

**General information**

Wellbore name	6407/7-4
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	NJORD
Discovery	6407/7-1 S Njord
Well name	6407/7-4
Seismic location	NH 8604- row 859 & column 1055
Production licence	107
Drilling operator	Norsk Hydro Produksjon AS
Drill permit	600-L
Drilling facility	POLAR PIONEER
Drilling days	75
Entered date	13.01.1989
Completed date	28.03.1989
Plugged and abandon date	31.01.2017
Release date	28.03.1991
Publication date	09.03.2009
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	ILE FM
2nd level with HC, age	EARLY JURASSIC
2nd level with HC, formation	BÅT GP
Kelly bushing elevation [m]	23.0
Water depth [m]	329.0
Total depth (MD) [m RKB]	3211.0
Final vertical depth (TVD) [m RKB]	3204.0
Maximum inclination [°]	9.7
Bottom hole temperature [°C]	122
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	ÅRE FM
Geodetic datum	ED50
NS degrees	64° 15' 43.43" N



EW degrees	7° 13' 25.84" E
NS UTM [m]	7127595.36
EW UTM [m]	413943.15
UTM zone	32
NPDID wellbore	1360

Wellbore history

General

Well 6407/7-4 was drilled on the Njord A-East structure in the southern part of the Halten Terrace. The Njord structure is located ca 30 km west of the Draugen Field. The location was within a gentle ice berg plough mark with a trend southwest-northeast. The primary objective was to establish the oil-water contact in the Tilje Formation. Secondary objectives were to obtain a better mapping of the reservoir quality of the Tilje Formation on the east flank, to test productivity and injectivity of the Tilje Formation, and to appraise the down flank oil bearing potential and productivity of the Ile Formation. Reservoir fluids including formation water should be sampled. Boulders were expected at 395 m, and shallow gas from 509 - 528 m and especially at 553 m.

Operations and results

Appraisal well 6407/7-4 was spudded by the semi-submersible rig Polar Pioneer on 11 January 1989 drilled to TD at 3211 m in Early Jurassic sediments of the Åre Formation. Spudding was delayed due to severe weather conditions causing the rig to drift 43 nautical miles off location. No shallow gas was encountered. Further periods of bad weather led to some problems and WOW, but apart from this the drilling proceeded without significant problems. The well was drilled with spud mud down to 538 m and with KCl mud from 538 m to TD.

The well proved oil in sands of the Ile, Tilje, and Åre Formations. The Ile Formation had oil from 2873.5 to 2896 m with a net pay of 14.8 m. The Tilje Formation had oil from 2972.5 m and down to 3120 m. Net pay in the Tilje Formation was 89.5 m. From logs, cores, and DST data an OWC could be placed at ca 3120 m in the Tilje Formation, while RFT data indicated a contact at 3110 m. The CPI log also showed a thin oil zone between 3148 and 3153 m in the Åre Formation. Weak shows (minor spotted blue-white to yellow white direct and cut fluorescence) were seen on limestones at 1850 - 1890 m. At 2435 to 2450 m in the Kvitnos Formation sandstones had direct and crush cut yellow-white fluorescence. From 3120 m to 3142 m there were no shows. Below 3142 m only weak shows were observed.

One core was cut from 2877 - 2896 m, and a total of nine cores were cut from 2974 - 3140 m. Twenty-six of 30 sidewall cores were recovered. Segregated RFT samples were taken at 2885 m (water/filtrate with traces of oil and gas), and at 3037 m (0.85 Sm³ gas and 5 litres 42.5 deg API oil in 2 3/4 gallon chamber).

The well was permanently abandoned on 28 March 1989 as an oil appraisal well.

Testing

Three DST tests were performed in this well.

Test no 1 was performed in the interval 3126 - 3138.5 m in the water zone. It produced 147 m³ water and 424 Sm³ gas /day through a 11.11 mm choke. The gas gravity was 0.69 (air = 1) with 11% CO₂ and 0.1 ppm H₂S. The down-hole temperature in the test, measured at 3065.7 m, was 118.5 deg C.



Test no 2 A was performed in the interval 2999 - 3008 m. It produced 242 Sm3 oil and 46000 Sm3 gas /day through a 7.94 mm choke. The GOR was 185 Sm3/Sm3, oil density was 0.83 g/cm3, gas gravity was 0.74 (air = 1) with 2% CO2 and 2 ppm H2S. The down-hole temperature in the test, measured at 2957.7 m, was 115.7 deg C.

Test no 2 B was performed in the combined intervals 2999 - 3008 m and 3028 - 3071 m. It produced 740 Sm3 oil and 125000 Sm3 gas /day through a 12.7 mm choke. The GOR was 169 Sm3/Sm3, oil density was 0.84 g/cm3, gas gravity was 0.72 (air = 1) with 2% CO2 and 2 ppm H2S. The down-hole temperature in the test, measured at 3005.7 m, was 117.1 deg C.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
550.00	3210.00

Cuttings available for sampling?	YES
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Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	2877.0	2897.0	[m]
2	2974.6	2982.8	[m]
3	2982.8	3010.5	[m]
4	3010.6	3037.3	[m]
5	3037.3	3040.6	[m]
6	3040.6	3068.1	[m]
7	3069.0	3097.3	[m]
8	3087.0	3100.0	[m]
9	3101.1	3127.7	[m]
10	3128.0	3140.0	[m]

Total core sample length [m]	193.2
Cores available for sampling?	YES

Core photos



2877-2882m



2882-2887m



2887-2892m



2887-2897m



2892-2895m



2974-2979m



2979-2983m



2983-2988m



2988-2993m



2993-2998m



2998-3003m



3003-3008m



3008-3012m



3012-3017m



3017-3022m



3022-3027m



3027-3032m



3032-3037m



3037-3040m



3040-3045m



3045-3050m



3050-3055m



3055-3060m



3060-3065m



3065-3068m



3068-3073m



3073-3078m



3078-3083m



3083-3088m



3088-3093m



3093-3098m



3098-3103m



3103-3108m



3108-3113m



3113-3118m



3118-3123m



3123-3127m



3128-3133m



3133-3138m



3138-3140m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1690.0	[m]	DC	STRAT
1700.0	[m]	DC	STRAT
1720.0	[m]	DC	STRAT
1730.0	[m]	DC	STRAT
1750.0	[m]	DC	STRAT
1760.0	[m]	DC	STRAT
1780.0	[m]	DC	STRAT
1790.0	[m]	DC	STRAT
1805.0	[m]	DC	STRAT
1820.0	[m]	DC	STRAT
1835.0	[m]	DC	STRAT
1850.0	[m]	DC	STRAT
1865.0	[m]	DC	STRAT
1880.0	[m]	DC	STRAT
1895.0	[m]	DC	STRAT
1910.0	[m]	DC	STRAT
1925.0	[m]	DC	STRAT
1940.0	[m]	DC	STRAT
1955.0	[m]	DC	STRAT
1970.0	[m]	DC	STRAT
1985.0	[m]	DC	STRAT
2000.0	[m]	DC	STRAT
2015.0	[m]	DC	STRAT



2030.0	[m]	DC	STRAT
2045.0	[m]	DC	STRAT
2060.0	[m]	DC	STRAT
2075.0	[m]	DC	STRAT
2090.0	[m]	DC	STRAT
2105.0	[m]	DC	STRAT
2120.0	[m]	DC	STRAT
2135.0	[m]	DC	STRAT
2150.0	[m]	DC	STRAT
2165.0	[m]	DC	STRAT
2180.0	[m]	DC	STRAT
2195.0	[m]	DC	STRAT
2205.0	[m]	DC	STRAT
2220.0	[m]	DC	STRAT
2490.0	[m]	DC	STRAT
2505.0	[m]	DC	STRAT
2520.0	[m]	DC	STRAT
2535.0	[m]	DC	STRAT
2550.0	[m]	DC	STRAT
2565.0	[m]	DC	STRAT
2580.0	[m]	DC	STRAT
2595.0	[m]	DC	STRAT
2610.0	[m]	DC	STRAT
2625.0	[m]	DC	STRAT
2650.0	[m]	DC	STRAT
2660.0	[m]	DC	STRAT
2670.0	[m]	DC	STRAT
2680.0	[m]	DC	STRAT
2690.0	[m]	DC	STRAT
2700.0	[m]	DC	STRAT
2710.0	[m]	DC	STRAT
2720.0	[m]	DC	STRAT
2730.0	[m]	DC	STRAT
2740.0	[m]	DC	STRAT
2750.0	[m]	DC	STRAT
2760.0	[m]	DC	STRAT
2770.0	[m]	DC	STRAT
2780.0	[m]	DC	STRAT
2790.0	[m]	DC	STRAT
2805.0	[m]	SWC	HYDRO



2815.0	[m]	SWC	HYDRO
2827.0	[m]	SWC	HYDRO
2846.0	[m]	SWC	HYDRO
2850.0	[m]	SWC	HYDRO
2855.0	[m]	SWC	HYDRO
2860.0	[m]	SWC	HYDRO
2866.0	[m]	SWC	HYDRO
2872.0	[m]	DC	STRAT
2878.1	[m]	C	HYDRO
2886.4	[m]	C	HYDRO
2891.7	[m]	C	HYDRO
2894.7	[m]	C	HYDRO
2898.5	[m]	SWC	HYDRO
2905.0	[m]	DC	STRAT
2912.0	[m]	SWC	HYDRO
2920.0	[m]	DC	STRAT
2927.0	[m]	SWC	HYDRO
2932.0	[m]	DC	STRAT
2940.0	[m]	SWC	HYDRO
2950.0	[m]	SWC	HYDRO
2950.0	[m]	SWC	HYDRO
2957.0	[m]	DC	STRAT
2965.0	[m]	SWC	HYDRO
2975.2	[m]	C	HYDRO
2979.7	[m]	C	HYDRO
2982.5	[m]	C	HYDRO
2987.5	[m]	C	HYDRO
2996.6	[m]	C	HYDRO
3000.0	[m]	DC	STRAT
3009.5	[m]	C	HYDRO
3020.8	[m]	C	HYDRO
3026.8	[m]	C	HYDRO
3033.3	[m]	C	HYDRO
3038.3	[m]	C	HYDRO
3046.6	[m]	C	HYDRO
3056.9	[m]	C	HYDRO
3059.4	[m]	C	HYDRO
3069.2	[m]	C	HYDRO
3073.5	[m]	C	HYDRO
3078.5	[m]	C	HYDRO



3086.8	[m]	C	HYDRO
3089.5	[m]	C	HYDRO
3096.3	[m]	C	HYDRO
3099.5	[m]	C	HYDRO
3107.7	[m]	C	HYDRO
3118.6	[m]	C	HYDRO
3123.2	[m]	C	HYDRO
3132.5	[m]	C	HYDRO
3137.2	[m]	C	HYDRO
3139.8	[m]	C	HYDRO
3142.5	[m]	C	HYDRO
3152.0	[m]	DC	STRAT
3161.0	[m]	SWC	HYDRO
3170.0	[m]	SWC	HYDRO
3180.0	[m]	DC	STRAT
3187.0	[m]	DC	STRAT
3197.0	[m]	SWC	HYDRO
3210.0	[m]	SWC	HYDRO
3210.0	[m]	DC	STRAT

Oil samples at the Norwegian Offshore Directorate

Test type	Bottle number	Top depth MD [m]	Bottom depth MD [m]	Fluid type	Test time	Samples available
DST	DST2A	2999.00	3008.00		21.03.1989 - 00:00	YES
DST	DST 2B	2999.00	3008.00		25.03.1989 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
352	NORDLAND GP
352	NAUST FM
1094	KAI FM
1150	HORDALAND GP
1150	BRYGGE FM
1735	ROGALAND GP
1735	TARE FM



1794	TANG FM
1990	SHETLAND GP
1990	SPRINGAR FM
1999	NISE FM
2200	KVITNOS FM
2631	CROMER KNOLL GP
2631	LANGE FM
2844	VIKING GP
2844	SPEKK FM
2855	MELKE FM
2860	FANGST GP
2860	NOT FM
2874	ILE FM
2896	BÅT GP
2896	ROR FM
2973	TILJE FM
3139	ÅRE FM

Geochemical information

Document name	Document format	Document size [MB]
1360_1	pdf	0.34
1360_2	pdf	0.19

Documents - older Norwegian Offshore Directorate WDSS reports and other related documents

Document name	Document format	Document size [MB]
1360_01 WDSS General Information	pdf	0.27
1360_02 WDSS completion log	pdf	0.16

Documents - reported by the production licence (period for duty of secrecy expired)

Document name	Document format	Document size [MB]
1360_6407_7_4 COMPLETION REPORT AND LOG	pdf	21.39





Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3126	3139	11.1
2.0	2999	3008	7.9
3.0	3028	3071	12.7

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				119
2.0				115
3.0				117

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0		424		0.690	
2.0	242	46000	0.830	0.740	185
3.0	740	125000	0.840	0.720	169

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL CET GR	2280	3168
CST GR	2805	3210
DIL LSS LDL CNL GR SP AMS	1040	2805
DIL LSS LDL CNL NGS GR SP AMS	2792	3214
DLL MSFL GR	2792	3210
FEWD - GR RES NEU POR DENS	2965	3208
MWD - GR RES DIR	352	2877
MWD - GR RES DIR	2896	2974
RFT HP AMS	2876	3201
RFT HP AMS	3037	3037
SHDT GR	2792	3214
VSP	1200	3160

Casing and leak-off tests



Casing type	Casing diam. [inch]	Casing depth [m]	Hole diam. [inch]	Hole depth [m]	LOT/FIT mud eqv. [g/cm3]	Formation test type
CONDUCTOR	30	440.0	36	0.0	0.00	LOT
INTERM.	20	524.0	26	541.0	1.41	LOT
INTERM.	13 3/8	1099.0	18 1/2	1118.0	1.96	LOT
INTERM.	9 5/8	2790.0	12 1/4	2812.0	1.60	LOT
LINER	7	3209.0	8 1/2	3211.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
366	1.05	10.0	35.0	WATER BASED	17.01.1989
390	1.05	10.0	35.0	WATER BASED	17.01.1989
419	1.05	10.0	35.0	WATER BASED	17.01.1989
440	1.05	10.0	35.0	WATER BASED	17.01.1989
500	1.47	19.0	4.0	WATER BASED	28.03.1989
524	1.05	10.0	35.0	WATER BASED	18.01.1989
538	1.20	20.0	8.0	WATER BASED	20.01.1989
538	1.05	10.0	35.0	WATER BASED	19.01.1989
938	1.22	14.0	7.0	WATER BASED	24.01.1989
1115	1.20	10.0	7.0	WATER BASED	24.01.1989
1115	1.23	11.0	7.0	WATER BASED	24.01.1989
1570	1.60	26.0	8.0	WATER BASED	24.01.1989
1959	1.60	19.0	8.0	WATER BASED	25.01.1989
2197	1.60	18.0	5.0	WATER BASED	26.01.1989
2273	1.60	17.0	6.0	WATER BASED	27.01.1989
2293	1.60	25.0	9.0	WATER BASED	30.01.1989
2330	1.60	26.0	7.0	WATER BASED	30.01.1989
2330	1.60	25.0	7.0	WATER BASED	30.01.1989
2330	1.60	25.0	7.0	WATER BASED	31.01.1989
2333	1.60	23.0	6.0	WATER BASED	01.02.1989
2387	1.60	23.0	6.0	WATER BASED	02.02.1989
2399	1.60	23.0	6.0	WATER BASED	03.02.1989
2399	1.60	21.0	5.0	WATER BASED	07.02.1989
2404	1.60	22.0	5.0	WATER BASED	07.02.1989
2404	1.60	22.0	5.0	WATER BASED	08.02.1989
2481	1.60	18.0	6.0	WATER BASED	09.02.1989
2580	1.60	24.0	9.0	WATER BASED	10.02.1989



2645	1.60	20.0	8.0	WATER BASED	13.02.1989
2703	1.60	21.0	10.0	WATER BASED	13.02.1989
2775	1.60	19.0	8.0	WATER BASED	13.02.1989
2808	1.60	19.0	9.0	WATER BASED	16.02.1989
2808	1.47	12.0	5.0	WATER BASED	24.02.1989
2808	1.60	18.0	5.0	WATER BASED	14.02.1989
2808	1.60	19.0	9.0	WATER BASED	15.02.1989
2808	1.60	19.0	9.0	WATER BASED	17.02.1989
2808	1.60	19.0	9.0	WATER BASED	20.02.1989
2808	1.60	19.0	9.0	WATER BASED	21.02.1989
2808	1.60	19.0	9.0	WATER BASED	22.02.1989
2808	1.60	19.0	9.0	WATER BASED	23.02.1989
2877	1.47	26.0	7.0	WATER BASED	27.02.1989
2920	1.47	27.0	6.0	WATER BASED	27.02.1989
2949	1.47	19.0	4.0	WATER BASED	28.03.1989
2974	1.47	29.0	7.0	WATER BASED	27.02.1989
3010	1.47	27.0	7.0	WATER BASED	28.02.1989
3040	1.47	31.0	8.0	WATER BASED	01.03.1989
3068	1.47	28.0	7.0	WATER BASED	02.03.1989
3101	1.47	28.0	7.0	WATER BASED	03.03.1989
3121	1.47	20.0	5.0	WATER BASED	28.03.1989
3121	1.47	21.0	7.0	WATER BASED	20.03.1989
3121	1.47	20.0	5.0	WATER BASED	20.03.1989
3121	1.47	20.0	5.0	WATER BASED	21.03.1989
3121	1.47	19.0	4.0	WATER BASED	28.03.1989
3129	1.47	25.0	7.0	WATER BASED	06.03.1989
3171	1.47	27.0	8.0	WATER BASED	09.03.1989
3171	1.47	19.0	6.0	WATER BASED	10.03.1989
3171	1.47	20.0	6.0	WATER BASED	13.03.1989
3171	1.47	20.0	7.0	WATER BASED	14.03.1989
3171	1.47	20.0	7.0	WATER BASED	16.03.1989
3171	1.47	20.0	7.0	WATER BASED	17.03.1989
3171	1.47	21.0	7.0	WATER BASED	20.03.1989
3171	1.47	21.0	7.0	WATER BASED	13.03.1989
3182	1.47	25.0	7.0	WATER BASED	06.03.1989
3211	1.47	26.0	6.0	WATER BASED	07.03.1989
3211	1.47	26.0	6.0	WATER BASED	06.03.1989
3211	1.47	24.0	5.0	WATER BASED	08.03.1989

**Pressure plots**

The pore pressure data is sourced from well logs if no other source is specified. In some wells where pore pressure logs do not exist, information from Drill stem tests and kicks have been used. The data has been reported to the NPD, and further processed and quality controlled by IHS Markit.

Document name	Document format	Document size [MB]
1360 Formation pressure (Formasjonstrykk)	pdf	0.29

