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FIXED-BED GASIFICATION RESEARCH USING U.S. COALS, VOLUME 12 GASIFICATION OF ABSALOKA/ROBINSON SUBBITUMINOUS COAL

Contract H0222001
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16. Abstract (Limit: 200 words)

A single-staged, fixed-bed Wellman-Galusha gasifier coupled with a hot, raw gas combustion system and scrubber has been used to gasify numerous coals from throughout the United States. The gasification test program is organized as a cooperative effort by private industrial participants and governmental agencies. The consortium of participants is organized under the Mining and Industrial Fuel Gas (MIFGa) Group.

This report is the twelfth volume in a series of reports describing the atmospheric pressure, fixed-bed gasification of U.S. coals. This specific report describes the gasification of Absaloka/Robinson subbituminous coal. This volume covers the test period June 18, 1984 to June 30, 1984.

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FOREWORD

This report was prepared by Black, Sivalls and Bryson, Incorporated of Houston, Texas under USBM contract number HO222001. The contract was administered under the technical direction of the Twin Cities Research Center, with Mr. Robert Zahl acting as Technical Project Officer. Mr. Frank Pavlich was the contract administrator for the Bureau of Mines. This report is a partial summary of the work recently completed as a part of this contract during the period March-December, 1984. This report was submitted by the authors May 1, 1985.

Funding for this contract was through USBM/USDOE Interagency Agreement DE-A121-7ET10205.

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INTRODUCTION

The United States Department of Interior, Bureau of Mines, Twin Cities Research Center, Minneapolis, Minnesota is the site of a 6.5 foot diameter Wellman-Galusha gasifier, installed in 1977-78. This gasifier, combustor/incinerator, and flue gas scrubber system in the past had been operated jointly by Bureau of Mines personnel, personnel from member companies of the Mining and Industrial Fuel Gas group (MIFGa), and United States Department of Energy (DOE) personnel/consultants. Numerous tests using a variety of coals have to date been performed.

In May of 1982, Black, Sivalls & Bryson, Incorporated was awarded the contract to plan, execute, and report gasification test performance data from this small industrial fixed-bed gasification test facility. BS&B is responsible for program administration, test planning, test execution, and all documentation of program activities and test reports. The University of Minnesota, Particle Technology Laboratory is subcontractor to BS&B to monitor process parameters, and provide analysis for material inputs and outputs.

This report describes BOM/FGT-012, the gasification of Absaloka/ Robinson Subbituminous Coal, and is the twelfth final test report prepared under the BS&B operating contract. This volume covers the test period June 18, 1984 to June 30, 1984.

Section 1 is a brief summary of the test. Section 2 identifies the test objectives. Section 3 describes the fuel. Sections 4 and 5 describe the facility and monitoring procedures. Sections 6 and 7 describe the test and results. Section 8 gives conclusions. Data collected during the test are contained in the Appendices.

SECTION 1

TEST SUMMARY

Absaloka/Robinson Subbituminous coal is a non-swelling, low sulfur, low ash fusion temperature, subbituminous C coal mined in large quantities in the Powder River Basin of Montana. A similar coal was gasified with unsatisfactory results just after the installation of the gasifier. It was deemed appropriate to gasify the coal again with the upgraded controls and procedures instituted in the interim. A fresh shipment of the coal was screened for use in this test.

Testing of this coal involved gasification in a Wellman-Galusha gas producer, and combustion of the hot, raw gas in a combustion chamber. The products of combustion were water-quenched, cleaned of sulfur oxides and particulate, and exhausted.

The coal gasified well during the test. The coal bed deteriorated at high throughput when gasifying +1/4 inch coal, but was stable at similar throughputs when gasifying +3/4 inch coal. There was always some ash crusting and clinkering, even at modest throughputs. This is thought to be a result of the very narrow range of ash fusion temperatures from initial deformation to fluid. Very high dust loadings in the product gas were measured at high throughputs. Table 1-1 gives design point data for gasification of this coal at a throughput of 2.0 ton/hr and a blast saturation temperature of 152 F (66.7 C).

Due to high throughputs achievable and high gas quality observed during this test, relatively fresh Absaloka/Robinson subbituminous coal can be recommended as a single-stage, fixed-bed gasifier feedstock.

Table 1-1

Design Point Characteristics for Gasification
of Absaloka/Robinson Subbituminous Coal

Coal Throughput - 2.0 tons/hour (121 lb/hr/sq ft grate)

Air/Coal	1.80	lb/lb
Steam/Coal	.415	lb/lb
Blast Saturation Temperature	152	deg F
Gas Offtake Temperature	635	deg F
Wet Gas/Coal	48.0	scf/lb
Gas Dewpoint	132	deg F
Tar Yield	4.2	lb/100lb coal
Tar Analysis		
HHV (dry)	16995	Btu/lb
Pourpoint	85	deg F
Viscosity (210 F)	9.7	SUS
Specific Gravity (60/60 F)	1.0454	
Dry Gas Composition (mol%)		
Hydrogen	18.6	
Carbon Monoxide	28.8	
Methane	1.41	
Ethane	.100	
Ethylene	.059	
Propane	.028	
Propylene	.034	
Carbon Dioxide	5.15	
Nitrogen + Argon	45.7	
Water	8.84	lb/1000 dscf
Dry Gas HHV	171	Btu/dscf
Dry Gas LHV	160	Btu/dscf
Thermal Efficiencies		
Hot, Raw	90 %	
Cold, with Tar	81 %	
Cold, without Tar	73 %	

SECTION 2

TEST OBJECTIVES

2.1 Selection of Coal for Test

Absaloka/Robinson is a subbituminous C coal mined in large quantities and is readily available. Its low rank fits well into the coal test objective matrix, and expands the gasification data base for subbituminous coals.

A similar coal from the same mine (but not necessarily the same seam) was gasified under the supervision of the Bureau of Mines very early in the MIFGa program (Volume 1, Thimsen, Maurer et al, 1984). Results of this early test were poor and generally inconclusive due perhaps to inadequacies in the physical plant at that time, or due to the compaction and storage of the coal prior to the early test. It was desired to gasify this coal under optimum conditions and with the cumulative experience of 6 years of operation of the facility.

This coal is also very similar to Rosebud subbituminous coal gasified previously (Volume 3, Thimsen, Maurer et al, 1985), but is mined from a different seam. The Rosebud subbituminous coal (recovered from compacted storage) was subject to limited throughput due to gas channeling and ash clinkering. Performance results gathered during this test could be compared directly to those gathered during these previous tests.

The coal was readily available as fresh shipment in the Twin Cities.

2.2 Test Objectives

A. Determine gasifier performance (including throughput and conversion efficiency) gasifying this subbituminous C coal.

B. Investigate the influence of a wide size distribution (2 x 1/4 inch) and small bottom size on maximum throughput and thermal efficiency.

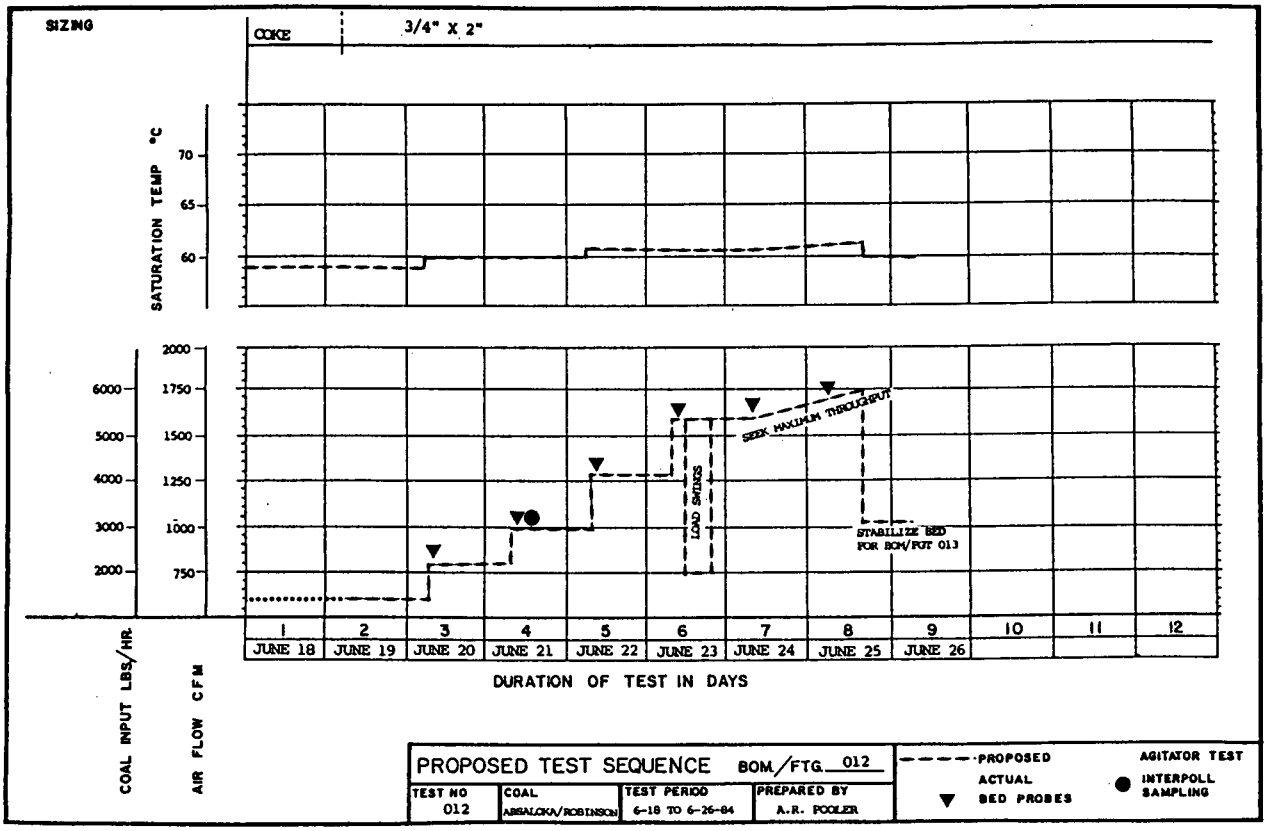
C. Identify the operational requirements for gasifying this low rank coal.

2.3 Test Plan

The proposed test plan for gasification of Absaloka/Robinson subbituminous coal is shown in Figure 2-1. Several load levels are shown along with some variation in blast saturation temperature. Evaluations of step changes in blast air flow are included. Agitator rate and vertical position are left to the

Figure 2-1

Proposed Test Plan, BOM/FGT-012



facility manager's judgement based on observed conditions during operation as are establishment of maximum throughput and optimum blast saturation temperature.

The grate spacings were set at 6 inches and 6.5 inches between the top and middle and the middle and bottom grates respectively.

SECTION 3

DESCRIPTION OF FUEL TESTED

The Absaloka coal gasified during BOM/FGT-012 is a subbituminous C coal mined from the Robinson seam by Westmoreland Resources, Inc. in Big Horn County, Montana. The McKay seam is also mined at this site. Figure 3-1 shows the location of the mine near Sarpy Creek, Montana. Yearly production of Robinson seam coal at this site is 1.8 million tons with total mine reserves in excess of 100 million tons. The primary market for this coal is for steam production.

The coal gasified during this test was obtained from a shipment destined for Northern States Power Company (NSP), Minneapolis, Minnesota. Coal from 16 rail cars was passed over a 1/4 inch screen at the NSP Highbridge plant (approximately 7 miles from the test site) shortly after unloading from the rail cars. 470 tons of screened coal was trucked to the test site from June 14 to June 15, 1984. The low yield of +1/4 inch coal from the screening operation (about 30%) indicates the very friable nature of this coal.

Table 3-1 gives the average analysis of the Absaloka coal gasified during BOM/FGT-012. Table 3-2 shows how the coal fits into the coal test objective matrix. Absaloka is a non-swelling, high-moisture, low-ash, low ash fusion temperature subbituminous C coal.

Figure 3-1

Location of the Sarpy Creek Mine
(Absaloka/Robinson Subbituminous Coal)

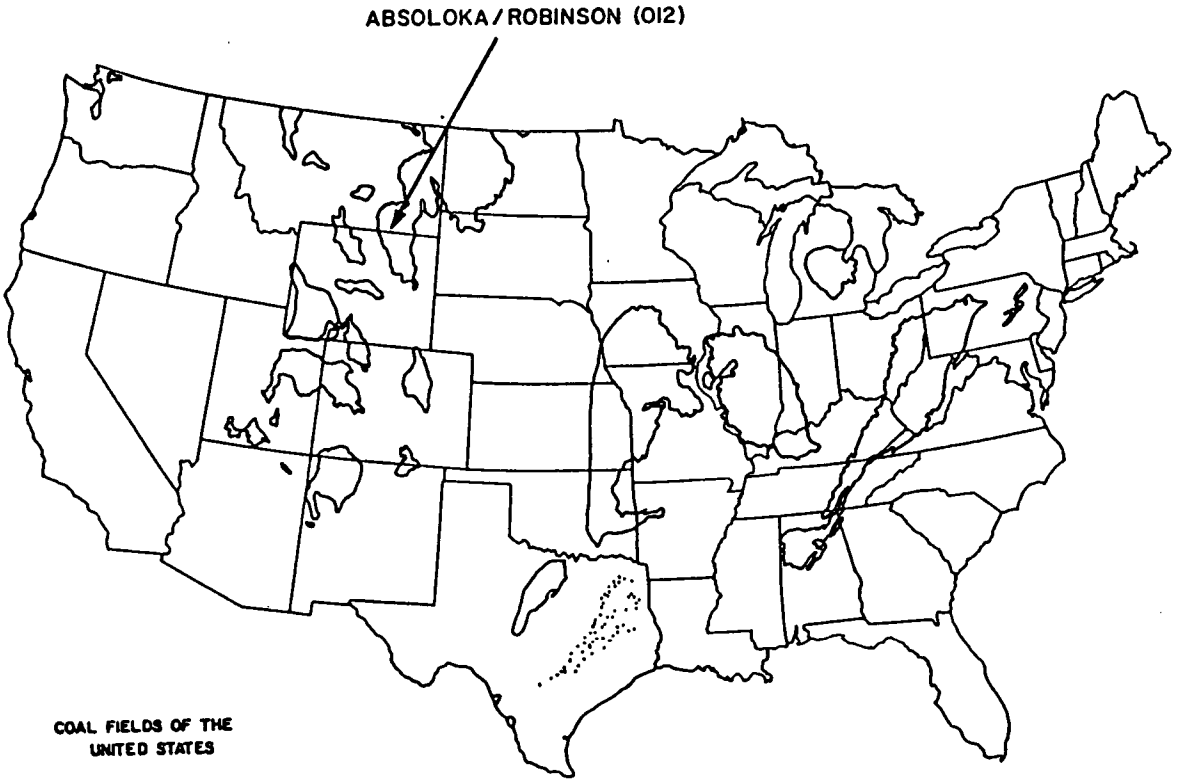


Table 3-1

Average Analysis of Absaloka/Robinson Subbituminous Coal

Proximate Analysis (%)	
Volatile Matter	29.56
Fixed Carbon	40.72
Ash	6.26
Moisture	23.46
Sulfur	0.31
Heating Value (Btu/lb)	9187
Ultimate Analysis (%)	
Carbon	53.59
Hydrogen	3.60
Nitrogen	0.54
Sulfur	0.31
Oxygen	12.22
Ash	6.26
Moisture	23.46

Ash Fusion Temperatures (deg F):	Oxidizing	Reducing
Initial deformation	2135	2070
Softening	2175	2105
Hemispherical	2195	2120
Fluid	2230	2175
Free Swelling Index:	0	

Table 3-2

Characteristics of Absaloka/Robinson Subbituminous Coal with Regard to the Coal Test Objective Matrix.

COAL TEST OBJECTIVE MATRIX										
PHYSICAL CHARACTERISTICS		COAL RANK								
TYPE	RANGE	BITUMINOUS	SUB-BITUMINOUS			LIGNITE	PEAT/BIOMASS	PETROLEUM COKE	BRIQUETTES
			A	B	C				
ASH CONTENT	H +20%								
	M 10-20%								
	L -10%				012				
ASH FUSION	H +2700 F								
	M 2300-2700 F								
	L -2300 F				012				
FREE SWELLING INDEX	H 3+								
	M 1-3								
	L 0-1				012				
MOISTURE CONTENT	H +15%				012				
	M 5-15%								
	L -5%								
FRIABILITY (GRINDABILITY)	H				012				
	M								
	L								

SECTION 4

FACILITY DESCRIPTION

The USBM/TCRC gasification facility is described in detail in Volume 1 of this series (Thimsen, Maurer et al, 1984). A brief description of the equipment and monitoring systems is given here.

4.1 Test Facility

The gasification test facility includes a 6.5 foot diameter Wellman-Galusha gas producer, a combustion test chamber and a wet caustic scrubber. The site also includes an iron ore pelletizing kiln, and a tar scrubber which were not used during this test. The entire stream of producer gas was consumed in the combustion chamber. A process flow schematic is shown in Figure 4-1. A bottom size screen removes fine material prior to transport to the overhead storage bin by bucket elevator.

The facility is equipped with standard industrial monitoring equipment for measurement of temperatures, pressures, flows, and process conditions. These are recorded by an automatic data acquisition system for subsequent process analysis.

4.1.1 Gas Producer

The gas producer is a 6.5 foot ID Wellman-Galusha, single-staged, fixed-bed, atmospheric-pressure gasifier. The gasifier has a gravity fuel feed system, a water-cooled agitator, and an eccentric-step type grate for ash removal. The retort is water-jacketed and has no refractory lining. Steam generated in the water jacket is mixed with blast air. Steam/air ratio in the blast is controlled with the temperature of the saturated steam/air mixture. Steam is imported if that generated in the water jacket is not adequate.

4.1.2 Gas Combustor

The gas combustor includes a baffle burner and a refractory-lined combustion chamber, and is designed to burn the full gas output of the gasifier at a rated capacity of 30 MMBTU/hour. The combustion products exhaust through an impingement tray-type wet caustic scrubber for sulfur dioxide and particulate removal. An induced draft fan is used to exhaust the scrubbed products of combustion through a flue stack.

4.2 Gas Sampling and Conditioning System

Figure 4-2 is a schematic of the gas sampling and conditioning system. The sampling port is thermally insulated to prevent condensation. The hot producer gas is quenched rapidly upon

Figure 4-1

Coal Gasifier Process Flow Schematic,
U.S. Bureau of Mines, Twin Cities Research Center.

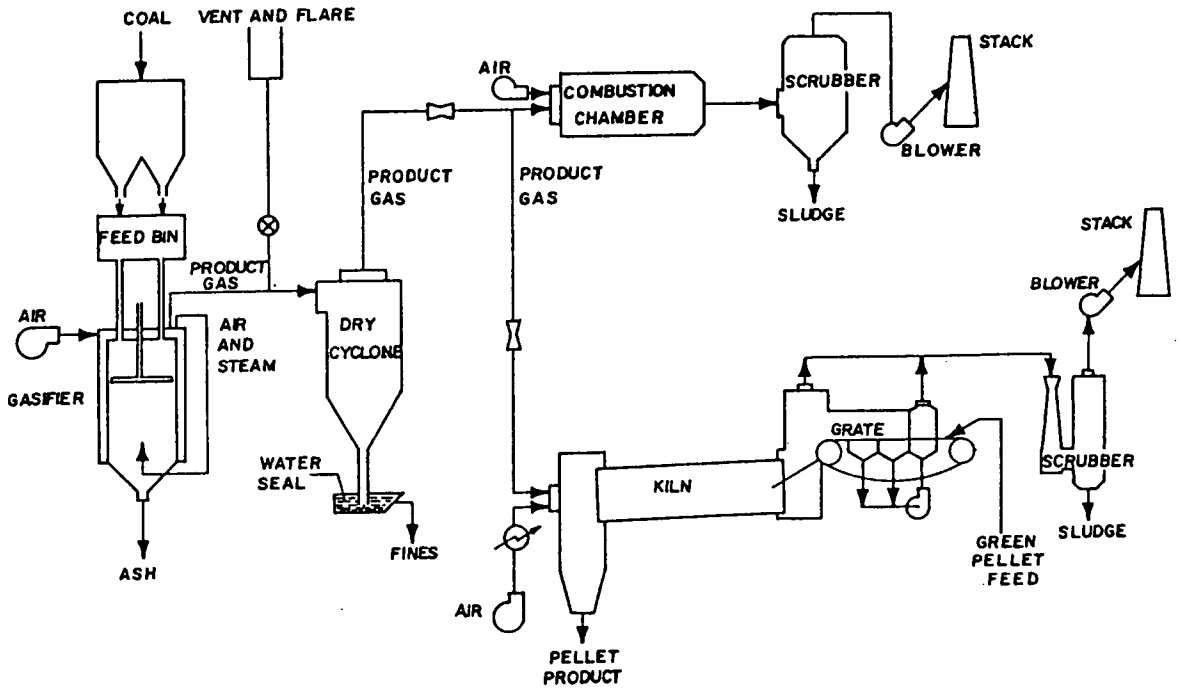
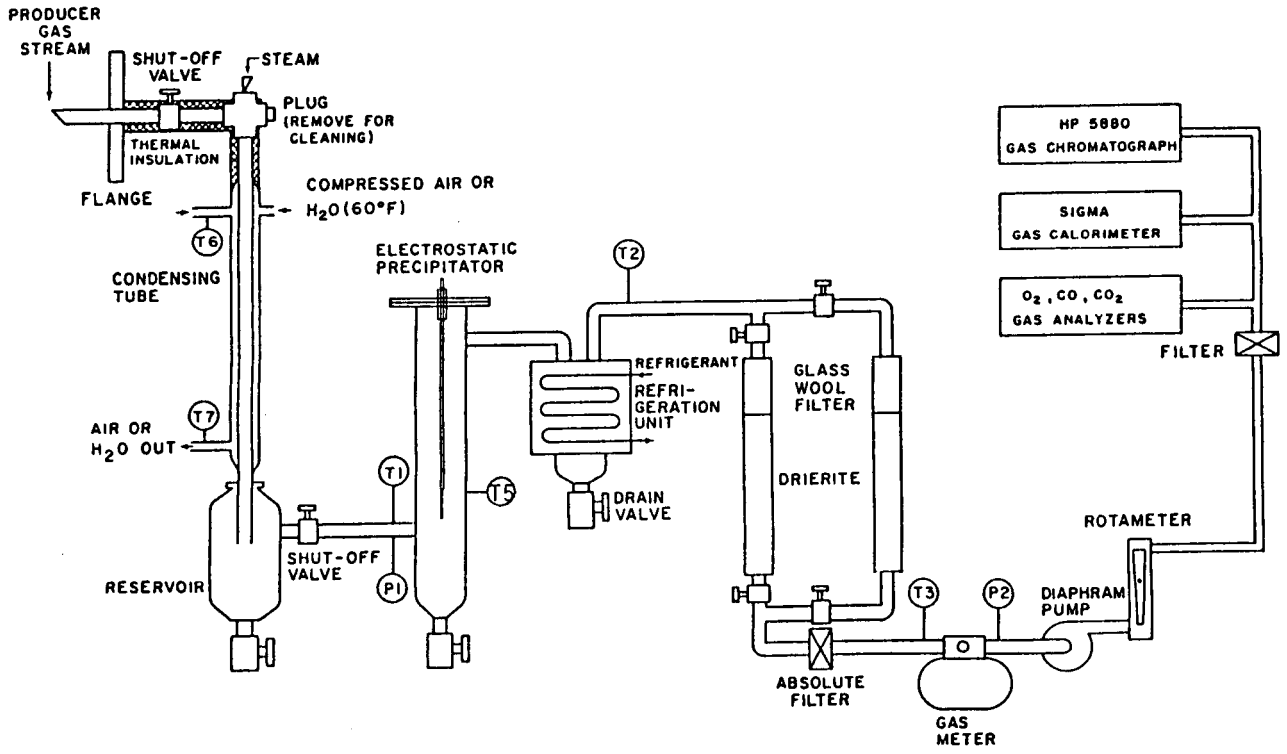


Figure 4-2

Schematic Diagram of the Gas Sampling and Conditioning System



entering the surface condenser which is cooled by cold water or cold, compressed air. The rapid quenching causes tar, oil, and water to condense on the inner surface of the condenser tube. The tar fog generated during cooling is removed in the electrostatic precipitator. The detarred gas is refrigerated and dessicated to remove water remaining in the gas stream. The dry, detarred gas is metered and transported to the instruments.

Condensate samples are collected from traps in the condenser, electrostatic precipitator, and refrigerator.

4.3 Gas Analysis Equipment

Carbon dioxide and carbon monoxide concentrations are continuously measured with individual Beckman 864 non-dispersive infrared (NDIR) analyzers. Oxygen is monitored continuously with a Beckman 755 paramagnetic oxygen analyzer. Higher heating value of the sample gas is measured with a SIGMA continuous flow calorimeter. These signals are all recorded by the automatic data acquisition system.

Detailed gas composition is determined every 23 minutes with a Hewlett-Packard model 5880A gas chromatograph. The principal features of this chromatograph are listed in Table 4-1.

Sulfur species concentrations in the gas are determined with a HP 5793 gas chromatograph by manual injection of grab samples. The principal features of the HP 5793 are given in Table 4-2.

Table 4-1

Operating Configuration and Conditions,
Hewlett-Packard Model 5880A Gas Chromatograph

1. Columns used:
   a. 1-10 ft x 1/8 inch SS Porapak Q
   b. 1-10 ft x 1/8 inch SS Molecular Seive 5A
   c. 2-18 ft x 1/8 inch SS 2% OV-101 on WHP

2. Dual detectors - flame ionization detector in series with thermal conductivity detector

3. Set up for analysis of the following species:
   Hydrogen, Carbon dioxide, Ethylene, Ethane, Propane, Propylene, Oxygen, Nitrogen, Methane, and Carbon monoxide

4. Argon Carrier Gas - flow rate of 28 ml/min

5. Programmed Temperature from 75 C to 165 C to 135 C

6. 1.0 ml sample

7. 18 minute analysis time

Table 4-2

Operating Configuration and Conditions,
Hewlett-Packard Model 5793 Gas Chromatograph

1. Flame photometric detector

2. Single column - 18" x 1/8" Teflon Supelpak-S (Porapak QS)

3. Ten port valve for sample injection and column backflush

4. Integrator with limited control capabilities

5. Nitrogen carrier gas: Carrier Flowrate = 32 ml/min

6. Sample loop size = 125 ul

7. Temperature program:
   Initial temperature 30 C
   Initial time 1.5 min
   Program rate 35 C min
   Final temperature 170 C
   Final time 5.0 min

8. Analysis cycle time 25 min.

SECTION 5

TEST PROCEDURES

Test procedures are described in detail in Volume 1 of this series (Thimsen, Maurer et al, 1984). The following is a summary of the procedures including specific procedures used in this test only.

5.1 Test Teams

5.1.1 Gasifier Operation and Overall Coordination

The gasifier operations team was organized by Black, Sivalls & Bryson, Incorporated (BS&B) and consisted of the facility manager, facility engineers, three shift lead operators and additional helpers as required. The gasifier was staffed with a lead operator and two helpers, three shifts each day.

The gasifier operations team was responsible for overall operation of the gasifier and associated process equipment and coordination of the three test teams. This includes: gasifier start-up, coal gas handling and incineration, exhaust gas cleanup, coal addition and sample collection, fire bed monitoring, process equipment maintenance and repair, operation of the boiler, changes in process conditions, sampling of waste water streams, and measurement of retort temperature and pressure profiles.

5.1.2 Gasifier Monitoring

The gas sampling and data retrieval/monitoring team was organized by the University of Minnesota Particle Technology Laboratory, and consisted of persons with individual responsibility for:

1) sample gas cleanup
2) gas chromatograph
3) continuous gas analysis and SIGMA continuous calorimeter
4) data acquisition system
5) safety evaluation personnel

and such equipment operators as were necessary. The monitoring systems were staffed 24 hours per day.

The monitoring team was responsible for recording continuous process signals, operation of the gas chromatographs and continuous gas analysis equipment, operation of the gas sampling and conditioning system, collection of tar and oil samples, analysis of coal, ash, and cyclone dust samples, retort exhaust particle sampling and evaluation of health and safety measures.

5.1.3 Stack Gas Sampling

Interpoll, Incorporated, a subcontractor to the University of Minnesota, had a two-man team on site on June 22, 1984. They sampled for exhaust emissions from the gas combustor.

5.2 Gasifier Sampling and Data Acquisition Procedures

5.2.1 Continuous Data

An Analog Devices, Incorporated MACSYM 350 data acquisition system was used for this test. Process signals are sampled once a minute. Ten-minute signal averages are recorded on floppy disc. Thirty-minute signal averages are printed by line printer. The operations team also logs these signals hourly along with some twenty other parameters not sampled by the data acquisition system. During observation of transients the sample time is reduced to 6 seconds with one minute averages written to disc.

5.2.2 Gas Analysis Data

The continuous gas analyzers are calibrated daily, according to the manufacturer's recommendations. Output signals are recorded by the data acquisition system.

The HP 5880A gas chromatograph is calibrated using a mixture of oxygen, carbon monoxide, carbon dioxide, hydrogen, methane, ethane, ethylene, propane, propylene, and nitrogen at concentrations which nearly duplicate the gasifier offgas. Another calibration mixture with the concentrations of all the species except nitrogen increased by about 50%, and the nitrogen correspondingly reduced, is used to check the linearity of the detectors.

The HP 5793 gas chromatograph is calibrated before and after the test. Calibrations with varying levels of hydrogen sulfide in nitrogen have confirmed the square root response of the flame photometric detector to gas sulfur concentrations. The hydrogen sulfide FPD calibration factor is used for determination of carbonyl sulfide and mercaptan concentrations.

5.2.3 Tar and Oil Data

The condensed tar, oil, and water are removed from the accumulation reservoirs daily. Water collected in the surface condenser and sample electrostatic precipitator is decanted from the tar and combined with the water from the refrigerator. Tar from the surface condenser is combined with tar and oil collected in the sample electrostatic precipitator. Condensate loadings are measured by weighing both the tar/oil sample and the water sample. Moisture content of each daily tar sample is determined by distillation.

5.2.4 Coal Data

Coal samples are taken by the operations team during coal addition to the lock hopper four times each shift. These four samples are stored in one bucket and submitted as a composite shift sample. Detailed chemical analysis of the coal is performed on a composite of the shift samples.

5.2.5 Ash Data

An ash sample is taken by the operations team each time ash is discharged, and stored in a sealed container. For each ash sample the bulk density, particle size distributions, and carbon, sulfur, and moisture content of the ash are tabulated by the monitoring team. The carbon and sulfur content of each sample is determined from milled samples submitted by the monitoring team. The ash samples, on which detailed analyses are performed, are composited over the same time periods used for compositing the coal samples.

5.2.6 Dust Data

Samples of cyclone dust are grabbed daily from the dust accumulation bin. A single composite of all daily samples is submitted for analysis.

5.2.7 Exhaust Gas Sampling

The gas phase combustion exhaust is analyzed by EPA methods 5 and 6 for sulfur dioxide, nitrogen oxides, and particulates once during the test.

5.2.8 Retort Particle Sampling

Sampling of the gasifier offtake for particles is performed periodically as operating conditions permit.

5.2.9 Retort Temperature and Pressure Data

Vertical temperature and pressure profiles are taken at a single location periodically. The measurements are made at the end of relatively stable periods of operation just before operational changes are made.

SECTION 6

CONDUCT OF THE TEST

The gasification test began at 10:00 am on June 18. The modified start-up procedure (Volume 1, Thimsen, Maurer et al, 1984) was used with green petroleum coke as the initial fuel. The subbituminous coal (screened at 1/4 inch on site) entered the retort at 2:30 pm and fully occupied the retort by midnight.

The test history is given in Figure 6-1.

It was anticipated that the coal would behave somewhat like Rosebud subbituminous coal (Volume 3, Thimsen, Maurer et al, 1985), so relatively modest blast air flows were initially called for. One day each was spent at blast air flows of 400, 600, 900, 1200, and 1500 cfm. During this time period operation was stable and gas quality very high (170 - 180 Btu/dscf). The blast saturation temperature (BST) was maintained at 59-60 C (138-140 F) during this period.

On June 23 the blast air flow was set at 2100 cfm in an effort to identify maximum throughput. At this high blast air flow coal consumption was approximately 2.4 tons/hour, but gas quality declined and the fire bed deteriorated significantly until the air flow had to be reduced to 1700 cfm on June 24. On June 25 the air flow was further reduced to 600 cfm to allow the bed to stabilize. This low air flow was held until June 27.

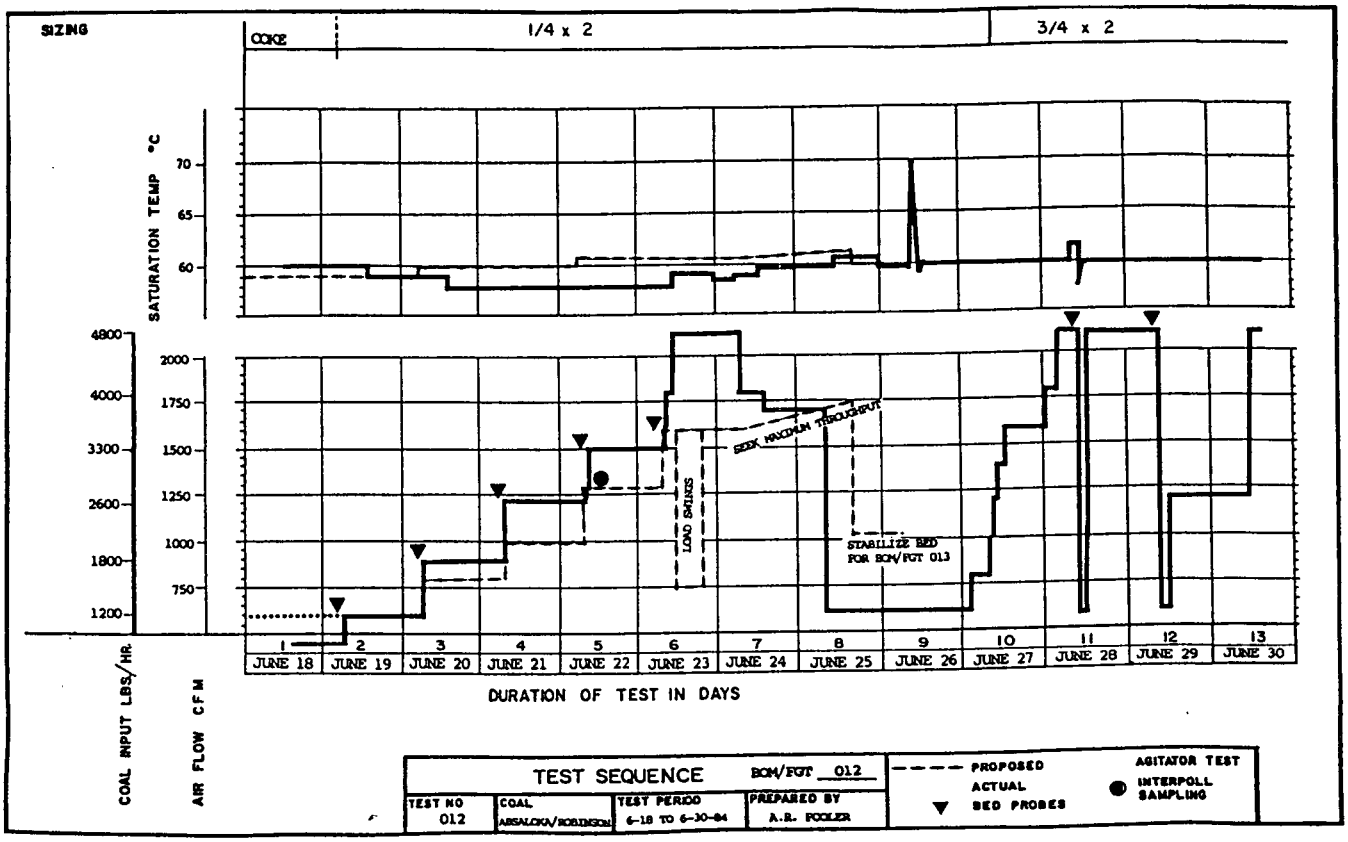
Early in the morning of June 27 the blast air flow was increased gradually to 1700 cfm. The coal screen was changed from 1/4 inch mesh to 3/4 inch mesh during the day. Coal screened at +3/4 inch reached the retort at 5:00 pm. Elimination of the -3/4 inch coal from the gasifier feed had a positive effect on operation. Firetests showed a more stable bed within several hours.

Blast air flow was raised to 2100 cfm on June 28 and held for approximately 30 hours with no significant deterioration in bed stability. Resulting coal consumption was 2.4 tons/hour. Two periods of rapid load change were undertaken to study transient behavior of gasification of this coal. These were at 12:15 - 3:15 on June 28 and 10:15 - 1:15 on June 29. The test ended at 4:30 pm on June 30.

Throughout the test the grate was operated at low speed or intermittently as the ash content of the delivered coal was less than expected. The ash was whitish during stable operation and charcoal grey to black during the unstable periods of June 23 - 25. Throughout the test large ash chunks (5-6 inches) were removed from the ash cone, but at no time was excessive torque exerted by the grate to remove this material.

Figure 6-1

Test History, BOM/FGT-012



Most of the firetests showed clinker under one or more holes, or multiple fire zones. The location of the clinker was not constant, but moved from point to point in a random fashion.

Very large quantities of cyclone dust and sludge were removed during operation at high throughput. Dust generated when gasifying the +3/4 inch coal was less than that generated when gasifying the +1/4 inch coal.

SECTION 7

TEST RESULTS

7.1 Data Summary

7.1.1 Continuous Output Transducer Data

The data acquisition system operated smoothly throughout the test. There was, however, one time period greater than 3 hours where no data were collected. Loss of this data was due to operator error. This time period of 947 minutes beginning 1709 on June 29, 1984, shows up as blank data on the graphs following.

The physical characteristics of the gasifier operation are shown in Figure 7-1. Dry gas heating value, fire loss pressure, and offtake temperature are shown along with the operating parameters.

The offtake temperature under steady operation varied between 200 and 350 C (390-660 F). There appears to be some correlation of offtake temperature with load as represented by blast air flow. The upset periods of June 23-26 are readily identifiable by the higher and more variable offtake temperatures.

The dramatic rise in offtake temperature and corresponding drop in fireloss pressure on June 24 is consistent with gas channeling noted by the operators. The dramatic drop in offtake temperature on June 26 occurred after increasing the grate speed dramatically and operator efforts to break ash clinkers. The fresh coal replacing the removed ash and clinker brought the temperature down. The removal of clinker then allowed more even distribution of blast across the retort and minimized gas channeling. The offtake temperature behaved in a relatively stable manner thereafter.

The fireloss pressure was generally proportional to blast air flow. Somewhat elevated fireloss pressures than might be expected were observed during the upset period of June 23-26 (with the exception of the episode of June 24 described above).

Dry gas heating value was fairly steady at 165-175 Btu/dscf during stable operation. During the upset period of June 23-26 dry gas heating value dropped to 145-160 Btu/dscf with a brief excursion to 135 Btu/dscf on June 25.

On June 28, a series of rapid changes in blast air flow were undertaken to observe the transient response of the gasifier. The continuous carbon monoxide and carbon dioxide signals along with offtake temperature are shown with operating parameters in Figure 7-2. The long term changes in blast saturation temperature (BST) corresponding to the step changes in blast air

Figure 7-1

Physical Characteristics of the Gasifier Operation

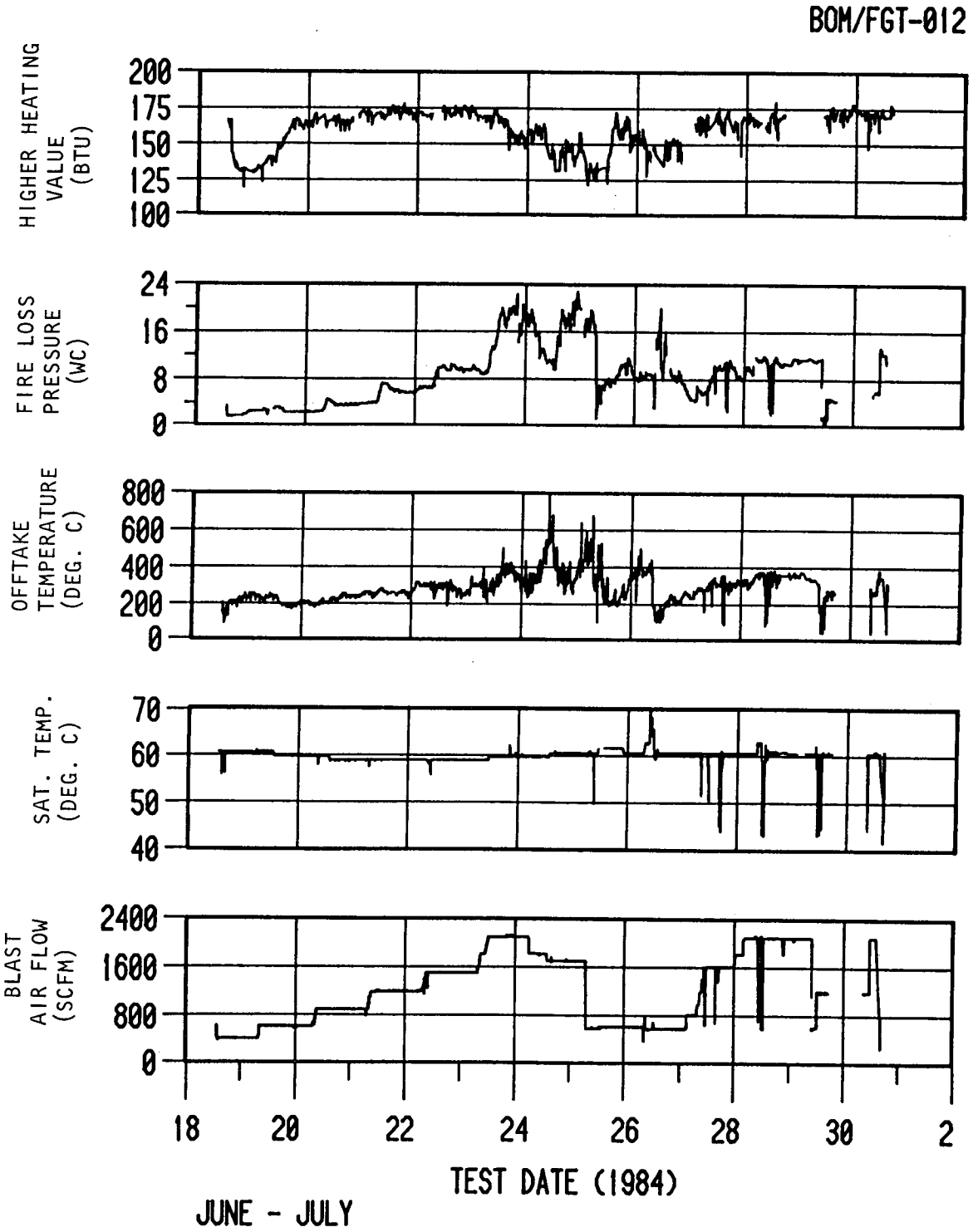
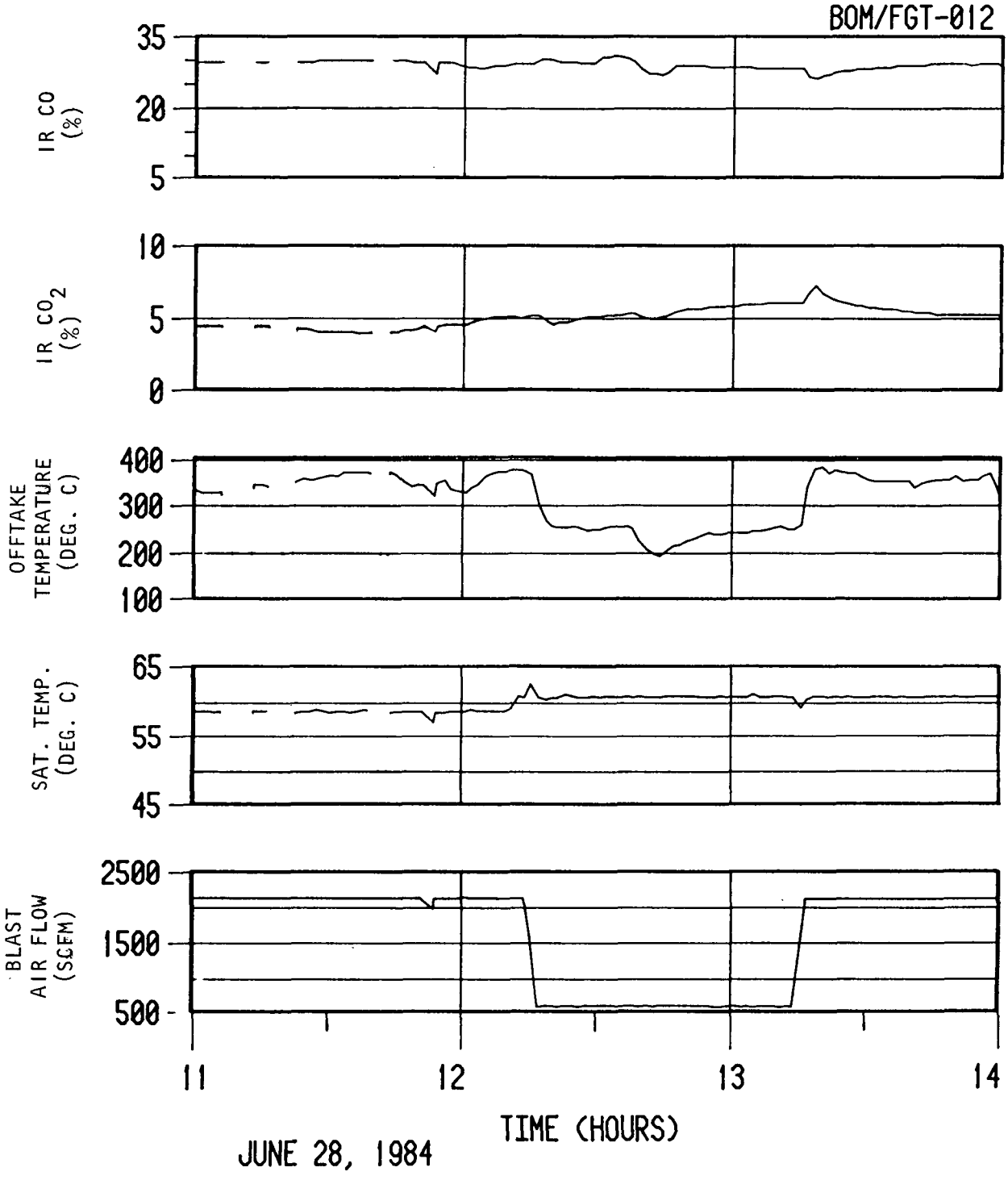


Figure 7-2

Gasifier Response to Step Changes in Blast Air Flow



flow are the result of a change in controller set point. The short term (<10 minutes) response of the BST to the step changes in blast air flow are true dynamic responses of the of the blast air saturation process in the water jacket freeboard. The offtake temperature is definitely lower at lower blast air flow rates during this 1-hour period.

It is difficult to detect any changes in carbon monoxide or carbon dioxide concentration on a drop in blast air flow rate. Upon the rise in blast air flow rate, the carbon monoxide concentration dropped for about 10 minutes before returning to its previous level. The carbon dioxide concentration rose slightly during this same transient period.

7.1.2 Coal, Ash and Dust Data

A complete listing of the analyses performed on the bulk coal, ash, and cyclone dust samples collected during BOM/FGT-012, together with the number of samples analyzed is shown in Table 7-1.

7.1.2.1 Coal Data

The mass fraction of coal less than each of five indicated mesh sizes and the mean coal particle size are presented in Figure 7-3. The fraction of coal passing the 3/4 inch analysis screen was about 20%. It is difficult to detect the change in coal bottom size screen on June 27 from these data. The fraction of coal less than 3/4 inch decreased slightly, but this decrease was insignificant. Either the 3/4 inch screening operation was inefficient, or considerable particle degradation occurred from the end of the screen to the weigh bin discharge. The geometrical mean coal was relatively steady, averaging about 0.95 inch. The average coal particle size distribution for the entire test is shown in Figure 7-4.

The results of the physical and chemical analyses of a single composite coal sample are given in Table 7-2. The most significant analyses here are the ash fusion temperatures. There is a very narrow range of temperatures (<100 F) from initial deformation to fluid. This narrow range means that there is little warning before ash clinkering takes place. This is consistent with the presence of clinkered ash alongside granular ash through the test. The clinker may form when small differences in blast distribution across the retort occur.

7.1.2.2 Ash Data

The mass fraction of ash less than each of five indicated mesh sizes and the mean ash particle size are shown in Figure 7-5. The ash particle size distribution was relatively steady during stable periods of operation. During the upset conditions of June 23-26, the ash size distribution showed more material over 2 inches and less than 1/4 inch with an initial increase than a

Table 7-1

Summary of Coal, Ash and Cyclone Dust Analyses

Material	Type of Analysis	Number of Samples Collected and Analyzed	Number of composite Samples Analyzed
Coal	Particle size distribution	36	---
	Proximate analysis	---	1
	Ultimate analysis	---	1
	Ash fusion temperature	---	1
	Free swelling index	---	1
Ash	Particle size distribution	111	---
	Bulk density	111	---
	Moisture content	111	---
	Carbon content	111	1
	Sulfur content	111	1
	Chemical analysis	---	1
Cyclone Dust	Proximate analysis	---	1(**)
	Ultimate analysis	---	1(**)

(**) Composite from 11 cyclone dust samples.

Figure 7-3

Feed Coal Size Distribution Analysis and
Geometrical Mean Coal Particle Size

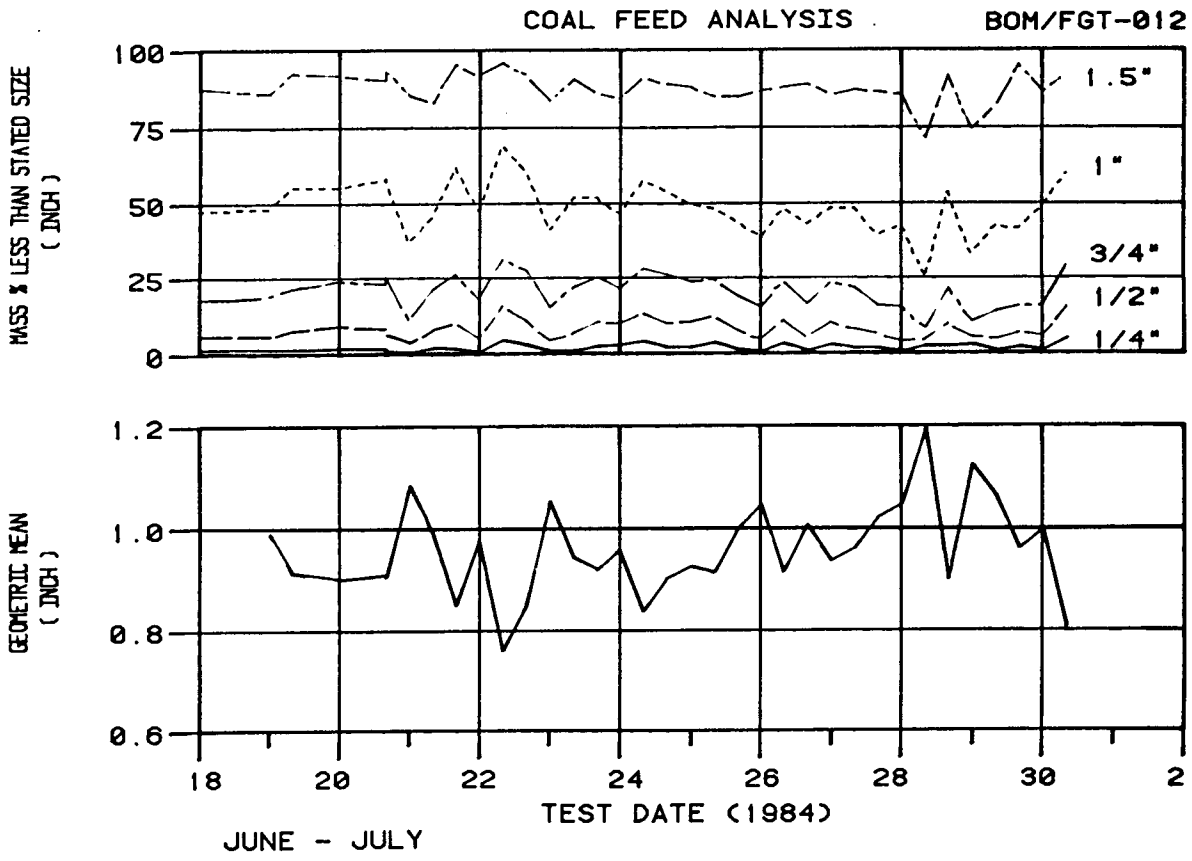


Figure 7-4

Average Particle Size Distribution of Feed Coal

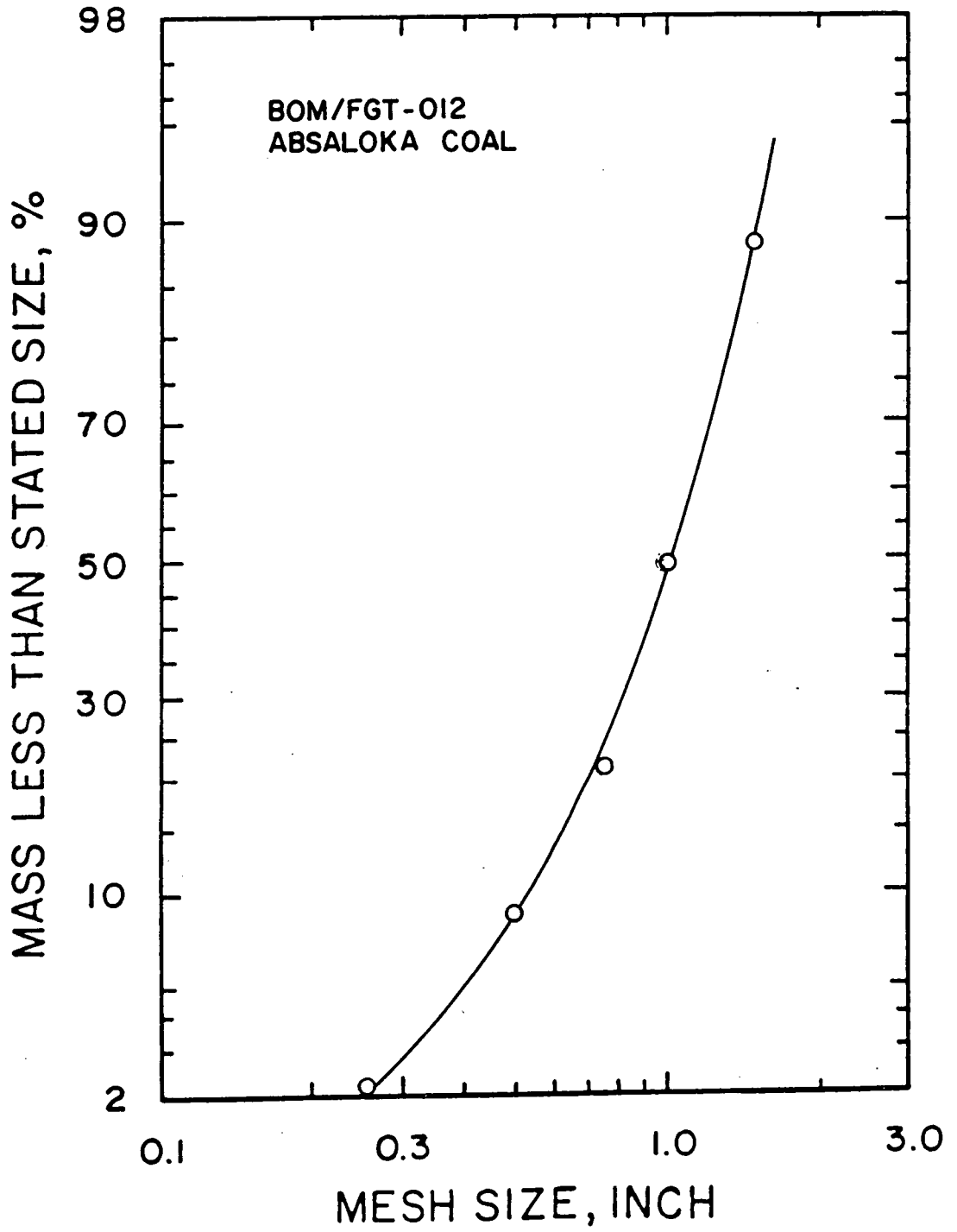


Table 7-2

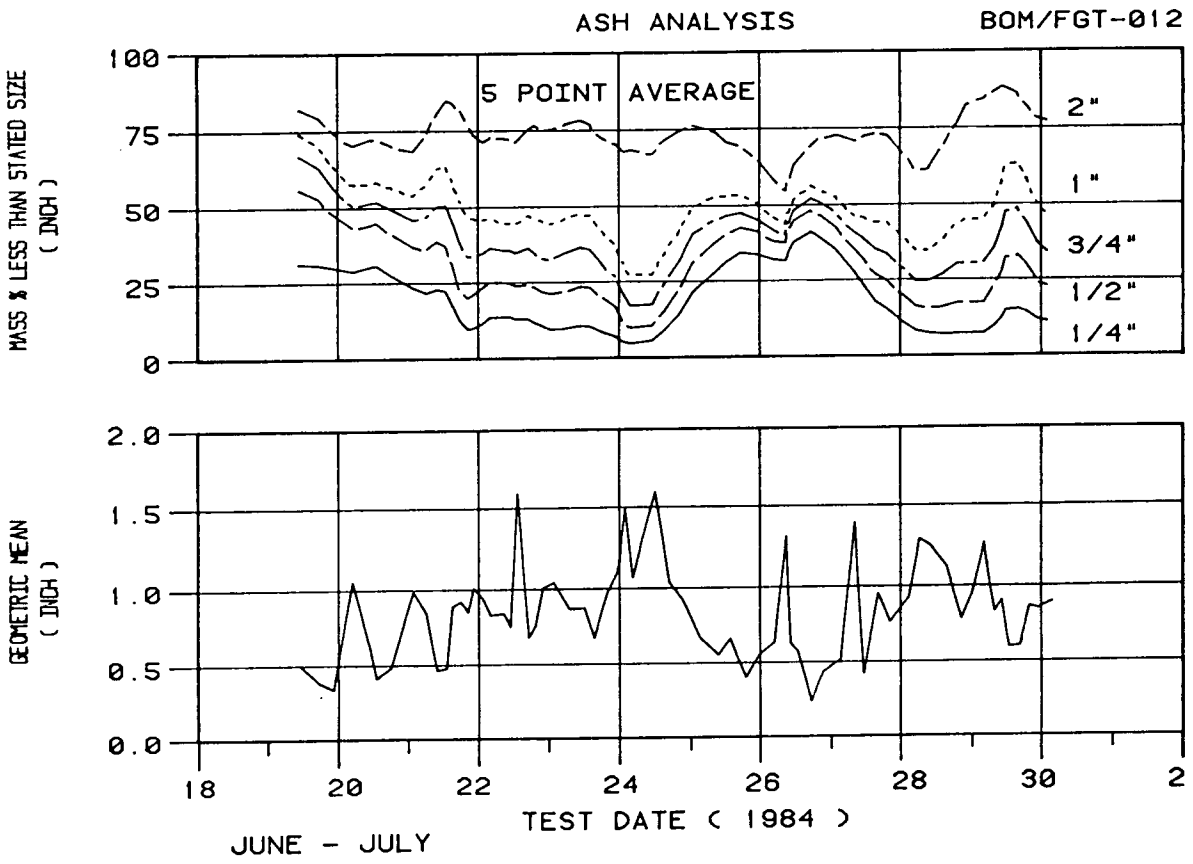
Physical and Chemical Properties of Coal and Cyclone Dust

Material	Coal	Cyclone Dust (dry basis)
Type of Analysis (*)		
Proximate Analysis, wt % :		
Moisture	23.46	---
Volatile Matter	29.56	19.46
Ash	6.26	26.82
Fixed Carbon (**)	40.72	53.71
Ultimate Analysis, wt % :		
Hydrogen	3.60	2.06
Carbon	53.59	65.20
Nitrogen	0.54	0.57
Sulfur	0.31	1.82
Oxygen (**)	12.22	3.53
Ash	6.28	26.82
Moisture	23.46	---
Heating Value, btu/lb :		
As Recieved	9187	
Moisture Free	12003	10279
Ash Fusion Temp. Deg F:		
(Oxidizing Atmosphere)		
Initial Def., IT	2135	---
Softening, ST	2175	---
Softening, HT	2195	---
Fluid, FT	2230	---
(Reducing Atmosphere)		
Initial Def., IT	2070	---
Softening, ST	2105	---
Softening, HT	2120	---
Fluid, FT	2175	---
Free Swelling Index	0	---

(*) All values as received unless otherwise noted.
(**) By difference.

Figure 7-5

Ash Size Distribution Analysis and
Geometrical Mean Ash Particle Size



decrease in mean ash particle size.

Figure 7-6 shows the physical and chemical characteristics of the ash along with operating parameters. Ash carbon content was very low except during the period of June 25-26 when the grates were operated at high speed. Some unconsumed char was removed from the gasifier during this period. Ash sulfur content tended to track ash carbon content, but in a less pronounced fashion. Geometrical mean ash particle size decreased as carbon content increased. Dry ash bulk density was not greatly affected by operation or condition of the bed.

(It should be noted that the ash analyses represent ash generated 4-6 hours prior to the time of the ash dump. This is the time required to move the ash from the combustion zone to the ashpit.)

Table 7-3 gives the chemical analysis of a single sample of ash composited over the entire test. The ash is alkaline, consistent with the somewhat higher sulfur levels in the ash.

7.1.2.3 Cyclone Dust Data

The chemical analysis of a single cyclone dust sample composited from eleven daily grab samples is given in Table 7-2. The volatile matter to fixed carbon ratio of the cyclone dust is only 49% that of the feed coal. This is consistent with partial devolatilization of the dust in the high temperature regions of the upper retort and ductwork to the cyclone. This partial devolatilization is not, however, enough to account for the increased ash content of the cyclone dust. The ash to fixed carbon ratio of the dust is 3.2 times that of the feed coal. High ash materials are, apparently, preferentially blown over. These materials may come from the lower regions of the retort where some of the fixed carbon has been lost to the gas phase during gasification.

7.1.3 Gas Analysis Data

The NDIR gas analyzers and the SIGMA continuous calorimeter operated well during the test. The HP 5880A gas chromatograph measuring the major gaseous species and hydrocarbons gave data for the entire test period. The HP 5793 gas chromatograph measuring the gas sulfur species experienced major electrical control problems and flame photometric detector operating problems; consequently, gas phase sulfur data were collected during only a portion of the test.

The major gaseous species concentrations are shown in Figure 7-7. The species concentrations changes little except during the period of June 24-26. During this period carbon dioxide and nitrogen concentrations rose while carbon monoxide and hydrogen

Figure 7-6

Ash Characteristics and Operating Conditions

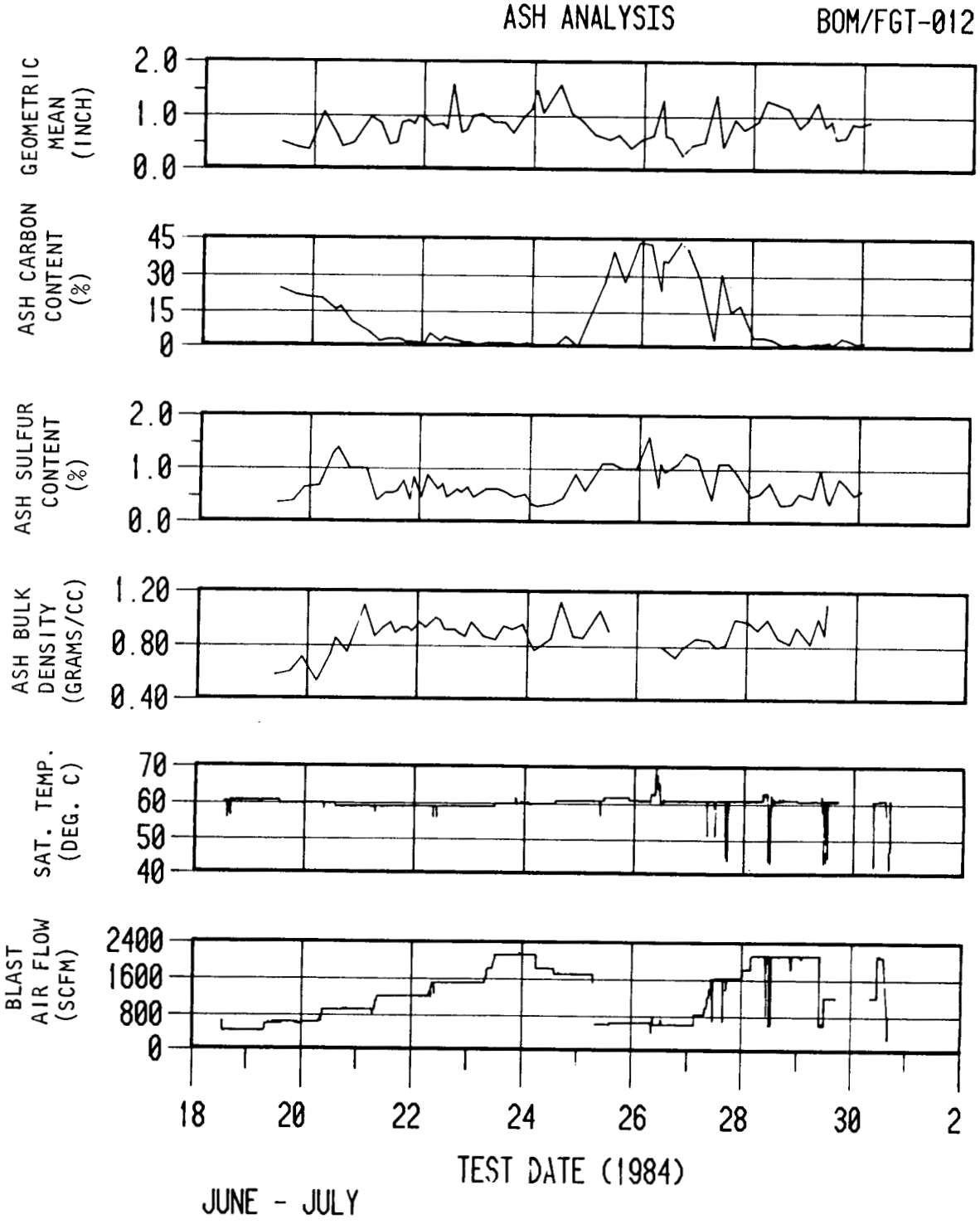


Table 7-3

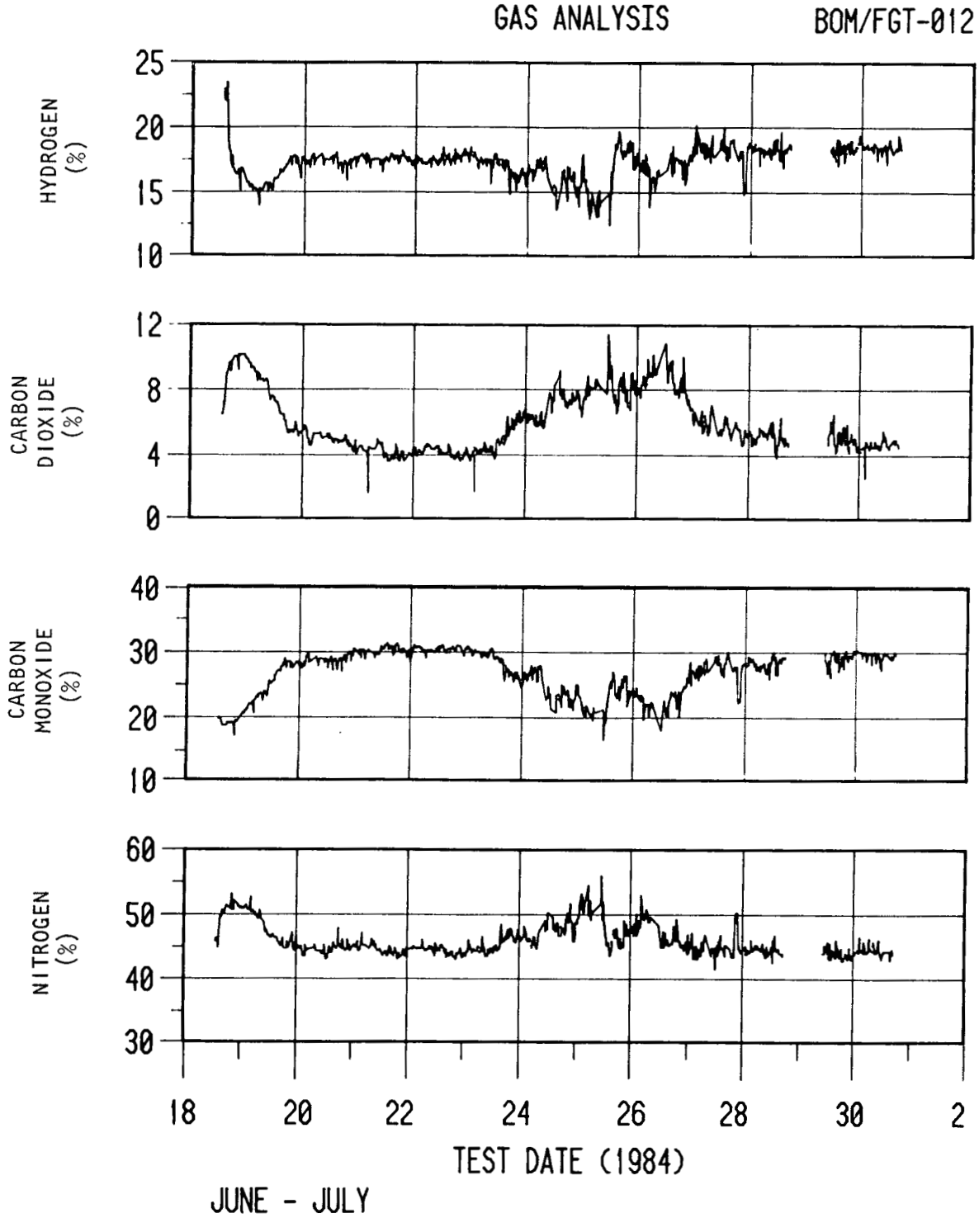
Elemental Analysis of Moisture-Free Ash

Element	Mass Fraction, % (**)
Fe	7.9
Fe(2+)	2.7
Si	19.6
Al	8.0
C	12.9
Ca	10.5
Mg	1.3
K	.40
P	.09
Na	3.2
S	1.2
Ti	.47

(**) Unaccounted for mass is presumed to be oxygen contained in metal oxides.

Figure 7-7

Major Gas Species Measured by the Gas Chromatograph.



concentrations fell. This incomplete reduction of the gas phase is consistent with gas channeling and shorter gas phase residence times. Elimination of the gas channeling resulted in restoration of all major gas concentrations to their steady state level.

The major gas species and operating parameters are shown in Figure 7-8. A small rise in carbon monoxide concentration and decline in carbon dioxide concentration is detectable on the drop in blast saturation temperature on June 20. This is may be associated with rapid achievement of water-gas equilibrium in the gasifier. Otherwise, there is no strong correlation of product gas composition with operating parameters.

The hydrocarbon species concentrations are shown in Figure 7-9. Methane concentrations were relatively steady at about 1.45% but rose during June 25-26. Ethylene concentrations rose dramatically during the period June 23-26. This correlates well with rises in offtake temperature during this period and is consistent with cracking of high molecular weight hydrocarbons. Ethane concentrations tended to track methane concentrations.

Propylene and propane concentrations also tended to track methane with the exception of an episode on June 24-25. During this period, these concentrations dropped dramatically and then returned just as dramatically to their previous levels. The rapid drop in these concentrations does not correlate with any identifiable operational event. The rise in concentrations occurred at the same time as the drop in blast air flow on June 25.

The gas phase sulfur species are shown in Figure 7-10. The data show very low methyl mercaptan concentrations. Approximately 25-30 percent of the gas phase sulfur occurs as carbonyl sulfide with about 70% as hydrogen sulfide. Total gas phase sulfur was about 400 ppm.

7.1.4 Tar and Water Yield Data

The only problems experienced operating the gas sampling and conditioning system during BOM/FGT-012 were related to erratic operation of the ESP high voltage power supply. The power supply was replaced during the test. The condensate traps were drained daily to calculate tar and water loadings.

The tar and water loadings are shown in Figure 7-11 along with offtake temperature and operating parameters. The most noticeable feature of these data is the rise in water content of the gas on the June 24 drain. This is consistent with the poor reducing conditions (discussed in Section 7.1.3) occurring due to gas channeling in the retort.

A single tar sample composited from those collected during the entire test was submitted for analysis. The results of the

Figure 7-8

Dry gas HHV, Major Gas Species and
Gasifier Operational Parameters.

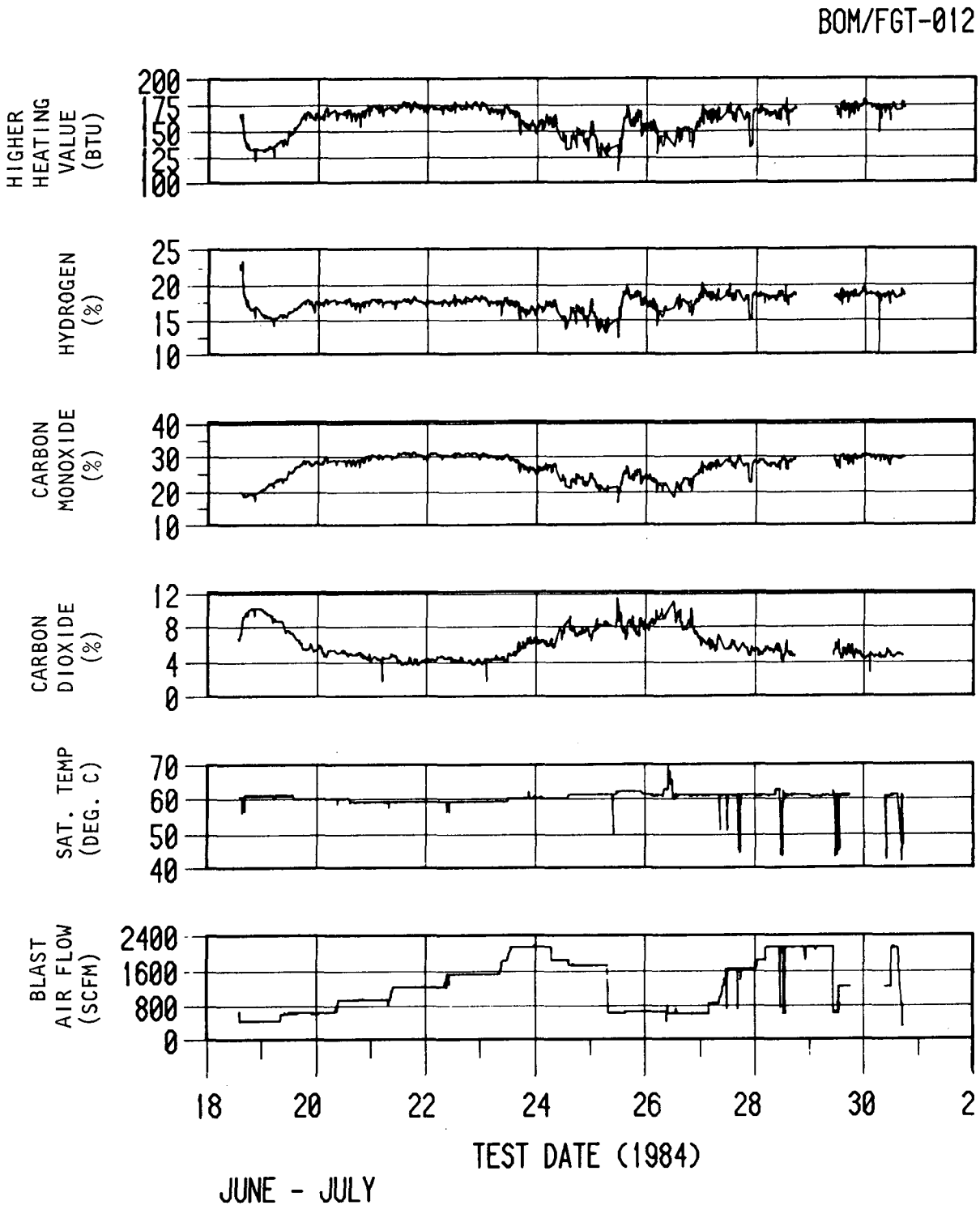


Figure 7-9

Minor Gas Species Measured by the Gas Chromatograph.

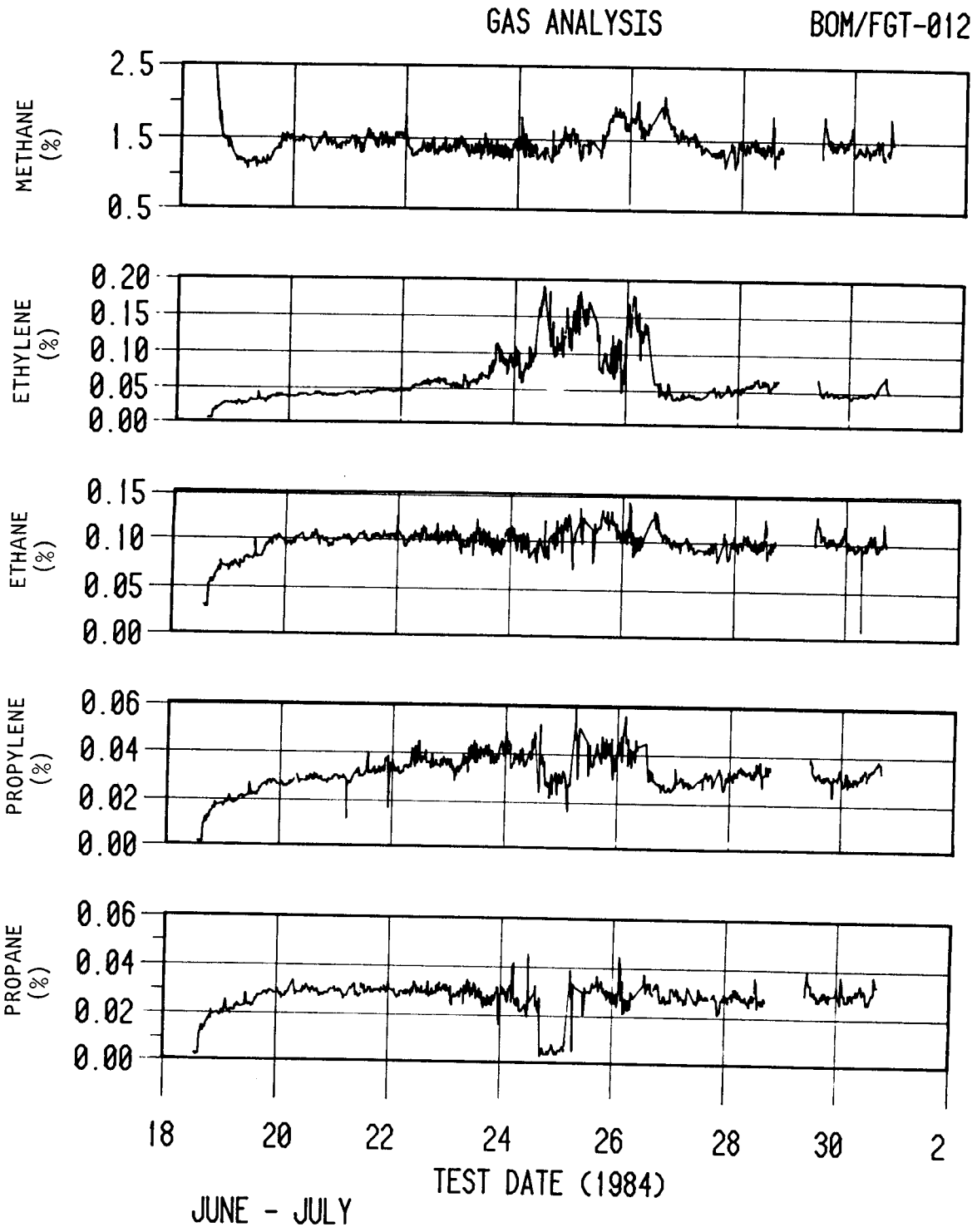


Figure 7-10

Sulfur Species Measured by the Gas Chromatograph

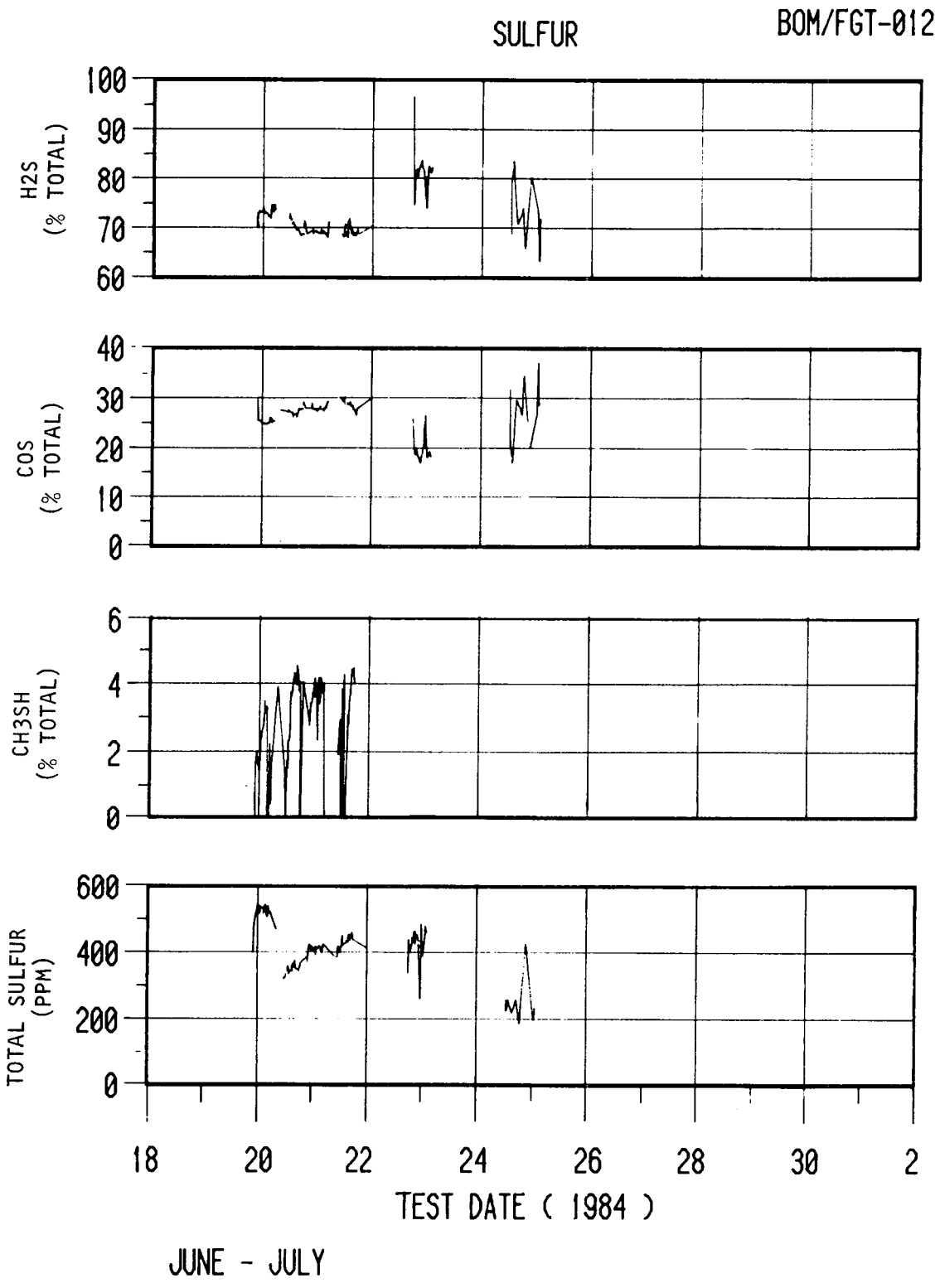
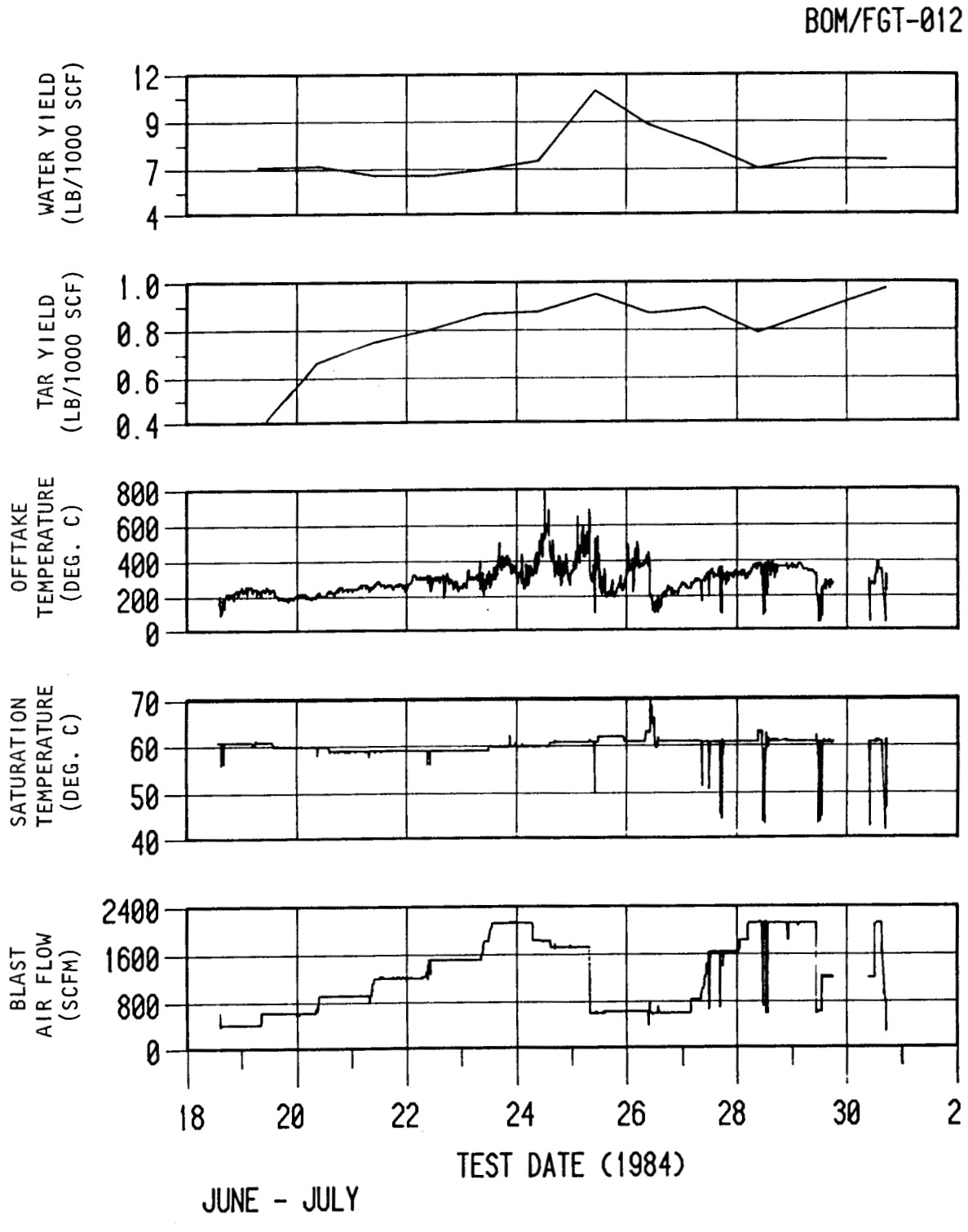


Figure 7-11

Tar/Oil Yield and Water Yield with Operating Conditions



analysis are shown in Table 7-4.

7.2 Material and Energy Balances

The material and energy balance calculation procedure is described in detail in Volume 1 of this series (Thimsen, Maurer et al, 1984). A brief description is given here.

The measured values used to calculate balances around the gasifier include process temperatures, pressures, flows, material ultimate analyses, gas compositions, dust carryover measurements (Section 7.6), and tar and water loadings in the gas.

The relative gas phase sulfur species data described in Section 7.1.2 was extrapolated to the entire test. The total gas phase sulfur concentration is calculated assuming that sulfur in the feed coal not appearing in the ash, tar, or dust appears in the gas. Total gas composition is then normalized to 99.9 mol % species accounted for.

The balances are calculated over various time periods representing relatively steady operation. Each time period is characterized by a coal consumption rate and blast saturation temperature, and coal bottomsize. Tables 7-5 to 7-13 show the results of the calculations. Table 7-14 shows the average results of all the calculations.

7.3 Grate Performance Model

A goemetrical grate performance model was prepared and is described in Volume 1 of this series (Thimsen, Maurer et al, 1984). The model calculates the void volume swept by the eccentric grate and compares it to the volume of ash rejected by the grate. Figure 7-12 shows the experimental data from the test and the theoretical prediction. The theory tends to underpredict the actual measurements for data collected during this test.

7.4 Tar Yield Correlations

The overall average tar yield measured during gasification of Absaloka/Robinson subbituminous coal 4.2 lb/100 lb coal (as received). This value ranged from 2.1 to 4.4. The Fischer-Schrader Assay tar/oil yield correlations described by Ode and Selvig (1944) and Gomez et al (1958) have predicted the tar/oil yields from past gasification tests within acceptable error bands.

There is no Fischer Assay available for this coal. As can be seen from Figures 7-13 and 7-14, the correlations of tar/oil

Table 7-4

Condensed Material Analysis

Water		
Total Organics, %	0.42	
Tar (As recieved)		
Heating Value, btu/lb	12891	(16995) **
Flash point, Deg. F	220	
Water by distillation, %	24.15	
Specific gravity, 60/60 Deg. F	1.0454	
Pour point, Deg. F	+80	
Cold (solid) point, Deg. F	+75	
Viscosity at :		
170 Deg. F Saybolt Universal, Sec.	68.10	
170 Deg. F Kinematic, centistoks	12.44	
210 Deg. F Saybolt Universal, Sec.	58.00	
210 Deg. F Kinematic, centistoks	9.69	
Ultimate Analysis, WT%		
Hydrogen	6.47	(8.53) **
Carbon	67.38	(88.83) **
Nitrogen	0.55	(0.73) **
Oxygen (by difference)	0.92	(1.21) **
Sulfur	0.32	(0.42) **
Moisture (total)	24.15	
Ash	0.21	(0.28) **
Sediment (solids)	1.03	(1.36) **

** Dry basis values in parentheses

Table 7-5

Material Balance and Thermal Efficiency Calculation
0.30 tn/hr, 142 F, +1/4 inch

Input Data

Time period: 6/18/84 16:30 - 6/19/84 08:00 (15.5 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 0.30	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	= 410.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 142.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.16	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 66.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 432.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 8.17	Ash discharge ,lb/hour	= 34.
Tar yield, lb/1000 SCF	= 0.43	Ash carbon ,percent	= 24.2
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.34
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet) ,percent	= 34.2
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 0.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 16.0	CH4	%	= 1.31	H2S	(est ppm) =	662
CO	%	= 21.1	C2H4	%	= 0.025			
CO2	%	= 9.52	C2H6	%	= 0.070			
N2	%	= 51.1	C3H6	%	= 0.017			
O2	%	= 0.00	C3H8	%	= 0.019	HHV,	Btu/SCF =	136
Molec. Weight=		25.06	Argon(est. %)		= 0.610	LHV,	Btu/SCF =	126

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 2.92)

Input,		lb/hr	% Total	Output,		lb/hr	% Total
Coal	=	599.	26.1	Dry gas	=	1928.	86.5
Steam (total)	=	240.	10.5	Water in gas	=	239.	10.7
Air(calc,dry)	=	1457.	63.4	Oil and tar	=	13.	0.6
				Ash(calc,dry)	=	50.	2.2
				Dust	=	0.	0.0
Total	=	2296.		Total	=	2229.	

Energy Balance (Percent unaccounted for: 3.44)

Input,		MM BTU/hr	Output,		MM Btu/hr	% Total
Coal	=	5.5	Dry coal gas	=	4.0	71.0
Air	=	0.002	Oil and tar	=	0.22	3.9
Steam(import)	=	0.264	Sensible	=	0.24	4.3
Cooling water	=	0.005	Latent	=	0.254	4.5
			Ash	=	0.171	3.1
			Dust	=	0.001	0.0
			Cooling water	=	0.737	13.2
Total	=	5.8	Total	=	5.6	

Performance Data

Cold gas efficiency,	percent =	68.6
Cold gas with tar efficiency,	percent =	72.3
Hot gas without tar efficiency	percent =	77.0
Hot gas with tar efficiency,	percent =	80.8
Air/Coal	(lb./lb.) =	2.430
Steam/Coal	(lb./lb.) =	0.400
Air/Fixed Carbon	(lb./lb.) =	5.976
Coal/Gasifier Area	(lb./hr./sqft) =	18.1
Fixed Carbon/Area	(lb./hr./sqft) =	7.3
Producer Gas/Coal	(SCF/lb.) =	57.1
Producer Gas/Fixed Carbon	(SCF/lb.) =	140.4
Tar Yield	(lb./lb. coal) =	0.021

Table 7-6

Material Balance and Thermal Efficiency Calculation
0.64 tn/hr, 140 F, +1/4 inch

Input Data

Time period: 6/19/84 14:00 - 6/20/84 08:00 (18.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 0.64	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	= 605.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 140.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.16	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 69.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 377.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 8.47	Ash discharge ,lb/hour	= 56.
Tar yield, lb/1000 SCF	= 0.78	Ash carbon ,percent	= 20.1
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.67
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 17.5
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 1.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.7	CH4	%	= 1.44	H2S	(est ppm)	=	481
CO	%	= 28.7	C2H4	%	= 0.037	COS	(est ppm)	=	165
CO2	%	= 5.55	C2H6	%	= 0.099	CH3SH	(est ppm)	=	0
N2	%	= 45.7	C3H6	%	= 0.030	C2H5SH	(est ppm)	=	23
O2	%	= 0.00	C3H8	%	= 0.028	HHV,	Btu/SCF	=	168
Molec. Weight		= 23.99	Argon(est. %)		= 0.545	LHV,	Btu/SCF	=	158

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 0.72)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal =	1273.	31.2	Dry gas =	3441.	85.1
Steam (total) =	379.	9.3	Water in gas =	461.	11.4
Air(calc,dry) =	2423.	59.5	Oil and tar =	42.	1.0
			Ash(calc,dry) =	100.	2.5
			Dust =	1.	0.0
Total =	4075.		Total =	4046.	

Energy Balance (Percent unaccounted for: 4.32)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal =	11.7	Dry coal gas =	9.2	79.0
Air =	0.005	Oil and tar =	0.73	6.3
Steam(import) =	0.413	Sensible =	0.38	3.3
Cooling water =	0.010	Latent =	0.492	4.2
		Ash =	0.287	2.5
		Dust =	0.007	0.1
		Cooling water =	0.545	4.7
Total =	12.1	Total =	11.6	

Performance Data

Cold gas efficiency,	percent	= 75.6
Cold gas with tar efficiency,	percent	= 81.6
Hot gas without tar efficiency	percent	= 82.6
Hot gas with tar efficiency,	percent	= 88.7
Air/Coal	(lb./lb.)	= 1.904
Steam/Coal	(lb./lb.)	= 0.298
Air/Fixed Carbon	(lb./lb.)	= 4.682
Coal/Gasifier Area	(lb./hr./sqft)	= 38.4
Fixed Carbon/Area	(lb./hr./sqft)	= 15.6
Producer Gas/Coal	(SCF/lb.)	= 50.4
Producer Gas/Fixed Carbon	(SCF/lb.)	= 124.0
Tar Yield	(lb./lb. coal)	= 0.033

Table 7-7

Material Balance and Thermal Efficiency Calculation
0.90 tn/hr, 138 F, +1/4 inch

Input Data

Time period: 6/20/84 14:00 - 6/21/84 08:00 (18.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 0.90	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	= 905.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 138.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.15	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 72.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 462.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 7.80	Ash discharge ,lb/hour	= 92.
Tar yield, lb/1000 SCF	= 0.87	Ash carbon ,percent	= 7.7
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.87
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 8.6
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 4.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.7	CH4	%	= 1.45	H2S	(est ppm)	=	440
CO	%	= 30.0	C2H4	%	= 0.040	COS	(est ppm)	=	174
CO2	%	= 4.51	C2H6	%	= 0.101	CH3SH	(est ppm)	=	0
N2	%	= 45.4	C3H6	%	= 0.029	C2H5SH	(est ppm)	=	22
O2	%	= 0.00	C3H8	%	= 0.029	HHV,	Btu/SCF	=	173
Molec. Weight		= 23.82	Argon(est. %)		= 0.542	LHV,	Btu/SCF	=	162

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.26)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal =	1796.	31.4	Dry gas =	4845.	85.9
Steam (total) =	500.	8.8	Water in gas =	602.	10.7
Air(calc,dry) =	3416.	59.8	Oil and tar =	67.	1.2
			Ash(calc,dry) =	122.	2.2
			Dust =	4.	0.1
Total =	5712.		Total =	5640.	

Energy Balance (Percent unaccounted for: 3.09)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal =	16.5	Dry coal gas =	13.3	80.7
Air =	0.010	Oil and tar =	1.16	7.0
Steam(import) =	0.498	Sensible =	0.68	4.1
Cooling water =	0.005	Latent =	0.644	3.9
		Ash =	0.135	0.8
		Dust =	0.040	0.2
		Cooling water =	0.523	3.2
Total =	17.0	Total =	16.5	

Performance Data

Cold gas efficiency,	percent =	78.3
Cold gas with tar efficiency,	percent =	85.0
Hot gas without tar efficiency	percent =	85.8
Hot gas with tar efficiency,	percent =	92.8
Air/Coal	(lb./lb.) =	1.902
Steam/Coal	(lb./lb.) =	0.278
Air/Fixed Carbon	(lb./lb.) =	4.676
Coal/Gasifier Area	(lb./hr./sqft) =	54.1
Fixed Carbon/Area	(lb./hr./sqft) =	22.0
Producer Gas/Coal	(SCF/lb.) =	50.1
Producer Gas/Fixed Carbon	(SCF/lb.) =	123.1
Tar Yield	(lb./lb. coal) =	0.037

Table 7-8

Material Balance and Thermal Efficiency Calculation
1.30 tn/hr, 138 F, +1/4 inch

Input Data

Time period: 6/21/84 09:00 - 6/22/84 08:00 (23.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 1.30	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	=1198.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 138.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.15	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 73.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 515.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 7.88	Ash discharge ,lb/hour	= 169.
Tar yield, lb/1000 SCF	= 0.95	Ash carbon ,percent	= 2.3
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.63
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 7.2
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 22.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.8	CH4	%	= 1.46	H2S	(est ppm)	=	462
CO	%	= 30.9	C2H4	%	= 0.046	COS	(est ppm)	=	189
CO2	%	= 4.11	C2H6	%	= 0.104	CH3SH	(est ppm)	=	0
N2	%	= 44.9	C3H6	%	= 0.033	C2H5SH	(est ppm)	=	18
O2	%	= 0.00	C3H8	%	= 0.030	HHV,	Btu/SCF	=	176
Molec. Weight		= 23.75	Argon(est. %)		= 0.535	LHV,	Btu/SCF	=	165

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.24)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal =	2609.	32.0	Dry gas =	6888.	85.6
Steam (total) =	718.	8.8	Water in gas =	867.	10.8
Air(calc,dry) =	4817.	59.1	Oil and tar =	105.	1.3
			Ash(calc,dry) =	163.	2.0
			Dust =	22.	0.3
Total =	8144.		Total =	8043.	

Energy Balance (Percent unaccounted for: 2.56)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal =	24.0	Dry coal gas =	19.4	80.8
Air =	0.014	Oil and tar =	1.80	7.5
Steam(import) =	0.588	Sensible =	1.10	4.6
Cooling water =	0.004	Latent =	0.927	3.9
		Ash =	0.057	0.2
		Dust =	0.222	0.9
		Cooling water =	0.490	2.0
Total =	24.6	Total =	24.0	

Performance Data

Cold gas efficiency,	percent =	78.7
Cold gas with tar efficiency,	percent =	86.0
Hot gas without tar efficiency	percent =	86.7
Hot gas with tar efficiency,	percent =	94.2
Air/Coal	(lb./lb.) =	1.846
Steam/Coal	(lb./lb.) =	0.275
Air/Fixed Carbon	(lb./lb.) =	4.539
Coal/Gasifier Area	(lb./hr./sqft) =	78.6
Fixed Carbon/Area	(lb./hr./sqft) =	32.0
Producer Gas/Coal	(SCF/lb.) =	49.2
Producer Gas/Fixed Carbon	(SCF/lb.) =	121.0
Tar Yield	(lb./lb. coal) =	0.040

Table 7-9

Material Balance and Thermal Efficiency Calculation
1.67 tn/hr, 138 F, +1/4 inch

Input Data

Time period: 6/22/84 09:00 - 6/23/84 08:00 (23.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 1.67	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	=1509.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 138.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.15	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 68.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 539.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 8.38	Ash discharge ,lb/hour	= 251.
Tar yield, lb/1000 SCF	= 1.04	Ash carbon ,percent	= 2.0
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.58
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 8.5
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 65.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.9	CH4	%	= 1.38	H2S	(est ppm)	=	516
CO	%	= 30.8	C2H4	%	= 0.056	COS	(est ppm)	=	117
CO2	%	= 4.06	C2H6	%	= 0.103	CH3SH	(est ppm)	=	0
N2	%	= 44.9	C3H6	%	= 0.036	C2H5SH	(est ppm)	=	0
O2	%	= 0.00	C3H8	%	= 0.030	HHV,	Btu/SCF	=	176
Molec. Weight=		23.70	Argon(est. %)		= 0.535	LHV,	Btu/SCF	=	165

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 0.85)

Input,		lb/hr	% Total	Output,		lb/hr	% Total
Coal	=	3334.	32.4	Dry gas	=	8650.	84.7
Steam (total)	=	907.	8.8	Water in gas	=	1160.	11.4
Air(calc,dry)	=	6061.	58.8	Oil and tar	=	144.	1.4
				Ash(calc,dry)	=	197.	1.9
				Dust	=	65.	0.6
Total	=	10302.		Total	=	10215.	

Energy Balance (Percent unaccounted for: 2.77)

Input,		MM BTU/hr	Output,		MM Btu/hr	% Total
Coal	=	30.6	Dry coal gas	=	24.3	79.0
Air	=	0.012	Oil and tar	=	2.48	8.1
Steam(import)	=	0.987	Sensible	=	1.49	4.8
Cooling water	=	0.006	Latent	=	1.241	4.0
			Ash	=	0.060	0.2
			Dust	=	0.664	2.2
			Cooling water	=	0.506	1.6
Total	=	31.6	Total	=	30.8	

Performance Data

Cold gas efficiency,	percent	= 76.8
Cold gas with tar efficiency,	percent	= 84.7
Hot gas without tar efficiency	percent	= 85.2
Hot gas with tar efficiency,	percent	= 93.2
Air/Coal	(lb./lb.)	= 1.818
Steam/Coal	(lb./lb.)	= 0.272
Air/Fixed Carbon	(lb./lb.)	= 4.469
Coal/Gasifier Area	(lb./hr./sqft)	= 100.5
Fixed Carbon/Area	(lb./hr./sqft)	= 40.9
Producer Gas/Coal	(SCF/lb.)	= 48.9
Producer Gas/Fixed Carbon	(SCF/lb.)	= 120.3
Tar Yield	(lb./lb. coal)	= 0.043

Table 7-10

Material Balance and Thermal Efficiency Calculation
2.36 tn/hr, 140 F, +1/4 inch

Input Data

Time period: 6/23/84 09:00 - 6/24/84 07:00 (22.0 hours)

Gasifier Operation:

Coal feed, Ton/hour	= 2.36
Blast air flow (dry) , Scfm	=2072.
Saturated air temperature, F	= 140.
Steam/Air Ratio (lb./lb.)	= 0.16
Ambient air temperature, F	= 66.
Off-take temperature, F	= 626.

Coal Data:

Type = Absaloka/Robinson Bituminous	
Mass Fraction Carbon %	= 53.6
Mass Fraction Fixed Carbon	= 40.67
Mass Fraction Moisture %	= 23.46
Mass Fraction nitrogen %	= 0.54
Mass Percent sulfur	= 0.31
Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF	= 8.77
Tar yield, lb/1000 SCF	= 1.03
Carbon in Tar (percent)	= 90.1
Sulfur in Tar (percent)	= 0.43
Tar HHV, thou. Btu/lb	= 17.23

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour	= 475.
Ash carbon ,percent	= 1.0
Ash sulfur ,percent	= 0.46
Ash moisture (wet),percent	= 11.5
Cyclone dust,lb/hour(est.)	= 328.

Gas Composition (Dry): (normalized to 99.90)

H2	% = 17.1	CH4	% = 1.39	H2S	(est ppm) =	429	
CO	% = 28.0	C2H4	% = 0.084				
CO2	% = 5.73	C2H6	% = 0.103				
N2	% = 46.8	C3H6	% = 0.039				
O2	% = 0.00	C3H8	% = 0.028	HHV,	Btu/SCF =	164	
Molec. Weight=	24.16	Argon(est. %)	= 0.558	LHV,	Btu/SCF =	154	

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.82)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 4720.	32.1	Dry gas	= 12064.	83.4
Steam (total)	= 1359.	9.2	Water in gas	= 1660.	11.5
Air(calc,dry)	= 8647.	58.7	Oil and tar	= 195.	1.3
			Ash(calc,dry)	= 211.	1.5
			Dust	= 328.	2.3
Total	= 14726.		Total	= 14458.	

Energy Balance (Percent unaccounted for: 3.25)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 43.4	Dry coal gas	= 31.1	72.6
Air	= 0.011	Oil and tar	= 3.36	7.8
Steam(import)	= 0.959	Sensible	= 2.50	5.8
Cooling water	= 0.012	Latent	= 1.776	4.1
		Ash	= 0.035	0.1
		Dust	= 3.373	7.9
		Cooling water	= 0.674	1.6
Total	= 44.4	Total	= 42.9	

Performance Data

Cold gas efficiency,	percent	= 70.2
Cold gas with tar efficiency,	percent	= 77.8
Hot gas without tar efficiency	percent	= 79.4
Hot gas with tar efficiency,	percent	= 87.2
Air/Coal	(lb./lb.)	= 1.832
Steam/Coal	(lb./lb.)	= 0.288
Air/Fixed Carbon	(lb./lb.)	= 4.504
Coal/Gasifier Area	(lb./hr./sqft)	= 142.3
Fixed Carbon/Area	(lb./hr./sqft)	= 57.9
Producer Gas/Coal	(SCF/lb.)	= 47.6
Producer Gas/Fixed Carbon	(SCF/lb.)	= 117.0
Tar Yield	(lb./lb. coal)	= 0.041

Table 7-11

Material Balance and Thermal Efficiency Calculation
2.14 tn/hr, 142 F, +1/4 inch

Input Data

Time period: 6/24/84 14:00 - 6/25/84 8:00 (18.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 2.14	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	=1680.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 142.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.17	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 66.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 749.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 10.66	Ash discharge ,lb/hour	= 279.
Tar yield, lb/1000 SCF	= 0.89	Ash carbon ,percent	= 5.0
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.64
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 9.2
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 383.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 16.1	CH4	%	= 1.51	H2S	(est ppm)	=	219
CO	%	= 23.5	C2H4	%	= 0.137	COS	(est ppm)	=	82
CO2	%	= 7.99	C2H6	%	= 0.112	CH3SH	(est ppm)	=	0
N2	%	= 49.9	C3H6	%	= 0.032	C2H5SH	(est ppm)	=	0
O2	%	= 0.00	C3H8	%	= 0.013	HHV,	Btu/SCF	=	148
Molec. Weight=		24.77	Argon(est. %)		= 0.595	LHV,	Btu/SCF	=	138

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.05)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal =	4289.	29.8	Dry gas =	11639.	81.6
Steam (total) =	1447.	10.0	Water in gas =	1901.	13.3
Air(calc,dry) =	8671.	60.2	Oil and tar =	158.	1.1
			Ash(calc,dry) =	176.	1.2
			Dust =	383.	2.7
Total =	14407.		Total =	14257.	

Energy Balance (Percent unaccounted for: 4.65)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal =	39.4	Dry coal gas =	26.4	67.9
Air =	0.011	Oil and tar =	2.72	7.0
Steam(import) =	1.403	Sensible =	3.01	7.7
Cooling water =	0.012	Latent =	2.028	5.2
		Ash =	0.128	0.3
		Dust =	3.935	10.1
		Cooling water =	0.592	1.5
Total =	40.8	Total =	38.9	

Performance Data

Cold gas efficiency,	percent =	64.7
Cold gas with tar efficiency,	percent =	71.4
Hot gas without tar efficiency	percent =	76.6
Hot gas with tar efficiency,	percent =	83.5
Air/Coal	(lb./lb.) =	2.022
Steam/Coal	(lb./lb.) =	0.337
Air/Fixed Carbon	(lb./lb.) =	4.971
Coal/Gasifier Area	(lb./hr./sqft) =	129.3
Fixed Carbon/Area	(lb./hr./sqft) =	52.6
Producer Gas/Coal	(SCF/lb.) =	50.9
Producer Gas/Fixed Carbon	(SCF/lb.) =	125.3
Tar Yield	(lb./lb. coal) =	0.037

Table 7-12

Material Balance and Thermal Efficiency Calculation
0.61 tn/hr, 143 F, +1/4 inch

Input Data

Time period: 6/25/84 8:00 - 6/27/84 3:00 (43.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 0.61	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	= 593.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 143.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.17	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 75.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 511.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 10.74	Ash discharge ,lb/hour	= 140.
Tar yield, lb/1000 SCF	= 1.05	Ash carbon ,percent	= 35.3
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 1.10
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 14.5
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 1.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.6	CH4	%	= 1.71	H2S	(est ppm)	= 507
CO	%	= 23.8	C2H4	%	= 0.087			
CO2	%	= 8.27	C2H6	%	= 0.110			
N2	%	= 47.6	C3H6	%	= 0.036			
O2	%	= 0.00	C3H8	%	= 0.030	HHV,	Btu/SCF	= 156
Molec. Weight		= 24.41	Argon(est. %)		= 0.568	LHV,	Btu/SCF	= 145

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -0.71)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal =	1213.	30.3	Dry gas =	3305.	82.0
Steam (total) =	403.	10.1	Water in gas =	552.	13.7
Air(calc,dry) =	2386.	59.6	Oil and tar =	54.	1.3
			Ash(calc,dry) =	119.	3.0
			Dust =	1.	0.0
Total =	4002.		Total =	4030.	

Energy Balance (Percent unaccounted for: 3.57)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal =	11.1	Dry coal gas =	8.0	71.6
Air =	0.008	Oil and tar =	0.93	8.3
Steam(import) =	0.436	Sensible =	0.55	4.9
Cooling water =	0.015	Latent =	0.589	5.3
		Ash =	0.595	5.3
		Dust =	0.010	0.1
		Cooling water =	0.511	4.6
Total =	11.6	Total =	11.2	

Performance Data

Cold gas efficiency,	percent =	69.0
Cold gas with tar efficiency,	percent =	77.0
Hot gas without tar efficiency	percent =	78.6
Hot gas with tar efficiency,	percent =	86.8
Air/Coal	(lb./lb.) =	1.968
Steam/Coal	(lb./lb.) =	0.333
Air/Fixed Carbon	(lb./lb.) =	4.838
Coal/Gasifier Area	(lb./hr./sqft) =	36.5
Fixed Carbon/Area	(lb./hr./sqft) =	14.9
Producer Gas/Coal	(SCF/lb.) =	52.0
Producer Gas/Fixed Carbon	(SCF/lb.) =	127.9
Tar Yield	(lb./lb. coal) =	0.044

Table 7-13

Material Balance and Thermal Efficiency Calculation
2.23 tn/hr, 152 F, +3/4 inch

Input Data

Time period: 6/28/84 04:00 - 6/29/84 10:00 (30.0 hours)

Gasifier Operation:		Coal Data:	
Coal feed, Ton/hour	= 2.23	Type = Absaloka/Robinson Bituminous	
Blast air flow (dry) , Scfm	=1953.	Mass Fraction Carbon %	= 53.6
Saturated air temperature, F	= 152.	Mass Fraction Fixed Carbon	= 40.67
Steam/Air Ratio (lb./lb.)	= 0.23	Mass Fraction Moisture %	= 23.46
Ambient air temperature, F	= 74.	Mass Fraction nitrogen %	= 0.54
Off-take temperature, F	= 635.	Mass Percent sulfur	= 0.31
		Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):		Ash and Dust Data:(dry basis)	
Water yield, lb./1000 SCF	= 8.84	Ash discharge ,lb/hour	= 210.
Tar yield, lb/1000 SCF	= 1.04	Ash carbon ,percent	= 1.9
Carbon in Tar (percent)	= 90.1	Ash sulfur ,percent	= 0.55
Sulfur in Tar (percent)	= 0.43	Ash moisture (wet),percent	= 10.7
Tar HHV, thou. Btu/lb	= 17.23	Cyclone dust,lb/hour(est.)	= 269.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 18.6	CH4	%	= 1.41	H2S	(est ppm)	=	457
CO	%	= 28.8	C2H4	%	= 0.059				
CO2	%	= 5.15	C2H6	%	= 0.100				
N2	%	= 45.2	C3H6	%	= 0.034				
O2	%	= 0.00	C3H8	%	= 0.028	HHV,	Btu/SCF	=	171
Molec. Weight		= 23.69	Argon(est. %)		= 0.539	LHV,	Btu/SCF	=	160

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 5.16)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 4454.	31.3	Dry gas	= 11231.	83.3
Steam (total)	= 1848.	13.0	Water in gas	= 1590.	11.8
Air(calc,dry)	= 7922.	55.7	Oil and tar	= 187.	1.4
			Ash(calc,dry)	= 212.	1.6
			Dust	= 269.	2.0
Total	= 14224.		Total	= 13489.	

Energy Balance (Percent unaccounted for: 1.80)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 40.9	Dry coal gas	= 30.8	74.1
Air	= 0.025	Oil and tar	= 3.22	7.8
Steam(import)	= 1.327	Sensible	= 2.40	5.8
Cooling water	= 0.026	Latent	= 1.700	4.1
		Ash	= 0.063	0.2
		Dust	= 2.770	6.7
		Cooling water	= 0.543	1.3
Total	= 42.3	Total	= 41.6	

Performance Data

Cold gas efficiency,	percent	= 72.8
Cold gas with tar efficiency,	percent	= 80.4
Hot gas without tar efficiency	percent	= 82.1
Hot gas with tar efficiency,	percent	= 90.0
Air/Coal	(lb./lb.)	= 1.779
Steam/Coal	(lb./lb.)	= 0.415
Air/Fixed Carbon	(lb./lb.)	= 4.374
Coal/Gasifier Area	(lb./hr./sqft)	= 134.2
Fixed Carbon/Area	(lb./hr./sqft)	= 54.6
Producer Gas/Coal	(SCF/lb.)	= 48.0
Producer Gas/Fixed Carbon	(SCF/lb.)	= 117.9
Tar Yield	(lb./lb. coal)	= 0.042

Table 7-14

Material Balance and Thermal Efficiency Calculation
Absoloka/Robinson Overall Average

Input Data

Time period: Overall Average (210.5 hours)

Gasifier Operation:

Coal feed, Ton/hour	= 1.35
Blast air flow (dry) , Scfm	=1215.
Saturated air temperature, F	= 143.
Steam/Air Ratio (lb./lb.)	= 0.17
Ambient air temperature, F	= 70.
Off-take temperature, F	= 582.

Coal Data:

Type = Absaloka/Robinson Bituminous	
Mass Fraction Carbon %	= 53.6
Mass Fraction Fixed Carbon	= 40.67
Mass Fraction Moisture %	= 23.46
Mass Fraction nitrogen %	= 0.54
Mass Percent sulfur	= 0.31
Heating value, Btu/lb	= 9187

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF	= 8.97
Tar yield, lb/1000 SCF	= 0.97
Carbon in Tar (percent)	= 90.1
Sulfur in Tar (percent)	= 0.43
Tar HHV, thou. Btu/lb	= 17.23

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour	= 192.
Ash carbon ,percent	= 8.3
Ash sulfur ,percent	= 0.65
Ash moisture (wet),percent	= 11.4
Cyclone dust,lb/hour(est.)	= 34.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.6	CH4	%	= 1.45	H2S	(est ppm)	=	462
CO	%	= 27.9	C2H4	%	= 0.070	COS	(est ppm)	=	152
CO2	%	= 5.72	C2H6	%	= 0.103	CH3SH	(est ppm)	=	0
N2	%	= 46.4	C3H6	%	= 0.034	C2H5SH	(est ppm)	=	10
O2	%	= 0.00	C3H8	%	= 0.027	HHV,	Btu/SCF	=	166
Molec. Weight		= 24.04	Argon(est. %)		= 0.553	LHV,	Btu/SCF	=	155

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.47)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 2699.	30.5	Dry gas	= 7349.	84.4
Steam (total)	= 899.	10.2	Water in gas	= 1040.	11.9
Air(calc,dry)	= 5244.	59.3	Oil and tar	= 113.	1.3
			Ash(calc,dry)	= 176.	2.0
			Dust	= 34.	0.4
Total	= 8842.		Total	= 8712.	

Energy Balance (Percent unaccounted for: 3.53)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 24.8	Dry coal gas	= 19.3	77.5
Air	= 0.012	Oil and tar	= 1.95	7.8
Steam(import)	= 0.925	Sensible	= 1.38	5.6
Cooling water	= 0.012	Latent	= 1.112	4.5
		Ash	= 0.211	0.8
		Dust	= 0.354	1.4
		Cooling water	= 0.571	2.3
Total	= 25.7	Total	= 24.8	

Performance Data

Cold gas efficiency,	percent	= 74.8
Cold gas with tar efficiency,	percent	= 82.4
Hot gas without tar efficiency	percent	= 84.2
Hot gas with tar efficiency,	percent	= 92.0
Air/Coal	(lb./lb.)	= 1.943
Steam/Coal	(lb./lb.)	= 0.333
Air/Fixed Carbon	(lb./lb.)	= 4.778
Coal/Gasifier Area	(lb./hr./sqft)	= 81.3
Fixed Carbon/Area	(lb./hr./sqft)	= 33.1
Producer Gas/Coal	(SCF/lb.)	= 51.2
Producer Gas/Fixed Carbon	(SCF/lb.)	= 125.8
Tar Yield	(lb./lb. coal)	= 0.042

Figure 7-12

Comparison of the Geometrical Grate Performance Model with Ash Removal Rates.

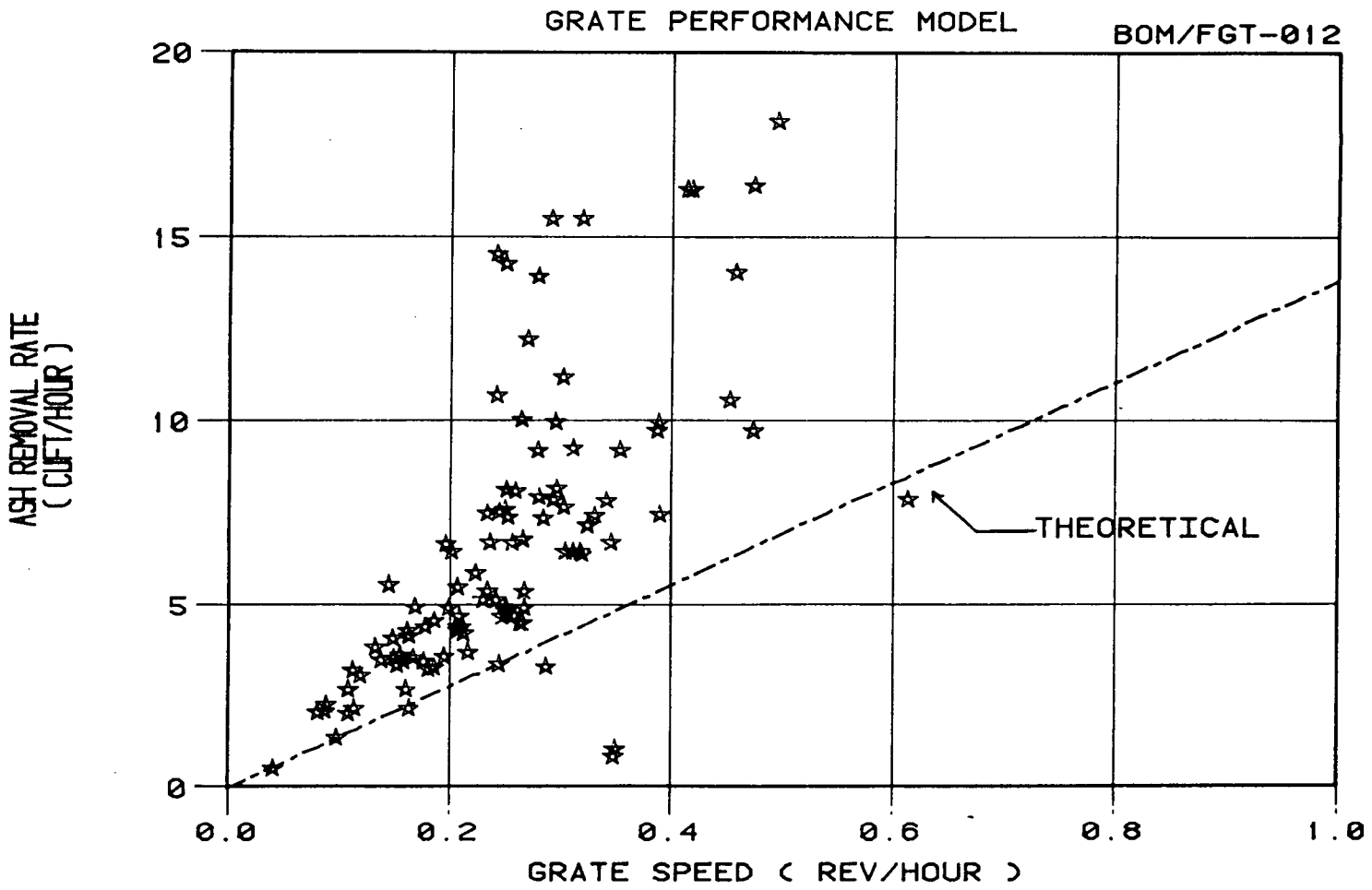


Figure 7-13

Correlation of Tar Yield with Volatile Matter and Oxygen

Reference: Ode and Selvig (1944)

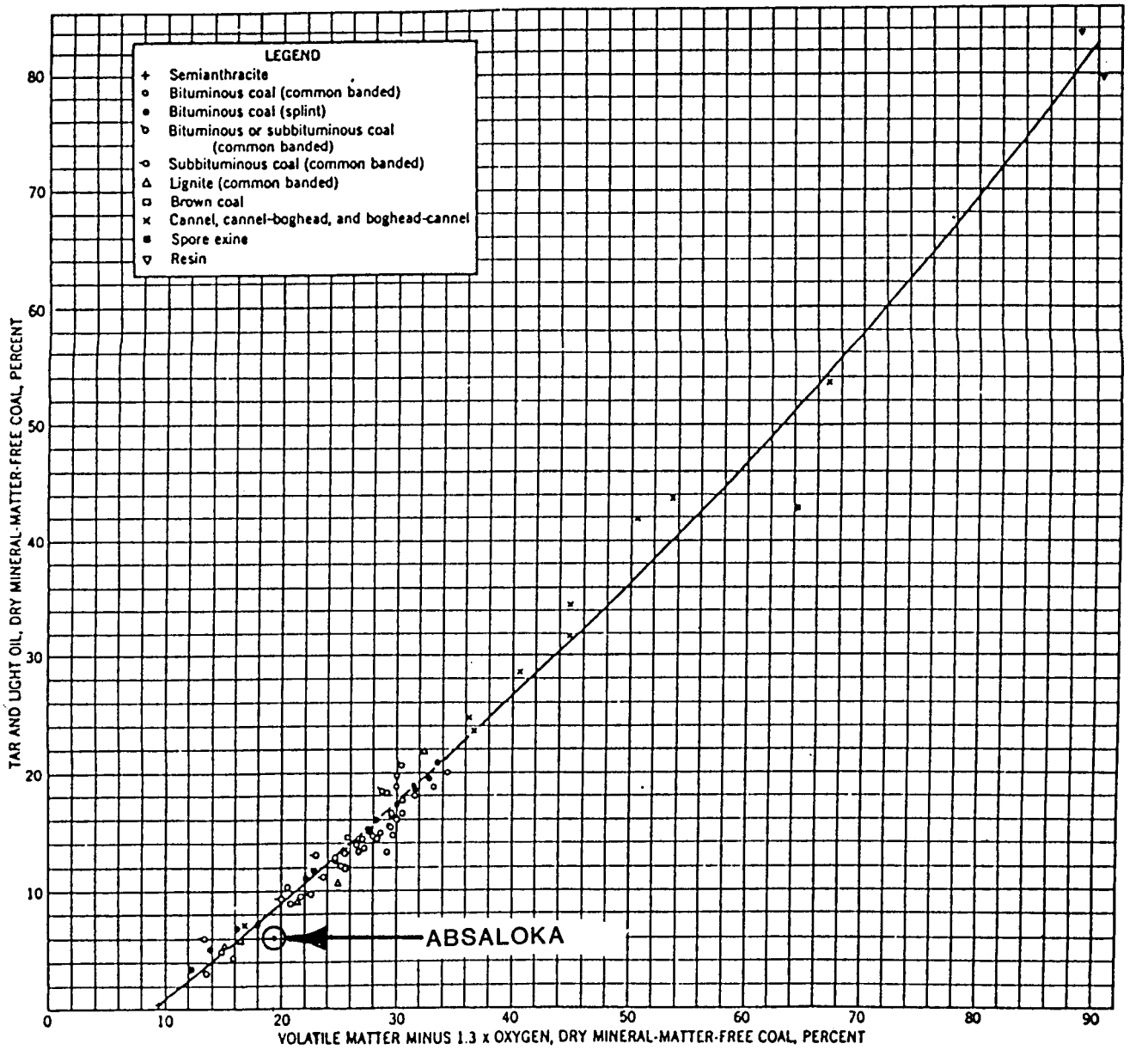
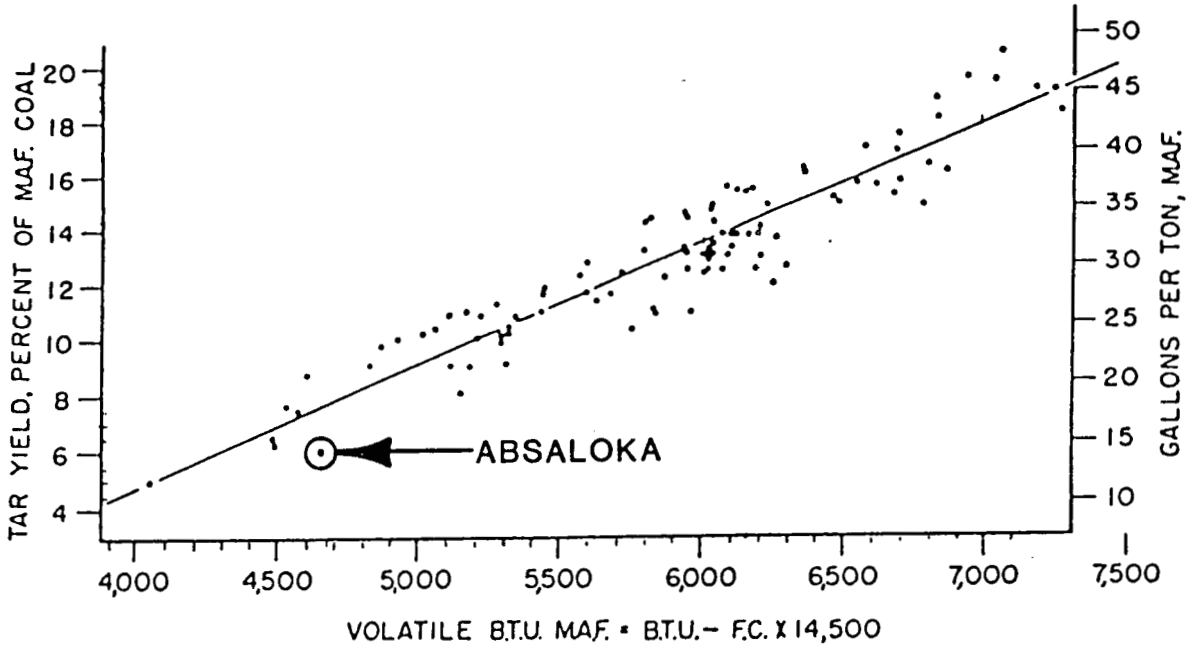


Figure 7-14

Correlation of Tar Yield with Volatile Btu

Reference: Gomez et al (1958)



yields of similar coals predict a tar/oil yield of 5.4 lb/100 lb coal (as received). The tar/oil yield measured during this test is somewhat less than that predicted by the correlations.

7.5 Combustion Emissions Monitoring

Emissions from the hot, raw gas combustor were monitored on June 22, 1984 while operating at a moderate to high throughput. The stack sampling report is included in Appendix K.

Particulate loadings averaged 0.029 grains/dscf. This corresponds to a mass rate of 3.4 lb/hour and a corrected particulate emission factor of 0.12 lb/million Btu. If the assumption is made that the particulate is ash, this corresponds to 1.56% of the ash entering the retort during this period. Corresponding dust flow rates penetrating the cyclone would be 13.5 lb/hour, approximately 18% of the dust calculated to be leaving the retort at the time.

Sulfur dioxide concentrations averaged 232 ppm (dry). This corresponds to a mass rate of 30.3 lb/hour and a corrected sulfur dioxide emission factor of 1.03 lb/million Btu. The maximum sulfur dioxide emission factor expected should all coal sulfur appear in the combustor exhaust is 0.67 lb/million Btu. The discrepancy is unexplained.

Nitric oxide concentrations averaged 678 ppm (dry).

7.6 Retort Particle Sampling

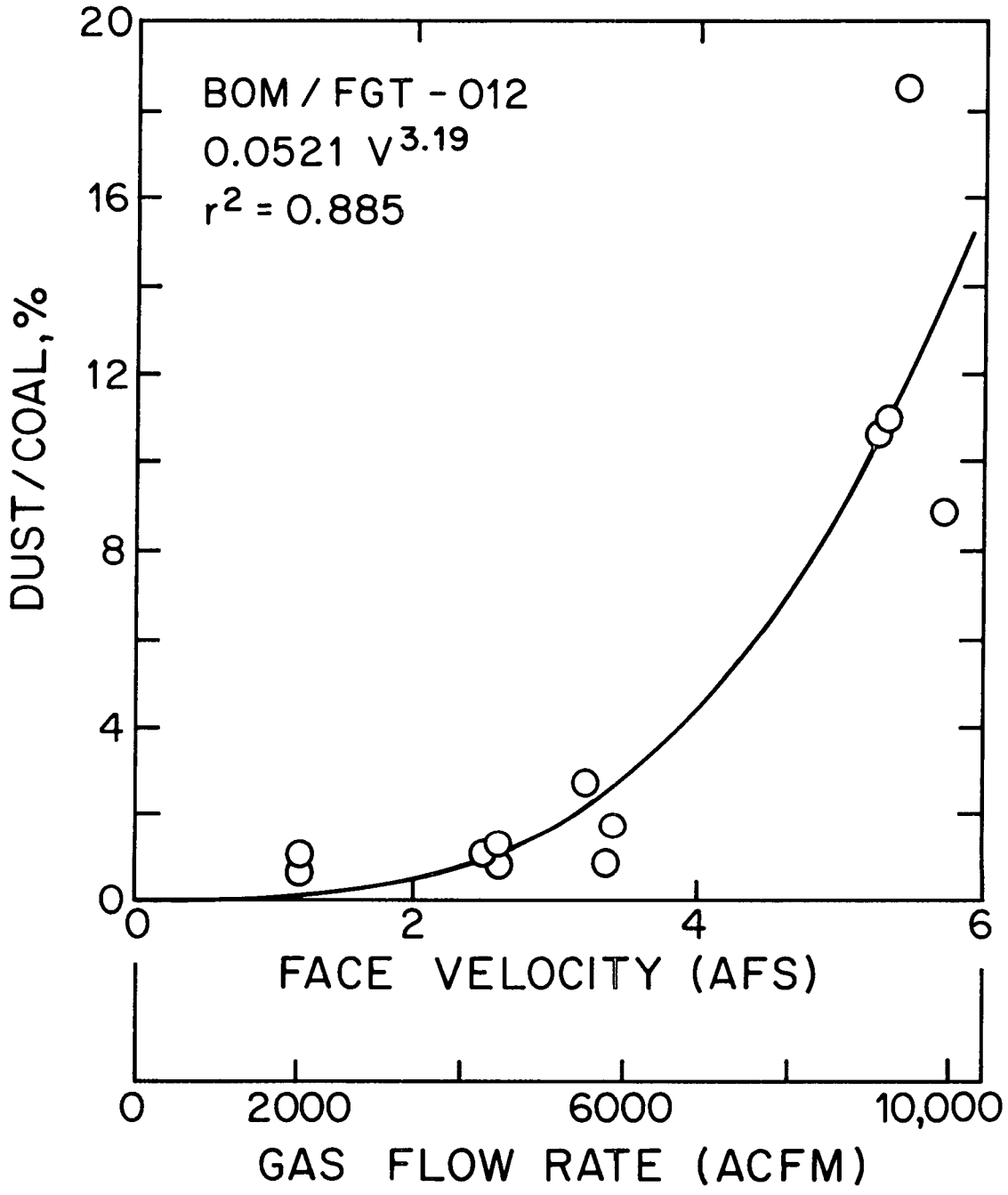
Developmental efforts continued in regard to measurement of total particle mass loadings leaving the retort and particle size distributions. The procedures are described in Volume 1 of this series (Thimsen, Maurer et al, 1984). Data collected are included in Appendix G.

A total of 12 sampling runs were made, all resulting in valid data. The particle loading data correlated fairly well with superficial gas velocity leaving the coal bed. These data are shown in Figure 7-15. As can be noted, substantial dust generation and carryover occurred at high face velocities which correspond to high coal throughputs. The power law correlation was used to calculate dust carryover for the material and energy balances (Section 7.2).

Four of the dust samplings were analyzed for particle size distributions (Appendix G). The mass median particle diameter ranged from 100 um at low gas flow rates to 650 um at the very high gas flow rates. The shifted particle size distributions could be fitted well with bimodal size distribution functions. The smaller mode varied from 15-150 um. The larger mode varied from 150-1000 um.

Figure 7-15

Dust Carryover vs. Gas Face Velocity



SECTION 8

CONCLUSIONS

1. The maximum throughput observed was 2.4 tons per hour over a 48-hour period. Maximum throughput was limited by firebed conditions, gas channeling and excessive dust loss overhead.

2. A coal throughput of 2.0 tons per hour is recommended for design purposes. Based on this throughput and a blast saturation temperature of 152 F (66.7 C), the following material and energy flows can be expected:

Material in (lb/lb coal)		Energy in (million Btu/hour)	
Air	1.80	Coal	36.7
Steam	.415	Steam (import)	1.3

Material out (lb/lb coal)		Energy out (million Btu/hour)	
Dry gas	2.52	Dry gas	27.6
Tar/oil	.042	Tar/oil	2.9
Water	.357	Sensible/latent	3.7
Dust	.060	Dust	2.5
Ash	.048	Ash	0.1
Unaccounted for	.188	Cooling Water	0.5
		Unaccounted for	0.7

3. The averge tar yield measured during the test was 4.2 lb tar/100 lb coal (as received). This represents 8% of the energy in the coal. This tar yield conforms to correlations based on Fischer Assay tar yields of similar coals.

4. Pockets of clinkered ash were present in the retort throughout the test. It is surmised that the relatively narrow range of ash fusion temperatures from initial deformation to fluid allows these pockets to form when minor flow gradients are present in the retort. Blast saturation temperatures of 138 to 144 F (59 to 62 C) were used.

5. Excessive clinkering was observed when gasifying at high throughput and lower blast saturation temperatures. At similar throughputs, gasification at slightly higher blast saturation temperatures did not result in such ash clinkering.

6. Particle emissions from the combustor were 0.12 lb/million Btu input. Sulfur dioxide emissions were 1.03 lb/million Btu input. This measured sulfur dioxide emission factor is greater than that expected based solely on the coal analysis.

7. Particle loss in the overhead product was severe at high throughputs amounting to as much as 10% of the wet coal feed. The dust/coal ratio could be expressed as a power function of produced gas flow rate. Dust carried over at high throughput was coarse with a mass median diameter of 650 um.

8. Based on the results of this test, fresh Absaloka/Robinson subbituminous coal can be recommended as a fixed-bed gasifier feedstock based on high throughput achievable and good gas quality.

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APPENDICES

APPENDIX A

Gasifier Operator's Log

These are the comments recorded by the gasifier operators during the course of the test.

Note: Grate speeds are referred to as:

"gear teeth engaged per stroke/Grate RPDay per gear tooth engaged"

Grate speed is the multiple of these two numbers.

BOM/FGT 012 ABSALOKA/ROBINSON

Test Log

June 18, 1984

0950 Loaded 8.69 tons of petroleum coke into the weigh bin.

0955 Retort, coal legs and the lower bin are all full. Dropped 8.61 tons of coke.

1005 Saturation blower is on and we are ready to set draft.

1013 Lit the wicks.

1016 Got smoke.

1058 Got combustable gas.

1130 Number 1 scrubber pump is on. Top nozzles and spray ring are on. Induced draft fan, primary and secondary combustor air is on.

1140 Flame safety pilot is on and the valve is open.

1146 The combustor has been lit. Downcomer tee valve needs tightening.

1200 Took the initial board readings. Scrubber inlet temperature is high at 317 C. Opened the bypass overriding solenoid valve. This dropped the scrubber inlet temperature to 67 C.

1220 Increased both the primary and secondary combustor air to improve the combustor flame. Reduced the furnace pressure to o.60 inches wc and the back pressure valve to 20% open to maintain 1/2 inch wc on the cyclone outlet.

1250 Saturation temperature is 60 C. Must increase the jacket water from 3 to 10 gpm. We are trying to maintain a 55 C saturation temperature.

1317 Increased the saturation temperature to 60 C to warm and loosen the bed for the addition of the Absaloka/Robinson.

1400 The coal legs are starting to heat up and run empty.

1402 Dropped coal into the lower bin (4.80 tons). The coal legs are full.

1412 Reduced the furnace pressure, as we have dropped the saturation air flow from 600 cfm to 400 cfm. Started loading the weigh bins to 10 tons.

1430 Fire test shows a good even ash level. The average is 14.4 inches. Bars number 1 & 2 show a bottom crust developing. The grate is in the off position.

1500 Third shift begins.

1530 The offtake temperature is 180 C.

1600 Fire test showed holes number 3 & 5 are shallow at 7 inches.

1630 Coal feed only took 0.17 ton.

1640 The offtake temperature is up to 210 C. The pH is running high, so we adjusted the caustic pumps from 50 to 45.

1645 The offtake temperture is now at 220 C.

1720 The offtake temperature is still at 220 C.

1800 The ash average has come back up to a 13 inch average.

1930 Still only taking small amounts of coal during the feed. (0.16 ton)

2000 The ash average is now 14 inches.

2115 The offtake temperature has risen slightly to 236 C. The pH is now 7.0.

2300 Everything appears to be running well. The grate drive is off until the ash level reaches a 15 inch average. Agitator drive is off.

2330 Cyclone dump showed the cyclone to be empty.

2345 The pH has gone down again (5.0), so we have increased the pump to 50/50.

June 19, 1984

0015 The ash level is slightly over 15 inches. Started the grate on 3/.39. We will run it for 30 minutes and then stop it until the next fire test.

0045 Shut off the grate. Flushed the cyclone with water for 2 minutes.

0100 Replaced the empty caustic barrel with a full one. Noticed the coal readout is not functioning properly.

0215 The pH is now 8.0 so we decreased the pumps to 45/45.

0425 Opened the back pressure valve from 20% to 30% to reduce

the cyclone outlet pressure from 0.9 to 0.5 inches wc.

0530 Saturation temperature is dropping off (59 C). Reduced the jacket water flow to 10 gpm from 12 gpm.

0555 Increased the jacket water to 11 gpm.

0600 Started the grate drive at 2/0.40.

0630 Decreased the caustic pumps to 40/40.

0720 Started the bed temperature and pressure probe test.

0800 Fire test shows a 9.1 inch ash average. We hit clinker under the number 6 hole. The south side of the bed appears colder than the north. Leaving the grate speed at 2 teeth as we still have some coke above the ash.

0810 Increase the saturation air flow to 600 cfm per plan. Increasing the furnace pressure to 60 to maintain a 0.5 inch wc cyclone outlet pressure. Adjusted the steam port orifices toward minimum output, as we are still on a relatively low load.

0910 One hour after the load increase, the gas quality has improved. CO is 22% and CO2 is 9%.

1000 Fire test ash average is 8 inches. Number two had to be hammered in as there was a hard crust present. The fire zone appears to be fairly even all around. Leaving the grate speed at 2/0.40.

1035 Dumped 500 pounds of ash and sprayed the underside of the grate.

1045 The scrubber inlet temperature has climbed to 300 C with the bypass off. The temperature control is not actuating the solenoid. Turned off the temperature control and the solenoid opened allowing the scrubber inlet temperature to return to normal levels (i.e. 70-80 C).

1200 Fire test shows an 8.6 inch ash average. This time number 4 hole had a hard crust on the bottom. All other bars went in with ease. Leaving the grate at 2/0.40.

1255 Started filling the weigh bin at 5.57 tons.

1340 Stopped filling the upper bin at 11.09 tons. Lowered the saturation temperature to 59 C as we are getting cold bars at 60 C saturation temperature and 600 cfm saturation air flow. The air flow indicator on the chart is swinging drastically. The digital is stable, however. Cut the jacket water flow to 10 gpm. Cleaned dirty contacts to remedy the indicator problems.

1400 Fire test shows an 8.7 inch ash average. The bed is still cold. Leaving the grate alone.

1445 Gas quality continues to improve. CO is 26.1% and CO2 is 6.2%. Higher heating value is 150 BTU/FT^3.

1500 Third shift begins.

1545 Everything appears to be running smoothly. The offtake temperature is 201 C. Saturation air flow is 600 cfm. The grate is set at 2/0 and the agitator is off.

1600 Fire test shows a 12 inch ash average.

1800 Changing the grate speed to 2/0.45 as the ash depth average was 5.3 inches.

1900 The pH is low. Adjusted the caustic pumps to 45 from 40.

2000 Ash average is 9.4 inches. Freeboard average is 42 inches. The offtake temperature is running between 175 and 195 C. Saturation air flow is still 600 cfm.

2130 The ph is still low, so we turned the caustic pumps to 50 from 45. There has been almost no particulate evident in the cyclone dumps.

2200 Fire test ash average is now 6.9 inches.

2230 Loaded coal into the weigh bin at 12.63 tons.

2300 Everything is running well. It is cloudy and humid outside. Saturation air flow is 600 cfm. The offtake temperature is 201 C, and the charts are showing a straight line.

2330 Cyclone dump produced reddish colored water and very little particulate.

June 20, 1984

0005 Fire test shows 10.6 inch ash average. The rods went in easily.

0200 CO is 32% and CO2 is 6%. Higher heating value is 163 BTU/FT^3 and the lower heating value is 153 BTU/FT^3. Stopped the grate drive to allow the ash depth to build up.

0330 Started the grate drive at 2/0.40.

0345 The CO2 is 5% and the CO is 32.5%. Higher heating value is 170 BTU/FT^3 and the lower heating value is 161 BTU/FT^3.

0400 All rods went in easily with number 7 rod being red hot at

the tip.

0545 CO2 is 6% and the CO is 32.0%. Higher heating value is 166 BTU/FT^3 and the lower heating value is 156 BTU/FT^3.

0600 Fire test ash average is 11.9 inches and the number 7 bar is at 0 and cold.

0740 Started the bed temperature probe test.

0755 Started the bed pressure probe test.

0810 Fire test shows an ash average of 12.7 inches. Hit a hard mass under the number 4 hole. As the plan calls for increasing the saturation air flow to 900 cfm, we are increasing the grate speed to 2/0.50.

0815 Increased the saturation air flow to 700 cfm and we will increase it every half hour by 100 cfm.

0845 Increased the saturation air flow to 800 cfm. Increasing the grate speed to 2/0.60. Increasing the furnace pressure to 65 inches wc.

0915 Increased the saturation air flow to 900 cfm. Increased the grate speed to 2/1.00. Increased the furnace pressure to maintain 1.5 inches on the cyclone offtake pressure.

0935 Dumped 500 pounds of ash.

1000 Fire test shows a 9.3 inch ash average. All bars are falling right to the grate and the fire is still burning cool. Leaving the grate speed at 2/1.00.

1030 Getting little particulate from the cyclone. Started filling the weigh bin at 3.99 tons.

1200 Fire test shows only a little over 6 inches average. Hit hard clinker under the number 4 hole. Slowed the grate to 2/0.40 to preserve what ash we have.

1400 Have gained slightly on the ash level to 7.3 inches. Barely allowing the grte to move, now. No clinkering at this time.

1410 Lowered the saturation temperature to 58 C in attempt to heat up the bed. The primary is 50% open and the secondary is 30% open. Everything is running fairly smoothly. The offtake temperature is 224 C. Saturation air flow is 900 cfm. The ash bed is still not where we want it.

1600 Fire test showed a slight improvement. Freeboard average is 40 inches.

1800 The offtake is up slightly to 254 C. The fire test did not

show much improvement.

2000 Fire test showed some improvement, as the ash average is up to 10 inches. The grate setting is 2/0.41. The ash weight is building slowly (156#). All readings appear to be stable. We are feeding just under 1 ton per hour. Getting a small amount of crud from the cyclone dump.

2200 The ash bed is still improving. There is an 11 inch ash average. All readings still appear stable.

2230 There is still very little particulate apparent in the cyclone dumps. Afternoon shift went very smoothly.

2300 Saturation air flow is 900 cfm and the offtake temperature is 235 C.

June 21, 1984

0005 During this fire test we had to use a sledge on rods number 4&6, but no hard clinker was evident.

0030 Cyclone dump showed increased particulate (3 rakesful).

0200 Holes number 4,5&6 seemed to be layered over. We did not have to use the sledge, however. Dumped 607 pounds of ash.

0230 Coal feed is still a just below 1 ton/hour.

0400 During this fire test, number 4 rod needed to be hammered in. The rest of the rods went in with ease.

0415 Started to load coal into the weight bin at 4.25 tons.

0500 Stopped loading coal at 10.71 tons. Started the pad clean up.

0600 During this fire test all the rods went in smoothly. The ash depth average was 15.7 inches. Increased the grate to 2/0.50.

0735 Started the probe test.

0800 Fire test shows a 9.4 inch ash averge. Finding a crusty build up all the way around near the grate. The heaviest crust is about 8 inches thick on the 4,5 &6 side of the retort. These holes showed a much more shallow fire zone.

0815 Plan calls for increasing the saturation air flow in increments of 100 cfm until we reach 1200 cfm. Made the first increase to 1000 cfm and left the grate at 2/0.50.

0845 Increased the saturation air flow to 1100 cfm. Increased the grate 2/0.60. Increased the furnace pressure to 80.

0915 Reached 1200 cfm saturation air flow. Furnace pressure is 90 inches wc with the back pressure valve open 40% to maintain a 2 inch wc gas supply pressure. Grate speed is now pushing 2/0.70.

0920 Getting 2-4 rakesful from this cyclone dump.

0930 Ash dump shows a quantity of larger sized chunks. The ash is moist.

1000 Fire test shows 10.9 inches ash average. We are getting a hard crust of 4-5 inches thick in holes 2,3&4. No multiple zones or deep fire zones . The grate will be left at 2/0.70. Saturation temperature is 58 C and we will hold it there until the bed stiffens.

1010 Started loading coal into the weigh bin at 5.88 tons.

1030 Coal feed is now at 1.25 tons/hour. The offtake temperature is ranging between 280 & 285 C.

1130 The higher heating value is approaching 170 BTU/ft^3. The CO2 is reading at 4%.

1200 Fire test showed a slight decrease in the ash level. Leaving the grate at 2/0.70.

1230 Dumped ash.

1400 Some bottom crust is still evident with this fire test. Leaving the grate speed at 2/0.70.

1445 Stopped filling the weigh bin at 11.35 tons.

1500 Higher heating value is 167-170 BTU/ft^3. The CO is running 32.5%. Increased the saturation air flow to 1200 cfm. The offtake temperature is 260 C. All readings appear stable.

1800 Fire test shows an uneven bed. Ash average is a little over 11 inches.

1845 The caustic line was plugged. We had to flush it with water. The pH went down to 5.5.

1930 The coal slide gate button burned out and was repaired. We are now feeding over 1.3 tons/hour. Everything appears to be running smoothly.

2000 Fire test ash average is down one inch, but it seems to be evening out. There is a bit more particulate present in the cyclone dumps today than yesterday.

2030 This coal feed took 1.32 tons.

2200 Fire test shows the bed improving and the ash average is now up to 14 inches.

2230 Turned the grate drive up slightly to 2/0.85. This coal feed ate 2.39 tons.

2250 Everything is running smoothly. The offtake temperature has been ranging between 240 & 280 C. Saturation temperature is 60 C. Saturation air flow is 1200 cfm. Furnace pressure is 90 inches wc.

2300 It is cloudy outside , 71 F and humid.

June 22, 1984

0005 Fire test shows the ash average to be down from the last reading (12.57 inches). Grate speed was 2/0.85, but we reduced it to 2/0.50 to build the ash back up.

0030 The pH is 5.0. The pump for the caustic is plugged. Had to flush it out and reinstall it.

0100 Dumped 550 pounds of ash. It was wet with few large chunks.

0130 The caustic hose blew apart, spraying caustic solution all around. Repaired the hose.

0200 During this fire test the rods all went in smoothly. There appeared to be a little crust but we did not have to use the sledges. The ash average is a little over 9 inches. Keeping the grate speed at 2/0.50 until next fire test.

0230 Coal up this time was 1.26 tons.

0245 Replaced the lights over the caustic pumps.

0330 Filled the weigh bin with 10.92 tons of coal.

0400 This fire test we had to use the sledge on number 2 hole. The bed is a little uneven, but the ash level is up to a little over 10 inches.

0415 Dumped 501 pounds of ash. The ash is drier this time than last with more football sized chunks.

0425 This cyclone dump produced 3-4 rakesful. The particulate was mudlike in texture with a fine silt floating on top of the tank.

0550 Cleaned the second caustic pump. It is now running at 60/60.

0600 This fire test show a still increasing ash average (10.71

inches). All rods went down easily.

0730 Started the pressure and temperature probe test. The gas quality is very good. The CO is 31%.

0800 This fire test ash average was 13.7 inches. Getting a heavy crust below holes number 3 & 4. Also had multiple zones on hole number 5. Increasing the grate speed to 2/0.70 as we are preparing to increase the saturation air flow to 1500 cfm.

0815 Increased the saturation air flow to 1300 cfm. The saturation temperature is 58 C.

0835 Noticed glowing on the number 5 hole. Started the agitator at the slowest speed 1.6 sweeps/hour to help cover over this area.

0845 Increased the saturation air flow to 1400 cfm and adjust the furnace pressure and back pressure valves to maintain the outlet pressure at 2.5 inches wc.

0900 Manually lowered the agitator to the bed. This was done to control the offtake temperature which had risen to over 350 C and to distribute the coal over the top of the bed.

0915 Increased the saturation air flow to 1500 cfm and increased the grate speed and furnace pressure slightly. Opened the back pressure valve to 55% open. The grate speed is now 2/0.80.

0930 At 1500 cfm, saturation air flow, we are feeding 1.5 tons per hour. Number 5 hole is still glowing. The freeboard is 39 inches on this hole. Offtake temperature is 300 C.

1000 Fire test shows a 13.7 inch ash average. The bed is fairly even, however the number 5 hole produced multiple zones and number 4 hole is high and hot. Increasing the grate speed to 2/0.90.

1030 Dumped 530 pounds of ash. Getting many chunks 5-6 inches across.

1040 Increased the combustion air flow and opened the back pressure valve to 60.5% open to keep the flame as cool as possible.

1200 This fire test shows deterioration throughout the bed, with 5 bars showing multiple zones (some as many as 4 distinct zones). Slowed the grate to 2/0.80 to maintain what ash we have.

1230 Freeboard is still in the 39-40 inch average range. There is now some glow on hole number 6. The gas quality is still pretty good (CO is 30%).

1400 This time the fire test was much better. No multiple zones resulted. Increased the grate speed to 2/1.20 as the ash level is up markedly.

1410 Started filling the weigh bin.

1500 Saturation air flow is 1500 cfm. The offtake temperature is 290 C. There are severe thunderstorm warnings out for this area until 1900.

1800 Fire test showed a very uneven ash bed. The measurements ranged from 6-40 inches. Increasing the grate drive speed to 2/1.40.

2015 Loading coal into the weigh bin. The offtake temperature is 270 C. Saturation temperature is 60C. Saturation air flow is 1500 cfm.

2200 This fire test shows the bed to be getting worse. The ranges of measurements are 3-40 inches with the average being 16.4 inches. The freeboard average is 40 inches. Increasing the grate to 2/2.15 in hopes of spreading out the high spot.

2240 Rechecked the fire bed and found some improvement. Reduced the grate speed to 2/1.25.

2315 Caustic pump has plugged again. After flushing and repriming, it is now working satisfactorily.

June 23, 1984

0005 This fire test showed some multiple zones. Ash average is 10.14 inches. Slowed the grate down to 2/0.80 until we do the 0200 fire test.

0030 Dumped 720 pounds of ash. The ash was dry with a few chunks 5-6 inches across. This cyclone dump produced 15 rakesful of sludge. There was a slight amount of floating silt.

0200 This fire test shows the ash level still decreasing. There is a low measurement of 1 inch and a high one of 19 inches. Slowed the grate to 2/0.60.

0215 Dumped 523 pounds of moist ash. Still seeing some chunks 5-6 inches across.

0330 Dumped the cyclone. Result was 20-30 rakesful of mud.

0400 Fire test ash average is 9.14 inches. The bed is leveling out slowly, however.

0430 The pH is 7.0. Both caustic pumps are running 50/50.

0515 Dumped 531 pounds of moist ash. There are some chunks 4-5 inches across.

0600 During this fire test, the rods went in with some difficulty. The ash average is up to 12.57 inches.

0720 Offtake temperature is 410 C. The strip chart is not agreeing with the readout. There it only reaches 390-400 C and the alarm is not sounding.

0740 Ran the agitator at high speed for 2 revolutions between the temperature and pressure probe tests. This should lower the offtake temperature immediately to about 260 C. Then we will return the agitator to the original setting of 1.6 sweeps/hour.

0800 Fire test shows the bed to be a little upset. The ash average is high at 18.9 inches. Had multiple zones on 2 bars. All holes are a bit crusty. We will increase the grate speed to 2/0.90 as we are preparing to increase the saturation air flow to 1800 cfm. We will poke the high holes every 20 minutes between now and the 1000 fire test in attempt to lower the high zones.

0815 Increased the saturation air flow to 1600 cfm. Dumped 560 pounds of ash.

0830 Noticed burning through on holes number 3 & 4.

0840 Started poking holes number 3,4,5 & 6. Found a considerable crust on the top of all holes.

0845 Increased the saturation air flow to 1700 cfm.

0900 Increased the agitator to 5 sweeps/hour and continues poking the above mentioned holes. The offtake temperature has dropped from 335 C to the neighborhood of 270 C.

0905 Started loading coal into the weigh bin at 5.9 tons.

0910 Having difficulty with the cyclone gate valve. It will not close.

0915 Increased the saturation air flow to 1800 cfm.

0930 Fed 2.11 tons of coal. The cyclone gate valve continues to be inoperable. Particulate is packed in and around the gate seat. The valve only closes 2 inches.

0945 Stopped coaling up at 11.13 tons.

1000 Cyclone valve is still inoperable. This fire test indicates that the poking and increased grate speed has helped. The ash average is now 15.7 inches. There are no clinkers evident, only a mild crust on both top and bottom. In-

creased the grate drive speed to 2/1.00 to reduce the overall ash level.

1045 The cyclone valve continues to be inoperable. The possibility exists that a piece of refractory may have fallen across the cone opening. Something hard is felt when pushing a rod up under the cone opening.

1130 Work continues on the cyclone valve. Increased the saturation air flow to 1900 cfm and the saturation temperature to 59 C. There is no longer an orange glow on top of any holes. Increased the agitator speed to 9.0 sweeps/hour to aid in controlling the offtake temperature.

1200 Increased the saturation air flow to 2000 cfm. This fire test shows a 17.4 inch ash average. Increased the grate speed to 2/1.20 and removed the ash build up under the 5,6 & 7 quadrant.

1220 Finally obtained a full open/drain/close cycle on the cyclone gate valve. The cyclone must be flushed and cleaned a minimum of once every hour at high loads. We are getting 25-30 rakesful from the tank at each flushing.

1230 Increased the saturation air flow to 2100 cfm. The vane valve is open 100%.

1240 The back pressure valve is 98.9% open. We are able to reduce furnace pressure from 115 to 80 allowing the vane valve to close to 70% open. This way we can control the cyclone outlet pressure with the vane valve.

1300 Changed the caustic barrels as the pH was 5.0. Started loading coal into the weigh bin.

1350 The cyclone valve is again refusing to close. Chunks the size of Toledo are falling out of the cone. After cycling the valve numerous times, we finally got it to close.

1400 This fire test shows 13.6 inch ash average. Number 6 had multiple zones and a crust about 2 feet up. Number 3 also was a dirty bar. The grate speed was adjusted to 2/1.10 to maintain 13 inches of ash.

1420 Dumped ash for the 4th time in 5 hours. The ash is now charcoal grey and very dense. The larger chunks are 4-5 inches across.

1540 The offtake temperature is now 480 C, so we are turning up the agitator to 10.0 sweeps/hour. The scrubber pump was flooding so we cut back the water and adjusted the float level.

1600 During this fire test we had to use a sledge on hole number 6 and still were unable to get it all the way in. The off-

take temperature is fluctuating quite a bit.

1645 This fire test again showed multiple zones (3) on hole number 6 and 3. Turning up the agitator seems to have remedied the high offtake temperature. It now reads in the 370-415 C range.

1745 The offtake temperature is coming up again (460 C). Increasing the agitator speed to 10.5 sweeps/hour.

1900 The cyclone slide valve hung up and we had to cycle it back and forth a couple of times to free it up.

2000 This fire test showed high and uneven readings. Increasing the grate drive to 2/1.35 and increased the jacket water flow to 15 gpm. We were also getting high saturation temperatures. We are now getting quite heavy particulate from the cyclone now. The saturation temperature has started on it's way down.

2200 The ash level is still climbing, so turned up the grate drive speed to 2/2.00.

2330 We poked the high holes and tried to break up the clinkers. The gasifier is eating approximately 2.3 tons for each of the last 5 drops. When we dump ash, the readout never goes below 130 pounds. Either the readout is screwed up or there is something stuck in the ash dump.

2315 The temperature outside is 61 F and cloudy. The cyclone door lights are not working properly, as there is a bent micro bracket. After a 30 second flush with the valve open, flush for an additional 5-10 seconds to help keep the valve slides from plugging.

2330 Dumped 640 pounds of ash and water (3/4 water).

June 24, 1984

0005 During this fire test, all rods went down smoothly except number 7. Multiple zones were evident with holes number 3 & 4. Increased the grate speed to 2/2.18.

0030 Cyclone slide valve stuck again during the cyclone dump. We pounded it shut. There were 30-40 rakesful for +300 pounds.

0040 Changed the grate teeth from 2 to 4 and the setting from 2.18 to 1.00.

0045 Started loading coal into the weigh bin.

0100 Dumped the cyclone. One minute water flush produced a heavy sludge. Leaving the water on 1/4 turn.

0130 Stopped coaling up at 11.18 tons.

0200 Keeping the grate at 4/1.00. The offtake temperature is dropping (from 331 C to 265 C). Dumped 820 pounds of water and ash. The ash particles were of medium size.

0230 Cyclone dump and a 1 minute flush produced a good deal of heavy mud.

0300 In checking the bed conditions, it was noted that there was a crust under the #1 zone.

0330 Started loading coal into the weigh bin at 3.72 tons. Dumped 1100 pounds of ash (400 pounds was water). Dumped the cyclone and flushed it with water for 1 minute.

0400 This fire test we had to hammer in the rods on number 2 & 3 as a hard crust had developed. Number 3 rod showed multiple zones. The ash average was down around 18 inches. Slowed the grate to 4/0.60. We will recheck the bed in half an hour.

0430 Stopped loading coal into the weigh bin. Checked the bed and found it slightly improved. We will leave the grate at 4/0.60.

0500 This cyclone dump produced 300-400 pounds of mud.

0515 Dumped 1112 pounds of ash (720 pounds of it was water). After this dump the readout still showed 121 pounds.

0530 Started loading coal into the weigh bin at 6.03 tons.

0600 Fire test showed the ash level to be over 22 inches. All the rods went in fairly easily. Increasing the grate speed to 4/1.00.

0620 Stopped loading coal into the weigh bin at 11.64 tons.

0635 Due to extreme variations in the ash depth,bed conditions, deterioration of gas quality and high rate of particulate carryover, we will reduce the saturation air flow from 2100 cfm to 1800 cfm. Reduced the induced draft vane valve to 55% open. Left the back pressure valve at 100% open to maintain at least a +5 inch wc pressure on the cyclone outlet. Changed the grate back to 2 teeth and a setting of 1.40.

0700 Reduced the agitator speed to 7.0 sweeps/hour. Reduced jacket water flow to 10.0 gpm.

0730 Dumped 880 pounds of ash and water (at least half was water). We have been having problems keeping up with the cyclone particulate over the last 24 hours.

0755 The offtake temperature is 425 C and the bed is burning on top. We will attempt to stabilize the bed at 1800 cfm before doing the probe tests. Will reschedule the tempera- temperature and pressure bed probe tests for early afternoon.

0800 This fire test shows an ash level a little over 18 inches average. Numbers 1,3 & 5 are showing multiple zones. There seems to be agglomeration around the top of the bed in the area of holes 4-6. There was a very large clinker on the bottom of hole #2. The grate speed is 2/1.40.

0810 The cyclone was completely packed to the bottom of the pipe. The operator had to rake for 25 minutes to clear the particulate from the tank. We are leaving the water on slightly to prevent the valve guides from plugging.

0835 Started loading coal into the weigh bin at 4.8 tons. Dumped 610 pounds of ash. This time there was very little water.

0840 Changed the caustic barrel. The pH is 5.0.

0915 Stopped coaling up at 11.06 tons.

0930 The offtake temperature continues to wander all over. It is running between 330C and 600 C. Hole number 6 continues to glow.

1000 This fire test shows an ash average of 19 inches. Number 1 & 2 rods showed multiple zones and evidence of the curst that has built up in those regions. Number 4 &5 showed signs of a heavy top crust. The offtake temperature is hovering around 550-600 C. The CO is down and the CO2 is up. The grate speed is at 2/1.20. Moving the high temperature alarm to 600 C.

1040 The offtake temperature hit 815 C. Poked the #6 hole and will run the agitator faster for 2 minutes. This brought the offtake temperature to 375 C.

1100 Dumped 800 pounds of ash.

1130 The offtake temperature again tops 800 C. Poked the number 6 hole and stepped up the agitator to 9.0 sweeps/hour.

1200 This fire test showed considerable improvement with the exception of the #6 hole. There were no multiple zones present. Had to, however, pound most of the bars in. The offtake temperature is at 890 C. Leaving the grate at 2/1.20.

1303 The offtake peaks at 1000 C less than 5 minutes after poking. The bed is orange from number 1 hole around to number 6. We will again put off the temperature and

pressure bed probe tests due to this unusually high offtake temperature.

1330 The cyclone continues to be a difficult problem. Carry-over, even at 1800 cfm, requires a minimum of 15-20 minutes raking time/hour.

1400 This fire test shows a little more improvement. Trying to break up the masses in the bed. Had to use a sledge on holes number 1,2,5 & 6.

1415 The decision was made to reduce the saturation air flow to to 1700 cfm and raise the saturation temperature to 60 C. Hopefully this will aid in stabilizing the offtake temperature at a lower range. Once it has stabilized, we can increase the load again.

1415 Ten minutes after reducing the saturation air flow, the offtake temperature swing has reduced to 350-450 C. Both the ash pit and fire loss pressures have risen 5 inches wc.

1500 Again it took 1/2 hour to rake out the cyclone tank after dumping. The offtake temperature seems to have leveled out at 330-380 C.

1550 Again we are getting high offtake temperatures. Increasing the agitator from 7.0 to 9.5 sweeps/hour.

1600 The offtake stabilized, so we are turning the agitator back to 7.0 sweeps/hour.

1645 The offtake temperature is acting up a bit. Increased the agitator speed to 8.5 sweeps/hour until it settles down.

1730 We are getting exremely large, heavy amounts of sludge from the cyclone. We are now dumping it every half hour.

1930 Increased the grate speed to 2/1.60 to attempt to even out the bed.

2130 The offtake temperature is still unstable (500 C). Increasing the agitator to 10.0 sweeps/hour.

2140 Increasing the agitator to 11.0 sweeps/hour.

2200 Unable to get the #6 rod into the hole this fire test. The rest of the holes seem to be leveling out. The ash average is 16.5 inches. The cyclone has been putting out an incredible amount of sludge. We are flushing it every half hour and still it tends to plug.

2230 This coal feed was 2.29 tons. The offtake temperature has finally stabilized in the range of 260-350 C.

2300 The offtake temperature is again bouncing around.

2330 This cyclone dump is the worst I have seen yet. The dumpster is nearly 3/4 full of particulate. Had to shovel it out.

June 25, 1984

0005 This fire test showed an ash average a little over 14 inches. Had to use the sledge on holes number 4,5,6 & 7. Number 3 gave a zero reading (down to the grate!). Reduced the grate speed to 2/0.41 and will check the bed again at 0100.

0030 Dumped the cyclone.

0100 Increased the grate speed to 2/1.20.

0115 Replaced the caustic barrel.

0130 Started loading coal into the weigh bin at 3.22 tons.

0145 The offtrake temperature is near 500 C. Increased the agitator to 15 sweeps/hour.

0200 The ash average is 8.5 inches. Decreased the grate speed to 2/0.50. Will check the bed again at 0230 and will poke the bed to attempt some control over the bed.

0230 Cyclone dump again showed an extremely large amount of sludge. The gas quality is not so good (CO:23% and CO2:9%). Stopped loading coal into the weigh bin at 9.54 tons.

0300 The fire test showed an 11 inch ash average and the rods all went in fairly smoothly. The grate speed is remaining at 2/0.50.

0330 This cyclone dump required 30 minutes of raking to empty the dumpster.

0400 This fire test showed an average of 14.57 inches. The bed quality has started to deteriorate again. Numbers 4 & 6 showed multiple zones. Numbers 3 & 7 showed 0". There was some difficulty in getting the bars in. The grate is remaining at 2/0.50.

0420 Lowered the agitator to 40 inches to aid in stabilizing the offtake temperature.

0430 The large caustic pump stopped. It was flushed, primed and the stroke increased to 80 from 60.

0450 Increased the agitator speed to 20 sweeps/hour. Lowering the agitator does not seem to have helped much.

0500 This fire test showed an average ash depth of 15.3 inches. Increased the grate drive to 2/0.65. All rods had to be hammered in.

0600 This fire test showed an average ash depth of 17.7 inches. Number 6 had multiple zones. The rods went in easier than in recent tests. Increased the grate speed to 2/0.80.

0630 The pH is at 8.0 so we reset the caustic pumps at 65/100.

0700 The agitator speed is 20 sweeps/hour to eliminate the offtake temperature extremes. Slowed the agitator to 9.0 sweeps/hour to bring the freeboard back to the 36 inch level.

0715 It appears that slowing the agitator allows the offtake temperature to peak out at over 600 C, but the freeboard reduced to 33-34 inches average.

0728 The decision was made to return to the low loads to straighten out the bed conditions. Burning through continues on holes number 4,5 & 6. Reduced the saturation air flow to 800 cfm. Reduced the furnace pressure and combustor air. Dropped the jacket water 2 gpm and closed the back pressure valve to 40% open to maintain cyclone outlet pressure. Cut the agitator speed to 1.7 sweeps/hour. Leaving the grate speed at 2/0.80 to remove the ash.

0740 Still burning through on holes number 4,5 &6. Reduced the saturation air flow to 600 cfm. Ran the agitator full out to distribute the coal (1-2 minutes) and then returned it to 9.0 sweeps/hour.

0750 Ran the grate full out at 2 teeth for 10 minutes to churn out some ash.

0800 The grate is now at 2/0.90. The fire test shows a 9 inch ash average. There were large clinkers on the bed. Had to use the hammer'on number 5 and broke the hammer on number 2. Number 5 hole also showed multiple zones. The bed has a heavy crust all over. Continuing the variance of the speeds on both the grate and the agitator, alternating full out for 10 minutes and back to help clear out the clinkers and drive the offtake temperature down under 30 C.

0830 Freeboard average is running between 33 & 34 inches. The offtake temperature is 258 C. Grate drive speed is 2/1.00. Agitator speed is 3.5 sweeps/hour. Dumped ash. The cyclone particulate is still very heavy. It took 20 minutes to clean out the tank, this time.

0840 Number 6 hole continues to burn through. The offtake temperature is now 350 C.

0855 Cranked the grate drive full out (2.18) for 10 minutes.

0900 Freeboard average is 32.5 inches. Holes number 5 & 6 continue to burn through. The offtake temperature swings back and forth between 250 & 350 C.

1000 This fire test shows a 13.6 inch ash average, however, the bed is very uneven. Number 3 has multiple zones and numbers 5 & 6 are still burning through. Had to pound the bars through agglomeration in the region of holes number 2,5 & 7. The majority of the grate shows very low ash level. Slowing the grate speed to 2/0.75 after a 10 minute "full out" period.

1045 Cut the jacket water to 7 gpm. Jacket water temperature is 70 C.

1050 There has been a slight improvement in holes 5 & 6. Number 6 still shows multiple zones.

1055 Ran the grate at 2/2.18 for 10 minutes. Continued to poke the mass under the number 5 hole. Raised the saturation temperature to 61 C.

1200 Fire test shows a breaking up of the agglomeration and the ash average is 8.6 inches. We are going to continue running the grate "full out" for 10 minutes out of every 30-40 minutes to help churn out the clinkers.

1220 Dumped 750 pounds of ash. The ash is now very hot and dry with a combination of fine sand like granules and larger clinkers.

1300 The offtake has stabilized at 235 C. Gas quality is markedly better with the CO climbing to 25%.

1340 Will try turning off the agitator all together to see if the offtake temperature will stay below 300 C. Running with out the agitator is desireable with this coal as it is very friable.

1355 The offtake temperature is now 365 C. At 300 C the CO starts heading downward.

1400 This time the fire test showed a return to old problems. We had to use the sledge on holes number 2,3 & 5. Holes number 5 & 6 are burning through again. Numbers 1 & 6 showed multiple zones.

1410 Will continue to run the grate full out at 2/2.19 for 10 minutes and then return to 2/0.80.

1420 The scrubber inlet temperature is over 300 C due to the valve being partially closed.

1435 Dumped 700 pounds of ash. The ash is very powdery with a few clinkers interspersed.

1500 Saturation air flow is 600 cfm. Offtake temperature is 230 C. Still have a large clinker in the ash bed. The grate drive is operating at 2/0.75. The agitator is running at 5 sweeps/hour.

1730 Running the grate at full speed for 10 minutes. We poked holes number 4 & 5 to break up the clinkers. It appears to have worked, somewhat. Our highest hole was 28 inches and the lowest 0 inches.

2000 During this fire test we could not get the poke rods all the way in on holes numbers 4 & 6. The offtake temperature is now staying in the range of 190 to 260 C.

2110 Pounded rods into the bed to break up the clinkers and turned up the grate for 5 minutes.

2200 This fire test showed a slight improvement. Increased the grate speed to 2/0.90.

2300 Higher heating value is 150 BTU/ft^3 and the lower heating value is 139 BTU/ft^3.

June 26, 1984

0005 Fire test ash average was 11.4 inches. Had to use the sledge on holes numbere 1,4,6 & 7. Reduced the grate speed to 2/0.60.

0100 Dumped 630 pounds of ash. The ash was dry and small to dustlike particles. They melted the bottom of the bucket. Increased the grate speed to 2/2.18 for 5 minutes.

0105 Resumed 2/0.60 grate drive speed. This time the cyclone dump only produced 3 rakesful.

0130 The pH is low at 5.5, so we increased the caustic pump speed to 50.

0200 Fire test ash average is 10.0 inches. There was some burning through on holes number 4,5 & 6.

0230 The offtake temperature is unstable running from 320-535 C. Tried increasing the speed on the agitator until the temperature drops and then turned it off until the temperature starts to rise again. Then put the agitator speed at 4.9 sweeps/hour.

0300 Raised the agitator up to 37 inches.

0400 Fire test ash average is 8.14 inches. Had to use the

sledge on holes number 3,5 & 7. The grate speed is at 2/0.60.

0445 There is burning through in the area of holes number 4 & 5. We will keep poking these holes. Dumped 721 pounds of ash. The ash was hot, dry and the size of dust particles.

0500 Increased the grate speed to 2/2.18 for 2 minutes and then returned to 2/0.60.

0530 Started filling the weigh bin at 5.04 tons.

0600 Fire test ash average is 13.14 inches. Number 4 rod showed multiple zones. Had to use the sledge on rods number 1,3,5 & 6. Number 4 showed slight burning through. Increased the grate speed to 2/0.80.

0630 Finished loading coal at 10.99 tons.

0700 Opened the back pressure valve to 50%. The cyclone outlet pressure was up to 1.1 inches wc and this brought it back to 0.8 inch wc.

0730 Holes number 4,5 & 6 are burning through. We still have a clinkered bed. The gas quality is poor and the offtake temperature is still fluctuating too much.

0800 This fire test shows a 3 inch ash average. There were multiple zones on rods number 4 & 5. Had to use the sledge on rods number 2,4 & 5. We are discussing various options. It would be ideal to be able to keep the agitator off due to the friability of this coal, but we must find a way to eliminate the clinkers and produce a 12 inch ash average.

0900 The decision was made to try the following:

a. Turn the agitator off.
b. Crank the grate at maximum speed (2/2.18)
c. Poke holes number 2,4 & 5 to break up the clinkers
d. Reduce the combustor and furnace blowers correspondingly.
e. Close the back pressure valve.
f. We reduced the saturation air flow to 400 cfm for 5 minutes.

0905 Changed the grate speed to 6/2.18.

1000 Turned the grate off for a while. The ash is down to a 2 inch average, but we are making progress on the clinker removal. All rods went in without the persuasion of the sledge hammer. Saturation temperature is 68 C. We are continuing to poke the bed and run the grate at 6/2.19. The offtake temperature is staying under 200 C with the agitator off.

1130 Have dumped ash 3 times in the last 2 hours. We are getting mostly clinker and partially consumed coal. The bed is still improving. We are able to put the rods in with out pounding. The CO and CO2 are starting to improve also. The offtake temperature is still staying down.

1200 This fire test produced a 5.4 inch ash average. There was only a slight crust on the bottom of holes 4 & 5. We are now showing ash on all holes. We will continue poking holes number 4 & 5. Leaving the grate speed at 3/1.00 with the agitator off.

1215 Saturation temperature is reduced to 59 C. The CO2 is coming down, but the CO is staying 20 to 22%. This indicates we still have some clinker and a burn through somewhere.

1230 Dumped ash. We are getting cinders but fewer large chunks.

1250 Poked hole number 4 and still found some clinker. We are breaking it loose from the retort wall with a bar and sledge. Returning the saturation temperature to 62 C and will run the grate full out for 5 minutes.

1300 Increased the saturation air flow to 700 cfm.

1308 Reduced the saturation temperature to 60 C as the ash pit pressure increased.

1345 The offtake temperature is staying between 135 & 205 C. Saturation air flow is 600 cfm.

1350 Changed caustic barrels and repaired a leak in the upper nozzles on the scrubber quench.

1500 The offtake temperature is 200 C and the saturation air flow is 60 cfm.

1640 Poked holes 4 & 5 and found some clinker. We broke it up and reduced the grate drive speed to allow the ash to build up a little.

1800 This fire test showed the bed still to be uneven, but we found no hard spots. Ash average was 11.8 inches.

1900 There was a red spot in hole number 3 during this fire test. We pounded it until the red was not visible. Rods 3 & 4 showed multiple zones.

2000 The bed is leveling out somewhat.

2130 The CO, CO2 and offtake graph shows straight lines.

2200 We are building ash slowly. The CO, CO2 and the offtake temperature are still improving.

2240 All is fairly stable.

2330 Gas quality is greatly improved. The CO is 27% and the CO2 is 7%. Higher heating value is 164 BTU/ft^3 and the lower heating value is 153 BTU/ft^3.

June 27, 1984

0005 This fire test showed an ash average of 3.7 inches. The bed is soft and the poke rods went in smoothly. Reduced the grate drive speed to 2/0.60.

0200 Ash average is now 6 inches. The bed is cooling down. Keeping the grate speed at 2/0.60.

0330 Increased the saturation air flow to 800 cfm. Opened the back pressure valve to 71.5% open and increased the grate speed to 2/0.80.

0400 Ash average is 10.7 inches. All rods went in with ease during this fire test. Keeping the grate speed at 2/0.80.

0430 Dumped 532 pounds of ash. It is hot, dry and the size varies from dustlike particles to softball sized clinkers.

0500 Started loading coal into the weigh bin at 5.8 tons.

0530 Cyclone dump produced half a shovelful of particulate.

0600 Fire test ash average is 9.14 inches.

0630 Finished loading coal and outside clean up. CO is 28% and CO2 is 6.5%. Higher heating value is 164 BTU/ft^3 and lower heating value is 153 BTU/ft^3.

0700 CO is 26%. There are no signs of clinkering or burning through at this time.

0725 Started the temperature probe of the bed. Offtake temperature is up to 300 C. The agitator is still off.

0800 Fire test shows very little ash on the grate. Ash average is 4.7 inches. All bars are still going in easily. There is no bottom crust evident on holes 4,5 & 6. There was a multiple zone on rod number 5. Slowed the grate to 2/0.50.

0815 Increased the saturation air flow to 1000 cfm. Keeping the grate speed at 2/0.50. If we do not start burning through, we will increase the saturation air flow to 1200 cfm at 0915.

0845 The CO is almost 28% and the CO2 is dropping. The offtake temperature remains between 280 & 300 C. The agitator is off. The cyclone particulate is heavier. We did burp out

a large cylindrical plug.

0915 Higher heating value is 176 BTU/ft3. Increased the saturation air flow to 1200 cfm. Increased the combustor air flow to maintain the cyclone outlet pressure. Both the primary and secondary blowers are at 60% open. The furnace pressure is at 85 inches wc.

0920 The offtake temperature is staying around 310 C. We are going to 3/4 inch screen on the future coal ups to reduce the amount of fines entering the retort.

0930 Dropped 2 tons of coal during this feed.

1000 This fire test showed mixed results. We will poke in the area of hole number 5 to prevent clinkering.

1015 Increased the saturation air flow to 1400 cfm. Increased the draw to keep 1.5 inches wc on the cyclone offtake.

1030 Poked hole number 5 and found no clinkers.

1110 Gas quality is excellent. Higher heating value is 172 BTU/ft3. CO is 29%. The offtake temperature is 325 C.

1115 Increased the saturation air flow to 1600 cfm. Increased the furnace pressure to 100 inches wc. Increased the grate drive speed to 2/1.00.

1120 Dumped 550 pounds of ash.

1130 Offtake temperature is 345 C. The grate is still spewing out larger chunks.

1200 The fire test shows we are on the verge of bed upset. Ash average is 12.7 inches. We are getting multiple zones and wide incandescent zones. We have decided not to go directly to 1800 cfm. Instead we will leave the saturation air flow at 1600 cfm and monitor it. We will poke holes 2 & 5. Increasing the grate speed to 2/1.10. The next ash dump, we will attempt to double flush the underside of the grate in the area of the number 5 hole. For some reason this is where the burning through and the clinkering occurs.

1230 Cyclone particulate is steadily increasing in volume. Poked holes 2 & 5.

1320 CO is down and the CO2 is rising. Cannot see any visible signs of this on top of the bed. Poked holes 2 & 5. The offtake temperature is staying within the limits.

1400 This fire test shows the same upset conditions. Ash average is 8.6 inches. The only bar we had to use a little pursuasion on was number 1. There were multiple zones on 2 bars. Leaving the grate speed at 2/1.10.

1415 Increased the jacket water supply as the steam valve is only 5% open and the saturation temperature is oscillating.

1430 Dropping the last of the 1/4 inch sized coal into the weigh bin. The north cone is empty. We dropped only 1.26 tons.

1500 Slide gates to the weigh bin shut off. Will load 3/4 inch sized coal into the weigh bin at 0.82 tons. It is all in the south cone of the weigh bin. Higher heating value is 169 BTU/ft^3. CO is 28% and CO2 is 6%. The offtake temperature is 300 C.

1700 The north coal leg is hot. The offtake temperature is up to 435 C. Have turned the coal bin discharge slide gate is on and am dropping coal. The offtake temperature went up to 500 C but dropped 170 degrees as soon as the slide gates were shut. We are now running on coal screened at 3/4 inch.

2200 During this fire test the rods number 2 & 4 showed multiple zones. The offtake temperature has settled down at 290-330 C.

2300 Replaced the caustic barrel.

June 28, 1984

0005 Ash average is 11.85 inches. There were multiple zones on numbers 3 & 7. All rods went in with ease except number 2 which had to be hammered in. We are going to poke holes 2,3 & 7.

0030 Increased the saturation air flow to 1800 cfm. Increased the grate speed to 2/1.20 until the 0200 fire test. Opened the back pressure valve to 100% open.

0100 Dumped 845 pounds of cool dry ash with a few clinkers up to 4 inches across.

0110 Co is 29% and CO2 is 5.5%. Higher heating value is 165 BTU/ft^3 and the lower heating value is 154 BTU/ft^3. The offtake temperature is 325 C.

0130 Cyclone dump produced 15-20 rakesful of mud. Left the water valve on about 1/4 turn with the slide valve open. Poked holes 2,3 & 7 for the second time. The rods went in easy except for number 2 which had to be hammered.

0200 Ash average is 13 inches. All rods went in easily except number 3. Increased the grate drive to 2/1.30 and will poke number 3 hole.

0300 Started filling the weigh bin at 4.98 tons.

0330 Cyclone dump only produced 2-3 rakesful.

0400 Fire test average ash depth was 13.71 inches. Stopped filling the weigh bin at 11.38 tons.

0415 Increased the saturation air flow to 2100 cfm. Opened the induced draft vane valve 100%. Increased the grate speed to 2/1.50. We are still not running the agitator. The off-take seems to be holding stable around

0430 Dumped the cyclone and got 4-5 rakesful.

0445 Poked holes 2,3 &7.

0500 Started filling the weigh bin at 5.09 tons.

0600 Ash average is 6.71 inches. Slowed the grate speed down to 2/1.15 to bring the ash level up. There appears to be a crust at 6-8 inches above the grate. Had to hammer in rods number 2,3 & 7.

0630 Finished filling the weigh bin and started the outside cleanup.

0645 Increased the grate speed to 1.25. Should still increase the ash bed, but at a slower rate. Cyclone dump produced 3 rakesful.

0730 The cyclone is putting out much less particulate at 2100 cfm with the 3/4 inch sized coal. There was 4 rakesful compared to the 25 rakesful with the 1/4 inch sized coal. Number 5 hole is glowing on top.

0800 Fire test ash average is 7.1 inches. The bed is quite even. We hit 4 feet of crust on the number 2 side. Slowed the grate slightly to 2/1.15.

0840 Increased the saturation temperature from 60 C to 62 C. We will attempt to see how changes in saturation temperature will affect gas quality and bed conditions. The plan calls for two hours at 64 C and then drop to 58 C.

0900 Dumped ash again as the indicator shows 640 pounds of ash. The lower level indicator only shows 340 pounds. The ash dump was very wet. There were many 3-5 inch chunks.

0910 Have noticed no significant change since increasing the saturation temperature. Fire loss pressure has been constant also.

1000 Fire test shows an ash level of 11.6 inches. Had to pound in bars 3 & 5. Number 2 hole was sticky. Multiple zones registered on bars number 2 & 7. Leaving the grate speed at 2/1.15 as the plan calls for lowering the saturation temperature to 58 C soon, and this might loosen the bed and

we would loose the ash too quickly if we speeded up the grate.

1010 Started loading coal into the weigh bin at 3.16 tons.

1030 Cyclone valve fails to close. Larger amounts of carryover are present. The scrubber exhaust temperature is 115 C. Checked all quench and spray valves.

1040 Decrease the saturation temperature from 62 C to58 C.

1045 Coincidence or not, we got an immediate drop in CO2 and a slight improvement in CO. The offtake temperature 345 C.

1100 Both the scrubber inlet (600 C) and discharge (115 C) are giving abnormally high readings.

1125 The scrubber discharge temperature went back to where it should be, but the scrubber inlet temperature is still over 600 C.

1130 The CO2 is down significantly and the CO is near 30%. Higher heating value is 173 BTU/ft^3. The offtake temperature is 380 C. Dumped 680 pounds of ash.

1155 Stopped coaling up at 10.12 tons.

1200 This fire test shows that clinkering is starting to occur in the region of holes number 2 & 6. The bed is hotter. Had multiple zones on rods number 3,4 & 5. We will go back to 60 C, saturation temperature, 1/2 hour sooner that planned due to the clinkering. The CO2 had just started to increase also. Leaving the grate drive speed alone as we are planning to start the load swings at 1215.

1215 Reduced the saturation air flow to 60 cfm. Jacket water is at 7 gpm. Furnace pressure is 60 inches wc. Back pressure valve is 34.8% open. Grate speed is reduced to 2/0.60. Combustion blowers have been cut back to 30% open. We are maintaining a 1 inch wc offtake pressure.

1245 The gas quality has dropped some.

1315 Increased the saturation air flow to 2100 cfm. The grate drive is at 2/1.15. Back pressure valve is 100% open and the combustor blowers are 80% open. The furnace pressure is at 115 inches wc. Jacket water is flowing at 12 gpm.

1345 There has been a slight improvement in gas quality. Drastic swings in air flow do not appear to have much affect to gas quality.

1400 This fire test shows the clinker has been broken up on the number 2 hole. We did, however, have to pound in the number 6 rod. There were multiple zones on rods number 2,5 &

7. Leaving the grate at 2/1.15.

1415 CO is back to 30%. Higher heating value is 169 BTU/ft 3. The plan is to stay at 2100 cfm steadily until the remaining coal supply is gone.

1430 Just heard the CO alarm on the coal sampling level for the first time this run. Gas is coming from the south leg valve area at over 500 ppm.

1500 Higher heating value is 168 BTU/ft3 and CO is 29%.

1600 Ash average is 13.4 inches.

1800 Ash level has risen slightly. The offtake temperature was 403 C and then settled down at 345 C.

2000 Number 7 rod showed multiple zones this fire test. Increasing the grate drive to 2/1.40.

2200 Number 3 rod showed multiple zones during this fire test. The ash average is 12 inches. Reduced the grate speed to 2/1.25.

2300 Everything appears to be fairly steady.

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0005 Fire test ash average is 11.57 inches. All rods went down with ease.

0030 Cyclone dump produced 10 rakesful.

0100 Dumped 1010 pounds of ash. The ash was cool and dry. Most was small granules, but there were a few 4-5 inches across.

0200 Fire test ash average is 17.42 inches. Increased the grate speed to 2/1.45.

0315 The offtake temperature is staying around 380-390 C. Ran the grate full out for 2 minutes. Poked holes 1,3 & 6.

0400 Fire test ash average is 20.42 inches. All rods went in easily except number 6. Will start poking holes number 3,6 & 7.

0430 Poked holes 3,6 & 7.

0450 Poked holes 3,6 & 7.

0520 Poked holes 3,6 & 7.

0530 Cyclone dump produced 10 rakesful.

0600 Fire test ash average is 18.57 inches. Multiple zones on number 4 hole. All rods went in easily. Increased the grate speed to 2/2.18 for 2 minutes.

0700 Ash weight indicator is not working. Last dump was 0350 and the weight indicator is stuck at 196 pounds.

0720 Dumped two rollovers estimated at 1000 pounds. The ash was very wet.

0800 Fire test shows an ash average of 20 inches. Multiple zones were evident on rods 4,6 & 7. None of the holes are glowing. Increased the grate speed to 2/1.60.

0830 Cyclone dump produced 6-7 rakesful (less than yesterday).

1000 Ash average is 19 inches. Had to use the sledge on rods number 1,5 & 6. Ash dump weigh cell is working again (loose panel board).

1015 Dropped the saturation air flow to 600 cfm. Leaving the grate at 2/1.60 for one hour. Closed the back pressure valve to 20% open. Reduced the furnace pressure and combustor air flow. Cut back on the jacket water (now 7 gpm) and reduced the scrubber water to stem the overflow. The spray ring at the scrubber inlet is now functioning again due to the fact the offtake temperature has dropped below 200 C. The scrubber inlet temperature is 110 C.

1130 Dumped 650 pounds of ash. The ash was extremely wet with a few large chunks.

1145 The higher heating value is 166 BTU/ft^3.

1200 Fire test shows a 15.4 inch ash average.

1215 Increased the saturation air flow to 1200 cfm. The jacket water flow is set at 9 gpm. The scrubber water is wide open on the supply side. Scrubber inlet readout is working again. There must have been a vapor lock. Furnace pressure is 7.0 inches wc. Combustor air is 62% open. Back pressure valve is 73.2% open with 0.7 inches wc cyclone offtake pressure. The grate speed has been bumped to 2/1.25.

1315 Gas quality is excellent. CO is 31%, CO2 is 4% and H2 is 16%. Higher heating value is 177 BTU/ft^3.

1400 Fire test ash average is 15.7 inches. Multiple zones were evident on bars number 2,3,5 & 6. Increased the grate speed to 2/1.45.

1430 Cyclone dump produced 6-7 rakesful. Scrubber inlet temperature is indicating over 400 C. Once the offtake temperature goes over 250-260 C, the scrubber inlet

temperature registers abnormally high.

1600 Multiple zones registered on Rod number 5. Saturation air flow is 1200 cfm and the offtake temperature is 273 C. Increasing the grate speed to 2/1.60.

1800 Multiple zones on rods number 4 & 5.

2000 Numbers 6 & 7 rods had multiple zones at this fire test.

2200 Fire test ash average is 8.8 inches. Reducing the grate speed to 2/1.45. The offtake temperature is running between 210 & 250. All readings appear to be stable.

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0200 The bed is somewhat uneven. Offtake temperature is 309 C.

0400 Multiple zones were evident on rods number 5 & 6. Increasing the grate speed to 2/1.55. The offtake temperature is 325 C. Everything else is fairly stable.

0600 Fire test ash averaged 16.3 inches. Increased the grate speed to 2/1.70 to remove more ash.

0700 The pH is running 8.5 to 9.0, so the caustic pumps are being turned down to 30/35.

0800 Fire test shows an increase in ash even though an increase in grate speed occurred. We now have an average ash level of 21.4 inches. A bottom crust was evident on holes number 1, 2 & 6. Increased grate speed to 2/2.18.

0830 Dumped 650 pounds of ash. Started loading coal into the weigh bins at 1.72 tons.

0930 This coal feed took 1.6 tons vs. 1.12 tons one hour ago. We can really hear the feed dogs hitting.

1000 This fire test shows a 18.6 inch ash average. Number 3 hole showed multiple zones. The bars were, however, going in with ease - no evidence of clinkers. Increased the grate speed to 3/1.55.

1155 Increased the saturation air flow to 2100 cfm. The grate speed is now 3/1.95. The back pressure valve is 99.6% open. Combustor fans are 93-97% open. Furnace pressure is 1.15 inches wc. Jacket water is 12 gpm.

1230 Fire test showed a rapid increase in ash. The average is 21.1 inches.

1430 Fire test shows a 19.8 inch ash average. Number 3 bar showed multiple zones.

1630 Shutting down. Closed the cyclone valve and flooded the cyclone.

1645 Made the seal in the cyclone. Shut off the saturation blower and induced draft fan. Ignited the roof vent.

END OF BOM/FGT 012 ABSALOKA/ROBINSON

APPENDIX B

Weather Data for Testing Days

These data were taken from NOAA weather station 72658 approximately 3 miles from the test site.

Note: Barometric pressure has been adiabatically normalized to sea level from 840 feet elevation and ambient temperature.

Temperature in degrees Farenheit

Relative Humidity in %

Barometric Pressure in inches mercury

Precipitation in inches

BOM/FGT 012 Absaloka-Robinson

WEATHER DATA

DATE: June 18, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	68	100	28.900	
0200	67	100	28.900	
0300	65	100	28.910	
0400	65	100	28.920	
0500	65	100	28.935	
0600	68	97	28.975	
0700	71	79	29.005	
0800	73	71	29.025	
0900	75	64	29.045	
1000	77	58	29.055	
1100	78	50	29.065	
1200	78	52	29.065	
1300	79	44	29.075	
1400	78	45	29.075	
1500	78	45	29.075	
1600	78	42	29.085	
1700	77	43	29.085	
1800	77	43	29.085	
1900	75	45	29.090	
2000	70	55	29.100	
2100	68	59	29.100	
2200	65	68	29.130	
2300	65	65	29.140	
2400	63	72	29.145	

General Conditions: Clear sunrise and sunset. 837 minutes of sunshine (89%). Maximum wind speed was 24 mph.

DATE: June 19, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	58	83	29.155	
0200	60	81	29.160	
0300	58	90	29.165	
0400	56	90	29.195	
0500	57	93	29.200	
0600	60	93	29.215	
0700	66	75	29.205	
0800	69	66	29.220	
0900	71	64	29.230	
1000	74	57	29.230	
1100	76	52	29.220	
1200	76	50	29.210	
1300	78	49	29.200	
1400	77	50	29.220	
1500	76	54	29.220	
1600	71	59	29.190	T
1700	72	51	29.195	
1800	72	55	29.185	
1900	71	59	29.175	
2000	70	63	29.170	
2100	70	66	29.180	
2200	69	68	29.200	
2300	67	75	29.190	
2400	66	75	29.170	

General Conditions:Clear sunrise and cloudy sunset. 736 minutes of sunshine (79%). Maximum wind speed was 17 mph.

DATE: June 20, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	66	78	29.180	
0200	65	84	29.170	T
0300	64	81	29.160	
0400	64	75	29.175	
0500	65	75	29.180	
0600	65	75	29.180	
0700	66	78	29.180	
0800	67	78	29.195	
0900	69	76	29.190	
1000	70	76	29.200	
1100	73	73	29.200	
1200	74	69	29.200	
1300	76	66	29.200	
1400	79	62	29.195	
1500	80	62	29.170	
1600	81	51	29.170	
1700	80	51	29.160	
1800	80	54	29.160	
1900	77	62	29.160	
2000	74	71	29.170	
2100	72	73	29.180	
2200	70	79	29.180	
2300	69	81	29.200	
2400	69	81	29.185	

General Conditions: Cloudy sunrise and hazy sunset. 587 minutes of sunshine (63%). The maximum wind speed was 20 mph.

DATE: June 21, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	68	81	29.185	
0200	67	84	29.190	
0300	67	84	29.180	
0400	67	81	29.185	
0500	67	81	29.195	
0600	67	81	29.190	
0700	69	73	29.185	
0800	71	71	29.170	
0900	74	64	29.160	
1000	76	62	29.160	
1100	78	62	29.130	
1200	79	58	29.125	
1300	78	60	29.125	
1400	77	64	29.105	
1500	78	62	29.085	T
1600	79	62	29.060	T
1700	78	62	29.055	
1800	77	64	29.055	
1900	76	64	29.030	
2000	72	76	29.045	
2100	71	79	29.045	
2200	70	81	29.055	
2300	70	81	29.055	
2400	70	81	29.045	

General Conditions: Cloudy sunrise and sunset. 645 minutes of sunshine (69%). Maximum wind speed was 17 mph.

DATE: June 22, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	69	84	29.045	
0200	69	84	29.045	
0300	68	87	29.025	
0400	67	87	29.025	
0500	66	90	29.015	
0600	67	93	29.035	
0700	71	81	29.055	
0800	73	79	29.045	
0900	73	79	29.035	
1000	77	69	29.005	
1100	79	68	28.995	
1200	80	69	28.995	
1300	81	63	28.995	
1400	81	60	28.995	
1500	66	90	29.055	0.32
1600	68	90	29.005	0.03
1700	67	87	28.925	T
1800	68	81	28.910	
1900	68	84	28.910	
2000	69	84	28.935	
2100	68	87	28.950	
2200	6	90	28.955	
2300	65	93	28.960	
2400	65	90	28.955	

General Conditions: Cloudy sunrise and sunset. 487 minutes of sunshine (52%). Maximum wind speed was 29 mph.

DATE: June 23, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	63	97	28.955	
0200	65	93	28.955	
0300	64	93	28.955	
0400	62	97	28.965	
0500	62	97	28.980	
0600	65	93	29.005	
0700	68	81	29.015	
0800	67	73	29.025	
0900	69	65	29.045	
1000	70	61	29.055	
1100	72	53	29.045	
1200	74	54	29.035	
1300	76	48	29.035	
1400	76	52	29.025	
1500	74	54	29.035	
1600	73	55	29.040	
1700	72	53	29.045	
1800	72	55	29.055	
1900	71	53	29.075	
2000	68	55	29.095	
2100	64	65	29.115	
2200	61	75	29.120	
2300	61	75	29.125	
2400	62	72	29.130	

General Conditions: Cloudy sunrise and clear sunset. 736 minutes of sunshine (79%). The maximum wind speed was 26 mph.

DATE: June 24, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	60	78	29.130	
0200	57	83	29.125	
0300	59	78	29.125	
0400	58	77	29.125	
0500	58	80	29.125	
0600	61	78	29.130	
0700	66	65	29.140	
0800	69	61	29.150	
0900	71	57	29.160	
1000	72	53	29.160	
1100	74	50	29.150	
1200	76	42	29.140	
1300	76	39	29.130	
1400	78	42	29.125	
1500	77	36	29.125	
1600	76	37	29.115	
1700	76	39	29.115	
1800	76	39	29.105	
1900	74	41	29.115	
2000	70	49	29.115	
2100	67	54	29.125	
2200	65	58	29.130	
2300	65	58	29.145	
2400	63	67	29.150	

General Conditions: Clear sunrise and sunset. 853 minutes of sunshine (91%). Maximum wind speed was 24 mph.

DATE: June 25, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	59	78	29.145	
0200	59	80	29.145	
0300	59	80	29.145	
0400	58	83	29.145	
0500	56	90	29.150	
0600	59	93	29.160	
0700	65	78	29.155	
0800	69	63	29.150	
0900	71	57	29.150	
1000	75	56	29.130	
1100	78	48	29.115	
1200	80	47	29.095	
1300	83	43	29.075	
1400	83	40	29.055	
1500	84	39	29.045	
1600	83	37	29.020	
1700	83	40	28.995	
1800	82	41	28.980	
1900	79	44	28.960	
2000	75	54	28.950	
2100	73	57	28.950	
2200	73	62	28.930	
2300	74	60	28.900	
2400	71	68	28.890	

General Conditions: Clear sunrise and cloudy sunset. 881 minutes of sunshine (94%). Maximum wind speed was 17 mph.

DATE: June 26, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	71	71	28.870	
0200	71	71	28.840	
0300	69	75	28.840	
0400	67	81	28.830	
0500	68	81	28.830	
0600	69	84	28.820	
0700	72	79	28.810	
0800	76	69	28.810	
0900	80	65	28.785	
1000	82	61	28.760	
1100	83	59	28.740	
1200	86	48	28.725	
1300	88	45	28.710	
1400	89	38	28.690	
1500	87	46	28.665	
1600	84	45	28.675	
1700	77	40	28.725	
1800	74	46	28.760	
1900	73	43	28.770	
2000	69	46	28.790	
2100	67	50	28.780	
2200	67	52	28.780	
2300	67	55	28.770	
2400	66	61	28.760	

General Conditions: Cloudy sunrise and sunset. 800 minutes of sunshine (85%). Maximum wind speed was 30 mph.

DATE: June 27, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	65	65	28.780	
0200	64	70	28.790	
0300	64	70	28.800	
0400	64	73	28.810	
0500	63	75	28.840	
0600	64	73	28.860	
0700	66	70	28.880	
0800	68	65	28.905	
0900	71	61	28.915	
1000	73	55	28.925	
1100	75	52	28.925	
1200	77	47	28.940	
1300	78	45	28.940	
1400	79	45	28.935	
1500	79	44	28.935	
1600	78	45	28.935	
1700	78	45	28.930	
1800	78	42	28.935	
1900	76	45	28.940	
2000	73	51	28.945	
2100	70	59	28.965	
2200	68	63	28.975	
2300	67	63	28.985	
2400	65	70	28.995	

General Conditions: Clear sunrise and sunset. 933 minutes of sunshine (100%). Maximum wind speed was 21 mph.

DATE: June 28, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	64	75	29.005	
0200	62	78	29.015	
0300	63	78	29.015	
0400	62	81	29.005	
0500	61	90	29.015	
0600	64	87	29.035	
0700	67	70	29.055	
0800	70	64	29.065	
0900	73	62	29.065	
1000	76	48	29.075	
1100	75	50	29.085	
1200	77	47	29.085	
1300	80	42	29.075	
1400	78	43	29.075	
1500	80	39	29.080	
1600	80	38	29.085	
1700	79	39	29.095	
1800	78	38	29.105	
1900	76	42	29.115	
2000	73	43	29.125	
2100	70	49	29.165	
2200	68	55	29.170	
2300	67	56	29.190	
2400	67	56	29.210	

General Conditions: Cloudy sunrise and clear sunset. 834 minutes of sunshine (89%). Maximum wind speed was 15 mph.

DATE: June 29, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	65	60	29.220	
0200	64	63	29.220	
0300	61	78	29.230	
0400	60	72	29.250	
0500	58	83	29.270	
0600	62	70	29.290	
0700	65	65	29.300	
0800	68	59	29.310	
0900	70	55	29.320	
1000	72	51	29.310	
1100	74	48	29.300	
1200	75	41	29.290	
1300	76	46	29.270	
1400	78	44	29.260	
1500	76	46	29.250	
1600	78	42	29.240	
1700	78	42	29.230	
1800	77	42	29.230	
1900	76	43	29.225	
2000	73	49	29.220	
2100	71	53	29.230	
2200	69	57	29.230	
2300	66	56	29.220	
2400	65	56	29.220	

General Conditions: Clear sunrise and sunset. 931 minutes of sunshine (100%). Maximum wind speed was 15 mph.

DATE: June 30, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	63	62	29.230	
0200	61	72	29.220	
0300	62	67	29.220	
0400	60	72	29.230	
0500	60	72	29.230	
0600	61	75	29.260	
0700	65	70	29.270	
0800	69	66	29.260	
0900	72	57	29.255	
1000	75	52	29.240	
1100	76	47	29.235	
1200	78	44	29.220	
1300	79	44	29.200	
1400	80	39	29.185	
1500	80	42	29.180	
1600	80	41	29.180	
1700	79	44	29.160	
1800	79	48	29.160	
1900	76	48	29.160	
2000	73	56	29.160	
2100	71	57	29.170	
2200	68	63	29.170	
2300	66	68	29.170	
2400	65	70	29.170	

General Conditions: Clear sunrise and sunset. 934minutesof sunshine (100%). Maximum wind speed was 16 mph.

APPENDIX C

Coal Sizing Data

Feed Coal Size Distribution for BOM/FGT-012

Sample Number	Date	Shift Start Time	Screen Mesh Size inch	Cumulative Mass Fraction, % less than stated mesh size, inch				
				1/4	1/2	3/4	1	1 1/2
1	6/16/84	----	(*)	1.7	5.7	16.5	46.1	90.4
2	6/19/84	0:00	+1/4	1.9	6.3	19.3	48.5	85.9
3	6/19/84	8:00	+1/4	1.9	8.3	21.9	55.1	92.6
4	6/19/84	16:00	+1/4	1.8	8.6	23.1	58.4	90.1
5	6/20/84	0:00	+1/4	2.2	9.5	24.3	55.4	91.7
6	6/20/84	16:00	+1/4	1.0	7.1	25.4	57.0	94.1
7	6/21/84	0:00	+1/4	0.7	4.0	12.2	37.7	85.3
8	6/21/84	8:00	+1/4	2.2	8.7	21.4	46.4	82.9
9	6/21/84	16:00	+1/4	1.9	11.1	26.4	62.0	95.9
10	6/22/84	0:00	+1/4	0.9	5.5	18.4	47.8	92.0
11	6/22/84	8:00	+1/4	4.5	16.3	31.9	69.4	96.3
13	6/22/84	16:00	+1/4	3.0	11.5	28.0	60.6	92.3
14	6/23/84	0:00	+1/4	1.2	4.8	15.6	41.8	83.8
15	6/23/84	8:00	+1/4	1.2	7.6	22.1	52.2	90.8
16	6/23/84	16:00	+1/4	2.8	11.2	25.3	51.8	86.0
17	6/24/84	0:00	+1/4	3.0	10.7	21.4	46.5	84.5
18	6/24/84	8:00	+1/4	4.3	13.9	28.2	57.6	91.4
19	6/24/84	16:00	+1/4	2.4	10.7	25.9	54.2	89.0
20	6/25/84	0:00	+1/4	2.4	11.3	23.8	50.0	87.7
21	6/25/84	8:00	+1/4	3.9	13.2	24.9	48.2	85.0
22	6/25/84	16:00	+1/4	1.7	8.0	19.1	44.4	84.9
23	6/26/84	0:00	+1/4	0.8	5.2	15.7	39.5	86.6
24	6/26/84	8:00	+1/4	3.6	11.5	24.0	48.7	87.9
25	6/26/84	16:00	+1/4	1.3	5.7	16.8	43.6	88.9
26	6/27/84	0:00	+1/4	3.1	10.8	23.7	48.8	85.7
27	6/27/84	8:00	+1/4	1.9	8.6	21.7	48.4	87.3
28	6/27/84	16:00	+1/4	2.0	6.9	15.9	40.2	86.5
29	6/28/84	0:00	+3/4	0.9	4.1	15.6	43.2	85.5
30	6/28/84	8:00	+3/4	2.6	5.2	9.0	25.8	71.4
31	6/28/84	16:00	+3/4	2.8	10.3	21.7	53.9	91.8
32	6/29/84	0:00	+3/4	3.1	5.8	11.4	33.8	74.2
33	6/29/84	8:00	+3/4	1.3	5.1	14.4	42.9	81.8
34	6/29/84	16:00	+3/4	2.2	7.4	15.8	42.1	95.3
35	6/30/84	0:00	+3/4	1.3	6.4	16.4	49.5	86.4
36	6/30/84	8:00	+3/4	5.2	15.5	29.6	59.8	92.2
1 - 36	AVERAGES			2.1	8.6	21.3	49.6	88.4

(*) PRE-TEST SAMPLE

APPENDIX D

Coal Addition Log

Coal weights are given in short tons.

BOM/FGT 012 ABSOLOKA/ROBINSON

COAL LOG

DATE	TIME	SAMPLE NUMBER	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	
6/18	950	COKE	8.68	0.07	8.61	0.25	NO	
6/18	1403	C1	10.80	6.00	4.80	0.25	NO	
6/18	1545	C1	11.72	11.31	0.41	0.25	NO	
6/18	1630	C1	11.25	11.08	0.17	0.25	NO	
6/18	1730	C1	11.08	10.96	0.12	0.25	NO	
6/18	1830	C1	10.96	10.56	0.40	0.25	NO	
6/18	1930	C1	10.56	10.40	0.16	0.25	NO	
6/18	2030	C1	10.40	9.94	0.46	0.25	NO	
6/18	2130	C1	10.12	10.02	0.10	0.25	NO	
6/18	2230	C1	10.02	9.87	0.15	0.25	NO	
6/19	30	C2	9.50	9.00	0.50	0.25	NO	
6/19	130	C2	9.50	9.35	0.15	0.25	NO	R.O. TROUBLE
6/19	230	C2	8.70	8.40	0.30	0.25	NO	R.O. TROUBLE
6/19	330	C2	8.65	7.92	0.73	0.25	NO	R.O. TROUBLE
6/19	430	C2	8.45	8.15	0.30	0.25	NO	R.O. TROUBLE
6/19	530	C2	7.83	7.53	0.30	0.25	NO	R.O. TROUBLE
6/19	630	C2	8.73	8.36	0.37	0.25	NO	
6/19	730	C3	8.36	7.98	0.38	0.25	NO	
6/19	830	C3	7.98	7.53	0.45	0.25	NO	
6/19	930	C3	7.53	7.06	0.47	0.25	NO	
6/19	1030	C3	7.06	6.57	0.49	0.25	NO	
6/19	1130	C3	6.57	6.08	0.49	0.25	NO	
6/19	1230	C3	6.08	5.57	0.51	0.25	NO	
6/19	1330	C3	10.77	10.35	0.42	0.25	NO	
6/19	1430	C3	11.08	10.54	0.54	0.25	NO	
6/19	1530	C4	10.54	9.97	0.57	0.25	NO	
6/19	1630	C4	9.97	9.42	0.55	0.25	NO	
6/19	1730	C4	9.42	8.84	0.58	0.25	NO	
6/19	1830	C4	8.84	8.10	0.74	0.25	NO	
6/19	1930	C4	8.10	7.53	0.57	0.25	NO	
6/19	2030	C4	7.53	6.85	0.68	0.25	NO	
6/19	2130	C4	6.85	6.26	0.59	0.25	NO	
6/19	2230	C4	12.63	11.97	0.66	0.25	NO	
6/19	2330	C4	11.97	11.36	0.61	0.25	NO	
6/20	0	C4	11.36	10.71	0.65	0.25	NO	
6/20	130	C4	10.71	10.05	0.66	0.25	NO	
6/20	230	C4	10.05	9.46	0.59	0.25	NO	
6/20	330	C4	9.46	8.81	0.65	0.25	NO	
6/20	430	C4	8.81	8.16	0.65	0.25	NO	
6/20	530	C4	8.59	7.85	0.74	0.25	NO	
6/20	630	C4	7.85	7.12	0.73	0.25	NO	
6/20	730	C5	7.12	6.51	0.61	0.25	NO	
6/20	830	C5	6.51	5.80	0.71	0.25	NO	
6/20	930	C5	5.80	4.97	0.83	0.25	NO	
6/20	1030	C5	4.97	3.99	0.98	0.25	NO	
6/20	1130	C5	10.41	9.51	0.90	0.25	NO	
6/20	1230	C5	10.26	9.27	0.99	0.25	NO	
6/20	1330	C5	9.27	8.41	0.86	0.25	NO	

DATE	TIME	SAMPLE NUMBER	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?
6/20	1430	C5	10.71	9.82	0.89	0.25	NO
6/20	1530	C6	11.01	10.16	0.85	0.25	NO
6/20	1630	C6	10.16	9.27	0.89	0.25	NO
6/20	1730	C6	9.27	8.44	0.83	0.25	NO
6/20	1830	C6	8.44	7.56	0.88	0.25	NO
6/20	1930	C6	7.56	6.65	0.91	0.25	NO
6/20	2030	C6	6.65	5.72	0.93	0.25	NO
6/20	2130	C6	5.72	4.89	0.83	0.25	NO
6/20	2230	C6	8.47	7.70	0.77	0.25	NO
6/20	2330	C7	8.88	7.93	0.95	0.25	NO
6/21	30	C7	7.93	7.00	0.93	0.25	NO
6/21	130	C7	7.00	6.05	0.95	0.25	NO
6/21	230	C7	6.05	5.17	0.88	0.25	NO
6/21	330	C7	5.17	4.25	0.92	0.25	NO
6/21	430	C7	5.79	4.83	0.96	0.25	NO
6/21	530	C7	10.71	9.81	0.90	0.25	NO
6/21	630	C7	9.81	8.88	0.93	0.25	NO
6/21	730	C8	8.88	7.95	0.93	0.25	NO
6/21	830	C8	7.95	6.99	0.96	0.25	NO
6/21	930	C8	6.99	5.88	1.11	0.25	NO
6/21	1030	C8	8.59	7.33	1.26	0.25	NO
6/21	1130	C8	10.50	9.31	1.19	0.25	NO
6/21	1230	C8	9.31	8.05	1.26	0.25	NO
6/21	1330	C8	8.05	6.79	1.26	0.25	NO
6/21	1430	C8	11.15	9.85	1.30	0.25	NO
6/21	1530	C9	11.35	10.08	1.27	0.25	NO
6/21	1630	C9	10.08	8.84	1.24	0.25	NO
6/21	1730	C9	8.84	7.55	1.29	0.25	NO
6/21	1830	C9	7.55	6.29	1.26	0.25	NO
6/21	1930	C9	6.29	4.93	1.36	0.25	NO
6/21	2030	C9	4.93	3.61	1.32	0.25	NO
6/21	2100	C9	6.55	5.32	1.23	0.25	NO
6/21	2230	C9	12.56	10.17	2.39	0.25	NO
6/21	2330	C10	10.14	8.79	1.35	0.25	NO
6/22	30	C10	8.79	7.45	1.34	0.25	NO
6/22	130	C10	7.45	6.18	1.27	0.25	NO
6/22	230	C10	6.18	5.10	1.08	0.25	NO
6/22	330	C10	5.37	4.03	1.34	0.25	NO
6/22	430	C10	10.92	9.67	1.25	0.25	NO
6/22	530	C10	9.60	8.34	1.26	0.25	NO
6/22	630	C10	9.91	8.75	1.16	0.25	NO
6/22	730	C11	8.75	7.48	1.27	0.25	NO
6/22	830	C11	7.48	6.14	1.34	0.25	NO
6/22	930	C11	6.14	4.58	1.56	0.25	NO
6/22	1030	C11	4.58	2.98	1.60	0.25	NO
6/22	1130	C11	9.35	7.70	1.65	0.25	NO
6/22	1230	C11	9.41	7.84	1.57	0.25	NO
6/22	1330	C11	7.84	6.22	1.62	0.25	NO
6/22	1430	C11	8.48	6.78	1.70	0.25	NO
6/22	1530	C12	10.50	9.01	1.49	0.25	NO

DATE	TIME	SAMPLE NUMBER	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?
6/22	1630	C12	9.01	7.08	1.93	0.25	NO
6/22	1730	C12	7.08	5.30	1.78	0.25	NO
6/22	1830	C12	5.30	3.61	1.69	0.25	NO
6/22	1930	C12	3.61	2.29	1.32	0.25	NO
6/22	2030	C12	4.69	2.93	1.76	0.25	NO
6/22	2130	C12	13.09	11.49	1.60	0.25	NO
6/22	2230	C12	11.49	9.62	1.87	0.25	NO
6/22	2330	C14	9.62	6.79	2.83	0.25	NO
6/23	30	C14	6.78	5.89	0.89	0.25	NO
6/23	130	C14	5.87	4.11	1.76	0.25	NO
6/23	230	C14	4.11	2.38	1.73	0.25	NO
6/23	330	C14	6.57	5.17	1.40	0.25	NO
6/23	430	C14	11.30	9.78	1.52	0.25	NO
6/23	530	C14	9.78	8.05	1.73	0.25	NO
6/23	630	C14	10.87	9.15	1.72	0.25	NO
6/23	730	C15	9.16	7.63	1.53	0.25	NO
6/23	830	C15	7.63	5.92	1.71	0.25	NO
6/23	930	C15	9.17	7.06	2.11	0.25	NO
6/23	1030	C15	11.13	9.00	2.13	0.25	NO
6/23	1130	C15	9.00	6.86	2.14	0.25	NO
6/23	1230	C15	6.86	4.49	2.37	0.25	NO
6/23	1330	C15	9.44	7.04	2.40	0.25	NO
6/23	1430	C15	11.67	9.36	2.31	0.25	NO
6/23	1530	C16	9.36	6.97	2.39	0.25	NO
6/23	1630	C16	6.97	4.82	2.15	0.25	NO
6/23	1730	C16	4.82	2.32	2.50	0.25	NO
6/23	1830	C16	5.60	3.41	2.19	0.25	NO
6/23	1930	C16	13.71	11.33	2.38	0.25	NO
6/23	2030	C16	11.33	9.10	2.23	0.25	NO
6/23	2130	C16	9.10	6.65	2.45	0.25	NO
6/23	2230	C16	9.20	7.05	2.15	0.25	NO
6/23	2330	C17	9.43	7.01	2.42	0.25	NO
6/24	30	C17	7.01	4.75	2.26	0.25	NO
6/24	130	C17	11.19	8.55	2.64	0.25	NO
6/24	230	C17	8.55	6.20	2.35	0.25	NO
6/24	330	C17	6.20	3.72	2.48	0.25	NO
6/24	430	C17	11.24	8.55	2.69	0.25	NO
6/24	530	C17	8.54	6.03	2.51	0.25	NO
6/24	630	C17	11.63	8.96	2.67	0.25	NO
6/24	730	C18	8.96	6.86	2.10	0.25	NO
6/24	830	C18	6.86	4.83	2.03	0.25	NO
6/24	930	C18	11.06	8.88	2.18	0.25	NO
6/24	1030	C18	8.88	6.94	1.94	0.25	NO
6/24	1130	C18	6.94	4.89	2.05	0.25	NO
6/24	1230	C18	8.22	6.24	1.98	0.25	NO
6/24	1330	C18	11.20	9.28	1.92	0.25	NO
6/24	1430	C18	11.11	9.14	1.97	0.25	NO
6/24	1530	C19	9.14	7.15	1.99	0.25	NO
6/24	1630	C19	7.15	5.21	1.94	0.25	NO
6/24	1730	C19	5.21	3.13	2.08	0.25	NO

DATE	TIME	SAMPLE NUMBER	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?
6/24	1830	C19	3.13	1.60	1.53	0.25	NO
6/24	1930	C19	5.01	2.13	2.88	0.25	NO
6/24	2030	C19	11.10	9.18	1.92	0.25	NO
6/24	2130	C19	15.11	13.08	2.03	0.25	NO
6/24	2230	C19	13.08	10.79	2.29	0.25	NO
6/24	2330	C20	10.78	8.03	2.75	0.25	NO
6/25	30	C20	8.03	5.64	2.39	0.25	NO
6/25	130	C20	5.62	3.22	2.40	0.25	NO
6/25	230	C20	9.45	7.46	1.99	0.25	NO
6/25	330	C20	7.46	5.22	2.24	0.25	NO
6/25	430	C20	5.22	2.98	2.24	0.25	NO
6/25	530	C20	5.19	3.00	2.19	0.25	NO
6/25	630	C20	10.76	8.64	2.12	0.25	NO
6/25	730	C21	9.40	7.24	2.16	0.25	NO
6/25	830	C21	7.24	6.34	0.90	0.25	NO
6/25	930	C21	6.34	5.58	0.76	0.25	NO
6/25	1030	C21	6.21	5.57	0.64	0.25	NO
6/25	1130	C21	10.13	9.58	0.55	0.25	NO
6/25	1230	C21	9.58	8.96	0.62	0.25	NO
6/25	1330	C21	10.06	9.52	0.54	0.25	NO
6/25	1430	C21	9.52	8.84	0.68	0.25	NO
6/25	1530	C22	8.84	8.10	0.74	0.25	NO
6/25	1630	C22	8.10	7.51	0.59	0.25	NO
6/25	1730	C22	7.51	6.95	0.56	0.25	NO
6/25	1830	C22	6.95	6.24	0.71	0.25	NO
6/25	1930	C22	6.24	5.58	0.66	0.25	NO
6/25	2030	C22	6.24	5.58	0.66	0.25	NO
6/25	2130	C22	4.89	4.30	0.59	0.25	NO
6/25	2230	C22	6.59	6.03	0.56	0.25	NO
6/25	2330	C23	9.48	8.59	0.89	0.25	NO
6/26	30	C23	8.59	8.19	0.40	0.25	NO
6/26	130	C23	8.19	7.51	0.68	0.25	NO
6/26	230	C23	7.50	6.97	0.53	0.25	NO
6/26	330	C23	6.97	6.18	0.79	0.25	NO
6/26	430	C23	6.18	5.63	0.55	0.25	NO
6/26	530	C23	5.63	5.04	0.59	0.25	NO
6/26	630	C23	10.99	10.37	0.62	0.25	NO
6/26	730	C24	10.37	9.80	0.57	0.25	NO
6/26	830	C24	9.80	9.25	0.55	0.25	NO
6/26	930	C24	9.25	8.72	0.53	0.25	NO
6/26	1030	C24	8.72	8.16	0.56	0.25	NO
6/26	1130	C24	8.16	7.55	0.61	0.25	NO
6/26	1230	C24	7.55	6.80	0.75	0.25	NO
6/26	1330	C24	8.81	8.14	0.67	0.25	NO
6/26	1430	C24	10.81	10.40	0.41	0.25	NO
6/26	1530	C25	10.40	10.05	0.35	0.25	NO
6/26	1630	C25	10.05	9.49	0.56	0.25	NO
6/26	1730	C25	9.49	9.07	0.42	0.25	NO
6/26	1830	C25	9.07	8.06	1.01	0.25	NO
6/26	1930	C25	8.06	7.57	0.49	0.25	NO

DATE	TIME	SAMPLE NUMBER	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?
6/26	2030	C25	7.57	7.29	0.28	0.25	NO
6/26	2130	C25	7.29	6.57	0.72	0.25	NO
6/26	2230	C25	9.06	8.72	0.34	0.25	NO
6/26	2330	C26	9.93	9.36	0.57	0.25	NO
6/27	30	C26	9.36	8.67	0.69	0.25	NO
6/27	130	C26	8.67	8.10	0.57	0.25	NO
6/27	230	C26	8.10	7.47	0.63	0.25	NO
6/27	430	C26	6.66	5.88	0.78	0.25	NO
6/27	530	C26	9.18	8.38	0.80	0.25	NO
6/27	630	C26	11.59	10.79	0.80	0.25	NO
6/27	730	C27	10.79	9.92	0.87	0.25	NO
6/27	830	C27	9.92	9.12	0.80	0.25	NO
6/27	930	C27	9.12	8.12	1.00	0.25	NO
6/27	1030	C27	8.11	6.82	1.29	0.25	NO
6/27	1130	C27	6.82	5.38	1.44	0.25	NO
6/27	1230	C27	5.38	3.76	1.62	0.25	NO
6/27	1330	C27	3.76	2.08	1.68	0.25	NO
6/27	1430	C27	2.08	0.82	1.26	0.25	NO
6/27	1530	C28	BEING CHOKE FED THE REMAINDER OF 1/4" SCREENED COAL				
6/27	1710	C28	12.08	8.56	3.52	0.75	NO
6/27	1830	C28	8.55	5.65	2.90	0.75	NO
6/27	1930	C28	5.65	3.86	1.79	0.75	NO
6/27	2030	C28	6.86	5.11	1.75	0.75	NO
6/27	2130	C28	11.46	9.99	1.47	0.75	NO
6/27	2230	C28	14.14	12.38	1.76	0.75	NO
6/27	2330	C29	12.38	10.75	1.63	0.75	NO
6/28	30	C29	10.75	8.73	2.02	0.75	NO
6/28	130	C29	8.73	6.97	1.76	0.75	NO
6/28	230	C29	6.97	4.98	1.99	0.75	NO
6/28	330	C29	11.39	9.27	2.12	0.75	NO
6/28	430	C29	9.27	7.22	2.05	0.75	NO
6/28	530	C29	7.22	5.09	2.13	0.75	NO
6/28	630	C29	11.15	9.01	2.14	0.75	NO
6/28	730	C30	10.10	7.61	2.49	0.75	NO
6/28	830	C30	7.61	5.38	2.23	0.75	NO
6/28	930	C30	5.38	3.16	2.22	0.75	NO
6/28	1030	C30	4.86	2.65	2.21	0.75	NO
6/28	1130	C30	9.78	7.51	2.27	0.75	NO
6/28	1230	C30	10.12	8.32	1.80	0.75	NO
6/28	1330	C30	8.31	7.30	1.01	0.75	NO
6/28	1430	C30	10.98	8.72	2.26	0.75	NO
6/28	1530	C31	11.12	9.03	2.09	0.75	NO
6/28	1630	C31	9.03	6.70	2.33	0.75	NO
6/28	1730	C31	6.70	4.19	2.51	0.75	NO
6/28	1830	C31	4.19	2.26	1.93	0.75	NO
6/28	1930	C31	8.00	5.67	2.33	0.75	NO
6/28	2030	C31	11.75	9.59	2.16	0.75	NO
6/28	2130	C31	12.87	10.77	2.10	0.75	NO
6/28	2230	C31	10.77	8.36	2.41	0.75	NO
6/28	2330	C32	8.36	5.94	2.42	0.75	NO

DATE	TIME	SAMPLE NUMBER	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?
6/29	30	C32	5.94	3.38	2.56	0.75	NO
6/29	130	C32	7.65	5.56	2.09	0.75	NO
6/29	230	C32	9.07	6.87	2.20	0.75	NO
6/29	330	C32	11.75	9.28	2.47	0.75	NO
6/29	430	C32	9.28	6.92	2.36	0.75	NO
6/29	530	C32	6.92	4.54	2.38	0.75	NO
6/29	630	C32	11.36	9.07	2.29	0.75	NO
6/29	730	C33	10.88	8.26	2.62	0.75	NO
6/29	830	C33	8.26	5.77	2.49	0.75	NO
6/29	930	C33	8.89	6.57	2.32	0.75	NO
6/29	1030	C33	10.27	8.21	2.06	0.75	NO
6/29	1130	C33	8.21	7.45	0.76	0.75	NO
6/29	1230	C33	7.45	6.43	1.02	0.75	NO
6/29	1330	C33	6.43	5.06	1.37	0.75	NO
6/29	1430	C33	10.76	9.46	1.30	0.75	NO
6/29	1530	C34	10.47	9.40	1.07	0.75	NO
6/29	1630	C34	9.40	8.12	1.28	0.75	NO
6/29	1730	C34	8.12	6.76	1.36	0.75	NO
6/29	1830	C34	6.76	5.23	1.53	0.75	NO
6/29	1930	C34	5.22	3.89	1.33	0.75	NO
6/29	2030	C34	3.89	2.63	1.26	0.75	NO
6/29	2130	C34	2.63	1.28	1.35	0.75	NO
6/29	2230	C34	4.01	2.47	1.54	0.75	NO
6/29	2330	C35	5.90	4.67	1.23	0.75	NO
6/30	30	C35	4.67	3.43	1.24	0.75	NO
6/30	130	C35	3.43	2.13	1.30	0.75	NO
6/30	230	C35	7.20	6.13	1.07	0.75	NO
6/30	330	C35	6.23	4.90	1.33	0.75	NO
6/30	430	C35	4.90	3.58	1.32	0.75	NO
6/30	530	C35	3.58	2.40	1.18	0.75	NO
6/30	630	C35	5.00	3.60	1.40	0.75	NO
6/30	730	C36	3.60	2.30	1.30	0.75	NO
6/30	830	C36	2.30	1.22	1.08	0.75	NO
6/30	930	C36	6.53	4.93	1.60	0.75	NO
6/30	1030	C36	4.93	3.54	1.39	0.75	NO
6/30	1130	C36	3.54	2.18	1.36	0.75	NO
6/30	1230	C36	2.18	0.82	1.36	0.75	NO
6/30	1330	C36	2.60	1.25	1.35	0.75	NO
6/30	1430	C36	4.56	1.58	2.98	0.75	NO
6/30	1530	C36	2.85	1.47	1.38	0.75	NO

END OF BOM/FGT 012 ABSALOKA/ROBINSON

ASH ANALYSIS FOR BOM/FGT-012

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch 1/4	1/2	3/4	1	2	Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
1	6/19/84	10:30	27.5	52.5	62.3	67.7	74.0	0.59	34	24.2	0.34
2	6/19/84	17:00	31.9	57.9	71.0	81.5	89.9	0.61	18	20.7	0.39
3	6/19/84	22:00	41.6	61.0	69.0	77.2	87.6	0.71	15	20.6	0.64
4	6/20/84	5:00	16.2	23.8	28.6	32.6	45.9	0.53	13	19.8	0.69
5	6/20/84	10:30	26.3	40.8	49.3	56.5	70.7	0.73	8	15.0	1.30
6	6/20/84	13:00	40.3	55.1	60.5	67.5	81.8	0.85	6	17.0	1.40
7	6/20/84	18:00	30.8	47.8	59.3	65.5	80.3	0.74	10	10.3	1.00
8	6/21/84	1:29	16.1	26.6	32.6	39.2	47.6	1.09	8	5.5	1.00
9	6/21/84	6:00	15.7	27.1	38.3	47.1	67.0	0.87	8	2.4	0.38
10	6/21/84	9:30	28.7	46.5	58.5	72.0	89.5	0.93	10	3.1	0.56
11	6/21/84	12:30	26.5	44.2	59.0	72.6	90.5	0.97	9	2.9	0.55
12	6/21/84	15:00	12.1	22.7	34.4	46.8	72.2	0.89	6	2.7	0.58
13	6/21/84	17:29	8.7	13.3	32.6	47.8	83.8	0.93	5	1.4	0.76
14	6/21/84	20:29	9.6	22.4	35.4	48.1	84.5	0.92	5	1.3	0.42
15	6/21/84	22:00	8.6	16.8	29.4	43.9	68.5	0.90	6	1.1	0.84
16	6/22/84	1:00	10.8	24.5	36.1	46.1	63.6	0.97	7	1.0	0.44
17	6/22/84	4:00	14.8	26.3	36.6	46.5	74.9	0.92	9	5.0	0.87
18	6/22/84	8:35	15.9	26.1	35.1	42.6	73.8	1.01	8	2.2	0.62
19	6/22/84	10:30	14.3	28.0	41.5	52.3	81.4	0.99	12	3.3	0.70
20	6/22/84	12:30	3.2	7.6	13.0	18.3	39.8	0.92	8	2.6	0.45
21	6/22/84	14:10									
22	6/22/84	17:00	19.9	33.3	45.4	55.0	78.0	0.92	8	2.2	0.61
23	6/22/84	18:29	12.6	26.5	39.2	53.2	86.3	0.89	8	1.8	0.56
24	6/22/84	19:29									
25	6/22/84	21:29	8.0	17.4	28.0	40.4	72.8	0.86	5	1.2	0.66
26	6/22/84	22:29									
27	6/23/84	0:10	8.5	19.4	28.5	38.7	65.6	0.97	10	0.9	0.46
28	6/23/84	2:29									
29	6/23/84	5:15	9.8	22.7	37.1	49.0	78.8	0.86	10	1.5	0.60
30	6/23/84	8:14									
31	6/23/84	10:30	9.5	22.3	34.1	45.4	82.6	0.84	9	1.3	0.61
32	6/23/84	12:30									
33	6/23/84	14:10	16.2	32.3	47.3	58.8	83.6	0.95	11	1.6	0.54
34	6/23/84	16:35									
35	6/23/84	17:37	8.4	20.6	32.0	42.8	69.6	0.92	13	0.5	0.45
41	6/23/84	21:29									
42	6/23/84	22:14	5.4	14.5	24.3	34.5	70.3	0.95	12	1.1	0.52
45	6/24/84	0:10									

APPENDIX E

Ash Analysis Data

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch 1/4	1/2	3/4	1	2	Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
46	6/24/84	1:00	3.1	5.3	10.2	19.2	54.5	0.84	10	0.8	0.33
47	6/24/84	2:00									
48	6/24/84	3:29	5.2	11.0	19.8	32.5	87.7	0.76	14	0.7	0.29
49	6/24/84	5:15									
52	6/24/84	11:00	2.4	5.0	9.6	16.8	46.6	0.85	3	0.9	0.34
53	6/24/84	13:10									
54	6/24/84	15:00	8.7	15.9	24.9	35.2	75.4	1.12	9	4.5	0.45
56	6/24/84	18:29									
57	6/24/84	20:29	13.2	17.4	29.1	39.8	78.6	0.86	4	0.2	0.90
58	6/24/84	22:29									
59	6/25/84	1:00	19.7	34.4	46.0	56.1	79.3	0.85	15	10.3	0.58
60	6/25/84	5:15									
61	6/25/84	8:00	29.8	40.7	48.8	57.6	79.4	1.06	0	26.5	1.10
62	6/25/84	10:30									
63	6/25/84	12:14	32.0	38.0	41.2	45.4	60.3	0.91	17	40.1	1.10
64	6/25/84	14:30									
65	6/25/84	17:00	42.2	53.2	59.0	67.6	82.0	0.88	29	27.1	1.00
66	6/25/84	20:14									
67	6/25/84	23:20	35.6	43.5	49.1	56.4	64.6	——	46	43.7	1.00
69	6/26/84	4:30	33.4	39.0	41.6	46.4	61.3	——	——	43.1	1.60
70	6/26/84	8:30	12.9	16.8	18.9	21.7	37.0	——	——	23.5	0.65
71	6/26/84	9:30	36.5	41.5	44.4	46.4	53.0	——	——	36.0	1.10
72	6/26/84	10:30									
73	6/26/84	11:30	35.5	44.0	47.6	51.6	62.6	0.78	20	35.3	0.92
75	6/26/84	14:00									
76	6/26/84	17:00	60.1	66.8	71.2	74.5	98.3	0.71	1	43.7	1.10
77	6/26/84	20:10	44.5	51.8	55.2	58.8	71.9	0.78	1	41.0	1.30
78	6/26/84	22:29									
79	6/27/84	1:45	36.3	44.1	50.0	55.9	73.4	0.85	2	28.5	1.20
80	6/27/84	4:30									
81	6/27/84	7:50	4.7	8.3	12.7	18.2	59.8	0.84	14	3.1	0.42
82	6/27/84	11:19	40.5	53.1	60.0	66.8	81.1	0.79	10	30.6	1.10
83	6/27/84	15:00	14.4	21.6	29.0	34.5	68.5	0.81	9	14.5	1.10
84	6/27/84	17:00									
85	6/27/84	19:00	17.5	28.3	38.0	51.0	76.7	1.00	11	17.7	0.89
86	6/27/84	21:29									

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch 1/4	1/2	3/4	1	2	Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
87	6/28/84	0:50	7.6	18.2	31.2	47.8	81.0	0.96	9	3.3	0.49
88	6/28/84	3:29									
89	6/28/84	4:50	7.1	14.7	20.5	25.9	51.0	0.92	12	3.9	0.55
90	6/28/84	7:30									
91	6/28/84	9:00	8.0	15.5	22.2	32.0	48.7	0.99	15	2.8	0.73
92	6/28/84	11:19									
93	6/28/84	14:10	4.8	10.9	23.2	34.6	75.8	0.86	8	0.7	0.32
94	6/28/84	16:20									
95	6/28/84	19:10	9.7	25.0	42.5	56.7	85.2	0.82	11	1.1	0.36
96	6/28/84	21:00									
97	6/28/84	22:14	6.6	16.5	29.4	46.1	82.3	0.95	13	0.7	0.56
98	6/29/84	1:10									
99	6/29/84	3:50	4.1	6.6	11.7	25.1	76.2	0.82	10	1.7	0.46
100	6/29/84	7:30	9.6	23.1	37.1	48.9	87.2	1.01	9	1.6	1.00
101	6/29/84	10:14	5.0	15.1	30.2	48.3	95.3	0.88	8	2.3	0.44
102	6/29/84	11:30	18.8	38.5	52.1	65.4	85.0	1.11	6	0.5	0.36
103	6/29/84	13:30									
104	6/29/84	15:30	15.5	34.9	54.6	70.1	89.0	0.91	8	3.9	0.83
105	6/29/84	17:00									
106	6/29/84	18:50	7.6	19.6	32.7	54.9	84.2	0.95	7	2.7	0.70
107	6/29/84	20:29									
108	6/29/84	22:10	14.7	27.7	39.5	49.1	64.6	1.00	8	1.4	0.51
109	6/30/84	1:29	9.9	20.6	31.9	45.0	80.7	1.03	1	2.3	0.61
111	6/30/84	4:30									
6-111	AVERAGE		17.1	27.3	37.0	46.6	73.3	0.909	9.7	9.7	0.71

APPENDIX F

Ash Removal Log

Ash weights are given in pounds.

Flush water is given in gallons.

DATE	TIME	SAMPLE #	INITIAL DRY WT.	FINAL DRY WT.	NET DRY WT.	INITIAL WET WT.	FINAL WET WT.	NET WET WT.	NET DRY & NET WET	FLUSH (GAL)
6/19	1030	A1	520	160	360	598	151	447	807	30
6/19	1700	A2	540	150	390	478	147	331	721	30
6/19	2200	A3	484	163	321	460	158	302	623	30
6/20	500	A4	464	152	312	475	146	329	641	30
6/20	930	A5	526	148	378	455	145	310	688	30
6/20	1300	A6	605	147	458	464	143	321	779	30
6/20	1800	A7	520	166	354	433	155	278	632	30
6/21	130	A8	607	187	420	530	145	385	805	30
6/21	600	A9	531	169	362	471	144	327	689	30
6/21	930	A10	602	190	412	488	143	345	757	30
6/21	1230	A11	630	191	439	480	145	335	774	30
6/21	1500	A12	565	181	384	488	181	307	691	30
6/21	1730	A13	527	181	346	466	161	305	651	30
6/21	2030	A14	568	180	388	480	173	307	695	30
6/21	2245	A15	503	173	330	470	146	324	654	30
6/22	100	A16	554	182	372	481	144	337	709	30
6/22	400	A17	508	144	364	465	140	325	689	30
6/22	830	A18	580	194	386	540	190	350	736	30
6/22	1030	A19	530	144	386	515	141	374	760	30
6/22	1230	A20	384	144	240	599	143	456	696	30
6/22	1415	C12	583	188	395	526	193	333	728	30
6/22	1530	A21	582	183	399	510	149	361	760	30
6/22	1700	A22	520	170	350	500	142	358	708	30
6/22	1820	A23	535	188	347	481	145	336	683	30
6/22	1930	A24	568	173	395	507	170	337	732	30
6/22	2130	A25	534	179	355	625	191	434	789	30
6/22	2230	A26	524	181	343	517	139	378	721	30
6/23	10	A27	720	142	578	515	184	331	909	30
6/23	230	A28	523	140	383	508	138	370	753	30
6/23	515	A29	539	169	370	477	138	339	709	30
6/23	815	A30	560	169	391	490	175	315	706	30
6/23	1030	A31	702	197	505	530	134	396	901	30
6/23	1220	A32	572	139	433	545	135	410	843	30
6/23	1410	A33	700	140	560	510	138	372	932	30
6/23	1535	A34	552	139	413	548	136	412	825	30
6/23	1737	A35	502	137	365	530	137	393	758	30
6/23	1745	A36	538	139	399	511	141	370	769	30
6/23	1830	A37	530	137	393	530	135	395	788	30
6/23	1930	A38	506	136	370	542	136	406	776	30
6/23	2015	A39	507	135	372	540	136	404	776	30
6/23	2100	A40	600	143	457	550	181	369	826	30
6/23	2135	A41	554	131	423	544	144	400	823	30
6/23	2245	A42	510	139	371	528	140	388	759	30
6/23	2240	A43	500	137	363	557	138	419	782	30
6/23	2310	A44	640	138	502	565	139	426	928	30
6/24	10	A45	817	138	679	560	141	419	1098	30
6/24	100	A46	630	130	500	608	138	470	970	30
6/24	200	A47	820	265	555	564	140	424	979	30
6/24	330	A48	1131	193	938	630	142	488	1426	30
6/24	515	A49	1112	262	850	592	141	451	1301	30

DATE	TIME	SAMPLE #	INITIAL DRY WT.	FINAL DRY WT.	NET DRY WT.	INITIAL WET WT.	FINAL WET WT.	NET WET WT.	NET DRY & NET WET	FLUSH (GAL)
6/24	715	A50	901	222	679	550	222	328	1007	30
6/24	830	A51	617	176	441	495	140	355	796	30
6/24	1100	A52	810	140	670	507	135	372	1042	30
6/24	1300	A53	775	195	580	542	216	326	906	30
6/24	1500	A54	640	209	431	520	134	386	817	30
6/24	1630	A55	515	143	372	567	136	431	803	30
6/24	1830	A56	584	137	447	570	138	432	879	30
6/24	2030	A57	783	135	648	528	132	396	1044	30
6/24	2230	A58	780	133	647	523	131	392	1039	30
6/25	100	A59	945	137	808	528	134	394	1202	30
6/25	510	A60	1042	136	906	598	134	464	1370	30
6/25	815	A61	775	150	625	450	165	285	910	30
6/25	1030	A62	650	158	492	420	140	280	772	30
6/25	1215	A63	738	143	595	483	136	347	942	30
6/25	1430	A64	664	140	524	410	130	280	804	30
6/25	1700	A65	600	138	462	407	128	279	741	30
6/25	2015	A66	700	142	558	427	125	302	860	30
6/25	2220	A67	715	145	570	490	132	358	928	30
6/26	100	A68	631	141	490	426	140	286	776	30
6/26	430	A69	709	148	561	408	187	221	782	30
6/26	820	A70	727	151	576	419	183	236	812	30
6/26	1030	A71	932	209	723	483	248	235	958	30
6/26	1135	A73	665	168	497	477	205	272	769	30
6/26	1230	A74	515	150	365	426	137	289	654	30
6/26	1400	A75	615	154	461	455	235	220	681	30
6/26	1700	A76	530	147	383	430	134	296	679	30
6/26	2010	A77	604	147	457	430	133	297	754	30
6/26	2230	A78	490	146	344	425	143	282	626	30
6/27	145	A79	609	150	459	396	166	230	689	30
6/27	430	A80	532	183	349	420	141	279	628	30
6/27	750	A81	643	210	433	480	174	306	739	30
6/27	1120	A82	505	173	332	480	200	280	612	30
6/27	1415	A83	660	149	511	475	142	333	844	30
6/27	1700	A84	735	147	588	477	143	334	922	30
6/27	1900	A85	619	147	472	480	141	339	811	30
6/27	2130	A86	670	150	520	490	144	346	866	30
6/28	50	A87	845	199	646	510	155	355	1001	30
6/28	330	A88	730	158	572	430	160	270	842	30
6/28	450	A89	850	147	703	520	157	363	1066	30
6/28	730	A90	1360	149	1211	545	148	397	1608	30
6/28	900	A91	340	205	135	514	149	365	500	30
6/28	1100	A92	692	212	480	512	160	352	832	30
6/28	1410	A93	665	142	523	520	145	375	898	30
6/28	1620	A94	718	145	573	516	205	311	884	30
6/28	1900	A95	850	144	706	565	143	422	1128	30
6/28	2100	A96	720	147	573	525	147	378	951	30
6/28	2215	A97	655	143	512	530	146	384	896	30
6/29	110	A98	1020	146	874	570	155	415	1289	30
6/29	350	A99	945	162	783	410	205	205	988	30
6/29	730	A100	196	196	0	196	196	0	0	30

PANEL BOARD MALFUNCTION

DATE	TIME	SAMPLE #	INITIAL DRY WT.	FINAL DRY WT.	NET DRY WT.	INITIAL WET WT.	FINAL WET WT.	NET WET WT.	NET DRY & NET WET	FLUSH (GAL).
6/29	1015	A101	196	196	0	550	240	310	310	30
				PANEL BOARD MALFUNCTION						
6/29	1130	A102	675	160	515	460	160	300	815	30
6/29	1330	A103	660	175	485	475	170	305	790	30
6/29	1530	A104	700	145	555	460	142	318	873	30
6/29	1700	A105	600	145	455	460	140	320	775	30
6/29	1850	A106	731	146	585	462	142	320	905	30
6/29	2030	A107	651	147	504	451	141	310	814	30
6/29	2210	A108	706	146	560	463	141	322	882	30
6/30	830	A109	603	172	431	498	178	320	751	30
6/30	930	A110	750	147	603	485	142	343	946	30
6/30	1630	A111	556	141	415	530	140	390	805	30

APPENDIX G

Retort Particle Sampling Data

Reference: Volume 1, Thimsen, Maurer et al, 1984

G-1. Dust Loading Data

G-2. Cummulative Dust Data

G-3. Cummulative Dust Size Distributions (4 included)

G-4. Dust Size Distribution Modal Analysis (4 included)

G-5. Explanation of Modal Fitting Parameters

DUST DATA for BOM/FGT-012

Grand Average Gas/Air Ratio: 2.04

Estimated Offtake Elbow Area/ Sampler Inlet Area: 7678

Retort Area Less Draft Shroud Area: 28.75 square feet

Equation of Fitted Curve : Dust (#/hr)/ Coal Feed (#/hr) (%) =0.0521*Face Velocity**3.19 R Squared = 0.885

RUN #	DATE TIME	TEST LENGTH (min)	MASS PARTICLES (millgram)	COAL FEED RATE (lb/hr)	T- 705 (deg. K)	P-705 ("hg abs)	F-701 (scfm)	GAS FLOW RATE (acfm)	DUST RT/ COAL RT (%)	PROBE DEPTH (inch)	AGITATOR ANGLE (deg)	AGITATOR RATE (sw/hr)	FREE-BOARD (inch)
1	20-JUN-84 02:36	0.83	7.8	1080	477	29.37	608	2032	0.88	27	--	0.0	40.0
2	20-JUN-84 03:27	2.00	13.1	1300	481	29.37	608	2043	0.51	27	--	0.0	37.5
3	21-JUN-84 11:15	2.00	48.1	2427	548	29.43	1199	4500	1.01	27	--	0.0	36.0
4	21-JUN-84 11:50	5.00	87.9	2473	545	29.43	1201	4475	0.72	27	--	0.0	35.0
5	21-JUN-84 12:33	5.00	104.7	2520	530	29.41	1200	4351	0.84	27	--	0.0	38.5
6	22-JUN-84 10:57	6.00	496.2	3267	537	29.20	1514	5563	2.57	27	210	1.7	37.0
7	22-JUN-84 11:44	6.00	299.7	3193	570	29.20	1513	5872	1.59	27	270	1.7	36.0
8	22-JUN-84 13:31	6.00	128.0	3347	567	29.19	1512	5809	0.65	27	315	1.7	37.0
9	23-JUN-84 20:35	1.92	782.6	4753	673	29.31	2117	9904	8.73	27	270	10.5	36.5
10	23-JUN-84 21:43	0.95	774.4	4500	636	29.34	2121	9422	18.40	27	325	10.5	38.0
11	23-JUN-84 22:16	0.95	443.0	4500	615	29.33	2122	9161	10.53	27	270	10.5	38.0
12	23-JUN-84 22:47	0.95	472.5	4660	614	29.33	2122	9216	10.84	27	210	10.5	36.0

TABLE G-2

CUMULATIVE SIZE DISTRIBUTION DATA

SIEVING ASTM SIEVE NUM.	SIEVE SIZE (um)	SHIFT SIZE (um)	Sample # 012-02 Percent Less Than Stated Size (%<)	012-04 (%<)	012-07 (%<)	012-10 (%<)
14	1400	1891.9	--	--	98.6	90.3
20	841	1136.5	--	99.3	92.6	62.8
30	595	804.1	--	98.6	84.6	45.4
40	420	567.5	96.0	94.2	75.5	31.1
60	250	337.8	86.7	81.6	61.5	19.8
100	149	201.4	66.1	62.5	45.4	14.1
200	74	100.0	33.6	29.1	22.4	7.5

MICROSCOPY PARTICLE DIAMETER (um)	Percent Less Than Stated Size (%<)	(%<)	(%<)	(%<)
178.0	--	29.1	22.4	7.5
100.0	33.6	27.5	18.6	7.2
56.0	20.9	13.9	10.3	4.8
32.0	11.5	7.3	4.7	2.1
17.8	6.1	3.3	1.82	0.86
10.0	3.1	1.46	0.63	0.30
5.60	1.31	0.43	0.17	0.05
3.20	0.33	0.10	0.03	0.01

Figure G-3a

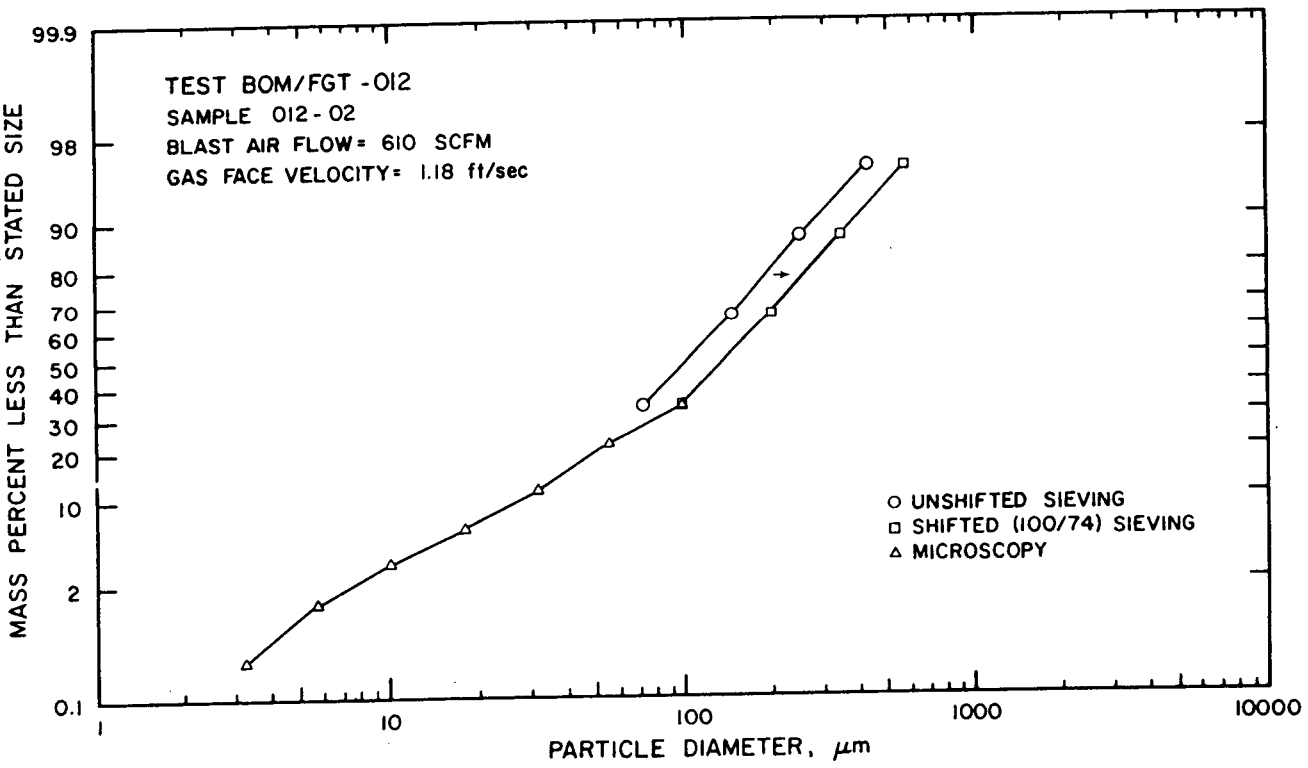

TEST BOM/FGT -012
SAMPLE 012 - 02
BLAST AIR FLOW= 610 SCFM
GAS FACE VELOCITY= 1.18 ft/sec
MASS PERCENT LESS THAN STATED SIZE
99.9
98
90
80
70
60
50
40
30
20
10
2
0.1
1
10
100
1000
10000
PARTICLE DIAMETER, μm
O UNSHIFTED SIEVING
□ SHIFTED (100/74) SIEVING
△ MICROSCOPY

Figure G-3b

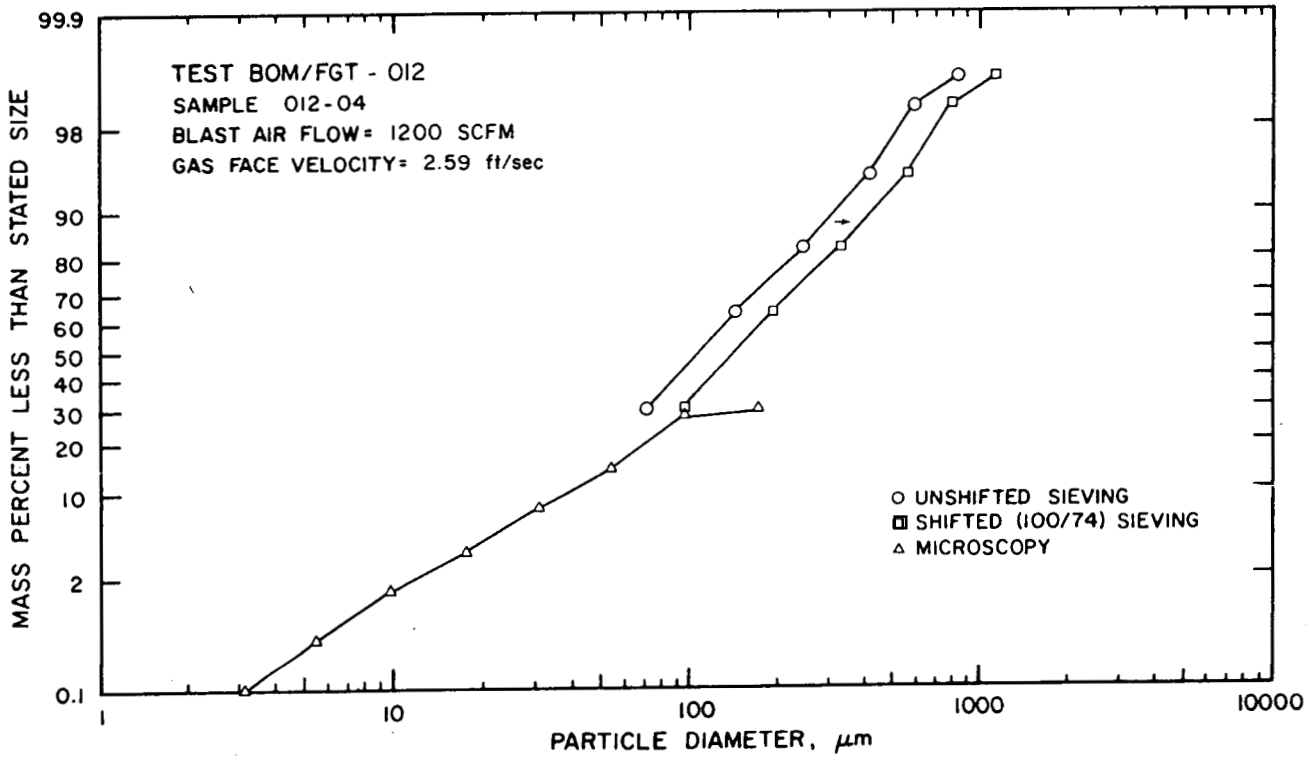

TEST BOM/FGT - 012
SAMPLE 012-04
BLAST AIR FLOW= 1200 SCFM
GAS FACE VELOCITY= 2.59 ft/sec
MASS PERCENT LESS THAN STATED SIZE
99.9
98
90
80
70
60
50
40
30
20
10
2
0.1
1
10
100
1000
10000
PARTICLE DIAMETER, μm
O UNSHIFTED SIEVING
⊡ SHIFTED (100/74) SIEVING
△ MICROSCOPY

Figure G-3c

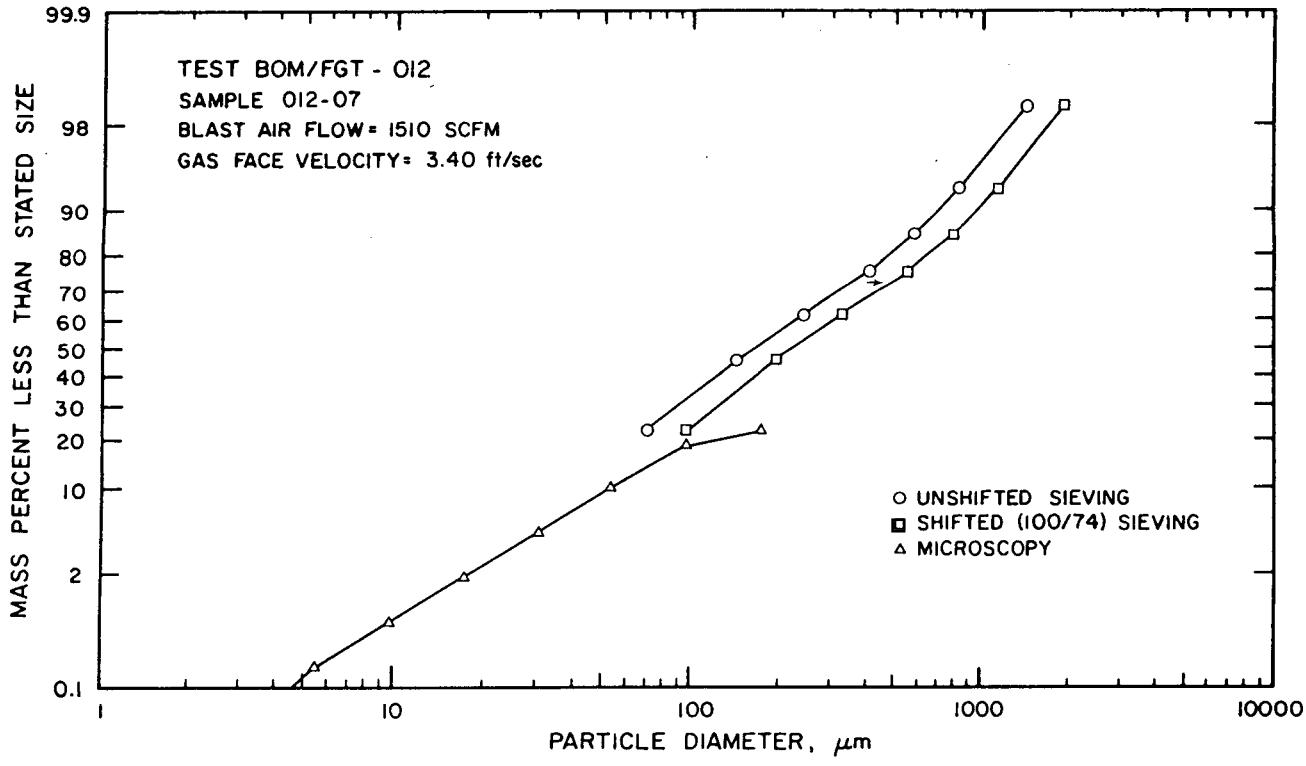

TEST BOM/FGT - 012
SAMPLE 012-07
BLAST AIR FLOW = 1510 SCFM
GAS FACE VELOCITY = 3.40 ft/sec
MASS PERCENT LESS THAN STATED SIZE
99.9
98
90
80
70
60
50
40
30
20
10
2
0.1
1
10
100
1000
10000
PARTICLE DIAMETER, μm
UNSHIFTED SIEVING
SHIFTED (100/74) SIEVING
MICROSCOPY

Figure G-3d

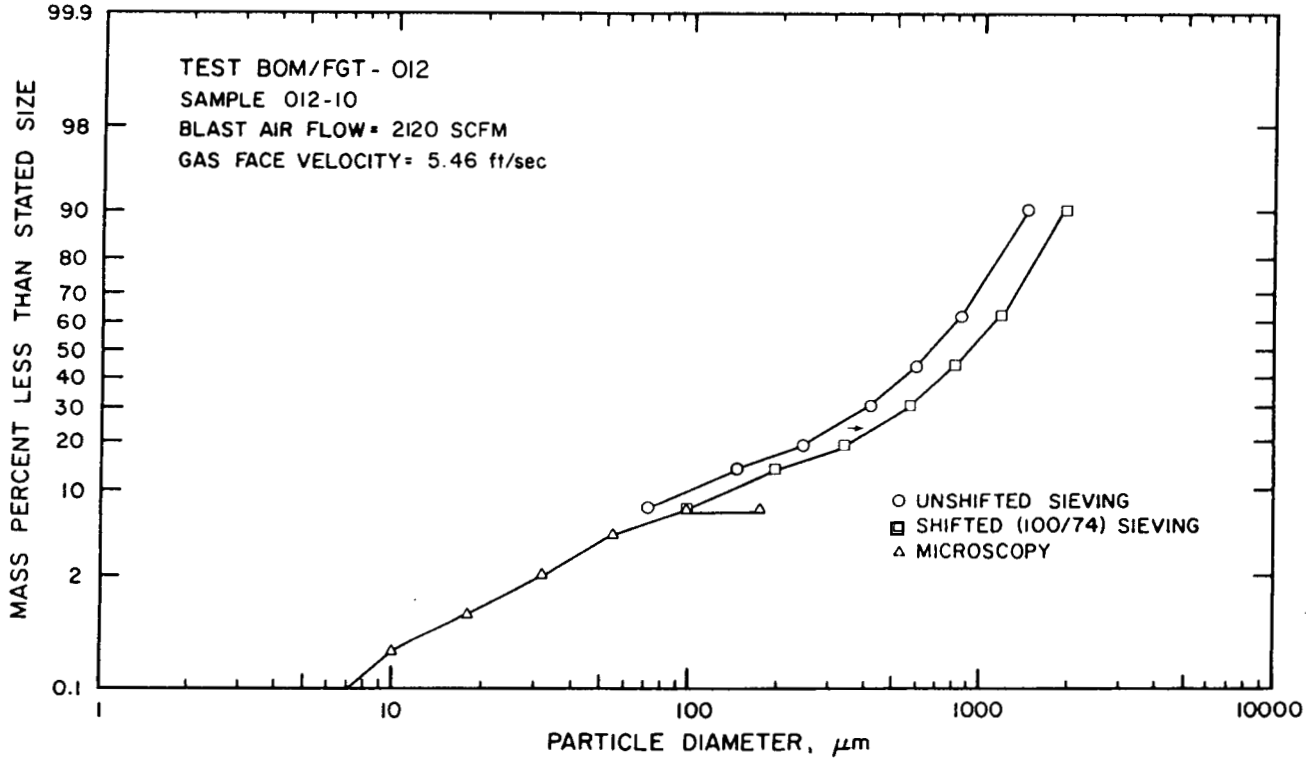
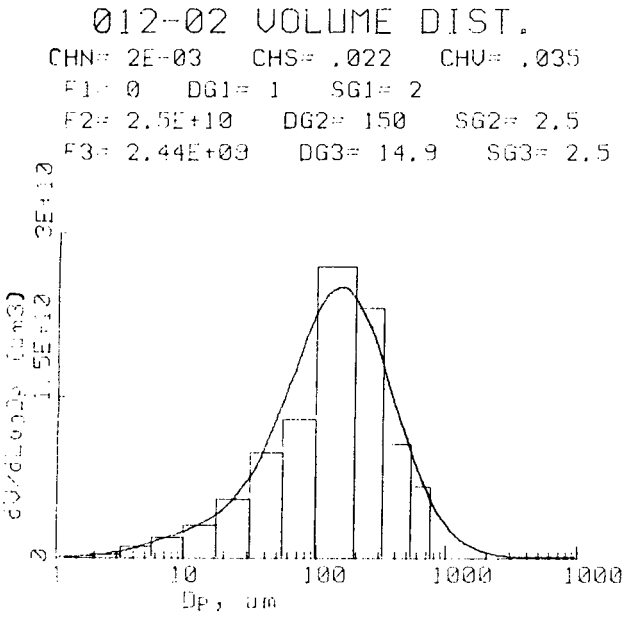
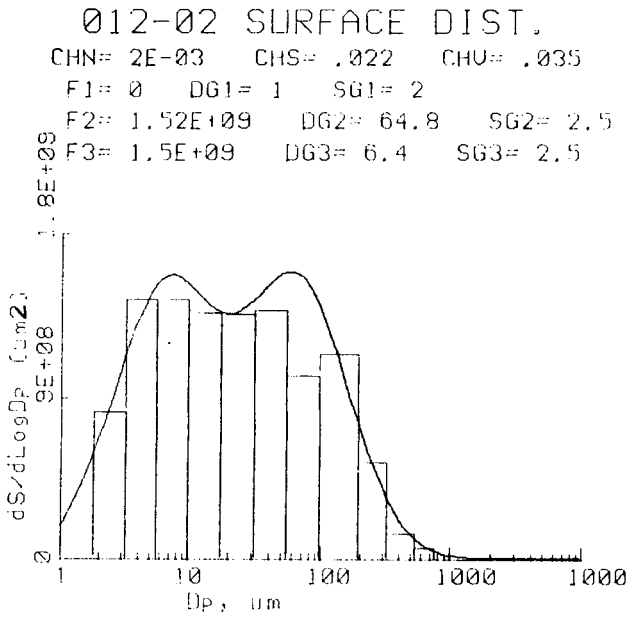

TEST BOM/FGT- 012
SAMPLE 012-10
BLAST AIR FLOW= 2120 SCFM
GAS FACE VELOCITY= 5.46 ft/sec
MASS PERCENT LESS THAN STATED SIZE
99.9
98
90
80
70
60
50
40
30
20
10
2
0.1
1
10
100
1000
10000
PARTICLE DIAMETER, μm
O UNSHIFTED SIEVING
□ SHIFTED (100/74) SIEVING
△ MICROSCOPY

Figure G-4a


012-02 VOLUME DIST.
CHN= 2E-03 CHS= .022 CHV= .035
F1= 0 DG1= 1 SG1= 2
F2= 2.5E+10 DG2= 150 SG2= 2.5
F3= 2.44E+03 DG3= 14.9 SG3= 2.5
3E+12
1.5E+12
0
dV/dLogDp (um3)
1
10
100
1000
1000
Dp, um


012-02 SURFACE DIST.
CHN= 2E-03 CHS= .022 CHV= .035
F1= 0 DG1= 1 SG1= 2
F2= 1.52E+09 DG2= 64.8 SG2= 2.5
F3= 1.5E+09 DG3= 6.4 SG3= 2.5
1.8E+09
9E+08
0
dS/dLogDp (um2)
1
10
100
1000
1000
Dp, um

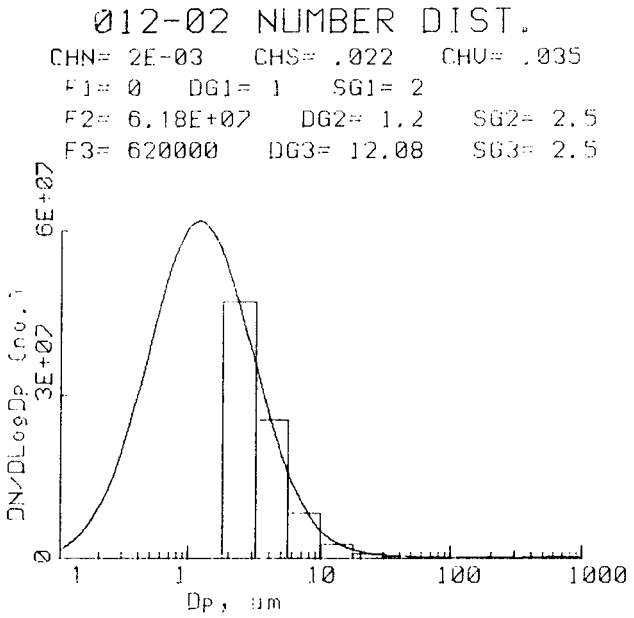
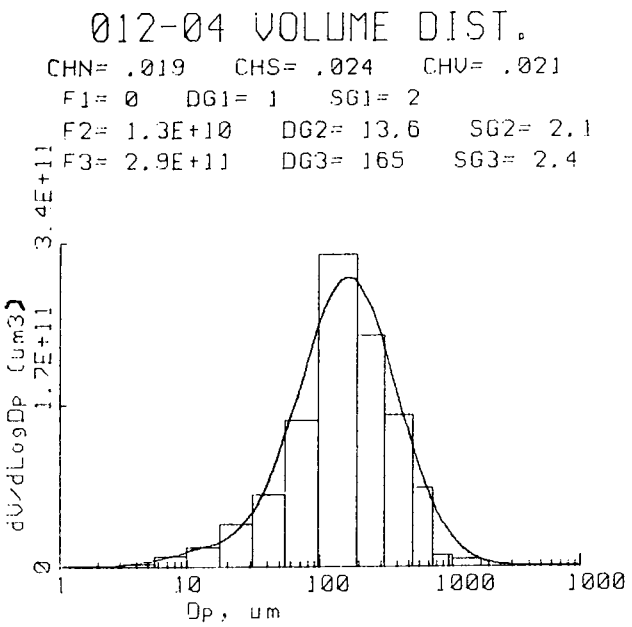
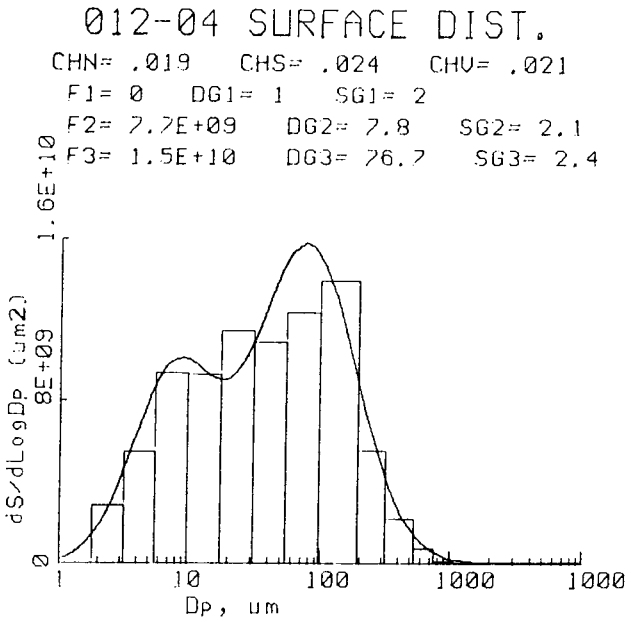

012-02 NUMBER DIST.
CHN= 2E-03 CHS= .022 CHV= .035
F1= 0 DG1= 1 SG1= 2
F2= 6.18E+07 DG2= 1.2 SG2= 2.5
F3= 620000 DG3= 12.08 SG3= 2.5
6E+07
3E+07
0
dN/dLogDp (no.)
1
1
10
100
1000
Dp, um

Figure G-4b


012-04 VOLUME DIST.
CHN= .019 CHS= .024 CHV= .021
F1= 0 DG1= 1 SG1= 2
F2= 1.3E+10 DG2= 13.6 SG2= 2.1
F3= 2.9E+11 DG3= 165 SG3= 2.4
dV/dLogDp (um3)
3.4E+11
1.7E+11
0
1
10
100
1000
1000
Dp, um


012-04 SURFACE DIST.
CHN= .019 CHS= .024 CHV= .021
F1= 0 DG1= 1 SG1= 2
F2= 7.7E+09 DG2= 7.8 SG2= 2.1
F3= 1.5E+10 DG3= 76.7 SG3= 2.4
dS/dLogDp (um2)
1.6E+10
8E+09
0
1
10
100
1000
1000
Dp, um

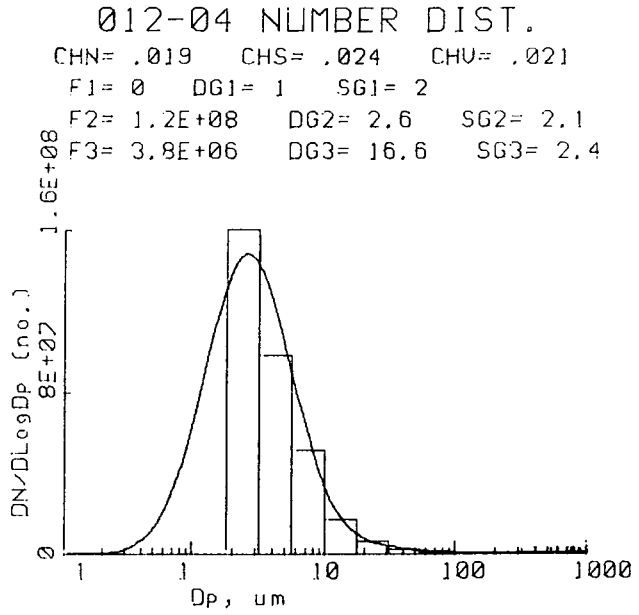
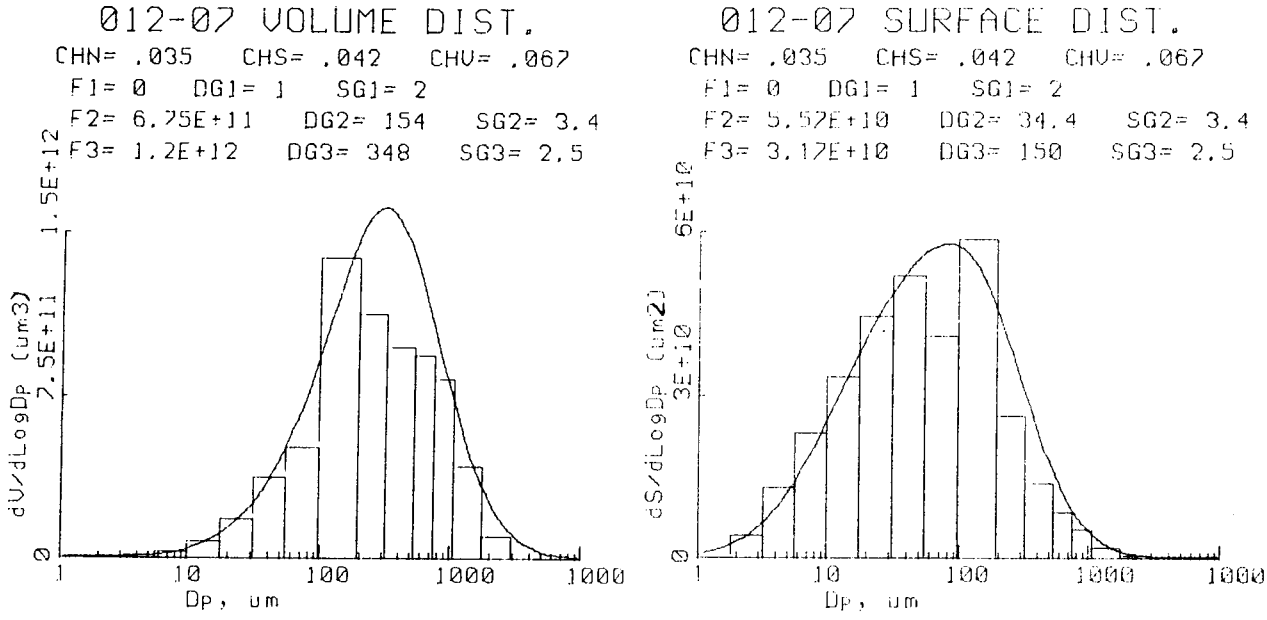

012-04 NUMBER DIST.
CHN= .019 CHS= .024 CHV= .021
F1= 0 DG1= 1 SG1= 2
F2= 1.2E+08 DG2= 2.6 SG2= 2.1
F3= 3.8E+06 DG3= 16.6 SG3= 2.4
DN/DLogDp (no.)
1.6E+08
8E+07
0
1
1
10
100
1000
Dp, um

Figure G-4c


012-07 VOLUME DIST.
CHN= .035 CHS= .042 CHV= .067
F1= 0 DG1= 1 SG1= 2
F2= 6.75E+11 DG2= 154 SG2= 3.4
F3= 1.2E+12 DG3= 348 SG3= 2.5
dV/dLogDp (um3)
1.5E+12
2.5E+11
0
1
10
100
1000
1000
Dp, um
012-07 SURFACE DIST.
CHN= .035 CHS= .042 CHV= .067
F1= 0 DG1= 1 SG1= 2
F2= 5.52E+10 DG2= 34.4 SG2= 3.4
F3= 3.17E+10 DG3= 150 SG3= 2.5
dS/dLogDp (um2)
5E+10
3E+10
0
1
10
100
1000
1000
Dp, um

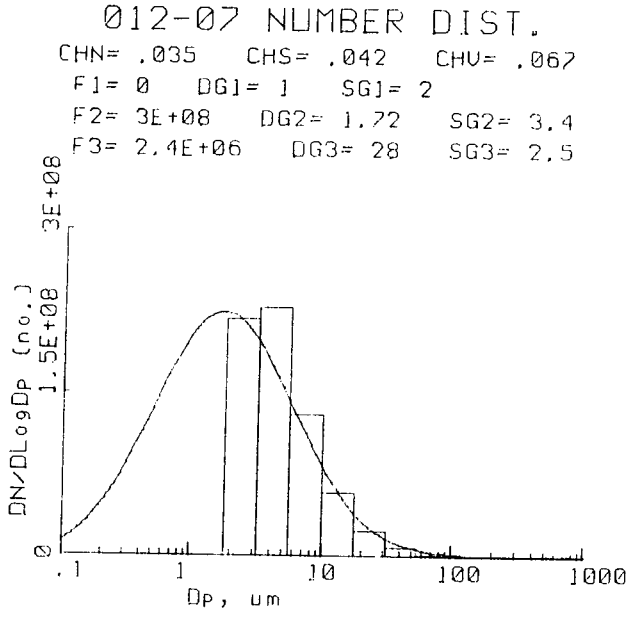

012-07 NUMBER DIST.
CHN= .035 CHS= .042 CHV= .067
F1= 0 DG1= 1 SG1= 2
F2= 3E+08 DG2= 1.72 SG2= 3.4
F3= 2.4E+06 DG3= 28 SG3= 2.5
DN/DLogDp (no.)
3E+08
1.5E+08
0
.1
1
10
100
1000
Dp, um

Figure G-4d

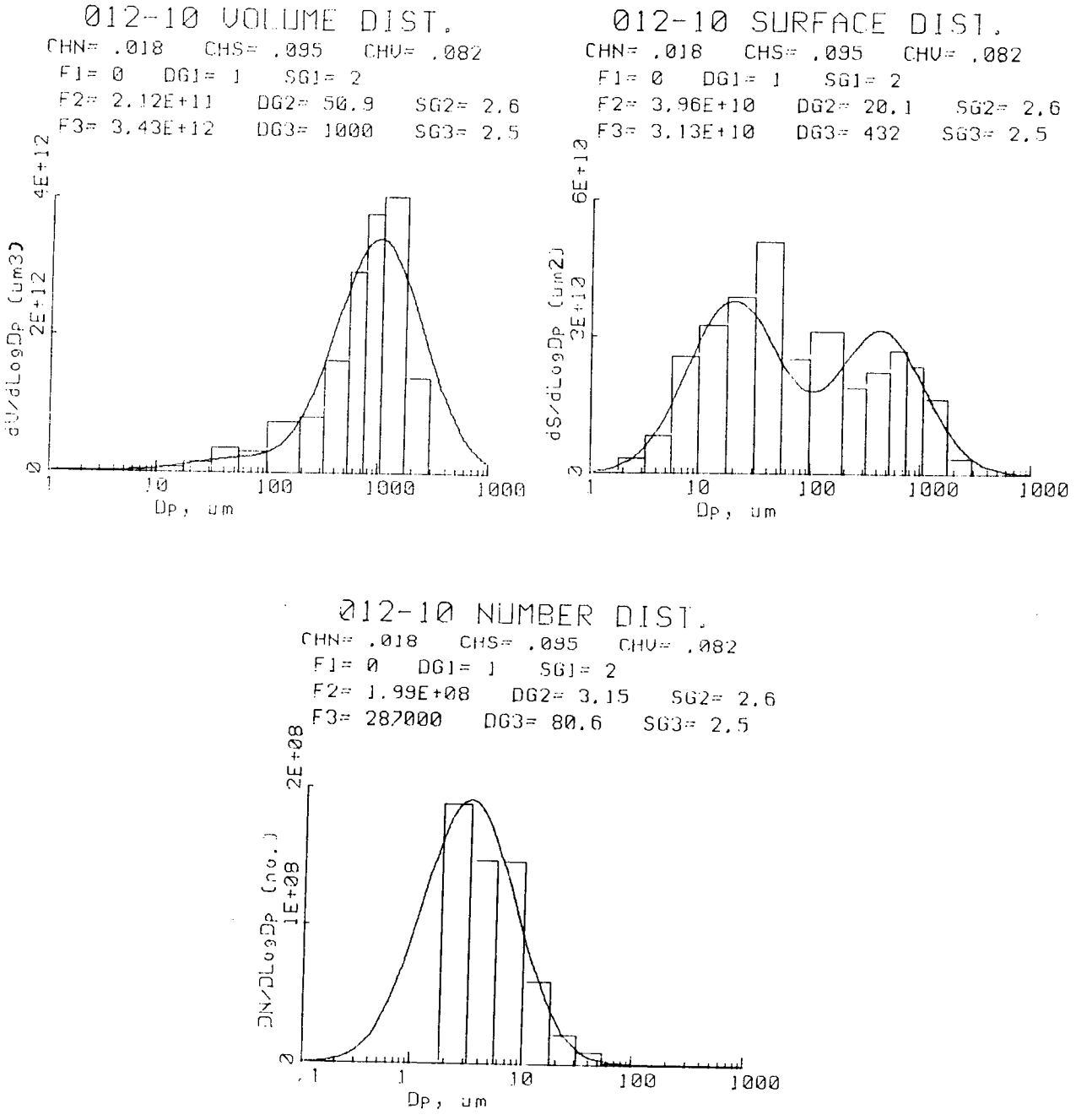

012-10 VOLUME DIST.
CHN= .018 CHS= .095 CHV= .082
F1= 0 DG1= 1 SG1= 2
F2= 2.12E+11 DG2= 50.9 SG2= 2.6
F3= 3.43E+12 DG3= 1000 SG3= 2.5
dV/dLogDp (um3)
4E+12
2E+12
0
1
10
100
1000
1000
Dp, um
012-10 SURFACE DIST.
CHN= .018 CHS= .095 CHV= .082
F1= 0 DG1= 1 SG1= 2
F2= 3.96E+10 DG2= 20.1 SG2= 2.6
F3= 3.13E+10 DG3= 432 SG3= 2.5
dS/dLogDp (um2)
6E+10
3E+10
0
1
10
100
1000
1000
Dp, um
012-10 NUMBER DIST.
CHN= .018 CHS= .095 CHV= .082
F1= 0 DG1= 1 SG1= 2
F2= 1.99E+08 DG2= 3.15 SG2= 2.6
F3= 287000 DG3= 80.6 SG3= 2.5
dN/dLogDp (no.)
2E+08
1E+08
0
.1
1
10
100
1000
Dp, um

Table G-5

Description of Modal Fitting Parameters
(Associated with Figures G-4(a-d))

CHN: CHI square for the number distribution
CHS: CHI square for the surface distribution
CHV: CHI square for the volume distribution

If CHI square is less than 0.04 the fit is good.
If CHI square is less than 0.15 the fit is fair.

F1: Total number, surface, or volume of Mode 1 for the respective weighting. (*)
F2: Total number, surface, or volume of Mode 2 for the respective weighting.
F3: Total number, surface, or volume in Mode 3 for the respective weighting.

DG1: Geometrical mean diameter of Mode 1 for the given weighting (*)
DG2: Geometrical mean diameter of Mode 2 for the given weighting
DG3: Geometrical mean diameter of Mode 3 for the given weighting

SG1: Geometric Standard Deviation of Mode 1 (*)
SG2: Geometric Standard Deviation of Mode 2
SG3: Geometric Standard Deviation of Mode 3

(*) Unused modes are set to F1 = 0, DG1 = 1, and SG1 = 2, etc.

APPENDIX H

Gasifier Operator Logged Data

Included are three tables of data:

H-1. Freeboard Data

H-2. Firetest Data

D - Multiple incandescent zones

H - Relatively hot incandescent zone

C - Relatively cold incandescent zone

H-3. Operator Logged Data I

Water flows in gpm.

Water totals in gallons.

Steam flows in lb/min.

H-4. Operator Logged Data II

Agitator counter in (total revolutions * 2)

Grate Gear counter in (total grate revolutions * 116)

Further description of these data are given in Volume 1 of this series (Thimsen, Maurer et al, 1984).

TABLE H-1

Freeboard Data

DATE	TIME	#1	#2	#3	#4	#5	#6	AVERAGE
6/18	1230			40.0			41.0	40.5
6/18	1300	40.0			39.0			39.5
6/18	1400			35.0			36.0	35.5
6/18	1600	36.0	37.0	38.0	35.0	37.0	36.0	36.5
6/18	1630		40.0			39.0		39.5
6/18	1800	36.0		39.0			41.0	38.7
6/18	1900		39.0		37.0			38.0
6/18	2000	36.0		40.0		40.0		38.6
6/18	2100		40.0		40.0		40.0	40.0
6/18	2200	38.0		41.0		40.0		39.7
6/18	2300		40.0		38.0		40.0	39.3
6/18	2330	37.0			37.0			37.0
6/19	5		39.0			38.0		38.5
6/19	30			40.0			39.0	39.5
6/19	100				36.0		19.0	27.5
6/19	130	38.0			38.0			38.0
6/19	200	37.0	41.0	40.0	39.0	39.0	40.0	39.3
6/19	300	39.0	41.0	40.0	40.0	41.0	42.0	40.5
6/19	330		41.0			41.0		41.0
6/19	400			40.0			39.0	39.5
6/19	500	37.0			37.0			37.0
6/19	600			41.0			42.0	41.5
6/19	700		35.0			37.0		36.0
6/19	800			35.0			36.0	35.5
6/19	900	36.0			36.0			36.0
6/19	1000		39.0			38.0		38.5
6/19	1100			37.0			37.0	37.0
6/19	1200	40.0			38.0			39.0
6/19	1300		37.0			37.0		37.0
6/19	1400			39.0			40.0	39.5
6/19	1600	38.0			37.0			37.5
6/19	1700		41.0			42.0		41.5
6/19	1800			40.0			42.0	41.0
6/19	1900	39.0			40.0			39.5
6/19	2000		42.0			42.0		42.0
6/19	2100			39.0			40.0	39.5
6/19	2200	40.0			38.0			39.0
6/20	0	34.0			35.0			34.5
6/20	100		38.0			37.0		37.5
6/20	200			38.0			38.0	38.0
6/20	230	40.0			40.0			40.0
6/20	300		37.0			37.0		37.0
6/20	400			38.0			38.0	38.0
6/20	500	37.0			38.0			37.5
6/20	600		39.0			37.0		38.0
6/20	700			38.0			38.0	38.0
6/20	800		36.0			36.0		36.0
6/20	830		39.0			39.0		39.0
6/20	930			36.0			36.0	36.0

DATE	TIME	#1	#2	#3	#4	#5	#6	AVERAGE
6/20	1030	37.0			36.0			36.5
6/20	1130		39.0			39.0		39.0
6/20	1230			36.0			38.0	37.0
6/20	1330	37.0			35.0			36.0
6/20	1430		37.0			37.0		37.0
6/20	1600			40.0			40.0	40.0
6/20	1700	39.0			39.0			39.0
6/20	1800		39.0			40.0		39.5
6/20	1900			40.0			40.0	40.0
6/20	2000	39.0			38.0			38.5
6/20	2100		39.0			41.0		40.0
6/20	2200			40.0			42.0	41.0
6/20	2300	39.0			39.0			39.0
6/20	2330	37.0			37.0			37.0
6/21	30		38.0			37.0		37.5
6/21	130			37.0			37.0	37.0
6/21	230	37.0			37.0			37.0
6/21	330		37.0			37.0		37.0
6/21	430			38.0			37.0	37.5
6/21	530	37.0			37.0			37.0
6/21	630		38.0			38.0		38.0
6/21	730			37.0			36.0	36.5
6/21	830	36.0			35.0			35.5
6/21	930		39.0			39.0		39.0
6/21	1030			35.0			38.0	36.5
6/21	1130	34.0			35.0			34.5
6/21	1230		39.0			38.0		38.5
6/21	1330		40.0			38.0		39.0
6/21	1430			36.0			37.0	36.5
6/21	1600	38.0			39.0			38.5
6/21	1700		40.0			40.0		40.0
6/21	1800			40.0			40.0	40.0
6/21	1900	40.0			38.0			39.0
6/21	2000		40.0			38.0		39.0
6/21	2100			38.0			41.0	39.5
6/21	2200	38.0			37.0			37.5
6/21	2300		39.0			38.0		38.5
6/21	2330	36.0			34.0			35.0
6/22	130			43.0			42.0	42.5
6/22	230	41.0			40.0			40.5
6/22	330		38.0			37.0		37.5
6/22	430			43.0			43.0	43.0
6/22	530	38.0			42.0			40.0
6/22	630		38.0			38.0		38.0
6/22	730	36.0			37.0			36.5
6/22	830		40.0			38.0		39.0
6/22	930		40.0			39.0		39.5
6/22	1030		39.0			39.0		39.0
6/22	1130	35.0			35.0			35.0
6/22	1230		39.0			40.0		39.5
6/22	1330		37.0			37.0		37.0
6/22	1430	35.0			34.0			34.5
6/22	1600			38.0			38.0	38.0

DATE	TIME	#1	#2	#3	#4	#5	#6	AVERAGE
6/22	1700		40.0			40.0		40.0
6/22	1800	39.0			38.0			38.5
6/22	1900			40.0			40.0	40.0
6/22	2000		38.0			39.0		38.5
6/22	2100	38.0			39.0			38.5
6/22	2200		40.0			40.0		40.0
6/22	2300			40.0			40.0	40.0
6/22	2330	36.0			36.0			36.0
6/23	30		38.0			37.0		37.5
6/23	130			38.0			40.0	39.0
6/23	230	38.0			37.0			37.5
6/23	330		38.0			38.0		38.0
6/23	430			41.0			41.0	41.0
6/23	530	38.0			40.0			39.0
6/23	630	41.0				39.0		40.0
6/23	730		40.0			39.0		39.5
6/23	830	35.0			37.0			36.0
6/23	930		35.0			36.0		35.5
6/23	1030	36.0			35.0			35.6
6/23	1130		38.0			37.0		37.5
6/23	1230			36.0			37.0	36.5
6/23	1330	34.0			34.0			34.0
6/23	1430		35.0			37.0		36.0
6/23	1610	37.0			38.0			37.5
6/23	1700		36.0			35.0		35.5
6/23	1800			38.0			37.0	37.5
6/23	2000	36.0			34.0			35.0
6/23	2200			38.0			38.0	38.0
6/23	2300	35.0			36.0			35.5
6/23	2330	36.0			35.0			35.5
6/24	0		36.0			34.0		35.0
6/24	130			33.0			32.0	32.5
6/24	230	36.0			32.0			34.0
6/24	330		35.5			36.0		35.8
6/24	430			36.0			38.0	37.0
6/24	530	36.0			37.0			36.5
6/24	630		34.0			32.0		33.0
6/24	730			34.0			37.0	35.5
6/24	830	35.0			34.0			34.5
6/24	930		35.0			33.0		34.0
6/24	1030			35.0			37.0	36.0
6/24	1130	36.0			37.0			36.5
6/24	1230		34.0			34.0		34.0
6/24	1330	33.0			33.0			33.0
6/24	1430		33.0			34.0		33.5
6/24	1600			32.0			37.0	34.5
6/24	1700	36.0			34.0			35.0
6/24	1800		35.0			37.0		36.0
6/24	2000			36.0			38.0	37.0
6/24	2100	36.0			38.0			37.0
6/24	2200		28.0			30.0		29.0
6/24	2300			34.0			38.0	36.0
6/24	2330	35.0			33.0			34.0

DATE	TIME	#1	#2	#3	#4	#5	#6	AVERAGE
6/25	30		36.0			35.0		35.5
6/25	130			33.0			40.0	36.5
6/25	230	35.0			34.0			34.5
6/25	330		34.0			36.0		35.0
6/25	430			30.0			36.0	33.0
6/25	530	32.0			34.0			33.0
6/25	630		31.0			36.0		33.5
6/25	700			30.0			30.0	30.0
6/25	800	32.0			33.0			32.5
6/25	900		32.0			33.0		32.5
6/25	1000		28.0			33.0		30.5
6/25	1100			34.0			36.0	35.0
6/25	1300		33.0			35.0		34.0
6/25	1400			34.0			34.0	34.0
6/25	1500			33.0			34.0	33.5
6/25	1600	34.0			34.0			34.0
6/25	1700		33.0			36.0		34.5
6/25	1800			31.0			35.0	33.0
6/25	1900	32.0			35.0			33.5
6/25	2000		31.0			37.0		34.0
6/25	2100			33.0			31.0	32.0
6/25	2200	33.0			34.0			33.5
6/25	2300		28.0			30.0		29.0
6/25	2330	32.0			35.0			33.5
6/26	30		34.0			36.0		35.0
6/26	100			34.0			34.0	34.0
6/26	130	34.0			34.0			34.0
6/26	230		28.0			31.0		29.5
6/26	330			34.0			33.0	33.5
6/26	430	34.0			33.0			33.5
6/26	530		29.0			35.0		32.0
6/26	630			32.0			33.0	32.5
6/26	730	32.0			34.0			33.0
6/26	830		33.0			34.0		33.5
6/26	930			34.0			34.0	34.0
6/26	1030	36.0			36.0			36.0
6/26	1130		36.0			37.0		36.5
6/26	1230	35.0			36.0			35.5
6/26	1330		35.0			35.0		35.0
6/26	1430	37.0			36.0			36.5
6/26	1600		41.0			40.0		40.5
6/26	1700			40.0			38.0	39.0
6/26	1800	38.0			40.0			39.0
6/26	1900		42.0			43.0		42.5
6/26	2000			42.0			42.0	42.0
6/26	2100	38.0			37.0			37.5
6/26	2200		41.0			41.0		41.0
6/26	2300			39.0			40.0	39.5
6/26	2330	37.0			37.0			37.0
6/27	30		39.0			38.0		38.5
6/27	130			38.0			40.0	39.0
6/27	230	37.0			39.0			38.0
6/27	330		40.0			41.0		40.5

DATE	TIME	#1	#2	#3	#4	#5	#6	AVERAGE
6/27	430			41.0			41.0	41.0
6/27	530	39.0			40.0			39.5
6/27	630		38.0			40.0		39.0
6/27	730	34.0			35.0			34.5
6/27	830		37.0			38.0		37.5
6/27	930			35.0			36.0	35.5
6/27	1030	36.0			37.0			36.5
6/27	1130			36.0			37.0	36.5
6/27	1230		40.0			42.0		41.0
6/27	1330			37.0			36.0	36.5
6/27	1430	38.0			40.0			39.0
6/27	1600		42.0			44.0		43.0
6/27	1700			40.0			41.0	40.5
6/27	1800	40.0			40.0			40.0
6/27	1900		40.0			39.0		39.5
6/27	2000			42.0			39.0	40.5
6/27	2100	37.0			37.0			37.0
6/27	2200		40.0			40.0		40.0
6/27	2300			40.0			41.0	40.5
6/27	2330	41.0			39.0			40.0
6/28	30		40.0			41.0		40.5
6/28	130			40.0			40.0	40.0
6/28	230	38.0			39.0			38.5
6/28	330		39.0			40.0		39.5
6/28	430			40.0			40.0	40.0
6/28	530	37.0			37.0			37.0
6/28	630		38.0			40.0		39.0
6/28	730			38.0			37.0	37.5
6/28	830	38.0			38.0			38.0
6/28	930		38.0			36.0		37.0
6/28	1030			39.0			37.0	38.0
6/28	1130	38.0			37.0			37.5
6/28	1230		38.0			36.0		37.0
6/28	1330			36.0			36.0	36.0
6/28	1430	39.0			37.0			38.0
6/28	1600		40.0			39.0		39.5
6/28	1700			39.0			40.0	39.5
6/28	1800	36.0			36.0			36.0
6/28	1900		43.0			43.0		43.0
6/28	2000			40.0			40.0	40.0
6/28	2100	38.0			39.0			38.5
6/28	2200		42.0			41.0		41.5
6/28	2300			41.0			40.0	40.5
6/28	2330	38.0			39.0			38.5
6/29	30		40.0			40.0		40.0
6/29	130			40.0			39.0	39.5
6/29	230	38.0			38.0			38.0
6/29	330		40.0			39.0		39.5
6/29	430			41.0			42.0	41.5
6/29	530	40.0					39.0	39.5
6/29	630		40.0			41.0		40.5
6/29	730	38.0			37.0			37.5

DATE	TIME	#1	#2	#3	#4	#5	#6	AVERAGE
6/29	830		39.0			40.0		39.5
6/29	930			38.0			38.0	38.0
6/29	1030	36.0			36.0			36.0
6/29	1130		40.0			38.0		39.0
6/29	1230			37.0			40.0	38.5
6/29	1330	40.0			39.0			39.5
6/29	1430		37.0			37.0		37.0
6/29	1530			40.0			42.0	41.0
6/29	1700	36.0			38.0			37.0
6/29	1800		37.0			39.0		38.0
6/29	1900			41.0			42.0	41.5
6/29	2000	35.0			37.0			36.0
6/29	2100		39.0			40.0		39.5
6/29	2200			39.0			39.0	39.0
6/29	2300	38.0			38.0			38.0
6/29	2330		42.0			43.0		42.5
6/30	30			40.0			42.0	41.0
6/30	130	39.0			38.0			38.5
6/30	230		39.0			39.0		39.0
6/30	330			39.0			42.0	40.5
6/30	430	39.0			39.0			39.0
6/30	530		40.0			42.0		41.0
6/30	630			42.0			41.0	41.5
6/30	730	38.0			36.0			37.0
6/30	830		40.0			39.0		39.5
6/30	930			35.0			37.0	36.0
6/30	1030	35.0			36.0			35.5
6/30	1130		38.0			36.0		37.0
6/30	1230			35.0			36.0	35.5
6/30	1330	35.0			36.0			35.5
6/30	1430		37.0			37.0		37.0

TABLE H-2

FIRETEST DATA

Date	Time	Insertion Time (min)	#1	#2	#3	#4	#5	#6	#7	Average
0618	1430	4	13	16	12	14	16	14	16	14.4
0618	1600	3	14	13	7	16	7	11	-	11.3
0618	1800	3	13	11	17	10	17	14	9	13.0
0618	2000	3	14	19	16	17	14	11	7	14.0
0618	2200	3	10.5	11	8	9	21	10.5	10	11.4
0619	0000	3	13H	22H	15H	8H	17H	18H	13H	15.1
0619	0200	3	18H	17H	14H	16H	9H	14H	12H	14.3
0619	0400	3	13H	17H	12H	15H	4H	19H	12H	13.1
0619	0600	3	18H	17H	10H	15H	12H	17H	0H	12.7
0619	0800	3	12C	10	6	10	11	10	5C	9.1
0619	1000	4	13	10	7H	6H	9H	11	0H	8.0
0619	1200	3-5	9C	10C	11C	4H	10C	1	5H	8.6
0619	1400	4-7	8H	5H	8	9	14H	9C	8H	8.7
0619	1600	3	16	7D	19	10	9	3	20	12.0
0619	1800	3	9	6	9	4	4	5	0	5.3
0619	2000	3	12	6	11	11	10	10	6	9.4
0619	2200	3	8	5D	12	7	8	8	0	6.9
0620	0000	5-6	11H	13H	10H	10H	15C	6H	9H	10.6
0620	0200	4-5	17C	11H	11C	9H	12H	12H	0H	10.3
0620	0400	4-5	16H	14H	10H	13H	10H	16H	0H	11.3
0620	0600	4-5	16C	12H	11H	10H	15C	19H	0C	11.9
0620	0800	5-8	13C	8	10	13C	16C	14	15	12.7
0620	1000	5-8	11	9C	8H	13C	9H	6	3	8.4
0620	1200	4-7	8C	4	9C	3	5	8	10C	6.7
0620	1400	5-10	14C	6	13C	2	8C	8C	0	7.3
0620	1600	5	6	8	11	22	8	4	2	8.7
0620	1800	3	2	12	8	12	10	1	9	7.7
0620	2000	3.5	9	14	9	9	17	7	7	10.3
0620	2200	3.5	7	16	14	11	14	11	10	11.9
0621	0000	5-6	15H	11H	12H	13H	9H	12H	6H	11.1
0621	0200	5-6	13H	8H	12C	13H	12H	12H	3H	10.4
0621	0400	5-6	7H	12H	14H	11.5H	14H	18H	7H	11.9
0621	0600	4-5	14C	16H	20H	16C	12H	19H	13C	15.7
0621	0800	5-8	12C	12	11C	7	8	14	2	9.4
0621	1000	5-6	12C	8	16	13C	11H	16H	0	10.9
0621	1200	5-6	9	9	6	6H	13	20H	4H	9.6
0621	1400	5-6	10D	15D	7	8	18	13	4H	10.7
0621	1600	5	6	2	C	10	24	6	12	10.0
0621	1800	5	8	11D	11D	8	30	6	6	11.4
0621	2000	4	9	12	8D	7	20	9	9	10.6
0621	2200	4	11	11	27	21	12	10	9	14.4
0622	0000	5-6	4H	12H	8H	11H	34H	8	11C	12.6
0622	0200	5-6	8C	4H	10H	16D	7D	12H	8H	9.3
0622	0400	5-6	10H	9H	4H	21H	18D	9H	0H	10.1
0622	0600	4-5	10H	11H	13H	4H	27H	0D	10H	10.7
0622	0800	5	11C	6C	9	38H	23D	10C	0	13.9
0622	1000	5	11	10	13	36H	10D	10	6	13.7

Date	Time	Insertion Time (min)	#1	#2	#3	#4	#5	#6	#7	Average
0622	1200	5	13D	3	6D	12D	13D	9D	0	8.0
0622	1400	5	4C	3	23C	38	33	16	19	19.4
0622	1600	4	8	21	17	7D	34	4D	4D	13.6
0622	1800	3	18	14	23	40	34	6	18	21.9
0622	2000	3	12	26	33	25	7D	8	2	14.7
0622	2200	3	6	25	40	32	3	4	6	16.6
0623	0000	4-5	6D	6D	26H	10C	8D	11H	4C	10.1
0623	0200	4-5	1D	3D	19H	5C	15H	11H	12C	9.4
0623	0400	4-5	7H	17H	4H	8H	12H	10H	6C	9.1
0623	0600	4-5	7H	7H	5H	12H	18H	39H	0H	12.6
0623	0800	4-5	8C	8D	36H	8D	21	42	9C	18.9
0623	1000	3-4	10	7D	26H	16	20	25D	6D	15.7
0623	1200	3-4	6	5	6D	10D	19	49	27	17.4
0623	1400	3-4	17C	7	12D	24	22	7D	6D	13.6
0623	1600	2	13	9	25	21	14	-	26	18.0
0623	1800	2	9	14	33	34	-	9	11D	16.7
0623	2000	2	14	15	40	21	15	36	31	24.6
0623	2200	2	19	0	34	35	15	31	24	22.6
0624	0000	3-4	9C	10C	23D	23D	26C	14H	48H	21.9
0624	0200	2-3	30H	9H	23D	21D	11C	38H	8H	20.0
0624	0400	2-3	11H	2H	2D	24H	31H	48H	10H	18.3
0624	0600	2-3	19H	17C	17H	10H	15H	66H	14H	22.6
0624	0800	3-4	9D	7C	13D	15H	18D	53	14H	18.4
0624	1000	3-4	14D	20D	14C	12	10C	63H	0	19.0
0624	1200	3-4	7	16	4D	3	5	24D	0	8.4
0624	1400	3-4	7	16	4D	3	5	24D	0	8.4
0624	1600	3	12	19	11	C	37	11	0	15.0
0624	1800	3	31	11	9	13	40	22	5	18.7
0624	2000	3	12	7	8	22	32	-	10	15.2
0624	2200	2	10	20	7	12	28	-	22	16.5
0625	0000	3-4	14D	6H	0H	26C	10H	19H	25H	14.3
0625	0200	3-4	10H	0	10H	4D	8H	24H	4H	8.6
0625	0300	3-4	14H	14H	7H	10H	10C	22H	0H	11.0
0625	0400	3-4	27H	10H	0H	16D	45H	4D	0H	14.6
0625	0500	3-4	13H	9H	26H	11H	14H	31H	0D	14.9
0625	0600	3-4	13H	10H	7H	16H	16D	36DF	26H	17.7
0625	0800	4	7	7	13	14	10D	13	0	9.1
0625	1000	7	1	4	4D	1	49	36D	0	13.6
0625	1200	5-7	8	9	6	10	15D	4	8	8.6
0625	1400	6	9D	1	3	7	41	16D	6	11.9
0625	1600	3	16	14	15	20	-	11	4	13.3
0625	1800	3	13	8	8	5	28D	13	0	12.3
0625	2000	3	16	10	8	23	36	9	2	14.9
0625	2200	3	12	15	23	-	10D	9	16	14.2
0626	0000	4-5	0H	13C	27C	19H	0H	18C	3H	11.4
0626	0200	4-5	4H	14H	3H	22H	12H	5H	10H	10.0
0626	0400	4-5	5H	0H	5H	9H	16H	10H	12H	8.14
0626	0600	4-5	9H	14C	13H	24D	15H	10H	7H	13.1
0626	0800	5-7	2C	2	8C	1D	6D	6	0	3.6
0626	1000	5-7	0C	1	0	10	2D	1C	0	2.0
0626	1200	7-9	4C	11C	4	4D	6	9	0	5.4

Date	Time	Insertion Time (min)	#1	#2	#3	#4	#5	#6	#7	Average
0626	1400	8	7	2C	0	4	3D	4	0D	2.9
0626	1540	6	6	3	0	5D	6	3	0	3.3
0626	1800	7	7	5	0H	38	10	7	17	12.0
0626	2000	6	9	2	5	9	6	5	0	5.1
0626	2200	7	4	4	9D	5	5	6	19D	7.4
0627	0000	4-5	6C	4H	4D	6H	0C	6C	0C	3.7
0627	0200	4-5	5H	5H	8C	10C	4C	10C	0H	6.0
0627	0400	5-6	7H	11H	6H	36H	3H	4H	8H	10.7
0627	0600	5-6	4C	19C	7C	4H	4H	19C	7C	9.1
0627	0800	7	11C	3	0	0	1D	14	4C	4.7
0627	1000	5	6C	11	11	4C	34	11	6C	11.9
0627	1200	5	11	19D	16H	0D	32D	0	11	12.7
0627	1400	8	6C	0C	4D	35H	6D	9	0	8.6
0627	1600	6	8	11	10	12	5	4	13	9.0
0627	1800	6	0	14	12	15	7	8	0	8.0
0627	2000	6	9	16	7D	11	8	11	15	11.0
0627	2200	5	6	4	37	11D	2	5	15	11.4
0628	0000	2-3	8C	18H	19D	3H	7H	12H	16D	11.9
0628	0200	2-3	11H	18H	25H	8H	4H	15H	11H	13.1
0628	0400	2-3	6H	43H	8D	13H	5H	12H	9D	13.7
0628	0600	2-3	9H	11H	4H	4H	2H	8H	9H	6.7
0628	0800	5	9	10D	7	9	5	10H	0D	7.1
0628	1000	5	13D	14D	12	10	14	8	10D	11.6
0628	1200	3	0	13	9D	13D	10D	14	8D	9.6
0628	1400	3-4	21	6D	23H	9	5D	16	7D	12.4
0628	1600	4	12	40	11	7	13	11	0D	13.4
0628	1800	3	20	32	22	18	23	14D	10	19.9
0628	2000	3	18D	23	16	25	11	34	0D	18.1
0628	2200	3	12	12	0D	8	14	28	10	12.0
0629	0000	3-4	15D	19H	15H	8H	14H	10H	10D	13.0
0629	0200	3-4	29H	14H	11D	14H	16H	24H	14D	17.4
0629	0400	3-4	11H	12H	29H	7H	12H	48H	24H	20.4
0629	0600	3-4	12H	9D	30H	9H	21D	26H	23H	18.6
0629	0800	4	24	22	31	10	40	10D	6D	20.4
0629	1000	4	6	20	29	10	27	35	6D	19.0
0629	1200	7	13	13D	9	13	36	24	0D	15.4
0629	1400	5	24	15D	16D	12	11D	11D	21	15.9
0629	1600	3	31	13	31	14	13D	27	18	21.0
0629	1800	3	23	24	6	11D	4D	2	19	12.7
0629	2000	3	8	26	4	22	20	7D	0D	12.4
0629	2200	3	4	20	3D	8	7	10	10	8.9
0630	0000	3	14	14	10	20	21	20	10	15.6
0630	0200	3	C	3	12	24	27	26	25	16.7
0630	0400	3	16	25	25	10D	10D	11	20	16.7
0630	0600	4-5	11C	27	14	15	10C	34	3D	16.3
0630	0800	4-5	14C	25	33	14	39	15	10	21.4
0630	1000	4-5	9	13	13D	10	40	36	9	18.6
0630	1230	4	23	49	7D	13	27	9D	20	21.1
0630	1430	7	9	36	12D	8	39	15	-	19.8

END OF BOM/FGT 012 ABSOLOKA/ROBINSON

TABLE H-3

OPERATOR LOGGED DATA I

DATE	TIME	AGIT. WATER FLOW	JACKET WATER FLOW	JACKET W. F. TOTAL	JACKET WATER HRLY USE	METER INLET PRESS.	REG. STEAM PRESS.	STEAM TEMP. F.	ORIFICE DELTA P	VALVE POSIT.
0618	1230	3.0	5.5	27298	100	54	39	283	0	7
0618	1330	3.0	12.0	27303	500	52	39.5	283	55	12
0618	1430	3.0	12.0	27311	800	51	39	280	0	16
0618	1530	2.8	12.0	27315	400	50	39	280	0	11
0618	1630	3.0	12.0	27323	800	50	40	280	0	11
0618	1730	3.0	12.0	27329	600	50	39	280	0	14
0618	1830	3.0	12.0	27335	600	50	39	280	0	15
0618	1930	3.0	12.0	27343	800	50	39	280	0	16
0618	2030	3.0	12.0	27349	600	55	39	285	0	14
0618	2130	3.0	12.0	27356	700	50	39	285	0	14
0618	2230	3.0	12.0	27364	900	50	39	285	0	17
0618	2330	3.0	12.0	27370	600	50	40	280	0	12
0619	0030	3.0	12.0	27377	700	55	39	285	0	15
0619	0130	3.0	12.0	27383	600	55	39	285	0	12
0619	0230	3.0	12.0	27390	700	55	39	285	0	12
0619	0330	3.0	12.0	27396	600	55	39	285	0	12
0619	0430	3.0	12.0	27403	700	55	39	285	0	11
0619	0530	3.0	12.0	27410	700	50	38	285	0	11
0619	0630	3.0	11.0	27415	500	58	39.5	285	0	11
0619	0730	3.0	11.0	27422	700	57	39	283	0	11
0619	0830	3.0	11.0	27428	600	56	39	283	0.2	13
0619	0930	3.0	11.0	27434	600	52	39	282	1.8	14
0619	1030	3.0	11.0	27441	700	55	38.7	281	1.5	11
0619	1130	3.0	11.0	27446	500	56	38.8	281	1.2	14
0619	1230	3.0	11.0	27453	700	56	38.7	281	2.0	14
0619	1330	3.0	11.0	27459	600	55	38	281	1.8	16
0619	1430	3.0	10.0	27464	500	57	38.8	281	3.0	12
0619	1530	3.0	10.0	27470	600	50	38	281	2.0	14
0619	1630	3.0	10.0	27476	600	50	38	285	2.5	17
0619	1730	3.0	10.0	27480	400	58	39	285	2.0	18
0619	1830	3.0	10.0	27487	700	55	39	285	1.5	19
0619	1930	3.0	10.0	27492	500	55	39	285	1.5	19
0619	2030	3.0	10.0	27497	500	50	38	285	2.0	19
0619	2130	3.0	10.0	27503	600	50	39	285	2.0	20
0619	2230	3.0	10.0	27508	500	51	39	285	2.0	20
0619	2330	3.0	10.0	27516	800	50	39	280	1.5	20
0620	0030	3.0	10.0	27521	500	50	40	280	1.0	18
0620	0130	3.0	10.0	27526	500	55	39	285	1.5	20
0620	0230	3.0	10.0	27530	400	50	38	280	2.0	20
0620	0330	3.0	10.0	27536	600	50	39	280	1.5	22
0620	0430	3.0	10.0	27541	500	55	39	280	2.0	20
0620	0530	3.0	10.0	27547	600	55	39	280	2.0	20
0620	0630	3.0	10.0	27554	700	55	39	285	2.5	18
0620	0730	2.5	10.0	27558	400	51	37	280	.5	24
0620	0830	2.5	10.0	27563	500	54	38	280	2.0	22
0620	0930	2.5	10.0	27569	600	49	36	279	2.0	22

DATE	TIME	AGIT. WATER FLOW	JACKET WATER FLOW	JACKET W. F. TOTAL	JACKET WATER HRLY USE	METER INLET PRESS.	REG. STEAM PRESS.	STEAM TEMP. F.	ORIFICE DELTA P	VALVE POSIT.
0620	1030	2.5	10.0	27574	500	53	38	280	1.5	20
0620	1130	2.5	10.0	27580	600	48	36	278	2.1	21
0620	1230	2.5	10.0	27585	500	48	36.5	277	1.4	18
0620	1330	2.5	10.0	27590	500	48	36.5	2777	1.4	18
0620	1430	2.5	10.0	27596	600	58	38.5	281	2.5	25
0620	1530	2.5	10.0	27601	500	51	39	285	1.5	20
0620	1630	2.5	10.0	27607	600	51	43	290	0	20
0620	1730	2.5	10.0	27611	400	59	49	295	0	16
0620	1830	2.5	10.0	27616	500	55	46	290	0	18
0620	1930	2.5	10.0	27623	700	50	42	285	0	15
0620	2030	2.5	10.0	27629	600	54	46	290	0	15
0620	2130	2.5	10.0	27636	700	55	46	290	0	20
0620	2230	2.5	10.0	27639	300	50	43	290	0	21
0620	2330	2.5	10.0	27646	700	55	46	290	0	20
0621	0030	2.5	10.0	27651	600	50	41.5	290	0	20
0621	0130	2.5	10.0	27657	600	60	48	295	1.0	14
0621	0230	2.5	10.0	27662	500	50	44	290	2.0	15
0621	0330	2.5	10.0	27667	500	55	46	295	0	20
0621	0430	2.5	10.0	27673	600	55	45	290	0	20
0621	0530	2.5	10.0	27678	500	58	48	290	0	15
0621	0630	2.5	10.0	27683	500	50	44	290	0	21
0621	0730	2.5	10.0	27689	600	48	41	280	0	19
0621	0830	2.5	10.0	27695	600	53	38.2	280	0	20
0621	0930	2.5	10.0	27700	500	52	38.8	280	0	20
0621	1030	2.5	10.0	27706	600	58	39.7	282	0.5	18
0621	1130	2.5	10.0	27711	500	52	38.8	280	1.0	23
0621	1230	2.5	10.0	27717	600	51	37.5	278	1.1	24
0621	1330	2.5	10.0	27724	700	54	38.2	280	1.4	23
0621	1430	2.5	10.0	27728	400	56	38.9	281	1.5	24
0621	1530	2.5	10.0	27733	500	54	39	285	1.5	22
0621	1630	2.5	10.0	27738	500	59	39	285	0.5	22
0621	1730	2.5	10.0	27744	600	52	39	285	1.5	20
0621	1830	2.5	10.0	27749	500	50	38	285	2.0	22
0621	1930	2.5	10.0	27754	500	49	38	285	1.5	20
0621	2030	2.5	10.0	27760	600	59	39	285	1.0	21
0621	2130	2.5	10.0	27765	500	51	39	285	1.5	23
0621	2230	2.5	10.0	27771	600	51	39	285	2.0	24
0621	2330	2.5	10.0	27777	600	50	39	285	1.0	22
0622	0030	2.5	10.0	27782	500	60	39.5	285	2.0	20
0622	0130	2.5	10.0	27787	500	55	29	285	1.0	22
0622	0230	2.5	10.0	27792	500	50	38.5	280	2.0	22
0622	0330	2.5	10.0	27799	700	58	39.5	285	2.5	20
0622	0430	2.5	10.0	27804	500	60	39.5	280	3.0	20
0622	0530	2.5	10.0	27810	600	58	39.5	285	2.0	21
0622	0630	2.5	10.0	27814	400	50	37.0	280	3.5	22
0622	0730	2.5	10.0	27820	600	51	37.8	280	4.0	24
0622	0830	2.5	10.0	27826	600	54	38.1	282	3.5	26
0622	0930	2.5	10.0	27831	500	58	39.0	282	3.0	24
0622	1030	2.5	10.0	27837	600	49	37.0	280	4.0	28
0622	1130	2.5	10.0	27842	500	54	37.8	277	6.5	25

DATE	TIME	AGIT. WATER FLOW	JACKET WATER FLOW	JACKET W. F. TOTAL	JACKET WATER HRLY USE	METER INLET PRESS.	REG. STEAM PRESS.	STEAM TEMP. F.	ORIFICE DELTA P	VALVE POSIT.
0622	1230	2.5	10.0	27848	600	52	37.7	277	6.0	23
0622	1330	2.5	10.0	27853	500	54	38.0	277	7.0	28
0622	1430	2.5	10.0	27859	600	50	37.2	280	6.8	26
0622	1530	2.5	10.0	27864	500	50	38.0	285	8.0	28
0622	1630	2.5	10.0	27869	500	53	38.0	285	8.0	27
0622	1730	2.5	10.0	27874	500	59	39.0	285	6.0	27
0622	1830	2.5	10.0	27880	600	59	40.0	285	7.0	26
0622	1930	2.5	10.0	27885	500	58	40.0	285	6.0	25
0622	2030	2.5	10.0	27891	600	57	39.0	285	9.0	29
0622	2130	2.5	10.0	27896	500	50	38.0	285	10.0	30
0622	2230	2.5	10.0	27901	500	60	40.0	285	9.0	24
0622	2330	2.5	10.0	27907	600	50	38.5	280	10.0	28
0623	0030	2.5	10.0	27913	600	50	38.5	285	10.0	28
0623	0130	2.5	10.0	27918	500	58	38.5	285	10.0	28
0623	0230	2.5	10.0	27924	600	55	39.0	280	8.0	25
0623	0330	2.5	10.0	27930	600	50	37.5	280	10.0	25
0623	0430	2.5	10.0	27935	500	50	37.5	280	10.0	25
0623	0530	2.5	10.0	27940	500	58	40.0	280	10.0	25
0623	0630	2.5	10.0	27945	500	50	39.0	280	11.0	28
0623	0730	2.5	10.0	27951	600	48	36.2	277	11.5	26
0623	0830	2.5	10.0	27956	500	58	39.9	283	14.0	24
0623	0930	2.5	10.0	27963	700	48	36.5	280	14.0	30
0623	1030	2.5	10.0	27967	400	49	36.9	280	15.0	32
0623	1130	2.5	10.0	27973	600	58	38.0	280	14.5	30
0623	1230	2.5	10.0	27978	500	52	38.2	281	14.2	27
0623	1330	2.5	10.0	27983	500	54	39.0	282	14.0	24
0623	1430	2.5	10.0	27988	500	57	37.2	281	15.2	30
0623	1530	2.5	10.0	27994	600	56	39.0	285	16.0	30
0623	1630	2.5	10.0	27999	500	56	39.0	285	15.0	26
0623	1730	2.5	10.0	28004	500	59	40.0	285	13.5	24
0623	1830	2.5	10.0	28009	500	50	39.0	285	14.0	24
0623	1930	2.5	10.0	28014	500	59	40.0	285	12.5	18
0623	2030	2.5	10.0	28020	600	58	40.0	285	12.0	17
0623	2130	2.5	15.0	28027	700	58	40.0	285	12.0	21
0623	2230	2.5	15.0	28036	900	50	38.0	285	13.0	20
0623	2330	2.5	15.0	28045	900	50	40.0	280	12.0	20
0624	0030	2.5	15.0	28052	700	50	39.0	280	12.0	12
0624	0130	2.5	15.0	28060	800	50	39.0	285	12.0	18
0624	0230	2.5	15.0	28070	1000	60	40.0	285	12.0	24
0624	0330	2.5	15.0	28079	900	55	39.5	280	12.0	22
0624	0430	2.5	15.0	28086	700	55	40.0	285	11.0	22
0624	0530	2.5	15.0	28095	900	50	39.0	280	12.0	26
0624	0630	2.5	15.0	28102	700	50	39.0	285	13.0	28
0624	0730	2.5	10.0	28110	800	49	37.0	280	13.0	24
0624	0830	2.5	10.0	28116	600	54	39.0	281	12.0	25
0624	0930	2.5	10.0	28121	500	55	37.8	280	13.0	30
0624	1030	2.5	10.0	28126	500	52	38.0	280	12.0	26
0624	1130	2.5	10.0	28131	500	46	35.8	275	11.5	31
0624	1230	2.5	10.0	28136	500	55	39.0	280	11.5	26
0624	1330	2.5	10.0	28142	600	59	40.0	282	12.5	29

DATE	TIME	AGIT. WATER FLOW	JACKET WATER FLOW	JACKET W. F. TOTAL	JACKET WATER HRLY USE	METER INLET PRESS.	REG. STEAM PRESS.	STEAM TEMP. F.	ORIFICE DELTA P	VALVE POSIT.
0624	1430	2.5	10.0	28147	500	53	38.8	280	9.0	21
0624	1530	2.3	10.0	28152	500	50	38.0	285	8.0	20
0624	1630	2.3	10.0	28157	500	59	40.0	285	8.0	9
0624	1730	2.5	10.0	28162	500	57	40.0	285	8.0	15
0624	1830	2.5	10.0	28167	500	58	40.0	285	8.0	21
0624	1930	2.5	10.0	28173	600	56	39.0	285	7.5	20
0624	2030	2.5	10.0	28178	500	49	38.0	285	7.0	24
0624	2130	3.0	10.0	28184	600	49	38.0	280	9.0	29
0624	2230	3.0	12.0	28190	600	60	40.0	285	8.0	22
0624	2330	2.5	12.0	28198	800	60	40.0	285	8.0	25
0625	0030	2.5	12.0	28204	600	55	39.5	280	10.0	30
0625	0130	2.5	12.0	28209	500	50	39.0	285	10.0	30
0625	0230	2.5	12.0	28216	700	55	39.5	280	10.0	28
0625	0330	2.5	12.0	28221	500	55	39.5	280	9.0	26
0625	0430	2.5	12.0	28229	800	55	39.5	285	8.0	28
0625	0530	2.5	12.0	28234	500	50	39.0	285	10.0	32
0625	0630	2.5	12.0	28241	700	60	40.0	280	12.0	28
0625	0730	2.5	12.0	28248	700	46	37.0	276	6.0	22
0625	0830	2.5	10.0	28253	500	52	39.0	281	6.0	18
0625	0930	2.5	10.0	28258	500	44	37.0	280	7.2	21
0625	1030	2.5	10.0	28264	600	45.5	38.9	280	8.5	21
0625	1130	2.5	7.0	28267	300	50	38.9	280	---	15
0625	1230	2.5	8.5	28272	500	48	38.8	280	---	17
0625	1330	2.5	9.5	28276	400	52	39.2	281	---	20
0625	1430	2.5	9.5	28281	500	55	40.1	282	1.0	18
0625	1530	2.5	10.0	28286	500	58	40.0	285	0	21
0625	1630	2.5	10.0	28290	400	54	39.0	280	0	22
0625	1730	2.5	10.0	28296	600	57	39.0	285	0	20
0625	1830	2.5	10.0	28301	500	58	40.0	285	1.0	20
0625	1930	2.5	10.0	28306	500	56	40.0	285	0	19
0625	2030	2.5	10.0	28311	500	49	38.0	285	1.0	19
0625	2130	2.5	10.0	28317	600	55	39.0	285	0.5	19
0625	2230	2.5	10.0	28322	500	60	40.0	285	0	14
0625	2330	2.5	10.0	28328	600	60	40.0	285	1.0	20
0626	0030	2.5	10.0	28333	500	55	40.0	280	2.0	18
0626	0130	2.5	10.0	28337	400	75	41.0	290	2.5	20
0626	0230	2.5	10.0	28343	600	90	41.0	290	3.0	19
0626	0330	2.5	10.0	28348	500	90	41.0	290	4.0	18
0626	0430	2.5	10.0	28353	500	80	41.0	290	2.5	18
0626	0530	2.5	10.0	28358	500	80	41.0	290	2.5	18
0626	0630	2.5	10.0	28363	500	80	41.0	290	2.5	14
0626	0730	2.5	10.0	28368	500	82	42.0	285	3.0	16
0626	0830	2.5	10.0	28373	500	86	42.0	285	4.0	18
0626	0930	2.5	7.0	28379	600	72	42.0	282	4.2	0
0626	1030	2.5	12.0	28383	400	82	42.0	283	2.5	12
0626	1130	2.5	12.0	28389	600	72	42.0	285	3.0	0
0626	1230	2.5	12.0	28396	700	88	42.0	282	5.0	16
0626	1330	2.5	10.0	28401	500	86	42.0	282	3.0	10
0626	1430	2.5	10.0	28407	600	76	41.7	283	2.0	14
0626	1530	2.5	10.0	28411	400	76	41.0	290	2.0	14

DATE	TIME	AGIT. WATER FLOW	JACKET WATER FLOW	JACKET W. F. TOTAL	JACKET WATER HRLY USE	METER INLET PRESS.	REG. STEAM PRESS.	STEAM TEMP. F.	ORIFICE DELTA P	VALVE POSIT.
0626	1630	2.5	10.0	28417	600	90	43.0	290	5.0	15
0626	1730	2.5	10.0	28422	500	86	42.0	290	5.0	13
0626	1830	2.5	10.0	28430	800	90	42.0	285	5.0	13
0626	1930	2.5	10.0	28431	100	84	42.0	285	5.0	15
0626	2030	2.5	10.0	28438	700	84	43.0	290	5.0	12
0626	2130	2.5	10.0	28444	600	90	42.0	290	5.0	17
0626	2230	2.5	10.0	28450	600	90	42.0	290	5.0	15
0626	2330	2.5	10.0	28457	700	85	41.0	290	5.0	20
0627	0030	2.5	10.0	28462	500	85	41.0	290	5.0	18
0627	0130	2.5	10.0	28468	600	85	41.0	290	4.0	21
0627	0230	2.5	10.0	28474	600	85	41.0	290	4.0	20
0627	0330	2.5	10.0	28479	500	85	41.0	290	4.0	25
0627	0430	2.5	10.0	28484	500	80	40.5	290	4.0	22
0627	0530	2.5	10.0	28490	600	80	40.5	290	4.0	24
0627	0630	2.5	10.0	28495	500	85	41.0	290	5.0	24
0627	0730	2.5	10.0	28501	600	84	41.8	285	5.0	14
0627	0830	2.5	10.0	28507	600	74	41.0	285	4.0	15
0627	0930	2.5	10.0	28513	600	73	41.0	285	4.0	24
0627	1030	2.5	10.0	28518	500	85	41.8	285	4.0	26
0627	1130	2.5	10.0	28524	600	85	42.0	283	6.0	24
0627	1230	2.5	10.0	28529	500	82	41.0	283	5.0	24
0627	1330	2.5	10.0	28535	600	84	41.0	283	5.0	24
0627	1430	2.5	12.0	28542	700	84	41.5	285	5.5	18
0627	1530	2.5	12.0	28549	700	84	41.5	290	5.0	18
0627	1630	2.5	12.0	28553	400	79	42.0	290	5.0	20
0627	1730	2.5	12.0	28559	600	90	42.0	290	5.0	20
0627	1830	2.5	12.0	28565	600	90	42.0	290	0.5	19
0627	1930	2.5	12.0	28572	700	84	41.0	290	4.0	24
0627	2030	2.5	12.0	28579	700	85	41.0	290	4.0	22
0627	2130	2.5	12.0	28586	700	90	40.0	290	2.0	23
0627	2230	2.5	12.0	28594	800	89	42.0	290	3.0	23
0627	2330	2.5	12.0	28600	600	90	41.5	290	7.5	22
0628	0030	2.5	12.0	28608	800	80	40.5	285	3.0	28
0628	0130	2.5	12.0	28614	600	90	41.0	290	7.5	29
0628	0230	2.5	12.0	28619	500	80	40.5	285	2.5	30
0628	0330	2.5	12.0	28627	800	75	40.5	285	7.5	28
0628	0430	2.5	12.0	28633	600	75	40.5	285	5.0	22
0628	0530	2.5	12.0	28640	700	75	40.5	280	1.0	18
0628	0630	2.5	12.0	28646	600	90	41.0	290	5.0	26
0628	0730	2.5	12.0	28653	700	85	41.5	285	9.0	29
0628	0830	2.5	12.0	28660	700	73	40.5	288	7.5	33
0628	0930	2.5	12.0	28666	600	76	40.5	285	7.5	34
0628	1030	2.5	12.0	28673	700	76	41.0	283	11.5	36
0628	1130	2.5	12.0	28680	700	77	41.0	280	4.0	28
0628	1230	2.5	12.0	28685	500	84	41.0	283	6.0	17
0628	1330	2.5	12.0	28690	500	84	42.0	285	7.0	27
0628	1430	2.5	12.0	28697	700	88	42.0	283	7.0	30
0628	1530	2.5	12.0	28703	600	90	41.0	290	5.0	31
0628	1630	2.5	12.0	28710	700	89	41.0	290	5.0	33
0628	1730	2.5	12.0	28717	700	85	42.0	290	5.0	35

DATE	TIME	AGIT. WATER FLOW	JACKET WATER FLOW	JACKET W. F. TOTAL	JACKET WATER HRLY USE	METER INLET PRESS.	REG. STEAM PRESS.	STEAM TEMP. F.	ORIFICE DELTA P	VALVE POSIT.
0628	1830	2.5	12.0	28722	500	89	42.0	285	5.0	30
0628	1930	2.5	12.0	28730	800	78	41.0	285	5.0	34
0628	2030	2.5	12.0	28737	700	89	42.0	285	5.0	33
0628	2130	2.5	12.0	28743	600	82	41.0	290	5.0	30
0628	2230	2.5	12.0	28749	600	80	41.0	290	5.0	32
0628	2330	2.5	12.0	28756	700	85	41.0	290	7.5	35
0629	0030	2.5	12.0	28763	700	80	40.5	290	7.5	34
0629	0130	2.5	12.0	28770	700	75	40.5	285	7.5	32
0629	0230	2.5	12.0	28776	600	75	40.0	280	7.5	35
0629	0330	2.5	12.0	28784	800	90	41.0	290	10.0	34
0629	0430	2.5	12.0	28790	600	75	40.0	280	7.5	34
0629	0530	2.5	12.0	28797	700	90	48.0	290	10.0	34
0629	0630	2.5	12.0	28804	700	75	40.5	290	10.0	33
0629	0730	2.5	12.0	28811	700	82	42.0	285	10.0	33
0629	0830	2.5	12.0	28818	700	71	41.0	290	7.0	31
0629	0930	2.5	12.0	28824	600	86	41.8	285	9.0	32
0629	1030	2.5	7.0	28830	600	88	42.0	285	7.0	17
0629	1130	2.5	7.0	28834	400	75	41.0	288	5.0	20
0629	1230	2.5	9.0	28838	400	78	42.0	282	6.0	27
0629	1330	2.5	9.0	28842	400	86	42.0	285	7.5	25
0629	1430	2.5	9.0	28848	600	82	42.0	285	7.5	25
0629	1530	2.5	9.0	28853	500	72	41.0	290	6.0	22
0629	1630	2.5	9.0	28857	400	82	41.0	290	5.0	21
0629	1730	2.5	9.5	28862	500	85	42.0	290	5.0	21
0629	1830	2.5	9.5	28868	600	82	41.0	290	5.0	22
0629	1930	2.5	9.5	28873	500	88	41.0	290	5.0	21
0629	2030	2.5	9.5	28877	400	90	41.0	290	4.0	24
0629	2130	2.5	9.5	28882	500	90	42.0	290	4.0	25
0629	2230	2.5	9.5	28887	500	89	42.0	290	4.0	22
0629	2330	2.5	9.5	28892	500	84	41.0	290	5.0	20
0630	0030	2.5	9.5	28897	500	90	42.0	290	5.0	23
0630	0130	2.5	9.5	28902	500	90	42.0	290	5.0	22
0630	0230	2.5	9.5	28907	500	76	41.0	290	5.0	24
0630	0330	2.5	9.5	28912	500	76	40.0	290	5.0	25
0630	0430	2.5	9.5	28917	500	70	41.0	290	5.0	25
0630	0530	2.5	9.5	28922	500	84	42.0	290	5.0	16
0630	0630	2.5	9.5	28927	500	86	41.8	285	5.0	26
0630	0730	2.5	9.5	28933	600	76	41.7	285	5.5	27
0630	0830	2.5	9.5	28938	500	84	41.0	285	5.0	28
0630	0930	2.5	9.5	28943	500	84	41.8	283	6.0	28
0630	1030	2.5	9.5	28948	500	89	42.0	285	7.5	26
0630	1130	2.5	9.5	28953	500	91	42.0	285	6.0	26
0630	1230	2.5	12.0	28960	700	77	41.0	282	9.0	36
0630	1330	2.5	12.0	28966	600	84	42.0	285	9.0	34
0630	1430	2.5	12.0	28973	700	80	41.0	285	8.0	24

END OF BOM/FGT 012 ABSOLOKA/ROBINSON

TABLE H-4

OPERATOR LOGGED DATA II

DATE	TIME	AGIT. COUNTRDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	FLUE GAS SCRUBBER REAGENT PUMP SPEED	FLUE GAS SCRUBBER REAGENT PUMP STROKE	ANNUBAR DELTA P
0618	1230	0	0	0	0	0	0	6.5	50	50	0
0618	1330	0	0	0	0	0	0	6.5	50	50	0
0618	1430	1	1	0	0	0	0	6.5	50	50	0
0618	1530	1	0	0	0	0	0	6.5	50	50	0
0618	1630	1	0	0	0	0	0	8.0	50	50	0
0618	1730	1	0	0	0	0	0	8.0	45	45	0
0618	1830	1	0	0	0	0	0	7.5	45	45	0
0618	1930	1	0	0	0	0	0	7.5	45	45	0
0618	2030	1	0	0	0	0	0	7.5	45	45	0
0618	2130	1	0	0	0	0	0	7.0	45	45	0
0618	2230	1	0	0	0	0	0	7.0	45	45	0
0618	2330	1	0	0	0	0	3/0	5.0	50	50	0
0619	0030	1	0	0	8	8	3/0.4	5.0	50	50	0
0619	0130	1	0	0	9	1	3/0	8.0	45	45	0
0619	0230	1	0	0	9	0	3/0	8.0	45	45	0
0619	0330	1	0	0	9	0	3/0	7.5	45	45	0
0619	0430	1	0	0	9	0	3/0	7.5	45	45	0
0619	0530	1	0	0	9	0	3/0	7.5	45	45	0
0619	0630	1	0	0	13	4	2/0.4	7.0	40	40	0
0619	0730	1	0	0	25	12	2/0.4	7.0	40	40	.05
0619	0830	1	0	0	35	10	2/0.4	7.0	40	40	.04
0619	0930	1	0	0	46	11	2/0.4	7.0	40	40	.04
0619	1030	1	0	0	57	11	2/0.4	6.5	40	40	.05
0619	1130	1	0	0	68	11	2/0.4	6.5	40	40	.04
0619	1230	1	0	0	79	11	2/0.4	6.5	40	40	.04
0619	1330	1	0	0	91	12	2/0.4	6.5	40	40	.023
0619	1430	1	0	0	100	9	2/0.4	6.5	40	40	.04
0619	1530	1	0	0	112	12	2/0.41	6.5	40	40	.04
0619	1630	1	0	0	126	14	2/0.6	6.5	40	40	.05
0619	1730	1	0	0	140	14	2/0.59	6.5	40	40	.04
0619	1830	1	0	0	155	15	2/0.45	6.5	40	40	.05
0619	1930	1	0	0	166	11	2/0.45	5.5	45	45	.04
0619	2030	1	0	0	178	12	2/0.45	5.5	45	45	.04
0619	2130	1	0	0	190	12	2/0.45	5.5	50	50	.05
0619	2230	1	0	0	202	12	2/0.45	5.5	50	50	.04
0619	2330	1	0	0	217	15	2/0.45	5.0	50	50	
0620	0030	1	0	0	229	12	2/0.45	8.5	45	45	
0620	0130	1	0	0	239	10	2/0.45	9.0	40	40	
0620	0230	1	0	0	245	6	2/0	9.0	40	40	
0620	0330	1	0	0	247	2	2/0.40	8.0	40	40	
0620	0430	1	0	0	255	8	2/0.41	7.5	35	35	
0620	0530	1	0	0	268	13	2/0.41	7.0	35	35	
0620	0630	1	0	0	278	10	2/0.42	7.0	35	35	
0620	0730	1	0	0	289	11	2/0.40	7.0	35	35	.03
0620	0830	1	0	0	300	11	2/0.5	6.5	35	35	.06

DATE	TIME	AGIT. COUNTRDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	ANNUB DELTP
0620	0930	1	0	0	318	18	2/1.0	6.5	35	35	.1
0620	1030	1	0	0	345	27	2/1.0	6.5	35	35	.1
0620	1130	1	0	0	371	26	2/1.0	6.5	35	35	.1
0620	1230	1	0	0	392	21	2/0.4	6.5	35	35	.1
0620	1330	1	0	0	402	10	2/0.4	6.5	35	35	.1
0620	1430	1	0	0	413	11	2/0.4	6.0	35	35	.1
0620	1530	1	0	0	423	10	2/0.41	6.0	35	35	.1
0620	1630	1	0	0	434	11	2/0.41	6.0	35	35	.1
0620	1730	1	0	0	443	9	2/0.41	6.5	35	35	.1
0620	1830	1	0	0	452	9	2/0.41	6.5	35	35	.1
0620	1930	1	0	0	465	13	2/0.41	5.5	35	35	.1
0620	2030	1	0	0	477	12	2/0.41	6.5	35	35	.1
0620	2130	1	0	0	492	15	2/0.41	6.5	35	35	.1
0620	2230	1	0	0	497	5	2/0.41	7.0	38	38	.1
0620	2330	1	0	0	511	14	2/0.41	7.0	38	38	.1
0621	0030	1	0	0	521	10	2/0.41	7.0	38	38	.1
0621	0130	1	0	0	532	11	2/0.41	7.0	38	38	.1
0621	0230	1	0	0	541	9	2/0.41	7.0	38	38	.1
0621	0330	1	0	0	552	11	2/0.41	7.0	38	38	.1
0621	0430	1	0	0	564	12	2/0.41	7.0	38	38	.1
0621	0530	1	0	0	573	9	2/0.41	7.0	38	38	.1
0621	0630	1	0	0	583	10	2/0.5	7.0	38	38	.1
0621	0730	1	0	0	598	15	2/0.5	7.0	38	38	.1
0621	0830	1	0	0	611	13	2/0.5	7.0	38	38	.1
0621	0930	1	0	0	626	15	2/0.7	7.0	38	38	.2
0621	1030	1	0	0	644	18	2/0.7	7.0	38	38	.2
0621	1130	1	0	0	663	19	2/0.7	10.0+	80	80	.2
		PH AND REAGENT INFO WILL BE UNSTABLE DUE TO BURNING TAR									
0621	1230	1	0	0	684	21	2/0.7	10.0+	80	80	.2
0621	1330	1	0	0	701	17	2/0.7	10.0+	80	80	.2
0621	1430	1	0	0	717	16	2/0.7	10.0+	80	80	.2
0621	1530	1	0	0	737	20	2/0.7	10.0+	80	80	.2
0621	1630	1	0	0	754	17	2/0.7	10.0+	80	80	.2
0621	1730	1	0	0	772	18	2/0.7	10.0+	80	80	.2
0621	1830	1	0	0	790	18	2/0.7	10.0+	80	80	.2
0621	1930	1	0	0	806	16	2/0.7	5.5+	80	80	.2
0621	2030	1	0	0	825	19	2/0.7	9.0+	80	80	.2
0621	2130	1	0	0	843	18	2/0.7	10.0+	80	80	.2
0621	2230	1	0	0	861	18	2/0.7	9.5	80	80	.2
0621	2330	1	0	0	887	26	2/0.85	5.0	80	80	.2
0622	0030	1	0	0	904	17	2/0.5	5.0	80	80	.2
0622	0130	1	0	0	915	11	2/0.5	5.0	80	80	.2
0622	0230	1	0	0	927	12	2/0.5	10.0	50	60	.2
0622	0330	1	0	0	942	15	2/0.5	8.0	50	60	.2
0622	0430	1	0	0	955	13	2/0.5	7.0	50	60	.2
0622	0530	1	0	0	969	14	2/0.5	7.5	50	60	.2
0622	0630	1	0	0	979	10	2/0.5	10.0+	30/60	30/60	.2
0622	0730	1	0	0	993	14	2/0.5	10.0+	55/60	55/60	.2
0622	0830	1	0	0	1008	15	2/0.7	10.0+	55/60	55/60	.2

DATE	TIME	AGIT. COUNTRDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	ANNUBAR DELTA P
0622	0930	3	2	1.6	1028	20	2/0.8	10.0+	55/60	55/60	.38
0622	1030	4	1	1.6	1047	19	2/0.8	10.0	55/60	55/60	.38
0622	1130	6	2	1.7	1071	24	2/0.9	5.0	55/60	55/60	.38
0622	1230	8	2	1.7	1093	22	2/0.8	5.5	55/60	55/60	.38
0622	1330	10	2	1.7	1114	21	2/0.8	6.0	55/60	55/60	.38
0622	1430	11	1	1.7	1138	24	2/1.2	6.5	55/60	55/60	.39
0622	1530	13	2	1.7	1168	30	2/1.2	6.5	55/60	55/60	.38
0622	1630	14	1	1.6	1197	29	2/1.2	6.0	55/60	55/60	.40
0622	1730	17	3	1.7	1228	31	2/1.2	6.0	55/60	55/60	.37
0622	1830	19	2	1.7	1262	34	2/1.4	6.0	55/60	55/60	.35
0622	1930	21	2	1.7	1294	32	2/1.4	6.0	55/60	55/60	.37
0622	2030	23	2	1.7	1333	39	2/1.4	6.0	55/60	55/60	.3
0622	2130	25	2	1.7	1368	35	2/1.4	6.0	55/60	55/60	.3
0622	2230	27	2	1.7	1403	35	2/1.4	6.0	55/60	55/60	.37
0622	2330	28	1	1.7	1455	52	2/1.25	5.0	50	50	.37
0623	0030	30	2	1.7	1476	21	2/0.8		50	50	.37
0623	0130	32	2	1.7	1498	22	2/0.8		100	100	.37
0623	0230	33	1	1.7	1517	19	2/0.6		100	100	.37
0623	0330	35	2	1.7	1535	18	2/0.6		100	100	.40
0623	0430	36	1	1.7	1547	12	2/0.6	7.0+	100	100	.40
0623	0530	38	2	1.7	1563	16	2/0.6	7.0+	100	100	.38
0623	0630	39	1	1.7	1576	13	2/0.6	7.0+	80	80	.40
0623	0730	41	2	1.7	1594	18	2/0.6	7.0+	80	80	.39
0623	0830	42	1	1.6	1611	17	2/0.9	7.0+	80	80	.43
0623	0930	47	5	5.0	1639	28	2/0.9	7.0+	80	80	.55
0623	1030	51	4	5.0	1658	19	2/0.9	7.0+	80	80	.55
0623	1130	56	5	5.0	1685	27	2/1	7.0+	80	80	.62
0623	1230	64	8	9.0	1712	27	2/1.2	7.0+	80	80	.75
0623	1330	74	10	9.0	1745	33	2/1.2	5.0+	80	80	.75
0623	1430	82	8	9.0	1769	24	2/1.2	8.5+	80	80	.75
0623	1530	91	9	9.0	1800	31	2/1.1	6.5	80	80	.75
0623	1630	100	9	10.0	1827	27	2/1.1	6.5	80	80	.75
0623	1730	110	10	10.0	1853	26	2/1.1	6.5	80	80	.75
0623	1830	120	10	10.5	1881	28	2/1.1	6.5	80	80	.75
0623	1930	130	10	10.5	1909	28	2/1.1	6.5	80	80	.75
0623	2030	141	11	10.5	1938	29	2/1.35	6.5	80	80	.75
0623	2130	152	11	10.5	1974	36	2/1.35	6.5	80	80	.75
0623	2230	163	11	10.5	2017	43	2/2.0	6.5	80	80	.75
0623	2330	174	11	10.5	2072	55	2/2.0	6.5	80	80	.75
0624	0030	183	9	10.5	2117	45	2/2.18	6.5	80	80	.80
0624	0130	193	10	10.5	2167	50	4/1.0	6.0	80	80	.75
0624	0230	204	11	10.5	2227	60	4/1.0	6.0	80	80	.75
0624	0330	216	12	10.5	2283	56	4/1.0	6.0	80	80	.75
0624	0430	221	5	10.5	2314	31	4/0.6	6.0	80	80	.80
0624	0530	232	11	10.5	2348	34	4/0.6	6.0	80	80	.75
0624	0630	240	8	10.5	2378	30	4/0.6	6.5	80	80	.75
0624	0730	250	10	7.0	2418	40	2/1.4	5.0	80	80	.57
0624	0830	256	6	7.0	2459	41	2/1.4	6.5			.61

DATE	TIME	AGIT. COUNT RDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	ANNUBA DELTA P
0624	0930	263	7	7.0	2491	32	2/1.1	6.5			.62
0624	1030	269	6	7.0	2512	21	2/1.2	6.5			.55
0624	1130	277	8	7.0	2549	37	2/1.2	6.5			.62
0624	1230	284	7	9.0	2580	31	2/1.2	6.5			.55
0624	1330	293	9	9.0	2611	31	2/1.2	6.5			.55
0624	1430	299	6	7.0	2640	29	2/0.95	6.5			.50
0624	1530	306	7	7.0	2666	26	2/0.95	6.5			.50
0624	1630	315	9	7.5	2688	22	2/0.95	6.5			.50
0624	1730	322	7	8.5	2710	22	2/0.95	6.5			.50
0624	1830	331	9	8.5	2736	26	2/0.95	6.5			.50
0624	1930	339	8	8.5	2766	30	2/1.6	6.5			.50
0624	2030	348	9	8.5	2808	42	2/1.6	6.5			.50
0624	2130	356	8	10.0	2850	42	2/1.6	6.5			.50
0624	2230	366	10	11.0	2890	40	2/1.6	6.5			.50
0624	2330	380	14	11.0	2942	52	2/1.59	6.0	80	80	.50
0625	0030	390	10	11.0	2967	25	2/0.41	5.5	80	80	.50
0625	0130	397	7	11.0	2983	16	2/1.2	5.0	80	80	.50
0625	0230	410	13	15.2	3011	28	2/0.5	5.5	80	90	.50
0625	0330	420	10	15.2	3021	10	2/0.5	5.0	80	90	.50
0625	0430	435	15	15.2	3038	17	2/0.5	5.0	80	100	.50
0625	0530	447	12	20.0	3048	10	2/0.65	7.5	80	100	.50
0625	0630	467	20	20.0	3067	19	2/0.8	8.0	80	100	.50
0625	0730	484	17	20.0	3091	24	2/0.8	9.5	65	100	.5[illegible]
0625	0830	492	8	3.5	3128	37	2/1.0	9.5	65	100	.0[illegible]
0625	0930	499	7	3.5	3158	30	2/1.00	9.5	65	100	.04
0625	1030	504	5	3.0	3186	28	2/0.75	6.0	30	30	.04
0625	1130	507	3	3.0	3219	33	2/0.75	6.0	30	30	.04
0625	1230	510	3	3.0	3257	38	2/0.75	6.0	30	30	.04
0625	1330	513	3	3.0	3286	29	2/0.75	5.5	30	30	.04
0625	1430	516	3	3.0	3313	27	2/0.75	5.5	30	30	.04
0625	1530	521	5	3.0	3332	19	2/0.75	5.5	30	30	.05
0625	1630	525	4	5.0	3347	15	2/0.75	5.5	30	30	.04
0625	1730	531	6	5.0	3370	23	2/0.75	5.5	30	30	.04
0625	1830	535	4	5.0	3392	22	2/0.75	5.5	30	30	.04
0625	1930	540	5	5.0	3412	20	2/0.75	5.5	30	30	.04
0625	2030	545	5	5.0	3431	20	2/0.75	6.0	30	30	.04
0625	2130	550	5	5.0	3459	28	2/0.75	6.0	30	30	.05
0625	2230	556	6	5.0	3481	22	2/0.9	6.0	30	30	.04
0625	2330	561	5	4.9	3507	26	2/0.9	5.5	30	30	.04
0626	0030	565	4	4.9	3527	20	2/0.6	5.5	30	30	.04
0626	0130	569	4	4.9	3544	17	2/0.6	6.0	50	30	.04
0626	0230	579	10	4.9	3562	18	2/0.6	6.5	50	30	.04
0626	0330	583	4	4.9	3579	17	2/0.6	6.5	50	30	.04
0626	0430	588	5	4.9	3594	15	2/0.6	6.5	50	30	.04
0626	0530	593	5	4.9	3611	17	2/0.6	6.0	50	30	.04
0626	0630	598	5	4.9	3627	16	2/0.6	6.0	50	30	.05
0626	0730	603	5	4.9	3647	20	2/0.8	6.5	50	30	.04
0626	0830	607	4	4.5	3666	19	2/0.65	6.5	50	30	.05
0626	0930	611	4	4.5	3743	77	2/2.18	6.5	50	30	.04

DATE	TIME	AGIT. COUNT RDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	FLUE GAS SCRUBBER REAGENT PUMP SPEED	FLUE GAS SCRUBBER REAGENT PUMP STROKE	ANNUBAR DELTA P
0626	1030	611	0	-	3817	74	2/2.18	6.5	50	30	.03
0626	1130	613	2	-	3870	53	2/1.3	5.0	50	30	.03
0626	1230	615	2	-	3915	45	2/1.0	5.0	50	30	.03
0626	1330	617	2	-	3956	41	2/1.0	5.0	50	30	.04
0626	1430	617	0	-	3982	26	2/1.0	6.5	50	30	.04
0626	1530	617	0	-	4004	22	2/1.01	6.5	50	30	.04
0626	1630	617	0	-	4031	27	2/0.91	6.5	50	30	.04
0626	1730	617	0	-	4051	20	2/0.91	6.5	50	30	.04
0626	1830	617	0	-	4094	43	2/0.91	6.5	50	30	.04
0626	1930	617	0	-	4116	22	2/0.91	7.0	50	30	.04
0626	2030	617	0	-	4119	3	2/0.91	7.0	50	30	.04
0626	2130	617	0	-	4144	25	2/0.91	6.5	50	30	.0
0626	2230	617	0	-	4168	24	2/0.91	6.5	50	30	.0
0626	2330	617	0	-	4197	29	2/0.91	6.0	50	30	.0
0627	0030	617	0	-	4216	19	4/0.6	6.5	50	30	.0
0627	0130	617	0	-	4231	15	2/0.6	6.5	50	30	.0
0627	0230	617	0	-	4245	14	2/0.6	6.5	50	30	.0
0627	0330	617	0	-	4264	19	2/0.6	6.5	50	30	.05
0627	0430	617	0	-	4282	18	2/0.8	6.5	50	30	.05
0627	0530	617	0	-	4305	23	2/0.8	6.5	50	30	.05
0627	0630	617	0	-	4323	18	2/0.8	6.0	50	30	.05
0627	0730	617	0	-	4348	25	2/0.8	6.0	50	30	.10
0627	0830	617	0	-	4365	17	2/0.8	6.5	50	30	.16
0627	0930	617	0	-	4379	14	2/0.5	6.0	50	30	.25
0627	1030	617	0	-	4398	19	2/0.9	6.0	50	30	.39
0627	1130	617	0	-	4423	25	2/1.0	6.0	50	30	.43
0627	1230	617	0	-	4456	33	2/1.1	6.0	50	30	.45
0627	1330	617	0	-	4478	22	2/1.1	5.0	50	30	.45
0627	1430	617	0	-	4512	34	2/1.1	5.5	50	30	.43
0627	1530	617	0	-	4543	31	2/1.1	5.5	50	30	.44
0627	1630	617	0	-	4561	18	2/1.1	5.5	50	30	.45
0627	1730	617	0	-	4588	27	2/1.1	5.5	50	30	.45
0627	1830	617	0	-	4615	27	2/1.1	5.5	50	30	.45
0627	1930	617	0	-	4642	27	2/1.1	6.5	50	30	.45
0627	2030	617	0	-	4672	30	2/1.1	6.5	50	30	.45
0627	2130	617	0	-	4700	28	2/1.1	6.5	50	30	.45
0627	2230	617	0	-	4728	28	2/1.1	6.5	50	30	.45
0627	2330	617	0	-	4761	33	2/1.1	6.5	50	30	.45
0628	0030	617	0	-	4794	33	2/1.1	6.5	50	30	.45
0628	0130	617	0	-	4820	26	2/1.2	6.5	50	30	.65
0628	0230	617	0	-	4846	26	2/1.3	6.5	50	30	.65
0628	0330	617	0	-	4884	38	2/1.3	6.5	50	30	.65
0628	0430	617	0	-	4914	30	2/1.5	6.5	50	30	.65
0628	0530	617	0	-	4949	35	2/1.5	6.5	50	30	.75
0628	0630	617	0	-	4981	32	2/1.15	6.5	50	30	.75
0628	0730	617	0	-	5017	36	2/1.25	6.0	50	30	.75
0628	0830	617	0	-	5044	27	2/1.15	6.0	50	30	.74
0628	0930	617	0	-	5075	31	2/1.15	6.5	50	30	.75
0628	1030	617	0	-	5107	32	2/1.15	6.5	50	30	.76

DATE	TIME	AGIT. COUNT RDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	ANNUBA DELTA P
0628	1130	617	0	-	5136	29	2/1.15	6.5	50	30	.75
0628	1230	617	0	-	5159	23	2/0.6	6.5	50	30	.04
0628	1330	617	0	-	5178	19	2/1.15	6.0	50	30	.74
0628	1430	617	0	-	5208	30	2/1.15	6.0	50	30	.74
0628	1530	617	0	-	5234	26	2/1.15	6.0	50	30	.65
0628	1630	617	0	-	5262	28	2/1.15	6.0	50	30	.75
0628	1730	617	0	-	5293	31	2/1.15	6.5	50	30	.75
0628	1830	617	0	-	5317	24	2/1.15	6.5	50	30	.75
0628	1930	617	0	-	5349	32	2/1.15	6.5	50	30	.75
0628	2030	617	0	-	5378	29	2/1.4	6.5	50	30	.75
0628	2130	617	0	-	5408	30	2/1.4	6.5	50	30	.75
0628	2230	617	0	-	5439	31	2/1.25	6.0	50	30	.75
0628	2330	617	0	-	5466	27	2/1.25	6.5	50	50	.75
0629	0030	617	0	-	5499	33	2/1.25	6.5	50	50	.75
0629	0130	617	0	-	5532	33	2/1.25	6.5	50	50	.75
0629	0230	617	0	-	5559	27	2/1.45	6.5	50	50	.75
0629	0330	617	0	-	5603	44	2/1.45	6.5	50	50	.75
0629	0430	617	0	-	5639	36	2/1.45	6.5	50	50	.75
0629	0530	617	0	-	5675	36	2/1.45	6.5	50	50	.75
0629	0630	617	0	-	5712	37	2/1.45	6.5	50	50	.75
0629	0730	617	0	-	5750	38	2/1.45	7.0	50	50	.75
0629	0830	617	0	-	5791	41	2/1.6	7.0	50	50	.75
0629	0930	617	0	-	5831	40	2/1.6	7.0	50	50	.75
0629	1030	617	0	-	5871	40	2/1.6	7.0	50	50	.05
0629	1130	617	0	-	5904	33	2/1.00	7.0	50	50	.04
0629	1230	617	0	-	5937	33	2/1.0	7.0	50	50	.24
0629	1330	617	0	-	5966	29	2/1.25	6.5	50	50	.25
0629	1430	617	0	-	6004	38	2/1.45	6.5	50	50	.24
0629	1530	617	0	-	6046	42	2/1.43	6.5	50	50	.25
0629	1630	617	0	-	6069	23	2/1.6	6.5	50	50	.25
0629	1730	617	0	-	6110	41	2/1.6	8.0	50	50	.25
0629	1830	617	0	-	6158	48	2/1.6	8.0	50	50	.25
0629	1930	617	0	-	6201	43	2/1.6	8.0	50	50	.25
0629	2030	617	0	-	6235	34	2/1.6	8.0	50	50	.25
0629	2130	617	0	-	6271	26	2/1.6	8.0	50	50	.25
0629	2230	617	0	-	6313	42	2/1.6	8.0	50	50	.25
0629	2330	617	0	-	6354	41	2/1.45	9.0	50	50	.25
0630	0030	617	0	-	6390	36	2/1.45	8.5	50	50	.25
0630	0130	617	0	-	6429	39	2/1.45	8.5	50	50	.25
0630	0230	617	0	-	6464	35	2/1.45	9.0	50	50	.25
0630	0330	617	0	-	6504	40	2/1.45	9.0	50	50	.25
0630	0430	617	0	-	6545	41	2/1.55	9.0	50	50	.25
0630	0530	617	0	-	6580	35	2/1.55	8.5	50	50	.25
0630	0630	617	0	-	6621	41	2/1.7	8.5	50	50	.25
0630	0730	617	0	-	6670	49	2/1.7	8.0	30	30	.25
0630	0830	617	0	-	6718	48	2/2.18	7.5	30	30	.25
0630	0930	617	0	-	6771	53	2/2.18	7.5	30	30	.25
0630	1030	617	0	-	6825	54	2/1.55	7.5	30	30	.25
0630	1130	617	0	-	6882	57	2/1.55	7.5	30	30	.25

DATE	TIME	AGIT. COUNT RDING	AGIT SWEEP PER HR	AGIT DRIVE SETNG	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SETNG	FLUE GAS SCRUBBER pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	ANNUBAR DELTA P
0630	1230	617	0	-	6973	91	2/1.95	7.0	35	35	.74
0630	1330	617	0	-	7035	62	2/1.95	7.0	35	35	.74
0630	1430	617	0	-	7129	94	2/2.18	7.0	35	35	.75

END OF BOM/FGT 012 ABSOLOKA/ROBINSON

APPENDIX I

Gas Chromatograph Data

The results of each successful gas chromatograph analysis are included here. Results from both the HP5880A (analysis for permanent gasses and hydrocarbons) and the HP5793 (analysis for gaseous sulfur species) are included in separate tables.

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/18/1984															
13: 8	22.850	6.494	0.006	0.031	0.077	45.57	2.873	19.64	0.001	0.002	166.8	152.5	97.54	22.08	0.762
13:25	22.007	6.369	0.005	0.030	0.199	46.19	2.674	19.82	0.001	0.002	162.6	148.9	97.29	22.24	0.768
13:42	22.594	6.882	0.005	0.029	0.022	45.53	2.665	19.53	0.001	0.002	163.5	149.5	97.27	22.16	0.765
13:59	21.992	7.237	0.005	0.028	0.000	46.12	2.524	19.48	0.001	0.002	159.9	146.3	97.39	22.42	0.774
14:17	23.396	7.127	0.005	0.030	0.000	44.72	2.709	19.31	0.001	0.002	165.8	151.4	97.30	21.99	0.759
14:34	19.857	8.415	0.005	0.027	0.000	48.13	2.238	18.52	0.001	0.002	147.0	134.8	97.20	23.15	0.799
14:51	18.923	8.741	0.007	0.032	0.000	48.97	2.122	18.46	0.003	0.004	142.8	131.2	97.27	23.48	0.810
15: 8	18.534	8.893	0.011	0.044	0.000	49.08	2.132	18.54	0.007	0.009	142.4	130.9	97.25	23.60	0.815
15:26	18.212	9.030	0.014	0.050	0.000	49.53	2.051	18.50	0.009	0.010	140.7	129.4	97.41	23.76	0.820
15:43	17.956	9.177	0.014	0.052	0.000	49.42	1.944	18.56	0.010	0.012	139.0	128.0	97.14	23.78	0.821
16:18	17.205	9.563	0.016	0.055	0.000	50.42	1.724	18.46	0.012	0.014	134.3	123.8	97.47	24.16	0.834
16:35	16.804	9.631	0.018	0.056	0.000	50.30	1.636	18.59	0.012	0.014	132.5	122.4	97.06	24.17	0.834
16:40	17.699	9.289	0.016	0.052	0.000	50.03	1.826	18.60	0.010	0.012	137.2	126.4	97.53	23.99	0.828
16:52	17.003	9.519	0.018	0.055	0.000	49.80	1.630	18.85	0.012	0.013	133.9	123.7	96.90	24.06	0.830
17: 9	17.049	9.013	0.017	0.053	0.014	50.25	1.641	18.95	0.011	0.012	134.4	124.1	97.01	24.00	0.828
17:27	16.457	9.798	0.019	0.057	0.000	51.08	1.477	19.10	0.012	0.013	131.4	121.6	98.01	24.57	0.848
17:44	16.420	9.801	0.019	0.058	0.000	50.91	1.482	19.06	0.012	0.014	131.3	121.5	97.78	24.52	0.846
18: 1	16.378	9.837	0.020	0.059	0.000	51.17	1.474	19.05	0.013	0.014	131.1	121.3	98.01	24.60	0.849
18:19	16.239	10.030	0.022	0.064	0.000	51.05	1.462	18.87	0.014	0.016	130.2	120.4	97.76	24.60	0.849
18:36	16.230	9.963	0.022	0.063	0.000	50.97	1.444	18.94	0.014	0.016	130.2	120.4	97.66	24.57	0.848
18:53	16.341	10.016	0.023	0.065	0.000	51.00	1.460	18.94	0.015	0.017	130.8	121.0	97.88	24.61	0.849
19:10	16.424	9.990	0.023	0.066	0.000	50.85	1.456	18.97	0.015	0.017	131.1	121.3	97.81	24.56	0.848
19:28	16.601	9.934	0.024	0.069	0.000	50.73	1.467	19.08	0.016	0.018	132.3	122.3	97.94	24.54	0.847
19:45	16.559	10.004	0.025	0.069	0.000	50.72	1.446	18.97	0.016	0.018	131.6	121.7	97.83	24.54	0.847
20:21	16.659	10.062	0.027	0.075	0.000	50.47	1.462	19.10	0.018	0.020	132.7	122.7	97.89	24.53	0.847
20:38	16.711	10.015	0.026	0.072	0.000	50.61	1.435	19.18	0.017	0.019	132.8	122.8	98.08	24.57	0.848
20:55	16.647	10.088	0.026	0.071	0.000	50.56	1.393	19.12	0.017	0.019	131.9	122.0	97.94	24.56	0.848
21:13	16.577	10.092	0.026	0.070	0.000	52.00	1.362	19.11	0.017	0.019	131.3	121.5	99.28	24.96	0.862
22:46	15.748	10.045	0.025	0.068	0.000	51.12	1.223	19.96	0.017	0.019	129.9	120.7	98.23	24.89	0.859
23: 3	15.634	9.967	0.026	0.070	0.000	51.00	1.212	20.07	0.017	0.019	129.8	120.6	98.01	24.85	0.858
23:20	15.640	9.859	0.026	0.070	0.000	50.94	1.209	20.29	0.017	0.019	130.5	121.3	98.06	24.85	0.858
23:38	15.529	9.826	0.025	0.068	0.000	50.94	1.188	20.28	0.017	0.019	129.9	120.7	97.89	24.82	0.857
23:55	15.427	9.722	0.024	0.065	0.000	50.83	1.145	20.49	0.016	0.018	129.7	120.7	97.73	24.79	0.856
6/19/1984															
0:12	15.192	9.743	0.026	0.069	0.113	50.94	1.139	20.30	0.017	0.019	128.4	119.5	97.56	24.82	0.857
0:30	15.386	9.602	0.024	0.072	0.000	50.71	1.172	20.81	0.018	0.020	131.1	122.0	97.82	24.81	0.856
0:47	15.466	9.577	0.027	0.073	0.000	50.66	1.194	20.77	0.018	0.020	131.5	122.4	97.80	24.77	0.855
1: 5	15.407	9.543	0.027	0.075	0.000	50.60	1.203	20.89	0.019	0.020	131.8	122.7	97.78	24.78	0.855
1:22	15.244	9.474	0.027	0.073	0.000	50.66	1.186	21.07	0.018	0.020	131.6	122.6	97.77	24.81	0.856
1:39	15.068	9.265	0.023	0.069	0.206	50.97	1.146	21.09	0.017	0.019	130.5	121.7	97.88	24.86	0.858
2:25	15.210	9.368	0.028	0.076	0.000	51.27	1.178	22.03	0.021	0.025	134.8	125.8	99.21	25.20	0.870
2:43	15.010	9.205	0.026	0.072	0.000	50.53	1.146	21.78	0.018	0.021	132.8	123.9	97.82	24.84	0.858
3:17	14.953	9.058	0.023	0.070	0.000	50.56	1.111	21.94	0.018	0.020	132.6	123.8	97.76	24.82	0.857
3:34	15.055	9.076	0.026	0.070	0.000	50.59	1.110	22.17	0.018	0.020	133.7	124.9	98.13	24.90	0.860

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/19/1984															
3:40	15.047	9.064	0.023	0.069	0.000	50.46	1.112	22.04	0.017	0.019	133.2	124.4	97.85	24.82	0.857
3:52	15.036	9.058	0.026	0.071	0.000	50.41	1.118	22.20	0.018	0.020	133.8	125.0	97.96	24.86	0.858
4:26	15.124	8.982	0.028	0.075	0.000	50.27	1.147	22.46	0.019	0.021	135.4	126.5	98.13	24.87	0.858
4:44	15.076	8.897	0.027	0.075	0.000	50.30	1.142	22.54	0.019	0.021	135.5	126.6	98.10	24.86	0.858
5: 1	15.052	8.775	0.027	0.073	0.000	50.43	1.134	22.78	0.018	0.020	136.0	127.1	98.31	24.90	0.860
5:18	15.037	8.646	0.024	0.074	0.000	50.24	1.136	22.94	0.019	0.020	136.5	127.6	98.14	24.84	0.857
5:36	14.966	8.499	0.024	0.073	0.000	50.14	1.131	23.11	0.019	0.020	136.7	127.9	97.99	24.79	0.856
5:53	15.330	8.499	0.027	0.073	0.000	49.78	1.144	23.32	0.019	0.020	138.7	129.7	98.21	24.76	0.855
6:10	15.206	8.489	0.027	0.074	0.355	50.12	1.127	22.81	0.019	0.021	136.6	127.7	98.26	24.82	0.857
6:28	15.430	8.577	0.026	0.080	0.000	49.55	1.177	23.25	0.020	0.022	139.4	130.3	98.12	24.72	0.853
6:45	15.579	8.422	0.029	0.079	0.000	49.47	1.199	23.51	0.020	0.022	140.9	131.7	98.33	24.71	0.853
7:20	15.615	8.447	0.030	0.082	0.000	49.18	1.148	23.50	0.021	0.023	140.6	131.4	98.04	24.63	0.850
7:37	15.490	8.471	0.030	0.082	0.116	49.23	1.210	23.36	0.021	0.022	140.4	131.2	98.03	24.66	0.851
7:54	15.446	8.491	0.030	0.082	0.129	49.24	1.140	23.28	0.021	0.023	139.3	130.2	97.87	24.64	0.850
8:12	14.975	8.610	0.029	0.078	0.405	50.43	1.052	22.32	0.020	0.021	133.6	124.9	97.94	24.82	0.857
8:29	15.527	8.338	0.030	0.079	0.000	49.01	1.159	23.78	0.020	0.022	141.2	132.1	97.97	24.61	0.850
10: 4	14.972	7.210	0.029	0.078	1.143	48.55	1.092	23.01	0.021	0.022	136.3	127.5	96.12	24.11	0.832
10:22	15.701	7.572	0.030	0.080	0.000	47.06	1.127	24.38	0.021	0.023	143.5	134.3	96.00	23.90	0.825
11: 4	16.021	7.577	0.040	0.097	0.086	47.48	1.210	25.48	0.026	0.027	149.6	140.1	98.05	24.38	0.842
11:22	15.849	7.420	0.031	0.081	0.000	46.94	1.130	24.94	0.022	0.023	145.8	136.6	96.44	23.96	0.827
11:39	15.973	7.381	0.031	0.081	0.000	46.64	1.141	24.92	0.022	0.023	146.3	136.9	96.21	23.85	0.823
11:57	16.013	7.247	0.030	0.079	0.000	46.51	1.121	25.07	0.021	0.022	146.6	137.3	96.11	23.80	0.821
12:14	16.014	7.196	0.030	0.081	0.000	46.56	1.113	25.16	0.021	0.023	146.8	137.5	96.19	23.81	0.822
12:31	16.114	7.137	0.031	0.082	0.000	46.35	1.213	25.32	0.022	0.023	148.7	139.3	96.29	23.79	0.821
12:49	16.169	7.112	0.031	0.082	0.000	46.14	1.142	25.35	0.022	0.023	148.3	138.8	96.06	23.72	0.819
13: 6	16.334	7.135	0.030	0.081	0.000	46.24	1.143	25.46	0.021	0.023	149.2	139.6	96.47	23.79	0.821
13:24	16.650	6.985	0.031	0.082	0.000	46.40	1.173	26.11	0.021	0.022	152.5	142.8	97.47	23.96	0.827
13:41	16.369	6.787	0.027	0.082	0.000	46.63	1.158	26.28	0.021	0.022	152.0	142.5	97.38	23.98	0.828
13:59	16.411	6.514	0.028	0.082	0.000	46.63	1.173	26.74	0.021	0.023	153.8	144.2	97.62	23.99	0.828
14:16	16.349	6.584	0.032	0.085	0.000	46.53	1.194	26.60	0.022	0.023	153.5	143.9	97.42	23.96	0.827
14:33	16.532	6.423	0.029	0.087	0.000	46.27	1.224	26.87	0.023	0.024	155.3	145.6	97.48	23.90	0.825
14:51	16.708	6.353	0.033	0.089	0.000	46.25	1.245	26.93	0.023	0.024	156.4	146.6	97.65	23.89	0.825
15: 8	16.769	6.354	0.034	0.091	0.000	46.15	1.263	26.96	0.024	0.025	156.9	147.0	97.66	23.87	0.824
15:26	16.808	6.414	0.034	0.092	0.000	46.10	1.292	26.72	0.024	0.025	156.6	146.7	97.50	23.83	0.822
15:43	16.885	6.330	0.031	0.095	0.000	45.88	1.311	27.00	0.025	0.027	158.0	148.0	97.58	23.81	0.822
16: 1	17.083	6.021	0.035	0.093	0.000	45.60	1.323	27.39	0.025	0.026	160.1	149.9	97.60	23.72	0.819
16:18	17.038	5.926	0.035	0.094	0.000	45.29	1.322	27.56	0.025	0.027	160.5	150.4	97.32	23.63	0.816
16:35	17.185	5.920	0.035	0.095	0.000	45.34	1.331	27.44	0.025	0.027	160.7	150.5	97.40	23.61	0.815
16:53	17.228	5.721	0.036	0.096	0.000	45.22	1.333	27.93	0.025	0.027	162.5	152.3	97.62	23.63	0.816
17:10	17.376	5.433	0.036	0.095	0.066	44.95	1.327	28.25	0.026	0.027	163.9	153.6	97.58	23.54	0.813
17:28	17.484	5.154	0.036	0.095	0.000	44.85	1.356	28.73	0.025	0.027	166.1	155.7	97.76	23.51	0.812
17:45	17.507	5.387	0.037	0.098	0.000	44.81	1.385	28.30	0.026	0.027	165.1	154.7	97.58	23.49	0.811
18: 4	16.915	5.154	0.035	0.092	0.872	46.23	1.316	27.32	0.024	0.027	159.2	149.2	97.98	23.76	0.820
18:21	17.530	5.381	0.034	0.100	0.000	44.50	1.401	28.29	0.026	0.027	165.3	154.9	97.28	23.40	0.808
18:39	17.610	5.304	0.038	0.100	0.000	44.60	1.417	28.40	0.027	0.028	166.2	155.7	97.52	23.43	0.809
18:56	17.648	5.264	0.038	0.100	0.000	44.44	1.527	28.39	0.027	0.028	167.4	156.8	97.46	23.38	0.807

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/19/1984															
19:14	17.643	5.266	0.038	0.102	0.000	44.47	1.428	28.34	0.028	0.028	166.3	155.8	97.34	23.36	0.806
19:31	17.676	5.391	0.034	0.101	0.000	44.46	1.420	28.23	0.027	0.028	165.9	155.3	97.36	23.38	0.807
19:49	17.562	5.402	0.038	0.102	0.000	44.62	1.510	28.26	0.027	0.028	166.6	156.0	97.55	23.46	0.810
20: 6	17.008	5.189	0.036	0.096	0.689	45.54	1.456	27.38	0.025	0.027	161.2	151.0	97.45	23.57	0.814
20:24	17.560	5.529	0.038	0.102	0.000	44.68	1.406	27.94	0.027	0.028	164.5	154.1	97.31	23.42	0.808
20:41	17.313	5.806	0.038	0.102	0.000	45.07	1.521	27.43	0.027	0.028	163.2	152.8	97.34	23.52	0.812
20:59	17.285	5.914	0.036	0.103	0.000	44.80	1.544	27.13	0.027	0.029	162.5	152.0	96.87	23.41	0.808
22:19	15.778	4.957	0.037	0.098	0.000	46.91	1.436	27.99	0.026	0.028	159.1	149.5	97.26	23.78	0.821
22:36	17.512	5.321	0.037	0.098	0.000	44.55	1.504	28.21	0.025	0.027	166.1	155.6	97.28	23.38	0.807
22:54	17.445	5.308	0.037	0.098	0.000	44.16	1.504	28.08	0.026	0.027	165.4	155.0	96.68	23.23	0.802
23:12	17.596	5.246	0.035	0.097	0.000	44.29	1.489	28.34	0.025	0.027	166.6	156.0	97.15	23.31	0.805
6/20/1984															
0: 9	16.868	5.376	0.034	0.090	0.909	46.56	1.392	27.30	0.025	0.028	159.7	149.7	98.58	23.97	0.827
0:27	17.301	5.424	0.035	0.093	0.000	44.31	1.428	27.92	0.027	0.029	163.7	153.3	96.58	23.26	0.803
0:44	17.211	5.587	0.035	0.094	0.000	44.65	1.436	27.66	0.026	0.028	162.6	152.3	96.72	23.35	0.806
1: 1	17.060	5.716	0.036	0.095	0.000	44.63	1.442	27.33	0.026	0.028	161.1	150.9	96.36	23.31	0.805
1:18	17.120	5.624	0.035	0.094	0.000	44.79	1.432	27.55	0.025	0.027	161.8	151.6	96.70	23.38	0.807
1:36	17.152	5.363	0.036	0.095	0.000	44.27	1.430	27.98	0.025	0.027	163.4	153.1	96.38	23.24	0.802
1:53	17.308	5.234	0.036	0.096	0.000	44.27	1.442	28.28	0.025	0.027	164.9	154.6	96.72	23.27	0.803
2:10	16.811	4.908	0.035	0.092	0.646	44.89	1.414	27.51	0.025	0.025	160.4	150.4	96.36	23.27	0.803
2:28	17.589	4.786	0.035	0.094	0.000	43.72	1.456	28.98	0.025	0.027	168.2	157.7	96.70	23.12	0.798
2:45	17.498	4.496	0.036	0.094	0.000	43.45	1.434	29.21	0.025	0.026	168.4	158.0	96.26	22.98	0.793
3: 2	17.682	4.480	0.036	0.095	0.000	43.40	1.462	29.42	0.025	0.026	170.0	159.4	96.63	23.02	0.795
3:19	17.789	4.475	0.036	0.095	0.000	43.21	1.476	29.46	0.025	0.026	170.6	160.0	96.59	22.98	0.793
3:37	17.797	4.415	0.036	0.095	0.000	43.49	1.458	29.62	0.025	0.027	171.0	160.4	96.95	23.08	0.797
3:54	17.656	4.545	0.038	0.100	0.000	43.34	1.500	29.23	0.027	0.028	169.9	159.3	96.47	22.99	0.794
4:11	16.939	4.598	0.036	0.095	0.855	45.01	1.423	27.96	0.025	0.027	162.5	152.4	96.97	23.37	0.807
4:29	17.277	5.025	0.038	0.101	0.000	43.98	1.493	28.52	0.027	0.028	166.3	155.9	96.49	23.17	0.800
4:46	17.385	5.242	0.038	0.100	0.000	44.33	1.481	28.33	0.026	0.028	165.9	155.4	96.96	23.31	0.805
7:18	17.851	5.251	0.039	0.104	0.000	44.68	1.441	29.05	0.030	0.033	169.6	159.0	98.48	23.63	0.816
7:36	17.522	5.268	0.038	0.099	0.000	44.48	1.373	28.43	0.027	0.029	165.6	155.2	97.27	23.38	0.807
7:53	16.958	5.086	0.037	0.097	0.635	44.96	1.329	27.46	0.026	0.028	160.1	150.0	96.61	23.35	0.806
8:11	16.946	4.984	0.036	0.096	0.851	45.25	1.335	27.47	0.026	0.027	160.1	150.0	97.02	23.46	0.810
8:28	17.421	4.907	0.036	0.095	0.000	44.14	1.305	28.74	0.028	0.028	165.5	155.2	96.70	23.20	0.801
10:28	17.358	5.096	0.039	0.099	0.000	44.04	1.435	28.60	0.027	0.028	166.2	155.8	96.72	23.24	0.802
10:44	17.297	5.233	0.039	0.101	0.000	43.85	1.460	28.17	0.027	0.029	165.0	154.6	96.20	23.13	0.798
11: 1	17.579	4.846	0.039	0.100	0.000	43.63	1.456	28.93	0.027	0.028	168.2	157.7	96.63	23.11	0.798
11:18	17.467	5.133	0.040	0.104	0.000	43.77	1.387	28.28	0.029	0.030	165.3	154.9	96.24	23.08	0.797
11:35	17.473	5.179	0.039	0.102	0.000	44.00	1.488	28.28	0.027	0.029	166.2	155.7	96.62	23.19	0.800
11:52	17.726	4.916	0.039	0.101	0.000	43.45	1.487	28.55	0.027	0.029	167.8	157.2	96.32	22.99	0.794
12: 9	17.013	4.990	0.040	0.102	0.856	45.03	1.469	27.14	0.028	0.029	160.9	150.6	96.69	23.33	0.805
12:25	17.761	4.898	0.041	0.108	0.000	43.24	1.547	28.58	0.030	0.031	168.9	158.2	96.23	22.95	0.792
12:42	17.593	4.797	0.040	0.107	0.142	43.11	1.557	28.20	0.030	0.031	167.2	156.6	95.61	22.81	0.787
12:59	17.728	4.638	0.039	0.106	0.000	42.68	1.569	28.66	0.029	0.030	169.2	158.5	95.48	22.70	0.784

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/20/1984															
13:16	17.852	4.523	0.039	0.102	0.000	43.11	1.522	29.00	0.029	0.030	170.1	159.4	96.21	22.86	0.789
13:33	17.953	4.613	0.039	0.099	0.000	43.30	1.490	29.02	0.028	0.029	170.1	159.4	96.57	22.96	0.792
13:50	17.530	4.895	0.038	0.098	0.000	43.67	1.446	28.25	0.028	0.029	165.8	155.3	95.99	22.95	0.792
14: 7	16.682	4.930	0.036	0.093	0.750	44.77	1.369	26.96	0.027	0.028	158.0	148.0	95.65	23.12	0.798
14:24	16.978	4.862	0.039	0.102	0.000	43.86	1.462	28.23	0.030	0.030	164.3	154.0	95.60	22.98	0.793
14:40	17.101	4.825	0.038	0.099	0.000	44.22	1.443	28.46	0.028	0.029	165.1	154.8	96.25	23.13	0.798
14:57	17.168	4.729	0.039	0.099	0.000	44.23	1.429	28.78	0.028	0.029	166.2	155.9	96.53	23.17	0.800
15:14	17.154	4.567	0.039	0.102	0.000	43.72	1.457	28.80	0.030	0.030	166.6	156.3	95.90	22.97	0.793
15:48	17.164	4.728	0.039	0.101	0.000	44.04	1.465	28.59	0.029	0.030	166.0	155.7	96.19	23.08	0.797
16: 5	16.287	4.638	0.037	0.096	1.030	45.47	1.376	27.11	0.028	0.028	157.3	147.6	96.10	23.32	0.805
16:57	17.245	4.763	0.039	0.099	0.000	44.61	1.437	28.80	0.029	0.030	166.6	156.3	97.05	23.31	0.804
17:14	17.125	4.785	0.039	0.100	0.000	44.42	1.448	28.65	0.029	0.030	165.9	155.6	96.62	23.22	0.801
17:31	17.165	4.700	0.037	0.097	0.000	44.60	1.417	28.91	0.028	0.028	166.4	156.1	96.99	23.30	0.804
17:48	17.035	4.899	0.038	0.095	0.000	44.83	1.386	28.73	0.027	0.028	165.0	154.9	97.07	23.39	0.807
18: 5	15.713	4.747	0.036	0.090	1.168	47.74	1.318	26.64	0.026	0.026	153.2	143.7	97.51	23.89	0.825
18:22	16.893	5.077	0.038	0.095	0.000	45.16	1.364	28.51	0.027	0.028	163.6	153.5	97.19	23.49	0.811
18:39	16.995	5.056	0.037	0.093	0.000	45.09	1.357	28.55	0.027	0.027	163.9	153.8	97.24	23.48	0.810
18:55	17.092	4.796	0.037	0.093	0.000	44.85	1.354	28.95	0.027	0.027	165.5	155.3	97.23	23.41	0.808
19:12	17.276	4.546	0.037	0.094	0.000	44.56	1.374	29.30	0.027	0.028	167.5	157.2	97.24	23.32	0.805
19:29	17.439	4.495	0.035	0.094	0.000	44.42	1.383	29.46	0.026	0.027	168.5	158.2	97.39	23.31	0.805
19:46	17.193	4.824	0.037	0.092	0.000	44.86	1.346	28.96	0.027	0.027	165.8	155.6	97.37	23.43	0.809
20: 3	16.612	4.340	0.037	0.092	1.044	45.81	1.326	28.09	0.026	0.027	160.9	151.0	97.41	23.56	0.813
20:20	17.434	4.526	0.037	0.099	0.000	44.39	1.415	29.48	0.028	0.028	169.1	158.7	97.43	23.33	0.805
20:37	17.344	4.613	0.039	0.097	0.000	44.73	1.408	29.30	0.028	0.028	168.1	157.8	97.59	23.41	0.808
20:53	17.468	4.323	0.038	0.098	0.000	44.17	1.412	29.75	0.028	0.028	170.0	159.6	97.31	23.25	0.803
21:10	17.504	4.375	0.039	0.098	0.000	44.29	1.417	29.67	0.028	0.028	170.0	159.5	97.45	23.29	0.804
21:27	17.453	4.193	0.039	0.098	0.000	44.21	1.417	29.92	0.027	0.028	170.6	160.2	97.39	23.26	0.803
21:44	17.569	4.199	0.039	0.097	0.000	44.32	1.405	29.93	0.027	0.028	170.8	160.4	97.61	23.29	0.804
22: 1	16.708	4.072	0.039	0.096	1.097	45.98	1.366	28.44	0.028	0.027	162.9	152.9	97.86	23.61	0.815
22:18	17.531	4.379	0.040	0.100	0.000	44.42	1.428	29.77	0.029	0.029	170.6	160.1	97.72	23.36	0.806
22:35	17.192	4.754	0.037	0.100	0.000	45.11	1.409	29.10	0.029	0.029	167.1	156.8	97.77	23.52	0.812
22:52	17.385	4.371	0.039	0.100	0.000	44.54	1.419	29.72	0.029	0.029	169.8	159.5	97.63	23.37	0.807
23: 9	17.628	3.947	0.039	0.098	0.000	43.98	1.403	30.31	0.030	0.029	172.4	161.9	97.47	23.20	0.801
6/21/1984															
0:29	17.785	4.414	0.041	0.102	0.000	45.00	1.499	30.00	0.029	0.030	172.9	162.2	98.90	23.62	0.815
0:47	17.678	4.431	0.041	0.103	0.000	44.99	1.503	29.87	0.029	0.030	172.2	161.6	98.68	23.59	0.814
1: 4	17.513	4.412	0.041	0.101	0.000	45.02	1.483	29.84	0.028	0.028	171.3	160.8	98.47	23.57	0.814
1:20	17.375	4.426	0.041	0.102	0.000	44.56	1.478	29.46	0.029	0.029	169.6	159.2	97.50	23.34	0.806
1:37	17.541	4.426	0.041	0.102	0.000	44.56	1.498	29.50	0.029	0.029	170.5	159.9	97.72	23.36	0.806
1:54	17.639	4.234	0.041	0.102	0.000	44.95	1.447	30.07	0.028	0.029	172.1	161.6	98.54	23.53	0.812
2:11	17.095	4.145	0.040	0.098	0.731	45.76	1.325	28.95	0.028	0.028	165.4	155.3	98.20	23.61	0.815
2:28	17.841	4.192	0.042	0.104	0.000	44.66	1.515	30.12	0.029	0.029	173.7	163.0	98.53	23.47	0.810
2:45	17.846	4.158	0.041	0.102	0.000	44.49	1.388	30.12	0.029	0.029	172.4	161.8	98.20	23.38	0.807
3: 2	17.626	4.156	0.041	0.102	0.000	44.15	1.486	29.95	0.029	0.029	172.1	161.5	97.57	23.25	0.802

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/21/1984															
3:19	17.634	4.099	0.040	0.100	0.000	44.14	1.457	30.04	0.029	0.029	172.1	161.5	97.57	23.24	0.802
3:35	17.474	4.011	0.039	0.099	0.000	44.24	1.454	30.05	0.028	0.028	171.5	161.0	97.43	23.23	0.802
3:52	17.393	4.146	0.040	0.098	0.000	44.37	1.426	29.92	0.028	0.028	170.5	160.1	97.45	23.28	0.804
4: 9	16.618	3.949	0.037	0.092	0.962	45.84	1.346	28.67	0.027	0.026	163.0	153.1	97.57	23.53	0.812
4:26	17.270	1.515	0.039	0.097	0.664	47.11	1.412	29.68	0.011	0.027	168.7	158.5	97.83	23.02	0.795
4:43	17.343	4.376	0.038	0.093	0.000	45.07	1.277	29.96	0.026	0.025	168.7	158.5	98.21	23.56	0.813
5: 0	17.368	4.339	0.039	0.095	0.000	44.77	1.272	29.97	0.026	0.027	168.9	158.7	97.91	23.46	0.810
5:17	17.329	4.246	0.039	0.096	0.000	44.91	1.386	30.05	0.027	0.026	170.2	159.9	98.11	23.50	0.811
5:34	17.432	4.207	0.039	0.096	0.000	44.96	1.294	30.17	0.026	0.026	170.0	159.7	98.25	23.52	0.812
5:51	17.369	4.209	0.040	0.097	0.000	44.84	1.400	30.04	0.027	0.027	170.5	160.1	98.05	23.47	0.810
7:27	17.380	4.275	0.041	0.105	0.000	44.37	1.570	29.73	0.030	0.030	171.6	161.0	97.54	23.31	0.805
7:44	17.453	4.363	0.042	0.104	0.000	44.73	1.613	29.61	0.030	0.030	171.8	161.2	97.98	23.43	0.809
8: 1	17.272	4.529	0.042	0.103	0.216	45.08	1.467	29.02	0.031	0.030	167.9	157.5	97.79	23.47	0.810
8:18	16.958	4.845	0.040	0.105	0.000	44.97	1.578	28.80	0.031	0.030	167.3	156.9	97.35	23.46	0.810
8:51	17.277	4.712	0.041	0.102	0.000	45.84	1.531	29.63	0.032	0.031	170.5	160.1	99.19	23.88	0.824
9: 8	17.278	4.628	0.044	0.107	0.000	44.94	1.474	29.27	0.032	0.032	169.0	158.5	97.81	23.48	0.811
9:25	17.294	4.515	0.042	0.101	0.000	44.86	1.538	29.35	0.031	0.029	169.7	159.2	97.76	23.44	0.809
9:42	16.396	4.523	0.041	0.100	0.000	45.79	1.490	29.26	0.029	0.027	165.9	155.9	97.66	23.65	0.816
9:59	17.481	4.464	0.041	0.102	0.000	44.47	1.442	29.62	0.030	0.028	170.1	159.7	97.68	23.37	0.807
10:16	17.109	4.623	0.042	0.099	0.000	45.10	1.499	29.29	0.029	0.027	168.4	158.0	97.82	23.53	0.812
10:33	17.198	4.448	0.041	0.097	0.000	44.73	1.473	29.55	0.029	0.027	169.1	158.8	97.59	23.41	0.808
10:49	17.564	3.994	0.039	0.097	0.000	44.07	1.377	30.25	0.029	0.026	171.6	161.2	97.45	23.22	0.801
11: 6	17.560	3.811	0.042	0.098	0.000	44.02	1.475	30.60	0.029	0.027	173.7	163.2	97.67	23.24	0.802
11:23	17.435	3.690	0.040	0.096	0.000	43.97	1.450	30.76	0.029	0.026	173.6	163.1	97.50	23.21	0.801
11:40	17.314	3.853	0.042	0.097	0.117	44.16	1.354	30.18	0.030	0.027	170.4	160.1	97.17	23.19	0.800
12:13	17.227	4.014	0.041	0.098	0.000	44.28	1.467	30.26	0.031	0.032	171.7	161.3	97.44	23.30	0.804
12:30	17.504	3.688	0.042	0.097	0.000	43.74	1.480	30.72	0.031	0.030	174.1	163.6	97.33	23.14	0.799
12:47	17.552	3.487	0.044	0.103	0.000	43.71	1.533	31.04	0.033	0.030	176.0	165.4	97.53	23.14	0.799
13: 4	17.852	3.477	0.044	0.103	0.000	43.18	1.549	30.92	0.039	0.031	176.9	166.2	97.20	22.97	0.793
13:21	17.732	3.479	0.043	0.100	0.000	43.61	1.512	31.13	0.030	0.027	176.5	165.8	97.66	23.14	0.799
13:38	17.551	3.561	0.045	0.101	0.000	43.72	1.378	31.00	0.031	0.028	174.2	163.8	97.41	23.14	0.799
13:54	17.755	3.603	0.046	0.105	0.000	43.71	1.450	30.98	0.031	0.029	175.6	165.0	97.71	23.17	0.800
14:11	17.407	3.742	0.044	0.101	0.244	44.12	1.405	30.18	0.031	0.028	171.4	161.0	97.31	23.19	0.800
14:28	17.325	3.957	0.044	0.101	0.000	44.10	1.392	30.31	0.030	0.028	171.4	161.0	97.29	23.23	0.802
14:45	17.570	3.742	0.044	0.105	0.000	43.71	1.562	30.64	0.031	0.030	175.1	164.4	97.43	23.15	0.799
15: 2	17.743	3.572	0.044	0.102	0.000	43.36	1.417	30.78	0.032	0.030	174.6	164.0	97.08	23.00	0.794
15:19	17.741	3.623	0.043	0.102	0.000	43.40	1.558	30.73	0.032	0.030	175.8	165.1	97.26	23.04	0.795
15:36	17.501	3.698	0.044	0.100	0.000	43.69	1.382	30.60	0.033	0.030	172.9	162.5	97.08	23.08	0.797
15:52	17.459	3.893	0.045	0.104	0.000	44.01	1.424	30.42	0.032	0.030	172.7	162.2	97.42	23.22	0.801
16:10	17.045	4.516	0.043	0.100	0.077	44.84	1.387	29.20	0.030	0.029	166.8	156.7	97.27	23.39	0.807
16:27	17.043	4.498	0.042	0.098	0.000	44.76	1.352	29.41	0.030	0.028	167.1	156.9	97.26	23.38	0.807
16:44	17.177	4.224	0.043	0.101	0.000	44.30	1.484	29.72	0.031	0.029	169.9	159.6	97.10	23.25	0.802
17: 1	17.440	3.916	0.043	0.100	0.020	43.66	1.395	30.09	0.031	0.029	171.1	160.7	96.72	23.03	0.795
17:18	17.727	3.604	0.043	0.100	0.000	43.44	1.401	30.87	0.030	0.028	174.5	164.0	97.24	23.05	0.796
17:35	17.678	3.475	0.045	0.104	0.000	43.50	1.420	31.05	0.032	0.030	175.3	164.8	97.33	23.07	0.796
17:52	18.157	3.512	0.047	0.109	0.000	43.35	1.500	31.17	0.033	0.030	178.2	167.3	97.91	23.10	0.797

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/21/1984															
18: 9	17.957	3.674	0.046	0.104	0.000	43.89	1.425	31.01	0.031	0.029	176.1	165.4	98.17	23.26	0.803
18:25	17.799	3.898	0.044	0.101	0.000	44.14	1.376	30.73	0.033	0.029	174.2	163.6	98.16	23.34	0.806
18:42	17.738	4.177	0.045	0.102	0.000	44.56	1.402	30.29	0.031	0.029	172.8	162.3	98.38	23.46	0.810
18:59	17.519	4.156	0.044	0.102	0.000	44.11	1.404	29.84	0.032	0.030	170.7	160.2	97.23	23.19	0.801
19:16	17.401	4.117	0.043	0.103	0.000	43.62	1.546	29.65	0.032	0.030	171.2	160.6	96.54	23.01	0.794
19:33	17.541	3.703	0.043	0.103	0.000	42.88	1.559	30.19	0.033	0.029	173.5	162.9	96.08	22.77	0.786
19:50	17.471	3.541	0.043	0.103	0.000	42.69	1.550	30.30	0.031	0.029	173.5	162.9	95.77	22.68	0.783
20: 6	17.159	3.567	0.042	0.098	0.446	43.90	1.487	29.74	0.034	0.028	170.0	159.6	96.50	22.99	0.794
20:23	17.367	3.595	0.042	0.100	0.000	43.11	1.498	30.48	0.031	0.028	173.1	162.6	96.25	22.85	0.789
20:40	17.415	3.689	0.044	0.105	0.000	43.12	1.533	30.31	0.037	0.030	173.3	162.8	96.28	22.86	0.789
20:57	17.561	3.728	0.044	0.103	0.000	43.29	1.549	30.36	0.035	0.030	174.1	163.5	96.70	22.95	0.792
21:14	17.251	3.818	0.044	0.103	0.000	43.36	1.532	29.99	0.037	0.030	171.8	161.3	96.16	22.89	0.790
21:31	17.178	3.897	0.043	0.100	0.000	43.64	1.506	30.03	0.037	0.029	171.3	160.9	96.46	23.01	0.794
21:47	17.211	3.995	0.045	0.106	0.000	43.48	1.548	29.93	0.034	0.031	171.6	161.2	96.38	22.99	0.794
22: 4	16.917	3.878	0.042	0.103	0.610	44.21	1.540	28.86	0.016	0.030	166.6	156.3	96.21	23.02	0.795
22:21	17.321	3.972	0.043	0.101	0.000	43.31	1.525	29.86	0.032	0.029	171.3	160.8	96.19	22.91	0.791
22:38	17.220	3.921	0.043	0.098	0.000	43.55	1.473	30.03	0.035	0.028	171.0	160.6	96.39	22.99	0.794
22:55	17.048	3.840	0.045	0.102	0.000	43.64	1.499	30.07	0.033	0.029	170.9	160.6	96.30	22.99	0.794
23:12	16.631	4.019	0.047	0.112	0.938	44.49	1.608	28.29	0.034	0.032	165.2	155.0	96.20	23.13	0.798
23:30	17.732	4.286	0.049	0.122	0.000	42.95	1.794	29.47	0.035	0.032	174.7	163.7	96.47	22.90	0.790
23:47	17.741	4.163	0.047	0.116	0.000	43.08	1.734	29.61	0.034	0.031	174.4	163.5	96.55	22.91	0.791
6/22/1984															
0: 3	17.018	3.916	0.046	0.107	0.663	44.22	1.593	28.87	0.036	0.030	168.1	157.7	96.50	23.08	0.797
0:20	17.195	4.307	0.043	0.105	0.000	44.23	1.458	30.03	0.034	0.030	170.9	160.5	97.43	23.35	0.806
0:37	17.500	4.271	0.043	0.105	0.000	44.33	1.467	30.31	0.031	0.029	172.8	162.3	98.09	23.45	0.809
0:54	17.544	4.120	0.044	0.104	0.046	44.29	1.367	30.28	0.032	0.030	171.9	161.4	97.86	23.36	0.806
1:11	17.262	3.814	0.043	0.100	0.000	44.70	1.334	30.95	0.031	0.029	172.6	162.4	98.26	23.50	0.811
1:28	17.430	4.007	0.045	0.102	0.000	44.38	1.330	30.72	0.033	0.029	172.5	162.2	98.07	23.44	0.809
1:44	17.390	4.082	0.046	0.102	0.000	44.28	1.324	30.58	0.033	0.030	171.9	161.6	97.86	23.40	0.808
2: 1	17.459	4.182	0.046	0.101	0.000	44.30	1.330	30.42	0.033	0.030	171.7	161.3	97.90	23.41	0.808
2:18	17.233	4.222	0.045	0.097	0.000	44.64	1.262	30.40	0.032	0.029	170.0	159.9	97.96	23.50	0.811
2:35	17.084	4.116	0.042	0.093	0.000	44.85	1.217	30.61	0.031	0.027	169.6	159.6	98.08	23.56	0.813
2:52	17.145	3.992	0.043	0.093	0.000	44.62	1.236	30.68	0.030	0.027	170.2	160.1	97.86	23.46	0.810
3: 9	17.140	4.035	0.043	0.092	0.000	44.68	1.217	30.68	0.031	0.027	170.0	160.0	97.95	23.49	0.811
3:26	17.128	3.954	0.043	0.092	0.000	44.54	1.218	30.77	0.031	0.026	170.3	160.2	97.80	23.44	0.809
3:42	17.081	4.064	0.045	0.097	0.000	44.45	1.267	30.46	0.032	0.028	169.8	159.7	97.52	23.39	0.807
3:59	17.140	4.055	0.047	0.096	0.028	44.45	1.260	30.39	0.032	0.028	169.7	159.6	97.52	23.37	0.807
4:33	17.083	4.364	0.051	0.100	0.000	44.70	1.288	30.17	0.033	0.029	169.3	159.2	97.82	23.52	0.812
4:50	17.227	4.433	0.050	0.101	0.000	44.50	1.300	30.03	0.034	0.029	169.4	159.2	97.70	23.46	0.810
5: 7	17.348	4.359	0.050	0.102	0.000	44.37	1.321	30.10	0.033	0.029	170.2	159.9	97.71	23.41	0.808
5:23	17.177	4.547	0.051	0.102	0.000	44.48	1.317	29.75	0.034	0.029	168.6	158.4	97.49	23.43	0.809
5:40	17.435	4.428	0.053	0.102	0.000	44.57	1.321	30.14	0.034	0.029	170.7	160.4	98.11	23.51	0.812
5:57	17.418	4.433	0.050	0.101	0.000	44.55	1.341	29.97	0.033	0.028	170.2	159.9	97.93	23.46	0.810

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/22/1984															
6:14	16.819	4.596	0.052	0.098	0.491	45.80	1.292	28.91	0.033	0.028	164.3	154.4	98.12	23.73	0.819
6:31	17.357	4.508	0.052	0.102	0.000	44.70	1.351	29.96	0.034	0.029	170.2	159.9	98.09	23.54	0.813
6:50	17.645	4.387	0.051	0.108	0.000	44.43	1.429	30.22	0.034	0.030	172.9	162.3	98.33	23.50	0.811
7:24	17.495	4.287	0.052	0.101	0.000	44.13	1.337	30.16	0.033	0.028	171.1	160.7	97.62	23.34	0.806
7:41	17.441	4.237	0.052	0.106	0.034	43.99	1.376	29.97	0.035	0.029	170.8	160.4	97.26	23.24	0.802
7:57	17.333	4.233	0.052	0.106	0.091	43.97	1.366	29.97	0.041	0.030	170.5	160.2	97.19	23.25	0.803
8:14	17.239	4.233	0.053	0.103	0.000	44.25	1.330	30.16	0.036	0.028	170.3	160.1	97.43	23.34	0.806
8:31	17.218	4.202	0.054	0.101	0.000	44.26	1.301	30.13	0.041	0.029	170.0	159.8	97.34	23.32	0.805
8:48	17.040	4.216	0.055	0.106	0.000	44.40	1.427	30.06	0.035	0.029	170.4	160.1	97.37	23.36	0.806
9: 5	17.149	4.268	0.053	0.096	0.000	44.49	1.275	29.95	0.033	0.026	168.6	158.4	97.35	23.35	0.806
9:22	16.861	4.392	0.057	0.106	0.014	44.89	1.295	29.86	0.042	0.030	168.0	158.0	97.54	23.50	0.811
9:39	17.215	4.456	0.057	0.106	0.000	44.54	1.336	29.93	0.042	0.030	169.8	159.6	97.71	23.46	0.810
9:56	17.472	4.413	0.059	0.111	0.000	44.27	1.400	29.96	0.037	0.030	171.4	161.0	97.75	23.39	0.807
10:12	17.155	4.354	0.053	0.100	0.221	44.98	1.286	29.69	0.035	0.028	168.0	157.8	97.90	23.53	0.812
10:29	17.372	4.410	0.058	0.114	0.124	44.52	1.414	29.81	0.044	0.033	171.0	160.6	97.90	23.46	0.810
10:46	17.374	3.945	0.053	0.109	0.000	44.27	1.404	30.53	0.037	0.031	172.9	162.5	97.76	23.34	0.806
11: 3	17.845	4.139	0.059	0.112	0.000	43.81	1.430	30.43	0.044	0.032	174.7	164.0	97.90	23.29	0.804
11:20	17.671	4.257	0.055	0.105	0.000	44.22	1.355	30.42	0.036	0.030	172.9	162.4	98.15	23.43	0.809
11:37	18.400	3.961	0.055	0.110	0.000	43.33	1.477	30.69	0.038	0.031	177.5	166.5	98.09	23.17	0.800
11:54	17.782	3.911	0.052	0.100	0.000	44.11	1.318	30.74	0.035	0.029	173.7	163.2	98.07	23.33	0.805
12:11	16.849	4.075	0.056	0.097	0.579	45.47	1.253	29.59	0.035	0.028	166.3	156.4	98.03	23.62	0.815
12:28	17.386	3.990	0.057	0.103	0.000	44.58	1.320	30.68	0.038	0.030	172.5	162.2	98.19	23.48	0.810
12:45	17.475	4.046	0.059	0.100	0.000	44.54	1.304	30.55	0.036	0.029	172.1	161.8	98.14	23.45	0.810
13: 2	17.721	3.903	0.056	0.102	0.000	44.17	1.327	30.76	0.036	0.030	173.8	163.3	98.11	23.35	0.806
13:18	17.469	3.918	0.057	0.097	0.000	44.43	1.242	30.91	0.037	0.028	172.6	162.3	98.19	23.45	0.810
13:35	17.767	4.031	0.058	0.105	0.000	44.11	1.365	30.63	0.041	0.031	174.2	163.6	98.14	23.37	0.807
13:52	17.534	4.034	0.060	0.100	0.000	44.45	1.298	30.63	0.037	0.029	172.6	162.2	98.17	23.45	0.809
14:10	17.250	3.934	0.056	0.101	0.414	45.01	1.310	30.01	0.035	0.028	169.6	159.4	98.15	23.51	0.812
14:27	16.963	4.127	0.061	0.101	0.000	45.06	1.317	30.28	0.035	0.028	169.7	159.6	97.98	23.55	0.813
14:44	17.324	4.530	0.056	0.101	0.000	44.78	1.308	29.70	0.035	0.029	168.9	158.6	97.87	23.49	0.811
15:40	17.424	4.295	0.063	0.106	0.000	44.34	1.421	29.70	0.036	0.030	170.6	160.2	97.42	23.29	0.804
15:57	17.651	3.713	0.053	0.097	0.000	43.84	1.310	30.50	0.032	0.027	172.3	161.9	97.22	23.09	0.797
16:14	17.094	3.878	0.060	0.115	0.480	44.35	1.407	29.64	0.039	0.033	169.5	159.2	97.10	23.24	0.802
16:31	18.170	3.813	0.057	0.114	0.000	42.95	1.494	30.57	0.038	0.033	176.7	165.8	97.23	22.96	0.793
16:47	17.777	3.812	0.057	0.100	0.000	43.57	1.347	30.48	0.034	0.028	173.2	162.7	97.20	23.07	0.796
17: 4	17.699	3.835	0.057	0.095	0.000	43.59	1.304	30.27	0.033	0.027	171.7	161.3	96.91	23.02	0.794
17:21	17.467	3.631	0.060	0.097	0.000	43.74	1.315	30.57	0.035	0.027	172.2	161.8	96.94	23.05	0.796
17:38	17.892	3.624	0.057	0.098	0.000	43.25	1.328	30.54	0.034	0.028	173.6	163.0	96.86	22.91	0.791
17:55	17.609	3.582	0.055	0.095	0.000	43.33	1.267	30.76	0.034	0.027	172.6	162.3	96.77	22.96	0.793
18:12	17.531	3.800	0.059	0.107	0.086	43.51	1.391	30.16	0.036	0.030	172.1	161.6	96.71	22.99	0.794
18:29	17.463	3.992	0.055	0.101	0.000	43.96	1.344	30.27	0.034	0.028	171.5	161.1	97.25	23.19	0.801
18:46	17.676	3.967	0.052	0.099	0.000	43.67	1.335	30.30	0.034	0.028	172.1	161.6	97.15	23.11	0.798
19: 2	17.147	4.123	0.054	0.098	0.000	44.13	1.290	29.94	0.034	0.028	168.8	158.6	96.84	23.19	0.800
19:19	17.619	3.909	0.054	0.102	0.000	43.48	1.357	30.33	0.034	0.028	172.3	161.8	96.91	23.04	0.795
19:36	17.756	3.625	0.053	0.103	0.000	43.28	1.369	30.75	0.034	0.029	174.2	163.7	97.00	22.98	0.793
19:53	18.000	3.459	0.052	0.102	0.000	42.98	1.378	30.89	0.033	0.028	175.5	164.8	96.92	22.87	0.789

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/22/1984															
20:10	17.743	3.716	0.053	0.106	0.000	43.26	1.366	30.70	0.036	0.031	174.2	163.6	97.01	23.01	0.794
20:27	18.295	3.610	0.053	0.108	0.000	42.83	1.465	30.76	0.037	0.032	177.2	166.3	97.19	22.88	0.790
20:43	18.192	3.570	0.051	0.102	0.000	43.12	1.405	30.81	0.036	0.031	176.2	165.4	97.32	22.95	0.792
21: 0	17.736	3.698	0.048	0.094	0.000	43.70	1.304	30.66	0.034	0.029	173.0	162.5	97.31	23.10	0.797
21:17	17.897	3.827	0.053	0.107	0.000	43.43	1.445	30.46	0.038	0.032	174.8	164.1	97.29	23.05	0.796
21:34	17.944	3.870	0.053	0.099	0.000	43.74	1.399	30.18	0.035	0.030	173.3	162.6	97.35	23.07	0.796
21:51	17.859	4.017	0.056	0.103	0.000	43.75	1.443	29.87	0.037	0.030	172.6	162.0	97.16	23.06	0.796
22: 9	17.591	4.082	0.051	0.098	0.039	44.10	1.343	29.86	0.035	0.029	170.5	160.1	97.23	23.17	0.800
22:26	17.716	4.341	0.052	0.106	0.000	44.02	1.474	29.53	0.035	0.030	171.3	160.7	97.31	23.18	0.800
22:42	17.146	4.277	0.049	0.103	0.290	44.73	1.396	29.09	0.034	0.030	167.2	156.9	97.15	23.30	0.804
23:17	18.252	3.867	0.056	0.113	0.000	43.13	1.517	30.34	0.037	0.032	176.4	165.4	97.34	22.97	0.793
23:34	18.305	3.725	0.052	0.108	0.000	43.00	1.495	30.50	0.035	0.032	176.6	165.7	97.25	22.91	0.791
23:40	17.833	3.959	0.050	0.103	0.000	43.57	1.419	30.19	0.035	0.030	173.2	162.6	97.19	23.07	0.796
23:51	18.009	3.528	0.049	0.102	0.050	43.28	1.411	30.63	0.034	0.030	175.0	164.3	97.12	22.93	0.792
6/23/1984															
0: 8	17.675	3.494	0.050	0.099	0.367	43.78	1.357	30.20	0.033	0.029	171.9	161.4	97.08	23.02	0.795
0:25	17.629	3.634	0.052	0.101	0.000	43.64	1.365	30.66	0.035	0.029	173.5	163.0	97.14	23.06	0.796
0:41	17.900	3.853	0.053	0.109	0.000	43.50	1.465	30.35	0.037	0.032	174.6	163.9	97.30	23.06	0.796
0:58	18.011	3.806	0.049	0.101	0.000	43.41	1.426	30.33	0.033	0.029	174.2	163.4	97.19	22.99	0.794
1:15	17.692	3.960	0.048	0.097	0.000	44.06	1.337	30.09	0.032	0.029	171.4	160.9	97.34	23.15	0.799
1:32	17.520	4.177	0.050	0.102	0.000	44.20	1.376	29.80	0.034	0.030	170.4	160.0	97.29	23.21	0.801
1:49	17.474	3.947	0.048	0.094	0.000	44.19	1.284	30.09	0.032	0.028	170.0	159.7	97.19	23.17	0.800
2: 6	17.348	1.545	0.058	0.105	0.730	45.92	1.388	29.64	0.027	0.031	169.6	159.2	96.79	22.73	0.784
2:22	17.039	4.333	0.067	0.090	0.000	44.69	1.307	29.19	0.032	0.025	166.1	156.0	96.77	23.23	0.802
2:39	16.666	4.271	0.066	0.085	0.000	45.25	1.226	29.38	0.030	0.023	164.5	154.7	96.99	23.39	0.807
2:56	17.151	4.052	0.064	0.092	0.000	44.42	1.284	29.79	0.033	0.026	168.2	158.1	96.91	23.20	0.801
3:13	17.297	3.992	0.057	0.095	0.000	44.21	1.296	29.91	0.033	0.027	169.2	158.9	96.91	23.15	0.799
3:30	17.315	3.956	0.057	0.100	0.014	44.05	1.350	30.08	0.034	0.028	170.5	160.2	96.98	23.15	0.799
3:47	17.568	4.001	0.057	0.099	0.014	43.91	1.383	29.88	0.033	0.027	170.9	160.4	96.97	23.08	0.797
4: 4	17.256	4.106	0.049	0.093	0.014	44.31	1.300	29.77	0.031	0.027	168.4	158.2	96.95	23.19	0.800
4:21	16.970	4.225	0.052	0.093	0.000	44.46	1.279	29.52	0.034	0.027	166.6	156.6	96.66	23.20	0.801
4:37	17.323	4.032	0.051	0.093	0.000	44.05	1.293	29.79	0.033	0.027	168.7	158.5	96.69	23.08	0.797
4:54	17.227	3.970	0.052	0.093	0.014	44.04	1.281	29.86	0.033	0.027	168.5	158.4	96.60	23.08	0.797
5:11	17.273	4.085	0.056	0.093	0.000	44.19	1.267	29.81	0.034	0.027	168.5	158.3	96.84	23.15	0.799
5:30	17.372	4.216	0.058	0.102	0.023	44.18	1.407	29.57	0.036	0.029	169.7	159.3	96.99	23.17	0.800
5:47	17.434	4.115	0.055	0.096	0.021	44.02	1.334	29.61	0.039	0.028	169.2	158.8	96.75	23.08	0.797
6: 4	16.989	4.096	0.055	0.092	0.344	44.66	1.277	29.00	0.034	0.027	165.0	155.0	96.58	23.17	0.800
6:21	16.881	4.685	0.061	0.097	0.022	44.95	1.324	28.83	0.036	0.028	164.8	154.8	96.92	23.37	0.807
6:38	17.477	4.333	0.059	0.104	0.000	44.24	1.438	29.29	0.036	0.030	169.5	159.1	97.01	23.17	0.800
6:55	17.486	4.082	0.057	0.100	0.000	43.94	1.365	29.62	0.038	0.030	169.8	159.4	96.71	23.05	0.796
7:12	17.210	4.021	0.055	0.098	0.000	44.07	1.304	29.84	0.035	0.029	168.8	158.6	96.66	23.10	0.797
7:28	17.459	4.197	0.059	0.103	0.060	44.10	1.399	29.42	0.036	0.030	169.5	159.0	96.86	23.11	0.798
7:45	17.003	4.080	0.054	0.083	0.053	44.69	1.204	29.46	0.031	0.024	165.5	155.5	96.68	23.19	0.800
8: 2	17.136	4.191	0.061	0.106	0.087	44.08	1.354	29.43	0.042	0.032	168.3	158.0	96.53	23.11	0.798

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/23/1984															
8:19	15.393	4.055	0.055	0.098	0.031	46.37	1.256	29.11	0.035	0.029	160.1	150.9	96.44	23.52	0.812
8:36	17.235	4.087	0.061	0.096	0.023	44.23	1.305	29.70	0.037	0.029	168.6	158.4	96.81	23.15	0.799
8:53	16.863	4.410	0.065	0.096	0.031	44.71	1.292	29.11	0.039	0.029	165.5	155.5	96.64	23.25	0.803
9:10	16.705	4.320	0.068	0.104	0.197	44.19	1.327	28.73	0.043	0.031	164.4	154.4	95.71	23.02	0.795
9:27	17.880	4.377	0.068	0.121	0.000	43.21	1.564	29.49	0.042	0.034	173.4	162.5	96.78	22.99	0.794
9:44	17.834	4.062	0.060	0.106	0.000	43.39	1.402	29.95	0.037	0.030	172.5	161.9	96.87	22.99	0.794
10: 1	17.553	3.942	0.070	0.104	0.000	43.60	1.373	30.13	0.039	0.029	172.0	161.6	96.84	23.04	0.795
10:18	17.875	4.038	0.065	0.112	0.000	43.22	1.472	29.81	0.045	0.032	173.3	162.6	96.66	22.92	0.791
10:34	17.847	3.792	0.064	0.107	0.000	43.23	1.401	30.27	0.038	0.031	173.7	163.1	96.79	22.93	0.791
10:51	16.986	3.647	0.065	0.094	0.000	44.27	1.238	30.51	0.035	0.026	169.6	159.6	96.87	23.17	0.800
11: 8	17.259	3.970	0.064	0.104	0.000	43.82	1.344	30.02	0.044	0.030	170.5	160.22;6.65		23.08	0.797
11:25	17.410	4.177	0.066	0.107	0.000	43.70	1.406	29.60	0.039	0.031	170.2	159.8	96.53	23.03	0.795
11:42	16.894	4.817	0.063	0.094	0.000	44.69	1.261	28.71	0.036	0.028	163.8	153.8	96.59	23.30	0.804
12:16	17.469	4.913	0.066	0.110	0.000	43.95	1.442	28.51	0.042	0.033	167.5	156.9	96.54	23.13	0.798
12:33	17.382	4.456	0.061	0.103	0.000	43.76	1.351	29.20	0.039	0.031	168.2	157.8	96.38	23.04	0.795
12:50	16.784	4.625	0.066	0.092	0.000	44.86	1.202	29.06	0.037	0.026	164.0	154.1	96.75	23.35	0.806
13: 7	17.320	4.698	0.080	0.106	0.000	44.18	1.395	28.80	0.042	0.029	167.5	157.1	96.65	23.17	0.800
13:24	17.261	4.672	0.069	0.102	0.000	44.23	1.357	28.78	0.040	0.029	166.6	156.3	96.54	23.16	0.799
13:41	17.022	4.663	0.068	0.095	0.000	44.45	1.242	28.80	0.039	0.027	164.5	154.4	96.40	23.19	0.801
13:58	16.518	4.996	0.079	0.095	0.000	45.21	1.267	28.28	0.039	0.027	161.6	151.8	96.51	23.40	0.808
14:15	17.257	5.088	0.086	0.108	0.000	44.47	1.468	28.10	0.042	0.030	165.9	155.5	96.64	23.24	0.802
14:32	17.401	4.513	0.070	0.098	0.000	44.10	1.345	28.94	0.037	0.027	167.2	156.9	96.53	23.09	0.797
14:49	16.912	4.555	0.078	0.092	0.000	44.56	1.240	28.93	0.039	0.026	164.6	154.6	96.43	23.21	0.801
15: 6	17.041	5.022	0.081	0.102	0.000	44.57	1.382	28.16	0.042	0.029	164.4	154.1	96.43	23.24	0.802
15:23	17.254	4.761	0.083	0.100	0.000	44.42	1.353	28.65	0.041	0.028	166.3	156.0	96.69	23.21	0.801
15:39	16.631	5.130	0.090	0.092	0.000	45.23	1.281	27.85	0.039	0.025	160.8	150.9	96.37	23.35	0.806
15:56	15.779	5.792	0.108	0.090	0.000	46.53	1.256	26.69	0.040	0.025	154.3	144.9	96.31	23.67	0.817
16:13	14.679	6.233	0.111	0.083	0.065	48.44	1.230	25.18	0.038	0.023	145.5	136.6	96.08	23.96	0.827
16:30	16.646	5.636	0.108	0.102	0.030	45.53	1.402	26.97	0.043	0.027	159.9	149.8	96.49	23.45	0.809
16:47	16.297	4.990	0.102	0.098	0.024	45.82	1.332	27.81	0.041	0.026	160.5	150.6	96.54	23.46	0.810
17: 4	16.418	5.560	0.105	0.098	0.105	45.79	1.373	26.82	0.041	0.026	158.1	148.2	96.34	23.46	0.810
17:21	16.344	5.593	0.093	0.097	0.029	45.78	1.322	26.91	0.039	0.026	157.4	147.6	96.23	23.46	0.810
17:38	16.100	5.502	0.085	0.086	0.026	46.02	1.196	27.22	0.035	0.023	155.9	146.3	96.29	23.54	0.813
17:55	15.789	5.494	0.095	0.090	0.033	46.46	1.244	27.08	0.036	0.023	155.1	145.7	96.34	23.62	0.815
18:12	15.793	6.151	0.102	0.105	0.044	46.59	1.418	25.87	0.040	0.028	153.6	144.0	96.14	23.65	0.817
18:29	16.336	5.664	0.090	0.097	0.000	45.94	1.359	26.69	0.038	0.026	157.0	147.1	96.24	23.47	0.810
18:46	15.031	5.458	0.083	0.087	0.020	47.61	1.214	26.70	0.035	0.024	150.9	141.9	96.26	23.80	0.821
19: 3	15.970	5.699	0.091	0.098	0.029	46.22	1.313	26.77	0.038	0.027	155.7	146.1	96.25	23.58	0.814
19:20	16.300	6.053	0.086	0.097	0.000	46.24	1.358	26.08	0.037	0.027	154.8	145.0	96.28	23.55	0.813
19:37	15.901	5.745	0.080	0.088	0.021	46.67	1.244	26.44	0.035	0.025	153.2	143.8	96.25	23.61	0.815
19:53	15.540	6.068	0.089	0.085	0.029	47.20	1.167	26.04	0.037	0.023	150.1	140.8	96.27	23.77	0.821
20:12	15.666	6.526	0.088	0.101	0.203	47.85	1.336	25.10	0.039	0.027	149.6	140.1	96.94	23.99	0.828
20:29	16.072	6.016	0.081	0.096	0.104	47.14	1.316	26.21	0.038	0.027	154.1	144.4	97.11	23.85	0.823
20:46	16.363	5.909	0.068	0.092	0.039	46.78	1.316	26.78	0.037	0.026	156.5	146.7	97.41	23.83	0.823
21: 4	16.805	6.724	0.074	0.097	0.033	46.42	1.217	25.91	0.042	0.026	154.4	144.5	97.34	23.84	0.823
21:21	16.758	5.868	0.091	0.106	0.034	45.85	1.409	26.60	0.043	0.029	158.9	148.8	96.79	23.54	0.813

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/23/1984															
21:38	16.435	6.197	0.091	0.104	0.042	45.72	1.365	25.76	0.043	0.029	154.7	144.8	95.79	23.40	0.808
21:55	16.091	5.922	0.096	0.108	0.042	46.03	1.363	26.25	0.045	0.029	155.4	145.6	95.97	23.50	0.811
22:12	16.308	6.084	0.085	0.110	0.074	45.67	1.430	25.83	0.044	0.031	155.3	145.4	95.67	23.38	0.807
22:29	16.344	6.064	0.091	0.109	0.041	45.39	1.426	25.74	0.043	0.030	155.1	145.2	95.28	23.26	0.803
22:46	15.254	6.559	0.076	0.098	0.089	46.77	1.383	24.89	0.038	0.015	147.5	138.2	95.17	23.59	0.814
23: 3	15.685	6.331	0.084	0.112	0.071	46.40	1.494	25.43	0.043	0.017	152.3	142.6	95.66	23.57	0.814
23:20	15.649	6.493	0.076	0.100	0.585	47.44	1.321	24.30	0.039	0.028	146.6	137.2	96.03	23.75	0.820
23:37	16.759	6.795	0.100	0.108	0.022	46.07	1.447	24.85	0.048	0.029	154.0	143.8	96.23	23.53	0.812
23:54	16.070	6.190	0.076	0.104	0.014	46.16	1.326	26.21	0.040	0.029	154.3	144.6	96.22	23.62	0.815
6/24/1984															
0:11	16.416	6.288	0.079	0.113	0.415	46.40	1.470	25.06	0.041	0.031	153.5	143.4	96.32	23.57	0.814
0:28	16.975	6.297	0.105	0.114	0.000	45.75	1.505	25.80	0.049	0.031	158.6	148.2	96.62	23.50	0.811
0:45	16.611	5.868	0.079	0.102	0.012	45.94	1.341	26.86	0.040	0.028	158.3	148.3	96.88	23.61	0.815
1: 2	16.496	6.137	0.081	0.107	0.020	46.33	1.397	26.23	0.043	0.030	156.7	146.7	96.87	23.68	0.817
1:20	16.647	6.454	0.100	0.112	0.025	46.33	1.766	25.70	0.045	0.000	158.9	148.5	97.17	23.73	0.819
1:37	16.553	6.062	0.097	0.100	0.011	46.50	1.608	26.47	0.043	0.027	159.8	149.6	97.47	23.79	0.821
1:54	16.581	6.219	0.082	0.104	0.000	46.65	1.355	26.27	0.043	0.029	156.6	146.6	97.33	23.80	0.822
2:11	15.687	6.419	0.062	0.096	0.509	47.97	1.297	25.31	0.033	0.026	149.3	139.8	97.40	24.11	0.832
2:28	16.077	6.144	0.073	0.088	0.028	47.32	1.227	26.34	0.033	0.025	153.2	143.6	97.36	23.94	0.826
2:46	16.239	6.350	0.064	0.094	0.027	46.86	1.247	26.12	0.035	0.026	153.2	143.5	97.06	23.85	0.823
3: 3	16.220	6.119	0.056	0.104	0.011	46.19	1.571	26.77	0.036	0.030	158.7	148.7	97.10	23.79	0.821
3:20	16.753	6.016	0.057	0.102	0.000	45.76	1.343	26.91	0.036	0.030	158.5	148.5	97.01	23.63	0.816
3:52	17.483	5.752	0.070	0.105	0.011	45.93	1.335	27.84	0.040	0.032	164.2	153.8	98.59	23.85	0.823
4: 9	17.280	6.335	0.076	0.104	0.376	46.15	1.471	25.50	0.037	0.028	157.3	146.9	97.35	23.64	0.816
4:26	17.324	5.631	0.076	0.091	0.014	45.58	1.239	27.24	0.038	0.025	160.4	150.2	97.26	23.51	0.811
4:43	16.771	5.936	0.083	0.087	0.303	46.04	1.223	26.34	0.000	0.040	155.1	145.2	96.82	23.59	0.814
5: 1	17.065	5.648	0.077	0.107	0.013	44.84	1.413	27.57	0.000	0.041	162.2	152.0	96.78	23.42	0.808
5:18	17.528	5.745	0.077	0.106	0.028	44.54	1.402	27.22	0.039	0.028	163.0	152.5	96.72	23.30	0.804
5:35	16.738	5.863	0.075	0.091	0.032	45.71	1.246	27.04	0.035	0.025	157.8	147.9	96.85	23.58	0.814
5:52	16.594	6.049	0.090	0.092	0.043	45.86	1.245	26.84	0.037	0.024	157.0	147.2	96.87	23.65	0.817
6: 9	16.439	6.401	0.105	0.103	0.358	46.59	1.382	25.24	0.041	0.026	153.3	143.4	96.69	23.70	0.818
6:26	16.815	6.559	0.101	0.090	0.209	46.30	1.298	25.36	0.036	0.023	153.6	143.6	96.80	23.66	0.817
6:44	17.249	5.677	0.077	0.091	0.000	45.25	1.286	27.48	0.038	0.025	161.4	151.2	97.18	23.50	0.811
7: 1	17.419	6.086	0.097	0.106	0.000	44.94	1.421	27.16	0.042	0.027	163.0	152.6	97.31	23.55	0.813
7:18	17.718	5.515	0.084	0.098	0.000	44.38	1.370	27.88	0.036	0.026	165.3	154.7	97.10	23.33	0.805
7:35	17.501	5.570	0.087	0.089	0.000	44.84	1.301	27.61	0.035	0.023	162.8	152.5	97.06	23.38	0.807
7:52	16.978	5.607	0.091	0.082	0.000	45.45	1.199	27.54	0.034	0.021	159.7	149.8	97.00	23.52	0.812
8: 9	15.980	6.217	0.095	0.084	0.335	47.33	1.212	25.64	0.035	0.021	150.7	141.2	96.95	23.88	0.824
10:15	15.025	7.770	0.162	0.093	0.011	48.35	1.308	22.56	0.040	0.024	140.1	130.9	95.35	23.90	0.825
10:32	15.163	7.491	0.148	0.084	0.000	48.25	1.276	22.94	0.037	0.022	140.9	131.7	95.41	23.84	0.823
10:48	14.756	7.344	0.166	0.077	0.000	48.81	1.203	23.09	0.037	0.019	139.4	130.5	95.50	23.96	0.827
11: 5	15.397	6.441	0.172	0.096	0.000	47.29	1.362	24.51	0.046	0.024	148.4	139.0	95.34	23.59	0.814
11:23	14.870	7.358	0.163	0.090	0.000	48.44	1.295	22.92	0.041	0.022	140.5	131.4	95.19	23.83	0.823
11:40	14.659	7.282	0.167	0.087	0.000	48.53	1.269	23.00	0.000	0.045	139.5	130.5	95.04	23.84	0.823

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/24/1984															
11:57	15.312	7.230	0.190	0.098	0.008	47.39	1.358	23.58	0.046	0.024	145.4	136.0	95.23	23.70	0.818
12:14	13.478	8.203	0.186	0.101	0.000	50.24	1.287	21.26	0.048	0.026	131.4	123.0	94.83	24.23	0.836
14: 8	15.127	8.772	0.131	0.083	0.346	49.39	1.160	20.54	0.023	0.029	131.5	122.4	95.60	24.14	0.833
14:25	16.021	9.150	0.183	0.119	0.011	47.98	1.602	20.61	0.052	0.030	141.2	131.2	95.76	23.95	0.827
14:25	16.021	9.150	0.183	0.119	0.011	47.98	1.602	20.61	0.052	0.032	141.3	131.2	95.76	23.95	0.827
14:45	16.462	7.500	0.128	0.081	0.000	47.55	1.280	23.18	0.034	0.023	145.5	135.7	96.25	23.74	0.819
15: 2	15.949	7.949	0.105	0.089	0.000	47.95	1.249	22.75	0.036	0.025	142.0	132.5	96.11	23.91	0.825
15:19	16.610	7.567	0.129	0.094	0.000	47.20	1.384	23.25	0.038	0.024	147.6	137.6	96.29	23.71	0.819
15:36	16.133	7.378	0.113	0.085	0.000	47.74	1.284	23.47	0.000	0.022	144.4	134.8	96.22	23.79	0.821
15:53	15.606	7.930	0.139	0.079	0.000	48.48	1.264	22.55	0.034	0.020	140.6	131.2	96.10	23.99	0.828
16:10	15.530	7.554	0.101	0.101	0.309	48.49	1.315	22.99	0.036	0.027	142.3	132.9	96.46	24.06	0.830
17: 1	16.947	6.853	0.100	0.103	0.000	46.49	1.400	24.78	0.026	0.003	152.6	142.5	96.69	23.62	0.815
17:18	16.297	7.198	0.105	0.105	0.115	47.17	1.408	23.93	0.027	0.003	148.1	138.2	96.35	23.75	0.820
17:35	16.022	6.837	0.094	0.099	0.511	48.09	1.359	23.51	0.028	0.004	145.1	135.5	96.56	23.84	0.823
17:52	16.795	6.878	0.121	0.096	0.000	46.41	1.365	24.51	0.025	0.006	151.2	141.2	96.21	23.53	0.812
18: 9	15.909	6.967	0.103	0.106	0.330	47.34	1.487	23.70	0.026	0.004	146.9	137.1	95.97	23.71	0.818
18:27	15.643	7.070	0.101	0.106	0.339	47.80	1.490	23.35	0.026	0.003	144.8	135.2	95.92	23.78	0.821
18:44	15.953	7.301	0.110	0.090	0.041	47.64	1.405	23.36	0.021	0.003	144.8	135.1	95.93	23.73	0.819
19: 1	15.676	7.226	0.110	0.102	0.114	47.68	1.453	23.53	0.025	0.003	145.2	135.6	95.92	23.79	0.821
19:18	16.533	7.206	0.107	0.120	0.156	46.79	1.646	23.63	0.031	0.003	150.6	140.4	96.22	23.63	0.816
19:35	16.315	6.992	0.102	0.119	0.165	46.90	1.603	23.99	0.031	0.003	150.6	140.5	96.22	23.66	0.817
19:52	16.368	7.396	0.120	0.095	0.000	47.30	1.504	23.39	0.022	0.004	147.5	137.5	96.20	23.70	0.818
20: 9	15.353	7.788	0.133	0.113	0.819	49.03	1.577	21.40	0.029	0.004	139.2	129.7	96.24	24.07	0.831
20:27	14.925	7.339	0.093	0.106	0.944	49.49	1.468	22.03	0.029	0.003	138.0	128.8	96.43	24.18	0.835
20:45	14.484	7.170	0.116	0.108	1.415	50.24	1.471	21.31	0.028	0.004	134.7	125.7	96.35	24.26	0.837
21: 2	15.269	7.187	0.117	0.108	0.627	48.70	1.499	22.63	0.029	0.004	141.8	132.3	96.17	23.97	0.828
21:19	15.168	7.326	0.120	0.116	0.623	48.65	1.555	22.56	0.032	0.005	142.1	132.6	96.15	24.01	0.829
21:36	13.669	7.690	0.145	0.086	0.809	51.46	1.358	20.93	0.022	0.006	129.7	121.2	96.18	24.50	0.846
21:53	15.139	7.807	0.161	0.098	0.135	49.02	1.470	22.32	0.025	0.008	140.6	131.2	96.17	24.09	0.832
22:28	15.459	7.577	0.123	0.121	0.207	48.19	1.626	22.97	0.031	0.004	145.2	135.5	96.31	23.99	0.828
22:45	16.198	7.411	0.128	0.112	0.203	47.93	1.595	23.00	0.027	0.005	147.2	137.2	96.61	23.86	0.824
23: 2	17.075	7.026	0.105	0.111	0.000	45.98	1.549	24.78	0.027	0.003	154.8	144.5	96.65	23.58	0.814
23:19	17.375	6.764	0.132	0.122	0.000	45.58	1.625	24.90	0.031	0.004	157.7	147.0	96.53	23.42	0.808
23:36	17.794	6.741	0.114	0.110	0.000	45.59	1.561	24.89	0.027	0.004	157.8	147.0	96.83	23.40	0.808
23:53	16.835	6.814	0.108	0.108	0.038	46.62	1.455	24.67	0.027	0.003	152.8	142.6	96.68	23.63	0.816
6/25/1984															
0:10	15.722	6.282	0.101	0.109	1.180	48.50	1.423	23.49	0.028	0.003	145.0	135.4	96.85	23.93	0.826
0:27	15.516	7.074	0.141	0.126	0.568	48.60	1.560	23.12	0.032	0.005	145.6	135.9	96.74	24.04	0.830
0:45	15.776	7.453	0.156	0.120	0.233	48.34	1.556	22.91	0.030	0.005	145.8	136.0	96.58	23.98	0.828
1: 2	15.048	7.363	0.145	0.124	0.259	49.05	1.474	23.03	0.032	0.005	142.9	133.6	96.53	24.15	0.834
1:19	15.152	7.520	0.127	0.114	0.491	49.33	1.470	22.31	0.029	0.004	140.4	131.0	96.54	24.16	0.834
1:36	14.892	7.314	0.125	0.107	1.022	50.21	1.404	21.54	0.027	0.004	136.2	127.0	96.64	24.25	0.837
1:53	13.946	7.719	0.152	0.108	0.767	51.33	1.336	21.16	0.027	0.005	131.7	123.0	96.55	24.53	0.847
2:28	12.835	8.857	0.178	0.068	0.113	53.10	1.175	19.99	0.015	0.006	122.2	114.3	96.33	24.94	0.861

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/25/1984															
2:45	14.292	7.547	0.139	0.101	0.932	50.80	1.315	21.40	0.026	0.006	133.0	124.2	96.55	24.43	0.843
3: 2	13.290	7.655	0.125	0.098	1.518	52.42	1.227	20.32	0.027	0.005	125.2	117.0	96.69	24.78	0.855
3:19	13.318	8.177	0.122	0.101	1.033	52.50	1.317	19.89	0.026	0.004	124.7	116.5	96.49	24.77	0.855
3:36	14.773	8.050	0.183	0.107	0.184	49.93	1.426	21.60	0.027	0.007	137.2	128.0	96.29	24.27	0.838
5:10	12.871	7.963	0.137	0.119	1.770	54.38	1.391	19.76	0.052	0.034	125.5	117.2	98.48	25.43	0.878
5:27	13.808	7.926	0.144	0.133	1.032	50.69	1.470	20.28	0.058	0.039	131.7	122.8	95.58	24.34	0.840
5:44	14.601	8.580	0.158	0.103	0.101	49.69	1.427	20.45	0.046	0.027	133.4	124.3	95.19	24.09	0.831
6: 1	12.930	8.033	0.135	0.122	0.719	51.54	1.281	20.37	0.048	0.034	126.5	118.3	95.21	24.49	0.845
6:18	13.067	8.591	0.160	0.096	0.525	52.02	1.326	19.33	0.043	0.025	123.7	115.4	95.19	24.52	0.846
6:36	15.009	8.155	0.156	0.117	0.068	48.80	1.447	21.44	0.029	0.005	137.4	128.1	95.23	23.92	0.826
6:53	13.664	8.412	0.137	0.123	0.280	50.51	1.418	20.58	0.000	0.033	129.8	121.2	95.15	24.30	0.839
7:10	14.065	8.164	0.168	0.119	0.510	50.15	1.459	20.55	0.050	0.031	133.0	124.1	95.27	24.20	0.835
10:42	14.780	7.650	0.138	0.109	1.164	51.50	1.314	21.16	0.044	0.029	135.0	125.9	97.89	24.71	0.853
10:59	14.340	8.871	0.117	0.085	0.540	51.92	1.284	20.47	0.035	0.023	129.9	121.1	97.69	24.94	0.861
11:16	12.227	11.313	0.123	0.076	0.311	55.69	1.212	16.49	0.030	0.020	109.3	101.7	97.49	25.82	0.891
11:33	15.476	10.153	0.113	0.097	0.000	50.44	1.395	20.00	0.036	0.026	133.4	123.9	97.73	24.82	0.857
11:50	16.511	9.793	0.124	0.117	0.000	48.89	1.568	20.62	0.043	0.031	141.4	131.1	97.70	24.47	0.845
12:24	17.032	8.762	0.077	0.108	0.000	47.69	1.463	22.56	0.034	0.029	147.0	136.7	97.76	24.20	0.835
12:41	16.481	9.403	0.075	0.109	0.019	48.60	1.489	21.49	0.034	0.029	142.1	132.0	97.73	24.43	0.843
12:58	17.421	8.777	0.073	0.111	0.000	47.05	1.543	22.75	0.034	0.029	149.7	139.1	97.79	24.10	0.832
13:15	18.191	7.546	0.071	0.111	0.199	45.65	1.548	24.37	0.035	0.029	157.5	146.5	97.75	23.70	0.818
13:33	18.598	7.645	0.081	0.115	0.035	44.92	1.602	24.72	0.038	0.030	160.8	149.5	97.79	23.61	0.815
13:50	18.213	7.144	0.092	0.113	0.000	45.17	1.571	25.46	0.038	0.029	161.7	150.6	97.82	23.64	0.816
14:24	18.530	7.688	0.099	0.121	0.041	45.31	1.710	24.36	0.041	0.030	160.9	149.6	97.93	23.66	0.817
14:41	19.293	6.926	0.095	0.131	0.000	43.54	1.765	26.20	0.044	0.033	170.1	158.3	98.03	23.36	0.806
14:58	19.503	6.425	0.087	0.132	0.000	43.20	1.770	26.85	0.042	0.033	172.8	160.9	98.04	23.22	0.802
15:15	19.395	6.595	0.085	0.123	0.000	43.54	1.742	26.46	0.040	0.031	170.6	158.8	98.01	23.27	0.803
15:32	18.820	7.131	0.074	0.123	0.000	44.39	1.725	25.12	0.039	0.032	164.1	152.6	97.46	23.36	0.806
15:50	18.120	8.227	0.075	0.119	0.000	45.62	1.819	23.45	0.039	0.031	157.3	146.1	97.51	23.72	0.819
16:41	17.422	8.709	0.070	0.117	0.000	47.40	1.803	22.82	0.036	0.032	152.8	141.9	98.42	24.23	0.836
16:58	18.119	8.269	0.105	0.129	0.000	46.29	1.953	23.54	0.047	0.036	159.9	148.5	98.48	23.98	0.828
17:16	17.952	7.733	0.101	0.111	0.000	46.15	1.804	24.57	0.038	0.030	160.5	149.3	98.49	23.96	0.827
17:33	17.976	8.026	0.122	0.121	0.000	46.60	1.885	24.25	0.045	0.033	161.1	149.8	99.05	24.15	0.834
17:50	17.674	9.033	0.067	0.117	0.000	47.66	1.801	22.60	0.038	0.033	152.8	141.9	99.02	24.39	0.842
18:24	18.232	8.004	0.064	0.119	0.000	45.62	1.791	24.43	0.037	0.032	160.4	149.1	98.32	23.88	0.824
18:41	18.751	7.271	0.074	0.117	0.000	44.73	1.803	25.54	0.039	0.031	165.9	154.4	98.36	23.64	0.816
18:58	18.325	7.554	0.109	0.129	0.000	45.48	1.933	24.61	0.046	0.034	163.8	152.3	98.22	23.74	0.820
19:15	17.958	7.966	0.073	0.115	0.000	46.09	1.766	24.25	0.039	0.029	158.7	147.6	98.28	23.94	0.826
19:32	18.635	6.966	0.078	0.119	0.000	44.73	1.792	25.99	0.040	0.031	166.9	155.5	98.38	23.63	0.816
19:49	18.833	6.897	0.105	0.116	0.000	44.44	1.836	26.07	0.044	0.029	168.7	157.1	98.37	23.56	0.813
20:23	18.160	7.145	0.119	0.117	0.000	45.42	1.874	25.39	0.044	0.029	165.0	153.6	98.31	23.75	0.820
20:40	18.814	6.714	0.088	0.109	0.000	44.64	1.767	26.14	0.039	0.028	167.6	156.1	98.35	23.53	0.812
20:57	17.290	8.492	0.117	0.118	0.000	47.19	1.795	23.05	0.046	0.030	153.9	143.1	98.12	24.15	0.834
21:14	16.676	8.875	0.088	0.101	0.477	48.73	1.639	21.52	0.037	0.026	144.3	134.0	98.17	24.42	0.843
21:31	16.686	8.989	0.044	0.103	0.000	48.06	1.613	22.60	0.029	0.028	146.8	136.6	98.16	24.42	0.843
21:48	17.683	7.992	0.076	0.111	0.000	46.46	1.710	24.19	0.039	0.030	157.0	146.1	98.29	24.02	0.829

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/25/1984															
22: 5	16.775	7.914	0.062	0.102	0.753	48.24	1.602	22.84	0.033	0.028	148.1	137.8	98.35	24.31	0.839
22:22	17.488	8.474	0.056	0.108	0.000	47.06	1.680	23.33	0.033	0.029	152.8	142.1	98.26	24.15	0.833
22:39	16.994	7.943	0.084	0.097	0.000	47.60	1.600	23.81	0.033	0.026	152.1	141.7	98.19	24.18	0.835
22:56	17.981	7.596	0.067	0.108	0.300	46.44	1.690	23.92	0.036	0.029	156.6	145.6	98.17	23.86	0.824
23:13	17.244	7.901	0.134	0.097	0.000	47.12	1.656	23.91	0.040	0.025	154.8	144.1	98.13	24.09	0.831
23:30	17.190	7.535	0.121	0.103	0.000	47.02	1.699	24.32	0.038	0.027	156.2	145.5	98.05	24.01	0.829
23:48	17.223	7.751	0.151	0.110	0.000	47.08	1.795	23.90	0.044	0.029	156.8	145.9	98.08	24.04	0.830
6/26/1984															
0: 5	16.874	7.917	0.140	0.101	0.000	47.65	1.724	23.65	0.039	0.026	153.6	143.0	98.12	24.17	0.834
0:22	16.513	8.108	0.166	0.106	0.000	48.15	1.777	23.05	0.045	0.027	151.7	141.2	97.93	24.24	0.837
0:39	16.789	7.841	0.154	0.098	0.000	47.63	1.745	23.58	0.041	0.025	153.5	142.9	97.90	24.12	0.833
0:57	17.452	7.440	0.121	0.112	0.000	46.54	1.786	24.46	0.043	0.029	158.7	147.8	97.98	23.90	0.825
1:14	16.725	7.868	0.146	0.109	0.075	47.87	1.739	23.43	0.047	0.027	153.0	142.5	98.03	24.18	0.835
1:31	16.416	8.318	0.135	0.096	0.000	48.37	1.700	22.90	0.036	0.023	149.1	138.9	98.00	24.32	0.840
1:48	16.891	8.295	0.167	0.120	0.000	47.77	1.874	22.80	0.049	0.030	153.5	142.7	98.00	24.18	0.835
2:20	16.256	8.826	0.178	0.103	0.000	49.87	1.767	22.51	0.051	0.030	149.4	139.0	99.59	24.89	0.859
2:37	17.785	8.348	0.165	0.141	0.000	46.36	1.992	23.33	0.064	0.044	160.3	148.9	98.23	24.01	0.829
2:54	17.429	8.676	0.176	0.134	0.000	47.22	2.015	22.24	0.055	0.038	155.7	144.4	97.99	24.08	0.831
3:11	17.035	8.079	0.156	0.103	0.000	47.43	1.736	23.32	0.044	0.026	153.6	142.9	97.93	24.10	0.832
3:28	16.152	8.399	0.140	0.096	0.000	48.76	1.622	22.64	0.044	0.028	147.1	137.0	97.88	24.38	0.842
3:45	16.936	8.231	0.133	0.109	0.000	47.74	1.752	22.98	0.047	0.034	152.3	141.7	97.97	24.16	0.834
4: 3	16.532	8.778	0.128	0.103	0.000	48.55	1.666	22.07	0.045	0.025	146.8	136.5	97.89	24.34	0.840
4:20	13.751	9.911	0.145	0.083	0.144	52.78	1.521	19.37	0.034	0.020	127.2	118.4	97.75	25.23	0.871
4:37	15.075	8.660	0.155	0.087	0.443	50.80	1.565	21.02	0.038	0.021	137.5	128.1	97.86	24.72	0.853
4:54	15.968	8.864	0.127	0.099	0.000	49.25	1.627	21.96	0.039	0.026	144.0	134.0	97.96	24.53	0.847
5:11	15.889	9.012	0.131	0.103	0.000	49.49	1.661	21.60	0.042	0.027	143.2	133.2	97.96	24.57	0.848
5:28	15.658	8.783	0.090	0.089	0.318	49.89	1.491	21.60	0.034	0.022	139.5	129.9	97.98	24.63	0.850
5:45	16.147	8.774	0.131	0.102	0.000	48.94	1.643	22.04	0.041	0.026	145.2	135.1	97.85	24.43	0.843
6: 2	15.890	8.697	0.126	0.091	0.000	49.28	1.581	22.04	0.039	0.022	143.2	133.4	97.76	24.47	0.845
6:36	15.040	10.120	0.113	0.103	0.000	50.84	1.606	19.73	0.041	0.026	133.5	124.0	97.61	24.87	0.859
6:53	15.673	9.141	0.128	0.090	0.000	49.80	1.552	21.49	0.036	0.022	140.5	130.7	97.93	24.65	0.851
7:10	16.203	8.761	0.140	0.105	0.000	48.66	1.668	22.13	0.043	0.026	146.1	136.0	97.73	24.38	0.842
7:35	16.447	8.880	0.136	0.104	0.000	49.36	1.707	22.29	0.045	0.030	147.9	137.6	99.00	24.69	0.852
7:52	16.666	8.950	0.126	0.094	0.000	48.54	1.630	22.05	0.041	0.028	146.6	136.3	98.13	24.41	0.842
8:27	16.132	9.268	0.136	0.100	0.000	49.46	1.659	21.39	0.042	0.027	143.3	133.2	98.21	24.62	0.850
11:42	16.600	10.875	0.055	0.121	0.471	48.10	1.869	17.75	0.044	0.031	134.5	124.0	95.92	24.10	0.832
12:54	17.682	8.399	0.056	0.122	0.000	44.62	1.956	22.38	0.028	0.033	153.4	142.3	95.28	23.22	0.801
13:11	17.954	9.158	0.055	0.130	0.000	44.69	1.900	21.47	0.034	0.037	151.1	139.9	95.42	23.31	0.805
13:28	16.172	9.665	0.049	0.112	0.028	47.19	1.779	19.99	0.028	0.029	138.6	128.5	95.04	23.77	0.820
13:45	16.935	9.127	0.039	0.114	0.000	45.96	1.836	21.17	0.029	0.031	145.5	134.9	95.24	23.53	0.812
14: 2	18.452	9.691	0.057	0.129	0.000	44.51	2.095	20.62	0.032	0.030	151.8	140.2	95.62	23.30	0.804
14:19	16.432	9.781	0.045	0.120	0.000	47.01	1.876	19.79	0.031	0.033	140.1	129.7	95.12	23.73	0.819
14:36	16.718	8.945	0.042	0.116	0.000	45.69	1.856	21.41	0.029	0.032	145.8	135.3	94.83	23.44	0.809
14:53	17.602	8.368	0.041	0.111	0.000	45.08	1.911	22.06	0.028	0.033	151.2	140.2	95.23	23.22	0.802

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/26/1984															
15:10	17.533	8.346	0.042	0.108	0.000	45.34	1.848	22.20	0.028	0.031	150.7	139.8	95.48	23.32	0.805
15:27	17.631	8.255	0.042	0.108	0.000	45.99	1.792	22.70	0.028	0.033	152.1	141.2	96.58	23.59	0.814
16: 2	17.476	7.607	0.046	0.104	0.000	44.87	1.697	23.71	0.027	0.029	153.8	143.1	95.57	23.25	0.803
16:19	17.372	7.598	0.039	0.104	0.000	44.78	1.705	23.58	0.027	0.029	153.0	142.3	95.23	23.18	0.800
16:36	17.199	7.719	0.037	0.100	0.000	45.17	1.640	23.36	0.026	0.028	151.0	140.5	95.28	23.27	0.803
17:10	17.109	8.014	0.042	0.106	0.000	45.38	1.683	22.96	0.028	0.031	150.1	139.6	95.36	23.36	0.806
17:27	17.219	7.758	0.051	0.106	0.000	45.26	1.691	23.32	0.027	0.032	151.8	141.2	95.46	23.32	0.805
17:44	17.368	7.464	0.058	0.105	0.000	45.00	1.684	23.71	0.026	0.032	153.6	142.9	95.45	23.23	0.802
18: 1	16.647	8.400	0.051	0.104	0.000	46.72	1.650	21.98	0.026	0.033	145.2	135.0	95.61	23.61	0.815
18:18	15.891	7.816	0.046	0.097	1.153	48.01	1.532	21.27	0.024	0.031	139.0	129.3	95.87	23.85	0.823
18:36	16.262	8.655	0.041	0.103	0.000	46.70	1.578	21.78	0.027	0.033	142.4	132.5	95.17	23.64	0.816
18:53	17.468	7.731	0.042	0.100	0.000	45.77	1.552	23.75	0.026	0.032	152.3	141.8	96.47	23.55	0.813
19:17	16.270	9.241	0.039	0.103	0.000	48.36	1.563	21.23	0.027	0.029	140.5	130.5	96.87	24.21	0.836
19:34	15.433	10.025	0.037	0.101	0.000	49.14	1.502	19.72	0.026	0.029	132.2	122.7	96.01	24.32	0.839
19:51	15.958	8.763	0.034	0.094	0.000	47.30	1.450	21.86	0.024	0.025	139.9	130.2	95.51	23.84	0.823
20:26	17.123	7.729	0.036	0.095	0.000	45.61	1.485	23.87	0.024	0.026	150.6	140.3	96.00	23.51	0.812
20:43	16.988	7.643	0.035	0.093	0.000	45.66	1.484	23.87	0.024	0.025	150.0	139.8	95.82	23.48	0.811
21: 0	17.480	7.401	0.036	0.097	0.000	45.04	1.591	24.18	0.025	0.026	153.8	143.3	95.88	23.32	0.805
21:17	17.809	7.055	0.038	0.102	0.000	44.59	1.634	24.73	0.026	0.028	157.3	146.5	96.01	23.21	0.801
21:34	17.614	7.304	0.038	0.100	0.000	44.78	1.594	24.29	0.026	0.028	154.8	144.1	95.77	23.24	0.802
21:51	17.284	7.286	0.037	0.099	0.000	45.13	1.548	24.42	0.025	0.027	153.6	143.2	95.86	23.35	0.806
22: 8	17.238	6.871	0.036	0.093	0.000	45.13	1.514	24.51	0.024	0.025	153.2	142.8	95.44	23.18	0.800
22:25	17.671	6.690	0.035	0.095	0.000	44.15	1.550	25.26	0.024	0.026	157.4	146.8	95.50	23.05	0.796
22:42	18.460	6.655	0.037	0.096	0.000	45.11	1.541	25.90	0.024	0.026	162.0	151.0	97.85	23.50	0.811
22:59	17.718	6.813	0.036	0.097	0.000	44.72	1.551	25.14	0.025	0.026	157.3	146.6	96.12	23.23	0.802
23:17	18.476	6.711	0.039	0.096	0.000	45.78	1.539	25.91	0.025	0.026	162.1	151.1	98.61	23.72	0.819
23:35	18.597	6.342	0.041	0.094	0.000	45.42	1.532	26.38	0.026	0.026	164.0	152.9	98.46	23.59	0.814
23:53	20.072	5.682	0.043	0.095	0.000	43.41	1.517	28.33	0.027	0.026	174.9	163.1	99.20	23.31	0.805
6/27/1984															
0:11	17.807	6.416	0.037	0.088	0.000	46.78	1.405	24.62	0.026	0.025	154.3	143.8	97.20	23.47	0.810
0:28	19.492	6.613	0.042	0.096	0.000	43.48	1.494	27.03	0.034	0.031	168.9	157.4	98.31	23.36	0.807
1: 4	18.999	6.161	0.040	0.097	0.000	44.69	1.538	27.03	0.027	0.031	167.6	156.3	98.62	23.50	0.811
2: 9	17.951	5.781	0.039	0.099	1.679	46.87	1.508	25.63	0.028	0.028	159.4	148.6	99.61	24.06	0.830
2:26	18.215	5.949	0.042	0.102	0.000	42.86	1.562	26.92	0.030	0.030	165.1	154.2	95.71	22.85	0.789
2:43	18.747	5.776	0.042	0.103	0.000	42.75	1.567	27.37	0.030	0.030	168.3	157.1	96.42	22.88	0.790
3:17	18.304	6.182	0.042	0.103	0.000	43.22	1.576	26.41	0.030	0.031	163.9	152.9	95.90	22.92	0.791
3:34	17.546	6.651	0.039	0.095	0.000	44.82	1.400	25.44	0.028	0.027	156.3	145.8	96.04	23.25	0.803
3:40	18.810	5.600	0.041	0.102	0.000	42.77	1.557	27.70	0.030	0.030	169.5	158.2	96.64	22.90	0.791
3:51	17.873	6.105	0.038	0.093	0.000	43.37	1.428	26.51	0.027	0.027	161.0	150.4	95.47	22.91	0.791
4: 8	17.401	5.216	0.038	0.091	1.380	44.96	1.382	25.86	0.026	0.026	156.8	146.5	96.39	23.21	0.801
4:25	18.650	5.364	0.041	0.096	0.000	42.76	1.477	27.90	0.028	0.028	168.6	157.5	96.35	22.83	0.788
4:42	18.309	5.692	0.042	0.097	0.000	43.13	1.467	27.31	0.028	0.028	165.6	154.7	96.10	22.91	0.791
4:59	17.631	6.404	0.039	0.095	0.000	44.39	1.408	26.27	0.027	0.028	159.3	148.8	96.29	23.26	0.803
5:16	18.123	5.858	0.037	0.093	0.000	43.89	1.412	27.27	0.027	0.027	164.0	153.3	96.74	23.17	0.800

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/27/1984															
5:33	17.869	5.681	0.038	0.093	0.000	43.25	1.409	27.36	0.029	0.027	163.5	152.9	95.75	22.93	0.791
5:50	18.299	5.284	0.038	0.089	0.000	43.35	1.362	28.33	0.026	0.025	167.4	156.6	96.80	23.05	0.796
6: 7	17.199	5.064	0.037	0.086	1.554	45.56	1.299	26.10	0.025	0.024	155.9	145.8	96.95	23.41	0.808
6:24	18.044	5.709	0.036	0.091	0.000	44.08	1.361	27.54	0.026	0.026	164.0	153.4	96.92	23.22	0.801
6:41	19.046	5.316	0.038	0.088	0.000	44.38	1.357	28.79	0.027	0.025	171.3	160.1	99.07	23.50	0.811
6:59	19.228	6.045	0.037	0.088	0.000	44.16	1.347	28.09	0.026	0.026	169.5	158.3	99.05	23.56	0.813
7:17	17.768	6.356	0.036	0.088	0.000	45.27	1.318	26.81	0.026	0.026	160.3	149.9	97.69	23.62	0.815
7:46	17.520	6.979	0.036	0.092	0.202	46.67	1.389	26.62	0.026	0.032	159.8	149.4	99.57	24.31	0.839
10:22	18.186	5.170	0.041	0.091	0.000	43.40	1.306	28.28	0.029	0.026	166.5	155.8	96.53	22.99	0.794
10:39	18.889	5.143	0.042	0.088	0.000	44.58	1.264	29.01	0.028	0.025	170.6	159.6	99.07	23.52	0.812
10:56	19.044	5.168	0.045	0.093	0.000	44.39	1.331	29.02	0.029	0.026	172.0	160.9	99.15	23.50	0.811
11:14	18.710	5.202	0.046	0.089	0.000	44.72	1.291	28.82	0.029	0.025	169.8	158.9	98.94	23.54	0.813
11:32	18.091	5.494	0.049	0.088	0.000	44.52	1.274	27.81	0.029	0.025	164.4	153.8	97.38	23.31	0.805
11:49	19.957	5.210	0.046	0.091	0.000	41.24	1.318	29.40	0.030	0.026	176.0	164.5	97.32	22.76	0.786
12: 7	19.451	5.147	0.047	0.088	0.221	44.00	1.253	28.92	0.025	0.000	171.4	160.2	99.15	23.41	0.808
12:25	17.920	5.545	0.046	0.095	0.000	44.62	1.317	27.69	0.030	0.031	164.1	153.6	97.30	23.34	0.806
12:43	18.536	5.381	0.048	0.090	0.150	45.23	1.299	28.01	0.031	0.029	166.9	156.0	98.80	23.58	0.814
13: 0	17.473	5.688	0.050	0.087	0.000	43.37	1.258	27.10	0.032	0.026	160.0	149.8	95.08	22.86	0.789
13:17	17.351	6.370	0.053	0.094	0.000	44.10	1.292	26.29	0.033	0.027	157.6	147.3	95.60	23.15	0.799
13:34	18.412	6.017	0.046	0.098	0.000	45.66	1.345	27.32	0.032	0.029	164.9	154.0	98.96	23.75	0.820
13:52	18.369	5.887	0.046	0.094	0.000	45.28	1.343	27.35	0.031	0.028	164.7	153.9	98.43	23.59	0.814
14:10	17.561	6.245	0.040	0.088	0.595	46.68	1.254	25.85	0.029	0.027	156.0	145.8	98.36	23.87	0.824
14:27	17.847	6.006	0.044	0.097	0.000	44.43	1.359	26.95	0.031	0.028	161.9	151.3	96.80	23.29	0.804
14:44	18.866	5.655	0.047	0.098	0.000	44.55	1.375	28.09	0.031	0.028	169.1	158.0	98.74	23.51	0.811
15: 2	18.708	5.482	0.045	0.095	0.000	44.50	1.358	28.10	0.031	0.027	168.3	157.3	98.34	23.41	0.808
15:20	18.914	5.347	0.048	0.100	0.000	44.65	1.374	28.61	0.032	0.028	171.0	159.8	99.10	23.55	0.813
15:56	19.047	4.785	0.038	0.084	0.000	43.31	1.185	29.85	0.029	0.027	172.9	162.0	98.36	23.24	0.802
16:14	18.478	5.036	0.037	0.077	0.000	45.06	1.109	29.40	0.026	0.027	168.7	158.1	99.25	23.68	0.818
18:17	17.297	5.940	0.046	0.094	0.000	44.33	1.337	26.61	0.031	0.028	158.8	148.5	95.71	23.12	0.798
18:34	17.525	5.520	0.047	0.097	0.000	43.63	1.362	27.19	0.032	0.029	161.8	151.3	95.44	22.91	0.791
18:51	17.776	5.592	0.051	0.103	0.000	43.55	1.434	27.22	0.032	0.028	163.5	152.9	95.79	22.95	0.792
19: 8	18.160	5.365	0.052	0.109	0.000	43.01	1.438	27.43	0.034	0.029	165.7	154.8	95.62	22.76	0.786
19:25	18.068	5.429	0.056	0.103	0.000	43.15	1.362	27.33	0.034	0.027	164.2	153.5	95.56	22.79	0.787
19:41	18.030	5.501	0.053	0.102	0.000	43.35	1.325	27.32	0.032	0.027	163.5	152.9	95.74	22.87	0.789
19:58	17.539	5.369	0.049	0.098	0.533	44.24	1.421	26.45	0.030	0.026	159.9	149.5	95.75	22.99	0.793
20:16	18.119	5.340	0.051	0.102	0.000	43.03	1.363	27.47	0.032	0.027	164.7	154.0	95.53	22.75	0.785
21:42	18.559	5.525	0.050	0.099	0.000	44.30	1.461	27.38	0.031	0.027	166.7	155.7	97.43	23.19	0.800
22: 0	18.220	5.247	0.047	0.093	0.234	44.83	1.366	27.39	0.029	0.026	164.4	153.7	97.48	23.27	0.803
22:17	18.411	5.345	0.049	0.099	0.000	44.38	1.421	27.75	0.030	0.027	167.0	156.1	97.51	23.22	0.802
22:34	18.768	5.036	0.050	0.098	0.000	43.90	1.446	28.18	0.030	0.027	169.8	158.7	97.54	23.09	0.797
22:52	18.672	5.017	0.049	0.093	0.000	44.13	1.396	28.18	0.029	0.026	168.8	157.8	97.60	23.13	0.798
23: 9	18.327	5.028	0.049	0.095	0.000	44.19	1.374	28.10	0.030	0.026	167.3	156.5	97.22	23.12	0.798
23:26	18.555	5.179	0.051	0.104	0.000	43.91	1.493	27.76	0.032	0.029	168.4	157.4	97.11	23.04	0.795
23:44	18.480	5.198	0.050	0.098	0.000	44.36	1.433	27.79	0.031	0.028	167.5	156.5	97.46	23.17	0.800

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/28/1984															
0: 1	18.323	5.202	0.049	0.094	0.000	44.41	1.352	27.95	0.030	0.026	166.6	155.8	97.44	23.21	0.801
0:18	17.971	5.421	0.049	0.097	0.000	44.66	1.372	27.47	0.031	0.028	164.2	153.5	97.10	23.24	0.802
0:36	18.056	5.149	0.047	0.092	0.000	44.52	1.333	27.92	0.029	0.027	165.3	154.7	97.17	23.20	0.801
0:53	18.041	5.212	0.043	0.088	0.000	44.88	1.294	27.89	0.028	0.025	164.6	154.0	97.50	23.31	0.805
1:10	18.491	4.480	0.051	0.097	0.000	43.67	1.362	29.05	0.031	0.028	170.9	160.0	97.26	23.00	0.794
1:28	18.687	4.533	0.054	0.099	0.000	43.41	1.434	28.87	0.032	0.028	171.8	160.7	97.15	22.92	0.791
1:45	18.100	5.023	0.047	0.096	0.000	44.41	1.350	28.22	0.030	0.028	166.7	156.0	97.30	23.20	0.801
2: 2	18.264	4.720	0.049	0.095	0.000	43.94	1.336	28.70	0.031	0.028	168.7	158.0	97.17	23.08	0.797
2:20	18.270	4.865	0.050	0.099	0.000	43.89	1.412	28.36	0.032	0.029	168.5	157.7	97.02	23.05	0.796
2:37	18.357	4.596	0.050	0.093	0.000	43.97	1.347	28.77	0.030	0.026	169.2	158.4	97.24	23.05	0.796
2:54	18.186	4.602	0.053	0.093	0.000	43.89	1.311	28.84	0.032	0.027	168.6	158.0	97.03	23.04	0.795
3:12	18.135	5.074	0.055	0.102	0.069	44.21	1.405	27.96	0.034	0.030	166.9	156.1	97.08	23.14	0.799
3:29	16.953	4.983	0.055	0.106	0.000	45.87	1.483	27.46	0.034	0.031	162.4	152.1	96.97	23.39	0.807
3:47	18.302	5.150	0.054	0.102	0.000	44.03	1.441	27.77	0.033	0.030	167.2	156.3	96.91	23.05	0.796
4: 4	18.200	5.108	0.053	0.101	0.000	44.18	1.410	27.97	0.032	0.028	167.1	156.3	97.08	23.12	0.798
4:22	17.993	5.611	0.055	0.105	0.000	44.67	1.465	26.99	0.035	0.031	164.0	153.3	96.95	23.22	0.801
4:40	18.282	5.365	0.054	0.099	0.000	44.45	1.420	27.45	0.033	0.029	165.8	154.9	97.17	23.17	0.800
4:57	17.616	5.532	0.053	0.095	0.000	45.07	1.334	27.11	0.032	0.027	161.5	151.1	96.87	23.29	0.804
5:14	18.254	5.499	0.059	0.107	0.000	44.42	1.501	27.17	0.034	0.030	165.9	154.9	97.06	23.16	0.799
5:32	18.030	5.224	0.053	0.097	0.000	44.59	1.399	27.53	0.032	0.028	164.9	154.2	96.98	23.16	0.799
5:49	18.030	5.088	0.058	0.095	0.000	44.37	1.343	27.91	0.032	0.027	165.6	155.0	96.95	23.14	0.799
6: 7	17.839	5.453	0.057	0.102	0.283	45.04	1.465	26.68	0.033	0.029	162.5	151.8	96.99	23.25	0.803
6:24	18.122	5.138	0.055	0.093	0.000	44.35	1.361	27.76	0.031	0.026	165.5	154.8	96.93	23.11	0.798
6:41	18.003	5.144	0.060	0.091	0.000	44.70	1.325	27.87	0.032	0.026	165.1	154.5	97.25	23.24	0.802
6:59	17.883	5.258	0.063	0.098	0.000	44.51	1.377	27.60	0.031	0.027	164.6	154.0	96.85	23.17	0.800
7:16	18.310	5.060	0.060	0.096	0.000	44.15	1.388	27.93	0.033	0.027	167.1	156.2	97.05	23.08	0.797
7:34	18.056	4.977	0.059	0.095	0.000	44.26	1.362	28.01	0.033	0.027	166.2	155.6	96.88	23.09	0.797
7:51	17.683	4.870	0.062	0.091	0.000	44.32	1.290	28.07	0.033	0.026	164.4	154.0	96.44	23.05	0.796
8: 8	17.427	5.508	0.065	0.103	0.320	45.31	1.426	26.45	0.033	0.028	160.1	149.7	96.68	23.29	0.804
8:26	17.825	5.300	0.057	0.096	0.037	44.41	1.399	27.08	0.030	0.026	162.8	152.2	96.26	23.03	0.795
8:43	18.282	5.582	0.054	0.090	0.000	43.86	1.307	27.04	0.031	0.026	163.0	152.3	96.27	22.96	0.793
9: 1	17.863	5.990	0.052	0.089	0.000	44.42	1.259	26.41	0.030	0.025	159.1	148.6	96.14	23.11	0.798
9:18	18.578	5.536	0.055	0.095	0.000	43.50	1.368	27.33	0.032	0.026	165.7	154.7	96.52	22.94	0.792
9:35	18.890	5.109	0.055	0.094	0.000	42.89	1.354	27.99	0.031	0.026	168.6	157.6	96.43	22.77	0.786
9:53	18.703	5.035	0.056	0.090	0.000	43.21	1.304	28.19	0.030	0.024	168.0	157.1	96.64	22.87	0.789
10:10	17.883	6.046	0.062	0.097	0.445	44.97	1.365	25.65	0.034	0.027	158.2	147.6	96.57	23.24	0.802
10:28	18.999	5.406	0.059	0.100	0.000	43.34	1.430	27.83	0.033	0.028	169.5	158.3	97.23	23.00	0.794
10:45	18.999	5.000	0.057	0.093	0.000	43.63	1.376	28.40	0.031	0.026	170.5	159.4	97.61	23.05	0.796
11: 3	18.108	4.115	0.063	0.102	0.000	44.08	1.396	29.49	0.036	0.029	171.8	161.0	97.42	23.09	0.797
11:20	18.252	4.041	0.061	0.101	0.000	43.84	1.416	29.50	0.035	0.029	172.5	161.6	97.28	22.99	0.794
11:37	17.994	3.744	0.054	0.092	0.000	44.09	1.298	30.04	0.032	0.026	171.7	161.2	97.37	23.05	0.796
11:56	17.396	4.134	0.060	0.094	0.000	44.64	1.271	29.51	0.034	0.028	168.0	157.8	97.17	23.22	0.802
12:13	17.292	4.615	0.061	0.098	0.000	44.77	1.346	28.60	0.035	0.028	165.6	155.4	96.85	23.22	0.802
12:31	19.595	4.603	0.055	0.123	0.000	42.20	1.830	29.06	0.037	0.036	180.1	168.1	97.53	22.76	0.786
12:48	17.294	4.721	0.048	0.109	1.668	45.92	1.617	26.08	0.032	0.032	160.3	149.8	97.53	23.46	0.810
13: 5	18.119	5.526	0.049	0.115	0.000	43.97	1.684	27.63	0.033	0.034	168.8	157.8	97.16	23.20	0.801

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/28/1984															
13:23	16.786	6.318	0.046	0.080	0.000	46.62	1.107	26.16	0.026	0.023	152.9	143.1	97.16	23.74	0.820
13:40	17.699	5.125	0.053	0.091	0.000	44.76	1.244	28.12	0.031	0.025	164.0	153.6	97.15	23.29	0.804
13:58	18.165	4.769	0.052	0.091	0.000	44.03	1.301	28.55	0.031	0.026	167.4	156.8	97.01	23.07	0.796
14:15	17.914	4.962	0.056	0.093	0.000	44.40	1.302	28.33	0.032	0.027	166.1	155.5	97.12	23.20	0.801
14:32	18.179	4.645	0.056	0.092	0.000	44.04	1.300	28.85	0.032	0.026	168.5	157.9	97.22	23.11	0.798
14:50	17.927	4.663	0.059	0.088	0.000	44.13	1.238	28.81	0.032	0.025	166.9	156.4	96.97	23.11	0.798
15: 7	18.058	4.478	0.064	0.100	0.195	44.58	1.375	28.10	0.035	0.027	166.9	156.2	97.02	23.05	0.796
15:25	18.361	4.942	0.056	0.095	0.000	43.90	1.344	28.52	0.033	0.026	168.6	157.8	97.27	23.12	0.798
15:42	18.386	4.525	0.057	0.092	0.000	43.70	1.313	29.08	0.031	0.024	170.0	159.3	97.20	23.03	0.795
16:17	18.674	4.682	0.063	0.100	0.000	43.41	1.415	28.83	0.035	0.027	171.6	160.5	97.23	22.98	0.793
16:34	18.465	4.473	0.061	0.095	0.000	43.64	1.347	29.16	0.033	0.026	171.1	160.2	97.30	23.02	0.795
16:40	18.485	4.570	0.063	0.101	0.000	43.40	1.365	29.13	0.035	0.026	171.4	160.5	97.17	23.00	0.794
16:52	18.228	4.714	0.062	0.095	0.000	43.83	1.312	28.82	0.034	0.026	168.9	158.2	97.12	23.08	0.797
6/29/1984															
9:58	18.023	4.572	0.061	0.097	0.000	43.93	1.255	29.61	0.037	0.029	170.4	159.8	97.62	23.25	0.803
10:16	18.281	5.084	0.065	0.107	0.000	43.92	1.413	28.71	0.038	0.031	170.3	159.4	97.65	23.26	0.803
10:51	18.481	5.424	0.050	0.127	0.389	43.93	1.828	27.40	0.036	0.039	171.1	159.7	97.70	23.24	0.802
11: 9	17.704	6.024	0.046	0.117	0.460	45.19	1.672	26.41	0.033	0.035	163.5	152.6	97.69	23.56	0.813
11:26	18.223	5.899	0.046	0.116	0.000	44.16	1.664	27.63	0.032	0.033	168.9	157.8	97.81	23.42	0.808
11:44	17.770	5.267	0.043	0.117	0.018	44.11	1.638	28.46	0.032	0.034	169.8	159.0	97.49	23.35	0.806
12:20	17.350	6.462	0.041	0.108	0.000	45.54	1.518	26.04	0.030	0.033	159.2	148.7	97.13	23.56	0.813
12:37	18.355	5.260	0.043	0.101	0.000	43.72	1.445	28.48	0.030	0.030	169.4	158.5	97.46	23.21	0.801
12:55	19.004	4.596	0.048	0.105	0.000	43.03	1.492	29.68	0.032	0.030	176.0	164.7	98.02	23.09	0.797
13:12	19.090	4.509	0.049	0.107	0.000	42.67	1.517	29.65	0.031	0.030	176.5	165.1	97.66	22.95	0.792
13:30	16.893	4.021	0.048	0.103	0.000	45.41	1.399	29.71	0.032	0.029	168.3	158.1	97.64	23.45	0.809
13:47	18.873	4.220	0.050	0.106	0.000	42.71	1.483	30.16	0.032	0.030	177.1	165.9	97.67	22.96	0.793
14: 4	18.380	4.832	0.044	0.099	0.000	43.48	1.404	29.15	0.030	0.028	171.1	160.3	97.44	23.13	0.799
14:22	17.823	5.335	0.047	0.099	0.000	44.42	1.351	28.50	0.030	0.028	166.8	156.2	97.64	23.42	0.808
14:39	18.004	5.377	0.044	0.102	0.000	44.09	1.405	28.37	0.031	0.029	167.5	156.8	97.45	23.32	0.805
14:56	18.298	5.296	0.046	0.102	0.000	43.70	1.434	28.40	0.030	0.029	168.9	158.0	97.33	23.20	0.801
15:14	18.442	4.809	0.045	0.097	0.000	43.57	1.371	29.32	0.029	0.026	171.5	160.6	97.71	23.19	0.801
15:31	18.652	4.537	0.047	0.100	0.000	42.97	1.396	29.82	0.030	0.026	174.1	163.1	97.58	23.06	0.796
15:49	18.557	4.562	0.049	0.104	0.000	43.06	1.440	29.61	0.031	0.027	173.8	162.8	97.44	23.04	0.795
16: 6	17.121	4.950	0.046	0.097	1.315	45.82	1.354	26.80	0.029	0.026	159.0	148.8	97.56	23.57	0.814
16:23	17.933	5.766	0.045	0.099	0.000	44.54	1.391	27.80	0.029	0.027	165.2	154.6	97.63	23.45	0.810
16:41	17.920	5.717	0.045	0.105	0.000	44.22	1.442	27.84	0.031	0.029	166.0	155.3	97.34	23.36	0.806
16:58	18.492	5.157	0.041	0.103	0.000	43.50	1.469	28.65	0.030	0.029	170.6	159.6	97.47	23.16	0.799
17:15	18.753	4.603	0.046	0.100	0.000	43.05	1.446	29.47	0.030	0.027	173.9	162.8	97.53	23.02	0.795
17:32	18.419	4.656	0.046	0.103	0.000	43.05	1.439	29.30	0.031	0.029	172.3	161.3	97.07	22.99	0.794
17:50	18.380	5.257	0.043	0.105	0.000	43.40	1.505	28.32	0.031	0.030	169.7	158.7	97.07	23.09	0.797
18: 7	17.834	5.863	0.043	0.099	0.087	44.49	1.422	27.16	0.029	0.028	163.1	152.5	97.06	23.33	0.805
18:27	18.308	5.022	0.043	0.100	0.000	43.54	1.414	29.06	0.030	0.030	170.8	159.9	97.55	23.21	0.801
18:44	18.833	4.404	0.043	0.101	0.000	42.51	1.469	29.69	0.030	0.030	175.1	163.9	97.11	22.85	0.789
19: 1	18.855	4.036	0.041	0.097	0.000	42.36	1.423	30.15	0.029	0.028	175.9	164.8	97.02	22.76	0.786

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV	TMP %	MW	S.G. WRT AIR
6/29/1984															
19:19	18.307	4.466	0.044	0.094	0.000	42.98	1.332	29.58	0.028	0.027	171.4	160.6	96.85	22.94	0.792
19:36	17.985	4.759	0.044	0.099	0.000	42.97	1.377	28.98	0.023	0.028	168.9	158.2	96.26	22.90	0.790
19:53	17.872	5.150	0.044	0.102	0.012	43.37	1.430	28.24	0.031	0.029	167.0	156.3	96.28	22.99	0.794
20:11	17.867	5.295	0.044	0.100	0.000	43.93	1.410	28.31	0.030	0.026	166.8	156.2	97.01	23.22	0.802
20:28	18.250	4.864	0.043	0.097	0.000	43.53	1.380	29.25	0.029	0.028	170.7	160.0	97.48	23.19	0.800
20:45	18.085	4.709	0.043	0.100	0.000	43.08	1.399	29.23	0.030	0.029	170.4	159.7	96.70	22.99	0.793
21: 3	18.496	4.571	0.045	0.104	0.000	42.70	1.479	29.39	0.031	0.029	173.2	162.2	96.84	22.88	0.790
21:20	18.365	4.971	0.043	0.103	0.000	43.11	1.466	28.79	0.030	0.029	170.6	159.7	96.90	23.00	0.794
21:37	18.769	4.882	0.045	0.101	0.028	44.61	1.473	28.84	0.029	0.000	171.4	160.4	98.77	23.40	0.808
21:55	18.816	4.753	0.046	0.108	0.030	43.29	1.526	29.25	0.031	0.000	173.6	162.5	97.85	23.11	0.798
22:12	18.661	4.269	0.045	0.107	0.028	43.57	1.535	29.58	0.031	0.000	174.2	163.1	97.83	23.06	0.796
22:29	19.166	4.183	0.044	0.110	0.029	42.74	1.545	30.13	0.032	0.000	177.8	166.4	97.98	22.96	0.792
22:46	19.324	4.438	0.044	0.118	0.030	42.76	1.672	29.70	0.034	0.000	178.4	166.8	98.12	22.98	0.793
23: 4	19.201	4.120	0.043	0.101	0.000	42.83	1.506	30.04	0.030	0.030	177.8	166.4	97.91	22.93	0.791
23:24	18.744	4.161	0.042	0.098	0.000	43.53	1.420	30.27	0.031	0.032	176.2	165.1	98.33	23.18	0.800
23:41	18.492	4.144	0.040	0.091	0.000	43.58	1.331	30.16	0.029	0.030	173.8	163.0	97.89	23.13	0.798
23:59	18.439	4.089	0.039	0.097	0.000	43.61	1.296	30.30	0.027	0.028	173.8	163.0	97.92	23.15	0.799
6/30/1984															
0:16	18.315	4.188	0.039	0.101	0.000	44.01	1.269	30.30	0.027	0.027	173.1	162.4	98.27	23.30	0.804
0:33	18.211	4.326	0.039	0.099	0.000	44.16	1.285	30.02	0.027	0.028	172.0	161.4	98.19	23.32	0.805
0:51	18.398	4.391	0.041	0.095	0.000	44.07	1.330	29.96	0.028	0.025	172.8	162.1	98.34	23.32	0.805
1: 8	18.387	4.401	0.042	0.094	0.000	44.05	1.344	29.88	0.029	0.028	172.8	162.0	98.26	23.30	0.804
1:29	18.519	4.490	0.044	0.096	0.000	44.27	1.376	29.95	0.032	0.037	174.1	163.2	98.81	23.43	0.809
1:46	18.604	4.448	0.044	0.098	0.000	43.79	1.404	29.81	0.033	0.033	174.2	163.2	98.26	23.25	0.802
2: 5	18.198	2.477	0.044	0.096	1.115	46.53	1.381	28.91	0.026	0.030	169.5	158.7	98.81	23.24	0.802
2:22	18.272	4.786	0.043	0.094	0.000	44.35	1.338	29.37	0.030	0.029	170.7	160.0	98.31	23.41	0.808
2:40	18.368	4.632	0.043	0.096	0.000	44.06	1.361	29.52	0.030	0.029	171.8	161.0	98.13	23.30	0.804
2:57	18.363	4.564	0.042	0.093	0.000	44.16	1.344	29.57	0.029	0.028	171.7	160.9	98.20	23.31	0.805
3:14	18.358	4.486	0.042	0.091	0.000	44.21	1.311	29.78	0.028	0.026	171.9	161.1	98.33	23.35	0.806
3:32	18.271	4.501	0.043	0.092	0.000	44.20	1.324	29.66	0.029	0.027	171.4	160.7	98.15	23.32	0.805
3:49	18.475	4.406	0.044	0.094	0.000	43.92	1.351	29.84	0.029	0.027	173.0	162.1	98.18	23.26	0.803
4: 6	18.530	4.201	0.045	0.092	1.138	45.76	1.304	28.22	0.029	0.026	167.5	156.6	99.34	23.58	0.814
4:24	17.928	4.733	0.043	0.093	0.000	44.54	1.324	29.24	0.027	0.027	168.9	158.4	97.96	23.39	0.807
4:41	18.381	4.543	0.045	0.099	0.000	43.91	1.403	29.58	0.030	0.029	172.6	161.7	98.01	23.25	0.803
4:58	18.725	4.383	0.044	0.098	0.000	43.75	1.430	29.69	0.030	0.028	174.2	163.2	98.18	23.18	0.800
5:16	18.465	4.389	0.043	0.095	0.000	43.86	1.363	29.67	0.029	0.028	172.6	161.7	97.93	23.18	0.800
6: 8	17.240	4.340	0.041	0.007	1.061	46.10	1.256	27.91	0.027	0.027	160.2	150.2	98.01	23.57	0.814
6:25	17.949	4.746	0.043	0.092	0.000	44.61	1.288	29.26	0.029	0.029	168.8	158.3	98.04	23.42	0.808
6:42	18.240	4.450	0.043	0.095	0.000	44.22	1.340	29.70	0.029	0.030	171.8	161.0	98.15	23.32	0.805
7:17	18.299	4.345	0.044	0.093	0.000	44.19	1.322	29.81	0.030	0.029	172.1	161.3	98.16	23.29	0.804
7:34	18.269	4.372	0.045	0.095	0.000	44.07	1.342	29.76	0.030	0.029	172.1	161.4	98.01	23.26	0.803
7:40	18.331	4.350	0.044	0.095	0.000	43.95	1.351	29.67	0.030	0.030	172.1	161.3	97.86	23.19	0.801
7:52	18.359	4.532	0.047	0.099	0.000	44.04	1.386	29.50	0.032	0.031	172.2	161.3	98.03	23.26	0.803
8: 9	17.687	4.260	0.045	0.093	0.991	45.69	1.330	28.15	0.030	0.029	164.8	154.4	98.30	23.51	0.812

GAS CHROMATOGRAPH DATA

DATE TIME	H2 %	CO2 %	C2H4 %	C2H6 %	O2 %	N2 %	CH4 %	CO %	C3H6 %	C3H8 %	HHV BTU/SCF	LHV BTU/SCF	TMP %	MW	S.G. WRT AIR
6/30/1984															
8:26	18.249	4.441	0.046	0.095	0.000	44.21	1.343	29.61	0.031	0.029	171.6	160.9	98.05	23.28	0.804
8:44	18.424	4.214	0.048	0.099	0.000	43.78	1.372	29.92	0.032	0.031	173.6	162.7	97.91	23.16	0.799
9: 1	18.480	4.493	0.048	0.103	0.000	43.99	1.419	29.56	0.032	0.031	173.2	162.3	98.16	23.25	0.803
9:19	18.430	4.932	0.048	0.102	0.000	44.18	1.423	28.89	0.032	0.031	170.9	160.0	98.08	23.31	0.805
9:37	18.670	4.788	0.048	0.107	0.000	43.79	1.496	29.09	0.034	0.034	173.3	162.1	98.06	23.22	0.801
9:54	18.177	5.434	0.047	0.108	0.000	44.35	1.501	27.84	0.033	0.033	167.7	156.8	97.52	23.30	0.804
10:12	17.050	4.756	0.042	0.095	1.257	46.02	1.316	26.89	0.029	0.029	158.6	148.5	97.48	23.54	0.813
10:29	18.184	4.968	0.046	0.102	0.000	44.00	1.409	28.73	0.031	0.031	169.4	158.6	97.50	23.22	0.802
10:46	18.325	5.045	0.045	0.102	0.000	44.06	1.436	28.61	0.031	0.031	169.7	158.8	97.69	23.25	0.803
11: 4	18.620	4.614	0.046	0.104	0.000	43.40	1.451	29.35	0.032	0.031	173.3	162.2	97.65	23.09	0.797
11:21	18.704	4.454	0.050	0.106	0.000	43.21	1.468	29.56	0.033	0.031	174.5	163.4	97.62	23.03	0.795
11:38	18.992	4.486	0.050	0.108	0.000	43.13	1.515	29.70	0.033	0.031	176.4	165.1	98.04	23.07	0.796
11:56	18.857	4.421	0.049	0.106	0.000	42.84	1.498	29.57	0.033	0.030	175.3	164.1	97.40	22.92	0.791
12:13	18.215	4.390	0.055	0.092	0.000	43.75	1.243	29.51	0.033	0.026	170.2	159.6	97.31	23.09	0.797
12:30	18.321	4.220	0.055	0.097	0.189	43.74	1.306	29.33	0.034	0.027	170.8	160.0	97.32	23.04	0.795
12:48	18.053	4.448	0.056	0.090	0.000	43.96	1.231	29.40	0.033	0.026	169.2	158.6	97.29	23.14	0.799
13: 5	17.849	4.514	0.059	0.092	0.000	44.10	1.228	29.28	0.033	0.025	168.2	157.8	97.17	23.17	0.800
14:15	18.306	4.850	0.065	0.099	0.000	43.98	1.368	28.64	0.036	0.029	169.4	158.6	97.38	23.14	0.799
14:50	18.045	4.599	0.065	0.095	0.000	44.14	1.279	29.25	0.036	0.029	169.5	158.9	97.54	23.23	0.802
15: 7	18.198	4.880	0.070	0.101	0.000	44.00	1.389	28.68	0.037	0.031	169.6	158.8	97.38	23.18	0.800
15:24	19.248	4.704	0.054	0.121	0.000	42.46	1.800	28.81	0.037	0.037	177.8	166.0	97.27	22.79	0.787
16:12	18.611	4.587	0.048	0.101	0.000	44.31	1.506	29.83	0.036	0.032	175.5	164.4	99.06	23.48	0.810
16:30	18.228	4.401	0.045	0.096	0.000	43.44	1.434	29.34	0.033	0.033	171.7	160.9	97.05	22.99	0.794

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SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:
6/19/1984						
21:38	70.0	29.2	0.7	0.0	395	
21:58	73.6	26.4	0.0	0.0	458	
22:18	73.3	25.1	1.6	0.0	473	
22:38	73.1	25.0	2.0	0.0	503	
22:58	73.3	25.1	1.6	0.0	511	
23:18	73.5	25.0	1.4	0.0	532	
23:38	73.6	24.6	1.8	0.0	534	
23:58	76.8	25.8	1.4	0.0	534	
6/20/1984						
0:18	73.1	24.6	2.3	0.0	514	
0:38	73.0	24.6	2.4	0.0	517	
0:58	72.9	24.6	2.5	0.0	537	
1:18	72.8	24.5	2.7	0.0	529	
1:38	72.6	24.6	2.8	0.0	531	
1:58	72.1	24.5	3.4	0.0	528	
2:18	72.3	24.6	3.1	0.0	508	
2:38	72.1	24.8	3.1	0.0	533	
2:58	71.8	24.9	3.3	0.0	544	
3:18	74.4	25.6	0.0	0.0	526	
3:38	74.3	25.7	0.0	0.0	516	
3:58	74.7	25.3	0.0	0.0	507	
4:18	72.9	24.9	2.2	0.0	526	
4:38	74.1	25.2	0.7	0.0	537	
4:58	74.4	25.2	0.4	0.0	516	
5:18	73.4	25.0	1.6	0.0	521	
7:59	69.0	27.1	3.9	0.0	465	
11:20	71.8	26.9	1.3	0.0	316	
11:40	72.6	27.4	0.0	0.0	314	
12: 0	71.5	26.8	1.7	0.0	323	
12:20	71.8	26.7	1.4	0.0	323	
12:40	70.7	27.0	2.3	0.0	338	
13: 0	71.1	26.7	2.3	0.0	337	
13:20	70.6	26.8	2.7	0.0	355	
13:40	70.4	25.9	3.7	0.0	345	
13:60	70.1	26.3	3.6	0.0	330	
14:20	71.8	27.4	3.8	0.0	339	
14:40	69.4	26.6	4.0	0.0	339	
15: 0	69.4	26.4	4.2	0.0	338	
15:20	69.8	25.9	4.3	0.0	357	
15:40	69.2	26.7	4.1	0.0	363	
16: 0	68.5	27.6	3.9	0.0	349	
16:20	68.3	27.4	4.4	0.0	369	
16:41	68.4	27.1	4.5	0.0	355	
17: 1	68.4	27.3	4.3	0.0	343	
17:21	68.6	27.6	3.7	0.0	347	
17:41	68.3	27.7	4.0	0.0	345	

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SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:
6/20/1984						
18: 1	71.3	28.7	0.0	0.0	337	
18:21	70.8	29.2	0.0	0.0	344	
19: 1	68.4	27.6	4.0	0.0	366	
21:41	69.4	27.7	2.8	0.0	385	
22: 1	68.5	28.8	2.7	0.0	367	
22:21	69.2	27.4	3.4	0.0	412	
22:41	69.2	27.4	3.3	0.0	419	
23: 1	69.2	27.1	3.7	0.0	406	
23:21	68.8	27.5	3.7	0.0	400	
23:41	68.9	27.4	3.7	0.0	414	
6/21/1984						
0: 1	68.9	26.9	4.1	0.0	398	
0:21	68.8	27.7	3.6	0.0	400	
0:41	68.6	27.4	4.0	0.0	410	
1: 1	68.9	27.4	3.7	0.0	411	
1:21	69.7	28.0	2.3	0.0	385	
1:41	68.8	27.5	3.7	0.0	416	
2: 1	68.5	27.3	4.2	0.0	404	
2:21	69.3	27.3	3.3	0.0	407	
2:41	68.7	27.5	3.8	0.0	417	
3: 1	68.8	27.0	4.2	0.0	412	
3:21	68.7	27.3	4.0	0.0	413	
3:41	68.2	28.0	3.8	0.0	399	
4: 1	68.8	27.6	3.6	0.0	411	
4:21	67.8	28.2	4.0	0.0	391	
4:41	70.9	29.1	0.0	0.0	418	
10:20	68.4	29.7	1.9	0.0	378	
10:40	68.2	29.3	2.5	0.0	385	
10:60	67.9	29.5	2.6	0.0	408	
11:20	68.1	29.0	2.9	0.0	416	
11:40	70.6	29.4	0.0	0.0	403	
12: 0	70.0	30.0	0.0	0.0	392	
12:20	68.0	28.1	3.8	0.0	404	
12:40	69.1	27.9	3.0	0.0	418	
13: 0	67.7	28.1	4.2	0.0	447	
13:20	70.8	29.2	0.0	0.0	415	
13:40	71.7	28.3	0.0	0.0	421	
14:20	68.4	28.9	2.6	0.0	427	
14:40	68.7	28.2	3.0	0.0	424	
15: 0	69.5	27.8	2.7	0.0	428	
15:20	68.1	28.3	3.6	0.0	425	
15:40	68.5	27.9	3.6	0.0	450	
16: 0	69.0	27.3	3.8	0.0	443	
16:20	68.1	27.4	4.4	0.0	430	
16:40	68.9	26.8	4.3	0.0	453	
16:60	69.5	26.1	4.4	0.0	459	

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SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:
6/21/1984						
17:20	68.8	27.0	4.2	0.0	456	
17:40	68.5	27.6	4.0	0.0	433	
23:41	70.3	29.7	0.0	0.0	411	
6/22/1984						
17:57	96.4	0.0	3.6	0.0	327	
18:17	74.7	25.3	0.0	0.0	437	
18:37	80.6	19.4	0.0	0.0	395	
19: 4	81.6	18.4	0.0	0.0	408	
19:24	81.5	18.5	0.0	0.0	427	
19:44	80.1	19.9	0.0	0.0	439	
20: 4	81.4	18.6	0.0	0.0	425	
20:24	82.2	17.8	0.0	0.0	464	
20:44	82.4	17.6	0.0	0.0	461	
21: 4	82.8	17.2	0.0	0.0	419	
21:24	83.4	16.6	0.0	0.0	450	
21:44	81.9	18.1	0.0	0.0	449	
22: 4	81.2	18.8	0.0	0.0	430	
23: 9	75.7	24.3	0.0	0.0	256	
23:24	80.1	19.9	0.0	0.0	425	
23:37	73.7	26.3	0.0	0.0	484	
23:57	80.5	19.5	0.0	0.0	402	
6/23/1984						
0:17	81.7	18.3	0.0	0.0	384	
0:37	82.4	17.6	0.0	0.0	399	
0:57	81.4	18.6	0.0	0.0	435	
1:17	81.4	18.6	0.0	0.0	456	
1:37	80.9	19.1	0.0	0.0	475	
1:57	82.0	18.0	0.0	0.0	458	
6/24/1984						
12:36	68.4	31.6	0.0	0.0	261	
12:53	79.0	21.0	0.0	0.0	217	
13:15	81.6	18.4	0.0	0.0	230	
13:36	83.5	16.5	0.0	0.0	256	
15:31	70.8	29.2	0.0	0.0	213	
17:28	72.8	27.2	0.0	0.0	253	
17:50	73.9	26.1	0.0	0.0	228	
18:50	65.5	34.5	0.0	0.0	179	
21:12	80.2	19.8	0.0	0.0	424	
6/25/1984						
0:25	73.5	26.5	0.0	0.0	219	
1: 1	63.2	36.8	0.0	0.0	192	

APPENDIX J

Continuous Output Transducer Data

These are averages of the continuous output transducer data averaged for the time periods over which material and energy balance calculations were made.

AVERAGE FROM PERIOD: 6/18/84 16:30 TO 6/19/84 8:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	22.094	%	1.400
CO2	10.066	%	0.591
O2	0.045	%	0.423
SIGMA	82.963	BTU/SCF	7.890
AG VEL	-0.004	SPH	0.004
GR VEL	0.063	RPD/T	0.142
T-701	18.882	DEG C	3.897
T-702	32.358	DEG C	3.738
T-703	60.148	DEG C	0.498
T-703A	49.448	DEG C	1.561
TT1-703	60.929	DEG C	0.163
TT2-703	60.504	DEG C	0.164
T-705	224.352	DEG C	16.506
T-706	148.645	DEG C	16.129
T-707	124.472	DEG C	16.532
T-710	15.634	DEG C	0.282
T-711	85.598	DEG C	4.973
T-712	17.285	DEG C	0.267
T-713	16.629	DEG C	0.321
T-715	139.247	DEG C	0.367
T-806	106.471	DEG C	16.425
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	159.099	DEG C	17.684
T-820	--OFF--	DEG C	
T-821	48.672	DEG C	3.445
T-822	50.439	DEG C	2.270
T-823	--OFF--	DEG C	
F-701	410.057	SCFM	1.422
F-715	402.635	LBS/HR	110.006
F-802	2998.920	SCFM	324.706
F-803	4421.558	SCFM	76.573
P-703	2.649	IN WC	0.491
P-705	0.394	IN WC	0.124
P-704	2.255	IN WC	0.396
P-706	0.457	IN WC	0.160
P-707	-7.502	IN WC	0.000
P-810	-0.066	IN WC	0.012

AVERAGE BASE TEMPERATURE 24.812

AVERAGE FROM PERIOD: 6/19/84 14:00 TO 6/20/84 8:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	30.802	%	1.335
CO2	6.038	%	0.558
O2	-0.041	%	0.155
SIGMA	145.270	BTU/SCF	11.644
AG VEL	-0.010	SPH	0.005
GR VEL	0.417	RPD/T	0.127
T-701	20.796	DEG C	2.504
T-702	33.316	DEG C	2.556
T-703	59.764	DEG C	0.388
T-703A	44.591	DEG C	3.647
TT1-703	60.041	DEG C	0.032
TT2-703	59.649	DEG C	0.035
T-705	191.426	DEG C	10.751
T-706	149.523	DEG C	5.618
T-707	136.985	DEG C	4.176
T-710	16.121	DEG C	0.338
T-711	82.053	DEG C	4.195
T-712	17.650	DEG C	0.436
T-713	17.170	DEG C	0.360
T-715	139.229	DEG C	0.428
T-806	124.326	DEG C	3.443
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	279.639	DEG C	23.509
T-820	--OFF--	DEG C	
T-821	60.410	DEG C	0.904
T-822	60.845	DEG C	1.086
T-823	--OFF--	DEG C	
F-701	604.627	SCFM	5.267
F-715	602.481	LBS/HR	78.833
F-802	3575.015	SCFM	904.482
F-803	4442.328	SCFM	56.114
P-703	3.124	IN WC	0.144
P-705	0.716	IN WC	0.067
P-704	2.409	IN WC	0.122
P-706	0.742	IN WC	0.080
P-707	-7.502	IN WC	0.000
P-810	-0.161	IN WC	0.010

AVERAGE BASE TEMPERATURE 24.038

AVERAGE FROM PERIOD: 6/20/84 14:00 TO 6/21/84 8:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	31.367	%	0.701
CO2	5.039	%	0.293
O2	-0.026	%	0.147
SIGMA	147.524	BTU/SCF	8.923
AG VEL	-0.015	SPH	0.003
GR VEL	0.411	RPD/T	0.028
T-701	22.443	DEG C	2.201
T-702	34.000	DEG C	2.054
T-703	58.379	DEG C	0.536
T-703A	47.565	DEG C	1.618
TT1-703	59.058	DEG C	0.158
TT2-703	58.674	DEG C	0.156
T-705	238.755	DEG C	12.347
T-706	190.335	DEG C	8.859
T-707	176.367	DEG C	7.675
T-710	15.701	DEG C	0.362
T-711	80.124	DEG C	7.064
T-712	17.252	DEG C	0.374
T-713	16.920	DEG C	0.389
T-715	142.644	DEG C	1.697
T-806	160.859	DEG C	6.769
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	299.301	DEG C	20.906
T-820	227.331	DEG C	6.799
T-821	56.864	DEG C	0.885
T-822	64.130	DEG C	1.139
T-823	--OFF--	DEG C	
F-701	905.263	SCFM	13.764
F-715	430.482	LBS/HR	137.059
F-802	3762.588	SCFM	261.242
F-803	6774.697	SCFM	251.632
P-703	5.018	IN WC	0.287
P-705	1.315	IN WC	0.130
P-704	3.704	IN WC	0.176
P-706	1.284	IN WC	0.142
P-707	-7.502	IN WC	0.000
P-810	-0.367	IN WC	0.020

AVERAGE BASE TEMPERATURE 23.592

AVERAGE FROM PERIOD: 6/21/84 9:00 TO 6/22/84 8:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	31.868	%	0.768
CO2	4.525	%	0.341
O2	-0.010	%	0.380
SIGMA	121.675	BTU/SCF	19.861
AG VEL	-0.009	SPH	0.002
GR VEL	0.632	RPD/T	0.103
T-701	22.555	DEG C	1.774
T-702	33.460	DEG C	1.635
T-703	58.199	DEG C	0.555
T-703A	46.200	DEG C	1.145
TT1-703	59.125	DEG C	0.044
TT2-703	58.720	DEG C	0.049
T-705	268.271	DEG C	21.617
T-706	219.832	DEG C	13.846
T-707	207.091	DEG C	11.797
T-710	15.609	DEG C	0.637
T-711	78.016	DEG C	5.468
T-712	16.946	DEG C	0.727
T-713	16.955	DEG C	0.634
T-715	138.433	DEG C	0.618
T-806	192.213	DEG C	10.693
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	341.023	DEG C	20.688
T-820	269.743	DEG C	19.637
T-821	55.903	DEG C	0.792
T-822	68.146	DEG C	1.038
T-823	71.039	DEG C	1.727
F-701	1198.172	SCFM	8.357
F-715	509.996	LBS/HR	626.307
F-802	3497.133	SCFM	311.802
F-803	6490.237	SCFM	281.186
P-703	8.300	IN WC	0.559
P-705	2.095	IN WC	0.146
P-704	6.205	IN WC	0.454
P-706	2.023	IN WC	0.153
P-707	-7.503	IN WC	0.000
P-810	-0.771	IN WC	0.024

AVERAGE BASE TEMPERATURE 22.367

AVERAGE FROM PERIOD: 6/22/84 9:00 TO 6/23/84 8:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	31.763	%	0.641
CO2	4.466	%	0.268
O2	-0.042	%	0.100
SIGMA	105.094	BTU/SCF	5.382
AG VEL	1.682	SPH	0.724
GR VEL	0.971	RPD/T	0.343
T-701	20.211	DEG C	3.628
T-702	30.582	DEG C	3.548
T-703	58.151	DEG C	0.960
T-703A	44.742	DEG C	1.673
TT1-703	59.128	DEG C	0.270
TT2-703	58.731	DEG C	0.265
T-705	281.874	DEG C	29.853
T-706	237.059	DEG C	20.428
T-707	226.418	DEG C	16.123
T-710	15.756	DEG C	0.528
T-711	77.845	DEG C	1.966
T-712	17.448	DEG C	0.595
T-713	18.124	DEG C	0.706
T-715	138.238	DEG C	1.902
T-806	213.636	DEG C	13.521
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	363.361	DEG C	11.395
T-820	321.798	DEG C	10.125
T-821	55.623	DEG C	1.573
T-822	67.928	DEG C	1.540
T-823	72.379	DEG C	2.313
F-701	1509.366	SCFM	23.986
F-715	888.260	LBS/HR	105.353
F-802	4442.141	SCFM	633.436
F-803	8621.121	SCFM	890.063
P-703	10.415	IN WC	0.490
P-705	0.936	IN WC	0.420
P-704	9.480	IN WC	0.424
P-706	1.153	IN WC	0.355
P-707	-7.502	IN WC	0.000
P-810	-0.981	IN WC	0.064

AVERAGE BASE TEMPERATURE 21.729

AVERAGE FROM PERIOD: 6/23/84 9:00 TO 6/24/84 7:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	29.634	%	1.409
CO2	6.284	%	0.925
O2	-0.008	%	0.118
SIGMA	99.303	BTU/SCF	9.451
AG VEL	9.096	SPH	2.316
GR VEL	1.114	RPD/T	0.372
T-701	18.744	DEG C	3.314
T-702	28.923	DEG C	3.083
T-703	58.958	DEG C	0.814
T-703A	52.368	DEG C	4.003
TT1-703	60.027	DEG C	0.417
TT2-703	59.641	DEG C	0.420
T-705	329.937	DEG C	54.375
T-706	270.527	DEG C	36.498
T-707	263.886	DEG C	33.492
T-710	16.183	DEG C	0.739
T-711	81.568	DEG C	4.769
T-712	17.872	DEG C	0.734
T-713	23.112	DEG C	1.718
T-715	138.706	DEG C	0.726
T-806	258.395	DEG C	33.618
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	541.013	DEG C	58.774
T-820	434.522	DEG C	38.268
T-821	66.061	DEG C	8.507
T-822	68.238	DEG C	1.413
T-823	75.974	DEG C	5.075
F-701	2072.165	SCFM	110.110
F-715	831.489	LBS/HR	226.444
F-802	4253.506	SCFM	543.824
F-803	8009.084	SCFM	482.743
P-703	18.464	IN WC	2.343
P-705	1.246	IN WC	0.316
P-704	17.218	IN WC	2.464
P-706	0.850	IN WC	0.446
P-707	-7.502	IN WC	0.000
P-810	-0.652	IN WC	0.221

AVERAGE BASE TEMPERATURE 22.961

AVERAGE FROM PERIOD: 6/24/84 14:00 TO 6/25/84 8:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	24.288	%	2.187
CO2	8.814	%	0.875
O2	0.317	%	0.379
SIGMA	138.480	BTU/SCF	15.467
AG VEL	10.684	SPH	5.405
GR VEL	1.083	RPD/T	0.409
T-701	18.758	DEG C	3.986
T-702	29.204	DEG C	3.832
T-703	59.873	DEG C	0.512
T-703A	49.810	DEG C	3.434
TT1-703	61.101	DEG C	0.052
TT2-703	60.694	DEG C	0.049
T-705	398.361	DEG C	86.724
T-706	331.408	DEG C	48.138
T-707	324.919	DEG C	45.133
T-710	16.324	DEG C	0.488
T-711	84.133	DEG C	3.764
T-712	18.029	DEG C	0.466
T-713	22.595	DEG C	1.349
T-715	138.700	DEG C	0.461
T-806	325.837	DEG C	55.385
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	443.582	DEG C	32.358
T-820	421.398	DEG C	12.730
T-821	63.334	DEG C	1.574
T-822	65.946	DEG C	2.210
T-823	71.212	DEG C	2.180
F-701	1680.253	SCFM	186.777
F-715	1641.668	LBS/HR	193.272
F-802	5071.011	SCFM	1050.209
F-803	6388.477	SCFM	571.292
P-703	18.819	IN WC	3.687
P-705	1.157	IN WC	0.128
P-704	17.662	IN WC	3.649
P-706	0.599	IN WC	0.079
P-707	-7.502	IN WC	0.000
P-810	-0.264	IN WC	0.056

AVERAGE BASE TEMPERATURE 23.424

AVERAGE FROM PERIOD: 6/25/84 8:00 TO 6/27/84 3:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	23.137	%	2.560
CO2	8.377	%	1.289
O2	0.126	%	0.580
SIGMA	139.594	BTU/SCF	23.992
AG VEL	3.056	SPH	2.939
GR VEL	0.887	RPD/T	0.367
T-701	24.156	DEG C	4.321
T-702	36.649	DEG C	4.297
T-703	60.253	DEG C	2.379
T-703A	47.758	DEG C	4.505
TT1-703	61.589	DEG C	1.461
TT2-703	61.156	DEG C	1.439
T-705	266.037	DEG C	86.790
T-706	198.725	DEG C	45.664
T-707	193.680	DEG C	40.029
T-710	16.665	DEG C	0.761
T-711	80.096	DEG C	7.736
T-712	18.265	DEG C	0.868
T-713	19.837	DEG C	1.556
T-715	139.549	DEG C	4.450
T-806	173.831	DEG C	37.051
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	281.322	DEG C	46.430
T-820	245.643	DEG C	82.618
T-821	63.863	DEG C	37.340
T-822	53.245	DEG C	5.346
T-823	60.590	DEG C	6.115
F-701	593.112	SCFM	25.688
F-715	683.940	LBS/HR	327.496
F-802	4251.058	SCFM	1490.921
F-803	4080.632	SCFM	1607.652
P-703	9.519	IN WC	2.545
P-705	0.993	IN WC	0.517
P-704	8.525	IN WC	2.409
P-706	0.944	IN WC	0.523
P-707	-7.502	IN WC	0.000
P-810	-0.161	IN WC	0.243

AVERAGE BASE TEMPERATURE 23.063

AVERAGE FROM PERIOD: 6/28/84 4:00 TO 6/29/84 10:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	28.330	%	3.258
CO2	5.222	%	0.790
O2	-0.048	%	0.934
SIGMA	162.450	BTU/SCF	21.811
AG VEL	-0.009	SPH	0.038
GR VEL	1.076	RPD/T	0.224
T-701	23.061	DEG C	3.643
T-702	32.949	DEG C	4.403
T-703	60.261	DEG C	6.324
T-703A	48.775	DEG C	5.603
TT1-703	66.737	DEG C	113.787
TT2-703	60.534	DEG C	2.573
T-705	335.210	DEG C	51.165
T-706	240.650	DEG C	29.188
T-707	271.524	DEG C	35.276
T-710	17.534	DEG C	1.962
T-711	77.735	DEG C	9.027
T-712	18.415	DEG C	1.997
T-713	19.676	DEG C	2.168
T-715	141.706	DEG C	14.784
T-806	257.632	DEG C	33.472
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	504.486	DEG C	68.241
T-820	422.238	DEG C	64.092
T-821	408.705	DEG C	267.653
T-822	66.741	DEG C	7.737
T-823	81.962	DEG C	12.053
F-701	1952.905	SCFM	469.799
F-715	1148.803	LBS/HR	222.733
F-802	4285.602	SCFM	904.979
F-803	6610.977	SCFM	1984.220
P-703	11.986	IN WC	3.925
P-705	2.239	IN WC	1.121
P-704	9.747	IN WC	3.122
P-706	1.120	IN WC	0.933
P-707	-7.509	IN WC	0.117
P-810	-0.996	IN WC	0.474

AVERAGE BASE TEMPERATURE 20.684

AVERAGE FROM PERIOD: 6/28/84 4:00 TO 6/29/84 10:00

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	28.330	%	3.258
CO2	5.222	%	0.790
O2	-0.048	%	0.934
SIGMA	162.450	BTU/SCF	21.811
AG VEL	-0.009	SPH	0.038
GR VEL	1.076	RPD/T	0.224
T-701	23.061	DEG C	3.643
T-702	32.949	DEG C	4.403
T-703	60.261	DEG C	6.324
T-703A	48.775	DEG C	5.603
TT1-703	66.737	DEG C	113.787
TT2-703	60.534	DEG C	2.573
T-705	335.210	DEG C	51.165
T-706	240.650	DEG C	29.188
T-707	271.524	DEG C	35.276
T-710	17.534	DEG C	1.962
T-711	77.735	DEG C	9.027
T-712	18.415	DEG C	1.997
T-713	19.676	DEG C	2.168
T-715	141.706	DEG C	14.784
T-806	257.632	DEG C	33.472
T-811	--OFF--	DEG C	
T-812	--OFF--	DEG C	
T-813	--OFF--	DEG C	
T-814	--OFF--	DEG C	
T-815	--OFF--	DEG C	
T-816	--OFF--	DEG C	
T-817	--OFF--	DEG C	
T-818	--OFF--	DEG C	
T-819	504.486	DEG C	68.241
T-820	422.238	DEG C	64.092
T-821	408.705	DEG C	267.653
T-822	66.741	DEG C	7.737
T-823	81.962	DEG C	12.053
F-701	1952.905	SCFM	469.799
F-715	1148.803	LBS/HR	222.733
F-802	4285.602	SCFM	904.979
F-803	6610.977	SCFM	1984.220
P-703	11.986	IN WC	3.925
P-705	2.239	IN WC	1.121
P-704	9.747	IN WC	3.122
P-706	1.120	IN WC	0.933
P-707	-7.509	IN WC	0.117
P-810	-0.996	IN WC	0.474

AVERAGE BASE TEMPERATURE 20.684

APPENDIX K

Stack Sampling Report

This is the report submitted by Interpoll, Inc., Circle Pines, Minnesota to the University of Minnesota Particle Technology Laboratory. The appendices to the stack sampling report have not been included here. The appendices include raw data and calculations.

Interpoll Inc.
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Telephone (612)786-6020

RESULTS OF THE JUNE 22, 1984, ABSALOKA/ROBINSON SUB-BITUMINOUS COAL TEST BURN EMISSION TESTS ON THE WELLMAN-GALUSHA GASIFIER AT THE TWIN CITIES RESEARCH CENTER IN MINNEAPOLIS, MINNESOTA

Submitted to:

UNIVERSITY OF MINNESOTA
Room 130 Mechanical Engineering Building
111 Church Street S.E.
Minneapolis, Minnesota 55455

Attention: David Y.H. Pui, Ph.D.

Approved by:

Perry Lonnes, Ph.D.
President

Report Number 4-1811
July 27, 1984

TABLE OF CONTENTS

ABBREVIATIONS

ACFM	actual cubic feet per minute
cc (ml)	cubic centimeter (milliliter)
DSCFM	standard cubic foot of dry gas per minute
DSML	dry standard milliliter
DEG-F (^{O}F)	degrees Fahrenheit
DIA.	diameter
FT/SEC	feet per second
GPM	gallons per minute
GR/ACF	grains per actual cubic foot
GR/DSCF	grains per dry standard cubic foot
g	gram
HP	horsepower
HRS	hours
IN.	inches
IN. HG.	inches of mercury
IN. WC.	inches of water
LB	pound
LB/DSCF	pounds per dry standard cubic foot
LB/HR	pounds per hour
LB/10^{6}BTU	pounds per million British Thermal Units heat input
LB/MMBTU	pounds per million British Thermal Units heat input
MW	megawatt
mg/DSCM	milligrams per dry standard cubic meter
microns (µm)	micrometer
MIN.	minutes
ohm-cm	ohm-centimeter
PPH	pounds per hour
PPM	parts per million
PSI	pounds per square inch
SQ. FT.	square feet
v/v	percent by volume
w/w	percent by weight

Standard conditions are defined as 68 ^{O}F (20 ^{O}C) and 29.92 IN. of mercury pressure.

1 INTRODUCTION

On June 22, 1984, Interpoll Inc. personnel conducted a series of flow rate and emission tests on the pilot low BTU Gasifier at the Bureau of Mines Twin Cities Research Center, Minneapolis, Minnesota. On-site testing was performed by a two-man team under the direction of J. Riedle. Coordination between testing activities and gasifier operation was provided by Dave Thimsen and Dick Pooler of Black, Sivalls and Bryson (BSB).

The unit tested is a six-foot, six-inch Wellman-Galusha, single stage, fixed-bed gasifier with an agitator. This gasifier has a nominal operating capacity of 30 10^6BTU/HR (bituminous coal). A combustion test chamber is attached to the gasifier and it also has a nominal capacity of 30 10^6BTU/HR. The combustion test chamber is a horizontral, cylindrical chamber, seven feet I.D. by 21 feet long, and exhausts through an impingement tray-type scrubber and an induced draft fan to a three-foot diameter stack. Most of the testing in this work was performed at the combustion test chamber outlet, however, flow determinations were performed at the forced draft fan outlet to allow assessment of the combustion air usage and in the stack to ascertain the total volumetric flow rate of the combustion products. During this test, Absaloka/Robinson sub-bituminous coal was gasified.

Particulate and sulfur dioxide determinations were performed in accordance with EPA Methods 1-6, CFR Title 40, Part 60, Appendix A (Revised July 1, 1983). A preliminary determination of the gas velocity profile was made before the first particulate run to allow selection of the appropriate nozzle diameter required for isokinetic sample withdrawal. An Interpoll sampling train which meets or exceeds specifications in the above-cited reference was used to collect particulate samples by means of a heated stainless steel-lined probe. A single diameter traverse was used in this work due to the high cost of installing a second test port at 90 degrees to the existing port.

The back half of the EPA Method 5 particulate sampling train was used to collect sulfur dioxide samples. This is the large impinger version specified in EPA Method 6 and provides for a complete stack traverse during sample collection. Collected sulfur dioxide samples were returned to the laboratory for sulfate analysis by the standard barium/Thorin I titration technique.

Nitric oxide concentrations in the flue gas were measured by means of a Monitor Labs chemiluminescent nitric oxide analyzer. Nitric oxide concentrations were read at each traverse point in the particulate determination. The nitric oxide concentrations were determined on a dry basis using the exhaust gas stream from the EPA Method 5 sampling train.

An integrated flue gas sample was extracted simultaneously with each particulate and sulfur dioxide sample using a specially designed gas sampling system. Integrated flue gas samples were collected in 44-liter Tedlar bags. After sampling was complete, the bags were sealed and returned to the laboratory for Orsat analysis. The integrity of the sample bags was insured by reading the oxygen concentration of the bag in the field immediately after sampling and again in the laboratory immediately prior to Orsat analysis using a Teledyne Model 320P oxygen analyzer.

Testing at the combustion chamber outlet test site was conducted from one test port on the combustion chamber outlet duct (see Appendix B). Each traverse point was sampled five minutes to give a total sampling time of 60 minutes per run. Test port and traverse port locations for the flow determinations are also given in Appendix B.

The important results of the tests are summarized in Section 2. Detailed results are presented in Section 3. Results of preliminary measurements, field data and all other supporting information are presented in the appendices.

2 SUMMARY AND DISCUSSION

The important results of the particulate test are presented in Table 1 and the SO_2 test in Table 2. As will be noted, the particulate emission factor averaged .134 LB/10^6BTU (as calculated by the oxygen F-factor method using oxygen content data derived from duplicate Orsat analysis of the integrated bag samples collected during each particulate determination). The SO_2 emission factor averaged 1.25 LB/10^6BTU.

The heat input to the combustion test chamber was estimated to average 24.5 10^6BTU/HR using the F-factor calculated from the producer gas composition together with the particulate emission factor and the particulate mass rates. This heat input rate was verified by the SO_2 emission factors and rates.

The results of the SO_2 determinations are given in Table 2. As will be noted, the SO_2 concentrations ranged from 198 to 226 ppm. The SO_2 emission rate was approximately 30 LB/HR and the SO_2 emission factor 1.25 LB/10^6BTU. This emission factor agrees with internal data for this fuel, however, it does not agree with emission factors calculated from the fuel sample analytical results of the "socalled" typical fuel analysis.

Nitric oxide concentrations ranged from 670 to 690 ppb (dry). Plume opacity was estimated to be zero, however, the readings could not be performed at the stack outlet due to the existence of condensed moisture at that point. Estimations are based on readings taken downwind after the condensed moisture had evaporated.

Volumetric flow rate determinations were performed at three different locations. The results of the flow rate determinations performed at the combustor outlet are given in Table 1 and ranged from 13,000 to 13,300 DSCFM. The flow geometry at this site is not conducive to accurate flow rate measurements (using an S-Type pitot will cause

substantial positive bias). The flow rate at the combustion air duct inlet was estimated at 6840 DSCFM. The flow rate at the stack test site was 11,800 DSCFM.

No difficulties were encountered in the field or in the laboratory evaluations of the particulate and flue gas samples. On the basis of the above fact and a complete review of the entire data and results, it is our opinion that the particulate and SO_2 emission factors reported herein are accurate and closely reflect the actual values which existed at the time the tests were performed.

Table 1. Summary of the Results of the June 22, 1984 Particulate Emission Test on the Combustor Outlet at the Bureau of Mines Coal Gasifier Plant Located in Minneapolis, Minnesota

ITEM	RUN 1	RUN 2	RUN 3
Time of test (HRS)	1120/1220	1300/1400	1440/1540
Estimated gas burning rate (DSCFM)	2310	2534	2310
Estimated heat input (MMBTU) *	23.7	26.0	23.7
Estimated percent of rated capacity	79.0	86.7	79.0
Volumetric flow			
ACTUAL (ACFM)	52900	52400	51800
STANDARD (DSCFM)	13300	13000	13200
Gas temperature (DEG-F)	1433	1429	1394
Moisture content (% v/v)	7.37	8.58	8.25
Gas composition (% v/v dry)			
carbon dioxide	5.80	6.15	6.10
oxygen	14.30	13.55	14.30
nitrogen	79.90	80.30	79.60
Oxygen analyzer (% v/v, dry)	13.71	13.91	14.12
Isokinetic variation (%)	100.0	101.2	101.1
Particulate concentration **			
ACTUAL (GR/ACF)	.008	.008	.006
STANDARD (GR/DSCF)	.031	.033	.023
Particulate mass rate (LB/HR) **	3.6	3.7	2.6
Particulate emission factor ** (LB/MMBTU)			
F-factor method (Orsat)	.15	.14	.11

* To combustor from producer gas
** Dry Catch only

Table 2. Summary of the Results of the June 22, 1984 Sulfur Dioxide Emission Test on the Combustor Outlet at the U of M/BOM-Coal Gasification Plant located in Minnespolis, Minnesota

ITEM	Run 1	Run 2	Run 3
Time of test (HRS)	1120-1220	1300-1400	1440-1540
SO2 concentration			
(PPM/dry)	213	247	236
(PPM/wet)	198	226	217
SO2 mass rate (LB/HR)	28	32	31
SO2 emission factor (LB/MMBTU)			
F-factor method	1.19	1.23	1.32

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition results (Orsat and moisture) are presented first followed by the computer printout of the particulate, sulfur dioxide, oxides of nitric, and visible emission data. Preliminary measurements including traverse point description are given in Appendices A and B.

The results have been calculated on a DEC PDP-11 Computer using standard Fortran programs. EPA-published equations have been used as the basis of the calculation techniques in these programs. It should be noted in interpreting these results that the particulate emission rates have been calculated by both the "concentration x flow" and the "ratio of areas" methods and the average reported. The average is the best estimate of the true value, since the bias introduced by anisokinetic sampling is approximately equal but of opposite sign in the two calculation techniques and thus cancels in the average.

3.1 Results of Orsat and Moisture Analysis

Test No. 1
Combustor Inlet

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1
Date of run	06/22/84
Dry basis (orsat)*	
carbon dioxide	.03
oxygen	20.90
carbon monoxide	.00
nitrogen	79.07
Wet basis (orsat)*	
carbon dioxide	.03
oxygen	20.40
carbon monoxide	.00
nitrogen	77.19
Moisture content	2.38
Dry molecular weight	28.84
Wet molecular weight	28.58
Specific gravity (relative to air)	.9873

* Ambient air; sample not measured.

FO .00

Test No. 1
Combustor Outlet

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1	Run 2	Run 3
Date of run	06/22/84	06/22/84	06/22/84
Dry basis (orsat)			
carbon dioxide	5.80	6.15	6.10
oxygen	14.30	13.55	14.30
carbon monoxide	.00	.00	.00
nitrogen	79.90	80.30	79.60
Wet basis (orsat)			
carbon dioxide	5.37	5.62	5.60
oxygen	13.25	12.39	13.12
carbon monoxide	.00	.00	.00
nitrogen	74.01	73.41	73.03
Moisture content	7.37	8.58	8.25
Dry molecular weight	29.50	29.53	29.55
Wet molecular weight	28.65	28.54	28.60
Specific gravity (relative to air)	.9897	.9857	.9877
Teledyne oxygen analyzer (velocity & time weighted avg.)	13.71	13.91	14.12
FO	1.14	1.20	1.08

Test No. 1
Scrubber Stack

Results of Orsat & Moisture Analysis -- Methods 3 & 4 (% v/v)

	Run 1
Date of run	06/22/84
Dry basis (orsat)	
carbon dioxide	5.80
oxygen	14.20
carbon monoxide	.00
nitrogen	80.00
Wet basis (orsat)	
carbon dioxide	3.59
oxygen	8.80
carbon monoxide	.00
nitrogen	49.58
Moisture content	38.02
Dry molecular weight	29.50
Wet molecular weight	25.13
Specific gravity (relative to air)	.8679

Test No. 1
Combustor Outlet

3.2 Results of Particulate Loading Determinations -- Method 5

	Run 1	Run 2	Run 3
Date of run	06/22/84	06/22/84	06/22/84
Time run start/end (HRS)	1120/1220	1300/1400	1440/1540
Pitot tube coefficient	.850	.850	.850
Water in sample			
condensate (ml)	54.0	70.0	69.0
silica gel (grams)	29.0	27.0	25.0
Total particulate material collected (grams) *	.1000	.1031	.0738
Meter correction coefficient	1.0052	1.0052	1.0052
Volume through gas meter			
at meter conditions...(CF)	51.70	52.15	52.72
standard conditions..(SCF)	49.15	48.68	49.22
Total sampling time (min)	60.0	60.0	60.0
Nozzle diameter (IN)	.502	.502	.502
Average stack gas temperature during determination (DEG-F)	1433	1429	1393
Volumetric flow			
actual.....(CFM)	52930	52403	51841
standard.....(DSCFM)	13314	13035	13190
Isokinetic variation (%)	100.0	101.2	101.1
Particle concentration			
actual.....(GR/ACF)	.0079	.0082	.0059
dry standard.....(GR/DSCF)	.0314	.0327	.0231
Particle mass flow (LB/HR)	3.58	3.67	2.63
Water mass flow (KLB/HR)	3.0	3.5	3.4
Emission factor (LB/MMBTU)			
by F factor (320-F)	.139	.148	.108
by F factor (orsat)	.151	.141	.111

* Dry Catch Only
F factor: Run 1 =10630.0 Run 2 =10630.0 Run 3 =10630.0
#AmCO/2

Test No. 1
Combustor Outlet

3.3 Results of Sulfur Dioxide Determinations -- Method 6

	Run 1	Run 2	Run 3
Date of run	6/22/84	6/22/84	6/22/84
Time run start/end (HRS)	1120/1220	1300/1400	1440/1540
Average stack gas temperature during determination (DEG-F)	1433	1429	1393
Barometric Pressure (IN.HG.)	29.21	29.21	29.21
Meter Temperature (DEG-F)	88.0	98.0	98.0
Meter correction coefficient	1.0052	1.0052	1.0052
Volume through gas meter			
at meter conditions...(CF)	51.70	52.15	52.72
standard conditions..(SCF)	49.15	48.68	49.22
Total sampling time (MIN)	60	60	60
Moisture content (% v/v)	7.37	8.58	8.25
Oxygen content (% v/v dry)	14.30	13.50	14.30
Milliequivalents of SO2 in gas sample	24.6616	28.2492	27.3722
Sulfur dioxide concentration			
(GR/DSCF)	.2480	.2868	.2748
(MG/DSCM)	567	656	629
(PPM-dry)	213	247	236
(PPM-wet)	198	226	217
Dry standard volumetric flow (DSCFM)	13314	13035	13190
Sulfur dioxide mass rate (LB/HR)	28.30	32.04	31.07
Sulfur dioxide emission factor (LB/MMBTU)			
F-factor method*	1.193	1.230	1.322

* F factor: Run 1 =10630.0 Run 2 =10630.0 Run 3 =10630.0

Test No. 1
Combustor Outlet

3.4 Results of NO Measurement--Monitor Labs Chemiluminescent NO Analyzer

NO Concentration (PPM-DRY)		
Run 1	Run 2	Run 3
690	680	675
685	675	670
690	680	670
690	675	675
690	675	675
690	675	675
690	670	670
690	675	670
685	670	670
685	670	675
685	670	675
680	670	675
Average: 687.5	673.7	672.9

Test No. 1
Scrubber Stack

3.5 Results of Opacity Observations - EPA Method 9

Percent Opacity	Optical Density	Relative Frequency (%)
0	.0000	100.00
5	.0223	.00
10	.0458	.00
15	.0706	.00
20	.0969	.00
25	.1249	.00
30	.1549	.00
35	.1871	.00
40	.2219	.00
45	.2596	.00
50	.3010	.00
55	.3468	.00
60	.3979	.00
65	.4559	.00
70	.5229	.00
75	.6021	.00
80	.6990	.00
85	.8239	.00
90	1.0000	.00
95	1.3010	.00
99	2.0000	.00
.00	.00000	Time Average

Observer: J. Hill
Cert. Date: 04-26-84
Date of Observation: 06-22-84
Time of Observation: 1600-1606

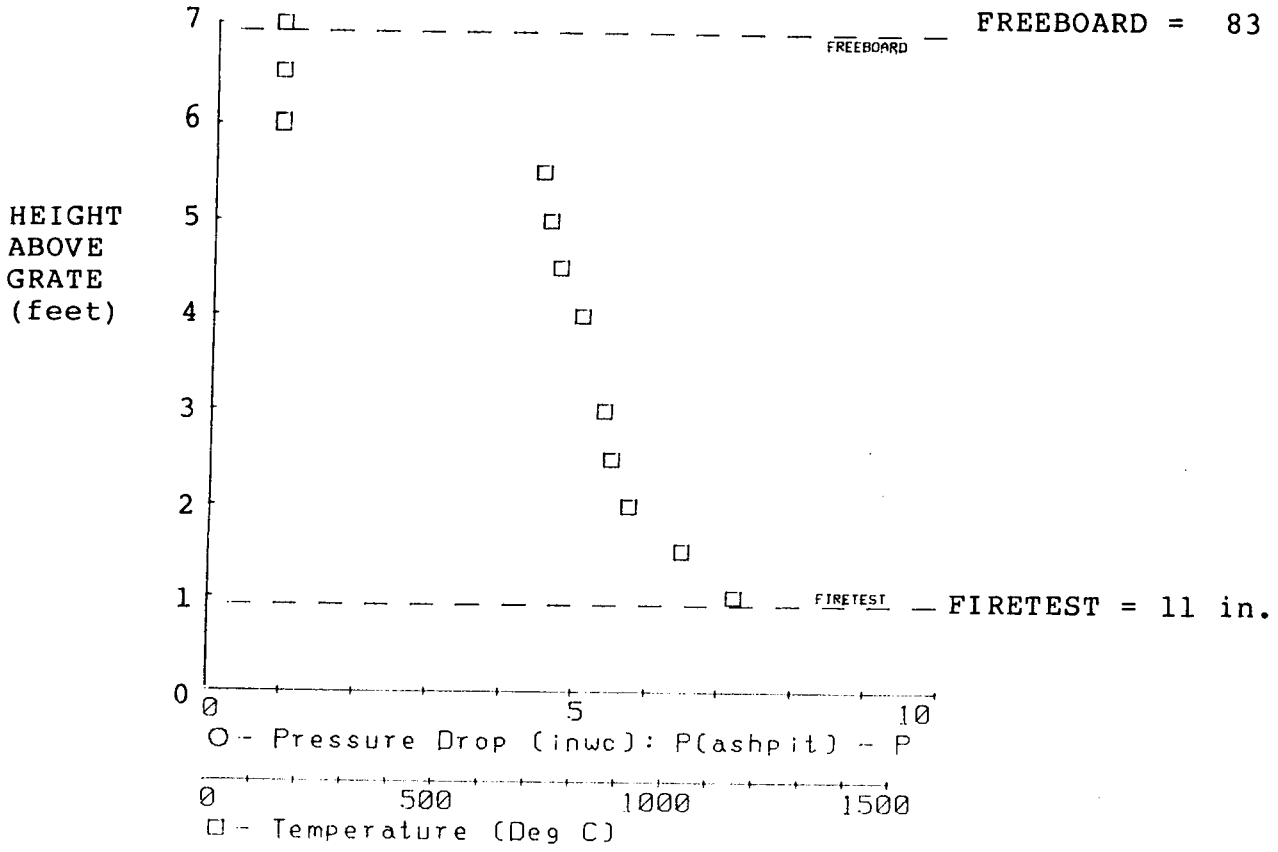
APPENDIX L

Retort Pressure and Temperature Probe Data

Reference: Volume 1, Thimsen, Maurer et al (1984)

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/19/84
RETORT ACCESS PORT NUMBER: 5



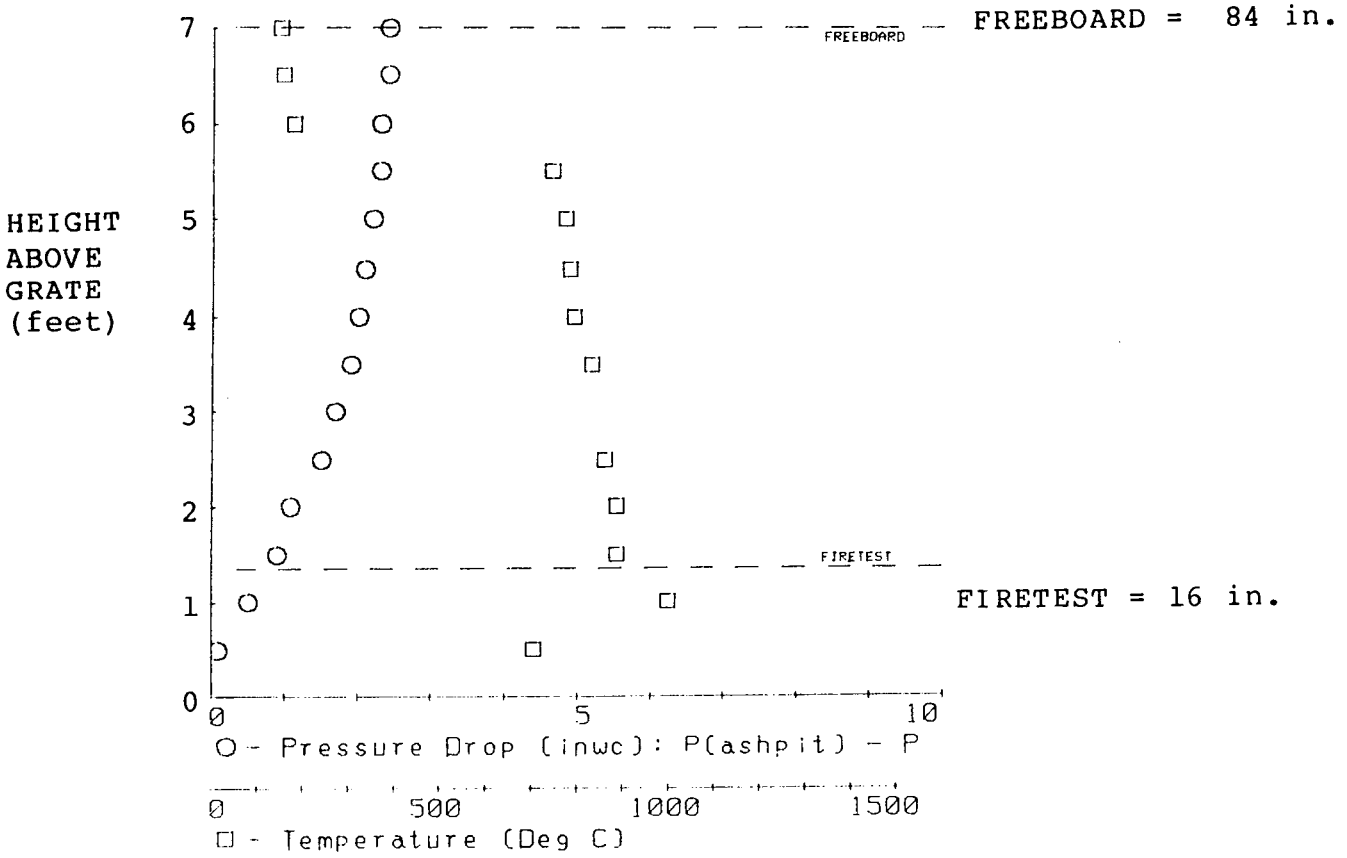
DATA:

INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
12	---	1154
18	---	1038
24	---	921
30	---	882
36	---	866
48	---	810
54	---	760
60	---	738
66	---	721
72	---	149
78	---	149
84	---	149

TIME (hrs)	727	759
Blast Air (scfm)	390	400
Saturation Temperature (deg C)	60.1	60.1
Ashpit Pressure (inwc)	2.7	2.5
Offtake Temperature (deg C)	219	214

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/20/84
RETORT ACCESS PORT NUMBER: 5



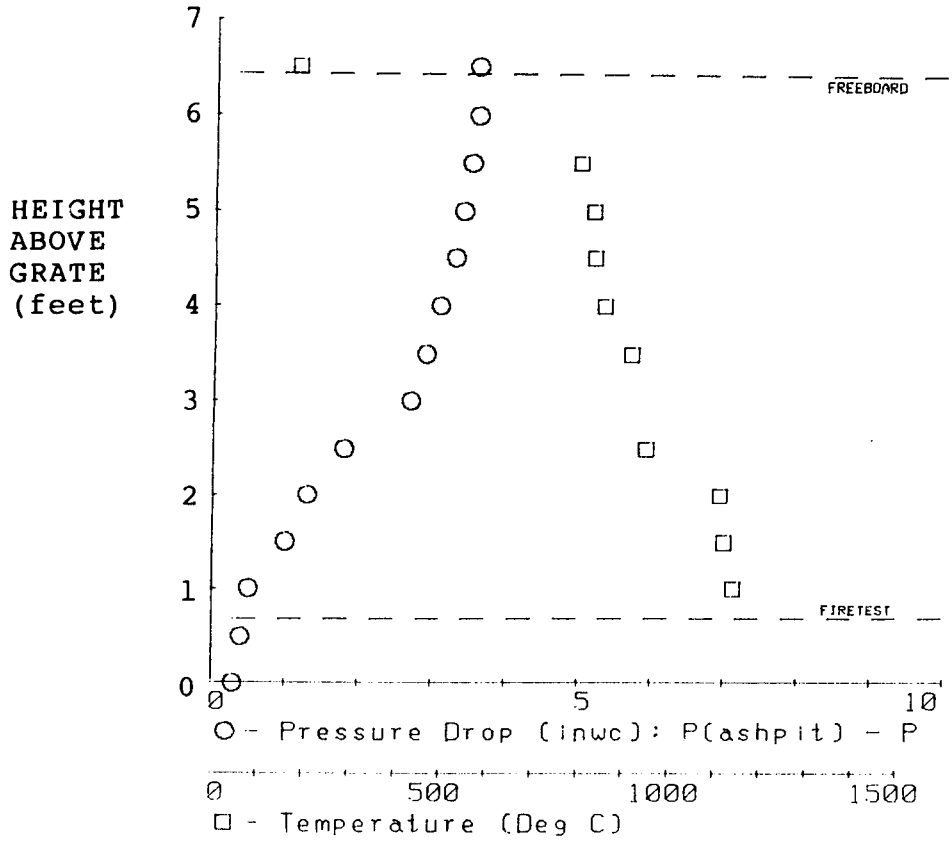
DATA:

INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
0	0.0	---
6	0.1	704
12	0.5	999
18	0.9	888
24	1.1	888
30	1.5	860
36	1.7	---
42	1.9	832
48	2.0	793
54	2.1	782
60	2.2	771
66	2.3	743
72	2.3	177
78	2.4	154
84	2.4	149

TIME (hrs)	720	804
Blast Air (scfm)	600	600
Saturation Temperature (deg C)	59.2	59.4
Ashpit Pressure (inwc)	3.6	3.3
Offtake Temperature (deg C)	196	199

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/21/84
RETORT ACCESS PORT NUMBER: 5

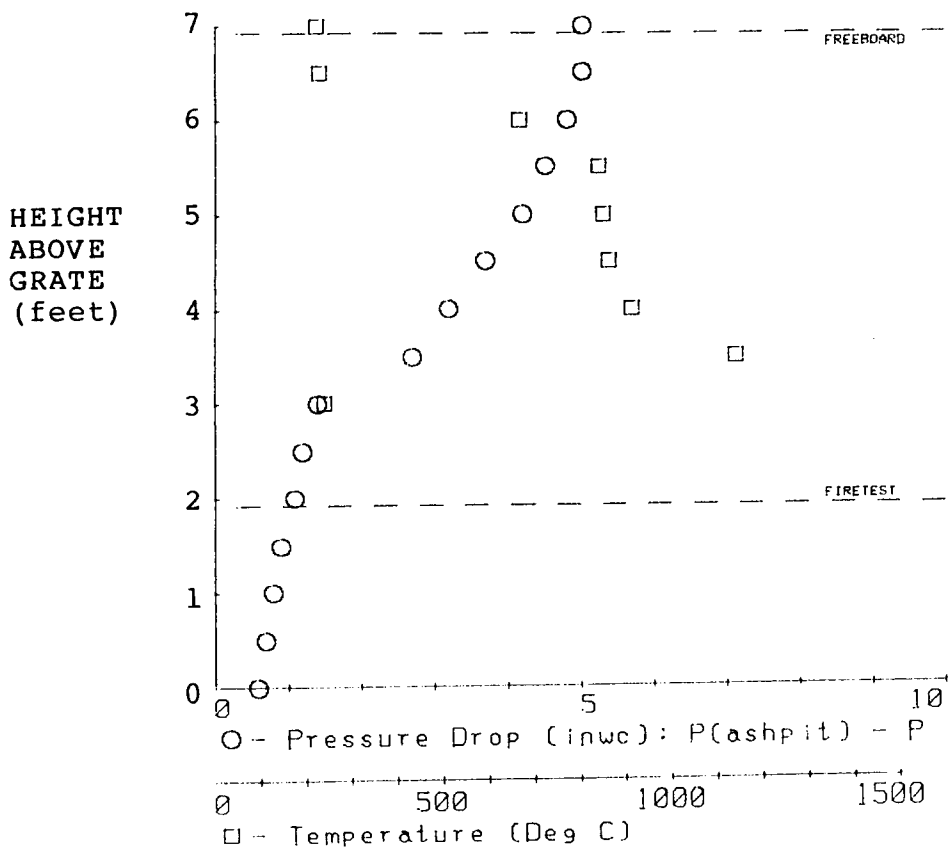


DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
0	0.3	---
6	0.4	---
12	0.5	1143
18	1.0	1121
24	1.3	1110
30	1.8	949
36	2.7	---
42	2.9	916
48	3.1	854
54	3.3	832
60	3.4	827
66	3.5	799
72	3.6	---
78	3.6	182

TIME (hrs)	726	801
Blast Air (scfm)	900	900
Saturation Temperature (deg C)	58.1	58.1
Ashpit Pressure (inwc)	5.6	5.6
Offtake Temperature (deg C)	242	251

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/22/84
RETORT ACCESS PORT NUMBER: 5



FREEBOARD = 83 in.

FIRETEST = 23 in.

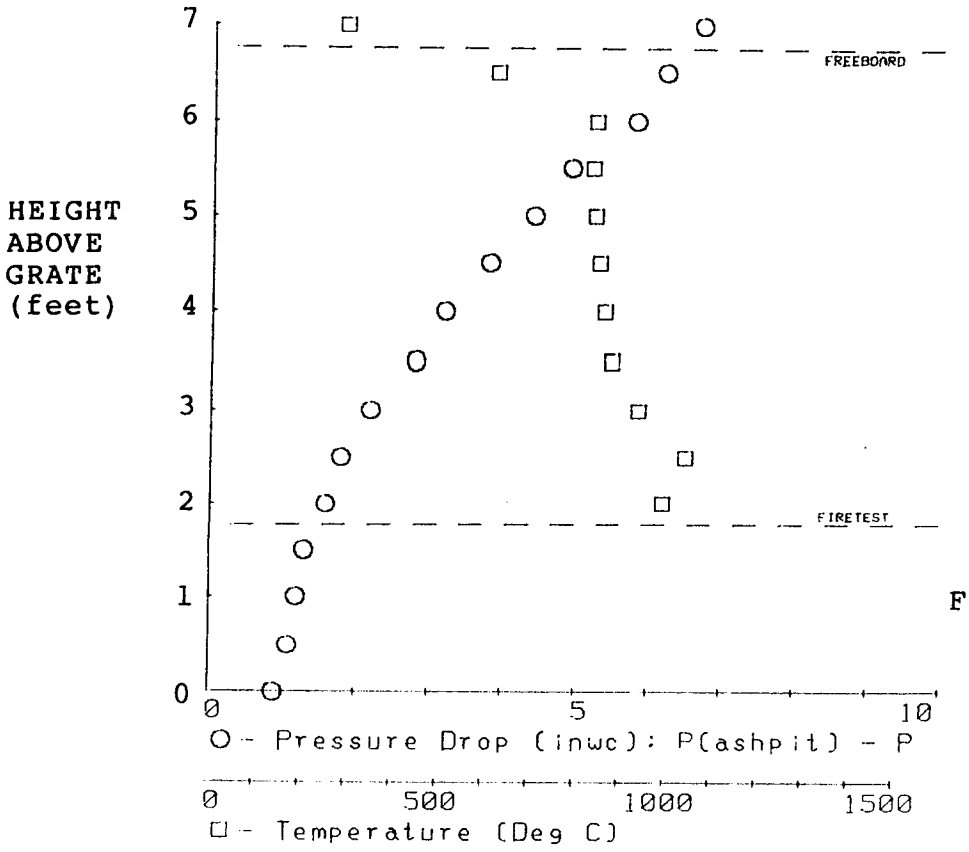
DATA:

INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
0	0.6	---
6	0.7	---
12	0.8	---
18	0.9	---
24	1.1	---
30	1.2	---
36	1.4	238
42	2.7	1138
48	3.2	910
54	3.7	860
60	4.2	849
66	4.5	838
72	4.8	666
78	5.0	227
84	5.0	221

TIME (hrs)	726	756
Blast Air (scfm)	1195	1195
Saturation Temperature (deg C)	58.0	58.0
Ashpit Pressure (inwc)	8.9	8.4
Offtake Temperature (deg C)	292	315

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/23/84
RETORT ACCESS PORT NUMBER: 5



FREEBOARD = 81 in.

FIRETEST = 21 in.

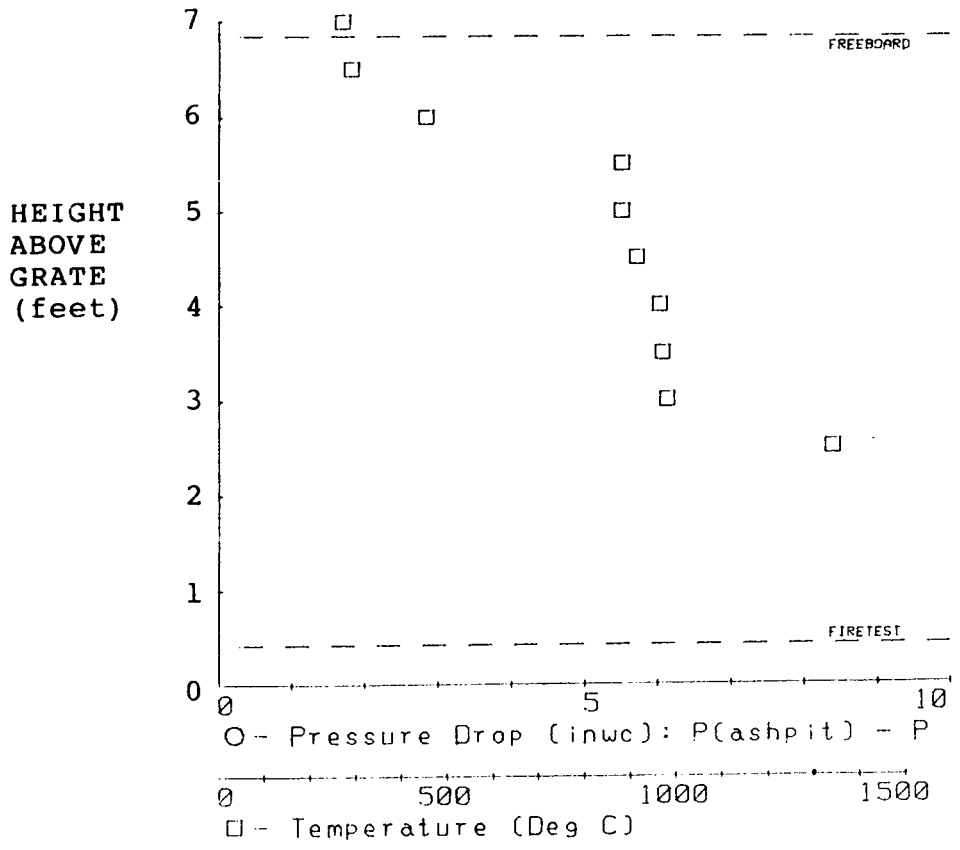
DATA:

INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
0	0.9	---
6	1.1	---
12	1.2	---
18	1.3	---
24	1.6	993
30	1.8	1043
36	2.2	938
42	2.8	877
48	3.2	860
54	3.8	849
60	4.4	838
66	4.9	832
72	5.8	838
78	6.2	621
84	6.7	293
90	6.8	277

TIME (hrs)	718	800
Blast Air (scfm)	1500	1500
Saturation Temperature (deg C)	58.0	58.0
Ashpit Pressure (inwc)	10.1	9.8
Offtake Temperature (deg C)	304	245

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/28/84
RETORT ACCESS PORT NUMBER: 5

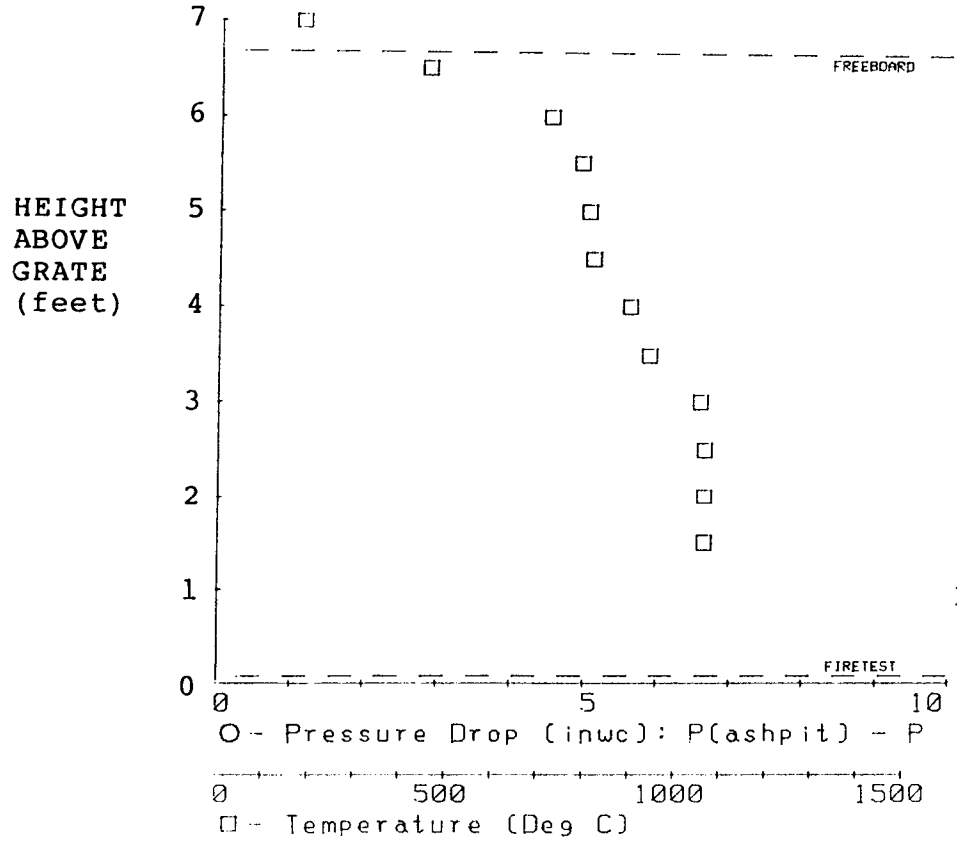


DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
30	---	1343
36	---	982
42	---	971
48	---	966
54	---	916
60	---	882
66	---	882
72	---	454
78	---	293
84	---	271

TIME (hrs)	815	837
Blast Air (scfm)	2100	2100
Saturation Temperature (deg C)	60.0	62.0
Ashpit Pressure (inwc)	14.1	14.6
Offtake Temperature (deg C)	365	381

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/27/84
RETORT ACCESS PORT NUMBER: 5

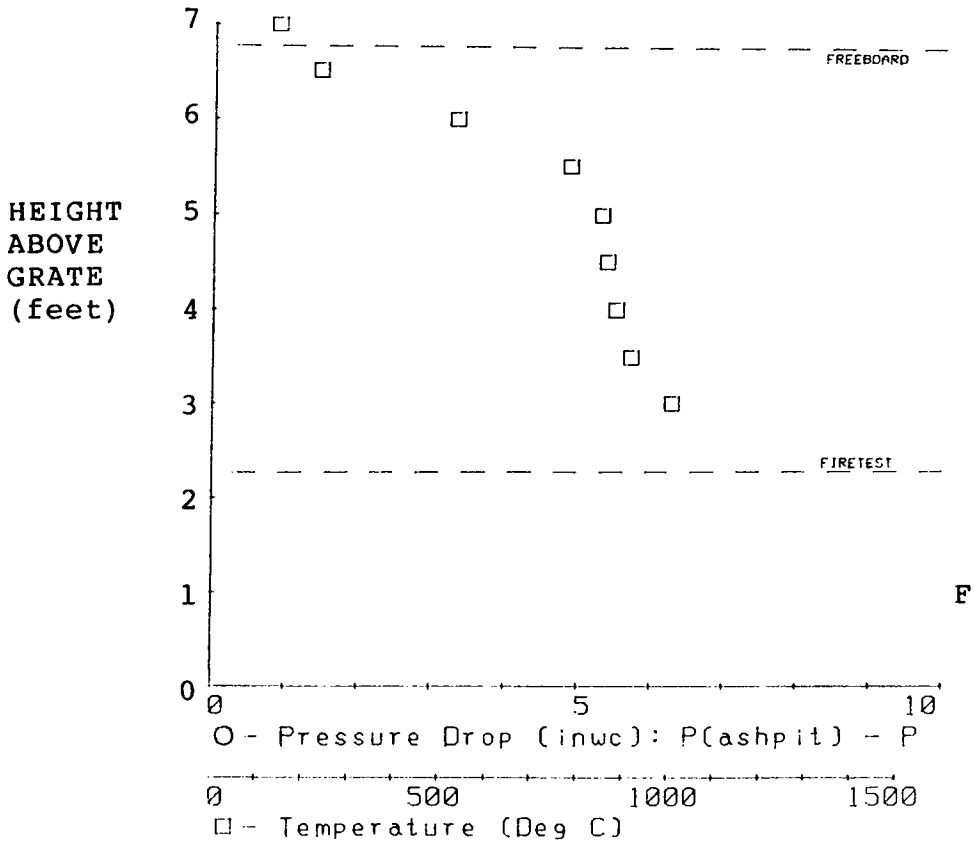


DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
18	---	1066
24	---	1066
30	---	1066
36	---	1054
42	---	943
48	---	899
54	---	816
60	---	804
66	---	788
72	---	721
78	---	454
84	---	177

TIME (hrs)	731	752
Blast Air (scfm)	800	800
Saturation Temperature (deg C)	60.0	60.0
Ashpit Pressure (inwc)	6.8	6.8
Offtake Temperature (deg C)	278	266

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-012 COAL: ABSOLOKA
DATE: 06/29/84
RETORT ACCESS PORT NUMBER: 5



DATA:

INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)
36	---	1004
42	---	916
48	---	882
54	---	860
60	---	849
66	---	777
72	---	532
78	---	232
84	---	143

TIME (hrs)	1040	1108
Blast Air (scfm)	590	590
Saturation Temperature (deg C)	60.0	60.0
Ashpit Pressure (inwc)	2.9	2.9
Offtake Temperature (deg C)	190	180