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Hydrocarbon source facies character of sediments penetrated by the

Shell Oil Company, No. 1 Santa Fe well,
Sandoval County, New Mexico
(Spot NW NW Sec. 18; T13N; R3E)

Prepared for
Burlington Resources
Farmington, New Mexico

1998

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Prepared for:
BURLINGTON RESOURCES
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Geoffrey S. Bayliss

GEOCHEM JOB NUMBER 4417

September, 1998

BURLINGTON RESOURCES

Shell Oil Company
#1 Santa Fe Well
Sandoval County, New Mexico

GeoChem Job Number 4417

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This report documents the findings of a basic geochemical Hydrocarbon Source Facies Characterization of sediments penetrated by the Shell Oil Company, No. 1 Santa Fe Well, Sandoval County, New Mexico (Spot NW NW Sec. 18; T13N; R3E).

INTRODUCTION

On August 19, 1998, GeoChem received from the New Mexico sample storage center at Socorro, ten (10) boxes of samples containing dried well cuttings samples in small brown envelopes collected at ten (10±) foot intervals from 600± feet to 11,033 feet T.D.

GeoChem was also provided with an AMSTRAT (American Stratigraphic Company) litho percent description log on which was provided the formation top information. This formation top information is presented in Summary Table I.

The work authorized in this study involved the collection of approximately forty (40) samples as outlined in GeoChem's letter of recommendation and costs, August 6, 1998, over the entire well section, 600± feet to 11,033 feet T.D. This well had a complete suite of dried well cuttings at essentially ten (10) foot intervals in small brown envelopes. The well was assigned the GeoChem Job Number 4417 with each sample identified by a suffix, -001 through -036A and B in order of increasing depth of penetration.

GeoChem personnel selected appropriate samples at specific depths based upon the visual examination of the sample material cross referenced with the litho percent log description.

Each sample selected was sieved to remove fines material (<20 mesh) and the cuttings sample then visually examined and high graded by removal of any extraneous mud additive and drilling contaminants. Iron was removed by magnet with loss of circulation material (mica, etc.) removed by air blowing of the sample.

The analytical sample was then ground to pass through 200 mesh.

The analytical program called for the measurement of Total Organic Carbon content (TOC), Rock-Eval (R-E) pyrolysis, Visual Kerogen Assessment of Organic Matter Type (OMT) and Thermal Alteration rank (TAI) and Vitrinite Reflectance %Ro determination.

RESULTS AND DISCUSSION

RESULTS

A. Geologic Zonation

The AMSTRAT, stratigraphic top information contained in the litho percent log provided to GeoChem was used to break out the geologic zones of explorational interest. These formation tops have been presented in Summary Table I and on all Data Tables and well profile Diagrams presenting the analytical data discussed herein.

B. Hydrocarbon Source Character of Sediments

The hydrocarbon source data presented herein is summarized in Summary Table II for each of the stratigraphic intervals penetrated by this well. In Summary Table II, the data reflects the minimum, maximum and mean values for each of the analytical parameters presented, Total Organic Carbon (TOC) content, S_1 volatile hydrocarbon, S_2 generatable hydrocarbon, S_3 organic oxygen content, Hydrogen Index (HI), Oxygen Index (OI) and Thermal Alteration Index (TAI) and %Ro Vitrinite Reflectance measurements.

The results of the individual analyses are also reported in Table I (Sample identification, depth and TOC values), Tables II-A and II-B (Rock-Eval pyrolysis data reported as mgm/gram and ppm $^{wt}/_{wt}$ respectively), Table III-A and III-B (Visual Kerogen Summary and Worksheet respectively) and Table IV (Vitrinite Reflectance %Ro Summary). Rock-Eval (R-E) pyrograms are reproduced in Appendix I at the rear of this report and the Vitrinite population histograms are immediately behind Table IV.

DISCUSSION

The data presentation in this report has focused on displaying the information in well profile format or in diagram plots which address the inter-relationships between two (2) or more interactive analytical parameters.

The Total Organic Carbon (TOC) data and the Rock-Eval (R-E) data are presented in well profile format in Figures 1-A and 1-B (mgm/gram and ppm $^{wt}/_{wt}$) upon which is overlain the well stratigraphy. Organic carbon richness, hydrocarbon richness, hydrocarbon generating potential, organic facies oil versus gas character and thermal maturity rank can be readily appraised on this one figure.

These data are also presented on GeoChem's Hydrocarbon Source Richness Diagrams, Figures 2-A, 2-B, 2-C, 3-A, 3-B and 3-C which shows the relationship between TOC and S_1 and S_2 values for both carbonate and clastic rock types. These diagrams should be self-evident in terms of the significances of these data.

The Visual Kerogen data (OMT and TAI) provides information on the organic facies controls on oil and/or gas generation as well as determining the level of geothermal diagenesic (time-temperature) attained by these sediments with increasing depth of burial in this well. The visual kerogen information is presented in well profile format in Figure 4 and also in GeoChem's Oil Factor Diagram Figure 5.

Using these Summary Tables and Figures, one can evaluate the independent stratigraphic hydrocarbon source facies characteristics for each section.

Quaternary Sediments (600± feet to 3,140± feet)

The Quaternary-age sediments, mostly representative of an intermixed red bed (claystone) and sand/silt sequence has only experienced an immature (TAI 1.4) geothermal diagenetic (time-temperature) history which is insufficient for any significant generation of oil liquids and/or gas to have occurred.

The red beds contain little organic matter as is reflected in the low TOC values (average 0.28%). Surprisingly, the Rock-Eval (R-E) data does provide indications of fair to good yields of both S_1 volatile hydrocarbon (320 ppm to 440 ppm, average 387 ppm) and S_2 generatable hydrocarbon (200 ppm to 390 ppm, average 323 ppm). Hydrogen Index (HI) (83 to 216, average 130) and Oxygen Index (129 to 222, average 171) indicate a more likely gas sourcing character.

It is possible that these observed hydrocarbon yields (S_1 and S_2) could be indicative of the infusion of these immature sediments with hydrocarbon migrating from deeper buried source or reservoir sediments or could be contamination associated with the drilling and sample collection.

Quaternary-age sediments at this well location are consequently rated as a nonsource for oil and/or associated gas.

Cretaceous-age Sediments (3,140± feet to 6,840± feet)

The Cretaceous-age sediments at this well location include Cretaceous Undivided (3,140± feet to 3,644± feet), Menefee (3,644± feet to 4,378± feet), Point Lookout (4,378± feet to 4,520± feet), Mancos (4,520± feet to 6,010± feet), Gallup (6,010± feet to 6,443± feet), Greenhorn (6,443± feet to 6,514± feet), Graneros (6,514± feet to 6,540± feet), Graneros Sandstone (6,540± feet to 6,600± feet) and Dakota (6,600± feet to 6,840± feet).

Lithologically, the entire Cretaceous section is similar to the overlying Quaternary section being representative of mixed claystone, red bed, dark shales interfingered by sandstones and siltstones facies. The Menefee formation has interfingered coal stringers over much of the interval, 3,644± feet to 4,378± feet with one coal stringer being present in the Point Lookout interval.

As a consequence, it is difficult to accurately determine the source rock potential for hydrocarbon generation (oil and/or gas). Most definitely the Menefee formation could serve as an excellent source for both oil and gas when one considers the interfingered nature of the various swamp-near shore depositional cycles which appear to characterize these sediments.

Based on the data presented in Summary Table II and Table I, (and discounting the high coal values), the organic carbon contents (TOC) vary from a low of 0.18% to a high of 5.40% (average 2.60%). These values would indicate a good to very good potential for sourcing gas and a possibly good oil liquids source potential. The kerogen is predominantly Herbaceous-Woody-Inertinitic plant detritus with, however, fair abundances of oil-prone Amorphous-Sapropellic distributed throughout the formations. The carbon content of the coals (46.59% and 53.34%)

would be consistent with bituminous type coals which have experienced a geothermal diagenetic (time-temperature) history comparable to that rated as the oil generation window.

A similar appraisal of the S_1 volatile hydrocarbon and S_2 generatable hydrocarbon yields following Rock-Eval (R-E) pyrolysis also shows good to very good abundances (S_1, 190 ppm to 830 ppm, average 437 ppm; S_2, 230 ppm to 10,430 ppm, average 4,210 ppm). A good oil source quality for the contained organic matter in these sediments is also reflected in the moderately higher Hydrogen Index values (98 to 277, average 167) compared to the significantly lower Oxygen Index values (23 to 110, average 37). Note also the high S_2/S_3 ratio values which indicates a significant oil liquids source character for the contained organic matter (Figure 1-B).

Unfortunately, at this well location the thermal alteration ranking for the Cretaceous sediments only rates at a moderately immature Stage 1+ to 2- (TAI 1.5) grading with increasing depth of burial to a moderately mature Stage 2 (TAI 2.2), based on the coloration of the plant cuticle. It should be borne in mind, however, that when one visually rates organic rich carbonaceous shales or limestones, it is a limitation on the accuracy of the maturity rank in that whereas the outside of the palynologic kerogen can be darkened geologically, it also applies that the inside can remain comparatively unaltered.

It is my opinion that this is the case at this well location and consequently the thermal alteration rank should be a moderately mature to mature level (i.e. TAI 2.3 to 2.5). The Vitrinite Reflectance %Ro measurements would be more in keeping with a moderately mature to mature thermal rank for this interval.

Based on the above discussed findings, the Cretaceous-age sediments are rated as good to possibly excellent moderately mature to mature oil and associated gas source rocks. The interfingered sequence of sands, silts, carbonaceous shales and bituminous rank coals could well have generated significant yields of oil liquids, and most certainly, methane coal gas in the local area of this well.

Jurassic-age Sediments (6,840± feet to 7,726± feet)

Jurassic-age sediments at this well location comprised the Morrison Formation (6,840± feet to 7,412± feet), the Todilto (7,412± feet to 7,530± feet) and the Entrada (7,530± feet to 7,726± feet).

From the litho percentage log and litho description it appears these three (3) stratigraphic units are primarily a mixture of interfingered light colored claystones and shales with sandstones and siltstones. Limestone nodules were noted in the upper portion of the Morrison Formation and also at the base of the Entrada.

The data presented in Figure 1-B indicates poor to very good organic carbon (TOC) contents (average 1.45%, Summary Table II) with correspondingly good amounts of S_1 volatile hydrocarbon (360 ppm to 520 ppm, average 420 ppm) and good to excellent amounts of S_2 generatable hydrocarbon potential (400 ppm to 2,720 ppm, average 1,413 ppm).

Thermal maturity ranking for the Jurassic sediments rated as moderately immature to moderately mature (Stage 2- to 2, TAI 1.8 to 2.0), a value which is only at an onset level of oil and/or associated gas formation. The contained organic matter in these sediments was dominantly Herbaceous plant detritus with secondary amounts of oil-prone Amorphous-Sapropellic kerogen. It is interpreted however that at this maturity level the contained kerogens would be essentially potential gas sources with the possibility for oil liquids at higher maturity rank.

Triassic Sediments (7,726± feet to 8,885± feet)

Triassic sediments comprised the Chinle Formation (7,726± feet to 8,737± feet) and the Aqua Zarca Formation (8,737± feet to 8,885± feet).

Based on the parameters discussed above for the Jurassic-age sediments, the Triassic sediments appear to be very similar comprising interfingered mixtures of red shales, orange red claystones, sandstones and siltstones. Limestone nodules were again noted at the upper sections of the Chinle Formation.

Thermal maturity of these sediments is again rated at the moderately immature to moderately mature (Stage 2- to 2 to 2, TAI 2.0 to 2.2) but with the various richness parameters, TOC, Rock-Eval (R-E), S_1, S_2, HI and OI values all averaging significantly lower (0.19%-0.22%; 250 ppm-260 ppm; 250 ppm 353 ppm; 131-188; 139-142 respectively).

These lower values would be consistent with the Triassic-age sediments having a moderately immature to moderately mature poor-to at-best-fair oil and/or associated gas source character should this facies be buried deeper elsewhere in this Basin.

Permian-age Sediments (8,885± feet to 10,375± feet)

This interval is represented by the San Andreas Formation (8,885± feet to 8,990± feet), Yeso (8,990± feet to 9,378± feet), Meseta Blanca (9,378± feet to 9,630± feet) and the Abo Formation (9,630± feet to 10,375± feet).

These sediments are again mixtures of red shales, dolomites, limestone nodules interfingered with sandstones and siltstones. The entire interval is lean in organic carbon content (TOC, 0.13% to 0.29%, average 0.22%) with, however, moderately fair amounts of S_1 volatile hydrocarbon (150 ppm-475 ppm, average 293 ppm) and S_2 generatable hydrocarbon potential (367 ppm-570 ppm, average 442 ppm). These sediments have also experienced an increasing geothermal diagenetic (time-temperature) history being ranked at an oil and associated gas onset generation rank of Stage 2 to 2+ (TAI 2.3).

The contained kerogen however is entirely a mixture of gas-prone Herbaceous, Inertinite and Woody structured plant remains.

Based on these parameters, the Permian-age sediments rate as moderately mature to mature poor source rocks for either oil liquids and/or associated gas generation in the local area of this well.

Pennsylvanian-age Sediments (10,375± feet to 10,955± feet)

These basal sediments sit upon the Precambrian and are representative of the Madera Formation at this well location.

Source rock characteristics reflect the lithologic character of these sediments which are comprised of red shale intermixed with a dominantly cream to tan colored limestone accumulation. Organic carbon contents (TOC) are comparatively good for carbonates (0.21%-0.42%, average 0.31%) but the yields of S_1 volatile hydrocarbon (70 ppm-170 ppm, average 100 ppm) and S_2 generatable hydrocarbon (320 ppm-480 ppm, average 402 ppm) would only indicate a fair hydrocarbon source character. The maturity level is at a similar moderately mature to mature Stage 2 to 2+ (TAI 2.3) state.

Based on these criteria, the Pennsylvanian-age sediments at this well location are not considered as viable sources for the generation of economically significant volumes of oil and associated gas.

Precambrian Sediments (10,955± feet to 11,033 feet T.D.)

No samples were analyzed from this interval.

SUMMARY TABLE I

FORMATION TOPS

Formation Age	Formation Name	Depth (feet)
Quaternary		600
Cretaceous		3140 ?
	Cretaceous Undivided	3140 ?
	Menefee	3644
	Point Lookout	4378
	Mancos	4520
	Gallup	6010 ?
	Greenhorn	6443 ?
	Graneros	6514 ?
	Graneros Sandstone	6540
	Dakota	6600
Jurassic		6840
	Morrison	6840
	Todilto	7412
	Entrada	7530
Triassic		7726
	Chinle	7726
	Aqua Zarca	8737
Permian		8885
	San Andres	8885
	Yeso	8990
	Meseta Blanca	9378
	Abo	9630
Pennsylvanian		10375
	Madera	10375
Precambrian		10955
	Precambrian	10955

SUMMARY TABLE II

Summary of Analyses by Formation

Formation	Total Organic Carbon			S1 (ppm)			S2 (ppm)			S3 (ppm)			Hydrogen Index			Oxygen Index			Thermal Alteration Index			%Ro		
	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
QUATERNARY	0.24	0.41	0.28	320	440	387	200	390	323	390	530	440	83	216	130	129	222	171	1.4	1.4	1.4	-	-	-
CRETACEOUS																								
Cretaceous Undivided	0.18	0.27	0.23	260	300	280	230	390	310	350	600	475	127	144	136	194	222	208	1.5	1.5	1.5	-	-	-
Menefee	1.49	53.34	20.15	190	5520	2638	1550	152830	49523	1090	25520	10090	104	286	185	23	110	66	1.9	1.9	1.9	0.43	1.12	0.78
Point Lookout	5.40	46.59	26.00	560	2520	1540	10430	77210	43820	1450	11730	6590	165	193	179	25	26	26	-	-	-	-	-	-
Mancos	2.90	5.08	3.86	360	610	483	2860	8210	5260	850	1170	995	98	161	131	22	30	26	2.0	2.1	2.1	0.49	1.34	0.61
Gallup	2.04	3.34	2.69	520	830	675	3500	5620	4560	500	880	690	168	171	169	24	26	25	2.2	2.2	2.2	0.44	1.64	0.69
Greenhorn	1.65	1.65	1.65	360	360	360	4580	4580	4580	390	390	390	277	277	277	23	23	23	-	-	-	-	-	-
Graneros	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Graneros Sandstone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dakota	1.42	1.42	1.42	360	360	360	2630	2630	2630	400	400	400	185	185	185	28	28	28	2.2	2.2	2.2	0.57	0.72	0.65
JURASSIC																								
Morrison	0.14	2.40	1.27	300	420	360	300	5140	2720	380	530	455	214	214	214	22	271	147	2.0	2.0	2.0	-	-	-
Todilto	2.70	2.70	2.70	380	380	380	1120	1120	1120	290	290	290	41	41	41	11	11	11	1.8	1.8	1.8	0.65	1.36	0.67
Entrada	0.38	0.38	0.38	520	520	520	400	400	400	240	240	240	105	105	105	63	63	63	2.0	2.0	2.0	-	-	-
TRIASSIC																								
Chinle	0.13	0.32	0.22	230	260	250	270	430	353	240	280	263	84	276	188	75	215	139	2.0	2.2	2.1	-	-	-
Aqua Zarca	0.19	0.19	0.19	260	260	260	250	250	250	270	270	270	131	131	131	142	142	142	-	-	-	-	-	-
PERMIAN																								
San Andres	0.13	0.13	0.13	230	230	230	380	380	380	280	280	280	292	292	292	215	215	215	-	-	-	-	-	-
Yeso	0.23	0.32	0.28	270	360	315	430	470	450	160	210	185	146	186	166	65	69	67	2.3	2.3	2.3	-	-	-
Meseta Blanca	0.27	0.30	0.29	460	490	475	450	690	570	340	420	380	166	230	198	113	155	134	2.3	2.3	2.3	-	-	-
Abo	0.16	0.24	0.19	100	220	150	240	460	367	170	290	227	150	270	195	70	170	125	2.1	2.1	2.1	-	-	-
PENNSYLVANIAN																								
Madera	0.21	0.42	0.31	70	170	100	320	480	402	150	220	194	78	186	143	35	104	70	2.3	2.3	2.3	0.91	1.21	1.06
PRECAMBRIAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

TABLE I
SAMPLE IDENTIFICATION
AND
TOTAL ORGANIC CARBON RESULTS

GeoChem Sample Number	Depth (feet)	Total Organic Carbon (% of Rock)
4417-001	1000-1020	0.41
4417-002	1990-2020	0.24
4417-003	2500-2530	0.18
4417-004	3190-3220	0.18
4417-005	3490-3520	0.27
4417-006A	3700-3720	2.61
4417-006B	3700-3720	23.17
4417-007	4000-4010	1.49 ; 1.46R
4417-008	4200-4210	53.34
4417-009A	4500-4520	5.40
4417-009B	4500-4520	46.59
4417-010	4600-4610	3.73
4417-011	4900-4920	2.90
4417-012	5400-5410	5.08
4417-013	5800-5810	3.71
4417-014	6100-6110	3.34
4417-015	6290-6300	2.04 ; 2.03R
4417-016	6500-6510	1.65
4417-017	6700-6710	1.42
4417-018	6900-6910	2.40
4417-019	7100-7110	0.14
4417-020	7500-7510	2.70
4417-021	7600-7610	0.38
4417-022	7900-7910	0.21 ; 0.30R
4417-023	8300-8310	0.13
4417-024	8600-8610	0.32
4417-025	8800-8810	0.19
4417-026	8900-8910	0.13
4417-027	9000-9010	0.32
4417-028	9100-9110	0.23
4417-029	9400-9410	0.30
4417-030	9600-9610	0.27

TABLE I
SAMPLE IDENTIFICATION
AND
TOTAL ORGANIC CARBON RESULTS

GeoChem Sample Number	Depth (feet)	Total Organic Carbon (% of Rock)
4417-031	9700-9710	0.17 ; 0.15R
4417-032	10000-10010	0.24
4417-033	10300-10310	0.16
4417-034	10400-10410	0.22
4417-035A	10600-10610	0.42
4417-035B	10600-10610	0.21
4417-036A	10800-10810	0.27
4417-036B	10800-10810	0.41

FIGURE 1-A
ROCK-EVAL PYROLYSIS SUMMARY (mgm/gram)
GeoChem Job Number 4417

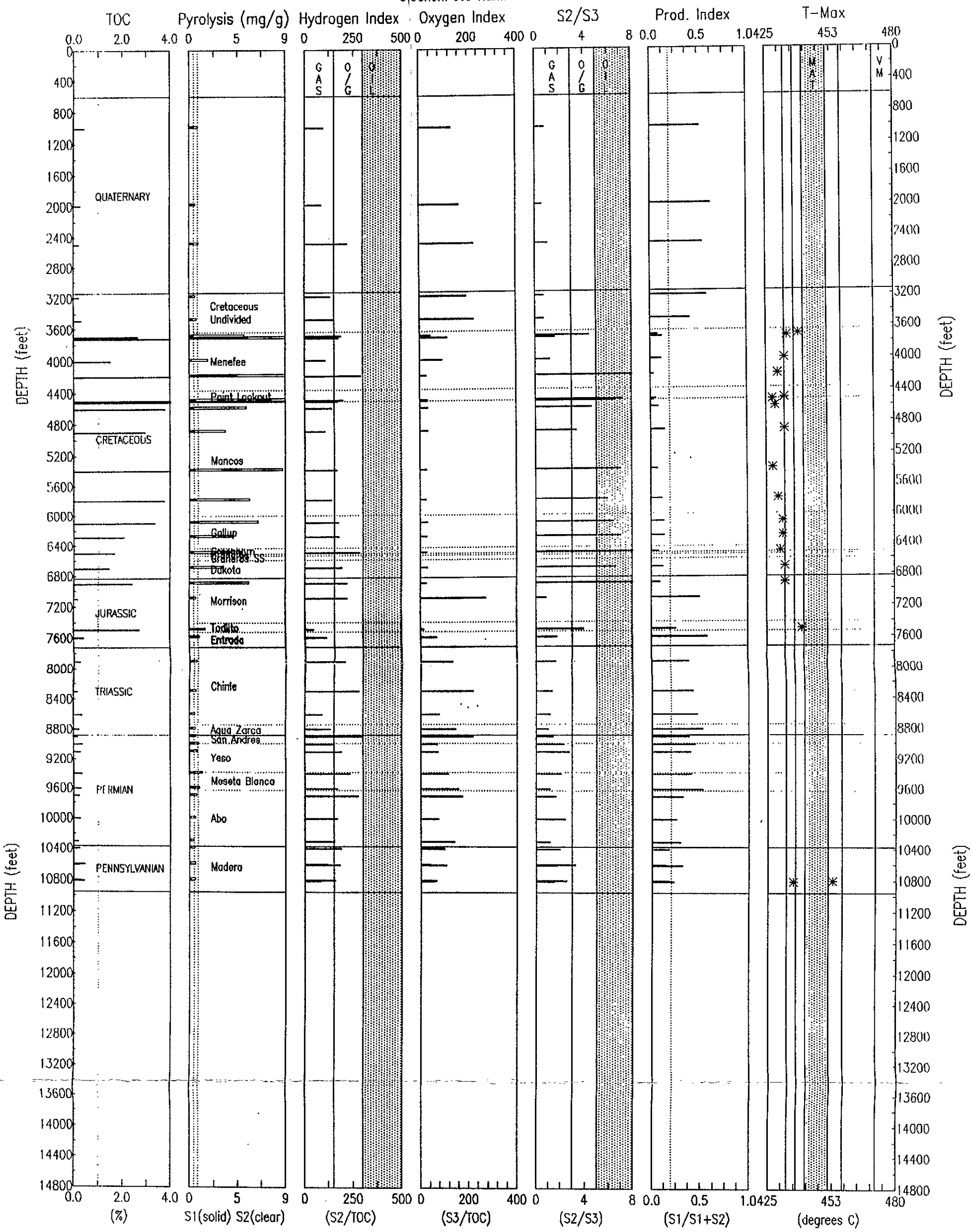


TABLE II-A

RESULTS OF ROCK-EVAL PYROLYSIS (mg/g)

GeoChem Sample No.	Client Identification	Qty.	Tmax (°c)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	PI	PC*	T.O.C. (wt%)	Hydrogen Index	Oxygen Index
4417-001	1000-1020	88.4	361	0.40	0.38	0.53	0.51	0.06	0.41	92	129
4417-002	1990-2020	92.9	347	0.32	0.20	0.39	0.62	0.04	0.24	83	162
4417-003	2500-2530	93.5	351	0.44	0.39	0.40	0.54	0.06	0.18	216	222
4417-004	3190-3220	90.7	335	0.30	0.23	0.35	0.58	0.04	0.18	127	194
4417-005	3490-3520	92.1	338	0.26	0.39	0.60	0.41	0.05	0.27	144	222
4417-006A	3700-3720	81.6	439	0.37	4.77	1.09	0.07	0.42	2.61	182	41
4417-006B	3700-3720	3.8	434	5.52	38.94	25.52	0.12	3.70	23.17	168	110
4417-007	4000-4010	99.9	433	0.19	1.55	1.37	0.11	0.14	1.49	104	91
4417-008	4200-4210	6.7	430	4.47	152.83	12.38	0.03	13.10	53.34	286	23
4417-009A	4500-4520	48.1	433	0.56	10.43	1.45	0.05	0.91	5.40	193	26
4417-009B	4500-4520	11.5	428	2.52	77.21	11.73	0.03	6.62	46.59	165	25
4417-010	4600-4610	96.2	429	0.36	4.97	1.09	0.07	0.44	3.73	133	29
4417-011	4900-4920	84.7	433	0.46	2.86	0.87	0.14	0.27	2.90	98	30
4417-012	5400-5410	78.0	428	0.50	8.21	1.17	0.06	0.72	5.08	161	23
4417-013	5800-5810	95.9	430	0.61	5.00	0.85	0.11	0.46	3.71	134	22
4417-014	6100-6110	77.7	432	0.83	5.62	0.88	0.13	0.53	3.34	168	26
4417-015	6290-6300	81.9	432	0.52	3.50	0.50	0.13	0.33	2.04	171	24
4417-016	6500-6510	93.1	431	0.36	4.58	0.39	0.07	0.41	1.65	277	23
4417-017	6700-6710	89.5	433	0.36	2.63	0.40	0.12	0.24	1.42	185	28
4417-018	6900-6910	85.5	433	0.42	5.14	0.53	0.08	0.46	2.40	214	22
4417-019	7100-7110	92.6	364	0.30	0.30	0.38	0.50	0.05	0.14	214	271
4417-020	7500-7510	98.7	440	0.38	1.12	0.29	0.25	0.12	2.70	41	11
4417-021	7600-7610	96.4	322	0.52	0.40	0.24	0.57	0.07	0.38	105	63
4417-022	7900-7910	94.2	353	0.26	0.43	0.27	0.38	0.05	0.21	204	128
4417-023	8300-8310	100.0	357	0.26	0.36	0.28	0.42	0.05	0.13	276	215
4417-024	8600-8610	100.5	359	0.23	0.27	0.24	0.46	0.04	0.32	84	75
4417-025	8800-8810	93.9	351	0.26	0.25	0.27	0.52	0.04	0.19	131	142
4417-026	8900-8910	95.4	356	0.23	0.38	0.28	0.38	0.05	0.13	292	215
4417-027	9000-9010	98.1	331	0.36	0.47	0.21	0.44	0.06	0.32	146	65
4417-028	9100-9110	96.9	334	0.27	0.43	0.16	0.39	0.05	0.23	186	69
4417-029	9400-9410	94.5	356	0.46	0.69	0.34	0.40	0.09	0.30	230	113
4417-030	9600-9610	101.1	365	0.49	0.45	0.42	0.52	0.07	0.27	166	155
4417-031	9700-9710	100.7	372	0.22	0.46	0.29	0.32	0.05	0.17	270	170
4417-032	10000-10010	94.1	374	0.13	0.40	0.17	0.25	0.04	0.24	166	70

T.O.C. = Total organic carbon, wt.%
S1 = Free Hydrocarbons, mg HC/g of rock
S2 = Residual hydrocarbon potential (mg HC/g of rock)
S3 = CO_2 produced from kerogen pyrolysis (mg CO_2/g of rock)
PC* = 0.083 (S1 + S2)
Hydrogen Index = mg HC/g organic carbon
Oxygen Index = mg CO_2/g organic carbon
PI = S1/(S1+S2)
Tmax = Temperature Index, °C.

TABLE II-A

RESULTS OF ROCK-EVAL PYROLYSIS (mg/g)

GeoChem Sample No.	Client Identification	Qty.	Tmax (°c)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	PI	PC*	T.O.C. (wt%)	Hydrogen Index	Oxygen Index
4417-033	10300-10310	98.3	378	0.10	0.24	0.22	0.29	0.02	0.16	150	137
4417-034	10400-10410	97.2	380	0.08	0.41	0.21	0.17	0.04	0.22	186	95
4417-035A	10600-10610	95.6	505	0.07	0.48	0.15	0.13	0.04	0.42	114	35
4417-035B	10600-10610	95.0	503	0.17	0.38	0.22	0.31	0.04	0.21	180	104
4417-036A	10800-10810	95.0	453	0.09	0.42	0.17	0.18	0.04	0.27	155	62
4417-036B	10800-10810	100.1	436	0.09	0.32	0.22	0.22	0.03	0.41	78	53

T.O.C. = Total organic carbon, wt.%
S1 = Free Hydrocarbons, mg HC/g of rock
S2 = Residual hydrocarbon potential (mg HC/g of rock)

S3 = CO_2 produced from kerogen pyrolysis (mg CO_2/g of rock)
PC* = 0.083 (S1 + S2)
Hydrogen index = mg HC/g organic carbon

Oxygen Index = mg CO_2/g organic carbon
PI = S1/(S1+S2)
Tmax = Temperature Index, °C.

FIGURE 1-B
ROCK-EVAL PYROLYSIS SUMMARY (ppm wt/wt)
Geochem Job Number 4417

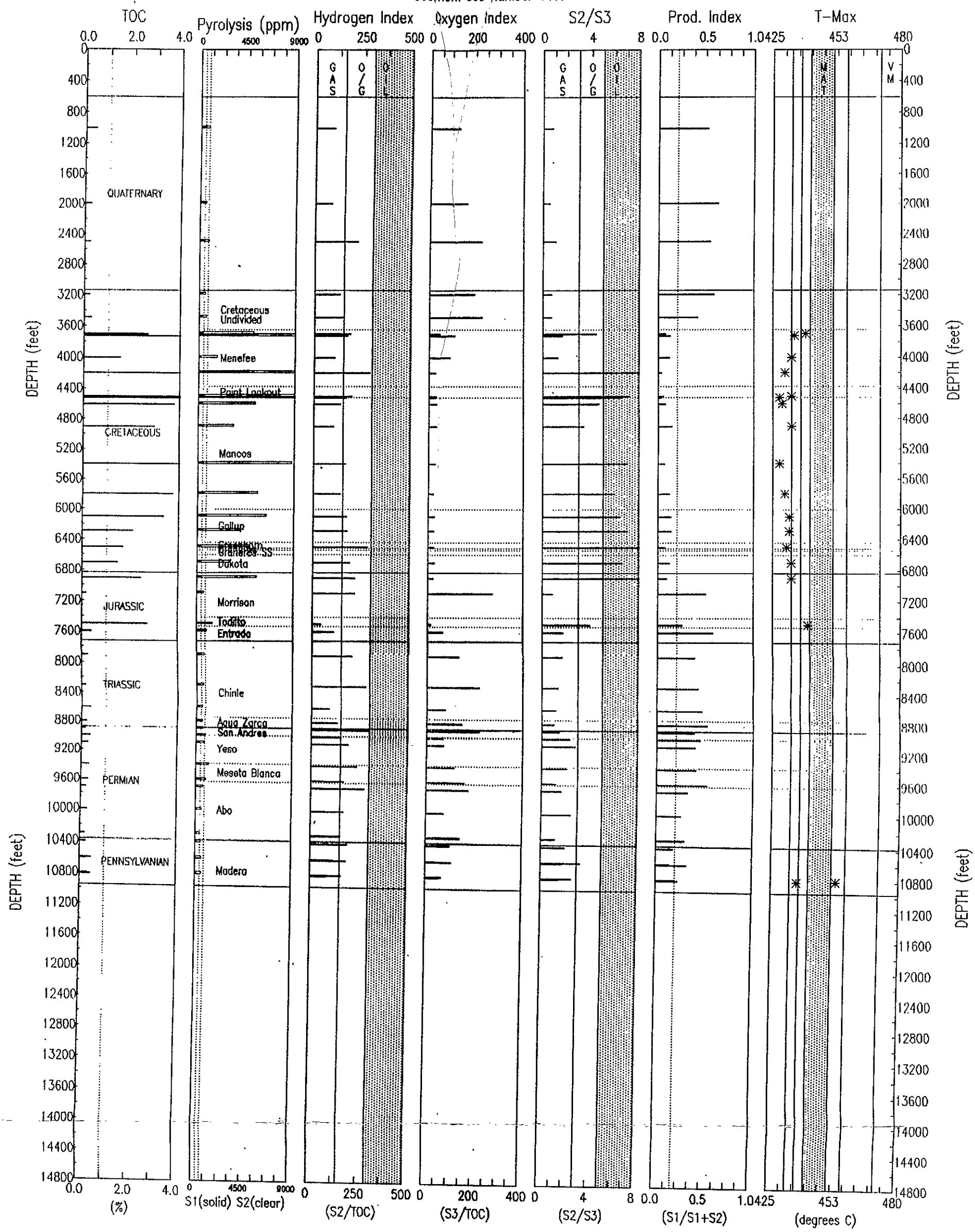


TABLE II-B

RESULTS OF ROCK-EVAL PYROLYSIS (ppm)

GeoChem Sample No.	Client Identification	Qty.	Tmax (°c)	S1 (ppm)	S2 (ppm)	S3 (ppm)	PI	PC*	T.O.C. (wt%)	Hydrogen Index	Oxygen Index
4417-001	1000-1020	88.4	361	400	380	530	0.51	0.06	0.41	92	129
4417-002	1990-2020	92.9	347	320	200	390	0.62	0.04	0.24	83	162
4417-003	2500-2530	93.5	351	440	390	400	0.54	0.06	0.18	216	222
4417-004	3190-3220	90.7	335	300	230	350	0.58	0.04	0.18	127	194
4417-005	3490-3520	92.1	338	260	390	600	0.41	0.05	0.27	144	222
4417-006A	3700-3720	81.6	439	370	4770	1090	0.07	0.42	2.61	182	41
4417-006B	3700-3720	3.8	434	5520	38940	25520	0.12	3.70	23.17	168	110
4417-007	4000-4010	99.9	433	190	1550	1370	0.11	0.14	1.49	104	91
4417-008	4200-4210	6.7	430	4470	152830	12380	0.03	13.10	53.34	286	23
4417-009A	4500-4520	48.1	433	560	10430	1450	0.05	0.91	5.40	193	26
4417-009B	4500-4520	11.5	428	2520	77210	11730	0.03	6.62	46.59	165	25
4417-010	4600-4610	96.2	429	360	4970	1090	0.07	0.44	3.73	133	29
4417-011	4900-4920	84.7	433	460	2860	870	0.14	0.27	2.90	98	30
4417-012	5400-5410	78.0	428	500	8210	1170	0.06	0.72	5.08	161	23
4417-013	5800-5810	95.9	430	610	5000	850	0.11	0.46	3.71	134	22
4417-014	6100-6110	77.7	432	830	5620	880	0.13	0.53	3.34	168	26
4417-015	6290-6300	81.9	432	520	3500	500	0.13	0.33	2.04	171	24
4417-016	6500-6510	93.1	431	360	4580	390	0.07	0.41	1.65	277	23
4417-017	6700-6710	89.5	433	360	2630	400	0.12	0.24	1.42	185	28
4417-018	6900-6910	85.5	433	420	5140	530	0.08	0.46	2.40	214	22
4417-019	7100-7110	92.6	364	300	300	380	0.50	0.05	0.14	214	271
4417-020	7500-7510	98.7	440	380	1120	290	0.25	0.12	2.70	41	11
4417-021	7600-7610	96.4	322	520	400	240	0.57	0.07	0.38	105	63
4417-022	7900-7910	94.2	353	260	430	270	0.38	0.05	0.21	204	128
4417-023	8300-8310	100.0	357	260	360	280	0.42	0.05	0.13	276	215
4417-024	8600-8610	100.5	359	230	270	240	0.46	0.04	0.32	84	75
4417-025	8800-8810	93.9	351	260	250	270	0.52	0.04	0.19	131	142
4417-026	8900-8910	95.4	356	230	380	280	0.38	0.05	0.13	292	215
4417-027	9000-9010	98.1	331	360	470	210	0.44	0.06	0.32	146	65
4417-028	9100-9110	96.9	334	270	430	160	0.39	0.05	0.23	186	69
4417-029	9400-9410	94.5	356	460	690	340	0.40	0.09	0.30	230	113
4417-030	9600-9610	101.1	365	490	450	420	0.52	0.07	0.27	166	155
4417-031	9700-9710	100.7	372	220	460	290	0.32	0.05	0.17	270	170
4417-032	10000-10010	94.1	374	130	400	170	0.25	0.04	0.24	166	70

T.O.C. = Total organic carbon, wt.%
S1 = Free Hydrocarbons, mg HC/g of rock
S2 = Residual hydrocarbon potential (mg HC/g of rock)
S3 = CO_2 produced from kerogen pyrolysis (mg CO_2/g of rock)
PC* = 0.083 (S1 + S2)
Hydrogen Index = mg HC/g organic carbon
Oxygen Index = mg CO_2/g organic carbon
PI = S1/(S1+S2)
Tmax = Temperature Index, °C.

TABLE II-B

RESULTS OF ROCK-EVAL PYROLYSIS (ppm)

GeoChem Sample No.	Client Identification	Qty.	Tmax (°c)	S1 (ppm)	S2 (ppm)	S3 (ppm)	PI	PC*	T.O.C. (wt%)	Hydrogen Index	Oxygen Index
4417-033	10300-10310	98.3	378	100	240	220	0.29	0.02	0.16	150	137
4417-034	10400-10410	97.2	380	80	410	210	0.17	0.04	0.22	186	95
4417-035A	10600-10610	95.6	505	70	480	150	0.13	0.04	0.42	114	35
4417-035B	10600-10610	95.0	503	170	380	220	0.31	0.04	0.21	180	104
4417-036A	10800-10810	95.0	453	90	420	170	0.18	0.04	0.27	155	62
4417-036B	10800-10810	100.1	436	90	320	220	0.22	0.03	0.41	78	53

T.O.C. = Total organic carbon, wt.%
S1 = Free Hydrocarbons, mg HC/g of rock
S2 = Residual hydrocarbon potential (mg HC/g of rock)

S3 = CO_2 produced from kerogen pyrolysis (mg CO_2/g of rock)
PC* = 0.083 (S1 + S2)
Hydrogen index = mg HC/g organic carbon

Oxygen Index = mg CO_2/g organic carbon
PI = S1/(S1+S2)
Tmax = Temperature Index, °C.

FIGURE 2-A
HYDROCARBON SOURCE RICHNESS - CARBONATES

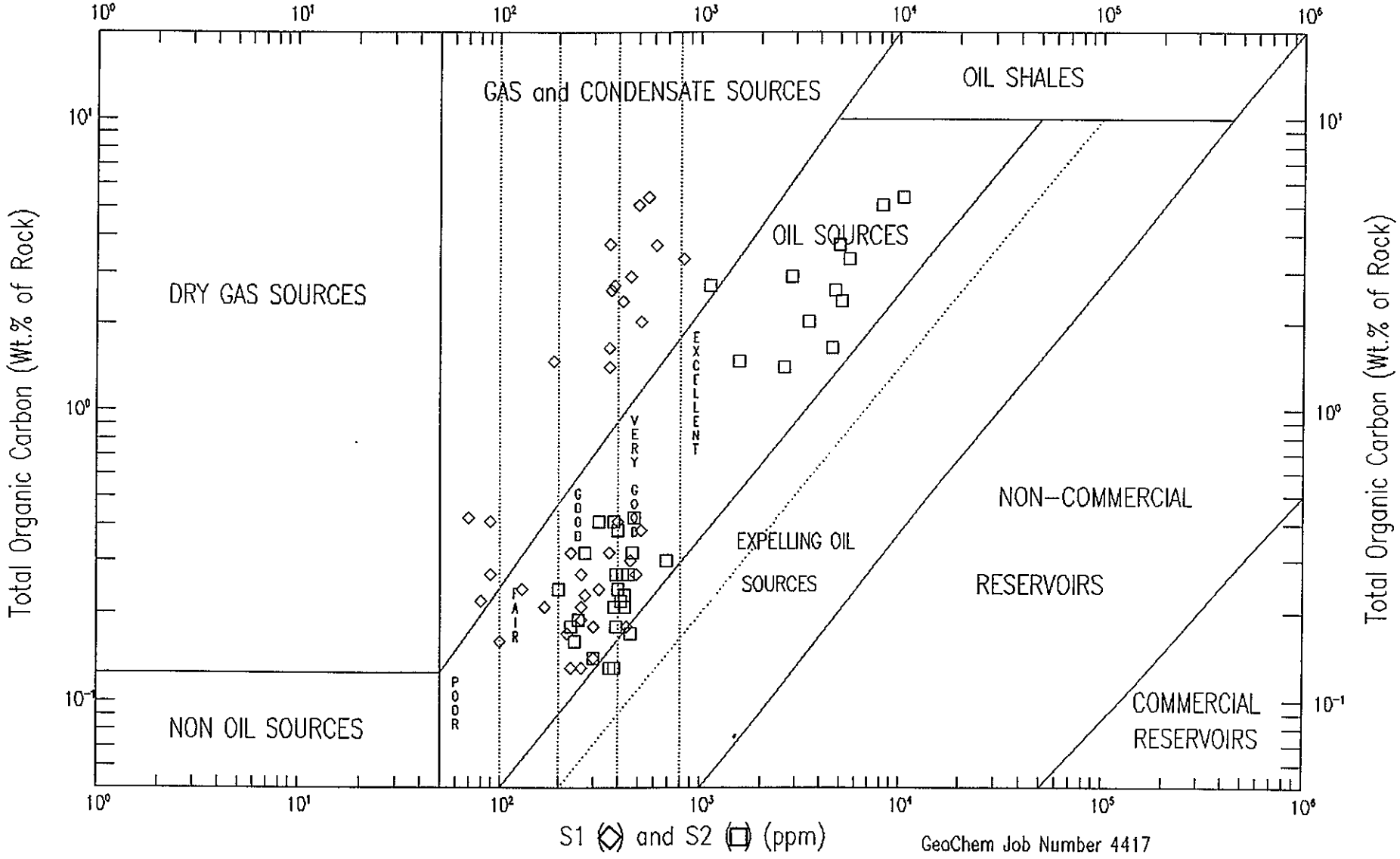


FIGURE 2-B
HYDROCARBON SOURCE RICHNESS - CARBONATES

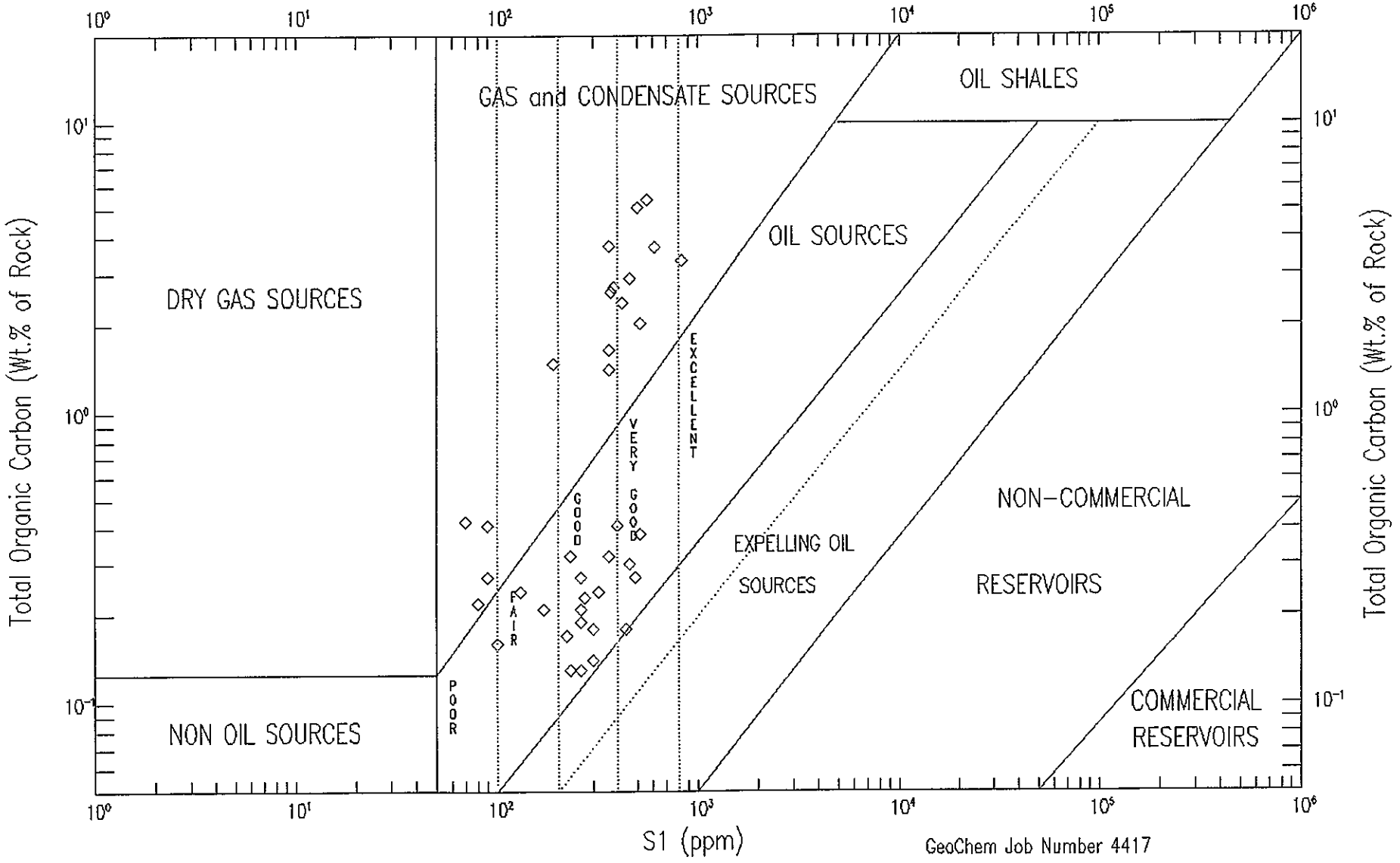


FIGURE 2-C
HYDROCARBON SOURCE RICHNESS - CARBONATES

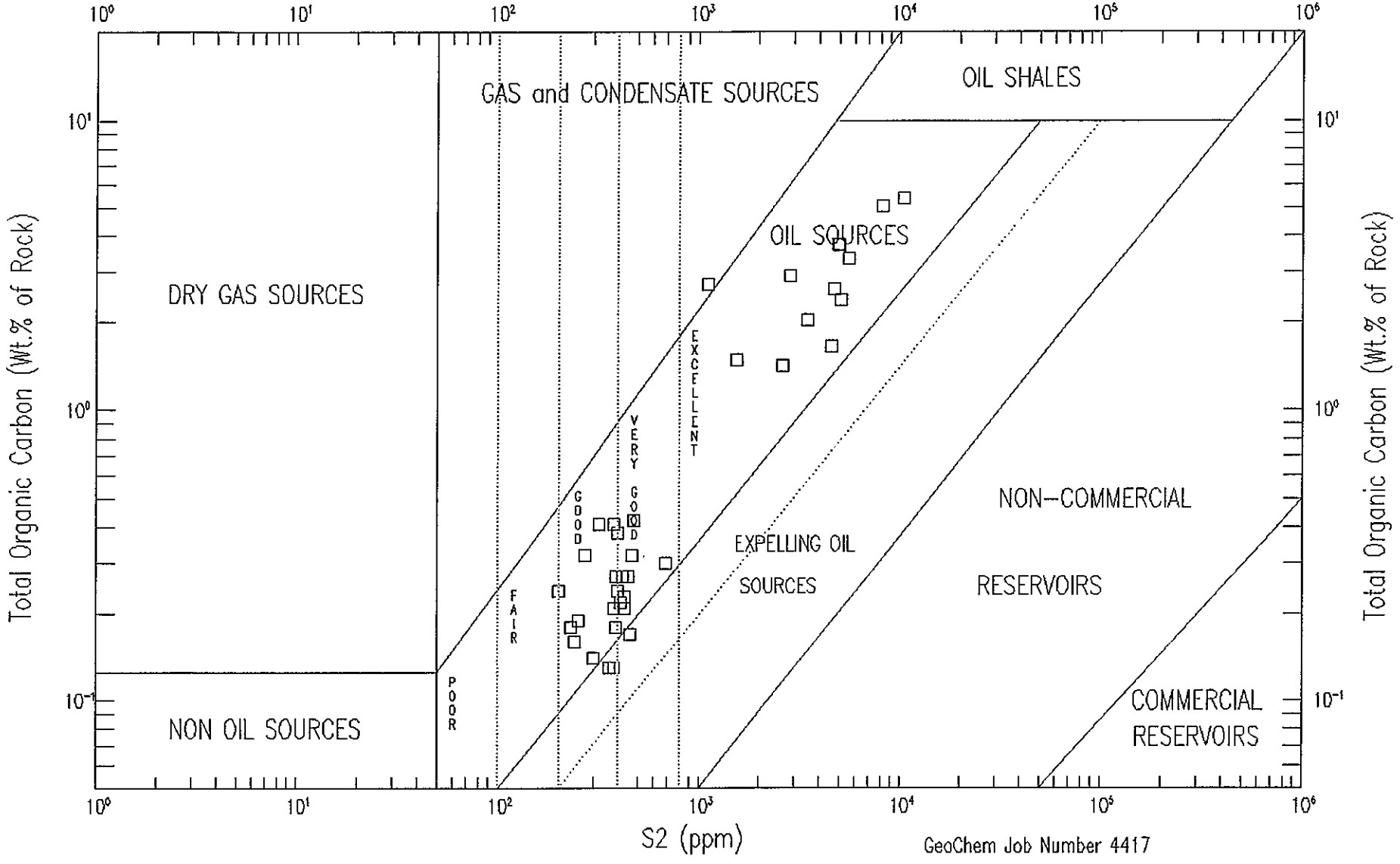


FIGURE 3-A
HYDROCARBON SOURCE RICHNESS - SHALES & MUDSTONES

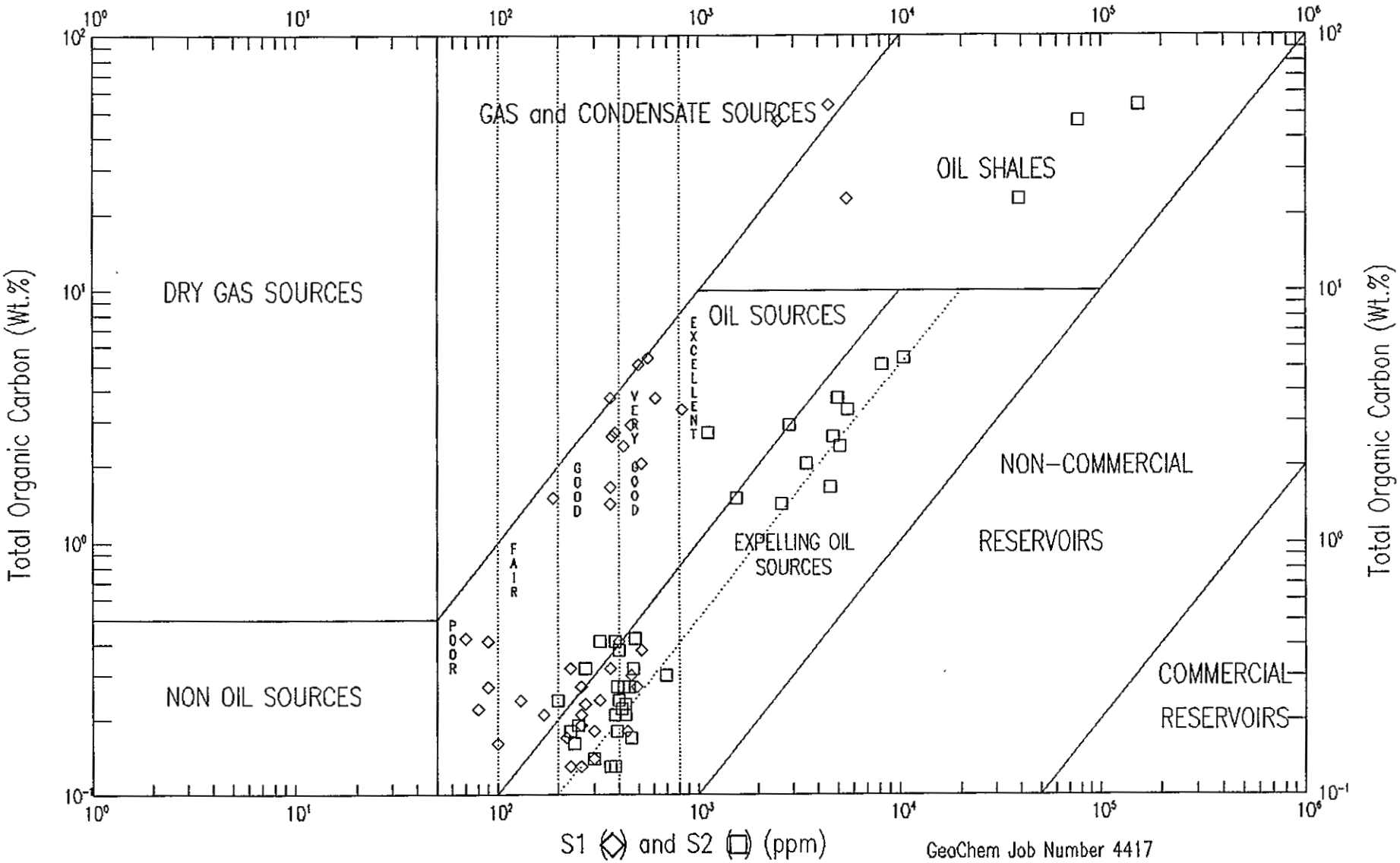


FIGURE 3–B
HYDROCARBON SOURCE RICHNESS – SHALES & MUDSTONES

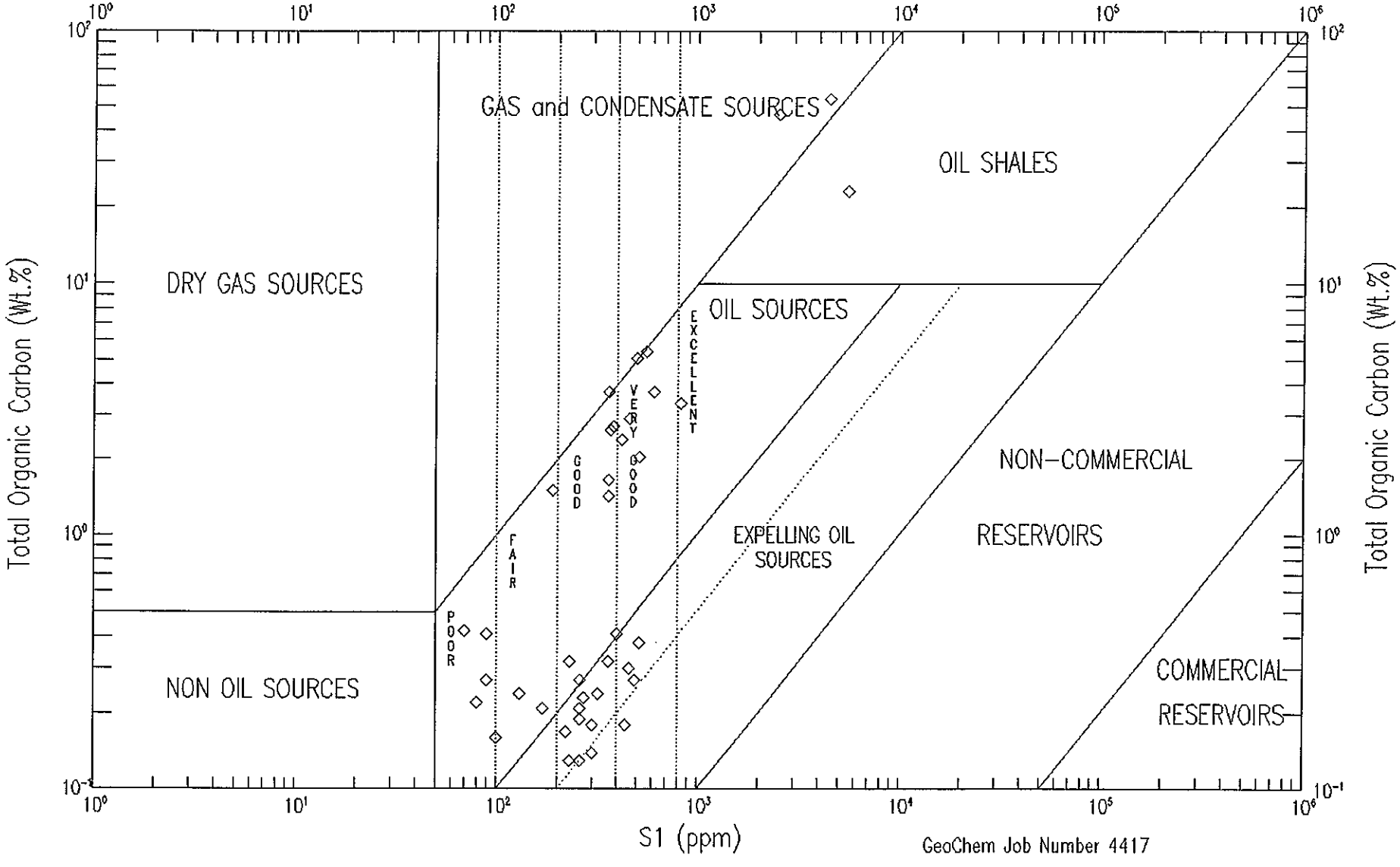


FIGURE 3-C
HYDROCARBON SOURCE RICHNESS - SHALES & MUDSTONES

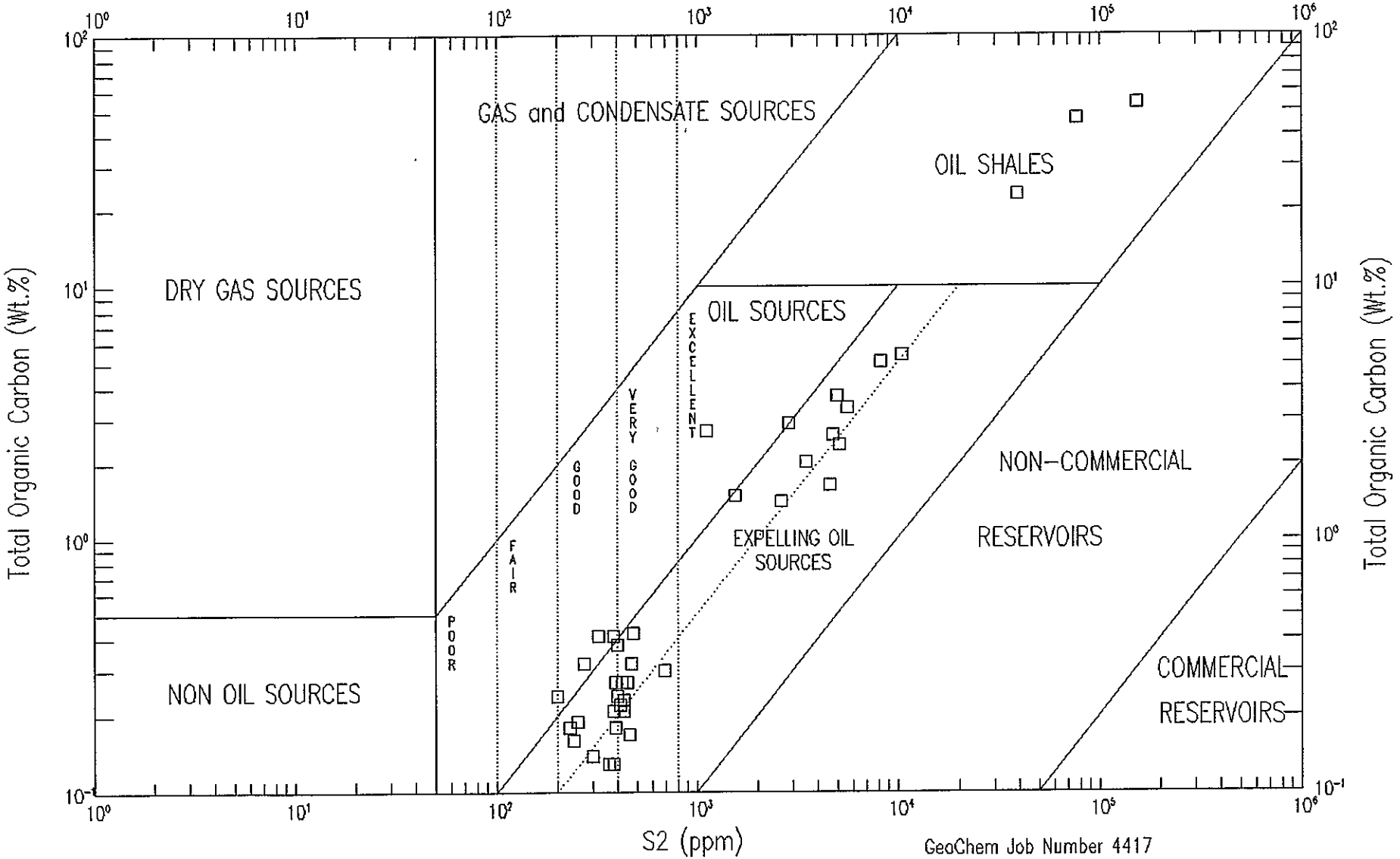


FIGURE 4: KEROGEN SUMMARY
GeoChem Job Number 4417

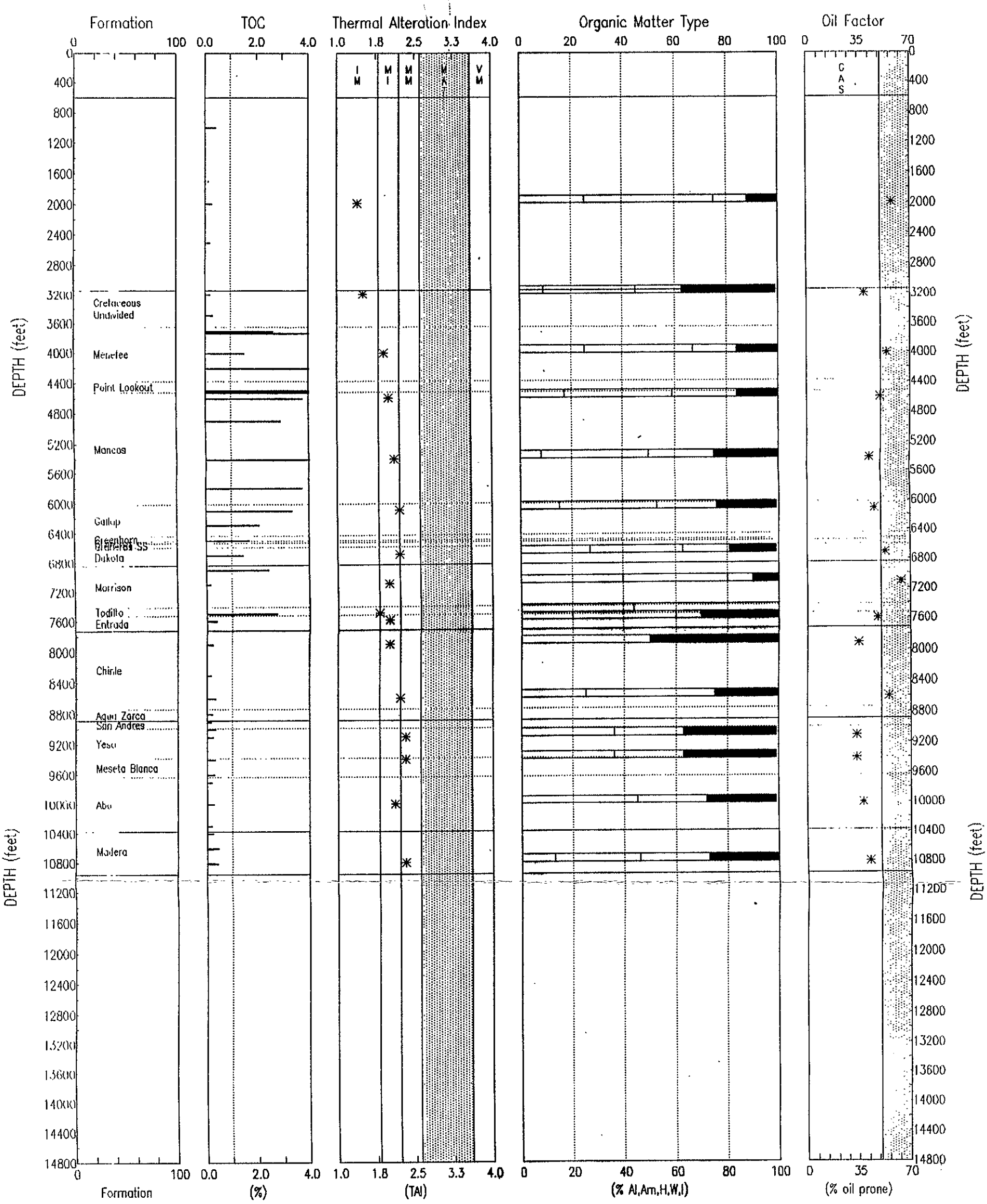


TABLE III - A

SUMMARY OF ORGANIC CARBON AND VISUAL KEROGEN DATA

GEOCHEM SAMPLE NUMBER	DEPTH (FEET)	TOTAL ORGANIC CARBON	ORGANIC MATTER TYPE	VISUAL ABUNDANCE NORMALIZED PERCENT					ALTERATION STAGE	THERMAL ALTERATION INDEX
				AL	AM	H	W	I		
4417-002	1990-2020	0.24	H;Am;W-I	0	25	50	13	13	1+	1.4
4417-004	3190-3220	0.18	H-I;W;Am	0	9	36	18	36	1+ to 2-	1.5
4417-007	4000-4010	1.49; 1.46R	H;Am;W-I	0	25	42	17	17	2- to 2	1.9
4417-010	4600-4610	3.73	H;W;Am-I	0	17	42	25	17	2- to 2	2.0
4417-012	5400-5410	5.08	H;W-I;Am	0	8	42	25	25	2- to 2	2.1
4417-014	6100-6110	3.34	H;W-I;Am	0	15	38	23	23	2	2.2
4417-017	6700-6710	1.42	H;Am;W-I	0	27	36	18	18	2	2.2
4417-019	7100-7110	0.14	Am-H;-;W-I	0	40	40	10	10	2- to 2	2.0
4417-020	7500-7510	2.70	H;Am;-	0	44	56	0	0	2-	1.8
4417-021	7600-7610	0.38	H;I;Am(W)	0	20	40	10	30	2- to 2	2.0
4417-022	7900-7910	0.21; 0.30R	H-I;-;-	0	0	50	0	50	2- to 2	2.0
4417-024	8600-8610	0.32	H;Am-I;-	0	25	50	0	25	2	2.2
4417-028	9100-9110	0.23	H-I;W;-	0	0	36	27	36	2 to 2+	2.3
4417-029	9400-9410	0.30	H-I;W;-	0	0	36	27	36	2 to 2+	2.3
4417-032	10000-10010	0.24	H;W-I;-	0	0	45	27	27	2- to 2	2.1
4417-036A	10800-10810	0.27	H;W-I;Am	0	13	33	27	27	2 to 2+	2.3

LEGEND:

KEROGEN KEY

Predominant;	Secondary;	Trace
60-100%	20-40%	0-20%

Al	=	Algal	W	=	Woody-Structured
Am	=	Amorphous-Sapropel	U	=	Unidentified Material
Am**	=	Relic Amorphous-Sapropel	I	=	Inertinite
H	=	Herbaceous-Spore/Pollen	C	=	Coaly
H*	=	Degraded Herbaceous			

FIGURE 5: GEOTHERMAL DIAGENESIS GeoChem Job Number 4417

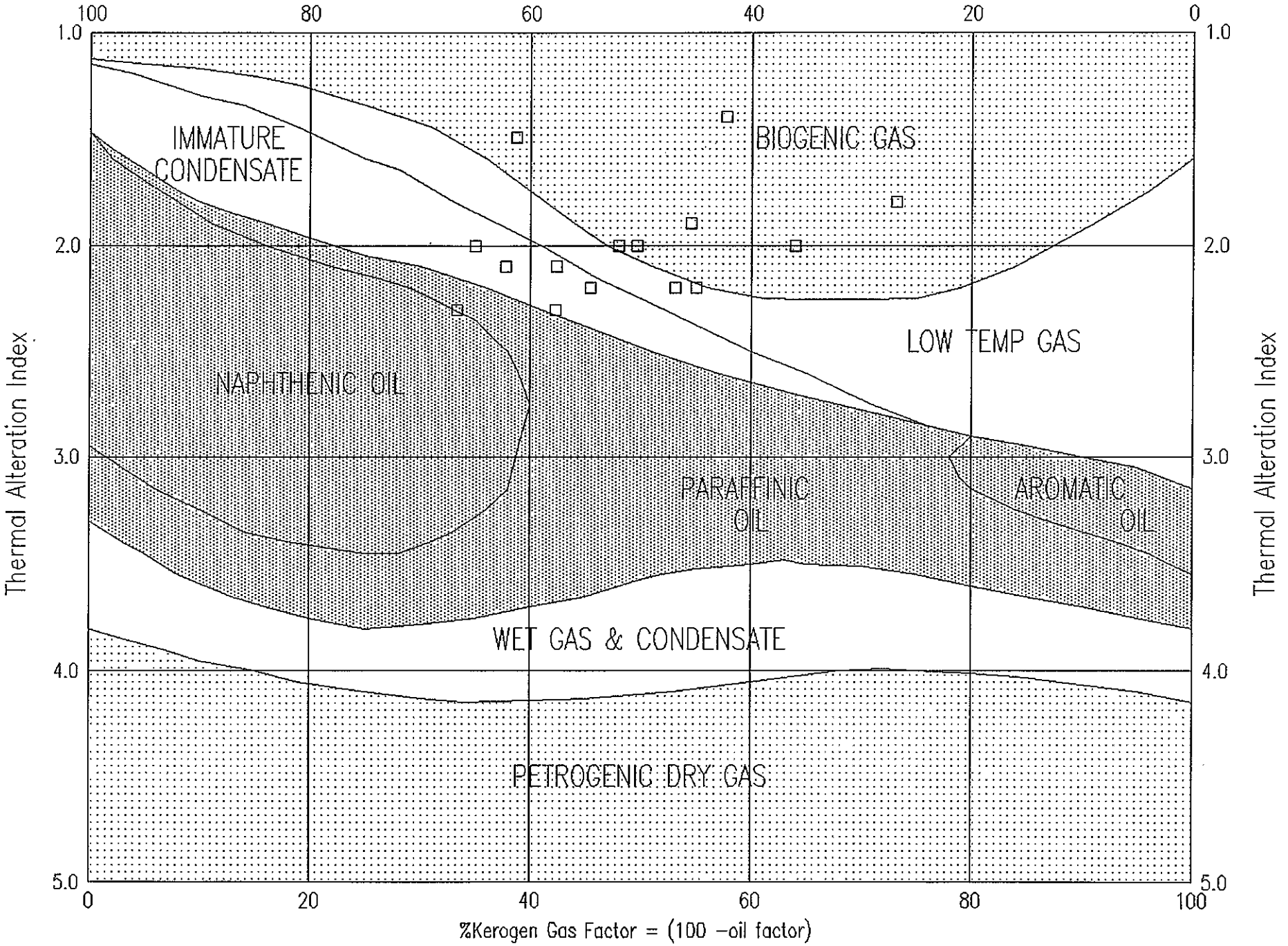
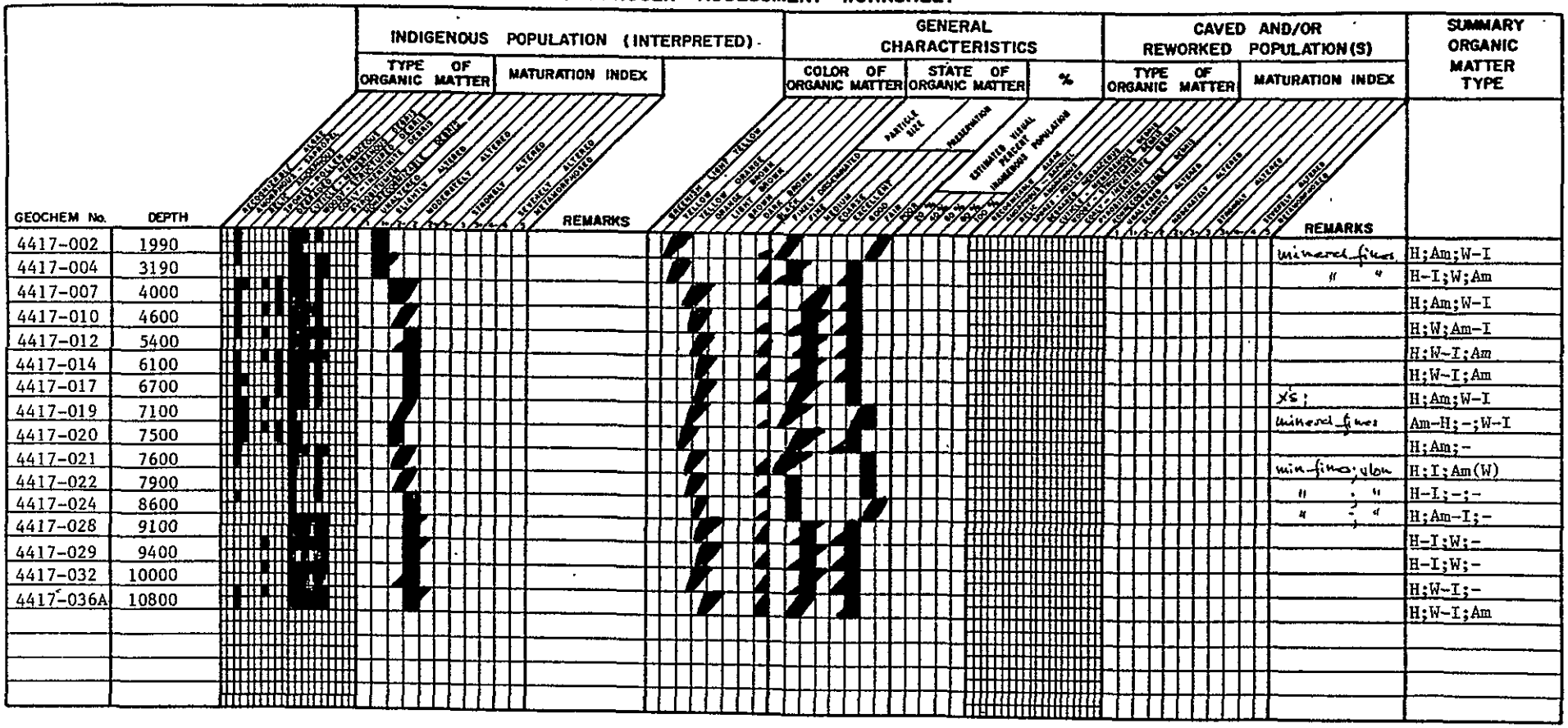


TABLE III-B

VISUAL KEROGEN ASSESSMENT WORKSHEET



GEOCHEM No.	DEPTH	INDIGENOUS POPULATION (INTERPRETED) - TYPE OF ORGANIC MATTER	INDIGENOUS POPULATION (INTERPRETED) - MATURATION INDEX	REMARKS	GENERAL CHARACTERISTICS - COLOR OF ORGANIC MATTER	GENERAL CHARACTERISTICS - STATE OF ORGANIC MATTER	GENERAL CHARACTERISTICS - %	CAVED AND/OR REWORKED POPULATION(S) - TYPE OF ORGANIC MATTER	CAVED AND/OR REWORKED POPULATION(S) - MATURATION INDEX	REMARKS	SUMMARY ORGANIC MATTER TYPE
4417-002	1990									mineral fines	H;Am;W-I
4417-004	3190									" "	H-I;W;Am
4417-007	4000										H;Am;W-I
4417-010	4600										H;W;Am-I
4417-012	5400										H;W-I;Am
4417-014	6100										H;W-I;Am
4417-017	6700									xs;	H;Am;W-I
4417-019	7100									mineral fines	Am-H;-;W-I
4417-020	7500										H;Am;-
4417-021	7600									min-fine;xlon	H;I;Am(W)
4417-022	7900									" ; "	H-I;-;-
4417-024	8600									" ; "	H;Am-I;-
4417-028	9100										H-I;W;-
4417-029	9400										H-I;W;-
4417-032	10000										H;W-I;-
4417-036A	10800										H;W-I;Am

TABLE IV

VITRINITE REFLECTANCE SUMMARY

GeoChem Sample Number	Depth (feet)	Type of Sample	Popu-lation	Number of Readings	Minimum Reflectance (%Ro)	Maximum Reflectance (%Ro)	Mean Reflectance (%Ro)	Std. Dev. (%Ro)	Maturity Rank
4417-007	4000-4010	CUTTINGS	1	43	0.43	0.58	0.50	0.034	MODERATELY IMMATURE TO MODERATELY MATURE
			2	2	1.09	1.12	1.11	0.015	MATURE
4417-010	4600-4610	CUTTINGS	1	45	0.49	0.69	0.60	0.049	MODERATELY IMMATURE TO MODERATELY MATURE
			2	5	1.28	1.34	1.31	0.021	MATURE
4417-012	5400-5410	CUTTINGS	1	42	0.49	0.60	0.55	0.022	MODERATELY IMMATURE TO MODERATELY MATURE
4417-014	6100-6110	CUTTINGS	1	46	0.44	0.55	0.49	0.028	MODERATELY IMMATURE
			2	5	1.19	1.24	1.21	0.017	MATURE
			3	5	1.58	1.64	1.61	0.025	MATURE TO VERY MATURE
4417-017	6700-6710	CUTTINGS	1	27	0.57	0.72	0.65	0.042	MODERATELY MATURE

TABLE IV

VITRINITE REFLECTANCE SUMMARY

GeoChem Sample Number	Depth (feet)	Type of Sample	Popu-lation	Number of Readings	Minimum Reflectance (%Ro)	Maximum Reflectance (%Ro)	Mean Reflectance (%Ro)	Std. Dev. (%Ro)	Maturity Rank
4417-020	7500-7510	CUTTINGS	1	11	0.65	0.73	0.69	0.025	MODERATELY MATURE
			2	16	0.82	0.95	0.89	0.030	MATURE
			3	6	1.32	1.36	1.35	0.014	MATURE
4417-036A	10800-10810	CUTTINGS	1	7	0.91	0.98	0.95	0.025	MATURE
			2	6	1.13	1.21	1.17	0.023	MATURE

VITRINITE REFLECTANCE HISTOGRAM

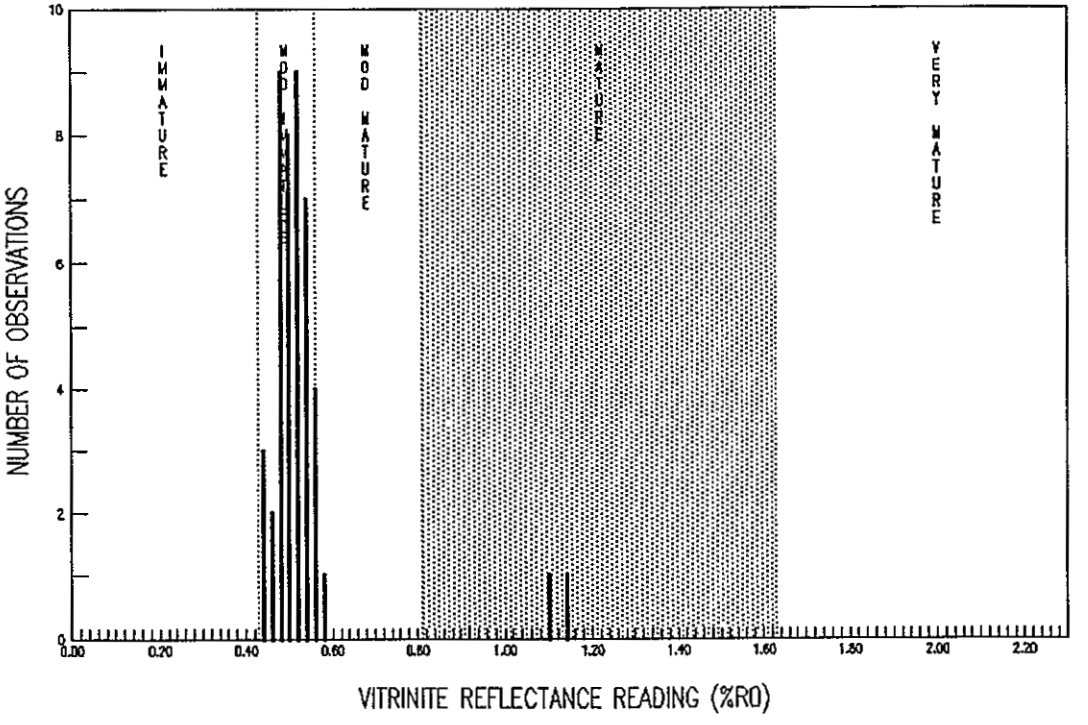
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-007
SAMPLE TYPE	CUTTINGS	CLIENT NO.	4000-4010 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS:

0.43	0.44	0.44	0.45	0.46	0.47	0.47	0.47	0.47	0.47	0.48	0.48	0.48	0.48
0.49	0.49	0.49	0.49	0.49	0.50	0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.52
0.52	0.53	0.53	0.53	0.53	0.53	0.54	0.54	0.55	0.55	0.55	0.56	0.58	1.09
1.12													

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	43	0.43	0.58	0.50	0.034	MODERATELY IMMATURE TO MODERATELY MATURE
2	2	1.09	1.12	1.11	0.015	MATURE

SAMPLE NO. 4417-007



VITRINITE REFLECTANCE HISTOGRAM

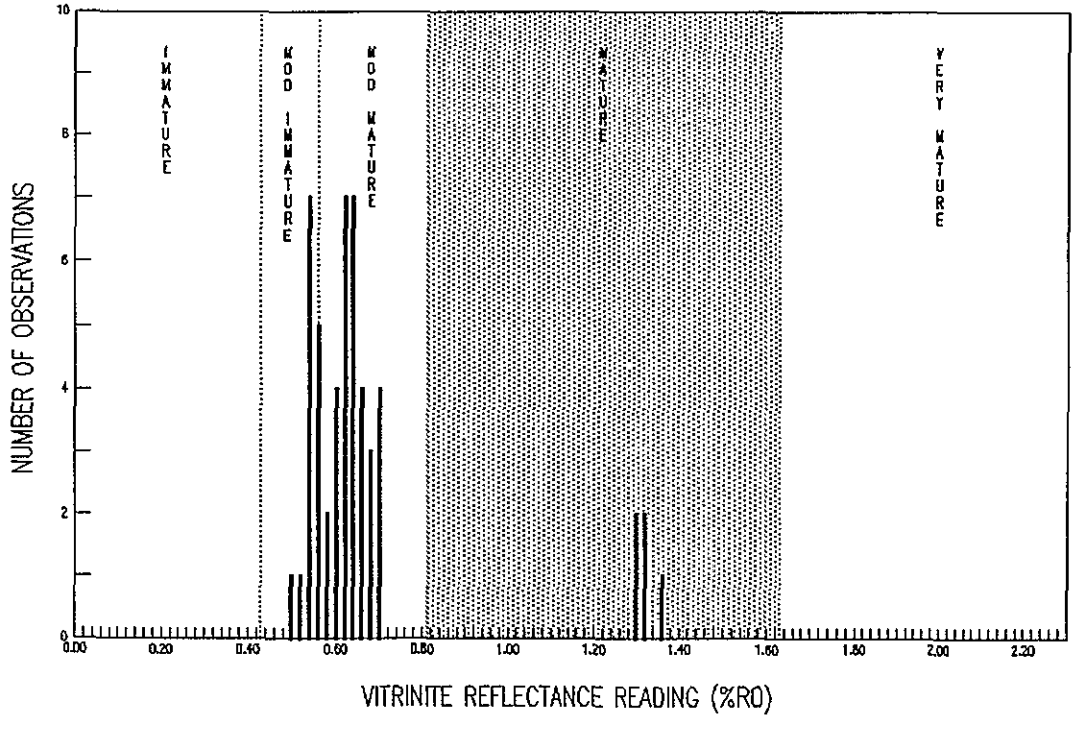
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-010
SAMPLE TYPE	CUTTINGS	CLIENT NO.	4600-4610 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS:

0.49	0.52	0.53	0.53	0.54	0.54	0.54	0.54	0.54	0.55	0.55	0.56	0.56		
0.56	0.58	0.58	0.59	0.59	0.59	0.59	0.60	0.60	0.60	0.60	0.60	0.61	0.61	0.62
0.62	0.62	0.62	0.62	0.63	0.63	0.64	0.64	0.64	0.65	0.66	0.66	0.67	0.68	0.68
0.68	0.69	1.28	1.29	1.31	1.31	1.34								

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	45	0.49	0.69	0.60	0.049	MODERATELY IMMATURE TO MODERATELY MATURE
2	5	1.28	1.34	1.31	0.021	MATURE

SAMPLE NO. 4417-010



VITRINITE REFLECTANCE HISTOGRAM

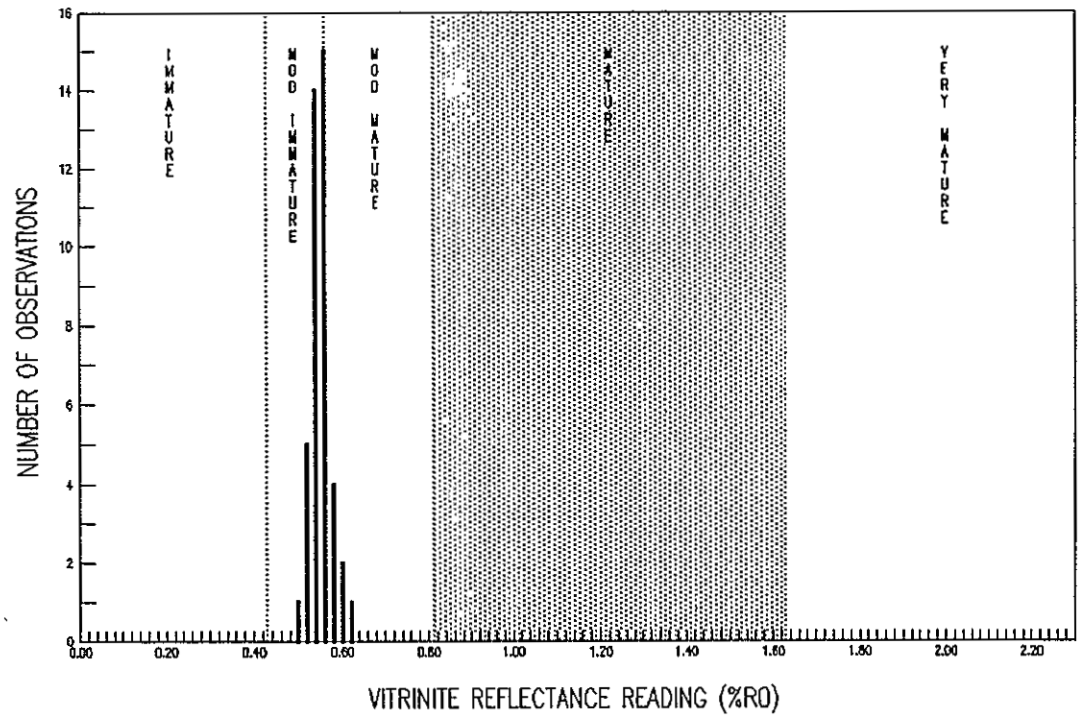
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-012
SAMPLE TYPE	CUTTINGS	CLIENT NO.	5400-5410 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS:

		0.49	0.51	0.51	0.52	0.52	0.52	0.53	0.53	0.53	0.53	0.53	0.54	0.54
0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
0.55	0.56	0.56	0.56	0.56	0.56	0.56	0.57	0.57	0.57	0.58	0.59	0.59	0.60	

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	42	0.49	0.60	0.55	0.022	MODERATELY IMMATURE TO MODERATELY MATURE

SAMPLE NO. 4417-012



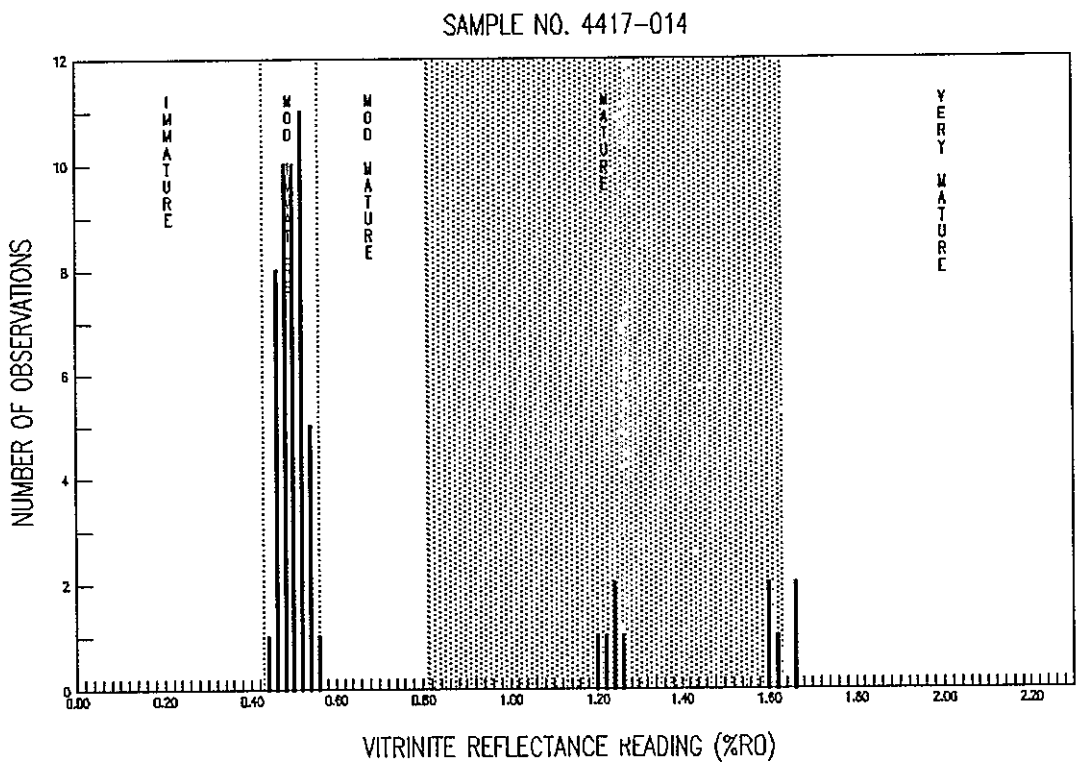
VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-014
SAMPLE TYPE	CUTTINGS	CLIENT NO.	6100-6110 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS:

		0.44	0.45	0.45	0.45	0.46	0.46	0.46	0.46	0.46	0.47	0.47	0.47	0.48
0.48	0.48	0.48	0.48	0.48	0.48	0.49	0.49	0.49	0.49	0.50	0.50	0.50	0.50	0.50
0.50	0.51	0.51	0.51	0.51	0.51	0.51	0.52	0.52	0.52	0.52	0.52	0.53	0.53	0.54
0.54	0.54	0.55	1.19	1.20	1.22	1.22	1.24	1.58	1.59	1.61	1.64	1.64		

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	46	0.44	0.55	0.49	0.028	MODERATELY IMMATURE
2	5	1.19	1.24	1.21	0.017	MATURE
3	5	1.58	1.64	1.61	0.025	MATURE TO VERY MATURE



VITRINITE REFLECTANCE HISTOGRAM

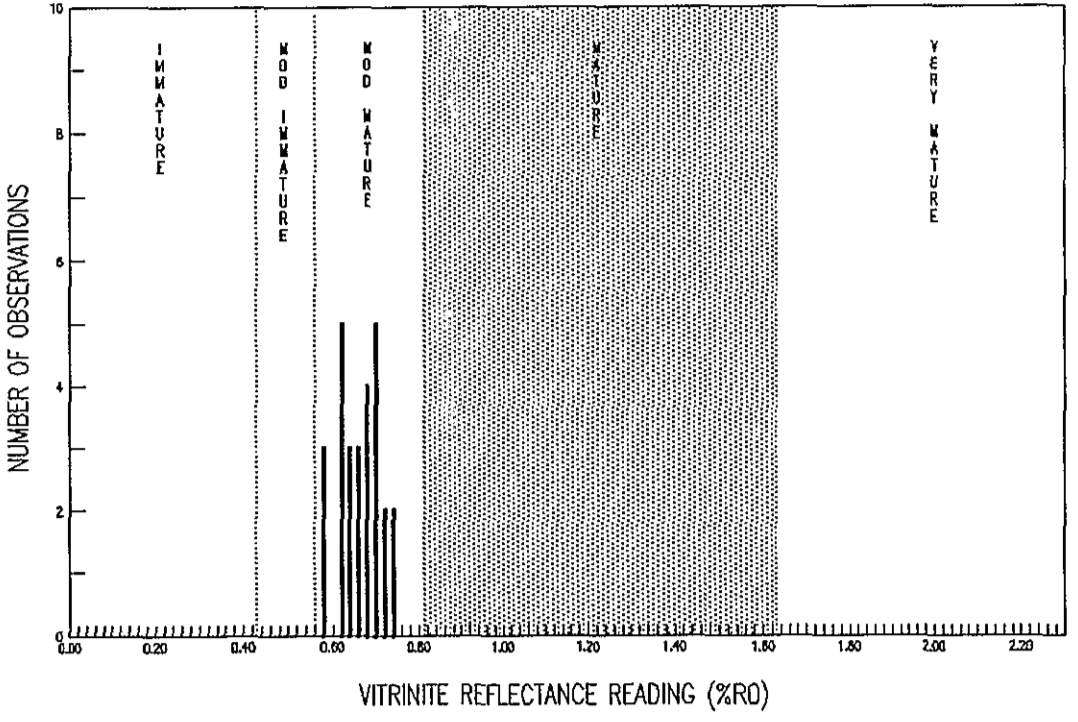
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-017
SAMPLE TYPE	CUTTINGS	CLIENT NO.	6700-6710 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS:

0.64	0.66	0.57 0.66	0.58 0.66	0.58 0.67	0.60 0.68	0.61 0.68	0.61 0.68	0.61 0.68	0.61 0.69	0.62 0.70	0.63 0.70	0.63 0.72	0.64 0.72	0.64

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	27	0.57	0.72	0.65	0.042	MODERATELY MATURE

SAMPLE NO. 4417-017



VITRINITE REFLECTANCE HISTOGRAM

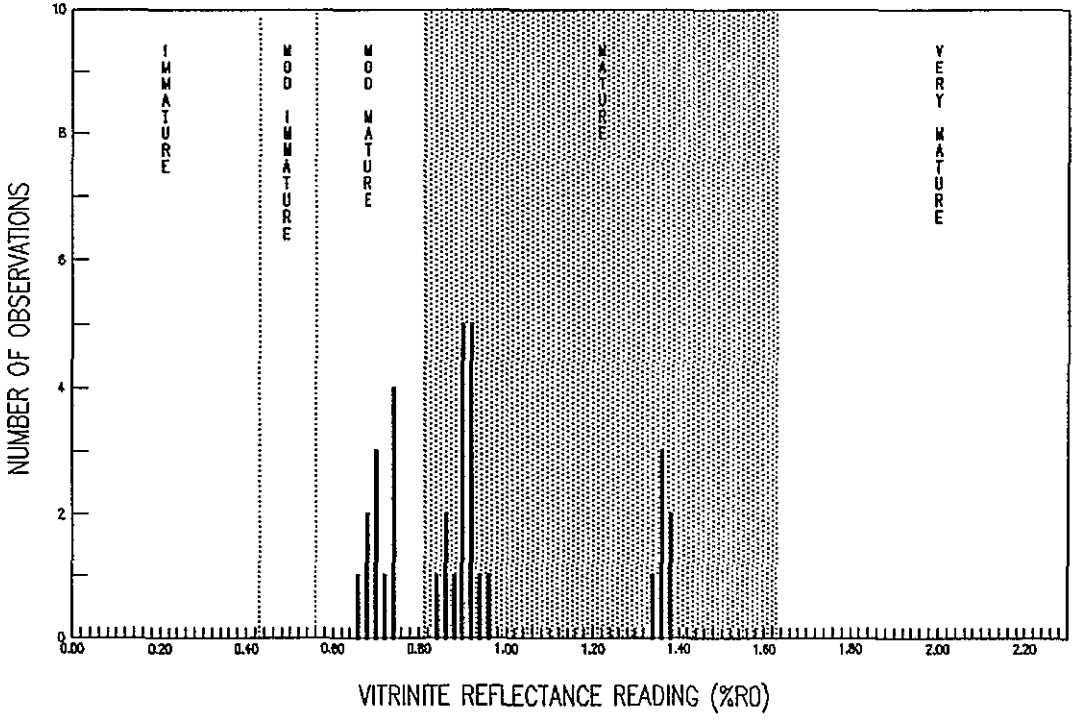
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-020
SAMPLE TYPE	CUTTINGS	CLIENT NO.	7500-7510 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS:

0.65 0.67 0.67 0.68 0.69 0.69 0.70 0.72 0.72 0.72 0.73 0.82 0.85
0.85 0.87 0.88 0.88 0.88 0.88 0.89 0.90 0.90 0.90 0.90 0.91 0.92 0.95 1.32
1.34 1.34 1.35 1.36 1.36

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	11	0.65	0.73	0.69	0.025	MODERATELY MATURE
2	16	0.82	0.95	0.89	0.030	MATURE
3	6	1.32	1.36	1.35	0.014	MATURE

SAMPLE NO. 4417-020

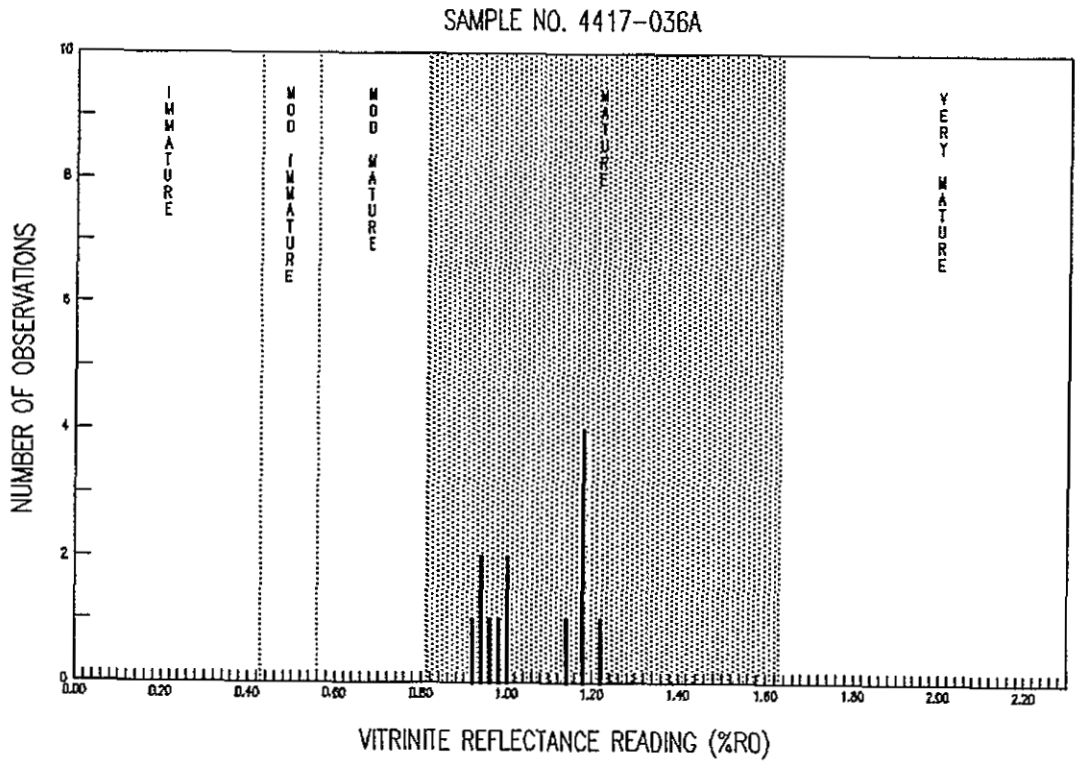


VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4417-036A
SAMPLE TYPE	CUTTINGS	CLIENT NO.	10800-10810 FEET
LOCATION	SHELL OIL CO., #1 SANTA FE WELL	DATE	SEPTEMBER 29, 1998

READINGS: 0.91 0.93 0.93 0.94 0.96 0.98 0.98 1.13 1.16 1.17 1.17 1.17 1.21

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	7	0.91	0.98	0.95	0.025	MATURE
2	6	1.13	1.21	1.17	0.023	MATURE



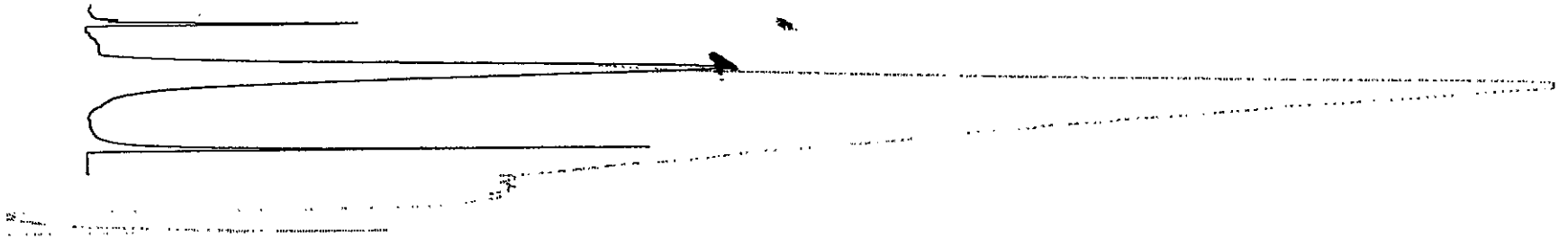
APPENDIX I

Rock-Eval Pyrograms

DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

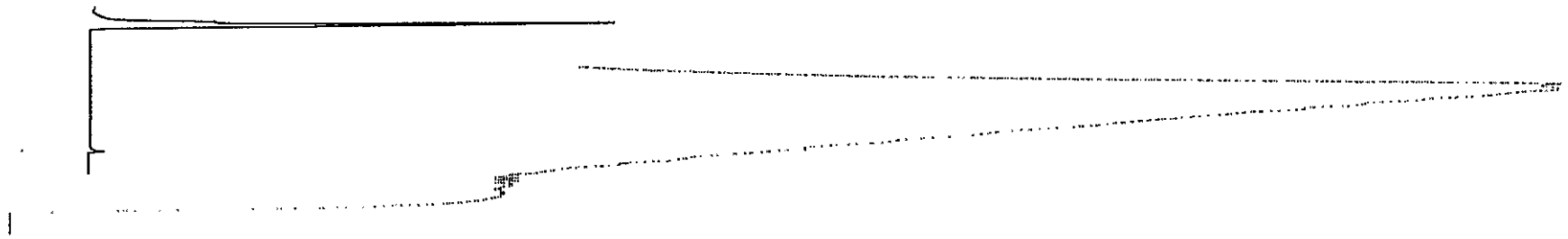
	DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
STANDARD	1	100.0	429	0.41	3.24	0.86	0.11	3.76	0.30	2.89	112	29



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

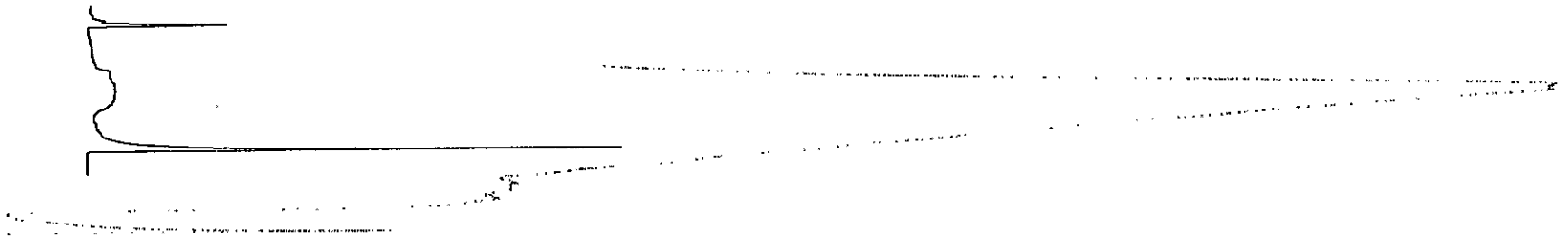
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

	DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
BLANK	1	100.0	320	0.00	0.00	2.50	0.00	0.00	0.00	1.00	0	250



INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

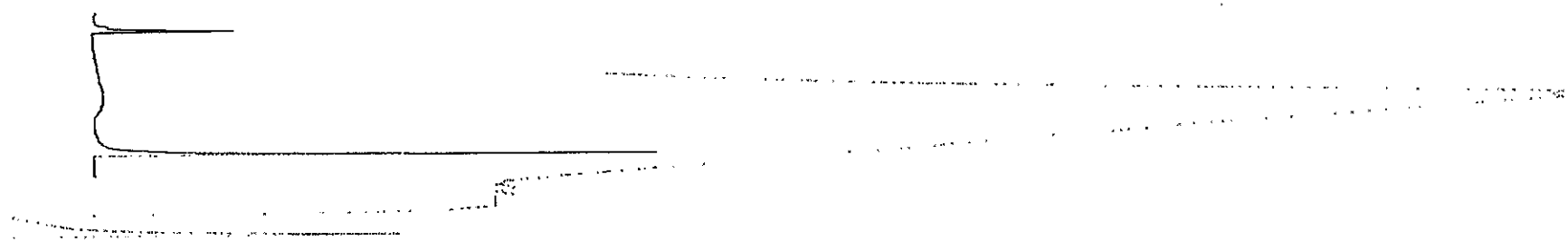
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
417-003	93.8	351	0.44	0.39	0.40	0.54	0.97	0.06	0.18	216	222



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

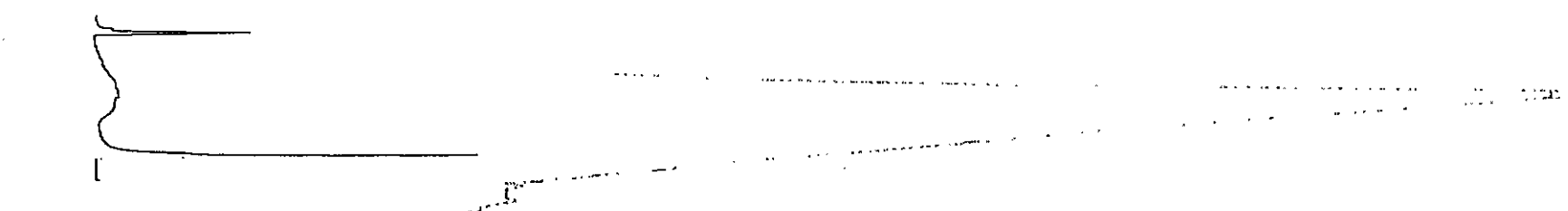
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
417-002	92.9	347	0.32	0.20	0.39	0.62	0.51	0.04	0.24	83	162



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

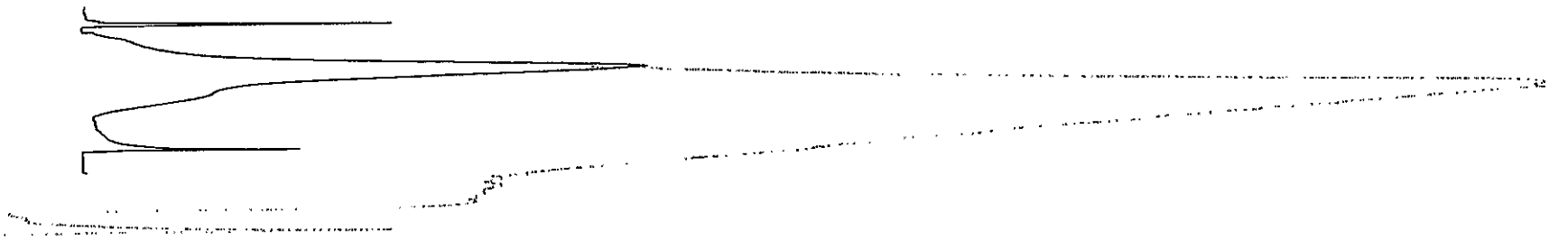
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
417-001	88.4	361	0.40	0.38	0.56	0.51	0.71	0.06	0.41	92	129



INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

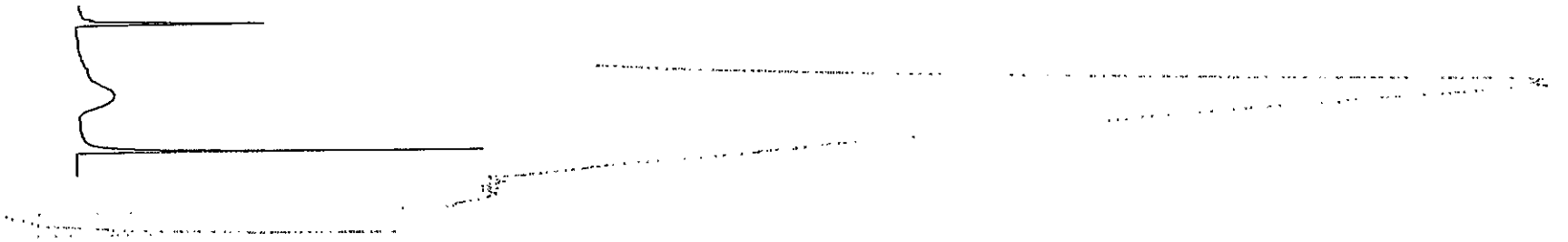
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4447-006A	81.6	439	0.37	4.77	1.09	0.07	4.37	0.42	2.61	182	41



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

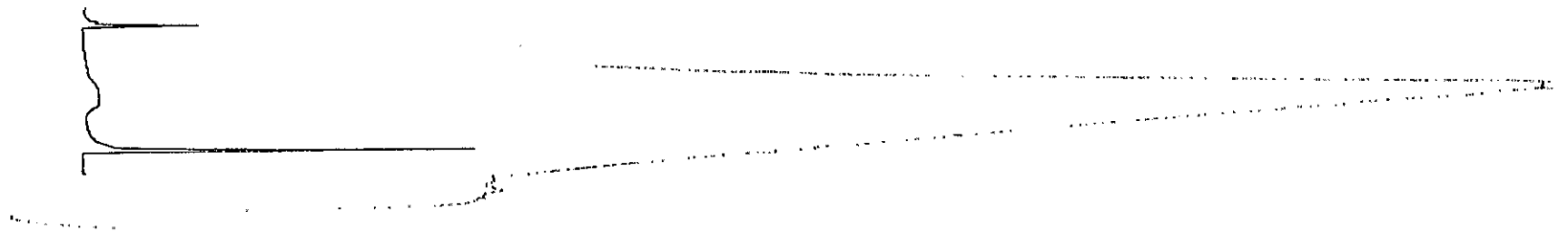
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4447-005	42.1	339	0.26	0.39	0.60	0.41	0.65	0.05	0.27	144	222



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

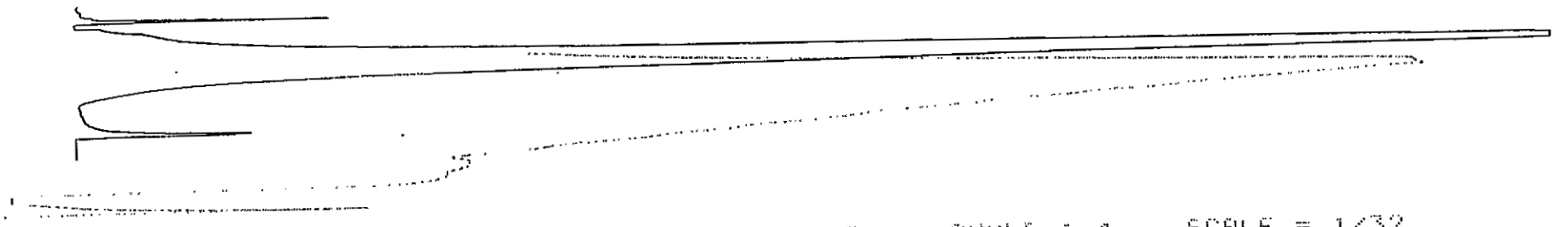
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4447-004	98.7	335	0.30	0.23	0.35	0.58	0.65	0.04	0.18	127	194



INIT TEMP = 50 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

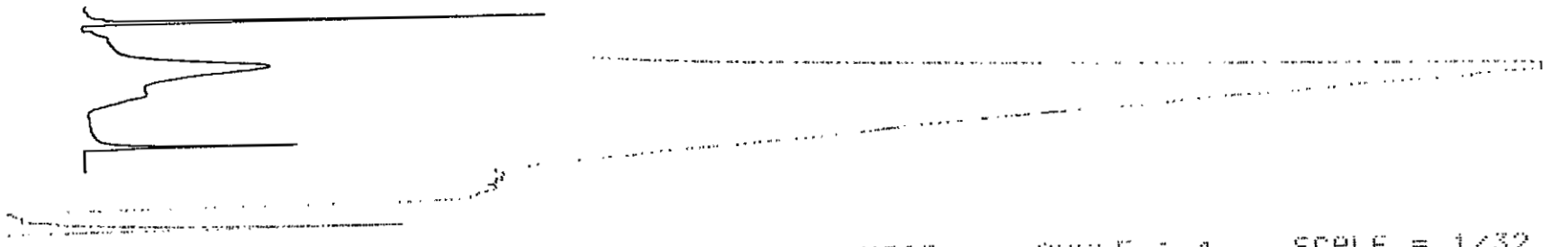
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-008	6.7	430	4.47	152.83	12.38	0.03	12.34	13.10	53.34	286	23



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

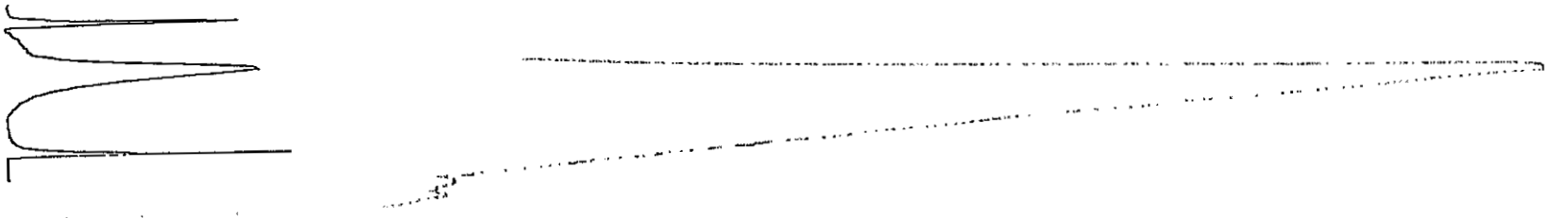
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-007	99.9	433	0.19	1.55	1.37	0.11	1.13	0.14	1.49	104	91



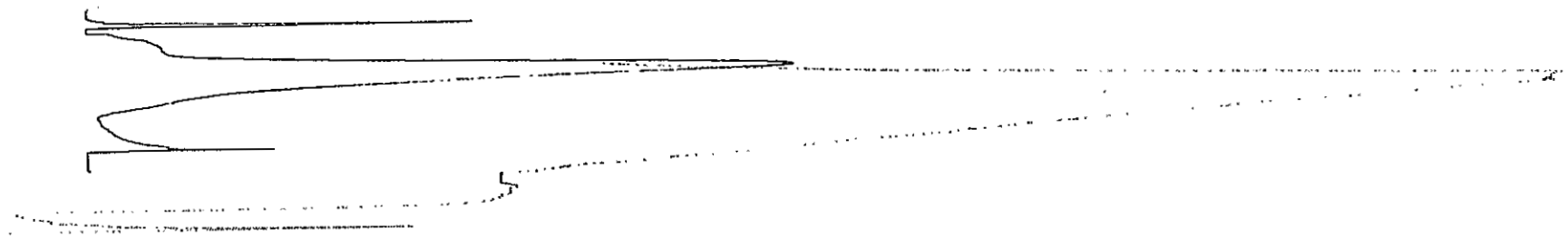
DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-006B	3.8	434	5.52	38.94	25.52	0.12	1.52	3.70	23.17	168	110



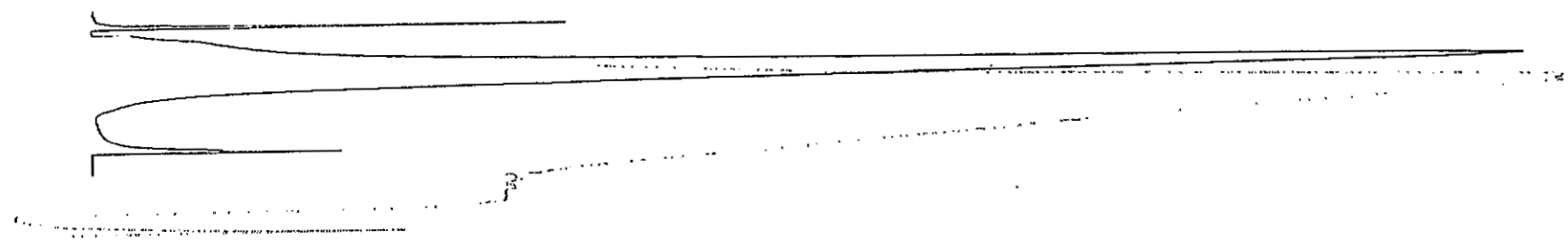
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-010	96.9	429	0.36	4.97	1.09	0.07	4.55	0.44	3.73	133	29



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

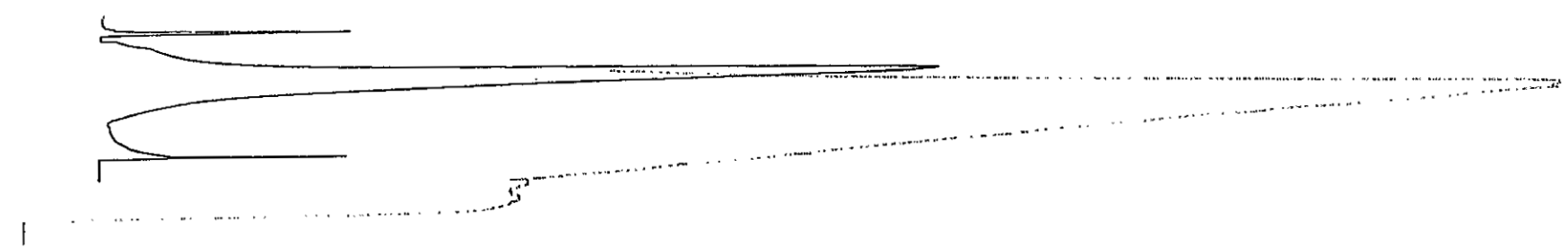
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-009B	11.5	428	2.52	77.21	11.73	0.03	6.58	6.64	46.59	165	25



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

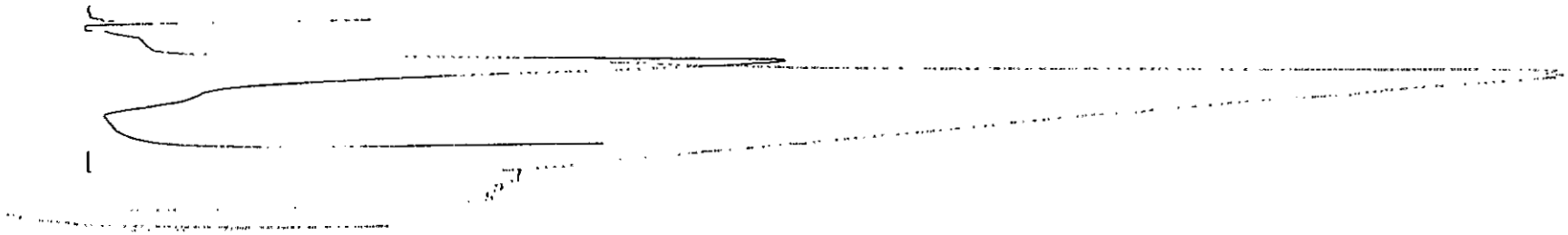
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-009A	48.1	433	0.56	10.43	1.45	0.05	7.19	0.91	5.40	193	26



INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

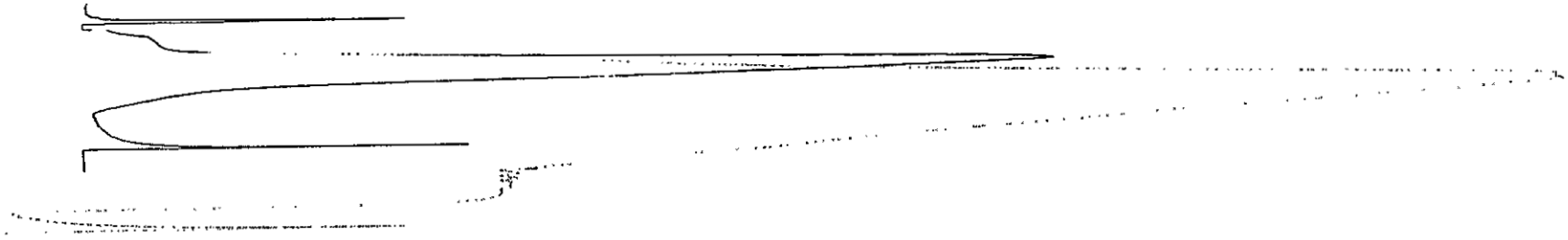
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4447-013	95.9	430	0.61	5.00	0.85	0.11	5.88	0.46	3.71	134	22



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

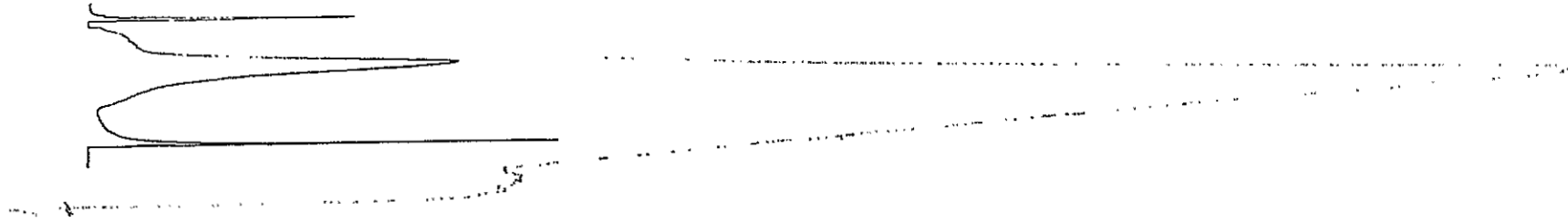
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4447-012	78.0	428	0.50	8.21	1.17	0.06	7.01	0.72	5.08	161	23



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

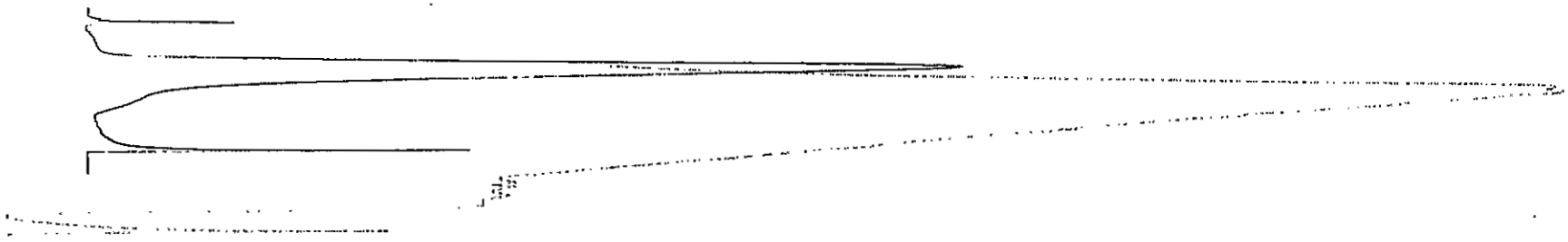
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4447-011	84.7	433	0.46	2.86	0.87	0.14	3.28	0.27	2.90	98	30



INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

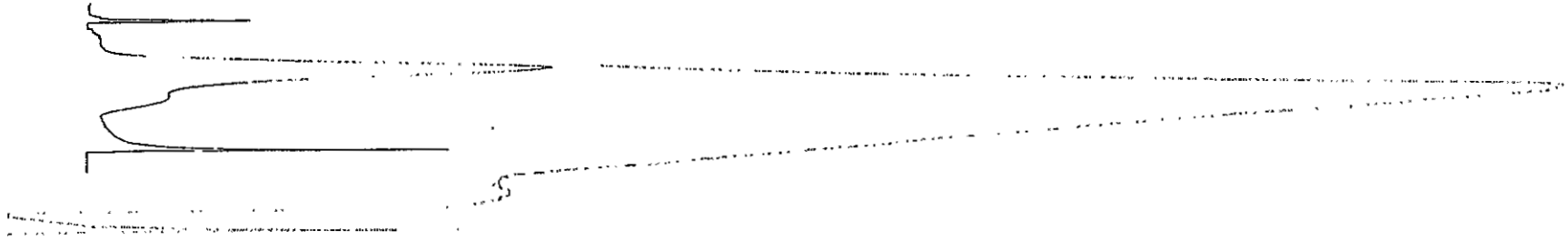
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-016	93.1	431	0.36	4.58	0.39	0.07	11.74	0.41	1.65	277	23



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

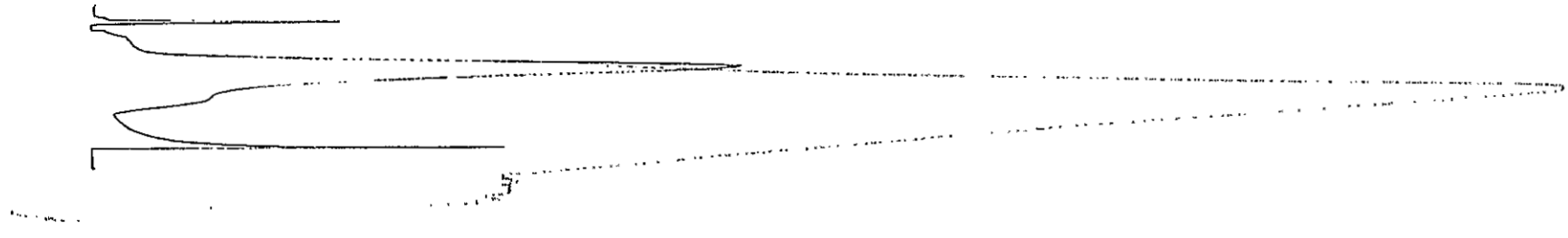
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-015	81.9	432	0.52	3.50	0.50	0.13	7.00	0.33	2.04	171	24



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

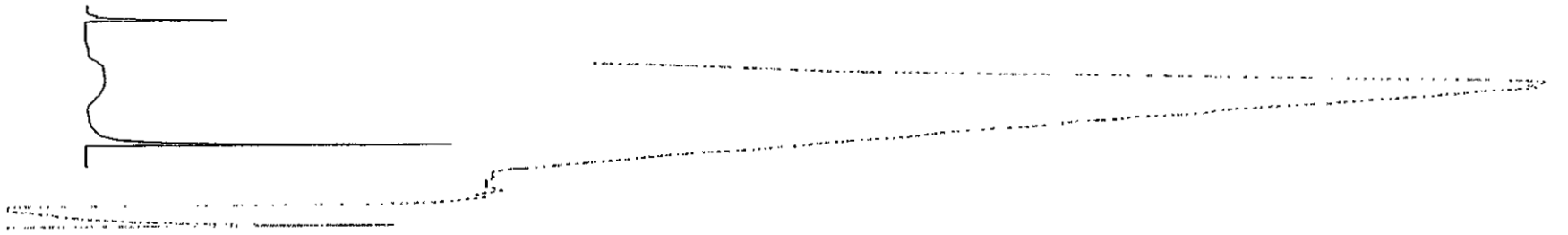
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-014	77.7	432	0.83	5.62	0.88	0.13	6.38	0.53	3.34	168	26



INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

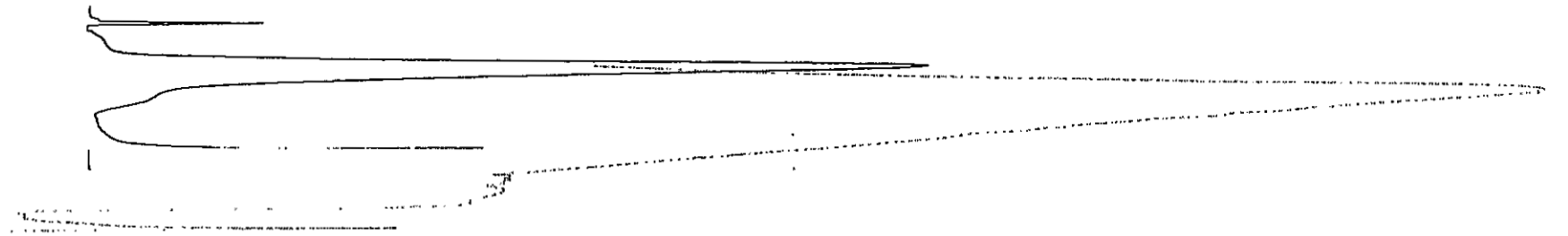
DEPTH	QTY	TMAX	S 1	S 2	S 3	P 1	S2/S3	P C	TOC	H I	O I
4417-019	92.6	364	0.30	0.30	0.38	0.50	0.78	0.05	0.14	214	271



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P 1	S2/S3	P C	TOC	H I	O I
4417-018	85.5	433	0.42	5.14	0.53	0.08	9.69	0.46	2.40	214	22



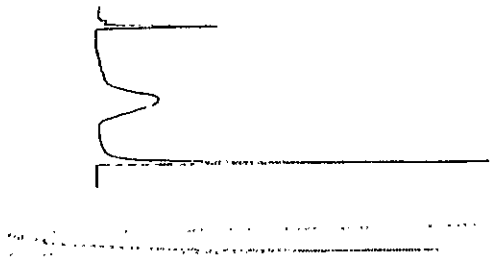
DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P 1	S2/S3	P C	TOC	H I	O I
4417-017	89.5	433	0.36	2.63	0.40	0.12	6.57	0.24	1.42	185	28

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

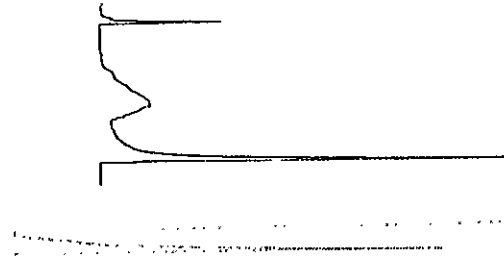
DEPTH	QTY	TMAX	S 1	S 2	S 3	P 1	S2/S3	P C	TOC	H I	O I
4417-022	94.2	353	0.26	0.43	0.27	0.38	1.59	0.05	0.21	204	128



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

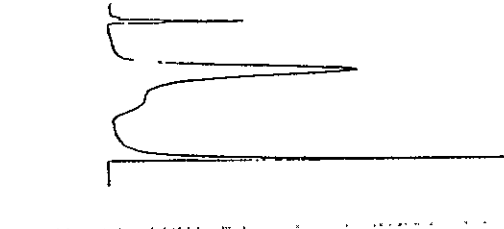
DEPTH	QTY	TMAX	S 1	S 2	S 3	P 1	S2/S3	P C	TOC	H I	O I
4417-021	96.4	422	0.52	0.40	0.24	0.57	1.66	0.07	0.38	105	63



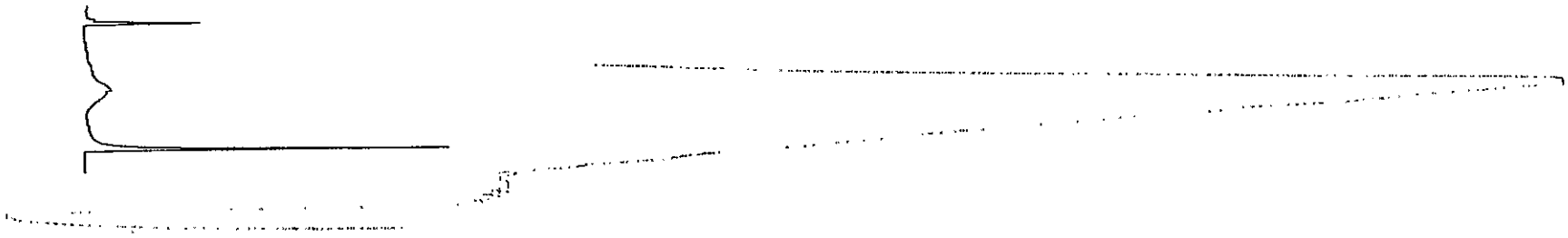
DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P 1	S2/S3	P C	TOC	H I	O I
4417-020	98.7	440	0.38	1.12	0.29	0.25	3.86	0.12	2.70	41	11



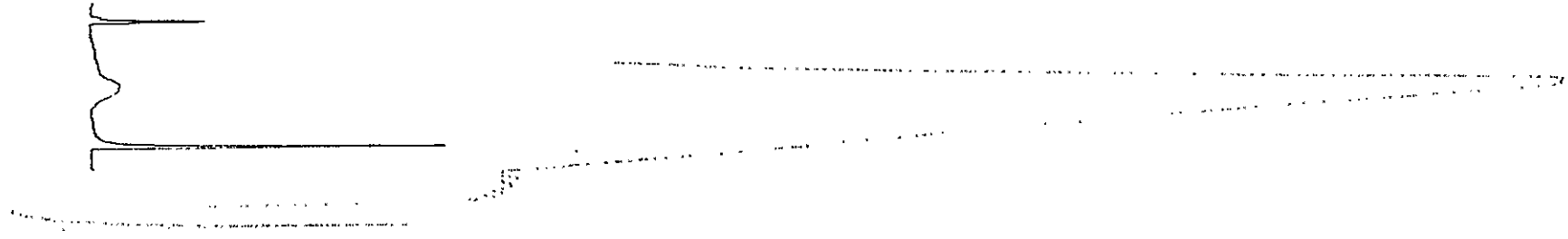
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-025	93.9	351	0.26	0.25	0.27	0.52	0.92	0.04	0.19	131	142



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

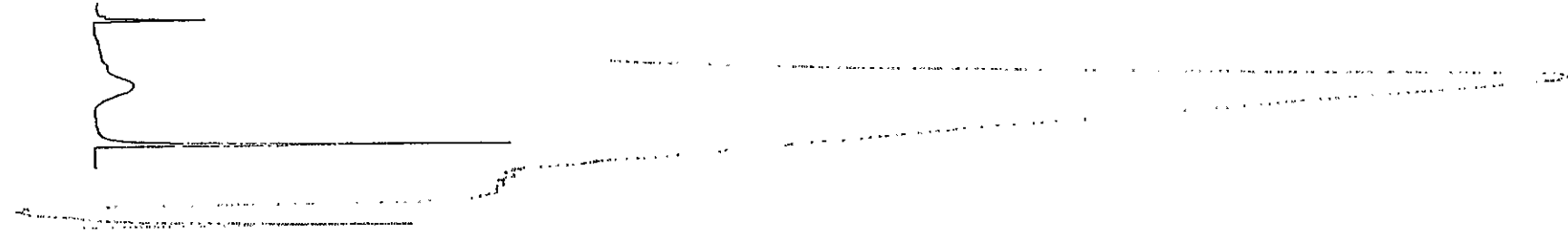
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-024	100.5	359	0.23	0.27	0.24	0.46	1.12	0.04	0.32	84	75



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

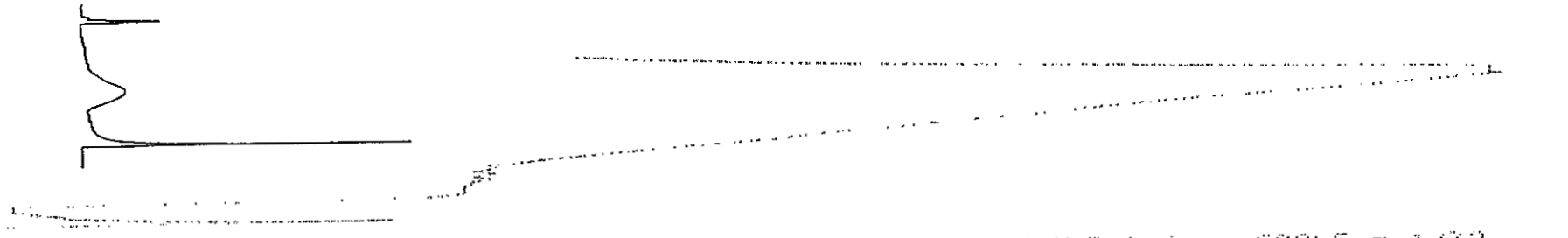
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-023	100.0	357	0.26	0.36	0.28	0.42	1.28	0.05	0.13	276	215



INIT TEMP = 250 ISO TIME = 0 TEMP GRADIENT=25

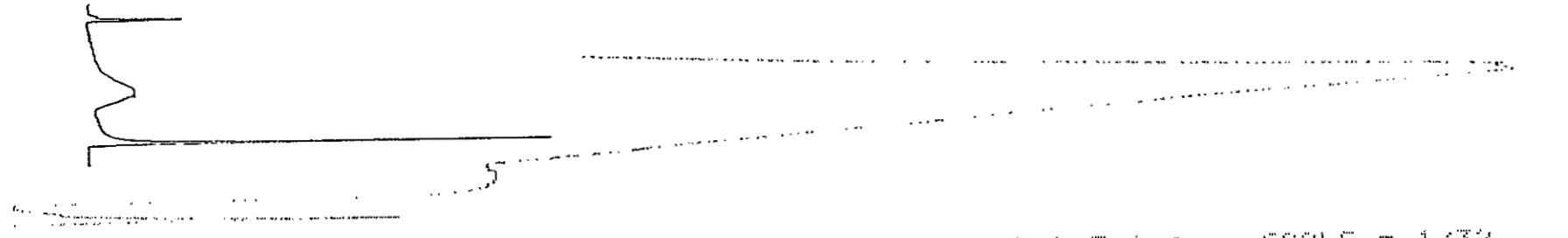
DEPTH	QTY	MAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-028	96.4	334	0.27	0.43	0.16	0.39	2.68	0.05	0.23	186	69



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

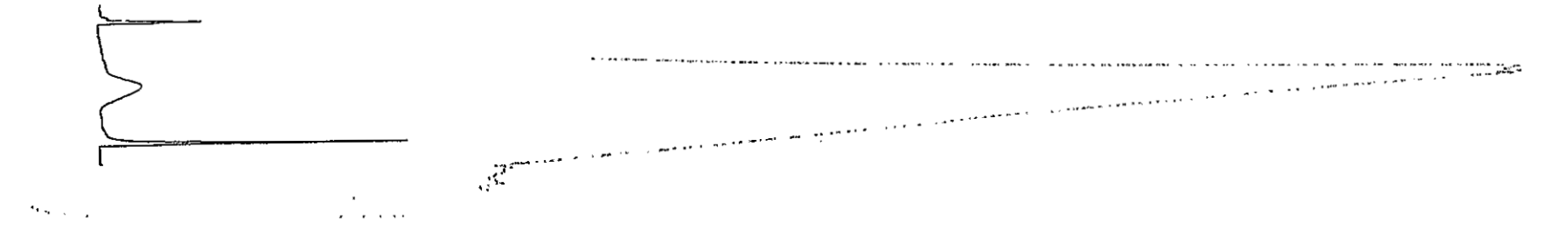
DEPTH	QTY	MAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-027	98.1	331	0.36	0.47	0.21	0.44	2.23	0.06	0.32	146	65



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

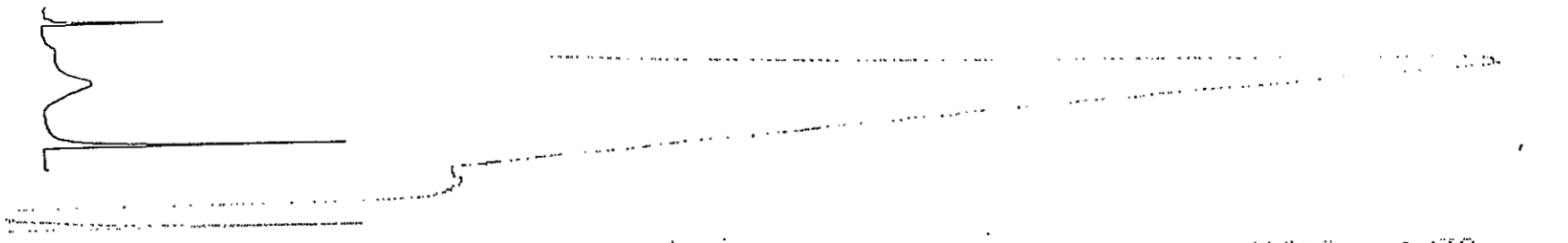
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	MAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-026	95.4	356	0.23	0.38	0.28	0.38	1.35	0.05	0.13	292	215



INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

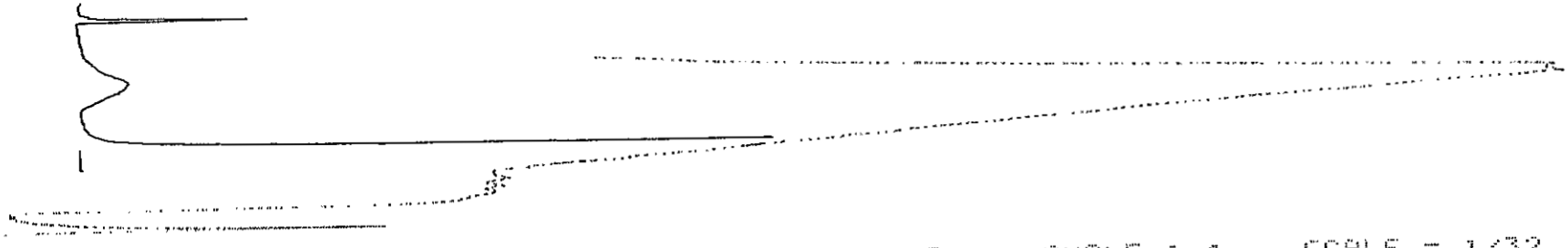
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-031	100.7	372	0.22	0.46	0.29	0.32	1.58	0.05	0.17	270	170



DATE: 09-10-98 CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

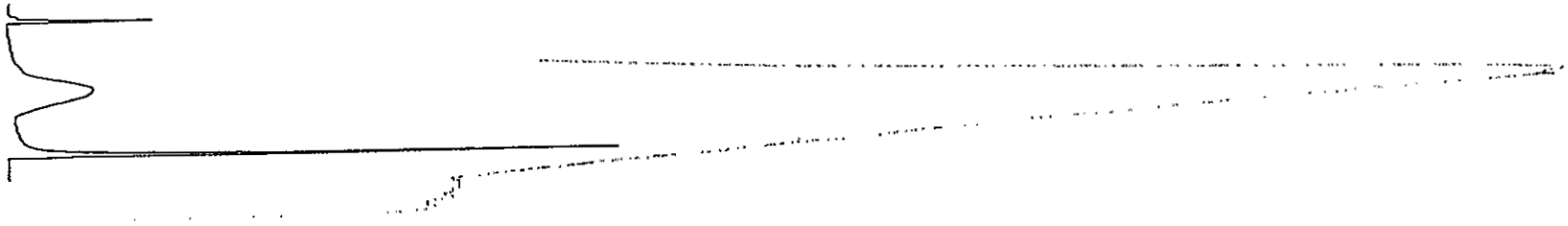
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-030	101.1	365	0.49	0.45	0.42	0.52	1.07	0.07	0.27	166	155



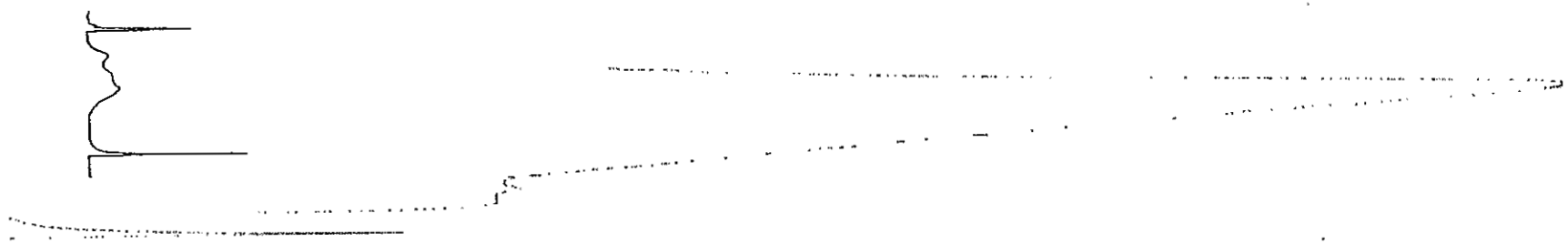
DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-029	94.5	358	0.46	0.69	0.34	0.40	2.02	0.09	0.30	230	113



DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-034	97.2	380	0.08	0.41	0.21	0.17	1.95	0.04	0.22	186	95



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

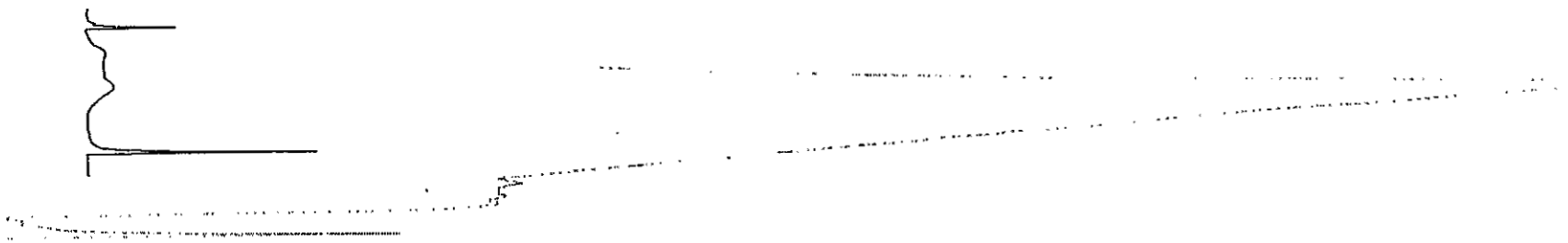
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-033	98.3	378	0.10	0.24	0.22	0.29	1.09	0.02	0.16	150	137

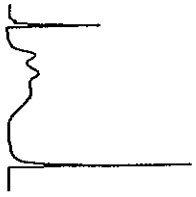
DATE: 09-10-98 CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-032	94.1	374	0.13	0.40	0.17	0.25	2.35	0.04	0.24	166	70



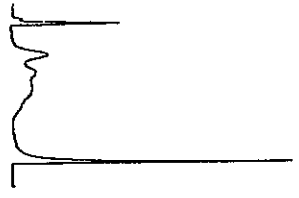
:DEPT.	QTY	:TMAX:	S 1	: S 2	: S 3	: P [redacted]	:S2/S3	: P C	: TOC	: H I	: O I [redacted]
4417-036A	95.0:	453:	0.09:	0.42:	0.17:	0.18:	2.47:	0.04:	0.27:	155 :	62 :



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

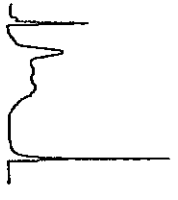
:DEPTH:	QTY	:TMAX:	S 1	: S 2	: S 3	: P 1	:S2/S3	: P C	: TOC	: H I	: O I
4417-035B	95.0:	503:	0.17:	0.38:	0.22:	0.31:	1.72:	0.04:	0.21:	180 :	104 :



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

:DEPTH:	QTY	:TMAX:	S 1	: S 2	: S 3	: P I	:S2/S3	: P C	: TOC	: H I	: O I
4417-035:A	95.6:	505:	0.07:	0.48:	0.15:	0.13:	3.20:	0.04:	0.42:	114 :	35 :



DATE: 09-10-98 ANALYSIS CYCLE : 4 SCALE = 1/32

INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP SURF T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4417-0368	100.1	436	0.09	0.32	0.22	0.22	1.45	0.03	0.41	78	53