V-621

HYDRO

Norsk Hydro a.s Bergen
E&P Research Centre

Document frontpage
Exploration and Production

3.

Doc. type: ☐ Agreement ☐ Amendment ☒ Report

Storage: ☐ 2 years ☐ 5 years ☒ Permanent archives

Grading: ☐ Open ☐ Internal ☒ Confidential ☐ Very conf. ☐ Strictly conf.

Doc. Id: R-043044

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Title

GEOCHEMICAL OIL CHARACTERIZATION OSEBERG AREA

Summary/Conclusion//Recommendation

The analysed suite of oils from the Oseberg area are very similar, and all appear to be sourced from a mature marine source rock. The oil from 30/9-9 may originate from a source rock with a slightly higher terrestrially derived input, giving a lighter oil.
Several of the oils is shown to be a composite of an early, heavily biodegraded oil, and a later migrating unaltered oil.

Keywords
OIL-OIL CORRELATION, GEOCHEMISTRY
BIOMARKERS, ISOTOPES

Pages-appendix	Amendment no.	Revision no.	Revision date

Quadrant/Block-well	Project no.	Licens no.	Date
30/9-9	300431	PL 104	06.06.90

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INTRODUCTION

The oil samples from well 30/9-9 have been characterised by petroleum geochemical techniques. and are correlated with other oils in the Oseberg/Brage area.

All samples are DST or STO unless otherwise stated.

The well locations are given in Fig. 1.

The analyses and compilation of this report has been carried out at Norsk Hydro Research Center in Bergen. except the stable isotopes which have been analysed by GeolabNor in Trondheim.

WELL	DST#	$\delta_{13}C$
30/9-9	1	-27.87
30/9-9	2	
30/9-8	2A	-28.40
30/9-7	1	-28.12
30/9-3A	1	-28.03
30/6-5	RFT	
30/6-9	1	
31/4-7	STO	-28.66

Table 2: $\delta^{13}C$ composition of topped whole oils.

The saturated hydrocarbon fractions have been analysed by gas chromatography and gas chromatography-mass spectrometry.

The gas chromatograms of the saturated hydrocarbon fractions are given in Appendix 2. and the normalised results of metastable ion monitoring of biological markers of the terpane and sterane type using a VG 7070E mass spectrometer interfaced to a HP5890 GC are given in Appendix 3.

Molecular parameters from the gas chromatography of the saturated hydrocarbons are given in Table 3.

WELL	DST#	Prist/n-C_{17}	Prist/Phyt	CPI	n-C_{17}/n-C_{27}
30/9-9	1	0.96	3.28	1.04	3.28
30/9-9	2	0.98	3.20	1.03	3.08
30/9-8	2A	0.80	1.84	1.01	3.72
30/9-7	1	0.89	2.09	0.96	3.40
30/9-3A	1	0.88	2.01	1.01	6.26
30/6-5	RFT	0.86	1.45	1.04	3.43
30/6-9	1	0.57	1.58	0.98	3.75
31/4-7	STO	0.85	1.38	0.98	2.88

Table 3: Molecular parameters from GC of saturated fractions.

The ratio of Pristane/n-C_{17} range from 0.96 in the 30/9-9 oils to 0.57 in the oil from 30/6-9, and suggests that these oils are unaffected by biodegradation.
The Pristane/Phytane ratios range from 3.28 in the oils from 30/9-9 to 1.38 in the oil from 31/4-7. This parameter may reflect the oxygen level at the time of deposition of the source rock, but is also affected by maturity. Here it probably reflects a higher maturity of the 30/9-9 oils.
The CPI (Carbon Preference Index) values are all around 1.0 suggesting mature, marine oils. Higher values suggest a odd over even carbon number predominance which is typical of immature organic matter.
The ratio of n-C_{17} to n-C_{27} gives an estimate of how light the oil is. High values suggest condensate like samples. This value range from 2.88 to 6.26. The latter value is from the 30/9-3A oil and suggests that this oil is lighter than the other oils in this study.

In this study the biological markers in the saturated hydrocarbon fraction have been analysed both by Single Ion Monitoring GC-MS and Metastable Ion Monitoring GC-MS. The biomarker ratios from the monitoring of steranes are given in Table 4.

WELL	DST#	%20S	%αββ	%C_{27}	%C_{28}	%C_{29}	C_{21}/C_{29}	Dia/Reg
30/9-9	1	49	63	23	38	39	0.22	1.14
30/9-9	2							
30/9-8	2A	55	60	22	44	34	0.39	1.61
30/9-7	1	52	59	23	43	36	0.28	1.07
30/9-3A	1	54	63	22	42	36	0.32	1.24
30/6-5	RFT	54	65	25	44	31	0.41	1.16
30/6-9	1	54	60	26	43	31	0.56	1.81
31/4-7	STO	52	65	20	50	30	0.43	1.08

Table 4: Sterane biomarker ratios from Oseberg oils.

The maturity parameters %20S and %αββ have both reached their equilibrium values showing that these oils have been generated at average maturities higher than 0.7% vitrinite reflectance.

The Sterane Carbon Number distribution ($\%C_{27}.\%C_{28}.\%C_{29}$) is sensitive to the orginic input in the source of these oils. These values are very similar, and are typical of the Upper Jurassic Draupne Fm. There is no indication of contribution from another source to these oils.

The ratio of C_{21} steranes to C_{29} steranes (C_{21}/C_{29}) is both source and maturity dependent. In these oils with a limited range of maturities, this ratio probably reflects source variations. This ratio range from 0.22 to 0.56, with the higher values in the oil from 30/6-9. The oils from 30/9-9 have the lowest values.

The ratio of diasteranes to regular steranes (Dia/Reg) is a function of both the lithology of the source facies and maturity. Lower values indicate a lower maturity or a more carbonate dominated source lithology. The lowest values are represented by the oils from 30/9-7 and 31/6-7.

The biomarker ratios calculated from the terpanes are listed in Table 5.

WELL	DST#	Ts/Tm	25-nor/nor	24/23	23/Hop	St/Hop
30/9-9	1	2.01	0.01	1.35	0.03	1.55
30/9-9	2					
30/9-8	2A	1.27	0.32	0.31	0.05	1.22
30/9-7	1	1.21	0.20	0.34	0.04	1.36
30/9-3A	1	1.37	0.21	0.37	0.04	1.33
30/6-5	RFT	2.08	0.00	0.62	0.07	1.52
30/6-9	1	1.46	0.25	0.76	0.06	1.21
31/4-7	STO	2.03	0.00	0.64	0.07	1.55

Table 5: Terpane biomarker ratios for Oseberg oils.

The ratio of Ts/Tm, which is maturity dependent within a confined type of depositional environment, range from 1.21 to 2.13, with the higher values representing higher maturity. The ratio of 25-norhopane to norhopane (25-nor/nor) is dependent on biodegradation. With intense biodegradation 25-norhopanes are generated. The values in Table 5 suggests that the oils from 30/9-8, 30/9-7, 30/9-3A and 30/6-9 contains two migration pulses, one early oil which has been very heavily biodegraded, and a fresh, unaltered oil which migrated in at a later stage.

The ratio of C_{24}-tetracyclic terpane to C_{23}-trycyclic terpane (C_{24}/C_{23}) show little variataion except for the 30/9-9 oil which have a much higher value for this ratio. This might indicate a somewhat higher terrestrial input to this oil. this is also supported by a slightly higher abundance of C_{29} steranes in these oils.

The ratio of C_{23}-tricyclic terpane to hopane (C_{23}/Hop) show little variation.

The Sterane to Hopane ratio (St/Hop) is also relatively constant.

CONCLUSION

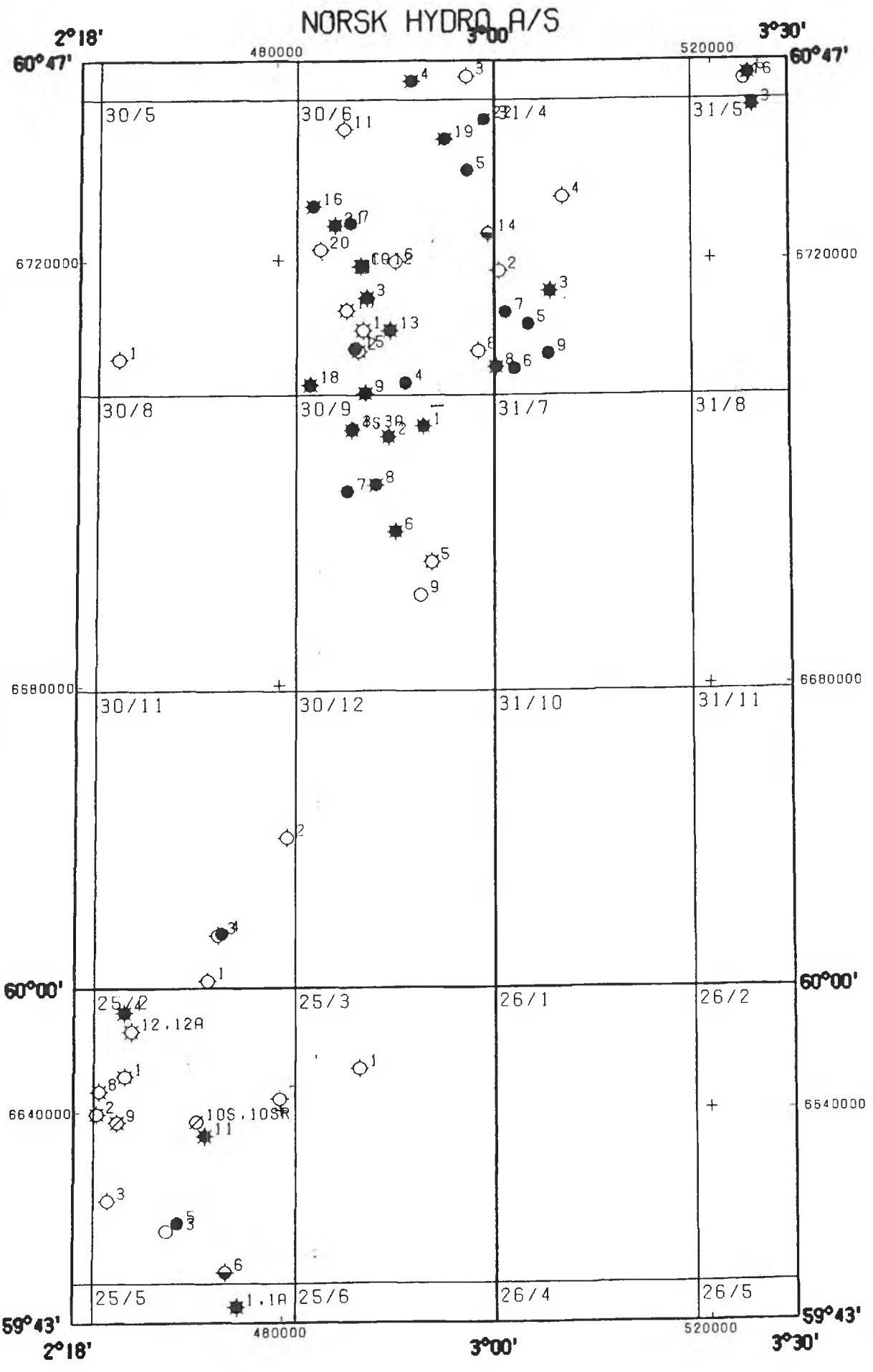
The different tests from well 30/9-9 appears to be near identical based on the distribution of light hydrocarbons.

The analysed suite of oils from the Oseberg area are very similar. and all appear to be sourced from a mature marine source rock. The oil from 30/9-9 may originate from a source rock with a slightly higher terrestrially derived input. giving a lighter oil. Several of the oils is shown to be a composite of an early. heavily biodegraded oil. and a later migrating unaltered oil.

FIGURE 1: Well location map.

1:400000

C.M.030000E



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APPENDIX 1

DISTRIBUTION OF C_1-C_9 HYDROCARBONS IN 30/9-9 TESTS

Injection Report

Acquired on 9-MAY-1990 at 13:11

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analyst Name : NILS
Lims Id :
Comment : 30/9-9 OILS CORRELATION
Method Title : C10- ANALYSE
Sample Name : 30/9-9 RFT2B
Sample Id :
Sample Type : Sample Amount=1.00000
Bottle No : 1

PEAK INFORMATION

Peak	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
_	4.112	4.103	559.314	87	145	0.001		1.6	
2	4.320	4.310	560.990	4440	7233	0.059	PROPANE	1.6	
3	4.643	4.632	563.590	6069	10236	0.084	ISO-BUTANE	1.8	
4	4.920	4.909	565.825	16143	29216	0.238	N-BUTANE	1.9	P
5	5.061	5.050	566.964	124	208	0.002		1.9	R
6	5.925	5.912	573.926	19486	42023	0.343	ISO-PENTANE	2.1	
7	6.469	6.455	578.310	25124	57850	0.472	N-PENTANE	2.2	
8	7.499	7.476	586.605	855	2327	0.019	CYCLOPENTANE	2.7	
9	8.589	8.559	595.394	3547	10317	0.084	2,3DM-BUTANE	2.9A	CF
10	8.640	8.609	595.802	2649	8139	0.066		3.5A	O
11	8.816	8.784	597.220	14956	46262	0.377	2M-PENTANE	2.9	CL
12	9.515	9.477	602.850	8417	28233	0.230	3M-PENTANE	3.2	
13	10.480	10.440	610.630	24313	87382	0.713	HEXANE	3.4	
14	12.152	12.109	624.103	576	2411	0.020	2.2DM-PENTANE	4.0	CF
15	12.341	12.297	625.629	14131	61201	0.499	M-CYCLO PENTANE	4.2	PCL
16	12.632	12.587	627.971	1159	4899	0.040	2,4-DM PENTANE	4.2	R
17	13.088	13.042	631.646	153	677	0.006	2,2,3-TM BUTANE	4.3	
18	14.347	14.298	641.789	4734	23955	0.195	BENZENE	4.8	
19	14.917	14.868	646.388	293	1510	0.012	3,3-DM PENTANE	5.0	
20	15.291	15.240	649.396	23196	121340	0.990	CYCLO HEXANE	5.0	
	16.264	16.210	657.240	6766	34294	0.280	2M-HEXANE	5.0	CF
22	16.429	16.374	658.572	2251	11822	0.096	2,3-DM PENTANE	5.0	O
23	16.709	16.653	660.829	1430	7664	0.063	1,1 DM CY-PENTANE	5.1	CL
24	17.219	17.161	664.933	7053	36679	0.299	3-M HEXANE	5.0	
25	17.899	17.838	670.413	2799	14992	0.122	C1,3DM-CYPEN	5.1	
26	18.213	18.152	672.949	2559	13802	0.113	T1,3-DM CYCLOPENTANE	5.3	CF
27	18.379	18.317	674.281	542	2740	0.022	3-ETYL PENTANE	5.4A	O
28	18.528	18.465	675.484	4392	25223	0.206	T1,2-DM CYCLOPENTANE	5.4	O
29	18.747	18.683	677.246	16701	91923		ISO-OCTANE	5.3	CL
30	20.125	20.057	688.356	21365	116771	0.953	N-HEPTANE	5.3	
31	22.517	22.451	707.632	40062	256808	2.095	M-CYCLO HEXANE	6.1	P
32	22.891	22.825	710.641	1619	8686	0.071	2,2-DM HEXANE	5.3	R
33	23.973	23.908	719.365	2227	12531	0.102	ETHYL CYCLOPENTANE	5.4	CF
34	24.219	24.154	721.342	981	5784	0.047	2,5-DM HEXANE	5.6	O
35	24.456	24.391	723.255	1238	6773	0.055	2,4-DM HEXANE	5.3	CL
36	25.139	25.075	728.756	1479	8457	0.069	1T,2C,4-TM CYCLOPENTANE	5.6	CF

Pk	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
37	25.339	25.275	730.368	358	2029	0.017	3,3-DM HEXANE	5.6	CL
38	26.104	26.041	736.535	1394	8101	0.066	1,T2,C3-TM CYCLOPENTANE	5.6	
39	26.485	26.423	739.608	188	1066	0.009	2,3,4-TM PENTANE	5.6	
40	26.960	26.898	743.433	17217	104463	0.852	TOLUENE	5.8	
41	28.003	27.940	751.836	1542	9067	0.074	2,3-DM HEXANE	5.6	CF
42	28.155	28.092	753.061	370	2075	0.017	2M,3ET PENTANE	5.8A	CL
43	28.877	28.814	758.884	7759	44754	0.365	2-M HEPTANE	5.6	CF
44	29.061	28.998	760.367	2400	14139	0.115		5.6	O
45	29.171	29.107	761.248	339	2368	0.019		15.0A	CL
46	29.912	29.848	767.222	5743	28972	0.236		7.0A	CF
47	30.000	29.936	767.931	8526	54020	0.441	3-M HEPTANE	5.8A	O
48	30.245	30.182	769.908	3753	21281	0.174	C1,3DM-CYHEXANE	5.4	CL
49	30.963	30.902	775.689	1261	7643	0.062	1,1-DM-CYHEXANE	5.9	
50	31.501	31.442	780.030	642	3525	0.029	C1,2-M,ET PENTANE	5.4	
51	31.789	31.731	782.351	611	3606	0.029	1-ET,2-M CYPENTANE	6.6	CF
52	31.963	31.905	783.747	1373	9031	0.074		6.2	CL
53	32.232	32.175	785.918	210	1222	0.010	C-1,4-DM CYHEXANE	5.8	
54	32.613	32.558	788.991	4431	26957	0.220	T1,3DM-CYHEXANE	5.9	
	33.611	33.558	797.028	23749	145891	1.190	N-OCTANE	5.9	
	35.419	35.352	811.598	143	805	0.007	2,4-DM HEPTANE	5.6	
57	35.765	35.696	814.391	154	831	0.007	USPES. C-9	5.4	CF
58	35.968	35.897	816.024	177	1002	0.008	2,2-DM HEPTANE	5.6	CL
59	36.259	36.185	818.367	361	1976	0.016		5.4	
60	36.797	36.720	822.708	1405	10928	0.089		7.7	CF
61	36.907	36.828	823.589	268	611	0.005	USPES. C-9	5.8A	CL
62	37.512	37.429	828.467	10456	70131	0.572	ETYL CYCLOHEXANE	6.6	CF
63	37.723	37.641	830.164	3446	20662	0.169		5.6	FCL
64	37.960	37.879	832.077	67	253	0.002		6.1A	FO
65	37.981	37.901	832.249	55	95	7.758E-4		4.8A	FO
66	38.232	38.152	834.269	2411	14001	0.114		5.6	
67	38.592	38.514	837.170	2072	13530	0.110		6.2	CF
68	38.787	38.710	838.739	322	2482	0.020		8.3A	O
69	38.933	38.857	839.920	235	1350	0.011	1,1,4TM-CYHEX	5.8A	O
70	39.104	39.028	841.296	350	2604	0.021	1,2,4TM-CYHEX	7.0	O
71	39.312	39.237	842.972	221	1312	0.011	USPES. C-9	5.8	CL
72	39.899	39.827	847.700	4200	25939	0.212	ETYLBENZENE	6.1	CF
73	40.064	39.993	849.032	649	4731	0.039	USPES.C-9	8.3A	O
74	40.296	40.226	850.902	1546	9350	0.076	USPES. C-9	5.9	CL
	40.557	40.489	853.007	158	932	0.008		5.6	
	40.819	40.751	855.113	73	362	0.003		5.1	
77	41.117	41.051	857.520	13535	87221	0.712	M XYLENE	6.2	CF
78	41.245	41.178	858.552	4616	24376	0.199	P XYLENE	5.4A	O
79	41.373	41.306	859.583	2423	13773	0.112		5.4A	O
80	41.624	41.555	861.603	222	1325	0.011	USPES.C-9	6.1A	O
81	41.840	41.770	863.344	940	4988	0.041	3,4-DM HEPTANE	5.8A	O
82	42.021	41.951	864.805	472	2952	0.024		5.8	FCL
83	42.192	42.120	866.180	51	214	0.002		5.6	R
84	42.443	42.370	868.200	2885	16661	0.136	4-M OCTANE	5.9	CF
85	42.587	42.513	869.361	4216	24160	0.197	2M OCTANE	5.6	CL
86	42.963	42.887	872.391	364	2245	0.018	3-ET HEPTANE	5.9	
87	43.301	43.224	875.120	809	5580	0.046		7.0A	CF
88	43.472	43.394	876.495	4035	25372	0.207	3M OCTANE	5.9	CL
89	43.925	43.845	880.148	118	206	0.002		3.2A	CF
90	44.085	44.004	881.438	6245	41624	0.340	O-XYLENE	5.9	FCL
91	44.939	44.853	888.314	1130	6880	0.056	USPES.C9	7.0A	CF

Pe	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
92	45.085	44.999	889.496	4024	25000	0.204	N-BUTYLCYPENE	5.9	O
93	45.379	45.291	891.860	2486	14824	0.121	USPES. C-9	5.8	CL
94	45.720	45.630	894.611	161	842	0.007	USP.C-9	5.3	
95	45.917	45.827	896.201	264	1587	0.013		6.9	CF
96	45.987	45.896	896.760	116	271	0.002	PPPF. C-9	5.8A	CL
97	46.629	46.535	901.939	423	2418	0.020		5.6	
98	46.947	46.851	904.496	179	363	0.003		3.5A	CF
99	47.093	46.997	905.678	14427	35215	0.287		3.8A	O
100	47.149	47.053	906.129	24560	103862	0.847	N-NONANE	3.5A	PO
101	47.451	47.352	908.557	2336	15362	0.125		6.2	R
102	47.779	47.679	911.200	657	5596	0.046		8.0	CL
103	48.264	48.162	915.111	1541	8386	0.068		5.3	
104	48.528	48.424	917.239	33	27	2.188E-4		1.3A	CF
105	48.677	48.573	918.442	1890	11524	0.094		5.9	O
106	48.912	48.806	920.333	2104	11089	0.090		5.1	O
107	49.072	48.965	921.623	313	1765	0.014		5.6	O
108	49.309	49.202	923.535	1022	6107	0.050		6.7A	O
109	49.347	49.239	923.836	800	4453	0.036		11.5A	O
1	49.555	49.446	925.512	279	1503	0.012		5.8A	O
1	49.605	49.496	925.921	179	670	0.005		8.6A	CL
112	49.896	49.785	928.263	693	4421	0.036		6.4	CF
113	50.112	50.000	930.003	7747	44191	0.361		5.3	FCL
114	50.267	50.154	931.250	227	813	0.007		4.0	R
115	50.536	50.422	933.420	1543	7802	0.064		4.8	CF
116	50.693	50.579	934.688	413	2985	0.024		6.1A	CL
117	51.027	50.910	937.374	4448	23423	0.191		4.8	CF
118	51.101	50.985	937.976	902	3545	0.029		8.0A	O
119	51.293	51.176	939.523	467	2874	0.023		6.1A	O
120	51.493	51.375	941.135	3103	20256	0.165		5.8	O
121	51.771	51.650	943.370	2166	10582	0.086		4.6	O
122	51.917	51.796	944.552	216	1079	0.009		5.3	O
123	52.069	51.948	945.776	253	1722	0.014		7.0A	O
124	52.275	52.152	947.431	5619	29278	0.239		4.8	O
125	52.464	52.340	948.957	3271	17445	0.142		5.1	CL
126	52.920	52.794	952.631	1204	5990	0.049		5.1A	CF
127	53.048	52.921	953.663	5511	29156	0.238		5.0	O
128	53.339	53.211	956.005	398	2182	0.018		5.8A	O
129	53.509	53.380	957.381	582	1552	0.013		5.1A	O
1	53.581	53.452	957.961	1691	6900	0.056		4.8A	O
1	53.752	53.622	959.336	4049	17599	0.144		4.2	O
132	53.989	53.858	961.249	6012	34773	0.284		5.8	FCL
133	54.117	53.985	962.280	14	22	1.820E-4		2.6	R
134	54.299	54.166	963.741	720	4303	0.035		5.8	CF
135	54.451	54.317	964.966	429	2015	0.016		4.8A	O
136	54.597	54.463	966.148	4382	23368	0.191		5.0	O
137	54.856	54.720	968.233	836	4424	0.036		5.0	O
138	54.944	54.808	968.942	68	87	7.109E-4		4.2A	CL

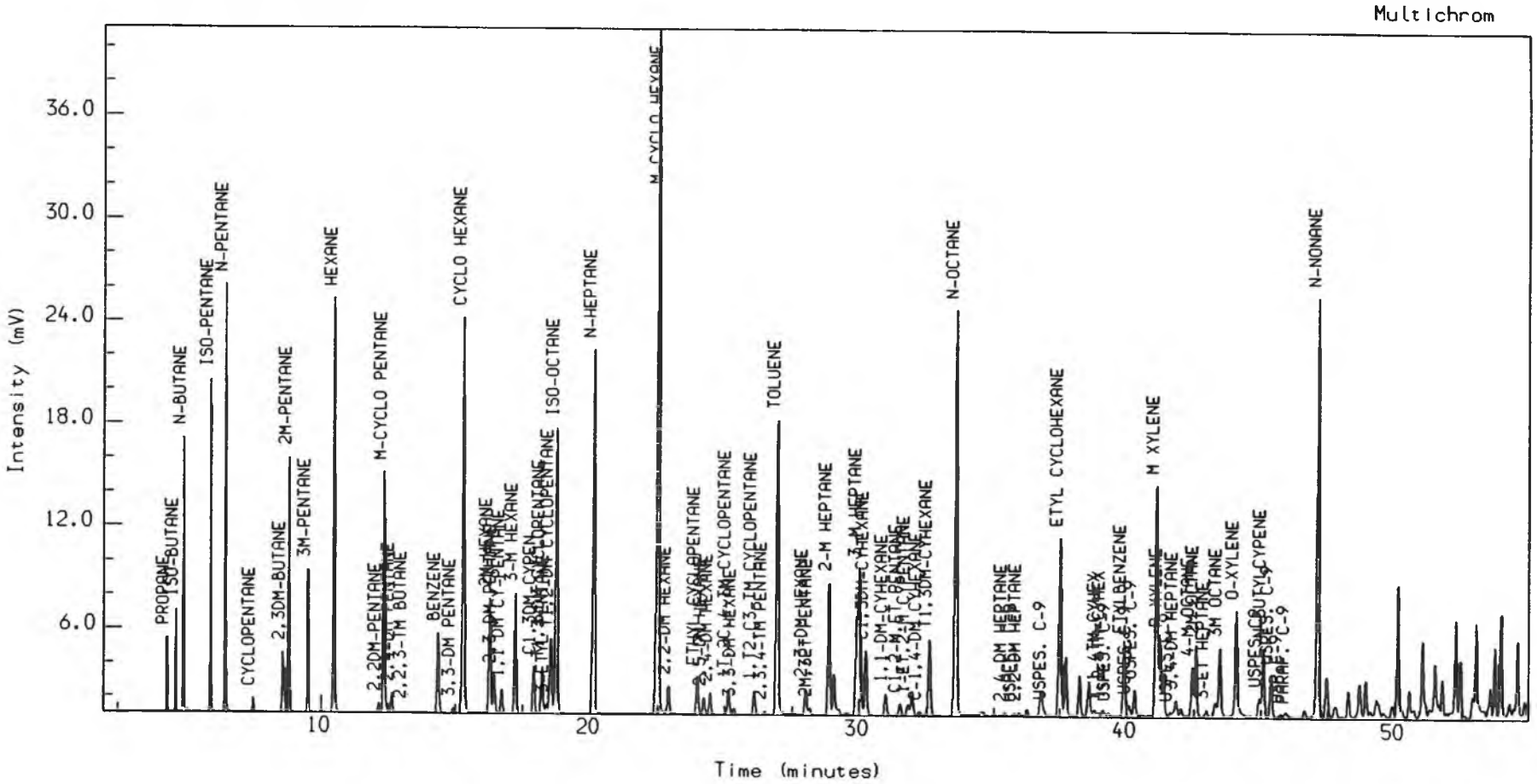
Totals			
Unknowns	0	0	N/A
Quantified	551369	2685837	21.161
Grand Total	551369	2685837	21.161

NOR HYDRO F-BERGEN, PETROLEUM GE CHEMISTRY

Analysis Name : [PETRO] 15 A3009090IL,1,1.

30/9-9 RFT2B Amount : 1.000

C1-C9 HYDROCARBONS



Instrument : HP5880

Channel Title : OIL GC

Lims ID :

Acquired on 9-MAY-1990 at 13:11

Reported on 9-MAY-1990 at 14:09

Method : PVT

Calibration : pvt

Run Sequence : PVT

Reported on 9-MAY-1990 at 19:53

Injection Report

Acquired on 9-MAY-1990 at 18:57

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analyst Name : NILS
Lims Id :
Comment : 30/9-9 OILS CORRELATION
Method Title : C10- ANALYSE
Sample Name : 30/9-9 DST#1
Sample Id :
Sample Type : Sample Amount=1.00000
Bottle No : 3

PEAK INFORMATION

Peak	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
1	4.077	4.090	559.034	990	1639	0.012		1.6	
2	4.285	4.299	560.710	21731	35848	0.271	PROPANE	1.6	
3	4.608	4.622	563.311	17822	30736	0.233	ISO-BUTANE	1.8	
4	4.885	4.900	565.545	57234	105289	0.797	N-BUTANE	1.9	P
5	5.027	5.042	566.684	262	422	0.003		1.8	R
6	5.893	5.912	573.668	42886	94201	0.713	ISO-PENTANE	2.1	
7	6.435	6.455	578.031	57450	134964	1.022	N-PENTANE	2.4	
8	7.467	7.478	586.347	1383	3816	0.029	CYCLOPENTANE	2.7	
9	8.557	8.560	595.136	6752	20447	0.155	2,3DM-BUTANE	3.2A	CF
10	8.605	8.607	595.523	4319	12720	0.096		3.5A	O
11	8.784	8.784	596.962	23697	74328	0.563	2M-PENTANE	3.0	CL
12	9.483	9.477	602.593	12792	43454	0.329	3M-PENTANE	3.2	
13	10.451	10.442	610.393	38803	140490	1.064	HEXANE	3.4	P
14	12.120	12.105	623.845	745	3160	0.024	2.2DM-PENTANE	4.0	CF
15	12.312	12.296	625.393	21190	93375	0.707	M-CYCLO PENTANE	4.2	FCL
16	12.603	12.586	627.735	1514	6336	0.048	2,4-DM PENTANE	4.0	R
17	13.051	13.032	631.345	195	907	0.007	2,2,3-TM BUTANE	4.5	
18	14.317	14.294	641.553	9664	49817	0.377	BENZENE	4.8	
19	14.880	14.855	646.087	362	1872	0.014	3,3-DM PENTANE	5.1	
20	15.267	15.240	649.203	32362	175362	1.328	CYCLO HEXANE	5.1	
21	16.237	16.206	657.025	8487	43534	0.330	2M-HEXANE	5.0	CF
22	16.397	16.365	658.314	2761	14804	0.112	2,3-DM PENTANE	5.1	O
23	16.677	16.644	660.571	1783	9673	0.073	1,1 DM CY-PENTANE	5.3	CL
24	17.189	17.153	664.697	8646	45588	0.345	3-M HEXANE	5.0	
25	17.867	17.828	670.155	3580	19606	0.148	C1,3DM-CYPEN	5.3	CF
26	18.184	18.143	672.712	3274	17972	0.136	T1,3-DM CYCLOPENTANE	5.4	O
27	18.349	18.308	674.044	626	3227	0.024	3-ETYL PENTANE	5.8A	O
28	18.501	18.459	675.269	5551	31600	0.239		5.4	O
29	18.723	18.679	677.053	20118	111865		ISO-OCTANE	5.3	CL
30	20.107	20.057	688.206	27163	151786	1.149	N-HEPTANE	5.4	
31	22.507	22.454	707.546	47838	321497	2.434	M-CYCLO HEXANE	6.6	P
32	22.869	22.817	710.469	1850	9939	0.075	2,2-DM HEXANE	5.3	R
33	23.949	23.896	719.172	2712	15456	0.117		5.4	CF
34	24.195	24.141	721.149	1104	6506	0.049		5.6	O
35	24.432	24.378	723.062	1354	7533	0.057		5.4	CL
36	25.112	25.057	728.541	1684	9802	0.074		5.6	CF

Peak	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
37	25.312	25.257	730.153	393	2304	0.017		5.8	CL
38	26.075	26.019	736.299	1521	9071	0.069	1,T2,C3-TM CYCLOPENTANE	5.8	
39	26.461	26.405	739.415	196	1132	0.009		5.6	
40	26.955	26.898	743.391	26494	167168	1.266	TOLUENE	6.1	
41	27.976	27.924	751.621	1686	9911	0.075		5.6	CF
42	28.131	28.079	752.867	401	2249	0.017	2M,3ET PENTANE	5.8A	CL
43	28.853	28.805	758.691	8589	48793	0.369	2-M HEPTANE	5.4	CF
44	29.040	28.993	760.195	2455	12889	0.098		5.1	CL
45	29.885	29.842	767.007	6466	32821	0.248		6.4A	CF
46	29.979	29.936	767.759	9579	60359	0.457	3-M HEPTANE	5.8A	O
47	30.221	30.179	769.715	4314	24474	0.185	C1,3DM-CYHEXANE	5.4	CL
48	30.941	30.901	775.517	1381	8393	0.064	1,1-DM-CYHEXANE	5.9	
49	31.480	31.441	779.858	723	3956	0.030	C1,2-M,ET PENTANE	5.3	
50	31.768	31.730	782.179	702	4090	0.031	1-ET,2-M CYPENTANE	6.6	CF
51	31.939	31.901	783.554	1486	9851	0.075		6.4	O
52	32.208	32.171	785.724	233	1398	0.011	C-1,4-DM CYHEXANE	5.9	CL
53	32.589	32.553	788.797	4927	30130	0.228	T1,3DM-CYHEXANE	5.9	
54	33.592	33.558	796.877	26465	168021	1.272	N-OCTANE	6.1	
[illegible]	35.395	35.347	811.404	152	883	0.007	2,4-DM HEPTANE	5.8	
[illegible]	35.741	35.691	814.198	163	880	0.007	UNRES. C-9	5.3	CF
57	35.944	35.892	815.831	189	1077	0.008	2,2-DM HEPTANE	5.6	CL
58	36.229	36.175	818.130	370	2076	0.016		5.4	
59	36.773	36.715	822.514	1476	12275	0.093		7.7	
60	37.445	37.381	827.929	7578	17584	0.133		3.8A	CF
61	37.493	37.429	828.316	11451	58700	0.444	ETYL CYCLOHEXANE	5.1A	O
62	37.704	37.640	830.014	3594	21300	0.161		5.6	FOL
63	37.939	37.876	831.905	70	286	0.002		5.4A	FO
64	37.965	37.902	832.120	54	87	6.596E-4		4.5A	FO
65	38.211	38.149	834.097	2420	14181	0.107		5.8	CF
66	38.568	38.507	836.976	2139	14093	0.107		6.4	O
67	38.768	38.708	838.588	333	2617	0.020		8.0A	O
68	38.909	38.849	839.727	242	1383	0.010	1,1,4TM-CYHEX	6.1A	O
69	39.085	39.026	841.145	361	2658	0.020	1,2,4TM-CYHEX	7.2	O
70	39.291	39.232	842.800	230	1344	0.010	UNRES. C-9	5.6	CL
71	39.877	39.821	847.528	5170	32324	0.245	ETYLBENZENE	5.9	CF
72	40.035	39.978	848.796	674	4799	0.036	UNRES.C-9	9.0A	O
73	40.275	40.219	850.730	1607	9984	0.076	UNRES. C-9	5.9	CL
74	40.533	40.479	852.814	158	922	0.007		5.6	
75	40.803	40.749	854.984	70	345	0.003		5.1	
[illegible]	41.104	41.051	857.413	16391	111136	0.841	M XYLENE	6.4	CF
77	41.232	41.179	858.444	6149	33053	0.250	P XYLENE	5.4A	O
78	41.352	41.298	859.411	2510	13629	0.103		5.8A	O
79	41.603	41.548	861.431	222	1319	0.010	UNRES.C-9	6.1A	O
80	41.819	41.763	863.172	1008	5315	0.040	3,4-DM HEPTANE	5.8A	O
81	42.000	41.944	864.633	470	2925	0.022		5.8	FOL
82	42.176	42.119	866.051	50	210	0.002		5.8	R
83	42.421	42.364	868.029	2973	17156	0.130	4-M OCTANE	6.1	CF
84	42.565	42.507	869.189	4442	25225	0.191	2M OCTANE	5.6	CL
85	42.941	42.882	872.219	375	2335	0.018		6.1	
86	43.280	43.219	874.948	805	5673	0.043		7.4A	CF
87	43.451	43.389	876.323	4181	26091	0.198	3M OCTANE	5.9	CL
88	43.904	43.841	879.977	125	211	0.002		2.9A	CF
89	44.069	44.005	881.309	7410	49360	0.374	O-XYLENE	6.1	FOL
90	44.296	44.231	883.135	23	56	4.205E-4		3.2	R
91	44.915	44.848	888.121	1125	6888	0.052	UNRES.C9	6.7A	CF

Peak	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
92	45.064	44.996	889.324	4230	26190	0.198	N-BUTYLCYPENE	5.8	O
93	45.355	45.286	891.667	2598	15495	0.117	USPES. C-9	5.8	CL
94	45.704	45.634	894.482	159	814	0.006	USP.C-9	5.3	
95	45.893	45.823	896.008	274	1636	0.012		6.6	CF
96	45.965	45.894	896.588	118	291	0.002	PARAF. C-9	6.1A	CL
97	46.608	46.535	901.767	422	2429	0.018		5.6	
98	46.923	46.848	904.302	174	340	0.003		3.5A	CF
99	47.128	47.053	905.957	25570	157583	1.193	N-NONANE	5.9	PCL
100	47.432	47.355	908.407	2398	15685	0.119		6.2	R
101	47.763	47.685	911.072	641	5493	0.042		8.3	R
102	48.243	48.163	914.940	1680	9039	0.068		5.3	
103	48.653	48.572	918.249	1869	11884	0.090		5.9	CF
104	48.888	48.806	920.140	2104	11398	0.086		5.3	O
105	49.053	48.971	921.472	311	1766	0.013		5.9	O
106	49.285	49.202	923.342	1032	6947	0.053		6.1A	O
107	49.368	49.284	924.008	772	3696	0.028		6.4A	O
108	49.533	49.449	925.340	276	1486	0.011		5.8A	O
109	49.584	49.499	925.749	173	648	0.005		8.6A	CL
110	49.872	49.786	928.069	689	4366	0.033		6.4	CF
	50.088	50.001	929.810	7908	45328	0.343		5.3	PCL
112	50.243	50.156	931.056	212	748	0.006		4.0	R
113	50.515	50.427	933.248	1571	7992	0.061		4.8	CF
114	50.672	50.583	934.516	426	3280	0.025		6.7A	O
115	51.008	50.918	937.224	4343	23661	0.179		5.0	O
116	51.083	50.992	937.826	930	3717	0.028		8.0A	O
117	51.277	51.186	939.394	506	3213	0.024		7.0A	O
118	51.472	51.380	940.963	3321	22148	0.168		5.8	O
119	51.749	51.657	943.198	2169	11192	0.085		5.0	O
120	52.051	51.957	945.626	324	2404	0.018		9.3A	O
121	52.256	52.161	947.281	6201	32824	0.249		4.8	O
122	52.445	52.350	948.806	3689	20382	0.154		5.1	PCL
123	52.600	52.504	950.053	21	55	4.174E-4		3.7	R
124	52.901	52.804	952.481	1157	5564	0.042		5.4A	CF
125	53.032	52.934	953.534	5694	31011	0.235		5.1	O
126	53.320	53.221	955.855	404	2237	0.017		5.4A	O
127	53.488	53.389	957.209	582	1522	0.012		5.1A	O
128	53.563	53.463	957.810	1684	6676	0.051		4.5A	O
129	53.728	53.628	959.143	3965	17390	0.132		4.3	O
130	53.971	53.870	961.098	6046	35460	0.268		5.8	PCL
	54.101	54.000	962.151	17	29	2.172E-4		2.4	R
132	54.275	54.172	963.548	687	3964	0.030		5.6	CF
133	54.435	54.332	964.837	382	1681	0.013		5.1A	O
134	54.576	54.473	965.976	4295	22115	0.167		5.0	CL
135	54.832	54.728	968.039	776	3898	0.030		5.0	CF
136	54.925	54.821	968.791	57	79	5.982E-4		4.5A	CL

Totals			
Unknowns	0	0	N/A
Quantified	778303	3532714	25.901
Grand Total	778303	3532714	25.901

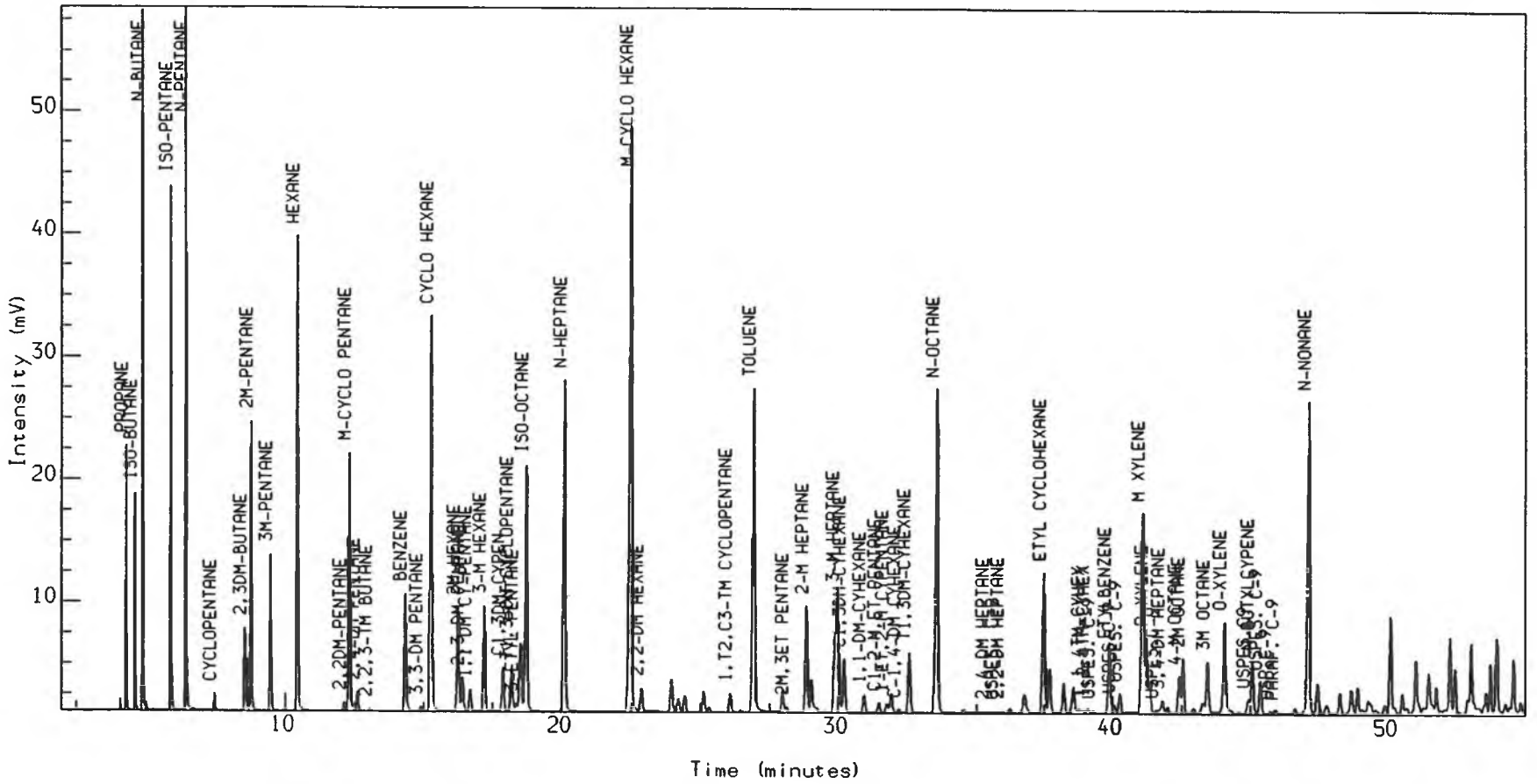
NOR HYDRO F-BERGEN, PETROLEUM GE CHEMISTRY

Analysis Name : [PETRO] 15 A3009090IL,3,1.

30/9-9 DST#1 Amount : 1.000

C1-C9 HYDROCARBONS

Multichrom



Instrument : HP5880

Channel Title : OIL GC

Lims ID :

Acquired on 9-MAY-1990 at 18:57

Reported on 9-MAY-1990 at 19:54

Method : PVT

Calibration : pvt

Run Sequence : PVT

Reported on 7-JUN-1990 at 13:39

Injection Report

Acquired on 6-JUN-1990 at 16:36

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analyst Name : NILS
Lims Id :
Comment : 30/9-9 OILS CORRELATION
Method Title : C10- ANALYSE
Sample Name : 30/9-9 DST#1
Sample Id :
Sample Type : Sample Amount=1.00000
Bottle No : 5

PEAK INFORMATION

Peak	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
	4.141	4.112	559.550	733	1281	0.009		1.8	
2	4.349	4.318	561.226	19034	33954	0.231		1.8	
3	4.675	4.641	563.848	16923	31648	0.215	ISO-BUTANE	1.9	
4	4.949	4.914	566.061	50648	101481	0.690	N-BUTANE	1.9	P
5	5.093	5.057	567.222	240	393	0.003		1.9	R
6	5.960	5.917	574.206	41259	97826	0.665	ISO-PENTANE	2.2	
7	6.501	6.455	578.568	53425	134818	0.917	N-PENTANE	2.4	
8	7.533	7.478	586.884	1406	4162	0.028	CYCLOPENTANE	2.9	
9	8.624	8.560	595.673	6507	17340	0.118	2,3DM-BUTANE	2.9A	CF
10	8.645	8.581	595.845	4880	17404	0.118		7.0A	O
11	8.851	8.784	597.500	23697	78914	0.537	2M-PENTANE	3.0	CL
12	9.549	9.477	603.130	12934	46395	0.316	3M-PENTANE	3.5	
13	10.520	10.443	610.952	38260	145451	0.989	HEXANE	3.5	
14	12.189	12.105	624.404	765	3384	0.023	2.2DM-PENTANE	4.3	CF
15	12.384	12.299	625.973	21527	99082	0.674	M-CYCLO PENTANE	4.3	FCL
16	12.672	12.586	628.294	1547	6760	0.046	2,4-DM PENTANE	4.3	R
17	13.123	13.034	631.925	210	972	0.007	2,2,3-TM BUTANE	4.5	
18	14.389	14.295	642.133	9070	48354	0.329	BENZENE	5.0	
19	14.952	14.855	646.667	381	2067	0.014	3,3-DM PENTANE	5.3	
20	15.339	15.240	649.783	33860	188303	1.281	CYCLO HEXANE	5.3	
	16.304	16.203	657.562	8918	46492	0.316	2M-HEXANE	5.1	CF
22	16.467	16.365	658.873	3000	16384	0.111	2,3-DM PENTANE	5.3	O
23	16.747	16.644	661.129	1882	10554	0.072	1,1 DM CY-PENTANE	5.4	CL
24	17.253	17.150	665.212	9151	49189	0.335	3-M HEXANE	5.0	
25	17.933	17.828	670.692	3744	21095	0.143	C1,3DM-CYPEN	5.4	CF
26	18.251	18.144	673.249	3436	19332	0.131	T1,3-DM CYCLOPENTANE	5.3	O
27	18.565	18.458	675.785	5787	34172	0.232		5.8	O
28	18.792	18.684	677.612	21893	124527		ISO-OCTANE	5.3	FCL
29	20.120	20.009	688.313	16216	31682	0.215		3.2A	CF
30	20.168	20.057	688.700	27820	119473	0.813	N-HEPTANE	4.2A	CL
31	22.517	22.393	707.632	33682	105076	0.715		5.4A	CF
32	22.568	22.443	708.041	49890	210683	1.433	M-CYCLO HEXANE	3.8A	FCL
33	22.923	22.799	710.899	2042	10824	0.074	2,2-DM HEXANE	5.3	R
34	24.000	23.882	719.580	2897	16545	0.113		5.4	CF
35	24.245	24.128	721.557	1193	7189	0.049		5.6	O
36	24.483	24.366	723.470	1491	8316	0.057		5.3	CL

Pe-'-	RT mins	RT Corr	RT Val	Hght uV	Area uVs	WT%	Peak name	Width	Type
37	25.168	25.055	728.993	1820	10653	0.072		5.6	OF
38	25.365	25.253	730.583	428	2553	0.017		5.6	OL
39	26.125	26.016	736.707	1664	9913	0.067	1,T2,C3-TM CYCLOPENTANE	5.8	
40	26.512	26.405	739.823	211	1253	0.009		5.9	
41	27.003	26.898	743.777	26159	168602	1.147	TOLUENE	6.2	
42	28.027	27.927	752.029	1824	10986	0.075		5.8	OF
43	28.173	28.075	753.211	440	2533	0.017		6.4A	OL
44	28.899	28.804	759.056	9143	52916	0.360	2-M HEPTANE	5.6	OF
45	29.085	28.992	760.560	2624	13990	0.095		5.1	OL
46	29.936	29.848	767.416	6948	35338	0.240		7.0A	OF
47	30.024	29.936	768.125	10442	66987	0.456	3-M HEPTANE	6.1A	O
48	30.269	30.182	770.102	4695	26884	0.183	C1,3DM-CYHEXANE	5.4	OL
49	30.984	30.898	775.861	1504	9318	0.063	1,1-DM-CYHEXANE	6.1	
50	31.520	31.436	780.180	768	4234	0.029	C1,2-M,ET PENTANE	5.4	
51	31.808	31.724	782.501	728	4401	0.030	1-ET,2-M CYPENTANE	5.1A	OF
52	31.981	31.898	783.898	1610	10833	0.074		6.4	O
53	32.251	32.168	786.068	257	1581	0.011	C-1,4-DM CYHEXANE	5.9	OL
54	32.635	32.553	789.163	5365	33078	0.225	T1,3DM-CYHEXANE	5.9	
--	33.597	33.518	796.920	20034	55231	0.376		4.8A	OF
--	33.637	33.558	797.243	27760	112482	0.765	N-OCTANE	4.2A	OL
57	35.435	35.345	811.727	166	958	0.007	2,4-DM HEPTANE	5.6	
58	35.781	35.690	814.520	181	1010	0.007	USPES. C-9	5.4	OF
59	35.981	35.889	816.132	212	1244	0.008	2,2-DM HEPTANE	5.8	OL
60	36.269	36.175	818.453	411	2332	0.016		5.6	
61	36.805	36.708	822.772	1646	12698	0.086		7.5	OF
62	36.915	36.817	823.653	331	807	0.005	USPES. C-9	6.1A	OL
63	37.531	37.429	828.617	12430	84319	0.574	ETYL CYCLOHEXANE	6.4	OF
64	37.739	37.638	830.293	4007	24642	0.168		5.8	PO
65	37.976	37.876	832.206	80	418	0.003		5.3	R
66	38.248	38.149	834.398	2678	15970	0.109		5.8	O
67	38.605	38.508	837.277	2388	15730	0.107		6.4	O
68	38.803	38.706	838.867	377	2985	0.020		8.3A	O
69	38.944	38.848	840.006	269	1589	0.011	1,1,4TM-CYHEX	6.4A	O
70	39.117	39.022	841.403	403	3048	0.021	1,2,4TM-CYHEX	7.4	O
71	39.325	39.231	843.079	253	1527	0.010	USPES. C-9	5.8	OL
72	39.915	39.822	847.829	5442	33702	0.229	ETYLBENZENE	5.9	OF
73	40.069	39.978	849.075	750	5400	0.037	USPES.C-9	9.3A	O
74	40.304	40.213	850.966	1781	11159	0.076	USPES. C-9	5.9	POL
75	40.571	40.481	853.115	171	1020	0.007		5.8	R
.	40.829	40.741	855.199	82	421	0.003		5.3	
77	41.139	41.051	857.692	17076	116870	0.795	M XYLENE	6.7	OF
78	41.267	41.179	858.724	6501	34548	0.235	P XYLENE	5.1A	O
79	41.384	41.296	859.669	2828	15550	0.106		5.8A	O
80	41.632	41.543	861.668	251	1533	0.010	USPES.C-9	6.1A	O
81	41.851	41.760	863.430	1104	5903	0.040	3,4-DM HEPTANE	6.1A	O
82	42.035	41.944	864.913	530	3341	0.023		5.8	POL
83	42.203	42.111	866.266	53	225	0.002		5.3	R
84	42.448	42.356	868.243	3266	19061	0.130	4-M OCTANE	6.1	OF
85	42.597	42.504	869.447	4902	27782	0.189	2M OCTANE	5.6	OL
86	42.976	42.882	872.498	411	2576	0.018		6.1	
87	43.315	43.219	875.227	893	6232	0.042		7.7A	OF
88	43.483	43.386	876.581	4531	28912	0.197	3M OCTANE	5.9	OL
89	43.939	43.841	880.256	149	272	0.002		3.2A	OF
90	44.096	43.997	881.524	7966	52877	0.360	O-XYLENE	5.9	POL
91	44.325	44.226	883.372	21	54	3.641E-4		3.5	R

Pr	RT mins	RT Corr	RT Val	Hght uV	Area uVs	Wt%	Peak name	Width	Type
92	44.949	44.848	888.400	1223	7622	0.052	USPES.C9	7.4	A CF
93	45.093	44.991	889.561	4570	29042	0.198	N-BUTYLCYPENE	6.1	O
94	45.389	45.286	891.946	2833	17138	0.117	USPES. C-9	5.8	CL
95	45.731	45.626	894.697	177	919	0.006	USP.C-9	5.3	
96	45.917	45.812	896.201	294	1746	0.012		5.1	A CF
97	45.987	45.881	896.760	151	383	0.003	PARAF. C-9	6.4	A CL
98	46.637	46.529	902.003	468	2721	0.019		5.6	
99	46.939	46.829	904.431	160	255	0.002		2.6	A CF
100	47.085	46.976	905.613	12152	26816	0.182		3.2	A O
101	47.163	47.053	906.236	27706	132744	0.903	N-NONANE	3.5	A PCL
102	47.459	47.347	908.622	2631	17348	0.118		6.2	R
103	47.792	47.680	911.308	711	6091	0.041		8.3	R
104	48.267	48.152	915.133	1803	9827	0.067		5.3	
105	48.683	48.567	918.485	2088	13405	0.091		6.1	CF
106	48.917	48.801	920.376	2355	12773	0.087		5.3	O
107	49.077	48.960	921.666	352	1986	0.014		6.1	O
108	49.312	49.194	923.557	1152	7820	0.053		6.7	A O
109	49.392	49.274	924.201	841	4009	0.027		6.7	A O
	49.555	49.436	925.512	308	1663	0.011		5.8	A O
111	49.608	49.489	925.942	198	778	0.005		9.0	A CL
112	49.901	49.781	928.306	796	5017	0.034		6.4	CF
113	50.117	49.996	930.046	8758	50686	0.345		5.4	PO
114	50.267	50.145	931.250	244	867	0.006		4.0	R
115	50.536	50.413	933.420	1739	9088	0.062		5.0	O
116	50.693	50.570	934.688	488	2651	0.018		6.7	A O
117	51.029	50.905	937.396	4881	26357	0.179		5.1	O
118	51.101	50.976	937.976	1084	4543	0.031		8.6	A O
119	51.299	51.173	939.566	566	3750	0.026		7.0	A O
120	51.493	51.367	941.135	3626	24566	0.167		5.8	O
121	51.773	51.646	943.391	2428	12613	0.086		5.0	O
122	52.069	51.941	945.776	368	2722	0.019		9.6	A O
123	52.280	52.151	947.474	6633	35935	0.244		5.0	O
124	52.469	52.339	949.000	3967	22403	0.152		5.3	PCL
125	52.632	52.501	950.311	19	47	3.183E-4		3.2	R
126	52.925	52.794	952.674	1327	6331	0.043		5.1	A CF
127	53.053	52.921	953.706	6263	34352	0.234		5.1	O
128	53.133	53.001	954.351	998	4109	0.028		9.0	A O
129	53.341	53.208	956.027	468	2564	0.017		5.8	A O
130	53.509	53.375	957.381	665	1758	0.012		5.1	A O
131	53.584	53.450	957.982	1875	7699	0.052		4.5	A O
132	53.752	53.617	959.336	4340	19611	0.133		4.5	O
133	53.989	53.854	961.249	6807	39825	0.271		5.8	PO
134	54.117	53.981	962.280	19	30	2.058E-4		2.4	R
135	54.293	54.157	963.698	814	5229	0.036		6.1	O
136	54.451	54.313	964.966	493	2254	0.015		4.8	A O
137	54.597	54.459	966.148	4880	25983	0.177		5.0	O
138	54.853	54.714	968.211	912	4733	0.032		4.8	CL

Totals			
Unknowns	0	0	N/A
Quantified	866943	3712807	24.406
Grand Total	866943	3712807	24.406

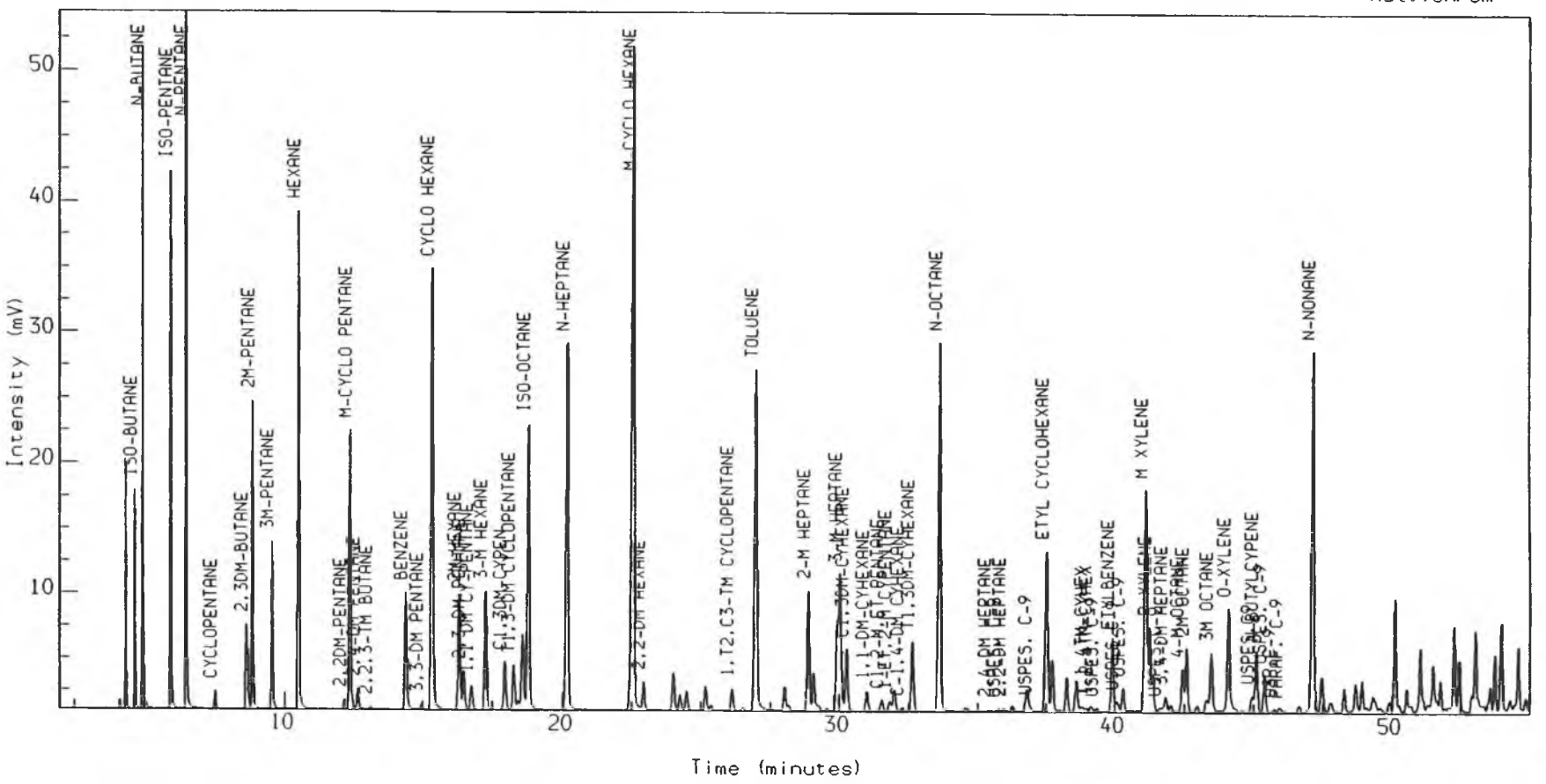
NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 15 A30090901L.5.1.

30/9-9 DST#1 Amount : 1.000

C1-C9 HYDROCARBONS

Multichrom



Instrument : HP5880

Channel Title : OIL GC

Lims ID :

Acquired on 6-JUN-1990 at 16:36

Reported on 7-JUN-1990 at 12:04

Method : PVT

Calibration : pvt

Run Sequence : PVT

HYDRO

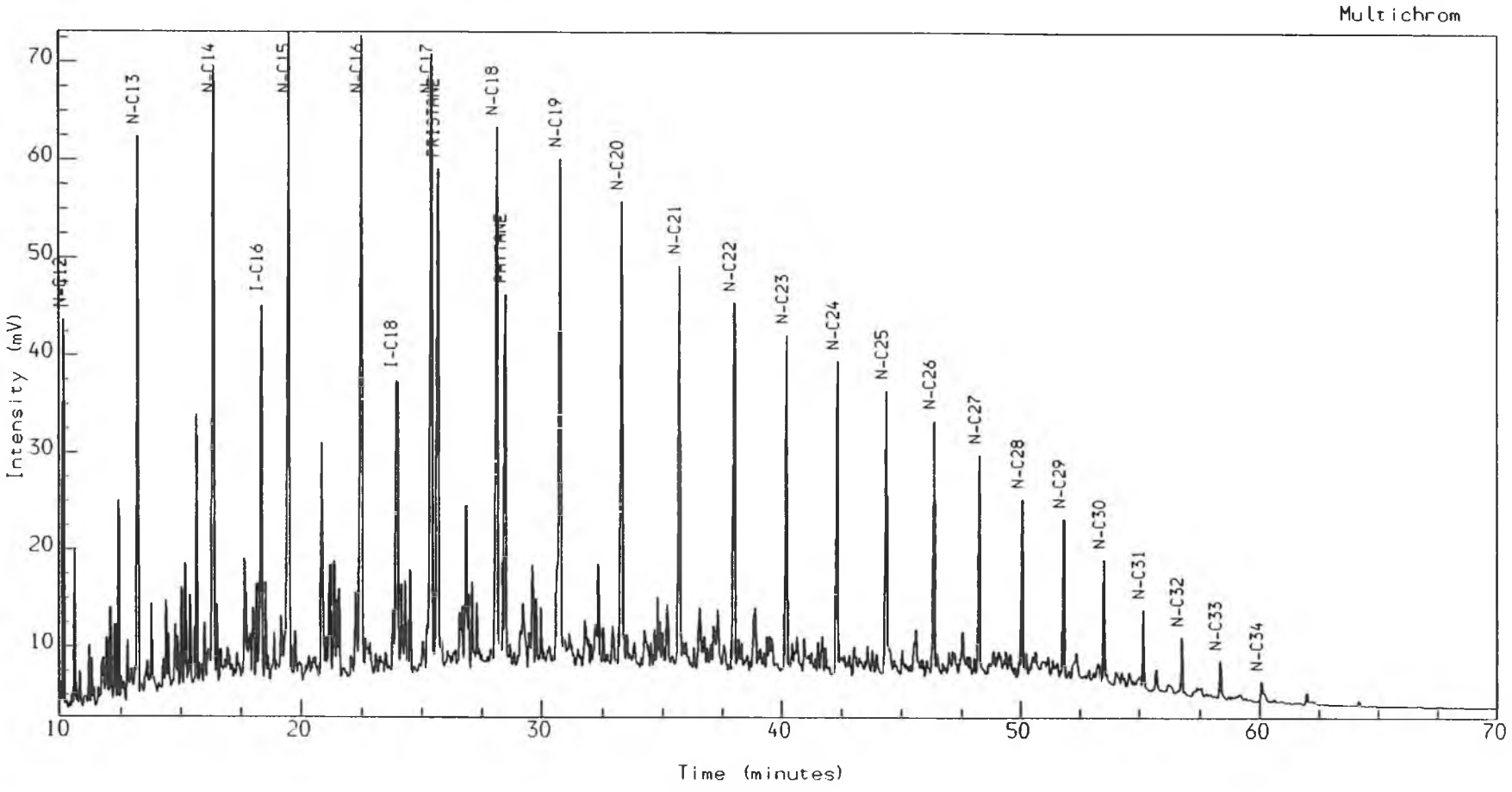
APPENDIX 2

GAS CHROMATOGRAMS OF SATURATED HYDROCARBONS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO.9.1.

30/6-5 RFT



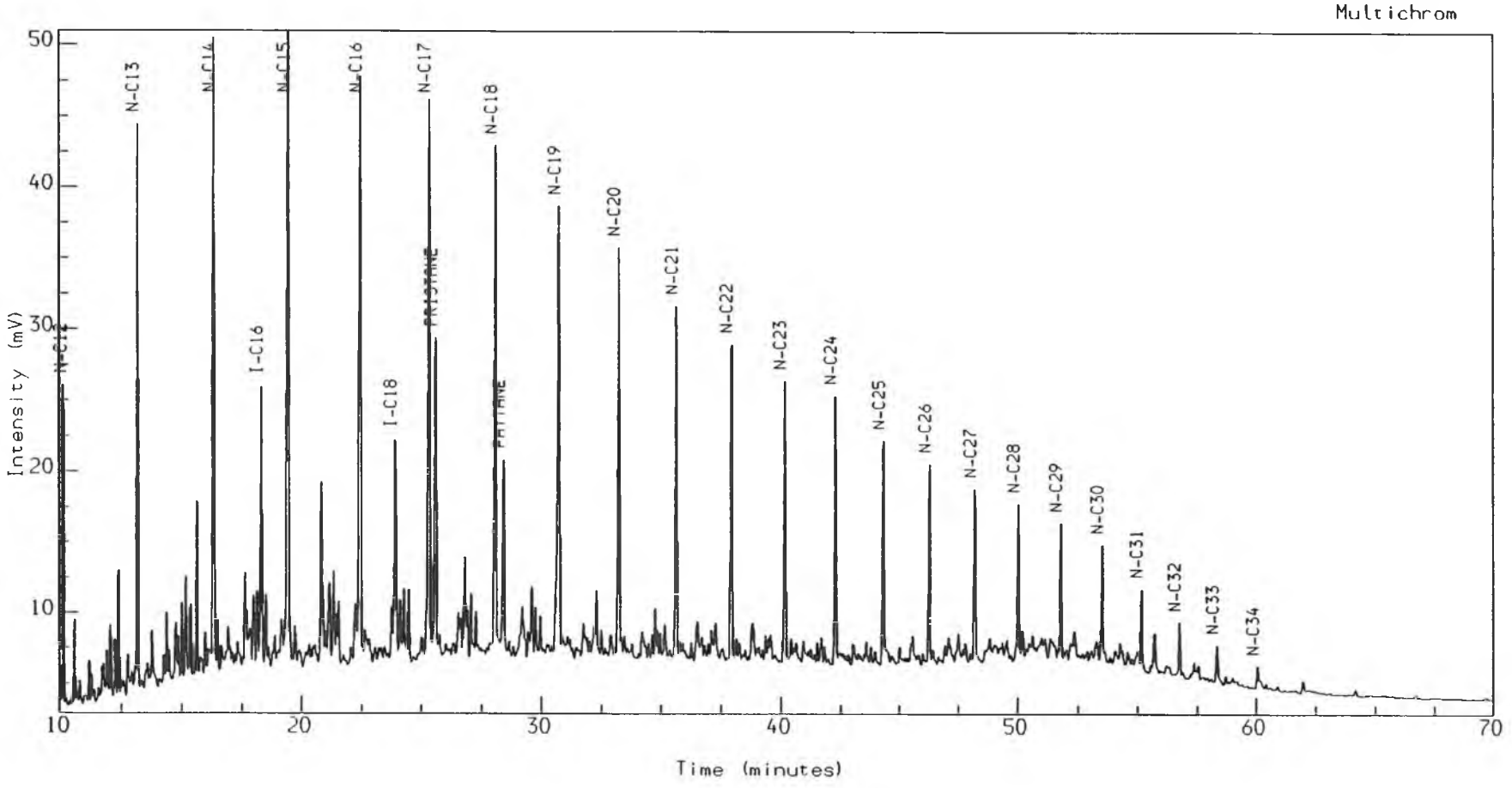
Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 23-MAR-1990 at 04:45
Reported on 6-JUN-1990 at 17:19

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN. PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO.8.1.

30/6-9 DST1



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 23-MAR-1990 at 03:13

Reported on 6-JUN-1990 at 17:17

Method : MSDS

Calibration : MSDS

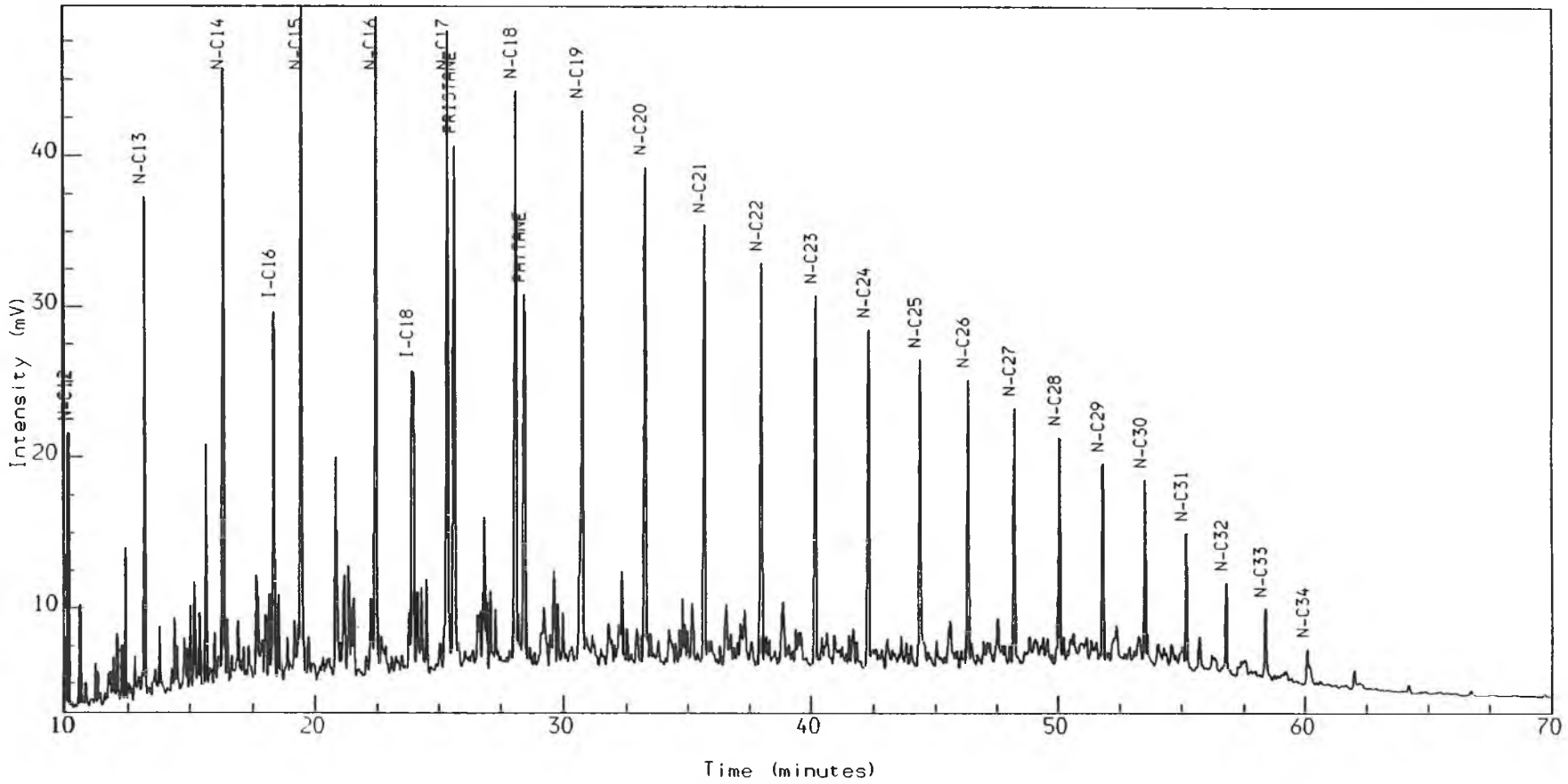
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERG0.5.1.

31/4-7 STO

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 22-MAR-1990 at 22:37

Reported on 6-JUN-1990 at 17:10

Method : MSDS

Calibration : MSDS

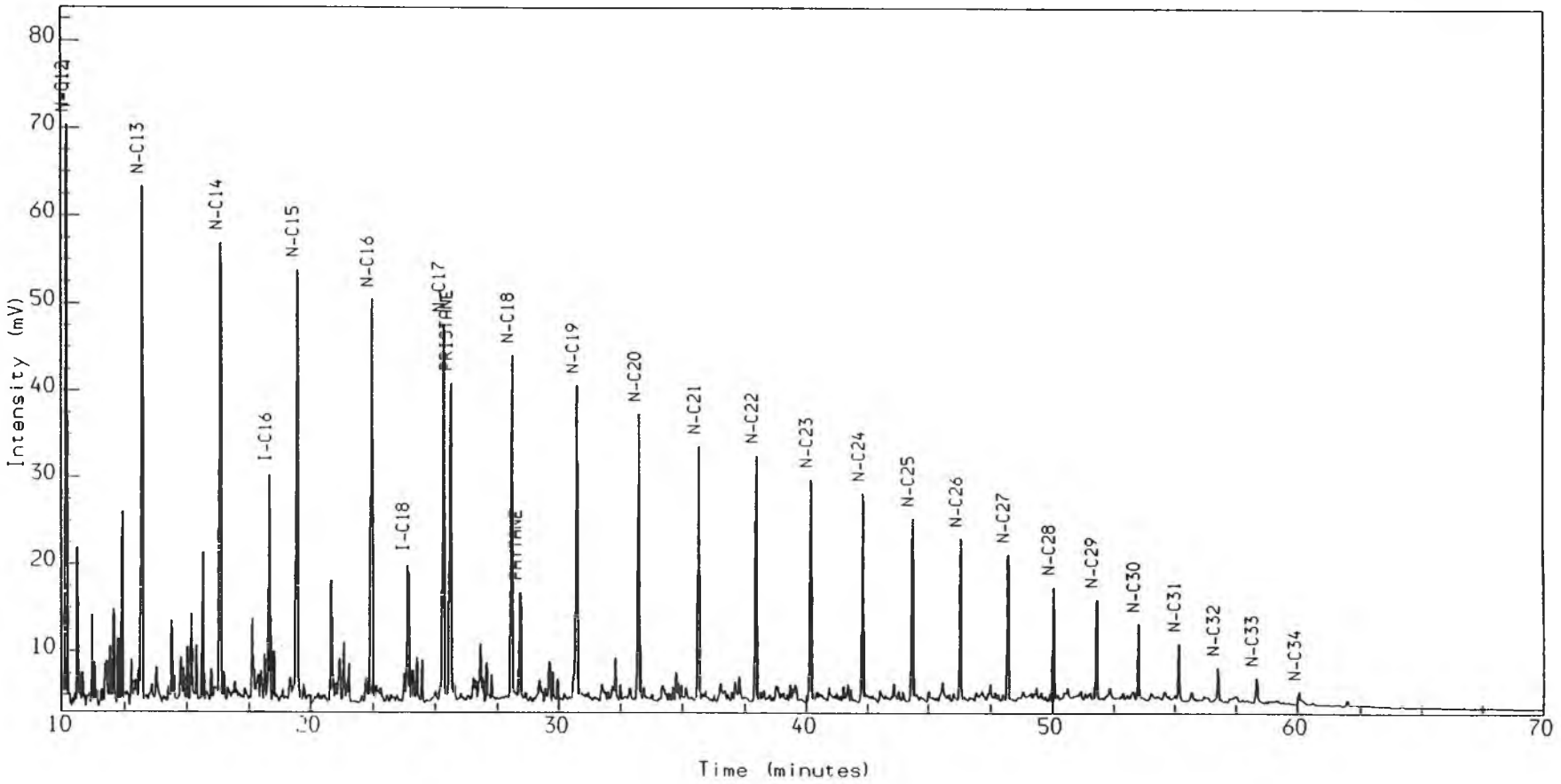
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO.4.1.

30/9-9 DST 2

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 22-MAR-1990 at 21:05

Reported on 6-JUN-1990 at 17:08

Method : MSDS

Calibration : MSDS

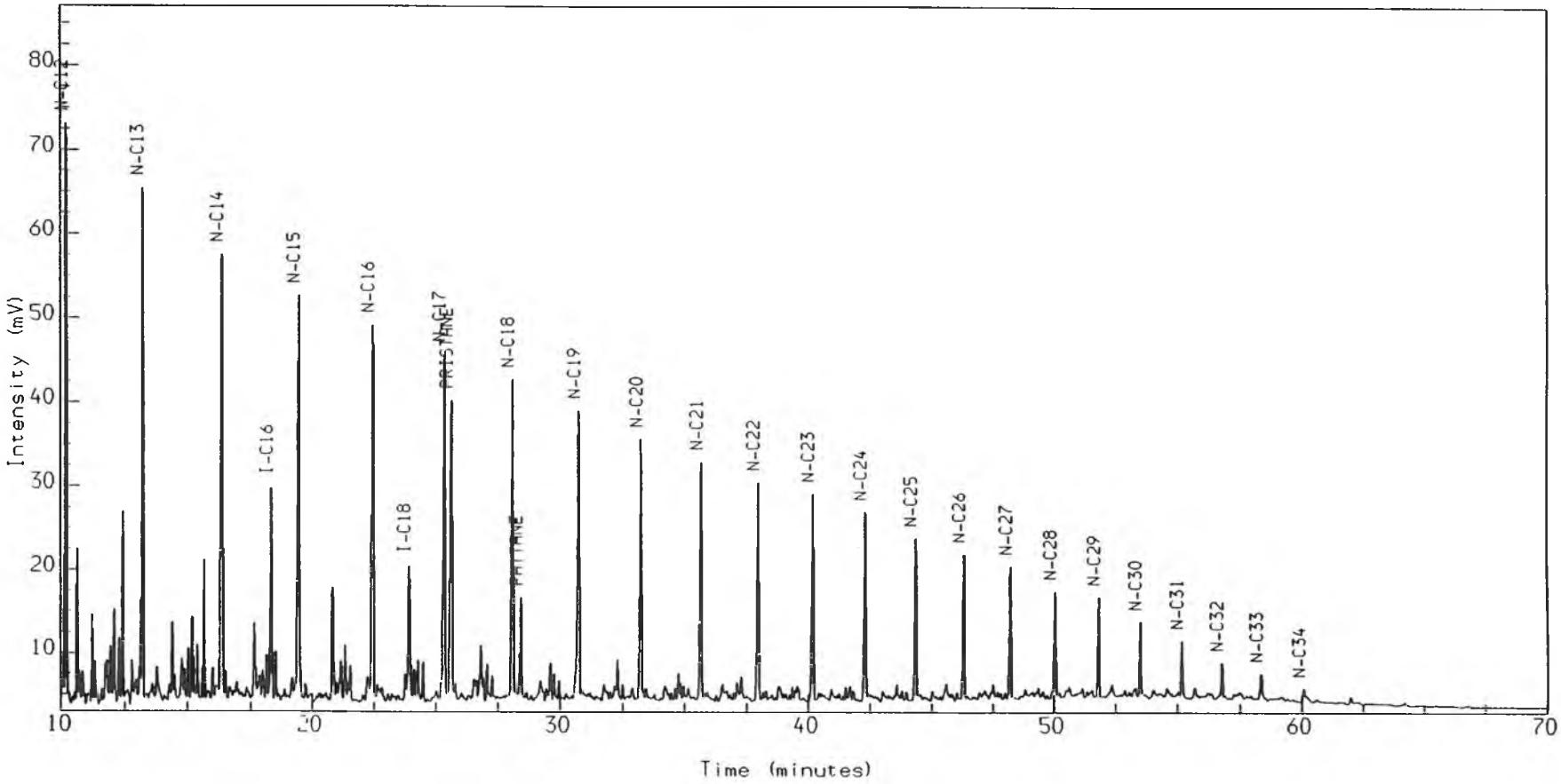
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO,3,1.

30/9-9 DST1

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 22-MAR-1990 at 19:33

Reported on 6-JUN-1990 at 17:06

Method : MSDS

Calibration : MSDS

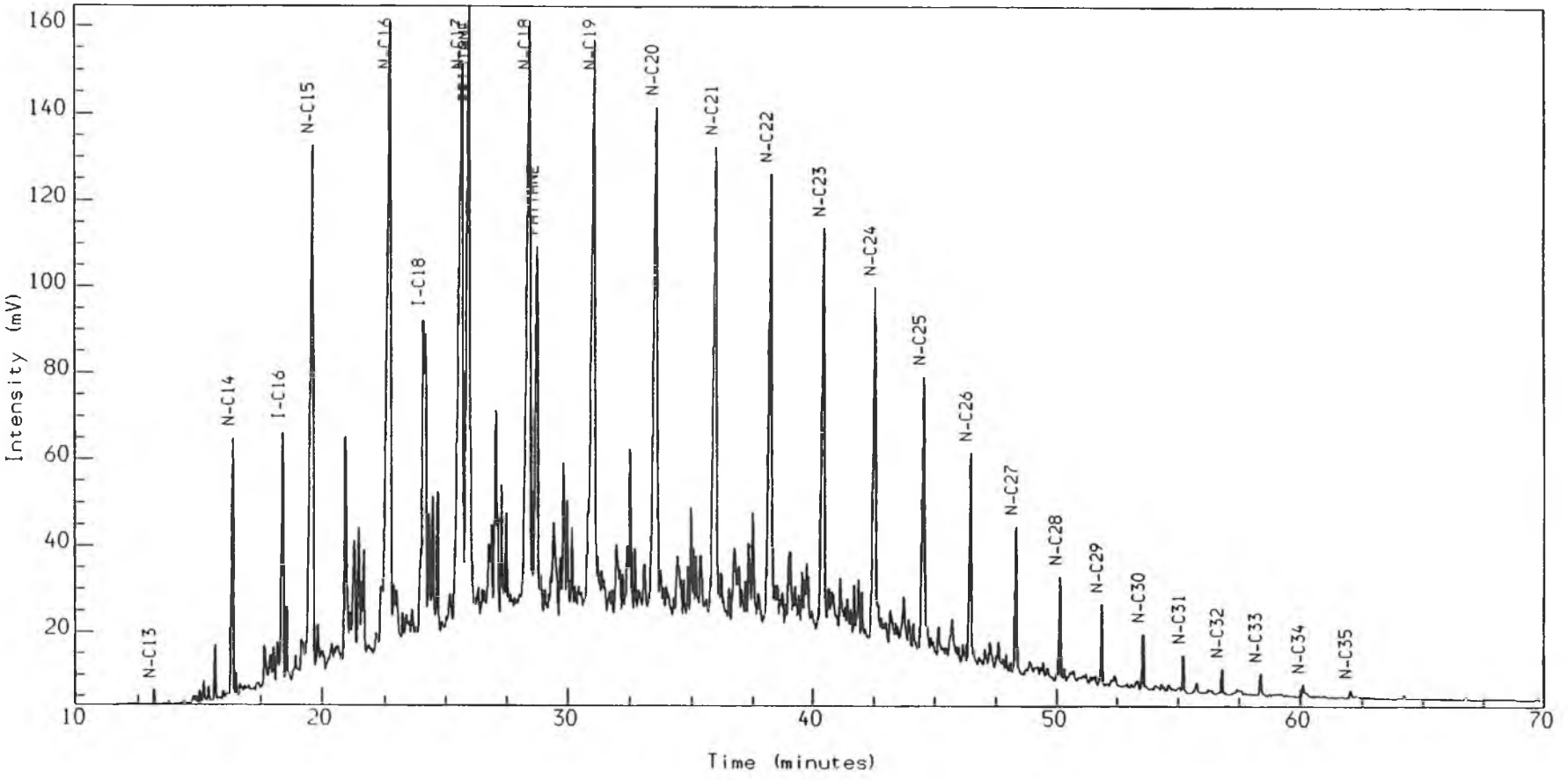
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 OSEBERGO,2,1.

30/9-3A

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 22-MAR-1990 at 18:01

Reported on 6-JUN-1990 at 17:04

Method : MSDS

Calibration : MSDS

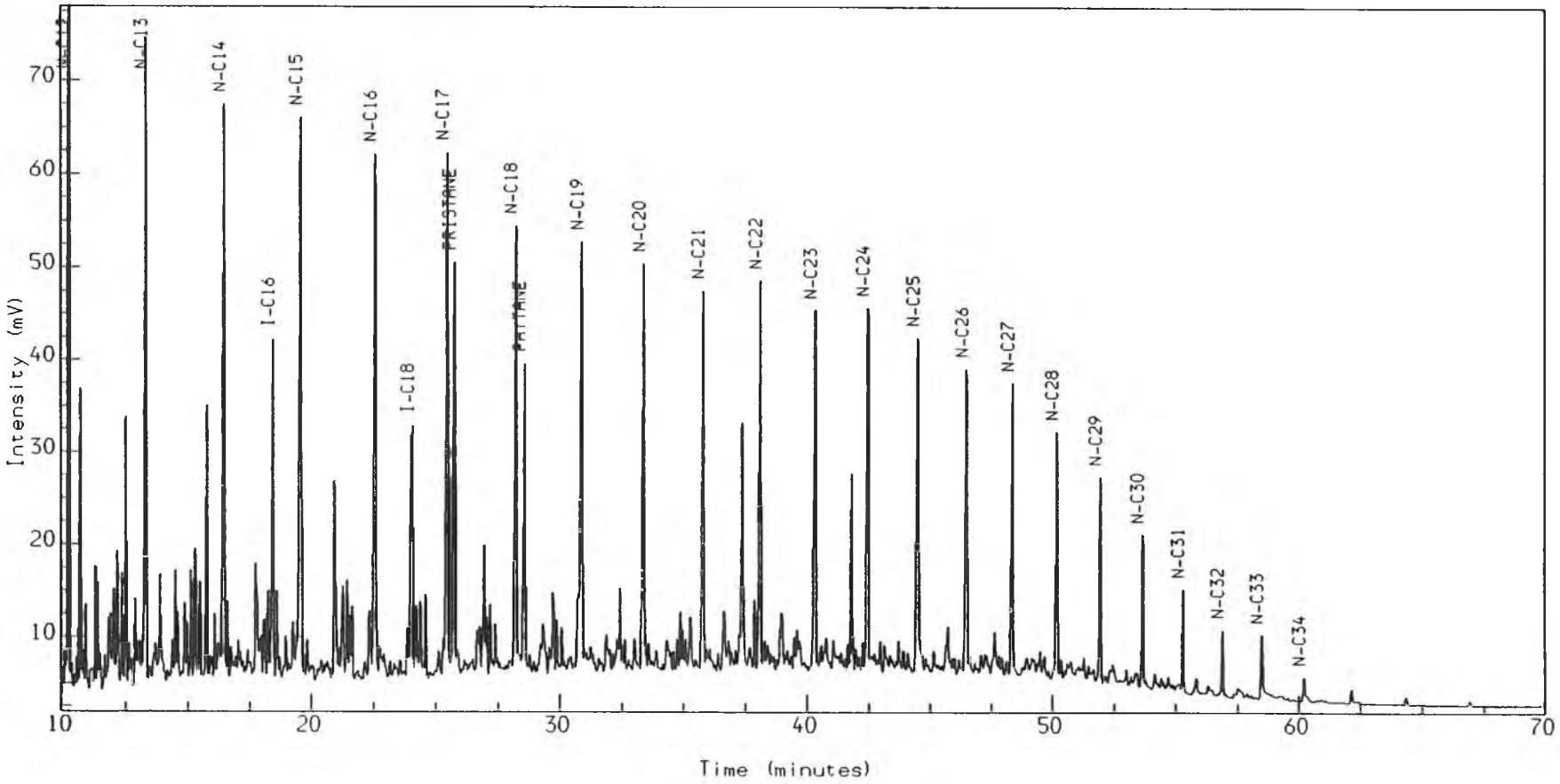
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 D3009090.5.1.

31/4-7 STO SAT

Multichrom



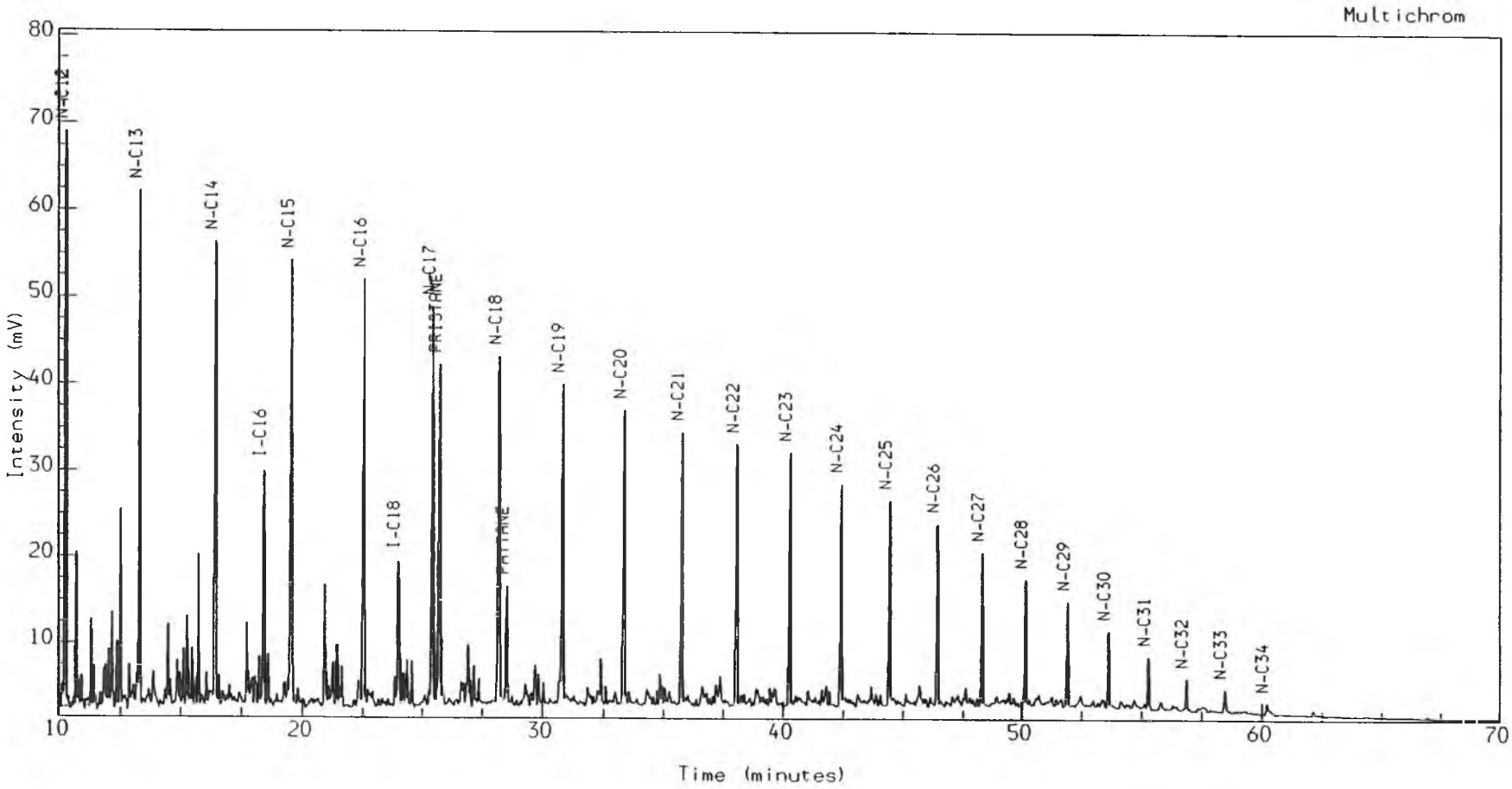
Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 25-APR-1990 at 20:30
Reported on 6-JUN-1990 at 16:52

Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 D3009090,4,1.

30/9-9 DST#2 SAT



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 25-APR-1990 at 18:58
Reported on 6-JUN-1990 at 16:49

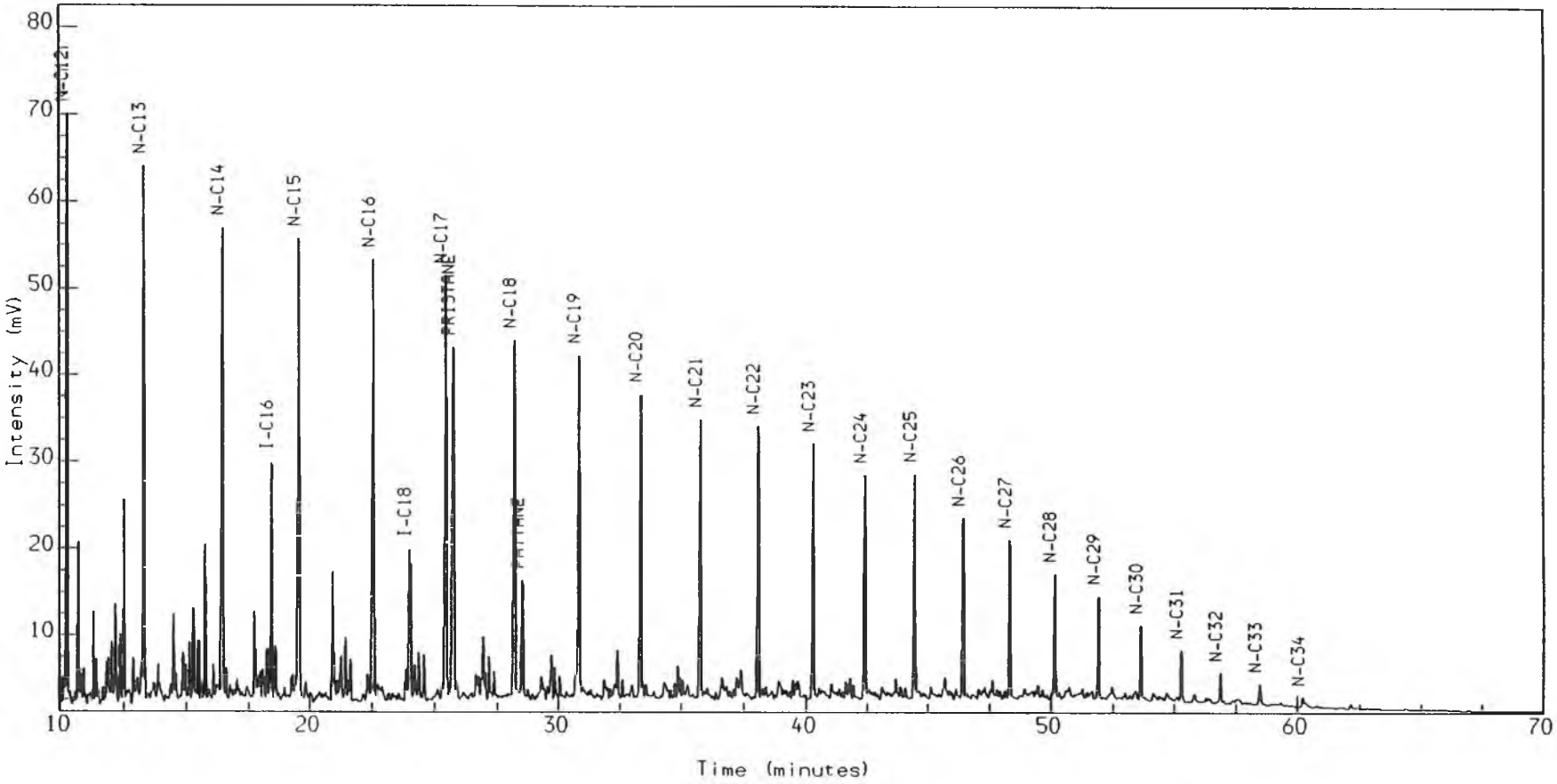
Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

NORSK HYDRO F-BERGEN, PETROLEUM GEOCHEMISTRY

Analysis Name : [PETRO] 7 D3009090.3.1.

30/9-9 DST#1 SAT

Multichrom



Instrument : HP5890
Channel Title : MSD
Lims ID :
Acquired on 25-APR-1990 at 17:26
Reported on 6-JUN-1990 at 16:47

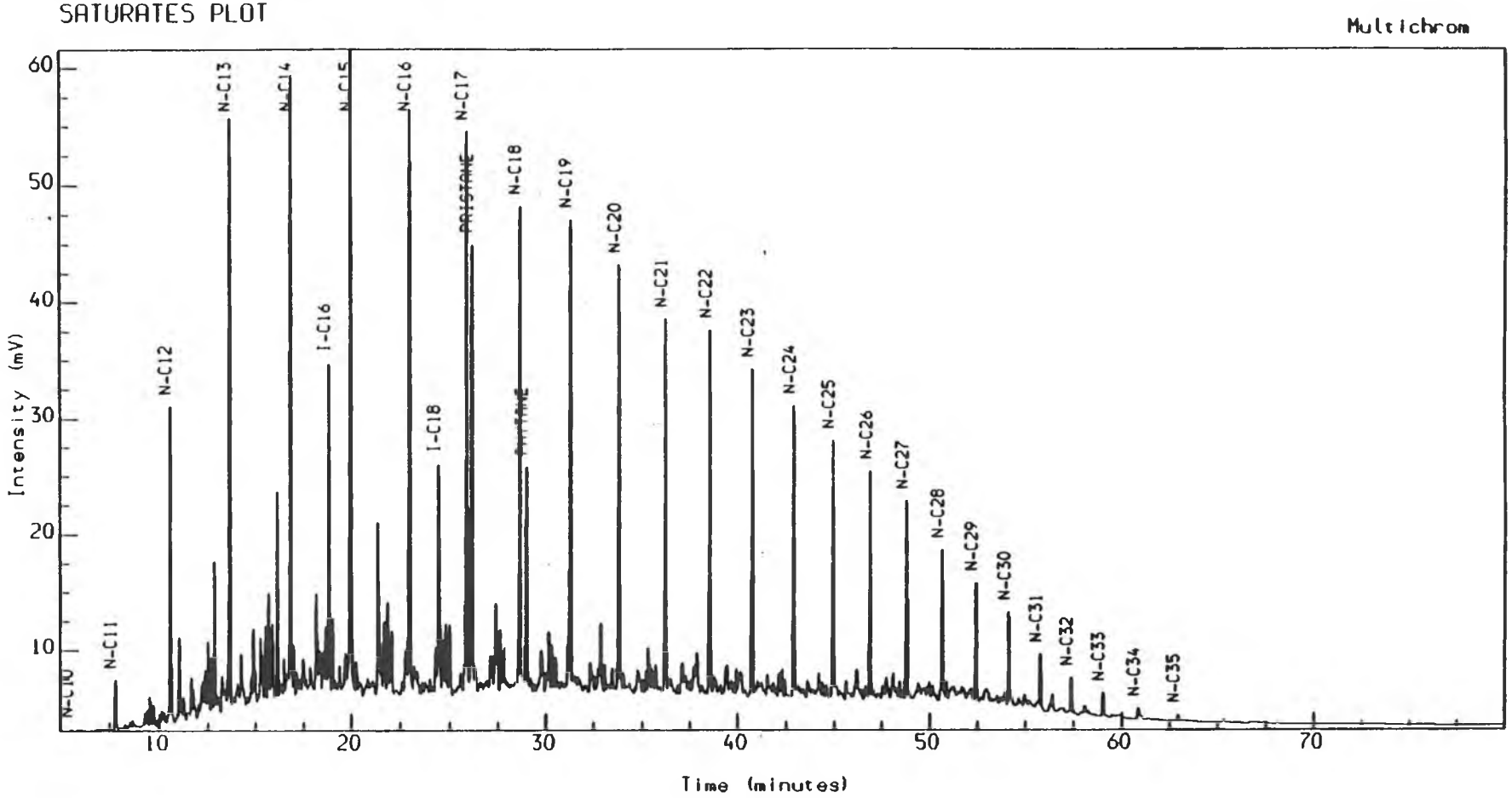
Method : MSDS
Calibration : MSDS
Run Sequence : MSDS

N. SK HYDRO F-BERGEN, PETROLEUM OCHEMISTRY

Analysis Name : [PETRO] 7 B300908S.3.1.

30/9-7 Amount : 1.000

SATURATES PLOT



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 15-OCT-1989 at 12:32

Reported on 15-OCT-1989 at 15:55

Method : MSDS

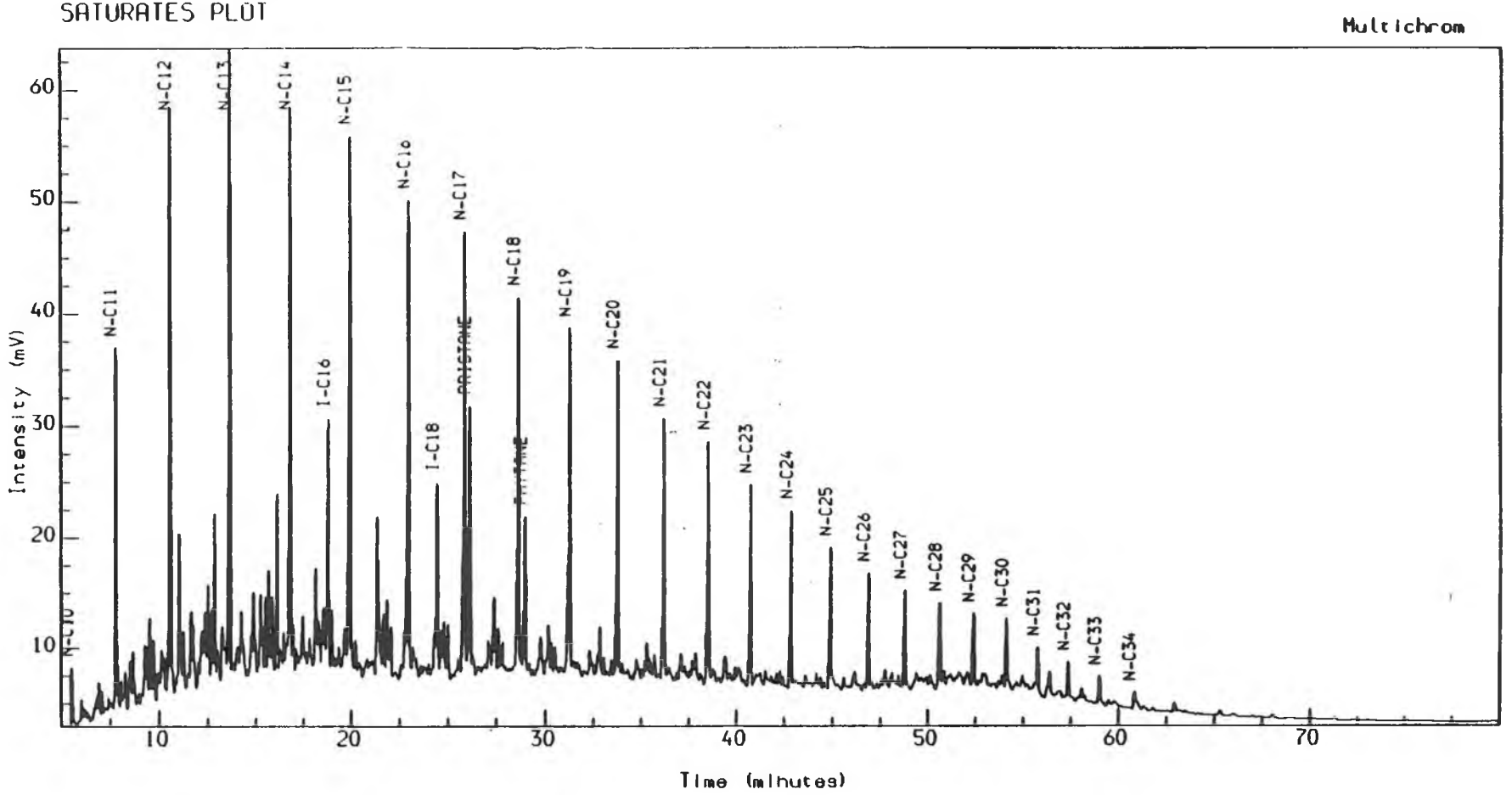
Calibration : MSDS

Run Sequence : MSDS

Analysis Name : [PETRO] 7 B3009085.1.1.

30/9-8 Amount : 1.000

SATURATES PLOT



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 15-[illegible]T-1989 at 09:28

Reported on 15-[illegible]T-1989 at 15:46

Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

APPENDIX 3

DISTRIBUTION OF BIOLOGICAL MARKERS

IDENTIFICATION OF BIOLOGICAL MARKERS

Triterpanes (m/z 191):

Numbers from **18** to **35** corresponds to the carbon number of the molecule. the following capital letter identifies the stereochemistry and/or the number of rings.

A 17α(H)-hopanes (**I**) 22S
B 17α(H)-hopanes 22R
C 17β(H)-moretanes (**II**) 22S
D 17β(H)-moretanes 22R
E 17β(H)-hopanes (**III**)
F Neohopanes (**IV**)
G Gammacerane (**V**)
H $\Delta^{13,18}$-hopenes (**VI**)
I 25-norhopanes (**VII**)
L Lupane (**VIII**)
O 18α(H)-oleanane (**IX**)
X Tetracyclic terpanes (**X**)
Y Tricyclic terpanes (**XI**)

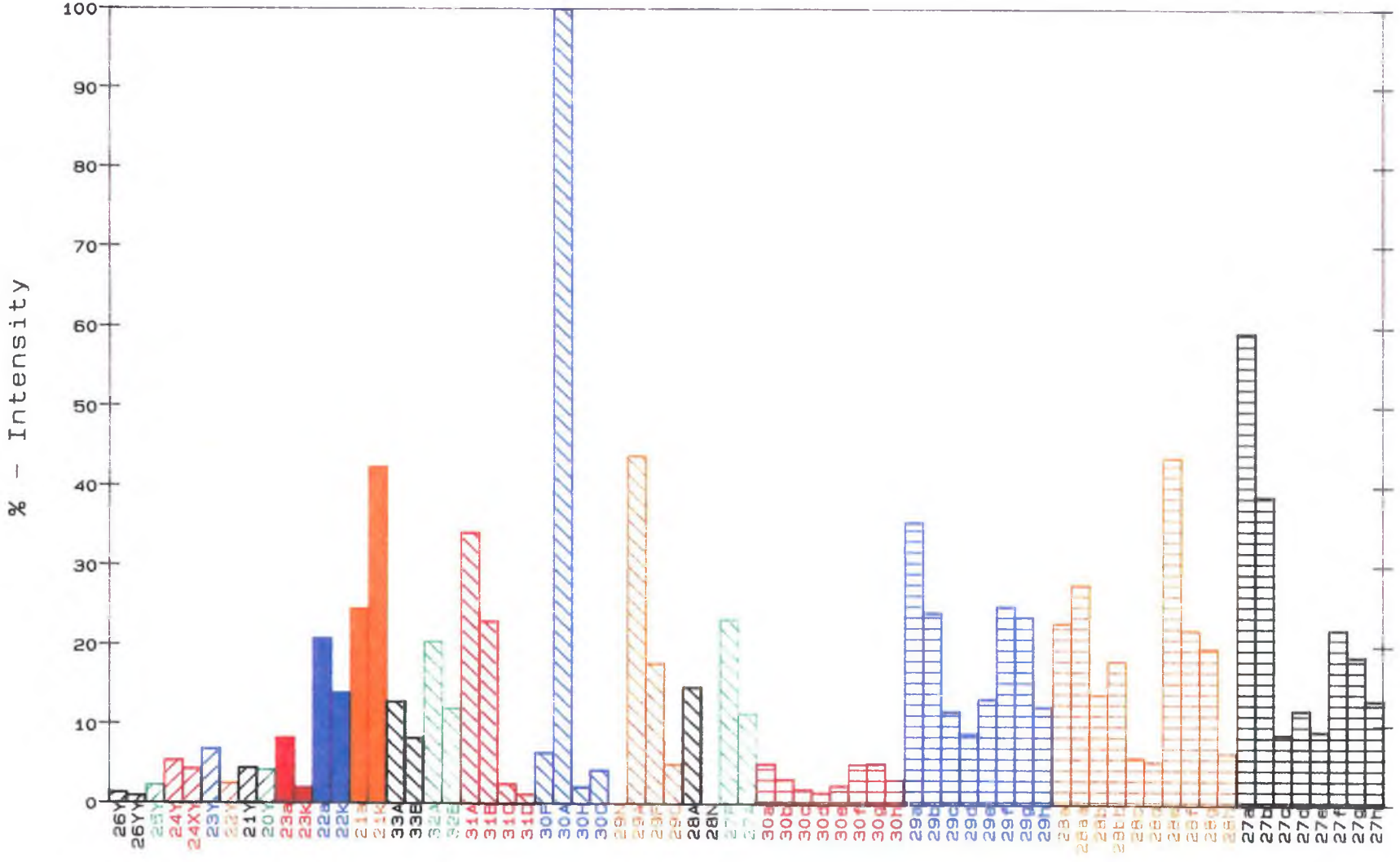
Steranes (m/z 217):

Numbers from **20** to **30** corresponds to the carbon number of the molecules. the following small letter identifies the stereochemistry.

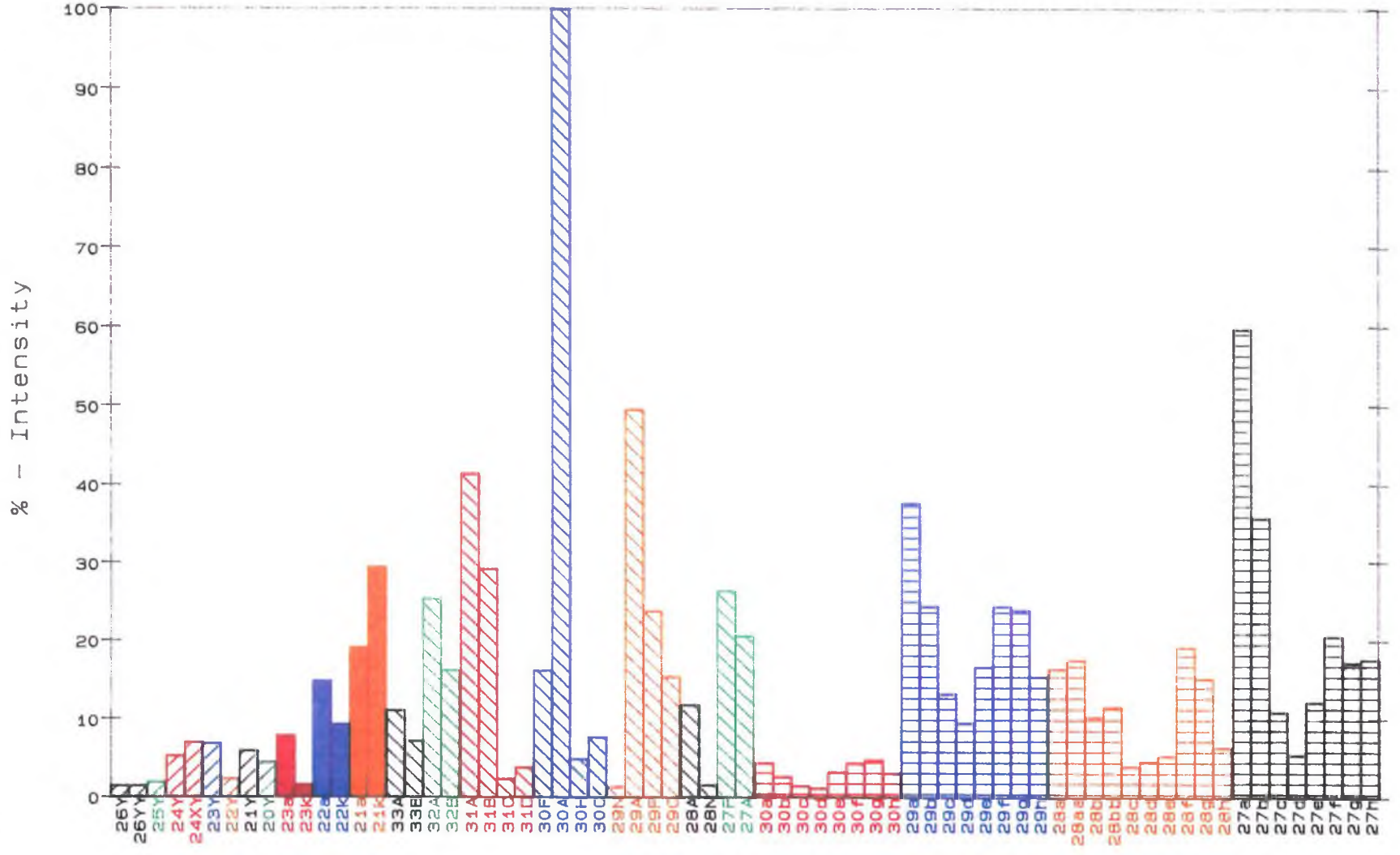
a 13β(H).17α(H)-diasteranes 20S (**1**)
b 13β(H).17α(H)-diasteranes 20R (**2**)
c 13α(H).17β(H)-diasteranes 20S (**3**)
d 13α(H).17β(H)-diasteranes 20R (**4**)
e 5α(H).14α(H).17α(H)-steranes 20S (**5**)
f 5α(H).14β(H).17β(H)-steranes 20R (**6**)
g 5α(H).14β(H).17β(H)-steranes 20S (**7**)
h 5α(H).14α(H).17α(H)-steranes 20R (**8**)
i 5β(H).14α(H).17α(H)-steranes (**9**)
k 4-methylsteranes (**10**)

Examples: **31B** corresponds to 17α(H)-homohopane 22R
29e corresponds to ααα-ethylcholestane 20S

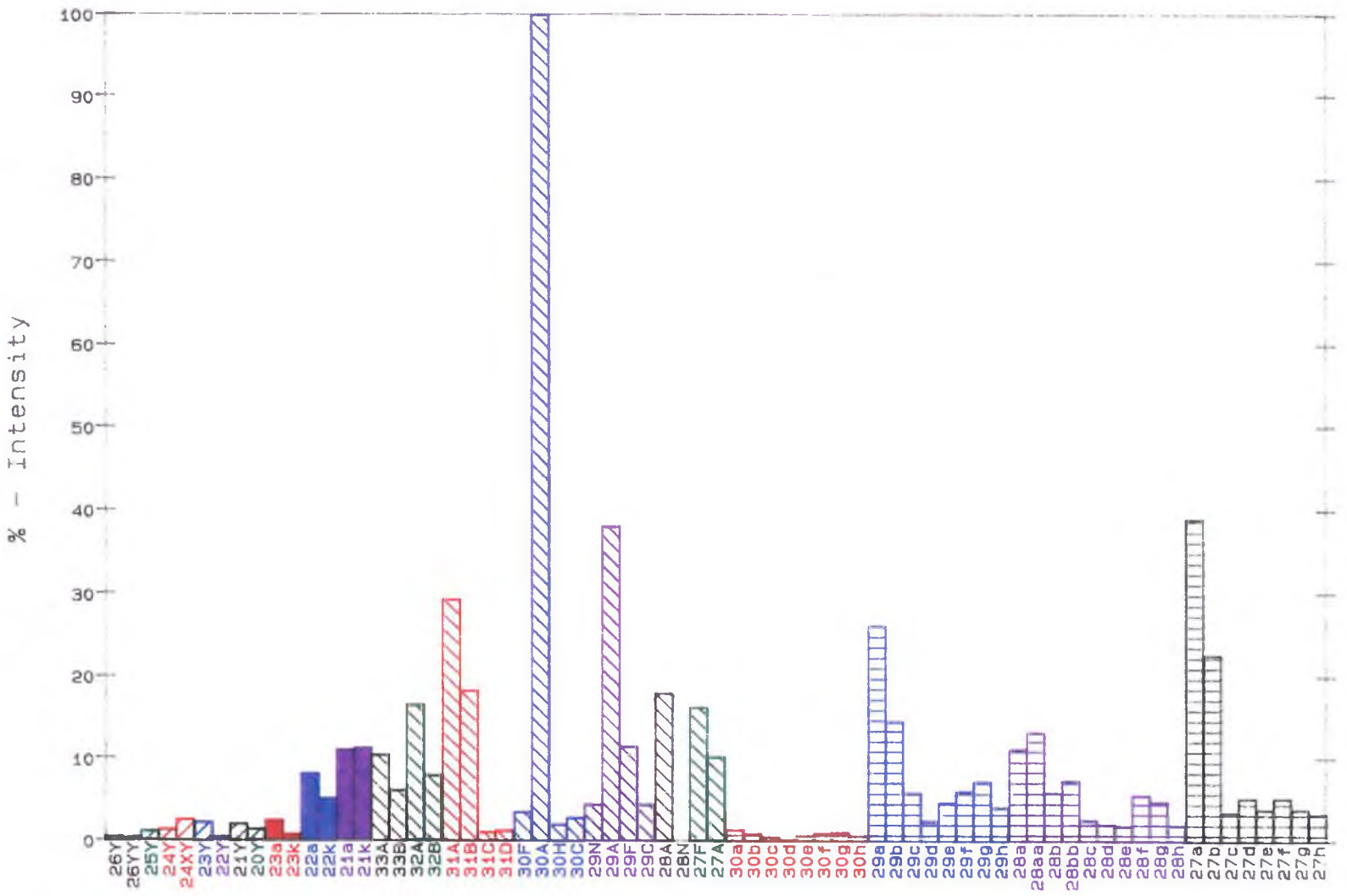
Biomarker pattern, SAT-fraction
Well: 31/4_7, STO , OIL , NNS
ms-file: AS05020, norm. factor: 2016



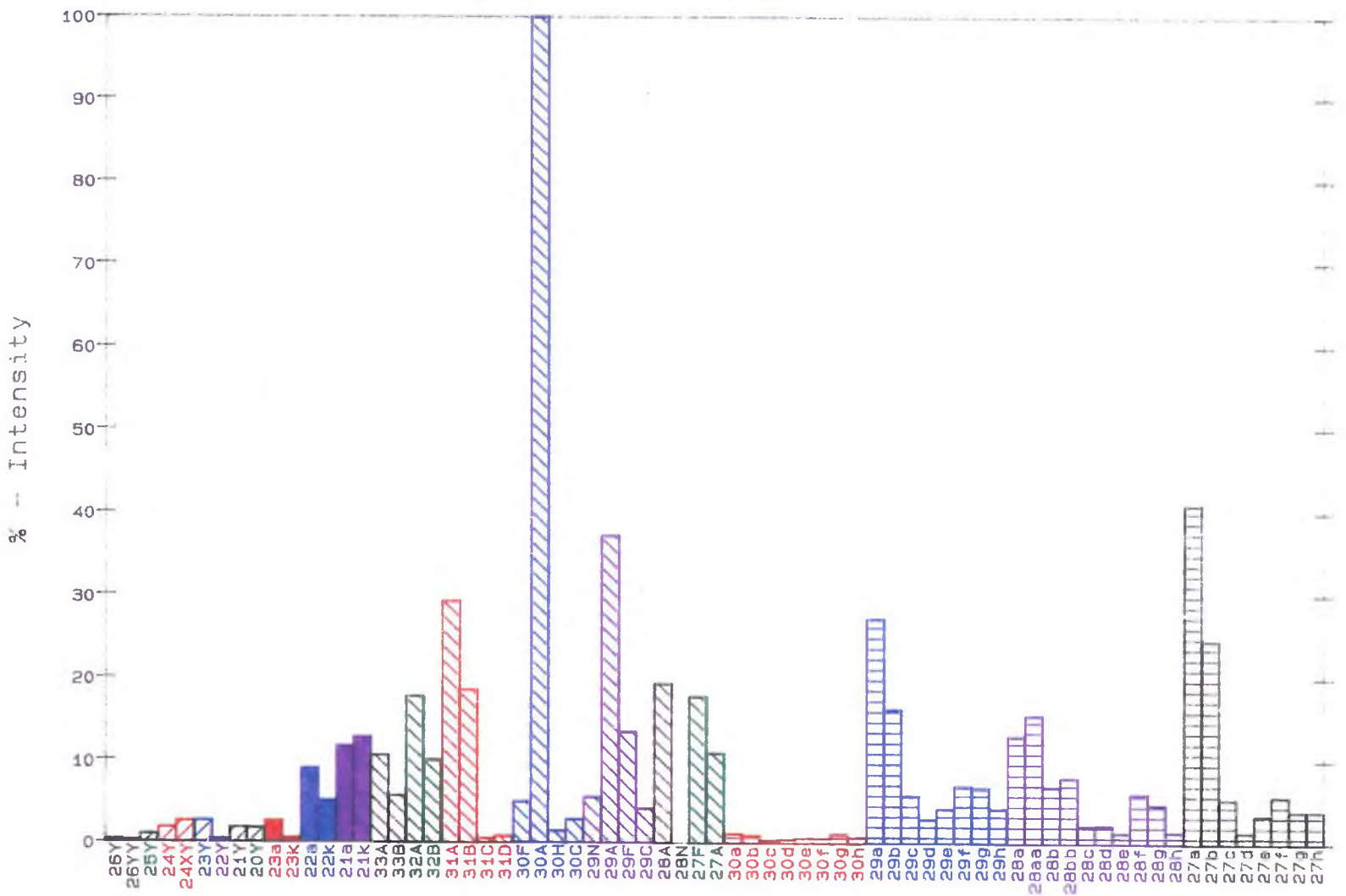
Biomarker pattern, SAT-fraction
Well: 30/9_9, DST1 , OIL , NNS
ms-file: NS02129, norm. factor: 11658



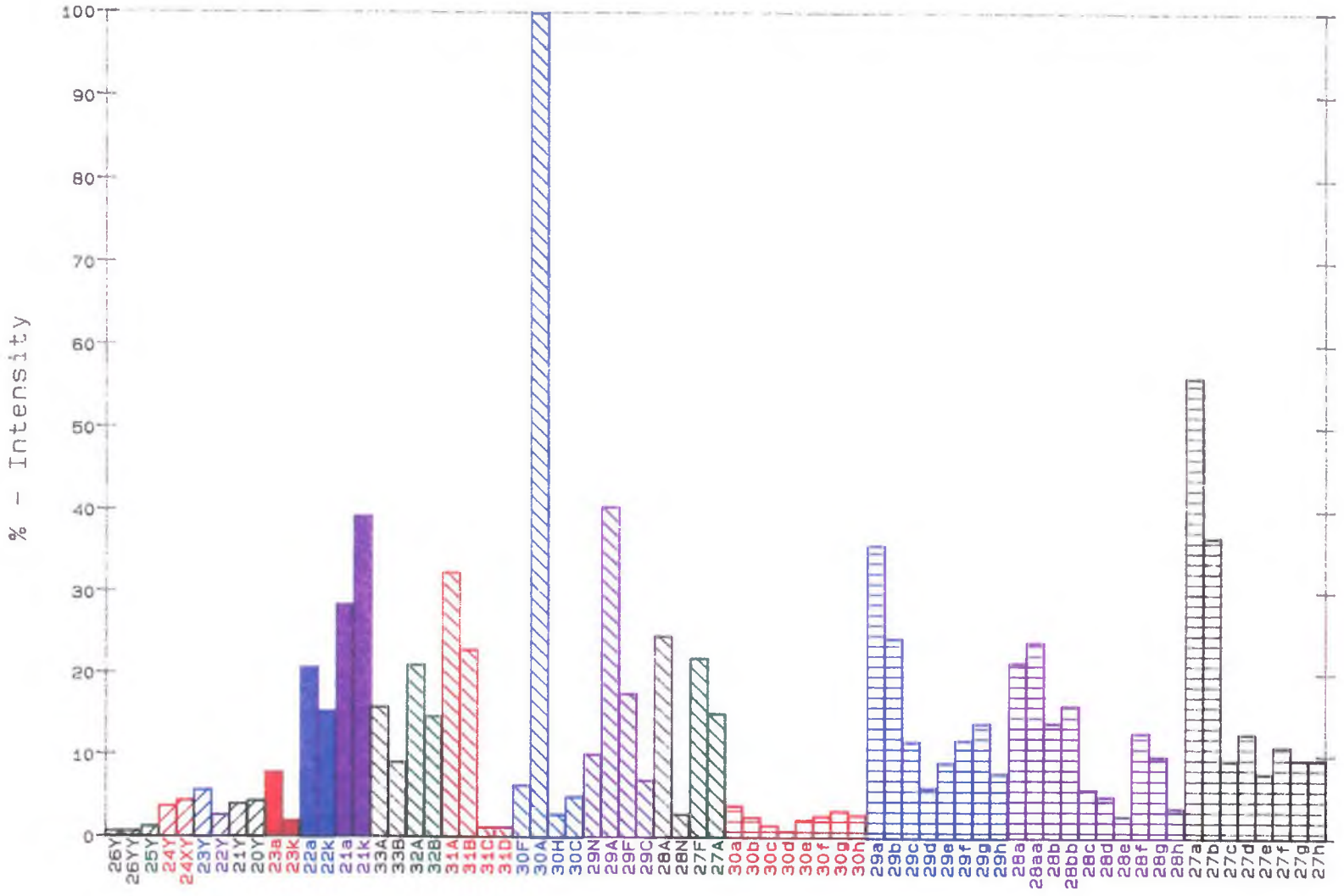
Biomarker pattern, SAT-fraction
Well: 30/9_1, DST2A , OIL , NNS
ms-file: NS15050, norm. factor: 1434



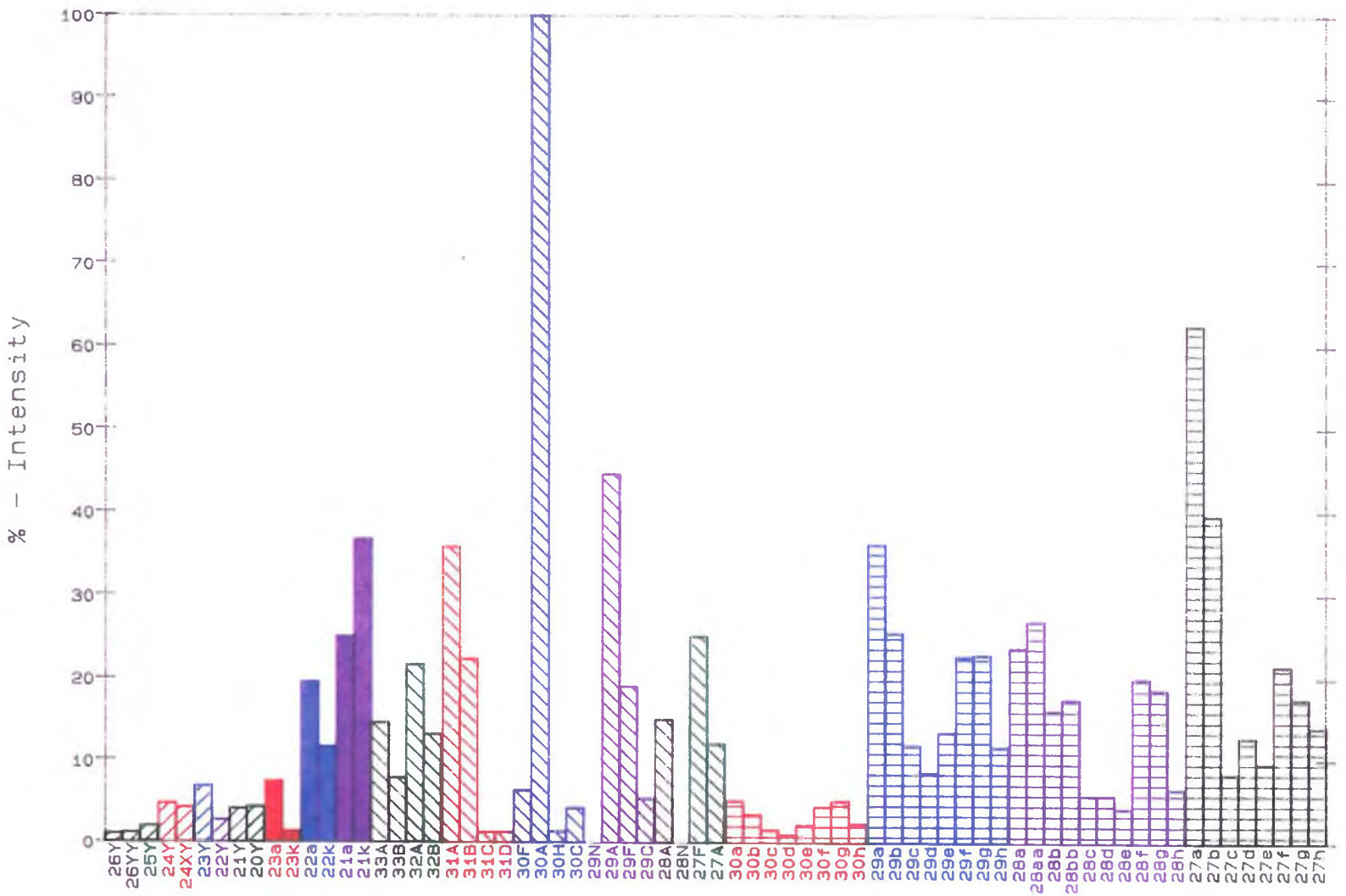
Biomarker pattern, SAT-fraction
Well: 30/6_7, DST4 , OIL , NNS
ms-file: NS15050, norm. factor: 1974



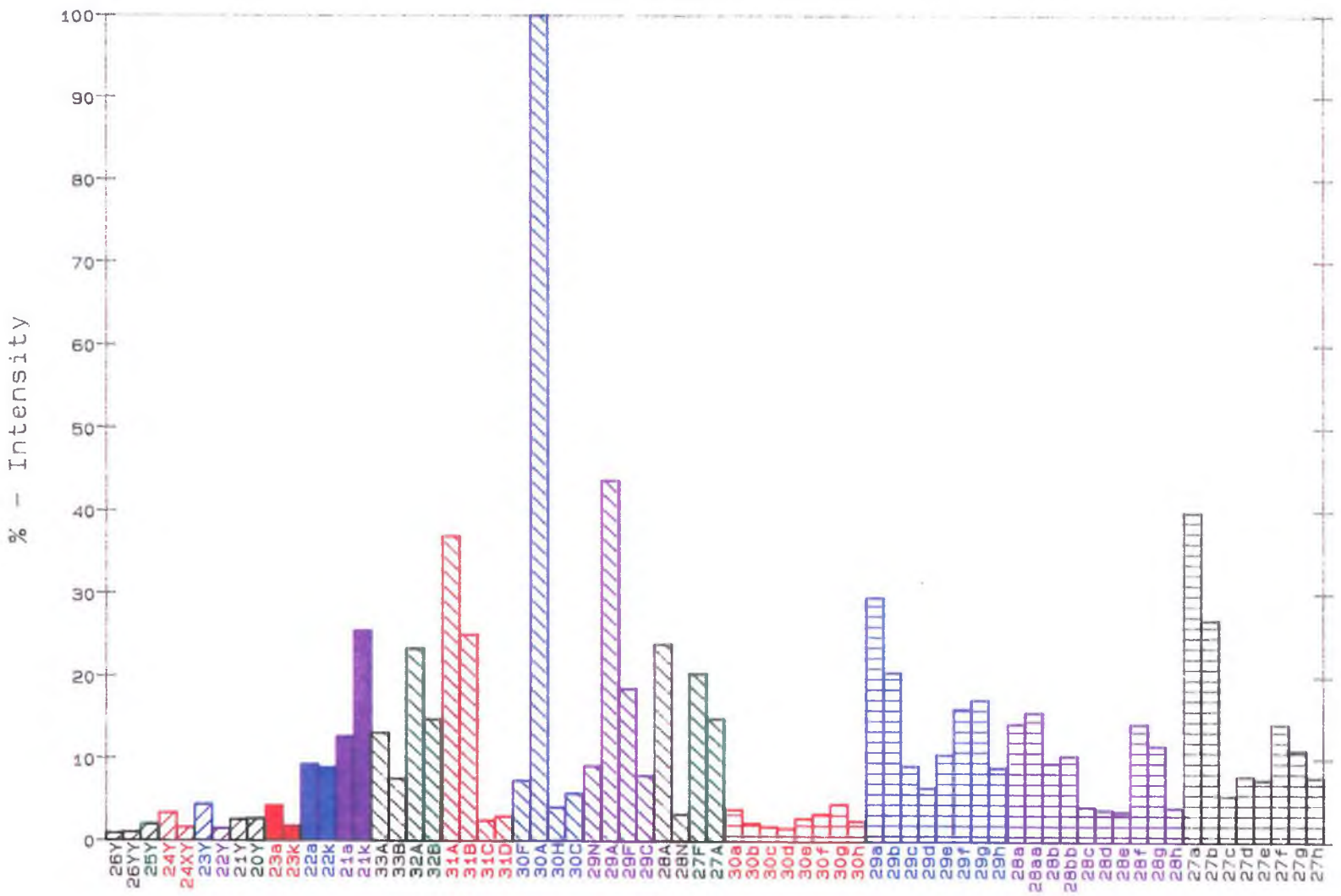
Biomarker pattern, SAT-fraction
Well: 30/6_9, DST1 , OIL , NNS
ms-file: NS29010, norm. factor: 2754



Biomarker pattern, SAT-fraction
Well: 30/6_5, RFT , OIL , NNS
ms-file: NS29010, norm. factor: 3067



Biomarker pattern, SAT-fraction
Well: 30/9-3A, 2910 - 2916m, OIL, DST1
ms-file: NS11109, norm. factor: 225.59



Biomarker pattern, SAT-fraction
Well: B30/6-13, 2573 - 2578.5m, OIL, DST3
ms-file: NS11109, norm. factor: 129.9