

Well no : 6407/7-4 Operator : HYDRO

Coordinates : 64° 15' 43.43" N UTM coord. : 712759536 N  
 07° 13' 25.84" E 41394315 E

Licence no : 107 Permit no : 600

Rig : POLAR PIONEER Rig type : SEMI-SUB.

Contractor : POLAR FRONTIER DRILLING A/S

Bottom hole temp: 92°C Elev. KB : 23 M

Spud. date : 89.01.13 Water depth : 328 M

Compl. date : 89.03.28 Total depth : 3211 M

Spud. class : APPRAISAL Form. at TD E.JURASSIC

Compl. class : SUSPENDED. OIL Prod.form. :

Seisloca : NH 8604 , row 859 , column 1055

## LICENSEES

20,000000 NORSK HYDRO PRODUKSJON A.S  
 20,000000 A/S NORSKE SHELL  
 50,000000 DEN NORSKE STATS OLJESELSKAP A.S  
 10,000000 NORSK AGIP A/S

## CASING AND LEAK-OFF TESTS

Type	Casing diam.	Depth below KB	Hole diam.	Hole depth below KB	Lot mud eqv. g/cm3
CONDUCTOR	30	440,0	36		
INTERM.	20	524,0	26	541,0	1,41
INTERM.	13 3/8	1099,0	18 1/2	1118,0	1,96
INTERM.	9 5/8	2790,0	12 1/4	2812,0	1,60
LINER	7	3209,0	8 1/2	3211,0	

## CONVENTIONAL CORES

Core no.	Intervals cored meters	Recovery	
		M	%
1	2877,0 - 2897,0	20,0	100,0
2	2974,6 - 2982,8	8,2	102,5
3	2982,8 - 3010,5	27,8	99,3
4	3010,6 - 3037,3	26,7	98,9
5	3037,3 - 3040,6	3,3	100,0
6	3040,6 - 3068,1	27,5	98,2
7	3069,0 - 3097,3	28,3	96,9
8	3097,0 - 3100,0	3,0	100,0
9	3101,0 - 3125,0	24,0	100,0
10	3128,0 - 3140,0	12,0	100,0

## MUD

Depth	Mud weight	Visc.	Mud type
366,000	1,05	10,0	WATER BASED

Depth	Mud weight	Visc.	Mud type
500,000	1,47	19,0	WATER BASED
538,000	1,05	10,0	WATER BASED
538,000	1,20	20,0	WATER BASED
938,000	1,22	14,0	WATER BASED
1115,000	1,20	10,0	WATER BASED
1115,000	1,23	11,0	WATER BASED
2808,000	1,60	19,0	WATER BASED
3211,000	1,47	26,0	WATER BASED

## DRILL STEM TEST

### INTERVALS AND PRESSURES

Test no.	Interval meter		Choke size	Pressure (PSI) WHP	BTHP	FFP	TEMP
1,0	3126,000	-	3138,500	11,1	113	4542	49 ° C
2,0	2999,000	-	3008,000	7,9	2302	5027	45 ° C
3,0	3028,000	-	3071,000	12,7	2726	5733	77 ° C

### RECOVERY

Test no.	Oil Sm3/d	Gas Sm3/d	Oil grav. g/cm3	Gas grav. rel. air	GOR m3/m3
1,0 *		424	1,041	0,690	
2,0	242	46000	0,830	0,740	185
3,0	740	125000	0,840	0,720	169

\* WATER-TEST

## DRILL BIT CUTTINGS AND WET SAMPLES

Sample type	Interval below KB	Number of samples
WET SAMPLES	550 - 3210	330
CUTTING	540 - 3210	360

## SHALLOW GAS

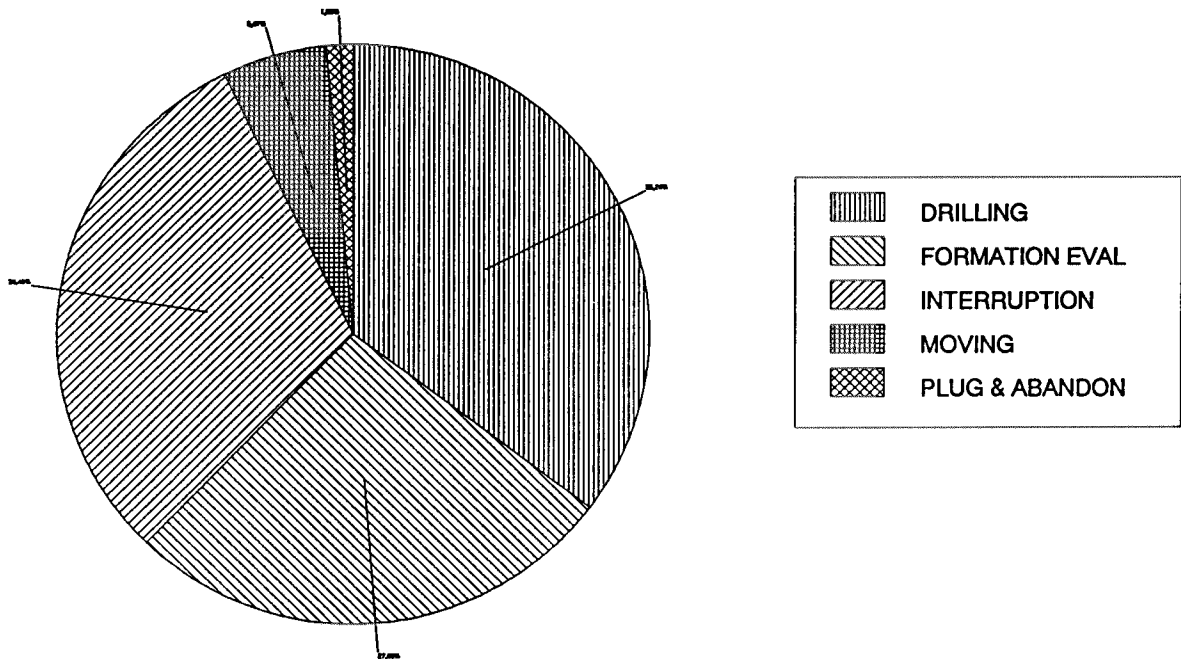
Interval below KB	Remarks
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## AVAILABLE LOGS

Log type	Intervals		1/200	1/500	Div.
AMS	1040,0	-	2805,0		1:1000
AMS	2792,5	-	3214,0		1:1000
CBL VDL GR	2950,0	-	3134,0	X	
CBL-VDL-GR	2280,0	-	3168,0	X	
CBL-VDL-GR	3058,0	-	3166,0	X	

Log type	Intervals		1/200	1/500	Div.
DIS LSS GR	1040,0	- 2805,0	X	X	
DIL LSS GR	2792,5	- 3214,0	X	X	
DLL MSFL GR	2792,5	- 3210,0	X	X	
WIRELINE DATA PRESS.	352,0	- 3211,0			1:5000
DRILL. DATA PRESS.	352,0	- 3211,0			1:5000
LDL CNL GR	1040,0	- 2805,0	X	X	
LDL CNL NGS	2792,5	- 3214,0	X	X	
MUD	352,0	- 3211,0		X	
MWD	2982,0	- 3211,0	X	X	
NGS RATIOS	2792,5	- 3214,0	X	X	
RFTB GR	2876,0	- 3201,0			1:1000
VELOCITY LOG	1110,0	- 3200,0		X	1:1000
SHDT GR	2792,5	- 3214,0	X		
CDM AP	2797,0	- 3212,0	X	X	
SYNTHETIC SEISMOGRAM	10 cm/s				2
TWO WAY TRAVEL TIME	10 cm/s				1
V.S.P, ZERO OFFSET,	10 cm/s	20 cm/s			13

**Daily Drilling Report System (DDRS)**  
**Operations for well: 6407/7-4**



Main operations	Minutes	Hours	% of total
DRILLING	41640	694,00	35,26
FORMATION EVAL	31920	532,00	27,03
INTERRUPTION	36000	600,00	30,49
MOVING	6690	111,50	5,67
PLUG & ABANDON	1830	30,50	1,55
<b>Total</b>	<b>118080</b>	<b>1968,00</b>	<b>100,00</b>

**Operations for well: 6407/7-4****Main operation: DRILLING**

Sub operations	Minutes	Hours	% of total
BOP ACTIVITIES	1200	20,00	2,88
BOP/WELLHEAD EQ	1620	27,00	3,89
CASING	9030	150,50	21,69
CIRC/COND	600	10,00	1,44
DRILL	21810	363,50	52,38
REAM	300	5,00	0,72
SURVEY	30	0,50	0,07
TRIP	7050	117,50	16,93
<b>Total</b>	<b>41640</b>	<b>694,00</b>	<b>100,00</b>

**Main operation: FORMATION EVAL**

Sub operations	Minutes	Hours	% of total
CIRC SAMPLES	180	3,00	0,56
CIRC/COND	120	2,00	0,38
CORE	3840	64,00	12,03
DST	19710	328,50	61,75
LOG	2310	38,50	7,24
OTHER	30	0,50	0,09
RFT/FIT	1110	18,50	3,48
TRIP	4620	77,00	14,47
<b>Total</b>	<b>31920</b>	<b>532,00</b>	<b>100,00</b>

**Main operation: INTERRUPTION**

Sub operations	Minutes	Hours	% of total
FISH	300	5,00	0,83
LOST CIRC	120	2,00	0,33
MAINTAIN/REP	11640	194,00	32,33
OTHER	4680	78,00	13,00
WAIT	19260	321,00	53,50
<b>Total</b>	<b>36000</b>	<b>600,00</b>	<b>100,00</b>

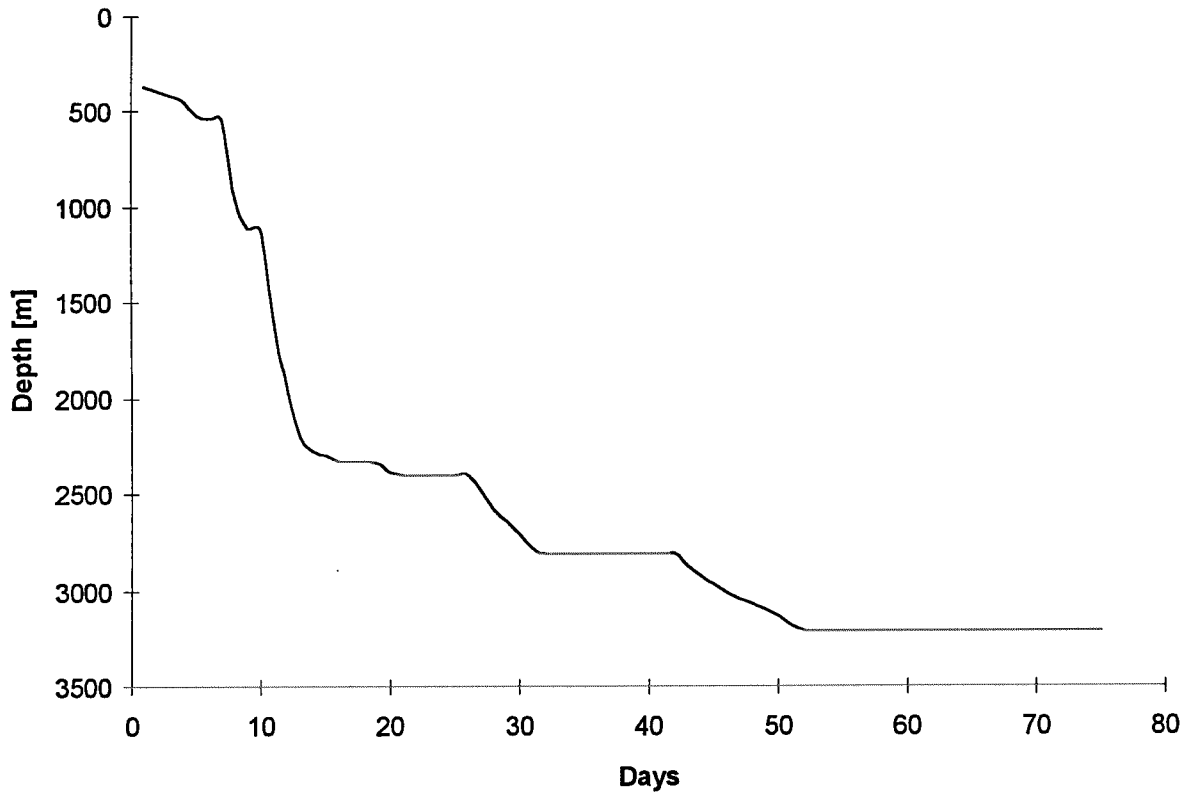
**Main operation: MOVING**

Sub operations	Minutes	Hours	% of total
ANCHOR	3000	50,00	44,84
SKID	30	0,50	0,45
TRANSIT	3660	61,00	54,71
<b>Total</b>	<b>6690</b>	<b>111,50</b>	<b>100,00</b>

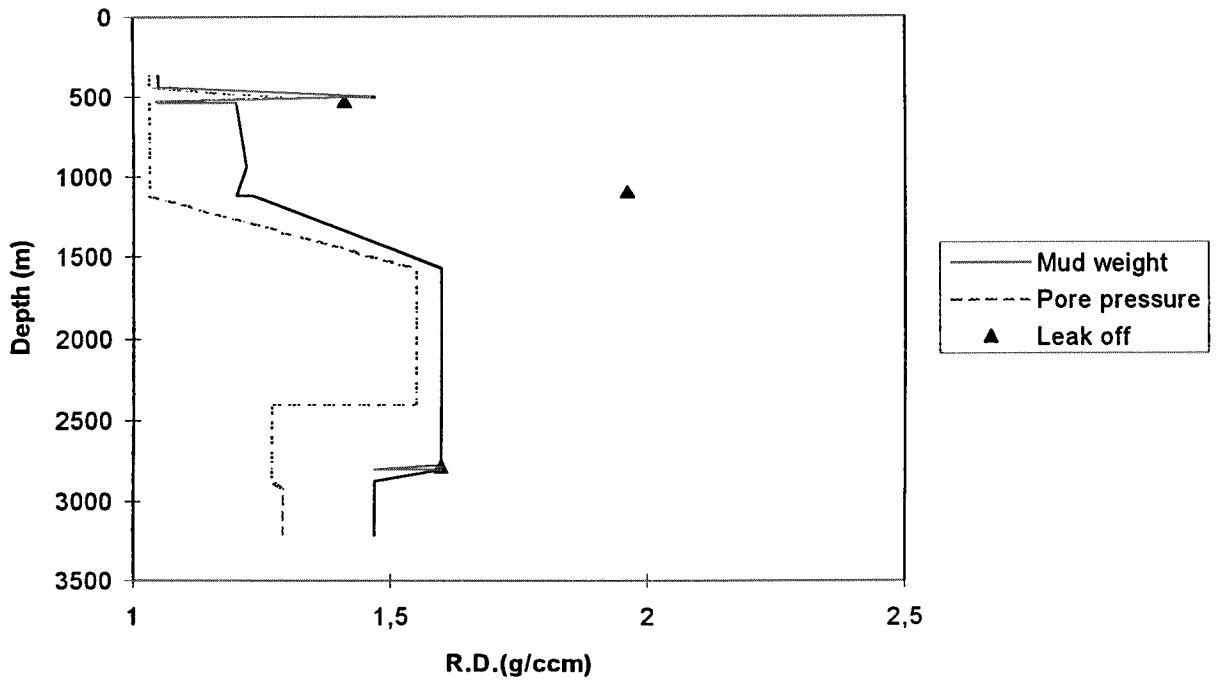
**Main operation: PLUG & ABANDON**

Sub operations	Minutes	Hours	% of total
CEMENT PLUG	90	1,50	4,92
EQUIP RECOVERY	900	15,00	49,18
MECHANICAL PLUG	90	1,50	4,92
TRIP	750	12,50	40,98
<b>Total</b>	<b>1830</b>	<b>30,50</b>	<b>100,00</b>

Depth vs time for well: 6407/7-4



Composite plot for well: 6407/7-4



# Well History 6407/7-4.

## General:

Well 6407/7-4 was designed to drill the A-East structure of the eastern part of the Njord Field structure on the Halten Terrace, in a downfaulted position to the Frøya High and the Trondelag Platform. The location was within a gentle isberg plough mark with a trend southwest-northeast. Boulders were expected at 395 m, and shallow gas from 509 - 528 m and especially at 553 m. The primary objective was to:

establish the oil-water contact in the Tilje Formation.

The secondary objectives were to:

asses pressure, thickness and reservoir quality variations of the Tilje Formation on the east flank to enable detailed reservoir modelling

test the productivity and injectivity of the Tilje Formation

appraise the downflank oil bearing potential and productivity of the Ile Formation

sample reservoir fluids including formation water

The Njord Field structure is considered being a rather complex structural configuration.

## Operations:

Appraisal well 6407/7-4 was spudded by the semi-submersible rig Polar Pioneer 11 January 1989 and completed 29 March 1989 at a depth of 3211 m RKB in the Åre Formation of Lower Jurassic age. Spudding was delayed due to severe weather conditions causing the rig to drift 43 nautical miles off location.

No shallow gas was encountered in the well. Apart from periods with bad weather conditions, the drilling proceeded without any significant problems. One core was cut from 2877 - 2896 m RKB, and a total of nine cores were cut from 2974 - 3140 m RKB. 26 of 30 sidewall cores were recovered.

The well proved oil in the sands of the Ile-, Tilje-, and Åre Formations from 2873.5 m RKB.

Oil/water contact was encountered at 3155 m RKB in the Åre Formation. The well was temporarily plugged and abandoned as an oil discovery.

## Testing:

Two DST tests were performed in this well.

Test no 1 was performed in the interval 3126 - 3138.5 m RKB. GOR 2.9 ( $\text{Sm}^3/\text{Sm}^3$ ).

Test no 2 A was performed in the interval 2999 - 3008 m RKB. GOR 185 ( $\text{Sm}^3/\text{Sm}^3$ ).

Test no 2 B was performed in the interval 3028 - 3071 m RKB. GOR 169 ( $\text{Sm}^3/\text{Sm}^3$ ).

# Geological Tops.

## Well: 6407/7-4.

	Depth m (RKB).
Nordland Group	352.0
Naust Fm	352.0
Kai Fm	1094.0
Hordaland Group	1150.0
Brygge Fm	1150.0
Rogaland Group	1735.0
Tare Fm	1735.0
Tang Fm	1794.0
Shetland Group	1990.0
NiseFm	1999.0
Kvitnos Fm	2200.0
Cromer Knoll Group	2631.0
Lange Fm	2631.0
Viking Group	2844.0
Spekk Fm	2844.0
Melke Fm	2855.0
Fangst Group	2860.0
Not Fm	2860.0
Ile Fm	2873.5
Båt Group	2896.0
Ror Fm	2896.0
Tilje Fm	2972.5
Åre Fm	3138.5
T.D.	3211.0