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GASIFICATION OF RESIDUAL MATERIALS FROM COAL LIQUEFACTION

Type IV Sustained Pilot Plant Evaluation of SRC-II Vacuum Flash Drum Bottoms From Powhatan Coal

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ABSTRACT

A Type IV Sustained Pilot Plant demonstration of SRC-II vacuum flash drum bottoms obtained from the liquefaction of Powhatan coal at Ft. Lewis, Washington was successfully completed at Texaco's Montebello Research Laboratory.

Approximately 83 tons of SRC-II residue were gasified during four pilot plant runs at 1200 and 600 psig. The longest continuous run was 127 hours, and a total of 237 hours of operation was accumulated. Operating conditions were held substantially constant throughout the demonstrations. The dry syngas produced contained over 90 (vol) percent hydrogen plus carbon monoxide.

No major operating problems were experienced and all of the key phases of the gasification were demonstrated. Steady state operating conditions were obtained in all streams, and extensive environmental data were obtained.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

A Type IV Sustained Pilot Plant Evaluation of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan Coal was successfully completed at Texaco's Montebello Research Laboratoy.

Approximately 83 tons of SRC-II residue were gasified by reacting with pure oxygen and steam in a high pressure Texaco pilot plant reactor during four runs. In the first three runs the residue was gasified at 1200 psig, while in the fourth run, the residue was gasified at 600 psig. The runs lasted from 7.4 to 126.9 hours each and a total of 236.7 hours of demonstration was accumulated. On the average, the SRC-II residue contained 65 (wt) percent carbon and 27 (wt) percent ash. It was fed to the Texaco gasifier as a molten fluid which was diluted with five percent of a coal based heavy distillate for viscosity control. The residue feed rate and the steam/residue ratio were held substantially constant throughout the run, while the oxygen/residue ratio was slightly varied to maintain smooth operating conditions. The oxygen/residue ratio was varied between .72 and .84 (avg. = .79) pounds/pound. The conversion of carbon to syngas varied from 98.3 percent to 99.8 percent (avg = 99.3 pct.). An average of 29.4 standard cubic feet of hydrogen plus carbon monoxide was produced per pound of residue feed. The steam/residue ratio was held substantially constant at .45 pounds/pound.

The gasifier temperature was maintained within the range 2300°F to 2800°F. The cold gas efficiency varied between 77 percent and 83 percent with an average of 80 percent.

The ash was recovered as coarse slag, lockhopper fines and char. The ratio of lockhopper fines to coarse slag was higher than that obtained during the previous Type II evaluation. It varied from 13.6 to 1.9, averaging 4.7 pounds per pound. The ratio of char to coarse slag averaged 0.28 pounds per pound. The carbon content of the coarse slag was under 0.2 (wt) percent; the carbon content of the lockhopper fines varied between 0.6 percent and 5.6 percent depending on operating conditions. The carbon content of the char varied between 1.5 percent and 4.5 percent.

Steady state conditions were reached in all process streams, and extensive analytical testing was completed.

No major problems were encountered in melting and pumping the residue.

INTRODUCTION

Objective

The objectives of a Type IV pilot plant demonstration are to establish equilibrium conditions in all streams, to demonstrate sustained operation with the selected residue and to confirm the design basis. The demonstration consists of a 7-10 day sustained gasificaton run during which up to 100 tons (500 barrels) of the selected coal liquefaction residue are gasified at a pressure between 350 and 1200 psig. Operating conditions are to be maintained substantially constant throughout the run. The demonstration provides information which can serve as the basis for a commercial design.

Background

Almost all coal liquefaction processes, which are being developed to reduce our dependence on foreign oil, require hydrogen or synthesis gas (a mixture of hydrogen and carbon monoxide) to solubilize the coal. In order to obtain a favorable product yield in such a coal liquefaction plant it is desirable to produce the needed hydrogen or synthesis gas primarily from the residue fraction of the coal. This material, together with the inorganic ash and some fraction of the converted coal, may be recovered in various forms depending on the particular process. Some of these streams are fluid at elevated temperatures and will make excellent feedstocks for gasification using te Texaco Synthesis Gas Generation Process to produce synthesis gas or hydrogen.

Texaco developed the non-catalytic partial oxidation process in the late 1940's to convert natural gas to synthesis gas which was then reacted with steam to form additional hydrogen. Further developments enabled the use of light oils, residual oils and asphalts as feedstocks. Texaco has carried out work that has demonstrated the feasibility of gasifying coal-water slurries.

Exploratory pilot plant runs conducted in the summer of 1975 demonstrated the feasibility of gasifying pumpable coal derived residues which contained as much as 28 percent ash.

In June, 1976, a contract was awarded to Texaco by the U.S. Department of Energy (DOE) which provided for three levels of testing to be completed on residual materials from DOE sponsored coal liquefaction projects. In September, 1979, the contract was extended and modified to include a fourth level of testing. The four types of tests are shown in Table I followed by a brief description of each.

Table I

Test Definitions

Test Type	Description	Max Sample Size	Min. No of Samples	Max. No. of Samples
I	Laboratory Evaluation	20 lbs	4	25
II	Preliminary Pilot Plant Evaluation	20 bbls	0	8
III	Extended Pilot Plant Evaluation	200 bbls	0	8
IV	Sustained Pilot Plant Demonstration	500 bbls	0	4

The Type I evaluation will determine the chemical composition and physical properties of each material. On the basis of these results, the mode of feeding the material to a Texaco gasifier will be selected and the gasification conditions, yields and product gas composition will be estimated. An assessment of the suitability of the material for further testing will be made.

The Type II evaluation will consist of a preliminary pilot plant test in which approximately 20 barrels of the candidate feedstock will be gasified. This short pilot plant evaluation will confirm the operability of the process on the candidate feedstock and permit refining the estimates of preferred processing conditions, product gas yield and composition. Unexpected operating problems will be identified.

The Type III evaluation will consist of an extended series of runs in which approximately 200 barrels of the candidate feedstock will be gasified. Operating conditions will be varied to further define the optimum. Definitive heat and material balance data will be obtained. The testing will provide information which will serve as the basis for an analysis of thermal efficiency and operability of the particular liquefaction process which the material is derived.

The Type IV evaluation will consist of a long sustained gasification run in which approximately 500 barrels of the candidate feedstock will be gasified. Operating conditions will be held substantially constant throughout the run. The demonstration will provide information which will serve as the basis for a commercial design.

All materials received will be given a Type I evaluation. Pilot plant evaluations will be performed only on the most promising materials.

A Type I Laboratory Evaluation of a 20-pound sample of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal was completed in March, 1979. The sample was judged to be a suitable feedstock for the Texaco Synthesis Gas Generation Process (Ref. DOE Report FE-2247-21).

A Type II preliminary pilot plant evaluation of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal at Ft. Lewis, Washington was completed in January, 1979. During this evaluation about 7.5 tons of SRC-II vacuum flash drum bottoms were successfully gasified in a single 15 hour pilot plant run at 350 psig. Data obtained from the run are reproduced from DOE report Fe-2247-24 in Appendix A.

The Type IV Sustained Pilot Plant Demonstration Run of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal at Ft. Lewis, Washington was completed in February, 1980. The results of this evaluation are discussed in this report.

Scope

This report covers work performed at Texaco's Montebello Research Laboratory under contract DEAC 01-76ET10137(formerly EX-76-C01-2247) with the United States Department of Energy (DOE) during the priod January 1980 through February 1980.

Specifically, the work includes a Type IV Sustained Pilot Plant Demonstration of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal. Three gasification runs were completed at 1200 psig and a fourth gasification run was completed at 600 psig. All runs were completed in the Texaco High Pressure Pilot Plant gasifier.

PROCESS DESCRIPTION

The Texaco Synthesis Gas Generation Process is a non-catalytic Partial Oxidation Process that is based on certain reactions between oxygen and hydrocarbons that take place at high temperature to produce synthesis gas composed primarily of hydrogen and carbon monoxide. The reactions occur when the hydrocarbon and a deficiency of oxygen are introduced under pressure into a refractory lined vessel.

In order to control both the temperature and the conversion of hydrocarbon to gas, steam or liquid water is often added to the reactor. Gasification efficiency if enhanced to the degree that the steam-carbon reaction can be made to take place.

The high temperature synthesis gas produced in the gasifier can be treated in one of two ways. It can be quenched directly in water, which saturates the syngas with water vapor so that no additional steam is required for water-gas shift conversion, or it may be routed through a synthesis gas cooler, which produces a separate stream of high pressure steam. Both modes are being used in commercial operations. The direct water-quench approach is often favored in hydrogen and ammonia plants.

The quenched or partially cooled synthesis gas is scrubbed with water to remove any entrained char and then processed further depending on the end product desired.

A block diagram of a plant designed to produce hydrogen from coal liquefaction residue is shown in Figure 1.

The scrubbed synthesis gas is reacted with steam in a shift converter to produce additional hydrogen. All of the sulfur in the gas after shift conversion is in the form of H_2S or COS and is removed along with CO_2 in one of several commercially available processes. The sulfur is then recovered in a conventional manner. The small amount of residual CO remaining in the product hydrogen may be eliminated if necessary by methanation, copper liquor scrubbing, or nitrogen washing.

Any char produced in the gasifier is washed from the gas by quenching and scrubbing with water. The char-water slurry is then allowed to thicken by settling, or by the use of centrifugal force. Depending on its carbon content, the char may be recycled to the process after some further preparation, or disposed of with the slag.

The slag produced in the gasifier is quenched with water and removed through a lockhopper system. After dewatering, the slag is sent to disposal.

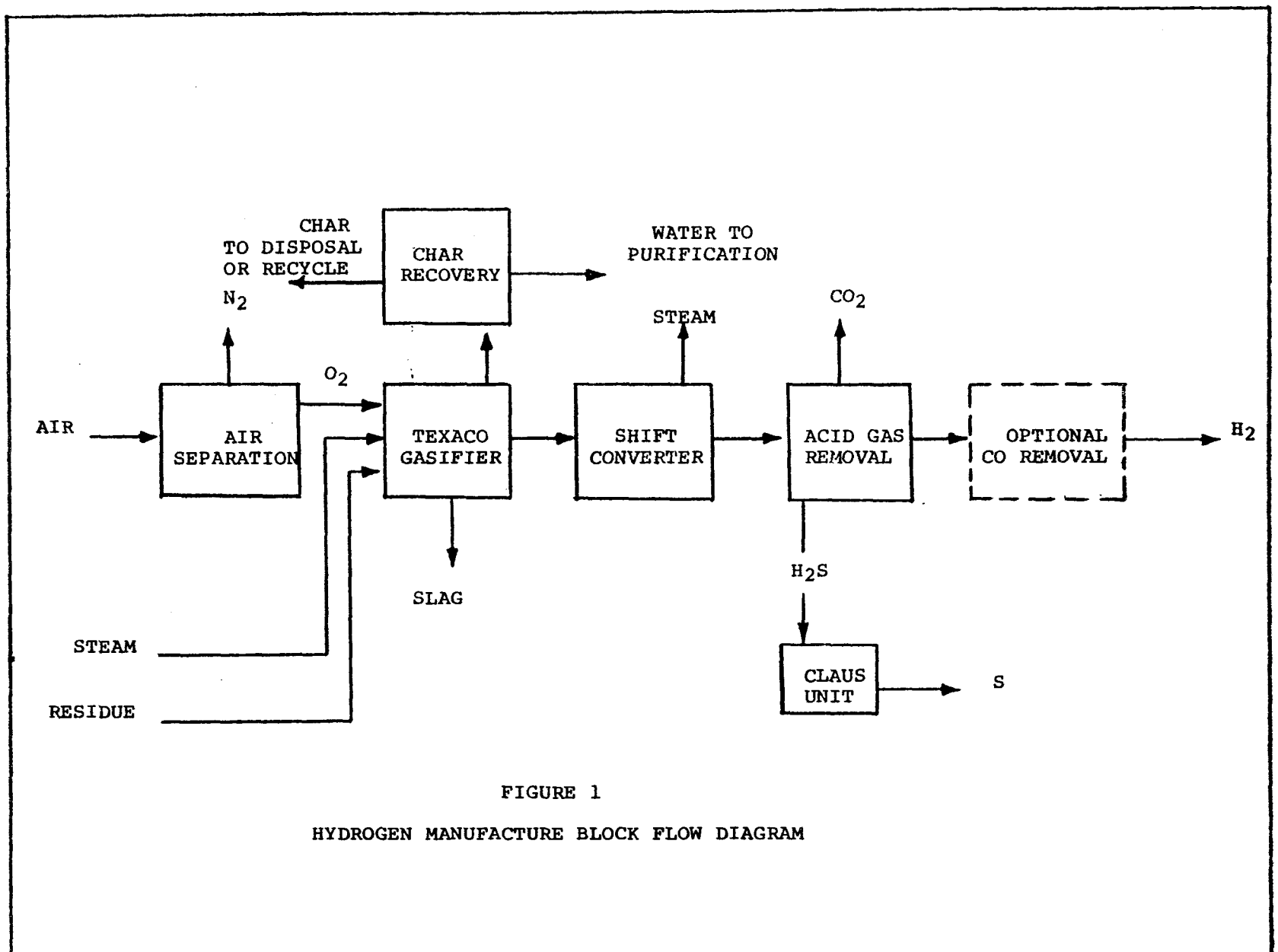

FIGURE 1

HYDROGEN MANUFACTURE BLOCK FLOW DIAGRAM

A blowdown stream of water is maintained to limit the buildup of dissolved solids in the circulating water streams. This blowdown stream, which normally represents only a small fraction of the circulating water, may be sent to a water treatment plant prior to reuse.

In the Texaco Synthesis Gas Generation Pilot Plant, only the direct quench mode of operation is used.

PILOT PLANT PROCESS FLOW

Figure 2 is a process flow diagram of the Texaco gasification pilot plant at the Montebello Research Laboratory. The pilot plant consists of seven sections; the residue preparation and feed system, the oxygen feed system, the steam feed system, the gasifier, the slag removal system, the char recovery and water recycle system and the syngas treatment system. The flow rate of each gaseous and liquid stream is recorded during every run.

Residue Preparation and Feed System

The residue feed is pulverized to -¼ inch in a hammer mill, after which it is pneumatically transferred to a feed bin. From the feed bin it is charged by a screw feeder to a 1300 gallon melt tank at a rate of approximately 1000 pounds per hour, and melted at a temperature of about 500°F under a nitrogen blanket. The melt tank is agitated and a pool of molten residue is maintained in the melt tank at all times. When necessary, solvent may be added to the melt tank to reduce the viscosity of the molten residue to an acceptable level for pumping into the gasifier. From the bottom of the melt tank, the molten residue is circulated through a heat exchanger, heated to about 525°F, and then returned to the top of the melt tank. This is done to allow the hot molten residue to mix with the dry residue feed to speed the melting process.

The melted residue is intermittently screened and transferred from the melt tank to a 1000 gallon day tank which is mounted on a scale to allow monitoring the charge rate. From the bottom of the day tank, the molten residue is circulated continuously through a line strainer past the suction of the high pressure residue charge pump and back to the top of the day tank. This is done to insure that a positive pressure is maintained at all times at the suction of the high pressure residue charge pump. The day tank is also blanketed with nitrogen during each run.

The molten residue is pumped to the gasifier under pressure at a constant rate using a positive displacement plunger pump fitted with external ball check valves. The piping between each check valve assembly and the corresponding pump cylinder is filled with a clean purge solvent. An auxiliary pump is utilized to maintain a small purge rate (±2% of residue feed rate) of fresh solvent into each connecting pipe to prevent molten residue from diffusing back to the charge pump cylinders.

Oxygen Feed System

Liquid oxygen of 99.9 percent purity is stored on site. The oxygen is pumped up to the desired pressure and vaporized before feeding to the gasifier. The flow rate of gaseous oxygen is measured with a conventional orifice, recorded, and controlled at the desired flow rate during each run. A steam heater is used to heat the oxygen to approximately 300°F prior to metering to insure a steady temperature at the orifice.

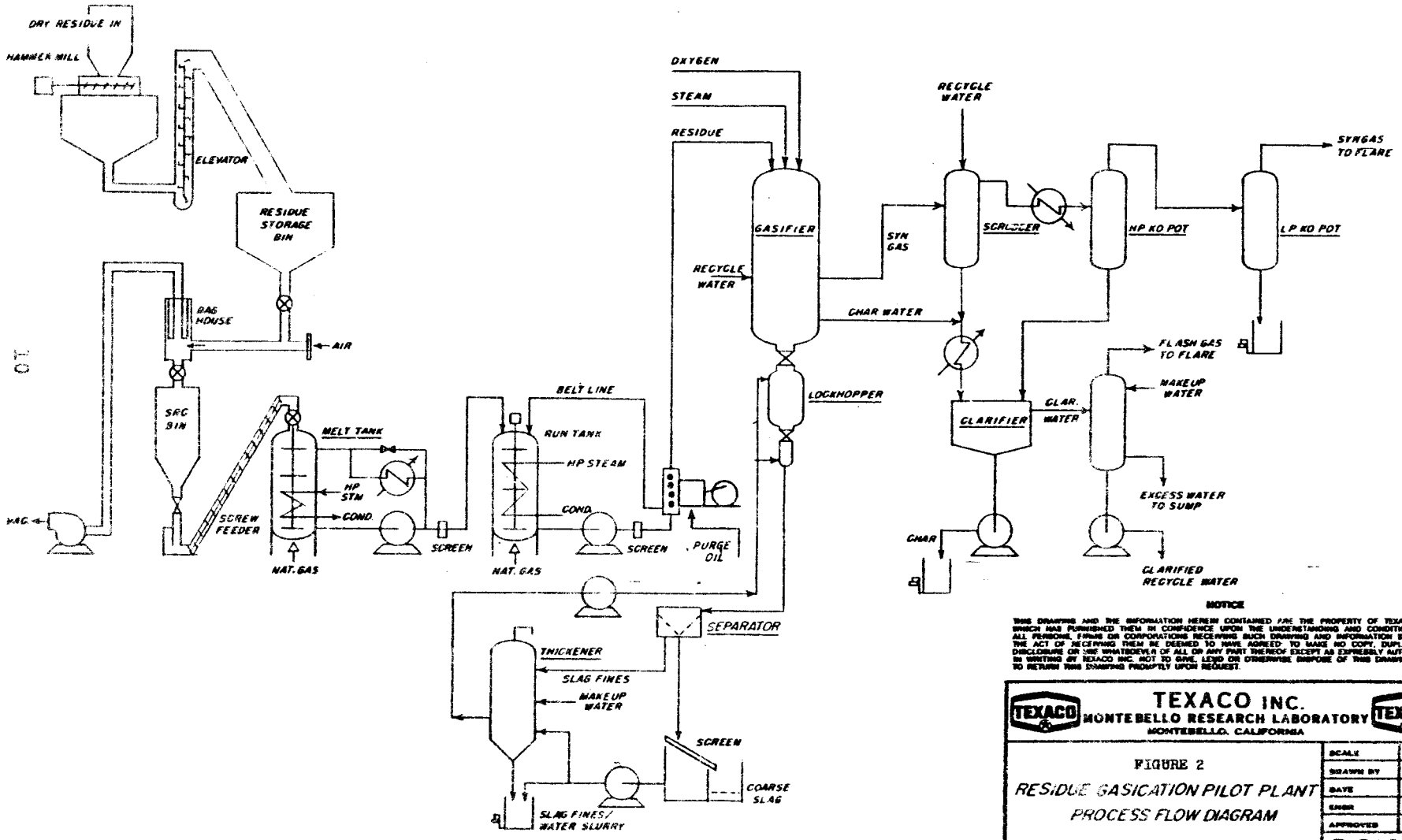

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FIGURE 2
RESIDUE GASIFICATION PILOT PLANT
PROCESS FLOW DIAGRAM

SCALE	—
DRAWN BY	White
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Steam Feed System

Steam is generated on site at the desired pressure using a gas fired vaporizer. The charge rate is controlled by pumping a constant weight of boiler feed water to the vaporizer using a positive displacement pump. The flow rate is determined by weighing out of the feed tank.

Pilot Plant Gasifier

Steam, molten residue and oxygen are fed at constant, predetermined flow rates to a proprietary Texaco burner from which the streams enter the gasifier at the desired pressure and mass ratio.

The pilot plant gasifier is a 5 ft diameter vessel which is divided internally into two sections. The top section is lined with a refractory material specifically designed to withstand the severe operating environment expected. In this section, the partial oxidation reactions take place. The lower section is a quench vessel. A reservoir of water is maintained in the bottom of this vessel at all times. Syngas leaving the top section of the gasifier passes through a water cooled dip tube into the water in the quench vessel. Slag, and most of the char, carried with the syngas remain in the water. The saturated syngas is removed from the gas space above the water. Water is continuously injected into the quench vessel to replace water lost by evaporation and solids removal. The gasifier is designed to operate at a maximum pressure of 80 atmospheres (1200 psig).

Slag Removal System

Molten slag, which forms during the gasification of the residue, is carried into the quench chamber with the syngas. Upon contacting the reservoir of water in the quench chamber, the molten slag solidifies. The slag forms sand-like grains, spheres and teardrops that vary in size from a few microns up to one half inch depending on the operating conditions. Slag is removed from the bottom of the quench chamber during each run with a lockhopper system.

The slag and water which are removed through the lockhopper system are ducted to a dewatering screen where the slag is separated into coarse and fine fractions. The coarse fraction is collected and weighed as a solid with less than 10 percent moisture. The fine fraction is collected and allowed to concentrate for later weighing, sampling and disposal.

Char Recovery and Water Recycle System

During the gasification process, a small amount of char is formed which must be removed and recycled when practical. Most of this material is removed from the syngas in the water reservoir at the bottom of the quench chamber. The char is less dense than slag and tends to remain dispersed in the water.

A continuous side draw-off of char-water slurry is maintained during each run. The slurry is cooled and sent to a settling vessel where it is allowed to thicken for later removal, weighing, sampling, and disposal.

The clarified water off the top of the settling vessel is recycled to the process.

Final traces of char are removed in a scrubber in which the syngas is contacted with additional water. The dilute char-water is collected in a scrubber knockout pot from which it is continuously withdrawn and combined with the quench water-char slurry in the settling vessel.

Syngas Treatment System

The saturated syngas is removed from the gas space above the water in the gasifier quench chamber and fed through an orifice scrubber into a scrubber knockout pot. Water sprayed into the orifice scrubber removes final traces of char from the syngas. The syngas is then cooled to condense and remove most of its water content, reduced in pressure, metered with a conventional orifice, sampled and flared. A back pressure controller on this line maintains a steady gasifier pressure at the desired level.

FEEDSTOCK PROPERTIES

Residue

The residue was received in 55 gallon steel drums from the SRC-II pilot plant at Ft. Lewis, Washington. It was in the form of brittle solid flakes, approximately one quarter inch thick. Samples were taken periodically from random drums and analyzed. The results of these analyses are presented in Table II. The as-received residue had an average carbon content of 64.6 percent and an average ash content of 27.2 percent.

The residue was crushed in a hammer mill to minus one quarter inch size and periodically charged to a melt tank where it was melted under a nitrogen atmosphere at 500-525°F. Each melt tank charge of residue was diluted with approximately five weight percent heavy distillate to reduce its viscosity to an acceptable level for pumping to the gasifier. This small amount of solvent has a negligible effect on the residue properties, except for viscosity, and will not effect the gasification efficiency. In a commercial plant, were residue is expected to be fed to the Texaco gasifier at a temperature of 600-650°F,no solvent dilution should be required. The heavy distillate was obtained from the Fort Lewis pilot plant where it was produced during operation in the SRC-I mode.

Molten, diluted residue was charged periodically from the bottom of the melt tank to a day tank which was held at 515-525°F under a nitrogen atmosphere. From the day tank the residue was charged continuously to the gasifier. Samples of diluted residue were obtained from the day tank prior to beginning each run and during each run. The results of thse analyses are presented in Table III.

Although there were only four runs completed, data were obtained during the operation on a daily basis. Therefore each run was divided into lettered data periods for purposes of presenting the data collected. In those instances when operating conditions changed significantly during a single day, the data period was divided into two numbered sub-periods as listed on Table III and subsequent Tables.

On the average, the diluted SRC-II residue contained 66.0 weight percent carbon and 26.0 weight percent ash. The diluted residue contained 2.75 weight percent sulfur and only negligible amounts of oxygen. At 450°F its average viscosity was 1287 centipose while at 500°F its average viscosity was 470 centipoise. The suspended solids were finely divided and evenly dispersed and showed no tendency to settle at operating temperatures.

Purge Solvent

A purge solvent was used to prevent molten residue from contacting the packing on the residue charge pump. This solvent was injected at a rate of approximately two (wt.) percent of the residue feed rate. The solvent used was the same heavy distillate from the Ft. Lewis Pilot Plant that was charged to the melt tank for viscosity control.

Table II
Analysis of As-Received SRC-II Residue From Powhatan Coal

Run	1	3	4	4	4	4	Avg.	σ_{n-1}
Wt. Pct.								
C	64.84	64.34	65.91	63.31	66.11	63.34	64.64	1.21
H	3.74	3.58	3.92	3.63	3.97	3.72	3.76	0.16
N	1.24	1.24	1.29	1.11	1.18	1.28	1.22	0.07
S	2.63	2.79	2.90	3.02	3.08	2.91	2.89	0.16
Ash	27.08	27.59	25.71	28.93	25.63	28.40	27.22	1.36
O(By Diff)	0.47	0.46	0.27	0.00	0.03	0.35	0.27	0.21
HHV(Btu/Lb)	11536.	11178.	11730.	11127.	11612.	11138.	11387.	270.

Table III

Analysis of Diluted SRC-II Residue From Run Tank

Run	1A	1B	1C	2	3A	3B.1	3B.2	3C	3D
Ultimate Analysis Wt. Pct.									
C	67.93	65.82	65.80	66.62	68.11	66.27	65.98	66.22	66.46
H	4.24	3.91	3.75	3.93	4.25	3.91	3.62	3.90	3.93
Ash	24.01	26.04	26.15	25.30	24.00	25.94	25.94	25.56	25.39
S	2.58	2.64	2.54	2.54	2.50	2.65	2.72	2.76	2.77
N	1.24	1.25	1.26	1.22	1.14	1.17	1.18	1.19	1.15
O(By diff)	0.00	0.34	0.50	0.39	0.00	0.26	0.56	0.37	0.30
Cl				35 PPM					
True Viscosity Centipoise at									
450°F		1480		760	478	1310		1690	
500°F		487		261	190	397		521	
550°F		207		134	109	192		165	

Table III (Cont'd)
Analysis of Diluted SRC-II Residue From Run Tank

Run	4A	4B.1	4B.2	4C	4D	4E.1	4E.2	4F	AVG	σn-1
Ultimate Analysis Wt. Pct.										
C	66.73	66.16	65.57	65.38	65.38	64.73	64.41	64.50	66.0	0.98
H	3.91	3.99	3.86	3.86	3.85	3.83	3.81	3.73	3.89	0.16
Ash	25.26	25.93	26.35	26.61	26.58	27.30	27.73	27.61	25.98	1.05
S	2.68	2.84	2.78	3.04	3.03	3.00	2.88	2.87	2.75	0.17
N	1.30	1.08	1.15	1.11	1.16	1.14	1.13	1.29	1.18	0.065
O(By diff)	0.12	0.00	0.29	0.00	0.00	0.00	.04	0.00	0.20	0.20
Cl				35 PPM	35 PPM	35 PPM	35 PPM	35 PPM		
True Viscosity Centipoise at										
450°F	1095	1085		1785	1345	1845			1287	444
500°F	341	368		577	600	603		821	470	181
550°F	183	178		250	268	269		348	209	69

Properties of the solvent are summarized in Table IV. The heavy distillate had an initial distillation temperature of 546 deg. F and a specific gravity of 1.087.

Table IV

Analysis of Heavy Distillate Purge Solvent
From Ft. Lewis, Washington

Ultimate Analysis	Wt. Pct.
C	85.32
H	7.19
N	1.3
S	1.5
Ash	.02
O(By Diff)	4.67
Distillation ASTM - D86 @ 760 mmHg *	
IBP	546°F
5%	559°F
10%	567°F
20%	580°F
40%	607°F
60%	638°F
80%	697°F
EP	700°F
SP Gr 60/60	1.087

* Data From P&M Coal Mining Company, Sample 1667

DATA TREATMENT

Because of inherent errors associated with metering flow rates, reading scales, and obtaining representative samples of the various solids and slurries involved in the process, raw pilot plant data should be adjusted in some manner to close all of the material balances. This should be done before the data can be used for design purposes with confidence.

All of the material balance data reported in the following section have been processed by computer to obtain 100 percent recoveries for each of the major elements and for the ash. Each stream and the analysis of each stream was varied in relation to its known standard error until closure of all material balances was obtained with a minimum total deviation. This usually results in very minor changes to be measured variables. In the data reported here, however, it was discovered that gross errors in the measurement of the residue and oxygen feed rates had occurred in all runs. In order to obtain reasonable material balances it was necessary to decrease the measured oxygen feed rate by five percent. This has been done to all of the data reported n Appendix C as raw data. No explanation could be found for threse errors. The dry syngas rate was confirmed by metering through two orifice runs in series.

It is assumed that the measured amounts and concentrations of char-water slurry and fine slag-water slurry were relatively accurate. Any significant correction to the ash balance required was made to the recovered coarse slag. Since the coarse slag contained very little carbon, this material had no effect on any of the other material balances.

The standard errors used to prepare the material balances are listed in Table V. Computer balanced data are included in Appendix B and the adjusted raw pilot plant data are included in Appendix C.

Table V

Standard Errors Used to Prepare
Material Balances

Stream	Std Error%
Oxygen Feed Rate	2.5%
Residue Feed Rate	2.5%
Steam Feed Rate	2.5%
Syngas Flow Rate	2.5%
Char Recovery Rate	50%
Flash Gas Flow Rate	15%
Component Analysis in Residue Except Oxygen	2%
Oxygen	5%
Component Analysis in Syngas, Except CO2	2%
CO2	5%
Component Analysis in Flash Gas,	
Except H2, CO and CO2	2%
H2 & CO	5%
CO2	10%

DISCUSSION AND RESULTS OF PILOT PLANT DEMONSTRATION RUNS

Operating Experience & Material Balances

Four runs were completed in the Texaco high pressure residue gasification pilot plant charging molten SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal. The runs lasted 43 hours, 7 hours, 60 hours and 127 hours respectively for a total accumulated on stream time of 237 hours. Approximately 83 tons of SRC-II residue were gasified. The first three runs were carried out at 1200 psig while the last run was carried out at 600 psig.

The feed streams were: molten SRC-II residue, steam and oxygen. The product streams were: dry synthesis gas, water flash gas, slag and char.

The properties of the SRC-II residue were discussed in a previous section. Process steam was generated on site at 1500 psig and fed to the gasifier at a temperature betwen 690°F and 750°F. Oxygen was available on site at a purity of approximately 99.9 percent.

The properties of the product streams will be discussed individually in the following sections.

The initial objective of the test was a sustained run of 7 to 10 days duration at steady operating conditions.

On the average, one pound of diluted residue gasified produced 29.4 standard cubic feet of CO plus H2. An overall conversion of 99.3 percent was achieved with 0.785 pounds of oxygen per pound of diluted residue. The steam to residue feed rate of 693 pounds per hour. The dry syngas produced contained over 90 volume percent CO + H2 with an average CO/H2 ratio of 1.52.

The cold gas efficiency averaged 79.7 percent, but was as high as 82.5 percent during the first run. During the latter runs oxygen in excess of the amount needed to achieve complete conversion was required to raise the gasifier temperature. The gasifier was operated within the temperature range 2300-2800°F.

Table VI summarizes the important material balance data obtained during each pilot plant run. For purposes of data analysis each run was divided into lettered 24 hour data periods. In those few runs where significant changes in operation occurred within a 24 hour data period, the data were divided into two numbered sub-periods.

Referring to Table VI, 99 percent of the input mass is accounted for by the output streams listed. The missing one percent is assumed to be H2S and NH3 that are required to close the material balances but were not measured during the runs. The fuel analysis shown includes the approximately two percent purge solvent that was added at the charge pump.

Table VI

Computer Balanced Data From Gasification of SRC-II Coal Liquefaction Residue From Powhatan Coal

Run Number		1A	1B	1C	2
Data Period, Hrs		11.6	24.0	7.3	7.4
Gasifier Pressure, psig		1200.	1191.	1200.	1200.
Charge to Gasifier					
Fuel Rate *	, Lb/Hr	716.	727.	726.	709.
Steam Rate	, Lb/Hr	312.	312.	311.	311.
Oxygen Rate	, Lb/Hr	571.	530.	521.	553.
Total Charge	, Lb/Hr	1599.	1569.	1558.	1573.
Output From Gasifier					
Dry Product Syngas	, Lb/Hr	1252.	1223.	1215.	1212.
Flash Gas	, Lb/Hr	33.	34.	34.	34.
Char	, Lb/Hr	4.	4.	4.	9.
Coarse Slag	, Lb/Hr	10.	10.	10.	18.
Lockhopper Fines	, Lb/Hr	132.	124.	130.	198.
Missing Ash	, Lb/Hr	19.	51.	51.	(-40.)
Water in Syngas	, Lb/Hr	132.	106.	100.	142.
Total Output	, Lb/Hr	1582.	1552.	1544.	1573.
Analytical					
Fuel Analysis, Wt. Pct.					
C		68.9	66.5	66.3	67.1
H		4.4	4.0	3.8	4.0
N		1.2	1.2	1.2	1.2
S		2.5	2.6	2.5	2.5
Ash		22.7	25.2	25.5	24.7
O(By Diff)		0.3	0.5	0.7	0.5
Carbon Conversion (Wt. Pct.)		99.5	98.9	98.5	98.3
Dry Product Syngas Analysis, Vol. Pct.					
H2		37.01	37.73	37.73	36.68
CO		55.35	54.44	54.05	54.07
CO2		7.05	7.19	7.60	7.90
N2		0.02	0.00	0.00	0.50
H2S		0.37	0.44	0.40	0.58
COS		0.04	0.05	0.04	0.05
CH4		0.13	0.12	0.15	0.19
A		0.03	0.03	0.03	0.03
SCF (H2+CO)/Lb Fuel		31.4	30.4	30.0	29.8

*Fuel=Diluted Residue From Charge Tank Plus Solvent Purge

Table VI (Cont'd)

Computer Balanced Data From Gasification of
SRC-II Coal Liquefaction Residue From Powhatan Coal

Run Number		3A	3B.1	3B.2	3C	3D
Data Period, Hrs		8.2	8.0	16.0	24.0	3.3
Gasifier Pressure, psig		1194.	1198.	1198.	1195.	1191.
Charge to Gasifier						
Fuel Rate *	, Lb/Hr	714.	703.	678.	675.	673.
Flash Gas	, Lb/Hr	315.	314.	316.	315.	319.
Char	, Lb/Hr	602.	562.	525.	528.	528.
Total Charge	, Lb/Hr	1631.	1579.	1519.	1518.	1520.
Output From Gasifier						
Dry Product Syngas	, Lb/Hr	1255.	1203.	1159.	1150.	1147.
Flash Gas	, Lb/Hr	34.	36.	36.	35.	35.
Char	, Lb/Hr	10.	6.	5.	5.	5.
Coarse Slag	, Lb/Hr	57.	53.	49.	49.	50.
Lockhopper Fines	, Lb/Hr	95.	100.	91.	90.	94.
Missing Ash	, Lb/Hr	10.	23.	29.	27.	20.
Water in Syngas	, Lb/Hr	153.	142.	138.	147.	153
Total Output	, Lb/Hr	1614.	1563.	1507.	1503.	1504.
Analytical						
Fuel Analysis, Wt. Pct.						
C		68.5	66.5	66.5	66.8	67.0
H		4.3	4.1	3.7	4.0	4.0
N		1.1	1.2	1.2	1.2	1.2
S		2.5	2.6	2.7	2.7	2.7
Ash		23.5	25.5	25.2	24.9	24.7
O(By Diff)		0.1	0.1	0.7	0.4	0.4
Carbon Conversion (Wt. Pct.)		99.1	99.5	99.5	99.5	99.5
Dry Product Syngas Analysis, Vol. Pct.						
H2		36.00	36.37	36.31	36.18	36.20
CO		54.03	53.70	53.92	54.95	54.97
CO2		9.38	9.31	8.96	8.17	8.13
N2		0.00	0.01	0.24	0.06	0.06
H2S		0.40	0.40	0.36	0.42	0.42
COS		0.04	0.05	0.05	0.03	0.03
CH4		0.12	0.13	0.13	0.17	0.17
A		0.03	0.03	0.03	0.02	0.02
SCF (H2+CO)/Lb Fuel		29.8	29.2	29.2	29.5	29.6

* Fuel=Diluted Residue from Charge Tank Plus Solvent Purge

Table VI (Cont'd)

Computer Balanced Data From Gasification of
SRC-II Coal Liquefaction Residue From Powhatan Coal

Run Number	4A	4B.1	4B.2	4C	4D	4E.1	4E.2	4F
Data Period, Hrs	8.1	11.0	13.0	24.0	24.0	13.0	11.0	22.8
Gasifier Pressure, psig	600.	600.	600.	600.	600.	600.	600.	600.
Charge to Gasifier								
Fuel Rate * , Lb/Hr	684.	685.	675.	669.	688.	709.	703.	690.
Flash Gas , Lb/Hr	315.	309.	309.	315.	315.	315.	316.	311.
Char , Lb/Hr	552.	539.	533.	534.	543.	559.	568.	557.
Total Charge , Lb/Hr	1551.	1533.	1517.	1518.	1546.	1583.	1587.	1558.
Output From Gasifier								
Dry Product Syngas , Lb/Hr	1163.	1161.	1148.	1133.	1173.	1206.	1201.	1185.
Flash Gas , Lb/Hr	33.	32.	31.	27.	22.	19.	20.	24.
Char , Lb/Hr	21.	20.	18.	17.	9.	4.	3.	13.
Coarse Slag , Lb/Hr	60.	60.	58.	43.	52.	44.	44.	9.
Lockhopper Fines , Lb/Hr	90.	85.	78.	118.	116.	155.	151.	155.
Missing Ash , Lb/Hr	3.	14.	23.	3.	5.	(-12.)	(-7.)	8.
Water in Syngas , Lb/Hr	167.	150.	153.	169.	158.	160.	166.	160.
Total Output , Lb/Hr	1537.	1522.	1509.	1510.	1535.	1576.	1578.	1554.
Analytical								
Fuel Analysis, Wt. Pct.								
C	66.6	66.5	66.2	65.7	65.9	65.4	65.2	65.4
H	4.1	4.1	3.9	4.0	3.9	3.9	3.9	3.8
N	1.3	1.1	1.2	1.1	1.2	1.1	1.1	1.3
S	2.7	2.8	2.7	3.0	3.0	3.0	2.8	2.8
Ash	25.1	25.4	25.6	26.1	25.9	26.5	26.8	26.6
O(By Diff)	0.2	0.1	0.4	0.1	0.1	0.1	0.2	0.1
Carbon Conversion (Wt. Pct.)	99.4	99.4	99.4	99.2	99.5	99.3	99.3	99.8
Dry Product Syngas Analysis, Vol. Pct.								
H2	35.27	36.16	35.63	35.51	35.42	35.40	35.11	35.15
CO	55.74	55.40	55.14	54.82	55.27	55.00	54.05	54.17
CO2	8.18	7.66	8.36	8.67	8.38	8.42	9.79	9.35
N2	0.11	0.08	0.12	0.22	0.14	0.36	0.26	0.53
H2S	0.57	0.56	0.62	0.65	0.67	0.70	0.71	0.71
COS	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.04
CH4	0.06	0.07	0.06	0.06	0.06	0.06	0.01	0.02
A	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
SCF (H2+CO)/Lb Fuel	29.1	29.6	29.1	28.7	29.1	28.9	28.2	28.5

* Fuel=Diluted Residue from Charge Tank Plus Solvent Purge

Approximately 53 percent of the steam fed to the gasifier reacted with CO or C. The remaining 47 percent exited the gasifier as saturated water vapor with the syngas.

Synthesis Gas

The dry synthesis gas produced contained over 90 volume percent H2+CO. The actual value decreased from 92.2 percent in run 1 to 90.3 percent in run 4. The reason for this reduction is that increasing amounts of syngas were reacted with excess oxygen to raise the temperature of the gasifier. This may also be seen from the CO2 concentration which increased from 7.2 volume percent during run 1 to 8.7 volume percent during run 4. The ratio of CO/H2 increased from 1.46 during run 1 to 1.55 during run 4, averaging 1.52 overall.

The concentration of H2S in the dry syngas increased from an average of 0.42 volume percent during the 1200 psig runs to 0.66 volume percent during the 600 psig run. This occurred because less H2S dissolves in the quench water at lower pressures.

The concentration of CH4 in the dry syngas decreased from an average of 0.14 volume percent during the 1200 psig runs to 0.05 volume percent during the 600 psig run. This phenomenon is commonly observed. At a constant pressure level the CH4 concentration increases with decreasing reactor temperature.

On the average, one pound of diluted residue gasified produced 29.4 standard cubic feet of dry syngas.

Samples of syngas have been analyzed for trace organic compounds and priority pollutants. These analyses will be made available upon request to those who have a current Secrecy Agreement with Texaco Development Corporation.

Water Flash Gas

When the pressure of the quench and scrubber blowdown water streams was reduced to one atmosphere, gaseous components from the syngas which were dissolved in the water were released. This flash gas contained augmented amounts of CO2 and H2S due to the higher relative solubilities of these two components. Table VII lists a typical flash gas analysis obtained during operation at 1200 psig and at 600 psig. Very little difference between the two samples is evident.

The amount of flash gas obtained varied with the pressure of the gasifier and the temperature of the quench and scrubber blowdown water. During the 1200 psig runs, the flash gas represented about 2.0 volume percent of the syngas; during the 600 psig runs the flash gas represented about 1.5 volume percent of the syngas.

Table VII

Typical Analysis of Water Flash Gas

Component	Vol Percent @ 1200 PSIG Gasifier Pressure	Vol Percent @ 600 PSIG Gasifier Pressure
H2	23.7	24.0
CO	29.1	30.2
CO2	39.7	37.6
N2	0.02	0.25
CH4	0.09	0.00
H2S	7.30	7.88
COS	0.01	0.00
A	0.05	0.07
Total	100.00	100.00

Slag and Char

Typical particle size distributions of coarse slag, lockhopper fines and char recovered from each of the four runs are shown in Figure 3 through Figure 6.

The coarse slag was granular material that was caught on an 8 mesh dewatering screen located at the discharge of the lockhopper. Approximately 20 percent of this material was smaller than 0.1 inches in diameter; the remainder of this material was in the form of random irregularly shaped glassy particles of up to one half inch in length. It had an average true density of 2.52 and an average bulk density of 1.46, and it contained very little carbon (±0.1%).

The lockhopper fines were solid material that passed through the 8 mesh dewatering screen. From 16 to 68 percent of this material was smaller than 44 microns in diameter, depending on operating conditions. It had an average true density of 2.52 and an average bulk density of 1.40. The carbon content of the lockhopper fines varied from 0.56 percent to 5.6 percent depending on run conditions.

The char was solid material that was recovered from the bottom of the clarifier during each run. This material is predominantly the finer fraction of the lockhopper solids that tends to remain suspended in the water in the quench chamber, and, therefore, is carried out with the quench blowdown water into the clarifier. Essentially all of the char was smaller than .033 inches in diameter and from 50 to 100 percent of the material was smaller than 44 microns in diameter, depending on operating conditions. It had an average true density of 2.36 and an average bulk density of 1.16. A 68 percent slurry of char in water recovered during run 4 had an average density of 1.746. The carbon content varied from 1.5 percent to 4.5 percent.

The distribution of the three solid streams obtained as a percentage of ash fed to the gasifier is summarized in Table VIII for each run.

During the first run, approximately 84 percent of the input ash was accounted for in the slag and char. Very little coarse slag and char were produced. The ratio of fines to coarse slag was 13.6, and the lockhopper fines produced were extremely fine (55% through a 325 mesh screen).

The second run was of very short duration (7.4 hours) and steady state operation may not have been obtained. The recovered solids contained 128 percent of the input ash, thus some of the ash missing from the first run was recovered.

During the third run the amount of coarse slag increased significantly. The ratio of lockhopper fines to coarse slag decreased to 1.9, and 87 percent of the input ash was accounted for. The lockhopper fines were not as fine as those produced during run 1 (32% through a 325 mesh screen).

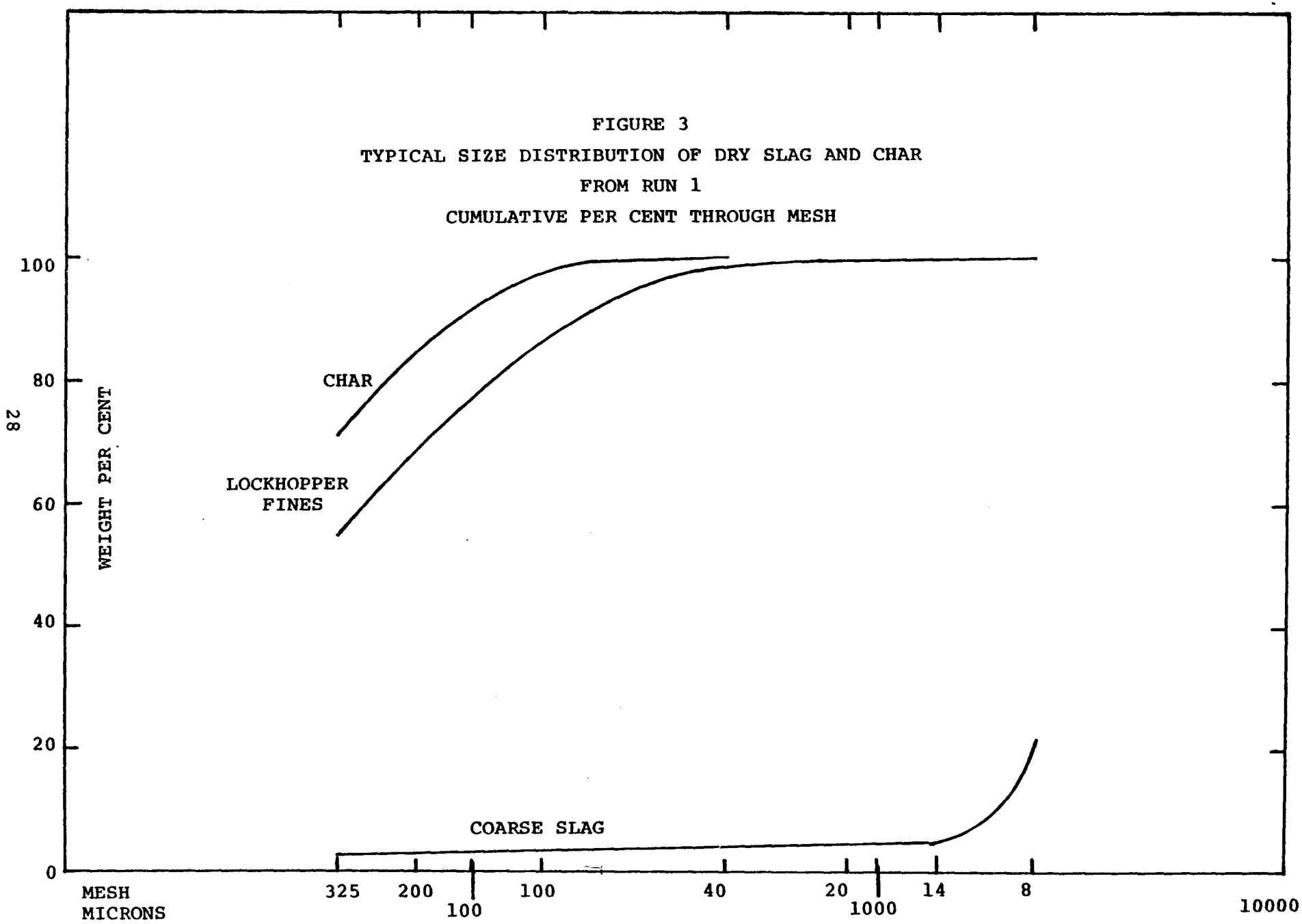
FIGURE 3
TYPICAL SIZE DISTRIBUTION OF DRY SLAG AND CHAR
FROM RUN 1
CUMULATIVE PER CENT THROUGH MESH
100
80
60
40
20
0
WEIGHT PER CENT
CHAR
LOCKHOPPER
FINES
COARSE SLAG
MESH
MICRONS
325
200
100
100
40
20
14
8
1000
10000

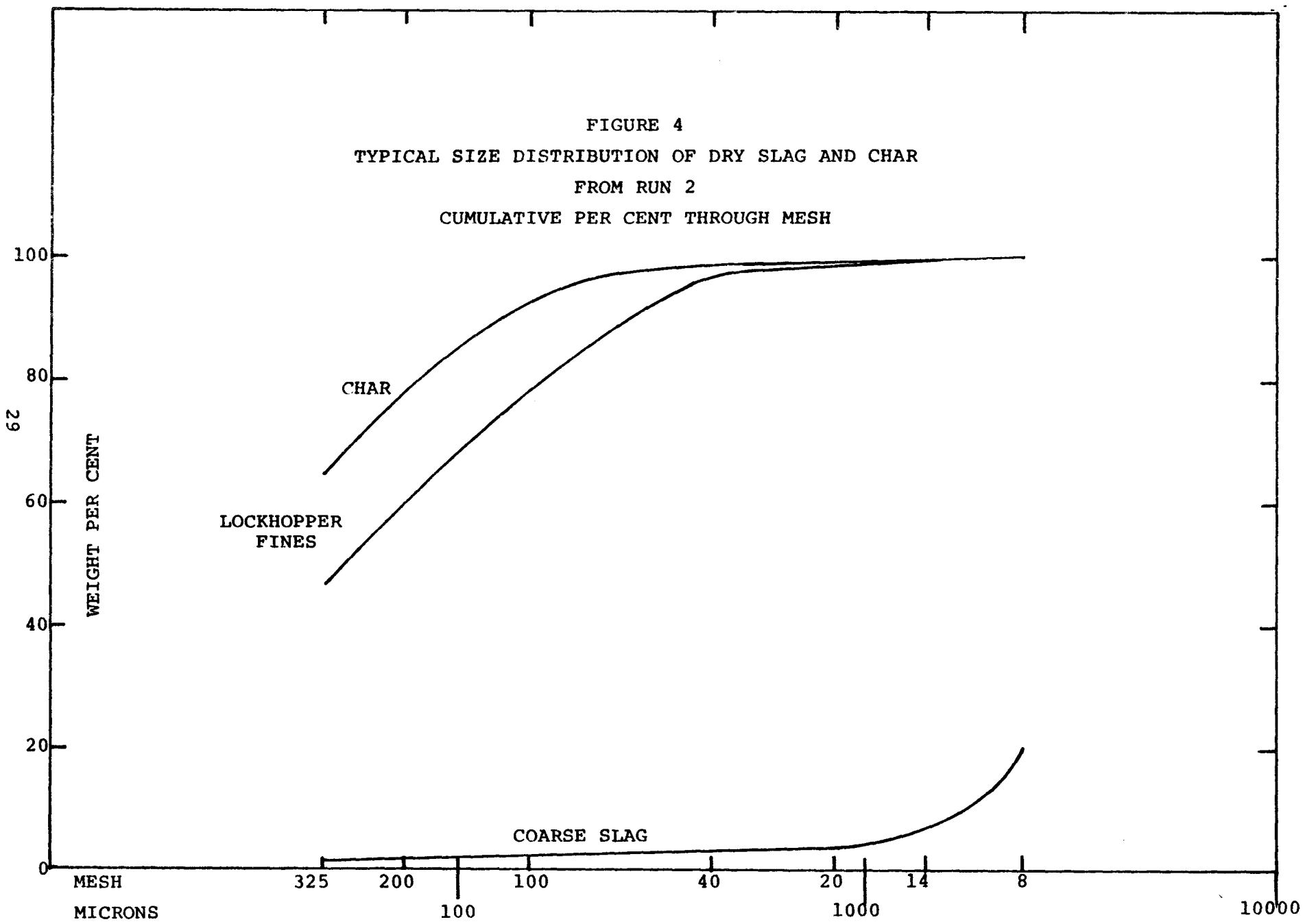
FIGURE 4
TYPICAL SIZE DISTRIBUTION OF DRY SLAG AND CHAR
FROM RUN 2
CUMULATIVE PER CENT THROUGH MESH
100
80
60
40
20
0
WEIGHT PER CENT
CHAR
LOCKHOPPER
FINES
COARSE SLAG
MESH
325
200
100
40
20
14
8
MICRONS
100
1000
10000

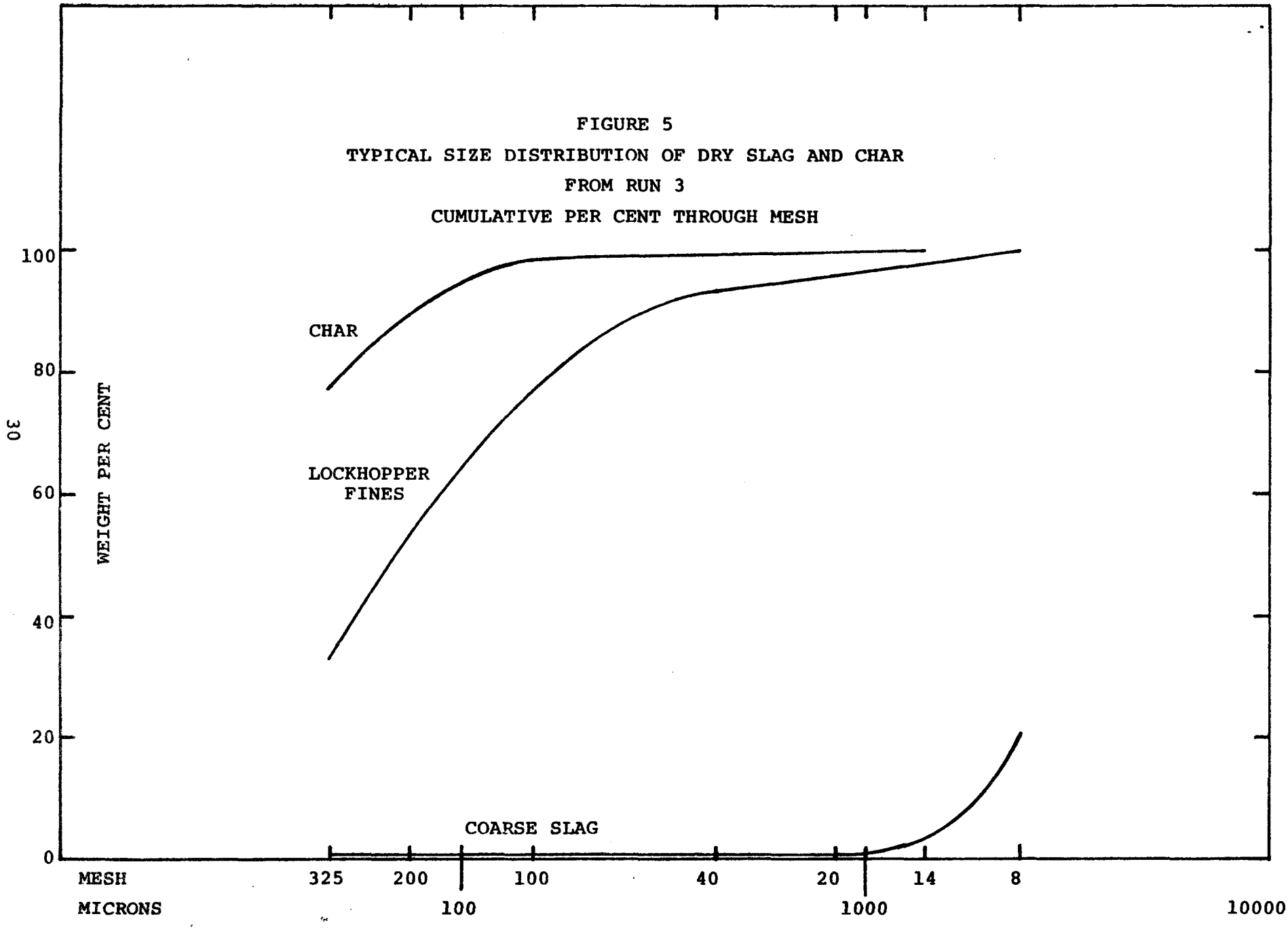
FIGURE 5
TYPICAL SIZE DISTRIBUTION OF DRY SLAG AND CHAR
FROM RUN 3
CUMULATIVE PER CENT THROUGH MESH
100
80
60
40
20
0
WEIGHT PER CENT
CHAR
LOCKHOPPER
FINES
COARSE SLAG
MESH
325
200
100
40
20
14
8
MICRONS
100
1000
10000

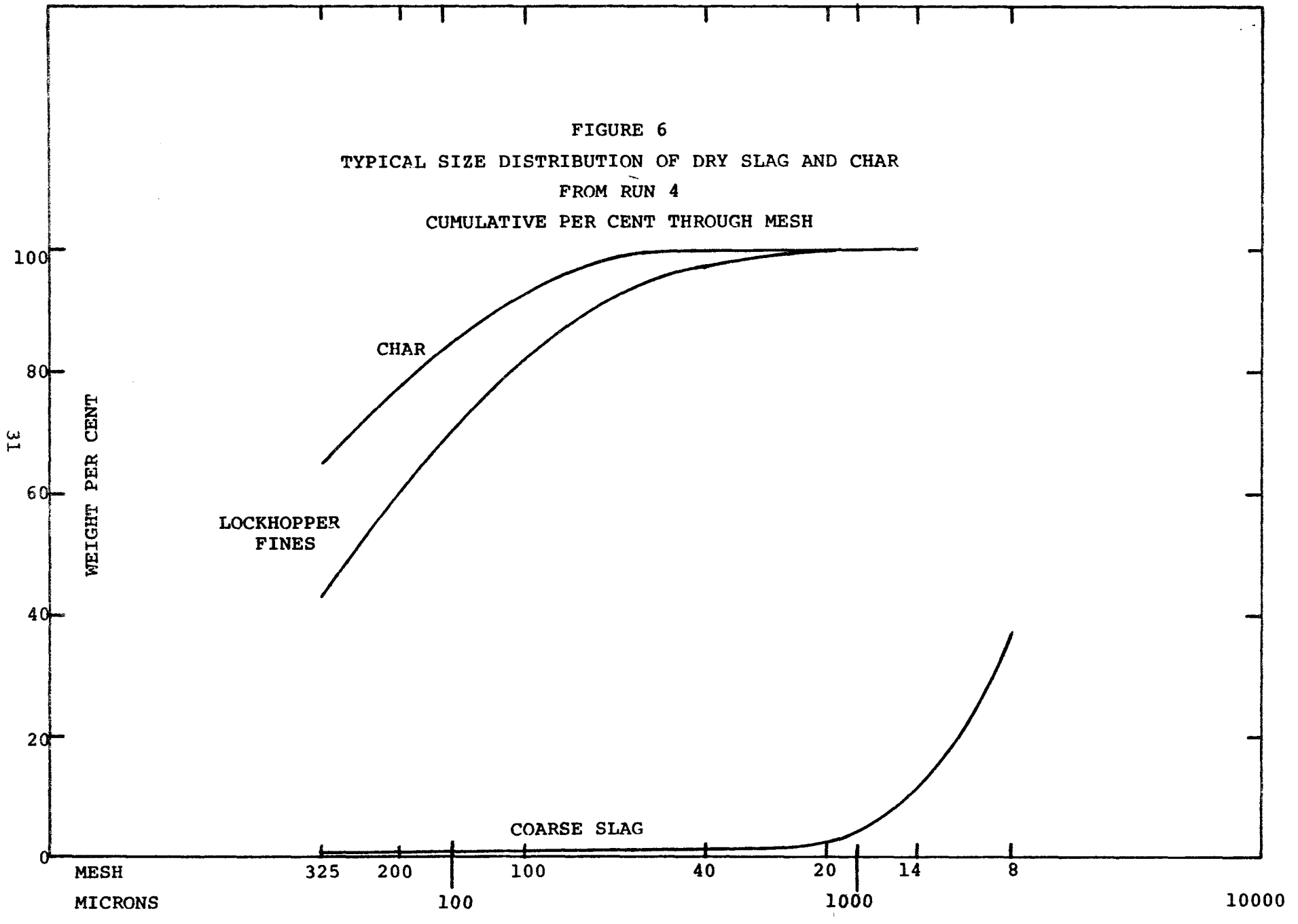
FIGURE 6
TYPICAL SIZE DISTRIBUTION OF DRY SLAG AND CHAR
FROM RUN 4
CUMULATIVE PER CENT THROUGH MESH
WEIGHT PER CENT
100
80
60
40
20
0
CHAR
LOCKHOPPER FINES
COARSE SLAG
MESH
MICRONS
325
200
100
40
20
14
8
100
1000
10000

Table VIII

Ash, Slag and Char Distribution, Raw Data* From
Powhatan SRC-II Coal Liquefaction Residue Gasification

Run No.	Hrs.	% of Input Ash Recovered in				Lb Coarse Slag	Lbs Char / Lb Coarse Slag	%C on Coarse Slag	%C on Fines	%C on Char
		Coarse Slag	Fines	Char	Missing					
1	42.9	5.8	76.2	2.3	15.7	13.6	0.41	0.13	3.8	4.1
2	7.4	10.8	112.0	5.3	(-28.1)	11.0	0.51	0.16	3.8	4.0
3	59.5	30.0	53.8	3.3	12.9	1.9	0.10	0.10	2.4	3.6
4	126.9	24.3	66.8	6.9	2.0	2.6	0.30	0.11	2.0	2.0

*Raw Data Adjusted by Reducing Measured Residue Feed Rate by 10%

The fourth run was carried out at 600 psig to decrease the residence time in the gasifier. As can be seen from Table VIII, the ratio of lockhopper fines to coarse slag changed very little from the previous 1200 psig run (2.8 vs 1.9). The amount of -325 mesh particles in the lockhopper fines actually increased from 32 percent to 43 percent. A total of 98 percent of the input ash was recovered.

The amount of char produced in all of the runs was very small. The ratio of char to coarse slag varied from 0.1 to 0.5 pounds per pound. From 2 to 7 percent of the input ash was recovered as char. The carbon content of the char was comparable to the carbon content of the lockhopper fines, hence no advantage in separating the two materials is obvious.

Table IX shows a typical analysis of the ash in the residue feed and in the three solids output streams obtained. Only minor differences in the composition are apparent. There is a significant difference between the fusion temperature of the ash in the charge residue (2254°F) and the fusion temperatures of the slag and char (2390°F-2478°F). This difference appears to be related to the alkali metals content of the ash which increases in the same order as the fusion temperature decreases.

Semiquantitative analysis by emission spectrograph of the ash from the charge residue and from the coarse slag, lockhopper fines and char are summarized for several runs in Table X. When comparing the slag and char with the ash in the residue it is apparent that there is a significant increase in chromium and a decrease in calcium in the coarse slag that is not observed in the lockhopper fines or in the char. There is a decrease in sodium concentration in all of the output solids, and little or no potassium detected in any of the solids. It is assumed that these elements are leached into the circulating water streams.

Table XI summarizes the analytical and physical data obtained from the slag and char for each run data period.

Samples of slag were sent to ORNL for leaching tests. Settling and filtration tests with lockhopper fines and char were conducted on location by Hydroscience Inc. of Westwood, New Jersey under contract with Gulf Mineral Resources Company.

Water Quality

Samples of quench and scrubber blowdown water and clarifier water were taken frequently throughout the runs and analyzed for a large number of dissolved compounds. These analyses included sulfides, chlorides, ammonia, cyanides and formates as well as ten other dissolved components.

In addition, determinations of pH, TDS, TSS, TOC, TIC and COD were made. These data have been transmitted to Gulf Mineral Resources Company and are available upon request to others who have executed a current Secrecy Agreement with Texaco Development Corporation.

Table IX

Typical Ash Analysis
SRC-II Residue From Powhatan Coal

ASTM D-2795

Description	Charge Residue Wt%	Coarse Slag Wt%	Fine Slag Wt%	Char Wt%
SiO2	43.88	42.98	41.22	41.98
Al2O3	21.54	24.29	21.29	20.94
Fe2O3	24.05	22.48	25.18	23.77
CaO	2.44	1.96	2.08	2.58
K2O	1.93	1.35	1.57	1.42
MgO	0.74	0.29	0.67	0.61
Na2O	0.63	0.36	0.43	0.58
TiO2	1.53	0.88	2.36	3.28
P2O5	0.17	0.13	0.12	0.12
SO3	1.78	1.67	1.29	1.29
ASTM D-1857 Ash Fusion Temperatures, Reducing Atmosphere, Deg. F.				
Initial Temperature	2007	2052	1954	1945
Softening Temperature	2111	2084	2070	2044
Hemispherical Temperature	2273	2289	2273	2255
Fusion Temperature	2254	2478	2415	2390

Table X

Semiquantitative Analysis by Emission Spectrograph
Ash From Gasification of Powhatan SRC-II Residue

	Charge Residue Wt%			Coarse Slag Wt%			Lockhopper Fines		
Element	Run 4C	Run 4E	Run 4F	Run 2	Run 4C	Run 4E	Run 2	Run 4C	Run 4E
Si	23.9	22.94	21.93	24.6	26.0	25.4	20.8	25.2	23.2
Fe	14.65	11.275	12.29	10.8	11.7	11.7	13.9	14.1	15.2
Al	8.87	11.66	11.96	11.8	9.7	11.7	11.9	8.9	12.2
Ca	1.66	1.75	1.76	1.28	.90	.97	1.6	1.5	.85
Mg	0.50	.505	.797	.66	.26	.26	.72	.32	.27
Ti	0.58	.738	.664	.47	.59	.46	.62	.54	.57
Mn	0.0278	.025	.032	.046	.029	.028	.029	.028	.02
Cr	.0208	.0214	.0176	.31	.29	.22	.044	.022	.026
B	.0424	.043	.0432	.048	.050	.048	.024	.035	.039
Pb	TR < .004	-	-	ND < .01	ND < .02	ND < .01	TR < .01	-	ND < .01
Ga	.0085	.0085	.0073	.004	.0036	.0037	.011	.008	.0059
Ni	.024	.0194	.0133	.018	.0088	.014	.026	.020	.0016
MO	.0077	.0058	.0029	.011	.002	.0028	.0036	.0043	.0025
V	.0166	.0139	.0133	.018	.019	.013	.023	.012	.014
Cu	.010	.0093	.0153	.012	.0065	.018	.012	.019	.085
Na	.733	.777	.565	.27	.37	.32	.085	.47	.25
Zr	.0196	.043	.0196	.018	.016	.013	.020	.022	.019
CO	.0077	.0069	.0069	.013	.013	.013	.012	.011	.012
K	.04	TR < .04	-	ND < .10	-	TR < .10	-	-	-
Sr	.0289	.021	.0289	.018	.027	.038	.019	.067	.051
Sn	ND < .0008	-	-	-	ND < .003	ND < .003		1	ND < .003
Zn	ND < .01	-	-	-	ND < .03	ND < .03		-	ND < .03

Table X(Cont'd)

Semiquantitative Analysis by Emission Spectrograph
Ash From Gasification of Powhatan SRC-II Residue

Element	Char Run 2	Run 4C	Run 4E
Si	25.1	22.5	26.2
Fe	12.	14.7	11.2
Al	10.	9.7	10.1
Ca	1.	1.1	1.6
Mg	.60	.29	.30
Ti	.47	.69	.64
Mn	.031	.024	.031
Cr	.024	.027	.022
B	.046	.041	.063
Pb	-	-	-
Ga	.017	.01	.007
Ni	.025	.015	.014
Mo	.0045	.0056	.0031
V	.020	.022	.016
Cu	.015	.0072	.0099
Na	.66	.29	.30
Zr	.016	.018	.021
Co	.012	.0067	.0058
K	-	-	-
Sr	.016	.061	.051
Sn	-	-	-
Zn	-	-	-

Table XI
Gasification of SRC-II Residue From Powhatan Coal
Slag and Char Properties

	Run No. 1A*				Run No. 1B*			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	6.0	80.3	2.4	88.7	5.4	70.3	2.1	77.8
Ultimate Analysis (wt%)								
C		1.88				4.24	4.02	
H		.05				.07	.10	
N		.03				.05	.10	
S		.81				1.49	1.37	
Ash		97.23				94.15	94.41	
Total		100.0				100.0	100.0	
Bulk Density		1.124				1.134		
True Density		2.525				2.3786		
Sieve Analysis (Wt% on Sieve)								
8		-					-	
14		.42				.28	-	
20		1.00				.50	.01	
40		1.50				.97	.11	
100		21.20				11.30	2.14	
200		28.35				18.38	12.77	
325		14.00				13.57	13.58	
-325		33.53				55.00	71.39	

* See Analysis of Run 1C

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 1C*				Run No. 2			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	5.6	70.0	2.1	77.7	10.4	108.2	5.1	123.7
Ultimate Analysis (Wt%)								
C	.13	5.55	4.21		.16	3.80	4.52	
H	.10	.10	.11		.02	.08	.10	
N	.14	.12	.10		.09	.09	.09	
S	.26	1.72	1.75		.15	1.22	1.61	
Ash	99.37	92.51	93.83		99.58	94.83	93.68	
Total	100.0	100.0	100.0		100.0	100.0	100.0	
Bulk Density	1.695	.9930			1.6286	1.2956	1.1346	
True Density	2.70	2.2643			2.7875	2.4286		
Sieve Analysis (Wt% on Sieve)								
8	78.23	0	0		80.00	0	0	
14	16.44	0	0		13.34	.63	.31	
20	1.19	.02	.11		2.78	.93	.26	
40	.36	.20	.67		.89	1.08	.97	
100	.45	4.05	4.15		.45	17.78	4.93	
200	.51	13.0	7.45		.49	20.80	15.70	
325	.49	11.70	14.85		.45	12.33	13.67	
-325	2.33	17.03	72.77		1.60	46.45	64.16	

* Samples of the coarse, fine and char are composite of Run 1A through 1C

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 3A			
	Coarse	Fine	Char	Total
% of Input Ash Recovered	34.0	55.4	6.1	95.5
Ultimate Analysis (Wt%)				
C	.27	4.14		
H	.04	.08		
N	.05	.12		
S	.20	1.36		
Ash	99.44	94.3		
Total	100.0	100.0		
Bulk Density	1.7321	1.034		
True Density	2.8167	2.4188		
Sieve Analysis (Wt% on Sieve)				
8	63.56	0		
14	27.27	.10		
20	7.44	.20		
40	1.19	.38		
100	.18	5.40		
200	.07	13.20		
325	.03	16.75		
-325	.26	63.97		

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 3B.1				Run No. 3B.2			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	29.5	53.9	3.0	86.4	29.4	53.8	2.9	86.1
Ultimate Analysis (wt%)								
C	.09	2.14	2.76		.09		4.46	
H	.04	.03	.05		.04		.10	
N	.03	.03	.07		.06		.10	
S	.19	.57	1.08		.20		1.61	
Ash	99.65	97.23	96.04		99.61		93.73	
Total	100.0	100.0	100.0		100.0		100.0	
Bulk Density	1.8021	1.8964	1.1375		1.7707		1.0211	
True Density	2.7077	2.6940	2.2750		2.7829		2.2938	
Sieve Analysis (Wt% on Sieve)								
8	83.64	0	0		79.25		0	
14	13.20	16.30	.08		17.32		.03	
20	2.47	15.55	.12		2.60		.03	
40	.36	6.37	.13		.35		.13	
100	.06	22.95	.58		.03		1.63	
200	.01	16.0	11.94		.03		8.31	
325	.01	6.92	17.86		.02		13.62	
-325	.25	15.91	69.29		.40		76.25	

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 3C				Run No. 3D			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	29.6	54.1	3.0	86.7	30.4	56.1	3.1	89.6
Ultimate Analysis (Wt%)								
C	.05					2.32	4.46	
H	.02					.08	.11	
N	.03					.11	.06	
S	.19					1.16	.60	
Ash	99.71					96.33	94.77	
Total	100.0					100.0	100.0	
Bulk Density	1.7260					1.5630	.9353	
True Density	2.7750					2.5781	2.1806	
Sieve Analysis (Wt% on Sieve)								
8	65.45					0	0	
14	23.83					4.60	0	
20	4.23					.45	0	
40	1.05					1.10	.15	
100	.87					16.00	1.22	
200	1.44					32.0	1.27	
325	.90					13.27	5.38	
-325	2.18					32.58	91.98	

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 4A				Run No. 4B.1			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	34.0	47.0	10.9	91.9	34.5	45.5	10.6	90.6
Ultimate Analysis (Wt%)								
C	.08				.27	2.73	1.81	
H	.04				.03	.09	.10	
N	.08				0	.07	.12	
S	.19				.59	1.74	.95	
Ash	99.61				99.11	95.37	97.02	
Total	100.0				100.0	100.0	100.0	
Bulk Density	1.6586				1.6929	1.2436	1.4620	
True Density	2.6727				2.7019	2.5794	2.5175	
Sieve Analysis (Wt% on Sieve)								
8	0				0	0	0	
14	96.35				95.96	0	0	
20	2.81				1.54	.1	.16	
40	.67				.25	.37	.44	
100	.06				.23	4.9	7.69	
200	.03				.235	12.1	21.87	
325	.05				.28	14.13	18.60	
-325	.05				1.51	68.4	51.24	

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 4B.2*				Run No. 4C			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	33.6	44.2	10.4	88.2	24.2	61.1	8.7	94.0
Utlimate Analysis (Wt%)								
C		2.73	1.81		.03	2.70	2.81	
H		.05	.06		.04	.09	.07	
N		.07	.12		0.	0.	0.	
S		1.04	1.34		.23	1.47	1.40	
Ash		96.11	96.67		99.7	95.74	95.72	
Total		100.0	100.0		100.0	100.0	100.0	
Bulk Density		1.6814	1.2762		1.6452	1.3395	-	
True Density		2.7075	2.5206		2.6705	2.5300	-	
Sieve Analysis (Wt% on Sieve)								
8		0	0		0	0	0	
14		1.58	0		97.28	.44	0	
20		2.10	0		1.655	1.27	0	
40		5.52	.05		.525	2.34	.11	
100		24.87	3.53		.085	11.82	5.62	
200		24.91	23.68		.045	22.02	12.97	
325		12.46	13.96		.09	13.45	13.76	
-325		27.56	69.76		.32	48.66	67.54	

* For 4B.2 Coarse See 4B.1

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 4D				Run No. 4E.1			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	29.1	63.9	4.7	97.7	23.7	81.5	1.9	107.1
Ultimate Analysis (Wt%)								
C	.16	1.80	2.31		.04	2.01	1.53	
H	.04	.05	.09		.003	.10	.08	
N	0.	0.	0.		0.	0.	0.	
S	.28	1.08	.30		.23	1.10	1.03	
Ash	99.52	97.07	97.30		99.727	96.79	97.36	
Total	100.0	100.0	100.0		100.0	100.0	100.0	
Bulk Density	1.7679	1.5048			1.7013	1.5582		
True Density	2.7586	2.5500			2.7160	2.4625		
Liquid Slurry Density @ 68% Solids			1.7434				1.7276	
Sieve Analysis (Wt% on Sieve)								
8	72.20	0	0		63.07	0	0	
14	17.68	0	0		26.78	.50	0	
20	3.39	.58	.07		6.32	1.15	0	
40	.80	2.18	.25		2.05	1.30	.09	
100	.60	14.78	5.73		.71	11.50	6.07	
200	.89	24.65	16.19		.30	19.50	16.32	
325	1.08	14.62	17.12		.25	14.85	13.27	
-325	3.36	43.23	60.64		.52	51.20	64.25	

Table XI(Cont'd)

SRC-II Residue Gasification
Slag and Char Properties

	Run No. 4E.2*				Run No. 4F			
	Coarse	Fine	Char	Total	Coarse	Fine	Char	Total
% of Input Ash Recovered	23.4	82.2	1.9	107.5	5.2	85.2	7.1	97.5
Ultimate Analysis (Wt%)								
C					.06	.56	1.75	
H					.03	.06	.09	
N					.0	.0	.0	
S					.24	.63	1.32	
Ash					99.67	98.75	96.84	
Total					100.0	100.0	100.0	
Bulk Density					1.6420	1.8179	-	
True Density					2.6790	2.6762		
Liquid Slurry Density at 68% Solids							1.7674	
Sieve Analysis (Wt% on Sieve)								
8					51.46	0	0	
14					25.79	.30	0	
20					8.35	.12	.01	
40					3.38	.62	.13	
100					2.07	19.10	3.64	
200					2.45	33.60	12.84	
325					1.98	15.85	13.4	
-325					4.52	30.41	69.97	

* Check 4E.1

ESTIMATED PERFORMANCE OF COMMERCIAL GASIFIER

Based on the data obtained during this program, it is estimated that a conceptual Texaco residue gasifier of a size comparable to the largest Texaco oil based gasifier now in commercial use, when operated at 81 atmospheres pressure, is capable of producing 180 million standard cubic feet per day of hydrogen plus carbon monoxide from 3132 tons per day of the SRC-II vacuum flash drum bottoms tested.

Table XII summarizes the estimated material balance for commercial operation at 81 atmospheres pressure with Powhatan SRC-II coal liquefaction residue. It was assumed that 99 percent of the feed carbon will be gasified. The remaining one percent of the feed carbon will be recovered as a char and disposed of with the slag.

The SRC-II residue will be fed to the gasifier as a molten fluid at 650°F. About 0.77 pounds of pure oxygen per pound of SRC-II residue will be required to produce 28.7 standard cubic feet of hydrogen plus carbon monoxide.

Depending on the conversion level achieved in the down stream water-gas shift reactor, the hydrogen production rate will be from 27.9 to 28.6 standard cubic feet per pound of residue gasified.

Table XII

Estimated Performance of a Commercial Texaco Gasifier with SRC-II Vacuum Flash Drum Bottoms From Powhatan Coal

Residue Feed Rate, tons/hr.	130.5
Process Steam Feed Rate, tons/hr.	65.3
Pure Oxygen Feed Rate, tons/hr.	100.0
Ultimate Analysis of Feed Stock Wt. Percent, Moisture Free	
C	64.64
H	3.76
N	1.22
S	2.89
Ash	27.22
O(By Diff.)	0.27
Higher Heating Value, Btu/lb	11,387.
Product Composition, Mole Percent	
CO	44.09
H2	31.64
CO2	9.01
H2O	13.66
CH4	0.14
A	0.12
N2	0.47
H2S	0.84
COS	0.03
H2 + CO Production, MSCFH	7500.
Dry Syngas Production, MSCFD	205,200.
Slag, tons/hr.	28.5
Char, tons/hr.	7.9
Carbon Content of Char, Wt. Percent	10.0
Carbon Conversion, Percent	99.0

CONCLUSIONS

The Texaco Synthesis Gas Generation Process is an efficient method for producing hydrogen from SRC-II vacuum flash drum bottoms.

A continuous pilot plant gasification run of 5½ days duration with Powhatan SRC-II coal liquefaction residue was achieved and steady state water quality data were obtained.

A total of 83 tons of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal was successfully gasified at 1200 and 600 psig.

With 0.78 pounds of oxygen per pound of SRC-II vacuum flash drum bottoms a 99.3 percent conversion of carbon to syngas was achieved which yielded about 29.4 standard cubic feet of hydrogen plus carbon monoxide.

Periodic removal of slag from the gasifier's quench chamber during each run was demonstrated, and no major problems were encountered.

No evidence of significant burner tip erosion was observed.

Enough data, including water quality data and trace component analyses, have been obtained to define a basis for commercial design when gasifying SRC-II vacuum flash drum bottoms from Powhatan coal.

RECOMMENDATIONS

It is recommended that the data reported here be used as the basis for design of a large scale demonstration plant.

APPENDIX A

Data From Type II Preliminary Pilot Plant Evaluation; Report Fe-2247-24

GASIFICATION OF RESIDUAL MATERIALS FROM COAL LIQUEFACTION

Type II Preliminary Pilot Plant Evaluations of SRC-II Vacuum Flash Drum Bottoms From Powhatan Coal

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ABSTRACT

About 7½ tons of SRC-II vacuum flash drum bottoms from the liquefaction of Powhatan coal were successfully gasified in a 12 ton per day pilot plant at Texaco's Montebello Research Laboratory. The single fifteen hour run was completed at 24 atmospheres pressure.

A 99.5 percent conversion of the carbon in the feed to syngas was achieved, yielding 33.4 SCF of dry syngas per pound of residue charged. The dry syngas contained about 90 (vol) percent carbon monoxide plus hydrogen.

About three percent heavy distillate was added to the molten residue to reduce its viscosity to an acceptable level for handling in the pilot plant. Samples of all effluent streams were obtained and sent to Gulf Mineral Resources Company for detailed analyses. The short pilot plant run confirmed the operability of the Texaco Synthesis Gas Generation Process with this feedstock, and the data obtained confirms earlier predictions of performance efficiency.

The run consisted of two Type II Preliminary Pilot Plant Evaluations run back to back, thus achieving a single run of twice the normal on stream time for a Type II Evaluation.

Figure 3

Comparison of Predicted vs. Actual Performance
For Gasification of SRC-II Vacuum Flash Drum Bottoms
From the Liquefaction of Powhatan Coal

	Predicted Data From DOE Report Fe 2247-21 Figure 1	Actual Data
Charge to Gasifier		
Residue (+5% Solvent) Pounds per Hour	1000	1006
Pure Oxygen, Pounds per Hour	746	742
Steam, Pounds per Hour	400	397
Total Input	2146	2145
Output From Gasifier		
Dry Product Syngas, Pounds per Hour	1725	1750
Flash Gas, Pounds per Hour	-	10
Char, Pounds per Hour	85	25
Coarse Slag, Pounds per Hour	183	87
Lockhopper Fines, Pounds per Hour	-	91
Missing Ash, Pounds per Hour	-	53
Forced Water, Pounds per Hour	149	120
Total Output	2142	2136
Analytical		
Charge Residue Analysis, Weight Percent		
C	66.7	66.1
H	3.5	3.8
N	1.5	1.1
S	2.7	2.7
O(By Diff)	0.0	1.2
Ash	25.6	25.1
Higher Heating Value, Btu per Pound	11898	11681

Figure 3(Cont'd)

Comparison of Predicted vs. Actual Performance
For Gasification of SRC-II Vacuum Flash Drum Bottoms
From the Liquefaction of Powhatan Coal

	Predicted Data From DOE Report Fe 2247-21 Figure 1	Actual Data
Product Syngas Composition, Mole Percent		
H2	35.5	37.0
CO	55.8	53.5
CO2	7.1	8.4
N2	0.60	0.20
H2S	0.90	0.78
COS	0.07	0.04
CH4	0.00	0.05
A	0.03	0.03
Carbon on Coarse Slag, Weight Percent	<0.5	0.8
Carbon on Lockhopper Fines, Weight Percent	-	0.9
Carbon on Char, Weight Percent	15	9.0
Percent Carbon Conversion	99.0	99.5
Gasifier Pressure-PSIG	350.	350.
Dry Product Gas, Standard Cubic Feet Per Hour	32,800	33,550
Hydrogen Plus Carbon Monoxide, Standard Cubic Feet per Hour	29,900	30,360
Run Length, Hours	-	15

Figure 4

Gasification of
SRC-II Vacuum Flash Drum Bottoms From
Powhatan Coal
Ash, Slag and Char Properties

Stream	Coarse Slag	Lockhopper Fines	Char
Ultimate Analysis			
Wt.%			
C	0.75	0.88	5.46-9.54
H	0.00	0.00	0.00-0.07
N	0.30	0.00	0.00
S	0.56	0.76	1.82
Ash	99.87	99.71	95.08-90.24
Bulk Density	1.906	1.652	1.137
True Density	2.727	2.666	
Sieve Analysis % on US Sieve No.			
6	21.3	0	0
10	7.6	0.3	0
14	5.1	0.8	0
20	8.7	3.2	0
40	16.4	15.8	0
100	30.4	52.0	1.6
200	6.6	12.7	4.8
325	1.8	5.4	9.0
-325	2.1	9.8	84.6
% of Input Ash Recovered	35.7	37.1	9.2

APPENDIX B

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
1A	11.60		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.61	0.03	0.00	0.00	0.15	0.03
H2	8998.25	37.01	0.00	0.00	110.14	24.82
CO	13457.13	55.35	0.00	0.00	119.83	27.01
CO2	1714.72	7.05	0.00	0.00	180.16	40.60
N2	5.35	0.02	0.00	0.00	2.03	0.46
CH4	31.85	0.13	0.00	0.00	0.50	0.11
H2S	90.46	0.37	0.00	0.00	30.82	6.95
COS	8.75	0.04	0.00	0.00	0.05	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.54		0.00		28.47	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		29.39	C	68.93	O2	99.90
LH FINES LB/HR		131.61	H	4.40	A	0.10
SETTLER FINES LB/HR		3.93	N	1.24	H2	0.00
FINES ANAL	LH	SETTLER	S	2.52	CO	0.00
PCT C	1.88	4.02	ASH	22.66	CO2	0.00
PCT S	0.00	0.00	O	0.26	N2	0.00
PCT H	0.06	0.11	CL	0.00	TOT	100.00
PCT ASH	98.06	95.87	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.219 M/HR
UNACCOUNTED FOR NH3 0.594 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	716.10	INT SYN GAS SCFH	24313.15
FUEL TEMP	540.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.436	FLASH GAS SCFH	443.72
STEAM TEMP, PRES.	751. 1360.	SOLIDS LBS/HR	164.94
O2/AIR RATE SCFH	6770.59	H2O,FORCED,LB/HR	131.71

METERED TO CALCULATED FLOW RATIOS
O2=1.002 FUEL=0.996 UNC CARBON=1.006 TOT SYNGAS=1.002 FLASH GAS=1.000
INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.467

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
18	24.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.08	0.03	0.00	0.00	0.20	0.04
H2	9037.22	37.73	0.00	0.00	120.59	26.07
CO	13045.57	54.46	0.00	0.00	132.32	28.60
CO2	1722.60	7.19	0.00	0.00	172.68	37.33
N2	0.14	0.00	0.00	0.00	1.02	0.22
CH4	28.49	0.12	0.00	0.00	0.38	0.08
H2S	104.39	0.44	0.00	0.00	35.36	7.64
COS	10.91	0.05	0.00	0.00	0.04	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	19.38		0.00		27.67	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		51.10	C	66.52	O2	99.90
LH FINES LB/HR		123.87	H	4.00	A	0.10
SETTLER FINES LB/HR		3.69	N	1.24	H2	0.00
FINES ANAL	LH	SETTLER	S	2.60	CO	0.00
PCT C	4.24	4.02	ASH	25.19	CO2	0.00
PCT S	0.00	0.00	O	0.46	N2	0.00
PCT H	0.06	0.11	CL	0.00	TOT	100.00
PCT ASH	95.70	95.87	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.192 M/HR
UNACCOUNTED FOR NH3 0.639 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	727.23	INT SYN GAS SCFH	23955.44
FUEL TEMP	531.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.429	FLASH GAS SCFH	462.62
STEAM TEMP, PRES.	761. 1369.	SOLIDS LBS/HR	188.67
O2/AIR RATE SCFH	6288.11	H2O,FORCED,LB/HR	106.24

METERED TO CALCULATED FLOW RATIOS
O2=1.015 FUEL=0.978 UNC CARBON=1.068 TOT SYNGAS=1.002 FLASH GAS=0.992
INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 98.884

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
1C	7.30		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	5.97	0.03	0.00	0.00	0.20	0.04
H2	8947.66	37.73	0.00	0.00	120.29	25.86
CO	12816.12	54.04	0.00	0.00	133.71	28.74
CO2	1803.44	7.60	0.00	0.00	175.42	37.71
N2	1.18	0.00	0.00	0.00	1.03	0.22
CH4	35.77	0.15	0.00	0.00	0.65	0.14
H2S	95.46	0.40	0.00	0.00	33.91	7.29
COS	9.94	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	19.44		0.00		27.75	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		60.93	C	66.34	O2	99.90
LH FINES LB/HR		129.74	H	3.83	A	0.10
SETTLER FINES LB/HR		3.86	N	1.25	H2	0.00
FINES ANAL	LH	SETTLER	S	2.51	CO	0.00
PCT C	5.55	4.21	ASH	25.48	CO2	0.00
PCT S	1.72	0.00	O	0.59	N2	0.00
PCT H	0.06	0.11	CL	0.00	TOT	100.00
PCT ASH	92.67	95.68	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.131 M/HR
UNACCOUNTED FOR NH3 0.638 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	725.54	INT SYN GAS SCFH	23715.58
FUEL TEMP	528.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.429	FLASH GAS SCFH	465.24
STEAM TEMP, PRES.	734. 1320.	SOLIDS LBS/HR	194.55
O2/AIR RATE SCFH	6180.18	H2O,FORCED,LB/HR	99.80

METERED TO CALCULATED FLOW RATIOS
O2=1.026 FUEL=0.977 UNC CARBON=1.055 TOT SYNGAS=0.993 FLASH GAS=0.978
INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 98.470

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
2	7.40		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.35	0.03	0.00	0.00	0.20	0.04
H2	8531.50	36.68	0.00	0.00	119.73	25.88
CO	12575.80	54.07	0.00	0.00	133.09	28.76
CO2	1838.03	7.90	0.00	0.00	174.23	37.66
N2	116.19	0.50	0.00	0.00	1.02	0.22
CH4	44.28	0.19	0.00	0.00	0.65	0.14
H2S	135.19	0.58	0.00	0.00	33.75	7.30
COS	11.65	0.05	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.77		0.00		27.74	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	19.08	C	67.06	O2	99.90
NONSLAG ASH	LB/HR	157.05	H	4.03	A	0.10
UNCONV CARB	LB/HR	7.96	N	1.22	H2	0.00
FINES ANAL	LH	SETTLER	S	2.51	CO	0.00
PCT C	3.80	4.52	ASH	24.69	CO2	0.00
PCT S	1.22	0.00	O	0.50	N2	0.00
PCT H	0.08	0.10	CL	0.00	TOT	100.00
PCT ASH	94.90	95.38	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.004 M/HR
UNACCOUNTED FOR NH3 0.000 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	709.39	INT SYN GAS SCFH	23259.03
FUEL TEMP	503.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.438	FLASH GAS SCFH	462.70
STEAM TEMP, PRES.	736. 1325.	SOLIDS LBS/HR	183.10
O2/AIR RATE SCFH	6554.51	H2O,FORCED,LB/HR	141.65

METERED TO CALCULATED FLOW RATIOS
O2=1.017 FUEL=0.994 UNC CARBON=0.999 TOT SYNGAS=0.991 FLASH GAS=0.981
INT SYNGAS= PCT N2=1.58 PCT H2S=1.00 EXT SYNGAS= PCT N2=0.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 98.325

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3A	8.20		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.96	0.03	0.00	0.00	0.17	0.04
H2	8496.81	36.01	0.00	0.00	109.81	24.27
CO	12748.75	54.03	0.00	0.00	138.51	30.61
CO2	2214.52	9.38	0.00	0.00	181.43	40.10
N2	0.00	0.00	0.00	0.00	1.26	0.28
CH4	27.85	0.12	0.00	0.00	0.51	0.11
H2S	93.96	0.40	0.00	0.00	20.76	4.59
COS	8.49	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	20.18		0.00		28.39	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	66.67	C	68.49	O2	99.90
LH FINES	LB/HR	94.98	H	4.31	A	0.10
SETTLER FINES	LB/HR	10.25	N	1.14	H2	0.00
FINES ANAL	LH	SETTLER	S	2.48	CO	0.00
PCT C	4.14	2.76	ASH	23.47	CO2	0.00
PCT S	0.00	0.00	O	0.11	N2	0.00
PCT H	0.08	0.05	CL	0.00	TOT	100.00
PCT ASH	95.78	97.19	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.227 M/HR
UNACCOUNTED FOR NH3 0.574 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	714.11	INT SYN GAS SCFH	23597.37
FUEL TEMP	499.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.441	FLASH GAS SCFH	452.47
STEAM TEMP, PRES.	710. 1340.	SOLIDS LBS/HR	171.91
O2/AIR RATE SCFH	7135.00	H2O,FORCED,LB/HR	152.92

METERED TO CALCULATED FLOW RATIOS
O2=1.001 FUEL=0.996 UNC CARBON=1.017 TOT SYNGAS=1.004 FLASH GAS=1.010
INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.138

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3B.1	8.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.40	0.03	0.00	0.00	0.26	0.05
H2	8279.08	36.39	0.00	0.00	113.03	23.67
CO	12216.81	53.70	0.00	0.00	138.89	29.09
CO2	2117.32	9.31	0.00	0.00	189.93	39.77
N2	1.58	0.01	0.00	0.00	0.13	0.03
CH4	28.53	0.13	0.00	0.00	0.43	0.09
H2S	90.37	0.40	0.00	0.00	34.80	7.29
COS	10.87	0.05	0.00	0.00	0.04	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		99.99		0.00		100.00
AVG MOL WT		20.07		0.00		28.66

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		76.22	C	66.53	O2	99.90
LH FINES LB/HR		100.09	H	4.05	A	0.10
SETTLER FINES LB/HR		5.60	N	1.18	H2	0.00
FINES ANAL	LH	SETTLER	S	2.63	CO	0.00
PCT C	2.14	2.76	ASH	25.45	CO2	0.00
PCT S	0.57	1.08	O	0.17	N2	0.00
PCT H	0.08	0.05	CL	0.00	TOT	100.00
PCT ASH	97.21	96.11	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.198 M/HR
UNACCOUNTED FOR NH3 0.581 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	702.97	INT SYN GAS SCFH	22751.48
FUEL TEMP	497.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.447	FLASH GAS SCFH	477.52
STEAM TEMP, PRES.	690. 1344.	SOLIDS LBS/HR	181.92
O2/AIR RATE SCFH	6662.53	H2O,FORCED,LB/HR	141.79

METERED TO CALCULATED FLOW RATIOS
O2=1.042 FUEL=1.001 UNC CARBON=0.989 TOT SYNGAS=0.964 FLASH GAS=0.947
INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.509

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3B.2	16.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	5.97	0.03	0.00	0.00	0.25	0.05
H2	7974.72	36.30	0.00	0.00	112.50	23.67
CO	11845.03	53.92	0.00	0.00	138.24	29.08
CO2	1969.06	8.96	0.00	0.00	189.12	39.78
N2	52.50	0.24	0.00	0.00	0.13	0.03
CH4	28.87	0.13	0.00	0.00	0.42	0.09
H2S	80.07	0.36	0.00	0.00	34.64	7.29
COS	10.72	0.05	0.00	0.00	0.04	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		20.03		0.00		28.67

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	78.36	C	66.51	O2	99.90
LH FINES	LB/HR	90.53	H	3.74	A	0.10
SETTLER FINES	LB/HR	5.04	N	1.18	H2	0.00
FINES ANAL	LH	SETTLER	S	2.68	CO	0.00
PCT C	2.14	4.46	ASH	25.23	CO2	0.00
PCT S	0.57	1.61	O	0.66	N2	0.00
PCT H	0.08	0.10	CL	0.00	TOT	100.00
PCT ASH	97.21	93.83	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.218 M/HR
UNACCOUNTED FOR NH3 0.292 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	678.07	INT SYN GAS SCFH	21966.96
FUEL TEMP	497.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.466	FLASH GAS SCFH	475.38
STEAM TEMP, PRES.	690. 1344.	SOLIDS LBS/HR	173.94
O2/AIR RATE SCFH	6232.03	H2O,FORCED,LB/HR	138.26

METERED TO CALCULATED FLOW RATIOS
O2=1.048 FUEL=0.976 UNC CARBON=1.023 TOT SYNGAS=0.975 FLASH GAS=0.951
INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.521

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3C	24.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	4.20	0.02	0.00	0.00	2.04	0.45
H2	7920.66	36.18	0.00	0.00	105.94	23.19
CO	12029.83	54.95	0.00	0.00	135.36	29.63
CO2	1788.51	8.17	0.00	0.00	183.09	40.07
N2	13.34	0.06	0.00	0.00	0.05	0.01
CH4	37.83	0.17	0.00	0.00	0.32	0.07
H2S	91.86	0.42	0.00	0.00	30.06	6.58
COS	6.60	0.03	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		19.93		0.00		28.84

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	75.72	C	66.77	O2	99.90
LH FINES	LB/HR	89.98	H	3.99	A	0.10
SETTLER FINES	LB/HR	5.03	N	1.19	H2	0.00
FINES ANAL	LH	SETTLER	S	2.72	CO	0.00
PCT C	2.14	3.61	ASH	24.87	CO2	0.00
PCT S	0.57	1.34	O	0.47	N2	0.00
PCT H	0.08	0.07	CL	0.00	TOT	100.00
PCT ASH	97.21	94.97	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.216 M/HR
UNACCOUNTED FOR NH3 0.501 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	675.38	INT SYN GAS SCFH	21892.87
FUEL TEMP	494.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.466	FLASH GAS SCFH	456.89
STEAM TEMP, PRES.	713. 1330.	SOLIDS LBS/HR	170.75
O2/AIR RATE SCFH	6256.63	H2O,FORCED,LB/HR	147.09

METERED TO CALCULATED FLOW RATIOS
O2=1.022 FUEL=0.980 UNC CARBON=1.022 TOT SYNGAS=0.995 FLASH GAS=0.981
INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.533

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
30	3.30		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	4.17	0.02	0.00	0.00	2.08	0.45
H2	7906.83	36.20	0.00	0.00	107.78	23.21
CO	12008.83	54.98	0.00	0.00	137.72	29.66
CO2	1774.84	8.13	0.00	0.00	185.83	40.02
N2	13.31	0.06	0.00	0.00	0.05	0.01
CH4	37.77	0.17	0.00	0.00	0.32	0.07
H2S	91.70	0.42	0.00	0.00	30.58	6.59
COS	6.59	0.03	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		99.99		0.00		100.00
AVG MOL WT		19.92		0.00		28.82

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	69.99	C	66.96	O2	99.90
LH FINES	LB/HR	93.54	H	4.02	A	0.10
SETTLER FINES	LB/HR	5.27	N	1.15	H2	0.00
FINES ANAL	LH	SETTLER	S	2.74	CO	0.00
PCT C	2.32	4.46	ASH	24.73	CO2	0.00
PCT S	0.00	0.00	O	0.41	N2	0.00
PCT H	0.08	0.10	CL	0.00	TOT	100.00
PCT ASH	97.59	95.44	TOT	100.00	A.WT	32.01

UNACCOUNTED FOR H2S 0.234 M/HR

UNACCOUNTED FOR NH3 0.481 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	672.52	INT SYN GAS SCFH	21844.06
FUEL TEMP	491.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.475	FLASH GAS SCFH	464.39
STEAM TEMP, PRES.	699. 1340.	SOLIDS LBS/HR	168.81
O2/AIR RATE SCFH	6257.67	H2O,FORCED,LB/HR	153.22

METERED TO CALCULATED FLOW RATIOS

O2=1.013 FUEL=0.990 UNC CARBON=1.014 TOT SYNGAS=0.995 FLASH GAS=0.986

INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.466

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4A	8.10		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.30	0.03	0.00	0.00	0.24	0.06
H2	7712.28	35.27	0.00	0.00	100.52	23.19
CO	12187.65	55.74	0.00	0.00	138.51	31.96
CO2	1788.38	8.18	0.00	0.00	165.95	38.29
N2	23.75	0.11	0.00	0.00	0.00	0.00
CH4	14.16	0.06	0.00	0.00	0.28	0.07
H2S	125.32	0.57	0.00	0.00	27.84	6.42
COS	8.93	0.04	0.00	0.00	0.08	0.02
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	20.19		0.00		28.50	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		62.98	C	66.63	O2	99.90
LH FINES LB/HR		90.40	H	4.07	A	0.10
SETTLER FINES LB/HR		20.84	N	1.32	H2	0.00
FINES ANAL	LH	SETTLER	S	2.69	CO	0.00
PCT C	2.73	1.81	ASH	25.05	CO2	0.00
PCT S	0.00	0.00	O	0.24	N2	0.00
PCT H	0.09	0.10	CL	0.00	TOT	100.00
PCT ASH	97.18	98.09	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.146 M/HR

UNACCOUNTED FOR NH3 0.519 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	683.75	INT SYN GAS SCFH	21866.80
FUEL TEMP	482.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.461	FLASH GAS SCFH	433.45
STEAM TEMP, PRES.	695. 1210.	SOLIDS LBS/HR	174.23
O2/AIR RATE SCFH	6545.38	H2O,FORCED,LB/HR	167.25

METERED TO CALCULATED FLOW RATIOS

O2=1.031 FUEL=1.040 UNC CARBON=0.940 TOT SYNGAS=0.950 FLASH GAS=0.943

INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.376

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
48.1	11.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.14	0.03	0.00	0.00	0.24	0.06
H2	8013.02	36.15	0.00	0.00	103.56	24.07
CO	12278.49	55.40	0.00	0.00	136.90	31.82
CO2	1697.89	7.66	0.00	0.00	159.97	37.18
N2	18.38	0.08	0.00	0.00	0.00	0.00
CH4	15.94	0.07	0.00	0.00	0.28	0.07
H2S	124.71	0.56	0.00	0.00	29.19	6.79
COS	8.63	0.04	0.00	0.00	0.07	0.02
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.88		0.00		28.12	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	73.59	C	66.46	O2	99.90
LH FINES	LB/HR	85.24	H	4.09	A	0.10
SETTLER FINES	LB/HR	19.62	N	1.09	H2	0.00
FINES ANAL	LH	SETTLER	S	2.82	CO	0.00
PCT C	2.73	1.81	ASH	25.43	CO2	0.00
PCT S	1.56	0.95	O	0.11	N2	0.00
PCT H	0.09	0.10	CL	0.00	TOT	100.00
PCT ASH	95.62	97.14	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.127 M/HR

UNACCOUNTED FOR NH3 0.438 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	684.96	INT SYN GAS SCFH	22163.24
FUEL TEMP	479.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.451	FLASH GAS SCFH	430.24
STEAM TEMP, PRES.	696. 1200.	SOLIDS LBS/HR	178.46
O2/AIR RATE SCFH	6391.66	H2O,FORCED,LB/HR	149.97

METERED TO CALCULATED FLOW RATIOS

O2=1.008 FUEL=1.012 UNC CARBON=0.977 TOT SYNGAS=0.986 FLASH GAS=0.984

INT SYNGAS= PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS= PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.411

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
48.2	13.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.09	0.03	0.00	0.00	0.22	0.06
H2	7702.89	35.62	0.00	0.00	92.18	22.64
CO	11923.12	55.14	0.00	0.00	125.04	30.71
CO2	1807.31	8.36	0.00	0.00	159.47	39.17
N2	25.79	0.12	0.00	0.00	0.02	0.01
CH4	13.87	0.06	0.00	0.00	0.13	0.03
H2S	134.63	0.62	0.00	0.00	30.05	7.38
COS	9.32	0.04	0.00	0.00	0.03	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		20.14		0.00		28.85

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG	LB/HR 80.59	C	66.18	O2	99.90
LH	FINES	LB/HR 78.25	H	3.91	A	0.10
SETTLER FINES		LB/HR 18.05	N	1.15	H2	0.00
FINES ANAL		LH SETTLER	S	2.74	CO	0.00
PCT	C	2.73 1.81	ASH	25.62	CO2	0.00
PCT	S	1.56 0.95	O	0.40	N2	0.00
PCT	H	0.09 0.10	CL	0.00	TOT	100.00
PCT	ASH	95.62 97.14	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.075 M/HR
UNACCOUNTED FOR NH3 0.415 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	675.05	INT SYN GAS SCFH	21623.04
FUEL TEMP	479.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.458	FLASH GAS SCFH	407.17
STEAM TEMP, PRES.	696. 1200.	SOLIDS LBS/HR	176.90
O2/AIR RATE SCFH	6319.04	H2O,FORCED,LB/HR	152.58

METERED TO CALCULATED FLOW RATIOS
O2=0.984 FUEL=0.994 UNC CARBON=1.020 TOT SYNGAS=1.022 FLASH GAS=1.028
INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.449

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4C	24.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.13	0.03	0.00	0.00	0.19	0.05
H2	7556.20	35.51	0.00	0.00	83.14	23.28
CO	11664.04	54.82	0.00	0.00	111.36	31.18
CO2	1844.19	8.67	0.00	0.00	136.74	38.29
N2	46.84	0.22	0.00	0.00	0.01	0.00
CH4	12.13	0.06	0.00	0.00	0.07	0.02
H2S	139.26	0.65	0.00	0.00	25.58	7.16
COS	7.87	0.04	0.00	0.00	0.03	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	20.21		0.00		28.53	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG	LB/HR 46.34	C	65.68	O2	99.90
LH	FINES	LB/HR 117.62	H	3.95	A	0.10
SETTLER FINES		LB/HR 16.51	N	1.12	H2	0.00
FINES ANAL		LH SETTLER	S	3.02	CO	0.00
PCT	C	2.70 2.91	ASH	25.11	CO2	0.00
PCT	S	1.65 0.00	O	0.12	N2	0.00
PCT	H	0.08 0.06	CL	0.00	TOT	100.00
PCT	ASH	95.57 97.12	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.114 M/HR

UNACCOUNTED FOR NH3 0.286 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	669.38	INT SYN GAS SCFH	21276.71
FUEL TEMP	493.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.470	FLASH GAS SCFH	357.15
STEAM TEMP, PRES.	707. 1218.	SOLIDS LBS/HR	180.48
O2/AIR RATE SCFH	6332.07	H2O,FORCED,LB/HR	168.90

METERED TO CALCULATED FLOW RATIOS

O2=0.992 FUEL=1.020 UNC CARBON=0.964 TOT SYNGAS=0.994 FLASH GAS=1.000

INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.172

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4D	24.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.26	0.03	0.00	0.00	0.17	0.06
H2	7812.16	35.42	0.00	0.00	70.36	24.14
CO	12187.81	55.27	0.00	0.00	91.94	31.54
CO2	1348.30	8.38	0.00	0.00	107.37	36.83
N2	30.70	0.14	0.00	0.00	0.10	0.04
CH4	14.13	0.06	0.00	0.00	0.11	0.04
H2S	146.87	0.67	0.00	0.00	21.45	7.36
COS	7.06	0.03	0.00	0.00	0.01	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	20.19		0.00		28.08	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG	LB/HR 56.61	C	65.89	O2	99.90
LH	FINES	LB/HR 115.57	H	3.92	A	0.10
SETTLER FINES		LB/HR 8.56	N	1.16	H2	0.00
FINES ANAL		LH SETTLER	S	2.99	CO	0.00
PCT	C	1.30 2.31	ASH	25.92	CO2	0.00
PCT	S	0.00 0.00	O	0.12	N2	0.00
PCT	H	0.05 0.09	CL	0.00	TOT	100.00
PCT	ASH	98.15 97.60	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.179 M/HR

UNACCOUNTED FOR NH3 0.407 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	688.23	INT SYN GAS SCFH	22053.31
FUEL TEMP	493.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.457	FLASH GAS SCFH	291.56
STEAM TEMP, PRES.	698. 1234.	SOLIDS LBS/HR	180.75
O2/AIR RATE SCFH	6437.25	H2O,FORCED,LB/HR	157.63

METERED TO CALCULATED FLOW RATIOS

O2=0.991 FUEL=1.000 UNC CARBON=1.002 TOT SYNGAS=1.010 FLASH GAS=1.009

INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.498

COMPUTER BALANCED DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4E.1	13.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.45	0.03	0.00	0.00	0.17	0.07
H2	8014.44	35.39	0.00	0.00	61.55	23.97
CO	12455.17	55.00	0.00	0.00	77.61	30.22
CO2	1906.51	8.42	0.00	0.00	96.45	37.56
N2	82.49	0.36	0.00	0.00	0.74	0.29
CH4	14.09	0.06	0.00	0.00	0.00	0.00
H2S	158.40	0.70	0.00	0.00	20.25	7.89
COS	7.27	0.03	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	20.21		0.00		28.28	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG*	LB/HR 32.11	C	65.45	O2	99.90
LH	FINES	LB/HR 159.15	H	3.88	A	0.10
SETTLER FINES		LB/HR 3.66	N	1.13	H2	0.00
FINES ANAL		LH SETTLER	S	2.95	CO	0.00
PCT	C	2.01 1.53	ASH	26.47	CO2	0.00
PCT	S	0.00 0.00	O	0.12	N2	0.00
PCT	H	0.10 0.08	CL	0.00	TOT	100.00
PCT	ASH	97.89 98.39	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.161 M/HR
UNACCOUNTED FOR NH3 0.135 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	708.74	INT SYN GAS SCFH	22644.84
FUEL TEMP	494.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.445	FLASH GAS SCFH	256.79
STEAM TEMP, PRES.	690. 1206.	SOLIDS LBS/HR	190.93
O2/AIR RATE SCFH	6630.99	H2O,FORCED,LB/HR	160.38

METERED TO CALCULATED FLOW RATIOS
O2=0.980 FUEL=0.986 UNC CARBON=0.997 TOT SYNGAS=1.035 FLASH GAS=1.022
INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.320

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4E.2	11.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.58	0.03	0.00	0.00	0.15	0.06
H2	7799.64	35.11	0.00	0.00	62.18	23.00
CO	12006.13	54.05	0.00	0.00	83.87	31.02
CO2	2174.98	9.79	0.00	0.00	103.95	38.45
N2	57.29	0.26	0.00	0.00	0.01	0.00
CH4	1.56	0.01	0.00	0.00	0.00	0.00
H2S	158.06	0.71	0.00	0.00	20.21	7.48
COS	9.58	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	20.51		0.00		28.65	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG* LB/HR	36.98	C	65.21	O2	99.90
LH	FINES LB/HR	151.30	H	3.86	A	0.10
SETTLER	FINES LB/HR	3.46	N	1.12	H2	0.00
FINES ANAL	LH	SETTLER	S	2.82	CO	0.00
PCT C	2.01	1.53	ASH	26.83	CO2	0.00
PCT S	0.00	0.00	O	0.16	N2	0.00
PCT H	0.10	0.08	CL	0.00	TOT	100.00
PCT ASH	97.89	98.39	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.123 M/HR

UNACCOUNTED FOR NH3 0.261 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	702.68	INT SYN GAS SCFH	22213.85
FUEL TEMP	496.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.449	FLASH GAS SCFH	270.40
STEAM TEMP, PRES.	741. 1274.	SOLIDS LBS/HR	191.75
O2/AIR RATE SCFH	6741.04	H2O,FORCED,LB/HR	165.88

METERED TO CALCULATED FLOW RATIOS

O2=0.986 FUEL=0.982 UNC CARBON=1.035 TOT SYNGAS=1.031 FLASH GAS=1.020

INT SYNGAS- PCT N2=1.00 PCT H2S=1.00 EXT SYNGAS- PCT N2=1.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.325

COMPUTER BALANCED DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4F	22.80		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	6.41	0.03	0.00	0.00	0.18	0.06
H2	7736.81	35.14	0.00	0.00	76.16	23.84
CO	11925.46	54.17	0.00	0.00	102.62	32.12
CO2	2058.32	9.35	0.00	0.00	115.18	36.06
N2	116.96	0.53	0.00	0.00	2.50	0.78
CH4	4.65	0.02	0.00	0.00	0.01	0.00
H2S	155.69	0.71	0.00	0.00	22.77	7.13
COS	9.74	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	20.43		0.00		28.02	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	17.01	C	65.39	O2	99.90
LH FINES	LB/HR	154.86	H	3.76	A	0.10
SETTLER FINES	LB/HR	13.05	N	1.28	H2	0.00
FINES ANAL	LH	SETTLER	S	2.81	CO	0.00
PCT C	0.56	1.75	ASH	26.64	CO2	0.00
PCT S	0.00	0.00	O	0.13	N2	0.00
PCT H	0.07	0.09	CL	0.00	TOT	100.00
PCT ASH	99.37	98.16	TOT	100.00	AMWT	32.01

UNACCOUNTED FOR H2S 0.108 M/HR

UNACCOUNTED FOR NH3 0.000 M/HR

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	689.78	INT SYN GAS SCFH	22014.06
FUEL TEMP	495.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.451	FLASH GAS SCFH	319.45
STEAM TEMP, PRES.	706. 1233.	SOLIDS LBS/HR	184.94
O2/AIR RATE SCFH	6599.78	H2O,FORCED,LB/HR	160.32

METERED TO CALCULATED FLOW RATIOS

O2=0.976 FUEL=0.979 UNC CARBON=1.004 TOT SYNGAS=1.048 FLASH GAS=1.036

INT SYNGAS- PCT N2=1.18 PCT H2S=1.00 EXT SYNGAS- PCT N2=0.00 PCT H2S=1.00

PERCENT CARBON CONVERSION 99.757

APPENDIX C

Adjusted Raw Data

The following adjustments to the measured flow rates were made to the data in this section:

Fuel Rate - decreased 10%
Oxygen Rate - increased 5%

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
1A	11.60		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	13.87	0.06	0.00	0.00	0.15	0.04
H2	9009.85	37.00	0.00	0.00	110.12	24.83
CO	13474.48	55.34	0.00	0.00	119.81	27.01
CO2	1715.47	7.05	0.00	0.00	180.06	40.60
N2	5.35	0.02	0.00	0.00	2.03	0.46
CH4	31.89	0.13	0.00	0.00	0.50	0.11
H2S	90.58	0.37	0.00	0.00	30.81	6.95
COS	8.76	0.04	0.00	0.00	0.05	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.55		0.00		28.47	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		9.70	C	68.90	O2	99.90
LH FINES LB/HR		132.44	H	4.40	A	0.10
SETTLER FINES LB/HR		3.95	N	1.24	H2	0.00
FINES ANAL	LH	SETTLER	S	2.52	CO	0.00
PCT C	1.88	4.02	ASH	22.68	CO2	0.00
PCT S	0.00	0.00	O	0.26	N2	0.00
PCT H	0.06	0.11	CL	0.00	TOT	100.00
PCT ASH	98.06	95.87	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	712.99	INT SYN GAS SCFH	24350.28
FUEL TEMP	540.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.438	FLASH GAS SCFH	443.56
STEAM TEMP, PRES.	751. 1360.	SOLIDS LBS/HR	146.10
O2/AIR RATE SCFH	6783.58	H2O,FORCED,LB/HR	141.07

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
1B	24.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	12.72	0.05	0.00	0.00	0.20	0.04
H2	9062.48	37.74	0.00	0.00	119.80	26.11
CO	13082.03	54.48	0.00	0.00	131.46	28.65
CO2	1709.15	7.12	0.00	0.00	170.81	37.23
N2	0.14	0.00	0.00	0.00	1.01	0.22
CH4	28.57	0.12	0.00	0.00	0.37	0.08
H2S	104.69	0.44	0.00	0.00	35.13	7.66
COS	10.94	0.05	0.00	0.00	0.04	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.37		0.00		27.64	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	9.72	C	66.36	O2	99.90
LH FINES	LB/HR	132.32	H	4.00	A	0.10
SETTLER FINES	LB/HR	3.94	N	1.25	H2	0.00
FINES ANAL	LH	SETTLER	S	2.61	CO	0.00
PCT C	4.24	4.02	ASH	25.32	CO2	0.00
PCT S	0.00	0.00	O	0.46	N2	0.00
PCT H	0.06	0.11	CL	0.00	TOT	100.00
PCT ASH	95.70	95.87	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	710.99	INT SYN GAS SCFH	24010.75
FUEL TEMP	531.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.439	FLASH GAS SCFH	458.85
STEAM TEMP, PRES.	761. 1369.	SOLIDS LBS/HR	145.99
O2/AIR RATE SCFH	6383.53	H2O,FORCED,LB/HR	117.60

RAW DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
1C	7.30		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	21.67	0.09	0.00	0.00	0.20	0.04
H2	8898.17	37.77	0.00	0.00	118.05	25.95
CO	12745.24	54.10	0.00	0.00	131.21	28.84
CO2	1751.79	7.44	0.00	0.00	170.54	37.49
N2	1.17	0.00	0.00	0.00	1.01	0.22
CH4	35.57	0.15	0.00	0.00	0.64	0.14
H2S	94.93	0.40	0.00	0.00	33.28	7.32
COS	9.89	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.41		0.00		27.70	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		10.05	C	66.22	O2	99.90
LH FINES LB/HR		136.94	H	3.82	A	0.10
SETTLER FINES LB/HR		4.07	N	1.26	H2	0.00
FINES ANAL	LH	SETTLER	S	2.52	CO	0.00
PCT C	5.55	4.21	ASH	25.59	CO2	0.00
PCT S	1.72	0.00	O	0.59	N2	0.00
PCT H	0.06	0.11	CL	0.00	TOT	100.00
PCT ASH	92.67	95.68	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	708.99	INT SYN GAS SCFH	23558.46
FUEL TEMP	528.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.440	FLASH GAS SCFH	454.96
STEAM TEMP, PRES.	734. 1320.	SOLIDS LBS/HR	151.08
O2/AIR RATE SCFH	6340.95	H2O,FORCED,LB/HR	119.74

RAW DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
2	7.40		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	23.06	0.10	0.00	0.00	0.19	0.04
H2	8440.38	36.60	0.00	0.00	117.74	25.95
CO	12441.48	53.95	0.00	0.00	130.87	28.84
CO2	1784.93	7.74	0.00	0.00	170.10	37.49
N2	182.18	0.79	0.00	0.00	1.01	0.22
CH4	43.81	0.19	0.00	0.00	0.64	0.14
H2S	133.75	0.58	0.00	0.00	33.19	7.32
COS	11.53	0.05	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	19.78		0.00		27.70	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		18.08	C	67.07	O2	99.90
LH FINES LB/HR		198.39	H	4.01	A	0.10
SETTLER FINES LB/HR		9.32	N	1.22	H2	0.00
FINES ANAL	LH	SETTLER	S	2.51	CO	0.00
PCT C	3.80	4.52	ASH	24.69	CO2	0.00
PCT S	1.22	0.00	O	0.50	N2	0.00
PCT H	0.08	0.10	CL	0.00	TOT	100.00
PCT ASH	94.90	95.38	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	704.99	INT SYN GAS SCFH	23061.14
FUEL TEMP	503.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.441	FLASH GAS SCFH	453.78
STEAM TEMP, PRES.	736. 1325.	SOLIDS LBS/HR	225.80
O2/AIR RATE SCFH	6669.05	H2O,FORCED,LB/HR	154.01

RAW DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3A	8.20		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	13.74	0.06	0.00	0.00	0.17	0.04
H2	8529.62	35.99	0.00	0.00	110.83	24.26
CO	12797.98	54.00	0.00	0.00	139.80	30.61
CO2	2227.79	9.40	0.00	0.00	183.21	40.11
N2	0.00	0.00	0.00	0.00	1.27	0.28
CH4	27.96	0.12	0.00	0.00	0.51	0.11
H2S	94.32	0.40	0.00	0.00	20.95	4.59
COS	8.53	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	20.19		0.00		28.39	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		56.76	C	68.48	O2	99.90
LH FINES LB/HR		96.59	H	4.31	A	0.10
SETTLER FINES LB/HR		10.43	N	1.14	H2	0.00
FINES ANAL	LH	SETTLER	S	2.48	CO	0.00
PCT C	4.14	2.76	ASH	23.48	CO2	0.00
PCT S	0.00	0.00	O	0.11	N2	0.00
PCT H	0.08	0.05	CL	0.00	TOT	100.00
PCT ASH	95.78	97.19	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	710.99	INT SYN GAS SCFH	23699.97
FUEL TEMP	499.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.443	FLASH GAS SCFH	456.77
STEAM TEMP, PRES.	710. 1340.	SOLIDS LBS/HR	163.78
O2/AIR RATE SCFH	7139.33	H2O,FORCED,LB/HR	159.61

RAW DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3B.1	8.00		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	10.96	0.05	0.00	0.00	0.24	0.05
H2	8013.36	36.55	0.00	0.00	107.81	23.85
CO	11624.71	53.94	0.00	0.00	132.47	29.30
CO2	1947.21	8.88	0.00	0.00	177.79	39.33
N2	1.53	0.01	0.00	0.00	0.12	0.03
CH4	27.62	0.13	0.00	0.00	0.41	0.09
H2S	87.47	0.40	0.00	0.00	33.19	7.34
COS	10.52	0.05	0.00	0.00	0.04	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		99.99		0.00		100.00
AVG MOL WT		19.96		0.00		28.55

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	52.64	C	66.71	O2	99.90
LH FINES	LB/HR	98.96	H	3.99	A	0.10
SETTLER FINES	LB/HR	5.54	N	1.17	H2	0.00
FINES ANAL	LH	SETTLER	S	2.62	CO	0.00
PCT C	2.14	2.76	ASH	25.34	CO2	0.00
PCT S	0.57	1.08	O	0.17	N2	0.00
PCT H	0.08	0.05	CL	0.00	TOT	100.00
PCT ASH	97.21	96.11	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	703.99	INT SYN GAS SCFH	21923.42
FUEL TEMP	497.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.447	FLASH GAS SCFH	452.12
STEAM TEMP, PRES.	690. 1344.	SOLIDS LBS/HR	157.14
O2/AIR RATE SCFH	6940.21	H2O,FORCED,LB/HR	187.72

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3B.2	16.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	9.21	0.04	0.00	0.00	0.24	0.05
H2	7809.83	36.45	0.00	0.00	107.81	23.85
CO	11600.12	54.14	0.00	0.00	132.47	29.30
CO2	1838.36	8.58	0.00	0.00	177.79	39.33
N2	51.42	0.24	0.00	0.00	0.12	0.03
CH4	28.28	0.13	0.00	0.00	0.41	0.09
H2S	78.41	0.37	0.00	0.00	33.19	7.34
COS	10.49	0.05	0.00	0.00	0.04	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	19.94		0.00		28.55	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	49.33	C	66.45	O2	99.90
LH FINES	LB/HR	92.65	H	3.71	A	0.10
SETTLER FINES	LB/HR	5.16	N	1.18	H2	0.00
FINES ANAL	LH	SETTLER	S	2.69	CO	0.00
PCT C	2.14	4.46	ASH	25.31	CO2	0.00
PCT S	0.57	1.61	O	0.66	N2	0.00
PCT H	0.08	0.10	CL	0.00	TOT	100.00
PCT ASH	97.21	93.83	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	661.99	INT SYN GAS SCFH	21426.16
FUEL TEMP	497.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.478	FLASH GAS SCFH	452.12
STEAM TEMP, PRES.	690. 1344.	SOLIDS LBS/HR	147.15
O2/AIR RATE SCFH	6528.28	H2O,FORCED,LB/HR	171.48

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3C	24.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	16.77	0.08	0.00	0.00	2.01	0.45
H2	7887.92	36.21	0.00	0.00	104.25	23.26
CO	11980.11	55.00	0.00	0.00	133.21	29.72
CO2	1748.22	8.03	0.00	0.00	178.78	39.89
N2	13.28	0.06	0.00	0.00	0.05	0.01
CH4	37.68	0.17	0.00	0.00	0.31	0.07
H2S	91.48	0.42	0.00	0.00	29.58	6.60
COS	6.57	0.03	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		99.99		0.00		100.00
AVG MOL WT		19.91		0.00		28.79

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR-ANALYSIS MOLPCT	
LH SLAG	LB/HR	48.96	C	66.66	O2	99.90
LH FINES	LB/HR	91.99	H	3.98	A	0.10
SETTLER FINES	LB/HR	5.14	N	1.19	H2	0.00
FINES ANAL	LH	SETTLER	S	2.73	CO	0.00
PCT C	2.14	3.61	ASH	24.97	CO2	0.00
PCT S	0.57	1.34	O	0.47	N2	0.00
PCT H	0.08	0.07	CL	0.00	TOT	100.00
PCT ASH	97.21	94.97	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	661.99	INT SYN GAS SCFH	21782.07
FUEL TEMP	494.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.476	FLASH GAS SCFH	448.22
STEAM TEMP. PRES.	713. 1330.	SOLIDS LBS/HR	146.09
O2/AIR RATE SCFH	6391.70	H2O,FORCED,LB/HR	163.82

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
3D	3.30		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	16.73	0.08	0.00	0.00	2.06	0.45
H2	7870.72	36.21	0.00	0.00	106.50	23.26
CO	11953.98	55.00	0.00	0.00	136.08	29.72
CO2	1744.41	8.03	0.00	0.00	182.63	39.89
N2	13.25	0.06	0.00	0.00	0.05	0.01
CH4	37.60	0.17	0.00	0.00	0.32	0.07
H2S	91.28	0.42	0.00	0.00	30.22	6.60
COS	6.56	0.03	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		19.91		0.00		28.79

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG	LB/HR 50.20	C	66.92	O2	99.90
LH	FINES	LB/HR 94.88	H	4.01	A	0.10
SETTLER FINES		LB/HR 5.35	N	1.15	H2	0.00
FINES ANAL		LH SETTLER	S	2.74	CO	0.00
PCT	C	2.32 4.46	ASH	24.77	CO2	0.00
PCT	S	0.00 0.00	O	0.41	N2	0.00
PCT	H	0.08 0.10	CL	0.00	TOT	100.00
PCT	ASH	97.59 95.44	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	665.99	INT SYN GAS SCFH	21734.56
FUEL TEMP	491.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.480	FLASH GAS SCFH	457.88
STEAM TEMP, PRES.	699. 1340.	SOLIDS LBS/HR	150.44
O2/AIR RATE SCFH	6340.95	H2O,FORCED,LB/HR	168.22

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4A	8.10		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS SCFH	INTERNAL SYNGAS MOLPCT	EXTERNAL SYNGAS SCFH	EXTERNAL SYNGAS MOLPCT	FLASH GAS SCFH	FLASH GAS MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	14.74	0.07	0.00	0.00	0.22	0.06
H2	7350.83	35.38	0.00	0.00	95.44	23.35
CO	11616.46	55.92	0.00	0.00	131.51	32.17
CO2	1628.30	7.84	0.00	0.00	154.80	37.87
N2	22.64	0.11	0.00	0.00	0.00	0.00
CH4	13.50	0.07	0.00	0.00	0.26	0.07
H2S	119.45	0.58	0.00	0.00	26.44	6.47
COS	8.51	0.04	0.00	0.00	0.08	0.02
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		20.12		0.00		28.40

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	59.59	C	67.15	O2	99.90
LH FINES	LB/HR	84.93	H	3.98	A	0.10
SETTLER FINES	LB/HR	19.58	N	1.30	H2	0.00
FINES ANAL	LH	SETTLER	S	2.65	CO	0.00
PCT C	2.73	1.81	ASH	24.58	CO2	0.00
PCT S	0.00	0.00	O	0.24	N2	0.00
PCT H	0.09	0.10	CL	0.00	TOT	100.00
PCT ASH	97.18	98.09	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	710.99	INT SYN GAS SCFH	20774.46
FUEL TEMP	482.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.444	FLASH GAS SCFH	408.78
STEAM TEMP, PRES.	695. 1210.	SOLIDS LBS/HR	164.11
O2/AIR RATE SCFH	6749.40	H2O,FORCED,LB/HR	218.17

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
48.1	11.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	16.38	0.07	0.00	0.00	0.24	0.06
H2	7901.62	36.17	0.00	0.00	102.06	24.11
CO	12107.80	55.43	0.00	0.00	134.93	31.88
CO2	1653.53	7.57	0.00	0.00	156.92	37.07
N2	18.13	0.08	0.00	0.00	0.00	0.00
CH4	15.72	0.07	0.00	0.00	0.27	0.07
H2S	122.98	0.56	0.00	0.00	28.77	6.80
COS	8.51	0.04	0.00	0.00	0.07	0.02
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		99.99		0.00		100.00
AVG MOL WT		19.87		0.00		28.09

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	60.46	C	66.61	O2	99.90
LH FINES	LB/HR	83.31	H	4.06	A	0.10
SETTLER FINES	LB/HR	19.18	N	1.09	H2	0.00
FINES ANAL	LH	SETTLER	S	2.81	CO	0.00
PCT C	2.73	1.81	ASH	25.32	CO2	0.00
PCT S	1.56	0.95	O	0.11	N2	0.00
PCT H	0.09	0.10	CL	0.00	TOT	100.00
PCT ASH	95.52	97.14	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	592.99	INT SYN GAS SCFH	21844.81
FUEL TEMP	479.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.446	FLASH GAS SCFH	423.29
STEAM TEMP, PRES.	696. 1200.	SOLIDS LBS/HR	162.95
O2/AIR RATE SCFH	6439.63	H2O,FORCED,LB/HR	169.10

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
48.2	13.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	18.12	0.08	0.00	0.00	0.23	0.06
H2	7854.91	35.53	0.00	0.00	94.42	22.56
CO	12158.43	55.00	0.00	0.00	128.08	30.61
CO2	1889.11	8.55	0.00	0.00	164.77	39.37
N2	26.30	0.12	0.00	0.00	0.02	0.01
CH4	14.14	0.06	0.00	0.00	0.13	0.03
H2S	137.28	0.62	0.00	0.00	30.78	7.36
COS	9.50	0.04	0.00	0.00	0.03	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		20.20		0.00		28.90

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	57.95	C	66.05	O2	99.90
LH FINES	LB/HR	79.84	H	3.94	A	0.10
SETTLER FINES	LB/HR	18.42	N	1.15	H2	0.00
FINES ANAL	LH	SETTLER	S	2.75	CO	0.00
PCT C	2.73	1.81	ASH	25.71	CO2	0.00
PCT S	1.56	0.95	O	0.40	N2	0.00
PCT H	0.09	0.10	CL	0.00	TOT	100.00
PCT ASH	95.62	97.14	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	670.99	INT SYN GAS SCFH	22107.84
FUEL TEMP	479.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.461	FLASH GAS SCFH	418.49
STEAM TEMP, PRES.	696. 1200.	SOLIDS LBS/HR	156.21
O2/AIR RATE SCFH	6215.94	H2O,FORCED,LB/HR	140.62

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4C	24.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	17.34	0.08	0.00	0.00	0.19	0.05
H2	7507.89	35.49	0.00	0.00	83.08	23.27
CO	11589.46	54.78	0.00	0.00	111.29	31.17
CO2	1838.20	8.69	0.00	0.00	136.78	38.31
N2	46.54	0.22	0.00	0.00	0.01	0.00
CH4	12.06	0.06	0.00	0.00	0.07	0.02
H2S	138.37	0.65	0.00	0.00	25.56	7.16
COS	7.82	0.04	0.00	0.00	0.03	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		20.23		0.00		28.53

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	43.00	C	65.85	O2	99.90
LH FINES	LB/HR	113.42	H	3.94	A	0.10
SETTLER FINES	LB/HR	15.92	N	1.11	H2	0.00
FINES ANAL	LH	SETTLER	S	3.00	CO	0.00
PCT C	2.70	2.81	ASH	25.98	CO2	0.00
PCT S	1.65	0.00	O	0.12	N2	0.00
PCT H	0.08	0.06	CL	0.00	TOT	100.00
PCT ASH	95.57	97.12	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	682.99	INT SYN GAS SCFH	21157.71
FUEL TEMP	493.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.461	FLASH GAS SCFH	357.04
STEAM TEMP, PRES.	707. 1218.	SOLIDS LBS/HR	172.35
O2/AIR RATE SCFH	6281.80	H2O,FORCED,LB/HR	176.69

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4D	24.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	17.37	0.08	0.00	0.00	0.17	0.06
H2	7879.48	35.37	0.00	0.00	70.90	24.11
CO	12292.84	55.18	0.00	0.00	92.64	31.50
CO2	1887.11	8.47	0.00	0.00	108.49	36.89
N2	30.96	0.14	0.00	0.00	0.10	0.04
CH4	14.25	0.06	0.00	0.00	0.12	0.04
H2S	148.14	0.67	0.00	0.00	21.62	7.35
COS	7.12	0.03	0.00	0.00	0.01	0.01
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		99.99	
AVG MOL WT	20.22		0.00		28.10	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	51.80	C	65.85	O2	99.90
LH FINES	LB/HR	115.80	H	3.93	A	0.10
SETTLER FINES	LB/HR	8.58	N	1.16	H2	0.00
FINES ANAL	LH	SETTLER	S	2.99	CO	0.00
PCT C	1.80	2.31	ASH	25.95	CO2	0.00
PCT S	0.00	0.00	O	0.12	N2	0.00
PCT H	0.05	0.09	CL	0.00	TOT	100.00
PCT ASH	98.15	97.60	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	687.99	INT SYN GAS SCFH	22277.31
FUEL TEMP	493.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.458	FLASH GAS SCFH	294.07
STEAM TEMP, PRES.	698. 1234.	SOLIDS LBS/HR	176.19
O2/AIR RATE SCFH	6379.00	H2O,FORCED,LB/HR	156.29

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4E.1	13.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	22.03	0.09	0.00	0.00	0.17	0.07
H2	8267.98	35.27	0.00	0.00	62.75	23.91
CO	12849.19	54.81	0.00	0.00	79.12	30.15
CO2	2034.81	8.68	0.00	0.00	99.00	37.72
N2	85.10	0.36	0.00	0.00	0.75	0.29
CH4	14.53	0.06	0.00	0.00	0.00	0.00
H2S	163.41	0.70	0.00	0.00	20.65	7.87
COS	7.50	0.03	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		100.00		0.00		100.00
AVG MOL WT		20.29		0.00		28.32

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH	SLAG	LB/HR 44.09	C	65.26	O2	99.90
LH	FINES	LB/HR 154.75	H	3.92	A	0.10
SETTLER FINES		LB/HR 3.65	N	1.14	H2	0.00
FINES ANAL	LH	SETTLER	S	2.96	CO	0.00
PCT	C	2.01 1.53	ASH	26.60	CO2	0.00
PCT	S	0.00 0.00	O	0.12	N2	0.00
PCT	H	0.10 0.08	CL	0.00	TOT	100.00
PCT	ASH	97.89 98.39	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	698.99	INT SYN GAS SCFH	23444.59
FUEL TEMP	494.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.452	FLASH GAS SCFH	262.46
STEAM TEMP, PRES.	690. 1206.	SOLIDS LBS/HR	202.50
O2/AIR RATE SCFH	6497.26	H2O,FORCED,LB/HR	135.12

RAW DATA

MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4E.2	11.00		

FUEL TYPE

SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	19.47	0.09	0.00	0.00	0.16	0.06
H2	8015.71	34.99	0.00	0.00	63.28	22.95
CO	12338.73	53.85	0.00	0.00	85.35	30.95
CO2	2305.16	10.06	0.00	0.00	106.39	38.58
N2	58.88	0.26	0.00	0.00	0.01	0.00
CH4	1.60	0.01	0.00	0.00	0.00	0.00
H2S	162.44	0.71	0.00	0.00	20.56	7.46
COS	9.85	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	100.00		0.00		100.00	
AVG MOL WT	20.59		0.00		28.68	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG LB/HR		43.57	C	64.96	O2	99.90
LH FINES LB/HR		156.64	H	3.90	A	0.10
SETTLER FINES LB/HR		3.58	N	1.13	H2	0.00
FINES ANAL	LH	SETTLER	S	2.84	CO	0.00
PCT C	2.01	1.53	ASH	27.01	CO2	0.00
PCT S	0.00	0.00	O	0.16	N2	0.00
PCT H	0.10	0.08	CL	0.00	TOT	100.00
PCT ASH	97.89	98.39	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	689.99	INT SYN GAS SCFH	22911.86
FUEL TEMP	496.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.458	FLASH GAS SCFH	275.77
STEAM TEMP, PRES.	741. 1274.	SOLIDS LBS/HR	203.81
O2/AIR RATE SCFH	6643.54	H2O,FORCED,LB/HR	145.42

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RAW DATA
MONTEBELLO COAL GASIFICATION GENERATOR

RUN NUMBER	RUN PERIOD HOURS	DATE	PAGE ONE
4F	22.80		

FUEL TYPE
SRC-II RESIDUE FROM POWHATAN COAL

DRY PRODUCT GAS STREAMS FROM COAL GASIFICATION

COMPONENTS	INTERNAL SYNGAS		EXTERNAL SYNGAS		FLASH GAS	
	SCFH	MOLPCT	SCFH	MOLPCT	SCFH	MOLPCT
C6H6	0.00	0.00	0.00	0.00	0.00	0.00
A	17.99	0.08	0.00	0.00	0.19	0.06
H2	8058.54	34.93	0.00	0.00	78.64	23.75
CO	12421.37	53.85	0.00	0.00	105.95	32.01
CO2	2249.12	9.75	0.00	0.00	120.14	36.29
N2	143.71	0.62	0.00	0.00	2.58	0.78
CH4	4.84	0.02	0.00	0.00	0.01	0.00
H2S	162.16	0.70	0.00	0.00	23.51	7.10
COS	10.14	0.04	0.00	0.00	0.00	0.00
NH3	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	99.99		0.00		100.00	
AVG MOL WT	20.55		0.00		28.08	

RECOVERED SOLIDS DATA			DRY FUEL ANALYSIS WTPCT		O2/AIR ANALYSIS MOLPCT	
LH SLAG	LB/HR	9.40	C	65.06	O2	99.90
LH FINES	LB/HR	155.48	H	3.82	A	0.10
SETTLER FINES	LB/HR	13.10	N	1.29	H2	0.00
FINES ANAL	LH	SETTLER	S	2.83	CO	0.00
PCT C	0.56	1.75	ASH	26.87	CO2	0.00
PCT S	0.00	0.00	O	0.13	N2	0.00
PCT H	0.07	0.09	CL	0.00	TOT	100.00
PCT ASH	99.37	98.16	TOT	100.00	AMWT	32.01

CHARGE DATA		PRODUCT DATA	
FUEL RATE LBS/HR	674.99	INT SYN GAS SCFH	23067.89
FUEL TEMP	495.00	EXT SYN GAS SCFH	0.00
STEAM/FUEL RATIO	0.461	FLASH GAS SCFH	331.06
STEAM TEMP, PRES.	706. 1233.	SOLIDS LBS/HR	177.99
O2/AIR RATE SCFH	6439.21	H2O,FORCED,LB/HR	123.86