

Well no : 6407/07-03

Operator : HYDRO

Coordinates : 64 16 44.34 N
07 09 0.13 EUTM coord. : 7129582 N
410422 E

Licence no : 107

Permit no : 573

Rig : POLAR PIONEER

Rig type : SEMI-SUB.

Contractor : POLAR FRONTIER DRILLING A/S

Bottom hole temperature : 98.9 deg.C

Elev. KB : 23 M

Spud. date : 88.03.02

Water depth : 333 M

Compl. date : 88.05.19

Total depth : 3222 M

Spud. class : WILDCAT

Form. at TD : TRIASSIC

Compl. class : SUSPENDED. OIL DISC.

Prod. form :

Seisloca : NH 8604 ROW 763 COL. 745

LICENSEES

10.000000 NORSK AGIP A/S
 20.000000 NORSK HYDRO PRODUKSJON A.S
 20.000000 A/S NORSKE SHELL
 50.000000 DEN NORSKE STATS OLJESELSKAP 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	442.0	.
SURF.COND.	20	520.0	26	536.0	1.37
INTERM.	13 3/8	1098.0	17 1/2	1116.0	1.78
INTERM.	9 5/8	2731.0	12 1/4	2750.0	1.75
LINER	7	3218.0	8 1/2	3222.0	.

CONVENTIONAL CORES

Core no.	Intervals cored meters	Recovery		Series
		M	%	
1	2852.0 - 2871.7	19.7	100.0	
2	2873.0 - 2892.5	19.5	100.0	LOWER JURASSIC
3	2937.0 - 2946.0	9.2	100.0	LOWER JURASSIC
4	2946.3 - 2952.9	6.6	94.3	LOWER JURASSIC
5	2953.0 - 2967.6	14.6	100.0	LOWER JURASSIC
6	2967.0 - 2984.4	17.4	100.0	LOWER JURASSIC
7	2984.0 - 3012.0	27.8	99.3	LOWER JURASSIC
8	3012.0 - 3025.0	13.2	101.5	LOWER JURASSIC
9	3025.0 - 3030.0	5.1	102.0	LOWER JURASSIC
10	3030.0 - 3043.0	12.8	98.5	LOWER JURASSIC
11	3043.0 - 3069.0	25.5	98.1	LOWER JURASSIC
12	3069.0 - 3070.4	1.4	100.0	LOWER JURASSIC
13	3071.0 - 3085.0	14.0	96.0	LOWER JURASSIC
14	3086.0 - 3100.4	14.4	100.0	LOWER JURASSIC

MUD PROPERTIES

Depth below KB meter	Mud weight g/cm ³	Viscosity	Mud type
442.000	1.03	0.0	WATER BASED
480.000	1.61	18.0	WATER BASED
510.000	1.08	0.0	WATER BASED
525.000	1.05	0.0	WATER BASED
536.000	1.07	5.0	WATER BASED
811.000	1.14	5.0	WATER BASED
891.000	1.03	0.0	WATER BASED
1116.000	1.14	6.0	WATER BASED
1116.000	1.15	7.0	WATER BASED
1116.000	1.14	5.0	WATER BASED
1176.000	1.53	12.0	WATER BASED
2711.000	1.60	18.0	WATER BASED
2745.000	1.61	18.0	WATER BASED
2750.000	1.60	10.0	WATER BASED
2753.000	1.59	12.0	WATER BASED
2898.000	1.46	16.0	WATER BASED
2922.000	1.60	15.0	WATER BASED
2922.000	1.61	18.0	WATER BASED
2947.000	1.46	20.0	WATER BASED
3030.000	1.52	22.0	WATER BASED
3041.000	1.60	21.0	WATER BASED
3222.000	1.52	25.0	WATER BASED
3222.000	1.56	21.0	WATER BASED
3222.000	1.60	22.0	WATER BASED

DRILL STEM TEST

INTERVALS AND PRESSURES

Test no.	interval meter	Choke size	Pressure (PSI)		
			WHP	BTHP	FFP
1.0	3046.800 - 3067.800 Test temperature: 116 °C	25.4	18.4	6146.5	3921.2
2.0	2990.000 - 3014.000 Test temperature: 113.7 °C	50.8	471.4	6072.6	2182.7
3.0	2852.100 - 2867.900 Test temperature: 111.9 °C	25.4	839.7	5735.1	3505.5

RECOVERY

Test no.	Oil Sm ³ /d	Gas Sm ³ /d	Oil grav. g/cm ³	Gas grav. rel. air	GOR m ³ /m ³
1.0	16	0	0.831	0.000	0
2.0	527	119389	0.809	0.737	227
3.0	950	396150	0.808	0.745	417

DRILL BIT CUTTINGS AND WET SAMPLES

SAMPLE TYPE	INTERVAL BELOW KB	NUMBER OF SAMPLES
Cutting	560-3201	390
Wet Samples	560-3222	240

SHALLOW GAS

Interval REMARKS
below KB

AVAILABLE LOGS

LOG TYPE	INTERVALS	1/200	1/500	Div.

DIS BHC GR	400.000 - 1057.000	X	X	
DIS BHC GR	1020.000 - 2748.000	X	X	
DIL SDT GR	2736.000 - 3225.000	X	X	
LDL CNL GR	1020.000 - 2748.000	X	X	
LDL CNL SGR	2736.000 - 3222.000	X	X	
DLL MSFL SGR	2736.000 - 3222.000	X	X	
SHDT	1099.000 - 2749.000	X		
CDM AP	2740.000 - 3226.000	X		
NGS	2736.000 - 3222.000	X	X	
AMS	1020.000 - 2748.000		X	
AMS	2736.000 - 3222.000		X	
RFT HP GR	2855.000 - 3145.000	X		
WIRELINE DATA PRESS	355.000 - 3222.000	1:5000		
CBL VDL GR	450.000 - 1095.000	X		
CBL VDL GR	2075.000 - 2730.000	X		
CBL VDL GR	2425.000 - 3136.000	X		
CBL VDL GR	2700.000 - 3034.000	X		
MUD	520.000 - 3222.000		X	
VELOCITY LOG	1130.000 - 3205.000		X	

(Two Way Travel Time, 10cm/s	1 stk)
(Synthetic Seismogram, 10cm/s	2 stk)
(V.S.P, Zero Offset V.S.P, 10cm/s	5 stk)
(V.S.P, Fixed Offset North East, 10cm/s	6 stk)
(V.S.P, Fixed Offset North East, 10cm/s	7 stk)
(V.S.P, Deconvolved Upwave, 10cm/s	4 stk)
(V.S.P, Interpreters Composite, 10cm/s	2 stk)

TOTALT 53 LOGGER.

TD:3222 M.

MAIN OPERATIONS FOR WELL: 640707 03

Main operation: DRILLING

Sub operations	Minutes	Hrs	% of total
BOP ACTIVITIES	1350	22,5	3,80
BOP/WELLHEAD EQ	330	5,5	0,93
CASING	6000	100,0	16,91
CIRC/COND	645	10,8	1,82
DRILL	17370	289,5	48,94
OTHER	60	1,0	0,17
REAM	330	5,5	0,93
SURVEY	285	4,8	0,80
TRIP	9120	152,0	25,70
Total	35490	591,5	100,00

Main operation: FORMATION EVAL

Sub operations	Minutes	Hrs	% of total
CIRC SAMPLES	420	7,0	0,90
CIRC/COND	180	3,0	0,38
CORE	6330	105,5	13,53
DST	26220	437,0	56,06
LOG	7560	126,0	16,16
TRIP	6060	101,0	12,96
Total	46770	779,5	100,00

Main operation: INTERRUPTION

Sub operations	Minutes	Hrs	% of total
FISH	1770	29,5	7,84
MAINTAIN/REP	9420	157,0	41,70
OTHER	1110	18,5	4,91
WAIT	1020	17,0	4,52
WELL CONTROL	9270	154,5	41,04
Total	22590	376,5	100,00

Main operation: MOVING

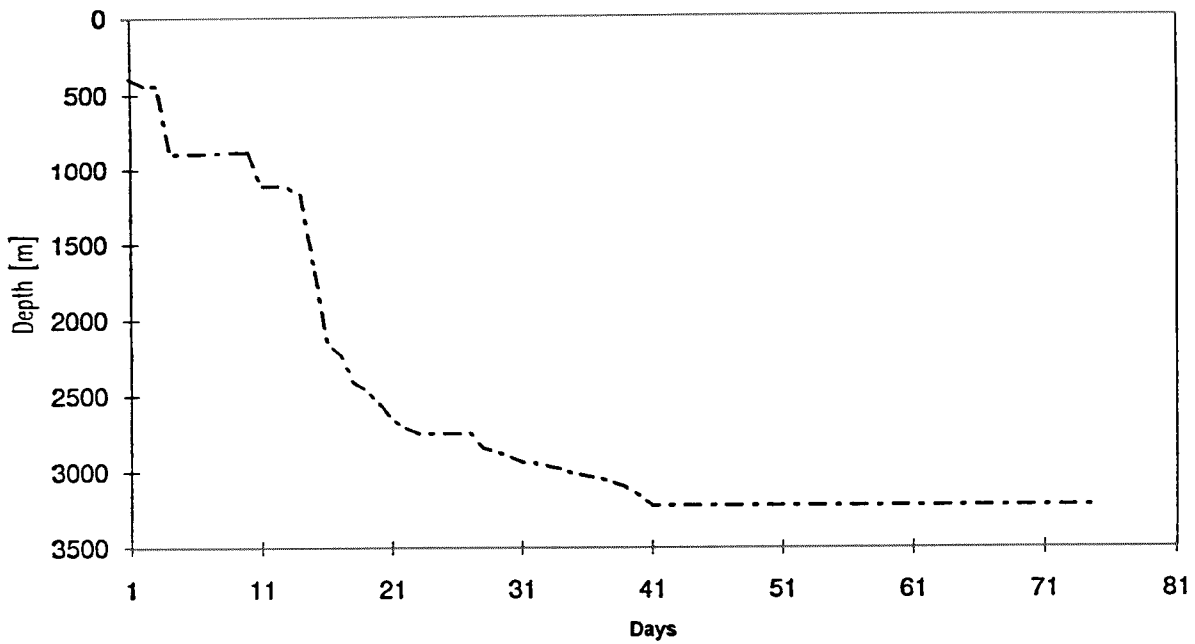
Sub operations	Minutes	Hrs	% of total
ANCHOR	2460	41,0	36,28
TRANSIT	4320	72,0	63,72
Total	6780	113,0	100,00

Main operation: PLUG & ABANDON

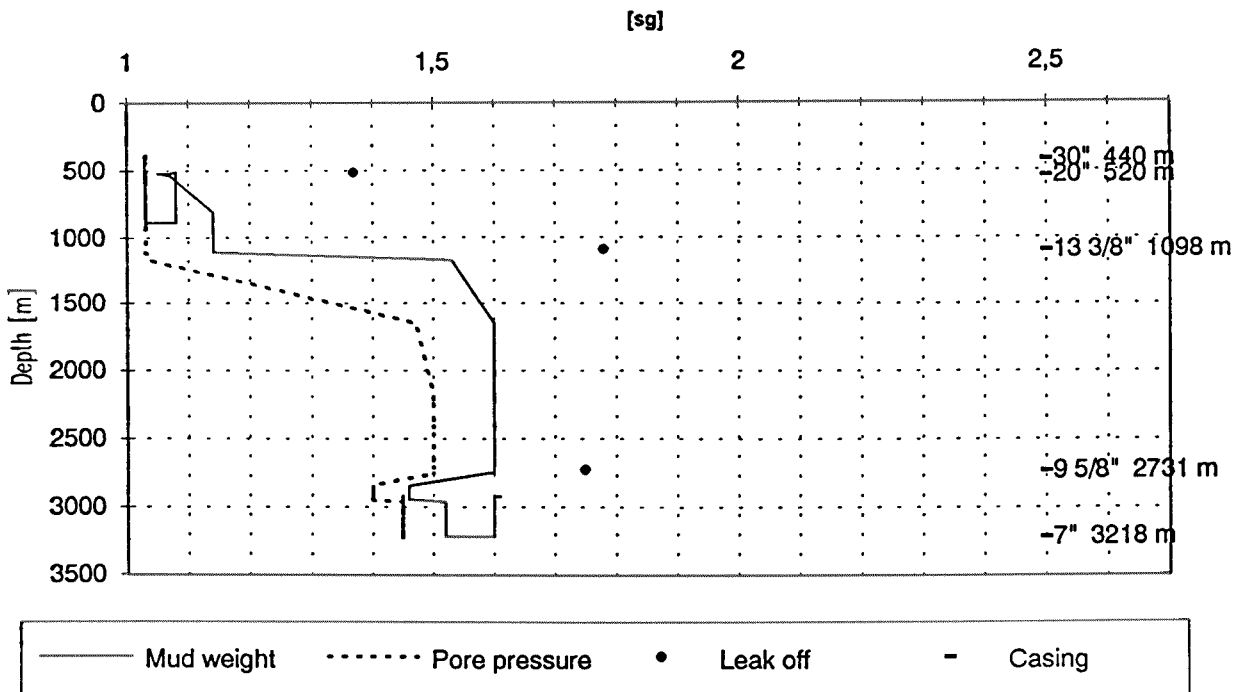
Sub operations	Minutes	Hrs	% of total
CEMENT PLUG	300	5,0	14,08
CIRC/COND	210	3,5	9,86
EQUIP RECOVERY	750	12,5	35,21
MECHANICAL PLUG	270	4,5	12,68
OTHER	240	4,0	11,27
TRIP	360	6,0	16,90
Total	2130	35,5	100,00

Total time used 1896 hrs (79 days)

Depth v.s. time plot for well: 640707 03



Composite plot for well: 640707 03



Well History 6407/7-3

GENERAL:

Well 6407/7-3 was situated in the northern part of the A structure of the Njord Field. The main objectives of the well were to:

- Test the hydrocarbon potential of the Tilje Formation in an undrilled structural part of the Njord Field, the A-north.
- Test the hydrocarbon potential of the Ile Formation as yet not penetrated on the A structure.
- Penetrate the Tilje Formation on the A-north above the oil down to level in the Tilje Formation in well 6407/7-1.
- Obtain formation pressure data to indicate the relationship between the A-north and the A-east/A-central.
Secondary objectives were to:
 - Clarify major exploration uncertainties in the northern area.
 - Test the reservoir properties and the interval thickness of the Jurassic reservoirs.
 - Calibrate the seismic interpretation and the horizon identification.

OPERATIONS:

Wildcat well 6407/7-3 was spudded 2 March 1988 by Polar Frontier Drilling semi-submersible rig Polar Pioneer and completed 19 May 1988 at a total depth of 3222 m in Triassic rocks. At 891 m, after setting of 30" casing, gas started to stream out of the casing. It was assumed that the gas came from the bottom of the hole, since there were no previous peaks on the MWD-log. Three cement plugs were set in the interval 780 - 891 m, but the gas continued to stream. A plug was then set in the interval 510 - 570 m, and the gas stream decreased. The hole was drilled up again to 525 m, where 20" casing was set, originally not a part of the program. Two zones had shallow gas, 553 - 570 m and 652 - 685 m, which was in agreement with what was assumed in the site-survey. Further drilling proceeded without any significant problems.

14 cores were cut in the well. The first two cores were cut in the interval 2852 - 2893 m. The other cores were cut between 2937 - 3103 m. During cutting of the fourth core, there was an invasion of formation fluid into the hole due to a sudden increase in pore pressure. Heavy mud was circulated into the hole, and the well was brought under control. The gas was circulated out, and the mudweight was increased to 1.52.

Top Triassic came in at 3130 m. It was logged, and RFT-measurements were taken. The logs were not very positive.

The well was suspended as an oil discovery.

to be re-entered for further testing or production.

TESTING:

Three DST-tests were performed in the well. DST 1 was in the interval 3047 - 3067.5 m. DST 2 was between 2990 - 3014 m. DST 2B was not performed because the bottom hole pressure tool was lost during test 2A and the hole had to be killed. Norsk Hydro was not interested in taking a separate test because they felt the information from the first part was adequate. DST 3 was in the interval 2852 - 2867 m.

GEOLOGICAL TOPS

WELL: 6407/7-3

Depth m (RKB)

<i>Nordland Group</i>	345.0
<i>Naust Fm.</i>	345.0
<i>Kai Fm.</i>	1100.0
<i>Hordaland Group</i>	1152.0
<i>Brygge Fm.</i>	1152.0
<i>Rogaland Group</i>	1762.0
<i>Tare Fm.</i>	1762.0
<i>Tang Fm.</i>	1825.0
<i>Shetland Group</i>	2000.0
<i>Springar Fm.</i>	2000.0
<i>Nise Fm.</i>	2027.0
<i>Kvitnos Fm.</i>	2232.0
<i>Cromer Knoll Group</i>	2563.0
<i>Lange Fm.</i>	2563.0
<i>Viking Group</i>	2795.0
<i>Spekk Fm.</i>	2795.0
<i>Fangst Group</i>	2807.0
<i>Not Fm.</i>	2807.0
<i>Ile Fm.</i>	2851.0
<i>Båt Group</i>	2866.5
<i>Ror Fm.</i>	2866.5
<i>Tilje Fm.</i>	2937.0
<i>Åre Fm.</i>	3014.0
<i>Triassic Group</i>	3127.5
<i>Grey Beds Fm.</i>	3127.5
<i>T.D.</i>	3222.0