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FIXED-BED GASIFICATION RESEARCH USING U.S. COALS, VOLUME 13 GASIFICATION OF BLIND CANYON BITUMINOUS COAL

Contract H0222001

Black, Sivalls, and Bryson, Incorporated

**BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR**

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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 January-December, 1985. This report was submitted by the authors May 1, 1985.

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TABLE OF CONTENTS

	TABLES.....	6
	FIGURES.....	7
	INTRODUCTION.....	8
Section 1	TEST SUMMARY.....	9
Section 2	TEST OBJECTIVES	
2.1	Selection of Coal for Testing.....	11
2.2	Construction and Operation of Enlarged Gas Cooler/Tar Separator.....	11
2.3	Test Objectives.....	11
2.4	Test Plan.....	12
Section 3	DESCRIPTION OF FUEL TESTED.....	14
Section 4	FACILITY DESCRIPTION	
4.1	Test Facility.....	18
4.2	Gas Sampling and Conditioning System....	18
4.3	Gas Analysis Equipment.....	21
4.4	Enlarged Gas Cooler/Tar Separator.....	21
Section 5	TEST PROCEDURES	
5.1	Test Teams.....	26
5.2	Gasifier Sampling and Data Acquisition Procedures.....	27
Section 6	CONDUCT OF TEST	
6.1	Gasifier Operation.....	29
6.2	Enlarged Gas Cooler/Tar Scrubber Operation.....	31
Section 7	TEST RESULTS	
7.1	Data Summary	
7.1.1	Continuous Output Transducer Data.	34
7.1.2	Coal, Ash, and Dust Data.....	37
7.1.3	Gas Analysis Data.....	45
7.1.4	Tar and Water Yield Data.....	51
7.2	Material Balance and Thermal Efficiency Calculations.....	51
7.3	Grate Performance Model.....	54
7.4	Tar/oil Yield Correlations.....	54
7.5	Combustion Emissions Monitoring.....	54
7.6	Retort Particle Sampling.....	66
7.7	Enlarged Gas Cooler/Tar Separator.....	68
Section 8	CONCLUSIONS.....	70
	REFERENCES.....	72
	APPENDICES.....	74

TABLES

- 1-1 Design Point Characteristics for Gasification of Blind Canyon Bituminous Coal

- 3-1 Average Analysis of Blind Canyon Bituminous Coal
- 3-2 Characteristics of Blind Canyon Bituminous Coal with Regard to the Coal Test Objective Matrix.

- 4-1 Operating Configuration and Conditions, Hewlett-Packard Model 5880A Gas chromatograph.
- 4-2 Operating Configuration and Conditions, Hewlett-Packard Model 5793 Gas chromatograph.

- 6-1 Gas Cooler/Tar Separator System Down Periods

- 7-1 Summary of Blind Canyon, Ash, and Cyclone Dust Analyses
- 7-2 Physical and Chemical Properties of Coal and Cyclone Dust
- 7-3 Elemental Analyses of Moisture-free Ash
- 7-4 Operation Summary for HP 5880A Gas Chromatograph
- 7-5 Condensed Material Analyses, Gas Sampling and Conditioning System
- 7-6 Material Balance and Thermal Efficiency Calculation Elkhorn, 0.95 ton/hour, 140 F
- 7-7 Material Balance and Thermal Efficiency Calculation 1.22 ton/hour, 140 F
- 7-8 Material Balance and Thermal Efficiency Calculation 1.34 ton/hour, 144 F
- 7-9 Material Balance and Thermal Efficiency Calculation 1.60 ton/hour, 143 F
- 7-10 Material Balance and Thermal Efficiency Calculation 1.55 ton/hour, 145 F
- 7-11 Material Balance and Thermal Efficiency Calculation 1.65 ton/hour, 145 F
- 7-12 Material Balance and Thermal Efficiency Calculation 1.84 ton/hour, 145 F
- 7-13 Material Balance and Thermal Efficiency Calculation Blind Canyon Overall Average
- 7-14 Condensed Material Analysis, Enlarged Gas Cooler/Tar Separator

FIGURES

- 2-1 Proposed Test Plan, BOM/FGT-014
- 3-1 Location of the Deer Creek Mine (Blind Canyon Bituminous Coal)
- 4-1 Coal Gasifier Process Flow Schematic, U.S. Bureau of Mines, Twin Cities Research Center.
- 4-2 Schematic Diagram of the Gas Sampling and Conditioning System
- 4-3 Enlarged Gas Cooler/Tar Separator System Schematic
- 4-4 Condenser/ESP Vessel Geometry
- 6-1 Test History, BOM/FGT-014
- 7-1 Physical Characteristics of the Gasifier Operation
- 7-2 Gasifier Response to Step Changes in Blast Air Flow
- 7-3 Feed Coal Size Distribution Analysis and Geometrical Mean Coal Particle Size
- 7-4 Average Particle Size Distribution of Feed Coal
- 7-5 Ash Size Distribution Analysis and Geometrical Mean Ash Particle Size
- 7-6 Ash Characteristics and Operating Conditions
- 7-7 Major Gas Species Measured by the Gas Chromatograph.
- 7-8 Minor Gas Species Measured by the Gas Chromatograph.
- 7-9 Dry Gas HHV, Major Gas Species and Gasifier Operating Conditions
- 7-10 Sulfur Species Measured by the Gas Chromatograph
- 7-11 Tar/Oil Yield and Water Yield with Operating Conditions
- 7-12 Comparison of the Geometrical Grate Performance Model with Ash Removal Rates.
- 7-13 Correlation of Tar Yield with Volatile Matter and Oxygen
- 7-14 Correlation of Tar Yield with Volatile Btu
- 7-15 Dust Carryover vs. Gas Flow Rate

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-014, the gasification of Blind Canyon bituminous coal, and is the thirteenth final test report prepared under the BS&B operating contract. This volume covers the test period July 31, 1984 to August 11, 1984.

Section 1 is a brief summary of the testing. 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 is contained in the Appendices.

SECTION 1

TEST SUMMARY

Blind Canyon bituminous coal is a moderate-swelling, low-sulfur, medium ash fusion temperature, high-volatile B bituminous coal mined in large quantities in south central Utah. The coal is a very high volatile matter coal.

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.

A slipstream of the coal gas was cooled and cleaned of tar by a surface contact condenser and electrostatic precipitator. This gas cleaning system was scaled up from the successful gas sampling and conditioning system. The enlarged gas cooler/tar separator operated continuously throughout the gasification of Blind Canyon bituminous coal and collected 420 pounds of relatively dry, high quality tar.

The coal gasified well during the test. Gas quality fluctuated randomly between 170 and 180 Btu/dscf. High throughputs were achieved but throughput was limited by a leaking section in the gas duct to the combustion chamber. Operation of the agitator was required to effectively manage coal agglomeration and maintain high gas quality. Table 1-1 gives design point data for gasification of this coal at a throughput of 1.8 ton/hr and a blast saturation temperature of 145 F (62.8 C).

Due to high throughputs achievable and high gas quality observed during this test, the Blind Canyon bituminous coal is recommended as a single-stage, fixed-bed gasifier feedstock with agitation.

Table 1-1

Design Point Characteristics for Gasification
of Blind Canyon Bituminous Coal

Coal Throughput - 1.8 tons/hour (108 lb/hr/sq ft grate)

Air/Coal	2.09	lb/lb
Steam/Coal	.384	lb/lb
Blast Saturation Temperature	145	deg F
Gas Offtake Temperature	800	deg F
Wet Gas/Coal	52.8	scf/lb
Gas Dewpoint	117	deg F
Tar Yield	14.2	lb/100lb coal
Tar Analysis		
HHV (dry)		Btu/lb
Pourpoint		deg F
Viscosity (210 F)	.	SUS
Specific Gravity (60/60 F)	.	
Dry Gas Composition (mol%)		
Hydrogen	18.3	
Carbon Monoxide	27.0	
Methane	1.84	
Ethane	.181	
Ethylene	.151	
Propane	.054	
Propylene	.057	
Carbon Dioxide	6.30	
Nitrogen + Argon	45.9	
Water	5.4	lb/1000 dscf
Dry Gas HHV	174	Btu/dscf
Dry Gas LHV	162	Btu/dscf
Thermal Efficiencies		
Hot, Raw	93	%
Cold, with Tar	84	%
Cold, without Tar	66	%

SECTION 2

TEST OBJECTIVES

2.1 Selection of Coal for Testing

Blind Canyon bituminous coal is a moderate swelling Utah coal mined in large quantities exclusively for Utah Power and Light, Incorporated (UPL). Its primary distinguishing feature is its comparatively high volatile content (DAF basis). Preliminary indications were that the DAF volatile matter was approximately equal to the DAF fixed carbon. This is unusual for bituminous coals. (Analyses of the coal gasified during BOM/FGT-014 showed volatile matter slightly lower than fixed carbon, but still comparatively high.) This coal is similar to other coals mined in the Uinta coal region of Utah.

This coal is under consideration by UPL for a utility electrical generating plant employing fixed-bed gasifiers.

2.2 Construction and Operation of an Enlarged Gas Cooler/Tar Separator

The notable success of the gas sampling and conditioning system (Section 4.2) in cooling and cleaning the raw gas led to an effort to scale the system up by a factor of approximately 30. Evaluating the performance of this enlarged system was an important part of this test. In addition, a collection of large quantities of relatively dry tar for subsequent analysis by others could be accomplished only by this enlarged gas cooler/tar separator.

Operation of this system would provide important information that could be used to scale the system up to treat the entire raw gas stream from a single gasifier.

2.3 Test Objectives

- A. Identify maximum gasifier throughput and the limitations to throughput gasifying this high volatile coal.
- B. Determine total product composition and conversion efficiency from the gasification of this high volatile B bituminous coal.
- C. Identify gasifier operating requirements for gasifying moderately swelling coals.
- D. Identify operating characteristics of a gas cooler/tar separator scaled up from the gas sampling and conditioning system.

- E. Evaluate gasifier response to step changes in the blast air flow.

2.4 Test Plan

The proposed test plan is shown in Figure 2-1. Several load levels are shown for a coal bottom size of 1/4 inch. Should difficulties be experienced gasifying the 1/4 inch coal, the screen would be changed to supply +3/4 inch coal to the gasifier. The test plan includes operation for 3 days on Elkhorn bituminous coal (Volume 9, Thimsen, Maurer et al, 1985) during which the enlarged tar separator could be installed and shaken down.

Agitator rate and vertical travel were left to the facility manager's judgment based on observed operation, as were establishment of blast saturation temperature and maximum throughput. The grate spacings were set at 5.5 inches between the top and middle levels and 6 inches between the middle and bottom levels.

Figure 2-1

Proposed Test Plan, BOM/FGT-014

SECTION 3

DESCRIPTION OF FUEL GASIFIED

The Blind Canyon Bituminous coal gasified during BOM/FGT-014 is a high volatile B bituminous coal mined by Emery Mining Corporation in Emery County, Utah. Figure 3-1 shows the location of the Deer Creek mine, near Huntington, Utah, where this coal is mined. The coal is deep mined from the Blind Canyon seam, which is 144 inches thick, using longwall mining equipment. Reserves within the current mining area are 50 million tons with annual production capacity of 2 million tons. The entire output of the mine is used by Utah Power and Light, Incorporated for steam generation.

Approximately 890 tons of crushed, run of mine coal were loaded into rail cars in June 1984. These cars arrived in the Twin Cities on June 20, 1984 and were unloaded at a site 15 miles from the test site. The coal was passed over a 1/4 inch mesh screen and trucked to the test site during the period of June 25 & 26, 1984. The coal was stored without cover until July 25, 1984 just prior to start of testing. Approximately 351 tons of +1/4 inch coal were delivered to the test site.

As received, the coal contained many pockets of a brown-orange material. Discussions with mine personnel indicated that these were resin pockets. In addition, the screened coal was very dusty. The coal was hard and not friable.

A complete analysis of the coal is given in Table 3-1. Table 3-2 shows how the coal fits into the coal test objective matrix.

The Elkhorn bituminous coal gasified during the beginning of this test is described in Volume 9 of this series (Thimsen, Maurer et al, 1985). It remained in uncovered storage from October 1983 to July 1984.

Figure 3-1

Location of the Deer Creek Mine
(Blind Canyon Bituminous Coal)

Table 3-1

Average Analysis of Blind Canyon Bituminous Coal

Proximate Analysis (wt %)

Volatile Matter	38.92
Fixed Carbon	43.88
Ash	11.10
Moisture	6.10
Sulfur	0.52

Heating Value (BTU/lb)	11926
------------------------	-------

Ultimate Analysis (wt%)

Carbon	66.52
Hydrogen	5.09
Nitrogen	0.96
Sulfur	0.52
Oxygen	9.72
Ash	11.10
Moisture	6.10

Ash Fusion Temperatures (deg F)

	Oxidizing	Reducing
Initial deformation	2345	2250
Softening	2450	2370
Hemispherical	2490	2450
Fluid	2660	2495

Free Swelling Index	1 1/2
---------------------	-------

Table 3-2

Characteristics of Blind Canyon Bituminous 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%	014							
	L - 10%								
ASH FUSION	H + 2700 F								
	M 2300-2700 F	014							
	L - 2300 F								
FREE SWELLING INDEX	H 3 +								
	M 1 - 3	014							
	L 0 - 1								
MOISTURE CONTENT	H + 15%								
	M 5 - 15%	014							
	L - 5 %								
FRIABILITY (GRINDABILITY)	H								
	M								
	L	014							

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. Equipment installed specifically for this test is also described.

4.1 Test Facility

The gasification test facility includes a 6.5 foot diameter Wellman-Galusha gas producer, a combustion chamber and a wet caustic scrubber. The site also includes an iron ore pelletizing kiln which was not used during this test. The entire stream of producer gas was ultimately 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 measured by 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 used. The sampling port is thermally insulated to

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

prevent condensation. The hot producer gas is quenched rapidly upon 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 approximately every 20 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.

4.4 Enlarged Gas Cooler/Tar Separator

The enlarged gas cooler/tar separator constructed for this test is scaled up by a factor of approximately 30 from the gas sampling and conditioning system described in Section 4.2. The gas sampling and conditioning system is described in more detail in Volume 1 of this series (Thimsen, Maurer et al, 1984).

The enlarged gas cooler/tar separator is shown in schematic in Figure 4-3. Raw gas is withdrawn from a Y section in the main gas downcomer, 64 pipe feet downstream of the cyclone and 7 pipe feet downstream of the sampling nozzle for the gas sampling and conditioning system.

The raw gas for the slipstream is extracted from the gas duct centerline, through a 2-inch pipe, beveled away from the flow to exclude dust particles greater than 5 μm . The relatively dust-free raw gas travels 7.5 feet through the 2-inch pipe, through control and safety valves to the shell and tube condenser.

The condenser geometry is shown in Figure 4-4. Coolant entering the shell side of the condensor is preheated by coolant leaving

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 Sieve 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.

Figure 4-3

Enlarged Gas Cooler/Tar Separator System Schematic

Figure 4-4
Condenser/ESP Vessel Geometry

HEAT EXCHANGER AND E.S.P.

the ESP shell. Total heat removed is controlled manually by coolant flow and coolant exit temperature to maintain a desired gas outlet temperature (typically 130 F, 54 C).

The nucleated tar droplets are removed in an electrostatic precipitator (ESP) with geometry identical to that of the condenser. Two stage electrodes are mounted at the centerline of each tube. A positive corona is applied to the electrodes to avoid sparkover problems (Liu et al, 1984). Coolant can be circulated through the shell-side of the ESP.

The condenser and ESP are mounted on a common tar reservoir which is steam heated and contains an explosion relief diaphragm. Gas is moved through the system by a steam jet eductor located approximately 40 pipe feet downstream of the ESP outlet. The gas flow is measured by a flange tap orifice plate approximately 8 pipe feet downstream of the ESP outlet. The entire system in Figure 4-3 is constructed of 304 stainless steel.

The gas leaving the ESP is analyzed for oxygen by a fuel cell type oxygen meter. If the oxygen content of the gas at this point exceeds 1.0%, the high voltage is automatically turned off and the air operated safety valve upstream of the condenser closed. This is done to avoid potential explosions initiated by a discharge from the high voltage electrode.

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, operations 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, Circle Pines, Minnesota, a subcontractor to the University of Minnesota, had a two-man team on site on August 8 and 9, 1984. They sampled for exhaust emissions from the gas combustor and from the stack after the wet caustic scrubber.

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 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 yields 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 Enlarged Gas Cooler and Tar Separator

The tar reservoir of the enlarged gas cooler and tar separator is drained into sealed 30 gallon drums approximately every 8 hours, or as needed.

5.2.10 Retort Temperature and Pressure Sampling

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

6.1 Gasifier Operation

BOM/FGT-014, gasification of Blind Canyon Bituminous coal, began at 0830 on July 30, 1984. The modified start-up procedure was used (Volume 1, Thimsen, Maurer et al, 1984). 11.7 tons of petroleum coke was used during start-up. Gas was sent to the combustion chamber at 0950. Figure 6-1 shows the operational history of the test. All coal for this test was screened at +1/4 inch.

Elkhorn bituminous coal was gasified during the first 3.5 days of the test. During this time period, the enlarged tar collection system as described in Sections 4.4 and 6.2 was installed. Two blast air flows (500 cfm and 1200 cfm) and three blast saturation temperatures (58 C, 62 C & 65 C) were maintained during this period. Coal consumption ranged from 0.8 tons/hour to 1.11 tons/hour during this period.

The negligible ash content of the petroleum coke did not allow operation of the grate until 0815 on July 31. Ash heights were low during this initial period. Some crusting of ash was noted through this initial period when operating a blast saturation temperature of 58 C (136 F).

On July 30, a significant gas leak was noted in the horizontal gas duct leading to the combustion chamber. The pressure at this point in the gas duct could be reduced to subatmosphere by adjustment of the combustion air flows and induced draft fan pressure, but management of this leak affected operations throughout the remainder of the test.

The Blind Canyon bituminous coal entered the retort at 0230 on August 3, 1984. Initial operating conditions were a blast air flow of 1200 cfm and a blast saturation temperature (BST) of 60 C (140 F) with the agitator off. Subsequent changes in the blast air flow rate and BST are shown in Figure 6-1. A higher BST than anticipated (62 C, 144 F) was found to be best in managing this coal's ash fusion.

Early in the morning of August 6, the blast air flow was reduced from 1600 cfm to 1400 cfm for a short period due to excessive emission of gas from the leak described earlier. The blast air flow was returned to 1600 cfm after about an hour. Gas leakage was reduced by reducing the amount of combustion air admitted to the combustion chamber downstream of the leak, thereby reducing the combustion chamber pressure, and consequently the pressure at the gas leak. Attempts to increase blast air flow later in the morning of August 6, resulted in increased gas leaks, so the blast air flow was maintained at 1600 cfm. BST was increased to 63 C (145 F) and kept at this level.

Figure 6-1

Test History, BOM/FGT-014

On August 7, a series of rapid changes in blast air flow with associated changes in BST were undertaken. These rapid changes had no observable affect on the ash zone. No clinkering was noted. The blast air flow was maintained at 1200 cfm for a short period to allow retort particle sampling at this intermediate gas flow rate, and was returned to 1600 cfm and held there until the afternoon of August 8, 1984.

At 1430 August 8, the blast air flow was increased to 1800 cfm. Clearing dust accumulations from the main gas burner throat allowed operation at this throughput without excessive gas leaks from the ductwork. This blast air flow and a BST of 63 C (145 F) were held until the end of the test at 1600 on August 11. At this point, BOM/FGT-015, the gasification of Kemmerer subbituminous coal began (Volume 14, Thimsen, Maurer et al, 1985).

A maximum throughput of 1.85 tons/hour was observed when operating the gasifier with a blast air flow of 1800 cfm. The limitation to operation at high throughputs was the excessive leaking of gas from ductwork near the combustion chamber. While some glowing was noted on top of the retort at this throughput, this does not represent fundamental limit to throughput; and it is likely that gas channeling would occur at a somewhat higher coal rate and blast air rate.

Almost all fire tests taken during this test had some abnormality. The most common pathology was double or triple zones on the bar. Skewed ash distributions were noted on several occasions. Ash fusion was manageable with a BST of 62-63 C (144-145 F). Gas quality was high (170-180 BTU/dscf) throughout the test.

Substantial amounts of cyclone dust were removed throughout the Blind Canyon portion of the test. Much of the dust was not collected by the cyclone, as evidenced by large accumulations of dust in the horizontal gas duct just upstream of the combustion chamber. These dust accumulations contributed to the gas leaking problem described earlier by creating restrictions which required higher upstream gas pressures. It was these higher gas pressures that pushed the gas through the leaks.

The ash collected during gasification of Blind Canyon coal was grey in color with fused pieces 1-4 inches in size, with some as large as 6 inches. The large pieces were not clinkered and could be broken up easily.

6.2 Operation of the Enlarged Gas Cooler/Tar Separator

The enlarged gas cooler/tar separator came online on August 2, at 1:00 pm. The slipstream operated almost continuously throughout the remainder of the test. The system was shut down

several times to correct problems with the high voltage insulator. Tar particle penetration at high throughputs provided conductive pathways on the inside insulator surface that shorted the high voltage. This problem did not appear at lower flow rates. Start up and shutdown was routine during these episodes. Several short automatic shutdowns of less than 15 minutes were experienced when oxygen aspirated into the raw gas during fire tests (Volume 9, Thimsen, Maurer et al, 1984) caused the oxygen level in the raw gas to exceed the 1% limit set at the slipstream. These downtime periods are listed in Table 6-1.

Coolant flow and temperature to the condenser (and to the ESP) were maintained to give a final gas temperature from 120-130 F (49-54 C). This resulted in a collection of relatively dry tar throughout the test. Gas rates through the system were maintained at 2,4,6,8,10 and 12 dscfm. No visual evidence of tar particle penetration was observed except at 12 dscfm. The ESP drew a current of about 7 uA at a voltage of 12 kV.

Approximately 40 pounds of Elkhorn tar and 420 pounds of Blind Canyon tar were collected during 200 hours of operation. This onstream time represents 93% of the available gasifier operating time.

Table 6-1

Gas Cooler/Tar Separator System
Down Periods

8/02/84	15:00	System up
8/03/84	00:33 - 01:16	System down, high oxygen level, automatic shut-down.
8/04/84	03:00 - 04:12	System down, oxygen analyzer detector flow obstructed, cleaned analyzer needle valve and recalibrated.
8/06/84	15:15 - 16:10	System down, power failure.
8/06/84	16:40 - 20:45	System down, high ESP current, removed electrically conductive tar from the teflon insulator.
8/09/84	10:50 - 19:15	System down, clogged inlet pipe, steam cleaned.
8/10/84	16:00 - 16:20	System down, high oxygen level, automatic shut down.

Total hours between 15:00, 8/02/84 and 00:00, 8/15/84 : 297 *

Total percent up time : 89.11 *

Total percent up time
(without power failure and steam cleaning) : 93.27 *

* Includes approximately 85 hours of operation during BOM/FGT-015

SECTION 7

TEST RESULTS

7.1 Data Summary

7.1.1 Continuous Output Transducers

The data acquisition system operated well during the entire test. Data was collected throughout the test with the exception of a 175 minute period beginning at 2147 on August 2, 1984. This data was lost due to a software error. No data recovery was done.

Figure 7-1 shows the offtake temperature, fire loss pressure, and dry gas higher heating value along with gasifier operating parameters observed during the test period. Offtake temperatures varied between 350 C and 550 C (660 F and 1020 F) in a somewhat random fashion. During most of the test, the offtake temperature fell between 400 C and 500 C (750 F and 930 F). Offtake temperature bore little relationship to the operating parameters. Offtake temperature variations appeared less severe during the gasification of Elkhorn bituminous coal, at the beginning of the test.

Dry gas higher heating value was approximately 150 BTU/dscf during the gasification of Elkhorn bituminous coal and rose to 170-180 Btu/dscf during the gasification of the Blind Canyon bituminous coal. Gas quality fluctuated between these limits throughout the remainder of the test. Gas quality was relatively independent of gasifier operating conditions.

Fire loss pressure was modest and tracked blast air flow fairly closely. There were, however, substantial random fluctuations in fire loss pressure throughout the gasification of the Blind Canyon bituminous coal.

On August 8, a series of rapid changes in blast air flow and blast saturation temperature were undertaken to observe the transient response of the gasifier. The results of these step changes are shown in Figure 7-2. The drop in blast saturation temperature (BST) is due to a change in the BST controller setpoint.

For a period of approximately 15-20 minutes after the step changes carbon monoxide and carbon dioxide concentrations showed a first order response to the step changes. Carbon monoxide concentrations rose on a drop in blast air and blast saturation temperature and dropped on a rise in blast air and blast saturation temperature. Carbon dioxide concentrations behaved in the opposite fashion. These concentrations quickly returned to steady levels. Behavior of the offtake temperature is much less easy to correlate with the step changes.

Figure 7-1

Physical Characteristics of the Gasifier Operation

BOM/FGT-014

Figure 7-2

Gasifier Response to Step Changes in Blast Air Flow

7.1.2 Coal, Ash and Dust Data

A complete list of the tests performed on the bulk coal, ash and dust samples collected during BOM/FGT-014, together with the number of samples analyzed, is given 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 given in Figure 7-3. The noticeable change in size distribution on August 2 marks the replacement of Elkhorn bituminous (screened at the barge at +1 inch) with Blind Canyon bituminous coal (screened at the rail unloading point at +1/4 inch). The average size distributions of the coal feed are given in Figure 7-4. Toward the end of the test, the 1/4 inch bottom size screen employed at the test facility was less effective in reducing the -1/4 inch material entering the retort due to blinding of the screen.

The results of the physical and chemical analyses of one composite Elkhorn bituminous coal sample and two composite Blind Canyon coal samples is given in Table 7-2.

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 is given in Figure 7-5. Geometrical mean ash particle size measured during gasification of Blind Canyon bituminous coal fluctuated randomly between 0.5 and 0.8 inches. The Elkhorn bituminous coal gasification ash had a geometrical mean ash size somewhat larger.

Figure 7-6 shows the physical and chemical characteristics of the ash, along with the operating parameters. The only noticeable features of these plots are the relatively lower ash bulk density observed when gasifying Elkhorn bituminous coal as opposed to that observed when gasifying Blind Canyon bituminous coal. (See also Volume 9, Thimsen, Maurer et al, 1985.) The Elkhorn bituminous coal ash also had relatively higher carbon and sulfur content. No strong relationship exists between operating parameters and ash chemistry. The carbon content of the dry Blind Canyon ash was about 9%. The sulfur content was about 0.15%.

Table 7-3 gives the elemental analyses of three ash samples corresponding to the coal sample analyses given in Table 7-2. The ashes resulting from the gasification of these two coals are very similar on a carbon-free basis with the Blind Canyon ash being slightly more alkaline.

7.1.2.3 Cyclone Dust Data

The chemical analyses of two composite cyclone dust samples (one

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	38	---
	Proximate analysis	---	3
	Ultimate analysis	---	3
	Ash fusion temperature	---	3
	Free swelling index	---	3
Ash	Particle size distribution	138	---
	Bulk density	138	---
	Moisture content	138	---
	Carbon content	138	3
	Sulfur content	138	3
	Chemical analysis	---	3
Cyclone Dust	Proximate analysis	---	2(**)
	Ultimate analysis	---	2(**)

(**) Composite from 17 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)	
Coal Type	Elkhorn	Blind Canyon I	Blind Canyon II	Elkhorn	Blind Canyon
Type of Analysis (*)					
Proximate Analysis, wt % :					
Moisture	4.19	6.35	5.84	---	---
Volatile Matter	36.05	38.61	39.24	29.52	16.01
Ash	6.85	13.02	9.18	14.31	27.39
Fixed Carbon (**)	52.19	42.02	45.74	56.16	56.60
Sulfur	0.84	0.54	0.50	1.54	0.90
Ultimate Analysis, wt % :					
Hydrogen	4.89	5.02	5.16	3.76	2.36
Carbon	73.66	64.48	68.56	71.28	64.90
Nitrogen	1.21	0.97	0.95	1.84	0.93
Sulfur	0.84	0.54	0.50	1.54	0.90
Oxygen (**)	8.36	9.62	9.81	7.28	3.52
Ash	6.85	13.02	9.18	14.31	27.39
Moisture	4.19	6.35	5.84	---	---
Heating Value, btu/lb :					
As Received	13030	11563	12289	---	---
Moisture Free	13600	12346	13052	12202	10462
Ash Fusion Temp. Deg F: (Oxidizing Atmosphere)					
Initial Def., IT	+2800	2350	2340	---	---
Softening, ST	---	2450	2455	---	---
Softening, HT	---	2505	2475	---	---
Fluid, FT	---	2645	2680	---	---
(Reducing Atmosphere)					
Initial Def., IT	2790	2260	2245	---	---
Softening, ST	+2800	2385	2355	---	---
Softening, HT	---	2465	2440	---	---
Fluid, FT	---	2495	2495	---	---
Free Swelling Index	2.5	1.5	1.5	---	---

(*) All values as received unless otherwise noted.

(**) By difference.

Figure 7-5

Ash Size Distribution Analysis and
Geometrical Mean Ash Particle Size

Figure 7-6

Ash Characteristics and Operating Conditions

Table 7-3
Elemental Analysis of Moisture-Free Ash

Element	Mass Fraction % for Composite Samples: (*)		
	Elkhorn	Blind Canyon I	Blind Canyon II
Fe	3.0	2.9	3.2
Fe(2+)	0.9	0.8	1.0
Si	22.0	26.6	26.6
Al	10.2	9.6	9.7
C	25.4	9.9	9.8
Ca	1.2	3.2	3.6
Mg	0.31	0.62	0.64
K	0.83	0.82	0.82
P	0.18	0.16	0.16
Na	0.26	1.8	1.7
S	0.20	0.19	0.18
Ti	0.89	0.59	0.58

(*) Unaccounted for mass is presumed to be oxygen bound onto metals as oxides.

collected during the gasification of Elkhorn bituminous coal, one collected during the gasification of Blind Canyon bituminous coal) are given in Table 7-2.

The Blind Canyon cyclone dust has a volatile matter/fixed carbon ratio only 54% that of the feed coal. This is consistent with partial devolatilization of the dust in the higher temperatures of the offtake duct and cyclone. This partial devolatilization is not adequate to explain the dry basis increase in ash content of the cyclone dust compared to the feed coal. The ash to fixed carbon ratio is two and a half times the ash to fixed carbon ratio of the feed coal. High ash materials are, apparently, preferentially blown over. These materials may come from the lower region of the retort where some of the fixed carbon is lost to the gas phase during gasification.

7.1.3 Gas Analysis Data

The NDIR carbon monoxide and carbon dioxide detectors operated well during the test. Daily calibration drift was less than 1%. The SIGMA calorimeter was operated but experienced substantial calibration drift. The HP 5880A gas chromatograph experienced two valve failures that resulted in lost data, as well as a series of operator errors resulting in short periods of lost data. These periods are summarized in Table 7-4. Total time of lost data was less than 42 hours. The concentrations of the various species measured by the HP 5880A are given in Figure 7-7 and 7-8. The major gas species, along with operating parameters and dry gas HHV are given in Figure 7-9.

The concentrations of major gas species were relatively stable during the gasification of Blind Canyon bituminous coal. The minor gas species (hydrocarbons) concentrations fluctuated in a random fashion. These fluctuations are consistent with a small unevenness in coal feed to the gasifier, resulting in an uneven flow of solids into the devolatilization zone.

Upon a rise in blast saturation temperature on August 4, a small increase in hydrogen and carbon dioxide concentrations and consequent decrease in carbon monoxide concentrations can be seen. This is consistent with rapid achievement of water/gas equilibrium in the gasifier.

The gas phase sulfur species were measured using the HP 5793 gas chromatograph from hand-injected, syringe samples. These data are shown in Figure 7-10. As these samples were injected by hand, the total quantity varied randomly from sample to sample. Thus the normalized composition is reported here along with total gas phase sulfur measured. Mercaptan concentrations were very low throughout the test. Hydrogen sulfide comprised approximately 83% of the gas phase sulfur measured with carbonyl sulfide amounting to about 12% and total mercaptans about 5% of the total gas phase sulfur measured. Total gas phase sulfur measured averaged about 1300 ppm during the gasification of

Table 7-4

Operation Summary for HP 5880A Gas Chromatograph

Date/time out	Date/time on	Duration	Problem
7/31 23:07	8/1 22:24	23.3 hrs	Valve #2
8/2 6:56	8/2 8:11	1.2	Operator error
8/2 14:15	8/2 23:11	8.9	Valve #2
8/6 14:36	8/6 15:55	1.3	Power Failure
8/8 1:39	8/8 3:59	2.3	Operator error
8/9 13:26	8/9 15:34	2.1	Operator error
8/10 9:10	8/10 11:54	2.7	Sampling system down

Figure 7-7

Major Gas Species Measured by the Gas Chromatograph.

Figure 7-8

Minor Gas Species Measured by the Gas Chromatograph.

Figure 7-9

Dry gas HHV, Major Gas Species and Gasifier Operating Conditions

BOM/FGT-014

Figure 7-10

Sulfur Species Measured by the Gas Chromatograph

Blind Canyon bituminous coal.

7.1.4 Tar and Water Yield Data

The gas sampling and conditioning system was shut down once during the test to replace the high voltage electrode. The time period over which gas was not available to the analyzers was only two hours. On several other occasions, the system was shut down for less than 15 minutes for routine maintenance or to collect special tar samples.

Four composite condensate samples were prepared from material collected in the gas sampling and conditioning system. These samples were composited over time periods corresponding to the collection of barrel quantities of tar from the enlarged gas cooler and tar scrubber described in Section 4.4 (see, also, Table 7-14). Table 7-5 gives the analyses of the composite samples from the gas sampling and conditioning system. The primary difference among the three Blind Canyon samples is the higher dry basis heating value of the sample collected 8/6-8/8. The dry basis ultimate analysis of this sample is also somewhat different.

The daily tar and water yields, along with operating parameters and offtake temperatures, are shown in Figure 7-11. The increasing tar yield, as the test progressed, is unexplained. There may be some relationship between tar yield and throughput (as indicated by blast air flow). The resolution on the condensate yields is such that it is not possible to draw correlations with the other operating conditions.

7.2 Material and Energy Balances

The material and energy balance calculation procedures are described in Volume 1 of this series (Thimsen, Maurer et al, 1984). A brief description follows.

The measured data used to calculate balances around the gasifier include process temperatures, pressures, flows, condensate concentrations, and dust carryover from the retort (see Section 7.6).

While relative measurements of gas phase sulfur species are made, the total gas sulfur loading used in the calculations is calculated from the coal sulfur content, coal rate, ash sulfur content, ash rate, dust sulfur content, dust rate, and tar/oil sulfur content and tar/oil yield. Sulfur species concentrations reported are obtained by normalizing GC data to the total sulfur loading in the gas as calculated by difference. In addition, the total gas composition has been normalized to 99.9% accounted for in the material and energy calculations.

The balances are calculated over various time periods

Table 7-5

Condensed Material Analysis,
Gas Sampling and Conditioning System

Coal Type	Elkhorn		Blind Canyon	
Date Collected	7/30 - 8/3	8/4	8/6 - 8/8	8/9 - 8/11
Water				
Total Organics, %	0.23	0.68	0.28	0.64
Tar (As recieved) (*)				
Heating Value, btu/lb	14071 (16654)	15244 (16530)	17234 (18783)	13930 (16158)
Flash point, Deg. F	224	204	221	200
Water by distillation, %	15.51	7.78	8.25	13.8
Specific gravity, 60/60 Deg. F	1.0758	1.0376	1.0470	1.0336
Pour point, Deg. F	80	90	95	90
Cold (solid) point, Deg. F	75	85	90	85
Viscosity at :				
122 Deg. F Saybolt Furol, Sec.	86.5	46.0	24.7	52.5
122 Deg. F Kinematic, centistoks	182.3	96.0	47.3	108.5
210 Deg. F Saybolt Universal, Sec.	62.2	78.5	48.1	59.9
210 Deg. F Kinematic, centistoks	10.8	15.2	6.7	10.2
Ultimate Analysis, WT% (*)				
Hydrogen	7.01 (8.30)	8.47 (9.18)	8.83 (9.62)	7.87 (9.13)
Carbon	72.33 (85.61)	77.69 (84.24)	74.31 (80.99)	72.31 (83.98)
Nitrogen	0.94 (1.11)	0.57 (.62)	0.60 (.65)	0.74 (.86)
Oxygen (by difference)	3.43 (4.06)	5.18 (5.62)	7.72 (8.41)	5.03 (5.83)
Sulfur	0.72 (.85)	0.30 (.32)	0.29 (.32)	0.26 (.30)
Moisture (total)	15.51	7.78	8.25	13.79
Ash	0.06 (.07)	0.01 (.01)	0.005 (.005)	0.004 (.005)
Sediment (solids %)	1.03 (1.22)	1.07 (1.16)	0.54 (.59)	0.75 (.87)

(*) Dry basis values are given in parentheses

Figure 7-11

Tar/Oil Yield and Water Yield with Operating Conditions

representing relatively stable operation. Each time period is characterized by a coal rate and a blast saturation temperature (steam/air ratio). Tables 7-6 to 7-12 show the results of the calculations. Table 7-13 shows the result of the calculation over the entire Blind Canyon test period.

7.3 Grate Performance Model

A geometrical 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 grate and compares it to the volume of ash rejected by the grate. Figure 7-12 shows the experimental data and the theoretical prediction. The model tends to underpredict the actual ash removed during this test.

7.4 Tar Yield Correlations

The overall tar yield measured during the gasification of the Blind Canyon bituminous coal was 13.8 lb/100 lb coal. This value varied from 10.2 to 15.4. The Fischer-Schrader Assay tar/oil yield correlations described by Ode and Selvig (1944) and Gomez et al (1958) have predicted tar/oil yields from past gasification tests within acceptable error bands.

There is no Fischer-Schrader Assay available for the Blind Canyon bituminous coal. As can be seen from Figures 7-13 and 7-14, the correlations of Fischer Assay tar/oil yields of similar coals predict a tar/oil yield of 13.7 to 15.5 lb/100 lb coal (as received). The tar/oil yield measured during the gasification of Blind Canyon bituminous coal is well within the scatter of the correlations.

7.5 Combustion Emission Measurements

Emissions from the gas combustion chamber were monitored on August 8 and 9, 1984. During this period, excess air in the combustion chamber was minimized to diminish back pressure in the leaking gas duct (see Section 6.1). This resulted in high combustor exhaust temperatures and allowed for only one particulate and one sulfur dioxide emission measurement to be made.

The single particulate measurement, made on August 8, showed a particulate loading of 0.052 gr/dscf. This corresponded to a particulate rate of 5.82 lb/hr and a particulate emission factor of 0.173 lb/million Btu input. Assuming this particulate is ash, it amounts to 1.9% of the ash entering the gasifier. Corresponding dust flow rates leaving the gasifier would be 0.65% of the coal feed rate. This is about 32% of the dust calculated to be leaving the retort at the time (see Section

Table 7-6

Material Balance and Thermal Efficiency Calculation
Elkhorn, 0.95 tn/hr, 140 F

Input Data

Time period: 8/ 2/84 12:00 - 8/ 3/84 2:00 (14.0 hours)

Gasifier Operation:

Coal feed, Ton/hour = 0.95
Blast air flow (dry) , Scfm =1209.
Saturated air temperature, F= 140.
Steam/Air Ratio (lb./lb.) = 0.15
Ambient air temperature, F = 74.
Off-take temperature, F = 858.

Coal Data:

Type = Elkhorn
Mass Fraction Carbon % = 73.7
Mass Fraction Fixed Carbon = 52.19
Mass Fraction Moisture % = 4.19
Mass Fraction nitrogen % = 1.21
Mass Percent sulfur = 0.84
Heating value, Btu/lb = 13030

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 3.13
Tar yield, lb/1000 SCF = 1.31
Carbon in Tar (percent) = 85.6
Sulfur in Tar (percent) = 0.85
Tar HHV, thou. Btu/lb = 16.65

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 141.
Ash carbon ,percent = 29.1
Ash sulfur ,percent = 0.20
Ash moisture (wet),percent = 12.1
Cyclone dust,lb/hour(est.) = 11.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 16.9	CH4 % = 1.72	H2S (est ppm)= 1524
CO % = 25.2	C2H4 % = 0.112	
CO2 % = 6.70	C2H6 % = 0.214	
N2 % = 48.2	C3H6 % = 0.046	
O2 % = 0.00	C3H8 % = 0.049	HHV, Btu/SCF = 162
Molec. Weight= 24.35	Argon(est. %)= 0.574	LHV, Btu/SCF = 151

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.27)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 1909.	24.0	Dry gas	= 7152.	91.2
Steam (total)	= 804.	10.1	Water in gas	= 348.	4.4
Air (calc,dry)	= 5228.	65.8	Oil and tar	= 146.	1.9
			Ash(calc,dry)	= 183.	2.3
			Dust	= 11.	0.1
Total	= 7941.		Total	= 7840.	

Energy Balance (Percent unaccounted for: 2.00)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 24.9	Dry coal gas	= 18.0	72.4
Air	= 0.017	Oil and tar	= 2.43	9.8
Steam(import)	= 0.436	Sensible	= 1.89	7.6
Cooling water	= 0.089	Latent	= 0.382	1.5
		Ash	= 0.755	3.0
		Dust	= 0.136	0.5
		Cooling water	= 1.277	5.1
Total	= 25.4	Total	= 24.9	

Performance Data

Cold gas efficiency, percent = 71.0
Cold gas with tar efficiency, percent = 80.5
Hot gas without tar efficiency percent = 79.3
Hot gas with tar efficiency, percent = 89.4
Air/Coal (lb./lb.) = 2.739
Steam/Coal (lb./lb.) = 0.421
Air/Fixed Carbon (lb./lb.) = 5.248
Coal/Gasifier Area (lb./hr./sqft) = 57.5
Fixed Carbon/Area (lb./hr./sqft) = 30.0
Producer Gas/Coal (SCF/lb.) = 62.3
Producer Gas/Fixed Carbon (SCF/lb.) = 119.4
Tar Yield (lb./lb. coal) = 0.076

Table 7-7

Material Balance and Thermal Efficiency Calculation
1.22 tn/hr, 140 F

Input Data

Time period: 8/ 3/84 12:00 - 8/ 4/84 9:00 (21.0 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.22
Blast air flow (dry) , Scfm = 1210.
Saturated air temperature, F = 140.
Steam/Air Ratio (lb./lb.) = 0.15
Ambient air temperature, F = 75.
Off-take temperature, F = 793.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 64.5
Mass Fraction Fixed Carbon = 42.02
Mass Fraction Moisture % = 6.35
Mass Fraction nitrogen % = 0.97
Mass Percent sulfur = 0.54
Heating value, Btu/lb = 11563

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 5.64
Tar yield, lb/1000 SCF = 2.86
Carbon in Tar (percent) = 84.2
Sulfur in Tar (percent) = 0.32
Tar HHV, thou. Btu/lb = 16.53

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 289.
Ash carbon ,percent = 16.1
Ash sulfur ,percent = 0.21
Ash moisture (wet),percent = 8.4
Cyclone dust,lb/hour(est.) = 9.

Gas Composition (Dry): (normalized to 99.90)

H2	%	= 17.6	CH4	%	= 1.99	H2S	(est ppm)= 1239
CO	%	= 27.7	C2H4	%	= 0.162		
CO2	%	= 5.63	C2H6	%	= 0.190		
N2	%	= 45.8	C3H6	%	= 0.069		
O2	%	= 0.00	C3H8	%	= 0.060	HHV,	Btu/SCF = 176
Molec. Weight=		23.97	Argon(est. %)=	0.544	LHV,	Btu/SCF = 165	

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -1.74)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 2448.	30.5	Dry gas	= 6848.	84.0
Steam (total)	= 745.	9.3	Water in gas	= 611.	7.5
Air(calc,dry)	= 4825.	60.2	Oil and tar	= 310.	3.8
			Ash(calc,dry)	= 378.	4.6
			Dust	= 9.	0.1
Total	= 8017.		Total	= 8156.	

Energy Balance (Percent unaccounted for: 2.08)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 28.3	Dry coal gas	= 19.1	67.0
Air	= 0.017	Oil and tar	= 5.12	18.0
Steam(import)	= 0.718	Sensible	= 1.89	6.6
Cooling water	= 0.057	Latent	= 0.674	2.4
		Ash	= 0.866	3.0
		Dust	= 0.096	0.3
		Cooling water	= 0.766	2.7
Total	= 29.1	Total	= 28.5	

Performance Data

Cold gas efficiency, percent = 65.6
Cold gas with tar efficiency, percent = 83.2
Hot gas without tar efficiency percent = 73.5
Hot gas with tar efficiency, percent = 91.9
Air/Coal (lb./lb.) = 1.971
Steam/Coal (lb./lb.) = 0.304
Air/Fixed Carbon (lb./lb.) = 4.691
Coal/Gasifier Area (lb./hr./sqft) = 73.8
Fixed Carbon/Area (lb./hr./sqft) = 31.0
Producer Gas/Coal (SCF/lb.) = 49.7
Producer Gas/Fixed Carbon (SCF/lb.) = 118.3
Tar Yield (lb./lb. coal) = 0.127

Table 7-8

Material Balance and Thermal Efficiency Calculation
1.34 tn/hr, 144 F

Input Data

Time period: 8/ 4/84 10:00 - 8/ 5/84 9:00 (23.0 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.34
Blast air flow (dry) , Scfm =1398.
Saturated air temperature, F= 144.
Steam/Air Ratio (lb./lb.) = 0.18
Ambient air temperature, F = 76.
Off-take temperature, F = 822.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 64.5
Mass Fraction Fixed Carbon = 42.02
Mass Fraction Moisture % = 6.35
Mass Fraction nitrogen % = 0.97
Mass Percent sulfur = 0.54
Heating value, Btu/lb = 11563

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 5.65
Tar yield, lb/1000 SCF = 2.86
Carbon in Tar (percent) = 84.2
Sulfur in Tar (percent) = 0.32
Tar HHV, thou. Btu/lb = 16.53

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 326.
Ash carbon ,percent = 8.5
Ash sulfur ,percent = 0.17
Ash moisture (wet),percent = 5.6
Cyclone dust,lb/hour(est.) = 17.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 18.3	CH4 % = 1.93	H2S (est ppm) = 1226
CO % = 27.0	C2H4 % = 0.161	
CO2 % = 6.25	C2H6 % = 0.184	
N2 % = 45.3	C3H6 % = 0.068	
O2 % = 0.00	C3H8 % = 0.059	HHV, Btu/SCF = 175
Molec. Weight= 23.91	Argon(est. %)= 0.539	LHV, Btu/SCF = 163

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -1.15)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 2677.	29.9	Dry gas	= 7639.	84.3
Steam (total)	= 942.	10.5	Water in gas	= 685.	7.6
Air (calc,dry)	= 5341.	59.6	Oil and tar	= 347.	3.8
			Ash (calc,dry)	= 376.	4.2
			Dust	= 17.	0.2
Total	= 8961.		Total	= 9064.	

Energy Balance (Percent unaccounted for: 1.58)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 31.0	Dry coal gas	= 21.2	67.6
Air	= 0.037	Oil and tar	= 5.73	18.3
Steam(import)	= 0.826	Sensible	= 2.21	7.0
Cooling water	= 0.057	Latent	= 0.755	2.4
		Ash	= 0.460	1.5
		Dust	= 0.181	0.6
		Cooling water	= 0.830	2.6
Total	= 31.9	Total	= 31.4	

Performance Data

Cold gas efficiency, percent = 66.5
Cold gas with tar efficiency, percent = 84.5
Hot gas without tar efficiency percent = 74.8
Hot gas with tar efficiency, percent = 93.7
Air/Coal (lb./lb.) = 1.995
Steam/Coal (lb./lb.) = 0.352
Air/Fixed Carbon (lb./lb.) = 4.747
Coal/Gasifier Area (lb./hr./sqft) = 80.7
Fixed Carbon/Area (lb./hr./sqft) = 33.9
Producer Gas/Coal (SCF/lb.) = 50.8
Producer Gas/Fixed Carbon (SCF/lb.) = 121.0
Tar Yield (lb./lb. coal) = 0.129

Table 7-9

Material Balance and Thermal Efficiency Calculation
1.60 tn/hr, 143 F

Input Data

Time period: 8/ 5/84 10:00 - 8/ 6/84 9:00 (23.0 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.60
Blast air flow (dry) , Scfm =1603.
Saturated air temperature, F= 143.
Steam/Air Ratio (lb./lb.) = 0.17
Ambient air temperature, F = 77.
Off-take temperature, F = 786.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 64.5
Mass Fraction Fixed Carbon = 42.02
Mass Fraction Moisture % = 6.35
Mass Fraction nitrogen % = 0.97
Mass Percent sulfur = 0.54
Heating value, Btu/lb = 11563

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 5.69
Tar yield, lb/1000 SCF = 3.21
Carbon in Tar (percent) = 81.0
Sulfur in Tar (percent) = 0.32
Tar HHV, thou. Btu/lb = 18.78

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 502.
Ash carbon ,percent = 8.2
Ash sulfur ,percent = 0.14
Ash moisture (wet),percent = 5.0
Cyclone dust,lb/hour (est.) = 37.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 18.1	CH4 % = 1.90	H2S (est ppm)= 897
CO % = 27.3	C2H4 % = 0.132	COS (est ppm)= 329
CO2 % = 5.73	C2H6 % = 0.186	CH3SH (est ppm)= 0
N2 % = 45.8	C3H6 % = 0.068	C2H5SH (est ppm)= 0
O2 % = 0.00	C3H8 % = 0.061	HHV, Btu/SCF = 175
Molec. Weight= 23.89	Argon(est. %)= 0.545	LHV, Btu/SCF = 163

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -0.71)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 3207.	29.9	Dry gas	= 9042.	83.7
Steam (total)	= 1119.	10.4	Water in gas	= 817.	7.6
Air(calc,dry)	= 6400.	59.7	Oil and tar	= 461.	4.3
			Ash(calc,dry)	= 445.	4.1
			Dust	= 37.	0.3
Total	= 10726.		Total	= 10802.	

Energy Balance (Percent unaccounted for: -2.19)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 37.1	Dry coal gas	= 25.1	64.3
Air	= 0.053	Oil and tar	= 8.66	22.2
Steam(import)	= 0.909	Sensible	= 2.52	6.5
Cooling water	= 0.068	Latent	= 0.905	2.3
		Ash	= 0.525	1.3
		Dust	= 0.383	1.0
		Cooling water	= 0.892	2.3
Total	= 38.1	Total	= 39.0	

Performance Data

Cold gas efficiency, percent = 65.8
Cold gas with tar efficiency, percent = 88.5
Hot gas without tar efficiency percent = 73.7
Hot gas with tar efficiency, percent = 97.3
Air/Coal (lb./lb.) = 1.996
Steam/Coal (lb./lb.) = 0.349
Air/Fixed Carbon (lb./lb.) = 4.749
Coal/Gasifier Area (lb./hr./sqft) = 96.6
Fixed Carbon/Area (lb./hr./sqft) = 40.6
Producer Gas/Coal (SCF/lb.) = 50.4
Producer Gas/Fixed Carbon (SCF/lb.) = 119.8
Tar Yield (lb./lb. coal) = 0.144

Table 7-10

Material Balance and Thermal Efficiency Calculation
1.55 tn/hr, 145 F

Input Data

Time period: 8/ 6/84 16:00 - 8/ 7/84 8:00 (16.0 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.55
Blast air flow (dry) , Scfm = 1585.
Saturated air temperature, F = 145.
Steam/Air Ratio (lb./lb.) = 0.18
Ambient air temperature, F = 77.
Off-take temperature, F = 799.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 64.5
Mass Fraction Fixed Carbon = 42.02
Mass Fraction Moisture % = 6.35
Mass Fraction nitrogen % = 0.97
Mass Percent sulfur = 0.54
Heating value, Btu/lb = 11563

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 3.97
Tar yield, lb/1000 SCF = 2.14
Carbon in Tar (percent) = 81.0
Sulfur in Tar (percent) = 0.32
Tar HHV, thou. Btu/lb = 18.78

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 442.
Ash carbon ,percent = 8.2
Ash sulfur ,percent = 0.14
Ash moisture (wet),percent = 5.0
Cyclone dust,lb/hour(est.) = 37.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 18.5	CH4 % = 1.88	H2S (est ppm) = 914
CO % = 26.9	C2H4 % = 0.134	COS (est ppm) = 225
CO2 % = 5.99	C2H6 % = 0.184	CH3SH (est ppm) = 8
N2 % = 45.6	C3H6 % = 0.065	C2H5SH (est ppm) = 32
O2 % = 0.00	C3H8 % = 0.061	HHV, Btu/SCF = 174
Molec. Weight = 23.82	Argon(est. %) = 0.542	LHV, Btu/SCF = 163

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: 1.86)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 3107.	28.4	Dry gas	= 9345.	87.2
Steam (total)	= 1219.	11.2	Water in gas	= 591.	5.5
Air(calc,dry)	= 6598.	60.4	Oil and tar	= 318.	3.0
			Ash(calc,dry)	= 430.	4.0
			Dust	= 37.	0.3
Total	= 10924.		Total	= 10721.	

Energy Balance (Percent unaccounted for: 0.66)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 35.9	Dry coal gas	= 26.0	70.6
Air	= 0.055	Oil and tar	= 5.98	16.3
Steam(import)	= 0.968	Sensible	= 2.46	6.7
Cooling water	= 0.070	Latent	= 0.653	1.8
		Ash	= 0.507	1.4
		Dust	= 0.392	1.1
		Cooling water	= 0.834	2.3
Total	= 37.0	Total	= 36.8	

Performance Data

Cold gas efficiency, percent = 70.1
Cold gas with tar efficiency, percent = 86.2
Hot gas without tar efficiency percent = 77.7
Hot gas with tar efficiency, percent = 94.5
Air/Coal (lb./lb.) = 2.124
Steam/Coal (lb./lb.) = 0.392
Air/Fixed Carbon (lb./lb.) = 5.054
Coal/Gasifier Area (lb./hr./sqft) = 93.6
Fixed Carbon/Area (lb./hr./sqft) = 39.3
Producer Gas/Coal (SCF/lb.) = 52.0
Producer Gas/Fixed Carbon (SCF/lb.) = 123.9
Tar Yield (lb./lb. coal) = 0.102

Table 7-11

Material Balance and Thermal Efficiency Calculation
1.65 tn/hr, 145 F

Input Data

Time period: 8/ 7/84 17:00 - 8/ 8/84 14:30 (21.5 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.65
Blast air flow (dry) , Scfm = 1588.
Saturated air temperature, F = 145.
Steam/Air Ratio (lb./lb.) = 0.18
Ambient air temperature, F = 72.
Off-take temperature, F = 779.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 68.6
Mass Fraction Fixed Carbon = 45.74
Mass Fraction Moisture % = 5.84
Mass Fraction nitrogen % = 0.95
Mass Percent sulfur = 0.50
Heating value, Btu/lb = 12289

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 6.95
Tar yield, lb/1000 SCF = 3.25
Carbon in Tar (percent) = 81.0
Sulfur in Tar (percent) = 0.32
Tar HHV, thou. Btu/lb = 18.78

Ash and Dust Data: (dry basis)

Ash discharge ,lb/hour = 422.
Ash carbon ,percent = 9.1
Ash sulfur ,percent = 0.14
Ash moisture (wet), percent = 8.6
Cyclone dust, lb/hour (est.) = 57.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 18.5	CH4 % = 1.92	H2S (est ppm) = 896
CO % = 26.9	C2H4 % = 0.133	COS (est ppm) = 126
CO2 % = 6.22	C2H6 % = 0.189	CH3SH (est ppm) = 12
N2 % = 45.3	C3H6 % = 0.057	C2H5SH (est ppm) = 19
O2 % = 0.00	C3H8 % = 0.061	HHV, Btu/SCF = 175
Molec. Weight = 23.84	Argon (est. %) = 0.539	LHV, Btu/SCF = 163

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -2.95)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 3301.	28.8	Dry gas	= 9840.	83.3
Steam (total)	= 1270.	11.1	Water in gas	= 1088.	9.2
Air (calc, dry)	= 6901.	60.2	Oil and tar	= 509.	4.3
			Ash (calc, dry)	= 317.	2.7
			Dust	= 57.	0.5
Total	= 11472.		Total	= 11811.	

Energy Balance (Percent unaccounted for: -2.37)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 40.6	Dry coal gas	= 27.4	64.1
Air	= 0.039	Oil and tar	= 9.56	22.4
Steam (import)	= 1.021	Sensible	= 2.79	6.5
Cooling water	= 0.056	Latent	= 1.197	2.8
		Ash	= 0.414	1.0
		Dust	= 0.597	1.4
		Cooling water	= 0.761	1.8
Total	= 41.7	Total	= 42.7	

Performance Data

Cold gas efficiency, percent = 65.6
Cold gas with tar efficiency, percent = 88.5
Hot gas without tar efficiency percent = 74.1
Hot gas with tar efficiency, percent = 98.0
Air/Coal (lb./lb.) = 2.091
Steam/Coal (lb./lb.) = 0.385
Air/Fixed Carbon (lb./lb.) = 4.571
Coal/Gasifier Area (lb./hr./sqft) = 99.5
Fixed Carbon/Area (lb./hr./sqft) = 45.5
Producer Gas/Coal (SCF/lb.) = 54.6
Producer Gas/Fixed Carbon (SCF/lb.) = 119.4
Tar Yield (lb./lb. coal) = 0.154

Table 7-12

Material Balance and Thermal Efficiency Calculation
1.84 tn/hr, 145 F

Input Data

Time period: 8/ 8/84 15:30 - 8/11/84 10:00 (66.5 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.84
Blast air flow (dry) , Scfm = 1801.
Saturated air temperature, F = 145.
Steam/Air Ratio (lb./lb.) = 0.18
Ambient air temperature, F = 69.
Off-take temperature, F = 800.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 68.6
Mass Fraction Fixed Carbon = 45.74
Mass Fraction Moisture % = 5.84
Mass Fraction nitrogen % = 0.95
Mass Percent sulfur = 0.50
Heating value, Btu/lb = 12289

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 5.36
Tar yield, lb/1000 SCF = 3.01
Carbon in Tar (percent) = 84.0
Sulfur in Tar (percent) = 0.30
Tar HHV, thou. Btu/lb = 16.16

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 498.
Ash carbon ,percent = 10.3
Ash sulfur ,percent = 0.15
Ash moisture (wet),percent = 9.9
Cyclone dust,lb/hour(est.) = 91.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 18.3	CH4 % = 1.84	H2S (est ppm) = 884
CO % = 27.0	C2H4 % = 0.151	COS (est ppm) = 128
CO2 % = 6.30	C2H6 % = 0.181	CH3SH (est ppm) = 16
N2 % = 45.4	C3H6 % = 0.057	C2H5SH (est ppm) = 25
O2 % = 0.00	C3H8 % = 0.054	HHV, Btu/SCF = 174
Molec. Weight = 23.91	Argon(est. %) = 0.540	LHV, Btu/SCF = 162

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -0.64)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 3682.	28.8	Dry gas	= 10971.	85.3
Steam (total)	= 1415.	11.1	Water in gas	= 933.	7.3
Air(calc,dry)	= 7690.	60.1	Oil and tar	= 524.	4.1
			Ash(calc,dry)	= 349.	2.7
			Dust	= 91.	0.7
Total	= 12787.		Total	= 12868.	

Energy Balance (Percent unaccounted for: 2.24)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 45.2	Dry coal gas	= 30.2	67.0
Air	= 0.016	Oil and tar	= 8.47	18.8
Steam(import)	= 0.772	Sensible	= 3.09	6.9
Cooling water	= 0.076	Latent	= 1.033	2.3
		Ash	= 0.516	1.1
		Dust	= 0.949	2.1
		Cooling water	= 0.798	1.8
Total	= 46.1	Total	= 45.1	

Performance Data

Cold gas efficiency, percent = 65.5
Cold gas with tar efficiency, percent = 83.9
Hot gas without tar efficiency percent = 73.4
Hot gas with tar efficiency, percent = 92.7
Air/Coal (lb./lb.) = 2.089
Steam/Coal (lb./lb.) = 0.384
Air/Fixed Carbon (lb./lb.) = 4.566
Coal/Gasifier Area (lb./hr./sqft) = 111.0
Fixed Carbon/Area (lb./hr./sqft) = 50.8
Producer Gas/Coal (SCF/lb.) = 52.8
Producer Gas/Fixed Carbon (SCF/lb.) = 115.5
Tar Yield (lb./lb. coal) = 0.142

Table 7-13

Material Balance and Thermal Efficiency Calculation
Blind Canyon Overall Average

Input Data

Time period: Overall Average (171.0 hours)

Gasifier Operation:

Coal feed, Ton/hour = 1.61
Blast air flow (dry) , Scfm = 1601.
Saturated air temperature, F = 144.
Steam/Air Ratio (lb./lb.) = 0.18
Ambient air temperature, F = 73.
Off-take temperature, F = 798.

Coal Data:

Type = Blind Canyon
Mass Fraction Carbon % = 66.8
Mass Fraction Fixed Carbon = 44.15
Mass Fraction Moisture % = 6.06
Mass Fraction nitrogen % = 0.96
Mass Percent sulfur = 0.52
Heating value, Btu/lb = 11978

Tar and Water Yield (dry basis):

Water yield, lb./1000 SCF = 5.53
Tar yield, lb/1000 SCF = 2.95
Carbon in Tar (percent) = 82.8
Sulfur in Tar (percent) = 0.31
Tar HHV, thou. Btu/lb = 17.18

Ash and Dust Data:(dry basis)

Ash discharge ,lb/hour = 435.
Ash carbon ,percent = 9.9
Ash sulfur ,percent = 0.15
Ash moisture (wet),percent = 8.1
Cyclone dust,lb/hour(est.) = 45.

Gas Composition (Dry): (normalized to 99.90)

H2 % = 18.3	CH4 % = 1.89	H2S (est ppm)= 926
CO % = 27.1	C2H4 % = 0.147	COS (est ppm)= 165
CO2 % = 6.11	C2H6 % = 0.184	CH3SH (est ppm)= 13
N2 % = 45.5	C3H6 % = 0.062	C2H5SH (est ppm)= 22
O2 % = 0.00	C3H8 % = 0.058	HHV, Btu/SCF = 174
Molec. Weight= 23.90	Argon(est. %)= 0.541	LHV, Btu/SCF = 163

Calculation Results (based on nitrogen and carbon balance)

Material Balance (Percent unaccounted for: -0.91)

Input,	lb/hr	% Total	Output,	lb/hr	% Total
Coal	= 3230.	29.1	Dry gas	= 9494.	84.8
Steam (total)	= 1193.	10.8	Water in gas	= 334.	7.5
Air(calc,dry)	= 6670.	60.1	Oil and tar	= 445.	4.0
			Ash(calc,dry)	= 375.	3.3
			Dust	= 45.	0.4
Total	= 11093.		Total	= 11193.	

Energy Balance (Percent unaccounted for: 0.74)

Input,	MM BTU/hr	Output,	MM Btu/hr	% Total
Coal	= 38.7	Dry coal gas	= 26.3	66.8
Air	= 0.027	Oil and tar	= 7.65	19.5
Steam(import)	= 0.841	Sensible	= 2.66	6.8
Cooling water	= 0.067	Latent	= 0.922	2.3
		Ash	= 0.534	1.4
		Dust	= 0.475	1.2
		Cooling water	= 0.811	2.1
Total	= 39.6	Total	= 39.3	

Performance Data

Cold gas efficiency, percent = 66.3
Cold gas with tar efficiency, percent = 85.6
Hot gas without tar efficiency percent = 74.3
Hot gas with tar efficiency, percent = 94.5
Air/Coal (lb./lb.) = 2.065
Steam/Coal (lb./lb.) = 0.370
Air/Fixed Carbon (lb./lb.) = 4.678
Coal/Gasifier Area (lb./hr./sqft) = 97.3
Fixed Carbon/Area (lb./hr./sqft) = 43.0
Producer Gas/Coal (SCF/lb.) = 52.3
Producer Gas/Fixed Carbon (SCF/lb.) = 118.5
Tar Yield (lb./lb. coal) = 0.138

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

(Ode and Selvig, 1944)

Figure 7-14

Correlation of Tar Yield with Volatile Btu

(Gomez et al, 1958)

7.6).

The single sulfur dioxide measurement of the combustor exhaust was also made on August 8. The sulfur dioxide concentration was measured to be 242 ppm (dry basis). This corresponds to a mass flow of 31 lb/hour and a sulfur dioxide emission factor of 0.94 lb/million Btu input. If the sulfur in the coal were ultimately converted to sulfur dioxide in the combustor exhaust, the sulfur dioxide mass flow rate would be 0.81 lb/million Btu input. The fact that the actual emission factor is higher than this is unexplained.

On August 9, two sulfur dioxide measurements were performed at the discharge of the scrubber I.D. fan. The coal throughput was approximately 17% greater on August 9 than on August 8. The sulfur dioxide emission factor measured at this location on August 9 averaged 0.54 lb/million Btu input. If scrubber input emission factors on August 9 were the same as those on August 8 (a likely situation), then the sulfur dioxide removal efficiency of the wet caustic scrubber is approximately 42% at a combustor heat output of about 45 million Btu/hr.

Nitric oxide concentrations averaged 730 ppm (dry basis) on August 8.

7.6 Retort Particle Sampling

Developmental efforts continued in regard to measurement of total particle mass loadings, leaving the retort. The procedures described in volume 1 of this series (Thimsen, Maurer et al, 1984).

A total of 12 sampling runs were made, all resulting in valid data. No tar droplets were collected during sampling due to the high offtake temperatures observed during the gasification of Blind Canyon coal. Filter samples contained only dry dust.

Figure 7-15 shows the total particle mass as a function of actual gas flow. The face velocity is calculated by dividing the actual gas flow by the area of the annulus through which the gas moves at the top of the retort (22.75 sq. ft.). The least squares curve fit is used for the material and energy balance calculations (Section 7.2).

Particle size distributions were measured for 4 of the dust samples taken. These data are included in Appendix G. The mass median particle size ranged from 100 to 210 μm for a gas face velocity increase from 3.4 to 4.6 ft/sec. Bimodal size distribution functions were found to fit two of the size distributions well. Unimodal size distribution functions were used on the other two. The upper mode volume (mass) mode ranged from 200 to 550 μm .

Figure 7-15

Dust Carryover vs. Gas Flow Rate

7.7 Enlarged Gas Cooler/Tar Separator

Tar samples collected by the enlarged gas cooler/tar separator were submitted for the same analyses performed on tar samples collected by the gas sampling and conditioning system. The results of these analyses are shown in Table 7-14. All three Blind Canyon tar samples collected in the enlarged gas cooler/tar separator show analyses very close to each other. The analyses of the tar collected in the enlarged gas cooler/tar separator are similar to the analyses of the tar collected in the gas sampling and conditioning system (Table 7-5), but some significant differences are present.

The enlarged system tar had higher dry basis heating value (with one exception), higher flash point, lower specific gravity and higher pour point and solid point. Low temperature (122 F) viscosity of the enlarged system tar was substantially lower than that collected in the gas sampling and conditioning system, while high temperature viscosity (210 F) was about the same. Ultimate analysis hydrogen, carbon and sulfur were higher for the enlarged system tar (consistent with the higher HHV), while ultimate nitrogen and oxygen were somewhat lower. These differences are unexplained, but may be related to difficulties in accurately measuring the water content of the tars. The enlarged system tar water contents were low (1-5%), while the small gas sampling and conditioning system tar water contents were relatively higher (8-13%).

Tar loadings measured by the enlarged gas cooler/tar separator were greater than 3.5 lb/1000 dscf compared to loadings measured by the small gas sampling and conditioning system of 1.8 to 2.8 lb/1000 dscf. Some of the discrepancy may be explained by the relatively uneven gas flow through the enlarged system, due to steam drum pressure cycling. (There was no steam pressure regulator installed upstream of the steam jet eductor.) Measurement of the total amount of gas processed was therefore also subject to some error.

Tar samples were sent to the following agencies for analysis on behalf of EPRI:

Hydrocarbon Research, Incorporated
Trenton, New Jersey

SRI, International
Menlo Park, California

Alberta Research Council
Nisku, Alberta

Biomaterials Profiling Center
University of Utah
Salt Lake City, Utah

Table 7-14

Condensed Material Analysis,
Enlarged Gas Cooler/Tar Separator

Coal Type	Elkhorn		Blind Canyon	
	7/30 - 8/3		8/4	8/6 - 8/8
Date Collected			8/9 - 8/11	
Tar (As recieved) (*)				
Heating Value, btu/lb	15713 (16025)	17423 (17631)	16683 (17680)	17456 (17645)
Flash point, Deg. F	256	247	236	241
Water by distillation, %	1.95	1.18	5.64	1.07
Specific gravity, 60/60 Deg. F	1.0253	1.0049	0.9968	1.0008
Pour point, Deg. F	90	100	100	95
Cold (solid) point, Deg. F	85	95	95	90
Viscosity at :				
122 Deg. F Saybolt Universal, Sec.	130.5	41.3	81.3	37.5
122 Deg. F Kinematic, centistoks	276.1	83.7	171.2	75.4
210 Deg. F Saybolt Universal, Sec.	42.7	54.0	46.2	53.5
210 Deg. F Kinematic, centistoks	5.02	8.5	6.1	8.3
Ultimate Analysis, WT% (*)				
Hydrogen	9.04 (9.22)	9.76 (9.88)	9.44 (10.00)	9.88 (9.99)
Carbon	78.67 (80.23)	85.26 (86.28)	81.46 (86.33)	84.91 (85.83)
Nitrogen	0.57 (.58)	0.47 (.48)	0.47 (.50)	0.41 (.41)
Oxygen (by difference)	9.23 (9.41)	3.06 (3.10)	2.71 (2.87)	3.47 (3.51)
Sulfur	0.47 (.48)	0.27 (.27)	0.28 (.30)	0.26 (.26)
Moisture (total)	1.95	1.18	5.64	1.07
Ash	0.07 (.07)	0.004 (.004)	0.004 (.004)	0.004 (.004)
Sediment (solids %)	0.14 (.14)	0.59 (.60)	0.44 (.47)	0.31 (.31)

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(*) Dry basis values given in parentheses

SECTION 8

CONCLUSIONS

1. The maximum throughput observed during gasification of Blind Canyon bituminous coal was 1.85 ton/hour for a time period exceeding 64 hours. The throughput was limited by the ability of the scrubber's induced draft fan to keep the gas duct pressure just in front of the burner below atmospheric pressure. Attempts to raise throughput beyond this level resulted in unacceptable gas emissions through a leak in the gas duct at this point. There were no indications that excessive gas channeling, ash clinkering or degradation of product gas quality were occurring at this throughput.
2. A coal throughput of 1.8 ton/hour (108.5 lb/hour/square foot grate) is recommended for design purposes. Based on this throughput and a blast saturation temperature of 145 F (62.8 C), the following material and energy flows can be expected:

Material In (lb/lb coal)		Energy In (million Btu/hr)	
Air	2.089	Coal	44.2
Steam (total)	0.384	Steam(import)	0.76

Material Out (lb/lb coal)		Energy Out (million Btu/hr)	
Dry Gas	2.979	Dry Gas	29.35
Tar/oil	.142	Tar/oil	8.29
Water Vapor	.253	Sensible/Latent (gas)	4.03
Dust	.025	Dust	0.93
Ash	.095	Ash	0.50
		Cooling Water	0.78
		Unaccounted for	1.05

3. The average tar/oil yield over the entire test period was 13.8 lb/100 lb coal. This represents 20% of the energy in the coal.
4. Blast saturation temperatures between 140 F and 145 F (60 C and 62.8 C) were used successfully. Smoothest operation was achieved at the higher blast saturation temperatures.
5. Coal agglomerations were detected, but operation the agitator was adequate to keep large agglomerations of char from forming in the upper zone of the retort. The fluctuations in gas composition and offtake temperature observed during the test may be a result of the buildup of short term agglomerations that inhibited coal feed. In any case, these fluctuations were minor and gas quality remained high throughout the test (170-180 Btu/dscf).

6. A single measurement of emissions from the combustion chamber showed a particulate emission factor of 0.173 lb/million Btu input, and a sulfur dioxide emission factor of 0.94 lb/million Btu input.
7. The sulfur dioxide removal efficiency of the wet, caustic scrubber appears to be less than 50%.
8. Dust particle loss from the retort could be characterized as a power function of the produced gas flow rate.
9. The gas cooler/tar separator that was scaled up from the gas sampling and conditioning system performed according to design. Dry gas flow rates as high as 10 scfm were cleaned with no visually detectable tar penetration.
10. Tar yields from the enlarged gas cooler/tar separator were somewhat greater than those measured by the gas sampling and conditioning system.
11. The tar collected from the enlarged gas cooler/tar separator was very fluid and not difficult to drain by gravity.
12. Based on this test, the Blind Canyon bituminous coal is recommended as a fixed-bed gasifier fuel with agitation. High throughputs are possible and gas quality is good.

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APPENDICES

A. Gasifier Operator's Log.....	A-1
B. Weather Data for Testing Days.....	B-1
C. Coal Sizing Data.....	C-1
D. Coal Consumption Log.....	D-1
E. Ash Analysis Data.....	E-1
F. Ash Removal Log.....	F-1
G. Retort Particle Sampling Data.....	G-1
H. Operator Logged Data.....	H-1
I. Gas Chromatograph Data.....	I-1
J. Continuous Output Transducer Data.....	J-1
K. Stack Sampling Report.....	K-1
L. Retort Temperature and Pressure Probe Data.....	L-1
M. Gas Cooler/Tar Scrubber Operator's Log.....	M-1
N. Gas Cooler/Tar Scrubber Operator Logged Data...	N-1

APPENDIX A

Gasifier Operator's Log

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

BOM/FGT 014 ELKHORN/BLIND CANYON

TEST LOG

July 30, 1984

- 0700 Filled the jacket, agitator, bin drain trap, and cyclone with water.
- 0730 Dumped 15 gallons of fuel oil and sprayed down the boxes and wicks.
- 0815 Closed the top manhole after dumping 11.7 tons of petroleum coke.
- 0830 Lit off the gasifier. Saturation air flow is 280 cfm.
- 0845 Opened the steam header valves.
- 0850 Set the saturation temperature at 60 C. Started filling the weigh bins with Elkhorn. Set the back pressure valve at 9.9%. The furnace pressure was set at atmosphere wc. Started filling the scrubber tanks with water.
- 0915 Lit the pilot on the coal leg.
- 0925 Started the caustic pump.
- 0930 Started the number 1 scrubber pump. Lit the combustor pilot. The number 2 scrubber pump disconnect stuck; will check it.
- 0932 Stopped loading coal at 11.08 tons.
- 0950 Drained the cyclone and are burning gas in the combustor.
- 1015 Furnace pressure is not reading correctly. Will run it on manual by the % of vane open. To maintain a minimum of .5 inches wc on the cyclone outlet pressure.
- 1200 Fire test ash average is 6.1 inches. All bars went in with ease. There were double zones on bars number 4, 6 & 7.
- 1300 Started using caustic as the pH was 5.0.
- 1345 Reduced the caustic pump speed to 25/25. The pH level is 10.0+. Pouring caustic soda from the old metal barrels directly into the scrubber tanks.

1400 Fire test ash average is 4.1 inches. Double zones were again noted on bars number 4,6 & 7. Still waiting for a high coal leg temperature so we can drop the Elkhorn.

1430 Decreased the furnace pressure to 25%.

1450 Increased the jacket water flow to 18 gpm. The steam valve is only open 2%.

1500 We are still waiting to drop the coal.

1600 Fire test ash average is 4.7 inches. The poke rods were very hot this test.

1845 Coal leg temperature went up high enough to trip the alarm (50 C). The offtake temperature is 390 C.

1850 Coal leg temperature is 60 C. The offtake temperature is still 390 C.

1920 Coal leg temperature is 80 C. The offtake temperature is 420 C.

1925 Coal leg temperature is 90 C. The offtake temperature is 425 C.

1930 Coal leg temperature is 95 C. The offtake temperature is 430 C. We will now feed 4.73 tons of elkhorn to the gasifier. Coal leg and offtake temperatures immediately began to drop.

2200 Fire test ash average is 3.1 inches.

2330 The coal leg temperature is 50 C. Dropped only .12 ton from the weigh bin. The south coal leg is warmer to the touch. The pipes sound full. The cyclone outlet pressure is reading +000.0. Discovered that a brass fitting is shattered and thus nothing in this line is connected. Replaced the brass 1 inch bushing and reattached the copper tubing. Now the cyclone outlet pressure is reading 0.5 inches wc.

July 31, 1984

0000 Fire test ash average is 4.1 inches. There has developed a thick upper crust and must pound in the bars. The grate remains turned off until we show 12 inches of ash all around.

0120 Started filling the weigh bin with Elkhorn bituminous coal at 4.59 tons.

0130 There is very little particulate evident from the

cyclone.

- 0140 The coal conveyor stopped running. Coal tends to pile up on the inner side of the belt around the lower drum. The breaker tripped 3 or 4 times before the situation was remedied.
- 0155 Stopped filling the weigh bin at 9.6 tons.
- 0230 Dropped .14 tons on this coal up. The high coal leg temperature alarm has sounded periodically with the coal leg temperature remaining around 50 C. The south coal leg is warmer to the touch. Both pipes are choked and both upper valves are functioning.
- 0400 This fire test shows some improvement over the previous tests. The ash average is 5.1 inches. Number 3 bar had to be pounded in.
- 0545 It is daylight. Took a walk around the outside and discovered that the boiler was on night setting, so switched it to day with an immediate load demand. The pH is 7.5. There do not appear to be any back pressure leaks in the horizontal duct. A slight gas leak at the downcomer mouth was noticed.
- 0555 This fire test ash average is 7.7 inches. The grate remains off.
- 0600 Per plan, we are increasing the saturation air flow to 800 cfm from 600 cfm and decreased the saturation temperature to 58 C from 60 C. The back pressure valve is opened from 46% to 60% to maintain the gas supply pressure at .5 inches wc.
- 0610 Finished loading the weigh bin at 11.02 tons.
- 0650 Jacket water flow is 20 gpm in attempt to hold the saturation temperature at 58 C. The steam valve is 7% open.
- 0730 This cyclone dump produced no measureable particulate.
- 0740 The inlet line to the combustor is leaking. Increased the furnace pressure to 65 inches wc (valve 35% open).
- 0800 Fire test ash average is 9.14. The bars went in fairly well, but we had to pound them through the layer of crust.
- 0815 Started the grate drive at 2/0.39. Started the agitator to bring down the offtake temperature and help stabilize the saturation temperature and reduce the

jacket water flow to 8.0 gpm.

- 0840 Freeboard average is 32 inches. Slowed the agitator to 5.0 sweeps/hour.
- 0930 Freeboard average is 25 inches. Stopped running the agitator. Poked holes 3 & 4 to break up the hard crust.
- 1000 Fire test ash average is 6.6 inches. Increased the grate speed to 2/0.7.
- 1115 The offtake temperature is 615 C. Started poking holes number 1,2 & 3 due to glowing on top of the bed. Increased the grate speed to 2/1.00.
- 1120 First ash dump this run produced a brownish ash 2-3.5 inches across.
- 1200 Fire test ash average is 4.3 inches. Grate speed is 2/1.00.
- 1205 First steam/air test is completed. Raised the saturation temperature to 62 C per plan. Reduced the jacket water flow to 15 gpm.
- 1215 Increased the grate speed to 2/2.19 for 15 minutes and will fire test the number 5 hole.
- 1230 Number 5 hole had a 4 inch ash average.
- 1400 Fire test ash average is 5 inches. The bars went down easier.
- 1410 Started the agitator to maintain a 38 inch freeboard.
- 1600 Fire test ash average is 4.6 inches.
- 1800 Fire test ash average is 4.9 inches.
- 1805 Increased the saturation temperature to 65 C. Increased the jacket water flow to 20 gpm.
- 2000 Fire test ash average is 7.9 inches.
- 2200 Fire test ash average is 11.4 inches. Glowing was noted on hole number 6. We will poke it periodically.
- 2235 Poked hole number 6 and the cherry red color disappeared.
- 2325 Opened the upper ash cone valve. Saturation temperature is 65 C.

2330 Turned on the oil lubricant to the grate.

August 1, 1984

0000 Fire test ash average is 15.6 inches. Multiple zones were evident on holes 3, 5 & 7. Increased the grate speed to 2/1.5 to remove more ash.

0030 Very little carryover is observed from the cyclone.

0040 Tried the vane valve on automatic. It will not hold pressure. The valve closes down to 20% open. Must keep it on manual (52=35% open).

0100 Reduced the saturation temperature to 60 C to bring the system in line for the third steam/air test. Decreased the jacket water to 18 gpm.

0120 Made another adjustment to the furnace pressure to prevent the gas from leaking from the hole in the horizontal duct. Primary air is 32% open. Secondary air is 28% open. The vane valve is 47% open. This maintains a 0.6 inch wc on the gas supply pressure.

0200 Fire test shows the bed deteriorated after going to a saturation temperature of 60C. The bars have to be pounded in. Multiple zones are evident on bars number 1 & 3. Slowed the grate slightly to 2/1.35 to maintain ash level. Gas quality has improved some since going to 60 C saturation temperature. Higher heating value is 150 BTU/ft³.

0240 Dumped 506 pounds of ash.

0400 Fire test ash average is 11.7 inches and the bed is hardening and becoming uneven. leaving the grate speed at 2/1.35. Higher heating value is now 165 BTU/ft³.

0430 Offtake temperature is 450 C. Turned the agitator on. It had been off for 30 minutes.

0530 Started loading Elkhorn into the weigh bin at 4.75 tons.

0600 Fire test ash average is 9.9 inches. No multiple or wide fire zones.

0607 Flushed the cyclone to 1.5 minutes and still no particulate can be seen.

0620 Dumped 515 pounds of ash.

0730 Flushed the cyclone and very little carryover result-

ed. There was some orange sludge floating in the holding tank (oily foam). Starting to pour soda from the old drums directly into the scrubber tank.

- 0800 Fire test ash average is 13.1 inches. Increasing the grate to 3/1.3. The bars went in fairly easily.
- 0830 Flushed the cyclone and found very little carryover.
- 1000 Fire test ash average is 12.6. Increased the grate speed to 3/1.45. All bars went in with ease.
- 1015 Lowered the agitator to 40 inches to try and stabilize the offtake temperature.
- 1020 Dumped 505 pounds of ash. The ash is uniform in size (2-3 inches). There appears to be a mixture of unburned coal both black and tan in color.
- 1030 This cyclone dump again showed very little carryover. The water color is a milky green with a floating orange sludge marked by black oily droplets.
- 1200 Fire test ash average is 13.3 inches.
- 1210 Increased the grate speed to 5/0.5 until the load change at 1230.
- 1235 Increased the saturation air flow, as scheduled, to 1200 cfm with the saturation temperature at 58 C. The grate speed is 5/0.6. Increased the jacket water to 20 gpm. Set the back pressure valve at 100% open. Set the furnace pressure at 60% open.
- 1400 Fire test ash average is 16.3 inches. The bed has leveled off, but it is still high. The bed is softer.
- 1410 Dumped 530 pounds of ash. The size of the ash is fairly uniform at 2-3 inches.
- 1430 Cyclone dump produced a small amount of floating particulate.
- 1445 Decreased the grate speed to 5/1.20.
- 1450 Reduced the agitator speed to 3.5 sweeps/hour to maintain a 38 inch freeboard.
- 1800 Fire test ash average is 7.1 inches. Reducing the grate speed to 0.75. Increasing the saturation steam to 62 C.
- 2000 Fire test ash average is 7.6 inches. Number 3 hole is glowing.

2320 Dumped 600 pounds of ash. The ash was very dry and fuel was totally consumed. The chunks were 1-2 inches in size and grey to white in color. After flushing the underside of the grate, there was much fine ash.

August 2, 1984

0000 Fire test shows 10 inches. Number 6 bar showed a double zone. The bars went in with ease. Slowed the grate to 5/0.80.

0200 Ash average is 10.1 inches. The side in which the holes number 4,5 & 6 are located is hardening up. Slowed the grate speed to 5/0.7 and will recheck holes number 4 & 5 in half an hour.

0215 Cyclone particulate is running 1 scoop per dump. Dumped 520 pounds of ash. Higher heating value is 155 BTU/ft³. Keeping the agitator at a slow speed to control the offtake temperature.

0245 Rechecked the number 4 & 5 holes. They both showed multiple fire zones. Slowed the grate speed to 5/0.60.

0300 Replaced the caustic barrel as the pH had fallen to 6.0.

0400 This fire test ash average was 9.7 inches. Number 5 bar again showed multiple zones. Number 4 hole was extremely hard. Leaving the grate at 5/0.6 after running it full out for 10 minutes. Before running the grate full out, the ash weight was 357 pounds. Afterwards the ash weight was 443 pounds. The off-take temperature is 413 C.

0515 Checked the area outside and found that both spray nozzles on the scrubber intake and on the upper ring were closed. This explains why the scrubber discharge temperature has been running 30 C above normal. The scrubber discharge temperature is now reading 72 C.

0530 Both top gas and gas supply pressures are reading negative and remain so until the vane valve was closed to 65% open.

0600 Fire test ash average is 10.1 inches. Most of the ash appears to be on the side of the numbers 6,1 & 2. There were multiple zones on bars 4 & 5. Increased the grate speed to 5/0.75.

0610 Started filling the weigh bin with the remaining

Elkhorn coal. Dumped 570 pounds of ash. The cyclone dumps are as they have been, very little carryover. Ductwork downstream of the scrubber is leaking excessively.

- 0640 The last of the Elkhorn is in the weigh bin and the conveyor hopper (approximately 14 tons). Increased the caustic pump to 40/40. The pH is 6.5.
- 0700 Saturation blower failed - shutdown. Vent valve is open and we are flooding the cyclone. Shut down the induced draft, primary, secondary fans.
- 0705 Set the induced draft fan and both combustor fans at 10% open. Saturation air flow is 500 cfm.
- 0710 Waiting for the cyclone to fill so we can restart.
- 0725 Cyclone is full. Fired off the combustor pilot. Started the induced draft fan and combustion blowers. Started draining the cyclone.
- 0730 We are back on line.
- 0745 Increased the saturation air flow to 1200 cfm. Opened the back pressure valve 100%. Furnace pressure 60% open. Set the saturation temperature at 62 C. Increased the primary combustor blower to 3500 cfm and the secondary to 11500 cfm.
- 0750 Running at scheduled load.
- 0800 Fire test showed that the shutdown helped level the bed! The ash average is 13.9 inches. All bars went in easily with no extra persuasion. Leaving the grate speed at 5/0.75.
- 0830 Flushed the cyclone of heavy accumulation of dust due to shutdown.
- 0915 Informed by the University of Minnesota personnel that the ESP will be running in an hour.
- 0930 Continuing to dump caustic soda from old drums into the scrubber tanks. All remaining Elkhorn is in the weigh bin.
- 1000 Fire test ash average is 17.4 inches. Noticed a hard area in the region of the number 5 hole. Increased the grate speed to 5/1.2.
- 1030 Turned the agitator off to see at what temperature the offtake temperature will stabilize.
- 1200 Fire test ash average is 14.4 inches. Decreased the

grate speed to 5/1.0.

- 1225 Informed by the University of Minnesota that the ESP would be running in 15 minutes.
- 1230 Coal useage is up to 1.1 ton for the last 2 drops.
- 1400 Informed the U of M personnel that we would be doing a fire test. Fire test ash average is 13.6 inches.
- 1415 Reduced the back pressure valve to 50% open to increase the back pressure and maintain it at 1.5 inches wc when the ESP unit is in operation.
- 1445 Reduced the grate speed to 5/1.05 to avoid loosing too much ash. Will readjust it after the 1600 fire test.
- 1500 Steam input readout shows no reading. Increased the jacket water flow to reduce the steam produced in the jacket.
- 1600 Firetest ash average is 5.4. Decreasing the grate speed to 0.50. Going to shut the agitator off completely.
- 1640 Increased the grate speed to .090.
- 1800 Fire test ash average is 5.7 inches.
- 2000 Fire test ash average is 8.4 inches.
- 2130 Dumped the last of the Elkhorn. Shut off the coal bin slide gates. Going to let the remainder of the coal burn up before introducing the Blind Canyon coal.
- 2200 Fire test ash average shows the ash level getting back to where it belongs (11.3 inches). Gas supply pressure readout is incorrect. We are going by the gas offtake pressure readout.
- 2300 Saturation air flow is 1200 cfm at a saturation temperature of 60 C.
- 2315 Closed the back pressure valve to 35.2% open to increase gas supply pressure to 1.5 inches wc. Advised the U of M that we are still burning Elkhorn.
- 2317 The offtake temperature is 458 C and the coal leg temperature is 34 C. Will cycle the lower bin valves every hour until the pipes run empty before dropping the Blind Canyon.

August 3, 1984

- 0000 Fire test ash average is 12 inches. All bars except number 3 went in easily. Leaving the grate at 5/0.9. CETCO advised that their equipment showed an O₂ level of 0.6% during this time period.
- 0027 CETCO advised that their system is shut down until further notice. They will purge the excessive oxygen, change some parts and come back on line.
- 0030 Dumped and sampled the cyclone. Light particulate levels continue. The pH is 7.0 and the caustic barrel is still 1/3 full. Dumped 540 pounds of ash.
- 0120 The ESP is back on line.
- 0130 Continuing to cycle lower coal bin valves. There still has been no climb in the offtake temperature or coal leg temperatures.
- 0200 Fire test ash average is 7.4 inches. Leaving the grate speed at 5/0.9. Had to open the back pressure valve to 61.7% open to aid in controlling the duct leakage. CETCO advised that this also helps their O₂ at the ESP, which ran 0.5% instead of the previous 0.85% as was seen with the 0000 fire test.
- 0220 Have come to the end of the Elkhorn coal as we can hear the pipes emptying out.
- 0222 Coal leg high temperature alarm went off as the coal leg temperature went above 50 C. Advised CETCO that we are dropping the Blind Canyon coal at 0230. They wanted to check the tar levels and drain their holding tank.
- 0230 Coal leg temperature is 118 C and the offtake temperature is 553 C. Dropped 7.961 tons of Blind Canyon coal from the weigh bin. Dumped 530 pounds of ash.
- 0245 Constant adjustment to both the back pressure valve and the vane valve was necessary to assure that the proper gas supply pressure during the draining of the tar, ash dump and gas leakage from the horizontal duct. There was gas all over the ESP area during the tar drain procedure from the opening of the 3 inch drain valves.
- 0300 45 minutes after dropping the Blind Canyon coal, the coal leg temperatures are back under control (48 C) and the offtake temperature is back to 495 C. Will reduce the vane valve to 60% open to maintain a 1.5-2 inch cyclone outlet pressure.

- 0330 One hour after dropping the Blind Canyon, the offtake temperature is climbing (620 C), the CO is increasing and the CO₂ is decreasing. Holes 3, 5 & 6 showed signs of burning through. Cycled the agitator to 360 degrees to cover over the burn through area and lower the offtake temperature.
- 0345 Offtake temperature is 145 C. Burn through area now shows dark. CO and CO₂ now show a turn around. Both the ash pit and gas supply pressures are up. The ash pit pressure is 10 inches wc and the gas supply pressure is 2.5 inches wc.
- 0400 Fire test ash average is 6.4 inches and the bed shows upheaval. Bars number 2 & 4 are showing multiple zones. Slowed the grate to 5/0.65 and will run the agitator at slow speed to control the offtake temperature which is climbing toward 500 C again.
- 0440 Half hour after starting the agitator, the offtake temperature is 534 C. Number 6 hole shows glowing on top. Will turn the agitator off for 30 minutes.
- 0510 The agitator has been turned back on as the offtake temperature is now over 600 C. Will leave the agitator running at 1.6 sweeps/hour.
- 0600 Fire test ash average is 9.1 inches. Leaving the grate at 5/0.65.
- 0615 Started loading the weigh bin at 5.61 tons and clearing away the fines accumulated during the previous shift. Changing caustic barrels. Dumped 565 pounds of ash.
- 0645 Higher heating value is 168 BTU/ft³. Will have to shut down the agitator shortly, as the freeboard has decreased almost 10 inches.
- 0650 Stopped filling the weigh bin. The screen was blinded over due to the coal being wet and dirty.
- 0700 Saturation air flow is 1200 cfm. Gas quality has greatly improved on the Blind Canyon coal.
- 0800 Fire test ash average is 9.4 inches. The bed seems to have softened up since last shift.
- 0900 Turned the agitator off to see where the offtake temperature would peak.
- 0915 This ash dump did not produce much noticeable clinker, mostly small particles sandy in color.
- 0920 The offtake temperature is 620 C.

0925 The offtake took a dramatic decrease to the 380-425 C range.

0930 Cyclone dump again produced very little carryover.

1000 Fire test ash average is 16.4 inches. The bed is still loose and the bars went in with ease. Increased the grate speed to 5/1.10. Bars number 1 & 7 showed multiple zones.

1050 The offtake temperature is ranging between 360 & 430 C. It shot up to 565 C while fire testing, but went down to 360 C afterwards.

1200 Fire test ash average is 10.7 inches. All rods went in with ease. Multiple zones were observed on rods number 1 & 6. We will poke these holes at 1230. The tar recirculating pump by the old esp unit was leaking and was, as a result shut off and the area cleaned up.

1400 Fire test ash average is 21.9 inches. Changed the grate to 7 teeth. Started the temperature and pressure probe.

1430 Grate speed is 7/2.21 for 10 minutes.

1440 Grate speed is 7/1.4.

1520 Dumped 720 pounds of ash.

1600 Fire test ash average is 11.2 inches. Grate speed is 7/1.0.

1820 Offtake temperature is 650 C. Turned the agitator on for 10 minutes. This cooled the offtake temperature off to 300 C.

1830 Shut off the agitator.

1855 Once again the offtake temperature has risen. Turning on the agitator and will leave it on for 1/2 hour.

1925 Shut off the agitator and will watch the offtake temperature. It is currently 460 C.

1945 The offtake temperature is once again rising. It is now 700 C. Turned the agitator on for 10 minutes. This cooled down the offtake temperature once more.

2000 Fire test ash average is 10.1 inches.

2330 Gas quality is good. The offtake temperature is still cycling up and down. Checked all poke holes

and found number 1 glowing.

August 4, 1984

- 0000 Fire test ash average is 9.4 inches. There is an upset area in the bed near the holes number 1 & 2. Multiple zones showed on both those bars as on bar number 6. Gas quality remains good. Slowed the grate to 7/0.9.
- 0005 Offtake temperature is 350 C (a 200 degree drop after the fire test).
- 0030 The charts indicated burn through and upon checking we discovered holes 1 & 2 alive with fire. The agitator water outlet had reached 100 C. Increased the agitator water flow to 5 gpm. Cranked the agitator to cover up this area in the bed.
- 0040 Dumped ash and found quite a few larger clinkers. The ash was hot and dry.
- 0050 The agitator water outlet temperature is 63 C (more normal). Reduced the agitator water flow to 3.0 gpm. One revolution of the agitator cooled the offtake temperature from 600 C to 135 C.
- 0100 Cyclone particulate is heavier (both floating and bottom accumulation) than last night.
- 0130 Gas quality is excellent. A slight glow has been noticed on holes 1,2 & 3. CO₂ is 4.6% and CO is 28.3%. Higher heating value is 182 BTU/ft³. The offtake temperature is back to 550 C.
- 0150 The offtake temperature is over 600 C. The alarm has sounded. Ran the agitator full out for 5 revolutions. This brought the offtake temperature down to 104 C.
- 0200 Fire test results indicate that we have a build up along the side in the area of holes 6,1,2 & 3. Ash average is 14.7 inches.
- 0215 Decided to run the grate full out at 7 teeth for 10 minutes. Then we will poke holes 6,1,2 & 3. Hopefully this will loosen the clinkers.
- 0225 Slowed the grate speed to 7/0.8. The grate drive stopped dead center and we got no alarm. We only heard a whine from the variable speed drive box and no teeth were grinding. The offtake temperature went to 700 C. The ash cone gained no weight during the 10 minutes of full out grate.

0240 Got the grate back on line. Will go through normal ash dump and then flush the underside of the grate a second time.

0300 Started poking holes 6,1,2 & 3 after notifying CETCO. CETCO advised that they are shutting down as they are having trouble with the flow to the O2 meter.

0315 Poked all 6 holes and found no appreciable masses, only some hard spots around the number 5 hole.

0330 Half hour after poking all 6 holes, the offtake temperature is more stable at 435 C. Gas quality is very good. Now see only black when checking the holes.

0400 Fire test ash average is 6.9 inches. Slowed the grate to 7/0.6.

0410 CETCO advised that they are going back on line. Dumped 570 pounds of ash. We are now getting large chunks of ash among the hot, dry, finer sized ash particles. The offtake temperature has been more steady over the last 1.5 hours at 450 C.

0530 Started loading coal into the weigh bin at 2.43 tons. There has been no sign of burn through for 4 hours. The poking, evidently, helped. Found 20-30 clinkers 7-9 inches across and 4-5 inches high in the last ash dump. CO is 28% and CO2 is 5%. Higher heating value is 180 BTU/ft³.

0600 Fire test ash average is 11.1 inches. Increased the grate speed to 7/0.75.

0625 Dumped 600 pounds of ash.

0700 Started the temperature and pressure probe test.

0730 Informed by CETCO of the tar drain.

0800 Fire test ash average is 22 inches. Increasing the grate speed to 7/2.23. The grate kicked out! Turned it over by hand until free and then restarted it. It will run at 7/2.0 for 15 minutes.

0815 Dumped 770 pounds of creamy-white ash, with the size ranging from very fine to clinkers 6-8 inches across. Decreased the grate to 7/1.5.

0830 Increased the saturation temperature to 62 C.

0907 Increased the saturation air flow to 1400 cfm.

0908 Dumped 550 pounds of ash. Furnace pressure valve is 100% open.

0916 Saturation temperature is 64 C.

0935 Secondary air flow pressure readout is not working correctly.

0945 Increased the caustic pump speed to 50/50.

1000 Fire test shows an ash average of 17 inches. Had to use the sledge on the number 4 bar.

1005 This ash dump produced many softball and larger sized clinkers.

1030 Changed the caustic pump speed to 45/45.

1035 Dumped the cyclone and only 1 rakeful of particulate resulted.

1100 Slowed the grate to 7/0.9.

1150 Dumped the cyclone.

1155 The offtake temperature reached 624 C. Turned on the agitator at a speed of 5 sweeps/hour. This lowered the saturation temperature to 143 C.

1200 This fire test showed an ash average of 12.4 inches. Number 4 bar was a cold bar.

1240 This cyclone dump resulted in 2 rakesful more than the last dump which was crusty in texture.

1250 Dumped ash and discovered less clinkers than in the previous dumps.

1310 Reduced the saturation temperature to 62 C. Increased the grate speed to 7/1.0.

1400 Fire test ash average is 13.4 inches. Number 1 bar showed multiple zones. Slowed the grate to 7/0.91.

1410 Dumped ash and found no clinkers in this dump.

1440 Got 2 rakesful of cyclone particulate this dump. Started the outside cleanup.

1500 Saturation air flow is 1400 cfm and the offtake temperature is 276 C.

1710 Turned the agitator on for 5 minutes to help maintain the offtake temperature.

1940 Turned the agitator on for 5 minutes to help maintain the offtake temperature.

- 2000 Fire test ash average is 20 inches. Increasing the grate speed to 7/1.1.
- 2120 The offtake temperature is climbing to 540 C. Again we turned on the agitator.
- 2125 Turned off the agitator as the offtake temperature was 380 C.
- 2200 Fire test ash average is 17 inches. Coal feeds are averaging 1.55 tons/hour.
- 2245 The offtake seems to be hovering around 450 C. All other readings are stable. Fire tests have been somewhat inconsistent and we have had some glowing spots on top.
- 2315 The offtake temperature is 675 C. There is excessive steam from the jacket trap. Checked the water jacket and agitator water flows and found only 1.4 gpm into the agitator. Checked the agitator water outlet temperature and found it to be 117 C. Increased the agitator water to 5 gpm until this reading stabilizes between 60 & 70 C. The pH is 5. The caustic barrel was empty so we changed barrels.

August 5, 1984

- 0005 Fire test ash average is 5.4 inches. Slowed the grate to 7/0.42 to aid in building up the ash level.
- 0050 Attempted to dump the cyclone, but the valve would not close.
- 0105 Finally got the cyclone valve closed after repeated attempts, flushing and hammering. Large plugs of particulate had packed the valve seat. Cyclone has been raked clean.
- 0115 Rechecked the pH and found it to be 8.
- 0120 Dumped ash and found some clinkers. Reduced the caustic pumps to 30/30.
- 0200 Fire test ash average is 9.6 inches. Bars 3 & 6 were cold. Number 2 bar showed multiple zones. Number 1 bar had to be hammered in. Increased the grate speed to 7/0.6.
- 0220 The cyclone dump was normal this time (3-4 rakesful). Will leave the water trickling to keep the valve seat clear. Have decided to run the agitator at the slowest speed (0.16 sweeps/hour). This we are doing in attempt to keep the offtake temperature from

reaching 600 C. The burn through problem has calmed down and all holes are dark.

- 0350 Dumped 740 pounds of ash. Found some 4-5 inch clinkers amongst the dust to 1 inch particles. There is a variety in color (white/grey/black).
- 0400 Fire test ash average is 6.4 inches. There were 4 dirty bars during this fire test. The bed on the 1,2 & 3 side is much hotter than the balance of the bed. Grate speed is 7/0.7.
- 0435 Started loading coal into the weigh bin at 2.97 tons.
- 0545 Dumped pounds of ash. Found fewer large clinkers during this ash dump.
- 0600 Fire test shows a 10 inch ash average. Bars number 4 & 6 showed multiple zones. Grate speed is 7/0.85. Continuing to run the agitator slowly to keep the offtake temperature in line.
- 0630 Temperature outside is 77 F and the dewpoint is 67.
- 0700 Dumped 650 pounds of ash. Began the temperature and pressure probe.
- 0800 Fire test ash average is 22.7 inches. Grate speed is 7/2.0 for 10 minutes to bring the ash level down.
- 0840 Dumped 680 pounds of ash. The size varied between marble and softball size. The pH is 6. Increased the caustic pump speed to 35/35.
- 0845 Once again the shaker screen is blinded over. Cleaned it off.
- 0855 CO is 28% and CO2 is 6.5%. Higher heating value is 172 BTU/ft³.
- 0900 Increased the grate speed to 7/1.3.
- 0910 Increased the saturation air flow to 1600 cfm. This is 200 cfm less than planned, but was necessary to reduce the amount of change due to the ununiformity of the bed and erratic changes in the fire tests. The back pressure valve was open 79.1%.
- 1000 Fire test ash average is 19 inches. Keeping the grate speed at 7/1.3. Dumped 780 pounds of ash. The color is light brown with 5-6 inch clinkers.
- 1100 Dumped 764 pounds of ah. There were lots of medium sized clinkers.

- 1200 Fire test ash average is 18.4 inches. Ran the grate at 7/2.24 for 5 minutes and then returned it to 7/1.35. There was no noticable clinkering.
- 1220 Dumped 702 pounds of ash. There were medium sized clinkers, brown in color.
- 1235 This cyclone dump produced 4-5 rakesful. The size of the cyclone dust ranged from dust particle to coal sized pieces. The water color is a light green.
- 1240 CO is 25% and the CO2 is 7.5%.
- 1310 Dumped 722 pounds of ash.
- 1335 Cyclone dump produced 2-3 scoopsful of gravel size particles.
- 1400 Fire test ash average is 9.6 inches. Slowed the grate to 7/1.1.
- 1530 Dumped 625 pounds of ash. There were several clinkers softball sized.
- 1535 Dumped the cyclone and got 1 rakeful of fine particles.
- 1600 The grate is still at 7 teeth.
- 1655 Cyclone dump.
- 1700 Dumped 660 pounds of ash. The clinkers were few and small in size.
- 1720 The amount of gas escaping near the back pressure valve is increasing.
- 1740 Instructed by CETCO to lower the back pressure to 1.5 to facillitate a tar drain.
- 1745 Completed the tar drain and returned the back pressure to 3.4. The gas supply valve is 34.1% open.
- 1800 Increased the grate speed to 7/1.78. Fire test ash average is 18.1 inches.
- 1810 Cyclone dump produced 2 scoopsful. Flushed it twice.
- 1815 Dumped 650 pounds of ash.
- 1840 Set the back pressure valve at 30.5% to better reduce the amount of gas escaping.
- 1910 Changed the caustic pump settings to 45/45. The pH is 6. Changed barrels.

1930 Dumped 702 pounds of ash.

2000 Fire test ash average is 16.6 inches. Reduced the grate speed to 7/1.06.

2045 Ran the grate at full speed for 5 minutes and then reset it at 7/1.2.

2050 Dumped 740 pounds of ash. Dumped the cyclone and got 1 rakeful and one large clump.

2140 Dumped the cyclone and the result was 1 rakeful.

2145 Slowed the caustic pump to 40/45. The pH is 7.5. The second caustic pump is on, but set at the lowest speed, so we turned it off.

2200 Fire test ash average is 13.1 inches. All bars went in smoothly with normal effort.

2210 Dumped 702 pounds of ash.

2240 Cyclone dump and general clean up.

2300 All is well except the outside temperature and dew-point..it feels like the tropics. CO is 27% and CO2 is 5%. Higher heating value is 173 BTU/ft3. The pH is 6.5. The agitator is running.

2330 Dumped the ash and the cyclone. We are obtaining in excess of 500 pounds/hour of ash at the saturation air flow of 1600 cfm. There is a considerable amount of floating particulate in the cyclone.

August 6, 1984

0000 Fire test ash average is 11.7 inches. Bars 5 & 6 showed multiple zones. The bed has improved over the last 24 hours. Leaving the grate speed at 7/1.2. Gas supply pressure went up to 5.7 inches wc during the fire test. Unable to control the gas leakage from the horizontal duct.

0015 The best valve setting to maintain the gas supply pressure at 5 inches wc is 24% open, with all blowers at 100%. The horizontal duct is still leaking badly.

0100 Reduced the saturation air flow to 1400 cfm as we are still having difficulty with the leakage. Slowed the grate to 7/1.0. Reduced the jacket water flow to 12 gpm. Opened the back pressure valve to 58.1% open. Will try later to return to 1600 cfm. Gas supply pressure is 3.5 inches wc (a drop of about 2 inches.

- 0105 Dumped 780 pounds of ash.
- 0200 Fire test shows a 5.9 inch ash average. No multiple zones or excessively high bars on this test.
- 0205 Slowing the grate to 7/0.9 as we will be returning to saturation air flow of 1600 again shortly.
- 0220 Fifteen minutes after returning to 1600 cfm saturation air flow, the gas is billowing from the horizontal duct. Gas supply pressure is 6.1 inches wc. Reduced the primary and secondary blowers to 80% & 60%, respectively. The back pressure valve is 58% open. The gas leakage has somewhat subsided. Now the main leakage is from the valve shaft packing area and flanges. Will continue to monitor the problem.
- 0240 The system is again leaking badly. Gas is curling around the gasifier building. Reduced the combustor air flow (60% open on the primary and 45% open on the secondary). It appears that the leaking cannot be controlled with the back pressure valve. Gas supply pressure is currently 5.1 inches.
- 0330 All is running fairly well. The duct leakage is not currently excessive. Higher heating value is 173 BTU/ft³. Cyclone tank showed very little carryover after this cyclone dump (1-2 scoopsful). Dumped 900 pounds of ash. Started loading coal into the weigh bin. The screen is not currently blinding over.
- 0400 Fire test is still showing an upset bed. Slowed the grate to 7/0.8. Gas supply pressure is 6.0 inches. Gas is still leaking badly from the horizontal duct.
- 0430 The leakage has increased over the last 50 minutes. Closed the secondary combustor blower to 40% open. Gas supply pressure is 4.8 inches wc. CO is 27% and CO₂ is 5%.
- 0600 Fire test shows drastically increased ash level (23 inches). Increased the grate speed to 7/1.2. The grate runs for 5 minutes or so and then kicks out as it had done previously at 7/2.2.
- 0620 The grate is back on line. Gas supply pressure is 4.4 inches wc. Secondary combustor blower is closed to 30% open to aid in controlling the leakage.
- 0700 Induced draft damper was found to be partially closed, so we were not 100% open on the vane valve, as our instruments indicated. Adjusted the linkage on the induced draft vane valve and brought it to full open. This did not seem to make an appreciable difference on the back pressure.

0730 The pH is 7.

0800 Fire test ash average is 21.3 inches. All bars went in with little difficulty. Ran the grate full out at 7 teeth for 10 minutes.

0830 Dumped 847 pounds of ash. There was a considerable amount of 5-6 inch clinker, light brown in color.

0845 Temperature and pressure probe test. We are having some lift truck problems. Cyclone dump showed very little carryover.

0930 Increased the grate drive to 7/1.4. Increased the saturation air flow to 1700 cfm. Closed the back pressure valve to 15.5% open. Reduced the air flow on the secondary combustor blower to 20% open. Increased the saturation temperature to 63 C.

0945 Dumped 840 pounds of ash. Started loading coal into the weigh bin at 5.26 tons.

1000 Fire test ash average is 13.7 inches. All rods went in without difficulty.

1010 Finished loading coal at 10.58 tons.

1015 Replaced the empty caustic barrel with a full one. Greased all equipment. Cleaned the bottom of the gasifier building.

1030 Reached a coal feed of 2 tons/hour. Because of increase in saturation air flow to 1700 cfm and gas leakage problems, did not perform 0930 readings.

1050 Filled the automatic oiler for the grate with SAE 40 oil.

1100 Dumped 821 pounds of ash.

1145 Cyclone dump produced 4 scoopsful of gravel sized interspersed with much dust sized particles.

1200 Fire test ash average is 12.7 inches.

1210 Dumped 720 pounds of ash. This time the clinkers were only 3-4 inches in size.

1215 Due to gas leakage during the fire test, we reduced the saturation air flow to 1600 cfm. Slowed the grate to 7/1.25.

1330 Cyclone dump produced 3 rakesfull of gravel sized carryover. Dumped 774 pounds of ash. Average size of the ash is 2-3 inches across.

1400 Fire test ash average is 12.7 inches. All bars went in with ease. Number 6 bar showed multiple zones.

1510 Power loss put the saturation blower down. Went through shut down procedure. Flooded the cyclone. CETCO was notified for emergency shutdown.

1512 Operator notified the lead that gas was backing up to the back pressure valve.

1524 Filled the cyclone. Restarted the gasifier.

1530 Vent valve is closed.

1535 Poked the inspection port in the combustor.

1536 Returned the gasifier to the original saturation air flow.

1545 Turned on the grate drive and agitator.

1600 Fire test ash average is 13.9 inches. The bars went in easily.

1635 Dumped 695 pounds of ash. There were more softball sized clinkers than normal with a few larger.

1800 Fire test ash average is 12.6 inches. Reduced the grate drive to 7/1.1.

1810 Cyclone dump. Dumped 790 pounds of ash. The clinkers were even larger than before.

1843 The ESP was restarted and then stopped again.

1900 Put a bar in the number 5 hole to see if the grate drive slow down helped. It did some (gained 1 inch).

1945 Cyclone dump produced 2 scoopsful.

2000 This fire test showed an improved bed condition. Ash average was 10.3 inches. Reduced the grate speed to 7/1.05 to attempt an ash level increase. Number 3 bar showed multiple zones.

2007 Dumped 690 pounds of ash.

2015 Slowed the caustic pump to 45/45. The pH is 8.

2100 Put a bar in the number 6 hole to check the ash depth. It showed a depth of 17 inches. Increased the grate drive to 7/1.1.

2150 Dumped 767 pounds of ash.

2200 Fire test ash average is 16.1 inches. Increased the grate drive to 7/1.2. Noticed the green pen on the recorder for Blast air flow quit writing.

2225 Changed the empty caustic barrel for a full one.

2235 Dumped the cyclone (filled and drained twice).

2330 All looks well. The gasifier is humming along nicely. The gas quality, however, is down some from last night. The CO₂ is bouncing around.

August 7, 1984

0000 Fire test ash average is 14.1 inches. Both the number 2 & 3 holes showed multiple zones. The rods went in with ease. Readjusted the steam orifice. The offtake pressure was 7 inches wc during the fire test forcing gas through the number 1 hole.

0015 Dumped 1010 pounds of ash. The sizes ranged from dust sized particles to clinkers 3-4 inches across. The ash remains dry and hot.

0130 Gas quality is improving. CO is 28% and the CO₂ is 5.8%. There is less of a swing in offtake temperature and CO₂ than was previously noted. It has started to rain again and there is lightning to the southwest.

0200 Firetest ash average is 12.3 inches. Bars number 1,4 & 6 showed multiple zones. On holes 2 & 5 the bars had to be pounded in. Slowed the grate to 7/1.00 to preserve the ash level.

0215 Having trouble closing the cyclone gate valve. Took 5 minutes to flush out the seat and cycle the valve to the closed position. Started filling the weigh bin at 4.33 tons. Dumped 1100 pounds of ash. The size was smaller and the ash was damp.

0230 Noticed the scrubber discharge temperature is up to 99 C. Upon investigating, we found nothing unusual down below. Opened the spray nozzle valve to provide more supply water to the tanks. Neither pump was overheated.

0300 The scrubber discharge temperature was 119 C. It is starting to thunder outside.

0330 The scrubber discharge temperature is 104 C. Wind is picking up.

0340 All the windows on the north and west sides are being

blown shut. The rain is coming down horizontally. The scrubber discharge temperature is down to 79 C.

- 0400 Fire test shows a more even bed and an ash average of 11 inches. Number 2 bar showed multiple zones. Leaving the grate drive at 7/1.0.
- 0410 No power blips, so far. It is still storming outside. Winds are gusting at 63 mph. The control room roof is leaking again over the control box for the scrubber pumps. Dumped ash and cyclone. Heavy floating accumulation resulted from the cyclone dump. The cyclone gate valve is functioning well now.
- 0430 The thunderstorm has subsided.
- 0515 More storm cells are moving through the region.
- 0530 It is once again raining heavily. Scrubber discharge temperature is 88 C. Enough steam is rising from the combustor and scrubber area, that it engulf the area.
- 0600 Fire test ash average is 15 inches. Number 2 bar showed multiple zones. Grate speed is set at 7/1.20.
- 0610 Dumped 1000 pounds of ash. Started loading coal into the weigh bin again.
- 0730 Dumped 874 pounds of pebble to golf ball size ash.
- 0800 Fire test ash average is 20.1 inches. All rods went in without difficulty.
- 0815 Going to start load swings when the University of Minnesota personnel gets their computer set up on accelerated sampling.
- 0830 Decreased the saturation air flow to 600 cfm and the saturation temperature to 61 C. Furnace pressure valve is 25% open and the back pressure valve is 32.9% open. Reduced the grate drive to 7/0.6. Decreased the agitator water to 2.0 gpm and the jacket water to 10 gpm.
- 0900 This cyclone dump was light. Turned off the agitator.
- 0945 Dumped 868 pounds of ash with the size ranging from dust size to 1 inch across.
- 1000 Fire test ash average is 14.4 inches. No clinkering.
- 1040 Cyclone dump produced a light amount of carryover. Cyclone outlet pressure is not functioning properly. We will troubleshoot it as soon as possible.

- 1200 Fire test ash average is 11.3 inches. We do not appear to be generating any more clinkers.
- 1340 Increased the saturation air flow to 1800 cfm and the saturation temperature to 62 C. Back pressure valve is 100% open as is the furnace pressure valve. Increased the grate drive to 7/1.25.
- 1355 Decreased the saturation air flow to 1600 cfm due to gas leakage.
- 1400 Fire test ash average is 15.1 inches. Rods went in easily.
- 1415 Increased the saturation air flow to 1700 cfm.
- 1425 Decreased the saturation air flow to 1200 cfm. Saturation temperature was reduced to 62 C. Furnace pressure valve is open 50% and the back pressure valve to 60% open. University of Minnesota needed this flow to do some particle sampling for the next few hours. Reduced the grate speed to 7/0.80.
- 1445 Increased the agitator water flow to 3.0 gpm and the jacket water flow to 12.0 gpm.
- 1500 Increased the caustic pump to 50/50.
- 1510 Dumped 650 pounds of ash. A very large clinker had to be poked out. There was some red hot ash.
- 1520 Changed the caustic soda barrel and adjusted both pumps to 35/35.
- 1525 Slowed the grate drive to 7/0.6.
- 1540 Cyclone dump produced 1.5 scoopsful.
- 1600 Fire test bars went in with ease except number 2 which had to be persuaded and all had single zones. Left the grate at 7/0.6 to build up ash.
- 1700 Increased the saturation air flow to 1600 cfm. The furnace pressure valve was set at 100% open. Adjusted the cyclone outlet pressure with the back pressure valve.
- 1800 This fire test showed a 26.9 inch ash average. There were no low holes and all bars went in easily. Increased the grate speed to 1.20.
- 1815 Dumped 804 pounds of ash. The clinkers were softball size.
- 1910 Dumped the cyclone. The gate stuck, so we ran water

and kept trying until it freed up. This cyclone dump produced 3.5 rakesful.

1915 Put a bar in the number 4 hole and got a reading of 36 inches. Increased the grate speed to 1.35.

1930 Ash dump.

1955 Operator leveled out the road leading to the ash dump area. This should make the ash handling easier.

2000 Slowed the grate to 1.20. All bars were very hot and the number 3 bar showed a double zone.

2010 Cyclone dump produced 2 rakesful.

2100 Put a bar in number 4 hole and the ash level was 26 inches. Increased the grate speed to 1.30.

2105 Dumped 800 pounds of ash.

2120 Cyclone dump produced 2 rakesful.

2200 This fire test all bars were hot and number 6 showed a double zone. Slowed the grate to 1.20.

2210 Steam seems to be leaking much more where the induced draft fan duct connects to the stack.

2230 Ash dump produced 770 pounds of ash.

2235 Cyclone dump.

August 8, 1984

0000 Fire test ash average is 9 inches. The bars are going in with some difficulty. Had to use the sledge for holes number 4 & 5. Bars number 1 & 6 showed zero. Leaving the grate speed at 7/1.20.

0015 Dumped 900 pounds of ash. The ash was very hot and dry with chunks being 1 inch to baseball size. There was very little ash sand to powder size. Cyclone particulate was light this dump, only 3 rakesful on the bottom.

0100 Finished cleaning the control room floor.

0200 This fire test results were more normal. The overall ash average was 6.7 inches. The bed has gotten softer.

0210 Flushed the cyclone. Dumped 1000 pounds of ash. Increased the caustic pumps slightly to bring the pH to 7 from 6.5.

0330 South half of the weigh bin is empty. Started coal-
ing up at 1.18 tons.

0400 Fire testash average is 9.7 inches with 3 holes
showing 0. Leaving the grate at 7/1.20.

0415 Dumped 1020 pounds of ash. Still coaling up outside.
The pH is 7.

0430 Gas supply pressure is 2.8 inches wc. The transition
piece is leaking badly. Reducing the secondary air
flow to 15% open. The actual air flow is unknown, as
the indicator is not functioning. The gas supply
pressure has retreated to 2.4 inches wc. Must keep
it below 2.5 inches wc to curtail back pressure
problems. Rodded the combustor. The elbow is packed
to the halfway point going to the combustor. This
reduced the gas supply pressure to 1.8 inches wc.

0600 This fire test ash average is 7.4 inches. Leaving
the grate at 7/1.20. Still dumping approximately 1000
pounds of ash every 2 hours and are burning approxi-
mately 1.7 tons of coal/hour.

0610 Dumped ash and started cleanup.

0730 Poking the combustor. The combustor is half full of
particulate.

0800 Fire test ash average is 10.1 inches. Holes 2,3 & 6
showed multiple zones. Increased the grate to
7/1.30. Dumped ash at 817 pounds.

0830 Replaced the caustic soda barrel. Moved the empty
caustic barrels from the second floor to outside.

0900 Reduced the grate speed to 7/1.20.

0930 Dumped 920 pounds of ash. Do not seem to be generat-
ing any clinkers. Ash chunks are golf ball sized and
smaller.

0945 Cyclone dump produced 3 rakesful (mud & dust).

1000 Fire test ash average is 20.3 inches. Increased the
grate speed to 7/1.35. All rods went in fairly
easily.

1055 Dumped 835 pounds of ash. The ash chunks are larger
in this dump than the previous one. Possibly clink-
ering is starting.

1200 Fire test ash average is 16.1 inches. The rods are
still going in without much difficulty.

- 1230 Dumped 938 pounds of ash. Started loading coal into the weigh bin at 2.02 tons.
- 1300 Finished loading coal at 11.3 tons.
- 1400 Fire test ash average is 16.1 inches. All bars went in easily.
- 1420 Ran the grate full out (7/2.26) for 10 minutes.
- 1430 Slowed the grate to 7/1.35. Started the outside clean up. Increased the saturation air flow to 1800 cfm. Opened the back pressure valve to 100% open after poking the combustor inlet pipes to reduce the cyclone outlet pressure.
- 1500 Increased the grate speed to 7/1.45.
- 1520 Reduced the saturation air flow to 1700 cfm due to gas leakage at the higher flow. Cut the secondary air flow to 0 and raised the saturation air flow back to 1800 cfm. Now there is no apparent leak around the back pressure valve.
- 1530 This coal drop was only 0.8 ton. The coal got hung up in the top bin by the east side of the slide gate. Poked it with a rod and loosened it up. Then we dropped 2.37 tons of coal.
- 1600 Fire test ash average is 12.4 inches. Slowed the grate speed to 7/1.35.
- 1615 Dumped 1127 pounds of ash. There were many softball to football sized chunks.
- 1617 Dumped the cyclone and removed 2 scoopsful.
- 1700 Put a bar in the number 4 hole and it showed 1 inch of ash. Left the grate at 7/1.35.
- 1735 The gate stuck again on this cyclone dump.
- 1800 Fire test showed one side to be considerably lower than the other.
- 1820 Dumped 1116 pounds of ash and found many clinkers.
- 1900 Still trying to close the cyclone, as it will only close about halfway. Turning off the agitator in attempt to get the offtake temperature to 500 C.
- 1910 Finally got the cyclone unstuck. Will dump the cyclone every half hour and leave the water running about a 1/4 turn.
- 1915 Put a bar in hole number 2 and got a 5 inch reading.

Tried number 5 hole and got a 38 inch reading. Increased the grate speed to 7/1.40.

2000 Fire test ash average is 13.1 inches. The bed seems to have a mind of its own as it is moving all over. The bars went in easily. Slowed the grate to 7/1.35.

2010 Cleared the cyclone.

2025 Dumped 1023 pounds of ash.

2050 Cyclone dump.

2130 Dumped the cyclone and got a large plug of fines. So dumped it twice.

2140 Freeboard average is 41.5 inches. Ran the agitator at 1.7 sweeps/hour until 2100.

2150 Changed the caustic soda barrel.

2200 During this fire test a sledge had to be used on the number 3 bar to get it in place. The remaining bars went in easily. Slowed the grate speed to 7/1.26.

2210 Dumped the cyclone.

2215 Dumped 1002 pounds of ash. Emptied the cyclone hopper.

2300 Shutdown the agitator to see if we can hold the off-take temperature down under 500 C. While the agitator was running it was holding between 300 & 400 C.

2310 We got an initial increase in offtake temperature to 571 C and then it settled down to the mid 400's.

2330 The offtake temperature is 447 C. Will leave the agitator off until it becomes necessary to turn it on once again. Flushed the cyclone and found only 3-4 scoopsful of particulate. Ash weight is 750 pounds. The pH is 6 with both caustic pumps working at 40/40.

August 9, 1984

0000 This fire test shows a much improved bed from what was evident 24 hours ago. Ash average is 10.6 inches. The gas supply pressure jumped 1 inch wc during the fire test. Leaving the grate speed at 7/1.27.

0015 Dumped 1200 pounds of damp ash. The ash was mostly smaller chunks with a few 3-4 inches in size.

0100 The offtake temperature is 394 C. The cyclone valve is being cycled every half hour with flushes hourly

on the half hour. There is still not much carryover.

- 0123 The green saturation air flow chart pen has faltered and stopped. We are still at a saturation air flow of 1800 cfm.
- 0200 Fire test ash average is 13.6 inches. Holes 3 & 6 are dirty. Leaving the grate at 7/1.27.
- 0215 Dumped 1180 pounds of ash. There were some larger clinkers. Started loading coal into the weigh bin at 2.47 tons.
- 0230 Dropped 2 tons from the weigh bin and resumed coaling up procedure. The offtake temperature is staying in line with the agitator off. Gas quality is also staying in the same region. We will not run the agitator unless necessary.
- 0330 Dropped 1.05 tons of coal. The offtake temperature has climbed to 560 C. Gas quality is not as good as it was 2-3 hours ago. The CO₂ is gradually increasing. Freeboard average is 43 inches. Cyclone off-take pressure has gradually climbed to 4.0 inches wc.
- 0347 The offtake has fallen to 402 C.
- 0400 Fire test ash average is 9.9 inches. The fire is now cooler from hole number 3 around to number 6. Had to pound in the bars number 4 & 7. Gas supply pressure climbed to 4.9 inches during the fire test. Will rod out the combustor.
- 0410 Dumped 1120 pounds of ash. The ash size was mostly 1 inch across and smaller with a few softball size thrown in. Rodding the 90 degree combustor elbow. It dropped the cyclone outlet pressure 1 inch wc. The duct had 8-10 inches of particulate in it. The green saturation air flow pen is once again working. The saturation air flow is still being recorded as 1800 cfm.
- 0430 The higher heating value is 165 BTU/ft³. CO₂ is 7% and the CO is 25%. Coal was hanging up in the north coal leg. Finally were able to drop 1.86 tons.
- 0445 Gas supply pressure is gradually climbing again. It now reads 4.4 inches wc after topping out at 4.9 inches wc. It then dropped an additional inch wc after rodding the combustor elbow.
- 0553 The offtake temperature hit 650 C. CO₂ is 9% and CO is on a downward progression. The high offtake alarm was followed by the low saturation temperature alarm. The ash pit air inlet temperature is 61 C. Checked

the bed and found the number 5 hole glowing slightly. Gas supply pressure is 5.0 inches wc.

- 0558 Everything has headed back to normal levels.
- 0600 Fire test ash average is 8.6 inches. The bars were sooty above and below the fire zone. Had to use the sledge on the number 2 bar. Slowing the grate to 7/1.10.
- 0610 Flushed the cyclone, dumped ash and resumed loading coal into the weigh bin. The offtake temperature is now staying in the mid 400's C. The CO is 25% and the CO2 is 7%. The agitator remains off.
- 0655 The offtake temperature is back up past the alarm point at 624 C.
- 0656 Low saturation alarm is going off. Number 2 hole is glowing on top.
- 0730 Cyclone dump produced 4 scoopsful of mud.
- 0800 Fire test ash average is 11.6 inches. All bars went in with very little difficulty.
- 0815 Cleaned out the combustor inlet.
- 0820 Screen blinded over. We cleaned it off.
- 0840 The agitator has been turned on once again. The offtake temperature had risen to +580 C.
- 0846 Turned the agitator off as the offtake temperature has dropped to under 200 C.
- 0910 Started the agitator at the slowest speed as the offtake temperature once again rose to over 550 C. Burning through was evident on hole number 2.
- 0930 Plugged the holes on the scrubber discharge in attempt to lower the cyclone outlet pressure.
- 1000 Fire test ash average is 17.1 inches. The bars went in with ease.
- 1025 Ran the grate at 7/2.25 for 10 minutes.
- 1035 Set the grate speed at 7/1.35.
- 1200 Fire test ash average is 16.3 inches. Number 3 hole showed double zones. The bars are still going in easily.
- 1330 Started the temperature and pressure probe test.

1345 Took all empty caustic soda barrels outside.

1400 Fire test ash average is 15.1 inches.

1415 Ran the grate at 7/2.26 for 10 minutes.

1425 Slowed the grate to 7/1.35. Dumped 911 pounds of ash.

1430 Started the outside clean up. Loaded coal into the weigh bin until it read 9.29 tons.

1520 Cycled the cyclone valve.

1540 Cycled the cyclone valve.

1600 Fire test ash average is 18.9 inches.

1610 The slide gate stuck once again during the cyclone dump.

1615 High saturation light went on. The jacket water flow had fallen and then returned to 12 gpm. Low saturation alarm went off and the fire loss pressure went to 5.2 inches wc. The metering line was plugged. Closed the sampling valve and then reopened it and the line freed up.

1620 Changed the caustic barrel.

1625 Finally got the cyclone gate to close.

1700 Ran the grate at 7/2.26 for 10 minutes. Dumped the cyclone.

1705 Dumped 1050 pounds of ash.

1710 Slowed the grate to 7/1.35.

1735 Dumped the cyclone twice.

1755 The ESP is back on line.

1810 Dumped the cyclone.

1850 Dumped the cyclone. Dumped 1060 pounds of ash.

1920 Dumped the cyclone.

2000 Fire test ash average is 16.6 inches. Increased the grate speed to 7/1.40. All bars were hot with no double zones.

2005 Cyclone dump.

2030 Dumped 1030 pounds of ash. Many softball sized clinkers were evident. dumped the cyclone.

2100 Cyclone dump.

2130 Increased both caustic pumps to 40/40 to return the pH to 7.

2200 Fire test ash average is 11 inches. Slowed the grate 7/1.35.

2205 Cyclone dump.

2215 Rodded the combustor port. Did not feel or see any blockage.

2240 Dumped the cyclone and finished coaling up.

2300 The offtake temperature hit 520 C. Ran the agitator at 6.9 sweeps/hour for a couple minutes.

2315 The ductwork is leaking badly with the gas supply pressure at 4.9 inches wc. Played with the back pressure valves as well as the vane and secondary combustion fan. Got the gas supply pressure back to between 4.5 and 4.6 inches wc. The leaking has stopped. The patches above the turn into the induced draft fan transition are still in place.

August 10, 1984

0000 Fire test ash average is 10.4 inches. No multiple zones showed. Slowed the grate to 7/1.20 to build the ash level a bit.

0010 Flushed the cyclone and got 5 scoopsful. Dumped 1200 pounds of mostly 1" and smaller chunks of ash. The pH is 7. Both pumps are running.

0130 Number 3 hole is glowing brightly. Higher heating value is 174 BTU/ft². CO is 27% and CO₂ is 6%.

0200 Fire test ash average is 12 inches. The rods went in easily and produced no multiple zones. Leaving the grate at 7/1.22.

• 0215 Flushed the cyclone, dumped ash and started loading coal into the weigh bin. Increased the large caustic pump to 45/45. Leaving the smaller pump at 40/40. The pH is 6.5.

0330 Gas supply pressure is 4.0 inches wc.

0400 Fire test ash average is 9.6 inches. Leaving the

grate at 7/1.22.

0415 Dump ash. We seem to be staying between 1100 and 1200 pounds every 2 hours. Did not notice any clinkers. Cyclone particulate remains light (4-5 rakesful).

0530 Dropped 2.25 tons this coal feed.

0600 Fire test ash average is 11.5 inches. No multiple zones and had to pound the number 4 bar through a light crust. Leaving the grate speed at 7/1.22.

0610 Dumped ash at 1200 pounds.

0620 The pH is low. Changed the caustic barrels. Set both pumps at 40/40.

0630 Only dropped 1.55 tons this coal feed. Both coal legs seem choked full.

0700 Started the temperature and pressure probe test.

0800 Fire test ash average is 13.7 inches. All bars went in easily.

0845 Dumped 965 pounds of ash.

0900 Moved 10 loader buckets of Blind Canyon to the back lot and marked it.

0910 Cyclone dump produced 3-4 scoopsful of mud.

0930 Started loading coal into the weigh bin at 4.8 tons.

1000 Fire test ash average is 17.4 inches.

1030 Finished filling the weigh bin at 10.34 tons.

1115 Reduced the saturation air flow to 1675 cfm due to excessive leakage on the combustor inlet. Had to clean off the shaker screen as it had blinded over. Poked the combustor inlet and left the cover off to aid in burning out the residue build up.

1130 Closed up the combustor inlet. Cyclone pressure dropped .4 inch wc. Increased the saturation air flow to 1800 cfm.

1200 Fire test ash average is 16.7 inches. Increased the grate speed to 7/1.6.

1300 Dumped 930 pounds of ash.

1400 Fire test ash average is 17.3 inches. All bars went in with no difficulty.

1420 Running the grate full out at 7/2.24.

1430 Slowed the grate to 7/1.45. Loading coal into the weigh bin. Dumped 911 pounds of ash. Started the outside clean up.

1510 Dumped the cyclone.

1600 Fire test ash average is 10.6 inches. Slowed the grate to 7/1.25 to build up the ash.

1615 The cyclone slide gate cylinder leaks around the piston packing. This may be what is giving us problems getting it closed.

1645 Cyclone dump. Dumped 1023 pounds of ash.

1735 Cyclone dump.

1800 Fire test ash average is 18.1 inches. Number 2 bar had multiple zones showing. Increased the grate speed to 7/1.35.

1810 Cycled the cyclone valve for several minutes with the water on a quarter turn.

1830 Dumped 1025 pounds of ash and dumped the cyclone.

1930 Cycled the cyclone valve.

1945 Cyclone dump.

2000 Fire test ash average is 22 inches. All bars were hot and went in with ease. Ran the grate at 7/2.26 for 5 minutes. Then slowed it to 7/1.45.

2015 Cycled the cyclone valve.

2040 Dumped the cyclone.

2045 Ran the agitator at high speed for 2 minutes to bring the over 500 C offtake temperature back down to tolerable levels.

2047 Gas supply pressure is 5.2 inches wc. Will rod out the combustor port.

2055 Rodding the combustor port brought the gas supply pressure down to 4.7 inches. The elbow after the back pressure valve leading to the combustor feels packed solid for about the bottom 1/4 or 1/3 of the pipe. We are unable to poke it loose at this time. More gas appears to be leaking from the line than earlier this shift. Not much can be done about it now. Everything is pulling as hard as it can and the

back pressure valve is 100% open. The offtake temperature is now 430 C.

- 2100 Put a bar in the number 4 hole to check the ash level and found it to be 24 inches at that point. Leaving the grate speed at 7/1.45.
- 2120 Cycled the cyclone valve.
- 2140 Cyclone dump.
- 2200 Fire test ash average is 20.1 inches. All bars are hot and clean with no low holes. Ran the grate at full speed for 10 minutes.
- 2210 Reduced the grate speed to 7/1.45.
- 2237 Dumped 830 pounds of ash.
- 2245 Gas supply pressure is 5 inches wc. Poking the combustor seemed to help but doesn't last long.
- 2300 Higher heating value is 168 BTU/ft³. All appears to be running fairly smoothly, except for the leaks and the rising ash.

August 11, 1984

- 0000 Fire test ash average is 22.9 inches. Rods are going in easily and showing no double zones. The bed is much cooler. Increasing the grate speed to 7/1.25 to reduce the ash level.
- 0010 Flushed the cyclone. The valve would not close. A large plug of fine material had to be removed before we could achieve proper closure. It required 30 rakesful to clean the bottom of the tank. The tank was packed clear up to the cone bottom. Left the water running slightly and we will cycle the valve every half hour.
- 0015 Dumped 1000 pounds of ash. The ash was, for the most part, dry and 1/4" to 1" in size. There were a few larger chunks. The pH did not register when checked. Checked the barrels and found the tubing was not all the way in the barrel. Corrected the situation.
- 0030 CO alarm sounds again. It lasts 2-3 minutes and then stops.
- 0115 Coaling up early as we are running low on coal on top. The ash cone weight is 926 pounds after only one hour. The grate is doing it's job.

- 0130 The last 3 drops have been close to 2 tons/hour. Reduced the grate speed to 7/1.6.
- 0200 Fire test shows a 17.3 inch ash average. The rods went in easily with no double zones. Increased the grate speed to 7/1.7.
- 0210 Dumped 1450 pounds of ash. The pH is 5.0. Changed the position of the caustic barrels. Flushed the cyclone and only got 2 rakesful.
- 0230 Again dropped over 2 tons this coal feed.
- 0330 The pH has returned to the 6-6.5 range. The gas supply pressure is running 4.3-4.4 inches wc. The amount of gas leaking from the transition piece has increased even though the back pressure has not increased from previous hours.
- 0400 During this fire test had to use a sledge on bars number 1 & 2. No multiple zones, just very deep fire zones appeared. Slowed the grate to 7/1.15. During the fire test the gas supply pressure reached 5.7 inches wc. it had been 4.8 inches wc prior to the fire test.
- 0410 Dumped 1580 pounds of ash. Flushed the cyclone and found barely 2 scoopsful on the bottom.
- 0505 Increased the grate speed to 7/1.40.
- 0530 Gas continues to pour from the transition pipe. Only rodding the combustion elbow seems to help and then it is only temporary aid.
- 0600 During this fire test the gas supply pressure reached 6.1 inches wc. Fire test ash average is 16.1 inches. Increased the grate to 7/1.45. Dumped 900 pounds of ash.
- 0620 Rodding the combustor reduced the gas supply pressure to 4.4 inches wc, but within 10 minutes it was back up to 5.2 inches wc. Started loading the remaining Blind Canyon coal into the weigh bin. Try reduction in saturation air flow first to 1750 cfm and then to 1700 cfm to aid in keeping the gas supply pressure down and the leakage at a minimum. At 1750 cfm, the gas supply pressure was 4.7 inches wc and at 1700 cfm the gas supply pressure was 4.3 inches wc. The transition pipe is still leaking at an unacceptable level.
- 0630 The gas supply pressure has dropped to 3.8 inches wc and the leakage is almost non existent.
- 0640 Increased the saturation air flow to 1800 cfm. The

gas supply pressure has increased to 4.6 inches wc.

0645 The caustic barrel is now empty. The pH is 6.5. The pumps are set at 40/50 for the large one and 30/30 for the smaller one.

0650 Have 8.27 tons in the weigh bin. This is the last of the Blind Canyon. Changed caustic barrels.

0730 Cleaned out the excess Blind Canyon coal from the coal hopper.

0800 Fire test ash average is 16.7 inches. Lowered the saturation air flow to 1600 cfm due to excess leakage from the combustor inlet.

0815 Ran the grate full out for 5 minutes at 7 teeth and then increased the saturation air flow to 1800 cfm.

0820 Slowed the grate to 7/1.6.

0830 Cyclone dump produced 4 scoopsful.

0845 Dumped ash. Ninety percent of the ash was 1 inch particles, with a few clinkers 5-6 inches in size.

0850 Cycled the vent valve. No problems this time with respect to closure.

0900 Cleaned up all the fines and washed off the screen in preparation for the Kemmerer coal. 4.82 tons of Blind Canyon remain in the weigh bin.

0955 Reduced the saturation air flow to 1650 cfm.

1000 Fire test ash average is 19.7 inches.

1020 Ran the grate for 10 minutes at 7/2.26.

1030 Slowed the grate to 7/1.50.

1045 Started the temperature and pressure probe test. 1.2 tons of Blind Canyon coal remains in the weigh bin.

1055 Cyclone dump. Dumped 845 pounds of ash. Again 90% was 1" in size with a few 5-6 inch clinkers. The ash is grey in color.

1130 Coal drop. The weigh bin is now reading 0.24 tons. Shoveled some down into the lower section.

1200 Fire test ash average is 17.6 inches. All bars went in easily. Grate speed is 7/1.50.

1225 Reduced the saturation air flow to 800 cfm as all the

Blind Canyon coal has been droppeed. Saturation temperature has been lowered to 60 C. Reduced the grate speed to 4/1.3. The furnace pressure valve is 15% open. Cyclone outlet pressure is 0.6 inches wc. The back pressure valve is 100% open.

- 1300 Started filling the weigh bin with Kemmerer coal. There were too many -1/4 inch fines for the screen to handle. Changing the to 1/2-inch screen.
- 1400 Fire test ash average is 7.2 inches. All bars went in easily.
- 1420 Slowed the grate to 4/0.7.
- 1500 The pH is 9.0 so we slowed the small pump to 30/30 and turned the big pump off.
- 1510 The screen is not yet operational. Reduced the saturation air flow to 600 cfm. Slowed the grate to 4/0.45.
- 1540 Cyclone dump.
- 1545 Cut the furnace pressure to lower the gas supply pressure. Lots of gas was leaking out. When the gas supply pressure gets to 5.0 and below, the gas stops leaking.

END OF BOM/FGT 014 BLIND CANYON

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/FGT014 Blind Canyon

WEATHER DATA

DATE: July 30, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	66	70	29.290	
0200	65	70	29.280	
0300	65	70	29.280	
0400	63	70	29.270	
0500	62	75	29.270	
0600	65	67	29.270	
0700	67	61	29.280	
0800	68	61	29.270	
0900	73	51	29.260	
1000	76	48	29.260	
1100	79	47	29.230	
1200	80	45	29.210	
1300	82	43	29.190	
1400	83	40	29.170	
1500	83	41	29.160	
1600	81	43	29.150	
1700	80	44	29.130	
1800	80	47	29.120	
1900	78	49	29.100	
2000	75	56	29.090	
2100	74	58	29.100	
2200	73	60	29.105	
2300	71	63	29.095	
2400	72	63	29.105	

General Conditions: Cloudy sunrise and sunset. 718 minutes of sunshine (81%). Maximum wind speed was 22 mph.

DATE: July 31, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	71	64	29.075	
0200	70	63	29.065	
0300	69	66	29.070	
0400	70	61	29.055	
0500	70	61	29.055	
0600	70	61	29.055	
0700	70	66	29.095	0.02
0800	71	64	29.075	0.01
0900	68	78	29.065	0.01
1000	68	81	29.045	0.04
1100	75	62	29.025	
1200	79	56	29.025	
1300	81	53	29.005	
1400	83	53	29.005	
1500	82	55	29.015	
1600	82	55	29.005	
1700	82	53	28.995	
1800	80	58	29.000	
1900	78	62	29.000	
2000	76	69	29.005	
2100	76	67	29.020	
2200	74	74	29.025	
2300	73	76	29.020	
2400	74	76	29.015	

General Conditions: Cloudy sunrise and sunset. 546 minutes of sunshine (62%). Maximum wind speed was 20 mph.

DATE: August 1, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	73	76	29.005	
0200	72	81	29.015	
0300	72	79	29.015	
0400	70	84	29.005	
0500	70	84	29.015	
0600	72	84	29.035	
0700	72	84	29.045	
0800	73	87	29.065	
0900	74	79	29.065	
1000	77	74	29.065	
1100	81	65	29.075	
1200	80	67	29.065	
1300	84	61	29.065	
1400	84	61	29.055	
1500	84	57	29.055	
1600	85	59	29.045	
1700	85	57	29.065	
1800	83	61	29.085	
1900	76	76	29.095	
2000	75	79	29.105	
2100	75	79	29.115	
2200	74	82	29.125	
2300	74	82	29.115	
2400	73	84	29.125	

General Conditions: Cloudy sunrise and sunset. 538 minutes of sunshine (61%). Maximum wind speed was 13 mph.

DATE: August 2, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	72	84	29.125	
0200	72	84	29.130	
0300	72	84	29.130	
0400	72	81	29.140	
0500	71	87	29.150	
0600	72	84	29.160	
0700	73	81	29.160	
0800	75	76	29.165	
0900	77	69	29.175	
1000	78	69	29.180	T
1100	81	65	29.175	T
1200	82	63	29.170	
1300	81	65	29.170	
1400	76	79	29.170	0.10
1500	74	79	29.180	0.36
1600	73	79	29.160	0.77
1700	74	82	29.160	T
1800	77	77	29.160	
1900	77	77	29.170	
2000	75	82	29.160	
2100	74	82	29.180	
2200	73	84	29.180	
2300	72	87	29.180	
2400	73	84	29.190	

General Conditions: Cloudy sunrise and sunset. 508 minutes of sunshine (58%). Maximum wind speed was 13 mph.

DATE: August 3, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	73	84	29.170	
0200	72	87	29.180	
0300	72	87	29.170	
0400	71	84	29.170	
0500	70	87	29.170	
0600	70	84	29.190	
0700	71	81	29.200	
0800	74	74	29.190	
0900	75	74	29.200	
1000	76	67	29.200	
1100	80	58	29.190	
1200	81	49	29.180	
1300	82	48	29.170	
1400	83	48	29.160	
1500	84	41	29.150	
1600	83	43	29.130	
1700	82	46	29.130	
1800	81	46	29.130	
1900	80	47	29.130	
2000	78	50	29.130	
2100	78	52	29.130	
2200	77	54	29.130	
2300	76	60	29.130	
2400	76	60	29.140	

General Conditions: Cloudy sunrise and sunset. 677 minutes of sunshine (71%). Maximum wind speed was 12 mph.

DATE: August 4, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	73	66	29.130	
0200	74	66	29.130	
0300	73	71	29.125	
0400	73	74	29.125	
0500	73	71	29.125	
0600	71	79	29.125	
0700	72	79	29.130	
0800	75	76	29.135	
0900	78	69	29.130	
1000	81	60	29.125	
1100	82	57	29.115	
1200	83	59	29.105	
1300	84	55	29.090	
1400	83	59	29.085	
1500	82	57	29.075	T
1600	82	58	29.070	T
1700	83	59	29.055	
1800	81	63	29.035	
1900	75	69	29.065	
2000	74	74	209.065	T
2100	73	81	29.075	T
2200	73	81	29.055	T
2300	73	79	29.045	
2400	74	76	29.035	

General Conditions: Cloudy sunrise and sunset. 617 minutes of sunshine (71%). Maximum wind speed was 17 mph.

DATE: August 5, 1984

HOURLY	TEMP	RELATIVE HUMIDITY	BAROMETRIC PRESS	RAIN SNOW
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0100	74	76	29.035	
0200	74	79	29.035	
0300	74	79	29.015	T
0400	73	81	29.015	0.01
0500	73	84	29.015	0.07
0600	73	81	29.015	0.08
0700	73	81	29.015	T
0800	74	82	29.005	
0900	74	82	29.005	
1000	77	72	29.005	
1100	79	72	29.005	
1200	81	69	29.005	
1300	85	59	29.005	
1400	86	57	28.995	
1500	87	57	28.975	
1600	85	61	28.965	
1700	86	59	28.965	
1800	85	61	28.955	
1900	82	67	28.955	
2000	81	69	28.955	
2100	81	67	28.965	
2200	78	74	28.975	
2300	78	74	28.975	
2400	77	79	28.975	

General Conditions: Cloudy sunrise and sunset. 658 minutes of sunshine (75%). Maximum wind speed was 14 mph.

DATE: August 6, 1984

HOURLY	TEMP	RELATIVE HUMIDITY	BAROMETRIC PRESS	RAIN SNOW
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0100	75	82	28.975	
0200	74	84	28.975	
0300	73	84	28.975	
0400	73	84	28.965	
0500	73	84	28.965	
0600	73	89	28.955	
0700	76	85	28.955	
0800	79	77	28.965	
0900	83	70	28.980	
1000	85	63	28.960	
1100	87	61	28.955	
1200	87	59	28.955	
1300	90	56	28.955	
1400	90	52	28.950	
1500	89	54	28.935	
1600	90	49	28.935	
1700	89	56	28.935	
1800	87	61	28.935	
1900	85	63	28.925	
2000	83	70	28.935	
2100	83	67	28.935	
2200	82	72	28.945	
2300	81	77	28.945	
2400	80	79	28.965	

General Conditions: Cloudy sunrise and sunset. 716 minutes of sunshine (82%). Maximum wind speed was 10 mph.

DATE: August 7, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	75	74	28.975	0.13
0200	71	81	28.925	0.05
0300	70	76	29.005	0.50
0400	70	84	28.965	0.05
0500	70	84	29.005	1.05
0600	70	84	28.975	0.11
0700	72	81	28.975	T
0800	75	71	28.955	T
0900	75	69	28.985	0.07
1000	71	82	29.005	0.15
1100	71	84	28.955	0.04
1200	74	79	28.910	0.02
1300	78	72	28.920	T
1400	82	65	28.920	
1500	86	61	28.910	
1600	83	67	28.920	T
1700	80	72	28.910	T
1800	78	76	28.900	0.01
1900	75	84	28.920	0.05
2000	72	87	28.900	0.04
2100	73	84	28.860	0.02
2200	71	87	28.880	
2300	71	84	28.900	
2400	70	87	28.905	

General Conditions: Cloudy sunrise and sunset. 309 minutes of sunshine (36%). Maximum wind speed was 35 mph.

DATE: August 8, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
0100	68	90	28.905	
0200	639	84	28.890	
0300	68	84	28.890	
0400	67	84	28.880	
0500	67	87	28.900	
0600	68	84	28.910	
0700	69	81	28.925	
0800	69	81	28.925	
0900	73	74	28.925	
1000	75	71	28.935	
1100	78	67	28.925	
1200	82	57	28.925	
1300	83	57	28.920	
1400	85	53	28.910	
1500	86	55	28.900	
1600	86	57	28.880	
1700	86	55	28.870	
1800	86	40	28.860	
1900	82	47	28.850	
2000	78	54	28.850	
2100	75	64	28.860	
2200	73	68	28.860	
2300	73	66	28.880	
2400	74	58	28.880	

General Conditions: Cloudy sunrise and sunset. 709 minutes of sunshine (82%). Maximum wind speed was 20 mph.

DATE: August 9, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	73	48	28.900	
0200	71	51	28.910	
0300	68	59	28.910	
0400	64	70	28.910	
0500	63	72	28.910	
0600	62	78	28.920	
0700	69	63	28.935	
0800	71	59	28.945	
0900	73	57	28.955	
1000	75	50	28.965	
1100	76	50	28.965	
1200	77	50	28.985	
1300	78	47	28.985	
1400	77	48	29.005	
1500	78	45	29.005	
1600	77	47	29.015	
1700	77	47	29.025	
1800	77	47	29.025	
1900	74	54	29.035	
2000	72	59	29.055	
2100	70	63	29.065	
2200	68	70	29.085	
2300	67	73	29.095	
2400	65	78	29.095	

General Conditions: Cloudy sunrise and clear sunset. 772 minutes of sunshine (90%). Maximum wind speed was 18 mph.

DATE: August 10, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	65	78	29.100	
0200	65	75	29.100	
0300	65	75	29.115	
0400	63	78	29.129	
0500	63	81	29.130	
0600	64	81	29.150	
0700	68	73	29.170	
0800	70	66	29.180	
0900	73	64	29.190	
1000	73	62	29.200	
1100	75	60	29.210	
1200	74	60	29.215	
1300	76	54	29.210	
1400	79	52	29.210	
1500	79	51	29.200	
1600	80	49	29.190	
1700	79	49	29.190	
1800	78	52	29.190	
1900	76	52	29.190	
2000	74	62	29.210	
2100	73	64	29.225	
2200	70	66	29.240	
2300	69	71	29.250	
2400	68	70	29.250	

General Conditions: Clear sunrise and cloudy sunset. 818 minutes of sunshine (95%). Maximum wind speed was 14 mph.

DATE: August 11, 1984

HOUR	TEMP	RELATIVE HUMIDITY	BAROMET PRESS	RAIN SNOW
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0100	66	73	29.255	
0200	64	75	29.260	
0300	64	75	29.260	
0400	62	81	29.270	
0500	61	81	29.270	
0600	61	81	29.280	
0700	63	72	29.280	
0800	65	73	29.280	
0900	67	73	29.290	
1000	70	70	29.290	
1100	71	70	29.280	
1200	72	68	29.280	
1300	73	66	29.270	
1400	75	60	29.250	
1500	75	60	29.250	
1600	76	56	29.240	
1700	75	58	29.230	
1800	76	56	29.220	
1900	74	60	29.220	
2000	70	71	29.230	
2100	69	73	29.240	
2200	67	78	29.250	
2300	66	81	29.250	
2400	65	82	29.250	

General Conditions: Clear sunrise
and hazy sunset. 802 minutes of
sunshine (94%). Maximum wind
speed was 14 mph.

APPENDIX C
Coal Sizing Data

Feed Coal Size Distribution for BOM/FGT-014

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	7/30/84	8:00	+1/4	1.9	3.7	13.9	53.9	95.3
***** Elkhorn *****								
2	7/30/84	16:00	+1/4	0.9	2.3	6.9	31.4	87.0
3	7/31/84	0:00	+1/4	0.5	2.4	6.8	18.6	87.4
4	7/31/84	8:00	+1/4	0.7	3.0	5.4	15.4	73.5
5	7/31/84	16:00	+1/4	0.5	2.7	7.2	17.4	86.8
6	8/ 1/84	0:00	+1/4	0.8	2.9	6.6	18.5	77.3
7	8/ 1/84	8:00	+1/4	0.4	2.5	6.6	16.7	78.7
8	8/ 1/84	16:00	+1/4	0.8	2.7	8.0	19.9	82.0
9	8/ 2/84	0:00	+1/4	1.5	5.7	10.7	26.5	85.4
10	8/ 2/84	8:00	+1/4	1.0	2.6	7.6	25.0	84.4
11	8/ 2/84	16:00	+1/4	0.6	3.3	9.0	21.5	83.6
***** Blind Canyon I *****								
12	8/ 3/84	0:00	+1/4	0.8	3.2	6.7	15.7	85.2
13	8/ 3/84	0:00	+1/4	1.1	22.0	63.4	93.6	100.0
14	8/ 3/84	8:00	+1/4	0.9	9.4	23.8	48.5	91.9
15	8/ 3/84	16:00	+1/4	1.8	12.2	32.3	60.9	93.0
16	8/ 4/84	0:00	+1/4	2.8	44.2	85.4	97.1	100.0
17	8/ 4/84	8:00	+1/4	2.7	19.7	43.5	69.5	93.6
18	8/ 4/84	16:00	+1/4	3.4	32.0	67.7	87.9	100.0
19	8/ 5/84	0:00	+1/4	3.5	37.1	81.4	95.6	100.0
20	8/ 5/84	8:00	+1/4	2.5	20.0	35.3	49.3	83.3
21	8/ 5/84	16:00	+1/4	4.3	40.7	84.9	95.1	100.0
22	8/ 6/84	0:00	+1/4	3.9	45.9	84.3	96.5	100.0
23	8/ 6/84	8:00	+1/4	4.9	34.1	62.4	84.1	100.0
24	8/ 6/84	16:00	+1/4	5.5	43.1	75.2	89.5	100.0
25	8/ 7/84	0:00	+1/4	2.1	34.4	82.6	97.7	100.0
***** Blind Canyon II *****								
26	8/ 7/84	8:00	+1/4	7.4	49.4	85.5	95.6	100.0
27	8/ 7/84	16:00	+1/4	4.1	79.9	71.8	100.0	100.0
28	8/ 8/84	0:00	+1/4	3.0	34.5	71.9	90.6	100.0
29	8/ 8/84	8:00	+1/4	4.1	39.3	79.9	98.2	100.0
30	8/ 8/84	16:00	+1/4	3.3	28.0	57.1	82.0	100.0
31	8/ 9/84	0:00	+1/4	5.0	45.8	85.6	100.0	100.0
32	8/ 9/84	8:00	+1/4	10.8	53.2	80.4	93.1	100.0
33	8/ 9/84	16:00	+1/4	4.6	37.9	72.8	94.2	100.0
34	8/10/84	0:00	+1/4	13.4	55.0	80.6	91.4	100.0
35	8/10/84	8:00	+1/4	5.0	42.1	80.6	95.6	100.0
36	8/10/84	16:00	+1/4	23.6	70.3	87.8	99.0	100.0
37	8/11/84	0:00	+1/4	3.6	54.0	86.6	95.8	100.0
38	8/11/84	8:00	+1/4	7.0	49.9	75.5	85.2	100.0

AVERAGES

Elkhorn (Samples 2-11)	0.8	3.1	7.5	21.2	83.5
Blind Canyon I (Smpls 14-25)	3.3	33.1	67.8	84.8	97.8
Blind Canyon II (Smpls 26-37)	6.5	47.3	78.7	94.7	100.0

APPENDIX D

Coal Addition Log

Coal Weights are given in short tons.

DATE	TIME	SAMPLE #	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	FUEL
7/30	800	C1	11.70	0.00	11.70	0.25	NO	COKE
7/30	1930	C2	11.13	6.40	4.73	0.25	NO	ELKHORN
7/30	2030	C2	6.40	5.47	0.93	0.25	NO	ELKHORN
7/30	2130	C2	5.47	5.08	0.39	0.25	NO	ELKHORN
7/30	2230	C2	5.06	4.91	0.15	0.25	NO	ELKHORN
7/30	2330	C3	4.91	4.79	0.12	0.25	NO	ELKHORN
7/31	30	C3	4.79	4.59	0.20	0.25	NO	ELKHORN
7/31	130	C3	6.72	6.52	0.20	0.25	NO	ELKHORN
7/31	230	C3	9.60	9.46	0.14	0.25	NO	ELKHORN
7/31	330	C3	9.46	9.24	0.22	0.25	NO	ELKHORN
7/31	430	C3	9.24	9.03	0.21	0.25	NO	ELKHORN
7/31	530	C3	9.03	8.91	0.12	0.25	NO	ELKHORN
7/31	630	C3	11.02	10.84	0.18	0.25	NO	ELKHORN
7/31	730	C4	10.84	10.59	0.25	0.25	NO	ELKHORN
7/31	830	C4	10.59	9.71	0.88	0.25	NO	ELKHORN
7/31	930	C4	9.71	9.51	0.20	0.25	NO	ELKHORN
7/31	1030	C4	9.51	9.42	0.09	0.25	NO	ELKHORN
7/31	1130	C4	9.42	9.34	0.08	0.25	NO	ELKHORN
7/31	1230	C4	9.34	9.07	0.27	0.25	NO	ELKHORN
7/31	1330	C4	9.07	8.85	0.22	0.25	NO	ELKHORN
7/31	1430	C4	8.85	8.35	0.50	0.25	NO	ELKHORN
7/31	1530	C5	8.35	7.86	0.49	0.25	NO	ELKHORN
7/31	1630	C5	7.86	7.58	0.28	0.25	NO	ELKHORN
7/31	1730	C5	7.58	7.17	0.41	0.25	NO	ELKHORN
7/31	1830	C5	7.17	6.89	0.28	0.25	NO	ELKHORN
7/31	1930	C5	6.89	6.22	0.67	0.25	NO	ELKHORN
7/31	2030	C5	10.83	10.44	0.39	0.25	NO	ELKHORN
7/31	2130	C5	10.44	9.91	0.53	0.25	NO	ELKHORN
7/31	2230	C5	9.92	9.43	0.49	0.25	NO	ELKHORN
7/31	2330	C6	9.44	8.76	0.68	0.25	NO	ELKHORN
8/ 1	30	C6	8.76	8.03	0.73	0.25	NO	ELKHORN
8/ 1	130	C6	8.03	7.39	0.64	0.25	NO	ELKHORN
8/ 1	230	C6	7.39	6.69	0.70	0.25	NO	ELKHORN
8/ 1	330	C6	6.69	5.96	0.73	0.25	NO	ELKHORN
8/ 1	430	C6	5.96	5.41	0.55	0.25	NO	ELKHORN
8/ 1	530	C6	5.41	4.74	0.67	0.25	NO	ELKHORN
8/ 1	630	C6	11.68	10.97	0.71	0.25	NO	ELKHORN
8/ 1	730	C7	10.97	10.54	0.43	0.25	NO	ELKHORN
8/ 1	830	C7	10.54	10.01	0.53	0.25	NO	ELKHORN
8/ 1	930	C7	10.01	9.62	0.39	0.25	NO	ELKHORN
8/ 1	1030	C7	9.62	9.03	0.59	0.25	NO	ELKHORN
8/ 1	1130	C7	9.03	8.58	0.45	0.25	NO	ELKHORN
8/ 1	1230	C7	8.58	8.09	0.49	0.25	NO	ELKHORN
8/ 1	1330	C7	8.09	7.31	0.78	0.25	NO	ELKHORN
8/ 1	1430	C7	7.31	6.26	1.05	0.25	NO	ELKHORN
8/ 1	1530	C8	6.25	5.42	0.83	0.25	NO	ELKHORN
8/ 1	1630	C8	5.42	4.49	0.93	0.25	NO	ELKHORN
8/ 1	1730	C8	4.48	3.47	1.01	0.25	NO	ELKHORN
8/ 1	1830	C8	3.47	2.51	0.96	0.25	NO	ELKHORN
8/ 1	1930	C8	2.51	1.60	0.91	0.25	NO	ELKHORN
8/ 1	2030	C8	2.35	1.60	0.75	0.25	NO	ELKHORN

DATE	TIME	SAMPLE #	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	FUEL
8/ 1	2130	C8	11.98	11.09	0.89	0.25	NO	ELKHORN
8/ 1	2230	C8	11.09	10.11	0.98	0.25	NO	ELKHORN
8/ 1	2330	C9	10.11	9.31	0.80	0.25	NO	ELKHORN
8/ 2	30	C9	9.31	8.37	0.94	0.25	NO	ELKHORN
8/ 2	130	C9	8.37	7.50	0.87	0.25	NO	ELKHORN
8/ 2	230	C9	7.50	6.42	1.08	0.25	NO	ELKHORN
8/ 2	330	C9	6.42	5.58	0.84	0.25	NO	ELKHORN
8/ 2	430	C9	5.58	4.58	1.00	0.25	NO	ELKHORN
8/ 2	530	C9	4.58	3.71	0.87	0.25	NO	ELKHORN
8/ 2	630	C9	11.28	10.37	0.91	0.25	NO	ELKHORN
8/ 2	730	C10	11.80	11.01	0.79	0.25	NO	ELKHORN
8/ 2	830	C10	11.01	10.09	0.92	0.25	NO	ELKHORN
8/ 2	930	C10	12.14	11.42	0.72	0.25	NO	ELKHORN
8/ 2	1030	C10	11.42	10.38	1.04	0.25	NO	ELKHORN
8/ 2	1130	C10	10.38	9.29	1.09	0.25	NO	ELKHORN
8/ 2	1230	C10	9.29	8.18	1.11	0.25	NO	ELKHORN
8/ 2	1330	C10	8.18	7.10	1.08	0.25	NO	ELKHORN
8/ 2	1430	C10	7.10	6.07	1.03	0.25	NO	ELKHORN
8/ 2	1530	C10	6.06	5.10	0.96	0.25	NO	ELKHORN
8/ 2	1630	C11	5.11	4.33	0.78	0.25	NO	ELKHORN
8/ 2	1730	C11	4.33	3.41	0.90	0.25	NO	ELKHORN
8/ 2	1830	C11	3.41	2.60	0.81	0.25	NO	ELKHORN
8/ 2	1930	C11	2.60	1.87	0.73	0.25	NO	ELKHORN
8/ 2	2030	C11	1.87	0.89	0.98	0.25	NO	ELKHORN
8/ 2	2130	C11	0.89	0.08	0.81	0.25	NO	LAST OF ELKHORN
8/ 2	2330	C12	0.00	0.00	0.00	0.25	NO	CYCLING COAL VALVES
8/ 3	30	C12	0.00	0.00	0.00	0.25	NO	CYCLING COAL VALVES
8/ 3	130	C12	0.00	0.00	0.00	0.25	NO	CYCLING COAL VALVES
8/ 3	230	C13	13.05	7.91	5.14	0.25	NO	BLIND CANYON
8/ 3	330	C13	7.91	7.43	0.48	0.25	NO	BLIND CANYON
8/ 3	430	C13	7.43	6.33	1.10	0.25	NO	BLIND CANYON
8/ 3	530	C13	6.33	5.61	0.72	0.25	NO	BLIND CANYON
8/ 3	630	C13	11.04	10.06	0.98	0.25	NO	BLIND CANYON
8/ 3	730	C14	10.06	9.07	0.99	0.25	NO	BLIND CANYON
8/ 3	830	C14	9.07	7.93	1.14	0.25	NO	BLIND CANYON
8/ 3	930	C14	7.93	6.82	1.11	0.25	NO	BLIND CANYON
8/ 3	1030	C14	6.82	5.56	1.26	0.25	NO	BLIND CANYON
8/ 3	1130	C14	5.56	4.23	1.33	0.25	NO	BLIND CANYON
8/ 3	1230	C14	8.53	7.24	1.29	0.25	NO	BLIND CANYON
8/ 3	1330	C14	12.57	11.19	1.38	0.25	NO	BLIND CANYON
8/ 3	1430	C14	11.19	10.03	1.16	0.25	NO	BLIND CANYON
8/ 3	1530	C15	10.03	8.66	1.37	0.25	NO	BLIND CANYON
8/ 3	1630	C15	8.66	7.36	1.30	0.25	NO	BLIND CANYON
8/ 3	1730	C15	7.36	6.33	1.03	0.25	NO	BLIND CANYON
8/ 3	1830	C15	6.33	4.93	1.40	0.25	NO	BLIND CANYON
8/ 3	1930	C15	4.93	3.77	1.16	0.25	NO	BLIND CANYON
8/ 3	2030	C15	3.77	2.84	0.93	0.25	NO	BLIND CANYON
8/ 3	2130	C15	13.13	11.81	1.32	0.25	NO	BLIND CANYON
8/ 3	2230	C15	11.81	10.73	1.08	0.25	NO	BLIND CANYON
8/ 3	2330	C16	10.73	9.49	1.24	0.25	NO	BLIND CANYON
8/ 4	30	C16	9.49	8.20	1.29	0.25	NO	BLIND CANYON

DATE	TIME	SAMPLE #	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	FUEL
8/ 4	130	C16	8.20	7.01	1.19	0.25	NO	BLIND CANYON
8/ 4	230	C16	7.01	5.56	1.45	0.25	NO	BLIND CANYON
8/ 4	330	C16	5.56	4.73	0.83	0.25	NO	BLIND CANYON
8/ 4	430	C16	4.73	3.45	1.28	0.25	NO	BLIND CANYON
8/ 4	530	C16	3.45	2.43	1.02	0.25	NO	BLIND CANYON
8/ 4	630	C16	10.60	9.39	1.21	0.25	NO	BLIND CANYON
8/ 4	730	C17	9.39	8.02	1.37	0.25	NO	BLIND CANYON
8/ 4	830	C17	8.01	6.74	1.27	0.25	NO	BLIND CANYON
8/ 4	930	C17	6.73	5.21	1.52	0.25	NO	BLIND CANYON
8/ 4	1030	C17	5.20	3.80	1.40	0.25	NO	BLIND CANYON
8/ 4	1130	C17	10.74	9.39	1.35	0.25	NO	BLIND CANYON
8/ 4	1230	C17	9.39	7.98	1.41	0.25	NO	BLIND CANYON
8/ 4	1330	C17	7.97	6.75	1.22	0.25	NO	BLIND CANYON
8/ 4	1430	C17	9.89	8.53	1.36	0.25	NO	BLIND CANYON
8/ 4	1530	C18	9.96	8.76	1.20	0.25	NO	BLIND CANYON
8/ 4	1630	C18	8.76	7.00	1.76	0.25	NO	BLIND CANYON
8/ 4	1730	C18	7.00	6.16	0.84	0.25	NO	BLIND CANYON
8/ 4	1830	C18	6.16	4.85	1.31	0.25	NO	BLIND CANYON
8/ 4	1930	C18	4.85	3.37	1.48	0.25	NO	BLIND CANYON
8/ 4	2030	C18	7.95	6.79	1.16	0.25	NO	BLIND CANYON
8/ 4	2130	C18	13.62	12.28	1.34	0.25	NO	BLIND CANYON
8/ 4	2230	C18	12.28	10.89	1.39	0.25	NO	BLIND CANYON
8/ 4	2330	C19	10.89	9.35	1.54	0.25	NO	BLIND CANYON
8/ 5	30	C19	9.35	8.29	1.06	0.25	NO	BLIND CANYON
8/ 5	130	C19	8.29	7.13	1.16	0.25	NO	BLIND CANYON
8/ 5	230	C19	7.13	5.51	1.62	0.25	NO	BLIND CANYON
8/ 5	330	C19	5.51	4.33	1.18	0.25	NO	BLIND CANYON
8/ 5	430	C19	4.33	2.97	1.36	0.25	NO	BLIND CANYON
8/ 5	530	C19	10.92	9.66	1.26	0.25	NO	BLIND CANYON
8/ 5	630	C19	11.26	9.88	1.38	0.25	NO	BLIND CANYON
8/ 5	730	C20	9.87	8.41	1.46	0.25	NO	BLIND CANYON
8/ 5	830	C20	8.41	7.07	1.34	0.25	NO	BLIND CANYON
8/ 5	930	C20	7.07	5.29	1.78	0.25	NO	BLIND CANYON
8/ 5	1030	C20	5.29	3.34	1.95	0.25	NO	BLIND CANYON
8/ 5	1130	C20	10.39	8.78	1.61	0.25	NO	BLIND CANYON
8/ 5	1230	C20	8.78	7.39	1.39	0.25	NO	BLIND CANYON
8/ 5	1330	C20	7.39	5.75	1.64	0.25	NO	BLIND CANYON
8/ 5	1430	C20	5.75	4.06	1.69	0.25	NO	BLIND CANYON
8/ 5	1530	C21	8.94	7.42	1.52	0.25	NO	BLIND CANYON
8/ 5	1630	C21	7.41	5.78	1.63	0.25	NO	BLIND CANYON
8/ 5	1730	C21	5.77	4.23	1.54	0.25	NO	BLIND CANYON
8/ 5	1830	C21	4.22	2.46	1.76	0.25	NO	BLIND CANYON
8/ 5	1930	C21	10.26	8.71	1.55	0.25	NO	BLIND CANYON
8/ 5	2030	C21	8.70	7.08	1.62	0.25	NO	BLIND CANYON
8/ 5	2130	C21	7.07	5.62	1.45	0.25	NO	BLIND CANYON
8/ 5	2230	C21	7.54	5.99	1.55	0.25	NO	BLIND CANYON
8/ 5	2330	C22	9.33	7.57	1.76	0.25	NO	BLIND CANYON
8/ 6	30	C22	7.57	5.97	1.60	0.25	NO	BLIND CANYON
8/ 6	130	C22	5.97	4.43	1.54	0.25	NO	BLIND CANYON
8/ 6	230	C22	4.43	3.08	1.35	0.25	NO	BLIND CANYON
8/ 6	330	C22	3.08	1.34	1.74	0.25	NO	BLIND CANYON

DATE	TIME	SAMPLE #	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	FUEL
8/ 6	430	C22	11.39	9.97	1.42	0.25	NO	BLIND CANYON
8/ 6	530	C22	9.97	8.34	1.63	0.25	NO	BLIND CANYON
8/ 6	630	C22	11.83	10.09	1.74	0.25	NO	BLIND CANYON
8/ 6	730	C23	10.09	8.64	1.45	0.25	NO	BLIND CANYON
8/ 6	830	C23	8.64	6.67	1.97	0.25	NO	BLIND CANYON
8/ 6	930	C23	6.67	5.26	1.41	0.25	NO	BLIND CANYON
8/ 6	1030	C23	10.58	8.57	2.01	0.25	NO	BLIND CANYON
8/ 6	1130	C23	8.56	6.97	1.59	0.25	NO	BLIND CANYON
8/ 6	1230	C23	6.97	5.57	1.40	0.25	NO	BLIND CANYON
8/ 6	1330	C23	5.57	3.84	1.73	0.25	NO	BLIND CANYON
8/ 6	1430	C23	5.33	3.77	1.56	0.25	NO	BLIND CANYON
8/ 6	1530	C24	7.17	5.92	1.25	0.25	NO	BLIND CANYON
8/ 6	1630	C24	5.91	4.80	1.11	0.25	NO	BLIND CANYON
8/ 6	1730	C24	4.79	3.20	1.59	0.25	NO	BLIND CANYON
8/ 6	1830	C24	6.50	5.01	1.49	0.25	NO	BLIND CANYON
8/ 6	1930	C24	10.01	8.58	1.43	0.25	NO	BLIND CANYON
8/ 6	2030	C24	8.56	7.11	1.45	0.25	NO	BLIND CANYON
8/ 6	2130	C24	7.10	5.56	1.54	0.25	NO	BLIND CANYON
8/ 6	2230	C24	10.69	9.06	1.63	0.25	NO	BLIND CANYON
8/ 6	2330	C25	9.06	7.58	1.48	0.25	NO	BLIND CANYON
8/ 7	30	C25	7.58	6.03	1.55	0.25	NO	BLIND CANYON
8/ 7	130	C25	6.03	4.33	1.70	0.25	NO	BLIND CANYON
8/ 7	230	C25	7.52	5.89	1.63	0.25	NO	BLIND CANYON
8/ 7	330	C25	10.78	9.24	1.54	0.25	NO	BLIND CANYON
8/ 7	430	C25	9.24	7.84	1.40	0.25	NO	BLIND CANYON
8/ 7	530	C25	7.84	6.25	1.59	0.25	NO	BLIND CANYON
8/ 7	630	C25	10.54	8.70	1.84	0.25	NO	BLIND CANYON
8/ 7	730	C26	10.72	9.04	1.68	0.25	NO	BLIND CANYON
8/ 7	830	C26	9.04	7.58	1.46	0.25	NO	BLIND CANYON
8/ 7	930	C26	7.58	6.49	1.09	0.25	NO	BLIND CANYON
8/ 7	1030	C26	6.49	5.91	0.58	0.25	NO	BLIND CANYON
8/ 7	1130	C26	5.91	5.11	0.80	0.25	NO	BLIND CANYON
8/ 7	1330	C26	9.05	7.71	1.34	0.25	NO	BLIND CANYON
8/ 7	1430	C26	9.03	7.39	1.64	0.25	NO	BLIND CANYON
8/ 7	1530	C27	7.39	6.44	0.95	0.25	NO	BLIND CANYON
8/ 7	1630	C27	6.43	5.19	1.24	0.25	NO	BLIND CANYON
8/ 7	1730	C27	5.18	4.07	1.11	0.25	NO	BLIND CANYON
8/ 7	1830	C27	4.05	2.46	1.59	0.25	NO	BLIND CANYON
8/ 7	1930	C27	9.99	8.20	1.79	0.25	NO	BLIND CANYON
8/ 7	2030	C27	8.19	6.74	1.45	0.25	NO	BLIND CANYON
8/ 7	2130	C27	6.74	5.22	1.52	0.25	NO	BLIND CANYON
8/ 7	2230	C27	10.62	8.96	1.66	0.25	NO	BLIND CANYON
8/ 7	2330	C28	8.96	7.19	1.77	0.25	NO	BLIND CANYON
8/ 8	30	C28	7.19	5.12	2.07	0.25	NO	BLIND CANYON
8/ 8	130	C28	5.12	4.00	1.12	0.25	NO	BLIND CANYON
8/ 8	230	C28	4.00	2.20	1.80	0.25	NO	BLIND CANYON
8/ 8	330	C28	2.20	1.18	1.02	0.25	NO	BLIND CANYON
8/ 8	430	C28	10.91	8.75	2.16	0.25	NO	BLIND CANYON
8/ 8	530	C28	11.21	9.48	1.73	0.25	NO	BLIND CANYON
8/ 8	630	C28	12.21	10.50	1.71	0.25	NO	BLIND CANYON
8/ 8	730	C29	10.50	8.52	1.98	0.25	NO	BLIND CANYON

DATE	TIME	SAMPLE #	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	FUEL
8/ 8	830	C29	8.52	7.01	1.51	0.25	NO	BLIND CANYON
8/ 8	930	C29	7.01	5.44	1.57	0.25	NO	BLIND CANYON
8/ 8	1030	C29	5.44	3.78	1.66	0.25	NO	BLIND CANYON
8/ 8	1130	C29	3.78	2.18	1.60	0.25	NO	BLIND CANYON
8/ 8	1230	C29	6.73	4.71	2.02	0.25	NO	BLIND CANYON
8/ 8	1330	C29	11.30	9.84	1.46	0.25	NO	BLIND CANYON
8/ 8	1430	C29	9.84	8.11	1.73	0.25	NO	BLIND CANYON
8/ 8	1530	C30	8.11	5.74	2.37	0.25	NO	BLIND CANYON
8/ 8	1630	C30	5.73	4.28	1.45	0.25	NO	BLIND CANYON
8/ 8	1730	C30	4.28	2.64	1.64	0.25	NO	BLIND CANYON
8/ 8	1830	C30	9.88	7.85	2.03	0.25	NO	BLIND CANYON
8/ 8	1930	C30	7.84	6.22	1.62	0.25	NO	BLIND CANYON
8/ 8	2030	C30	6.21	4.46	1.75	0.25	NO	BLIND CANYON
8/ 8	2130	C30	6.09	4.21	1.88	0.25	NO	BLIND CANYON
8/ 8	2230	C30	8.21	6.41	1.80	0.25	NO	BLIND CANYON
8/ 8	2330	C31	8.00	6.17	1.83	0.25	NO	BLIND CANYON
8/ 9	30	C31	6.17	4.22	1.95	0.25	NO	BLIND CANYON
8/ 9	130	C31	4.22	2.47	1.75	0.25	NO	BLIND CANYON
8/ 9	230	C31	6.92	4.89	2.03	0.25	NO	BLIND CANYON
8/ 9	330	C31	11.52	9.87	1.65	0.25	NO	BLIND CANYON
8/ 9	430	C31	9.87	8.01	1.86	0.25	NO	BLIND CANYON
8/ 9	530	C31	8.01	6.25	1.76	0.25	NO	BLIND CANYON
8/ 9	630	C31	10.68	8.88	1.80	0.25	NO	BLIND CANYON
8/ 9	730	C32	10.90	9.19	1.71	0.25	NO	BLIND CANYON
8/ 9	830	C32	9.19	7.62	1.57	0.25	NO	BLIND CANYON
8/ 9	930	C32	7.62	5.53	2.09	0.25	NO	BLIND CANYON
8/ 9	1030	C32	5.53	4.09	1.44	0.25	NO	BLIND CANYON
8/ 9	1130	C32	10.38	8.23	2.15	0.25	NO	BLIND CANYON
8/ 9	1230	C32	11.16	9.42	1.74	0.25	NO	BLIND CANYON
8/ 9	1330	C32	9.42	7.54	1.88	0.25	NO	BLIND CANYON
8/ 9	1430	C32	7.54	5.75	1.79	0.25	NO	BLIND CANYON
8/ 9	1530	C33	9.28	7.39	1.89	0.25	NO	BLIND CANYON
8/ 9	1630	C33	7.38	5.64	1.74	0.25	NO	BLIND CANYON
8/ 9	1730	C33	5.63	3.68	1.95	0.25	NO	BLIND CANYON
8/ 9	1830	C33	3.68	1.95	1.73	0.25	NO	BLIND CANYON
8/ 9	1930	C33	11.24	9.55	1.69	0.25	NO	BLIND CANYON
8/ 9	2030	C33	9.54	7.62	1.92	0.25	NO	BLIND CANYON
8/ 9	2130	C33	10.10	8.25	1.85	0.25	NO	BLIND CANYON
8/ 9	2230	C33	8.24	6.37	1.87	0.25	NO	BLIND CANYON
8/ 9	2330	C34	9.38	7.48	1.90	0.25	NO	BLIND CANYON
8/10	30	C34	7.48	5.64	1.84	0.25	NO	BLIND CANYON
8/10	130	C34	5.64	3.88	1.76	0.25	NO	BLIND CANYON
8/10	230	C34	7.38	5.38	2.00	0.25	NO	BLIND CANYON
8/10	330	C34	9.81	8.03	1.78	0.25	NO	BLIND CANYON
8/10	430	C34	8.03	6.22	1.81	0.25	NO	BLIND CANYON
8/10	530	C34	6.22	3.98	2.24	0.25	NO	BLIND CANYON
8/10	630	C34	7.38	5.83	1.55	0.25	NO	BLIND CANYON
8/10	730	C35	10.62	8.61	2.01	0.25	NO	BLIND CANYON
8/10	830	C35	8.61	6.71	1.90	0.25	NO	BLIND CANYON
8/10	930	C35	6.71	4.80	1.91	0.25	NO	BLIND CANYON
8/10	1030	C35	10.66	8.76	1.90	0.25	NO	BLIND CANYON

DATE	TIME	SAMPLE #	START WT (T)	STOP WT (T)	NET WT (T)	SCREEN (IN)	WASH?	FUEL
8/10	1130	C35	10.34	8.69	1.65	0.25	NO	BLIND CANYON
8/10	1230	C35	10.49	8.47	2.02	0.25	NO	BLIND CANYON
8/10	1330	C35	8.47	6.60	1.87	0.25	NO	BLIND CANYON
8/10	1430	C35	8.23	6.25	1.98	0.25	NO	BLIND CANYON
8/10	1530	C36	11.35	9.62	1.73	0.25	NO	BLIND CANYON
8/10	1630	C36	9.62	7.92	1.70	0.25	NO	BLIND CANYON
8/10	1730	C36	7.91	6.03	1.88	0.25	NO	BLIND CANYON
8/10	1830	C36	6.02	4.12	1.90	0.25	NO	BLIND CANYON
8/10	1930	C36	8.12	6.27	1.85	0.25	NO	BLIND CANYON
8/10	2030	C36	9.93	8.21	1.72	0.25	NO	BLIND CANYON
8/10	2130	C36	8.20	6.38	1.82	0.25	NO	BLIND CANYON
8/10	2230	C36	9.02	7.17	1.85	0.25	NO	BLIND CANYON
8/10	2330	C37	7.17	5.31	1.86	0.25	NO	BLIND CANYON
8/11	30	C37	5.31	3.25	2.06	0.25	NO	BLIND CANYON
8/11	130	C37	6.82	4.83	1.99	0.25	NO	BLIND CANYON
8/11	230	C37	10.49	8.47	2.02	0.25	NO	BLIND CANYON
8/11	330	C37	8.47	6.52	1.95	0.25	NO	BLIND CANYON
8/11	430	C37	6.52	4.63	1.89	0.25	NO	BLIND CANYON
8/11	530	C37	4.63	2.83	1.80	0.25	NO	BLIND CANYON
8/11	630	C37	6.07	4.33	1.74	0.25	NO	BLIND CANYON
8/11	730	C38	8.29	6.33	1.96	0.25	NO	BLIND CANYON
8/11	830	C38	6.84	4.83	2.01	0.25	NO	BLIND CANYON
8/11	930	C38	4.83	3.10	1.73	0.25	NO	BLIND CANYON
8/11	1030	C38	3.10	1.21	1.89	0.25	NO	BLIND CANYON
8/11	1130	C38	1.21	0.24	0.97	0.25	NO	BLIND CANYON

APPENDIX E
Ash Analysis Data

ASH ANALYSIS FOR BOM/FGI-014

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch					Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
			1/4	1/2	3/4	1	2				
1	7/31/84	11:19	2.8	3.7	5.1	7.0	18.4	0.63	15	12.0	0.36
2	7/31/84	16:29	19.6	29.9	36.3	40.9	51.0	0.89	1	21.3	1.10
3	7/31/84	22:25	13.4	26.2	35.4	48.0	63.6	0.75	19	20.0	0.66
4	8/ 1/84	2:40	8.3	15.3	21.1	29.0	51.8	0.72	4	17.0	0.31
5	8/ 1/84	6:19	13.9	22.9	30.6	38.4	56.6	0.62	—	29.6	0.30
6	8/ 1/84	10:14	14.7	32.0	48.2	66.8	100.0	0.51	17	30.7	0.30
7	8/ 1/84	14:10	6.1	12.9	25.1	33.9	80.6	0.51	4	24.2	0.25
8	8/ 1/84	17:29	22.3	38.6	54.4	70.0	100.0	0.52	3	27.3	0.19
9	8/ 1/84	20:20	28.3	47.7	56.9	66.1	89.8	0.44	12	21.3	0.20
10	8/ 1/84	23:29	6.3	18.1	35.2	53.5	91.8	0.42	5	26.0	0.20
11	8/ 2/84	2:15	31.3	57.1	74.9	85.8	96.4	0.40	9	31.3	0.22
12	8/ 2/84	6:00	16.8	35.1	51.9	61.6	83.8	0.42	12	32.4	0.23
13	8/ 2/84	10:30	12.6	28.9	43.1	58.7	89.0	0.42	8	30.5	0.19
14	8/ 2/84	12:30	29.8	50.4	63.4	75.7	100.0	0.48	10	20.0	0.14
15	8/ 2/84	14:19	28.6	53.1	65.1	76.9	100.0	0.46	5	36.0	0.21
16	8/ 2/84	17:00	16.3	30.0	48.5	65.4	87.3	0.46	23	23.6	0.17
17	8/ 2/84	19:29	23.0	44.4	60.9	72.5	94.7	0.54	7	26.3	0.25
19	8/ 3/84	3:00	13.8	26.5	39.7	52.6	80.8	0.52	7	34.6	0.24
20	8/ 3/84	5:00									
21	8/ 3/84	6:15	21.1	42.5	59.5	71.2	92.3	0.53	12	23.9	0.21
22	8/ 3/84	9:14									
23	8/ 3/84	11:44	28.6	46.9	60.4	71.8	89.1	0.58	3	12.6	0.21
24	8/ 3/84	13:30	12.3	30.7	47.1	57.9	76.3	0.62	—	21.8	0.36
25	8/ 3/84	15:17	6.6	24.7	44.5	58.9	81.1	0.66	1	12.7	0.18
26	8/ 3/84	17:00									
27	8/ 3/84	18:45	5.8	18.9	41.9	57.1	88.4	0.65	34	24.1	0.28
28	8/ 3/84	21:00									
29	8/ 3/84	22:29	9.7	27.8	46.1	63.5	92.9	0.67	—	17.4	0.21
30	8/ 4/84	—	10.0	28.0	48.5	62.6	77.1	0.70	6	20.7	0.22
31	8/ 4/84	—									
32	8/ 4/84	4:15	12.9	28.8	43.6	54.0	69.0	0.69	5	9.2	0.14
33	8/ 4/84	6:30									
34	8/ 4/84	8:10	11.4	32.2	54.7	70.8	93.3	0.66	2	12.8	0.19
37	8/ 4/84	11:14									
38	8/ 4/84	12:44	9.1	31.9	53.6	70.5	100.0	0.62	3	17.4	0.22
39	8/ 4/84	14:10									

ASH ANALYSIS FOR BOM/FGT-014

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch					Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
			1/4	1/2	3/4	1	2				
40	8/ 4/84	16:00	13.7	33.6	52.8	66.3	87.9	0.68	4	9.1	0.22
42	8/ 4/84	19:39									
43	8/ 4/84	21:20	7.4	24.7	47.3	65.4	92.4	0.68	4	11.2	0.15
44	8/ 4/84	22:39									
45	8/ 5/84	0:15	10.1	27.7	50.2	66.8	89.4	0.76	6	7.5	0.14
46	8/ 5/84	3:45									
47	8/ 5/84	5:44	12.7	33.1	55.1	71.4	100.0	0.75	6	8.4	0.21
48	8/ 5/84	7:15									
49	8/ 5/84	8:39	8.0	23.0	40.5	56.4	69.2	0.64	4	6.1	0.12
50	8/ 5/84	10:00									
51	8/ 5/84	11:14	14.1	44.5	71.0	86.7	100.0	0.71	10	8.4	0.17
52	8/ 5/84	12:19									
53	8/ 5/84	13:10	10.1	30.9	54.3	71.4	91.8	0.72	5	8.8	0.15
54	8/ 5/84	14:14									
55	8/ 5/84	15:30	12.7	32.6	50.1	65.4	88.3	0.74	7	10.1	0.15
56	8/ 5/84	17:00									
57	8/ 5/84	18:10	22.2	43.2	61.4	76.3	100.0	0.71	10	9.1	0.28
58	8/ 5/84	19:29									
59	8/ 5/84	20:50	13.5	35.3	58.9	72.7	100.0	0.75	8	11.4	0.14
60	8/ 5/84	22:14									
61	8/ 5/84	23:29	5.9	18.8	35.9	53.3	82.1	0.72	4	4.9	0.11
62	8/ 6/84	1:00									
63	8/ 6/84	3:29	10.4	30.3	51.1	64.1	93.1	0.70	5	8.2	0.18
65	8/ 6/84	7:15									
66	8/ 6/84	8:30	4.9	18.3	40.2	64.3	92.1	0.67	4	9.5	0.17
68	8/ 6/84	11:00									
69	8/ 6/84	12:10	11.3	30.7	50.7	65.8	98.2	0.69	5	7.9	0.12
70	8/ 6/84	13:30									
71	8/ 6/84	14:44	9.7	24.9	42.2	58.4	75.1	0.71	6	9.3	0.16
72	8/ 6/84	16:29									
73	8/ 6/84	18:20	6.1	24.7	45.3	66.0	95.5	0.75	21	7.1	0.12
74	8/ 6/84	20:00									

ASH ANALYSIS FOR BOM/FGT-014

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, in _{ch}					Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
			1/4	1/2	3/4	1	2				
75	8/ 6/84	21:54	17.3	41.7	61.9	80.1	97.7	0.71	7	11.0	0.14
76	8/ 7/84	1:00									
77	8/ 7/84	2:29	7.4	23.9	43.7	61.4	90.4	0.67	6	7.0	0.14
78	8/ 7/84	4: 9									
79	8/ 7/84	6:30	8.8	26.9	50.2	69.4	94.0	0.72	5	6.7	0.13
80	8/ 7/84	9:00									
81	8/ 7/84	11:30	5.5	19.6	40.2	62.6	85.8	0.71	3	8.0	0.15
82	8/ 7/84	13:00									
83	8/ 7/84	15:00	16.7	39.1	58.6	72.2	94.3	0.83	7	7.1	0.18
85	8/ 7/84	19:29									
86	8/ 7/84	21:00	14.7	38.5	63.1	79.8	100.0	0.78	7	7.1	0.18
87	8/ 7/84	22:29									
88	8/ 8/84	0:10	14.2	35.3	55.1	68.2	92.8	0.75	9	6.4	0.08
89	8/ 8/84	3:29									
90	8/ 8/84	4:15	14.2	33.7	50.5	63.7	85.6	0.71	9	11.0	0.16
91	8/ 8/84	6:15									
92	8/ 8/84	7:50	17.1	37.4	56.7	70.5	89.1	0.72	9	8.1	0.14
93	8/ 8/84	9:35									
94	8/ 8/84	11:00	21.5	46.9	68.0	81.3	95.5	0.78	7	8.8	0.17
95	8/ 8/84	13:00									
96	8/ 8/84	14:50	11.6	25.1	40.7	54.0	85.6	0.74	1	8.5	0.15
97	8/ 8/84	16:29									
98	8/ 8/84	18:20	34.9	57.5	72.9	83.7	100.0	0.71	14	11.8	0.16
99	8/ 8/84	20:29									
100	8/ 8/84	22:00	9.1	24.7	39.3	52.5	73.8	0.72	6	8.2	0.14
101	8/ 8/84	24:00									
102	8/ 9/84	2:00	14.2	33.7	46.8	55.6	69.2	0.80	—	9.0	0.14
103	8/ 9/84	3:29									
104	8/ 9/84	4:30	17.0	40.6	61.4	78.7	100.0	0.73	14	9.6	0.12
105	8/ 9/84	6:00									
106	8/ 9/84	7:30	16.7	42.7	56.5	73.1	95.1	0.73	9	13.8	0.18

ASH ANALYSIS FOR BOM/FGT-014

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch					Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
			1/4	1/2	3/4	1	2				
107	8/ 9/84	10:00	14.3	33.3	52.1	68.2	86.4	0.70	9	12.3	0.17
108	8/ 9/84	11:30									
109	8/ 9/84	13:30	12.7	35.5	57.8	74.2	93.5	0.65	13	7.0	0.13
110	8/ 9/84	15:14									
111	8/ 9/84	17:00	11.2	25.8	42.4	60.7	87.7	0.73	6	11.5	0.17
112	8/ 9/84	19:00									
113	8/ 9/84	20:20	11.7	27.9	45.1	59.5	82.1	0.70	9	11.9	0.15
114	8/ 9/84	22:04									
115	8/10/84	0:15	20.0	46.5	63.5	75.6	91.0	0.72	15	9.0	0.14
116	8/10/84	4:09									
117	8/10/84	5:00	8.0	22.6	38.9	47.6	59.7	0.73	9	9.8	0.15
118	8/10/84	6:09									
119	8/10/84	7:25	29.3	59.8	76.8	85.0	96.2	0.71	16	12.1	0.17
121	8/10/84	10:19									
122	8/10/84	11:39	15.5	36.0	51.8	62.6	87.1	0.80	7	13.1	0.17
123	8/10/84	13:05									
124	8/10/84	14:30	16.7	42.5	62.8	78.2	94.9	0.74	9	14.0	0.16
125	8/10/84	18:39									
127	8/10/84	20:45	7.7	23.3	45.2	64.3	100.0	0.74	10	9.0	0.14
128	8/10/84	22:29									
129	8/11/84	0:10	20.0	42.3	55.1	64.4	75.7	0.73	10	7.8	0.16
130	8/11/84	2: 9									
131	8/11/84	4: 9	20.0	48.0	67.2	78.0	90.5	0.77	10	9.8	0.16
132	8/11/84	6: 9									
133	8/11/84	7:30	14.2	34.9	56.5	73.3	94.6	0.70	10	8.7	0.14
136	8/11/84	10:55									
137	8/11/84	12:10	13.5	35.3	59.0	75.0	94.7	0.78	7	8.8	0.15
138	8/11/84	14:10									

ASH ANALYSIS FOR BOM/FGT-014

Sample Number	Date	Time	Cumulative Mass Fraction, % less than stated size, inch					Bulk Density gm/cc	Moisture content %	Carbon content %	Sulfur content %
			1/4	1/2	3/4	1	2				

AVERAGES

Elkhorn (samples 4 - 20)	18.1	34.2	47.9	60.5	86.8	0.496	8.9	27.4	0.23
Blind Canyon I (samples 25 - 87)	10.6	29.6	50.3	66.7	90.3	0.705	6.7	10.3	0.17
Blind Canyon II (samples 92 - 138)	16.2	37.4	55.3	68.9	88.3	0.733	9.6	10.1	0.15

APPENDIX F

Ash Removal Log

Ash weights are given in pounds.

Flush water is given in gallons.

DATE	TIME	SAMPLE NUMBER	INITIAL DRY WT.	FINAL DRY WT.	NET DRY WT.	INITIAL WET WT.	FINAL WET WT.	NET WET WT.	NET DRY & NET WET	FLUSH WATER
7/31	1120	A1	525	128	397	426	114	312	709	30
7/31	1650	A2	535	118	417	365	115	250	667	30
7/31	2225	A3	636	113	523	360	110	250	773	30
8/ 1	240	A4	518	112	406	375	110	265	671	30
8/ 1	620	A5	521	126	395	386	117	269	664	30
8/ 1	1030	A6	505	113	392	400	120	280	672	30
8/ 1	1410	A7	530	110	420	402	109	293	713	30
8/ 1	1630	A8	577	108	469	380	104	276	745	30
8/ 1	2015	A9	580	107	473	397	105	292	765	30
8/ 1	2330	A10	655	107	548	398	105	293	841	30
8/ 2	215	A11	528	128	400	380	106	274	674	30
8/ 2	600	A12	650	130	520	373	122	251	771	30
8/ 2	1030	A13	729	108	621	413	105	308	929	30
8/ 2	1230	A14	579	109	470	415	107	308	778	30
8/ 2	1420	A15	557	110	447	395	106	289	736	30
8/ 2	1700	A16	545	108	437	415	106	309	746	30
8/ 2	1930	A17	620	109	511	400	107	293	804	30
8/ 2	2200	A18	555	109	446	400	106	294	740	30
8/ 3	30	A19	565	110	455	380	106	274	729	30
8/ 3	245	A20	522	110	412	385	115	270	682	30
8/ 3	615	A21	600	111	489	374	107	267	756	30
8/ 3	915	A22	521	111	410	368	108	260	670	30
8/ 3	1145	A23	680	111	569	392	107	285	854	30
8/ 3	1330	A24	584	109	475	390	105	285	760	30
8/ 3	1517	A25	763	132	631	392	105	287	918	30
8/ 3	1700	A26	812	103	709	380	101	279	988	30
8/ 3	1845	A27	715	137	578	416	101	315	893	30
8/ 3	2100	A28	680	101	579	370	98	272	851	30
8/ 3	2230	A29	660	100	560	350	96	254	814	30
8/ 4	100	A30	700	130	570	360	130	230	800	30
8/ 4	215	A31	202	100	102	415	105	310	412	30
8/ 4	415	A32	585	102	483	325	101	224	707	30
8/ 4	630	A33	622	106	516	343	104	239	755	30
8/ 4	810	A34	770	107	663	389	104	285	948	30
8/ 4	900	A35	600	106	494	395	104	291	785	30
8/ 4	1010	A36	680	106	574	412	105	307	881	30
8/ 4	1115	A37	590	107	483	400	104	296	779	30
8/ 4	1245	A38	585	106	479	382	103	279	758	30
8/ 4	1410	A39	619	105	514	376	103	273	787	30
8/ 4	1600	A40	690	107	583	400	104	296	879	30
8/ 4	1815	A41	718	107	611	395	104	291	902	30
8/ 4	1940	A42	600	107	493	390	104	286	779	30
8/ 4	2120	A43	750	108	642	408	104	304	946	30
8/ 4	2340	A44	600	106	494	400	104	296	790	30
8/ 5	15	A45	725	108	617	395	103	292	909	30
8/ 5	345	A46	730	109	621	402	106	296	917	30
8/ 5	545	A47	708	141	567	425	107	318	885	30
8/ 5	715	A48	648	109	539	404	107	297	836	30
8/ 5	840	A49	685	108	577	400	105	295	872	30
8/ 5	1000	A50	841	171	670	498	188	310	980	30

DATE	TIME	SAMPLE NUMBER	INITIAL DRY WT.	FINAL DRY WT.	NET DRY WT.	INITIAL WET WT.	FINAL WET WT.	NET WET WT.	NET DRY & NET WET	FLUSH WATER
8/ 5	1100	A51	764	180	584	464	164	300	884	30
8/ 5	1220	A52	702	105	597	452	104	348	945	30
8/ 5	1310	A53	722	109	613	444	156	288	901	30
8/ 5	1415	A54	778	105	673	435	104	331	1004	30
8/ 5	1530	A55	690	107	583	425	106	319	902	30
8/ 5	1700	A56	677	116	561	465	108	357	918	30
8/ 5	1810	A57	620	108	512	410	108	302	814	30
8/ 5	1930	A58	725	107	618	430	107	323	941	30
8/ 5	2050	A59	764	106	658	428	104	324	982	30
8/ 5	2215	A60	720	107	613	430	107	323	936	30
8/ 5	2330	A61	823	168	655	448	165	283	938	30
8/ 6	100	A62	815	105	710	398	106	292	1002	30
8/ 6	330	A63	910	107	803	426	106	320	1123	30
8/ 6	545	A64	870	110	760	435	108	327	1087	30
8/ 6	715	A65	802	118	684	446	107	339	1023	30
8/ 6	830	A66	847	171	676	468	148	320	996	30
8/ 6	935	A67	818	175	643	470	188	282	925	30
8/ 6	1100	A68	821	106	715	464	104	360	1075	30
8/ 6	1210	A69	720	173	547	460	175	285	832	30
8/ 6	1330	A70	774	159	615	440	174	266	881	30
8/ 6	1445	A71	660	173	487	447	221	226	713	30
8/ 6	1630	A72	725	106	619	403	107	296	915	30
8/ 6	1810	A73	816	106	710	419	102	317	1027	30
8/ 6	2000	A74	722	105	617	420	102	318	935	30
8/ 6	2152	A75	774	104	670	435	102	333	1003	30
8/ 7	10	A76	1056	106	950	447	102	345	1295	30
8/ 7	230	A77	1128	186	942	461	151	310	1252	30
8/ 7	410	A78	856	103	753	465	102	363	1116	30
8/ 7	610	A79	1026	188	838	460	120	340	1178	30
8/ 7	745	A80	874	105	769	446	103	343	1112	30
8/ 7	940	A81	868	109	759	373	103	270	1029	30
8/ 7	1320	A82	921	126	795	366	144	222	1017	30
8/ 7	1500	A83	676	105	571	390	113	277	848	30
8/ 7	1815	A84	815	108	707	680	106	574	1281	30
8/ 7	1930	A85	765	108	657	430	105	325	982	30
8/ 7	2100	A86	804	107	697	430	105	325	1022	30
8/ 7	2230	A87	801	125	676	456	105	351	1027	30
8/ 8	10	A88	889	104	785	416	104	312	1097	30
8/ 8	210	A89	1006	150	856	450	155	295	1151	30
8/ 8	415	A90	1037	132	905	455	118	337	1242	30
8/ 8	615	A91	999	105	894	420	101	319	1213	30
8/ 8	750	A92	817	161	656	418	121	297	953	30
8/ 8	935	A93	927	175	752	445	124	321	1073	30
8/ 8	1055	A94	835	103	732	440	103	337	1069	30
8/ 8	1230	A95	938	102	836	428	101	327	1163	30
8/ 8	1410	A96	934	100	834	440	100	340	1174	30
8/ 8	1615	A97	1135	98	1037	500	100	400	1437	30
8/ 8	1820	A98	1116	187	929	534	97	437	1366	30
8/ 8	2030	A99	1045	100	945	445	99	346	1291	30
8/ 8	2215	A100	1015	100	915	440	100	340	1255	30

DATE	TIME	SAMPLE NUMBER	INITIAL DRY WT.	FINAL DRY WT.	NET DRY WT.	INITIAL WET WT.	FINAL WET WT.	NET WET WT.	NET DRY & NET WET	FLUSH WATER
8/ 9	15	A101	1210	140	1070	480	170	310	1380	30
8/ 9	215	A102	1180	175	1005	440	104	336	1341	30
8/ 9	415	A103	1120	170	950	463	103	360	1310	30
8/ 9	615	A104	1160	170	990	500	105	395	1385	30
8/ 9	745	A105	840	96	744	474	98	376	1120	30
8/ 9	910	A106	837	99	738	463	98	365	1103	30
8/ 9	1050	A107	1000	97	903	475	95	380	1283	30
8/ 9	1216	A108	917	104	813	445	97	348	1161	30
8/ 9	1350	A109	924	170	754	450	100	350	1104	30
8/ 9	1515	A110	920	248	672	618	95	523	1195	30
8/ 9	1700	A111	1090	100	990	490	100	390	1380	30
8/ 9	1900	A112	1084	96	988	474	95	379	1367	30
8/ 9	2020	A113	1047	97	950	438	99	339	1289	30
8/ 9	2215	A114	1137	97	1040	450	98	352	1392	30
8/10	15	A115	1262	226	1036	535	97	438	1474	30
8/10	215	A116	1134	192	942	495	104	391	1333	30
8/10	415	A117	1106	171	935	435	100	335	1270	30
8/10	615	A118	1210	160	1050	420	110	310	1360	30
8/10	725	A119	943	114	829	444	103	341	1170	30
8/10	845	A120	965	103	862	490	102	388	1250	30
8/10	1020	A121	1080	101	979	466	103	363	1342	30
8/10	1140	A122	858	180	678	481	102	379	1057	30
8/10	1305	A123	930	103	827	446	102	344	1171	30
8/10	1430	A124	911	102	809	470	103	367	1176	30
8/10	1640	A125	1030	100	930	450	100	350	1280	30
8/10	1825	A126	1070	109	961	462	163	299	1260	30
8/10	2045	A127	1035	100	935	495	100	395	1330	30
8/10	2230	A128	870	100	770	460	100	360	1130	30
8/11	10	A129	1059	100	959	503	99	404	1363	30
8/11	210	A130	1490	165	1325	580	180	400	1725	30
8/11	410	A131	1575	99	1476	540	101	439	1915	30
8/11	610	A132	864	112	752	480	100	380	1132	30
8/11	730	A133	926	100	826	513	102	411	1237	30
8/11	845	A134	935	101	834	524	102	422	1256	30
8/11	955	A135	906	100	806	488	107	381	1187	30
8/11	1055	A136	856	120	736	482	102	380	1116	30
8/11	1210	A137	987	103	884	485	102	383	1267	30
8/11	1420	A138	892	105	787	389	100	289	1076	30

APPENDIX G

Retort Particle Sampling Data

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

- G-1. Dust Loading Data
- G-2. Cumulative Dust Data
- G-3. Cumulative Dust Size Distributions (4 included)
- G-4. Dust Size Distribution Modal Analysis (4 included)
- G-5. Explanation of Modal Fitting Parameters

TABLE G-1

DUST DATA for BOM/FGT-014

Grand Average Gas/Air Ratio
1.95Estimated Offtake Elbow Area/ Sampler Inlet Area
7678Retort Area Less Draft Shroud Area
28.75 square feetEquation of Fitted Curve : Dust (#/hr)/ Coal Feed (#/hr) (%) = $5.75E-3 \times \text{Face Velocity}^{**3.94}$ R Squared = 0.756

RUN #	TEST DATE TIME	TEST LENGTH (min)	MASS PARTICLES (milligram)	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	4-AUG-84 23:02	1	10.70	2980	758	29.34	1391	6928	0.365	34	270	0.0	38.5
2	4-AUG-84 23:21	1	43.26	2980	622	29.35	1405	5728	1.475	34	270	0.0	35.0
3	4-AUG-84 23:41	1	74.34	2440	800	29.32	1410	7425	3.095	34	270	0.0	36.0
4	5-AUG-84 16:30	1	107.45	3187	749	29.46	1622	7795	3.425	34	325	1.7	38.0
5	5-AUG-84 16:51	1	52.75	3140	651	29.46	1619	6793	1.706	34	270	1.7	38.0
6	5-AUG-84 17:11	1	11.62	3140	691	29.46	1620	7168	0.376	34	210	1.7	38.0
7	7-AUG-84 15:08	1	12.15	1770	745	29.10	1215	5900	0.697	34	325	1.7	37.5
8	7-AUG-84 15:25	1	4.58	1770	723	29.12	1213	5706	0.263	34	275	1.7	38.5
9	7-AUG-84 15:36	1	17.70	2287	755	29.12	1213	5939	0.786	34	210	1.7	38.5
10	9-AUG-84 10:50	1	39.90	3827	663	29.50	1784	7717	1.059	34	275	1.6	37.5
11	9-AUG-84 11:13	1	48.00	3827	677	29.51	1782	7873	1.027	34	210	1.7	35.0
12	9-AUG-84 11:34	1	114.20	3827	656	29.51	1791	7665	3.031	34	325	1.7	30.0

TABLE G-2

BOM/FGT-014 CUMULATIVE DUST DATA

SIEVING ASTM SIEVE NUM.	SIEVE SIZE (um)	SHIFT SIZE (um)	Sample #			
			014-02 Percent Less Than Stated Size (%<)	014-05 Percent Less Than Stated Size (%<)	014-07 Percent Less Than Stated Size (%<)	014-11 Percent Less Than Stated Size (%<)
14	1400	1891.9				95.5
20	841	1136.5	89.2	92.5		89.7
30	595	804.1	73.4	85.5	94.3	80.2
40	420	567.5	59.0	73.7	89.5	66.5
60	250	337.8	37.2	52.3	76.0	48.8
100	149	201.4	20.8	32.3	59.4	33.1
200	74	100.0	9.2	8.0	28.3	12.8

MICROSCOPY

PARTICLE DIAMETER (um)	Percent Less Than Stated Size			
	(%<)	(%<)	(%<)	(%<)
178.0	--	8.0	--	--
100.0	9.2	7.2	28.3	12.8
56.0	4.7	2.9	9.7	5.6
32.0	2.9	0.80	2.4	1.77
17.8	1.45	0.33	0.60	0.50
10.0	0.57	0.13	0.15	0.15
5.60	0.16	0.03	--	0.02
3.20	0.03	0.01	--	0.002

Figure G-3a

Figure G-3b

Figure G-3c

Figure G-3d

Figure G-4a

Figure G-4b

014-05 VOLUME DIST.

CHN= .016 CHS= .059 CHV= .032
 F1= 0 DG1= 1 SG1= 2
 F2= 5.56E+09 DG2= 56.1 SG2= 3
 F3= 2.61E+11 DG3= 340 SG3= 2.45

014-05 SURFACE DIST.

CHN= .016 CHS= .059 CHV= .032
 F1= 0 DG1= 1 SG1= 2
 F2= 1.09E+09 DG2= 16.8 SG2= 3
 F3= 6.88E+09 DG3= 152 SG3= 2.45

014-05 NUMBER DIST.

CHN= .016 CHS= .059 CHV= .032
 F1= 0 DG1= 1 SG1= 2
 F2= 1.38E+07 DG2= 1.5 SG2= 3
 F3= 470000 DG3= 30.6 SG3= 2.45

Figure G-4c

Figure G-4d

014-11 VOLUME DIST.

CHN= .107 CHS= .02 CHU= .03
 F1= 0 DG1= 1 SG1= 2
 F2= 0 DG2= 1 SG2= 2
 F3= 1.94E+11 DG3= 375 SG3= 3.2

014-11 SURFACE DIST.

CHN= .107 CHS= .02 CHU= .03
 F1= 0 DG1= 1 SG1= 2
 F2= 0 DG2= 1 SG2= 2
 F3= 6.09E+09 DG3= 97 SG3= 3.2

014-11 NUMBER DIST.

CHN= .107 CHS= .02 CHU= .03
 F1= 0 DG1= 1 SG1= 2
 F2= 0 DG2= 1 SG2= 2
 F3= 3.08E+06 DG3= 6.48 SG3= 3.2

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

H - Relatively hot incandescent zone

D - Multiple incandescent zones

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
7/30	1330			36.0			36.0	36.0
7/30	1430	37.0			37.0			37.0
7/30	1601		41.0			41.0		41.0
7/30	1700			40.0			38.0	39.0
7/30	1800	40.0			38.0			39.0
7/30	1900		41.0			41.0		41.0
7/30	2000			39.0			40.0	39.5
7/30	2100	40.0			40.0			40.0
7/30	2200		39.0			41.0		40.0
7/30	2300			39.0			41.0	40.0
7/30	2330	36.0			36.0			36.0
7/31	30			36.5			38.5	37.5
7/31	130		42.0			42.0		42.0
7/31	230			38.0			38.0	
7/31	330	37.0			36.0			36.5
7/31	430		39.0			39.0		39.0
7/31	530			38.0			38.0	38.0
7/31	630	36.0			35.0			35.5
7/31	730		42.0			40.0		41.0
7/31	830			32.0			32.0	32.0
7/31	900	30.0			31.0			30.5
7/31	930		23.0			27.0		25.0
7/31	1030	29.0	28.0	26.0	36.0	33.0	26.0	29.6
7/31	1100	34.0	32.0	32.0	35.0	35.0	28.0	32.6
7/31	1130	35.0	38.0	35.0	36.0	38.0	32.0	35.6
7/31	1200	37.0	40.0	38.0	37.0	39.0	37.0	38.0
7/31	1230	38.0	37.0	40.0	38.0	40.0	39.0	38.6
7/31	1300	38.0			38.0			38.0
7/31	1330		41.0			41.0		41.0
7/31	1400			40.0			43.0	41.5
7/31	1430	36.0			36.0			36.0
7/31	1600		41.0			40.0		40.5
7/31	1700			39.0			40.0	39.5
7/31	1800	42.0			40.0			41.0
7/31	1900		41.0			41.0		41.0
7/31	2000			40.0			42.0	41.0
7/31	2100	39.0			38.0			38.5
7/31	2200		39.0			40.0		39.5
7/31	2330	34.0			36.0			35.0
8/ 1	30		39.0			39.0		39.0
8/ 1	130			36.0			41.0	38.5
8/ 1	230	33.0			34.0			33.5
8/ 1	330		39.0			38.0		38.5
8/ 1	430			35.0			39.0	37.0
8/ 1	530	35.0			35.0			35.0
8/ 1	630		34.0			33.0		33.5
8/ 1	730			34.0			37.0	35.5
8/ 1	830	36.0			36.0			36.0
8/ 1	930		36.0			35.0		35.5

Date	Time	#1	#2	#3	#4	#5	#6	Average
8/ 1	1030			36.0			35.0	35.5
8/ 1	1100	35.0			36.0			35.5
8/ 1	1130		37.0			36.0		36.5
8/ 1	1230			38.0			38.0	38.0
8/ 1	1330	36.0			37.0			36.5
8/ 1	1430		36.0			37.0		36.5
8/ 1	1600			38.0			41.0	39.5
8/ 1	1700	36.0			36.0			36.0
8/ 1	1800		39.0			38.0		38.5
8/ 1	1900			39.0			40.0	39.5
8/ 1	2000	36.0			36.0			36.0
8/ 1	2100			35.0			40.0	37.5
8/ 1	2200		36.0			34.0		35.0
8/ 1	2300			39.0	38.0			38.5
8/ 1	2330	35.0			33.0			34.0
8/ 2	30		38.0			38.0		38.0
8/ 2	130			36.0			35.0	35.5
8/ 2	230	36.0			36.0			36.0
8/ 2	330		39.0			39.0		39.0
8/ 2	430			36.0			39.0	37.5
8/ 2	530	35.5			35.5			35.5
8/ 2	630		39.5			39.5		39.5
8/ 2	730			40.0			39.0	39.5
8/ 2	830	34.0			38.0			36.0
8/ 2	930		36.0			36.0		36.0
8/ 2	1030			37.0			40.0	38.5
8/ 2	1130	37.0			36.0			36.5
8/ 2	1230		40.0			39.0		39.5
8/ 2	1330			40.0			42.0	41.0
8/ 2	1430	36.0			36.0			36.0
8/ 2	1600		42.0			43.0		42.5
8/ 2	1700			40.0			43.0	41.5
8/ 2	1800	38.0			44.0			41.0
8/ 2	1900		42.0			42.0		42.0
8/ 2	2000			41.0			44.0	42.5
8/ 2	2100	39.0			36.0			37.5
8/ 2	2200		40.0			41.0		40.5
8/ 2	2300			40.0			42.0	41.0
8/ 2	2330	34.0			34.0			34.0
8/ 3	30		42.0			41.0		41.5
8/ 3	130			39.0			42.0	40.5
8/ 3	230	35.0			36.0			35.5 BC STARTS
8/ 3	330		41.0			42.0		41.5
8/ 3	430			34.0			37.0	35.5
8/ 3	530	35.0			34.0			34.5
8/ 3	630		32.0			31.0		31.5
8/ 3	730			34.0			36.0	35.0
8/ 3	830	36.0			37.0			36.5
8/ 3	930		44.0			46.0		45.0
8/ 3	1030			40.0			41.0	40.5
8/ 3	1130	36.0			35.0			35.5

Date	Time	#1	#2	#3	#4	#5	#6	Average
8/ 3	1230		40.0			41.0		40.5
8/ 3	1330			40.0			41.0	40.5
8/ 3	1430	38.0			37.0			37.5
8/ 3	1600		42.0			39.0		40.5
8/ 3	1700			40.0			42.0	41.0
8/ 3	1800	40.0			39.0			39.5
8/ 3	1900		40.0			40.0		40.0
8/ 3	2000			38.0			40.0	39.0
8/ 3	2100	40.0			39.0			39.5
8/ 3	2200		40.0			41.0		40.5
8/ 3	2300			39.0			41.0	40.0
8/ 3	2330	38.0			33.0			35.5
8/ 4	30		38.0			39.0		38.5
8/ 4	130			36.0			31.0	33.5
8/ 4	230	38.0			31.0			34.5
8/ 4	330		38.0			40.0		39.0
8/ 4	430			39.0			40.0	39.5
8/ 4	530	36.0			35.0			35.5
8/ 4	630		41.0			40.0		40.5
8/ 4	730			37.0			42.0	39.5
8/ 4	830	37.0			38.0			37.5
8/ 4	930		40.0			40.0		40.0
8/ 4	1030			40.0			40.0	40.0
8/ 4	1130	38.0			37.0			37.5
8/ 4	1230		41.0			41.0		41.0
8/ 4	1330			40.0			43.0	41.5
8/ 4	1430	38.0			38.0			38.0
8/ 4	1600		41.0			41.0		41.0
8/ 4	1700			40.0			39.0	39.5
8/ 4	1800	39.0			40.0			39.5
8/ 4	1900		40.0			42.0		41.0
8/ 4	2000			42.0			45.0	43.5
8/ 4	2100	39.0			38.0			38.5
8/ 4	2200		42.0			40.0		41.0
8/ 4	2300			38.0			39.0	38.5
8/ 4	2330	35.0			35.0			35.0
8/ 5	30		38.0			40.0		39.0
8/ 5	130			37.0			39.0	38.0
8/ 5	230	35.0			34.0			34.5
8/ 5	330		39.0			40.0		39.5
8/ 5	430			34.0			34.0	34.0
8/ 5	530	35.0			35.0			35.0
8/ 5	630		39.0			39.0		39.0
8/ 5	730			40.0			39.0	39.5
8/ 5	830	37.0			36.0			36.5
8/ 5	930		39.0			40.0		39.5
8/ 5	1030			39.0			37.0	38.0
8/ 5	1130	36.0			37.0			36.5
8/ 5	1230		39.0			39.0		39.0
8/ 5	1330			38.0			39.0	38.5
8/ 5	1430	36.0			36.0			36.0

Date	Time	#1	#2	#3	#4	#5	#6	Average
8/ 5	1530		36.0			37.0		36.5
8/ 5	1630			38.0			38.0	38.0
8/ 5	1730	38.0			37.0			37.5
8/ 5	1830		39.0			40.0		39.5
8/ 5	1930			38.0			39.0	38.5
8/ 5	2030	38.0			39.0			38.5
8/ 5	2130		38.0			39.0		38.5
8/ 5	2230			40.5			42.0	41.3
8/ 5	2330	35.0			33.0			34.0
8/ 6	30		33.5			33.5		33.5
8/ 6	130			37.0			40.0	38.5
8/ 6	230	34.0			34.0			34.0
8/ 6	330		40.0			39.0		39.5
8/ 6	430			37.0			40.0	38.5
8/ 6	530	34.0			33.0			33.5
8/ 6	630		34.0			34.0		34.0
8/ 6	730			40.0			40.0	40.0
8/ 6	830	37.0			36.0			36.5
8/ 6	930		39.0			39.0		39.0
8/ 6	1030			39.0			39.0	39.0
8/ 6	1130	39.0			40.0			39.5
8/ 6	1230		40.0			39.0		39.5
8/ 6	1330			39.0			39.0	39.0
8/ 6	1430	38.0			37.0			37.5
8/ 6	1530	SHUTDOWN DUE TO POWER OUTAGE!						
8/ 6	1630		39.0			37.0		38.0
8/ 6	1730			38.0			40.0	39.0
8/ 6	1830	38.0			37.0			37.5
8/ 6	1930		38.0			37.0		37.5
8/ 6	2030			38.0			39.0	38.5
8/ 6	2130	38.0			37.0			37.5
8/ 6	2230		39.0			40.0		39.5
8/ 6	2330	35.0			35.0			35.0
8/ 7	30		39.0			41.0		40.0
8/ 7	130			35.0			37.0	36.0
8/ 7	230	33.0			34.0			33.5
8/ 7	330		40.0			38.0		39.0
8/ 7	430			34.0			36.0	35.0
8/ 7	530	34.0			35.0			34.5
8/ 7	630		39.0			38.0		38.5
8/ 7	730			40.0			38.0	39.0
8/ 7	830	35.0			36.0			35.5
8/ 7	930		40.0			39.0		39.5
8/ 7	830	35.0			36.0			35.5
8/ 7	930		40.0			39.0		39.5
8/ 7	1030			41.0			40.0	40.5
8/ 7	1130	36.0			38.0			37.0
8/ 7	1230		39.0			40.0		39.5
8/ 7	1330			39.0			40.0	39.5
8/ 7	1430	37.0			36.0			36.5
8/ 7	1530		38.0			39.0		38.5

Date	Time	#1	#2	#3	#4	#5	#6	Average
8/ 7	1630			40.0			41.0	40.5
8/ 7	1730	36.0			37.0			36.5
8/ 7	1830		38.0			39.0		38.5
8/ 7	1930			38.0			42.0	40.0
8/ 7	2030	36.0			36.0			36.0
8/ 7	2130		39.0			39.0		39.0
8/ 7	2230			39.0			41.0	40.0
8/ 7	2330	35.0			33.0			34.0
8/ 8	30		39.0			38.0		38.5
8/ 8	130			36.0			38.0	37.0
8/ 8	230	34.0			35.0			34.5
8/ 8	330		39.0			39.0		39.0
8/ 8	430			39.0			39.0	39.0
8/ 8	530	34.0			35.0			34.5
8/ 8	630		40.0			38.0		39.0
8/ 8	730			40.0			41.0	40.5
8/ 8	830	41.0			41.0			41.0
8/ 8	930		38.0			38.0		38.0
8/ 8	1030			38.0			40.0	39.0
8/ 8	1130	35.0			35.0			35.0
8/ 8	1230		38.0			39.0		38.5
8/ 8	1330			39.0			39.0	39.0
8/ 8	1430	37.0			36.0			36.5
8/ 8	1530		39.0			40.0		39.5
8/ 8	1630			39.0			41.0	40.0
8/ 8	1730	39.0			37.0			38.0
8/ 8	1830		40.0			40.0		40.0
8/ 8	1930			40.0			41.0	40.5
8/ 8	2030	39.0			39.0			39.0
8/ 8	2130		41.0			42.0		41.5
8/ 8	2230			39.0			42.0	40.5
8/ 8	2330	35.0			35.0			35.0
8/ 9	30		42.0			43.0		42.5
8/ 9	130			38.0			40.0	39.0
8/ 9	230	35.0			36.0			35.5
8/ 9	330		45.0			42.0		43.5
8/ 9	430			39.0			40.0	39.5
8/ 9	530	35.0			35.0			35.0
8/ 9	630		39.0			38.0		38.5
8/ 9	730			40.0			41.0	40.5
8/ 9	830	36.0			37.0			36.5
8/ 9	930		38.0			40.0		39.0
8/ 9	1030			39.0			41.0	40.0
8/ 9	1130	38.0			22.0			30.0
8/ 9	1230		38.0			34.0		36.0
8/ 9	1340			38.0			42.0	40.0
8/ 9	1430	36.0			36.0			36.0
8/ 9	1530		37.0			39.0		38.0
8/ 9	1630			38.0			38.0	38.0
8/ 9	1730	39.0			38.0			38.5
8/ 9	1830		36.0			39.0		37.5

Date	Time	#1	#2	#3	#4	#5	#6	Average
8/ 9	1930			39.0			40.0	39.5
8/ 9	2030	38.0			39.0			38.5
8/ 9	2130		37.0			39.0		38.0
8/ 9	2330	35.0			34.0			34.5
8/10	30		38.0			37.0		37.5
8/10	130			37.0			40.0	38.5
8/10	230	35.0			35.0			35.0
8/10	330		38.0			38.0		38.0
8/10	430			38.0			38.0	38.0
8/10	530	34.0			35.0			34.5
8/10	630		39.0			39.0		39.0
8/10	730			39.0			40.0	39.5
8/10	830	37.0			36.0			36.5
8/10	930		40.0			36.0		38.0
8/10	1030			37.0			36.0	36.5
8/10	1130	38.0			37.0			37.5
8/10	1230		42.0			39.0		40.5
8/10	1330			38.0			39.0	38.5
8/10	1430	38.0			38.0			38.0
8/10	1530		39.0			39.0		39.0
8/10	1630			39.0			40.0	39.5
8/10	1730	38.0			35.0			36.5
8/10	1830		39.0			40.0		39.5
8/10	1930			39.0			41.0	40.0
8/10	2030	39.0			38.0			38.5
8/10	2130		40.0			40.0		40.0
8/10	2230			39.0			40.0	39.5
8/10	2330	34.0			36.0			35.0
8/11	30		39.0			39.0		39.0
8/11	130			36.0			38.0	37.0
8/11	230	35.0			35.0			35.0
8/11	330		38.0			38.0		38.0
8/11	430			36.0			38.0	37.0
8/11	530	35.0			35.0			35.0
8/11	630		39.0			40.0		39.5
8/11	735			38.0			40.0	39.0
8/11	830	37.0			36.0			36.5
8/11	930		38.0			39.0		38.5
8/11	1040			34.0			40.0	37.0
8/11	1130	36.0			36.0			36.0

TABLE H-2
FIRE TEST DATA

Date	Time	Insertion Time (min)	#1	#2	#3	#4	#5	#6	#7	Average
730	1200	5-6	0H	12H	8H	2D	5C	7D	9D	6.1
730	1400	4-5	0H	8H	9H	3D	0H	1D	8D	4.1
730	1600	4	3H	8	7H	1H	0	5	8	4.6
730	1800	3	0	4	8	8	6	0	0	3.7
730	2000	3	0	9	9	2	6	0	0	3.7
730	2200	3	3	4	5	4	6	0	0	3.1
731	0000	4	7	9	4H	1	4	5	0	4.3
731	0200	3.5	10	11	4	0	5	2	0	4.6
731	0400	3.5	10	11	2	0	7	6	0	5.1
731	0600	3.5	9	15	10	11	4	5	0	7.7
731	0800	3-4	10	11	11	7	6	9	10	9.1
731	1000	3-4	10	9	8	3	3	2	11	6.6
731	1200	3-4	8	5	6	62	1	8	0	4.3
731	1400	3-4	3	13	3	6	3	3	4	5.0
731	1600	2.5	3	9	3	0	8	9	0	4.6
731	1800	2.5	3	2	9	13	2	5	0	4.9
731	2000	2	10	11	6	0	10	18	0	7.9
731	2200	2	14	0	12	13	19	16	6	11.4
801	0000	3-4	15	19	23D	16	15D	16	5D	15.6
801	0200	3-4	12D	15	6	10	18	10D	9	11.4
801	0400	3-4	3	7	18D	13	12	23D	6	11.7
801	0600	3-4	8	3	15	10	10	16	7	9.9
801	0800	3-4	16H	4H	11H	9H	19H	22H	11H	13.14
801	1000	2-3	11H	16H	16H	7H	12H	9H	17H	12.6
801	1200	2-3	9	13	14	4	16	21	16	13.3
801	1400	2-3	16	21	12	15	17	14	19	16.3
801	1600	2	7	12	12	15	15	6	5	10.3
801	1800	2	11	11	9	0	9	10	0	7.1
801	2000	2	7	10	5	6	8	9	8	7.6
801	2200	2	9	10	25	15	16	7	6	12.6
802	0000	3	8	15	17	10	11	6D	3	10.0
802	0200	3	10	11	15	9D	9D	17	0D	10.1
802	0400	3	14	14	16	8	4D	12	0D	9.7
802	0600	3	15	20	9	0D	0D	18	9	10.1
802	0800	3	18	16	12	14	8	12	17	13.9
802	1000	3	18	17	17	12	22	20	16	17.4
802	1200	3	9	15	16	17	17	14	13	14.4
802	1400	3	12	18	13	7	17	10	18	13.6
802	1600	2	4	4	5	2	12	4	5	5.4
802	1800	2	4	5	11	3	3	7	7	5.7
802	2000	2	7	13	2	10	15	5	7	8.4
802	2200	1.5	11	13	17	11	3	24	0	11.3
803	0000	3	21	22	4	4	17	13	3	12
803	0200	2-3	15	20	3	5	0	9	0	7.4
803	0400	2-3	12	1D	0	1D	10	13	8	6.4
803	0600	2-3	20	2	0	1	20	14	7	9.1
803	0800	2-3	12	15	2	5	7	12	13	9.4

Date	Time	Insertion Time (min)	#1	#2	#3	#4	#5	#6	#7	Average
803	1000	2-3	13D	20	18	9	11	25	19D	16.4
803	1200	2-3	12	4	7	2	4	34	12	10.7
803	1400	2-3	31	12	13	36	26	32	3	21.9
803	1600	2	6	8	4	17	34	7	3	11.3
803	1800	2	0	0C	3	4	21	7	9	6.3
803	2000	2	23	3D	10	16	4D	0	15	10.1
803	2200	2	18	23	8	21	12	13	0	13.6
804	0000	2-3	24D	19D	4	7	7	7D	2	10
804	0200	2-3	24	14	0W	0	0D	56C	9	14.7
804	0400	3-4	1D	3	0D	23C	11	0D	0	6.9
804	0600	3-4	17	0D	18	11D	0D	11	21	11.1
804	0800	3-4	24	15	17	12D	46	18D	22	22
804	1000	3-4	17	12	19	25	17	10	19	17
804	1200	3-4	13	12	7	9C	8	12	26	12.4
804	1400	3-4	1D	1	6	12	24	17	31	13.1
804	1600	2	6	17	0	24	35	14	16	16
804	1800	2	0	31	11	12	29	11	20	16.3
804	2000	2	20	29	10	17	20	27	17	20
804	2200	2	0	18	0C	14	23	16	14	17.1
805	0000	3	12	0	8	0	5	0	13	5.4
805	0200	3	17	0D	9	4	6D	31C	0	9.6
805	0400	3-4	7	0D	0D	5C	12D	15	6D	6.4
805	0600	3	23	2	0	7	29	6D	3H	10
805	0800	3	27H	22H	38H	15H	9H	21D	27H	22.7
805	1000	3	35H	19H	10H	9H	11H	36H	13D	19
805	1200	3	28	7	10	21	38	15	10	18.4
805	1400	3	4H	0D	3H	13H	19H	14H	14H	9.6
805	1600	3	1C	10D	17	14	1D	10	16	9.9
805	1800	3	0	17	12	15	35	13	35	18.1
805	2000	3	12	14	1	20	27	25D	17	16.6
805	2200	3	2	12	11	21	11	20	15	13.1
806	0000	2	23	8	27	9	3D	0D	12	11.7
806	0200	2-3	9	7	6	3	5	9	2	5.9
806	0400	2	0	6C	0	12	12D	21	0H	7.3
806	0600	2	12	11	16	38	34	25	27	23.3
806	0800	2-3	12	42	40	8	12	31	4	21.3
806	1000	2-3	32	10D	10	12	13	14	5	13.7
806	1200	2-3	16	7	11	11	22	22	0	12.7
806	1400	2-3	15	15	5	8	14	5D	27	12.7
806	1600	2-3	16	4	26	10	5	18	18D	13.9
806	1800	2-3	4	1	35	0D	7	4	37	12.6
806	2000	2-3	10D	20	11	9	6	7	9	10.3
806	2200	2-3	38	0	3	10	33	18	11	16.1
807	0000	2-3	12	5D	4D	30	22	26	0	14.1
807	0200	2-3	11D	0	27	7D	8	8D	25	12.3
807	0400	2-3	22	10D	7	8	0	11	19	11
807	0600	2-3	30	22D	0	18	1	21	13	15
807	0800	2-3	11	13	13	34	39	13	18D	20.1
807	1000	2-3	5	12	12	32	15	7	18	14.4
807	1200	3-4	8D	24H	18H	21H	3D	0H	5D	11.3
807	1400	2-3	25H	11H	2H	30H	9H	7D	22H	15.1

Date	Time	Insertion Time (min)	#1	#2	#3	#4	#5	#6	#7	Average
807	1600	2-3	36	2	1	8	11	22	2	11.7
807	1800	2-3	36	25	18D	36	37	19	17	26.9
807	2000	2-3	16	21	0	9D	25	24	17	16.0
807	2200	2-3	0	13	28	14	9	9D	19	13.1
808	0000	2-3	0	22	3	11	20C	0	7	9.0
808	0200	2-3	10	8	10	2	6	11	0	6.7
808	0400	2-3	0	16D	6	0	18	28	0	9.7
808	0600	2-3	19	1	0	16	0	0D	16	7.4
808	0600	2-3	10H	4D	8D	7H	36H	6D	0H	10.1
808	1000	2-3	6	3	6	10	36	45	36	20.3
808	1200	2-3	9D	8	7D	27	27	15H	20H	16.1
808	1400	2-3	28H	18	17	0H	6	28	16	16.1
808	1600	2-3	30	10	9	0	18	13	7	12.4
808	1800	2-3	1	5C	5	0	36	36D	6	12.7
808	2000	2-3	23	0	6	20	27	16D	0	13.1
808	2200	2-3	10	7	0	24	9	25D	7	11.7
809	0000	2-3	12	10	22	9	11	0	10	10.6
809	0200	2-3	6	15	0D	12	28	3D	31	13.6
809	0400	2-3	0	13D	13	11	13	7	12	9.9
809	0600	2-3	10	11	8	12	0	12	7	8.6
809	0800	2-3	12	10	5	0	10	30	14	11.6
809	1000	2-3	20H	11H	7H	20D	34H	18H	10H	17.1
809	1200	2-3	17H	16H	10D	20H	26H	12H	13H	16.3
809	1400	2-3	7H	15D	34H	13H	14H	6H	17H	15.1
809	1600	2-3	17	27	9D	9	23	38D	9	18.9
809	1800	2-3	21	7	1	1	12	30	7	11.3
809	2000	2-3	13	10	1	34	32	14	12	16.6
809	2200	2-3	12	16	15	10	6	9	19	12.4
810	0000	2-3	6	29	10	14	0	6	8	10.4
810	0200	2-3	30	14	5	21	9	0	5	12
810	0400	2-3	6	13	0D	10	22	16	0	9.6
810	0600	2-3	13	12	19	3	11	10	0	9.7
810	0800	2-3	10	15	17	15	16	9	14	13.7
810	1000	2-3	9	22	15	12	14	14	36	17.4
810	1200	2-3	24	9	9	14	12	36	13	16.7
810	1400	2-3	13	16	9	22	29	25	7	17.3
810	1600	2-3	9	12	8	8	9	18	10	10.6
810	1800	2-3	18	32D	31	16	10	20	27	18.1
810	2000	2-3	11	34	29	12	28	21	19	22
810	2200	2-3	27	14	13	16	23	32	16	20.1
811	0000	2-3	9	17	20	36	17	37	24	22.9
811	0200	2-3	10	29	20	16	19	14	13	17.3
811	0400	2-3	16	9	24	6	11	26	0	13.1
811	0600	2-3	9	31	16	8	11	35	3	16.1
811	0800	2-3	9H	23H	23H	31H	5H	10H	16D	16.7
811	1000	2-3	17H	18H	22H	18H	5D	22H	36H	19.7
811	1200	2-3	17H	13H	7H	20H	25H	17H	24	17.6
811	1400	2-3	3	4D	3D	15	12	0	14D	7.3

END OF BOM/FGT 014 BLIND CANYON

TABLE H-3

OPERATOR LOG II

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.
730	1130	2	12.5	29741	0	50	39	290	0	10
730	1230	2	15.0	29749	800	50	38.5	290	2	8
730	1330	2	15.0	29758	900	50	38	290	2	8
730	1430	2	15	29767	900	50	38	290	2	6
730	1530	2	18	29776	1000	54	38	290	5	17
730	1630	2	18	29784	800	59	39	290	4	11
730	1730	2	18	29801	1700	56	38	290	3	11
730	1830	2	18	29807	600	50	38	290	3	11
730	1930	2	18	29817	1000	50	38	290	3	13
730	2030	2	18	29834	1700	50	38	290	3	12
730	2130	2	18	29843	900	50	38	290	3	10
730	2230	2	18	29846	300	50	39	290	3.5	11
730	2330	1.5	18	29863	1700	51	37	280	2.5	12
731	0030	3	18	29870	700	53	38.5	280	2.7	9
731	0130	3	18	29881	1100	51	37.5	280	2.7	15
731	0230	3	18	29891	1000	50	36.8	280	2.2	10
731	0330	3	18	29900	900	51	37	280	2.5	10
731	0430	3	18	29911	1100	52	36.5	280	2.5	9
731	0530	3	18	29921	1000	51	36.5	280	2.5	14
731	0630	3	23	29932	1100	80	40.2	285	2	0
731	0730	3	20	29942	1000	85	40	280	2.5	0
731	0830	3	20	29954	1200	90	41	280	5	12
731	0930	3	20	29965	1100	90	20	280	2.5	14
731	1030	3	20	29977	1200	85	40.0	280	5	10
731	1130	3	20	29987	1000	85	40	280	5	12
731	1230	3	15	29998	1100	85	40	280	2.5	16
731	1330	3	15	30006	800	85	40	280	3.0	18
731	1430	3	15	30014	800	85	40	280	3.5	18
731	1530	3	15	30024	1000	85	40	290	3.5	15
731	1630	3	15	30030	600	80	40	290	3.5	18
731	1730	3	15	30039	900	80	40	290	3	18
731	1830	3	20	30048	900	80	40	290	2.5	25
731	1930	3	20	30060	1200	80	40	290	3.5	28
731	2030	3	20	30071	1100	72	39	290	3.5	28
731	2130	3	20	30081	1000	81	40	290	3.5	28
731	2230	3	20	30095	1400	79	40	290	3.5	29
731	2330	3	20	30106	1100	85	40	285	3.5	24
801	0030	3	20	30119	1300	86	40.2	285	5	25
801	0130	3	17	30128	900	88	40	288	3	18
801	0230	3	17	30138	1000	84	39.5	285	3.5	16
801	0330	3	17	30148	1000	79	40	288	3	18
801	0430	3	17	30158	1000	82	39.8	285	2.2	18
801	0530	3	17	30166	800	74	39.8	285	2.5	17
801	0630	3	17	30176	1000	74	39.8	288	20	18
801	0730	2.5	17	30186	1000	80	40	285	2.5	18
801	0830	2.5	17	30196	1000	90	40	285	3	18

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
801	0930	2.5	17	30204	800	90	40	285	3	20
801	1030	2.5	17	30215	1100	90	40	285	5	20
801	1130	2.5	17	30226	1100	90	40	285	2.5	20
801	1230	3	20	30237	1100	90	40	285	2.5	20
801	1330	3	20	30246	900	85	40	285	2.5	20
801	1430	3	20	30257	1100	85	40	285	2.5	20
801	1530	3	20	30266	900	80	40	290	2.5	22
801	1630	3	20	30278	1200	83	39	290	2.5	20
801	1730	3	20	30291	1300	76	39	290	2.5	20
801	1830	3	20	30301	1000	72	39	295	2.5	26
801	1930	3	20	30312	1100	81	39	295	2.3	24
801	2030	3	20	30325	1300	82	39	295	2	21
801	2130	3	20	30336	1100	74	39	295	2	25
801	2230	3	20	30348	1200	79	39	290	2	23
801	2330	3	19.5	30359	1100	88	40	289	4	24
802	0030	3	19.5	30370	1100	89	40	290	3.5	24
802	0130	3	19.5	30381	1100	77	40	293	3	25
802	0230	3	20	30394	1300	88	40	290	4	22
802	0330	3	20	30404	1000	74	40	292	2.2	25
802	0430	3	20	30415	1100	81	40	294	3	23
802	0530	3	20	30427	1200	84	40	285	3	24
802	0630	3	20	30436	900	74	40	292	2.5	26
802	0730	3	15	30452	1600	75	40	285	4	25
802	0830	3	15	30460	800	90	40	285	4	22
802	0930	3	15	30467	700	90	40	285	2.5	20
802	1030	3	15	30475	800	90	39.5	285	2	20
802	1130	3	15	30484	900	90	40	285	5	20
802	1230	3	15	30494	1000	80	39.5	285	2.5	20
802	1330	3	20	30504	1000	90	40	285	2.5	20
802	1430	3	20	30517	1300	90	40	285	3	12
802	1530	3	22	30527	1000	78	40	290	1.5	10
802	1630	3	22	30539	1200	83	39	285	2.5	17
802	1730	3	22	30552	1300	90	39	285	2.5	19
802	1830	3	22	30566	1400	86	39	290	2.5	22
802	1930	3	22	30578	1200	86	40	285	2.5	19
802	2030	2.5	22	30590	1200	83	39	290	2.5	20
802	2130	2.5	22	30604	1400	85	39	295	2.0	21
802	2230	2.5	22	30616	1200	89	40	290	3	20
802	2330	2.3	22.2	30634	1800	82	40	290	2.5	21
803	0030	2.2	22.2	30646	1200	87	40	290	3	20
803	0130	2.2	22.5	30658	1200	84	40	288	2	23
803	0230	2.2	22	30672	1400	88	40	290	3.5	22
803	0330	2.2	22	30683	1100	85	40	285	3	18
803	0430	2.2	22.2	30696	1300	84	40	285	4	23
803	0530	2.3	22.4	30709	1300	88	40	291	2	20
803	0630	2.2	22	30723	1400	89	40	291	2.2	25
803	0730	2.5	22	30734	1100	80	39.5	285	5	28
803	0830	2.5	15	30746	1200	85	40	285	4	28
803	0930	2.5	12	30754	800	90	40	285	4	30
803	1030	2.5	12	30760	600	85	40	285	4.0	24

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.
803	1130	2.5	12	30767	700	85	40	285	3	22
803	1230	2.5	12	30774	700	75	39.5	285	3	26
803	1330	2.5	12	30782	800	75	39.5	285	3	25
803	1430	2.5	12	30789	700	80	40	285	4	25
803	1530	2.5	12	30793	400	88	40	290	3	21
803	1630	2.5	12	30799	600	73	39	290	2	24
803	1730	2.5	12	30806	700	90	40	290	2	30
803	1830	2.5	12	30813	700	90	39	290	2.5	22
803	1930	2.5	12	30819	600	78	40	290	2.5	26
803	2030	2.7	12	30827	800	78	39	290	2.5	25
803	2130	2.7	12	30833	600	70	39	290	2.5	29
803	2230	2.7	12	30839	600	75	39	290	2.5	28
803	2330	2.5	12	30848	900	76	40	295	3.5	27
804	0030	2.5	12	30854	600	86	40	292	2.5	22
804	0130	3.0	12	30861	700	83	40	288	3	24
804	0230	3.0	12	30867	600	83	40	290	3	25
804	0330	3.0	12	30873	600	81	39.5	292	2.8	24
804	0430	3.0	12	30881	800	82	39.7	287	3	24
804	0530	3.0	12	30888	700	84	39.8	289	2.6	22
804	0630	3.0	12	30893	500	84	39.0	286	2.5	25
804	0730	3.0	12	30902	900	85	39.5	285	2.5	22
804	0830	3.0	12	30908	600	85	39.5	285	3	28
804	0930	3.0	12	30915	700	85	39.5	290	3	30
804	1030	3.0	12	30921	600	80	39.5	290	3	31
804	1130	3.0	12	30928	700	85	39.5	290	3	30
804	1230	3.0	12	30934	600	85	39.5	295	3	30
804	1330	3.0	12	30941	700	80	39.5	295	3	24
804	1430	3.0	12	30948	700	85	39.5	295	3	28
804	1530	3.0	12	30953	500	82	40	295	3	25
804	1630	3.0	12	30960	700	83	39	290	2.5	28
804	1730	3.0	12	30967	700	83	39	290	2.5	20
804	1830	3.0	12	30974	700	83	39	290	2.5	24
804	1930	3.0	12	30981	700	82	39	290	2.5	26
804	2030	3.0	12	30988	700	82	39	290	2.5	24
804	2130	3.0	12	30995	700	82	39	290	2.5	23
804	2230	2.0	12	31002	700	80	39	290	2.5	27
804	2330	3.0	12	31010	800	82	40	296	2.5	25
805	0030	3.0	12	31016	600	82	40	290	2.5	22
805	0130	3.0	12	31023	700	82	39.5	290	2.5	22
805	0230	3.0	12	31029	600	83	40	290	3.5	24
805	0330	3.0	12	31036	700	83	39.5	288	3.5	25
805	0430	3.0	12	31044	800	82	39.7	290	3.0	26
805	0530	3.0	12	31050	600	82	40	290	2.5	27
805	0630	3.0	12	31056	600	80	40	293	3	28
805	0730	3.0	12	31064	800	83	40	293	3	28
805	0830	3.0	12	31070	600	84	39.5	290	4.5	30
805	0930	3.0	12	31078	800	85	39.5	285	4	26
805	1030	3.0	12	31084	600	85	40	285	3	16
805	1130	3.0	12	31091	700	85	39.5	285	2	14
805	1230	3.0	15	31098	700	80	39.5	285	2.5	24

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
805	1330	3.0	15	31106	800	85	39.5	285	2.5	24
805	1430	3.0	15	31115	900	85	39.5	285	4	28
805	1530	3.0	15	31124	900	80	39.5	285	4	31
805	1630	3.0	15	31134	1000	82	40	290	4	30
805	1730	3.0	15	31141	700	82	40	290	4	28
805	1830	3.0	15	31151	1000	82	40	290	4	28
805	1930	3.0	15	31158	700	81	40	290	4	27
805	2030	3.0	15	31167	900	81	40	290	3	27
805	2130	3.0	15	31174	700	82	40	290	3	24
805	2230	3.0	15	31182	800	82	40	290	3	26
805	2330	3.0	15	31191	900	80	40	290	5	29
806	0030	3.0	15	31200	900	82	39.3	290	4	30
806	0130	3.0	12	31207	700	81	39.5	288	2.5	26
806	0230	3.0	12	31214	700	80	40	288	4	27
806	0330	3.0	12	31221	700	82	39.5	290	3	26
806	0430	3.0	12	31228	700	82	39.2	288	3	30
806	0530	3.0	12	31236	600	81	40	290	3	28
806	0630	3.0	12	31243	700	82	39.5	299	3	28
806	0730	3.0	13	31250	700	85	39.5	285	4	28
806	0830	3.0	13	31257	700	80	39.5	285	3.5	26
806	1030	3.0	13	31270	1300	90	40	290	2	16
806	1130	3.0	13	31278	800	85	40	290	2	16
806	1230	3.0	13	31285	700	85	40	290	3	24
806	1330	3.0	13	31292	700	85	40	285	3	26
806	1430	3.0	13	31298	600	80	39	285	4	38
806	1530				SHUT DOWN					
806	1630	3.0	13	31315	1700	85	40	285	4	30
806	1730	3.0	13	31321	600	85	40	285	4	30
806	1830	3.0	13	31328	700	85	40	285	4	28
806	1930	3.0	13	31335	700	85	40	285	4	24
806	2030	3.0	13	31342	700	85	40	285	4	26
806	2130	3.0	13	31350	800	85	40	285	4	26
806	2230	3.0	13	31357	700	85	40	285	4	24
806	2330	2.5	12.5	31364	700	82	40	290	3.5	26
807	0030	2.5	12.5	31370	600	81	39.5	291	3	29
807	0130	3.0	12	31378	800	83	39.5	288	4	29
807	0230	3.0	12	31385	700	82	40	290	5	29
807	0330	3.0	12	31392	700	82	39.5	290	5	32
807	0430	3.0	12	31399	700	82	39.3	289	4	31
807	0530	3.0	12	31405	600	82	39.8	287	3.5	26
807	0630	3.0	12	31412	700	82	39.5	290	4.5	26
807	0730	3.0	12	31420	800	80	40	285	3.5	26
807	0830	3.0	12	31425	500	85	40	290	2.5	22
807	0930	3.0	10	31432	700	85	40	290	2.5	20
807	1030	3.0	10	31438	600	80	39.5	285	2.5	20
807	1130	3.0	10	31443	500	80	39.5	285	2.5	18
807	1230	3.0	10	31448	500	85	39.5	285	2.5	18
807	1330	3.0	10	31453	500	85	39.5	285	2.5	26
807	1445	3.0	12	31460	700	80	39.5	285	2	26
807	1530	3.0	12	31465	500	85	39.5	285	3	26

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.
807	1630	3.0	12	31473	800	85	39.5	285	3	26
807	1730	3.0	12	31480	700	85	39.5	285	3	26
807	1830	3.0	12	31486	600	85	40	285	3	26
807	1930	3.0	12	31494	800	85	40	285	3	28
807	2030	3.0	12	31500	600	85	40	285	3	24
807	2130	3.0	12	31507	700	85	40	285	3	28
807	2230	3.0	12	31514	700	85	40	285	3	30
807	2330	3.0	12	31520	600	82	39.5	290	4.5	29
808	0045	3.0	12	31529	900	82	39	292	5.5	31
808	0130	3.0	12	31534	500	81	39.5	291	5.2	32
808	0230	3.0	12	31541	700	82	39.5	290	5	30
808	0330	3.0	12	31548	700	82	39.5	290	4.6	29
808	0430	3.0	12	31555	700	82	39.5	290	4.6	29
808	0530	3.0	12	31561	600	81	39.5	285	5	31
808	0630	3.0	12	31567	600	83	39.5	283	4	27
808	0730	3.0	12	31575	800	85	39.5	285	3.5	30
808	0830	3.0	12	31582	700	80	39.5	285	4	28
808	0930	3.0	12	31588	600	85	40	285	4	28
808	1030	3.0	12	31594	600	85	39.5	285	3.5	26
808	1130	3.0	12	31601	700	80	39.5	285	4.5	30
808	1230	3.0	12	31609	800	85	39.5	285	6	32
808	1330	3.0	12	31615	600	85	39.5	285	6	32
808	1430	3.0	12	31621	600	82	39.5	285	7	32
808	1530	3.0	12	31630	900	82	39.5	285	5	28
808	1630	3.0	12	31636	600	82	39.5	285	5	28
808	1730	3.0	12	31643	700	82	39.5	285	5	28
808	1830	3.0	12	31651	800	82	39.5	285	5	28
808	1930	3.0	12	31656	500	82	39.5	285	5	28
808	2030	3.0	12	31663	700	82	39.5	285	5	26
808	2130	3.0	12	31670	700	82	39.5	285	5	30
808	2230	3.0	12	31677	700	82	39.5	285	5	24
808	2330	3.0	12	31684	700	81	39.5	289	3	24
809	0030	3.0	12	31691	700	82	39.2	287	2.5	24
809	0130	3.0	12	31698	700	81	39.5	292	3.7	26
809	0230	3.0	12	31704	600	83	29.6	285	3	26
809	0330	3.0	12	31710	600	81	39.2	290	2	20
809	0430	3.0	12	31718	800	83	39.8	285	2.5	20
809	0530	3.0	12	31724	600	83	39.8	287	2.5	22
809	0630	3.0	12	31731	700	82	39.5	285	2	19
809	0730	3.0	12	31738	700	82	39.5	285	3	22
809	0830	3.0	12	31744	600	82	40	285	3	22
809	0930	3.0	12	31751	700	85	40	285	2.5	18
809	1030	3.0	12	31758	700	85	39.5	285	3	18
809	1130	3.0	12	31764	600	82	39.5	285	3	24
809	1230	3.0	12	31771	700	80	39.8	285	4	25
809	1330	3.0	12	31777	600	80	39.8	285	3	28
809	1430	3.0	12	31784	700	82	39.8	285	2.5	19
809	1530	3.0	12	31790	600	82	39.8	285	2.5	19
809	1630	3.0	12	31797	700	90	39.8	285	2.5	28
809	1730	3.0	12	31803	600	80	39.8	285	2.5	28

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
809	1830	3.0	12	31810	700	80	39.8	285	2.5	20
809	1930	3.0	12	31817	700	82	39.9	285	2.5	28
809	2030	3.0	12	31824	700	82	39.8	285	2.5	24
809	2130	3.0	12	31831	700	82	39.9	285	2.5	24
809	2230	3.0	12	31837	600	82	40	285	2.5	29
809	2330	3.0	12	31844	700	82	39.7	287	5	31
810	0030	3.0	12	31852	800	81	39.5	290	5.5	30
810	0130	3.0	12	31858	600	82	39.2	287	4.5	28
810	0230	3.0	12	31865	700	81	39.5	289	4	26
810	0330	3.0	12	31872	700	82	39.8	285	2	22
810	0430	3.0	12	31879	700	80	39.4	290	3.5	27
810	0530	3.0	12	31886	700	82	39.5	285	3	26
810	0630	3.0	12	31892	600	80	39.2	285	3	22
810	0730	3.0	12	31900	800	82	39.8	285	2	18
810	0830	3.0	12	31906	600	84	39.6	285	2	16
810	0930	3.0	12	31912	600	80	39.5	285	2	22
810	1030	3.0	12	31920	800	80	39.6	285	3	24
810	1130	3.0	12	31925	500	80	39.5	285	3.5	30
810	1230	3.0	12	31932	700	82	39.5	285	3.5	26
810	1330	3.0	12	31938	600	80	39.8	285	4	22
810	1430	3.0	12	31945	700	80	39.8	285	5	30
810	1530	3.0	12	31952	700	80	39.9	285	3	26
810	1630	3.0	12	31959	700	80	39.9	285	3	28
810	1730	3.0	12	31966	700	80	39.9	285	3	26
810	1830	3.0	12	31973	700	80	39.9	285	3	30
810	1930	3.0	12	31979	600	80	39.9	285	3	28
810	2030	3.0	12	31986	700	80	39.9	285	3	24
810	2130	3.0	12	31993	700	80	40	285	3	30
810	2230	3.0	12	32000	700	80	40	285	3	31
810	2330	3.0	12	32006	600	82	39.8	295	4.5	26
811	0030	3.0	12	32014	800	82	39.5	289	3	20
811	0130	3.0	12	32020	600	83	39.8	285	2	13
811	0230	3.0	12	32028	800	82	39.5	288	2.5	22
811	0330	3.0	12	32034	600	82	39.5	285	2.5	24
811	0430	3.0	12	32041	700	82	39.5	290	3	22
811	0530	3.0	12	32048	700	82	39.3	288	4	27
811	0630	3.0	12	32055	700	81	39.5	290	4	26
811	0730	3.0	12	32062	700	82	39.6	285	3	26
811	0830	3.0	12	32069	700	80	39.5	290	4	26
811	0930	3.0	12	32075	600	80	39.5	290	4	26
811	1030	3.0	12	32082	700	82	39.8	285	4.5	26
811	1130	3.0	12	32096	1400	85	39.6	285	2	16
811	1230	3.0	12	32103	700	85	39.8	285	2.5	20
811	1330	3.0	12	32110	700	82	39.5	285	3	18

END OF BOM/FGT 014 BLIND CANYON

TABLE H-4

OPERATOR LOG II

DATE	TIME	AGIT. COUNT	AGIT SWEEP	AGIT DRIVE	GRATE GEAR COUNTER	GRATE GEAR RPH	GRATE DRIVE SETTING	FLUE GAS SCRUBBER			ANNUBAR DELTA P
								PH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	
730	1130	0	0	0	0	0	0	5	50	50	0
730	1230	0	0	0	0	0	0	5	60	60	.02
730	1330	0	0	0	0	0	0	10	60	60	.02
730	1430	0	0	0	0	0	0	7.5	25	25	.02
730	1530	0	0	0	0	0	0	7.5	25	25	.09
730	1630	0	0	0	0	0	0	6	25	25	.05
730	1730	0	0	0	0	0	0	6	25	25	.05
730	1830	0	0	0	0	0	0	8.5	25	25	.03
730	1930	0	0	0	0	0	0	8.5	30	30	.05
730	2030	0	0	0	0	0	0	8.5	30	30	.05
730	2130	0	0	0	0	0	0	7.5	30	30	.05
730	2230	0	0	0	0	0	0	7.5	30	30	.05
730	2330	0	0	0	0	0	0	7.5	30	30	.05
731	0030	0	0	0	0	0	0	7.5	30	30	.05
731	0130	0	0	0	0	0	0	7.5	30	30	.04
731	0230	0	0	0	0	0	0	7.5	30	30	.05
731	0330	0	0	0	0	0	0	7.5	30	30	.05
731	0430	0	0	0	0	0	0	7	30	30	.04
731	0530	0	0	0	0	0	0	7	30	30	.05
731	0630	0	0	0	0	0	0	7	30	30	.10
731	0730	0	0	0	0	0	0	6.5	30	30	.07
731	0830	3	3	8.2	3	3	2/0.4	6.5	30	30	.12
731	0930	7	4	0	13	10	2/0.4	6.5	30	30	.12
731	1030	8	1	0	27	14	2/0.7	6	30	30	.10
731	1130	8	0	0	46	19	2/1.0	5	30	30	.1
731	1230	8	0	0	84	38	2/1.0	6.5	30	30	.1
731	1330	8	0	0	109	25	2/1.0	6.5	30	30	.1
731	1430	9	1	2	133	24	2/1.0	6	30	30	.1
731	1530	11	2	2.1	160	27	2/1.0	5	30	30	.1
731	1630	13	2	1.6	184	24	2/1.0	5	30	30	.1
731	1730	15	2	1.7	211	27	2/1.0	5	30	30	.1
731	1830	16	1	1.7	236	25	2/1.0	5	30	30	.1
731	1930	17	1	1.7	263	27	2/1.0	5	30	30	.1
731	2030	18	1	1.7	289	26	2/1.0	7.5	30	30	.1
731	2130	20	2	1.7	310	21	2/1.0	7.5	30	30	.1
731	2230	22	2	1.7	343	33	2/1.0	7.5	30	30	.1
731	2330	24	2	1.7	367	24	2/1.0	7.5	30	30	.1
801	0030	25	1	1.7	405	38	2/1.5	7.5	30	30	.1
801	0130	27	2	1.7	438	33	2/1.5	7.5	30	30	.1
801	0230	29	2	1.7	476	38	2/1.35	7	30	30	.1
801	0330	30	1	1.7	511	35	2/1.35	7	30	30	.1
801	0430	31	1	1.7	548	37	2/1.35	7	30	30	.1
801	0530	33	2	1.7	576	28	2/1.4	7	30	30	.1
801	0630	35	2	1.7	613	37	2/1.3	7	30	30	.1
801	0730	37	2	1.7	647	34	2/1.3	7.5	30	30	.1

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			ANNUAL DELTA P
								PH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	
801	0830	39	2	2	680	33	3/1.3	7.5	30	30	.1
801	0930	41	2	2	707	27	3/1.3	7.5	30	30	.1
801	1030	44	3	2	747	40	3/1.45	7.5	30	30	.1
801	1130	46	2	2	786	39	3/1.45	7.5	30	30	.1
801	1230	49	3	4.5	824	38	5/0.6	7.5	30	30	.25
801	1330	52	3	4.5	854	30	5/0.6	7	30	30	.25
801	1430	56	4	4.5	929	75	5/1.5	7	30	30	.25
801	1530	60	4	3.5	994	65	5/1.21	7	30	30	.25
801	1630	63	3	1.7	1078	84	5/1.21	6.5	30	30	.25
801	1730	64	1	1.7	1161	83	5/1.21	6.5	30	30	.25
801	1830	66	2	1.7	1223	62	5/0.71	6.5	30	30	.25
801	1930	67	1	1.7	1268	45	5/0.74	7	30	30	.25
801	2030	69	2	1.7	1323	65	5/0.74	7	30	30	.25
801	2130	70	1	1.7	1369	46	5/0.75	7	30	30	.25
801	2230	72	2	1.7	1429	60	5/0.9	7	30	30	.25
801	2330	74	2	1.7	1483	54	5/0.91	6.5	30	30	.25
802	0030	75	1	1.7	1537	54	5/0.8	6.5	30	30	.25
802	0130	77	2	1.7	1585	48	5/0.8	6.5	30	30	.26
802	0230	78	1	1.7	1639	54	5/0.7	6.5	30	30	.25
802	0330	80	2	1.7	1676	37	5/0.6	6	30	30	.26
802	0430	82	2	1.7	1731	55	5/0.6	5	30	30	.26
802	0530	83	1	1.7	1769	38	5/0.6	5	30	30	.25
802	0630	85	2	1.7	1808	39	5/0.75	6	40	40	.25
802	0730	86	1	1.7	1855	47	5/0.75	7.5	40	40	.25
802	0830	89	3	2.5	1898	43	5/0.75	7.5	30	30	.25
802	0930	90	1	2	1938	40	5/0.75	7	30	30	.25
802	1030	92	2	0	1998	60	5/1.2	8	30	30	.25
802	1130	92	0	0	2073	75	5/0.9	8	30	30	.25
802	1230	92	0	0	2141	68	5/1.2	8.5	30	30	.25
802	1330	92	0	0	2212	71	5/1.2	6	30	30	.25
802	1430	92	0	0	2295	83	5/1.2	6	30	30	.25
802	1530	92	0	0	2352	57	5/1.05	6	30	30	.25
802	1630	92	0	0	2406	56	5/0	6	30	30	.25
802	1730	92	0	0	2443	37	5/0.9	6	30	30	.25
802	1830	92	0	0	2504	60	5/0.9	6	30	30	.25
802	1930	92	0	0	2557	53	5/0.9	6	30	30	.25
802	2030	92	0	0	2612	55	5/0.9	6	30	30	.25
802	2130	92	0	0	2674	62	5/0.9	6	30	30	.25
802	2230	92	0	0	2727	53	5/0.9	7.5	30	30	.25
802	2330	92	0	0	2809	82	5/0.9	7	30	30	.25
803	0030	92	0	0	2860	51	5/0.9	7	30	30	.25
803	0130	92	0	0	2916	56	5/0.9	7	30	30	.25
803	0230	92	0	0	2979	63	5/0.9	6.5	30	30	.26
803	0330	92	0	0	3025	46	5/0.9	6.5	30	30	.26
803	0430	94	2	1.6	3081	56	5/0.65	7	30	30	.26
803	0530	95	1	1.6	3122	41	5/0.65	7	30	30	.25
803	0630	97	2	1.6	3166	44	5/0.65	7	30	30	.26
803	0730	99	2	1.7	3204	38	5/0.65	7	30	30	.26
803	0830	100	1	0	3251	47	5/0.65	7	30	30	.26

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			ANNUBAR DELTA P
								pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	
803	0930	100	0	0	3289	38	5/0.65	7	30	30	.26
803	1030	100	0	0	3341	52	5/1.1	6	30	30	.26
803	1130	100	0	0	3414	73	5/1.1	9	30	30	.26
803	1230	100	0	0	3480	66	5/1.1	9	30	30	.26
803	1330	100	0	0	3564	84	5/1.1	9	30	30	.26
803	1430	100	0	0	3642	78	7/1.4	8	30	30	.26
803	1530	100	0	0	3715	73	7/1.4	8	30	30	.25
803	1630	100	0	0	3830	115	7/1.0	8	30	30	.25
803	1730	100	0	0	3914	84	7/1.0	8	30	30	.25
803	1830	100	0	0	4019	105	7/1.0	8	35	35	.25
803	1930	100	0	0	4093	74	7/1.0	8	35	35	.25
803	2030	100	0	0	4196	103	7/1.0	8	35	35	.25
803	2130	100	0	0	4276	80	7/1.0	8	35	35	.25
803	2230	100	0	0	4361	85	7/1.0	8	35	35	.25
803	2330	103	3	0	4467	106	7/1.0	7.5	35	35	.26
804	0030	103	0	0	4552	85	7/0.9	7.5	35	35	.26
804	0130	104	1	0	4630	78	7/0.9	7.5	35	35	.26
804	0230	109	5	0	4720	90	0	7.5	35	35	.26
804	0330	110	1	0	4786	66	7/0.8	7.5	35	35	.26
804	0430	110	0	0	4852	66	7/0.6	7.5	35	35	.26
804	0530	110	0	0	4902	50	7/0.6	7.5	35	35	.26
804	0630	110	0	0	4948	46	7/0.75	7.5	35	35	.26
804	0730	110	0	0	5033	85	7/0.75	7.5	35	35	.26
804	0830	110	0	0	5132	99	7/1.5	7.5	35	35	.26
804	0930	110	0	0	5264	132	7/1.49	7.5	50	50	.35
804	1030	110	0	0	5390	126	7/1.41	7.5	45	45	.35
804	1130	110	0	0	5487	97	7/0.9	7.5	45	45	.35
804	1230	110	0	0	5565	78	7/0.9	7.5	45	45	.35
804	1330	110	0	0	5647	79	7/1.0	7.5	45	45	.35
804	1430	110	0	0	5733	86	7/0.91	7.5	45	45	.35
804	1530	113	3	0	5796	63	7/0.91	7.5	45	45	.35
804	1630	113	0	0	5880	84	7/0.91	7	45	45	.35
804	1730	113	0	0	5959	79	7/0.91	7	45	45	.35
804	1830	113	0	0	6040	81	7/0.91	7	45	45	.35
804	1930	114	1	0	6115	75	7/0.91	7	45	45	.35
804	2030	114	0	0	6199	84	7/0.91	7	45	45	.35
804	2130	114	0	0	6297	98	7/0.91	7	45	45	.35
804	2230	114	0	0	6402	105	7/0.91	7	45	45	.35
804	2330	115	1	0	6513	111	7/1.1	5	45	45	.35
805	0030	115	0	0	6573	60	7/0.42	6.5	45	45	.35
805	0130	115	0	0	6613	40	7/0.42	8	30	30	.35
805	0230	117	2	0	6648	35	7/0.6	7.5	30	30	.35
805	0330	119	2	1.6	6705	57	7/0.6	7.5	30	30	.35
805	0430	121	2	1.6	6774	69	7/0.75	7	30	30	.35
805	0530	122	1	1.6	6824	50	7/0.75	7	30	30	.35
805	0630	123	1	1.7	6882	58	7/0.85	6.5	30	30	.35
805	0730	126	3	1.7	6969	87	7/0.84	6	30	30	.35
805	0830	126	0	0	7047	78	7/0.9	6	35	35	.35
805	0930	127	1	1.7	7159	112	7/1.3	6	40	40	.46

DATE	TIME	AGIT.			GRATE		FLUE GAS SCRUBBER					ANNUBAR DELTA P
		COUNT	SWEEP	DRIVE	GEAR	GRATE	GRATE	pH	REAGENT	REAGENT		
									PUMP	PUMP		
		RDING	PER HR	SEING	COUNTER READING	RPH	SEING		SPEED	STROKE		
805	1030	128	1	1.7	7259	100	7/1.3	6.5	40	40	.45	
805	1130	130	2	1.7	7382	123	7/1.3	6.5	40	40	.45	
805	1230	132	2	1.7	7498	116	7/1.35	6.5	40	40	.45	
805	1330	133	1	1.7	7606	108	7/1.35	6.5	40	40	.45	
805	1430	135	2	1.7	7734	128	7/1.05	7	40	40	.45	
805	1530	137	2	1.7	7831	97	7/1.05	7	40	40	.45	
805	1630	139	2	1.7	7942	111	7/1.05	7	40	40	.45	
805	1730	140	1	1.7	8014	72	7/1.18	6.5	40	40	.45	
805	1830	142	2	1.6	8132	118	7/1.18	6	45	45	.45	
805	1930	143	1	1.7	8215	83	7/1.18	6.5	45	45	.45	
805	2030	145	2	1.7	8322	107	7/1.2	7.5	45	45	.45	
805	2130	147	2	1.7	8418	96	7/1.2	7.5	45	45	.45	
805	2230	148	1	1.6	8525	107	7/1.2	7	40	45	.45	
805	2330	150	2	1.7	8630	105	7/1.2	6.5	40	45	.45	
806	0030	151	1	1.6	8744	114	7/1.2	6.5	40	45	.45	
806	0130	153	2	1.6	8826	82	7/1.0	6.5	40	45	.35	
806	0230	154	1	1.6	8908	82	7/0.9	6.5	45	50	.45	
806	0330	156	2	1.6	8990	82	7/0.9	7	45	50	.45	
806	0430	157	1	1.6	9066	76	7/0.8	7	45	50	.45	
806	0530	159	2	1.6	9141	75	7/0.8	7	50	50	.45	
806	0630	163	4	1.6	9216	75	7/1.2	7	50	50	.46	
806	0730	165	2	1.7	9319	103	7/1.2	7	50	50	.46	
806	0830	167	2	1.7	9436	117	7/1.2	7	50	50	.46	
806	0930	0	0	0	0	0	0	7.5	50	50	.46	
806	1030	169	2	1.7	9647	211	7/1.4	7.5	50	50	.50	
806	1130	171	2	1.7	9782	135	7/1.4	7.5	50	50	.51	
806	1230	173	2	1.7	9885	103	7/1.25	7.5	50	50	.45	
806	1330	174	1	1.7	10011	126	7/1.25	7.5	50	50	.45	
806	1430	176	2	1.7	10106	95	7/1.25	7.5	50	50	.45	
806	1630	179	3	1.7	10296	190	7/1.27	7.5	50	50	.45	
806	1730	180	1	1.7	10380	84	7/1.27	7.5	50	50	.45	
806	1830	181	1	1.7	10481	101	7/1.11	7.5	50	50	.45	
806	1930	183	2	1.7	10578	97	7/1.11	7.5	50	50	.45	
806	2030	184	1	1.6	10673	95	7/1.05	8	45	45	.45	
806	2130	186	2	1.7	10774	101	7/1.1	7.5	45	45	.45	
806	2230	188	2	1.7	10872	98	7/1.2	7.5	45	45	.45	
806	2330	189	1	1.6	10975	103	7/1.2	7.5	45	45	.44	
807	0030	191	2	1.6	11063	88	7/1.2	7.5	45	45	.45	
807	0130	192	1	1.7	11185	122	7/1.2	7.5	45	45	.44	
807	0230	194	2	1.6	11284	99	7/1.0	7.5	45	45	.44	
807	0330	195	1	1.6	11362	78	7/1.0	7	45	45	.44	
807	0430	196	1	1.6	11455	93	7/1.0	7	45	45	.45	
807	0530	198	2	1.6	11537	82	7/1.0	7	45	45	.44	
807	0630	200	2	1.6	11634	97	7/1.2	7	45	45	.45	
807	0730	201	1	1.6	11758	124	7/1.2	7	45	45	.47	
807	0830	203	2	1.6	11840	82	7/1.2	7	45	45	.46	
807	0930	204	1	0	11911	71	7/0.6	7	45	45	.0	
807	1030	204	0	0	11969	58	7/0.6	7.5	45	45	.06	
807	1130	204	0	0	12017	48	7/0.6	9	45	45	.06	

DATE	TIME	AGIT. COUNT RDING	AGIT SWEEP PER HR	AGIT DRIVE SEING	GRATE GEAR COUNTER READING	GRATE GEAR RPH	GRATE DRIVE SEING	FLUE GAS SCRUBBER			ANNUBAR DELTA P
								pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	
807	1230	204	0	0	12062	45	7/0.5	7.5	30	30	.06
807	1330	204	0	0	12112	50	7/0.5	5.5	30	30	.06
807	1430	206	2	1.6	12215	103	7/0.8	5.5	45	45	.26
807	1530	207	1	1.7	12266	51	7/0.6	7.5	35	35	.26
807	1630	209	2	1.7	12324	58	7/0.6	7.5	35	35	.26
807	1730	211	2	1.7	12376	52	7/0.6	7.5	35	35	.45
807	1830	212	1	1.7	12444	68	7/1.2	7.5	35	35	.45
807	1930	214	2	1.7	12571	127	7/1.32	7.5	35	35	.45
807	2030	215	1	1.7	12669	98	7/1.2	7.5	35	35	.45
807	2130	217	2	1.7	12780	111	7/1.3	7.5	35	35	.45
807	2230	219	2	1.7	12890	100	7/1.2	7.5	35	35	.45
807	2330	220	1	1.7	12986	96	7/1.19	6.5	35	35	.45
808	0030	222	2	1.7	13121	135	7/1.2	7	40	40	.44
808	0130	223	1	1.7	13196	75	7/1.2	7	40	40	.44
808	0230	225	2	1.7	13303	107	7/1.2	7	40	40	.44
808	0330	227	2	1.7	13411	108	7/1.2	7	40	40	.45
808	0430	228	1	1.7	13514	103	7/1.2	7	40	40	.45
808	0530	230	2	1.7	13613	99	7/1.2	7	40	40	.45
808	0630	231	1	1.7	13705	92	7/1.2	7	40	40	.45
808	0730	233	2	1.7	13819	114	7/1.2	7	40	40	.45
808	0830	235	2	1.7	13931	112	7/1.3	7	40	40	.45
808	0930	236	1	1.7	14037	106	7/1.2	7.5	40	40	.45
808	1030	238	2	1.7	14130	93	7/1.35	7	40	40	.45
808	1130	240	2	1.7	14261	131	7/1.35	7.5	40	40	.45
808	1230	242	2	1.7	14396	135	7/1.35	7.5	40	40	.45
808	1330	243	1	1.7	14502	106	7/1.35	7.5	40	40	.45
808	1430	245	2	1.7	14621	119	7/1.35	7	40	40	.45
808	1530	247	2	1.7	14792	171	7/1.45	7	40	40	.55
808	1630	249	2	1.7	14885	93	7/1.35	7	40	40	.55
808	1730	250	1	1.7	15016	131	7/1.35	7	40	40	.55
808	1830	252	2	1.7	15150	134	7/1.2	7	40	40	.55
808	1930	253	1	1.7	15234	84	7/1.4	7	40	40	.55
808	2030	253	0	0	15350	116	7/1.35	7	40	40	.55
808	2130	253	0	0	15466	116	7/1.35	7	40	40	.55
808	2230	254	1	1.6	15577	111	7/1.27	7	40	40	.55
808	2330	255	1	0	15688	111	7/1.27	6	40	40	.58
809	0030	255	0	0	15803	115	7/1.27	6	40	40	.57
809	0130	255	0	0	15923	120	7/1.27	7	40	40	.56
809	0230	255	0	0	16012	89	7/1.27	7	40	40	.56
809	0330	255	0	0	16116	104	7/1.27	7	40	40	.58
809	0430	255	0	0	16234	118	7/1.27	6.5	40	40	.58
809	0530	255	0	0	16332	98	7/1.27	6.5	40	40	.58
809	0630	255	0	0	16443	111	7/1.1	6.5	40	40	.58
809	0730	255	0	0	16554	111	7/1.1	7	40	40	.58
809	0830	255	0	0	16636	82	7/1.2	7	40	40	.58
809	0930	259	4	1.7	16745	109	7/1.2	6.5	40	40	.58
809	1030	261	2	1.7	16863	118	7/1.35	5	40	40	.55
809	1130	262	1	1.7	16989	126	7/1.35	5	40	40	.55
809	1230	264	2	1.7	17108	119	7/1.35	5	40	40	.55

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			ANNUAL DELTA P
								pH	REAGENT PUMP SPEED	REAGENT PUMP STROKE	
809	1330	266	2	1.7	17229	121	7/1.35	5	40	40	.55
809	1430	267	1	1.7	17366	137	7/1.35	5	40	40	.55
809	1530	269	2	1.7	17480	114	7/1.35	8	40	40	.55
809	1630	270	1	1.7	17598	118	7/1.35	8	35/40	40	.55
809	1730	272	2	1.7	17727	129	7/1.35	7.5	35/40	40	.55
809	1830	273	1	1.7	17833	106	7/1.35	7	35/40	40	.55
809	1930	275	2	1.7	17951	118	7/1.35	7	35/40	35/40	.55
809	2030	276	1	1.7	18075	124	7/1.4	6.5	35/40	35/40	.55
809	2130	278	2	1.7	18191	116	7/1.4	6.5	40	40	.55
809	2230	280	2	1.7	18307	116	7/1.35	7	40	40	.55
809	2330	282	2	1.7	18423	116	7/1.35	7	40	40	.56
810	0030	283	1	1.7	18536	113	7/1.2	6.5	40	40	.56
810	0130	285	2	1.7	18641	105	7/1.2	7	40	40	.57
810	0230	286	1	1.7	18751	110	7/1.22	6.5	40	40	.57
810	0330	288	2	1.7	18847	96	7/1.21	7	40/45	40/45	.57
810	0430	289	1	1.7	18958	111	7/1.22	7	40/45	40/45	.56
810	0530	291	2	1.7	19067	109	7/1.22	5	40/45	40/45	.56
810	0630	292	1	1.7	19166	99	7/1.22	7.5	40	40	.57
810	0730	294	2	1.7	19278	112	7/1.22	7.5	40	40	.57
810	0830	295	1	1.7	19384	106	7/1.45	7.5	40	40	.57
810	0930	297	2	1.7	19500	116	7/1.25	6.5	50	50	.57
810	1030	299	2	1.7	19618	118	7/1.45	6	50	50	.57
810	1130	301	2	1.7	19741	123	7/1.45	6	50	50	.57
810	1230	303	2	1.7	19869	128	7/1.6	6	50	50	.57
810	1330	304	1	1.7	20003	134	7/1.6	6	50	50	.57
810	1430	306	2	1.7	20166	163	7/1.45	6	50	50	.57
810	1530	308	2	1.7	20296	130	7/1.45	6	50	50	.57
810	1630	310	2	1.7	20417	121	7/1.26	6	50	50	.57
810	1730	312	2	1.7	20525	108	7/1.26	6	50	50	.57
810	1830	313	1	1.7	20642	117	7/1.35	6.5	50	50	.57
810	1930	315	2	1.7	20750	108	7/1.35	6.5	50	50	.57
810	2030	317	2	1.7	20885	135	7/1.45	6.5	50	50	.57
810	2130	319	2	1.7	21006	121	7/1.45	6.5	50	50	.57
810	2230	322	3	1.7	21140	134	7/1.45	6.5	50	50	.57
810	2330	324	2	1.7	21269	129	7/1.45	5+	50	50	.57
811	0030	326	2	1.7	21420	151	7/1.75	6	50	50	.57
811	0130	327	1	1.7	21556	136	7/1.75	6	50	50	.58
811	0230	329	2	1.7	21719	163	7/1.7	5	50	50	.58
811	0330	330	1	1.7	21849	130	7/1.7	6	55	60	.57
811	0430	331	1	1.7	21980	131	7/1.15	6.5	55	60	.56
811	0530	333	2	1.7	22085	105	7/1.4	6.5	40/30	50/30	.57
811	0630	335	2	1.7	22210	125	7/1.45	6.5	40/30	50/30	.51
811	0730	336	1	1.7	22346	136	7/1.45	6.5	45/30	50/30	.58
811	0830	338	2	1.7	22491	145	7/1.6	6.5	45/30	50/30	.57
811	0930	340	2	1.7	22604	113	7/1.45	6.5	45/30	50/30	.57
811	1030	341	1	1.7	22754	150	7/1.5	6.5	45/30	50/30	.57
811	1130	345	4	1.7	23006	252	7/1.5	6.5	45/30	50/30	.57
811	1230	345	0	0	23064	58	4/1.3	7	45/30	50/30	.11
811	1330	345	0	0	23124	60	4/0.7	9	45/30	50/30	.12

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 BTU/SCF	TMP %	MW	S.G. WRT AIR

7/30/1984															
11:27	22.816	9.582	0.009	0.032	0.000	47.77	3.221	15.33	0.002	0.002	156.5	141.8	98.77	22.89	0.790
11:54	21.912	9.887	0.007	0.030	0.000	49.42	2.965	15.92	0.001	0.000	152.7	138.8	100.15	23.59	0.814
12:30	19.977	9.979	0.006	0.026	0.000	50.23	2.494	16.02	0.001	0.002	142.0	129.4	98.73	23.76	0.820
12:49	19.465	9.901	0.007	0.024	0.000	50.56	2.302	16.51	0.001	0.002	139.9	127.9	98.77	23.92	0.826
13: 7	18.884	9.839	0.006	0.023	0.000	50.81	2.143	16.78	0.001	0.003	137.3	125.7	98.49	24.00	0.828
13:25	18.703	9.759	0.006	0.022	0.000	50.93	2.063	17.03	0.001	0.003	136.7	125.2	98.51	24.05	0.830
13:43	18.651	9.738	0.005	0.021	0.000	51.11	1.992	17.17	0.001	0.003	136.2	124.9	98.68	24.12	0.832
14: 2	18.536	9.642	0.005	0.019	0.000	51.18	1.869	17.58	0.001	0.003	135.9	124.7	98.84	24.19	0.835
15: 8	18.243	9.406	0.005	0.018	0.000	51.55	1.756	18.44	0.001	0.002	136.5	125.6	99.42	24.41	0.842
15:25	17.948	9.239	0.005	0.017	0.000	50.91	1.725	18.29	0.001	0.002	134.7	124.0	98.13	24.10	0.832
15:43	17.750	9.220	0.005	0.016	0.000	51.01	1.646	18.47	0.001	0.001	133.8	123.3	98.12	24.15	0.834
16: 1	16.119	8.471	0.004	0.015	0.000	55.24	1.504	16.86	0.001	0.001	121.9	112.3	98.22	24.50	0.846
16:20	17.221	9.143	0.004	0.016	0.000	51.28	1.596	18.65	0.001	0.001	132.2	121.9	97.92	24.23	0.836
16:38	17.019	9.294	0.003	0.014	0.000	51.36	1.475	18.69	0.001	0.001	130.4	120.4	97.86	24.30	0.839
16:56	16.853	9.314	0.003	0.014	0.000	51.51	1.445	18.71	0.001	0.001	129.6	119.7	97.85	24.35	0.840
17:14	16.806	9.274	0.003	0.015	0.000	51.50	1.481	18.78	0.001	0.001	130.0	120.1	97.85	24.35	0.841
17:33	16.721	9.166	0.003	0.014	0.000	51.50	1.426	19.08	0.001	0.001	130.1	120.3	97.91	24.38	0.841
17:51	16.476	9.129	0.003	0.013	0.000	51.67	1.350	19.28	0.001	0.001	129.2	119.6	97.92	24.45	0.844
18: 9	16.129	9.267	0.003	0.013	0.000	52.07	1.339	18.98	0.001	0.001	127.0	117.6	97.81	24.53	0.847
18:28	16.207	9.158	0.002	0.012	0.000	52.02	1.272	19.37	0.001	0.001	127.8	118.4	98.04	24.57	0.848
18:46	16.038	9.168	0.002	0.011	0.000	52.34	1.176	19.54	0.001	0.001	126.8	117.6	98.28	24.69	0.852
19: 4	15.946	9.084	0.002	0.010	0.000	52.16	1.087	19.81	0.001	0.001	126.5	117.4	98.10	24.66	0.851
19:22	15.665	9.056	0.002	0.009	0.000	52.35	0.954	20.04	0.001	0.001	124.9	116.1	98.07	24.74	0.854
19:41	15.301	9.128	0.007	0.024	0.000	52.22	0.999	19.98	0.004	0.005	124.5	115.8	97.67	24.73	0.853
20: 0	15.080	8.050	0.021	0.080	0.000	55.51	1.474	17.88	0.016	0.023	123.8	114.6	98.12	24.69	0.852
20:18	15.901	8.985	0.018	0.077	0.000	51.79	1.334	19.80	0.014	0.022	131.1	121.6	97.94	24.59	0.849
20:37	15.069	9.054	0.013	0.055	0.000	52.40	0.994	20.20	0.010	0.016	125.5	116.9	97.82	24.82	0.857
20:55	14.452	9.211	0.015	0.051	0.000	53.04	0.828	20.22	0.011	0.015	121.8	113.7	97.85	25.03	0.864
21:13	14.090	9.191	0.018	0.057	0.000	53.16	0.770	20.48	0.013	0.017	121.2	113.2	97.80	25.12	0.867
21:32	13.935	9.148	0.020	0.058	0.000	53.23	0.746	20.74	0.014	0.017	121.4	113.5	97.91	25.19	0.869
21:50	13.672	9.264	0.020	0.059	0.000	53.38	0.710	20.62	0.014	0.017	119.8	112.1	97.76	25.24	0.871
22: 9	12.382	7.998	0.033	0.075	0.000	58.03	0.778	18.60	0.018	0.021	110.5	103.3	97.94	25.41	0.877
22:27	13.544	9.402	0.031	0.095	0.000	53.32	0.938	20.38	0.022	0.028	122.2	114.2	97.76	25.27	0.872
22:45	13.162	9.481	0.022	0.063	0.000	53.88	0.726	20.40	0.014	0.017	117.7	110.2	97.77	25.40	0.877
23: 4	12.744	9.542	0.020	0.049	0.000	54.23	0.599	20.48	0.012	0.013	114.9	107.8	97.69	25.52	0.881
23:22	12.584	9.595	0.021	0.056	0.000	54.43	0.647	20.50	0.014	0.015	115.1	108.0	97.85	25.60	0.884
23:40	12.385	9.554	0.020	0.058	0.000	54.17	0.645	20.60	0.014	0.016	114.9	107.9	97.47	25.54	0.882
23:59	12.313	9.533	0.021	0.057	0.000	54.21	0.620	20.57	0.014	0.015	114.2	107.3	97.35	25.53	0.881
7/31/1984															
0:17	12.182	9.598	0.030	0.081	0.000	54.08	0.648	20.35	0.020	0.023	114.3	107.3	97.01	25.48	0.879
0:36	11.921	9.614	0.022	0.057	0.000	54.53	0.000	20.46	0.014	0.015	106.4	100.3	96.64	25.52	0.881
0:54	11.866	9.517	0.025	0.060	0.000	54.33	0.634	20.61	0.016	0.016	113.2	106.5	97.07	25.56	0.882
1:12	11.792	9.571	0.025	0.064	0.000	54.42	0.660	20.58	0.016	0.018	113.3	106.5	97.14	25.61	0.884
1:12	11.896	9.554	0.035	0.087	0.000	54.12	0.810	20.49	0.022	0.024	115.7	108.7	97.04	25.53	0.881

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

7/31/1984															
1:49	11.854	9.610	0.029	0.072	0.000	54.09	0.746	20.27	0.017	0.020	113.6	106.8	96.71	25.46	0.879
2: 8	10.261	8.698	0.034	0.069	0.000	59.58	0.662	17.72	0.019	0.019	99.5	93.5	97.06	25.84	0.892
2:26	11.597	9.700	0.027	0.065	0.000	54.47	0.676	20.28	0.016	0.018	111.9	105.3	96.85	25.59	0.883
2:45	11.434	9.700	0.025	0.050	0.000	54.99	0.573	20.28	0.014	0.014	109.9	103.4	97.08	25.71	0.888
3: 3	11.544	9.705	0.025	0.068	0.000	54.47	0.660	20.26	0.018	0.020	111.6	105.0	96.77	25.59	0.883
3:22	11.793	9.683	0.031	0.073	0.000	54.39	0.840	20.18	0.020	0.021	114.3	107.3	97.03	25.57	0.883
3:40	11.691	9.572	0.035	0.091	0.000	54.64	0.933	20.00	0.024	0.026	114.9	107.8	97.00	25.56	0.882
4: 0	11.865	9.738	0.034	0.086	0.000	54.47	0.778	19.99	0.023	0.024	113.7	106.7	97.00	25.56	0.882
4:18	12.019	9.741	0.034	0.098	0.000	54.04	0.696	19.92	0.024	0.029	113.5	106.5	96.61	25.42	0.878
4:37	12.016	9.798	0.027	0.075	0.000	54.57	0.638	20.17	0.019	0.022	112.9	106.0	97.34	25.64	0.885
4:55	11.775	9.902	0.026	0.066	0.000	54.89	0.692	20.01	0.017	0.019	111.8	105.1	97.40	25.73	0.888
5:14	11.589	9.876	0.026	0.058	0.000	54.82	0.832	20.14	0.016	0.016	112.8	106.0	97.38	25.75	0.889
5:32	11.470	9.881	0.031	0.069	0.000	54.89	0.692	20.11	0.020	0.020	111.4	104.7	97.18	25.75	0.889
5:51	11.729	9.904	0.036	0.089	0.000	54.81	0.832	20.04	0.025	0.025	114.1	107.2	97.50	25.76	0.889
6: 9	10.916	9.942	0.033	0.080	0.000	55.52	0.768	19.73	0.022	0.023	109.5	103.0	97.04	25.85	0.892
6:28	11.578	9.223	0.030	0.062	0.000	54.62	0.668	21.09	0.019	0.017	114.4	107.8	97.32	25.65	0.886
6:46	11.375	9.031	0.034	0.064	0.000	54.87	0.672	21.36	0.020	0.017	114.8	108.2	97.45	25.71	0.888
7: 5	11.333	8.991	0.042	0.072	0.000	54.84	0.708	21.48	0.024	0.020	115.8	109.2	97.51	25.73	0.888
7:23	11.725	8.950	0.050	0.097	0.000	54.36	0.867	21.62	0.031	0.027	120.0	113.0	97.73	25.67	0.886
7:42	11.824	9.009	0.042	0.090	0.000	54.10	0.859	21.39	0.025	0.025	119.1	112.1	97.37	25.55	0.882
8: 0	11.567	8.926	0.039	0.082	0.000	54.07	0.809	21.42	0.023	0.023	117.6	110.8	96.96	25.50	0.880
9:17	12.982	8.420	0.062	0.240	0.000	52.20	1.929	22.11	0.050	0.070	140.7	131.6	98.06	25.24	0.871
9:36	12.708	8.045	0.047	0.178	0.000	53.10	1.582	22.33	0.037	0.052	134.9	126.5	98.09	25.29	0.873
9:55	13.267	8.103	0.039	0.138	0.000	52.44	1.413	23.00	0.026	0.037	135.7	127.3	98.47	25.28	0.873
10:13	12.668	8.422	0.028	0.078	0.000	53.74	0.999	22.81	0.018	0.020	127.1	119.6	98.79	25.62	0.884
10:32	11.697	8.533	0.027	0.056	0.000	55.07	0.721	22.08	0.016	0.014	118.2	111.5	98.21	25.76	0.889
10:50	11.576	8.795	0.026	0.047	0.000	54.82	0.605	22.58	0.015	0.012	118.0	111.4	98.47	25.92	0.895
11: 9	10.566	9.443	0.034	0.042	0.000	56.37	0.515	21.01	0.016	0.011	108.8	102.9	98.01	26.16	0.903
11:28	11.270	8.516	0.026	0.044	0.000	54.64	0.501	23.34	0.015	0.012	118.3	112.1	98.36	25.93	0.895
11:46	11.556	8.483	0.026	0.040	0.000	54.02	0.468	23.51	0.014	0.011	119.3	113.0	98.13	25.79	0.890
12: 5	11.759	8.665	0.044	0.070	0.000	53.90	0.668	23.04	0.025	0.019	121.8	115.1	98.19	25.77	0.889
12:36	13.632	9.390	0.033	0.064	0.000	52.65	0.652	22.92	0.020	0.020	126.9	119.3	99.38	25.73	0.888
13: 4	14.094	9.005	0.028	0.062	0.000	52.31	0.678	23.25	0.018	0.019	129.6	121.7	99.47	25.57	0.883
13:23	14.098	8.846	0.027	0.059	0.000	51.26	0.642	23.49	0.019	0.019	129.9	122.1	98.45	25.26	0.872
13:41	14.270	8.654	0.037	0.082	0.000	50.84	0.774	23.71	0.024	0.025	133.4	125.2	98.42	25.16	0.869
13:59	14.928	8.527	0.042	0.090	0.000	49.99	0.905	23.62	0.027	0.027	136.9	128.3	98.15	24.88	0.859
14:17	15.186	8.419	0.034	0.091	0.000	49.88	0.901	23.84	0.023	0.027	138.2	129.4	98.40	24.87	0.858
14:36	16.010	8.131	0.047	0.139	0.000	49.32	1.226	23.81	0.034	0.043	145.8	136.2	98.76	24.67	0.852
14:54	16.412	8.052	0.049	0.145	0.000	48.69	1.322	23.90	0.034	0.044	148.5	138.6	98.64	24.51	0.846
15:12	16.283	8.060	0.051	0.151	0.000	48.83	1.317	23.88	0.035	0.045	148.1	138.3	98.65	24.55	0.847
15:31	16.193	8.183	0.053	0.146	0.000	48.70	1.313	23.52	0.036	0.043	146.6	136.8	98.19	24.46	0.844
16: 3	14.876	7.824	0.045	0.130	0.000	54.52	1.211	21.34	0.034	0.045	133.9	124.9	100.03	25.28	0.872
16:21	16.018	8.379	0.036	0.098	0.000	49.31	1.036	23.49	0.027	0.034	141.5	132.2	98.43	24.64	0.850
16:40	16.826	8.144	0.049	0.125	0.000	48.08	1.265	23.67	0.031	0.036	147.9	137.9	98.23	24.31	0.839
16:58	16.921	7.862	0.053	0.137	0.000	47.51	1.331	23.82	0.033	0.040	149.8	139.6	97.70	24.08	0.831
17:16	17.030	7.905	0.052	0.129	0.000	47.57	1.313	23.81	0.031	0.036	149.6	139.4	97.88	24.11	0.832

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

7/31/1984

17:35	16.825	7.849	0.055	0.136	0.000	47.44	1.313	24.09	0.034	0.038	150.1	140.1	97.79	24.13	0.833
17:53	16.809	7.747	0.054	0.130	0.000	47.31	1.255	24.28	0.033	0.037	149.9	139.9	97.66	24.09	0.832
18:12	17.289	7.926	0.044	0.107	0.000	46.65	1.104	24.55	0.027	0.030	149.9	139.9	97.73	24.03	0.830
18:30	17.514	8.318	0.048	0.096	0.000	46.85	0.998	24.24	0.027	0.026	148.4	138.3	98.12	24.15	0.834
18:48	18.279	8.128	0.054	0.128	0.000	45.63	1.264	24.15	0.033	0.037	154.3	143.6	97.70	23.78	0.821
19: 7	18.622	7.822	0.063	0.160	0.000	45.48	1.442	24.53	0.041	0.047	159.6	148.4	98.20	23.76	0.820
19:25	19.085	7.789	0.060	0.160	0.000	44.25	1.514	24.41	0.040	0.046	161.4	149.9	97.36	23.39	0.807
19:43	19.014	7.839	0.064	0.164	0.000	44.56	1.531	24.27	0.041	0.048	161.1	149.6	97.53	23.47	0.810
20: 2	18.755	8.119	0.062	0.155	0.000	45.44	1.485	23.75	0.039	0.046	157.8	146.5	97.85	23.67	0.817
20:20	18.210	8.181	0.045	0.111	0.000	45.83	1.161	23.90	0.028	0.033	151.6	141.0	97.50	23.76	0.820
20:39	18.756	7.833	0.057	0.120	0.000	44.02	1.229	24.50	0.033	0.036	156.5	145.6	96.58	23.30	0.804
20:57	18.825	7.847	0.061	0.147	0.000	44.89	1.409	24.18	0.038	0.043	158.4	147.2	97.44	23.51	0.811
21:16	18.846	8.041	0.059	0.159	0.000	44.30	1.513	23.92	0.039	0.047	159.0	147.6	96.93	23.38	0.807
21:35	18.375	8.246	0.065	0.150	0.000	44.91	1.437	23.44	0.039	0.044	155.0	143.9	96.70	23.48	0.810
21:53	18.239	8.402	0.061	0.162	0.000	45.44	1.473	23.19	0.040	0.047	154.4	143.4	97.06	23.63	0.816
22:12	17.271	8.799	0.056	0.145	0.000	46.34	1.328	22.58	0.036	0.043	147.2	136.9	96.60	23.83	0.823
22:30	17.127	9.203	0.051	0.137	0.000	47.72	1.309	21.90	0.033	0.041	144.0	133.8	97.51	24.19	0.835
22:49	17.319	8.783	0.055	0.144	0.000	46.15	1.341	22.59	0.035	0.042	147.5	137.1	96.46	23.78	0.821
23: 7	18.120	8.895	0.060	0.163	0.000	44.42	1.558	21.93	0.016	0.035	149.9	138.9	95.20	23.21	0.801

8/ 1/1984

22:24	15.706	7.400	0.090	0.146	0.000	46.73	1.366	23.28	0.045	0.040	145.5	135.8	94.80	23.51	0.812
22:43	16.275	7.419	0.104	0.180	0.000	46.22	1.603	22.89	0.053	0.051	149.7	139.4	94.80	23.34	0.806
23: 1	16.548	7.363	0.099	0.179	0.000	45.94	1.656	22.89	0.051	0.049	151.0	140.5	94.78	23.25	0.802
23:20	16.458	7.213	0.092	0.167	0.000	45.95	1.545	23.32	0.047	0.046	150.5	140.2	94.84	23.28	0.803
23:38	16.910	7.030	0.087	0.174	0.000	45.42	1.641	23.44	0.047	0.049	153.4	142.8	94.80	23.11	0.798
23:56	17.167	6.874	0.087	0.185	0.000	45.06	1.714	23.56	0.049	0.053	155.7	144.9	94.75	22.99	0.794

8/ 2/1984

0:15	16.627	7.072	0.065	0.117	0.000	45.90	1.282	23.70	0.034	0.034	147.7	137.7	94.84	23.24	0.802
0:33	16.631	7.104	0.103	0.179	0.000	45.64	1.589	23.42	0.054	0.052	152.5	142.0	94.78	23.19	0.801
0:52	17.117	7.076	0.100	0.193	0.000	45.27	1.740	23.44	0.055	0.057	156.0	145.1	95.05	23.12	0.798
1:10	16.860	7.027	0.086	0.164	0.000	45.56	1.527	23.62	0.048	0.049	152.5	142.1	94.94	23.17	0.800
1:29	16.729	6.876	0.088	0.166	0.000	45.61	1.505	24.16	0.048	0.051	153.7	143.3	95.23	23.27	0.803
1:47	16.883	6.799	0.093	0.150	0.000	45.57	1.440	24.11	0.048	0.045	153.0	142.7	95.14	23.19	0.801
2: 6	15.992	6.939	0.087	0.146	0.000	47.67	1.397	22.55	0.046	0.043	144.4	134.6	94.88	23.38	0.807
2:24	16.819	6.826	0.082	0.150	0.000	45.50	1.433	24.12	0.045	0.046	152.6	142.3	95.02	23.18	0.800
2:43	16.004	6.510	0.090	0.167	0.000	48.14	1.516	22.66	0.049	0.051	146.7	136.7	95.19	23.39	0.807
3: 1	16.822	6.908	0.093	0.174	0.000	45.51	1.585	23.82	0.050	0.051	154.0	143.5	95.02	23.18	0.800
3:20	16.985	7.017	0.094	0.193	0.000	45.21	1.750	23.54	0.053	0.054	155.8	145.0	94.90	23.10	0.797
3:38	16.708	7.117	0.092	0.161	0.000	45.91	1.525	23.55	0.049	0.046	151.8	141.4	95.16	23.29	0.804
3:57	16.431	7.045	0.089	0.156	0.000	46.10	1.501	23.77	0.047	0.044	151.1	140.9	95.18	23.36	0.806
4:15	16.492	7.136	0.083	0.154	0.000	46.16	1.444	23.57	0.046	0.045	149.9	139.8	95.12	23.35	0.806
4:34	16.794	7.168	0.096	0.186	0.000	45.75	1.695	23.27	0.053	0.053	153.6	143.0	95.07	23.23	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

8/ 2/1984

4:52	17.007	6.889	0.095	0.182	0.000	45.45	1.650	23.96	0.053	0.054	156.0	145.3	95.34	23.21	0.801
5:11	16.780	6.868	0.081	0.140	0.000	45.73	1.394	24.16	0.043	0.040	151.8	141.6	95.23	23.26	0.803
5:30	16.810	6.855	0.086	0.153	0.000	45.60	1.405	24.23	0.047	0.045	152.7	142.5	95.24	23.25	0.803
6: 1	15.877	6.899	0.080	0.154	0.000	49.49	1.408	22.55	0.048	0.048	144.4	134.6	96.55	23.87	0.824
6:19	16.496	6.889	0.086	0.173	0.000	46.01	1.512	24.10	0.054	0.055	153.1	142.9	95.38	23.37	0.807
6:38	16.828	6.874	0.091	0.168	0.000	45.74	1.539	23.96	0.048	0.051	153.8	143.4	95.30	23.26	0.803
6:56	17.084	6.681	0.091	0.183	0.000	45.05	1.666	24.22	0.050	0.054	157.1	146.4	95.08	23.08	0.797
8:11	15.996	6.813	0.088	0.159	0.000	47.43	1.443	22.97	0.049	0.047	146.7	136.7	94.99	23.39	0.807
8:30	17.009	6.704	0.098	0.162	0.000	44.81	1.509	24.25	0.049	0.045	154.9	144.4	94.64	23.00	0.794
8:48	17.409	6.610	0.106	0.193	0.000	45.06	1.713	24.70	0.057	0.054	160.8	149.8	95.90	23.21	0.801
9: 7	17.224	6.652	0.098	0.190	0.000	45.14	1.704	24.49	0.054	0.053	159.2	148.3	95.61	23.19	0.800
9:25	17.022	6.792	0.094	0.151	0.000	45.60	1.448	24.49	0.047	0.043	154.7	144.3	95.68	23.31	0.805
9:44	16.791	6.930	0.098	0.160	0.000	45.73	1.503	24.18	0.050	0.044	153.9	143.5	95.49	23.33	0.805
10: 3	16.907	6.976	0.101	0.176	0.000	45.57	1.601	23.90	0.054	0.051	154.9	144.3	95.34	23.26	0.803
10:21	17.128	6.986	0.090	0.155	0.000	45.81	1.512	23.71	0.047	0.045	153.3	142.8	95.48	23.25	0.803
10:40	17.288	6.855	0.102	0.207	0.000	45.29	1.817	23.99	0.058	0.059	159.5	148.4	95.66	23.21	0.801
10:58	16.762	6.982	0.076	0.133	0.000	46.01	1.358	24.20	0.040	0.038	151.1	141.0	95.60	23.39	0.807
11:17	16.531	6.695	0.097	0.142	0.000	45.88	1.356	24.82	0.045	0.040	153.0	143.0	95.61	23.41	0.808
11:36	16.783	6.769	0.091	0.161	0.000	45.48	1.483	24.58	0.046	0.046	154.8	144.4	95.44	23.30	0.804
11:54	16.777	6.571	0.080	0.141	0.000	45.43	1.353	24.97	0.041	0.041	153.9	143.8	95.40	23.27	0.803
12:13	16.488	6.729	0.086	0.144	0.000	45.71	1.328	24.88	0.042	0.042	152.6	142.6	95.45	23.39	0.807
12:32	16.208	6.419	0.084	0.163	0.000	46.00	1.471	24.86	0.046	0.050	153.7	143.6	95.30	23.35	0.806
12:50	15.865	6.313	0.082	0.155	0.000	46.42	1.415	25.11	0.044	0.048	152.6	142.8	95.45	23.47	0.810
13: 9	15.939	6.378	0.090	0.163	0.000	46.28	1.469	25.08	0.045	0.050	153.6	143.7	95.50	23.47	0.810
13:28	15.658	6.466	0.103	0.164	0.000	46.37	1.476	24.93	0.049	0.049	152.6	142.7	95.26	23.49	0.811
14: 5	15.314	6.760	0.093	0.162	0.000	49.54	1.491	23.59	0.046	0.050	147.1	137.4	97.05	24.13	0.833
23:11	16.940	6.753	0.107	0.159	0.000	48.97	1.821	25.21	0.045	0.046	160.9	150.1	100.05	24.50	0.846
23:11	16.940	6.753	0.107	0.159	0.000	48.97	1.821	25.21	0.045	0.046	160.9	150.1	100.05	24.50	0.846

8/ 3/1984

0: 2	17.013	6.301	0.133	0.186	0.000	47.68	2.060	22.84	0.052	0.057	157.3	146.1	96.32	23.34	0.806
0:20	17.225	6.500	0.113	0.172	0.000	46.38	1.952	23.92	0.049	0.048	159.5	148.4	96.36	23.34	0.806
0:44	16.455	6.775	0.107	0.127	0.000	47.01	1.551	24.54	0.031	0.038	153.4	143.2	96.63	23.70	0.818
1: 2	17.341	6.089	0.142	0.174	0.000	44.93	1.915	25.47	0.042	0.047	164.8	153.7	96.16	23.19	0.801
1:57	16.667	6.733	0.166	0.791	0.000	46.84	2.086	24.13	0.053	0.050	171.7	159.7	97.51	23.84	0.823
2:16	17.661	6.626	0.114	0.146	0.000	46.71	1.786	24.84	0.041	0.038	161.3	150.2	97.97	23.71	0.819
2:34	17.029	6.799	0.133	0.261	0.000	46.66	1.876	24.42	0.054	0.043	161.6	150.5	97.27	23.71	0.818
2:52	18.736	6.473	0.115	0.279	0.000	45.76	2.856	24.39	0.072	0.086	178.5	165.4	98.77	23.52	0.812
3:11	17.772	6.112	0.097	0.176	0.000	46.25	2.012	26.06	0.051	0.055	168.8	157.3	98.58	23.75	0.820
3:30	17.271	6.394	0.116	0.156	0.000	47.15	1.868	25.51	0.049	0.047	163.6	152.6	98.56	23.94	0.826
3:48	17.569	6.990	0.160	0.272	0.000	46.26	2.903	23.59	0.088	0.082	173.4	160.9	97.92	23.66	0.817
4: 7	17.289	6.063	0.120	0.261	0.000	48.26	2.866	23.45	0.089	0.083	170.9	158.6	98.48	23.75	0.820
4:25	18.110	6.121	0.121	0.220	0.000	46.08	2.554	25.54	0.061	0.049	174.9	162.7	98.86	23.68	0.817
4:44	17.881	6.133	0.090	0.158	0.000	46.64	2.054	25.68	0.048	0.048	167.6	156.2	98.73	23.76	0.820
5: 2	16.414	6.511	0.089	0.113	0.000	48.15	1.556	25.53	0.036	0.032	155.9	145.8	98.44	24.18	0.835

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

8/ 3/1984															
5:20	15.942	6.726	0.088	0.120	0.000	48.89	0.153	25.35	0.047	0.037	140.1	131.6	97.35	24.20	0.835
5:39	17.282	6.304	0.092	0.181	0.000	47.09	2.128	25.54	0.055	0.058	166.8	155.5	98.73	23.94	0.826
5:57	17.237	6.150	0.101	0.188	0.000	46.92	2.068	25.97	0.059	0.057	167.8	156.6	98.75	23.94	0.826
6:15	17.795	5.945	0.090	0.188	0.000	46.43	2.222	26.24	0.060	0.061	172.0	160.3	99.03	23.82	0.822
7:13	16.128	5.012	0.083	0.145	0.000	44.80	1.351	27.91	0.052	0.050	161.8	151.9	95.53	23.23	0.802
7:31	15.988	4.826	0.078	0.130	0.000	44.94	1.256	28.34	0.047	0.045	161.2	151.5	95.65	23.28	0.803
7:49	16.385	4.580	0.098	0.164	0.000	43.98	1.471	28.87	0.058	0.056	167.8	157.6	95.67	23.12	0.798
8: 9	16.145	4.234	0.092	0.158	0.000	44.92	0.000	28.30	0.058	0.055	150.1	141.6	93.96	22.82	0.788
8:27	17.329	4.335	0.109	0.199	0.000	42.50	1.901	29.03	0.065	0.072	177.1	165.9	95.55	22.75	0.785
8:45	16.537	4.455	0.092	0.139	0.000	44.03	1.474	29.22	0.047	0.044	168.4	158.2	96.04	23.16	0.799
9:41	17.886	4.230	0.131	0.150	0.000	42.83	1.716	29.45	0.061	0.046	177.1	165.9	96.50	22.87	0.790
9:59	17.476	4.571	0.182	0.179	0.000	43.40	1.909	28.82	0.064	0.054	177.3	166.0	96.66	23.06	0.796
10:18	16.953	4.480	0.100	0.150	0.000	44.00	1.581	28.94	0.052	0.048	170.5	159.9	96.31	23.12	0.798
10:36	17.054	4.395	0.119	0.164	0.000	43.57	1.701	28.89	0.059	0.052	172.6	161.8	96.00	22.98	0.793
10:55	17.088	5.248	0.245	0.197	0.000	44.46	2.110	27.05	0.077	0.059	174.2	162.8	96.53	23.21	0.801
11:13	18.363	4.355	0.129	0.198	0.000	40.92	1.995	29.27	0.073	0.064	182.5	170.6	95.37	22.43	0.774
11:32	18.008	4.244	0.120	0.183	0.000	42.44	1.900	29.39	0.064	0.058	180.0	168.5	96.40	22.80	0.787
11:50	17.738	4.592	0.114	0.167	0.000	42.01	1.752	28.82	0.061	0.001	173.9	162.8	95.26	22.61	0.781
12: 9	16.229	4.916	0.179	0.177	0.000	45.51	1.841	26.32	0.068	0.053	164.6	154.0	95.29	23.06	0.796
12:27	16.875	5.657	0.189	0.172	0.000	44.68	1.878	26.84	0.060	0.055	168.6	157.7	96.41	23.32	0.805
12:46	17.702	5.121	0.139	0.197	0.000	44.07	1.993	27.86	0.066	0.066	175.8	164.3	97.21	23.24	0.802
13: 4	16.271	5.862	0.162	0.161	0.000	45.62	1.707	26.79	0.068	0.053	164.3	153.9	96.70	23.61	0.815
13:23	17.651	5.321	0.171	0.212	0.000	43.62	2.136	27.35	0.078	0.073	176.7	165.0	96.61	23.10	0.797
13:41	16.987	5.352	0.136	0.164	0.000	44.43	1.734	27.62	0.060	0.054	169.0	158.2	96.54	23.30	0.804
14: 0	17.696	5.494	0.114	0.199	0.000	44.04	2.014	26.95	0.061	0.069	172.7	161.2	96.64	23.13	0.799
14:18	16.738	5.224	0.107	0.171	0.000	44.98	1.746	27.28	0.057	0.057	166.9	156.3	96.35	23.29	0.804
14:37	16.805	5.548	0.139	0.202	0.000	45.13	2.003	26.58	0.065	0.068	169.0	157.9	96.54	23.35	0.806
14:55	17.215	5.783	0.106	0.192	0.000	44.78	1.943	26.58	0.060	0.065	168.8	157.7	96.72	23.34	0.806
15:14	16.255	6.552	0.160	0.175	0.000	45.99	1.838	25.13	0.067	0.056	160.5	149.9	96.22	23.58	0.814
15:32	15.876	6.871	0.196	0.164	0.000	46.54	1.815	24.80	0.049	0.004	156.6	146.4	96.32	23.75	0.820
15:51	16.356	6.571	0.119	0.177	0.000	45.46	1.804	25.37	0.058	0.058	160.5	150.0	95.98	23.49	0.811
16:10	17.540	5.690	0.112	0.197	0.000	44.06	2.039	26.73	0.060	0.066	171.5	160.1	96.50	23.16	0.800
16:29	17.158	5.290	0.081	0.178	0.000	44.23	1.825	27.60	0.051	0.061	169.8	158.8	96.47	23.21	0.801
16:47	16.727	5.679	0.147	0.178	0.000	44.78	1.868	26.81	0.067	0.057	167.6	156.7	96.31	23.34	0.806
17: 6	15.966	6.417	0.210	0.185	0.000	45.88	1.998	25.29	0.069	0.059	162.8	152.2	96.07	23.57	0.814
17:25	15.067	6.971	0.221	0.148	0.000	47.40	1.690	24.56	0.072	0.046	153.7	143.8	96.17	23.96	0.827
17:43	18.121	5.458	0.125	0.245	0.000	43.05	2.393	26.68	0.070	0.086	178.6	166.4	96.23	22.86	0.789
18: 2	17.340	4.845	0.123	0.203	0.000	45.20	2.117	26.28	0.063	0.069	170.7	159.3	96.24	23.00	0.794
18:20	14.699	7.551	0.395	0.158	0.000	48.09	2.003	23.06	0.086	0.046	154.1	143.9	96.08	24.09	0.831
18:39	17.464	5.645	0.095	0.202	0.000	44.25	2.055	26.88	0.061	0.071	171.9	160.5	96.72	23.24	0.802
18:57	16.935	7.099	0.354	0.174	0.000	45.62	2.171	24.02	0.089	0.054	166.1	154.6	96.52	23.54	0.812
19:16	17.780	5.895	0.175	0.250	0.000	43.94	2.494	26.16	0.075	0.086	177.9	165.7	96.86	23.19	0.800
19:35	17.770	5.511	0.122	0.196	0.000	43.91	2.036	26.94	0.065	0.066	173.2	161.7	96.62	23.11	0.798
19:53	15.904	7.099	0.346	0.163	0.000	46.91	1.989	23.89	0.092	0.047	160.1	149.3	96.44	23.80	0.822
20:12	17.105	6.297	0.158	0.206	0.000	44.86	2.051	25.95	0.076	0.069	169.1	157.8	96.77	23.45	0.809
20:30	17.726	5.662	0.202	0.186	0.000	43.76	2.141	26.85	0.065	0.060	174.8	163.1	96.66	23.14	0.799

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

8/ 3/1984															
20:49	17.637	5.090	0.151	0.177	0.000	43.76	1.870	27.98	0.070	0.057	174.4	163.1	96.79	23.14	0.799
21: 8	17.500	5.657	0.267	0.218	0.000	43.45	2.230	27.18	0.086	0.070	178.4	166.5	96.66	23.20	0.801
21:26	16.787	5.767	0.137	0.180	0.000	45.02	1.769	27.02	0.067	0.059	167.4	156.6	96.80	23.49	0.811
21:45	17.963	5.154	0.153	0.173	0.000	43.63	1.778	27.76	0.064	0.055	173.6	162.3	96.73	23.06	0.796
22: 3	17.675	4.674	0.127	0.165	0.000	44.77	1.768	27.52	0.061	0.053	171.1	160.0	96.81	23.08	0.797
22:22	17.410	4.631	0.134	0.150	0.000	44.03	1.617	29.07	0.058	0.048	173.4	162.5	97.14	23.25	0.803
22:40	17.464	5.122	0.150	0.172	0.000	43.90	1.833	27.95	0.065	0.055	173.2	162.0	96.72	23.18	0.800
22:59	17.270	5.302	0.135	0.163	0.000	44.35	1.745	27.60	0.062	0.053	170.0	159.1	96.68	23.25	0.803
23:18	17.604	5.134	0.133	0.168	0.000	44.20	1.783	27.84	0.064	0.055	172.4	161.2	96.98	23.22	0.802
23:36	17.398	5.212	0.147	0.157	0.000	44.14	1.711	27.77	0.066	0.051	170.7	159.7	96.65	23.20	0.801
23:55	17.112	5.094	0.136	0.143	0.000	44.25	1.577	28.05	0.054	0.046	168.5	157.9	96.46	23.22	0.801
8/ 4/1984															
0:29	17.937	5.408	0.151	0.189	0.000	44.97	1.959	27.94	0.076	0.064	176.7	165.1	98.69	23.64	0.816
0:47	16.491	6.289	0.294	0.170	0.000	45.79	2.029	25.55	0.069	0.054	166.6	155.6	96.74	23.60	0.815
1: 5	18.196	5.274	0.150	0.278	0.000	42.82	2.590	27.17	0.077	0.096	183.8	171.3	96.64	22.91	0.791
1:24	18.286	4.657	0.138	0.210	0.000	43.12	2.128	28.37	0.077	0.070	181.3	169.3	97.05	22.95	0.792
1:45	17.157	5.163	0.143	0.145	0.000	44.57	1.605	28.22	0.072	0.048	170.1	159.4	97.12	23.40	0.808
2: 4	17.222	5.391	0.135	0.240	0.000	43.76	2.124	27.45	0.079	0.082	175.7	164.2	96.48	23.19	0.800
2:22	18.221	5.574	0.184	0.307	0.000	42.55	2.869	26.43	0.093	0.100	185.9	172.9	96.33	22.83	0.788
2:40	15.847	5.494	0.245	0.120	0.000	45.38	1.478	27.51	0.067	0.032	163.0	153.0	96.17	23.54	0.813
2:58	18.485	5.054	0.122	0.183	0.000	43.03	1.983	27.54	0.063	0.059	176.5	164.7	96.52	22.83	0.788
3:17	17.200	5.045	0.133	0.151	0.000	44.17	1.622	28.23	0.058	0.046	170.0	159.3	96.65	23.24	0.802
3:35	16.678	5.207	0.135	0.138	0.000	44.75	1.484	28.00	0.065	0.042	166.1	155.7	96.50	23.37	0.807
3:53	17.097	5.231	0.141	0.170	0.000	44.19	1.749	27.70	0.065	0.054	170.1	159.2	96.39	23.21	0.801
4: 7	17.289	6.063	0.120	0.261	0.000	48.26	2.866	23.45	0.000	0.000	166.8	154.8	98.31	23.68	0.817
4:11	16.688	5.203	0.102	0.166	0.000	44.98	1.702	27.09	0.060	0.053	165.5	154.9	96.04	23.22	0.801
4:30	17.464	4.666	0.110	0.164	0.000	43.50	1.720	28.61	0.058	0.052	173.1	162.1	96.34	23.01	0.794
4:48	17.404	4.812	0.137	0.165	0.000	44.00	1.784	28.33	0.064	0.052	173.2	162.2	96.75	23.15	0.799
5: 6	17.675	4.848	0.149	0.194	0.000	44.00	1.963	28.04	0.062	0.062	175.9	164.5	97.00	23.14	0.799
5:25	17.172	5.050	0.121	0.154	0.000	44.42	1.712	27.82	0.055	0.048	169.4	158.6	96.55	23.21	0.801
5:43	17.371	5.037	0.150	0.194	0.000	43.71	1.949	27.80	0.073	0.063	174.3	163.0	96.35	23.07	0.796
6: 1	17.339	4.764	0.130	0.178	0.000	43.90	1.845	28.20	0.076	0.058	173.8	162.7	96.49	23.09	0.797
6:20	16.931	5.068	0.154	0.167	0.000	44.33	1.778	27.91	0.071	0.055	170.8	160.0	96.47	23.24	0.802
6:38	16.834	5.019	0.155	0.165	0.000	44.34	1.827	28.05	0.062	0.053	171.2	160.4	96.51	23.26	0.803
6:56	17.259	4.996	0.193	0.210	0.000	43.70	2.096	27.88	0.081	0.066	176.9	165.5	96.48	23.12	0.798
7:15	16.343	5.210	0.154	0.153	0.000	45.39	1.668	27.32	0.064	0.048	165.3	154.9	96.34	23.39	0.808
7:33	17.853	4.769	0.129	0.220	0.000	43.28	2.172	27.95	0.074	0.074	179.0	167.2	96.52	22.93	0.791
7:51	17.206	4.743	0.108	0.163	0.000	43.99	1.751	28.34	0.059	0.054	171.7	160.9	96.42	23.11	0.798
8:10	16.831	4.909	0.122	0.175	0.000	45.17	1.814	27.25	0.067	0.057	168.4	157.6	96.40	23.22	0.801
8:29	18.084	5.513	0.158	0.222	0.000	43.51	2.150	27.33	0.082	0.074	178.2	166.3	97.12	23.16	0.799
8:47	18.500	6.180	0.118	0.214	0.000	43.25	2.159	26.06	0.070	0.072	174.5	162.4	96.63	23.02	0.794
9: 6	17.397	6.527	0.096	0.162	0.000	44.64	1.736	25.78	0.053	0.053	163.6	152.7	96.45	23.35	0.806
9:24	18.730	5.993	0.130	0.162	0.000	43.01	1.736	26.82	0.068	0.053	172.2	160.5	96.70	22.99	0.794
9:42	19.159	6.551	0.099	0.200	0.000	42.58	2.028	25.91	0.064	0.066	174.0	161.8	96.65	22.92	0.791

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

8/ 4/1984															
10: 1	18.696	6.541	0.106	0.182	0.000	42.99	1.850	26.18	0.066	0.061	171.3	159.5	96.67	23.07	0.796
10:19	18.471	6.223	0.115	0.170	0.000	43.03	1.744	26.71	0.058	0.056	170.8	159.3	96.58	23.06	0.796
10:37	18.533	6.524	0.147	0.209	0.000	42.81	2.016	26.16	0.072	0.069	173.8	161.9	96.54	23.06	0.796
10:56	19.066	6.452	0.101	0.192	0.000	42.79	1.961	26.13	0.060	0.064	173.4	161.4	96.81	22.99	0.793
11:14	18.166	7.053	0.245	0.178	0.000	43.76	2.059	24.82	0.059	0.055	169.1	157.3	96.39	23.18	0.800
11:33	18.611	6.624	0.118	0.185	0.000	43.17	1.910	25.83	0.067	0.060	170.7	158.9	96.58	23.07	0.796
11:51	17.373	7.446	0.249	0.158	0.000	45.14	1.864	24.27	0.062	0.048	162.4	151.2	96.61	23.54	0.812
12: 9	18.818	7.161	0.139	0.285	0.000	43.36	2.655	23.90	0.090	0.096	176.3	163.3	96.50	23.00	0.794
12:28	19.252	6.326	0.101	0.180	0.000	42.41	1.983	25.89	0.060	0.057	173.1	161.0	96.26	22.76	0.786
12:46	18.826	6.593	0.126	0.155	0.000	43.23	1.775	25.58	0.056	0.049	168.3	156.6	96.39	22.97	0.793
13: 4	18.052	6.943	0.132	0.150	0.000	43.94	1.642	25.27	0.055	0.049	163.5	152.3	96.23	23.20	0.801
13:23	17.709	6.099	0.122	0.177	0.000	44.13	1.804	26.43	0.062	0.059	168.4	157.2	96.59	23.24	0.802
13:41	17.549	6.333	0.221	0.190	0.000	43.96	2.030	25.88	0.066	0.060	170.4	158.9	96.29	23.21	0.801
14: 0	17.121	6.438	0.245	0.160	0.000	44.71	1.874	25.68	0.048	0.039	165.6	154.6	96.31	23.35	0.806
14:18	17.745	6.181	0.223	0.161	0.000	43.74	1.881	25.91	0.058	0.048	168.6	157.3	95.95	23.05	0.796
14:37	17.664	6.140	0.134	0.166	0.000	43.86	1.801	26.11	0.061	0.052	167.0	155.9	95.99	23.09	0.797
14:55	17.034	7.016	0.231	0.192	0.000	44.55	2.045	24.74	0.062	0.058	165.2	154.0	95.92	23.34	0.806
15:14	18.463	5.734	0.112	0.229	0.000	42.44	2.228	26.51	0.068	0.075	176.7	164.6	95.85	22.73	0.785
15:32	18.164	5.603	0.133	0.175	0.000	43.28	1.906	27.07	0.061	0.055	173.0	161.4	96.45	22.99	0.793
15:51	17.582	6.557	0.352	0.221	0.000	43.69	2.425	25.05	0.085	0.065	175.0	162.9	96.03	23.12	0.798
16: 9	17.355	6.118	0.168	0.181	0.000	44.38	1.896	26.02	0.067	0.055	167.7	156.5	96.24	23.22	0.802
16:28	16.867	6.824	0.224	0.150	0.000	45.71	1.796	24.74	0.063	0.045	161.0	150.2	96.42	23.52	0.812
16:47	17.740	6.579	0.211	0.241	0.000	43.88	2.348	25.08	0.082	0.078	173.2	161.1	96.23	23.15	0.799
17: 5	18.301	5.862	0.168	0.173	0.000	43.64	1.960	26.36	0.066	0.056	172.4	160.7	96.58	23.02	0.795
17:24	16.564	6.506	0.176	0.144	0.000	45.48	1.577	25.71	0.062	0.045	160.1	149.6	96.27	23.53	0.812
17:42	16.993	6.562	0.253	0.188	0.000	44.60	2.058	25.42	0.066	0.059	167.8	156.5	96.20	23.36	0.806
18: 1	16.223	6.623	0.228	0.124	0.000	45.58	1.527	25.39	0.058	0.038	157.6	147.4	95.78	23.51	0.811
18:19	17.944	5.703	0.114	0.173	0.000	43.80	1.788	26.85	0.059	0.058	170.1	158.8	96.50	23.09	0.797
18:38	17.852	5.616	0.131	0.156	0.000	43.99	1.710	27.05	0.059	0.051	169.4	158.3	96.62	23.14	0.799
18:56	17.271	6.068	0.199	0.174	0.000	44.88	1.889	25.98	0.067	0.055	167.6	156.5	96.59	23.33	0.805
19:15	17.966	5.815	0.133	0.198	0.000	43.24	1.990	26.58	0.068	0.065	172.5	160.9	96.05	22.95	0.792
19:33	17.350	5.871	0.122	0.182	0.000	43.81	1.843	26.71	0.068	0.059	168.8	157.7	96.01	23.13	0.798
19:52	17.413	6.297	0.237	0.168	0.000	44.45	1.951	25.20	0.071	0.050	166.7	155.3	95.84	23.12	0.798
20:10	18.641	5.313	0.156	0.236	0.000	42.67	2.366	26.64	0.080	0.078	180.3	167.8	96.18	22.69	0.783
20:29	18.493	5.464	0.115	0.188	0.000	42.61	1.973	27.21	0.082	0.062	175.8	164.0	96.20	22.80	0.787
20:47	17.862	6.188	0.227	0.196	0.000	43.63	2.143	25.88	0.067	0.058	172.7	160.9	96.25	23.08	0.797
21: 6	17.666	6.345	0.111	0.154	0.000	44.48	1.722	25.84	0.055	0.048	164.5	153.5	96.42	23.25	0.802
21:25	17.148	6.342	0.119	0.140	0.000	44.88	1.543	26.06	0.057	0.043	161.6	151.0	96.33	23.38	0.807
21:43	17.920	5.787	0.108	0.170	0.000	43.85	1.770	26.91	0.068	0.054	170.0	158.7	96.63	23.15	0.799
22: 2	17.891	5.845	0.111	0.168	0.000	44.02	1.760	26.72	0.054	0.055	168.9	157.7	96.62	23.16	0.799
22:20	16.655	6.793	0.225	0.163	0.000	45.69	1.827	25.28	0.053	0.051	162.6	151.8	96.74	23.66	0.817
22:39	17.895	6.136	0.104	0.186	0.000	43.84	1.916	26.07	0.069	0.062	169.1	157.7	96.28	23.10	0.797
22:57	17.722	5.746	0.097	0.154	0.000	44.00	1.637	27.01	0.061	0.057	167.8	156.8	96.48	23.16	0.800
23:16	17.647	6.632	0.250	0.260	0.000	43.71	2.512	25.01	0.090	0.085	175.6	163.4	96.19	23.15	0.799
23:35	18.695	6.115	0.116	0.224	0.000	42.84	2.308	25.89	0.069	0.073	176.2	163.9	96.33	22.85	0.789
23:53	17.225	6.341	0.146	0.151	0.000	44.79	1.731	25.91	0.063	0.047	164.1	153.2	96.40	23.36	0.806

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

8/ 5/1984															
0:12	16.442	6.082	0.163	0.191	0.000	46.22	1.863	24.98	0.070	0.061	161.4	150.7	96.07	23.41	0.808
0:32	18.039	5.848	0.116	0.162	0.000	43.73	1.747	26.65	0.066	0.053	169.2	157.9	96.41	23.07	0.796
0:51	17.254	6.276	0.169	0.183	0.000	44.27	1.875	25.98	0.069	0.058	167.2	156.1	96.13	23.25	0.802
1:18	17.628	6.361	0.116	0.122	0.000	45.27	1.508	26.15	0.055	0.040	162.6	151.8	97.26	23.52	0.812
1:36	16.901	6.125	0.113	0.128	0.000	45.45	1.418	26.63	0.051	0.044	160.9	150.6	96.86	23.57	0.814
1:54	16.312	6.195	0.132	0.124	0.000	45.77	1.346	26.55	0.049	0.040	158.1	148.1	96.51	23.64	0.816
2:13	17.926	5.657	0.107	0.259	0.000	43.55	2.381	26.21	0.081	0.090	176.7	164.6	96.26	22.96	0.792
2:31	17.630	5.715	0.164	0.169	0.000	43.78	1.886	26.87	0.061	0.055	170.8	159.5	96.34	23.11	0.798
2:49	17.698	6.101	0.194	0.173	0.000	44.23	1.866	26.25	0.071	0.055	169.6	158.3	96.64	23.25	0.802
3: 7	17.471	5.936	0.135	0.187	0.000	43.92	1.852	26.52	0.077	0.062	169.3	158.0	96.17	23.15	0.799
3:26	17.872	5.779	0.136	0.187	0.000	43.98	1.845	26.77	0.072	0.061	171.2	159.8	96.70	23.17	0.800
3:44	17.781	5.758	0.144	0.190	0.000	44.19	1.889	26.81	0.070	0.061	171.6	160.2	96.90	23.24	0.802
4: 2	17.734	5.901	0.130	0.179	0.000	43.99	1.858	26.60	0.067	0.058	169.9	158.6	96.52	23.17	0.800
4:21	17.595	5.889	0.168	0.164	0.000	44.22	1.841	26.58	0.067	0.051	169.3	158.1	96.57	23.22	0.802
4:39	18.647	5.786	0.134	0.195	0.000	43.31	2.029	26.56	0.069	0.064	175.0	163.0	96.79	22.97	0.793
4:57	18.104	5.792	0.126	0.177	0.000	44.10	1.834	26.82	0.060	0.060	171.3	159.8	97.07	23.22	0.801
5:16	18.537	6.122	0.214	0.206	0.000	44.21	2.180	26.70	0.067	0.043	177.5	165.3	98.28	23.45	0.809
5:34	18.559	5.737	0.161	0.172	0.000	44.65	1.852	27.64	0.064	0.053	176.0	164.2	98.89	23.59	0.814
5:52	17.841	5.086	0.149	0.191	0.000	45.09	1.920	28.44	0.069	0.061	177.4	165.9	98.85	23.66	0.817
6:11	16.970	5.880	0.150	0.148	0.000	46.48	1.539	27.05	0.064	0.045	165.0	154.4	98.32	23.91	0.825
6:29	18.535	5.572	0.138	0.189	0.000	44.17	1.885	28.05	0.066	0.061	177.7	166.0	98.66	23.51	0.811
6:47	18.344	5.728	0.188	0.196	0.000	44.28	2.015	27.68	0.067	0.060	178.2	166.3	98.56	23.54	0.813
7: 6	18.471	5.582	0.185	0.187	0.000	43.61	1.964	28.06	0.068	0.060	179.1	167.2	98.18	23.38	0.807
7:24	18.048	5.058	0.157	0.173	0.000	41.77	1.810	28.92	0.070	0.054	178.1	166.7	96.06	22.83	0.788
7:43	18.028	5.441	0.135	0.177	0.000	45.17	1.855	26.91	0.067	0.056	171.8	160.3	97.84	23.39	0.807
8: 2	17.441	5.605	0.115	0.156	0.000	45.16	1.570	27.33	0.067	0.051	167.5	156.7	97.49	23.51	0.811
8:20	17.671	5.427	0.092	0.144	0.000	45.11	1.493	27.65	0.066	0.047	167.8	157.0	97.70	23.49	0.811
8:40	17.629	5.497	0.106	0.160	0.000	45.25	1.630	27.47	0.060	0.053	169.0	158.0	97.85	23.53	0.812
8:58	17.495	5.522	0.136	0.150	0.000	45.42	1.597	27.34	0.068	0.048	168.2	157.3	97.78	23.56	0.813
9:16	16.836	6.226	0.204	0.151	0.000	46.33	1.680	25.87	0.067	0.048	163.2	152.5	97.41	23.73	0.819
9:35	18.821	5.364	0.125	0.199	0.000	45.09	2.010	27.06	0.066	0.066	176.8	164.8	98.80	23.43	0.809
9:53	18.048	5.723	0.128	0.192	0.000	44.83	1.955	26.57	0.069	0.065	172.2	160.6	97.58	23.35	0.806
10:11	17.817	5.666	0.096	0.183	0.000	44.99	1.829	26.79	0.059	0.061	169.9	158.6	97.50	23.39	0.807
10:30	17.600	6.070	0.115	0.194	0.000	45.64	1.911	26.09	0.066	0.065	168.5	157.2	97.75	23.58	0.814
10:48	17.428	6.001	0.109	0.168	0.000	45.88	1.699	26.44	0.064	0.056	166.1	155.1	97.84	23.66	0.817
11: 7	17.621	6.484	0.175	0.211	0.000	45.72	2.087	25.21	0.079	0.070	169.2	157.6	97.66	23.59	0.814
11:25	17.412	6.621	0.133	0.196	0.000	46.65	1.938	25.19	0.070	0.066	165.7	154.4	98.28	23.86	0.823
11:43	17.544	6.166	0.144	0.186	0.000	45.37	1.907	25.89	0.068	0.061	167.9	156.6	97.33	23.49	0.811
12: 2	17.304	6.716	0.162	0.227	0.000	45.80	2.187	24.75	0.080	0.075	167.9	156.3	97.30	23.60	0.815
12:20	17.712	6.355	0.144	0.203	0.000	45.48	2.080	25.17	0.070	0.065	168.3	156.7	97.27	23.44	0.809
12:39	17.766	6.812	0.127	0.198	0.000	45.94	2.052	24.59	0.067	0.065	165.9	154.4	97.62	23.60	0.815
12:57	18.133	6.064	0.120	0.190	0.000	44.95	1.977	25.94	0.068	0.063	170.4	158.8	97.51	23.36	0.806
13:16	18.035	5.641	0.133	0.205	0.000	45.14	2.112	26.44	0.069	0.066	173.7	161.9	97.84	23.40	0.808
13:34	17.929	6.044	0.112	0.190	0.000	45.32	1.929	26.06	0.063	0.062	169.4	157.9	97.71	23.47	0.810
13:53	17.706	5.903	0.110	0.171	0.000	45.34	1.770	26.54	0.060	0.056	168.0	156.8	97.65	23.51	0.811
14:11	17.757	5.296	0.103	0.173	0.000	45.72	1.799	26.80	0.061	0.056	169.3	158.0	97.76	23.42	0.809

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

8/ 5/1984

14:29	18.119	5.135	0.105	0.162	0.000	45.09	1.735	27.71	0.059	0.052	172.4	161.1	98.17	23.42	0.809
14:48	17.721	5.374	0.135	0.172	0.000	44.59	1.777	27.46	0.062	0.055	171.5	160.3	97.34	23.33	0.805
15: 7	17.739	5.610	0.154	0.194	0.000	44.58	1.931	26.95	0.066	0.063	172.5	161.0	97.29	23.33	0.805
15:25	18.271	5.565	0.130	0.168	0.000	44.52	1.838	26.83	0.063	0.054	171.8	160.2	97.44	23.24	0.802
15:44	18.125	5.624	0.139	0.187	0.000	44.78	1.905	26.63	0.063	0.060	171.9	160.4	97.50	23.30	0.804
16: 2	17.425	5.819	0.138	0.168	0.000	45.42	1.715	26.45	0.061	0.052	166.6	155.6	97.25	23.46	0.810
16:21	18.014	5.562	0.131	0.190	0.000	44.63	1.920	26.85	0.068	0.061	172.5	161.0	97.43	23.29	0.804
16:40	17.767	5.554	0.132	0.165	0.000	45.10	1.738	27.16	0.062	0.053	170.1	158.9	97.72	23.46	0.810
16:59	17.674	5.509	0.121	0.190	0.000	44.93	1.861	27.28	0.066	0.062	172.0	160.7	97.69	23.45	0.810
17:17	17.661	5.132	0.141	0.199	0.000	44.28	1.942	27.94	0.070	0.066	175.6	164.1	97.43	23.31	0.805
17:36	18.117	5.042	0.134	0.181	0.000	44.22	1.865	27.90	0.070	0.061	175.6	164.1	97.59	23.24	0.802
17:54	17.805	5.326	0.117	0.182	0.000	44.56	1.866	27.42	0.065	0.061	172.7	161.3	97.40	23.31	0.805
18:13	17.559	5.283	0.119	0.166	0.000	44.89	1.717	27.69	0.065	0.055	170.8	159.8	97.54	23.42	0.808
18:31	18.114	5.219	0.113	0.195	0.000	43.91	1.916	27.39	0.066	0.065	174.4	162.8	96.99	23.09	0.797
18:50	16.621	6.792	0.291	0.198	0.000	46.92	2.125	24.26	0.068	0.060	164.4	153.2	97.33	23.80	0.822
19: 8	17.850	5.942	0.167	0.227	0.000	44.58	2.222	26.11	0.080	0.074	174.5	162.6	97.25	23.32	0.805
19:27	18.259	5.378	0.125	0.162	0.000	44.42	1.796	27.22	0.068	0.052	172.4	160.9	97.47	23.23	0.802
19:46	17.783	5.456	0.114	0.174	0.000	44.87	1.777	27.21	0.067	0.057	170.8	159.5	97.50	23.37	0.807
20: 5	17.778	5.501	0.114	0.179	0.000	45.85	1.830	26.45	0.064	0.059	168.9	157.6	97.83	23.47	0.810
20:23	17.304	6.021	0.101	0.181	0.000	45.43	1.757	26.53	0.059	0.059	166.6	155.7	97.44	23.57	0.814
20:42	17.628	5.514	0.105	0.188	0.000	45.05	1.804	27.30	0.062	0.062	171.0	159.8	97.72	23.48	0.810
21: 0	17.955	5.354	0.115	0.185	0.000	44.71	1.878	27.23	0.065	0.064	172.8	161.3	97.55	23.32	0.805
21:19	17.909	5.986	0.143	0.216	0.000	45.04	2.079	26.26	0.075	0.069	172.9	161.2	97.78	23.47	0.810
21:37	17.339	6.001	0.114	0.160	0.000	45.78	1.675	26.52	0.071	0.051	165.8	154.9	97.71	23.65	0.816
21:56	17.512	5.963	0.115	0.180	0.000	45.54	1.788	26.49	0.068	0.060	167.9	156.8	97.72	23.59	0.814
22:15	17.365	5.519	0.099	0.140	0.000	45.33	1.519	27.35	0.062	0.047	166.1	155.4	97.42	23.50	0.811
22:33	18.397	5.114	0.104	0.170	0.000	44.33	1.790	27.87	0.060	0.056	174.6	163.1	97.89	23.26	0.803
22:52	18.011	5.244	0.104	0.187	0.000	44.42	1.873	27.69	0.063	0.063	174.2	162.7	97.66	23.31	0.805
23:10	18.095	5.054	0.114	0.172	0.000	44.43	1.788	27.93	0.066	0.056	174.1	162.7	97.71	23.28	0.804
23:29	18.160	5.432	0.124	0.185	0.000	44.50	1.882	27.10	0.063	0.061	173.1	161.5	97.50	23.26	0.803
23:48	18.198	5.536	0.159	0.193	0.000	45.49	1.976	26.93	0.064	0.063	174.4	162.7	98.61	23.57	0.813

8/ 6/1984

0: 6	17.598	5.897	0.175	0.219	0.000	45.53	2.200	25.66	0.080	0.071	171.9	160.2	97.42	23.42	0.809
0:25	18.019	5.713	0.122	0.188	0.000	44.82	1.894	26.64	0.069	0.062	171.5	159.9	97.53	23.35	0.806
0:57	18.061	6.009	0.233	0.229	0.000	45.34	2.300	26.73	0.094	0.076	179.4	167.2	99.08	23.78	0.821
1:15	18.201	5.645	0.150	0.176	0.000	44.67	1.939	26.67	0.063	0.059	172.6	161.0	97.57	23.29	0.804
1:34	17.970	5.862	0.108	0.186	0.000	44.73	1.899	26.52	0.061	0.061	170.5	159.0	97.39	23.34	0.806
1:52	17.405	5.913	0.093	0.166	0.000	45.54	1.687	26.60	0.056	0.056	165.9	155.0	97.52	23.56	0.813
2:10	17.521	5.317	0.089	0.164	0.000	44.99	1.676	27.54	0.054	0.055	169.1	158.1	97.40	23.40	0.808
2:29	17.803	5.243	0.117	0.176	0.000	44.63	1.766	27.63	0.067	0.058	172.2	161.0	97.49	23.33	0.805
2:47	18.055	5.041	0.122	0.198	0.000	44.08	1.925	27.92	0.071	0.066	176.3	164.7	97.48	23.21	0.801
3: 5	17.955	5.382	0.121	0.184	0.000	44.55	1.883	27.31	0.066	0.060	173.1	161.6	97.52	23.31	0.805
3:23	18.108	5.533	0.123	0.218	0.000	44.03	2.104	26.95	0.068	0.070	175.6	163.8	97.21	23.18	0.800
3:42	18.055	5.389	0.131	0.181	0.000	44.59	1.873	27.29	0.065	0.057	173.2	161.8	97.63	23.32	0.805

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

8/ 6/1984															
4: 0	18.143	5.513	0.163	0.198	0.000	44.61	2.023	26.94	0.076	0.062	175.1	163.3	97.73	23.32	0.805
4:18	17.735	5.804	0.195	0.180	0.000	45.12	1.951	26.66	0.072	0.056	172.1	160.6	97.77	23.50	0.811
4:37	18.023	5.508	0.130	0.185	0.000	44.31	1.865	26.96	0.069	0.059	172.2	160.7	97.11	23.20	0.801
4:55	17.866	5.722	0.125	0.175	0.000	44.97	1.780	26.88	0.067	0.055	170.2	158.9	97.64	23.43	0.809
5:13	17.621	5.907	0.130	0.169	0.000	45.35	1.749	26.54	0.064	0.054	167.9	156.7	97.58	23.51	0.812
5:32	17.643	5.597	0.106	0.172	0.000	45.12	1.746	27.00	0.059	0.058	169.0	157.9	97.50	23.43	0.809
5:50	17.471	5.142	0.115	0.166	0.000	45.06	1.704	27.72	0.061	0.055	170.4	159.4	97.49	23.41	0.808
6: 8	17.210	5.446	0.109	0.165	0.000	45.91	1.687	26.60	0.065	0.055	165.7	154.9	97.25	23.46	0.810
6:27	17.667	5.174	0.157	0.196	0.000	44.39	1.972	27.67	0.075	0.063	175.3	163.8	97.37	23.30	0.804
6:45	17.647	5.432	0.121	0.173	0.000	44.99	1.741	27.35	0.069	0.057	170.6	159.4	97.58	23.43	0.809
7: 4	18.041	5.331	0.114	0.177	0.000	44.28	1.820	27.50	0.062	0.058	173.0	161.6	97.39	23.25	0.803
7:22	17.757	4.806	0.122	0.173	0.000	44.57	1.787	28.01	0.063	0.057	173.4	162.2	97.34	23.23	0.802
7:40	17.611	5.363	0.128	0.156	0.000	45.04	1.617	27.43	0.063	0.051	169.0	158.0	97.47	23.41	0.808
7:59	17.731	5.401	0.121	0.166	0.000	45.01	1.671	27.50	0.067	0.056	170.4	159.3	97.72	23.45	0.810
8:17	17.291	5.746	0.124	0.164	0.000	45.57	1.652	26.84	0.067	0.054	166.6	155.8	97.50	23.56	0.813
8:35	17.958	5.500	0.136	0.174	0.000	45.66	1.765	27.13	0.066	0.055	171.2	159.9	98.44	23.60	0.815
8:55	17.708	5.412	0.123	0.183	0.000	45.92	1.852	26.96	0.068	0.061	170.9	159.6	98.29	23.60	0.815
9:13	17.066	5.861	0.146	0.184	0.000	45.49	1.863	25.95	0.068	0.059	166.0	155.0	96.68	23.38	0.807
9:32	17.620	5.904	0.143	0.210	0.000	44.56	2.067	25.95	0.069	0.065	170.5	159.0	96.60	23.20	0.801
9:50	17.695	6.068	0.132	0.194	0.000	45.11	1.977	25.85	0.069	0.062	169.0	157.5	97.16	23.38	0.807
10:27	17.913	6.372	0.117	0.184	0.000	45.49	1.909	25.41	0.058	0.058	166.8	155.4	97.51	23.47	0.810
10:45	17.976	6.639	0.116	0.200	0.000	45.67	2.029	25.08	0.065	0.066	167.8	156.2	97.84	23.58	0.814
11: 4	18.191	6.412	0.173	0.214	0.000	45.74	2.189	25.14	0.070	0.067	171.6	159.6	98.20	23.57	0.814
11:22	17.889	6.614	0.120	0.211	0.000	45.07	2.116	24.92	0.068	0.068	168.3	156.5	97.07	23.37	0.807
11:40	17.589	6.930	0.105	0.208	0.000	45.69	2.063	24.58	0.067	0.069	165.4	153.9	97.31	23.57	0.814
11:59	18.238	6.369	0.127	0.205	0.000	44.84	2.070	25.49	0.069	0.067	170.7	158.9	97.47	23.36	0.806
12:17	17.819	5.374	0.138	0.203	0.000	44.91	2.081	26.99	0.067	0.067	174.4	162.8	97.65	23.36	0.806
13: 4	18.832	5.785	0.105	0.194	0.000	44.26	1.991	27.02	0.065	0.063	176.1	164.1	98.32	23.36	0.806
13:22	18.435	5.502	0.104	0.177	0.000	43.72	1.832	26.89	0.039	0.057	171.7	160.1	96.76	22.99	0.794
13:40	17.781	5.719	0.143	0.208	0.000	44.46	2.042	26.39	0.065	0.063	172.0	160.4	96.87	23.21	0.801
13:59	18.339	5.606	0.120	0.180	0.000	43.92	1.856	26.90	0.062	0.060	172.5	160.9	97.04	23.11	0.798
14:17	18.167	5.775	0.115	0.187	0.000	43.92	1.916	26.27	0.063	0.062	170.7	159.1	96.47	23.02	0.795
14:36	18.156	5.547	0.105	0.172	0.000	43.95	1.757	27.00	0.057	0.057	170.7	159.4	96.81	23.10	0.797
15:55	17.668	5.223	0.091	0.178	0.000	43.14	1.712	27.11	0.056	0.061	169.0	157.9	95.24	22.74	0.785
16:13	18.023	3.763	0.108	0.183	0.000	44.53	1.792	27.02	0.058	0.060	171.1	159.7	95.54	22.49	0.776
16:32	18.133	5.254	0.118	0.195	0.000	42.66	1.906	26.90	0.064	0.064	172.8	161.2	95.29	22.62	0.781
16:50	17.365	5.508	0.115	0.174	0.000	43.56	1.731	26.73	0.060	0.057	167.3	156.3	95.30	22.88	0.790
17: 9	18.032	5.746	0.158	0.224	0.000	43.02	2.148	25.86	0.068	0.066	172.8	161.0	95.32	22.70	0.784
17:28	18.747	5.483	0.100	0.166	0.000	42.77	1.829	26.47	0.051	0.054	171.3	159.6	95.68	22.61	0.780
17:47	18.660	5.514	0.103	0.200	0.000	42.90	1.996	26.46	0.060	0.066	173.8	161.9	95.96	22.70	0.783
18: 6	17.410	6.208	0.122	0.208	0.000	45.24	1.992	24.38	0.067	0.070	163.7	152.4	95.70	23.06	0.796
18:24	18.092	5.854	0.177	0.224	0.000	43.38	2.230	26.02	0.075	0.074	175.1	163.0	96.13	22.92	0.791
18:43	18.324	5.829	0.108	0.158	0.000	43.87	1.726	26.11	0.056	0.053	167.8	156.4	96.24	22.94	0.792
19: 1	18.374	5.746	0.128	0.174	0.000	43.45	1.836	26.20	0.061	0.059	170.2	158.6	96.03	22.85	0.789
19:20	17.651	6.314	0.117	0.143	0.000	44.86	1.578	25.41	0.055	0.048	161.6	150.7	96.17	23.19	0.801
19:38	17.041	6.492	0.115	0.162	0.000	44.79	1.642	25.14	0.058	0.056	159.9	149.2	95.49	23.18	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

8/ 6/1984

19:57	17.319	6.299	0.157	0.170	0.000	44.88	1.723	25.53	0.065	0.058	163.9	153.0	96.21	23.27	0.803
20:15	18.006	5.296	0.104	0.144	0.000	44.55	1.552	27.23	0.053	0.048	168.1	157.0	96.98	23.17	0.800
20:34	17.664	5.970	0.146	0.192	0.000	44.25	1.877	26.04	0.068	0.067	168.8	157.4	96.27	23.13	0.799
20:53	17.931	5.668	0.108	0.167	0.000	44.14	1.705	26.60	0.058	0.057	168.2	157.0	96.44	23.08	0.797
21:11	17.811	5.169	0.220	0.226	0.000	45.62	2.270	25.00	0.089	0.072	172.3	160.3	96.47	22.98	0.793
21:30	17.952	6.165	0.107	0.154	0.000	44.55	1.673	25.72	0.053	0.050	164.6	153.4	96.43	23.15	0.799
21:48	18.465	5.815	0.117	0.187	0.000	43.90	1.891	26.31	0.063	0.062	171.6	159.9	96.81	23.05	0.796
22: 7	16.960	6.129	0.098	0.178	0.000	46.48	1.735	24.91	0.058	0.060	160.0	149.2	96.60	23.45	0.809
22:26	18.764	5.601	0.103	0.186	0.000	44.14	1.898	26.72	0.060	0.062	173.7	161.8	97.54	23.14	0.799
22:44	18.042	5.714	0.091	0.164	0.000	44.29	1.747	26.59	0.052	0.055	168.4	157.1	96.75	23.14	0.799
23: 3	17.685	6.406	0.202	0.196	0.000	44.99	2.045	24.88	0.081	0.063	168.0	156.4	96.55	23.26	0.803
23:21	18.592	5.762	0.116	0.180	0.000	43.88	1.847	26.43	0.062	0.059	171.7	160.0	96.93	23.04	0.795
23:40	17.769	6.055	0.161	0.162	0.000	44.53	1.735	25.95	0.068	0.052	166.7	155.5	96.48	23.19	0.801
23:58	18.029	5.614	0.108	0.158	0.000	44.67	1.617	26.89	0.058	0.053	168.2	157.1	97.20	23.27	0.803

8/ 7/1984

0:17	18.123	5.446	0.098	0.164	0.000	44.25	1.624	27.62	0.056	0.055	170.9	159.7	97.44	23.28	0.804
0:36	17.999	5.696	0.097	0.169	0.000	44.43	1.698	27.04	0.057	0.056	169.6	158.3	97.24	23.29	0.804
0:54	17.671	5.842	0.119	0.177	0.000	45.08	1.706	27.10	0.064	0.059	169.5	158.4	97.82	23.56	0.813
1:13	17.774	5.818	0.195	0.169	0.000	45.10	1.819	26.96	0.068	0.053	171.5	160.2	97.95	23.55	0.813
1:53	18.483	5.941	0.156	0.174	0.000	45.62	1.849	27.23	0.069	0.057	174.6	162.9	99.58	23.84	0.823
2:12	17.768	6.581	0.126	0.176	0.000	46.08	1.784	25.47	0.065	0.059	165.5	154.2	98.11	23.73	0.819
2:30	17.360	6.656	0.247	0.191	0.000	46.24	2.039	24.78	0.081	0.060	167.1	155.6	97.65	23.69	0.818
2:48	18.738	5.861	0.136	0.183	0.000	44.07	1.923	26.42	0.064	0.062	173.4	161.5	97.46	23.16	0.800
3: 6	18.703	6.020	0.148	0.191	0.000	44.39	2.002	26.09	0.067	0.064	173.5	161.5	97.68	23.25	0.802
3:25	17.795	6.312	0.162	0.208	0.000	45.14	1.998	26.00	0.077	0.070	171.1	159.5	97.77	23.56	0.813
3:43	18.205	6.346	0.140	0.169	0.000	45.42	1.815	25.95	0.065	0.057	168.8	157.3	98.17	23.59	0.814
4: 1	17.722	6.047	0.157	0.184	0.000	46.05	1.857	26.08	0.070	0.061	168.8	157.5	98.23	23.68	0.817
4:20	17.861	5.568	0.144	0.162	0.000	45.04	1.701	27.55	0.065	0.054	171.5	160.3	98.14	23.56	0.813
4:38	19.249	5.587	0.122	0.193	0.000	44.23	2.042	26.99	0.067	0.065	178.2	165.9	98.55	23.28	0.803
4:56	18.216	6.258	0.126	0.190	0.000	45.27	1.926	26.09	0.065	0.065	170.7	159.1	98.21	23.57	0.814
5:15	18.333	6.333	0.128	0.195	0.000	45.19	1.966	26.10	0.069	0.065	171.8	160.0	98.37	23.59	0.814
5:33	18.707	6.020	0.106	0.176	0.000	44.62	1.865	26.37	0.061	0.060	171.8	160.0	97.98	23.35	0.806
5:51	18.308	5.803	0.112	0.169	0.000	45.01	1.723	27.14	0.063	0.058	171.5	160.1	98.39	23.55	0.813
6:10	18.595	5.620	0.099	0.172	0.000	44.63	1.768	27.30	0.059	0.058	173.2	161.6	98.30	23.41	0.808
6:28	18.546	6.179	0.107	0.201	0.000	44.73	1.973	26.18	0.065	0.068	172.5	160.7	98.05	23.42	0.809
6:46	17.974	5.890	0.108	0.167	0.000	45.02	1.677	27.05	0.059	0.056	169.4	158.2	98.00	23.54	0.813
7: 5	18.348	5.690	0.125	0.182	0.000	44.42	1.813	27.22	0.065	0.060	173.4	161.8	97.93	23.38	0.807
7:23	18.221	5.862	0.151	0.193	0.000	44.57	1.938	26.85	0.072	0.063	173.9	162.2	97.92	23.43	0.809
7:41	18.089	6.031	0.133	0.188	0.000	44.72	1.869	26.57	0.069	0.061	171.4	159.8	97.73	23.44	0.809
8:18	18.581	5.678	0.115	0.175	0.000	44.30	1.819	26.81	0.060	0.057	172.4	160.7	97.60	23.22	0.802
8:37	19.415	5.059	0.127	0.243	0.000	42.76	2.418	27.67	0.071	0.081	186.2	173.3	97.85	22.91	0.791
8:55	18.055	5.646	0.102	0.249	0.000	44.22	2.522	26.33	0.067	0.084	178.2	165.9	97.28	23.19	0.800
9:13	17.989	5.773	0.083	0.255	0.000	44.08	2.557	25.98	0.062	0.083	176.9	164.6	96.86	23.10	0.797
9:51	16.513	5.821	0.071	0.177	0.000	46.27	1.846	26.53	0.049	0.061	164.2	153.6	97.34	23.71	0.818

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

8/ 7/1984															
10: 9	14.823	5.183	0.062	0.146	0.000	51.77	1.558	23.65	0.041	0.050	145.5	136.1	97.29	24.06	0.831
10:28	16.857	5.076	0.045	0.140	0.000	44.35	1.577	27.87	0.033	0.048	165.2	154.8	96.00	23.15	0.799
10:46	17.363	5.012	0.053	0.156	0.000	45.06	1.698	28.06	0.039	0.054	169.3	158.5	97.49	23.41	0.808
11: 5	17.381	4.441	0.052	0.148	0.000	43.64	1.680	28.97	0.037	0.051	171.9	161.1	96.40	23.01	0.794
11:23	18.075	4.778	0.077	0.180	0.000	44.06	1.942	28.15	0.051	0.062	175.7	164.2	97.37	23.13	0.798
11:42	17.899	4.998	0.074	0.185	0.000	44.69	1.983	27.75	0.050	0.063	174.3	162.8	97.69	23.30	0.804
12: 0	17.881	5.332	0.070	0.184	0.000	44.99	1.984	27.24	0.049	0.064	172.5	161.1	97.79	23.38	0.807
12:18	18.086	5.366	0.079	0.196	0.000	44.56	2.106	27.05	0.054	0.068	174.4	162.7	97.57	23.26	0.803
12:37	18.422	4.981	0.076	0.216	0.000	43.93	2.239	27.61	0.056	0.076	179.2	167.1	97.61	23.11	0.798
12:55	18.082	5.089	0.070	0.183	0.000	44.28	1.957	27.71	0.049	0.064	174.4	162.9	97.49	23.21	0.801
13:14	18.256	5.223	0.066	0.206	0.000	43.85	2.167	27.29	0.051	0.072	176.3	164.5	97.17	23.08	0.797
13:32	17.577	4.810	0.067	0.169	0.000	44.75	1.854	28.04	0.046	0.058	172.3	161.1	97.37	23.28	0.803
13:50	19.194	5.426	0.120	0.190	0.000	43.67	1.854	27.13	0.064	0.065	176.4	164.3	97.72	23.05	0.796
14: 9	18.374	5.784	0.160	0.216	0.000	45.52	2.160	25.20	0.074	0.071	172.1	160.1	97.56	23.25	0.802
14:27	19.167	5.486	0.142	0.199	0.000	43.40	2.027	27.18	0.071	0.065	178.9	166.6	97.74	23.06	0.796
14:46	17.936	5.313	0.108	0.183	0.000	43.88	1.842	27.29	0.061	0.061	172.2	160.8	96.67	23.07	0.796
15: 4	17.746	5.943	0.197	0.197	0.000	44.39	2.051	26.17	0.073	0.063	172.1	160.5	96.82	23.24	0.802
15:23	18.245	5.244	0.116	0.156	0.000	45.21	1.678	26.97	0.056	0.051	169.8	158.5	97.72	23.29	0.804
15:45	17.573	5.760	0.111	0.161	0.000	44.77	1.648	27.00	0.060	0.054	167.6	156.7	97.14	23.39	0.807
16: 3	17.286	5.967	0.105	0.181	0.000	44.62	1.758	26.47	0.059	0.060	166.5	155.5	96.50	23.31	0.804
16:22	17.071	6.270	0.088	0.164	0.000	44.96	1.697	25.84	0.052	0.053	162.2	151.5	96.19	23.33	0.805
16:40	17.234	6.003	0.089	0.184	0.000	44.48	1.802	26.26	0.055	0.061	165.8	154.8	96.17	23.23	0.802
16:59	17.652	5.767	0.085	0.199	0.000	43.88	1.970	26.50	0.056	0.067	170.0	158.6	96.18	23.06	0.796
17:17	17.927	5.961	0.099	0.187	0.000	43.76	1.857	26.26	0.059	0.062	169.0	157.6	96.17	23.04	0.795
17:35	18.322	5.711	0.104	0.153	0.000	43.94	1.651	26.50	0.055	0.049	168.0	156.7	96.48	23.00	0.794
17:55	18.210	5.674	0.107	0.156	0.000	43.69	1.668	26.90	0.055	0.052	169.2	158.0	96.51	23.03	0.795
18:13	18.025	5.283	0.095	0.136	0.000	43.51	1.450	27.66	0.051	0.044	168.1	157.2	96.25	22.97	0.793
18:32	17.786	5.608	0.104	0.172	0.000	43.57	1.688	26.82	0.059	0.058	168.3	157.1	95.86	22.95	0.792
18:51	17.514	5.886	0.099	0.159	0.000	44.15	1.594	26.67	0.056	0.054	165.5	154.6	96.18	23.16	0.800
19: 9	17.543	5.916	0.108	0.182	0.000	43.91	1.756	26.31	0.060	0.061	166.9	155.8	95.85	23.05	0.796
19:28	18.062	4.916	0.109	0.179	0.000	44.65	1.798	26.20	0.061	0.059	168.6	157.2	96.04	22.80	0.787
19:46	16.329	8.261	0.433	0.236	0.000	46.77	2.583	21.19	0.050	0.071	161.1	149.3	95.92	23.66	0.817
20: 5	16.678	6.945	0.158	0.203	0.000	47.04	1.959	23.23	0.071	0.068	157.9	146.9	96.35	23.56	0.813
20:23	18.361	6.377	0.113	0.191	0.000	43.80	1.948	25.31	0.059	0.062	168.5	156.8	96.22	22.99	0.794
20:42	17.937	6.624	0.118	0.167	0.000	44.53	1.777	25.02	0.057	0.053	163.9	152.6	96.28	23.18	0.800
21: 0	17.877	6.361	0.096	0.186	0.000	44.05	1.846	25.52	0.056	0.061	166.1	154.8	96.06	23.08	0.797
21:19	17.822	6.262	0.102	0.167	0.000	44.18	1.715	25.86	0.054	0.055	165.3	154.1	96.22	23.14	0.799
21:37	18.212	5.719	0.122	0.198	0.000	43.03	1.946	26.64	0.064	0.064	172.7	161.0	95.99	22.86	0.789
21:56	18.090	5.854	0.089	0.170	0.000	43.56	1.717	26.49	0.052	0.057	168.1	156.8	96.08	22.96	0.793
22:14	17.485	6.253	0.083	0.150	0.000	44.33	1.562	26.00	0.048	0.049	162.2	151.4	95.96	23.17	0.800
22:33	18.088	5.578	0.094	0.176	0.000	43.24	1.749	26.92	0.056	0.060	170.1	158.7	95.96	22.88	0.790
22:52	18.029	5.406	0.099	0.177	0.000	43.19	1.739	27.24	0.057	0.060	171.0	159.7	96.00	22.88	0.790
23:10	17.952	5.603	0.087	0.184	0.000	43.55	1.826	26.83	0.056	0.064	170.3	158.9	96.15	22.97	0.793
23:29	17.940	5.672	0.142	0.198	0.000	43.41	1.934	26.74	0.069	0.066	172.5	161.0	96.16	22.98	0.793
23:47	17.690	6.216	0.126	0.186	0.000	44.22	1.883	25.90	0.063	0.060	167.7	156.4	96.35	23.18	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

8/ 8/1984															
0: 6	17.972	5.969	0.136	0.219	0.000	43.41	2.083	26.21	0.070	0.073	172.9	161.2	96.14	22.99	0.794
0:24	18.354	5.506	0.177	0.215	0.000	42.85	2.179	26.57	0.071	0.026	175.7	163.7	95.96	22.75	0.785
0:43	18.218	6.049	0.141	0.205	0.000	43.06	2.094	25.56	0.062	0.060	171.0	159.2	95.44	22.74	0.785
1: 1	18.161	6.219	0.109	0.186	0.000	43.67	1.963	25.49	0.057	0.056	168.2	156.6	95.91	22.93	0.791
1:20	18.499	5.862	0.119	0.212	0.000	42.99	2.102	26.01	0.064	0.065	173.4	161.4	95.92	22.77	0.786
1:39	18.215	5.653	0.106	0.163	0.000	43.63	1.733	25.96	0.051	0.048	166.8	155.5	95.56	22.75	0.785
3:59	17.747	6.594	0.270	0.201	0.000	44.62	2.126	25.56	0.087	0.062	172.4	160.6	97.27	23.46	0.810
4:17	17.519	5.886	0.156	0.141	0.000	43.68	1.606	26.24	0.057	0.045	164.6	153.8	95.33	22.92	0.791
4:35	17.948	5.909	0.141	0.177	0.000	43.08	1.795	25.86	0.063	0.055	167.5	156.1	95.03	22.71	0.784
4:54	17.457	6.202	0.139	0.166	0.000	43.71	1.710	25.59	0.058	0.051	163.8	152.8	95.08	22.90	0.791
5:12	17.751	5.935	0.156	0.163	0.000	43.44	1.767	26.10	0.058	0.053	167.2	156.0	95.43	22.88	0.790
5:30	17.952	6.017	0.177	0.204	0.000	43.35	2.072	25.86	0.068	0.067	171.8	160.1	95.77	22.90	0.791
5:48	17.749	6.028	0.151	0.195	0.000	43.41	1.913	26.02	0.070	0.064	169.4	158.0	95.59	22.93	0.791
6: 7	17.638	5.900	0.117	0.181	0.000	44.88	1.849	25.18	0.060	0.061	164.6	153.4	95.86	23.01	0.794
6:25	17.970	5.902	0.130	0.173	0.000	43.67	1.770	26.17	0.063	0.058	168.1	156.8	95.90	22.95	0.792
6:43	17.923	6.004	0.117	0.191	0.000	43.28	1.867	26.33	0.061	0.062	169.7	158.3	95.84	22.95	0.792
7: 1	17.756	5.901	0.097	0.178	0.000	43.54	1.765	26.39	0.055	0.059	167.5	156.3	95.75	22.96	0.793
7:20	17.698	6.440	0.132	0.208	0.000	43.88	2.029	25.28	0.069	0.068	168.1	156.5	95.81	23.05	0.796
7:38	17.050	6.322	0.104	0.183	0.000	44.94	1.814	24.98	0.059	0.061	161.5	150.6	95.51	23.14	0.799
7:56	17.978	6.126	0.122	0.225	0.000	43.22	2.143	25.77	0.069	0.074	172.0	160.2	95.73	22.89	0.790
8:15	18.199	5.925	0.115	0.223	0.000	43.46	2.154	25.74	0.068	0.074	172.6	160.6	95.96	22.87	0.789
9: 9	18.613	6.106	0.135	0.189	0.000	44.08	2.009	26.45	0.067	0.061	174.1	162.2	97.70	23.29	0.804
9:28	18.617	5.909	0.111	0.164	0.000	44.18	1.762	27.01	0.058	0.055	172.2	160.6	97.87	23.33	0.805
9:46	18.334	5.769	0.111	0.182	0.000	44.17	1.852	27.12	0.061	0.061	173.1	161.5	97.66	23.32	0.805
10: 4	17.990	6.511	0.112	0.190	0.000	44.76	1.894	25.85	0.063	0.065	168.7	157.2	97.44	23.46	0.810
10:22	17.765	5.941	0.128	0.189	0.000	44.88	1.910	26.09	0.062	0.060	168.9	157.5	97.02	23.31	0.804
10:41	18.221	5.902	0.126	0.189	0.000	43.90	1.932	26.98	0.000	0.066	172.2	160.6	97.32	23.25	0.803
10:59	18.452	6.185	0.127	0.191	0.000	44.27	1.961	26.54	0.000	0.067	171.9	160.1	97.79	23.37	0.807
11:17	18.169	6.310	0.148	0.205	0.000	44.15	2.025	26.12	0.000	0.052	170.4	158.8	97.17	23.28	0.804
11:36	18.212	6.275	0.138	0.190	0.000	44.14	1.963	26.07	0.063	0.058	171.0	159.3	97.11	23.26	0.803
11:55	18.519	6.160	0.145	0.199	0.000	44.42	1.990	26.87	0.000	0.070	173.9	162.1	98.37	23.51	0.811
12:13	18.164	6.265	0.127	0.186	0.000	45.84	1.876	26.13	0.000	0.066	168.7	157.2	98.66	23.71	0.818
13:27	18.732	5.958	0.128	0.160	0.000	44.01	1.715	27.52	0.062	0.057	174.1	162.5	98.35	23.45	0.809
13:46	18.836	6.224	0.113	0.158	0.000	44.34	1.704	27.19	0.056	0.054	172.8	161.1	98.68	23.56	0.813
14: 4	18.909	6.343	0.105	0.156	0.000	44.69	1.678	27.25	0.055	0.054	172.7	161.1	99.23	23.72	0.819
14:59	18.745	6.330	0.123	0.176	0.000	44.47	1.816	26.95	0.063	0.060	173.6	161.8	98.73	23.60	0.815
15:18	19.225	6.087	0.126	0.196	0.000	43.77	1.994	27.09	0.067	0.068	178.1	165.9	98.61	23.39	0.807
15:36	19.060	6.319	0.112	0.194	0.000	44.26	2.017	26.66	0.060	0.067	176.0	163.8	98.75	23.50	0.811
15:55	19.512	6.248	0.118	0.209	0.000	44.95	2.105	26.84	0.068	0.073	179.7	167.1	100.13	23.75	0.820
16:13	19.313	6.149	0.130	0.191	0.000	45.25	2.010	26.30	0.063	0.063	175.8	163.5	99.47	23.61	0.815
16:31	18.914	6.335	0.132	0.176	0.000	44.89	1.891	26.29	0.062	0.056	172.8	160.9	98.75	23.55	0.813
16:50	18.505	6.695	0.112	0.174	0.000	45.47	1.806	25.85	0.058	0.059	168.9	157.3	98.73	23.72	0.819
17: 8	18.468	6.477	0.189	0.175	0.000	45.93	1.952	25.55	0.068	0.058	170.7	158.9	98.87	23.72	0.819
17:27	19.078	6.008	0.117	0.183	0.000	44.99	1.898	26.54	0.063	0.065	174.4	162.4	98.94	23.52	0.812
17:45	19.172	6.569	0.133	0.187	0.000	45.18	1.955	26.10	0.066	0.064	174.2	162.1	99.43	23.71	0.818
17: 4	18.951	6.394	0.161	0.180	0.000	45.25	1.905	26.45	0.069	0.061	174.4	162.4	99.43	23.74	0.820

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

8/ 8/1984

18:22	18.991	5.985	0.166	0.155	0.000	45.12	1.750	27.16	0.062	0.051	174.5	162.7	99.43	23.69	0.818
18:41	19.245	5.954	0.132	0.176	0.000	44.96	1.851	27.09	0.064	0.059	176.2	164.2	99.53	23.63	0.816
18:59	19.107	6.092	0.155	0.195	0.000	44.57	1.963	27.02	0.074	0.065	177.8	165.6	99.25	23.60	0.815
19:18	18.955	6.087	0.170	0.168	0.000	45.67	1.872	26.38	0.069	0.054	173.6	161.7	99.42	23.70	0.818
19:36	18.889	6.753	0.165	0.162	0.000	46.05	1.830	25.52	0.064	0.053	169.9	158.1	99.48	23.84	0.823
19:55	18.520	6.839	0.136	0.143	0.000	46.52	1.615	25.74	0.055	0.046	166.1	154.7	99.62	24.01	0.829
20:13	19.390	5.870	0.130	0.167	0.000	44.71	1.767	27.44	0.063	0.057	176.7	164.7	99.59	23.61	0.815
20:32	18.487	5.987	0.147	0.157	0.000	45.61	1.733	27.11	0.060	0.052	172.3	160.7	99.35	23.80	0.821
20:51	18.835	6.218	0.146	0.155	0.000	45.31	1.705	26.85	0.060	0.052	172.2	160.5	99.34	23.74	0.820
21:10	18.681	6.398	0.147	0.160	0.000	45.31	1.707	26.57	0.066	0.053	171.1	159.5	99.09	23.74	0.820
21:28	18.638	6.400	0.174	0.163	0.000	45.30	1.768	26.51	0.069	0.053	172.0	160.3	99.08	23.74	0.820
21:47	19.082	6.191	0.142	0.194	0.000	44.69	1.981	26.70	0.066	0.067	176.4	164.3	99.11	23.58	0.814
22: 5	18.724	6.184	0.161	0.200	0.000	45.44	2.053	26.07	0.072	0.067	174.5	162.4	98.97	23.63	0.816
22:24	18.360	7.078	0.272	0.213	0.000	45.58	2.293	24.94	0.089	0.067	174.6	162.3	98.89	23.82	0.822
22:42	18.937	6.050	0.130	0.188	0.000	44.69	1.921	26.89	0.065	0.064	175.6	163.6	98.93	23.55	0.813
23: 1	18.770	5.974	0.125	0.205	0.000	44.49	2.028	27.09	0.067	0.070	177.2	165.1	98.83	23.54	0.813
23:19	19.193	5.851	0.113	0.175	0.000	44.43	1.901	27.22	0.059	0.058	176.5	164.4	99.00	23.47	0.810
23:38	18.160	6.665	0.135	0.169	0.000	45.95	1.785	26.09	0.064	0.055	168.6	157.2	99.07	23.91	0.825
23:56	19.072	6.305	0.145	0.162	0.000	45.44	1.807	26.63	0.062	0.053	173.5	161.6	99.68	23.78	0.821

8/ 9/1984

0:15	18.816	5.859	0.115	0.167	0.000	46.14	1.762	27.14	0.057	0.055	173.4	161.6	100.10	23.90	0.825
0:33	18.099	6.311	0.207	0.151	0.000	46.42	1.760	26.66	0.064	0.047	170.6	159.2	99.72	24.05	0.830
0:52	18.284	6.158	0.176	0.154	0.000	45.63	1.742	26.68	0.061	0.049	170.7	159.2	98.93	23.76	0.820
1:10	19.135	5.777	0.119	0.175	0.000	44.76	1.865	27.13	0.057	0.059	175.7	163.7	99.08	23.50	0.811
1:29	19.012	5.411	0.106	0.161	0.000	44.58	1.723	27.89	0.055	0.055	175.7	164.0	98.99	23.47	0.810
1:48	18.104	6.141	0.181	0.192	0.000	45.21	1.953	26.71	0.074	0.064	173.7	162.1	98.63	23.70	0.818
2: 6	18.004	6.061	0.121	0.161	0.000	46.42	1.757	25.98	0.055	0.055	166.9	155.6	98.61	23.72	0.819
2:25	18.053	6.276	0.177	0.179	0.000	45.53	1.900	26.13	0.068	0.060	170.6	159.0	98.37	23.66	0.817
2:43	18.130	6.709	0.312	0.192	0.000	45.45	2.201	24.99	0.084	0.060	173.0	161.0	98.12	23.61	0.815
3: 2	17.916	6.753	0.123	0.155	0.000	45.98	1.686	25.33	0.057	0.053	163.7	152.6	98.06	23.71	0.818
3:20	18.092	6.693	0.143	0.178	0.000	45.91	1.872	25.26	0.066	0.061	167.1	155.6	98.27	23.70	0.818
3:39	17.339	7.023	0.314	0.155	0.000	46.86	1.912	24.56	0.079	0.046	165.1	153.8	98.29	23.94	0.827
3:58	17.921	6.971	0.213	0.167	0.000	46.37	1.909	24.68	0.071	0.053	165.9	154.4	98.35	23.80	0.822
4:34	17.995	6.567	0.113	0.141	0.000	46.01	1.585	25.64	0.053	0.046	163.3	152.3	98.15	23.70	0.818
4:52	18.112	6.501	0.142	0.183	0.000	45.65	1.869	25.70	0.069	0.062	168.7	157.2	98.29	23.67	0.817
5:10	18.116	6.323	0.127	0.161	0.000	46.13	1.693	26.36	0.059	0.054	168.0	156.7	99.02	23.86	0.824
5:29	17.810	6.778	0.150	0.169	0.000	46.56	1.786	25.23	0.064	0.055	165.0	153.7	98.60	23.88	0.824
5:47	17.971	6.860	0.148	0.185	0.000	47.00	1.896	25.09	0.069	0.063	166.7	155.2	99.28	24.03	0.830
6: 5	18.119	6.396	0.165	0.158	0.000	47.35	1.792	25.27	0.061	0.052	166.1	154.7	99.36	23.95	0.827
6:23	18.466	6.312	0.127	0.167	0.000	46.25	1.779	26.17	0.060	0.056	169.6	158.0	99.39	23.86	0.824
6:41	17.892	6.757	0.178	0.171	0.000	46.81	1.818	25.16	0.074	0.057	166.1	154.7	98.92	23.95	0.827
6:59	16.877	7.447	0.295	0.151	0.000	48.57	1.853	23.16	0.073	0.048	158.0	147.0	98.47	24.19	0.835
7:18	17.956	6.585	0.189	0.180	0.000	46.28	1.909	25.31	0.073	0.061	168.1	156.6	98.54	23.78	0.821
7:36	17.949	6.576	0.131	0.144	0.000	46.76	1.583	25.53	0.029	0.052	162.7	151.7	98.75	23.87	0.824

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

8/ 9/1984															
7:54	17.509	6.168	0.164	0.165	0.000	46.37	1.693	26.39	0.067	0.057	167.1	156.0	98.58	23.87	0.824
8:13	18.161	6.593	0.141	0.187	0.000	46.33	1.957	25.14	0.065	0.066	168.0	156.4	98.63	23.75	0.820
8:31	17.594	6.734	0.152	0.156	0.000	46.78	1.694	25.03	0.063	0.053	162.4	151.4	98.25	23.85	0.823
8:49	18.370	6.472	0.128	0.232	0.000	45.37	2.189	25.41	0.070	0.083	173.1	161.0	98.33	23.57	0.814
9: 8	18.253	7.079	0.200	0.250	0.000	45.73	2.541	23.85	0.083	0.085	173.1	160.6	98.07	23.59	0.814
9:26	17.666	6.817	0.208	0.199	0.000	46.62	2.062	24.59	0.084	0.062	167.4	155.7	98.31	23.82	0.822
9:44	18.341	7.018	0.159	0.162	0.000	46.35	1.814	24.32	0.066	0.052	164.0	152.5	98.28	23.69	0.818
10: 3	18.537	6.928	0.165	0.180	0.000	46.00	1.953	24.52	0.071	0.059	167.4	155.6	98.42	23.65	0.816
10:21	18.266	5.964	0.128	0.132	0.000	45.81	1.552	26.37	0.053	0.043	166.2	155.0	98.32	23.58	0.814
10:40	18.694	5.553	0.111	0.170	0.000	44.55	1.752	27.36	0.059	0.058	173.7	162.1	98.32	23.38	0.807
10:58	18.642	5.575	0.116	0.184	0.000	44.49	1.853	27.37	0.063	0.063	175.1	163.3	98.35	23.40	0.808
11:16	18.591	5.606	0.119	0.165	0.000	44.90	1.744	27.33	0.059	0.056	173.2	161.6	98.57	23.49	0.811
11:35	18.614	5.712	0.156	0.188	0.000	44.63	1.937	26.99	0.069	0.063	175.5	163.6	98.36	23.42	0.808
11:53	18.257	6.009	0.157	0.180	0.000	45.17	1.900	26.58	0.065	0.061	172.4	160.8	98.38	23.57	0.814
12:13	18.573	5.749	0.145	0.195	0.000	45.29	2.001	26.27	0.071	0.068	173.8	161.9	98.36	23.43	0.809
12:31	18.360	5.825	0.155	0.196	0.000	44.75	1.979	26.79	0.075	0.068	174.9	163.0	98.20	23.46	0.810
13:26	18.850	5.951	0.219	0.171	0.000	45.34	1.892	27.83	0.080	0.058	179.3	167.3	100.39	23.97	0.827
15:34	18.265	6.238	0.111	0.182	0.000	45.61	1.847	26.83	0.061	0.063	171.9	160.4	99.20	23.84	0.823
15:53	17.922	6.193	0.117	0.157	0.000	45.18	1.696	26.15	0.058	0.054	166.5	155.3	97.53	23.47	0.810
16:11	18.231	5.949	0.121	0.134	0.000	44.41	1.517	26.87	0.054	0.044	167.3	156.2	97.33	23.31	0.805
16:29	18.173	5.836	0.110	0.174	0.000	44.47	1.760	26.93	0.059	0.059	170.8	159.4	97.57	23.35	0.806
16:48	18.438	5.780	0.111	0.198	0.000	43.90	2.008	26.81	0.062	0.069	174.5	162.7	97.38	23.20	0.801
17: 6	18.439	5.878	0.109	0.201	0.000	43.79	2.002	26.67	0.062	0.070	174.0	162.2	97.22	23.17	0.800
17:25	18.551	5.668	0.114	0.205	0.000	43.76	2.106	27.00	0.063	0.069	176.7	164.7	97.54	23.18	0.800
17:43	18.325	5.900	0.135	0.202	0.000	44.35	2.055	26.59	0.069	0.067	174.5	162.6	97.70	23.33	0.805
17:56	18.210	6.700	0.186	0.161	0.000	45.90	1.819	25.30	0.070	0.051	167.3	155.8	98.40	23.71	0.818
18: 1	18.864	6.490	0.195	0.211	0.000	44.31	2.322	25.06	0.040	0.067	174.5	162.0	97.56	23.21	0.801
18:20	18.142	6.507	0.118	0.179	0.000	45.00	1.877	25.39	0.059	0.060	167.2	155.6	97.33	23.39	0.807
18:38	18.155	6.077	0.154	0.174	0.000	44.71	1.881	26.19	0.066	0.056	170.4	158.8	97.46	23.35	0.806
18:57	17.826	6.409	0.223	0.193	0.000	45.02	2.073	25.63	0.074	0.061	171.2	159.5	97.51	23.48	0.811
19:15	18.326	6.258	0.114	0.180	0.000	44.65	1.882	25.81	0.061	0.060	169.1	157.5	97.33	23.30	0.804
19:33	18.520	5.619	0.106	0.170	0.000	44.13	1.765	27.15	0.058	0.057	172.5	160.9	97.57	23.23	0.802
19:52	18.316	5.814	0.105	0.180	0.000	44.27	1.850	26.71	0.059	0.060	171.5	159.9	97.36	23.24	0.802
20:10	18.550	6.001	0.116	0.168	0.000	44.43	1.816	26.49	0.059	0.055	171.0	159.4	97.68	23.31	0.804
20:29	17.536	5.203	0.106	0.171	0.000	45.07	1.734	27.86	0.058	0.057	171.2	160.2	97.79	23.48	0.811
20:47	18.125	5.694	0.102	0.166	0.000	44.50	1.736	27.20	0.055	0.055	170.8	159.5	97.63	23.36	0.806
21: 6	18.518	5.804	0.115	0.209	0.000	44.22	2.085	26.80	0.066	0.070	175.9	163.9	97.88	23.31	0.805
21:24	18.078	6.020	0.097	0.158	0.000	45.41	1.675	26.92	0.053	0.054	168.8	157.6	98.46	23.67	0.817
21:43	17.660	6.172	0.088	0.161	0.000	45.65	1.509	26.91	0.053	0.057	165.8	154.9	98.26	23.76	0.820
22: 1	18.491	5.653	0.117	0.157	0.000	44.63	1.658	27.72	0.060	0.054	173.1	161.6	98.54	23.52	0.812
22:19	18.975	5.418	0.116	0.193	0.000	43.85	1.964	27.80	0.063	0.067	179.0	166.9	98.45	23.30	0.804
22:39	18.390	5.889	0.127	0.176	0.000	44.94	1.854	27.07	0.063	0.061	173.4	161.7	98.58	23.58	0.814
22:57	18.791	6.034	0.241	0.217	0.000	44.26	2.292	26.47	0.088	0.072	180.5	168.0	98.46	23.42	0.808
23:16	18.942	6.373	0.201	0.215	0.000	44.40	2.322	25.82	0.071	0.071	178.2	165.6	98.42	23.41	0.808
23:34	18.539	6.225	0.125	0.150	0.000	45.37	1.661	26.43	0.057	0.051	168.9	157.5	98.61	23.62	0.815
23:53	18.643	5.978	0.109	0.173	0.000	44.87	1.819	26.82	0.060	0.057	172.5	160.8	98.53	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

8/10/1984															
0:11	17.138	5.002	0.133	0.150	0.000	45.81	1.626	28.21	0.060	0.048	169.9	159.2	98.18	23.67	0.817
0:30	18.797	5.468	0.111	0.166	0.000	44.10	1.768	27.69	0.058	0.056	175.1	163.4	98.21	23.31	0.805
0:48	18.556	5.567	0.117	0.164	0.000	44.52	1.744	27.53	0.059	0.055	173.6	162.1	98.32	23.42	0.808
1: 7	18.438	5.767	0.162	0.197	0.000	44.64	1.989	27.10	0.074	0.067	176.3	164.4	98.44	23.49	0.811
1:25	18.510	5.980	0.182	0.186	0.000	44.84	2.024	26.64	0.068	0.062	175.3	163.3	98.49	23.52	0.812
1:44	18.472	5.892	0.206	0.177	0.000	44.63	1.948	26.80	0.073	0.058	175.1	163.3	98.26	23.46	0.810
2: 2	18.547	5.699	0.124	0.169	0.000	44.66	1.788	27.33	0.063	0.058	173.8	162.1	98.44	23.47	0.810
2:21	17.703	5.783	0.138	0.162	0.000	45.13	1.620	27.56	0.065	0.056	170.1	159.1	98.21	23.66	0.817
2:39	18.797	5.805	0.172	0.143	0.000	44.77	1.708	27.00	0.059	0.048	172.7	161.0	98.50	23.45	0.810
2:58	17.827	6.748	0.193	0.183	0.000	46.27	1.793	25.26	0.076	0.062	166.6	155.2	98.41	23.82	0.822
3:16	18.532	5.873	0.109	0.178	0.000	45.09	1.660	26.95	0.064	0.065	171.3	159.8	98.52	23.55	0.813
3:35	18.200	5.925	0.114	0.155	0.000	45.43	1.543	26.79	0.056	0.052	167.7	156.6	98.26	23.58	0.814
3:54	18.356	5.747	0.108	0.176	0.000	45.27	1.646	27.29	0.061	0.061	171.5	160.1	98.71	23.63	0.816
4:12	17.835	5.771	0.114	0.146	0.000	46.08	1.466	27.19	0.054	0.050	166.8	155.9	98.71	23.78	0.821
4:31	18.574	5.592	0.123	0.180	0.000	44.85	1.696	27.54	0.064	0.064	173.9	162.4	98.68	23.53	0.812
4:49	17.966	5.882	0.112	0.147	0.000	45.99	1.457	27.14	0.055	0.051	167.0	156.1	98.80	23.79	0.821
5: 8	18.489	5.742	0.126	0.215	0.000	44.89	1.940	27.08	0.071	0.079	175.9	164.0	98.63	23.54	0.812
5:26	18.113	5.692	0.100	0.164	0.000	45.68	1.575	27.34	0.056	0.059	169.6	158.5	98.78	23.71	0.818
5:45	18.745	5.990	0.164	0.202	0.000	45.03	1.968	26.33	0.072	0.069	174.7	162.7	98.57	23.49	0.811
6: 3	18.289	5.940	0.140	0.195	0.000	45.54	1.852	26.62	0.070	0.069	172.5	160.8	98.72	23.65	0.816
6:22	18.924	5.665	0.132	0.178	0.000	44.88	1.771	26.89	0.064	0.060	173.8	161.9	98.56	23.41	0.808
7:39	16.726	5.695	0.121	0.162	0.000	43.60	1.475	26.56	0.060	0.056	162.0	151.6	94.46	22.87	0.789
7:57	17.877	6.119	0.120	0.230	0.000	43.49	1.967	26.38	0.070	0.080	172.1	160.5	96.33	23.11	0.798
8:15	17.366	6.111	0.133	0.197	0.000	44.97	1.793	25.72	0.066	0.068	165.8	154.7	96.43	23.29	0.804
8:33	17.388	6.541	0.208	0.218	0.000	44.03	1.951	25.65	0.053	0.051	168.1	156.7	96.09	23.23	0.802
8:52	17.610	6.246	0.121	0.185	0.000	43.91	1.751	26.07	0.044	0.043	165.7	154.6	95.98	23.11	0.798
9:10	17.770	6.193	0.150	0.217	0.000	43.55	1.879	26.40	0.032	0.033	169.1	157.7	96.22	23.12	0.798
11:54	17.878	5.673	0.132	0.199	0.000	42.98	1.764	26.99	0.068	0.068	171.3	160.0	95.75	22.90	0.790
12:12	17.602	5.706	0.113	0.174	0.000	44.03	1.583	27.08	0.063	0.059	167.8	156.8	96.41	23.18	0.800
12:31	17.733	5.745	0.100	0.180	0.000	44.12	1.614	27.26	0.043	0.043	168.1	157.1	96.84	23.26	0.803
12:49	17.739	5.569	0.100	0.180	0.000	43.40	1.605	27.59	0.062	0.062	170.0	159.0	96.30	23.09	0.797
13: 7	17.786	5.670	0.108	0.207	0.000	43.04	1.797	27.47	0.048	0.048	171.7	160.4	96.17	23.03	0.795
13:25	17.719	5.782	0.105	0.188	0.000	43.53	1.691	27.21	0.025	0.048	168.6	157.6	96.29	23.11	0.798
13:43	17.651	6.262	0.142	0.172	0.000	43.83	1.684	26.22	0.038	0.029	165.3	154.3	96.03	23.13	0.798
14: 1	17.552	6.475	0.183	0.197	0.000	44.15	1.844	25.92	0.083	0.066	168.7	157.4	96.47	23.30	0.804
14:20	17.556	6.620	0.127	0.191	0.000	44.28	1.743	25.49	0.031	0.029	163.1	152.1	96.07	23.21	0.801
14:38	17.796	6.041	0.120	0.190	0.000	43.55	1.765	26.61	0.021	0.046	167.8	156.7	96.14	23.08	0.797
14:57	18.158	6.272	0.133	0.189	0.000	43.47	1.725	26.35	0.051	0.046	168.6	157.3	96.40	23.10	0.797
15:15	17.722	6.423	0.122	0.180	0.000	43.94	1.673	26.06	0.055	0.049	165.6	154.5	96.22	23.19	0.801
15:33	17.689	5.856	0.107	0.160	0.000	43.68	1.497	27.17	0.037	0.029	165.8	155.0	96.23	23.13	0.798
15:51	17.252	5.965	0.099	0.154	0.000	43.88	1.400	27.12	0.030	0.021	162.6	152.2	95.92	23.18	0.800
16:10	17.362	6.213	0.107	0.171	0.000	43.89	1.549	26.78	0.031	0.026	164.0	153.3	96.13	23.24	0.802
16:28	17.641	5.870	0.121	0.178	0.000	43.63	1.600	27.29	0.039	0.031	167.7	156.8	96.40	23.18	0.800
16:46	17.708	6.047	0.133	0.173	0.000	43.79	1.607	26.99	0.022	0.050	167.2	156.2	96.51	23.22	0.802
17: 5	17.509	6.277	0.136	0.196	0.000	43.31	1.773	26.26	0.014	0.053	166.2	155.2	95.53	23.02	0.794
17:23	17.350	6.432	0.129	0.193	0.000	43.57	1.699	26.21	0.056	0.046	165.4	154.5	95.68	23.14	0.799

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
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8/10/1984

17:41	17.012	6.031	0.143	0.155	0.000	43.68	1.487	27.02	0.061	0.049	164.5	154.0	95.64	23.17	0.800
17:59	17.733	6.251	0.150	0.184	0.000	43.31	1.700	26.52	0.051	0.023	167.2	156.1	95.93	23.07	0.796
17:59	17.900	6.020	0.122	0.170	0.000	43.90	1.563	27.50	0.044	0.041	169.1	158.0	97.26	23.39	0.807
18:18	17.530	6.120	0.127	0.162	0.000	43.52	1.558	26.48	0.057	0.036	164.7	153.8	95.59	23.03	0.795
19: 9	17.347	5.980	0.127	0.188	0.000	43.24	1.634	26.91	0.048	0.046	166.7	155.8	95.51	23.03	0.795
19:27	17.313	6.180	0.107	0.170	0.000	43.65	1.535	26.71	0.042	0.042	164.1	153.4	95.74	23.14	0.799
19:46	17.537	6.660	0.278	0.214	0.000	43.08	2.021	25.60	0.047	0.048	169.9	158.4	95.49	23.03	0.795
20: 4	17.603	5.870	0.158	0.181	0.000	44.53	1.727	25.49	0.032	0.043	163.8	152.8	95.64	22.96	0.793
20:23	17.700	6.900	0.164	0.189	0.000	43.70	1.770	25.44	0.021	0.046	164.5	153.3	95.93	23.18	0.800
20:41	17.345	6.500	0.122	0.157	0.000	44.05	1.495	26.33	0.046	0.039	162.6	151.9	96.08	23.28	0.804
20:59	17.348	6.400	0.141	0.181	0.000	43.81	1.626	26.25	0.034	0.043	164.2	153.4	95.83	23.18	0.800
21:18	17.719	6.162	0.119	0.168	0.000	43.67	1.542	26.78	0.032	0.042	165.6	154.7	96.23	23.17	0.800
21:36	17.540	5.806	0.119	0.181	0.000	43.23	1.562	27.52	0.027	0.047	167.8	157.0	96.03	23.10	0.797
21:55	17.210	6.000	0.152	0.189	0.000	43.58	1.634	27.21	0.037	0.046	167.4	156.6	96.06	23.22	0.801
22:13	16.842	6.000	0.125	0.153	0.000	44.12	1.381	27.42	0.037	0.037	163.0	152.8	96.12	23.36	0.806
22:31	17.058	6.170	0.122	0.165	0.000	44.11	1.487	27.09	0.022	0.041	163.7	153.2	96.27	23.36	0.806
22:51	17.305	6.230	0.134	0.173	0.000	43.83	1.571	26.77	0.051	0.042	165.3	154.5	96.11	23.25	0.803
23: 9	17.316	6.360	0.144	0.191	0.000	43.87	1.986	26.65	0.055	0.046	169.8	158.6	96.62	23.36	0.807
23:12	17.459	6.570	0.156	0.166	0.000	43.80	1.637	25.34	0.052	0.048	162.3	151.4	95.23	23.01	0.794
23:28	17.766	5.826	0.114	0.163	0.000	43.24	1.807	27.33	0.013	0.039	169.5	158.4	96.30	23.09	0.797
23:46	17.820	6.125	0.121	0.206	0.000	43.37	2.067	26.93	0.018	0.053	172.4	160.9	96.70	23.21	0.801

8/11/1984

0: 4	17.397	6.000	0.127	0.184	0.000	44.31	1.979	26.25	0.046	0.047	168.1	156.9	96.33	23.21	0.801
0:23	17.324	6.200	0.133	0.188	0.000	43.69	2.006	26.73	0.048	0.049	170.0	158.8	96.37	23.26	0.803
0:41	17.192	6.600	0.128	0.160	0.000	44.15	1.836	25.98	0.021	0.038	163.9	153.0	96.11	23.30	0.804
1: 0	17.439	6.375	0.130	0.189	0.000	45.45	1.975	26.25	0.050	0.049	168.5	157.3	97.91	23.70	0.818
1:18	17.189	6.338	0.107	0.177	0.000	43.81	1.827	26.75	0.031	0.045	166.7	155.8	96.27	23.31	0.805
1:37	17.018	6.370	0.118	0.190	0.000	43.87	1.937	26.48	0.051	0.050	167.4	156.4	96.08	23.30	0.804
1:55	16.598	7.270	0.152	0.184	0.000	45.09	1.965	24.95	0.029	0.046	161.2	150.4	96.29	23.60	0.815
2:14	17.487	6.540	0.117	0.177	0.000	43.78	1.942	26.07	0.023	0.045	166.6	155.4	96.19	23.23	0.802
2:32	17.172	6.118	0.101	0.166	0.000	43.97	1.508	27.13	0.032	0.026	163.9	153.4	96.22	23.30	0.804
2:51	17.198	6.168	0.116	0.192	0.000	43.67	1.899	26.94	0.024	0.051	168.5	157.4	96.25	23.27	0.803
3: 9	17.262	6.132	0.112	0.202	0.000	43.39	2.001	26.71	0.033	0.021	168.5	157.4	95.86	23.12	0.798
3:28	16.945	6.135	0.128	0.214	0.000	43.51	2.018	26.91	0.051	0.057	170.1	159.0	95.97	23.24	0.802
3:46	17.357	6.600	0.116	0.200	0.000	43.60	2.098	25.98	0.040	0.036	168.0	156.7	96.03	23.21	0.801
4: 4	17.158	6.470	0.138	0.210	0.000	44.23	2.202	25.44	0.045	0.038	167.4	156.1	95.93	23.20	0.801
4:23	15.127	6.000	0.103	0.143	0.000	46.15	1.344	26.70	0.049	0.031	154.4	145.0	95.65	23.68	0.817
5: 0	17.700	6.430	0.161	0.212	0.000	43.90	1.989	26.23	0.044	0.044	170.1	158.6	96.71	23.30	0.804
5:18	17.098	6.637	0.139	0.176	0.000	44.20	1.886	25.98	0.044	0.029	164.9	154.0	96.19	23.35	0.806
5:37	17.093	6.151	0.126	0.188	0.000	43.44	1.878	26.87	0.041	0.030	167.6	156.7	95.82	23.17	0.800
5:55	16.725	6.212	0.131	0.150	0.000	44.39	1.423	26.93	0.025	0.034	161.2	151.0	96.02	23.39	0.807
6:13	16.722	6.490	0.130	0.162	0.000	44.00	1.532	26.30	0.038	0.029	160.6	150.3	95.40	23.25	0.802
6:32	17.591	6.078	0.121	0.186	0.000	42.83	1.610	26.68	0.033	0.025	165.5	154.6	95.16	22.88	0.790
6:59	17.178	6.214	0.125	0.199	0.000	43.74	1.648	27.26	0.054	0.053	167.9	157.1	96.48	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

8/11/1984															
7:17	16.952	6.002	0.109	0.173	0.000	43.44	1.516	27.14	0.049	0.044	164.4	153.9	95.43	23.12	0.798
7:35	15.938	6.000	0.132	0.201	0.000	44.54	1.659	26.53	0.043	0.031	161.0	150.8	95.08	23.27	0.803
7:53	17.202	6.240	0.135	0.194	0.000	43.41	1.677	26.55	0.045	0.024	165.1	154.3	95.47	23.09	0.797
8:11	17.247	6.155	0.125	0.222	0.000	43.65	1.831	25.95	0.045	0.023	165.2	154.2	95.24	22.98	0.793
8:30	17.236	6.460	0.114	0.185	0.000	43.38	1.636	26.29	0.050	0.021	163.5	152.8	95.37	23.09	0.797
8:48	17.185	6.640	0.213	0.227	0.000	42.95	1.909	26.08	0.057	0.062	169.0	157.7	95.32	23.09	0.797
9:10	17.162	6.683	0.000	0.000	0.000	43.46	1.671	26.29	0.053	0.046	159.2	148.8	95.36	23.14	0.799
9:29	17.173	6.427	0.165	0.157	0.000	44.04	1.681	26.69	0.053	0.036	165.9	155.1	96.42	23.39	0.807
9:47	17.680	6.215	0.153	0.168	0.000	43.98	1.840	27.03	0.038	0.040	170.0	158.8	97.15	23.41	0.808
10: 5	16.482	6.007	0.154	0.181	0.000	43.88	1.914	27.06	0.043	0.045	167.4	156.6	95.77	23.29	0.804
10:23	16.985	6.208	0.113	0.163	0.000	43.84	1.745	27.11	0.027	0.041	166.0	155.3	96.23	23.34	0.806
10:42	17.093	6.710	0.237	0.180	0.000	45.24	2.057	25.75	0.043	0.041	167.8	156.6	97.36	23.67	0.817
11: 0	17.201	6.407	0.179	0.182	0.000	43.41	2.076	26.32	0.042	0.045	169.3	158.1	95.86	23.18	0.800
11:18	17.195	5.838	0.141	0.171	0.000	43.03	1.926	27.34	0.027	0.042	169.9	158.8	95.71	23.06	0.796
12: 3	17.889	6.182	0.149	0.183	0.000	44.69	1.705	27.85	0.043	0.044	172.3	161.1	98.73	23.81	0.822
12:21	16.941	5.702	0.143	0.183	0.000	43.75	2.136	26.94	0.043	0.044	170.5	159.4	95.89	23.13	0.798
12:39	17.078	5.742	0.141	0.206	0.000	43.35	2.469	26.69	0.035	0.050	173.9	162.3	95.76	23.03	0.795
12:57	17.988	5.367	0.100	0.210	0.000	44.55	2.054	27.64	0.060	0.073	176.3	164.6	98.04	23.43	0.809
13:16	17.281	4.870	0.089	0.192	0.000	43.57	2.223	28.36	0.035	0.047	176.3	164.9	96.67	23.12	0.798
13:34	17.537	4.896	0.094	0.198	0.000	43.26	2.323	28.06	0.039	0.049	177.5	165.9	96.46	22.99	0.793
13:52	17.495	5.521	0.089	0.189	0.000	44.15	1.873	27.04	0.049	0.047	169.5	158.3	96.45	23.15	0.799
14:10	17.408	5.891	0.073	0.173	0.000	45.56	2.095	26.88	0.055	0.062	170.9	159.6	98.19	23.69	0.818
14:29	17.457	5.169	0.067	0.160	0.000	46.73	1.558	27.77	0.051	0.053	167.8	157.1	99.01	23.86	0.824
14:47	16.024	4.814	0.061	0.122	0.000	45.74	1.539	28.63	0.029	0.029	163.9	154.0	96.99	23.60	0.815
15: 5	17.194	4.941	0.084	0.203	0.000	44.47	1.753	28.59	0.040	0.053	172.4	161.5	97.32	23.39	0.808
15:25	16.708	5.005	0.089	0.205	0.000	44.14	1.835	27.50	0.040	0.048	168.1	157.4	95.57	23.03	0.795
15:43	16.168	5.247	0.061	0.135	0.000	45.20	1.658	28.21	0.027	0.031	164.4	154.3	96.73	23.55	0.813
16: 1	15.021	5.317	0.062	0.109	0.000	47.06	1.301	27.53	0.021	0.026	154.2	145.1	96.44	23.82	0.822
16:20	16.936	5.644	0.089	0.251	0.000	43.51	2.631	27.32	0.042	0.053	177.3	165.6	96.48	23.23	0.802

MIFGA PROGRAM
TEST BOM/FGT-014

SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:

8/ 5/1984						
21:30	73.1	26.9	0.0	0.0	846	143
8/ 6/1984						
11:56	82.7	13.9	0.0	3.4	983	170
12:15	80.2	14.4	2.3	3.1	1100	171
15: 8	75.7	24.3	0.0	0.0	779	178
16: 5	71.8	28.2	0.0	0.0	819	181
16:23	72.8	24.9	0.0	2.4	851	182
16:43	72.9	24.8	0.0	2.4	877	183
16:58	75.1	22.8	0.0	2.1	1011	184
17:13	85.3	12.1	0.0	2.6	1008	185
17:30	73.8	23.8	0.0	2.4	922	186
17:48	74.6	25.4	0.0	0.0	813	187
18:14	72.2	24.7	0.0	3.1	989	188
18:33	81.9	13.0	2.0	3.1	1006	189
18:54	70.7	23.5	2.3	3.5	978	190
19:19	71.1	25.2	0.0	3.7	907	191
20:42	71.0	24.3	2.1	2.6	1038	193
21: 4	79.8	12.3	2.7	5.2	1081	194
21:31	71.5	24.7	0.0	3.9	1017	195
22: 4	70.3	25.7	0.0	3.9	1019	196
8/ 7/1984						
1: 0	83.1	13.5	0.0	3.4	1111	203
1:54	85.6	14.4	0.0	0.0	1048	204
2:27	86.0	14.0	0.0	0.0	1120	205
2:55	84.5	12.4	0.0	3.1	1258	206
4:10	78.5	15.0	2.5	4.0	1108	207
4:57	81.3	12.9	3.1	2.7	1068	208
5:58	70.6	25.4	0.0	4.0	969	209
7: 4	82.4	14.3	0.0	3.3	1033	210
7:40	85.2	12.2	0.0	2.6	1098	212
8:26	85.4	12.1	0.0	2.5	1217	214
8:45	85.8	11.8	0.0	2.4	1207	
9: 1	86.9	10.6	0.0	2.5	1158	216
9:43	71.7	25.4	3.0	0.0	1022	217
10:25	79.9	17.9	2.2	0.0	1081	219
10:40	80.7	17.1	2.2	0.0	1127	220
11: 4	79.3	16.0	2.2	2.4	1118	221
11:30	79.8	15.8	2.1	2.3	1199	222
11:46	81.8	14.0	2.2	1.9	1355	223
12:17	81.6	16.2	2.1	0.0	1128	224
12:43	82.6	15.2	2.2	0.0	1214	225
13: 9	82.1	13.4	2.4	2.1	1294	226
13:26	82.9	14.9	2.2	0.0	1198	227
13:45	82.0	14.2	1.6	2.2	1460	228
14:12	81.8	13.6	2.1	2.5	1353	229

MIFGA PROGRAM
TEST BOM/FGT-014

SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:

8/ 7/1984						
14:29	81.4	14.3	1.9	2.4	1375	
14:46	82.8	12.8	2.2	2.2	1311	231
15: 6	83.0	12.0	2.0	3.0	1289	232
15:31	85.2	12.1	0.0	2.7	1245	233
17:22	85.8	12.4	0.0	1.8	1293	234
17:48	84.4	12.5	0.0	3.1	1196	235
19:20	80.5	13.6	3.2	2.7	1229	236
19:42	85.1	9.8	0.0	5.1	1453	237
20: 5	83.1	13.8	0.0	3.1	1262	238
20:36	85.1	12.0	0.0	2.9	1199	239
21:21	87.1	12.9	0.0	0.0	1145	240
22:39	82.3	14.4	1.8	1.5	1138	241
23:25	82.8	11.8	2.8	2.6	1390	242
23:43	86.0	11.6	0.0	2.4	1343	243
8/ 8/1984						
0:17	82.7	14.3	0.0	3.0	1271	244
1:27	85.6	12.2	0.0	2.2	1152	245
1:47	86.0	11.4	0.0	2.5	1196	246
2: 3	87.2	10.8	0.0	2.0	1323	247
2:23	88.1	11.9	0.0	0.0	1214	248
2:43	86.6	11.2	0.0	2.3	1293	249
2:59	87.1	10.7	0.0	2.2	1302	250
3:21	87.5	10.5	2.0	0.0	1292	251
3:52	84.3	10.2	2.1	3.4	1309	252
4:24	84.3	11.9	1.8	1.9	1252	253
5: 3	84.0	11.4	2.5	2.1	1269	254
6:22	83.8	13.7	2.5	0.0	1171	255
6:44	86.0	11.6	0.0	2.4	1314	256
7: 8	88.2	11.8	0.0	0.0	1284	257
7:25	87.5	10.5	0.0	2.0	1388	258
8: 3	88.4	11.6	0.0	0.0	1294	259
9:22	84.3	13.4	2.3	0.0	1021	260
9:45	84.0	11.9	2.1	2.0	1150	261
10: 8	84.5	13.4	2.1	0.0	1137	262
10:37	84.8	13.2	2.1	0.0	1170	263
11: 1	84.5	11.3	2.1	2.1	1160	264
11:45	86.1	11.6	2.3	0.0	1134	265
12:19	83.8	14.2	2.0	0.0	1091	266
12:35	84.1	11.7	2.1	2.1	1342	267
12:55	84.5	11.2	2.0	2.3	1223	268
13:28	85.5	10.9	2.0	1.7	1372	270
13:45	85.4	10.9	1.8	1.9	1364	271
15:34	85.6	11.9	2.5	0.0	1268	272
15:56	84.7	10.8	2.4	2.1	1451	273
16:33	86.5	11.3	0.0	2.2	1376	275

MIFGA PROGRAM
TEST BOM/FGT-014

SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:

8/ 8/1984						
16:50	86.1	10.1	1.7	2.2	1372	276
17: 9	83.0	11.6	2.0	3.4	1368	277
17:26	85.3	10.1	2.2	2.3	1384	278
17:43	85.3	9.9	2.4	2.3	1394	279
18: 3	84.3	10.8	2.5	2.4	1380	280
18:20	80.8	14.2	2.2	2.7	1211	281
19: 6	82.0	12.9	3.0	2.1	1250	282
19:37	81.9	12.2	2.4	3.6	1209	283
20: 8	77.1	17.5	2.4	3.0	1140	284
20:42	81.9	12.9	2.3	2.9	1173	285
21:29	80.2	13.3	3.1	3.4	1190	286
22: 6	78.0	16.4	2.6	3.0	1247	287
22:55	82.0	13.8	2.6	1.7	1252	288
23:41	74.7	23.2	0.0	2.1	1090	289
8/ 9/1984						
0: 3	84.8	12.5	0.0	2.7	1227	290
0:25	83.9	13.2	0.0	3.0	1205	291
0:42	81.7	13.9	0.0	4.4	1138	
0:58	84.6	12.4	0.0	3.0	1330	293
1:57	85.5	12.7	1.8	0.0	1260	294
3:50	83.1	11.3	2.7	2.8	1310	295
4: 7	81.3	15.1	0.0	3.6	1234	296
4:28	85.5	11.9	0.0	2.6	1228	297
4:44	84.3	12.6	0.0	3.1	1268	298
5: 3	85.3	12.2	0.0	2.5	1263	299
5:22	75.3	21.8	0.0	3.0	1152	
5:42	83.8	12.9	0.0	3.3	1183	
6: 1	84.8	11.5	0.0	3.7	1259	302
6:38	86.6	11.1	0.0	2.3	1464	305
6:59	83.4	12.1	0.0	4.4	1276	
7:19	84.6	10.7	1.7	3.1	1378	307
7:39	83.9	11.2	1.8	3.1	1282	308
8: 2	83.8	10.0	2.1	4.1	1465	309
8:22	84.9	9.9	2.3	2.8	1396	310
8:48	85.3	9.7	2.2	2.9	1486	311
9:16	89.9	10.1	0.0	0.0	1291	312
10:31	86.0	12.1	0.0	1.9	1182	313
11:33	85.9	11.0	1.6	1.5	1397	314
11:56	85.5	10.4	1.6	2.6	1429	315
13:16	83.7	10.7	3.2	2.4	1321	316
13:45	80.5	15.1	2.3	2.1	1342	317
14:57	85.9	11.5	2.6	0.0	1277	318
16: 1	84.5	10.9	2.6	2.1	1370	319
16:30	86.1	11.5	2.4	0.0	1357	320
19: 5	79.8	14.4	3.1	2.7	1080	321

MIFGA PROGRAM
TEST BOM/FGT-014

SULFUR GAS CHROMATOGRAPH DATA

DATE TIME	H2S % TOT	COS % TOT	C2H5SH % TOT	CH3SH % TOT	TOTAL PPM	NOTES:

8/ 9/1984						
20:59	82.7	15.1	0.0	2.1	1114	322
22: 3	81.9	15.6	0.0	2.5	1158	323
22:57	83.8	11.9	2.2	2.2	1330	324
23:32	74.7	22.1	0.0	3.2	1060	325
23:51	83.7	13.8	0.0	2.5	1132	326
8/10/1984						
1:23	85.1	12.1	0.0	2.8	1212	327
1:56	85.4	12.2	1.6	0.9	1224	328
2:55	82.6	11.6	2.5	3.3	1316	329
4: 4	77.8	16.4	3.1	2.7	1179	330
6:15	80.1	14.2	3.0	2.6	1250	331
7: 9	83.3	14.1	2.7	0.0	1174	332
9: 4	84.9	13.1	0.0	2.1	1227	333
11:27	83.3	11.9	2.1	2.7	1224	334
12:50	82.7	12.3	2.7	2.3	1305	335
14:22	82.8	12.8	2.6	1.8	1251	336
15:18	85.2	11.9	2.8	0.0	1122	337
15:57	85.2	12.0	2.8	0.0	1176	338
16:54	87.6	10.7	0.0	1.7	1442	339
17:31	87.1	10.7	0.0	2.2	1305	340
19:10	86.4	11.4	2.3	0.0	1305	341
19:50	84.5	9.9	3.0	2.6	1388	342
21: 9	87.3	10.8	0.0	1.9	1240	343
21:58	89.3	10.7	0.0	0.0	1303	344
22:60	84.9	10.7	2.5	1.9	1285	345
8/11/1984						
0: 3	83.7	10.7	3.0	2.7	1392	346
0:56	83.9	10.0	3.2	2.9	1383	347
1:42	86.8	10.6	0.0	2.6	1340	348
2:26	86.4	10.9	0.0	2.7	1307	349
3: 7	85.3	10.4	2.0	2.4	1414	350
4:35	83.4	10.6	2.8	3.3	1318	351
5: 7	85.1	9.7	2.4	2.7	1394	352
6: 1	84.2	10.4	2.8	2.6	1376	353
7:20	85.4	11.0	3.6	0.0	995	354
7:53	85.0	9.9	2.3	2.8	1406	355
8:43	86.7	9.6	0.0	3.7	1492	356
9:54	86.4	9.2	0.0	4.4	1423	357
11:31	86.1	10.5	1.9	1.4	1414	358
12: 1	86.1	9.9	1.9	2.0	1500	359
13:33	86.2	11.0	2.8	0.0	1500	360

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: 8/ 2/84 12: 0 TO 8/ 3/84 2: 0

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	23.541	%	0.915
CO2	7.354	%	0.417
O2	-0.299	%	0.212
SIGMA	150.733	BTU/SCF	7.545
AG VEL	-0.013	SPH	0.002
GR VEL	0.918	RPD/T	0.248
T - 3	--OFF--	DEG C	
T - 8	--OFF--	DEG C	
T - 9	--OFF--	DEG C	
T-701	23.445	DEG C	2.296
T-702	33.950	DEG C	2.566
T-703	58.556	DEG C	0.460
T-703A	50.444	DEG C	2.371
TT1-703	59.732	DEG C	0.323
TT2-703	59.400	DEG C	0.323
T-705	458.936	DEG C	60.503
T-706	311.346	DEG C	17.554
T-707	326.444	DEG C	21.170
T-710	19.832	DEG C	0.246
T-711	81.446	DEG C	3.339
T-712	19.955	DEG C	0.266
T-713	60.244	DEG C	8.033
T-715	140.734	DEG C	1.830
T-806	295.950	DEG C	17.126
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	397.311	DEG C	32.713
T-820	390.382	DEG C	30.923
T-821	64.850	DEG C	1.862
T-822	66.945	DEG C	0.712
T-823	69.375	DEG C	0.952
F-701	1209.041	SCFM	3.407
F-715	377.365	LBS/HR	111.301
F-802	3139.643	SCFM	354.699
F-803	6499.985	SCFM	970.803
P-703	5.901	IN WC	0.806
P-705	1.128	IN WC	0.415
P-704	4.773	IN WC	0.558
P-706	1.256	IN WC	0.725
P-707	-7.503	IN WC	0.000
P-810	-0.390	IN WC	2.218

AVERAGE BASE TEMPATURE 20.936

AVERAGE FROM PERIOD: 8/ 3/84 12: 0 TO 8/ 4/84 9: 0

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	26.881	%	1.151
CO2	5.833	%	0.599
O2	-0.339	%	0.123
SIGMA	174.431	BTU/SCF	5.368
AG VEL	0.452	SPH	1.971
GR VEL	0.948	RPD/T	0.272
T - 3	--OFF--	DEG C	
T - 8	--OFF--	DEG C	
T - 9	--OFF--	DEG C	
T-701	23.775	DEG C	2.195
T-702	34.713	DEG C	1.993
T-703	58.289	DEG C	0.683
T-703A	45.130	DEG C	1.145
TT1-703	59.758	DEG C	0.374
TT2-703	59.439	DEG C	0.374
T-705	422.744	DEG C	85.793
T-706	278.035	DEG C	19.260
T-707	310.894	DEG C	31.493
T-710	19.914	DEG C	0.652
T-711	77.219	DEG C	2.153
T-712	20.078	DEG C	0.653
T-713	64.697	DEG C	15.369
T-715	140.096	DEG C	2.029
T-806	276.995	DEG C	19.774
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	434.157	DEG C	31.244
T-820	348.033	DEG C	32.652
T-821	57.790	DEG C	17.595
T-822	67.971	DEG C	1.190
T-823	73.851	DEG C	5.345
F-701	1209.545	SCFM	6.763
F-715	621.946	LBS/HR	68.280
F-802	3139.984	SCFM	281.804
F-803	5756.300	SCFM	298.531
P-703	6.060	IN WC	1.134
P-705	1.719	IN WC	0.276
P-704	4.341	IN WC	0.983
P-706	1.378	IN WC	0.267
P-707	-7.503	IN WC	0.001
P-810	-0.914	IN WC	1.694

AVERAGE BASE TEMPATURE 21.790

AVERAGE FROM PERIOD: 8/ 4/84 10: 0 TO 8/ 5/84 9: 0

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	26.384	%	1.233
CO2	6.528	%	0.524
O2	-0.326	%	0.202
SIGMA	165.369	BTU/SCF	13.393
AG VEL	0.686	SPH	1.799
GR VEL	0.865	RPD/T	0.246
T - 3	--OFF--	DEG C	
T - 8	--OFF--	DEG C	
T - 9	--OFF--	DEG C	
T-701	24.403	DEG C	2.306
T-702	34.831	DEG C	2.236
T-703	60.168	DEG C	1.521
T-703A	49.248	DEG C	1.830
TT1-703	61.997	DEG C	0.872
TT2-703	61.675	DEG C	0.867
T-705	438.845	DEG C	77.036
T-706	275.142	DEG C	16.874
T-707	326.028	DEG C	32.070
T-710	19.766	DEG C	0.548
T-711	82.475	DEG C	3.012
T-712	19.966	DEG C	0.562
T-713	66.782	DEG C	13.382
T-715	140.556	DEG C	4.258
T-806	289.786	DEG C	18.966
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	430.137	DEG C	28.092
T-820	322.458	DEG C	20.605
T-821	52.421	DEG C	2.309
T-822	68.660	DEG C	2.033
T-823	72.151	DEG C	2.166
F-701	1397.685	SCFM	41.613
F-715	715.652	LBS/HR	127.220
F-802	3825.668	SCFM	416.069
F-803	6846.231	SCFM	481.465
P-703	7.267	IN WC	1.160
P-705	2.073	IN WC	0.392
P-704	5.194	IN WC	0.994
P-706	1.559	IN WC	0.380
P-707	-7.503	IN WC	0.000
P-810	-0.675	IN WC	1.660

AVERAGE BASE TEMPATURE 20.062

AVERAGE FROM PERIOD: 8/ 5/84 10: 0 TO 8/ 6/84 9: 0

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	29.176	%	2.014
CO2	6.060	%	0.457
O2	-0.366	%	0.069
SIGMA	167.837	BTU/SCF	2.817
AG VEL	1.637	SPH	1.391
GR VEL	1.109	RPD/T	0.191
T - 3	---OFF---	DEG C	
T - 8	---OFF---	DEG C	
T - 9	---OFF---	DEG C	
T-701	25.143	DEG C	2.274
T-702	35.365	DEG C	2.130
T-703	60.086	DEG C	0.228
T-703A	49.705	DEG C	2.597
TT1-703	61.787	DEG C	0.050
TT2-703	61.463	DEG C	0.049
T-705	419.129	DEG C	36.736
T-706	266.192	DEG C	9.437
T-707	320.133	DEG C	17.696
T-710	19.994	DEG C	0.240
T-711	80.905	DEG C	4.127
T-712	20.584	DEG C	0.643
T-713	61.296	DEG C	12.030
T-715	141.645	DEG C	2.657
T-806	298.652	DEG C	12.590
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	626.239	DEG C	39.889
T-820	443.350	DEG C	29.351
T-821	59.286	DEG C	1.919
T-822	71.933	DEG C	1.212
T-823	76.231	DEG C	1.308
F-701	1602.766	SCFM	47.402
F-715	786.928	LBS/HR	171.138
F-802	3778.559	SCFM	312.722
F-803	5419.298	SCFM	1111.836
P-703	11.967	IN WC	0.802
P-705	5.017	IN WC	0.575
P-704	6.950	IN WC	0.768
P-706	4.326	IN WC	0.552
P-707	-7.503	IN WC	0.000
P-810	-2.563	IN WC	3.598

AVERAGE BASE TEMPATURE 20.649

AVERAGE FROM PERIOD: 8/ 6/84 16: 0 TO 8/ 7/84 8: 0

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	26.990	%	0.625
CO2	6.318	%	0.339
O2	-0.429	%	0.076
SIGMA	163.859	BTU/SCF	3.533
AG VEL	1.471	SPH	0.424
GR VEL	1.109	RPD/T	0.092
T - 3	--OFF--	DEG C	
T - 8	--OFF--	DEG C	
T - 9	--OFF--	DEG C	
T-701	25.040	DEG C	3.826
T-702	34.937	DEG C	4.269
T-703	61.431	DEG C	0.565
T-703A	50.602	DEG C	1.292
TT1-703	62.704	DEG C	0.032
TT2-703	62.383	DEG C	0.037
T-705	426.092	DEG C	41.054
T-706	263.239	DEG C	12.768
T-707	321.203	DEG C	21.268
T-710	20.426	DEG C	0.579
T-711	82.058	DEG C	1.917
T-712	21.717	DEG C	0.545
T-713	65.920	DEG C	10.507
T-715	142.331	DEG C	2.267
T-806	301.973	DEG C	19.847
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	684.221	DEG C	29.650
T-820	482.879	DEG C	24.688
T-821	59.064	DEG C	1.518
T-822	74.375	DEG C	1.228
T-823	87.893	DEG C	11.991
F-701	1585.038	SCFM	7.418
F-715	837.411	LBS/HR	76.395
F-802	3914.920	SCFM	340.943
F-803	4063.294	SCFM	1394.986
P-703	12.067	IN WC	0.792
P-705	5.807	IN WC	0.582
P-704	6.260	IN WC	0.475
P-706	5.090	IN WC	0.594
P-707	-7.502	IN WC	0.001
P-810	-3.188	IN WC	4.501

AVERAGE BASE TEMPATURE 21.176

AVERAGE FROM PERIOD: 8/ 7/84 17: 0 TO 8/ 8/84 14:30

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	26.861	%	2.274
CO2	6.217	%	0.662
O2	-0.348	%	0.374
SIGMA	159.666	BTU/SCF	27.263
AG VEL	1.562	SPH	0.345
GR VEL	1.123	RPD/T	0.214
T - 3	--OFF--	DEG C	
T - 8	--OFF--	DEG C	
T - 9	--OFF--	DEG C	
T-701	22.391	DEG C	3.066
T-702	32.683	DEG C	3.013
T-703	60.378	DEG C	1.075
T-703A	48.864	DEG C	2.100
TT1-703	62.622	DEG C	0.412
TT2-703	62.298	DEG C	0.407
T-705	414.853	DEG C	44.089
T-706	253.284	DEG C	9.905
T-707	316.252	DEG C	20.090
T-710	19.495	DEG C	0.577
T-711	80.375	DEG C	3.434
T-712	20.908	DEG C	0.616
T-713	55.440	DEG C	12.092
T-715	141.818	DEG C	3.117
T-806	298.885	DEG C	17.569
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	647.627	DEG C	57.596
T-820	435.989	DEG C	48.657
T-821	59.205	DEG C	2.403
T-822	72.785	DEG C	1.366
T-823	95.450	DEG C	11.100
F-701	1587.764	SCFM	30.526
F-715	883.630	LBS/HR	122.714
F-802	3053.476	SCFM	614.443
F-803	0.000	SCFM	0.000
P-703	9.463	IN WC	1.101
P-705	2.607	IN WC	0.444
P-704	6.856	IN WC	0.908
P-706	1.788	IN WC	0.409
P-707	-7.503	IN WC	0.001
P-810	-2.308	IN WC	3.168

AVERAGE BASE TEMPATURE 21.654

AVERAGE FROM PERIOD: 8/ 8/84 15:30 TO 8/11/84 10: 0

SIGNAL	AVERAGE	UNITS	STD.DEV.
CO	26.898	%	1.059
CO2	6.630	%	0.440
O2	-0.382	%	0.080
SIGMA	169.246	BTU/SCF	10.933
AG VEL	1.318	SPH	1.000
GR VEL	1.369	RPD/T	0.178
T - 3	--OFF--	DEG C	
T - 8	--OFF--	DEG C	
T - 9	--OFF--	DEG C	
T-701	20.469	DEG C	3.207
T-702	30.803	DEG C	3.055
T-703	60.690	DEG C	0.768
T-703A	53.215	DEG C	1.895
TT1-703	62.707	DEG C	0.049
TT2-703	62.375	DEG C	0.057
T-705	427.554	DEG C	47.850
T-706	278.584	DEG C	19.348
T-707	327.352	DEG C	26.200
T-710	20.264	DEG C	0.683
T-711	86.676	DEG C	3.097
T-712	21.280	DEG C	0.630
T-713	63.731	DEG C	10.051
T-715	140.366	DEG C	2.374
T-806	320.717	DEG C	27.603
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	998.671	DEG C	38.112
T-820	820.531	DEG C	43.459
T-821	76.647	DEG C	14.800
T-822	77.119	DEG C	1.366
T-823	100.039	DEG C	14.487
F-701	1801.512	SCFM	19.694
F-715	667.634	LBS/HR	186.456
F-802	3565.001	SCFM	424.368
F-803	0.000	SCFM	0.000
P-703	14.516	IN WC	1.267
P-705	5.283	IN WC	0.700
P-704	9.232	IN WC	1.006
P-706	4.096	IN WC	0.665
P-707	-7.502	IN WC	0.001
P-810	-1.042	IN WC	3.652

AVERAGE BASE TEMPATURE 20.985

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.

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RESULTS OF THE AUGUST 8 AND 9, 1984,
BLIND CANYON BITUMINOUS COAL
EMISSION TESTS ON THE
WELLMAN-GALUSHA GASIFIER AT THE
TWIN CITIES RESEARCH CENTER
IN MINNEAPOLIS, MINNESOTA

Submitted to:

UNIVERSITY OF MINNESOTA
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Attention: David Y.H. Pui, Ph.D.

Approved by:

Perry Lounes, Ph.D.
President

Report Number 4-1850
August 31, 1984

TABLE OF CONTENTS

ABBREVIATIONS

1	—	INTRODUCTION
2		SUMMARY AND DISCUSSION
3		RESULTS
		3.1 Results of Orsat and Moisture Analysis
		3.2 Results of Particulate Loading Determinations
		3.3 Results of Sulfur Dioxide Determinations
		3.4 Results of NO Measurements
		3.5 Results of Opacity Observations

APPENDICES:

A	-	Results of Preliminary Measurements
B	-	Location of Test Ports and Traverse Points
C	-	Methods 2-5 Field Data Sheets
D	-	Method 6 Field Data Sheets
E	-	Method 9 Field Data Sheets
F	-	Laboratory Data Sheets
G	-	Operating Conditions of Gasifier and Fuel Composition
H	-	Calculation of the Dry F-Factor
I	-	Procedures
J	-	Calculation Equations
K	-	Sampling Train Calibration Data

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 (°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 °F (20 °C) and 29.92 IN. of mercury pressure.

1

INTRODUCTION

On August 8 and 9, 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, Sivalis and Bryson (BSB).

Difficulties in sampling were encountered in this test burn due to the high burning rate maintained during the emission tests. The actual burning rate was 12% above the rated capacity of the combustor. This resulted in abnormally high temperatures in the combustor at times far exceeding 2000 °F.

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 10⁶BTU/HR (bituminous coal). A combustion test chamber is attached to the gasifier and it also has a nominal capacity of 30 10⁶BTU/HR. The combustion test chamber is a horizontal, 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, Blind Canyon 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 and only 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 inconel-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. Because of the high temperatures encountered, the last two SO₂ determinations were performed downstream of the scrubber in the stack.

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.

The important results of the particulate determinations performed at the combustor outlet are summarized in Table 1. As will be noted, only one particulate concentration determination was performed. The temperature in the combustor rose to well over 2000 °F after the first run and melted the tip of the pitot tube. The particulate emission factor for the one run completed was 0.17 LB/10⁶BTU.

The heat input to the combustion test chamber for the first run was estimated to average 33.6 10⁶BTU/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 SO₂ emission factors and rates.

The results of the SO₂ determinations are given in Table 2. As will be noted, the SO₂ concentration in the combustor was 216 ppm actual. This corresponds to an SO₂ emission rate of 31 LB/HR and an SO₂ emission factor of 0.95 LB/HR. The SO₂ emission factor calculated from the sulfur content and the heating value of the typical fuel analysis was 0.90 LB/10⁶BTU. A fuel sample from the actual fuel gasified during the SO₂ emission test was not provided for analysis. Inasmuch as the measured SO₂ emission factor exceeded the potential emission factor calculated from the fuel composition analysis, it appears likely that the typical fuel sample analysis is not representative with respect to sulfur of the fuel actually gasified during the SO₂ emission test.

The last two SO₂ tests were performed at the scrubber outlet. However, the inlet and outlet test cannot be directly compared, since the combustor was fired differently on the two days (oxygen content in the stack on the first day was about 14% whereas it dropped to 10.8% on the second day when the two SO₂ tests on the scrubber outlet or stack were performed. If the sulfur content of the fuel was the same for both days, the SO₂ removal efficiency of the wet scrubber can be shown to be about 20%.

TABLE 1. SUMMARY OF THE RESULTS OF THE AUGUST 8, 1984 PARTICULATE EMISSION TEST ON THE COMBUSTOR OUTLET AT THE BUREAU OF MINES COAL GASIFIER PLANT LOCATED IN MINNEAPOLIS, MINNESOTA

ITEM	RUN 1
TIME OF TEST (HRS)	1205/1305
ESTIMATED GAS BURNING RATE (DSCFM)	3231
ESTIMATED HEAT INPUT (MMBTU)*	33.6
ESTIMATED PERCENT OF RATED CAPACITY	112.0
VOLUMETRIC FLOW	
ACTUAL (ACFM)	67100
STANDARD (DSCFM)	13000
GAS TEMPERATURE (DEG-F)	1883
GAS MOISTURE CONTENT (% V/V)	10.55
GAS COMPOSITION (% V/V, DRY)	
CARBON DIOXIDE	8.26
OXYGEN	11.56
NITROGEN	80.18
ISOKINETIC VARIATION (%)	101.0
PARTICULATE CONCENTRATION**	
ACTUAL (GR/ACF)	.010
STANDARD (GR/DSCF)	.052
PARTICULATE EMISSION RATE (LB/HR)**	5.82
PARTICULATE EMISSION FACTORS**	
(LB/MMBTU)	
F-FACTOR METHOD (ORSAT)	.173

* TO COMBUSTOR FROM PRODUCER GAS

** DRY CATCH ONLY

TABLE 2. SUMMARY OF THE RESULTS OF THE AUGUST 9, 1984 SULFUR DIOXIDE EMISSION TEST ON THE COMBUSTOR OUTLET AND SCRUBBER STACK AT THE UNIVERSITY OF MINNESOTA
BUREAU OF MINES

ITEM	OUTLET	STACK	
	RUN 1	RUN 1	RUN 2
DATE OF TEST	8-8-84	8-9-84	8-9-84
TIME OF TEST (HRS)	1205-1305	1110-1131	1200-1221
SO2 CONCENTRATION			
(PPM/DRY)	242	146	155
(PPM/WET)	216	83	83
SO2 MASS RATE (LB/HR)	31	25	26
SO2 EMISSION FACTOR (LB/MMBTU)			
F-FACTOR METHOD	.94	.52	.56

Nitric oxide concentrations averaged 730 ppm (dry). Plume opacity was zero. Volumetric flow rate determinations were performed at three different locations. The results of the flow rate determinations at the combustor outlet was 13,000 DSCFM. The flow rate at the combustion fan inlet duct was measured at 8079 DSCFM. The flow rate at the stack test site was 17,059 DSCFM.

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.

TEST NO. 1
COMBUSTOR OUTLET

3.1 RESULTS OF ORSAT & MOISTURE ANALYSES -- METHOD 3 & 4 (% V/V)

RUN 1

DATE OF RUN 08-08-84

DRY BASIS (ORSAT)

CARBON DIOXIDE 8.26

OXYGEN 11.56

CARBON MONOXIDE 0

NITROGEN 80.18

WET BASIS (ORSAT)

CARBON DIOXIDE 7.39

OXYGEN 10.34

CARBON MONOXIDE 0

NITROGEN 71.72

MOISTURE CONTENT 10.55

DRY MOLECULAR WEIGHT 29.78

WET MOLECULAR WEIGHT 28.54

SPECIFIC GRAVITY
(RELATIVE TO AIR) .9859

VELOCITY WEIGHTED AND
TIME-AVERAGED OXYGEN
DURING METHOD 5 RUNS 10.59

FO 1.13

K-13

TEST NO. 1
COMBUSTOR OUTLET

3.2 RESULTS OF PARTICULATE LOADING DETERMINATIONS -- METHOD 5

RUN 1

DATE OF RUN 08-08-84

TIME RUN START/END(HRS) 1205/1305

PITOT TUBE COEFFICIENT .851

WATER IN SAMPLE

CONDENSATE (ML) 97.0

SILICA GEL (GRAMS) 24.0

TOTAL PARTICULATE WATER-
IAL COLLECTED(GRAMS) .1619

VOLUME THROUGH GAS METER

METER CONDITIONS(CF) 51.55

STANDARD CONDITIONS (SCF) 48.29

TOTAL SAMPLING TIME (MIN) 60.0

NOZZLE DIAMETER (IN) .500

AVERAGE STACK GAS TEMPERATURE
DURING DETERMINATION (DEG-F) 1883

VOLUMETRIC FLOW**

ACTUAL (ACFM) 67115

DRY STANDARD ... (DSCFM) 13047

ISOKINETIC VARIATION (%) 101.0

PARTICLE CONCENTRATION

ACTUAL (GR/ACF) .0101

DRY STANDARD ... (GR/DSCF) .0517

PARTICLE MASS FLOW (LB/HR) 5.82

EMISSION FACTOR (LB/MMBTU)

BY F FACTOR (320-F) .157

BY F FACTOR (ORSAT) .173

* DRY CATCH ONLY

K-14

** MAMCQ/2

F-FACTOR=10483.0

3.3 Results of Sulfur Dioxide Determinations

TEST NO. 1
COMBUSTOR OUTLET

RESULTS OF SULFUR DIOXIDE DETERMINATIONS -- METHOD 6

	RUN 1
DATE OF RUN	8/ 8/84
TIME RUN START/END (HRS)	1205/1305
AVERAGE STACK GAS TEMPERATURE DURING DETERMINATION (DEG-F)	1883
BAROMETRIC PRESSURE (IN.HG.)	29.06
METER TEMPERATURE (DEG-F)	87.20
METER CORRECTION COEFFICIENT	.9944
VOLUME THROUGH GAS METER	
AT METER CONDITIONS...(CF)	51.550
STANDARD CONDITIONS...(SCF)	48.289
TOTAL SAMPLING TIME (MIN)	60.0
MOISTURE CONTENT (%V/V)	10.55
OXYGEN CONTENT (%V/V DRY)	11.56
MILLIEQUIVALENTS OF SO2 IN GAS SAMPLE	27.4825
SULFUR DIOXIDE CONCENTRATION	
(GR/DSCF)	.2813
(MG/DSCM)	644
(PPM-DRY)	242
(PPM-WET)	216
DRY STANDARD VOLUMETRIC FLOW (DSCFM)	13047
SULFUR DIOXIDE MASS RATE (LB/HR)	31.45
SULFUR DIOXIDE EMISSION FACTOR (LB/MMBTU)	
F-FACTOR METHOD*	.943

* F=10483.0 DSCF/MMBTU

INTERPOLL REPORT NO. 4-1850
UNIVERSITY OF MINNESOTA
BUREAU OF MINES

TEST NO. 1
SCRUBBER STACK

RESULTS OF SULFUR DIOXIDE DETERMINATIONS — METHOD 6

	RUN 1	RUN 2
DATE OF RUN	8/ 9/84	8/ 9/84
TIME RUN START/END (HRS)	1110/1131	1200/1221
AVERAGE STACK GAS TEMPERATURE DURING DETERMINATION (DEG-F)	171	171
BAROMETRIC PRESSURE (IN.HG.)	29.10	29.10
METER TEMPERATURE (DEG-F)	86.20	90.60
METER CORRECTION COEFFICIENT	.9944	.9944
VOLUME THROUGH GAS METER		
AT METER CONDITIONS...(CF)	16.040	16.120
STANDARD CONDITIONS...(SCF)	15.058	15.012
TOTAL SAMPLING TIME (MIN)	21.0	21.0
MOISTURE CONTENT (ZV/V)	43.12	43.12
OXYGEN CONTENT (ZV/V DRY)	10.75	10.87
MILLIEQUIVALENTS OF SO2 IN GAS SAMPLE	5.1863	5.4842
SULFUR DIOXIDE CONCENTRATION		
(GR/DSCF)	.1702	.1805
(MG/DSCM)	390	413
(PPM-DRY)	146	155
(PPM-WET)	83	88
DRY STANDARD VOLUMETRIC FLOW (DSCFM)	17059	17059
SULFUR DIOXIDE MASS RATE (LB/HR)	24.89	26.40
SULFUR DIOXIDE EMISSION FACTOR (LB/MMBTU)		
F-FACTOR METHOD*	.523	.561

Test-No. 1
Combustor Outlet

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

NO CONCENTRATION (PPM-DRY)

RUN 1

750
750
735
735
735
730
730
730
730
710
695

Average: 730

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: 4-26-84
Date of Observation: 08-08-84
Time of Observation: 1200-1206

APPENDIX L

Retort Pressure and Temperature Probe Data

Reference: Thimsen, Maurer et al (1984)

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-014

COAL: BLIND CANYON

DATE: 08/03/84

RETORT ACCESS PORT NUMBER:

5

DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)	TIME (hrs)	1417	1435
0	0.8		Blast Air (scfm)	1200	1200
6	0.8				
12	0.9				
18	1.1		Saturation Temperature (deg C)	59.8	59.8
24	1.2				
30	1.4				
36	1.5				
42	1.8		Ashpit Pressure (inwc)	4.6	5.6
48	2.0				
54	2.2				
60	2.7				
66	3.2		Offtake Temperature (deg C)	459	339
72	3.6	1016			
78	3.7	316			

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-014
 DATE: 08/04/84
 RETORT ACCESS PORT NUMBER:

COAL: BLIND CANYON
 5

DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)	TIME (hrs)	708	746
0	0.9		Blast Air (scfm)	1200	1200
6	1.0				
12	1.1		Saturation Temperature (deg C)	59.7	60.0
18	1.2				
24	1.3				
30	1.4				
36	1.6	1221			
42	1.7	1216	Ashpit Pressure (inwc)	5.6	5.3
48	1.9	1216			
54	2.1	1182			
60	2.3	1060	Offtake Temperature (deg C)	351	452
66	2.4	1049			
72	3.0	454			
78	3.2	432			
84	3.2	371			

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-014

COAL: BLIND CANYON

DATE: 08/05/84

RETORT ACCESS PORT NUMBER:

4

DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)	TIME (hrs)	736	755
0	1.1		Blast Air (scfm)	1400	1400
6	1.2				
12	1.4	1143			
18	1.6	999	Saturation Temperature (deg C)	62.0	62.0
24	1.9	899			
30	2.1	816			
36	2.2	766			
42	2.3		Ashpit Pressure (inwc)	7.8	6.8
48	2.7	732			
54	2.8	616			
60	3.0	582			
66	3.3		Offtake Temperature (deg C)	448	494
72	3.6	804			
78	3.9	732			
84	3.9	249			

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-014 COAL: BLIND CANYON
 DATE: 08/09/84
 RETORT ACCESS PORT NUMBER: 5

DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)	TIME (hrs)	1329	1358
0	1.6		Blast Air	1778	1763
6	2.0		(scfm)		
12	2.3		Saturation	63.0	63.0
18	2.4		Temperature		
24	2.7		(deg C)		
30	3.2				
36	3.5	988			
42	3.8	877	Ashpit	15.3	14.5
48	4.6	871	Pressure		
54	5.4	788	(inwc)		
60	6.6	543			
66	7.2	388	Offtake	402	427
72	7.6	277	Temperature		
78	7.6		(deg C)		
84	8.0				

RETORT TEMPERATURE AND PRESSURE PROBE DATA

TEST: BOM/FGT-014

COAL: BLIND CANYON

DATE: 08/10/84

RETORT ACCESS PORT NUMBER:

5

DATA: INCHES ABOVE GRATE	PRESSURE (inwc)	TEMPERATURE (deg C)	TIME (hrs)	718	920
0	2.3		Blast Air (scfm)	1766	1800
6	2.5				
12	2.8				
18	3.0	1188	Saturation Temperature (deg C)	63.0	62.9
24	3.3	1149			
30	3.6				
36	3.7	1043			
42	4.0	1004	Ashpit Pressure (inwc)	14.7	14.9
48	4.8	993			
54	5.2	966			
60	5.6				
66	8.8		Offtake Temperature (deg C)	397	443
72	9.1	843			
78	9.2	427			
84	9.3	282			

APPENDIX M

Gas Cooler/Tar Scrubber Operator's Log

These are the comments recorded by the operators of the enlarged gas cooler/tar scrubber during its operation.

GLO - Gasifier Lead Operator

CETCO - Condensor ESP Tar Collection Operator

August 2, 1984

- 1227 Informed BS&B that the gas cleanup system will be up in 15 minutes. See startup procedure sheets for the sequence of events. Steam pressure is irregular, causing gas flow to fluctuate $\pm 50\%$. We set up the flow nominally at 6 cfm. DYHP
- 1500 The gas cleanup system was started. AM
- 1510 Water rotameter was adjusted, to greater than full scale. AM
- 1530 Some water droplets were noticed in the tubing connections for O₂, T₃, P₃, HP₄, LP₄, & V₉. Inspection was carried out. AM
- 1540 DP₄ flow reading reduced from 6.00 to 3.5. AM
- 1545 More water in O₂ pipe was detected. AM
- 1550 DP₄ flow reading was again around 6 in H₂O. AM
- 1645 P₃ dropped off to about -1.5 also P₂ shows negative, but P₂ P₃ is positive. In the fire test the O₂ peaked at about 0.85%. AM
- 1710 A leak was noticed in the gas pipe joint V₂₀, steam inlet to the gas tank. AM
- 2000 Fire test. I opened the instrument panel for inspection and saw some droplets in the line going into the oxygen meter. I think we will have to come up with a procedure for changing the drierite and the iron oxide without having to shut down the system. Also, we should include the examination of the Drierite as part of the hourly log in the future. AM
- 2300 I had a couple of high voltage jolts just by being close to the back of the high voltage box. It definately needs better insulation where the wire is connected. All be careful as it Hertz (get the joke). AB
- 2330 BS&B just told me that until now, they have been gasifying Elkhorn coal, contrary to what I thought earlier, which was that all the tar we were collecting was from the Utah coal. The cyclone outlet pressure was let to remain low until Dick B. from BS&B raised it up to 1.5 inches. Now we are reading +0.5 for P₁ & P₂. AM

August 3, 1984

- 0022 GLO opened two poke holes to see how much oxygen is

injected into the gasifier. TJK

0026 Two poke holes have now been open for 5 minutes to see what happens to the oxygen level. TJK

0032 Oxygen to 0.9%, then to full scale. Emergency shutdown, purging with nitrogen. I will now fix the Drierite system and the high voltage shock problem. TJK

0033 Called GLO, system down. TJK

0101 I put a valve just before the iron oxide on the oxygen sample line, so we can change the Drierite. It took about 3.5 minutes for the oxygen trapped in the Drierite to be purged out. During this time, the oxygen detector was on the calibration mode so that the alarm would not go off (on nitrogen anyway).

Procedure to change Drierite

- (1) Turn the oxygen analyser to calibration mode.
- (2) Turn off the green oxygen valve by the iron oxide.
- (3) Unplug the vacuum pump
- (4) Change the Drierite.
- (5) Plug in the pump, and purge out the oxygen in the Drierite with coal gas by opening the green valve.
- (6) Wait for the oxygen level to drop below 0.3 when on the calibration mode setting.
- (7) Turn the oxygen analyser to X1000 level.

I put some RTV on the high voltage supply, I hope this works or more will have to be put on. Also, I purged the water from the oxygen line from the pump to the analyser. TJK

0113 Told GLO I will go back on line. TJK

0116 On line now. Cyclone outlet pressure is at 2 inches water. The downcomer leak is not bad. All flows and settings are at what they were before the shutdown. TJK

Work Schedule

Hour	0	8	16	24
8/2 Thursday			Neville	Abir
8/3 Friday		Tom K.	Neville	Abir
8/4 Saturday		Tom K.	Majid	Pui
8/5 Sunday		Tom K.	Majid	Pui
8/6 Monday		Majid	Neville	Pui
8/7 Tuesday		Abir	Neville	Majid

0200 Fixed the gas leak at the P1 stainless steel tube to plastic line. TJK

0204 Glo opened the back pressure valve to 2.4 inches water

during the fire test. TJK

0210 Cyclone outlet pressure is 1.5 inches water. TJK

0231 Dip stick check. Cyclone pressure to 2 inches water, P1 reads 1 inch water. About 1.5 inches of tar and 6 inches of water were on the stick. TJK

0232 I will drain the tank now, and at 0800 to get the Elkhorn tar out of the tank. The gasifier is now on Utah coal. TJK

0246 Drum number 1 tared at 34 pounds with the lid and ring. TJK

0300 GLO raised the cyclone pressure to 2 inches of water, P1 is at 1 inch of water. Lots of gas came out right away with the tar. I opened and closed the 3-inch valve 3 times. The oxygen never went over 1%. I got 2 inches of tar in the drum. TJK

0330 I got 50 pounds total
 -34 pounds tare

 16 pounds of tar and water since 1245, 8/02 to 300,
 8/03. TJK

0410 To stop the gas leak from the downcomer, the cyclone outlet is now set to 0.7 inches water. P1 is -0.5, P2 is -0.5 and P3 is -1.0. The oxygen is 5% due to the fire test. TJK

Note: From 0000-0300 I put up 2 rain tarps, there is a third under the cabinet for use where needed.

0900 Tar drained into drum number 1. Since 0045-0900 we got
 63 pounds total
 -34 pounds tare

 29 pounds tar and water
All systems are working fine. NJB

1100 The tank was insulated by fiberglass to see whether we get any changes in temperature. NJB

1200 The T3 temperature reads 134 degrees F. The tank temperature went up due to the insulation and remained steady at 134 degrees F. The flow DP4 was observed to be fluctuating around 3.0 to 11.0 (averaging 7.5). This pulsating flow DP4 may be due to the varying steam pressure on the ejector (P5). NJB

1225 P1, P2 and P3 are all reading negative pressures. Flow is at around 9.5. P2-P3 is positive. Cyclone outlet pressure is 0.9. NJB

1230 The setting of V11 valve was changed to 5 to get higher flow. The flow averaged at around 8.00. The cooling water

flow was increased so that T4 was greater than 100 degrees F, but less than 110 degrees F. NJB

1400 During the fire test the O2 shot up to 1500 ppm. It slowly came down. NJB

1435 Tried to inspect the O2 line in the cabinet, but ended up getting a shock. Something should be done about the electrical connection. NJB

1730 I was curious to find out what was passing through the ESP, so I drained the valves 8, 9, and 10. The aqueous liquid I collected is in an empty Drierite jar by the cabinet. I raised the HV output to maximum, which is slightly more than 14 KV, and lowered the steam flow for the tank jacket. AM

1800 Fire test. O2 had not been on zero before the test, nor did it go up higher than 0.18%. I hope the meter is still working right. AM

2100 O2 is down to normal.

2300 I wanted to experiment with different temperatures, so I cooled the ESP with the water from the outlet of the condenser, but either because of that or just coincidentally, the HV started going down. I had also shut off the steam line that heats the tank's jacket, but when I returned everything back to the way it was, the HV reading remained lower. Dr. Pui called and suggested preheating the cooling water in the condenser, so we are back to using the heat exchanger. I had the inlet and outlet lines go cocurrently, as Dr. Pui suggested, but this brought up the inlet temperature 2 degrees only, so I switched to counter current. Now T6 is up to 80 degrees F. HV still needs more insulation. AM

August 4, 1984

0015 I increased the water flow to lower the T3 temperature now at 139 degrees F. Will shoot for 125 degrees F. I reset the zeros on the pressure gauges. The P4 gauge was zeroed on a negative value, now it is o.k. TJK

0300 The oxygen analyser flow was down to 11 ppm. I could not set the flow faster. System is down. TJK

0408 The nupro needle valve in the oxygen analyser was clogged up. I took the analyser apart, cleaned the valve and recalibrated it. TJK

0412 System is now on line, GLO informed. TJK

0730 Tar drain. Drum #2 Tare = 35 pounds
Dip stick reading = 3.75 inches
Drum & Tar = 77 pounds
Tar = 44 pounds

Note: Save the drain liquid from valves 8,9 & 10 in clean labeled jars. Drain these valves once per shift. TJK

0915 The V8, V9, V10 valves were drained in three labeled jars. The mixture looked oily. The water meter was observed not to change. MA

0945 The Drierite was changed. Also water droplets were observed in the oxygen line near the O2 analyser. AM

1510 The T2 temperture is high. The insulation on tank was taken off. MA

1600 Throughout the shift from 0830 to 1530 the ESP voltage fell from 12.5 KV to 11.5 KV and remained steady. The gas flow was surprisingly steady at 9.0 to 10.5 (P4). MA

1615 Called the BS&B operator to report shift change for the gas cleanup crew. Compared 1600 readings with the current instrument reading. DYHP

1700 The steam inlet was shut off for the tank jacket to reduce the T3 temperature and increased the water flow. DYHP

1800 Operator called to inform of a fire test in 2 minutes. Noticed a decrease in corona current as the oxygen concentration increases. eg. at 0.5% oxygen current Ima decreased from: 0.6 ma to 0.4 ma 11.7 KV to 12.5 KV

2030 Decreased the water flow to increase the water outlet temperature T4 from 90 to 108 degrees F. DYHP

2200 Operator informed of a fire test in 5 minutes. DHYP

2215 Turned on the V20 valve (tank system valve) to ready the tank for draining. DYHP

2300 Tom Kotz performed retort sampling; saw no evidence of O2 concentration increase. Maximum deflection -0.3 (FS10). DYHP.

2400 Dip stick measurement 3.5 inches. Will now drain the tar.

Total weight 115 pounds
since 0745 - 77 pounds

38 pounds difference.

6 days to collect 150 Kg of tar for "EPRI" + 6 hours. DYHP

August 5, 1984

0106 New cooling system is plumbed in.

T7 fresh water in small heat exchanger
T8 fresh water out of small heat exchanger
T6 water into bottom of condenser
T4 water out top of condenser
T9 water into small heat exchanger
T10 water out of small heat exchanger

0130 Tested the oxygen alarm to see if GLO could hear the horn over the PA system with the microphone left on, and on the door of the cabinet. Yes, he could. GLO could, also, hear the horn without using the PA system, but not as well. TJK

0830 Tar drain. Collected 17 pounds of tar in drum #3. TJK

1215 Drierite change. TJK

1700 Will begin training regular monitoring crew for the gas cleanup system, so that several of the gas cleanup crew can be freed to set up the diesel engine test. The regular monitoring crew would be asked to record one complete set of readings every hour on the half hour and every hour on the hour. The regular crew would be asked to note down O2, HV, Ima, T3, and DP4 during their hour data logging trip on the sampling platform. They will be explained to about the system design, emergency shutdown procedure and will be asked to call the responsible personnel if:

- (a) O2 > 5 (midscale) for over 15 minutes
- (b) HV < 9KV and/or i > 1.5 ua
- (c) P1 - P2 and/or P2 - P3 > 0.5 inches H2O
- (d) T2 and T3 > 145 degrees F
- (e) After emergency shutdown

1730 Tar drain. Before drain, the dipstick read 2.75 inches.
Barrel & tar = 78 pounds
Previous = 35 pounds

43 pounds net collected.

We are collecting approximately 2.5 pounds/hour. It will take about 6 days to collect 150 Kg tar.

August 6, 1984

0930 The tar was drained in the same barrel. We are collecting a goodly amount of tar now.

1110 The high voltage is fluctuating + or -1.5 Kv. The T2 temperature is very high.

1140 The thermostat setting for the tank is lowered, the limits

being 100 degrees F -140 degrees F. The V11 valve setting was reduced to number 3. The DP4 is now around 12.00.

- 1200 A high CO ppm was detected near the system. None of the parameters were affected by CO.
- 1445 The overload high voltage light indicator flickered a few times. They are running the cyclone at a very high outlet pressure.
- 1500 There were sparks observed between the ESP cover and insulating foil. The current is varying like crazy (0.25 to 0.8) but relatively, the voltage remains steady.
- 1515 We had a shutdown due to power failure. Emergency procedures were effectively carried out. We will be looking over the ESP problem.
- 1610 We are back on line. Everything is working quite well, but we are still getting overload flashings of current surges.
- 1640 We shut the system down to tke a look at the ESP high voltage teflon insulator. Conductive tar spots were removed from the insulator. We had nitrogen gas purging. Due to operator's negligence when cleaning the system, the safety diaphragm blew due to steam pressure. It was replaced. Also it was noticed that we had plugs in different pressure tap lines, maybe due to condensation of water in them. Some tubings were changed and the others were cleaned with compressed air.
- 2045 The system was back on line. To reduce DP4 flow, we kept the V11 setting at number 3.

August 7, 1984

0830 Load swing. RSK

1700 Drain tank.	189 pounds total
	138 pounds previously

	51 pounds tar/water

Total tar in drum #3	189 pounds
Tare weight	34

	155 pounds tar and water

August 8, 1984

- 0030 The temperture gauges are not working properly.
- 0530 The temperature readings are still going crazy and very few

readings are being registered. The system seems to be working fine. The overload light is flickering more often. Also high oxygen is being registered, around 0.15% for the last hour.

0730 The oxygen pipe was nearly clogged with a large water drop, restricting the sample flow.

August 9, 1984

0710 (1) Thermocouple will not stabilize. T1 reads 262, 395, 438 and sometimes 1888. It will not give constant readings.

(2) P1, P2, P3, are very negative.

(3) All pressure gauges and high voltage supply and current are oscillating together. The overload light is coming on and blinking to the other readings oscillations. RSK

1050 Shutddown. A clog in the pipeline was confirmed.

1153 The horn went off because of the high oxygen content in the gas. The nitrogen regulator was set to zero. Neville did not check the nitrogen tank after he started to purge the system. TJK

1915 System is back on line. It took a while to get the O2 level down. System has not stabilized yet. The current reading is still erratic. Many of the thermocouples are not functioning properly. They read +1888 and once in a while flashes out what seems to be the correct reading. P1 and P2 are both positive (1.5), but they are considerably less than the cyclone outlet pressure. Maybe this is due to the fact that the induced draft fan is going maximum speed, causing a drop in pressure where we get our sample gas. AM

August 10, 1984

1330 Replaced the P3 line. Now it works. TJK

1600 Fire test, emergency shut down. TJK

1620 System is back on line. TJK

APPENDIX N

Gas Cooler/Tar Scrubber Operator Logged Data

Signals are identified in Figure 4-3.

TIME	02-AUG-84 15:00:00	02-AUG-84 15:30:00	02-AUG-84 16:15:00	02-AUG-84 16:55:00	02-AUG-84 17:30:00	02-AUG-84 18:15:00
O2 (%)	0.10	0.10	0.80	0.10	0.10	0.10
HV kv	12.50	12.70	12.50	13.00	13.00	13.20
I millA	0.60	0.55	0.60	0.55	0.50	0.50
P1 "H2O	0.70	0.60	0.60	-0.60	0.00	-0.01
P2 "H2O	0.70	0.70	0.70	-0.60	-0.01	-0.03
P3 "H2O	0.20	0.10	0.20	-1.40	-0.70	-0.90
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.07	0.08	0.08	0.00	0.04	0.10
DP4 "H2O	4.50	5.80	5.50	6.30		8.00
T1 DEG F	323.00	344.00	355.00	366.00	378.00	377.00
T2 DEG F	121.00	96.00	82.00	109.00	103.00	111.00
T3 DEG F	125.00	124.00	113.00	117.00	121.00	124.00
T4 DEG F	114.00	106.00	107.00	102.00	100.00	74.00
T5 DEG F	91.00	85.00	86.00	84.00	85.00	74.00
T6 DEG F	75.00	74.00	73.00	72.00	72.00	71.00
T7 DEG F	105.00	97.00	98.00	99.00	100.00	76.00
T8 DEG F	105.00	97.00	98.00	98.00	99.00	76.00
T9 DEG F	104.00	97.00	98.00	97.00	98.00	78.00
T10 DEG F	103.00	97.00	98.00	98.00	100.00	81.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	48.00	49.00	46.00	50.00	53.00	56.00
P6 PSI	90.00	94.00	80.00	94.00	75.00	85.00
Vll	3.00	3.00	3.00	3.00	3.00	3.00
P704 "H2O	--	--	--	--	--	--

TIME	02-AUG-84 19:00:00	02-AUG-84 19:30:00	02-AUG-84 20:00:00	02-AUG-84 20:30:00	02-AUG-84 21:20:00	02-AUG-84 22:00:00
O2 (%)	0.6	0.00	0.70	0.23	0.00	0.00
HV kv	12.7	13.50	13.80	13.50	13.00	13.00
I millA	0.6	0.40	0.30	0.30	0.40	0.40
P1 "H2O	0.0	0.00	0.10	-0.10	-0.30	0.00
P2 "H2O	0.0	0.00	0.10	-0.10	-0.20	0.00
P3 "H2O	-0.5	-0.80	-0.40	-0.60	-0.80	-0.50
P1-P2 "H2O	0.0	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.8	0.10	0.08	0.10	0.06	0.08
DP4 "H2O	5.0	7.00	6.75	8.00	5.00	5.50
T1 DEG F	390.0	397.00	385.00	394.00	413.00	388.00
T2 DEG F	113.0	113.00	112.00	115.00	116.00	116.00
T3 DEG F	127.0	126.00	124.00	130.00	130.00	127.00
T4 DEG F	111.0	106.00	106.00	107.00	111.00	97.00
T5 DEG F	90.0	89.00	93.00	91.00	85.00	81.00
T6 DEG F	76.0	74.00	74.00	73.00	74.00	72.00
T7 DEG F	107.0	105.00	107.00	108.00	102.00	93.00
T8 DEG F	107.0	106.00	106.00	108.00	100.00	93.00
T9 DEG F	107.0	106.00	107.00	107.00	102.00	94.00
T10 DEG F	109.0	107.00	107.00	108.00	100.00	94.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	45.0	48.00	56.00	53.00	46.00	55.00
P6 PSI	95.0	90.00	98.00	88.00	96.00	79.00
Vll	3.0	3.00	3.00	3.00	3.00	3.00
"H2O	--	--	--	--	--	--

TIME	02-AUG-84 22:00:00	02-AUG-84 23:00:00	02-AUG-84 23:30:00	03-AUG-84 00:15:00	03-AUG-84 01:23:00	03-AUG-84 02:10:00
O2 (%)	0.00	0.00	0.00	0.01	0.07	0.16
HV kv	13.00	13.00	13.00	13.25	12.50	12.50
I millA	0.50	0.50	0.50	0.45	0.45	0.50
P1 "H2O	-0.10	0.50	0.50	0.50	0.70	0.50
P2 "H2O	-0.10	0.50	0.50	0.50	0.70	0.50
P3 "H2O	-0.80	0.00	0.00	0.10	0.50	0.00
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.10	0.10	0.10	0.11	0.02	0.09
DP4 "H2O	7.85	8.00	8.50	9.00	5.00	7.00
T1 DEG F	395.00	389.00	402.00	394.00	327.00	386.00
T2 DEG F	115.00	114.00	117.00	119.00	117.00	119.00
T3 DEG F	128.00	126.00	127.00	129.00	118.00	124.00
T4 DEG F	82.00	107.00	109.00	107.00	96.00	105.00
T5 DEG F	75.00	86.00	88.00	93.00	84.00	91.00
T6 DEG F	72.00	72.00	73.00	73.00	73.00	74.00
T7 DEG F	81.00	101.00	104.00	107.00	97.00	107.00
T8 DEG F	81.00	101.00	104.00	107.00	96.00	107.00
T9 DEG F	81.00	101.00	104.00	106.00	96.00	107.00
T10 DEG F	81.00	102.00	104.00	107.00	97.00	106.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00	58.00	55.00	54.00	55.00	54.00
P6 PSI	92.00	82.00	98.00	80.00	76.00	76.00
V11	3.00	3.00	3.00	3.00	3.00	3.00
P704 "H2O	--	--	--	--	--	--

TIME	03-AUG-84 03:00:00	03-AUG-84 04:03:00	03-AUG-84 05:01:00	03-AUG-84 06:00:00	03-AUG-84 07:00:00	03-AUG-84 08:00:00
O2 (%)	0.01	0.05	0.02	0.02	0.02	0.0
HV kv	12.50	12.50	12.50	13.00	13.00	13.5
I millA	0.50	0.15	0.50	0.50	0.50	
P1 "H2O	0.50	0.00	-0.50	0.00	0.00	0.0
P2 "H2O	0.50	0.00	-0.50	0.00	0.00	0.0
P3 "H2O	0.00	-0.50	-1.00	-0.50	-0.50	-0.5
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.0
P2-P3 "H2O	0.08	0.02	0.08	0.10	0.10	-0.8
DP4 "H2O	5.00	3.00	7.00	7.00	7.00	6.0
T1 DEG F	367.00	349.00	406.00	400.00	395.00	384.0
T2 DEG F	118.00	124.00	126.00	126.00	121.00	122.0
T3 DEG F	127.00	129.00	130.00	133.00	125.00	127.0
T4 DEG F	100.00	103.00	90.00	90.00	93.00	93.0
T5 DEG F	95.00	87.00	76.00	77.00	76.00	78.0
T6 DEG F	72.00	73.00	71.00	71.00	71.00	72.0
T7 DEG F	98.00	99.00	82.00	84.00	3.00	84.0
T8 DEG F	99.00	100.00	4.00	85.00	85.00	85.0
T9 DEG F	98.00	100.00	84.00	85.00	84.00	85.0
T10 DEG F	98.00	100.00	84.00	85.00	84.00	85.0
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	58.00	52.00	54.00	52.00	--	44.0
P6 PSI	76.00	76.00	76.00	76.00	76.00	84.0
V11	3.00	3.00	3.00	3.00	3.00	3.0
P704 "H2O	--	--	0.60	--	1.00	1.3

TIME	03-AUG-84 09:15:00	03-AUG-84 10:00:00	03-AUG-84 11:00:00	03-AUG-84 12:00:00	03-AUG-84 12:55:00	03-AUG-84 14:00:00
O2 (%)	0.10	0.10	0.80	0.10	0.10	0.15
HV kv	13.50	13.00	12.50	13.50	13.50	13.50
I millA	0.40	0.60	0.60	0.40	0.20	0.30
P1 "H2O	0.70	0.60	0.70	0.50	0.50	0.40
P2 "H2O	0.70	0.70	0.70	0.60	0.30	0.30
P3 "H2O	0.30	0.20	0.30	0.20	-0.20	0.20
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.10	0.09	0.06	0.07	0.12	0.12
DP4 "H2O	7.00	7.50	5.00	5.00	9.00	9.50
T1 DEG F	408.00	370.00	392.00	383.00	387.00	379.00
T2 DEG F	118.00	116.00	122.00	125.00	122.00	126.00
T3 DEG F	130.00	120.00	133.00	136.00	135.00	137.00
T4 DEG F	93.00	94.00	96.00	86.00	111.00	102.00
T5 DEG F	78.00	78.00	81.00	77.00	91.00	84.00
T6 DEG F	73.00	73.00	74.00	74.00	75.00	75.00
T7 DEG F	86.00	87.00	91.00	85.00	101.00	95.00
T8 DEG F	87.00	87.00	92.00	84.00	101.00	96.00
T9 DEG F	86.00	88.00	90.00	86.00	101.00	96.00
T10 DEG F	86.00	89.00	89.00	85.00	101.00	96.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	54.00	56.00	56.00	42.00	55.00	50.00
P6 PSI	85.00	84.00	80.00	97.00	86.00	89.00
V11	3.00	3.00	4.00	5.00	5.00	5.00
P704 "H2O	1.80	2.30	1.70	0.90	0.90	0.90

TIME	03-AUG-84 15:00:00	03-AUG-84 16:00:00	03-AUG-84 17:00:00	03-AUG-84 18:00:00	03-AUG-84 19:00:00	03-AUG-84 20:00:00
O2 (%)	0.30	0.00	0.10	0.15	0.25	0.40
HV kv	13.00	13.50	13.50	14.40	14.40	12.00
I millA	0.40	0.40	0.40	0.40	0.40	0.30
P1 "H2O	0.10	0.80	0.20	0.80	0.30	1.00
P2 "H2O	0.00	0.90	0.20	0.80	0.30	1.00
P3 "H2O	-0.50	0.30	-0.40	0.60	0.00	0.50
P1-P2 "H2O	0.00	0.01	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.12	0.07	0.12	0.12	0.13	0.12
DP4 "H2O	9.00	6.50	8.50	8.25	9.25	8.75
T1 DEG F	370.00	370.00	310.00	365.00	383.00	408.00
T2 DEG F	131.00	135.00	128.00	134.00	136.00	120.00
T3 DEG F	136.00	140.00	136.00	141.00	141.00	121.00
T4 DEG F	102.00	105.00	76.00	83.00	83.00	108.00
T5 DEG F	84.00	85.00	75.00	77.00	76.00	83.00
T6 DEG F	76.00	75.00	73.00	73.00	73.00	74.00
T7 DEG F	94.00	96.00	78.00	81.00	82.00	98.00
T8 DEG F	95.00	96.00	78.00	81.00	83.00	99.00
T9 DEG F	95.00	97.00	78.00	81.00	82.00	99.00
T10 DEG F	96.00	98.00	78.00	82.00	82.00	99.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	56.00	48.00	55.00	56.00	53.00	48.00
P6 PSI	83.00	80.00	75.00	78.00	88.00	95.00
V11	5.00	5.00	5.00	5.00	5.00	5.00
"H2O	1.10	1.35	--	--	--	--

03-AUG-84 21:00:00 03-AUG-84 22:00:00 03-AUG-84 23:00:00 04-AUG-84 00:00:00 04-AUG-84 01:07:00 04-AUG-84 02:00:00

O2 (%)	0.02	0.02	0.02	0.02	0.02	0.02
HV kv	11.50	11.50	11.50	12.50	12.00	12.00
I millA	0.60	0.60	0.60	0.40	0.50	0.50
P1 "H2O	0.80	0.60	1.00	0.00	1.00	0.50
P2 "H2O	0.80	0.60	0.10	0.00	1.00	0.50
P3 "H2O	0.50	0.20	-0.40	-0.50	1.00	0.40
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.10	0.11	0.11	0.10	0.10	0.10
DP4 "H2O	9.00	8.25	9.00	8.00	9.00	9.00
T1 DEG F	398.00	405.00	406.00	416.00	356.00	388.00
T2 DEG F	124.00	119.00	127.00	131.00	130.00	128.00
T3 DEG F	128.00	129.00	136.00	143.00	136.00	136.00
T4 DEG F	119.00	111.00	133.00	128.00	83.00	84.00
T5 DEG F	95.00	90.00	102.00	108.00	77.00	77.00
T6 DEG F	80.00	78.00	81.00	85.00	74.00	73.00
T7 DEG F	86.00	84.00	89.00	93.00	75.00	75.00
T8 DEG F	75.00	76.00	79.00	82.00	72.00	72.00
T9 DEG F	107.00	104.00	125.00	115.00	84.00	82.00
T10 DEG F	103.00	100.00	115.00	115.00	83.00	84.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	55.00	55.00	55.00	52.00	54.00	--
P6 PSI	82.00	88.00	82.00	--	80.00	--
V11	5.00	5.00	5.00	5.00	5.00	5.00
P704 "H2O	--	--	--	1.10	1.90	1.50

TIME	04-AUG-84 04:13:00	04-AUG-84 05:00:00	04-AUG-84 06:01:00	04-AUG-84 06:57:00	04-AUG-84 08:03:00	04-AUG-84 09:05:00
O2 (%)	0.10	0.02		0.02	0.20	0.10
HV kv	10.00	12.00	11.50	11.50	12.00	11.50
I millA	0.50	0.60	0.80	0.70	0.50	0.60
P1 "H2O	0.50	0.50	0.50	0.50	1.00	0.10
P2 "H2O	0.50	0.50	0.50	0.50	1.00	0.30
P3 "H2O	0.40	0.40	0.40	0.40	0.90	0.10
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.10	0.12	0.11	0.12	0.12	0.13
DP4 "H2O	9.00	10.00	9.00	10.00	10.00	10.00
T1 DEG F	265.00	358.00	368.00	377.00	378.00	367.00
T2 DEG F	117.00	127.00	131.00	134.00	136.00	135.00
T3 DEG F	111.00	133.00	135.00	137.00	140.00	138.00
T4 DEG F	77.00	82.00	82.00	84.00	89.00	90.00
T5 DEG F	75.00	77.00	76.00	77.00	77.00	78.00
T6 DEG F	74.00	73.00	73.00	73.00	74.00	74.00
T7 DEG F	73.00	74.00	73.00	74.00	74.00	75.00
T8 DEG F	71.00	72.00	71.00	72.00	72.00	72.00
T9 DEG F	77.00	82.00	82.00	82.00	85.00	86.00
T10 DEG F	77.00	82.00	82.00	81.00	84.00	84.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00	56.00	54.00	54.00	52.00	52.00
P6 PSI	80.00	84.00	80.00	80.00	76.00	99.00
V11	5.00	5.00	5.00	5.00	5.00	5.00
P704 "H2O	1.20	1.20	1.50	1.50	1.30	1.20

TIME	04-AUG-84 10:00:00	04-AUG-84 11:05:00	04-AUG-84 12:00:00	04-AUG-84 13:00:00	04-AUG-84 14:05:00	04-AUG-84 15:00:00
O2 (%)	0.02	0.06	0.01	0.01	0.05	0.01
HV kv	12.00	12.00	12.50	11.20	12.00	11.50
I millA	0.45	0.60	0.30	0.55	0.45	0.50
P1 "H2O	0.90	0.30	0.90	0.20	0.50	0.30
P2 "H2O	1.00	0.40	1.10	0.30	0.50	0.40
P3 "H2O	0.80	0.20	1.00	0.10	0.40	0.30
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.12	0.13	0.12	0.12	0.13	0.13
DP4 "H2O	9.00	9.50	9.00	9.50	10.00	10.00
T1 DEG F	372.00	370.00	356.00	400.00	404.00	383.00
T2 DEG F	131.00	131.00	138.00	137.00	137.00	136.00
T3 DEG F	138.00	138.00	144.00	141.00	145.00	142.00
T4 DEG F	103.00	101.00	107.00	103.00	97.00	97.00
T5 DEG F	93.00	93.00	98.00	93.00	89.00	89.00
T6 DEG F	77.00	78.00	80.00	78.00	77.00	77.00
T7 DEG F	80.00	81.00	82.00	81.00	79.00	78.00
T8 DEG F	75.00	74.00	76.00	75.00	75.00	75.00
T9 DEG F	97.00	98.00	105.00	98.00	95.00	93.00
T10 DEG F	94.00	93.00	100.00	95.00	92.00	91.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00	56.00	53.00	54.00	54.00	53.00
P6 PSI	80.00	83.00	90.00	95.00	78.00	83.00
V11	5.00	5.00	5.00	5.00	5.00	5.00
P704 "H2O	1.20	1.40	1.40	1.30	1.40	1.40

TIME	04-AUG-84 16:00:00	04-AUG-84 16:15:00	04-AUG-84 17:00:00	04-AUG-84 18:00:00	04-AUG-84 19:00:00	04-AUG-84 20:00:00
O2 (%)	0.04	0.06	0.06	0.10	0.10	0.10
HV kv	12.00	11.50	11.00	11.50	11.70	11.70
I millA	0.40	0.50	0.70	0.65	0.65	0.60
P1 "H2O	0.50	0.00	0.10	0.80	0.20	0.30
P2 "H2O	0.60	0.00	0.20	0.90	0.40	0.50
P3 "H2O	0.40	0.00	0.10	0.90	0.30	0.50
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.13	0.12	0.12	0.13	0.13	0.13
DP4 "H2O	9.50	10.00	9.50	10.00	10.00	10.00
T1 DEG F	402.00	400.00	403.00	420.00	414.00	398.00
T2 DEG F	134.00	129.00	133.00	131.00	123.00	114.00
T3 DEG F	142.00	139.00	141.00	139.00	134.00	130.00
T4 DEG F	95.00	93.00	95.00	93.00	90.00	90.00
T5 DEG F	89.00	86.00	87.00	85.00	84.00	84.00
T6 DEG F	76.00	76.00	78.00	76.00	75.00	75.00
T7 DEG F	78.00	78.00	77.00	77.00	76.00	77.00
T8 DEG F	75.00	74.00	76.00	74.00	73.00	74.00
T9 DEG F	94.00	90.00	89.00	92.00	88.00	89.00
T10 DEG F	90.00	89.00	88.00	91.00	87.00	87.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00	53.00	54.00	52.00	54.00	52.00
P6 PSI	93.00	83.00	94.00	80.00	85.00	95.00
V11	5.00	5.00	5.00	5.00	5.00	5.00
"H2O	1.70	1.10	1.30	1.10	1.40	1.60

O2 (%)	0.10	0.10	0.10	0.10	0.00	0.00
HV kv	11.30	11.50	12.00	12.50	12.00	12.50
I millA	0.70	0.65	0.50	0.45	0.60	0.50
P1 "H2O	0.40	0.30	0.50	0.40	0.50	0.50
P2 "H2O	0.60	0.40	0.70	0.40	0.50	0.50
P3 "H2O	0.60	0.40	0.60	0.40	0.40	0.40
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.13	0.11	0.12	0.12	0.12	0.14
DP4 "H2O	10.00	10.00	10.00	10.00	10.00	11.00
T1 DEG F	396.00	396.00	395.00	406.00	413.00	410.00
T2 DEG F	118.00	114.00	125.00	130.00	140.00	131.00
T3 DEG F	130.00	128.00	134.00	138.00	126.00	126.00
T4 DEG F	113.00	112.00	114.00	115.00	104.00	114.00
T5 DEG F	90.00	89.00	89.00	91.00	88.00	94.00
T6 DEG F	76.00	76.00	77.00	77.00	79.00	77.00
T7 DEG F	82.00	81.00	81.00	83.00	84.00	85.00
T8 DEG F	74.00	73.00	74.00	74.00	76.00	75.00
T9 DEG F	102.00	101.00	103.00	102.00	112.00	110.00
T10 DEG F	100.00	95.00	100.00	99.00	106.00	106.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00	50.00	55.00	52.00	54.00	--
P6 PSI	98.00	75.00	75.00	80.00	80.00	80.00
Vll	5.00	5.00	5.00	5.00	5.00	5.00
P704 "H2O	1.40	1.50	1.40	1.30	1.30	1.80

N-7

TIME	05-AUG-84 03:10:00	05-AUG-84 04:00:00	05-AUG-84 05:00:00	05-AUG-84 06:00:00	05-AUG-84 07:08:00	05-AUG-84 08:16:00
O2 (%)	0.00	0.00	0.00	0.00	0.00	1.00
HV kv	11.00	11.50	11.00	11.50	11.50	11.50
I millA	0.50	0.50	0.50	0.60	0.50	0.55
P1 "H2O	0.50	0.50	0.50	0.50	0.90	0.50
P2 "H2O	0.50	0.50	0.50	0.50	0.90	0.60
P3 "H2O	0.50	0.50	0.40	0.40	0.80	0.75
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.12	0.12	0.12	0.12	0.12	0.12
DP4 "H2O	9.00	10.00	10.00	10.00	10.00	9.00
T1 DEG F	402.00	405.00	398.00	413.00	408.00	410.00
T2 DEG F	118.00	114.00	107.00	100.00	105.00	116.00
T3 DEG F	118.00	115.00	118.00	112.00	121.00	116.00
T4 DEG F	110.00	109.00	111.00	106.00	107.00	91.00
T5 DEG F	92.00	90.00	91.00	89.00	91.00	86.00
T6 DEG F	78.00	77.00	78.00	78.00	77.00	80.00
T7 DEG F	85.00	84.00	84.00	83.00	84.00	82.00
T8 DEG F	75.00	75.00	75.00	74.00	74.00	76.00
T9 DEG F	111.00	108.00	107.00	105.00	105.00	111.00
T10 DEG F	105.00	103.00	103.00	101.00	102.00	107.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	54.00	54.00	52.00	--	52.00	52.00
P6 PSI	80.00	80.00	80.00	85.00	85.00	94.00
Vll	5.00	5.00	5.00	5.00	5.00	5.00
P704 "H2O	1.80	1.80	1.90	1.70	1.90	1.70

TIME	05-AUG-84 09:00:00	05-AUG-84 10:00:00	05-AUG-84 11:00:00	05-AUG-84 12:00:00	05-AUG-84 13:00:00	05-AUG-84 14:00:00
O2 (%)	0.50	1.60	0.00	0.00	2.00	0.00
HV kv	12.50	12.50	12.50	12.50	12.50	11.50
I millA	0.40	0.40	0.35	0.40	0.35	0.40
P1 "H2O	1.00	2.50	2.40	2.50	2.50	2.50
P2 "H2O	1.10	2.75	2.50	2.75	2.60	2.60
P3 "H2O	1.10	2.75	2.60	2.70	2.65	2.60
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.12	0.14	0.16	0.16	0.16	0.13
DP4 "H2O	10.00	11.00	11.00	11.50	11.00	11.00
T1 DEG F	411.00	389.00	387.00	394.00	388.00	400.00
T2 DEG F	121.00	118.00	118.00	123.00	121.00	125.00
T3 DEG F	118.00	123.00	122.00	125.00	123.00	127.00
T4 DEG F	90.00	104.00	103.00	106.00	104.00	121.00
T5 DEG F	81.00	91.00	90.00	92.00	91.00	104.00
T6 DEG F	76.00	77.00	80.00	80.00	80.00	84.00
T7 DEG F	77.00	84.00	85.00	85.00	86.00	92.00
T8 DEG F	75.00	77.00	80.00	76.00	77.00	80.00
T9 DEG F	96.00	109.00	109.00	110.00	111.00	120.00
T10 DEG F	94.00	105.00	106.00	106.00	107.00	118.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00	52.00	52.00	58.00	54.00	55.00
P6 PSI	74.00	78.00	85.00	90.00	95.00	94.00
V11	5.00	5.00	5.00	5.00	5.00	5.00
P704 "H2O	1.70	2.80	3.60	3.80	3.80	4.50

TIME	05-AUG-84 15:00:00	05-AUG-84 15:50:00	05-AUG-84 16:30:00	05-AUG-84 17:00:00	05-AUG-84 17:30:00	05-AUG-84 18:10:00
O2 (%)	0.00	0.00	0.10	0.10	0.10	0.3
HV kv	11.30	11.40	11.20	11.20	11.00	11.0
I millA	0.50	0.40	0.42	0.45	0.55	0.5
P1 "H2O	2.50	2.50	2.50		2.60	
P2 "H2O	2.50	2.60	2.60		2.80	
P3 "H2O	2.60	2.70	2.70		2.80	
P1-P2 "H2O	0.00	0.01	0.00		0.00	
P2-P3 "H2O	0.13	0.13	0.15		0.14	
DP4 "H2O	11.00	11.00	10.50	11.00	11.00	11.0
T1 DEG F	404.00	420.00	420.00		413.00	
T2 DEG F	131.00	131.00	132.00		138.00	
T3 DEG F	127.00	119.00	122.00	124.00	123.00	124.0
T4 DEG F	129.00	100.00	109.00		108.00	
T5 DEG F	104.00	84.00	92.00		92.00	
T6 DEG F	85.00	78.00	80.00		81.00	
T7 DEG F	93.00	81.00	86.00		86.00	
T8 DEG F	80.00	76.00	76.00		77.00	
T9 DEG F	122.00	102.00	112.00		112.00	
T10 DEG F	118.00	98.00	106.00		106.00	
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	54.00	55.00	53.00		54.00	
P6 PSI	95.00	75.00	83.00		84.00	
V11	5.00	5.00	5.00		5.00	
"H2O	4.10		4.00		3.50	

O2 (%)	0.10	0.1	0.10	2.7	0.10	0.10
HV kv	11.20	11.2	11.00	11.2	11.40	11.00
I millA	0.35	0.4	0.45	0.4	4.00	5.00
P1 "H2O	2.40		3.10		3.10	29.00
P2 "H2O	2.50		3.30		3.40	3.00
P3 "H2O	2.40		3.30		3.30	3.10
P1-P2 "H2O	0.00		0.00		0.00	0.00
P2-P3 "H2O	0.14		0.14		0.15	0.14
DP4 "H2O	11.00	11.0	11.00	12.0	11.50	11.00
T1 DEG F	402.00		415.00		402.00	408.00
T2 DEG F	140.00		143.00		144.00	141.00
T3 DEG F	125.00	129.0	128.00	129.0	128.00	125.00
T4 DEG F	108.00		110.00		110.00	110.00
T5 DEG F	93.00		93.00		91.00	92.00
T6 DEG F	81.00		80.00		80.00	79.00
T7 DEG F	87.00		87.00		86.00	86.00
T8 DEG F	77.00		78.00		75.00	77.00
T9 DEG F	112.00		114.00		112.00	111.00
T10 DEG F	107.00		108.00		108.00	106.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	52.00		52.00		55.00	55.00
P6 PSI	92.00		84.00		85.00	80.00
V11	5.00		5.00		5.00	5.00
P704 "H2O			4.60		7.60	4.30

6-N

TIME	05-AUG-84 22:00:00	05-AUG-84 22:30:00	05-AUG-84 23:00:00	05-AUG-84 23:30:00	06-AUG-84 00:00:00	06-AUG-84 00:30:00
O2 (%)	2.0	0.10	0.1	0.10	1.75	0.00
HV kv	11.5	11.30	11.0	11.00	11.50	11.10
I millA	4.0	4.00	5.0	5.20	3.50	0.45
P1 "H2O		3.20		3.00	4.00	3.60
P2 "H2O		3.40		3.70	4.00	4.00
P3 "H2O		3.30		3.90	4.20	4.00
P1-P2 "H2O		0.00		0.00	0.00	0.00
P2-P3 "H2O		0.15		0.15	0.15	0.15
DP4 "H2O	11.0	11.00	11.0	12.00	11.00	11.00
T1 DEG F		403.00		408.00	403.00	416.00
T2 DEG F		141.00		141.00	139.00	142.00
T3 DEG F	130.0	125.00	125.0	124.00	129.00	123.00
T4 DEG F		110.00		110.00	114.00	110.00
T5 DEG F		92.00		91.00	93.00	91.00
T6 DEG F		80.00		79.00	79.00	79.00
T7 DEG F		86.00		85.00	85.00	86.00
T8 DEG F		77.00		75.00	75.00	76.00
T9 DEG F		112.00		112.00	114.00	113.00
T10 DEG F		106.00		108.00	109.00	106.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI		52.00		55.00	54.00	53.00
P6 PSI		82.00		82.00	80.00	80.00
V11		5.00		5.00	5.00	5.00
P704 "H2O		4.40		4.60	5.70	5.10

TIME	06-AUG-84 01:00:00	06-AUG-84 01:30:00	06-AUG-84 02:00:00	06-AUG-84 02:30:00	06-AUG-84 03:00:00	06-AUG-84 03:30:00
O2 (%)	0.00	0.00	0.00	0.00	0.00	0.00
HV kv	11.10	11.00	11.20	11.00	11.00	11.00
I millA	0.45	0.50	0.45	0.55	0.55	0.55
P1 "H2O		2.20		3.60		2.90
P2 "H2O		2.30		4.00		3.00
P3 "H2O		2.40		4.00		3.10
P1-P2 "H2O		0.00		0.00		0.00
P2-P3 "H2O		0.14		0.16		0.15
DP4 "H2O	11.00	11.00	11.00	11.00	12.00	12.00
T1 DEG F		409.00		417.00		410.00
T2 DEG F		138.00		139.00		139.00
T3 DEG F	125.00	122.00	122.00	123.00	123.00	124.00
T4 DEG F		108.00		111.00		108.00
T5 DEG F		90.00		91.00		90.00
T6 DEG F		78.00		79.00		79.00
T7 DEG F		84.00		85.00		85.00
T8 DEG F		75.00		75.00		75.00
T9 DEG F		111.00		111.00		112.00
T10 DEG F		107.00		108.00		108.00
ROTOMETER (GPM)		MAX		MAX		MAX
P5 PSI		53.00		53.00		52.00
P6 PSI		80.00		90.00		90.00
V11		5.00		5.00		5.00
P704 "H2O		3.80		5.30		4.80

N-10

TIME	06-AUG-84 04:00:00	06-AUG-84 04:30:00	06-AUG-84 05:00:00	06-AUG-84 05:30:00	06-AUG-84 06:00:00	06-AUG-84 06:30:00
O2 (%)	0.00	0.00	0.0	0.00	0.00	0.00
HV kv	11.00	11.00	11.0	11.50	11.00	11.20
I millA	0.55	0.45	0.5	0.50	0.35	0.45
P1 "H2O		3.70		3.20		2.90
P2 "H2O		4.00		3.40		3.00
P3 "H2O		4.00		3.50		3.10
P1-P2 "H2O		0.00		0.00		0.00
P2-P3 "H2O		0.15		0.16		0.16
DP4 "H2O	12.00	12.00	11.0	12.00	12.00	12.00
T1 DEG F		438.00		426.00		398.00
T2 DEG F		141.00		138.00		134.00
T3 DEG F	124.00	124.00	124.0	122.00	130.00	125.00
T4 DEG F		109.00		109.00		105.00
T5 DEG F		91.00		91.00		91.00
T6 DEG F		78.00		78.00		78.00
T7 DEG F		86.00		85.00		85.00
T8 DEG F		75.00		75.00		75.00
T9 DEG F		113.00		110.00		114.00
T10 DEG F		109.00		105.00		109.00
ROTOMETER (GPM)		MAX		MAX		MAX
P5 PSI		53.00		54.00		53.00
P6 PSI		96.00		74.00		74.00
V11		5.00		5.00		5.00
P "H2O		5.20		5.10		4.10

O2 (%)	0.00	0.00	1.7	0.70	0.01	0.04
I millA	11.00	11.00	11.0	11.50	11.00	11.00
P1 "H2O	0.45	0.50	0.5	0.40	0.45	0.48
P2 "H2O		2.90		3.40	3.50	
P3 "H2O		3.00		3.60	3.80	
P1-P2 "H2O		3.10		3.60	3.80	
P2-P3 "H2O		0.00		0.00	0.00	
DP4 "H2O	12.00	0.16		0.17	0.16	
T1 DEG F		12.00	12.0	13.00	13.00	14.50
T2 DEG F		434.00		423.00	413.00	
T3 DEG F	123.00	142.00		143.00	139.00	
T4 DEG F		124.00	121.0	125.00	126.00	130.00
T5 DEG F		109.00		91.00	95.00	
T6 DEG F		91.00		83.00	84.00	
T7 DEG F		78.00		78.00	80.00	
T8 DEG F		85.00		80.00	82.00	
T9 DEG F		74.00		75.00	78.00	
T10 DEG F		112.00		100.00	104.00	
ROTOMETER (GPM)		107.00		97.00	100.00	
P5 PSI		MAX		MAX	MAX	
P6 PSI		53.00		52.00	58.00	
V11		92.00		78.00	95.00	
P704 "H2O		5.00		5.00	5.00	
		4.50		5.10	5.70	

11-11

TIME	06-AUG-84 10:30:00	06-AUG-84 11:00:00	06-AUG-84 11:30:00	06-AUG-84 12:00:00	06-AUG-84 12:30:00	06-AUG-84 13:00:00
O2 (%)	0.00	0.00	0.00	0.0	0.00	0.0
HV kv	10.50	10.50	10.50	11.2	11.00	10.5
I millA	0.50	0.52	0.52	0.5	0.45	0.6
P1 "H2O	3.60		4.20		4.20	
P2 "H2O	4.00		4.20		4.20	
P3 "H2O	4.00		4.20		4.30	
P1-P2 "H2O	0.00		0.00		0.00	
P2-P3 "H2O	0.19		0.15		0.14	
DP4 "H2O	15.50	13.50	11.50	10.2	11.60	11.0
T1 DEG F	404.00		414.00		419.00	
T2 DEG F	139.00		139.00		132.00	
T3 DEG F	128.00	129.00	121.00	119.0	118.00	116.0
T4 DEG F	91.00		89.00		89.00	
T5 DEG F	84.00		82.00		84.00	
T6 DEG F	79.00		78.00		78.00	
T7 DEG F	82.00		81.00		79.00	
T8 DEG F	78.00		77.00		77.00	
T9 DEG F	101.00		97.00		94.00	
T10 DEG F	97.00		95.00		92.00	
ROTOMETER (GPM)	MAX		MAX		MAX	
P5 PSI	58.00		57.00		53.00	
P6 PSI	85.00		97.00		96.00	
V11	5.00		5.00		5.00	
P704 "H2O	5.30		5.80		5.60	

TIME	06-AUG-84 13:30:00	06-AUG-84 14:00:00	06-AUG-84 14:30:00	06-AUG-84 15:00:00	06-AUG-84 20:45:00	06-AUG-84 21:00:00
O2 (%)	0.01	0.03	0.01	0.01	0.02	0.3
HV kv	10.50	10.70	10.50	10.50	10.20	10.4
I millA	0.50	0.60	0.50	0.40	0.70	0.6
P1 "H2O	4.60		4.90		3.50	
P2 "H2O	4.60		5.00		3.50	
P3 "H2O	4.60		5.10		3.60	
P1-P2 "H2O	0.00		0.01		0.01	
P2-P3 "H2O	0.15		0.14		0.09	
DP4 "H2O	11.00	11.50	11.00	11.20	8.50	7.0
T1 DEG F	399.00		407.00		396.00	
T2 DEG F	132.00		129.00		121.00	
T3 DEG F	122.00	119.00	117.00	118.00	113.00	114.0
T4 DEG F	91.00		89.00		91.00	
T5 DEG F	83.00		82.00		82.00	
T6 DEG F	78.00		77.00		77.00	
T7 DEG F	82.00		79.00		80.00	
T8 DEG F	76.00		75.00		75.00	
T9 DEG F	94.00		94.00		95.00	
T10 DEG F	90.00		91.00		93.00	
ROTOMETER (GPM)	MAX		MAX		MAX	
P5 PSI	55.00		56.00		40.00	
P6 PSI	94.00		90.00		84.00	
V11	5.00		3.00		3.00	
P704 "H2O	5.50		6.20		4.90	

TIME	06-AUG-84 21:30:00	06-AUG-84 22:00:00	06-AUG-84 22:30:00	06-AUG-84 23:00:00	06-AUG-84 23:40:00	07-AUG-84 00:15:00
O2 (%)	0.25	0.4	0.50	0.4	0.25	0.25
HV kv	10.30	10.0	10.10	10.1	10.00	10.00
I millA	0.65	0.5	0.70	0.7	0.70	0.70
P1 "H2O	3.40		3.70		3.50	3.80
P2 "H2O	3.30		3.80		3.80	3.80
P3 "H2O	3.60		3.90		3.80	3.00
P1-P2 "H2O	0.00		0.00		0.00	0.00
P2-P3 "H2O	0.09		0.07		0.07	0.07
DP4 "H2O	7.10	7.0	7.00	6.8	6.70	6.80
T1 DEG F	414.00		388.00		404.00	405.00
T2 DEG F	119.00		116.00		116.00	117.00
T3 DEG F	110.00	112.0	106.00	107.0	107.00	108.00
T4 DEG F	91.00		89.00		90.00	89.00
T5 DEG F	81.00		83.00		81.00	81.00
T6 DEG F	77.00		77.00		77.00	77.00
T7 DEG F	78.00		80.00		78.00	79.00
T8 DEG F	79.00		75.00		75.00	76.00
T9 DEG F	101.00		92.00		94.00	94.00
T10 DEG F	98.00		91.00		91.00	93.00
ROTOMETER (GPM)	MAX		MAX		MAX	MAX
P5 PSI	45.00		42.00		40.00	38.00
P6 PSI	98.00		98.00		88.00	84.00
V11	3.00		3.00		3.00	3.00
P704 "H2O	5.10				4.80	4.00

O2 (%)	0.25	0.25	0.20	0.20	0.20	0.15
HV kv	10.50	10.50	11.00	10.80	10.70	11.00
I 1A	0.70	0.70	0.50	0.60	0.60	0.50
P1 "H2O	3.80	3.80	4.50	4.20	5.00	4.40
P2 "H2O	4.00	4.00	4.60	4.30	5.00	4.40
P3 "H2O	4.20	4.20	4.80	4.60	5.20	4.60
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.07	0.07	0.07	0.07	0.07	0.07
DP4 "H2O	7.00	7.00	7.00	7.00	7.40	7.00
T1 DEG F	406.00	406.00	400.00	396.00	410.00	398.00
T2 DEG F	107.00	107.00	91.00	104.00	85.00	100.00
T3 DEG F	107.00	107.00	107.00	115.00	104.00	114.00
T4 DEG F	92.00	92.00	100.00	100.00	82.00	98.00
T5 DEG F	79.00	79.00	85.00	85.00	75.00	84.00
T6 DEG F	77.00	77.00	75.00	77.00	76.00	75.00
T7 DEG F	79.00	79.00	78.00	81.00	79.00	81.00
T8 DEG F	75.00	75.00	73.00	75.00	74.00	73.00
T9 DEG F	92.00	92.00	96.00	101.00	95.00	11.00
T10 DEG F	90.00	90.00	92.00	97.00	91.00	97.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	40.00	40.00	40.00	38.00		40.00
P6 PSI	85.00	85.00	88.00	90.00		82.00
V11	3.00	3.00	3.00	3.00	3.00	3.00
P704 "H2O			5.50	5.30		5.40

N-13

TIME	07-AUG-84 06:00:00	07-AUG-84 07:10:00	07-AUG-84 08:00:00	07-AUG-84 08:50:00	07-AUG-84 10:00:00	07-AUG-84 10:55:00
O2 (%)	0.15	0.10	0.10	0.10	0.20	0.30
HV kv	10.50	10.40	11.30	11.30	11.00	10.80
I millA	0.60	0.70	0.40	0.60	0.70	0.78
P1 "H2O	5.40	4.20	4.60	-0.50	-0.40	-0.20
P2 "H2O	5.20	4.20	4.60	-0.70	-0.10	-0.10
P3 "H2O	5.40	4.40	4.80	-0.70	-1.00	-0.30
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.07	0.07	0.07	0.06	0.05	0.05
DP4 "H2O	7.50	5.75	8.20	4.50	4.00	3.75
T1 DEG F	398.00	388.00	390.00	391.00	307.00	298.00
T2 DEG F	101.00	91.00	111.00	104.00	93.00	96.00
T3 DEG F	115.00	110.00	127.00	120.00	117.00	116.00
T4 DEG F	104.00	93.00	116.00	114.00	111.00	105.00
T5 DEG F	83.00	81.00	99.00	100.00	98.00	93.00
T6 DEG F	75.00	75.00	99.00	81.00	78.00	79.00
T7 DEG F	79.00	78.00	87.00	88.00	85.00	84.00
T8 DEG F	74.00	73.00	76.00	77.00	76.00	77.00
T9 DEG F	96.00	96.00	113.00	112.00	106.00	105.00
T10 DEG F	93.00	93.00	109.00	109.00	102.00	102.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	40.00	42.00	40.00	40.00	40.00	40.00
P6 PSI	75.00	90.00	95.00	95.00	95.00	95.00
V11	3.00	3.00	4.00	4.00	4.00	4.00
P704 "H2O	5.90	5.40	5.90	2.00	0.30	0.20

TIME	07-AUG-84 12:00:00	07-AUG-84 13:00:00	07-AUG-84 14:00:00	07-AUG-84 15:22:00	07-AUG-84 17:35:00	07-AUG-84 18:25:00
O2 (%)	0.20	0.20	0.15	0.15	0.015	0.01
HV kv	11.10	10.70	11.50	10.70	10.300	10.30
I millA	0.55	0.65	0.40	0.60	0.700	0.70
P1 "H2O	0.50	0.00	1.50	-0.20	0.400	0.40
P2 "H2O	0.40	0.10	1.50	-0.30	0.400	0.20
P3 "H2O	0.40	0.10	1.50	-0.50	0.300	0.33
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.000	0.00
P2-P3 "H2O	0.06	0.06	0.06	0.07	0.080	0.07
DP4 "H2O	4.25	4.50	6.00	5.00	5.000	5.80
T1 DEG F	285.00	280.00	321.00	337.00	368.000	382.00
T2 DEG F	102.00	111.00	118.00	120.00	1120.000	121.00
T3 DEG F	122.00	120.00	128.00	125.00	21.000	117.00
T4 DEG F	123.00	117.00	130.00	131.00	132.000	84.00
T5 DEG F	106.00	103.00	113.00	113.00	109.000	80.00
T6 DEG F	83.00	84.00	93.00	91.00	88.000	77.00
T7 DEG F	91.00	86.00	89.00	95.00	92.000	75.00
T8 DEG F	91.00	86.00	84.00	87.00	86.000	75.00
T9 DEG F	107.00	109.00	113.00	115.00	114.000	88.00
T10 DEG F	104.00	105.00	105.00	115.00	114.000	88.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	40.00	40.00	40.00	40.00	40.000	40.00
P6 PSI	95.00	95.00	90.00	90.00	80.000	80.00
V11	4.00	4.00	4.00	4.00	4.000	4.00
P704 "H2O	0.20	0.30	1.60	0.60	1.700	1.70

TIME	07-AUG-84 19:30:00	07-AUG-84 20:20:00	07-AUG-84 21:30:00	07-AUG-84 22:30:00	07-AUG-84 23:35:00	08-AUG-84 00:30:00
O2 (%)	0.02	0.15	0.01	0.01	0.01	0.00
HV kv	10.20	10.50	10.30	10.60	10.20	10.50
I millA	0.75	0.70	0.70	0.60	0.65	0.70
P1 "H2O	0.30	0.50	0.70	0.50	0.60	0.90
P2 "H2O	0.20	0.20	0.70	0.40	0.40	0.80
P3 "H2O	0.20	0.30	0.70	0.40	0.30	0.80
P1-P2 "H2O	0.02	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.06	0.06	0.06	0.05	0.06	0.07
DP4 "H2O	5.00	4.30	4.80	4.60	5.00	6.00
T1 DEG F	351.00	370.00	364.00	363.00	360.00	367.00
T2 DEG F	104.00	102.00	109.00	111.00	115.00	109.00
T3 DEG F	110.00	117.00	113.00	114.00	111.00	109.00
T4 DEG F	109.00	98.00	99.00	104.00	102.00	103.00
T5 DEG F	89.00	98.00	83.00	84.00	86.00	83.00
T6 DEG F	78.00	78.00	77.00	77.00	78.00	74.00
T7 DEG F	84.00	86.00	81.00	82.00	80.00	82.00
T8 DEG F	76.00	78.00	75.00	77.00	75.00	94.00
T9 DEG F	88.00	110.00	100.00	102.00	102.00	100.00
T10 DEG F	88.00	110.00	95.00	100.00	97.00	96.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	40.00	40.00	44.00	40.00	40.00	42.00
P6 PSI	90.00	90.00	90.00	98.00	92.00	96.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	1.50	1.50	1.90	1.10	2.00	2.30

O2 (%)	0.00	0.00	0.01	0.14	0.15	0.05
HV kv	10.00	10.50	10.00	10.50	10.50	10.50
I millA	0.80	0.60	0.80	0.65	0.75	0.90
P1 "H2O	0.80	0.70	1.00	1.20	0.80	0.50
P2 "H2O	0.80	0.70	1.00	1.20	0.70	0.40
P3 "H2O	0.80	0.70	0.60	1.30	0.70	0.40
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.07	0.08	0.06	0.06	0.07	0.07
DP4 "H2O	4.00	6.00	5.50	6.50	4.00	5.00
T1 DEG F	367.00	373.00	378.00	393.00	366.00	370.00
T2 DEG F	105.00	110.00	112.00		120.00	116.00
T3 DEG F	108.00	113.00	113.00		113.00	112.00
T4 DEG F	103.00	96.00	98.00	100.00	99.00	112.00
T5 DEG F	87.00	82.00	86.00	85.00	82.00	84.00
T6 DEG F	76.00	78.00	77.00	77.00	75.00	78.00
T7 DEG F	81.00	84.00	85.00	82.00	81.00	79.00
T8 DEG F	78.00	75.00	75.00	75.00	73.00	
T9 DEG F	100.00	101.00	98.00	99.00	102.00	111.00
T10 DEG F	104.00	96.00	94.00	96.00	96.00	99.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	41.00	41.00	42.00	42.00	42.00	42.00
P6 PSI	80.00	81.00	80.00	78.00	78.00	76.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	2.10	2.40	2.30	3.20	2.40	3.10

N-15

TIME	08-AUG-84 07:30:00	08-AUG-84 09:30:00	08-AUG-84 10:12:00	08-AUG-84 11:06:00	08-AUG-84 12:30:00	08-AUG-84 13:15:00
O2 (%)		0.80	0.50	0.80	0.14	0.16
HV kv	10.50	10.50	10.50	10.50	10.50	10.50
I millA	0.70	0.70	0.60	0.60	0.70	0.70
P1 "H2O	0.40	0.80	0.70	0.80	0.60	0.90
P2 "H2O	0.40	0.80	0.70	0.70	0.50	0.60
P3 "H2O	0.50	0.70	0.80	0.60	0.50	0.70
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.07	0.06	0.07	0.07	0.08	0.08
DP4 "H2O	5.00	5.00	5.50	5.00	5.00	6.00
T1 DEG F	355.00	367.00	368.00	361.00	377.00	370.00
T2 DEG F	120.00	108.00	114.00	111.00	115.00	115.00
T3 DEG F	113.00	111.00	114.00	112.00	114.00	113.00
T4 DEG F	98.00	101.00	101.00	101.00	100.00	106.00
T5 DEG F	83.00	82.00	86.00	85.00	87.00	87.00
T6 DEG F	74.00	77.00	78.00	78.00	80.00	83.00
T7 DEG F	88.00	80.00	82.00	82.00	84.00	84.00
T8 DEG F	77.00	73.00	78.00	76.00	77.00	78.00
T9 DEG F	101.00	101.00	105.00	101.00	102.00	103.00
T10 DEG F	97.00	100.00	100.00	99.00	100.00	98.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	42.00	42.00	44.00	41.00	44.00	40.00
P6 PSI	80.00	86.00	84.00	82.00	96.00	79.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	2.00	2.30	2.00	1.80	1.90	2.20

TIME	08-AUG-84 14:10:00	08-AUG-84 16:10:00	08-AUG-84 18:14:00	08-AUG-84 19:00:00	08-AUG-84 20:00:00	08-AUG-84 21:00:00
O2 (%)	0.01	0.13	0.08	0.40	0.70	0.40
HV kv	10.90	10.40	10.20	10.70	10.80	10.60
I millA	0.52	0.60	0.70	0.50	0.55	0.57
P1 "H2O	1.20	0.90	0.90	1.20	0.70	0.70
P2 "H2O	1.10	0.80	0.80	1.20	0.80	0.80
P3 "H2O	1.00	0.90	0.90	1.30	0.80	0.70
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.09	0.08	0.08	0.08	0.08	0.08
DP4 "H2O	6.00	7.00	7.00	8.00	5.50	6.50
T1 DEG F	376.00	360.00	379.00	374.00	388.00	383.00
T2 DEG F	119.00	114.00	116.00	121.00	126.00	127.00
T3 DEG F	119.00	118.00	117.00	129.00	129.00	130.00
T4 DEG F	106.00	103.00	101.00	151.00	152.00	150.00
T5 DEG F	89.00	87.00	86.00	120.00	122.00	122.00
T6 DEG F	82.00	80.00	78.00	9.00	100.00	98.00
T7 DEG F	86.00	84.00	84.00	94.00	95.00	93.00
T8 DEG F	78.00	79.00	78.00	89.00	90.00	87.00
T9 DEG F	107.00	107.00	109.00	118.00	125.00	128.00
T10 DEG F	102.00	102.00	102.00	110.00	114.00	113.00
ROTOMETER (GPM)	MAX	MAX	MAX	44.00	45.00	47.00
P5 PSI	40.00	40.00	40.00	41.00	41.00	40.00
P6 PSI	79.00	98.00	96.00	93.00	90.00	98.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	1.90	2.60	3.20	3.30	2.90	2.00

TIME	08-AUG-84 22:01:00	08-AUG-84 23:06:00	09-AUG-84 00:00:00	09-AUG-84 02:01:00	09-AUG-84 04:04:00	09-AUG-84 06:06:00
O2 (%)	0.10	0.00	0.00	0.00	0.00	0.00
HV kv	11.20	11.40	11.00	10.60	11.20	11.00
I millA	0.45	0.42	0.55	0.62	0.48	0.60
P1 "H2O	1.70	1.40	0.60	0.00	0.40	-0.50
P2 "H2O	1.80	1.40	0.60	-0.10	0.10	-0.10
P3 "H2O	1.70	1.40	0.40	-0.10	0.00	-0.30
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.08	0.07	0.07	0.06	0.06	0.08
DP4 "H2O	6.00	5.00	5.00	6.00	6.00	6.00
T1 DEG F	371.00	362.00	380.00	373.00	395.00	409.00
T2 DEG F	129.00	129.00	123.00	123.00	118.00	124.00
T3 DEG F	133.00	133.00	127.00	122.00	129.00	127.00
T4 DEG F	151.00	147.00	146.00	149.00	162.00	166.00
T5 DEG F	124.00	121.00	119.00	119.00	125.00	126.00
T6 DEG F	98.00	97.00	95.00	95.00	96.00	96.00
T7 DEG F	93.00	92.00	91.00	91.00	88.00	88.00
T8 DEG F	87.00	86.00	85.00	85.00	82.00	82.00
T9 DEG F	128.00	127.00	120.00	121.00	122.00	123.00
T10 DEG F	112.00	109.00	108.00	106.00	106.00	106.00
ROTOMETER (GPM)	45.00	45.00	45.00	45.00	45.00	45.00
P5 PSI	40.00	41.00	41.00	41.00	41.00	41.00
P6 PSI	96.00	88.00	90.00	90.00	92.00	90.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	3.50	3.50	3.00	3.00	4.00	4.20

TIME	09-AUG-84 07:04:00	09-AUG-84 08:03:00	09-AUG-84 09:00:00	09-AUG-84 10:10:00	09-AUG-84 19:35:00	09-AUG-84 20:15:00
(%)	0.00	0.00	0.03	0.07	0.03	0.04
kv	10.20	9.50	9.50	9.00	11.00	11.00
I millA	0.80	0.90	0.80	0.80	0.50	0.50
P1 "H2O	-1.50	-1.90	-2.50	-2.00	1.50	1.60
P2 "H2O	-1.40	-1.80	-2.00	-2.10	1.50	1.60
P3 "H2O	-2.20	-2.00	-2.00	-2.60	0.00	0.00
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.02	0.02
P2-P3 "H2O	0.07	0.08	0.05	0.05	1.00	1.00
DP4 "H2O	5.00	5.00	5.00	4.00	6.50	7.50
T1 DEG F	393.00		340.00	380.00	308.00	350.00
T2 DEG F			115.00	122.00	111.00	117.00
T3 DEG F			100.00	104.00	118.00	122.00
T4 DEG F			87.00	103.00	122.00	127.00
T5 DEG F			77.00	93.00	110.00	111.00
T6 DEG F			73.00	86.00	83.00	83.00
T7 DEG F				84.00	87.00	91.00
T8 DEG F			77.00	83.00	81.00	80.00
T9 DEG F			90.00	90.00	105.00	120.00
T10 DEG F			86.00	90.00	100.00	114.00
ROTOMETER (GPM)	MAX	MAX	MAX	50.00	50.00	50.00
P5 PSI	41.00	41.00	42.00	42.00	38.00	40.00
P6 PSI	90.00	92.00	95.00	97.00	85.00	90.00
V11	4.00	4.00	5.00	3.00	4.00	4.00
P704 "H2O	4.00	4.20	4.10	4.10	4.00	4.10

N-17

TIME	09-AUG-84 21:15:00	09-AUG-84 22:10:00	09-AUG-84 23:00:00	09-AUG-84 23:55:00	10-AUG-84 01:00:00	10-AUG-84 02:00:00
O2 (%)	0.03	0.05	0.03	0.03	0.02	0.02
HV kv	11.00	10.80	11.30	11.00	11.00	11.00
I millA	0.50	0.60	0.50	0.60	0.40	0.40
P1 "H2O	1.60	1.70	2.20	1.60	2.10	2.50
P2 "H2O	1.60	1.70	2.20	1.60	2.20	2.50
P3 "H2O	0.00	0.00	-0.10	-0.10	-0.10	0.00
P1-P2 "H2O	0.02	0.03	0.02	0.02	0.00	0.00
P2-P3 "H2O	1.00	1.00	1.00	1.00	1.00	1.00
DP4 "H2O	7.00	7.00	7.25	6.75	7.00	7.00
T1 DEG F	367.00	376.00	387.00	402.00	387.00	393.00
T2 DEG F	117.00	118.00	116.00	119.00	122.00	127.00
T3 DEG F	120.00	121.00	122.00	121.00	123.00	123.00
T4 DEG F	116.00	120.00	121.00	121.00	123.00	123.00
T5 DEG F	100.00	104.00	104.00	103.00	106.00	105.00
T6 DEG F	80.00	81.00	80.00	81.00	80.00	82.00
T7 DEG F	89.00	89.00	89.00	89.00	87.00	84.00
T8 DEG F	77.00	77.00	77.00	78.00	81.00	81.00
T9 DEG F	115.00	117.00	117.00	118.00	120.00	117.00
T10 DEG F	111.00	113.00	113.00	112.00	110.00	114.00
ROTOMETER (GPM)	50.00	50.00	50.00	50.00	50.00	50.00
P5 PSI	40.00	39.00	39.00	36.00	40.00	40.00
P6 PSI	78.00	85.00	95.00	80.00	96.00	85.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	4.10	4.10	5.00	4.30	4.50	4.30

TIME	10-AUG-84 03:00:00	10-AUG-84 04:00:00	10-AUG-84 05:00:00	10-AUG-84 06:00:00	10-AUG-84 07:00:00	10-AUG-84 08:00:00
O2 (%)	0.02	0.03	0.02	0.02	0.02	0.30
HV kv	11.00	11.00	11.00	11.50	11.00	11.50
I millA	0.60	0.40	0.50	0.40	0.50	0.35
P1 "H2O	1.60	1.60	1.90	2.40	1.90	1.70
P2 "H2O	1.90	1.90	1.80	2.50	1.90	1.70
P3 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	1.00	1.00	1.00	1.00	1.00	1.00
DP4 "H2O	6.00	7.50	7.40	7.40	7.50	7.00
T1 DEG F	397.00	393.00	387.00	382.00	384.00	329.00
T2 DEG F	120.00	116.00	118.00	125.00	129.00	122.00
T3 DEG F	121.00	119.00	122.00	123.00	123.00	129.00
T4 DEG F	127.00	123.00	125.00	124.00	125.00	122.00
T5 DEG F	110.00	107.00	106.00	107.00	113.00	114.00
T6 DEG F	82.00	80.00	82.00	88.00	85.00	91.00
T7 DEG F	80.00	86.00	87.00	88.00	82.00	84.00
T8 DEG F	82.00	80.00	80.00	82.00	82.00	84.00
T9 DEG F	121.00	117.00	117.00	118.00	118.00	119.00
T10 DEG F	116.00	109.00	105.00	112.00	109.00	111.00
ROTOMETER (GPM)	50.00	50.00	580.00	MAX	MAX	MAX
P5 PSI	40.00	40.00	40.00	42.00	40.00	40.00
P6 PSI	95.00	85.00	89.00	85.00	98.00	84.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	4.40	4.30	4.30	4.50	4.20	3.20

TIME	10-AUG-84 13:00:00	10-AUG-84 14:35:00	10-AUG-84 16:50:00	10-AUG-84 18:00:00	10-AUG-84 19:00:00	10-AUG-84 20:05:00
O2 (%)	0.03	0.5	0.46	0.05	0.05	0.09
HV kv	10.50	10.6	10.50	11.00	10.50	11.00
I millA	0.60	0.5	0.70	0.40	0.60	0.40
P1 "H2O	1.50	1.4	1.60	2.50	1.90	2.40
P2 "H2O	1.60	1.9	1.60	2.50	1.90	2.40
P3 "H2O		0.0	1.60	2.60	1.90	2.40
P1-P2 "H2O	0.00	0.0	0.00	0.00	0.00	0.00
P2-P3 "H2O		0.5	0.10	0.11	0.11	0.11
DP4 "H2O	5.50	2.5	6.50	6.75	7.00	7.50
T1 DEG F	372.00	394.0	380.00	398.00	402.00	399.00
T2 DEG F	116.00	126.0	123.00	122.00	120.00	119.00
T3 DEG F	121.00	123.0	121.00	120.00	117.00	124.00
T4 DEG F	131.00	137.0	132.00	115.00	114.00	128.00
T5 DEG F	113.00	116.0	114.00	101.00	100.00	110.00
T6 DEG F	91.00	94.0	88.00	84.00	83.00	85.00
T7 DEG F	87.00	88.0	93.00	90.00	89.00	92.00
T8 DEG F	87.00	88.0	88.00	79.00	80.00	84.00
T9 DEG F	118.00	124.0	116.00	115.00	114.00	119.00
T10 DEG F	111.00	117.0	111.00	108.00	109.00	114.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	35.00	40.0	40.00	38.00	38.00	40.00
P6 PSI	91.00	92.0	95.00	80.00	95.00	82.00
V11	4.00	4.0	4.00	4.00	4.00	4.00
"H2O	3.20	3.6	4.20	4.40	4.40	4.30

O2 (%)	0.06	0.07	0.05	0.05	0.40	0.50
HV kv	10.80	11.00	11.00	10.50	11.00	11.00
I1A	0.50	0.40	0.40	0.60	0.50	0.45
P1 "H2O	2.10	2.70	2.60	2.40	2.00	2.70
P2 "H2O	2.10	2.70	2.60	2.40	2.00	2.70
P3 "H2O	2.10	2.70	2.60	2.40	2.00	2.80
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.11	0.11	0.13	0.13	0.14	0.15
DP4 "H2O	7.50	8.00	8.00	8.00	7.50	7.50
T1 DEG F	410.00	403.00	416.00	400.00	385.00	399.00
T2 DEG F	121.00	120.00	124.00	116.00	115.00	118.00
T3 DEG F	120.00	120.00	120.00	119.00	120.00	122.00
T4 DEG F	127.00	125.00	129.00	126.00	124.00	126.00
T5 DEG F	108.00	103.00	110.00	107.00	107.00	108.00
T6 DEG F	83.00	83.00	85.00	83.00	83.00	81.00
T7 DEG F	91.00	90.00	91.00	90.00	90.00	89.00
T8 DEG F	81.00	80.00	83.00	83.00	81.00	82.00
T9 DEG F	123.00	119.00	121.00	120.00	118.00	118.00
T10 DEG F	122.00	114.00	111.00	111.00	112.00	111.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	40.00	39.00	40.00	38.00	41.00	41.00
P6 PSI	85.00	75.00	80.00	80.00	74.00	94.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	4.70	5.00	5.00	5.10	4.30	4.70

GT-N-19

TIME	11-AUG-84 03:02:00	11-AUG-84 04:02:00	11-AUG-84 05:02:00	11-AUG-84 06:06:00	11-AUG-84 07:08:00	11-AUG-84 08:00:00
O2 (%)	0.50	0.60	0.60	0.60	0.70	0.70
HV kv	11.00	11.50	11.30	11.53	11.00	11.00
I millA	0.45	0.35	0.45	0.45	0.55	0.55
P1 "H2O	1.90	3.00	2.40	3.10	2.10	2.00
P2 "H2O	1.90	3.00	2.40	3.10	2.10	2.00
P3 "H2O	2.00	3.00	2.30	3.10	2.20	2.00
P1-P2 "H2O	0.00	0.00	0.00	0.00	0.00	0.00
P2-P3 "H2O	0.14	0.17	0.10	0.18	0.15	0.14
DP4 "H2O	7.00	7.50	7.54	7.50	7.00	7.00
T1 DEG F	378.00	376.00	382.00	404.00	388.00	387.00
T2 DEG F	117.00	120.00	119.00	119.00	117.00	114.00
T3 DEG F	120.00	122.00	124.00	126.00	118.00	117.00
T4 DEG F	126.00	125.00	127.00	130.00	123.00	125.00
T5 DEG F	108.00	108.00	108.00	111.00	106.00	105.00
T6 DEG F	82.00	82.00	81.00	81.00	81.00	82.00
T7 DEG F	90.00	89.00	89.00	88.00	88.00	88.00
T8 DEG F	81.00	80.00	80.00	80.00	80.00	80.00
T9 DEG F	119.00	118.00	119.00	119.00	117.00	117.00
T10 DEG F	110.00	107.00	108.00	111.00	111.00	110.00
ROTOMETER (GPM)	MAX	MAX	MAX	MAX	MAX	MAX
P5 PSI	41.00	41.00	41.00	41.00	41.00	41.00
P6 PSI	84.00	78.00	86.00	88.00	76.00	73.00
V11	4.00	4.00	4.00	4.00	4.00	4.00
P704 "H2O	4.50	4.80	4.90	6.10	4.50	4.50