ADVANCED LIQUEFACTION USING COAL SWELLING
AND CATALYST DISPERSION TECHNIQUES

DOE/PC/91051--T1

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For

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Pittsburgh, Pennsylvania

By

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EXECUTIVE SUMMARY

Research in this project centers upon developing a new approach to the direct liquefaction of coal to produce an all-distillate product slate at a sizable cost reduction over current technology. The approach integrates all aspects of the coal liquefaction process including coal selection, pretreatment, coal swelling with catalyst impregnation, coal liquefaction experimentation, product recovery with characterization, alternate bottoms processing, and a technical assessment including an economic evaluation. The project is being carried out under contract to the United States Department of Energy.

The Department of Energy has not yet authorized starting the experimental aspects of this and other similar projects; specifically, approval of the National Environmental Policy Act (NEPA) requirements. Therefore, work has centered upon the following: 1) preparing and obtaining approval of the Project Management Plan, Milestone Schedule/Manpower Plan, Cost Plan, and the Notice of Energy R&D Project, 2) negotiating contracts to be signed with subcontractors after the NEPA approvals, 3) obtaining bulk samples of feedstocks for the project, 4) up-dating the background literature, 5) and preparing and testing a computer program to perform material balance calculations for the continuous flow liquefaction unit.

PROGRAM OBJECTIVES

The objective of this project is to develop a new approach to the direct liquefaction of coal to generate an all-distillate product slate at a sizable cost reduction over current technology. The approach will integrate all aspects of the coal liquefaction process including coal selection, pretreatment, coal swelling with catalyst impregnation (and parallel runs with dispersed catalyst), coal liquefaction experimentation including solvent evaluation, product recovery with characterization, alternate bottoms processing, and a technical assessment including an economic evaluation. The three tasks of this program are:

1. Task 1: Laboratory-Scale Experimentation--The goals are to obtain samples of coals and Wilsonville-derived solvents and vacuum tower bottoms and to establish experimental procedures.

2. Task 2: Laboratory-Scale Operation--The goals are to:
(1) reduce the concentration of mineral matter and alkali metals in low rank coals, (2) swell and impregnate coals with dispersed catalysts, (3) characterize the resulting catalyst solids, (4) evaluate the effectiveness of the procedures using liquefaction runs, and (5) study solids separation and alternative bottoms handling, which includes observing pumping characteristics, deasphalting and coking.

3. Task 3: Technical Assessment--The goals are to analyze the data, develop descriptive models, and carry out an economic evaluation.

The research will be carried out in cooperation with the following subcontractors: Foster Wheeler Development Corporation, Auburn University, Pennsylvania State University, and Hazen Research Incorporated. Appropriate meetings and correspondence will be maintained to insure effective completion of the project.

PROGRAM MILESTONES

The first key milestone is to obtain the appropriate feed stocks for the experiments. The second milestone is preparing the beneficiated bulk samples of coal for subsequent experiments. This will be done within the first quarter after the start of experimentation. In the meantime, the small-scale coal swelling and catalyst screening program will also start. Sufficient data must be obtained from the latter program to establish conditions for bench-scale liquefaction experiments to start during the fourth quarter. The batch deasphalting and coking experiments will be completed by the end of the fifth quarter. Experimentation should be essentially complete by the end of the seventh quarter in order to complete the project within the two year schedule. Again, it is noted that experimentation has not started yet, pending approval of the NEPA requirements by DOE. The two year schedule starts with such approval.

SUMMARY OF RESULTS AND ACTIVITY

Activity has been limited to carrying out non-experimental work covered under Subtasks 1.1 and 2.2.

Subtask 1.1: Laboratory Support

The following documentation has been completed:

- 1) Project Management Plan,
- 2) Milestone Schedule/Manpower Plan,
- 3) Cost Plan,
- 4) Notice of Energy R&D Project.

Draft copies were submitted to the DOE project manager, Dr. Baird, and approval was received during a joint meeting of December 4.

Fresh, bulk samples of Black Thunder subbituminous coal and Martin Lake Texas lignite were obtained from the mines. Samples have been submitted to commercial laboratories for standard analyses.

Sufficient quantities of coal-derived liquids (atmospheric tower bottoms and solvent) have been obtained from Wilsonville in order to complete this project. A bulk sample of Wilsonville atmospheric tower bottoms derived from the liquefaction of Black Thunder subbituminous coal has been sent to Foster Wheeler Development Corporation so that it will be available when the start of experimentation is authorized by DOE.

The literature concerning coal swelling and coal liquefaction using dispersed catalysts has been up-dated using Amoco's library computer search facilities.

Subtask 2.1: Laboratory Support

The material balance program for the continuous flow unit, AU-44, has been written for a moderate-sized PC in Lotus 123R22. This program has been tested using data generated under a previous DOE contract (DE-AC22-88PC88819). A print-out of the entire spreadsheet of the run with four operating periods is attached in Appendix I.

CONCLUSIONS AND FUTURE WORK

After approval of the NEPA form by the Department of Energy, experimentation is ready to get underway. Feedstocks have been obtained and the necessary documentation is essentially complete.

ACKNOWLEDGMENTS

This work is being supported by the United States Department of Energy under Contract DE-AC22-91PC91051. Appreciation is particularly extended to Mr. C. Gutterman of Foster Wheeler Development Corporation, Dr. C. W. Curtis of Auburn University, and Dr. S. Chander of Pennsylvania State University for participating in contract negotiations and preparing to initiate work in this project.

APPENDIX I

Computer spreadsheet of the AU-44 continuous flow liquefaction unit.

REPORT: (SUMMARY OF EXTRACTIONS)
 BOOK#: 14554 November, 1991
 COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.
 CATALYST: None *

DATE: 03/03/92

REPORT:	Extraction No	104	103	138	106	
Description:	Run No.-----	95C	93C	97C	99C	Comments
CONDITIONS:	PSIG	2000	2000	2000	2000	
Temperature, F	(F)	750.0	800.0	750.0	800.0	
Space Time, min	Min	31.0	30.2	22.8	23.3	
Hydrogen (Brooksset)	SCFH	13.3	14.0	10.9	10.9	
Lineout Time, Hr	Hrs	6.2	6.6	4.3	2.3	
Run Time, after lineout	Hrs	4.1	4.2	2.9	3.3	

MATERIAL BALANCE:

Feed Rate (L/O+Run)	Gm/Hr	527.99	542.27	719.59	701.62
Slurry Product	Gm/Hr	505.22	495.75	675.25	643.84
Light Ends	Gm/Hr	0.11	0.11	0.13	0.44
C1-C3 Gases	Gm/Hr	1.44	4.28	0.86	3.61
C4+ Gases	Gm/Hr	0.73	2.60	0.45	1.98
Carbon Monoxide	Gm/Hr	0.40	0.65	0.27	0.69
Carbon Dioxide	Gm/Hr	4.18	4.59	2.67	4.58
Water	Gm/Hr	49.44	41.44	39.86	78.09
Recovery	(%)	106.4%	101.3%	100.0%	104.5%

YIELD: (Based on MAF Total Feed)

Hexane Solubles	Wt%	77.18	78.88	79.64	77.44
Asphaltenes	Wt%	6.99	11.30	6.03	10.35
Preasphaltenes	Wt%	3.52	1.87	2.71	2.64
Hexane Insoluble Fee	Wt%	22.82	21.12	20.36	22.56
TOL Insoluble MAF Fee	Wt%	15.83	9.82	14.33	12.21
THF Insoluble MAF Fee	Wt%	12.32	7.95	11.62	9.56

YIELD: (Based on MAF Coal Only)

Asphaltenes	Wt%	26.97	43.59	23.28	39.95
Preasphaltenes	Wt%	13.57	7.23	10.45	10.20
THF Solubles (MAF	Wt%	52.48	69.33	55.18	63.10
Hexane Insoluble (MAF	Wt%	88.06	81.50	78.55	87.05
TOL Insolubles (MAF	Wt%	61.09	37.90	55.27	47.10
THF Insolubles (MAF	Wt%	47.52	30.67	44.82	36.90
Light Ends	Wt%	0.00	0.00	0.00	0.00
C1+C2+C3 Gases	Gm/Hr	1.44	4.28	0.86	3.61
C4+C5+C6 Gases	Gm/Hr	0.73	2.60	0.45	1.98
Carbon Monoxide	Gm/Hr	0.40	0.65	0.27	0.69
Carbon Dioxide	Gm/Hr	4.18	4.59	2.67	4.58

EXTRACTION RESULTS:	Page:	104	103	138	106
THF Insolubles	Gms	5.436	3.633	4.835	3.734
Tol Insolubles	Gms	6.789	4.330	5.810	4.602
Hex Ins in Tol Sol	Gms	2.689	4.205	2.172	3.399
Hex & Tol Insol.	Gms	9.478	8.535	7.983	8.001
HEX Solubles	Gms	26.760	24.530	29.280	22.500
Extraction Feed	Gms	40.880	37.780	37.520	33.450
Recovery	(%)	88.65%	87.52%	99.31%	91.19%

ELEMENTAL ANALYSIS: (Complete Extraction)

Comments

Unconverted Coal (A)

C	Gms	0.6620	0.6589	0.6725	0.6562
H	Gms	0.0437	0.0431	0.0433	0.0421
N	Gms	0.0136	0.0000	0.0109	0.0135
O	Gms	0.0000	0.0000	0.0000	0.0000
S	Gms	0.0044	0.0054	0.0047	0.0053
Ash	Gms	0.0000	0.0000	0.0000	0.0000
Total	Gms	0.7237	0.7074	0.7314	0.7171

Preasphaltenes (B)

C	Gms	0.7971	0.8121	0.8048	0.8086
H	Gms	0.0656	0.0654	0.0630	0.0689
N	Gms	0.0000	0.0000	0.0000	0.0000
O	Gms	0.0900	0.0000	0.0833	0.0829
S	Gms	0.0019	0.0000	0.0022	0.0015
Total	Gms	0.9546	0.8775	0.9533	0.9619

Asphaltenes (C)

C	Gms	0.8394	0.8569	0.8243	0.8543
H	Gms	0.0621	0.0610	0.0605	0.0614
N	Gms	0.0133	0.0135	0.0140	0.0139
O	Gms	0.0678	0.0541	0.0726	0.0571
S	Gms	0.0000	0.0000	0.0028	0.0000
Total	Gms	0.9826	0.9855	0.9742	0.9867

Oils (Hex Sol) (D)

C	Gms	0.8890	0.8912	0.8856	0.8908
H	Gms	0.0928	0.0912	0.0933	0.0919
N	Gms	0.0058	0.0047	0.0058	0.0050
O	Gms	0.0145	0.0151	0.0143	0.0159
S	Gms	0.0000	0.0000	0.0000	0.0000
Total	Gms	1.0021	1.0022	0.9990	1.0036

THF EXTRACTION RESULTS Page: 0.0 0.0 0.0 0.0

THF Insoluble	Gms	0.0000	0.0000	0.0000	0.0000
THF Soluble Recovered	Gms	0.0000	0.0000	0.0000	0.0000
Extraction Feed	Gms	0.0000	0.0000	0.0000	0.0000
Recovery	(%)	0.0000	0.0000	0.0000	0.0000
Ash, in THF Insoluble	(%)	0.0000	0.0000	0.0000	0.0000

ELEMENTAL ANALYSIS: (THF Only Extraction)

Unconverted Coal (X1)

C	Wt%	0.0000	0.0000	0.0000	0.0000
H	Wt%	0.0000	0.0000	0.0000	0.0000
N	(%)	0.0000	0.0000	0.0000	0.0000
O	(%)	0.0000	0.0000	0.0000	0.0000
S	(%)	0.0000	0.0000	0.0000	0.0000
Ash	(%)	0.0000	0.0000	0.0000	0.0000

THF Solubles (X2)

C	Wt%	0.0000	0.0000	0.0000	0.0000
H	Wt%	0.0000	0.0000	0.0000	0.0000
N	(%)	0.0000	0.0000	0.0000	0.0000
O	(%)	0.0000	0.0000	0.0000	0.0000
S	(%)	0.0000	0.0000	0.0000	0.0000

INDIVIDUAL RUN DATA

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

CONDITIONS:	Item:	Unit:	Begin	End	Total	UOM	Yield Gm/Hr
RUN NO. 95C	Coal Feed		82.0	70.0	11.9	LBS	528.0
	Product Slurry		1.5	12.9	11.4	LBS	505.2
Temp. 750.0	Water (Discarded)		0.0	507.6	507.6	GMS	49.4
Res.min. 31.0	Light Ends		0.0	1.2	1.2	GMS	0.1
	Total Liquid Yield				5695.8	GMS	554.8
REF: Page 1	Lineout + Run Time				10.27	HRS	
	Offgases (wtm)				174.6	Cft	17.0
RUN NO. 93C	Coal Feed		96.8	83.9	12.9	LBS	542.3
	Product Slurry		1.7	13.5	11.8	LBS	495.7
Temp. 800.0	Water (Discarded)		0.0	446.9	446.9	GMS	41.4
Res.min. 30.2	Light Ends		0.0	1.2	1.2	GMS	0.1
	Total Liquid Yield				5793.9	GMS	537.3
REF: Page 2	Lineout + Run Time				10.78	HRS	
	Offgases				177.9	Cft	16.5
RUN NO. 97C	Coal Feed		58.9	47.6	11.3	LBS	719.6
	Product Slurry		11.3	21.9	10.6	LBS	675.2
Temp. 750.0	Water (Discarded)		0.0	283.6	283.6	GMS	39.9
Res.min. 22.8	Light Ends		0.0	1.0	1.0	GMS	0.1
	Total Liquid Yield				5090.2	GMS	715.2
REF: Page 3	Lineout + Run Time				7.12	HRS	
	Offgases				88.3	Cft	12.4
RUN NO. 99C	Coal Feed		42.4	33.9	8.5	LBS	701.6
	Product Slurry		10.7	18.5	7.8	LBS	643.8
Temp. 800.0	Water (Discarded)		0.0	429.5	429.5	GMS	78.1
Res.min. 23.3	Light Ends		0.0	2.4	2.4	GMS	0.4
	Total Liquid Yield				3973.1	GMS	722.4
REF: Page 4	Lineout + Run Time				5.50	HRS	
	Offgases				89.5	Cft	16.3

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DATE: 03-Mar 1992

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COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

RUN NO: 95C

750 F.

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CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	91.96	307.28	0.00	0.00	399.24	399.24
H	4.87	0.00	6.62	34.10	0.00	33.68	40.72	79.27
N	0.00	0.00	1.42	1.87	0.00	0.00	3.28	3.28
O	39.00	0.00	22.64	8.88	0.00	0.00	31.52	70.52
S	0.00	0.00	0.60	0.14	0.00	0.00	0.74	0.74
ASH	0.00	8.61	0.00	0.00	0.00	0.00	8.61	8.61
TOTAL	43.87	8.61	123.24	352.27	0.00	33.68	484.12	561.67
FEED:	43.87	8.61	123.24	352.26	0.00	33.68	484.12	561.67

RUN NO: 93C

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CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	94.45	315.59	0.00	0.00	410.04	410.04
H	5.01	0.00	6.80	35.02	0.00	35.44	41.82	82.27
N	0.00	0.00	1.46	1.92	0.00	0.00	3.37	3.37
O	40.05	0.00	23.25	9.12	0.00	0.00	32.37	72.42
S	0.00	0.00	0.62	0.14	0.00	0.00	0.76	0.76
ASH	0.00	8.84	0.00	0.00	0.00	0.00	8.84	8.85
TOTAL	45.06	8.84	126.58	361.79	0.00	35.44	497.21	577.72
FEED:	45.06	8.84	126.58	361.79	0.00	35.44	497.21	577.71

RUN NO: 97C

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CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	125.33	418.78	0.00	0.00	544.12	544.12
H	6.64	0.00	9.02	46.47	0.00	27.66	55.49	89.79
N	0.00	0.00	1.93	2.54	0.00	0.00	4.48	4.48
O	53.15	0.00	30.86	12.10	0.00	0.00	42.95	96.10
S	0.00	0.00	0.82	0.19	0.00	0.00	1.02	1.02
ASH	0.00	11.74	0.00	0.00	0.00	0.00	11.74	11.74
TOTAL	59.79	11.74	167.96	480.09	0.00	27.66	659.79	747.25
FEED:	59.79	11.74	167.96	480.09	0.00	27.66	659.79	747.24

RUN NO: 99C

800 F.

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CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	122.21	408.33	0.00	0.00	530.54	530.54
H	6.48	0.00	8.79	45.31	0.00	27.73	54.11	88.32
N	0.00	0.00	1.88	2.48	0.00	0.00	4.36	4.36
O	51.82	0.00	30.08	11.80	0.00	0.00	41.88	93.71
S	0.00	0.00	0.80	0.19	0.00	0.00	0.99	0.99
ASH	0.00	11.44	0.00	0.00	0.00	0.00	11.44	11.45
TOTAL	58.30	11.44	163.77	468.11	0.00	27.73	643.32	729.36
FEED:	58.30	11.44	163.77	468.11	0.00	27.73	643.32	729.36

MATERIAL BALANCE:

DATE: 03-Mar 1992

Total 12 Pages

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

RUN NO: 95C

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CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.17	1.14	1.13	0.60	0.10	0.00	3.1
H	38.61	0.00	0.00	0.32	0.13	0.01	5.49	44.6
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.23	3.04	0.00	0.00	0.00	43.95	47.2
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
TOTAL	38.61	0.40	4.18	1.44	0.73	0.11	49.44	94.9
	38.61	0.40	4.18	1.44	0.73	0.11	49.44	94.9

RUN NO: 93C

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CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.28	1.25	3.35	2.15	0.09	0.00	7.1
H	36.82	0.00	0.00	0.94	0.45	0.01	4.60	42.8
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.37	3.34	0.00	0.00	0.00	36.83	40.5
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
TOTAL	36.82	0.65	4.59	4.28	2.60	0.11	41.44	90.5
	36.82	0.65	4.59	4.28	2.60	0.11	41.44	90.5

RUN NO: 97C

750 F.

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CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.12	0.73	0.67	0.37	0.12	0.00	2.0
H	27.32	0.00	0.00	0.19	0.08	0.02	4.43	32.0
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.15	1.94	0.00	0.00	0.00	35.43	37.5
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
TOTAL	27.32	0.27	2.67	0.86	0.45	0.13	39.86	71.6
	27.32	0.27	2.67	0.86	0.45	0.13	39.86	71.6

RUN NO: 99C

800 F.

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CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.30	1.25	2.82	1.64	0.38	0.00	6.4
H	35.33	0.00	0.00	0.79	0.34	0.05	8.68	45.2
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.39	3.33	0.00	0.00	0.01	69.41	73.1
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
TOTAL	35.33	0.69	4.58	3.61	1.98	0.44	78.09	124.7
	35.33	0.69	4.58	3.61	1.98	0.44	78.09	124.7

MATERIAL BALANCE:

DATE: 03-Mar 1992

Total 12 Pages

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

RUN NO: 95C

750 F.

Page 9 of 12

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)

ITEM	P/GAS +L.E.	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	3.14	61.45	13.97	28.39	344.27	448.08	451.22	451.22
H	39.07	4.06	1.15	2.10	35.94	43.24	82.31	43.70
N	0.00	1.26	0.00	0.45	2.26	3.97	3.97	3.97
O	3.27	0.00	1.58	2.29	5.62	9.49	12.76	12.76
S	0.00	0.41	0.03	0.00	0.00	0.44	0.44	0.44
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	45.48	67.18	16.73	33.24	388.08	505.22	550.70	512.08
	45.48	67.18	16.73	33.24	388.08	505.22	550.7	

RUN NO: 93C

800 F.

Page 10 of 12

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)

ITEM	P/GAS +L.E.	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	7.12	44.40	8.47	47.98	341.24	442.09	449.22	449.22
H	38.22	2.90	0.68	3.42	34.92	41.92	80.14	43.32
N	0.00	0.00	0.00	0.76	1.80	2.56	2.56	2.56
O	3.72	0.00	0.00	3.03	5.78	8.81	12.53	12.53
S	0.00	0.36	0.00	0.00	0.00	0.36	0.36	0.36
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	49.06	47.67	9.16	55.18	383.75	495.75	544.80	507.98
	49.06	47.67	9.16	55.18	383.75	495.75	544.8	

RUN NO: 97C

750 F.

Page 11 of 12

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)

ITEM	P/GAS +L.E.	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	2.00	80.01	14.82	33.08	471.24	599.15	601.15	601.15
H	27.61	5.15	1.16	2.43	49.65	58.39	85.99	58.67
N	0.00	1.30	0.00	0.56	3.09	4.94	4.94	4.94
O	2.10	0.00	1.53	2.91	7.61	12.06	14.16	14.16
S	0.00	0.56	0.04	0.11	0.00	0.71	0.71	0.71
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	31.71	87.02	17.55	39.10	531.58	675.25	706.96	679.64
	31.71	87.02	17.55	39.10	531.58	675.25	706.96	

RUN NO: 99C

800 F.

Page 12 of 12

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)

ITEM	-H2O	Unc.Coal	P/ASPH	ASPH.	OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	6.38	65.77	14.04	56.65	434.76	571.23	577.61	577.61
H	36.51	4.22	1.20	4.07	44.85	54.34	90.85	55.53
N	0.00	1.35	0.00	0.92	2.45	4.73	4.73	4.73
O	3.73	0.00	1.44	3.79	7.76	12.99	16.72	16.72
S	0.00	0.53	0.03	0.00	0.00	0.56	0.56	0.56
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	46.63	71.88	16.71	65.43	489.83	643.84	690.47	655.14
		71.88	16.71	65.43	489.83			

FORCED ELEMENTAL BALANCE:

DATE: 03/03/92

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

RUN NO: 95C

750 F.

Page 1

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS CONVRS'N	COX+HC GASES	SUBTOTAL SL+LE+GS	FORCED.... H2O	H2S&NH3	SUBTOTAL EX.H-GAS	TOTAL
C		3.04	451.22	0.00	0.00	451.22	451.22
H	4.3%	0.44	43.70	7.22	0.02	50.94	89.55
N	0.0%	0.00	3.97	0	0.00	3.97	3.97
O	69.9%	3.27	12.76	57.76	0.00	70.52	70.52
S	40.7%	0.00	0.44	0.00	0.30	0.74	0.74
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		6.75	512.08	64.98	0.32	577.38	616.00

RUN NO: 93C

800 F.

Page 2

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS CONVRS'N	COX+HC GASES	SUBTOTAL SL+LE+GS	FORCED.... H2O	H2S&NH3	SUBTOTAL EX.H-GAS	TOTAL
C		7.03	449.22	0.00	0.00	449.22	449.22
H	3.3%	1.38	43.32	7.49	0.20	51.01	87.83
N	24.2%	0.00	2.56	0	0.82	3.37	3.37
O	72.8%	3.71	12.53	59.90	0.00	72.42	72.42
S	52.4%	0.00	0.36	0.00	0.40	0.76	0.76
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		12.13	507.98	67.38	1.42	576.78	613.61

RUN NO: 97C

750 F.

Page 3

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS CONVRS'N	COX+HC GASES	SUBTOTAL SL+LE+GS	FORCED.... H2O	H2S&NH3	SUBTOTAL EX.H-GAS	TOTAL
C		1.89	601.15	0.00	0.00	601.15	601.15
H	4.0%	0.27	58.67	10.24	0.02	68.93	96.25
N	0.0%	0.00	4.94	0	0.00	4.94	4.94
O	71.9%	2.10	14.16	81.95	0.00	96.10	96.10
S	29.8%	0.00	0.71	0.00	0.30	1.02	1.02
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		4.25	679.64	92.19	0.32	772.15	799.47

RUN NO: 99C

800 F.

Page 4

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS CONVRS'N	COX+HC GASES	SUBTOTAL SL+LE+GS	FORCED.... H2O	H2S&NH3	SUBTOTAL EX.H-GAS	TOTAL
C		6.01	577.61	0.00	0.00	577.61	577.61
H	2.8%	1.13	55.53	9.62	0.03	65.18	100.50
N	0.0%	0.00	4.73	0	0.00	4.73	4.73
O	69.0%	3.72	16.72	76.99	0.00	93.71	93.71
S	43.7%	0.00	0.56	0.00	0.43	0.99	0.99
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		10.86	655.14	86.61	0.46	742.21	777.54

[illegible]

	\0	/WTC{HOMEB.	C.	D.	G.	P.	R.	S. X.
	\A	/WWC/WTC{	REV	CHOOS	SELE	VIEW	PRI	REVIE
	\E	/WTC{HOME/xg\B~	/xg\C~	/xg\D~	/xg\G~	/xg\P~	/xg\R~	/xg/xQ

FORCED BALANCE PRINT COMMANDS:
 \Z /WTC{HOME}{GOTO}F~/PPAC
 RPF1~GRPFL~GRPF2~GRPFL~
 RPF3~GRPFL~GRPF4~GPQ/XQ

EXPLANATION:
 ENTER LOCATION, MARGINS, & SETUP.
 PRINT RANGES 1 AND 2, PLUS LINES.
 PRINT RANGE 3 & 4; END PAGE/QUIT.

RUN SUMMARY PRINT COMMANDS:
 \I /WTC{HOME}{GOTO}S~/PPAC
 LLLLLLRPSH~GRPS1~GRPSL~
 LLLLLLRPSH~GRPS2~GRPSL~
 LLLLLLRPSH~GRPS3~GRPSL~
 LLLLLLRPSH~GRPS4~GRPSL~
 LLLLLLRPSH~G
 RPS5~GRPSL~GRPS6~GRPSL~

ENTER LOCATION, MARGINS, & SETUP.
 PRINT HEADER AND RANGE 1
 PRINT HEADER AND RANGE 2; END PG.
 PRINT HEADER AND RANGE 3
 PRINT HEADER AND RANGE 4; END PG.
 PRINT HEADER INFORMATION.
 PRINT RANGES 5&6; END PAGE; QUIT.

\J /WTC{HOME}/PPACFOOUS\01

PRINT ON 15" CONTINUOUS PAPER.

STEP PROCESS FLOW CHART:

GOTO

INSTRUCTIONS:

1.00	PREPARE FEED SLURRY	C	Record coal analysis and item wts
2.00	PROCESS FEED SLURRY	S	Record conditions/collect samples
2.1	Lineout phase	S	Record time; + feed & product wts
2.2	Run phase; Samples ABC	S	Record time; + feed & product wts
3.00	SEPARATE H2O SAMPLE (B)	P	Determine & record H2O/Lt Ends wt
4.00	ANALIZE PRODUCT GASES	D	Determine and record elements wt%
5.00	RUN COMPLETE EXTRACTION	D	Record extraction results on (C)
5.1	A. Unconverted Coal	D	Record elemental analysis results
5.2	B. Preasphaltenes	D	Record elemental analysis results
5.3	C. Asphaltenes	D	Record elemental analysis results
5.4	D. Oils (Hex Sol)	D	Record elemental analysis results
6.00	RUN THF ONLY EXTRACTION	D	Record extraction results on (C)
6.1	X1 Unconverted Coal	D	Record elemental analysis results
6.2	X2 Preasphaltenes	D	Record elemental analysis results
7.00	RECORD CHNOS ANALYSES	T	Identify coal, catalyst & solvent
7.1	Feed slurry	T	Determine and record elements wt%
7.2	Product gases (A)	T	Determine and record elements wt%
7.3	Product slurry (C)	T	Determine and record elements wt%

\V /WTC{HOME}{GOTO}B~/PPACFOOUS\018-ML6-MR240~Q
 RPBH1~GRPBH2~GRPB1~GRPBH1~GRPBH2~GRPB2~g
 RPBH1~GRPBH2~GRPB3~GQ/XQ

REPORT: (SUMMARY OF EXTRACTIONS)

DATE: 03/03/92

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

REPORT:	Extraction No	104	103	138	106	
Description:	Run No.-----	95C	93C	97C	99C	Comments
CONDITIONS:	PSIG	2000	2000	2000	2000	
Temperature, F	(F)	750.0	800.0	750.0	800.0	
Space Time, min	Min	31.0	30.2	22.8	23.3	
Hydrogen (Brooksset)	SCFH	13.3	14.0	10.9	10.9	
Lineout Time, Hr	Hrs	6.2	6.6	4.3	2.3	
Run Time, after lineout	Hrs	4.1	4.2	2.9	3.3	

MATERIAL BALANCE:

Feed Rate (L/O+Run)	Gm/Hr	527.99	542.27	719.59	701.62
Slurry Product	Gm/Hr	505.22	495.75	675.25	643.84
Light Ends	Gm/Hr	0.11	0.11	0.13	0.44
C1-C3 Gases	Gm/Hr	1.44	4.28	0.86	3.61
C4+ Gases	Gm/Hr	0.73	2.60	0.45	1.98
Carbon Monoxide	Gm/Hr	0.40	0.65	0.27	0.69
Carbon Dioxide	Gm/Hr	4.18	4.59	2.67	4.58
Water	Gm/Hr	49.44	41.44	39.86	78.09
Recovery	(%)	106.4%	101.3%	100.0%	104.5%

YIELD: (Based on MAF Total Feed)

Hexane Solubles	Wt%	77.18	78.88	79.64	77.44
Asphaltenes	Wt%	6.99	11.30	6.03	10.35
Preasphaltenes	Wt%	3.52	1.87	2.71	2.64
Hexane Insoluble Fee	Wt%	22.82	21.12	20.36	22.56
TOL Insoluble MAF Fee	Wt%	15.83	9.82	14.33	12.21
THF Insoluble MAF Fee	Wt%	12.32	7.95	11.62	9.56

YIELD: (Based on MAF Coal Only)

Asphaltenes	Wt%	26.97	43.59	23.28	39.95
Preasphaltenes	Wt%	13.57	7.23	10.45	10.20
THF Solubles (MAF	Wt%	52.48	69.33	55.18	63.10
Hexane Insoluble (MAF	Wt%	88.06	81.50	78.55	87.05
TOL Insolubles (MAF	Wt%	61.09	37.90	55.27	47.10
THF Insolubles (MAF	Wt%	47.52	30.67	44.82	36.90
Light Ends	Wt%	0.00	0.00	0.00	0.00
C1+C2+C3 Gases	Gm/Hr	1.44	4.28	0.86	3.61
C4+C5+C6 Gases	Gm/Hr	0.73	2.60	0.45	1.98
Carbon Monoxide	Gm/Hr	0.40	0.65	0.27	0.69
Carbon Dioxide	Gm/Hr	4.18	4.59	2.67	4.58

EXTRACTION RESULTS:	Page:	104	103	138	106
THF Insolubles	Gms	5.436	3.633	4.835	3.734
Tol Insolubles	Gms	6.789	4.330	5.810	4.602
Hex Ins in Tol Sol	Gms	2.689	4.205	2.172	3.399
Hex & Tol Insol.	Gms	9.478	8.535	7.983	8.001
HEX Solubles	Gms	26.760	24.530	29.280	22.500
Extraction Feed	Gms	40.880	37.780	37.520	33.450
Recovery	(%)	88.65%	87.52%	99.31%	91.19%

ELEMENTAL ANALYSIS: (Complete Extraction)

Comment

Unconverted Coal (A)						-----
C	Gms	0.6620	0.6589	0.6725	0.6562	
H	Gms	0.0437	0.0431	0.0433	0.0421	
N	Gms	0.0136	0.0000	0.0109	0.0135	
O	Gms	0.0000	0.0000	0.0000	0.0000	
S	Gms	0.0044	0.0054	0.0047	0.0053	
Ash	Gms	0.0000	0.0000	0.0000	0.0000	
Total	Gms	0.7237	0.7074	0.7314	0.7171	

Preasphaltenes (B)						
C	Gms	0.7971	0.8121	0.8048	0.8086	
H	Gms	0.0656	0.0654	0.0630	0.0689	
N	Gms	0.0000	0.0000	0.0000	0.0000	
O	Gms	0.0900	0.0000	0.0833	0.0829	
S	Gms	0.0019	0.0000	0.0022	0.0015	
Total	Gms	0.9546	0.8775	0.9533	0.9619	

Asphaltenes (C)						
C	Gms	0.8394	0.8569	0.8243	0.8543	
H	Gms	0.0621	0.0610	0.0605	0.0614	
N	Gms	0.0133	0.0135	0.0140	0.0139	
O	Gms	0.0678	0.0541	0.0726	0.0571	
S	Gms	0.0000	0.0000	0.0028	0.0000	
Total	Gms	0.9826	0.9855	0.9742	0.9867	

Oils (Hex Sol) (D)						
C	Gms	0.8890	0.8912	0.8856	0.8908	
H	Gms	0.0928	0.0912	0.0933	0.0919	
N	Gms	0.0058	0.0047	0.0058	0.0050	
O	Gms	0.0145	0.0151	0.0143	0.0159	
S	Gms	0.0000	0.0000	0.0000	0.0000	
Total	Gms	1.0021	1.0022	0.9990	1.0036	

THF EXTRACTION RESULTS	Page:	0.0	0.0	0.0	0.0
------------------------	-------	-----	-----	-----	-----

THF Insoluble	Gms	0.0000	0.0000	0.0000	0.0000
THF Soluble Recovered	Gms	0.0000	0.0000	0.0000	0.0000
Extraction Feed	Gms	0.0000	0.0000	0.0000	0.0000
Recovery	(%)	0.0000	0.0000	0.0000	0.0000
Ash, in THF Insoluble	(%)	0.0000	0.0000	0.0000	0.0000

ELEMENTAL ANALYSIS: (THF Only Extraction)

Unconverted Coal (X1)					
C	Wt%	0.0000	0.0000	0.0000	0.0000
H	Wt%	0.0000	0.0000	0.0000	0.0000
N	(%)	0.0000	0.0000	0.0000	0.0000
O	(%)	0.0000	0.0000	0.0000	0.0000
S	(%)	0.0000	0.0000	0.0000	0.0000
Ash	(%)	0.0000	0.0000	0.0000	0.0000

THF Solubles (X2)					
C	Wt%	0.0000	0.0000	0.0000	0.0000
H	Wt%	0.0000	0.0000	0.0000	0.0000
N	(%)	0.0000	0.0000	0.0000	0.0000
O	(%)	0.0000	0.0000	0.0000	0.0000
S	(%)	0.0000	0.0000	0.0000	0.0000

INDIVIDUAL RUN DATA

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

CONDITIONS:	Item:	Unit:	Begin	End	Total	UOM	Yield Gm/Hr
DATE: 07-Nov	Coal Feed	Scale 1	82.0	75.3	6.6	LBS	488.8
Run (F) 750.0	Lineout	Scale A	1.5	7.7	6.2	LBS	457.6
BP MMHg 754.6	H2O+Lt/E	2 Tanks	0.0	210.0	210.0	GMS	34.1
PSI 2000.0	Offgases	W/T Mtr	213.4	316.9	103.5	Cft	16.8
RmT (F) 66.0	-----	-----	-----	-----	-----	---	-----
Brooks 13.3	Lineout	Total	213.4	526.9	3031.6	GMS	491.6
Res.min 31.0	Lineout	Time	1035	1605	6.17	HRS	

RUN NO. 95C	Coal Feed	Scale 1	75.3	70.0	5.3	LBS	586.9
	Product	Scale B	0.0	5.2	5.2	LBS	576.9
	H2O+Lt/E	2 Tanks	0.0	298.8	298.8	GMS	72.9
	Offgases	W/T Mtr	316.9	388.0	71.1	Cft	17.3
PAGE 1	-----	-----	-----	-----	-----	---	-----
	Product	Total	316.9	686.8	2664.1	GMS	649.8
*****END DATA****		Time	1605	2011	4.10	HRS	

DATE: 06-Nov	Coal Feed	Scale 1	96.8	89.1	7.7	LBS	531.0
Run (F) 800.0	Product	Scale A	1.7	8.6	6.8	LBS	471.4
BP MMHg 750.0	H2O+Lt/E	2 Tanks	0.0	214.5	214.5	GMS	32.6
PSI 2000.0	Offgases	W/T Mtr	7.2	111.3	104.2	Cft	15.8
RmT (F) 68.0	-----	-----	-----	-----	-----	---	-----
Brooks 14.0	Product	Total	7.2	325.8	3317.6	GMS	503.9
Res.min 30.2	Lineout	Time	950	1545	6.58	HRS	

RUN NO. 93C	Coal Feed	Scale 1	89.1	83.9	5.2	LBS	559.9
	Product	Scale B	0.0	4.9	4.9	LBS	534.0
	H2O+Lt/E	2 Tanks	0.0	233.5	233.5	GMS	55.6
	Offgases	W/T Mtr	111.3	185.1	73.8	Cft	17.6
PAGE 2	-----	-----	-----	-----	-----	---	-----
	Product	Total	111.3	418.6	2476.3	GMS	589.6
*****END DATA****		Time	1545	1957	4.20	HRS	

DATE: 12-Nov	Coal Feed	Scale 1	58.9	52.7	6.2	LBS	664.4
Run (F) 750.0	Product	Scale A	11.3	17.0	5.7	LBS	612.6
BP MMHg 741.4	H2O+Lt/E	2 Tanks	0.0	76.2	76.2	GMS	17.9
PSI 2000.0	Offgases	W/T Mtr	463.3	499.1	35.9	Cft	8.4
RmT (F) 70.0	-----	-----	-----	-----	-----	---	-----
Brooks 10.9	Product	Total	463.3	575.3	2679.9	GMS	630.6
Res.min 22.8	Lineout	Time	1025	1400	4.25	HRS	

RUN NO. 97C	Coal Feed	Scale 1	52.7	47.6	5.1	LBS	801.4
	Product	Scale B	0.0	4.9	4.9	LBS	768.1
	H2O+Lt/E	2 Tanks	0.0	208.4	208.4	GMS	72.7
	Offgases	W/T Mtr	499.1	551.6	52.5	Cft	18.3
PAGE 3	-----	-----	-----	-----	-----	---	-----
	Product	Total	499.1	760.0	2410.3	GMS	840.8
*****END DATA****		Time	1400	1652	2.87	HRS	

DATE: 14-Nov	Coal Feed	Scale 1	42.4	39.7	2.8	LBS	556.9
PSI 800.0	Product	Scale A	10.7	13.2	2.5	LBS	510.5
BP MMHg 741.3	H2O+Lt/E	2 Tanks	0.0	156.0	156.0	GMS	69.3
Run (F) 2000.0	Offgases	W/T Mtr	615.9	645.0	29.0	Cft	12.9
RmT (F) 74.0	-----	-----	-----	-----	-----	---	-----
Brooks 10.9	Product	Total	615.9	801.0	1304.6	GMS	579.8
Res.min 23.3	Lineout	Time	1130	1305	2.25	HRS	

RUN NO.		Coal Feed Scale 1	39.7	33.9	5.7	LBS	801.8
99C		Product Scale B	0.0	5.3	5.3	LBS	736.2
		H2O+Lt/E 2 Tanks	0.0	275.9	275.9	GMS	84.9
		Offgases W/T Mtr	645.0	705.5	60.5	Cft	18.6
=====							
PAGE 4		Product Total	645.0	981.4	2668.5	GMS	821.1
*****END DATA*****		Time	1305	1620	3.25	HRS	
RUN NO.	95C	Coal Feed	82.0	70.0	11.9	LBS	528.0
		Product Slurry	1.5	12.9	11.4	LBS	505.2
Temp.	750.0	Water (Discarded)	0.0	507.6	507.6	GMS	49.4
Res.min.	31.0	Light Ends	0.0	1.2	1.2	GMS	0.1
		Total Liquid Yield			5695.8	GMS	554.8
REF:	Page 1	Lineout + Run Time			10.27	HRS	
		Offgases (wtm)			174.6	Cft	17.0
=====							
RUN NO.	93C	Coal Feed	96.8	83.9	12.9	LBS	542.3
		Product Slurry	1.7	13.5	11.8	LBS	495.7
Temp.	800.0	Water (Discarded)	0.0	446.9	446.9	GMS	41.4
Res.min.	30.2	Light Ends	0.0	1.2	1.2	GMS	0.1
		Total Liquid Yield			5793.9	GMS	537.3
REF:	Page 2	Lineout + Run Time			10.78	HRS	
		Offgases			177.9	Cft	16.5
RUN NO.	97C	Coal Feed	58.9	47.6	11.3	LBS	719.6
		Product Slurry	11.3	21.9	10.6	LBS	675.2
Temp.	750.0	Water (Discarded)	0.0	283.6	283.6	GMS	39.9
Res.min.	22.8	Light Ends	0.0	1.0	1.0	GMS	0.1
		Total Liquid Yield			5090.2	GMS	715.2
REF:	Page 3	Lineout + Run Time			7.12	HRS	
		Offgases			88.3	Cft	12.4
=====							
RUN NO.	99C	Coal Feed	42.4	33.9	8.5	LBS	701.6
		Product Slurry	10.7	18.5	7.8	LBS	643.8
Temp.	800.0	Water (Discarded)	0.0	429.5	429.5	GMS	78.1
Res.min.	23.3	Light Ends	0.0	2.4	2.4	GMS	0.4
		Total Liquid Yield			3973.1	GMS	722.4
REF:	Page 4	Lineout + Run Time			5.50	HRS	
		Offgases			89.5	Cft	16.3
=====							
DATE PRINTED		03-Mar ,1992					
		Miscellaneous Data:					
		..V-1074 Sol..					
C	Gms	86.2900	87.23%				
H	Gms	9.5800	9.68%				
N est	Gms	0.5230	0.53%				
O	Gms	2.4900	2.52%				
S est	Gms	0.0414	0.04%				
Total	Gms	98.9244	100.0%				

COAL-FEED COMPOSITION: BOOK#: 14554 November, 1991

03/03/92

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

Description:	(%)	Feed:	Gms	Calculate:	(%)
Moisture	25.0%	MoS2	0.0	Moisture	8.3%
MF Coal	75.0%	Oil in catalyst	0.0	MeOH	0.0%
		HAS Catalyst	0.0	Ash	1.6%
Total	100.0%	Coal (as rcvd.)	14678.7	MF Coal	25.0%
Ash dry basis	6.5%	MeOH	0.0	MAF Coal	23.3%
Ash, as recv'd	4.9%	Solvent	29424.8	Solvent	66.7%
MAF Coal	70.1%				
		Total	44103.5	Total	100.0%

GAS TABLES:

GAS TABLE:							
CONDITIONS:		Gas	Barom	Rm T.	Run Time	Adjusted	Gas
Run No.	(F)	Cu Ft	MM Hg	(F)	(Hrs)	Std CuFt	CF/Hr
95C	750	174.6	754.6	66.0	10.3	15.794	17.0
93C	800	177.9	750.0	68.0	10.8	15.173	16.5
97C	750	88.3	741.4	70.0	7.1	11.241	12.4
99C	800	89.5	741.3	74.0	5.5	14.629	16.3

GAS CONVERSION TABLE:

GAS CONVERSION TABLE:		2.000	1.000	3.000	4.000
Run Choice----->					
Run Number----->		95C	93C	97C	99C
Run Temperature	(F)	750.0	800.0	750.0	800.0
Product Offgases	(StdCFH)	15.79	15.17	11.24	14.63

GAS SUMMARY (Adjusted):

	95C	93C	97C	99C
Total (Less N2+O2+Argon)	99.9289	99.9704	99.9746	99.9611
CO Moles %	0.0890	0.1540	0.1146	0.2189
CO2 Moles %	0.5868	0.6897	0.7187	0.9225
Methane Moles %	0.1890	0.6244	0.2146	0.6929
Ethane Moles %	0.1015	0.3162	0.1167	0.3752
Propane Moles %	0.0647	0.2003	0.0729	0.2204
C4's Moles %	0.0287	0.0958	0.0335	0.1149
C5's Moles %	0.0149	0.0592	0.0208	0.0675
C6's Moles %	0.0203	0.0855	0.0220	0.0698
Helium Moles %	0.0000	0.0000	0.0000	0.0000
Hydrogen Moles %	96.8029	96.0868	96.2457	95.6202
Total	97.8979	98.3120	97.5596	98.3023
Hydrogen (By Difference)	98.9050	97.7748	98.6862	97.3179

Calculations to convert gases from SCFH to element content in Gms/Hr.

Constants----->			Offgas Gas Composition.....			
Element:	MWt	Factor	Gms	Gms	Gms	Gms
-----	-----	-----	-----	-----	-----	-----
CO	28.00	35.358	0.50	0.83	0.46	1.13
CO2	44.00	55.563	5.15	5.81	4.49	7.50
CH4	16.00	20.205	0.60	1.91	0.49	2.05
C2H6	30.00	37.884	0.61	1.82	0.50	2.08
C3H8	44.00	55.563	0.57	1.69	0.46	1.79
C4H10	58.00	73.242	0.33	1.06	0.28	1.23
C5H12	72.00	90.921	0.21	0.82	0.21	0.90
C6H14	86.00	108.600	0.35	1.41	0.27	1.11
H2	2.00	2.526	38.61	36.82	27.32	35.33

=====

GAS CONVERSION BASED ON MAF COAL

MAF Coal	Gm/Hr	123.24	126.58	167.96	163.77
CO	Gm/Hr	0.40	0.65	0.27	0.69
CO2	Gm/Hr	4.18	4.59	2.67	4.58
CH4	Gm/Hr	0.49	1.51	0.29	1.25
C2H6	Gm/Hr	0.49	1.44	0.30	1.27
C3H8	Gm/Hr	0.46	1.33	0.27	1.09
C4H10	Gm/Hr	0.27	0.84	0.16	0.75
C5H12	Gm/Hr	0.17	0.65	0.13	0.55
C6H14	Gm/Hr	0.28	1.11	0.16	0.68
H2	Gm/Hr	31.33	29.09	16.27	21.57

=====

MATERIAL BALANCE:

		95C	93C	97C	99C
Feed Rate (L/O+Run)	Gm/Hr	527.99	542.27	719.59	701.62
Slurry Product	Gm/Hr	505.22	495.75	675.25	643.84
Light Ends	Gm/Hr	0.11	0.11	0.13	0.44
C1-C3 Gases	Gm/Hr	1.44	4.28	0.86	3.61
C4+ Gases	Gm/Hr	0.73	2.60	0.45	1.98
Carbon Monoxide	Gm/Hr	0.40	0.65	0.27	0.69
Carbon Dioxide	Gm/Hr	4.18	4.59	2.67	4.58
Water	Gm/Hr	49.44	41.44	39.86	78.09
Recovery	(%)	106.4%	101.3%	100.0%	104.5%

FORCED ELEMENTAL BALANCE:

DATE: 03/03/92

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

RUN NO: 95C

750 F.

Page 1

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS	COX+HC	SUBTOTAL	FORCED....		SUBTOTAL	
	CONVRS'N	GASES	SL+LE+GS	H2O	H2S&NH3	EX.H-GAS	TOTAL
C		3.04	451.22	0.00	0.00	451.22	451.22
H	4.3%	0.44	43.70	7.22	0.02	50.94	89.55
N	0.0%	0.00	3.97	0	0.00	3.97	3.97
O	69.9%	3.27	12.76	57.76	0.00	70.52	70.52
S	40.7%	0.00	0.44	0.00	0.30	0.74	0.74
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		6.75	512.08	64.98	0.32	577.38	616.00

RUN NO: 93C

800 F.

Page 2

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS	COX+HC	SUBTOTAL	FORCED....		SUBTOTAL	
	CONVRS'N	GASES	SL+LE+GS	H2O	H2S&NH3	EX.H-GAS	TOTAL
C		7.03	449.22	0.00	0.00	449.22	449.22
H	3.3%	1.38	43.32	7.49	0.20	51.01	87.83
N	24.2%	0.00	2.56	0	0.82	3.37	3.37
O	72.8%	3.71	12.53	59.90	0.00	72.42	72.42
S	52.4%	0.00	0.36	0.00	0.40	0.76	0.76
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		12.13	507.98	67.38	1.42	576.78	613.61

RUN NO: 97C 750 F. Page 3

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS CONVRS'N	COX+HC GASES	SUBTOTAL SL+LE+GS	FORCED..... H2O	H2S&NH3	SUBTOTAL EX.H-GAS	TOTAL
C		1.89	601.15	0.00	0.00	601.15	601.15
H	4.0%	0.27	58.67	10.24	0.02	68.93	96.25
N	0.0%	0.00	4.94	0	0.00	4.94	4.94
O	71.9%	2.10	14.16	81.95	0.00	96.10	96.10
S	29.8%	0.00	0.71	0.00	0.30	1.02	1.02
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		4.25	679.64	92.19	0.32	772.15	799.47

RUN NO: 99C 800 F. Page 4

CALCULATED ELEMENTAL BALANCE: (Gms/Hr)

ITEM:	PROCESS CONVRS'N	COX+HC GASES	SUBTOTAL SL+LE+GS	FORCED..... H2O	H2S&NH3	SUBTOTAL EX.H-GAS	TOTAL
C		6.01	577.61	0.00	0.00	577.61	577.61
H	2.8%	1.13	55.53	9.62	0.03	65.18	100.50
N	0.0%	0.00	4.73	0	0.00	4.73	4.73
O	69.0%	3.72	16.72	76.99	0.00	93.71	93.71
S	43.7%	0.00	0.56	0.00	0.43	0.99	0.99
ASH		0.00	0.00	0.00	0.00	0.00	0.00
TOTAL		10.86	655.14	86.61	0.46	742.21	777.54

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

RUN NO: 95C

750 F.

Page 1 of 12

CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	91.96	307.28	0.00	0.00	399.24	399.24
H	4.87	0.00	6.62	34.10	0.00	33.68	40.72	79.27
N	0.00	0.00	1.42	1.87	0.00	0.00	3.28	3.28
O	39.00	0.00	22.64	8.88	0.00	0.00	31.52	70.52
S	0.00	0.00	0.60	0.14	0.00	0.00	0.74	0.74
ASH	0.00	8.61	0.00	0.00	0.00	0.00	8.61	8.61
TOTAL	43.87	8.61	123.24	352.27	0.00	33.68	484.12	561.67
FEED:	43.87	8.61	123.24	352.26	0.00	33.68	484.12	561.67

RUN NO: 93C

800 F.

Page 2 of 12

CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	94.45	315.59	0.00	0.00	410.04	410.04
H	5.01	0.00	6.80	35.02	0.00	35.44	41.82	82.27
N	0.00	0.00	1.46	1.92	0.00	0.00	3.37	3.37
O	40.05	0.00	23.25	9.12	0.00	0.00	32.37	72.42
S	0.00	0.00	0.62	0.14	0.00	0.00	0.76	0.76
ASH	0.00	8.84	0.00	0.00	0.00	0.00	8.84	8.85
TOTAL	45.06	8.84	126.58	361.79	0.00	35.44	497.21	577.72
FEED:	45.06	8.84	126.58	361.79	0.00	35.44	497.21	577.71

RUN NO: 97C

750 F.

Page 3 of 12

CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	125.33	418.78	0.00	0.00	544.12	544.12
H	6.64	0.00	9.02	46.47	0.00	27.66	55.49	89.79
N	0.00	0.00	1.93	2.54	0.00	0.00	4.48	4.48
O	53.15	0.00	30.86	12.10	0.00	0.00	42.95	96.10
S	0.00	0.00	0.82	0.19	0.00	0.00	1.02	1.02
ASH	0.00	11.74	0.00	0.00	0.00	0.00	11.74	11.74
TOTAL	59.79	11.74	167.96	480.09	0.00	27.66	659.79	747.25
FEED:	59.79	11.74	167.96	480.09	0.00	27.66	659.79	747.24

RUN NO: 99C

800 F.

Page 4 of 12

CALCULATED ELEMENTAL CONTENT OF FEED SLURRY: (Gms/Hr)

ITEM:	H2O	Ash	MAF	Solvent	MeOH	H2	Ex H2O, H2 GAS	TOTAL
C	0.00	0.00	122.21	408.33	0.00	0.00	530.54	530.54
H	6.48	0.00	8.79	45.31	0.00	27.73	54.11	88.32
N	0.00	0.00	1.88	2.48	0.00	0.00	4.36	4.36
O	51.82	0.00	30.08	11.80	0.00	0.00	41.88	93.71
S	0.00	0.00	0.80	0.19	0.00	0.00	0.99	0.99
ASH	0.00	11.44	0.00	0.00	0.00	0.00	11.44	11.45

TOTAL 58.30 11.44 163.77 468.11 0.00 27.73 643.32 729.36
 FEED: 58.30 11.44 163.77 468.11 0.00 27.73 643.32 729.36
 RUN NO: 95C 750 F. Page 5 of 12
 CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.17	1.14	1.13	0.60	0.10	0.00	3.1
H	38.61	0.00	0.00	0.32	0.13	0.01	5.49	44.6
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.23	3.04	0.00	0.00	0.00	43.95	47.2
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

TOTAL 38.61 0.40 4.18 1.44 0.73 0.11 49.44 94.9
 38.61 0.40 4.18 1.44 0.73 0.11 49.44 94.9
 RUN NO: 93C 800 F. Page 6 of 12
 CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.28	1.25	3.35	2.15	0.09	0.00	7.1
H	36.82	0.00	0.00	0.94	0.45	0.01	4.60	42.8
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.37	3.34	0.00	0.00	0.00	36.83	40.5
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

TOTAL 36.82 0.65 4.59 4.28 2.60 0.11 41.44 90.5
 36.82 0.65 4.59 4.28 2.60 0.11 41.44 90.5
 RUN NO: 97C 750 F. Page 7 of 12
 CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.12	0.73	0.67	0.37	0.12	0.00	2.0
H	27.32	0.00	0.00	0.19	0.08	0.02	4.43	32.0
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.15	1.94	0.00	0.00	0.00	35.43	37.5
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

TOTAL 27.32 0.27 2.67 0.86 0.45 0.13 39.86 71.6
 27.32 0.27 2.67 0.86 0.45 0.13 39.86 71.6
 RUN NO: 99C 800 F. Page 8 of 12
 CALCULATED ELEMENTAL CONTENT OF PRODUCT GASES AND LIQUID: (Gms/Hr)

ITEM	H2	CO	CO2	C1-C3	C4+	LT ENDS	H2O	TOTAL
C	0.00	0.30	1.25	2.82	1.64	0.38	0.00	6.4
H	35.33	0.00	0.00	0.79	0.34	0.05	8.68	45.2
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
O	0.00	0.39	3.33	0.00	0.00	0.01	69.41	73.1
S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0

TOTAL 35.33 0.69 4.58 3.61 1.98 0.44 78.09 124.7
 35.33 0.69 4.58 3.61 1.98 0.44 78.09 124.7

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)								
ITEM	P/GAS +L.E.	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	3.14	61.45	13.97	28.39	344.27	448.08	451.22	451.22
H	39.07	4.06	1.15	2.10	35.94	43.24	82.31	43.70
N	0.00	1.26	0.00	0.45	2.26	3.97	3.97	3.97
O	3.27	0.00	1.58	2.29	5.62	9.49	12.76	12.76
S	0.00	0.41	0.03	0.00	0.00	0.44	0.44	0.44
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	45.48	67.18	16.73	33.24	388.08	505.22	550.70	512.08
	45.48	67.18	16.73	33.24	388.08	505.22	550.7	

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)								
ITEM	P/GAS +L.E.	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	7.12	44.40	8.47	47.98	341.24	442.09	449.22	449.22
H	38.22	2.90	0.68	3.42	34.92	41.92	80.14	43.32
N	0.00	0.00	0.00	0.76	1.80	2.56	2.56	2.56
O	3.72	0.00	0.00	3.03	5.78	8.81	12.53	12.53
S	0.00	0.36	0.00	0.00	0.00	0.36	0.36	0.36
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	49.06	47.67	9.16	55.18	383.75	495.75	544.80	507.98
	49.06	47.67	9.16	55.18	383.75	495.75	544.8	

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)								
ITEM	P/GAS +L.E.	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	2.00	80.01	14.82	33.08	471.24	599.15	601.15	601.15
H	27.61	5.15	1.16	2.43	49.65	58.39	85.99	58.67
N	0.00	1.30	0.00	0.56	3.09	4.94	4.94	4.94
O	2.10	0.00	1.53	2.91	7.61	12.06	14.16	14.16
S	0.00	0.56	0.04	0.11	0.00	0.71	0.71	0.71
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	31.71	87.02	17.55	39.10	531.58	675.25	706.96	679.64
	31.71	87.02	17.55	39.10	531.58	675.25	706.96	

CALCULATED ELEMENTAL CONTENT OF PRODUCT SLURRY (Gms/Hr)								
ITEM	-H2O	Unc.Coal	PRODUCT P/ASPH	SLURRY ASPH.	SLURRY OILS	SLURRY TOTAL	SUB-TOT -H2O	SUB-TOT -H2&H2O
C	6.38	65.77	14.04	56.65	434.76	571.23	577.61	577.61
H	36.51	4.22	1.20	4.07	44.85	54.34	90.85	55.53
N	0.00	1.35	0.00	0.92	2.45	4.73	4.73	4.73
O	3.73	0.00	1.44	3.79	7.76	12.99	16.72	16.72
S	0.00	0.53	0.03	0.00	0.00	0.56	0.56	0.56
ASH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	46.63	71.88	16.71	65.43	489.83	643.84	690.47	655.14
		71.88	16.71	65.43	489.83			

ANALYSES TABLE:

Total 12 Pages

BOOK#: 14554 November, 1991

COAL: Black Thunder; SOLVENT: V-1074 Wilsonville Run 258.

CATALYST: None *

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FEED-SLURRY ANALYSES:

ITEM	COAL.....	SOLVENT.....	..GAS..			
	H2O	Ash	MAF	Solvent	MeOH	H2
C			74.62%	87.23%	37.49%	
H	11.1%		5.37%	9.68%	12.58%	100.0%
N			1.15%	0.53%		
O	88.9%		18.37%	2.52%	49.93%	
S			0.49%	0.04%		
ASH		100.0%		0.00%		
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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FEED-SLURRY ANALYSES:

Repeat Page 1

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FEED-SLURRY ANALYSES:

Repeat Page 1

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FEED-SLURRY ANALYSES:

Repeat Page 1

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DUCT-LIQUID ANALYSES:

.....GASES.....				LIQUID.....	
CO	CO2	C1-C3	C4+	LT	ENDS H2O
-----	-----	-----	-----	-----	-----
2.9%	27.3%	78.14%	82.76%	85.45%	
		21.86%	17.24%	12.50%	11.1%
				0.02%	
7.1%	72.7%			2.00%	88.9%
				0.03%	
				0.00%	
-----	-----	-----	-----	-----	-----
0.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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Repeat Page 5

DUCT-LIQUID ANALYSES:

...
DILS

1.71%
1.26%
1.58%
1.45%
1.00%
1.00%

0.0%
002

Page 10 of 12

...
ILS

.92%
.10%
.47%
.51%
.00%
.00%

0.0%
002

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...
ILS

.65%
.34%
.58%
.43%
.00%
.00%

).0%
999

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LS

76%
16%
50%
58%
00%
00%

.0%
04

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Repeat Page 5

PRODUCT-LIQUID ANALYSES:

1	3	4	DATA ENTRY TABLE:	UOM	ne	Mole %
COLUMN NUMBERS...						Mole %
			BOOK#/RUN DATE (Header)	S-0		Mole %
			COAL/SOLVENT (Header)	I.D.	(C4's)	Mole %
			CATALYST (Header)	I.D.		Mole %
0	0	0	CATALYST on Coal (ppm)	#		Mole %
	97C	99C	PROD. SLURRY NO.	I.D.		Mole %
			FEED COAL SLURRY:	S-1		Mole %
0%	25.0%	25.0%	COAL MOISTURE	Wt%	ane	Mole %
5%	6.5%	6.5%	DRY COAL ASH	Wt%		Mole %
0	0.0	0.0	MoS2	Gms		Mole %
0	0.0	0.0	Oil in catalyst	Gms	itadiene	Mole %
0	0.0	0.0	HAS Catalyst	Gms	ie	Mole %
0	0.0	0.0	Coal (as rcvd.)	Gms	ene	Mole %
7	14678.7	14678.7	MeOH	Gms	ene	Mole %
0	0.0	0.0	Solvent	Gms		Mole %
8	29424.8	29424.8	CONDITIONS:	S-2	ene	Mole %
			RUN DATE	D-M	C5's)	Mole %
iv	12-Nov	14-Nov	RUN TEMP.	F.	utane	Mole %
0	750.0	800.0	BAROMETER	MMHg	utane	Mole %
0	741.4	741.3	RUN PRESSURE	Psi	e	Mole %
0	2000.0	2000.0	ROOM TEMP.	F.	ne	Mole %
0	70.0	74.0	BROOKS METER (.prnFILE)	CFM	)	Mole %
0	10.9	10.9	LINEOUT:	S-2		Mole %
			TIME, Begin	Hrs		Mole %
0	1025	1130	TIME, End	Hrs	CTION:	S-5
15	1400	1305	FEED, Begin	Lbs	#	
8	58.9	42.4	FEED, End	Lbs		Gms
1	52.7	39.7	L.O.PROD, Begin	Lbs		Gms
7	11.3	10.7	L.O.PROD, End	Lbs	1 sol)	Gms
6	17.0	13.2	H2O, Begin	Gms		Gms
0	0.0	0.0	H2O, End	Gms	ed	Gms
5	76.2	156.0	GAS, Begin	CFT		
2	463.3	615.9	GAS, End	CFT	YSIS:	S-5
3	499.1	645.0	RUN:	S-2	al (A)	
			TIME, End	Hrs		Wt%
57	1652	1620	FEED, End	Lbs		Wt%
9	47.6	33.9	PROD, Begin	Lbs		Wt%
0	0.0	0.0	PROD, End	Lbs		Wt%
9	4.9	5.3	HOH, End	Gms		Wt%
5	208.4	275.9	GAS, End	CFT		Wt%
1	551.6	705.5	WATER SEPARATION:	S-3	(B)	S-5
			Light Ends	Gms		Wt%
2	1.0	2.4	GAS ANALYSIS: (DEG.F)	S-4		Wt%
0	2000.0	2000.0	Nitrogen	Mole %	imated->	Wt%
96	0.0254	0.0389	Oxygen	Mole %	td=Est->	Wt%
00	0.0000	0.0000	Argon	Mole %	td=Est->	Wt%
00	0.0000	0.0000	Carbon monoxide	Mole %	(C)	S-5
40	0.1146	0.2188	Carbon dioxide	Mole %		Wt%
95	0.7185	0.9221	Methane	Mole %		Wt%
42	0.2145	0.6926	Ethylene	Mole %	td=Est->	Wt%
41	0.0106	0.0254	Ethane (C2's)	Mole %	td=Est->	Wt%
20	0.1061	0.3497	Propane	Mole %	td=Est->	Wt%
53	0.0545	0.1789	Cyclopropane	Mole %	(D)	S-5
00	0.0000	0.0000	Propylene	Mole %		Wt%
349	0.0184	0.0414	Acetylene(C3's)	Mole %		Wt%
00	0.0000	0.0000	Isobutane	Mole %		Wt%
139	0.0044	0.0159	Allene	Mole %		Wt%
00	0.0000	0.0000	N-Butane	Mole %		Wt%
95	0.0181	0.0705	Cyclobutane	Mole %		Wt%
000	0.0000	0.0000				

DATA ENTRY TABLE:	UOM	1	2	3	4
BOOK#/RUN DATE (Header)	S-0	BOOK#: 14554 November, 1991			
COAL/SOLVENT (Header)	I.D.	COAL: Black Thunder; SOLVENT: V-1074			
CATALYST (Header)	I.D.	CATALYST: None *			
CATALYST on Coal (ppm)	#	0	0	0	0
PROD. SLURRY NO.	I.D.	93C	95C	97C	99C
FEED COAL SLURRY:	S-1	(Wt% in decimal form)			
COAL MOISTURE	Wt%	0.2497	0.2497	0.2497	0.2497
DRY COAL ASH	Wt%	0.0653	0.0653	0.0653	0.0653
MoS2	Gms				
Oil in catalyst	Gms				
HAS Catalyst	Gms				
Coal (as rcvd.)	Gms	14678.7	14678.7	14678.7	14678.7
MeOH	Gms				
Solvent	Gms	29424.8	29424.8	29424.8	29424.8
CONDITIONS:	S-2				
RUN DATE	D-M	06-Nov	07-Nov	12-Nov	14-Nov
RUN TEMP.	F.	800.0	750.0	750.0	800.0
BAROMETER	MMHg	750.0	754.6	741.4	741.3
RUN PRESSURE	Psi	2000.0	2000.0	2000.0	2000.0
ROOM TEMP.	F.	68.0	66.0	70.0	74.0
BROOKS METER (.prnFILE)	CFM	14.0	13.3	10.9	10.9
LINEOUT:	S-2				
TIME, Begin	Hrs	950	1035	1025	1130
TIME, End	Hrs	1545	1605	1400	1305
FEED, Begin	Lbs	96.8	82.0	58.9	42.4
FEED, End	Lbs	89.1	75.3	52.7	39.7
L.O.PROD, Begin	Lbs	1.7	1.5	11.3	10.7
L.O.PROD, End	Lbs	8.6	7.7	17.0	13.2
H2O, Begin	Gms	0.0	0.0	0.0	0.0
H2O, End	Gms	214.5	210.0	76.2	156.0
GAS, Begin	CfT	7.2	213.4	463.3	615.9
GAS, End	CfT	111.3	316.9	499.1	645.0
RUN:	S-2				
TIME, End	Hrs	1957	2011	1652	1620
FEED, End	Lbs	83.9	70.0	47.6	33.9
PROD, Begin	Lbs	0.0	0.0	0.0	0.0
PROD, End	Lbs	4.9	5.2	4.9	5.3
HOH, End	Gms	233.5	298.8	208.4	275.9
GAS, End	CfT	185.1	388.0	551.6	705.5
WATER SEPARATION:	S-3				
Light Ends	Gms	1.2	1.2	1.0	2.4
GAS ANALYSIS: (DEG.F)	S-4	800	750	750	800
Nitrogen	Mole %	0.0296	0.0711	0.0254	0.0389
Oxygen	Mole %	0.0000	0.0000	0.0000	0.0000
Argon	Mole %	0.0000	0.0000	0.0000	0.0000
Carbon monoxide	Mole %	0.1540	0.0889	0.1146	0.2188
Carbon dioxide	Mole %	0.6895	0.5864	0.7185	0.9221
Methane	Mole %	0.6242	0.1889	0.2145	0.6926
Ethylene	Mole %	0.0141	0.0084	0.0106	0.0254
Ethane (C2's)	Mole %	0.3020	0.0930	0.1061	0.3497
Propane	Mole %	0.1653	0.0490	0.0545	0.1789
Cyclopropane	Mole %	0.0000	0.0000	0.0000	0.0000
Propylene	Mole %	0.0349	0.0157	0.0184	0.0414
Acetylene(C3's)	Mole %	0.0000	0.0000	0.0000	0.0000
Isobutane	Mole %	0.0139	0.0037	0.0044	0.0159
Allene	Mole %	0.0000	0.0000	0.0000	0.0000
N-Butane	Mole %	0.0595	0.0167	0.0181	0.0705
Cyclobutane	Mole %	0.0000	0.0000	0.0000	0.0000

Trans 2 Butene	Mole %	0.0058	0.0025	0.0023	0.0072
1-Butene	Mole %	0.0076	0.0030	0.0035	0.0092
Isobutylene	Mole %	0.0048	0.0028	0.0035	0.0065
Cis 2 Butene (C4's)	Mole %	0.0042	0.0000	0.0017	0.0056
Neopentane	Mole %	0.0000	0.0000	0.0000	0.0000
1,2 Butadiene	Mole %	0.0000	0.0038	0.0000	0.0000
Cyclopentane-?	Mole %	0.0094	0.0028	0.0033	0.0109
Iso Pentane	Mole %	0.0121	0.0000	0.0038	0.0143
Methyl Acetylene	Mole %	0.0000	0.0066	0.0000	0.0000
N-Pentane	Mole %	0.0254	0.0000	0.0000	0.0272
1,3 Butadiene	Mole %	0.0000	0.0017	0.0082	0.0000
3-Methyl, 1-Butadiene	Mole %	0.0026	0.0000	0.0018	0.0031
Trans 2 Pentene	Mole %	0.0034	0.0000	0.0019	0.0048
2-Ethyl Propylene	Mole %	0.0000	0.0000	0.0000	0.0000
2-Methyl, 2-Butene	Mole %	0.0031	0.0000	0.0018	0.0037
1-Pentene	Mole %	0.0032	0.0000	0.0000	0.0035
2-Methyl, 1-Butene	Mole %	0.0000	0.0000	0.0000	0.0000
Cis-2-Pentene(C5's)	Mole %	0.0000	0.0000	0.0000	0.0000
2,2-Dimethyl Butane	Mole %	0.0350	0.0041	0.0049	0.0175
2,3-Dimethyl Butane	Mole %	0.0197	0.0060	0.0050	0.0186
2-Methyl Pentane	Mole %	0.0081	0.0000	0.0021	0.0079
3-Methyl Pentane	Mole %	0.0151	0.0040	0.0041	0.0164
Hexane (C6's)	Mole %	0.0076	0.0062	0.0059	0.0094
Helium	Mole %	0.0000	0.0000	0.0000	0.0000
Hydrogen	Mole %	96.058	96.734	96.221	95.5830
COMPLETE EXTRACTION:	S-5				
Page Number	#	103	104	138	106
THF Insol.	Gms	3.6325	5.4356	4.8350	3.7342
TOL Insol.	Gms	4.3302	6.7890	5.8104	4.6022
HEX Insol (Tol sol)	Gms	4.2051	2.6894	2.1724	3.3992
HEX Solubles	Gms	24.53	26.76	29.28	22.50
Extraction Feed	Gms	37.78	40.88	37.52	33.45
ELEMENTAL ANALYSIS:	S-5				
Unconverted coal (A)					
C	Wt%	0.6589	0.6620	0.6725	0.6562
H	Wt%	0.0431	0.0437	0.0433	0.0421
N	Wt%		0.0136	0.0109	0.0135
O	Wt%				
S	Wt%	0.0054	0.0044	0.0047	0.0053
Ash	Wt%				
Preasphaltenes (B)	S-5				
C	Wt%	0.8121	0.7971	0.8048	0.8086
H	Wt%	0.0654	0.0656	0.0630	0.0689
N	Estimated-> Wt%				
O	Protd=Est-> Wt%		0.0900	0.0833	0.0829
S	Protd=Est-> Wt%		0.0019	0.0022	0.0015
Asphaltenes (C)	S-5				
C	Wt%	0.8569	0.8394	0.8243	0.8543
H	Wt%	0.0610	0.0621	0.0605	0.0614
N	Protd=Est-> Wt%	0.0135	0.0133	0.0140	0.0139
O	Protd=Est-> Wt%	0.0541	0.0678	0.0726	0.0571
S	Protd=Est-> Wt%			0.0028	
Oils (Hex sol) (D)	S-5				
C	Wt%	0.8912	0.8890	0.8856	0.8908
H	Wt%	0.0912	0.0928	0.0933	0.0919
N	Wt%	0.0047	0.0058	0.0058	0.0050
O	Wt%	0.0151	0.0145	0.0143	0.0159
S	Wt%				

THF ONLY EXTRACTION:	S-6				
Page Number	#	103	104	105	106
THF Insolubles	Gms	2.7593	5.6306	4.8284	4.1069
THF Solubles Rcvd.	Gms	32.11	40.31	38.04	39.98
Extraction Feed	Gms	33.48	40.66	35.71	37.73
Unconverted Coal	S-6				
C	Wt%	0.0000			
H	Wt%				
N	Wt%				
O	Wt%	0.0117	0.0123		0.0118
S	Wt%				
Ash	Wt%				
THF Solubles	S-6				
C	Wt%	0.8466	0.8730	0.8288	0.7853
H	Wt%	0.0894	0.0888	0.0935	0.0956
N	Wt%	0.0055	0.0062	0.0060	0.0053
O	Wt%	0.0480	0.0422	0.0544	0.0636
S	Wt%				

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END

**DATE
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