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§ ..... nr. ....

25/4-3

GEOLOGICAL REPORT

BA 77-0038-1

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**REGISTRERT  
OLJEDIREKTORATET**

December 1974

1. PERTINENT DATA1.1. General Data

Licence	036 Pan Ocean	
Association	Norsk Hydro	6,920%
	Elf Norge	5,814%
	Aquitaine Norge	2,906%
	Total Marine Norsk	4,360%
	Pan Ocean Oil Norge	36,905%
	K/S Femogtyvefire Norge	20,476%
	Bow Valley Exploration Norge	15,238%
	Sunningdale Oil Norge	7,381%
Operator	ELF NORGE A/S	
Rig	Deep Sea Driller 1 (H <sub>3</sub> )	
Contractors	Deep Sea Drilling Co.	
	Mud logging: Geoservices	
Location	S.P. 135, Seismic line 72-02-05	
	X = 02° 05' 28" 9 E	
	Y = 59° 30' 44" 2 N	
Water depth	121,5 m	
RKB	25,5 m	
Sea bottom	147 m	

1.2. Drilling and Operation Time Table

13.10.74	Spudded
17.10.74	30" casing set at 184 m
23.10.74	Moving rig 42 m at SE
23.10.74	30" casing set at 184 m
27.10.74	13" 3/8 casing set at 454 m
06.11.74	SPE, Run 1: IES, BHC-GR, SWC 1
07.11.74	9" 5/8 casing set at 1957 m
9-10.11.74	Cores 1,2,3 (2124 - 2144 m)
17.11.74	TD: 2714 m (Driller and Schlumberger)
17-20.11.74	SPE; Run 2: IES, GR-BHC, HDT, LL MLL, GR-Neutron; GR-FDC-CNL on the reservoir top SWC 2, SWC 3; Fit 1: 2126,2 (RKB); Fit 2: 2129,7; Fit 3: 2126,4;
	Velocity survey
22.11.74	Completed

1.3. Status

Gas and oil bearing sands at the top of the Heimdall formation.

Plugged and abandoned.

## 2. GEOLOGICAL DATA AND RESULTS

### 2.1. Objectives

The well 25/4-3 is located southwesterly of the Heimdall field on a Paleocene structure which trends NE-SW and stretches southwards over the block 25/7.

Heimdall sand formation was the main objective with a bright spot phenomenon clearly visible on all the seismic sections through the structure. Seismic mapped vertical closure was assumed to be less than 50 m.

Danian sands were conceived as secondary targets.

### 2.2. Stratigraphical and Structural Results

#### 2.2.1. Stratigraphy

See following table and composite log.

Stratigraphy units	Top RKB (m)	Top MSL (m)	Thickness (m)
Pleistocene to Miocene	147	- 121,5	593
Oligocene	740	- 714,5	485
Upper Middle Eocene	1225	- 1199,5	395
(Lower Eocene)	1620	- 1594,5	354
Paleocene to Danian	1974	- 1948,5	576
Danian	2550	- 2524,5	96
Maestrichtian	2646	- 2620,5	68
TD	2714	- 2688,5	

#### 2.2.2. Structural Results

Tuff marker C<sub>1</sub> was encountered at 1974 m i.e. 20 m lower than prognosed.

Heimdall sands expected around 2075 m were found

at 2125 m.

But correlations with nearby wells show a thickening of the reservoir serie by deposition of new units = sands between 2125 - 2139 m and shales with calcareous sandstone streaks between 2098 - 2125 m.

Therefore the seismic horizon computed as the top of the Heimdall sands has to be connected with the first velocity break beneath the tuffs at 2098 m so the structural gap with prognosis is estimated at 25 m.

Upper Cretaceous chalky limestone was topped at 2646 m.

### 2.3. Reservoirs, Shows and Fluids

#### 2.3.1. "Heimdall sands" - 2098 - 2503 m (405 m)

Heimdall sands are divided into three members:

- a) 2098 - 2125 m = dark grey shale with sandstone stringers.
- b) 2125 - 2266 m = sandy shaly transgressive regressive gamma ray sequences with fine to medium locally calcareous cemented sands and dark grey shales.
- c) 2266 - 2501 m = heterometric sand bars and shale interbeds.

Net sand thickness (48 API gamma ray cut) is around 296 m.

Average porosity inferred from electrical logs amounts 30-33%.

Gas ground increase and fluorescences occurred in drilling below 2098 m provided by gas bearing sand/sandstone levels.

Coring started at 2124 m (DD) and the last core, K3 2135 - 2144 showed only water saturated sand.

Logging interpretation gave the following results:

top of reservoir	2124,5 m	
gas/oil contact	2127,6 m	3.1 m
gas saturation	85%	
oil/water contact	2133,1 m	5.5 m
oil saturation	80 to 50%	

Three FIT were conducted on the interval 2125 - 2133

FIT 1.3 at 2126,2 and 2126,40 m were unsuccessful due to mechanical failures.

FIT 2 at 2129,70 recovered oil and mud filtrate and has been transferred under PVT conditions.

No drill stem test was conducted over the hydrocarbon zone.

#### 2.3.2. Danian sands 2550 - 2646 m (90 m)

Danian sands are overlaying the Upper Cretaceous chalky limestones.

Down to 2630 m sands are coarse grained subangular, poorly consolidated and alternate with dark grey shales.

The interval 2630 - 2646 m consists of fine argillaceous more or less calcareous cemented sands with shale interbeds.

Net sands are 40 m thick.

Porosities are ranging between 23 to 28%.

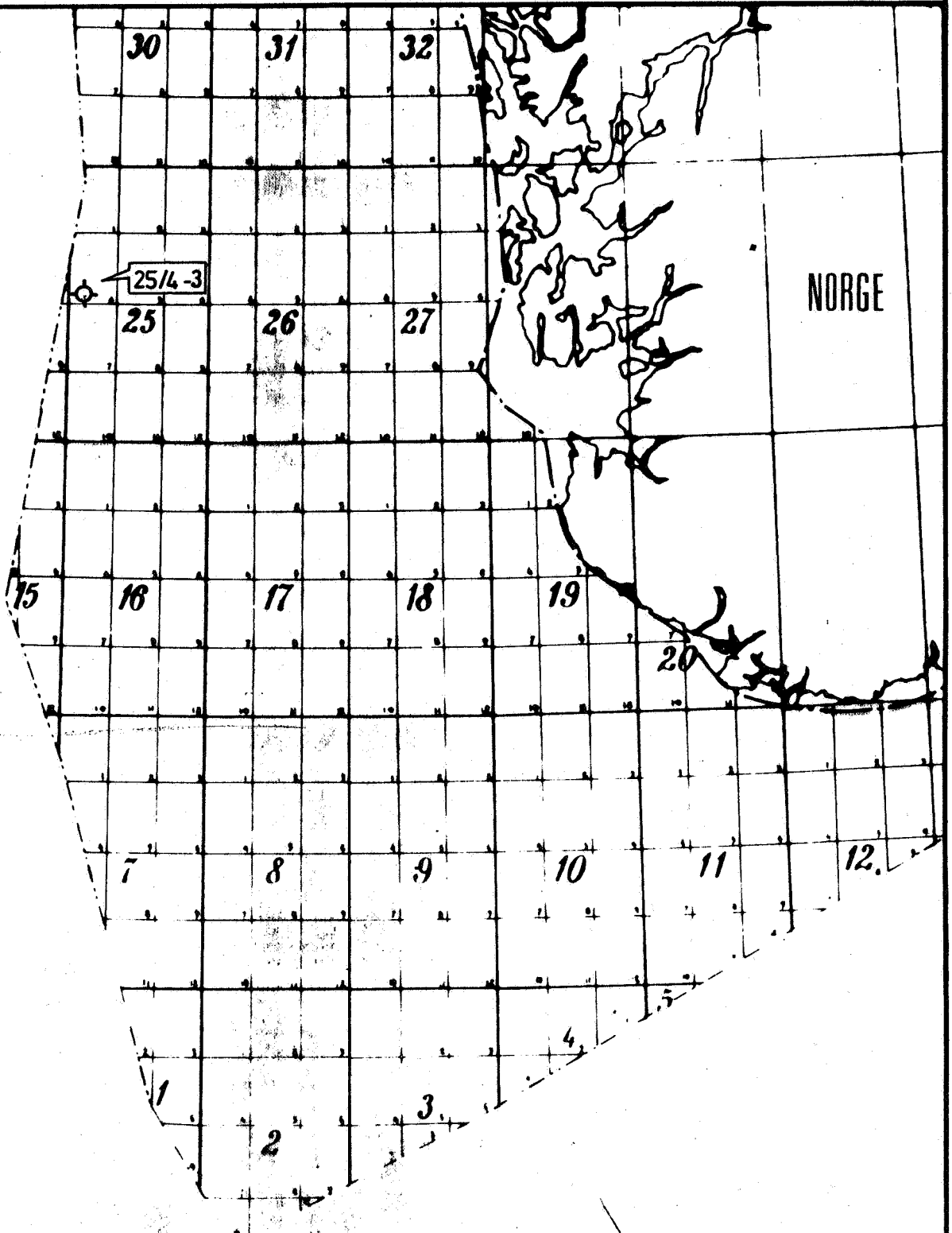
All these sands are waterwet.



# Position Map



25/4-3



SIDE WALL CORES DESCRIPTION			SERVICE COMPANY : SPE
			ASKED : 30
WELL : 25/4-3			RECOVERED : 21
			SHOT : 30
LICENCE : 036			LOST : 9
			FULL BULLET : 6
RUN N° 2			
PAGE N° 1			
DATE : 20.11.74			

tr : trace - M : medium - G : good

N°	DEPTHS	REC	LITHOLOGY	Fluorescence	
				cut	cut
1	2710		lost		
2	2687		lost		
3	2665		lost		
4	2631		empty		
5	2570		lost		
6	2535		lost		
7	2505	60	sh dk-gy to brn, sft, micmic, strongly calc, loc. sndy		
8	2449	60	altern. of: sh gy, micmic, non calc, w/sd fn to v. fn loc. consol. glauc.		
9	2423	50	silts. gy, sft, v. arg, glauc. w/thn lamin. of black to gn org. mater. partly slightly calc.		
10	2395		lost		
11	2263	50	sd fn to med, subang, poor sorted, glauc.		
12	2200	100	sh lt-brn, slightly micmic and slightly calc.		
13	2175		empty		
14	2162,5		empty		
15	2150		lost		
16	2142,5	10	sd fn angul., poor sorted, mic, v. weak oil stain and hydrocarb. odor.		
17	2132,5	70	sd v. fn, loose strongly micmic and pyr. loc argilaceous w/residue of black mater. (bituminous)		
18	2120		lost		





SIDE WALL CORES DESCRIPTION

SERVICE COMPANY :	SPE
ASKED :	30
RECOVERED :	22
SHOT :	26
LOST :	4
FULL BULLET :	13

WELL :	25/4-3	RUN N°	1
LICENCE :	036	PAGE N°	1
		DATE :	6.11.74

tr : trace - M : medium - G : good

N°	DEPTHS	REC	LITHOLOGY	Fluorescence	
				Color	CUT
1	1955	60	sh lt-gy, lt-gn to lt-brn, micmic, local pigmented black mater., non calc.		
2	1942	100	sh a.a.		
3	1925	20	sh lt-gn to lt-gy, soft, non calc.		
4	1910	100	sh lt-gn, micmic w/some inclusion of sh strongly black pigmented, pyr and calc.		
5	1888	100	sh lt-gy to gnish-blue, micmic, calc.		
6	1875		lost		
7	1850	100	sh lt-brn, soft, micmic, slightly calc w/incl. of sh. gn		
8	1831	100	sh lt-brn to gn calc, some black pigments		
9	1815,5		lost		
10	1785	100	sh gy, strongly micmic, some incl. of calcite and local. slightly calc.		
11	1738		lost		
12	1699	20	sh lt-gn to lt-brn, soft, specked w/black, mater. local. slightly calc.		
13	1677	50	sh a.a.		
14	1625	100	sh lt-brn, micmic, slightly calc.		
15	1600	80	sh gy to dk-gy, micmic w/black pigmentation.		
16	1565	100	sh lt-brn to brn, soft, micmic slightly calc.		
17	1528	80	sh a.a. partly dolomitic w/some inclus. of dol dk to dk-gy.		
18	1500	100	sh dk-gy, micmic, local. pyr, non cal. and w/black pigments.		



		SERVICE COMPANY : SPE	
		ASKED :	24
		RECOVERED :	23
		SHOT :	23
		LOST :	
		FULL BULLET :	
<b>SIDE WALL CORES DESCRIPTION</b>			
WELL :	25/4-3	RUN N°	3
LICENCE :	035	PAGE N°	1
		DATE :	20.11.74

tr : trace - M : medium - G : good

N°	DEPTHS	REC	L I T H O L O G Y	Fluorescence	
				EXC	CUT
1	2710	40	marl lt-gy sft		
2	2687	20	sd fn loose fair sorted slightly micmic and glauc. w/some black mater.		
3	2665		emoty		
4	2631	10	sh dk-gy sft silty strongly pyr (scattered gn)		
5	2603	10	sd fn rare med loose subrnd fair sorted		
6	2570	10	sd a.a.		
7	2535	20	sh dk-gy		
8	2485		mis fire		
9	2395	60	sh lt-gy slightly calc.		
10	2372	70	sh lt-gy non calc. w/some inclus. of sd med poor sorted		
11	2350	10	sd a.a.		
12	2318	10	siltst dk-gy arg. strohgly micmic, slightly calc. w/incl. of sd cor sol. cmt calc.		
13	2298	10	sd fn rare med loose subrnd poor sorted		
14	2224	20	sd a.a.		
15	2175	10	s a.a.		
16	2162,5	20	sh dk-gy to gn sft slightly silty micmic non calc.		
17	2150	10	sd fn to med subrnd to rnd		
18	2120	40	sd fn, micmic and galuc. abundant.		





Cut 5 m  
 Recovered: 2 m  
 Loss: 3 m

40%

Company ELF NORGE  
 Well no 25/4-3  
 Core no 2

Date 10/11/74

Depth: 2130 - 2135 m

Depths	Gr Co	PERM	POROS	EMOXY	DIPS	Log	DESCRIPTION
2130				↑ ▲ ▲ ↓ 30.5		.....	Shale: grey, indurated, micaceous, pyritaceous, locally sandy.
						.....	
						.....	30.3 Sand: fine, subangular, micaceous, slightly coloured by hydrocarbon.
						.....	30.5 Sandstone: very fine, hard, lineations with dark micas.
2131						.....	
						.....	31 Sandstone: very fine, hard, lineations with dark micas, with intercalations of dark grey shale.
						.....	31.05
						.....	31.2 Shale: grey, very micaceous, with sand lenses, cross bedding.
						.....	31.5 Sandstone: very fine, hard, lineations with dark micas.
2132						.....	
						.....	

Cut : 9 m  
 Recovered : 4 m  
 Loss : 5 m

44 %

Company : ELF NORGE  
 Well no : 25/4-3  
 Core no : 3

Date : 10/11/74  
 Depths : 2135 - 2144

Depths	GR Co	PERM	POROS	SHOWS	DIPS	Log	DESCRIPTION
2135							Sand/Sandstone: very fine, laminations with dark micas.
							Shale: dark grey, very pyritaceous, micaceous with cross-bedding, sand lenses.
2140							Sand: fine to medium, subangular, poor consolidated micaceous.
2141							
2142							Sandstone: very fine, intercalations of grey shale.
							Shale: grey, cross-bedding, sand lenses.
							Sandstone: very fine, cross bedding.
							Sand/Sandstone: fine, subangular.
2143							

No SHOWS



SP 135-Line 72-02-05

Coord. X: 02° 05' 289" E Z ground -121,5 m Y: 59° 30' 44,2" N Z RKB. +25,5m 42mSE 147 m		Spudded 13.10.74 Started drilling 17.10.74 At TD. 17.11.74 Completed 22.11.74 TD Driller 2714m TD Logger		Well: <b>25/4-3</b> <b>NORWAY</b> <b>off shore</b>	
Depths datum RKB Rig: D. S. D. Stopped in: U. Cretaceous chalk.		LICENCE 036 OWNED BY PAN OCEAN			
OPERATOR ELF NORGE A/S		TARGETS Heimdall sands (paleocene)			
RESULTS: Oil / Gas in Heimdall sands. Pay zone = Gas 3m - Oil 5m G/O = 2128m (-2102 m) O/W = 2133m (-2107 m)					
CASINGS 30" 184m (23.10) 13 3/8" 454m (27.10) 9 5/8" 1957m SHOWS below 2100 m, C <sub>1</sub> to C <sub>3</sub> - Fluo on K1., K2. down to 2131 m.		CORES SWC1 1960 - 450 22/30 K1. 2126 - 2130 75% K2. 2130 - 2135 40% K3. 2135 - 2144 44% SWC2 1965 - 2710 21/30 SWC3 1965 - 2710 23/24			
TESTS FIT 1. 2126,5 - no rec. but gas. FIT 2. 2129,7 - oil - PVT - transfert FIT 3. 2126,4 - failed.		LOGS IES 1961 - 451 1 GRSL 1961 - 451 1 " 2713 - 1960 2 IES 2713 - 1960 2 DLL " - " 1 MSFL " - " 1 MLMU " - " 1 CNL 2158 - 2086 1 FDCCR SNP GR. 2713 - 1960 1 HDT 2713 1960 1 Seismic survey		INTERPRETATION With laboratory results	



Depth E ↓	Litho- Section	Formations	Stages Shows	Descriptions. Obs.	Z : RKB +25,5 m Z : Ground or Sea bottom -121,5m	Well : <b>25/4-3</b>				
7800		HEIMDALL SANDS	MONTIAN TO	nt Ib	Sd, f to v.crs., tr. Sh, gry, grn, pyrite, coal, dol. Lmst and Sdst, calc. cmt string.	3500				
8000					Sd f to med.	11600				
8200					2503	11800				
2500					Sh, dk gry, grn, Lmst, wht, hd and Sdst, v.f., calc. cmt	12000				
8400					2550	12200				
8600					DAN. SDS	DANIA N		nt Ia	Sd, md to crs, subrded.	3750
									12400	
8800					MAESTR.				Lmst, hard, whitish Marl, gry, wht, sdy.	12600
9000									2646	12800
2750					T.D. 2714m					
9200					13000					
9400					4000					
					13200					
9600					13400					
9800					13600					
3000					13800					
10000					4250					
10200					14000					
10400					14200					
10600					14400					
3250					14600					
10800					4500					
11000					14800					
11200					15000					
11400					15200					