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SUMMARY REPORT

ORBIT GAS CO. WELL RAY CLARK #1

UGR FILE # 254

July 1979

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TABLE OF CONTENTS

Section		Page
1.0	Summary	1
2.0	Well Siting	2
3.0	Drilling, Coring, Logging, Casing & Cementing Operations	6
4.0	Core Data and Description	9
5.0	Stimulation Operations	11
	• Perforations	
	• Acidization of Perforations Prior to Foam Frac	
	• Foam Frac of the New Albany Shale	
6.0	Product in Tests & Status of the Well	20
7.0	Summary Results & Conclusions	22
Appendix A -	Distribution of Core Material	23
Appendix B -	Battelle Labs	25
Appendix C -	Illinois Geological Survey	52
Appendix D -	Mound Labs	78
Appendix E -	Kerogen Analysis	114
Appendix F -	Log Copies	162
Appendix G -	Scope of Work	163
Appendix H -	Financial Report, Lease, Permit, and Title Examination Bid Sheet & Well Specifications	170
Appendix I -	Narrative Account of the Coring Operations	182

LIST OF FIGURES

Figure Page

2.1 Location of Ray Clark #1 Well 3
2.2 Base Map of Vienna Limestone Showing Well Locations 4
2.3 Well Location Plat. 5
3.1 Ray Clark Well #1 8

LIST OF TABLES

Table Page

4.1 Summary of Reservoir Parameters at Various Depths. 10
5.1 Flow Back After Stimulation. 13
5.2 Flow Back After Stimulation. 14
5.3 Pretreatment Data for the Interval Perforated. 17
5.4 Summary of the Foam Fracture Treatment 18
5.5 Data on Second Treatment 19

1.0 SUMMARY

In 1976, Orbit Gas Company, Owensboro, Kentucky, drilled a well located in the East Crofton Field of Christian County, Kentucky. The well was drilled to a depth of 2592 ft.

A four inch diameter oriented Devonian Shale core was obtained from 2178 ft. to 2327 ft. Of the original 149 ft. of core, 128 ft. was recovered. Battelle Research Laboratories and Mound Facility received samples of the core for analysis. Schlumberger Well Services ran the following suite of logs: Spontaneous Potential, Simultaneous Compensated Neutron - Formation Density, Microlaterolog - Microlog, Bore Hole Compensated Sonic Log, and a dual Induction-Laterolog. Following the logging of the hole the casing was set at 2360 ft.

The interval between 2186 ft. and 2320 ft. (134 ft.) was selected for stimulation with foam. The zone was shot with ten, 0.48" holes and broken down with acid. No measurable gas was observed during the swabbing operation or after the acid treatment.

On November 4, 1976, foam frac of the New Albany Shale was performed by Halliburton Services with the assistance of Aircowell's Nitrogen Gas Service A total of 45,000 gallons of 78 quality foam carrying 54,000 lbs. of frac sand was used in the treatment. Formation breakdown pressure was 1,800 psi and the average injection rate of the frac fluid was 5.6 barrels per minute.

The final open flow of gas from the well, after the foam treatment, was established at 2 MCF per day. Well head pressure build-up after a 115 day shut-in period was 836.6 psig.

After consultation with DOE personnel, it was decided to restimulate the black shale. The interval between 2187 to 2331 ft. was shot with 280 quarts of oil well explosive (Nitro). One hour after the shot, flow from the well was gauged at 40 MCF per day. The well's final open flow was calculated to be approximately 15 MCF per day.

The well has been plugged and abandoned because of non-commercial gas production.

2.0 WELL SITING

Orbit Gas well, Ray Clark #1, is located in Christian County, Kentucky (Figure 2.1). The approximate co-ordinates of the well are 87° 25' 5" and 37° 2' 3". The drill site is located 607 ft. south of the Kentucky highway 800, 90 ft. from the east line and 650 ft. from the north line of Carter Section 12 (Figure 2.3). The selection of the site was based on the following criteria:

- Favorable Geologic setting.
- Proximity to known Devonian shale products.
- Proximity to pipeline for marketing of the gas.
- Favorable leasing position for the contractor in this test area.

The well is located along the south side of the Massive Pennyrile Fault system of Western Kentucky (see Figures 2.2 and 2.3). This location is considered favorable because of the structure and natural fracturing associated with faulting in the area. The structure on the base of the Vienna Limestone, which outcrops in the area is outlined in the map (Figure 2.2).

In western Kengucky, the New Albany Formation (the name of the Devonian Black shale in the Illinois Basin) of Upper Devonian age is sequentially overlain by the New Providence shale and the Fort Payne Formation both of the lower Mississippian age. The systemic boundary is placed at the contact between the New Providence shale and the New Albany Formation. A thin interval of limestone, the Rockford Limestone, occurs at the base of the New Providence shale i.e., immediately overlying the New Albany shale.

Within the test area one well (King Badget #1) was previously drilled. Devonian shale was encountered between 2,091 ft. to 2,273 ft., or a thickness of 182 ft. The temperature log indicated that the bottom 75 ft. of this section was gas-bearing. No measurable open flow was indicated. The well was treated with explosive stimulation and gas flow after stabilization was measured at 71 MCF/D.

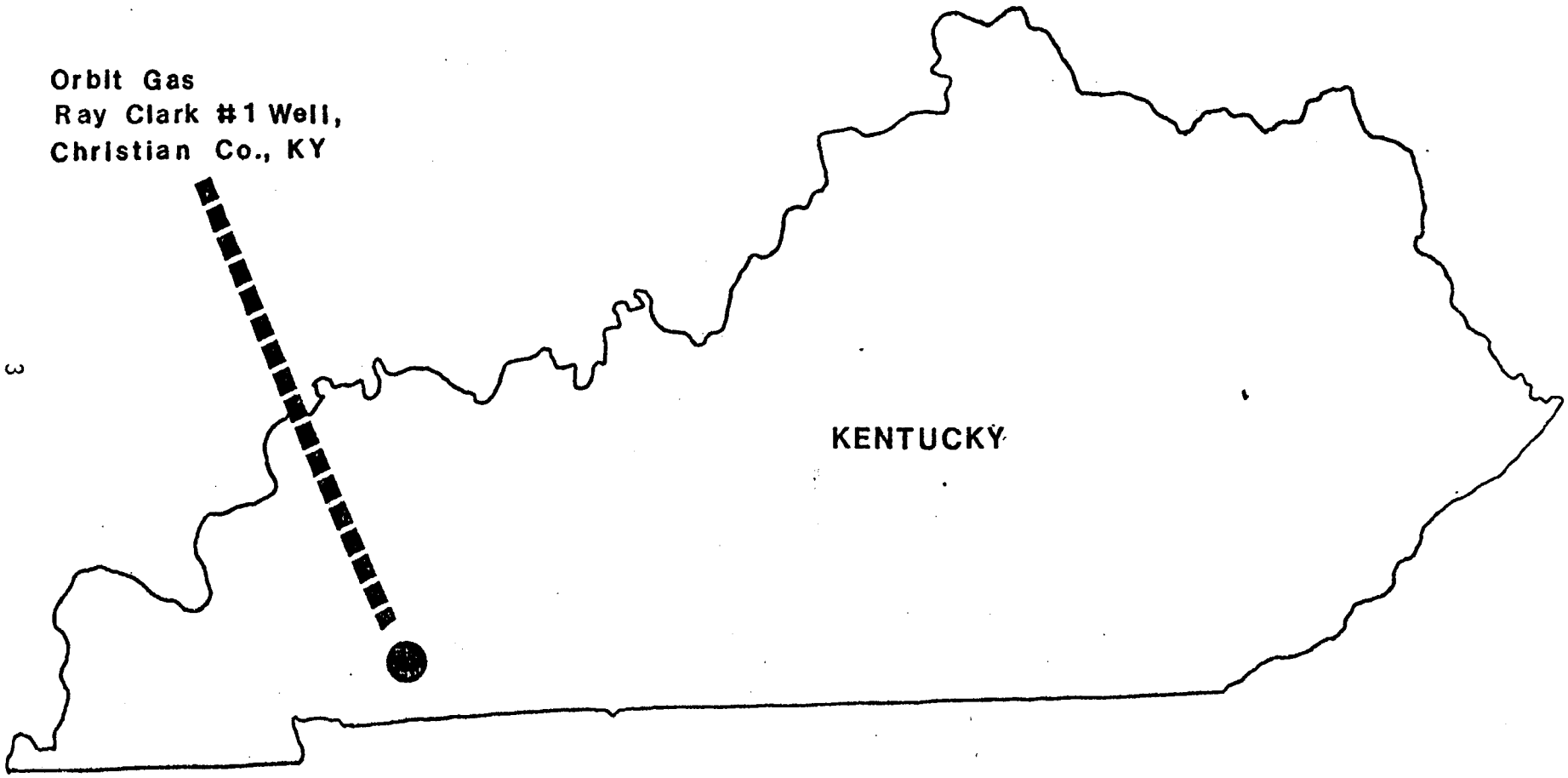
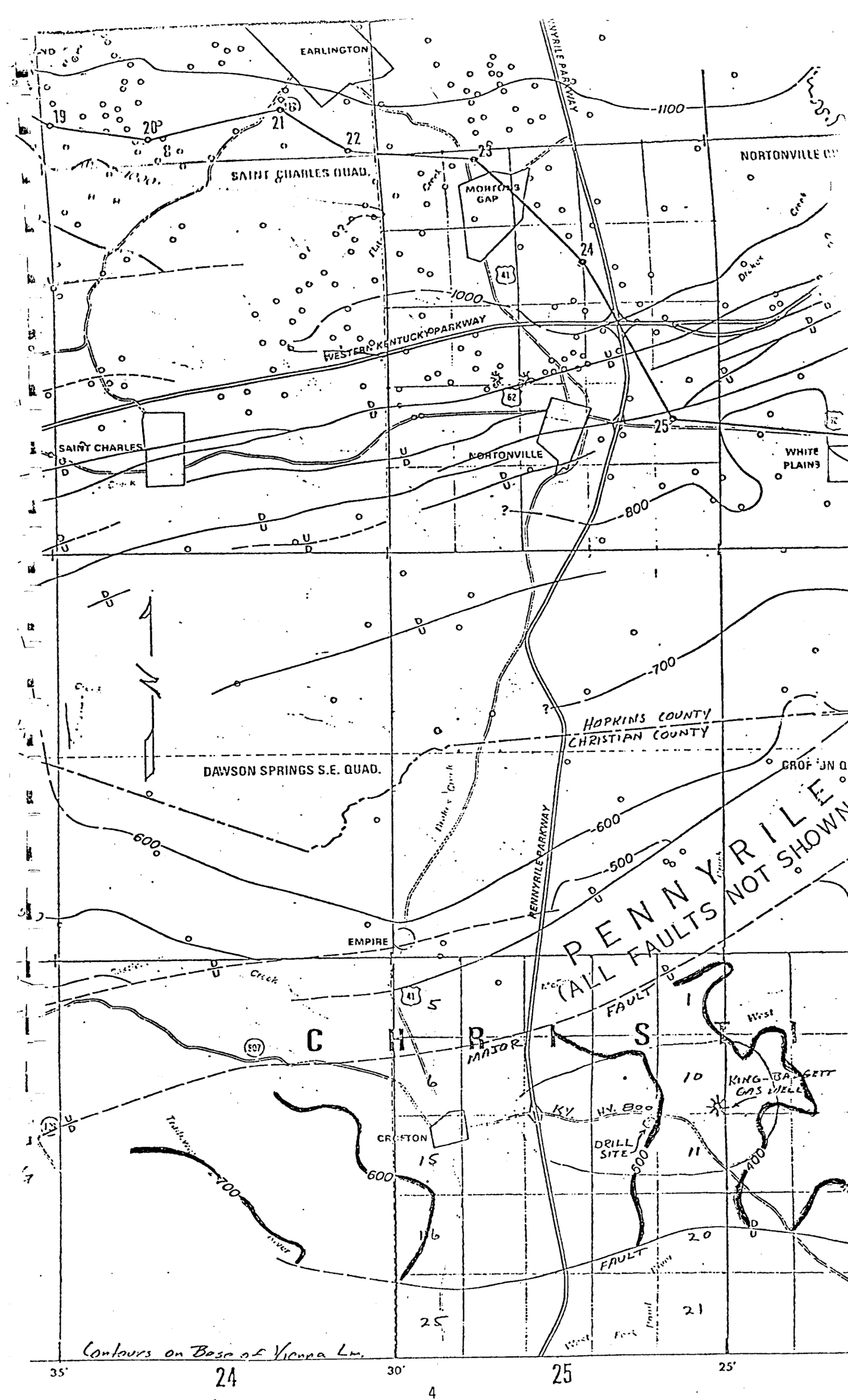
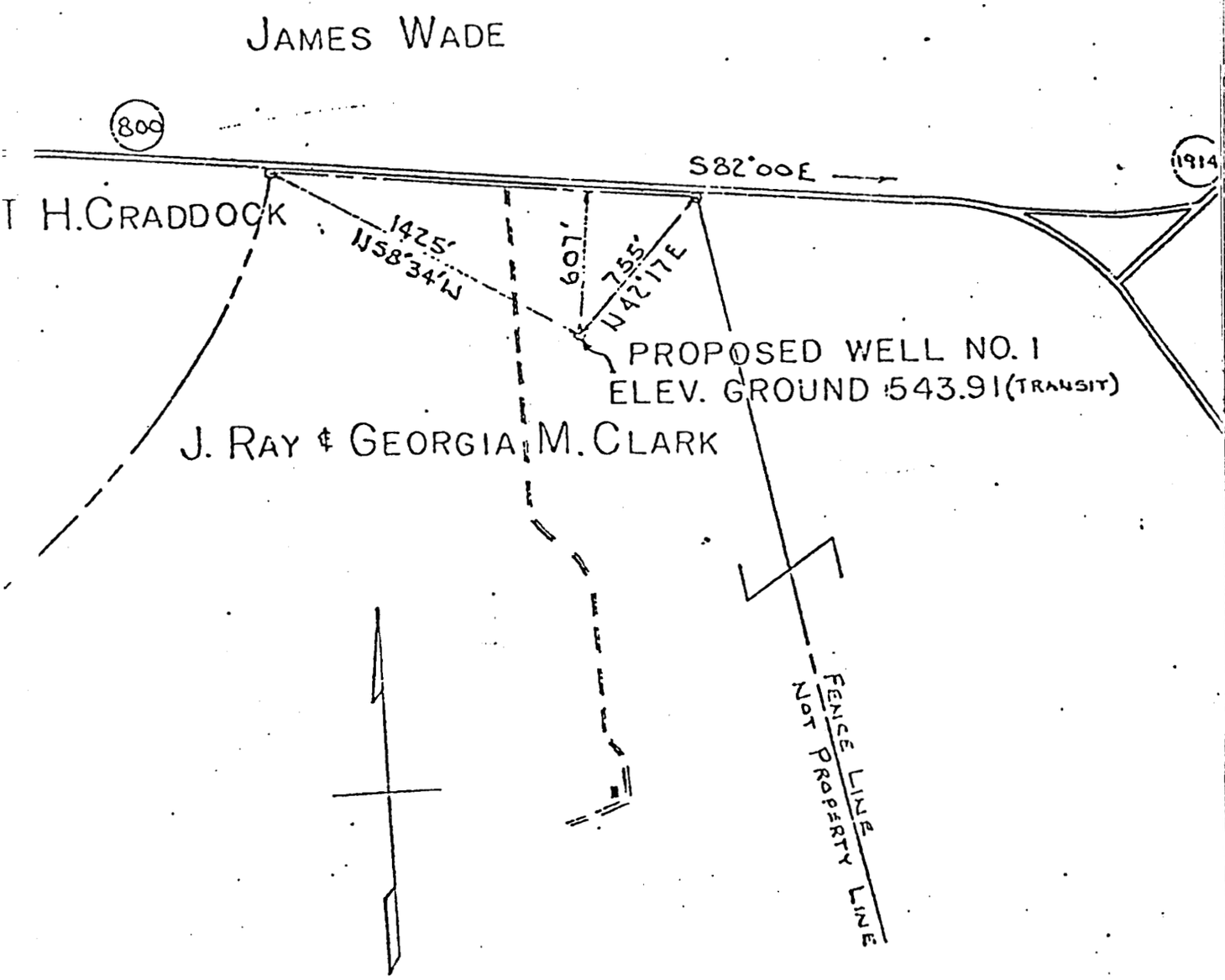


Figure 2.1 Location of Ray Clark #1 Well


EARLINGTON
SAINT CHARLES QUAD.
NORTONVILLE
MORTONS GAP
WESTERN KENTUCKY PARKWAY
SAINT CHARLES
NORTONVILLE
WHITE PLAINS
HOPKINS COUNTY
CHRISTIAN COUNTY
DAWSON SPRINGS S.E. QUAD.
PENNYRILE PARKWAY
PENNYRILE
(ALL FAULTS NOT SHOWN
EMPIRE
MAJOR FAULT
CROFTON
KY. HY. 800
DRILL SITE
KING-BADGETT GAS WELL
FAULT
Contours on Base of Vienna Ln.
35'
24
30'
25
25'

WELL LOCATION PLAT
CORNETTE ENGINEERING SERVICES



CROFTON QUAD.
CARTER COORINATE
12-G-25 SCALE: 1" = 2000'

650 FNL
90' FEL

(12)

OPERATOR ORBIT GAS COMPANY
FARM J. RAY & GEORGIA M. CLARK
WELL NO. 1 ELEVATION 543.91 (TRANSIT)
COUNTY CHRISTIAN STATE OF KENTUCKY
DATE 8-6-76 SCALE 1" = 660'
ENGINEER AUBREY J. CORNETTE
ADDRESS 155 NORTH MAIN ST. MADISONVILLE, KY. 42431

I HEREBY CERTIFY THAT THE ABOVE PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

A. J. Cornette

Figure 2.3

3.0 DRILLING/CORING, LOGGING, CASING AND CEMENTING OPERATIONS

Drilling and Coring Operations

On September 8, 1976, Cresent Drilling Company started the drilling operations of well Ray Clark #1 for Orbit Gas Co. Twenty-five ft. of surface hole was drilled and cased with an 8 5/8-inch surface casing. The surface casing was set with the bottom of the casing located at the base of the Vienna lime. Fluid circulation was lost while drilling the rat hole and cement was spotted at the same time the surface casing was set. Fifty sacks of cement and 100 pounds of calcium chloride was used for both jobs. The cementing operations were performed by General Oil Well Cementing Company of Owensboro, Kentucky.

After waiting on cement, Cresent commenced drilling out under the surface casing on September 10, 1976. At 952 ft. a drill stem test was run. After the drill stem test was completed, drilling continued steadily until September 12, 1976 when the core point of 2,178 ft. was reached. The core point was determined by an examination of drill cuttings.

The nominal diameter of the hole upon reaching core point was 7 7/8 in. Since the outside diameter of the core bit was 7 27/32 in., it was assumed that no reaming of the hole would be necessary prior to coring. The well was cored by Christiansen Diamond Tool Company. A total of 149 ft. of 4-in. core between 2,178 ft. to 2327 ft. was extracted taking 88 hours of rig time. The core itself was inspected, measured and marked for identification, boxed and taken from the well site by representatives of the Illinois Geological Survey for further study and analysis. A representative of Battelle Research Laboratories collected sample sections, which were sealed for further laboratory tests. Results obtained from Battelle Research Laboratories, Illinois Geological Survey, and Mound Labs are given in Appendices B, C, D. Following the coring operation the drilling was resumed and the well drilled to a total depth of 2,592 ft.

Logging Operations

After reaching total depth, the driller circulated mud to clean up the hole for the logging operation. Logging, which was performed by

Schlumberger Well Services, commenced on September 22, 1976 and continued until September 23, 1976. The suite of logs run were as follows:

1. Gamma Ray
2. Formation Density Compensated
3. Caliper
4. Dual Induction- Laterolog
5. Micro Laterolog
6. Compensated Neutron
7. Sonic
8. Spontaneous Potential

Two logs, temperature and sibilation, which were planned but could not be run because the borehole was filled with drilling mud. All logs were taped for computer processing and a Coriband analysis was made. Copies of the logs at selected depths are included in Appendix F. The Kerogen Analysis for the Depth cored is presented in Appendix E.

Casing

Following the logging of the hole, a production string of 4½" O.D. J-55 casing was run and cemented in the hole with 875 sacks of 50-50 Pozmix cement and 18% salt. The casing was set at 2,360 ft. with a formation packer. Cementing was done by Halliburton, and the plug pumped to the bottom to leave the casing free of cement. A schematic well diagram is shown in Figure 3.1.

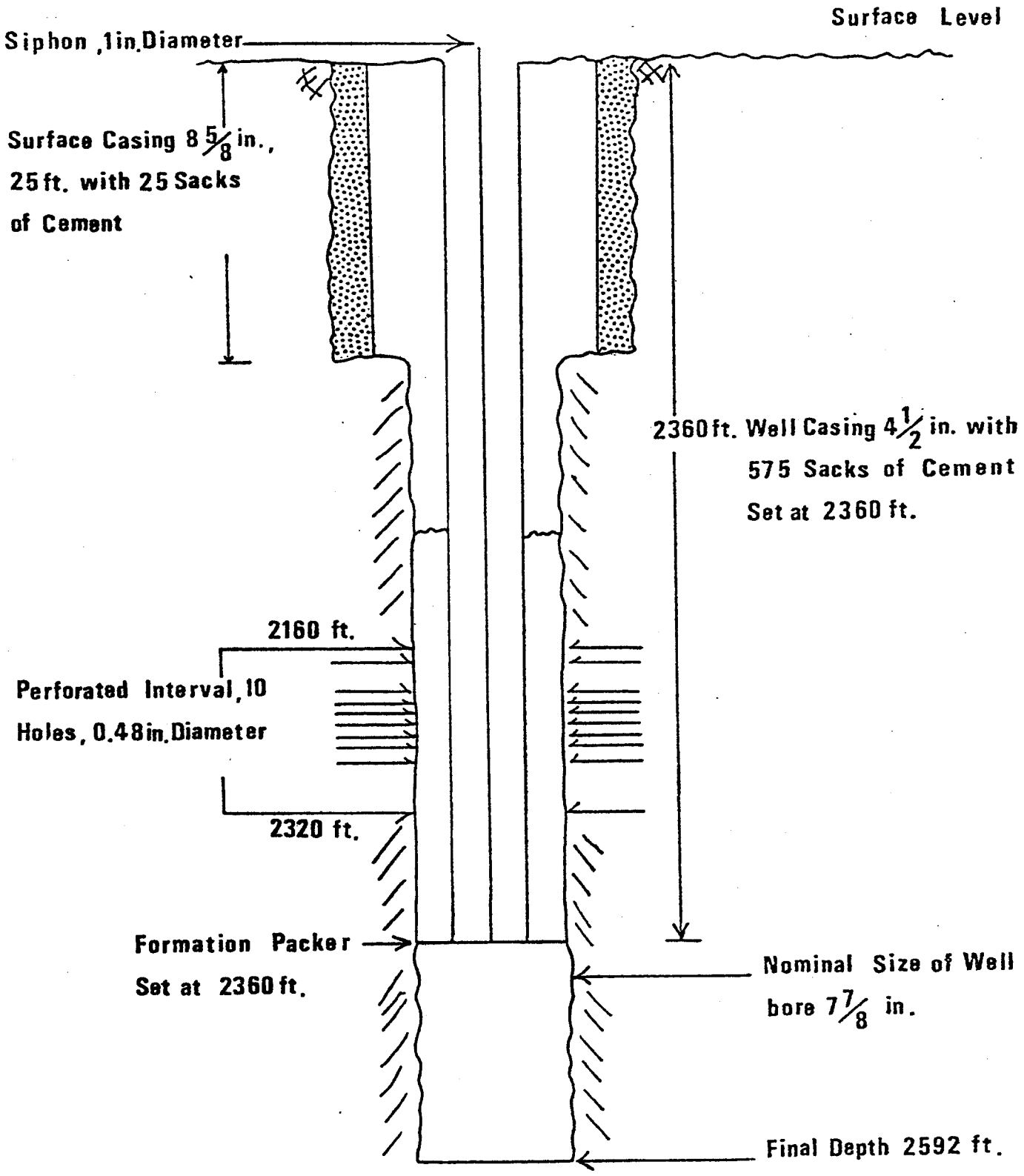


Figure 3.1 **Ray Clark Well # 1**

4.0 CORE DATA AND DESCRIPTION

Generalized Description of Core

The top of the New Albany Shale was encountered at 2175 ft.; the base, at 2321 ft. Thus, the thickness of the shale is 146 ft.

The New Albany Shale is predominantly brownish black, thickly laminated pyritic shale. Pyrite occurs as disseminated grains (probably replacing spore casings), in irregular concretionary masses, and as discrete laminae. Thin beds and laminae of dark colored silty shale and siltstone occur sparsely and irregularly throughout the section, commonly in groupings of two, three or more. Thin beds and laminae of light colored pyritic dolomite or sandy dolomite are more numerous, especially towards the base. Lithologic features of the New Albany Shale that appear to be restricted within the section are the following (from top to bottom):

(1) Phosphatic nodules: one observed within three feet of the top.

(2) Thin beds of olive gray shale: restricted to a 30 ft. interval in the middle of the formation.

(3) Calcareous (acid reactive) brownish black, thinly laminated shale containing scattered thin beds of light colored limestone and sandy limestone: basal 19 feet, (the contact between acid reactive shale and non-acid reactive shale is very sharp, though no color difference could be detected between the two types. This is a potentially significant observation that may have a bearing on gas production).

Natural fractures were strikingly absent from most of the core. Unfilled vertical fractures, however, were observed within an interval of 23 ft. between 43 ft. and 20 ft. above the base of the New Albany shale. These fractures were not numerous.

The entire New Albany Shale section was conspicuously lacking in hydrocarbon odor. The underlying Helderburg Limestone, however, exhibited a strong and very persistent hydrocarbon odor. Core samples were shipped to various organizations such as Battelle Research Laboratories, Illinois Geological Survey, and Mound Labs for analysis. The physical and chemical analysis determined by these contractors are given in Appendices B, C, and D. A summary of reservoir data generated through core analysis is presented in Table 4.1.

Table 4.1 Summary of Reservoir Parameters at Various Depths

Core Length	Sample Depth For Core Analysis ft.*	Gas Released/ Unit Volume of Shale at Each Depth (cu.ft./ cu. ft./ft.)	Perme-ability (md)	TOTAL POROSITY Core/Depth Measurement (%/ft.)*	TOTAL POROSITY Kerogen Analysis (%)**	Water Saturation (%)**
70						
80					1.58	82.2
2186	2183	0.70 / 2183	0 . V	2.85/2183	2.64	65.4
90	2191	0.73 / 2191	5.3×10^{-6} V	1.40/2191	4.82	40.6
2198					5.12	30.4
200	2200	0.45 / 2200		1.12/2200	5.28	30.6
					4.14	63.8
210					3.62	67.0
					3.60	61.8
220	2220		5.6×10^{-6} H		2.86	83.2
					2.70	91.6
230	2230	0.28/2230	0 H	1.46/2230	3.44	64.0
					2.80	83.6
240	2239	0.89/2239	0 V	1.57/2239	2.04	100.0
					2.20	94.0
2248						
250	2251	0.13/2251	7.4×10^{-7} V	1.71/2251	2.56	74.0
					1.90	100.0
260	2259	1.03/2259	0 V	.50/2259	1.90	100.0
					1.62	78.6
270 2270	2271	0.30/2271	0 V	5.21/2271	1.74	69.4
					1.70	94.2
280 2280	2281	1.24/2281	7.1×10^{-5} V	.84/2281	2.86	75.2
					2.94	47.4
290 2290	2290	0.51/2290	0 V	.44/2290	4.58	25.0
					3.00	32.8
300 2300	2300	0.46/2300	0 V	.43/2300	3.72	31.6
					4.68	20.4
310 2310	2310	0.38 2310		2.15/2310	2.85	35.9
2315					4.54	28.8
320 2320	2320	0.18/2319		3.10/2319	4.82	37.4
					3.18	50.6
330					0.00	100.0

* From Battelle Labs
** Kerogen analysis/Schlumberger Well Services (avg. of 5 ft. interval)
----> Perforation Depths, ft.
V Direction of Flow Relative to Bedding Planes (Vertical)
H Direction of Flow Relative to Bedding Planes (Horizontal)

5.0 STIMULATION OPERATIONS

Perforation

The casing was swabbed and found to be clear of cement to a depth of 2,352 ft. This point was 28 ft. below the base of the New Albany Shale. A Gamma ray-Neutron log was then run in the empty hole to properly locate the perforations. The perforations were made in the open hole, with no fluid present, using a hollow steel carrier gun with 80 gram jet shots of 0.48 inch diameter with a rated penetration depth of 7.7 inches (Berea Sandstone Standard). The location of the perforations was one shot each at depths of 2,186', 2,198', 2,248', 2,270', 2,280', 2,290', 2,300', 2,310', 2,315', and 2,320'. The Gamma ray-Neutron log and perforation operations were performed by Birdwell. A slight amount of gas was noted in the well casing after the perforations were completed but the flow was insufficient to measure.

Acidization of Perforations Prior to Foam Frac

The acid treatment prior to foam fracturing consisted of pumping 500 gallons of 10% mud clean-out acid mixed with one gallong of inhibitor and three gallons of "cla-sta" into the well followed by 38 barrels of water. The job was performed on November 4, 1976. A breakdown pressure of 1,250 psig was required at the surface to start injection of acid, and a pumping time of 15 minutes was required for the injection. Average injection pressure was 900 psig. No gas was observed in the well bore during the swabbing operation after the acid treatment.

Foam-Frac of tne New Albany Shale

On November 5, 1976 the well was foam-fraced in the New Albany shale. The frac consisted of the high pressure injection of 45,000 gallons of 78 quality foam carrying a total of 54,000 pounds of frac sand with additives to reduce formation swelling. Two grades of sand were used. An initial 3,000 pounds of fine 100 mesh sand was used as a pre-pad to leak-off into natural fractures. This was immediately followed by 51,000 pounds of the coarser 20/40 mesh sand to provide the permeability required for flow of gas from the fractured formation. The foam used as a carrying

agent for the sand consisted of a total of 88 gallons of Halliburton's HC-2 detergent, 712,500 cubic feet of nitrogen and 300 barrels of water. Additives mixed with the injected foam and sand were 7 gallons of "cla-sta" and six sacks of calcium chloride. Surface breakdown pressure was 1,800 psig and the maximum pressure reached during the frac was 2,200 psig. The average injection rate of frac fluid was 5.6 barrels per minute. Immediately following the completion of the frac a choke was installed on the well equipped with a porcelain lined 1/8 inch diameter choke tube and opened the well to vent the nitrogen, excess sand and foam from the well bore. Successively larger diameter choke tubes were used until finally a 48/64 inch tube was being used. At this time, the flow from the well still maintained good velocity with slugs of slightly sand-laden foam at one to two minute intervals. Flow pressure behind the choke had diminished to zero psig. By the afternoon of November 6, some 26 hours after the frac, the flow had diminished to the point where it was necessary to successively shut the well in for 10 minutes -- during which time the pressure would build to approximately 40 psig -- and reopen the well in order to obtain brief periods of foam recovery. The well was then shut in for approximately 40 hours to allow it to recover enough energy to lift the foam to the surface. This shut-in period resulted in pressure buildup to 1,100 psig and indicated that a considerable amount of nitrogen remained in the well, because the formation gas pressure should not have exceeded 837 psig. Following this buildup and after a one and one-half hour blow through the 48/64 inch choke, the flow diminished to the point where the choke could be removed and the well blown through a 2-inch blow-down pipe. In 18 minutes of flow through the full 2-inch opening, the well showed only a light flow of gas with light showers of foam at frequent intervals but no significant recovery. For a period of 4 additional days, the well was shut in for a build-up period and blown down with results as shown in the following table (Table 5.1).

TABLE 5.1
Flow Back After Stimulation

Date Blown	Initial Pressure	Hours Blown	Result from 2" Blown-down Pipe	Final Pressure
11/08/76	1,100 Psig	2:00	Light showers of foam & sand	0
11/09/76	820 "	2:00	Light showers of foam & sand	0
11/10/76	480 "	2:00	Light showers of foam & sand	0
11/11/76	400 "	2:00	Light showers of foam & sand	0
11/12/76	325 "	2:00	Light foam - flow too low to lift	0

A specific gravity test of the gas from the well was made on November 12, 1976 and a gas gravity of 0.806 obtained. A similar test on the same day of an adjoining well, previously completed in the New Albany Shale by shooting, was made with a result of 0.596 gravity. Comparison of the tests indicated that about 50% of the stream from the well was nitrogen on November 12.

Because of the inability of the well to flow enough gas to lift significant amounts of foam to the surface through the 4½" O.D. casing. Orbit again moved in a small work-over rig and installed a 1-inch siphon line in the well bore on November 20, 1976. The siphon was installed with the bottom perforated nipple set at the base of the shale and 5/64 inch jet nipples spaced to lift fluid to the surface with a minimum of 40 psig well pressure. Use of this siphon to clean up the remainder of the foam from the well was commenced on November 22. The following table (Table 5.2) shows, for each day's operation, the initial shut-in casing pressure before blowing, the amount of time the siphon was open, a summary of the result, and well head pressure on the casing at the end of the blowing period.

TABLE 5.2

Flow Back After Stimulation

Date Blown	Initial Pressure	Hours Blown	Result from 1" Siphon	Final Pressure
11/22/76	250 Psig	2:00	Full stream for 20 min. then mist.	20 Psig
11/23/76	192 "	1:00	Heavy mist 10 min. then mist.	35 "
11/24/76	185 "	2:00	Heavy mist 7 min. then gas only.	0
11/25/76	170 "	2:00	Heavy mist 5 min. then gas only.	0
11/26/76	190 "	2:00	Heavy mist 5 min. then gas only.	0
11/27/76	150 "	2:00	Heavy mist 5 min. then gas only.	0
11/28/76	160 "	2:00	Heavy mist 5 min. then gas only.	0
11/29/76	Not blown.			
11/30/76	245 Psig	2:00	Heavy mist* 5 min. then gas only.	15 Psig
12/01/76	175 "	2:00	Heavy mist* 5 min. then gas only.	0
12/02/76	145 "	1:30	Heavy mist 7 min. then gas only.	0
12/03/76	170 "	2:00	Heavy mist 5 min. then gas only.	0
12/04/76	135 "	2:00	Heavy mist 10 min. then gas only.	0
12/05/76	165 "	1:30	Heavy mist** 10 min. then gas only.	0
12/06/76	175 "	2:00	Heavy mist** 8 min. then gas only.	0
12/07/76	160 "	4:00	Heavy mist** 5 min. then gas only.	0
12/08/76	135 "	2:00	Light mist 10 min. then gas only.	0
12/09/76	150 "	2:00	Heavy mist 7 min. then gas only.	0
12/10/76	160 "	2:00	Heavy mist 8 min. then gas only.	0
12/11/76	150 "	2:20	Heavy mist** 10 min. then gas only.	0
12/12/76	145 Psig	2:15	Heavy mist 10 min. then gas only.	0
12/13/76	145 "	2:00	Light mist 5 min. then gas only.	0
12/14/76	155 "	2:00	Light mist 10 min. then gas only.	0
12/15/76	148 "	2:00	Heavy mist 10 min. then gas only.	0
12/16/76	150 "	2:00	Heavy mist 8 min. then gas only.	0
12/17/76	155 "	2:00	Heavy mist 10 min. then gas only.	0
12/18/76	145 "	2:00	Heavy mist 10 min. then gas only.	0
12/19/76	150 "	2:00	Heavy mist 10 min. then gas only.	0
12/19/76	Shut well in for pressure test.			

* Blew a slug of foam when pressure reached 35 Psig.
** Trace of foam.

As indicated by the data in the above table, the flow from the 1 inch siphon was very low after the initial 5 to 10 minutes of blow. The well, during the 22 hour shut-in interval following each blow, would not build the casing pressure above 150 psig for the last two days. Calculated casing volume at 150 psig is approximately 2 MCF which, if used as a base for the estimate, would indicate an open flow volume for the well at this time of 2 MCF per day. A specific gravity test made from the well head following the cleanup period indicated that practically all of the nitrogen used in the frac job had been removed from the well.

Because of the extremely low productive volume of the well, a long slow buildup in the well head pressure was experienced. On April 13, 1977, after a 115-day shut-in period, the well head pressure was considered to be stabilized and a dead-weight pressure test made. The result of this test was 836.8 psig. A dead weight pressure test on Orbit's adjoining shale gas well (approximately one mile east) made the same day with the same equipment, showed a pressure of 840.6 psig. Both wells were considered to be at a stabilized condition at the time of the tests. The level of pressure obtained from these tests is considered to be approximately equal to the hydrostatic pressure for their depth when related to the surface water table in the area. The pressure as experienced is not an abnormal pressure and conforms to pressure levels usually experienced in various sand reservoir formations in the Western Kentucky area.

On April 15, 1977, and after prior discussions with Mr. Yost of DOE, it was decided to re-stimulate the well using conventional bore-hole shooting. Orbit moved a work-over rig in over the test well, pulled the siphon line, removed the well head, and set 280 quarts of oil-well explosive (nitro) opposite the black shale section from 2,187 ft. to 2,331 ft. No tamping was used. The shot went off at 1:30 p.m. with normal reaction at the surface. Flow from the well after the shot immediately began to settle down, and after one hour was gauged at 40 MCF per day rate. Experience with flow decline over long-term stabilization gained by Orbit in its other shale test in the area indicates that the test well would have an estimated open flow after the shot of 15 MCF per 24 hours.

Following the shot and flow test, the well head was replaced and the well shut-in for five days. Shut-in pressure at this time (April 20, 1977) had build up to 625 psig, and the well was blown through a 2-inch wellhead valve for the purpose of determining if any fluid had accumulated in the hole.

No sign of fluid was noted in the gas stream during this blow down and, although not gauged, the well did not indicate any improvement in flow volume after being blown down. Treatment and pre-treatment data for the first interval is shown in Tables 5.3 and 5.4. Similarly, Table 5.5 presents a summary of the second treatment.

TABLE 5.3

Pretreatment Data For The Interval Perforated

Pretreatment Data

Well Number	Ray Clark #1
County, State	Christian, KY
Interval Number/Treatment Number	1/1
Perforated Interval	2186' - 2320'
Treatment Date	November 4, 1976
10% Mud Clean-out Acid (Gallons)	500
Inhibitor (Gallons)	1
"CLA-STA" (Gallons)	3
Water (Barrels)	38
Average Injection Pressure (PSIG)	900
Pumping Time for Injection (minutes)	15

TABLE 5.4

Summary of the Foam Fracture Treatment

Treatment Parameter	Actual
Well Number	Ray Clark #1
County, State	Christian, KY
Interval Number/Treatment Number	1/1
Perforated Interval (ft.)	2186' to 2320'
Treatment Date	November 5, 1976
Treatment Type	Foam Frac
Treatment Size (Gallons)	45,000
Treatment Volume (Pounds)	54,000
Fine 100 Mesh Sand (pounds)	3,000
Coarser 20/40 Mesh Sand (pounds)	51,000
HC-2 Detergent (gallons)	88
Nitrogen (cubic feet)	712,500
Water (barrels)	300
"CLA-STA" (gallons)	7
Calcium Chloride (sacks)	6
Average Pumping Rate (BPM)	5.6
Breakdown Pressure (PSIG)	1800
Calculated Open Flow After Treatment	2MCFD

TABLE 5.5

Data on Second Treatment

Treatment Parameter	Actual
Well Number	Ray Clark #1
County, State	Christian, KY
Interval Number/Treatment Number	1/2
Treated Interval	2187' to 2331'
Treatment Date	April 15, 1977
Nitro (quarts)	280
Calculated Open Flow After Shot	15 Mcf per 24 hrs.

6.0 PRODUCTION TESTS

All data indicated that the well should be plugged and abandoned due to the noncommercial gas flow volumes; however, arrangements were made for a temporary gathering system to transport the gas for a period of six (6) months in order to obtain production information.

On June 28, 1977, both the offset and test wells were pressure tested. Specific gravity was measured and a calorimeter test for BTU Content was performed. The results were as follows:

	King Badget #1 (off-set well)	Ray Clark #1 (test well)
Dead weight pressure	839.1 PSIG	834.9 PSIG
Specific Gravity	0.602	0.622
BTU	930	893

Both wells were considered to be at a stabilized condition at the time of the tests. On August 1, 1977 the wells were put into production against a line pressure of approximately 200 psi. Pressure on the gathering system was held back until stabilization occurred and the wells could produce at the line pressure. The pressure of both wells dropped to the 200 psi line pressure by August 5, 1977. The following production has been received:

PERIOD	PRODUCTION (Mcf's @ 15.025 Pressure Base)	
	Clark well	King-Badget Well
August 1-8	202	838
August 9-15	126	546
August 16-22	106	491

Production continued to decline gradually from both wells as indicated. After August 5, 1977 the pressure at which both wells were being produced was from 195 to 200 psi and continued through this date. On August 17, 1977 a sample taken from the common stream of gas from both wells was tested on a calorimeter and indicated 940.0 BTU's and 0.601 specific gravity.

Status of the Well

The well was shut-in, and later plugged and abandoned because of non-commercial gas production.

7.0 SUMMARY OF RESULTS AND CONCLUSIONS

1. The well was cored from 2178' to 2327' and a total of 128 feet of core was recovered. Analysis of the core suggested:
   - Average offgas value in the cored interval was 0.56 cu. ft./ cu. ft.
   - Porosity as determined by the Kerogen Analysis was higher than core porosity.

   No permeability measurements were taken on the cores.
2. The well was stimulated between 2186' to 2320'. Initial open flows were low (2 MCF per day) and no increase in open flow was obtained after stimulation with foam fracturing. A probable reason for failure as suggested by the contractor, was that the formation had extensive natural fractures in the area, and the foam-frac followed the lines of least resistance in this natural fracture system.
3. The well was restimulated using 280 quarts of oil-well explosive (nitro) between 2187' to 2331'. Marginal increases in open flow measurements were obtained (from 2 MCFD to 15 MCFD).
4. Gas production from the well was considered non-economical and the well was later plugged and abandoned.

APPENDIX A

Distribution of Core Material

TABLES AND FIGURES IN THE APPENDICES ARE NUMBERED AS PRESENTED IN VARIOUS REPORTS WHICH INCLUDE MONTHLY, QUARTERLY, ANNUAL, AND SPECIAL REPORTS OF EGSP CONTRACTORS.

DISTRIBUTION OF CORE MATERIAL

Core Date 10/4/76

Core Length 2178' to 2331'

IDENTIFICATION #'s & RESPECTIVE DEPTHS

1. Battelle Labs

The ID #'s are also representative of the depths.

ID #:	
2183	2259
2191	2271
2220	2281
2230	2290
2239	2300
2251	2310
	2319

2. Illinois Geological Survey

ID #:	Depth:
01C1	2181.0
01C1	2182.3
02L1	2188.6
02C1	2191.2
03L1	2216.7
03C1	2220.3
04C1	2230.2
04L1	2231.1
05C1	2240.1
05L1	2244.1
06C1	2250.0
06L1	2255.4
07C1	2260.3
07L1	2263.7
08C1	2270.3
08L1	2273.5
09C1	2280.0
10L1	2287.8
10C1	2290.8
11L1	2293.0
11C1	2299.8
12C1	2310.5
12L1	2311.1
13L1	2312.7
13C1	2318.8

3. Mound Labs

ID #:	DEPTHS:
0-1-1	2183.71 to 2184.08
0-1-3	2261.02 to 2261.50
0-1-4	2292.47 to 2202.91
0-1-5	2317.21 to 2317.64

APPENDIX B

Chemical and Physical Analysis

by

Battelle Research Laboratories

Well O-1 Christian County, WV
From Battelle Labs - 13 Samples

List of Tables

Tables Page

5 Core Run Information. 27

12 Initial Gas Release Data (13) 28

19 Statistical Analyses of Off Gas Data (13) 29

26 Chemical Characterization Data (13) 30

34 Summary of Physical Characterization Data (13). 31

41 Statistical Analysis of Physical Characterization (13). 32

B-1 Porosity Data for Sample O-1-2183 33-34

List of Figures

Figures Page

4 Gas Content as a Function of Sample Depth (Graph) 35

8 Ranking of Wells According to Gas Contents. 36

12 Carbon Content as a Function of Sample Depth (Graph). 37

19 Hydrogen Content as a Function of Sample Depth (Graph). 38

26 H/C Atomic Ratio as a Function of Sample Depth (Graph). 39

30 Ranking of Wells According to Carbon Contents 40

31 Ranking of Wells According to Hydrogen Contents 41

32 Ranking of Wells According to H/C Atomic Ratios 42

36 Gas Content as a Function of Carbon Content 43

43 Gas Content as a Function of Hydrogen Content 44

50 Gas Content as a Function of Bulk Density 45

57 Carbon Content as a Function of Bulk Density. 46

64 Hydrogen Content as a Function of Bulk Density. 47

71 Pore Volume as a Function of Pressure for Sample O-1-2183 48

77 Pore Size Distribution for Sample O-1-2183. 49

B-1 Penetration Volume, G/CC. 50

B-2 PCT Pores Greater Than DIA Indicated. 51

TABLE 5. WELL DATA FOR O- 1

LOCATION: CHRISTIAN COUNTY, KY

ALTITUDE: 580 FEET

COORDINATES: 37.03 (DEGREES,MINUTES) LATITUDE
87.27 (DEGREES,MINUTES) LONGITUDE

CORING BEGAN AT 2170 FEET AND STOPPED AT 2331 FEET. IT TOOK 3 BARRELS TO COMPLETE.

SAMPLES WERE RETURNED TO BATTELLE ON 10/ 4/76.

THERE WERE 13 SAMPLES COLLECTED FOR BATTELLE AND 4 SAMPLES COLLECTED FOR OTHERS.

RUN INFORMATION FROM WELL O- 1

RUN NO. 1 CORING BEGAN AT 2178 FEET AND CORING STOPPED AT 2215 FEET. THE AVERAGE CORING RATE IS 20.50 FEET PER MINUTE. THE SAMPLES WERE ON SURFACE IN 9.50 HOURS.

RUN NO. 2 CORING BEGAN AT 2215 FEET AND CORING STOPPED AT 2275 FEET. THE AVERAGE CORING RATE IS 17.40 FEET PER MINUTE. THE SAMPLES WERE ON SURFACE IN 2.08 HOURS.

RUN NO. 3 CORING BEGAN AT 2275 FEET AND CORING STOPPED AT 2331 FEET. THE AVERAGE CORING RATE IS 18.60 FEET PER MINUTE. THE SAMPLES WERE ON SURFACE IN 2.12 HOURS.

TABLE 12. INITIAL GAS RELEASE DATA: WELL O- 1

SAMPLE ID	PRESSURE TORR	FREE VOLUME CC	CORE VOLUME CC	OPEN POROSITY PCT.	GAS COMPOSITION, VOLUME PERCENT METHANE	ETHANE	PROPANE	BUTANE	PENTANE	TOTAL HYDROC.	NITROGEN	OXYGEN	CARBON DIOXIDE	GAS RELEASED/ UNIT VOLUME OF SHALE	SEQ NO.
O 1-2183.	800.	620.	830.	.63	81.55	6.11	1.10	.11	0.00	88.87	11.01	0.00	.13	.70	1
O 1-2191.	2150.	381.	1069.	.55	67.21	4.47	1.03	.09	0.00	72.80	24.77	1.91	.52	.73	2
O 1-2220.	1100.	636.	814.	.53	35.65	2.79	1.05	.21	.02	39.72	52.99	5.18	2.11	.45	3
O 1-2230.	1000.	612.	838.	.54	27.40	1.88	.07	.09	.02	29.46	61.04	7.73	1.14	.28	4
O 1-2239.	1750.	551.	899.	.62	57.44	3.90	1.18	.21	0.00	62.73	34.88	.96	1.43	.89	5
O 1-2251.	850.	424.	1026.	1.71	25.30	2.03	.40	.02	0.00	27.72	64.00	6.90	1.20	.13	6
O 1-2259.	2100.	487.	963.	.50	69.12	2.98	1.83	.05	0.00	73.98	24.16	1.43	.43	1.03	7
O 1-2271.	1370.	330.	1120.	.36	50.46	2.78	2.30	.06	0.00	55.60	40.88	2.26	1.26	.30	8
O 1-2281.	1690.	686.	764.	.52	59.93	2.17	0.00	0.00	0.00	62.10	34.19	2.68	1.02	1.24	9
O 1-2290.	1200.	607.	843.	.44	43.46	1.78	0.00	0.00	0.00	45.24	48.30	5.45	1.00	.51	10
O 1-2300.	1225.	562.	888.	.43	43.40	1.97	0.00	0.00	0.00	45.37	48.41	4.93	1.27	.46	11
O 1-2310.	1250.	467.	983.	.44	46.64	1.88	0.00	0.00	0.00	48.52	45.21	5.15	1.12	.38	12
O 1-2319.	860.	255.	1195.	.43	71.57	2.45	0.00	0.00	0.00	74.02	24.12	.84	1.01	.18	13

TABLE 19. STATISTICAL ANALYSES OF OFF GAS DATA

WELL O 1

	MEAN	STANDARD DEVIATION	VARIENCE	COEFFICIENT OF DEVIATION	95 PCT. CONFIDENCE INTERVAL LOWER LIMIT	UPPER LIMIT	NO OF SAMPLES
METHANE, PERCENT	52.241	17.41	302.98	.33	41.721	62.760	13
ETHANE, PERCENT	2.858	1.28	1.63	.45	2.088	3.629	13
PROPANE, PERCENT	.689	.78	.62	1.14	.215	1.164	13
BUTANE, PERCENT	.065	.08	.01	1.17	.019	.110	13
PENTANE, PERCENT	.003	.01	.00	2.44	-.001	.008	13
TOTAL HYDROCARBONS, PCT	55.856	18.59	345.58	.33	44.621	67.091	13
NITROGEN, PERCENT	39.535	15.78	248.96	.40	30.000	49.071	13
OXYGEN, PERCENT	3.494	2.51	6.30	.72	1.976	5.011	13
CARBON DIOXIDE, PERCENT	1.049	.49	.24	.47	.751	1.347	13
GAS VOLUME/SHALE VOLUME	.560	.34	.11	.60	******	.764	13

TABLE 26. CHEMICAL CHARACTERIZATION DATA, 6/77

SAMPLE ID	TOTAL, PERCENT CARBON	HYDROGEN	NITROGEN	LOW TEMPERATURE ASH, % 200 C	100 C	CARD CODE	SEQ NO.
0 1-2183.	14.7	1.5	.5			5	1
0 1-2191.	10.5	1.1	.4			5	2
0 1-2220.	7.1	.9	.2			5	3
0 1-2230.	2.2	.5	.2			5	4
0 1-2239.	8.8	1.0	.3			5	5
0 1-2251.	1.3	.4	.1			5	6
0 1-2259.	12.6	1.3	.5	12.40	12.60	5	7
0 1-2271.	9.0	.8	.2	6.06		5	8
0 1-2281.	8.9	.9	.4			5	9
0 1-2290.	9.8	.8	.3			5	10
0 1-2300.	9.3	.8	.3			5	11
0 1-2310.	8.9	.8	.2			5	12
0 1-2319.	12.6	1.0	.3			5	13

Tot 13 cols.
Avg 8.7 0.1

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July 1979

TABLE 34. SUMMARY OF PHYSICAL CHARACTERIZATION DATA FOR WELL O-1

		BULK DENSTY G/CC	OPEN PORSTY PCT	CLOSED PORSTY PCT	TOTAL POROSTY PCT	SURFACE AREA M2/G	SEQ
O	1-2183.	2.248	.634	2.214	2.849	4.040	1
O	1-2191.	2.403	.549	.851	1.401	4.640	2
O	1-2220.	2.470	.530	.586	1.116	4.228	3
O	1-2230.	2.662	.536	.929	1.465	3.490	4
O	1-2239.	2.422	.617	.949	1.566	4.250	5
O	1-2251.	2.733	1.705	0.000	1.705	5.000	6
O	1-2259.	2.360	.495	0.000	.495	4.620	7
O	1-2271.	2.462	.858	4.649	5.207	3.390	8
O	1-2281.	2.403	.518	.323	.841	3.370	9
O	1-2290.	2.500	.436	0.000	.436	2.520	10
O	1-2300.	2.605	.425	0.000	.425	4.980	11
O	1-2310.	2.619	.442	1.709	2.151	5.980	12
O	1-2319.	2.409	.428	2.666	3.095	4.200	13

TABLE 41. STATISTISTICAL ANALYSES OF PHYSICAL CHARACTERIZATION DATA

WELL O- 1

	MEAN	STANDARD DEVIATION	VARIENCE	COEFFICIENT OF DEVIATION	95 PCT. CONFIDENCE INTERVAL LOWER LIMIT	UPPER LIMIT	NO OF SAMPLES
BULK DENSITY, G/CC	2.484	.14	.02	.05	2.402	2.566	13
APPARENT DENSITY, G/CC	2.499	.14	.02	.06	2.414	2.585	13
TRUE DENSITY, G/CC	2.488	.13	.02	.05	2.411	2.565	13
OPEN POROSITY, PCT	.590	.34	.12	.58	.382	.798	13
CLOSED POROSITY, PCT	1.160	1.41	1.99	1.22	.307	2.012	13
TOTAL POROSITY, PCT	1.750	1.34	1.80	.77	.938	2.562	13
WEIGHT LOSS INITIAL, G/KG	5.972	2.30	5.29	.38	4.583	7.362	13
WEIGHT LOSS FINAL, G/KG	.225	.39	.15	1.75	0.000	.462	13
TOTAL WEIGHT LOSS, G/KG	6.197	2.19	4.81	.35	4.871	7.522	13

TABLE B-1

POROSITY DATA FOR SAMPLE 0 1-2183.

SEQUENCE NUMBER 1
PORE VOLUME .022 CC/G

PRESSURE AIMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0005	.0217	2.2
2.	29.392	7.500	.0018	.0204	8.0
3.	44.088	5.000	.0034	.0188	15.2
4.	58.784	3.700	.0034	.0188	15.2
5.	73.480	3.000	.0040	.0182	18.1
6.	88.176	2.500	.0051	.0171	23.2
7.	102.872	2.100	.0051	.0171	23.2
8.	117.568	1.800	.0051	.0171	23.2
9.	132.264	1.600	.0063	.0159	28.3
10.	146.960	1.500	.0063	.0159	28.3
11.	161.656	1.400	.0066	.0156	29.7
12.	176.352	1.300	.0066	.0156	29.7
13.	191.048	1.200	.0066	.0156	29.7
14.	205.744	1.100	.0066	.0156	29.7
15.	220.440	1.000	.0066	.0156	29.7
16.	235.136	.930	.0076	.0146	34.1
17.	249.832	.860	.0076	.0146	34.1
18.	264.528	.830	.0076	.0146	34.1
19.	279.224	.790	.0076	.0146	34.1
20.	293.920	.750	.0076	.0146	34.1
25.	367.400	.600	.0093	.0129	42.0
30.	440.880	.500	.0103	.0119	46.4
35.	514.360	.430	.0108	.0114	48.6
40.	587.840	.370	.0111	.0111	50.0
45.	661.320	.330	.0111	.0111	50.0
50.	734.800	.300	.0111	.0111	50.0
55.	808.280	.270	.0111	.0111	50.0
60.	881.760	.250	.0116	.0106	52.2
65.	955.240	.230	.0116	.0106	52.2
70.	1028.720	.210	.0116	.0106	52.2
75.	1102.200	.200	.0116	.0106	52.2
80.	1175.680	.180	.0125	.0097	56.5
85.	1249.160	.170	.0125	.0097	56.5

UGR File #254
SAI
July 1979

DEC 21

TABLE 48. POROSITY DATA FOR SAMPLE 0 1-2183. (Continued)

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0125	.0097	56.5
100.	1469.600	.150	.0130	.0092	58.7
110.	1616.560	.140	.0130	.0092	58.7
120.	1763.520	.130	.0130	.0092	58.7
130.	1910.480	.120	.0135	.0087	60.9
140.	2057.440	.110	.0135	.0087	60.9
150.	2204.400	.100	.0135	.0087	60.9
170.	2498.320	.088	.0135	.0087	60.9
180.	2645.280	.083	.0145	.0077	65.2
190.	2792.240	.079	.0145	.0077	65.2
200.	2939.200	.075	.0145	.0077	65.2
220.	3233.120	.068	.0145	.0077	65.2
240.	3527.040	.062	.0151	.0071	68.1
260.	3820.960	.057	.0151	.0071	68.1
280.	4114.880	.053	.0158	.0064	71.0
300.	4408.800	.050	.0158	.0064	71.0
330.	4849.680	.045	.0158	.0064	71.0
360.	5290.560	.041	.0162	.0060	73.2
390.	5731.440	.038	.0162	.0060	73.2
420.	6172.320	.035	.0171	.0051	76.8
450.	6613.200	.033	.0171	.0051	76.8
490.	7201.040	.030	.0179	.0043	80.4
510.	7494.960	.029	.0179	.0043	80.4
540.	7935.840	.027	.0179	.0043	80.4
590.	8670.640	.025	.0183	.0039	82.0
610.	8964.560	.024	.0188	.0034	84.8
640.	9405.440	.023	.0188	.0034	84.8
700.	10287.200	.021	.0195	.0027	87.7
740.	10875.040	.020	.0198	.0024	89.1
770.	11315.920	.019	.0203	.0019	91.3
800.	11756.800	.019	.0203	.0019	91.3
830.	12197.680	.018	.0203	.0019	91.3
860.	12638.560	.017	.0206	.0016	92.8
900.	13226.400	.017	.0206	.0016	92.8
930.	13667.280	.016	.0214	.0008	96.4
960.	13961.200	.016	.0214	.0008	96.4
1000.	14696.000	.014	.0222	.0000	100.0

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July 1979
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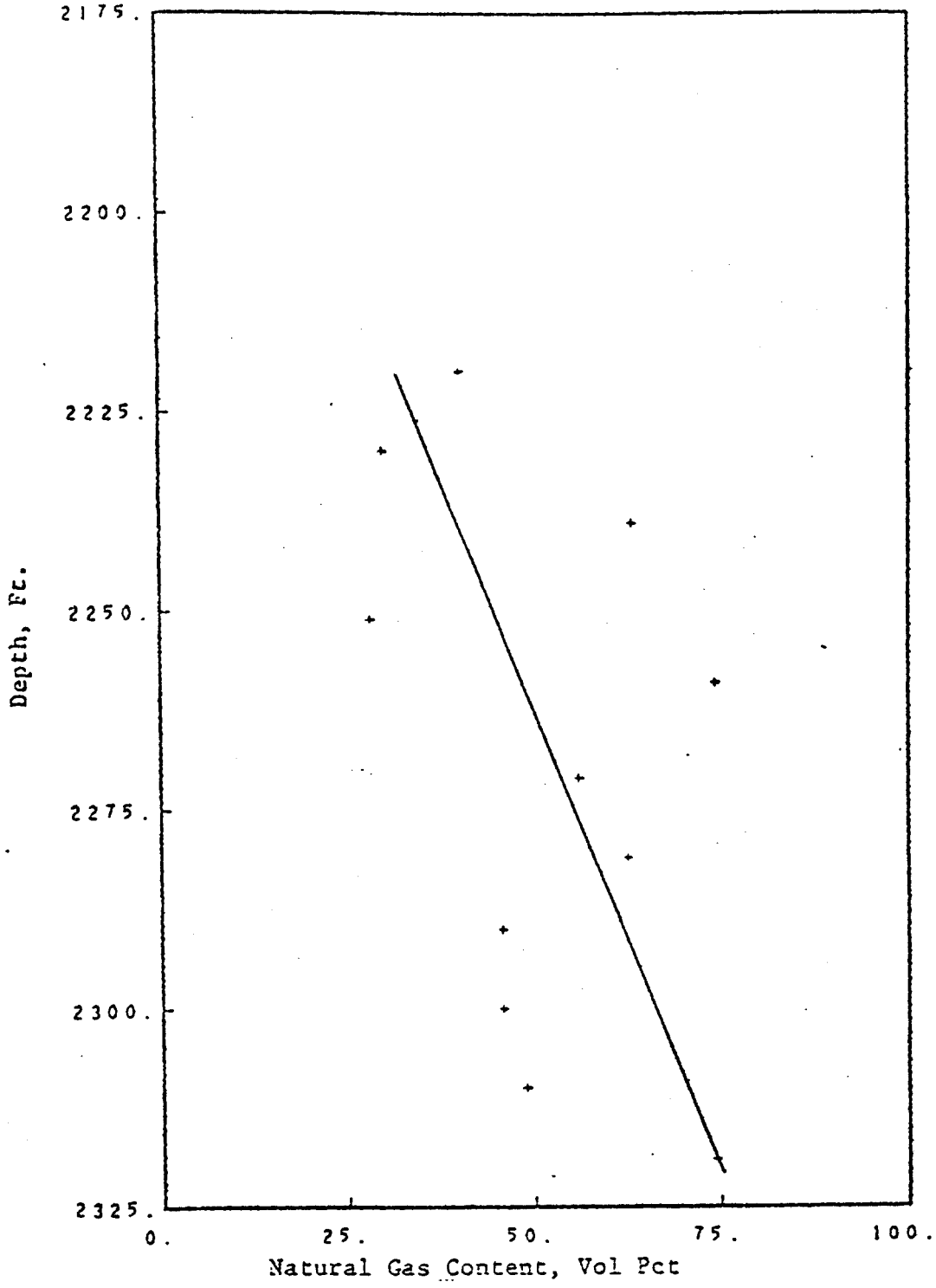


FIGURE 4. GAS CONTENT AS A FUNCTION OF SAMPLE DEPTH FOR WELL O-1

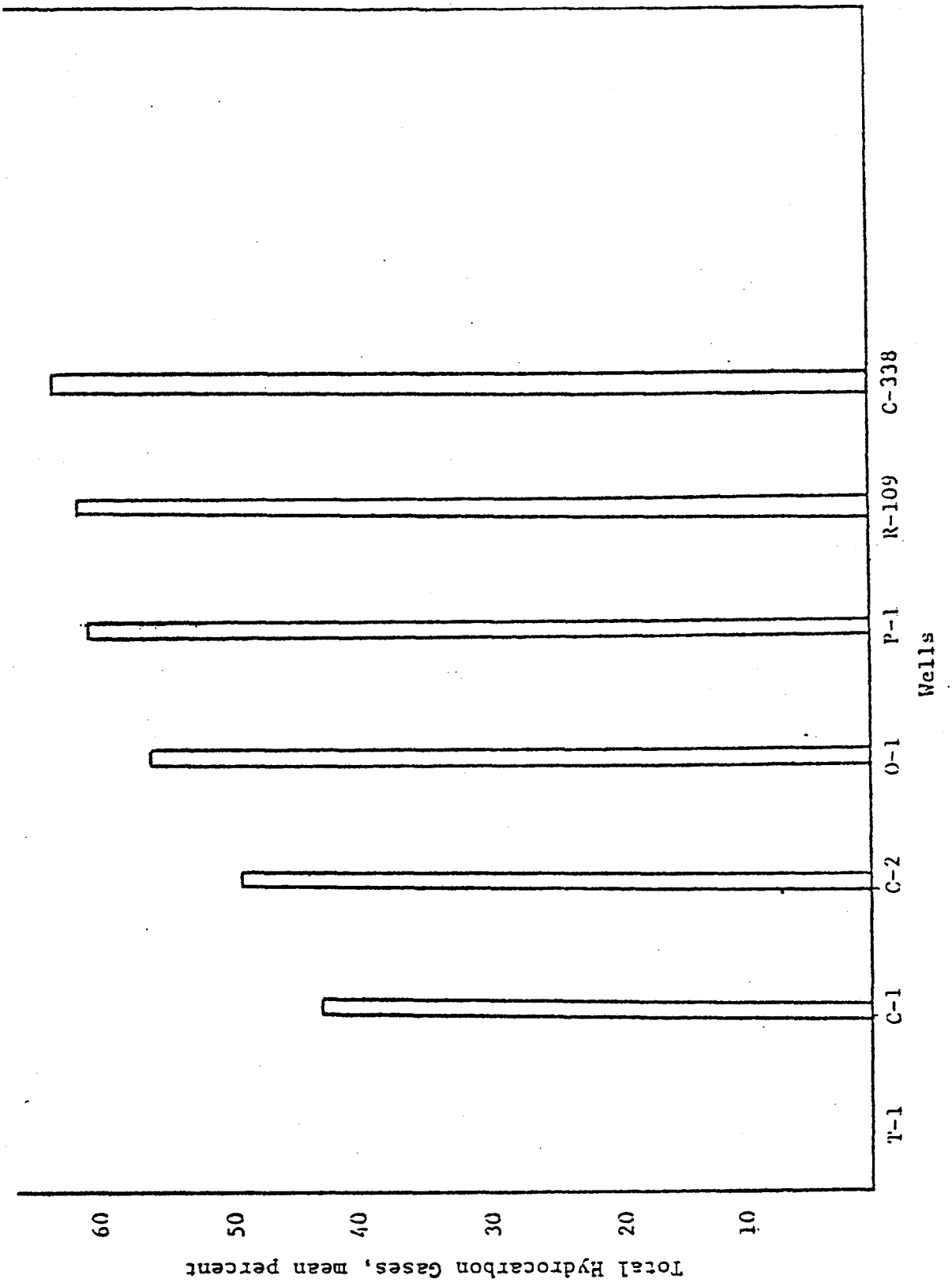


FIGURE 8. RANKING OF WELLS ACCORDING TO GAS CONTENTS

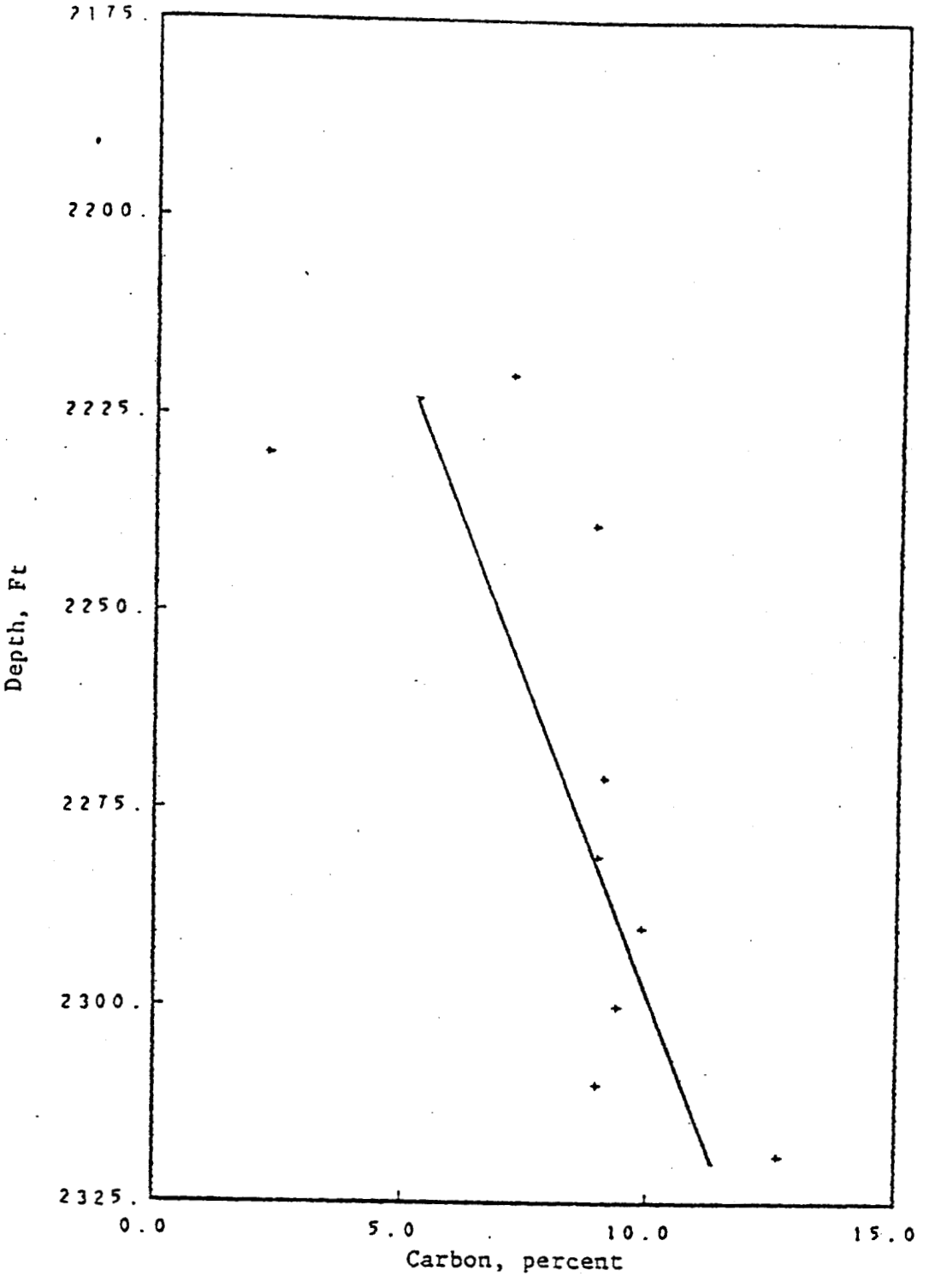


FIGURE 12. CARBON CONTENT AS A FUNCTION OF SAMPLE DEPTH FOR WELL O-1

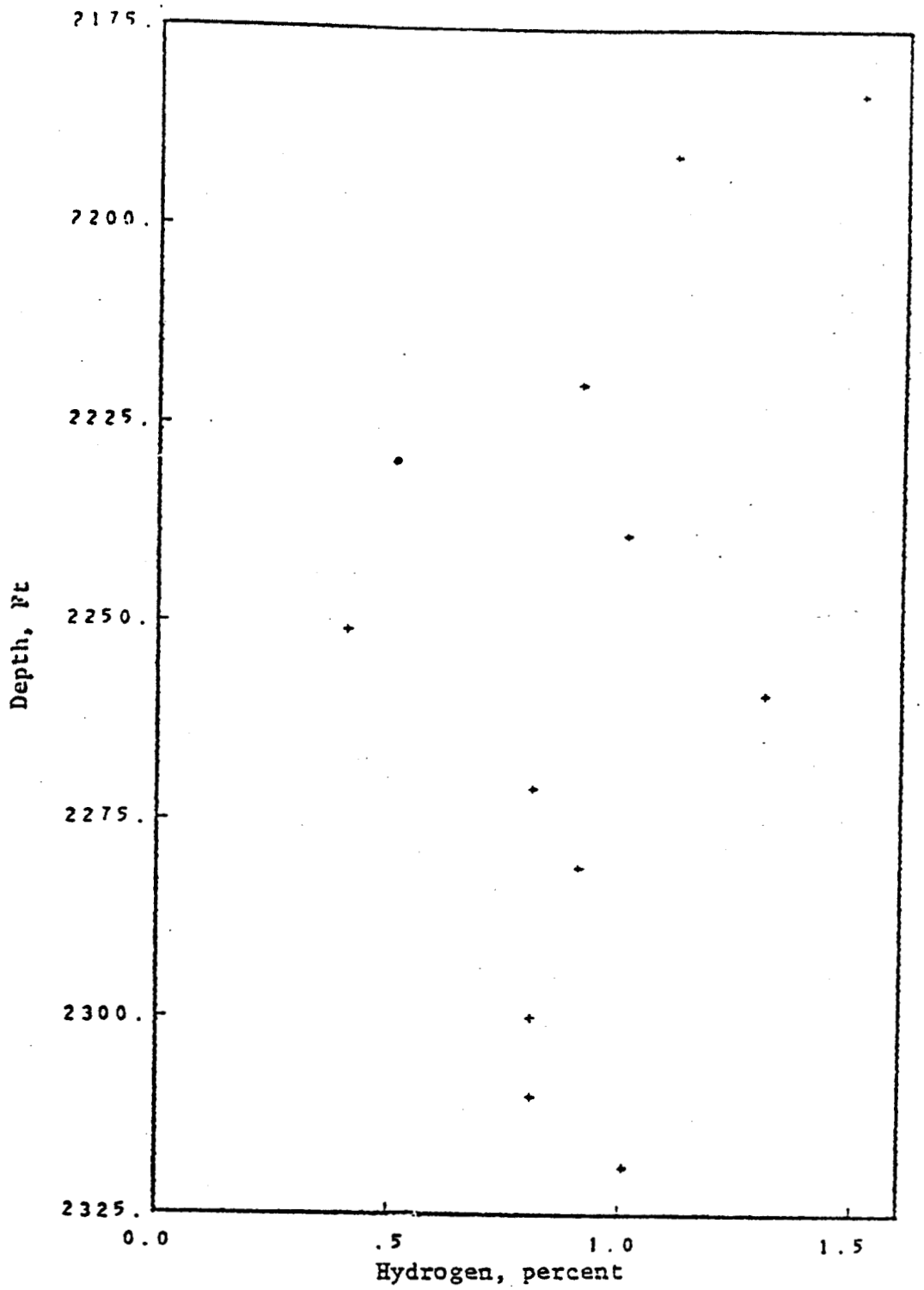


FIGURE 19. HYDROGEN CONTENT AS A FUNCTION OF SAMPLE DEPTH FOR WELL O-1

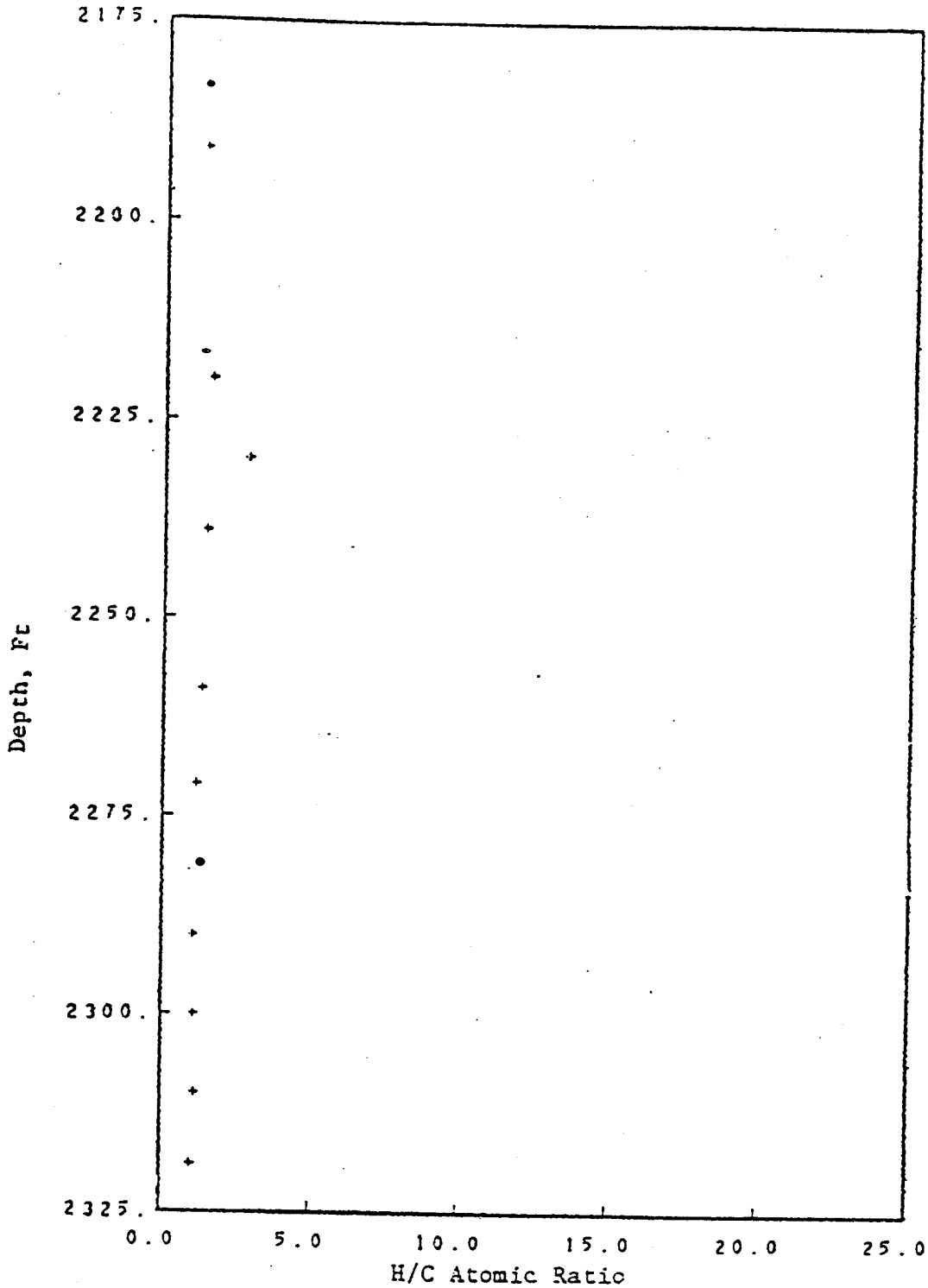


FIGURE 26. H/C ATOMIC RATIO AS A FUNCTION OF SAMPLE DEPTH FOR WELL O-1

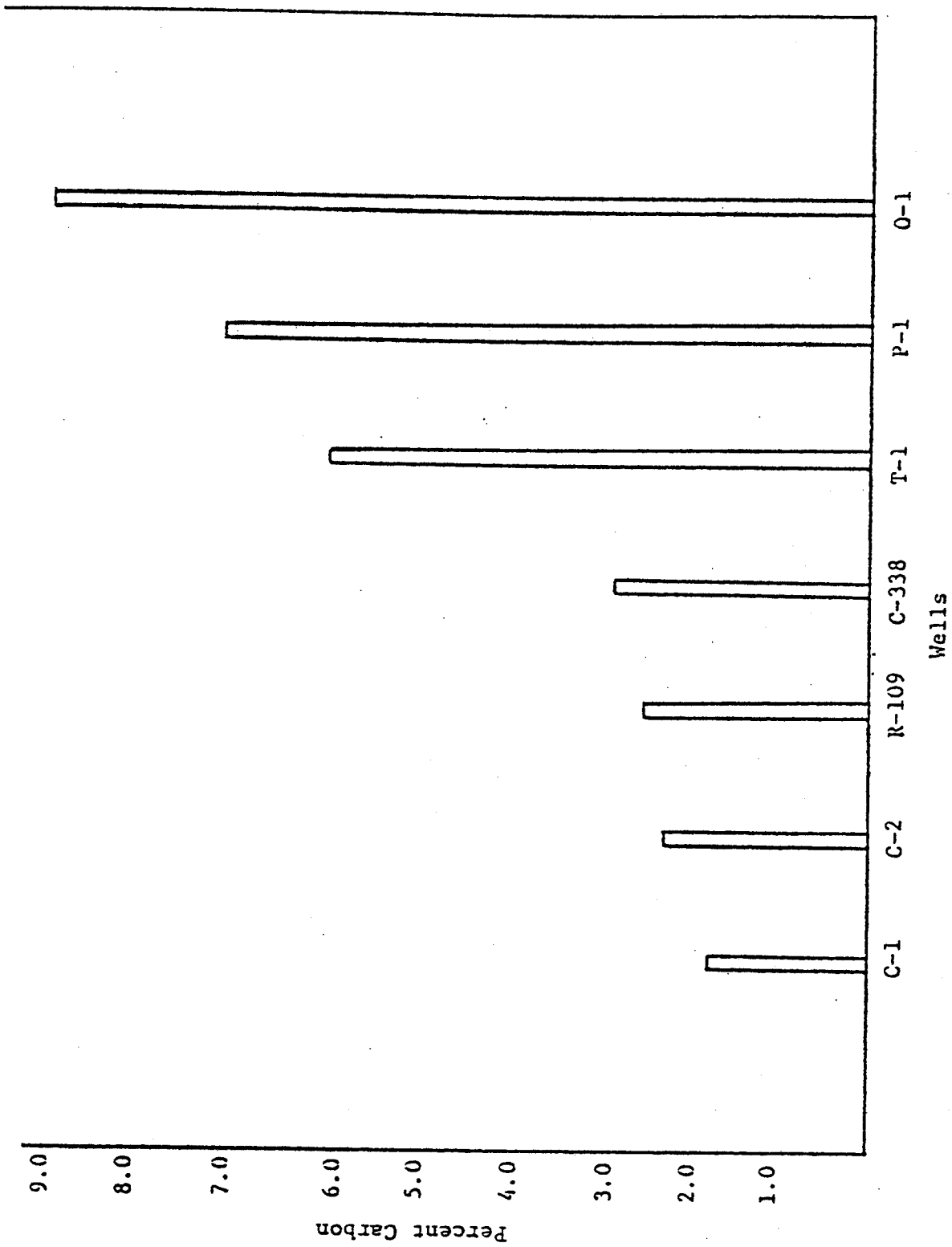


FIGURE 30. RANKING OF WELLS ACCORDING TO CARBON CONTENTS

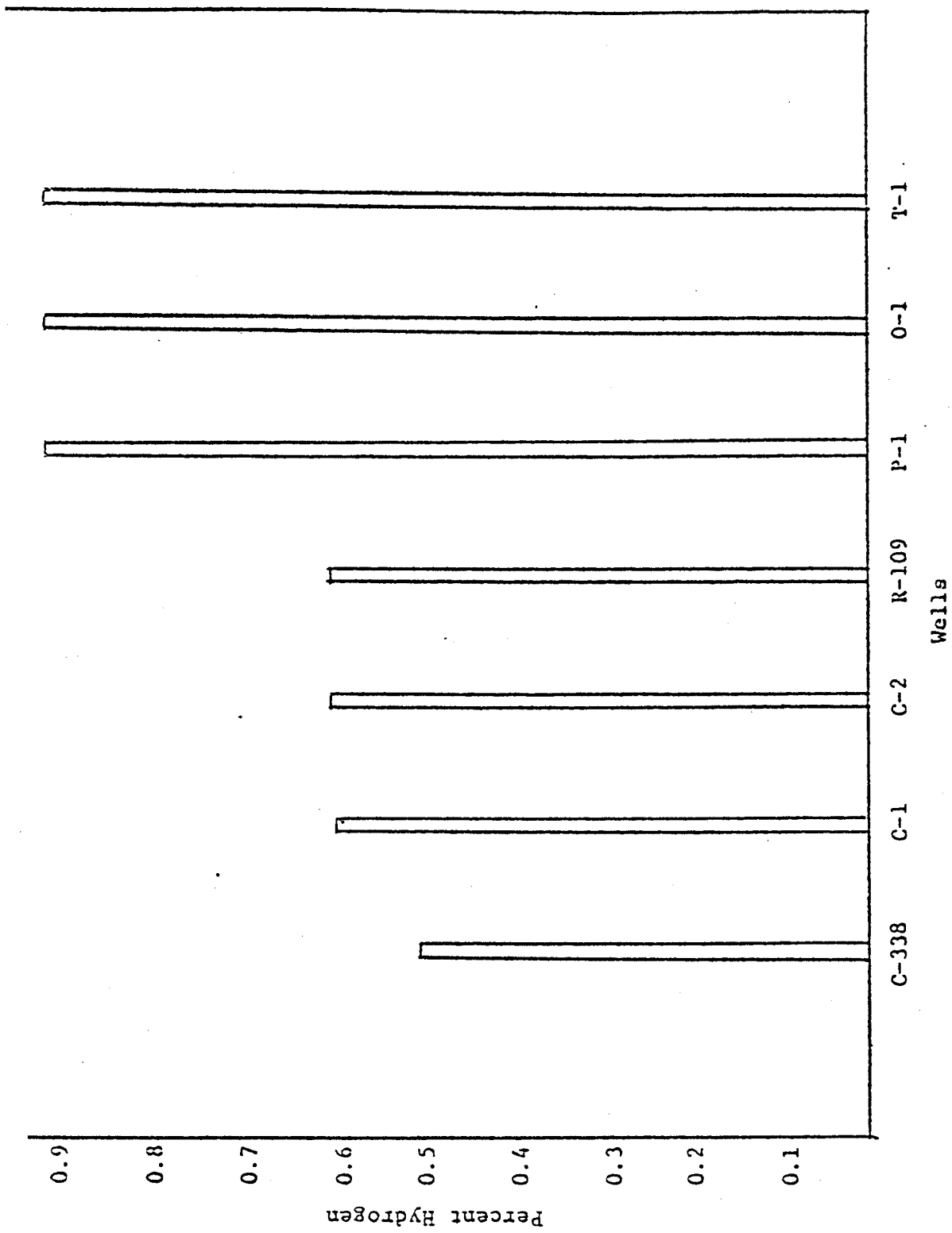


FIGURE 31. RANKING OF WELLS ACCORDING TO HYDROGEN CONTENTS

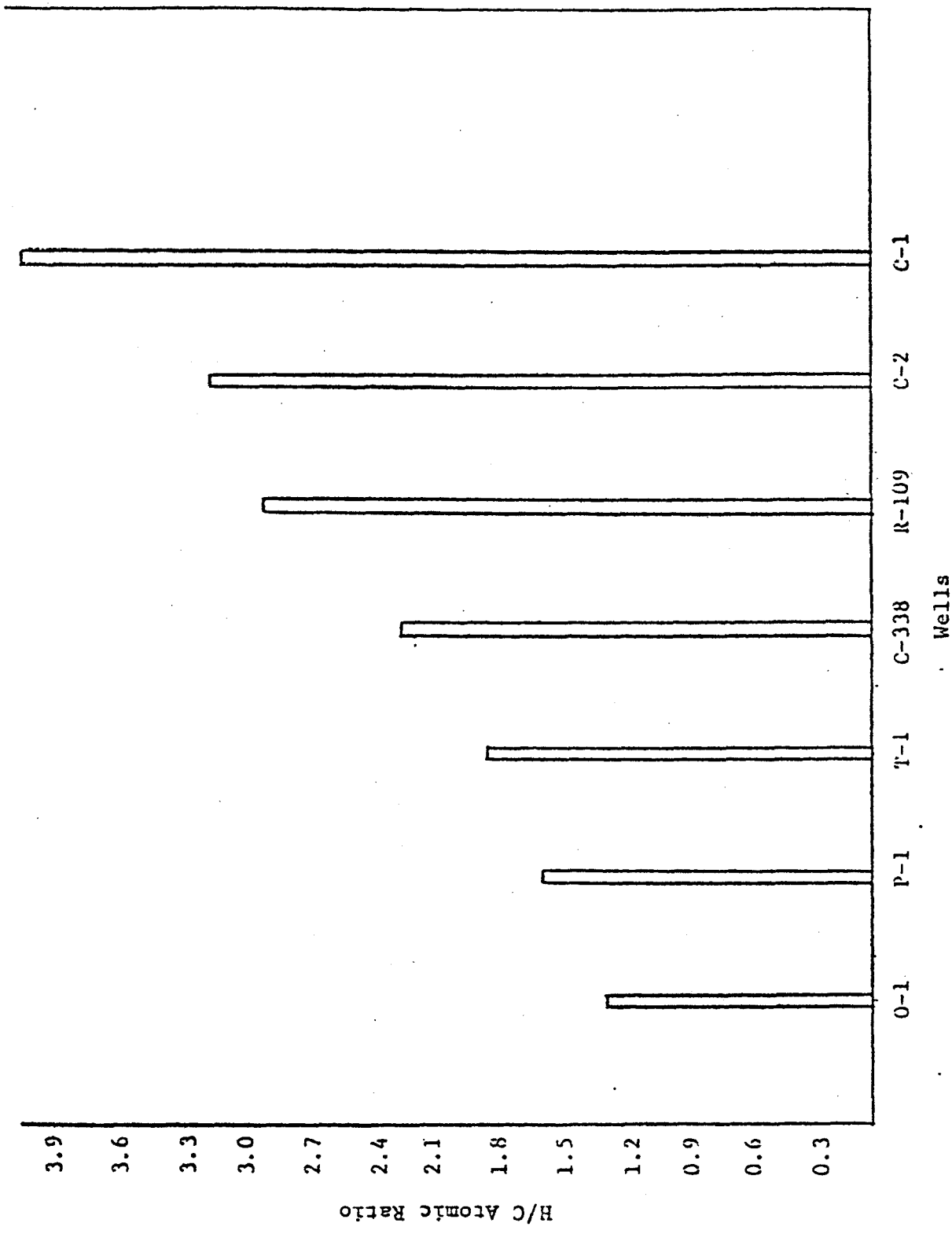


FIGURE 32. RANKING OF WELLS ACCORDING TO H/C ATOMIC RATIOS

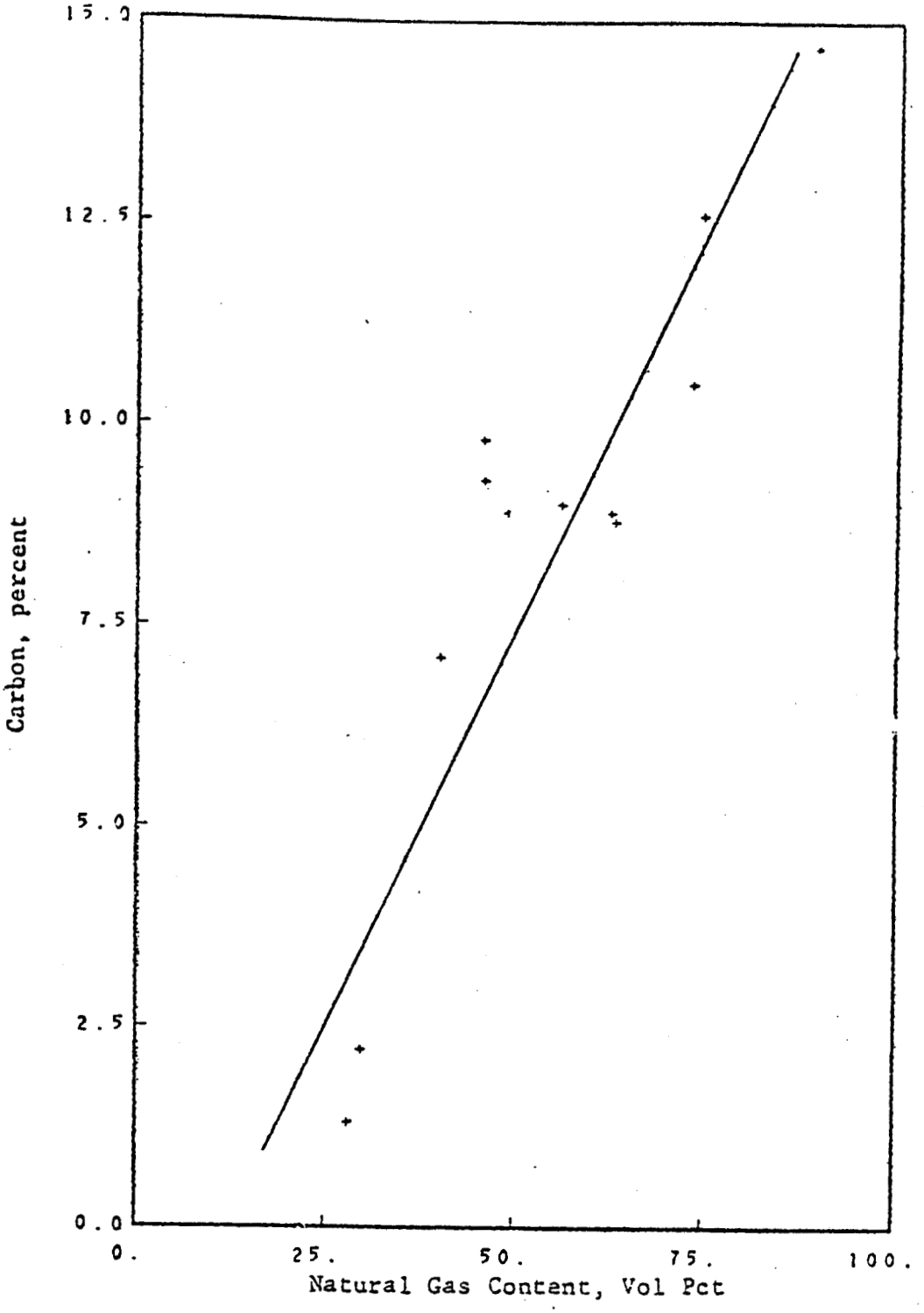


FIGURE 36. GAS CONTENT AS A FUNCTION OF CARBON CONTENT FOR WELL O-1

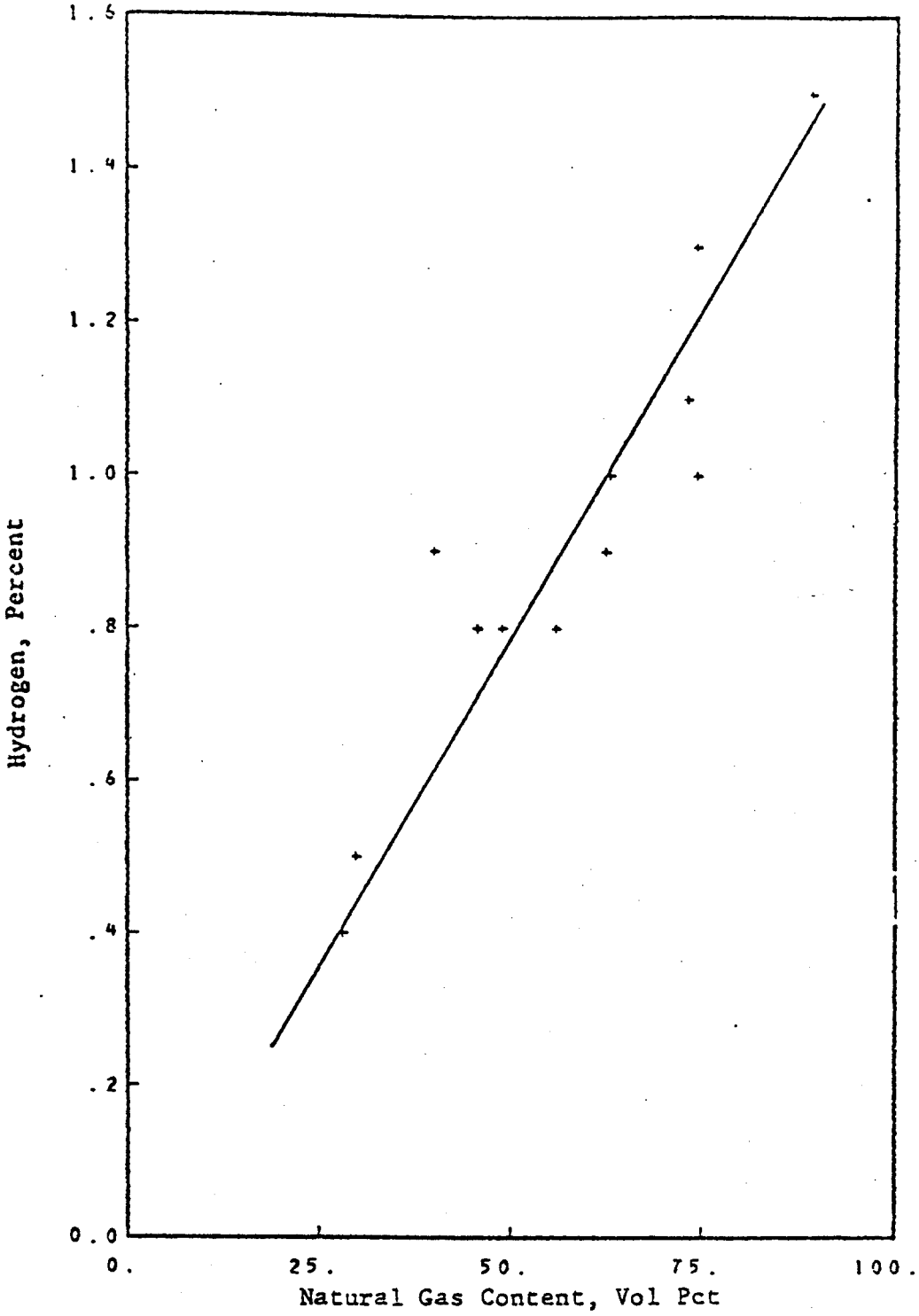


FIGURE 43. GAS CONTENT AS A FUNCTION OF HYDROGEN CONTENT FOR WELL O-1

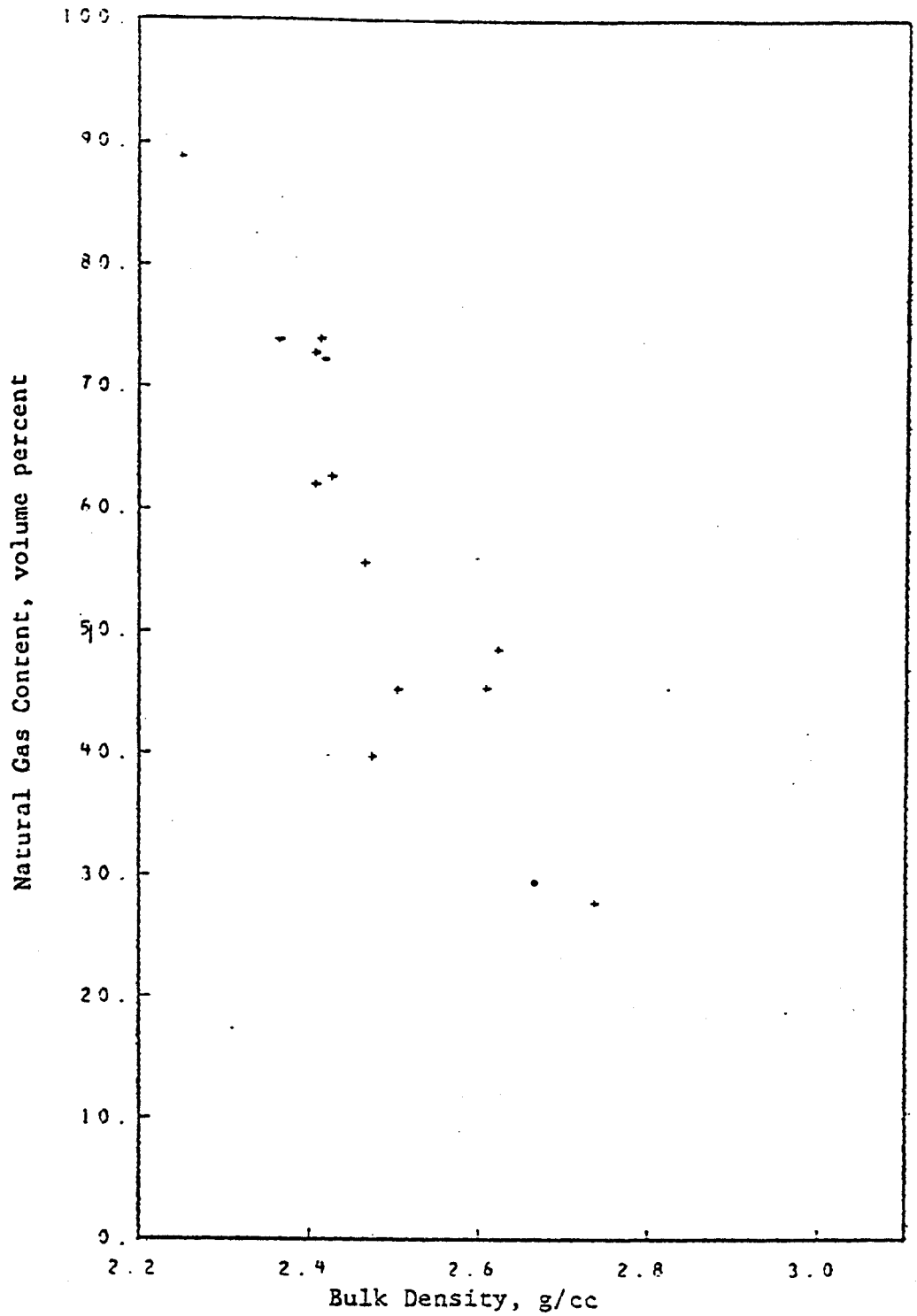


FIGURE 50. GAS CONTENT AS A FUNCTION OF BULK DENSITY FOR WELL O-1

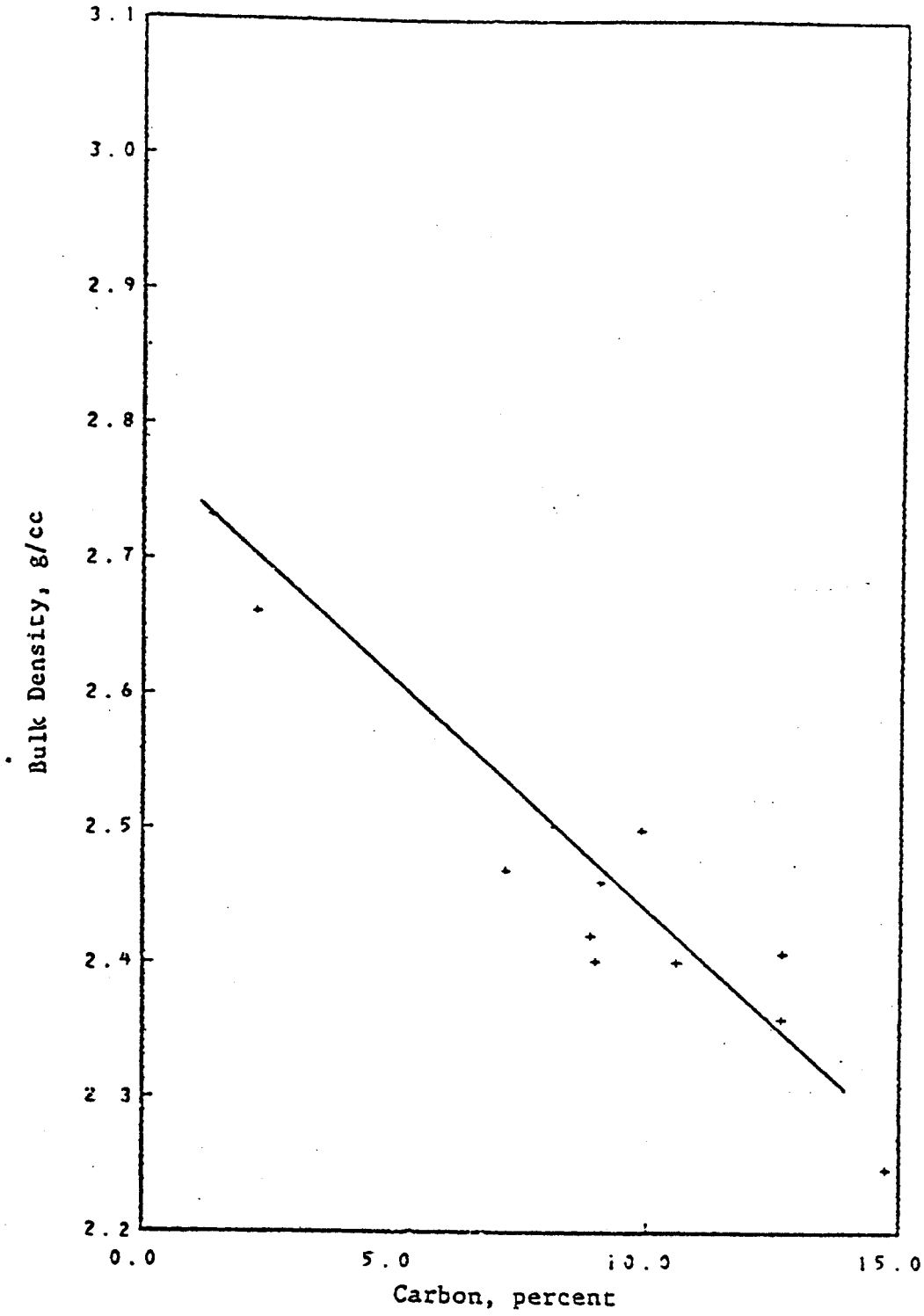


FIGURE 57. CARBON CONTENT AS A FUNCTION OF BULK DENSITY FOR WELL O-1

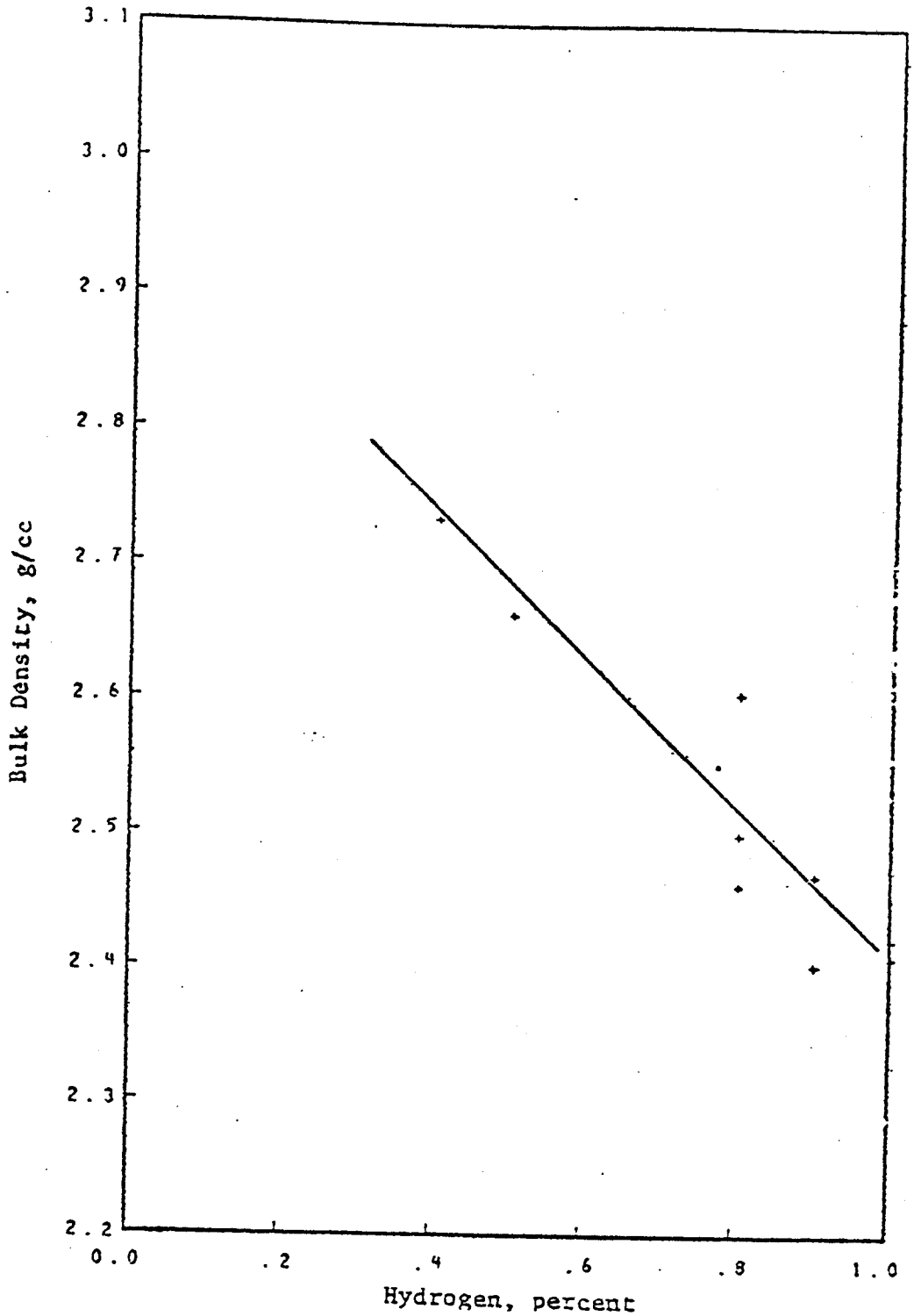


FIGURE 64. HYDROGEN CONTENT AS A FUNCTION OF BULK DENSITY FOR WELL O-1

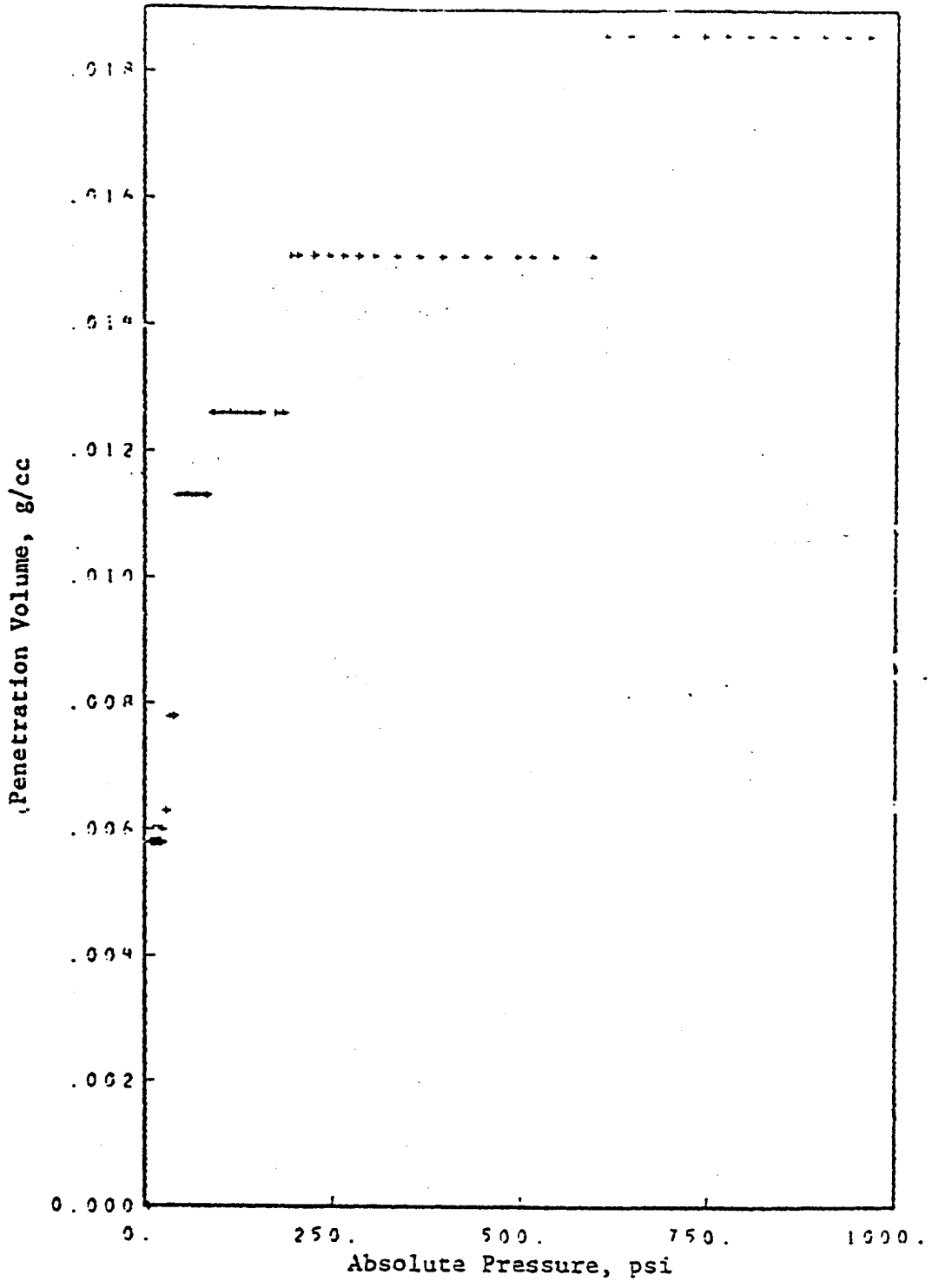


FIGURE 71. PORE VOLUME AS A FUNCTION OF PRESSURE FOR WELL SAMPLE O-1-2183

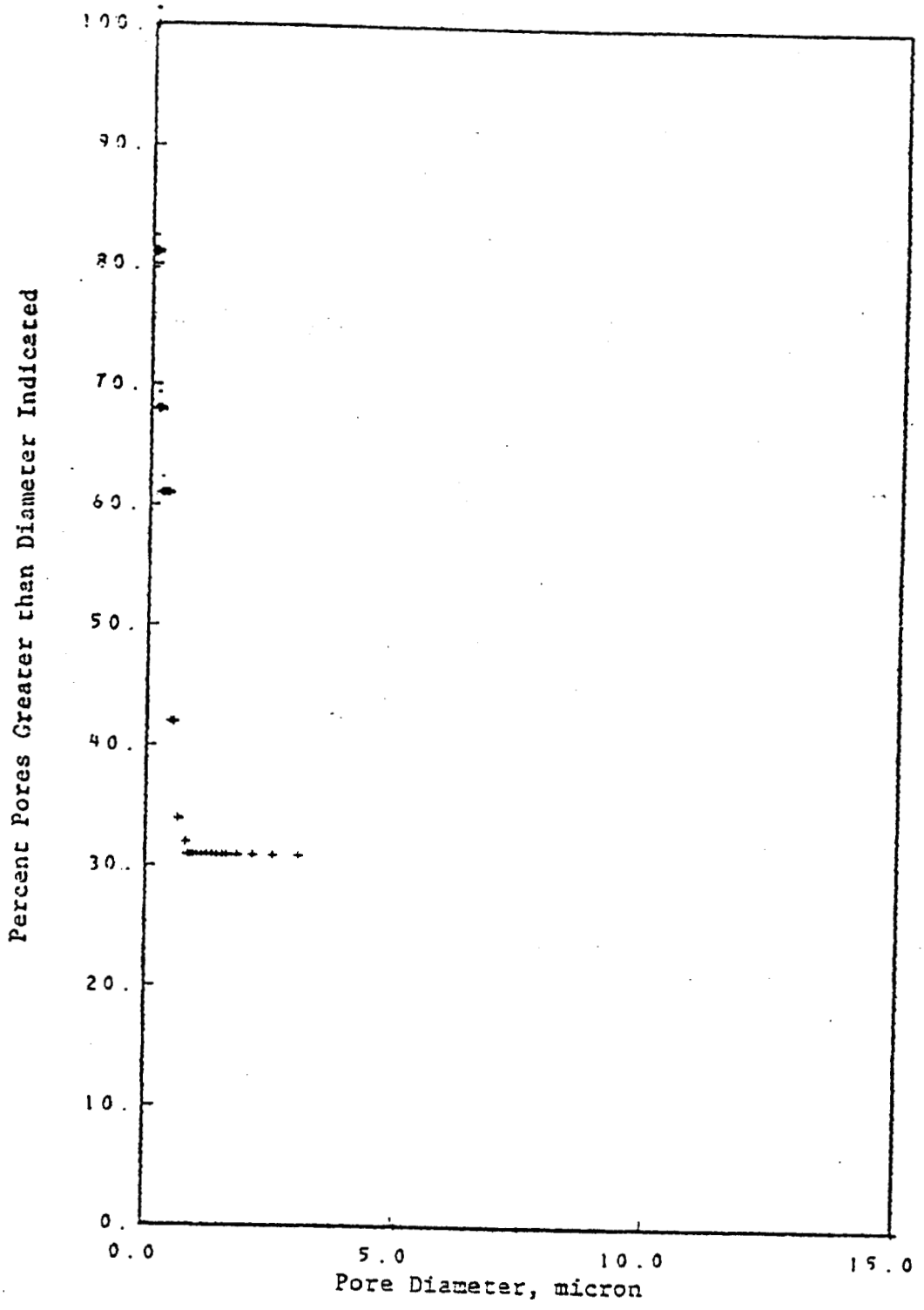
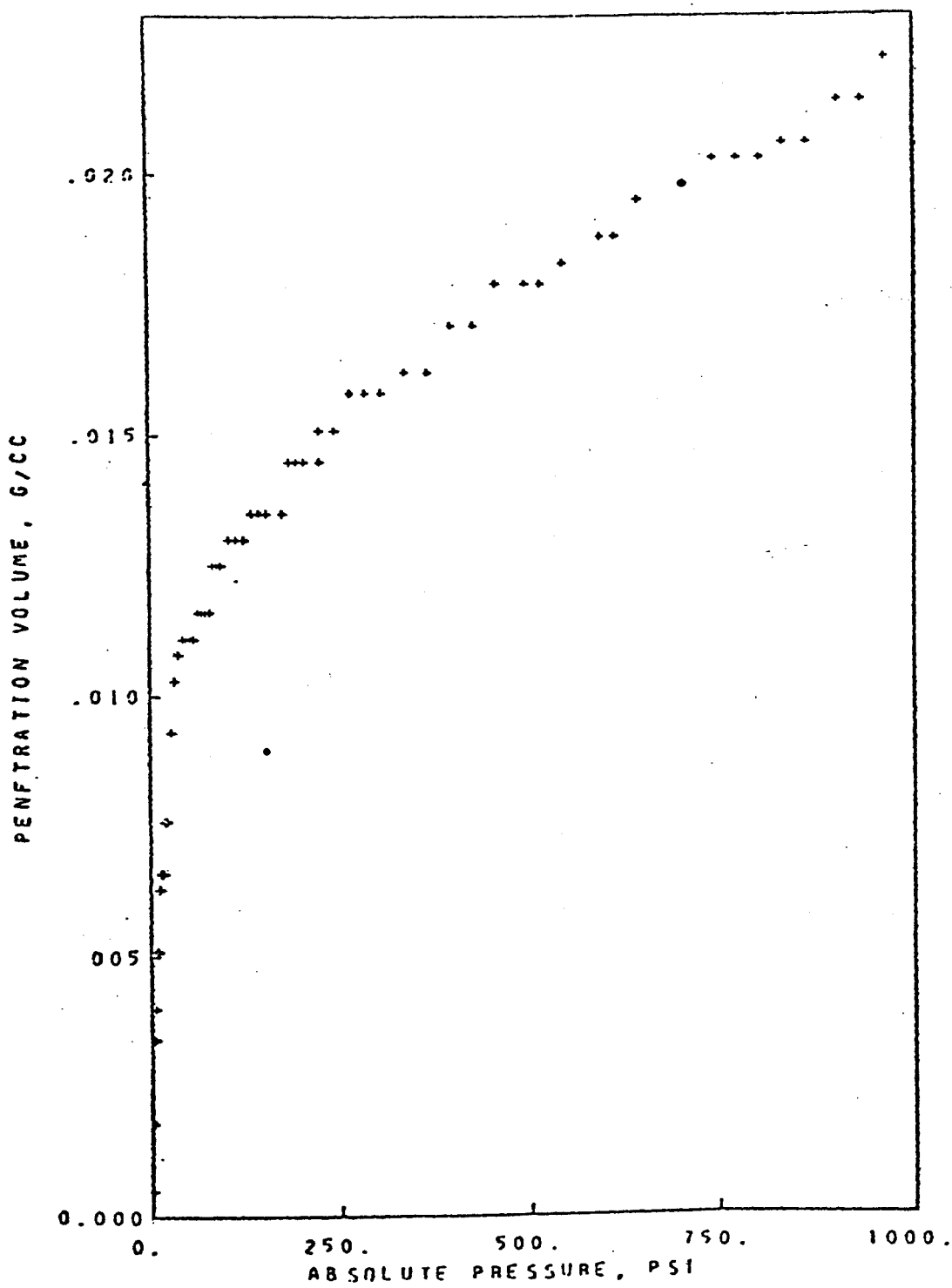
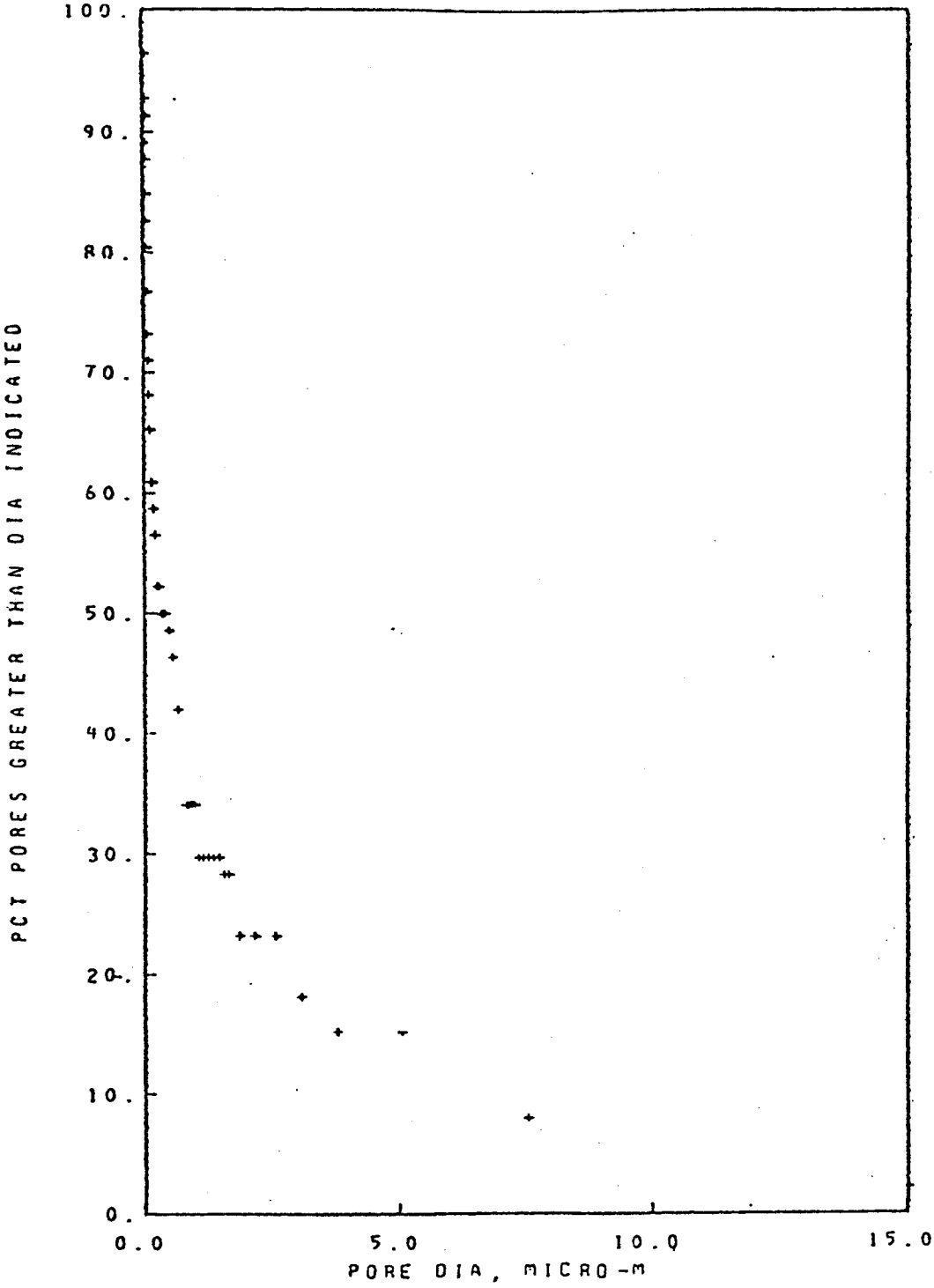


FIGURE 77. PORE SIZE DISTRIBUTION FOR SHALE SAMPLE O-1-2183



01-~~2191~~
2183

Figure B-1



01-2191
2183

Figure B-2

APPENDIX C

Chemical and Physical Analysis

by

Illinois Geological Survey

ILLINOIS GEOLOGICAL SURVEY

List of Tables

Tables		Page
C-1	Geochemical Characterization of Core Samples	54
22	Mean-random vitrinite reflectance	56
24	Sharpness Ratio	57
C-2	Chemical Data	58-61
IIG3	Clay Mineral Orientation	66
IIG2	Radiography	67
1	Internal Surface Area Values	68
IIG1	Summary of Vitrinite Reflectance Data	71

List of Figures

Figures		Page
1	Map of the Distribution of Mean-Random Vitrinite Reflectance Data	55
IIG1	Clay Mineral Composition	62
IIG4	Plot of Orientation Index of Clay Minerals	65
2	Hydrocarbon Composition as a Function of Depth	69
1	Maturity Plot for Gas Samples	70

List of Plates

Plates		Page
IIG1	X-radiograph	63
IIG1	Photomicrographs	64

Well: 0-1
0-1
Location: Christian County, Kentucky

TABLE C-1
July 1979

Geochemical Characterization of Core Samples

DEPTH	GAS RELEASED	% TOTAL CARBON	% ORGANIC CARBON	VITRINITE REFLECTANCE (%Ro) MIN	MAX	AVG	SAMPLER
2183	0.70	14.7	N/A	---	---	---	Battelle
2183	0.407	N/A	N/A	0.22	0.61	0.40	Mound
2191	0.73	10.5	N/A	---	---	---	Battelle
2220	0.45	7.1	N/A	---	---	---	Battelle
2230	0.28	2.2	N/A	---	---	---	Battelle
2239	0.89	8.8	N/A	---	---	---	Battelle
2251	0.13	1.3	N/A	---	---	---	Battelle
2259	1.03	12.6	N/A	---	---	---	Battelle
2261	0.005	N/A	N/A	0.22	0.71	0.42	Mound
2271	0.30	9.0	N/A	---	---	---	Battelle
2281	1.24	8.9	N/A	---	---	---	Battelle
2290	0.51	9.8	N/A	---	---	---	Battelle
2292	0.063	N/A	N/A	0.29	0.70	0.48	Mound
2300	0.46	9.3	N/A	---	---	---	Battelle
2310	0.38	8.9	N/A	---	---	---	Battelle
2317	0.129	N/A	N/A	0.34	0.78	0.48	Mound
2319	0.18	12.6	N/A	---	---	---	Battelle
17	7.884						

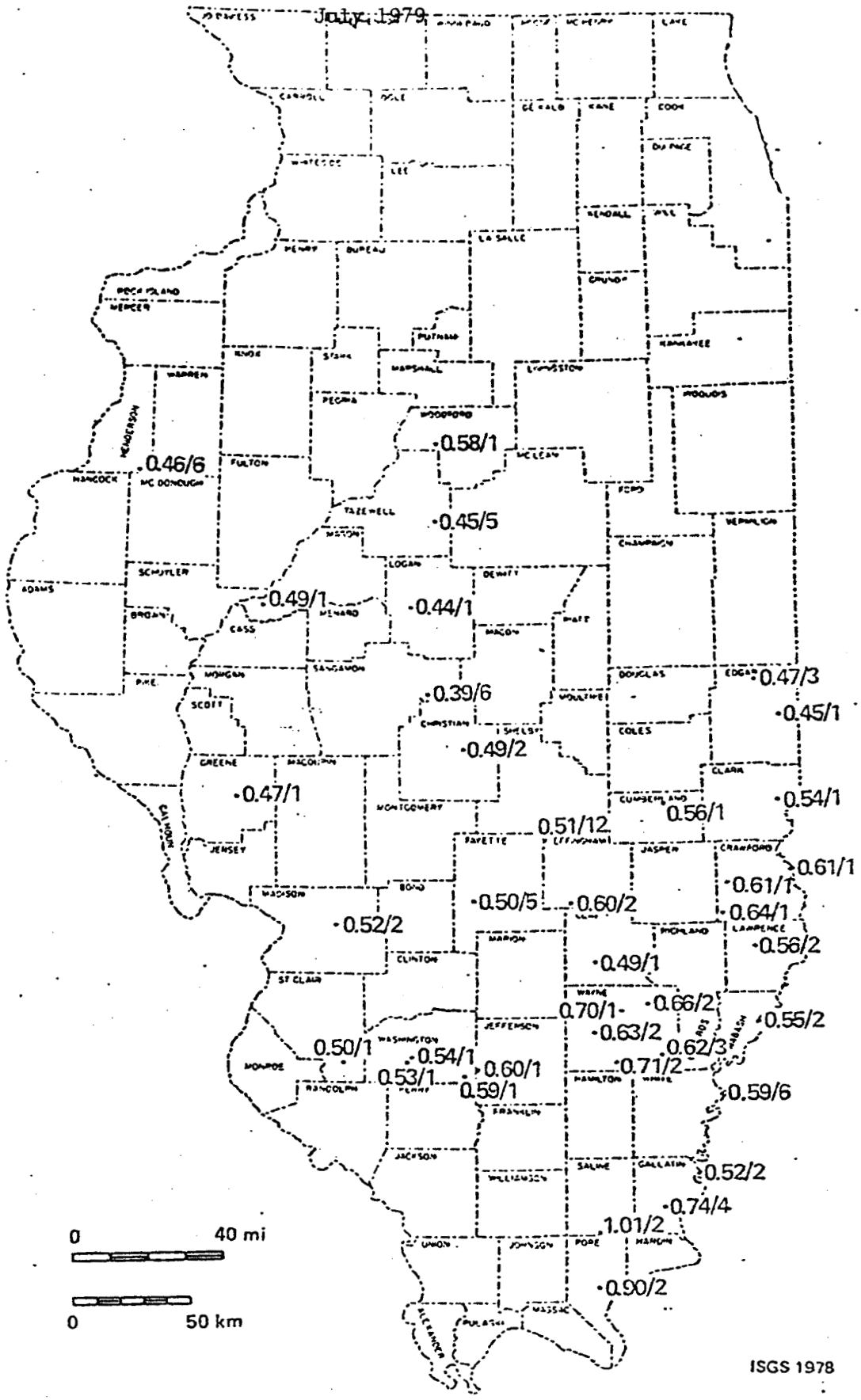


Fig. 1. Map of the distribution of mean-random vitrinite reflectance data.

TABLE 22 - MEAN-RANDOM VITRINITE REFLECTANCE, ILLINOIS AND KENTUCKY CORE SAMPLES

API NUMBER	SAMPLE NUMBER	N	R P	STD DEV	PERCENT VITRINITE IN EACH REFLECTANCE CLASS <.25	.30	.35	.40	.45	.50	.55	.60	.65	.7	.75	.80	.85	.90	.95	1.0	>1
1604731175	01KY01L1	35	.46	.05	0	0	3	9	17	49	23	0	0	0	0	0	0	0	0	0	0
1604731175	01KY01C1	59	.39	.08	0	12	20	27	17	10	10	2	0	2	0	0	0	0	0	0	0
1604731175	01KY01C1	33	.52	.07	0	0	0	0	9	39	21	21	0	6	3	0	0	0	0	0	0
1604731175	01KY02L1	50	.48	.09	0	0	0	18	24	16	20	12	6	4	2	0	0	0	0	0	0
1604731175	01KY02C1	27	.36	.10	4	26	26	15	7	11	4	4	4	0	0	0	0	0	0	0	0
1604731175	01KY02C1	31	.56	.09	0	0	0	0	13	13	23	13	19	10	10	0	0	0	0	0	0
1604731175	01KY03L1	36	.46	.09	0	0	11	14	17	14	22	19	0	3	0	0	0	0	0	0	0
1604731175	01KY03C1	32	.33	.11	31	16	22	9	6	9	0	0	6	0	0	0	0	0	0	0	0
1604731175	01KY03C1	46	.53	.08	0	0	0	2	30	35	13	2	9	4	0	0	0	0	0	0	0
1604731175	01KY04C1	49	.82	.30	0	0	0	4	2	10	12	6	4	4	2	2	2	2	12	4	32
1604731175	01KY04L1	50	.53	.11	0	0	0	8	20	18	14	6	16	14	0	2	2	0	0	0	0
1604731175	01KY05C1	33	.41	.08	0	0	22	22	22	22	9	3	0	0	0	0	0	0	0	0	0
1604731175	01KY05L1	48	.58	.11	0	0	2	6	2	10	15	19	19	15	6	4	2	0	0	0	0
1604731175	01KY07C1	62	.39	.06	0	0	16	31	31	14	3	0	2	0	0	0	0	0	0	0	0
1604731175	01KY07L1	12	.37	.05	0	0	33	25	42	0	0	0	0	0	0	0	0	0	0	0	0
1604731175	01KY08C1	44	.52	.07	0	0	0	2	14	20	27	27	4	2	2	0	0	0	0	0	0
1604731175	01KY08L1	23	.44	.04	0	0	4	13	30	48	4	0	0	0	0	0	0	0	0	0	0
1604731175	01KY09C1	43	.55	.10	0	0	2	2	16	5	16	26	21	5	2	5	0	0	0	0	0
1604731175	01KY10L1	16	.48	.07	0	0	0	12	25	19	25	12	6	0	0	0	0	0	0	0	0
1604731175	01KY10C1	32	.52	.11	0	0	9	3	12	19	9	16	12	19	0	0	0	0	0	0	0
1604731175	01KY11L1	24	.51	.08	0	0	4	0	12	29	12	29	8	4	0	0	0	0	0	0	0
1604731175	01KY11C1	16	.44	.10	0	0	12	31	25	6	6	12	6	0	0	0	0	0	0	0	0
1604731175	01KY12C1	23	.79	.36	0	0	9	9	9	0	9	0	9	0	4	4	4	0	4	4	36
1604731175	01KY12L1	27	.60	.14	0	0	0	0	15	7	11	15	18	15	7	0	4	4	4	0	0
1604731175	01KY13L1	21	.53	.12	0	0	0	14	19	19	9	5	9	9	9	5	0	0	0	0	0
1604731175	01KY13C1	17	.51	.28	12	12	12	18	0	6	12	6	0	0	0	0	6	0	12	0	0

TABLE 24 - SHARPNESS RATIO DATA. ILLINOIS AND KENTUCKY CORE SAMPLES

API NUMBER	SAMPLE NUMBER	DEPTH (FT)	10.5A PEAK	10.0A PEAK	SHARPNESS RATIO
1604731175	01KY01L1	2181	16.	9.	1.78
1604731175	01KY01C1	2182	84.	30.	2.80
1604731175	01KY02L1	2189	14.	4.	3.50
1604731175	01KY02C1	2191	60.	18.	3.33
1604731175	01KY03L1	2217	30.	11.	2.73
1604731175	01KY04L1	2231	22.	10.	2.20
1604731175	01KY05L1	2244	26.	12.	2.17
1604731175	01KY06L1	2256	70.	31.	2.26
1604731175	01KY07L1	2264	32.	9.	3.56
1604731175	01KY08C1	2270	20.	12.	1.67
1604731175	01KY09C1	2280	18.	7.	2.57
1604731175	01KY10C1	2291	26.	14.	1.86
1604731175	01KY11C1	2300	24.	13.	1.85
1604731175	01KY12C1	2310	14.	7.	2.00
1604731175	01KY13C1	2319	17.	7.	2.43

Table C-2

CHEMICAL DATA ON CHRISTIAN COUNTY, KENTUCKY CORE

SAMPLE NO.	GEOL. NO.	DEPTH (FT)	SIO2 (%)	AL2O3 (%)	FE2O3 (%) (XRF)	FE AS % FE2O3 (NAA)	MGO (%)	CAO (%)	NA AS % NA2O (NAA)	K2O (%) (XRF)	K AS % K2O (NAA)	TIO2 (%)	P2O5 (%)	MN (PPM) (NAA)
SOOOB1	01XY01C1	1822.2	53.2	18.1	6.85	7.46	.74	.14	.74	3.06	3.52	.56	.10	110
02	02C1	2191.1	59.3	9.65	5.48	6.08	1.21	1.63	.66	2.71	3.86	.58	.06	310
03	03C1	2220.3	57.8	9.93	7.21	7.66	1.08	1.60	.68	2.76	3.24	.54	.18	260
04	04C1	2230.2	62.8	15.0	3.91	3.69	1.49	.56	.86	4.22	4.54	.71	.01	270
05	05C1	2240.1	48.0	10.0	7.74	10.2	1.69	7.30	.74	2.61	2.75	.45	1.25	410
06	06C1	2250.0	59.0	16.4	4.40	5.30	1.98	1.25	.98	4.31	4.64	.83	.07	360
07	07C1	2266.3	49.9	13.5	6.20	6.38	1.05	.26	.77	3.93	4.19	.70	.07	102
08	08C1	2270.3	57.9	14.4	3.37	3.19	2.10	2.03	.92	4.23	4.06	.73	.13	190
09	09C1	2280.0	51.9	11.5	3.60	4.27	3.59	4.81	.60	3.49	3.66	.71	.01	360
10	10C1	2290.7	53.0	11.5	2.64	3.11	2.83	3.69	.75	3.81	4.36	.66	.05	200
11	11C1	2299.7	45.0	9.77	4.26	4.79	4.75	7.50	.87	2.99	3.53	.52	.19	400
12	12C1	2310.5	51.6	8.44	3.16	3.29	4.31	7.51	.56	2.87	3.34	.43	.15	320
13	13C1	2318.8	46.0	7.07	3.09	3.67	4.08	11.7	.45	2.61	3.02	.35	.19	360
33	08L1	2273.5	55.0	14.5	5.05	5.46	1.82	1.69	.80	4.10	5.02	.71	.12	200
34	10L1	2287.8	54.3	11.9	2.98	2.72	3.62	5.67	.75	3.62	4.16	.71	.03	340
35	11L1	2292.9	51.8	10.9	3.42	3.62	3.47	5.50	.76	3.53	3.96	.63	.04	330
36	12L1	2311.1	49.8	8.87	2.62	2.78	4.25	10.3	.50	2.44	3.19	.33	.19	320
37	13L1	2312.6	49.8	7.59	3.05	3.33	4.19	9.32	.53	2.63	3.05	.36	.25	360

	MN (PPM) (DE-P)	V (PPM) (DE-O)	V (PPM) (DE-P)	S (%)	CL (%)	TOTAL C (%)	ORGANIC C (%)	INORG. C (%)	H (%)	TOTAL CEC MEQ/100G	SR (PPM)	AS (PPM)
SOOOB1	120	160	200	2.42	.02	14.13	14.03	.10	1.93	4.7	8.9	68
02	290	140	160	1.80	.02	12.86	12.29	.57	1.63	3.4	3.3	36
03	220	170	162	1.93	.01	7.70	7.03	.75	1.27	4.7	5.6	62
04	260	150	150	.35	.02	2.20	1.60	.60	.74	5.1	1.8	17
05	340	120	120	2.27	.02	7.01	5.81	1.22	.91	3.2	6.2	37
06	310	150	152	.22	.02	1.69	.66	1.03	.59	3.3	1.0	9.8
07	150	560	450	1.70	.01	12.61	12.30	.31	1.72	5.0	11	45
08	170	190	200	.53	.02	6.22	5.26	.96	1.29	4.5	2.0	15
09	320	170	190	.62	.01	7.51	5.39	2.12	1.10	3.3	2.8	12
10	200	190	220	.40	.01	10.50	9.23	1.33	1.38	2.6	1.6	10
11	360	150	150	1.38	.02	10.10	7.43	2.73	.95	2.5	2.1	16
12	360	230	240	1.80	.01	8.32	5.67	2.65	1.06	1.7	2.4	17
13	330	980	320	1.16	.01	10.36	7.37	3.06	.35	1.0	5.7	19
33	170	260	230	.85	.01	6.80	6.22	.62	1.27	6.8	3.0	23
34	310	120	130	.32	.01	5.65	3.40	2.25	.75	4.0	.6	6.2
35	300	120	130	.78	.02	8.69	6.74	1.92	1.23	3.2	1.0	11
36		220		.90	.01	6.90	5.79	3.11	.86	1.6	2.5	12
37		285		1.32	.01	6.93	5.93	3.22	.85	1.2	4.1	17

(Continued)

CHEMICAL DATA ON CHRISTIAN COUNTY, KENTUCKY CORE

SAMPLE NO.	GEOL. NO.	DEPTH (FT)	BA (PPM)	BE (PPM) (OE-D)	BE (PPM) (OE-P)	B (PPM)	BR (PPM)	CE (PPM)	CS (PPM)	CR (PPM) (NAA)	CR (PPM) (OE-D)	CR (PPM) (OE-P)	CU (PPM) (NAA)	CO (PPM) (OE-D)
800001	01KYC1C1	1822.2	900	3.6	3.6	120	5	82	5.4	65	74	84	39	44
02	02C1	2191.1	1100	4.3	5.0	140	4.5	65	4.5	56	62	65	29	32
03	03C1	2220.3	880	4.2	4.0	180	4	67	5.1	59	65	73	23	26
04	04C1	2230.2	570	3.2	5.2	240	3	60	6.5	69	98	110	11	12
05	05C1	2240.1	7800	3.0	3.4	180	3	170	4.5	64	60	70	32	30
06	06C1	2250.0	790	2.6	4.4	290	<4	91	9.1	99	100	110	12	11
07	07C1	2260.3	820	2.9	5.0	210	5	81	7.4	89	100	120	23	29
08	08C1	2270.3	460	2.3	5.2	240	4	77	7.8	100	120	150	14	19
09	09C1	2280.0	350	2.5	5.1	225	3.6	70	6.9	65	99	110	11	13
10	10C1	2290.7	410	2.6	5.0	190	5.0	75	7.7	97	88	110	12	12
11	11C1	2299.7	390	2.4	3.0	165	3	63	5.3	65	68	66	13	14
12	12C1	2310.5	270	2.0	3.3	150	3	48	4.2	55	56	75	11	19
13	13C1	2318.0	510	2.2	3.6	130	0	58	4.0	87	68	96	13	10
33	08L1	2273.5	400	4.5	4.9	190	3	71	6.3	120	110	140	13	14
34	10L1	2287.0	150	2.9	3.6	230	<4	52	5.6	71	75	81	6.0	5.1
35	11L1	2292.9	200	4.4	4.0	315	<5	51	5.8	79	71	60	6.4	7.3
36	12L1	2311.1	200	2.0		150	<4	47	3.9	63	58		9.7	14
37	13L1	2312.6	400	2.6		120	2	47	4.0	67	61		11	12

SAMPLE NO.	CO (PPM) (OE-P)	CU (PPM) (OE-D)	CU (PPM) (OE-P)	DY (PPM)	EU (PPM)	F (PPM)	GD (PPM)	GA (PPM)	GE (PPM) (OE-D)	GE (PPM) (OE-P)	HF (PPM)	PB (PPM) (OE-P)
800001	56	89	99	5.9	1.6	640	1.4	17	1.4	<17	3.6	37
02	38	60	82	4.4	1.3	630	1.3	15	2.6	<11	3.0	14
03	24	82	92	4.6	1.3	500	1.0	13	1.7	<17	3.1	36
04	12	61	70	6.7	1.3	920	1.6	22	1.5	<11	3.0	19
05	23	76	72	17	5.0	2925	6.2	11	< .4	<11	6.5	24
06	9.6	36	35	5.4	1.4	695	1.9	23	< .4	<11	5.2	11
07	26	160	170	6.4	1.9	765	1.3	22	1.0	<10	3.5	23
08	16	140	200	5.6	1.6	885	1.4	19	< .4	<11	4.6	29
09	11	130	180	6.8	1.9	770	1.7	16	< .4	<11	5.1	14
10	11	190	340	6.4	1.6	820	1.7	16	1.1	<11	4.6	30
11	11	130	190	6.6	1.6	865	1.8	16	< .4	<11	3.3	33
12	12	125	250	6.1	1.5	920	1.3	13	< .4	<11	2.3	24
13	10	210	270	7.0	1.9	920	2.3	12	.6	<11	2.6	14
33	12	150	210	6.5	1.7	950	2.6	22	.7	<11	4.2	24
34	8.0	64	120	6.0	1.2	875	1.2	21	< .4	<11	3.7	7.2
35	12	155	150	6.6	1.4	730	2.0	16	2.6	<11	3.6	11
36		120		6.5	1.5	970	.9	13	< .4	<11	2.3	
37		110		7.6	1.5	260	2.3	6.7	< .4	<11	2.5	

(Continued)

GEOCHEMICAL DATA ON CRYSTALLINE CORES, ALTONAH CORE

SAMPLE NO.	GEOL. NO.	DEPTH (FT)	LA (PPM)	LU (PPM)	MO (PPM) (DE-D)	MO (PPM) (NAA)	NI (PPM) (DE-D)	NI (PPM) (DE-P)	NI (PPM) (NAA)	RB (PPM)	SM (PPM)	SC (PPM)	AG (PPM) (DE-P)	SR (PPM) (NAA)
300001	01KY01C1	1822.2	35	.5	180	240	190	180	130	110	9.1	13	< .7	76
02	02C1	2191.1	28	.3	200	200	76	100	90	95	8.2	12	< .7	77
03	03C1	2220.3	29	.4	160	170	85	110	90	100	7.7	13	< .7	230
04	04C1	2230.2	37	.4	4	37	33	42	30	150	9.2	17	< .8	120
05	05C1	2240.1	43	.9	100	74	84	87	150	25	25	14	< .7	800
06	06C1	2250.0	42	.5	<1	ND	23	38	49	190	7.6	23	< .8	150
07	07C1	2260.3	38	.6	220	250	280	300	320	130	12	16	< .7	210
08	08C1	2270.3	44	.3	1.5	28	80	180	150	160	11	20	.87	180
09	09C1	2280.8	36	.5	8.5	18	88	120	150	130	6.6	17	< .8	180
10	10C1	2290.7	37	.6	28	21	120	200	160	140	7.5	16	< .7	110
11	11C1	2299.7	33	.5	23	45	90	120	140	100	7.9	15	< .7	130
12	12C1	2310.5	38	.4	39	38	120	190	130	77	6.8	18	< .8	110
13	13C1	2318.8	31	.5	110	86	200	250	280	93	9.5	13	< .8	160
33	08L1	2273.5	39	.4	17	80	130	150	120	170	7.6	20	< .7	170
34	10L1	2287.8	35	.6	4	85	69	76	87	100	6.9	14	< .8	220
35	11L1	2292.9	32	.4	11	20	100	120	96	120	6.3	14	< .8	150
36	12L1	2311.1	29	.5	36	ND	140		120	82	6.5	11		150
37	13L1	2312.6	31	.5	39	59	150		160	84	7.5	12		190

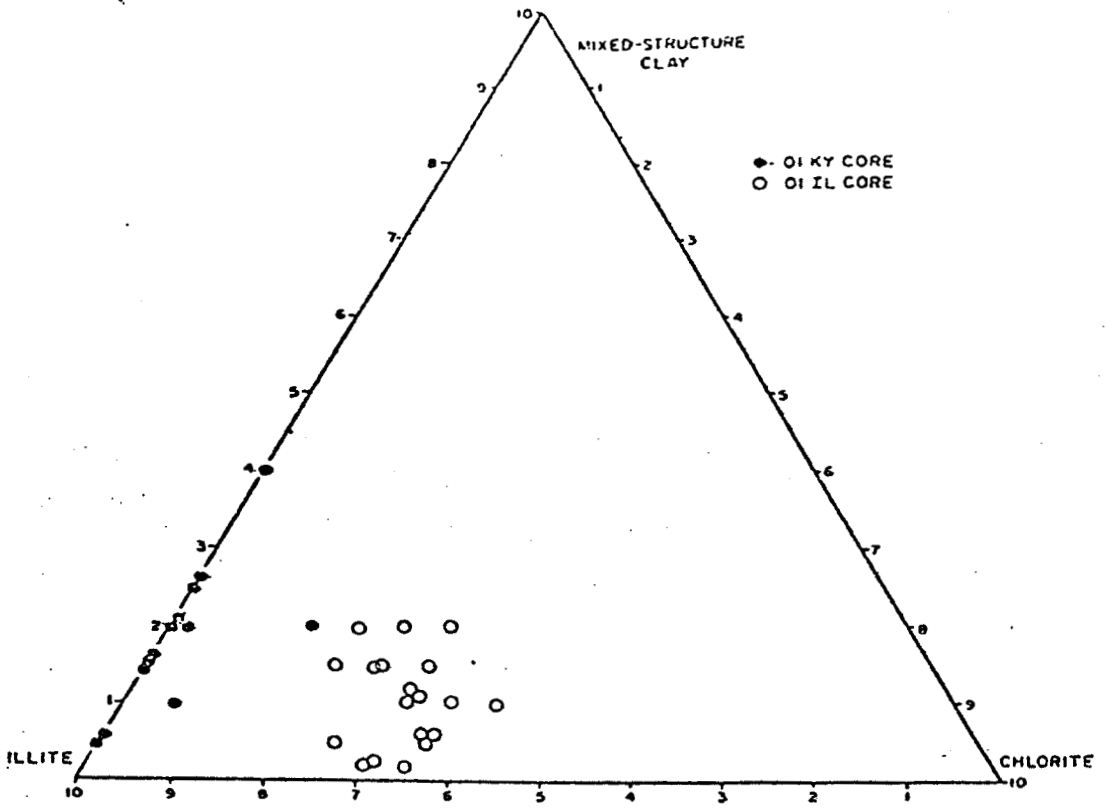
	SR (PPM) (DE-D)	TA (PPM)	TB (PPM)	TH (PPM)	SN (PPM) (DE-D)	SN (PPM) (DE-P)	U (PPM)	YB (PPM)	ZN (PPM) (DE-P)	ZN (PPM) (NAA)	ZR (PPM) (DE-D)	ZR (PPM) (DE-D)
300001	110	.9	1.1	7.3	2.4	<1.4	51	2.3	72	120	80	71
02	140	.8	.8	6.9	.8	<1.5	43	1.9	51	56	67	120
03	190	.8	.9	7.3	.9	<1.5	22	2.4	130	230	260	140
04	190	1.0	.8	8.5	4.7	<1.7	14	2.2	68	120	49	120
05	>600	.7	3.6	12	1.4	<1.6	37	5.3	110	230	160	270
06	210	1.4	.8	14	6.4	<1.7	5	2.9	63	150	68	180
07	250	.8	1.0	4.1	3.8	<1.4	40	2.6	810	670	230	130
08	190	1.0	.8	11	5.6	15	5	2.4	240	200	160	170
09	210	1.0	1.0	12	2.8	4.7	6	3.3	83	150	61	200
10	150	1.0	1.0	11	3.6	15	4	3.3	120	140	64	130
11	170	.7	1.1	7.6	3.6	4.0	6	3.1	160	210	80	190
12	130	.6	.7	6.9	3.8	5.3	10	2.8	180	66	64	130
13	160	.6	1.3	6.2	3.7	4.3	22	3.1	530	360	170	170
33	160	1.6	1.2	10	5.6	11	14	2.8	140	260	180	190
34	170	.9	.7	8.6	4.4	6.1	7	1.7	51	260	29	160
35	120	1.0	.8	8.2	5.0	6.9	6	2.6	220	220	220	190
36	160	.6	.7	5.8	4.2		12	2.1		250	80	170
37	165	.7	1.2	5.5	4.4		13	2.4		170	72	150

(Continued)

CHEMICAL DATA ON CHRISTIAN COUNTY, KENTUCKY CORE

SAMPLE NO.	GEOL. NO.	DEPTH (FT)	ZR (PPM) (DE-P)	500 DEG. ASH (%)	ND (PPM)
300HA1	01KY01C1	1822.2	210	79.68	32
02	02C1	2191.1	210	86.17	24
03	03C1	2228.3	222	87.62	31
04	04C1	2230.2	228	95.46	21
05	05C1	2240.1	270	98.12	8P
06	06C1	2250.0	210	95.8A	2A
07	07C1	2260.3	230	62.49	28
08	08C1	2270.3	280	91.23	16
09	09C1	2280.0	270	90.82	46
10	10C1	2290.7	180	87.83	21
11	11C1	2299.7	280	92.08	29
12	12C1	2310.5	130	92.06	28
13	13C1	2318.6	180	90.43	32
33	08L1	2273.5	1A0	89.13	34
34	10L1	2287.A	180	95.51	
35	11L1	2292.9	210	91.72	3A
36	12L1	2311.1		93.13	
37	13L1	2312.6		92.56	26

ND = NOT DETECTED



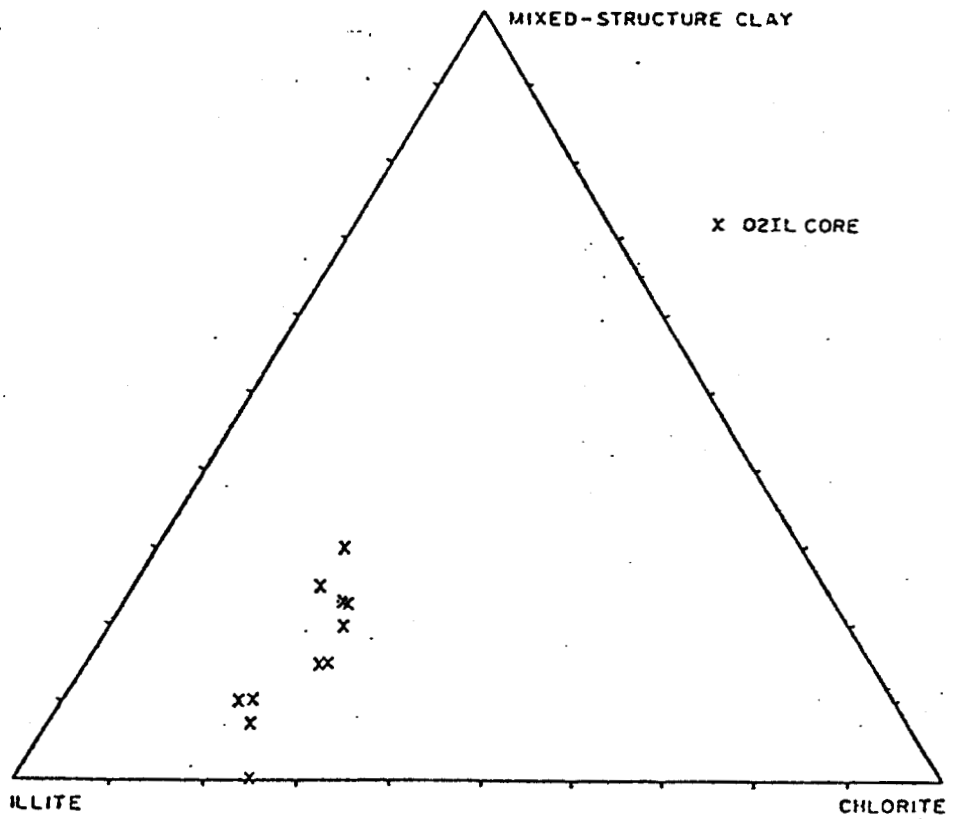
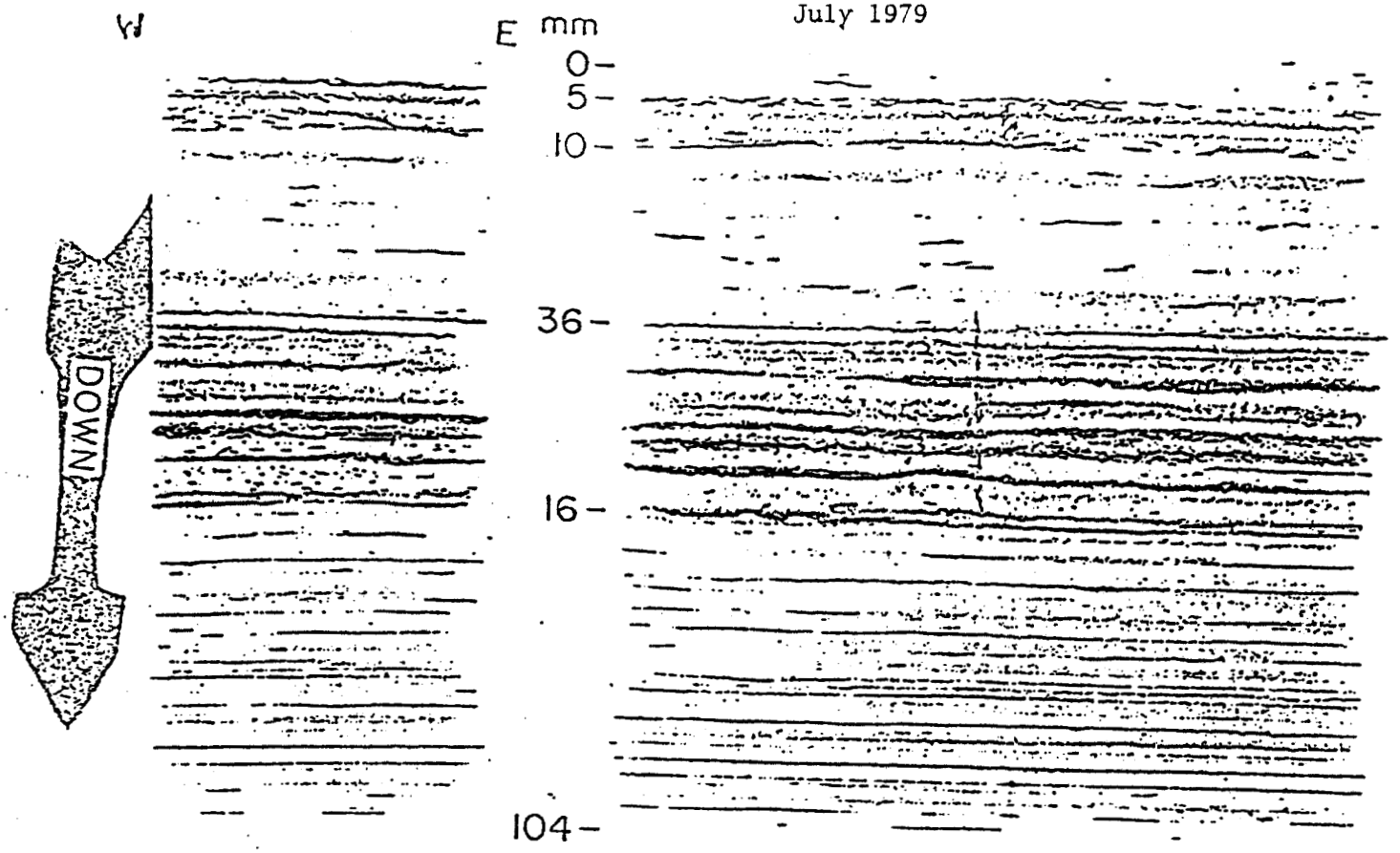
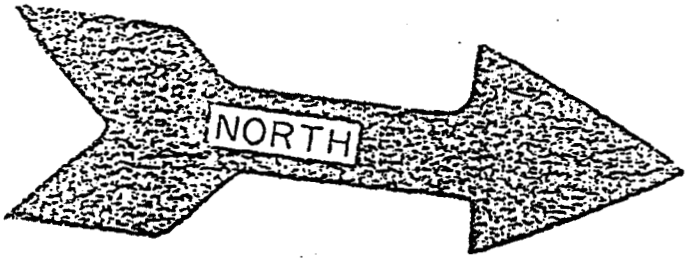
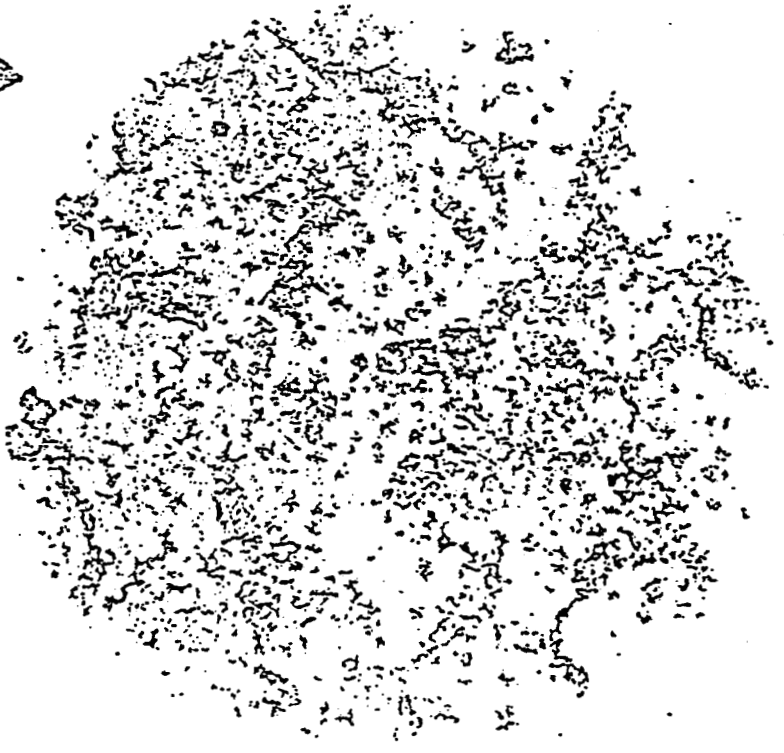


Figure IIG-1. Clay mineral composition of samples from the 01KY, 01IL, and 021L cores. No kaolinite was detected in these samples.

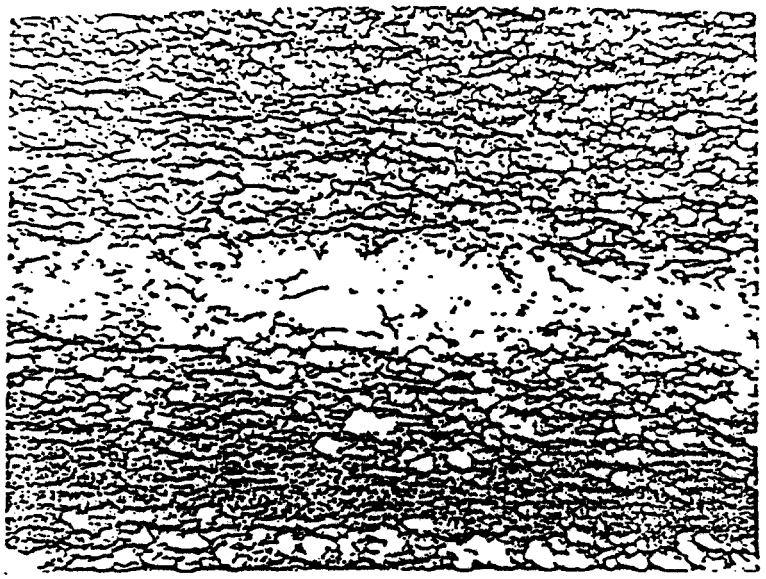


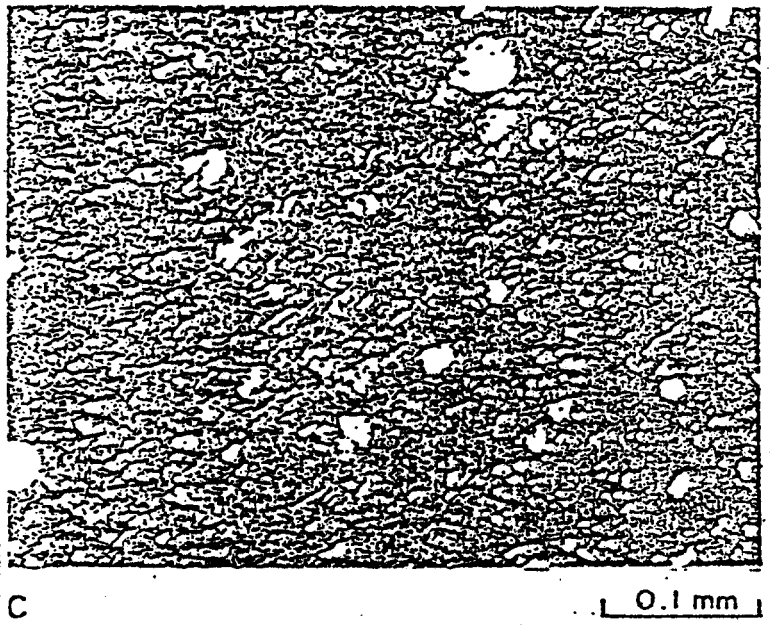




Orbit Gas
#1 Clark
Christian Co., Ky.
Sample 03
2216.7—2217.1
40KV 3 min, 11/17/76

Plate II G 1 - An example of an X-radiograph of a core sample of shale. The upper are of slabs oriented perpendicular to the bedding and as indicated by the arrows; the lower is parallel to bedding and oriented as indicated by the lower arrow.





A. Quartz silt lamina (bright irregular band) overlain by silty shale and underlain by organic rich shale (dark irregular band). Sample 01KY07L1, X20.

B. Crystals of pyrite (black) surrounded by radial fibrous quartz (chalcedony, white area). Sample 01KY04L1, X80.

C. Mica flakes (white streaks) aligned parallel to bedding and scattered irregular patches of sparry calcite (large white areas). Sample 01KY02L1, X200.

PLATE II G 1

Photomicrographs of thin sections in plane polarized transmitted light. New Albany Shale, Christian Co., KY.

Figure II G 4—Clay mineral orientation, Christian County, Kentucky (01KY) core. Large orientation values correspond to well aligned fabrics, low values to poorly aligned or random fabrics.

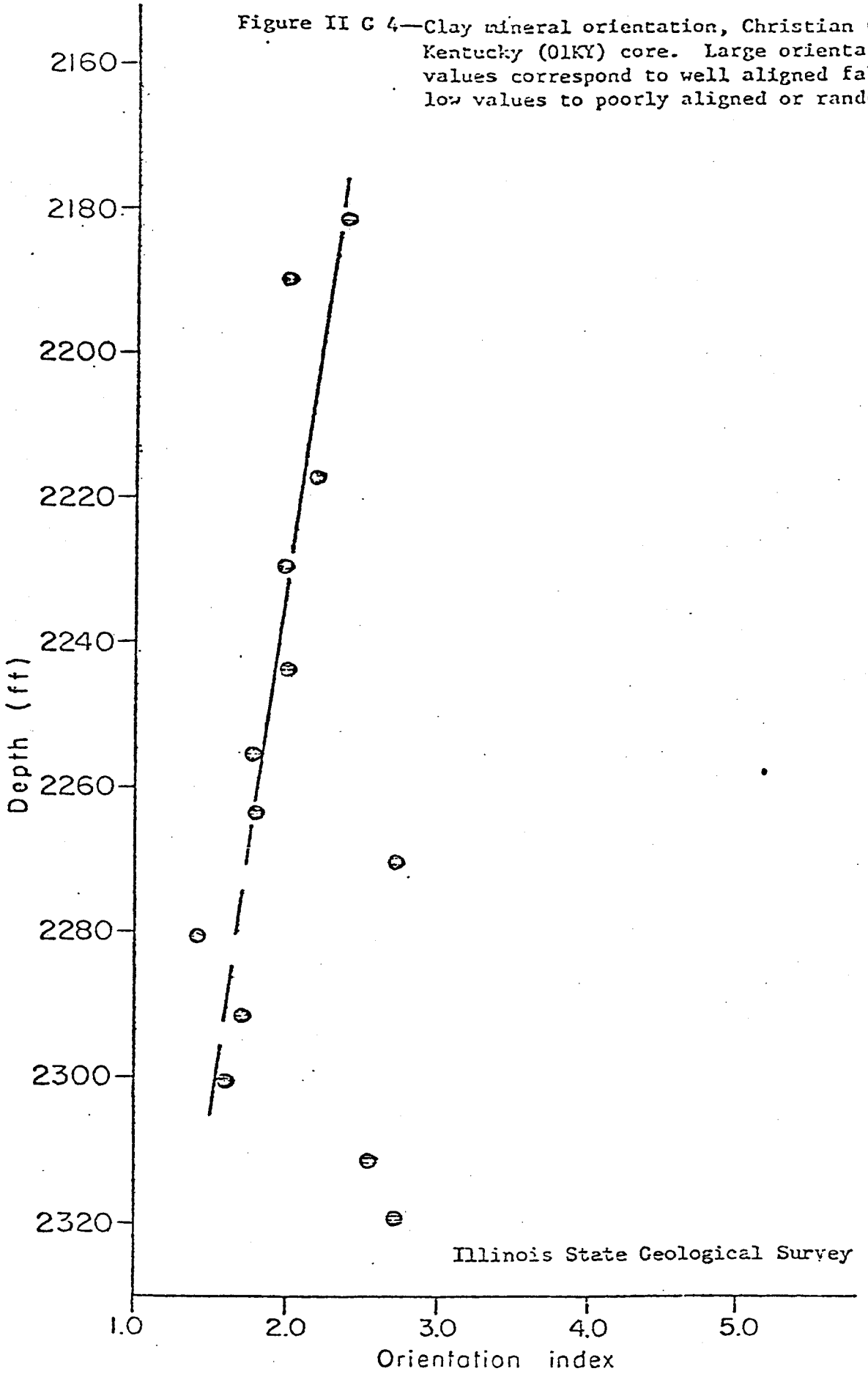


TABLE II G 3 — CLAY MINERAL ORIENTATION

CHRISTIAN COUNTY KENTUCKY (OHY) CORE

Sample number	Depth* (ft)	Orientation index +
01L1	2181.0	2.4
02L1	2188.6	2.0
03L1	2216.7	2.2
04L1	2231.1	2.0
05L1	2244.1	2.0
06L1	2255.4	1.8
07L1	2263.7	1.8
08C1	2270.3	2.7
09C1	2280.0	1.4
10C1	2290.8	1.7
11C1	2299.8	1.6
12C1	2310.5	2.5
13C1	2318.8	2.7

*Depth below reference level of 548.0 feet above MSL.

+ No additional clay mineral orientation analyses are planned for this core.

TABLE VIG2--RADIOGRAPHY, CHRISTIAN COUNTY KENTUCKY CORE SAMPLES (01KY)

Sample number	Depth* (ft)	Laminations† Thickness	Laminations† Contrast	Synaeresis joints** Early stage	Synaeresis joints** Late stage	Recent cracks	Fossils & traces	Pyrite Nodules†† Size range(mm)	Pyrite Nodules†† Number	Pyrite Nodules†† Occurrence	Other sedimentary features
01L1	2181.0	fn	gd	-	-	-	-	2-10	few	sc	-
01C1	2182.3	fn	gd	-	-	-	-	1-25	few	bg	-
02L1	2188.6	fn	gd	-	several	few	-	<1-1	several	sc	-
02C1	2191.2	fn	gd	-	-	-	-	1-20	several	bg	x
03L1	2216.7	fn & med	fr	few	few	-	-	<1-8	several	bg	-
03C1	2220.3	fn	fr	few	few	-	-	<1-20	several	bg	-
04C1	2230.2	ms	fr	few	-	-	-	<1-16	several	sc & bg	-
04L1	2231.1	fn & med	fr	-	-	few	few	1-4	several	bd	-
05C1	2240.1	fn & cs	fr & pr	few	few	-	-	2-16	several	bd	x
05L1	2244.1	med	fr	-	-	-	-	1-2	several	bg	-
06C1	2250.0	ms	fr	abund.	-	few	-	1-4	several	sc	-
06L1	2255.4	ms	fr	abund.	-	few	few	1-8	several	sc	-
07C1	2260.3	fn & med	fr	few	-	-	few	1-20	several	bg	-
07L1	2263.7	fn & cs	fr & pr	-	few	-	-	1-8	several	bg	x
08C1	2270.3	med & cs	fr	several	-	few	few	1-4	several	bg & sc	x
08L1	2273.5	fn	pr	abund.	-	few	-	1-4	abund.	sc	-
09C1	2280.0	med & cs	gd	several	few	few	-	1-4	several	sc	-
10L1	2287.8	med	fr	few	few	few	-	1-4	several	bg	-
10C1	2290.8	fn & med	fr	abund.	-	-	-	1-4	abund.	bg	-
11L1	2293.0	fn & ms	pr & gd	abund.	-	few	-	1-4	abund.	sc & bg	-
11C1	2299.8	fn & cs	gd	few	-	few	-	1-4	several	bg	x
12C1	2310.5	fn & med	pr & gd	-	-	-	-	1-4	several	bg	-
12L1	2311.1	fn	fr	-	-	-	-	1-4	several	bg	-
13L1	2312.7	fn & med	pr & gd	-	-	-	-	1-4	several	bg	x

TABLE 1 - INTERNAL SURFACE AREA VALUES FOR SHALE SAMPLES FROM CHRISTIAN COUNTY, KENTUCKY (CORE 01KY)

Sample No.	Feet Depth to Top of Sample	ISA, m^2/g CO_2	ISA, m^2/g N_2	ISA, CO_2/N_2
01C1	2182.25	39.3	1.50	26.2
02C1	2191.15	27.0	1.33	20.4
03C1	2220.30	20.4	1.26	16.2
04C1	2230.20	13.8	5.00	2.8
05C1	2240.10	13.8	1.04	13.2
06C1	2250.00	14.5	8.71	1.67
07C1	2260.30	31.3	1.52	20.6
08C1	2270.30	11.8	1.43	8.5
09C1	2280.00	11.1	1.05	10.6
10C1	2290.75	14.7	1.08	13.6
11C1	2299.75	12.7	0.92	13.8
12C1	2310.50	10.0	1.04	9.6
13C1	2318.80	14.3	0.82	17.4

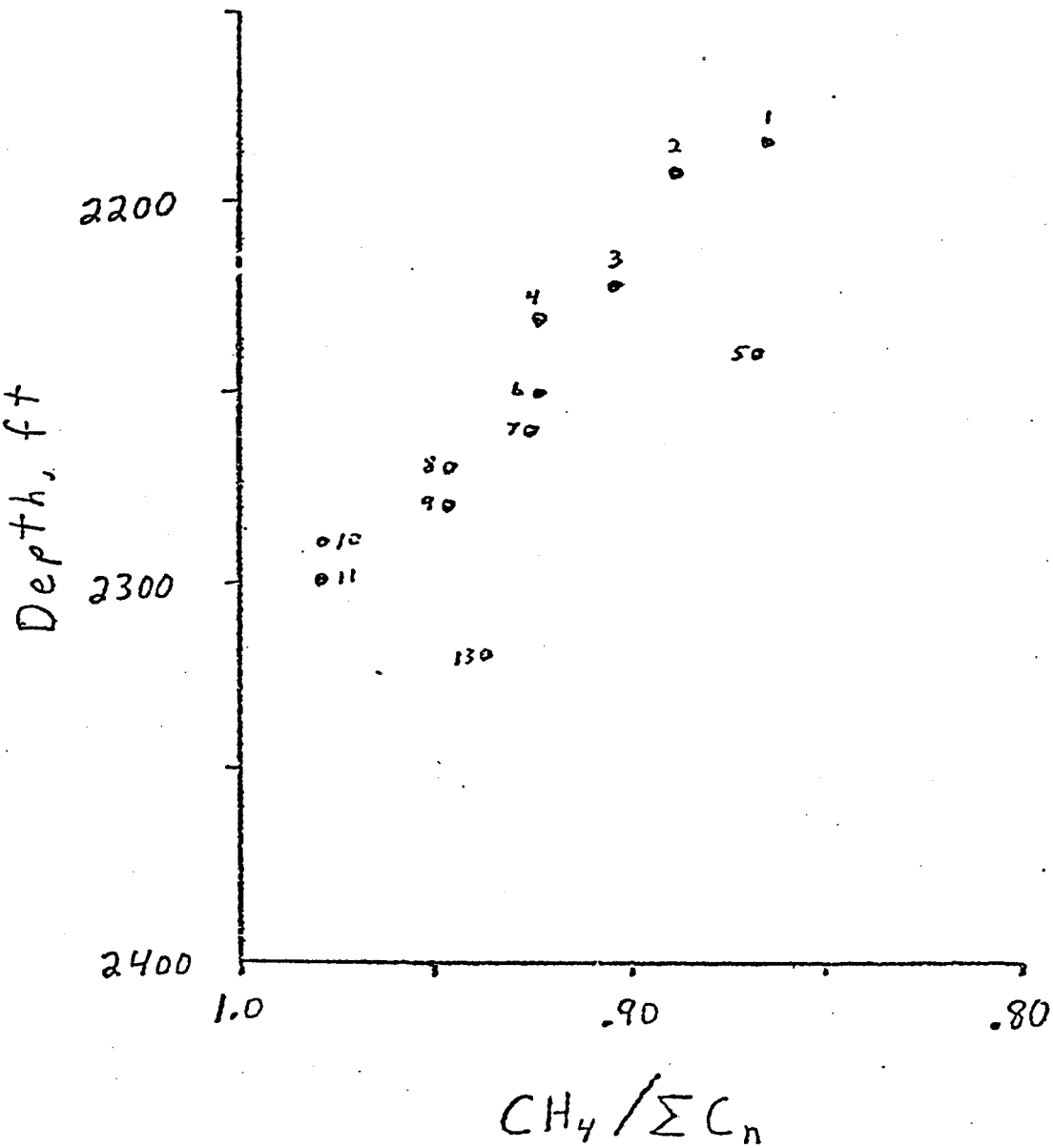


Fig. 2. Hydrocarbon composition as a function of depth for gas samples from core OlKY.

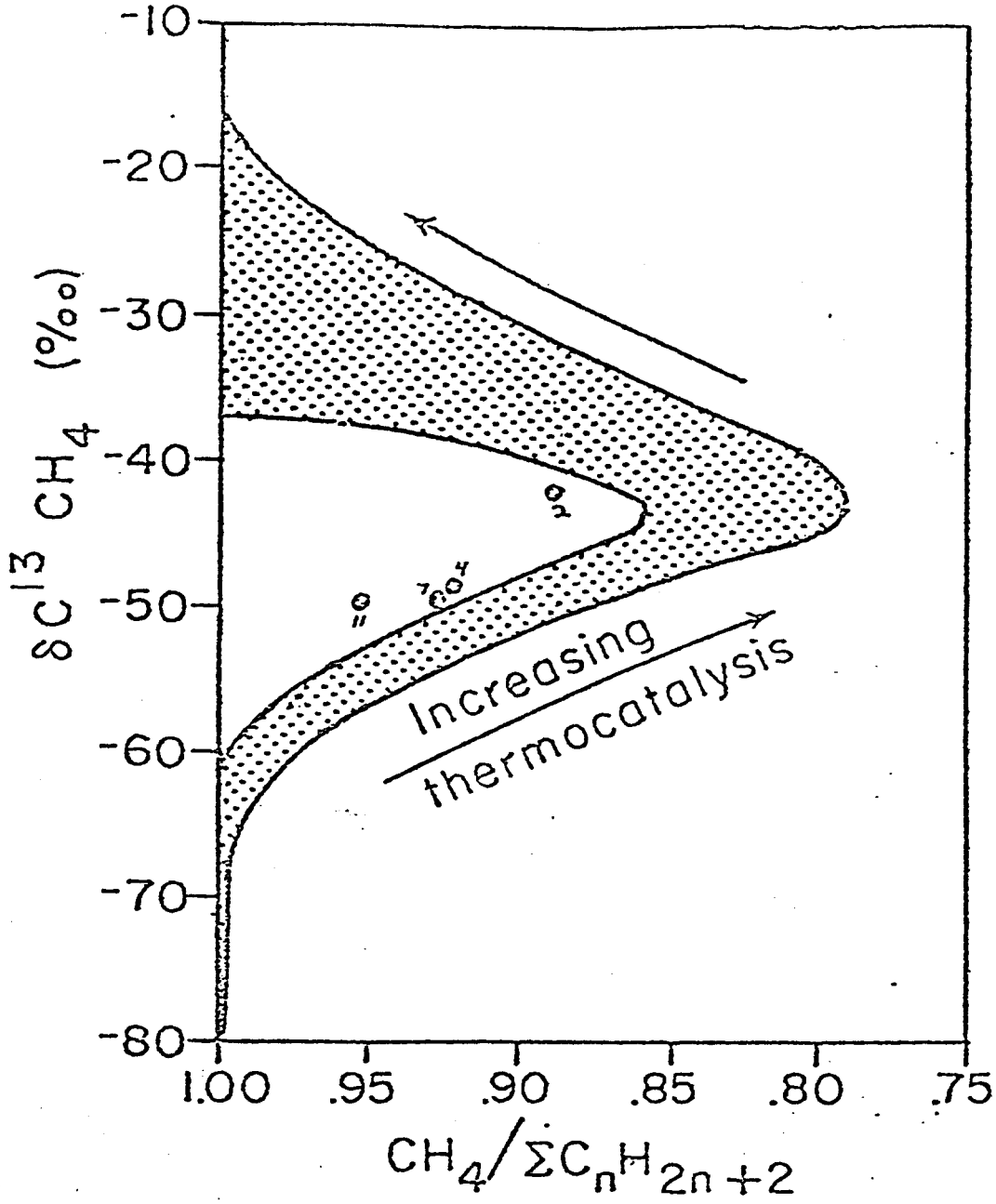


Fig. 1. Maturity plot for gas samples from core OlKY. After Stahl, 1974. Hydrocarbon compositions are in mole fraction.

TABLE II G 1 - SUMMARY OF VITRINITE REFLECTANCE DATA;
CHRISTIAN CO., KENTUCKY (OIKY) CORE

Sample	Depth (ft.)*	# Readings	Ro (%) Average	Std. deviation
1L1	2181	35	0.46	0.05
1C1	2182	59	0.39	0.08
2L1	2189	50	0.48	0.09
2C1	2191	27	0.36	0.10
3L1	2217	36	0.46	0.09
3C1	2220	32	0.33	0.11
4C1	2230	49	0.82	0.30
4L1	2231	50	0.53	0.11
5C1	2240	33	0.41	0.08
5L1	2244	48	0.58	0.11
6C1	2250	no vitrinite	---	---
6L1	2256	no vitrinite	---	---
7C1	2260	62	0.39	0.06
7L1	2264	12	0.37	0.05
8C1	2270	44	0.52	0.07
8L1	2274	23	0.44	0.04
9C1	2280	43	0.55	0.10
10L1	2288	16	0.48	0.07
10C1	2291	32	0.52	0.11
11L1	2293	24	0.51	0.08
11C1	2300	16	0.44	0.10
12C1	2310	23	0.79	0.36
12L1	2311	27	0.60	0.14
13L1	2313	21	0.53	0.12
13C1	2319	17	0.51	0.28

*Depth below reference level of 548 feet above MSL.

This section includes the physical, chemical, and mechanical properties of the New Albany Shale in Illinois, sampled by Illinois Geological Survey from Ray Clark Well #1. The studies include the quantitative and qualitative characterization, by optical and X-ray techniques, of the inorganic mineral consituents, the dispersed organic mater, and the fabric of the scale. Results obtained are discussed briefly in the following paragraphs.

Chemical Properties

Vitrinite Reflectance

Coals and dispersed organic particles in sedimentary rocks are composed of several distinct components that have been termed macerals by coal petrographers. Macerals differ from one another in their botanical origin, morphology, chemical composition, reflectance, and fluorescence. The reflectance of all macerals varies with the degree of thermal metamorphism (or rank) of the enclosing rock, but the correlation with metamorphism is best exhibited in the reflectance of vitrinite. Vitrinite is an abundant constituent in coal and is frequently present in other types of sedimentary rocks as dispersed grains. It is thought to be derived from woody plant tissues. Because the reflectance of vitrinite changes with small changes in rank, vitrinite reflectance analysis has become a standard technique is studying rank of coal and in evaluating rocks as sources of oil and natural gas.

Vitrinite particles are only a minor component of the organic matter in the New Albany Shale, but they are found in virtually all samples of the black shales. Few vitrinite particles were recovered from the gray-green shales in the New Albany.

Reflectance analysis of the Christian County, Kentucky (01KY) cores has been completed. The data are presented in tables II G 1 and II G 2, and graphically shown on Figure II G I. No significant variation in reflectance with depth was observed in either core. Average reflectance values (Ro) range from 0.33 percent (01KY3C1) to 0.92 percent (1KY4C1), with the majority falling between 0.35 and 0.60 percent Ro. Three samples (1KY4C1, 1KY12C1, and 1KY13C1) have such large standard deviations that they should not be

considered in evaluating the overall formation. The reason for the wide variation in reflectance values for these samples is not yet known. Samples with fewer than 25 readings should be considered only approximate indicators of the reflectance at that level. Fifty readings is usually considered an adequate sampling.

The average reflectance values for the Kentucky core are near 0.5 percent, while those of the Illinois core are near 0.4 percent. This difference may not be significant. The absence of a vertical reflectance gradient implies that the geothermal gradient in these two areas was fairly low. The reflectance values observed in these cores correspond to a level of organic metamorphism of 2 to 8 (LOM scale of Hood et al., 1975*). Studies by petroleum geologists have related this range to the stage of early methane generation, resulting from biologic and other low-temperature processes. The main phase of gas generation occurs at LOM values of 12 to 14, corresponding to vitrinite reflectances of 1.4 to 2.1 percent Ro (see Fig. II G 3).

Clay Mineral Orientation

Clay orientation analyses for the OlKY is presented in Table II G 3 and in Figure II G 4. The linear trend of orientation vs. depth observed in the upper portion of the core does not continue to the base of the formation. The break in this trend at 2300 feet approximately coincides with the base of the Morgan Trail Member. The underlying Blocher Member is a finely laminated black, pyritic shale most similar to the shales at the top of the core.

An orientation index of 1.0 corresponds to a completely random fabric. Higher values correspond to increasingly more perfect alignment of the clay flakes in the shale. The high values measured are associated with the finely laminated fissile black shales; low values are associated with poorly to nonlaminated gray and dark-gray shales.

Table 11 G 4 exhibits that data of clay mineral analyses by using X-ray mineralogy technique.

Thin-Section Petrography

Oriented horizontal thin sections were prepared to the directional

properties and Paleocurrent indicators. Few elongated particles were found suitable for measurement, within the standard 1" x 2" petrographic slide. Several random particles were found which may indicate: (1) the absence of bottom currents that would serve to orient the particles, (2) shifting bottom currents that oriented the particles in several directions, or (3) the reorientation of particles by compaction or other nondepositional processes.

Microfossils

The thin section made at the depth of 2231 feet, reveal the presence of calcareous microfossils. These microfossils as identified are calcispheres of the genus Radiina Reitlinger. The carbonate that makes up the calcispheres is pleoehroic and stands out distinctly in the thin section. Very little is known about the paleoecology of calcispheres, and their relationship to the depositional environment of the shale is at present unknown.

Mechanical Properties

This includes the point load fracture strength.

Point Load Testing

Values of the point load index have shown a sizeable range: black shales, 1.32 to 4.89 MPa; limestones, 3.20 to 10.80 MPa. In addition, there seemed to be considerable deviation from the original axial loading of the sample during failure. However, the orientations of the fractures have shown the following apparent preferred orientations:

Lithology	Location	Orientation
Black Shale	Upper New Albany	$140^{o}/320^{o} \pm 25^{o}$
Black Shale	Lower New Albany	$95^{o}/275^{o} \pm 15^{o}$
Limestone	Below New Albany	$170^{o}/350^{o} \pm 40^{o}$

Adsorption/Desorption Studies of Gases Through Shales

With nitrogen and carbon dioxide, determine internal surface area on 900 shale core samples; on 100 of these, use methane as the absorbate. Determine methane adsorption isotherms for the 100 shales at pressures within the range of 1 to 80 atmospheres. Comparison of these properties in gas-producing and non-gas-producing shales will be made to determine the relationship of shale physical properties to gas recovery.

Christian County, Kentucky, Core

Isotopic analyses were performed on methane from four of the gas samples from the Christian County, Kentucky core (01KY), and the results are given in Table 3. These values are typical of gas of low to moderate maturity, formed by thermal degradation of organic matter. Sample 2, however, is isotopically much heavier (i.e., a higher C^{13}/C^{12} ratio and a more positive C^{13} value) than the others, and the C13 value obtained is typical of relatively mature gas, such as that produced in the Gulf Coast regiona and the south-central U.S. This value appears to be anomalous when compared to the others from the same core.

Table 3. Carbon-isotopic composition of methane from core 01KY. Compositions are expressed relative to the PDB standard. The precession is $\pm$ .5 $^{o}/oo$.

Sample	C^{13} $^{o}/oo$
2C1	-41.7
4C1	-48.5
7C1	-49.1
11C1	-49.4

Stahl (1974) has developed a model based on laboratory studies and analyses of gas samples from several areas of the world that relates the isotopic composition of methane to the hydrocarbon composition of the gas. According to the model, the first methane that is formed in a sedimentary environment is the result of bacterial degradation of organic matter. The

only hydrocarbon component formed is methane, and the methane is isotopically very light (C^{13} = -65 to -90 $^{o}/oo$). With deeper burial and increasing temperature, bacterial degradation of organic matter is replaced by thermal degradation. The first gas formed by this process is also primarily methane, but as the process continues and the temperature increases (i.e., increasing maturity), the proportion ofheavier hydrocarbons (i.e., C_2H^6, C^3H^8, C^4H^{10}, etc.) formed increases. This continues until a point is reached where even the heavier hydrocarbon gases begin to break down to methane, and the methane content of the gas again increases. Throughout the process the methane continually becomes isotopically heavier. This model is illustrated by the stippled region on Figure 1.

The four points shown on Figure 1 represent the samples from core OlKY. The four samples have compositions very close to those predicted by the model and suggest that the gas from sample 2 is more mature tha that from the other samples.

To determine if this trend is apparent throughout the core, and not just in these four samples, we plotted Figure 2, which shows the hydrocarbon composition of 12 samples from the core, as a function of depth. This plot shows that there is a general trend of increasing methane content with depth. This implies that maturity increases from the bottom to the top of the core and is opposite to what one would normally expect. In fact, since we are dealing with only about 100 feet of core, one would expect little if any difference in maturity between the samples.

The vitrinite reflectance data, presented elsewhere in this report, are an indication of the maturity of the solid organic material in the sediments. These data suggest that the organic material is relatively immature and that the maturity is fairly constant throughout the section of the core studied. The data support the previous implication that the isotopic and chemical data suggest an anomalous situation.

One possible explanation that is presently being investigated is that in the area where this core was taken, gas has migrated out of the shale into the overlying strata. When gases flow through porous materials via diffusional processes, the different components may migrate at different rates. In most cases, the lighter components migrate more rapidly. If gas has been migrating out of the shale very slowly over a long period of time, one would expect the gas remaining to be enriched in the heavier

components (i.e., $C^{13}H_4$ relative to $C^{12}H_4$, C_2H_6 relative to CH_4, etc.). Also if the migration were upward, the upper portion of the shale would be more affected than the lower portion.

THis hypothesis appears to fit the data that have thus far been considered; however, a more thorough analysis of all available data is necessary before a conclusion can be drawn.

APPENDIX D

Chemical and Physical Analysis

By

Mound Laboratories

MOUND LABS

List of Tables

Tables		Page
49	Gross Lithological Description and Density	80
3	Shale Samples from the O-1 Well Located in Christian County, Kentucky	81
46	Visual Kerogen Assessment and Organic Richness	82
51	Kerogen Composition	83
22	Mean Random Vitrinite Reflectance	84
24	Sharpness Ratio Data, Illinois and Kentucky Core Samples	85
D-1	Fuel Oil Yield Based on Organic Content	86
89	Material Balance Assay Gaseous Yield for Christian County, Kentucky, Samples	87
4	Material Balance and Assay Results of Sample O-1-5	88
21	Material Balance Assay of Sample O-1-3	89
D-2	Detailed analyses of C_4 - C_7	90
D-3	Summary of C_{15}+ Soxhlet Extraction, Deasphaltening and Liquid Chromatography	91
33	Estimated Indigeneous Gas Content	92
44	Saturated Hydrocarbon Analyses and Normalized Paraffing Distribution	93
D-4	First Cycle Palynomorphs	94

TABLE 49

Gross Lithological Description and Density

Mound Sample Number	Well Interval	Gross Lithological Description	GSA Color Code	Density g/cm³
0-1-1	2183.71-2184.08	100% Shale, Noncalcareous, Nonsilty, Moderately Fissile, Very Hard, Black, Very Slight Milky Cut.	N1	2.28
0-1-3	2261.02-2261.50	100% Shale, Noncalcareous, Nonsilty, Fissile Very Hard, Trace Pyrite Nodules, Grayish Black, Speckled Orange Fluorescence, Very Slight Milky Cut.	N2	2.29
0-1-4	2292.47-2292.91	100% Shale, Very Slightly Calcareous, Very Slightly Silty, Slightly Pyritic, Very Hard, Black	N1	2.41
0-1-5	2317.21-2317.64	100% Shale, Very Slightly Calcareous, Very Slightly Silty, Very Hard, Black.	N1	2.39

TABLE 3

Shale Samples from the O-1 Well
Located in Christian County, Kentucky

Mound Sample No.	MERC Sample No.	Depth, Ft.
O-1-1	O-1-2184	2183.71/2184.08
O-1-3	O-1-2261	2261.02/.50
O-1-4	O-1-2292	2292.47/.91
O-1-5	O-1-2317	2317.21/.64

TABLE 46

Visual Kerogen Assessment and Organic Richness

Mound Sample Number	Organic Matter Type	Thermal Alteration Index	Organic Carbon (% of Rock)
0-1-1	H;Am;W	2- to 2	12.06
0-1-3	H;Am;W-C	1+ to 2-	8.64
0-1-4	Am-H;-;-	2- to 2	6.85; 6.84 R
0-1-5	Am-H;-;-	2- to 2	7.47

Al = Algal

Am = Amorphous-Sapropel

H = Herbaceous-Spore/Cuticle

W = Woody

C = Coaly

TABLE 51

Kerogen Composition

Mound Sample Number	Weight Percent (Ash Free) Carbon	Hydrogen	Nitrogen	Oxygen	Weight Percent Ash	ATOMIC H/C	ATOMIC H/C
0-1-1	77.7	7.4	3.3	11.6	10.7	1.13	0.11
0-1-3	79.5	8.6	3.0	8.9	17.6	1.29	0.08
0-1-4	70.5	7.0	2.5	20.0	21.1	1.18	0.21
0-1-5	79.3	7.1	1.9	11.7	22.1	1.07	0.11

Calculated* Gross Heating Values
Based Upon the Composition of the Kerogen

Well	Gross Heating Value 1 (cal./g)	Gross Heating Value 2** (cal./g)
0-1	8232.08	8335.08

*Gross Heating Value (cal./g) = 8,400(C) + 27,765(H) + 1,500(N) + 2,500(S) - 2,650(O)

**Determined by assuming 2% Sulfur and modifying the oxygen value {New Oxygen Value - (Determined Value - 2%)}.

UGR File #254
SAI
July 1979

TABLE 22 - MEAN-RANDOM VITRINITE REFLECTANCE,

API NUMBER	SAMPLE NUMBER	N	R	STD DEV	PERCENT VITRINITE IN EACH REFLECTANCE CLASS																VITRAIN BAND
					<.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.0	>1
1604731175	01KY01L1	35	.46	.05	0	0	3	9	17	49	23	0	0	0	0	0	0	0	0	0	0
1604731175	01KY01C1	59	.39	.08	0	12	20	27	17	10	10	2	0	2	0	0	0	0	0	0	0
1604731175	01KY01C1	33	.52	.07	0	0	0	0	9	39	21	21	0	6	3	0	0	0	0	0	0
1604731175	01KY02L1	50	.48	.09	0	0	0	18	24	16	20	12	6	4	2	0	0	0	0	0	0
1604731175	01KY02C1	27	.36	.10	4	26	26	15	7	11	4	0	4	0	0	0	0	0	0	0	0
1604731175	01KY02C1	31	.56	.09	0	0	0	0	13	13	23	13	19	10	10	0	0	0	0	0	0
1604731175	01KY03L1	36	.46	.09	0	0	11	14	17	14	22	19	0	3	0	0	0	0	0	0	0
1604731175	01KY03C1	32	.33	.11	31	16	22	9	6	9	0	0	6	0	0	0	0	0	0	0	0
1604731175	01KY03C1	46	.53	.08	0	0	0	2	30	35	13	2	9	4	0	0	0	0	0	0	0
1604731175	01KY04C1	49	.82	.30	0	0	0	4	2	10	12	6	4	4	2	2	2	2	12	4	32
1604731175	01KY04L1	50	.53	.11	0	0	0	8	20	16	14	6	16	14	0	2	2	0	0	0	0
1604731175	01KY05C1	33	.41	.08	0	0	22	22	22	22	9	3	0	0	0	0	0	0	0	0	0
1604731175	1KY05L1	48	.58	.11	0	0	2	6	2	10	15	19	19	15	6	4	2	0	0	0	0
1604731175	01KY07C1	62	.39	.06	0	0	16	31	31	14	3	0	2	0	0	0	0	0	0	0	0
1604731175	01KY07L1	12	.37	.05	0	0	33	25	42	0	0	0	0	0	0	0	0	0	0	0	0
1604731175	01KY08C1	44	.52	.07	0	0	0	2	10	20	27	27	4	2	2	0	0	0	0	0	0
1604731175	01KY08L1	23	.44	.04	0	0	4	13	30	43	4	0	0	0	0	0	0	0	0	0	0
1604731175	01KY09C1	43	.55	.10	0	0	2	2	16	5	16	26	21	5	2	5	0	0	0	0	0
1604731175	01KY10L1	16	.48	.07	0	0	0	12	25	19	25	12	6	0	0	0	0	0	0	0	0
1604731175	01KY10C1	32	.52	.11	0	0	9	3	12	19	9	16	12	19	0	0	0	0	0	0	0
1604731175	01KY11L1	24	.51	.08	0	0	4	0	12	29	12	29	0	4	0	0	0	0	0	0	0
1604731175	01KY11C1	16	.44	.10	0	0	12	31	25	6	6	12	6	0	0	0	0	0	0	0	0
1604731175	01KY12C1	23	.79	.36	0	0	9	9	9	0	9	0	9	0	4	0	4	0	4	4	36
1604731175	01KY12L1	27	.60	.14	0	0	0	0	15	7	11	15	10	15	7	0	4	4	4	0	0
1604731175	01KY13L1	21	.53	.12	0	0	0	14	19	19	9	5	9	9	9	5	0	0	0	0	0
1604731175	01KY13C1	17	.51	.28	12	12	12	18	0	6	12	6	0	0	0	0	6	0	12	0	6

TABLE 24 - SHARPNESS RATIO DATA. ILLINOIS AND KENTUCKY CORE SAMPLES

API NUMBER	SAMPLE NUMBER	DEPTH (FT)	10.5A PEAK	10.0A PEAK	SHARPNESS RATIO
1604731175	01KY01L1	2181	16.	9.	1.78
1604731175	01KY01C1	2182	84.	30.	2.80
1604731175	01KY02L1	2189	14.	4.	3.50
1604731175	01KY02C1	2191	60.	18.	3.33
1604731175	01KY03L1	2217	30.	11.	2.73
1604731175	01KY04L1	2231	22.	10.	2.20
1604731175	01KY05L1	2244	26.	12.	2.17
1604731175	01KY06L1	2256	70.	31.	2.26
1604731175	01KY07L1	2264	32.	9.	3.56
1604731175	01KY08C1	2270	20.	12.	1.67
1604731175	01KY09C1	2280	18.	7.	2.57
1604731175	01KY10C1	2291	26.	14.	1.86
1604731175	01KY11C1	2300	24.	13.	1.85
1604731175	01KY12C1	2310	14.	7.	2.00
1604731175	01KY13C1	2319	17.	7.	2.43

Table D-1

Fuel Oil Yield

Actual Yield of Sample O-1-3	12.5 Gal/Ton
Yield Based on Organic Carbon Content*	Gal/Ton
Colorado	16.9
Wyoming (GRB)	19.4
Wyoming (WB)	17.1
Utah	19.7
Kentucky	8.9

*Based on formulae from U. S. Bureau of Mines RI7523 (1971)

TABLE 89

Material Balance Assay Gaseous Yield
for Christian County, Kentucky, Samples

Mound Sample No.	0-1-1	0-1-3	0-1-4	0-1-5
Hydrocarbons (cm^3/g)				
Methane	9.126		5.625	4.974
Ethane	4.449	1.156	3.387	2.894
Ethylene	1.697	0.746	0.987	0.889
Propane	0.325	0.138	0.153	0.147
Propylene	1.007	0.195	0.403	0.373
i-Butane	0.464	0.097	0.238	0.226
n-Butane	0.076	0.010	0.055	0.033
Butene-1	0.475	0.039	0.161	0.166
t-Butene-2	0.207		0.104	0.095
c-Butene-2	0.060		0.029	0.033
i-Pentane	0.041		0.019	0.021
n-Pentane	0.074		0.017	0.021
Pentene-1	0.191		0.067	0.057
C_5-C_7	0.060		0.025	0.019
		0.078		
Non-Hydrocarbons (cm^3/g)				
Hydrogen	4.264		1.518	2.459
Hydrogen Sulfide	9.092		1.942	3.717
Carbon Monoxide	0.265		0.071	0.064
Carbon Dioxide	1.836		1.311	0.683

TABLE 4

Material Balance

Sample:

0-1-5	Water	0.96%		
	Oil	2.47%	Total Volatiles	3.91%
(7.47%C)	Gas & Char Balance	0.48%		
	Residual Rock	96.09%		
	Total	100.00		

ASSAY RESULTS

Sample No. 0-1-5		
	Gals. Water/Ton Rock	2.30
	Gals. Oil/Ton Rock	6.23
	Total Volatiles - (H_2O) as Gals. Oil/Ton Rock	7.44

TABLE 21

Material Balance Assay of Sample O-1-3 -
Average Results Based Upon Sample Particle Size

Mesh Size	4-8	20-30	60-80
Percent Weight Loss	7.1	7.0	8.1
Percent Organic Carbon	8.64	8.64	8.64
Gas:			
Gas Concentration (cm^3/g)	17.0	14.6	12.5
Hydrocarbon Composition (cm^3/g):			
nC_1	1.156	0.748	0.712
nC_2	0.746	0.578	0.408
$C_2^=$	0.138	0.179	0.104
nC_3	0.195	0.132	0.094
$C_3^=$	0.097	--	0.071
iC_4	0.010	0.008	0.003
nC_4	0.039	0.034	0.016
C_5-C_7	0.078	0.072	0.034
Water:			
Water Concentration (ml/g)	0.012	0.012	0.014
pH	9.3	9.3	9.3
Oil:			
Oil Concentration			
Milliliters/Gram	0.052	0.050	0.050
Gallons/Ton	12.5	12.0	12.0

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
027.0	0.00	100	0.0	0.0	2.76	25	17.60	2.77
028.0	0.00	100	0.0	0.0	2.75	21	17.60	2.77
029.0	0.00	100	0.4	0.0	2.77	15	17.60	2.77
030.0	0.00	100	0.7	0.3	2.77	15	17.60	2.77
031.0	0.00	100	1.4	1.0	2.76	15	17.59	2.77
032.0	0.00	100	0.3	0.3	2.76	20	17.57	2.77
033.0	0.00	100	0.0	0.0	2.79	23	17.57	2.77
034.0	0.00	100	0.0	0.0	2.78	21	17.57	2.77
035.0	0.00	100	0.0	0.0	2.78	23	17.57	2.77
036.0	0.00	100	0.5	0.5	2.75	22	17.57	2.77
037.0	0.00	100	4.0	2.2	2.73	16	17.56	2.77
038.0	0.00	100	6.4	2.4	2.73	12	17.51	2.77
039.0	0.00	100	5.9	1.4	2.73	11	17.45	2.77
040.0	0.00	100	4.8	0.8	2.73	12	17.39	2.77
041.0	0.00	100	3.7	0.0	2.70	14	17.35	2.77
042.0	0.00	100	1.3	0.0	2.70	12	17.31	2.77
043.0	0.00	100	0.1	0.1	2.71	12	17.30	2.77
044.0	0.00	100	0.0	0.0	2.71	15	17.30	2.77
045.0	0.00	100	0.0	0.0	2.73	15	17.30	2.77
046.0	0.00	100	0.0	0.0	2.73	17	17.30	2.77
047.0	0.00	100	0.0	0.0	2.73	20	17.30	2.77
048.0	0.00	100	1.8	0.0	2.71	18	17.30	2.77
049.0	0.00	100	2.1	0.6	2.71	17	17.28	2.77
050.0	0.00	100	0.3	0.0	2.74	17	17.26	2.77
051.0	0.00	100	0.0	0.0	2.77	17	17.26	2.77
052.0	0.00	100	0.0	0.0	2.80	18	17.26	2.77
053.0	0.00	100	0.7	0.0	2.75	13	17.26	2.77
054.0	0.00	100	0.4	0.0	2.71	19	17.25	2.77
055.0	0.00	100	0.0	0.0	2.72	16	17.25	2.77
056.0	0.00	100	0.4	0.0	2.71	14	17.25	2.77
057.0	0.00	100	0.0	0.0	2.72	13	17.25	2.77
058.0	0.00	100	0.2	0.0	2.71	13	17.25	2.77
059.0	0.00	100	0.6	0.0	2.70	12	17.25	2.77
060.0	0.00	100	0.0	0.0	2.71	16	17.24	2.77
061.0	0.00	100	0.0	0.0	2.74	19	17.24	2.77
062.0	0.00	100	0.0	0.0	2.72	17	17.24	2.77
063.0	0.00	100	0.0	0.0	2.71	16	17.24	2.77
064.0	0.00	100	0.0	0.0	2.71	18	17.24	2.77
065.0	0.00	100	0.0	0.0	2.71	23	17.24	2.77
066.0	0.00	100	1.1	0.0	2.70	18	17.24	2.77
067.0	0.00	100	0.2	0.0	2.71	17	17.23	2.77
068.0	0.00	100	0.0	0.0	2.71	16	17.23	2.77
069.0	0.00	100	0.5	0.0	2.70	11	17.23	2.77
070.0	0.00	100	0.8	0.0	2.70	10	17.22	2.77
071.0	0.00	100	0.4	0.0	2.71	12	17.21	2.77
072.0	0.00	100	0.2	0.0	2.71	14	17.21	2.77
073.0	0.00	100	0.0	0.0	2.72	16	17.21	2.77
074.0	0.00	100	0.0	0.0	2.72	18	17.21	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
075.0	0.00	100	0.8	0.0	2.70	10	17.21	2.77
076.0	0.00	100	0.0	0.0	2.71	16	17.20	2.77
077.0	0.00	100	0.0	0.0	2.75	20	17.20	2.77
078.0	0.00	100	0.0	0.0	2.74	21	17.20	2.77
079.0	0.00	100	0.0	0.0	2.71	21	17.20	2.77
080.0	0.00	100	0.2	0.2	2.73	22	17.20	2.77
081.0	0.00	100	0.0	0.0	2.78	22	17.20	2.77
082.0	0.00	100	0.0	0.0	2.77	21	17.20	2.77
083.0	0.00	100	0.0	0.0	2.74	17	17.20	2.77
084.0	0.00	100	0.0	0.0	2.73	16	17.20	2.77
085.0	0.00	100	0.0	0.0	2.72	15	17.20	2.77
086.0	0.00	100	0.0	0.0	2.75	13	17.20	2.77
087.0	0.00	100	0.0	0.0	2.75	13	17.20	2.77
088.0	0.00	100	0.0	0.0	2.75	13	17.20	2.77
089.0	0.00	100	0.0	0.0	2.74	13	17.20	2.77
090.0	0.00	100	0.0	0.0	2.75	13	17.20	2.77
091.0	0.00	100	0.0	0.0	2.74	14	17.20	2.77
092.0	0.00	100	0.0	0.0	2.75	14	17.20	2.77
093.0	0.00	100	0.0	0.0	2.74	12	17.20	2.77
094.0	0.00	100	0.0	0.0	2.73	12	17.20	2.77
095.0	0.00	100	0.0	0.0	2.74	12	17.20	2.77
096.0	0.00	100	0.0	0.0	2.75	13	17.20	2.77
097.0	0.00	100	0.0	0.0	2.76	13	17.20	2.77
098.0	0.00	100	0.0	0.0	2.76	16	17.20	2.77
099.0	0.00	100	0.0	0.0	2.75	21	17.20	2.77
100.0	0.00	100	0.0	0.0	2.73	21	17.20	2.77
101.0	0.00	100	0.0	0.0	2.72	16	17.20	2.77
102.0	0.00	100	0.0	0.0	2.74	14	17.20	2.77
103.0	0.00	100	0.0	0.0	2.75	15	17.20	2.77
104.0	0.00	100	0.0	0.0	2.74	14	17.20	2.77
105.0	0.00	100	0.0	0.0	2.75	14	17.20	2.77
106.0	0.00	100	0.0	0.0	2.79	16	17.20	2.77
107.0	0.00	100	0.0	0.0	2.79	17	17.20	2.77
108.0	0.00	100	0.0	0.0	2.76	18	17.20	2.77
109.0	0.00	100	0.0	0.0	2.77	21	17.20	2.77
110.0	0.00	100	1.8	0.8	2.73	13	17.20	2.77
111.0	0.00	100	3.9	1.2	2.71	10	17.17	2.77
112.0	0.00	100	3.5	1.2	2.72	10	17.13	2.77
113.0	0.00	100	2.7	0.8	2.73	11	17.10	2.77
114.0	0.00	100	2.0	0.7	2.72	11	17.08	2.77
115.0	0.00	100	0.4	0.4	2.72	15	17.06	2.77
116.0	0.00	100	0.0	0.0	2.75	18	17.06	2.77
117.0	0.00	100	0.0	0.0	2.78	21	17.06	2.77
118.0	0.00	100	0.3	0.3	2.76	24	17.06	2.77
119.0	0.00	100	2.4	0.9	2.78	22	17.05	2.77
120.0	0.00	100	5.2	2.6	2.73	23	17.02	2.77
121.0	0.00	100	7.3	3.5	2.72	19	16.96	2.77
122.0	0.00	100	6.7	1.8	2.74	14	16.89	2.77

DEPTH	KEROGEN-VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1123.0	0.00	100	4.8	1.1	2.74	16	16.82	2.77
1124.0	0.00	100	2.5	0.9	2.74	26	16.78	2.77
1125.0	0.00	100	1.3	0.8	2.75	35	16.76	2.77
1126.0	0.00	100	2.5	0.5	2.79	18	16.74	2.77
1127.0	0.00	100	3.1	1.6	2.79	14	16.72	2.77
1128.0	0.00	100	5.0	2.7	2.76	16	16.68	2.77
1129.0	0.00	100	5.8	3.0	2.78	16	16.63	2.77
1130.0	0.00	100	4.5	2.1	2.79	21	16.57	2.77
1131.0	0.00	100	1.6	1.2	2.79	29	16.53	2.77
1132.0	0.00	100	0.0	0.0	2.79	25	16.52	2.77
1133.0	0.00	100	0.0	0.0	2.75	13	16.52	2.77
1134.0	0.00	100	0.0	0.0	2.73	14	16.52	2.77
1135.0	0.00	100	0.0	0.0	2.77	15	16.52	2.77
1136.0	0.00	100	0.0	0.0	2.74	14	16.52	2.77
1137.0	0.00	100	0.0	0.0	2.73	15	16.52	2.77
1138.0	0.00	100	0.0	0.0	2.76	20	16.52	2.77
1139.0	0.00	100	0.0	0.0	2.75	23	16.52	2.77
1140.0	0.00	100	0.0	0.0	2.76	21	16.52	2.77
1141.0	0.00	100	0.0	0.0	2.75	20	16.52	2.77
1142.0	0.00	100	0.0	0.0	2.75	20	16.52	2.77
1143.0	0.00	100	0.3	0.0	2.75	18	16.52	2.77
1144.0	0.00	100	0.0	0.0	2.75	21	16.52	2.77
1145.0	0.00	100	0.0	0.0	2.75	21	16.52	2.77
1146.0	0.00	100	0.0	0.0	2.74	20	16.52	2.77
1147.0	0.00	100	0.0	0.0	2.71	14	16.52	2.77
1148.0	0.00	100	0.0	0.0	2.72	13	16.52	2.77
1149.0	0.00	100	0.0	0.0	2.74	13	16.52	2.77
1150.0	0.00	100	0.0	0.0	2.71	11	16.52	2.77
1151.0	0.00	100	1.0	0.0	2.71	6	16.52	2.77
1152.0	0.00	100	0.5	0.0	2.71	9	16.51	2.77
1153.0	0.00	100	0.0	0.0	2.73	12	16.51	2.77
1154.0	0.00	100	0.0	0.0	2.74	11	16.51	2.77
1155.0	0.00	100	0.0	0.0	2.71	9	16.51	2.77
1156.0	0.00	100	0.5	0.0	2.71	10	16.50	2.77
1157.0	0.00	100	0.0	0.0	2.72	12	16.50	2.77
1158.0	0.00	100	0.0	0.0	2.72	13	16.50	2.77
1159.0	0.00	100	0.6	0.6	2.72	18	16.50	2.77
1160.0	0.00	100	2.4	0.6	2.73	17	16.49	2.77
1161.0	0.00	100	3.3	1.7	2.71	18	16.46	2.77
1162.0	0.00	100	3.4	1.6	2.72	15	16.43	2.77
1163.0	0.00	100	2.6	1.3	2.73	15	16.40	2.77
1164.0	0.00	100	1.5	1.0	2.72	17	16.37	2.77
1165.0	0.00	100	0.9	0.8	2.73	16	16.36	2.77
1166.0	0.00	100	2.0	0.8	2.72	12	16.35	2.77
1167.0	0.00	100	1.5	0.0	2.71	14	16.33	2.77
1168.0	0.00	100	0.0	0.0	2.74	18	16.32	2.77
1169.0	0.00	100	0.0	0.0	2.75	14	16.32	2.77
1170.0	0.00	100	0.0	0.0	2.72	11	16.32	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1171.0	0.00	100	0.0	0.0	2.74	11	16.32	2.77
1172.0	0.00	100	0.3	0.0	2.76	10	16.32	2.77
1173.0	0.00	100	1.0	0.3	2.75	11	16.31	2.77
1174.0	0.00	100	2.0	1.4	2.73	12	16.30	2.77
1175.0	0.00	100	2.0	1.6	2.76	21	16.28	2.77
1176.0	0.00	100	4.0	1.6	2.82	15	16.26	2.77
1177.0	0.00	100	5.0	0.9	2.87	9	16.21	2.77
1178.0	0.00	100	5.9	1.2	2.87	9	16.16	2.77
1179.0	0.00	100	4.5	1.5	2.83	11	16.10	2.77
1180.0	0.00	100	1.4	1.0	2.78	14	16.07	2.77
1181.0	0.00	100	0.0	0.0	2.75	18	16.06	2.77
1182.0	0.00	100	0.1	0.1	2.72	15	16.06	2.77
1183.0	0.00	100	1.4	1.0	2.72	11	16.06	2.77
1184.0	0.00	100	1.9	1.6	2.75	14	16.04	2.77
1185.0	0.00	100	2.5	2.0	2.77	16	16.02	2.77
1186.0	0.00	100	3.2	2.2	2.76	14	15.99	2.77
1187.0	0.00	100	3.6	2.5	2.77	18	15.96	2.77
1188.0	0.00	100	3.3	1.5	2.82	18	15.92	2.77
1189.0	0.00	100	2.2	1.9	2.82	22	15.89	2.77
1190.0	0.00	100	3.0	2.5	2.81	20	15.87	2.77
1191.0	0.00	100	3.9	2.8	2.81	22	15.84	2.77
1192.0	0.00	100	2.7	1.9	2.80	25	15.80	2.77
1193.0	0.00	100	1.6	1.2	2.76	22	15.78	2.77
1194.0	0.00	100	2.3	1.4	2.74	16	15.76	2.77
1195.0	0.00	100	1.9	0.7	2.73	16	15.74	2.77
1196.0	0.00	100	0.8	0.7	2.72	20	15.72	2.77
1197.0	0.00	100	0.0	0.0	2.75	20	15.71	2.77
1198.0	0.00	100	0.3	0.0	2.74	11	15.71	2.77
1199.0	0.00	100	0.0	0.0	2.74	6	15.71	2.77
1200.0	0.00	100	0.0	0.0	2.75	6	15.71	2.77
1201.0	0.00	100	0.0	0.0	2.73	9	15.71	2.77
1202.0	0.00	100	0.0	0.0	2.72	17	15.71	2.77
1203.0	0.00	100	0.0	0.0	2.72	18	15.71	2.77
1204.0	0.00	100	0.6	0.0	2.71	31	15.71	2.77
1205.0	0.00	100	1.9	0.0	2.72	30	15.70	2.77
1206.0	0.00	100	1.1	0.2	2.73	36	15.68	2.77
1207.0	0.00	100	0.8	0.0	2.71	54	15.67	2.77
1208.0	0.00	100	1.7	0.0	2.77	63	15.66	2.77
1209.0	0.00	100	2.2	0.0	2.80	59	15.65	2.77
1210.0	0.00	100	2.2	0.0	2.78	55	15.62	2.77
1211.0	0.00	100	1.9	0.0	2.76	38	15.60	2.77
1212.0	0.00	100	0.2	0.0	2.71	34	15.59	2.77
1213.0	0.00	100	0.1	0.0	2.71	33	15.58	2.77
1214.0	0.00	100	0.4	0.0	2.72	21	15.58	2.77
1215.0	0.00	100	0.0	0.0	2.75	15	15.58	2.77
1216.0	0.00	100	0.0	0.0	2.76	14	15.58	2.77
1217.0	0.00	100	0.0	0.0	2.78	20	15.58	2.77
1218.0	0.00	100	0.0	0.0	2.75	19	15.58	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1219.0	0.00	100	0.0	0.0	2.74	17	15.58	2.77
1220.0	0.00	100	0.0	0.0	2.71	15	15.58	2.77
1221.0	0.00	100	0.0	0.0	2.71	14	15.58	2.77
1222.0	0.00	100	0.0	0.0	2.74	16	15.58	2.77
1223.0	0.00	100	0.0	0.0	2.74	18	15.58	2.77
1224.0	0.00	100	0.0	0.0	2.72	19	15.58	2.77
1225.0	0.00	100	0.0	0.0	2.73	18	15.58	2.77
1226.0	0.00	100	0.2	0.2	2.72	10	15.58	2.77
1227.0	0.00	100	0.0	0.0	2.71	11	15.58	2.77
1228.0	0.00	100	0.1	0.0	2.71	13	15.58	2.77
1229.0	0.00	100	0.7	0.0	2.71	10	15.58	2.77
1230.0	0.00	100	1.0	0.0	2.72	6	15.57	2.77
1231.0	0.00	100	0.9	0.0	2.75	6	15.56	2.77
1232.0	0.00	100	0.3	0.0	2.73	11	15.55	2.77
1233.0	0.00	100	0.5	0.0	2.71	12	15.55	2.77
1234.0	0.00	100	0.4	0.4	2.71	11	15.55	2.77
1235.0	0.00	100	0.3	0.0	2.71	15	15.54	2.77
1236.0	0.00	100	0.0	0.0	2.72	22	15.54	2.77
1237.0	0.00	100	0.0	0.0	2.74	27	15.54	2.77
1238.0	0.00	100	0.1	0.0	2.72	27	15.54	2.77
1239.0	0.00	100	0.8	0.0	2.75	20	15.54	2.77
1240.0	0.00	100	1.6	0.0	2.79	13	15.53	2.77
1241.0	0.00	100	2.8	0.0	2.80	11	15.51	2.77
1242.0	0.00	100	3.8	0.0	2.80	9	15.48	2.77
1243.0	0.00	100	4.0	1.0	2.79	10	15.44	2.77
1244.0	0.00	100	4.1	0.6	2.79	15	15.40	2.77
1245.0	0.00	100	4.1	0.8	2.78	19	15.36	2.77
1246.0	0.00	100	1.8	0.5	2.75	22	15.32	2.77
1247.0	0.00	100	0.0	0.0	2.74	23	15.31	2.77
1248.0	0.00	100	0.0	0.0	2.73	17	15.31	2.77
1249.0	0.00	100	0.0	0.0	2.74	15	15.31	2.77
1250.0	0.00	100	0.0	0.0	2.73	15	15.31	2.77
1251.0	0.00	100	0.0	0.0	2.73	16	15.31	2.77
1252.0	0.00	100	0.0	0.0	2.73	16	15.31	2.77
1253.0	0.00	100	0.0	0.0	2.74	20	15.31	2.77
1254.0	0.00	100	0.0	0.0	2.74	25	15.31	2.77
1255.0	0.00	100	0.3	0.0	2.74	17	15.31	2.77
1256.0	0.00	100	0.3	0.0	2.75	15	15.31	2.77
1257.0	0.00	100	0.0	0.0	2.74	18	15.31	2.77
1258.0	0.00	100	0.0	0.0	2.73	25	15.31	2.77
1259.0	0.00	100	0.0	0.0	2.74	25	15.31	2.77
1260.0	0.00	100	0.0	0.0	2.75	22	15.31	2.77
1261.0	0.00	100	0.0	0.0	2.75	22	15.31	2.77
1262.0	0.00	100	0.9	0.7	2.74	21	15.31	2.77
1263.0	0.00	100	1.5	0.0	2.77	15	15.30	2.77
1264.0	0.00	100	1.8	0.0	2.78	11	15.28	2.77
1265.0	0.00	100	2.6	0.5	2.76	11	15.26	2.77
1266.0	0.00	100	4.2	0.0	2.77	6	15.23	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY, TOTAL	POROSITY, SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1267.0	0.00	100	4.7	0.4	2.78	8	15.19	2.77
1268.0	0.00	100	3.9	1.1	2.78	16	15.14	2.77
1269.0	0.00	100	2.5	1.0	2.80	27	15.11	2.77
1270.0	0.00	100	2.4	0.4	2.82	26	15.08	2.77
1271.0	0.00	100	2.8	0.5	2.83	24	15.06	2.77
1272.0	0.00	100	3.1	0.5	2.83	23	15.03	2.77
1273.0	0.00	100	3.8	1.6	2.80	19	15.00	2.77
1274.0	0.00	100	4.1	1.6	2.80	20	14.96	2.77
1275.0	0.00	100	4.0	1.2	2.81	17	14.92	2.77
1276.0	0.00	100	3.3	0.0	2.83	12	14.88	2.77
1277.0	0.00	100	2.8	0.0	2.83	12	14.85	2.77
1278.0	0.00	100	2.6	0.5	2.80	16	14.82	2.77
1279.0	0.00	100	2.6	0.2	2.80	16	14.79	2.77
1280.0	0.00	100	2.2	0.3	2.81	18	14.77	2.77
1281.0	0.00	100	1.9	0.1	2.82	17	14.75	2.77
1282.0	0.00	100	1.9	1.4	2.78	22	14.73	2.77
1283.0	0.00	100	2.7	1.6	2.77	22	14.71	2.77
1284.0	0.00	100	3.4	1.7	2.80	20	14.68	2.77
1285.0	0.00	100	3.3	2.0	2.81	22	14.65	2.77
1286.0	0.00	100	4.1	2.8	2.79	22	14.61	2.77
1287.0	0.00	100	3.8	2.7	2.79	18	14.57	2.77
1288.0	0.00	100	3.0	2.3	2.78	18	14.53	2.77
1289.0	0.00	100	0.9	0.8	2.74	37	14.51	2.77
1290.0	0.00	100	0.0	0.0	2.73	41	14.50	2.77
1291.0	0.00	100	0.6	0.4	2.75	19	14.50	2.77
1292.0	0.00	100	0.0	0.0	2.77	14	14.49	2.77
1293.0	0.00	100	0.0	0.0	2.77	18	14.49	2.77
1294.0	0.00	100	0.0	0.0	2.76	16	14.49	2.77
1295.0	0.00	100	0.0	0.0	2.78	18	14.49	2.77
1296.0	0.00	100	0.0	0.0	2.77	19	14.49	2.77
1297.0	0.00	100	0.0	0.0	2.77	23	14.49	2.77
1298.0	0.00	100	0.0	0.0	2.76	22	14.49	2.77
1299.0	0.00	100	0.0	0.0	2.76	20	14.49	2.77
1300.0	0.00	100	0.0	0.0	2.77	25	14.49	2.77
1301.0	0.00	100	0.0	0.0	2.77	26	14.49	2.77
1302.0	0.00	100	0.0	0.0	2.77	27	14.49	2.77
1303.0	0.00	100	0.0	0.0	2.76	21	14.49	2.77
1304.0	0.00	100	0.0	0.0	2.74	19	14.49	2.77
1305.0	0.00	100	0.0	0.0	2.74	21	14.49	2.77
1306.0	0.00	100	0.0	0.0	2.75	26	14.49	2.77
1307.0	0.00	100	0.1	0.1	2.73	31	14.49	2.77
1308.0	0.00	100	0.4	0.0	2.75	32	14.49	2.77
1309.0	0.00	100	0.4	0.0	2.74	33	14.49	2.77
1310.0	0.00	100	0.8	0.0	2.74	29	14.48	2.77
1311.0	0.00	100	0.8	0.0	2.74	29	14.48	2.77
1312.0	0.00	100	1.0	0.0	2.72	28	14.47	2.77
1313.0	0.00	100	0.8	0.0	2.73	30	14.46	2.77
1314.0	0.00	100	0.8	0.0	2.73	27	14.45	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1315.0	0.00	100	0.3	0.0	2.73	27	14.44	2.77
1316.0	0.00	100	0.0	0.0	2.71	30	14.44	2.77
1317.0	0.00	100	0.3	0.0	2.71	25	14.44	2.77
1318.0	0.00	100	0.0	0.0	2.72	27	14.44	2.77
1319.0	0.00	100	0.0	0.0	2.75	37	14.44	2.77
1320.0	0.00	100	0.1	0.0	2.74	35	14.44	2.77
1321.0	0.00	100	0.0	0.0	2.73	25	14.43	2.77
1322.0	0.00	100	0.0	0.0	2.78	27	14.43	2.77
1323.0	0.00	100	0.1	0.0	2.79	24	14.43	2.77
1324.0	0.00	100	0.3	0.0	2.79	25	14.43	2.77
1325.0	0.00	100	0.4	0.0	2.79	24	14.43	2.77
1326.0	0.00	100	0.1	0.0	2.77	26	14.42	2.77
1327.0	0.00	100	0.0	0.0	2.77	28	14.42	2.77
1328.0	0.00	100	0.0	0.0	2.82	28	14.42	2.77
1329.0	0.00	100	0.0	0.0	2.85	29	14.42	2.77
1330.0	0.00	100	0.0	0.0	2.81	30	14.42	2.77
1331.0	0.00	100	0.0	0.0	2.82	26	14.42	2.77
1332.0	0.00	100	0.0	0.0	2.80	24	14.42	2.77
1333.0	0.00	100	0.0	0.0	2.75	28	14.42	2.77
1334.0	0.00	100	0.2	0.0	2.71	19	14.42	2.77
1335.0	0.00	100	0.0	0.0	2.71	12	14.42	2.77
1336.0	0.00	100	0.0	0.0	2.74	14	14.42	2.77
1337.0	0.00	100	0.0	0.0	2.72	10	14.42	2.77
1338.0	0.00	100	0.0	0.0	2.72	13	14.42	2.77
1339.0	0.00	100	0.0	0.0	2.75	17	14.42	2.77
1340.0	0.00	100	0.0	0.0	2.76	13	14.42	2.77
1341.0	0.00	100	0.0	0.0	2.74	15	14.42	2.77
1342.0	0.00	100	0.0	0.0	2.74	18	14.42	2.77
1343.0	0.00	100	0.0	0.0	2.75	29	14.42	2.77
1344.0	0.00	100	0.0	0.0	2.73	27	14.42	2.77
1345.0	0.00	100	0.0	0.0	2.79	20	14.42	2.77
1346.0	0.00	100	0.0	0.0	2.80	20	14.42	2.77
1347.0	0.00	100	0.0	0.0	2.77	29	14.42	2.77
1348.0	0.00	100	0.0	0.0	2.76	23	14.42	2.77
1349.0	0.00	100	0.0	0.0	2.79	11	14.42	2.77
1350.0	0.00	100	0.0	0.0	2.78	9	14.42	2.77
1351.0	0.00	100	0.0	0.0	2.74	12	14.42	2.77
1352.0	0.00	100	0.3	0.0	2.71	13	14.42	2.77
1353.0	0.00	100	0.9	0.0	2.70	12	14.42	2.77
1354.0	0.00	100	0.0	0.0	2.71	14	14.41	2.77
1355.0	0.00	100	0.0	0.0	2.74	14	14.41	2.77
1356.0	0.00	100	0.0	0.0	2.74	18	14.41	2.77
1357.0	0.00	100	0.9	0.0	2.76	17	14.41	2.77
1358.0	0.00	100	0.5	0.0	2.75	15	14.40	2.77
1359.0	0.00	100	0.8	0.0	2.72	20	14.39	2.77
1360.0	0.00	100	2.1	0.0	2.73	19	14.38	2.77
1361.0	0.00	100	2.2	0.0	2.73	14	14.36	2.77
1362.0	0.00	100	1.6	0.0	2.77	11	14.34	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1363.0	0.00	100	1.8	0.0	2.77	12	14.32	2.77
1364.0	0.00	100	2.1	0.0	2.76	18	14.31	2.77
1365.0	0.00	100	2.1	0.0	2.76	24	14.28	2.77
1366.0	0.00	100	2.2	0.0	2.77	21	14.26	2.77
1367.0	0.00	100	1.2	0.0	2.78	16	14.24	2.77
1368.0	0.00	100	0.2	0.0	2.74	17	14.23	2.77
1369.0	0.00	100	0.1	0.0	2.71	18	14.23	2.77
1370.0	0.00	100	0.0	0.0	2.74	18	14.23	2.77
1371.0	0.00	100	0.0	0.0	2.76	18	14.23	2.77
1372.0	0.00	100	0.0	0.0	2.76	22	14.23	2.77
1373.0	0.00	100	0.0	0.0	2.74	17	14.23	2.77
1374.0	0.00	100	0.0	0.0	2.73	12	14.23	2.77
1375.0	0.00	100	0.1	0.1	2.73	10	14.23	2.77
1376.0	0.00	100	0.0	0.0	2.74	14	14.23	2.77
1377.0	0.00	100	0.0	0.0	2.74	22	14.23	2.77
1378.0	0.00	100	0.2	0.0	2.74	15	14.23	2.77
1379.0	0.00	100	0.2	0.0	2.73	12	14.23	2.77
1380.0	0.00	100	0.0	0.0	2.73	13	14.23	2.77
1381.0	0.00	100	0.0	0.0	2.72	14	14.23	2.77
1382.0	0.00	100	0.0	0.0	2.74	16	14.23	2.77
1383.0	0.00	100	0.0	0.0	2.78	19	14.23	2.77
1384.0	0.00	100	0.0	0.0	2.81	15	14.23	2.77
1385.0	0.00	100	0.0	0.0	2.74	14	14.23	2.77
1386.0	0.00	100	0.0	0.0	2.73	11	14.23	2.77
1387.0	0.00	100	0.0	0.0	2.74	11	14.23	2.77
1388.0	0.00	100	0.0	0.0	2.74	12	14.23	2.77
1389.0	0.00	100	0.0	0.0	2.74	17	14.23	2.77
1390.0	0.00	100	0.0	0.0	2.75	22	14.23	2.77
1391.0	0.00	100	0.0	0.0	2.78	28	14.23	2.77
1392.0	0.00	100	1.0	0.0	2.81	26	14.23	2.77
1393.0	0.00	100	1.4	0.0	2.79	28	14.21	2.77
1394.0	0.00	100	1.4	0.0	2.78	30	14.20	2.77
1395.0	0.00	100	1.2	0.0	2.80	23	14.19	2.77
1396.0	0.00	100	1.1	0.0	2.80	24	14.18	2.77
1397.0	0.00	100	1.2	0.0	2.82	24	14.16	2.77
1398.0	0.00	100	1.1	0.0	2.82	23	14.15	2.77
1399.0	0.00	100	1.5	0.0	2.79	21	14.14	2.77
1400.0	0.00	100	0.3	0.0	2.77	18	14.12	2.77
1401.0	0.00	100	0.0	0.0	2.75	17	14.12	2.77
1402.0	0.00	100	0.0	0.0	2.75	19	14.12	2.77
1403.0	0.00	100	0.0	0.0	2.74	21	14.12	2.77
1404.0	0.00	100	0.0	0.0	2.74	22	14.12	2.77
1405.0	0.00	100	0.0	0.0	2.75	22	14.12	2.77
1406.0	0.00	100	0.0	0.0	2.75	18	14.12	2.77
1407.0	0.00	100	0.0	0.0	2.75	12	14.12	2.77
1408.0	0.00	100	0.0	0.0	2.77	13	14.12	2.77
1409.0	0.00	100	0.0	0.0	2.76	16	14.12	2.77
1410.0	0.00	100	0.0	0.0	2.72	17	14.12	2.77

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SECE	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1411.0	0.00	100	0.0	0.0	2.73	20	14.12	2.77
1412.0	0.00	100	0.0	0.0	2.76	21	14.12	2.77
1413.0	0.00	100	0.0	0.0	2.75	23	14.12	2.77
1414.0	0.00	100	0.0	0.0	2.72	22	14.12	2.77
1415.0	0.00	100	0.0	0.0	2.73	20	14.12	2.77
1416.0	0.00	100	0.0	0.0	2.77	18	14.12	2.77
1417.0	0.00	100	0.0	0.0	2.79	19	14.12	2.77
1418.0	0.00	100	0.0	0.0	2.78	18	14.12	2.77
1419.0	0.00	100	0.0	0.0	2.79	16	14.12	2.77
1420.0	0.00	100	0.0	0.0	2.78	7	14.12	2.77
1421.0	0.00	100	0.0	0.0	2.76	4	14.12	2.77
1422.0	0.00	100	0.4	0.0	2.72	5	14.12	2.77
1423.0	0.00	100	0.2	0.0	2.73	7	14.12	2.77
1424.0	0.00	100	0.8	0.0	2.75	5	14.12	2.77
1425.0	0.00	100	2.3	0.0	2.75	0	14.10	2.77
1426.0	0.00	69	3.6	0.0	2.73	0	14.08	2.77
1427.0	0.00	87	3.7	0.0	2.74	0	14.04	2.76
1428.0	0.00	95	3.7	0.0	2.75	0	14.01	2.75
1429.0	0.00	75	3.7	0.0	2.75	0	13.97	2.75
1430.0	0.00	78	3.5	0.0	2.75	0	13.93	2.74
1431.0	0.00	77	3.7	0.0	2.76	0	13.90	2.73
1432.0	0.00	53	4.8	0.0	2.75	0	13.86	2.72
1433.0	0.00	56	4.3	0.3	2.75	1	13.81	2.69
1434.0	0.00	84	3.6	0.0	2.74	0	13.77	2.68
1435.0	0.00	99	3.2	0.0	2.74	0	13.73	2.67
1436.0	0.00	100	2.7	0.0	2.77	2	13.70	2.67
1437.0	0.00	100	2.9	0.0	2.75	3	13.68	2.67
1438.0	0.00	100	2.3	0.0	2.74	4	13.65	2.67
1439.0	0.00	100	1.5	0.0	2.74	6	13.63	2.67
1440.0	0.00	100	0.0	0.0	2.71	10	13.61	2.67
1441.0	0.00	100	1.0	0.0	2.70	5	13.61	2.67
1442.0	0.00	100	0.4	0.2	2.72	5	13.60	2.67
1443.0	0.00	100	0.3	0.0	2.72	6	13.60	2.67
1444.0	0.00	100	0.8	0.0	2.72	5	13.60	2.67
1445.0	0.00	100	1.0	0.0	2.71	7	13.59	2.67
1446.0	0.00	100	2.7	0.0	2.73	2	13.57	2.67
1447.0	0.00	90	3.7	0.0	2.73	1	13.54	2.67
1448.0	0.00	97	3.9	0.1	2.73	0	13.51	2.66
1449.0	0.00	100	3.5	0.0	2.74	0	13.47	2.66
1450.0	0.00	100	3.5	0.0	2.76	0	13.43	2.66
1451.0	0.00	75	4.4	0.0	2.75	0	13.40	2.66
1452.0	0.00	64	4.8	0.0	2.75	0	13.35	2.65
1453.0	0.00	74	4.5	0.0	2.77	0	13.30	2.63
1454.0	0.00	68	4.3	0.0	2.77	0	13.26	2.62
1455.0	0.00	71	4.2	0.0	2.76	0	13.22	2.60
1456.0	0.00	72	4.2	0.3	2.76	0	13.17	2.59
1457.0	0.00	96	3.5	0.0	2.76	0	13.13	2.58
1458.0	0.00	100	3.2	0.0	2.76	0	13.10	2.58

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1459.0	0.00	100	3.6	1.2	2.74	0	13.07	2.58
1460.0	0.00	100	2.8	0.3	2.73	0	13.03	2.58
1461.0	0.00	100	1.5	0.0	2.75	0	13.01	2.58
1462.0	0.00	100	1.8	0.0	2.74	0	12.99	2.58
1463.0	0.00	100	2.7	0.2	2.73	0	12.97	2.58
1464.0	0.00	100	2.8	0.7	2.72	0	12.95	2.58
1465.0	0.00	100	2.0	0.0	2.73	0	12.92	2.58
1466.0	0.00	100	1.7	0.0	2.74	0	12.90	2.58
1467.0	0.00	100	1.6	0.0	2.74	0	12.88	2.58
1468.0	0.00	100	2.2	0.0	2.73	0	12.87	2.58
1469.0	0.00	100	2.0	0.0	2.75	0	12.84	2.58
1470.0	0.00	100	1.8	0.0	2.75	0	12.82	2.58
1471.0	0.00	100	2.7	0.0	2.74	0	12.81	2.58
1472.0	0.00	100	3.7	0.0	2.74	0	12.78	2.58
1473.0	0.00	100	4.0	0.0	2.74	0	12.74	2.58
1474.0	0.00	100	3.7	0.1	2.74	0	12.70	2.58
1475.0	0.00	100	2.9	0.0	2.76	0	12.66	2.58
1476.0	0.00	100	2.7	0.0	2.77	0	12.63	2.58
1477.0	0.00	100	2.9	0.0	2.78	0	12.61	2.58
1478.0	0.00	100	3.5	0.0	2.76	0	12.58	2.58
1479.0	0.00	100	2.9	0.0	2.76	0	12.54	2.58
1480.0	0.00	100	2.3	0.0	2.76	0	12.51	2.58
1481.0	0.00	100	1.4	0.0	2.74	5	12.49	2.58
1482.0	0.00	100	0.7	0.5	2.71	9	12.48	2.58
1483.0	0.00	100	2.2	0.0	2.73	3	12.47	2.58
1484.0	0.00	100	3.0	0.0	2.76	0	12.45	2.58
1485.0	0.00	100	2.8	0.0	2.78	0	12.42	2.58
1486.0	0.00	100	3.4	0.0	2.77	0	12.39	2.58
1487.0	0.00	66	5.3	0.0	2.74	0	12.35	2.58
1488.0	0.00	50	6.5	2.1	2.73	0	12.29	2.55
1489.0	0.00	71	5.0	2.2	2.73	0	12.23	2.52
1490.0	0.00	100	2.4	0.6	2.74	0	12.19	2.52
1491.0	0.00	100	1.3	0.0	2.74	0	12.17	2.52
1492.0	0.00	100	1.2	0.0	2.76	0	12.16	2.52
1493.0	0.00	100	2.3	0.0	2.78	0	12.14	2.52
1494.0	0.00	94	4.1	0.0	2.76	0	12.11	2.52
1495.0	0.00	85	4.3	0.0	2.77	0	12.07	2.51
1496.0	0.00	74	4.8	0.0	2.76	0	12.03	2.50
1497.0	0.00	77	5.2	1.0	2.73	0	11.98	2.48
1498.0	0.00	73	5.6	1.0	2.73	0	11.92	2.47
1499.0	0.00	88	5.4	0.1	2.75	0	11.87	2.46
1500.0	0.00	99	4.9	0.0	2.76	0	11.82	2.45
1501.0	0.00	99	4.8	0.0	2.76	0	11.77	2.45
1502.0	0.00	100	4.4	0.0	2.74	0	11.72	2.45
1503.0	0.00	100	2.9	0.0	2.73	0	11.68	2.45
1504.0	0.00	100	1.6	0.0	2.75	0	11.65	2.45
1505.0	0.00	100	1.2	0.0	2.74	0	11.64	2.45
1506.0	0.00	100	0.7	0.0	2.74	2	11.63	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1507.0	0.00	100	0.0	0.0	2.76	10	11.62	2.45
1508.0	0.00	100	0.0	0.0	2.74	12	11.62	2.45
1509.0	0.00	100	0.1	0.0	2.73	7	11.62	2.45
1510.0	0.00	100	0.8	0.0	2.76	0	11.62	2.45
1511.0	0.00	100	0.0	0.0	2.75	6	11.61	2.45
1512.0	0.00	100	0.0	0.0	2.74	11	11.61	2.45
1513.0	0.00	100	0.2	0.0	2.74	4	11.61	2.45
1514.0	0.00	100	0.6	0.0	2.74	0	11.61	2.45
1515.0	0.00	100	0.1	0.1	2.73	3	11.61	2.45
1516.0	0.00	100	0.0	0.0	2.72	7	11.60	2.45
1517.0	0.00	100	0.3	0.0	2.73	6	11.60	2.45
1518.0	0.00	100	0.9	0.0	2.76	0	11.60	2.45
1519.0	0.00	100	0.8	0.0	2.75	0	11.59	2.45
1520.0	0.00	100	0.9	0.0	2.74	0	11.58	2.45
1521.0	0.00	100	1.0	0.0	2.74	0	11.57	2.45
1522.0	0.00	100	0.7	0.0	2.75	0	11.56	2.45
1523.0	0.00	100	0.5	0.0	2.76	0	11.56	2.45
1524.0	0.00	100	0.5	0.0	2.74	1	11.55	2.45
1525.0	0.00	100	0.3	0.1	2.72	3	11.55	2.45
1526.0	0.00	100	0.0	0.0	2.73	6	11.55	2.45
1527.0	0.00	100	0.0	0.0	2.74	10	11.55	2.45
1528.0	0.00	100	0.0	0.0	2.73	13	11.55	2.45
1529.0	0.00	100	0.1	0.0	2.72	8	11.55	2.45
1530.0	0.00	100	1.0	0.0	2.75	0	11.54	2.45
1531.0	0.00	100	1.0	0.0	2.75	0	11.53	2.45
1532.0	0.00	100	0.7	0.0	2.76	2	11.52	2.45
1533.0	0.00	100	1.0	0.0	2.77	0	11.52	2.45
1534.0	0.00	100	0.4	0.0	2.75	3	11.51	2.45
1535.0	0.00	100	0.7	0.0	2.75	1	11.50	2.45
1536.0	0.00	100	0.9	0.0	2.75	0	11.49	2.45
1537.0	0.00	100	0.2	0.0	2.78	2	11.49	2.45
1538.0	0.00	100	0.0	0.0	2.76	7	11.49	2.45
1539.0	0.00	100	0.0	0.0	2.72	13	11.49	2.45
1540.0	0.00	100	0.0	0.0	2.77	21	11.49	2.45
1541.0	0.00	100	0.0	0.0	2.79	23	11.49	2.45
1542.0	0.00	100	0.1	0.0	2.81	20	11.49	2.45
1543.0	0.00	100	0.2	0.0	2.78	19	11.49	2.45
1544.0	0.00	100	1.0	0.0	2.76	11	11.48	2.45
1545.0	0.00	100	1.3	0.0	2.77	0	11.47	2.45
1546.0	0.00	100	0.6	0.0	2.76	0	11.46	2.45
1547.0	0.00	100	0.4	0.0	2.77	0	11.45	2.45
1548.0	0.00	100	0.3	0.0	2.77	0	11.45	2.45
1549.0	0.00	100	0.0	0.0	2.77	4	11.45	2.45
1550.0	0.00	100	0.0	0.0	2.80	7	11.45	2.45
1551.0	0.00	100	0.0	0.0	2.81	11	11.45	2.45
1552.0	0.00	100	0.0	0.0	2.80	13	11.45	2.45
1553.0	0.00	100	0.0	0.0	2.75	12	11.45	2.45
1554.0	0.00	100	0.0	0.0	2.73	7	11.45	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1555.0	0.00	100	0.0	0.0	2.75	6	11.45	2.45
1556.0	0.00	100	0.0	0.0	2.75	7	11.45	2.45
1557.0	0.00	100	0.0	0.0	2.76	10	11.45	2.45
1558.0	0.00	100	0.0	0.0	2.76	11	11.45	2.45
1559.0	0.00	100	0.3	0.0	2.73	4	11.45	2.45
1560.0	0.00	100	0.0	0.0	2.76	4	11.44	2.45
1561.0	0.00	100	0.0	0.0	2.78	8	11.44	2.45
1562.0	0.00	100	0.0	0.0	2.76	13	11.44	2.45
1563.0	0.00	100	0.0	0.0	2.75	14	11.44	2.45
1564.0	0.00	100	0.2	0.0	2.76	10	11.44	2.45
1565.0	0.00	100	0.0	0.0	2.73	13	11.44	2.45
1566.0	0.00	100	0.6	0.0	2.70	12	11.44	2.45
1567.0	0.00	100	0.0	0.0	2.71	16	11.44	2.45
1568.0	0.00	100	0.0	0.0	2.75	14	11.44	2.45
1569.0	0.00	100	0.0	0.0	2.76	13	11.44	2.45
1570.0	0.00	100	0.0	0.0	2.76	16	11.44	2.45
1571.0	0.00	100	0.0	0.0	2.77	17	11.44	2.45
1572.0	0.00	100	0.0	0.0	2.73	13	11.44	2.45
1573.0	0.00	100	0.0	0.0	2.71	11	11.44	2.45
1574.0	0.00	100	0.0	0.0	2.76	13	11.44	2.45
1575.0	0.00	100	0.0	0.0	2.77	13	11.44	2.45
1576.0	0.00	100	0.0	0.0	2.76	10	11.44	2.45
1577.0	0.00	100	0.3	0.0	2.76	10	11.44	2.45
1578.0	0.00	100	0.6	0.0	2.77	8	11.43	2.45
1579.0	0.00	100	0.0	0.0	2.78	9	11.43	2.45
1580.0	0.00	100	0.1	0.0	2.76	6	11.43	2.45
1581.0	0.00	100	0.2	0.0	2.73	4	11.43	2.45
1582.0	0.00	100	0.0	0.0	2.75	9	11.42	2.45
1583.0	0.00	100	0.1	0.0	2.74	6	11.42	2.45
1584.0	0.00	100	0.4	0.0	2.74	3	11.42	2.45
1585.0	0.00	100	0.0	0.0	2.75	6	11.42	2.45
1586.0	0.00	100	0.0	0.0	2.73	8	11.42	2.45
1587.0	0.00	100	0.0	0.0	2.75	11	11.42	2.45
1588.0	0.00	100	0.0	0.0	2.79	11	11.42	2.45
1589.0	0.00	100	0.0	0.0	2.77	9	11.42	2.45
1590.0	0.00	100	0.0	0.0	2.74	9	11.42	2.45
1591.0	0.00	100	0.0	0.0	2.75	13	11.42	2.45
1592.0	0.00	100	0.0	0.0	2.78	14	11.42	2.45
1593.0	0.00	100	0.0	0.0	2.81	11	11.42	2.45
1594.0	0.00	100	0.3	0.0	2.78	10	11.42	2.45
1595.0	0.00	100	0.6	0.0	2.77	5	11.41	2.45
1596.0	0.00	100	0.6	0.0	2.76	3	11.41	2.45
1597.0	0.00	100	1.1	0.0	2.75	0	11.40	2.45
1598.0	0.00	100	1.1	0.0	2.73	0	11.39	2.45
1599.0	0.00	100	0.6	0.0	2.72	2	11.38	2.45
1600.0	0.00	100	0.5	0.0	2.74	2	11.38	2.45
1601.0	0.00	100	0.3	0.0	2.73	5	11.37	2.45
1602.0	0.00	100	0.5	0.0	2.75	4	11.37	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1603.0	0.00	100	1.3	0.0	2.77	0	11.36	2.45
1604.0	0.00	100	1.4	0.0	2.74	0	11.35	2.45
1605.0	0.00	100	1.0	0.0	2.75	0	11.34	2.45
1606.0	0.00	100	0.5	0.0	2.78	0	11.33	2.45
1607.0	0.00	100	0.4	0.0	2.78	0	11.32	2.45
1608.0	0.00	100	0.0	0.0	2.77	7	11.32	2.45
1609.0	0.00	100	0.0	0.0	2.74	10	11.32	2.45
1610.0	0.00	100	0.0	0.0	2.74	10	11.32	2.45
1611.0	0.00	100	0.0	0.0	2.74	8	11.32	2.45
1612.0	0.00	100	0.3	0.0	2.75	3	11.32	2.45
1613.0	0.00	100	1.1	0.0	2.73	0	11.31	2.45
1614.0	0.00	100	0.7	0.0	2.71	1	11.30	2.45
1615.0	0.00	100	0.3	0.0	2.72	4	11.29	2.45
1616.0	0.00	100	0.5	0.0	2.75	4	11.29	2.45
1617.0	0.00	100	0.2	0.0	2.76	3	11.29	2.45
1618.0	0.00	100	0.2	0.0	2.76	3	11.28	2.45
1619.0	0.00	100	0.1	0.0	2.77	2	11.28	2.45
1620.0	0.00	100	0.0	0.0	2.75	4	11.28	2.45
1621.0	0.00	100	0.2	0.0	2.72	4	11.28	2.45
1622.0	0.00	100	0.0	0.0	2.74	5	11.28	2.45
1623.0	0.00	100	0.0	0.0	2.75	6	11.28	2.45
1624.0	0.00	100	0.0	0.0	2.76	7	11.28	2.45
1625.0	0.00	100	0.0	0.0	2.76	12	11.28	2.45
1626.0	0.00	100	0.0	0.0	2.75	7	11.28	2.45
1627.0	0.00	100	0.9	0.0	2.76	0	11.27	2.45
1628.0	0.00	100	0.6	0.0	2.77	0	11.27	2.45
1629.0	0.00	100	0.9	0.0	2.75	0	11.26	2.45
1630.0	0.00	100	0.9	0.0	2.75	0	11.25	2.45
1631.0	0.00	100	0.8	0.0	2.75	0	11.24	2.45
1632.0	0.00	100	0.8	0.0	2.74	0	11.23	2.45
1633.0	0.00	100	0.7	0.0	2.74	0	11.23	2.45
1634.0	0.00	100	0.5	0.0	2.76	0	11.22	2.45
1635.0	0.00	100	0.0	0.0	2.76	4	11.22	2.45
1636.0	0.00	100	0.0	0.0	2.75	6	11.22	2.45
1637.0	0.00	100	0.0	0.0	2.74	9	11.22	2.45
1638.0	0.00	100	0.0	0.0	2.74	9	11.22	2.45
1639.0	0.00	100	0.6	0.0	2.77	12	11.21	2.45
1640.0	0.00	100	2.0	0.0	2.79	10	11.21	2.45
1641.0	0.00	100	2.3	0.0	2.75	0	11.18	2.45
1642.0	0.00	100	0.8	0.0	2.75	0	11.17	2.45
1643.0	0.00	100	0.5	0.0	2.77	0	11.16	2.45
1644.0	0.00	100	0.6	0.0	2.76	3	11.15	2.45
1645.0	0.00	100	0.2	0.0	2.76	11	11.15	2.45
1646.0	0.00	100	0.1	0.0	2.80	18	11.15	2.45
1647.0	0.00	100	0.5	0.0	2.79	18	11.15	2.45
1648.0	0.00	100	1.2	0.0	2.75	11	11.14	2.45
1649.0	0.00	100	2.0	0.0	2.73	1	11.12	2.45
1650.0	0.00	100	0.5	0.0	2.75	6	11.11	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1651.0	0.00	100	0.0	0.0	2.77	18	11.10	2.45
1652.0	0.00	100	0.4	0.1	2.78	32	11.10	2.45
1653.0	0.00	100	1.9	0.0	2.80	28	11.10	2.45
1654.0	0.00	100	2.4	0.0	2.79	16	11.08	2.45
1655.0	0.00	100	2.7	0.0	2.77	0	11.05	2.45
1656.0	0.00	100	1.4	0.0	2.74	1	11.03	2.45
1657.0	0.00	100	0.6	0.0	2.76	6	11.01	2.45
1658.0	0.00	100	0.0	0.0	2.76	15	11.01	2.45
1659.0	0.00	100	0.4	0.0	2.75	18	11.01	2.45
1660.0	0.00	100	1.7	0.0	2.77	5	11.00	2.45
1661.0	0.00	100	1.1	0.0	2.77	0	10.99	2.45
1662.0	0.00	100	0.9	0.0	2.78	0	10.98	2.45
1663.0	0.00	100	1.1	0.0	2.78	0	10.97	2.45
1664.0	0.00	100	0.9	0.0	2.76	4	10.96	2.45
1665.0	0.00	100	0.0	0.0	2.73	16	10.95	2.45
1666.0	0.00	100	0.0	0.0	2.75	28	10.95	2.45
1667.0	0.00	100	1.6	0.0	2.82	12	10.94	2.45
1668.0	0.00	100	0.7	0.0	2.77	10	10.93	2.45
1669.0	0.00	100	2.0	0.0	2.77	2	10.92	2.45
1670.0	0.00	100	1.1	0.0	2.76	0	10.90	2.45
1671.0	0.00	100	0.4	0.0	2.77	3	10.89	2.45
1672.0	0.00	100	0.1	0.0	2.78	5	10.89	2.45
1673.0	0.00	100	0.0	0.0	2.78	11	10.89	2.45
1674.0	0.00	100	0.0	0.0	2.78	18	10.89	2.45
1675.0	0.00	100	0.0	0.0	2.75	21	10.89	2.45
1676.0	0.00	100	0.0	0.0	2.76	14	10.89	2.45
1677.0	0.00	100	0.0	0.0	2.78	16	10.89	2.45
1678.0	0.00	100	0.2	0.0	2.77	15	10.89	2.45
1679.0	0.00	100	0.3	0.0	2.78	8	10.89	2.45
1680.0	0.00	100	0.0	0.0	2.75	18	10.88	2.45
1681.0	0.00	100	0.0	0.0	2.74	29	10.88	2.45
1682.0	0.00	100	1.3	0.0	2.76	19	10.88	2.45
1683.0	0.00	100	2.0	0.0	2.74	2	10.87	2.45
1684.0	0.00	100	1.0	0.0	2.73	0	10.85	2.45
1685.0	0.00	100	0.7	0.0	2.75	0	10.84	2.45
1686.0	0.00	100	0.4	0.0	2.75	2	10.83	2.45
1687.0	0.00	100	0.2	0.0	2.72	7	10.83	2.45
1688.0	0.00	100	1.2	0.0	2.70	9	10.83	2.45
1689.0	0.00	100	2.4	0.0	2.73	0	10.81	2.45
1690.0	0.00	100	1.1	0.0	2.74	0	10.79	2.45
1691.0	0.00	100	0.3	0.0	2.74	3	10.78	2.45
1692.0	0.00	100	0.0	0.0	2.72	11	10.78	2.45
1693.0	0.00	100	0.6	0.0	2.72	11	10.78	2.45
1694.0	0.00	100	2.5	0.0	2.75	0	10.77	2.45
1695.0	0.00	100	1.1	0.0	2.77	0	10.75	2.45
1696.0	0.00	100	0.9	0.0	2.78	0	10.74	2.45
1697.0	0.00	100	0.6	0.0	2.77	2	10.73	2.45
1698.0	0.00	100	0.0	0.0	2.73	9	10.72	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY, TOTAL	POROSITY, SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1699.0	0.00	100	0.0	0.0	2.71	14	10.72	2.45
1700.0	0.00	100	0.1	0.0	2.71	18	10.72	2.45
1701.0	0.00	100	0.2	0.0	2.71	22	10.72	2.45
1702.0	0.00	100	0.4	0.0	2.70	23	10.72	2.45
1703.0	0.00	100	2.2	0.0	2.70	16	10.71	2.45
1704.0	0.00	100	2.2	0.0	2.70	11	10.69	2.45
1705.0	0.00	100	0.2	0.0	2.72	13	10.67	2.45
1706.0	0.00	100	0.1	0.0	2.71	11	10.67	2.45
1707.0	0.00	100	0.0	0.0	2.73	12	10.67	2.45
1708.0	0.00	100	0.2	0.0	2.76	9	10.67	2.45
1709.0	0.00	100	0.3	0.0	2.75	6	10.66	2.45
1710.0	0.00	100	0.0	0.0	2.75	6	10.66	2.45
1711.0	0.00	100	0.0	0.0	2.78	7	10.66	2.45
1712.0	0.00	100	0.0	0.0	2.79	6	10.66	2.45
1713.0	0.00	100	0.0	0.0	2.80	8	10.66	2.45
1714.0	0.00	100	0.0	0.0	2.77	11	10.66	2.45
1715.0	0.00	100	0.0	0.0	2.74	11	10.66	2.45
1716.0	0.00	100	0.2	0.0	2.73	7	10.66	2.45
1717.0	0.00	100	0.0	0.0	2.73	8	10.66	2.45
1718.0	0.00	100	1.2	0.0	2.75	1	10.66	2.45
1719.0	0.00	100	0.8	0.0	2.75	1	10.64	2.45
1720.0	0.00	100	0.1	0.0	2.76	4	10.64	2.45
1721.0	0.00	100	0.0	0.0	2.77	10	10.64	2.45
1722.0	0.00	100	0.0	0.0	2.75	8	10.64	2.45
1723.0	0.00	100	0.0	0.0	2.76	8	10.64	2.45
1724.0	0.00	100	0.0	0.0	2.78	6	10.64	2.45
1725.0	0.00	100	0.2	0.0	2.79	4	10.64	2.45
1726.0	0.00	100	0.3	0.0	2.75	5	10.64	2.45
1727.0	0.00	100	0.4	0.0	2.76	5	10.63	2.45
1728.0	0.00	100	0.5	0.0	2.78	2	10.63	2.45
1729.0	0.00	100	0.7	0.0	2.77	2	10.62	2.45
1730.0	0.00	100	1.0	0.0	2.77	1	10.62	2.45
1731.0	0.00	100	1.1	0.0	2.77	0	10.60	2.45
1732.0	0.00	100	0.8	0.0	2.78	0	10.59	2.45
1733.0	0.00	100	0.5	0.0	2.79	0	10.59	2.45
1734.0	0.00	100	0.0	0.0	2.77	5	10.58	2.45
1735.0	0.00	100	0.0	0.0	2.75	8	10.58	2.45
1736.0	0.00	100	0.0	0.0	2.75	16	10.58	2.45
1737.0	0.00	100	0.2	0.0	2.76	16	10.58	2.45
1738.0	0.00	100	0.3	0.0	2.79	11	10.58	2.45
1739.0	0.00	100	0.3	0.0	2.78	7	10.58	2.45
1740.0	0.00	100	0.1	0.0	2.73	8	10.58	2.45
1741.0	0.00	100	0.1	0.0	2.72	10	10.58	2.45
1742.0	0.00	100	0.6	0.0	2.70	10	10.57	2.45
1743.0	0.00	100	0.4	0.0	2.71	11	10.57	2.45
1744.0	0.00	100	0.4	0.0	2.72	13	10.56	2.45
1745.0	0.00	100	0.3	0.0	2.73	16	10.56	2.45
1746.0	0.00	100	0.3	0.0	2.73	19	10.56	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1747.0	0.00	100	0.5	0.0	2.74	18	10.55	2.45
1748.0	0.00	100	0.6	0.0	2.76	19	10.55	2.45
1749.0	0.00	100	0.9	0.0	2.78	17	10.54	2.45
1750.0	0.00	100	0.2	0.0	2.79	15	10.53	2.45
1751.0	0.00	100	0.0	0.0	2.78	18	10.53	2.45
1752.0	0.00	100	0.7	0.0	2.76	12	10.53	2.45
1753.0	0.00	100	0.0	0.0	2.75	14	10.52	2.45
1754.0	0.00	100	0.0	0.0	2.73	15	10.52	2.45
1755.0	0.00	100	0.5	0.0	2.73	13	10.52	2.45
1756.0	0.00	100	0.0	0.0	2.73	16	10.52	2.45
1757.0	0.00	100	0.0	0.0	2.71	20	10.52	2.45
1758.0	0.00	100	0.0	0.0	2.75	22	10.52	2.45
1759.0	0.00	100	0.1	0.0	2.73	20	10.52	2.45
1760.0	0.00	100	0.2	0.0	2.73	17	10.52	2.45
1761.0	0.00	100	0.0	0.0	2.71	15	10.51	2.45
1762.0	0.00	100	0.0	0.0	2.71	19	10.51	2.45
1763.0	0.00	100	0.0	0.0	2.73	28	10.51	2.45
1764.0	0.00	100	0.0	0.0	2.72	27	10.51	2.45
1765.0	0.00	100	0.0	0.0	2.71	27	10.51	2.45
1766.0	0.00	100	0.0	0.0	2.72	29	10.51	2.45
1767.0	0.00	100	0.2	0.0	2.73	29	10.51	2.45
1768.0	0.00	100	0.7	0.0	2.70	30	10.51	2.45
1769.0	0.00	100	0.9	0.0	2.70	26	10.50	2.45
1770.0	0.00	100	0.0	0.0	2.74	30	10.50	2.45
1771.0	0.00	100	0.1	0.0	2.75	30	10.50	2.45
1772.0	0.00	100	0.5	0.0	2.76	25	10.49	2.45
1773.0	0.00	100	0.0	0.0	2.76	22	10.49	2.45
1774.0	0.00	100	0.0	0.0	2.75	27	10.49	2.45
1775.0	0.00	100	0.2	0.0	2.71	27	10.49	2.45
1776.0	0.00	100	0.8	0.0	2.71	27	10.49	2.45
1777.0	0.00	100	0.2	0.0	2.74	27	10.48	2.45
1778.0	0.00	100	0.0	0.0	2.76	27	10.48	2.45
1779.0	0.00	100	0.1	0.0	2.77	26	10.48	2.45
1780.0	0.00	100	0.3	0.0	2.75	24	10.48	2.45
1781.0	0.00	100	0.2	0.0	2.73	24	10.47	2.45
1782.0	0.00	100	0.0	0.0	2.73	27	10.47	2.45
1783.0	0.00	100	0.6	0.0	2.70	29	10.47	2.45
1784.0	0.00	100	0.7	0.0	2.70	29	10.47	2.45
1785.0	0.00	100	0.5	0.0	2.70	30	10.46	2.45
1786.0	0.00	100	1.0	0.0	2.70	30	10.45	2.45
1787.0	0.00	100	0.9	0.0	2.70	30	10.44	2.45
1788.0	0.00	100	0.7	0.0	2.70	28	10.43	2.45
1789.0	0.00	100	0.0	0.0	2.71	27	10.43	2.45
1790.0	0.00	100	0.0	0.0	2.73	24	10.43	2.45
1791.0	0.00	100	0.0	0.0	2.74	25	10.43	2.45
1792.0	0.00	100	0.0	0.0	2.73	27	10.43	2.45
1793.0	0.00	100	0.0	0.0	2.72	29	10.43	2.45
1794.0	0.00	100	0.4	0.0	2.71	27	10.43	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY, TOTAL	POROSITY, SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1795.0	0.00	100	0.1	0.0	2.72	24	10.42	2.45
1796.0	0.00	100	0.0	0.0	2.71	26	10.42	2.45
1797.0	0.00	100	0.5	0.0	2.72	28	10.42	2.45
1798.0	0.00	100	0.7	0.0	2.71	29	10.42	2.45
1799.0	0.00	100	1.6	0.0	2.70	26	10.41	2.45
1800.0	0.00	100	1.7	0.0	2.70	27	10.39	2.45
1801.0	0.00	100	1.0	0.0	2.73	26	10.38	2.45
1802.0	0.00	100	0.9	0.0	2.76	20	10.37	2.45
1803.0	0.00	100	0.2	0.0	2.76	22	10.36	2.45
1804.0	0.00	100	0.0	0.0	2.76	27	10.36	2.45
1805.0	0.00	100	1.2	0.0	2.78	20	10.35	2.45
1806.0	0.00	100	0.8	0.0	2.74	22	10.34	2.45
1807.0	0.00	100	0.1	0.0	2.71	31	10.34	2.45
1808.0	0.00	100	1.3	0.0	2.70	30	10.33	2.45
1809.0	0.00	100	0.8	0.0	2.70	30	10.32	2.45
1810.0	0.00	100	0.0	0.0	2.71	33	10.31	2.45
1811.0	0.00	100	0.6	0.0	2.71	29	10.31	2.45
1812.0	0.00	100	0.9	0.0	2.73	26	10.30	2.45
1813.0	0.00	100	0.9	0.0	2.75	24	10.29	2.45
1814.0	0.00	100	0.7	0.0	2.74	25	10.29	2.45
1815.0	0.00	100	0.7	0.0	2.74	26	10.28	2.45
1816.0	0.00	100	0.3	0.0	2.80	24	10.27	2.45
1817.0	0.00	100	0.2	0.0	2.81	24	10.27	2.45
1818.0	0.00	100	0.6	0.0	2.77	26	10.27	2.45
1819.0	0.00	100	1.0	0.0	2.76	24	10.26	2.45
1820.0	0.00	100	0.3	0.0	2.74	25	10.25	2.45
1821.0	0.00	100	0.2	0.0	2.75	26	10.25	2.45
1822.0	0.00	100	0.7	0.0	2.75	25	10.25	2.45
1823.0	0.00	100	1.0	0.0	2.74	22	10.24	2.45
1824.0	0.00	100	0.0	0.0	2.74	26	10.23	2.45
1825.0	0.00	100	0.0	0.0	2.73	30	10.23	2.45
1826.0	0.00	100	1.0	0.0	2.74	27	10.23	2.45
1827.0	0.00	100	1.3	0.0	2.77	18	10.22	2.45
1828.0	0.00	100	0.0	0.0	2.75	24	10.21	2.45
1829.0	0.00	100	0.5	0.5	2.71	26	10.21	2.45
1830.0	0.00	100	0.9	0.0	2.70	30	10.20	2.45
1831.0	0.00	100	0.3	0.0	2.71	28	10.19	2.45
1832.0	0.00	100	0.0	0.0	2.72	30	10.19	2.45
1833.0	0.00	100	0.3	0.0	2.71	31	10.19	2.45
1834.0	0.00	100	1.0	0.0	2.72	27	10.19	2.45
1835.0	0.00	100	0.8	0.0	2.73	26	10.18	2.45
1836.0	0.00	100	0.9	0.0	2.75	26	10.17	2.45
1837.0	0.00	100	1.7	0.0	2.76	24	10.16	2.45
1838.0	0.00	100	1.6	0.0	2.79	20	10.14	2.45
1839.0	0.00	100	1.1	0.0	2.82	16	10.13	2.45
1840.0	0.00	100	0.0	0.0	2.83	22	10.12	2.45
1841.0	0.00	100	0.0	0.0	2.77	32	10.12	2.45
1842.0	0.00	100	2.3	0.0	2.70	29	10.12	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1843.0	0.00	100	3.0	0.0	2.70	24	10.09	2.45
1844.0	0.00	100	2.0	0.0	2.70	27	10.06	2.45
1845.0	0.00	100	0.6	0.0	2.72	29	10.05	2.45
1846.0	0.00	100	0.2	0.0	2.71	32	10.04	2.45
1847.0	0.00	100	0.3	0.0	2.71	32	10.04	2.45
1848.0	0.00	100	0.5	0.0	2.73	29	10.04	2.45
1849.0	0.00	100	1.5	0.0	2.70	26	10.03	2.45
1850.0	0.00	100	2.5	0.0	2.70	22	10.01	2.45
1851.0	0.00	100	1.8	0.0	2.70	26	9.99	2.45
1852.0	0.00	100	1.6	0.0	2.72	25	9.97	2.45
1853.0	0.00	100	1.2	0.0	2.74	26	9.95	2.45
1854.0	0.00	100	0.7	0.0	2.74	27	9.94	2.45
1855.0	0.00	100	1.0	0.0	2.74	26	9.94	2.45
1856.0	0.00	100	0.9	0.0	2.73	27	9.93	2.45
1857.0	0.00	100	0.7	0.0	2.73	27	9.92	2.45
1858.0	0.00	100	0.5	0.0	2.74	25	9.91	2.45
1859.0	0.00	100	0.6	0.0	2.74	26	9.91	2.45
1860.0	0.00	100	0.8	0.0	2.73	26	9.90	2.45
1861.0	0.00	100	0.8	0.0	2.74	25	9.89	2.45
1862.0	0.00	100	0.2	0.0	2.73	28	9.88	2.45
1863.0	0.00	100	0.5	0.0	2.71	29	9.88	2.45
1864.0	0.00	100	0.9	0.0	2.71	27	9.88	2.45
1865.0	0.00	100	0.3	0.0	2.75	27	9.87	2.45
1866.0	0.00	100	0.1	0.0	2.76	28	9.87	2.45
1867.0	0.00	100	0.8	0.0	2.74	25	9.86	2.45
1868.0	0.00	100	0.6	0.0	2.75	25	9.86	2.45
1869.0	0.00	100	0.1	0.0	2.76	28	9.85	2.45
1870.0	0.00	100	0.5	0.0	2.75	27	9.85	2.45
1871.0	0.00	100	0.8	0.0	2.71	26	9.84	2.45
1872.0	0.00	100	1.5	0.0	2.70	25	9.83	2.45
1873.0	0.00	100	0.6	0.0	2.73	27	9.82	2.45
1874.0	0.00	100	0.5	0.0	2.74	28	9.82	2.45
1875.0	0.00	100	0.9	0.0	2.73	27	9.81	2.45
1876.0	0.00	100	1.5	0.0	2.73	25	9.80	2.45
1877.0	0.00	100	0.9	0.0	2.73	27	9.79	2.45
1878.0	0.00	100	0.6	0.0	2.73	28	9.78	2.45
1879.0	0.00	100	0.3	0.0	2.73	28	9.77	2.45
1880.0	0.00	100	0.7	0.0	2.71	28	9.77	2.45
1881.0	0.00	100	1.2	0.0	2.70	28	9.76	2.45
1882.0	0.00	100	0.4	0.0	2.72	29	9.75	2.45
1883.0	0.00	100	0.3	0.0	2.73	27	9.75	2.45
1884.0	0.00	100	0.0	0.0	2.76	29	9.74	2.45
1885.0	0.00	100	0.2	0.0	2.75	29	9.74	2.45
1886.0	0.00	100	0.2	0.0	2.73	31	9.74	2.45
1887.0	0.00	100	0.5	0.0	2.72	30	9.74	2.45
1888.0	0.00	100	0.3	0.0	2.75	28	9.73	2.45
1889.0	0.00	100	0.4	0.0	2.73	27	9.73	2.45
1890.0	0.00	100	0.6	0.0	2.71	28	9.73	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1891.0	0.00	100	1.7	0.0	2.70	27	9.72	2.45
1892.0	0.00	100	1.5	0.0	2.70	28	9.70	2.45
1893.0	0.00	100	0.1	0.0	2.71	33	9.69	2.45
1894.0	0.00	100	0.0	0.0	2.74	36	9.69	2.45
1895.0	0.00	100	0.0	0.0	2.75	34	9.69	2.45
1896.0	0.00	100	0.0	0.0	2.74	34	9.69	2.45
1897.0	0.00	100	0.0	0.0	2.75	36	9.69	2.45
1898.0	0.00	100	0.8	0.0	2.73	35	9.69	2.45
1899.0	0.00	100	1.2	0.0	2.73	31	9.68	2.45
1900.0	0.00	100	0.5	0.0	2.75	29	9.67	2.45
1901.0	0.00	100	0.0	0.0	2.73	31	9.66	2.45
1902.0	0.00	100	0.5	0.0	2.70	31	9.66	2.45
1903.0	0.00	100	0.3	0.0	2.72	32	9.66	2.45
1904.0	0.00	100	0.2	0.0	2.74	33	9.65	2.45
1905.0	0.00	100	0.1	0.0	2.76	32	9.65	2.45
1906.0	0.00	100	0.2	0.0	2.76	31	9.65	2.45
1907.0	0.00	100	0.4	0.0	2.76	27	9.65	2.45
1908.0	0.00	100	0.4	0.0	2.73	28	9.65	2.45
1909.0	0.00	100	0.3	0.0	2.71	30	9.64	2.45
1910.0	0.00	100	0.7	0.0	2.71	28	9.64	2.45
1911.0	0.00	100	0.5	0.0	2.73	30	9.63	2.45
1912.0	0.00	100	0.5	0.0	2.78	29	9.63	2.45
1913.0	0.00	100	0.7	0.0	2.77	29	9.62	2.45
1914.0	0.00	100	1.0	0.0	2.75	28	9.61	2.45
1915.0	0.00	100	0.6	0.0	2.73	29	9.61	2.45
1916.0	0.00	100	0.9	0.0	2.71	28	9.60	2.45
1917.0	0.00	100	1.0	0.0	2.71	27	9.59	2.45
1918.0	0.00	100	1.2	0.0	2.71	26	9.58	2.45
1919.0	0.00	100	1.4	0.0	2.70	26	9.57	2.45
1920.0	0.00	100	0.8	0.0	2.71	27	9.56	2.45
1921.0	0.00	100	0.8	0.0	2.70	28	9.55	2.45
1922.0	0.00	100	0.5	0.0	2.74	27	9.54	2.45
1923.0	0.00	100	0.7	0.0	2.74	27	9.54	2.45
1924.0	0.00	100	1.8	0.0	2.73	25	9.53	2.45
1925.0	0.00	100	1.5	0.0	2.74	24	9.51	2.45
1926.0	0.00	100	1.2	0.0	2.72	25	9.50	2.45
1927.0	0.00	100	1.1	0.0	2.73	25	9.48	2.45
1928.0	0.00	100	0.8	0.0	2.71	28	9.47	2.45
1929.0	0.00	100	1.3	0.0	2.70	28	9.46	2.45
1930.0	0.00	100	0.5	0.0	2.72	28	9.45	2.45
1931.0	0.00	100	0.1	0.0	2.72	29	9.45	2.45
1932.0	0.00	100	0.0	0.0	2.72	29	9.45	2.45
1933.0	0.00	100	1.2	0.0	2.70	26	9.45	2.45
1934.0	0.00	100	1.9	0.0	2.70	25	9.43	2.45
1935.0	0.00	100	2.3	0.0	2.70	23	9.41	2.45
1936.0	0.00	100	0.3	0.0	2.71	29	9.39	2.45
1937.0	0.00	100	0.7	0.0	2.73	25	9.39	2.45
1938.0	0.00	100	0.8	0.0	2.71	26	9.38	2.45

UGR File #254
SAI
July 1979

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1939.0	0.00	100	0.3	0.0	2.76	25	9.38	2.45
1940.0	0.00	100	0.4	0.0	2.78	24	9.38	2.45
1941.0	0.00	100	0.6	0.0	2.78	23	9.37	2.45
1942.0	0.00	100	0.5	0.0	2.76	25	9.37	2.45
1943.0	0.00	100	0.8	0.0	2.74	25	9.36	2.45
1944.0	0.00	100	0.9	0.0	2.74	27	9.35	2.45
1945.0	0.00	100	1.2	0.0	2.70	29	9.34	2.45
1946.0	0.00	100	0.5	0.0	2.72	30	9.33	2.45
1947.0	0.00	100	1.0	0.0	2.75	29	9.33	2.45
1948.0	0.00	100	2.1	0.0	2.77	25	9.31	2.45
1949.0	0.00	100	2.3	0.0	2.82	15	9.29	2.45
1950.0	0.00	100	1.1	0.0	2.84	10	9.27	2.45
1951.0	0.00	100	0.0	0.0	2.83	15	9.26	2.45
1952.0	0.00	100	0.4	0.4	2.78	21	9.26	2.45
1953.0	0.00	100	0.3	0.0	2.72	32	9.26	2.45
1954.0	0.00	100	0.8	0.0	2.75	28	9.26	2.45
1955.0	0.00	100	0.5	0.0	2.73	27	9.25	2.45
1956.0	0.00	100	1.6	0.0	2.70	25	9.24	2.45
1957.0	0.00	100	1.4	0.0	2.70	26	9.22	2.45
1958.0	0.00	100	1.1	0.0	2.75	26	9.21	2.45
1959.0	0.00	100	1.0	0.0	2.77	23	9.20	2.45
1960.0	0.00	100	0.6	0.0	2.75	25	9.19	2.45
1961.0	0.00	100	0.5	0.0	2.76	26	9.19	2.45
1962.0	0.00	100	0.3	0.0	2.74	29	9.18	2.45
1963.0	0.00	100	0.2	0.0	2.76	30	9.18	2.45
1964.0	0.00	100	0.8	0.0	2.74	27	9.18	2.45
1965.0	0.00	100	0.5	0.0	2.72	28	9.17	2.45
1966.0	0.00	100	0.6	0.0	2.74	27	9.16	2.45
1967.0	0.00	100	0.7	0.0	2.76	26	9.16	2.45
1968.0	0.00	100	0.5	0.0	2.73	28	9.15	2.45
1969.0	0.00	100	0.6	0.0	2.73	28	9.15	2.45
1970.0	0.00	100	0.4	0.0	2.74	29	9.14	2.45
1971.0	0.00	100	0.5	0.0	2.74	28	9.14	2.45
1972.0	0.00	100	0.8	0.0	2.73	26	9.13	2.45
1973.0	0.00	100	1.3	0.0	2.71	27	9.12	2.45
1974.0	0.00	100	1.5	0.0	2.72	26	9.11	2.45
1975.0	0.00	100	1.3	0.0	2.70	29	9.09	2.45
1976.0	0.00	100	1.3	0.0	2.71	29	9.08	2.45
1977.0	0.00	100	0.6	0.0	2.77	27	9.07	2.45
1978.0	0.00	100	0.4	0.0	2.78	24	9.06	2.45
1979.0	0.00	100	0.5	0.0	2.72	27	9.06	2.45
1980.0	0.00	100	0.4	0.0	2.71	33	9.05	2.45
1981.0	0.00	100	0.2	0.0	2.73	33	9.05	2.45
1982.0	0.00	100	0.7	0.0	2.71	30	9.04	2.45
1983.0	0.00	100	1.2	0.0	2.71	29	9.04	2.45
1984.0	0.00	100	1.0	0.0	2.71	29	9.02	2.45
1985.0	0.00	100	0.9	0.0	2.74	28	9.01	2.45
1986.0	0.00	100	0.8	0.0	2.77	28	9.01	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SECE	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
1987.0	0.00	100	0.4	0.0	2.76	32	9.00	2.45
1988.0	0.00	100	0.9	0.0	2.73	30	8.99	2.45
1989.0	0.00	100	0.7	0.0	2.71	32	8.99	2.45
1990.0	0.00	100	0.5	0.0	2.71	33	8.98	2.45
1991.0	0.00	100	0.9	0.0	2.71	32	8.97	2.45
1992.0	0.00	100	0.7	0.0	2.73	32	8.96	2.45
1993.0	0.00	100	0.8	0.0	2.74	31	8.96	2.45
1994.0	0.00	100	0.6	0.0	2.76	33	8.95	2.45
1995.0	0.00	100	0.0	0.0	2.74	37	8.94	2.45
1996.0	0.00	100	1.2	0.0	2.70	33	8.94	2.45
1997.0	0.00	100	1.7	0.0	2.70	33	8.93	2.45
1998.0	0.00	100	1.3	0.0	2.72	33	8.92	2.45
1999.0	0.00	100	0.8	0.0	2.77	28	8.90	2.45
2000.0	0.00	100	0.1	0.0	2.77	26	8.90	2.45
2001.0	0.00	100	0.0	0.0	2.74	32	8.90	2.45
2002.0	0.00	100	0.0	0.0	2.73	37	8.90	2.45
2003.0	0.00	100	0.7	0.0	2.76	34	8.89	2.45
2004.0	0.00	100	0.2	0.0	2.74	36	8.89	2.45
2005.0	0.00	100	0.0	0.0	2.75	36	8.89	2.45
2006.0	0.00	100	0.3	0.0	2.72	35	8.89	2.45
2007.0	0.00	100	1.5	0.0	2.70	32	8.88	2.45
2008.0	0.00	100	1.4	0.0	2.70	34	8.86	2.45
2009.0	0.00	100	1.0	0.0	2.70	35	8.85	2.45
2010.0	0.00	100	0.2	0.0	2.71	36	8.84	2.45
2011.0	0.00	100	0.0	0.0	2.72	38	8.84	2.45
2012.0	0.00	100	0.2	0.0	2.71	37	8.84	2.45
2013.0	0.00	100	0.3	0.0	2.71	35	8.84	2.45
2014.0	0.00	100	0.4	0.0	2.72	33	8.84	2.45
2015.0	0.00	100	1.3	0.0	2.70	31	8.83	2.45
2016.0	0.00	100	1.2	0.0	2.70	32	8.82	2.45
2017.0	0.00	100	1.0	0.0	2.70	35	8.81	2.45
2018.0	0.00	100	1.3	0.0	2.70	33	8.80	2.45
2019.0	0.00	100	0.1	0.0	2.71	37	8.79	2.45
2020.0	0.00	100	0.0	0.0	2.73	39	8.79	2.45
2021.0	0.00	100	0.2	0.0	2.73	36	8.78	2.45
2022.0	0.00	100	0.1	0.0	2.73	37	8.78	2.45
2023.0	0.00	100	0.4	0.0	2.74	37	8.78	2.45
2024.0	0.00	100	0.9	0.0	2.73	34	8.78	2.45
2025.0	0.00	100	1.1	0.0	2.71	31	8.77	2.45
2026.0	0.00	100	0.4	0.0	2.72	31	8.76	2.45
2027.0	0.00	100	0.1	0.0	2.73	34	8.75	2.45
2028.0	0.00	100	0.1	0.0	2.71	38	8.75	2.45
2029.0	0.00	100	0.1	0.0	2.72	40	8.75	2.45
2030.0	0.00	100	0.6	0.0	2.71	38	8.75	2.45
2031.0	0.00	100	1.6	0.0	2.70	34	8.74	2.45
2032.0	0.00	100	0.9	0.0	2.74	37	8.73	2.45
2033.0	0.00	100	1.3	0.0	2.81	31	8.71	2.45
2034.0	0.00	100	0.6	0.0	2.81	30	8.70	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2035.0	0.00	100	0.0	0.0	2.81	37	8.70	2.45
2036.0	0.00	100	0.0	0.0	2.81	48	8.70	2.45
2037.0	0.00	100	0.2	0.0	2.76	45	8.70	2.45
2038.0	0.00	100	0.3	0.0	2.78	41	8.70	2.45
2039.0	0.00	100	0.2	0.0	2.76	41	8.69	2.45
2040.0	0.00	100	0.4	0.0	2.73	43	8.69	2.45
2041.0	0.00	100	0.0	0.0	2.71	44	8.69	2.45
2042.0	0.00	100	0.0	0.0	2.73	45	8.69	2.45
2043.0	0.00	100	0.0	0.0	2.71	45	8.69	2.45
2044.0	0.00	100	0.0	0.0	2.72	46	8.69	2.45
2045.0	0.00	100	0.5	0.0	2.70	45	8.69	2.45
2046.0	0.00	100	0.9	0.0	2.72	42	8.68	2.45
2047.0	0.00	100	0.6	0.0	2.76	41	8.67	2.45
2048.0	0.00	100	1.1	0.0	2.70	43	8.67	2.45
2049.0	0.00	100	2.9	0.0	2.70	35	8.65	2.45
2050.0	0.00	100	2.4	0.0	2.70	37	8.62	2.45
2051.0	0.00	100	1.3	0.0	2.70	43	8.60	2.45
2052.0	0.00	100	1.1	0.0	2.71	44	8.59	2.45
2053.0	0.00	100	1.3	0.0	2.75	44	8.58	2.45
2054.0	0.00	100	1.8	0.0	2.81	34	8.56	2.45
2055.0	0.00	100	0.0	0.0	2.87	37	8.55	2.45
2056.0	0.00	100	0.0	0.0	2.88	43	8.55	2.45
2057.0	0.00	100	0.1	0.0	2.72	53	8.55	2.45
2058.0	0.00	100	1.9	0.0	2.70	47	8.54	2.45
2059.0	0.00	100	1.6	0.0	2.70	47	8.52	2.45
2060.0	0.00	100	0.5	0.0	2.71	50	8.51	2.45
2061.0	0.00	100	0.6	0.0	2.70	50	8.50	2.45
2062.0	0.00	100	1.7	0.0	2.70	49	8.50	2.45
2063.0	0.00	100	1.8	0.0	2.70	54	8.48	2.45
2064.0	0.00	100	0.8	0.4	2.72	56	8.46	2.45
2065.0	0.00	100	1.0	0.8	2.72	55	8.46	2.45
2066.0	0.00	100	1.5	0.8	2.71	56	8.44	2.45
2067.0	0.00	98	0.8	0.0	2.77	57	8.43	2.45
2068.0	0.00	100	1.6	0.0	2.84	38	8.42	2.45
2069.0	0.00	100	0.0	0.0	2.86	34	8.41	2.45
2070.0	0.00	100	0.1	0.1	2.82	37	8.41	2.45
2071.0	0.00	100	0.0	0.0	2.79	58	8.41	2.45
2072.0	0.00	100	0.0	0.0	2.71	60	8.41	2.45
2073.0	0.00	100	0.0	0.0	2.73	60	8.41	2.45
2074.0	0.00	100	0.4	0.0	2.70	57	8.41	2.45
2075.0	0.00	100	0.0	0.0	2.72	57	8.40	2.45
2076.0	0.00	100	1.1	0.0	2.75	53	8.40	2.45
2077.0	0.00	100	1.4	0.0	2.75	55	8.39	2.45
2078.0	0.00	100	1.5	0.0	2.76	55	8.37	2.45
2079.0	0.00	100	1.8	0.0	2.72	54	8.36	2.45
2080.0	0.00	100	1.5	0.0	2.71	54	8.34	2.45
2081.0	0.00	100	1.0	0.0	2.77	54	8.33	2.45
2082.0	0.00	100	1.7	0.0	2.78	52	8.31	2.45

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2083.0	0.00	100	1.8	0.0	2.75	53	8.30	2.45
2084.0	0.00	100	1.3	0.0	2.80	55	8.28	2.45
2085.0	0.00	100	1.0	0.0	2.81	59	8.27	2.45
2086.0	0.00	100	1.1	0.0	2.79	60	8.26	2.45
2087.0	0.00	100	1.1	0.0	2.79	61	8.24	2.45
2088.0	0.00	100	1.1	0.0	2.77	61	8.23	2.45
2089.0	0.00	100	1.7	0.0	2.77	58	8.22	2.45
2090.0	0.00	100	1.6	0.0	2.76	57	8.20	2.45
2091.0	0.00	100	1.5	0.0	2.71	56	8.19	2.45
2092.0	0.00	99	1.9	0.0	2.70	54	8.17	2.45
2093.0	0.00	99	1.4	0.0	2.71	55	8.15	2.45
2094.0	0.00	100	1.6	0.0	2.72	53	8.14	2.45
2095.0	0.00	75	3.1	0.0	2.69	51	8.12	2.45
2096.0	0.00	100	1.9	0.0	2.73	53	8.09	2.44
2097.0	0.00	100	1.2	0.0	2.76	55	8.07	2.44
2098.0	0.00	100	1.4	0.1	2.73	57	8.06	2.44
2099.0	0.00	100	1.2	0.0	2.73	59	8.05	2.44
2100.0	0.00	100	0.8	0.0	2.76	61	8.04	2.44
2101.0	0.00	100	0.9	0.0	2.75	60	8.03	2.44
2102.0	0.00	100	0.5	0.0	2.78	61	8.02	2.44
2103.0	0.00	100	0.8	0.0	2.79	62	8.01	2.44
2104.0	0.00	96	1.8	0.5	2.73	64	8.00	2.44
2105.0	0.00	73	1.4	0.5	2.71	68	7.98	2.44
2106.0	0.00	71	0.9	0.0	2.70	71	7.97	2.43
2107.0	0.00	97	0.5	0.0	2.78	71	7.97	2.43
2108.0	0.00	93	0.5	0.0	2.77	71	7.96	2.43
2109.0	0.00	74	1.7	0.0	2.71	69	7.95	2.43
2110.0	0.00	79	2.1	0.0	2.72	67	7.93	2.42
2111.0	0.00	87	1.4	0.0	2.77	67	7.92	2.42
2112.0	0.00	85	1.2	0.0	2.75	69	7.90	2.42
2113.0	0.00	99	1.5	0.0	2.79	66	7.89	2.42
2114.0	0.00	99	1.9	0.0	2.76	66	7.87	2.41
2115.0	0.00	98	1.7	0.0	2.73	67	7.85	2.41
2116.0	0.00	100	1.9	0.0	2.78	65	7.84	2.41
2117.0	0.00	98	1.8	0.0	2.77	66	7.82	2.41
2118.0	0.00	82	1.6	0.0	2.74	70	7.80	2.41
2119.0	0.00	82	0.8	0.0	2.79	74	7.79	2.41
2120.0	0.00	88	0.7	0.0	2.79	75	7.78	2.41
2121.0	0.00	97	1.4	0.0	2.78	71	7.77	2.40
2122.0	0.00	100	1.7	0.0	2.78	69	7.76	2.40
2123.0	0.00	88	1.8	0.0	2.72	73	7.74	2.40
2124.0	0.00	87	2.1	0.0	2.73	72	7.72	2.40
2125.0	0.00	87	2.3	0.0	2.74	70	7.70	2.40
2126.0	0.00	87	2.9	0.0	2.77	66	7.67	2.39
2127.0	0.00	86	2.4	0.0	2.80	68	7.64	2.39
2128.0	0.00	96	2.4	0.0	2.80	65	7.62	2.38
2129.0	0.00	99	2.2	0.0	2.80	64	7.60	2.38
2130.0	0.00	94	1.7	0.0	2.78	67	7.57	2.38

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2131.0	0.00	95	0.9	0.0	2.81	68	7.56	2.38
2132.0	0.00	87	1.8	0.0	2.75	68	7.55	2.37
2133.0	0.00	94	2.4	0.0	2.69	70	7.53	2.37
2134.0	0.00	89	2.1	0.0	2.70	72	7.50	2.37
2135.0	0.00	93	0.9	0.0	2.76	75	7.48	2.36
2136.0	0.00	82	0.8	0.0	2.79	81	7.48	2.36
2137.0	0.00	75	1.3	0.0	2.81	81	7.47	2.36
2138.0	0.00	93	0.8	0.0	2.90	80	7.46	2.36
2139.0	0.00	99	0.4	0.2	2.96	83	7.45	2.36
2140.0	0.00	99	0.3	0.3	2.79	87	7.45	2.35
2141.0	0.00	88	1.5	0.0	2.69	84	7.44	2.35
2142.0	0.05	100	0.0	0.0	2.79	89	7.43	2.35
2143.0	0.16	100	0.0	0.0	2.97	93	7.43	2.35
2144.0	0.33	100	0.0	0.0	2.97	92	7.43	2.35
2145.0	1.14	100	0.0	0.0	2.97	93	7.43	2.35
2146.0	2.46	100	0.0	0.0	2.97	94	7.43	2.35
2147.0	4.43	100	0.0	0.0	2.97	92	7.43	2.35
2148.0	5.50	100	0.0	0.0	2.97	91	7.43	2.35
2149.0	5.12	100	0.0	0.0	2.97	89	7.43	2.35
2150.0	3.21	100	0.0	0.0	2.97	91	7.43	2.35
2151.0	0.97	100	0.0	0.0	2.97	90	7.43	2.35
2152.0	0.25	100	0.0	0.0	2.97	87	7.43	2.35
2153.0	0.60	100	0.0	0.0	2.97	87	7.43	2.35
2154.0	0.19	100	0.0	0.0	2.97	89	7.43	2.35
2155.0	0.00	100	0.0	0.0	2.97	88	7.43	2.35
2156.0	0.07	100	0.0	0.0	2.97	89	7.43	2.35
2157.0	1.10	100	0.0	0.0	2.97	93	7.43	2.35
2158.0	2.81	100	0.0	0.0	2.97	90	7.43	2.35
2159.0	3.57	100	0.0	0.0	2.97	90	7.43	2.35
2160.0	4.32	100	0.0	0.0	2.97	92	7.43	2.35
2161.0	4.56	100	0.0	0.0	2.97	95	7.43	2.35
2162.0	4.11	100	0.0	0.0	2.97	96	7.43	2.35
2163.0	4.20	100	0.0	0.0	2.97	95	7.43	2.35
2164.0	3.22	100	0.0	0.0	2.97	96	7.43	2.35
2165.0	1.83	100	0.0	0.0	2.97	98	7.43	2.35
2167.0	3.02	100	0.0	0.0	2.97	99	7.43	2.35
2168.0	2.32	100	0.0	0.0	2.97	99	7.43	2.35
2169.0	0.95	100	0.0	0.0	2.97	96	7.43	2.35
2170.0	1.82	100	0.0	0.0	2.97	99	7.43	2.35
2171.0	3.77	100	0.0	0.0	2.97	96	7.43	2.35
2172.0	4.31	100	0.0	0.0	2.97	93	7.43	2.35
2173.0	3.98	100	0.0	0.0	2.97	94	7.43	2.35
2174.0	4.42	100	0.0	0.0	2.97	94	7.43	2.35
2176.0	6.77	100	1.3	0.0	2.74	65	7.43	2.35
2177.0	8.60	100	0.4	0.0	2.75	66	7.41	2.35
2178.0	16.82	100	0.0	0.0	2.78	69	7.41	2.35

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2179.0	29.84	58	2.7	0.0	2.70	82	7.41	2.35
2180.0	35.83	53	3.5	3.5	2.84	71	7.38	2.34
2181.0	35.33	69	0.7	0.0	2.74	78	7.36	2.33
2182.0	33.71	67	2.2	2.2	2.82	74	7.35	2.32
2183.0	31.90	98	0.4	0.0	2.75	79	7.33	2.32
2184.0	31.15	59	4.4	4.4	2.88	51	7.33	2.32
2185.0	31.92	34	5.5	5.5	2.88	50	7.28	2.29
2186.0	32.33	41	5.3	5.3	2.88	54	7.22	2.26
2187.0	31.40	44	4.3	4.3	2.88	58	7.17	2.23
2188.0	30.58	39	4.8	4.8	2.88	54	7.13	2.20
2189.0	30.15	38	5.1	5.1	2.88	53	7.08	2.17
2190.0	29.37	41	4.6	4.6	2.86	52	7.03	2.14
2191.0	28.24	39	4.5	4.5	2.87	51	6.98	2.11
2192.0	27.94	33	5.0	5.0	2.88	49	6.94	2.08
2193.0	28.04	26	5.6	5.6	2.86	44	6.89	2.05
2194.0	26.41	25	5.3	5.3	2.86	45	6.83	2.01
2195.0	23.74	29	5.2	5.2	2.87	42	6.78	1.97
2196.0	22.18	31	5.0	5.0	2.84	39	6.73	1.93
2197.0	21.39	24	5.7	5.7	2.87	38	6.68	1.90
2198.0	21.37	28	5.6	5.6	2.87	38	6.62	1.86
2199.0	22.09	30	5.7	5.7	2.85	38	6.56	1.81
2200.0	21.84	40	4.4	4.4	2.82	42	6.51	1.78
2201.0	20.76	59	3.8	3.8	2.80	41	6.47	1.76
2202.0	20.42	57	4.2	4.2	2.82	38	6.43	1.74
2203.0	21.36	53	5.3	5.3	2.84	40	6.38	1.72
2204.0	20.88	50	4.7	4.7	2.82	42	6.33	1.69
2205.0	18.60	100	2.7	2.7	2.79	44	6.29	1.68
2206.0	17.64	62	3.7	3.7	2.80	45	6.26	1.68
2207.0	17.38	60	3.7	3.7	2.80	45	6.22	1.66
2208.0	17.28	95	3.1	3.1	2.78	42	6.19	1.65
2209.0	17.87	55	4.0	4.0	2.79	42	6.15	1.64
2210.0	18.04	63	3.6	3.6	2.81	45	6.12	1.62
2211.0	18.49	71	3.6	3.6	2.80	47	6.08	1.61
2212.0	18.55	72	3.1	3.1	2.79	50	6.05	1.60
2213.0	18.58	69	3.1	3.1	2.82	53	6.02	1.59
2214.0	20.02	42	4.4	4.4	2.85	53	5.98	1.58
2215.0	20.50	55	3.8	3.8	2.81	54	5.94	1.56
2216.0	19.05	86	2.8	2.8	2.80	54	5.90	1.54
2217.0	18.16	61	3.6	3.6	2.80	48	5.88	1.54
2218.0	17.18	69	3.3	3.3	2.78	45	5.84	1.53
2219.0	15.89	100	1.8	1.8	2.75	47	5.81	1.52
2220.0	15.46	100	2.8	2.8	2.76	42	5.79	1.52
2221.0	15.51	100	2.0	2.0	2.75	43	5.76	1.52
2222.0	16.19	100	2.6	2.6	2.76	40	5.74	1.52
2223.0	17.07	65	3.6	3.6	2.79	40	5.71	1.51
2224.0	17.46	100	2.0	0.0	2.74	49	5.67	1.50
2225.0	17.36	93	3.3	3.3	2.79	42	5.65	1.50
2226.0	18.73	66	3.8	3.8	2.82	43	5.62	1.50

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2227.0	21.42	54	3.9	3.9	2.80	48	5.58	1.48
2228.0	22.00	69	2.1	0.5	2.73	60	5.55	1.47
2229.0	20.60	73	3.1	3.1	2.82	51	5.52	1.46
2230.0	20.48	58	4.3	4.3	2.84	51	5.49	1.45
2231.0	20.64	55	4.3	4.3	2.83	50	5.45	1.43
2232.0	19.27	63	4.1	4.1	2.81	48	5.40	1.41
2233.0	16.00	100	2.1	2.0	2.75	49	5.36	1.40
2234.0	12.40	100	1.5	0.8	2.74	48	5.35	1.40
2235.0	11.38	100	2.0	2.0	2.76	46	5.33	1.40
2236.0	13.76	100	2.4	2.4	2.77	52	5.31	1.40
2237.0	14.94	100	3.1	0.9	2.72	55	5.28	1.40
2238.0	10.44	100	1.5	0.3	2.74	49	5.25	1.40
2239.0	5.95	100	1.5	0.2	2.74	46	5.24	1.40
2240.0	4.94	100	1.7	0.0	2.74	44	5.22	1.40
2241.0	6.67	100	1.5	1.0	2.74	45	5.21	1.40
2242.0	10.72	100	2.4	2.4	2.77	47	5.19	1.40
2243.0	14.87	99	3.5	3.5	2.79	52	5.16	1.40
2244.0	17.46	100	1.9	1.9	2.77	55	5.13	1.40
2245.0	19.68	71	2.4	1.9	2.75	59	5.11	1.40
2246.0	19.50	67	1.8	1.1	2.74	61	5.09	1.39
2247.0	17.66	69	1.1	0.0	2.74	63	5.07	1.39
2248.0	17.19	72	2.8	2.8	2.81	54	5.06	1.39
2249.0	18.21	85	3.1	3.1	2.80	51	5.03	1.38
2250.0	19.52	77	4.0	4.0	2.81	50	5.00	1.37
2251.0	18.74	100	2.3	2.3	2.76	56	4.96	1.37
2252.0	15.41	100	1.9	1.3	2.73	56	4.93	1.37
2253.0	9.94	100	1.9	0.9	2.74	47	4.92	1.37
2254.0	4.43	100	1.6	0.2	2.74	42	4.90	1.37
2255.0	1.79	100	1.8	0.7	2.74	42	4.88	1.37
2256.0	1.81	100	1.8	0.9	2.74	42	4.86	1.37
2257.0	2.67	100	2.3	0.7	2.74	42	4.84	1.37
2258.0	2.19	100	1.9	0.0	2.74	43	4.82	1.37
2259.0	1.85	100	1.7	0.4	2.74	43	4.80	1.37
2260.0	3.86	100	1.8	1.5	2.74	43	4.78	1.37
2261.0	9.09	100	1.1	0.0	2.75	51	4.77	1.37
2262.0	17.52	100	1.7	0.0	2.73	65	4.76	1.37
2263.0	23.05	72	2.1	0.0	2.72	74	4.74	1.37
2264.0	23.32	61	2.3	2.3	2.81	68	4.71	1.36
2265.0	22.94	60	0.9	0.0	2.74	72	4.69	1.35
2266.0	23.73	40	1.1	0.0	2.74	70	4.68	1.34
2267.0	24.47	99	1.5	0.0	2.73	65	4.67	1.34
2268.0	24.19	87	1.1	0.0	2.74	65	4.66	1.34
2269.0	23.98	66	1.9	1.9	2.80	63	4.65	1.34
2270.0	24.74	55	3.1	3.1	2.83	67	4.62	1.32
2271.0	23.47	71	2.4	2.4	2.79	66	4.59	1.31
2272.0	19.05	100	1.5	0.0	2.74	56	4.57	1.31
2273.0	15.30	100	1.3	0.0	2.75	42	4.56	1.31
2274.0	15.17	100	1.7	0.0	2.74	45	4.54	1.31

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2275.0	17.29	100	1.6	1.1	2.74	55	4.53	1.31
2276.0	18.83	59	3.0	2.9	2.77	54	4.51	1.30
2277.0	17.75	91	2.2	2.2	2.76	52	4.48	1.29
2278.0	15.46	63	4.0	4.0	2.81	44	4.45	1.29
2279.0	13.71	63	3.2	3.2	2.81	44	4.41	1.27
2280.0	14.76	100	1.9	1.9	2.76	51	4.38	1.26
2281.0	17.03	50	2.6	0.0	2.73	55	4.36	1.26
2282.0	15.94	40	4.2	4.2	2.83	46	4.33	1.24
2283.0	15.29	48	1.4	1.4	2.78	55	4.29	1.22
2284.0	18.70	58	3.1	3.1	2.79	51	4.28	1.21
2285.0	23.04	41	3.4	3.4	2.81	54	4.24	1.20
2286.0	25.92	19	4.1	4.1	2.86	61	4.21	1.17
2287.0	26.12	17	5.3	5.3	2.88	56	4.16	1.14
2288.0	23.55	30	4.8	4.8	2.85	46	4.11	1.09
2289.0	20.20	31	3.9	3.9	2.82	43	4.06	1.06
2290.0	17.16	28	4.8	4.8	2.83	40	4.02	1.03
2291.0	14.97	33	3.5	3.5	2.81	40	3.97	1.00
2292.0	15.58	55	1.5	0.5	2.75	46	3.94	0.98
2293.0	18.27	23	2.6	2.6	2.76	51	3.93	0.97
2294.0	19.31	20	4.5	4.5	2.84	47	3.89	0.95
2295.0	18.54	33	2.9	2.9	2.79	49	3.85	0.91
2296.0	17.73	29	4.1	4.1	2.82	41	3.82	0.89
2297.0	17.28	54	2.5	2.5	2.78	46	3.78	0.86
2298.0	18.11	35	1.5	1.2	2.75	53	3.76	0.85
2299.0	19.42	21	4.8	4.8	2.85	45	3.74	0.84
2300.0	19.39	19	5.7	5.7	2.87	41	3.68	0.79
2301.0	18.46	25	2.9	2.9	2.79	49	3.63	0.75
2302.0	17.37	17	4.3	4.3	2.83	45	3.60	0.73
2303.0	15.20	14	6.4	6.4	2.86	29	3.55	0.69
2304.0	12.27	18	6.1	6.1	2.84	23	3.48	0.63
2305.0	10.74	28	3.7	3.7	2.79	30	3.43	0.59
2306.0	10.57	31	3.2	3.2	2.76	33	3.39	0.56
2307.0	9.98	47	2.1	1.8	2.74	37	3.37	0.55
2308.0	10.49	36	2.5	2.5	2.76	39	3.35	0.54
2309.0	12.23	32	3.1	3.1	2.77	35	3.32	0.52
2310.0	13.98	30	3.3	3.3	2.77	35	3.29	0.50
2311.0	14.78	22	4.7	4.7	2.80	30	3.25	0.47
2312.0	14.31	28	4.7	4.7	2.80	28	3.21	0.43
2313.0	13.76	33	4.1	4.1	2.79	28	3.16	0.40
2314.0	13.80	33	4.4	4.4	2.80	28	3.12	0.38
2315.0	14.39	28	4.8	4.8	2.80	27	3.07	0.34
2316.0	14.55	41	4.4	4.4	2.79	27	3.03	0.31
2317.0	14.47	41	4.5	4.5	2.80	26	2.98	0.29
2318.0	14.58	39	4.5	4.5	2.79	27	2.94	0.26
2319.0	14.58	39	5.0	5.0	2.81	28	2.89	0.23
2320.0	15.24	27	5.7	5.7	2.83	24	2.84	0.20
2321.0	16.38	21	5.5	5.5	2.81	25	2.79	0.16
2322.0	14.19	52	1.9	1.9	2.91	43	2.73	0.11

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2323.0	5.05	19	5.9	4.3	2.82	28	2.71	0.10
2324.0	0.00	61	2.6	2.6	2.74	15	2.65	0.05
2325.0	0.00	100	0.0	0.0	2.78	12	2.64	0.05
2326.0	0.00	100	0.0	0.0	2.77	7	2.64	0.05
2327.0	0.00	100	0.0	0.0	2.75	3	2.64	0.05
2328.0	0.00	100	0.0	0.0	2.76	4	2.64	0.05
2329.0	0.00	100	0.0	0.0	2.77	5	2.64	0.05
2330.0	0.00	100	0.0	0.0	2.76	5	2.64	0.05
2331.0	0.00	100	0.0	0.0	2.76	5	2.64	0.05
2332.0	0.00	100	0.0	0.0	2.76	3	2.64	0.05
2333.0	0.00	100	0.0	0.0	2.79	3	2.64	0.05
2334.0	0.00	100	0.0	0.0	2.80	6	2.64	0.05
2335.0	0.00	100	0.0	0.0	2.82	7	2.64	0.05
2336.0	0.00	100	0.0	0.0	2.79	7	2.64	0.05
2337.0	0.00	100	0.0	0.0	2.81	7	2.64	0.05
2338.0	0.00	100	0.0	0.0	2.81	6	2.64	0.05
2339.0	0.00	100	0.0	0.0	2.77	2	2.64	0.05
2340.0	0.00	100	0.0	0.0	2.76	1	2.64	0.05
2341.0	0.00	100	0.0	0.0	2.74	2	2.64	0.05
2342.0	0.00	100	0.1	0.0	2.76	0	2.64	0.05
2343.0	0.00	100	0.0	0.0	2.77	0	2.64	0.05
2344.0	0.00	100	0.0	0.0	2.77	0	2.64	0.05
2345.0	0.00	100	0.0	0.0	2.79	0	2.64	0.05
2346.0	0.00	100	0.0	0.0	2.77	0	2.64	0.05
2347.0	0.00	100	0.0	0.0	2.78	0	2.64	0.05
2348.0	0.00	100	0.0	0.0	2.77	1	2.64	0.05
2349.0	0.00	100	0.0	0.0	2.81	1	2.64	0.05
2350.0	0.00	100	0.0	0.0	2.78	0	2.64	0.05
2351.0	0.00	100	0.0	0.0	2.77	0	2.64	0.05
2352.0	0.00	100	0.0	0.0	2.77	0	2.64	0.05
2353.0	0.00	100	0.0	0.0	2.80	0	2.64	0.05
2354.0	0.00	100	0.1	0.0	2.77	0	2.64	0.05
2355.0	0.00	100	0.3	0.0	2.75	0	2.63	0.05
2356.0	0.00	100	0.3	0.0	2.74	0	2.63	0.05
2357.0	0.00	100	0.0	0.0	2.77	0	2.63	0.05
2358.0	0.00	100	0.1	0.0	2.77	0	2.63	0.05
2359.0	0.00	100	0.0	0.0	2.77	0	2.63	0.05
2360.0	0.00	100	0.5	0.0	2.74	0	2.63	0.05
2361.0	0.00	100	0.6	0.0	2.74	0	2.62	0.05
2362.0	0.00	100	0.5	0.0	2.75	0	2.62	0.05
2363.0	0.00	100	0.7	0.0	2.74	0	2.61	0.05
2364.0	0.00	100	0.1	0.0	2.72	2	2.60	0.05
2365.0	0.00	100	0.0	0.0	2.72	3	2.60	0.05
2366.0	0.00	100	0.0	0.0	2.76	3	2.60	0.05
2367.0	0.00	100	0.0	0.0	2.79	4	2.60	0.05
2368.0	0.00	100	0.0	0.0	2.77	4	2.60	0.05

DEPTH	KEROGEN-VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2371.0	0.00	100	0.0	0.0	2.80	4	2.60	0.05
2372.0	0.00	100	0.0	0.0	2.79	4	2.60	0.05
2373.0	0.00	100	0.0	0.0	2.75	2	2.60	0.05
2374.0	0.00	100	0.0	0.0	2.76	3	2.60	0.05
2375.0	0.00	100	0.0	0.0	2.77	4	2.60	0.05
2376.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2377.0	0.00	100	0.0	0.0	2.75	4	2.60	0.05
2378.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2379.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2380.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2381.0	0.00	100	0.0	0.0	2.73	4	2.60	0.05
2382.0	0.00	100	0.0	0.0	2.73	4	2.60	0.05
2383.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2384.0	0.00	100	0.0	0.0	2.75	5	2.60	0.05
2385.0	0.00	100	0.0	0.0	2.75	3	2.60	0.05
2386.0	0.00	100	0.0	0.0	2.73	6	2.60	0.05
2387.0	0.00	100	0.0	0.0	2.73	5	2.60	0.05
2388.0	0.00	100	0.0	0.0	2.75	4	2.60	0.05
2389.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2390.0	0.00	100	0.0	0.0	2.73	4	2.60	0.05
2391.0	0.00	100	0.0	0.0	2.72	3	2.60	0.05
2392.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2393.0	0.00	100	0.0	0.0	2.77	4	2.60	0.05
2394.0	0.00	100	0.0	0.0	2.78	4	2.60	0.05
2395.0	0.00	100	0.0	0.0	2.79	1	2.60	0.05
2396.0	0.00	100	0.0	0.0	2.79	0	2.60	0.05
2397.0	0.00	100	0.0	0.0	2.77	4	2.60	0.05
2398.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2399.0	0.00	100	0.0	0.0	2.74	4	2.60	0.05
2400.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2401.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2402.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2403.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2404.0	0.00	100	0.0	0.0	2.77	4	2.60	0.05
2405.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2406.0	0.00	100	0.0	0.0	2.76	4	2.60	0.05
2407.0	0.00	100	0.0	0.0	2.75	4	2.60	0.05
2408.0	0.00	100	0.0	0.0	2.77	4	2.60	0.05
2409.0	0.00	100	0.0	0.0	2.78	4	2.60	0.05
2410.0	0.00	100	0.0	0.0	2.76	0	2.60	0.05
2411.0	0.00	100	0.3	0.0	2.75	0	2.60	0.05
2412.0	0.00	100	0.0	0.0	2.73	1	2.60	0.05
2413.0	0.00	100	0.0	0.0	2.75	4	2.60	0.05
2414.0	0.00	100	0.0	0.0	2.78	2	2.60	0.05
2415.0	0.00	100	0.0	0.0	2.79	0	2.60	0.05
2416.0	0.00	100	0.3	0.0	2.75	0	2.60	0.05
2417.0	0.00	100	0.3	0.0	2.75	0	2.60	0.05
2418.0	0.00	100	0.5	0.0	2.74	0	2.59	0.05

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2419.0	0.00	100	0.5	0.0	2.75	0	2.59	0.05
2420.0	0.00	100	0.2	0.0	2.77	0	2.58	0.05
2421.0	0.00	100	0.1	0.0	2.75	1	2.58	0.05
2422.0	0.00	100	0.0	0.0	2.75	1	2.58	0.05
2423.0	0.00	100	0.0	0.0	2.76	1	2.58	0.05
2424.0	0.00	100	0.0	0.0	2.77	4	2.58	0.05
2425.0	0.00	100	0.0	0.0	2.79	4	2.58	0.05
2426.0	0.00	100	0.0	0.0	2.78	4	2.58	0.05
2427.0	0.00	100	0.0	0.0	2.76	2	2.58	0.05
2428.0	0.00	100	0.0	0.0	2.78	2	2.58	0.05
2429.0	0.00	100	0.0	0.0	2.78	1	2.58	0.05
2430.0	0.00	100	0.4	0.0	2.79	0	2.58	0.05
2431.0	0.00	100	0.7	0.0	2.76	1	2.57	0.05
2432.0	0.00	100	1.5	0.0	2.77	2	2.57	0.05
2433.0	0.00	100	2.5	0.0	2.76	1	2.55	0.05
2434.0	0.00	100	2.5	0.0	2.76	1	2.52	0.05
2435.0	0.00	100	3.0	0.0	2.76	0	2.50	0.05
2436.0	0.00	73	3.9	3.9	2.75	0	2.46	0.05
2437.0	0.00	100	3.0	0.0	2.77	0	2.43	0.04
2438.0	0.00	100	2.9	0.0	2.75	0	2.40	0.04
2439.0	0.00	100	2.6	2.6	2.75	0	2.37	0.04
2440.0	0.00	100	0.9	0.0	2.75	5	2.35	0.04
2441.0	0.00	100	0.3	0.0	2.78	7	2.34	0.04
2442.0	0.00	100	0.0	0.0	2.81	13	2.34	0.04
2443.0	0.00	100	0.0	0.0	2.80	14	2.34	0.04
2444.0	0.00	100	0.2	0.0	2.77	5	2.34	0.04
2445.0	0.00	100	0.7	0.0	2.74	2	2.33	0.04
2446.0	0.00	100	0.0	0.0	2.75	5	2.33	0.04
2447.0	0.00	100	0.4	0.0	2.77	2	2.33	0.04
2448.0	0.00	100	1.3	0.0	2.74	1	2.32	0.04
2449.0	0.00	100	1.0	0.0	2.74	2	2.31	0.04
2450.0	0.00	100	1.2	0.0	2.73	4	2.30	0.04
2451.0	0.00	100	0.4	0.4	2.71	8	2.29	0.04
2452.0	0.00	100	0.0	0.0	2.72	11	2.29	0.04
2453.0	0.00	100	0.0	0.0	2.74	11	2.29	0.04
2454.0	0.00	100	3.6	0.0	2.76	0	2.28	0.04
2455.0	0.00	100	4.6	0.0	2.73	0	2.24	0.04
2456.0	0.00	100	3.5	0.9	2.73	2	2.19	0.04
2457.0	0.00	100	3.1	0.4	2.74	2	2.16	0.04
2458.0	0.00	100	4.4	0.0	2.74	0	2.13	0.04
2459.0	0.00	100	4.8	0.0	2.74	1	2.08	0.04
2460.0	0.00	100	2.7	0.0	2.75	2	2.04	0.04
2461.0	0.00	100	0.4	0.0	2.76	3	2.02	0.04
2462.0	0.00	100	1.4	0.0	2.77	0	2.01	0.04
2463.0	0.00	100	2.2	0.0	2.74	1	1.99	0.04
2464.0	0.00	100	1.9	0.0	2.75	3	1.97	0.04
2465.0	0.00	100	2.4	0.0	2.76	1	1.95	0.04
2466.0	0.00	100	3.9	0.0	2.76	0	1.92	0.04

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2467.0	0.00	100	5.3	0.0	2.77	0	1.88	0.04
2468.0	0.00	100	6.1	0.0	2.75	0	1.83	0.04
2469.0	0.00	100	5.9	0.0	2.74	0	1.76	0.04
2470.0	0.00	99	6.4	0.0	2.74	0	1.70	0.04
2471.0	0.00	100	5.2	0.0	2.75	0	1.64	0.04
2472.0	0.00	100	4.4	0.0	2.75	0	1.59	0.04
2473.0	0.00	100	4.1	0.0	2.72	0	1.55	0.04
2474.0	0.00	100	3.7	0.0	2.72	0	1.51	0.04
2475.0	0.00	100	2.9	0.0	2.75	0	1.47	0.04
2476.0	0.00	100	3.1	0.0	2.75	0	1.44	0.04
2477.0	0.00	100	3.4	0.0	2.75	0	1.41	0.04
2478.0	0.00	100	3.5	0.0	2.74	1	1.38	0.04
2479.0	0.00	100	5.0	0.0	2.74	0	1.34	0.04
2480.0	0.00	100	5.8	0.0	2.75	0	1.29	0.04
2481.0	0.00	100	6.3	0.0	2.79	0	1.23	0.04
2482.0	0.00	97	7.2	0.0	2.76	0	1.17	0.04
2483.0	0.00	100	5.1	0.0	2.74	0	1.10	0.04
2484.0	0.00	100	4.5	0.0	2.71	0	1.05	0.04
2485.0	0.00	100	3.8	1.4	2.70	1	1.00	0.04
2486.0	0.00	100	2.0	0.2	2.72	2	0.97	0.04
2487.0	0.00	100	3.0	0.0	2.74	0	0.95	0.04
2488.0	0.00	99	3.6	0.0	2.73	0	0.92	0.04
2489.0	0.00	100	3.7	0.0	2.74	0	0.88	0.04
2490.0	0.00	100	3.5	0.0	2.76	0	0.84	0.04
2491.0	0.00	98	4.4	0.0	2.75	0	0.81	0.04
2492.0	0.00	100	3.9	0.1	2.74	1	0.76	0.03
2493.0	0.00	100	2.1	0.0	2.77	0	0.73	0.03
2494.0	0.00	100	1.4	0.0	2.77	0	0.71	0.03
2495.0	0.00	100	1.1	0.0	2.77	0	0.70	0.03
2496.0	0.00	100	2.4	0.0	2.74	0	0.68	0.03
2497.0	0.00	95	3.8	0.4	2.70	0	0.66	0.03
2498.0	0.00	100	2.6	0.8	2.71	1	0.62	0.03
2499.0	0.00	100	0.8	0.4	2.73	4	0.60	0.03
2500.0	0.00	100	1.7	0.0	2.74	1	0.59	0.03
2501.0	0.00	100	1.9	0.0	2.76	1	0.57	0.03
2502.0	0.00	100	1.5	0.0	2.76	2	0.55	0.03
2503.0	0.00	100	0.2	0.0	2.75	5	0.54	0.03
2504.0	0.00	100	0.3	0.0	2.75	4	0.54	0.03
2505.0	0.00	100	1.4	0.0	2.75	1	0.53	0.03
2506.0	0.00	100	1.6	0.0	2.73	3	0.52	0.03
2507.0	0.00	100	1.6	0.0	2.74	3	0.50	0.03
2508.0	0.00	100	1.1	0.0	2.76	3	0.49	0.03
2509.0	0.00	100	0.9	0.0	2.76	2	0.48	0.03
2510.0	0.00	100	0.6	0.0	2.76	3	0.47	0.03
2511.0	0.00	100	0.0	0.0	2.78	4	0.46	0.03
2512.0	0.00	100	1.0	0.0	2.77	1	0.46	0.03
2513.0	0.00	100	1.8	0.0	2.76	0	0.45	0.03
2514.0	0.00	100	1.6	0.0	2.75	2	0.43	0.03

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2515.0	0.00	100	0.8	0.0	2.75	2	0.42	0.03
2516.0	0.00	100	1.2	0.0	2.76	0	0.41	0.03
2517.0	0.00	100	1.2	0.0	2.72	0	0.40	0.03
2518.0	0.00	100	0.2	0.0	2.73	3	0.39	0.03
2519.0	0.00	100	0.1	0.0	2.75	3	0.39	0.03
2520.0	0.00	100	0.0	0.0	2.74	4	0.39	0.03
2521.0	0.00	100	0.0	0.0	2.77	5	0.39	0.03
2522.0	0.00	100	0.0	0.0	2.78	6	0.39	0.03
2523.0	0.00	100	0.0	0.0	2.75	3	0.39	0.03
2524.0	0.00	100	0.3	0.0	2.74	2	0.38	0.03
2525.0	0.00	100	0.8	0.0	2.73	2	0.38	0.03
2526.0	0.00	100	0.8	0.0	2.72	3	0.37	0.03
2527.0	0.00	100	0.7	0.0	2.73	3	0.37	0.03
2528.0	0.00	100	1.2	0.0	2.74	1	0.36	0.03
2529.0	0.00	100	0.9	0.0	2.74	2	0.35	0.03
2530.0	0.00	100	0.6	0.0	2.74	4	0.34	0.03
2531.0	0.00	100	0.2	0.0	2.76	3	0.33	0.03
2532.0	0.00	100	0.6	0.0	2.75	2	0.33	0.03
2533.0	0.00	100	0.2	0.0	2.74	3	0.32	0.03
2534.0	0.00	100	0.5	0.0	2.73	3	0.32	0.03
2535.0	0.00	100	0.0	0.0	2.72	5	0.32	0.03
2536.0	0.00	100	0.0	0.0	2.73	6	0.32	0.03
2537.0	0.00	100	0.6	0.0	2.75	3	0.32	0.03
2538.0	0.00	100	0.0	0.0	2.77	5	0.31	0.03
2539.0	0.00	100	0.0	0.0	2.79	7	0.31	0.03
2540.0	0.00	100	0.1	0.0	2.73	5	0.31	0.03
2541.0	0.00	100	0.9	0.0	2.72	3	0.31	0.03
2542.0	0.00	100	1.0	0.0	2.74	2	0.30	0.03
2543.0	0.00	100	0.3	0.0	2.76	3	0.29	0.03
2544.0	0.00	100	0.1	0.0	2.77	4	0.29	0.03
2545.0	0.00	100	0.7	0.0	2.74	2	0.29	0.03
2546.0	0.00	100	0.4	0.0	2.76	2	0.28	0.03
2547.0	0.00	100	0.0	0.0	2.78	6	0.28	0.03
2548.0	0.00	100	0.0	0.0	2.78	5	0.28	0.03
2549.0	0.00	100	0.0	0.0	2.77	4	0.28	0.03
2550.0	0.00	100	0.0	0.0	2.73	4	0.28	0.03
2551.0	0.00	100	0.0	0.0	2.73	5	0.28	0.03
2552.0	0.00	100	1.7	0.0	2.74	0	0.28	0.03
2553.0	0.00	87	3.3	0.0	2.74	0	0.26	0.03
2554.0	0.00	70	3.8	0.0	2.76	0	0.22	0.02
2555.0	0.00	100	3.1	0.0	2.76	0	0.18	0.01
2556.0	0.00	100	2.2	0.0	2.75	0	0.16	0.01
2557.0	0.00	100	2.5	0.2	2.74	0	0.14	0.01
2558.0	0.00	74	2.9	0.1	2.74	0	0.11	0.00
2559.0	0.00	100	1.6	0.0	2.76	0	0.08	0.00
2560.0	0.00	100	0.7	0.0	2.76	0	0.07	0.00
2561.0	0.00	100	0.3	0.0	2.76	0	0.06	0.00
2562.0	0.00	100	0.1	0.0	2.75	0	0.06	0.00

DEPTH	KEROGEN VOLUME	WATER SAT.	POROSITY TOTAL	POROSITY SEC.	MATRIX DENSITY GM/CC	SHALE VOLUME	CUMULATIVE INTEGRATIONS POR-FT	CUMULATIVE INTEGRATIONS HC-FT
2563.0	0.00	100	0.0	0.0	2.76	5	0.06	0.00
2564.0	0.00	100	0.0	0.0	2.78	4	0.06	0.00
2565.0	0.00	100	0.5	0.0	2.76	0	0.06	0.00
2566.0	0.00	100	0.9	0.0	2.73	0	0.05	0.00
2567.0	0.00	100	0.2	0.0	2.76	0	0.04	0.00
2568.0	0.00	100	0.3	0.0	2.76	0	0.04	0.00
2569.0	0.00	100	0.6	0.2	2.73	0	0.04	0.00
2570.0	0.00	100	0.5	0.2	2.73	0	0.03	0.00
2571.0	0.00	100	0.1	0.0	2.75	0	0.03	0.00
2572.0	0.00	100	0.0	0.0	2.75	1	0.03	0.00
2573.0	0.00	100	0.2	0.0	2.75	0	0.03	0.00
2574.0	0.00	100	0.1	0.0	2.77	0	0.03	0.00
2575.0	0.00	100	0.0	0.0	2.78	0	0.03	0.00
2576.0	0.00	100	0.0	0.0	2.77	0	0.03	0.00
2577.0	0.00	100	0.0	0.0	2.76	0	0.03	0.00
2578.0	0.00	100	0.0	0.0	2.78	0	0.02	0.00
2579.0	0.00	100	0.1	0.0	2.76	0	0.02	0.00
2580.0	0.00	100	0.3	0.0	2.75	0	0.02	0.00
2581.0	0.00	100	0.2	0.0	2.76	0	0.02	0.00
2582.0	0.00	100	0.2	0.0	2.76	0	0.02	0.00
2583.0	0.00	100	0.0	0.0	2.77	0	0.02	0.00
2584.0	0.00	100	0.0	0.0	2.81	0	0.02	0.00
2585.0	0.00	100	0.1	0.0	2.77	0	0.02	0.00
2586.0	0.00	100	0.3	0.0	2.75	0	0.02	0.00
2587.0	0.00	100	0.5	0.0	2.73	0	0.01	0.00
2588.0	0.00	100	0.5	0.0	2.73	0	0.01	0.00
2589.0	0.00	100	0.1	0.0	2.76	0	0.00	0.00
2590.0	0.00	100	0.1	0.0	2.76	0	0.00	0.00

APPENDIX F

This section includes the copies of the logs provided by Schlumberger Well Services. They include:

- Sonic Log
- Compensated Neutron Formation Density Log
- Microlaterolog - Microlog
- Dual Induction - Laterolog
- Coriband Analysis

APPENDIX G

This section contains the scope of work for the Orbit Gas Company Eastern Gas Shale Project Contract

UGR File #254
SAI
July 1979

SCOPE OF WORK

Eastern Gas Shales Project - Concept for
Stimulating Production From the Upper
Devonian Shale of Western Kentucky

1.0 Work under this contract shall be performed in accordance with the specific tasks of effort set forth below. The total project shall consist of 3 tasks which shall be performed sequentially. The objective of the project is to 1) acquire oriented core material and comprehensive geophysical well log data from the Devonian Shale in western Kentucky and 2) to evaluate the technical and economic feasibility of stimulating natural gas production from the Devonian Shale by hydraulic fracturing. The Contractor shall furnish the personnel, facilities, equipment and services necessary to perform each task of the program as outlined below.

1.1 Task 1 - The Contractor shall select a well location in the East Crofton Field of Christian County, Kentucky. More specifically, the well will be located in the southeastern portion of Section 9, Township 6, Range 25, and will be as close to Highway 800 as possible. Once the well location has been selected, a map showing the location will be supplied to the ERDA TPO. The Government shall have two (2) working days after receipt of the map to concur with the Contractors selection or to make recommendations concerning an alternate location. No work shall commence or costs be incurred for subsequent tasks work until written authorization to proceed with these tasks has been granted by the Contracting Officer.

1.2 Task II - The Contractor shall obtain all the necessary state and local permits and satisfy all existing state and local laws and regulations pertinent to the drilling of a natural gas well in Christian County, Kentucky.

The Contractor shall then drill, core, log and case a well through the Devonian Shale formation. The Contractor will drill and case the hole, using standard field practices, in such a manner that satisfies all existing state and local laws and regulations. Conventional drilling will continue to the top of the New Albany Shale at an approximate depth of 2000 feet. This depth will be referred to as the "core point". The Contractor will use all available information to select the core point as accurately as possible.

A four inch diameter oriented core will be obtained through the entire (approximately 200 ft.) Devonian Shale formation. The core material will be handled, i.e. marked, wrapped, boxed and transported, by MERC/ERDA personnel. The core material will be transported to MERC where it will be processed for utilization in the Eastern Gas Shales Project (EGSP).

Following the coring operation, a comprehensive suite of geophysical well logs will be run in the well. This suite of logs will be consistent with the logging program outlined in the EGSP and will consist of the following logs:

(1) Gamma Ray
(2) Formation Density Compensated
(3) Temperature
(4) Caliper
(5) Sibilation
(6) Dual Induction - Laterolog
(7) Micro Laterolog
(8) Compensated Neutron
(9) Sonic
(10) SP

After the logging operation is complete the Contractor shall case the hole through the Devonian Shale with K-55, 4-1/2 O.D. seamless casing. The cement top shall be at least 200 feet above the top of the Devonian Shale formation.

The Contractor and the ERDA TPO and/or his representative shall concur on the hydraulic fracturing design for this well. The placement of the perforations and the exact size of the treatment will be determined using data from drilling records, core analysis, and well logs. The hydraulic fracturing fluid will be sand-laden foam - 75% nitrogen, 25% water. Approximately 1200 barrels of foam, and 50,000 pounds of 20-40 mesh sand will be used in the fracturing operation. This quantity of fluid and proppant is consistent with other experimental stimulation work that is being conducted in conjunction with the EGSP.

The final design of the hydraulic fracturing treatment will be prepared by ERDA and sent to the Contractor for concurrence no later than 20 working days after the logging operation has been completed. The Contractor shall have five (5) working days to approve the design or make recommendations concerning an alternate design. No work shall commence or costs be incurred for subsequent tasks work until written authorization has been granted by the Contracting Officer.

1.3 Task III - The Contractor shall hydraulically fracture the well according to the design approved in Task II. Due to certain unknown reservoir parameters it may be necessary to make changes in the hydraulic fracture treatment while the treatment is in progress. The ERDA TPO will be on location to make recommendations and to concur with any proposed changes.

Due to the critical nature of the "flowback" period after the treatment the ERDA TPO and/or his representative will be present to advise the Contractor on the procedures that must be followed to produce the best results.

Once well conditions permit, the Contractor shall conduct extensive well tests which will permit evaluation of the hydraulic fracture treatment. These tests will consist of a four-point, modified-isochronal test, a drawdown test, and a long-term pressure build-up test.

The Contractor shall prepare and present to the ERDA TPO a final report which contains a log of all wellsite activities, results, and recommendations through the end of the preliminary testing and evaluation period.

1.4 Task IV - If production is sufficient from the proposed well and other developmental wells to warrant laying a gathering line to this field, the proposed well will be put on line and its production monitored for a three year period. Monthly production records will be supplied to the ERDA TPO semi-annually. These records should include amount of gas produced, wellhead pressures and the composition of the gas being produced.

Deliverables

As part of the work to be performed pursuant to this contract, the Contractor shall submit the following reports:

1.0 TASK REPORTS

The Contractor shall prepare and submit a letter report at the completion of each task of effort. This report shall provide a narrative summary of all work accomplished under each task including conclusions reached and specific recommendations for subsequent tasks effort.

2.0 DRAFT FINAL REPORT

Upon completion of the work described in the Statement of Work, the Contractor shall prepare and submit a draft final report which shall include an analysis of salient findings, a presentation of general conclusions, and any guidance or recommendations deemed pertinent for future consideration by the Government. The Government will be allowed twenty (20) days to review the draft and notify the Contractor, in writing, of approval or of recommended changes to be made in the final copy.

If the Government does not approve or recommend changes in writing within twenty (20) days of receipt of the draft final report, the report will be deemed approved. The draft final report shall also include a list of inventions made or conceived in the course of or under the contract or a certification of the absence thereof.

3.0 FINAL REPORT

Within thirty (30) days of receipt of approval of the draft final report from the Government Technical Project Officer, the Contractor shall furnish the Government with a reproducible master and the required number of copies of the final report in final form. For the reproducible master, the typing shall be single spaced on one side of the sheet only, and all photographs shall consist of glossy prints.

The following disclaimer shall be printed or stamped on the title page or inside cover of each volume and copy of the final report:

> "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or recommendations of the U.S. Government."

DELIVERY DATES

1. Reports

Description	Quantity	Delivery Date
a. Task Reports	10 copies	Due on or before ten (10) days after the completion of each task of effort
b. Draft Final Report	10 copies	Due ten (10) days after completion of Task IV
c. Final Report	One reproducible master and 50 copies	Due on or before thirty days after approval of the draft final report.

2. Distribution of Reports

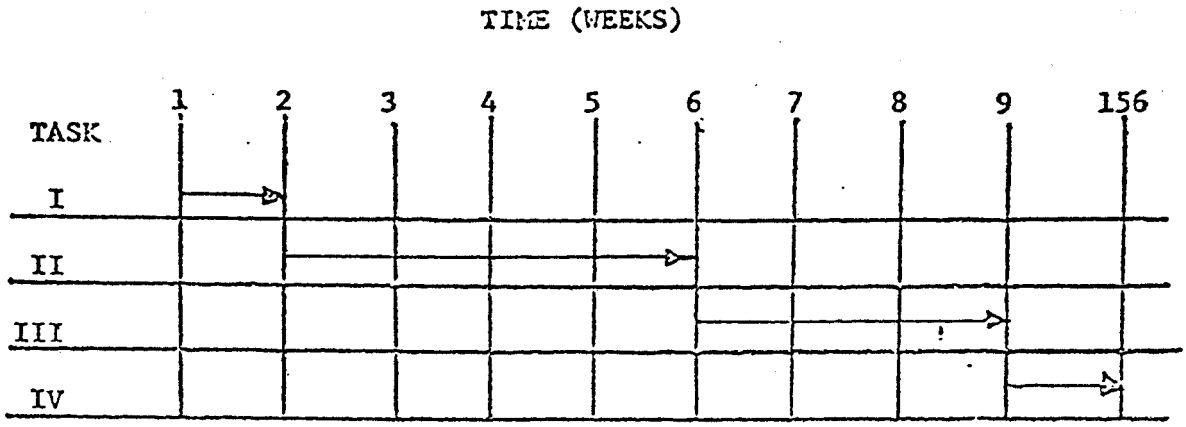
a. One copy of each report, in draft and/or final form, as required by this contract, shall be delivered prepaid to:

United States Energy Research and Development Administration
P.O. Box E
Oak Ridge, Tennessee 37830

ATTENTION: F. O. Christie, Director, Contract Division
Oak Ridge Operations

b. All remaining copies of reports shall be delivered prepaid to the Government Technical Project Officer designated by the Contracting Officer.

TASK SCHEDULE



APPENDIX H

This section contains a monthly financial report, an oil and gas lease, permit to drill, and examination of the title to the leasehold estate performed by Neal & Neal Attorneys, and bid sheet and well specifications.

UGR File #254
SAI
July 1979

Orbit Gas Company
January 3, 1977

MONTHLY FINANCIAL REPORT

ITEM	PAYEE	DESCRIPTION OF WORK PERFORMED	COST ALLOCATION ERDA	COST ALLOCATION ORBIT GAS
1. Title Examination	Neal & Neal	Title opinion re: Oil & Gas Minerals on J. R. Clark Lease.	$ 0	$ 741.60
2. Survey & Drilling Permit	Cornette Engineering Services	Survey well location, determine elevation, draft location map.	0	167.40
	Kentucky State Treasurer	Standard Drilling Permit Fee	0	25.00
3. Make Location	J. G. Daugherty	Make location and dig mud pits for rotary rig.	0	436.00
4. Move in and rig up.	Crescent Drilling Co.	Move rig from Ky. State Highway to drill site (did not charge).	0	0
5. Surface Casing & Installation	National-Southwire Co.	25 Ft. (Net) of 8-5/8" O.D. .264 wall well casing @ $5.1428 per foot.	0	128.57
	Crescent Drilling Co.	Rig time to drill surface hole, run casing, and wait on cement - 15 Hours.	0	1,125.00
	General Oil Well Cementing Co.	Cement surface casing with 50 sks. cement & 100 lb. Calcium Chloride.	0	459.00
6. Rotary Drilling	Crescent Drilling Co.	Rig time to drill rat hole, drill cement out of surface casing 5-3/4 Hours.	0	431.25
	Crescent Drilling Co.	Rig time to circulate & run drill stem test @ 952 ft. - 9½ Hours.	0	712.50
	Crescent Drilling Co.	Drilling 2,415 ft. of hole @ $8.50 per ft.	0	20,527.50
	Halliburton Services	Drill stem test at 952 ft.	0	518.00
7. Drilling Fluid	Baroid Petroleum Service	Mud chemicals used by Orbit from base of New Albany shale to total depth.		
		Orbit used plain water for its drilling operation to the core point.	0	1,266.5
8. Production Casing	General Oil Field Supply Co.	2,376 Ft. (including threads) of 4½" O.D. J-55 @ $2.8644 per ft. less 2%.	0	6,669.7
	General Oil Field Supply Co.	Hauling casing to drill site - 8 hrs. at $28.50 per hour.	0	228.0
9. Cement Casing	Halliburton Services	Pumping charge plus mileage to drill site.	0	710.2
	Halliburton Services	288 sacks regular bulk cement plus 287 sacks Pozmix A.	0	1,102.0
	Halliburton Services	Service charge on cement and hauling to drill site.	0	990.7
	Halliburton Services	Kentucky tax on cementing materials, etc.	0	162.1
	Crescent Drilling Co.	Rig Time to cement casing - 4½ Hours.	0	337.1

UGR File #254
SAI
July 1979

ITEM	PAYEE	DESCRIPTION OF WORK PERFORMED	COST ALLOCATION ERDA	COST ALLOCATION ORBIT GAS
Miscellaneous Materials	Halliburton Services	Formation packer, centralizers, wall cleaners, mud flush, salt for cementing.	$ 0	$ 1,149.
Hauling	J. G. Daugherty	Water for cementing casing	0	80.
Rig Down	Crescent Drilling Co	Rig time to lay down drill pipe & drill collars, etc. - 6 Hrs.	0	450.
Well Head and Equipment	Orbit Gas Company	Xmas Tree, Stuffing Box and 1" Siphon String	0	2,922.
Fill Pits, Clean-up & Damages	Orbit Gas Company	Installation pending completion of well.	0	*
Testing	Orbit Gas Company	To be performed on completion of well.	0	*
Oriented Coring	Christensen Diamond Prod. Co.	Equipment rental & engineering for 149 ft. oriented core of the New Albany black shale (corrected by $5.00 per ft.).	7,827.90	0
	Crescent Drilling Co.	Rig time to mix mud, condition hole, run 60 ft. core barrel, free stuck pipe, ream hole, mix additional mud & run core barrel for two more core sections (total of three) - 88 Hours.	6,600.00	0
	Bariod Petroleum Service	Mud chemicals required for coring per Christensen specifications.	769.42	0
	Bariod Petroleum Service	Additional chemicals to prevent stuck pipe and facilitate coring.	1,689.30	0
Logging	Schlumberger Well Services	Requested suite of logs, taping and analysis.	7,191.51	0
	Crescent Drilling Co.	Rig time for conditioning hole and logging - 15½ Hours.	1,162.50	0
Stimulation	Owensboro Supply Company	Service rig to swab casing, run perforating log and perforate casing.	360.00	0
	Birdwell Division	Run Gamma Ray - Neutron Log and perforate ten shots.	1,460.09	0
	Halliburton Services	Acidize perforations	914.48	0
	Halliburton Services	Foam Frac New Albany shale formation.	8,347.50	0
	Aircowell	Nitrogen Service for Foam Frac	8,680.25	0
	J. G. Daugherty	Water for Acid Flush and Foam Frac	243.50	0
	Owensboro Supply Company	Service rig to swab back acid and assist foam frac.	604.50	
		TOTAL EXPENDITURES TO DATE	$ 45,850.95	$ 41,340.

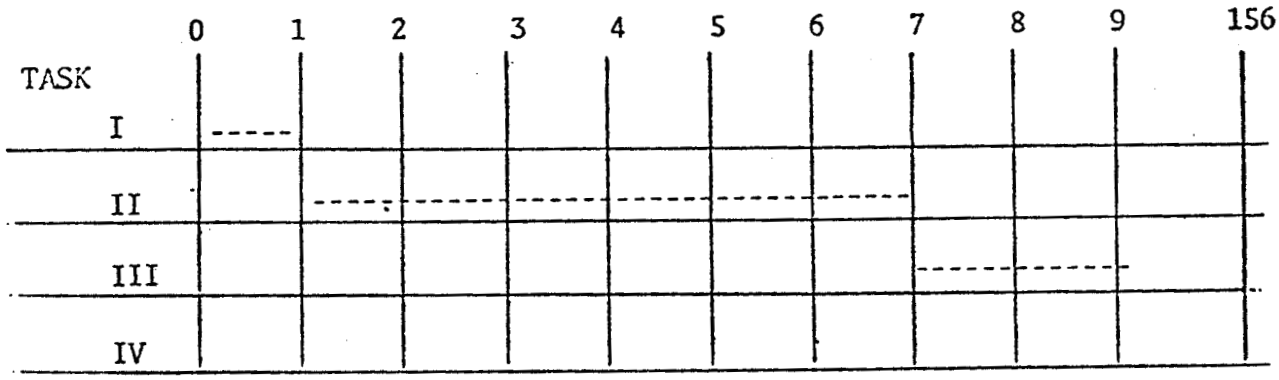
* Work to follow recovery of foam frac and nitrogen from producing formation and other work which may be required on well.

UGR File #254
SAI
July 1979

SUPPLEMENT TO MONTHLY FINANCIAL REPORT

Graph Showing Progress of Work
and
Comparison of Actual and Cumulative Costs

Progress of Contract in Weeks ---



TIME REQUIRED AND ALLOCATED EXPENDITURE TO DATE

	Time Required Weeks	ERDA Actual	ERDA Planned	ORBIT Actual	ORBIT Planned
Task I	1	$ 0	$ 0	$ 0	$ 0
Task II	6	25,240.63	25,000.00	38,418.31	39,500.00
Task III	8	19,759.37*	20,000.00	3,773,37**	5,500.00
	15	$45,000.00	$45,000.00	$42,191.68	$45,000.00

* ERDA Contract overrun of $850.95 was deducted from this amount.

** ERDA Contract overrun of $850.95 was added into this amount.

-[101-] [[[[L.. ANL GASL LEASE [[[[[EXHIBIT "A"

IN PRINTING COMPANY
UCERS 88 SP. T.O.P. REV

Kentucky Form

596

AGREEMENT made and entered into this ______________ day of ______________ 19__

between J. Ray Clark and Georgia M. Clark (his wife)
Box 208, Crofton, Kentucky

the first part, hereinafter called lessor (whether one or more) and Orbit Gas Company
711 Leitchfield Road, Owensboro, Kentucky

______________ party of the second part, hereinafter called lessee.

WITNESSETH, That the lessor, for and in consideration of Twenty-Five Hundred ______________ 00/100 DOLLARS ($ 2,500.00) hand paid, the receipt of which is hereby acknowledged, and of the covenants and agreements hereinafter contained, has granted, demised, leased and let, and by these presents does demise, lease, and let exclusively unto the said lessee, its successors and assigns, the land hereinafter described, with the exclusive right for the purpose of mining, exploring by geophysical and other methods, and operating for and producing therefrom oil, gas, casing-head gas, casing-head gasoline, and the exclusive right of injecting water, brine and other fluids into subsurface strata, with rights of way and easements for laying pipe lines, telephone and telegraph lines, tanks, power houses, stations, gasoline plants, ponds and roadways and fixtures for producing, treating, and caring for such products and housing and boarding employees and any and all other rights and privileges necessary, incident to, or convenient for the economical operation alone or conjointly with neighboring land, on said land for the production of oil, gas, casing-head gasoline, and erection of structures thereon to produce, save and take care of said products, and the injecting of water, brine and other fluids into subsurface strata. All that certain tract of land situated in the

______________ County of Christian ______________, State of Kentucky, and bounded as follows, to-wit:

the North by lands of Highway #800

the East by lands of Henry L. King

On the South by lands of Lawson West, Wallace King and C. B. Zentmyer

the West by lands of C. B. Zentmyer, W. Craddick

containing 481 acres, more or less, and being the same land conveyed to lessor by Joe P. Clark

______________ deed dated ______________, recorded in Deed Book 7 Page 543

______________ deed dated May 10, 1948, recorded in Deed Book 247 Page 389

______________ County Clerk's Office

It being intended hereby to include herein all lands and interests therein contiguous to or appurtenant to said described lands owned or claimed by lessor. For rental payment purposes said lands shall be deemed to contain 481 acres.

It is agreed that this lease shall remain in force for a term of two years from this date and as long thereafter as oil, gas, casing-head gas, casing-head gasoline or either of them is produced from said leased premises or operations for drilling are continued as hereinafter provided, or operations are continued for the injection of water, brine and other fluids to subsurface strata. Provided, however, that for injection purposes this lease shall continue in full force and effect only as to well or wells so used and the ten acres contiguous etc.

In consideration of the premises the said lessee covenants and agrees:

1. To deliver to the credit of lessor, free of cost, in the pipe line to which lessee may connect his wells, the equal one-eighth part of all oil produced and saved from the leased premises, or at the lessee's option, may pay to the lessor for such one-eighth royalty, the market price for oil of like grade and gravity prevailing on the day such oil is run into the pipe line or into storage tanks.

2. To pay lessor one-eighth, at the market price at the well for the gas so used, for the gas from each well where gas only is found, while the same is being used off the premises, and lessor to have gas free of cost from any such well for all stoves and inside lights in the principal dwelling house on said land during the same time by making his own connections with the well at his own risk and expense.

3. To pay lessor for gas produced from any oil well and used off the premises or for the manufacture of casing-head gas, one-eighth, at the market price at the well for the gas during the time during which such gas shall be used, said payments to be made monthly.

If no well be commenced on said land on or before one year from date hereof, this lease shall terminate as to both parties, unless the lessee, on or before that date shall pay to or tender to the lessor's credit in the Planters Bank & Trust

Hopkinsville, Kentucky ______________, or its successors, which shall continue as the depository regardless of changes in the ownership of said land, the sum of $962.00 ______________ Dollars, which shall operate as a rental and cover the privilege of deferring the commencement of a well for twelve months from said date. In a like manner and upon like payments or tenders the commencement of a well may be further deferred for like periods of the same number of months successively. All payments or tenders may be made by check or draft of lessee or any assignee thereof, mailed or delivered on or before the rental paying date.

Should the first well drilled on the above described land be a dry hole, then, and in that event, if a second well is not commenced on said land within twelve months from the expiration of the last rental period for which rental has been paid this lease shall terminate, as to both parties, unless the lessee on or before the expiration of said twelve months shall resume the payment of rentals in the same amount and in the same manner as hereinbefore provided. And it is agreed that upon the resumption of the payment of rentals, as above provided, that the last preceding paragraph hereof, governing the payment of rentals and the effect thereof, shall continue in force just as though there had been no interruption in the rental payments.

If said lessor owns a less interest in the above described land than the entire and undivided fee simple estate therein, then the royalties and rentals herein provided shall be paid the lessor only in proportion which his interest bears to the whole and undivided fee.

Lessee shall have the right to use, free of cost, gas, oil and water produced on said land for its operation thereon, except water from wells of lessor.

When requested by the lessor, lessee shall bury its pipe lines below plow depth.

No well shall be drilled nearer than 200 feet to the house or barn on said premises, without the written consent of the lessor.

Lessee shall pay for damage caused by its operation to growing crops on said lands.

Lessee shall have the right at any time to remove all machinery and fixtures placed on said premises, including the right to draw and remove casing.

If the lessee shall commence to drill a well within the term of this lease or any extension thereof, the lessee shall have the right to drill such well to completion with reasonable diligence and dispatch, and if oil and gas, or either of them, be found in paying quantities, this lease shall continue and be in force with like effect as if such well had been completed within the term of years herein, first mentioned.

If the estate of either party hereto is assigned, and the privilege of assigning in whole or in part is expressly allowed, the covenants hereof shall extend to their heirs, executors, administrators, successors or assigns, but no change in the ownership of the land or assignment of rental or royalties shall be binding on the lessee until after the lessee has been furnished with a written transfer or assignment or a true copy thereof; and it is hereby agreed in the event this lease shall be assigned, as to a part or parts of the above described lands and the assignee or assignees of such parts shall fail or make default in the payment of the proportionate part of the rents due from him or them, such default shall not operate to defeat or affect this lease in so far as it covers a part or parts of said lands which the said lessee or any assignee thereof shall make due payment of said rental.

If the leased premises are now, or shall hereafter be, owned in severalty or in separate tracts, the premises nevertheless shall be developed and operated as one lease, and all royalties accruing hereunder shall be treated as an entirety and shall be divided among, and paid to such separate owners in the proportion that the acreage owned by each separate owner bears to the entire leased acreage; Provided however, if the leased premises consist of two or more non-abutting tracts this paragraph shall apply separately to each such non-abutting tract and further provided that if a portion of the leased premises is hereafter consolidated with other lands for the purpose of operating the consolidated tract as one lease this paragraph shall be inoperative as to such portion so consolidated.

If at any time there be as many as four parties entitled to rentals or royalties, lessee may withhold payments thereof unless and until all parties designate in writing in a recordable instrument to be filed with the lessee, a common agent to receive all payments due hereunder; and to execute division and transfer orders on behalf of said parties and their respective successors in title.

Lessee is hereby given the right and power to pool or combine the acreage covered by this lease or any portion thereof with other land, lease or leases in the immediate vicinity thereof, when in lessee's judgment it is necessary or advisable to do so in order properly to develop and operate said premises in compliance with the spacing rules of any lawful authority, or when to do so would, in the judgment of the lessee, promote the conservation of the oil and gas in and under and that may be produced from said premises. In connection with the production of oil such pooling may be in a unit or units not exceeding 50 acres each. In connection with the production of gas such pooling may be in a unit or units not exceeding 300 acres each. Lessee shall execute in writing an instrument identifying and describing the pooled acreage. The entire acreage so pooled into a tract or unit shall be treated, for all purposes except the payment of royalties on production from the pooled unit, as if it were included in this lease. If production is found on the pooled acreage, it shall be treated as if production is had from this lease, whether the well or wells be located on the premises covered by this lease or not. In lieu of the royalties elsewhere herein specified, lessor shall receive on production from a unit so pooled only such portion of the royalty stipulated herein as the amount of his acreage placed in the unit or his royalty interest therein bears to the total acreage so pooled in the particular unit involved. Provided, lessee shall be under no obligation whatsoever, express or implied, to drill more than one well to each such unitized tract, regardless of when, where or by whom wells may be drilled.

In the event gas is discovered on the leased premises, it is agreed that during any period when, after the discovery of gas on the leased premises, gas is not being sold on account of lack of market, and if there is no apparent production or operation on said lands sufficient to keep this agreement in full force and effect, the LESSEE may pay as royalty Fifty Dollars ($50.00) per year for each shut-in gas well, and such payment will be considered as if gas is actually being produced within the terms and conditions of this oil and gas lease. Such payment to be made annually in advance, within ninety (90) days following the completion of the well or the cessation of a market for gas. Such payment shall be paid or tendered to the LESSOR or the depository bank to be specified by the LESSOR. No rental shall accrue as to the leased premises during any period covered by a shut-in gas payment as herein provided. The shut-in payments herein provided for shall be considered advance royalties, and production from the leased premises during any annual period for which shut-in gas rental or royalty has been paid shall be credited against such advance payment.

Lessor hereby warrants and agrees to defend the title to the lands herein described, and agrees that the lessee shall have the right at any time to redeem for lessor, by payment, any mortgages, taxes or other liens on the above described lands, in the event of default of payment by lessor, and be subrogated to the rights of the holder thereof and lessor hereby agrees that any such payments made by the lessee for the lessor shall be deducted from any amounts of money which may become due the lessor under the terms of this lease.

The undersigned lessors, for themselves and their heirs, successors and assigns, hereby surrender and release all rights of dower and homestead in the premises herein described insofar as said rights of dower and homestead may in any way affect the purpose for which this lease is made as recited herein.

Should the depository bank hereafter close without a successor, lessee or his assigns may deposit rentals in any National Bank located in same county with first named bank, due notice of deposit of such rental to be mailed to the lessor at last known post office address.

~~[struck-through clause, illegible]~~

All express or implied covenants of this lease shall be subject to all Federal and State Laws and to all executive orders, rules or regulations of State and Federal authorities and this lease shall not be terminated, in whole or in part, nor lessee held liable for any failure to perform thereunder if such failure is due or is the result of any such law, order, rule or regulation.

IN WITNESS WHEREOF WE SIGN, this the 4th day of December 1972

______________ (SEAL) [signature] (SEAL)
______________ (SEAL) [signature] (SEAL)
______________ (SEAL) [signature] (SEAL)
______________ (SEAL) ______________ (SEAL)

R. M. COOPER 174

instrument was prepared by: [signature: R. M. Cooper] whose address is: Route 7, Box 302, Owensboro, KY 423

STATE OF KENTUCKY } SS.
COUNTY OF Christain

ACKNOWLEDGMENT TO THE LEASE

I, R. M. Cooper ~~County Court Clerk,~~ Notary Public, in and for said county, in the State aforesaid do hereby certify that J. Ray Clark and Georgia M Clark

personally known to me to be the same persons whose names subscribed to the foregoing instrument, appeared before me this day in person and acknowledged that they signed, sealed and delivered the said instrument as free and voluntary act for the uses and purposes therein set forth, including the release and waiver of the right of homestead and dower.

Given under my hand this 4th day of December A. D., 1975

My commission expires May 13 1979 R. M. Cooper County Court Clerk, Notary Public.

By Deputy Court Clerk.

STATE OF KENTUCKY, CHRISTIAN COUNTY - - - SCT.

I, Thomas E. Morris, Clerk of the Christian County Court, do certify that the foregoing oil & gas lease from J. Ray Clark et ux to Orbit Gas Co. was this day produced to me in my office, with the foregoing certificate of acknowledgement thereon endorsed.

Whereupon the same was, this day at 12:04 o'clock P.M. filed, ordered to record, indexed and with the foregoing and this certificate has been duly recorded in my office. This December 11th, 1975

Thomas E. Morris, Clerk

OIL AND GAS LEASE

FROM

TO

Date 19

No. of Acres County

Term

STATE OF KENTUCKY

County of ss.

This instrument filed for record in the day of o'clock M., and duly recorded in Deed Book page of the records of this office

County Court Clerk By Deputy Clerk

When Recorded Return to

FILED FOR RECORD
OIL & GAS
LEASE BOOK NO. 29 PAGE 596
'75 DEC 11 PM 12:04
CHRISTIAN CO.
COURT CLERK

ASSIGNMENT

For and in consideration of One Dollar cash in hand paid, and other good and valuable considerations, the receipt of all of which is hereby acknowledged, I hereby transfer and assign to

the within lease.

Given under my hand this day of A. D., 19

State of Kentucky, County of ss.

I, a

in and for the County and State aforesaid, do hereby certify that

lessee, in the foregoing lease, this day appeared before me and produced the foregoing assignment and acknowledged the same to be his act and deed.

Given under my hand this day of A. D., 19

DEPARTMENT OF MINES AND MINERALS
OIL AND GAS DIVISION
Box 680, Lexington, Ky.
40501

DO NOT WRITE IN THIS SPACE

Fee _____
Plat _____
Samples _____
Permit No. _____

APPLICATION FOR PERMIT TO DRILL, DEEPEN, REOPEN OR PRODUCE A WELL

August 7, 19 76

Well Operator (Lessee) Orbit Gas Company

Permanent Address 711 Leitchfield Road, Owensboro, KY 42301

Address for mailing permit same

Farm Owner (Lessor) J. Ray & Georgia M. Clark

Address Box 208, Crofton, KY 42217

County Christian Well No. 1

Carter Coordinates: 650 FNL ~~FSL~~ 90 FEL ~~FWL~~ 12 Sec. G Letter 25 No.

Approximate distance and direction from nearest town 3 miles east of Crofton, KY

Elevation 543.91 (Transit) Proposed Depth 2500'

Name of deepest geological formation to be tested Devonian

This proposed well is to be drilled for the following purpose:
Oil ☐ ; Gas ☒ ; Salt Water Disposal ☐ ; Secondary Recovery Input ☐ ; Secondary Recovery Producer ☐ ;
Underground Storage ☐ ; Water Supply ☐ ; Stratigraphic Test ☐ ; Structure Test ☐ .

Cable or Rotary Tools Rotary

Distance from nearest producing well (if less than 1000 feet) None less than 1000 ft.

Distance from nearest property line 607 ft.

Name of Contractor _____ Address _____

Will this well penetrate coal bearing strata? Yes ☐ No ☒

If answer is yes, answer the question in box below.

Is the coal owned, operated or leased by any person other than the oil or gas lessee or lessor? Yes ☐ No ☒
Coal Owners and Addresses:

The undersigned well operator has sent a copy of this application and a copy of the well location plat by registered or certified mail to all coal owners or operators named herein on the same date that this application was mailed to the Department.

Will this well be drilled within the area of a gas storage field as defined by Division of Oil and Gas Regulation? Yes ☐ No ☒

If answer is yes, the undersigned well operater has sent a copy of the application and a copy of the well location plat to the gas storage operator listed below on the same date that this application was mailed to the Department.

The undersigned hereby swears (or affirms) the foregoing facts in this application are true as therein set forth.

Dated this 7th day of August A.D. 19 76

W. C. Brown
Signature of Applicant

Accompany this application with proper permit fee and one (1) copy of well location plat. All blanks must be completed. Incomplete applications will be returned.

COMMONWEALTH OF KENTUCKY

ELECTRIC LOG REQUIRED
If such is taken

DEPARTMENT OF MINES AND MINERALS

DIVISION OF OIL AND GAS

P. O. Box 680, Lexington, Kentucky

AUTHORITY TO DRILL, DEEPEN, OR REOPEN A WELL

Permit No. 31175
Elevation 543.91
County CHRISTIAN

Lexington, Ky., AUGUST 12, 1976

This is the authority under the 1960 Oil and Gas Conservation Act, effective June 15, 1960, and the Rules and Regulations of this Division, for ORBIT GAS COMPANY 711 LEITCHFIELD ROAD OWENSBORO, KENTUCKY 42301 to drill a well on the below described premises.

Location of well to be 12-G-25 650' FNL X 90' FEL

Said well is number 1 (GAS) and lessor is J. RAY AND GEORGIA H. CLARK

This permit expires one year from date of issuance unless drilling operations have commenced, prior thereto.
A log of this well must be furnished to the Oil & Gas Division, at Lexington, Ky., in compliance with the laws of the Commonwealth of Kentucky.

This permit must be posted at the well site before drilling commences.

DIVISION OF OIL & GAS

Henry M. Morgan
Director

For Plugging - Notify
Inspector Joe Lander
424 Fairview Drive
[illegible], Ky.
[illegible] 15624

SAMPLES REQUI[illegible]
[illegible]
KENTUCKY GEO[illegible]

177

UGR File #254
SAI
July 1979

EXHIBIT "C"

EXCEPTIONS AND REQUIREMENTS

Exception (1): This opinion is subject to any easements, defects and rights of parties in possession a survey or visual inspection of the premises would disclose and does not certify against overlapping senior patents or surveys.

The fourth call of the current deed description is S 10 W 134 poles. Apparently this should be S 10 E 134 poles, which is the call we have used in Exhibits A and B.

Requirement: Affidavit of Adverse Possession using the correct description.

Exception (2): This opinion covers only the 222 acre tract described in Exhibit A and shown on Exhibit B.

Requirement: Supplemental title examination and opinion prior to drilling operations on the remaining portions of the lease.

Exception (3): On November 11, 1963, Deed Book 298, page 191, J. Ray Clark and Georgia Clark, his wife, conveyed the Commonwealth of Kentucky, Department of Highways, a strip 30 feet on each side of the proposed centerline of the Crofton Apex Road, plus additional footage at points thereon.

Requirement: None.

Exception (4): Master Commissioner's Deeds in the Christian County Court Clerk's office are indexed in the name of the grantees only in Commissioner's Deed Books 1 through 8 and in the name of the Master Commissioner and grantee in Commissioner's Deed Book 9, therefore this opinion excepts any Master Commissioner Deeds not disclosed in the chain of title upon which this opinion is based.

Requirement: None.

Exception (5): We found several old oil and gas leases covering the captioned tract, the most recent being a lease from J. R. Clark and Georgia M. Clark, his wife, to Fairy D. Yundt, August 4, 1964, for a primary term of one (1) year.

Requirement: Affidavit of Non-Production.

LAND COVERED:

Bounded as follows:
On the North by Highway #800
On the East by Henry L. King
On the South by Lawson West, Wallace King and C. B. Zentmy
On the West by C. B. Zentmyer, W. Craddick.
Containing 481 acres, more or less.

RECORDS EXAMINED

This opinion is based on a personal examination of the relevant and properly indexed records of Christian County, Kentucky, for a period of over 156 years, ending with the date hereof, and covers land located in Christian County, Kentucky, more particularly bounded and described in the following exhibits:

Exhibit A - Metes and bounds description and source of title.
Exhibit B - Plat of subject tract.

OPINION

In reliance upon the relevant and properly indexed records of Christian County, Kentucky, for the period aforesaid, subject to the exceptions and requirements hereinafter set out and any defects a survey or visual inspection of the premises may reveal, we are of the opinion that the title to the subject tract is vested as follows:

SURFACE AND MINERALS

Georgia M. Clark and J. Ray Clark, her husband, and the survivor of them	ALL

ROYALTY INTEREST

Georgia M. Clark and J. Ray Clark, her husband, and the survivor of them	1/8 RI

WORKING INTEREST

Orbit Gas Company	7/8 WI

UGR File #254
SAI
July 1979

SIDNEY A. NEAL
THOMAS E. NEAL
—
E. MARTIN PHOFUNO, JR.

NEAL & NEAL
ATTORNEYS AT LAW
613 FREDERICA STREET
OWENSBORO, KENTUCKY 42301

PHONE 502 684-0471

EXHIBIT "D"

August 18, 1976

ORBIT GAS COMPANY
711 Leitchfield Road
Owensboro, Kentucky 42301

Re: J. Ray Clark, et ux
481 Acre Lease
Christian County, Kentucky
11 & 12-G-25

Gentlemen:

Pursuant to your request, we have examined the title to the leasehold estate created by the following described oil and gas lease:

FORM OF LEASE:	Producers 88 SP. T.O.P. Rev.
LESSORS:	J. Ray Clark and Georgia M. Clark, his wife
LESSEES:	Orbit Gas Company
DATE OF LEASE:	December 4, 1975
RECORDED:	December 11, 1975, Lease Book 29, page 596, Christia County Court Clerk's office
PRIMARY TERM:	Two (2) years
ROYALTY:	One-eighth (1/8)
DELAY RENTAL PROVISION:	If no well be commenced on said land within one (1) year from date hereof, lesso shall pay to lessor the su of $962.00, or this lease shall terminate.
DEPOSITORY:	Planters Bank & Trust Hopkinsville, Kentucky
SPECIAL PROVISIONS:	None.

CONCLUSION

In reliance upon the relevant and properly indexed records of Christian County, Kentucky, for the period aforesaid, subject to the exceptions and requirements hereinabove set out and any defects a survey or visual inspection of the premises may reveal, we are of the opinion that title to the subject tract is vested as hereinabove set out.

Very truly yours,

NEAL & NEAL

Sidney A. Neal

SAN/clb

APPENDIX I

This Section contains a narrative account of the Coring Operations

UGR File #254
SAI
July 1979

SUMMARY OF CORING OPERATIONS

ORBIT GAS COMPANY

WELL

Ray Clark No. 1

Christian County, Kentucky

Prepared by C. S. Dean, Ph.D.

Geologist, ERDA-MERC

The following summary of coring operations for the Orbit Gas Company well Ray Clark No. 1 includes a narrative account, a generalized description of the core, and some recommendations. The well is located 600 ft. south of Kentucky route 800, 3½ miles due east of the town of Crofton in Christian County, Kentucky. The exact location, as stated in the permit (no. 31175), is 12-G-25, 650' FNL x 90' FEL (Carter Coordinate System). The well was drilled by the Crescent Drilling Company of Owensboro, Ky. on Quebracho, Polymer mud (Dextrid) having a weight of 8.9 lbs/gal., a viscosity of 38 sec./qt., and a water loss of 3.6 ml./min over the duration of a 30 min. test. The nominal diameter of the hole upon reaching core point was 7 7/8 in. Since the outside diameter of the core bit was 7 27/32 in., it was assumed that no reaming of the hole would be necessary prior to coring. The well was cored under the supervision of Christiansen Diamond Tool Company. The core retrieved is 4 in. in diameter. All logging is relative to the top of the kelly table, which stands at an elevation of 548 ft. above sea level.

Narrative Account

Friday, September 17, 1976.

The MERC petroleum engineer (H. Koerner) and geologist (C.S. Dean) arrived at the drill site around 9:30 a.m. Core point had been reached at 9:00 a.m. and the drilling fluid was being circulated in order to flush out any cuttings remaining in the hole. Mr. Donald Benson, President of Orbit Gas, who had closely monitored drilling operations as core point was approached, explained the criteria he used to pick the core point: drilling rate and cuttings.

In western Kentucky the New Albany Fm. (the name for the Devonian Black Shale in the Illinois Basin) of Upper Devonian age is sequentially overlain by the New Providence Shale and the Fort Payne Formation both of Lower Mississippian age. The systemic boundary is placed at the contact between the New Providence Shale and the New Albany Formation. Drilling was halted following the appearance of limestone within the cuttings of the New Providence Shale. A thin interval of limestone, the Rockford Limestone, occurs at the base of the New Providence Shale, i.e., immediately overlying the New Albany Shale. Subsequently, circulating drilling fluid brought up cuttings of balck shale. Mr. Benson placed the upper contact of the New Albany Shale at 2175 ft.; drilling ceased at 2178 ft.

Mr. Bensen had expected the Rockford Limestone to be 20 feet thick instead of only one foot thick; this was the reason for drilling three feet into the shale.

The drill string was hauled up and a ring gage slipped over the drill bit. The bit, a retip, was badly out of gage. The core barrel and monel collar orienting apparatus were then assembled by Christiansen Technicians and lowered into the hole under their supervision. At 928 ft. a hang up occured; the drilling log revealed that at this depth the drilling contractor had changed drill bits. Randall Anselment of Christiansen gave the driller permission to use the core bit to ream out the obstruction. Reaming past the obstruction was speedily and easily accomplished; the remainder of the descent was without incident. Coring began at 5:50 p.m. (at a depth of 2178 ft.)

Saturday, September 18, 1976

During the night, at 2215 ft., an incident occurred that resulted in the loss of some 23 feet of core. The slips located within the core bit that are designed to catch the core and prevent it from falling back down the hole failed to grip properly when the string was lifted off the bottom in order to make a connection. Instead of lifting the core, the core barrel slid over the core while the core remained in place. On the return trip back down to the bottom of the hole, the core barrel recaptured most of the core but jammed 21 ft. above the bottom of the hole. Christensen directed the core barrel be raised.

At 7:00 a.m., while on the way out of the hole with the first length of core, the string jammed at a depth of 1675 ft. It remained jammed until about mid afternoon, when it finally pulled free with the exertion of 160,000 - 180,000 lbs. of steady pull on the string. The pull that finally freed the string was effected by placing the lifting engines into direct, locked drive. Excessive mud cake was blamed for the hang up that occurred on the way out of the hole. Hole out of gage and faulty rig procedure may have been contributing factors. Once freed the remainder of the string was raised with relative ease.

The core barrel emerged about 5:30 p.m. D. L. Stevenson of the Illinois State Geological Survey (ISGS) removed the core from the core barrel under the supervision of H. Koerner, the MERC petroleum engineer. The first length of intact core was 14 ft. long; rubble comprising perhaps an additional 2 ft. at the bottom was also recovered. The core was broken down into manageable lengths, placed into short wooden boxes, and transferred to the Christensen trailer, where it was laid out and reassembled. After wiping the core down with a damp rag, J. A. Lineback (ISGS) logged the geological features. He was assisted by C. S. Dean (MERC). Subsequently, outgassing samples were removed and canned according to instructions in Task Order 2102. Finally, the core was placed into cardboard boxes and stowed aboard ISGS vehicles for shipment to ISGS. Mylar bags specified in the task order were not available on the site.

Because of the difficulties experienced in raising the first length of core, the operator reconditioned the hole prior to the second coring run; reconditioning included drilling up the 21 feet of core lost in the hole.

Sunday, September 19 to Monday, September 20, 1976.

The second length of New Albany Shale core emerged without incident around midnight. This core measured 59.5 ft. in length. Procedures followed were identical to those described above.

Monday, September 20 to Tuesday, September 21, 1976.

The third length of core emerged without incident around midnight, having penetrated 11 feet into the Sellersburg Limestone, the Middle Devonian limestone directly underlying the New Albany Shale. Coring ceased at 2331 ft. when the bit struck a layer of chert. This core measured 56 feet. Handling and logging procedures were the same as with the first two cores.

Following the taking of the third core the operator returned to drilling; Mr. Benson (Orbit Gas) expressed the intent of going down 225 to 250 feet more before completing.