U-485

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statoil

Tittel/Undertittel

COMPLETION REPORT

6506/12-5

Org.enhet	Kontraktnr./Prosjektnr.
LET B	
Rapportnr./Revisjon	**Sted/Dato**
	BERGEN, OKTOBER 1986

Statoil

Classification	Distribution
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Title/Subtitle

COMPLETION REPORT

6506/12-5

Activity/Keywords

BRØNN 6506/12-5, SLUTTRAPPORT

Requested by	PL 094
Org. unit	LET B
Contract No./Project No.	Report No./Revision

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PL 094

STATOIL - MOBIL - AGIP -
ARCO - TENNECO - NORSK HYDRO
COMPLETION REPORT
WELL 6506/12-5

BETA PROSPECT

GENERAL INFORMATION

Well Data Record

a) Designation 6506/12-5

b) Classification Appraisal

c) Location

i) Country : Norway Offshore, Norwegian Sea

ii) Area : Haltenbanken

iii) Licence : PL 094 Statoil (operator) 50%
Mobil 15%
Agip 10%
Arco 10%
Tenneco 10%
Norsk Hydro 5%

iv) Latitude : 65°02' 28,60" N
Longitude : 06°58' 21,93" E

v) Seismic Location : SP 338
Line no. : ST 8403-451

vi) Prospect : Beta

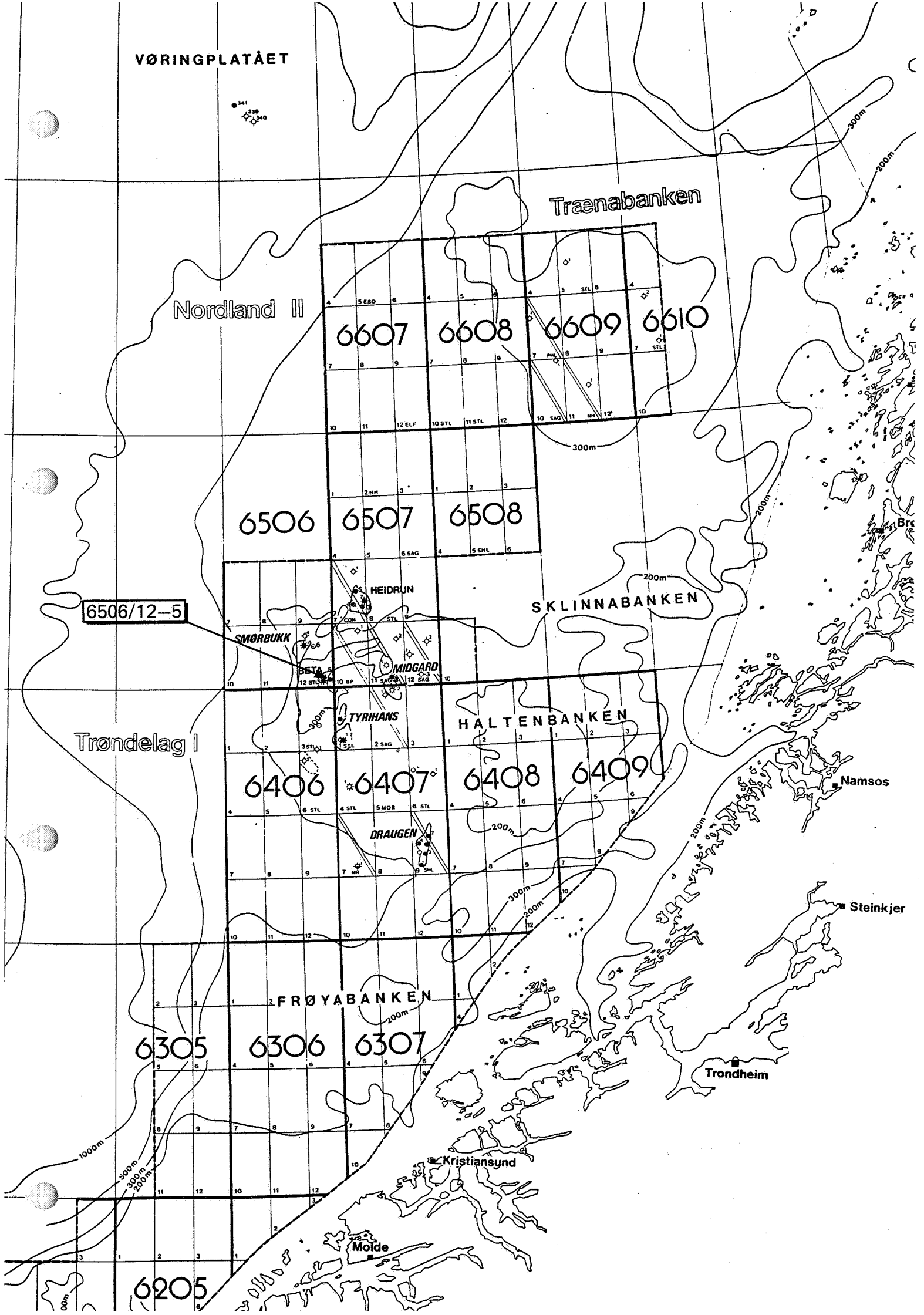
vii) Water depth : 301m

d) Rig data

i) Rig name : Dyvi Delta

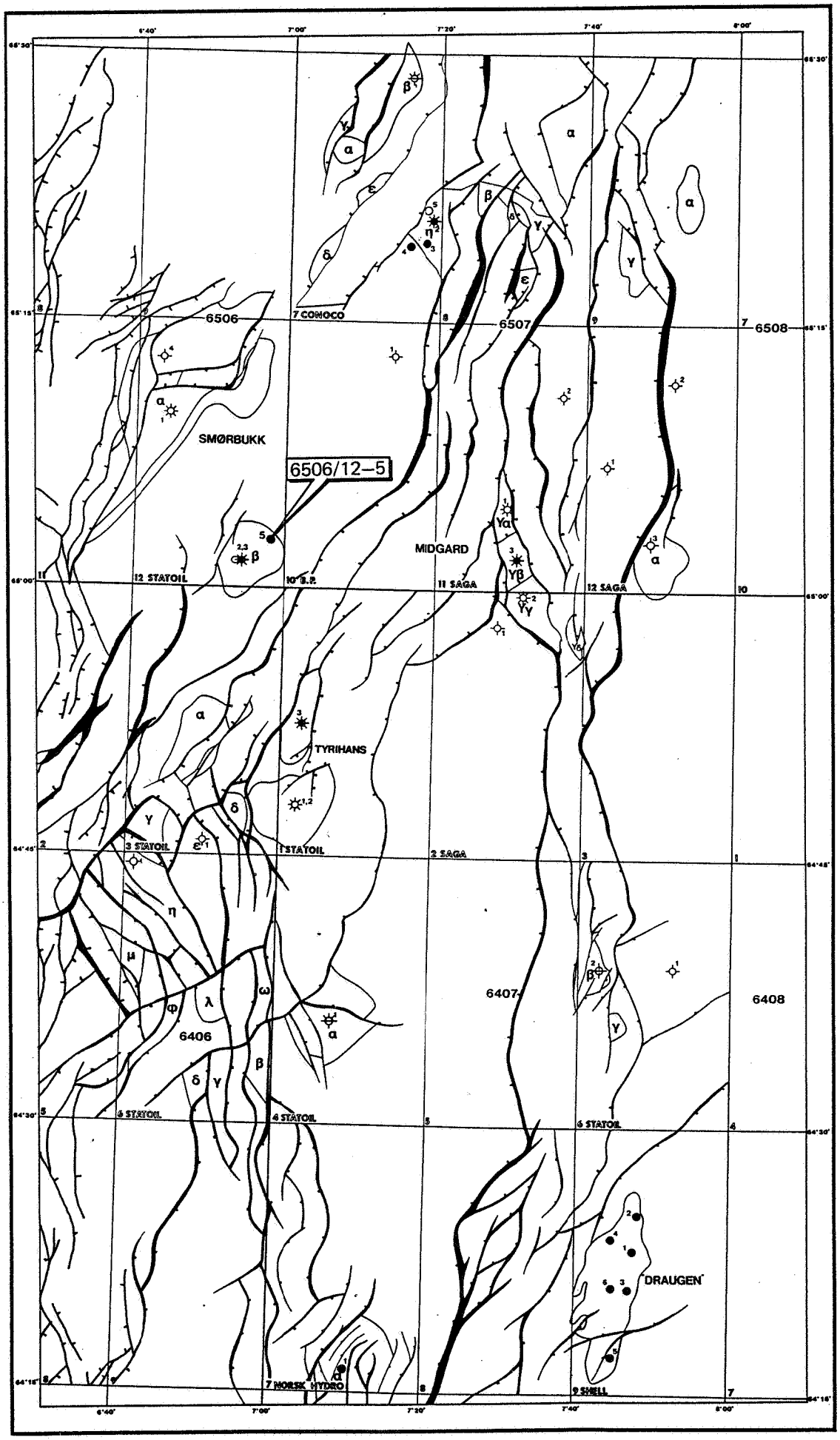
ii) Drilling Draft : 23.5m

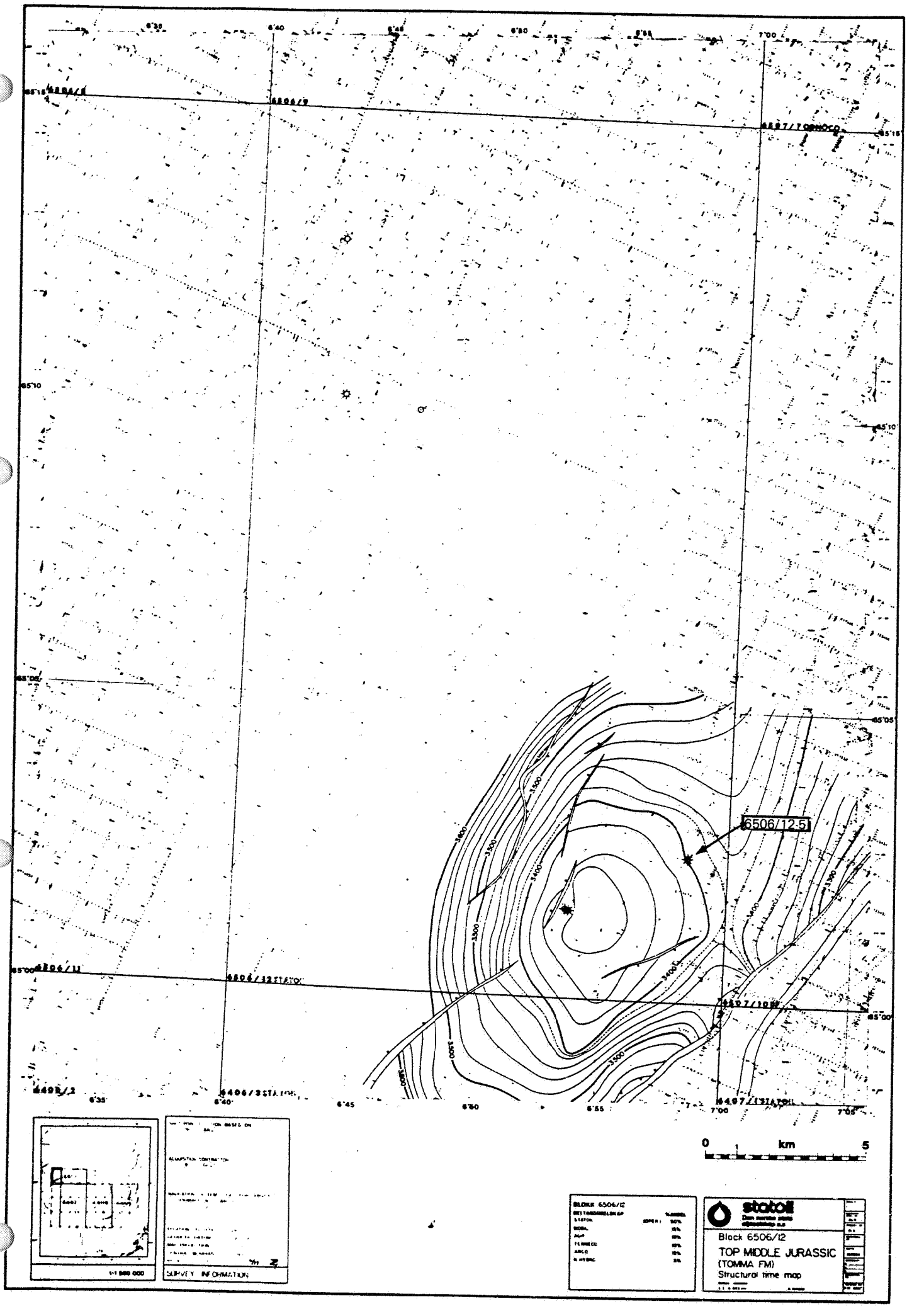
iii) KBE : 29m


VØRINGPLATÅET
Traenabanken
Nordland II
6607
6608
6609
6610
6506
6507
6508
6506/12–5
HEIDRUN
SMØRBUKK
BETA
MIDGARD
SKLINNABANKEN
TYRIHANS
HALTENBANKEN
Trøndelag I
6406
6407
6408
6409
DRAUGEN
FRØYABANKEN
6305
6306
6307
6205
300m
200m
1000m
500m
Namsos
Steinkjer
Trondheim
Kristiansund
Molde

SCHEMATIC STRUCTURAL MAP

HALTENBANKEN




6506/12-5
3400
3500
3600
0
km
5
Block 6506/12
TOP MIDDLE JURASSIC
(TOMMA FM)
Structural time map
statoil

Purpose of the well.

The 6506/12-5 well was the third well on the Beta structure in block 6506/12. The well 6506/12-2 was abandoned at 933m KB because of technical problems, and 6506/12-3 was drilled to 4360m KB in formations of Lower Jurassic age.

The well was classified as an appraisal well and was designed to further examine the hydrocarbon potential of the Beta structure. A primary objective was to define hydrocarbon - water contacts.

The primary targets were Middle and Lower Jurassic sandstones, and a secondary target was the Finnvær sands of Upper Cretaceous age.

The Siltstone Member within Tomma Formation was expected to be sealing at this depth. The Leka Formation, and intervals within the Aldra Formation may be sealing or partially sealing. This was to be tested.

Results of the well.

The well was drilled to a total depth of 4587m KB (-4558m MSL), 77m into the Hitra Formation. Hydrocarbons were encountered in Middle Jurassic sandstones (Tomma Formation-Unit I) and in Cretaceous sandstones in the top of Finnvær Group.

No shallow gas charged sands were encountered in this well.

Cores were cut in the Finnvær sands and in the Middle and Lower Jurassic from the lower part of Grip Group at 3910m KB down to 4362m KB in the Aldra Formation of Lower Jurassic, except for an interval from 4216m KB to 4245m KB in the Leka Formation. A total of 27 cores were cut.

Four drill stem tests were carried out in the Middle Jurassic (Tomma Formation-Unit I) and Cretaceous reservoir intervals.

An oil-water contact was found in the Finnvær sand at 3178.2m KB. An oil-water contact was also found in Tomma I at 4010.5m KB (from logs). A possible gas-watercontact can be calculated to 4068m KB from RFT. The Tomma II unit as well as the top of Tomma I was found to be sealing in this well.

The well was logged, plugged and abandoned as an oil discovery. A table of detailed reports generated from the well is enclosed.

REPORTS ON WELL 6506/12-5

Summaries

- MWD End of Well Report	Teleco
- Final Well Report	Exlog
- Petrophysical Evaluation	Statoil
- Well Testing Report	Flopetrol

Coring

- Core Gamma Log, Core Gamma Spec. Log and Lithologic Log, Cores 1-27	Geco
- Core Photographs, Core 1-27	Geco
- Conventional Core Analysis	Geco
- Thin Section Photographs Vol 1,2,3,4	Geco

Biostratigraphy

- Stratigraphical/Paleontological Final Report	Statoil

Geochemistry

- Geochemical Evaluation of the Sponge Core obtained from the 6506/12-5 well	Statoil(Geolab)

Seismic

- Check Shot Calibration, Synthetic Seismograms	Geco
- Vertical Seismic Profile	Geco
- Borehole Seismic Report	Geco

Sedimentology

- Glauconite in Finnvær Group Sandstones of Well 6506/12-5	Statoil
- The upper Tomma Formation of the Beta Structure: A preliminary evaluation of the origin of the permeability contrast between wells 6506/12-3 and 6506/12-5.	Statoil

Processed Data

- MSD, CSB, local 4585-3885	Schlumberger
- RAS (GST analysis) Run 5 A: 3157-3185m	Schlumberger
- GST Cap and Inel, Run 5 A: 3150-3250m	Schlumberger
- CET Quick-look, Run 5 A: 3080-3880m	Schlumberger
- Playback Composite Log 320.0-4596.08	Geco
- WTQL Run 1 : 3150-3203	Schlumberger
- Production Logging Run 1	Schlumberger
- Production Log Run 1 : 3150-3203	Schlumberger
- Caliper-Cement-Volume Log, X-Y Caliper Run 2 B, 1052.1 - 2279.6	Geco
- API - plot 3947.2 - 4267.2	Mobil
- Wave form P & S plot	Mobil
- Full wave form plot	Mobil
- Recomputed LDL-CNL-SGR Run 5C, 3880 - 4584	Schlumberger
- LDT LQC Run 5 C	Schlumberger

RFT

- Selective Formation Testing/Wireline Formation Testing	Statoil

Testing

- Test Program	Statoil
- Water Analysis DST 1	Statoil
- Compatability test of formation water from well 6506/12-5,DST 1 and seawater	Statoil
- TBP - distillation, wax and hydrocarbon analysis, DST 2	Statoil
- Well Testing Report, DST 3	Flopetrol
- Sampling and analysis of seawater	Petrotech
- Sampling and analysis of trace components	Petrotech
- Vedr. analyse av kvikksølv	NILU
- Test Report DST 2 (Part 2 of 4)	Baker Production
- Test Report DST 3 (Part 3 of 4)	Baker Production
- Type Survey PPA DST 4 (3-1345)	Core Lab
- Type Survey PPA DST 4 (3-1220)	Core Lab
- Well Testing Report DST 4	Flopetrol
- Test Report DST 4 (4 of 4)	Baker Production
- Well Testing Report DST 2	Flopetrol
- Laboratory Analyses of seawaters sampled in connection with drill stem test 1 and 2	Statoil
- Precision Pressure Analysis DST 3	Corelab
- Water Analysis DST 2	Statoil
- Water Analysis DST 4	Statoil
- Pressure/Temperature Survey DST 1B	Corelab
- Precision Pressure Analysis DST 1A	Corelab
- PVT Analysis DST 2	Statoil
- Report on stable isotopes on natural gases, sample A and C	IFE
- Computest Report DST 4	Flopetrol
- Computest Report DST 3	Flopetrol
- Well Testing Report DST 1	Flopetrol
- Scanning Electron microscope analyses of suspended solids from well 6506/12-5,DST 4	Statoil

- Pressure/Temperature Survey DST 2 — Corelab
- Computest Report DST 2 — Flopetrol
- Test Report DST 1B (Part 1 of 4) — Baker Production

Others

- Correlation Study involving Crude oil and extracted hydrocarbon shows from 6506/12-5. — Statoil (Geolab)

WELL HISTORY

A) General

i)	Spud Date	: 17.10.85
ii)	Rig released	: 27.03.86
iii)	Status	: Plugged and Abandoned - Oil discovery.

B) Contractors

Drilling Platform	: Dyvi Delta
Drilling Contractor	: Dyvi Drilling
Casing	: Weatherford
Cementing	: Halliburton
Electric Logging	: GWS+Schlumberger
Mud	: Anchor Drilling Fluids
Mudlogging	: Exploration Logging
MWD	: Teleco
Rig Positioning Contractor	: Decca/Geoteam
Bottom Survey(Site) Contractor	: Geoteam
Supply Boats	: Statoil supply-boat pool
"Stand-by " boats	: Statoil supply-boat pool
Diving	: Sub Sea Dolphin
Helicopters	: Helicopter Service A/S
Coring	: Christensen
Core Analysis	: Geco Bergen
Testing	: Flopetrol

C) Casing

30"	shoe	at 392m KB	
20"	shoe	at 1055m KB	LOT 1,69 SG
13 3/8"	shoe	at 2280m KB	LOT 1,91 SG
9 5/8"	shoe	at 3883m KB	LOT 1,95 SG
7"	liner	at 4178m KB.	

D) Mudlogging

A gemdas - XI logging unit from Exploration Logging conducted the mudlogging. Data recorded included:

- Drilling Rate
- Force on Bit
- Dxc - Exponent
- Cutting Gas
- H_2S - Gas
- Chromatographic Gas Analysis
- Shale Density
- Shale Factor
- Calcimetry
- Mud Temperature in and out
- Mud Resistivity in and out
- Mud Density in and out
- Lithology

CORE DEPTH SHIFTS COMPARED TO CDL/CNS LOG

WELL: 6506/12-5

CORE	INTERVAL (REC.)	SHIFT
7	3949 - 3967.5	-1.7
8	3967.5- 3993.75	-1.7
10	4004 - 4030.9	-2.8
11	4031 - 4046.15	-2.7
12	4046.5- 4064.5	-1.0
13	4064.5- 4066.6	-0.8
14	4067 - 4080.5	-0.5
15	4085 - 4106.6	+0.4
16	4112 - 4123.75	-2.0
17	4124 - 4135.8	-2.2
18	4136 - 4154.0	-2.7
19	4154 - 4179.9	-1.6
20		
21		
22		
23	4271 - 4285.6	-3.0
24	4286 - 4300.4	-3.2
25	4305 - 4324.5	-2.8
26	4327 - 4334	-2.8
FINNVÆRSAND		
1	3148 - 3175.2	+1.5
2	3175.2- 3188.2	+1.0

MWD/ELECRICAL LOGGING

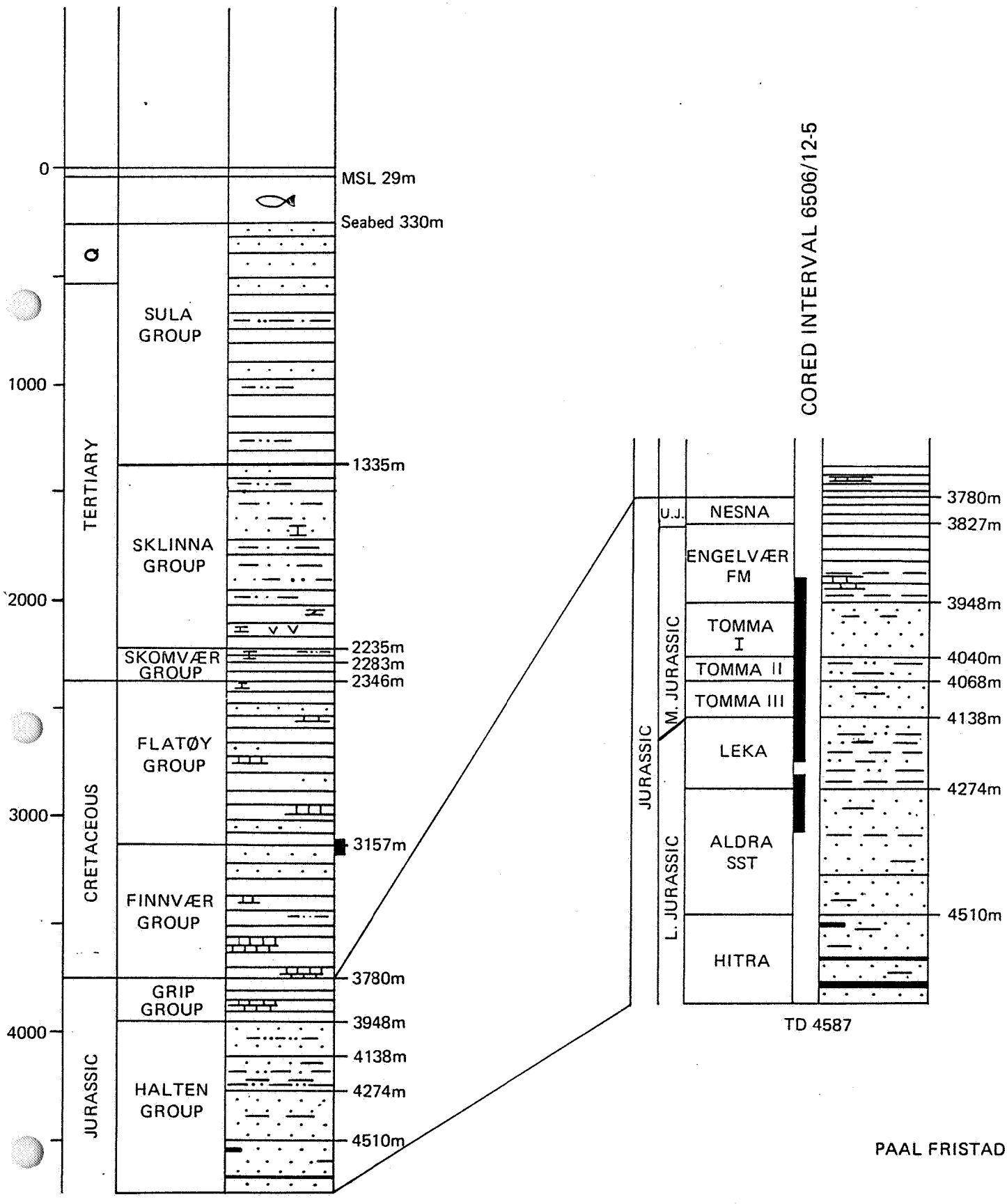
MWD services including gamma ray, resistivity and directional data were performed by TELECO from below the 30" casing shoe to 3897m. Wireline logs were performed by GECO Well Services and Schlumberger.

Type of log	Run no.	Logged Interval (m KB)
DIL/LSS/GR (Geco)	1A	1076.2 - 388.7
	2B	2279.3 - 1052.1
	3C	3898.8 - 2274.8
DIL/BCS/GR	5D	4584.5 - 3880.2
ISF/LSS/MSFL(Schlumberger)	3A	3899.0 - 2274.0
ISF/LSS/MSFL/GR	4B	4176.0 - 3880.0
CDL/CNS/GR (Geco)	1A	1071.0 - SEABED
	2B	2280.4 - 1052.1
	3C	3899.5 - 2274.9
	5D	4584.0 - 3880.2
LDL/CNL/GR (Schlumberger)	3A	3900.0 - 2274.0
	4B	4177.0 - 3880.0
LDL/CNL/NGS	5C	4586.0 - 3880.0
NGS (Schlumberger)	5C	4586.0 - 3880.0
DLL/MSF/GR (Geco)	3A	3247.6 - 3129.3
	5B	4584.9 - 3900.0
DLL/MSFL/GR (Schlumberger)	5A	4150.0 - 3880.0

SFT/GR (Geco)		3A	3183.0 - 3158.0
			7 press.points
			+2 samples
RFT/GR	(Schlumberger)	4A	Misrun
		4B	4161.0 - 3983.5
			19 press.points
			+1 sample
		5C	4484 - 3967
			20 press.points
			+1 sample
FED/GR (Geco)		3A	3899.5 - 3097.5
SHDT/GR	(Schlumberger)	5A	4586.0 - 3880.0
CBL/GR (Geco)		3A	2273.5 - 979.5
		4B	3827.0 - 325.6
		6C	4124 - 3740
		11A	3222 - 3069
		12A	3224 - 3066
CBL/VDL/GR	(Schlumberger)	5A	3880 - 3080
CBL/VDL		7A	4018 - 3736
CET/GR	(Schlumberger)	5A	3880 - 3080
		7A	4038 - 3736
SDT	(Schlumberger)	5A	4581.0 - 3880.0
SWC/GR (Geco)		3A	3890.7 - 3423.0 rec 20/48
		5B	misrun
VSP (Geco)		5A	4580 - 2218.5 95 levels
LSAL (Mobil)		5A	4587 - 3883

6506/12-5 BETA

Sept. 86
KB 29m



PAAL FRISTAD

Table: Lithostratigraphy 6506/12-5

GROUP/FORMATION	Depth (m MSL)	Thickness (m)	TWT (ms)
SULA GROUP (seabed)	301	1005	0.410
"Top Tertiary Unconformity"	481		
SKLINNA GROUP			
KORGEN FORMATION	1306	629	1.347
NARVIK FORMATION	1935	271	1.860
Top Eocene Red Brown Claystones	2153		
SKOMVÆR GROUP			
ALSTAHAUG FORMATION	2206	48	2.126
BODØ FORMATION	2254	63	2.169
FLATØY GROUP	2317	811	2.232
FINNVÆR GROUP	3128	623	2.883
Sandstone unit	3128	30	
GRIP GROUP			
NESNA FORMATION	3751	47	3.295
ENGELVÆR FORMATION	3798	121	3.330
HALTEN GROUP			
TOMMA FORMATION	3919	190	3.402
Unit I: Upper Sandstone Member	3919	92	
Unit II: Siltstone Member	4011	28	3.447
Unit III: Lower Sandstone Member	4039	70	3.461
LEKA FORMATION	4109	136	3.495
ALDRA FORMATION	4245	236	3.557
HITRA FORMATION	4481	77	3.670
TD	4558		

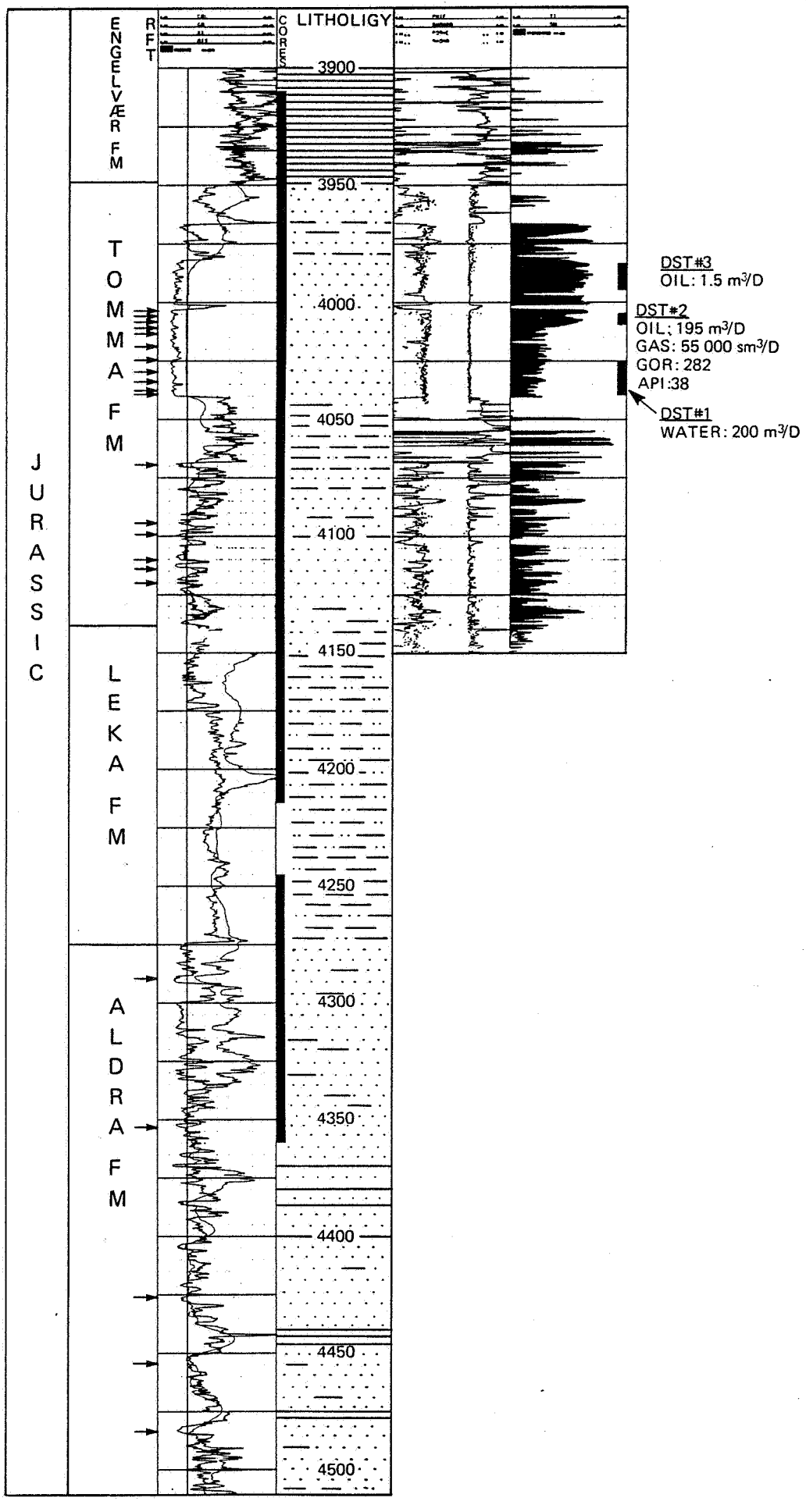
C O R E S U M M A R Y

Core	From - To	Cut(m)	Rec(m)	%	Formation
1	3148.0-3175.2	27.2	27.2	100	Flatøy+Finnvær
2	3175.2-3189.0	13.8	13.0	94	Finnvær
3	3910.0-3918.0	8.0	7.7	96	Engelvær
4	3918.0-3929.0	11.0	10.3	94	"
5	3929.0-3944.0	15.0	14.7	98	"
6	3944.0-3949.0	5.0	5.0	100	Engelvær+Tomma I
7	3949.0-3967.5	18.5	18.5	100	Tomma I
8	3967.5-3995.0	27.5	26.3	96	"
9 (Sponge Core)	3995.0-4004.0	9.0	3.0	33	"
10	4004.0-4031.0	27.0	26.9	100	"
11	4031.0-4046.5	15.5	15.2	98	Tomma I+II
12	4046.5-4064.5	18.0	18.0	100	TommaII
13	4064.5-4067.0	2.5	2.1	84	"
14	4067.0-4085.0	18.0	13.5	75	Tomma II+III
15	4085.0-4112.0	27.0	21.6	80	Tomma III
16	4112.0-4124.0	12.0	11.8	98	"
17	4124.0-4136.0	12.0	11.8	98	"
18	4136.0-4154.0	18.0	18.4	100	Tomma III+Leka
19	4154.0-4180.0	26.0	25.9	99	Leka
20	4180.0-4205.0	25.0	23.5	94	"
21	4205.0-4216.0	11.0	11.0	100	"
22	4245.0-4271.0	26.0	25.6	98.5	"
23	4271.0-4286.0	15.0	14.6	97	Leka+Aldra
24	4286.0-4305.0	19.0	14.4	76	Aldra
25	4305.0-4327.0	22.0	19.5	89	"
26	4327.0-4335.0	8.0	7.0	88	"
27	4335.0-4362.0	27.0	27.0	100	"

SUMMARY OF BIOSTRATIGRAPHICAL RESULTS 6506/12-5.
Consultants : Paleoservices

Depth	Interval	Stratigraphic Unit	Thickness
390m- 510m	Pleistocene	Sula Group	120m
510m-1680m	Late Pliocene	Sula/Sklinna Group	1170m
----------Unconformity----------			
1680m-1770m	Early Pliocene?-Late Miocene	Sklinna Group	90m
1770m-1800m	Late Miocene	Sklinna Group	30m
1800m-1860m	Middle Miocene	Sklinna Group	60m
1860m-1950m	Early Miocene	Sklinna Group	90m
1950m-2000m	Late Oligocene	Sklinna Group	50m
2000m-2080m	Middle-Early Oligocene	Sklinna Group	80m
----------Unconformity----------			
2080m-2220m	Early Eocene	Sklinna Group	140m
2220m-2270m	Basal Eocene-Late Paleocene	Skomvær Group	50m
2270m-2350m	Late Paleocene	Skomvær Group	80m
----------Unconformity----------			
2350m-2360m	Maastrichtian/Campanian	Flatøy Group	10m
2360m-2705m	Campanian-?Santonian	Flatøy Group	345m
2705m-3080m	Santonian	Flatøy Group	375m
3080m-3636m	Coniacian-?Late Turonian	Flatøy/Finnvær Group	573m
3636m-c.3653m	Coniacian? Late Turonian?	Finnvær Group	c.17m

WELLDATA, 6506/12-5



J.B.KRISTOFFERSEN 07.08.86

----------Unconformity----------			
c.3653m-3680m	Cenomanian?	Finnvær Group	c.27m
3680m-3727.5m (log depth)	Early Cenomanian -Late Albian	Finnvær Group	74.5m
3727.5m-3747m	Middle-?Early Albian	Finnvær Group	19.5m
3747m-3757.5m	Aptian	Finnvær Group	10.5m
----------Unconformity----------			
3757.5m-3767.5m	Late Hauterivian	Finnvær Group	10m
3767.5m-3777.5m	Early Hauteriv. -?Late Valanginian	Finnvær Group	10m
----------Probable Unconformity----------			
3777.5m-3810m	Ryazanian-Portlandian	Nesna Formation	32.5m
3810m-3827m	Portlandian/ Kimmeridgian	Nesna Formation	17m
----------Unconformity----------			
3827m-3837.5m	Early Oxfordian	Engelvær Formation	10.5m
----------Unconformity----------			
3837.5m-3887.5m	Middle-Early Callovian	Engelvær Formation	50m
3887.5m-3921m	Late-Middle Bathonian	Engelvær Formation	33.5m
3921m-3950m	Middle-?Early Bathonian	Engelvær Formation	29m
----------?Unconformity?----------			
3950m-3971.63m	?Bajocian	Tomma Formation-Upper Sandstone Mbr.	21.63m
3971.63m-4153.7m	Bajocian	Tomma Formation & Leka Formation	182.07m
4153.7m-4275.64m	Aalenian-Late Toarcian	Leka Formation	121.94m
4275.64m-4353m	Early Toarcian-Late Pliensbach.	Aldra Formation	77.36m
4353m-4585m	Pliensbachian-?Sinemurian	Aldra Formation & Hitra Formation	232m

1.0 GEOLOGICAL SUMMARY

LITHOLOGICAL SUMMARY

All the depths are referred to the RKB level.

SULA GROUP: 330 - 1335M Naust

Age: Quarternary : Pleistocene
Tertiary : Late Pliocene

The top Sula Group (down to Top Tertiary) is composed of interbedded sand and clay. The sand is medium to coarse grained, clear to white, and subangular to subrounded. The clay is light to medium grey, slightly to moderately silty and slightly to moderately calcareous. Trace amounts of shell fragments and foraminifera are also observed.
The lower interval of the Sula Group consisted predominantly of light to medium grey and green-grey clay firming up to claystone with depth, with stringers of clear to white quartz sand.
The clay is slightly to moderately silty to sandy, and slightly to moderately calcareous. The sand is very fine to coarse, poorly to moderately sorted, and subangular to subrounded. Trace amounts of shell fragments,microfossils, lithic fragments, glauconitic pellets, coarse pyrite and coal are observed.

No shallow gas bearing intervals of sand were encountered in this section of the well.

The top of the Sula Group is the seafloor at 330m. The base of the Sula Group is taken at the unconformity at 1335m, represented by a major log break.

SKLINNA GROUP : 1335 - 2235M.

Age : Late Pliocene - Basal Eocene.

Sklinna Group is divided into two formations (Korgen and Narvik) by an unconformity at 1964m marked by a log break. Another unconformity at 1498m (in Korgen Formation) is marked by a clear break in all the logs, especially in the sonic log. The top Eocene red brown claystones of Narvik Formation was picked at 2182m.

Korgen Formation: 1335m - 1964m Kai

Age : Late Pliocene - Late Oligocene.

The formation above the unconformity at 1498m is dominantly clay and claystone with stringers of sand and silt. The claystone/clay is light to medium grey, occasionally brown, silty with black speckles and non to slightly calcareous.

The sand is clear to white quartz, very fine to fine, occasionally medium to very coarse, moderately to poorly sorted and subangular to subrounded. Traces of shell fragments were observed.

Below the unconformity at 1498m the formation is also mainly claystone with stringers of sand and silt, but the stringers are more frequent in this interval. The claystone is in this interval in parts grading to siltstone;below 1825m the claystone is intergrading with siltstone, siltstone dominates. In this interval stringers of limestone were also observed.
The claystone is medium grey and moderately calcareous.

The sand is clear quartz, very fine to medium, occasionally coarse, poor to moderately sorted and subangular to subrounded. The sand is in part glauconitic.

The siltstone (from around 1825m) is medium grey to brown, very argillaceous, slightly sandy, soft to moderately hard, laminated and non to slightly calcareous.
The limestone was described as light grey to white and light brown,slightly argillaceous,occasionally slightly silty, hard, predominantly cryptocrystalline and occasionally slightly dolomitic.

Narvik Formation : 1964 - 2235m. Brygge

Age : Late Oligocene - Basal Eocene.

The formation consists of claystone and siltstone interbedded in the top 25m, with claystone as the dominant rock. The remaining formation consists of claystone with siltstone, dolomite and some limestone stringers. The claystone is tuffaceous to very tuffaceous in part, around 2085m and around 2175m. Lowermost in the formation is a distinct red brown claystone which, informally further divides the Narvik Formation.
The claystone was multicoloured in green, grey and medium brown, firm, very fine laminated, occasionally slight fissile, non calcareous, occasionally slightly silty and slightly micromicaceous.
The siltstone was recorded as medium dark brown, slightly black speckled, very argillaceous in part, grading to silty claystone, platy and non calcareous. The dolomite was orange to pale brown, very hard, blocky, cryptocrystalline, occasionally slightly calcareous and occasionally slightly argillaceous. The limestone was very argillaceous, light grey to light brown, generally soft, amorphous, occasionally with weak laminations, subfissile and cryptocrystalline.

"Red Brown Claystone Unit": 2182 - 2235m. Burn Bygge?

Age : Early Eocene - Basal Eocene.

This claystone is red to brown, soft to firm, blocky to platy, slightly black speckled with silt, occasionally subfissile and non calcareous.
The limestone stringers in this unit were white to light grey, hard, blocky, recrystallised, minimal intercrystal porosity and occasionally slightly argillaceous.

SKOMVÆR GROUP : 2235 - 2346M.

Age : Basal Eocene - Late Paleocene.

This group is further divided into two formations, the Alstahaug Formation and the Bodø Formation. Both formations are defined from the electric logs. The base of the Bodø Formation and the Skomvær Group was taken at the upper Cretaceous unconformity, seen as a log break at 2346m. Biostratigraphically, the Cretaceous/Tertiary boundary(Maastrichtian/Late Paleocene) was found at 2350m.

Alstahaug Formation : 2235 - 2283m. Tare

Age : Basal Eocene - Late Paleocene.

The formation consisted of silty claystone with limestone and sandstone stringers. The claystone was varicoloured in olive grey to dark olive grey, green-grey and brown-grey, silty,blocky, firm to moderately hard, non calcareous and pyritic.
The limestone was white to light grey, moderately hard to hard and occasionally crystalline. The sandstone was clear quartz, medium grains, moderately sorted, subrounded to rounded and loose.

Bodø Formation : 2283 - 2346m. Tang

Age : Late Paleocene.

Bodø Formation is similar to the Alstahaug Fomation above, but a reduction in limestone and sandstone stringers occurred and the claystone was also less silty.

FLATØY GROUP : 2346 - 3157M. Springar - Nise - Kvitnos

Age : Maastrichtian/Campanian - Coniacian.

2346

2450

2525

The Cretaceous is of considerable thickness, and is divided into two lithostratigraphic groups, Flatøy and Finnvær.

The upper part of the Flatøy Group consists mainly of claystone with traces of sandstone and a few dolomite/limestone stringers.

The claystone is light green-grey and medium grey to brown-grey, soft to firm, amorphous to blocky, non calcareous, occasionally silty and pyritic. From 2450m traces of fossil fragments and foraminifera were observed.
Around 2525m the section is more sandy, with interbedded claystone and sandstone and traces of dolomite and glauconite. The sandstone is clear to white quartz, fine to moderately sorted, subangular and subrounded with abundant pyrite. Further down, the section consists of sandy and silty claystone with stringers of sandstone, limestone; and siltstone (towards the base). The limestone and sandstone stringers were less frequent towards the base of this section. Traces of pyrite, glauconite, dolomite, foraminifera and other fossil fragments were observed.

The claystone is varicoloured with light to dark grey, brown-grey and brown-black shades, soft to firm, blocky, occasionally slightly micromicaceous, pyritic and non to slightly calcareous. The limestone is white to yellow-grey, soft to firm, blocky, micritic in part, microcrystalline and argillaceous in part.

The dolomite is brown to grey, very firm to hard, blocky, cryptocrystalline and argillaceous.

The lower boundary of the Flatøy Group was picked at an unconformity at 3157m, which is clearly defined on the logs.

FINNVÆR GROUP : 3157 -3780 M Lysing-Lange-Lyr

Age: Coniacian -? Late Valanginian

The interval has a sandstone unit in the uppermost part, after which claystone with some siltstone/sandstone and limestone/dolomite stringers dominate.

"Sandstone Unit": 3157 - 3187 m Lysing

Age: Coniacian

Two cores were cut in the sandstone unit from 3148 to 3189m KB. Sandstones down to 3178.2m KB contained a hydrocarbon column of oil.The sandstone was recorded as clear, light grey and translucent quartz, very fine to medium grained, hard to very hard, argillaceous, slightly calcite cemented, micaceous, glauconitic and with poor visual porosity in the top, and fair to good porosity in the lower part.

The unit is interbedded with claystone, and consists of mainly claystone in the middle part. A few dolomite stringers were also observed.

The claystone was olive dark grey and medium grey to dark grey, occasionally grey black to black, firm to moderately hard, blocky, occasionally subfissile, silty and slightly to non calcareous.

The dolomite was yellow brown-dark yellow brown, firm to hard, micritic and microcrystalline in part.

"Claystone Unit": 3187 - 3780m

Age: Coniacian -? Late Valanginian Lange – Lyr

This unit consists mainly of claystone, but has stringers of limestone/dolomite, in part numerous. Some sandstone stringers were also described.

The claystone was medium grey to medium dark grey, occasionally light grey to green grey, in the bottom also red brown and occasionally off white to green white; firm to hard, platy, occasionally blocky, micromicaceous, occasionally subfissile, slightly silty, pyritic in part and non calcareous. The bottom-most claystone was firm to moderately hard, blocky, occasionally subfissile, slightly silty to very silty, grading to siltstone and occasionally sandy, micromicaceous, pyritic and non to very calcareous.

The sandstone stringers were quartz, light grey, clear and translucent, occasionally yellow to yellow-red, predominantly very fine, occasionally fine, fair sorted, subangular to subrounded, appears loose, with traces of calcite cement and fair to good visual porosity.

The dolomite stringers were dark yellow-brown, in the bottom light brown-grey to dark brown-grey, hard, microcrystalline to crystalline, argillaceous, and partly grading to limestone except in the bottom part where it was slightly calcareous to calcareous.

The base of Finnvær Group was taken at the clear log break at 3780m, defined as the Base Cretaceous regional unconformity.

GRIP GROUP : 3780 - 3948M

Age: Ryazanian - Early to Middle Bathonian

The Grip Group in the area of Haltenbanken is divided into two formations, Nesna Formation and Engelvær Formation.

Nesna Formation : 3780 - 3827 m Spekk

Age: Ryazanian - Kimmeridgian (Upper Jurassic)

Nesna Formation is thicker in this well compared to 6506/12-3 which is the nearest well. The formation displayed typical Upper Jurassic shale characteristics. The claystone was described as dusky yellow-brown, occasionally light to medium grey, firm to moderate hard, blocky, subfissile, micromicaceous, carbonaceous to very carbonaceous, micropyritic in part and non calcareous.

Engelvær Formation : 3827 - 3948m Melke

Age: Early Oxfordian - Early to Middle Bathonian

Lithologically the formation consisted of claystones with thin limestone stringers in the upper part and shale with dolomite stringers in the lower part.
The claystone in the upper part was described as yellow-brown to grey brown, dark to medium grey and brown-grey, soft to moderately hard,blocky,occasionally subfissile, partly pyritic, glauconitic and carbonaceous, occasionally silty to very silty, micromicaceous and non to slightly calcareous.
In the lower part where the claystone is grading into shale, the colour is dark grey to black with weak silver micaceous sheen, slightly to moderate micromicaceous, hard to very hard, occasionally brittle, fissile, very dense,non to slightly dolomitic with traces of pyrite as fine desseminated crystals in laminations and as fine to coarse aggregates.
There were also observed traces of fine disseminated carbonaceous matter.

The limestones were pale brown to dark brown and grey-brown, occasionally brown-white, soft to hard, micritic, occasionally microcrystalline, slightly argillaceous to very argillaceous, dolomitic in part, occasionally grading to calcareous dolomite.

The dolomite was slightly argillaceous, dark grey to brown, very hard, cryptocrystalline, and with no visual structures or porosity.

The formation was cored from 3910 to 3948m.

HALTEN GROUP : 3948 - 4587 M (TD)

Age:? Bajocian -? Sinemurian

The Halten Group is the most important group in the Haltenbanken area. It represents the major potential reservoir sandstones and a probable source rock (the coal units) in the area.
The Halten Group is divided into four major formations: Tomma Formation, Leka Formation, Aldra Formation and Hitra Formation.

Cores were taken from the top of Tomma Formation down to 4362m in the Aldra Formation, except for an interval from 4216 to 4245m in the Leka Formation. Only sandstones of the upper Tomma Formation informally called the Upper Sandstone Member contained a hydrocarbon column of oil down to an oil/water-contact at 4010.5m. The sandstones are described in details in the core description, here only a general description is included.

Tomma Formation : 3948 - 4138m Gam - Nat - Ile

Age: Bajocian

The Tomma Formation can be divided into three informal units:
Tomma I: "The Upper Sandstone Member",
Tomma II: "The Siltstone Member", and
Tomma III: "The Lower Sandstone Member".

Tomma I : "The Upper Sandstone Member" 3948 - 4040m. Gam

This section consisted of generally massive, undifferentiated, fine to medium quartz sandstone, silica cemented, micaceous and argillaceous, with minor claystone/shale laminae and zones, especially in the upper part.

The sandstone in the upper 20 meters was described as extremely argillaceous and micaceous, carbonaceous in part, abundant burrows, dark grey to black and very fine to fine; the remainder was described as clear to white sandstone, predominantly fine to medium.
The lower boundary was picked at the gamma ray increase at 4040m.

Tomma II: "The Siltstone Member" 4040 - 4068m Not

This section consisted of poorly defined beds and interlaminated fine sandstone and shale in the upper part and mainly siltstone in the lower part. The sandstone was silty, light grey and very fine to fine. The claystone/shale was silty and medium to dark grey, and the siltstone was described as light to medium grey.

Tomma III:"The Lower Sandstone Member" 4068 - 4138m IIe

This section consisted of generally interbedded predominantly fine to medium micaceous sandstones with minor silty and shaly laminae and beds. The sandstones were white to light grey and hard. The shale was dark grey, hard ans silty in parts, and the siltstones were medium grey and hard.
The top of the member was defined by a clear log break at 4068m.
The base of "Lower Sandstone Member" was taken at the gamma ray increase at 4138m.

Leka Formation : 4138 - 4274m

Age: Bajocian - Late Toarcian

In this well the intra sandstone unit of the Leka Formation which was described in well 6506/12-3 is not present. The Leka Formation consisted in general of interbedded, occasionally intergrading shales and siltstones with minor very fine to fine sandstones at top, also interbedded with shale. The formation was micaceous and carbonaceous.

The sandstone was light to medium grey, very fine to fine, clear quartz, well sorted and moderately hard. The siltstone was grey to brown, moderately hard to hard and argillaceous. The shale was medium to dark grey and olive black, hard, silty to very silty in parts, very micaceous, slightly carbonaceous, occasional pyrite aggregates and non calcareous.

An abrupt drop in the gamma ray curve at 4274m represents an unconformity which marks the base of the formation.

Aldra Formation : 4274 - 4510m

Age: Early Toarcian -? Sinemurian

The Aldra Formation is a major sandy section of Lower Jurassic age. It was described as interbedded fine to coarse argillaceous and micaceous sandstones with minor shaley and silty horizons and beds, especially in the lower 75m of the section. Traces of dolomite and coal was also described in the lower section.
The sandstone down to 4400m was described as grey to brown, fine to coarse grains, clear to translucent quartz, poorly to moderate sorted, argillaceous to very argillaceous, angular to subangular, with kaolinite pore infillings and moderately silica cemented. It was hard to very hard, carbonaceous, had burrows in part, shaly laminations and showed no visual porosity.

The shale in this section was brown to black, occasionally slightly silty and hard.

From 4400m and down the sandstone was clear to translucent quartz, medium to coarse grains, occasionally fine, moderate to well sorted, subangular to angular, hard, silica cemented with traces of kaolinite and mica. It showed poor porosity.
The claystone/shale was brown-black to dark grey, slightly silty, subfissile, moderately hard, slightly micromicaceous and non calcareous.
The dolomite was described as yellow to brown, hard, brittle, microcrystalline to cryptocrystalline, generally calcareous, occasionally grading to limestone, and tight.
The coal (traces seen from 4500m) was argillaceous,black, firm and brittle.

Hitra Formation : 4510 - 4587m (TD)

Age:? Sinemurian

The Hitra Formation differs from the Aldra Formation by the presence of coal seams in the Haltenbanken area. The formation in general consists of interbedded fine to medium argillaceous and kaolinitic sandstones with minor shaly and silty horizons and beds, and coal seams.

The sandstone was described as light grey to white, fine to medium grains, clear with minor milky quartz, moderately to well sorted, subangular to subrounded, subspherical, hard, slightly friable, silica cemented, occasionally slight traces of calcite cement, poor porosity and slight traces of coarse white mica.

The claystone/shale was described as medium to dark grey, moderate micaceous, micromicaceous to coarse white mica, moderately fissile, occasionally silty, rarely grading to siltstone, non calcareous and slightly carbonaceous.

The coal was non to moderately argillaceous, black, shiney, lustrous to dull dark grey to black when moderately argillaceous and moderately fissile.

The formation continued to TD at 4587m.
The base of the Hitra Formation was not penetrated in this well.

	21:09		Pressured up tubing to 55 bar.
	21:12		Pressured up annulus to 110 bar.
			Opened PCT valve. 1 hour shut in.
	21:15		Pwh = 63 bar.
	22:10		Pwh = 65 bar.
			1. flow
	22:16	*	Flowed well on adjustable choke.
	22:20		Changed choke to 12.7 mm fixed choke.
	22:40		Pwh = 1.8 bar.
	23:00	*	Shut in well at choke manifold.
	23:10		Pwh = 56 bar.
	23:55		Closed lubricator valve. Rigged up Nowsco equipment.
13.02.	00:50		Hydraulic power drive on coiled tubing reel damaged.
	01:30		Pressured up tubing to 55 bar.
	01:35		Opened lubricator valve.
	01:40	*	Flowed well on fully open (50.8 mm) adj. choke.
	11:20	*	Shut in well at choke manifold. Closed lubricator valve.
	12:50		Opened lubricator valve.
	13:00	*	Opened choke manifold, started to RIH. Nowsco coiled tubing to 350 m RKB.
	13:50		Initiated gas injection at 5.7 Sm^3/min, commenced to RIH w/tubing. Well flowing on 50.8 mm adj. choke.
	14:15		Reduced nitrogen injection rate to 8.5 Sm^3/min
	14:50		Reduced nitrogen injection rate to 2.8 Sm^3/min.
	16:00		Coiled tubing at 3600 m RKB, stopped RIH.
	16:45		Increased injection to 5.7 Sm^3/min.
	17:55		Increased injection rate to 11.3 Sm^3/min.
	19:15		Increased injection rate to 17 Sm^3/min.
	19:20		Changed to 25.4 mm fixed choke.
	21:30		Changed to 19.05 mm fixed choke.
14.02.	01:00		Started sampling program by Petrotech.
	07:10	*	Closed PCT and chokemanifold for 1.st buildup.

1. buildup

09:16		Bleed off tubing pressure through chokemanifold to tank.
10:00		Started POOH w/coiled tubing.
11:07		Stopped POOH. Coiled tubing at 2000 m RKB.
11:08		Closed choke manifold.

2. flow (sampling flow)

15.02. 01:03		Opened PCT.
01:15		Nowsco started to inject nitrogen.
01:45		Nowsco RIH to 2350 m RKB.
01:50	*	Opened choke manifold on 9.5 mm adj. choke to surge tank.
02:05	*	Closed choke manifold.
02:50	*	Opened choke manifold on 9.5 mm adj. choke.
03:00		Nowsco RIH.
03:50		Nowsco coiled tubing at 3000 m RKB.
05:50		Increased adj. choke to 19 mm.
09:30		Started to POOH with coiled tubing, stopped injecting nitrogen.
12:08	*	Closed lubricator. Closed choke manifold.
15:33		Opened lubricator valve.
15:34		RIH w/Bottom Hole Samplers.
19:00		POOH w/BHS
20:54		Closed lubricator valve.
21:15		Bottom Hole Samplers out of hole.
21:30		Started bullheading.

END OF DST # 1

* = Opening or closing the well.

SEQENCE OF EVENTS DST # 2, 4004 - 4009.5 M RKB

19.02.	11:50	Packer sat at 3959.7 m RKB.
	16:00	RIH w/teststring.
	17:12	Activated Core Lab/Panex 3-1446/14-1239.
		Delay: 23 hrs.
		Sampling mode: 2 min for 97 hrs.
		Sensing depth: 3944.32 m RKB.
	17:13.30	Activated Core Lab/Panex 3-1352/14-1133.
		Delay: 20 hrs.
		Sampling mode: 4 min for 15 hrs.
		1 min for 10 hrs.
		4 min for 22 hrs.
		1 min for 18 hrs.
		4 min for 45 hrs.
		Sensing depth: 3944.32 m RKB.
	18:28	Activated Baker/Panex 1053/1084.
		Delay: 17 hrs.
		Sampling mode: 4 min for 12 hrs.
		30 sec for 10 hrs.
		4 min for 25 hrs.
		2 min for 38 hrs. 30 min.
		Will run out: 23:58 23.02.86
		Sensing depth: 3938.7 m RKB.
	18:35	Activated Baker/Panex 1128/1355.
		Delay: 23 hrs.
		Sampling mode: 2 min for 97 hrs.
		Will run out: 17:35 24.02.86
		Sensing depth: 3935.53 m RKB.
	22:00	Pressure tested bottom hole assembly pressure test OK.
	22:15	RIH w/teststring.
20.02.	06:30	Landed teststring for spaceout.
	17:36	Landed teststring.

Perforation, initial flow and buildup

19:50 Pressured up tubing to 53 bar to minimise

differential on PCT valve.

19:54 Pressured up annulus to open PCT.

19:55 Discoverd leak on rig choke manifold.

19:57 Bled down annulus pressure to repair leak.

20:15 Pressured up annulus to open PCT.

20:16 Pressure respons on tubing indicaing that PCT valve has opened.

20:17 Reached 120 bar on annulus, monitored tubing pressure to check for leak through packer.

20:21 Increased annulus pressure to 170 bar.

20:26 Pressured up tubing to perforate.

20:29.40 Reached 420 bar, bled down pressure to cement unit.

20:31 Closed kill valve.

20:35 Guns detonated.

Rig up and RIH with MUST tool

21:36 Closed lubricator valve.

21:39 Bled down to 50 bar above lubricator valve.

21:42 Bled down to 35 bar abive lubricator valve.

21:46.30 Opened choke manifold, pressure stabilised at 14 bar, found closed valve downstream choke manifold.

21:50 Bled down pressure downstream choke manifold, started rigging up MUST assembly.

22:52 MUST tool placed in test string.

23:07 Pressured up to 400 bar to pressure test stuffing box.

23:10 Bled down pressure due to leak in needle valve on stuffing box.

23:12 Pressured up to 400 bar to pressure test stuffing box.

23:28 Bled down pressure above lubricator to 55 bar.

23:30 Opened lubricator valve.

23:36 Closed kill valve.

23:59 Run in hole with MUST tool.

21.02. 01:25 Bled down tubing pressure to 70 bar, increase probably due to volume of MUST assembly.

01:46 MUST latched in.

Cleanup flow and buildup (1. flow)

02:05	*	Opened well on 4.76 mm adjustable choke, slowly increasing to 11.1 mm.
02:06		Started glycol injection on ez tree.
02:30		Increased choke to 12.7 mm.
03:20		Decreased choke to 4.76 mm due to possible water production.
03:34		Decreased choke to 2.38 mm.
03:44		Decreased choke to 1.59 mm.
03:55		Decreased choke to 0.79 mm.
04:20		Increased choke to 1.20mm.
05:58		Increased choke to 3.8 mm.
06:30		Increased choke to 4.76 mm.
06:40		Directed flow from tank to burner due to increasing wellhead pressure. Increased choke to 5.2 mm.
06:45		Increased choke to 6.35 mm.
06:47		Increased choke to 7.14 mm.
06:50		Increased choke to 7.94 mm.
07:15		Increased choke to 10.32 mm.
07:20		Changed to 11.1 mm fixed choke and started glycol injection on choke manifold.
07:24		Gas to surface.
11:50		Changed burner boom.
13:50		Directed flow through separator.
14:50		Directed flow to tank for 1. meterfactor.
15:20		Directed flow back to burner.
15:55		Started sampling 1. 20 ltr. pressurised oil sample.
16:15		Sample finished.
16:35		Directed flow to tank for 2. meterfactor.
16:40		Started sampling 2. 20 ltr. pressurised oil sample.
17:05		Directed flow back to burner.
17:15		Sample finished.
17:33		Changed orifice from 1" to 1.5" to lower separator pressure.
17:35		Started sampling 3. 20 ltr. pressurised oil

			sample.
	18:15		Directed flow to tank for 3. meterfactor.
	18:20		Sample finished.
	18:40		3. meterfactor aborted.
	19:00		Directed flow to tank for 3.meterfactor.
	19:30		Directed flow to burner.
	19:55		Started sampling 4. 20 ltr. pressurised oil sample.
	20:00		Directed flow to tank for 4. meterfactor. Schrinkage 2% at 4 deg C.
	20:30		Directed flow back to burner.
	20:55		Sample finished.
	21:05		Started sampling 5. 20 ltr. pressurised oil sample.
	21:30		Schrinkage 3% at 5 deg C. Directed flow to tank for 5. meterfactor.
	22:00		Directed flow back to burner.
	22:05		Sample finished.
	23:00		Directed flow to tank fo 6. meterfactor. Schrinkage 2% at 5 deg C.
	23:30		Directed flow back to burner.
	23:51		Started 1. set of PVT separator samples. Oil bottle: K-315 Gas bottles: A-15731, A-16277.
22.02	00:30		Directed flow to tank for 7. meterfactor.
	00:31		Finished 1. PVT set.
	01:04		Started 2. set of PVT separator samples. Oil bottle: K-601 Gas bottles: A-15749, A-16225.
	01:42		Finished 2. set of PVT samples.
	02:00		Bypassed separator.
	02:08	*	Closed well on MUST tool.
	02:09		Closed choke manifold.
			2. flow, low rate
	15:51		Opened MUST tool for equalising.
	16:42		Closed PCT valve to reduce volume for equalising.
	16:46		Opened PCT valve.

	16:55		Close PCT valve due to uncertainty whether MUST tool were open or not.
	17:05		Opened PCT valve.
	17:10	*	Opened well on choke manifold on 4.8 mm adj.
	17:13		Increased choke gradually to 12.7 mm.
	17:40		Changed to 12.7 mm fixed choke.
	17:50		Directed flow through separator.
23.02	00:33		Started PVT-sampling.
	01:08		Lost signals from surface readout tool.
	02:44		Finished PVT sampling.
	02:54		Changed to 12.7 mm adjustable choke.
			High rate flow (3. flow)
	02:58	*	Increased to 15.9 mm adjustable choke.
	03:02		Increased to 17.5 mm adjustable choke.
	03:16		Increased to 19.1 mm adjustable choke.
	03:28		Changed to 19.1 mm fixed choke.
	07:32.30	*	Closed well at PCT and choke manifold for final buildup.
	15:29		Started cycling MUST to pull out.
	15:42		MUST released. Started POOH.
	16:50		MUST tool at surface.
	17:14		Out of hole.
24.02.	09:20		Baker gauges out of hole.
	09:35		Core Lab gauges out of hole.
	11:30		Perforation guns OOH.
25.02	02:30		Started rigging up GECO to check perforation depth with CCL log.
	04:33		Logging finished. Perforations on depth within the required accuracy.
			END OF DST # 2

* = Opening or closing the well.

SEQUENCE OF EVENTS DST # 3, 3983 - 3996 M RKB.

25.02.	12:42	Run in hole with packer on wireline.
	14:00	Reached liner top. Problems to get in.
	14:21	Entered liner top.
	15:10	Sat packer at 3939.1 m RKB (top).
	21:15	Run in hole with teststring.
	21:22.30	Activated Core Lab/Panex 3-1356/14-1207.
		Delay: 20 hrs.
		Sampling mode: 2 min for 97 hrs.
		Will run out: 17:22.30 02.03.86
		Sensing depth: 3928.46 m RKB.
	21:24.30	Activated Core Lab/Panex 3-1345/14/1208.
		Delay: 23 hrs.
		Sampling mode: 5 min for 10 hrs.
		1 min for 46.5 hrs.
		Will run out: 04:54 01.03.86
		Sensing depth: 3928.46 m RKB.
	21:50	Activated Baker/Panex 1053/1084.
		Delay: 23 hrs.
		Sampling mode: 2 min for 97 hrs.
		Will run out: 21:50 02.03.86
		Sensing depth: 3922.84 m RKB.
	21:51	Activated Baker/Panex 1128/1355.
		Delay: 20 hrs.
		Sampling mode: 4 min for 10 hrs.
		1.5 min for 69 hrs.
		Will run out: 00:51 02.03.86
		Sensing depth: 3919.67 m RKB.
26.02	21:40	Landed test string.
	23:24	Pressure tests finished.
	23:27	Opened master valve.
	23:30	Pressured up tubing to 50 bar to minimise differential over PCT valve before opening.
	23:35	Pressured up annulus to open PCT valve.
	23:36	Indication on tubing pressure that PCT opened at 85 bar.
	23:40	Started pressuring up tubing to perforate.

			Increased annulus pressure to 170 bar to avoid pumping out the packer.
	23:43		Reached 430 bar on tubing. Bled down pressure to sement unit.
	23:45		Closed kill valve.
	23:48		Indication of perforation on shot detection system. Slow pressure increase on tubing.
27.02.	00:48		Started rigging up for running MUST.
	01:01		Closed lubricator valve.
	01:07		Bled of pressure down stream lubricator.
	02:14		MUST assembly placed in string.
	02:25		Opened kill valve.
	02:28		Started pressuring up to 345 bar for pressure testing stuffing box.
	02:45		Test OK, bled down pressure to 24 bar.
	02:49		Closed kill valve.
	02:50		Opened lubricator valve, had 45 bar tubing pressure.
	02:51		Started running in hole with MUST assembly.
	04:27		Bled down pressure on choke manifold from 76 to 69 bar.
	04:50		Latched in MUST assembly on 3. attempt.
			Main flow and buildup
	05:00.30	*	Opened choke manifold on 4.8 mm adjustable choke.
	05:21		Closed choke manifold, produced through bubble hose on choke manifold.
	11:03	*	Closed well at MUST valve. Started build up.
	11:05		Closed bubble hose.
	21:03		Closed PCT. End of MUST recorded build up.
	21:05		Opened MUST shut in valve.
	21:21		Started to pull out of hole with MUST actuator string.
	22:59		MUST actuator string in lubricator.
	23:30		Completed wireline rig down.
			Sheared SSARV with 262 bar. Started reverse circulation.

END OF DST # 3.

* = Opening or closing the well.

SEQUENCE OF EVENTS DST # 4, 3174-3177.5 M RKB.

06.03.	15:05	Started rigging up Geco for CBL-VDL-GR.
	15:20	Run in hole.
	17:55	Log finished.
	18:40	Out of hole.
	19:55	RIH w/ Baker Packer F1 production packer.
07.03.	03:30	Packer set at 3106.7 m RKB.
	03:35	Started pulling out of hole.
	05:15	Out of hole.
	05:30	Picked up Bottom Hole Assembly.
	06:25	Activated Core Lab Panex Gauge 3-1220/14-1234.
		Delay: 15 Hrs.
		Sampling mode: 60 min. for 5 Hrs.
		3 min. for 30 Hrs.
		2 min. for 40 Hrs.
		3 min. for 55 Hrs.
		Will run out: 07:25 13.03.86
		Sensing depth: 3096.25 m RKB.
	06:25	Activated Core Lab Panex Gauge 3-1345/14-1208.
		Delay: 15 Hrs.
		Sampling mode: 60 min. for 5 Hrs.
		3 min. for 145 Hrs.
		Will run out: 03:25 14.03.86
		Sensing depth: 3096.25 m RKB.
	06:44	Activated Lower Baker Panex Gauge 1096/101159.
		Delay: 17 Hrs.
		Sampling mode: 2 min. for 60 Hrs
		4 min. for 74 Hrs.
		Will run out: 13:44 13.03.86
		Sensing depth: 3090.5 m RKB.
	06:50	Activated Upper Baker Panex Gauge 1204/101248
		Delay: 23 Hrs.
		Sampling mode: 4 min. for 100 Hrs.
		2 min. for 47 Hrs.
		Will run out: 08:50 14.03.86
		Sensing depth: 3087.4 m RKB.
	13:15	End pressure testing of BHA. OK.

			Continued RIH w/teststring.
08.03.	06:00		Attempted to land fluted hanger in wellhead, negative.
	07:00		Pulled out landing string and 10 stds of tubing.
	10:00		Run in hole with BOP test plug and checked BOP.
	12:00		Made new space out.
	14:30		Started running in with landing string.
09.03.	00:50		Finished pressure testing, started rigging up slick line perforation bar assembly.
	01:50		Perforation bar assembly in string. Started pressure testing against lubricator valve.
	02:10		Finished pressure testing.
			Perforation, initial flow and buildup
	02:51		Pressured up tubing to 103 Bar to reduce differential pressure over PCT.
	02:56		Started pressuring up annulus to open PCT valve.
	02:59		PCT open at 100 bar annulus pressure, increased pressure to 120 bar.
	03:01		Started running in hole with perforation bar.
	03:04		Bled down pressure on choke manifold, monitored to check for pressure increase.
	03:06		Bled down to 1 bar on choke manifold.
	03:07		Closed choke manifold.
	03:34		Stopped bar at 3155 m RKB.
	03:36		Dropped bar, no indication of perforation.
	03:43		Pulled bar to 3145 m RKB.
	03:46		Dropped bar, no indication of perforation.
	03:51		Pulled bar to 3145 m RKB.
	03:52		Dropped bar, guns fired, perforated 3174-3177.5 m RKB.
	04:51		Started pulling perforation bar.
	05:22		Perforation bar at surface, swab valve closed and tool secured in lubricator.
			Cleanup flow and buildup (1. flow)
	05:42	*	Opened well to tank on 4.0 mm adjustable choke.
	05:44		Started glycol injection on EZ-tree.

05:48 Increased to 6.4 mm adj. choke.
06:03 Started glycol injection on choke manifold.
06:06 Increased to 7.9 mm adj. choke.
06:16 Increased to 9.5 mm adj. choke.
06:22 Decreased to 7.9 mm adj. choke.
06:32 Decreased to 6.4 mm adj. choke.
06:42 Gas to surface.
06:47 Bypassed tank, flowed to flare.
06:49 Increased to 9.5 mm adj. choke.
06:58 Closed glycol injection on choke manifold.
07:25 Started glycol injection on choke manifold.
08:45 Increased to 11.1 mm adj. choke.
08:50 Changed to 11.1 mm fixed choke.
09:02 Directed flow through separator on 1.25" orifice.
09:25 Changed orifice to 1.5".
10:20 Problems with Rotron turbinmeter, no liquid rate.
10:48 Rotron repaired.
11:15 Started 1. PVT set of gas bottle no. A 15752 and oil bottle no. K 5909.
11:45 End PVT-sampling.
12:30 Sampled 1 Jerry-bottle and 2 Salzkottner bottles.
13:30 Bypassed separator.
13:35 * Closed well at PCT and choke manifold.

Low rate flow (2. flow)

21:55 Closed lubricator.
22:05 Bled off pressure above.
22:10 Closed choke manifold, 50 bar WHP.
23:03 Opened lubricator, no pressure increase.
23:05 Closed lubricator valve, checked hydr.oil.
23:08 Opened lubricator valve.
23:11 Closed lubricator valve.
23:13 Bled off above.
23:14 Closed choke manifold, 45 bar WHP.
23:15 Opened lubricator valve, no pressure increase.
23:18 Bled down pressure above PCT, lubricator valve

leaking.

10.03. 00:33 Closed choke manifold, checked PCT.
00:49 Opened choke manifold.
00:53 Closed master valve.
00:54 Opened kill valve.
00:56 Flushed surface lines.
01:00 Stopped flushing.
01:03 Opened mastervalve, closed choke manifold.
01:04 Pressured up string to 45 bar.
01:30 Closed EZ-tree.
01:33 Closed fail-safe, rigged down flowline.
01:43 EZ-tree latched off.
02:03 Flowhead off string.
02:05 Lubricator off string.
03:15 Backup lubricator on string.
04:10 Flowhead on string.
05:00 EZ-tree latched on.
05:42 Pressured up string to 500 bar.
05:56 Closed lubricator valve. Bled down to 35 bar.
06:11 Opened lubricator valve. Bled down to 100 bar.
06:15 Closed lubricator valve, inserted MUST.
08:03 Opened killvalve.
08:11 Pressured up string to 345 bar, leaking valve. On wireline lubricator section.
08:18 Pressured up string to 345 bar, ok.
08:32 Closed killvalve.
08:35 Opened lubricator valve.
08:36 RIH with MUST assembly.
09:50 Tagged restriction at 3030 m RKB, stuck with MUST tool.
10:18 Opened PCT. Released MUST tool and pulled it into tubing section.
10:43 * Opened well on 3.18 mm adj. choke to clean up lower part of teststring.
10:44 Increased to 4.8 mm adj. choke.
10:45 Increased to 6.4 mm adj. choke.
10:48 Increased to 7.9 mm adj. choke.
10:52 Decreased to 4.8 mm adj. choke.
11:11 * Closed well at choke manifold, approximately 10 m^3 produced.

11:33		Latched on MUST.
11:38		Pull tested MUST. OK.
11:41	*	Opened well on 9.5 mm adj. choke.
11:44		Started glycol injection on EZ-tree.
11:46		Changed to 9.5 mm fixed choke.
		Stopped glycol injection.
13:30		Directed flow through separator on 1.5" orifice.
		Changed to 1.25" orifice
14:04		Started 1. meterfactor (.899)
14:20		Changed to 1" orifice.
15:00		Started 2. meterfactor (.8865)
15:45		Geochemical gas sample taken (Petrotech)
15:47		Changed to 1.25" orifice.
16:38		Started sampling of 2 x 20 litre Gerzat bottles with separator oil (bottle no. A 15750 & A 15742).
17:34		End sampling of Gerzat bottles.
18:04		Started 2. PVT set (oil no. K 5620, gas no A 15753).
18:42		End sampling 2. PVT set.
18:57		Started 3. PVT set (oil no. K 5912, gas no. A15754).
19:17		End sampling 3. PVT set.
19:41		Started 4. PVT set (oil no. K 5608, gas no. A15758).
19:45		Geochemical gas-sample taken (Petrotech).
20:05		End sampling 4. PVT set.
20:10		Started sampling 20 ltr. separator oil (Jerry).
20:30		End sampling (Jerry).
20:30		Started sampling 5 x 5 ltr. separator oil on Salzkotten.
21:15		Start meterfactor (.9015).
21:18		End sampling on Salzkot.
21:30		Finished meterfactor.
22:06		Changed to 9.5 mm adj. choke.

High rate flow (3. flow) and buildup

22:09	*	Increased to 15.9 mm adj. choke.
22:12		Changed to 15.9 mm fixed choke.

11.03.	01:35		Started 5. PVT set, oil no. K 3421, gas no. A15760)
	02:06		End sampling 5. PVT set.
	02:46		Bypassed meters on separator.
	02:51		Changed to 19.1 mm adj. choke.
	02:54		Increased to 20.6 mm adj. choke.
	02:55		Increased to 23.8 mm adj. choke.
	03:00		Changed to 23.8 mm fixed choke.
	03:09		Indication of water breakthrough on formation.
	04:00		5 x 1 ltr. of formation water sampled at separator (Petrotech).
	04:10	*	Closed well in at MUST and choke manifold.

Low rate flow to monitor coning effects (4. flow)

	18:03		Released tension on MUST valve to start equalising. Lost signal from MUST.
	18:18		Closed PCT valve to equalise faster.
	18:23		Pressured up annulus, PCT opened.
	18:26		Started glycol injection on choke manifold.
	18:27	*	Opened well on 3.2 mm adj. choke. Produced gas.
	18:40		Directed flow to tank.
	18:50		Bypassed tank.
	18:54		Increased to 4.8 mm adj. choke.
	18:58		Increased to 6.4 mm adj. choke. Produced oil.
	19:25		Directed flow through separator.
	19:35		Changed to 4.8 mm fixed choke.
	19:36		Stopped glycol injection on EZ tree.
	20:13		Started producing water.
	20:41		Started producing gas.
	20:50		Increase in gas production, traces of oil on inlet.
	22:38		Changed to 7.9 mm adjustable choke.
	22:40		Increased to 11.1 mm choke.
	22:46		Changed to 6.4 mm fixed choke.
	22:48		Stopped glycol injection on choke manifold.
12.03.	00:06		Bypassed meters on separator.
	00:11	*	Closed well on PCT and choke manifold.
	00:19		Started cycling MUST actuator.
	00:22		Pulled loose MUST actuator on 9. cycle, started

pulling out of hole.
01:30 MUST actuator at surface, closed lubricator valve.
01:33 Bled down pressure above to 35 bar.
01:48 Bled down to 0 bar. Start to rig down.

Releasing of perforation guns.

03:40 Rigged up wireline equipment. Pressure-tested lubricator.
04:05 Opened lubricator valve.
04:15 Opened PCT.
04:16 Run in hole with shifting tool.
04:25 Wireline tool not able to pass 33 m.
04:35 Operated and checked lubricator valve several times.
05:12 Closed lubricator valve. Bled off to 150 bar.
05:24 Run in hole with wireline tool, stopped at 24 m on lub. valve.
05:38 Opened lubricator valve.
05:39 Run in hole with wireline tool, stopped at 38 m on plug in tubing.
06:05 POOH, closed swab valve.
06:06 Started glycol injection at EZ-tree
06:09 * Opened well on 3.2 mm adj. choke to burners.
06:20 * Closed well at choke manifold.
06:25 Opened swab valve, RIH w/shifting tool, tagged restriction at 96 m. POOH.
06:40 Closed lubricator valve.
06:58 * Opened well on 3.2 mm adj. choke to burners.
07:00 Rapid decrease in wellhed pressure (50 bar).
* Closed well at choke manifold.
Indication of plugged string.
07:09 * Opened well on 4.8 mm adj. choke.
07:13 Increased to 9.5 mm adj. choke.
07:16 Increased to 11.1 mm adj. choke.
07:18 Plug broken.
07:19 Decreased to 9.5 mm adj. choke.
08:21 * Closed well at choke manifold.
08:30 Run in hole with shifting tool.

09:26 Released perforation guns. POOH.
10:03 Shifting tool above lubricator.
10:34 Closed lubricator valve.
11:00 Rigged down wireline equipment.
11:44 Opened lubricator valve.

Flowing well to heat up string

11:47 * Opened well on 11.1 mm adj. choke.
11:49 Decreased to 9.5 mm adj. choke.
12:04 Flowed to tank.
12:45 Changed to 6.3 mm fixed choke.
12:54 Changed choke to 9.5 mm adj. choke.
13:09 * Closed well at PCT and choke manifold.
13:18 Closed lubricator valve, bled off pressure above.

PLT logging flow (5. flow)

13:30 Rigged up wireline equipment for PLT run.
14:05 PLT in lubricator.
14:15 Opened kill valve, pressure tested lubricator.
14:51 Closed kill valve, test finished.
14:56 Opened lubricator valve.
15:00 Run in hole with Schlumberger PLT.
15:16 Opened PCT.
16:27 PLT tool in open hole, started correlating. Made passes down to 3200 m RKB. Situated tool at 3160 m RKB for logging vs. time.
17:28 Started glycol injection on EZ tree.
17:34 Started glycol injection on choke manifold.
17:35 * Opened well on 4.7 mm adj. choke.
17:37 Increased to 9.5 mm adj. choke.
17:40 Changed to 7.9 mm fixed choke.
17:46 Closed glycol injection on choke manifold.
17:50 Flow directed through separator.
19:51 Ready to start logging. Unable to move cable, probably due to iceing in stuffing box. Rigged up steam heating on stuffing box.
20:45 Sampled 4 x 1 ltr. formation water (Petrotech).

	20:50		Started glycol injection on lubricator, cable free.
	20:59		Started logging.
	22:45		Stopped glycol injection on EZ tree.
	22:50		Finished logging at first rate, ready to increase rate.
	22:50		Lost signal from PLT.
	23:15		Sampled 2 x 1 ltr. formation water (Petrotech).
	23:19		Started glycol injection on EZ tree.
	23:20	*	Closed well at choke manifold.
	23:36		Pulled PLT into string.
	23:45		Sampled 2 x 1 ltr. formation water (Petrotech).
13.03.	00:51		PLT out of hole. Prepared for bullheading.
	08:30		Pulled seal assembly out of packer.
	10:00		Circulating mud.
	21:00		Started pulling string out of hole.
14.03.	05:00		Bottomhole gauges out of hole.

END OF DST # 4

* = Opening or closing the well.

FLOW DATA 6506/12-5

Test no.	Formation	Perf. int. (mRKB)	Flow period no.	Duration (min)	Choke diam. (mm)	Liquid rate (Sm^3/d)	Gas rate ($10^3 Sm^3/d$)	GOR (Sm^3/Sm^3)	Water rate (Sm^3/d)	Oil dens (kg/m^3)	Gas Sp.g. (air=1)	Pwh (bar)	Pwf (bar)	Res. Temp. (^0C)	Res. Press. (bar)
1B	Tomma fm. I	4025-4040	1	1090	19.1	-	-	-	250	-	-	10	260	141	411.5
			2	558	(9.5)	-	-	-	180	-	-	20	325		
2	Tomma fm. I	4004-4009.5	1	1443	11.1	140	41	293	40	835	.895	50	220	140	409
			2	588	12.7	150	38	253	40	827	.795	50	210		
			3	275	19.1	200	55	275	70			25	-		
3	Tomma fm. I	3983-3996	1	363	(bubble hose)	2.4	-	-	-	-	-	1.5	330	139	408
4	Finnvær	3174-3177.5	1	473	11.1	440	75	170	0	800	.718	110	295	112	471
			2	628	9.5	390	62	160	0	798	.710	130	313		
			3	331	15.9	610	98	160	0	-	-	81	240		
			4	344	6.4	72	11	153	207	817	.690	164			
			5	345	7.9	120	22	180	325		.715	158	-		

2.3 PRESSURE COMPOSITE GRADIENTS

6506/12-5 - PRESSURE COMPOSITE GRADIENTS

Overburden Gradient

The overburden gradient is calculated from measured and calculated densities.

Down to seabed, a density of 1.03 g/cm^3 is assumed and used in the calculations.

In the top section, a density of 1.9 g/cm^3 is assumed down to 30" casing shoe.

Density measurements are available and are used for overburden calculations for the rest of the well.

Pore Pressure Gradient

The pore pressure is evaluated using drilling parameters, sonic and resistivity measurements, measured test pressure and drilling data from daily drilling report.

The pore pressure gradient is as prognosed equal to 1.03 g/cm^3 down to top Korgen Fm, Sklinna Group, where a rapid pressure increase is observed. The pressure in this section is estimated to 1.17 g/cm^3 EMW.

At approximately 1850 m RKB, another pressure increase occurs with pressure rising to 1.30 g/cm^3 EMW at 1950 m RKB and staying at this level down to approximately 2130 m RKB. From this level and down to the bottom part of the Skomvær Group, the pressure is increasing to 1.55 g/cm^3 EMW, again leveling off at this value down to approximately 2500 m RKB. Another sharp pressure increase can be seen at this level, rising to 1.62 g/cm^3 EMW at 2540 m RKB.

From this maximum, pressure is decreasing down to the Finnvær Sandstone, where SFT and DST measurements are giving 1.51 and 1.49 g/cm^3 EMW, respectively.

Due to changes in bit size, lithology and variations in drilling parameters, there are uncertainties in the pore pressure estimates in this section. The stepwise profile of the pore pressure curve is thought to be representative although the absolute pressure values could be slightly different.

From the Finnvær Sandstone down to 9 5/8 inch casing depth, the well was drilled with a turbine, giving poor information regarding pore pressure. The pore pressure is estimated to be constant at 1.55 g/cm^3 EMW down to top Upper Jurassic and then dropping sharply. In the Middle and Lower Jurassic, pressure values from RFT-measurements are used.

Fracture Gradient

The fracture gradient has been calculated using the "zero tensile strength" method presented in the Exploration Logging "Pressure Log Reference Manual MS-156", with results of the performed leak off tests plotted.

WELL: 6506/12 - 5

RIG NAME: DYVI DELTA

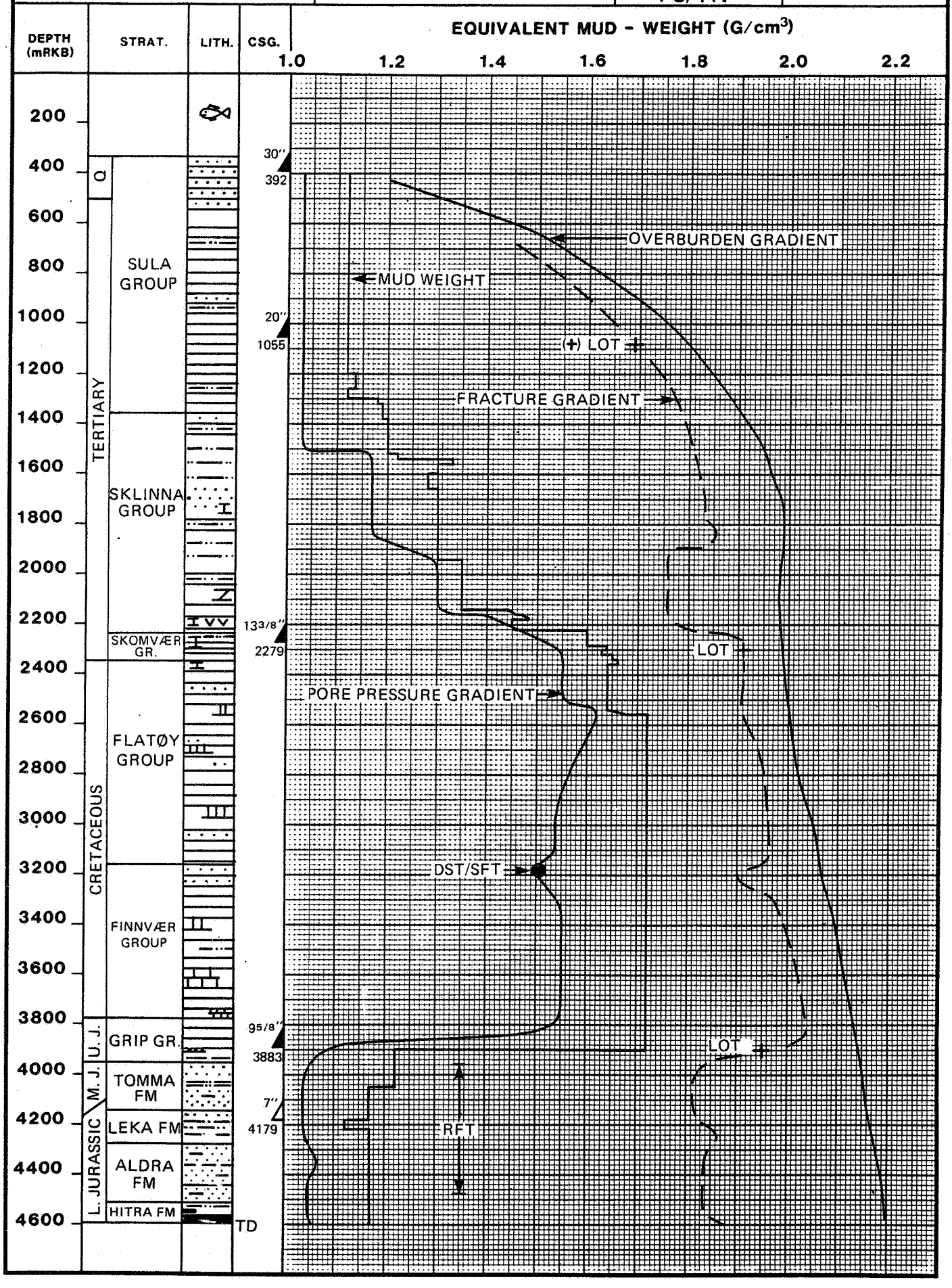
DEPTH mRKB: 4587

PRESSURE COMPOSITE GRAD.

statoil
Den norske stats oljeselskap a.s

MADE BY/DRAWN BY: PS/TN

DATE:



read from wireline unit depth indicator. Picked up slick line 100 m.

15:25 Bled of annulus pressure to zero, and pressured then up to 145 bars (2100 psi). Tubing pressure 12 bars (175 psi).

15:30 Ran down 100 m with slick line and found ball in closed position. Start POOH with slick line. Prepared cycling of MORV.

18:15 End cycling MORV. MORV closed.

18:30 Applied 50 bars (725 psi) to the tubing , and attempted opening of the PCT by setting 170 bars (2465 psi) to the annulus.
No success.

19:00 Tried to detonate the guns. Set 450 bars (6525 psi) on the tubing. No success.

19:15 Pressured up annulus twice to 240 bars (3480 psi) to shear the SSARV without success.

20:45 MORV cycled two full cycles (18 p.tests) without creating U-tube communication.

21:45 Cycled the SSARV, two annulus pressure tests, to 270 bars (3915 psi) and succeeded to shear the valve giving 117 bars (1695 psi) on the tubing at zero annulus pressure. Started reversing out tubing content.

11.02. 01:30 Pulled landing string out of hole.

01:30 - 06:00 Continued POOH.

09:00 Core Lab gauges to surface.

10:30 Perforation guns to surface. Discovered that guns had perforated, when cycling SSARV, at 2134 10.02.86. All charges detonated.