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:      :      M u d   c o n s u m p t i o n      Date      :
: ( ( ( :      -----                               3/8-1992  :
: ( o o o ) :      System : BORE                               :
:-----: Well: 31/2-17S                               :
: Norsk : Mud company: Anchor Drlng Fluids         :
: Hydro :                                           13:
=====
:
:                                           Actual
:                                           used
:-----:

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Drilling of 36 " hole

BARITE	Kg	145000
BENTONITE	Kg	28000
LIME	Kg	460
SODA ASH	Kg	1225
XC POLYMER	Kg	200

Drilling of 24 " hole

BARITE	Kg	157000
BENTONITE	Kg	54000
CMC EHV	Kg	1860
SODA ASH	Kg	300

Drilling of 12 1/4" hole

BARITE	Kg	189000
BENTONITE	Kg	3000
CLAYCAP	Kg	5559
DESCO CF	Kg	1600
KCL	Kg	5000
PAC POLYMER LV	Kg	4524
PAC POLYMER REG	Kg	1000
SHALETROL	Kg	75
SODA ASH	Kg	425
XC POLYMER	Kg	1305
DEFOAMER	l	25
DRILLING DETERG	l	832
KCL BRINE	l	385000
PROPAC	l	1540

Drilling of 8 1/2" hole

BARITE	Kg	49000
CLAYCAP	Kg	2210
KCL	Kg	4000
PAC POLYMER LV	Kg	4058
PAC POLYMER REG	Kg	486
SHALETROL	Kg	1675
SODA ASH	Kg	100
SODIUM BICARB	Kg	2401
XC POLYMER	Kg	1019
KCL BRINE	l	93000
PROPAC	l	372

3.1.6 Mud report

36" hole

The hole was drilled without problems from 364 m to 453 m with seawater and high viscosity unweighted bentonite pills. After reaching TD, the hole was displaced to 1.2 sg high viscosity mud prior to a wiper trip and prior to pulling out of the hole for running casing. The 30" casing was run and cemented with no problems.

24" hole

Due to the possibility of encountering shallow gas sand, a 8 1/2" pilot hole was drilled to 530 m using 1.20 sg bentonite mud. After a flowdeck and displacing to seawater the hole was then opened to 24". At 530 m kick-off point, the hole angle was slowly increased to a maximum deviation of 29.1 at total depth 921 m. The hole was cleaned with seawater and bentonite pills while drilling with a pump rate of 3 - 3.8 m³/min. At TD the hole was displaced to 1.25 sg high viscosity mud prior to run the 30" casing.

40 m³ of 1.25 sg high viscosity mud was used to wash the casing to bottom. After the cementing the casing was displaced with 74 m³ of 1.30 sg mud.

12 1/4" hole

The cement, float collar and shoe were drilled with seawater and bentonite pills prior to displacing to 1.30 sg KCL/PHPA polymer.

While drilling ahead, the mudweight was increased to 1.35 sg at 1112 m and maintained at same to casing point. At 1514 m, powder of KCL was added to the active system due to more reactive clayston encountered.

Other than the pack offs at 1292 m and 1573 m, the hole was drilled trouble free to TD.

The 9 5/8" casing was run and cemented with no problems.

8 1/2" hole

The mud density was cut back from 1.36 sg to 1.25 sg. The cement was tagged at 1788 m and the shoe was drilled out at 1827 m. After 3 m of new formation a FIT was performed to 1.45 sg equipment mud density.

The mud performed good through out the drilling, coring and logging of the hole.

Sodium Bicarb. and shaletrol were added to the mud for the plug back and retrieving of the 9 5/8" casing and the mud was used to dress off the cement prior to change over to oil base mud for well 31/2-17A.

Daily mud properties

24

Date
24/2-1992

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(ooo)

System : BORE

Well: 31/2-17S

Norsk Mud Contractor: Anchor Dring Fluids

Hydro Data: "Mid depth" from table 3, otherwise from table 14.

14.

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Date	Mid. depth m,MD	Mud Dens. (SG)	PV cp	YP Pa	GEL		pH	100 psi (cc)	HP/HT (cc)	Cl- inn/out mg/l	Alkalinity			Ca++ inn/out mg/l	Oil %	Sol %	H2O %	V.G. meter at 115 gr. F						Mud Type	
					0 Pa	10 Pa					Pf	Pm	Mf					600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm		
911225	0	1.03	99	99																				SPUD	
911226	0	1.03	99	99																					SPUD
911227	0	1.20	19	15	3	5												68	49	38	26	4	3	SPUD	
911228	365	1.20	19	15	3	5												68	49	38	26	4	3	SPUD	
911229	453	1.20	19	15	3	5												68	49	38	26	4	3	SPUD	
911230	454	1.20	19	15	3	5	9.0											68	49	38	26	4	3	SPUD	
911231	495	1.07	13	21	20	25	9.6											68	55	48	43	33	31	SPUD	
920101	604	1.20	20	14	10	12	9.0											67	47	32	32	21	20	SPUD	
920102	843	1.50	14	23	25	30												74	66	55	48	41	37	SPUD	
920103	921	1.30	20	15	18	32												70	50	44	35	26	25	SPUD	
920104	921	1.30	19	12	3	4	8.4	5.2		68000/68000			0.20	80/80		7		61	42	32	21	5	3	SPUD	
920105	921	1.30	19	11	3	4	8.4	5.1		68000/68000				60/60				60	41	31	21	5	4	SPUD	
920106	1070	1.30	24	15	2	3	9.8	5.8		57000/57000		0.40		280/280		7		78	54	43	29	5	3	KCL	
920107	1514	1.36	23	11	3	6	8.5	6.0		70000/70000	0.10		0.30	440/440		11		68	45	35	21	4	3	KCL	
920108	1841	1.36	23	14	4	13	8.5	5.5		70000/70000	0.01	0.20	0.30	660/660		11		76	52	39	26	7	5	KCL	
920109	1841	1.35	24	8	3	8	7.5	6.0		71000/71000			0.01	760/760		11		65	41	34	22	6	4	KCL	
920110	1841	1.31	19	10	3	7	7.5	6.0		81000/81000			1.20	760/760		10		59	40	31	21	5	4	KCL	
920111	1912	1.25	22	14	3	7	8.7	4.0	8.2	75000/75000	0.01	0.80	0.07	480/480		8		72	50	33	22	6	3	KCL	
920112	1978	1.25	20	9	3	4	8.7	3.8	7.5	74000/74000	0.02	0.05	0.05	280/280		7		58	38	30	20	4	3	KCL	
920113	2016	1.25	21	10	2	3	8.6	3.8	9.4	73000/73000	0.15	0.05	0.35	320/320		8		62	41	31	20	4	3	KCL	
920114	2117	1.25	22	11	2	3	8.4	3.4	9.6	72000/72000	0.10	0.30	0.30	340/340		8		65	43	33	21	4	3	KCL	
920115	2220	1.26	24	14	3	4	8.3	3.2	8.9	72000/72000	0.10	0.25	0.30	360/360		8		75	51	40	28	5	4	KCL	
920116	2220	1.26	24	13	3	4	8.3	3.2	8.9	72000/72000	0.10	0.20	0.30	360/360		8		74	50	39	28	5	4	KCL	
920117	2220	1.26	24	14	3	4	8.3	3.1	8.8	72000/72000	0.10	0.20	0.20	320/320		8		75	51	41	29	5	4	KCL	
920118	1775	1.34	25	15	3	3	10.9	3.4	9.5	72000/72000	0.10	1.10	0.40	440/440		10		79	54	43	29	6	4	KCL	
920119	850	1.34	25	14	3	4	9.8	4.1	10.8	72000/72000	0.10	1.50	0.30	460/460		10		77	52	41	28	6	4	KCL	
920120	850	1.34	25	14	3	4	9.8	4.1	10.8	72000/72000	0.10	1.50	0.30	460/460		10		77	52	41	28	6	4	KCL	

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:      :      Mud consumption      Date      :
: ( ( ( :      -----      4/8-1992      :
: (ooo) :      System : BORE      :
:-----: Well: 31/2-17A      :
: Norsk : Mud company: ANCHOR DRLNG FLUIDS      :
: Hydro :      13:
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:
:      Actual
:      used
:-----:

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Drilling of 17 1/2" hole

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BARITE           Kg      101000
CALSIUM CHLORID Kg      3700
LIME            Kg      9063
SAFEMUL VIS     Kg      7736
SAFETONE P     Kg      1250
BASE OIL       l      194000
CARBOMULPE     l      208
OIL BASED MUD  l      300000
SAFEMUL MOD    l      3120
SAFEMUL OW    l      624
SAFEMUL PE    l      3120
SAFEMUL SE    l      1456
SAFETONE L    l      832

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Drilling of 8 1/2" hole

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BARITE           Kg      21000
CALSIUM CHLORID Kg      375
LIME            Kg      2325
SAFEMUL VIS     Kg      1003
SAFETONE P     Kg      100
SAFEMUL MOD    l      416

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3.2.6 MUD REPORT

17 1/2" hole

The hole was kicked off at 909 m and drilled to 1012 m where the displacement to oilbase mud took place.

The mud was treated immediately to adjust the mud properties. The mud weight was kept at 1.35 sg down to 1280 m where the mud weight was increased to 1.37 sg as cavings were observed.

The directional drilling of the 17 1/2" hole was continued to 1658 m MD with an average ROP of 18 m/hr without any further hole problems. The actual mud properties were out of values as specified in the programme. Especial the 3 RPM readings and the OWR.

8 1/2" pilot hole

The hole was drilled to 1924 m maintaining the same oilbase mud with a density of 1.26 sg. The mudproperties were held within the specifications and no hole problems occurred that could be attributed to the drilling fluid. After logging was completed the section was plugged back.

Daily mud properties

Date
25/2-1992

Date
25/2-1992

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System : BORE

Norsk
Hydro

Well: 31/2-17A
Mud Contractor: ANCHOR DRILNG FLUIDS
Data: "Mid depth" from table 3, otherwise from table 14.

14.

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Date	Mid. depth m, MD	Mud Dens. (SG)	PV cp	YP Pa	GEL 0 Pa	GEL 10 Pa	pH	100 psi (cc)	HP/HT (cc)	Cl- inn/out mg/l	Alkalinity			Ca++ inn/out mg/l	Oil %	Sol %	H2O %	V.G. meter at 115 gr. F						Mud Type			
											Pf	Pm	MF					600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm				
920120	926	1.35	49	12	9	10				2.9								122	73	54	35	14	13	LIME			
920122	1546	1.38	50	11	10	12				2.4								122	72	53	34	13	12	LIME			
920123	1652	1.38	44	10	10	12				23.0								107	63	47	30	14	13	LIME			
920124	1652	1.38	46	10	10	13				2.2								61	20	19	112	66	47	31	14	13	LIME
920125	1652	1.38	44	10	15	18				2.4								62	18	20	108	64	49	32	15	14	LIME
920126	1703	1.26	31	9	9	11				2.9								67	15	18	79	48	36	24	10	11	LIME
920127	1755	1.26	29	10	10	15				3.0								68	14	18	78	49	38	26	14	13	LIME
920128	1847	1.26	29	10	14	19				4.1	112000/112000							81	19	0	77	48	37	26	14	13	LIME
920129	1924	1.26	35	11	17	23				4.2	03000/103000							67	17	16	92	57	45	31	17	16	LIME
920130	1924	1.25	30	12	16	22												67	17	16	84	54	44	30	16	15	LIME
920131	1500	1.25	35	13	17	19				4.0								63	16	21	96	61	48	35	20	19	LIME

M u d c o n s u m p t i o n		Date
((((ooo)	System : BORE	4/3-1992
Norsk Hydro	Well: 31/2-17B Mud company: ANCHOR DRLG FLUIDS Well chemical consumption not planned.	13
		Actual used

Drilling of 12 1/4" hole

BARITE	Kg	13.000
CALSIUM CHLORID	Kg	1.700
LIME	Kg	500
SAFETONE P	Kg	2.726
BASEOIL	l	20.000
SAFEMUL MOD	l	208
SAFEMUL PE	l	1.248
SAFEMUL SE	l	624
SAFETONE L	l	624

Drilling of 8 1/2" hole

BARITE	Kg	23.000
ZINC CARB	Kg	25
BASEOIL	l	23.500
SAFEMUL MOD	l	208

Plug and Abandon

BARITE	Kg	18.000
CAUSTIC SODA	Kg	200
XC POLYMER	Kg	120
PROPAC	l	416
FL-7	Kg	225
CITRIC ACID	Kg	25
Mg O	Kg	25
XANVIS	Kg	100
WATESAL	Kg	2325

3.3.6 MUD REPORT

12 1/4" section

The hole was drilled using the safemul oilbase mud with density of 1.27 sg.

The 12 1/4" hole was drilled with a average ROP of 11 m/hr and the hole angle was increased from 44 deg to 58.9 deg at 1875 m. During tripping the hole was backreamed to ensure it was sufficient cleaned. In addition a hi-visc pill was pumped without noticing any positiv effect on hole cleaning.

In generell the HTHP fluid loss was on the high side and polymeres were therefore added in order to bring the value within the specification. The centrifuges were run during trips to keep the low gravity solids on the low side.

8 1/2" section

The hole was drilled only for obtaining a core. After drilled to 1829 m two cores were cut from 1829 m to 1838 m. The mud density was the same as for the 12 1/4" hole section.

On completion of the coring a 6 m³ 1.30 sg of NaCl kill pill was spotted in the open hole section in preparation of the temporary abandonment.

P & A

After a 9 5/8" bridgeplug was set at 1703 m, the casing was cleaned by pumping spacer, soap pills and seawater.

A balanced cementplug was set and the hole displaced to 1.20 sg NaCl brine. After set a 13 3/8" bridgeplug, a 100 m hi-visc NaCl pill was spotted from 700 m and a 200 m cement plug set from 600 m.

Daily mud properties

Date 4/3-1992

Date 4/3-1992

Well: 31/2-17B

Mud Contractor: ANCHOR DRLG FLUIDS

Data: "Mid depth" from table 3, otherwise from table 14.

System : BORE

Date	Mid. depth m, MD	Mud Dens. (SG)	PV cp	YP Pa	GEL		pH	100 psi (cc)	HP/HT (cc)	Cl- inn/out mg/l	Alkalinity			Ca++ inn/out mg/l	Oil %	Sol %	H2O %	V.G. meter at 115 gr. F						Mud Type
					0 Pa	10 Pa					Pf	Pm	Mf					600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm	
920201	1657	1.27	33	13	21	26			6.0					66	15	19	91	58	45	31	18	17	LIME	
920202	1764	1.25	30	9	15	20			5.0					66	15	19	78	48	37	26	14	13	LIME	
920203	1815	1.27	32	10	15	22			4.0					67	14	19	84	52	40	28	15	14	LIME	
920204	1815	1.25	28	7	12	18			3.6		4.10			69	14	17	68	41	30	18	13	12	LIME	
920205	1815	1.26	28	8	13	18			3.6					69	14	17	72	44	30	18	14	13	LIME	
920206	1815	1.26	31	11	15	18			3.8					67	14	19	83	52	40	28	15	14	LIME	
920207	1815	1.26	30	10	17	20			3.8					67	15	18	79	49	39	28	14	13	LIME	
920208	1829	1.26	31	11	16	23			3.9					67	15	18	82	51	40	29	15	14	LIME	
920209	1838	1.26	31	10	16	23			3.9	145000/145000				66	15	19	81	51	40	29	15	14	LIME	
920210	1838	1.26	31	11	18	25			4.0					66	15	19	84	53	42	31	17	16	LIME	
920211	1838	1.20	36	11	18	30			4.8				72/72	59	12	29	93	57	46	30	13	12	LIME	
920212	1838	1.20	36	11	18	30			4.8				72/72	59	12	29	93	57	46	30	13	12	LIME	

TABLE 7: TOTAL CONSUMPTION OF MUD ADDITIVES ON WELL 31/2-17BR

Section Size	Product/Additive	Total Amount Planned	Total Amount Used	Unit	Difference		Difference in cost	
					Amount	%	%	[kNOK]
0.0	BARITE		116000.0	kg				
	BENTONITE		11000.0	kg				
	IDVIS		350.0	kg				
	SODA ASH		150.0	kg				

TABLE 8: CEMENT/ADDITIVE CONSUMPTION PER JOB ON WELL 31/2-17BR

Date	CsgSize	Jobtype	Cement/Additive	Description	Unit	Amount		Difference		
						Planned Used	Actual Used	Amount	%	Cost [kNOK]
22-feb-1993	18 5/8"	PLUG	API CLASS G	API CLASS G	MT		55.0			
			A-7L	ACCELERATOR: LIQUID CACL2	1	1340.0				
			FP-6LN	SPECIAL ADDITIVE: DEFOAMER FP-	1	10.0				

TABLE 6: MUD RHEOLOGY PARAMETERS FOR WELL 31/2-17BR

Hole section:

WATER BASED SYSTEM

Date	Depth (m)		Mud Type	Funnel Visc [sec]	Dens [sg]	Mudtmp Out [DegC]	Fann Readings								Rheo Test [DegC]	PV [mPas]	YP [Pa]	Gel0 [Pa]	Gel10 [Pa]	
	MD	TVD					600	300	200	100	60	30	6	3						
13-feb-1993	23:59	0	0	KCL/POLYME	78.0	1.20	0.0	69	47	36	24			5	3	0.0	22.0	12.0	1.0	3.0
14-feb-1993	23:59	0	0	KCL/POLYME	100.0	1.04	0.0									0.0	0.0	0.0	0.0	0.0
16-feb-1993	22:00	0	0	KCL/POLYME	80.0	1.30	0.0	70	48	37	25			5	3	50.0	22.0	12.5	4.0	5.0
17-feb-1993	23:59	0	0	KCL/POLYME	81.0	1.38	0.0	72	49	38	26			5	3	50.0	23.0	12.5	4.0	5.0
18-feb-1993	23:59	0	0	KCL/POLYME	81.0	1.38	0.0	71	48	36	24			5	3	50.0	23.0	12.0	4.0	5.0
19-feb-1993	22:00	0	0	KCL/POLYME	81.0	1.38	0.0	71	48	36	24			5	3	50.0	23.0	12.0	4.0	5.0
20-feb-1993	23:59	0	0	KCL/POLYME	78.0	1.38	13.0	70	47	39	27			13	12	50.0	23.0	11.5	7.0	18.0
21-feb-1993	22:00	0	0	KCL/POLYME	65.0	1.38	0.0	68	45	37	25			11	10	50.0	23.0	10.5	6.0	17.0
22-feb-1993	22:00	0	0	KCL/POLYME	61.0	1.38	0.0	48	32	26	17			8	7	50.0	16.0	7.7	5.0	16.0
23-feb-1993	10:00	0	0	KCL/POLYME	0.0	1.38	0.0									0.0	0.0	0.0	0.0	0.0
24-feb-1993	10:00	0	0	KCL/POLYME	0.0	1.38	0.0									0.0	0.0	0.0	0.0	0.0
25-feb-1993	10:00	0	0	KCL/POLYME	0.0	1.38	0.0									0.0	0.0	0.0	0.0	0.0

TABLE 6: DAILY MUD PROPERTIES : OTHER PARAMETERS FOR WELL 31/2-17BR

Hole section:

WATER BASED SYSTEM

Date	Depth (m)		Mud Type	Dens [sg]	Filtrate		Filt. cake API [mm]	HPHT Press/Temp [psi/DegC]	pH	Alkalinity			Inhib Chem [Kg/m3]	K+ [mg/l]	CL- [mg/l]	Ca++ [mg/l]	Mg++ [mg/l]	Tot hard [mg]	Percentage			CEC [Kg/m3]	ASG [sg]	LGS [Kg/m3]
	MD	TVD			API [ml]	HPHT [ml]				Pm [ml]	Pt [ml]	Mf [ml]							Solid [%]	Oil [%]	Sand [%]			
13-feb-1993	23:59	0	0	KCL/POLYME	1.20	0.0	0	0/0	8.5	0.4	0.1	0.6	135	71	93	220	24	0	12.0	0.0	0.0	260	0.0	0
14-feb-1993	23:59	0	0	KCL/POLYME	1.04	0.0	0	0/0	8.5	0.4	0.1	0.6	130	71000	93000	280	48	360	14.0	0.0	0.0	180	0.0	0
16-feb-1993	22:00	0	0	KCL/POLYME	1.30	0.0	1	0/0	8.5	0.4	0.1	0.6	130	71000	93000	280	48	360	17.0	0.0	0.0	180	0.0	0
17-feb-1993	23:59	0	0	KCL/POLYME	1.38	0.0	1	0/0	8.5	0.4	0.1	0.6	130	71000	93000	280	48	360	17.0	0.0	0.0	180	0.0	0
18-feb-1993	23:59	0	0	KCL/POLYME	1.38	0.0	1	0/0	8.5	0.4	0.1	0.6	130	71000	93000	280	48	360	17.0	0.0	0.0	180	0.0	0
19-feb-1993	22:00	0	0	KCL/POLYME	1.38	0.0	1	0/0	8.5	0.4	0.1	0.6	130	71000	93000	280	48	360	17.0	0.0	0.0	180	0.0	0
20-feb-1993	23:59	0	0	KCL/POLYME	1.38	0.0	1	0/0	10.0	0.3	0.3	0.9	110	65000	88000	200	24	240	17.0	0.0	0.0	27	0.0	0
21-feb-1993	22:00	0	0	KCL/POLYME	1.38	0.0	1	0/0	10.0	0.3	0.3	0.9	110	64000	88000	200	24	240	17.0	0.0	0.0	27	0.0	0
22-feb-1993	22:00	0	0	KCL/POLYME	1.38	0.0	0	0/0	10.0	0.3	0.3	0.9	110	64000	84000	200	24	240	17.0	0.0	0.0	28	0.0	0
23-feb-1993	10:00	0	0	KCL/POLYME	1.38	0.0	0	0/0	10.0	0.3	0.3	0.9	110	64000	84000	200	24	240	17.0	0.0	0.0	28	0.0	0
24-feb-1993	10:00	0	0	KCL/POLYME	1.38	0.0	0	0/0	10.0	0.3	0.3	0.9	0	0	0	0	0	0	0.0	0.0	0.0	0	0.0	0
25-feb-1993	10:00	0	0	KCL/POLYME	1.38	0.0	0	0/0	10.0	0.3	0.3	0.9	0	0	0	0	0	0	0.0	0.0	0.0	0	0.0	0

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26 .KT. 1992

REGISTER

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PRAKLA
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NORSK HYDRO A/S

FINGERPRINT ANALYSIS

TROLL FIELD

WELLS: 31/2-17S and 31/2-17SA

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SAMPLES

The following samples were supplied by Norsk Hydro a.s:

Three plug samples from well 31/2-17S taken at depths of 1942.00m, 1971.00 m and 1982.00 m.

Two plug samples from well 31/2-17SA taken at depths 1723.91 m and 1729.13 m.

Reference samples.

Three oil samples from wells 31/2-16S, 31/3-2 and 31/5-4AS1.

Two condensate samples from wells 31/6-1 and 31/6-8.

Base oil, HDF 200, being used in the oil based mud at 31/2-17SA.

Emulsifiers -Safemul PE and Safemul SE-, and Safetone L and Safemul MOD, all being added in small quantities to the mud.

Sample of waterbased mud used for drilling of 31/2-17S.

INTRODUCTION

The objective of the analysis was to identify possible reservoir hydrocarbons in the four plug samples to identify the condensate/oil contact in the reservoir.

The possible hydrocarbons should also be characterized as oil, condensate or oil being contaminated with condensate.

Well 31/2-17SA has been drilled with oil based mud which was likely to pollute the plug samples.

It was decided to perform fingerprint-analysis by Gas Chromatography on the hydrocarbons from the plugs and the reference samples mentioned above.

A fingerprint analysis gives a qualitative characteristic chromatogram with range C1-C30.

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SAMPLE PREPARATION

Separation of the hydrocarbons from the plugs was performed either by extraction using toluene or by flooding of the plug using formation water.

Using the flooding method, the hydrocarbons could easily be separated from the inorganic phase and then analysed by GC without any further treatment.

For the extracted samples it was necessary to distill off toluene prior to GC-analysis and the distillation was performed in a Rotavapor.

The residue sample left in the boiler after distillation contained small amounts of toluene.

The light fraction below approx. 151°C (below C10+) was lost during distillation.

Fingerprint analysis was carried out on the residue samples.

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REFERENCE SAMPLES

The reference samples includes three oil samples, two condensate samples, a sample of base oil and four different emulgate samples.

All samples were analysed by GC without any pretreatment.

0.1 μ l pure sample was injected and the sample chromatograms are enclosed.

For the oil- and condensate-samples from wells 31/2-16S and 31/6-8 respectively, it was also decided to solute the samples with toluene prior to distillation using Rotavapor.

GC analysis was carried out on the residue- oil and -condensate samples.

Tests were also performed by mixing residue sample from well 31/2-16S with residue oil from well 31/2-16S and baseoil respectively. The reason for this was to give the referance sample the same treatment as the unkonown samples.

The mixing ratio was 1:1.

The chromatograms from these tests are enclosed and are used as comparison material.

CONCLUSION

The three oil samples seemed quite similar.

The two condensate sample seemed also to be similar.

An oil from well 31/2-16S and a condensate from well 31/6-8 was chosen as representative samples for the comparison.

The baseoil differs principally from the stock tank oils and the condensates.

The emulsifiers contain hydrocarbons in the area C10 - C30, making it quite difficult to compare the fingerprint analyses between hydrocarbons from effluents in the plugs, the oils and the condensates from well 31/2-17SA.

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PLUG SAMPLES FROM WELL 31/2-17S.

Water based mud was used by drilling at well 31/2-17S.

The plug samples from depths 1942.00m, 1971.00 m and 1982.00 m were extracted with toluene.

The residue sample being left after the preparation was analysed by GC.

Hydrocarbon was not identified in the plug sample from depth 1942.00 m.

No significant difference was observed in the two sample chromatograms, both having components in the area C10-C30.

The two samples chromatograms were compared with residue-oil and condensate from wells 31/2-16S and 31/6-8 respectively.

- 1) Residue condensate from well 31/6-8.
Components above C16 was not observed.
- 2) Residue condensate from well 31/2-16S.
Majority of components was in the C13-C30 range.

CONCLUSION.

The hydrocarbons from the plug are most likely oil, due to the observation of components above C16 which was not found in the residue condensate.

As the light fraction is lost during preparation it is impossible to state whether there has been a condensate contamination or not.

It was not possible to determine condensate/oil contacts from the suit of samples.

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Troll field
Wells: 31/2-17S and 31/2-17SA

SAMPLES FROM WELL 31/2-17SA

By drilling of well 31/2-17SA oil based mud was used.

Plug sample from depth 1723.91 m was extracted with toluen prior to GC-analysis of residual hydrocarbons.

Plug from depth 1729.13 was flooded with formation water and fingerprint-analysis was performed on the organic phase.

The chromatograms from the two hydrocarbon samples was compared with chromatogram from baseoil and residue oil from well 31/2-16S.

CONCLUSION

Both samples seem to contain oil, contaminated with base oil.

The degree of contamination can not be established due to the qualitative character of the analysis, but the contamination of sample from depth 1723.91 is obviously higher than for the sample from depth 1729.13 m.

A possible contamination of condensate can not be seen due to the absence of the light fraction.

It is not possible to determine condensate/oil contact from the suit of samples.

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Fingerprint analysis
Troll field
Wells: 31/2-17S and 31/2-17SA

UV-ANALYSIS.

A UV-test was carried out to find the fluoriscens properties of the plug samples and the relevant reference samples.

Two UV-pictures are enclosed to the report.

UV-picture no. 1 shows baseoil and emulsifiers used in the drillmud on well 31/2-17S.

The UV-picture shows clearly that the emulsifiers are fluoriscens.

The baseoil does not fluoresce.

UV-picture no. 2 shows water based drillmud and the plug material at 1942.0 m depth of well 31/2-17SA.

The water based drillmud show weak fluoriscens.

The plug material gives no fluoriscens, which means that the plug contains very limited amounts of hydrocarbons, if any.

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Wells: 31/2-17S and 31/2-17SA

LABORATORY PROCEDURE

Fingerprint-analysis

Fingerprint-analysis of oil samples was carried out by a Perkin Elmer Gas Chromatograph (SIGMA 300).

The Gas Chromatograph was temperature programmed from 60-290°C at a temp. gradient of 10°C/min.

A fused SILIA capillary column was used for the analysis.

The determination was done by a FID at 320°C.

UV-PHOTO

The UV-photo was taken at a wavelength of 360nm i.e. in the medium UV range. The same wavelength as being chosen for the UV-photography of cores (ref. coro photos).

Distillation with ROTAVAPOR RE 121

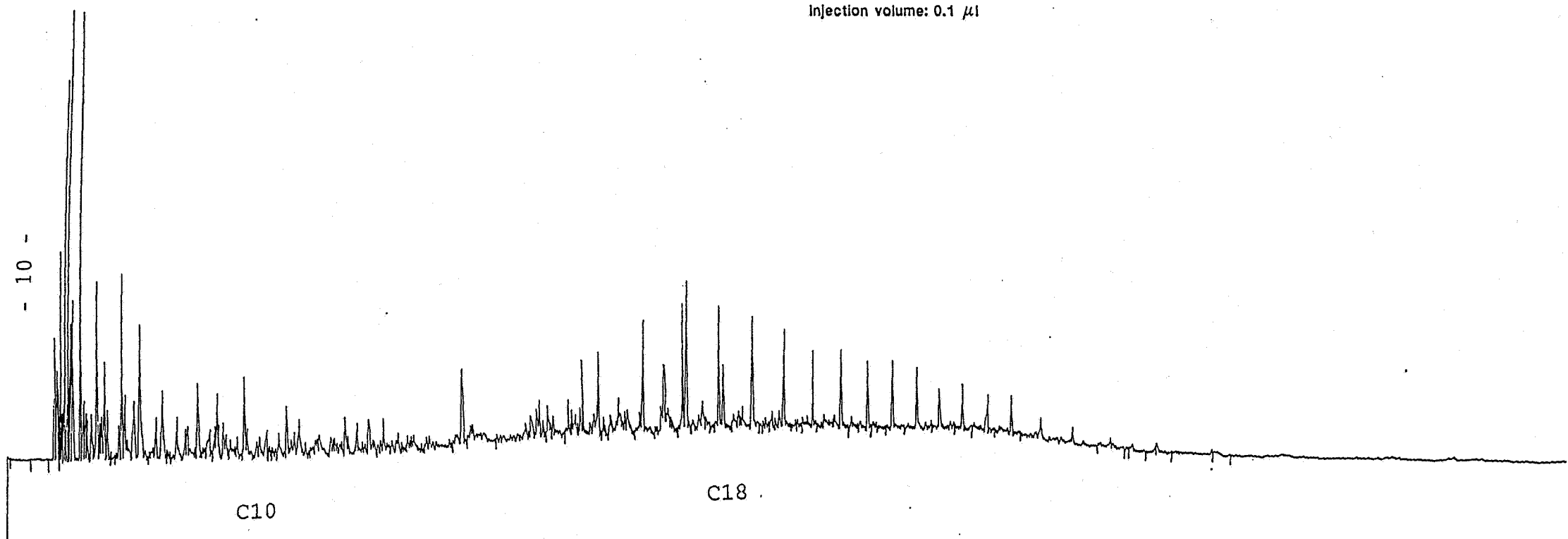
A Rotavapor RE 121 is a simple distillation apparatus equipped with a rotatory evaporating bottle containing the sample, a condenser, a distillate receiver and a waterbath.

The system is evacuated during distillation.

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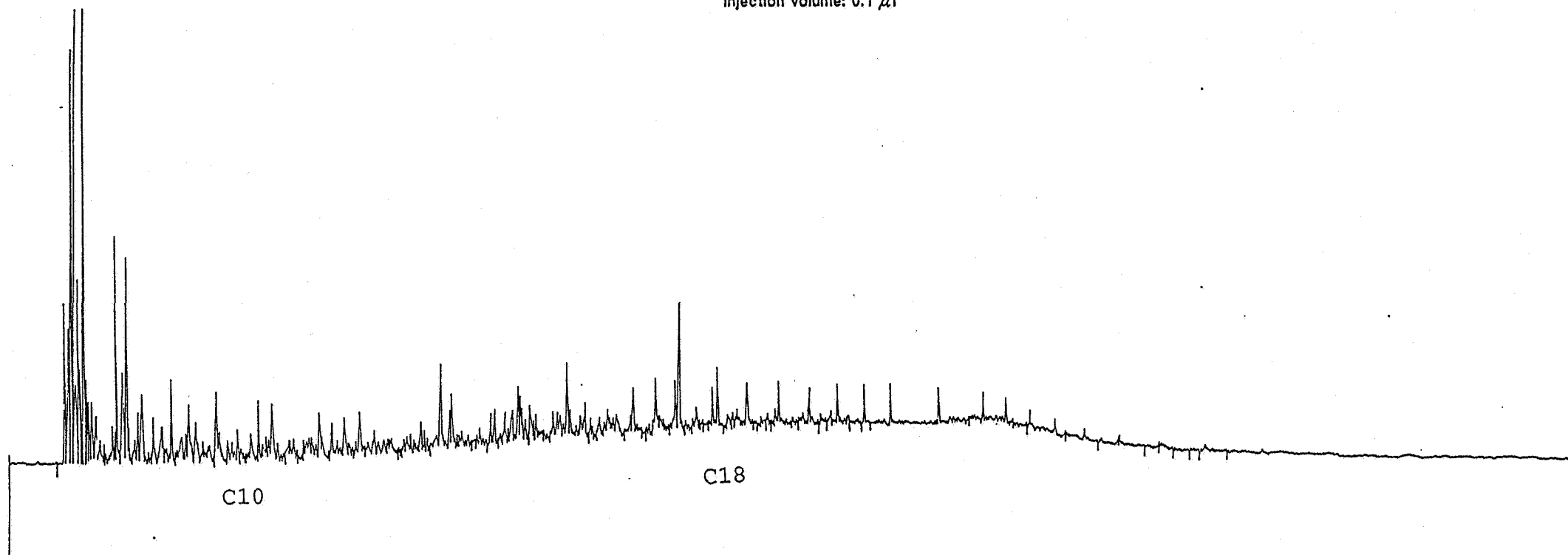
Norsk Hydro a.s
Oil sample from well 31/3-2

Injection volume: 0.1 μ l



Norsk Hydro a.s
Oil sample from well 31/5-4ASI

Injection volume: 0.1 μ l

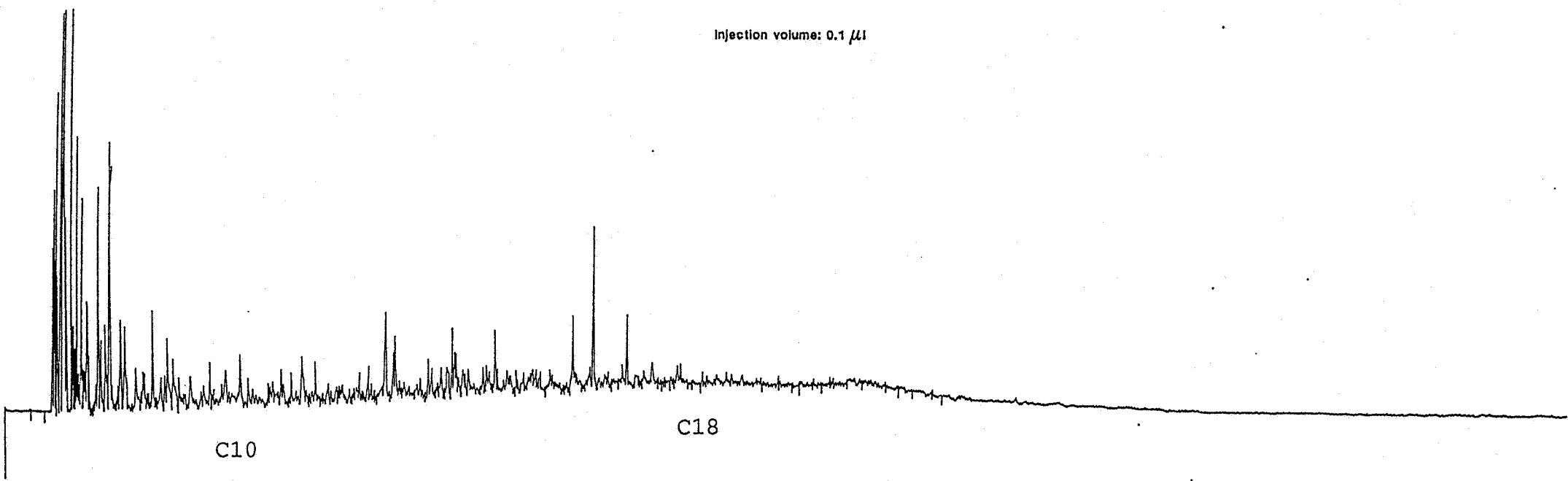


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Norsk Hydro a.s
Oil sample from well 31/2-16S

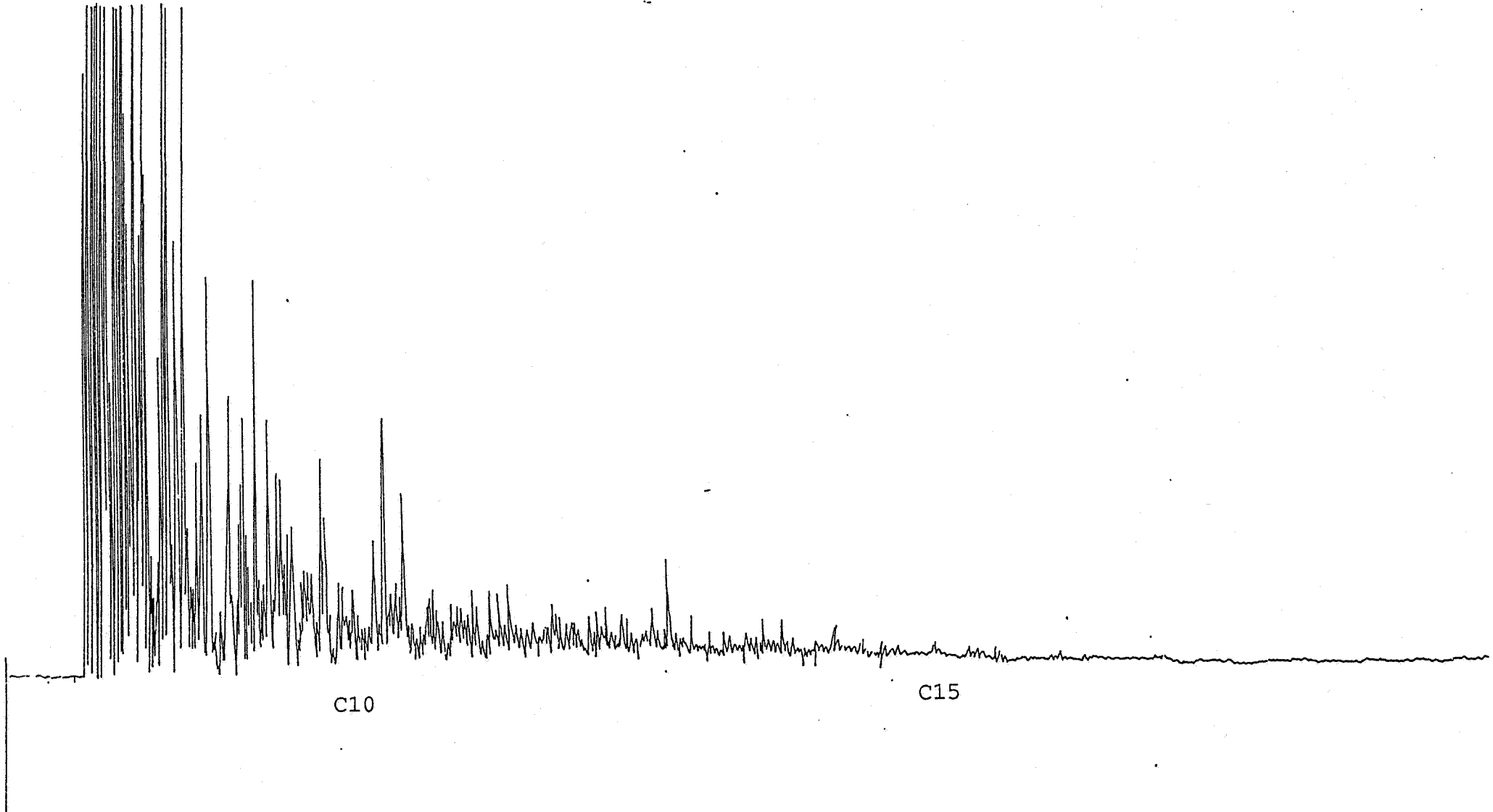
Injection volume: 0.1 μ l

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Norsk Hydro a.s
Condensate sample from well 31/6-8

Injection volume: 0.1 μ l



C10

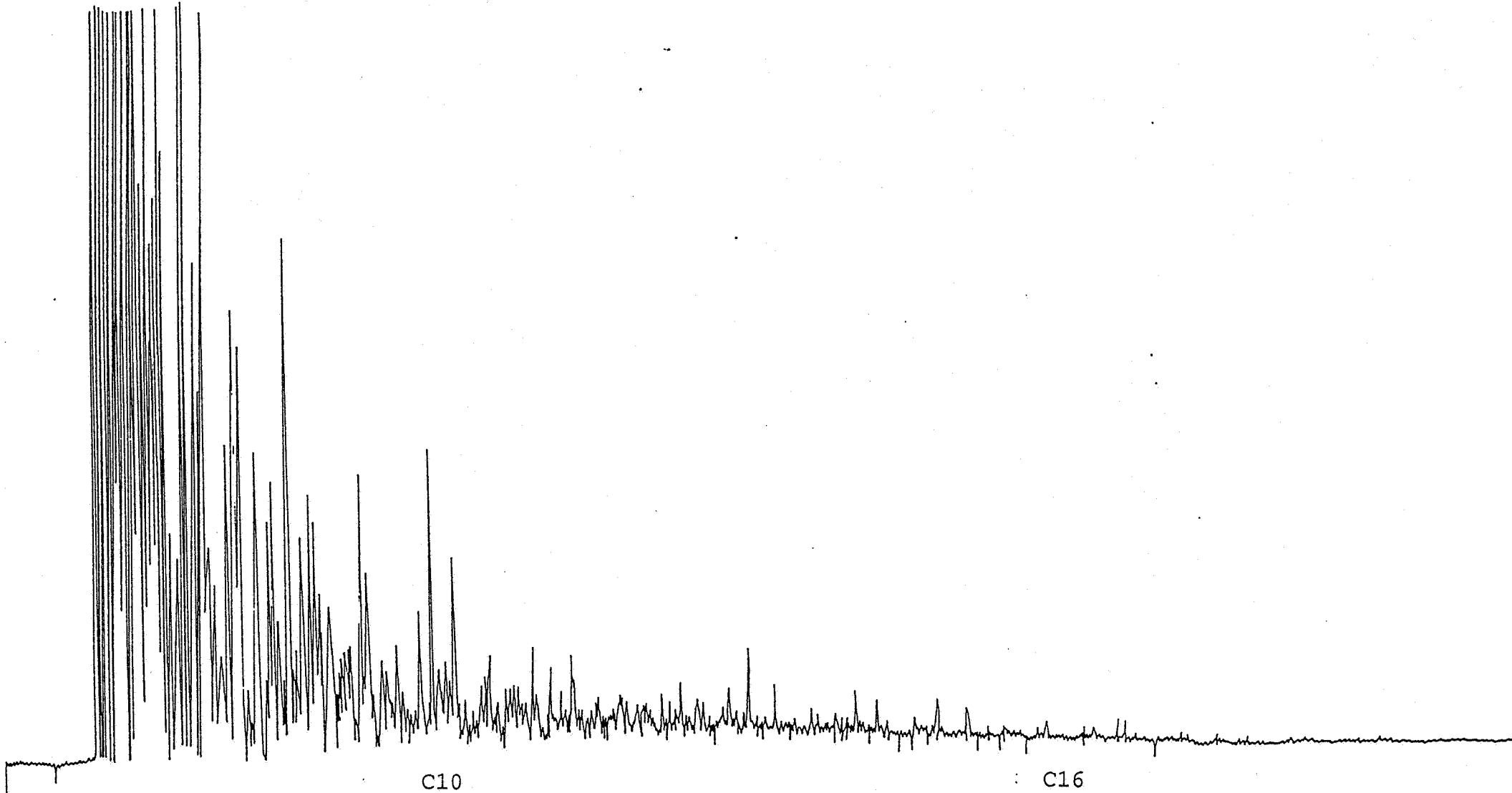
C15

Norsk Hydro a.s

Condensate sample from well 31/6-1

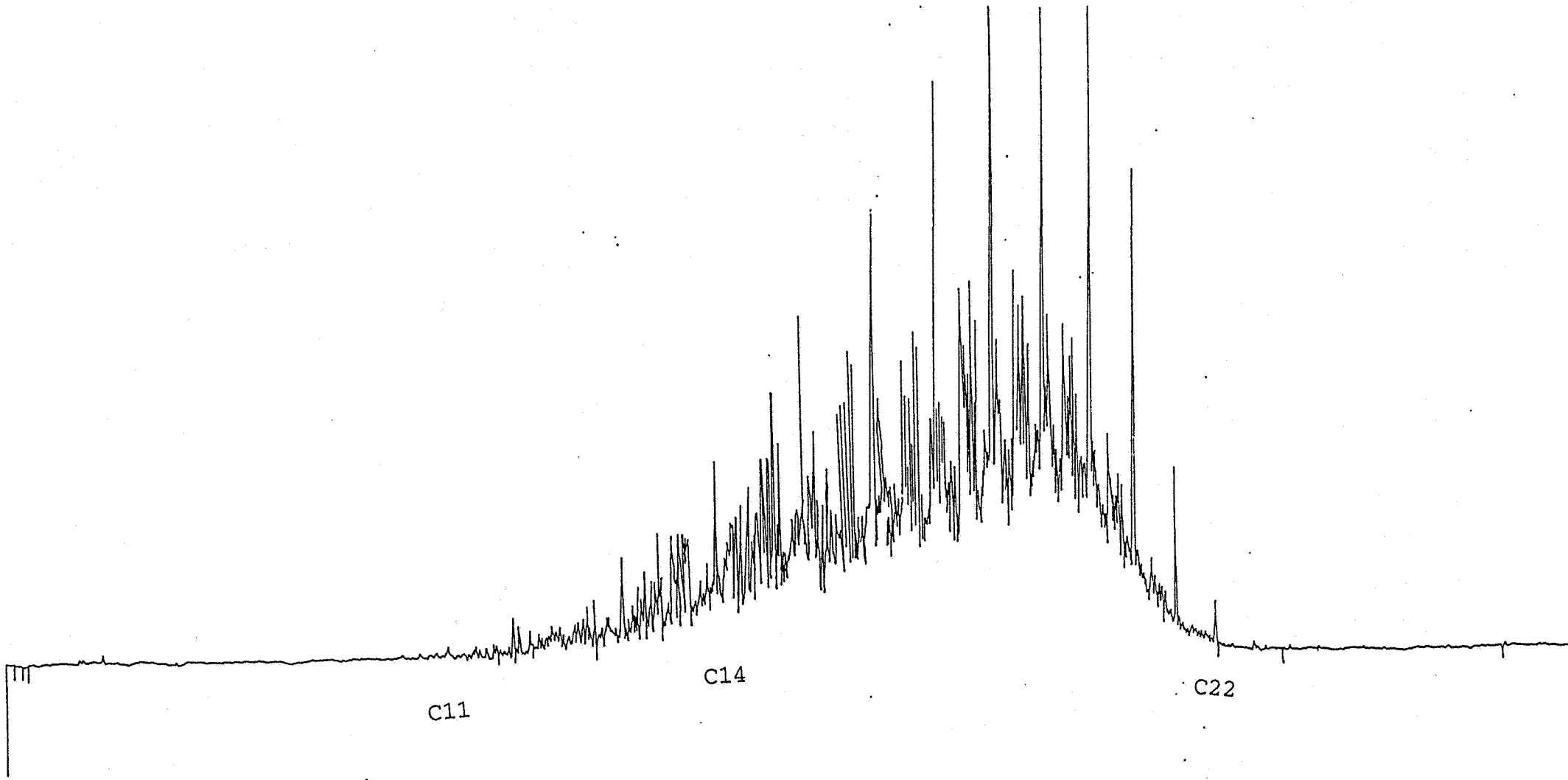
Injection volume: 0.1 μ l

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Baseoil HDF 200

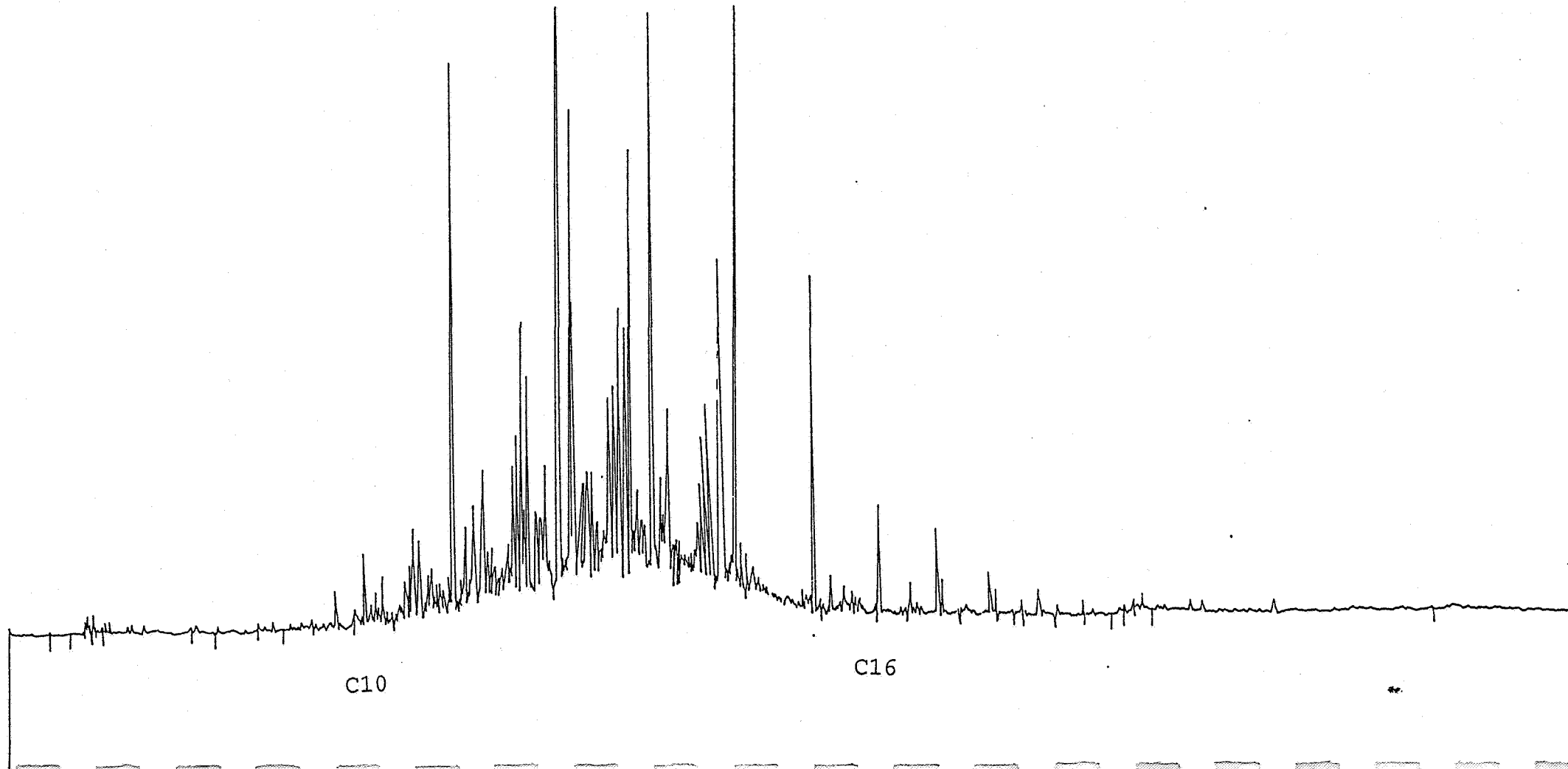
Injection volume: 0.1 μ l



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SAFETONE L

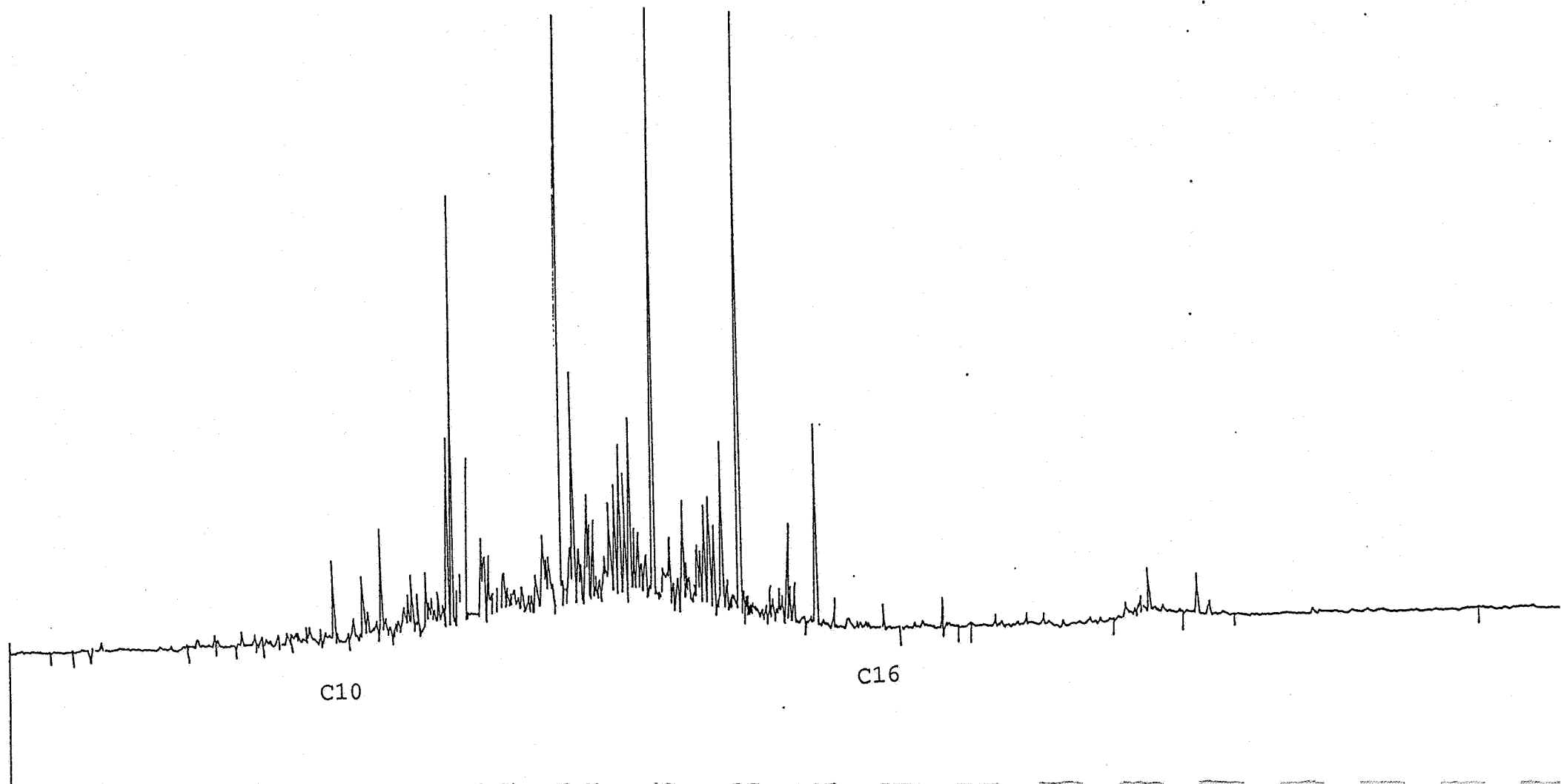
Injection volume: 0.1 μ l



SAFEMUL MOD

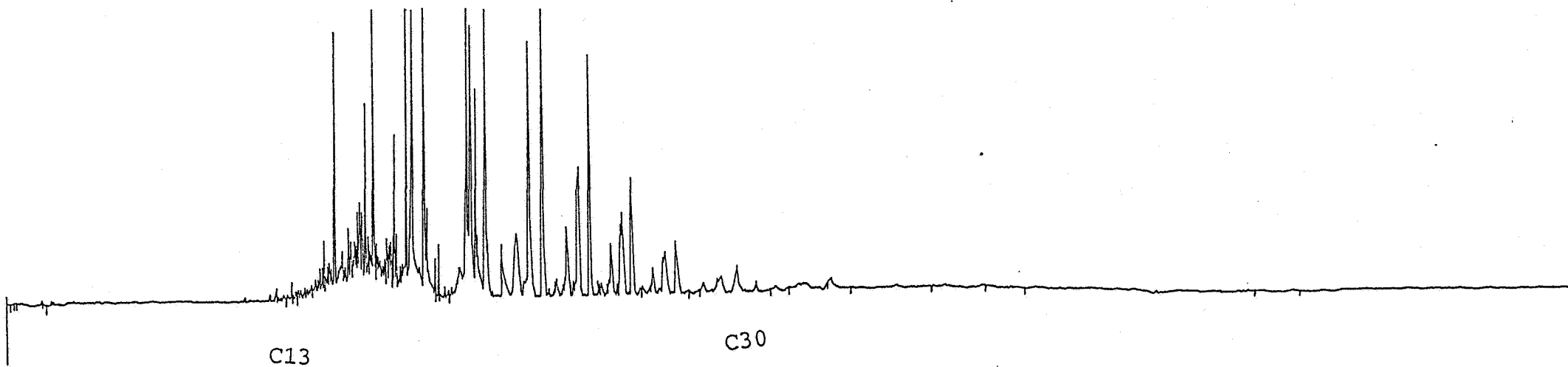
Injection volume: 0.1 μ l

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SAFEMUL SE
AFI 0041

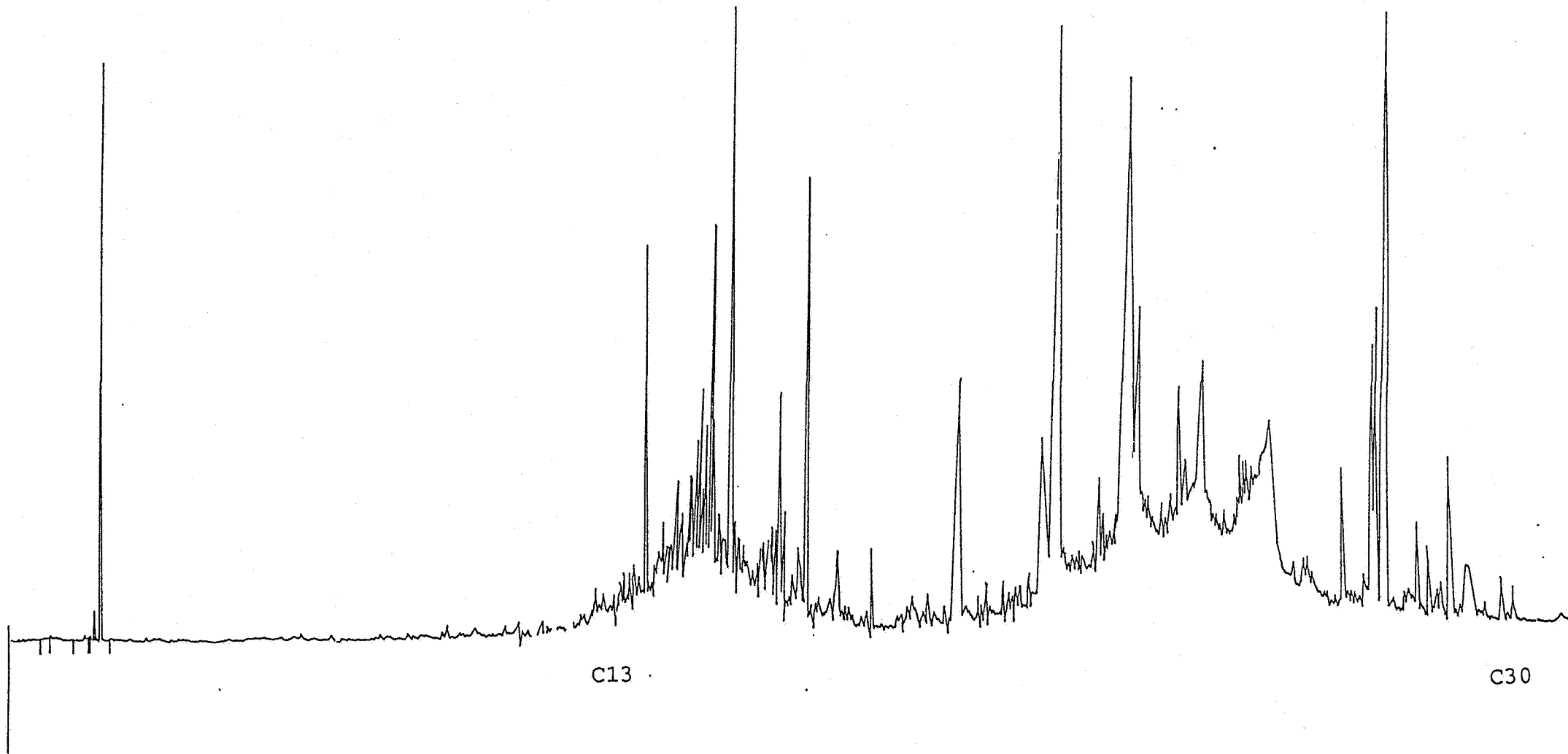
Injection volume: 0.1 μ l



SAFEMUL PE

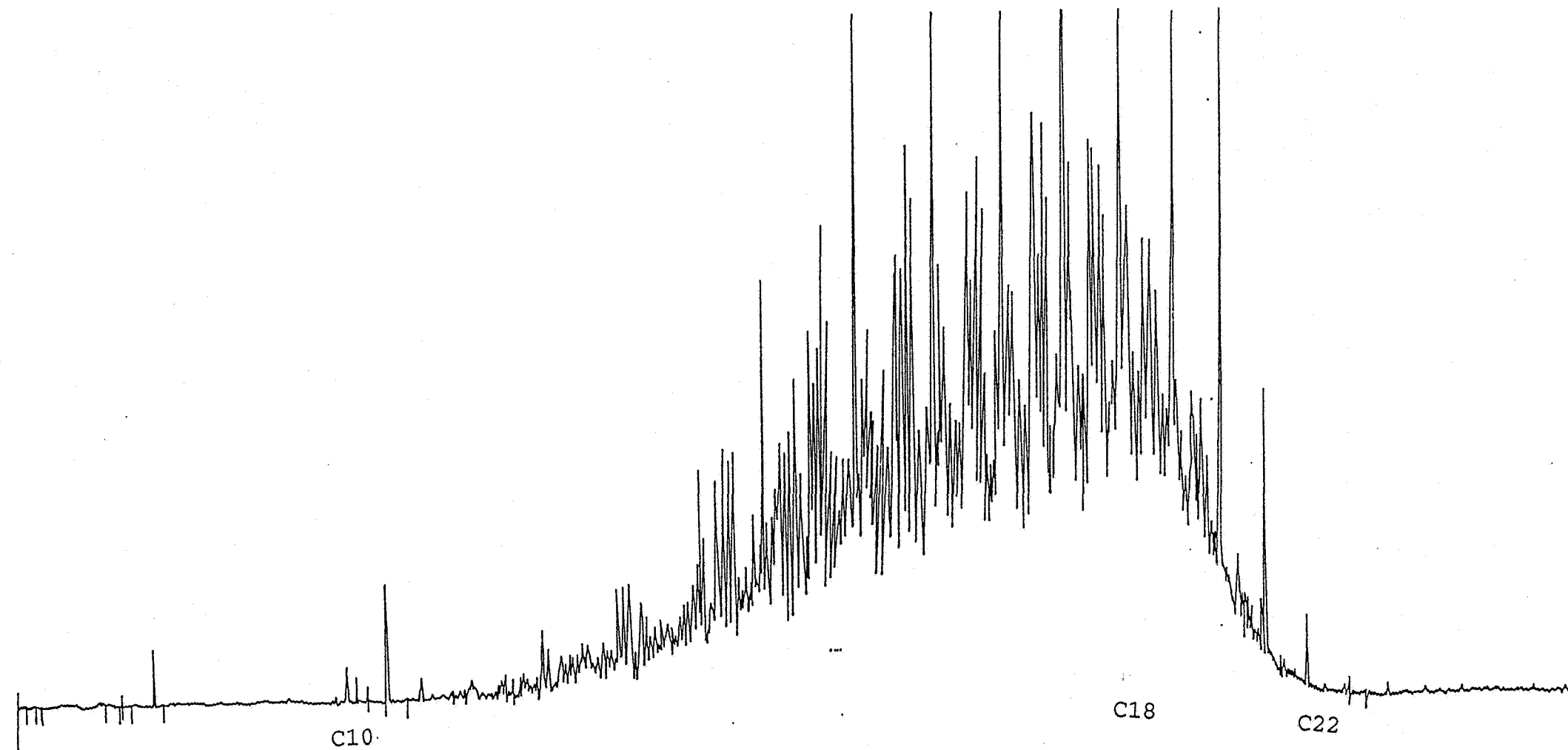
Injection volume: 0.1 μ l

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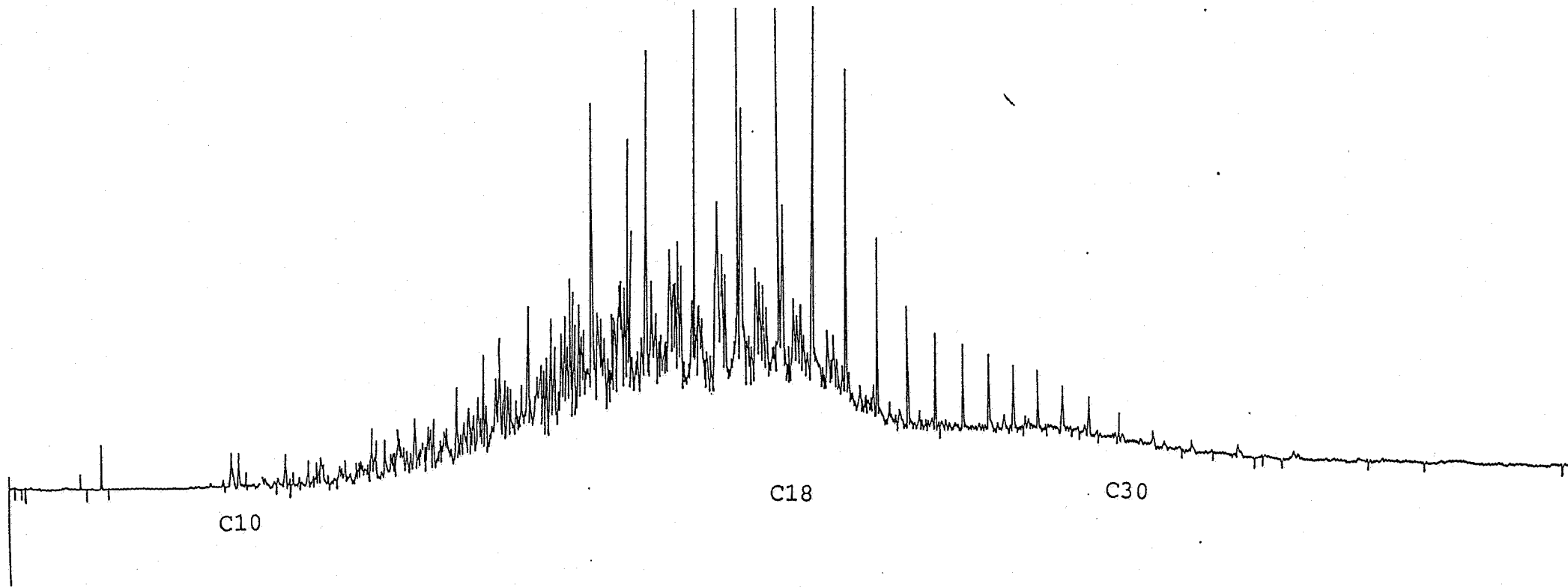
Baseoil and residue sample
from well 31/2-17SA, depth 1723.91m mixed 1:1

Injection volume: 0.2 μ l



Residue oil from well 31/2-16S
and residue sample from well 31/2-17SA, depth 1723.91m mixed 1:1

Injection volume: 0.2 μ l

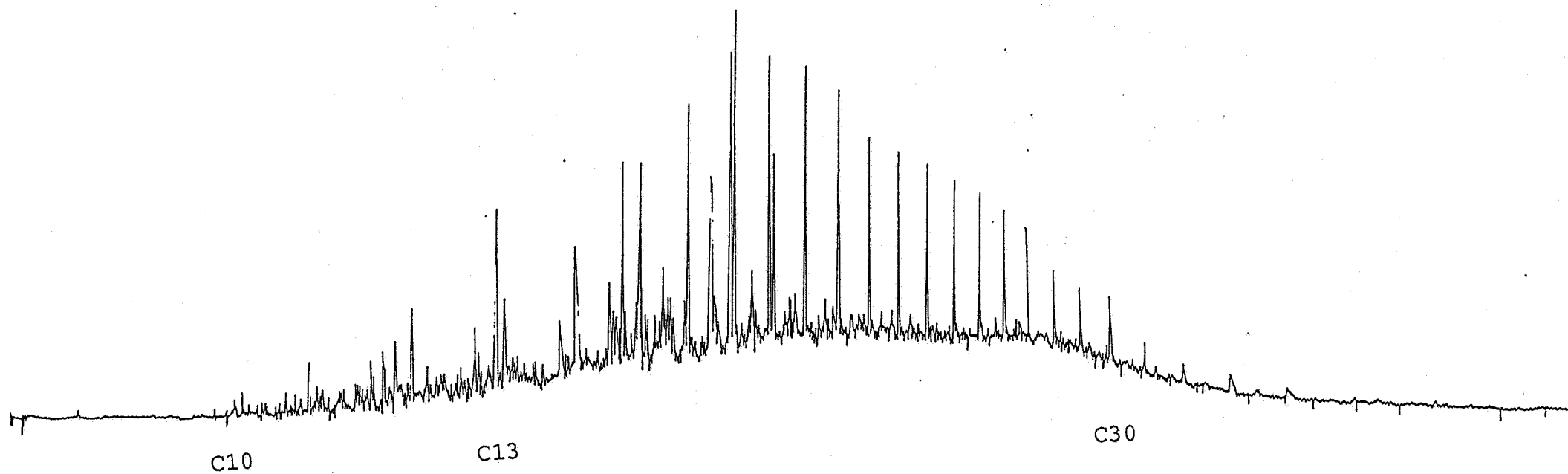


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Well: 31/2-16S

Residue oil

Injection volume: 0.1 μ l

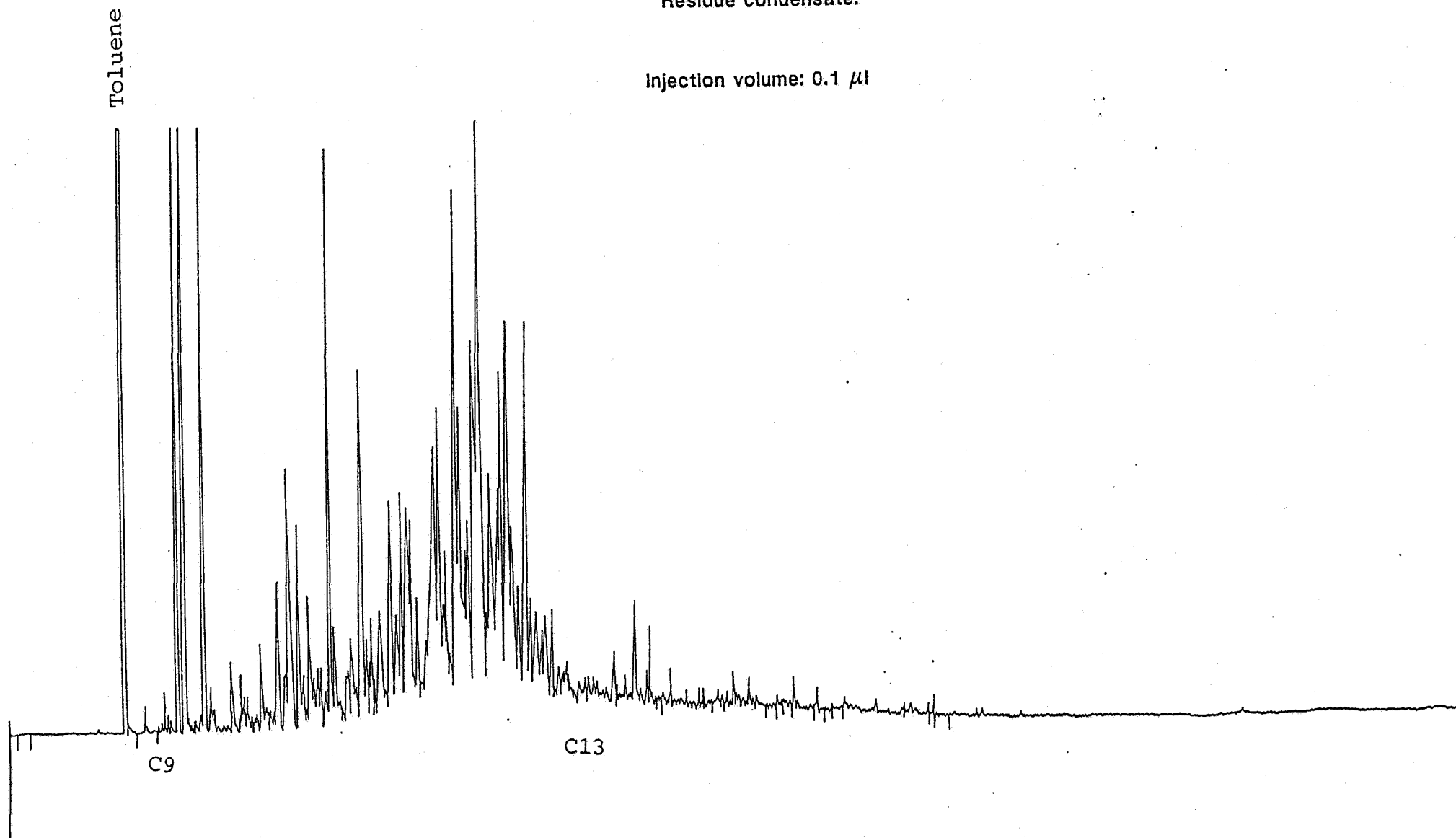


Norsk Hydro a.s

Well: 31/6-8

Residue condensate.

Injection volume: 0.1 μ l



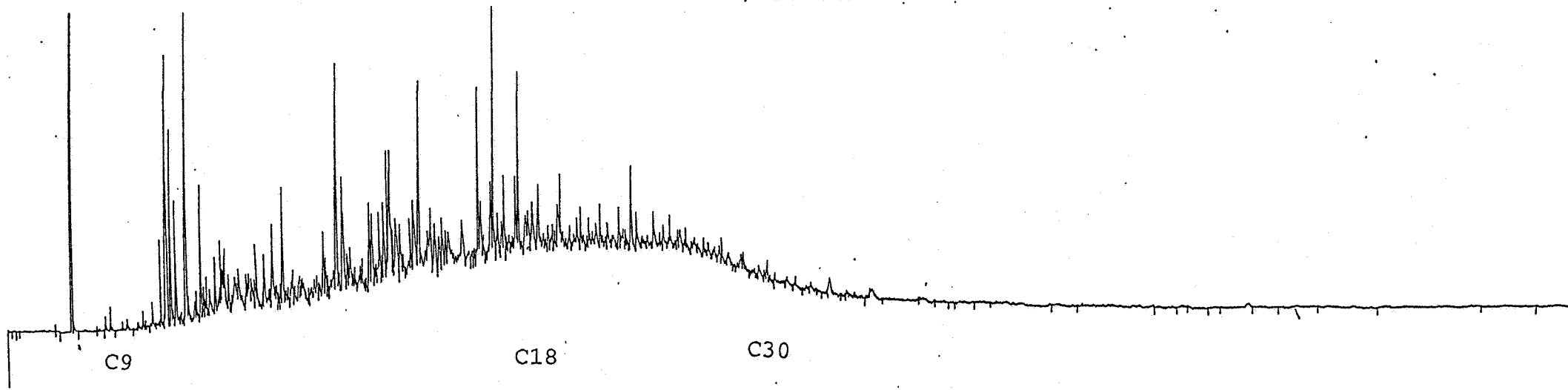
Toluene

C9

C13

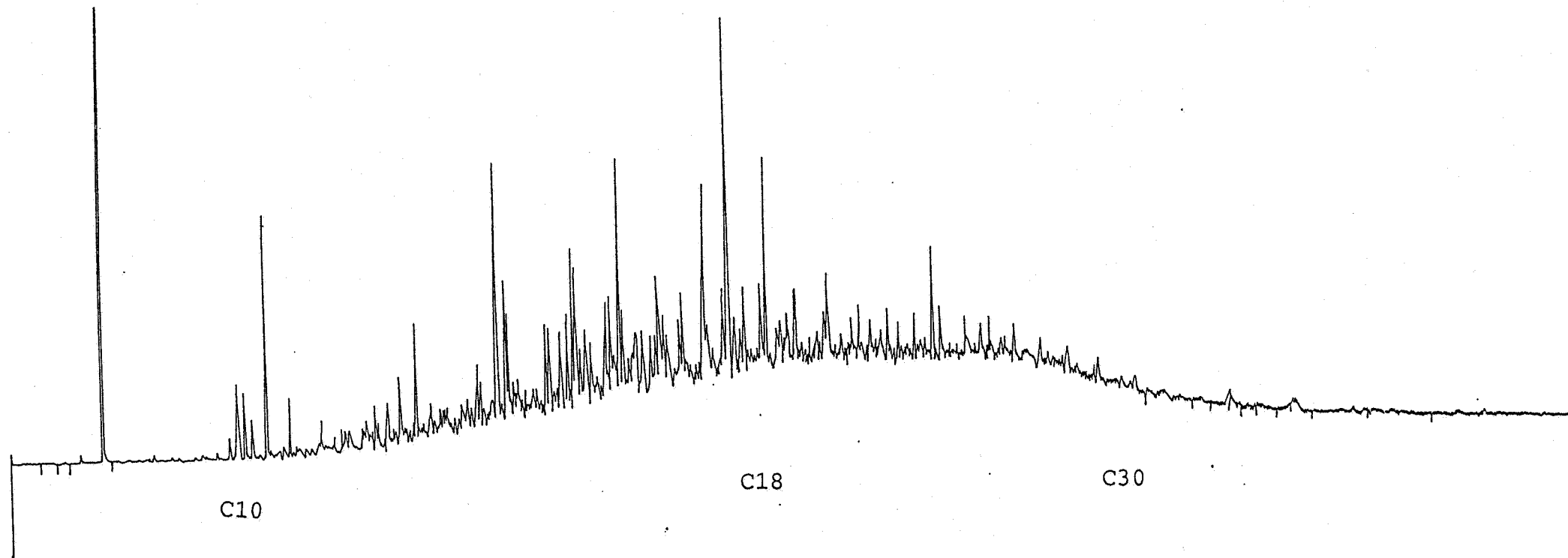
Toluene

Norsk Hydro a.s
Sample from well 31/2-17S
Depth: 1982.0m
Injection volume: 0.3 µl



Norsk Hydro a.s
Sample from well 31/2-17S
Depth: 1971.0m
Injection volume: 0.3 μ l

Toluene



C10

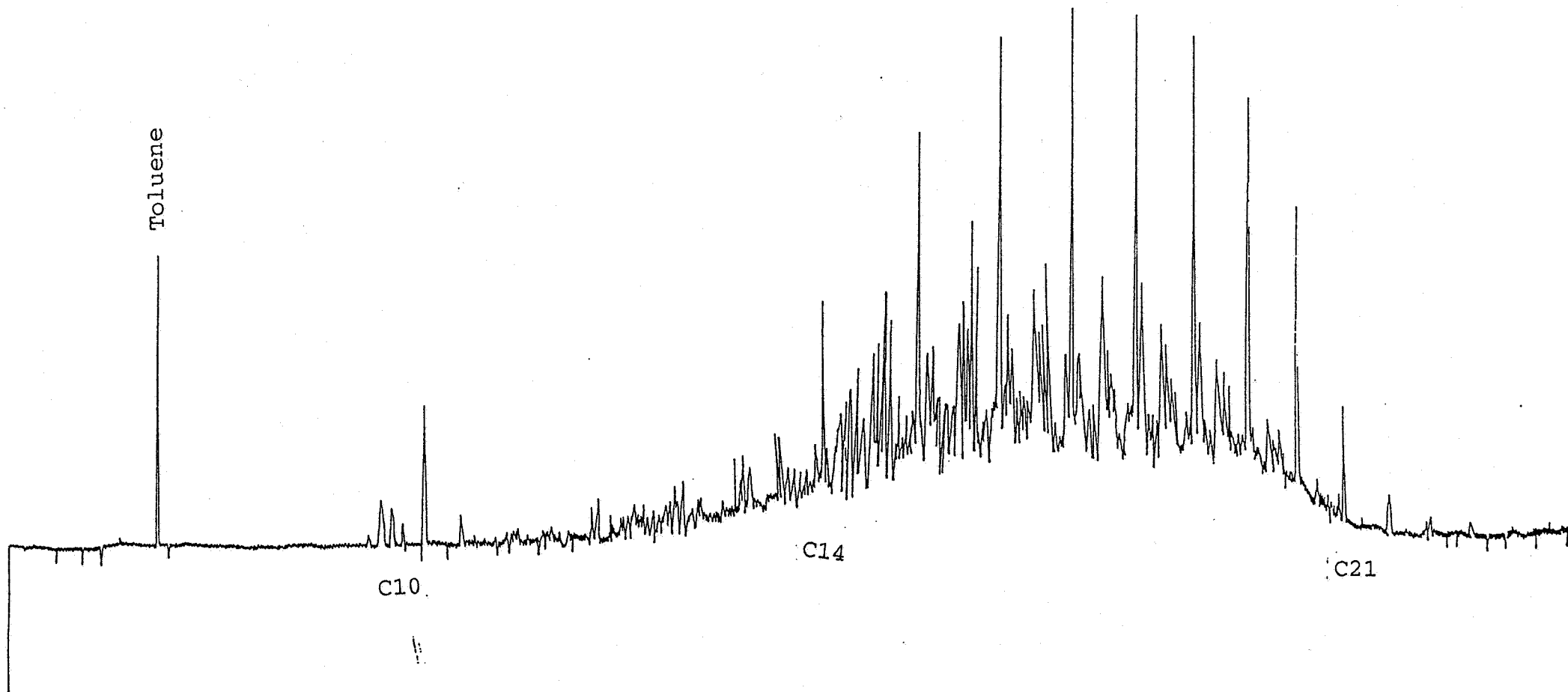
C18

C30

Norsk Hydro a.s
Sample from well 31/2-17SA
Depth: 1723.91m

Injection volume: 0.2 μ l

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Norsk Hydro a.s
Sample from well 31/2-17SA
Depth: 1729.13m

Injection volume: 0.14 μ l

