CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Permeability and Porosity Determinations

for

ERDA, MORGANTOWN ENERGY
RESEARCH CENTER

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

June 14, 1976

ERDA, Morgantown Energy Research Center
P. O. Box 880
Collins Ferry Road
Morgantown, West Virginia 26505

Attention: Mr. R. J. Watts

Subject: Permeability and Porosity Determinations
Purchase Order Number:
P3052242 ERDA
File Number: SCAL-75353

Gentlemen:

In your subject purchase order dated June 30, 1975, Core Laboratories, Inc., was requested to perform the following: (1) Whole Core Porosity and Permeability Determinations at an effective overburden pressure of 1650 psi, (2) Whole Core Porosity and Permeability Determinations at an effective overburden pressure of 3700 psi, (3) Whole Core Permeability and Porosity Routine Analysis, (4) Whole Core Analysis (horizonal permeability in four directions), and (5) Whole Core Analysis on six shale samples. The results of Items 3, 4, and 5 were submitted by our Oklahoma City laboratory on February 24, 1976, identified as File 3402-8498. The whole core permeability and porosity determinations at effective overburden pressures of 1650 psi and 3700 psi, and identified as Items 1 and 2, are presented herein.

Should you have any questions pertaining to these test results, or if we can be of any assistance, please do not hesitate to contact us.

Very truly yours,

Core Laboratories, Inc.

Duane L. Archer

Duane L. Archer, Manager
Special Core Analysis

DLA:JWW:gb
10 cc. - Addressee

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Page 1 of 1
File SCAL-75353
Well No. 11940

Permeability and Porosity as a Function of Overburden Pressure

Sample Number	Depth, Feet	Overburden Pressure, PSI	
		1650	3700
		Air Permeability, Md.	
1	3624.0	0.0013	0.00032
2	3733.5	0.00034	0.00034
3	3735.0	0.00045	0.00023
4	3740.0	0.0019	0.0011
5	3742.0	0.0012	0.00038
6	3743.5	0.00023	0.00011
		Porosity, Per Cent	
1	3624.0	0.5	0.3
2	3733.5	0.4	0.2
3	3735.0	0.2	0.1
4	3740.0	0.3	0.2
5	3742.0	0.4	0.2
6	3743.5	0.4	0.2

CORE LABORATORIES, INC.

COMPANY U. S. ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION
WELL CONSOLIDATED GAS SUPPLY NO. 11940
COUNTY JACKSON STATE WEST VIRGINIA
FILE 3402-8466 DATE REPORT 1/20/76
ANALYST PUGH

FLUID RECOVERY vs TEMPERATURE, °F

PERCENT BULK VOLUME

Depth, Feet	Porosity, Per Cent	OIL						WATER					
		200°	400°	600°	800°	1000°	1200°	200°	400°	600°	800°	1000°	1200°
3440.4	4.0	0.0	0.0	0.6	1.8	3.6	3.9	0.0	1.8	2.3	3.1	4.9	9.3
3461.0	2.9	0.0	0.0	0.4	1.2	3.3	3.3	0.0	1.3	1.8	2.4	3.9	9.2
3480.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.1	1.3	1.9	5.6
3626.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.8	3.1	4.0	7.3
3649.0	2.5	0.0	0.0	0.3	1.1	1.8	1.8	0.0	1.6	2.1	2.9	4.5	9.8
3666.0	2.0	0.0	0.4	0.6	2.8	4.5	4.5	0.0	1.5	2.0	3.0	4.3	9.3
3681.0	2.2	0.0	0.3	0.6	2.1	3.6	4.1	0.0	1.8	2.3	3.1	4.9	9.0
3709.9	3.5	0.0	0.3	0.6	2.8	4.3	4.6	0.0	1.5	1.8	2.5	4.0	8.6
3741.0	3.1	0.0	0.4	0.6	1.6	2.1	2.1	0.0	1.3	1.8	2.3	3.4	7.3
3759.0	3.0	0.0	0.3	0.7	1.2	2.9	2.9	0.0	1.9	2.4	3.2	4.3	9.6
3790.0	3.4	0.0	0.0	0.3	0.8	1.0	1.0	0.0	2.3	2.9	3.4	4.4	8.3

AVG. 3.0
CUMULE COPIE

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.063 at 100° F
AVG. 90529 NACL PPM.

File 3402-8466 Page No.
Well NO. 11940

SHALES

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH, FEET	NACL, PPM	SAMPLE NUMBER	DEPTH, FEET	NACL, PPM
1	3412.0	172,500	30	3649.0	75,250
2	3416.1	161,400	31	3655.0	57,190
3	3421.9	114,900	32	3660.6	89,600
4	3426.5	183,400	33	3666.0	70,190
5	3430.4	179,800	34	3671.0	91,700
6	3437.5	74,450	35	3676.0	95,490
7	3440.4	71,540	36	3681.0	93,590
8	3446.5	69,210	37	3687.1	66,850
9	3450.1	98,690	38	3696.5	63,550
10	3455.5	91,670	39	3700.0	70,190
11	3461.0	72,040	40	3705.5	90,400
12	3467.1	73,460	41	3709.9	65,950
13	3471.9	58,190	42	3714.0	62,820
14	3475.6	59,990	43	3719.1	66,850
15	3480.0	69,410	44	3727.0	81,470
16	3485.0	70,870	45	3729.3	104,400
17	3489.8	95,880	46	3735.0	76,290
18	3494.6	144,800 .055 at 100° F	47	3741.0	51,660
19	3500.0	182,700 167 AVG.	48	3745.8	61,840
20	3600.7	98,270	49	3752.0	114,300
21	3605.4	153,000	50	3755.0	73,810
22	3609.3	76,880	51	3759.0	111,000
23	3614.7	106,600	52	3765.0	102,600
24	3620.5	116,200	53	3770.0	57,140
25	3626.0	108,300	54	3775.0	65,180
26	3630.4	91,080	55	3781.0	73,120
27	3635.9	89,670	56	3784.5	58,760
28	3641.0	65,860	57	3790.0	57,880
29	3645.0	96,290	58	3795.0	56,330

AVG. 82,204
.066 AT
100° F

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

REPLY TO
8 N. W. 42ND ST.
OKLAHOMA CITY, OKLA.
73118

Company ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
MORGANTOWN ENERGY RESEARCH CENTER
Well NO. 11940
Page 1 Date 2/24/76 File 3402-8498

Sample Number	Depth, Feet	Permeability, Md. N-S	Permeability, Md. E-W	Porosity, Per Cent	Fluid Saturation Oil	Fluid Saturation Water	Grain Density
			WHOLE-CORE ANALYSIS				
1	3624.0	7.3	4.3	2.4	0.0	69.1	2.77
2	3733.5	2.0	0.7	2.6	7.8	45.3	2.55
3	3735.0	2.1	0.1	3.6	12.5	79.5	2.69
4	3740.0	3.3	1.1	3.3	9.9	71.5	2.56
5	3742.0	2.9	4.3	3.6	11.7	70.3	2.61
6	3743.5	1.2	2.1	3.7	11.4	68.3	2.60
AVG.		3.13	2.10	3.20			

CORE LABORATORIES, INC.
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Well NO. 11940
Page 2 Date 2/24/76 File 3402-8498

WHOLE CORE

DIRECTIONAL PERMEABILITY DATA

Sample Number	Depth, Feet	Permeability, Md. N-S	N30°E	N60°E	E-W	S60°E E30°S	S30°E E60°S
1	3624.0	7.3	9.5	21	4.3	4.3	5.2
2	3733.5	2.0	1.8	0.8	0.7	0.8	1.0
3	3735.0	2.1	2.2	0.9	0.1	0.1	0.2
4	3740.0	3.3	12	1.6	1.1	0.9	1.0
5	3742.0	2.9	1.0	9.0	4.3	1.1	1.2
6	3743.5	1.2	0.8	1.4	2.1	7.1	2.2
AVG.		3.13	4.55	5.78	2.1	2.38	1.8

Core analysis pd for by Consolidated Gas

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Page No.

CORE ANALYSIS RESULTS

Company CONSOLIDATED GAS SUPPLY CORP. Formation File 3402-
Well NO. 11940 Core Type Date Report 1/21/
Field Drilling Fluid Analysts PUGH
County JACKSON State W. VA. Elev. Location

Lithological Abbreviations

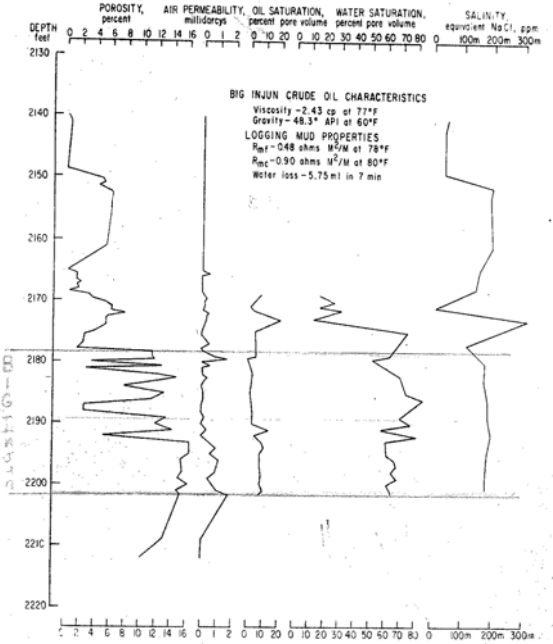
ANHYDRITE-ANHY · BENTONITE-BENT · BROWN-BRN · CALCAREOUS-CALC · CHERT-CH · CONGLOMERATE-CONG · CRYSTALLINE-XLN · DOLOMITE-DOL · FINE-FN · FRACTURED-FRAC · GRAIN-GRN · GRANULAR-GRNL · GRAY-GY · GYPSUM-GYP · LAMINATION-LAM · LIME-LM · LIMY-LNY · MEDIUM-MED · OOLITIC-O-OTY · POROSITY-POR · SANDY-SDY · SHALY-SHY · SILTY-SLTY · VUGGY-VGY

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	GRAIN DENS.	SAMPLE DESCRIPTION AND REMARKS
	DEAN-STARK PLUG ANALYSIS						
1	3412.0	<0.1	2.7	0.0	84.3	2.75	
2	3416.1	<0.1	3.4	5.0	73.8	2.72	
3	3421.9	<0.1	5.2	7.1	43.3	2.71	
4	3426.5	<0.1	2.0	6.1	75.5	2.73	
5	3430.4	<0.1	1.9	4.3	51.1	2.77	
6	3437.5	<0.1	3.5	6.1	80.5	2.73	
7	3440.4	<0.1	4.0	9.1	52.5	2.65	
8	3446.5	<0.1	4.4	7.8	80.0	2.78	
9	3450.1	<0.1	2.7	6.1	83.3	2.72	
10	3455.5	<0.1	3.4	7.2	73.5	2.75	
11	3461.0	<0.1	2.9	5.7	54.3	2.74	
12	3467.1	<0.1	3.0	5.5	58.9	2.66	
13	3471.9	<0.1	4.0	5.2	81.3	2.71	
14	3475.6	<0.1	4.1	4.0	78.0	2.76	
15	3480.0	<0.1	3.4	0.0	71.4	2.73	
16	3485.0	<0.1	3.3	0.0	88.5	2.76	
17	3489.8	<0.1	3.0	0.0	69.9	2.76	
18	3494.6	<0.1	1.4	0.0	45.7	2.77	
19	3500.0	<0.1	0.8	0.0	57.9	2.71	
20	3600.7	<0.1	4.6	6.2	61.9	2.80	
21	3605.4	<0.1	1.7	0.0	63.4	2.80	
22	3609.3	<0.1	4.3	4.7	73.3	2.81	
23	3614.7	<0.1	3.3	0.0	68.4	2.76	
24	3620.5	<0.1	3.9	0.0	60.0	2.83	
25	3626.0	<0.1	3.0	0.0	90.3	2.85	
26	3630.4	<0.1	3.7	0.0	83.6	2.78	
27	3635.9	<0.1	3.6	0.0	87.0	2.75	
28	3641.0	<0.1	3.8	0.0	88.0	2.73	
29	3645.0	<0.1	1.6	0.0	60.0	2.74	
30	3649.0	<0.1	2.5	4.8	59.7	2.66	
31	3655.0	<0.1	3.4	9.6	54.2	2.62	
32	3660.6	<0.1	2.8	7.2	68.1	2.65	
33	3666.0	<0.1	2.0	8.2	71.4	2.57	
34	3671.0	<0.1	3.9	7.3	64.6	2.72	
35	3676.0	<0.1	2.4	6.9	63.8	2.64	
36	3681.0	<0.1	2.2	9.4	69.8	2.60	
37	3687.1	<0.1	3.0	8.3	48.6	2.62	
38	3696.5	<0.1	3.0	8.8	66.2	2.58	
39	3700.0	<0.1	1.9	4.3	85.1	2.56	
40	3705.5	<0.1	2.7	9.5	69.8	2.64	

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE		GRAIN DENS.	SAMPLE DESCRIPTION AND REMARKS
				OIL	TOTAL WATER		
41	3709.9	<0.1	3.5	9.5	54.8	2.62	
42	3714.0	<0.1	4.3	10.6	51.0	2.59	
43	3719.1	<0.1	3.9	0.0	75.3	2.74	
44	3727.0	<0.1	3.0	8.3	77.8	2.71	
45	3729.3	<0.1	2.7	6.1	81.8	2.75	
46	3735.0	<0.1	3.4	9.8	56.1	2.65	
47	3741.0	<0.1	3.1	9.2	53.9	2.58	
48	3745.8	<0.1	2.7	6.2	78.5	2.69	
49	3752.0	<0.1	2.7	7.7	67.7	2.59	
50	3755.0	<0.1	3.7	4.9	73.2	2.78	
51	3759.0	<0.1	3.0	11.3	63.4	2.63	
52	3765.0	<0.1	2.3	7.4	68.5	2.64	
53	3770.0	<0.1	2.6	6.3	82.5	2.69	
54	3775.0	<0.1	3.4	10.6	63.6	2.62	
55	3781.0	<0.1	2.1	7.8	78.4	2.59	
56	3784.5	<0.1	2.2	5.6	79.6	2.61	
57	3790.0	<0.1	3.4	2.4	69.5	2.67	
58	3795.0	<0.1	3.2	3.9	71.1	2.65	

CORE ANALYSIS



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DALLAS, TEXAS

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Company ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
MORGANTOWN ENERGY RESEARCH CENTER
Well NO. 11940
Page 1 Date 2/24/76 File 3402-8498

Sample Number	Depth, Feet	Permeability, Md. N-S	Permeability, Md. E-W	Porosity, Per Cent	Fluid Saturation Oil	Fluid Saturation Water	Grain Density
			WHOLE-CORE ANALYSIS				
1	3624.0	7.3	4.3	2.4	0.0	69.1	2.77
2	3733.5	2.0	0.7	2.6	7.8	45.3	2.55
3	3735.0	2.1	0.1	3.6	12.5	79.5	2.69
4	3740.0	3.3	1.1	3.3	9.9	71.5	2.56
5	3742.0	2.9	4.3	3.6	11.7	70.3	2.61
6	3743.5	1.2	2.1	3.7	11.4	68.3	2.60
		3.43	1.10				

CORE LABORATORIES, INC.
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Company ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
MORGANTOWN ENERGY RESEARCH CENTER
Well NO. 11940
Page 2 Date 2/24/76 File 3402-8498

DIRECTIONAL PERMEABILITY DATA

Sample Number	Depth, Feet	Permeability, Md. N-S	N30°E	N60°E	E-W	E30°S	E60°S
						N 30 W	N 60 W
1	3624.0	7.3	9.5	21	4.3	4.3	5.2
2	3733.5	2.0	1.8	0.8	0.7	0.8	1.0
3	3735.0	2.1	2.2	0.9	0.1	0.1	0.2
4	3740.0	3.3	12	1.6	1.1	0.9	1.0
5	3742.0	2.9	1.0	9.0	4.3	1.1	1.2
6	3743.5	1.2	0.8	1.4	2.1	7.1	2.2
	ave	3.13	4.55	5.78	3.15	2.38	1.80

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

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Company ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
MORGANTOWN ENERGY RESEARCH CENTER
Well NO. 11940
Page 1 Date 2/25/76 File 3402-8497

Sample Number	Depth, Feet	Permeability, Md. N-S	E-W	Vertical	Porosity, Per Cent	Fluid Saturation Oil	Water	Grain Dens.	NaCl, ppm
1	3447.5-48.0	<0.1	<0.1	<0.1	2.1	6.0	56.0	2.73	94,580
2	3641.6-42.4	<0.1	<0.1	<0.1	3.3	9.0	44.9	2.72	73,180
3	3645.0	<0.1	<0.1	<0.1	2.5	8.0	44.0	2.72	136,500

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Page 1 of 1
File SCAL-75353
Well No. 11940

Permeability and Porosity as a Function of Overburden Pressure

Sample Number	Depth, Feet	Overburden Pressure, PSI	
		1650	3700
		Air Permeability, Md.	
1	3624.0	0.0013	0.00032
2	3733.5	0.00034	0.00034
3	3735.0	0.00045	0.00023
4	3740.0	0.0019	0.0011
5	3742.0	0.0012	0.00038
6	3743.5	0.00023	0.00011
		Porosity, Per Cent	
1	3624.0	0.5	0.3
2	3733.5	0.4	0.2
3	3735.0	0.2	0.1
4	3740.0	0.3	0.2
5	3742.0	0.4	0.2
6	3743.5	0.4	0.2

CORE ANALYSIS RESULTS

Company CONSOLIDATED GAS SUPPLY CORP. Formation File 3402
Well NO. 11940 Core Type Date Report 1/21
Field Drilling Fluid Analysts PUGH
County JACKSON State W. VA. Elev. Location

Lithological Abbreviations

SAND-SD SHALE-SH LIME-LM	DOLOMITE-DOL CHERT-CH GYPSUM-GYP	ANHYDRITE-ANHY CONGLOMERATE-CONG FOSSILIFEROUS-FOSS	SANDY-SDY SHALY-SHY LIMY-LMY	FINE-FN MEDIUM-MED COARSE-CSE	CRYSTALLINE-XLN GRAIN-GRN GRANULAR-GRNL	BROWN-BRN GRAY-GY VUGGY-VGY	FRACTURED-FRAC LAMINATION-LAM STYLOLITIC-STY

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	GRAIN DENS.	SAMPLE DESCRIPTION AND REMARKS
	DEAN-STARK PLUG ANALYSIS						
1	3412.0	<0.1	2.7	0.0	84.3	2.75	
2	3416.1	<0.1	3.4	5.0	73.8	2.72	
3	3421.9	<0.1	5.2	7.1	45.3	2.71	
4	3426.5	<0.1	2.0	6.1	75.5	2.73	
5	3430.4	<0.1	1.9	4.3	51.1	2.77	
6	3437.5	<0.1	3.5	6.1	80.5	2.73	
7	3440.4	<0.1	4.0	9.1	52.5	2.65	
8	3446.5	<0.1	4.4	7.8	80.0	2.78	
9	3450.1	<0.1	2.7	6.1	33.3	2.72	
10	3455.5	<0.1	3.4	7.2	73.5	2.75	
11	3461.0	<0.1	2.9	5.7	54.3	2.74	
12	3467.1	<0.1	3.0	5.5	58.9	2.66	
13	3471.9	<0.1	4.0	5.2	81.3	2.71	
14	3475.6	<0.1	4.1	4.0	78.0	2.76	
15	3480.0	<0.1	3.4	0.0	71.4	2.73	
16	3485.0	<0.1	3.3	0.0	88.5	2.76	
17	3489.8	<0.1	3.0	0.0	69.9	2.76	
18	3494.6	<0.1	1.4	0.0	45.7	2.77	
19	3500.0	<0.1	0.8	0.0	57.9	2.71	
20	3500.7	<0.1	4.6	6.2	61.9	2.80	
21	3505.4	<0.1	1.7	0.0	63.4	2.80	
22	3509.3	<0.1	4.3	4.7	73.3	2.81	
23	3515.7	<0.1	3.3	0.0	68.4	2.76	
24	3520.5	<0.1	3.9	0.0	60.0	2.83	
25	3525.0	<0.1	3.0	0.0	80.3	2.85	
26	3530.4	<0.1	3.7	0.0	85.5	2.78	
27	3533.9	<0.1	3.6	0.0	87.0	2.75	
28	3541.0	<0.1	3.8	0.0	88.9	2.75	
29	3545.0	<0.1	3.6	0.0	60.0	2.74	
30	3549.0	<0.1	2.5	4.8	59.7	2.66	
31	3555.0	<0.1	3.4	9.6	56.2	2.62	
32	3560.6	<0.1	2.8	7.2	68.1	2.65	
33	3565.0	<0.1	2.0	8.2	71.4	2.57	
34	3571.0	<0.1	3.9	7.3	64.6	2.72	
35	3575.0	<0.1	2.4	6.9	62.8	2.64	
36	3581.0	<0.1	2.2	9.4	69.8	2.60	
37	3587.1	<0.1	3.0	8.3	45.6	2.62	
38	3595.5	<0.1	3.0	8.8	66.2	2.58	
39	3700.0	<0.1	1.9	4.3	85.1	2.56	

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File 3402-8467 Page No.
Well NO. 11940

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	RESIDUAL SATURATION PER CENT PORE TOTAL WATER	GRAIN DENS.	SAMPLE DESCRIPTION AND REMARKS
41	3709.9	<0.1	3.5	9.5	54.8	2.62	
42	3714.0	<0.1	4.3	10.6	51.0	2.59	
43	3719.1	<0.1	3.9	0.0	75.3	2.74	
44	3727.0	<0.1	3.0	8.3	77.8	2.71	
45	3729.3	<0.1	2.7	6.1	81.8	2.75	
46	3735.0	<0.1	3.4	9.8	56.1	2.65	
47	3741.0	<0.1	3.1	9.2	53.9	2.58	
48	3745.8	<0.1	2.7	6.2	78.5	2.69	
49	3752.0	<0.1	2.7	7.7	67.7	2.59	
50	3755.0	<0.1	3.7	4.9	73.2	2.78	
51	3759.0	<0.1	3.0	11.3	63.4	2.63	
52	3765.0	<0.1	2.3	7.4	68.5	2.64	
53	3770.0	<0.1	2.6	6.3	82.5	2.69	
54	3775.0	<0.1	3.4	10.6	63.6	2.62	
55	3781.0	<0.1	2.1	7.8	78.4	2.59	
56	3784.5	<0.1	2.2	5.6	79.6	2.61	
57	3790.0	<0.1	3.4	2.4	69.5	2.67	
58	3795.0	<0.1	3.2	3.9	71.1	2.65	

Inc. 3.067

59 3800.0 <0.1 1.9 4.3 85.1 2.56

30

Core Laboratories
Mt Pleasant Mich.
517-773 9904
Mabre Manees District Lab manager
PO Box 131 Mt Pleasant Mich.
48858

Virgil Pugh indicated that the Mich Lab may do gas analysis during retorting.

10/16/75

Phil Martin
Consolidated Geo Supply
Clarksburg
F: 830-6 23 39 16

Called Martin to discuss core analysis and sampling of core from Well #11940 Citypark W Va.

Described core tests we wanted to run. He agreed. Suggested they send a purchase order to Core Labs at Oklahoma city for routine core analysis. Service No 2-OKC, 58 samples, $23 per sample total $1334.00 as their part of the cooperative agreement and we would pay for the remainder of the core tests which totaled $1360. as Phil said this was a satisfactory approach and he would request Core Labs to do the routine analysis and bill them.

TRACE ELEMENTAL ANALYSIS IN PARTS PER MILLION BY WEIGHT IN THE SHALE CORE FROM COTTAGEVILLE, WEST VIRGINIA, WELL NO. 11940, IN THE DEPTH INTERVAL FROM 3410 TO 3793 FEET.

Sample Number	Depth ft. Top	Depth ft. Btm	B (ppm)	Mn (ppm)	Cu (ppm)	Ni (ppm)	Ba (ppm)	Cr (ppm)	Sr (ppm)
1	3410.00	3410.66	120.0	231.1	12.0	10.0	562.7	86.3	194.8
2	3415.05	3415.45	122.4	220.3	32.0	5.1	429.90	78.6	99.7
3	3420.60	3421.03	114.4	229.1	64.0	26.8	522.5	80.1	118.2
4	3425.60	3426.07	125.0	222.1	117.2	55.7	532.7	90.2	177.9
5	3430.10	3430.34	136.0	228.2	58.8	28.8	636.6	85.7	166.5
6	3434.60	3435.20	130.4	249.3	108.0	35.4	492.9	84.1	106.7
7	3439.90	3440.30	130.4	227.7	88.0	25.6	480.3	87.8	105.7
8	3445.10	3445.60	156.0	311.6	352.2	106.6	650.0	85.7	121.6
9	3450.40	3454.00	115.6	204.6	119.2	87.0	776.1	84.1	157.7
10	3455.00	3455.50	115.6	260.0	133.9	87.0	626.7	86.8	145.8
11	3460.00	3460.50	110.7	292.4	76.0	51.8	666.7	76.0	147.6
12	3465.00	3465.50	120.0	253.2	96.6	65.8	564.7	77.3	131.4
13	3470.00	3470.60	108.6	306.0	66.0	63.1	536.7	77.6	97.9
14	3475.00	3475.50	100.4	306.0	97.1	93.8	482.1	69.4	157.0
15	3479.10	3479.90	114.3	255.7	73.6	55.6	728.4	86.9	167.9
16	3485.00	3485.50	120.0	814.8	42.0	40.3	542.5	80.0	202.8
17	3489.75	3490.40	78.4	321.5	70.3	31.3	956.9	47.2	153.1
18	3494.40	3495.00	80.8	1693.8	62.5	36.3	1171.1	35.8	295.5
19	3498.65	3499.25	113.1	423.8	85.9	54.7	651.7	63.4	242.7
20	3600.00	3600.50	147.9	838.1	33.2	16.0	431.7	79.2	225.1
21	3604.55	3605.00	70.6	376.7	42.9	29.5	612.7	68.0	181.2
22	3610.90	3611.30	55.4	329.3	82.0	10.9	580.9	54.9	158.0
23	3615.00	3615.45	134.7	206.5	84.0	53.4	601.6	60.8	215.7
24	3619.85	3620.30	80.0	1356.5	58.8	27.6	439.0	42.7	247.8
25	3624.80	3625.23	150.0	1394.7	92.0	45.3	494.0	86.2	205.2
26	3629.60	3630.10	142.8	3338.0	44.6	54.9	504.8	78.0	256.6
27	3634.93	3635.43	140.5	1026.1	37.2	49.9	496.9	70.1	217.5
28	3639.80	3640.28	84.6	822.9	48.6	34.9	479.3	54.3	199.3
29	3644.51	3645.00	64.0	1197.5	33.2	25.0	1435.2	28.0	208.0
30	3650.83	3651.28	175.1	201.1	49.3	75.0	573.4	92.1	121.2
31	3654.50	3655.00	166.3	207.3	37.0	47.5	538.1	82.8	135.2
32	3658.90	3659.37	161.0	225.5	45.2	45.0	469.4	84.0	155.4
33	3664.77	3665.27	158.4	187.1	76.4	67.5	478.0	78.8	113.6
34	3669.63	3670.07	154.6	359.8	49.3	35.2	472.5	88.0	207.7
35	3674.90	3675.33	138.8	209.2	60.4	60.0	508.6	76.0	167.4
36	3680.50	3680.90	150.0	199.3	54.6	65.1	436.2	78.8	117.6
37	3684.51	3685.12	168.0	225.2	44.3	71.8	517.2	72.0	120.1
38	3689.85	3690.35	180.7	296.9	69.4	83.6	496.3	75.9	134.0
39	3694.55	3695.05	180.7	208.8	50.8	61.5	515.7	66.2	144.1
40	3699.93	3700.45	164.3	188.2	50.7	100.0	468.5	65.0	109.0
41	3704.72	3705.20	180.7	260.0	56.4	76.1	529.6	71.9	150.4
42	3710.25	3710.75	188.2	225.2	48.8	113.1	542.5	77.2	110.3
43	3718.72	3714.43	188.2	326.7	49.5	85.5	518.2	74.7	135.0
44	3719.60	3720.25	179.7	210.0	34.9	72.1	555.4	66.7	188.5
45	3722.00	3722.41	187.0	261.4	56.2	99.8	532.1	80.0	125.7
46	3730.00	3730.70	171.3	427.0	38.0	39.0	484.4	90.5	168.0
47	3733.02	3734.23	147.8	366.9	38.8	43.0	426.6	82.8	158.9
48	3739.92	3740.56	154.8	204.3	46.5	75.2	452.0	85.2	102.2
49	3744.77	3745.40	160.0	208.2	61.0	74.0	433.0	70.2	122.0
50	3750.00	3750.35	164.7	205.0	78.2	103.4	396.0	72.5	105.5

51	3755.82	3756.30	168.6	359.2	60.0	35.8	431.1	74.1	152.5
52	3757.93	3758.38	173.1	310.4	72.7	41.7	496.4	78.4	192.4
53	3763.6	3764.05	174.8	225.6	70.9	86.3	563.6	85.1	166.6
54	3769.73	3770.19	167.0	286.8	43.6	47.4	365.7	66.5	141.6
55	3773.68	3774.55	174.8	188.5	54.5	85.0	438.4	76.5	120.5
56	3779.70	3782.35	104.7	205.9	60.6	64.8	400.6	68.9	91.8
57	3784.80	3785.45	173.3	178.2	58.2	83.8	447.1	76.2	134.7
58	3790.20	2790.70	173.3	215.4	40.0	47.4	498.3	79.8	192.8
59	3793.93	3794.50	168.0	194.3	61.8	92.3	405.0	72.6	144.8

MAJOR AND MINOR ELEMENTS IN THE SHALE CORE FROM COTTAGEVILLE, WEST VIRGINIA, WELL NO. 11940, IN THE DEPTH INTERVAL FROM 3410 TO 3793 FEET.

Sample Number	Depth Ft. Top	Depth Ft. Btm	HTA %	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	Na_2O %	K_2O %	P_2O_2 %	TiO_2 %	SO_3 %
1	3410.00	3410.66	92.26	60.7	18.9	9.0	0.5	1.8	0.9	4.6	0.2	0.8	0.8
2	3415.05	3415.45	90.81	61.6	19.3	8.9	0.6	2.0	0.7	4.2	0.1	0.2	1.4
3	3420.60	3421.03	90.99	60.9	19.6	8.5	0.4	1.9	1.0	4.4	0.2	0.6	0.8
4	3425.60	3426.07	91.59	61.10	19.9	8.7	0.4	1.9	0.9	4.4	0.1	0.5	0.7
5	3430.10	3430.34	92.08	60.9	19.6	8.1	0.4	1.9	1.0	5.1	0.2	0.8	0.8
6	3434.60	3435.20	91.52	63.1	18.6	7.5	0.5	2.0	0.7	4.8	0.1	0.7	0.8
7	3439.90	3440.30	90.73	63.2	18.5	8.0	0.5	1.9	0.8	4.4	0.1	0.2	0.7
8	3445.10	3445.60	88.70	62.8	18.7	7.5	0.5	2.2	0.9	4.8	0.3	0.9	0.7
9	3450.40	3454.00	92.76	62.4	19.1	7.6	0.4	2.0	1.5	4.5	0.2	0.2	0.4
10	3455.00	3455.50	95.71	62.2	18.6	7.8	0.4	2.2	0.8	4.2	0.1	0.7	0.8
11	3460.00	3460.40	93.35	62.2	19.0	8.3	0.5	2.0	0.9	4.7	0.2	0.5	0.7
12	3465.00	3465.50	92.94	62.5	19.5	7.7	0.4	1.8	0.9	4.3	0.0	0.7	0.8
13	3470.00	3470.60	91.46	65.4	16.4	7.2	0.8	1.8	0.7	4.3	0.1	1.0	0.9
14	3475.00	3475.50	94.44	61.6	18.6	7.9	0.9	1.8	0.7	4.7	0.1	1.0	1.0
15	3479.10	3479.90	93.47	61.4	19.2	8.3	0.4	1.7	0.7	4.4	0.1	1.2	0.7
16	3485.00	3485.50	93.52	58.7	20.6	7.7	0.6	2.0	0.8	5.2	0.1	1.0	0.6
17	3489.75	3490.40	95.87	72.9	13.3	4.4	1.0	1.3	0.8	2.7	0.1	1.3	1.3
18	3494.40	3495.00	81.59	46.6	13.6	7.7	22.0	1.8	0.6	3.1	0.1	1.0	2.8
19	3498.65	3499.25	93.56	59.2	18.1	9.7	2.6	1.7	0.8	4.2	4.2	1.0	0.7
20	3600.00	3600.50	92.15	55.6	21.8	10.0	1.3	2.2	0.6	5.4	0.1	0.9	0.7
21	3604.55	3605.00	93.90	61.4	19.5	7.4	0.9	2.0	0.8	4.8	0.1	1.0	0.9
22	3610.90	3611.30	95.50	66.0	18.5	5.8	0.6	1.4	0.8	3.9	0.1	0.9	0.5
23	3615.00	3615.45	94.10	62.5	20.1	6.6	0.4	1.4	0.7	5.0	0.1	1.2	0.8
24	3619.85	3620.30	86.98	53.2	15.9	9.0	13.2	1.9	0.8	4.0	0.1	0.9	0.3
25	3624.80	3625.23	91.94	58.8	19.8	10.2	1.5	2.4	0.3	3.9	0.2	1.0	1.3
26	3629.60	3630.10	94.03	60.9	19.3	6.2	3.6	1.3	0.8	3.4	0.2	1.2	1.8
27	3634.93	3635.43	92.30	60.2	18.6	8.0	3.0	1.6	0.7	3.6	0.1	0.9	1.6
28	3639.80	3640.28	93.69	65.9	15.5	6.8	3.7	1.1	0.7	2.6	0.1	1.0	1.3
29	3644.51	3645.00	90.41	71.8	6.9	4.8	9.9	1.2	0.7	1.0	0.1	0.4	1.8
30	3650.83	3651.28	94.98	62.9	19.2	7.9	0.3	1.3	0.5	4.1	0.1	1.3	0.8
31	3654.50	3655.00	90.75	64.8	17.9	7.5	1.3	0.9	0.9	3.3	0.2	2.7	0.8
32	3658.30	3659.37	93.12	65.8	17.9	5.8	1.3	1.2	1.0	3.6	0.0	0.7	0.7
33	3664.77	3665.27	89.61	65.8	17.8	7.4	0.8	1.1	0.7	3.3	0.1	1.9	0.7
34	3669.63	3670.07	93.82	60.8	19.3	8.6	1.6	1.4	0.6	3.8	0.2	1.1	1.3
35	3674.90	3675.33	90.84	64.6	16.8	7.9	0.6	1.1	0.7	3.8	0.2	1.0	1.7
36	3680.50	3680.90	91.41	66.9	17.0	6.0	0.6	1.3	0.7	3.8	0.1	1.2	1.3
37	3684.51	3685.12	91.29	67.4	16.8	6.4	0.4	1.7	0.5	3.6	0.0	0.8	0.7
38	3689.85	3690.35	90.56	63.7	18.8	6.8	1.3	1.4	0.6	4.0	0.1	0.7	1.0
39	3694.55	3695.05	91.77	65.2	18.6	6.2	0.5	1.6	0.9	4.1	0.0	0.9	0.6
40	3699.93	3700.45	90.48	67.8	17.6	5.9	0.5	1.3	0.7	4.1	0.1	0.4	0.6
41	3704.72	3705.20	92.82	64.4	19.1	6.5	0.9	1.7	0.7	4.1	0.1	0.4	1.0
42	3710.25	3710.75	90.00	65.3	18.1	6.8	0.4	2.2	1.1	4.0	0.0	0.5	1.5
43	3713.72	3714.43	87.13	63.9	18.9	6.7	0.9	2.1	0.8	4.0	0.1	0.5	1.1
44	3719.60	3720.25	89.52	63.7	18.7	7.7	0.7	1.4	0.9	4.1	0.2	0.8	0.6
45	3722.00	3722.41	88.78	62.6	19.5	7.0	1.3	1.1	0.6	4.5	0.0	0.7	1.0
46	3730.00	3730.70	94.25	61.8	19.3	6.5	2.2	1.6	0.9	4.3	0.2	1.0	2.0
47	3733.02	3734.23	94.47	65.4	17.5	6.7	1.7	1.8	0.6	3.7	0.1	0.7	2.0
48	3739.92	3740.56	88.43	66.2	17.7	6.8	0.6	1.6	0.6	3.8	0.0	0.9	0.6
49	3744.77	3745.40	91.17	67.10	17.4	6.1	0.2	1.6	0.6	4.1	0.1	0.8	0.7
50	3750.00	3750.35	89.04	65.00	17.5	7.8	6.2	2.1	0.6	3.8	0.2	0.8	0.8

51	3755.82	3756.30	94.56	64.2	19.3	5.8	0.8	2.1	0.6	3.9	0.2	1.1	1.3
52	3757.93	3758.38	94.76	64.7	18.8	5.9	0.5	1.9	0.6	4.1	0.2	0.8	1.5
53	3763.60	3764.05	92.55	64.4	19.1	6.7	0.2	1.7	0.9	4.1	0.1	0.6	0.6
54	3769.73	3770.19	94.50	64.7	18.8	6.6	0.5	2.2	0.8	3.9	0.1	0.7	0.6
55	3773.68	3774.55	91.67	63.7	19.1	6.7	0.2	1.7	0.7	4.2	0.2	0.6	1.1
56	3779.70	3782.35	89.82	66.5	16.5	7.1	0.3	1.7	0.6	3.9	0.1	0.8	0.8
57	3784.80	3785.45	91.91	65.2	18.2	6.8	0.5	1.8	0.5	4.1	0.1	0.6	0.5
58	3790.20	3790.70	93.49	62.5	19.5	6.5	0.7	2.1	2.8	4.1	0.0	0.8	0.8
59	3793.93	3794.50	90.41	63.7	18.9	7.2	0.7	1.7	0.7	4.0	0.0	0.8	0.5

CHEMICAL ANALYSIS OF SHALE CORE FROM COTTAGEVILLE, WEST VIRGINIA, WELL NO. AY540, IN THE DEPTH INTERVAL FROM 3410 TO 3793 FEET.

Sample #	Depth Ft. Top	Depth Ft. Btm	TC, %	H, %	N, %	TS, %	PS, %	Org. S, %	CO_2, %
1	3410.00	3410.66	2.47	1.48	0.07	3.60	2.97	0.62	0.09
2	3415.45	3415.45	3.63	1.16	0.09	3.23	2.92	0.30	0.23
3	3420.60	3421.03	3.49	1.22	0.11	2.94	2.71	0.21	0.14
4	3425.60	3426.07	2.47	2.95	0.08	2.72	2.50	0.22	0.13
5	3430.10	3430.34	1.75	0.87	0.12	2.95	2.67	0.27	0.17
6	3434.60	3435.20	3.11	1.09	0.10	2.77	2.59	0.18	0.18
7	3439.90	3440.30	3.54	1.23	0.14	2.57	2.36	0.21	0.21
8	3445.10	3445.60	5.06	1.15	0.09	2.60	2.33	0.27	0.29
9	3450.40	3454.00	1.44	0.74	0.07	2.88	2.06	0.20	0.10
10	3455.00	3455.50	0.48	0.79	0.06	2.59	2.37	0.21	0.03
11	3460.00	3460.40	1.19	0.51	0.05	3.00	2.68	0.30	0.38
12	3465.00	3465.50	2.85	0.82	0.00	2.56	2.36	0.19	0.19
13	3470.00	3470.60	3.68	0.81	0.02	2.54	2.31	0.23	0.27
14	3475.00	3475.50	1.07	0.48	0.02	1.94	1.76	0.18	0.36
15	3479.10	3479.90	1.30	0.71	0.00	2.75	2.60	0.15	0.11
16	3485.00	3485.50	0.27	0.54	0.01	0.96	0.91	0.04	0.03
17	3489.75	3490.40	0.55	0.40	0.01	0.93	0.89	0.03	1.02
18	3494.40	3495.00	4.60	0.38	0.00	1.47	1.39	0.01	16.97
19	3498.65	3499.25	0.97	0.74	0.00	4.14	3.52	0.18	1.23
20	3600.00	3600.50	0.92	0.70	0.00	0.37	0.21	0.16	3.14
21	3604.55	3605.00	0.68	0.73	0.02	1.75	1.57	0.17	2.04
22	3610.90	3611.30	2.74	0.59	0.02	0.58	0.53	0.03	1.53
23	3615.00	3615.45	0.68	0.76	0.00	1.80	1.63	0.15	2.13
24	3619.85	3620.30	2.87	0.38	0.00	0.82	0.77	0.02	10.16
25	3624.80	3625.23	1.45	0.75	0.16	0.28	0.16	0.10	4.74
26	3629.60	3630.10	1.43	0.72	0.17	1.78	1.63	0.12	0.47
27	3634.93	3635.43	1.54	0.71	0.12	0.97	0.86	0.09	4.56
28	3639.80	3640.28	1.28	0.45	0.10	0.62	0.48	0.07	4.22
29	3644.51	3645.00	2.55	0.22	0.04	1.20	1.03	0.13	9.12
30	3650.83	3651.28	1.79	0.55	0.18	2.94	2.68	0.20	0.15
31	3654.50	3655.00	3.48	1.11	0.22	2.82	2.67	0.08	0.40
32	3658.30	3659.37	2.13	0.72	0.16	1.60	1.47	0.09	0.42
33	3664.77	3665.27	5.41	0.97	0.00	2.61	2.43	0.13	0.29
34	3669.63	3670.07	5.60	0.85	0.00	3.00	2.79	0.14	1.43
35	3674.90	3675.33	3.82	0.80	0.00	3.37	3.19	0.08	0.52
36	3680.50	3680.90	3.75	0.82	0.29	1.92	1.78	0.09	0.22
37	3684.51	3685.12	4.13	0.55	0.00	2.31	2.17	0.09	0.49
38	3689.85	3690.35	3.80	1.07	0.00	2.34	2.20	0.08	0.93
39	3694.55	3695.05	3.09	0.67	0.03	0.98	1.83	0.12	0.34
40	3699.93	3700.45	4.48	0.80	0.00	1.74	1.55	0.17	0.23
41	3704.72	3705.20	2.35	0.45	0.00	1.81	1.67	0.09	0.67
42	3710.25	3710.75	4.14	1.32	0.03	2.02	1.86	0.13	0.23
43	3713.72	3714.43	7.60	1.39	0.02	1.94	1.79	0.13	0.86
44	3719.60	3720.25	5.05	0.66	0.00	2.55	2.53	0.02	0.29
45	3722.00	3722.41	5.32	1.24	0.01	2.21	2.10	0.10	0.44
46	3730.00	3730.70	1.11	0.53	0.03	1.88	1.76	0.10	1.98
47	3732.02	3734.23	1.18	0.53	0.02	1.91	1.79	0.11	1.86
48	3739.92	3740.56	6.39	0.76	0.00	2.50	2.32	0.14	0.20
49	3744.77	3745.40	3.90	0.98	0.02	1.91	1.81	0.09	0.24
50	3750.00	3750.35	5.29	0.99	0.04	2.53	2.50	0.03	0.20

51	3755.82	3756.20	0.96	0.29	0.02	0.78	0.69	0.07	2.13
52	3757.95	3758.38	6.49	0.69	0.03	1.25	1.11	0.11	1.38
53	3763.60	3764.05	2.44	0.69	0.00	2.06	1.91	0.13	0.38
54	3769.73	3770.19	0.98	0.53	0.04	1.56	1.48	0.06	1.39
55	3773.68	3774.55	3.23	0.53	0.02	2.02	1.88	0.11	0.21
56	3779.70	3782.35	4.30	1.56	0.01	2.31	2.17	0.10	0.54
57	3784.80	3785.45	2.83	0.94	0.00	2.03	1.89	0.12	0.21
58	3790.20	3790.70	1.31	0.83	0.02	1.99	1.83	0.15	0.55
59	3793.93	3794.50	4.19	0.87	0.01	2.48	2.32	0.14	2.32

TABLE 1. PERCENT OF COMBUSTIBLES AND BULK MINERALOGICAL ANALYSIS OF SHALE CORE FROM COTTAGEVILLE, WEST VIRGINIA, WELL NO. 11940, IN THE DEPTH INTERVAL FROM 3410 TO 3793 FEET.

Sample Number	Top	Btm	% COMB. LTA	% LTA	Mineralogical Components as Percent of Total Integrated Intensity											
					CHLO	ILLI	KAOL	QTZ	ORTH	PLAG	$CaSO_4$ $2H_2O$	CAL	$CaSO_4$ $\frac{1}{2}H_2O$	DOL	$CaSO_4$	PYR
1	3410.00	3410.66	1.11	98.89	4.9	60.9	0.5	26.4	0.0	2.1	0.0	0.3	1.6	0.6	0.5	2.2
2	3415.05	3415.45	3.19	96.81	3.3	57.5	2.9	29.7	0.0	2.2	0.0	0.0	1.4	0.0	0.0	2.8
3	3420.60	3421.03	2.91	97.09	3.8	54.1	3.7	32.4	0.0	1.8	0.0	0.2	0.7	0.0	0.5	2.9
4	3425.60	3426.07	2.23	97.77	4.1	55.6	4.4	29.3	0.0	2.5	0.0	0.9	0.6	0.0	0.6	1.9
5	3430.10	3430.34	1.52	98.48	2.4	55.5	5.2	29.6	0.0	2.2	0.0	0.0	1.1	0.6	0.3	3.0
6	3434.60	3435.20	2.29	97.71	2.8	56.9	4.8	28.7	0.0	2.6	0.0	0.5	1.0	0.3	0.0	2.5
7	3439.90	3440.30	3.6	96.40	4.3	53.1	3.2	31.5	0.0	1.6	0.0	0.4	1.4	0.6	0.5	3.4
8	3445.10	3445.60	4.98	95.02	5.1	57.9	2.5	25.4	0.0	1.8	0.2	0.7	0.7	0.8	0.8	4.1
9	3450.40	3454.00	1.31	98.69	3.4	53.6	7.3	29.5	0.0	2.4	0.0	0.4	0.5	0.0	0.4	2.6
10	3455.00	3455.50	0.55	99.45	4.4	61.3	4.5	25.9	0.4	2.4	0.0	0.4	1.6	0.7	0.6	2.7
11	3460.00	3460.40	1.32	98.68	3.9	53.9	8.1	26.4	0.0	3.2	0.0	0.0	1.2	0.8	0.5	1.9
12	3465.00	3465.50	1.63	98.27	4.3	54.2	3.0	29.3	0.4	3.9	0.0	0.0	1.1	0.0	0.5	3.2
13	3470.00	3470.60	3.08	96.92	3.5	52.0	5.9	29.5	0.0	3.2	0.0	0.6	0.9	0.9	0.6	2.7
14	3475.00	3475.50	0.59	99.41	4.4	53.7	7.5	28.2	0.0	3.2	0.0	0.4	0.0	0.3	0.0	2.2
15	3479.10	3479.90	0.89	99.11	4.0	54.7	6.0	26.8	0.0	2.7	0.0	0.5	0.7	0.5	1.0	3.7
16	3485.00	3485.50	0.30	99.70	4.5	57.0	7.1	26.9	0.0	0.0	0.0	0.2	1.4	0.3	2.5	0.0
17	3489.75	3490.40	0.4	99.60	4.8	44.5	2.0	36.7	0.0	8.6	0.6	0.0	0.0	1.1	0.6	1.0
18	3494.40	3495.00	0.20	99.80	2.6	38.1	2.9	24.1	0.0	1.9	0.0	22.9	0.0	6.3	0.0	1.1
19	3498.65	3499.25	0.26	99.74	9.0	53.8	0.0	28.8	0.0	2.7	0.0	0.6	0.7	0.1	0.6	3.8
20	3600.00	3600.50	0.36	99.64	6.5	57.5	0.0	28.0	0.0	1.2	0.0	0.4	1.1	0.0	0.0	5.4
21	3604.55	3605.00	0.57	99.43	6.6	53.4	1.3	31.3	0.0	2.6	0.0	0.9	0.5	1.5	0.6	1.2
22	3610.90	3611.30	0.31	99.69	7.8	51.8	0.0	33.3	0.7	4.5	0.0	0.0	0.8	0.0	0.0	1.2
23	3615.00	3615.45	0.50	99.50	5.8	55.5	0.3	30.6	0.4	2.5	0.0	0.0	2.3	0.0	0.5	1.9
24	3619.85	3620.30	0.10	99.90	5.1	35.8	2.6	32.4	0.6	4.3	0.0	19.2	0.0	0.0	0.0	0.0
25	3624.80	3625.23	0.34	99.66	7.2	52.8	0.3	32.4	0.6	4.0	0.0	0.7	1.1	0.3	0.6	0.0
26	3629.60	3630.10	0.02	98.98	6.4	53.5	0.9	31.9	0.0	3.8	0.0	0.0	0.6	0.0	0.6	2.3
27	3634.93	3635.43	0.51	99.49	6.6	55.5	0.0	30.5	0.0	3.3	0.0	4.0	0.0	0.0	0.0	0.0
28	3639.80	3640.28	0.27	99.73	7.5	43.1	0.0	33.4	0.0	6.2	0.6	5.1	1.9	2.1	0.0	0.0
29	3644.51	3645.00	0.15	99.85	4.4	17.4	0.0	38.0	0.7	7.8	0.0	14.9	0.0	16.8	0.0	0.0
30	3650.83	3651.28	2.46	97.54	6.8	52.3	0.0	30.6	0.3	3.2	1.3	0.0	1.0	0.0	1.1	3.4
31	3654.50	3655.00	3.48	96.52	7.9	53.6	0.0	31.2	0.4	3.1	0.0	0.4	1.6	1.2	0.3	3.6
32	3658.90	3659.37	1.88	98.12	5.2	55.0	0.0	33.3	0.5	2.8	0.0	0.7	0.6	0.5	0.3	1.2
33	3664.77	3665.27	4.87	95.13	4.1	54.5	0.4	34.9	0.0	3.5	0.0	0.4	0.6	0.8	0.7	0.0
34	3669.63	3670.07	0.15	99.85	6.2	56.1	0.0	28.2	0.0	2.2	0.0	1.4	1.1	1.6	0.7	2.5
35	3674.90	3675.33	3.32	96.68	5.7	50.7	0.0	33.4	0.0	3.8	0.0	0.0	1.7	0.0	0.0	4.7

50	3750.00	3750.33	4.67	93.13	7.0	34.2	0.0	28.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	4.0
51	3755.82	3756.30	0.24	99.76	5.7	52.1	1.2	34.0	0.0	2.7	0.0	1.3	0.9	1.4	0.0	1.0
52	3757.93	3758.38	0.29	99.71	5.8	57.6	0.0	28.8	0.0	2.8	0.0	0.6	0.4	1.0	0.2	1.8
53	3763.60	3764.05	1.85	98.15	4.1	48.8	5.6	32.7	0.0	3.8	0.0	0.0	1.0	0.0	0.0	3.8
54	3769.73	3770.19	0.27	99.73	6.4	53.2	0.0	30.3	0.8	2.6	0.3	0.9	1.3	1.0	0.8	2.4
55	3773.68	3774.55	2.54	97.46	3.9	56.8	1.8	30.0	0.0	4.1	0.0	0.0	0.8	0.0	0.6	2.1
56	3779.70	3782.35	4.29	95.71	5.4	55.6	0.0	32.9	0.0	2.1	0.0	0.0	1.2	0.0	0.0	2.6
57	3784.80	3785.45	2.38	97.62	5.4	54.4	0.0	31.1	0.0	3.4	0.0	0.6	1.6	0.0	1.1	1.9
58	3790.70	3790.70	1.05	98.95	6.0	61.6	0.0	25.5	0.5	3.2	0.0	0.0	0.7	0.0	0.5	1.8
59	3793.93	3794.50	3.58	96.42	5.6	57.0	2.7	28.0	0.4	2.6	0.0	0.0	1.2	0.0	0.7	2.2

COTTAGEVILLE, W.VA. CORE No. 12041

CHEM ANAL., C, H, N, S, SUL FORMS

S	DEPTH FT. TOP	BTM.	SPEC GRAV	MOIS	TOT CAR	H	N	TOT SUL	PYR SUL	ORG SUL	SULF SUL	CO_2	HTA
1	3220.00	3220.40	2.70	0.70	3.86	1.16	0.00	3.03	2.57	0.34	0.02	0.10	91.48
2	[illegible]	3225.55	2.64	0.75	3.80	0.88	0.00	2.94	2.62	0.32	0.00	0.14	91.49
3	[illegible]	3230.50	2.61	0.49	1.06	0.70	0.00	2.36	[illegible]	0.21	0.02	2.73	93.65
4	[illegible]	3235.85	2.69	0.61	0.75	1.09	0.00	2.66	2.31	0.33	0.01	1.03	91.80
5	[illegible]	3240.35	2.68	0.63	3.57	0.51	0.00	2.45	[illegible]	0.29	0.00	0.36	91.45
6	3245.10	3245.85	2.68	0.41	1.69	0.58	0.00	2.46	[illegible]	0.32	0.00	0.43	93.66
7	3250.10	3250.60	2.86	0.21	1.48	0.52	0.00	0.78	[illegible]	0.30	0.00	4.32	93.60
8	3255.00	3255.75	2.79	0.03	0.74	0.38	0.00	2.66	[illegible]	0.24	0.03	0.12	93.02
9	3260.10	3260.70	2.49	0.00	1.73	0.99	0.00	2.48	[illegible]	0.31	0.02	2.48	93.74
10	3265.00	3265.55	2.64	0.17	1.84	0.69	0.00	2.33	2.51	0.25	0.00	0.15	93.10
11	3270.00	3270.50	2.64	0.45	1.23	0.57	0.00	1.91	[illegible]	0.26	0.00	0.46	94.50
12	3275.05	3275.65	2.55	0.60	3.63	0.67	0.00	2.53	[illegible]	0.30	0.02	0.63	94.21
13	3280.00	3280.60	2.90	0.45	0.57	0.54	0.01	1.71	1.44	0.26	0.01	0.60	95.63
14	3285.00	3286.00	2.56	0.03	0.78	0.67	0.00	2.51	2.13	0.35	0.05	0.78	95.25
15	3289.78	3290.26	2.71	0.72	0.62	0.50	0.02	1.83	1.65	0.26	0.02	0.78	98.13
16	3294.85	3295.70	2.73	0.52	0.93	0.63	0.02	2.34	2.05	0.27	0.02	0.07	94.09
17	3300.00	3300.60	2.68	0.55	1.71	0.71	0.00	2.49	[illegible]	0.34	0.00	0.53	93.91
18	3305.05	3305.62	2.30	0.53	0.90	0.73	0.00	1.85	[illegible]	0.26	0.01	0.04	92.64
19	3310.00	3310.50	2.72	0.51	0.36	0.79	0.00	2.72	[illegible]	0.35	0.01	0.15	91.16
20	3315.20	3315.57	2.67	0.49	1.63	0.67	0.00	2.37	[illegible]	0.30	0.02	0.20	92.33
21	3320.00	3320.67	2.55	0.49	0.36	0.57	0.00	1.55	[illegible]	0.24	0.00	0.17	92.74
22	3325.50	[illegible]	2.77	0.25	0.65	0.62	0.00	[illegible]	[illegible]	0.30	0.01	1.13	95.75
23	3330.13	3330.70	2.73	0.44	1.43	0.72	0.00	2.90	[illegible]	0.34	0.00	0.12	95.91
24	3335.67	3335.78	2.75	0.31	1.10	0.74	0.00	2.59	2.27	0.26	0.00	0.07	94.67
25	3340.45	3340.27	2.72	0.46	0.76	0.57	0.02	1.61	[illegible]	0.16	0.03	0.15	94.75
26	3345.20	3345.65	2.37	0.52	1.14	0.55	0.01	[illegible]	[illegible]	0.10	0.01	3.94	92.55
27	3349.93	3350.40	2.78	0.51	0.79	0.60	0.00	[illegible]	[illegible]	0.06	0.04	1.74	92.47
28	3354.79	3355.25	2.73	0.13	1.42	0.35	0.00	0.37	[illegible]	0.07	0.00	2.62	94.99
29	3360.00	3360.17	2.74	0.45	0.46	0.64	0.01	2.54	[illegible]	0.25	0.02	0.16	92.14
30	3364.65	3365.00	2.66	0.49	1.75	0.65	0.02	2.31	[illegible]	0.12	0.00	0.17	92.62
31	3370.00	3370.55	2.78	0.47	0.75	0.75	0.00	1.61	[illegible]	0.13	0.03	0.10	94.16
32	3375.25	3375.77	2.79	0.40	1.61	0.50	0.00	0.31	0.19	0.07	0.05	2.99	93.55
33	3379.39	3380.36	2.70	0.40	1.15	0.63	0.00	[illegible]	[illegible]	0.24	0.03	0.22	93.70
34	3384.55	3385.00	2.69	0.20	2.03	0.35	0.01	1.55	1.74	0.07	0.02	6.08	96.35
35	3389.50	3390.40	2.78	0.60	1.12	0.74	0.00	2.45	2.15	0.28	0.05	0.12	93.46
36	3394.42	3395.00	2.71	0.56	0.56	0.65	0.00	[illegible]	[illegible]	0.10	0.03	0.09	93.39
37	3400.50	3400.95	2.37	0.68	1.40	0.72	0.01	0.89	0.76	0.12	0.00	2.81	92.72
38	3405.60	3406.05	2.79	0.70	0.62	0.57	0.00	[illegible]	[illegible]	0.16	0.01	1.74	93.92
39	3410.00	3410.50	2.51	0.65	0.50	0.49	0.00	[illegible]	[illegible]	0.12	0.00	2.45	93.22
40	3415.86	3416.30	2.79	0.50	0.75	0.68	0.00	[illegible]	[illegible]	0.18	0.01	2.49	93.20
41	3419.57	3420.24	2.71	0.54	0.49	0.63	0.01	1.79	1.57	0.20	0.00	0.29	93.27
42	3424.76	3425.40	2.75	0.44	0.60	0.74	0.00	2.51	2.32	0.19	0.01	0.08	93.96

S	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	P_2O_5	TiO_2	SO_3
1	63.6	18.9	5.0	0.5	1.8	0.6	4.2	0.2	0.7	0.5
2	64.7	19.2	7.4	0.6	1.9	0.5	4.2	0.2	0.7	0.7
3	64.0	15.8	6.9	2.4	1.6	0.6	3.5	0.1	0.7	2.3
4	64.6	16.8	7.7	1.6	1.8	0.7	3.5	0.1	0.8	1.7
5	63.9	18.9	6.9	0.7	1.8	0.7	4.1	0.1	0.2	0.6
6	66.4	16.9	7.0	0.6	1.9	0.7	3.6	0.1	0.6	0.7
7	70.0	10.8	7.5	0.8	2.0	0.6	3.8	0.1	0.4	0.9
8	58.6	20.7	7.6	1.6	3.1	0.7	4.4	0.1	0.9	0.4
9	60.6	17.7	7.8	2.6	2.4	1.4	3.7	0.1	0.9	1.9
10	63.9	17.6	7.6	1.4	1.8	0.9	3.9	0.1	0.4	0.6
11	67.6	16.5	6.0	1.5	1.8	0.7	3.8	0.1	0.4	0.7
12	66.2	17.2	7.0	0.5	2.0	0.8	3.6	0.1	0.7	0.9
13	69.9	15.5	6.4	0.5	1.4	0.9	3.0	0.1	0.7	0.8
14	67.6	15.9	6.3	0.8	1.5	0.9	3.3	0.1	0.9	1.2
15	66.0	22.5	7.2	0.3	3.4	0.5	4.5	0.1	0.9	0.6
16	63.7	13.8	6.7	0.2	3.7	0.6	3.4	0.1	1.1	0.5
17	63.9	15.7	6.9	0.7	1.7	0.7	3.7	0.1	1.0	1.0
18	60.4	22.3	6.6	0.3	1.9	0.5	4.4	0.1	0.9	0.4
19	63.4	20.8	7.3	0.3	0.6	0.6	4.1	0.1	1.3	0.3
20	67.6	15.9	6.6	0.3	0.5	0.6	3.5	0.1	1.1	0.3
21	62.7	21.3	6.2	0.6	1.8	1.1	4.2	0.1	0.9	0.2
22	69.2	16.6	5.7	0.9	1.3	0.7	2.4	0.1	1.0	1.1
23	65.3	17.8	7.7	0.4	1.6	0.5	3.3	0.1	0.9	0.3
24	66.8	17.8	6.5	0.2	1.7	0.8	2.9	0.1	1.1	0.3
25	67.3	15.0	5.8	0.3	1.7	0.7	3.7	0.1	5.8	0.9
26	60.8	18.6	7.0	3.2	2.0	0.6	4.3	0.1	6.5	0.3
27	62.6	19.3	6.1	1.3	2.3	0.7	4.4	0.1	0.7	0.8
28	62.9	19.7	8.3	1.9	1.7	0.9	1.8	0.1	0.4	1.1
29	63.9	15.5	7.6	0.4	1.9	0.3	4.1	0.1	0.3	0.6
30	62.4	20.3	7.6	0.3	1.7	0.7	4.4	0.1	1.0	0.6
31	57.7	24.8	6.9	0.3	2.3	0.4	4.5	0.1	0.9	0.5
32	61.1	26.9	6.9	0.7	2.5	0.7	4.1	0.1	1.1	0.7
33	69.0	20.6	7.6	0.4	1.7	0.7	3.7	0.1	0.7	0.6
34	61.8	14.4	6.1	5.1	1.8	0.6	2.5	0.1	1.0	1.3
35	61.0	22.2	7.6	0.5	2.1	0.6	4.5	0.1	0.9	0.6
36	61.7	22.6	6.8	0.1	2.0	0.4	4.4	0.1	1.1	0.5
37	59.4	22.4	8.0	1.1	1.9	0.5	4.6	0.0	0.9	1.4
38	61.1	22.4	6.2	0.8	2.0	0.4	4.7	0.0	1.0	0.5
39	57.7	23.6	7.2	1.2	2.0	0.4	4.6	0.0	0.7	0.5
40	59.6	22.5	6.4	1.7	2.2	0.3	4.6	0.0	0.9	0.4
41	58.3	24.0	6.9	0.2	2.2	0.5	4.9	0.0	1.0	0.4
42	59.4	22.8	8.8	0.1	2.1	0.5	4.8	0.0	0.9	0.5

S	B	Mn	Ni	Ba	Cr	Sr	Cu	% LTA	% Comb LTA	Chlorite	Illite	Kaolinite	Quartz	Orth	Plag	Calcite	Dol
1	183	314	65	535	75	95	79			4.1	52.0	1.7	33.3	1.2	2.5		
2	181	256	94	572	96	97	61	95.30	1.70	6.1	57.8		30.4		2.0	0.4	
3	183	667	50	434	60	112	50	99.45	0.56	6.3	42.8		36.6	0.9	5.2	4.4	
4	141	563	32	675	75	94	61	97.63	2.37	5.4	42.9	1.6	42.3	0.5	2.7		
5	143	207	62	472	51	69	59	97.56	2.44	5.1	45.3		38.0	0.8	2.9		
6	129	226	71	393	92	74	51	98.38	1.10	5.8	42.2		43.1	1.0	3.4	0.6	
7	50	981	30	177	41	146	51	99.74	0.26	2.4	26.9	3.7	47.2		2.2	3.3	6.5
8	178	314	45	595	90	132	59	99.37	0.63	5.1	42.4	3.0	34.0	0.8	2.8	0.6	
9	154	678	47	474	78	105	52	95.21	1.79	4.6	42.9	4.5	35.7		2.9	4.9	6.4
10	165	299	42	603	79	137	61	98.34	1.66	7.4	50.9		36.5		1.4	0.8	
11	125	276	19	640	46	72	29	99.17	0.33	4.8	41.5	1.3	41.2	1.1	4.7		
12	154	380	57	538	78	57	19	96.90	3.10	3.6	48.0	5.4	35.5		2.5		
13	195	409	34	518	75	102	45	99.97	0.03	6.3	53.6		34.9		3.5		
14	134	389	49	1972	70	140	45	99.70	0.30	7.2	40.6	1.8	40.3		5.5		
15	175	759	62	654	66	153	55	99.98	0.02	6.2	57.8	3.0	28.8	0.4	1.6		
16	169	299	55	903	93	157	45	99.86	0.14	7.1	51.0	1.5	30.8	0.5	3.6	0.8	
17	174	357	50	649	103	159	58	99.55	0.45	7.1	55.4		30.7	0.6	3.0	0.7	
18	211	237	36	635	117	156	29	99.90	0.10	5.4	64.0	2.4	24.9	0.6	1.3		
19	165	328	93	574	106	145	56	98.32	1.68	6.0	54.0	3.1	33.2		2.1		
20	150	273	59	547	59	127	65	98.16	1.84	5.6	49.8	3.3	34.0	0.7	3.1		
21	150	318	27	558	93	147	38	99.93	0.07	8.0	52.5		30.7		2.2		
22	107	356	13	989	70	133	59	99.99	0.01	5.6	48.0	4.5	30.4	0.4	5.8		
23	168	264	41	558	97	164	38	99.56	0.44	6.6	53.2	6.5	27.4	0.8	3.5		
24	149	231	41	654	57	162	49	99.30	0.70	5.0	50.3	6.3	31.6	0.8	4.1		
25	147	239	47	619	50	76	60	99.80	0.20	5.3	55.0	3.3	31.2	0.4	3.5		
26	180	639	46	477	57	85	61			7.0	50.8	4.3	31.6		2.4	3.0	
27	196	641	57	523	67	52	55			4.5	55.2	6.1	25.0	0.3	3.5	1.6	
28	83	670	29	1359	81	191	73	99.55	0.45	3.3	31.1	7.6	41.6		7.0		5.3
29	175	229	56	639	62	93	49	99.51	0.49	6.8	56.5	6.8	34.9		4.3		
30	123	265	74	522	69	91	60	98.45	1.55	6.0	57.0	3.2	28.7	0.5	2.7		
31	156	337	61	576	86	110	72	99.40	0.60	4.7	54.6	6.5	28.6	0.2	2.5		
32	162	790	41	633	62	92	59	99.62	0.38	6.7	54.5	1.6	28.4	0.6	1.8	2.0	
33	158	282	34	547	81	159	67	99.29	0.71	6.1	51.9	0.3	33.0	0.8	4.1		
34	190	318	41	407	84	56	48	99.97	0.03	6.0	60.4	6.5	26.2	0.2	1.8		
35	229	269	72	549	72	87	67	99.35	0.65	4.4	39.4	2.5	36.4		2.2	11.8	0.9
36	205	258	68	882	80	103	45	99.33	0.67	6.0	52.0	2.5	33.1	0.4	2.3		
37	119	369	36	558	82	161	57	99.74	0.26	5.8	57.8	0.3	26.6		2.9		
38	184	678	21	618	89	164	26	99.77	0.03	5.5	55.0	4.8	28.9		2.7		
39	163	675	33	504	73	143	67	99.82	0.18	4.8	57.8	7.3	27.7		1.4		
40	190	717	26	636	91	168	49	99.72	0.28	4.6	53.8	7.1	28.7		2.8	1.6	
41	212	393	51	684	99	195	40	99.55	0.45	5.2	57.7	3.6	27.7	0.7	1.7		
42	215	314	42	779	91	202	36	99.53	0.47	5.2	55.3	2.4	26.5		2.3		

S	DEPTH		SPEC GRAV	MOIS	TOT CAR	H	N	TOT SUL	PYR SUL	ORG SUL	SULF SUL	CO_2	HTA
43	3429.79	3430.27	2.72	0.25	1.49	0.62	0.00	2.39	1.83	0.55	0.01	2.06	
44	3435.60	3436.20	2.72	0.49	0.81	0.72	0.02	2.16	1.52	0.63	0	0.28	
45	3440.80	3441.00	2.76	[illegible]	1.08	0.62	0.01	1.00	0.82	0.17	0	2.91	
46	3445.90	3446.59	2.70	[illegible]	1.17	0.72	[illegible]	1.53	1.41	0.12	0	6.19	
47	3450.10	3450.60	2.66	0.15	(0.88)	[illegible]	[illegible]	2.09	1.87	[illegible]	0	0.35	

S	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	P_2O_5	TiO_2	SO_3
43	61.1	28.8	6.4	2.0	2.5	0.5	[illegible]	.02	0.9	0.8
44	60.5	22.1	7.1	.6	2.2	0.6	4.6	.03	0.9	0.1
45	59.5	[illegible]	9.5	1.3	2.0	0.7	[illegible]	[illegible]	0.9	1.7
46	66.1	[illegible]	7.5	0.3	2.1	0.4	[illegible]	[illegible]	1.3	0.05
47	63.6	[illegible]	[illegible]	0.3	1.6	0.6	[illegible]	0.1	1.0	[illegible]

S	B	Mn	Cu	Ni	Ba	Cr	Sr	% LTA	% Comb LTA	Mixed	Illite	Kaolin	Quartz	Orth.	Plag	Cal	Dolomite
43	1700	5199	280	463	553.1	69.8	1588	99.70	1.30	4.48	[illegible]	2.92	30.62	–	2.36	[illegible]	–
44	1775	5333	66.5	565	632.9	101.4	2213	99.33	0.69	[illegible]	[illegible]	[illegible]	[illegible]	–	5.07	•	–
45	1708	10355	[illegible]	[illegible]	656.1	[illegible]	1770	99.74	0.26	[illegible]	[illegible]	–	[illegible]	–	1.71	–	–
46	1987	[illegible]	38.5	55.0	634.2	[illegible]	[illegible]	[illegible]	0.77	[illegible]	[illegible]	–	[illegible]	–	[illegible]	–	–
47	1630	3135	1733	774	696.0	50.3	1631	[illegible]	1.41	[illegible]	[illegible]	427	3969	0.51	[illegible]	–	2.46