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Hydrocarbon source facies character of sediments penetrated by the

Shell Oil Company, No. 1 Isleta Central well, Valencia County, New Mexico (Spot NW NW Sec. 7; T7N; R2E)

Prepared for
Burlington Resources
Farmington, New Mexico

1998

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(Spot NW NW Sec. 7; T7N; R2E)

Prepared for:
BURLINGTON RESOURCES
Ms. Nanis Wallace

By:
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Geoffrey S. Bayliss

GEOCHEM JOB NUMBER 4416

September, 1998

BURLINGTON RESOURCES

Shell Oil Company
#1 Isleta Central Well
Valencia County, New Mexico
Sec. 7; T7N; R2E
GeoChem Job Number 4416

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INTRODUCTION

This report documents the findings of a basic geochemical Hydrocarbon Source Rock Characterization Study, carried out on a suite of dried well cuttings collected over the gross well interval, 500± feet to 16,350 feet T.D. in the Shell Oil Company, No. 1 Isleta Central Well, Valencia County, New Mexico, (Spot NW NW Sec. 7; T7N; R2E).

On August 19, 1998, GeoChem received from the New Mexico sample storage center at Socorro, six (6) boxes of samples containing dried well cuttings samples in small brown envelopes collected at ten (10±) foot intervals from 500± feet to 16,350 feet T.D.

In addition, GeoChem was provided with a full well log from the American Stratigraphic Company (AMSTRAT) which presented information of formation tops, porosity types, Gamma Ray and Bore Hole Compensated Sonic log data, a detailed sediment litho percent log and a supporting litho description text. This well was assigned the GeoChem Job Number 4416 with each of the samples selected further identified by a suffix -001 through -053 in order of increasing depth.

The work task designated for this well was authorized by Ms. Nanis Wallace, Burlington Resources, Farmington, New Mexico, and was to closely follow the program outlined by GeoChem in its budgetary-recommendation letter of August 6, 1998.

This program called for the selection/compositing and picking/cleanup of approximately fifty (50) cuttings samples from this well.

Upon starting the sample selection however, it was noted that the six (6) boxes of samples only covered the well section 500± feet to 13,160± feet with the section 13,160± feet to 16,350 feet T.D. missing. A check with Socorro indicated that the samples were not at their storage facility but since the AMSTRAT litho log was to T.D., quite clearly the full well profile had in fact been sampled.

Subsequently, Ms. Wallace located the missing samples at the U. S. Geologic Library in Denver (as part of the AMSTRAT sample donation made to the USGS) and obtained permission for sampling and analysis. Mr. Randy Laney was contracted to take a total of thirty-one (31) thirty (30) foot composite samples from this well between 13,160± feet and 16,350 feet T.D. These samples were of excellent quality.

Using the AMSTRAT litholog information and our visual examination of the sample materials from this well, a total of fifty-three (53) sieved cuttings samples, approximately 2-4 grams, were selected for the geochemical analyses required for this study.

The cuttings samples were sieved to retain the 20 mesh and greater allowing the fines to pan through. Each sample was then closely examined under a binocular scope as well as visually without magnification and high graded by the removal of iron (magnet) and reverse picking of extraneous mud additive materials. The samples were also air blown in order to remove mica prior to grinding to pass through 200 mesh.

The analytical program planned for this well involved measurement of Total Organic Carbon (TOC) content, Rock-Eval (R-E) pyrolysis, Visual Kerogen assessment of Organic Matter Type (OMT) and Thermal Alteration Index (TAI) and Vitrinite Reflectance %Ro determination.

RESULTS AND DISCUSSION

RESULTS

A. Geologic Zonation

The formation top information used for this well was that taken from the AMSTRAT litho percent well log and is reproduced herein in Summary Table I. In addition this stratigraphic zonation has been integrated into both the Data Tables and the Data Figures for convenient reference purposes.

B. Hydrocarbon Source Character of Sediments

The hydrocarbon source data is compiled in its entirety in Summary Table II for the minimum, maximum and average values measured for each stratigraphic interval. These data reflect TOC, R-E (S_1, S_2, S_3, HI, OI), Visual Kerogen Alteration (TAI) and %Ro Vitrinite Reflectance.

In addition, the organic carbon values (wt.%), sample identification and sample depth information are presented in Table I. The Rock-Eval (R-E) pyrolysis data are presented in Table II-A (mgm/gram) and in Table II-B (ppm $^{wt}/_{wt}$). Both these data sets have also been graphically presented in well profile format in Figures 1-A and 1-B and on GeoChem's Hydrocarbon Source Richness Diagrams, Figures 2-A, 2-B, 2-C, 3-A, 3-B, 3-C.

The Rock-Eval (R-E) pyrograms are reproduced in Appendix I.

Based on the TOC and R-E data, twenty-four (24) samples were selected for Visual Kerogen Assessment of Organic Matter Type (OMT) and Thermal Alteration Index (TAI) measurement. These data are summarized in Tables III-A and III-B and have been presented in well profile format in Figure 4 and in GeoChem's Organic Facies Diagram, Figure 5.

From this kerogen suite, a total of ten (10) samples were chosen for vitrinite %Ro reflectance measurement. These data are summarized in Summary Table II and Table IV with the population histograms appended immediately behind the summary information.

DISCUSSION

The format style of this report is to graphically present the data on well format figures such that one can readily assess the various analytically determined hydrocarbon richness and thermal maturity values for each of the stratigraphic units penetrated by the Shell Oil Company, No. 1 Isleta Central Well.

Quaternary and Tertiary Sediments (500± to 11,604± feet)

In Summary Table I and Figures 1-A, 1-B, the sample profiling for the Quaternary and Tertiary sediments was essentially selected in order to establish an overview of the possible hydrocarbon source character and, in particular, the thermal maturity levels for these upper sediments.

These sections were predominantly composed of sands, silts, interfingered light gray claystones, igneous rock fragments and gray and red shale stringers.

Surprisingly, although the total organic carbon (TOC) values were overall low (average 0.25 and 0.18 respectively; Summary Table II) the S_1 volatile hydrocarbon and S_2 generatable hydrocarbon values were quite good (S_1, average 690 ppm and 361 ppm; S_2, average 718 ppm and 725 ppm). The Hydrogen Index (HI) values were also quite high (HI, average 293 and 407; OI, average 246 and 222 respectively).

These data suggest either a fairly good hydrocarbon source character for these sediments or reflect that these sediments have been infused by migrated out-of-place oil liquids and possibly associated gas.

The fact that the contained kerogen reflects only a moderately immature level of diagenesis (Stage 2- to 2 to 2- to 2, TAI 1.9 to 2.1; Table III-A) would seem to favor the migrated infusion viewpoint. Similarly, calculation of the oil factor (OF) based on the organic matter type (OMT) (Figure 4) suggests a more gas-prone organic facies character.

Cretaceous Sediments (11,604± feet to 13,264± feet)

The Cretaceous sediments comprise the Cretaceous Undivided section (11,604± feet to 12,414± feet), the Menefee (12,414± feet to 13,214± feet), Point Lookout (13,214± feet to 13,264± feet) with the Mancos (13264± feet to 13650± feet faulted on Permian).

These sediments have a good organic carbon content (0.34% to 3.97% averaging from 0.59% to 1.91%) and overall good S_1 volatile hydrocarbon and S_2 generatable hydrocarbon values (average S_1, 530 ppm to 1,025 ppm; S_2, 943 ppm to 2,722 ppm). The thermal maturity for the Cretaceous sediments grades from a moderately immature 2.0 TAI to a moderately onset of oil generation at 2.4 TAI.

The contained kerogen is dominantly Herbaceous plant detritus with equal or secondary amounts of possibly reworked Inertinite. However, varying amounts of more oil-prone Amorphous-Sapropellic material does enhance the prospects for these sediments having a good oil and associated gas source quality.

Excellent quality bituminous coals appear to be interbedded throughout some 800± feet of the Menefee (12,450± feet to 13,214± feet) and this could reflect an excellent oil and associated gas generation unit in this exploration area.

Interestingly, examination of the visual kerogen profile across the fault at 13,650± feet clearly indicates an increase in the geothermal diagenetic (time-temperature) history at this depth at this well location. This may be a relatively local feature or could have exploration significances if regionally developed.

Permian-age Sediments (13,878± feet to 15,680± feet)

The Permian-age formations penetrated by this well were San Andreas (13,878± feet to 13,990± feet), Glorieta (13,990± feet to 14,814± feet), Meseta Blanca (14,814± feet to 15,056± feet) and Abo (15,056± feet to 15,680± feet).

The Permian sediments overall have a good to very good oil and associated gas source character at this well location. Total Organic values (TOC) average good to very good (0.93% to 2.25%) along with correspondingly good to very good S_1 volatile and S_2 generatable hydrocarbon contents (S_1, 340 ppm to 610 ppm, average 350 ppm to 1,190 ppm; S_2, 640 ppm to 4,790 ppm, average 850 ppm to 2,955 ppm). Hydrogen Index values and Oxygen Index values again reflect a mixed oil and gas source facies organic matter type character which is also indicated by the visual kerogen organic matter type (OMT) rating (dominantly Herbaceous and Inertinite with moderate abundances of oil-prone Amorphous-Sapropel).

The observed maturity level of 2.4 TAI to 2.5 TAI is well into the oil generation window for these sediments.

Pennsylvanian-age Sediments (15,680± feet to 16,250± feet)

The Pennsylvanian sediments comprise the Madera formation (15,680± feet to 16,160± feet) and Sandia formation (16,160± feet to 16,250± feet). Limestones become more dominant in the Pennsylvanian sediments according to the well log description but this was not well represented in the samples provided. The samples were calcareous but appeared to be more calcareous shales rather than limestones. If the latter, total organic carbon values (0.27% to 0.97%) would represent excellent amounts of organic matter whereas, if shales, these values would rate at a fair organic content.

These lower basal sediments however, do reflect having experienced an optimum geothermal diagenetic (time-temperature) history for both oil liquids and associated gas generation. Note the thermal rank (Stage 2+ to 3- to 2+ to 3-, TAI 2.7 to 2.8) as well as the S_1 volatile and S_2 generatable hydrocarbon contents (S_1, 160 ppm to 230 ppm; S_2, 350 ppm to 602 ppm; HI, 64 to 101 and OI, 129 to 133).

These values would indicate that the basal Pennsylvanian sections at this well location have a mature fair to possibly good oil and associated gas source character which, if more favorably developed in thickness and organic matter content, along with entrapment of more oil-prone Amorphous-Sapropellic kerogen, could constitute an economically significant hydrocarbon source unit.

Precambrian Sediments (16,250± feet to 16,350 feet T.D.)

One (1) sample was taken at 16,240± feet to 16,270± feet. This is probably cave from the Pennsylvanian sediments; however, it did confirm the maturity level at the bottom of this well and also indicated a possible facies change with significantly higher abundances of more oil-prone Amorphous-Sapropel and degraded Herbaceous plant detritus (Am-H*; Table III-A).

SUMMARY TABLE I

FORMATION TOPS

Formation Age	Formation Name	Depth (feet)
Quaternary		500
	Quaternary Undivided	500
Tertiary		4800 ?
	Tertiary Undivided	4800 ?
Cretaceous		11604
	Cretaceous Undivided	11604
	Menefee	12414
	Point Lookout	13214
	Mancos	13264 ?
Fault	Cretaceous on Permian	13650 ?
Permian		13878 ?
	San Andreas	13878 ?
	Glorieta	13990
	Meseta Blanca	14814
	Abo	15056
Pennsylvanian		15680
	Madera	15680
	Sandia	16160
Precambrian		16250 ?
	Precambrian?	16250 ?

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																								
Quaternary Undivided	0.18	0.31	0.25	350	1210	690	480	1090	718	430	820	555	208	372	293	164	455	246	1.9	1.9	1.9	-	-	-
TERTIARY																								
Tertiary Undivided	0.08	0.33	0.18	150	610	361	270	1050	725	160	610	390	225	605	407	124	290	222	1.9	2.1	2.0	-	-	-
CRETACEOUS																								
Cretaceous Undivided	0.34	0.92	0.59	280	770	530	560	1480	1018	370	780	634	61	250	194	82	134	112	2.0	2.0	2.0	-	-	-
Menefee	1.00	3.97	1.91	420	2300	1025	1090	6310	2722	430	1380	767	87	162	135	21	110	48	2.3	2.4	2.4	0.59	1.80	1.04
Point Lookout	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mancos	1.36	1.72	1.55	380	740	568	800	1060	943	730	1430	1048	47	69	61	42	88	68	2.0	2.6	2.4	0.78	2.10	1.44
FAULT																								
Cretaceous on Permian	0.55	0.88	0.72	280	300	290	450	550	500	510	770	640	63	82	72	58	140	99	2.2	2.2	2.2	-	-	-
PERMIAN																								
San Andreas	0.93	0.93	0.93	350	350	350	850	850	850	850	850	850	91	91	91	91	91	91	2.4	2.4	2.4	0.58	2.10	1.21
Glorieta	0.45	3.48	1.38	470	3160	1119	800	4790	1992	920	4190	2009	75	193	148	99	207	155	2.0	2.7	2.4	0.70	1.96	1.47
Meseta Blanca	1.75	2.74	2.25	610	1470	1040	1730	4180	2955	2330	5450	3890	99	153	126	133	199	166	-	-	-	-	-	-
Abo	0.42	0.80	0.62	340	800	538	640	1240	946	790	1430	1118	128	188	157	146	217	185	2.5	2.5	2.5	1.06	1.14	1.10
PENNSYLVANIAN																								
Madera	0.27	0.97	0.69	130	380	230	460	850	602	550	1130	840	63	174	101	102	204	133	2.7	2.8	2.8	-	-	-
Sandia	0.55	0.55	0.55	160	160	160	350	350	350	710	710	710	64	64	64	129	129	129	2.9	2.9	2.9	-	-	-
PRECAMBRIAN																								
Precambrian?	0.80	0.80	0.80	390	390	390	600	600	600	1060	1060	1060	75	75	75	133	133	133	-	-	-	-	-	-

TABLE I
SAMPLE IDENTIFICATION
AND
TOTAL ORGANIC CARBON RESULTS

GeoChem Sample Number	Depth (feet)	Total Organic Carbon (% of Rock)
4416-001	1490-1520	0.18
4416-002	2780-2810	0.23
4416-003	3650-3680	0.26
4416-004	4280-4310	0.31
4416-005	4910-4940	0.15
4416-006	5740-5760	0.21
4416-007	6380-6400	0.17
4416-008	7600-7620	0.28
4416-009	8500-8510	0.09 ; 0.12R
4416-010	9390-9400	0.13
4416-011	10200-10210	0.08
4416-012	10850-10860	0.33
4416-013	11800-11810	0.59
4416-014	12100-12110	0.46
4416-015	12200-12210	0.34
4416-016	12210-12220	0.62
4416-017	12400-12410	0.92
4416-018	12500-12510	2.51 ; 2.53R
4416-019	12700-12710	3.97
4416-020	12800-12810	1.45
4416-021	12990-13000	1.00
4416-022	13150-13160	1.27
4416-023	13180-13200	1.25
4416-024	13270-13300	1.36
4416-025	13360-13390	1.62
4416-026	13450-13480	1.51
4416-027	13540-13570	1.72
4416-028	13720-13750	0.55
4416-029	13810-13840	0.88
4416-030	13900-13930	0.93
4416-031	14020-14050	1.23 ; 1.26R
4416-032	14110-14140	1.66
4416-033	14210-14240	0.45

TABLE I
SAMPLE IDENTIFICATION
AND
TOTAL ORGANIC CARBON RESULTS

GeoChem Sample Number	Depth (feet)	Total Organic Carbon (% of Rock)
4416-034	14300-14330	1.12
4416-035	14390-14420	1.21
4416-036	14480-14510	1.19
4416-037	14630-14660	3.48
4416-038	14720-14750	0.96
4416-039	14810-14840	1.12
4416-040	14940-14970	2.74 ; 2.65R
4416-041	15030-15060	1.75
4416-042	15120-15150	0.76
4416-043	15250-15280	0.80
4416-044	15370-15400	0.66
4416-045	15490-15520	0.44
4416-046	15610-15640	0.42
4416-047	15700-15730	0.27
4416-048	15790-15820	0.51
4416-049	15910-15940	0.78 ; 0.85R
4416-050	16030-16060	0.97
4416-051	16120-16150	0.91
4416-052	16240-16270	0.55
4416-053	16330-16350	0.80

FIGURE 1-A
ROCK-EVAL PYROLYSIS SUMMARY (mgm/gram)
GeoChem Job Number 4416

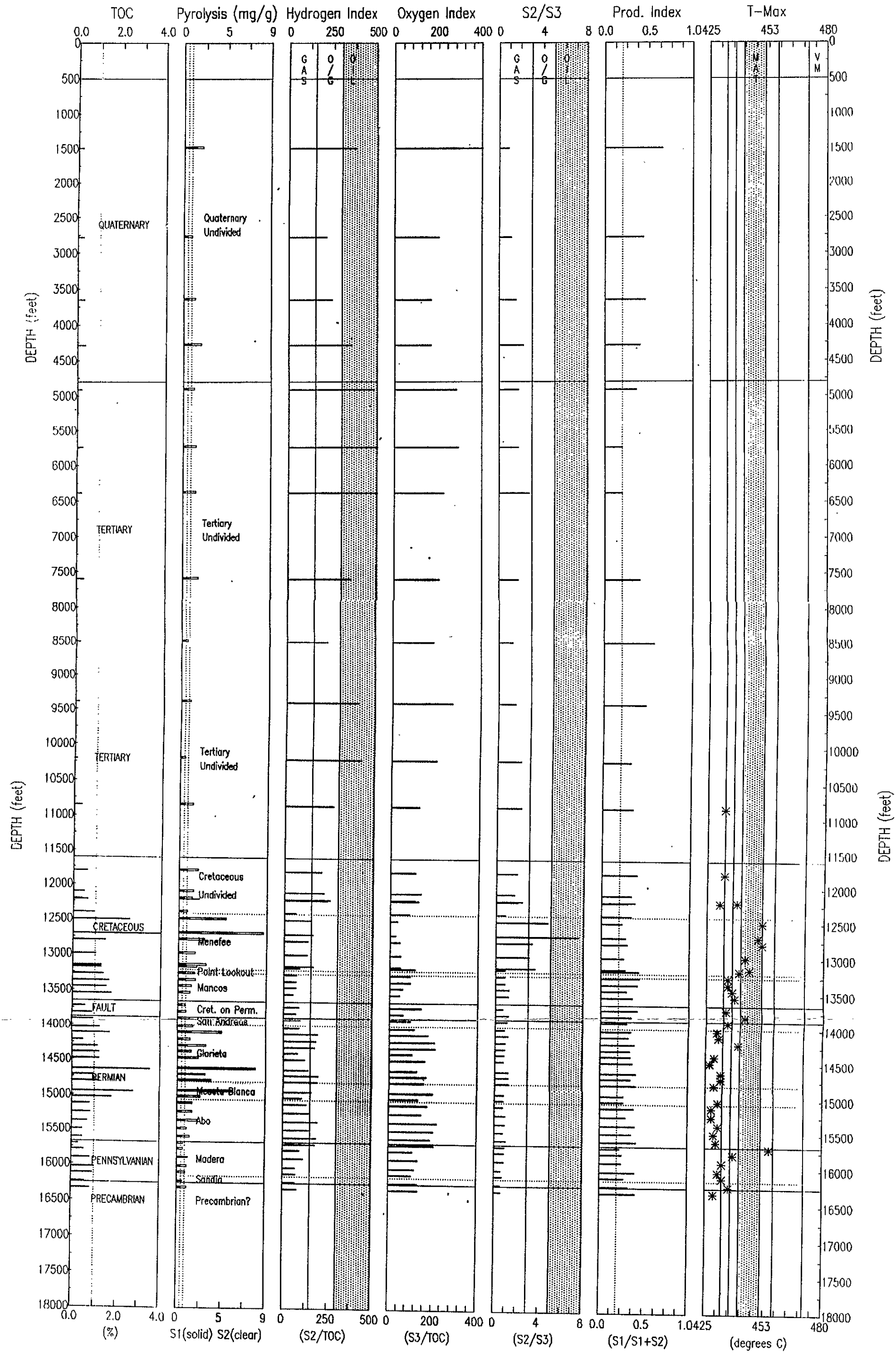


TABLE II-A

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
4416-001	1490-1520	95.0	317	1.21	0.67	0.82	0.64	0.15	0.18	372	455
4416-002	2780-2810	95.1	335	0.35	0.48	0.46	0.43	0.06	0.23	208	200
4416-003	3650-3680	97.0	314	0.50	0.63	0.43	0.45	0.09	0.26	242	165
4416-004	4280-4310	98.5	318	0.70	1.09	0.51	0.39	0.14	0.31	351	164
4416-005	4910-4940	93.9	321	0.39	0.72	0.42	0.35	0.09	0.15	480	280
4416-006	5740-5760	98.6	377	0.24	1.05	0.61	0.19	0.10	0.21	500	290
4416-007	6380-6400	96.5	364	0.24	1.03	0.38	0.19	0.10	0.17	605	223
4416-008	7600-7620	97.2	324	0.61	0.98	0.57	0.39	0.13	0.28	350	203
4416-009	8500-8510	97.0	310	0.35	0.27	0.22	0.56	0.05	0.12	225	183
4416-010	9390-9400	95.0	322	0.45	0.52	0.35	0.47	0.08	0.13	400	269
4416-011	10200-10210	96.5	384	0.15	0.34	0.16	0.31	0.04	0.08	425	200
4416-012	10850-10860	96.0	433	0.46	0.89	0.41	0.34	0.11	0.33	269	124
4416-013	11800-11810	96.1	433	0.77	1.20	0.65	0.39	0.16	0.59	203	110
4416-014	12100-12110	96.1	378	0.50	1.00	0.62	0.33	0.12	0.46	217	134
4416-015	12200-12210	94.9	439	0.51	0.85	0.37	0.37	0.11	0.34	250	108
4416-016	12210-12220	100.0	431	0.59	1.48	0.78	0.29	0.17	0.62	238	125
4416-017	12400-12410	92.5	380	0.28	0.56	0.75	0.33	0.07	0.92	61	82
4416-018	12500-12510	50.6	451	1.12	3.69	0.79	0.23	0.40	2.53	145	31
4416-019	12700-12710	56.5	449	2.30	6.31	0.84	0.27	0.71	3.97	158	21
4416-020	12800-12810	76.3	451	0.76	1.90	0.58	0.29	0.22	1.45	131	40
4416-021	12990-13000	87.7	443	0.42	1.28	0.43	0.25	0.14	1.00	128	43
4416-022	13150-13160	92.7	445	0.76	2.06	0.58	0.27	0.23	1.27	162	45
4416-023	13180-13200	96.7	440	0.79	1.09	1.38	0.42	0.15	1.25	87	110
4416-024	13270-13300	100.4	435	0.71	0.94	1.20	0.43	0.13	1.36	69	88
4416-025	13360-13390	98.8	435	0.74	1.06	1.43	0.41	0.15	1.62	65	88
4416-026	13450-13480	99.5	437	0.38	0.97	0.83	0.28	0.11	1.51	64	55
4416-027	13540-13570	95.2	438	0.44	0.80	0.73	0.35	0.10	1.72	47	42
4416-028	13720-13750	98.5	434	0.30	0.45	0.77	0.41	0.06	0.55	82	140
4416-029	13810-13840	96.6	443	0.28	0.55	0.51	0.34	0.06	0.88	63	58
4416-030	13900-13930	95.5	435	0.35	0.85	0.85	0.29	0.10	0.93	91	91
4416-031	14020-14050	97.6	430	0.54	1.06	1.34	0.34	0.13	1.23	86	109
4416-032	14110-14140	100.3	431	1.40	3.12	2.89	0.31	0.37	1.66	188	174
4416-033	14210-14240	102.0	440	0.49	0.80	0.92	0.38	0.10	0.45	178	204
4416-034	14300-14330	99.9	424	0.97	1.93	2.32	0.33	0.24	1.12	172	207
4416-035	14390-14420	99.1	429	0.47	0.91	1.20	0.34	0.11	1.21	75	99

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
4416-036	14480-14510	99.3	427	0.77	1.38	1.91	0.36	0.17	1.19	116	161
4416-037	14630-14660	104.9	432	3.16	4.79	4.19	0.40	0.66	3.48	138	120
4416-038	14720-14750	101.7	432	0.96	1.85	1.59	0.34	0.23	0.96	193	166
4416-039	14810-14840	100.1	429	1.31	2.09	1.72	0.39	0.28	1.12	187	154
4416-040	14940-14970	93.8	302	1.47	4.18	5.45	0.26	0.47	2.74	153	199
4416-041	15030-15060	96.9	431	0.61	1.73	2.33	0.26	0.19	1.75	99	133
4416-042	15120-15150	94.2	428	0.58	0.97	1.32	0.38	0.12	0.76	128	174
4416-043	15250-15280	95.8	428	0.45	1.11	1.17	0.29	0.13	0.80	139	146
4416-044	15370-15400	94.8	431	0.80	1.24	1.43	0.39	0.17	0.66	188	217
4416-045	15490-15520	96.2	429	0.34	0.64	0.88	0.35	0.08	0.44	145	200
4416-046	15610-15640	94.8	430	0.52	0.77	0.79	0.41	0.10	0.42	183	188
4416-047	15700-15730	98.4	455	0.13	0.47	0.55	0.22	0.05	0.27	174	204
4416-048	15790-15820	95.2	438	0.15	0.46	0.55	0.25	0.05	0.51	90	108
4416-049	15910-15940	96.0	433	0.26	0.85	1.04	0.24	0.09	0.78	109	133
4416-050	16030-16060	94.6	431	0.38	0.61	1.13	0.39	0.08	0.97	63	116
4416-051	16120-16150	92.3	433	0.23	0.62	0.93	0.27	0.07	0.91	68	102
4416-052	16240-16270	98.0	436	0.16	0.35	0.71	0.32	0.04	0.55	64	129
4416-053	16330-16350	97.0	429	0.39	0.60	1.06	0.40	0.08	0.80	75	133

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 = CO2 produced from kerogen pyrolysis (mg CO2/g of rock)
PC* = 0.083 (S1 + S2)
Hydrogen Index = mg HC/g organic carbon

Oxygen Index = mg CO2/g organic carbon
PI = S1/(S1+S2)
Tmax = Temperature Index, °C.

FIGURE 1-B
ROCK-EVAL PYROLYSIS SUMMARY (ppm wt/wt)
GeoChem Job Number 4416

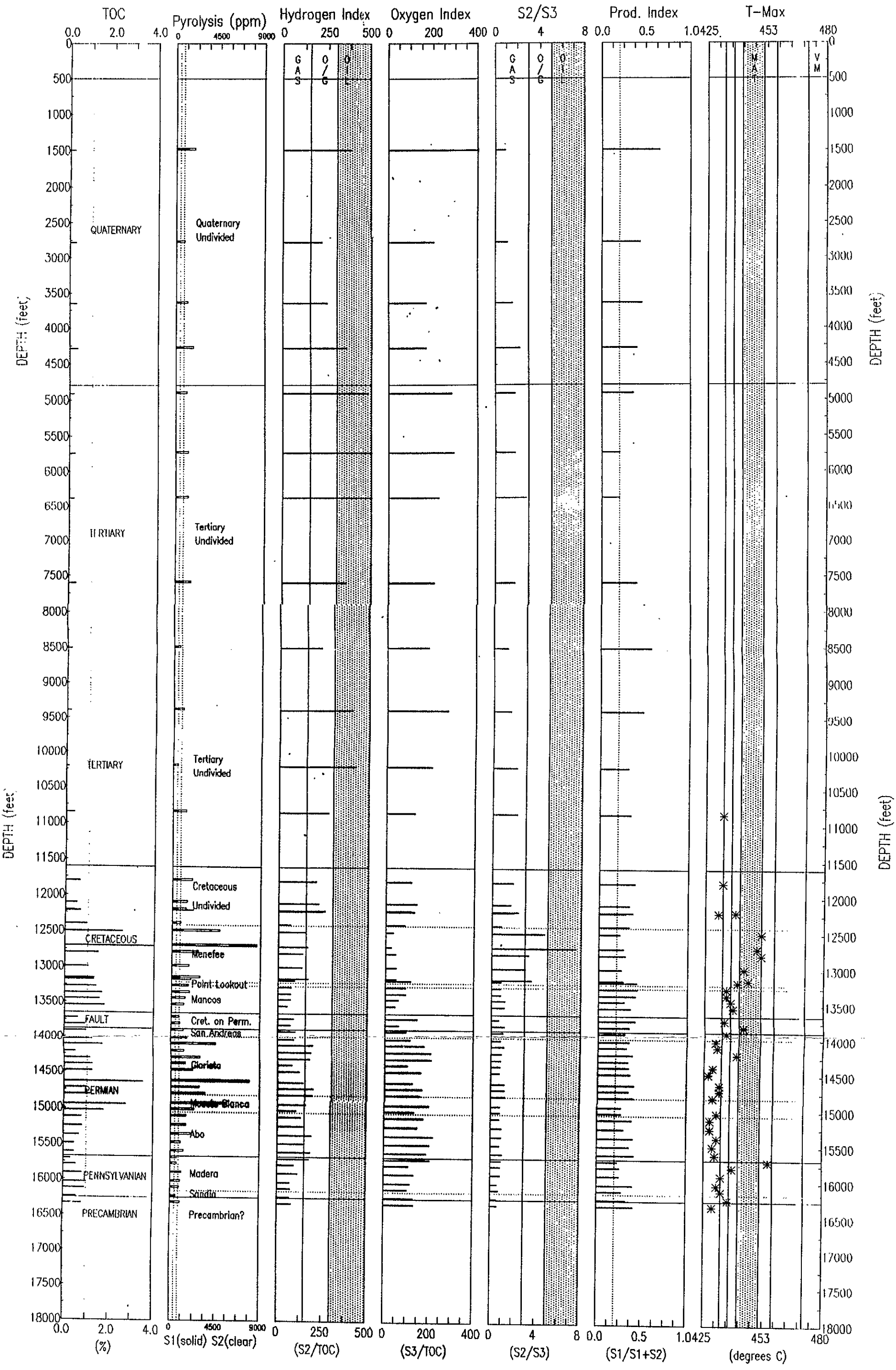


TABLE II-B

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
4416-001	1490-1520	95.0	317	1210	670	820	0.64	0.15	0.18	372	455
4416-002	2780-2810	95.1	335	350	480	460	0.43	0.06	0.23	208	200
4416-003	3650-3680	97.0	314	500	630	430	0.45	0.09	0.26	242	165
4416-004	4280-4310	98.5	318	700	1090	510	0.39	0.14	0.31	351	164
4416-005	4910-4940	93.9	321	390	720	420	0.35	0.09	0.15	480	280
4416-006	5740-5760	98.6	377	240	1050	610	0.19	0.10	0.21	500	290
4416-007	6380-6400	96.5	364	240	1030	380	0.19	0.10	0.17	605	223
4416-008	7600-7620	97.2	324	610	980	570	0.39	0.13	0.28	350	203
4416-009	8500-8510	97.0	310	350	270	220	0.56	0.05	0.12	225	183
4416-010	9390-9400	95.0	322	450	520	350	0.47	0.08	0.13	400	269
4416-011	10200-10210	96.5	384	150	340	160	0.31	0.04	0.08	425	200
4416-012	10850-10860	96.0	433	460	890	410	0.34	0.11	0.33	269	124
4416-013	11800-11810	96.1	433	770	1200	650	0.39	0.16	0.59	203	110
4416-014	12100-12110	96.1	378	500	1000	620	0.33	0.12	0.46	217	134
4416-015	12200-12210	94.9	439	510	850	370	0.37	0.11	0.34	250	108
4416-016	12210-12220	100.0	431	590	1480	780	0.29	0.17	0.62	238	125
4416-017	12400-12410	92.5	380	280	560	750	0.33	0.07	0.92	61	82
4416-018	12500-12510	50.6	451	1120	3690	790	0.23	0.40	2.53	145	31
4416-019	12700-12710	56.5	449	2300	6310	840	0.27	0.71	3.97	158	21
4416-020	12800-12810	76.3	451	760	1900	580	0.29	0.22	1.45	131	40
4416-021	12990-13000	87.7	443	420	1280	430	0.25	0.14	1.00	128	43
4416-022	13150-13160	92.7	445	760	2060	580	0.27	0.23	1.27	162	45
4416-023	13180-13200	96.7	440	790	1090	1380	0.42	0.15	1.25	87	110
4416-024	13270-13300	100.4	435	710	940	1200	0.43	0.13	1.36	69	88
4416-025	13360-13390	98.8	435	740	1060	1430	0.41	0.15	1.62	65	88
4416-026	13450-13480	99.5	437	380	970	830	0.28	0.11	1.51	64	55
4416-027	13540-13570	95.2	438	440	800	730	0.35	0.10	1.72	47	42
4416-028	13720-13750	98.5	434	300	450	770	0.41	0.06	0.55	82	140
4416-029	13810-13840	96.6	443	280	550	510	0.34	0.06	0.88	63	58
4416-030	13900-13930	95.5	435	350	850	850	0.29	0.10	0.93	91	91
4416-031	14020-14050	97.6	430	540	1060	1340	0.34	0.13	1.23	86	109
4416-032	14110-14140	100.3	431	1400	3120	2890	0.31	0.37	1.66	188	174
4416-033	14210-14240	102.0	440	490	800	920	0.38	0.10	0.45	178	204
4416-034	14300-14330	99.9	424	970	1930	2320	0.33	0.24	1.12	172	207
4416-035	14390-14420	99.1	429	470	910	1200	0.34	0.11	1.21	75	99

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
4416-036	14480-14510	99.3	427	770	1380	1910	0.36	0.17	1.19	116	161
4416-037	14630-14660	104.9	432	3160	4790	4190	0.40	0.66	3.48	138	120
4416-038	14720-14750	101.7	432	960	1850	1590	0.34	0.23	0.96	193	166
4416-039	14810-14840	100.1	429	1310	2090	1720	0.39	0.28	1.12	187	154
4416-040	14940-14970	93.8	302	1470	4180	5450	0.26	0.47	2.74	153	199
4416-041	15030-15060	96.9	431	610	1730	2330	0.26	0.19	1.75	99	133
4416-042	15120-15150	94.2	428	580	970	1320	0.38	0.12	0.76	128	174
4416-043	15250-15280	95.8	428	450	1110	1170	0.29	0.13	0.80	139	146
4416-044	15370-15400	94.8	431	800	1240	1430	0.39	0.17	0.66	188	217
4416-045	15490-15520	96.2	429	340	640	880	0.35	0.08	0.44	145	200
4416-046	15610-15640	94.8	430	520	770	790	0.41	0.10	0.42	183	188
4416-047	15700-15730	98.4	455	130	470	550	0.22	0.05	0.27	174	204
4416-048	15790-15820	95.2	438	150	460	550	0.25	0.05	0.51	90	108
4416-049	15910-15940	96.0	433	260	850	1040	0.24	0.09	0.78	109	133
4416-050	16030-16060	94.6	431	380	610	1130	0.39	0.08	0.97	63	116
4416-051	16120-16150	92.3	433	230	620	930	0.27	0.07	0.91	68	102
4416-052	16240-16270	98.0	436	160	350	710	0.32	0.04	0.55	64	129
4416-053	16330-16350	97.0	429	390	600	1060	0.40	0.08	0.80	75	133

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

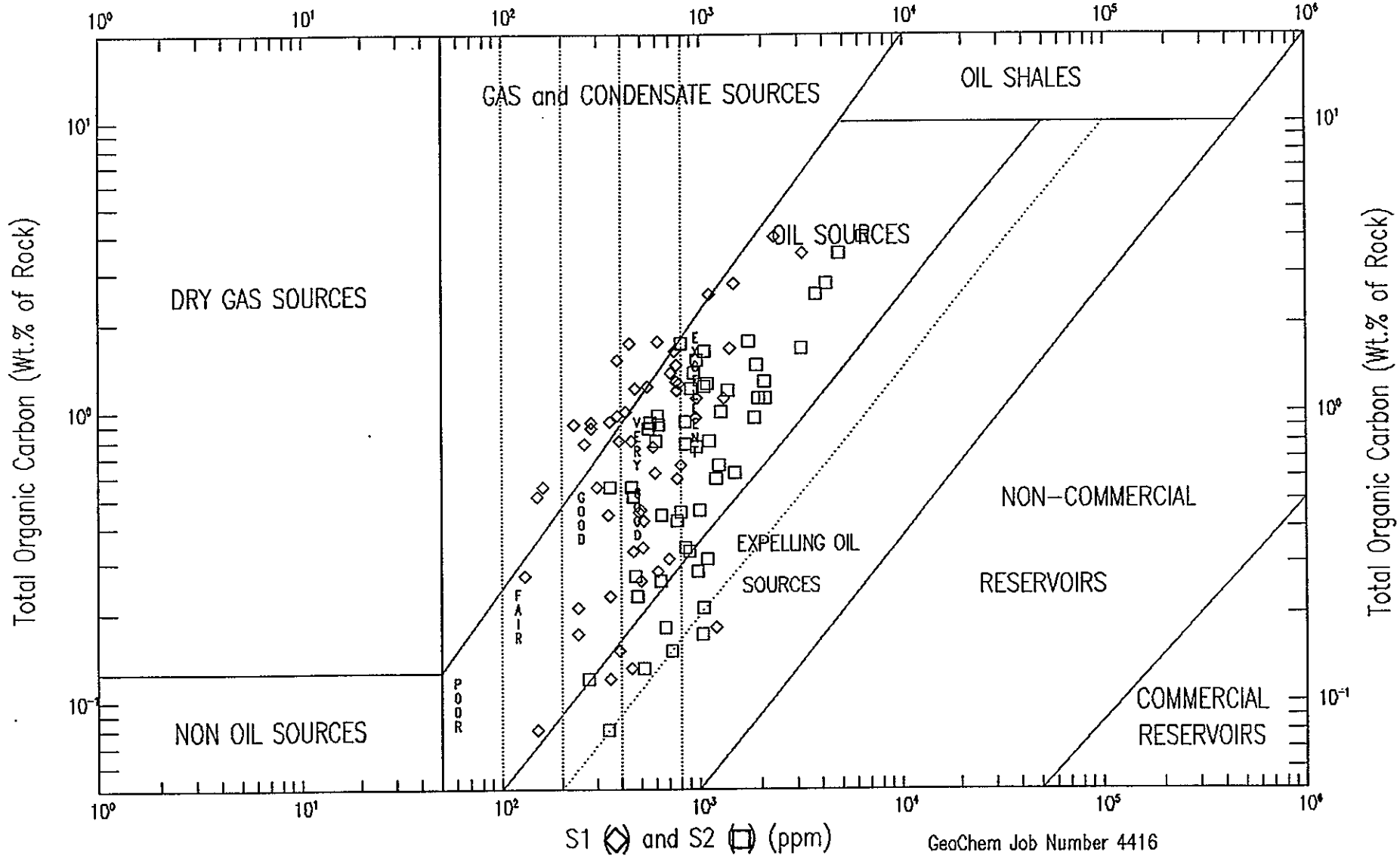


FIGURE 2-B
HYDROCARBON SOURCE RICHNESS - CARBONATES

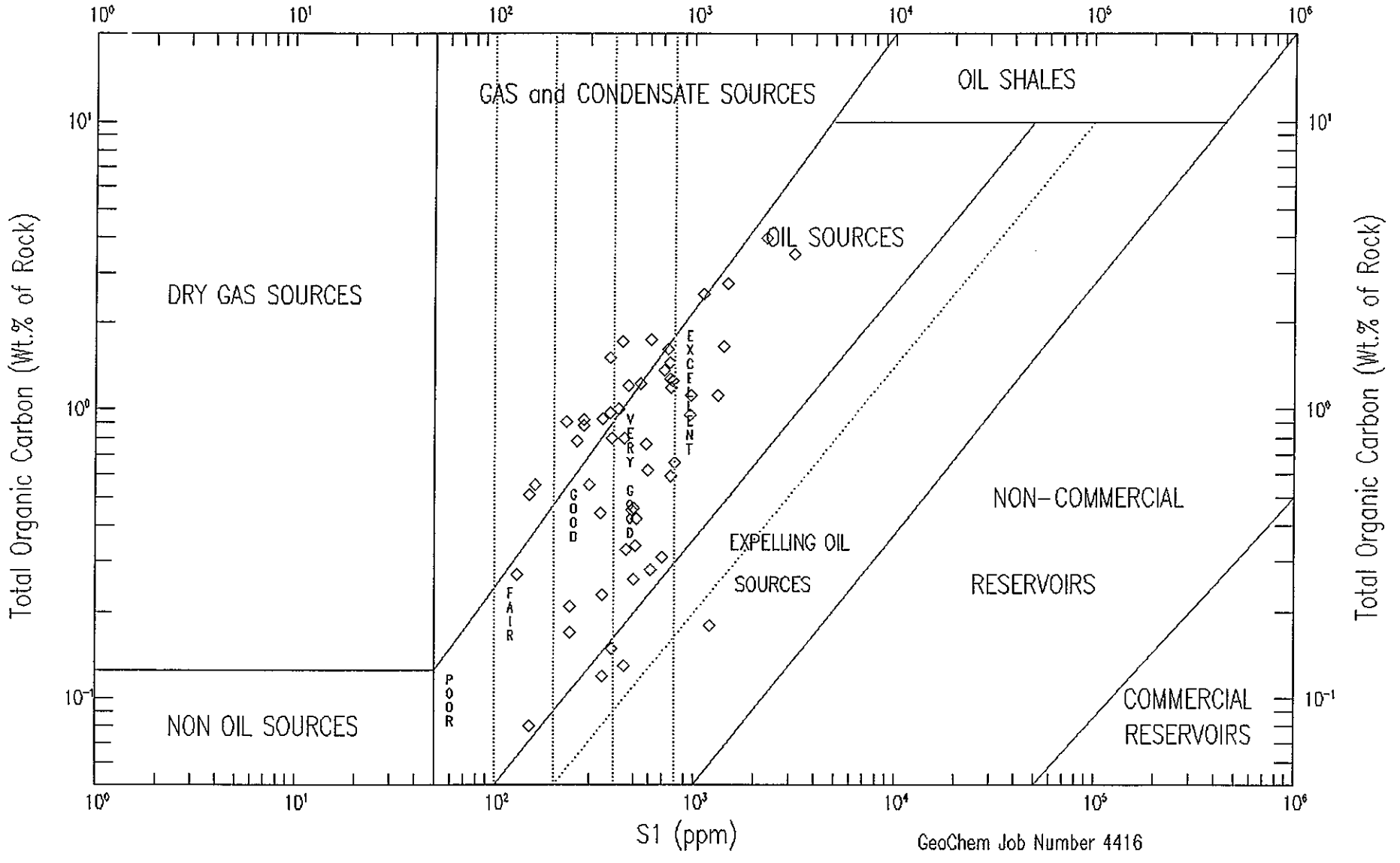


FIGURE 2-C
HYDROCARBON SOURCE RICHNESS - CARBONATES

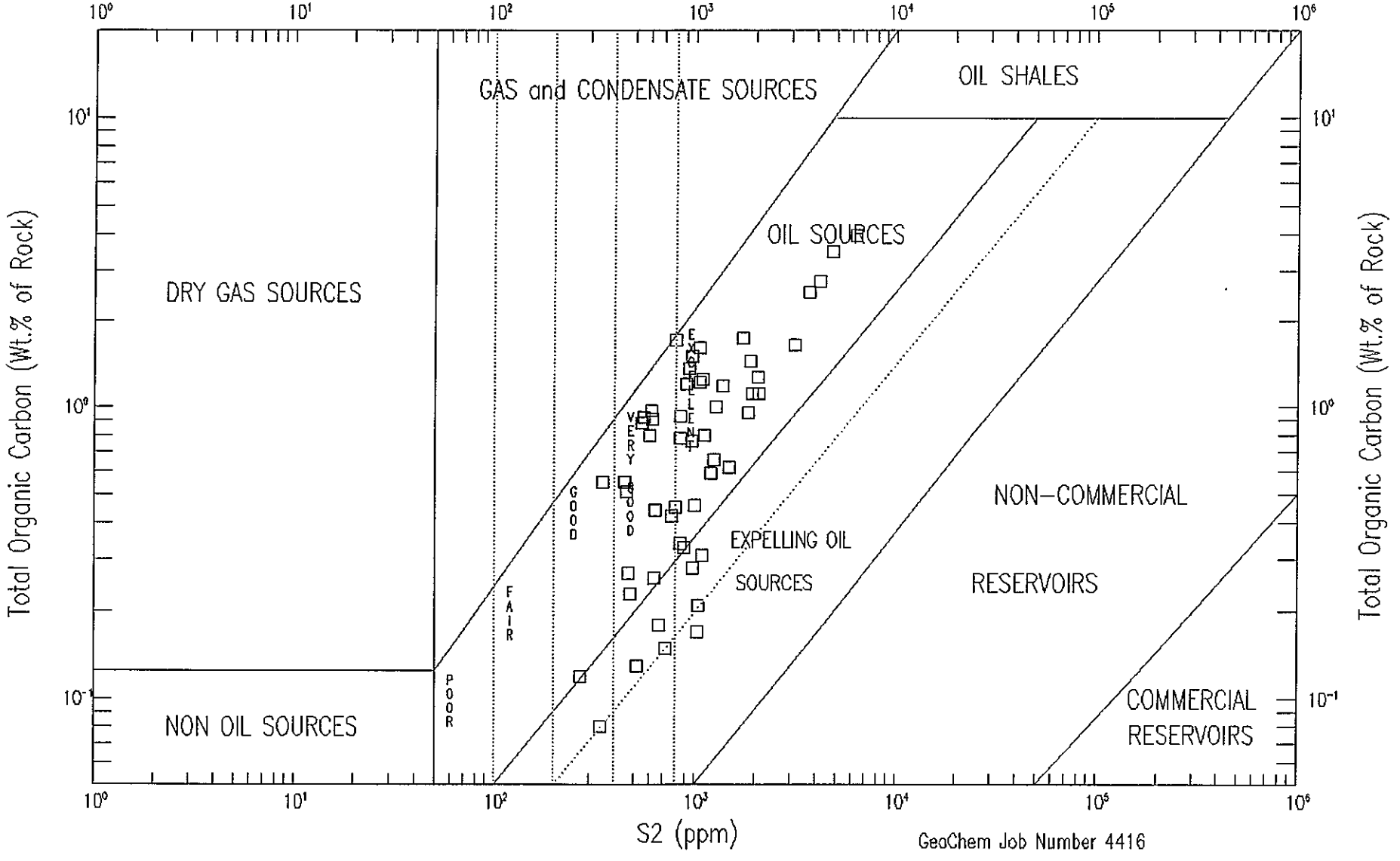


FIGURE 3-A
HYDROCARBON SOURCE RICHNESS – SHALES & MUDSTONES

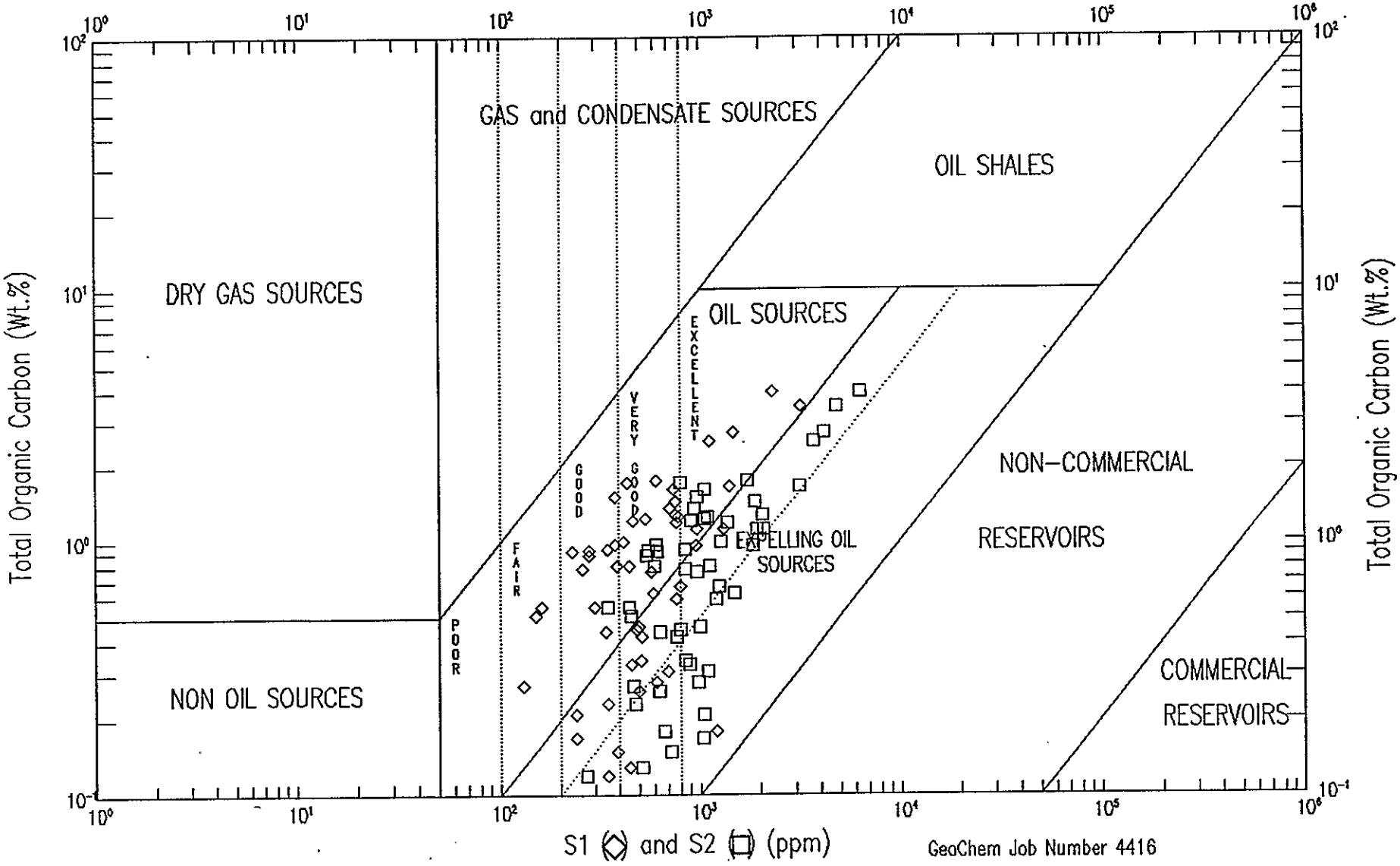


FIGURE 3-B
HYDROCARBON SOURCE RICHNESS - SHALES & MUDSTONES

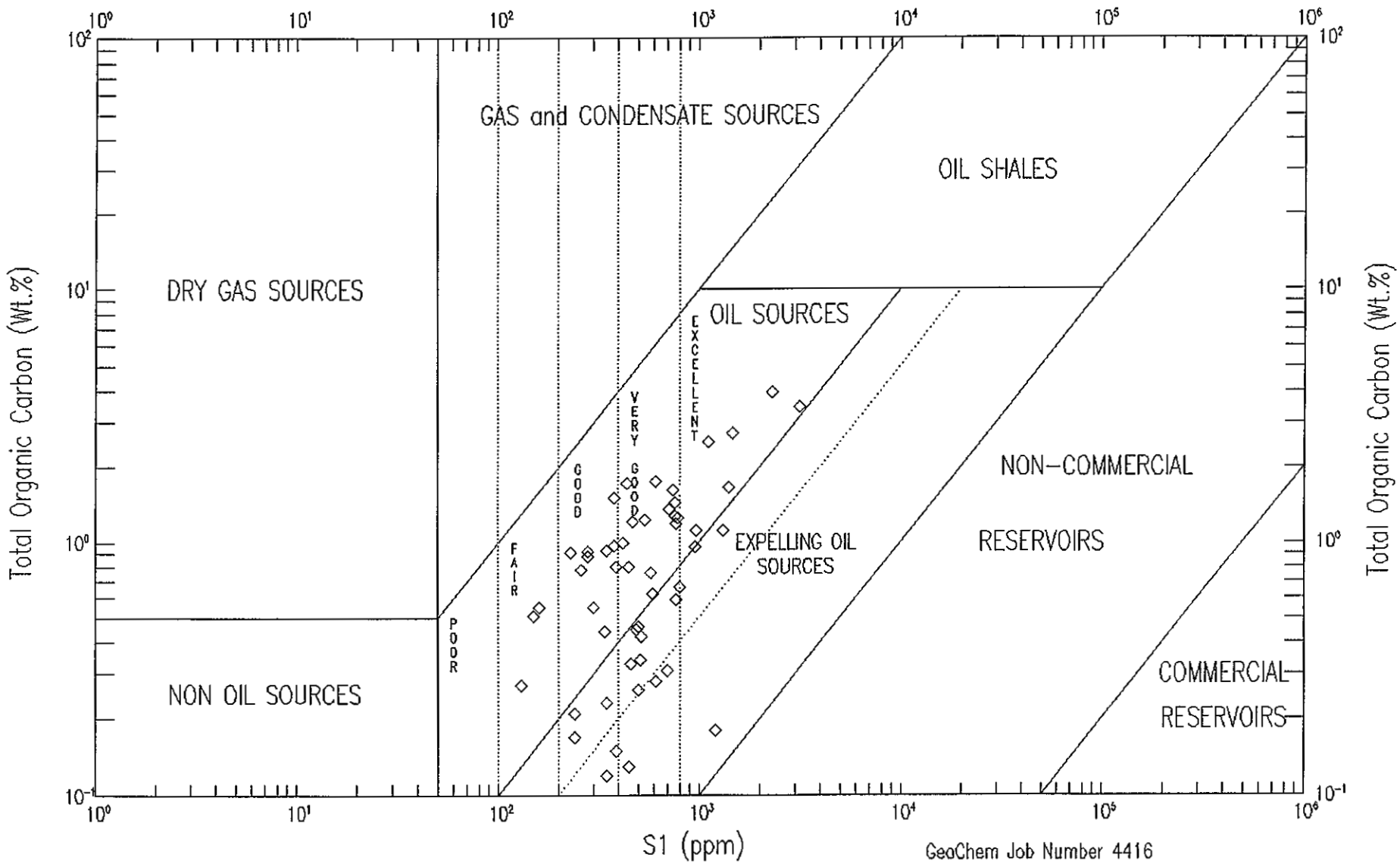


FIGURE 3–C
HYDROCARBON SOURCE RICHNESS – SHALES & MUDSTONES

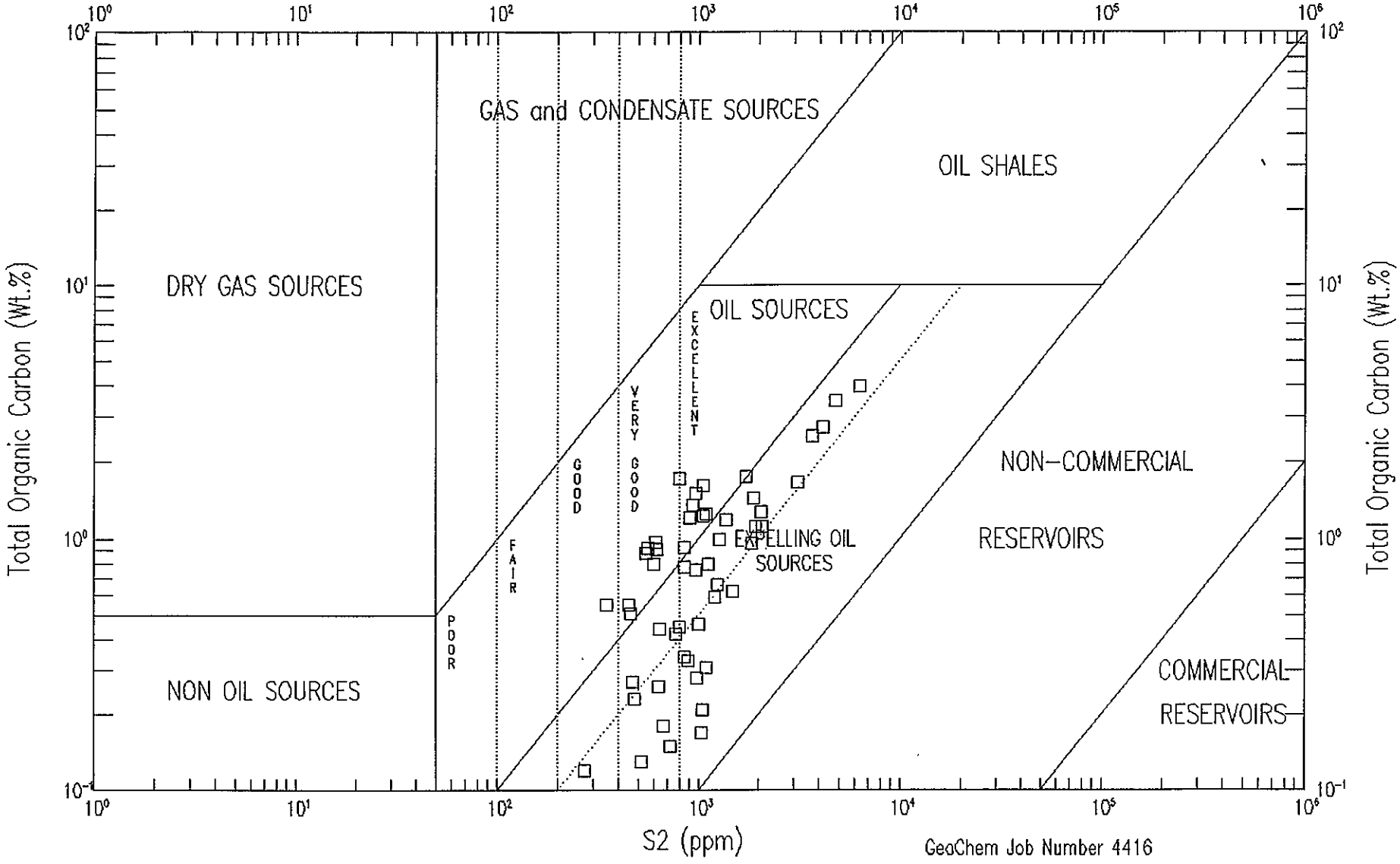


FIGURE 4: KEROGEN SUMMARY
GeoChem Job Number 4416

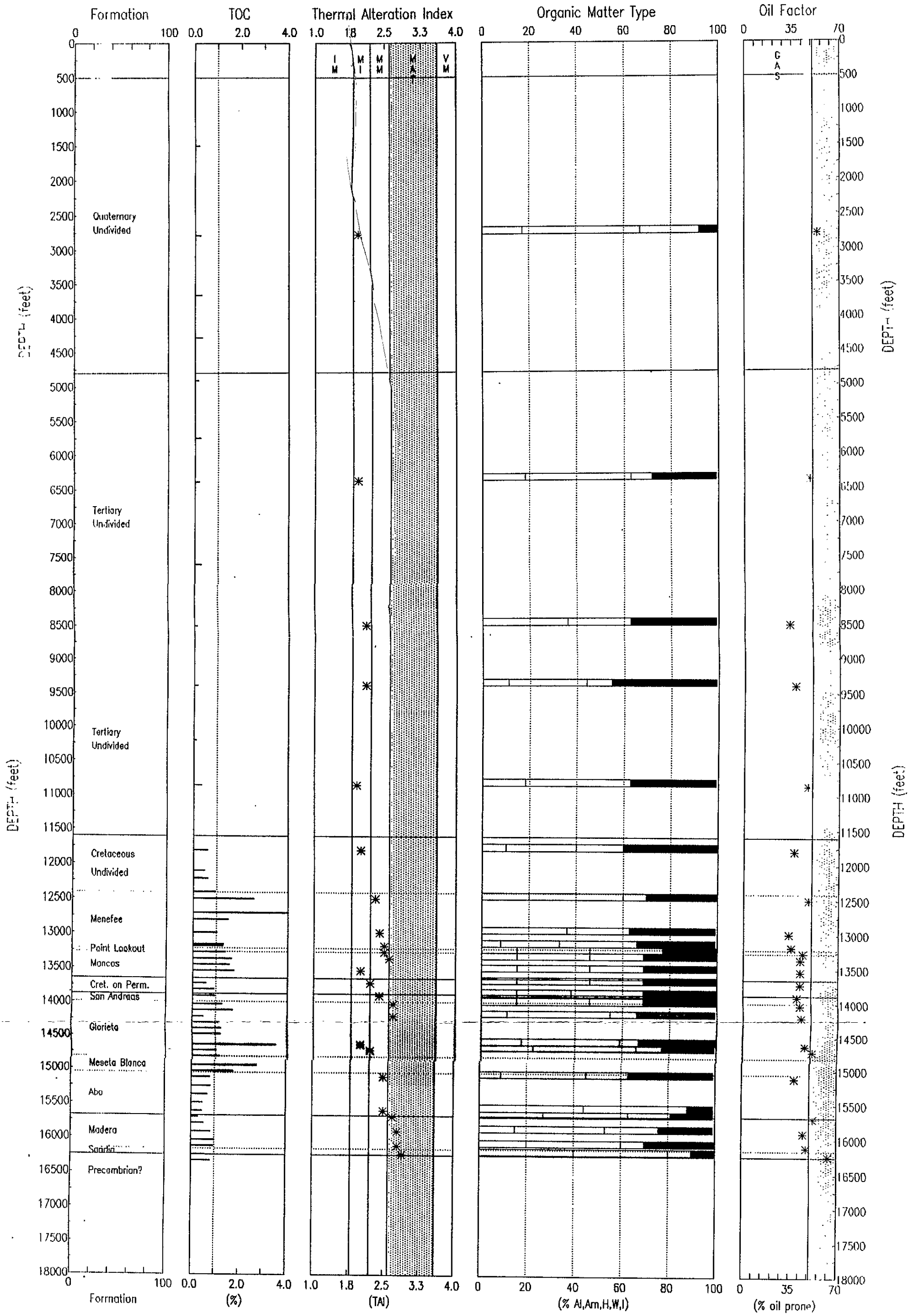


TABLE III - A

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		
4416-002	2780-2810	0.18	H;W;Am(I)	0	17	50	25	8	2- to 2	1.9
4416-007	6380-6400	0.17	H;I;Am(W)	0	18	45	9	27	2- to 2	1.9
4416-009	8500-8510	0.09; 0.12R	H-I;W;-	0	0	36	27	36	2- to 2	2.1
4416-010	9390-9400	0.13	I;H;Am-W	0	11	33	11	44	2- to 2	2.1
4416-012	10850-10860	0.33	H;I;Am	0	18	45	0	36	2- to 2	1.9
4416-013	11800-11810	0.59	I;H;W(Am)	0	10	30	20	40	2- to 2	2.0
4416-018	12500-12510	2.51; 2.53R	H*;I;Am(W)	0	20	40	10	30	2 to 2+	2.3
4416-021	12990-13000	1.00	H-I;W;-	0	0	36	27	36	2 to 2+	2.4
4416-023	13180-13200	1.25	W-I;H;Am	0	8	25	33	33	2 to 2+	2.5
4416-024	13270-13300	1.36	H*-W;I;Am	0	15	31	31	23	2 to 2+	2.5
4416-025	13360-13390	1.62	H-I;W;Am	0	15	31	23	31	2+	2.6
4416-027	13540-13570	1.72	H-I;W;Am	0	15	31	23	31	2- to 2	2.0
4416-028	13720-13750	0.55	H-I;W;Am	0	15	31	23	31	2	2.2
4416-030	13900-13930	0.93	W-I;H;Am	0	15	23	31	31	2 to 2+	2.4
4416-031	14020-14050	1.23; 1.26R	H-I;W;Am	0	15	31	23	31	2+ to 3-	2.7
4416-033	14210-14240	0.45	H;I;Am-W	0	11	44	11	33	2+ to 3-	2.7
4416-037	14630-14660	3.48	H;I;Am(W)	0	17	42	8	33	2- to 2	2.0
4416-038	14720-14750	0.96	H*;Am-I;W	0	22	44	11	22	2	2.2
4416-042	15120-15150	0.76	H-I;W;Am	0	9	36	18	36	2 to 2+	2.5
4416-046	15610-15640	0.42	Am-H*;-;I	0	44	44	0	11	2 to 2+	2.5
4416-047	15700-15730	0.27	H*;Am;W-I	0	27	36	18	18	2+ to 3-	2.7
4416-049	15910-15940	0.78; 0.85R	H;W-I;Am	0	15	38	23	23	2+ to 3-	2.8
4416-051	16120-16150	0.91	H*;I;Am(W)	0	20	40	10	30	2+ to 3-	2.8
4416-052	16240-16270	0.55	Am-H*;-;W-I	0	40	40	10	10	2+ to 3-	2.9

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 4416

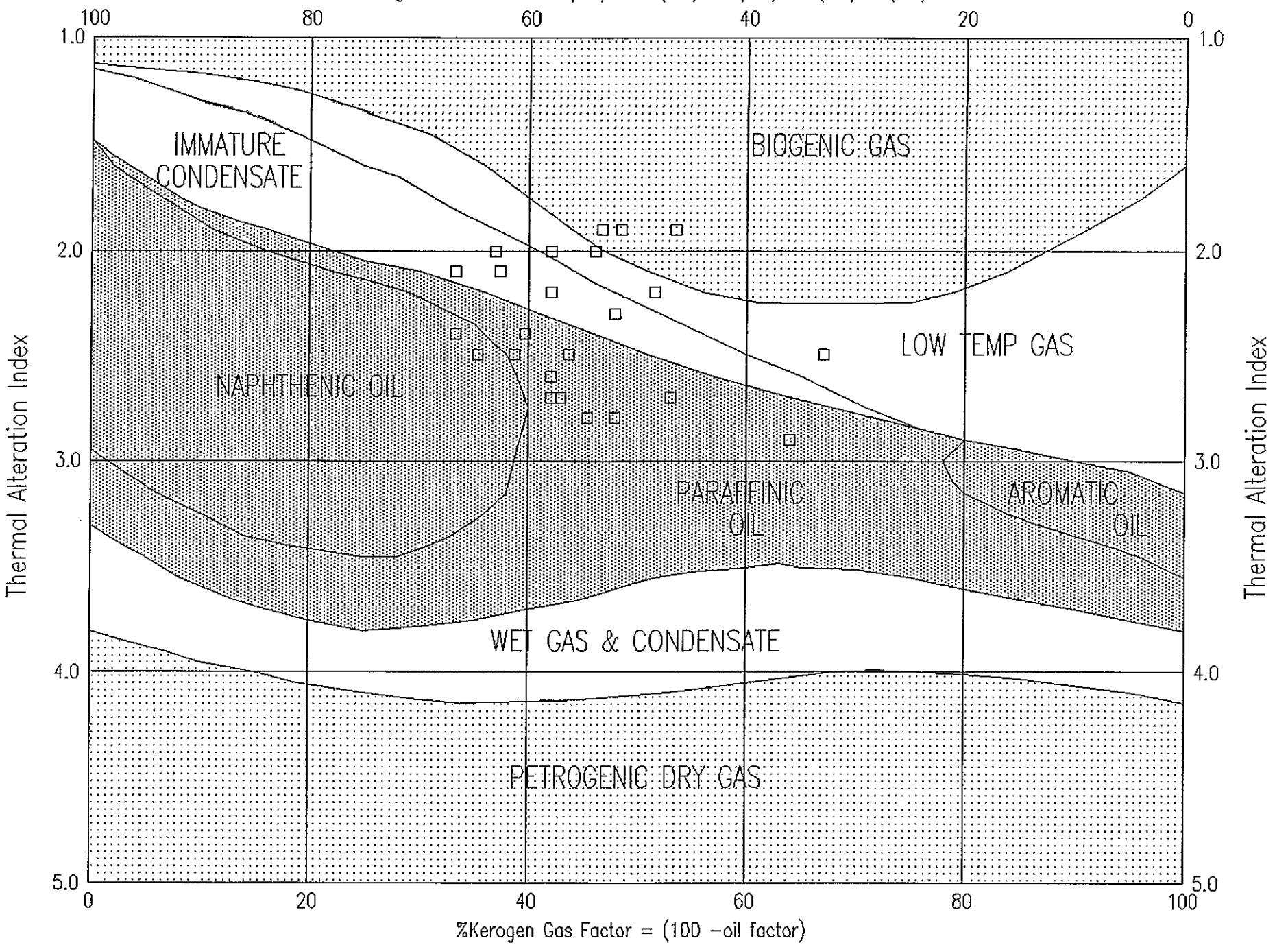
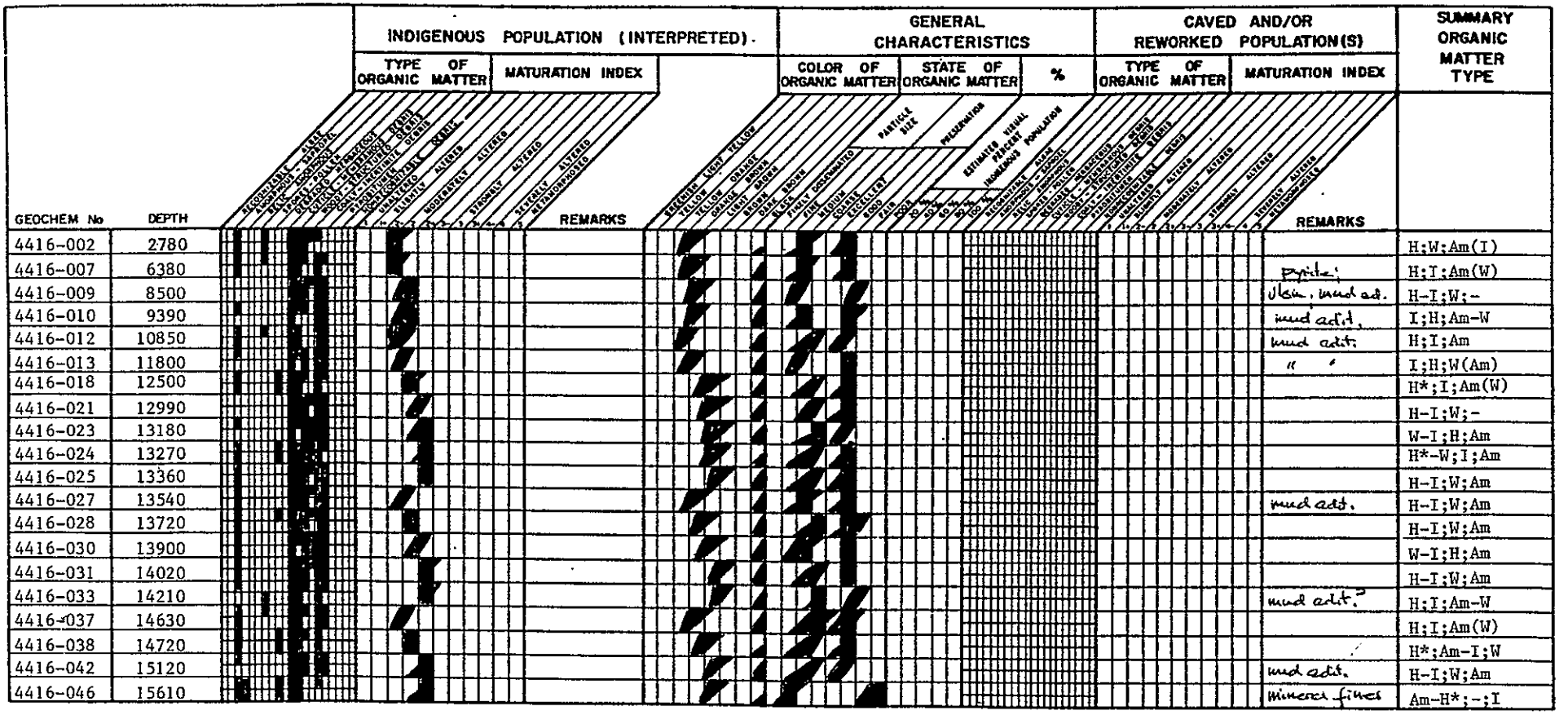


TABLE III-B

VISUAL KEROGEN ASSESSMENT WORKSHEET



GEOCHEM No	DEPTH	REMARKS	REMARKS	SUMMARY ORGANIC MATTER TYPE
4416-002	2780			H;W;Am(I)
4416-007	6380		pyrite;	H;I;Am(W)
4416-009	8500		Nsw. mud adt.	H-I;W;-
4416-010	9390		mud adt.	I;H;Am-W
4416-012	10850		mud adt.	H;I;Am
4416-013	11800		" "	I;H;W(Am)
4416-018	12500			H*;I;Am(W)
4416-021	12990			H-I;W;-
4416-023	13180			W-I;H;Am
4416-024	13270			H*-W;I;Am
4416-025	13360			H-I;W;Am
4416-027	13540		mud adt.	H-I;W;Am
4416-028	13720			H-I;W;Am
4416-030	13900			W-I;H;Am
4416-031	14020			H-I;W;Am
4416-033	14210		mud adt.	H;I;Am-W
4416-037	14630			H;I;Am(W)
4416-038	14720			H*;Am-I;W
4416-042	15120		mud adt.	H-I;W;Am
4416-046	15610		Mineral fines	Am-H*;-;I

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 - %	REMARKS	CAVED AND/OR REWORKED POPULATION(S) - TYPE OF ORGANIC MATTER	CAVED AND/OR REWORKED POPULATION(S) - MATURATION INDEX	REMARKS	SUMMARY ORGANIC MATTER TYPE
4416-047	15700											H*;Am;W-I
4416-049	15910											H;W-I;Am
4416-051	16120											H*;I;Am(W)
4416-052	16240											Am-H*;-;W-I

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
4416-018	12500-12510	CUTTINGS	1	32	0.61	0.74	0.68	0.029	MODERATELY MATURE
			2	2	0.83	0.83	0.83	---	MATURE
			3	8	1.25	1.34	1.30	0.032	MATURE
4416-021	12990-13000	CUTTINGS	1	42	0.59	0.70	0.65	0.024	MODERATELY MATURE
			2	6	1.19	1.29	1.24	0.035	MATURE
4416-023	13180-13200	CUTTINGS	1	3	0.77	0.78	0.77	0.005	MODERATELY MATURE
			2	33	0.93	1.03	0.98	0.027	MATURE
			3	3	1.16	1.19	1.18	0.012	MATURE
			4	6	1.77	1.80	1.78	0.009	VERY MATURE
4416-024	13270-13300	CUTTINGS	1	40	0.78	0.96	0.87	0.042	MODERATELY MATURE TO MATURE
			2	3	2.10	2.10	2.10	---	VERY MATURE
4416-025	13360-13390	CUTTINGS	NO MEASUREMENT - VERY SMALL PARTICLES !						

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
4416-030	13900-13930	CUTTINGS	1	7	0.58	0.65	0.62	0.021	MODERATELY MATURE
			2	22	0.90	1.02	0.96	0.031	MATURE
			3	2	1.20	1.26	1.23	0.030	MATURE
			4	3	2.00	2.10	2.03	0.047	VERY MATURE
4416-038	14720-14750	CUTTINGS	1	20	0.70	0.87	0.79	0.048	MODERATELY MATURE TO MATURE
			2	1	1.69	1.69	1.69	---	VERY MATURE
			3	3	1.92	1.96	1.94	0.017	VERY MATURE
4416-046	15610-15640	CUTTINGS	1	8	1.06	1.14	1.10	0.025	MATURE
4416-051	16120-16150	CUTTINGS	NO VITRINITE !						

VITRINITE REFLECTANCE HISTOGRAM

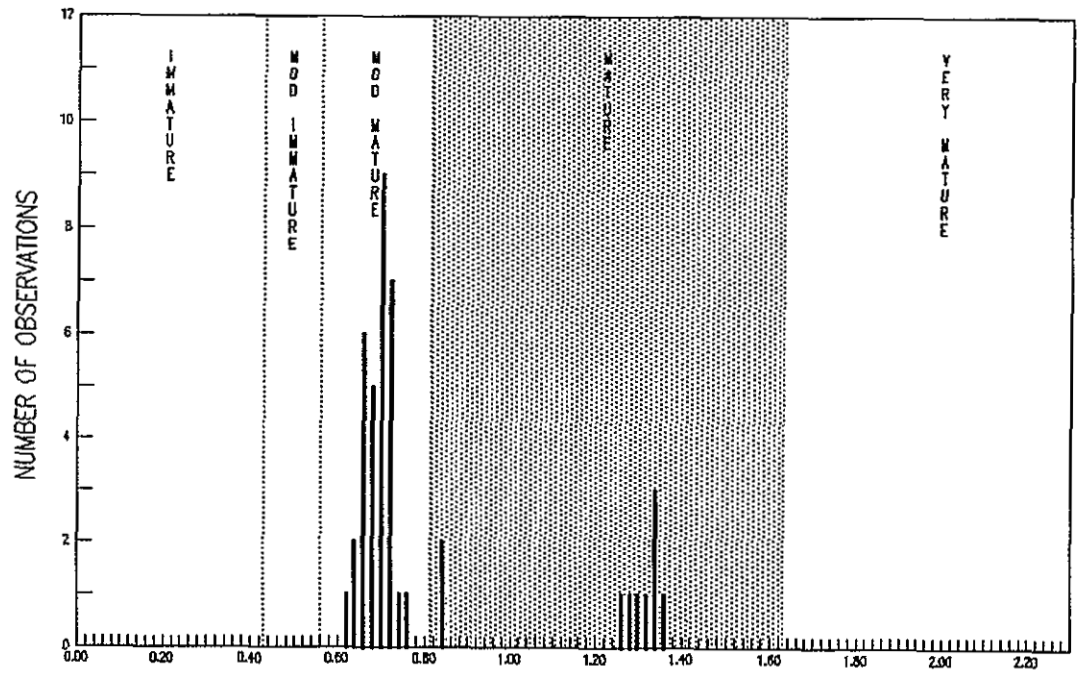
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-018
SAMPLE TYPE	CUTTINGS	CLIENT NO.	12500-12510 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

		0.61	0.63	0.63	0.64	0.64	0.64	0.64	0.65	0.65	0.66	0.67	0.67	0.67
0.67	0.68	0.68	0.68	0.68	0.68	0.68	0.69	0.69	0.69	0.70	0.70	0.70	0.70	0.70
0.71	0.71	0.72	0.74	0.83	0.83	1.25	1.26	1.28	1.30	1.32	1.33	1.33	1.34	

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	32	0.61	0.74	0.68	0.029	MODERATELY MATURE
2	2	0.83	0.83	0.83	—	MATURE
3	8	1.25	1.34	1.30	0.032	MATURE

SAMPLE NO. 4416-018



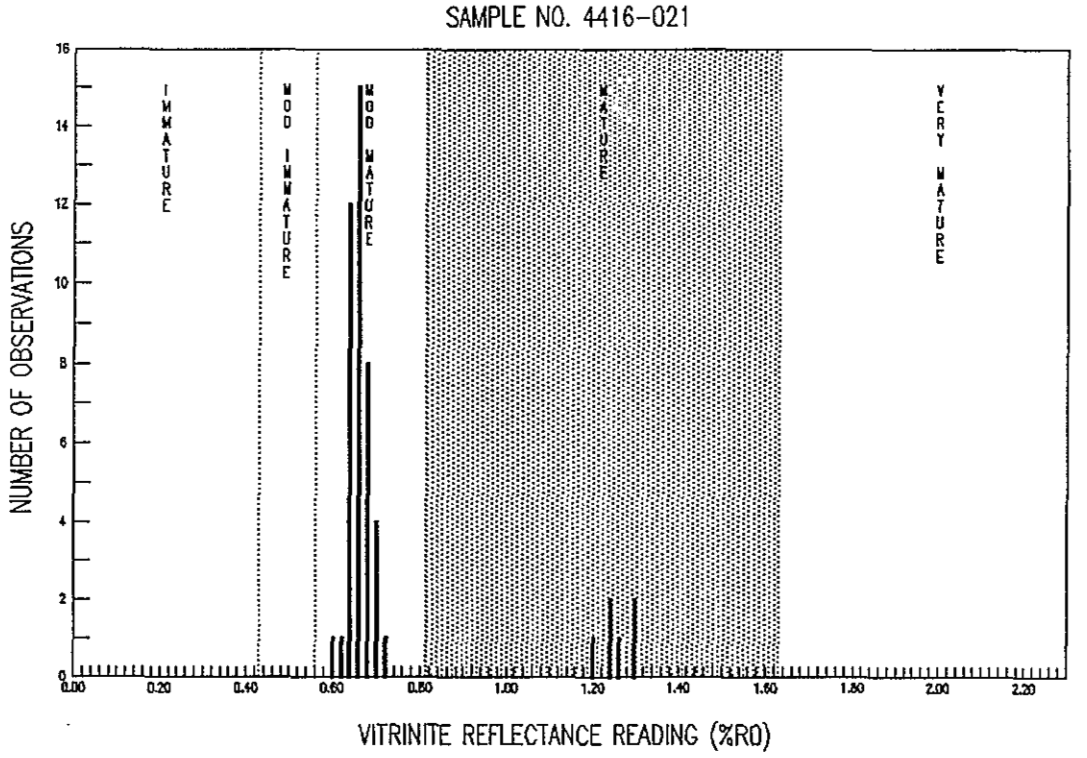
VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-021
SAMPLE TYPE	CUTTINGS	CLIENT NO.	12990-13000 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

		0.59	0.61	0.62	0.62	0.62	0.62	0.62	0.63	0.63	0.63	0.63	0.63	0.63
0.63	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.65	0.65	0.65	0.65	0.65	0.65
0.65	0.66	0.66	0.66	0.67	0.67	0.67	0.67	0.67	0.68	0.69	0.69	0.69	0.70	1.19
1.22	1.22	1.25	1.28	1.29										

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	42	0.59	0.70	0.65	0.024	MODERATELY MATURE
2	6	1.19	1.29	1.24	0.035	MATURE



VITRINITE REFLECTANCE HISTOGRAM

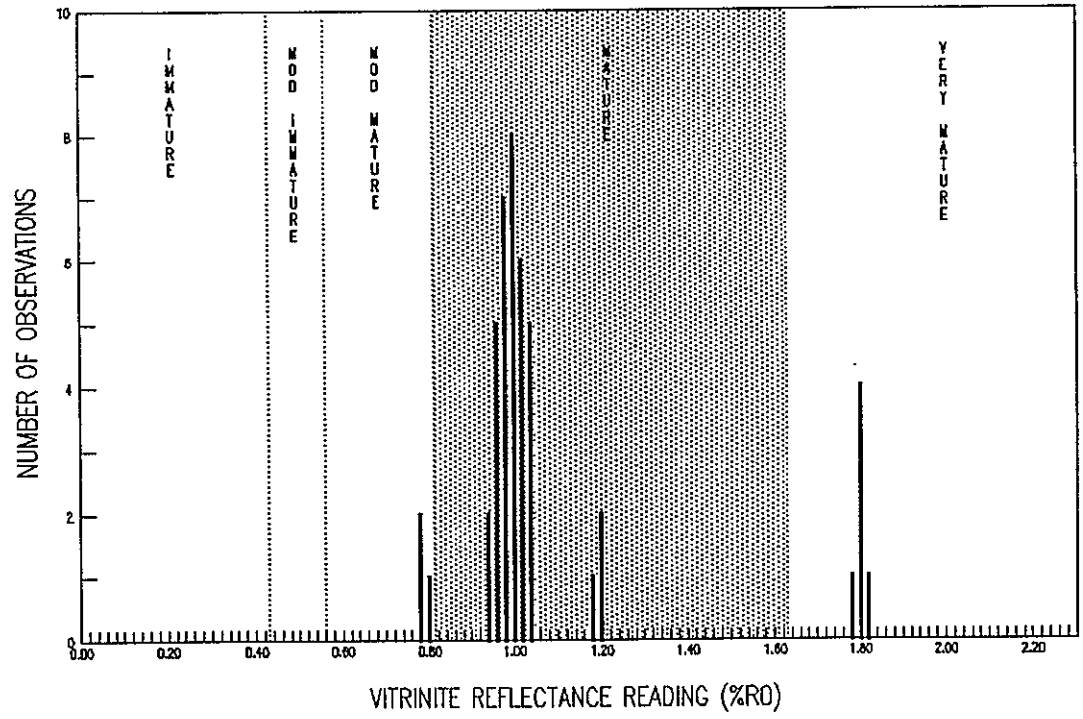
CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-023
SAMPLE TYPE	CUTTINGS	CLIENT NO.	13180-13200 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

		0.77	0.77	0.78	0.93	0.93	0.94	0.95	0.95	0.95	0.95	0.96	0.96	0.97
0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.99	0.99	0.99	0.99	0.99	1.00	1.00	1.00
1.01	1.01	1.01	1.02	1.02	1.02	1.02	1.03	1.16	1.18	1.19	1.77	1.78	1.78	1.78
1.79	1.80													

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	3	0.77	0.78	0.77	0.005	MODERATELY MATURE
2	33	0.93	1.03	0.98	0.027	MATURE
3	3	1.16	1.19	1.18	0.012	MATURE
4	6	1.77	1.80	1.78	0.009	VERY MATURE

SAMPLE NO. 4416-023



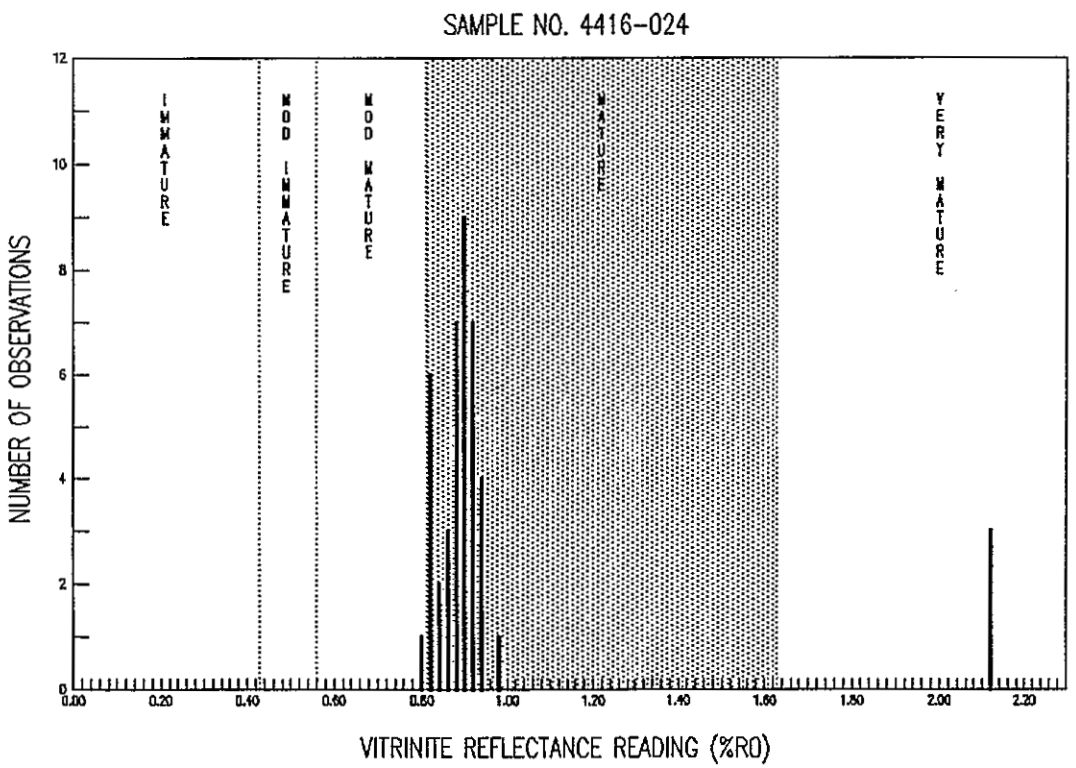
VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-024
SAMPLE TYPE	CUTTINGS	CLIENT NO.	13270-13300 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

		0.78	0.80	0.80	0.80	0.80	0.80	0.81	0.82	0.82	0.85	0.85	0.85	0.86
0.86	0.86	0.86	0.86	0.87	0.87	0.88	0.88	0.88	0.88	0.89	0.89	0.89	0.89	0.89
0.90	0.90	0.90	0.90	0.90	0.91	0.91	0.92	0.92	0.92	0.93	0.96	2.10	2.10	2.10

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	40	0.78	0.96	0.87	0.042	MODERATELY MATURE TO MATURE
2	3	2.10	2.10	2.10	—	VERY MATURE



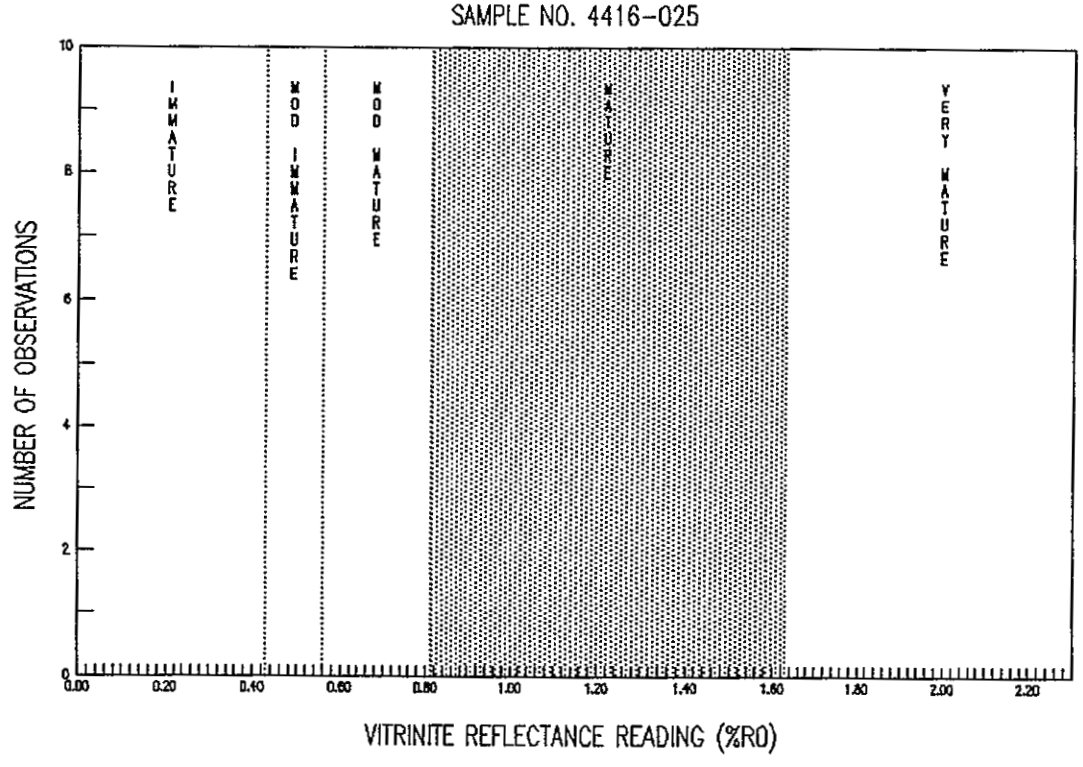
VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-025
SAMPLE TYPE	CUTTINGS	CLIENT NO.	13360-13390 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK

NO MEASUREMENT - VERY SMALL PARTICLES !



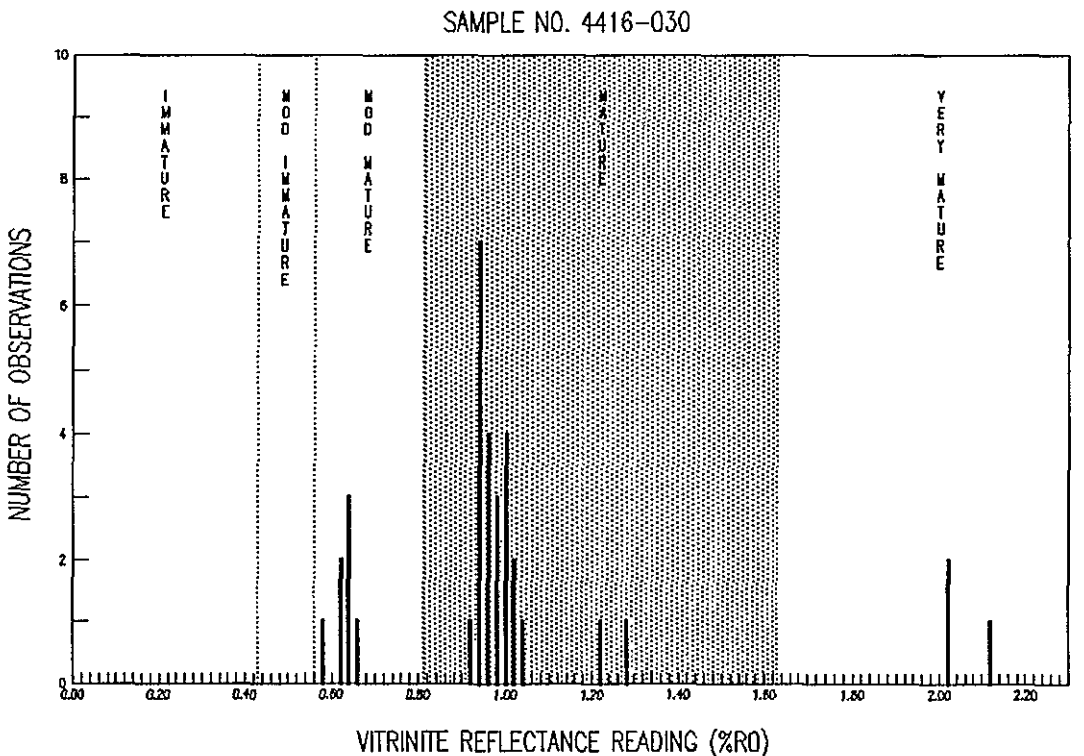
VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-030
SAMPLE TYPE	CUTTINGS	CLIENT NO.	13900-13930 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

0.58	0.60	0.61	0.62	0.62	0.63	0.65	0.90	0.92	0.92	0.92	0.93	0.93	0.93	0.93
0.94	0.95	0.95	0.95	0.96	0.96	0.97	0.98	0.98	0.98	0.99	1.00	1.00	1.02	1.20
1.26	2.00	2.00	2.10											

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	7	0.58	0.65	0.62	0.021	MODERATELY MATURE
2	22	0.90	1.02	0.96	0.031	MATURE
3	2	1.20	1.26	1.23	0.030	MATURE
4	3	2.00	2.10	2.03	0.047	VERY MATURE



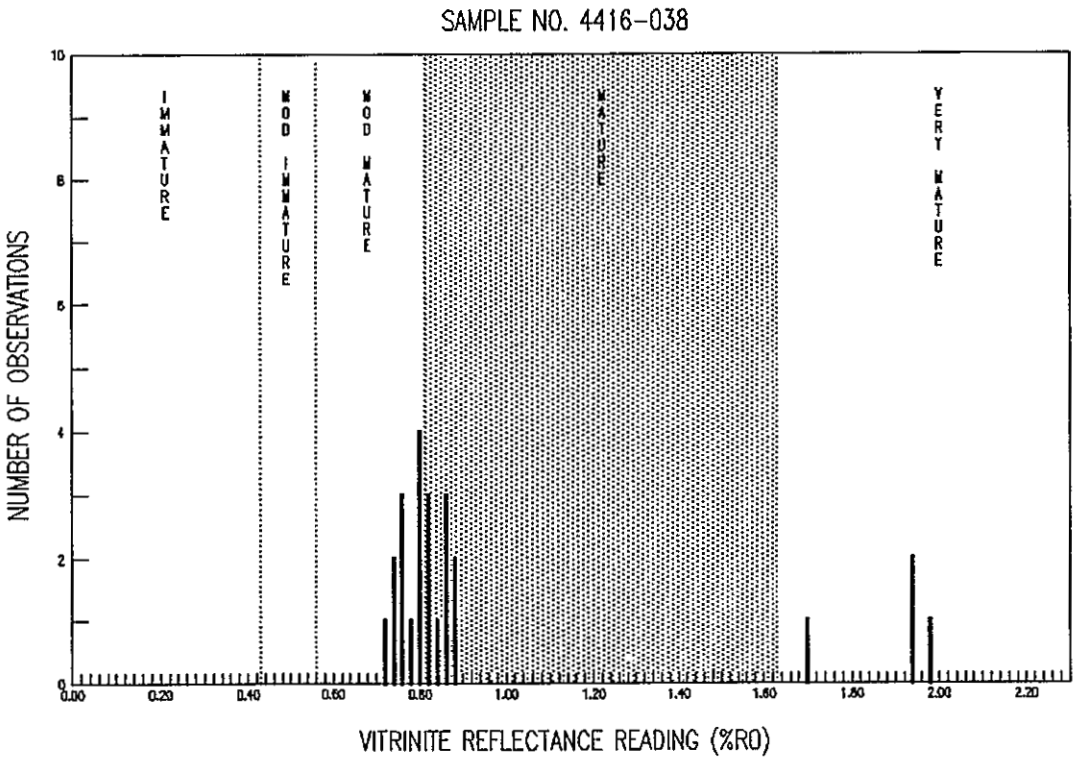
VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-038
SAMPLE TYPE	CUTTINGS	CLIENT NO.	14720-14750 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

0.70	0.72	0.72	0.74	0.75	0.75	0.77	0.78	0.78	0.78	0.78	0.80	0.81	0.81	0.83
0.84	0.84	0.84	0.86	0.87	1.69	1.92	1.93	1.96						

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	20	0.70	0.87	0.79	0.048	MODERATELY MATURE TO MATURE
2	1	1.69	1.69	1.69	—	VERY MATURE
3	3	1.92	1.96	1.94	0.017	VERY MATURE

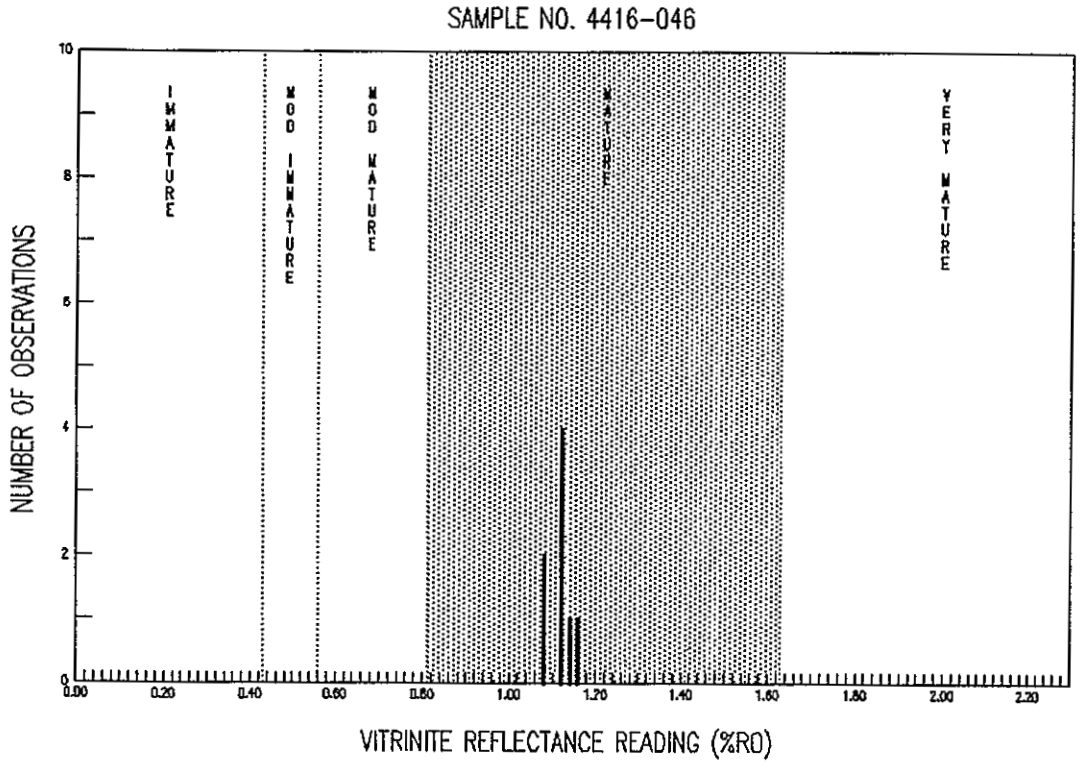


VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-046
SAMPLE TYPE	CUTTINGS	CLIENT NO.	15610-15640 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS: 1.06 1.07 1.10 1.11 1.11 1.11 1.13 1.14

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
1	8	1.06	1.14	1.10	0.025	MATURE

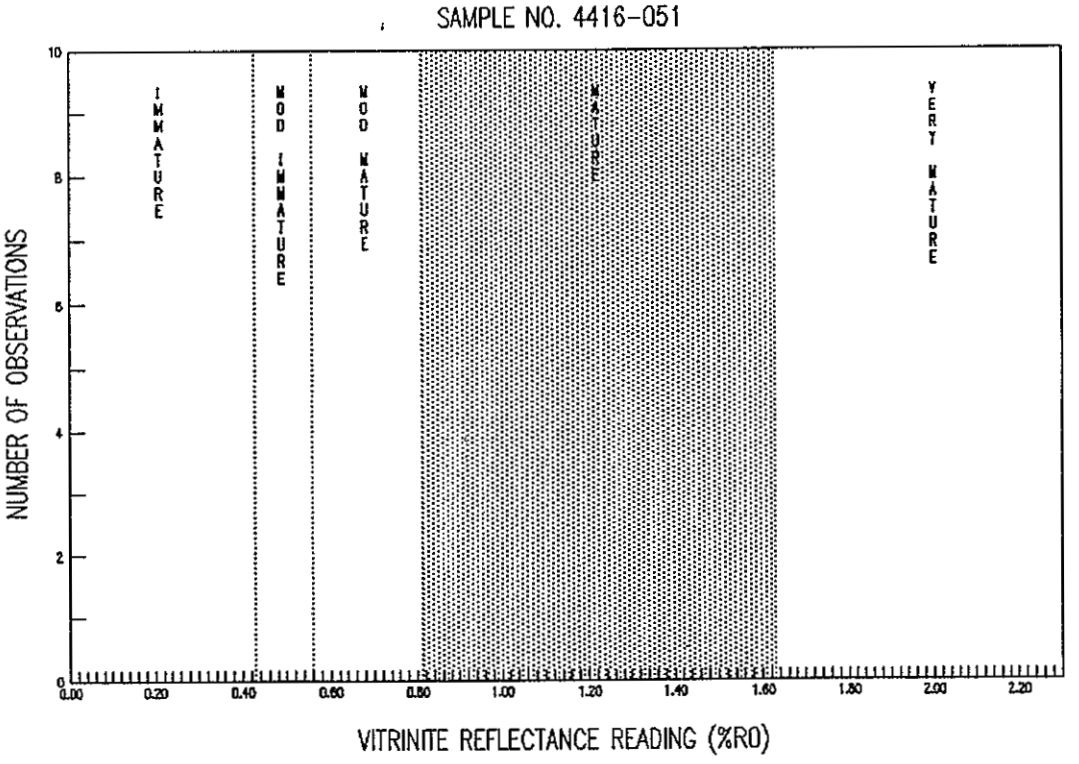


VITRINITE REFLECTANCE HISTOGRAM

CLIENT	BURLINGTON RESOURCES	GEOCHEM NO.	4416-051
SAMPLE TYPE	CUTTINGS	CLIENT NO.	16120-16150 FEET
LOCATION	SHELL OIL CO., #1 ISLETA CENTRAL WELL	DATE	SEPTEMBER 29, 1998

READINGS:

POPULATION	NO. READINGS	MIN. %Ro	MAX. %Ro	MEAN %Ro	STD. DEV. (%)	MATURITY RANK
NO VITRINITE !						



APPENDIX I

Rock-Eval Pyrograms

DATE: 09-15-98 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	100.00	429	0.38	3.38	0.75	0.10	4.50	0.31	2.89	116	25	

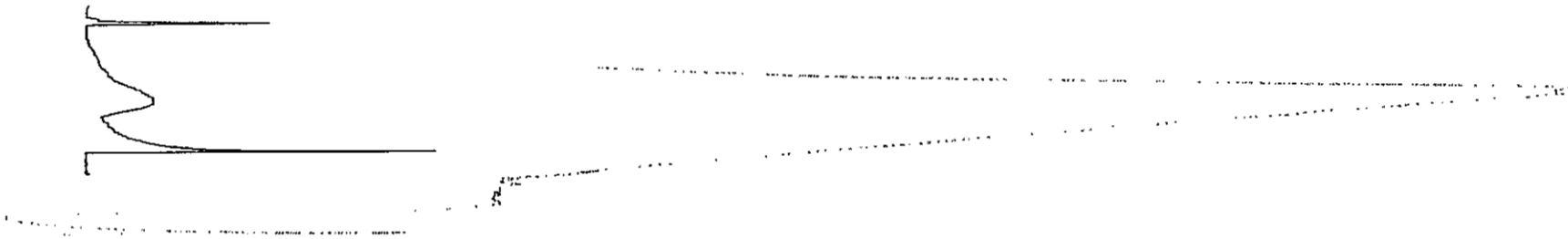
DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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	111	100.0	250	0.00	0.00	0.93	0.00	0.00	0.00	1.00	0	93

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

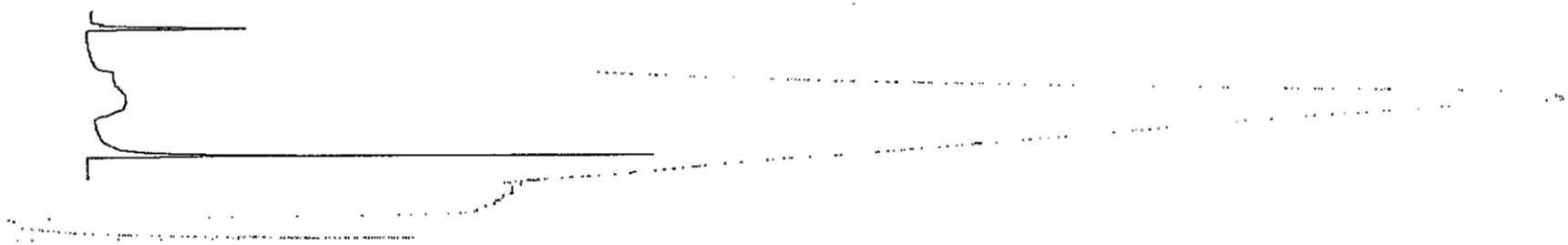
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-003	97.0	314	0.50	0.63	0.43	0.45	1.46	0.09	0.26	242	165



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

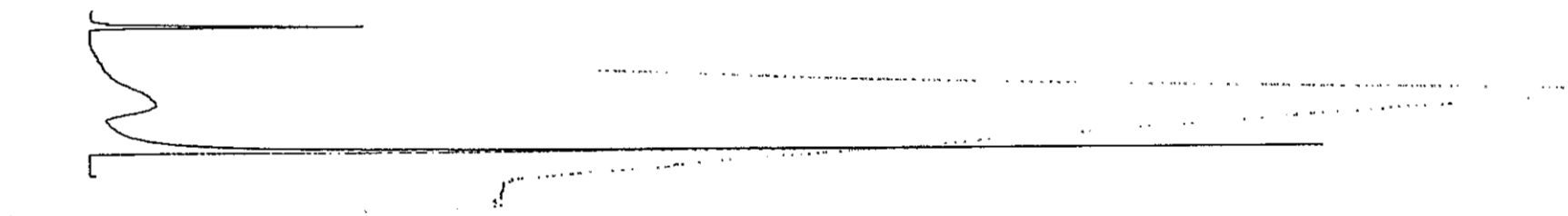
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-002	95.1	335	0.35	0.48	0.46	0.43	1.04	0.06	0.23	208	200



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

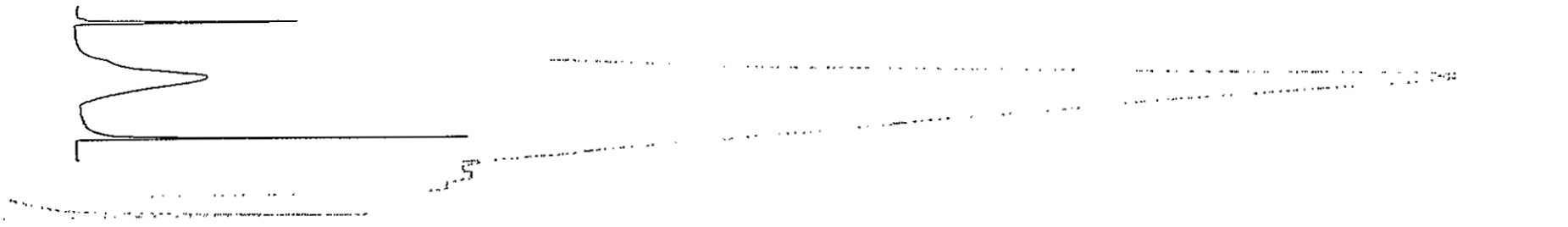
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-001	95.0	317	1.21	0.67	0.82	0.64	0.81	0.15	0.18	372	455



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

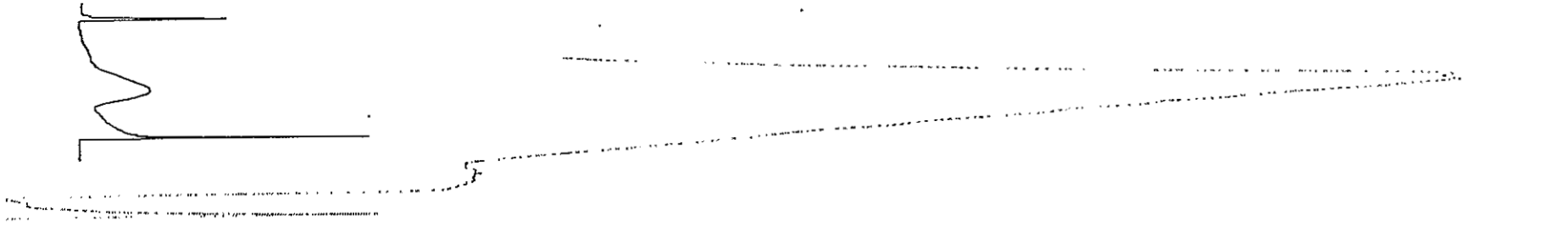
DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
4416-006	98.6	377	0.24	1.05	0.61	0.19	1.72	0.10	0.21	500	290



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

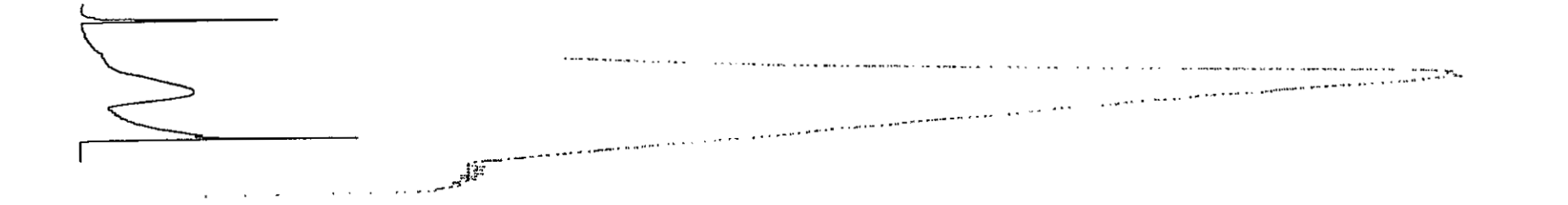
DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
4416-005	93.9	321	0.39	0.72	0.42	0.35	1.71	0.09	0.15	480	280



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
4416-004	98.5	318	0.70	1.09	0.51	0.39	2.13	0.14	0.31	351	164



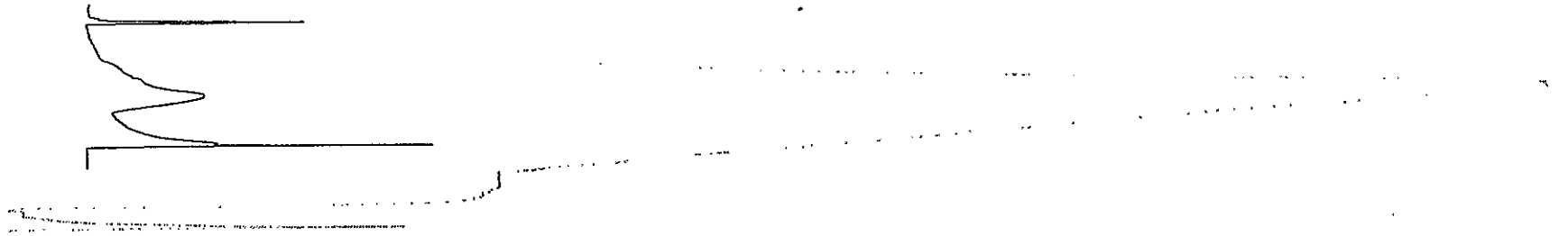
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-009	97.0	319	0.35	0.27	0.22	0.56	1.22	0.05	0.12	225	183

DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

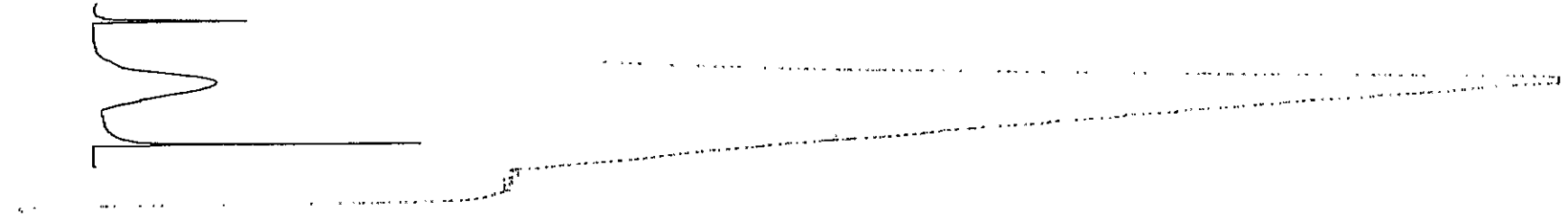
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-008	97.7	324	0.61	0.98	0.57	0.39	1.71	0.13	0.28	350	203



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

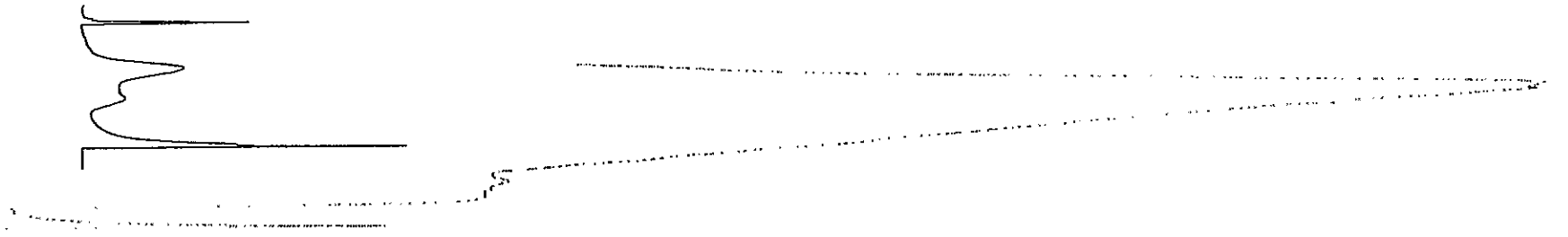
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-007	96.5	364	0.24	1.03	0.38	0.19	2.71	0.10	0.17	605	223



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

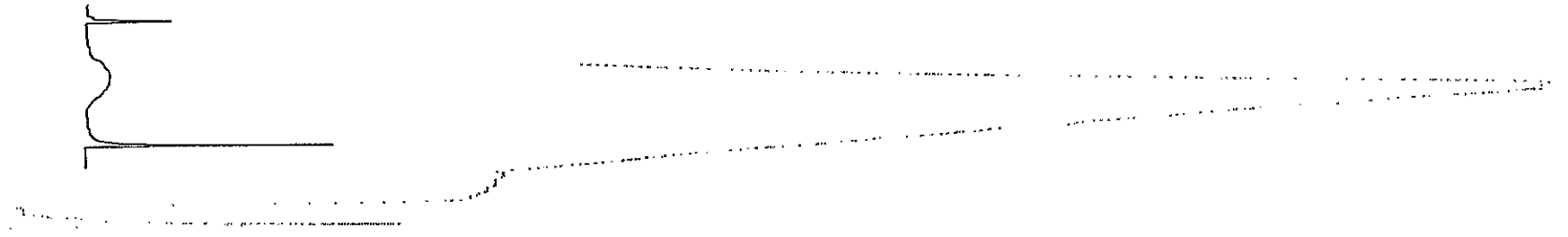
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-012	96.0	433	0.46	0.89	0.41	0.34	2.17	0.11	0.33	269	124



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

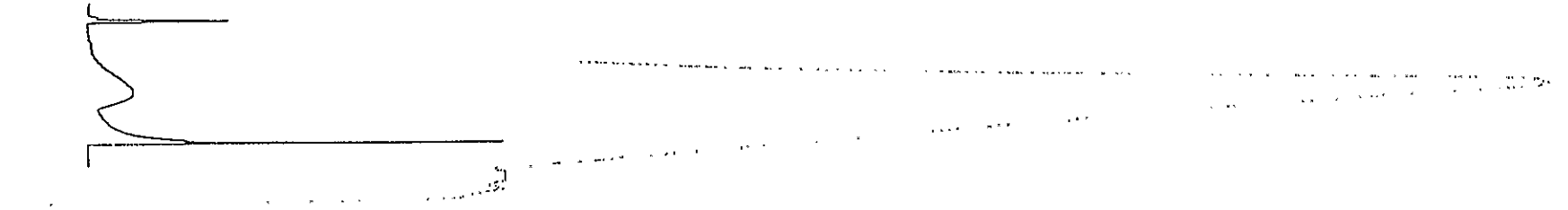
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-011	96.5	384	0.15	0.34	0.16	0.31	2.12	0.04	0.08	425	200



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

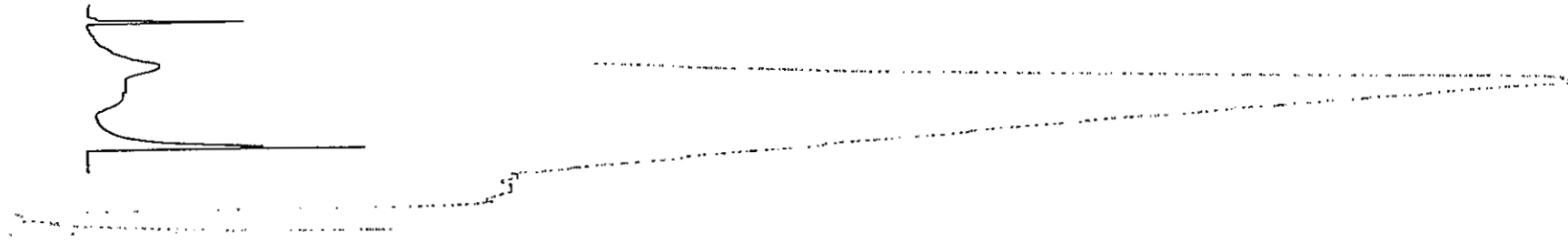
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-010	95.8	322	0.45	0.52	0.35	0.47	1.48	0.08	0.13	400	269



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

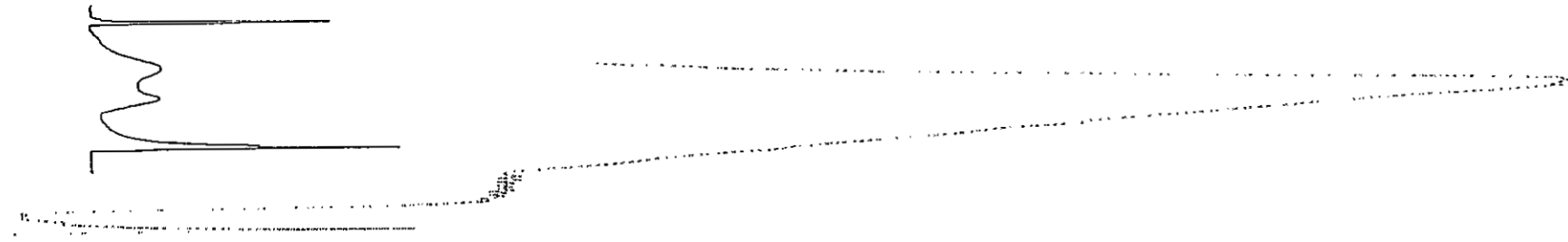
DEPTH	WTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-015	94.9	439	0.51	0.85	0.37	0.37	2.29	0.11	0.64	250	108



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

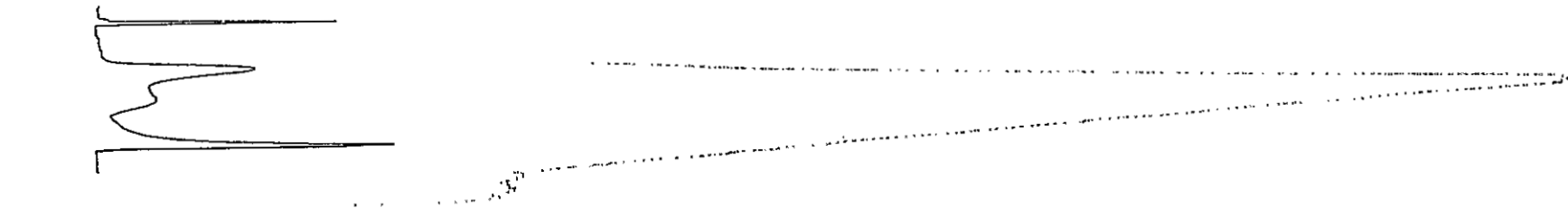
DEPTH	WTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-014	96.1	378	0.50	1.00	0.62	0.33	1.61	0.12	0.46	217	134



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

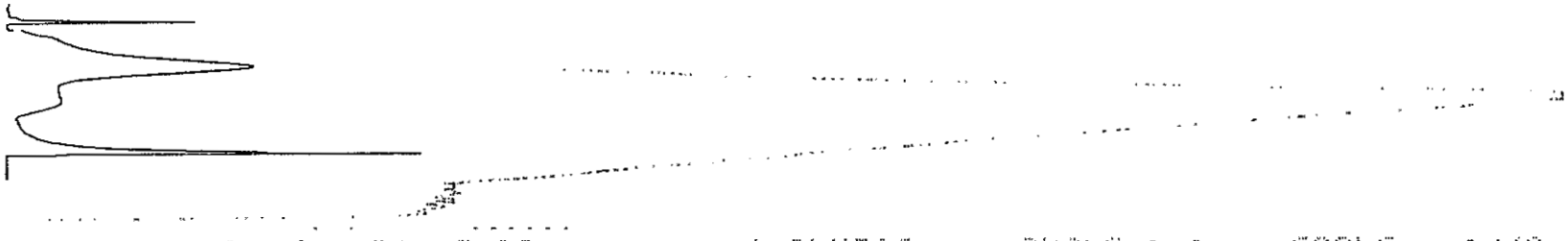
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	WTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-013	96.1	433	0.77	1.20	0.65	0.39	1.84	0.16	0.59	203	110



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

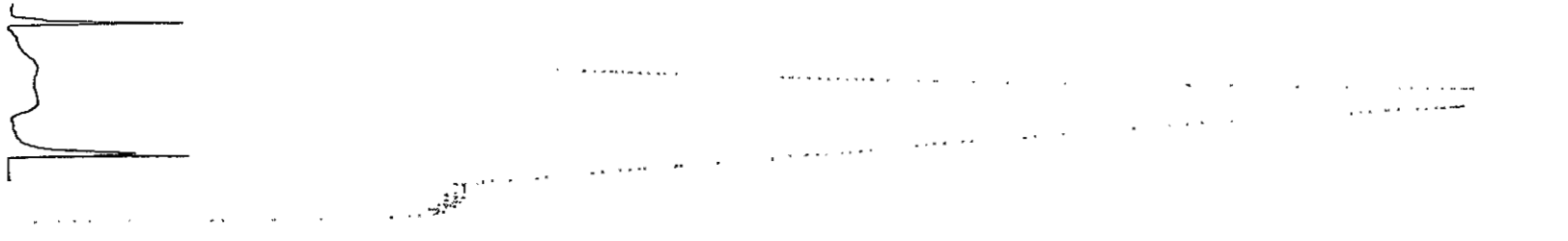
DEPTH	WTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-018	50.6	451	1.12	3.69	0.79	0.23	4.67	0.40	2.53	145	31



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

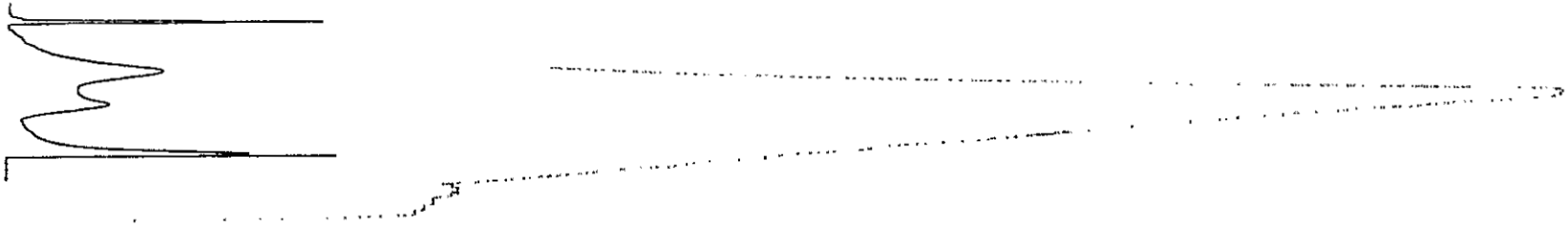
DEPTH	WTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-017	92.5	390	0.28	0.56	0.75	0.33	0.74	0.07	0.92	61	82



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

DEPTH	WTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-016	100.0	431	0.59	1.48	0.78	0.29	1.89	0.17	0.62	238	125



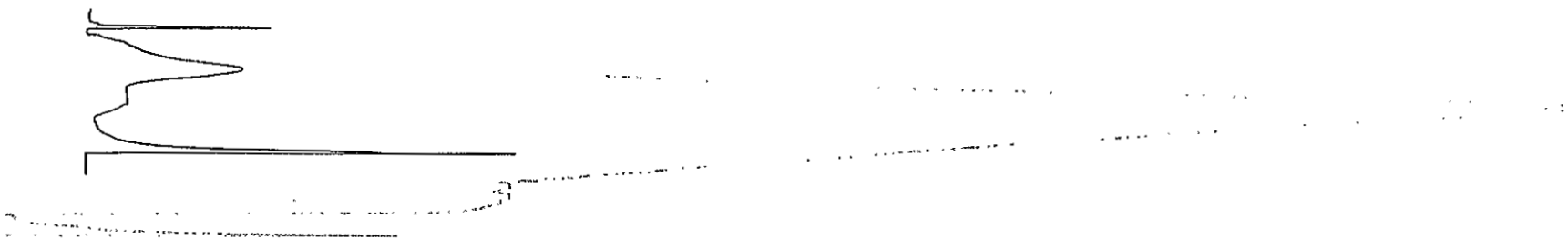
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
4416-021	87.7	443	0.42	1.28	0.43	0.25	2.97	0.14	1.00	128	43

DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

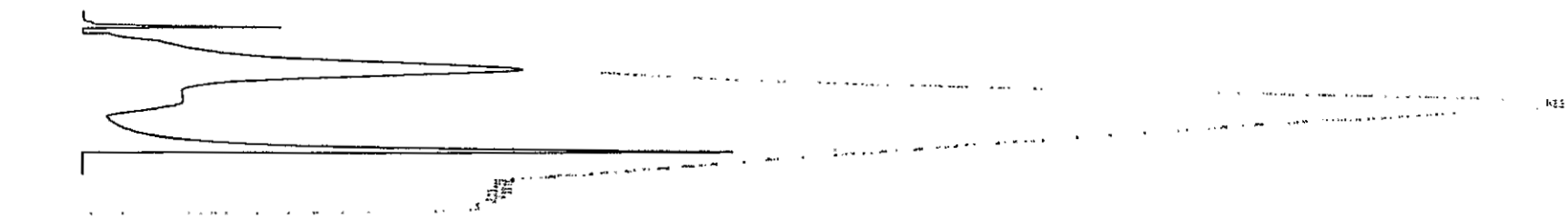
DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
4416-020	76.3	451	0.76	1.90	0.58	0.29	3.27	0.22	1.45	131	40



DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

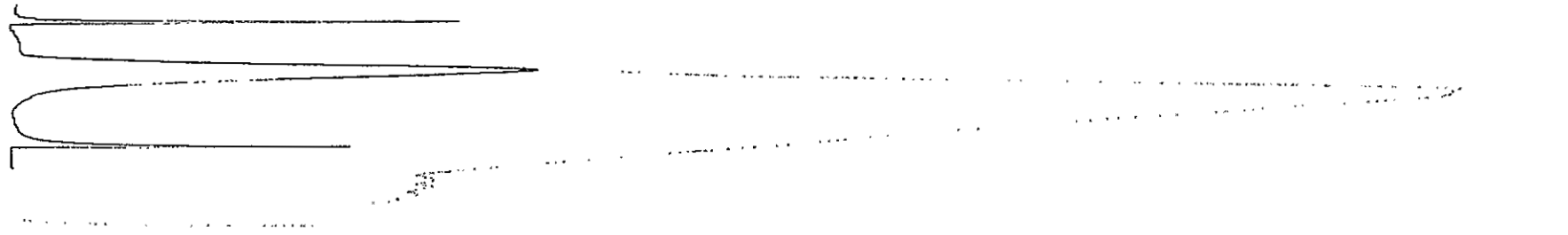
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S1	S2	S3	PI	S2/S3	PC	TOC	HI	OI
4416-019	56.5	449	2.30	6.31	0.84	0.27	7.51	0.71	3.97	158	21



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

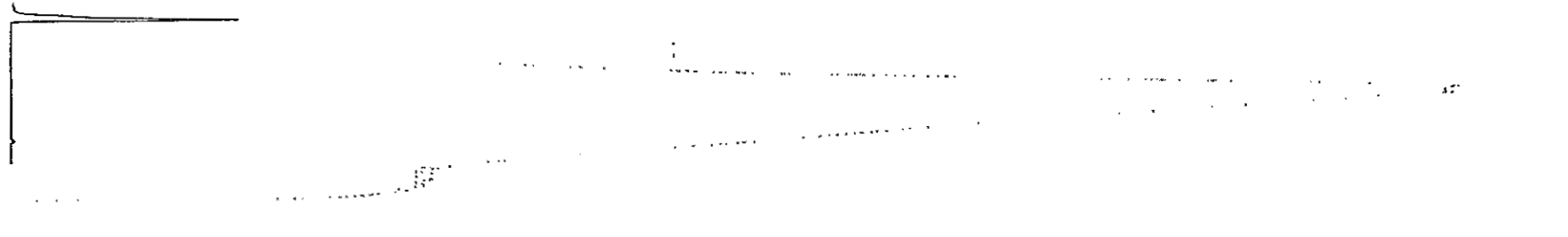
:DEPTH:	QTY :	TMAX:	S 1	: S 2	: S 3	: P I	:S2/S3	: P C	: TOC	: H I	: O I	:
STD ANAL	97.6:	427:	0.29:	2.75:	1.37:	0.10:	2.00:	0.25:	2.89:	95 :	47 :	



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

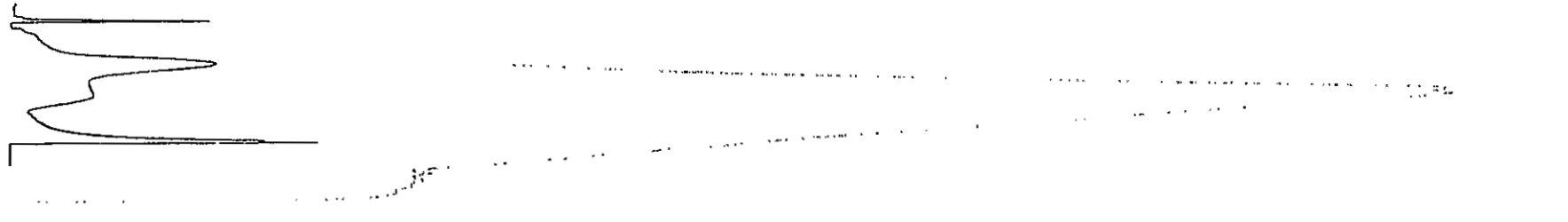
:DEPTH:	QTY :	TMAX:	S 1	: S 2	: S 3	: P I	:S2/S3	: P C	: TOC	: H I	: O I	:
BLANK	11:100.0:	229:	0.00:	0.00:	1.19:	0.00:	0.00:	0.00:	1.00:	0 :	119 :	



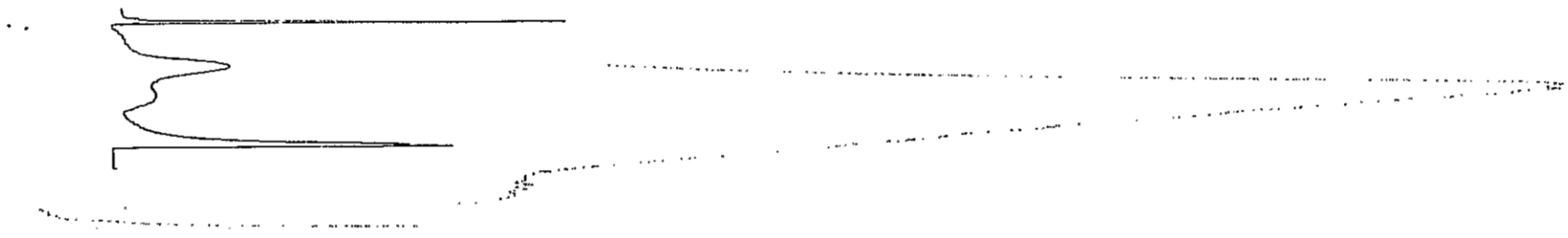
DATE: 09-15-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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	:
4416-0	22:	92.7:	445:	0.76:	2.06:	0.58:	0.27:	3.55:	0.23:	1:27:	162 :	45 :



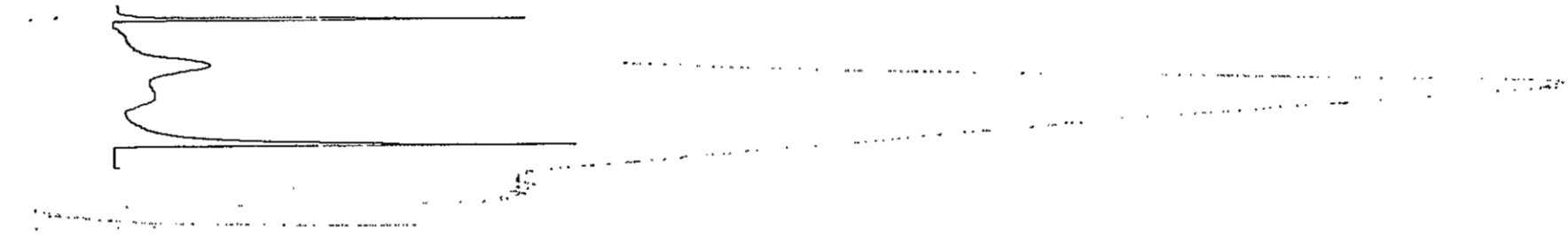
:DEPT●	WTY	:MAX:	S 1	: S 2	: S 3	: P ●	:S2/S3	: P C	: TOC	: H I	: O I ●
4416-025:	98.8:	435:	0.74:	1.06:	1.43:	0.41:	0.74:	0.15:	1.62	: 65	: 88 :



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

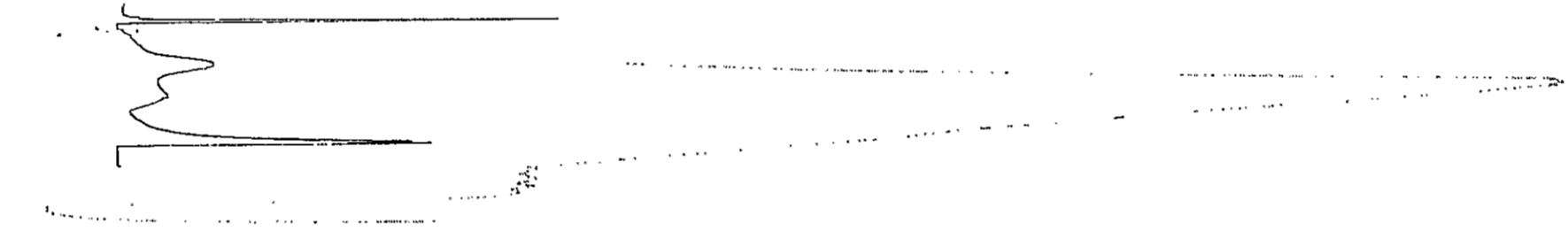
:DEPTH:	WTY	:MAX:	S 1	: S 2	: S 3	: P 1	:S2/S3	: P C	: TOC	: H I	: O I :
4416-024:	100.4:	435:	0.71:	0.94:	1.20:	0.43:	0.78:	0.13:	1.36	: 69	: 88 :



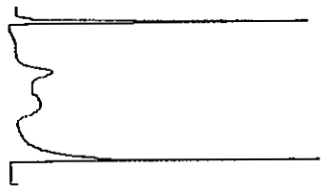
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

:DEPTH:	WTY	:MAX:	S 1	: S 2	: S 3	: P 1	:S2/S3	: P C	: TOC	: H I	: O I :
4416-023:	96.7:	440:	0.79:	1.09:	1.38:	0.42:	0.78:	0.15:	1.25	: 87	: 110 :



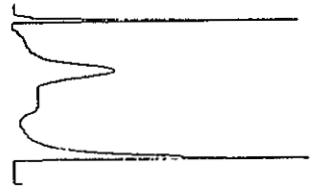
DEPTH	WIY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-028	98.5	434	0.30	0.45	0.77	0.41	0.58	0.06	0.55	82	140



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

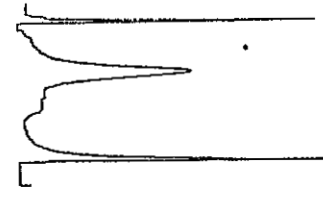
DEPTH	WIY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-027	95.2	438	0.44	0.80	0.73	0.35	1.09	0.10	1.72	47	42



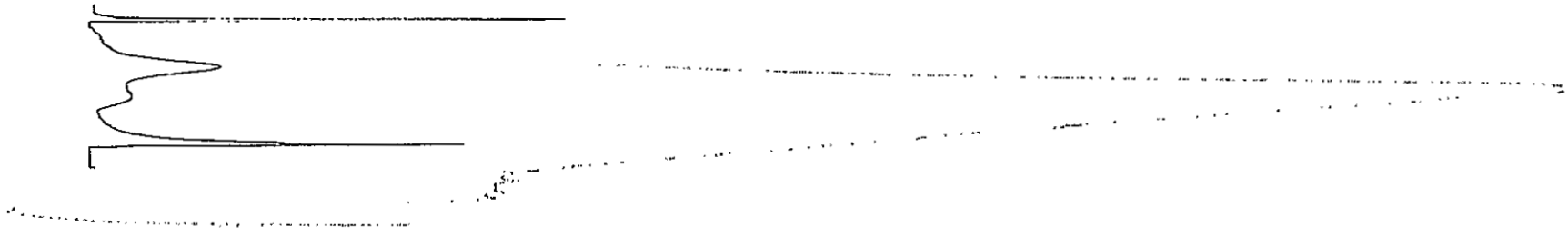
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

DEPTH	WIY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-026	99.5	437	0.38	0.97	0.83	0.28	1.16	0.11	1.51	64	55



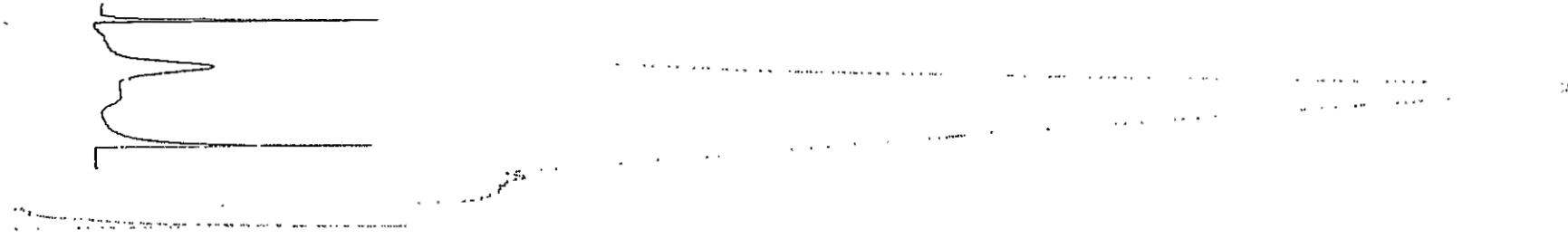
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4446-031	97.4	438	0.54	1.06	1.34	0.34	0.79	0.13	1.23	86	109



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

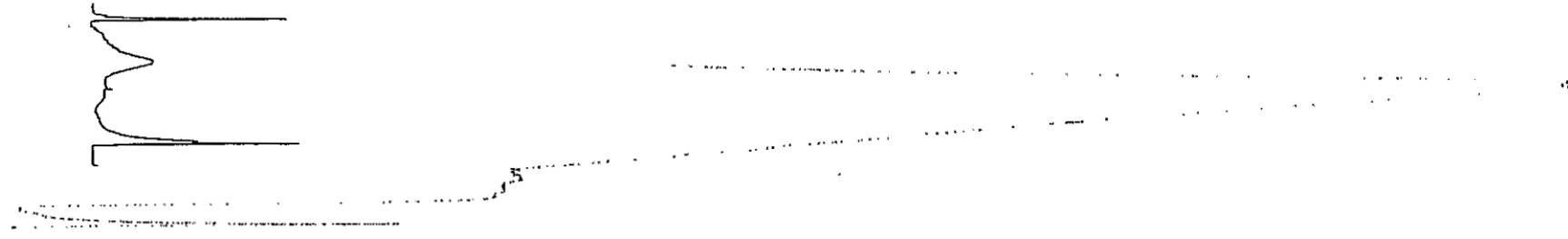
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4446-030	95.5	438	0.35	0.85	0.85	0.29	1.00	0.10	0.93	91	91



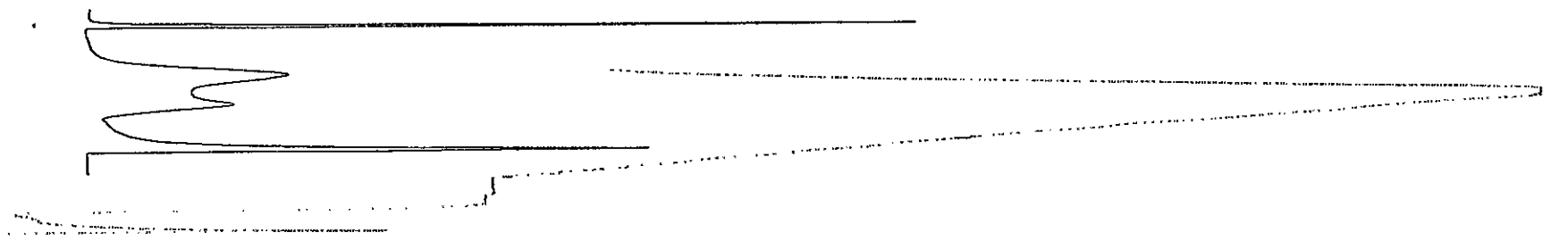
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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
4446-029	96.4	443	0.28	0.55	0.51	0.34	1.07	0.06	0.88	63	58



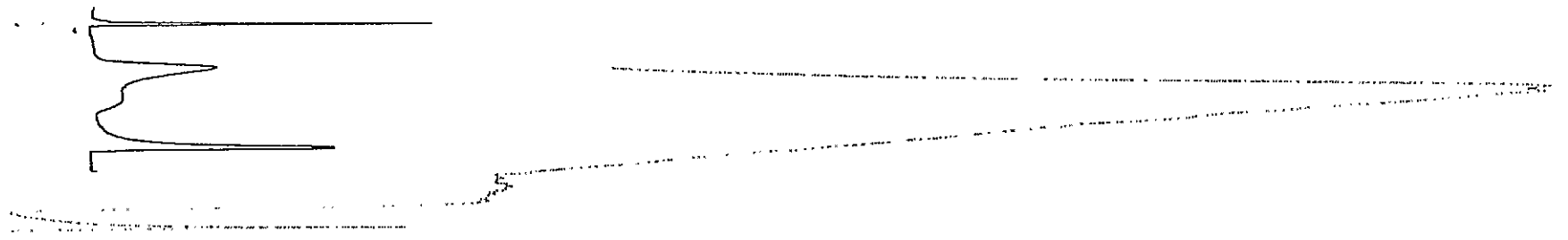
:DEPTH	QTY	:TMAX:	S 1	: S 2	: S 3	: P [redacted]	:S2/S3	: P C	: TOC	: H I	: O I [redacted]
4416-0 34:	99.9:	424:	0.97:	1.93:	2.32:	0.33:	0.83:	0.24:	1.12	: 172	: 207 :



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

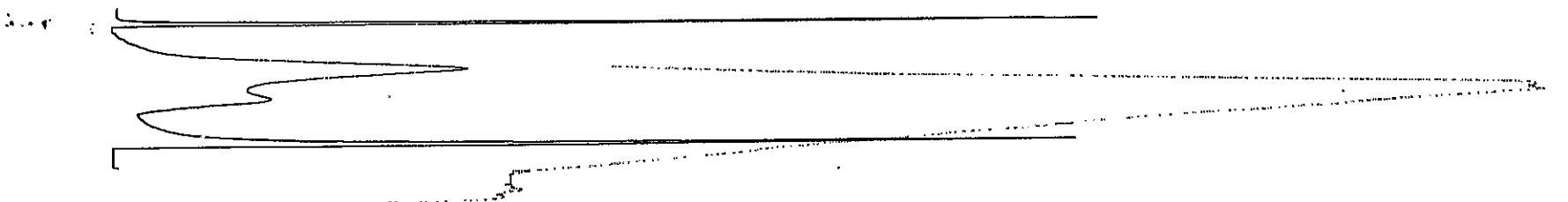
:DEPTH:	QTY	:TMAX:	S 1	: S 2	: S 3	: P 1	:S2/S3	: P C	: TOC	: H I	: O I :
4416-0 33:	102.0:	440:	0.49:	0.80:	0.92:	0.38:	0.86:	0.10:	0.45	: 178	: 204 :



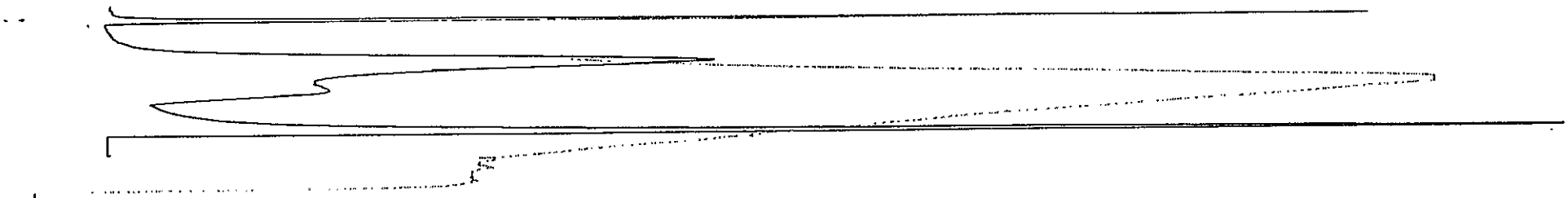
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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 :
4416-0 32:	100.3:	431:	1.40:	3.12:	2.89:	0.31:	1.07:	0.37:	1.66	: 188	: 174 :



DEPTH	QTY	TMAX	S 1	S 2	S 3	PI	S2/S3	PC	TOC	HI	OI
4416-037	104.9	432	3.16	4.79	4.19	0.40	1.14	0.66	3.48	138	120

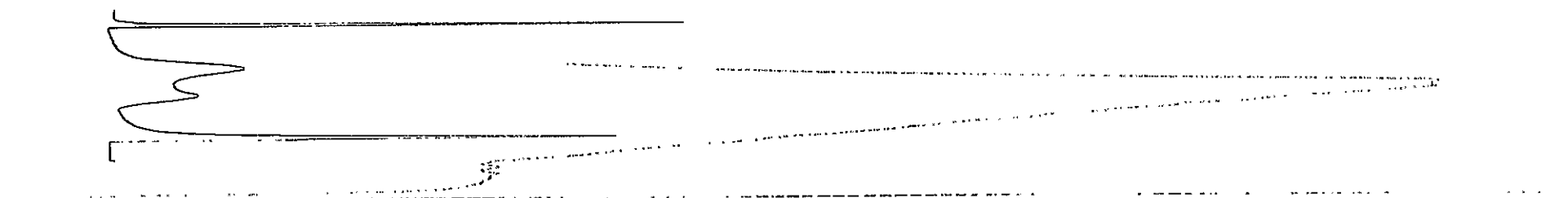


PM 8210 READY

DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

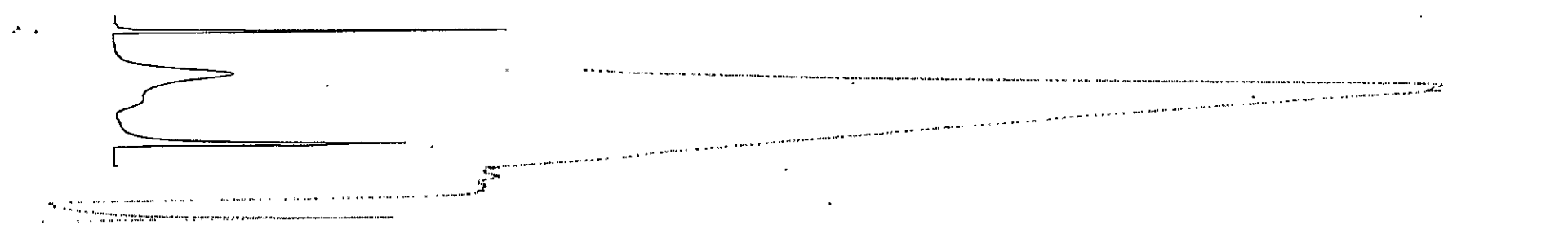
DEPTH	QTY	TMAX	S 1	S 2	S 3	PI	S2/S3	PC	TOC	HI	OI
4416-036	99.3	427	0.77	1.38	1.91	0.36	0.72	0.17	1.19	116	161



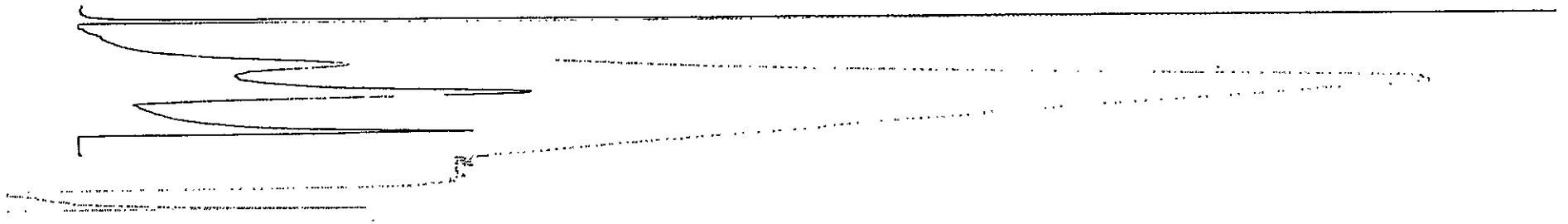
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

DEPTH	QTY	TMAX	S 1	S 2	S 3	PI	S2/S3	PC	TOC	HI	OI
4416-035	99.1	429	0.47	0.91	1.20	0.34	0.75	0.11	1.21	75	99



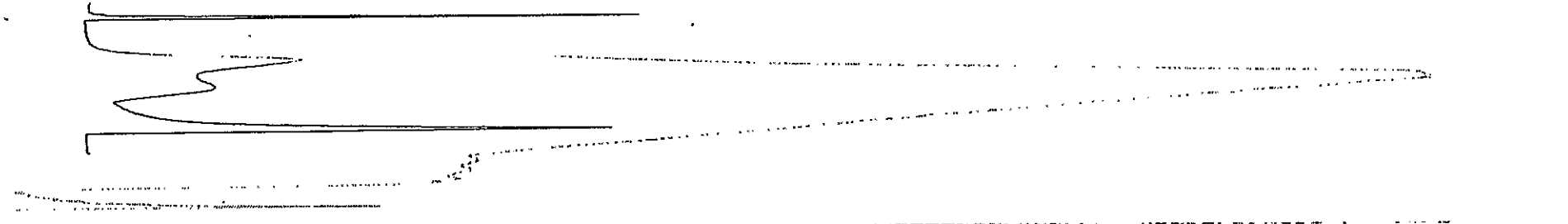
:DEPTH	QTY	:TMAX:	S 1	: S 2	: S 3	: P I	:S2/S3	: P C	: TOC	: H I	: O I	:
4416-040:	93.9:	302:	1.47:	4.18:	5.45:	0.26:	0.76:	0.47:	2.74	: 153	: 199	:



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

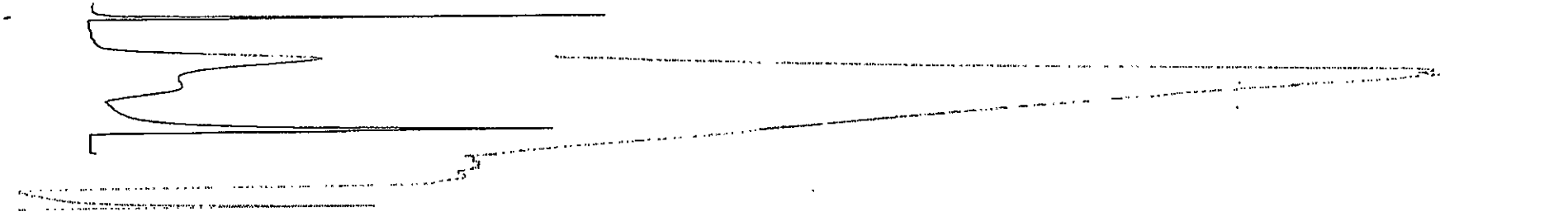
:DEPTH:	QTY	:TMAX:	S 1	: S 2	: S 3	: P I	:S2/S3	: P C	: TOC	: H I	: O I	:
4416-039:	100.1:	429:	1.31:	2.09:	1.72:	0.39:	1.21:	0.28:	1.12	: 187	: 154	:



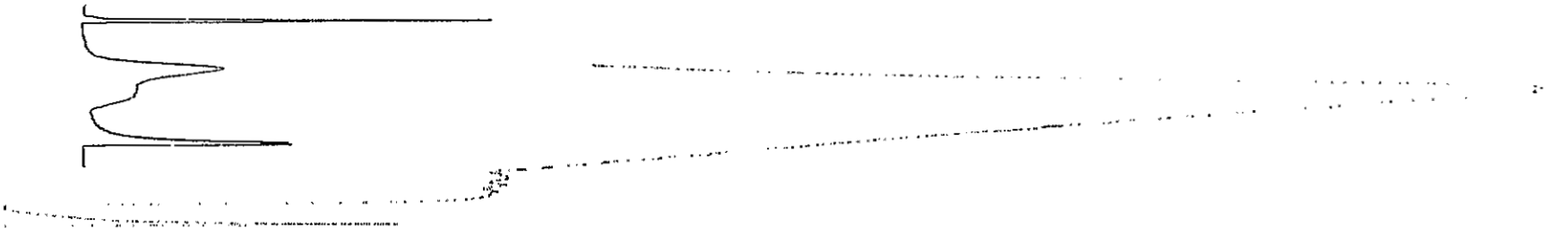
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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	:
4416-038:	101.7:	432:	0.96:	1.85:	1.59:	0.34:	1.16:	0.23:	0.96	: 193	: 166	:



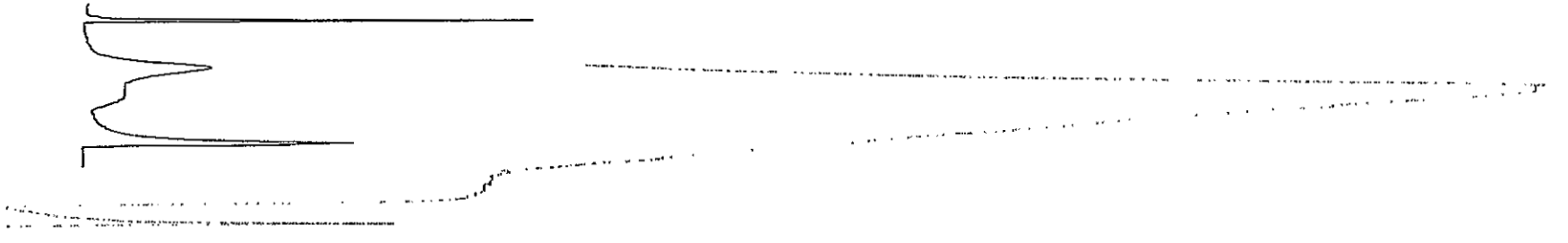
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-043	95.8	428	0.45	1.11	1.17	0.29	0.94	0.13	0.80	139	146



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

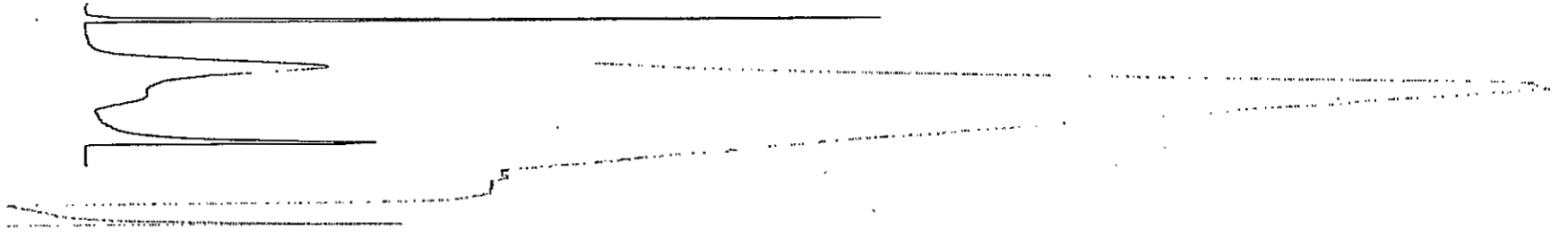
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-042	94.2	428	0.58	0.97	1.32	0.38	0.73	0.12	0.76	128	174



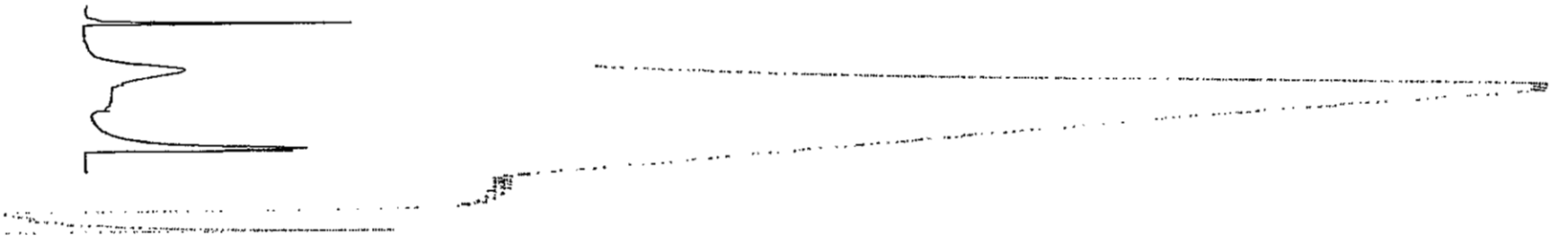
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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
4416-041	96.9	431	0.61	1.73	2.33	0.26	0.74	0.19	1.25	99	133



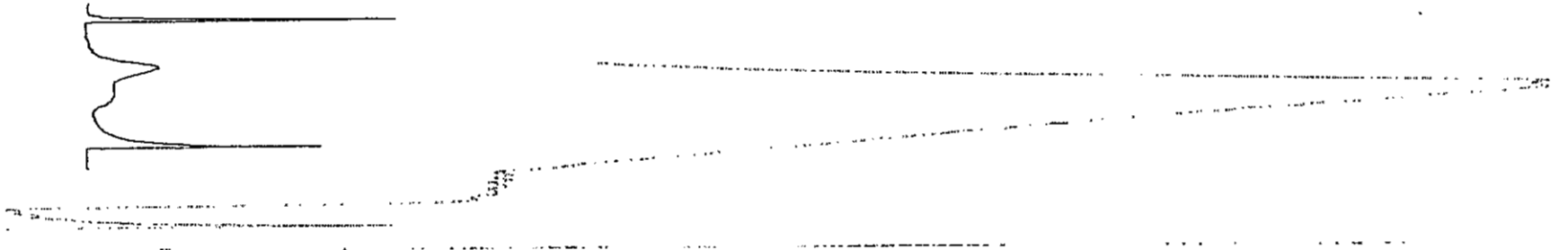
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-0 46	94.8	430	0.52	0.77	0.79	0.41	0.97	0.10	0.42	183	188



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

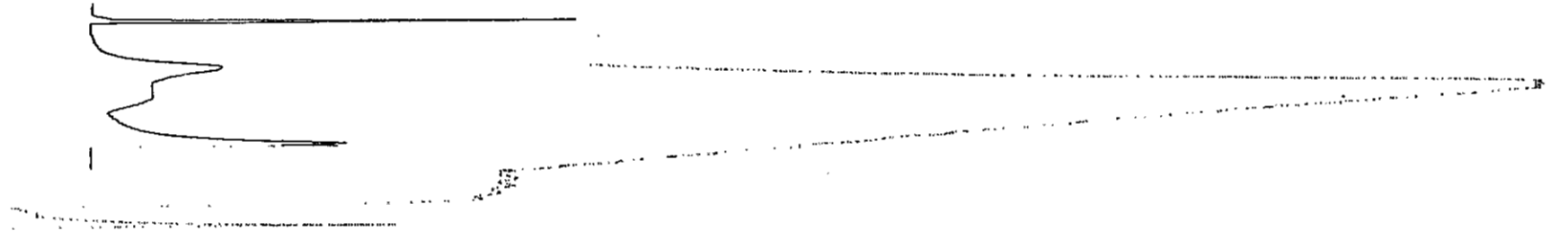
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-0 45	96.2	429	0.34	0.64	0.88	0.35	0.72	0.08	0.44	145	200



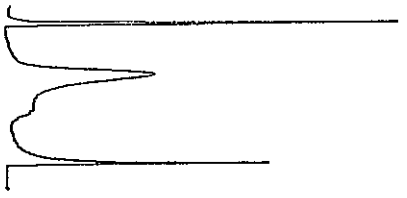
DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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
4416-0 44	94.8	431	0.80	1.24	1.43	0.39	0.86	0.17	0.66	188	217



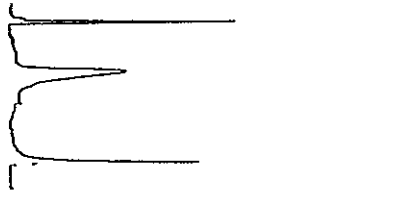
DEPT	QTY	TMAX	S 1	S 2	S 3	P	S2/S3	P C	TOC	H I	O I
4416-049	96.9	433	0.26	0.85	1.04	0.24	0.81	0.09	0.78	109	133



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

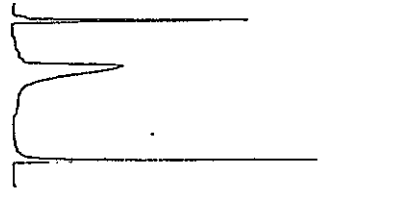
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-048	98.2	438	0.15	0.46	0.55	0.25	0.83	0.05	0.51	90	108



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

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

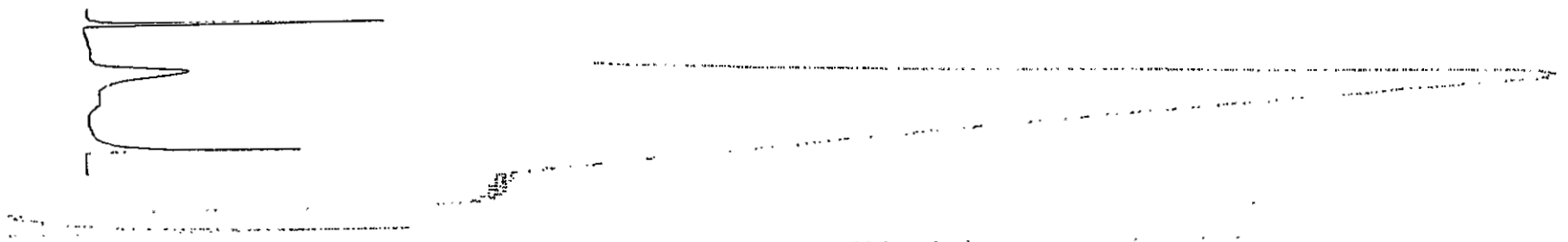
DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-047	98.4	455	0.13	0.47	0.55	0.22	0.85	0.05	0.27	174	204



DATE: 09-21-98 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
4416-0 51	99.3	433	0.23	0.62	0.93	0.27	0.66	0.07	0.91	68	102



DATE: 09-21-98 ANALYSIS CYCLE : 4 SCALE = 1/32

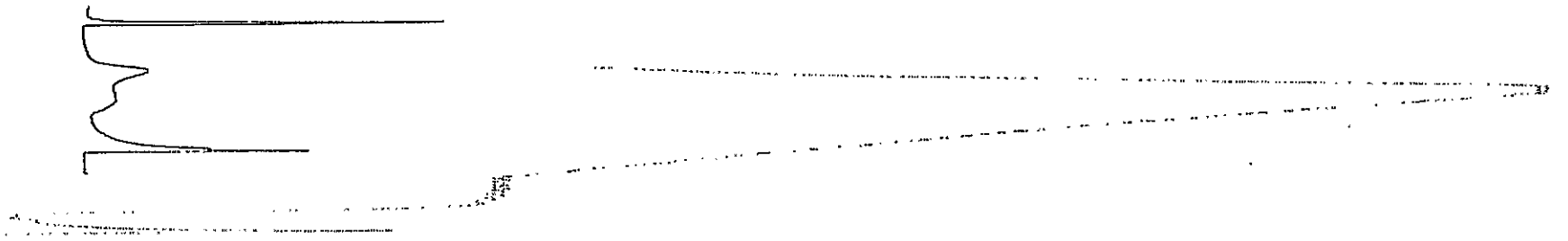
INIT TEMP = 250 ISO TIME = 5 TEMP GRADIENT=25 TRAP STOP T = 390

DEPTH	QTY	TMAX	S 1	S 2	S 3	P I	S2/S3	P C	TOC	H I	O I
4416-0 50	94.6	431	0.38	0.61	1.13	0.39	0.53	0.08	0.97	63	116

DATE: 09-21-98 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
4416-053	97.0	429	0.39	0.60	1.06	0.40	0.56	0.08	0.80	75	133



DATE: 09-21-98 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
4416O	52	98.0	436	0.16	0.35	0.71	0.32	0.49	0.04	0.55	64	129