EXXON PRODUCTION RESEARCH COMPANY

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GEOCHEMICAL ANALYSES OF CANNED CUTTINGS FROM 31/4-2, OFFSHORE NORWAY

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Reservoir Evaluation Division

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R. E. Metter

SUMMARY AND CONCLUSIONS

1. Twenty-six canned cuttings from the interval 2140-2900 meters (U. Jurassic to Triassic) were analyzed as follows:

   By EPR - C_1-C_4 hydrocarbon gases; total organic carbon; C_4-C_7 gasolines; visual kerogen characteristics by transmitted light.

   By Robertson Research (U.S.) Inc. - Pyrolysis by Rock-Eval; vitrinite reflectance; kerogen descriptions by reflected light, including fluorescence.

   By GeoChem Laboratories - Heavy (C_{15+}) soluble organic matter; gas chromatography of C_{15+} saturates.

   The results of these analyses are given in Tables 1-8 and in Figures 1-18.

2. The analytical data show that the upper part of the section includes the usual rich oil-prone Malm shales, which at this location are only at the onset of maturity. We do not know the stratigraphic tops here, but below roughly 2650 meters the section is more gas prone and generally leaner in organic content. The deeper, gas-prone interval is still not fully mature for gas and condensate generation.

Top Staff @ 2632 m RKB

3. Vertical geochemical zonations are not well defined from the data included here because cavings have distorted the results. Chips of the rich oil-prone Malm undoubtedly have been included in the handpicked samples representing pre-Malm beds. (The top of the more gas-prone zone noted above may thus be somewhat shallower than 2650 meters.) Whoever uses the data in this report should first be familiar with the section at 31/4-2, and should also refer to sample descriptions in Table 2 in order to arrive at better judgements as to which data represent their respective indicated depths. Perhaps mechanical log changes will help define organic facies boundaries here.

4. This work was requested in the November 16, 1979 Telex S-2663 by J. Barrier. Charges for the work were billed to our Job No. 12161.

   Preliminary data were delivered in Stavanger on Feb. 18, 1980.

→ Slikt som dette må unngåes. Siden de som foretar analysen ikke ber om log-data og tilhørende tolknings-resultater bør Ntt (her burde det vært ESSO's ansvar) sende med logger, eventuelt gi en liste over formasjons-topper.

EG

PROCEDURES

C_1-C_4

Compositions and concentrations of hydrocarbon gases in the air spaces above the cuttings in the sample cans were determined by gas chromatography. Similar data were obtained on gases released from standard mixtures of cuttings and tap water after two minutes of agitation in a Waring blender. Combined results on the "air space gas" plus the "cuttings gas" were calculated for each sample. The data were plotted graphically to show vertical variations in total gas (C_1-C_4) and a graphical plot was also made of the percent "wet gas" in total gas (Figure 1). Detailed results of the gas analyses are listed in Table 1.

C_4-C_7 and T.O.C.

While still wet, chips were handpicked from the samples for further analyses (Table 2). We attempted to pick chips of reasonably uniform fine-grained lithologies from the heterogeneous mixtures of cuttings in the original samples. Our routine gas chromatographic procedures were used for determining their light gasoline (C_4-C_7) content, and the total organic carbon was determined with a commercial Leco Analyzer after carbonate was first removed from the samples by use of HCl. These results are given in Tables 2, 3, 5 and 8 and they are plotted graphically in Figure 1.

Kerogen

Visual kerogen characterisitics by transmitted light were determined on all of the samples (Table 3). Determinations were made with a standard palynological microscope utilizing transmitted light through dispersed organic matter on standard slide mounts. The organic matter was separated from the samples by removing rock matrix materials with HF and HCl. The descriptions were based on the so-called "Staplin" nomenclature. In Table 3 the kerogens are shown to contain high percentages of "indeterminate fines". Chemical and lithologic data were used to aid in making our "Best Guesses" as to what the fines probably included.

Samples were also sent to Robertson Research (U.S.) Inc. for determinations of reflected light properties of the kerogen (Tables 3,4 and Figs. 2-8). Robertson had to combine consecutive pairs of samples to provide enough for analyses. They described their procedures as follows:

"A sample of ground rock is treated successively with hydrochloric and hydrofluoric acids to concentrate the kerogen, freeze-dried, mounted in an epoxy plug, and polished. Kerogen type is identified with the aid of blue light fluorescence (Table 4).

"The histograms (Figs. 2-8) show measured reflectance values on all vitrinite present and on all material with the visual appearance of vitrinite. Shaded values are those used to calculate the interpreted vitrinite reflectance maturities. Unshaded values are interpreted to be oxidized vitrinite, recycled vitrinite, or possibly misidentified material such as solid bitumen, pseudovitrinite, or semifusinite. Some of the samples analyzed contain no vitrinite or have an insufficient number of readings to allow a reliable maturity determination to be made. Alternate maturity calculations are possible on a few samples. The histograms are identified by sequence number."

C_{15+}

Eight of the gross cuttings samples were sent to GeoChem Laboratories of Houston for heavy (C_{15+}) soluble organic matter analysis (Table 6). This consisted of extraction of organic matter with a methylene chloride-methanol mixture, and analysis of the extracts (after deasphaltening) by means of liquid column chromatography. Gas chromatograms were run on the heavy saturate fractions (Figs. 9-16).

Pyrolysis

All 26 of the samples were analyzed by Rock-Eval pyrolysis at the Robertson Research laboratory. Results are given in Tables 7a and 7b and in Figs. 17 and 18. Remainders of the powders prepared by EPR for T.O.C. analysis were used by Robertson for the pyrolysis.

DISCUSSION

Maturity

The state of maturation of North Sea Jurassic samples is often problematical. In this well the kerogen alteration values of "1+" throughout (Table 3) suggest immature samples. The vitrinite reflectance values (Table 3, Figs. 2-8) range from .53 to .61, which suggest the material is just at the onset of maturity, perhaps best described as "transitional". Gas chromatograms of the heavy (C_{15+}) saturate hydrocarbons (Figs. 9-16) also indicate that the organic material in the samples is not yet mature.

On the other hand, some thermal hydrocarbon generation has occurred, as indicated by appreciable gas and gasoline yields (Fig. 1 and Tables 1, 5 and 8). But C_{15+} hydrocarbon contents (Table 6) were not nearly as high as we would expect from fully mature Malm shales.

Source Type

The upper dark shales are oil-prone. They contain appreciable percentages of amorphous (oil-prone) kerogen (Table 3). Though not yet mature, the hydrocarbon gases they contain are predominantly C_2-C_4 (Fig. 1 and Table 1), and appreciable amounts of light gasolines are present (Fig. 1 and Tables 5 and 8). Rock-Eval pyrolysis S_2/S_3 ratios indicate an oil source. We expect this of the richer Malm shales.

The lowest samples are more gas prone. The kerogen is more of the woody-herbaceous-coaly suite, cuttings gases contain higher percentages of methane, and gasoline yields are notably less (Fig. 1). This is characteristic of much of the Dogger, Lias, and Triassic as well as the lower Malm over much of the northern North Sea area.

Data Distortion from Cavings

Due to cavings in the samples our data do not show sharp vertical boundaries. In "picking" shale chips for our analyses we have undoubtedly used Malm lithologies to represent older zones. The deeper samples are probably less oily and less rich than the data indicate. Also, the base of the rich oil-prone Malm is probably shallower than suggested by the data, for the same reason. We do not know the stratigraphic tops, and in "picking" the samples tended to choose the darker shales.

No Esso, Statoil follow-up?

The C_{15+} data in particular are unreliable due to cavings. Approximately 120 grams of sample were sent to GeoChem Laboratories for this analysis and in order to obtain this amount we used the "unpicked" heterogeneous mixtures from the cans. The gas chromatograms are useful, but the total amounts of hydrocarbons are distorted for specific depth intervals.

Robertson Research Data

Robertson included a brief discussion of the results of their analyses of the samples. It is included on the following page.

DISCUSSION BY ROBERTSON RESEARCH

These samples contain exceptional amounts of amorphous kerogen at a stage of maturity at or near the top of the principal zone of oil formation mixed with some recycled, probably oxidized vitrinite.

Amount of Kerogen: Total organic carbon values, supplied by Exxon (Appendix I), indicate exceptional richness (>1.5% TOC) for all samples except those from 2830 and 2920m. The source potentials (Rock-Eval S2 peak) show the same trend; the S2 for the two relatively lean samples is an order of magnitude lower than the lowest S2 of the remaining samples.

Kerogen Type: Kerogen typing from Rock-Eval pyrolysis (S2/S3 ratios) indicates a strong oil source characteristic except for the two relatively lean samples, which have the lowest ratio and fall in the gas-generating field. A van Krevelen-type plot of the hydrogen index vs. oxygen index indicates a predominant Type 1 (oil-generating) kerogen. Visual description in reflected light indicates about 50% amorphous material + exinite, indicating a mixed source. From the histograms, it appears that much of the vitrinite is recycled, probably oxidized. The significant amounts of solid bitument reported contribute to the very high S2 peaks (Reference 2). Note that the two composites (73133 C+D and E+F) containing the lean samples have a higher pyrite content than the other samples.

Kerogen Maturity: Vitrinite reflectance values of 0.5 to 0.6 indicate a stage of maturity at our near the beginnig of the principal zone of oil generation. This is also substantiated by the high exinite fluorescence Tmax (from 410-433°C) and S1/(S1+S2) around 0.1 to 0.2.

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TABLE 1A

C1-C4 HYDROCARBON ANALYSES - AIR SPACE AT TOP OF CANS

SPL NO	R	DEPTH	METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	TOTAL GAS M	TOTAL GAS E	TOTAL GAS P	TOTAL GAS IB	TOTAL GAS NB	WET GAS E	WET GAS P	WET GAS IB	WET GAS NB
			GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS)								GAS COMPOSITION (PERCENT)								
73132A	7	2170	5819.77	4128.48	2561.77	3761.05	2842.08	13293.37	19113.14	69.5509	30.	22.	13.	20.	15.	32.	19.	28.	21.
73132B	7	2200	6690.82	7254.02	7762.94	1420.12	3053.06	19490.13	26180.95	74.4439	26.	28.	29.	5.	12.	37.	40.	7.	16.
73132C	7	2230	4150.78	3942.40	3677.18	637.70	1247.42	9504.70	13655.48	69.6035	30.	29.	27.	5.	9.	41.	39.	7.	13.
73132D	7	2260	4614.13	4188.80	4332.00	918.67	1993.60	11433.07	16047.20	71.2465	29.	26.	27.	6.	12.	37.	38.	8.	17.
73132E	7	2290	3660.80	3942.40	5637.82	1480.15	3262.25	14322.61	17983.41	79.6434	20.	22.	32.	8.	18.	28.	39.	10.	23.
73132F	7	2320	741.79	995.97	1002.24	210.66	406.96	2615.83	3357.62	77.9073	22.	30.	30.	6.	12.	38.	38.	8.	16.
73132G	7	2350	1087.60	1016.26	1293.82	337.69	698.71	3346.48	4434.08	75.4718	25.	23.	28.	8.	16.	30.	39.	10.	21.
73132H	7	2380	3206.93	2411.82	2343.30	486.85	849.37	6091.34	9298.27	65.5105	35.	26.	25.	5.	9.	40.	38.	8.	14.
73132I	7	2410	2478.08	1708.37	1623.36	289.45	569.60	4190.78	6668.86	62.8410	37.	26.	24.	4.	9.	40.	39.	7.	14.
73132J	7	2440	2591.36	1865.32	1921.14	357.26	759.29	4903.01	7494.37	65.4226	34.	25.	26.	5.	10.	38.	40.	7.	15.
73132K	7	2470	1095.57	734.53	806.40	148.53	273.41	1962.87	3058.44	64.1788	36.	24.	26.	5.	9.	37.	41.	8.	14.
73132L	7	2500	993.47	1293.60	1641.60	332.06	688.02	3955.28	4948.75	79.9248	20.	26.	33.	7.	14.	33.	42.	8.	17.
73132M	7	2530	2787.84	1798.72	1942.56	349.38	559.63	4650.29	7438.13	62.5196	37.	24.	26.	5.	8.	39.	41.	8.	12.
73132N	7	2560	2153.21	96.16	1094.40	229.58	333.42	1753.56	3906.77	44.8851	55.	2.	28.	6.	9.	5.	63.	13.	19.
73132O	7	2590	182.54	171.31	207.15	43.61	71.20	493.27	675.81	72.9894	27.	25.	31.	6.	11.	35.	42.	9.	14.
73132P	7	2620	8.74	16.68	70.38	20.67	56.87	164.60	173.34	94.9579	5.	10.	40.	12.	33.	10.	42.	13.	35.
73132Q	7	2650	400.87	197.12	216.30	23.94	59.51	496.87	897.74	55.3467	44.	22.	24.	3.	7.	40.	43.	5.	12.
73132R	7	2680	10412.41	2636.18	3441.43	398.46	1065.43	7541.49	17953.90	42.0048	58.	15.	19.	2.	6.	35.	46.	5.	14.
73132S	7	2710	3316.62	776.53	950.69	147.33	371.10	2245.65	5562.27	40.3729	59.	14.	17.	3.	7.	35.	41.	7.	17.
73132T	7	2740	3558.32	1319.33	1558.48	270.50	577.53	3725.84	7284.16	51.1499	49.	18.	21.	4.	8.	35.	42.	7.	16.
73133A	7	2770	5718.65	808.70	673.48	78.71	159.93	1720.82	7439.47	23.1309	77.	11.	9.	1.	2.	47.	39.	5.	9.
73133B	7	2800	4208.58	564.93	511.13	82.09	174.13	1332.28	5540.86	24.0446	77.	10.	9.	1.	3.	43.	38.	6.	13.
73133C	7	2830	5.16	1.81	5.47	0.68	102.53	110.49	115.65	95.5383	4.	2.	5.	1.	88.	2.	5.	1.	92.
73133D	7	2860	264.67	192.75	303.38	63.37	147.95	707.45	972.12	72.7739	27.	20.	31.	7.	15.	27.	43.	9.	21.
73133E	7	2890	283.58	233.21	327.55	64.50	150.42	775.68	1059.26	73.2285	27.	22.	31.	6.	14.	30.	43.	8.	19.
73133F	7	2920	92.74	90.49	180.58	35.21	90.95	397.23	489.97	81.0723	19.	18.	37.	7.	19.	23.	45.	9.	23.

B = CUTTINGS NOT ANALYZED *C* = AIR SPACE GAS NOT RUN *BC* = NO ANALYSES RUN

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TABLE 1B

C1-C4 HYDROCARBON ANALYSES - CUTTINGS ONLY

GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS)

GAS COMPOSITION (PERCENT)

SPL NO	R	DEPTH	METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	TOTAL GAS M	TOTAL GAS E	TOTAL GAS P	TOTAL GAS IB	TOTAL GAS NB	WET GAS E	WET GAS P	WET GAS IB	WET GAS NB
73132A	7	2170	2722.50	6283.20	9028.80	1653.60	5190.48	22156.07	24878.57	89.0568	11.	25.	36.	7.	21.	28.	42.	7.	23.
73132B	7	2200	1059.96	729.96	2134.08	485.90	1537.92	4887.86	5947.82	82.1790	18.	12.	36.	8.	26.	15.	44.	10.	31.
73132C	7	2230	708.58	5440.51	8208.00	1628.16	4767.55	20044.21	20752.79	96.5856	3.	26.	40.	8.	23.	27.	41.	8.	24.
73132D	7	2260	2276.74	2838.53	4793.47	1078.66	3229.63	11940.29	14217.03	83.9858	16.	20.	33.	8.	23.	24.	40.	9.	27.
73132E	7	2290	998.25	2448.60	7695.00	2671.20	8170.20	20985.00	21983.25	95.4590	5.	11.	35.	12.	37.	12.	37.	13.	38.
73132F	7	2320	3121.80	4989.60	13338.00	4197.60	12735.90	35261.09	38382.89	91.8667	8.	13.	35.	11.	33.	14.	38.	12.	36.
73132G	7	2350	2613.60	2864.40	4668.30	1119.36	3204.00	11856.06	14469.66	81.9374	18.	20.	32.	8.	22.	24.	40.	9.	27.
73132H	7	2380	2413.95	3672.90	5540.40	1189.32	3524.40	13927.01	16340.96	85.2276	15.	22.	34.	7.	22.	26.	40.	9.	25.
73132I	7	2410	5808.00	6006.00	8208.00	1742.64	5254.56	21211.20	27019.20	78.5042	21.	22.	32.	6.	19.	28.	39.	8.	25.
73132J	7	2440	5808.00	7761.60	17236.80	4680.96	14353.92	44033.27	49841.27	88.3470	12.	16.	34.	9.	29.	18.	38.	11.	33.
73132K	7	2470	3847.80	3788.40	6053.40	1182.96	3428.28	14453.04	18300.84	78.9747	21.	21.	33.	6.	19.	26.	42.	8.	24.
73132L	7	2500	3248.85	4989.60	12825.00	3892.32	12175.20	33882.11	37130.96	91.2503	9.	13.	35.	10.	33.	15.	38.	11.	36.
73132M	7	2530	3484.80	4088.70	7284.60	1221.12	3300.12	15894.54	19379.34	82.0179	18.	21.	38.	6.	17.	26.	45.	8.	21.
73132N	7	2560	2867.70	2055.90	3591.00	775.92	2002.50	8425.32	11293.02	74.6064	25.	18.	32.	7.	18.	24.	43.	9.	24.
73132O	7	2590	1452.00	1143.45	2462.40	489.72	1473.84	5569.41	7021.41	79.3204	21.	16.	35.	7.	21.	21.	44.	9.	26.
73132P	7	2620	1205.16	378.84	1682.64	351.07	1281.60	3694.15	4899.31	75.4014	25.	8.	34.	7.	26.	10.	45.	10.	35.
73132Q	7	2650	2729.76	1958.88	4924.80	580.03	2716.99	10180.70	12910.46	78.8562	21.	15.	39.	4.	21.	19.	48.	6.	27.
73132R	7	2680	3542.88	4213.44	9685.44	915.84	4806.00	19620.71	23163.60	84.7049	15.	18.	42.	4.	21.	21.	50.	5.	24.
73132S	7	2710	2061.84	822.36	1785.24	295.10	1012.46	3915.16	5977.00	65.5038	34.	14.	30.	5.	17.	21.	45.	8.	26.
73132T	7	2740	1713.36	1099.56	2729.16	508.80	1755.79	6093.31	7806.67	78.0526	22.	14.	35.	7.	22.	18.	45.	8.	29.
73133A	7	2770	4965.84	2106.72	3160.08	435.02	1243.15	6944.97	11910.81	58.3081	41.	18.	27.	4.	10.	30.	46.	6.	18.
73133B	7	2800	2845.92	554.40	769.50	142.46	435.74	1902.10	4748.02	40.0609	60.	12.	16.	3.	9.	29.	41.	7.	23.
73133C	7	2830	998.98	29.57	135.43	41.98	157.00	363.98	1362.96	26.7051	73.	2.	10.	3.	12.	8.	37.	12.	43.
73133D	7	2860	1422.96	130.51	448.87	127.20	422.93	1129.51	2552.47	44.2516	55.	5.	18.	5.	17.	12.	40.	11.	37.
73133E	7	2890	769.56	65.83	205.20	52.79	155.39	479.21	1248.77	38.3745	63.	5.	16.	4.	12.	14.	43.	11.	32.
73133F	7	2920	609.84	19.63	60.60	19.08	63.58	162.89	772.73	21.0798	79.	3.	8.	2.	8.	12.	37.	12.	39.

B = CUTTINGS NOT ANALYZED *C* = AIR SPACE GAS NOT RUN *BC* = NO ANALYSES RUN

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TABLE 1C

C1-C4 HYDROCARBON ANALYSES - CUTTINGS AND AIR SPACE

SPL NO	R	DEPTH	GAS CONCENTRATION (VOLUME GAS PER MILLION VOLUMES CUTTINGS) METHANE C1	ETHANE C2	PROPANE C3	IBUTANE IC4	NBUTANE C4	WET C2-C4	TOTAL C1-C4	WET/TOTAL PERCENT	GAS COMPOSITION (PERCENT) TOTAL GAS M	E	P	IB	NB	WET GAS E	P	IB	NB
73132A	7	2170	8543.27	10411.68	11590.57	5414.65	8032.56	35449.45	43991.71	80.5821	19.	24.	26.	12.	18.	29.	33.	15.	23.
73132B	7	2200	7750.78	7983.98	9897.02	1906.02	4590.98	24377.99	32128.77	75.8759	24.	25.	31.	6.	14.	33.	40.	8.	19.
73132C	7	2230	4859.36	9382.91	11885.18	2265.86	6014.97	29548.91	34408.27	85.8773	14.	27.	35.	7.	17.	32.	40.	8.	20.
73132D	7	2260	6890.87	7027.33	9125.47	1997.33	5223.23	23373.35	30264.22	77.2310	23.	23.	30.	7.	17.	30.	39.	9.	22.
73132E	7	2290	4659.05	6391.00	13332.82	4151.35	11432.45	35307.61	39966.66	88.3427	12.	16.	33.	10.	29.	18.	38.	12.	32.
73132F	7	2320	3864.59	5985.57	14340.24	4408.26	13142.86	37876.91	41740.51	90.7438	9.	14.	34.	11.	31.	16.	37.	12.	35.
73132G	7	2350	3700.20	3880.66	5962.12	1457.05	3902.71	15202.54	18903.73	80.4208	20.	21.	31.	8.	21.	26.	38.	10.	26.
73132H	7	2380	5619.88	6084.72	7883.70	1676.17	4373.77	20018.35	25639.23	78.0770	22.	24.	31.	7.	17.	30.	40.	8.	22.
73132I	7	2410	8286.08	7714.37	9831.36	2032.09	5824.16	25401.97	33688.05	75.4035	25.	23.	29.	6.	17.	30.	39.	8.	23.
73132J	7	2440	8399.36	9626.92	19157.93	5038.22	15113.21	48936.27	57335.63	85.3505	15.	17.	33.	9.	26.	20.	39.	10.	31.
73132K	7	2470	4944.37	4522.93	6859.80	1331.49	3701.69	16415.90	21359.27	76.8561	23.	21.	32.	6.	17.	28.	41.	8.	23.
73132L	7	2500	4242.32	6283.20	14466.60	4224.38	12863.22	37837.38	42079.70	89.9184	10.	15.	34.	10.	31.	17.	38.	11.	34.
73132N	7	2530	6273.64	5887.42	9227.16	1570.50	3859.75	20544.82	26817.46	76.6099	23.	22.	34.	6.	14.	29.	44.	8.	19.
73132N	7	2560	5020.91	2152.06	4685.40	1005.50	2335.92	10178.88	15199.79	66.9672	33.	14.	31.	7.	15.	21.	46.	10.	23.
73132O	7	2590	1634.54	1314.76	2669.55	533.33	1545.04	6062.68	7697.22	78.7645	21.	17.	35.	7.	20.	22.	44.	9.	25.
73132P	7	2620	1213.90	395.52	1753.02	371.74	1338.47	3858.75	5072.65	76.0697	24.	8.	35.	7.	26.	10.	45.	10.	35.
73132Q	7	2650	3130.63	2156.00	5141.10	603.97	2776.50	10677.57	13808.20	77.3277	23.	16.	37.	4.	20.	20.	48.	6.	26.
73132R	7	2680	13955.29	6849.62	13126.87	1314.30	5871.43	27162.21	41117.50	66.0600	34.	17.	32.	3.	14.	25.	48.	5.	22.
73132S	7	2710	5377.46	1598.89	2735.93	442.43	1383.56	6160.81	11539.27	53.3899	47.	14.	24.	4.	12.	26.	45.	7.	22.
73132T	7	2740	5272.68	2418.89	4287.64	779.30	2333.32	9819.14	15090.83	65.0670	35.	16.	28.	5.	15.	25.	43.	8.	24.
73133A	7	2770	10684.49	2915.42	3833.56	513.73	1403.08	8665.79	19350.27	44.7838	55.	15.	20.	3.	7.	34.	44.	6.	16.
73133B	7	2800	7054.50	1119.33	1280.63	224.55	609.87	3234.38	10288.88	31.4357	69.	11.	12.	2.	6.	35.	39.	7.	19.
73133C	7	2830	1004.14	31.38	140.90	42.66	259.53	474.47	1478.61	32.0889	67.	2.	10.	3.	18.	7.	30.	9.	54.
73133D	7	2860	1688.63	323.26	752.25	190.57	570.88	1836.96	3524.59	52.1184	48.	9.	21.	5.	16.	18.	41.	10.	31.
73133E	7	2890	1053.14	299.04	532.75	117.29	305.81	1254.89	2308.03	54.3706	46.	13.	23.	5.	13.	24.	43.	9.	24.
73133F	7	2920	702.58	110.12	241.18	54.29	154.53	560.12	1262.70	44.3589	56.	9.	19.	4.	12.	20.	42.	10.	28.

B = CUTTINGS NOT ANALYZED *C* = AIR SPACE GAS NOT RUN *BC* = NO ANALYSES RUN

TABLE 1D

SAMPLE NO.	DEPTH	TOTAL C1-C4	% WET	% C3+	C3+/C1	C2/C1
73132A	2170	43992.	80.	56.	2.93	1.22
73132B	2200	32129.	76.	51.	2.12	1.03
73132C	2230	34408.	86.	59.	4.15	1.93
73132D	2260	30264.	77.	54.	2.37	1.02
73132E	2290	39967.	88.	72.	6.21	1.37
73132F	2320	41741.	90.	76.	8.25	1.55
73132G	2350	18904.	81.	60.	3.06	1.05
73132H	2380	25639.	79.	55.	2.48	1.08
73132I	2410	33688.	75.	52.	2.13	0.93
73132J	2440	57336.	85.	68.	4.68	1.15
73132K	2470	21359.	76.	55.	2.41	0.91
73132L	2500	42080.	90.	75.	7.44	1.48
73132M	2530	26817.	76.	54.	2.34	0.94
73132N	2560	15200.	67.	53.	1.60	0.43
73132O	2590	7697.	79.	62.	2.90	0.80
73132P	2620	5073.	76.	68.	2.85	0.33
73132Q	2650	13808.	77.	61.	2.72	0.69
73132R	2680	41117.	66.	49.	1.46	0.49
73132S	2710	11539.	54.	40.	0.85	0.30
73132T	2740	15091.	64.	48.	1.40	0.46
73133A	2770	19350.	45.	30.	0.54	0.27
73133B	2800	10289.	31.	20.	0.30	0.16
73133C	2830	1479.	33.	31.	0.44	0.03
73133D	2860	3525.	51.	42.	0.90	0.19
73133E	2890	2308.	54.	41.	0.91	0.28
73133F	2920	1263.	44.	35.	0.64	0.16

TABLE 2 Descriptions of "Picked" Cuttings and Organic Carbon

(Lithology by Hahn, TOC by Bisotooni)

Depth (meters)	Sample No.	Gross Lithology	GSA Color Code (dry)	Total Organic Carbon (%)
2170	73132-A	Shale, olive gray, sl. silty	5Y4/1	5.07
2200	73132-B	Shale, dk. greenish gray, silty, traces of organic debris	5GY3/1	2.32
2230	73132-C	Shle, dk. olive gray, micaceous, plant fragments	5Y3/1	5.58
2260	73132-D	Shale, dk. brownish gray, some silty, organic debris	5YR3/1	6.38
2290	73132-E	Shale, med. grayish brown, sl. micaceous	5YR4/2	5.48
2320	73132-F	Shale, dk. brownish gray, some lt. gray, silty	5YR3/1;N7	3.98
2350	73132-G	75% shale, 25% claystone, dk. gray, sl. calc.	N3	4.93
2380	73132-H	Shale, dk. gray, very well laminated, sl. silty	N3	4.80
2410	73132-I	Shale, mod. grayish brown, silty	5YR4/2	6.14
2440	73132-J	Shale, dk. olive gray, sl. micaceous	5Y3/1	5.06
2470	73132-K	Shale, med. dk. gray, plant debris, well laminated	N4	5.74
2500*	73132-L	Shale, dk. brownish gray to lt. gray, micaceous, plant frags., well laminated	5YR3/1-N7	5.38
2530	73132-M	60% Shale, 40% claystone, med. brownish gray, silty and mic.	5YR5/1	5.56
2560	73132-N	Shale, dk. gray, laminated	N3	4.95
2590	73132-O	Shale, dk. olive gray and greenish gray (laminated)	5Y3/1-5GY6/1	7.38
2620	73132-P	Shale, mod. grayish brown to dk. gray, micaceous	5YR4/2-N3	5.18
2650	73132-Q	Shale, olive gray, coaly in spots	5Y4/1	3.30
2680	73132-R	Shale, med. brownish gray, micac., plant debris	5YR5/1	5.60
2710	73132-S	Shale, dk. gray to lt. olive gray, silty, mic.	N3-5Y6/1	4.21
2740	73132-T	Siltstone, dk. gray, mic.	N3	2.30
2770	73133-A	60% shale, 40% claystone, mod. grayish brown	5YR4/2	3.07
2800	73133-B	Shale, med. olive gray, well laminated, mic.	5Y5/1	4.10
2830	73133-C	Shale, dk. reddish brown to olive gray, mic.	10R3/6-5Y4/1	.37
2860	73133-D	Claystone, med. dk. gray, sl. color banding	N4	1.53
2890	73133-E	Shale, grayish brown, v. micaceous	5YR3/2	1.98
2920	73133-F	70% shale - 30% claystone, dk. gray to dk. reddish brown, mic.	N3-10R3/6	.45

* Chips picked from samples below this depth may be mostly cavings, at least down to 2800 m.

TABLE 3 Visual Descriptions of Organic Matter

(Transmitted light by Morgan (EPR), reflected light by Robertson Res.)

Depth (meters)	EPR No.	Total Organic Carbon (%)	Kerogen Alteration (TAI)	% Kerogen Types (Transmitted Light)*						Vitrinite R_o (%)	% O.M. Types (Reflected Light)**				
				A	Al	IF	H	W	C		AM	EX	V	I	B
2170	73132-A	5.07	1+	30		50 (A,H)	-	10	10						
2200	73132-B	2.32	1+	40		30 (A,H)	-	10	20	.51	30	15	30	20	5
2230	73132-C	5.58	1+	50		40 (A,H)	-	-	10						
2260	73132-D	6.38	1+	40		40 (A,H)	-	10	10	-	20	20	30	15	15
2290	73132-E	5.48	1+	40		40 (A,H)	-	10	10						
2320	73132-F	3.98	1+	60		30 (A,H)	-	tr	tr	.53	20	20	25	15	20
2350	73132-G	4.93	1+	50		40 (A,H)	-	tr	tr						
2380	73132-H	4.80	1+	40		40 (A,H)	-	10	10	-	25	15	30	15	15
2410	73132-I	6.14	1+	50		40 (A,H)	-	tr	tr						
2440	73132-J	5.06	1+	50		30 (A,H)	-	10	10	-	20	15	30	15	20
2470	73132-K	5.74	1+	60		30 (A,H)	-	-	10						
2500	73132-L	5.38	1+	50		40 (A,H)	-	-	10	.57	20	15	30	15	20
2530	73132-M	5.56	1+	60		20 (A,H)	-	10	10						
2560	73132-N	4.95	1+	30		30 (A,H)	10	20	10	.53	25	15	30	15	15
2590	73132-O	7.38	1+	30		40 (A,H)	10	10	10						
2620	73132-P	5.18	1+	10		50 (A,H)	20	10	10	.55	25	15	35	15	10
2650	73132-Q	3.30	1+	20		20 (H,W)	10	30	20						
2680	73132-R	5.60	1+	20	(?)30	30 (W,H)	tr	10	tr	.61	20	10	30	25	15
2710	73132-S	4.21	1+	10	(?)10	50 (W,H)	-	20	10						
2740	73132-T	2.30	1+	20	10	40 (W,H)	-	20	10	.60	20	10	45	15	10
2770	73133-A	3.07	1+	20		50 (W,H)	10	10	10						
2800	73133-B	4.10	1+	-		20 (H,W)	20	50	10	.55	20	15	35	10	20
2830	73133-C	.37	1+	20		40 (H,W)	10	20	10						
2860	73133-D	1.53	1+	10		50 (H,W)	10	20	10	.56	25	10	35	20	10
2890	73133-E	1.98	1+(2-?)	-		60 (H,W)	tr	20	10						
2920	73133-F	.45	1+	-	(?)10	60 (W,H)	tr	20	tr	-	20	20	30	20	10

* A - Amorphous
Al - Algal
H - Herbaceous
W - Woody
C - Coaly

IF - Indeterminate Fines
(A,H) - Best guess as to IF

**Am - Amorphous
EX - Exinite
V - Vitrinite
I - Inertinite
B - Bitumen

Table 4

ROBERTSON RESEARCH (U.S.) INC.

REFLECTED LIGHT

VISUAL KEROGEN ANALYSIS

PROJECT NO. RRUS/790/II/77
Exxon

ORGANIC MATTER TYPE %

SAMPLE DESCRIPTION

VITRINITE DESCRIPTION

FLUORESCENCE INTENSITY

O = NONE
T = TRACE
— = SMALL AMT.
M = MODERATE AMT.
+ = LARGE AMT.

SAMPLE	DEPTH(m) Average	Ro MATURITY	AMORPHOUS	EXINITE	VITRINITE	INERTINITE	BITUMEN	AMT ORGANIC MATTER	PYRITE	NORMAL	ROUGH, CORRODED, OILY	OXIDATION	COKE	EXINITE low	EXINITE med	EXINITE high	BACKGROUND low	BACKGROUND med	BACKGROUND high	REMARKS
73132																				
A+B	2185	.51	30	15	30	20	5	+	+	M	M	-		/	/	/	/			Some amorphous V.
C+D	2245	-	20	20	30	15	15	+	+	M	M			/	/	/	/			
E+F	2305	.53	20	20	25	15	20	+	+	M	M			/	/	/	/			Some amorphous V.
G+H	2365	-	25	15	30	15	15	+	+	M	M	-		/	/	/	/			Same
I+J	2425	-	20	15	30	15	20	+	+	M	M			/	/	/	/			Same
K+L	2485	.57	20	15	30	15	20	+	+	M	M			/	/	/	/			Same
M+N	2545	.53	25	15	30	15	15	+	+	M	M			/	/	/	/			Same
O+P	2605	.55	25	15	35	15	10	+	+	M	+			/	/	/	/			Same
Q+R	2665	.61	20	10	30	25	15	+	+	M	M		T	/	/	/	/			Some cannel coal.
S+T	2725	.60	20	10	45	15	10	+	+	M	M			/	/	/	/	/	/	
73133																				
A+B	2785	.55	20	15	35	10	20	+	+	M	M			/	/	/	/	/		
C+D	2845	.56	25	10	35	20	10	+	++	+	-			/	/	/	/	/	/	
E+F	2905	-	20	20	30	20	10	+	++	M	-		T	/	/	/	/	/		

TABLE 5 Light Gasolines (C_4-C_7) and Total Organic Carbon

(Analyses by H. M. Fry, M. S. Bisotooni)

Sample No.	Depth (meters)	Total Organic Carbon (%)	Total C_4-C_7 Hydrocarbons (ppm)	Correlation Ratios			
				C_1/C_2	A/D_2	C_1/D_2	CH/MCP
73132-A	2170	5.07	128	.68	2.31	4.76	.49
73132-B	2200	2.32	70	1.00	4.55	8.31	.71
73132-C	2230	5.58	*				
73132-D	2260	6.38	65	1.86	5.25	9.72	6.61
73132-E	2290	5.48	131	1.01	5.22	10.58	.71
73132-F	2320	3.98	*				
73132-G	2350	4.93	141	.98	5.22	10.40	.66
73132-H	2380	4.80	192	.64	4.03	7.68	.47
73132-I	2410	6.14	192	.62	4.04	7.41	.47
73132-J	2440	5.06	*				
73132-K	2470	5.74	36	.82	3.44	6.39	.44
73132-L	2500	5.38	37	.95	3.36	8.25	.63
73132-M	2530	5.56	*				
73132-N	2560	4.95	38	.93	3.37	8.12	.62
73132-O	2590	7.38	*				
73132-P	2620	5.18	89	.60	3.85	7.98	.39
73132-Q	2650	3.30	22	1.31	5.60	12.59	.73
73132-R	2680	5.60	95	1.27	6.34	10.95	.93
73132-S	2710	-	37	1.45	4.80	11.15	.92
73132-T	2740	2.30	*				
73133-A	2770	3.07	10	1.70	5.70	18.71	1.02
73133-B	2800	4.10	*				
73133-C	2830	.37	22	1.00	3.36	8.00	.59
73133-D	2860	1.53	*				
73133-E	2890	1.98	21	.99	3.30	7.79	.56
73133-F	2920	.45	*				

*Due to recording error after initial analysis all 26 samples had to be rerun for C_4-C_7. Those indicated by * were no longer available for reruns.

TABLE 6 Heavy (C_{15+}) Soluble Organic Matter

(Analyses by GeoChem)

Depth (meters)	2230	2320	2440	2530	2570	2740	2800	2860
EPR No.	73132-C	73132-F	73132-J	73132-M	73132-O	73132-T	73133-B	73133-D
Total Organic Carbon (%)*	1.25	.70	.94	.73	.95	.95	.54	.34
Soluble Organic Matter (ppm)	802	415	784	646	914	936	466	295
Asphaltenes (ppm)	213	190	311	376	529	637	296	202
Composition of Soluble O.M. (%)								
Saturates**	10.7	7.2	12.9	5.6	4.6	5.1	5.8	-
Aromatics	24.3	25.1	18.4	20.0	22.9	13.6	1.9	-
Eluted NSO's	21.8	14.5	17.1	10.4	10.6	8.4	7.7	-
Noneluted NSO's	14.0	5.1	7.9	2.5	2.8	3.1	4.9	-
Asphaltenes	26.6	45.8	39.7	58.2	57.9	68.1	63.5	68.5
Sulfur	2.6	2.4	4.1	3.4	1.2	1.7	16.1	-
Hydrocarbons								
ppm of rock	86	30	101	36	42	48	27	<70
% of T.O.C.*	.7	.4	1.1	.5	.4	.5	.5	-
Sats./Aroms.	.4	.3	.7	.3	.2	.4	3.0	-

* In order to provide the 110-gram samples needed for C_{15+} extractions the unpicked heterogeneous samples found in individual cans were used. These mixed lithologies had the organic carbon values shown above. In Tables 2, 3 and 5 the TOC values generally pertain to "picked" darker shales which were much richer.

** See Figures 2-9 for gas chromatograms of heavy saturates.

Table 7a Rock-Eval Data*
(by Robertson Res.)

EXXON 73132

meters	ID	S1	S2	S3	S2/S3	S1/S1+S2	Tmax	
2170	A	1.557	24.042	0.574	41.900	0.061	422	
2200	B	0.846	5.930	0.393	15.072	0.125	421	migr. hcls S1, P1,
2230	C	2.266	24.823	0.408	60.809	0.084	422	
2260	D	10.675	37.852	0.291	129.965	0.220	420	migr. hcls S1, P1.
2290	E	1.880	25.116	0.324	77.598	0.070	411	
2320	F	1.629	14.989	0.471	31.840	0.098	420	
2350	G	1.519	19.418	0.306	63.396	0.073	407	
2380	H	2.685	21.339	0.340	62.782	0.112	421	
2410	I	4.275	30.695	0.401	76.607	0.122	421	
2440	J	2.764	23.509	0.330	71.232	0.105	423	
2470	K	2.606	26.718	0.482	55.459	0.089	422	
2500	L	2.517	27.309	0.424	64.467	0.084	422	
2530	M	3.228	26.171	0.413	63.414	0.110	421	
2560	N	2.606	21.966	0.427	51.481	0.106	421	
2590	O	2.723	32.139	0.504	63.787	0.078	424	
2620	P	2.129	21.321	0.393	54.311	0.091	420	
2650	Q	1.845	6.130	0.291	21.062	0.231	430	
2680	R	1.446	20.486	0.264	77.615	0.066	422	
2710	S	2.129	8.520	0.309	27.550	0.200	433	
2740	T	0.564	4.868	0.296	16.433	0.104	432	

EXXON 73133

	ID	S1	S2	S3	S2/S3	S1/S1+S2	Tmax
2770	A	0.826	7.173	0.359	19.981	0.103	431
2800	B	1.516	13.376	0.419	31.913	0.102	424
2830	C	0.108	0.213	0.323	0.659	0.336	432
2860	D	0.309	2.376	0.282	8.420	0.115	430
2890	E	0.481	5.204	0.245	21.250	0.085	428
2920	F	0.089	0.244	0.231	1.057	0.267	432

S1 and S2 are given as mg HC/g rock; S3, as mg CO_2/g rock.

Table 7b Rock-Eval Data*
(by Robertson Res.)

EXXON 73132

ID	DEPTH METERS	HYDRO INDEX	OXYGEN INDEX	TOC
A	2170	505.0	11.0	5.07
B	2200	292.0	17.0	2.32
C	2230	485.0	7.0	5.58
D	2260	761.0	5.0	6.39
E	2290	493.0	6.0	5.48
F	2320	418.0	12.0	3.98
G	2350	425.0	6.0	4.93
H	2380	501.0	7.0	4.80
I	2410	570.0	7.0	6.14
J	2440	519.0	7.0	5.06
K	2470	511.0	8.0	5.74
L	2500	554.0	8.0	5.38
M	2530	529.0	7.0	5.56
N	2560	496.0	9.0	4.95
O	2590	472.0	7.0	7.38
P	2620	453.0	8.0	5.18
Q	2650	242.0	9.0	3.30
R	2680	392.0	5.0	5.60
S	2710	253.0	7.0	4.21
T	2740	236.0	13.0	2.30

EXXON 73133

ID	DEPTH METERS	HYDRO INDEX	OXYGEN INDEX	TOC
A	2770	261.0	12.0	3.07
B	2800	363.0	10.0	4.10
C	2830	87.0	87.0	0.37
D	2860	175.0	18.0	1.53
E	2890	287.0	12.0	1.98
F	2920	74.0	51.0	0.45

7c - Explanation for Tables 7a and 7b

Rock-Eval pyrolysis data on each sample analysed.
The samples are identified by sequence number.

Rock-Eval data are expressed as mg/g of rock and include four basic parameters: 1) S_1 represents the quantity of free hydrocarbons present in the rock and is roughly analogous to the solvent extractable portion of the organic matter; 2) S_2 represents the quantity of hydrocarbons released by the kerogen in the sample during pyrolysis; 3) S_3 is related to the amount of oxygen present in the kerogen; and 4) Tmax, in ^{o}C, is the temperature at which the maximum rate of generation (of the S_2 peak) occurs and can be used as an estimate of thermal maturity.

In addition, the ratio S_2/S_3 provides a general indication of kerogen quality (type) and reveals whether oil or gas are likely to be generated. The ratio S_1/S_1+S_2, or the productivity index, is an indication of the relative amount of free hydrocarbons (in place or migrated) present in the sample. Hydrogen index values are in mg of hydrocarbons (S_2 peak) per gram of organic carbon and oxygen index values are in mg of CO_2 (S_3 peak) per gram of organic carbon. When plotted against each other on a van Krevelen-type diagram, information on kerogen type and maturity can be obtained.

731321A OFF NORWAY, 2170 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	3068.6	2.41
ETHANE	0.0		1T2-DMCP	11305.4	8.82
PROPANE	1301.9		3-EPENT	0.0	0.00
IBUTANE	2436.0	1.90	224-TMP	0.0	0.00
NBUTANE	3196.0	2.49	NHEPTANE	6725.3	5.25
IPENTANE	5620.2	4.38	1C2-DMCP	3106.7	2.42
NPENTANE	7275.5	5.68	MCH	16578.6	12.93
22-DMB	46.9	0.04			
CPENTANE	2817.5	2.20			
23-DMB	0.0	0.00			
2-MP	6325.2	4.93			
3-MP	3925.6	3.06			
NHEXANE	7529.0	5.87			
MCP	22640.7	17.66			
22-DMP	0.0	0.00			
24-DMP	1814.3	1.42			
223-TMB	157.9	0.12			
CHEXANE	11006.5	8.59			
33-DMP ,	0.0	0.00			
11-DMCP	1753.1	1.37			
2-MHEX ,	0.0	0.00			
23-DMP ,	1768.2	1.40			
3-MHEX ,	6166.2	4.81			
1C3-DMCP	2877.0	2.24			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	129483.		C1/C2	0.68
GASOLINE	128131.		A /D2	2.31
NAPHTHENES	75174.	58.65	C1/D2	4.76
C6-7	96538.	75.31	CH/MCP	0.49
			PENT/IPENT.	1.29

731323B OFF NORWAY, 2200 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	1186.9	1.68
ETHANE	0.0		1T2-DMCP	4200.7	5.96
PROPANE	685.8		3-EPENT	0.0	0.00
IBUTANE	1295.1	1.84	224-TMP	0.0	0.00
NBUTANE	5614.7	7.97	NHEPTANE	3752.9	5.32
IPENTANE	5203.0	7.38	1C2-DMCP	1050.5	1.49
NPENTANE	6987.1	9.91	MCH	9059.2	12.85
22-DMB	81.5	0.12			
CPENTANE	964.9	1.37			
23-DMB	410.7	0.58			
2-MP	3692.3	5.24			
3-MP	2318.9	3.29			
NHEXANE	4986.1	7.07			
MCP	8161.6	11.58			
22-DMP	0.0	0.00			
24-DMP	95.2	0.13			
223-TMB	265.6	0.38			
CHEXANE	5799.5	8.23			
33-DMP ,	0.0	0.00			
11-DMCP	1115.1	1.58			
2-MHEX ,	0.0	0.00			
23-DMP ,	963.2	1.37			
3-MHEX ,	1921.1	2.73			
1C3-DMCP	1365.2	1.94			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	71177.		C1/C2	1.00
GASOLINE	70491.		A /D2	4.55
NAPHTHENES	32904.	46.68	C1/D2	8.31
C6-7	43923.	62.31	CH/MCP	0.71
			PENT/IPENT.	1.34

73132D OFF. NORWAY, 2260 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	903.3	1.39
ETHANE	0.0		1T2-DMCP	3212.1	4.93
PROPANE	3929.6		3-EPENT	0.0	0.00
IBUTANE	6621.6	10.16	224-TMP	0.0	0.00
NBUTANE	8993.2	13.79	NHEPTANE	2533.2	3.89
IPENTANE	6539.6	10.03	1C2-DMCP	791.3	1.21
NPENTANE	8112.3	12.44	MCH	6543.6	10.04
22-DMB	67.4	0.10			
CPENTANE	1372.0	2.10			
23-DMB	412.3	0.63			
2-MP	3179.9	4.88			
3-MP	2015.1	3.09			
NHEXANE	4169.7	6.40			
MCP	775.1	1.19			
22-DMP	0.0	0.00			
24-DMP	62.9	0.10			
223-TMB	52.7	0.08			
CHEXANE	5126.8	7.86			
33-DMP ,	0.0	0.00			
11-DMCP	735.8	1.13			
2-MHEX ,	0.0	0.00			
23-DMP ,	697.6	1.07			
3-MHEX ,	1276.4	1.96			
1C3-DMCP	1001.4	1.54			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	69125.		C1/C2	1.86
GASOLINE	65195.		A /D2	5.25
NAPHTHENES	20461.	31.38	C1/D2	9.72
C6-7	27882.	42.77	CH/MCP	6.61
			PENT/IPENT,	1.24

73132E OFF. NORWAY, 2290 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	1742.9	1.33
ETHANE	0.0		1T2-DMCP	6329.6	4.82
PROPANE	4814.0		3-EPENT	0.0	0.00
IBUTANE	11179.7	8.52	224-TMP	0.0	0.00
NBUTANE	14023.3	10.68	NHEPTANE	5037.3	3.84
IPENTANE	9536.6	7.27	1C2-DMCP	893.6	0.68
NPENTANE	12989.9	9.90	MCH	14054.7	10.71
22-DMB	106.0	0.08			
CPENTANE	3286.5	2.50			
23-DMB	0.0	0.00			
2-MP	5473.3	4.17			
3-MP	4106.5	3.13			
NHEXANE	7783.5	5.93			
MCP	14910.0	11.36			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	2187.0	1.67			
CHEXANE	10537.6	8.03			
33-DMP ,	0.0	0.00			
11-DMCP	1387.7	1.06			
2-MHEX ,	0.0	0.00			
23-DMP ,	1326.7	1.01			
3-MHEX ,	2454.5	1.87			
1C3-DMCP	1914.4	1.46			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	136077.		C1/C2	1.01
GASOLINE	131263.		A /D2	5.22
NAPHTHENES	55057.	41.94	C1/D2	10.58
C6-7	70559.	53.75	CH/MCP	0.71
			PENT/IPENT,	1.36

73132G OFF. NORWAY, 2350 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	1886.0	1.34
ETHANE	0.0		1T2-DMCP	6728.6	4.78
PROPANE	5940.3		3-EPENT	0.0	0.00
IBUTANE	11331.7	8.05	224-TMP	0.0	0.00
NBUTANE	13917.6	9.88	NHEPTANE	5557.7	3.95
IPENTANE	11235.2	7.98	1C2-DMCP	906.0	0.64
NPENTANE	14449.1	10.26	MCH	15080.8	10.71
22-DMB	153.2	0.11			
CPENTANE	3390.5	2.41			
23-DMB	166.2	0.12			
2-MP	5762.0	4.09			
3-MP	4534.5	3.22			
NHEXANE	8243.6	5.85			
MCP	16543.9	11.75			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	2356.1	1.67			
CHEXANE	10906.9	7.74			
33-DMP ,	0.0	0.00			
11-DMCP	1520.9	1.08			
2-MHEX ,	0.0	0.00			
23-DMP ,	1453.3	1.03			
3-MHEX ,	2646.0	1.88			
1C3-DMCP	2067.4	1.47			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	146777.		C1/C2	0.98
GASOLINE	140837.		A /D2	5.22
NAPHTHENES	59031.	41.91	C1/D2	10.40
C6-7	75897.	53.89	CH/MCP	0.66
			PENT/IPENT.	1.29

73132H OFF. NORWAY, 2380 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	3228.9	1.68
ETHANE	0.0		1T2-DMCP	12834.6	6.69
PROPANE	6583.5		3-EPENT	0.0	0.00
IBUTANE	12742.4	6.65	224-TMP	0.0	0.00
NBUTANE	18932.5	9.87	NHEPTANE	7524.5	3.92
IPENTANE	14483.2	7.55	1C2-DMCP	3639.5	1.90
NPENTANE	17090.7	8.91	MCH	17266.0	9.00
22-DMB	0.0	0.00			
CPENTANE	4909.3	2.56			
23-DMB	0.0	0.00			
2-MP	9359.2	4.88			
3-MP	5694.4	2.97			
NHEXANE	9446.7	4.93			
MCP	27745.3	14.47			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	2290.0	1.19			
CHEXANE	13102.8	6.83			
33-DMP ,	0.0	0.00			
11-DMCP	1947.6	1.02			
2-MHEX ,	0.0	0.00			
23-DMP ,	2014.8	1.05			
3-MHEX ,	4209.0	2.20			
1C3-DMCP	3277.7	1.71			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	198322.		C1/C2	0.64
GASOLINE	191739.		A /D2	4.03
NAPHTHENES	87952.	45.87	C1/D2	7.68
C6-7	108527.	56.60	CH/MCP	0.47
			PENT/IPENT.	1.18

73132I OFF. NORWAY, 2410 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	3205.9	1.67
ETHANE	0.0		1T2-DMCP	12245.2	6.36
PROPANE	7586.0		3-EPENT	0.0	0.00
IBUTANE	13803.2	7.17	224-TMP	0.0	0.00
NBUTANE	18086.6	9.40	NHEPTANE	7504.7	3.90
IPENTANE	15968.5	8.30	1C2-DMCP	3564.2	1.85
NPENTANE	18079.9	9.40	MCH	16050.0	8.34
22-DMB	90.1	0.05			
CPENTANE	4949.2	2.57			
23-DMB	135.4	0.07			
2-MP	9438.1	4.90			
3-MP	5636.3	2.93			
NHEXANE	9423.0	4.90			
MCP	27665.4	14.38			
22-DMP	0.0	0.00			
24-DMP	0.0	0.00			
223-TMB	2114.0	1.10			
CHEXANE	13087.2	6.80			
33-DMP ,	0.0	0.00			
11-DMCP	1931.8	1.00			
2-MHEX ,	0.0	0.00			
23-DMP ,	1984.4	1.03			
3-MHEX ,	4192.3	2.18			
1C3-DMCP	3268.0	1.70			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	200009.		C1/C2	0.62
GASOLINE	192423.		A /D2	4.04
NAPHTHENES	85967.	44.68	C1/D2	7.41
C6-7	106236.	55.21	CH/MCP	0.47
			PENT/IPENT,	1.13

73132K OFF. NORWAY, 2470 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	470.5	1.31
ETHANE	0.0		1T2-DMCP	1457.0	4.04
PROPANE	836.8		3-EPENT	0.0	0.00
IBUTANE	4114.0	11.42	224-TMP	0.0	0.00
NBUTANE	4462.4	12.38	NHEPTANE	885.1	2.46
IPENTANE	4652.5	12.91	1C2-DMCP	299.6	0.83
NPENTANE	5153.8	14.30	MCH	3053.1	8.47
22-DMB	31.3	0.09			
CPENTANE	852.1	2.36			
23-DMB	37.0	0.10			
2-MP	1510.8	4.19			
3-MP	920.8	2.56			
NHEXANE	1647.5	4.57			
MCP	2987.6	8.29			
22-DMP	0.0	0.00			
24-DMP	24.7	0.07			
223-TMB	383.3	1.06			
CHEXANE	1305.2	3.62			
33-DMP ,	0.0	0.00			
11-DMCP	338.9	0.94			
2-MHEX ,	0.0	0.00			
23-DMP ,	201.2	0.56			
3-MHEX ,	735.5	2.04			
1C3-DMCP	508.7	1.41			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	36870.		C1/C2	0.82
GASOLINE	36033.		A /D2	3.44
NAPHTHENES	11273.	31.28	C1/D2	6.39
C6-7	14298.	39.68	CH/MCP	0.44
			PENT/IPENT,	1.11

73132L OFF. NORWAY, 2500 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	689.9	1.87
ETHANE	0.0		1T2-DMCP	1888.3	5.12
PROPANE	755.1		3-EPENT	0.0	0.00
IBUTANE	1686.1	4.57	224-TMP	0.0	0.00
NBUTANE	3489.2	9.46	NHEPTANE	1210.5	3.28
IPENTANE	3061.7	8.30	1C2-DMCP	836.0	2.27
NPENTANE	3708.6	10.06	MCH	4887.6	13.25
22-DMB	32.7	0.09			
CPENTANE	624.9	1.69			
23-DMB	233.9	0.63			
2-MP	1799.6	4.88			
3-MP	1199.2	3.25			
NHEXANE	2007.1	5.44			
MCP	4139.9	11.23			
22-DMP	0.0	0.00			
24-DMP	40.8	0.11			
223-TMB	195.1	0.53			
CHEXANE	2602.2	7.06			
33-DMP ,	0.0	0.00			
11-DMCP	424.3	1.15			
2-MHEX ,	0.0	0.00			
23-DMP ,	393.5	1.07			
3-MHEX ,	958.8	2.60			
1C3-DMCP	766.8	2.08			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	37632.		C1/C2	0.95
GASOLINE	36877.		A /D2	3.36
NAPHTHENES	16860.	45.72	C1/D2	8.25
C6-7	21041.	57.06	CH/MCP	0.63
			PENT/IPENT,	1.21

73132N OFF. NORWAY, 2560 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	760.8	1.99
ETHANE	0.0		1T2-DMCP	1910.3	4.98
PROPANE	768.7		3-EPENT	0.0	0.00
IBUTANE	1809.9	4.72	224-TMP	0.0	0.00
NBUTANE	3561.4	9.29	NHEPTANE	1288.4	3.36
IPENTANE	3176.5	8.29	1C2-DMCP	891.6	2.33
NPENTANE	3789.7	9.89	MCH	4986.4	13.01
22-DMB	38.2	0.10			
CPENTANE	670.1	1.75			
23-DMB	249.7	0.65			
2-MP	1824.1	4.76			
3-MP	1215.9	3.17			
NHEXANE	2096.5	5.47			
MCP	4361.2	11.38			
22-DMP	0.0	0.00			
24-DMP	44.9	0.12			
223-TMB	198.9	0.52			
CHEXANE	2724.1	7.11			
33-DMP ,	0.0	0.00			
11-DMCP	451.3	1.18			
2-MHEX ,	0.0	0.00			
23-DMP ,	424.5	1.11			
3-MHEX ,	1004.6	2.62			
1C3-DMCP	843.4	2.20			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	39091.		C1/C2	0.93
GASOLINE	38322.		A /D2	3.37
NAPHTHENES	17599.	45.92	C1/D2	8.12
C6-7	21987.	57.37	CH/MCP	0.62
			PENT/IPENT,	1.19

73132P OFF. NORWAY, 2620 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	1585.5	1.79
ETHANE	0.0		1T2-DMCP	5675.5	6.41
PROPANE	5102.7		3-EPENT	0.0	0.00
IBUTANE	6143.2	6.94	224-TMP	0.0	0.00
NBUTANE	7986.9	9.02	NHEPTANE	2867.5	3.24
IPENTANE	8373.0	9.45	1C2-DMCP	1335.5	1.51
NPENTANE	9000.5	10.16	MCH	8205.0	9.26
22-DMB	26.3	0.03			
CPENTANE	2308.3	2.61			
23-DMB	447.9	0.51			
2-MP	3723.5	4.20			
3-MP	2653.3	3.00			
NHEXANE	3914.2	4.42			
MCP	12835.8	14.49			
22-DMP	0.0	0.00			
24-DMP	76.7	0.09			
223-TMB	1103.2	1.25			
CHEXANE	4995.1	5.64			
33-DMP ,	0.0	0.00			
11-DMCP	849.4	0.96			
2-MHEX ,	0.0	0.00			
23-DMP ,	850.7	0.96			
3-MHEX ,	1761.5	1.99			
1C3-DMCP	1841.8	2.08			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	93663.		C1/C2	0.60
GASOLINE	88560.		A /D2	3.85
NAPHTHENES	39632.	44.75	C1/D2	7.98
C6-7	47897.	54.08	CH/MCP	0.39
			PENT/IPENT,	1.07

73132Q OFF. NORWAY, 2650 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	440.6	2.05
ETHANE	0.0		1T2-DMCP	673.4	3.13
PROPANE	2189.2		3-EPENT	0.0	0.00
IBUTANE	832.4	3.87	224-TMP	0.0	0.00
NBUTANE	2484.5	11.56	NHEPTANE	742.2	3.45
IPENTANE	1896.7	8.82	1C2-DMCP	121.9	0.57
NPENTANE	2588.8	12.04	MCH	2496.8	11.61
22-DMB	12.2	0.06			
CPENTANE	680.3	3.16			
23-DMB	29.6	0.14			
2-MP	824.3	3.83			
3-MP	646.2	3.01			
NHEXANE	1374.1	6.39			
MCP	2073.8	9.65			
22-DMP	0.0	0.00			
24-DMP	26.1	0.12			
223-TMB	326.4	1.52			
CHEXANE	1513.6	7.04			
33-DMP ,	0.0	0.00			
11-DMCP	751.0	3.49			
2-MHEX ,	0.0	0.00			
23-DMP ,	265.5	1.23			
3-MHEX ,	378.2	1.76			
1C3-DMCP	320.8	1.49			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	23689.		C1/C2	1.31
GASOLINE	21500.		A /D2	5.60
NAPHTHENES	9072.	42.20	C1/D2	12.59
C6-7	11505.	53.51	CH/MCP	0.73
			PENT/IPENT,	1.36

73132R OFF. NORWAY, 2680 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	1004.0	1.05
ETHANE	0.0		1T2-DMCP	2887.0	3.03
PROPANE	7483.9		3-EPENT	0.0	0.00
IBUTANE	6552.0	6.88	224-TMP	0.0	0.00
NBUTANE	11087.9	11.65	NHEPTANE	3167.3	3.33
IPENTANE	9209.4	9.68	1C2-DMCP	696.8	0.73
NPENTANE	13551.7	14.24	MCH	8793.2	9.24
22-DMB	81.5	0.09			
CPENTANE	3726.4	3.92			
23-DMB	78.3	0.08			
2-MP	3802.3	4.00			
3-MP	2999.6	3.15			
NHEXANE	6865.6	7.21			
MCP	7983.7	8.39			
22-DMP	0.0	0.00			
24-DMP	111.6	0.12			
223-TMB	416.4	0.44			
CHEXANE	7456.4	7.84			
33-DMP ,	0.0	0.00			
11-DMCP	1066.5	1.12			
2-MHEX ,	0.0	0.00			
23-DMP ,	985.7	1.04			
3-MHEX ,	1581.7	1.66			
1C3-DMCP	1062.4	1.12			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	102651.		C1/C2	1.27
GASOLINE	95167.		A /D2	6.34
NAPHTHENES	34676.	36.44	C1/D2	10.95
C6-7	44078.	46.32	CH/MCP	0.93
			PENT/IPENT,	1.47

73132S OFF. NORWAY, 2710 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	436.5	1.19
ETHANE	0.0		1T2-DMCP	1139.8	3.11
PROPANE	3176.5		3-EPENT	0.0	0.00
IBUTANE	2426.6	6.62	224-TMP	0.0	0.00
NBUTANE	3202.7	8.74	NHEPTANE	1041.0	2.84
IPENTANE	3391.3	9.25	1C2-DMCP	332.7	0.91
NPENTANE	5051.1	13.78	MCH	4706.6	12.84
22-DMB	29.7	0.08			
CPENTANE	1286.9	3.51			
23-DMB	37.7	0.10			
2-MP	1425.5	3.89			
3-MP	1130.3	3.08			
NHEXANE	2410.0	6.58			
MCP	3143.0	8.58			
22-DMP	0.0	0.00			
24-DMP	42.6	0.12			
223-TMB	544.6	1.49			
CHEXANE	2904.2	7.92			
33-DMP ,	0.0	0.00			
11-DMCP	407.9	1.11			
2-MHEX ,	0.0	0.00			
23-DMP ,	375.7	1.02			
3-MHEX ,	719.0	1.96			
1C3-DMCP	466.5	1.27			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	39828.		C1/C2	1.45
GASOLINE	36652.		A /D2	4.80
NAPHTHENES	14824.	40.45	C1/D2	11.15
C6-7	18670.	50.94	CH/MCP	0.92
			PENT/IPENT,	1.49

73133A OFF. NORWAY, 2740 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	182.2	1.78
ETHANE	0.0		1T2-DMCP	249.2	2.44
PROPANE	362.3		3-EPENT	0.0	0.00
IBUTANE	750.6	7.34	224-TMP	0.0	0.00
NBUTANE	1177.3	11.51	NHEPTANE	258.5	2.53
IPENTANE	717.5	7.01	1C2-DMCP	46.6	0.46
NPENTANE	1045.6	10.22	MCH	1520.8	14.87
22-DMB	10.6	0.10			
CPENTANE	369.3	3.61			
23-DMB	9.1	0.09			
2-MP	307.2	3.00			
3-MP	264.3	2.58			
NHEXANE	524.5	5.13			
MCP	910.3	8.90			
22-DMP	0.0	0.00			
24-DMP	11.6	0.11			
223-TMB	479.0	4.68			
CHEXANE	929.9	9.09			
33-DMP ,	0.0	0.00			
11-DMCP	116.8	1.14			
2-MHEX ,	0.0	0.00			
23-DMP ,	87.4	0.85			
3-MHEX ,	137.3	1.34			
1C3-DMCP	123.9	1.21			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	10592.		C1/C2	1.70
GASOLINE	10230.		A /D2	5.70
NAPHTHENES	4449.	43.49	C1/D2	18.71
C6-7	5578.	54.53	CH/MCP	1.02
			PENT/IPENT,	1.46

73133C OFF. NORWAY, 2830 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	425.4	1.94
ETHANE	0.0		1T2-DMCP	1064.1	4.86
PROPANE	751.3		3-EPENT	0.0	0.00
IBUTANE	1358.7	6.21	224-TMP	0.0	0.00
NBUTANE	1664.2	7.61	NHEPTANE	738.4	3.37
IPENTANE	1886.0	8.62	1C2-DMCP	228.8	1.05
NPENTANE	2387.2	10.91	MCH	2850.9	13.03
22-DMB	15.7	0.07			
CPENTANE	608.1	2.78			
23-DMB	41.6	0.19			
2-MP	924.8	4.23			
3-MP	768.4	3.51			
NHEXANE	1225.2	5.60			
MCP	2539.3	11.61			
22-DMP	0.0	0.00			
24-DMP	38.8	0.18			
223-TMB	76.8	0.35			
CHEXANE	1490.5	6.81			
33-DMP ,	0.0	0.00			
11-DMCP	342.0	1.56			
2-MHEX ,	0.0	0.00			
23-DMP ,	176.4	0.81			
3-MHEX ,	585.3	2.67			
1C3-DMCP	443.5	2.03			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	22632.		C1/C2	1.00
GASOLINE	21880.		A /D2	3.36
NAPHTHENES	9993.	45.67	C1/D2	8.00
C6-7	12226.	55.87	CH/MCP	0.59
			PENT/IPENT,	1.27

73133E OFF. NORWAY, 2890 METERS

	TOTAL PPB	NORM PERCENT		TOTAL PPB	NORM PERCENT
METHANE	0.0		1T3-DMCP	420.8	2.03
ETHANE	0.0		1T2-DMCP	1021.0	4.92
PROPANE	454.3		3-EPENT	0.0	0.00
IBUTANE	1092.1	5.26	224-TMP	0.0	0.00
NBUTANE	1572.1	7.57	NHEPTANE	734.1	3.54
IPENTANE	1764.0	8.50	1C2-DMCP	227.8	1.10
NPENTANE	2252.8	10.85	MCH	2787.8	13.43
22-DMB	10.9	0.05			
CPENTANE	576.9	2.78			
23-DMB	26.4	0.13			
2-MP	850.4	4.10			
3-MP	724.4	3.49			
NHEXANE	1181.3	5.69			
MCP	2490.1	12.00			
22-DMP	0.0	0.00			
24-DMP	30.9	0.15			
223-TMB	68.8	0.33			
CHEXANE	1405.7	6.77			
33-DMP ,	0.0	0.00			
11-DMCP	334.9	1.61			
2-MHEX ,	0.0	0.00			
23-DMP ,	168.9	0.81			
3-MHEX ,	581.2	2.80			
1C3-DMCP	434.6	2.09			

	TOTALS PPB	NORM PERCENT	SIG COMP RATIOS	
ALL COMP	21212.		C1/C2	0.99
GASOLINE	20738.		A /D2	3.30
NAPHTHENES	9700.	46.73	C1/D2	7.79
C6-7	11888.	57.27	CH/MCP	0.56
			PENT/IPENT,	1.28

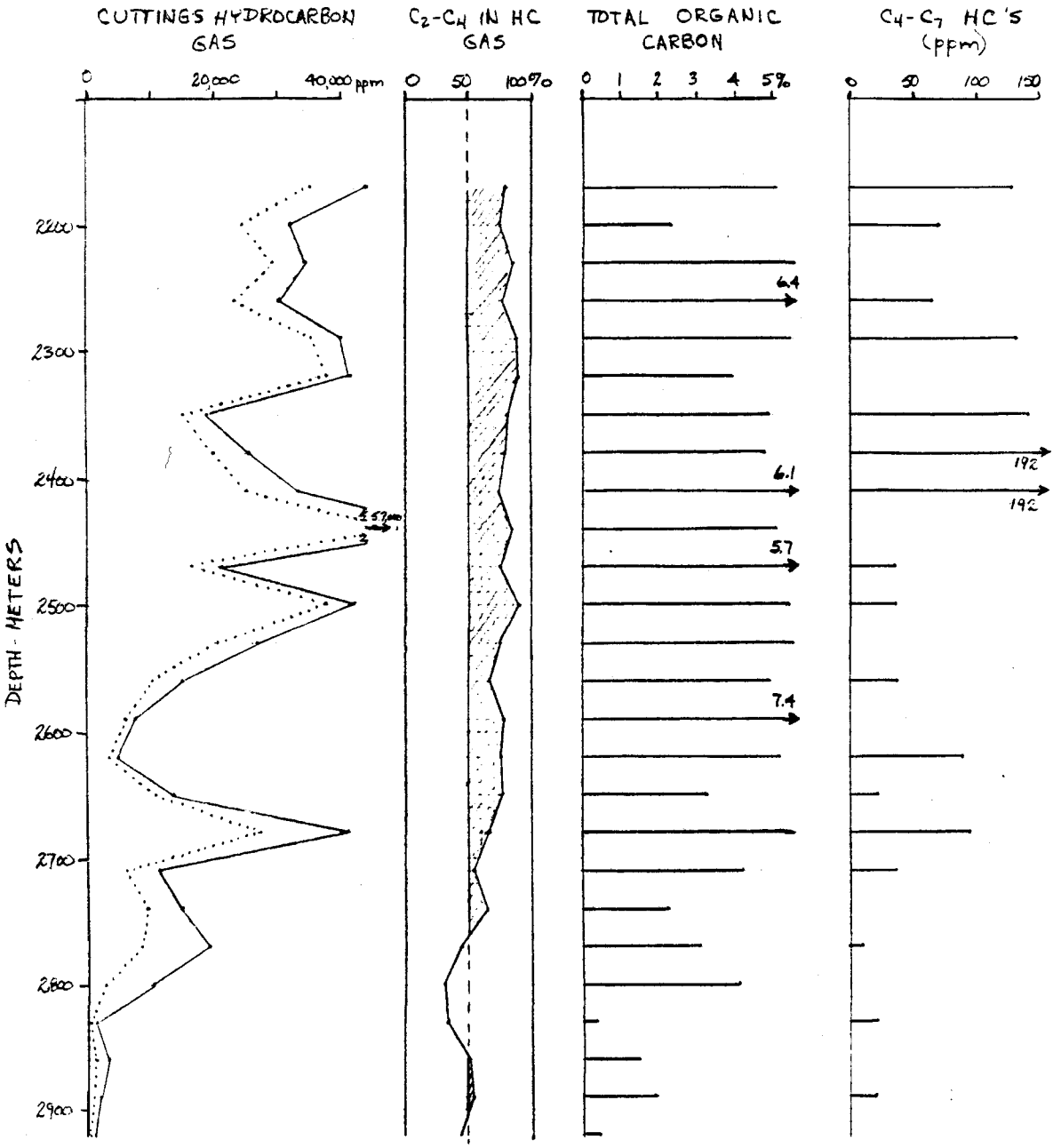
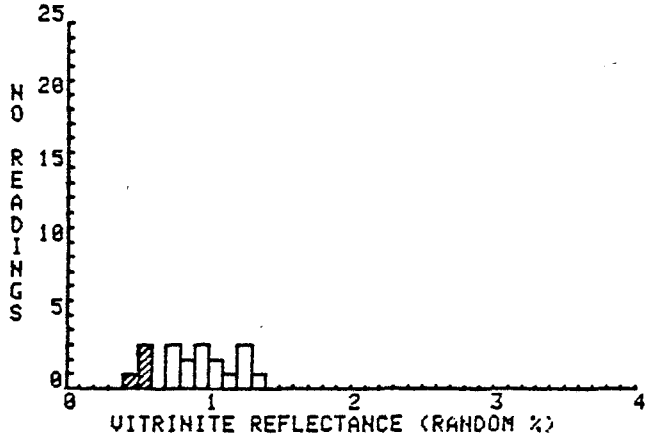


Fig. 1 Geochemical Profiles, 31/4-2

EXXON - 73132



ID A+B 2170 + 2200 m

DEPTH 7166.8 FT
2185.0 M

* = Ro MATURITY

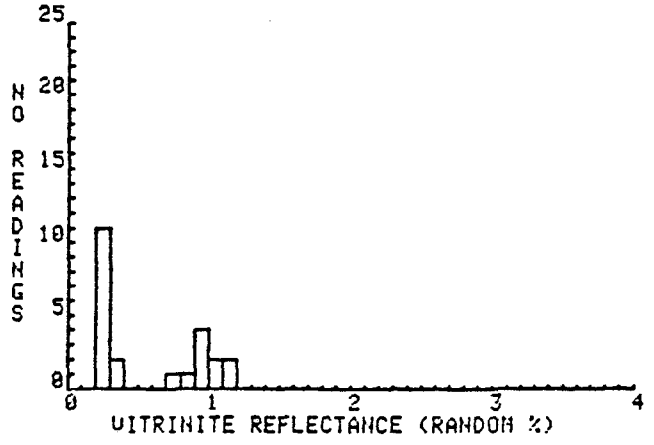
# VALUES	4.00
MEAN	0.51
STD DEV	0.06
MEDIAN	0.55
MODE	0.55

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

*0.42	0.92
*0.51	0.95
*0.55	1.00
*0.56	1.03
0.71	1.17
0.76	1.22
0.76	1.23
0.84	1.27
0.86	1.38
0.90	

EXXON - 73132



ID C+D 2230 + 2260

DEPTH 7363.6 FT
2245.0 M

# VALUES	23.00
MEAN	0.57
STD DEV	0.36
MEDIAN	0.32
MODE	0.25

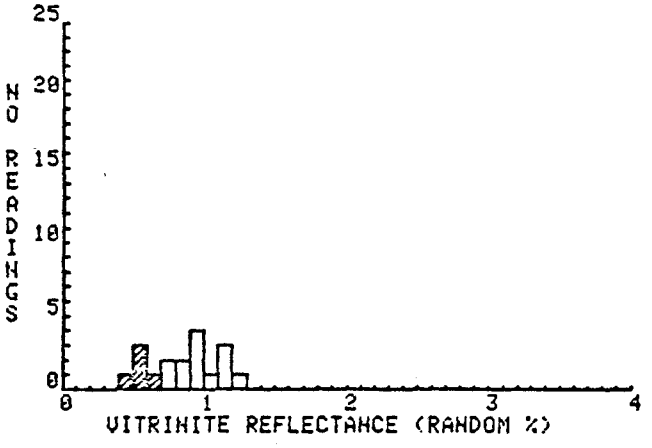
HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

0.22	0.27	1.04
0.24	0.32	1.15
0.24	0.32	1.18
0.26	0.72	
0.26	0.82	
0.26	0.91	
0.26	0.94	
0.27	0.94	
0.27	0.99	
0.27	1.03	

Fig. 2 Vitrinite Reflectance (Robertson Research)

EXXON - 73132



ID E+F 2290 + 2320 m.

DEPTH 7560.4 FT
2305.0 M

‡ = Ro MATURITY

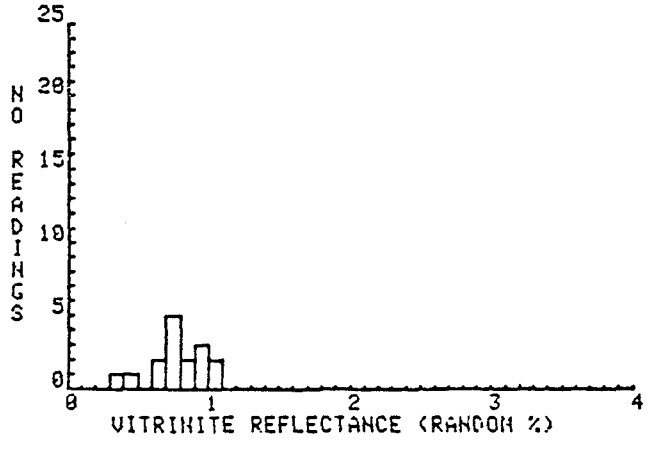
# VALUES	5.00
MEAN	0.53
STD DEV	0.05
MEDIAN	0.54
MODE	0.55

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

‡0.44	0.91
‡0.50	0.96
‡0.54	0.96
‡0.56	1.00
‡0.60	1.11
0.72	1.16
0.75	1.18
0.85	1.24
0.89	
0.90	

EXXON - 73132



ID G+H 2350 + 2380 m.

DEPTH 7757.2 FT
2365.0 M

# VALUES	16.00
MEAN	0.78
STD DEV	0.19
MEDIAN	0.78
MODE	0.75

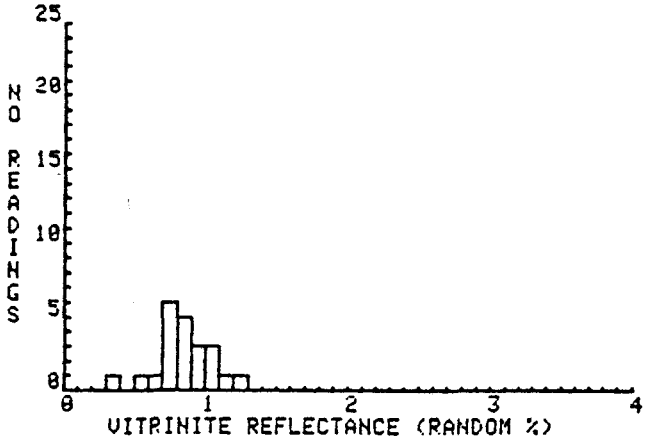
HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

0.32	0.86
0.49	0.95
0.67	0.96
0.68	0.97
0.70	1.00
0.72	1.05
0.77	
0.77	
0.78	
0.82	

Fig. 3 Vitrinite Reflectance (Robertson Research)

EXXON - 73132



ID I+J 2410 + 2440 m.

DEPTH 7954.8 FT
2425.8 M

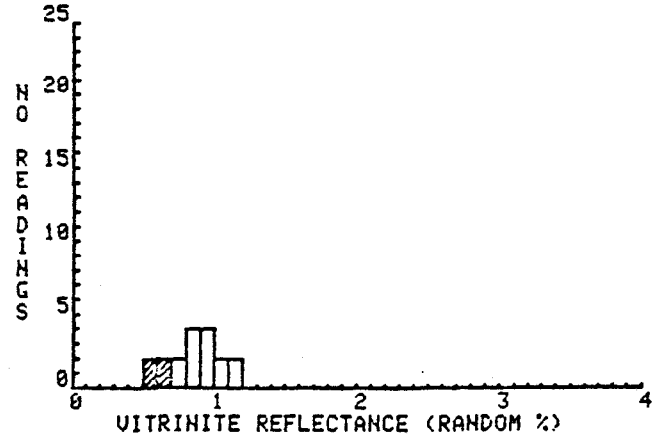
# VALUES	22.00
MEAN	0.85
STD DEV	0.19
MEDIAN	0.88
MODE	0.75

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

0.37	0.85	1.16
0.56	0.88	1.20
0.63	0.89	
0.78	0.89	
0.72	0.90	
0.75	0.94	
0.76	0.98	
0.77	1.03	
0.79	1.07	
0.81	1.08	

EXXON - 73132



ID K+L 2470 + 2500 m.

DEPTH 8150.8 FT
2485.0 M

* = Ro MATURITY

# VALUES	4.00
MEAN	0.57
STD DEV	0.06
MEDIAN	0.60
MODE	0.65

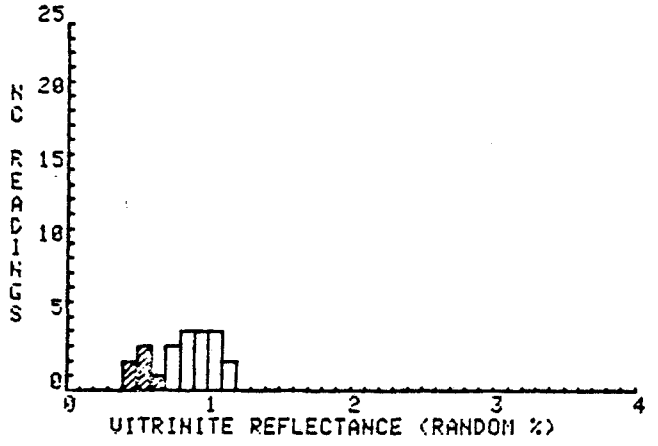
HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

*0.50	0.91
*0.52	0.92
*0.60	0.95
*0.65	0.97
0.71	1.03
0.78	1.04
0.81	1.16
0.81	1.18
0.83	
0.84	

Fig. 4 Vitrinite Reflectance (Robertson Research)

EXXON - 73132



ID M+N 2530 + 2560 m.

DEPTH 8347.6 FT
2545.0 M

* = Ro MATURITY

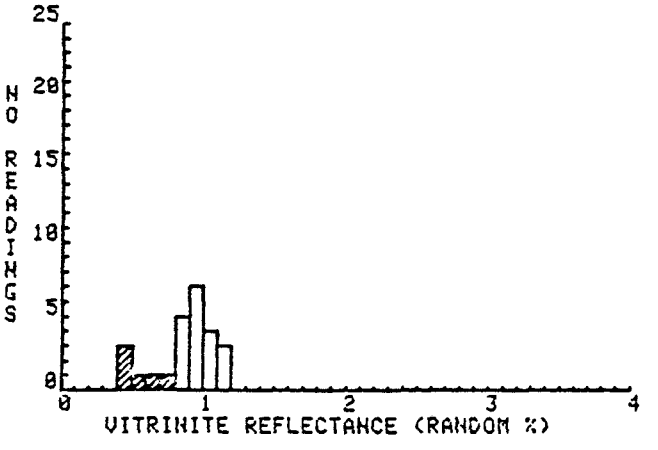
# VALUES	6.00
MEAN	0.53
STD DEV	0.08
MEDIAN	0.52
MODE	0.55

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

*0.45	0.84	1.08
*0.48	0.85	1.11
*0.51	0.88	1.12
*0.52	0.91	
*0.55	0.93	
*0.69	0.93	
0.73	0.97	
0.73	1.00	
0.79	1.04	
0.83	1.05	

EXXON - 73132



ID O+P 2590 + 2620 m

DEPTH 8544.4 FT
2605.0 M

* = Ro MATURITY

# VALUES	6.00
MEAN	0.55
STD DEV	0.11
MEDIAN	0.52
MODE	0.45

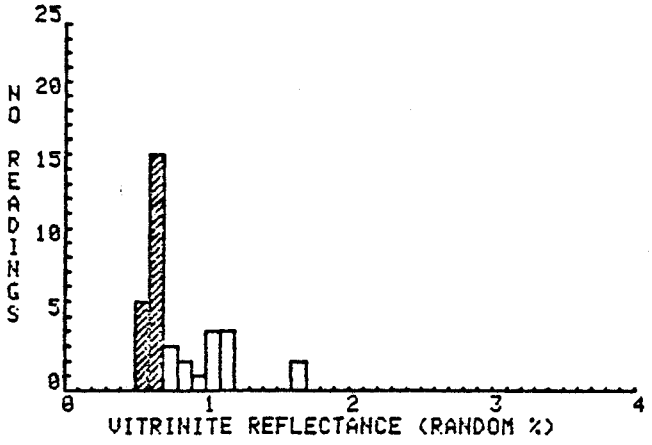
HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

*0.44	0.88	1.02
*0.46	0.90	1.07
*0.47	0.91	1.12
*0.52	0.93	1.16
*0.68	0.95	1.18
*0.71	0.97	
0.88	0.99	
0.84	0.99	
0.85	1.01	
0.87	1.02	

Fig. 5 Vitrinite Reflectance (Robertson Research)

EXXON - 73132



ID Q+R 2650 + 2680 m.

DEPTH 8741.2 FT
2665.0 M

% = Ro MATURITY

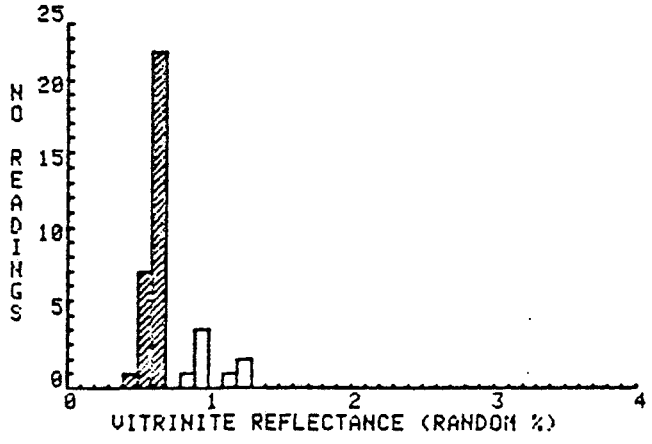
# VALUES	22.00
MEAN	0.61
STD DEV	0.06
MEDIAN	0.61
MODE	0.65

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

%0.50	%0.61	%0.69	1.07
%0.51	%0.61	%0.69	1.09
%0.52	%0.62	0.75	1.10
%0.52	%0.62	0.76	1.11
%0.55	%0.62	0.78	1.12
%0.55	%0.62	0.84	1.18
%0.60	%0.66	0.85	1.66
%0.60	%0.68	0.94	1.68
%0.61	%0.68	1.01	
%0.61	%0.69	1.07	

EXXON - 73132



ID S+T 2710 + 2740 m.

DEPTH 8938.0 FT
2725.0 M

% = Ro MATURITY

# VALUES	32.00
MEAN	0.60
STD DEV	0.05
MEDIAN	0.61
MODE	0.65

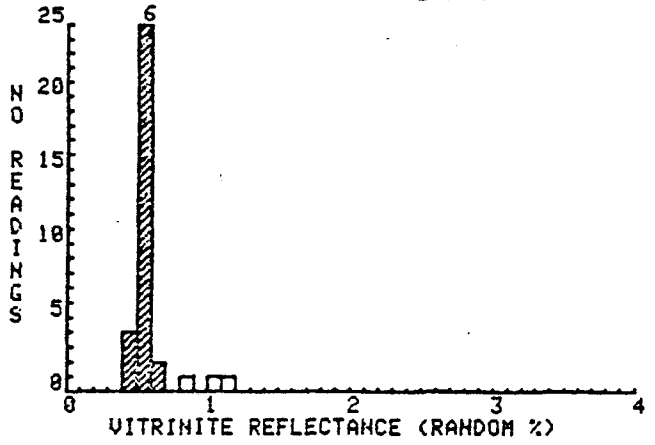
HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

%0.45	%0.60	%0.62	%0.66
%0.51	%0.60	%0.62	%0.68
%0.54	%0.60	%0.63	0.82
%0.55	%0.61	%0.63	0.98
%0.56	%0.61	%0.64	0.98
%0.56	%0.61	%0.64	0.98
%0.57	%0.61	%0.64	0.98
%0.57	%0.61	%0.64	1.12
%0.58	%0.61	%0.64	1.21
%0.60	%0.62	%0.65	1.27

Fig. 6 Vitrinite Reflectance (Robertson Research)

EXXON - 73133



ID A+B 2770 + 2800 m.

DEPTH 9134.8 FT
2785.0 M

* = Ro MATURITY

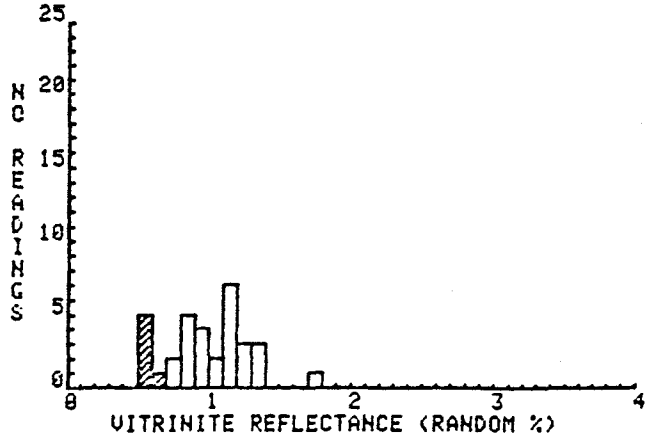
# VALUES	37.00
MEAN	0.55
STD DEV	0.04
MEDIAN	0.56
MODE	0.55

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

*0.48	*0.53	*0.56	*0.58
*0.48	*0.53	*0.56	*0.58
*0.48	*0.53	*0.56	*0.58
*0.49	*0.53	*0.56	*0.59
*0.50	*0.54	*0.57	*0.59
*0.50	*0.55	*0.57	*0.66
*0.51	*0.55	*0.57	*0.68
*0.51	*0.56	*0.57	0.88
*0.52	*0.56	*0.57	1.03
*0.52	*0.56	*0.57	1.12

EXXON - 73133



ID C+D 2830 + 2860 m.

DEPTH 9331.6 FT
2845.0 M

* = Ro MATURITY

# VALUES	6.00
MEAN	0.56
STD DEV	0.03
MEDIAN	0.57
MODE	0.55

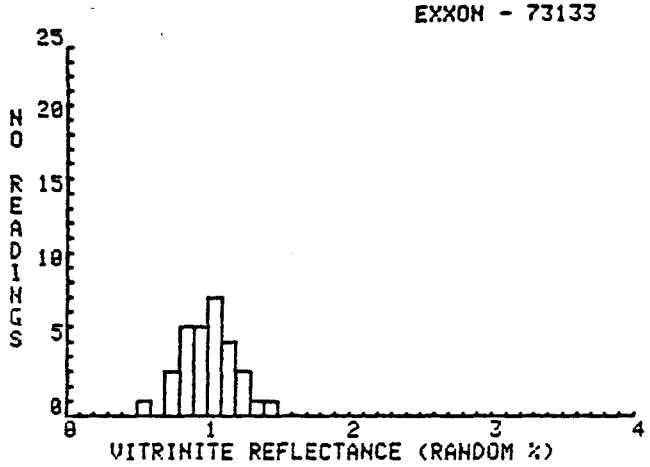
HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

*0.51	0.87	1.12	1.37
*0.54	0.88	1.13	1.38
*0.55	0.88	1.13	1.78
*0.57	0.90	1.16	
*0.59	0.92	1.18	
*0.60	0.96	1.19	
0.77	0.99	1.24	
0.79	1.01	1.25	
0.85	1.02	1.28	
0.86	1.11	1.36	

Fig. 7 Vitrinite Reflectance (Robertson Research)

EXXON - 73133



ID E+F	2890 + 2920m
DEPTH	9528.4 FT 2905.0 M
# VALUES	34.00
MEAN	1.00
STD DEV	0.19
MEDIAN	1.01
MODE	1.05

HISTOGRAM 0-4 (0.1)

ORDERED REFLECTANCE VALUES:

0.50	0.93	1.07	1.25
0.75	0.94	1.08	1.26
0.76	0.94	1.09	1.32
0.77	0.94	1.09	1.42
0.81	0.96	1.11	
0.81	0.97	1.12	
0.81	1.00	1.13	
0.85	1.01	1.17	
0.86	1.02	1.18	
0.89	1.05	1.24	

Fig. 8 Vitrinite Reflectance (Robertson Research)

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-001

Exxon No. 73132-C

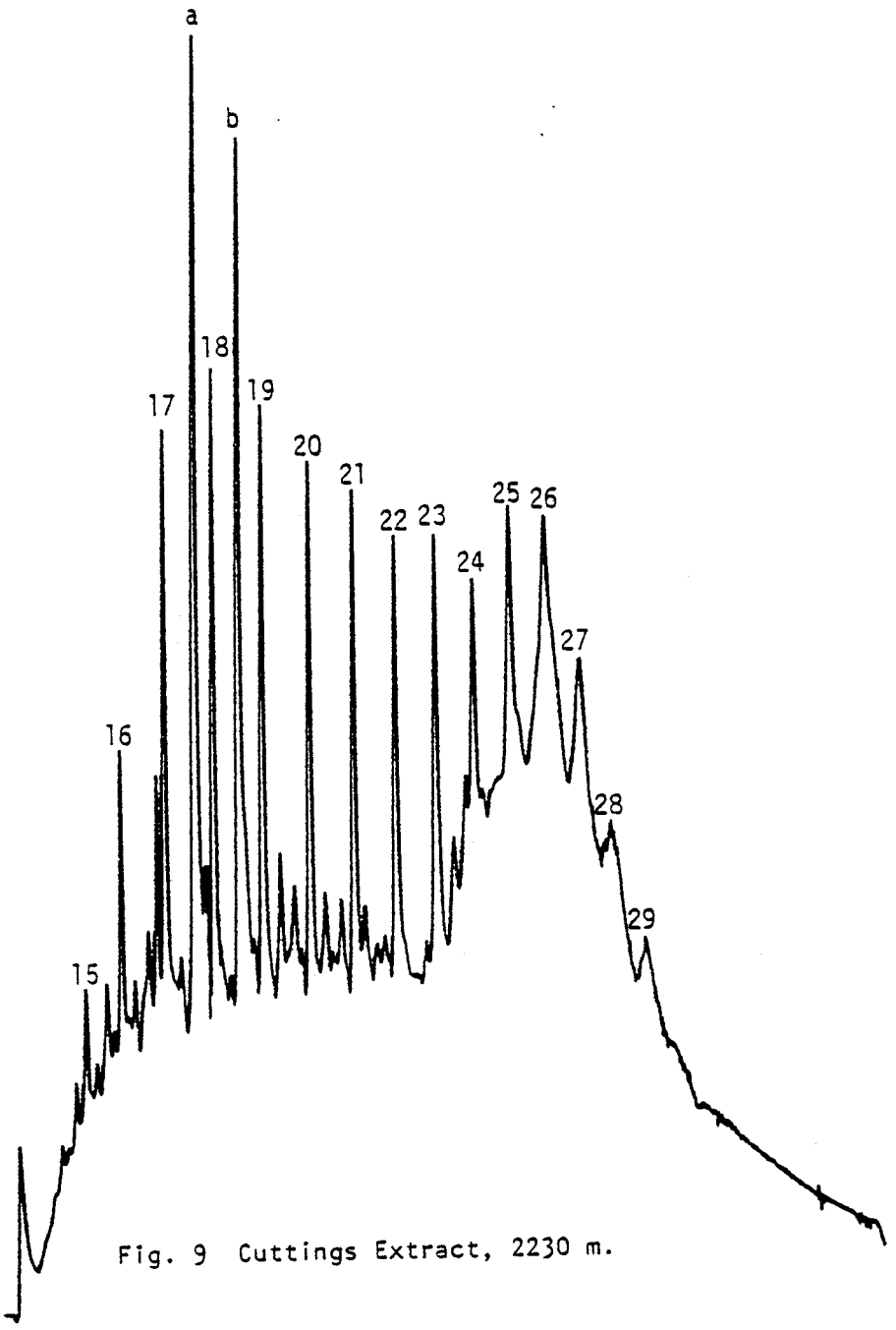


Fig. 9 Cuttings Extract, 2230 m.

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-002

Exxon No. 73132-F

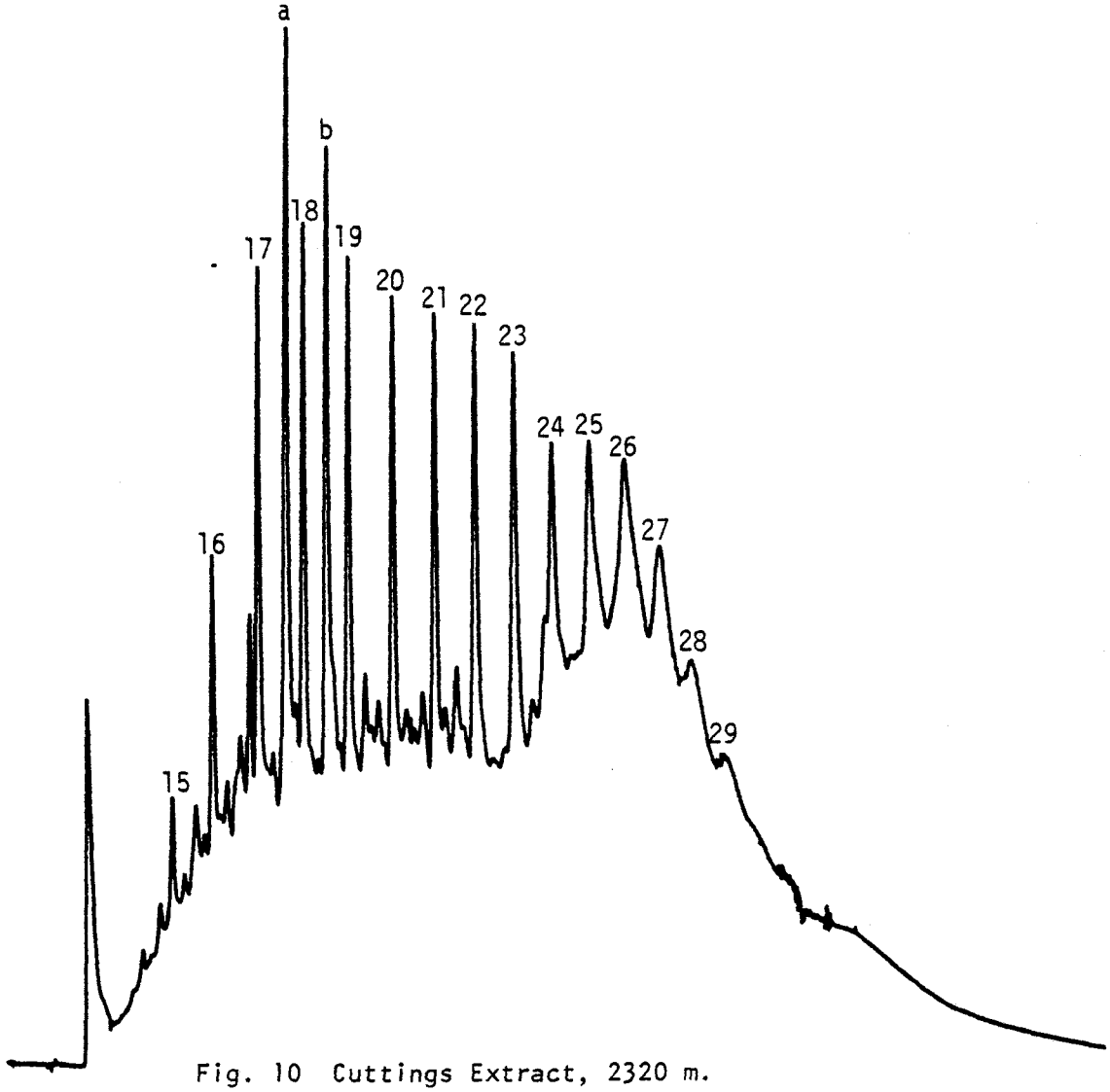


Fig. 10 Cuttings Extract, 2320 m.

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-003

Exxon No. 73132-J

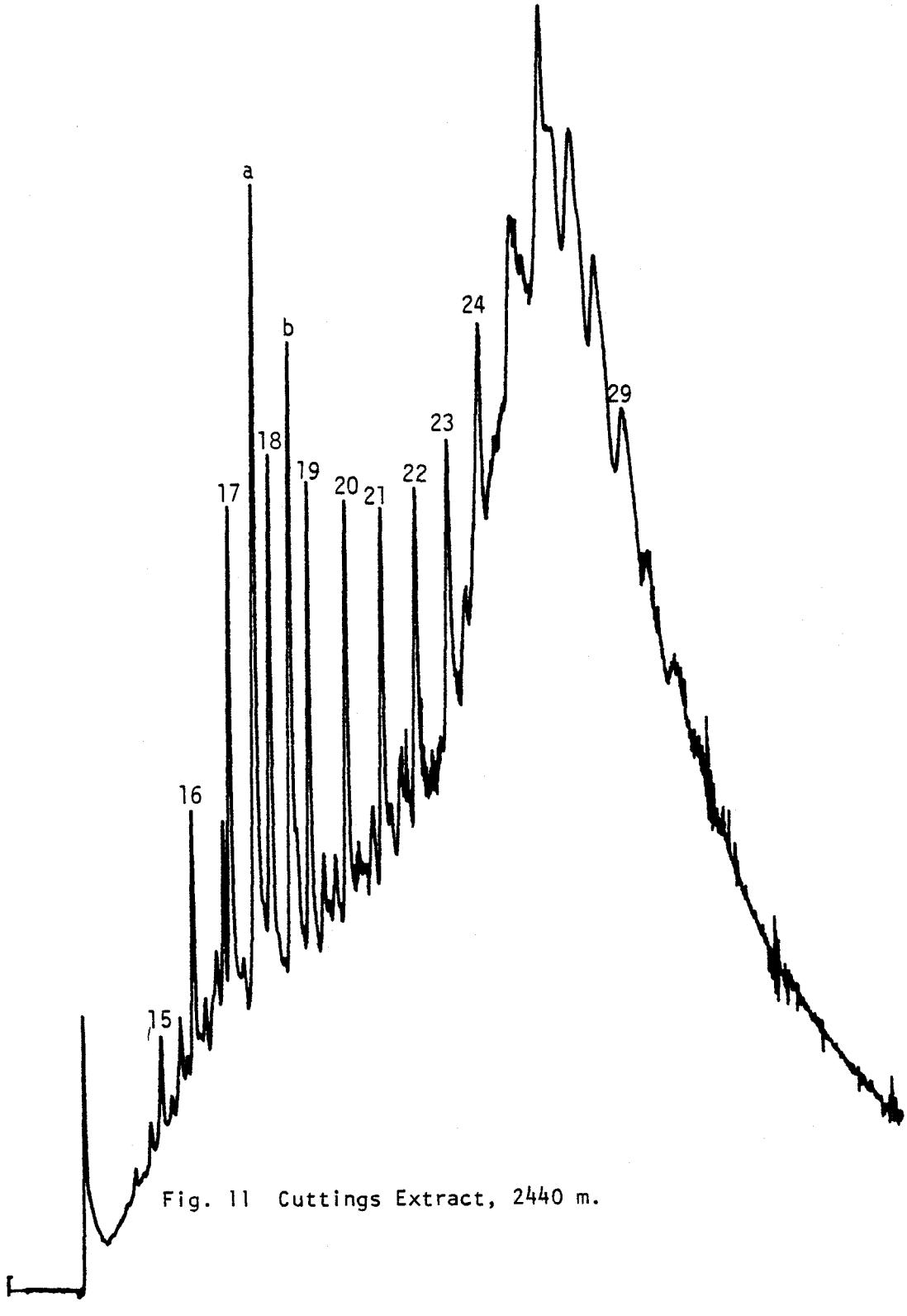


Fig. 11 Cuttings Extract, 2440 m.

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-004

Exxon No. 73132-M

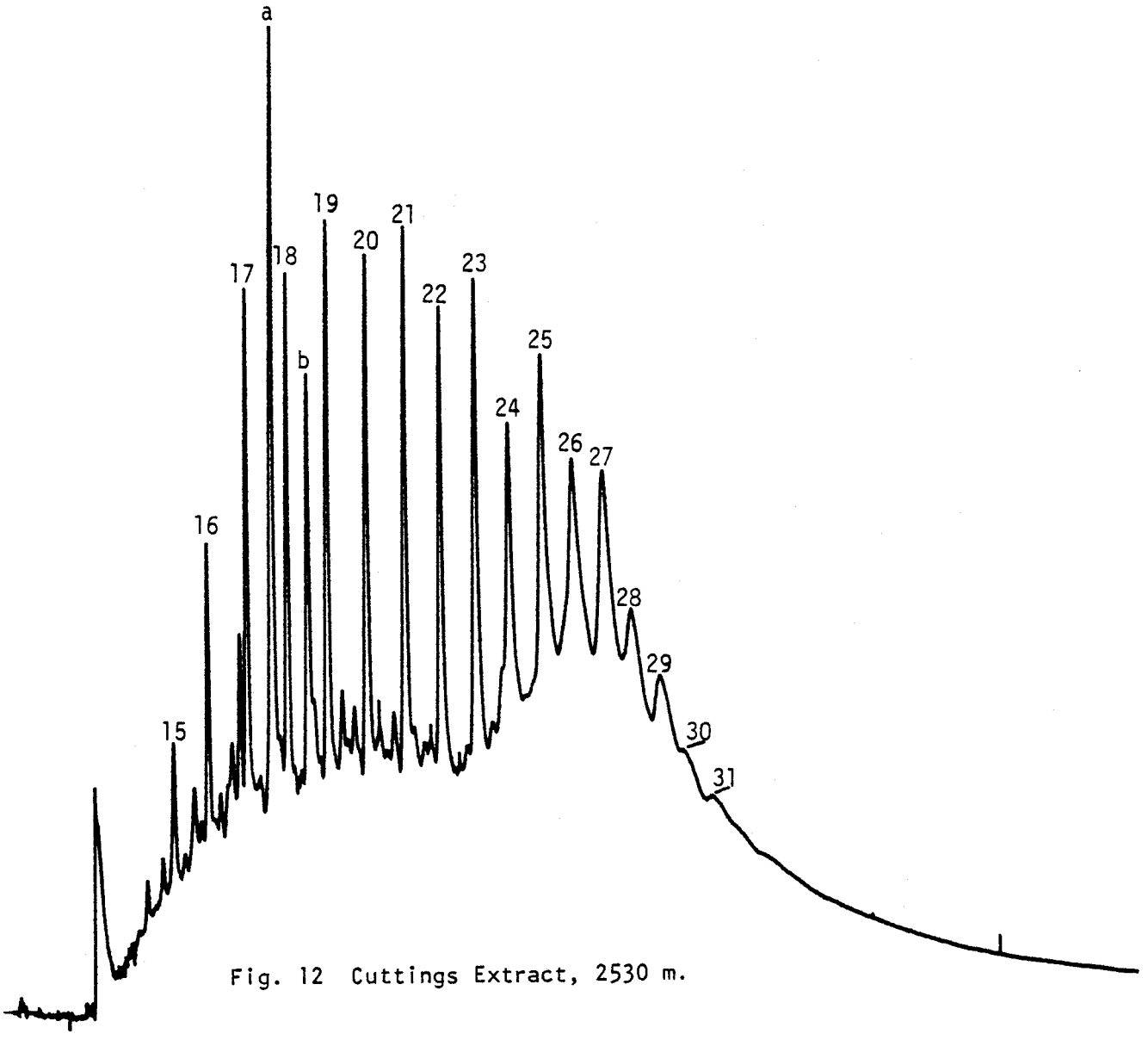


Fig. 12 Cuttings Extract, 2530 m.

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-005

Exxon No. 73132-0

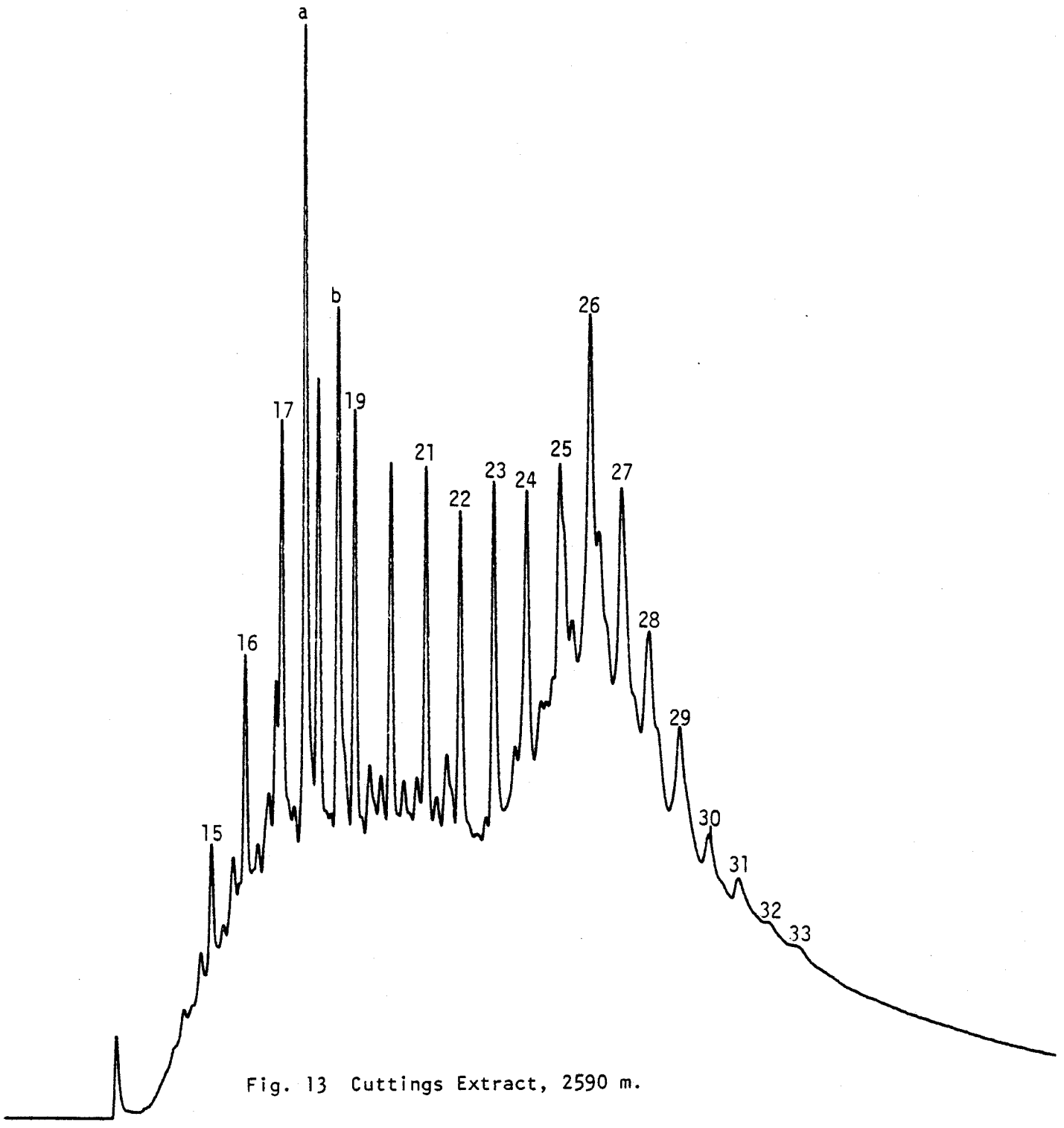


Fig. 13 Cuttings Extract, 2590 m.

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-006

Exxon No. 73132-T

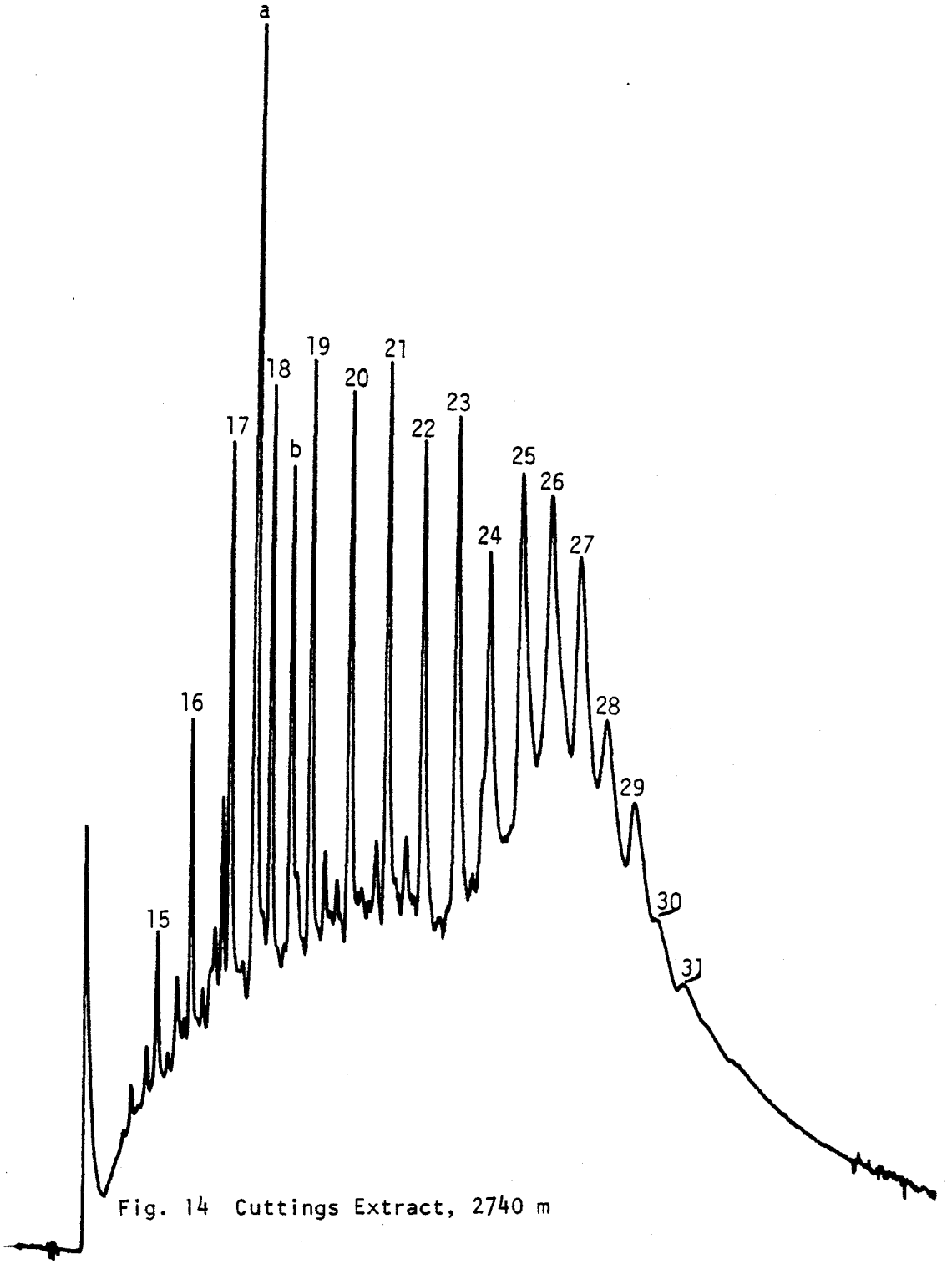


Fig. 14 Cuttings Extract, 2740 m

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-007

Exxon No. 73133-B

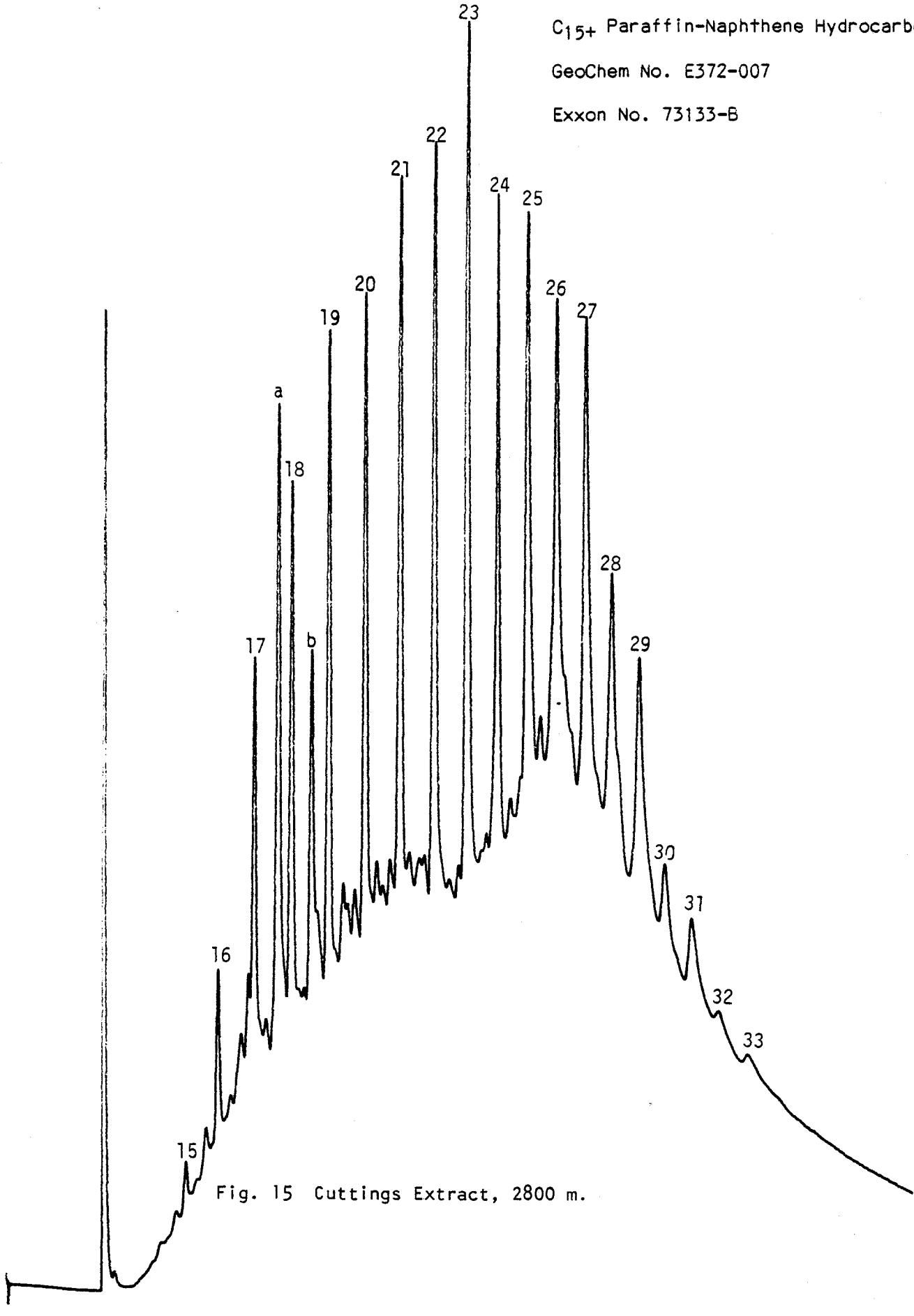


Fig. 15 Cuttings Extract, 2800 m.

C_{15+} Paraffin-Naphthene Hydrocarbon

GeoChem No. E372-008

Exxon No. 73133-D

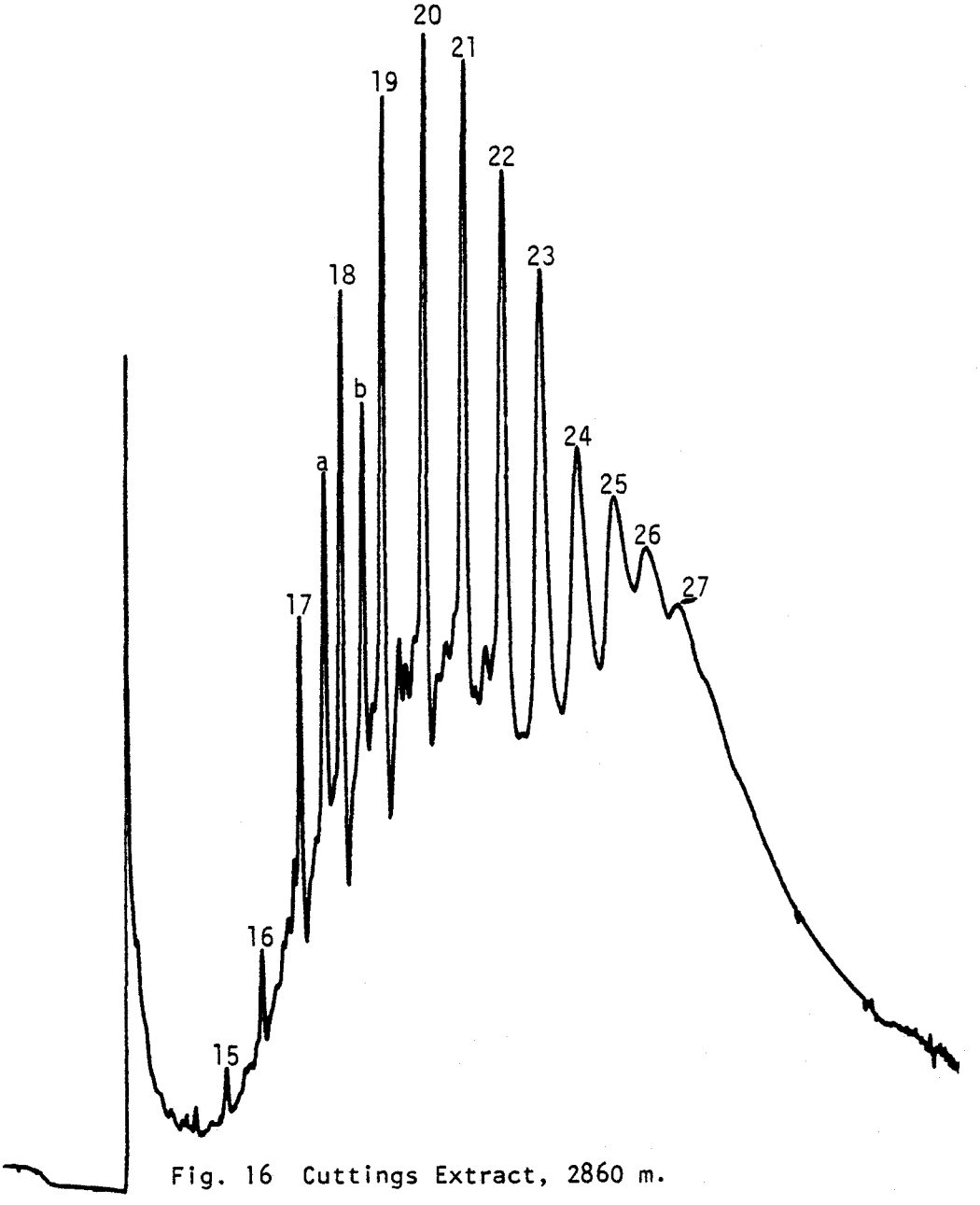
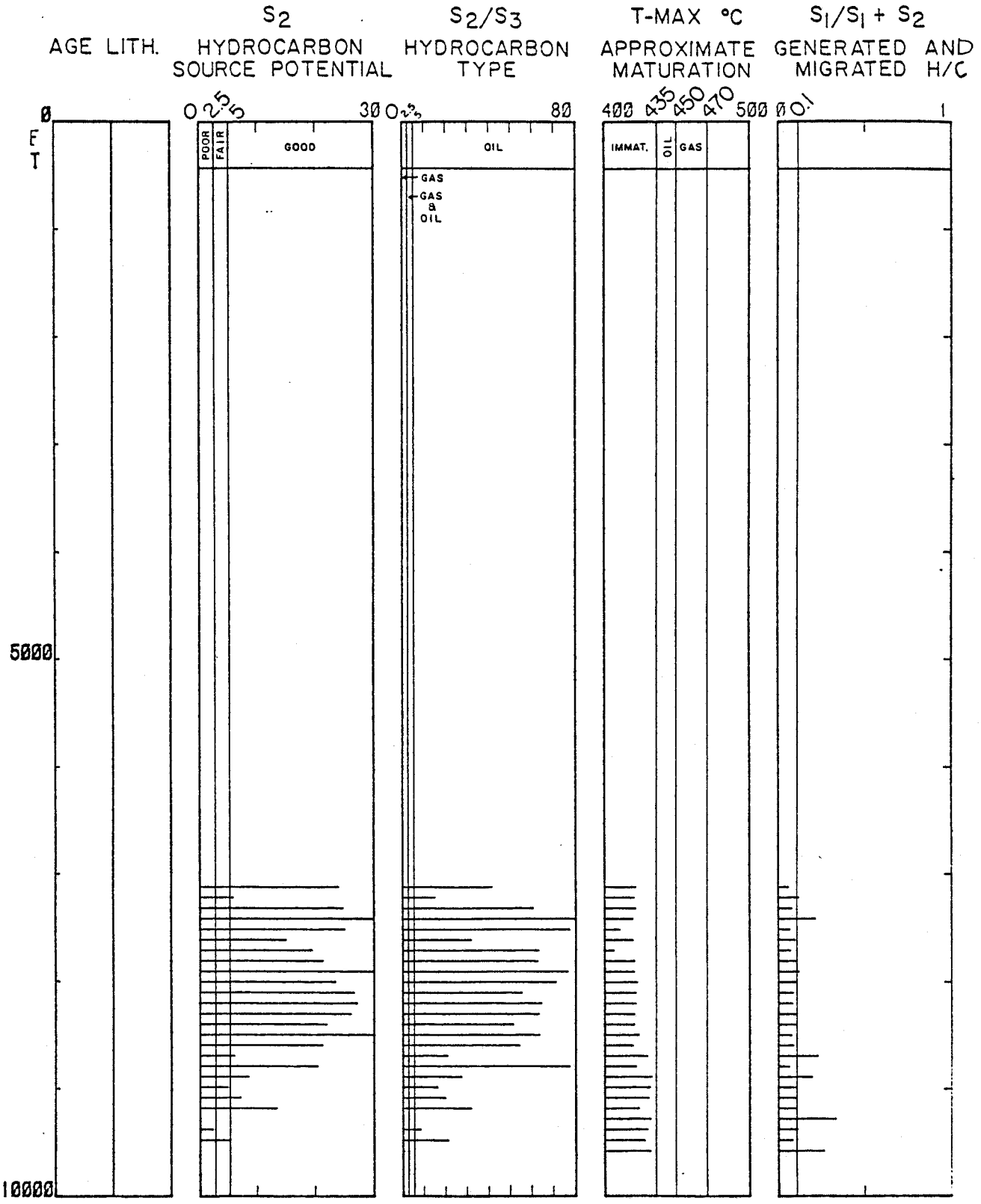
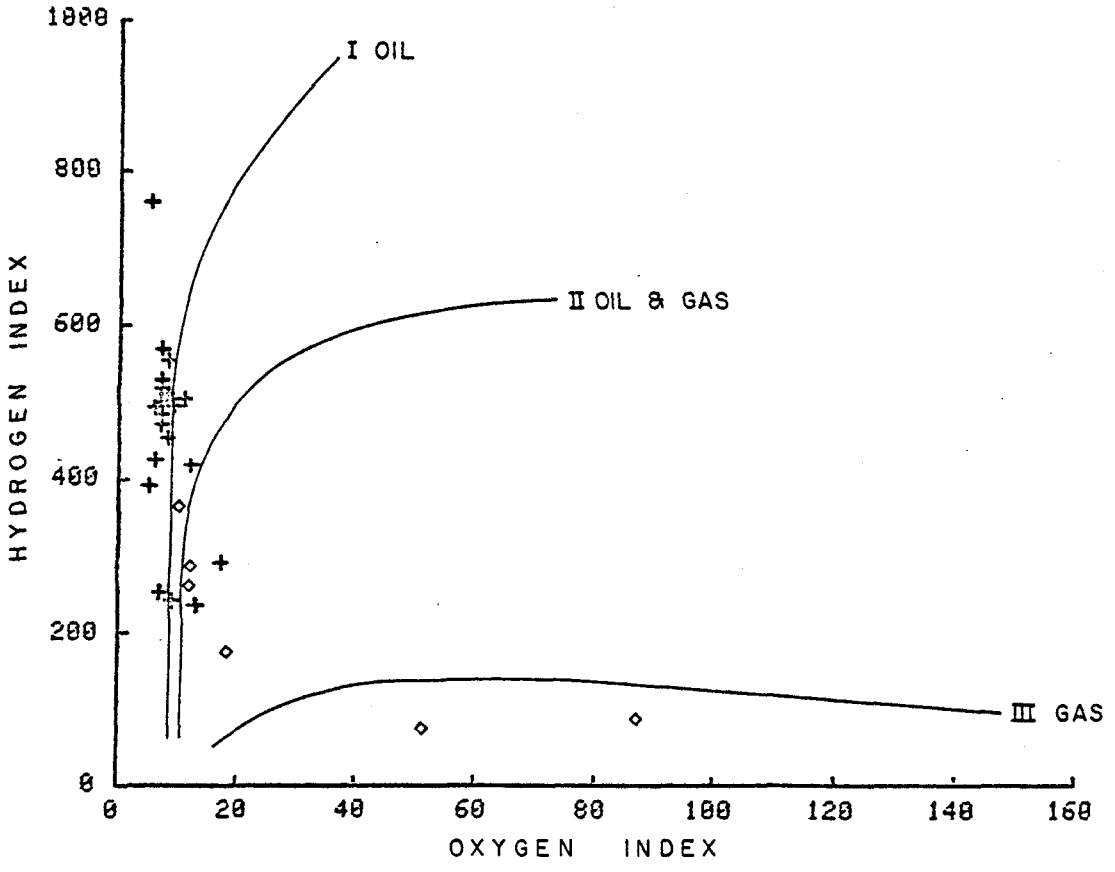


Fig. 16 Cuttings Extract, 2860 m.



Summary plots of Rock-Eval pyrolysis data

Fig. 17 (Robertson Research)



+ = 73132
◇ = 73133

Kerogen type determination from Rock-Eval pyrolysis data.

Fig. 18 (Robertson Research)