NORSKE SHELL - SKALMEN

DYVI STENA - 6306/10-1

INVENTORY SECTION-1 0

PRODUCT	UNIT SIZE	UNIT COST	START STOCK	USED	REC'D	BACK LOAD	END STOCK	SECTION COST NOK
BARITE	MT	694.00	0	65	389	0	324	45110.00
BENTONITE WYOMING	MT	1666.00	0	103	118	0	15	171598.00
IDVIS POLYMER	25 KG	1468.00	0	0	50	0	50	0.00
KOH	25 KG	229.00	0	29	40	0	11	6641.00
IDF FLR	25 KG	560.00	0	0	125	0	125	0.00
IDF FLR XL	25 KG	560.00	0	0	240	0	240	0.00
LIME	25 KG	36.00	0	47	120	0	73	1692.00
SODA ASH	25 KG	60.00	0	21	40	0	19	1260.00
GYPSUM	25 KG	36.00	0	0	424	0	424	0.00
GYPSUM BULK	KG	1.44	0	0	5000	0	5000	0.00
IDSEAL F	25 KG	145.00	0	0	40	0	40	0.00
IDSEAL C	25 KG	145.00	0	0	40	0	40	0.00
NUTPLUG F	25 KG	102.00	0	0	40	0	40	0.00
NUTPLUG C	25 KG	102.00	0	0	40	0	40	0.00
MICA C	25 KG	94.00	0	0	60	0	60	0.00
WATER	CM		0	1260	1260	0	0	0.00
DEFOAMER	25 LT	296.00	0	0	16	0	16	0.00
IDFREE	200 LT	3160.00	0	0	4	0	4	0.00

SECTION TOTAL = NOK 226301.00

NORSKE SHELL - SKALMEN

DYVI STENA - 6306/10-1

INVENTORY SECTION-2 0

PRODUCT	UNIT SIZE	UNIT COST	START STOCK	USED	REC'D	BACK LOAD	END STOCK	SECTION COST NOK
BARITE	MT	694.00	324	266	233	0	291	184604.00
BENTONITE WYOMING	MT	1666.00	15				15	0.00
IDVIS POLYMER	25 KG	1468.00	50	24	0	0	26	35232.00
KOH	25 KG	229.00	11	12	19	0	18	2748.00
CMC LOVIS	25 KG	277.00	0	35	200	0	165	9695.00
IDF FLR	25 KG	560.00	125	109	0	0	16	61040.00
IDF FLR XL	25 KG	560.00	240	331	200	0	109	185360.00
LIME	25 KG	36.00	73	8	0	0	65	288.00
SODA ASH	25 KG	60.00	19				19	0.00
GYPSUM	25 KG	36.00	424	475	240	0	189	17100.00
GYPSUM BULK	KG	1.44	5000	5000	0	0	0	7200.00
IDSEAL F	25 KG	145.00	40				40	0.00
IDSEAL C	25 KG	145.00	40				40	0.00
NUTPLUG F	25 KG	102.00	40				40	0.00
NUTPLUG C	25 KG	102.00	40				40	0.00
MICA C	25 KG	94.00	60				60	0.00
WATER	CM		0	910	910	0	0	0.00
DEFOAMER	25 LT	296.00	16				16	0.00
IDFREE	200 LT	3160.00	4				4	0.00
BIOTREAT 1451	200 LT	2952.00	0	1	1	0	0	2952.00
IDWASH	200 LT	2860.00	0	2	4	0	2	5720.00
BICARBONATE	25 KG	73.00	0	0	80	0	80	0.00

SECTION TOTAL = NOK 511939.00

NORSKE SHELL - SKALMEN

DYVI STENA - 6306/10-1

INVENTORY SECTION-3 0

PRODUCT	UNIT SIZE	UNIT COST	START STOCK	USED	REC'D	BACK LOAD	END STOCK	SECTION COST NOK
BARITE	MT	694.00	291	261	236	0	266	181134.00
BENTONITE WYOMING	25 KG	66.37	0	50	50	0	0	3318.50
BENTONITE WYOMING	MT	1666.00	15	3	0	0	12	4998.00
IDVIS POLYMER	25 KG	1468.00	26	47	25	0	4	68996.00
KOH	25 KG	229.00	18	13	0	0	5	2977.00
CMC LOVIS	25 KG	277.00	165	433	300	0	32	119941.00
IDF FLR	25 KG	560.00	16	126	150	0	40	70560.00
IDF FLR XL	25 KG	560.00	109	14	0	0	95	7840.00
LIME	25 KG	36.00	65	30	0	0	35	1080.00
SODA ASH	25 KG	60.00	19				19	0.00
GYPSUM	25 KG	36.00	189	431	488	0	246	15516.00
IDSEAL F	25 KG	145.00	40				40	0.00
IDSEAL C	25 KG	145.00	40				40	0.00
NUTPLUG F	25 KG	102.00	40				40	0.00
NUTPLUG C	25 KG	102.00	40				40	0.00
MICA C	25 KG	94.00	60				60	0.00
IDCIDE L	25 LT	369.00	0	19	32	0	13	7011.00
WATER	CM		0	708	708	0	0	0.00
DEFOAMER	25 LT	296.00	16				16	0.00
IDFREE	200 LT	3160.00	4				4	0.00
IDWASH	200 LT	2860.00	2	1	4	0	5	2860.00
BICARBONATE	25 KG	73.00	80				80	0.00

SECTION TOTAL = NOK 486231.50

NORSKE SHELL - SKALMEN

DYVI STENA - 6306/10-1

INVENTORY SECTION-4

PRODUCT	UNIT SIZE	UNIT COST	START STOCK	USED	REC'D	BACK LOAD	END STOCK	SECTION COST NOK
BARITE	MT	694.00	266	572	364	0	58	396968.00
BENTONITE WYOMING	MT	1666.00	12	1	0	0	11	1666.00
IDVIS POLYMER	25 KG	1468.00	4	54	100	50	0	79272.00
KOH	25 KG	229.00	5	9	4	0	0	2061.00
CMC LOVIS	25 KG	277.00	32				32	0.00
IDF FLR	25 KG	560.00	40	57	25	0	8	31920.00
IDF FLR XL	25 KG	560.00	95	245	360	160	50	137200.00
LIME	25 KG	36.00	35	50	42	0	27	1800.00
SODA ASH	25 KG	60.00	19				19	0.00
GYPSUM	25 KG	36.00	246	297	424	144	229	10692.00
IDSEAL F	25 KG	145.00	40	40	0	0	0	5800.00
IDSEAL C	25 KG	145.00	40	24	0	0	16	3480.00
NUTPLUG F	25 KG	102.00	40	10	40	40	30	1020.00
NUTPLUG C	25 KG	102.00	40	10	40	40	30	1020.00
MICA F	25 KG	94.00	0	0	40	40	0	0.00
MICA C	25 KG	94.00	60	0	40	40	60	0.00
IDCIDE L	25 LT	369.00	13	16	16	0	13	5904.00
WATER	CM		0	411	411	0	0	0.00
DEFOAMER	25 LT	296.00	16				16	0.00
IDFREE	200 LT	3160.00	4				4	0.00
IDWASH	200 LT	2860.00	5	3	0	0	2	8580.00
BICARBONATE	25 KG	73.00	80	30	0	0	50	2190.00

SECTION TOTAL = NOK 689573.00

NORSKE SHELL - SKALMEN

DYVI STENA - 6306/10-1

INVENTORY WELL TOTALS 0

PRODUCT	UNIT SIZE	UNIT COST	START STOCK	USED	REC'D	BACK LOAD	END STOCK	SECTION COST NOK
BARITE	MT	694.00	0	1164	1222	0	58	807816.00
BENTONITE WYOMING	25 KG	66.37	0	50	50	0	0	3318.50
BENTONITE WYOMING	MT	1666.00	0	107	118	0	11	178262.00
IDVIS POLYMER	25 KG	1468.00	0	125	175	50	0	183500.00
KOH	25 KG	229.00	0	63	63	0	0	14427.00
CMC LOVIS	25 KG	277.00	0	468	500	0	32	129636.00
IDF FLR	25 KG	560.00	0	292	300	0	8	163520.00
IDF FLR XL	25 KG	560.00	0	590	800	160	50	330400.00
LIME	25 KG	36.00	0	135	162	0	27	4860.00
SODA ASH	25 KG	60.00	0	21	40	0	19	1260.00
GYPSUM	25 KG	36.00	0	1203	1576	144	229	43308.00
GYPSUM BULK	KG	1.44	0	5000	5000	0	0	7200.00
IDSEAL F	25 KG	145.00	0	40	40	0	0	5800.00
IDSEAL C	25 KG	145.00	0	24	40	0	16	3480.00
NUTPLUG F	25 KG	102.00	0	10	80	40	30	1020.00
NUTPLUG C	25 KG	102.00	0	10	80	40	30	1020.00
MICA F	25 KG	94.00	0	0	40	40	0	0.00
MICA C	25 KG	94.00	0	0	100	40	60	0.00
IDCIDE L	25 LT	369.00	0	35	48	0	13	12915.00
WATER	CM		0	3289	3289	0	0	0.00
DEFOAMER	25 LT	296.00	0	0	16	0	16	0.00
IDFREE	200 LT	3160.00	0	0	4	0	4	0.00
BIOTREAT 1451	200 LT	2952.00	0	1	1	0	0	2952.00
IDWASH	200 LT	2860.00	0	6	8	0	2	17160.00
BICARBONATE	25 KG	73.00	0	30	80	0	50	2190.00

WELL TOTAL = NOK 1914044.50

DRILLING FLUID PROPERTIES RECORD | WELL NAME: 6306/10-1 | 26.00" HOLE | AREA: SKALMEN

WATER BASED MUD | RIG: DYVI STENA | CONTRACTOR: STENA DRILLING

NORSKE SHELL | FLUID SYSTEM: POLYMER/SW | IDF MUD ENGINEERS: NODBY/MACKIN

DAY No.	DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	FLUID LOSS HTHP	CAKE	pH	Pf	Mf	TOT HARD	CA HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	XS GYPSUM	REMARKS
1	05/09/1990	108	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		PREPARED TO SPUD
2	06/09/1990	108	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		MIX SPUD & KILL MUD
3	07/09/1990	121	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		SPUDDED & RESPUDDED
4	08/09/1990	175	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		DRLG. 17 1/2" HOLE
5	09/09/1990	235	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		DRLG. 17 1/2" HOLE
6	10/09/1990	456	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		DRLG. 12 1/4" HOLE
7	11/09/1990	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		DRLG. 12 1/4" HOLE
8	12/09/1990	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		OPEN HOLE TO 36"
9	13/09/1990	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.5	0.00	0.00	0	0	5.3	0	3	0.0	0.0	9.8	0.2	61.8	2.4		RUN 30" CSG. CMT.
10	14/09/1990	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.6	0.00	0.00	0	0	5.6	0	3	0.0	0.0	10.1	0.2	61.1	2.3		ATMPT LOG.OPEN HOLE
11	15/09/1990	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.6	0.00	0.00	0	0	5.6	0	3	0.0	0.0	10.1	0.2	61.1	2.3		OPEN HOLE TO 26"
12	16/09/19980	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.6	0.00	0.00	0	0	5.6	0	3	0.0	0.0	10.1	0.2	61.1	2.3		RUN 20" CSG.
13	17/09/1990	610	1.05	0	200+	0.0	0	0	0	0	0.0	0.0	0	10.6	0.00	0.00	0	0	5.6	0	3	0.0	0.0	10.1	0.2	61.1	2.3		CMT. RUN BOP & RISER

DRILLING FLUID PROPERTIES RECORD | WELL NAME: 6306/10-1 | 17.50" HOLE | AREA: SKALMEN

WATER BASED MUD | RIG: DYVI STENA | CONTRACTOR: STENA DRILLING

NORSKE SHELL | FLUID SYSTEM: PAC/GYPSUM | IDF MUD ENGINEERS: WARDE/NORDBY/DAIGLE

DAY No.	DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	CAKE HTHP	pH	Pf	Mf	TOT HARD	CA HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	XS GYPSUM	REMARKS
14	18/09/1990	624	1.3	27	60	27.5	20	15	1	2	3.9	0.0	1	9.2	0.10	0.15	3040	2600	21.0	0	11	0.0	5.0	343.1	8.1	36.5	1.4	7.7	DRILL CMT. LOT. DRILL
15	19/09/1990	1031	1.3	37	52	28.5	20	17	3	12	3.4	0.0	1	8.4	0.05	0.30	4080	2320	21.0	0	12	0.5	42.8	300.8	7.1	89.2	3.4	6.6	DRILL 17 1/2" HOLE
16	20/09/1990	1144	1.3	39	51	31.0	22	18	4	28	3.8	0.0	1	8.1	0.00	0.30	4160	2160	21.0	0	12	0.5	64.2	300.8	7.1	89.2	3.4	6.4	DRILL. TRIP
17	21/09/1990	1144	1.3	0	62	27.0	19	16	4	26	4.0	0.0	1	8.0	0.00	0.30	4040	2080	21.0	0	12	0.4	64.2	300.8	7.1	89.2	3.4	7.3	WORK ON ANCHORS
18	22/09/1990	1172	1.3	19	53	23.0	17	12	3	15	3.8	0.0	1	8.1	0.00	0.25	4360	2160	21.0	0	12	0.8	53.5	300.8	7.1	89.2	3.4	8.5	CORING
19	23/09/1990	1200	1.3	24	51	22.0	16	12	3	14	3.6	0.0	1	7.9	0.00	0.25	4560	2160	21.0	0	12	0.8	57.1	300.8	7.1	89.2	3.4	8.5	CORING
20	24/09/1990	1328	1.3	33	48	23.5	17	13	3	20	3.8	0.0	1	8.0	0.00	0.40	4800	2240	21.0	0	12	1.3	68.0	300.8	7.1	89.2	3.4	7.5	TRIP. DRILL.
21	25/09/1990	1478	1.3	48	50	25.5	18	15	4	25	3.4	0.0	1	8.2	0.05	0.50	4640	2320	21.0	0	12	1.0	62.0	300.8	7.1	89.2	3.4	7.3	DRILL.
22	26/09/1990	1510	1.3	48	68	30.5	21	19	5	29	3.6	0.0	1	8.0	0.05	0.30	4400	2160	21.0	0	13	0.8	68.0	279.7	6.6	115.5	4.4	8.5	DRILL. CIRCULATE
23	27/09/1990	1510	1.3	48	68	30.5	21	19	5	29	3.6	0.0	1	8.0	0.05	0.30	4400	2160	21.0	0	13	0.8	68.0	279.7	6.6	115.5	4.4	8.5	TRIP. LOG
24	28/09/1990	1510	1.3	n/a	68	30.5	21	19	5	29	3.6	0.0	1	8.0	0.05	0.30	4400	2160	21.0	0	13	0.8	68.0	279.7	6.6	115.5	4.4	8.5	LOG TRIP
25	29/09/1990	1510	1.31	28	98	26.5	18	17	5	36	3.8	0.0	1	7.9	0.05	0.30	4320	2080	21.0	0	13	0.8	69.0	306.0	7.3	99.2	3.8	6.0	CIRC. TRIP. RUN CSG
26	30/09/1990	1510	1.31	28	92	20.5	15	11	10	48	5.9	0.0	1	7.8	0.05	0.30	4480	400	20.0	0	13	0.8	71.0	305.2	7.2	101.5	3.9	-1.2	RUN CASING.
27	01/10/1990	1510	1.31	28	92	20.5	15	11	10	48	5.9	0.0	1	7.8	0.05	0.30	4480	400	20.0	0	13	0.8	71.0	305.2	7.2	101.5	3.9	-1.2	DRILL OUT CEMENT.

DRILLING FLUID PROPERTIES RECORD | WELL NAME: 6306/10-1 | 12.25" HOLE | AREA: SKALMEN

WATER BASED MUD | RIG: DYVI STENA | CONTRACTOR: STENA DRILLING

NORSKE SHELL | FLUID SYSTEM: PAC/GYPSUM | IDF MUD ENGINEERS: NORBY/KELLY/MACKIN

DAY No.	DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	FLUID LOSS HTHP	CAKE	pH	Pf	Mf	TOT HARD	CA HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	XS GYPSUM	REMARKS
28	02/10/1990	1851	1.21	42	44	17.0	11	12	2	9	3.4	0.0	1	8.0	0.05	0.35	4400	2160	21.0	0	9	0.2	36.0	190.8	4.5	77.8	3.0	6.9	DRILL 12 1/4" HOLE.
29	03/10/1990	1915	1.21	37	42	16.5	11	11	2	13	3.7	0.0	1	7.9	0.00	0.30	4320	2160	21.0	0	10	0.4	48.0	148.6	3.5	130.4	5.0	6.3	TRIP / DRILL.
30	04/10/1990	1990	1.2	N/A	41	17.0	11	12	2	10	3.6	0.0	1	7.8	0.00	0.25	4160	2120	21.0	0	10	0.5	46.0	122.2	2.9	146.7	5.6	6.4	DRILL/TRIP/W.O.W.
31	05/10/1990	2047	1.21	38	45	18.5	12	13	2	13	3.5	0.0	1	7.8	0.00	0.25	4200	2160	21.0	0	10	0.1	48.0	148.6	3.5	130.4	5.0	8.3	TRIP / DRILL.
32	06/10/1990	2132	1.25	41	45	20.5	14	13	3	22	3.7	0.0	1	7.8	0.00	0.25	4280	2200	21.0	0	12	0.1	54.0	190.4	4.5	144.3	5.5	8.3	DRILL / WIPERTRIP.
33	07/10/1990	2132	1.25	N/A	45	20.0	14	12	2	18	3.8	0.0	1	7.8	0.00	0.25	4280	2200	21.0	0	12	0.1	50.0	190.4	4.5	144.3	5.5	8.3	TRIPPING.
34	08/10/1990	2134	1.25	N/A	44	20.0	14	12	2	18	3.8	0.0	1	7.8	0.00	0.25	4280	2200	21.0	0	11	0.1	48.0	211.5	5.0	117.9	4.5	7.6	TRIP/REAM/TRIP/WOW
35	09/10/1990	2134	1.25	N/A	43	19.5	14	11	2	17	3.8	0.0	1	7.8	0.00	0.25	4280	2200	21.0	0	11	0.1	48.0	211.5	5.0	117.9	4.5	7.6	W.O.W.
36	10/10/1990	2134	1.25	N/A	42	17.0	12	10	2	16	3.7	0.0	1	7.8	0.00	0.25	4320	2240	21.0	0	11	0.1	51.0	211.5	5.0	117.9	4.5	8.1	W.O.W. ANCHOR HANDL.
37	11/10/1990	2134	1.25	N/A	42	17.5	12	11	2	16	3.7	0.0	1	8.4	0.05	0.30	4040	2080	21.0	0	11	0.1	51.0	211.5	5.0	117.9	4.5	8.6	ANCHOR HANDLING.
38	12/10/1990	2134	1.25	N/A	42	17.5	12	11	2	16	3.7	0.0	1	8.4	0.05	0.30	4040	2080	21.0	0	11	0.1	51.0	211.5	5.0	117.9	4.5	8.6	WORK ON ANCH.WINCHES
39	13/10/1990	2134	1.25	36	46	17.5	12	11	2	20	4.6	0.0	1	8.4	0.05	0.30	3960	2040	21.0	0	11	0.1	52.0	211.5	5.0	117.9	4.5	8.1	RIH & REAMED.
40	14/10/1990	2317	1.29	39	53	24.5	18	13	3	26	3.5	0.0	1	7.9	0.00	0.30	3920	2120	21.0	0	12	0.1	57.0	274.5	6.5	105.4	4.0	7.2	DRILLED.
41	15/10/1990	2416	1.29	42	49	24.0	17	14	3	23	3.8	0.0	1	8.0	0.00	0.25	3840	2040	21.0	0	12	0.2	48.0	274.5	6.5	105.4	4.0	6.8	DRILLED.
42	16/10/1990	2498	1.29	41	48	21.0	15	12	2	20	3.7	0.0	1	7.9	0.00	0.25	3880	2080	21.0	0	12	0.2	47.0	274.5	6.5	105.4	4.0	7.3	DRILLED.
43	17/10/1990	2595	1.29	49	49	24.0	16	16	5	27	3.8	0.0	1	7.9	0.00	0.25	4000	2080	21.0	0	12	0.2	57.0	274.5	6.5	105.4	4.0	7.3	DRILLED.
44	18/10/1990	2655	1.29	49	47	20.5	14	13	5	27	3.9	0.0	1	7.9	0.00	0.25	4400	2240	21.0	0	12	0.2	48.0	274.5	6.5	105.4	4.0	6.8	DRILLED. TRIPPED
45	19/10/1990	2655	1.29	0	47	20.5	14	13	5	27	3.9	0.0	1	7.9	0.00	0.25	4400	2240	21.0	0	12	0.2	48.0	274.5	6.5	105.4	4.0	6.8	LOGGING
46	20/10/1990	2655	1.29	0	47	20.5	14	13	5	27	3.9	0.0	1	7.9	0.00	0.25	4400	2240	21.0	0	12	0.2	48.0	274.5	6.5	105.4	4.0	6.8	LOGGING
47	21/10/1990	2655	1.35	48	63	34.5	23	23	9	38	4.2	0.0	1	7.8	0.00	0.25	4240	2160	21.0	0	14	0.2	57.0	347.8	8.3	113.0	4.3	6.6	TRIP REAM CIRCULATE
48	22/10/1990	2655	1.35	0	63	34.5	23	23	9	38	4.2	0.0	1	7.8	0.00	0.25	4240	2160	21.0	0	14	0.2	57.0	347.8	8.3	113.0	4.3	6.6	CIRCULATE RUN CSG
49	23/10/1990	2655	1.35	0	63	34.5	23	23	9	38	4.2	0.0	1	7.8	0.00	0.25	4240	2160	21.0	0	14	0.2	57.0	347.8	8.3	113.0	4.3	6.6	RUN CSG. CMT
50	24/10/1990	2655	1.35	0	63	34.5	23	23	9	38	4.2	0.0	1	7.8	0.00	0.25	4240	2160	21.0	0	14	0.2	57.0	347.8	8.3	113.0	4.3	6.6	GYRO, SCRAPE, TEST

DRILLING FLUID PROPERTIES RECORD

WELL NAME: 6306/10-1 8.50" HOLE

AREA: SKALMEN

WATER BASED MUD

RIG: DYVI STENA

CONTRACTOR: STENA DRILLING

NORSKE SHELL

FLUID SYSTEM: PAC/GYPSUM

IDF MUD ENGINEERS: WARDE/NORDBY/LAURITZEN

DAY No.	DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	FLUID LOSS HTHP	CAKE	pH	Pf	Mf	TOT HARD	CA HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	XS GYPSUM	REMARKS
51	25/10/1990	2682	1.35	38	50	25.0	19	12	2	4	3.2	0.0	1	8.0	0.00	0.25	4560	2160	21.0	0	13	tr	18.0	390.1	9.3	60.4	2.3	7.2	TRIP. DRILL
52	26/10/1990	2707	1.35	41	52	25.5	19	13	2	6	3.0	0.0	1	8.1	0.00	0.25	4640	2160	21.0	0	13	tr	21.0	390.1	9.3	60.4	2.3	7.2	DRILL TRIP WASH
53	27/10/1990	2747	1.55	41	49	27.0	21	12	2	5	2.8	0.0	1	8.0	0.00	0.25	4640	2160	21.0	0	20	0.3	18.0	620.3	14.7	103.3	4.0	7.0	DRILL TRIP WASH
54	28/10/1990	2773	1.55	37	53	31.5	23	17	3	15	3.0	0.0	1	7.9	0.00	0.25	4640	2160	21.0	0	20	0.3	18.0	620.3	14.7	103.3	4.0	7.0	CORE TRIP DRILL
55	29/10/1990	2858	1.6	47	52	34.5	26	17	4	29	3.2	0.0	1	8.0	0.00	0.35	4400	2160	21.0	0	22	0.3	28.0	667.3	15.8	127.2	4.9	7.2	DRILL TRIP
56	30/10/1990	2873	1.6	41	53	30.0	22	16	7	35	3.4	0.0	1	7.9	0.00	0.35	4400	2160	21.0	0	22	0.5	43.0	667.3	15.8	127.2	4.9	7.2	TRIP DRILL
57	31/10/1990	2891	1.6	39	59	35.0	26	18	7	42	3.6	0.0	1	8.6	0.00	0.40	4200	2120	21.0	0	23	0.5	47.0	625.0	14.8	179.8	6.9	6.6	DRILL/TRIP/CORE
58	01/11/1990	2910	1.6	42	61	37.0	27	20	7	45	3.4	0.0	1	8.4	0.00	0.30	3520	2520	20.0	0	23	0.5	43.0	645.5	15.3	155.5	6.0	6.2	RIG REPAIR/DRILL
59	02/11/1990	2965	1.6	36	52	28.5	22	13	3	19	3.2	0.0	1	8.0	0.00	0.35	3760	2880	20.5	0	22	0.2	29.0	688.1	16.3	101.8	3.9	6.5	DRILL AHEAD
60	03/11/1990	2976	1.6	31	54	29.0	22	14	3	19	2.9	0.0	1	8.0	0.00	0.35	3720	2840	20.5	0	22	0.2	32.0	688.1	16.3	101.8	3.9	6.6	DRILL/TRIP
61	04/11/1990	3019	1.6	42	53	29.5	22	15	3	25	3.4	0.0	1	8.0	0.00	0.35	3760	2720	20.5	0	22	0.2	32.0	666.9	15.8	128.2	4.9	6.3	DRILL/BIT TRIP
62	05/11/1990	3062	1.6	42	54	33.0	26	14	3	26	3.2	0.0	1	7.9	0.00	0.35	3880	2840	20.5	0	22	0.2	32.0	666.9	15.8	128.2	4.9	6.7	DRILL AHEAD
63	06/11/1990	3073	1.6	20	56	32.0	25	14	3	26	3.4	0.0	1	8.1	0.00	0.35	3880	2840	20.5	0	22	0.2	32.0	666.9	15.8	128.2	4.9	6.7	DRILL/POOH/TEST BOP
64	07/11/1990	3125	1.6	37	56	28.5	22	13	3	23	2.8	0.0	1	7.9	0.00	0.30	3840	2760	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.8	DRILL
65	08/11/1990	3141	1.6	20	57	32.5	25	15	4	32	3.2	0.0	1	7.9	0.00	0.30	3880	2800	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.0	DR.TO TD.POOH TO LOG
66	09/11/1990	3141	1.6	20	57	32.5	25	15	4	32	3.2	0.0	1	7.9	0.00	0.30	3880	2800	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.0	LOGGING .
67	10/11/1990	3141	1.6	20	57	32.5	25	15	4	32	3.2	0.0	1	7.9	0.00	0.30	3880	2800	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.0	LOGGING/FISHING .
68	11/11/1990	3141	1.6	32	60	35.0	26	18	6	36	3.2	0.0	1	8.5	0.00	0.35	3880	2800	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.0	CIRC/LOGGING .
69	12/11/1990	3141	1.6	32	60	35.0	26	18	6	36	3.2	0.0	1	8.5	0.00	0.35	3880	2800	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.0	LOGGING/FISHING
70	13/11/1990	3141	1.6	32	60	35.0	26	18	6	36	3.2	0.0	1	8.5	0.00	0.35	3880	2800	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	6.0	LOGGING
71	14/11/90	3141	1.6	32	60	36.0	27	18	6	25	3.3	0.0	1	7.9	0.00	0.35	3600	2600	20.5	0	21	0.2	28.0	709.2	16.8	75.5	2.9	7.2	LOGGING
72	15/11/90	3141	1.58	32	62	31.5	23	17	5	20	3.4	0.0	1	8.2	0.00	0.35	3640	2560	20.5	0	21	0.2	28.0	656.6	15.6	108.1	4.1	6.7	LOGGING
73	16/11/90	3141	1.58	32	63	32.5	24	17	6	24	3.6	0.0	1	7.6	0.00	0.35	3640	2520	20.5	0	21	0.2	28.0	656.6	15.6	108.1	4.1	7.5	WOW
74	17/11/90	3141	1.58	32	63	32.0	23	18	5	23	4.1	0.0	1	7.6	0.00	0.35	3600	2520	20.5	0	21	0.2	28.0	656.6	15.6	108.1	4.1	7.5	WOW
75	0.01818181	3141	1.56	32	53	25.5	19	13	5	16	4.1	0.0	1	8.0	0.00	0.35	3680	3320	20.5	0	20	0.2	28.0	646.3	15.3	88.0	3.4	7.9	TIH TO LINER TOP
76	19/11/90	3141	1.56	32	60	32.5	25	15	5	24		0	1																
77	20/11/90	3141	1.56	32	60	30.0	22	16	3	18	4.1	0.0	1	7.5	0.00	0.35	3680	3200	20.5	0	20	0.2	28.0	646.3	15.3	88.0	3.4	8.2	0
78	21/11/90	3141	1.56	35	60	37.0	28	18	4	20	4.2	0.0	1	7.5	0.00	0.35	3200	3000	20.5	0	20	0.2	28.0	646.3	15.3	88.0	3.4	8.8	DRLG CEMENT-CIRC AND
79	22/11/90	3160	1.56	24	68	36.0	28	16	3	18	3.9	0.0	1	9.5	0.50	1.10	2800	2720	20.5	0	20	0.2	28.0	646.3	15.3	88.0	3.4	10.9	COREING
80	23/11/90	3168	1.56	24	82	37.5	30	15	3	14	3.8	0.0	1	8.0	0.10	0.30	2520	2320	20.5	0	20	0.2	21.0	646.3	15.3	88.0	3.4	11.3	DRLG AHEAD- 2-6M/HR

DRILLING FLUID PROPERTIES RECORD | WELL NAME: 6306/10-1 8.50" HOLE | AREA: SKALMEN

WATER BASED MUD | RIG: DYVI STENA | CONTRACTOR: STENA DRILLING

NORSKE SHELL | FLUID SYSTEM: PAC/GYPSUM | IDF MUD ENGINEERS: WARDE/NORDBY/LAURITZEN

DAY No.	DATE	DEPTH M	WEIGHT S.G.	TEMP	FV	AV	PV	YP	GELS 10s	GELS 10m	FLUID LOSS API	FLUID LOSS HTHP	CAKE	pH	Pf	Mf	TOT HARD	CA HARD	CL- G/L	OIL %	SOLID %	SAND %	MBT	BAR Kg/M3	BAR % v/v	LGS Kg/M3	LGS % v/v	XS GYPSUM	REMARKS
81	24/11/90	3183	1.56	33	82	35.5	29	13	4	12	3.6	0.0	1	8.0	0.10	0.40	2560	2360	20.5	0	20	0.6	21.0	646.3	15.3	88.0	3.4	11.2	TRIP. DRILL
82	25/11/90	3183	1.56	22	82	36.0	29	14	4	12	3.8	0.0	1	8.0	0.10	0.40	2560	2360	20.5	0	20	0.6	21.0	646.3	15.3	88.0	3.4	11.2	DRILL TRIP WASH
83	26/11/90	3186	1.56	22	84	43.0	30	26	5	18	3.8	0.0	1	8.0	0.10	0.40	2920	2720	20.5	0	20	0.6	21.0	646.3	15.3	88.0	3.4	10.2	DRILL TRIP WASH
84	27/11/90	3186	1.56	15	84	37.5	27	21	5	15	3.9	0.0	1	8.0	0.10	0.40	2920	2720	20.5	0	20	0.6	21.0	646.3	15.3	88.0	3.4	10.2	CORE TRIP DRILL
85	28/11/90	3186	1.56	15	86	37.0	27	20	5	16	3.8	0.0	1	8.0	0.10	0.40	2920	2640	20.5	0	20	0.5	21.0	646.3	15.3	88.0	3.4	10.4	DRILL TRIP
86	29/11/1990	3186	1.56	21	97	42.0	29	26	7	21	3.7	0.0	1	8.5	0.15	0.45	2880	2600	21.0	0	20	0.6	21.0	646.6	15.4	87.0	3.3	11.2	TRIP DRILL
87	30/11/1990	3186	1.56	16	94	41.5	29	25	6	20	3.8	0.0	1	8.4	0.15	0.45	2880	2600	21.0	0	20	0.6	21.0	646.6	15.4	87.0	3.3	11.2	DRILL/TRIP/CORE
88	01/12/1990	3186	1.56	15	88	37.5	27	21	5	16	3.8	0.0	1	8.4	0.15	0.45	2920	2640	21.0	0	20	0.6	21.0	646.6	15.4	87.0	3.3	10.4	RIG REPAIR/DRILL
89	02/12/1990	3186	1.56	15	84	37.0	27	20	5	15	3.9	0.0	1	8.8	0.15	0.45	2840	2560	21.0	0	20	0.6	21.0	646.6	15.4	87.0	3.3	10.0	DRILL AHEAD
90	03/12/1990	3186	1.56	15	83	37.0	28	18	5	15	3.9	0.0	1	8.8	0.15	0.45	2880	2560	21.0	0	20	0.5	21.0	646.6	15.4	87.0	3.3	9.3	DRILL/TRIP
91	04/12/1990	3186	1.56	19	68	41.5	29	25	7	19	4.9	0.0	1	10.2	0.20	0.70	2960	2600	21.0	0	20	0.7	21.0	646.6	15.4	87.0	3.3	8.5	DRILL/BIT TRIP
92	05/12/1990	3186	1.58	23	66	36.5	26	21	6	20	8.7	0.0	1	10.3	0.25	0.90	3040	2720	21.0	0	21	0.6	21.0	657.0	15.6	107.1	4.1	9.0	DRILL AHEAD
93	06/12/1990	3186	1.58	18	66	36.0	26	20	6	19	8.9	0.0	1	10.3	0.25	0.85	3080	2720	21.0	0	21	0.6	21.0	657.0	15.6	107.1	4.1	8.3	DRILL/POOH/TEST BOP
94	07/12/1990	3186	1.58	15	67	36.0	26	20	6	20	9.1	0.0	1	10.3	0.25	0.85	3040	2640	21.0	0	21	0.6	21.0	657.0	15.6	107.1	4.1	9.2	DRILL
95	08/12/1990	3186	1.58	13	66	35.5	26	19	5	18	9.2	0.0	1	10.3	0.25	0.85	3000	2640	21.0	0	21	0.6	21.0	657.0	15.6	107.1	4.1	9.2	DR.TO TD.POOH TO LOG
96	09/12/1990	3186	1.58	12	67	35.5	26	19	5	18	9.1	0.0	1	10.3	0.25	0.85	3040	2600	21.0	0	21	0.6	21.0	657.0	15.6	107.1	4.1	9.3	LOGGING .
97	10/12/1990	3186	1.58	23	56	21.0	15	12	3	7	15.6	0.0	1	10.2	0.25	0.80	3000	2720	21.0	0	21	0.8	18.0	657.0	15.6	107.1	4.1	9.0	LOGGING/FISHING .
98	11/12/1990	3186	1.58	24	65	38.5	30	17	10	28	21.6	0.0	1	10.0	0.20	0.70	2560	2520	21.0	0	21	0.7	24.0	657.0	15.6	107.1	4.1	9.5	CIRC/LOGGING .
99	12/12/1990	3186	1.58	19	62	38.0	29	18	9	27	28.0	0.0	1	10.3	0.25	0.70	2520	2520	21.0	0	21	0.7	27.0	657.0	15.6	107.1	4.1	7.5	LOGGING/FISHING .

LOGGING

LOGGING

LOGGING

WOW

WOW

TIH TO LINER TOP

0

DRLG CEMENT-CIRC AND COREING

DRLG AHEAD- 2-6M/HR

RFT / FMT PRESSURES

Well: 6306/10-1

Pressure Gauge: HP

Run	Test No	Depth (m RKB)	Depth (m TV SS)	Hydr. st. initial (bara)	Pressure Final (bara)	Form.Pres. (bara)	Time set (mins)	Remarks.
1	1	1138.0	1113.0	150.0	149.9	112.5		
	2	1142.0	1117.0	150.7	150.6	112.7		
	3	1153.0	1128.0	152.1	151.9	113.8		
	4	1167.0	1142.0	153.7	153.6	115.3		
	5	1176.0	1151.0	154.9	154.8	116.2		
	6	1181.0	1156.0	155.5	155.5	116.6		
	7	1191.0	1166.0	156.8	156.7	117.6		
	8	1207.0	1182.0	152.0	158.9	119.2		
	9	1234.0	1209.0	162.3	162.5	121.9		
	10	1252.0	1227.0	164.8	164.7			Tight
	11	1253.0	1228.0	164.8	164.7	123.7		
	12	1259.0	1234.0	165.5	165.4	124.3		
	13	1279.0	1254.0	0.0	0.0			Tight
	14	1280.0	1255.0	168.2	167.8	126.4		
2	1	1828.0	1803.0	236.3				
	2	1828.5	1803.5	236.4	236.4			No Seal
	3	1835.5	1810.5	237.3	237.2			No Seal
	4	1834.5	1809.5	237.1	237.1			No Seal
	5	1840.5	1815.5	237.9	237.9			No Seal
	6	2167.0	2142.0	279.5	279.5			No Seal
	7	2202.0	2177.0	283.9	283.9			No Seal
	8	1828.0	1803.0	236.3	236.4			Tight
	9	1835.5	1810.5	237.4	237.4			Tight
	10	1840.5	1815.5	238.1	238.1			Tight
	11	1848.5	1823.5	239.1	239.1			Tight
	12	1994.0	1969.0	257.6	257.6			No Seal
	13	1993.5	1968.5	257.5	257.5			No Seal
	14	2167.0	2142.0	279.6	279.6			No Seal
	15	2167.0	2142.5	279.6	279.6			No Seal
	16	2198.0	2173.0	283.4	283.4			No Seal

RFT / FMT PRESSURES

Well: 6306/10-1

Pressure Gauge: HP

Run	Test No	Depth (m RKB)	Depth (m TV SS)	Hydr. st. initial (bara)	Pressure Final (bara)	Form.Pres. (bara)	Time set (mins)	Remarks.
4.4	1	2722.0	2695.3	427.7	427.6	415.9	9	K: 2.72 mD (derived from FMT response)
	2	2737.0	2710.3	430.6	430.3	417.8	17	K: 0.58 mD
	3	2752.5	2725.7	433.2	432.9	407.1	9	K: 0.77 mD
	4	2758.0	2731.2	433.9	433.8	419.8	9	K: 0.51 mD
	5	2776.0	2749.2	437.2	436.9		30	Tight (Abandonned)
	6	2780.0	2753.1	437.7	437.6		16	Tight (Abandonned)
	7	2789.0	2762.1	439.0	438.9	398.3	8	K: 0.86 mD
	8	2823.4	2796.4	445.2	444.7	401.4	8	K: 0.50 mD
	9	2977.4	2949.6	468.9	468.0	374.5	12	K: 0.67 mD
	10	3022.9	2994.7	476.5	476.0		10	Tight (Abandonned)
	11	3115.0	3085.9	491.5	489.9	427.0	20	K: 0.55 mD (Tool Stuck !)
4.5	1	2722.0	2695.3	431.2	431.3	426.7	9	K: 0.65 mD
	2	2737.0	2710.3	434.2	433.9	416.5	8	K: 0.50 mD
	3	2752.5	2725.7	436.4	436.2	405.7	5	K: 3.51 mD
	4	2758.0	2731.2	437.1	436.9	422.6	9	K: 0.28 mD
	5	2776.0	2749.2	439.9	439.9		3	Tigh (Abandonned)
	6	2775.5	2748.7	439.5				No Seal
	7	2780.0	2753.1	440.3				No Seal
	8	2789.0	2762.1	441.8	441.5	395.8	17	K: 0.23 mD
	9	2823.5	2796.5	447.1	447.0	401.3	3	K: 0.41 mD
	10	2959.0	2931.2	468.3	467.8	360.7	17	K: 0.35 mD (Tool Stuck !)
4.6	1	2823.4	2796.4	439.9	439.2	No pretest	30	Sample (mud filtrate)
	2	2722.0	2695.3	423.7	423.2	No pretest	30	Sample (mud filtrate)

9. TEST REPORT

9.1 General Information

Two production tests, Test No.1 and 2, were carried out over the intervals 2967 - 3158 m TV SS (2995 - 3187 m RKB) and 2689 - 2800 m TV SS (2716 - 2827 m RKB) respectively.

The primary objective in both intervals was to test well productivity and if possible obtain fluid samples.

The first production test tested an interval (2967-3158 m TV SS). At a low tubing head pressure the well flowed at a very low rate and did not produce any formation fluids to surface. A bottom hole sample was taken (sampling tool installed in the test string).

The second test was carried out over 2689-2800 m TV SS. The well flowed gas at very low rates of some 1500 Sm3/d (at low tubing head pressures) and the well was unable to clean up. Gas samples were collected at surface and one bottom hole sample was taken. While circulating out the string content before abandonment, condensate and possibly some formation water was recovered. Based on this it was concluded that the tested interval contained a gas/gas-condensate fluid and some mobile water.

9.2 Production Test #1: 2995 - 3187 m RKB

Sequence of Events

This interval was tested 'barefoot', i.e. no liner was cemented across the formation. The well was flowed for one hour and produced at a rate of 4 m3/d at low tubing head pressure (0.252 m3 of completion fluid produced), and subsequently shut in for 2 1/2 hour. After the initial shut-in the well was opened up. The rate was decreasing and after 2 1/2 hour of flow the rate was 1 m3/d. An injection test followed by backproduction was carried out but no significant increase in rate was achieved. The production test was finalised with a build-up of some 20 hours (waiting on weather).

A graph showing rate and bottom hole pressure vs time is shown on Figure 9.1.

Fluid Properties

The small amounts of formation fluid produced are of unknown type and property.

9.3 Production Test #2: 2716 - 2827 m RKB

Sequence of Events

This interval was perforated with TCP (5 SPF 60 deg phasing). An initial flow of one hour was carried out and the well produced at a rate of 25 m3/d at low tubing head pressure (1.2 m3 of completion fluid produced), and subsequently shut in for 2 1/2 hour. After the initial shut-in the well was flowed for some 12 hrs at low tubing head pressures. After backproducing completion fluid (some 6 m3), the well flowed gas at a very low rate (1500 Sm3/d). Gas gravity was measured at 0.64 (Air=1). The well did not further clean up and was shut in down-hole for a build-up (final build-up totalling some 6 hrs).

Upon abandonment of the test the tubing content was circulated out. This indicated that condensate and some formation water had been produced (some 1 m3 of condensate and some 4 m3 of water; 13000 ppm Cl-).

Fluid Properties

Standard wet gas correlations have been used to determine the gas PVT properties. Viscosity and compressibility were derived from correlations at 230 bar x ps (0.023 cp) and 0.00185 bar^{-1} respectively (at initial reservoir conditions).

A bottom-hole sample was taken (sampling tool in the test string; 'DBS') but was found to be half full of water (12000 ppm Cl^{-}). The fluids trapped between the DBS and the PCT were reported to be mainly condensate (density 0.795 g/cc i.e. 46 API).

SUMMARY OF PRODUCTION TEST RESULTS (OIL)

Well: 6306/10-1 *Test Details: Prod. Test No. 1*

Date		02.12-03.12.90	
Interval		2967-3158 (2995-3187)	m TV SS (m AH RKB)
Formation		Basement	
Reservoir Pressure	Pi	409	bara
Datum Level		3086	m
Permeability Thickness	kh	0.00054	(um) ² m
Drained Thickness	h	22	m
Permeability	k	0.00003	(um) ²
Total Skin	S	-1	
Productivity Index	PI	0.02	m³/(d x bar)
Water-cut		unknown	%

Rate and Pressure Data

Production Rate m³/d	Test Period hrs:min	Final BHP bara	Final THP bara
4	1:00	320	1
0	2:30	384	40
2	3:30	325	1
-25	0:40	500	180
6	1:30	320	1
0	20:00	390	

No formation fluid was produced at surface !

Recording Depth	2995 (2983)	m TV SS (m RKB)
Reservoir Temperature	112	deg C
Cumulative Prod. during test	5	m³
Average Gas/Oil Ratio	—	Sm³/m³
Oil Density	—	kg/m³
Gas Gravity	—	Air=1
Water Salinity	—	ppm C1-

SUMMARY OF PRODUCTION TEST RESULTS (GAS)

Well: 6306/10-1 Test Details: Prod. Test No. 2

Date		09.12-10.12.90	
Interval		2989-2800 (2716-2827)	m TV SS (m AH RKB)
Formation			
Reservoir Pressure	Pi	413	
Datum Level		2750	m
Permeability Thickness	kh	0.00004	(um) ² m
Drained Thickness	h	25	m
Permeability	k	2.e-06	(um) ²
Mechanical Skin	So	-0.5	
Darcy Flow Factor	A (sss)	180000	bar²/(1000 m³/d)
Non-Darcy Flow Factor	F	—	bar²/(1000 m³/d²)
Delivearbility (sss)	50 bar D.D.	200	

Standard Conditions: Psc = 1.01325 bara, Tsc = 288.16 K

Rate and Pressure Data

Production Rate m³/d	Test Period hrs:min	Final BHP bara	Final THP bara
0	9:00	397.7	83
25 (compl. fluid)	1:00	265.1	3
0	2:30	386.5	- (PCT)
1500	11:30	220.5	3
0	5:45	360.6	—

Recording Depth	2665 (2692)	m TV SS (m RKB)
Reservoir Temperature	103	deg C
Cumulative Prod. during test	500	Sm³
Average Cond/Gas Ratio	1000-2000	m³/mln Sm³
Average Water Gas Ratio	1000-10 000	m³/mln Sm³
Gas Gravity	0.64	Air=1
Ref. Pres. A and F factors	400	bara
Smith Cullendar flow Constants		
B	—	bar²/bar²
C	—	bar²/(1000 m³/d²)

Institutt for energiteknikk

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PHOTOMETRIC SPORE COLOUR, SPORINITE FLUORESCENCE AND VITRINITE REFLECTANCE OF 13 SAMPLES FROM WELL 6306/10-1 OFFSHORE NORWAY

by

Torbjørn Throndsen and Kristine Aasgaard
Institutt for energiteknikk

INTRODUCTION

This report gives the results of photometric spore colour, sporinite fluorescence and vitrinite reflectance analyses performed on 13 cuttings samples from well 6306/10-1 offshore Norway.

The photometric spore colour technique is a new technique developed by Institutt for energiteknikk with financial support from A/S Norske Shell and Statoil (Throndsen and Aasgaard 1990). An interpretation scale for correspondence between photometric spore colour values (A_{644nm}/A_{480nm}) and vitrinite reflectance is shown in Figure 1.

The photometric sporinite fluorescence technique is also a totally new technique developed by Institutt for energiteknikk with partial financial support from Statoil (Aasgaard and Throndsen 1991). It is included in this report for demonstration only. Our interpretation schemes for correspondence between sporinite fluorescence parameters and vitrinite reflectance is shown in Figure 2 and 3.

Table 1. Photometric spore colour, vitrinite reflectance and fluorescence data well 6306/10-1 offshore Norway.

Sample code	Depth mRKB	Lithology	Sample type	Photometric spore colour A644/A480	Equivalent vitrinite reflectance %Rm*	Measured vitrinite reflectance %Rm (N)	Data quality***	Fluorescence intensity arb. scale	Fluorescence fading I-10/I-0	Equivalent vitrinite reflectance %Rm**
SH 1	1000	clst	cut	0.21	0.30-0.68	0.30 (10)	ok/±	10.1	5.0	0.28-0.50
SH 2	1130	clst	cut	0.12	0.22-0.36	0.36 (25)	ok/±	9.5	5.7	0.28-0.36
SH 3	1290	clst	cut	0.14	0.24-0.44	0.29 (10)	ok/±	10.0	4.6	0.28-0.54
SH 4	1450	clst	cut	0.20	0.30-0.64	0.36 (8)	ok/±	20.0	4.1	0.28-0.58
SH 5	1610	clst	cut	0.21	0.30-0.68	0.42 (4)	ok/±	13.8	4.0	0.26-0.60
SH 6	1770	clst	cut	0.24	0.38-0.80	0.38 (9)	ok/±	16.3	3.8	0.24-0.62
SH 7	1930	clst	cut	0.24	0.38-0.80	0.41 (6)	ok/±	10.9	3.5	0.26-0.66
SH 8	2090	clst	cut	0.25	0.44-0.84	0.46 (11)	ok/±	11.1	3.5	0.26-0.66
SH 9	2250	clst	cut	0.25	0.44-0.84	0.53 (7)	ok/±	5.8	3.3	0.28-0.68
SH 10	2410	clst	cut	0.19	0.28-0.60	0.60 (11)	ok/+	5.2	4.0	0.28-0.60
SH 11	2560	clst	cut	0.26	0.52-0.90	0.58 (10)	ok/+	7.7	3.8	0.28-0.62
SH 12	2720	clst	cut	0.26	0.52-0.90	0.51 (15)	ok/-	4.7	1.9	0.38-0.80
SH 13	3040	sst	cut	0.25	0.44-0.84	0.58 (7)	cavings ?	7.5	1.1	0.56-0.72

* Interpreted using Figure 1

** Interpreted using Figure 2 and 3

*** "ok" : true vitrinite is identified in the sample
" ±" : the vitrinite quality is reduced. The correct value may be higher or lower.
" +" : the vitrinite quality is reduced. The measured value may be to high.
" -" : the vitrinite quality is reduced. The measured value may be to low.

U-619 3

March 1992

RKER 92.019

Geochemical investigation of two impregnations from well 6306/10-1, Norway

by

J.M.A. Buiskool Toxopeus and F.A.M. de Gier

Sponsor: Shell Risavika Code: 876.106.10

investigation: 8BAS0273

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM
RIJSWIJK, THE NETHERLANDS

(Shell research B.V.)

Summary of the Geochemical Data of the extract from well 6306/10-01 (1167.75 m.), Norway

Gravity and Gross Composition

% Extract :	1.4
% TOC after extract :	0.1
Extract/TOC :	14.00
Gross Composition (W%)	
Saturates :	67
Aromatics :	30
Heterocompounds :	3
Rest (High molecular) :	0
Sulphur (%) :	no data
Vanadium (ppm) :	no data
Nickel (ppm) :	no data

Saturates Distributions

(Gaschromatography)

Pristane / Phytane :	not detectable
Pristane / n-C17 :	not detectable
Phytane / n-C18 :	not detectable
ACI :	not detectable
Corr. Coeff. :	not detectable

C-7 Distributions

(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	not detectable
Mono Branched :	
Poly Branched :	
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	not detectable
Cyclo Alkanes :	
Branched Alkanes :	
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	not detectable
Cyclo Alkanes :	
Aromatics :	

Carbon Isotope Ratios

(Mass Spectrometry)

Total Sample (topped) :	-27.1
Saturates :	-27.0
Aromatics :	-26.9

Distribution of Ring Compounds

(Field Ionisation Mass Spectrometry)

C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions

(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	13
Rearranged Steranes :	67
Triterpanes :	20
Steranes (%)	
Iso Steranes :	16
Rearranged Steranes :	59
Normal Steranes :	25
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane (α+ β) :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	34
C-28 :	39
C-29 :	27
C-29 Sterane Ratios	
20S / 20R + 20S :	0.40
Iso / Iso + Normal :	0.42
Triterpane Ratios	
TS / TM :	0.59
3R / 3R + 5R :	0.24

Summary of the Geochemical Data of the extract from well 6306/10-01 (1169.4 m.), Norway

Gravity and Gross Composition

% Extract :	1.4
% TOC after extract :	0.04
Extract/TOC :	35.25
Gross Composition (W%)	
Saturates :	63
Aromatics :	33
Heterocompounds :	3
Rest (High molecular) :	0
Sulphur (%) :	no data
Vanadium (ppm) :	no data
Nickel (ppm) :	no data

Saturates Distributions
(Gaschromatography)

Pristane / Phytane :	not detectable
Pristane / n-C17 :	not detectable
Phytane / n-C18 :	not detectable
ACI :	not detectable
Corr. Coeff. :	not detectable

C-7 Distributions
(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	not detectable
Mono Branched :	
Poly Branched :	
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	not detectable
Cyclo Alkanes :	
Branched Alkanes :	
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	not detectable
Cyclo Alkanes :	
Aromatics :	

Carbon Isotope Ratios
(Mass Spectrometry)

Total Sample (topped) :	-27.2
Saturates :	-27.3
Aromatics :	-27.1

Distribution of Ring Compounds
(Field Ionisation Mass Spectrometry)

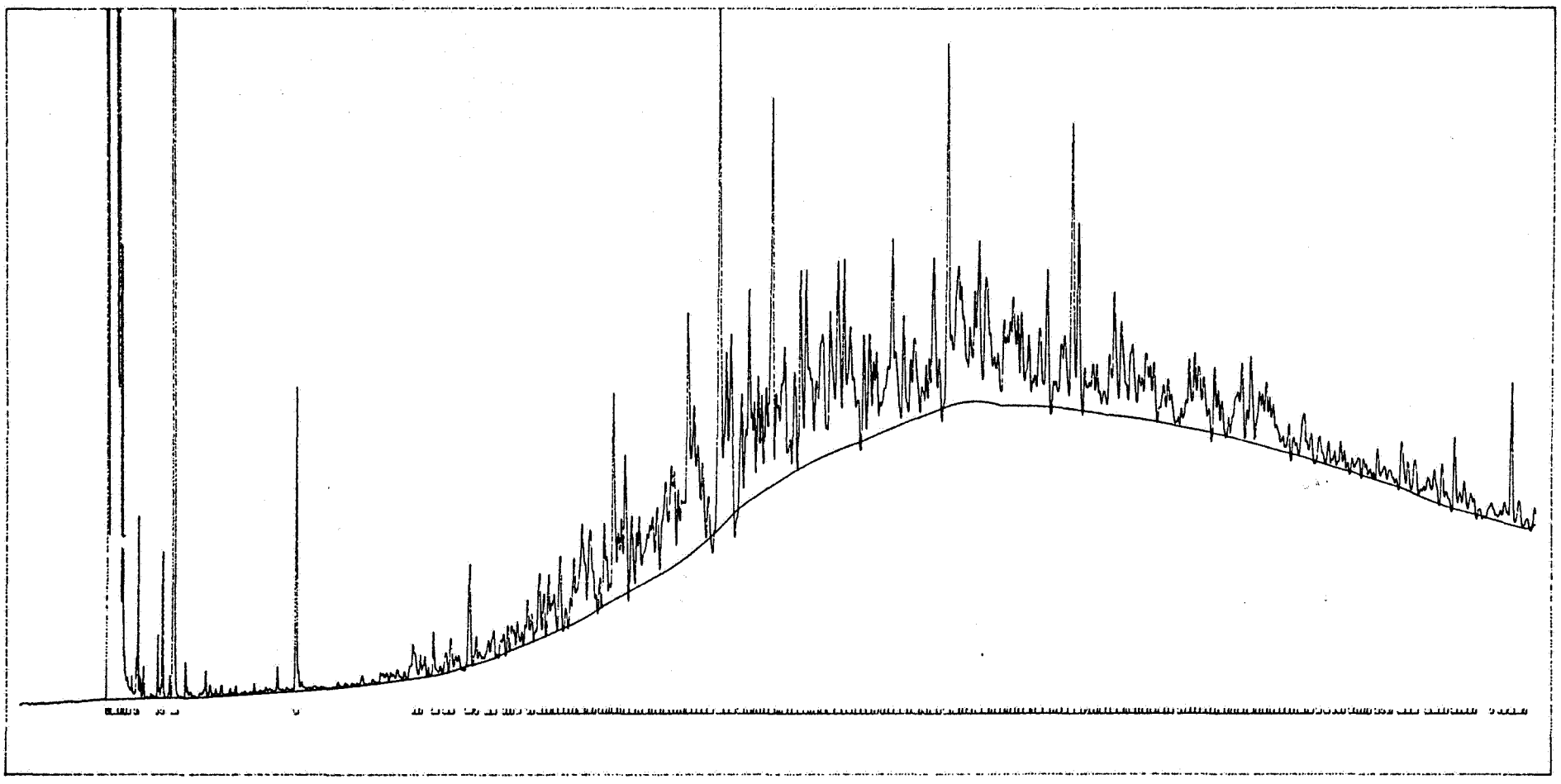
C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions
(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	12
Rearranged Steranes :	69
Triterpanes :	19
Steranes (%)	
Iso Steranes :	17
Rearranged Steranes :	62
Normal Steranes :	21
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane (α+ β) :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	31
C-28 :	39
C-29 :	30
C-29 Sterane Ratios	
20S / 20R + 20S :	0.40
Iso / Iso + Normal :	0.42
Triterpane Ratios	
TS / TM :	0.54
3R / 3R + 5R :	0.14

S15557505

Gas chromatogram of the aromatic hydrocarbons of the extract from well 6306/10-01 (1167.75 m.), Norway



NORWAY 6306/10-01

1167.75 M

S155574/5

GCMS data of the aromatic fraction well 6306/10-01 (1167.75 m.), Norway

Sample: NORWAY 6306/10-1 1167.75 M S155574/5 ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	31
1-MN	39
2,6+2,7-DMN	18
1,6-DMN	10
1,5-DMN	17
1,4,6+1,3,5-TMN	87
2,3,6-TMN	71
1,2,5-TMN	59
C4-Naphthalene	65
THN	601
Cadalene	291
Total Naphthalenes	1289

b) Parameters:

2-MN/1-MN (MNR)	0.81
2,6+2,7-DMN/1,5-DMN (DNR-1)	1.04
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	0.81
2,3,6-TMN/1,2,5-TMN (TNR-2)	1.19
2,3,6-TMN/THN	0.12
2,3,6-TMN/Cadalene	0.24

II) PHENANTHRENES

a) Concentrations (ppm):

P	197
3-MP	43
2-MP	38
9-MP	65
1-MP	52
Total Phenanthrenes	395

b) Parameters:

2-MP/1-MP	0.72
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.38
3(2-MP)/(P+1-MP+9-MP)	0.36
(2-MP+3-MP)/(1-MP+9-MP)	0.69
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.41

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	9
4-MDBT	6
2+3-MDBT	7
1-MDBT	18
Total Dibenzothiophenes	40

b)Parameters

4-MDBT/2+3-MDBT	0.93
4-MDBT/1-MDBT	0.34
2+3-MDBT/1-MDBT	0.37
4-MDBT/DBT	0.66
2+3-MDBT/DBT	0.71
1-MDBT/DBT	1.95

IV)BIPHENYLS

a)Concentrations (ppm):

BP	4
2-MBP	0
3-MBP	2
4-MBP	0
Total Biphenyls	6

b) Parameters:

3-MBP/BP	0.49
3-MBP/4-MBP	0.00
3-MBP/2-MBP	0.00

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	3
4-MDBF	0
2+3-MDBF	16
1-MDBF	12
Total Dibenzofurans	31

b) Parameters:

4-MDBF/2+3-MDBF	0.00
4-MDBF/1-MDBF	0.00
2+3-MDBF/1-MDBF	1.30
4-MDBF/DBF	0.00
2+3-MDBF/DBF	4.79
1-MDBF/DBF	3.69

VI) OVERALL RATIOS

Biphenyls/NAPH*	0.03
Dibenzothiophenes/NAPH*	0.21
Dibenzofurans/NAPH*	0.16

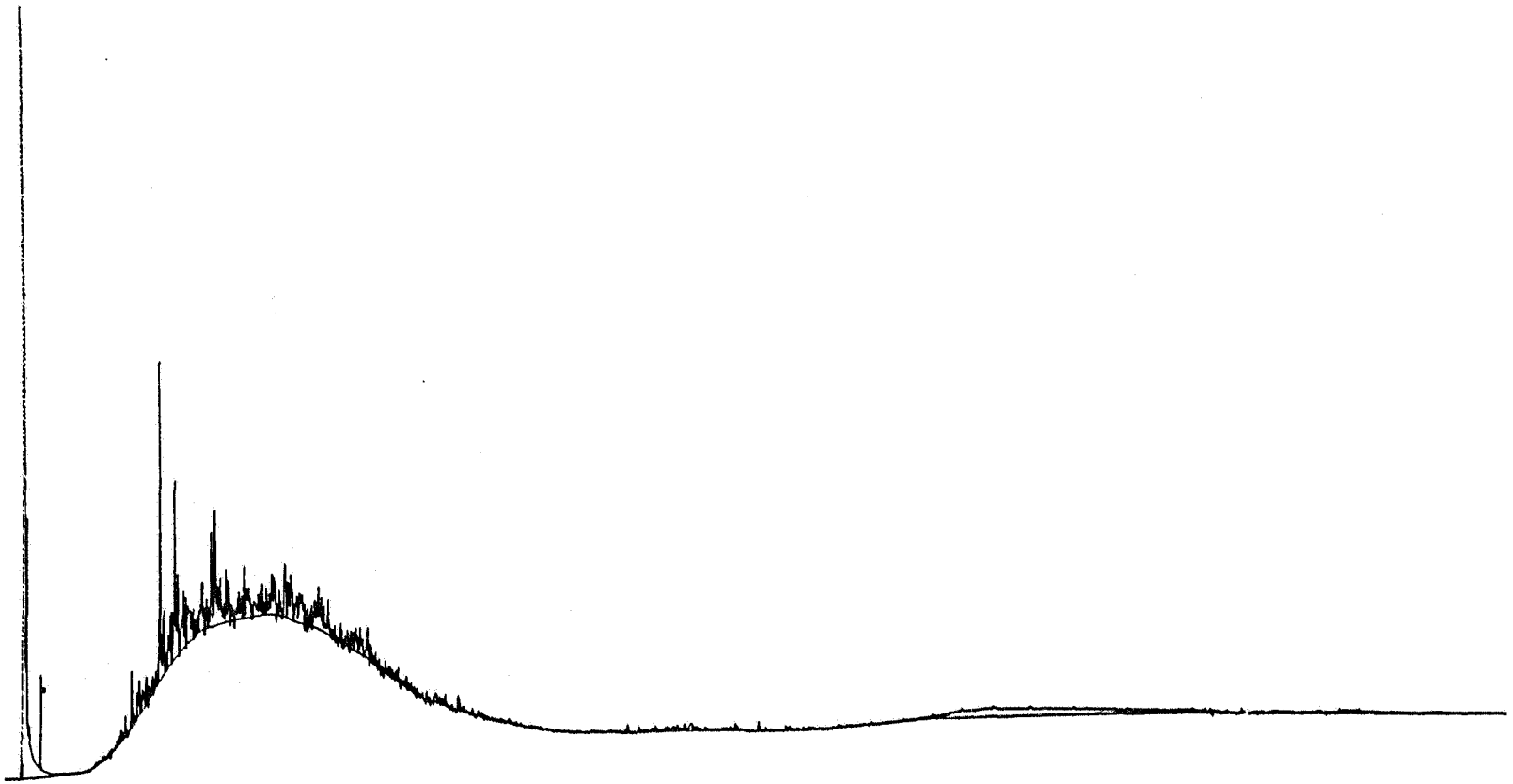
MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

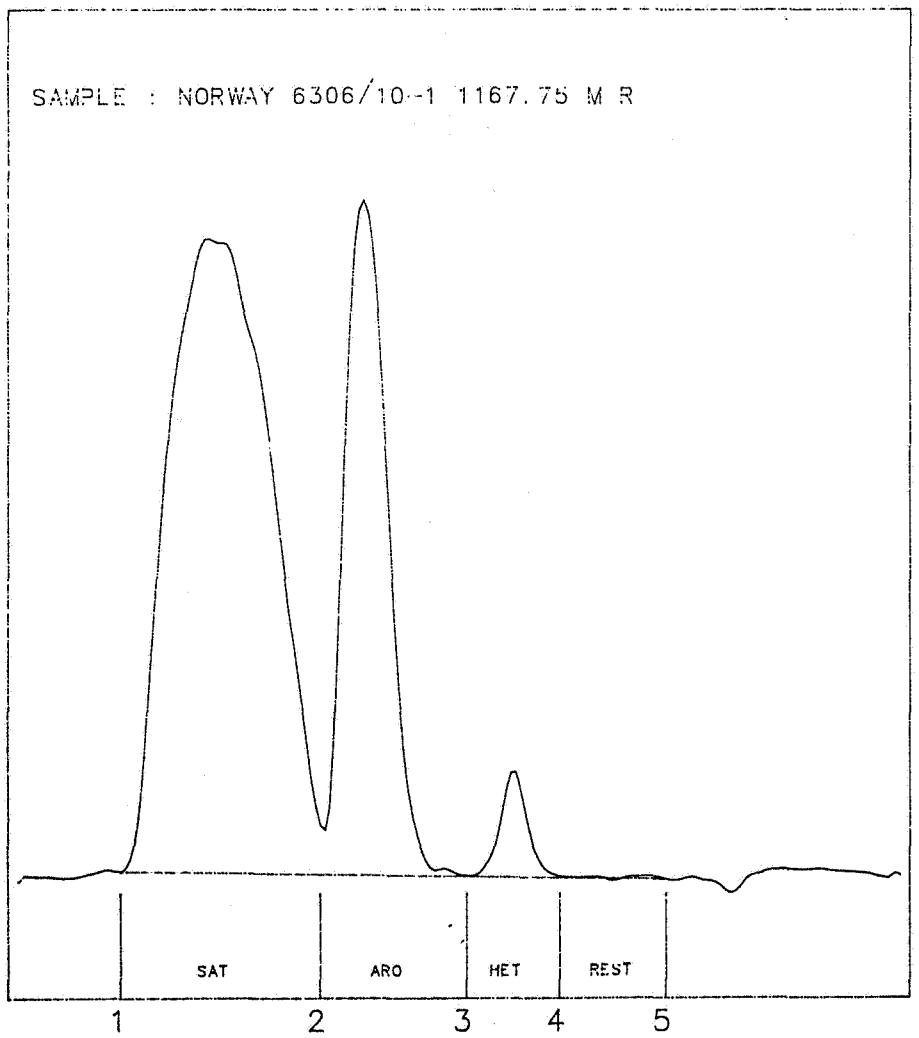
NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

S15557405

Gas chromatogram of the saturated hydrocarbons of the extract from well 6306/10-01 (1167.75 m.), Norway



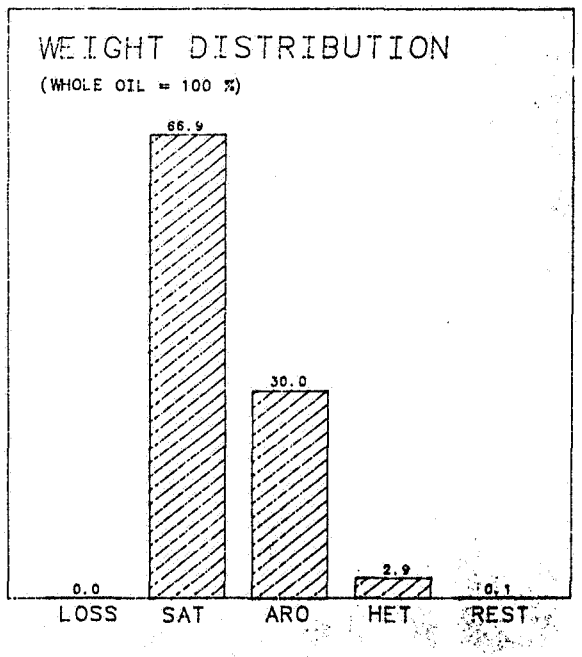
Gross Composition of the extract from well 6306/10-01 (1167.75 m.), Norway



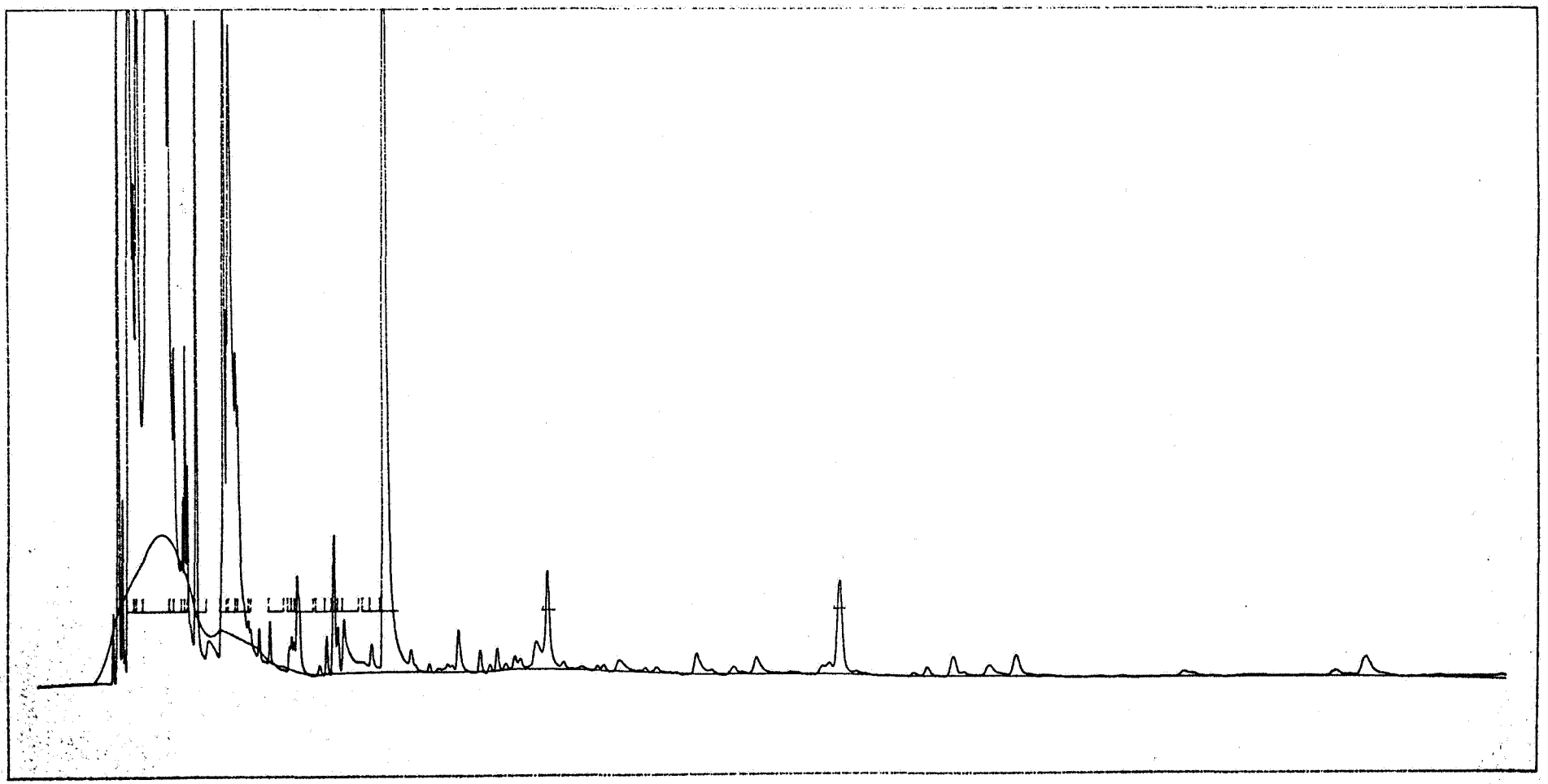
SAMPLE : S155574--5

WEIGHT LOST ON TOPPING	: 0.0 %
-- SATURATES	: 66.9 %
-- AROMATICS	: 30.0 %
-- HETEROCOMPOUNDS	: 2.9 %
-- REST (HIGH MOL.)	: 0.1 %

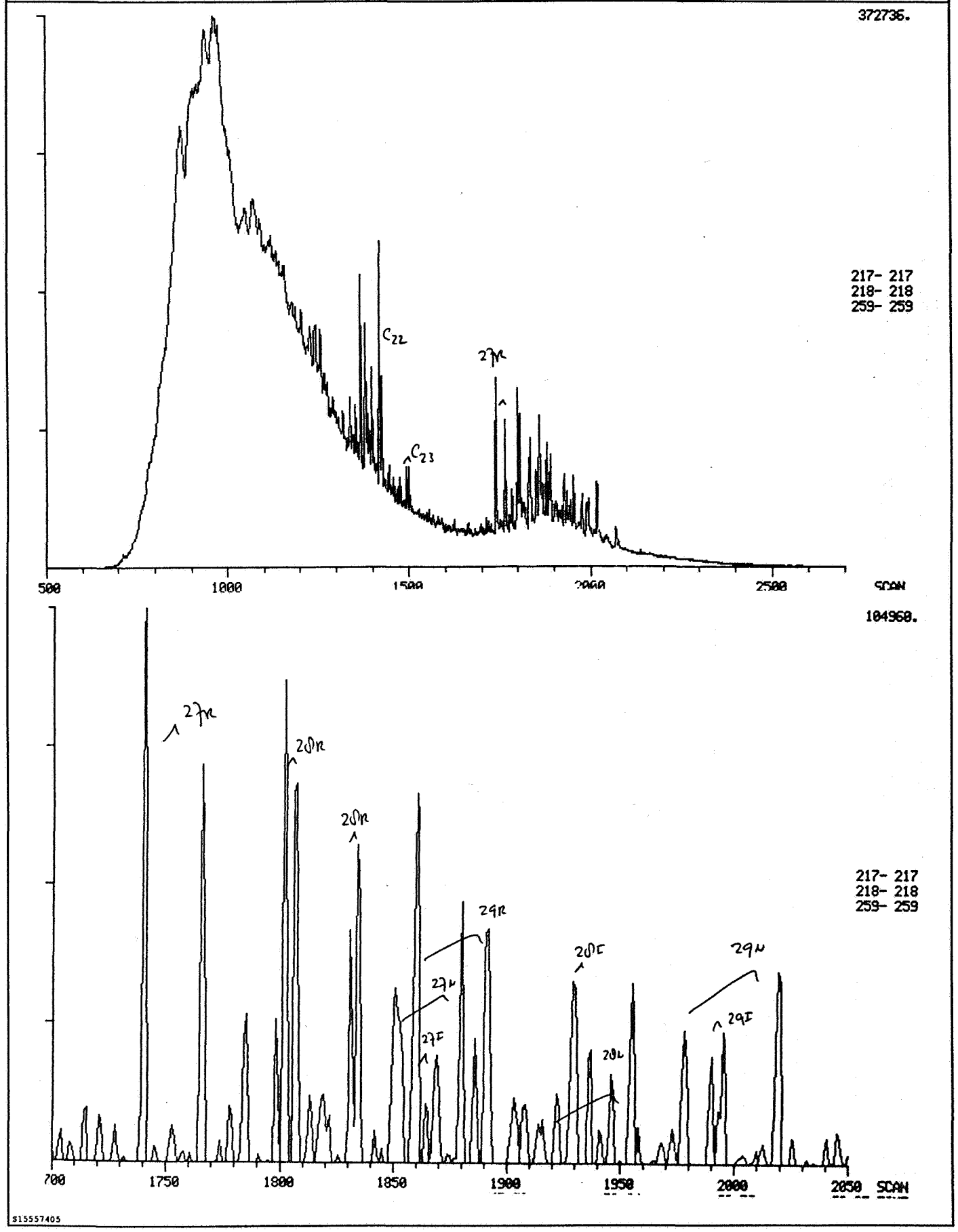
* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE



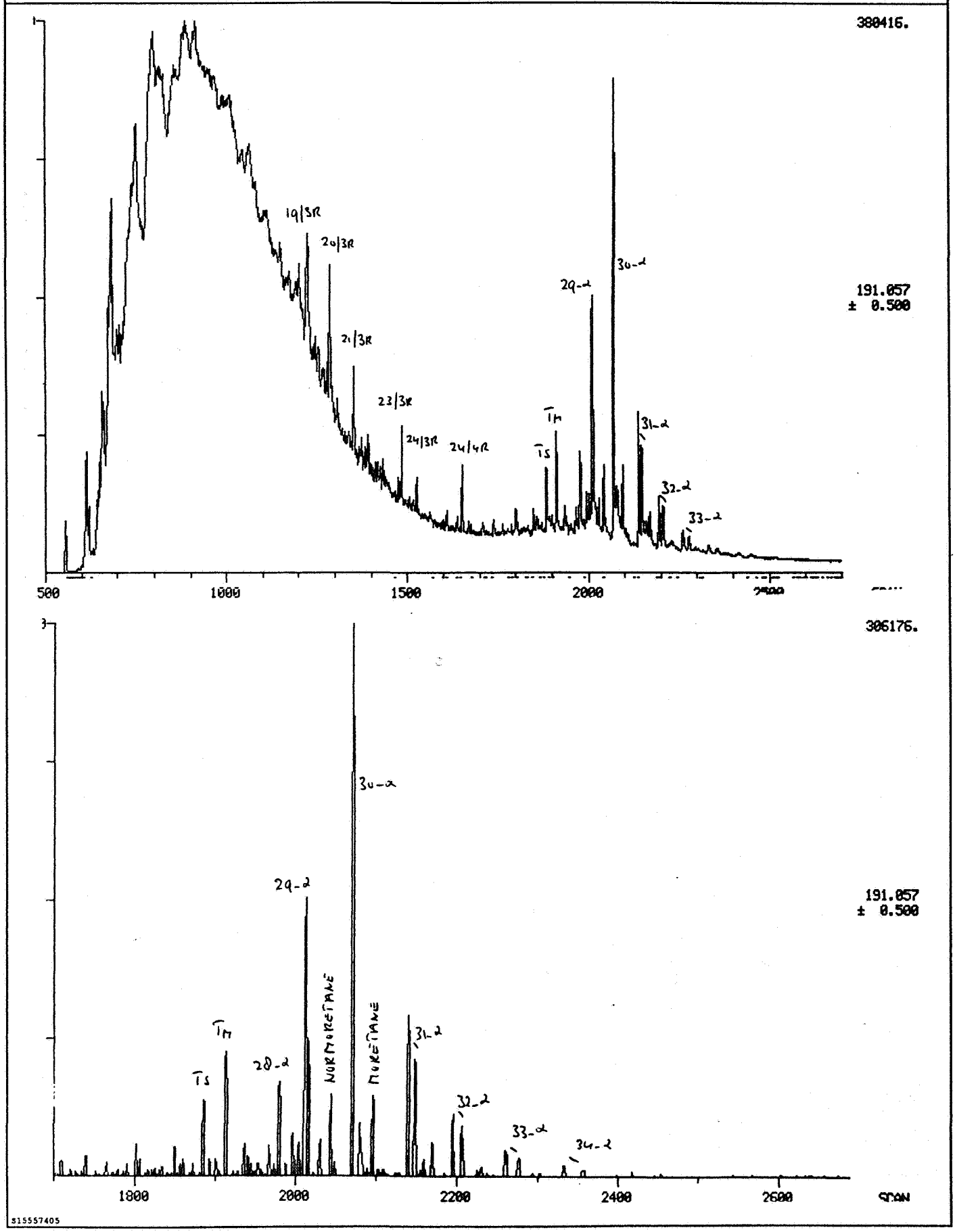
Gas chromatogram of the light fraction (< 120 C.) of the extract from well 6306/10-01 (1167.75 m.), Norway



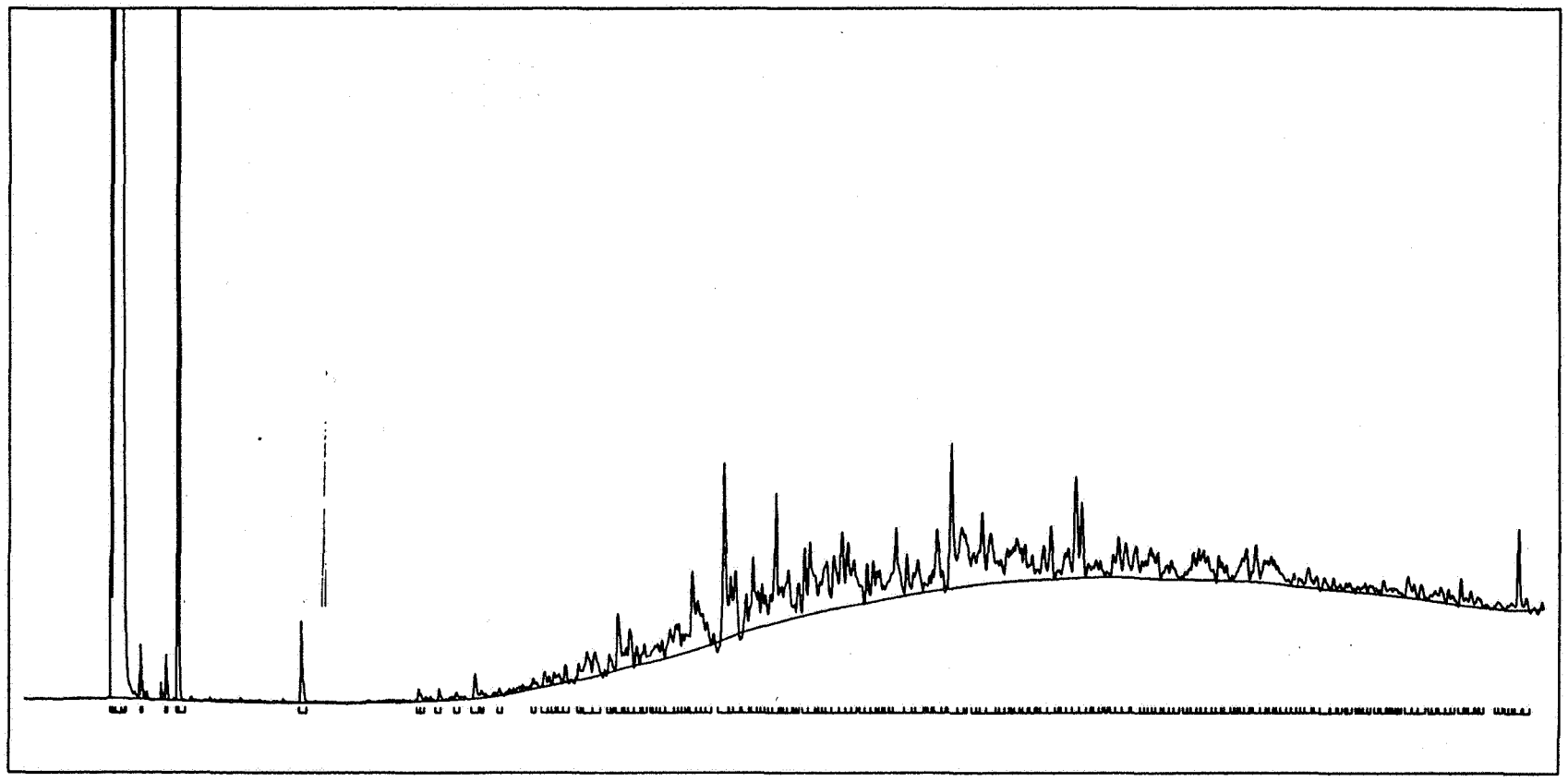
Sterane Fragmentograms of the extract from well 6306/10-01 (1167.75 m.), Norway



Triterpane Fragmentograms of the extract from well 6306/10-01 (1167.75 m.), Norway



Gas chromatogram of the aromatic hydrocarbons of the extract from well 6306/10-01 (1169.4 m.), Norway



NORWAY 6306/10-01

1169.4 M

S155575/5

GCMS data of the aromatic fraction well 6306/10-01 (1169.4 m.), Norway

Sample: NORWAY 6306/10-01 1169.4 M S155575/5 ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	33
1-MN	36
2,6+2,7-DMN	16
1,6-DMN	9
1,5-DMN	16
1,4,6+1,3,5-TMN	93
2,3,6-TMN	73
1,2,5-TMN	60
C4-Naphthalene	58
THN	613
Cadalene	240
Total Naphthalenes	1247

b) Parameters:

2-MN/1-MN (MNR)	0.92
2,6+2,7-DMN/1,5-DMN (DNR-1)	1.00
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	0.78
2,3,6-TMN/1,2,5-TMN (TNR-2)	1.22
2,3,6-TMN/THN	0.12
2,3,6-TMN/Cadalene	0.30

II) PHENANTHRENES

a) Concentrations (ppm):

P	203
3-MP	47
2-MP	39
9-MP	70
1-MP	59
Total Phenanthrenes	418

b) Parameters:

2-MP/1-MP	0.66
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.39
3(2-MP)/(P+1-MP+9-MP)	0.35
(2-MP+3-MP)/(1-MP+9-MP)	0.67
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.40

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	11
4-MDBT	13
2+3-MDBT	9
1-MDBT	10
Total Dibenzothiophenes	43

b)Parameters

4-MDBT/2+3-MDBT	1.43
4-MDBT/1-MDBT	1.41
2+3-MDBT/1-MDBT	0.99
4-MDBT/DBT	1.22
2+3-MDBT/DBT	0.85
1-MDBT/DBT	0.86

IV)BIPHENYLS

a)Concentrations (ppm):

BP	3
2-MBP	0
3-MBP	1
4-MBP	0
Total Biphenyls	4

b) Parameters:

3-MBP/BP	0.36
3-MBP/4-MBP	0.00
3-MBP/2-MBP	0.00

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	4
4-MDBF	1
2+3-MDBF	16
1-MDBF	13
Total Dibenzofurans	34

b) Parameters:

4-MDBF/2+3-MDBF	0.04
4-MDBF/1-MDBF	0.05
2+3-MDBF/1-MDBF	1.21
4-MDBF/DBF	0.16
2+3-MDBF/DBF	4.32
1-MDBF/DBF	3.56

VI) OVERALL RATIOS

Biphenyls/NAPH*	0.02
Dibenzothiophenes/NAPH*	0.22
Dibenzofurans/NAPH*	0.17

MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

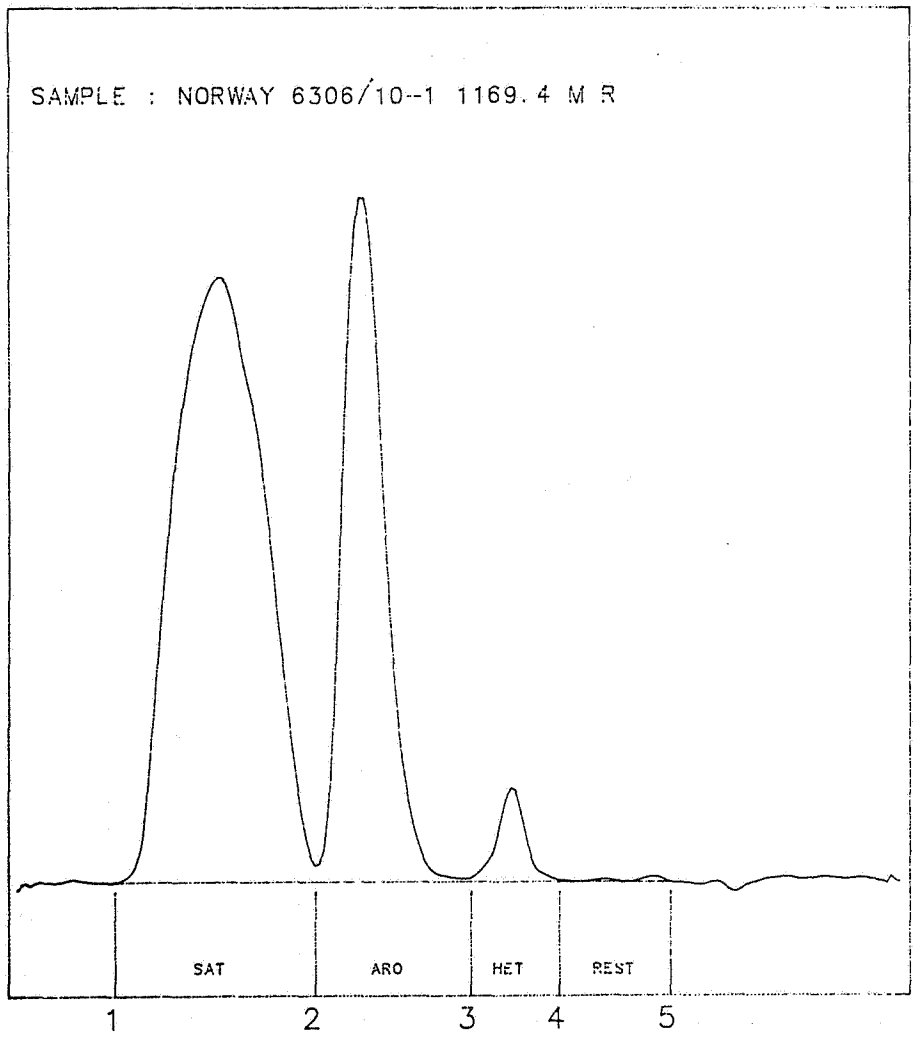
NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

S15557505

Gas chromatogram of the saturated hydrocarbons of the extract from well 6306/10-01 (1169.4 m.), Norway

S155575O5

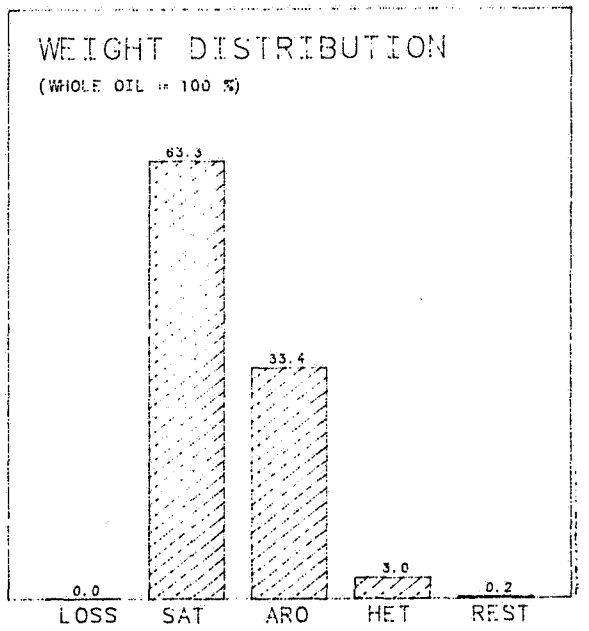
Gross Composition of the extract from well 6306/10-01 (1169.4 m.), Norway



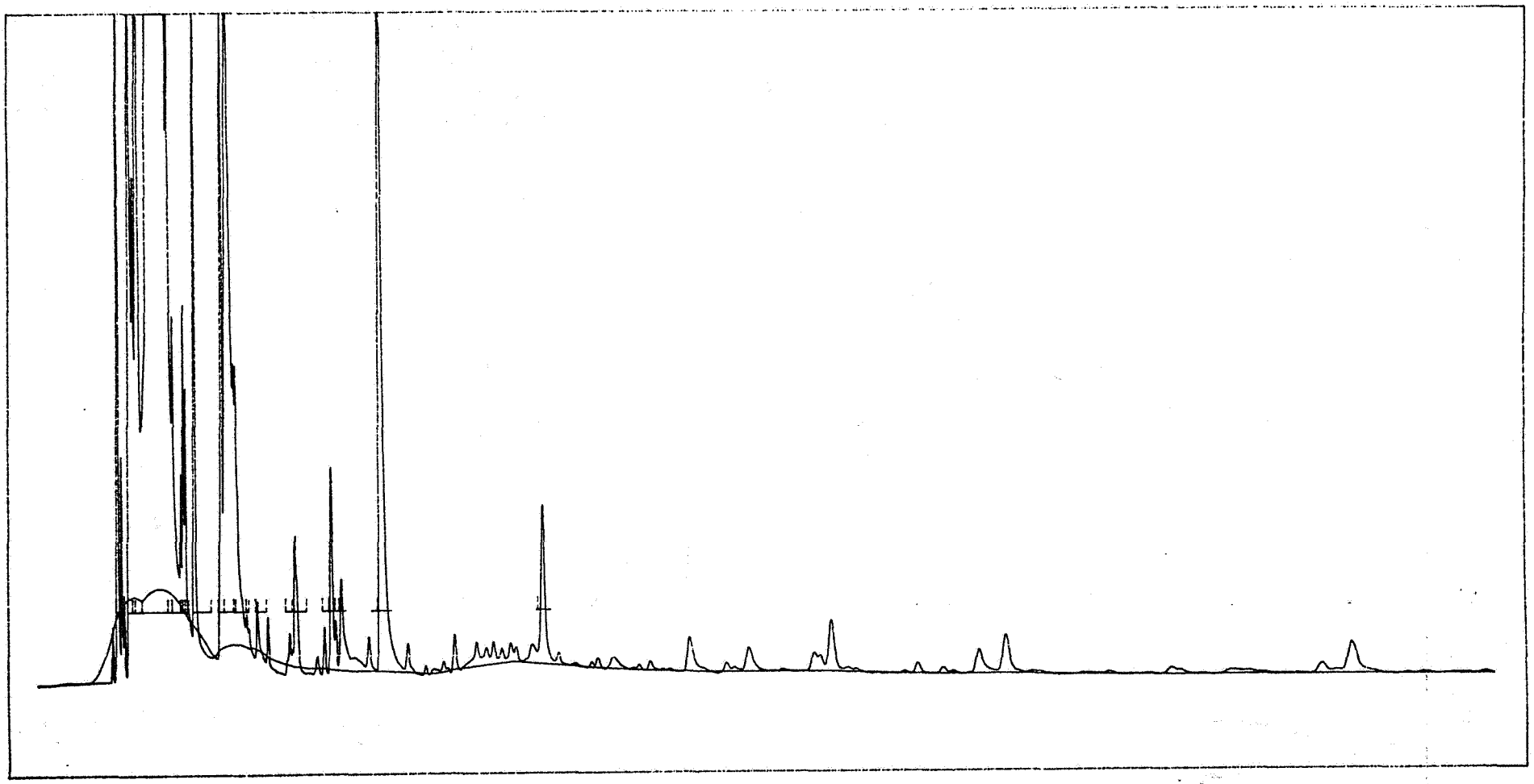
SAMPLE : S155575-5

WEIGHT LOST ON TOPPING :	0.0 %
-- SATURATES :	63.3 %
-- AROMATICS :	33.4 %
-- HETEROCOMPOUNDS :	3.0 %
-- REST (HIGH MOL.) :	0.2 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE

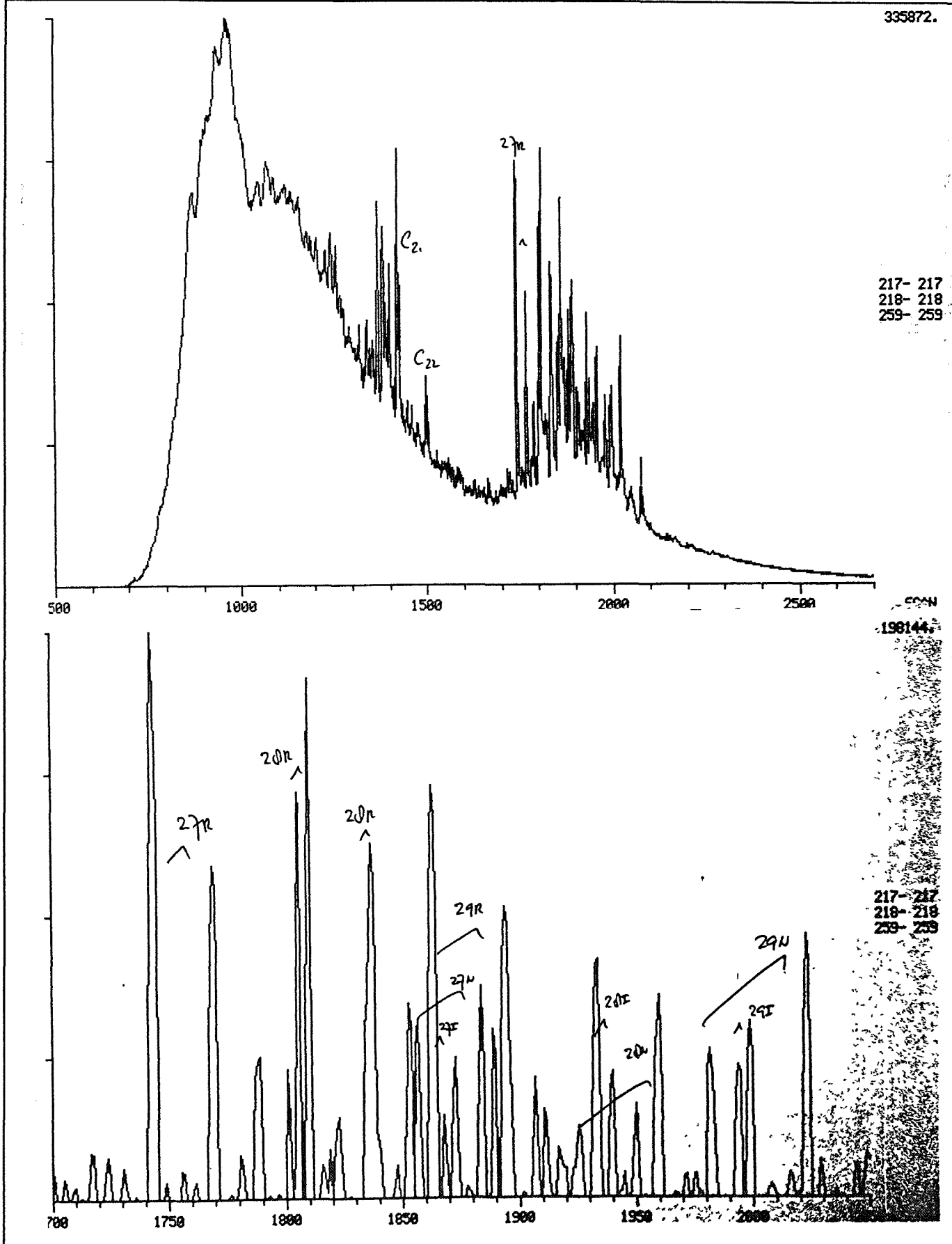


Gas chromatogram of the light fraction (< 120 C.) of the extract from well 6306/10-01 (1169.4 m.), Norway

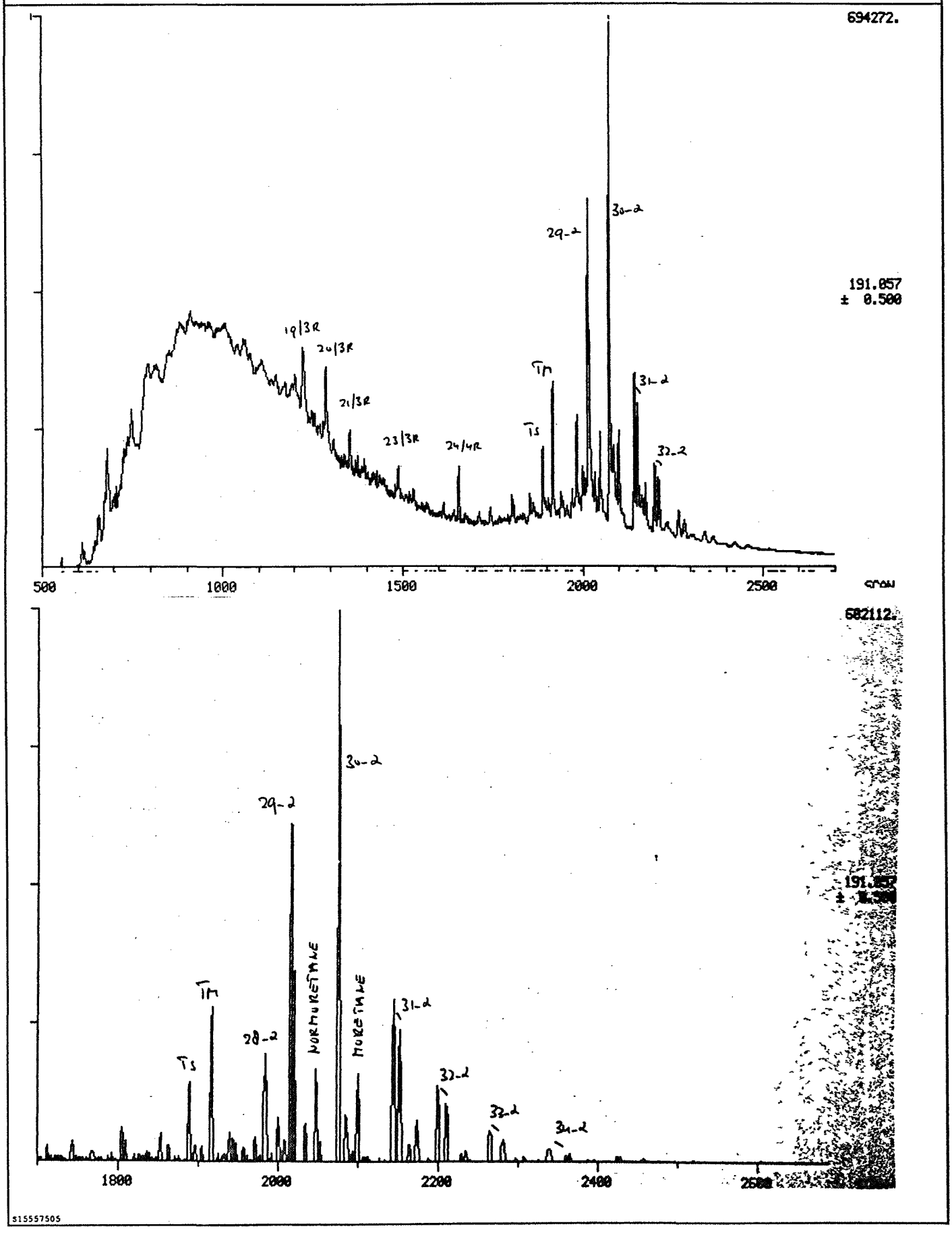


Norway
6306/10-01
1169.40 m
Skalmen, age: PC.

Sterane Fragmentograms of the extract from well 6306/10-01 (1169.4 m.), Norway



Triterpane Fragmentograms of the extract from well 6306/10-01 (1169.4 m.), Norway



May, 1991

RKER 91.057

Geochemical investigation of four source rock extracts from well 6306/10-1, Norway

by

J.M.A. Buiskool Toxopeus and F.A.M. de Gier

Sponsor: Shell Risavika Code: 876.106.10

investigation: 8BAS0090

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM
RIJSWIJK, THE NETHERLANDS

(Shell research B.V.)

Geochemical investigation of four source rock extracts from well 6306/10-1, Norway

1.0 Introduction

A geochemical investigation has been carried out on the following four samples from well 6306/10-1, Norway (request telex ref. RIS 080105 of 08.01.91):
- 2695.7 m, sidewall sample;
- 2757.3 m, core;
- 2882.8 m, core;
- 2980 m, cuttings.

The geochemical parameters are shown on pages 3 to 25, analysis results are presented on the yellow pages. In addition to the routine analyses, GC and GCMS of the aromatic fraction has also been carried out. No FIMS analysis has been performed.

Summary of the Geochemical Data of the sample from well 6306/10-01 (2695.7 m.), Norway

Gravity and Gross Composition

% Extract :	0.6
% TOC after extract :	4.3
Extract/TOC :	0.14
Gross Composition (wt%)	
Saturates :	11
Aromatics :	56
Heterocompounds :	30
Rest (High molecular) :	3
Sulphur (%) :	no data
Vanadium (ppm) :	no data
Nickel (ppm) :	no data

Saturates Distributions

(Gaschromatography)

Pristane / Phytane :	2.5
Pristane / n-C17 :	0.7
Phytane / n-C18 :	0.2
ACI :	15
Corr. Coeff. :	-0.9177

C-7 Distributions

(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	23
Mono Branched :	39
Poly Branched :	38
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	7
Cyclo Alkanes :	72
Branched Alkanes :	21
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	27
Cyclo Alkanes :	70
Aromatics :	3

Carbon Isotope Ratios

(Mass Spectrometry)

Total Sample (topped) :	-26.1
Saturates :	no data
Aromatics :	-25.4

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Distribution of Ring Compounds

(Field Ionisation Mass Spectrometry)

C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions

(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	14
Rearranged Steranes :	24
Triterpanes :	62
Steranes (%)	
Iso Steranes :	36
Rearranged Steranes :	42
Normal Steranes :	22
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane + Lupane :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	35
C-28 :	21
C-29 :	44
C-29 Sterane Ratios	
20S / 20R + 20S :	0.49
Iso / Iso + Normal :	0.61
Triterpane Ratios	
TS / TM :	0.45
3R / 3R + 5R :	0.04

Summary of the Geochemical Data of the sample from well 6306/10-01 (2757.3 m.), Norway

Gravity and Gross Composition

% Extract :	0.2
% TOC after extract :	1.9
Extract/TOC :	0.11
Gross Composition (wt%)	
Saturates :	8
Aromatics :	58
Heterocompounds :	32
Rest (High molecular) :	2
Sulphur (%) :	no data
Vanadium (ppm) :	no data
Nickel (ppm) :	no data

Saturates Distributions

(Gaschromatography)

Pristane / Phytane :	3.7
Pristane / n-C17 :	0.4
Phytane / n-C18 :	0.2
ACI :	17
Corr. Coeff. :	-0.9662

C-7 Distributions

(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	31
Mono Branched :	26
Poly Branched :	43
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	14
Cyclo Alkanes :	55
Branched Alkanes :	31
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	45
Cyclo Alkanes :	54
Aromatics :	1

Carbon Isotope Ratios

(Mass Spectrometry)

Total Sample (topped) :	-27.0
Saturates :	no data
Aromatics :	-26.9

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Distribution of Ring Compounds

(Field Ionisation Mass Spectrometry)

C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions

(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	22
Rearranged Steranes :	30
Triterpanes :	48
Steranes (%)	
Iso Steranes :	37
Rearranged Steranes :	34
Normal Steranes :	29
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane + Lupane :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	32
C-28 :	26
C-29 :	42
C-29 Sterane Ratios	
20S / 20R + 20S :	0.43
Iso / Iso + Normal :	0.57
Triterpane Ratios	
TS / TM :	0.68
3R / 3R + 5R :	0.06

Summary of the Geochemical Data of the sample from well 6306/10-01 (2882.75 m.), Norway

Gravity and Gross Composition

% Extract :	0.2
% TOC after extract :	6.9
Extract/TOC :	0.03
Gross Composition (wt%)	
Saturates :	3
Aromatics :	29
Heterocompounds :	64
Rest (High molecular) :	4
Sulphur (%) :	no data
Vanadium (ppm) :	no data
Nickel (ppm) :	no data

Saturates Distributions
(Gaschromatography)

Pristane / Phytane :	6.0
Pristane / n-C17 :	1.6
Phytane / n-C18 :	0.3
ACI :	15
Corr. Coeff. :	-0.9511

C-7 Distributions
(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	100
Mono Branched :	0
Poly Branched :	0
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	47
Cyclo Alkanes :	53
Branched Alkanes :	0
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	37
Cyclo Alkanes :	41
Aromatics :	22

Carbon Isotope Ratios
(Mass Spectrometry)

Total Sample (topped) :	-25.0
Saturates :	no data
Aromatics :	-24.7

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Distribution of Ring Compounds
(Field Ionisation Mass Spectrometry)

C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions
(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	26
Rearranged Steranes :	29
Triterpanes :	45
Steranes (%)	
Iso Steranes :	41
Rearranged Steranes :	30
Normal Steranes :	29
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane + Lupane :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	24
C-28 :	21
C-29 :	55
C-29 Sterane Ratios	
20S / 20R + 20S :	0.47
Iso / Iso + Normal :	0.62
Triterpane Ratios	
TS / TM :	0.18
3R / 3R + 5R :	0.09

Summary of the Geochemical Data of the sample from well 6306/10-01 (2980 m.), Norway

Gravity and Gross Composition

% Extract :	0.2
% TOC after extract :	9.8
Extract/TOC :	0.02
Gross Composition (wt%)	
Saturates :	12
Aromatics :	61
Heterocompounds :	25
Rest (High molecular) :	2
Sulphur (%) :	no data
Vanadium (ppm) :	no data
Nickel (ppm) :	no data

Saturates Distributions

(Gaschromatography)

Pristane / Phytane :	6.0
Pristane / n-C17 :	1.2
Phytane / n-C18 :	0.2
ACI :	16
Corr. Coeff. :	-0.9468

C-7 Distributions

(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	not detectable
Mono Branched :	
Poly Branched :	
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	not detectable
Cyclo Alkanes :	
Branched Alkanes :	
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	not detectable
Cyclo Alkanes :	
Aromatics :	

Carbon Isotope Ratios

(Mass Spectrometry)

Total Sample (topped) :	-25.2
Saturates :	-27.0
Aromatics :	-24.7

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Distribution of Ring Compounds

(Field Ionisation Mass Spectrometry)

C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions

(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	17
Rearranged Steranes :	24
Triterpanes :	59
Steranes (%)	
Iso Steranes :	40
Rearranged Steranes :	38
Normal Steranes :	22
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane + Lupane :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	21
C-28 :	22
C-29 :	57
C-29 Sterane Ratios	
20S / 20R + 20S :	0.52
Iso / Iso + Normal :	0.61
Triterpane Ratios	
TS / TM :	0.47
3R / 3R + 5R :	0.03

GCMS data of the aromatic fraction well 6306/10-1, Norway

Sample: NORWAY 6306/10-01 2697 M ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	25904
1-MN	13373
2,6+2,7-DMN	5719
1,6-DMN	4230
1,5-DMN	656
1,4,6+1,3,5-TMN	696
2,3,6-TMN	831
1,2,5-TMN	421
C4-Naphthalene	91
THN	34
Cadalene	0
Total Naphthalenes	51955

b) Parameters:

2-MN/1-MN (MNR)	1.94
2,6+2,7-DMN/1,5-DMN (DNR-1)	8.72
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	1.19
2,3,6-TMN/1,2,5-TMN (TNR-2)	1.97
2,3,6-TMN/THN	24.57
2,3,6-TMN/Cadalene	0.00

II) PHENANTHRENES

a) Concentrations (ppm):

P	8850
3-MP	2376
2-MP	3208
9-MP	2325
1-MP	1921
Total Phenanthrenes	18680

b) Parameters:

2-MP/1-MP	1.67
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.64
3(2-MP)/(P+1-MP+9-MP)	0.73
(2-MP+3-MP)/(1-MP+9-MP)	1.32
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.57

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	246
4-MDBT	244
2+3-MDBT	91
1-MDBT	0
Total Dibenzothiophenes	581

b)Parameters

4-MDBT/2+3-MDBT	2.68
4-MDBT/1-MDBT	0.00
2+3-MDBT/1-MDBT	0.00
4-MDBT/DBT	0.99
2+3-MDBT/DBT	0.37
1-MDBT/DBT	0.00

IV)BIPHENYLS

a)Concentrations (ppm):

BP	6953
2-MBP	128
3-MBP	3525
4-MBP	1183
Total Biphenyls	11789

b) Parameters:

3-MBP/BP	0.51
3-MBP/4-MBP	2.98
3-MBP/2-MBP	27.59

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	869
4-MDBF	364
2+3-MDBF	653
1-MDBF	276
Total Dibenzofurans	2162

b) Parameters:

4-MDBF/2+3-MDBF	0.56
4-MDBF/1-MDBF	1.32
2+3-MDBF/1-MDBF	2.37
4-MDBF/DBF	0.42
2+3-MDBF/DBF	0.75
1-MDBF/DBF	0.32

VI) OVERALL RATIOS

Biphenyls/NAPH*	1.49
Dibenzothiophenes/NAPH*	0.07
Dibenzofurans/NAPH*	0.27

MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

GCMS data of the aromatic fraction well 6306/10-1, Norway

Sample: NORWAY 6303/10-01 2757.3 M ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	23811
1-MN	16480
2,6+2,7-DMN	6432
1,6-DMN	5445
1,5-DMN	1255
1,4,6+1,3,5-TMN	1240
2,3,6-TMN	1107
1,2,5-TMN	971
C4-Naphthalene	228
THN	75
Cadalene	63
Total Naphthalenes	57107

b) Parameters:

2-MN/1-MN (MNR)	1.44
2,6+2,7-DMN/1,5-DMN (DNR-1)	5.13
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	0.89
2,3,6-TMN/1,2,5-TMN (TNR-2)	1.14
2,3,6-TMN/THN	14.70
2,3,6-TMN/Cadalene	17.61

II) PHENANTHRENES

a) Concentrations (ppm):

P	8029
3-MP	1983
2-MP	2710
9-MP	3096
1-MP	2686
Total Phenanthrenes	18504

b) Parameters:

2-MP/1-MP	1.01
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.51
3(2-MP)/(P+1-MP+9-MP)	0.59
(2-MP+3-MP)/(1-MP+9-MP)	0.81
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.45

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	430
4-MDBT	327
2+3-MDBT	182
1-MDBT	40
Total Dibenzothiophenes	979

b)Parameters

4-MDBT/2+3-MDBT	1.79
4-MDBT/1-MDBT	8.13
2+3-MDBT/1-MDBT	4.53
4-MDBT/DBT	0.76
2+3-MDBT/DBT	0.42
1-MDBT/DBT	0.09

IV)BIPHENYLS

a)Concentrations (ppm):

BP	6384
2-MBP	183
3-MBP	3693
4-MBP	1384
Total Biphenyls	11644

b) Parameters:

3-MBP/BP	0.58
3-MBP/4-MBP	2.67
3-MBP/2-MBP	20.20

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	1174
4-MDBF	598
2+3-MDBF	983
1-MDBF	443
Total Dibenzofurans	3198

b) Parameters:

4-MDBF/2+3-MDBF	0.61
4-MDBF/1-MDBF	1.35
2+3-MDBF/1-MDBF	2.22
4-MDBF/DBF	0.51
2+3-MDBF/DBF	0.84
1-MDBF/DBF	0.38

VI) OVERALL RATIOS

Biphenyls/NAPH*	1.16
Dibenzothiophenes/NAPH*	0.10
Dibenzofurans/NAPH*	0.32

MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

GCMS data of the aromatic fraction well 6306/10-1, Norway

Sample: NORWAY 6303/10-01 2882.75 M ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	19867
1-MN	14210
2,6+2,7-DMN	4854
1,6-DMN	6523
1,5-DMN	1578
1,4,6+1,3,5-TMN	1651
2,3,6-TMN	1100
1,2,5-TMN	1825
C4-Naphthalene	439
THN	26
Cadalene	75
Total Naphthalenes	52148

b) Parameters:

2-MN/1-MN (MNR)	1.40
2,6+2,7-DMN/1,5-DMN (DNR-1)	3.08
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	0.67
2,3,6-TMN/1,2,5-TMN (TNR-2)	0.60
2,3,6-TMN/THN	42.61
2,3,6-TMN/Cadalene	14.66

II) PHENANTHRENES

a) Concentrations (ppm):

P	2259
3-MP	570
2-MP	895
9-MP	768
1-MP	1186
Total Phenanthrenes	5678

b) Parameters:

2-MP/1-MP	0.75
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.52
3(2-MP)/(P+1-MP+9-MP)	0.64
(2-MP+3-MP)/(1-MP+9-MP)	0.75
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.43

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	99
4-MDBT	48
2+3-MDBT	50
1-MDBT	8
Total Dibenzothiophenes	205

b)Parameters

4-MDBT/2+3-MDBT	0.94
4-MDBT/1-MDBT	5.87
2+3-MDBT/1-MDBT	6.22
4-MDBT/DBT	0.48
2+3-MDBT/DBT	0.51
1-MDBT/DBT	0.08

IV)BIPHENYLS

a)Concentrations (ppm):

BP	850
2-MBP	31
3-MBP	854
4-MBP	300
Total Biphenyls	2035

b) Parameters:

3-MBP/BP	1.00
3-MBP/4-MBP	2.85
3-MBP/2-MBP	27.63

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	1663
4-MDBF	915
2+3-MDBF	1482
1-MDBF	373
Total Dibenzofurans	4433

b) Parameters:

4-MDBF/2+3-MDBF	0.62
4-MDBF/1-MDBF	2.45
2+3-MDBF/1-MDBF	3.98
4-MDBF/DBF	0.55
2+3-MDBF/DBF	0.89
1-MDBF/DBF	0.22

VI) OVERALL RATIOS

Biphenyls/NAPH*	0.22
Dibenzothiophenes/NAPH*	0.02
Dibenzofurans/NAPH*	0.48

MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

GCMS data of the aromatic fraction well 6306/10-1, Norway

Sample: NORWAY 6306/10-01 2980 M ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	19197
1-MN	11953
2,6+2,7-DMN	5337
1,6-DMN	1463
1,5-DMN	1116
1,4,6+1,3,5-TMN	1244
2,3,6-TMN	1136
1,2,5-TMN	1288
C4-Naphthalene	288
THN	24
Cadalene	37
Total Naphthalenes	43083

b) Parameters:

2-MN/1-MN (MNR)	1.61
2,6+2,7-DMN/1,5-DMN (DNR-1)	4.78
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	0.91
2,3,6-TMN/1,2,5-TMN (TNR-2)	0.88
2,3,6-TMN/THN	46.42
2,3,6-TMN/Cadalene	30.63

II) PHENANTHRENES

a) Concentrations (ppm):

P	4721
3-MP	1114
2-MP	1555
9-MP	1407
1-MP	1503
Total Phenanthrenes	10300

b) Parameters:

2-MP/1-MP	1.03
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.52
3(2-MP)/(P+1-MP+9-MP)	0.61
(2-MP+3-MP)/(1-MP+9-MP)	0.92
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.48

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	205
4-MDBT	103
2+3-MDBT	79
1-MDBT	0
Total Dibenzothiophenes	387

b)Parameters

4-MDBT/2+3-MDBT	1.31
4-MDBT/1-MDBT	0.00
2+3-MDBT/1-MDBT	0.00
4-MDBT/DBT	0.50
2+3-MDBT/DBT	0.38
1-MDBT/DBT	0.00

IV)BIPHENYLS

a)Concentrations (ppm):

BP	3258
2-MBP	35
3-MBP	2355
4-MBP	882
Total Biphenyls	6530

b) Parameters:

3-MBP/BP	0.72
3-MBP/4-MBP	2.67
3-MBP/2-MBP	66.83

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	2149
4-MDBF	970
2+3-MDBF	1568
1-MDBF	518
Total Dibenzofurans	5205

b) Parameters:

4-MDBF/2+3-MDBF	0.62
4-MDBF/1-MDBF	1.87
2+3-MDBF/1-MDBF	3.03
4-MDBF/DBF	0.45
2+3-MDBF/DBF	0.73
1-MDBF/DBF	0.24

VI) OVERALL RATIOS

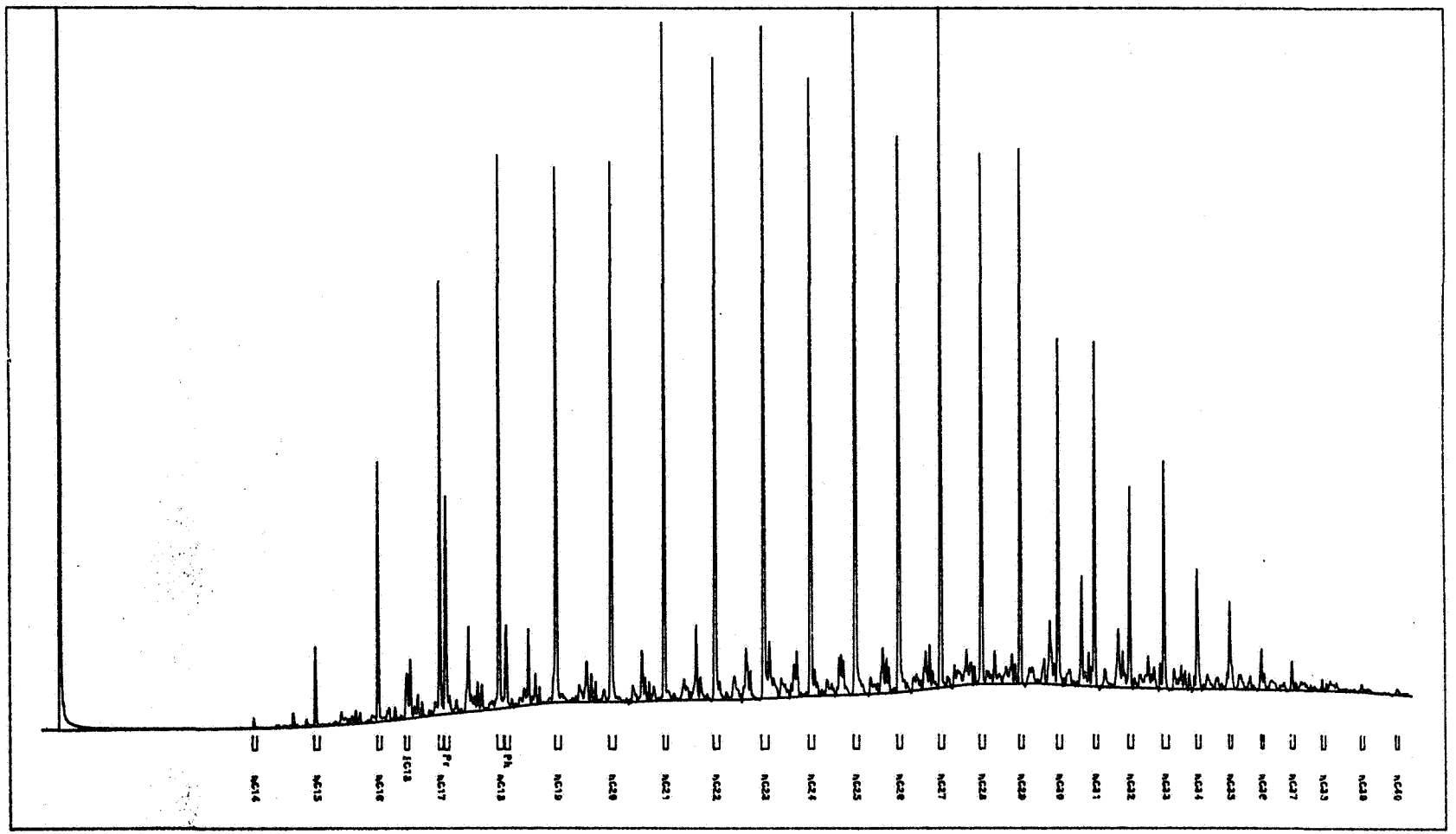
Biphenyls/NAPH*	0.74
Dibenzothiophenes/NAPH*	0.04
Dibenzofurans/NAPH*	0.59

MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

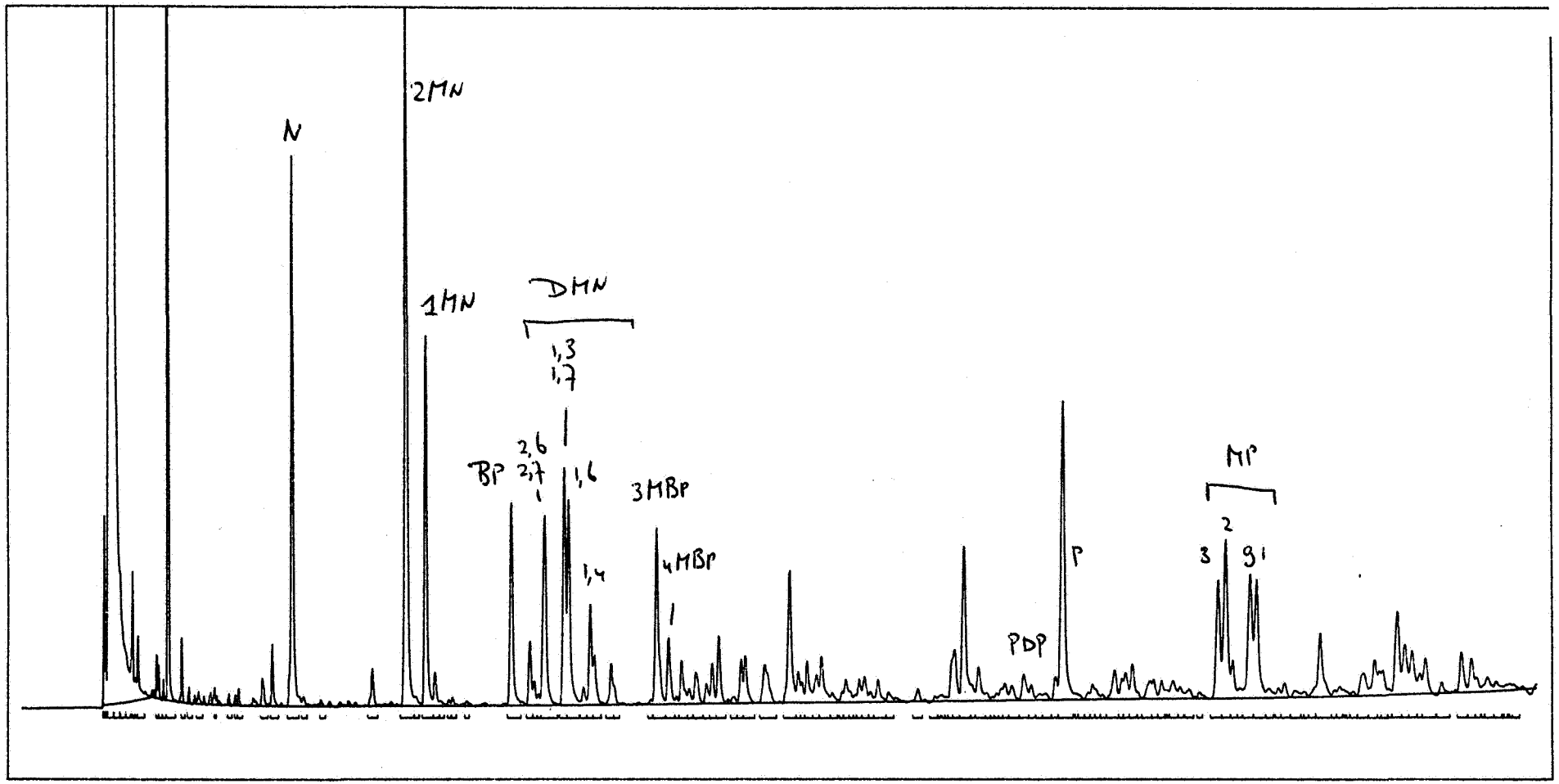
NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

GAS CHROMATOGRAM OF SATURATED HYDROCARBONS
well 6306/10-1, Norway



S150107-2

GAS CHROMATOGRAM OF AROMATIC HYDROCARBONS
well 6306/10-1, Norway



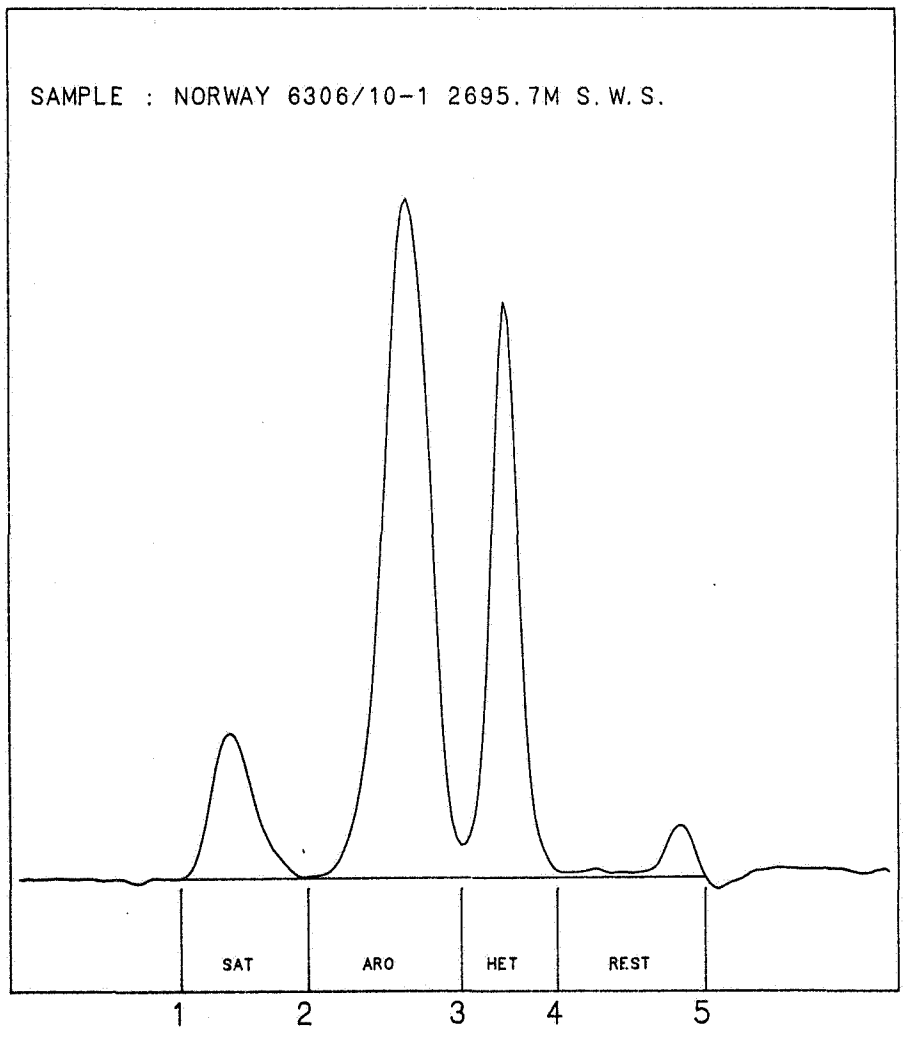
NORWAY 6306/10-01

2697 M

CUTTING SAMPLE

S150107-03

Gross Composition of the sample from well 6306/10-01 (2695.7 m.), Norway

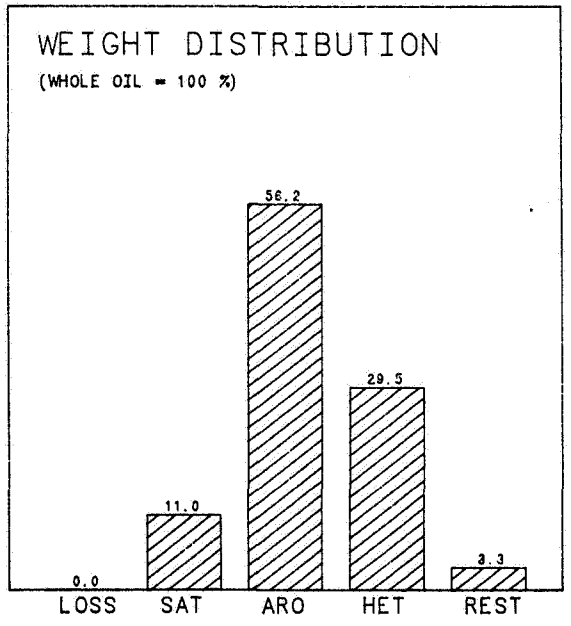


SAMPLE : S150107-3

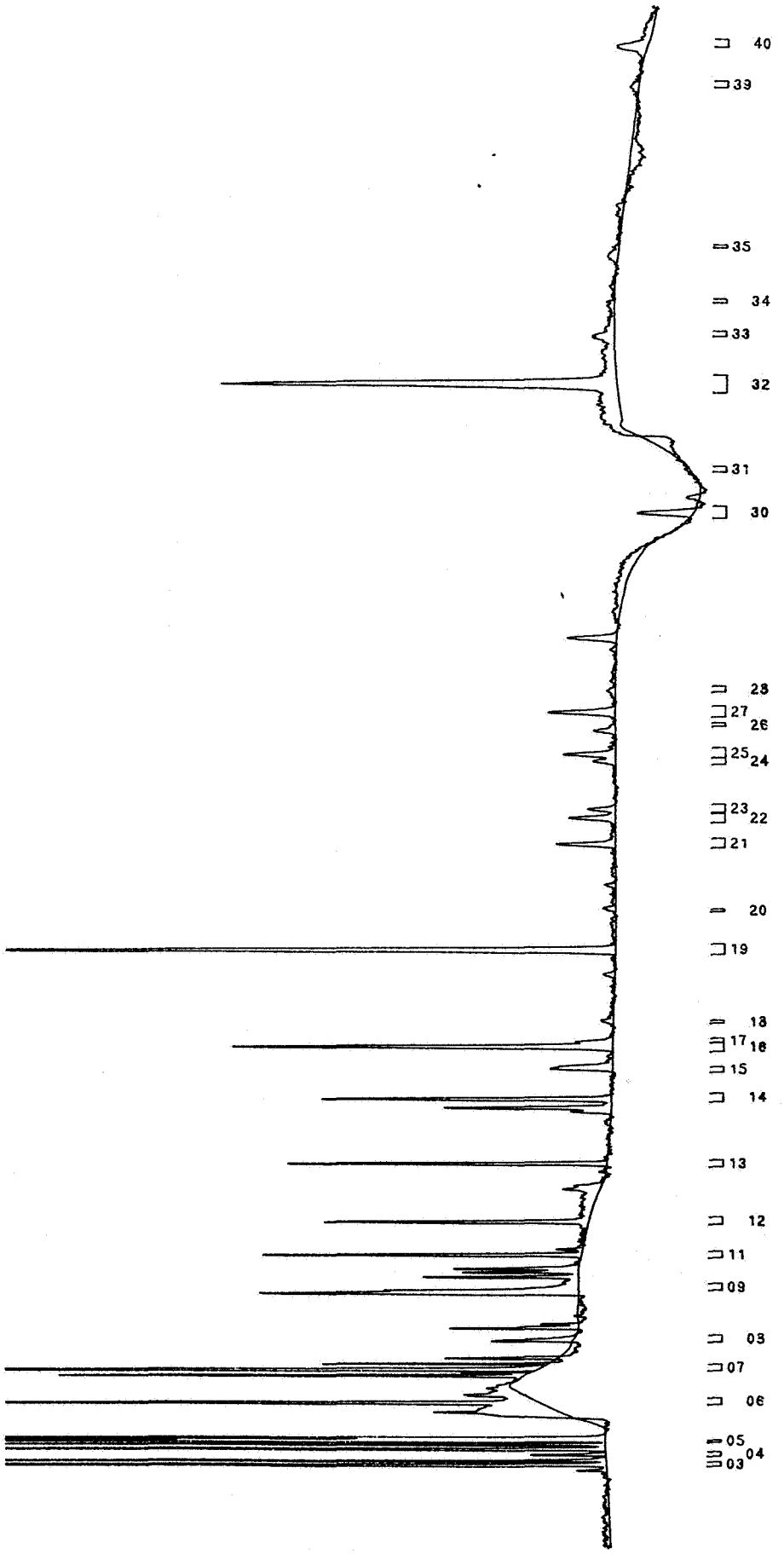
WEIGHT LOST ON TOPPING : 0.0 %

- SATURATES : 11.0 %
- AROMATICS : 56.2 %
- HETEROCOMPOUNDS : 29.5 %
- REST (HIGH MOL.) : 3.3 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE



Gas chromatogram of the light fraction (< 120 C.) of the sample from well 6306/10-01 (2695.7 m.), Norway



515010703

Gas chromatographic hydrocarbons analysis (< 120 C.) well 6306/10-01 (2695.7 m.), Norway

GAS CHROMATOGRAPHIC ANALYSIS OF THE FRACTION BOILING BELOW 114 DEGREES CENTIGRADE

Sample: S15010703 d.d. 11-apr-91 07:24
Recorded: L1-301 GLC-1

Country: Norway Well/Outcrop: 6306/10-01

Depth/Collector: 2695.70 m

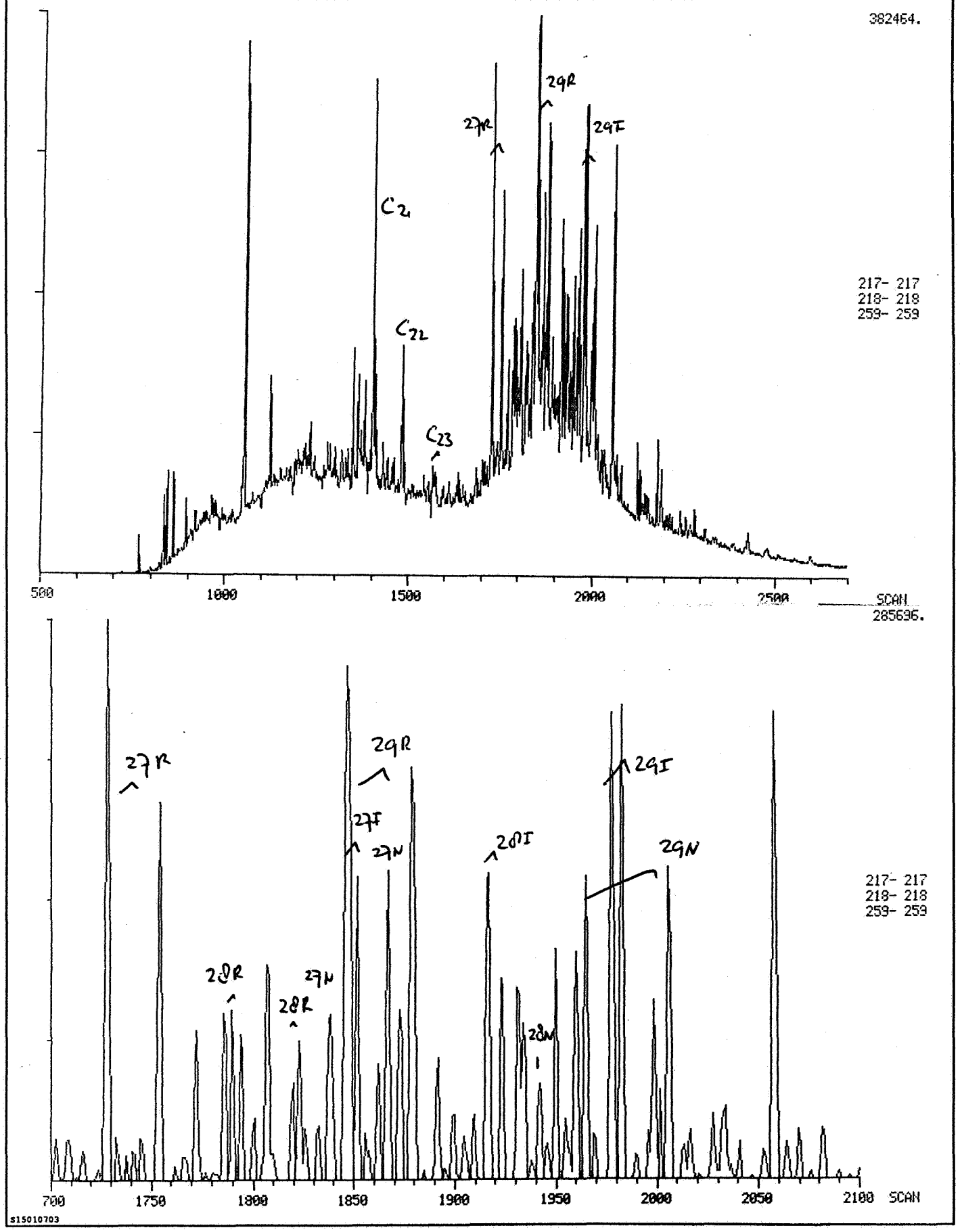
Comment:

COMPONENT No.	Name	RET.TIM (min)	MAXIMUM (mV)	AREA * (cnts)	WEIGHT PERC.
3	PROPANE	068:13	2357.0	22431	8.59
4	ISOBUTANE	069:13	110.3	1583	0.61
5	N-BUTANE	070:37	3522.0	26850	10.28
6	ISOPENTANE	074:22	857.2	15349	5.88
7	N-PENTANE	077:36	5911.2	56884	21.78
8	2.2-DIMETHYLBUTANE	080:31	120.7	2772	1.06
9	CYCLOPENTANE	085:30	284.8	5087	1.95
10	2.3-DIMETHYLBUTANE	* * *	Not detected	* * *	
11	2-METHYLPENTANE	089:01	465.3	8014	3.07
12	3-METHYLPENTANE	092:20	385.6	7588	2.91
13	N-HEXANE	098:10	465.5	8245	3.16
14	METHYLCYCLOPENTANE	104:39	422.9	9171	3.51
15	2.2-DIMETHYLPENTANE	107:41	92.4	2443	0.94
16	BENZENE	109:50	555.4	14252	5.46
17	2.4-DIMETHYLPENTANE	110:19	55.4	1263	0.48
18	2.2.3-TRIMETHYLBUTANE	112:21	18.6	318	0.12
19	CYCLOHEXANE	119:23	980.0	27214	10.42
20	3.3-DIMETHYLPENTANE	123:22	14.5	198	0.08
21	1.1-DIMETHYLCYCLOPENTANE	129:53	87.1	2892	1.11
22	2-METHYLHEXANE	132:30	68.0	2401	0.92
23	2.3-DIMETHYLPENTANE	133:22	41.5	1320	0.51
24	1-C-3-DIMETHYLCYCLOPENTANE	138:07	33.9	1162	0.45
25	3-METHYLHEXANE	138:46	76.2	2817	1.08
26	1-T-3-DIMETHYLCYCLOPENTANE	141:34	9.5	150	0.06
27	1-T-2-DIMETHYLCYCLOPENTANE	142:55	98.2	3810	1.46
28	3-ETHYLPENTANE	145:06	13.4	399	0.15
30	N-HEPTANE	162:44	83.7	3394	1.30
31	1-C-2-DIMETHYLCYCLOPENTANE	167:08	7.9	183	0.07
32	METHYLCYCLOHEXANE	175:33	577.3	29282	11.21
33	1.1.3-TRIMETHYLCYCLOPENTANE	180:21	32.5	968	0.37
34	2.2-DIMETHYLHEXANE	183:43	11.6	181	0.07
35	ETHYLCYCLOPENTANE	189:10	10.8	157	0.06
36	2.5-DIMETHYLHEXANE	* * *	Not detected	* * *	
38	2.2.3-TRIMETHYLPENTANE	* * *	Not detected	* * *	
39	1-T-2-C-4-TRIMETHYLCYCLOPENTANE	205:04	13.5	496	0.19
40	TOLUENE	209:06	46.2	1860	0.71
	30	162:44	83.7	3394	
	Total peak area			261133	

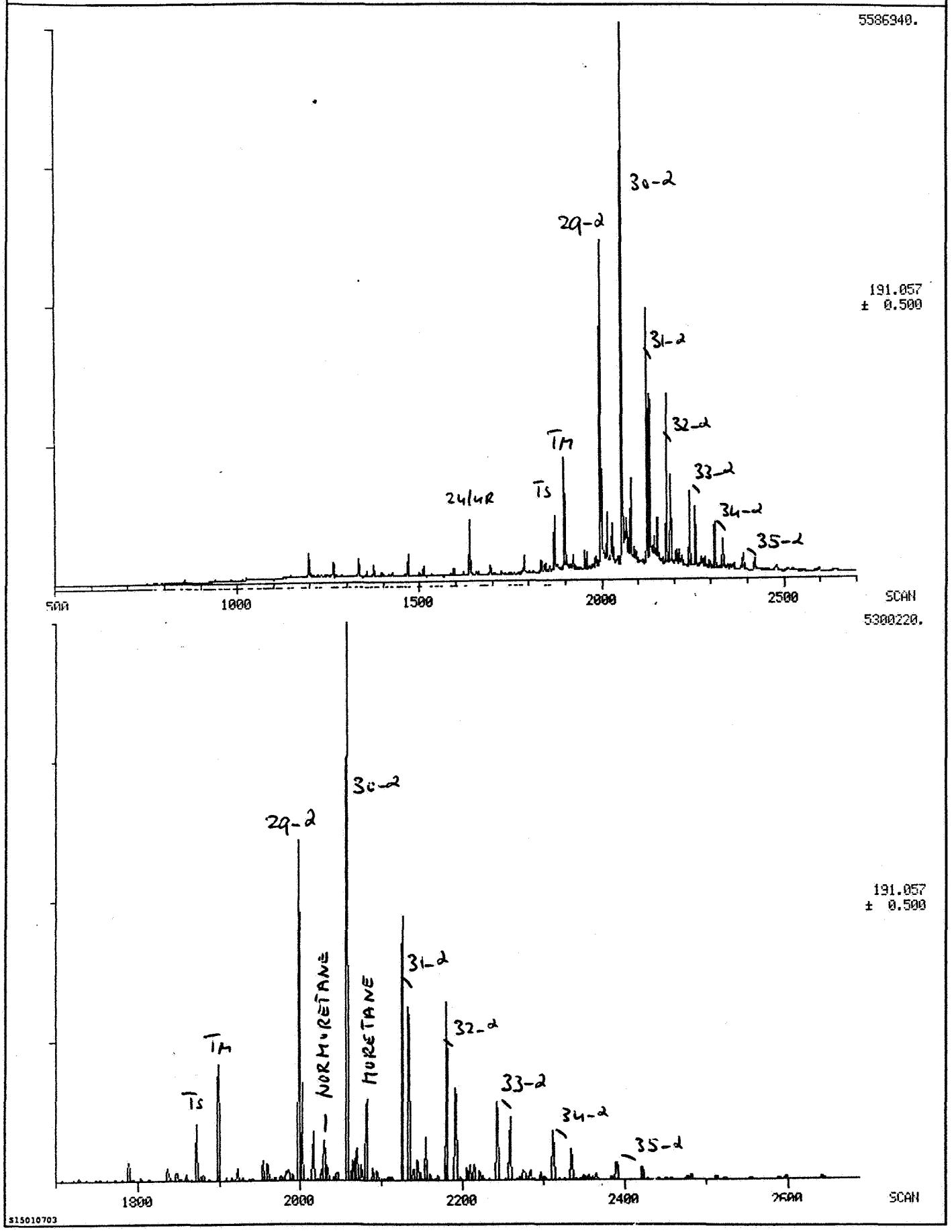
*) Corrected for difference in response

S15010703

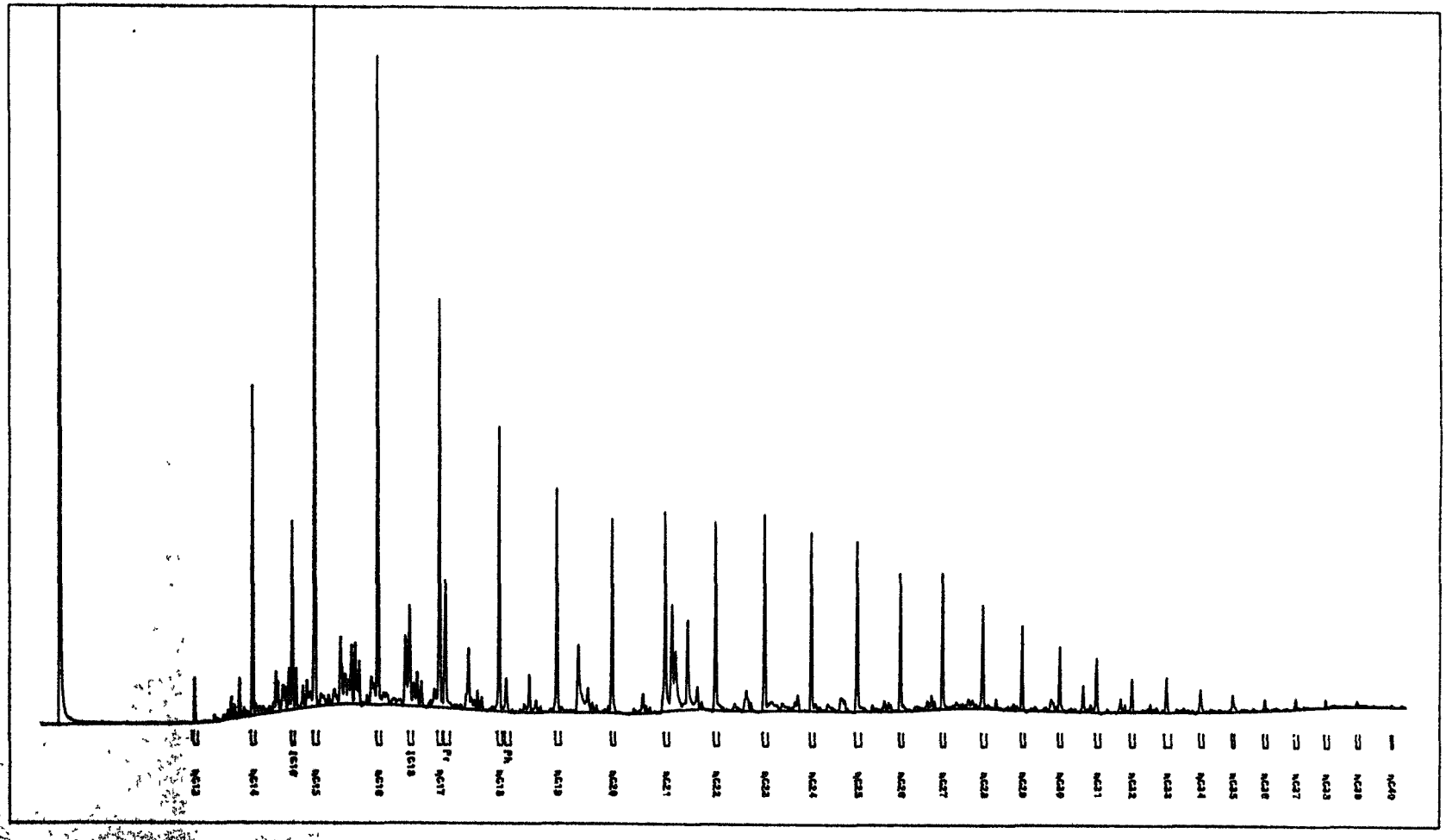
Sterane Fragmentograms of the sample from well 6306/10-01 (2695.7 m.), Norway



Triterpane Fragmentograms of the sample from well 6306/10-01 (2695.7 m.), Norway

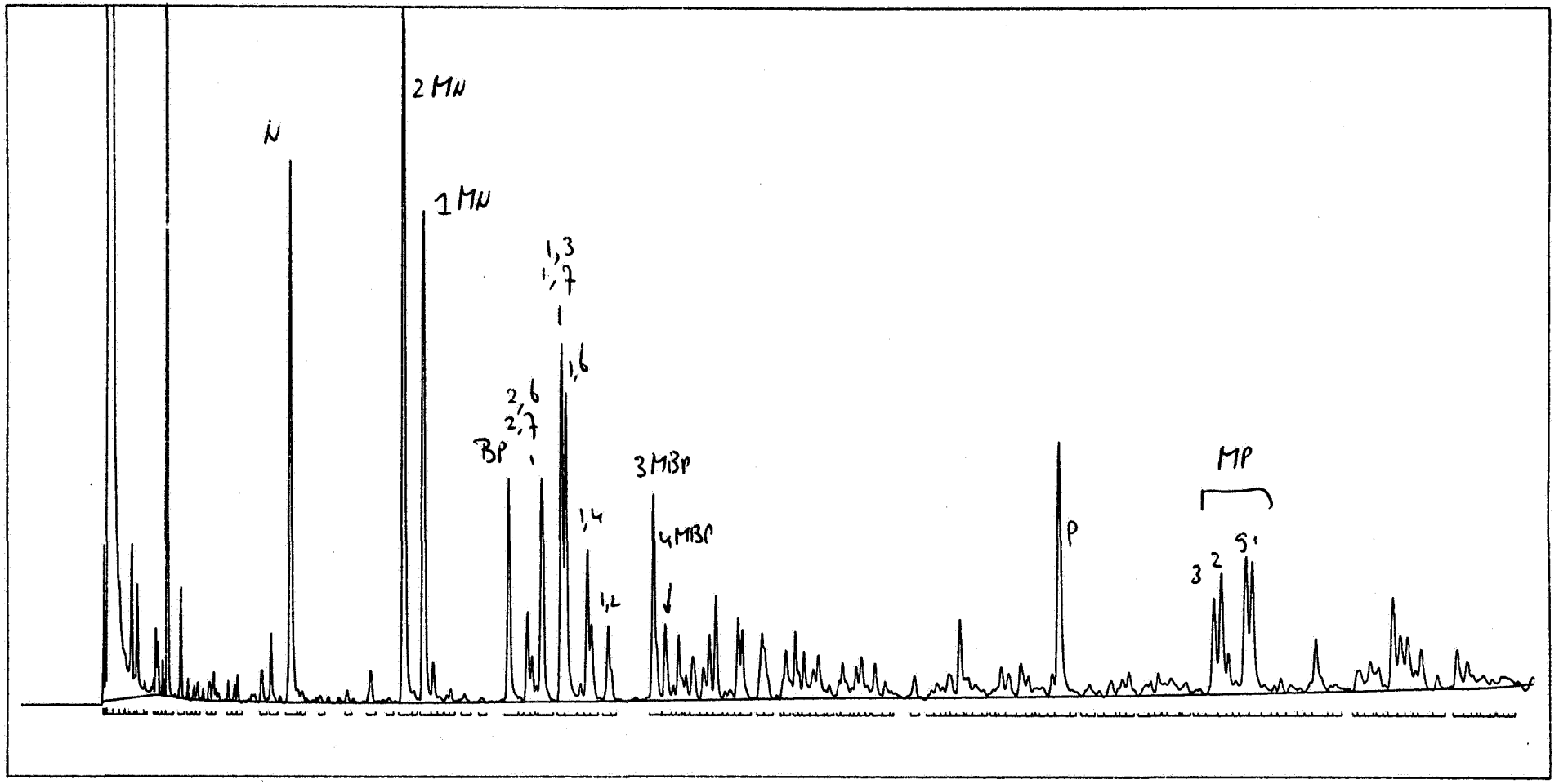


GAS CHROMATOGRAM OF SATURATED HYDROCARBONS
well 6306/10-1, Norway



S150110-3

GAS CHROMATOGRAM OF AROMATIC HYDROCARBONS
well 6306/10-1, Norway

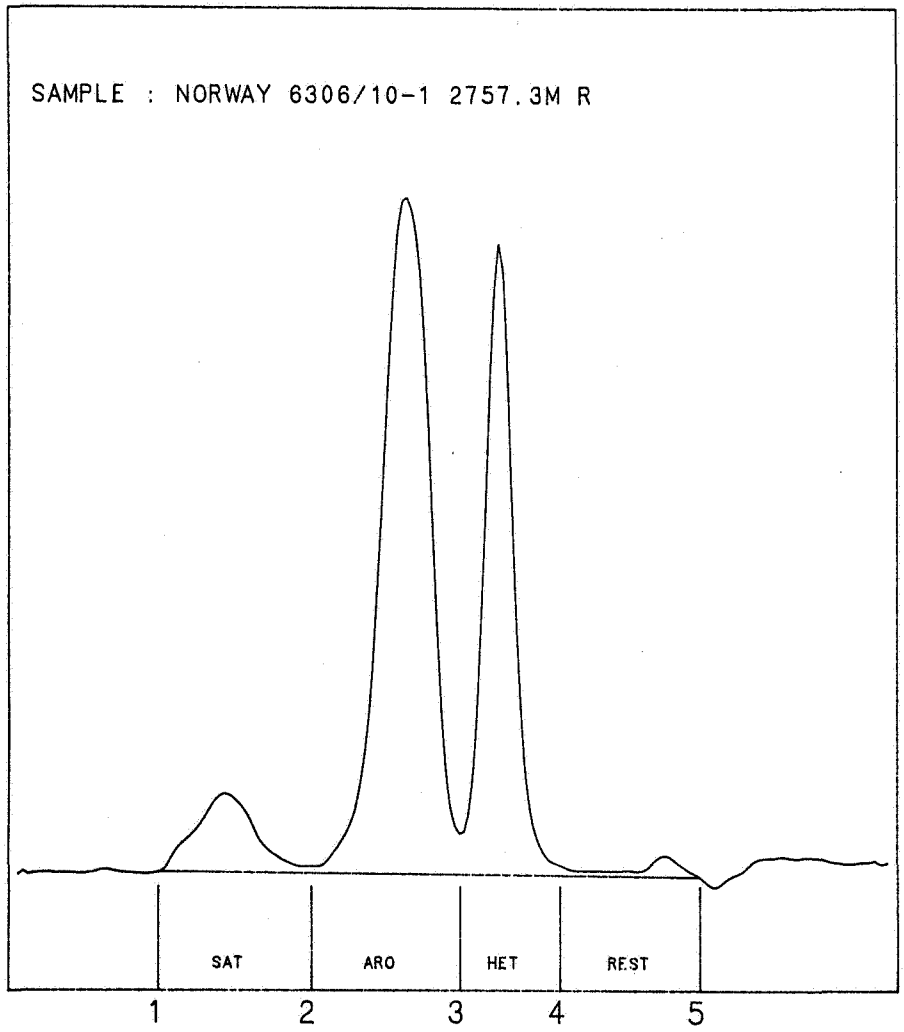


NORWAY 6303/10–01

2757.3 M

CORE SAMPLE

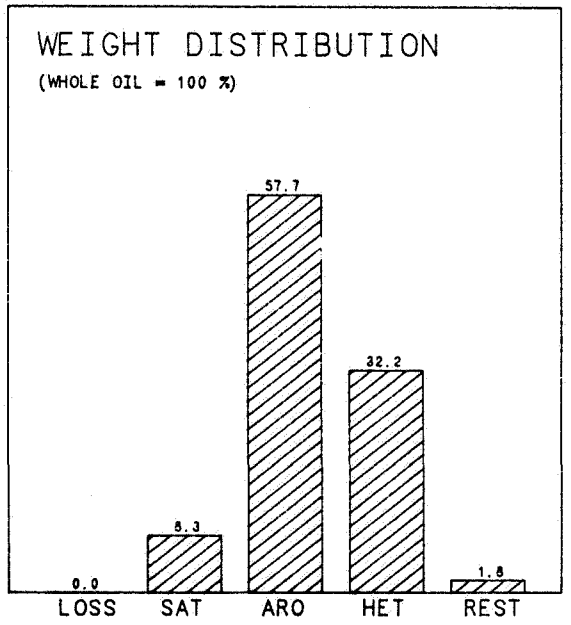
Gross Composition of the sample from well 6306/10-01 (2757.3 m.), Norway



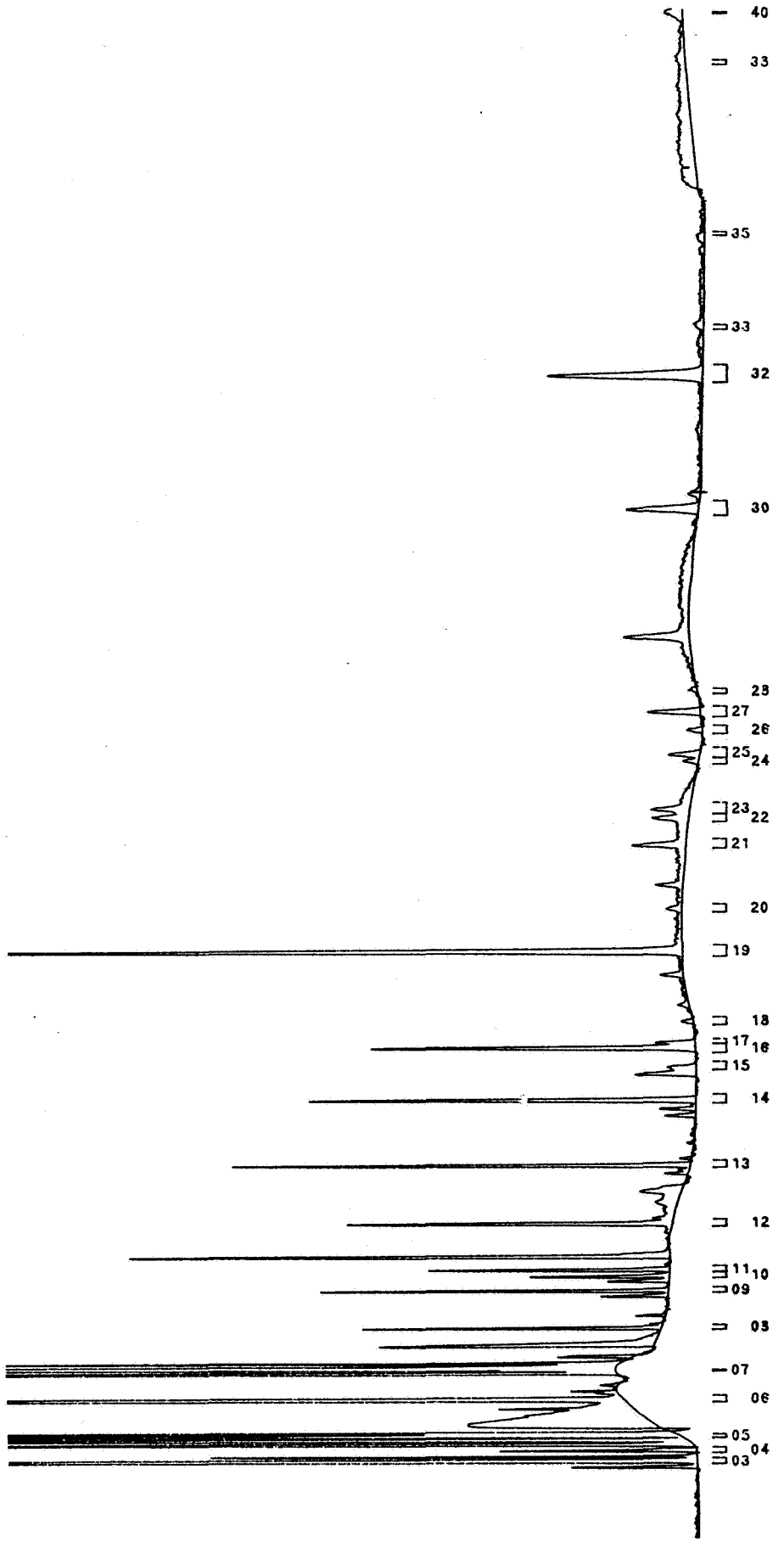
SAMPLE : S150110-3

WEIGHT LOST ON TOPPING	:	0.0 %
– SATURATES	:	8.3 %
– AROMATICS	:	57.7 %
– HETEROCOMPOUNDS	:	32.2 %
– REST (HIGH MOL.)	:	1.8 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE



Gas chromatogram of the light fraction (< 120 C.) of the sample from well 6306/10-01 (2757.3 m.), Norway



S15011003

Gas chromatographic hydrocarbons analysis (< 120 C.) well 6306/10-01 (2757.3 m.), Norway

GAS CHROMATOGRAPHIC ANALYSIS OF THE FRACTION BOILING BELOW 114 DEGREES CENTIGRADE

Sample: S15011003 d.d. 22-apr-91 15:48
Recorded: L1-301 GLC-1

Country: Norway Well/Outcrop: 6306/10-01

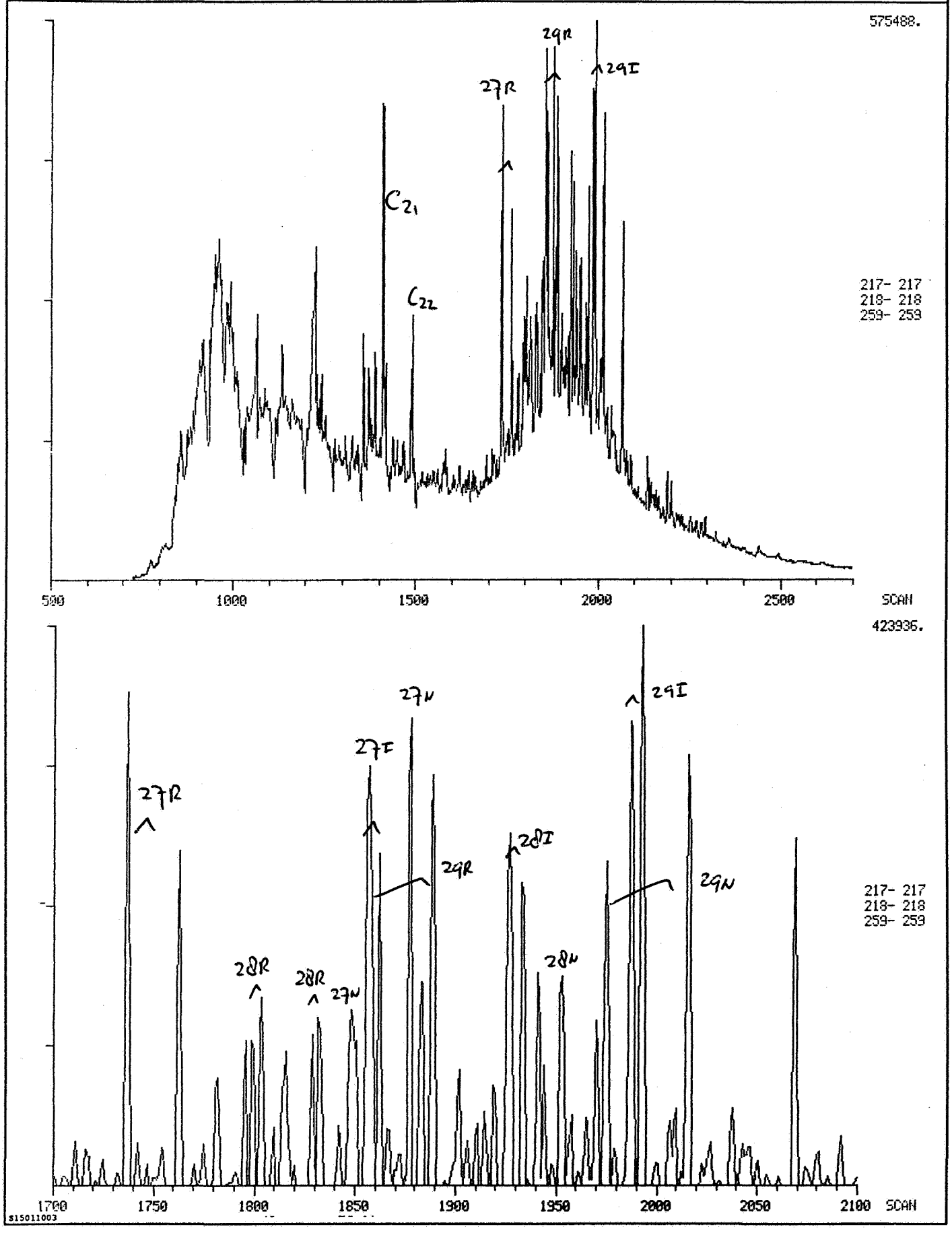
Depth/Collector: 2757.30 m

Comment:

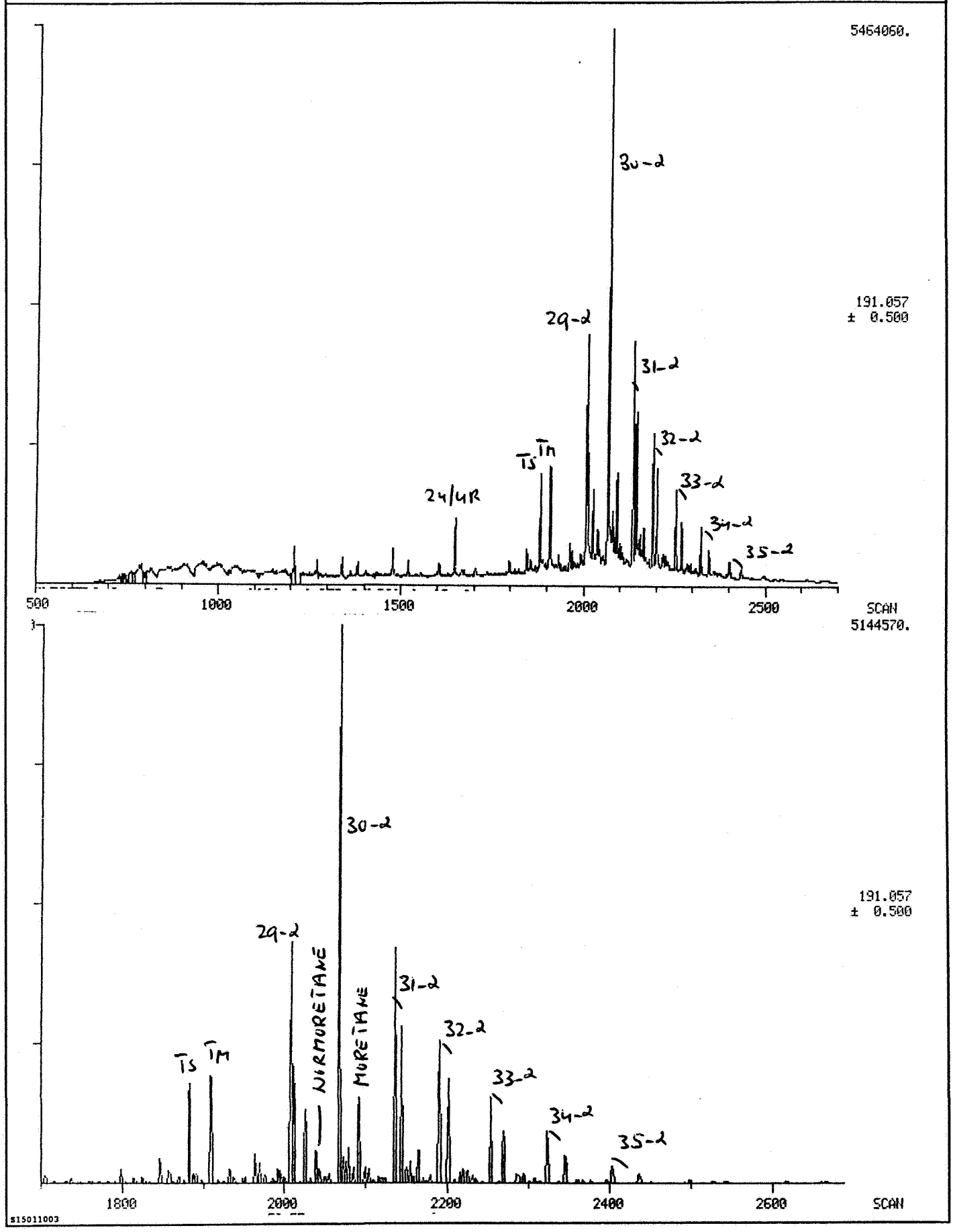
COMPONENT No. Name	RET.TIM (min)	MAXIMUM (mV)	AREA * (cnts)	WEIGHT PERC.
3 - PROPANE	068:13	10199.3	119310	26.22
4 - ISOBUTANE	069:11	415.3	5478	1.20
5 - N-BUTANE	070:34	10164.6	97236	21.37
6 - ISOPENTANE	073:56	2864.1	47465	10.43
7 - N-PENTANE	076:39	429.2	3434	0.75
8 - 2.2-DIMETHYLBUTANE	080:38	630.7	7548	1.66
9 - CYCLOPENTANE	084:05	733.0	9515	2.09
10 - 2.3-DIMETHYLBUTANE	085:23	295.1	4492	0.99
11 - 2-METHYLPENTANE	086:02	509.2	7701	1.69
12 - 3-METHYLPENTANE	090:20	686.6	12973	2.85
13 - N-HEXANE	095:46	965.8	16169	3.55
14 - METHYLCYCLOPENTANE	101:49	816.3	16700	3.67
15 - 2.2-DIMETHYLPENTANE	104:49	61.6	2070	0.45
16 - BENZENE	106:38	685.0	15373	3.38
17 - 2.4-DIMETHYLPENTANE	107:06	83.3	1869	0.41
18 - 2.2.3-TRIMETHYLBUTANE	109:06	24.6	551	0.12
19 - CYCLOHEXANE	115:37	1510.9	41143	9.04
20 - 3.3-DIMETHYLPENTANE	119:31	33.9	1231	0.27
21 - 1.1-DIMETHYLCYCLOPENTANE	125:28	115.1	4343	0.95
22 - 2-METHYLHEXANE	127:58	79.5	3165	0.70
23 - 2.3-DIMETHYLPENTANE	128:44	82.9	3816	0.84
24 - 1-C-3-DIMETHYLCYCLOPENTANE	133:15	33.6	979	0.22
25 - 3-METHYLHEXANE	133:51	66.9	2274	0.50
26 - 1-T-3-DIMETHYLCYCLOPENTANE	136:07	33.2	941	0.21
27 - 1-T-2-DIMETHYLCYCLOPENTANE	137:49	111.6	3623	0.80
28 - 3-ETHYLPENTANE	139:50	18.4	365	0.08
30 - N-HEPTANE	156:36	153.5	6775	1.49
31 - 1-C-2-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
32 - METHYLCYCLOHEXANE	169:02	328.2	16379	3.60
33 - 1.1.3-TRIMETHYLCYCLOPENTANE	173:37	19.2	600	0.13
34 - 2.2-DIMETHYLHEXANE	* * *	Not detected	* * *	
35 - ETHYLCYCLOPENTANE	182:01	16.8	336	0.07
36 - 2.5-DIMETHYLHEXANE	* * *	Not detected	* * *	
38 - 2.2.3-TRIMETHYLPENTANE	198:17	20.7	613	0.13
39 - 1-T-2-C-4-TRIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
40 - TOLUENE	202:42	39.8	506	0.11
30	156:36	153.5	6775	
Total peak area			454971	

*) Corrected for difference in response

Sterane Fragmentograms of the sample from well 6306/10-01 (2757.3 m.), Norway

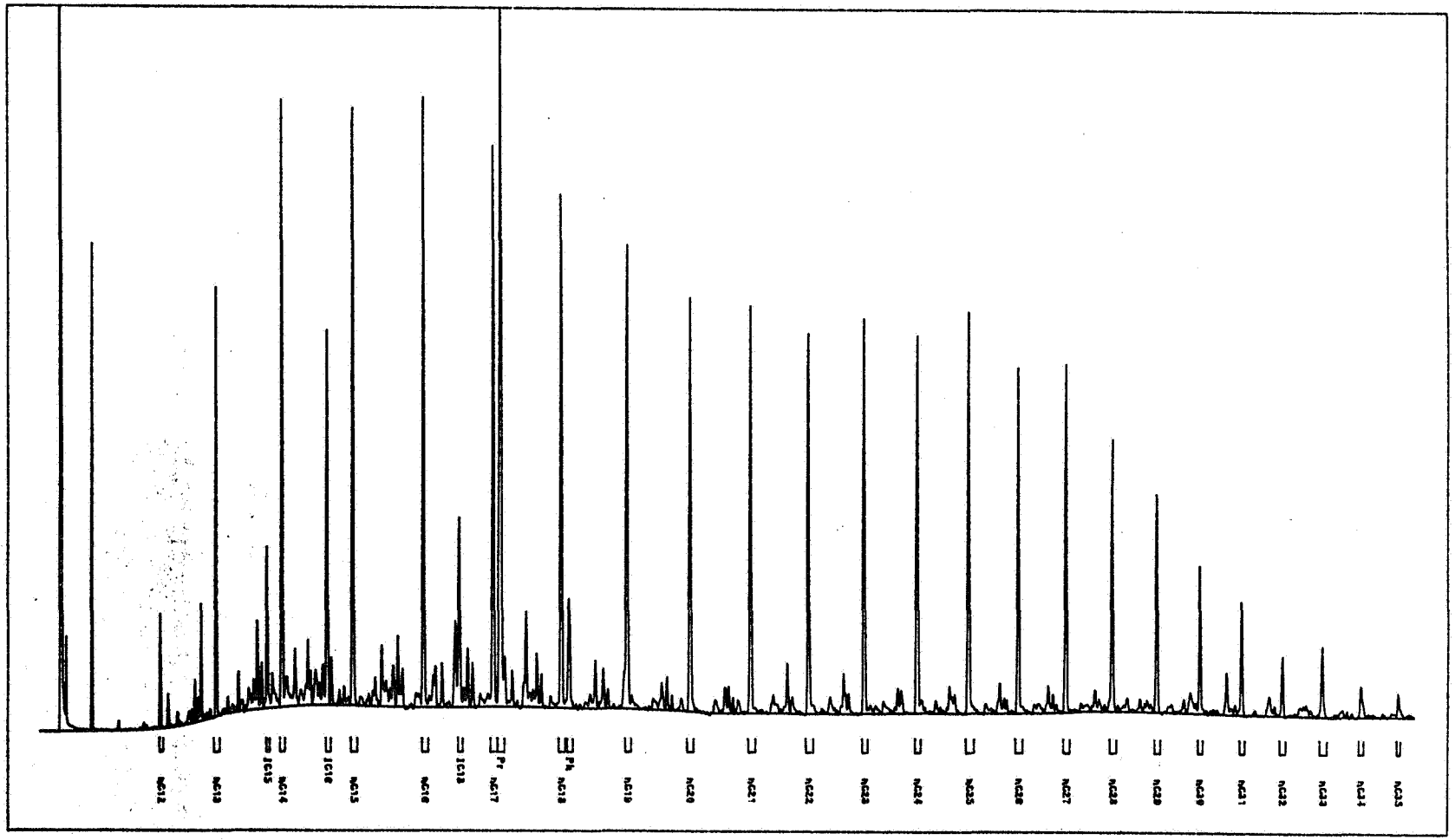


Triterpane Fragmentograms of the sample from well 6306/10-01 (2757.3 m.), Norway



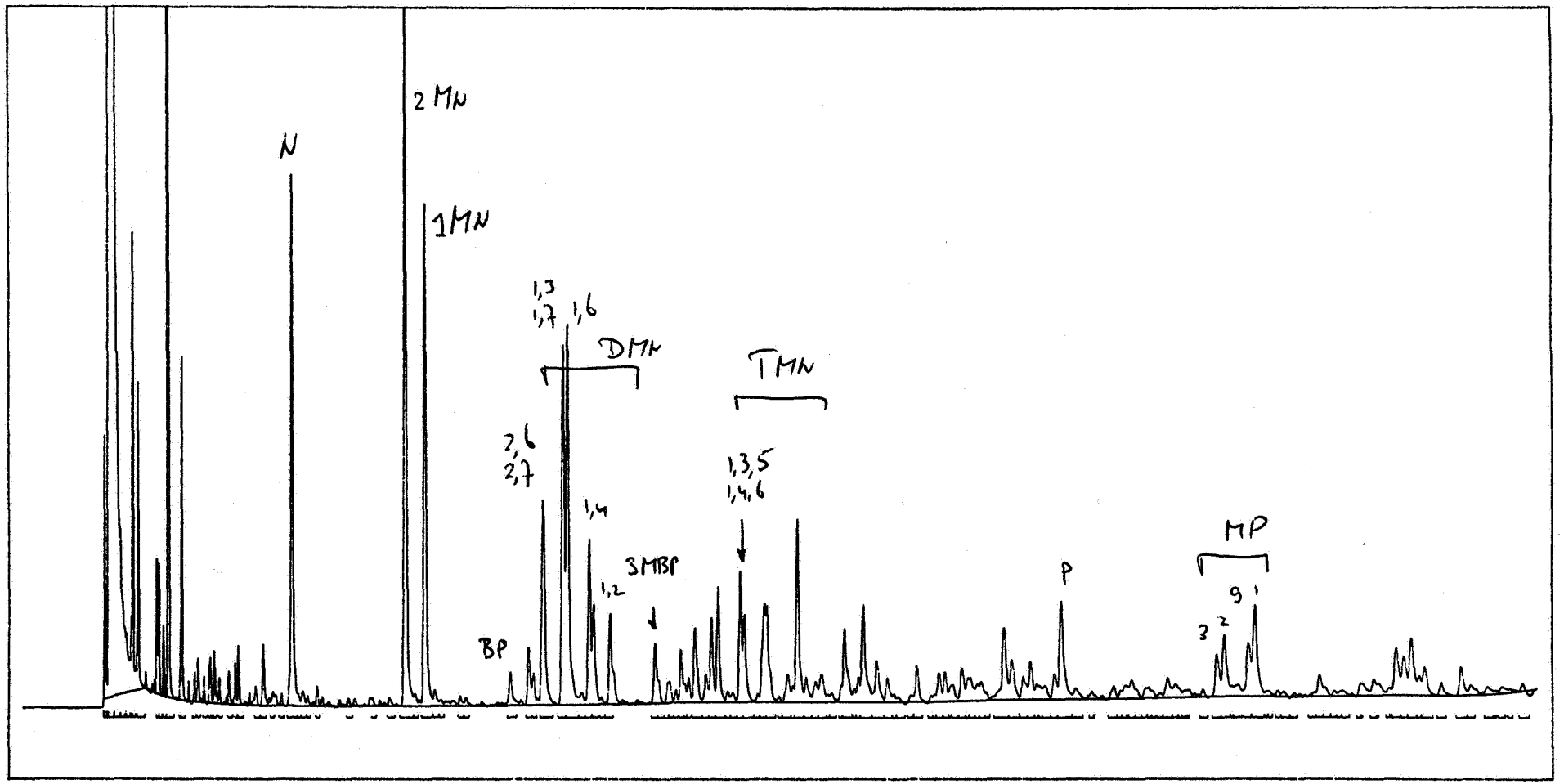
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

well 6306/10-1, Norway



S150108-3

GAS CHROMATOGRAM OF AROMATIC HYDROCARBONS
well 6306/10-1, Norway

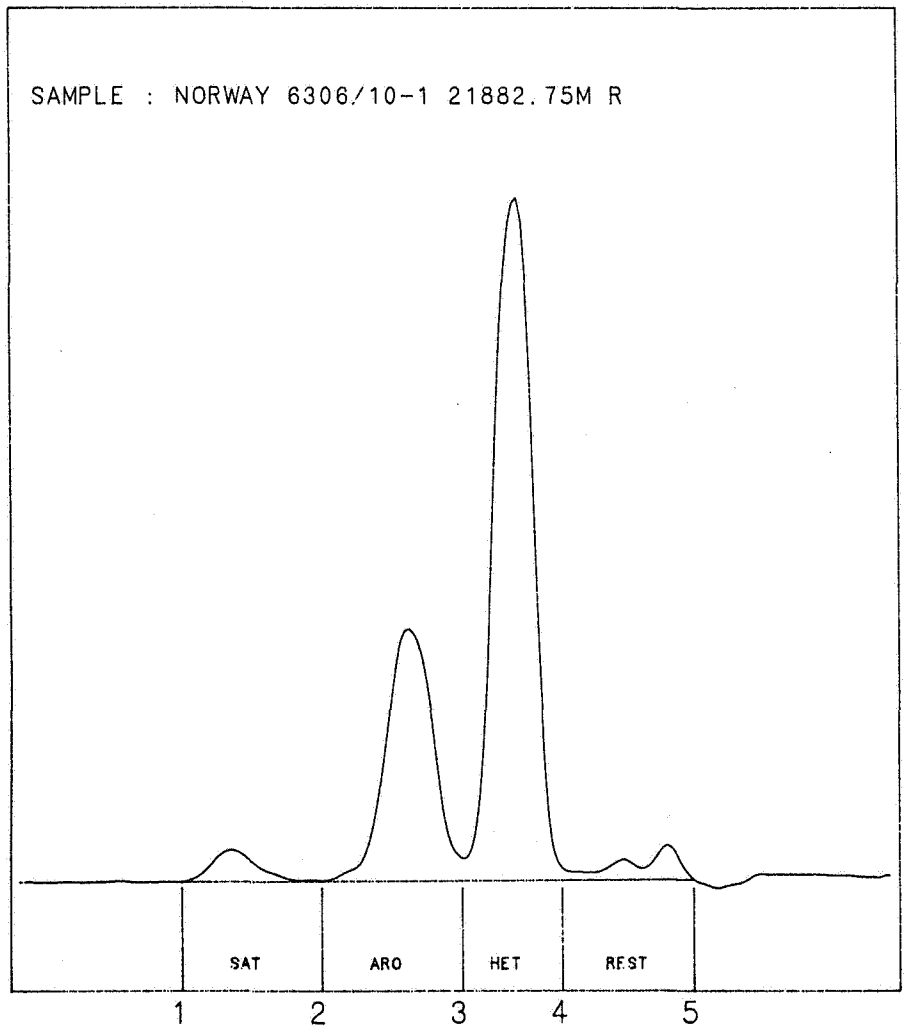


NORWAY 6306/10-01

2882.75 M

CORE SAMPLE

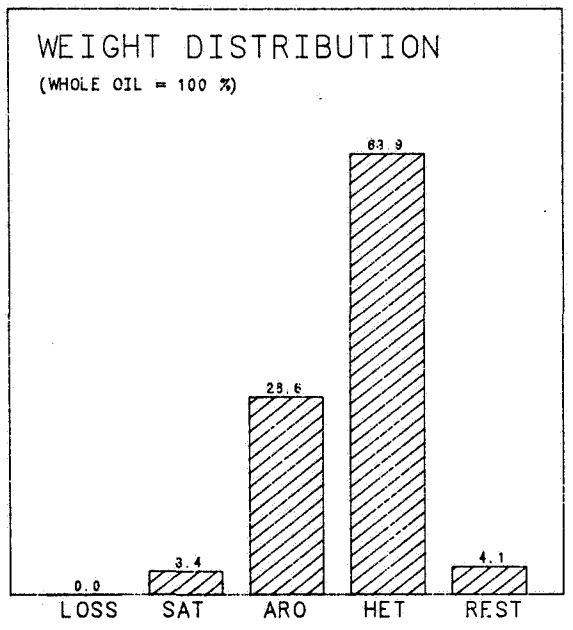
Gross Composition of the sample from well 6306/10-01 (2882.75 m.), Norway



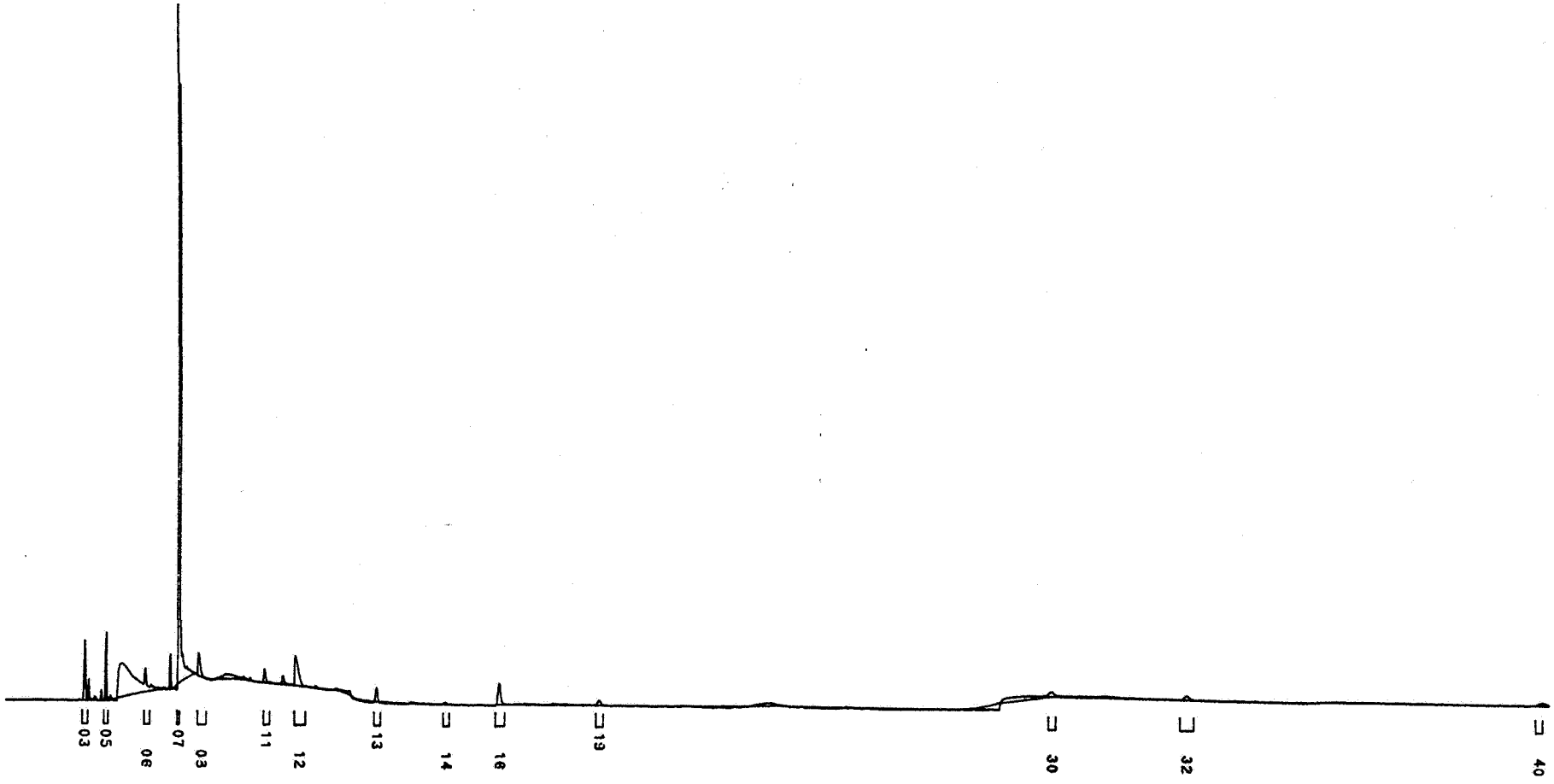
SAMPLE : S150108-3

WEIGHT LOST ON TOPPING	:	0.0 %
– SATURATES	:	3.4 %
– AROMATICS	:	28.6 %
– HETEROCOMPOUNDS	:	63.9 %
– REST (HIGH MOL.)	:	4.1 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE



Gas chromatogram of the light fraction (< 120 C.) of the sample from well 6306/10-01 (2882.75 m.), Norway



Gas chromatographic hydrocarbons analysis (< 120 C.) well 6306/10-01 (2882.75 m.), Norway

GAS CHROMATOGRAPHIC ANALYSIS OF THE FRACTION BOILING BELOW 114 DEGREES CENTIGRADE

Sample: S15010803 d.d. 17-apr-91 15:28
Recorded: L1-301 GLC-1

Country: Norway Well/Outcrop: 6306/10-01

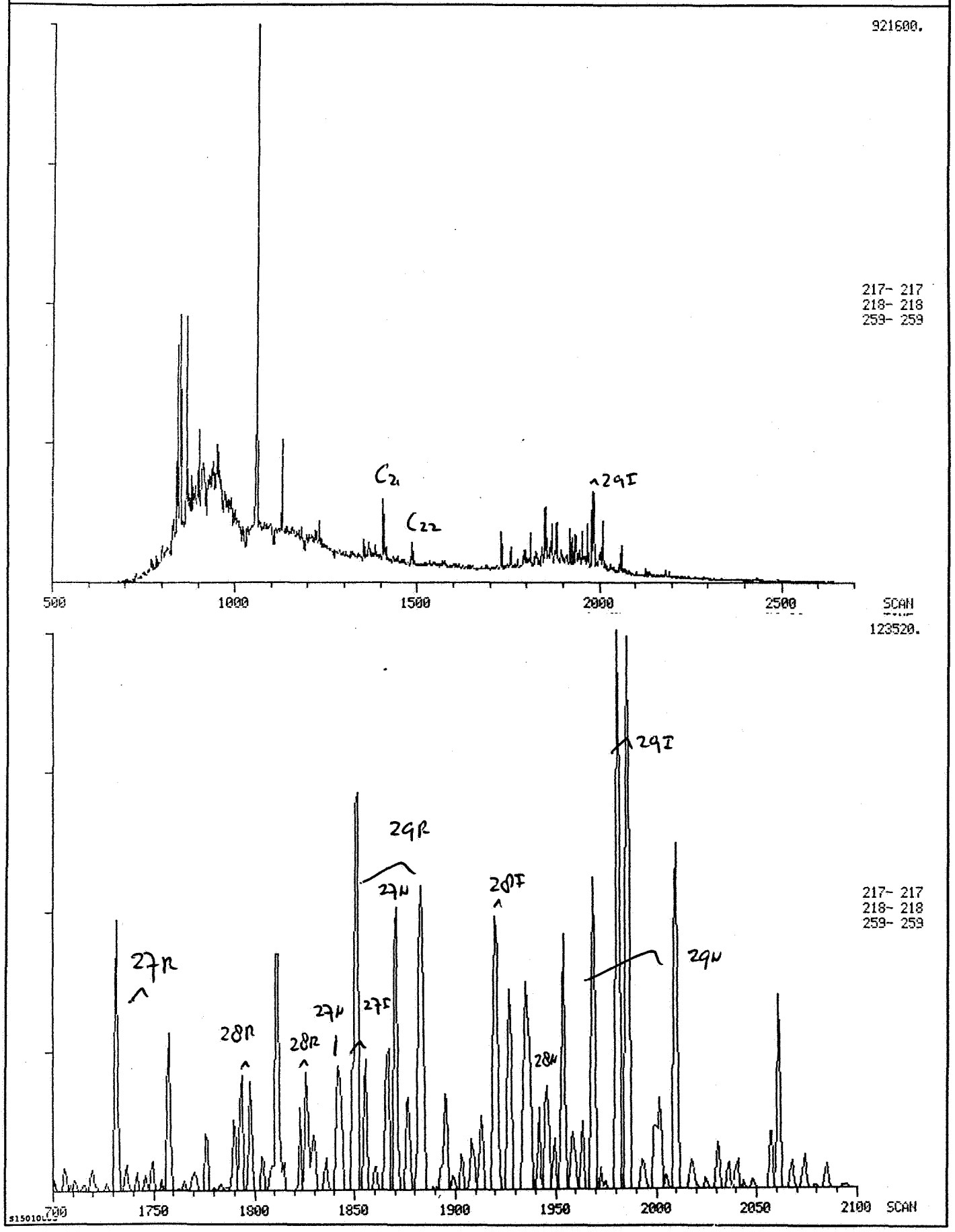
Depth/Collector: 2882.75 m

Comment:

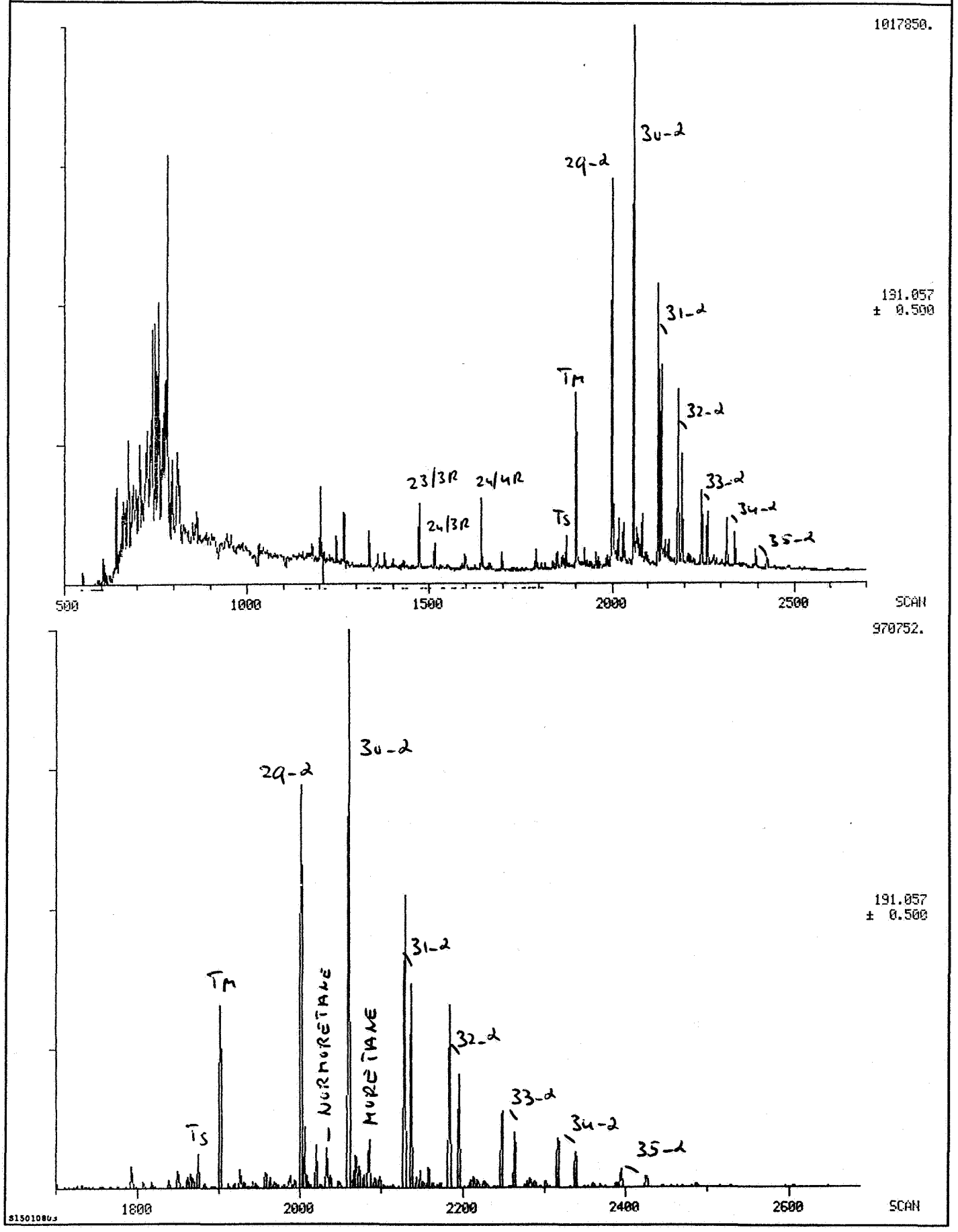
COMPONENT No.	Name	RET.TIM (min)	MAXIMUM (mV)	AREA * (cnts)	WEIGHT PERC.
3	PROPANE	068:19	654.4	7948	7.30
4	ISOBUTANE	* * *	Not detected	* * *	
5	N-BUTANE	070:21	745.3	6148	5.65
6	ISOPENTANE	074:08	252.5	5049	4.64
7	N-PENTANE	077:18	7695.9	54459	50.03
8	2.2-DIMETHYLBUTANE	079:15	256.2	5023	4.61
9	CYCLOPENTANE	* * *	Not detected	* * *	
10	2.3-DIMETHYLBUTANE	* * *	Not detected	* * *	
11	2-METHYLPENTANE	085:39	150.4	2418	2.22
12	3-METHYLPENTANE	088:38	327.8	10689	9.82
13	N-HEXANE	096:28	162.8	2504	2.30
14	METHYLCYCLOPENTANE	103:04	26.7	583	0.54
15	2.2-DIMETHYLPENTANE	* * *	Not detected	* * *	
16	BENZENE	108:16	234.5	5559	5.11
17	2.4-DIMETHYLPENTANE	* * *	Not detected	* * *	
18	2.2.3-TRIMETHYLBUTANE	* * *	Not detected	* * *	
19	CYCLOHEXANE	117:54	61.6	1861	1.71
20	3.3-DIMETHYLPENTANE	* * *	Not detected	* * *	
21	1.1-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
22	2-METHYLHEXANE	* * *	Not detected	* * *	
23	2.3-DIMETHYLPENTANE	* * *	Not detected	* * *	
24	1-C-3-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
25	3-METHYLHEXANE	* * *	Not detected	* * *	
26	1-T-3-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
27	1-T-2-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
28	3-ETHYLPENTANE	* * *	Not detected	* * *	
30	N-HEPTANE	161:32	57.2	2413	2.22
31	1-C-2-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
32	METHYLCYCLOHEXANE	174:34	53.3	2733	2.51
33	1.1.3-TRIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
34	2.2-DIMETHYLHEXANE	* * *	Not detected	* * *	
35	ETHYLCYCLOPENTANE	* * *	Not detected	* * *	
36	2.5-DIMETHYLHEXANE	* * *	Not detected	* * *	
38	2.2.3-TRIMETHYLPENTANE	* * *	Not detected	* * *	
39	1-T-2-C-4-TRIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
40	TOLUENE	208:48	40.4	1465	1.35
	30	161:32	57.2	2413	
	Total peak area			108852	

*) Corrected for difference in response

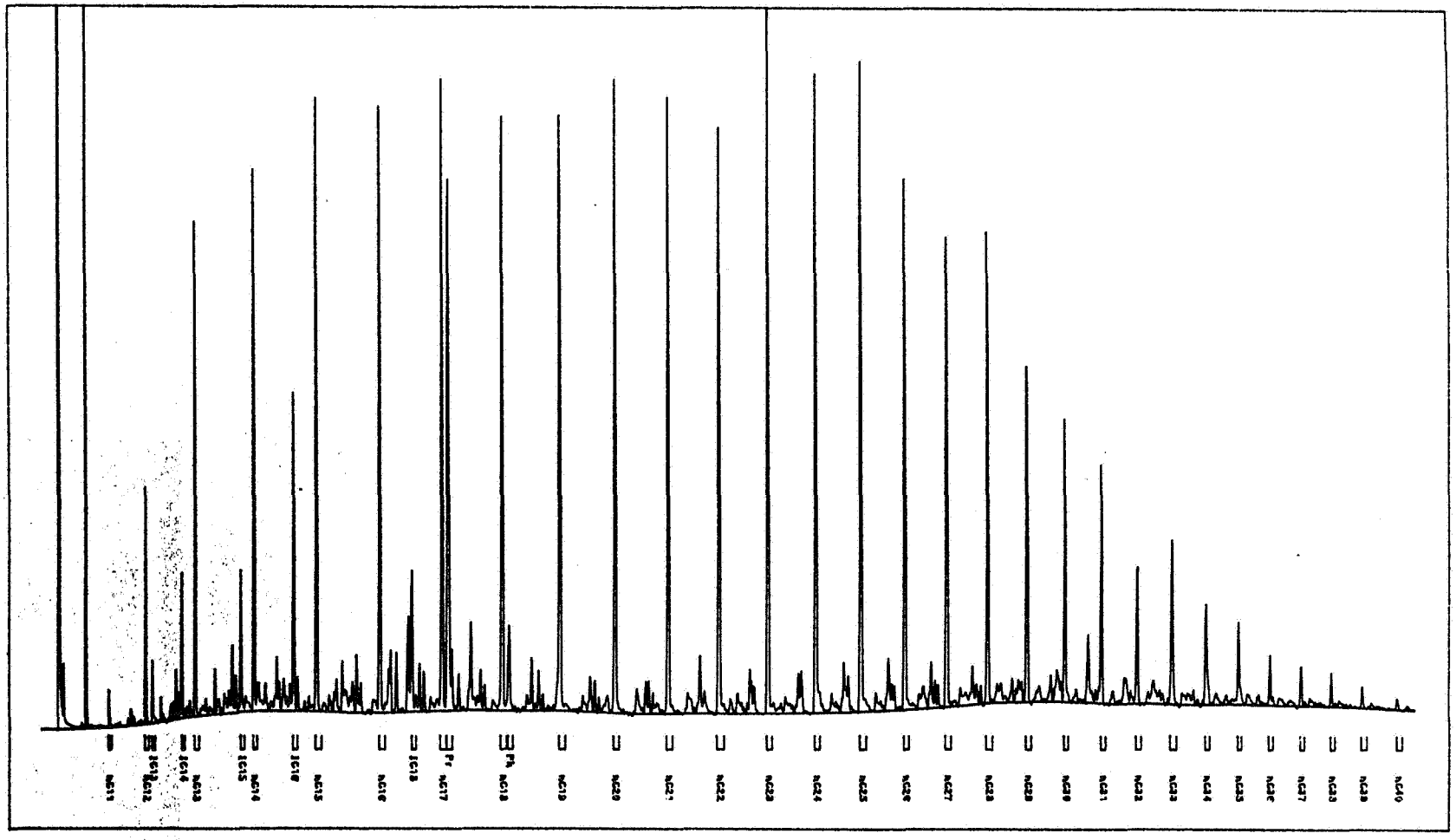
Sterane Fragmentograms of the sample from well 6306/10-01 (2882.75 m.), Norway



Triterpane Fragmentograms of the sample from well 6306/10-01 (2882.75 m.), Norway

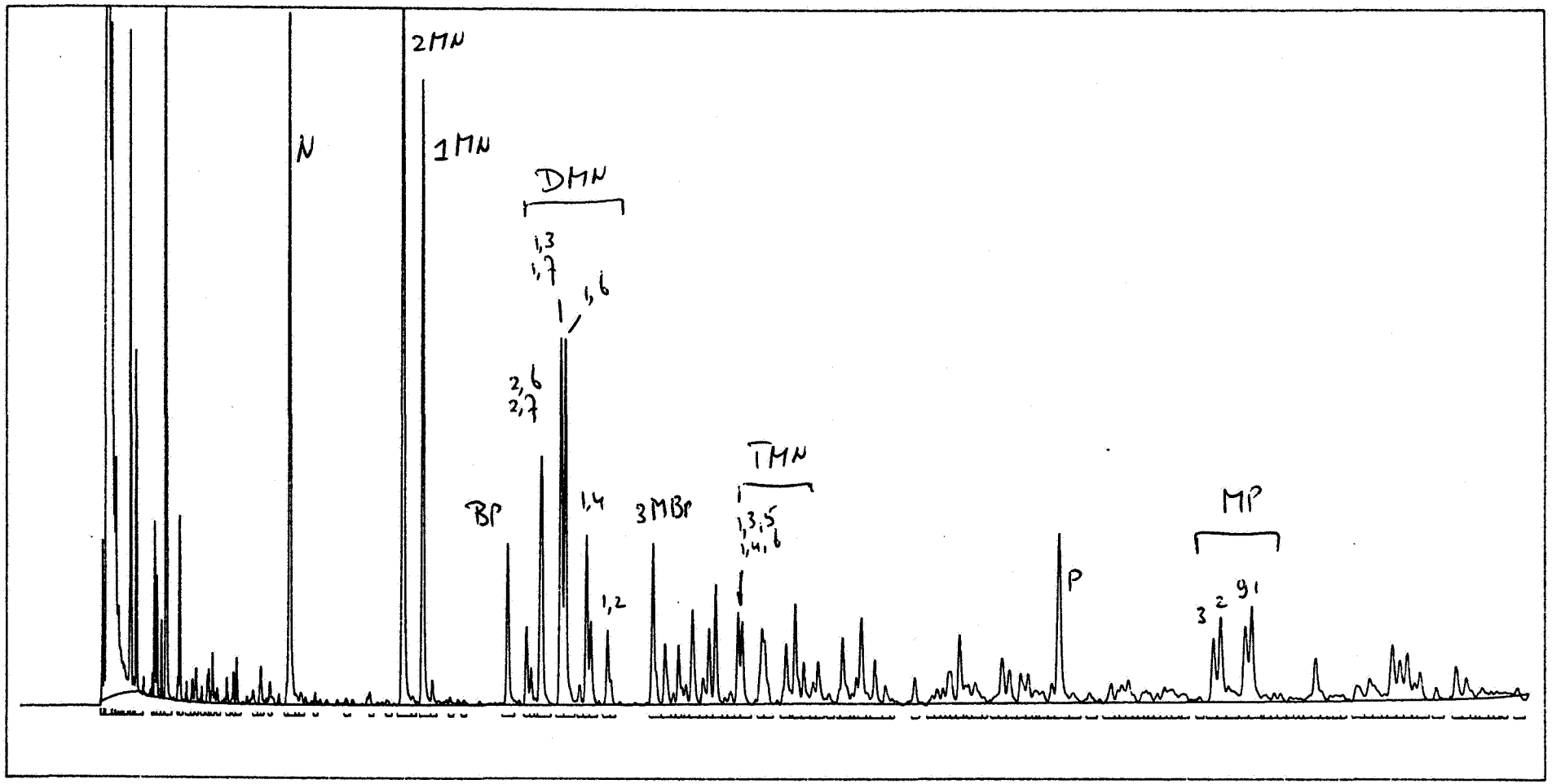


GAS CHROMATOGRAM OF SATURATED HYDROCARBONS
well 6306/10-1, Norway



S150109-3

GAS CHROMATOGRAM OF AROMATIC HYDROCARBONS
well 6306/10-1, Norway

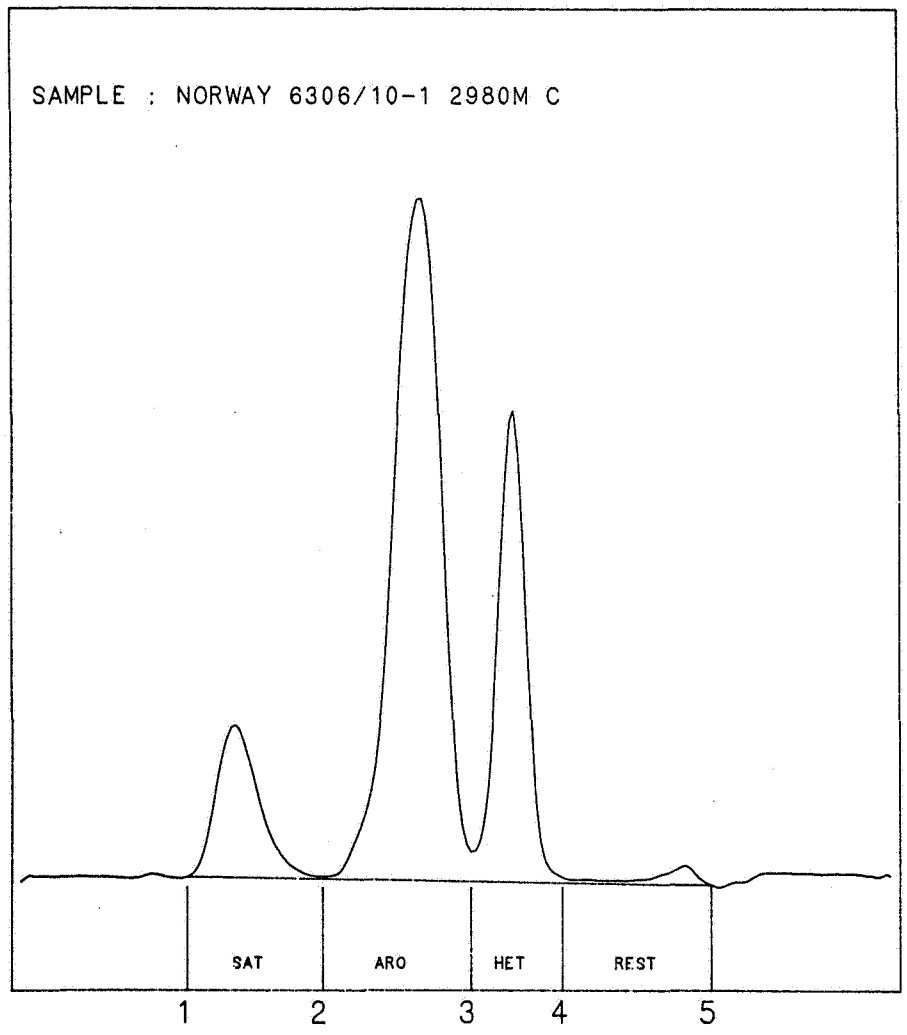


NORWAY 6306/10-01

2980 M

CUTTING

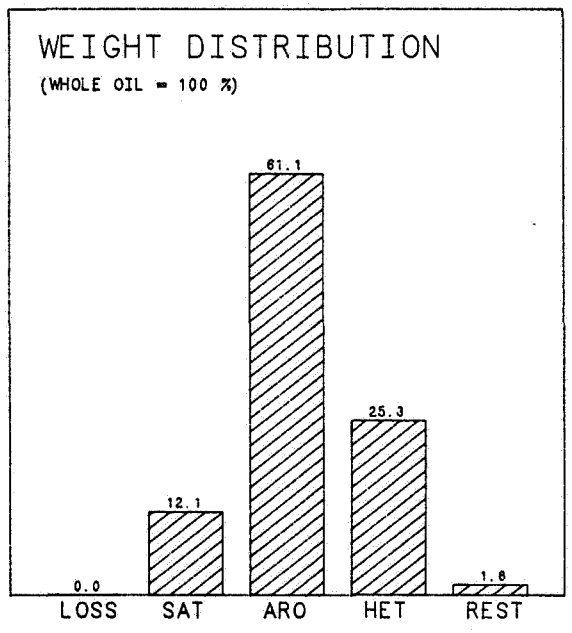
Gross Composition of the sample from well 6306/10-01 (2980 m.), Norway



SAMPLE : S150109-3

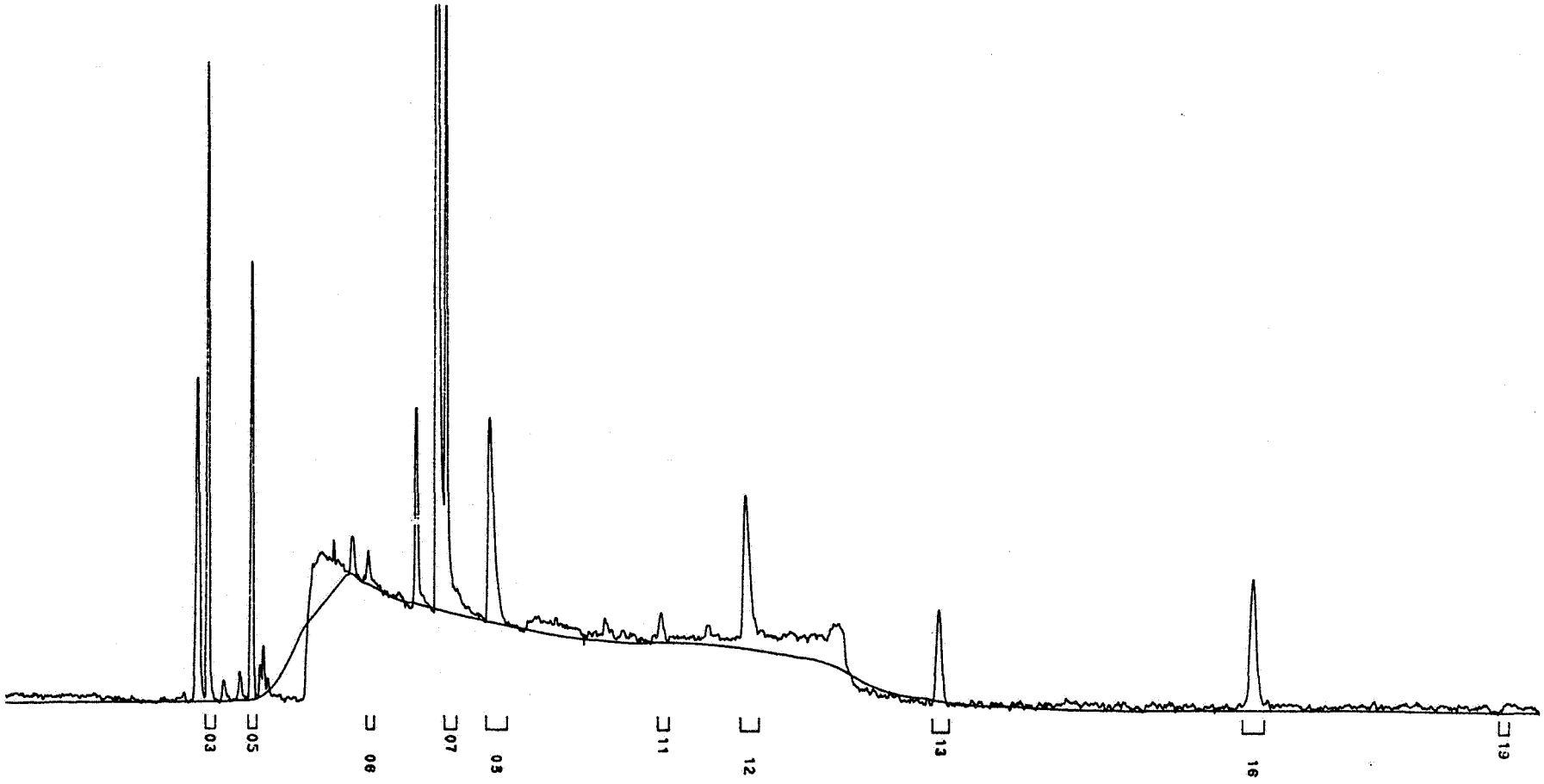
WEIGHT LOST ON TOPPING	0.0 %
– SATURATES	12.1 %
– AROMATICS	61.1 %
– HETEROCOMPOUNDS	25.3 %
– REST (HIGH MOL.)	1.6 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE



S15010903

Gas chromatogram of the light fraction (< 120 C.) of the sample from well 6306/10-01 (2980 m.), Norway



Gas chromatographic hydrocarbons analysis (< 120 C.) well 6306/10-01 (2980 m.), Norway

GAS CHROMATOGRAPHIC ANALYSIS OF THE FRACTION BOILING BELOW 114 DEGREES CENTIGRADE

Sample: S15010903 d.d. 18-apr-91 08:08
Recorded: L1-301 GLC-1

Country: Norway Well/Outcrop: 6306/10-01

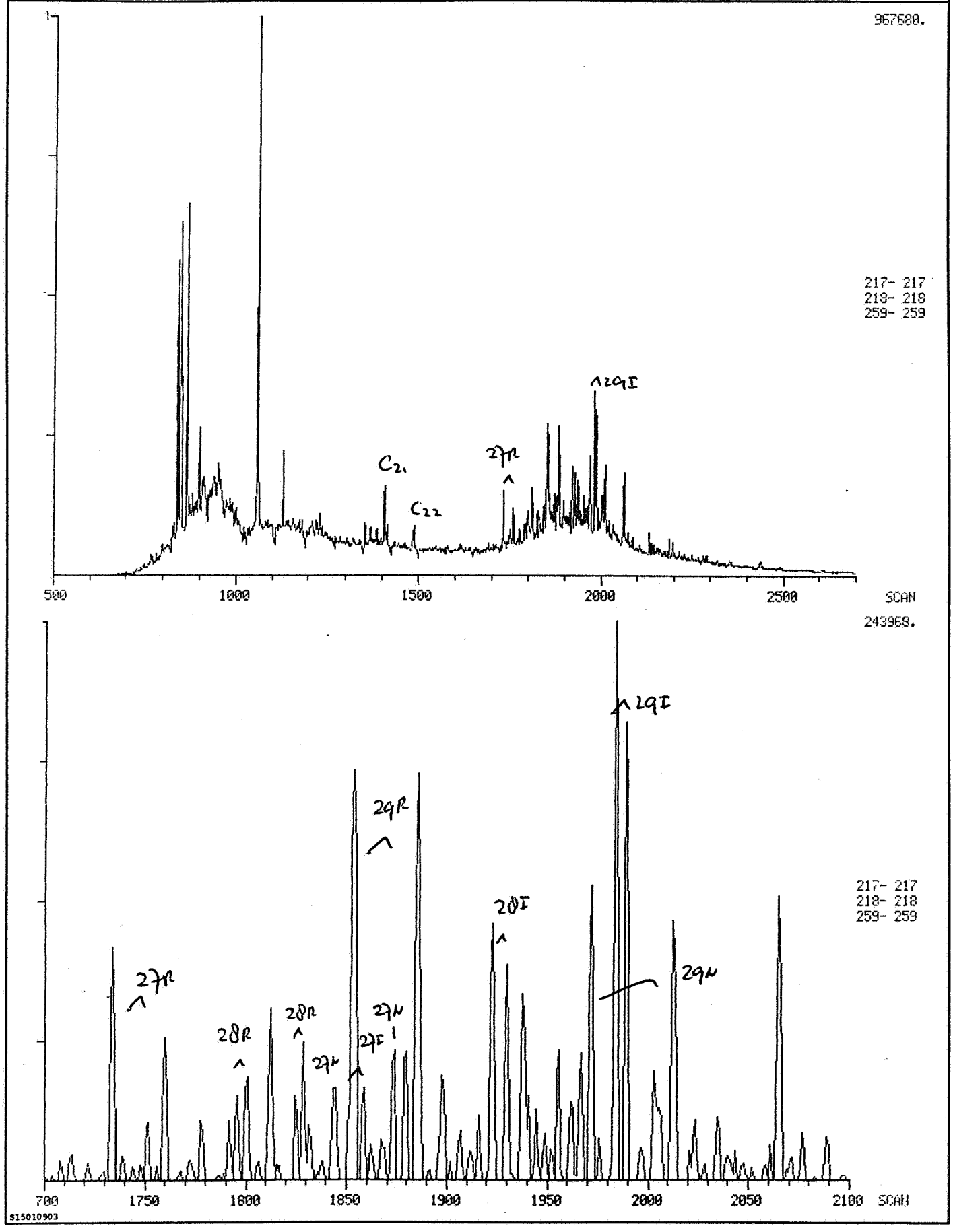
Depth/Collector: 2980.00 m

Comment:

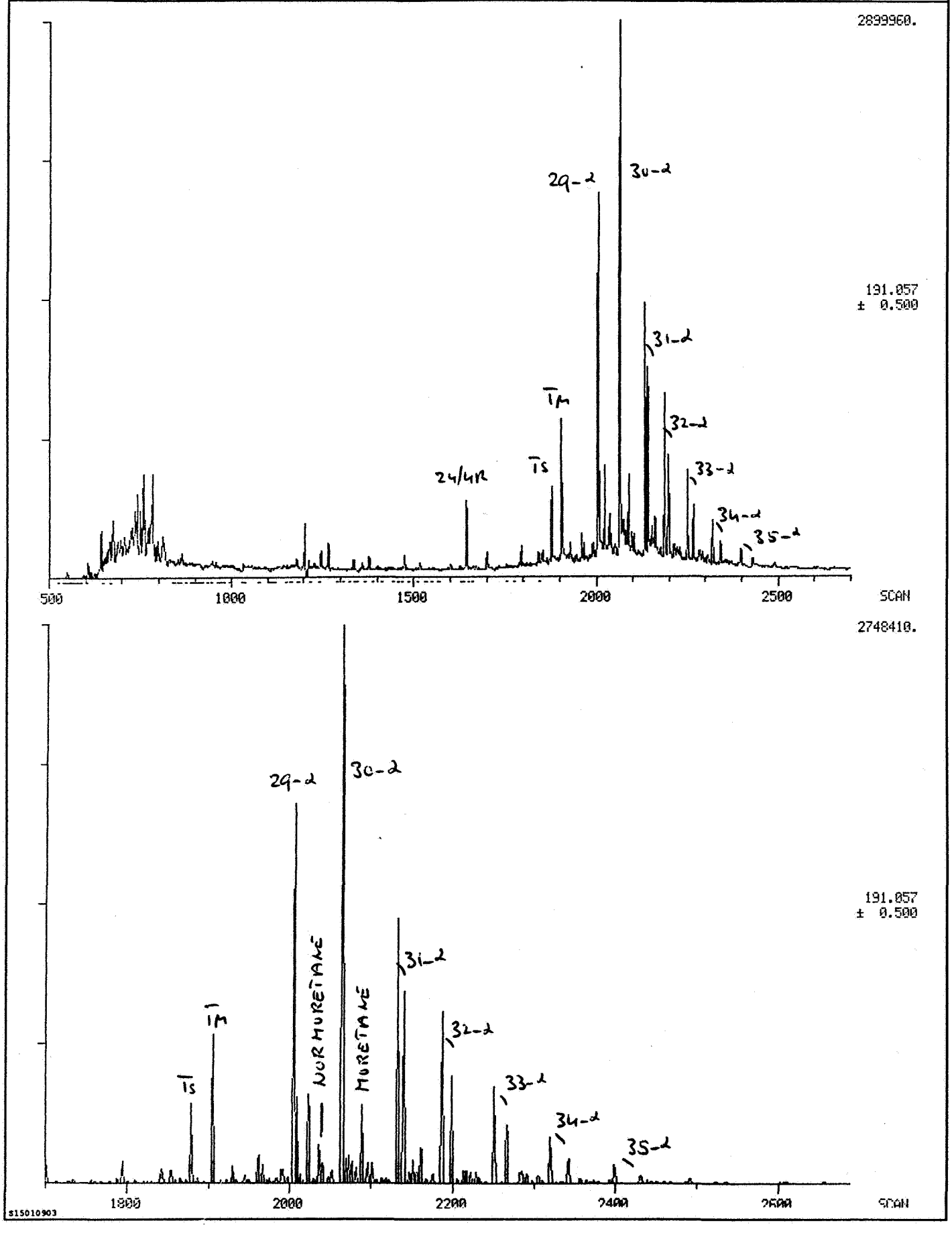
COMPONENT No.	Name	RET.TIM (min)	MAXIMUM (mV)	AREA * (cnts)	WEIGHT PERC.
3	PROPANE	068:40	675.5	4916	16.66
4	ISOBUTANE	* * *	Not detected	* * *	
5	N-BUTANE	070:18	463.3	3690	12.50
6	ISOPENTANE	074:39	36.1	414	1.40
7	N-PENTANE	077:35	749.7	6093	20.64
8	2.2-DIMETHYLBUTANE	079:13	216.3	4547	15.40
9	CYCLOPENTANE	* * *	Not detected	* * *	
10	2.3-DIMETHYLBUTANE	* * *	Not detected	* * *	
11	2-METHYLPENTANE	085:36	31.8	503	1.70
12	3-METHYLPENTANE	088:45	162.6	4033	13.66
13	N-HEXANE	096:00	97.3	1693	5.73
14	METHYLCYCLOPENTANE	* * *	Not detected	* * *	
15	2.2-DIMETHYLPENTANE	* * *	Not detected	* * *	
16	BENZENE	107:46	139.4	3422	11.59
17	2.4-DIMETHYLPENTANE	* * *	Not detected	* * *	
18	2.2.3-TRIMETHYLBUTANE	* * *	Not detected	* * *	
19	CYCLOHEXANE	117:17	11.5	209	0.71
20	3.3-DIMETHYLPENTANE	* * *	Not detected	* * *	
21	1.1-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
22	2-METHYLHEXANE	* * *	Not detected	* * *	
23	2.3-DIMETHYLPENTANE	* * *	Not detected	* * *	
24	1-C-3-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
25	3-METHYLHEXANE	* * *	Not detected	* * *	
26	1-T-3-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
27	1-T-2-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
28	3-ETHYLPENTANE	* * *	Not detected	* * *	
30	N-HEPTANE	* * *	Not detected	* * *	
31	1-C-2-DIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
32	METHYLCYCLOHEXANE	* * *	Not detected	* * *	
33	1.1.3-TRIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
34	2.2-DIMETHYLHEXANE	* * *	Not detected	* * *	
35	ETHYLCYCLOPENTANE	* * *	Not detected	* * *	
36	2.5-DIMETHYLHEXANE	* * *	Not detected	* * *	
38	2.2.3-TRIMETHYLPENTANE	* * *	Not detected	* * *	
39	1-T-2-C-4-TRIMETHYLCYCLOPENTANE	* * *	Not detected	* * *	
40	TOLUENE	* * *	Not detected	* * *	
30		166:29	29.7	527	
	Total peak area			29518	

*) Corrected for difference in response

Sterane Fragmentograms of the sample from well 6306/10-01 (2980 m.), Norway



Triterpane Fragmentograms of the sample from well 6306/10-01 (2980 m.), Norway



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MACERAL DESCRIPTION OF WELL/OUTCROP
Norway, 6306/10-01

Date : 4-MAR-91

Page : 1

Sample(s)

Sample(s)	ORGANIC MATTER																												MINERAL MATTER		
	SOM				VITRINITE						LIPTINITE													INERTINITE							
	LOAD BEARING			NON-L. B.	VIT.-1				VIT.-2		ALGAE																				
	DENSE	LAYERS	LENSES	DIFFUSE / INTERGRANULAR	LAYERS / LENSES TELOCOLLINITE	DETRITAL TELOCOLLINITE	LAYERS / LENSES TELINITE	DETRITAL TELINITE	LAYERS / LENSES DESMOCOLLINITE	DETRITAL DESMOCOLLINITE	SPORINITE (MICRO-)	SPORINITE (MEGA-)	CUTINITE	SUBERINITE	RESINITE (+ FLUORINITE)	LIPTODETRINITE	BOTRYOCOCCUS	TASMANITES	OTHER ALGAE	MICROPLANKTON	EXSUDATINITE (FLUORESCING)	EXSUDATINITE (NON-FLUORESING) S.HYDR.	SCLEROTINITE	(SEMI-) FUSINITE (+ INERTODETRINITE)	MICRINITE (+ OXY-MICRINITE)	UNDEFINED MINERALS	FRAMBOIDAL PYRITE	AGGREGATES / CRYSTALS PYRITE
2753.00 m/R	+	+							/	+	+					+	-							+	+	*	/	+
2757.30 m/R		/	+	+					-	-	+					+	/							/	+	*	+	/
2794.80 m/S					*				*		+				/	+					-			+	+	*		-
2882.75 m/R		/	+	+	*				+	/	-		/			-					-			/	+	*	-	-
2883.60 m/R					*				+	+	+		-		+	+	-				/			*	+	*		-
2885.00 m/R			+	+	*				/	+	+		/			/					-			/	+	*	-	-
2886.90 m/R			/	/					-	/	-					/								-	/	*	-	-
2898.50 m/S					*				*		+					/								+	+	*	-	-
2922.00 m/S		+	+	+	*				*	+	+					+					/			/	+	*	-	/
2980.00 m/C		+	+	+	+				+	+	+					+	?				-			+	+	*	+	/

LEGEND	
*	ABUNDANT
+	COMMON
/	FEW
-	RARE

Confidential

VISUAL VOLUME PERCENTAGE ESTIMATION

Norway, 6306/10-01

Date : 4-MAR-91

Page : 1

Sample(s)	ORGANIC MATTER																									MINERAL MATTER		
	SOM				VITRINITE						LIPTINITE												INERTINITE					
	LOAD BEARING			NON-L. B.	VIT.-1				VIT.-2								ALGAE					S.HYDR.						
	DENSE	LAYERS	LENSES	DIFFUSE / INTERGRANULAR	LAYERS / LENSES TELOCOLLINITE	DETRITAL TELOCOLLINITE	LAYERS / LENSES TELINITE	DETRITAL TELINITE	LAYERS / LENSES DESMOCOLLINITE	DETRITAL DESMOCOLLINITE	SPORINITE (MICRO-)	SPORINITE (MEGA-)	CUTINITE	SUBERINITE	RESINITE (+ FLUORINITE)	LIPTODETRINITE	BOTRYOCOCCUS	TASMANITES	OTHER ALGAE	MICROPLANKTON	EXSUDATINITE (FLUORESCING)	EXSUDATINITE (NON-FLUORESING)	SCLEROTINITE	(SEMI-) FUSINITE (+ INERTODETRINITE)	MICRINITE (+ OXY-MICRINITE)	UNDEFINED MINERALS	FRAMBOIDAL PYRITE	AGGREGATES / CRYSTALS PYRITE
2753.00 m/R	5	10							1	4	3					3	<1							3	C	66	2	3
2757.30 m/R		2	5	3					<1	<1	3					5	1							1	C	74	5	1
2794.80 m/S					20				55		5				2	3					R			10		5		<1
2882.75 m/R		2	3	3	5				8	2	<1		1			<1					R			2	C	74	<1	<1
2883.60 m/R					20				5	5	8		<1		4	4	<1				F			45		9		<1
2885.00 m/R			3	5	3				2	3	3		1			2					R			2	C	76	<1	<1
2886.90 m/R			1	1					<1	1	<1					1								<1	F	96	<1	<1
2898.50 m/S					30				50		3					2								5		10	<1	<1
2922.00 m/S		5	5	5	30				20	10	5					5					F			1	C	13	<1	1
2980.00 m/C		3	5	5	10				15	5	3					3					R			5	C	42	3	1

Listing of Comment lines

Country : Norway (203)
Well/Outcrop : 6306/10-01 (203/0186)
Order seq.nr. : 004

Depth (m)	Sample Type	Comment
2753.00 (S 150149)	R	SOM partly micrinised Sample oxidised Pyrite shows oxidation features Desmocollinite grades into SOM associated with fram. pyrite Desmocollinite grades into (semi-)fusinite Yellow to yellow/dark brown fluorescing liptinites
2757.30 (S 150150)	R	SOM partly micrinised Sample slightly oxidised Pyrite shows oxidation features Yellow to dark yellow fluorescing liptinites
2794.80 (S 150151)	S	Migration features - Resinite is fluorinite Weak brown fluoresc. vitrinite resulting in lower VR-value
2882.75 (S 150174)	R	SOM partly micrinised Desmocollinite grades into SOM Desmocollinite grades into (semi-)fusinite Desmocollinite / telocollinite
2883.60 (S 150152)	R	Resinite is fluorinite in fusinite Migration features - Yellow to yell./brown fluorescence
2885.00 (S 150153)	R	SOM partly micrinised Sample slightly oxidised Pyrite shows oxidation features Yellow brown fluorescing liptinites
2886.90 (S 150154)	R	SOM partly micrinised
2898.50 (S 150155)	S	Yellow brown fluoresing liptinites
2922.00 (S 150156)	S	Partly coarse grained impregnated with exsudatinite (HC) Rare fluid inclusions(blue fluor.) - Migration features
2980.00 (S 150175)	C	SOM partly micrinised Sample partly oxidised Desmocollinite grades into SOM associated with fram. pyrite

April 1991

RKER 91.040

Geochemical investigation of two crude oil samples from well 6306/10-1, Norway

by

J.M.A. Buiskool Toxopeus and F.A.M. de Gier

Sponsor: Shell Risavika

Code: 876.106.10

investigation: 8BAS0090

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM
RIJSWIJK, THE NETHERLANDS

(Shell research B.V.)

Geochemical investigation of two crude oil samples from well 6306/10-1, Norway

1.0 Introduction

A geochemical investigation has been carried out on the following two oil samples from well 6306/10-1, Norway:
- 2716-2827 m, Production Test-2, (OMC 5270);
- 2951 m, Production Test-1, Basement (OMC 5267).

The geochemical parameters are shown on pages 2 to 7, analysis results are presented on the yellow pages. Apart from the routine analyses, GC and GCMS of the aromatic fraction have been carried out. No FIMS analysis has been carried out.

Summary of the Geochemical Data of the oil sample from well 6306/10-01 (2716 m.), Norway

Gravity and Gross Composition

API gravity (degrees) :	46.8
Specific Gravity (g/ml) :	0.794
Gross Composition (wt%)	
Weight lost on topping :	75.0
Saturates :	75
Aromatics :	19
Heterocompounds :	5
Rest (High molecular) :	1
Gasoline fraction (%) :	30.2
Sulphur (%) :	0.0
Vanadium (ppm) :	0.0
Nickel (ppm) :	0.0

Saturates Distributions

(Gaschromatography)

Pristane / Phytane :	3.2
Pristane / n-C17 :	0.4
Phytane / n-C18 :	0.1
ACI :	23
Corr. Coeff. :	-0.9948

C-7 Distributions

(Gaschromatography)

C-7 Alkanes (%)	
Normal C-7 :	59
Mono Branched :	32
Poly Branched :	9
C-7 Alkanes / Cyclo Alkanes (%)	
Normal C-7 :	18
Cyclo Alkanes :	69
Branched Alkanes :	13
C-7 Alk. / Cyclo Alk. / Aromatics (%)	
Alkanes :	22
Cyclo Alkanes :	48
Aromatics :	30

Carbon Isotope Ratios

(Mass Spectrometry)

Total Oil (topped) :	-26.5
Saturates :	-27.5
Aromatics :	-25.0

315007301

Distribution of Ring Compounds

(Field Ionisation Mass Spectrometry)

C-15 Ring Compounds (%)	
1 ring :	no data
2 ring :	
3 ring :	
C-30 Ring Compounds (%)	
3 ring :	no data
4 ring :	
5 ring :	
C-29 VR/E :	no data

Sterane and Triterpane Distributions

(Gaschromatography / Mass Spectrometry)

Steranes/Triterpanes (%)	
Iso Steranes :	28
Rearranged Steranes :	51
Triterpanes :	21
Steranes (%)	
Iso Steranes :	37
Rearranged Steranes :	45
Normal Steranes :	18
Triterpanes (%)	
C-30 Hopanes :	100
Oleanane + Lupane :	0
W + T :	0
Steranes Carbon No. Dist. (%)	
C-27 :	32
C-28 :	34
C-29 :	34
C-29 Sterane Ratios	
20S / 20R + 20S :	0.53
Iso / Iso + Normal :	0.61
Triterpane Ratios	
TS / TM :	0.75
3R / 3R + 5R :	0.38

GCMS data of the aromatic fraction well 6306/10-1, Norway

Sample: NORWAY 6306/10-01 TEST-2 OMC 5270 ARO.FRAC.

I) NAPHTHALENES

a) Concentrations (ppm):

2-MN	9116
1-MN	4380
2,6+2,7-DMN	2524
1,6-DMN	1654
1,5-DMN	308
1,4,6+1,3,5-TMN	331
2,3,6-TMN	299
1,2,5-TMN	161
C4-Naphthalene	27
THN	0
Cadalene	0
Total Naphthalenes	18800

b) Parameters:

2-MN/1-MN (MNR)	2.08
2,6+2,7-DMN/1,5-DMN (DNR-1)	8.20
2.3.6-TMN/1,4,6+2,3,5-TMN (TNR-1)	0.90
2,3,6-TMN/1,2,5-TMN (TNR-2)	1.85
2,3,6-TMN/THN	0.00
2,3,6-TMN/Cadalene	0.00

II) PHENANTHRENES

a) Concentrations (ppm):

P	406
3-MP	94
2-MP	104
9-MP	85
1-MP	66
Total Phenanthrenes	755

b) Parameters:

2-MP/1-MP	1.57
1.5(2-MP+3-MP)/(P+1-MP+9-MP)(MPI1)	0.53
3(2-MP)/(P+1-MP+9-MP)	0.56
(2-MP+3-MP)/(1-MP+9-MP)	1.31
(2-MP+3-MP)/(1-MP+9-MP+2-MP+3-MP)	0.57

III) DIBENZOTHIOPHENES

a) Concentrations (ppm):

DBT	17
4-MDBT	11
2+3-MDBT	4
1-MDBT	0
Total Dibenzothiophenes	32

b)Parameters

4-MDBT/2+3-MDBT	2.68
4-MDBT/1-MDBT	0.00
2+3-MDBT/1-MDBT	0.00
4-MDBT/DBT	0.66
2+3-MDBT/DBT	0.25
1-MDBT/DBT	0.00

IV)BIPHENYLS

a)Concentrations (ppm):

BP	2229
2-MBP	106
3-MBP	1461
4-MBP	465
Total Biphenyls	4261

b) Parameters:

3-MBP/BP	0.66
3-MBP/4-MBP	3.14
3-MBP/2-MBP	13.72

V) DIBENZOFURANS

a) Concentrations (ppm):

DBF	115
4-MDBF	170
2+3-MDBF	77
1-MDBF	143
Total Dibenzofurans	505

b) Parameters:

4-MDBF/2+3-MDBF	2.21
4-MDBF/1-MDBF	1.19
2+3-MDBF/1-MDBF	0.54
4-MDBF/DBF	1.48
2+3-MDBF/DBF	0.67
1-MDBF/DBF	1.25

VI) OVERALL RATIOS

Biphenyls/NAPH*	1.23
Dibenzothiophenes/NAPH*	0.01
Dibenzofurans/NAPH*	0.15

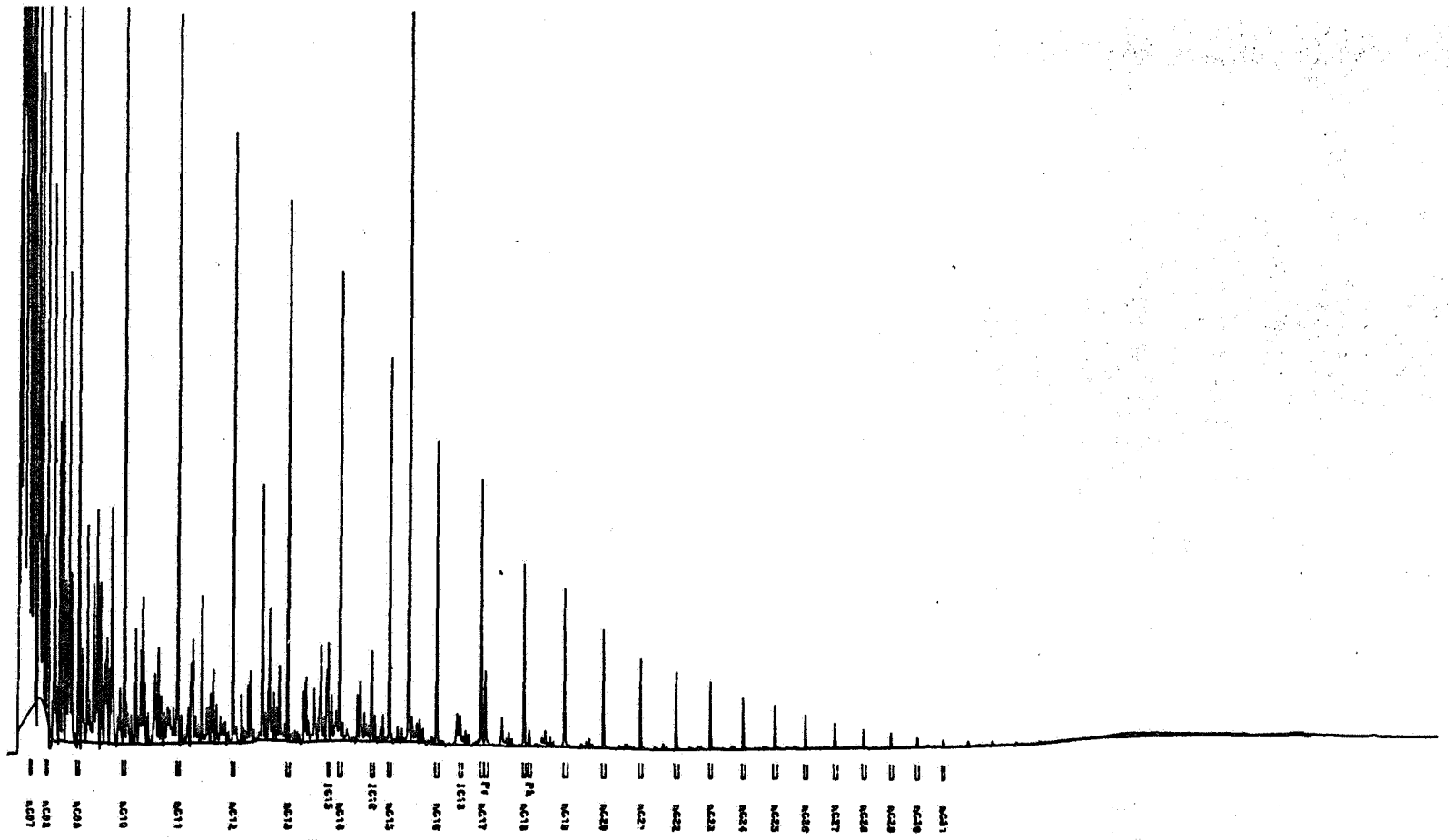
MN = methylnaphthalene
DMN = dimethylnaphthalene
TMN = trimethylnaphthalene
THN = tetrahydronaphthalene
DBF = dibenzofuran
MDBF = methyldibenzofuran

P = phenanthrene
MP = methylphenanthrene
DBT = dibenzothiophene
MDBT = methyldibenzothiophene
BP = biphenyl
MBP = methylbiphenyl

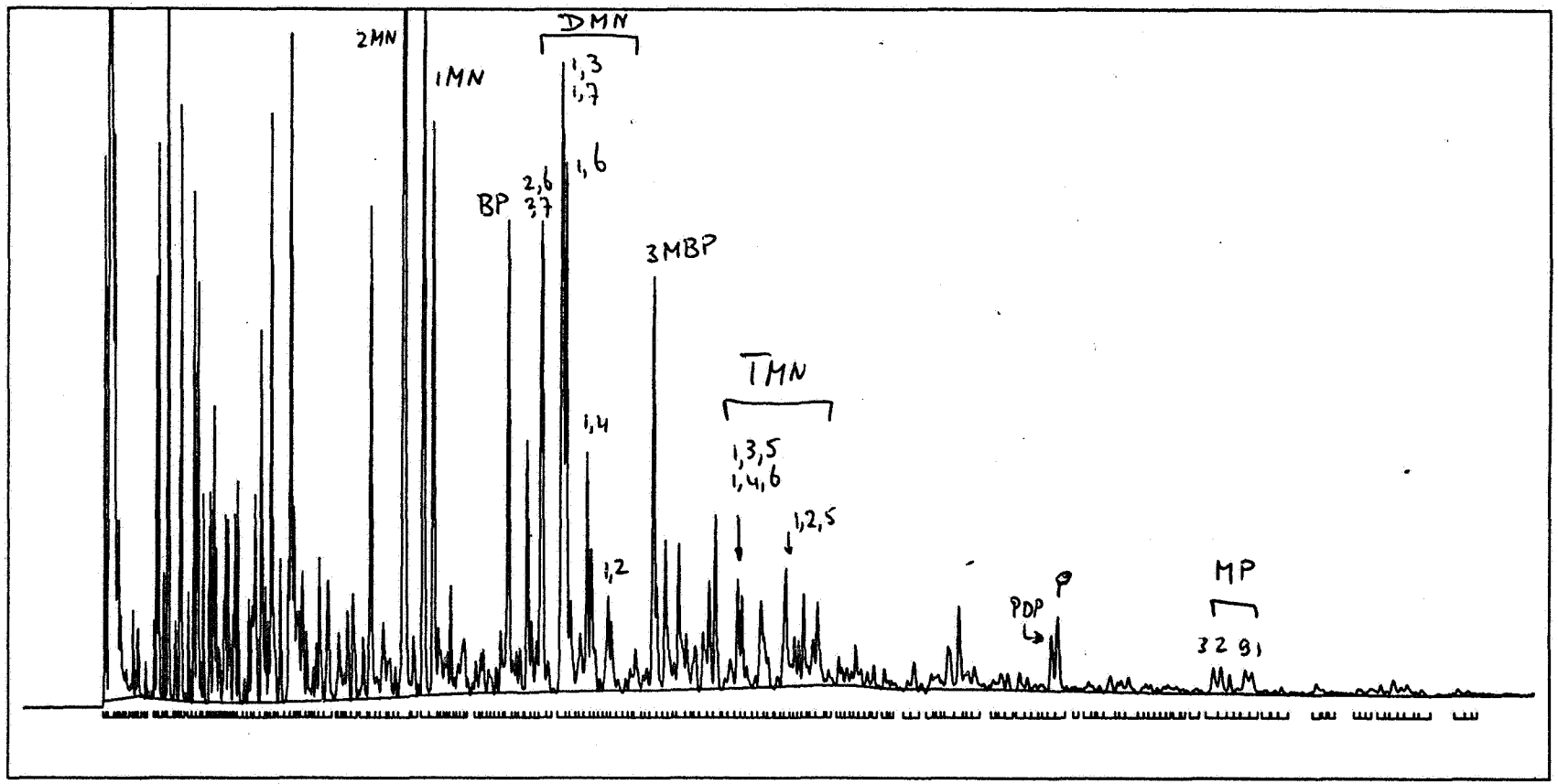
NAPH* = 2,6+2,7-DMN + 1,5-DMN + 1,4,6+1,3,5-TMN + 2,3,6-TMN

S15007901

Gas chromatogram of the whole oil sample from well 6306/10-01 (2716 m.), Norway



GAS CHROMATOGRAM AROMATIC HYDROCARBONS
well 6306/10-1, Norway



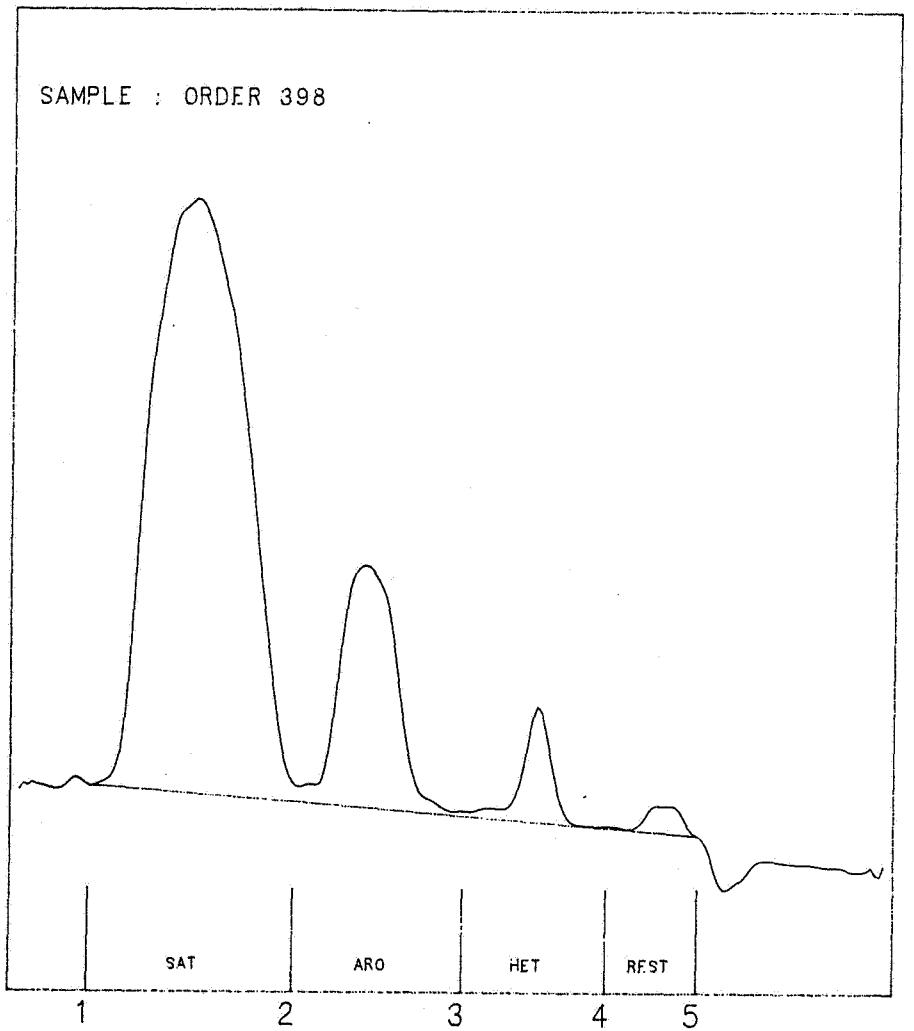
NORWAY 6306/10-01

TEST-2

OMC 5270

S150073G1

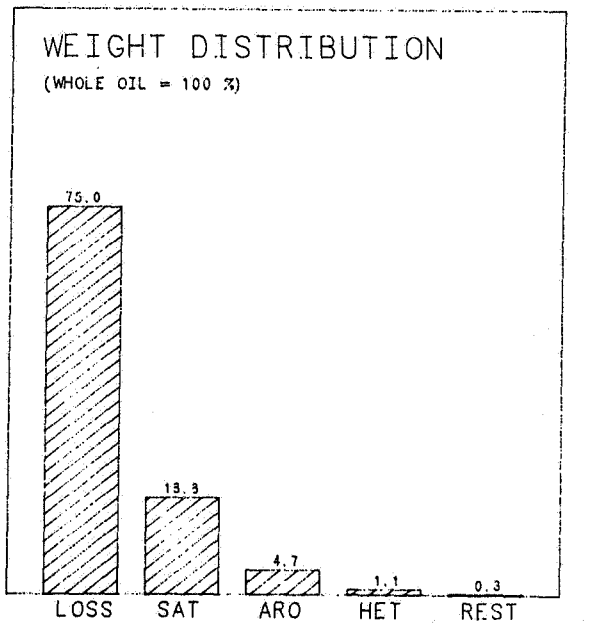
Gross Composition of the sample from well 6306/10-01 (2716 m.), Norway



SAMPLE : S150073

WEIGHT LOST ON TOPPING	:	75.0 %
– SATURATES	:	75.2 %
– AROMATICS	:	18.8 %
– HETEROCOMPOUNDS	:	4.6 %
– REST (HIGH MOL.)	:	1.4 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE

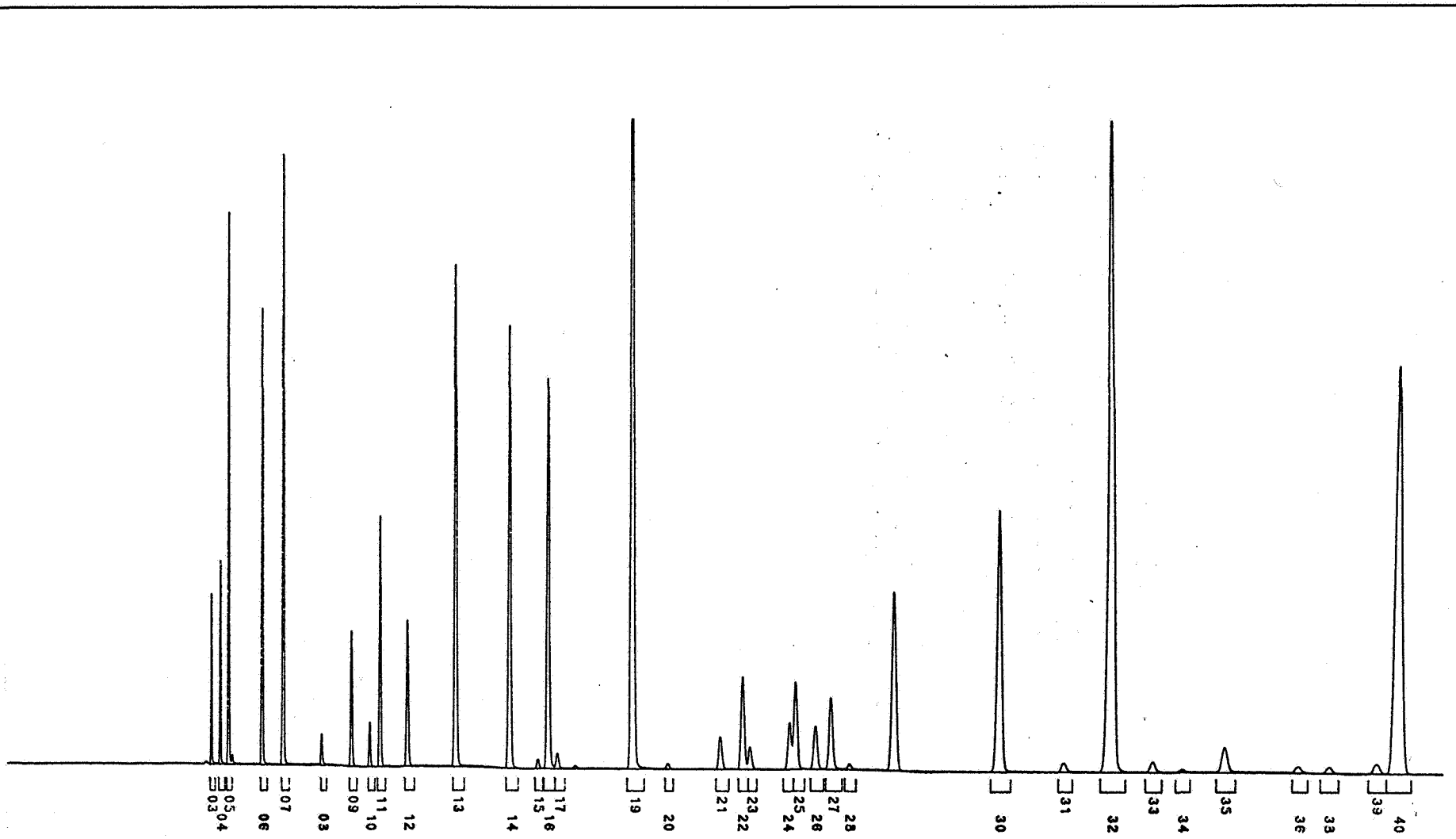


RKER 91.040

Confidential

815007301

Gas chromatogram of the light fraction (< 120 C.) of the sample from well 6306/10-01 (2716 m.), Norway



Gas chromatographic hydrocarbons analysis (< 120 C.) well 6306/10-01 (2716 m.), Norway

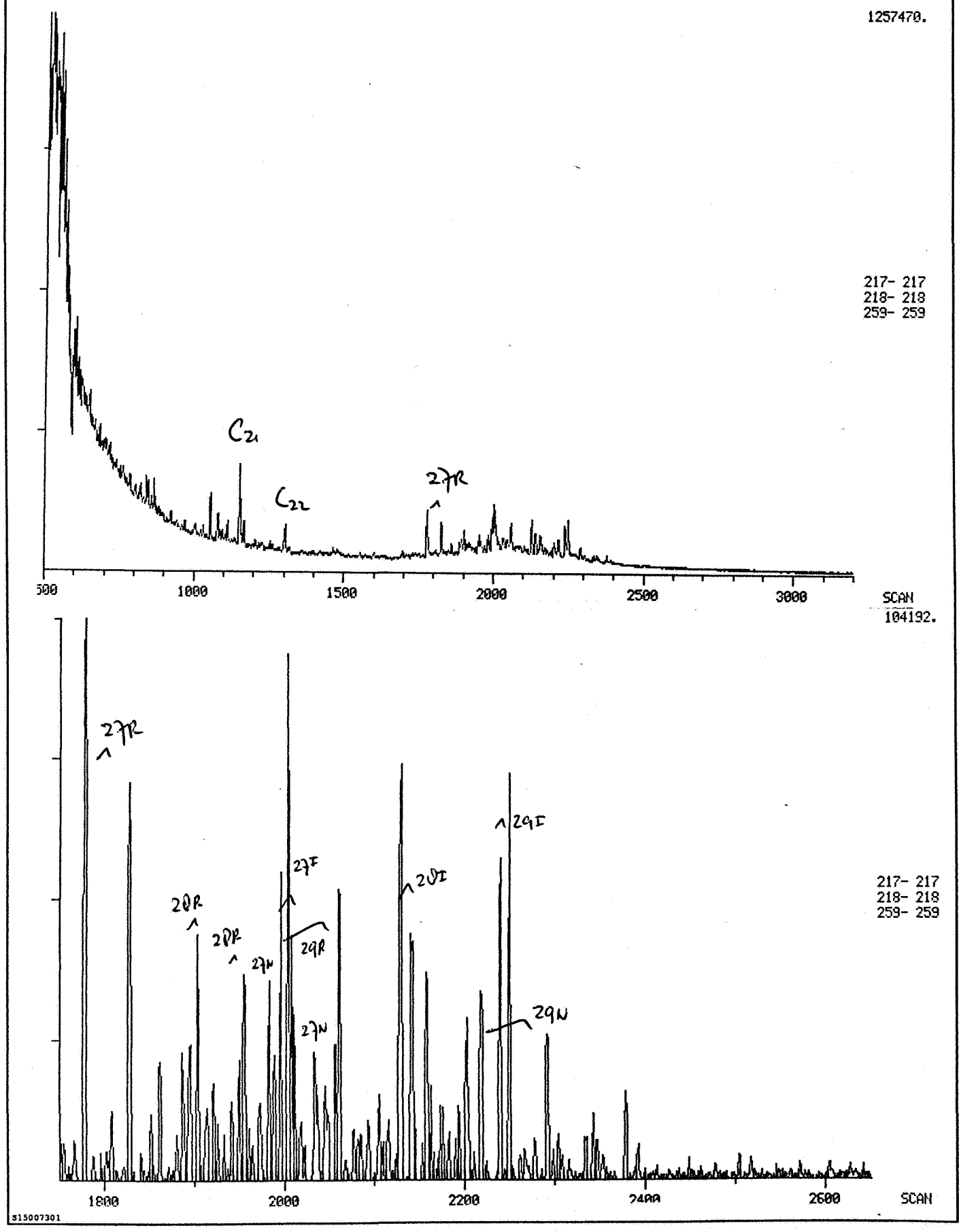
GAS CHROMATOGRAPHIC ANALYSIS OF THE FRACTION BOILING BELOW 114 DEGREES CENTIGRADE

Sample: S15007301 d.d. 27-feb-91 13:02

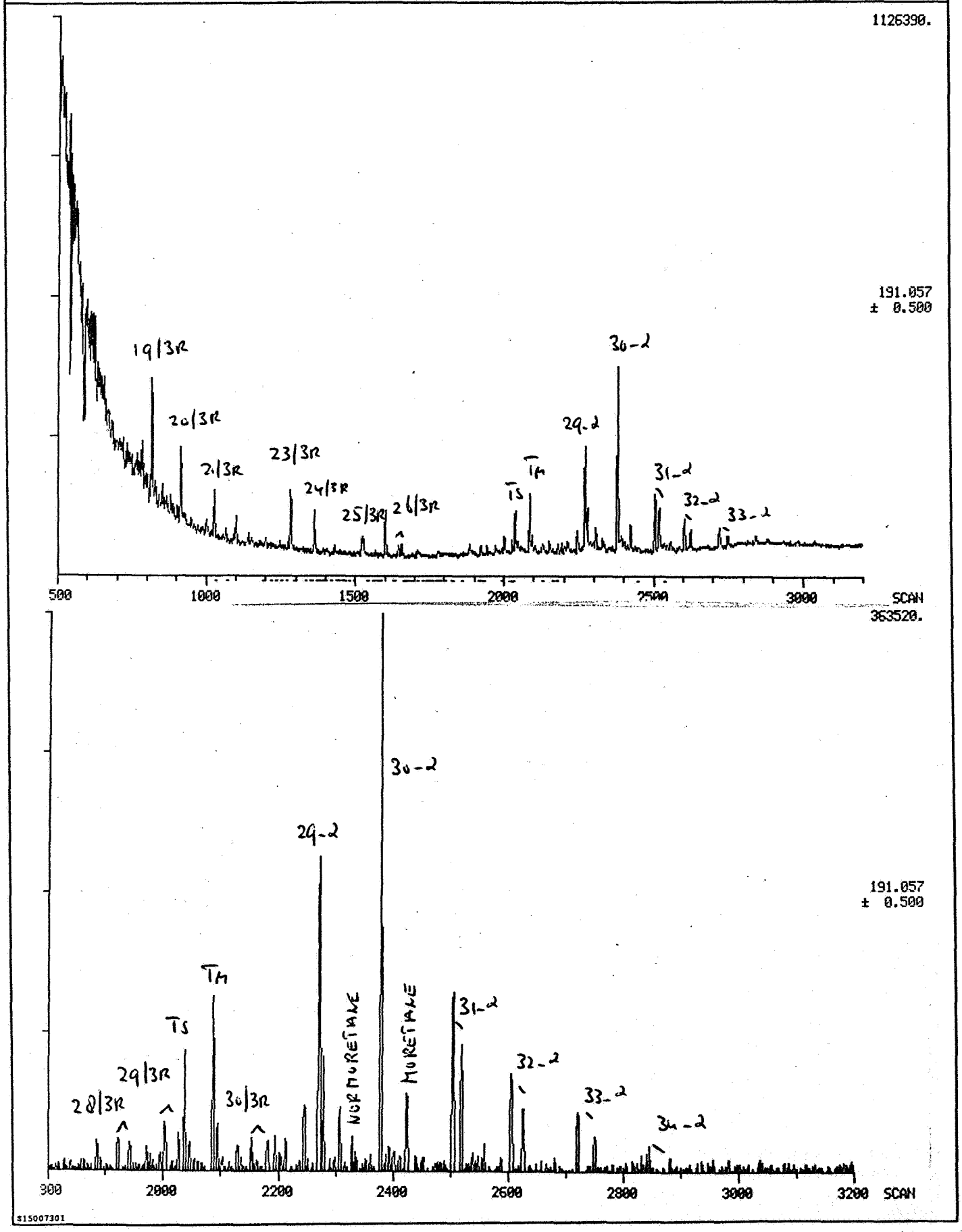
COMPONENT No.	Name	RET.TIM (min)	MAXIMUM (mV)	AREA * (cnts)	WEIGHT PERC.
4	I-BUTANE	016:13	1784.5	12975	1.09
5	N-BUTANE	016:43	4832.5	36470	3.05
6	I-PENTANE	018:49	4002.4	35247	2.95
7	N-PENTANE	020:07	5346.2	50238	4.21
8	2.2-DIMETHYLBUTANE	022:32	274.9	3274	0.27
9	CYCLOPENTANE	024:22	1182.6	14295	1.20
10	2.3-DIMETHYLBUTANE	025:30	391.6	4802	0.40
11	2-METHYLPENTANE	026:08	2198.0	27854	2.33
12	3-METHYLPENTANE	027:50	1280.3	17822	1.49
13	N-HEXANE	030:49	4398.2	67856	5.68
14	METHYLCYCLOPENTANE	034:10	3890.3	68847	5.77
15	2.2-DIMETHYLPENTANE	035:54	84.8	1600	0.13
16	BENZENE	036:34	3427.7	66557	5.57
17	2.4-DIMETHYLPENTANE	037:08	137.9	2944	0.25
18	2.2.3-TRIMETHYLBUTANE	* * *	Not detected	* * *	
19	CYCLOHEXANE	041:50	6971.1	157132	13.16
20	3.3-DIMETHYLPENTANE	043:59	50.1	1215	0.10
21	1.1-DIMETHYLCYCLOPENTANE	047:15	285.0	7450	0.62
22	2-METHYLHEXANE	048:38	809.5	20807	1.74
23	2.3-DIMETHYLPENTANE	049:05	199.3	5099	0.43
24	1-C-3-DIMETHYLCYCLOPENTANE	051:33	413.3	11844	0.99
25	3-METHYLHEXANE	051:54	764.7	20932	1.75
26	1-TR-3-DIMETHYLCYCLOPENTANE	053:08	379.6	11156	0.93
27	1-TR-2-DIMETHYLCYCLOPENTANE	054:05	629.3	18809	1.58
28	3-ETHYLPENTANE	055:15	52.1	1649	0.14
30	N-HEPTANE	064:33	2297.0	79677	6.67
31	1-C-2-DIMETHYLCYCLOPENTANE	068:31	79.2	3136	0.26
32	METHYLCYCLOHEXANE	071:30	5735.5	234771	19.66
33	1.1.3-TRIMETHYLCYCLOPENTANE	073:59	94.9	4033	0.34
34	2.2-DIMETHYLHEXANE	075:48	26.2	1323	0.11
35	ETHYLCYCLOPENTANE	078:26	224.3	10389	0.87
36	2.5-DIMETHYLHEXANE	082:59	57.9	3046	0.26
38	2.2.3-TRIMETHYLPENTANE	084:56	56.0	2701	0.23
39	1-TR-2-C-4-TRIMETHYLCYCLOPENTANE	087:53	87.2	4245	0.36
40	TOLUENE	089:21	3588.0	183913	15.40
	REFERENCE PEAK (29)	058:00	1569.1	50193	
	Total peak area			1194108	

*) Corrected for difference in response

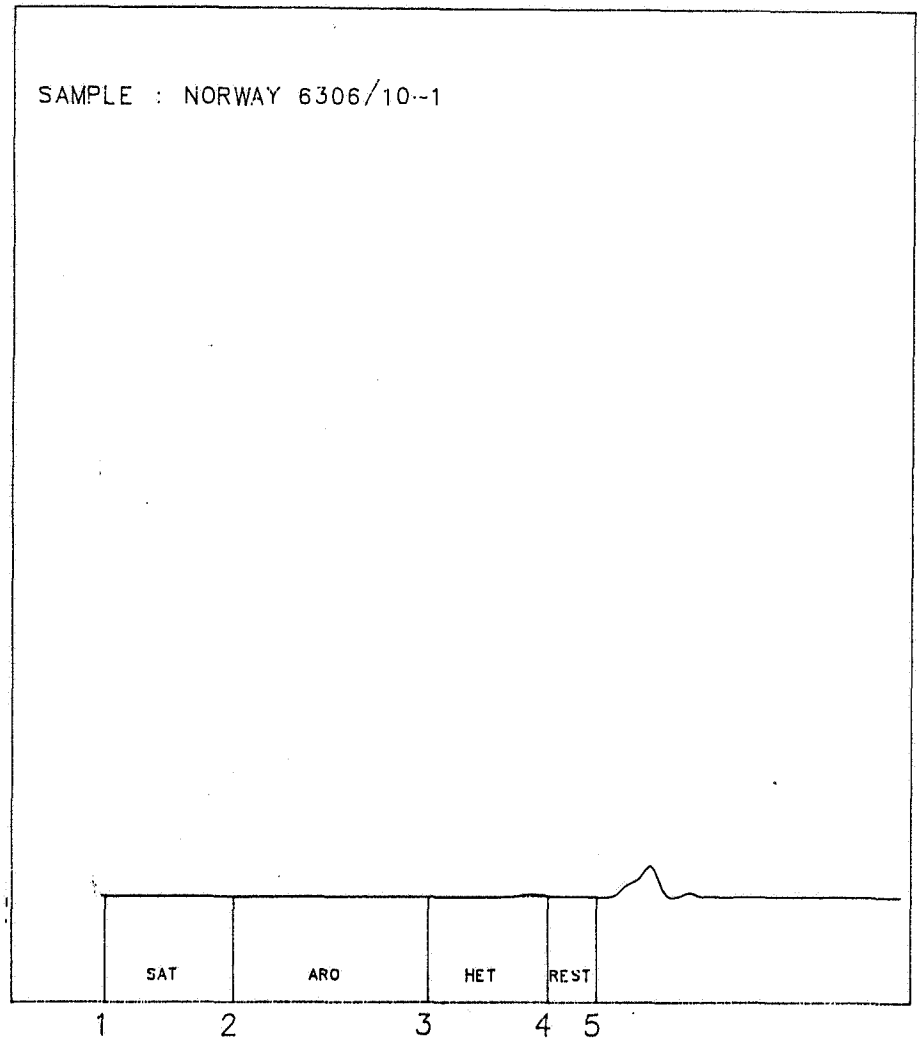
Sterane Fragmentograms of the sample from well 6306/10-01 (2716 m.), Norway



Triterpane Fragmentograms of the sample from well 6306/10-01 (2716 m.), Norway



Gross composition of the sample from 6306/10-01 (2951 m), Norway

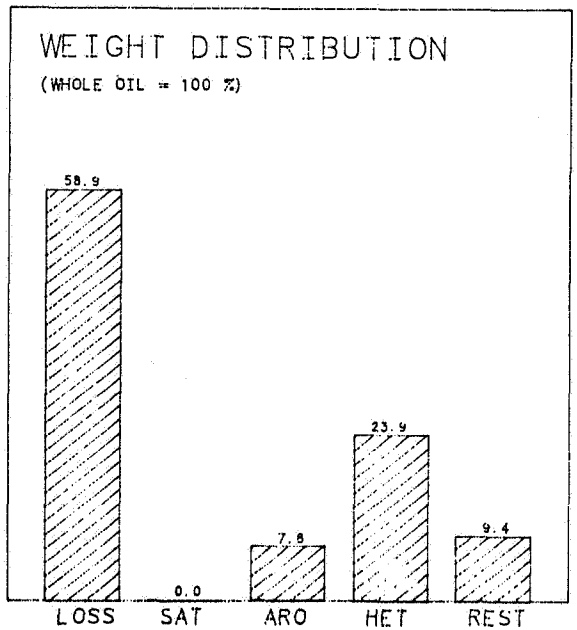


SAMPLE : OMC 5267D

WEIGHT LOST ON TOPPING : 58.9 %

– SATURATES	:	0.0 %
-- AROMATICS	:	19.1 %
-- HETEROCOMPOUNDS	:	58.0 %
-- REST (HIGH MOL.)	:	22.8 %

* WEIGHT PERCENTAGES CALCULATED FROM FID RESPONSE



April, 1991

RKER.91.044

Geochemical investigation of a gas sample from well 6306/10-01, Norway

by

F.A.M. de Gier and R. Berhitoe

Sponsor: Norske Shell, Risavika Code: 876.106.10

investigation: 8BAS0090

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM
RIJSWIJK, THE NETHERLANDS

(Shell research B.V.)

GEOCHEMICAL INVESTIGATION OF A GAS SAMPLE FROM WELL 6306/10-01, NORWAY

1. INTRODUCTION

Geochemical analyses have been completed on a gas sample from the following well:

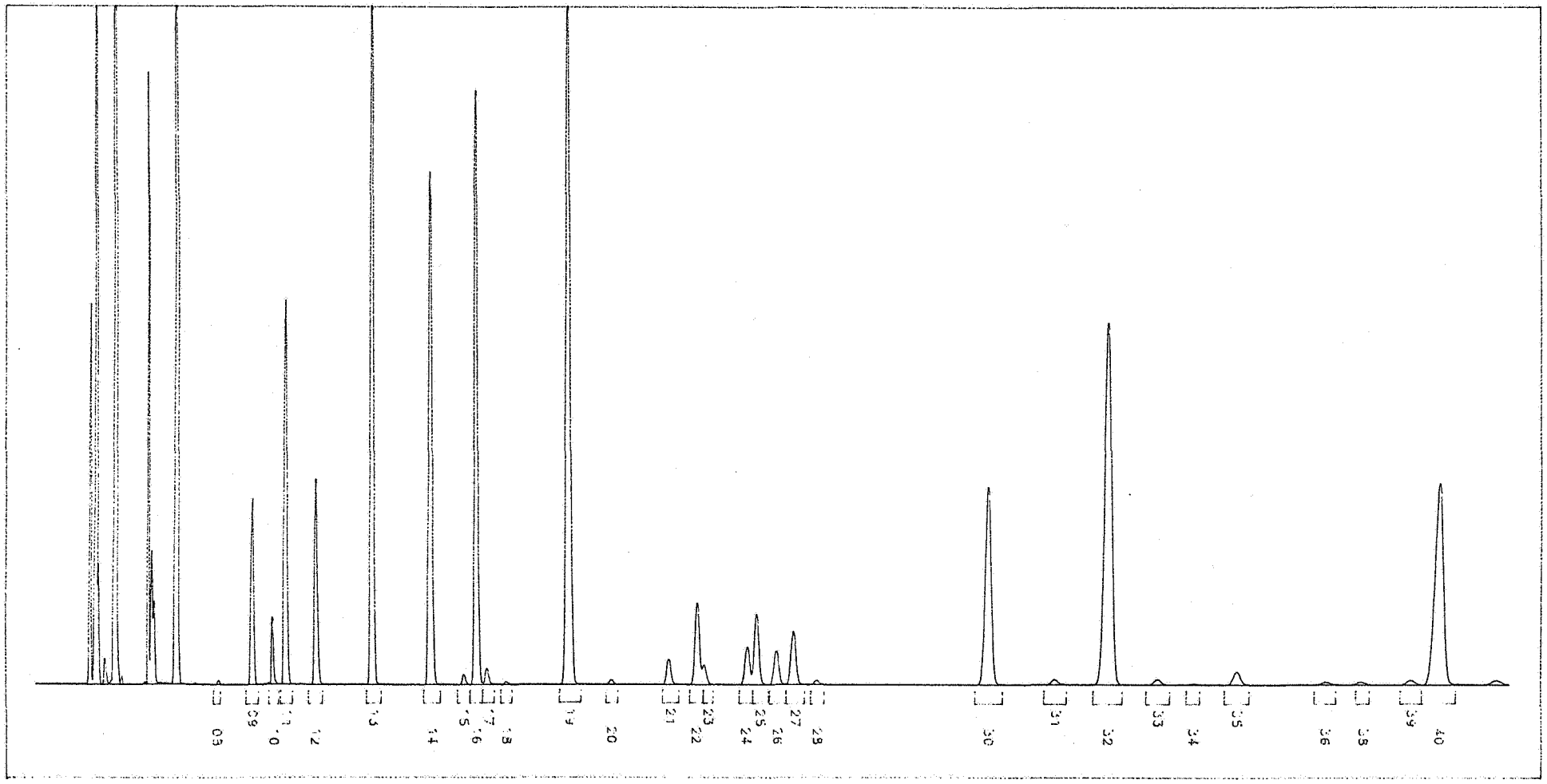
6306/10-01, 2716 - 2827 m,
bottle: A 17337, GMC 0478, S 150075/2.

2. RESULTS

The composition of the gas (mole %, corrected for the presence of air) and the carbon isotope ratios are as follows:

Sample:	6306/10-01 S 150075/2 , GMC 0478
	Total gas (Hydrocarbons only)
Methane	91.57 (92.42)
Ethane	4.31 (4.35)
Propane	1.72 (1.73)
i-Butane	0.24 (0.24)
n-Butane	0.45 (0.45)
i-Pentane	0.12 (0.12)
n-Pentane	0.15 (0.15)
C6+-hydrocarbons	0.52 (0.53)
Nitrogen	0.85
Carbon dioxide	0.08
$\delta^{13}C$ CH_4 (per mil)	-35.7
$\delta^{13}C$ C_2H_6 (per mil)	-29.4

GAS CHROMATOGRAM OF THE C-7 FRACTION OF A GAS SAMPLE



Norway
6306/10-01
2716.00 m
GMC 0478,

bottle: A 17337, PT-2.

Figure 2

GAS CHROMATOGRAPHIC ANALYSIS OF THE FRACTION BOILING BELOW 114 DEGREES CENTIGRADE

Sample: S15007502 d.d. 07-feb-91 08:33
Recorded: L1-301 GLC-2

Country: Norway Well/Outcrop: 6306/10-01

Depth/Collector: 2716.00 m

Comment: GMC 0478, bottle: A 17337, PT-2.

COMPONENT No.	Name	RET.TIM (min)	MAXIMUM (mV)	AREA * (cnts)	WEIGHT PERC.
2	ETHANE	* * *	Not detected	* * *	
3	PROPANE	* * *	Not detected	* * *	
4	I-BUTANE	* * *	Not detected	* * *	
5	N-BUTANE	* * *	Not detected	* * *	
6	I-PENTANE	* * *	Not detected	* * *	
7	N-PENTANE	* * *	Not detected	* * *	
8	2.2-DIMETHYLBUTANE	062:47	65.0	439	0.04
9	CYCLOPENTANE	064:15	2734.9	29645	2.86
10	2.3-DIMETHYLBUTANE	065:07	996.9	7815	0.75
11	2-METHYLPENTANE	065:41	5631.3	60824	5.87
12	3-METHYLPENTANE	066:59	3016.8	32296	3.12
13	N-HEXANE	069:25	10091.9	116173	11.21
14	METHYLCYCLOPENTANE	071:57	7523.3	97049	9.36
15	2.2-DIMETHYLPENTANE	073:22	157.1	1958	0.19
16	BENZENE	073:55	8715.2	99063	9.56
17	2.4-DIMETHYLPENTANE	074:21	242.3	3349	0.32
18	2.2.3-TRIMETHYLBUTANE	075:10	45.4	647	0.06
19	CYCLOHEXANE	077:54	10068.7	161402	15.57
20	3.3-DIMETHYLPENTANE	079:42	72.9	1158	0.11
21	1.1-DIMETHYLCYCLOPENTANE	082:12	373.3	6450	0.62
22	2-METHYLHEXANE	083:26	1203.3	22396	2.16
23	2.3-DIMETHYLPENTANE	083:44	291.2	4257	0.41
24	1-C-3-DIMETHYLCYCLOPENTANE	085:36	559.2	10949	1.06
25	3-METHYLHEXANE	086:00	1041.6	19932	1.92
26	1-TR-3-DIMETHYLCYCLOPENTANE	086:52	494.6	9862	0.95
27	1-TR-2-DIMETHYLCYCLOPENTANE	087:36	785.4	15613	1.51
28	3-ETHYLPENTANE	088:36	65.8	1304	0.13
30	N-HEPTANE	096:02	2902.6	70515	6.80
31	1-C-2-DIMETHYLCYCLOPENTANE	098:52	80.8	2137	0.21
32	METHYLCYCLOHEXANE	101:13	5317.7	148754	14.35
33	1.1.3-TRIMETHYLCYCLOPENTANE	103:18	86.9	2549	0.25
34	2.2-DIMETHYLHEXANE	104:52	20.2	564	0.05
35	ETHYLCYCLOPENTANE	106:44	196.2	5757	0.56
36	2.5-DIMETHYLHEXANE	110:33	46.0	1443	0.14
38	2.2.3-TRIMETHYLPENTANE	112:02	46.4	1374	0.13
40	TOLUENE	115:29	2959.2	100717	9.72
	30	096:02	2902.6	70515	
	Total peak area			1036387	

*) Corrected for difference in response

Figure 2a