

PART VII  
COAL PRETREATMENT IN 10-INCH PDU

7-u

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## 7.0. Summary of Coal Pretreatment in the 10-Inch PDU

The most reactive part of coal for producing methane is contained in the volatile matter of coal, a fact that favors the use of high-volatile coals to synthesize substitute natural gas (SNG) for pipeline use.

As a result of a literature review and batch pretreatment tests with air and nitrogen, both reported in IGT Research Bulletin No. 39,\* it was concluded that oxidation with air or diluted air was the most suitable method of destroying caking properties of bituminous coal with minimum loss of the valuable volatile matter.

A fluidized-bed unit was constructed and several tests were conducted at near-atmospheric pressure with Pittsburgh No. 8 seam high-volatile bituminous coal. Tests also were made with this coal at pressures up to 1055 psig utilizing a high-pressure reactor.

The objectives of the work reported here were:

- Development of a satisfactory, continuous, atmospheric-pressure fluidized-bed pretreatment unit and process,
- Establishment of minimum pretreatment conditions for the complete range of rank of bituminous coal, and
- Preparation of pretreated coal for the 4-inch-diameter hydrogasification process development unit.

The investigation continued over the period from October 1964 to July 1969. A total of about 72 reported runs were made on high-volatile bituminous coals, 2 on a medium-volatile bituminous coal and 6 on low-volatile bituminous coals. Toward the end of the investigation, conditions required for minimum pretreatment of coals ranging in rank from high-volatile C bituminous to low-volatile bituminous were determined.

Conditions necessary to destroy the agglomerating tendency of caking coals with minimal pretreatment using air or diluted air were established in an atmospheric-pressure fluidized-bed reactor. For high-volatile bituminous coals, which are commercially significant for SNG production, the successful pretreatment conditions were:

- 1) Temperature above 735°F,
- 2) Oxygen consumption of 1.0 to 2.5 standard cubic feet per pound of coal fed, and
- 3) Residence time exceeding 10 minutes.

The volatile matter in the coal was reduced from a range of 33 to 39% to a range of 24 to 26% before free-flowing char was produced which could be continuously fed to the hydrogasifier.

\* IGT Research Bulletin No. 39: Production of Pipeline Gas by Hydrogasification of Coal, Volume 1, 1954-1964, IGT and A. G. A., Chicago, December, 1972.

## 7.1 Introduction and Objectives

As a result of a literature review and batch pretreatment tests with air and nitrogen, both reported in IGT Research Bulletin No. 39<sup>1</sup>, it was concluded that oxidation with air or diluted air was the most suitable method of destroying caking properties of bituminous coal with minimum loss of the valuable volatile matter.

The most reactive part of coal for producing methane is contained in the volatile matter of coal, a fact that favors the use of high-volatile coals to synthesize substitute natural gas (SNG), for pipeline use. The volatile matter also is the first portion of the coal to be oxidized, however, when coal is pretreated with an oxidation technique. A strong incentive exists, therefore, to minimize the loss of volatile matter in any pretreatment technique employed in the hydrogasification of agglomerating bituminous coals. Minimizing the loss of volatile matter during pretreatment was, consequently, a major consideration during the HYGAS pretreatment development program.

Considering the above circumstances, and in order to dissipate the released heat during pretreatment and still maintain a uniform bed temperature without hot spots, a fluidized-bed reactor was considered mandatory.

A fluidized-bed unit was constructed and several tests were conducted at near-atmospheric pressure with Pittsburgh No. 8 seam high-volatile bituminous coal. Tests also were made with this coal at pressures up to 1055 psig utilizing a high-pressure reactor. Pretreatment at elevated pressure offers the possibility of performing both pretreatment and hydrogasification in the same vessel. Although high-pressure pretreatment appeared to be successful, the complexities of such a combination tend to outweigh the advantages. The objectives of the work reported here, therefore, were:

- Development of a satisfactory, continuous, atmospheric-pressure fluidized-bed pretreatment unit and process.
- Establishment of minimum pretreatment conditions for the complete range of rank of bituminous coal,
- Preparation of pretreated coal for the 4-inch-diameter hydrogasification process development unit (See Part II of this report).

The investigation continued over the period from October 1964 to July 1969. In the development of the process most of the work was devoted to a strongly caking coal from the Pittsburgh 8 seam of West Virginia, although a few runs were made with Ohio No. 6 and W. Va. No. 5 Block coals. Toward the end of the investigation, conditions required for minimum pretreatment of coals ranging in rank from high-volatile C bituminous to low-volatile bituminous were determined. Data were reported on run conditions, results, and compositions of feed and products for every run in which steady state was attained, although in many cases mechanical or other trouble caused shutdown ahead of schedule.

A total of about 59 reported runs were made on the above high-volatile A and B coals, 13 on two high-volatile C coals, 2 on a medium-volatile coal (Nicholas County Sewell seam) and 6 on two low-volatile coals (Fayette County Sewell and Pocahontas No. 4). Sources and ranks of these coals are presented in Table 7-1.

## 7.2 Apparatus

The 10-inch-diameter reactor described in Bulletin No. 39 was used throughout the program; however, a number of modifications of auxiliary equipment, as listed in Table 7-2, were incorporated during the course of the investigation. The final and most successful version of the apparatus is shown schematically in Figure 7-1.

The goal of the principal changes was to increase the capacity of the effluent gas cleaning system, while maintaining a low pressure-drop. A Schutte-Koerting venturi scrubber, operated at 55 psig inlet water pressure, produced a 12- to 14-in. water-column draft and facilitated reactor operation with air rates up to about 1300 SCF/hr.

## 7.3 Procedures

The coal was crushed in a hammer mill, dried, and then screened to retain the -16+80 USS mesh. About 500 lb of coal was charged to the hopper, which is connected at the bottom of the pretreater by a screw feeder. Nominal feed rates of 100 lb/hr could be attained. A 3-in.-diameter overflow pipe controlled the bed height. The length of the pipe could be changed to control residence time. The overflow was collected in a receiver and periodically dumped into storage drums.

Temperature was measured and recorded by thermocouples at several levels in the bed, and pressure taps at various points indicated the state of fluidization. Both gases and solids were sampled and analyzed.

In addition to chemical analyses, an agglomeration test was performed on the pretreated char before testing in the 4-in.-diameter hydrogasifier. This test is a modified version of that reported by Forney *et al.*<sup>2</sup> with the temperature of the test at 1400° F (760° C) rather than 1112° F (600° C). Details of the method and the basis to assign the residue from the agglomeration test to one of six categories ranging from free-flowing to fused is described in Appendix 7-A. It was found essential to produce either a free-flowing, or something between a free-flowing and very lightly-caked sample, in the agglomeration test, in order to ensure satisfactory fluidization in the 4-inch-diameter hydrogasifier.

## 7.4 Results

### 7.4.1 Temperatures of Pretreatment

Temperature was found to be a critical operating variable. With high-volatile A and B bituminous coals, a minimum temperature of 735°F was necessary for satisfactory pretreatment. The temperature minimum is evident from Figure 7-2, which shows how reactor temperature and coal residence time affect char quality. Data points of Figure 7-2 include:

- Nine tests on an Ohio No. 6 (hvBb) coal (Broken Aro Mine),

Table 7-1. COAL SOURCES AND RANKS

<u>Seam</u>	<u>Mine</u>	<u>County and State</u>	<u>Rank</u>
Pocahontas No. 4	Stotesbury No. 10	McDowell County, West Virginia	Low-volatile bituminous *
Sewell	Lochgelly No. 2	Fayette County, West Virginia	Low-volatile bituminous
Sewell	Sewell No. 1	Nicholas County, West Virginia	Medium-volatile bituminous †
Pittsburgh No. 8	Ireland	Marshall County, West Virginia	High-volatile A bituminous
W. Va. No. 5 Block (Lower Kitanning)	Kanawha	Randolph County, West Virginia	High-volatile A bituminous
Ohio No. 6	Broken Aro	Coshocton County, Ohio	High-volatile B bituminous
Indiana No. 6	Minnehaha	Sullivan County, Indiana	High-volatile C bituminous
Illinois No. 6	Crown	Montgomery County, Illinois	High-volatile C bituminous

\* As classified according to our proximate analyses; borders on medium volatile.

† As classified according to our proximate analyses; borders on high volatile.

NOTE: See Table 6a-4 and Figure 6a-1 for petrographic information.

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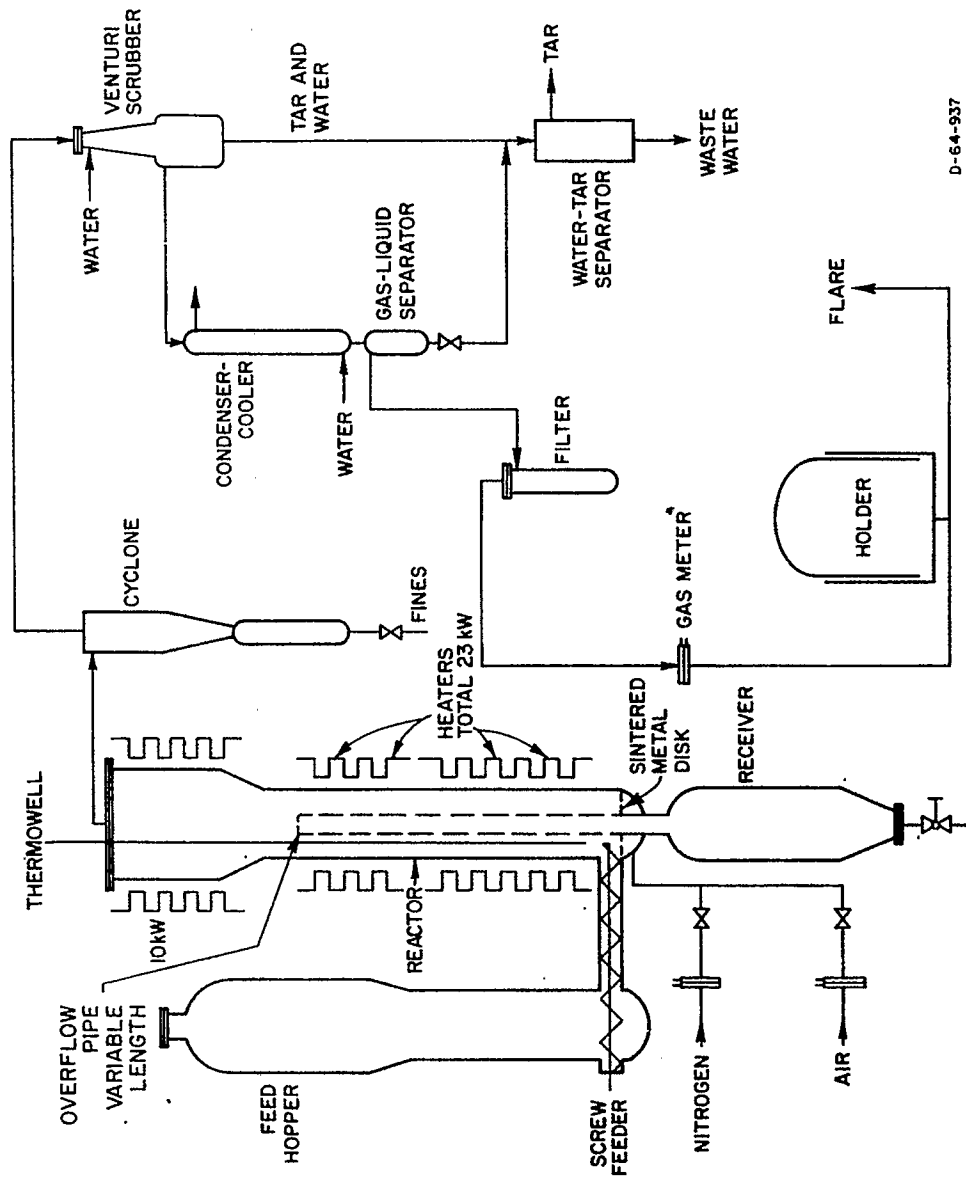


Table 7-2... MODIFICATIONS OF COAL PRETREATMENT APPARATUS

Modifications	Purpose	Approx. Date	Number of First Run After Change
Feed hopper enlarged	Increase feed capacity to 700 lb	11-64	FP-1
Venturi gas scrubber installed upstream of filters	Prevent fouling of gas meter by dust and tar	11-65	FP-45
Cyclone removed from the inside of reactor; reinstalled cyclone between reactor and knock-out drum	Prevent plugging of internal cyclone	2-66	FP-55
Water to venturi scrubber changed from recycle system to once-through system	Obtain cleaner product gas	5-66	FP-64
Second Cuno filter installed	Permit changing filter cartridge during run	5-66	FP-64
Volumetric gas meter replaced with orifice meter	Circumvent damage to gas meter by tar	6-66	FP-71
Cyclone temporarily removed	To determine effect of lessened pressure drop	6-66	FP-72A
Venturi scrubber was moved closer to the reactor and connected directly after the cyclone; the large knock-out drum was bypassed; pipe size from the reactor to the gas-liquid separator was increased to 2 in.; piping size downstream was increased to 1-1/2 in. Strip heaters on the reactor top were replaced with 10,000-W band heaters. Band heaters were installed on the product gas line.	Reduce pressure drop across gas cleanup system to improve fluidization; prevent plugging caused by tar condensation	8-66	FP-78A to FP-80
Cyclone replaced with new 2-in. inlet and outlet cyclone	Reduce pressure drop across cyclone	8-66	FP-82
Larger drain line installed on venturi scrubber	Increase nozzle pressure in venturi from 15 to 35 psig for better scrubbing and a greater induced draft to improve fluidization	9-66	FP-86
Air purge installed in feed hopper	Prevent bridging in feed hopper with moist coals	11-66	FP-95
Porous plate air distributor in reactor gasketed with lead plates	Prevent bypass leaks that cause poor gas distribution	12-66	FP-102D

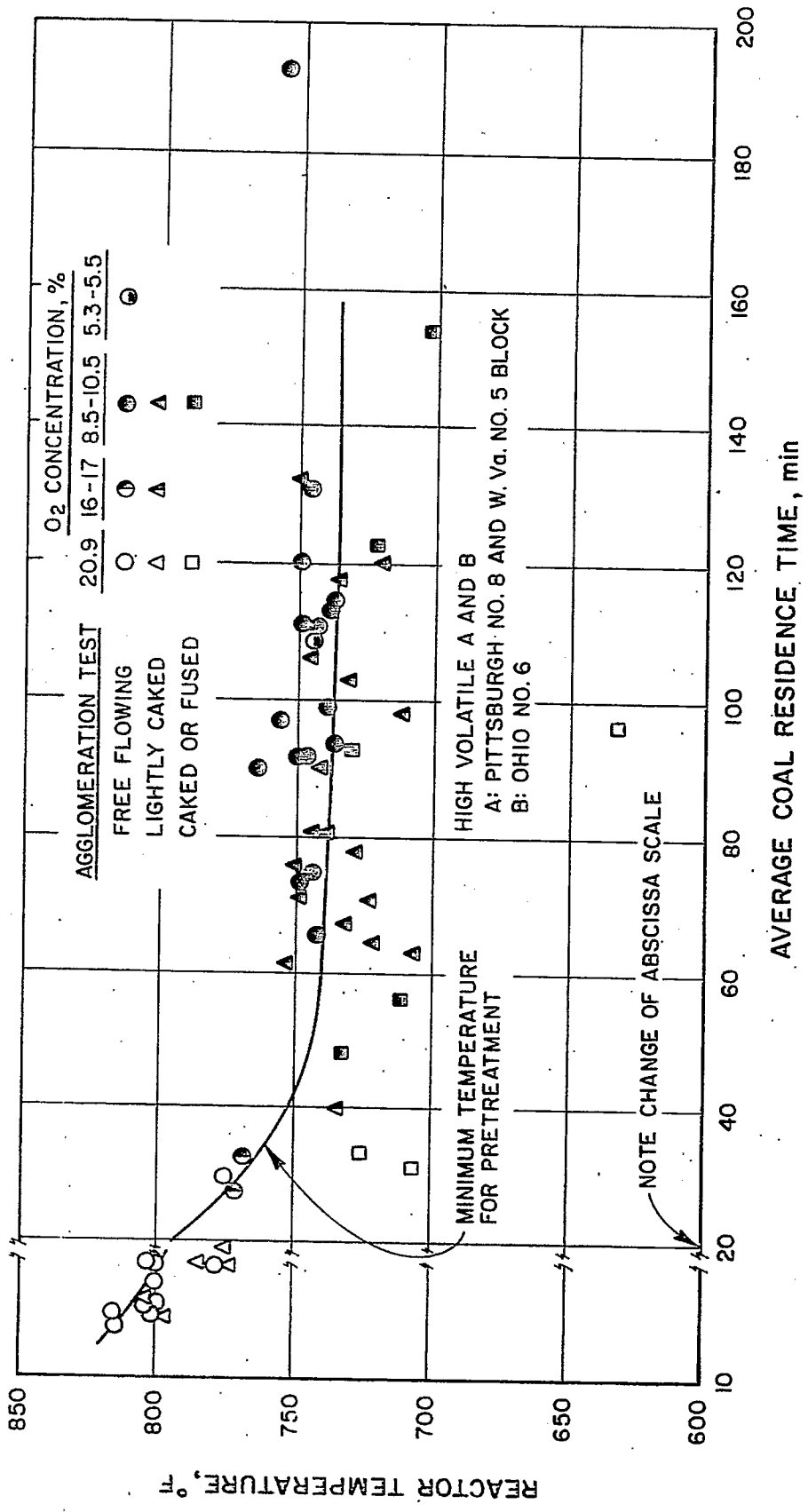
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NOTE: Figure 7-1 is a schematic diagram of the test apparatus incorporating the above modifications.



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Figure 7-1. COAL PRETREATMENT TEST APPARATUS EMPLOYED, INCORPORATING MODIFICATIONS DISCUSSED IN TABLE 7-2.



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Figure 7-2. MINIMUM PRETREATMENT TEMPERATURE PLOTTED FROM THE EXPERIMENTAL DATA SHOWN, RELATED TO THREE VARIABLES - OXYGEN CONCENTRATION, RESIDENCE TIME, AND REACTOR TEMPERATURE

- Four tests on a West Virginia No. 5 Block (hvAb) coal (Kanawha Mine), and,

- The remainder of points are from tests on the Pittsburgh No. 8 (hvAb) coal (Ireland Mine).

Below 735°F, even with coal residence times exceeding 2 hours and a wide range of oxygen concentrations, a free-flowing char could not be produced, even when the amount of oxygen reacted was as much or more than in successful tests at higher temperatures. The data of Figure 7-2 also show that, as the pretreatment temperature is increased above 735°F, the average coal residence time required for production of a free-flowing char decreased. These results indicate that two processes are involved in successful pretreatment:

1. Reaction with oxygen to form a non-caking skin on the particles, and
2. A temperature-dependent devolatilization of the interior of the particles.

If too low a temperature is used, devolatilization will be insufficient and high pressure will develop in the interior of the particles when they are rapidly heated to hydrogasification temperature. The internal pressure described breaks the oxidized pretreatment-skin and sticky, melted coal is exposed.

Conditions required to pretreat high-volatile C bituminous coal are depicted in Figure 7-3. For comparison, Figure 7-3 also presents the curve for the minimum pretreatment temperature of high-volatile A and B coals. Either a somewhat shorter residence time or a lower temperature is adequate to pretreat the lower-rank high-volatile C bituminous coal.

Conditions required to pretreat Fayette County Sewell seam coal (Lochgelly No. 2 Mine), which is a low-volatile bituminous coal bordering on medium-volatile, are depicted in Figure 7-4. A higher temperature of about 850°F is required for successful pretreatment of samples from the Sewell seam. In addition, the temperature was difficult to control during several runs with this Sewell seam coal because hot spots tended to develop. Furthermore, the coal showed a tendency for particle attrition.

Low-volatile bituminous Pocahontas No. 4 coal (Stotesbury No. 10 Mine) was pretreated in Runs FP-95A to FP-98. The pretreated coal was free-flowing in the agglomeration test, but caked in the hydrogasifier, in spite of pretreatment conditions as severe as 23 minutes at 855°F. The more rapid-rate of heating in the hydrogasifier, in comparison to the heating rate in the agglomeration test, is believed to have caused development of higher internal pressure in the particles and consequent discharge of fluid contents to the outside of the particle.

A rather wide gap in rank was noted between the highest rank high-volatile A bituminous coal (West Virginia No. 5 block, Kanawha Mine), and the Fayette County low-volatile Sewell seam coal (Lochgelly No. 2 Mine). Accordingly, a coal on the borderline between medium-volatile A and high-volatile bituminous

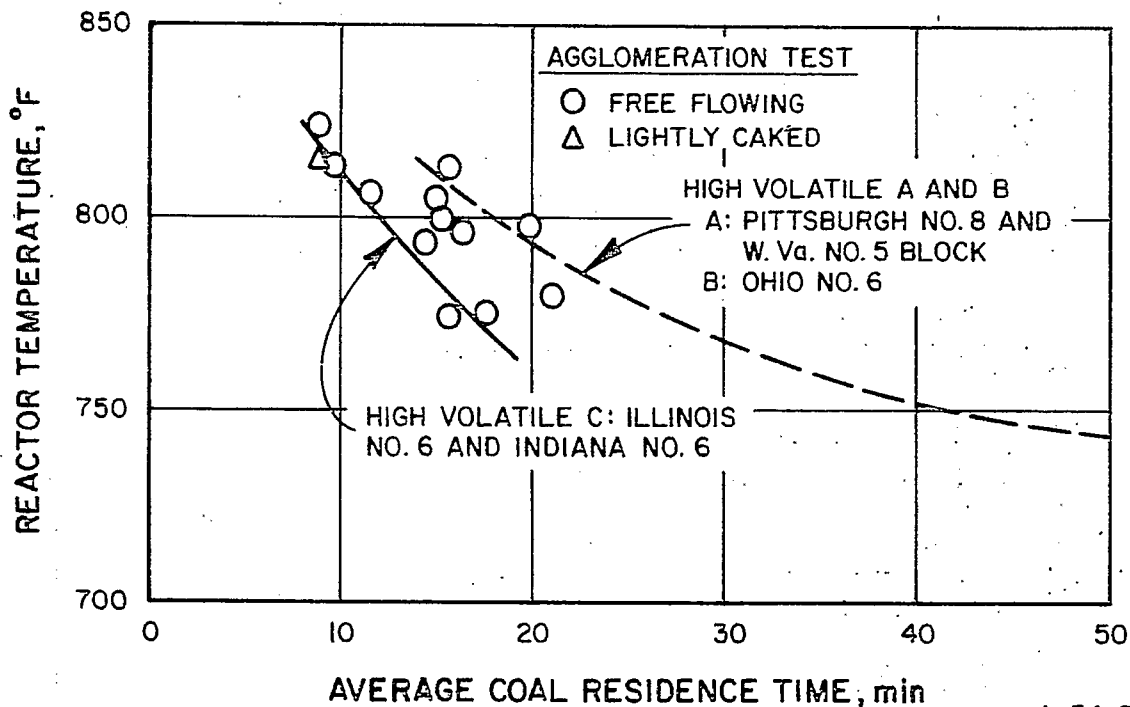


Figure 7-3. EXPERIMENTAL TESTS AND MINIMUM PRETREATMENT TEMPERATURE CURVE FOR HIGH VOLATILE C BITUMINOUS COALS, SHOWN WITH THE CURVE FOR HIGH VOLATILE A & B

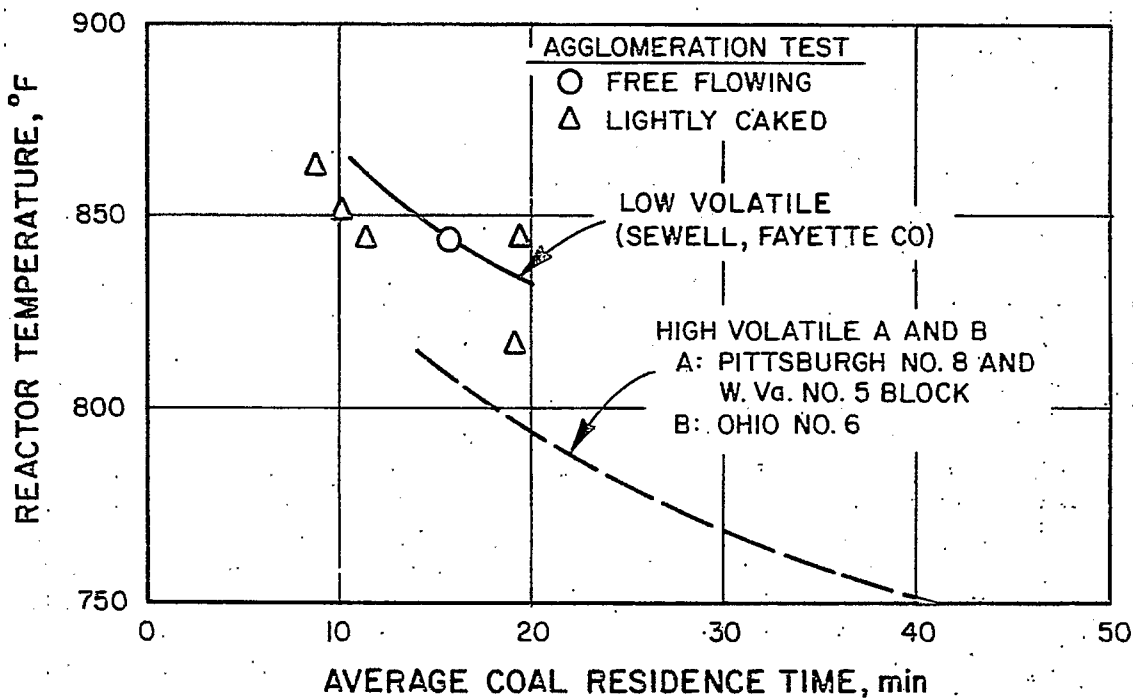


Figure 7-4. EXPERIMENTAL TESTS AND MINIMUM PRETREATMENT TEMPERATURE CURVE FOR LOW VOLATILE BITUMINOUS COAL, SHOWN WITH THE CURVE FOR HIGH VOLATILE A & B

(Sewell, Sewell No. 1 Mine, Nicholas County, West Virginia) was tested in two pretreatment runs. The product from Run FP-139, made with a reactor temperature of 781°F and coal residence time of 18 minutes, caked in the agglomeration test and was used as feed for the second run. The second run, identified as FP-140, was conducted at an average temperature of 849°F and a coal residence time of 12 minutes. The product of the latter run was free-flowing and was successfully hydrogasified. Only slightly longer than 12 minutes residence time probably would be required for successful pretreatment in a single run at 849°F.

Two-stage pretreatment was investigated in three series of runs with high-volatile A Pittsburgh No. 8 seam (Ireland Mine) bituminous coal. The two-stage pretreatment test series included Runs FP-41 and FP-42 followed by FP-43; FP-59 followed by FP-60; and FP-65 and FP-66 followed by FP-67. Details of the runs are presented in Appendix 7-B. Adequate pretreatment required just as much reduction of volatile matter as in single-stage treatment, and no advantage was detected.

#### 7.4.2 Extent of Oxidation

Because pretreatment is an oxidation process the extent of oxidation — in addition to temperature — is important in controlling pretreatment. The oxidation rate is rapid and conditions must be carefully selected and maintained for smooth operation. Poor pretreatment gas distribution, channeling through the coal bed, improper coal particle size distribution for good fluidization, and excessive solids short circuiting through the reactor all led to hot spots from localized combustion, poor system operation and an unacceptable char product.

The effect of oxygen concentrations of from 2 to 21% by volume in the pretreatment gas was investigated with high volatile A and B bituminous coals. Most of the tests were run either with a 50-50 air-nitrogen mixture as the pretreatment gas (10% O<sub>2</sub>), or with air (21% O<sub>2</sub>). In both cases, the amount of oxygen reacted influenced the success of pretreatment more significantly than did the oxygen concentration; however, the minimum pretreatment temperature was necessary for any success.

Free-flowing or very lightly-caked char could be produced at any oxygen concentration from 4 to 21%, provided the reactor temperature was maintained above about 735°F and the amount of oxygen reacted was sufficient. A resume of some of the runs on these coals (Table 7-3) shows the range of reacted oxygen that resulted in satisfactory pretreatment. The amount of oxygen reacted was as little as about one standard cubic foot per lb. of coal at temperatures from 735° to 750°F, and as little as about 1.5 standard cubic feet of oxygen per pound of coal at the higher temperatures. A residence time of an hour or more, required in runs in an environment of from 4 to 10% of oxygen at 735° to 750°F, was reduced to between 9 and 30 minutes in runs with air at from 770° to 820°F.

Oxygen breakthrough, attributed to gas bubbles in the fluidized bed, amounted to about 10% of the total oxygen fed during runs with 4 to 10% oxygen concentration, and increased to about 27% in runs with air.

Table 7-3. RESUME OF DATA FROM CERTAIN SELECTED RUNS  
IN THE EVALUATION OF HIGH-VOLATILE A AND B COALS

Run No.	Coal <sup>†</sup>	O <sub>2</sub> Concn	Solids Residence Time, min	O <sub>2</sub> Reacted, SCF/lb	Reactor Temp, °F	Agglomeration Test Result <sup>‡</sup>
FP-23	IM	9.6	89.9	1.52	764	FF
FP-28	IM	9.75	111.3	2.71	744	FF
FP-34	BA	5.48	115.0	1.11	737	FF
FP-34A	BA	5.26	109.2	0.88	744	FF
FP-37	IM	9.59	75.3	1.06	744	FF
FP-39	BA	9.28	98.3	1.09	739	FF
FP-46	IM	9.69	65.9	1.08	743	FF
FP-53	IM	9.96	94.4	1.27	736	FF
FP-59 & 60*	IM	5.3-4.6	149	1.00	737-746	FF
FP-66 & 67*	IM	3.8-4.3	138	1.07	738-740	FF
FP-71A	IM	19.22	19.2	1.45	767	VLC
FP-74	IM	16.19	33.3	2.32	769	FF
FP-82C	IM	20.9	14.7	1.80	816	FF
FP-83	IM	20.9	13.8	1.54	815	VLC
FP-87	BA	20.9	18.1	1.58	778	VLC
FP-90	5B	20.9	18.5	2.03	803	FF
FP-93A	5B	20.9	14.7	1.53	802	VLC

\* Two-stage runs.

† IM, Ireland mine (Pittsburgh No. 8 seam); BA, Broken Aro (Ohio No. 6 seam);  
5B, Kanawha mine (West Virginia No. 5 Block seam).

‡ FF, free flowing; VLC, very lightly caked.

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### 7.4.3 Properties of Pretreated Char

Test data show that chars of successfully pretreated high-volatile A and high-volatile B bituminous coals contained 24 to 26% volatile matter. The various feed coals originally contained from 33 to 39% volatile matter. The results stated were independent of the coal source, the nature of the pretreatment gas (50-50 air-nitrogen mixture or all air), and staging (single- or two-stage pretreatment).

The medium-volatile bituminous and low-volatile bituminous coals were reduced in volatiles from about 19 to 15%, and from about 16 to 14%, respectively, during pretreatment conversion to a free-flowing char.

Table 7-4 compares typical proximate analyses of the feed coal and product char of the various coals successfully pretreated during the program. The operating conditions and results, and the chemical analyses of coal feed, char product and product gas from the tests appear in Appendix 7-B.

Bulk densities of the pretreated coal from the successful runs averaged 45, 59 and 91% for high, medium, and low volatile coals respectively.

### 7.4.4 Supporting Studies

Very few differences were evident in processing characteristics among the high-volatile bituminous coals. Data obtained indicate that the pretreatment yield increases only slightly with the rank of vitrinite. Variation of yield with vitrinite reflectance is shown in Table 7-5, where the coals are listed in order of increasing rank.

Yields were calculated by two methods for runs from which the char was either free-flowing or only very lightly caked in the laboratory agglomeration test. In one method, the yield of moisture- and ash-free coal was calculated from the measured total char yield and the feed and product analyses. (Runs in which the material balance recovery was less than 85 or greater than 100% were excluded.) In the other method, the yield was calculated from the proximate analyses of feed and product, with the assumption that the amount of fixed carbon did not change. A similar calculation based on ash content is often used, but is distrusted here because of the tendency for dense, high-ash particles to accumulate in the fluidized pretreatment bed.

The yields from the second method are consistently less than those from the first method, but both show a trend of slightly increasing yield with increasing rank. The yield also depends, however, on maceral composition because the yield from inertinite is expected to be greater than that from vitrinite, while that from exinite is expected to be much less. The two higher rank coals have, on the average, more of both exinite and inertinite than the two lower rank coals. Thus, it is problematical whether the 2 to 3% higher average yield of the two higher rank coals can be attributed entirely to the higher ranks of their vitrinites.

Sulfur removed from the coal in pretreating was calculated from the sulfur content of the feed and product for a few runs; the amount removed ranged from 20 to 40 weight percent of sulfur in feed.



Table 7-4. PROXIMATE ANALYSES OF VARIOUS COALS TESTED IN  
10-INCH-DIAMETER PRETREATER

Coal Source	Pittsburgh No. 8 Seam		Ohio No. 6 Seam		Illinois No. 6 Seam	
	FP-28 Feed	FP-28 Product	FP-33 Feed	FP-33 Product	FP-99 Feed	FP-99 Product
Moisture	2.0	0.3	3.7	0.3	13.3	0.4
Volatile matter	33.6	25.1	38.8	24.6	33.0	24.0
Fixed carbon	48.3	62.0	51.8	68.6	44.9	64.5
Ash	16.1	12.6	5.7	6.5	8.8	11.1
Totals	100.0	100.0	100.0	100.0	100.0	100.0

Coal Source	Indiana No. 6 Seam		West Virginia No. 5 Block		West Virginia Sewell Seam		West Virginia Pocahontas No. 4 Seam	
	FP-110A Feed	FP-110A Product	FP-92 Feed	FP-92 Product	FP-114 Feed	FP-114 Product	FP-97 Feed	FP-97 Product
Moisture	7.5	0.3	0.8	0.4	2.2	0.3	1.6	0.4
Volatile matter	34.3	23.7	35.9	23.9	18.7	15.3	15.8	13.8
Fixed carbon	50.1	66.6	56.4	68.6	75.7	80.6	76.9	79.8
Ash	8.1	9.4	6.9	7.1	3.4	3.8	5.7	6.3
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Table 7-5. YIELDS FROM PRETREATMENT OF HIGH-VOLATILE BITUMINOUS COALS

Coal	Reflectance, % <sup>a</sup>	Maceral Content, vol % <sup>b</sup>		Number of Pretreatment Runs	Yield of Pretreated Coal, % MAF	
		Exinite	Inertinite		From Pilot Plant Data <sup>c</sup>	From Proximate Analysis <sup>d</sup>
Illinois No. 6	0.45	3	11	7	82.65	78.8
Indiana No. 6	0.48	4	6	6	80.0	80.8
Ohio No. 6	0.53	6	14	2	83.4	78.8
Pittsburgh No. 8	0.68	3	13	6	89.4	82.9
W. Va. No. 5 Block	0.81	10	21	3	84.7	82.1

a. Mean maximum reflectance of vitrinite in oil

b. Including semifusinite

c. Two runs on Illinois coal and two runs on Pittsburgh seam coal were excluded because of poor material balances

d. Fixed carbon assumed to remain unchanged

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## 7.5 Conclusion

The conditions necessary to destroy the agglomerating tendency of caking coals with minimal pretreatment, using air or diluted air, were established in an atmospheric-pressure fluidized-bed reactor. Coals ranging in rank from high-volatile C bituminous to low-volatile bituminous were tested. For high-volatile coals, which are commercially significant for SNG production, the successful pretreatment conditions were 1) temperatures above 735°F, 2) oxygen consumption of 1.0 to 2.5 standard cubic feet per pound of coal fed, and 3) residence time exceeding 10 minutes. The volatile matter in the coal was reduced from a range of 33 to 39% to a range of 24 to 26% before free-flowing char was produced which could be continuously fed to the hydrogasifier.

## 7.6 References Cited

1. Pyrcioch, E. J., et al., "Production of Pipeline Gas by Hydrogasification of Coal," IGT Research Bulletin No. 39, Chicago 1972.
2. Forney, A. J., et al., "Recent Catalyst Development in the Hot-Gas-Recycle Process," Report No. 66-99, U.S. Department of Interior, Bureau of Mines, Washington, D.C. 1965.

APPENDIX 7-A

IGT Test for Agglomeration Tendency  
of Hydrogasification Feed

7-A

## 7-A.1 Apparatus

Tube Furnace 12 inches long. A reasonably constant temperature of 1400°F is required; a furnace made from two Fieldner heating elements is used at IGT.

Silica Tube (vycor or vitreous). 3/4 of an inch inside diameter, and 30 inches long.

Sample Boats made of stainless steel wire screen as shown below.

Purification Train to handle effluent from the tube, which should be discharged to a hood or purified by passing it through bubblers containing reagents for removing tarry products. Perchloroethylene followed by concentrated sulfuric acid is satisfactory.

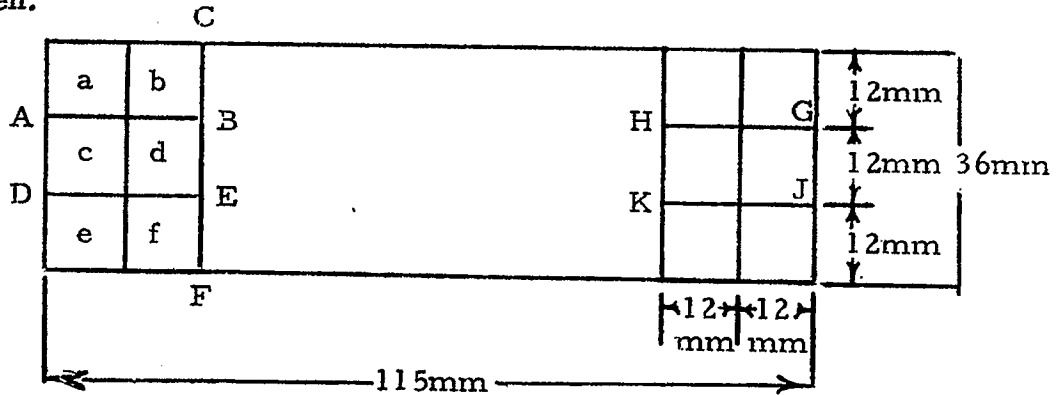
## 7-A.2 Procedure

Position the furnace on the outlet end of the tube and bring its temperature up to 1400°F. Fill the sample boat and place it in the cool inlet end of the tube. Pass nitrogen through the tube at a rate of about 100 milliliters per minute for 10 to 15 minutes, then switch to hydrogen at about the same rate. Move the furnace (or alternatively, the tube) up to cover half the sample boat. After 10 minutes, center the furnace over the boat. After an additional 50 minutes, move the furnace to its original position, and switch the gas flow from hydrogen to nitrogen. After 10-15 minutes for purging and cooling, remove the sample boat and observe the condition of the residue and characterize its agglomerating property as one of the following:

- |                     |  |
|---------------------|--|
| Free-flowing:       | The residue contains no agglomerates and thus flows easily on tilting the boat.  |
| Very Lightly Caked: | Agglomerates that break easily under slight pressure or when the residue is tumbled make up less than 25 percent of the residue. The residue as a whole, except for particles touching the container, is free flowing. |
| Lightly Caked:      | About half of the sample in the boat consists of moderate sized agglomerates that do not break up easily under pressure.   |
| Partially Caked:    | More than 75 percent, but less than all of the sample consists of moderate or large sized agglomerates that do not disintegrate under pressure.  |
| Caked:              | The residue is coherent, hard, either swollen or unswollen but the individual particles are discretely visible.  |
| Fused:              | The residue in the boat is a fused, swollen, shiny and hard homogenous mass, without any discernible particles.  |

7-A.3 Fabrication of Sample Boat

Cut a 115 X 36 millimeter rectangular piece of 140-mesh 316 stainless steel screen.



Cut AB, DE, GH, and JK. Fold up the upper one third with a crease at BH. Similarly fold up the lower one third. Fold up cd. Fold ab and ef over, one inside and the other outside, to make a box end. Fold c over both to lock all together. (Variations of this fabrication are also suitable).

APPENDIX 7-B

Pretreatment Test Data and Analysis  
From the 10-Inch PDU

7-Bu

Table 7-B1, Part 1. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-4A	FP-5	FP-6
Coal Feed Source	Montour 4	Montour 4	Montour 4
Sieve Size, USS	10/40	10/40	10/40
Pretreatment Gas	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	2	2-1/2	2-3/4
Steady-State Operating Period, min	30-120	67-201	107-169
OPERATING CONDITIONS			
Standpipe			
OD, in.	3	3	3
Height, ft	3	3	3
Bed Inventory, lb	48.59	38.79	57.99
Reactor Pressure, psig	1.50	1.25	4.80
Bed Temperature, °F			
Bottom	780	687	464
1/2 ft	--	760	655
1 ft	--	734	632
1-1/2 ft	--	760	663
2 ft	419	765	632
2-1/2 ft	--	790	692
3 ft	522	--	--
Average	574	733	623
Coal Rate (dry), lb/hr	86.8	49.1	98.6
Air Rate, SCF/hr	234.9	171.6	173.8
Nitrogen Rate, SCF/hr	707.6	683.6	674.0
Oxygen Concentration, mole %	5.2	4.2	4.3
Nitrogen Purge Rate, SCF/hr	3.9	3.0	3.1
Air/Coal Feed Ratio, SCF/lb	2.707	3.497	1.762
Air/Coal Bed Ratio, SCF/hr-lb	4.834	4.424	2.997
Coal Bed Pressure Differential, in. Hg	1.95	1.72	1.91
Coal Space Velocity, lb/cu ft-hr	74.46	32.40	66.29
Coal Residence Time, min	26.3	47.4	35.3
Pretreatment Gas Residence Time, min	0.0527	0.0476	0.0658
Superficial Pretreatment Gas Velocity, ft/sec	0.949	1.050	0.760
OPERATING RESULTS			
Product Gas Rate, SCF/hr	923.6	850.0	825.3
Residue Char (dry), wt % dry coal	89.7	97.5	102.4
Knockout Drum Residue, wt % dry coal	--	0.1	0.2
Condenser and Filter Residue, wt % dry coal	--	0.2	0.4
Total Residue Char, wt % dry coal	89.7	97.8	103.0
Water and Other Condensates, wt % dry coal	--	--	--
Overall Material Balance, %	--	98.6	100.8
Carbon Balance, % *	--	93.7	99.3
O <sub>2</sub> Reacted, SCF/lb coal fed	--	0.08	0.11
O <sub>2</sub> Reacted, % of O <sub>2</sub> fed	--	10.43	30.00
PRODUCT GAS PROPERTIES			
Gas Composition, mole %			
Nitrogen	No	95.9	96.6
Carbon Dioxide	Gas	0.10	0.12
Oxygen	Samples	3.8	3.1
Argon		0.20	0.21
Total		100.00	100.03
Heating Value, Btu/SCF <sup>†</sup>		0.0	0.0
Nitrogen, and Argon-Free Heating Value, Btu/SCF		0.0	0.0
Specific Gravity, Air = 1.00		0.978	0.978
Laboratory Agglomeration Test of Residue Evaluation			
1350°F	--	Fused	--
1700°F	Fused	Fused	Fused

\* Carbon in liquids not included

<sup>†</sup> Gross, gas saturated at 60°F, 30 in. Hg pressure.  
SCF-dry gas volume in SCF at 60°F, 30 in. Hg pressure.

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Table 7-B1, Part 2. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-7	FP-8	FP-9	FP-10
Coal Feed Source	Montour No. 4	Montour No. 4	Ireland Mine	Ireland Mine
Sieve Size, USS	10/40	-10	-10	-10
Pretreatment Gas	Nitrogen + Air	Air	Air	Air
Purge Gas	Nitrogen	Air	Air	Air
Duration of Test, hr	2	2-1/2	2	2-1/4
Steady-State Operating Period, min	40-113	99-159	51-123	--
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	3	3	3	5
Bed Inventory, lb	58.90	37.49	47.41	56.34
Reactor Pressure, psig	1.50	3.40	1.25	7.25
Bed Temperature, °F				
Bottom	656	833	239	700
1/2 ft	777	560	239	700
1 ft	773	510	246	--
1-1/2 ft	777	844	266	700
2 ft	773	--	370	705
2-1/2 ft	781	643	462	705
5 ft	--	--	--	--
Average	756	678	304	702
Coal Rate (dry), lb/hr	131.4	86.4	71.2	49.6
Air Rate, SCF/hr	167.9	833.6	598.8	602.8
Nitrogen Rate, SCF/hr	632.5	--	--	--
Oxygen Concentration, mole %	4.4	21.0	21.0	21.0
Nitrogen Purge Rate, SCF/hr	3.0	--	--	--
Air/Coal Feed Ratio, SCF/lb	1.278	9.64	8.41	12.15
Air/Coal Bed Ratio, SCF/hr-lb	2.851	22.24	12.63	10.70
Coal Bed Pressure Differential, in. Hg	1.88	1.84	1.80	2.28
Coal Space Velocity, lb/cu ft-hr	88.31	58.10	47.86	20.84
Coal Residence Time, min	26.9	26.0	40.0	68.2
Pretreatment Gas Residence Time, min	0.0570	0.0585	0.1086	0.1565
Superficial Pretreatment Gas Velocity, ft/sec	0.878	0.852	0.460	0.511
OPERATING RESULTS				
Product Gas Rate, SCF/hr	771.2	952.8	606.0	601.2
Residue Char (dry), wt % dry coal	96.0	92.5	88.8	76.8
Knockout Drum Residue, wt % dry coal	0.3	0.1	0.6	5.8
Condenser and Filter Residue, wt % dry coal	0.6	0.5	0.8	2.1
Total Residue Char, wt % dry coal	96.9	93.1	90.2	84.7
Water and Other Condensates, wt % dry coal	--	--	--	2.1 (Liquid) 1.8 (Tar)
Overall Material Balance, %	96.6	100.7	96.8	94.8 <sup>c</sup>
Carbon Balance, % <sup>a</sup>	100.0	93.1	90.2	85.8 <sup>d</sup>
O <sub>2</sub> Reacted SCF/lb Coal Fed	0.19	0.43	0.34	--
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	69.37	21.00	19.03	--
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				No Gas Samples
Nitrogen	94.0	84.1	79.5	
Carbon Monoxide	0.9	--	1.5	
Carbon Dioxide	0.9	0.7	1.3	
Oxygen	1.4	14.5	16.8	
Hydrogen	1.9	--	--	
Argon	0.89	0.74	0.93	
Total	99.99	100.04	100.03	
Heating Value, Btu/SCF <sup>b</sup>	8.9	0.0	4.7	
Nitrogen and Argon-Free Heating Value, Btu/SCF	17.4	0.0	24.2	
Specific Gravity, Air = 1.00	0.965	0.997	1.005	
Laboratory Agglomeration Test of Residue Evaluation				
1350°F	--	Fused	Fused	Partially Caked
1700°F	Fused	Fused	--	--

<sup>a</sup> Carbon in liquids not included

<sup>b</sup> Gross, gas saturated at 60°F, 30 in. Hg pressure. SCF - dry gas volume in SCF at 60°F, 30 in. Hg pressure

<sup>c</sup> Feed and product gases not included

<sup>d</sup> Carbon in liquids, tar and product gas not included

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**Table 7-B1, Part 3. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU**

Run No.	FP-11	FP-12	FP-13	FP-14	FP-15
Coal Feed Source	Ireland Mine	Ireland Mine	Ireland Mine	Ireland Mine	Ireland Mine
Sieve Size, USS	-10	-10	-10	-10	-10
Pretreatment Gas	Air	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air
Purge Gas	Air	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	4-1/4	6	3	4	4-1/2
Steady-State Operating Period, min	201-264	230-366	68-183	219-237	86-258
<b>OPERATING CONDITIONS</b>					
Standpipe					
OD, in.	3	3	3	3	3
Height, ft	5	5	5	5	5
Bed Inventory, lb	43.27	91.79	73.80	64.8	77.0
Reactor Pressure, psig	1.15	4.19	1.60	2.20	1.20
Bed Temperature, °F					
Bottom	734	433	525	--	703
1/2 ft	734	441	528	654	703
1 ft	765	441	531	661	703
1-1/2 ft	765	438	532	661	703
2 ft	775	444	545	666	704
2-1/2 ft	773	444	545	658	704
5 ft (4 ft Run FP-14 and FP-15)	812	--	--	698	730
Average	765	440	534	666	707
Coal Rate (dry), lb/hr	48.8	72.3	73.4	75.8	73.5
Air Rate, SCF/hr	603.3	60.2	63.6	275.8	274.8
Nitrogen Rate, SCF/hr	--	553.1	537.9	314.7	277.3
Oxygen Concentration, mole %	21.0	2.1	2.2	9.8	10.5
Nitrogen Purge Rate, SCF/hr	--	2.9	2.7	--	--
Air/Coal Feed Ratio, SCF/lb	12.38	0.833	0.866	3.637	3.738
Air/Coal Bed Ratio, SCF/hr-lb	13.94	0.656	0.862	4.256	3.537
Coal Bed Pressure Differential, in Hg	2.04	3.04	2.90	2.50	2.39
Coal Space Velocity, lb/cu ft-hr	20.48	30.40	30.84	31.86	29.65
Coal Residence Time, min	53.25	76.12	60.33	51.27	63.41
Pretreatment Gas Residence Time, min	0.1062	0.1718	0.1348	0.127	0.126
Superficial Pretreatment Gas Velocity, ft/sec	0.753	0.466	0.593	0.631	0.661
<b>OPERATING RESULTS</b>					
Product Gas Rate, SCF/hr	595.9	654.3	610.6	560.9	521.5
Residue Char (dry), wt % dry coal	87.34	92.08	83.89	89.44	95.60
Knockout Drum Residue, wt % dry coal	0.97	4.24	5.65	5.06	1.00
Condenser and Filter Residue, wt % dry coal	0.65	1.19	1.73	1.16	0.88
Total Residue Char, wt % dry coal	88.96	97.51	91.27	95.66	97.48
Water and Other Condensates, wt % dry coal	2.27	0.04	0.11	0.21	2.01
Overall Material Balance, %	95.4	101.2	94.2	95.4	97.9
Carbon Balance, %	95.9	102.2	91.7	91.4	103.9
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.62	0.17	0.17	0.60	0.77
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	62.42	94.86	90.66	78.66	98.22
<b>PRODUCT GAS PROPERTIES</b>					
Gas Composition, mole %					
Nitrogen	82.6	98.6	98.6	93.9	95.1
Carbon Monoxide	2.6	0.4	0.3	1.0	1.3
Carbon Dioxide	4.8	0.4	0.6	2.4	2.5
Oxygen	8.0	0.1	0.2	2.2	0.2
Hydrogen	--	--	0.2	--	0.1
Argon	0.99	0.15	0.12	0.48	0.40
Methane	0.2	0.1	--	--	--
Ethane	0.2	0.1	--	--	--
Propane	0.4	0.2	--	--	0.40
Butane	0.2	--	--	--	--
Total	99.99	100.05	100.02	99.98	100.00
Heating Value, Btu/SCF*	29.9	9.1	1.6	3.16	14.5
Nitrogen, and Argon-Free Heating Value, Btu/SCF	182.2	726	124	70.2	322.2
Specific Gravity, Air = 1.00	1.017	0.978	0.974	0.990	0.989
Laboratory Agglomeration Test of Residue Evaluation, 1400 °F	Caked	Fused	Fused	Fused	Very Lightly Caked

\* Gross, gas saturated at 60 °F, 30 in. hg pressure. SCF - dry gas volume in SCF at 60 °F, 30 in. Hg pressure.

Table 7-B1, Part 4. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-16	FP-17	FP-18
Coal Feed Source	Ireland Mine	Ireland Mine	Ireland Mine
Sieve Size, USS	-10	-10	-10
Pretreatment Gas	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	6	2-1/2	6-1/2
Steady State Operating Period, min	130-360	60-150	223-385
OPERATING CONDITIONS			
Standpipe			
OD, in.	3	3	3
Height, ft	5	5	5
Bed Inventory, lb	77.0	98.5	101.0
Reactor Pressure, psig	6.12	2.85	3.39
Bed Temperature, °F			
Bottom	650	622	581
1/2 ft	652	626	583
1 ft	653	626	582
1-1/2 ft	655	627	601
2 ft	653	626	579
2-1/2 ft	653	626	589
4 ft	684	652	606
Average	658	629	587
Coal Rate (dry), lb/hr	72.83	88.60	72.63
Air Rate, SCF/hr	136.60	73.98	79.08
Nitrogen Rate, SCF/hr	430.05	506.06	487.42
Oxygen Concentration, mole %	5.06	2.68	2.93
Nitrogen Purge Rate, SCF/hr	2.5	2.75	2.6
Air/Coal Feed Ratio, SCF/lb	1.875	0.835	1.089
Air/Coal Bed Ratio, SCF/hr-lb	1.400	0.751	0.783
Coal Bed Pressure Differential, in. Hg	2.87	2.73	3.11
Coal Space Velocity, lb/cu ft-hr	29.37	35.73	29.29
Coal Residence Time, min	80.32	66.67	83.40
Pretreatment Gas Residence Time, min	0.170	0.142	0.159
Superficial Pretreatment Gas Velocity, ft/sec	0.489	0.587	0.525
OPERATING RESULTS			
Product Gas Rate, SCF/hr	561.2	670.4	641.7
Residue Char (dry), wt % dry coal	94.06	83.54	89.09
Knockout Drum Residue, wt % dry coal	0.92	0.10	1.04
Condenser and Filter Residue, wt % dry coal	0.89	1.02	1.20
Total Residue Char, wt % dry coal	95.87	84.66	91.33
Water and Other Condensates, wt % dry coal	0.27	0.17	0.17
Overall Material Balance, %	97.01	93.20	98.20
Carbon Balance, %*	98.93	85.70	92.20
O <sub>2</sub> Reacted, SCF/lb coal fed	0.39	0.18	0.23
O <sub>2</sub> Reacted, % of O <sub>2</sub> fed	100.00	100.00	100.00
PRODUCT GAS PROPERTIES			
Gas Composition, mole %			
Nitrogen	97.2	98.3	98.4
Carbon Monoxide	0.6	0.5	0.5
Carbon Dioxide	1.1	0.6	0.8
Oxygen	0.1	--	--
Hydrogen	--	0.1	--
Argon	0.25	0.10	0.12
Methane	0.2	--	--
Ethane	0.1	--	--
Propane	0.4	0.4	0.2
Total	99.95	100.00	100.02
Heating Value, Btu/SCF†	15.76	9.17	6.32
Nitrogen- and Argon-Free Heating Value, Btu/SCF	631	573	446
Specific Gravity (Air = 1.00)	0.980	0.978	0.980
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Fused	Fused	Free Flowing

\* Carbon in liquids not included

† Gross, gas saturated at 60°F, 30 in. Hg pressure. SCF - gas volume in SCF at 60°F, 30 in. Hg pressure.

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Table 7-B1, Part 5. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-19	FP-20
Coal Feed Source	Ireland Mine	Ireland Mine
Sieve Size, USS	-10	-10
Pretreatment Gas	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen
Duration of Test, hr	5-1/2	4-1/2
Steady State Operating Period, min	65-312	38-240
OPERATING CONDITIONS		
Standpipe		
OD, in.	3	3
Height, ft	5	5
Bed Inventory, lb	52.5	85.5
Reactor Pressure, psig	2.08	5.34
Bed Temperature, °F		
Bottom	699	642
1/2 ft	700	645
1 ft	701	646
1-1/2 ft	722	658
2 ft	698	643
2-1/2 ft	702	647
4 ft	717	663
Average	706	649
Coal Rate (dry), lb/hr	68.49	69.09
Air Rate, SCF/hr	255.8	279.5
Nitrogen Rate, SCF/hr	298.1	302.4
Oxygen Concentration, mole %	9.70	10.09
Nitrogen Purge Rate, SCF/hr	2.98	2.97
Air/Coal Feed Ratio, SCF/lb	3.73	4.04
Air/Coal Bed Ratio, SCF/hr-lb	4.87	3.27
Coal Bed Pressure Differential, in. Hg	1.87	2.37
Coal Space Velocity, lb/cu ft-hr	27.62	27.85
Coal Residence time, min	46.00	74.25
Pretreatment Gas Residence Time, min	0.142	0.160
Superficial Pretreatment Gas Velocity, ft/sec	0.586	0.520
Coal Space Velocity, lb/cu ft-hr	27.6	27.8
OPERATING RESULTS		
Product Gas Rate, SCF/hr	616.6	547.4
Residue Char (dry), wt % dry coal	87.33	97.67
Knockout Drum Residue, wt % dry coal	3.89	2.72
Condenser and Filter Residue, wt % dry coal	2.38	2.00
Total Residue Char, wt % dry coal	93.60	102.39
Water and Other Condensates, wt % dry coal	1.36	1.41
Overall Material Balance, %	100.6	100.4
Carbon Balance, %*	95.3	102.9
O <sub>2</sub> Reacted, SCF/lb coal fed	0.78	0.85
O <sub>2</sub> Reacted, % O <sub>2</sub> fed	100.00	100.00
PRODUCT GAS PROPERTIES		
Gas Composition, mole %		
Nitrogen	95.0	95.1
Carbon Monoxide	1.3	1.1
Carbon Dioxide	2.4	2.4
Oxygen	0.4	0.6
Hydrogen	--	--
Argon	0.41	0.45
Methane	0.2	--
Ethane	--	--
Propane	0.3	0.3
Total	100.01	99.95
Heating Value, Btu/SCF <sup>†</sup>	13.7	11.1
Nitrogen and Argon-Free Heating Value, Btu/SCF	298.2	248.6
Specific Gravity (Air = 1.00)	0.988	1.005
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	--	Lightly Caked

\* Carbon in liquids not included

<sup>†</sup> Gross, gas saturated at 60°F, 30 in. Hg pressure. SCF/hr -- dry gas volume at 60°F, 30 in. Hg pressure.

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Table 7-B1, Part 6. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-22
Coal Feed Source	Ireland Mine
Sieve Size, USS	10/40
Pretreatment Gas	Nitrogen + Air
Purge Gas	Nitrogen
Duration of Test, hr	8-3/4
Steady State Operating Period, min	30-487

OPERATING CONDITIONS

Standpipe	
OD, in.	3
Height, ft	5
Bed Inventory, lb	60.0
Reactor Pressure, psig	5.86
Bed Temperature, °F	
Bottom	742
1/2 ft	742
1 ft	742
1-1/2 ft	742
2 ft	744
2-1/2 ft	744
4 ft	756
Average	745
Coal Rate (dry), lb/hr	33.76
Air Rate, SCF/hr	293.96
Nitrogen Rate, SCF/hr	313.79
Oxygen Concentration, mole %	10.16
Nitrogen Purge Rate, SCF/hr	3.0
Air/Coal Feed Ratio, SCF/lb	8.71
Air/Coal Bed Ratio, SCF/hr-lb	4.90
Coal Bed Pressure Differential, in. Hg	1.80
Coal Space Velocity, lb/cu ft-hr	13.61
Coal Residence Time, min	106.64
Superficial Pretreatment Gas Velocity, ft/sec	0.573
Pretreatment Gas Residence Time, min	0.146

OPERATING RESULTS

Product Gas Rate, SCF/hr	572.99
Residue Char (dry), wt % dry coal	89.9
Knockout Drum Residue, wt % dry coal	3.3
Condenser and Filter Residue, wt % dry coal	0.7
Total Residue Char, wt % dry coal	93.9
Water and Other Condensates, wt % dry coal	5.1
Overall Material Balance, %	94.9
Carbon Balance, %*	98.24
Carbon in Product Gas, wt % carbon fed	3.82
O <sub>2</sub> Reacted SCF/lb coal fed	1.62
O <sub>2</sub> Reacted, % of O <sub>2</sub> fed	88.60

PRODUCT GAS PROPERTIES

Gas Composition, mole %	
Nitrogen	92.9
Carbon Monoxide	1.6
Carbon Dioxide	3.2
Oxygen	1.2
Hydrogen	0.1
Argon	0.47
Methane	0.1
Ethane	0.1
Propane	0.3
Total	99.97
Heating Value, Btu/SCF <sup>†</sup>	15.7
Nitrogen, and Argon-Free Heating Value, Btu/SCF	237
Specific Gravity, Air = 1.00	0.992
Laboratory Agglomeration Test of Residue Evaluation, 1400°F	Lightly Caked

\* Carbon in liquid not included

† Gross gas saturated at 60°F, 30 in. Hg pressure. SCF - dry gas volume in SCF at 60°F, 30 in. Hg pressure

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Table 7-B1, Part 7. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-23	FP-24	FP-25	FP-26
Coal Feed Source	Ireland Mine			
Sieve Size, USS	10/40	10/40	10/40	10/40
Pretreatment Gas	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	3-1/2	3	4-1/4	9-1/2
Steady-State Operating Period, min	30-168	54-174	24-248	285-557
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	5	5	5	5
Bed Inventory, lb	52.77	65.00	68.00	54.25
Reactor Pressure, psig	5.08	6.99	2.27	4.24
Bed Temperature, °F				
Bottom	760	c	743	703
1/2 ft	761	728	746	728
1 ft	763	730	748	731
1-1/2 ft	763	730	748	731
2 ft	764	736	749	734
2-1/2 ft	764	736	749	734
3 ft	773	765	757	753
Average	764	738	749	731
Coal Rate (dry), lb/hr	35.20	34.28	36.64	31.38
Air Rate, SCF/hr	272.4	365.2	355.9	425.1
Nitrogen Rate, SCF/hr	324.3	464.7	404.7	561.5
Oxygen Concentration, mole %	9.6	9.2	9.8	9.1
Nitrogen Purge Rate, SCF/hr	2.9	2.9	2.6	2.0
Air/Coal Feed Ratio, SCF/lb	7.74	10.65	9.71	13.55
Air/Coal Bed Ratio, SCF/lb-hr	5.16	5.62	5.23	7.84
Coal Bed Pressure Differential, in. Hg	2.54	3.73	2.69	4.37
Coal Space Velocity, lb/cu ft-hr	14.19	13.82	14.77	12.65
Coal Residence Time, min	89.9	113.8	111.4	103.7
Pretreatment Gas Residence Time, min	0.140	0.113	0.098	0.086
Superficial Pretreatment Gas Velocity, ft/sec	0.594	0.736	0.847	0.969
OPERATING RESULTS				
Product Gas Rate, SCF/hr	562.7	760.4	740.8	957.3
Residue Char (dry), wt % dry coal	78.4	88.3	89.3	87.9
Knockout Drum Residue, wt % dry coal	3.1	1.0	0.9	4.8
Condensator and Filter Residue, wt % dry coal	0.2	0	0.3	1.1
Total Residue Char, wt % dry coal	81.7	89.3	90.5	93.8
Water and Other Condensates, wt % dry coal	2.5	1.9	2.9	0.3
Overall Material Balance, %	89.4	90.7	95.6	97.0
Carbon Balance, % <sup>a</sup>	87.9	90.8	91.0	91.0
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.52	2.23	2.03	2.08
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	93.69	100.00	100.00	73.32
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen	89.5	96.1	95.5	94.0
Carbon Monoxide	2.5	1.3	1.2	0
Carbon Dioxide	5.3	0.6	2.2	2.6
Oxygen	0.6	0	0	2.5
Hydrogen	0.7	0.5	0.1	0
Argon	0.42	0.45	0.45	0.37
Methane	0.5	0.6	0.3	0.2
Ethane	0.1	0.2	0.1	0.1
Propane	0.3 <sup>d</sup>	0.3	0.2	0.2
Total	99.92	100.05	100.05	99.97
Heating Value, Btu/SCF <sup>b</sup>	24.5	22.8	13.9	8.9
Nitrogen and Argon-Free Heating Value, Btu/SCF	242.7	651.1	339.5	158.8
Specific Gravity, Air = 1.00	0.997	0.972	0.985	0.991
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Free-Flowing	Free-Flowing	Free-Flowing	Lightly Caked

a Carbon in liquids not included

b Gross gas saturated at 60°F, 30 in. Hg pressure. SCF/hr - dry gas volume at 60°F, 30 in. Hg pressure

c Not averaged

d Plus 0.1% COS

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Table 7-B1, Part 8. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-27	FP-28	FP-29	FP-30
Coal Feed Source	Ireland Mine			
Sieve Size, USS	10/40	-20	16/80	16/80
Pretreatment Gas	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	8-1/2	9	8-3/4	3-3/4
Steady-State Operating Period, min	141-453	78-492	36-480	30-165
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	5	7	7	7
Bed Inventory, lb	62.25	63.0	55.0	62.8
Reactor Pressure, psig	1.95	1.39	1.28	0.38
Bed Temperature, °F				
Bottom	665	735	745	738
1/2 ft	721	741	752	750
1 ft	722	745	755	755
1-1/2 ft	723	745	757	758
2 ft	725	747	760	761
4 ft <sup>a</sup>	726	747	760	762
4 ft <sup>b</sup>	751	751	763	765
6 ft	719	744	756	756
Average				
Coal Rate (dry) lb/hr	30.98	33.97	34.12	19.46
Air Rate, SCF/hr	537.1	295.8	287.9	287.7
Nitrogen Rate, SCF/hr	787.5	341.4	321.4	310.3
Oxygen Concentration, mole %	8.51	9.75	9.92	10.10
Nitrogen Purge Rate, SCF/hr	2.28	3.08	2.97	3.00
Air/Coal Feed Ratio, SCF/lb	17.34	8.71	8.44	14.79
Air/Coal Bed Ratio, SCF/lb-hr	8.63	4.69	5.23	4.58
Coal Bed Pressure Differential, in. Hg	2.54	0.79	2.63	5.19
Coal Space Velocity, lb/cu ft-hr	12.49	9.78	9.83	5.60
Coal Residence Time, min	120.6	111.3	96.7	193.7
Pretreatment Gas Residence Time, min	0.056	0.153	0.156	0.151
Superficial Pretreatment Gas Velocity, ft/sec	1.50	0.763	0.748	0.775
OPERATING RESULTS				
Product Gas Rate, SCF/hr	1198.7	645.6	631.4	563.4
Residue Char (dry), wt % dry coal	89.05	81.85	86.23	84.96
Knockout Drum Residue, wt % dry coal	1.23	6.60	2.31	3.20
Condenser and Filter Residue, wt % dry coal	0.32	0.55	0	1.60
Total Residue Char, wt % dry coal	90.60	89.00	88.54	89.76
Water and Other Condensates, wt % dry coal	1.17	5.73	5.93	4.06
Overall Material Balance, %	91.2	98.4	99.8	94.1
Carbon Balance, %	102.5	96.3	93.4	93.4
O <sub>2</sub> Reacted, SCF/lb Coal Fed	2.63	1.82	1.77	3.10
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	72.38	100.00	100.00	100.00
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen	93.2	94.3	94.1	94.5
Carbon Monoxide	1.3	1.3	1.4	1.4
Carbon Dioxide	2.0	3.4	3.6	2.60
Oxygen	2.4	--	--	--
Hydrogen	0.2	--	--	0.2
Argon	0.43	0.43	0.43	0.48
Methane	0.2	--	--	0.5
Ethane	0.1	0.1	--	0.1
Propane	0.2	0.5	0.5	0.2
Total	100.03	100.03	100.03	99.98
Heating Value, Btu/SCF <sup>d</sup>	13.56	18.42	17.07	16.86
Nitrogen and Argon-Free Heating Value, Btu/SCF	211.81	349.5	310.4	337.3
Specific Gravity (Air = 1.00)	0.9867	0.9953	0.9968	0.9853
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Lightly Caked	Free-Flowing	Free-Flowing	Free-Flowing

a Temperature at 2-1/2 ft level during Run FP-27

b Temperature at 4-ft level during Run FP-27

c Carbon in liquids not included

d Gross - gas saturated at 60°F, 30 in. Hg pressure. SCF/hr - dry gas volume in SCF at 60°F, 30 in. Hg pressure

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Table 7-B1, Part 9: PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-31	FP-32	FP-33
Feed Source	Ireland Mine	Broken Arc	Mine
Sieve Size, USS	16/80		
Pretreatment Gas	Air + Nitrogen		
Purge Gas	Nitrogen		
Duration of Test, hr	17-3/4	4-1/2	5
Steady-State Operating Period, min	42-886	60-258	25-300
OPERATING CONDITIONS			
Standpipe			
OD, in.	3	3	3
Height, ft	7	7	7
Bed Inventory, lb	69.0	72.7	56.5
Reactor Pressure, psig	1.65	0.59	1.35
Bed Temperature, °F			
Bottom	748	696	745
1/2 ft	749	697	746
1 ft	749	699	748
1-1/2 ft	749	700	749
2 ft	751	704	750
4 ft	751	702	751
6 ft	751	713	752
Average	750	702	749
Coal Rate (dry), lb/hr	18.18	28.37	28.16
Air Rate, SCF/hr	276.2	293.7	306.0
Nitrogen Rate, SCF/hr	308.2	295.0	324.4
Oxygen Concentration, mole %	9.93	10.48	10.19
Nitrogen Purge Rate, SCF/hr	3.00	2.88	2.95
Air/Coal Feed Ratio, SCF/lb	15.19	10.35	10.87
Air/Coal Bed Ratio, SCF/lb-hr	4.00	4.04	5.42
Coal Bed Pressure Differential, in. Hg	4.08	2.66	3.33
Coal Space Velocity, lb/cu ft-hr	5.24	8.17	8.11
Coal Residence Time, min	227.7	153.8	120.4
Pretreatment Gas Residence Time, min	0.169	0.161	0.153
Superficial Pretreatment Gas Velocity, ft/sec	0.692	0.722	0.764
OPERATING RESULTS			
Product Gas Rate, SCF/hr	577.2	593.4	596.0
Residue Char (dry), wt % dry coal	85.50	88.68	88.62
Knockout Drum Residue, wt % dry coal	1.74	0.85	1.53
Condenser and Filter Residue, wt % dry coal	0	0	0
Total Residue Char, wt % dry coal	87.24	89.53	90.15
Water and Other Condensates, wt % dry coal	5.24	3.73	8.26
Overall Material Balance, %	97.77	100.80	95.90
Carbon Balance, %*	89.21	96.01	95.91
O <sub>2</sub> Reacted, SCF/lb Coal Fed	2.71	2.17	2.10
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	85.25	100.00	100.00
PRODUCT GAS PROPERTIES			
Gas Composition, mole %			
Nitrogen	92.1	93.1	93.3
Carbon Monoxide	1.4	1.5	1.3
Carbon Dioxide	4.0	4.3	3.3
Oxygen	1.5	--	0.8
Hydrogen	--	--	--
Argon	0.46	0.40	0.48
Methane	0.1	0.4	0.4
Ethane	0.1	0.1	0.1
Butane	0.3	0.2	0.3
Total	99.96	100.00	99.98
Heating Value, Btu/SCF†	14.77	15.54	17.41
Nitrogen and Argon-Free Heating Value, Btu/SCF	199.5	239.1	281.3
Specific Gravity (Air = 1.00)	0.9989	0.9969	0.9931
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Free-Flowing	Caked	Free-Flowing

\* Carbon in liquids not included

† Gross - gas saturated at 60°F, 30 in. pressure. SCF/hr - dry gas volume in SCF at 60°F, 30 in. pressure

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Table 7-B1, Part 10. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-34	FP-34A	FP-35C	FP-36
Feed Source	16/80	Broken Aro Mine	Bituminous Coal	16/80
Sieve Size, USS	16/80	16/80	16/80	16/80
Pretreatment Gas	Air + Nitrogen	Air + Nitrogen	Air	Air + Nitrogen
Purge Gas			Nitrogen	
Duration of Test, hr	2-1/4	4-1/4	6	4-3/4
Steady-State Operating Period, min	30-120	25-235	153-360	144-285
<b>OPERATING CONDITIONS</b>				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Bed Inventory, lb	57.25	56.88*	109.25	59.50
Reactor Pressure, psig	0.82	1.24	1.62	2.01
Bed Temperature, °F				
Bottom	729	736	646	723
1/2 ft	732	738	646	723
1 ft	733	742	646	723
1-1/2 ft	735	744	646	723
2 ft	740	746	594	693
4 ft	740	748	615	705
6 ft	752	756	648	765
Average	737	744	634	722
Coal Feed Rate (dry), lb/hr	29.87	31.24	56.29	55.38
Air Rate, SCF/hr	147.9	147.7	574.0	276.3
Nitrogen Rate, SCF/hr	442.6	442.3	0	319.8
Oxygen Concentration, mole %	5.48	5.26	21.0	9.73
Nitrogen Purge Rate, SCF/hr	2.87	3.00	2.72	3.00
Air/Coal Feed Ratio, SCF/lb	4.95	4.73	10.20	4.99
Air/Coal Bed Ratio, SCF/lb-hr	2.58	2.60*	5.25	4.64
Coal Bed Pressure Differential, in. Hg	3.67	3.02	3.43	3.61
Coal Space Velocity, lb/cu ft-hr	8.60	9.00	16.21	15.95
Coal Residence Time, min	115.0	109.2*	116.5	64.46
Pretreatment Gas Residence Time, min	0.159	0.163	0.188	0.171
Superficial Pretreatment Gas Velocity, ft/sec	0.734	0.717	0.622	0.682
<b>OPERATING RESULTS</b>				
Product Gas Rate, SCF/hr	588.1	598.4	571.8	644.0
Residue Char (dry), wt % dry coal	85.10	85.20	94.55	84.26
Knockout Drum Residue, wt % dry coal	2.42	2.12	0.15	0.62
Condenser and Filter Residue, wt % dry coal	0	0.41	0	0
Total Residue Char, wt % dry coal	87.52	87.73	94.70	84.88
Water and Other Condensates, wt % dry coal	3.27	5.79	6.26	7.35
Overall Material Balance, %	94.75	97.28	98.67	97.82
Carbon Balance, %*	86.22	91.25	95.76	87.97
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.11	0.88	0.72	0.94
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	100.00	88.62	33.65	90.00
<b>PRODUCT GAS PROPERTIES</b>				
Gas Composition, mole %				
Nitrogen	95.4	95.0	80.9	92.5
Carbon Monoxide	0.7	0.7	0.9	1.1
Carbon Dioxide	2.2	1.6	2.7	3.1
Oxygen	0	0.6	14.4	1.0
Hydrogen	0	0.1	0	0.1
Argon	0.23	0.26	0.95	0.47
Methane	0.9	0.7	0.1	0.9
Ethane	0.2	0.2	0	0.3
Butane	0.4	0.8	0.1	0.2
Total	100.03	99.96	100.05	99.97
Heating Value, Btu/SCF †	24.82	33.26	6.37	25.21
Nitrogen and Argon Free Heating Value, Btu/SCF	564.1	707.6	35.0	360.2
Specific Gravity (Air = 1.00)	0.9840	0.9832	1.011	0.9892
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Free-Flowing	Free-Flowing	Caked	Lightly Caked

\* Carbon in liquids not included

† Gross - gas saturated at 60°F, 30 in. pressure. SCF/hr - dry gas volume in SCF at 60°F, 30 in. pressure

\* Bed inventory taken as average of two previous runs due to solids carryover to knockout pot

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Table 7-B1, Part 11. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-37	FP-38	FP-39	FP-40
Feed Source	Ireland Mine	Broken Aro Mine		
Sieve Size, USS	16/80			
Pretreatment Gas	Air + Nitrogen			
Purge Gas	Nitrogen			
Duration of Test, hr	11	5-1/2	8	5-1/2
Steady-State Operating Period, min	156-656	78-330	190-400	79-318
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Pressure, psig	1.80	3.30	1.68	1.63
Bed Temperature, °F				
Bottom	742	721	737	713
1/2 ft	743	723	739	715
1 ft	744	723	740	715
1-1/2 ft	744	725	741	715
2 ft	744	726	741	716
4 ft	748	729	746	705
6 ft	740	716	728	698
Average	744	723	739	711
Coal Rate (dry), lb/hr	43.0	58.3	46.7	41.7
Air Rate, SCF/hr	276.2	285.1	293.1	253.8
Nitrogen Rate, SCF/hr	328.4	323.7	370.1	329.0
Oxygen Concentration, mole %	9.59	9.83	9.28	9.14
Nitrogen Purge Rate, SCF/hr	2.90	2.96	3.02	3.00
Air/Coal Feed Ratio, SCF/lb	6.42	4.89	6.27	6.09
Air/Coal Bed Ratio, SCF/lb-hr	5.11	4.14	3.83	3.63
Coal Bed Pressure Differential, in. Hg	3.05	3.56	3.60	7.84
Coal Space Velocity, lb/cu ft-hr	12.39	16.80	13.46	12.00
Coal Residence Time, min	75.3	70.9	98.3	98.4
Bed Inventory, lb	54.0	68.9	76.5	70.0
Pretreatment Gas Residence Time, min	0.165	0.181	0.150	0.173
Superficial Pretreatment Gas Velocity, ft/sec	0.709	0.643	0.780	0.673
OPERATING RESULTS				
Product Gas Rate, SCF/hr	603.4	608.2	653.6	583.4
Residue Char (dry), wt % dry coal	86.31	84.81	86.39	80.65
Knockout Drum Residue, wt % dry coal	1.72	2.54	2.65	7.21
Condenser and Filter Residue, wt % dry coal	0	0	0	0
Total Residue Char, wt % dry coal	88.03	87.35	89.04	87.86
Water and Other Condensates, wt % dry coal	5.52	7.58	7.14	6.27
Overall Material Balance, %	97.60	96.29	97.49	96.27
Carbon Balance, %*	86.36	92.95	92.31	90.23
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.06	0.94	1.09	1.10
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	78.67	92.12	83.05	86.21
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen	92.6	92.9	92.1	93.5
Carbon Monoxide	1.0	1.0	1.1	1.0
Oxygen	2.1	0.8	1.6	1.3
Carbon Dioxide	2.6	3.2	3.3	2.7
Hydrogen	0.1	0.2	0.1	0.1
Argon	0.48	0.46	0.43	0.44
Methane	0.6	0.7	0.7	0.5
Ethane	0.1	0.2	0.2	0.1
Butane	0.4	0.4	0.5	0.3
Total	99.98	99.86†	100.03	99.94‡
Heating Value, Btu/SCF	21.34	25.04	26.94	17.81
Nitrogen and Argon-Free Heating Value, Btu/SCF	309.2	379.5	420.9	292.0
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Free-Flowing	Lightly Caked	Free-Flowing	Lightly Caked
Specific Gravity (Air = 1.000)	0.9898	0.9901	0.9936	0.9886

\* Carbon in liquids not included  
† 0.1% H<sub>2</sub>S  
‡ 0.1% COS

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Table 7-B1, Part 12. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-41	FP-42	FP-43	FP-44
Feed Source	Ireland Mine		FP-42 Char	Ireland Mine
Sieve Size, USS	16/80			
Pretreatment Gas	Air + Nitrogen			
Purge Gas	Nitrogen			
Duration of Test, hr	3	6-1/2	6-1/2	5-3/4
Steady-State Operating Period, min	18-132	70-370	30-390	24-330
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Pressure, psig	1.24	1.40	1.50	1.40
Bed Temperature, °F				
Bottom	731	710	742	751
1/2 ft	735	711	743	755
1 ft	738	715	743	757
1-1/2 ft	738	717	744	757
2 ft	739	716	747	757
4 ft	744	708	749	752
6 ft	710	706	727	710
Average	733	712	742	753
Coal Rate (dry), lb/hr	64.80	65.39	36.50	48.70
Air Rate, SCF/hr	266.80	267.1	277.8	273.0
Nitrogen Rate, SCF/hr	334.8	322.1	330.0	326.7
Oxygen Concentration, mole %	9.31	9.52	9.60	9.56
Nitrogen Purge Rate, SCF/hr	3.00	3.04	3.00	2.99
Air/Coal Feed Ratio, SCF/lb	4.12	4.09	7.61	5.61
Air/Coal Bed Ratio, SCF/lb-hr	5.14	4.34	4.89	4.98
Coal Bed Pressure Differential, in. Hg	2.96	5.06	4.44	3.10
Coal Space Velocity, lb/cu ft-hr	18.66	18.83	10.51	14.03
Coal Residence Time, min	48.1	56.5	93.4	67.5
Bed Inventory, lb	51.90	61.50	56.76	54.80
Pretreatment Gas Residence Time, min	0.142	0.169	0.161	0.163
Superficial Pretreatment Gas Velocity, ft/sec	0.821	0.690	0.727	0.718
OPERATING RESULTS				
Product Gas Rate, SCF/hr	594.2	599.5	611.7	600.5
Residue Char (dry), wt % dry coal	72.35	89.19	93.21	80.04
Knockout Drum Residue, wt % dry coal	15.69	0.60	0.65	1.08
Condenser and Filter Residue, wt % dry coal	2.86	0	0	0
Total Residue Char, wt % dry coal	90.90	89.79	93.86	87.12
Water and Other Condensates, wt % dry coal	3.78	3.73	2.92	5.59
Overall Material Balance, %	94.73	97.03	99.53	95.81
Carbon Balance, %	96.99*	94.63	97.73	86.48
O <sub>2</sub> Reacted, SCF/lb Coal Fed	0.86	0.77	1.24	1.17
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	100.00	89.55	77.60	100.00
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen		90.8	92.3	94.31
Carbon Monoxide		1.1	1.2	1.05
Oxygen		1.0	2.2	--
Carbon Dioxide		5.0	3.2	2.73
Hydrogen		0.4	--	--
Argon		0.45	0.43	0.40
Methane		0.6	0.4	0.84
Ethane		0.1	0.1	0.21
Butane		0.5	0.2	0.42
Total	†	99.95	100.03	99.96
Heating Value, Btu/SCF	--	25.64	14.60	26.01
Nitrogen and Argon-Free Heating Value, Btu/SCF	--	294.7	200.0	495.4
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Caked	Caked	Free Flowing	Lightly Caked
Specific Gravity (Air = 1.000)	--	0.9992	0.9941	0.9873

\* Carbon in product gas not included  
† Not analyzed; contaminated sample

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Table 7-B1, Part 13. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-45	FP-46	FP-47	FP-48
Feed Source		Ireland Mine		No. 5 Block, W. Va.
Sieve Size, USS	16/80	16/80	-1/4 in.	16/80
Pretreatment Gas		Air + Nitrogen		
Purge Gas		Nitrogen		
Duration of Test, hr	6-3/4	7-1/2	5-3/4	5
Steady-State Operating Period, min	30-218	10-450	30-345	60-294
<b>OPERATING CONDITIONS</b>				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Pressure, psig	2.85	1.62	2.56	2.33
Bed Temperature, °F				
Bottom	732	739	736	733
1/2 ft	732	739	736	733
1 ft	725	742	740	737
1-1/2 ft	726	744	740	737
2 ft	728	747	745	741
4 ft	727	747	746	739
6 ft	728	741	742	744
Average	728	743	741	738
Coal Rate (dry), lb/hr	49.60	48.26	48.00	50.70
Air Rate, SCF/hr	264.9	275.2	418.1	173.6
Nitrogen Rate, SCF/hr	345.7	321.2	559.9	445.4
Oxygen Concentration, mole %	9.12	9.69	8.98	5.89
Nitrogen Pure Rate, SCF/hr	3.05	3.00	2.96	3.06
Bed Inventory, lb	64.50	53.00	72.45	68.50
Air/Coal Feed Ratio, SCF/lb	5.34	5.70	8.71	3.42
Air/Coal Bed Ratio, SCF/lb-hr	4.11	5.19	5.77	2.53
Coal Bed Pressure Differential, in. Hg	2.85	2.75	3.68	3.70
Coal Space Velocity, lb/cu ft-hr	14.30	13.90	13.82	14.60
Coal Residence Time, min	78.0	65.9	90.6	81.1
Pretreatment Gas Residence Time, min	0.164	0.166	0.107	0.167
Superficial Pretreatment Gas Velocity, ft/sec	0.713	0.704	1.094	0.699
<b>OPERATING RESULTS</b>				
Product Gas Rate, SCF/hr	619.6	585.0	957.3	607.1
Residue Char (dry), wt % dry coal	91.94	77.19	84.09	86.37
Knockout Drum Residue, wt % dry coal	1.32	1.39	3.47	2.93
Condenser and Filter Residue, wt % dry coal	0	0	0.02	0
Total Residue Char, wt % dry coal	93.26	78.58	87.58	89.30
Water and Other Condensates, wt % dry coal	4.85	6.25	4.02	4.96
Overall Material Balance, %	99.33	98.66	95.37	95.84
Carbon Balance, %	96.28	90.30	91.35	92.84
O <sub>2</sub> Reacted, SCF/lb Coal Fed	0.94	1.08	1.35	0.65
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	84.06	90.04	73.88	89.96
<b>PRODUCT GAS PROPERTIES</b>				
Gas Composition, mole %				
Nitrogen	93.7	93.4	93.0	95.5
Carbon Monoxide	1.0	1.0	1.0	0.7
Oxygen	1.5	1.0	2.4	0.6
Carbon Dioxide	2.3	2.7	2.4	1.6
Hydrogen	0.1	0.1	--	0.1
Argon	0.43	0.43	0.43	0.27
Methane	0.5	0.7	0.4	0.6
Ethane	0.1	0.2	0.1	0.1
Butane	0.4	0.5	0.3	0.5
Total	100.03	100.03	100.03	99.97
Heating Value, Btu/SCF	20.34	26.62	16.49	22.92
Nitrogen and Argon-Free Heating Value, Btu/SCF	344.7	429.3	249.9	545.6
Laboratory Agglomeration Test of Evaluation at 1400°F				
Special Gravity (Air = 1.000)	Lightly Caked 0.9880	Free Flowing 0.9894	Lightly Caked 0.9905	Partially Caked 0.9819

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**Table 7-B1, Part 14. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU**

Run No.	FP-49	FP-50	FP-51	FP-52
Feed Source	No. 5 Block, West Virginia		Ireland Mine	
Sieve Size, USS		16/80		
Pretreatment Gas		Air + Nitrogen		
Purge Gas		Nitrogen		
Duration of Test, hr	5	7	12	8-1/4
Steady-State Operating Period, min	18-300	18-408	25-720	30-490
<b>OPERATING CONDITIONS</b>				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Pressure, psig	1.86	1.89	1.65	1.46
Bed Temperature, °F				
Bottom	750	742	732	719
1/2 ft	750	754	750	734
1 ft	754	753	748	730
1-1/2 ft	754	762	754	735
2 ft	756	759	750	732
4 ft	746	764	756	738
6 ft	740	747	720	725
Average	750	754	744	730
Coal Rate (dry), lb/hr	51.00	45.37	39.82	41.39
Air Rate, SCF/hr	281.3	288.2	271.1	273.5
Nitrogen Rate, SCF/hr	321.2	357.9	307.7	321.8
Oxygen Concentration, mole %	9.80	9.37	9.83	9.65
Nitrogen Purge Rate, SCF/hr	2.97	2.89	3.00	3.00
Bed Inventory, lb	64.61	47.75	53.75	64.00
Air/Coal Feed Ratio, SCF/lb	5.51	6.35	6.81	6.61
Air/Coal Bed Ratio, SCF/lb-hr	4.35	6.04	5.04	4.27
Coal Bed Pressure Differential, in. Hg	3.54	3.49	2.76	3.74
Coal Space Velocity, lb/cu ft-hr	14.69	13.07	11.47	11.92
Coal Residence Time, min	76.01	61.79	80.99	92.78
Pretreatment Gas Residence Time, min	0.164	0.152	0.170	0.165
Superficial Pretreatment Gas Velocity, ft/sec	0.713	0.765	0.687	0.708
<b>OPERATING RESULTS</b>				
Product Gas Rate, SCF/hr	631.0	638.8	614.1	637.2
Residue Char (dry), wt % dry coal	87.68	84.28	80.71	87.39
Knockout Drum Residue, wt % dry coal	3.06	4.69	8.13	2.18
Condenser and Filter Residue, wt % dry coal	0	0	0	0
Total Residue Char, wt % dry coal	90.74	88.97	88.84	89.57
Water and Other Condensates, wt % dry coal	4.96	5.61	5.69	4.63
Overall Material Balance, %	99.22	96.51	97.88	100.55
Carbon Balance, %	94.31	96.89	90.84	99.53
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.03	1.05	1.23	1.27
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	89.17	78.76	86.83	92.06
<b>PRODUCT GAS PROPERTIES</b>				
Gas Composition, mole %				
Nitrogen	93.2	92.4	94.0	94.2
Carbon Monoxide	1.2	1.2	1.0	1.1
Oxygen	1.1	2.2	1.4	0.8
Carbon Dioxide	2.7	2.5	2.5	2.6
Hydrogen	0.1	0	0	0.1
Argon	0.43	0.47	0.47	0.41
Methane	0.6	0.6	0.1	0.2
Ethane	0.2	0.2	0	0.1
Butane	0.5	0.4	0.4	0.5
Total	100.03	99.97	99.87	100.01
Heating Value, Btu/SCF	14.87	23.41	14.59	25.48
Nitrogen and Argon-Free Heating Value, Btu/SCF	232.4	329.7	265.3	404.4
Laboratory Agglomeration Test of Residue Evaluation at 1400°F	Caked	Partially caked	Lightly caked	Caked
Specific Gravity (Air = 1.000)	0.9900	0.9902	0.9901	0.9931

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**Table 7-B1, Part 15. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU**

<u>Run No.</u>	<u>FP-53</u>	<u>FP-54</u>	<u>FP-55</u>	<u>FP-56</u>
Coal Feed Source	Ireland Mine	Ireland Mine	Ireland Mine	Ireland Mine
Sieve Size, USS	16/80	16/80	16/80	16/80
Pretreatment Gas	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	12	9-1/2	5	8-3/4
Steady-State Operating Period, min	30-720	60-570	10-253	20-278
<b>OPERATING CONDITIONS</b>				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Pressure, psig	1.49	1.88	2.04	1.74
Bed Temperature, °F				
Bottom	722	732	688	730
1/2 ft	740	740	727	748
1 ft	737	735	727	744
1-1/2 ft	741	742	733	744
2 ft	740	738	728	745
4 ft	746	743	734	751
6 ft	724	717	708	726
Average	736	735	721	742
Coal Rate (dry), lb/hr	41.0	38.1	38.0	37.8
Air Rate, SCF/hr	271.6	275.1	274.6	284.3
Nitrogen Rate, SCF/hr	301.2	313.9	318.5	324.1
Oxygen Concentration, mole %	9.96	9.81	9.72	9.81
Nitrogen Purge Rate, SCF/hr	3.10	3.16	2.85	5.04
Bed Inventory, lb	64.50	75.00	75.75	70.00
Air/Coal Feed Ratio, SCF/lb	6.62	7.22	7.23	7.52
Air/Coal Bed Ratio, SCF/lb-hr	4.21	3.67	3.63	4.06
Coal Bed Pressure Differential, in. Hg	2.86	3.16	3.36	2.90
Coal Space Velocity, lb/cu ft-hr	11.81	10.97	10.94	10.88
Coal Residence Time, min	94.4	118.1	122.8	111.1
Pretreatment Gas Residence Time, min	0.170	0.171	0.173	0.165
Superficial Pretreatment Gas Velocity, ft/sec	0.687	0.684	0.675	0.709
<b>OPERATING RESULTS</b>				
Product Gas Rate, SCF/hr	606.9	635.1	614.4	651.9
Residue Char (dry), wt % dry coal	89.08	83.51	94.88	81.54
Knockout Drum Residue, wt % dry coal	0	2.08	2.59	1.90
Condenser and Filter Residue, wt % dry coal	0	0	0	0
Total Residue Char, wt % dry coal	89.08	85.59	96.47	83.44
Water and Other Condensates, wt % dry coal	4.32	4.78	3.15	4.54
Overall Material Balance, %	100.10	99.07	102.04	97.56
Carbon Balance, %	88.62	94.97	89.21	97.73
O <sub>2</sub> Reacted, SCF/lb coal fed	1.27	1.35	1.35	1.28
O <sub>2</sub> Reacted, % of O <sub>2</sub> fed	91.36	89.22	89.04	81.37
<b>PRODUCT GAS PROPERTIES</b>				
Gas Composition, mole %				
Nitrogen	94.0	93.6	93.0	92.5
Carbon Monoxide	1.1	1.1	1.1	1.2
Oxygen	0.9	1.1	1.1	1.9
Carbon Dioxide	2.8	2.6	3.1	2.9
Hydrogen	--	0.1	0.1	0.1
Argon	0.43	0.46	0.42	0.47
Methane	0.4	0.4	0.6	0.4
Ethane	--	0.2	0.2	0.1
Butane	0.4	0.4	0.4	0.4
Total	100.03	99.96	100.02	99.97
Heating Value, Btu/SCF	17.580	21.415	23.409	19.973
Nitrogen and Argon-Free Heating Value, Btu/SCF	313.9	363.0	354.7	285.3
Laboratory Agglomeration Test of Residue Evaluation at 1400 °F				
Free Flowing	0.9913	0.9891	0.9915	0.9917
Lightly Caked				
Caked				
Free Flowing				

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Table 7-B1, Part 16. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-57	FP-58	FP-59	FP-60
Feed Source	Ireland Mine Bituminous Coal			
Sieve Size, USS	16/80			
Pretreatment Gas	Air + Nitrogen			
Purge Gas	Nitrogen			
Duration of Test, hr	14	10-1/4	12-1/4	9
Steady-State Operating Period, min	20-840	40-490	135-570	60-543
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Pressure, psig	1.81	1.36	1.67	1.52
Bed Temperature, °F				
Bottom				
1/2 ft	737	735	726	732
1 ft	751	750	737	742
1-1/2 ft	744	744	731	737
2 ft	752	750	741	745
4 ft	746	749	740	745
6 ft	753	753	741	745
Average	757	748	744	752
Coal Rate, (dry), lb/hr	749	747	737	746
Air Rate, SCF/hr	39.57	39.46	48.93	45.20
Nitrogen Rate, SCF/hr	288.7	265.2	159.7	133.0
Oxygen Concentration, mole %	335.2	312.1	475.5	467.2
Nitrogen Purge Rate, SCF/hr	9.72	9.64	5.28	4.65
Bed Inventory, lb	4.98	4.76	5.14	4.80
Air/Coal Feed Ratio, SCF/lb	61.50	61.50	59.75	56.60
Air/Coal Bed Ratio, SCF/lb-hr	7.19	6.63	3.24	2.94
Coal Bed Pressure Differential, in. Hg	4.69	4.31	2.67	2.35
Coal Space Velocity, lb/cu ft-hr	2.92	4.10	4.51	4.18
Coal Residence Time, min	11.57	11.51	14.21	13.03
Pretreatment Gas Residence Time, min	91.9	92.3	72.7	76.3
Superficial Pretreatment Gas Velocity, ft/sec	0.159	0.166	0.158	0.161
	0.732	0.701	0.737	0.678
OPERATING RESULTS				
Product Gas Rate, SCF/hr	659.1	620.0	600.9	606.1
Residue Char (dry), wt % dry coal	91.54	85.49	89.08	94.24
Knockout Drum Residue, wt % dry coal	2.54	0.80	0.38	0.15
Condenser Residue, wt % dry coal	0	0	0	0
Cyclone Catch Pot (dry), wt % dry coal	2.63	2.33	2.78	1.38
Total Residue Char, wt % dry coal	96.71	88.62	92.24	95.77
Water and Other Condensates, wt % dry coal	5.77	4.43	3.77	0.70
Overall Material Balance, %	102.29	98.28	95.25	98.89
Carbon Balance, %	98.14	91.06	94.03	95.78
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.44	1.31	0.44	0.56
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	94.08	93.03	64.15	91.52
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen	94.0	93.9	95.1	96.7
Carbon Monoxide	1.2	1.2	0.5	0.6
Oxygen	0.6	0.7	1.9	0.4
Carbon Dioxide	2.8	2.8	1.3	1.5
Hydrogen	0.0	0.1	0.1	0.1
Argon	0.45	0.47	0.33	0.22
Methane	0.4	0.5	0.3	0.3
Ethane	0.1	0.2	0.1	0.1
Propane	0.4	0.4	0.4	0.2
Total	99.95	99.97	100.03	100.02
Heating Value, Btu/SCF	19.65	22.73	10.40	11.70
Nitrogen + Argon-Free Heating Value, Btu/SCF	357.4	405.9	247.4	380.0
Laboratory Agglomeration Test of Residue at 1400°F	Very Lightly Caked	Very Lightly Caked	Partially Caked	Free Flowing
Specific Gravity (Air = 1.000)	0.9902	0.9877	0.9831	0.9817

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Table 7-B1, Part 17. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-61	FP-62	FP-63	FP-64
Feed Source	Ireland Mine			
Sieve Size, USS	-16/+80			
Pretreatment Feed Gas	Air + Nitrogen			
Purge Gas	Nitrogen			
Duration of Test, hr	3.8	12.6	12.1	9.8
Steady-State Operating Period, min	34-170	80-480	40-690	20-540
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Top Pressure, psig	1.49	1.53	1.36	1.57
Bed Temperature, °F				
Bottom	739	740	740	739
1/2 ft	748	752	750	751
1 ft	742	745	744	743
1-1/2 ft	747	754	752	751
2 ft	751	757	753	752
4 ft	740	757	755	756
6 ft	746	759	743	743
Average	746	749	748	748
Coal Rate (Dry), lb/hr	28.2	29.8	44.9	45.8
Air Rate, SCF/hr	283.9	267.8	273.9	277.4
Nitrogen Rate, SCF/hr	325.1	334.6	321.1	315.6
Oxygen Concentration, %	9.79	9.34	9.67	9.82
Nitrogen Purge Rate, SCF/hr	4.8	5.3	5.0	4.7*
Bed Inventory, lb	60.75	66.01	49.37	55.10
Air/Coal Feed Ratio, SCF/lb	10.06	8.97	6.10	5.97
Air/Coal Bed Ratio, SCF/lb-hr	4.67	4.06	5.55	5.03
Coal Bed Pressure Drop, in. Hg	3.58	3.49	3.43	3.47
Coal Space Velocity, lb/cu ft-hr	8.12	8.60	12.93	13.37
Coal Residence Time, min	131.6	132.7	73.7	71.2
Feed Gas Residence Time, min	0.160	0.163	0.162	0.164
Superficial Feed Gas Velocity, ft/sec	0.731	0.714	0.718	0.710
OPERATING RESULTS				
Product Gas Rate, SCF/hr	598.7	590.3	581.8	597.3
Residue Char (dry), wt % dry coal	98.23	84.75	84.07	80.70
Knockout Drum Residue, wt % dry coal	1.00	0.28	0.90	0.90
Cyclone Catch Pot, wt % dry coal	2.98	3.30	4.78	4.41
Total Residue Char, wt % dry coal	102.2	88.33	89.85	85.11
Water and Other Condensates, wt % dry coal	4.33	5.15	4.02	1.35
Scrubber Oils, wt % dry coal	--	--	1.08	0.36
Overall Material Balance, %	103.26	96.72	96.19	95.33
Carbon Balance, %	125.76	95.79	87.49	83.72
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.82	1.67	1.12	1.16
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	86.13	88.50	87.98	91.22
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen	92.8	92.7	93.1	93.9
Carbon Monoxide	1.2	1.3	1.1	1.1
Oxygen	1.4	1.1	1.2	0.9
Carbon Dioxide	2.7	2.9	2.7	2.3
Hydrogen	0.1	0.0	0.1	0.1
Argon	0.46	0.42	0.47	0.45
Methane	0.5	0.5	0.5	0.5
Ethane	0.4	0.2	0.1	0.1
Butane +	0.4	0.5	0.6	0.6
Total	99.96	99.62	99.87	99.95
Heating Value, Btu/SCF	11.7	12.1	25.7	26.1
Nitrogen + Argon-Free Heating Value, Btu/SCF	379.9	185.0	399.8	462.4
Laboratory Agglomeration Test of Residue at 1400°F	Very Lightly Caked	Lightly Caked	Very Lightly Caked	Lightly Caked
Specific Gravity (Air = 1.000)	0.9898	0.9883	0.9897	0.9808

\* Computed from the average bulk density of the char charged to the reactor and the char removed from the reactor and the final bed height.

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Table 7-B1, Part 18. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-65	FP-66	FP-67	FP-68
Feed Source	Ireland Mine	Ireland Mine	FP-66 Char	Ireland Mine
Sieve Source, USS		-16+80		
Pretreatment Gas	Air + Nitrogen			
Purge Gas	Nitrogen			
Duration of Test, hr	3-3/4	15-3/4	14-1/4	3-1/2
Steady-State Operating Period, min	0-210	50-819	9-850	110-200
OPERATING CONDITIONS				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	7	7
Reactor Top Pressure, psig	1.66	1.79	2.31	2.31
Bed Temperature, °F				
Bottom	726	726	731	716
1/2 ft	737	737	742	735
1 ft	731	731	736	736
1-1/2 ft	739	739	739	736
2 ft	747	746	748	735
4 ft	749	749	748	738
6 ft	740	740	736	739
Average	738	738	740	734
Coal Rate (Dry), lb/hr	51.8	51.7	40.6	76.9
Air Rate, SCF/hr	112.5	125.1	127.9	672.8
Nitrogen Rate, SCF/hr	476.3	564.3	490.4	157.8
Oxygen Concentration, mole percent	4.01	3.81	4.34	17.01
Nitrogen Purge Rate, SCF/hr	4.99	4.94	5.18	5.05
Bed Inventory, lb	44.6	56.0	50.1	51.8
Air/Coal Feed Ratio, SCF/lb	2.15	2.39	3.12	8.65
Air/Coal Bed Ratio, SCF/lb-hr	2.52	2.23	2.55	12.98
Coal Bed Pressure Differential, in. hg	3.33	3.80	3.55	4.45
Coal Space Velocity, lb/cu ft-hr	15.05	15.05	11.79	22.41
Coal Residence Time, min	51.2	64.3	73.5	40.0
Feed Gas Residence Time, min	0.166	0.143	0.158	0.124
Superficial Feed Gas Velocity, ft/sec	0.703	0.816	0.740	0.940
OPERATING RESULTS				
Product Gas Rate, SCF/hr	585.8	714.2	601.8	772.8
Residue Char (Dry), wt % dry coal	84.85	81.96	96.25	85.45
Knockout Drum Residue, wt % dry coal	0.86	2.48	1.82	1.37
Condenser Residue, wt % dry coal	0.0	0.0	0.0	0.0
Cyclone Catch Pot, wt % dry coal	1.89	1.80	0.0	3.08
Total Residue Char, wt % dry coal	86.74	86.24	98.07	88.53
Water and Other Condensates, wt % dry coal	1.09	2.40	0.07	0.22
Scrubber Oils, wt % dry coal	0.0	0.39	0.11	0.67
Overall Material Balance, %	93.96	96.69	98.62	94.49
Carbon Balance, %	83.89	80.82	94.13	87.63
O <sub>2</sub> Reacted, SCF/lb Coal Fed	0.45	0.51	0.59	1.72
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	100.00	100.00	88.67	94.11
PRODUCT GAS PROPERTIES				
Gas Composition, mole %				
Nitrogen	96.9	97.2	97.2	90.6
Carbon Monoxide	0.4	0.4	0.6	2.2
Oxygen	0.0	0.0	0.5	1.1
Carbon Dioxide	0.8	0.8	1.1	4.0
Hydrogen	0.1	0.1	0.0	0.0
Argon	0.18	0.16	0.19	0.81
Methane	0.6	0.4	0.2	0.6
Ethane	0.2	0.1	0.0	0.1
Propane+	0.8	0.7	0.2	0.6
Total	99.98	99.86	99.99	100.01
Heating Value, Btu/SCF	30.68	26.29	8.95	29.95
N <sub>2</sub> + Ar Free Heating Value, Btu/SCF	1048.5	1001.23	342.83	348.94
Laboratory Agglomeration Test of Residue at 1400°F	Lightly Caked	Caked	Free-Flowing	Lightly Caked
Specific Gravity (Air = 1.000)	0.9690	0.9689	0.9795	1.0001

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Table 7-B1, Part 19. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No. Feed Source Sieve Size, USS Pretreatment Feed Gas Purge Gas Duration of Test, hr Steady-State Operating Period, min	FP-69	FP-70	FP-71A	FP-72A
	Air	Air	Air + N <sub>2</sub>	Air
	5.0	4.9	2.7	2.3
	50-250	100-170	29-105	11-60
<b>OPERATING CONDITIONS</b>				
Standpipe				
OD, in.	3	3	3	3
Height, ft	7	7	4	4
Reactor Top Pressure, psig	2.31	3.32	3.15	1.75
Bed Temperature, °F				
Bottom	570*	552*	674*	692*
1/2 ft	725	702	750	772
1 ft	725	704	766	776
1-1/2 ft	725	706	770	776
2 ft	726	708	771	776
4 ft	729	711	777*	786*
6 ft	729	711	794*	848
Average	726	707	767	775
Coal Rate (Dry), lb/hr	97.2	120.8	85.8	82.3
Air Rate, SCF/hr	799.6	1003.4	722.0	674.5
Nitrogen Rate, SCF/hr	0.0	0.0	66.8	0.0
Oxygen Concentration, %	21.0	21.0	19.22	21.0
Nitrogen Purge Rate, SCF/hr	5.2	5.1	5.3	2.9
Bed Inventory, lb	54.3	64.0	29.5	41.1
Air/Coal Feed Ratio, SCF/lb	8.15	8.23	8.30	8.07
Air/Coal Bed Ratio, SCF/lb-hr	14.73	15.67	24.47	16.41
Coal Bed Pressure Drop, in. Hg	4.69	5.98	4.15	3.25
Coal Space Velocity, lb/cu ft-hr	28.25	35.12	43.87	42.13
Coal Residence Time, min	33.2	31.5	20.34	29.50
Superficial Feed Gas Velocity, ft/sec	0.87	1.02	0.875	0.811
Feed Gas Residence Time, min	0.134	0.114	0.076	0.082
<b>OPERATING RESULTS</b>				
Product Gas Rate, SCF/hr	732.0	916.1	693.3	642.0
Residue Char (Dry), wt % dry coal	92.59	88.81	86.97	91.52
Knockout Drum Residue, wt % dry coal	0.63	0.41	1.52	2.62
Cyclone Catch Pot, wt % dry coal	3.35	3.56	2.59	None
Total Residue Char, wt % dry coal	95.94	92.37	89.56	94.14
Condensate + Scrubber Oils, wt % dry coal	0.38	0.48	1.09	1.26
Overall Material Balance, %	97.83	94.77	95.24	97.72
Carbon Balance, %	95.67	93.47	92.22	95.03
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.31	1.05	1.45	1.46
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	75.88	60.47	82.25	84.87
<b>PRODUCT GAS PROPERTIES</b>				
Gas Composition, mole %				
Nitrogen	85.0	81.1	86.9	88.7
Carbon Monoxide	1.9	4.3	2.4	1.8
Oxygen	5.5	8.6	3.7	3.6
Carbon Dioxide	5.2	3.9	4.1	3.4
Hydrogen	0.1	0.0	0.1	0.1
Argon	0.98	0.99	0.98	0.92
Methane	0.4	0.4	0.7	0.6
Ethane	0.2	0.2	0.2	0.2
Propene+	0.7	0.5	0.9	0.7
Total	99.98	99.99	99.98	100.02
Heating Value, Btu/SCF	31.5	33.7	41.2	33.2
Nitrogen + Argon-Free Heating Value, Btu/SCF	224.9	188.4	339.6	291.8
Laboratory Agglomeration Test of Residue at 1400°F	Caked	Fused	Very Lightly Caked	Very Lightly Caked
Specific Gravity (Air = 1.000)	1.0134	1.0101	1.0048	0.9905

\* Not included in average bed temperature.

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Table 7-B1, Part 20. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-73	FP-74	FP-75	FP-76	FP-77
Feed Source	Ireland Mine		-16+80	Various Chars	
Sieve Size, U.S.					
Pretreatment Feed Gas	Air + N <sub>2</sub>	Air + N <sub>2</sub>	Air	Air + N <sub>2</sub>	Air + N <sub>2</sub>
Purge Gas	N <sub>2</sub>	N <sub>2</sub>	N <sub>2</sub>	N <sub>2</sub>	N <sub>2</sub>
Duration of Test, hr	3.58	4.95	8.0	6.12	6.72
Steady-State Operating Period, min	32-180	42-255	45-360	53-315	41-360
<b>OPERATING CONDITIONS</b>					
Standpipe					
OD, in.	3	3	3	3	3
Height, ft	4	4	4	4	4
Reactor Top Pressure, psig	1.80	2.00	1.78	2.24	2.07
Coal Bed Pressure Drop, in. Hg	4.42	4.18	4.10	4.64	4.28
Bed Temperatures, °F					
Bottom	568*	462*	725*	729*	731*
1/2 ft	761	764	727	730	734
1 ft	770	766	725	734	736
1-1/2 ft	779	773	726	738	740
2 ft	780	774	726	740	741
4 ft	779*	765*	721*	740*	736*
6 ft	784*	747*	705*	752*	736*
Average	772	769	726	736	738
Coal Rate (Dry), lb/hr	57.6	53.2	80.9	68.9	72.0
Air Rate, SCF/hr	614.4	589.3	599.5	594.4	568.8
Nitrogen Rate, SCF/hr	168.2	175.6	0.0	184.0	157.7
Oxygen Concentration, %	16.47	16.19	21.0	16.04	16.44
Nitrogen Purge Rate, SCF/hr	2.8	3.0	3.1	3.0	2.9
Bed Inventory, lb	26.6	30.0	28.6	30.3	29.0
Air/Coal Feed Ratio, SCF/lb	10.51	10.93	7.38	8.43	7.79
Air/Coal Bed Ratio, SCF/lb-hr	23.10	19.67	20.93	19.59	19.58
Coal Space Velocity, lb/cu ft-hr	29.46	27.19	40.94	35.54	36.81
Coal Residence Time, min	27.3	33.3	21.2	25.8	23.9
Superficial Feed Gas Velocity, ft/sec	0.939	0.897	0.696	0.887	0.833
Feed Gas Residence Time, min	0.071	0.074	0.096	0.075	0.080
<b>OPERATING RESULTS</b>					
Product Gas Rate, SCF/hr	762.0	725.3	578.3	744.1	701.7
Residue Char (Dry), wt % dry coal	82.65	86.04	94.62	95.56	94.38
Knockout Drum Residue, wt % dry coal	3.27	3.55	0.70	1.93	1.32
Cyclone Catch Pot, wt % dry coal	0.0	0.0	0.0	0.0	0.0
Total Residue Char, wt % dry coal	85.91	89.59	95.32	97.50	95.70
Condensate and Scrubber Oils, wt % dry coal	1.46	1.55	0.025	0.0	0.0
Overall Material Balance, %	95.14	95.82	97.71	97.96	96.36
Carbon Balance, %	85.60	94.32	96.78	96.75	98.24
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.97	2.32	1.11	1.72	1.61
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	88.13	100.00	71.43	95.35	97.17
<b>PRODUCT GAS PROPERTIES</b>					
Gas Composition, mole %					
Nitrogen	89.1	90.0	84.8	89.5	89.1
Carbon Monoxide	2.1	2.5	2.4	2.4	2.8
Oxygen	2.1	0.0	5.6	0.8	0.5
Carbon Dioxide	4.3	5.4	5.7	6.2	6.3
Hydrogen	0.2	0.1	0.0	0.0	0.1
Argon	0.75	0.75	0.97	0.74	0.75
Methane	0.6	0.2	0.2	0.1	0.1
Ethane + Propane	0.2	0.2	0.1	0.1	0.1
Total	99.95	99.85	99.97	99.94	99.85
Heating Value, Btu/SCF	30.95	34.10	16.39	14.18	15.89
N <sub>2</sub> and Ar-Free Heating Value, Btu/SCF	305.92	368.71	115.21	145.89	156.93
Specific Gravity (Air = 1.000)	1.0004	1.0068	1.0149	1.0100	1.0096
Laboratory Agglomeration Test of Residue at 1400°F	Free-Flowing	Free-Flowing	Free-Flowing	Flowing	Free-Flowing

\* Not included in average bed temperature.

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Table 7-B1, Part 21. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-78A	FP-79	FP-80	FP-81	FP-82C	FP-83
Feed Source	Ireland Mine					
Sieve Size, USS	-16+80					
Pretreatment Feed Gas	Air					
Purge Gas	Nitrogen					
Duration of Test, hr	5.0	2.4	4.8	2.8	2.2	3.3
Steady-State Operating Period, min	70-220	25-120	49-240	107-60	37-60	20-120
OPERATING CONDITIONS						
Standpipe						
OD, in.	3	3	3	3	3	3
Height, ft	4	4	4	4	4	4
Bed Inventory, lb	30.6	27.0	25.5	23.6	23.7	24.5
Reactor Top Pressure, psig	2.82	2.12	1.60	1.05	1.70	1.14
Coal Bed Pressure Drop, in. Hg	6.14	4.70	4.86	4.55	4.27	4.00
Bed Temperature, °F						
Bottom	557*	693*	708*	759	753*	709
1/2 ft	768	782	792	801	810	807
1 ft	772	782	794	802	814	814
1-1/2 ft	775	784	799	806	819	818
2 ft	776	786	798	806	818	819
4 ft	775*	783*	800	806*	820*	819
6 ft	754*	767*	800*	796*	825*	824
Average	773	784	797	804	816	815
Coal Rate (Dry), lb/hr	100.1	87.5	105.4	88.2	95.0	104.7
Air Rate, SCF/hr	1231.0	933.3	1151.5	1086.4	1127.6	1077.0
Nitrogen Rate, SCF/hr	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen Concentration, %	21.0	21.0	21.0	21.0	21.0	21.0
Nitrogen Purge Rate, SCF/hr	5.5	2.9	4.2	2.1	4.9	5.1
Air/Coal Feed Ratio, SCF/lb	12.11	10.51	10.76	12.13	11.68	10.15
Air/Coal Bed Ratio, SCF/lb-hr	40.21	34.58	45.19	46.09	47.58	43.95
Coal Space Velocity, lb/cu ft-hr	51.24	44.78	53.93	45.15	48.64	53.51
Coal Residence Time, min	18.1	18.2	14.3	15.8	14.73	13.85
Superficial Feed Gas Velocity, ft/sec	1.39	1.11	1.43	1.40	1.46	1.39
Feed Gas Residence Time, min	0.048	0.060	0.046	0.048	0.046	0.048
OPERATING RESULTS						
Product Gas Rate, SCF/hr	1139.8	850.3	1102.4	1001.3	1067.2	1040.7
Residue Char (Dry), wt % dry coal	92.04	88.76	85.22	98.39	89.94	88.09
Knockout Drum Residue, wt % dry coal	0.0	0.0	0.0	0.0	0.0	0.0
Cyclone Catch Pot, wt % dry coal	3.24	0.0	3.62	0.0	2.01	1.64
Total Residue Char, wt % dry coal	95.28	88.76	88.84	98.39	91.95	89.73
Condensate and Scrubber Oils, wt % dry coal	0.76	0.69	0.51	7.54	0.95	0.64
Overall Material Balance, %	94.99	91.90	92.48	99.76	95.24	93.57
Carbon Balance, %	98.00	94.68	92.38	106.91	94.66	93.61
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.71	1.58	1.56	1.95	1.80	1.54
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	66.27	70.64	68.09	75.61	72.42	71.43
PRODUCT GAS PROPERTIES						
Gas Composition, mole %						
Nitrogen	84.0	83.8	84.1	85.6	83.8	83.5
Carbon Monoxide	2.2	2.4	2.2	1.8	2.3	2.5
Oxygen	7.6	6.6	7.2	5.6	6.2	6.4
Carbon Dioxide	4.2	4.6	4.1	4.6	4.6	4.8
Hydrogen	0.1	0.1	0.1	0.1	0.1	0.1
Argon	1.01	1.02	1.01	1.03	1.04	1.02
Methane	0.2	0.5	0.5	0.2	0.8	0.7
Ethane	0.1	0.2	0.1	0.2	0.2	0.2
Propene + <sup>+</sup>	0.6	0.8	0.7	0.9	0.9	0.8
Total	100.01	100.02	100.01	100.03	99.94	100.02
Heating Value, Btu/SCF	26.20	36.64	31.72	34.28	41.84	38.95
Nitrogen and Argon-Free Heating Value, Btu/SCF	174.76	241.34	213.01	256.38	276.35	251.59
Specific Gravity (Air = 1.000)	1.0113	1.0123	1.0095	1.0130	1.0107	1.0123
Laboratory Agglomeration Test of Residue at 1400°F	Lightly caked	Lightly caked	Very lightly caked	Very lightly caked	Free-flowing	Very lightly caked

\* Not included in average bed temperature.

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Table 7-B1, Part 22. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-84A Ireland Mine Coal	FP-85 Ireland Chars	FP-86 Broken Arrow Chars -16+80	FP-87 Broken Arrow Coal	FP-88 Broken Arrow Coal	FP-89A Broken Arrow Coal
Feed Source	Air	Air + N <sub>2</sub>	Nitrogen	Air		
Sieve Size, USS						
Pretreatment Feed Gas						
Purge Gas						
Duration of Test, hr	1.83	7.3	5.6	5.93	4.0	4.42
Steady-State Operating Period, min	20-60	46-392	14-320	26-330	43-170	28-210
OPERATING CONDITIONS						
Standpipe						
OD, in.	3	3	3	3	3	3
Height, ft	4.0	4.0	4.0	4.0	4.0	4.0
Reactor Top Pressure, psig	1.07	0.72	0.78	0.76	0.71	0.0
Coal Bed Pressure Drop, in. Hg	3.33	2.85	3.20	3.71	3.57	3.23
Bed Temperatures, °F						
Bottom	(631)*	(558)*	(717)*	(774)*	(794)*	(797)*
1/2 ft	795	712	720	776	800	801
1 ft	798	715	721	777	800	802
1-1/2 ft	802	715	721	777	801	804
2 ft	803	714	720	780	802	806
4 ft	(806)*	(707)*	(722)*	778	(798)*	806
6 ft	(834)*	(687)*	(755)*	(766)*	(778)*	(798)*
Average	801	714	720	778	801	804
Coal Rate (Dry), lb/hr	94.75	61.05	75.35	89.85	83.22	89.83
Air Rate, SCF/hr	951.9	534.3	674.7	904.1	901.7	867.0
Nitrogen Rate, SCF/hr	0.0	114.8	0.0	0.0	0.0	0.0
Oxygen Concentration, %	21.0	17.29	21.0	21.0	21.0	21.0
Nitrogen Purge Rate, SCF/hr	5.03	5.07	5.09	5.32	5.15	5.07
Bed Inventory, lb	24.83	26.87	32.26	27.62	27.33	23.13
Air/Coal Feed Ratio, SCF/lb	9.89	8.57	8.72	9.85	10.01	9.41
Air/Coal Bed Ratio, SCF/lb-hr	38.34	19.89	20.92	32.73	33.00	37.48
Coal Space Velocity, lb/cu ft-hr	48.53	31.43	38.99	46.26	45.39	46.44
Coal Residence Time, min	15.47	25.85	25.02	18.06	18.21	15.07
Superficial Feed Gas Velocity, ft/sec	1.22	0.798	0.827	1.16	1.19	1.19
Feed Gas Residence Time, min	0.054	0.083	0.080	0.057	0.056	0.056
OPERATING RESULTS						
Product Gas Rate, SCF/hr	851.5	597.8	619.0	843.2	837.3	809.8
Residue Char (Dry), wt % dry coal	78.39	95.01	90.18	83.54	86.50	81.40
Knockout Drum Residue, wt % dry coal	0.0	0.0	0.0	0.0	0.0	0.0
Cyclone Catch Pot, wt % dry coal	0.89	0.72	1.64	1.77	0.41	1.03
Total Residue Char, wt % dry coal	79.28	95.73	91.82	85.31	86.91	82.43
Condensate and Scrubber Oils, wt % dry coal	0.60	0.0	0.0	1.28	2.6	2.10
Overall Material Balance, %	84.71	93.95	90.74	89.61	89.63	89.40
Carbon Balance, %	82.83	96.61	94.67	90.68	95.80	90.67
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.71	1.45	1.41	1.58	1.82	1.66
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	81.40	79.10	75.06	74.91	80.21	82.25
PRODUCT GAS PROPERTIES						
Gas Composition, mole %						
Nitrogen	86.2	88.7	83.7	83.2	82.9	84.0
Carbon Monoxide	2.5	2.2	2.6	2.4	2.9	2.6
Oxygen	4.3	3.9	5.6	5.6	4.4	4.0
Carbon Dioxide	4.3	4.2	7.0	6.0	6.6	6.5
Hydrogen	0.1	0.1	0.0	0.1	0.1	0.1
Argon	1.05	0.83	0.98	1.01	1.00	1.00
Methane	0.6	0.1	0.1	0.8	0.8	0.7
Ethane	0.2	0.0	0.0	0.3	0.4	0.4
Propanet	0.7	0.0	0.0	0.6	0.9	0.7
Total	99.95	100.03	99.98	100.01	100.00	100.00
Heating Value, Btu/SCF	35.42	8.28	9.21	36.33	47.25	40.25
N <sub>2</sub> and Ar-Free Heating Value, Btu/SCF	277.8	79.36	60.14	230.06	293.49	268.32
Specific Gravity (Air = 1.000)	1.0060	1.0027	1.0214	1.0162	1.0197	1.0178
Laboratory Agglomeration Test of Residue Char at 1400°F	Flowing	Free-Flowing	Flowing	Very Lightly Caked	Free-Flowing	Free-Flowing

\* Not included in average bed temperature.

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Table 7-B1, Part 23. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-90	FP-91	FP-92	FP-93A	FP-94
Feed Source		West Virginia Block No. 5			FP-91 Char
Sieve Size, USS		-16+80			
Pretreatment Feed Gas		Air			
Purge Gas		Nitrogen			
Duration of Test, hr	1.95	5.37	5.70	3.15	3.27
Steady-State Operating Period, min	28-60	17-305	28-325	17-172	12-180
<b>OPERATING CONDITIONS</b>					
Standpipe					
OD, in.	3	3	3	3	3
Height, ft	4.0	4.0	4.0	4.0	4.0
Reactor Top Pressure, psig	0.63	0.77	0.84	0.73	0.0
Coal Bed Pressure Drop, in. Hg	2.57	1.79	0.43	0.70	0.72
Bed Temperatures, °F					
Bottom	(806)*	(774)*	(799)*	(803)*	(728)*
1/2 ft	805	775	799	800	726
1 ft	803	775	799	800	726
1-1/2 ft	803	775	799	802	727
2 ft	803	775	802	803	723
4 ft	801	(770)*	800	802	(724)*
6 ft	(814)*	(759)*	(788)*	(812)*	(756)*
Average	805	775	800	802	726
Coal Rate (dry), lb/hr	85.78	84.38	96.37	103.16	87.44
Air Rate, SCF/hr	879.9	974.0	1113.6	1181.2	656.8
Nitrogen Rate, SCF/hr	0.0	0.0	0.0	0.0	0.0
Oxygen Concentration, %	21.0	21.0	21.0	21.0	21.0
Nitrogen Purge Rate, SCF/hr	4.98	4.99	5.29	5.36	5.00
Bed Inventory, lb	26.8	27.7	27.4	25.6	34.9
Air/Coal Feed Ratio, SCF/lb	10.09	11.37	11.46	11.33	7.44
Air/Coal Bed Ratio, SCF/lb-hr	32.8	35.1	40.6	46.2	18.8
Coal Space Velocity, lb/cu ft-hr	43.9	43.2	49.0	52.5	44.5
Coal Residence Time, min	18.46	19.42	16.95	14.72	23.76
Superficial Feed Gas Velocity, ft/sec	1.19	1.17	1.26	1.46	1.54
Feed Gas Residence Time, min	0.057	0.053	0.043	0.043	0.078
<b>OPERATING RESULTS</b>					
Product Gas Rate, SCF/hr	830.9	911.9	1009.0	1081.5	636.5
Residue Char (dry), wt % dry coal	83.77	88.35	84.31	85.60	93.59
Knockout Drum Residue, wt % dry coal	0.0	0.0	0.0	0.0	0.0
Cyclone Catch Pot, wt % dry coal	0.87	1.74	1.76	1.38	0.62
Total Residue Char, wt % dry coal	84.64	90.09	86.07	86.98	94.21
Condensate and Scrubber Oils, wt % dry coal	1.29	0.83	0.97	0.80	0.18
Overall Material Balance, %	90.04	92.72	89.86	90.36	95.94
Carbon Balance, %	89.47	92.68	91.51	91.67	95.24
O <sub>2</sub> Reacted, SCF/lb Coal Fed	2.03	1.59	1.68	1.53	1.03
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	94.40	66.20	69.46	63.87	65.21
<b>PRODUCT GAS PROPERTIES</b>					
Gas Composition, mole %					
Nitrogen	86.6	83.1	83.0	81.5	82.5
Carbon Monoxide	3.8	2.2	2.5	2.5	2.5
Oxygen	1.3	7.5	6.8	7.9	7.7
Carbon Dioxide	4.9	5.0	4.9	5.2	5.9
Hydrogen	0.2	0.1	0.1	0.1	0.1
Argon	1.02	0.99	1.00	0.96	0.95
Methane	0.9	0.4	0.6	0.6	0.1
Ethane	0.2	0.1	0.2	0.2	0.0
Propane†	1.1	0.6	0.9	1.0	0.2
Total	100.02	99.99	100.00	99.96	99.95
Heating Value, Btu/SCF	52.95	28.19	40.48	43.01	14.27
N <sub>2</sub> - and Ar-Free Heating Value, Btu/SCF	427.74	117.19	252.99	245.19	86.25
Specific Gravity (Air = 1.000)	1.0060	1.0145	1.0141	1.0173	1.0180
Laboratory Agglomeration Test of Residue Char at 1400°F	Free-Flowing	Lightly Caked	Free-Flowing	Very Lightly Caked	Free-Flowing

\* Not included in average bed temperature.

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Table 7-B1, Part 24. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-95A	FP-96	FP-97	FP-98	FP-99	FP-100
Coal Feed Source	Pocahontas	Pocahontas	Pocahontas	Pocahontas	Illinois	Illinois
Sieve Size, USS	No. 4 -16+80	No. 4 -16+80	No. 4 -16+80	No. 4 -16+80	No. 6 -16+80	No. 6 -16+80
Pretreatment Feed Gas	Air	Air	Air	Air	Air	Air
Purge Gas	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen	Nitrogen
Duration of Test, hr	5.62	7.67	6.0	5.55	6.68	1.4
Steady-State Operating Period, Min	6-315	20-380	16-344	4-320	26-375	12-60
OPERATING CONDITIONS						
Standpipe						
OD, in.	3.0	3.0	3.0	3.0	3.0	3.0
Height, ft	4.0	4.0	4.0	4.0	4.0	4.0
Reactor Top Pressure, psig	0.67	0.86	0.88	1.16	0.68	0.85
Coal Bed Pressure Drop, in. Hg	1.60	1.63	1.46	1.74	0.71	0.95
Bed Temperatures, °F						
Bottom	791*	830*	858*	853*	785*	813*
1/2 ft	788	826	853	849	777	803
1 ft	788	826	853	849	777	803
1-1/2 ft	790	828	855	850	781	807
2 ft	792	830	857	851	782	805
4 ft	793*	828	859	851	782	812*
6 ft	789*	814*	853*	--	772*	834*
Average	790	827	855	850	780	805
Dry Coal Feed Rate, lb/hr	86.36	94.65	107.05	107.93	65.67	82.25
Air Rate, SCF/hr	1113.8	1242.1	1291.0	1349.0	1164.9	1277.6
Nitrogen Rate, SCF/hr	0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen Purge Rate, SCF/hr	5.01	4.16	4.10	5.22	4.97	4.88
Oxygen Concentration, %	21.0	21.0	21.0	21.0	21.0	21.0
Air/Coal Feed Ratio, SCF/lb	12.61	13.03	11.87	12.30	15.38	13.58
Air/Coal Bed Ratio, SCF/lb-hr	30.36	29.20	30.17	31.40	43.55	54.62
Coal Space Velocity, lb/cu ft-hr	44.51	48.04	54.83	55.28	38.18	47.43
Coal Residence Time, min	24.93	26.78	23.65	23.51	21.19	14.91
Feed Gas Residence Time, sec	0.046	0.041	0.038	0.037	0.044	0.040
Superficial Feed Gas Velocity, ft/sec	1.45	1.64	1.76	1.79	1.51	1.68
Bed Inventory, lb	36.69	42.54	42.87	42.98	26.75	23.39
OPERATING RESULTS						
Product Gas Rate, SCF/hr	1054.2	1211.0	1160.6	1246.4	1078.2	1223.9
Total Gasified Char, wt % dry coal	84.83	81.04	79.74	81.77	82.85	84.95
Cyclone Catch Pot, wt % dry coal	8.07	12.09	12.23	14.03	2.22	1.84
Total Residue Char, wt % dry coal	92.90	93.13	91.97	96.80	85.07	86.79
Condensate and Scrubber Oils, wt % dry coal	0.0	0.0	0.0	0.0	1.51	0.0
Overall Material Balance, %	93.32	95.74	90.87	94.29	91.53	88.37
Carbon Balance, %	93.59	95.77	93.53	97.41	92.63	92.73
O <sub>2</sub> Reacted, SCF/lb coal fed	1.51	1.49	1.71	1.67	2.47	2.28
O <sub>2</sub> Reacted, % of O <sub>2</sub> fed	55.72	54.04	67.84	63.68	66.48	69.98
PRODUCT GAS PROPERTIES						
Gas Composition, mole %						
Nitrogen	82.5	80.3	82.3	82.1	82.3	83.2
Carbon Monoxide	2.2	2.6	3.1	3.0	2.5	2.3
Oxygen	9.8	9.9	7.1	8.0	7.4	6.7
Carbon Dioxide	4.3	5.3	5.7	5.3	5.7	5.7
Hydrogen	0.1	0.2	0.2	0.1	0.1	0.1
Argon	0.97	0.99	0.97	0.97	0.97	0.97
Methane	0.1	0.6	0.5	0.4	0.5	0.5
Ethane	0.0	0.1	0.1	0.1	0.2	0.2
Propane*	0.0	0.0	0.0	0.0	0.3	0.3
Total	99.97	99.99	99.97	99.97	99.97	99.97
Heating Value, Btu/SCF	8.27	16.59	17.18	15.54	24.31	23.67
N <sub>2</sub> and Ar-Free Heating Value, Btu/SCF	50.02	88.69	102.67	91.87	145.29	149.56
Specific Gravity (Air = 1.000)	1.0110	1.0140	1.0126	1.0129	1.0158	1.0149
Laboratory Agglomeration Test of Residue Char at 1400°F	Free Flowing	Free Flowing	Free Flowing	Free Flowing	Free Flowing	Free Flowing

\* Not included in average bed temperature.

B7506 1655W

Table 7-B1, Part 25. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-101E	FP-102D
Feed Source	Illinois No. 6	
Sieve Size, USS	-16+80	
Pretreatment Feed Gas	Air	
Purge Gas	Nitrogen	
Duration of Test, hr	1.35	5.28
Steady-State Operating Period, min	15-60	27-290
OPERATING CONDITIONS		
Standpipe		
OD, in.	3.0	3.0
Height, ft	4.0	4.0
Reactor Top Pressure, psig	1.15	1.30
Coal Bed Pressure Drop, in. Hg	1.30	1.44
Bed Temperatures, °F		
Bottom	(796)*	(775)*
1/2 ft	798	775
1 ft	798	775
1-1/2 ft	798	775
2 ft	797	774
4 ft	(805)*	774
6 ft	(814)*	(763)*
Average	798	775
Coal Rate (Dry), lb/hr	93.38	91.81
Air Rate, SCF/hr	1282.6	1296.4
Nitrogen Rate, SCF/hr	0.0	0.0
Oxygen Concentration, %	21.0	21.0
Nitrogen Purge Rate, SCF/hr	4.9	4.9
Bed Inventory, lb	35.23	28.0
Air/Coal Feed Ratio, SCF/lb	12.05	12.98
Air/Coal Bed Ratio, SCF/lb-hr	36.40	46.30
Coal Space Velocity, lb/cu ft-hr	53.67	50.36
Coal Residence Time, min	19.85	16.82
Superficial Feed Gas Velocity, ft/sec	1.62	1.60
Feed Gas Residence Time, min	0.041	0.042
OPERATING RESULTS		
Product Gas Rate, SCF/hr	1193.4	1230.49
Residue Char (Dry), wt % dry coal	83.70	95.55
Cyclone Catch Pot, wt % dry coal	1.92	0.93
Total Residue Char, wt % dry coal	85.62	96.48
Condensate and Scrubber Oils, wt % dry coal	1.31	0.74
Overall Material Balance (Dry), %	93.15	97.29
Carbon Balance, %	93.30	103.60
O <sub>2</sub> Reacted, SCF/lb Coal Fed	2.21	2.09
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	76.93	70.67
PRODUCT GAS PROPERTIES		
Gas Composition, mole %		
Nitrogen	82.4	82.6
Carbon Monoxide	2.8	2.1
Oxygen	5.1	6.5
Carbon Dioxide	6.6	6.6
Hydrogen	0.6	0.0
Argon	0.99	0.99
Methane	1.0	0.6
Ethane	0.1	0.2
Propane <sup>+</sup>	0.4	0.4
Total	99.99	99.99
Heating Value, Btu/SCF	32.61	26.25
N <sub>2</sub> - and Ar-Free Heating Value, Btu/SCF	196.31	159.96
Specific Gravity (Air = 1.000)	1.0119	1.0210
Laboratory Agglomeration Test of Residue at 1400°F	Free-Flowing	Free-Flowing

\* Not included in average bed temperature.

B7506 1655X



Table 7-B1, Part 26. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-103	FP-104	FP-105	FP-106	FP-107
Feed Source	Illinois No. 6			Indiana No. 6	
Sieve Size, USS	-16+80				
Pretreatment Feed Gas	Air				
Purge Gas	Nitrogen				
Duration of Test, hr	1.58	4.33	7.1	5.83	2.93
Steady-State Operating Period, min	25-63	29-239	74-372	17-326	29-321
OPERATING CONDITIONS					
Standpipe					
OD, in.	3.0	3.0	3.0	3.0	3.0
Height, ft	4.0	4.0	4.0	4.0	4.0
Reactor Top Pressure, psig	1.40	1.32	1.50	1.84	1.73
Coal Bed Pressure Drop, in. Hg	1.40	1.23	1.20	1.44	1.74
Bed Temperatures, °F					
Bottom	(812)*	(794)*	(800)*	(796)*	(776)*
1/2 ft	812	794	800	796	776
1 ft	812	794	800	797	776
1-1/2 ft	813	794	800	797	777
2 ft	814	794	800	797	777
4 ft	(816)*	794	799	(799)*	779
6 ft	(814)*	(777)*	(779)*	(792)*	(771)*
Average	813	794	800	797	777
Coal Rate (Dry), lb/hr	92.83	83.04	87.60	82.19	83.76
Air Rate, SCF/hr	1287.9	1252.2	1229.4	1216.2	1219.1
Nitrogen Rate, SCF/hr	0.0	0.0	0.0	0.0	0.0
Oxygen Concentration, %	21.0	21.0	21.0	21.0	21.0
Nitrogen Purge Rate, SCF/hr	4.98	5.08	4.88	5.34	4.99
Bed Inventory, lb	26.0	22.5	24.5	25.5	27.5
Air/Coal Feed Ratio, SCF/lb	13.07	13.33	12.72	13.02	13.04
Air/Coal Bed Ratio, SCF/lb-hr	49.53	55.65	50.18	47.69	44.33
Coal Space Velocity, lb/cu ft-hr	49.67	47.35	48.73	47.08	47.12
Coal Residence Time, min	15.83	14.37	15.20	16.38	17.65
Superficial Feed Gas Velocity, ft/sec	1.62	1.59	1.52	1.49	1.48
Feed Gas Residence Time, min	0.041	0.042	0.044	0.045	0.045
OPERATING RESULTS					
Product Gas Rate, SCF/hr	1130.1	1144.1	1097.3	1182.0	1158.5
Residue Char, wt % dry coal	82.84	77.08	77.94	77.76	82.55
Cyclone Catch Pot, wt % dry coal	1.16	6.36	2.53	3.16	2.12
Total Residue Char, wt % dry coal	84.00	83.44	80.47	80.92	84.67
Condensate and Scrubber Oils, wt % dry coal	0.37	0.39	0.69	0.67	0.37
Overall Material Balance, %	87.40	90.87	86.16	91.80	92.15
Carbon Balance, %	93.31	92.68	83.63	87.22	90.92
O <sub>2</sub> Reacted, SCF/lb Carbon Fed	2.13	2.21	2.30	2.14	2.03
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	73.2	70.1	78.2	78.2	66.4
PRODUCT GAS PROPERTIES					
Gas Composition, mole %					
Nitrogen	84.9	82.3	81.2	81.8	82.2
Carbon Monoxide	1.8	2.4	2.4	2.5	2.3
Oxygen	6.1	6.6	7.2	6.8	7.4
Carbon Dioxide	4.7	6.5	7.0	6.6	6.1
Hydrogen	0.1	0.1	0.1	0.1	0.1
Argon	1.05	1.00	1.02	1.02	1.00
Methane	0.6	0.5	0.5	0.6	0.4
Ethane	0.2	0.2	0.2	0.2	0.2
Propane <sup>†</sup>	0.5	0.4	0.4	0.4	0.3
Total	99.95	100.00	100.02	100.02	100.00
Heating Value, Btu/SCF	28.15	26.52	26.52	27.83	22.68
N <sub>2</sub> - and Ar-Free Heating Value, Btu/SCF	200.35	158.80	149.16	162.01	134.99
Specific Gravity (Air = 1.000)	1.0095	1.0203	1.0241	1.0209	1.0189
Laboratory Agglomeration Test of Residue Char at 1400°F	Free-Flowing	Free-Flowing	Free-Flowing	Free-Flowing	Free-Flowing

\* Not included in average bed temperature.

B7506 1655Y

Table 7-B1, Part 27. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-108	FP-109	FP-110A	FP-111A	FP-112 West Virginia Sewell Seam
Feed Source	Indiana 6th Vein Seam				
Sieve Size, USS	-16+80				
Pretreatment Feed Gas	Air				
Purge Gas	N <sub>2</sub>				
Duration of Test, hr	2.93	5.17	5.08	4.62	4.72
Steady-State Operating Period, min	45-120	62-248	22-283	32-245	18-265
OPERATING CONDITIONS					
Standpipe	3.0				
OD, in.	4.0				
Height, ft					
Reactor Top Pressure, psig	1.88	1.45	1.47	2.10	2.13
Coal Bed Pressure Drop, in. Hg	1.48	1.32	1.43	1.72	2.36
Bed Temperatures, °F					
Bottom	(813)*	(817)*	(811)*	(806)*	(816)*
1/2 ft	814	820	811	806	816
1 ft	814	822	813	806	816
1-1/2 ft	814	824	814	807	816
2 ft	814	825	815	807	817
4 ft	(820)*	826	(818)*	(809)*	819
6 ft	(818)*	(816)*	(802)*	(794)	(805)*
Average	814	824	813	806	817
Coal Rate (Dry), lb/hr	103.71	104.64	106.52	92.40	98.69
Air Rate, SCF/hr	1419.0	1417.8	1427.5	1479.0	1484.4
Nitrogen Rate, SCF/hr	0.0	0.0	0.0	0.0	0.0
Oxygen Concentration, %	21.0	21.0	21.0	21.0	21.0
Nitrogen Purge Rate, SCF/hr	4.89	4.98	5.06	5.67	5.18
Bed Inventory, lb	17.0	16.5	18.75	19.75	31.75
Air/Coal Feed Ratio, SCF/lb	12.27	12.75	12.40	14.65	14.88
Air/Coal Bed Ratio, SCF/lb-hr	83.47	85.93	76.13	74.88	46.75
Coal Space Velocity, lb/cu ft-hr	58.27	56.04	58.04	50.90	50.30
Coal Residence Time, min	8.82	8.90	9.77	11.73	19.09
Superficial Feed Gas Velocity, ft/sec	1.75	1.80	1.84	1.79	1.83
Feed Gas Residence Time, min	0.038	0.037	0.036	0.037	0.036
OPERATING RESULTS					
Product Gas Rate, SCF/hr	1360.1	1293.0	1415.0	1413.2	1430.0
Residue Char (Dry), wt % dry coal	69.32	79.39	80.67	80.11	90.10
Cyclone Catch Pot, wt % dry coal	11.36	2.27	2.35	3.33	2.85
Total Residue Char, wt % dry coal	80.68	81.66	83.02	83.44	92.95
Condensate and Scrubber Oils, wt % dry coal	1.22	1.18	0.98	1.67	0.0
Overall Material Balance (Dry), %	92.29	88.59	93.12	92.38	95.66
Carbon Balance, %	87.51	87.64	89.09	91.52	93.02
O <sub>2</sub> Reacted, SCF/lb Coal Fed	2.20	1.95	2.06	2.12	1.75
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	76.8	68.7	73.4	63.2	55.4
PRODUCT GAS PROPERTIES					
Gas Composition, mole %					
Nitrogen	81.9	82.1	81.2	81.1	81.1
Carbon Monoxide	2.5	2.6	2.6	2.6	2.6
Oxygen	5.1	6.9	7.9	8.0	9.7
Carbon Dioxide	7.9	6.0	5.8	6.0	4.7
Hydrogen	0.3	0.1	0.1	0.1	0.1
Argon	1.01	1.02	0.99	1.01	0.98
Methane	0.7	0.7	0.7	0.5	0.4
Ethane	0.2	0.2	0.2	0.2	0.1
Propene†	0.4	0.4	0.5	0.5	0.3
Total	100.01	100.02	99.99	100.01	99.98
Heating Value, Btu/SCF	29.47	29.15	31.67	29.68	21.87
N <sub>2</sub> - and Ar-Free Heating Value, Btu/SCF	172.43	172.66	177.85	165.91	122.03
Specific Gravity (Air = 1.000)	1.0235	1.0173	1.0177	1.0201	1.0159
Laboratory Agglomeration Test of Residue at 1400°F	Very Lightly Caked	Free-Flowing	Free-Flowing	Free-Flowing	Lightly Caked

\* Not included in average bed temperature.

B7506 1655Z

Table 7-B1, Part 28. PRETREATMENT TEST DATA FROM THE 10-INCH PDU

Run No.	FP-112	FP-114	FP-115	FP-116	FP-117	FP-118	FP-120
Feed Source	W. Virginia Sewell Seam		Sewell Chars		W. Virginia Sewell Seam		Sewell Chars
Sieve Size, USS mesh	1-72	1-72	4-75	6-75	1-75	109-220	21-490
Pretreatment Feed Gas	Nitrogen						
Purge Gas	Air						
Duration of Test, hr	11-72	11-72	20-271	15-290	9-75	109-220	21-490
Steady-State Operating Period, min	15-271	11-72	20-271	15-290	9-75	109-220	21-490
OPERATING CONDITIONS							
Standpipe	4.0						
OD, in.	4.0						
Height, ft	1.32	1.10	1.50	1.37	1.23	1.31	1.30
Reactor Top Pressure, psig	1.28	2.10	1.80	1.60	1.13	1.55	1.45
Coal Bed Pressure Drop, in. Hg	(841)	(841)	(841)	(841)	(847)	(838)	(814)
Bed Temperatures, °F	845	845	845	845	849	842	815
Bottom	844	845	845	845	850	842	816
1/2 ft	842	845	845	845	851	844	817
1 ft	842	845	845	845	851	844	817
2 ft	842	845	845	845	851	844	817
4 ft	842	845	845	845	851	844	817
6 ft	842	845	845	845	851	844	817
Average	(842)	(845)	(845)	(845)	(851)	(844)	(817)
Coal Rate (Dry), lb/hr	154.75	122.25	107.25	100.76	137.04	115.17	96.63
Air Rate, SCF/hr	137.11	127.75	127.75	1194.0	1313.7	1319.5	1187.7
Nitrogen Rate, SCF/hr	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Nitrogen Concentration, %	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Bed Air Velocity, ft/sec	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Air/Coal Ratio, SCF/lb	0.88	1.06	1.20	11.83	9.50	11.34	12.22
Air/Coal Bed Ratio, SCF/lb-hr	76.62	127.62	127.62	38.83	55.90	58.00	33.00
Coal Space Velocity, 1/cu ft-hr	13.29	16.87	16.87	58.89	69.70	58.64	49.00
Coal Residence Time, min	4.52	3.56	3.56	16.27	11.73	16.22	22.22
Superficial Feed Gas Velocity, ft/sec	1.25	1.27	1.27	1.49	1.42	1.35	1.53
Feed Gas Residence Time, min	0.037	0.034	0.034	0.045	0.038	0.034	0.044
OPERATING RESULTS							
Product Gas Rate, SCF/hr	137.8	153.7	132.1	119.5	130.5	139.5	115.0
Residue Char (Dry), wt % dry coal	81.33	76.62	85.12	79.22	87.42	87.42	94.26
Cyclone Catch Pot., wt % dry coal	10.17	6.04	10.80	2.51	4.13	4.30	1.96
Total Residue Char, wt % dry coal	91.40	75.09	96.02	76.77	92.17	91.72	96.22
Condensate and Scrubber Oils, wt % dry coal	0.02	0.0	0.0	0.0	0.0	0.0	0.0
Overall Material Balance (Dry), %	96.62	85.60	97.74	96.74	97.05	93.82	95.728
Carbon Balance, %	90.99	77.40	76.30	100.35	97.02	93.21	99.66
O <sub>2</sub> Reacted, SCF/lb Coal Fed	1.61	1.66	1.78	1.35	1.48	1.61	1.34
O <sub>2</sub> Reacted, % of O <sub>2</sub> Fed	87.98	69.49	66.92	54.42	74.24	67.45	52.18
PRODUCT GAS PROPERTIES							
Gas Composition, mole %							
Nitrogen	21.2	21.5	21.5	21.5	21.7	21.7	21.7
Carbon Monoxide	2.5	2.2	2.7	2.6	2.0	2.0	2.0
Oxygen	2.2	2.2	7.0	10.1	5.4	6.4	10.3
Carbon Dioxide	1.2	0.5	0.2	0.1	0.6	0.4	0.1
Hydrogen	1.0	0.9	1.01	0.9	0.99	0.67	0.96
Methane	0.2	0.2	0.6	0.1	0.7	0.5	0.2
Ethane	0.6	0.5	0.4	0.1	0.2	0.1	0.0
Propane	100.00	99.99	100.01	100.00	99.99	99.99	99.99
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Heating Value, Btu/SCF	121.55	121.54	121.54	121.54	121.54	121.54	121.54
Net SCF	253.20	253.20	253.20	253.20	253.20	253.20	253.20
Specific Gravity (Air = 1.000)	1.0124	1.0124	1.0124	1.0124	1.0124	1.0124	1.0124
Laboratory Agglomeration Test	Caked	Lightly Caked	Free-Flowing	Very Free-Flowing	Lightly Caked	Free-Flowing	Free-Flowing
of Residue at 2400°F							

\* Not included in average bed temperature.

E7506 1655AA

Table 7-B1, Part 29. PRETREATMENT TEST DATA  
FROM THE 10-INCH PDU

Run No.	FP-139	FP-140
Feed Source	Nicholas Co. Sewell Seam	Product of Run 139
Sieve Size, USS mesh	-10 + 80	-10 + 80
Pretreatment Feed Gas	Nitrogen + Air	Nitrogen + Air
Purge Gas	Nitrogen	Nitrogen
Duration of Test, hr	14.42	9.40
Steady-State Operating Period, Min	65-828	0-565
OPERATING CONDITIONS		
Standpipe		
OD, in.	3	3
Height, ft	4	4
Reactor Top Pressure, psig	1.48	3.05
Coal Bed Pressure, Drop, in. Hg	4.56	4.50
Bed Temperatures, °F		
Bottom	(740) *	(847) *
1/2 ft	772	854
1 ft	774	853
1-1/2 ft	797	829
2 ft	778	855
4 ft	784	855
6 ft	(824) *	(854) *
Average	781	849
Coal Rate (Dry), lb/hr	111.63	112.05
Air Rate, SCF/hr	1115	1095
Nitrogen Rate, SCF/hr	328	356
Oxygen Concentration, %	16.2	15.8
Nitrogen Purge Rate, SCF/hr	4.1	4.1
Bed Inventory, lb	33.25	22.0
Air/Coal Feed Ratio, SCF/lb	9.99	9.77
Air/Coal Bed Ratio, SCF/lb-hr	33.53	49.77
Coal Space Velocity, lb/cu ft-hr	56.95	56.93
Coal Residence Time, min	18.09	11.88
Feed Gas Residence Time, min	0.038	0.039
Superficial Feed Gas Velocity, ft/sec	1.76	1.70
OPERATING RESULTS		
Product Gas Rate, SCF/hr	Not Metered	Not Metered
Residue Char (Dry), wt % dry coal	76.17	77.50
Cyclone Catch Pot, wt % dry coal	9.85	No Data
Total Residue Char, wt % dry coal	86.02	--
Condensate and Scrubber Oils, wt % dry coal	No Data	No Data
Overall Material Balance Dry %	--	--
Carbon Balance, %	--	--
O <sub>2</sub> reacted, SCF/lb	2.097	2.051
O <sub>2</sub> reacted, %	--	--
PRODUCT GAS PROPERTIES		
Gas Composition, mole %	No Gas Samples	No Gas Samples
Nitrogen		
Carbon Monoxide		
Oxygen		
Carbon Dioxide		
Hydrogen		
Argon		
Methane		
Ethane		
Propane		
Total		
Heating Value, Btu/SCF		
N <sub>2</sub> - and Ar-Free Heating Value, Btu/SCF		
Specific Gravity (Air = 1.000)		
Laboratory Agglomeration Test of Residue at 1400°F	Fused	Lightly Caked

\* Not included in average bed temperature

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Table 7-B2, Part 1. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-4A		FP-5		FP-6			
	Feed	Residue	Feed	Residue	Feed	Residue		
Sample								
Proximate Analysis, wt %								
Moisture	1.6	0.8	1.8	0.5	1.9	0.5		
Volatile Matter	31.6	32.1	33.2	29.9	32.8	31.0		
Fixed Carbon	57.5	56.7	58.2	57.2	58.9	56.4		
Ash	9.3	10.4	6.8	12.4	6.4	12.1		
Total	100.0	100.0	100.0	100.0	100.0	100.0		
Ultimate Analysis (dry), wt %								
Carbon	74.7	73.6	77.6	72.0	78.4	72.1		
Hydrogen	5.01	4.87	5.24	4.79	5.30	4.99		
Nitrogen *	--	--	--	--	--	--		
Oxygen *	--	--	--	--	--	--		
Sulfur *	--	--	--	--	--	--		
Ash	9.42	10.47	6.97	12.51	6.54	12.18		
Screen Analysis, USS, wt %								
+10	0.2	0.0	0.0	0.0	0.0	0.0		
+12	2.1	5.0	0.0	2.2	0.0	2.6		
+16	7.5	16.7	2.4	9.3	3.4	10.5		
+20	13.6	20.5	17.3	15.7	21.2	22.1		
+30	26.8	24.2	30.1	29.8	31.3	30.4		
+40	35.1	21.1	25.7	28.5	22.6	21.0		
+100	14.5	12.0	24.2	14.3	19.4	12.9		
-100	0.2	0.5	0.3	0.2	2.1	0.5		
Total	100.0	100.0	100.0	100.0	100.0	100.0		
Run No.	FP-7		FP-8		FP-9		FP-10	
Sample	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue
Proximate Analysis, wt %								
Moisture	1.0	0.3	0.9	0.3	0.7	0.1	0.4	0.1
Volatile Matter	34.0	32.8	34.3	35.7	31.8	31.6	33.1	22.7
Fixed Carbon	48.8	45.1	50.5	52.8	51.9	48.1	51.5	62.0
Ash	16.2	21.8	14.3	11.2	15.6	20.2	15.0	15.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %								
Carbon	67.3	62.5	69.8	71.6	67.9	63.2	68.2	69.6
Hydrogen	4.50	4.67	5.15	4.95	4.85	4.52	4.76	3.86
Nitrogen *	--	--	--	--	--	--	--	--
Oxygen *	--	--	--	--	--	--	--	--
Sulfur *	--	--	--	--	--	--	--	--
Ash	16.37	21.87	14.47	11.21	15.75	20.23	15.05	15.17
Screen Analysis, USS, wt %								
+10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3
+12	0.1	0.3	0.0	0.0	0.0	0.0	0.0	2.9
+16	2.4	4.6	1.8	0.3	1.9	1.5	1.2	8.9
+20	10.6	19.8	9.0	3.7	8.5	7.7	5.8	15.3
+30	21.5	29.7	17.7	9.3	10.7	14.6	11.9	18.0
+40	24.8	23.7	22.9	12.6	11.1	16.6	12.2	14.4
+100	34.0	20.9	33.2	53.5	36.4	42.6	37.5	27.0
-100	6.6	1.0	16.9	20.6	31.4	17.0	32.3	12.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

\* Not analyzed

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Table 7-B2, Part 2. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No. Sample	FP-11		FP-12		FP-13		FP-14		FP-15	
	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver
Proximate Analysis, wt %										
Moisture	1.1	0.3	0.5	0.1	0.8	0.1	1.1	0.1	0.7	0.1
Volatile Matter	32.6	22.7	33.8	34.1	32.3	29.7	34.0	24.9	33.8	26.5
Fixed Carbon	52.3	66.1	49.3	55.1	51.1	48.0	50.1	43.4	49.2	59.9
Ash	14.0	10.9	16.4	10.7	15.8	22.2	14.8	31.6	16.3	13.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %										
Carbon	69.1	73.0	66.8	72.3	67.4	62.2	68.5	53.7	67.0	69.9
Hydrogen	4.81	3.83	4.64	4.91	4.71	4.16	4.76	3.46	4.73	4.01
Nitrogen *	--	--	--	--	--	--	--	--	--	--
Oxygen *	--	--	--	--	--	--	--	--	--	--
Sulfur *	--	--	--	--	--	--	--	--	--	--
Ash	14.19	10.91	16.51	10.69	15.94	22.19	14.93	31.67	16.38	13.48
Screen Analysis, USS, wt %										
+10	0	0.1	0	0	0	0.2	0	0.3	0	0.4
+12	0	0.5	0	0	0	0.1	0	0.2	0	0.4
+16	1.2	3.9	1.2	0.2	1.5	2.1	0.7	3.3	1.5	1.8
+20	6.1	10.5	7.1	2.7	7.3	10.2	3.9	12.6	7.6	5.3
+30	10.3	15.3	11.8	9.3	12.0	16.3	9.8	18.8	13.3	10.1
+40	10.6	15.5	12.3	14.9	12.3	16.4	12.6	17.4	13.9	12.0
+100	33.9	36.2	34.0	51.2	33.2	40.6	40.9	37.0	37.4	35.5
-100	37.9	18.1	33.6	21.7	33.7	14.1	32.1	11.8	26.3	57.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

\* Not analyzed

Table 7-B2, Part 3. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	Sample	FP-16			FP-17			FP-18		
		Feed	Reactor Residue	Receiver	Feed	Reactor Residue	Receiver	Feed	Reactor Residue	Receiver
	Proximate Analysis, wt %									
	Moisture	0.6	0.2	0.2	0.9	0.1	0.9	0.9	0.0	0.0
	Volatile Matter	33.9	29.4	29.8	34.8	30.1	34.9	34.9	30.9	30.9
	Fixed Carbon	50.2	55.9	57.1	48.1	55.2	48.5	48.5	54.5	54.5
	Ash	15.3	14.5	12.9	16.2	14.6	15.7	15.7	14.6	14.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Ultimate Analysis (dry), wt %									
	Carbon	67.8	69.4	69.8	67.3	68.7	67.5	67.5	67.6	67.6
	Hydrogen	4.71	4.48	4.41	4.72	4.36	4.70	4.70	4.27	4.27
	Nitrogen *	--	--	--	--	--	--	--	--	--
	Oxygen *	--	--	--	--	--	--	--	--	--
	Sulfur *	--	--	--	--	--	--	--	--	--
	Ash	15.40	14.48	12.90	16.31	14.63	15.84	15.84	14.59	14.59
	Screen Analysis, USS, wt %									
	+10	0.1	0.1	0.1	0.2	0.8	0.2	0.2	0.8	0.8
	+12	0.1	0.3	0.2	0.1	0.8	0.1	0.1	0.8	0.8
	+16	1.7	2.9	2.2	1.7	2.6	1.7	1.7	2.6	2.6
	+20	8.9	9.4	7.2	8.0	5.5	8.0	8.0	5.5	5.5
	+30	9.9	14.4	11.5	13.4	8.1	13.4	13.4	8.1	8.1
	+40	13.3	14.5	11.8	14.4	7.7	14.4	14.4	7.7	7.7
	+100	37.7	37.2	33.6	37.5	26.9	37.5	37.5	26.9	26.9
	-100	28.5	21.2	33.4	24.7	47.6	24.7	24.7	47.6	47.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	+20						6.3	6.3	6.1	6.1
	+30						8.2	8.2	5.2	5.2
	+40						8.9	8.9	5.1	5.1
	+60						19.4	19.4	12.0	12.0
	+80						11.9	11.9	8.9	8.9
	+100						7.2	7.2	5.7	5.7
	+200						17.9	17.9	18.0	18.0
	+325						8.1	8.1	10.6	10.6
	-325						12.1	12.1	28.4	28.4
	Total						100.0	100.0	100.0	100.0

\* Not analyzed

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Table 7-B2, Part 4. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-19			FP-20			FP-22		
	Feed	Reactor	Residue	Feed	Reactor	Residue	Feed	Reactor	Residue
Sample									
Proximate Analysis, wt %									
Moisture	0.8	0.5	0.7	1.1	0.2	0.6	0.9		0.5
Volatile Matter	32.5	24.7	27.2	34.3	22.5	28.9	32.7		26.5
Fixed Carbon	53.4	65.4	58.4	51.0	33.7	58.2	52.3		61.4
Ash	13.3	9.4	13.7	13.6	43.6	12.3	14.1		11.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0
Ultimate Analysis (dry), wt %									
Carbon	69.6	73.7	68.4	69.4	40.7	68.6	67.6		70.5
Hydrogen	4.76	4.13	4.00	4.79	2.82	40.4	4.62		3.77
Nitrogen *	--	--	--	--	--	--	1.18		1.28
Oxygen *	--	--	--	--	--	--	8.05		9.30
Sulfur *	13.43	9.46	13.83	13.73	43.71†	12.41	4.33		3.53
Ash							14.22		11.62
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.00		100.00
Screen Analysis, USS, wt %									
20	6.2	17.4	7.2	11.6	19.6	6.6			
30	10.0	13.4	5.6	19.9	20.5	8.3			
40	12.0	12.0	8.2	24.2	16.4	9.5			
60	21.5	21.0	16.2	26.4	19.8	18.2			
80	11.0	10.5	14.5	4.1	8.3	10.6			
100	6.9	5.8	6.1	2.1	4.0	6.4			
200	16.0	12.8	19.3	5.2	7.4	18.1			
325	6.8	3.8	11.3	2.3	2.0	8.5			
--325	9.6	3.3	11.6	4.2	2.0	13.8			
Total	100.0	100.0	100.0	100.0	100.0	100.0			100.0
Proximate Analysis, wt %									
Moisture									
Volatile Matter									
Fixed Carbon									
Ash									
Total									
Ultimate Analysis, wt %									
Carbon									
Hydrogen									
Nitrogen									
Oxygen									
Sulfur									
Ash †									
Total									
Screen Analysis, USS, wt %									
+20									
+30									
+40									
+60									
+80									
+100									
+200									
+325									
--325									
Total									

\* Not analyzed

† High ash content due to contamination from carbonized metallic flakes coming from reactor tube

\* Ash corrected for SO<sub>3</sub>

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Table 7-B2, Part 5. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-23		FP-24		FP-25		FP-26	
	Feed	Reactor Residue*	Feed	Reactor Residue	Feed	Reactor Residue	Feed	Reactor Residue
Sample Proximate Analysis, wt %								
Moisture	0.9	0.9	1.2	0.6	1.5	0.6	0.9	0.7
Volatile Matter	34.5	23.2	34.4	28.4	34.2	24.0	35.2	22.7
Fixed Carbon	50.6	64.7	51.1	61.0	51.9	55.5	49.3	35.8
Ash	14.0	11.2	13.2	10.0	12.4	19.9	14.6	40.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %								
Carbon	69.3	71.4	70.2	71.8	71.0	62.9	68.8	45.2
Hydrogen	4.87	3.72	4.98	4.29	4.93	3.52	4.78	3.05
Nitrogen	*	*	*	*	*	*	*	*
Oxygen	*	*	*	*	*	*	*	*
Sulfur	*	*	*	*	*	*	*	*
Ash	14.13	11.31	13.48	10.06	12.55	20.05	14.72	41.12
Screen Analysis, USS, wt %								
+20	49.0	20.4	45.0	31.1	42.9	41.4	42.5	56.2
+30	19.1	16.3	18.8	17.6	19.4	18.9	20.7	21.8
+40	14.1	22.0	16.2	22.3	17.7	17.9	17.4	13.7
+60	10.3	15.6	12.4	17.4	13.8	12.4	13.6	6.6
+80	1.7	4.3	2.0	2.8	1.6	1.9	1.7	0.8
+100	0.7	2.7	0.7	1.2	0.8	0.7	0.5	0.1
+200	1.9	10.7	1.8	3.6	1.5	1.4	1.4	0.3
+225	1.0	5.1	0.7	1.7	0.6	0.7	0.6	0.1
+325	2.2	2.9	2.4	2.2	1.7	4.7	1.6	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

\* Not analyzed

Table 7-B2. Part 6. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-27		FP-28		FP-29		FP-30	
	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver
Sample								
Proximate Analysis, wt %								
Moisture	1.0	0.5	0.4	0.3	1.7	0.3	0.8	0.6
Volatile Matter	35.5	14.0	21.9	17.6	38.4	23.5	20.5	20.2
Fixed Carbon	50.7	55.8	57.1	38.2	47.6	63.2	49.0	62.8
Ash	12.8	29.7	16.1	13.9	12.3	11.9	13.8	14.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %								
Carbon	70.2	59.5	63.52	42.2	70.5	69.9	69.0	69.8
Hydrogen	5.03	2.43	3.20	2.41	4.85	3.50	4.66	3.14
Nitrogen	*	*	*	*	*	*	*	*
Oxygen	*	*	*	*	*	*	*	*
Sulfur	*	*	*	*	*	*	*	*
Ash	12.97	29.87	20.70	11.99	12.51	11.99	14.01	14.11
Screen Analysis, USS, wt %								
+20	45.0	59.0	3.3	16.1	3.6	18.9	5.1	29.4
+30	19.1	15.6	12.4	32.3	23.6	18.6	25.7	25.2
+40	17.7	10.5	26.3	29.4	28.4	22.7	24.7	19.7
+60	14.4	6.6	20.4	15.9	25.2	21.4	23.5	16.7
+80	1.7	2.1	7.9	3.3	10.2	8.6	9.8	5.2
+100	0.2	0.9	4.5	0.8	4.2	3.3	4.5	1.4
+200	0.6	2.0	11.4	1.1	3.3	1.9	3.5	1.3
+325	0.4	1.9	2.7	1.1	0.7	1.1	1.1	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Run No.	FP-31		FP-32		FP-33	
	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver
Sample						
Proximate Analysis, wt %						
Moisture	1.7	0.5	4.0	0.9	3.7	0.5
Volatile Matter	34.8	20.0	39.0	27.5	36.8	24.1
Fixed Carbon	49.8	52.1	51.6	62.7	51.8	70.7
Ash	13.7	27.4	5.4	8.9	5.7	4.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %						
Carbon	69.2	56.2	74.9	73.0	74.5	77.7
Hydrogen	4.70	2.14	5.32	3.88	5.39	3.96
Nitrogen	*	*	*	*	*	*
Oxygen	*	*	*	*	*	*
Sulfur	*	*	*	*	*	*
Ash	13.92	27.54	5.58	9.95	5.88	4.59
Screen Analysis, USS, wt %						
+20	3.7	4.9	3.6	9.4	4.1	12.8
+30	22.4	16.7	20.4	18.6	22.6	20.3
+40	24.8	24.7	24.5	23.1	26.6	23.8
+60	25.5	30.3	27.9	26.2	27.0	25.3
+80	11.7	13.3	13.2	11.2	11.2	10.5
+100	5.2	4.0	6.1	5.5	4.8	3.8
+200	4.3	4.2	4.0	4.3	3.3	2.8
+325	1.1	0.5	0.1	0.3	0.3	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

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\* Not analyzed

Table 7-B2, Part 7. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-34		FP-35C		FP-36	
	Feed	Residue	Feed	Residue	Feed	Residue
Sample	Reactor Residue	Receiver	Reactor Residue	Receiver	Reactor Residue	Receiver
Proximate Analysis, wt %						
Moisture	2.3	1.1	3.5	0.2	4.3	0.4
Volatile Matter	40.9	24.4	40.2	27.9	39.8	39.7
Fixed Carbon	51.7	67.7	51.1	65.8	50.9	58.5
Ash	5.1	6.8	5.2	6.5	5.0	12.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %						
Carbon	74.6	74.8	74.6	76.5	75.2	74.9
Hydrogen	5.56	3.85	5.37	4.24	5.51	4.74
Nitrogen	*	*	*	*	*	*
Oxygen	*	*	*	*	*	*
Sulfur	*	*	*	*	*	*
Ash	5.18	8.70	5.40	6.10	5.15	4.49
Screen Analysis, USS, wt %						
+20	6.9	15.9	4.2	11.7	5.0	3.7
+30	28.8	26.6	20.9	20.0	25.1	27.6
+40	25.1	25.0	23.6	24.4	25.0	23.2
+60	23.3	20.7	26.6	25.5	24.0	26.7
+80	9.2	7.0	13.0	10.8	10.5	12.5
+100	4.1	2.7	6.2	4.1	5.2	6.3
+200	2.4	1.9	5.3	3.1	4.0	5.7
+325	0.1	0.1	0.1	0.3	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Run No.	FP-37		FP-38		FP-39		FP-40	
	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue
Sample	Reactor Residue	Receiver	Reactor Residue	Receiver	Reactor Residue	Receiver	Reactor Residue	Receiver
Proximate Analysis, wt %								
Moisture	1.5	0.4	2.4	0.3	2.0	0.3	2.5	0.3
Volatile Matter	35.5	19.1	40.2	28.2	39.7	26.2	39.9	22.2
Fixed Carbon	50.9	61.4	52.5	66.8	53.0	54.0	53.0	65.5
Ash	12.1	12.1	4.9	4.7	5.3	19.5	4.6	8.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %								
Carbon	71.0	47.4	75.3	79.2	75.1	61.7	75.5	73.6
Hydrogen	5.01	2.72	5.63	5.54	5.48	3.57	5.63	4.18
Nitrogen	*	*	*	*	*	*	*	*
Oxygen	*	*	*	*	*	*	*	*
Sulfur	4.23	6.89	3.53	2.84	3.72	7.39	3.43	3.96
Ash	12.23	38.17	5.00	4.71	5.36	19.52	4.71	8.94
Screen Analysis, USS, wt %								
+20	1.5	9.9	4.5	16.1	5.2	11.7	5.9	9.0
+30	15.7	27.7	23.8	21.5	26.9	25.9	28.3	21.9
+40	23.6	29.9	24.3	17.7	23.7	27.1	26.0	29.3
+60	27.5	20.0	25.4	19.0	22.6	16.1	22.3	24.2
+80	13.6	5.7	11.3	8.7	9.5	4.3	8.0	7.8
+100	6.4	2.3	5.4	4.4	4.6	11.5	3.3	2.9
+200	6.9	2.7	4.5	6.7	6.1	2.5	4.6	4.0
+325	1.7	0.6	0.4	2.4	0.7	0.3	1.0	0.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

B7506 1656F

\* Not analyzed

Table 7-B2, Part 8. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-41		FP-42		FP-43		FP-44	
	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver
Proximate Analysis, wt %								
Moisture	1.3	0.3	1.0	0.1	0.7	1.0	1.1	0.5
Volatile Matter	25.2	27.1	35.9	23.5	28.2	21.8	34.7	18.5
Fixed Carbon	52.4	55.0	51.8	62.7	57.1	62.8	52.5	63.2
Ash	11.1	17.6	11.3	13.7	14.0	14.4	11.7	10.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %								
Carbon	71.3	65.3	71.1	70.7	69.2	69.7	71.1	70.1
Hydrogen	4.99	4.19	4.95	4.06	4.20	3.51	5.01	2.66
Nitrogen	*	*	*	*	*	*	*	*
Oxygen	4.12	4.83	4.02	4.09	3.92	3.47	4.04	5.61
Sulfur	11.22	17.66	11.39	13.76	14.15	14.52	11.88	39.4
ASH								
Screen Analysis, USS, wt %								
+20	3.3	16.1	4.8	15.9	7.6	13.8	3.2	13.7
+30	21.2	25.4	26.0	20.5	14.7	21.4	21.7	30.0
+40	27.0	26.0	25.8	21.5	24.6	25.0	24.6	28.5
+60	28.0	20.3	22.4	19.8	21.6	21.6	26.4	18.1
+80	11.9	6.7	8.8	8.5	11.5	8.3	10.8	6.0
+100	4.9	2.5	3.9	4.2	6.1	3.7	6.1	4.1
+200	3.3	2.4	3.9	4.2	9.3	4.6	4.7	3.7
+325	0.1	0.4	1.5	1.6	3.0	0.9	0.5	0.2
+325	0.2	0.2	1.0	0.9	1.7	0.7	0.4	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (dry), wt %								
Carbon	71.1	45.7	71.6	42.3	71.0	47.6	77.1	77.9
Hydrogen	5.03	2.71	5.11	2.42	4.96	3.03	5.25	4.33
Nitrogen	*	*	*	*	*	*	*	*
Oxygen	4.13	6.77	4.07	7.28	4.03	6.66	1.17	1.83
Sulfur	11.71	39.71	11.95	43.08	12.39	37.42	7.86	6.59
Ash								
Screen Analysis, USS, wt %								
+20	3.6	13.1	14.3	8.3	50.1	42.3	4.0	11.7
+30	20.9	30.0	19.9	30.2	13.1	19.2	21.0	19.7
+40	25.4	26.1	23.4	31.4	9.7	17.4	22.7	25.8
+60	26.2	18.8	26.4	19.5	4.2	10.1	24.4	24.5
+80	11.4	5.9	10.2	5.4	2.1	2.9	12.6	10.0
+100	5.1	2.3	4.3	2.1	2.1	1.2	6.7	4.4
+200	5.6	2.6	4.7	2.1	5.2	2.8	6.2	3.8
+325	1.0	0.6	1.0	0.5	2.9	1.5	1.1	0.7
+325	0.8	0.6	0.8	0.5	3.4	2.6	1.3	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

\* Not analyzed

B7506 16566

Table 7-B2, Part 9. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	Sample	FP-49		FP-50		FP-51		FP-52	
		Feed	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue
	Proximate Analysis, wt %								
	Moisture	1.4	0.1	0	0.1	1.4	0.1	1.4	0.2
	Volatiles Matter	34.2	21.0	21.2	24.7	34.3	18.3	34.8	23.8
	Fixed Carbon	58.0	64.1	59.4	63.1	52.1	44.0	53.0	65.2
	Ash	6.4	14.8	19.4	12.1	12.2	37.6	10.8	9.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Ultimate Analysis (dry), wt %								
	Carbon	78.0	71.7	76.4	71.6	70.5	48.5	72.2	72.2
	Hydrogen	5.35	3.76	3.43	3.98	4.76	2.43	5.14	3.71
	Nitrogen	*	*	*	*	*	*	*	*
	Oxygen	0.98	2.23	4.09	3.57	4.10	5.57	4.03	3.52
	Sulfur	6.54	14.80	19.44	12.14	12.32	37.62	10.99	10.83
	Ash								
	Screen Analysis, USS, wt %								
	+20	2.7	16.6	16.0	17.3	1.8	9.1	3.8	16.9
	+30	18.3	31.7	21.6	19.4	15.7	27.2	22.8	21.5
	+40	23.8	24.0	22.2	21.8	25.7	30.2	21.5	19.9
	+60	27.0	16.8	20.6	21.9	28.6	21.6	22.2	20.7
	+80	13.1	5.2	9.0	10.1	12.7	6.4	11.1	9.7
	+100	6.2	2.3	3.9	3.8	6.0	2.4	6.2	4.6
	+200	6.2	2.7	5.0	4.8	6.3	2.4	7.2	4.8
	+325	1.2	0.5	1.0	0.7	1.5	0.3	1.2	1.2
	-325	1.5	0.2	0.7	0.2	1.7	0.2	2.6	0.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Run No.	Sample	FP-53		FP-54		FP-55		FP-56	
		Feed	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue	Reactor Residue
	Proximate Analysis, wt %								
	Moisture	1.6	0.1	0.9	0.2	0.9	0.1	1.1	0.1
	Volatiles Matter	33.7	18.1	25.8	24.8	33.9	16.5	34.3	18.4
	Ash	13.3	45.4	12.1	11.5	11.7	50.9	12.5	12.2
	Fixed Carbon	51.4	36.4	61.2	63.5	53.5	32.5	52.1	69.3
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Ultimate Analysis (dry), wt %								
	Ash	13.49	45.41	12.26	11.52	11.78	50.98	12.68	12.19
	Carbon	70.2	39.8	69.7	71.7	71.6	36.0	70.1	75.6
	Hydrogen	4.98	2.17	3.77	3.86	5.08	1.91	4.86	4.70
	Sulfur	4.07	6.39	3.51	3.50	3.77	6.13	4.01	3.46
	Screen Analysis, USS, wt %								
	+20	2.0	9.4	16.3	18.0	4.7	8.5	3.0	19.9
	+30	17.9	31.1	19.4	21.6	27.3	32.2	21.6	21.9
	+40	25.1	29.6	20.2	20.7	23.3	29.2	25.4	20.7
	+60	28.0	18.5	22.6	21.4	21.9	16.8	25.4	19.9
	+80	13.2	5.6	10.6	7.4	10.1	5.1	11.4	8.4
	+100	6.2	2.2	4.8	4.2	5.0	2.3	5.5	3.5
	+200	5.8	2.3	4.5	4.3	5.0	3.7	5.4	4.1
	+325	0.9	0.6	0.9	0.3	1.1	1.2	1.0	0.8
	-325	0.9	0.7	0.7	0.1	1.6	1.0	1.3	0.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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\* Oxygen and nitrogen not analyzed

Table 7-B2, Part 10. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-57		FP-58		FP-59		FP-60		FP-61		FP-62		FP-63		FP-64		
	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue
Sample																	
Proximate Analysis, wt %																	
Moisture	1.5	0.6	0.3	1.3	0.1	0.4	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	
Volatile Matter	34.7	17.9	24.8	38.9	24.5	25.6	36.8	24.5	27.7	27.7	27.7	36.8	24.5	27.7	27.7	27.7	
Ash	13.0	16.5	11.6	12.5	27.8	9.7	12.2	11.4	11.4	11.4	11.4	12.2	11.4	11.4	11.4	11.4	
Fixed Carbon	50.8	35.0	63.3	47.2	47.6	64.3	50.1	64.3	60.8	60.8	60.8	50.1	60.8	60.8	60.8	60.8	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Ultimate Analysis (Dry), wt %																	
Ash	13.24	16.78	11.63	12.69	27.84	9.72	12.34	12.69	11.45	11.45	11.45	12.34	11.45	11.45	11.45	11.45	
Carbon	70.6	39.0	71.9	70.8	57.3	70.7	70.2	70.8	71.4	71.4	71.4	70.2	71.4	71.4	71.4	71.4	
Hydrogen	4.87	2.31	3.64	4.89	4.33	3.40	4.99	4.89	4.17	4.17	4.17	4.99	4.17	4.17	4.17	4.17	
Sulfur	3.94	6.69	3.48	4.16	5.08	3.51	4.38	4.16	3.99	3.99	3.99	4.38	3.99	3.99	3.99	3.99	
Screen Analysis, USS, wt %																	
+20	3.6	11.4	11.1	2.5	13.7	21.8	1.2	1.2	11.2	11.2	11.2	1.2	11.2	11.2	11.2	11.2	
+30	24.2	33.9	10.6	20.2	26.6	20.6	16.3	16.3	19.7	19.7	19.7	16.3	19.7	19.7	19.7	19.7	
+40	23.8	28.8	20.4	26.2	19.6	19.6	24.9	26.2	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	
+60	23.5	17.2	35.7	27.2	18.1	21.5	28.6	27.2	24.3	24.3	24.3	28.6	24.3	24.3	24.3	24.3	
+80	10.6	4.6	9.8	12.1	6.9	8.7	13.3	12.1	11.5	11.5	11.5	13.3	11.5	11.5	11.5	11.5	
+100	4.9	1.9	4.4	5.5	3.0	3.4	6.2	5.5	4.5	4.5	4.5	6.2	4.5	4.5	4.5	4.5	
+200	5.9	1.9	6.3	5.6	5.3	1.5	7.0	5.6	6.1	6.1	6.1	7.0	6.1	6.1	6.1	6.1	
+325	1.6	0.3	1.2	0.3	1.6	2.7	1.3	0.3	0.6	0.6	0.6	1.3	0.6	0.6	0.6	0.6	
-325	1.9	0.3	0.2	0.1	1.2	0.2	1.2	0.1	0.3	0.3	0.3	1.2	0.3	0.3	0.3	0.3	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

\* Oxygen and nitrogen not analyzed

Run No.	FP-61		FP-62		FP-63		FP-64		FP-65		FP-66		FP-67		FP-68		
	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue	Reactor Residue	Feed	Reactor Residue
Sample																	
Proximate Analysis, wt %																	
Moisture	0.5	0.2	0.2	1.4	0.0	0.3	1.2	1.2	0.2	0.3	0.3	1.2	0.2	0.3	0.3	0.2	
Volatile Matter	35.4	19.1	25.0	35.9	23.6	24.5	36.3	36.3	16.9	25.7	25.7	36.3	16.9	25.7	25.7	36.3	
Ash	12.1	35.4	9.5	11.6	20.5	10.2	11.7	11.6	50.8	11.7	11.5	11.7	50.8	11.5	11.5	50.8	
Fixed Carbon	52.0	45.3	65.3	51.1	55.9	65.1	50.8	50.8	30.7	62.5	62.5	50.8	30.7	62.5	62.5	50.8	
Ultimate Analysis (Dry), wt %																	
Ash	12.19	35.45	9.55	11.81	20.53	10.21	11.69	11.69	50.93	11.51	11.51	11.69	50.93	11.51	11.51	50.93	
Carbon	69.9	49.4	73.89	70.9	64.0	71.5	71.5	71.5	34.1	71.1	71.1	71.5	34.1	71.1	71.1	71.5	
Hydrogen	4.87	2.60	3.89	4.99	3.53	3.80	5.02	5.02	8.94	3.82	3.82	5.02	8.94	3.82	3.82	5.02	
Sulfur	4.52	6.33	3.31	4.19	4.36	3.56	4.42	4.42	8.94	4.10	4.10	4.42	8.94	4.10	4.10	4.42	
Screen Analysis, USS, wt %																	
+20	0.8	11.5	20.5	1.8	13.7	17.1	1.6	1.6	9.1	13.2	13.2	1.6	9.1	13.2	13.2	1.6	
+30	11.1	31.7	21.5	16.0	24.4	20.8	15.2	15.2	25.4	19.3	19.3	15.2	25.4	19.3	19.3	15.2	
+40	23.2	27.0	19.4	21.2	23.7	19.7	21.3	21.3	30.9	23.4	23.4	21.3	30.9	23.4	23.4	21.3	
+60	15.1	18.3	20.2	12.7	21.0	21.1	26.6	26.6	21.3	23.4	23.4	26.6	21.3	23.4	23.4	26.6	
+80	7.7	5.7	8.8	12.7	7.7	9.3	11.7	11.7	5.7	9.2	9.2	11.7	5.7	9.2	9.2	11.7	
+100	8.6	3.1	4.3	9.1	4.4	6.0	8.9	8.9	3.5	7.4	7.4	8.9	3.5	7.4	7.4	8.9	
+200	1.5	0.3	0.5	2.4	0.8	0.9	3.0	3.0	0.8	1.6	1.6	3.0	0.8	1.6	1.6	3.0	
+325	1.3	0.1	0.2	2.2	0.4	0.3	4.6	4.6	0.6	0.3	0.3	4.6	0.6	0.3	0.3	4.6	
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

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Table 7-B2, Part 11. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-65		FP-66		FP-67		FP-68	
	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver
Sample:								
Proximate Analysis, wt %								
Moisture	0.9	0.2	0.7	0.2	0.5	0.2	0.2	0.4
Volatile Matter	33.4	26.5	25.6	15.5	23.6	21.1	21.1	27.2
Ash	12.2	9.8	10.4	49.9	9.7	39.3	10.4	10.4
Fixed Carbon	52.5	62.5	62.2	34.4	66.2	53.2	52.0	62.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)*								
Ash	12.28	9.79	10.46	50.02	9.73	39.36	10.45	10.45
Carbon	71.8	73.3	73.1	43.6	72.7	46.7	73.2	73.2
Hydrogen	4.85	4.19	4.12	2.33	3.10	2.85	4.00	4.00
Sulfur	4.24	3.96	4.02	--	--	--	--	--
Screen Analysis, USS, wt %								
+20	6.7	20.0	22.6	12.9	17.6	17.2	18.6	18.6
+40	35.3	19.4	19.6	31.7	17.5	33.3	19.8	19.8
+60	27.2	20.2	19.6	27.7	20.8	23.2	18.6	18.6
+80	17.7	22.3	19.6	18.9	21.5	15.3	20.9	20.9
+100	5.5	8.9	7.6	4.1	8.4	5.0	9.3	9.3
+200	2.7	4.7	4.0	1.9	4.5	2.5	4.8	4.8
+325	3.3	4.2	5.1	2.2	7.6	2.7	6.5	6.5
+525	0.8	0.3	0.2	0.2	0.8	0.5	0.9	0.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

\* Oxygen, nitrogen, and sulfur not analyzed  
 † Sample lost.

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Run No.	FP-69		FP-70		FP-71A		FP-72A	
	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver
Sample:								
Proximate Analysis, wt %								
Moisture	0.9	0.3	0.9	0.1	0.5	0.4	1.5	0.5
Volatile Matter	34.1	20.6	31.3	24.9	21.9	25.5	36.1	30.7
Ash	11.8	42.9	12.4	30.3	24.0	10.2	11.4	10.1
Fixed Carbon	52.2	36.2	52.4	44.7	52.9	63.9	51.0	52.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis (Dry), wt %								
Ash	11.91	43.0	12.56	30.31	11.06	10.25	11.52	10.16
Carbon	72.4	50.3	71.0	54.4	70.5	72.8	72.4	71.3
Hydrogen	5.16	3.03	4.8	3.53	4.32	4.26	5.04	4.48
Sulfur	--	--	--	--	--	--	--	--
Screen Analysis, USS, wt %								
+20	4.4	13.8	5.7	2.4	12.2	17.9	6.3	14.8
+40	22.2	22.3	22.9	29.1	20.1	17.3	26.0	20.1
+60	23.8	21.5	23.6	28.6	22.0	21.3	25.4	20.4
+80	23.0	16.8	24.3	22.1	22.3	22.2	24.4	19.1
+100	9.6	5.0	10.2	7.5	9.3	8.5	8.5	7.1
+200	4.9	2.7	5.4	4.3	7.0	6.1	6.1	2.3
+325	6.2	0.8	5.5	4.6	4.0	3.3	0.8	0.9
+525	1.3	0.8	1.0	0.8	1.3	1.0	2.2	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7-B2, Part 12. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No. Sample	FP-73		FP-74		FP-75		FP-76		FP-77			
	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver		
Proximate Analysis, wt %	1.4	0.5	0.6	0.3	2.3	0.8	1.4	0.7	0.4	0.4		
Moisture	35.3	24.3	24.4	27.1	25.2	23.2	25.9	22.2	23.6	23.6		
Volatile Matter	10.8	9.6	13.2	10.5	10.6	11.4	11.3	17.0	9.3	9.3		
Ash	51.9	65.6	61.1	62.1	61.9	61.8	61.4	60.1	66.1	66.1		
Fixed Carbon	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
Total												
Ultimate Analysis, wt %	19.35	32.57	19.7	19.7	19.6	19.6	19.6	19.6	19.6	19.6		
Ash	79.5	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7	72.7		
Carbon	46.6	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0	47.0		
Hydrogen	5.22	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00		
Screen Analysis, USS, wt %	6.2	24.4	18.2	17.9	13.9	10.2	12.9	11.7	20.4	20.4		
+20	24.8	18.9	24.3	20.0	16.2	16.1	16.0	16.0	21.5	21.5		
+30	24.6	19.2	23.0	20.5	20.3	19.3	23.8	24.2	19.7	19.7		
+40	9.3	8.3	10.8	22.2	23.4	24.1	24.4	24.2	20.4	20.4		
+60	4.1	4.1	7.0	10.2	10.0	10.1	10.3	9.5	6.7	6.7		
+80	5.6	4.5	5.0	4.6	5.2	5.2	5.3	4.3	4.2	4.2		
+100	0.9	0.7	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2		
+200	3.4	3.3	4.8	5.4	4.8	5.7	6.1	5.3	4.6	4.6		
+255	1.0	0.4	0.2	0.1	0.2	0.2	0.8	0.4	0.2	0.2		
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
* Not analyzed.												
Run No. Sample	FP-78A		FP-79		FP-80		FP-81		FP-82C		FP-83	
	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver	Feed	Residue Receiver
Proximate Analysis, wt %	1.5	0.3	1.7	0.8	0.9	0.6	0.5	0.6	1.6	0.6	1.4	0.0
Moisture	33.1	26.2	34.8	25.0	22.3	25.6	19.6	25.7	35.5	20.2	37.3	22.2
Volatile Matter	12.7	12.1	11.6	9.5	11.6	11.7	11.1	11.5	11.5	14.7	13.2	19.9
Ash	52.7	60.1	51.9	62.0	54.0	62.1	48.8	62.6	51.4	44.5	50.1	57.9
Fixed Carbon	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total												
Ultimate Analysis (Dry), wt %	12.85	13.10	11.79	9.55	23.04	11.81	11.63	11.21	11.71	34.95	13.22	19.93
Ash	70.2	70.0	71.3	72.6	59.3	71.2	71.4	70.7	70.8	48.8	69.0	62.4
Carbon	4.84	4.20	5.28	4.33	3.13	3.88	5.06	3.88	4.94	2.75	4.94	3.51
Hydrogen	7.6	15.8	7.1	20.9	27.5	21.0	3.5	14.4	4.2	16.9	20.1	29.0
+20	28.4	19.1	25.7	16.8	17.3	19.5	19.5	17.0	22.4	30.6	20.1	29.0
+30	24.1	21.2	21.5	22.0	23.6	21.2	21.2	21.5	20.3	20.3	18.7	19.5
+40	19.3	23.3	23.7	21.8	13.9	21.4	26.3	23.0	13.3	13.3	23.8	22.2
+60	5.7	6.7	7.3	4.7	3.9	8.0	10.1	4.9	4.9	4.9	11.7	8.1
+80	4.9	8.2	7.0	7.2	4.1	5.7	3.2	3.2	2.9	2.9	4.4	2.5
+100	0.6	0.3	0.1	0.6	3.4	3.7	5.2	4.6	4.2	4.0	4.0	1.6
+200	6.9	5.2	3.1	2.0	3.1	1.1	1.5	1.8	3.6	3.6	1.1	1.0
+255	2.2	0.2	0.5	0.2	3.7	0.1	1.2	0.8	2.3	2.3	0.6	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Table 7-B2, Part 13. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	Sample	FP-84A		FP-85		FP-86	
		Feed	Reactor Residue	Reactor Residue	Residue Receiver	Feed	Reactor Residue
	Proximate Analysis, wt %						
	Moisture	1.6	0.7	0.6	0.8	0.9	0.7
	Ash	35.7	22.2	21.3	25.8	24.4	26.5
	Volatile Matter	10.9	11.4	20.2	10.9	11.7	5.0
	Fixed Carbon	51.8	60.3	48.6	62.5	63.0	67.8
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Ultimate Analysis, wt % (dry)						
	Ash	11.03	16.88	11.62	10.93	11.84	5.04
	Carbon	71.5	63.7	70.0	71.2	70.0	75.0
	Hydrogen	4.93	3.32	3.70	3.69	3.47	3.72
	Screen Analysis, USS, wt %						
	+20	4.4	26.6	19.8	31.5	11.1	8.7
	+30	25.8	23.8	21.3	22.8	22.4	16.4
	+40	26.4	19.7	19.8	20.0	25.3	19.0
	+60	26.9	15.8	21.4	16.9	22.1	25.1
	+80	9.1	4.7	10.3	6.1	23.4	15.3
	+100	3.2	1.8	3.5	1.4	11.5	6.2
	+200	3.3	3.0	3.0	1.1	4.4	9.9
	+325	0.6	3.4	0.6	0.2	4.5	0.7
	-325	0.3	1.2	0.2	0.0	0.3	0.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0

Run No.	Sample	FP-87		FP-88		FP-89A	
		Feed	Reactor Residue	Reactor Residue	Residue Receiver	Feed	Reactor Residue
	Proximate Analysis, wt %						
	Moisture	2.1	0.6	0.6	0.6	1.9	0.6
	Volatile Matter	39.2	23.2	38.2	22.9	33.2	24.0
	Ash	5.6	17.7	6.0	14.3	7.0	6.3
	Fixed Carbon	53.1	58.5	53.2	62.2	57.9	69.1
	Total	100.0	100.0	100.0	100.0	100.0	100.0
	Ultimate Analysis, wt % (dry)						
	Ash	5.73	17.77	6.19	14.36	7.1	6.32
	Carbon	74.4	64.8	74.5	67.7	74.2	75.3
	Hydrogen	5.64	3.43	5.55	3.36	5.35	3.95
	Screen Analysis, USS, wt %						
	+20	4.4	13.3	3.7	21.1	4.1	20.5
	+30	27.8	25.3	8.8	25.3	26.6	24.8
	+40	29.8	27.7	33.0	23.1	24.4	21.5
	+60	24.4	19.6	30.2	25.8	22.6	15.0
	+80	7.3	7.8	15.7	14.8	25.1	14.2
	+100	2.2	2.0	6.4	3.5	12.4	2.3
	+200	3.0	2.1	4.9	2.7	3.6	1.3
	+325	0.4	2.5	3.1	0.4	2.4	0.2
	-325	0.7	0.6	0.2	0.1	0.2	0.0
	Total	100.0	100.0	100.0	100.0	100.0	100.0

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Table 7-B2, Part 15. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-101B		FP-102D		FP-105		FP-106		FP-107	
	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue
Sample										
Proximate Analysis, wt %										
Moisture	12.3	0.9	8.1	0.0	8.1	0.0	0.1	0.0	10.4	1.0
Volatile	33.7	20.0	34.0	22.1	34.0	22.1	25.6	23.5	32.7	21.8
Ash	9.3	11.0	8.6	13.1	8.6	13.1	10.9	9.9	8.8	12.7
Fixed Carbon	44.7	62.4	49.2	64.8	49.2	64.8	62.4	63.2	48.1	64.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)										
Ash	10.56	9.74	9.41	13.18	9.41	13.18	10.89	10.89	9.86	12.79
Carbon	69.8	74.0	69.8	68.6	69.8	68.6	70.9	70.9	72.5	71.2
Hydrogen	5.11	3.42	4.56	3.02	4.56	3.02	3.76	3.76	5.17	3.84
Screen Analysis, USS, wt %										
+20	30.6	54.4	12.7	9.0	12.7	9.0	17.4	17.4	10.0	10.0
+30	21.6	16.2	32.0	9.4	32.0	9.4	17.5	17.5	32.7	21.8
+40	17.5	12.2	21.7	28.4	21.7	28.4	23.6	23.6	8.8	12.7
+60	17.9	10.8	18.6	32.9	18.6	32.9	24.3	24.3	48.1	64.5
+80	6.7	7.4	9.3	10.9	9.3	10.9	8.7	8.7	10.4	1.0
+100	3.1	3.1	3.5	4.0	3.5	4.0	3.7	3.7	12.7	12.7
+200	2.0	1.1	1.9	3.4	1.9	3.4	3.0	3.0	100.0	100.0
+225	0.2	0.4	0.2	1.1	0.2	1.1	1.0	1.0	100.0	100.0
+255	0.4	0.7	0.1	0.2	0.1	0.2	0.8	0.8	100.0	100.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Run No.	FP-103		FP-104		FP-105		FP-106		FP-107	
	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue
Sample										
Proximate Analysis, wt %										
Moisture	5.8	0.4	0.3	0.4	0.4	0.3	0.2	0.2	10.4	1.0
Volatile	35.7	23.3	27.3	33.7	19.1	23.2	21.7	23.5	32.7	21.8
Ash	9.7	10.7	9.3	9.6	27.1	12.5	12.8	10.1	8.8	12.7
Fixed Carbon	48.8	65.6	64.3	47.3	53.4	64.0	65.3	65.5	48.1	64.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)										
Ash	10.35	10.7	9.30	10.58	27.22	12.58	12.84	10.13	9.86	12.79
Carbon	66.2	71.9	70.9	71.2	53.5	69.9	71.4	73.3	72.5	71.2
Hydrogen	2.62	3.54	2.95	4.61	2.63	3.64	3.65	3.79	5.17	3.84
Screen Analysis, USS, wt %										
+20	5.8	18.3	9.7	15.6	12.1	12.1	16.7	11.7	7.0	14.2
+30	3.5	12.5	4.6	18.7	21.2	4.5	20.6	16.6	29.0	19.6
+40	26.0	20.8	21.4	27.3	25.6	23.1	26.2	19.8	26.2	21.2
+60	34.1	23.7	31.5	26.7	22.1	29.8	21.6	27.6	23.4	19.7
+80	15.2	10.7	14.0	11.7	7.6	11.2	6.1	12.2	8.0	18.6
+100	6.7	4.9	6.1	5.3	3.3	5.3	3.2	5.6	3.5	2.6
+200	2.2	4.9	3.5	6.2	3.1	7.8	5.2	6.1	2.3	2.1
+225	0.2	1.5	2.1	1.6	3.6	2.4	1.6	0.2	0.2	0.6
+255	0.3	1.7	2.8	1.4	1.1	3.2	3.2	0.2	0.4	1.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7-B2, Part 16. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No.	FP-108		FP-109		FP-110A		FP-111A		FP-112	
	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue
Sample										
Proximate Analysis, wt %										
Moisture	10.3	0.5	5.9	0.1	7.5	0.0	5.5	0.1	1.1	0.2
Volatiles	51.3	23.4	34.9	23.2	34.3	19.4	23.7	20.2	20.2	15.4
Ash	8.6	10.4	7.9	9.3	8.1	23.1	9.4	22.7	2.7	2.7
Fixed Carbon	49.2	58.1	51.3	67.4	50.1	57.5	66.8	57.0	5.8	51.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)										
Carbon	9.57	21.84	8.35	25.15	8.78	23.14	3.47	22.79	2.77	2.47
Hydrogen	73.3	64.5	73.6	57.5	73.6	60.6	73.7	61.1	97.4	85.3
	4.84	3.53	4.94	2.74	4.77	3.29	4.10	2.81	4.83	3.52
Screen Analysis, USS, wt %										
+20	3.4	12.2	3.8	21.3	4.9	21.4	17.2	11.7	1.8	7.8
+30	20.7	14.8	21.4	22.6	21.4	27.6	18.9	25.4	15.1	14.4
+40	25.2	19.3	28.5	24.5	25.1	25.4	24.1	28.4	22.7	22.6
+60	25.3	19.3	28.2	20.2	11.4	16.3	22.9	20.6	31.2	28.3
+80	8.6	7.7	10.8	5.8	11.4	5.0	9.4	6.7	15.3	13.4
+100	4.2	3.7	4.7	2.2	5.8	1.8	7.1	3.1	7.9	6.3
+200	5.1	7.9	1.9	1.8	4.3	1.6	2.7	0.9	4.9	5.3
+325	0.3	0.3	0.3	0.7	1.0	0.3	0.5	0.9	0.2	0.4
-325	7.2	3.9	0.4	0.9	1.3	0.6	0.5	0.8	0.4	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Run No.	FP-113		FP-114		FP-115		FP-116	
	Feed	Residue	Feed	Residue	Feed	Residue	Feed	Residue
Sample								
Proximate Analysis, wt %								
Moisture	2.0	0.1	2.2	0.1	0.3	0.3	0.3	0.2
Volatiles	15.3	13.3	18.7	12.4	15.4	16.2	17.4	16.8
Ash	2.5	7.9	3.4	6.7	2.5	2.3	2.7	2.3
Fixed Carbon	76.7	78.7	75.7	80.8	81.8	81.2	79.7	80.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)								
Ash	2.52	7.97	3.51	6.69	2.52	2.36	2.68	2.23
Carbon	88.1	83.2	87.5	85.0	85.7	83.3	85.7	85.3
Hydrogen	4.45	3.37	4.40	3.22	3.65	3.49	3.55	3.21
Screen Analysis, USS, wt %								
+20	2.2	8.1	2.8	7.2	3.7	2.9	6.9	6.5
+30	13.9	8.8	13.6	11.5	3.2	2.9	11.3	13.7
+40	22.5	18.4	23.7	23.6	2.2	14.1	16.4	22.3
+60	23.1	24.5	26.7	26.7	30.7	24.0	25.0	26.2
+80	11.7	12.9	11.5	14.8	18.6	19.3	15.0	14.7
+100	6.3	8.1	6.2	6.1	7.1	8.8	7.8	5.5
+200	10.5	13.0	9.8	8.9	11.6	20.3	14.6	8.2
+325	7.0	2.5	3.7	2.2	1.7	2.1	2.1	1.8
-325	0.6	3.7	0.0	2.4	2.0	0.6	0.9	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Table 7-B2, Part 17. PRETREATMENT ANALYSIS DATA FROM THE 10-INCH PDU

Run No. Sample	FP-117		FP-118		FP-120	
	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver
Proximate Analysis, wt %						
Moisture	0.9	0.2	1.0	0.3	0.6	0.3
Volatiles Matter	18.9	15.5	18.7	13.9	16.6	16.1
Ash	2.2	1.9	2.1	2.0	2.5	2.6
Fixed Carbon	78.0	82.4	78.1	81.7	80.3	80.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)						
Ash	2.26	1.93	2.20	2.13	2.50	2.62
Carbon	88.9	90.2	88.4	87.5	84.2	84.9
Hydrogen	3.68	3.43	3.18	3.88	3.36	3.21
Screen Analysis, USS, wt %						
+20	3.0	5.5	2.0	8.7	5.3	6.3
+30	18.3	11.8	15.0	15.4	12.6	17.8
+40	29.0	19.0	23.8	23.7	21.0	26.1
+60	27.6	27.5	27.6	28.2	27.6	26.7
+80	12.5	16.9	16.0	12.0	16.4	12.9
+100	4.3	6.6	6.0	3.9	6.0	4.5
+200	4.0	10.8	6.5	4.8	8.5	4.7
+325	0.7	1.2	1.8	1.1	0.6	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Run No. Sample	FP-139		FP-140	
	Feed	Reactor Residue Receiver	Feed	Reactor Residue Receiver
Proximate Analysis, wt %				
Moisture	1.2	0.8	0.8	1.2
Volatiles Matter	27.8	24.8	24.8	19.3
Ash	4.0	3.7	3.7	4.0
Fixed Carbon	67.0	70.7	70.7	75.5
Total	100.0	100.0	100.0	100.0
Ultimate Analysis, wt % (dry)				
Ash	4.00	3.78	3.78	4.07
Carbon	83.2	79.6	79.6	81.6
Hydrogen	4.90	4.37	4.37	3.87
Screen Analysis, USS, wt %				
+20	13.8	19.7	19.7	17.0
+30	13.4	14.8	14.8	13.1
+40	15.6	16.9	16.9	19.8
+60	20.1	23.0	23.0	28.3
+80	10.0	10.9	10.9	13.6
+100	3.9	3.9	3.9	3.8
+200	10.8	9.2	9.2	4.0
+325	4.9	1.3	1.3	0.3
Total	100.0	100.0	100.0	100.0

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