Arkiveksemplar
RETUR
STATOIL
LTEK DOK.SENTER
L.NR. 91067981
KODE Well 15/3-2 nr. 20
Returneres etter bruk

ELF AQUITAINE NORGE A/S
Geological Dept.
311D/78/59/SG/JPM/sb

WELLFILE

GEOLOGICAL COMPLETION REPORT

WELL 15/3-2

Author: J.P. MOUCHET

Stavanger, March 1978

INTRODUCTION

The 15/3-2 well was drilled in two stages:

- the first with Polyglomar Driller (10.000 psi wellhead equipment)
- the second with Pentagone 84 (15.000 psi wellhead equipment)

After unsuccessful fishing and side-tracking at 4.750 m the well was abandoned before reaching the expected T.D.

Therefore, due to these technical problems the ambiguity related to the J4 seismic marker has not been solved.

Three Jurassic sandstone bodies were encountered, two are hydrocarbon-bearing. Three tests were attempted, but failed.

1. GENERAL AND GEOGRAPHICAL DATA

1.1 General

Country:	Norway
Area:	Block 15/3 (licence 025)
Owner:	Petronord Group
Operator:	Elf Aquitaine Norge A/S
Classification:	Wildcat
Drilling platform:	1st phase, until setting the 9 5/8" casing: Polyglomar Driller 2nd phase, after setting the 9 5/8" casing: Pentagone 84

1st phase - Polyglomar Driller

Rig released to EAN:	25.10.76
Date spudded:	29.10.76
Provisionally abandoned:	24.01.77
Provisional depth driller:	4.258 m
Provisional depth logger:	4.260 m

2nd phase - Pentagone 84

Re-entered:	26.07.77
Completed:	27.11.77
Drilled to:	4.990 m
Top fish:	4.742 m
Depth logger:	4.755 m

1.2 Geographical Data

Longitude:	01° 47' 12.6" E
Latitude:	58° 59' 00.6" N
Water depth:	110 m
RKB, Polyglomar Driller:	25 m
RKB, Pentagone 84:	25 m
Seismic location:	SP 210 - line 580 529

2. GEOLOGICAL ABSTRACT

2.1 Selection of Well Project

A first well has already been drilled by Petronord on the 15/3 block. This well (15/3-1) has recognized a thick Upper Jurassic series but was stopped of technical reasons before reaching the Dogger - Lias series. Three main reservoir sections were encountered from Kimmeridgian unconformity down to T.D. All are hydrocarbon bearing.

The 15/3-2 is located in the uplifted area (defined at the J2) in the northern part of the block, which opened greater possibilities of releasing parcels even in the case of a major discovery.

The objectives of the 15/3-2 were the Jurassic sands. However, in order to allow testing the Jurassic high pressured reservoirs in case of discovery, a rig with a 15.000 psi wellhead equipment, the Pentagone 84, was necessary, and used for the drilling of the 8 3/8" phase.

2.2 Uppermost and lowermost Formations

The uppermost geological formation consists of clays with intercalations of sands (Pleistocene).

The 2nd phase drilling was stopped in an argillaceous formation of Callovian age.

2.3 Results

Lithology (see 1/5.000 log and composite log)

- Tertiary - Cretaceous section:
  The lithology is approximately the same as prognosed.
  The 15/3-2 and 15/3-1 formations are isopach except for the lower Cretaceous which in the 15/3-2 is 2.4 times thicker than in the 15/3-1 well.

- Jurassic section:

A Jurassic series with shaly - sandy facies similar to the one of 15/3-1, has been encountered. The Jurassic section from 4.236 to 4.990 m, i.e. a total thickness of 754 m, is of Portlandian/Kimmeridgian to Callovian age.

Facies encountered are as follows:

Portlandian/Kimmeridgian series: mainly argillaceous, with limestone stringers.

Middle Oxfordian series: argillaceous with limestone stringers.

Callovo-Oxfordian: two sandstone bodies, 4.400 - 4.512 m and 4.551 - 4.615 m, with shale interbeds.

Callovian: light grey shale with sandstone levels in the upper part (notably in the interval 4.644 - 4.695,5 m).

Reservoirs

Four sandstone bodies were encountered in the Callovo-Oxfordian and Callovian series: 4.400 - 4.512 m, 4.551 - 4.615 m, 4.644 - 4.659 m and 4.677 - 4.695,5 m.

The first and second ones are hydrocarbon-bearing.

The low porosity (5 to 10%) of these sandstones seems to be an effect of hot thermal water coming up along faults.

Three DSTs were unsuccessfully performed in the second zone (4.551 - 4.574 m).

Shows

Down to 4.236 m (Tertiary and Cretaceous sections) no significant shows were observed except in Coniacian and Turonian limestones where only a few per cent of Cl were recorded. In these intervals electric log analysis do not indicate any hydrocarbon-bearing reservoirs.

Shows during drilling were recorded in all the Jurassic section: gas in mud with low percentage and C1 to C4.

Fluorescence (direct and cut) on cuttings and cores.

3. LITHOLOGY DESCRIPTION

The limits of the different units were selected mainly from correlations with well 15/3-1, but also in accordance with the first palynological results.

In the 4.755 - 4.990 m interval no electric logs were run due to fish left in hole, and subsequently, the lithology is inferred from cuttings and drilling rate.

3.1 Lignitic Series

- Miocene to Pleistocene (135 - 670 m)

  Clay silty to sandy with fine to medium sand, shell fragments, lignite.

3.2 Brown Clays Group

- Oligocene (670 - 1.360 m)

  Clay grey - brown, silty to sandy, glauconitic. Interbeds of sand fine to coarse.

- Eocene (1.360 - 2.082 m)

  Silty shale with dolomitic limestone stringers. Fine to medium sand (1.427 - 1.617 m).

3.3 Paleocene to Danian (2.082 - 2.803 m)

- Tuff zone (2.082 - 2.142 m)

  Tuff and shale, dark grey, silty, calcareous, locally abundant pyrite.

- Upper grey - shale (2.142 - 2.353 m)

  Clay dark to medium grey, micaceous.

- Heimdal sands (2.182 - 2.648 m)

  Upper sand/shale (2.182 - 2.242 m)

  Alternation between:

  - sand fine to medium, shaly
  - shale grey micaceous

  Upper massive sands (2.242 - 2.338 m)

  Fine to medium sand

  Lower sand/shale (2.338 - 2.437 m)

  Alternating beds of shale grey-green silty to sandy and sand fine to medium, shaly.

  Lower massive sands (2.437 - 2.648 m)

  Sand fine, shaly to shale grey-green sandy.

- Danian (2.648 - 2.803 m)

  Shale grey, silty. Limestone white, locally sandy, chalky. Clay to marl grey, locally pink.

3.4 Upper Cretaceous (2.803 - 3.913 m)

- Maestrichtian (2.803 - 3.078 m)

  2.803 - 2.970 m:

  Argillaceous limestone off-white to light grey with interbeds of marl/shale grey, pyritic.

  2.970 - 3.078 m:

  Marl grey, with shale grey-black, calcareous. Limestone stringers.

- Campanian

  Marl grey, calcareous, with marl pink to red-brownish.

- Santonian - Coniacian (3.163 - 3.603 m)

  3.163 - 3.367 m:

  Marl grey-green, grey, locally calcareous. Interbeds of argillaceous limestone and grey-dark shale.

  3.357 - 3.603 m:

  Limestone chalky, cream, strongly argillaceous. Interbeds of marl grey and white to beige limestone, glauconitic.

- Turonian (3.603 - 3.753 m)

  Microsparitic to sparitic limestone at the top, grading to micaceous shale at the bottom.

- Cenomanian (3.753 - 3.913 m)

  Alternates of calcareous shale, marl and argillaceous limestone.

3.5 Lower Cretaceous (3.913 - 4.236 m)

- Albian - Aptian (3.913 - 4.037 m)

  Shale dark-grey, micaceous.

- Barremian - Neocomian (4.037 - 4.236 m)

  Barremian: 4.037 - 4.109 m
  Lower Barremian to Hauterivian: 4.109 - 4.128 m
  Hauterivian: 4.128 - 4.152 m
  Valanginian: 4.152 - 4.236 m

  Shale dark-grey, pyritic. Marl beige with limestone stringers.

3.6 Jurassic (4.236 - 4.990 m)

- Kimmeridigan - Portlandian (4.236 - 4.332 m)

  Brown black shale, bituminous. Limestone levels white to beige in the basal part (below 4.303 m).

- Middle Oxfordian (4.332 - 4.400 m)

Shale to marl grey, grey-dark, multicoloured in basal part.
Argillaceous limestone stringers.

- Callovo-Oxfordian (4.400 - 4.644 m)

4.400 - 4.512 m:

Sandstone bad sorted, fine to coarse, siliceous cement.
Dark-brown shale levels, micaceous, pyritic.

4.512 - 4.551 m:

Shale dark-brown, silty, pyritic with traces of lignite.

4.551 - 4.615 m:

Sandstone fine to medium, with siliceous cement, argillaceous at the basal part, lignitic debris.

4.615 - 4.644 m:

Shale dark-grey, micaceous, silty, pyritic.

- Callovian (4.644 - 4.990 m - T.D.)

4.644 - 4.695,5 m:

Sandstone fine to medium, micaceous, lignitic debris.
Interbed of grey-black shale, silty to sandy, very micaceous.

4.695,5 - 4.990 m:

Alternating beds:
- shale light beige/brown, silty micaceous.
- sandstone fine, pyritic.

From 4.859 m, essentially shale light grey to dark, silty with some interbeds of sandstone medium to coarse, siliceous cement.

4. STRATIGRAPHY AND SEDIMENTOLOGICAL RESULTS

The limits of the different units were selected mainly from correlations with well 15/3-1, but also in accordance with the first laboratory results. (We point out that we have not yet received the laboratory reports but only flash and incomplete data.)

4.1 Tertiary Formation

In the 15/3-2 well the lithostratigraphical zonation is the same as that of the 15/3-1 well.

The basal Tertiary sediments have tentatively been assigned to a "deep sea fan" model as in the Frigg Field area*. The relationships between the 15/3-1 and 15/3-2 are shown on plate 4, and the most important points to be noted are:

- the lack of Danian sands in well 15/3-2
- the development of the lower massive Heimdal sands in the 15/3-2.

4.2 Cretaceous Formation

The different stages of the Upper Cretaceous have been identified, from Maestrichtian to Cenomanian. It is marked by the predominance of planktonic foraminiferal assemblages indicating open marine, probably outer neritic to bathyal conditions.

The Lower Cretaceous is characterized by arenaceous benthonic foraminiferal assemblages. Basically, it has been possible to identify an Albian - Aptian series and a Neocomian s.l., including a probable Lower Barremian and the Hauterivian - Valanginian.

The organic facies is essentially made up of coaly and ligneous particles in the cretaceous section.

* - See R. Cussey report: "Sedimentological study of basal tertiary formations" - GEO/LAB Bss 7/1559

4.3 Jurassic Formation

Only Upper Jurassic series have been drilled, ranging in age from Portlandian/Kimmeridgian to Callovian. They have not yet been studied, except for the samples in the upper zone (4.236 - 4.750 m).

The main points are:

- the thinning of Kimmeridgian and Callovo-Oxfordian series
- the lack of Upper Oxfordian series

The well was stopped just before reaching the seismic marker called J4, probably related to a Jurassic body and not to the top of a Triassic section.

The Kimmeridgian/Portlandian (4.236 - 4.332 m) is free of sands and has the typical sapropelic organic facies

The Middle Oxfordian series (4.332 - 4.400 m) is a shaly section.

The 15/3-2 Callovo-Oxfordian series (4.400 - 4.644 m) is thinner than the one of 15/3-1, and has an important development of sandy facies through a deltaic system environment. However, the bad reservoir characteristics of the 15/3-2 Jurassic sandstones seem due to a local water thermal effect on the faulted northern structure.

The sandy/shaly upper part of the thick Callovian series (4.644 - 4.990 m) is becoming more shaly down to 4.859 m.

5. STRUCTURAL RESULTS

5.1 Seismic results

The 15/3-2 well is located on the northern uplifted area of block 15/3. This structure is divided in two parts and the well has explored the NW culimination. Well 15/3-2 is on the M2 and J2 top position and near the top of the J3 seismic horizon. These two intra-Jurassic markers were called lower Callovian sands (J2) and top Dogger (J3). The last objective of the well was the J4 marker (prognosed Triassic top) but not mapped.

According to sonic logs and velocity survey results we can correlate the seismic markers with the stratigraphy.

Seismic marker	Stratigraphy attribution (actual)	Depth (MSL)	
		Predicted	Actual
C1	Tuff	2.080	2.057
C2	Maestrichtian chalk	2.810	2.778
M2	Kimmerian unconformity	4.290	4.211
J1	Callovo-Oxfordian Sandstones	eroded	4.375[1)]
J2		4.550	4.439
J3	Callovian	4.720	4.619
J4	Middle Jurassic top Trias ?	5.060/4.985[2)]	not reached

1) - The presence or the lack of the J1 seismic marker has been debated. However, according to the correlations between 15/3-1 and 15/3-2 we conclude in favour of J1 presence (plate 4).

2) - After having run the last sonic (4.375 - 4.755 m) and velocity survey the J4 predicted depth was corrected .

Further details on the seismic results are given in annexe 2.

5.2 Dipmeter Results

The 15/3-2 dipmeter shows successive sudden dip variations during all the Jurassic deposition. This fact can be related to tilting associated with a differential subsidence. This has also been observed in the 15/3-1 Jurassic section.

The low dips of sandstones show clearly the low depositional energy character which we can note is higher in 15/3-1 than in 15/3-2.

From correlations between 15/3-1 and 15/3-2 it appears that we have several major unconformities (see plate 6) which cause important thickness variations. These unconformities are not characterized on the dipmeter due to the low variations of dips, but can be deduced from correlations between all wells in the area (plate 1).

6. UNDERCOMPACTED FORMATIONS

"D" exponent was computed on board and indicates the top of undercompacted shales at 4.000 m. Geoservices' calculations computed from electrical logs indicate the top at 3.870 m, i.e. approximately at the top of Lower Cretaceous (3.913 m) as in the 15/3-1 well (plate 6).

The pore pressure values increased from 1,04 (normal Cretaceous gradient) to 1,60 at the Upper Jurassic top.

In the Jurassic section the formation pressure recorded by the RFT is 1,72, in conformity with Geoservices' values computed on board.

In fact, on board pore pressure calculations of values conducted both during 1st (Elf Aquitaine computer plus Exlog computer) and 2nd (TDC Geoservices) phase drilling were confirmed by electrical log calculations and RFT results. From this we can infer that the on board calculations are reliable.

We have to note that the 15/3-2 Jurassic pore pressure is lower than the one of 15/3-1 (between 1,85 and 1,94).

7. RESERVOIR AND SHOW RESULTS

7.1 Tertiary (0 - 2.803 m)

Pleistocene to Eocene

Several water-bearing unconsolidated metrics to decimetrics sand reservoirs are interbedded in the Tertiary clays, especially in the Eocene.

- Salinity: 65.000 ppm
- Porosity: about 30%

However, during drilling, a background of 0,5 to 2% of C1/C2 was recorded mainly in front of the shaly section from 220 to 920 m.

7.2 Paleocene Sands

Above Tuff zone there is no Frigg sand equivalence, only thin beds of sand.

Below Tuff zone the series (2.182 - 2.648 m) are mainly sandy with shale interbedded sands, fine to medium, moderately sorted. These sands are waterbearing and only traces of methane has been detected.

Between 2.465 and 2.545 m, direct pale yellow fluorescence was observed discontinuously.

- Salinity: 75.000 ppm
- Porosity: about 27% on clean sands

7.3 Cretaceous (2.803 - 4.236 m)

Upper Cretaceous Limestone

In the Coniacian and Turonian limestones several small gas kicks were recorded by chromatograph in the following intervals:

- 3.422 - 3.430 m: 4% - C1/C2
- 3.468 m: 1% - C1/C2
- 3.521 - 3.528 m: 1% - C1/C2
- 3.600 - 3.634 m: traces to 0,5% - C1
  traces - C2/C3

In these four intervals brown-yellow fluorescence was observed.

The electric logs analysis do not indicate any hydrocarbon-bearing reservoirs.

Lower Cretaceous

No reservoirs.

7.4 Jurassic Section (4.236 m to T.D.)

Reservoirs (see Coriband)

Four sandstone bodies were encountered in the Jurassic section (see plate 7 and Composite log).

At 4.400 m a first sandstone zone of 112 m was drilled through, which seems to be hydrocarbon-bearing (according to log interpretations) but of bad reservoir characteristics with a porosity of only 5% and a very low permeability (0,30 md).

Several RFTs were attempted, but dry (see plate 8).

- Gross thickness: 112 m
- Net thickness: 76 m

At 4.551 m a second hydrocarbon-bearing sandstone zone of 64 m was encountered. This zone has a better porosity (5 to 10%) but the permeability is still very low (0,30 md).

- Gross thickness: 64 m
- Net thickness: 37 m

At 4.644 m a third sandstone zone of 15 m with a porosity of 10 to 12%, but water-bearing, was encountered.

- Gross thickness: 15 m
- Net thickness: 8 m

Average core permeability is 0,09%.

At 4.677 m we have the last sandstone zone of 18,5 m which is also water-bearing.

- Gross thickness: 18,5 m
- Net thickness: 15,5 m

Average CPI porosity is 6,20%.

The core measures and the CPI study in the lowest sandstone bodies show a better porosity and lower permeability than in the upper sandstone bodies (see plate 7). The computed permeability values from the total permeability log are higher than those on core measures, but in the same range (see plate 4).

However, the bad reservoir characteristics can be explained by a silicification from hydrothermal infiltration. The way of these hydrothermal manifestations could logically be the faults or the fault-systems associated with certain compartments of the Jurassic grabben. The silicification does not exist in well 15/3-1 and is probably geographically limited.

Shows

Shows during drilling were encountered in all of the Jurassic section: C1, C2, C3 plus iC4, NC4 in the upper part.

- Core 1 (4.404 - 4.406 m): sandstone, dispersed fine spots of very weak fluorescence, bubbles of gas
- Core 2 (4.406 - 4.409 m): sandstone/shale, bubbles and fluorescence
- Core 3 (4.565 - 4.574 m): sandstone/shale, gas bubbles and very faint fluorescence on cut, blue direct fluorescence in parts
- Core 4 (4.656 - 4.662 m): sandstone/shale, gas seeping from all the core, faint direct fluorescence

From electrical logs and CPI log the following parameters have been calculated:

- RW = 0,029
- Water salinity = 70.000 ppm
- water saturation = 35% (on the two upper sandtone bodies)

RFT/Tests (see plate 8)

26 RFTs were attempted in the three upper sandstone bodies (see plate 8). All were either dry or they failed. Only two RFTs, at 4.401 and 4.401,4 m, were stabilized and indicate an equivalent density of 1.73.

Three tests were carried out in the upper Jurassic sandstone body, which

were expected hydrocarbon-bearing but all were misruns due to mechanical failure.

The calculations from the shows recorded during drilling indicate that the sandstones are gas bearing.

Consequently, the RFT/Tests do not confirm whether hydrocarbon is present.

8. CONCLUSIONS

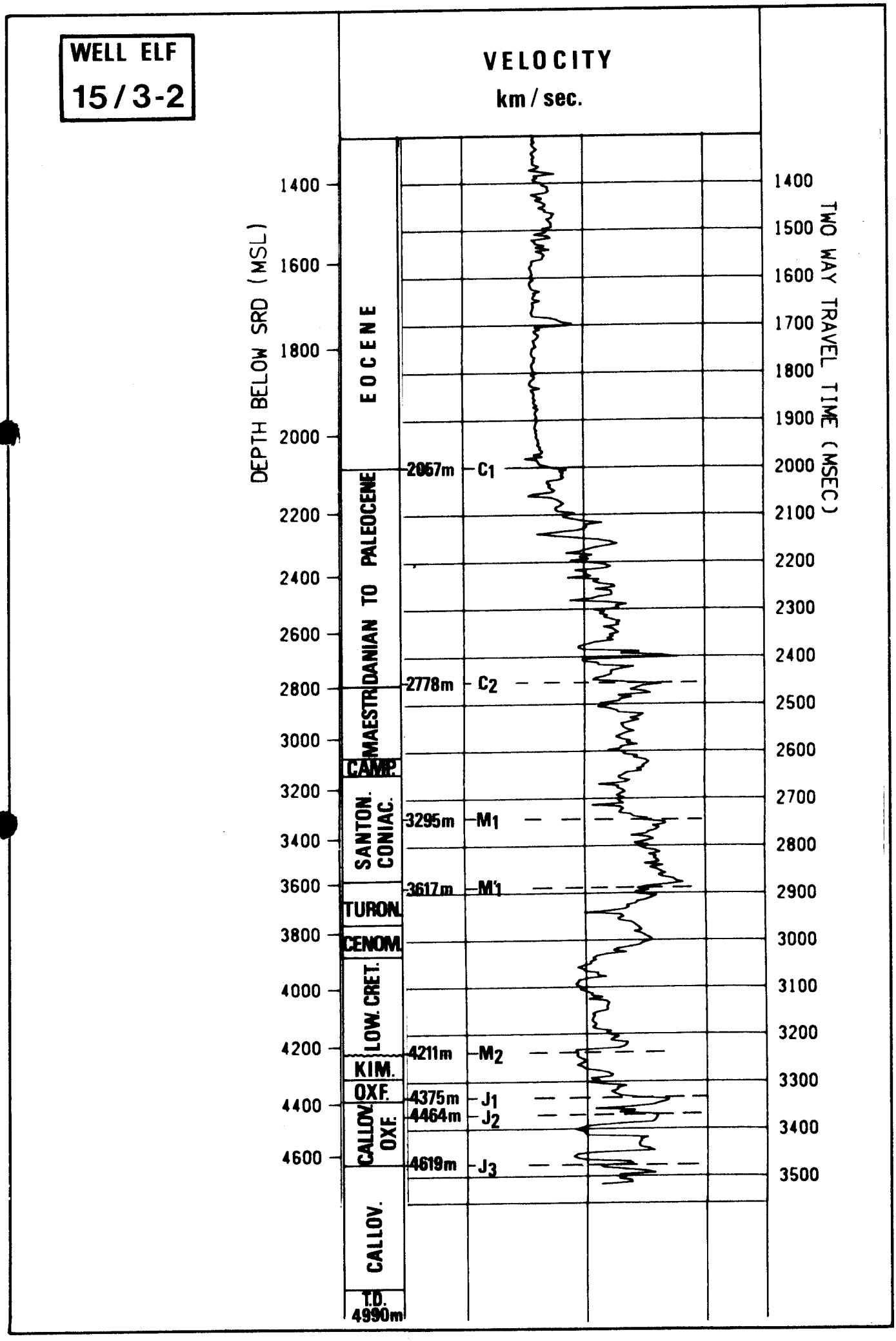
The purpose of well 15/3-2 was to explore a structure located in the NW part of the block. Due to technical reasons the well was stopped at 4.990 m in Callovian series. Because of the premature stop the Brent to Statfjord (Dogger to lower Jurassic) sedimentary section was not reached. However, it is possible that the Dogger section is very close to the T.D. (J4 horizon is prognosed at 5.000/5.100 m)

Four sandstone reservoirs were drilled. According to logs the two upper ones are hydrocarbon-bearing with bad characteristics (porosity destruction by silicification) and no tests were successful.

Post depositional cementation of the sandstone reservoir could be due to hydrothermal infiltration. This hydrothermal manifestations, probably in connection with a fault system, should be local and do not minimize the interest of the north part of the 15/3 block.

ANNEXE I - Geophysical Summary (by C.R. Evensen)

ANNEXE II - Well Data Summary


WELL ELF
15/3-2
VELOCITY
km/sec.
DEPTH BELOW SRD (MSL)
TWO WAY TRAVEL TIME (MSEC)
EOCENE
PALEOCENE
DANIAN TO MAESTR.
CAMP.
SANTON. CONIAC.
TURON.
CENOM.
LOW. CRET.
KIM.
OXF.
CALLOV. OXF.
CALLOV.
T.D. 4990m
2067m C1
2778m C2
3295m M1
3617m M'1
4211m M2
4375m J1
4464m J2
4619m J3
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
4000
4200
4400
4600
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500

WELL 15/3-2

COMPARISON BETWEEN GEOPHYSICAL PROGNOSIS AND ACTUAL RESULTS

coordinates: X = 01° 47' 12.6" E
Y = 58° 59' 00.5" N

Line 580 529 - SP 210

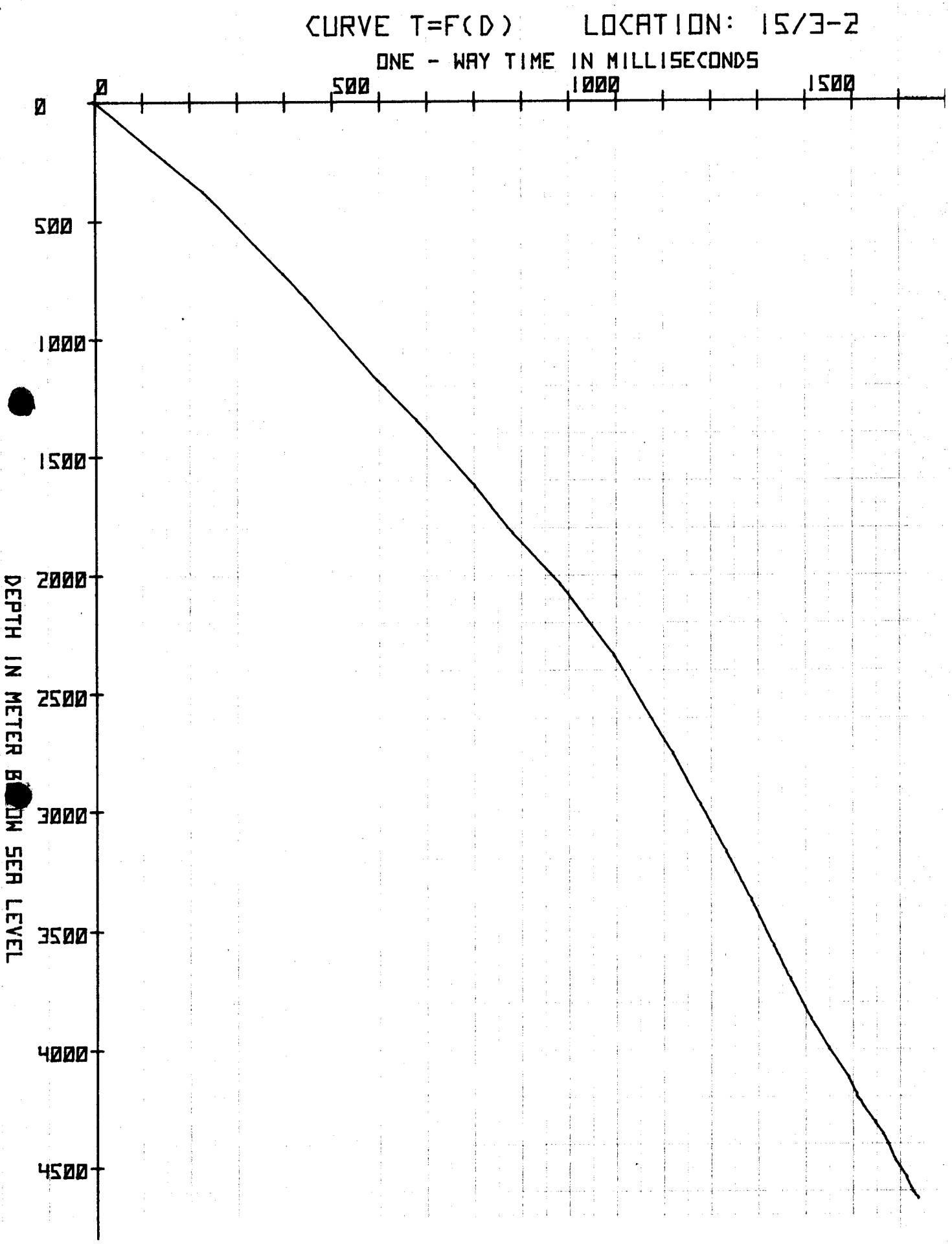
SEISMIC MARKER	STRATIGRAPHIC ATTRIBUTION	PROGNOSIS			ACTUAL		COMPARISONS	
		Depth, Dp (m-MSL)	Interval Vel. (m/s)	Time, Tp (ms)	Depth, Da (m-MSL)	Time, Ta (ms)	Da - Dp (m)	Ta - Tp (ms)
C1	Tuff	- 2080 (1)		979	-2057	989	- 23	+ 10
			2900					
C2	Maestrichtian chalk	- 2810		1229	- 2778	1224	- 32	- 5
			3860					
M2	Kimmerian unconformity	- 4290		1611	- 4211	1610	- 79	- 1
	Prognosis readjusted below M2 before phase II drilling, ref. telex e9631 st							
M2	Kimmerian unconformity				- 4211 (2)	1609	0	0
J1	Intra Callovo-Oxfordian	eroded	3164 (3)	eroded	- 4375	1665		
J2	Sandstone	- 4440		1683	- 4439	1682	- 1	- 1
			3308 (4)					
J3	Callovian	- 4580		1728	- 4619	1732	+ 39	+ 4
			3810 (4)					
J4	Middle Jurassic/Top Trias?	- 4980		1831	not reached			

(1) - Depth prevision of C1 horizon was taken from the average of TD curve of well 15/3-1.

(2) - Real depth for a sonic time of 1609 ms.

(3) - Interval velocity determined from log of well 16/8-1. One has taken a certain thickness of Callovo-Oxfordian situated immediately above J2. Calculations done included 73 ms o.w.t. of this series (identical results arise from taking data from well 15/3-1).

(4) - Interval velocities taken from well 16/8-1.


CURVE T=F(D)
LOCATION: 15/3-2
ONE - WAY TIME IN MILLISECONDS
0
500
1000
1500
0
500
1000
1500
2000
2500
3000
3500
4000
4500
DEPTH IN METER BELOW SEA LEVEL

COMMENTS

1/ The prognosis given in the time domain are satisfying taking into account the presision of our seismic tool.

In the depth domain one has some discrepencies, in some cases apparently important. But one should bear in mind the fact that the more important ones are at depths of more than 4200 m. The error in per cent is therefore small. These discrepencies are caused by interval velocities that do not quite correspond to the actual cases.

One feels therefore that adequate prognosis has been given in both domains.

2/ From study of seismic sections one predicted that the J1 horizon was eroded at well location and to the NE. Geological studies of well data show this not to be true.

One has therefore taken into consideration this new fact and translated it into a new study of J1 horizon in the NE part of the block. A map has been re-drawn and will soon be included in a new report on block 15/3.

SUMMARY OF WELL DATA

15/3-2 PHASE I + II

Location	N 58° 59' 00".6 E 01° 47' 12".6
Operator	Elf Aquitaine Norge A/S

Phase I (Polyglomar Driller)

Rig	Polyglomar Driller
RKB elevation (to MSL)	25m
Water depth	110m
Rig released to Elf Aquitaine Norge	October 25, 1976 at 02.00
Spudded	October 29, 1976
Abandoned (temporary)	Jan. 24, 1977 at 06.00 h.
Rig released to Total Oil Marine ltd.	Jan. 24, 1977 at 06.00 h.

Well Program:

Hole diameter	36"	to	186m
	26"	to	784m
	17½"	to	2875m
	12 1/8"	to	4285m
Casing record:	30"	set at	185m
	20"	set at	774m
	13"3/8	set at	2862m
	9"5/8	set at	4248m
Well Duration Phase I :	2188 hours or 91,2 days		

Phase II (Pentagone 84)

Rig	Pentagone 84
RHB Elevation (to MSL)	25m
Water depth	110m
Rig released to Elf Aquitaine Norge	July 6, 1977 at 18.00h
Spudded (reentry)	July 26, 1977
Abandoned	Nov. 27, 1977 at 11.00h
Rig released to Total Oil Marine Ltd.	Nov. 28, 1977 at 10.00h (GMT)

Well Program:

Hole diamter	8"11/32 to 4990m
Casing Record	7"liner Top liner at 4101m Shoe liner at 4665m
Well duration phase II	3484 hours or 145.2 days

Total duration well 15/3-2 (Phase I+II) 5672 hours or 236,4 days

OPERATION-SUMMARY

The well 15/3-2 is located in the northern part of block 15/3-2. The objectives were the Jurrassic sands found hydrocarbon-bearing in well 15/3-1 situated in a different trend in the centre of the block. The well was scheduled to explorate until the Dogger prospect which was not reached at 15/3-1.

Phase I of 15/3-2 was drilled by "Polyglomar Driller" equipped with 10.000 psi WP 18 3/4" BOP-stack and temporarily abandoned January 24.-77 with 9 5/8" casing set at 4248 m.

Phase II of 15/3-2 was drilled with "Pentagone 84" which was taken over from Total Oil Marine Ltd (TOM) July 6.-77. The P-84 is equipped with 15.000 psi WP 11" BOP-stack. The reentry of the well took place July 11th,-77, but due to difficulties of connecting to the wellhead the drilling operation was resumed July 26th,-77. A 8 11/32" hole was drilled down to 4990 m when the drill string parted. In spite of an extensive fishing operation, the fish had to be left in hole. Top fish at 4742 m. A sidetracking operation was performed trying to bypass the fish, but also this operation was negative.
A 7" liner was set from 4101 m to 4665 m. Three DST-runs were carried out, all misruns due to mechanical failure of the PCT-tool.
Well 15/3-2 was finally abandoned November 27th.-77.
P-84 was released to Total Oil Marine Ltd, November 28th at 10:00 h (GMT)

Duration	Phase I	: 91.2 days
	Phase II	:145.2 days

Total duration well 15/3-2 : 236. 4 days.

DIARY REPORT PHASE I

Report No. D1-1

25.10.76	Rig assigned to ELF NORGE A/S at 02:00 hrs. Start moving from location 30/7-3 to 15/3-2.
26.10. No.D1-2	Moving to location 15/3-2. WOW to drop anchors.
27.10. No.D1-3	WOW
28.10. No.D1-4	WOW. Start running anchors.
29.10. No. 1	Positioned rig. Tensional anchors. Spudded well with 26" bit + 36" hole opener. Drilled 36" hole from 135m to 186m.
30.10. No. 2	Ran and cmt. 30" conductor. Shoe at 185m. Ran and latched 22" riser.
31.10. No. 3	RIH w/bit No. 2 + 26" hole opener. Drilled cmt from 179m to 186m + formation from 186m to 187m. POOH w/bit + holeopener. RIH w/bit No. 3. Drilled 17"½ hole from 187m to 552m.
01.11. No. 4	Drilled 17"½ hole from 552 to 775m. POOH w/bit. Logging: ISF-SL-GR.
02.11. No. 5	RIH w/bit No. 2R + 26" underreamer. Reaming from 187m to 784m. POOH w/bit + underreamer.
03.11. No. 6	Pulled 22" riser. RIH w/bit No. 1R. Controllled and reamed 26" hole w/26" bit. POOH w/bit.
04.11. No. 7	RIH 20" csg. Shoe at 774m. Cemented csg w/130 tons class "G" w/12% gel + 0.3% MR7. 1.51 SG. Pressure test 20" csg to 1000 psi. OK.
05.11. No. 8	Tested anchors. RV and ran 18 3/4" x 10.000 psi. BOP-stack.
06.11. No. 9	Latched H-4 on wellhead. Leak on lower hydril. Pulled BOP. Set piggy back on anchor No. 3.
07.11. No. 10	Repaired yellow pod and pressure modulator on lower annular shuttle valve. Tested BOP on stump.
08.11. No. 11	Ran BOP and latched H-4 on wellhead. Tested BOP. OK. RIH w/bit No. 4. Drilled cmt and float collar and shoe.
09.11. No. 12	Drilled cmt to 784m. Drilled 17½" hole from 784m to 1216m.

10.11. No. 13	Drilled 17½" hole from 1216m to 1303m. Leak of test at shoe d = 1.50 POOH. RIH w/bit No. 5.
11.11. No. 14	Drilled 17½" hole from 1303m to 1529m.
12.11. No. 15	POOH w/bit No. 5. RIH w/bit No. 6. Drilled 17½" hole from 1529m to 1769m.
13.11. No. 16	Drilled 17½" hole from 1769m to 1813m. POOH. Rih w/bit No. 7. Drilled 17½" hole from 1813m to 1928m.
14.11. No. 17	Drilled 17½" hole from 1928m to 2073m.
15.11. No. 18	Drilled 17½" hole from 2073m to 2161m. POOH. RIH w/bit No. 8. Drilled 17½" hole from 2161m to 2226m.
16.11. No. 19	Drilled 17½" hole from 2226m to 2302m. Survey. POOH w/bit No. 8. Tested BOP - pipe rams, choke-and trill lines to 5000 psi for 10 min. OK. Upper and lower hydril to 2500 psi for 10 min. OK. RIH w/bit No. 9 + new BHA.
17.11. No. 20	Drilled 17½" hole from 2302m to 2377m. Survey at 2377m: 1° - N35^{o}E. POOH w/bit. RIH w/bit No. 10. Drilled 17½" hole from 2377m to 2413m.
18.11. No. 21	Drilled 17½" hole from 2413m to 2422m. POOH w/bit. RIH w/bit No. 11. Drilled 17½" hole from 2422m to 2440m.
19.11. No. 22	Drilled 17½" hole from 2440m to 2512m.
20.11. No. 23	Drilled 17½" hole from 2512m to 2568m. Survey.
21.11. No. 24	Drilled 17½" hole from 2568m to 2635m. Repaired heave compensator.
22.11. No. 25	Drilled 17½" hole from 2635m to 2681m. Survey at 2667m: 1° N 25 E.
23.11. No. 26	Drilled 17½" hole from 2681m to 2682m. POOH w/bit. Tested BOP. OK. RIH w/bit No. 12 Drilled 17½" hole from 2682m to 2684m.
24.11. No. 27	Drilled 17½" hole from 2684m to 2697m. Survey. Pulled bit to 20" csg. shoe and hung off DP on M.P.-rams. Pulled diverter. Set block on rotary table and changed rod packing on motion compensator.

25.11.	No. 28	Repaired heave comp. Installed diverter. Picked up DP and RIH to 2697m. Drilled 17½" hole from 2712m.
26.11.	No. 29	Drilled 17½" hole from 2712m to 2735m. Survey. POOH w/bit.
27.11.	No. 30	RIH w/bit No. 13. Drilled 17½" hole from 2735m to 2751m.
28.11.	No. 31	POOH w/bit. RIH w/bit No. 14. DRilled 17½" hole from 2751m to 2768m.
29.11.	No. 32	Drilled 17½" hole from 2768m to 2801m.
30.11.	No. 33	Drilled 17½" hole from 2801m to 2839m.
01.12.	No. 34	Drilled 17½" hole from 2839m to 2875m.
02.12.	No. 35	Wiper trip prior logging. Logging: ISF-SL-GR-SP, HDT.
03.12.	No. 36	Logging: HDT. Sidewall coring. RIH w/bit No. 14R. Reamed and cleaned hole prior running casing.
04.12.	No. 37	Circ. POOH w/bit. RIH 13"3/8 csg.
05.12.	No. 38	RIH 13"3/8 csg. Shoe at 2862m. DV at 848m. Cmt 1.stage w/32T class "G" + 12% gel d = 1å51 SG followed by 25T class "G" d = 1.90 SG. Opened DV and cmt. 2. stage w/26T class "G" d = 1.80 SG. Tested BOP. OK.
06.12.	No. 39	RIH w/bit No. 15.Drilled DV. Logging CBL. Repaired heave comp.
07.12.	No. 40	Repaired heave comp. RIH w/bit No. 16. Tested csg to 3000 psi. OK. Drilled float collar, cmt and shoe.
08.12.	No. 41	Drilled 12"1/8 hole from 2875m to 2904m. Leak off at shoe: 1.855.6. Survey. POOH w/bit. RIH w/bit No. 17
09.12.	No. 42	Drilled 12"1/8 hole from 2904m to 2940m.
10.12.	No. 43	Drilled 12"1/8 hole from 2940m to 2954m. Survey. POOH w/bit. RIH w/bit No. 18 (Crist. MD 311). Drilled 11"15/16 hole from 2954m to 2960m.
11.12.	No. 44	Drilled 11"15/16 hole from 2960m to 3019m.
12.12.	No. 45	Drilled 11"15/16 hole from 3019m to 3077m. Survey at 3047m - 2° N 25 E.
13.12.	No. 46	Drilled 11"15/16 hole from 3077m to 3133m.
14.12.	No. 47	Drilled 11"15/16 hole from 3133m to 3185m. Survey.

15.12. No. 48	Drilled 11"15/16 hole from 3185m to 3242m
16.12. No. 49	Drilled 11"15/16 hole from 3242m to 3291m. Survey.
17.12. No. 50	Drilled 11"15/16 hole from 3291m to 3336m.
18.12. No. 51	Drilled 11"15/16 hole from 3336m to 3354m. Survey. POOH w/bit. Tested BOP-stack. Leack on choke line. RIH w/open DP.
19.12. No. 52	Hang-off 5" DP and Gray valve on top pipe rams. Closed blind reams. Pulled riser. Tightened choke - and kill line connections. Ran and connected riser to BOP. Tested BOP. OK.
20.12. No. 53	RIH w/bit No. 19 (Ruck.Hyc. Warck 75P). Drilled 11"15/16 hole from 3354m to 3394m.
21.12. No. 54	Drilled 11"15/16 hole from 3394m to 3453m.
22.12. No. 55	Drilled 11"15/16 hole from 3453m to 3510m. Survey.
23.12. No. 56	Drilled 11"15/16 hole from 3510m to 3576m.
24.12. No. 57	Drilled 11"15/16 hole from 3576m to 3638m. Survey at 3617m: $2^{o}30'$ N58 E.
25.12. No. 58	Drilled 11"15/16 hole from 3638m to 3701m.
26.12. No. 59	Drilled 11"15/16 hole from 3701m to 3715m. Survey. POOH w/bit. Logging: IFS-SL-GR. CBL.
27.12. No. 60	CBL. Tested BOP. OK. RIH w/bit No. 20 (Christ. MD 311). Drilled 11"15/16 hole from 3715m to 3734m.
28.12. No. 61	Drilled 11"15/16 hole from 3734m to 3778m.
29.12. No. 62	Drilled 11"15/16 hole from 3778m to 3820m. Survey.
30.12. No. 63	Drilled 11"15/16 hole from 3820m to 3867m.
31.12. No. 64	Drilled 11"15/16 hole from 3867m to 3891m. Survey. Repaired Kelly drive bushings.
01.01.77 No. 65	Drilled 11"15/16 hole from 3891m to 3937m.
02.01. No. 66	Drilled 11"15/16 hole from 3937m to 3954m. Survey. POOH w/bit. Tested BOP. OK.
03.01. No. 67	RIH w/bit No. 21 (Chris. MD 311). Drilled 11"15/16 hole from 3954m to 3991m.
04.01. No. 68	Drilled 11"15/16 hole from 3991m to 4060m. Survey.
05.01. No. 69	Drilled 11"15/16 hole from 4060m to 4128m.
06.01. No. 70	Drilled 11"15/16 hole from 4128m to 4175m. Wiper trip. Survey.

07.01. No. 71 Drilled 11"15/16 hole from 4175m to 4243m.

08.01. No. 72 Drilled 11"15/16 hole from 4243m to 4258m. Survey. POOH w/bit. Logging: ISF-SL-Gr, FDC-CNL-GR.

09.01. No. 73 Logging: FDC-CNL-GR, MLL-ML, HDT. RIH w/bit No. 21 R. (Chris. MD 311) Reamed and washed down from 418m to 4258m.

10.01. No. 74 Circ. and cond. mud for logs. Survey. POOH. Logging: FDC-CNL, Velocity survey, side wall coring.

11.01. No. 75 SWC 1 (4250m - 3524m), 2 (4244m - 3424m), 3 (2702m - 2887m). RIH w/bit No. 22. Reamed 12" hole from 4247m to 4257m.

12.01. No. 76 Reamed 12" hole from 4257m to 4258m. POOH. 5" DP grade G parted at 138m RKB. Tension on drill string: 340.000 lbs. RIH w/11"3/4 overshot w/5" grapple. Latched top fish. Grapple slipped. POOH. RIH w/8"1/8 overshot w/ w/5" grapple. Latched top fish. Grapple slipped. POOH. RIH w/8"1/8 overshot w/4"7/8 grapple. Latched top fish and pulled out fish w/100.000 lbs/over-pull. Layed down overshot. POOH w/string. Circ. and cond. mud w/bit at 3816m.

13.01. No. 77 POOH w/bit No. 22. Recovered 2 kgs junk from SWC. Magnaflux stab, X-over and junk sub. RIH w/bit No. 23.

14.01. No. 78 RIH w/bit 23. Reamed 12" hole from 4227m to 4243m. Circ.

15.01. No. 79 Circ. Reamed 12" hole from 4243m to 4258m. Circ. at TD to work junk basket. POOH.

16.01. No. 80 POOH w/bit No. 23. Recovered 1.8 kgs junk from SWC. RIH 9"5/8 casing.

17.01. No. 81 RIH and landed 9"5/8 casing. Cmt. casing w/69T class E. D = 1.98. Pressured plug to 3500 psi. OK. Tightened seal assy. to 16.000 lbs/ft and tested to 2500 psi. OK. Ran temp. survey. Top cmt. annulus 2760m. Ran junk catcher to 4203m. Run and set Bridge plug at 4200 m.

18.01. No. 82 RIH w/test tool and tightened 9"5/8 seal assy. to 23.000 lbs/ft. Tested seal to 5000 psi for 15'. OK. Tested 9"5/8 csg to 5.000 psi w/ shear reams. OK. RIH w/open DP to 2885m. Set cmt plug from 2885m to 2835m. W/2.5T class "G" d = 1.90

19.01. No. 83	Set cmt. plug from 200m to 150m w/2.4T class "G". D = 1.90. RIH w/wash tool. Washed Housing and BOP-stack. Pulled Riser and BOP-stack.
20.01. No. 84	Run and set corrosion cap on wellhead. Filled up w/10 gallons of oil. Jumped divers to level base plate and refix to 30" housing. Negativ. Layed base plate on sea floor. Fixed pennant line to wellhead with marker buoy. Pulled guide lines.
21.01. No. 85	WOW to pull anchors.
22.01. No. 86	WOW to pull anchors.
23.01. No. 87	WOW. Pulled 6 anchors.
24.01. No. 88	Pulled last 2 anchors. Rig sailing for location 30/7-4. Rig transferred to Norsk Hydro at 06:00 hrs.

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DIARY REPORT

Report No. D1-1

06.07.77 Rig assigned to ELF AQUITAINE NORGE at 18:00 hrs.
Start moving from location UK 3/25-3A.

07.07. NO. D1-2 Moving to location 15/3-2. Start running anchors.

08.07. No. D1-3 Finished running anchors. Positioning rig.

09.07. No. D1-4 Positioning rig over wellhead. Installed piggy back anchor on anchor No. E-2. WOW for diving operations.

10.07. No. D1-5 WOW.

11.07. No. D1-6 WOW. Attached guide base to wellhead.

12.07. No. D1-7 Ran H-4 connector and latched on wellhead.
Negative test.

13.07. No. D1-8 Pulled test tool. Stand-by for new test tool to arrive.

14.07. No. D1-9 Testing H-4 connector. Negative.

15.07. No. D1-10 Ran impression block to check wellhead dimensions.
Installed wear bushing waiting on new test tool to arrive.

16.07. No. D1-11 Ran Ø 223.5 test tool. Pressure tested H-4 connector on wellhead. Negative. Pulled test tool and H-4 connector.

17.07. No. D1-12 Tested H-4 connector on test stump. OK.
Replaced old 9 5/8" seal assembly by a new seal assembly.

18.07. No. D1-13 Ran and tested H-4 connector. Negative.
Pulled H-4 connector. Waiting on Emergency Seal Assembly.

19.07. No. D1-14 Waiting on Emergency Seal Assembly.
Tried to recover seal assembly. Negative.

20.07. No. D1-15 Pressure testing 9 5/8" seal assembly.

21.07. No. D1-16 Ran and tested Emergency Seal Assembly and H-4 connector up to 15.000 psi. OK.

22.07. No. D1-17 Tested and repaired 11" x 15.000 psi BOP.

23.07. No. D1-18 Repairing Cameron 2 9/16" lower choke fail safe valve. Waiting on spare parts.

24.07. No. D1-19 Waiting on Cameron spare parts. Repaired and tested lower choke fail safe valve.

25.07. No. D1-20 Tested BOP on stump. OK. Ran BOP and riser. Tested BOP on wellhead. OK.

26.07. No. 1 Drlg. cmt from 170 m to 200 m. RIH to 2783 m. Drlg. cmt from 2783 m to 2886 m. RIH to 4043 m. Circ. and cond. mud.

27.07. No. 2 RIH to 4198 m top Bridge Plus. Drilling out Bridge Plug, Float Collar and cmt from 4198 m to 4230 m. Circ. and cond. new mud. Tested 9 5/8" csg to 4000 psi. OK. Drilling shoe and cmt from 4230 m to 4256 m. Reaming from 4256 m to 4268 m. Drilling 8 3/8" hole from 4268 m to 4272 m.

28.07. No. 3 POOH w/bit No. 1. Sperry Sun Survey. Negative. RIH w/bit No. 2. Drilled 8 3/8" hole from 4272m to 4283m.

29.07. No. 4 Drilled 8 3/8" hole from 4283m to 4288 m. POOH. Survey. RIH w/bit No. 3.

30.07. No. 5 RIH w/bit No. 3. Drilled 8 3/8" hole from 4288 m to 4319 m.

31.07. No. 6 Drilled 8 3/8" hole from 4319 m to 4323 m. Survey. POOH. RIH w/bit No. 4. Drilled 8 3/8" hole from 4323 m to 4334 m

01.08. No. 7 Drilled 8 3/8" hole from 4334 m to 4352 m. POOH. RIH w/test tool and tested BOP.

02.08. No. 8 Tested BOP. OK. RIH w/bit No. 5 (Chris. MD 311) Drilled 8 11/32 hole from 4352 m to 4389 m.

03.08. No. 9	Drilled 8 11/32" hole from 4389 m to 4404 m. Survey. POOH. RIH w/core barrel No. 1 (Chris.C-22 8 11/32" corehead).
04.08. No. 10	Coring from 4404 m to 4406 m. POOH w/core No. 1. RIH w/core barrel No. 2. Coring from 4406 m to 4407 m.
05.08. No. 11	Coring from 4407 m to 4409 m. POOH w/core No. 2. RIH w/bit No. 6. Reaming from 4404 m to 4409 m. Drilled 8 3/8" hole from 4409 m to 4410 m.
06.08. No. 12	Drilled 8 3/8" hole from 4410 m to 4413 m. POOH. Ran FIT's at 4401 m, 4403 m, 4404 m, 4405 m, 4406 m. Logging GR.
07.07. No. 13	RIH w/bit No. 7. Drilled 8 3/8" hole from 4413 m to 4416 m. POOH. RIH w/bit No. 8 (Chris. MD 311) Drilled 8 11/32" hole from 4416 m to 4418 m.
08.08. No. 14	POOH. RIH w/bit No. 9. Drilled 8 3/8" hole from 4418 m to 4431 m.
09.08. No. 15	Drilled 8 3/8" hole from 4431 m to 4450 m. POOH. RIH w/test tool. Test BOP. OK.
10.08. No. 16	RIH w/bit No. 10. Drilled 8 3/8" hole from 4450 m to 4470 m.
11.08. No. 17	Drilled 8 3/8" hole from 4470 m to 4506 m.
12.98. No. 18	POOH. Function tested BOP. Logging: ISF-SONIC-GR, FDC-CNL-GR, DEVIATION-CALIPER.
13.08. No. 19	RIH w/bit No. 11. Drilled 8 3/8" hole from 4506 m to 4528 m.
14.08. No. 20	Drilled 8 3/8" hole from 4528 m to 4551 m.
15.08. No. 21	Drilled 8 3/8" hole from 4551 m to 4565 m. Survey. POOH. Function test BOP. RIH w/corebarrel No. 3 (DRI.PIM 8 11/32" corehead).
16.08. No. 22	RIH w/corebarrel. Stucked at 4558 m. Pipe parted. RIH w/7 5/8" Bowen overshot w/6 3/8" grapple.

	Catched fish and POOH.
17.08. No. 23	POOH w/fish. Ran BOP-test tool and tested BOP. OK. RIH w/corebarrel No. 4. Coring from 4565 m to 4568 m.
18.08. No. 24	Coring from 4568 m to 4574 m. POOH w/core No. 3. Logging RFT/GR.
19.08. No. 25	Logging. RFT. RIH w/bit No. 12 (Chris. MD 311). Drilled 8 11/32" hole from 4574 m to 4595 m.
20.08. No. 26	Drilled 8 11/32" hole from 4595 m to 4647 m.
21.08. No. 27	Drilled 8 11/32" hole from 4647 m to 4656 m. Survey. POOH. RIH w/corebarrel No. 5. (Chris. C-22 8 11/32" corehead). Coring from 4656 m to 4657 m.
22.08. No. 28	Coring from 4657 m to 4662 m. POOH w/core No. 4. RIH w/bit No. 11R. Drilled 8 11/32" hole from 4662 m to 4674 m.
23.08. No. 29	Drilled 8 11/32" hole from 4674 m to 4726 m.
24.08. No. 30	Drilled 8 11/32" hole from 4726 m to 4754 m. Wiper trip. Survey. POOH.
25.08. No. 31	POOH. Logging: IFC-BHC-GR-FDC-CNL-HDT. RIH w/bit No. 9R.
26.08. No. 32	Reamed from 4325 m - 4362 m, 4520 m - 4552 m, 4718 m - 4754 m. POOH. Logging: RFT.
27.08. No. 33	Logging: RFT. Ran BOP-test tool and tested BOP. OK. RIH w/bit No. 13 (Chris. ME-315) Drilled 8 11/32" hole from 4754 m to 4758 m.
28.08. No. 34	Drilled 8 11/32" hole from 4758 m to 4783 m. Survey. POOH.
29.08. No. 35	RIH w/bit No. 14 (ACC SHARK TOOTH) Drilled 8 11/32" hole from 4783 m to 4801 m. Lost pressure. POOH. K-Monel washed out.

30.08. No. 36	RIH w/bit No. 15 (Chris MD 331). Reamed from 4742 m to 4801 m. Drilled 8 11/32" hole from 4801 m to 4833 m.
31.08. No. 37	Drilled 8 11/32" hole from 9833 m to 4876 m.
01.09. No. 38	Drilled 8 11/32" hole from 4876 m to 4905 m. Wiper trip to shoe.
02.09. No. 39	Drilled 8 11/32" hole from 4905 m to 4950 m.
03.09. No. 40	Drilled 8 11/32" hole from 4950 m to 4989 m.
04.09. No. 41	Drilled 8 11/32" hole from 4989 m to 4990 m. Survey. POOH. RIH test tool and tested BOP. OK. RIH w/bit No. 8R (Chris. MD-311). Tight spot at 4968 m. Pipe parted. POOH.
05.09. No. 42	POOH. RIH w/overshot. Top fish at 4192 m. Catched and worked fish. Negative.
06.09. No. 43	Worked fish. Tried to release overshot. Negative. Ran free-point indicator. Rigged up Schlumber.
07.09. No. 44	Ran back-off shot. Worked fish. Bakced off overshot. POOH. Overshot Bowl, Grapple and shoe left in hole.
08.09. No. 45	RIH w/overshot on 5" S-135 DP.
09.09. No. 46	Catched and worked fish.
10.09. No. 47	Rigged up Schlumberger. Fired back-off shots. Worked pipe. Negative.
11.09. No. 48	Fired back-off shots and worked pipe. POOH w/overshot. Ran test tool and tested BOP. OK.
12.09. No. 49	RIH w/8 3/8" bit to top fish. Hole in good condition. POOH.
13.09. No. 50	RIH w/7 jts (67.27m) 7 5/8" Hydril wash pipe and washed over fish from 4669 m to 4734 m. POOH w/wash pipe.

14.09. No. 51	RIH w/fishing assy. and catched fish. Worked pipe. Ran free-point indicator. Hold at 4670 m. Ran in w/sinkerbars. Negative.
15.09. No. 52	POOH bars. Worked pipe. Unscrew string at 4664 m and POOH to 4527 m. Hang-off fishing string on emerg. hang-off tool. WOW.
16.09. No. 53	POOH to change Jar. RIH and reconnected fish. Worked pipe. Ran free-point indicator with Schlumberger line. Negative.
17.09. No. 54	POOH. RIH w/top of Jar + fishing assy. and reconnected fish. Ran Schlumberger sinker bars. Bridge at 4744 m. Worked through bridge and ran bars to 4970 m.
18.09. No. 55	POOH bars. Disconnected from fish and POOH. RIH w/fishing assy. and reconnected fish. Worked pipe.
19.09. No. 56	Worked pipe. Ran Halluburton trying to cut 6½" DC at 4952 m. Negative. Ran Schl. free-point indicator. Free at 4780 m. Ran Schl. back-off at 4780 m. POOH w/fish. assy. + 3 DC 6½". Top fish at 4742 m.
20.09. No. 57	Ran test tool and tested BOP. OK. RIH w/bit to top fish. POOH.
21.09. No. 58	POOH. Ran 3 Schl. side wall cores. RIH w/bit. Wiper trip. POOH.
22.09. No. 59	RIH w/open pipe to 4742 m and spotted 3 m^3 of cement Class E. d = 2.02. POOH.WOC.
23.09. No. 60	WOC. RIH w/bit. Reamed down to 4670 m. WOC.
24.09. No. 61	WOC. Reamed to 4217 m. Set 25^T. Cmt. OK. POOH.
25.09. No. 62	RIH w/bit No. 17 (Chris. SST) + Kick-off assy. Side tracking 8 11/32" hole from 4715 m to 4751 m. Survey.

26.09. No. 63	Side tracking to 4731 m. POOH. RIH w/open pipe to 4730 m and set cmt plug. Class "E".
27.09. No. 64	POOH. Ran test-tool and tested BOP. OK. RIH w/bit No. 16R. Reamed soft cmt from 4525 m to 4596 m.
28.09. No. 65	WOC. Drilled cmt from 4596 m to 4626 m. Hang-off DP. WOC. WOW.
29.09. No. 66	WOW. RIH w/bit No. 16R and drilled cmt from 4625 m to 4681 m. POOH.
30.09. No. 67	RIH w/bit No. 17R (Chris. SST) and sidetracking assy. Sidetracking from 4681 m to 4698 m. POOH.
01.10. No. 68	RIH w/bit No. 16R and kick-off assy. Drilled cmt from 4698 m to 4709 m. Survey. POOH. RIH w/open pipe to 4740 m.
02.10. No. 69	Set $5m^3$ cmt plug Class "F". d = 2.17. POOH. RIH w/bit No. 16R. WOC.
03.10. No. 70	WOC. RIH to 4483 m. Washing out from 4483 m to 4598 m. Drilled cmt from 4598 m to 4633 m. WOC. Drilled cmt from 4633 m to 4673 m. POOH.
04.10. No. 71	POOH. Ran logs: Sonic-Velocity Survey - GR. RIH w/bit No. 16R.
05.10. No. 72	Drilled cmt from 4673 m to 4680 m. POOH. RIH w/bit No. 17R (Chris.SST) and turbine. Sidetracking 8 11/32" hole from 4680 m to 4684 m.
06.10. No. 73	Sidetracking from 4684 m to 4686 m. Survey. POOH. Tested turbine on drill-floor. RIH. Side-tracking from 4686 m to 4691 m.
07.10. No. 74	Survey. POOH. Tested turbine on drill floor. RIH w/bit No. 18 (Chris.SST). Survey. Sidetracking 8 11/32" hole from 4691 m to 4693 m.
08.10. No. 75	Sidetracking from 4693 m to 4697 m. Survey. POOH. RIH w/bit No. 18 (Chris C-20 corebit) and 6 1/4" core-barrel.

09.10. No. 76	RIH w/corebarrel to 4697 m. Coring from 4697 m to 4701 m. POOH. Ran test-tool and tested BOP. OK.
10.10. No. 77	RIH w/bit No. 16R. Reamed from 4695 m to 4701 m. Drilled 8 3/8" hole from 4701 m to 4740 m. POOH. RIH w/ 19 stds 3½" tail pipe to 4740 m. Set 5.3 m^3 cmt plug Class "F" + Ferrobar. d = 2.20.
11.10. No. 78	POOH. RIH w/bit No. 16R to 4629 m. Reamed cmt from 4629 m to 4678 m.
12.10. No. 79	POOH to 526 m. RIH w/scraper at 526 m. RIH. Scraping 9 5/8" csg from 4050 m to 4150 m. POOH. Hang-off DP. WOW.
13.10. No. 80	WOW. RIH to 4678 m. Circ. POOH.
14.10. No. 81	RIH 7" liner. Shoe at 4665m.
15.10. No. 82	Anchored hanger. Cmt liner w/18^T cmt "Class F" + Ferrobar. Sealed packer. Packer set at 4101 m. Released setting tool and POOH.
16.10. No. 83	RIH w/bit No. 20 to 4624 m. Reamed cmt from 4624 m to 4630 m. Tested 7" liner up to 4500 psi for 15 min. OK. POOH. Filled riser w/sea water. Pulled BOP-stack.
17.10. No. 84	Changed rams to 3½" on lower cameron. Tested BOP-stack on stump. OK.
18.10. No. 85	Ran BOP-stack and tested same.
19.10. No. 86	Tested BOP. Leak inside kill line. Pulled BOP. Changed lower rams. Tested BOP on stump. OK. Ran BOP-stack.
20.10. No. 87	Ran BOP-stack and tested same. OK. RIH w/bit No. 20R and scraper. Worked scraper from 4500 m to 4630 m. POOH.
21.10. No. 88	Logging: CBL-VDL-GR. RIH 3½" tubing.
22.10. No. 89	RIH 3½" tubing. Ran CCL.

23.10.	No. 90	POOH CCL. Circ. Ran perf. gun and perforated from 4567 m to 4573 m and from 4551 to 4559 m. POOH 3½" tubing.
24.10.	No. 91	POOH 3½" tubing. Rig up Schlumberger. Ran junk catcher. RIH OTIS packer.
25.10.	No. 92	Set OTIS packer at 4543 m. RIH test string and 3½" tubing.
26.10.	No. 93	RIH w/test string and connecting surface equipment.
27.10.	No. 94	Installed and tested SSTT and surf. lines. DST No. 1.
28.10.	No. 95	Pulled out DST assembly.
29.10.	No. 96	RIH w/stinger and circ. above packer. Latched stinger into packer and tested packer. OK.
30.10.	No. 97	POOH w/stinger. WOW.
31.10.	No. 98	WOW. RIH w/stinger.
01.11.	No. 99	RIH w/stinger and test annulus w/1000 psi. OK. Logging CCL to check for obstructions in packer. Packer OK.
02.11.	No. 100	RIH and tested DST assy No. 2.
03.11.	No. 101	Tested SSTT and surface equipment. OK. DST No. 2.
04.11.	No. 102	DST No. 2. POOH DST-assembly No. 2.
05.11.	No. 103	POOH DST-assembly No. 2. RIH w/test tool and tested BOP. OK. RIH w/stinger assembly.
06.11.	No. 104	RIH w/stinger assembly. RIH w/Schlumberger perforating assembly and perforated from 4568 m to 4574 m and 4552 m to 4559 m.
07.11.	No. 105	POOH w/stinger assy. RIH w/DST-assembly No. 3.
08.11.	No. 106	RIH w/DST-assembly and 3½" tubing.

09.11. No. 107	Tested SSTT and surface equipment. OK. DST No. 3.
10.11. No. 108	DST No. 3. POOH DST-assembly No. 3.
11.11. No. 109	RIH w/stinger and 3½" tubing. Ran Schlumberger CCL to check packer. Packer OK.
12.11. No. 110	Pressure testing packer. OK. POOH w/stinger.
13.11. No. 111	WOW. RIH w/open ended 3½" tubing and 5" DP.
14.11. No. 112	Set cmt. plugs. No. 1 from 4540 m to 4460 m. No. 2 from 4150 m to 4050 m POOH.
15.11. No. 113	Set Bridge plug at 3997 m w/Schlumberger. RIH w/open end 3½" tbg and 5" drill pipe. Set cmt. plugs. No. 3 from 3997 m to 3800 m. No. 4 from 2960 m to 2760 m. Perforated 9 5/8" and 13 3/8" csgs. at 205 m. Squeeze tested perforations. OK. No leak.
16.11. No. 114	POOH 3½" tubing and 5" DP. Disconnected diverter and pulled BOP w/16" riser. Ran and connected H4 on adapter.
17.11. No. 115	Retrieved H4 connector and adapter. Ran into wellhead and retrieved emergency seal.
18.11. No. 116	Retrieved 9 5/8" pack-off assy. Cut 9 5/8" csg at 800 m and retrieved csg. Tried to retrieve 13 3/8" pack-off assy. Negative.
19.11. No. 117	RIH w/5" DP and set cmt. plugs. No. 5 from 830 m to 730 m. No. 6 from 450 m to 350 m.
20.11. No. 118	Cut 13 3/8, 20" and 30" csgs at 145 m. Tried to retrieve 13 3/8" csg. Negative.
21.11. No. 119	RIH w/cutter and cut 13 3/8", 20" and 30" at 138.5 m. Ran into wellhead w/spear trying to retrieve 13 3/8" csg. Negative. Pulled baseplate with guide lines and retrieved cut-off wellhead. Ran 13 3/8" spear w/1 std 5" DP stinger. Tried to reentry hole. Negative. No visibility w/TV. Pulled spear and TV. WOW.

22.11.	No. 120	WOW. Ran 13 3/8" spear and TV. No visibility. Pulled spear and TV. Ran open end 5" DP with ropes on guidelines. Set cmt plug No. 7 from 145 m to sea bed (135 m).
23.11.	No. 121	Divers checked sea bed. OK, no debris. Picked up anchor A2, C1 and D1. WOW.
24.11.	No. 122	WOW.
25.11.	No. 123	WOW.
26.11.	No. 124	WOW. Picked up anchor B2, E1 and A1.
27.11.	No. 125	Picked up anchor B1, C2, D2 and E2. Started to move at 10:30 hrs.
28.11.	No. 126	Moving to location UK 14/30-1. Dropped first anchor at 17:00 hrs. Rig transferred to Total Oil Marine Ltd.

"

IV. Sidetrack-operation

After having left the fish in the hole (top fish 4742m), a sidetracking operation was performed at 4680m at the top of a 15m thick sandlayer. This layer had previously been drilled with a diamond bit at 150 RPM, 10-14 tons weight on bit giving a penetration rate of 4m/hour. The shale interbeddings drilled with the same parameters gave a penetration rate of 1.80 m/hour in the same area.
Three attempts were performed trying to side track, all three turned out negative.

The first cement plug set prior sidetracking had class "E" cement, fresh water, 20% sand, and minor additives of retarder and dispersant as components, the second plug was composed of class "E" cement and fresh water only.
The third plug had class "F", fresh water and ferrobar as components.

The reason for the failure of the sidetracking operation is believed to have its origin in the fact that the cement plugs did not gain the proper resistance and hardness probably due to contaminations and or down hole, conditions.
It is also believed that the downhole motor used did not give the necessary hydraulic horsepower to perform a proper force over the bit. (92 stages TURBODRILL).

Elappsed time: 21 days

Total time last:

Test 18 3/4 - 11" Housing Extension	:	10,25 days
Repair of Fail Safe Valve Cameron	:	3,25 days
1st. twist-off DP 5" C-95	:	1,00 day
2nd. twist-off DP 5" C-95	:	16,00 days
Sidetracking	:	21,00 days
Total	:	51½ days

LIST OF PLATES

1/ Composite log - 1/500

2/ Composite log with dipmeter - 1/1000

3/ 1/5000 log

4/ Permeability log

5/ Synergetic log systems

6/ "D" exponent - Tertiary/Cretaceous section

7/ "D" exponent - Jurassic section

8/ Composite sheet - 1/20.000

9/ 15/3-2 results

10/ Position map

11/ Predicted/actual depth comparison

12/ Comparative table of formation thickness

13/ Relationships between 15/3-1 and 15/3-2

14/ Correlations between 16/7-1, 15/3-1, 15/3-2 and 25/10-2

15/ Correlations - Infra M2 - 15/3-1 and 15/3-2

16/ 15/3-2 upper Jurassic sandstones - reservoir characteristics

17/ 15/3-2 Tertiary RFT results

R.I.A. Holdings
COMPOSITE LOG
Well
Ardmore
Field
SCALE 1/500
Depth Scale
Metres
Feet
Date
Time
Operator
Recorded by
Witnessed by
Depth Reference
Kelly Bushing
Ground Level
Permanent Datum
Elevation
Log Measured from
Drilling Measured from
Max. Rec. Temp.
Bottom Hole Temp.
Time Since Circ.
Time Logged
Run No.
Bit Size
Top Log Interval
Bottom Log Interval
Casing Size
Casing Depth
Mud Type
Density
Viscosity
Fluid Loss
Resistivity
Temperature
Source
Rm
Rmf
Rmc
Rw
Rt
Rxo
Depth Scale
Metres
Feet
Caliper
Gamma Ray
Resistivity
Sonic
Density
Neutron
Porosity
Lithology

WELLFILE

Coord X: 01° 47' 12,6" Z ground: −110,00 Y: 58° 59' 00,5" Z RKB: + 25,00 Line: 580529 SP: 210 135,00 m Depths datum: RKB Rig: POLYGLOMAR DRILLER / PENTAGONE 84 Stopped in: Jurassic	Spudded: 25.10.76 Started drilling: 29.10.76 Provisory abandon: 24.01.77 at 4258 m RE ENTERED 27.07.77 COMPLETED 27-11-77	Well **15/3-2** Country **NORWAY** off shore

OPERATOR **ELF NORGE** LICENCE **025** OWNED BY **PETRONORD**

TARGETS

1. JURASSIC SANDSTONES
2. TOP OF TRIASSIC

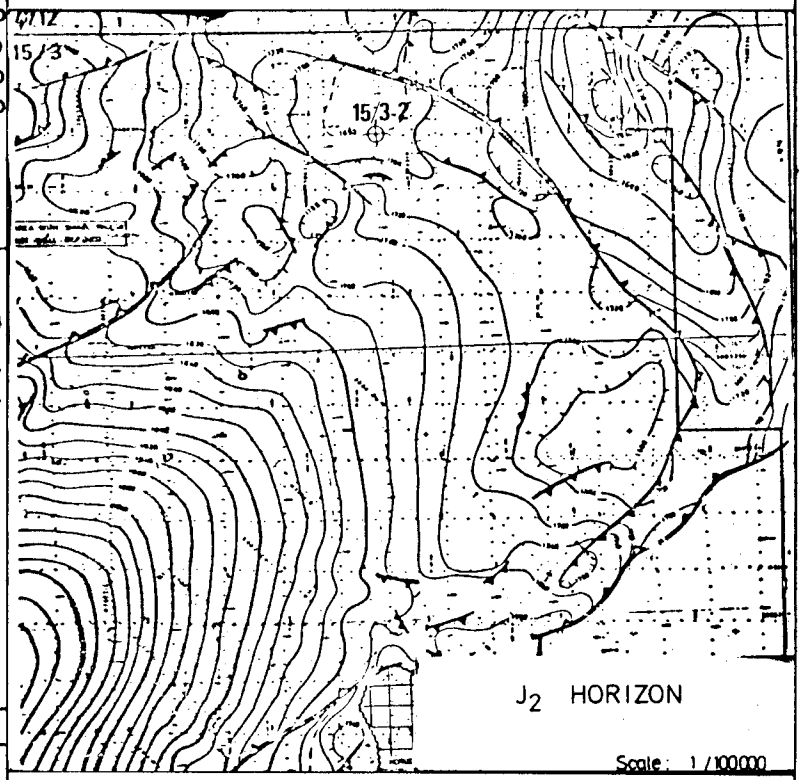
RESULTS

Drilled with POLYGLOMAR DRILLER down to 4258 m
Re-entered with PENTAGONE 84
Plugged and abandoned after an unsuccessful fishing and side tracking
Top fish 4742 m
Bottom hole 4990 m

CASINGS	CORES		
30" at 185 m	CST 1	2860,5 - 2422,5	28/30
20" at 775 m	CST 2	2760,5 - 2040	27/30
13 3/8" at 2862 m	CST 3	4250 - 2887	16/30
9 5/8" at 4248 m	CST 4		24/30
	CST 5		21/30
	K1	4404 - 4406	87 %
	K2	4406,3 - 4409,3	56 %
	K3	4565 - 4574	96 %
	K4	4656 - 4672	97 %
		CST phase 2	
	CST 1	4739 - 4345	3/24
	CST 2	4739 - 4330	4/24
	CST 3	4739 - 4290	7/24

SHOWS

From 3420m - 3635m
max 1 % C_1 to C_3
From 4225m - 4615m
max 10 % C_1 to nC_4
Δ on Sandstone
From 4225 to 4685
max 6% C_1 - C_3
From 4695 - 4935
max 1% C_1 to C_3
From 4935 to 4990
2 to 10 % C1 to C3



LOGS

PHASE 1.			PHASE 2.		
ISF SL GR	775 - 186 775 - 130	1	ISF-SL GR	4506 - 4252	5
ISF-SL GR	4258 - 775	2/4	FDC-CNL	" - "	2
HDT	4260 - 2000	1	ISF-SL GR	4755 - 4375	6
DEV.	2000 - 775	1	FDC-CNL	" - "	3
MLMLL	3880 - 3550	1	DLL-MSFL	4735 - 4252	1
FDC-CNL	4251 - 2859	1	HDT	4740 - 4252	2
CBL	2862 - 1546 920 - 550	1			
Thermo	3000 - 2125	1			

TESTS

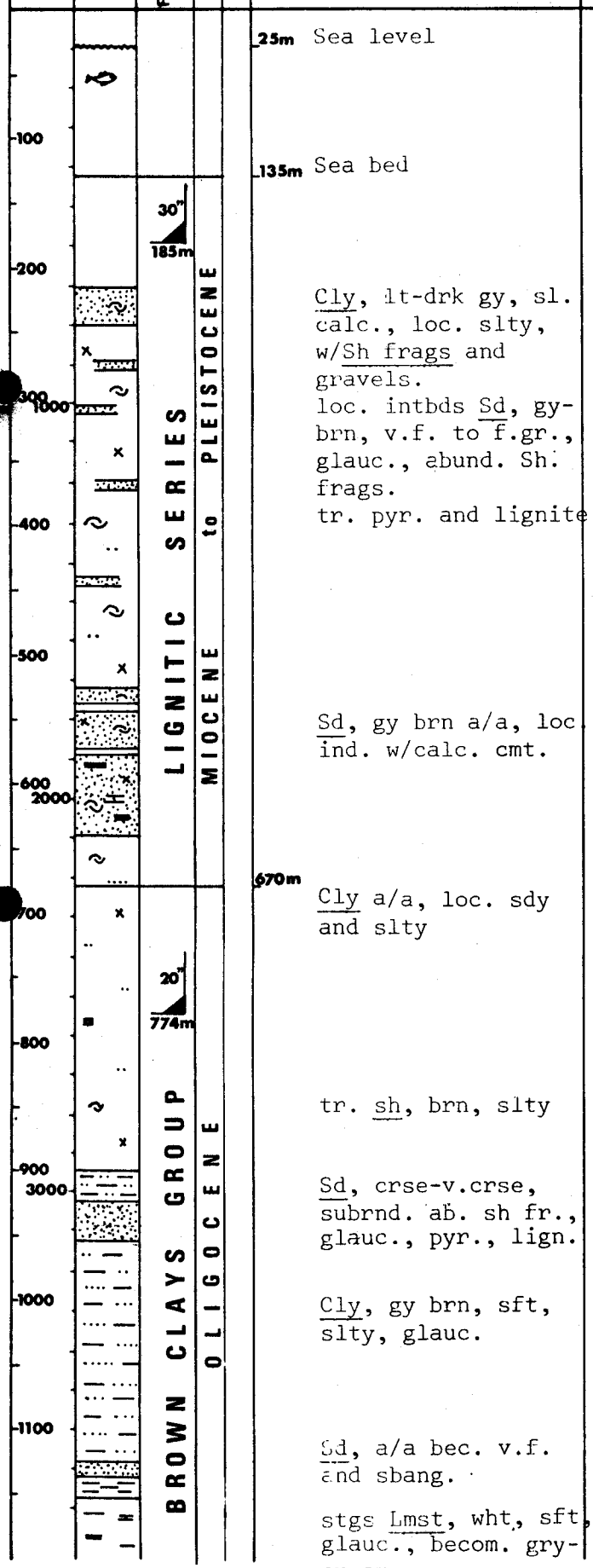
RFT 1	4401 - 4406 = 6 tests FP 10986psi DRY	
RFT 2	4401 - 4403 4450 - 4469 = 12 tests DRY	
RFT 3	4401 - 4402 4647 - 4652,5 = 8 tests DRY	

Checked J. P MOUCHET
Date 10.11 - 77

Depths E ↓ | Litho-section | Formations | Stages | Shows | Descriptions. Obs.

Z RKB + 25m
Z Ground or Sea bottom - 110m
135m

Well: **15/3-2**



25m Sea level

135m Sea bed

Cly, lt-drk gy, sl. calc., loc. slty, w/Sh frags and gravels.
loc. intbds Sd, gy-brn, v.f. to f.gr., glauc., abund. Sh. frags.
tr. pyr. and lignite

Sd, gy brn a/a, loc ind. w/calc. cmt.

670m Cly a/a, loc. sdy and slty

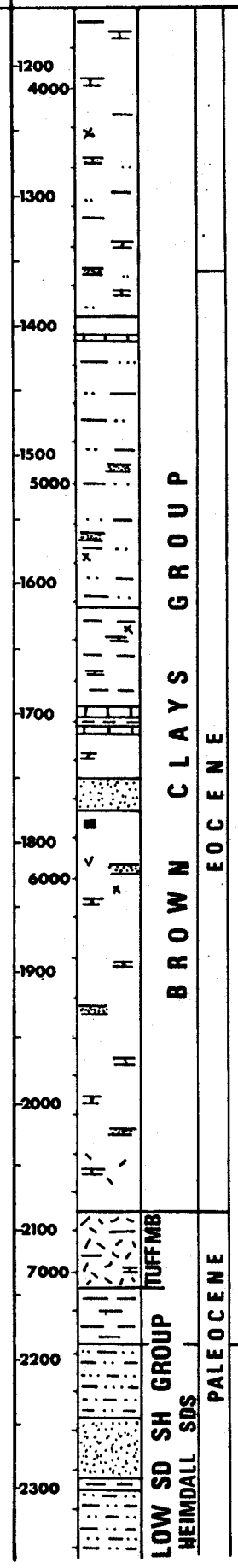
tr. sh, brn, slty

Sd, crse-v.crse, subrnd. ab. sh fr., glauc., pyr., lign.

Cly, gy brn, sft, slty, glauc.

Sd, a/a bec. v.f. and sbang.

stgs Lmst, wht, sft, glauc., becom. gry-cream



Cly, grading to sh

Sh, brn, slty, mic. pyr., loc. glauc. w/intbds sltst, gy, sl. calc, stgs Dol, beige, mcrxln and
1360m Sdst, gy-wht, f -md gr, argill, glauc.

Sh, becom. grnsh gy, slty, glauc.
intbds Sd, v.f. - f, rnd-subrnd
intbds Sh, grn-gy and brn.

loc. abund. glauc.

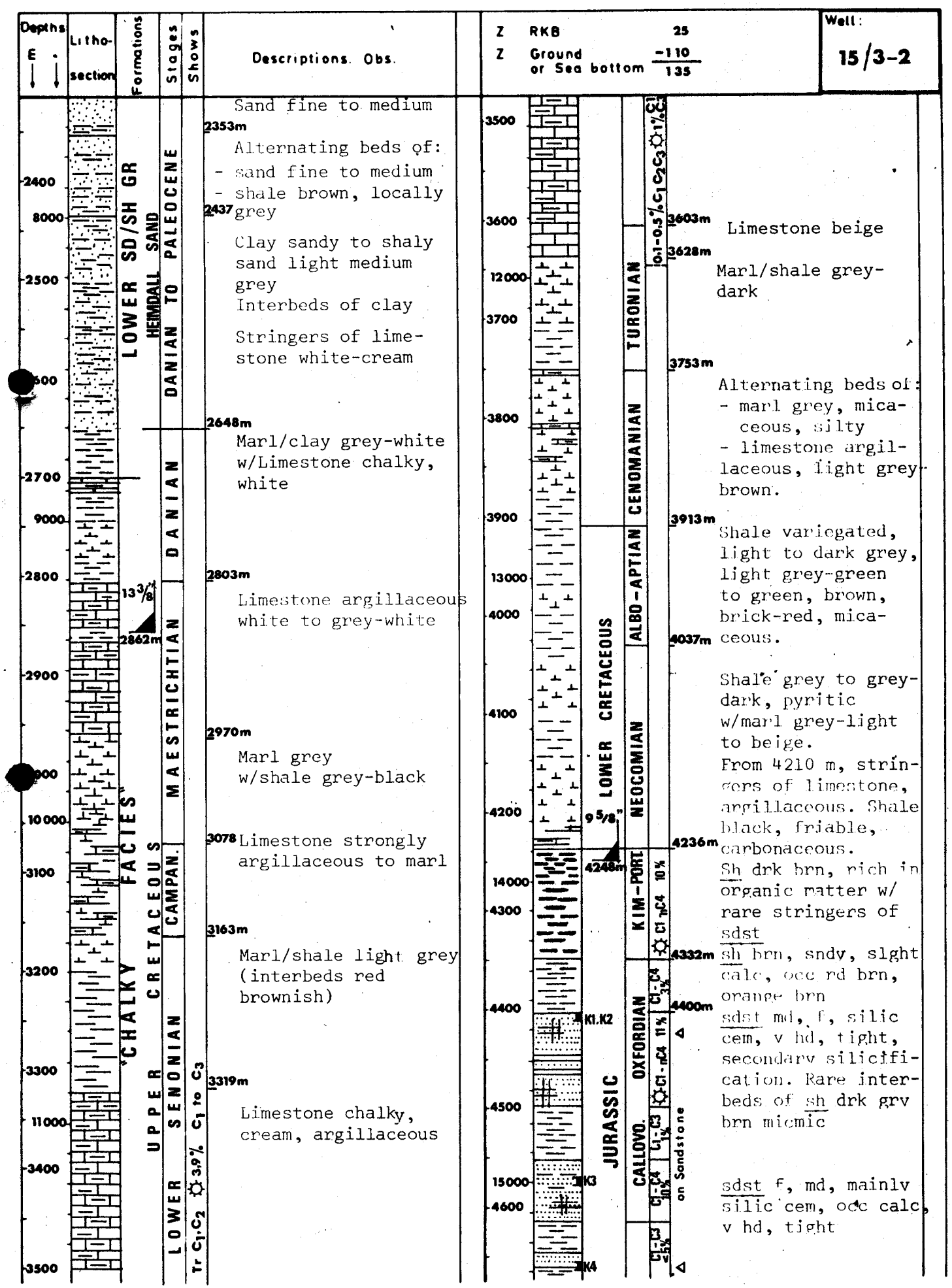
Sh, dk gy, v. slty, loc. mic.

tr. Sdst, beige-gy, mdcrse gr.

tr. Sh, grn, slty, glauc.

Sh, gy-blue-grn, w/tr. Tuff
2082m Sh, lt gy, w/ Tuff, gr, mcro congl. calc-non calc, w/blk spots
2142m
Sh, lt gry
2182m
strgs Sdsts. brn, f, friable

Sd, f-md gr, r.crse, rd to w.red, gen. w.std, loc. ang. and poorly sorted, loc. argill.
Sh, gy, brn, md -hd, non calc.


Depths
E
Litho-section
Formations
Stages
Shows
Descriptions. Obs.
Z RKB 25
Z Ground or Sea bottom -110 / 135
Well: 15/3-2
LOWER SD/SH GR
HERMDALL SAND
DANIAN TO PALEOCENE
DANIAN
MAESTRICHTIAN
CAMPAN.
LOWER SENONIAN
UPPER CRETACEOUS
"CHALKY FACIES"
Tr C1-C2 3.9% C1 to C3
13 3/8"
2862m
Sand fine to medium
2353m
Alternating beds of:
- sand fine to medium
- shale brown, locally grey
2437
Clay sandy to shaly sand light medium grey
Interbeds of clay
Stringers of limestone white-cream
2648m
Marl/clay grey-white w/Limestone chalky, white
2803m
Limestone argillaceous white to grey-white
2970m
Marl grey w/shale grey-black
3078 Limestone strongly argillaceous to marl
3163m
Marl/shale light grey (interbeds red brownish)
3319m
Limestone chalky, cream, argillaceous
TURONIAN
CENOMANIAN
ALBO-APTIAN
NEOCOMIAN
KIM-PORT.
OXFORDIAN
CALLOVO.
LOWER CRETACEOUS
JURASSIC
9 5/8"
4248m
K1.K2
K3
K4
0.1-0.5% C1 C2 C3 1% C1
C1-C4 10%
C1 nC4 10%
C1-C4 3%
C1-nC4 11%
C1-C3 1%
C1-C4 10%
C1-C3 <5%
on Sandstone
3603m
3628m
3753m
3913m
4037m
4236m
4332m
4400m
Limestone beige
Marl/shale grey-dark
Alternating beds of:
- marl grey, micaceous, silty
- limestone argillaceous, light grey-brown.
Shale variegated, light to dark grey, light grey-green to green, brown, brick-red, micaceous.
Shale grey to grey-dark, pyritic w/marl grey-light to beige.
From 4210 m, stringers of limestone, argillaceous. Shale black, friable, carbonaceous.
Sh drk brn, rich in organic matter w/ rare stringers of sdst
sh brn, sndy, slght calc, occ rd brn, orange brn
sdst md, f, silic cem, v hd, tight, secondary silicification. Rare interbeds of sh drk grv brn micmic
sdst f, md, mainly silic cem, occ calc, v hd, tight

Depths E	Litho-section	Formations	Stages	Shows	Descriptions. Obs.
4700		JURASSIC	CALLOVIAN		sh beige brn, lght beige, v sltv, hd, micmic, w/minor intervals of sdst v f, md, mainly argil cem.
4800				tr to 2% C1, C2	
16000 4900					Sh gry, slty,pyr.
				2 to 10% C1, C2, C3	
5000	TD 4990m				
5100					
17000 5200					

4859

4990

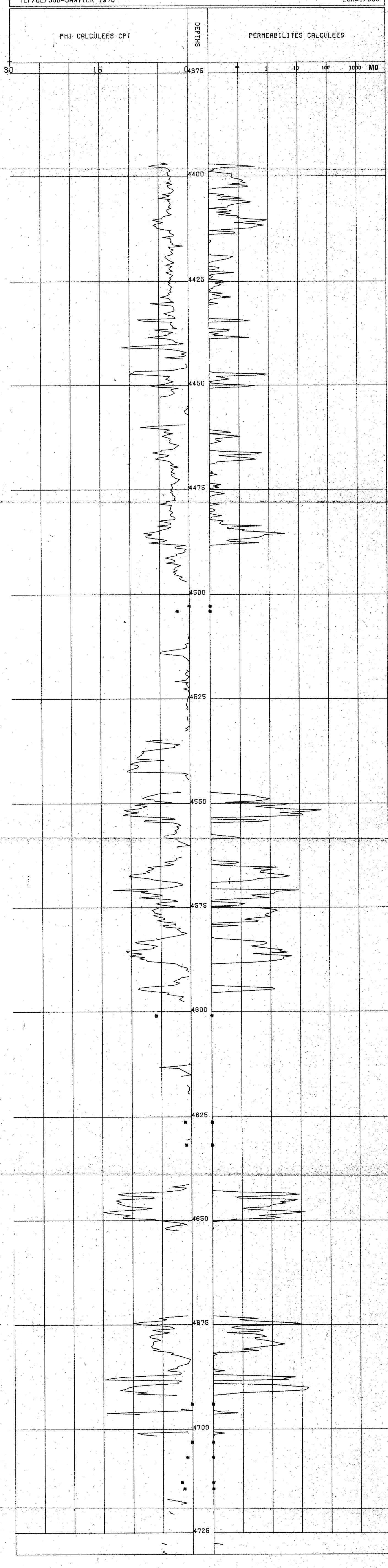
Z: RKB +25m
Z: Ground or Sea bottom -110m
135m

Well: 15/3-2

WELLFILE No 23

15/3-2
PERMEABILITY LOG
JURASSIC SECTION

TEP/DE/SUB-JANVIER 1978 ECH=1/500



PL 5

WELL#16

M. 23

Schlumberger
Synergetic Log Systems

Computer Processed Interpretation

CORIBAND

Depth Scale Units	1:200, Feet, Min., Pct., Ohm
COMPANY:	ELF ZAMBIA (K)
WELL:	11 (MUMBA-K)
FIELD:	MUFUNDE
COUNTY:	KITWE
REFERENCE Nº (TULAGH):	1
LOCATION:	28°.00'.00"E 12°.47'.15"S
DATE PROCESSED:	21-OCT-77
PROGRAM Nº	3
DATE RECORDED:	28-SEP-77
RUN Nº	1
DF:	0
GL:	0

FOLDER: The well name, location and borehole reference data were furnished by the customer

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of our interpretations, and we shall not owe or be liable for any loss or damage suffered or sustained by you as a result of any of our opinions or any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are subject to our General Terms and Conditions as set out in our current Price Schedule.

Computation Center: ALLOC — Program used: PRE 519,CORIBOR — Version: 2.00000TEMP

PARAMETERS

Depth Interval From	To	Rw	Rmf	Rmc	m	n	Mm	Mn	a	Cf
4730	4950	.029	.053	35.0	100	35	2.62	.55	.5538	

Remarks:

(m)

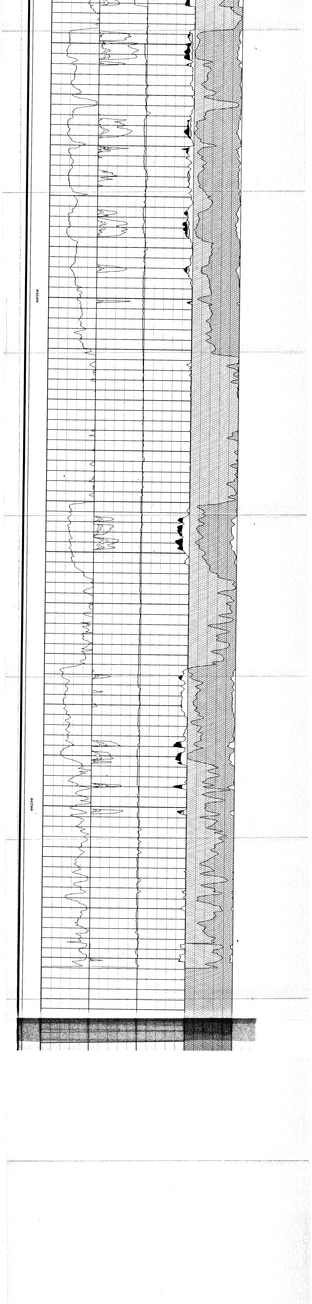
FORMATION CHARACTERISTICS: S P ; Water Saturation 0–100 %; Average Grain Density 2.5 g/cm³ – 3.0

HYDROCARBON ANALYSIS: Hydrocarbon Volume 0 – 25 %; Hydrocarbon Weight 0 – 25 %

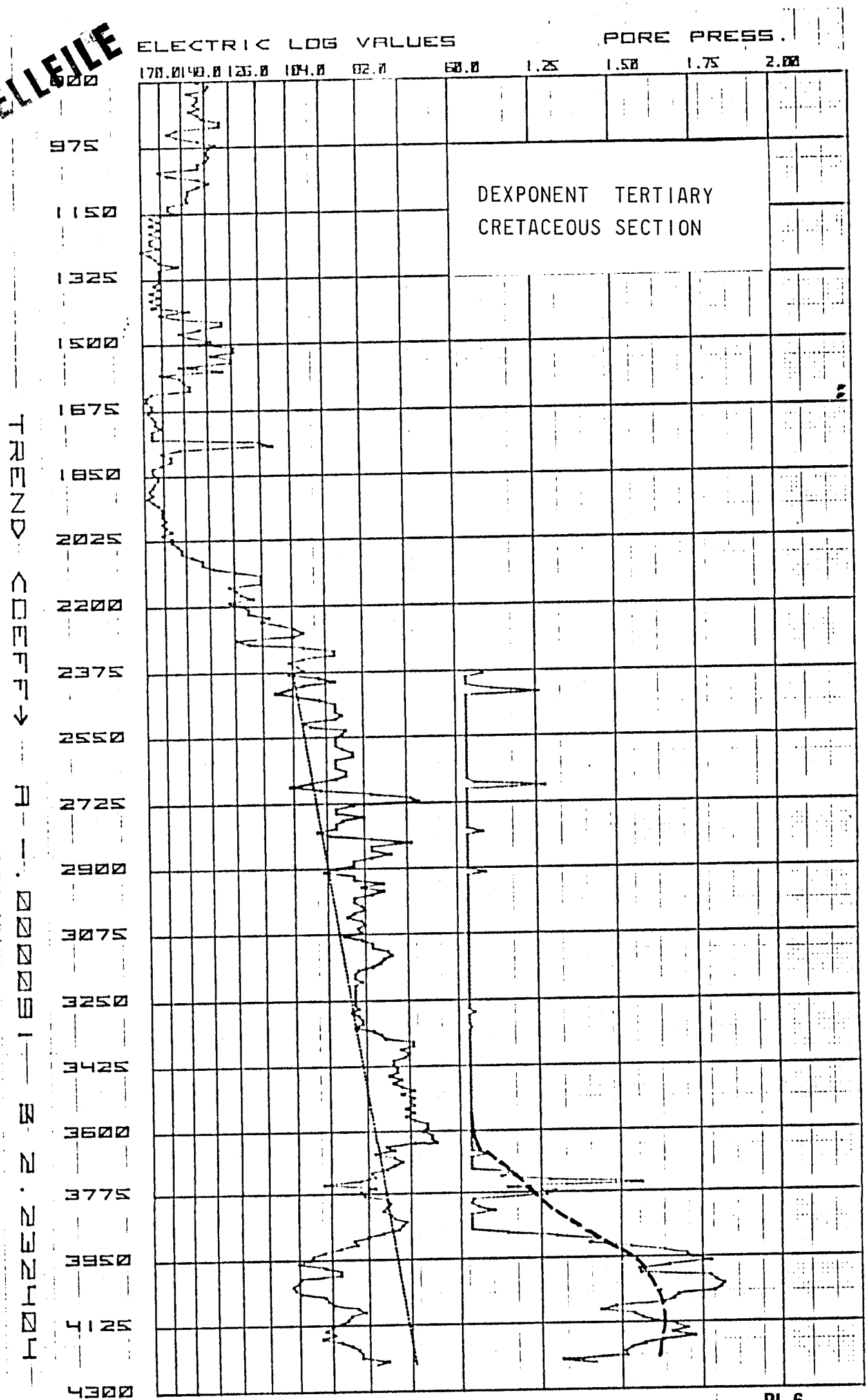
FLUIDITY AND FLUSH ANALYSIS BY VOLUME: Residual (Water / Hydrocarbon); Moved 0–100 %

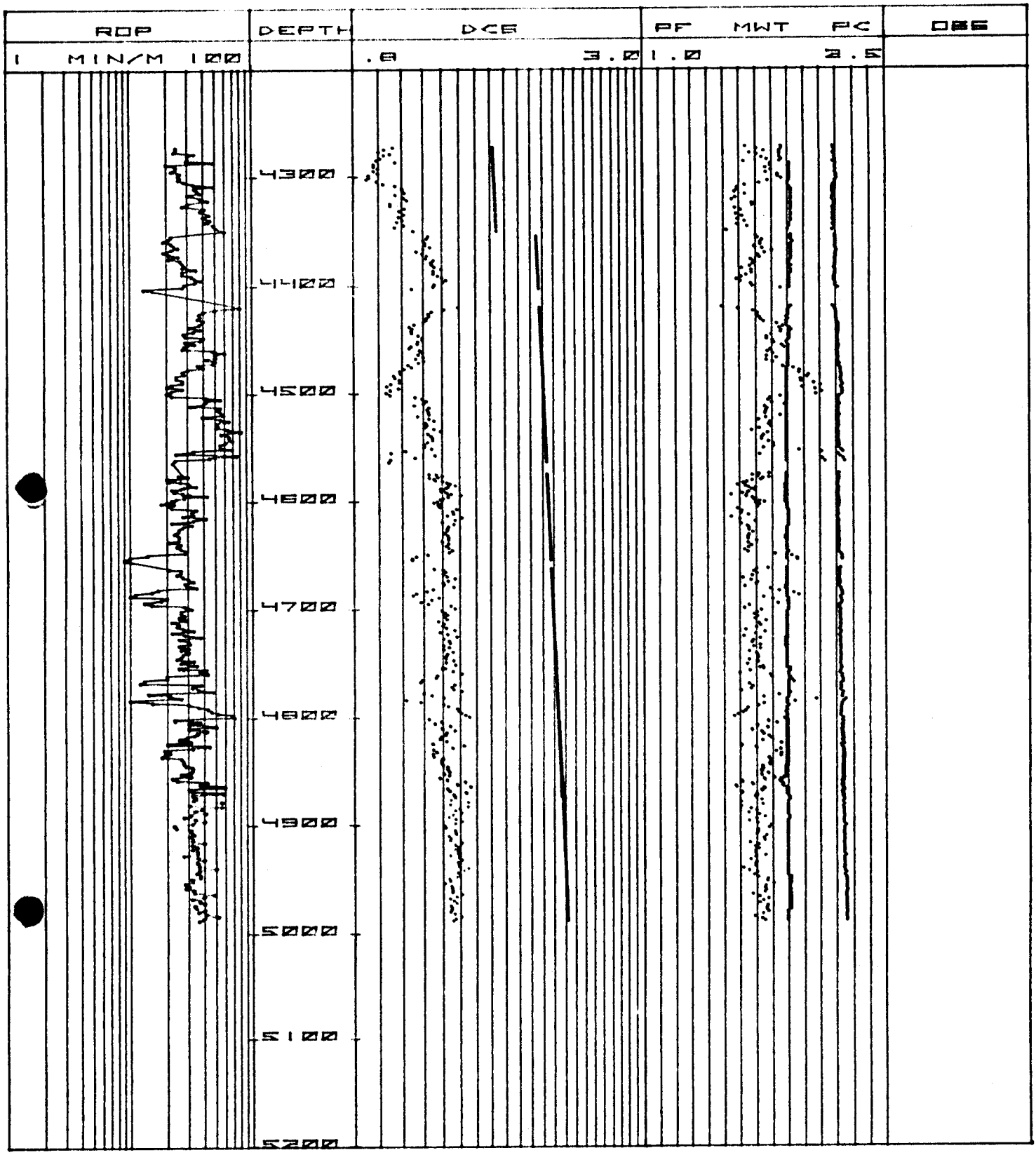
FORMATION ANALYSIS BY VOLUME: Clay, Matrix, Porosity 0 – 30 %

DEPTH

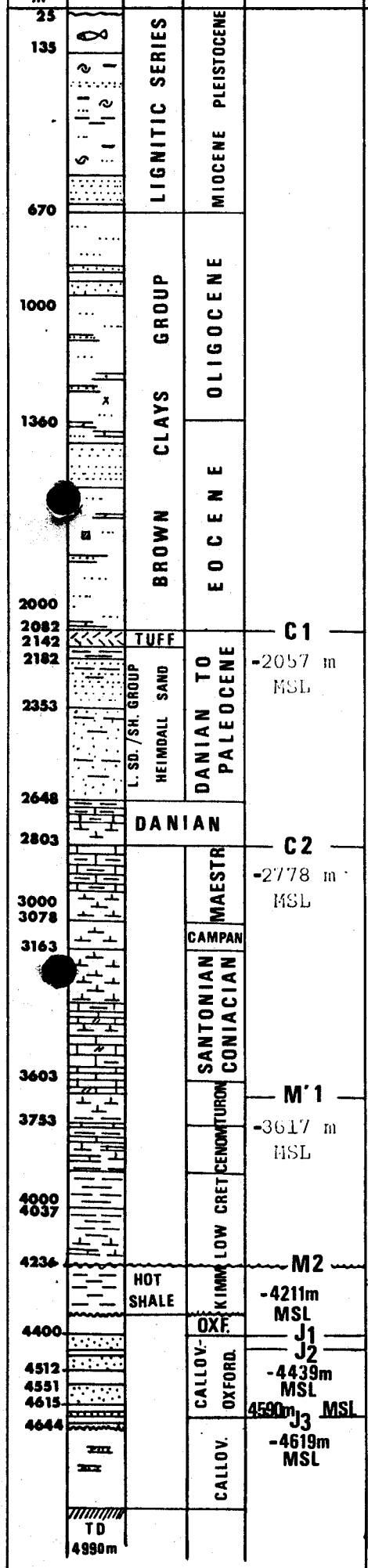


WELLFILE


ELECTRIC LOG VALUES
PORE PRESS.
170.0 140.0 126.0 104.0 82.0 60.0
1.25 1.50 1.75 2.00
DEXPONENT TERTIARY
CRETACEOUS SECTION
TREND ↑ DEPTH ↓ 1 : 1000 M 2 : 2000 M
900
975
1150
1325
1500
1675
1850
2025
2200
2375
2550
2725
2900
3075
3250
3425
3600
3775
3950
4125
4300



"DEXPONENT" - JURASSIC SECTION



DESCRIPTIONS OBS.
Clay silty to sandy with fine to medium sand. Shell fragments. Lignite.
Clay grey-brown, silty to sandy lignitic inpart, glauconitic. Interbeds of sand fine to coarse.
Silty shale and dolomitic limestone stringers. Fine to medium sand.
Brown silty shale.
Tuff and shale. Dark grey shale. Fine to medium sand, shale interbeds.
Fine to medium shaly sand and silty to sandy shale interbeds. Chalky limestone. Argillaceous limestone.
Marl grey. Marl grey/Marl pink. Marl grey-green.
Chalky and argillaceous limestone.
Alternating beds of marl grey, micaceous and argillaceous limestone. Micaceous shale grey black. Marl beige with stringers of limestone.
Brown black shale bit.
Sandstone bad sorted. Siliceous cement. Shale black, micaceous.
Shale black with sandstone interbeds.

COORD:
X = 01°47'12.6 E
Y = 58°59'00.5 N
Line 580529 SP 210
Sea depth - 110 m (RKB + 25m)

DEPTH REF: RKB

WELL: 15/3-2

COUNTRY: NORWAY

LIC: 025 PETRONORD

NOTA :

CASINGS

30" 185 m
20" 774 m
13 3/8" 2862m
9 5/8" 4248m

TARGETS:

JURASSIC TRIASSIC SANDSTONES

RESULTS:

Plugged and abondoned after unsuccessful fishing and sidetrack.

OBSERVATIONS:

J.P. MOUCHET 10/01/78

15/3-2
RESULTS.

DEPTH	STAGE	GROUP	LITHO.	DESCRIPTION
				30" 135 m
				185m BOULDER CLAY
	PLEISTOCENE	LIGNITIC SERIES		CLAY SILTY TO SANDY, WITH FINE, MEDIUM SHALY SAND - SHELL FRAGMENTS - LIGNITE.
500	MIOCENE TO			SAND, FINE, MEDIUM, GLAUCONITIC
				670m
				20" 774m CLAY GREY-BROWN, SILTY, GLAUCONITIC.
				FINE TO COARSE SAND INTERBEDS.
				? — 9655 — ?
1000	OLIGOCENE			LIMESTONE STRINGERS.
				1360 m
	EOCENE	BROWN CLAYS GROUP		SAND FINE, MEDIUM, AND SHALE SILTY, GREY-GREEN TO GREY-DARK, BROWN.
1500				SHALE WITH DOLOMITE AND LIMESTONE STRINGERS.
2000				2082 m C1
			TUFF	TUFF MARKER
	DANIAN TO PALEOGENE	LOWER SD / SH GROUP	SANDS	SAND FINE, MEDIUM AND SILTY SHALE INTERBEDS.
2500			HEIMDALL	LIMESTONE STRINGERS.
				2648 m
	DANIAN			CALCAREOUS SHALE AND CHALKY LIMESTONE.
				MARL GREY, PINK
				2803m C2
				13⅞" 2882m
	MAESTRICHTIAN			ARGILLACEOUS LIMESTONE
3000				MARL AND LIMESTONE
				3078m
	CAMP.			MARL GREY, PINK
				3163m
	CONIACIAN			MARL GREY-GREEN
	SANTONIAN			CHALKY AND ARGILLACEOUS LIMESTONE
3500				3603m
	TURON.			CHALKY LIMESTONE M1
				LIMESTONE TO MARL GLAUCONITIC
				MICACEOUS SHALE
				3753m
	CENOM.			ALTERNATES OF CALCAREOUS SHALE, MARL, ARGILLACEOUS LIMESTONE
				3913m
4000	ALB.-APT.			SHALE DARK-GREY, MICACEOUS.
				4037m
	BARR. - NEOC.			SHALE DARK-GREY, PYRITIC
				MARL BEIGE WITH LIMESTONE STRINGERS
				9⅝" 4248m 4236m M2
	KIMM. - PORT.	HOT SHALE		BROWN BLACK SHALE
				4332 m
	OXF.		K1, K2	4400m J1
				SANDSTONE FINE 4464m J2
4500	CALLOV. - OXF.			SILICEOUS CEMENT
				SHALE DARK BROWN, PYRITIC
			K3	
				4644m J3
	CALLOVIAN		K4	SANDSTONE FINE TO MEDIUM
				LIGNITIC DEBRIS
				SHALE DARK BROWN, SILTY, MICACEOUS
				SANDSTONE INTERBEDS
5000				T.D. 4980m

SCALE 1/5000

J.E. TANCHUT
10.01.78

POSITION MAP

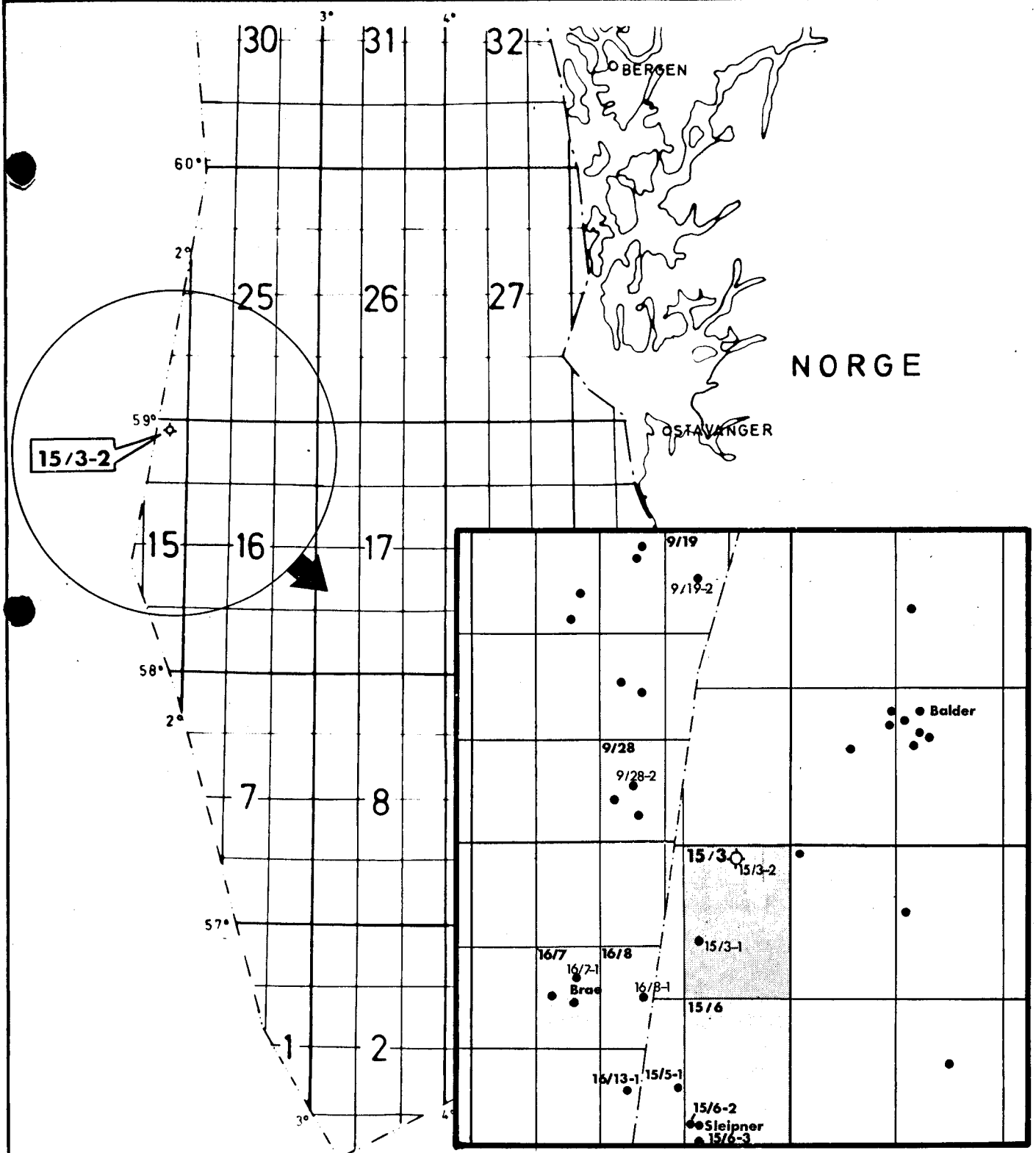
WELL : **15/3 -2**

COUNTRY : NORWAY OFFSHORE

COORDINATES: X : **01°47'12"6 E**

Y : **58°59'00"6 N**

Scale : 1/2500.000



PL.10

EXPLORATION

PREDICTED/ACTUAL DEPTH COMPARISON

Depth datum: RKB

		PREDICTED		ACTUAL		LITHOLOGY
SERIES	FORMATION	DEPTH	THICKNESS	DEPTH	THICKNESS	
SEA LEVEL SEA BED						
MIOCENE TO PLEISTOCENE	LIGNITIC SERIES	157 m	588 m	135 m	535 m	Clay with interbeds of sand
OLIGOCENE	BROWN CLAYS	745 m	650 m	670 m	690 m	Silty clay with intercalations of sand
EOCENE	GROUP	1395 m	710 m	1360 m	722 m	Clay and sand; rare stringers of limestone, dolomite
DANIAN TO PALEOCENE	LOWER SAND/SHALE GROUP	3005 m	730 m	2082 m	721 m	Tuff on the top. Sand locally shaly. Limestone and marl on the bottom.
UPPER CRETACEOUS		2835 m	980 m	2803 m	1110 m	Chalky limestone, argillaceous, with marl. Rare levels of shale.
LOWER CRETACEOUS		3815 m	460 m	3913 m	323 m	Shale - Marl with stringers of limestone on the bottom.
JURASSIC KIMM. UPPER JUR.		4275 m	**470 m**	4236 m	**754 m**	**Sand/shale alternance**
DOGGER+LIAS		4745 m	**340 m**	**DOGGER NOT REACHED**		

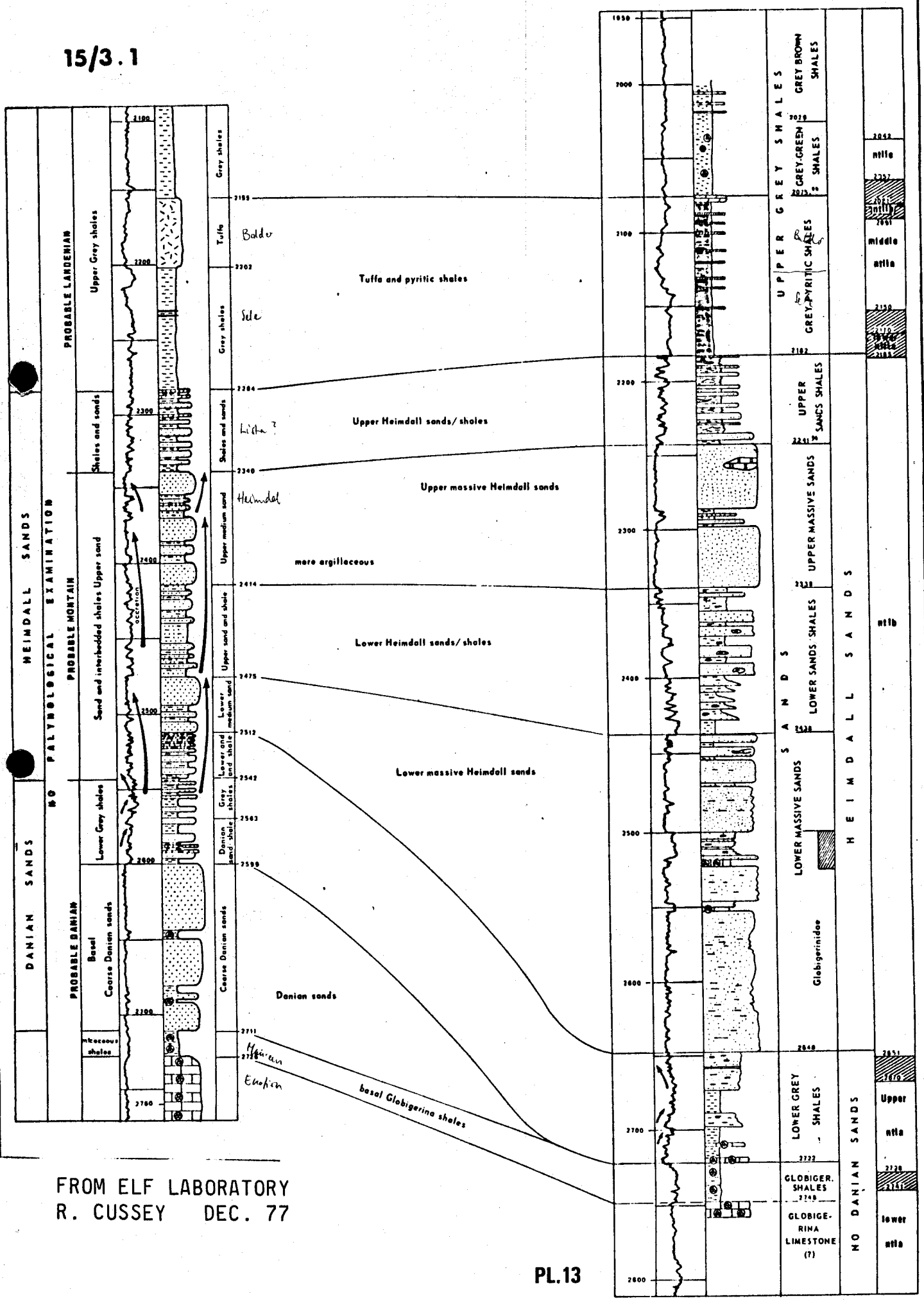
COMPARATIVE TABLE OF FORMATION THICKNESS *

BETWEEN 15/3-1 AND 15/3-2

STRATIGRAPHICAL UNIT	15/3-1		15/3-2	
Pleistocene to Miocene	712		535	
Oligocene	555		690	
Eocene	747		722	
Danian to Paleocene	645		721	
Maestrichtian	292		275	
Campanian	136		85	
Santonian - Coniacian	364	1019	440	1110
Turonian	109		150	
Cenomanian	118		160	
Albian - Aptian	59	135	124	323
Barremian - Neocomian	76		199	
Kimmeridgian/Portland	262		96	
Oxfordian/Callovo.-Oxford.	920	1182	312	754
Callovian	0		330	

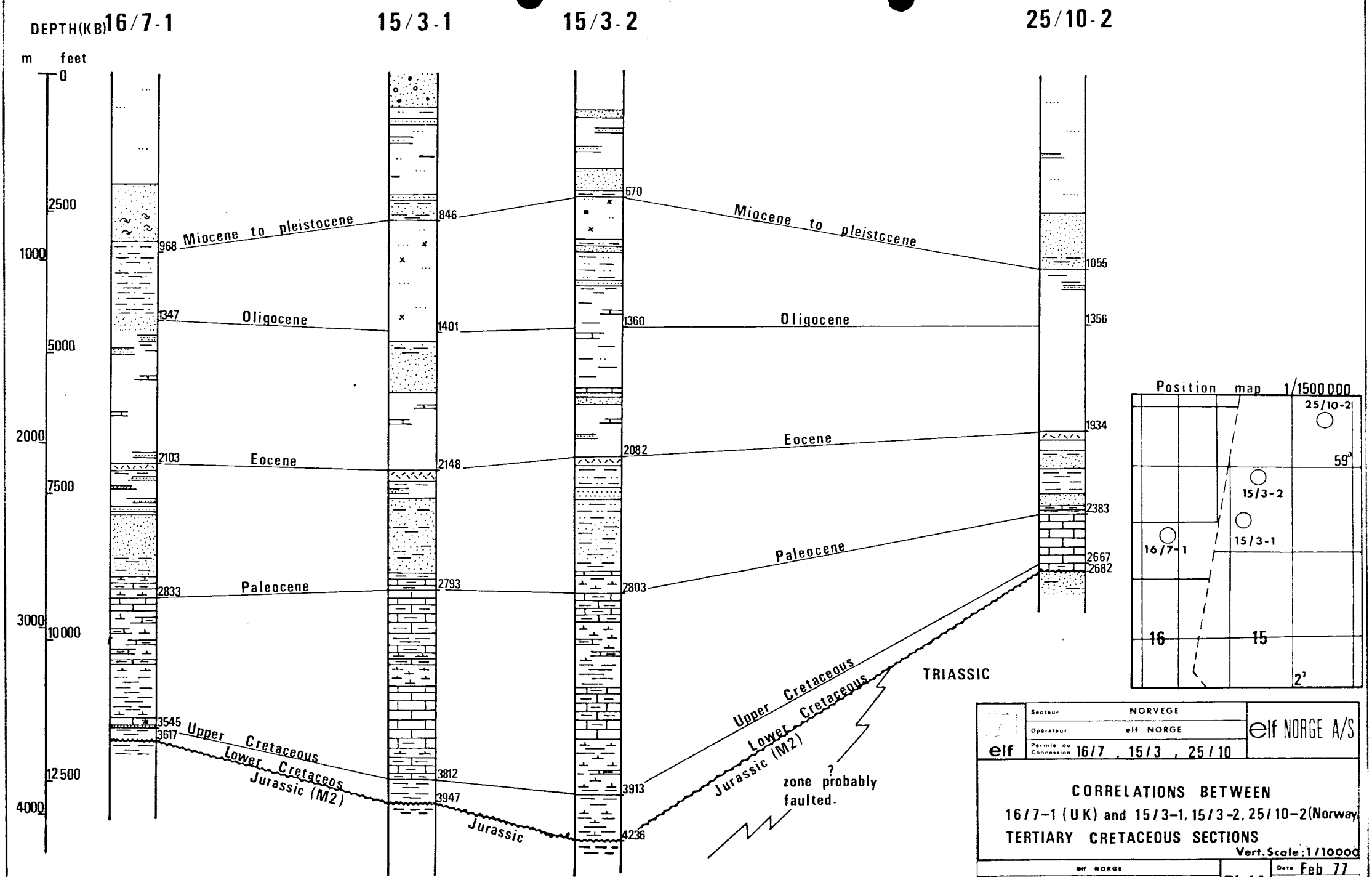
* Thickness in meters

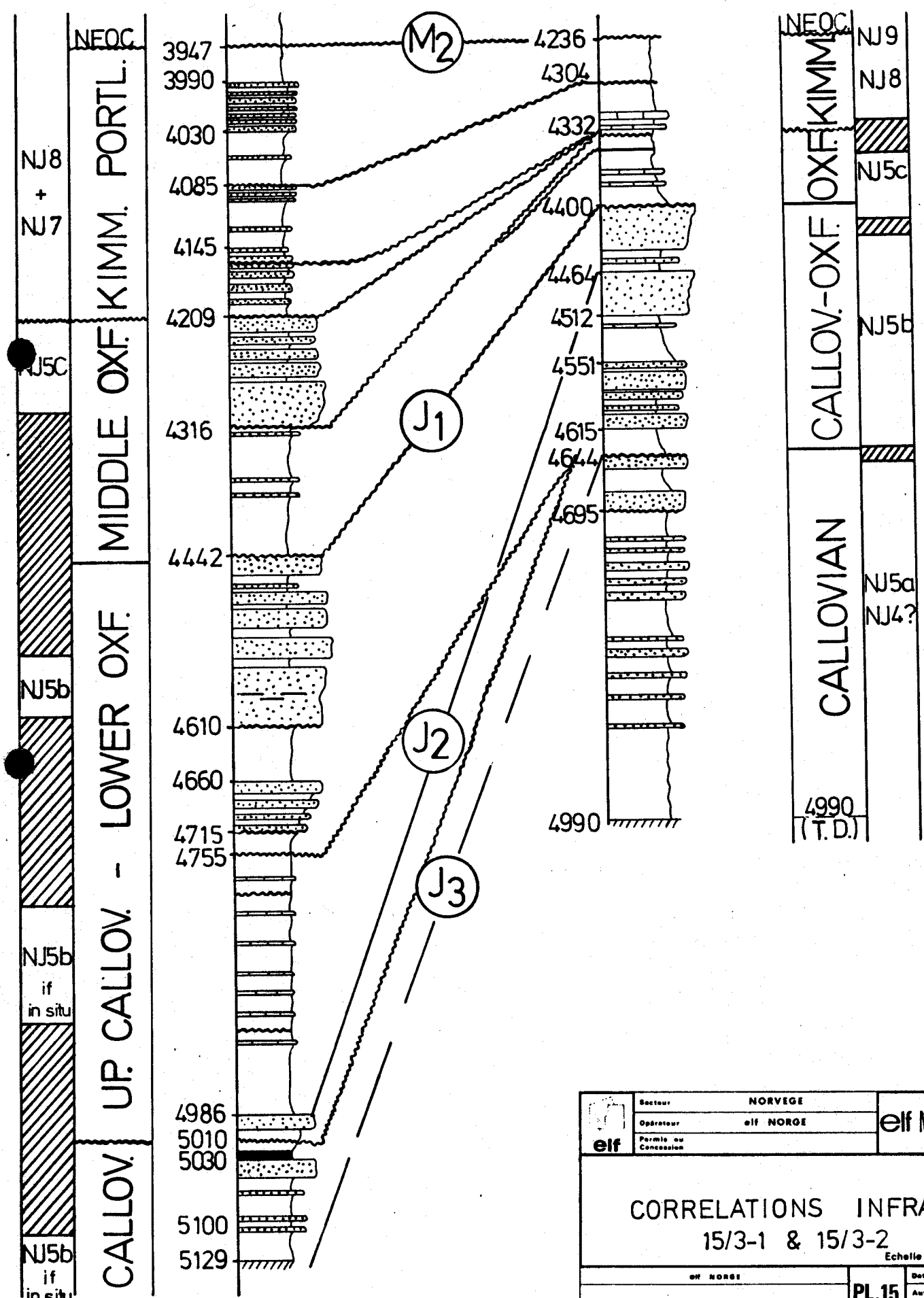
RELATIONSHIPS BETWEEN 15/3-1 and 15/3-2
LOWER TERT. SECTION.



FROM ELF LABORATORY
R. CUSSEY DEC. 77

PL.13


DEPTH(KB)
16/7-1
15/3-1
15/3-2
25/10-2
m
feet
0
2500
1000
5000
2000
7500
3000
10000
12500
4000
968
Miocene to pleistocene
1347
Oligocene
2103
Eocene
2833
Paleocene
3545
3617
Upper Cretaceous
Lower Cretaceos
Jurassic (M2)
846
1401
2148
2793
3812
3947
Jurassic
670
1360
2082
2803
3913
4236
1055
1356
1934
2383
2667
2682
TRIASSIC
zone probably faulted.
Position map 1/1500000
25/10-2
59°
15/3-2
15/3-1
16/7-1
16
15
2°
Secteur NORVEGE
Opérateur elf NORGE
Permis ou Concession 16/7 , 15/3 , 25/10
elf
elf NORGE A/S
CORRELATIONS BETWEEN
16/7-1 (UK) and 15/3-1, 15/3-2, 25/10-2 (Norway)
TERTIARY CRETACEOUS SECTIONS
Vert. Scale: 1/10000
elf NORGE
PL.14
Date Feb 77
Auteur Mouchet


15/3-1
15/3-2
NEOC.
PORTL.
KIMM.
MIDDLE OXF.
LOWER OXF.
UP. CALLOV. - LOWER OXF.
CALLOV.
NJ8 + NJ7
NJ5C
NJ5b
NJ5b if in situ
NJ5b if in situ
3947
3990
4030
4085
4145
4209
4316
4442
4610
4660
4715
4755
4986
5010
5030
5100
5129
M2
J1
J2
J3
4236
4304
4332
4400
4464
4512
4551
4615
4644
4695
4990
NEOC.
KIMM.
OXF.
CALLOV.-OXF.
CALLOVIAN
NJ9
NJ8
NJ5c
NJ5b
NJ5a
NJ4?
4990
(T.D.)
Secteur NORVEGE
Opérateur elf NORGE
Permis ou Concession
elf NORGE A/S
CORRELATIONS INFRA M2
15/3-1 & 15/3-2
Echelle : 1/ 5000
elf NORGE
PL.15
Date 10-4-78
Auteur MOUCHET
N° classeur

15/3-2

UPPER JURASSIC SANDSTONES

reservoirs characteristics

LEVEL	LAYER No		DEPTH (SPE)(m) Top	DEPTH (SPE)(m) Bottom	h total (m)	CPI cut off {Vclay ≥ 33 %, Sw =100 %, Ø < 2 %} h net (m)	Ø m (%)	k (md)	CPI cut off {Vclay ≥ 33 %, Sw ≥ 55 %, Ø < 2 %} h net (m)	Ø m (%)	S wm (%)	FLUIDS	LITHOLOGY
UPPER JURASSIC	Sandstones	1	4400	4512.7	112.7	75.9	3.50 (1) / 10.5 (2)	0.29 (2)	16.2	5.18	34.76	hydrocarbon bearing	Sdst / shale
		2	4551	4615	64	37.1	5.84 (1) / 11.1 (3)	0.31 (3)	11.7	8.62	38.74	hydrocarbon bearing	Sdst / shale
		3	4644	4659	14	7.9	9.75 (1) / 12.4 (4)	0.09 (4)				water bearing	calcareous sandstone
		4	4676.5	4695	18.5	15.6	6.20 (1)						Sdst / shale

(1) CPI Values
(2) Core measurement values Core no.1 and 2
(3) Core measurement values Core no. 3
(4) Core measurement values Core no. 4

elf	Secteur: NORVEGE	elf NORGE A/S
	Opérateur: elf NORGE	
	Permis ou Concession: 15/3	

UPPER JURASSIC SANDSTONES

RESERVOIR CHARACTERISTICS

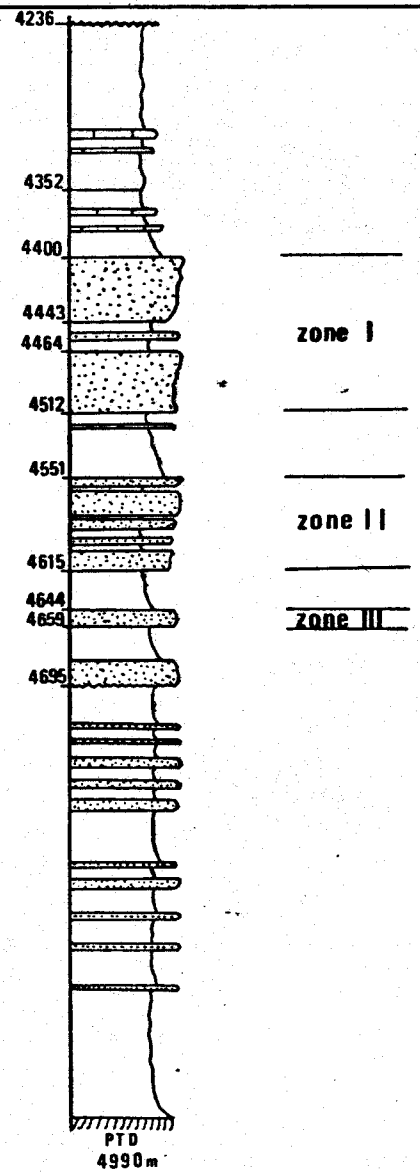
Echelle : 1/ 0000000

elf NORGE | PL. 16 | Date | Auteur

15/3-2

Testing RFT Results.

Shematic reservoir section



Reservoirs zone	RFT	Depth RKB	Pressure (psi)	Observations
zone I	17	4400	45	
	(2)	4401	10811	stabilized
	15	4401	19	
	18	4401,3	40	
	25	4401,3	-	seal failure
	(6)	4401,4	10870	stabilized
	23	4401,5	-	seal failure
	26	4401,7	41	59 cc mud recovered
	16	4402	54	
	24	4402	13	
	1	4403	5475	not stabilized
	4	4404	-	seal failure
	3	4405	-	seal failure
	5	4406	4822	not stabilized
	7	4450	25	
	10	4450,5	20	
	9	4451,5	0	
	8	4453,5	33	
zone II	13	4550,5	20	
	14	4552,5	20	
	12	4555	20	
	11	4569	38	
zone III	21	4647,5	-	seal failure
	20	4649,5	-	seal failure
	22	4650,5	-	seal failure
	19	4652,5	-	

DRY TESTS