ELF NORGE A/S L-104

3

BA 74 - 5 - 1

GEOLOGICAL REPORT

18/11-1 well

BRAGE

I Pertinent data

1.1 General data

Licence	- 008 - Petronord - Phillips	
Association	- Elf Norge	21,584 %
	Aquitaine Norge	10,792 %
	T.O.M. Norsk	16,188 %
	Norsk Hydro	26,800 %
	Eurafrep Norge	1,824 %
	Coparex	1,596 %
	Cofranord	1,216 %
	Phillips	14,780 %
	Norsk Agip	5,220 %
Operator	- Elf Norge A/S	
Rig	- Deep Sea Driller 1 (H3)	
Location	- SP 12, Line 72-18-6	
	x = 4° 32' 00" 1 E	
	y = 58° 04' 21" 3 N	
Water depth	- 116 m	
	- 25 m	

1.2 Drilling data

17/2/74	spudded
20/2/74	started drilling
21/2/74	30" casing set at 177 m
24/2/74	20" casing set at 373 m
1/3/74	SPE Run 1 IES BHC GR
4/3/74	13 3/8 casing set at 805 m
14/3/74	start SPE run 2 BHC GR CBL IES SWC end on the 18th March
20/3/74	9 5/8 casing set at 1805
26/3/74	TD 2086 m SPE run 3 IES BHC GR CBL FDC GR HDT SWC
27/3/74	Velocity survey
31/3/74	Completed

1.3 Status

Plugged and abandoned as a dry hole.

II Geological data and results

1. Objectives

Structural trap of the Jurassic and eventual Triassic or Rotliegend sandstones in a faulted triangular block tilted S.W.

2. Stratigraphical and structural results

2.1. Structural data

Main markers and tops	Prognosis /RKB	Results /RKB	Results/ Prognosis
Upper Cretaceous			
Top of chalk "C_2"	535	498	+37
Bottom of chalk "D_1"	1115	985	+130
Jurassic			
Radioactive sh. "M_2"	1905	1742	+163
Sandstone	2005	1878	+127
Triassic	?		
Zechstein	2125		missing
Rotliegend	2175		
Basement	>2325	2060	>265

The differences in depths and thicknesses between prognosis and results are mainly due to the used velocity law throughout the Upper Cretaceous section.

2.2. Stratigraphical data

No stratigraphic studies have been carried out yet. The considered main stratigraphical breaks (see composite log) are infered from logs correlations with the surrounding wells.

2.2.1. Pleistocene - Paleocene 141-498 m (357 m)

Reduced serie mainly sandy down to 216 m, then shaly. Pleistocene is probably overlying directly Oligocene, disconformity could be set around 216 m.
Tuff are present and mark the Paleocene top at 462 m.

2.2.2. Danian - Upper Cretaceous 498-985 m (487m)

Limy section with chert levels throughout. Limestones present an excellent porosity, according to a bordering facies from the Scandinavian shelf, i.e. wackestone packestone types rich in Polyps Echinids remains with some reef boundstone levels at the top. At 900 m limestone is becoming more chalky and shaly with Glauconite near the bottom.

2.2.3. Lower Cretaceous 985-1530 m (545m)

Monotonous dark grey shale makes up this section with some scattered limestone stringers.

2.2.4. Jurassic 1530-2060 m (530m)

Upper Jurassic 1530-1782 m (252m)

The upper part consists of dark grey to grey shale with some carbonaceous inclusions and limestone stringers. From 1742 to 1782 m, undercompacted black to dark brown shale should be stratigraphic equivalent to "radioactive shale" as known in the surrounding wells, but without any abnormal radioactivity.

The following section is made up by alternates of indurated brown to dark grey shale and dolomite stringers. Some argillaceous sandstones were encountered between 1820 and 1827 m.

Medium to lower Jurassic 1782 - 2060 m (278m)

The section called "sandy shaly Jurassic" can be devided into three main units:

1878 - 1919 m = fine, well sorted sandstone, argillaceous cemented.

1919 - 1964 m = dark greenish grey to brownish shale with some silstone and limestone interbeds.

1964 - 2060 m = fine to coarse, angular grained, sandstones and varigated shale.

Carbonaceous material is common throughout the section. The "Jurassic age" of that section is inferred from the log correlations and should be upheld by laboratories studies. According to such a datation, the Jurassic deposits could be directly overlaying the basement.

2.2.5. Basement 2060 - 2086 m

Quartzitic feldspathic rock with chloritoschiste below 2085,25 m.

III Shows

Throughout the whole section any noticeable show was recorded. Faint traces of C_1 gas occured only below 1880 m in connection with the coal inclusions or intercalations.

IV Reservoirs and fluids

4.1. Upper Cretaceous limestone (498 - 985m)

From 498 to 865 m, the limestone presents some excellent reservoir characteristics with a sonic average of 115 µs/ft. It is quite waterwet.

Then the limestone of wackestone/mudstone type becomes harder, more compacted and poor reservoir.

4.2. Jurassic sandstones 1878 - 2060 m

4.2.1. 1878 - 1919 m (41 m)

Reservoir thickness = 24 m (of which 6 m fine calcareous sandstone).
ϕSL max = 32% ϕ FDC max = 27%
Rw = .05 Ω Salinity around 90.000 - 95.000 ppm -
Sw = 100%

4.2.2. 1964 - 2060 m (96m)

Reservoir thickness = 55 m (of which 25 m fine to coarse clean sand)
ϕSL max = 30% ϕ FDC max = 24%
Rw = .05 Ω Salinity around 90.000 - 95.000 ppm -
Sw = 100%

- - -

elf

POSITION MAP

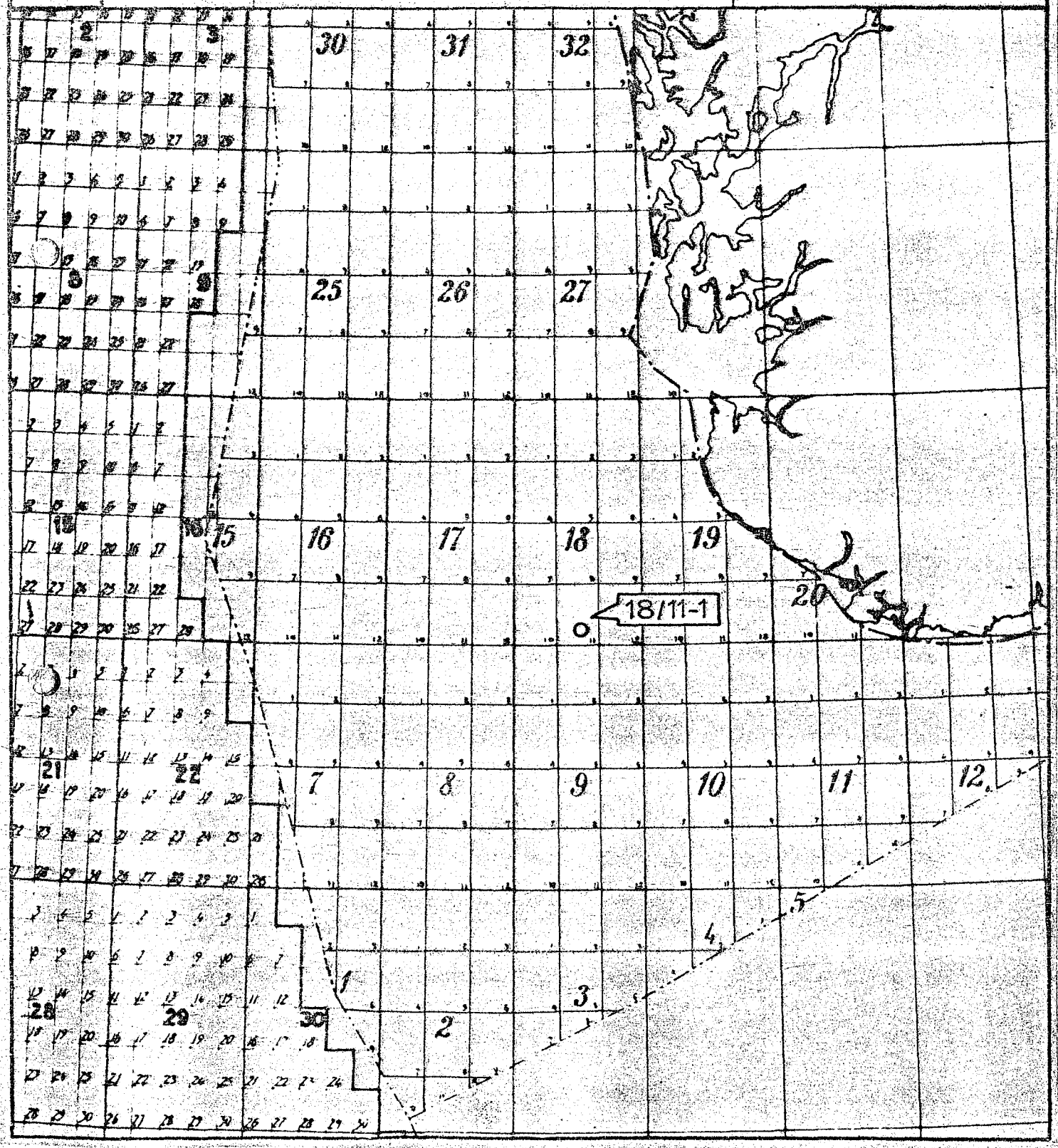
elf NORGE A/S

Echelle : 1/25000000

Date	
Auteur	N.F.
N° classt	

18/11-1

elf NORGE



Coord X : 04° 32'00,1" Z ground . 116m Y : 58° 04' 21,3" Z RKB. 25m Depths datum: R.K.B. Rig : D.S.D. Stopped in: Basement	Spudded 17.02.74 Started drilling 20.02.74 At TD 26.03.74 Completed 31.03.74 TD Driller 2086m TD Logger 2082m	Well: **BRAGE 18/11-1** Country: **NORWAY offshore**	
OPERATOR: ELF NORGE	LICENCE : 008	OWNED BY : PETRONORD	

TARGETS :

Jurassic and Rotliegend

RESULTS :

Jurassic sandstone reservoirs, water-wet overlaying basement.

CASINGS

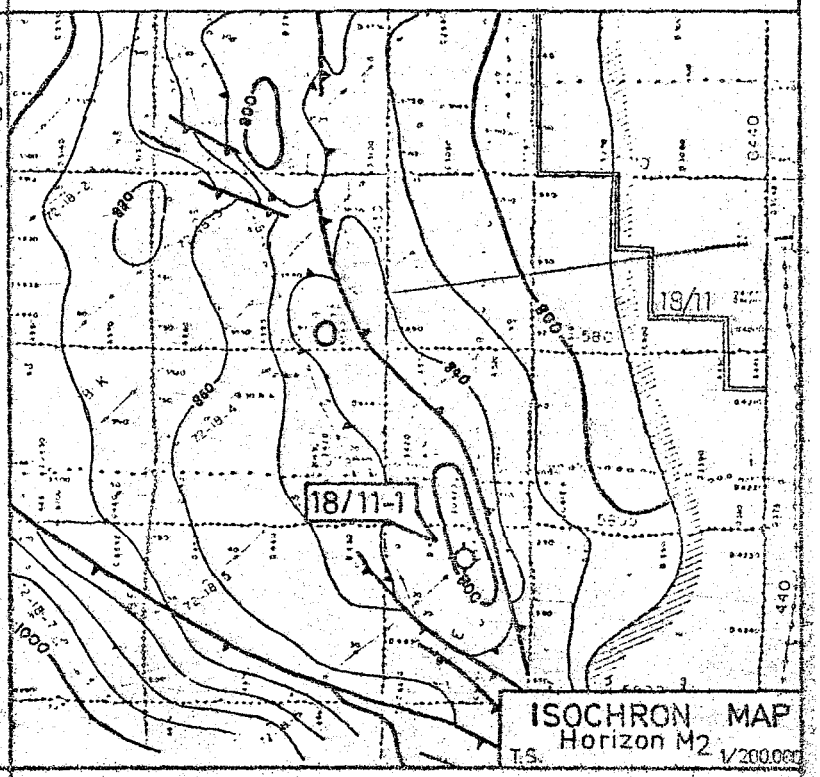
30"	177 m
20"	373 m
13⅜"	805 m
9⅝"	1805 m

CORES

K 1.	2082 - 2086	100%
SWC1.	804 - 1814	27/30
SWC2.	1814 - 2082	28/30

SHOWS

only tr. C1.



TESTS

LOGS

IES	376 - 820,5	1.
BHCGR	376 - 819	1.
GR	141 - 376	
BHCGR	804,5 - 1706	2.
"	1650 - 1814	2bis
CBL	300 - 800	1.
IES	804,5 - 1814	2.
IES	1802 - 2082	3.
BHCGR	1802 - 2082	3.
CBL	400 - 1801	2.
FDCGR	1802 - 2081	1.
HDT	1802 - 2082	1.
SSL		

INTERPRETATION

STRAT. TOPS FROM CORRELATIONS

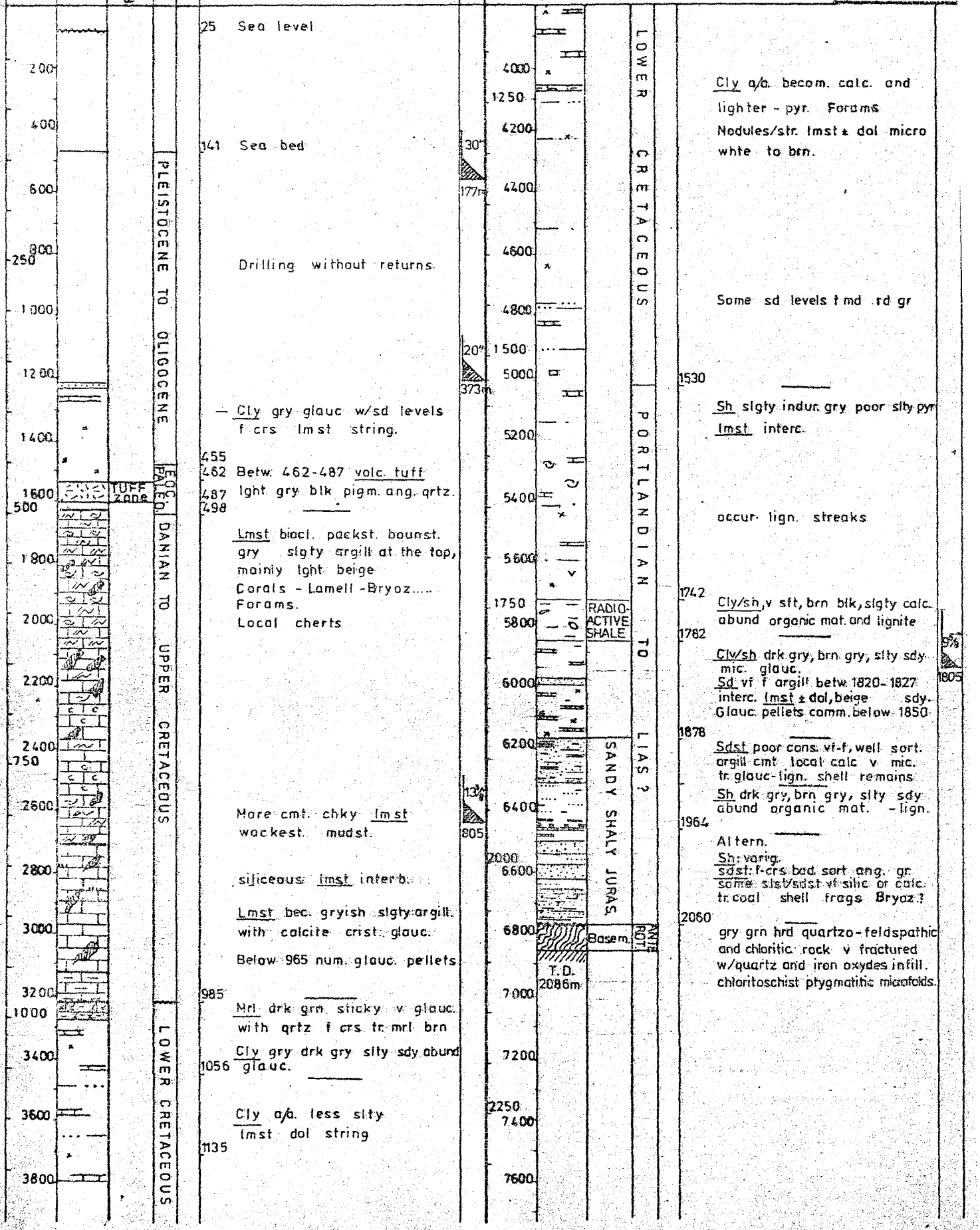
Checked 09.04.74.

By Y.G.

Depths m | Litho-section | Formations | Stages | Shows | Descriptions Obs.

Z RKB 25 m
Z Ground or Sea bottom 116 m
141 m

Well: BRAGE 18/11-1



Cut: 4 m
Recovered: 4 m
Loss: 0 m

100 %

Company: ELF NORGE
Well no: 18/11-1 "BRAGE"
Core no: 1

Date: 26.03.74
Depths: 2082 - 2086

Depths	% $CaCO_3$	Recov.	Porosity	Shows	Oil %	Log	DESCRIPTION
2082		BOX 1.					FROM 2082 TO 2085,65 GREENISH CRYSTALLINE ROCK MAINLY QUARTZIC MICROGRAINED TEXTURE WITH SOME AUTOMORPH ORTHOSE, XENOMORPH QUARTZ, FINE NEOSHAPED MUSCOVITE, CHLORITE, SOME ALTERED MINERALS INTO KAOLINITE SCHISTOSITY OR LINEATIONS: POOR PERCEPTIBLE MICROFISSURES AND FRACTURES THROUGHOUT THE SECTION WITH SLIKENSIDES PLANES OFTEN COVERED BY WHITISH "SHALY" CRUST OR FILLED BY MILKY QUARTZ VEINS OR CALCITE FELDSPATHIC QUARTZITE WITH MUSCOVITE AND CHLORITE
2083		BOX 2.					FROM 2085,65 TO 2086 "QUARTZITE" A.A. AND CHLORITOSCHIST. QUARTZIC TRANSLUCIDE OR OPALESCENT QUARTZ AND ALTERED MINERALS INTO KAOLINITE (SOME F RECRISTALLISATION AROUND QTZ)
2084		BOX 3					
2085		BOX 4.					
		BOX 5.					PTYGMATITIC FOLDS.
2086							

SERVICE COMPANY :	SPE
ASKED :	30
RECOVERED :	27
SHOT :	30
LOST :	1
FULL BULLET :	27

SIDE WALL CORES DESCRIPTION

WELL : 18/11-1
LICENCE : 008

RUN N° 1
PAGE N° 1
DATE : 18/3/74

tr : trace - M : medium - G : good

N°	DEPTHS	REC o/o	LITHOLOGY	Fluorescence tr	M	G	CUT
1	1790	40	CLY GRY DRK GRY V F SLTY SDY MIC NO CALC				
2	1775	60	CLY/SH BRN TO BLK V SFT ABUND ORGANIC MATTER LIGN SLGTY CALC				
3	1750	40	A.A. SLGTY SLTY AND CALC				
4	1710	40	CLY GRY DRKGRY SLGTY CALC SLTY F MIC				
5	1680	100	SH DRK GRY F MIC SLTY MODER CALC RARE F CARBON INCLUS				
6	1650	0	/				
7	1625	100	SH DRK GRY F MIC SLTY NO CALC				
8	1600	90	~~CLY GRY~~ BEIGE GRY SLGTY SLTY F MIC NO CALC				
9	1570	/	/				
10	1540	100	A.A.				
11	1515	100	A.A. (FORAMS)				
12	1480	100	SH GRY CALC F MIC SDY RARE GLAUC				
13	1455	100	SDST V ARGILL TO V SDY SH SLGTY CALC V F SUBANG GR ABUND MIC				
14	1425	100	SH GRY SLGTY CALC F SDY MIC RARE CLAUC FORAMS				
15	1405	100	SH GRY BEIGE GRY SLGTY CALC F MIC AND SLTY PYR SMALL SHELL FRAGS FORAMS				
16	1375	100	~~SH GRY BEIGE GRY SLGTY CALC F MIC AND SLTY RARE PYR FAULT PLANS~~				
17	1340	80	A.A. (FORAMS)				
18	1320	100	SH DRK GRY SLGTY CALC SLTY MIC				

SERVICE COMPANY :	SPE
ASKED :	30
RECOVERED :	27
SHOT :	30
LOST :	1
FULL BULLET :	27

SIDE WALL CORES DESCRIPTION

WELL :	18/11-1	RUN N°	1
LICENCE :	008	PAGE N°	2
		DATE :	18/3/74

tr : trace - M : medium - G : good

N°	DEPTHS	REC	LITHOLOGY	Fluorescence				CUT
19	1290	100	SH/CLY DRK GRY LOC F SLTY SDY SLGTY CALC SCATTER NOD SDST VF SMALL SHELL FRAGS					
20	1262	100	SH DRK GRY SLGTY CALC FAIR SLTY SDY MIC PYR					
21	1235	100	A.A. GLAUC					
22	1200	100	A.A. NO CALC					
23	1175	100	SH/CLY DRK GRY BLK POOR SLTY MIC TR PYR (PYR TUBES)					
24	1150	100	A.A. SCATTER NOD SDY SH CRS MIC GLAUC					
25	1130	0	/					
26	1100	100	A.A. ABUND GLAUC (PELLETS) CARBON SPECKS					
27	1080	100	A.A. SMALL SDY CONCRETIONS CRS MUSC THIN LIGN DEBRIS RARE GLAUC					
28	1050	100	SH/CLY GRN GRY V SDY TO SDST F VF ARGILL ABUND GLAUC PELLETS MUSC					
29	1005	100	SDST GRN GRY ARGILL FVF SUBANG V GLAUC MIC POOR CONSOL					
30	950	40	CHKY LMST WHTE V LGHT BEIGE (MUDST. WACKEST) BIOCLASTIC					

SERVICE COMPANY :	SPE
ASKED :	30
RECOVERED :	30
SHOT :	30
LOST :	0
FULL BULLET :	28

SIDE WALL CORES DESCRIPTION

WELL :	18/11-1	RUN N°	2
LICENCE :	008	PAGE N°	1
		DATE :	27/3/74

tr : trace - M : medium - G : good

N°	DEPTHS	REC	LITHOLOGY	Fluorescence tr	M	G	CUT
1	2070	0	EMTY BULLET				
2	2060,5	50	SH V SFT GRN SDY CR QTZ SUBROUND SUBANG F MUSC NO CALC				
3	2055	100	SH SLGTY INDUR BEIGE GRY SCATT QTZ NO CALC				
4	2050	40	CLY/SH V SFT GRN F MIC				
5	2045	100	CLY/SH V SFT GRN GRY NO CALC FRICTION PLANS				
6	2037,5	30	SDST GRY GRN F CRS V BAD SORT GR ARG CMT QUARTZITIC PEBBLE				
7	2029,7	30	SH DRK GRY GRN FISSILE F MIC SOME COAL INCL NO CALC				
8	2020	50	SH SLGTY INDUR GRN NO DETRITIC NO CALC				
9	2009	60	SDST GRYISH V F CRS BAD SORT ANG GR POOR CMT ARGILL INCL				
10	1999	80	SH SFT BEIGE F SDY NO CALC GRUMELOUS STRUCTURE				
11	1992	20	MRL LGHT GRN GRY V SDY F MD GR FAIR SORT				
12	1981	60	SDST GRYISH POOR CONSOL F CRS ANG GR ARGILL CMT IN PATCHES INC BIT OR DRK BRN ORGANIC CLY AND COAL				
13	1978,7	10	SH FISSILE POOR INDUR GRYISH GRN SLGTY DETRIT LAMINAE SILTST WHTE FISS SUBVERT NO CALC				
14	1968,7	50	SH BEIGE BUFF SLGTY SDY FRICTION PLANS NO CALC				
15	1958	0	EMPTY BULLET				
16	1955	60	SH DRK GRNISH GRY WITH THIN SLTY INTERBEDS FRICTION PLANES				
17	1947	60	SH BRNISH GRN SLTY/SDY THIN INTERBEDS SDST WHTISH F RICH IN ORGANIC STUFF SLGTY CALC				
18	1935	40	A.A. NO CALC				

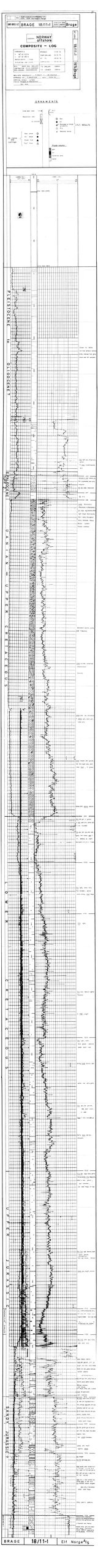
SERVICE COMPANY :	SPE
ASKED :	30
RECOVERED :	30
SHOT :	30
LOST :	0
FULL BULLET :	28

SIDE WALL CORES DESCRIPTION

WELL :	18/11-1	RUN N°	2
LICENCE :	008	PAGE N°	2
		DATE :	27/3/74

tr : trace - M : medium - G : good

N°	DEPTHS	REC	LITHOLOGY	Fluorescence				CUT
19	1925	20	A.A. MORE SDY ABUND ORGANIC STUFF CALC PYRITIC COAL BEDS					
20	1915	80	SDST BRN GRY F GR WELL SORT POOR CMT ARGILLO BIT LAMINAE					
21	1909	90	SDST BRNISH GRY VF F POOR CMT ARGILLO BIT LAMINAE					
22	1905,5	25	A.A. MORE ARGILL CMT					
23	1895,5	90	SDST GRNISH VF F GR POOR CONSOL ARGILL CMT MUSC TR BIT					
24	1885	50	SH DRK GRNISH BRNISH GRN V SLTY LAMINAE SILT MIC					
25	1878	100	SH DRK BRN ASSILE NO SLTY NO CALC					
26	1870	100	A.A.					
27	1863	90	A.A. LESS FISSILE					
28	1843,7	100	SH FISSILE DRK GRNISH DRK BRN SLTY F MIC NO CALC GLAUC FRICTION PLANS					
29	1826	70	SH DRK GRNISH SLTY SDY NO CALC THIN CARBON INCLUS					
30	1821	60	SDST SFT VF F GR ARGILL DRK GRNISH F MUSC INTERBEDS MORE SDY GLAUC 1 BELEMNITE FRAG					


BRAGE 18/11-1
NORWAY offshore
COMPOSITE - LOG
Brage
18/11-1
COMMENTS
FLEKKEFJORD IN OLIGOCENE
DANIAN - UPPER CRETACEOUS
LOWER CRETACEOUS
JURASSIC
SANDY
BRAGE 18/11-1 Elf Norge A/S