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société nationale elf aquitaine (production)

. EP/S/EXP/Lab.Pau n° 89-74RPGO

Pau , le August 1989

WELL 25/1-10

ORGANIC GEOCHIMISTRY AND OPTICAL STUDY

OF THE ORGANIC MATTER

EP/S/EXP/Lab.Pau n° 89-74RPGO

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Imp. 7332 B SNEA(P) - RGM 953 006 004

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TITLE : **WELL 25/1-10 : ORGANIC GEOCHEMISTRY AND OPTICAL STUDY OF THE ORGANIC MATTER**

REFERENCE : EP/S/EXP/Lab. Pau n° 89-74RPGO

SUMMARY

The Tertiary is immature.

The Cretaceous is immature to oil window mature ; its oil source potential, assessed at the base (Cromer Knoll Gp), is poor.

The Jurassic is overmature ; its residual oil potential is low.

1 - OPTICAL STUDY OF THE ORGANIC MATTER IN REFLECTANCE-FLUORESCENCE

The organic matter has been studied by reflectance-fluorescence on 16 samples (1 core and 15 cuttings) taken between 2 145 m (Frigg Formation) and 4 710 m (Brent Group).

1.1 - NATURE OF THE ORGANIC MATTER (Fig. B.1)

- Tertiary

The two samples studied, 2145/55m (Early Eocene) and 2495/2505m (Late Paleocene), show frequent fragments of coal made up of abundant vitrinite often structured,some homogeneous inertinites and semifusinites and some humic exinites (sporinites, cutinites and fluorinites).

The fluorescence is low and corresponds to a pale brown groundmass (2145/55m), humic exinites and rare green Dinocysts.

- Cretaceous

The samples are quite poor in reflectant particles.

The 3195/3210m, 3745/55m, 4110/4125m and 4230/35m samples are very poor (rare coals and very low fluorescence). The sample at 2890/2905m shows frequent small fragments of inertinites together with some probable vitrinites. Some orange Dinocysts have been observed in fluorescence. The sample at 3490/3505m shows rare coals made up of some homogeneous vitrinites, composite coals, fusinites and semifusinites. The fluorescence is null. The sample at 3895/3905m shows rare but homogeneous fragments of coals (vitrinites and inertinites). The fluorescence is null. More or less abundant mud additives (lignites at 0.25 % VRo) have also been observed.

- Draupne formation

The sample studied exhibits numerous small fragments of inertinites and very rare vitrinites.

The fluorescence is low and corresponds to a pale beige groundmass (index 0.5).

- Heather formation

The two cutting samples (4390 and 4455m) contain frequent coals varying in aspect and reflectance : vitrinites of different types, fusinites, homogeneous inertinites and composite coals.

The groundmass exhibits a pale beige fluorescence.

- Brent Group

The core sample (K1, 4473/73.60m) contains abundant typical coals made up of numerous homogenous vitrinites (60 %), frequent homogeneous inertinites and rare semifusinites associated with a brownish fluorescent groundmass (index 0,5).

The 4580m sample is poor in organic matter. The 4640m and 4710m samples show very abundant coaly particles associated with the matrix, particularly in the 4640m sample. The coals are made up of dominant homogeneous inertinites at 4640m and dominant homogeneous vitrinites at 4710m.

The fluorescence is low and due to a pale brownish groundmass.

1.2 - ORGANIC DIAGENESIS (Fig. B1 and Table B2)

Vitrinite measurements and T.A.I. data give us good information on the maturation in the Jurassic section and rather few in the Tertiary and Cretaceous.

The results of vitrinite reflectance analysis are presented in table B1 and the main data, taking into account the T.A.I., are summarized in table B2.

1.3 - CONCLUSION

The Tertiary is immature and contains frequent fragments of coals.

The Cretaceous is rather poor in organic matter. Its maturity increases with depth from 0.45 % VRo at 3500m to 0.75 % VRo at 3900m.

The Jurassic section is rich in coal in the Brent Group. The vitrinite reflectance is comprised between 1.20 % eq VRo in the Draupne formation and 1.30 % VRo in the Brent Group at 4710m.

In the Draupne formation (4260m) and Heather formation (4335m and 4465m), T.A.I. data (4,5-) give a maturation slightly higher than that obtained by reflectance.

2 - ORGANIC GEOCHEMISTRY : SCREENING ANALYSES

2.1 - TECHNIQUES AND SAMPLING

Organic geochemical analyses including Total Organic Carbon (TOC), Rock Eval pyrolysis (REP) and Iatroscan extractable organic matter (EOM) were carried out on 45 ditch cuttings from the 4115-4480 m interval (base Lower Cretaceous-Jurassic).

The samples are composed of unwashed cuttings which were submitted to thorough and careful washing in the laboratory. Heavy pollution by drilling mud additives is visible all along the section and, at more or less regularly spaced intervals, the contaminant makes up the bulk or even the totality of the material collected, thus corresponding probably each time to repeated injection of additives. Such a pollution of the cutting samples was reported in the lithology description of the geological survey data sheet which, indeed, corroborates our concern first raised and documents us on the high level of pollution attained.

The contaminant consists of black homogeneous soft granules bearing the appearance of lignitic coals particles. Subsequent investigation with the help of the EAN exploration geologist team, who provided us with the raw additive materials, showed that the contaminant is in fact a mixture of several products commonly used as drilling mud additives, known generally as lignosulphonates, the most important and most widely used in this case is the Soltex, a product which varies in composition depending upon its origin. Generally speaking, the Soltex is a sodium asphaltic sulphonate-based material derived from natural or refined asphalts.

In order to have an insight into the nature and chemical composition of the contaminant for comparison, as it is used and retrieved in the drilling conditions of this well, analyses were performed on a cutting sample collected at 4210 m. This sample, as many other, is practically entirely composed of black lignitic or asphaltic particles and is therefore analysed as such, without any treatment or washing. The results so far obtained are reported herein.

Due to the strong contamination by drilling mud additives stated, the collection of on-site washed cuttings could not be of any use, and consequently, the uswashed cuttings were submitted to repeated and thorough washing prior to analyses in order to remove any contaminant present. However, this implies the lost of fine shale particles as well as coal particles, if any present, and could lead to possible underestimated potential.

2.2 - RESULTS AND DISCUSSION

The basic data and lithologic description of the samples studied are listed in table B3, whereas TOC, Rock Eval and Iatroscan analytical results are reported in table B4. The signification of abbreviations and units used in the tables is explained separately in a glossary table.

Figure B2 shows the vertical profiles of the main parameters linked with the TOC and Rock Eval pyrolysis for the whole section studied, and figure B3 shows the parameters linked with the Iatroscan EOM analysis. Figures B4 to B6 show the cross-plots of the main parameters linked with TOC-Rock Eval and figure B7 those linked with TOC-EOM.

- Cromer Knoll Gp (4115-4255 m)

The contents of total organic carbon are comprised between 0.76 and 1.56 %. Highest values pertain to the 4170-4205 m interval, whereas the 4220-4255 m section shows uniform contents between 1.03 and 1.13 %. The S2 residual hydrocarbon content is uniformly low, from 0.23 to 0.37 mg HC/g rock, with a single value of 0.73 for the 4170-4195 m interval. The contents of extractable organic matter are low : 210-680 ppm for the whole section and 210-440 ppm for the 4200-4255 m interval. The EOM/TOC ratio is also low : 1.7-3.4 % between 4200 and 4255 m.

In contrast with the above results, the contaminant sample at 4210m is rich in TOC (30.8 %), S1 (3.5), S2 (47.7) and EOM (19070 ppm). This sample is characterized by rather low hydrogen index and high oxygen index (155 versus 98). Its chemical composition is typically poor in hydrocarbons, both saturated (8.4 %) and aromatic (7.5 %), and conversely rich in polar compounds (84.1 %), results which contrast with the other ones. Hence, the samples washed at the laboratory may be considered as not (or only very few) contaminated.

- Viking Gp (4260-4465 m)

The Viking Gp (Draupne Fm and Heather Fm) has been studied on cuttings over approximately two hundred meters, most of them being individual samples at single depth.

The results so far obtained are rather homogeneous over the section studied : in short, the values are uniformly low, particularly for the parameters linked with the hydrocarbons, either from the Rock Eval pyrolysis or from the extractable organic matter.

The TOC contents, except for the uppermost sample at the top of the formation (1.71 % at 4260-4265 m), range between 0.86 and 1.36 %, the mean value being 1.00 %

The S2 residual hydrocarbon potential is comprised between 0.15 and 0.37 mg HC/g rock for the same interval (4275-4465 m), with 0.21 as mean value over 35 samples. As a consequence, the hydrogen index is very low, varying from 16 to 28 mg HC/g TOC, the average being 21. This is to be compared with the values from well 25/2-12 which are approximately ten times as high. The temperature of S2 peak (Tmax) is rather uniform within the 4305-4400 m interval (446-455°C), suggesting a high maturity.

The content of extractable organic matter (EOM) is also very low, ranging from 100 to 300 ppm in the great majority of cases ; the average value is 228 ppm. This explains why the Iatroscan compositional analysis was performed only for a few samples, the threshold of the EOM content for such an analysis is 300 ppm. As a consequence, the EOM/TOC ratio is very low, comprised between 1 and 4 %.

- Brent Gp (4480 m)

Only one sample has been analysed, the other cutting samples consisting mainly of sands.

All results (TOC, Rock Eval, Iatrocan) are similar to those of the overlying samples from the Viking Group.

2.3 - CONCLUSIONS

The section ranging from 4115 m to 4480 m is characterized by low to very low residual source potential.

It is inferred from the results obtained that the above section has undergone extensive thermal stress and that the bulk of the initial hydrocarbon potential has already been converted and released (overmature). His assumption is in agreement with the optical studies of the organic matter which show a high level of maturation (1.15-1.25 % Ro) for this interval.

LEGENDS OF TABLES AND FIGURES OF ORGANIC INVENTORY ANALYSES : ABBREVIATIONS, UNITS AND CUT OFFS

SAMPLE TYPE :

[ND=unwashed cuttings; DE=cuttings washed on site. The cuttings are washed or washed anew in the laboratory]

[CA=core; CL=sidewall core; TE=outcrop; BO=mud; XX=other or undetermined]

Q1 : Contaminations or cavings, affecting the Rock Eval and TOC analyses [I=high; F=low; N=null or not detected]

Q2 : Contaminations or cavings, affecting the organic extract [I=high; F=low; N=null or not detected]

IR : Insoluble residue after HCl attack (% weight of rock)

LECO ANALYSIS

TOC : Total organic carbon (% weight of rock)

IOC : Insoluble organic carbon in chloroform (% weight of rock)

OC : Organic carbon without precision (total or insoluble)

ROCK EVAL ANALYSIS

Carried out on : .... [generally not performed if OC< .3%]

RT : Total rock

RI_RT : Insoluble residue after HCl attack

RE : Rock extracted with chloroform

RI_RE : Rock extracted with chloroform, and after HCl attack

Measured parameters : .... [# : result not given because meaningless; <S : lower than the detection threshold]

Tmax : Temperature of S2 peak (°C) .... [meaningless if S2 small, flat or plurimodal]

S1 : Free hydrocarbons in the rock (mgHC/g of rock) ...... [meaningless if the analysis is performed on the extracted rock]

S2 : Hydrocarbons yielded by pyrolysis (mgHC/g of rock)

S3 : CO_2 yielded by pyrolysis (mg CO_2/g of rock)

Calculated parameters :

PI : Production Index= S1/(S1+S2) .... [# : meaningless if S1 and S2 < .2]

HI : Hydrogen Index = (S2/OC)x100 (mg HC/g OC)

OI : Oxygen Index = (S3/OC)x100 (mg CO_2/g OC) .. [to be used with caution for analyses carried out on RT or RE if OC < 2%; IO>170 : mineral contribution to S3 peak]

IATROSCAN ANALYSIS

Fast and non preparative analysis of the chloroformic extract (quantity and composition)

EOM: Extractable organic matter with chloroform (% weight of rock) .... [<S if lower than .01%]

Normalized composition of the extract (% EOM) : .... [not performed if EOM < .03%]

SAT: Saturated hydrocarbons

ARO: Aromatic hydrocarbons

POL: Polar compounds (Resins+Asphaltenes)

HC : SAT+ARO (mg HC/g of rock)

FIGURES

Figure B1

PAYS
COUNTRY NORWAY
SONDAGE
WELL 25/1-10

PROFIL DE MATURATION
MATURATION PROFILE

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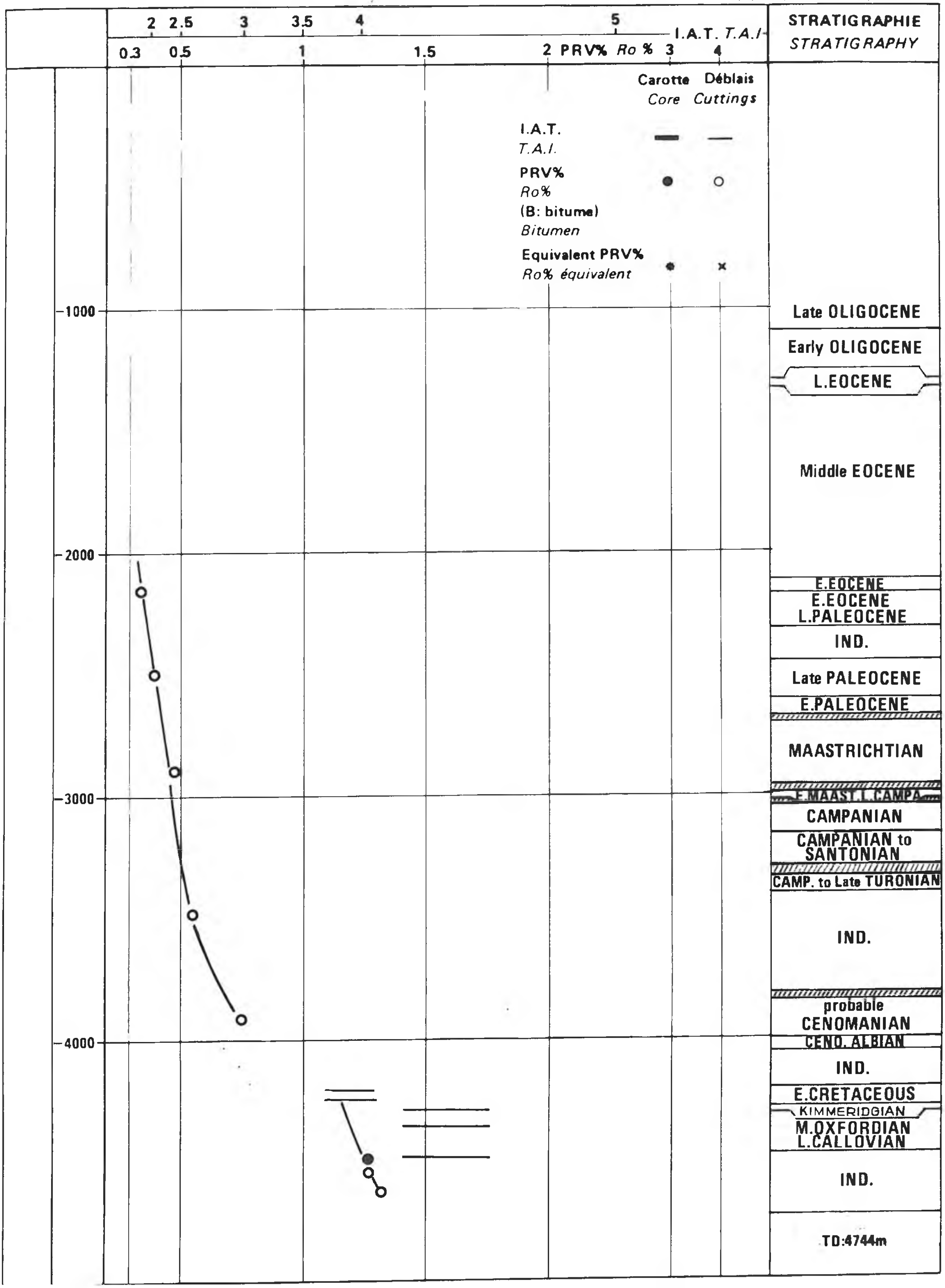

TOC-ROCK EVAL PROFILES

25/1-10

Fig. B2

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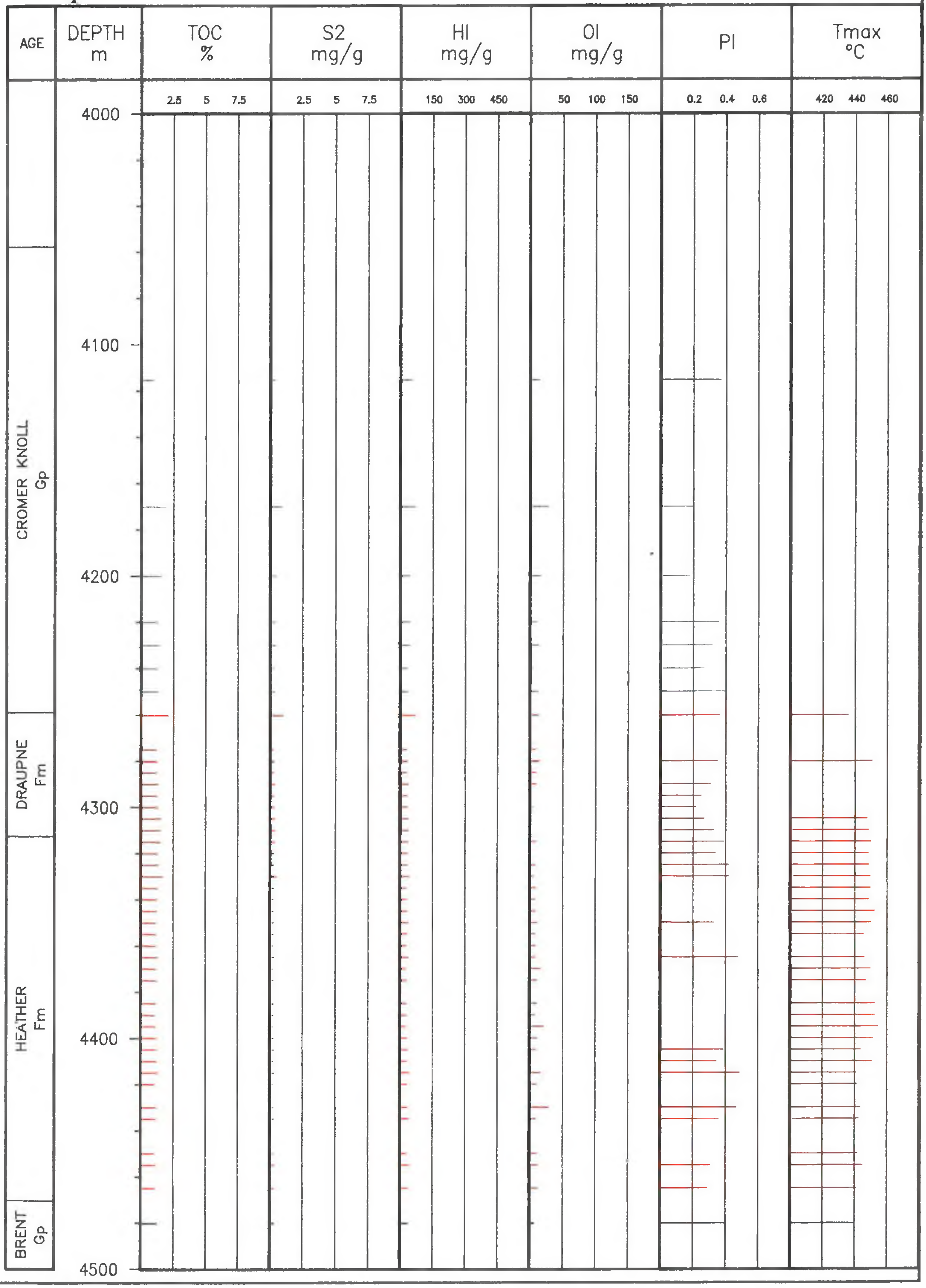

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IATROSCAN PROFILES

25/1-10

Fig. B3

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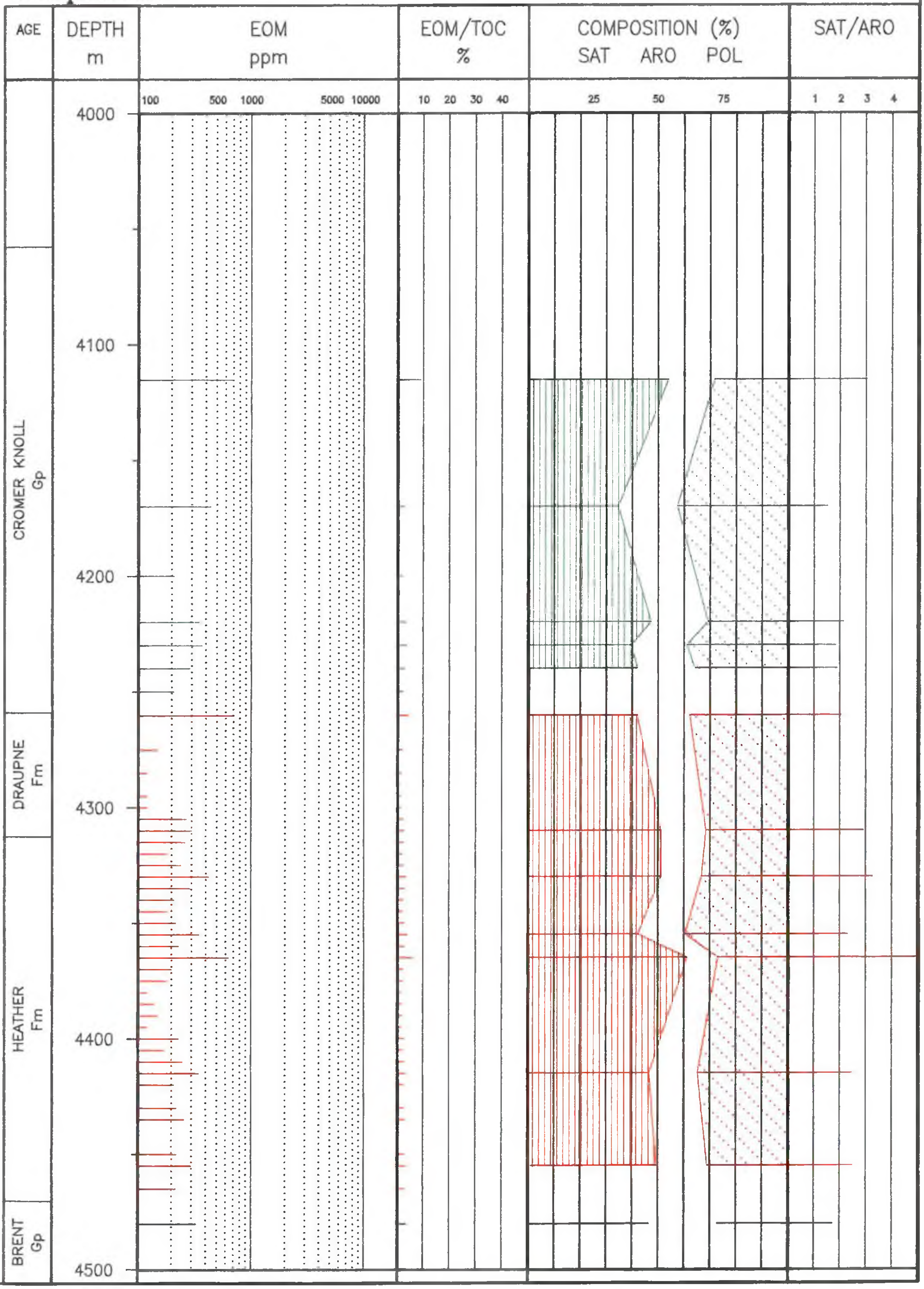

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Fig. B4

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HI vs. TOC

25/1-10

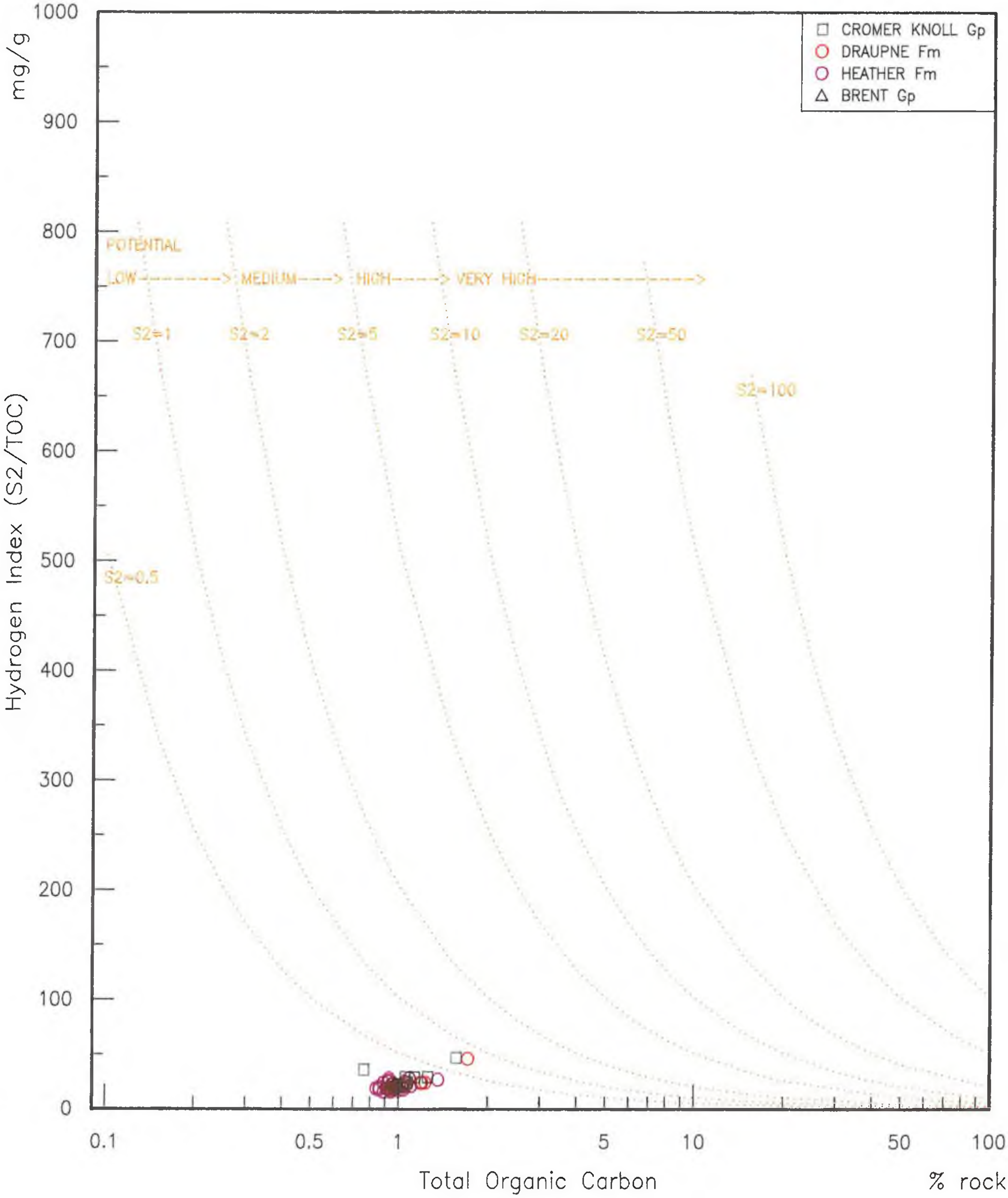

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Fig. B5

EP/S/EXP/Lab.Pau 89/74RPGO

HI vs. OI

25/1-10

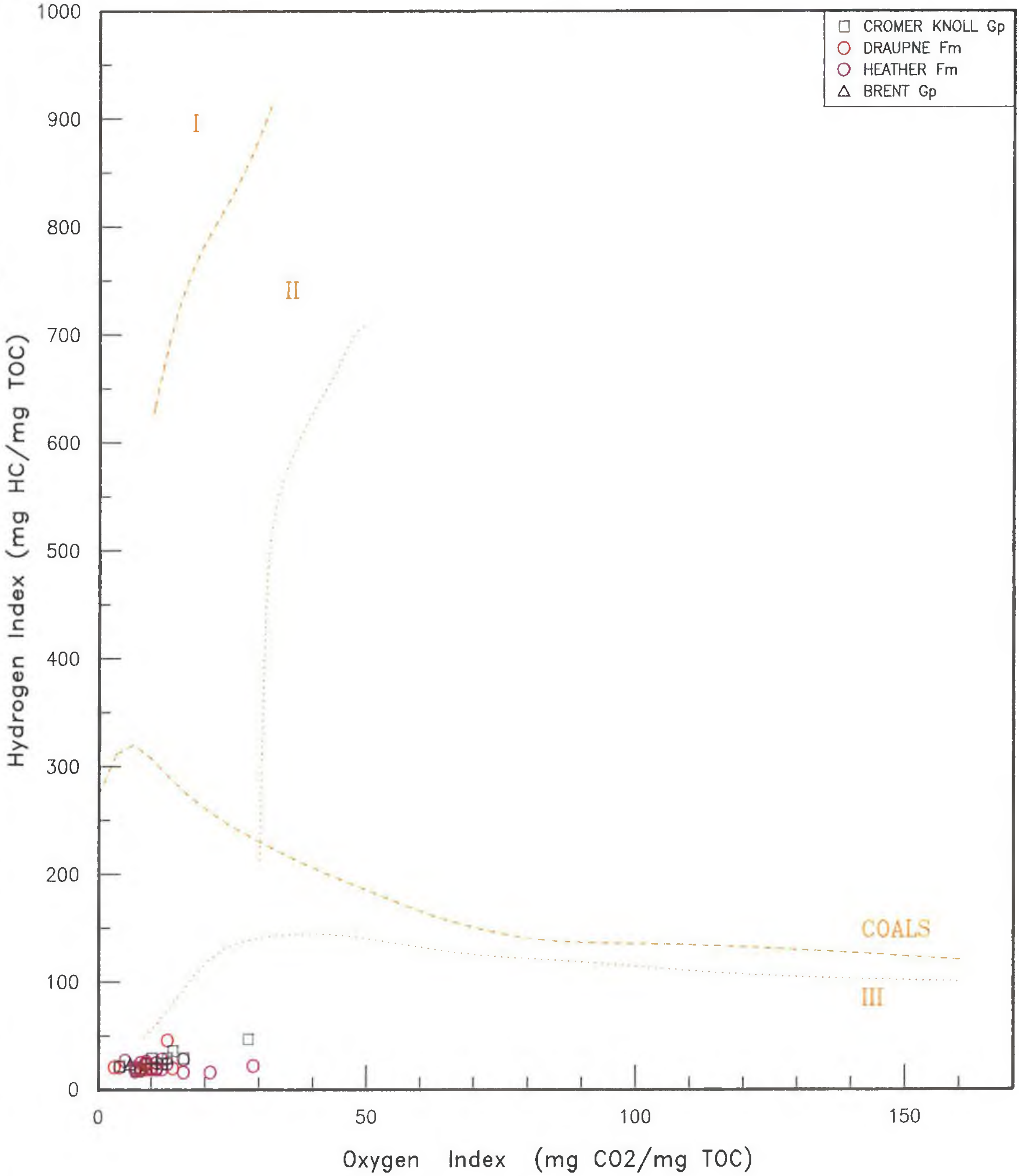

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Fig. B6

EP/S/EXP/Lab.Pau 89/74RPGO

HI vs. Tmax

25/1-10

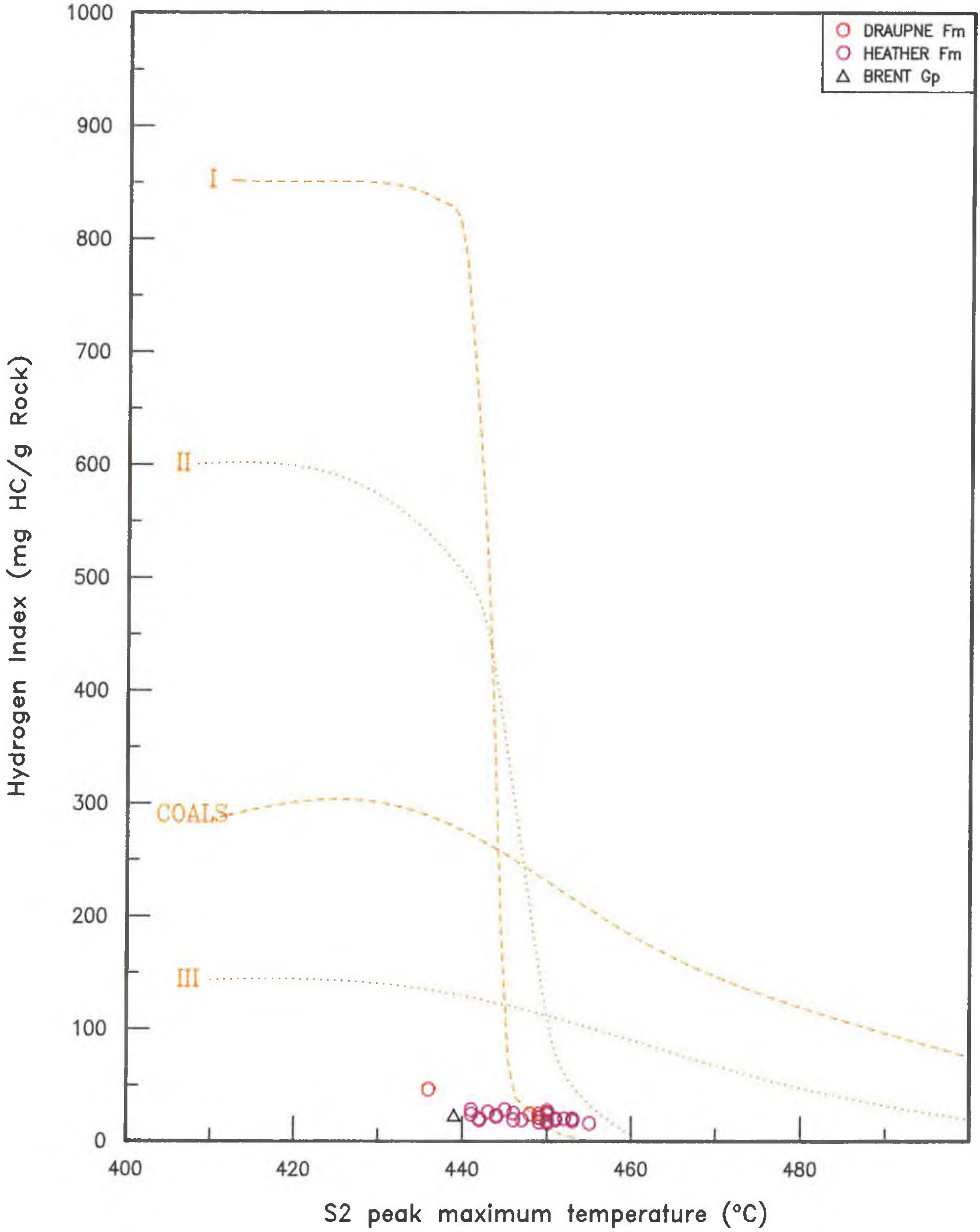

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Fig. B7

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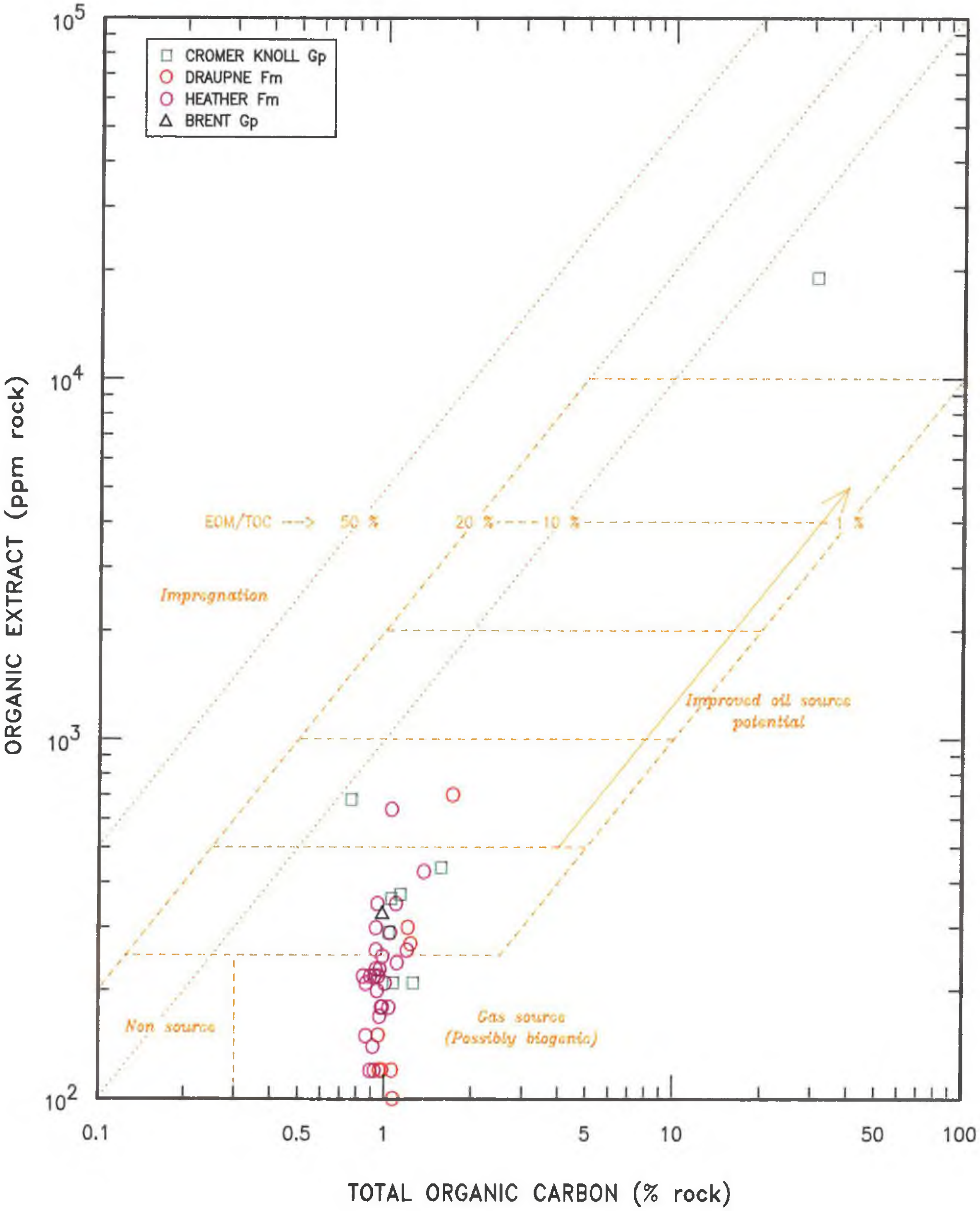
EOM vs. TOC

25/1-10



INFOLAB

TABLES

TABLE B1 - VITRINITE REFLECTANCE ANALYSIS

STRATIGRAPHY	SAMPLE	NUMBER OF READING (VITRINITE)	RANGE	VRo %	ST.DEV
E. Eocene	2145/55	30	0.30-0.92	0.38	0.11
L. Paleocene	2495/2505	29	0.33-0.66	0.42	0.07
Maastrichtian	2800/2905	41	0.38-0.90	0.61	0.13
Camp.to Santonian	3195/3210	6	0.25-1.22	0.75	0.36
Cretaceous	3490/3505	23	0.45-0.75	0.59	0.07
"	3745/55	2	0.69-1.02	0.85	0.17
Pro.Cenomanian	3895/3905	42	0.20-0.97	0.55	0.25
Cenon. Albian	4110/25	10	0.57-1.30	1.09	0.20
Valanginian	4230/35	15	0.18-1.21	0.34	0.29
Draupne FM	4285	24	0.21-1.69	0.51	0.39
Heather FM	4390	25	0.20-0.99	0.46	0.23
"	4455	99	0.19-3.22	1.53	1.08
Brent GR	4473/73.5K1	50	1.06-1.43	1.26	0.09
"	4580	50	0.14-1.71	0.63	0.42
"	4640	50	0.97-1.50	1.25	0.12
"	4710	50	1.11-1.59	1.31	0.10

TABLE B2 - ORGANIC DIAGENESIS MAIN DATA

STRATIGRAPHY	DEPTH (m)	VRo %	T.A.I.	CONCLUSION -VRo %
E. Eocene	2145/55	0.35		0.35
L. Paleocene	2495/2505	0.40		0.40
L. Cretaceous	3490/3505	0.45		0.45
pro. Cenomanian	3895/3905	0.75		0.75
E. Cretaceous	4200 & 4245		4^-	$\simeq$1.15
Draupne FM	4260		$4,5^-$	
Heather FM	4335 & 4465		$4,5^-$	
Brent GR	K.4473/73.50	1.25		1.25
"	4640	1.25		1.25
"	4710	1.30		1.30

TABLE: B3 25/1-10

DESCRIPTION OF ANALYSED SAMPLES AND ORGANIC CARBON CONTENT

AGE AND/OR FORMATION	LAB. REF.	SAMPLE TYPE	DEPTHS Metres		IR %	TOC %	IOC %	LITHOLOGY
CROMER KNOLL Gp	B13721	ND	4115.00	4145.00	61.9	.76		SHALE GREY, SILTY, CALCAREOUS
CROMER KNOLL Gp	B13722	ND	4170.00	4195.00	69.4	1.56		SHALE DARK GREY, SILTY, CALCAREOUS
CROMER KNOLL Gp	B13723	ND	4200.00	4205.00	80.3	1.25		SHALE GREY, SILTY, MICROMICACEOUS
CROMER KNOLL Gp	B13780	BO	4210.01			30.83		CONTAMINANT. HOMOGENEOUS BLACK SOFT PARTICLES, LIGNITIC
CROMER KNOLL Gp	B13724	ND	4220.00	4225.00	81.7	1.05		SHALE GREY, SILTY, MICROMICACEOUS
CROMER KNOLL Gp	B13725	ND	4230.00	4235.00	84.7	1.13		SHALE GREY, SILTY, MICROMICACEOUS
CROMER KNOLL Gp	B13726	ND	4240.00	4245.00	84.3	1.03		SHALE GREY, SILTY, MICROMICACEOUS
CROMER KNOLL Gp	B13727	ND	4250.00	4255.00	83.4	1.07		SHALE GREY, SILTY, MICROMICACEOUS
DRAUPNE Fm	B13728	ND	4260.00	4265.00	84.2	1.71		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13729	ND	4275.00		84.4	.95		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13730	ND	4280.00		83.9	.99		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13731	ND	4285.00		83.3	.96		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13732	ND	4290.00		83.2	1.07		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13733	ND	4295.00		84.1	.98		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13734	ND	4300.00		80.9	1.06		SHALE GREY_BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13735	ND	4305.00		80.8	1.23		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
DRAUPNE Fm	B13736	ND	4310.00		78.3	1.20		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13737	ND	4315.00		79.4	1.19		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13738	ND	4320.00		80.9	1.03		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13739	ND	4325.00		80.0	1.10		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13740	ND	4330.00		79.7	1.36		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13741	ND	4335.00		82.7	1.04		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13742	ND	4340.00		84.6	1.00		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13743	ND	4345.00		81.2	.97		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13744	ND	4350.00		75.8	.92		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13745	ND	4355.00		79.5	.94		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13746	ND	4360.00		80.5	.93		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13747	ND	4365.00		74.0	1.05		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13748	ND	4370.00		80.0	.94		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13749	ND	4375.00		81.3	.98		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13750	ND	4380.00		79.9	.92		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13751	ND	4385.00		80.7	.91		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13752	ND	4390.00		78.6	.86		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13753	ND	4395.00		80.9	.89		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13754	ND	4400.00		83.2	.96		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13755	ND	4405.00		79.0	.96		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13756	ND	4410.00		80.9	.98		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13757	ND	4415.00		77.6	1.09		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13758	ND	4420.00	4425.00	77.7	.86		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13759	ND	4430.00		81.0	.95		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13760	ND	4435.00	4445.00	79.8	.93		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13761	ND	4450.00		77.9	.84		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13762	ND	4455.00		76.5	.93		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
HEATHER Fm	B13763	ND	4465.00		80.3	.89		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS
BRENT Gp	B13764	ND	4480.00		76.9	.98		SHALE GREY-BROWNISH GREY, SLIGHTLY SILTY-SILTY, MICROMICACEOUS

TABLE: B4 25/1-10

RESULTS OF ORGANIC INVENTORY ANALYSIS

SAMPLE TYPE	DEPTHS Metres		ROCK-EVAL Q1	on	Tmax	S1	S2	S3	PI	HI	OI	LECO TOC	IOC	IATROSCAN Q2	EOM	100(EOM/TOC)	SAT	ARO	POL	SAT/ARO	HC
ND	4115.00	4145.00	N	RI_RT	#	.16	.27	.11	.37	36	14	.76		N	.068	8.9	53.8	17.8	28.4	3.02	.49
ND	4170.00	4195.00	N	RI_RT	#	.18	.73	.43	.20	47	28	1.56		N	.044	2.8	34.5	22.7	42.8	1.52	.25
ND	4200.00	4205.00	N	RI_RT	#	.08	.37	.20	.18	29	16	1.25		N	.021	1.7					
BO	4210.01		I	RT	433	3.50	47.66	30.32	.07	155	98	30.83		I	1.907						
ND	4220.00	4225.00	N	RI_RT	#	.17	.31	.11	.36	29	10	1.05		N	.036	3.4	47.2	21.9	30.9	2.16	.25
ND	4230.00	4235.00	N	RI_RT	#	.15	.33	.14	.32	29	13	1.13		N	.037	3.3	39.6	21.3	39.1	1.86	.22
ND	4240.00	4245.00	N	RI_RT	#	.08	.23	.04	.27	22	4	1.03		N	.029	2.8	41.9	22.1	36.0	1.90	.19
ND	4250.00	4255.00	N	RI_RT	#	.18	.26	.13	.40	24	12	1.07		N	.021	2.0					
ND	4260.00	4265.00	N	RI_RT	436	.44	.79	.23	.36	46	13	1.71		N	.070	4.1	41.9	20.2	37.9	2.07	.44
ND	4275.00		N	RI_RT	#	.08	.17	.08	#	18	8	.95		N	.015	1.6					
ND	4280.00		N	RI_RT	#	.11	.20	.14	.35	20	14	.99		N	<S						
ND	4285.00		N	RI_RT	#	.07	.18	.08	#	19	9	.96		N	.012	1.3					
ND	4290.00		N	RI_RT	#	.12	.26	.10	.31	24	9	1.07		N	.010	.9					
ND	4295.00		N	RI_RT	#	.07	.20	.03	.25	21	3	.98		N	.012	1.2					
ND	4300.00		N	RI_RT	#	.06	.23	.04	.22	21	4	1.06		N	.012	1.1					
ND	4305.00		N	RI_RT	448	.11	.29	0.00	.27	24	0	1.23		N	.027	2.2					
ND	4310.00		N	RI_RT	449	.14	.28	0.00	.33	24	0	1.20		N	.030	2.5	51.0	17.4	31.6	2.93	.21
ND	4315.00		N	RI_RT	450	.18	.29	.10	.39	24	9	1.19		N	.026	2.2					
ND	4320.00		N	RI_RT	449	.11	.22	.02	.34	21	2	1.03		N	.018	1.7					
ND	4325.00		N	RI_RT	449	.17	.23	.07	.42	21	7	1.10		N	.024	2.2					
ND	4330.00		N	RI_RT	450	.27	.37	.06	.42	27	5	1.36		N	.043	3.2	51.0	15.6	33.4	3.27	.29
ND	4335.00		N	RI_RT	450	.11	.19	.08	#	18	8	1.04		N	.029	2.8					
ND	4340.00		N	RI_RT	449	.06	.17	.07	#	17	7	1.00		N	.021	2.1					
ND	4345.00		N	RI_RT	453	.06	.19	.07	#	20	8	.97		N	.018	1.9					
ND	4350.00		N	RI_RT	450	.11	.23	.11	.33	25	11	.92		N	.022	2.4					
ND	4355.00		N	RI_RT	446	.14	.18	.06	#	19	7	.94		N	.035	3.7	42.1	18.2	39.7	2.31	.21
ND	4360.00		N	RI_RT	#	.14	.17	.07	#	18	8	.93		N	.023	2.5					
ND	4365.00		N	RI_RT	446	.24	.26	.09	.48	25	8	1.05		N	.064	6.1	61.1	12.0	26.9	5.09	.47
ND	4370.00		N	RI_RT	450	.09	.15	.15	#	16	16	.94		N	.020	2.1					
ND	4375.00		N	RI_RT	447	.15	.19	.11	#	19	11	.98		N	.018	1.8					
ND	4380.00		N	RI_RT	451	.06	.18	.11	#	19	12	.92		N	.012	1.3					
ND	4385.00		N	RI_RT	453	.05	.17	.09	#	19	10	.91		N	.014	1.5					
ND	4390.00		N	RI_RT	453	.06	.16	.06	#	18	7	.86		N	.015	1.7					
ND	4395.00		N	RI_RT	455	.05	.15	.19	#	16	21	.89		N	.012	1.3					
ND	4400.00		N	RI_RT	452	.10	.19	.11	#	20	11	.96		N	.023	2.4					
ND	4405.00		N	RI_RT	444	.14	.22	.09	.39	23	9	.96		N	.017	1.8					
ND	4410.00		N	RI_RT	451	.11	.19	.03	#	20	3	.98		N	.025	2.6					
ND	4415.00		N	RI_RT	441	.29	.30	.17	.49	28	16	1.09		N	.035	3.2	46.5	18.6	34.9	2.50	.23
ND	4420.00	4425.00	N	RI_RT	442	.12	.17	.09	#	20	10	.86		N	.021	2.4					
ND	4430.00		N	RI_RT	444	.19	.21	.28	.47	22	29	.95		N	.022	2.3					
ND	4435.00	4445.00	N	RI_RT	443	.14	.24	.09	.36	26	9	.93		N	.026	2.8					
ND	4450.00		N	RI_RT	442	.07	.16	.09	#	19	11	.84		N	.022	2.6					
ND	4455.00		N	RI_RT	445	.11	.26	.11	.31	28	12	.93		N	.030	3.2	49.2	19.7	31.1	2.50	.21
ND	4465.00		N	RI_RT	441	.09	.22	.11	.29	24	13	.89		N	.022	2.5					
ND	4480.00		N	RI_RT	439	.15	.22	.05	.40	23	6	.98		N	.033	3.4	46.3	26.5	27.2	1.75	.24