General information

Wellbore name	6407/1-4
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	TYRIHANS
Discovery	6407/1-3 Tyrihans Nord
Well name	6407/1-4
Seismic location	ST 9503-INLINE 554 & CROSSLINE 1562
Production licence	073
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	846-L
Drilling facility	BYFORD DOLPHIN
Drilling days	77
Entered date	08.06.1996
Completed date	23.08.1996
Release date	23.08.1998
Publication date	13.12.2005
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL/GAS
Discovery wellbore	NO
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	GARN FM
Kelly bushing elevation [m]	25.0
Water depth [m]	286.0
Total depth (MD) [m RKB]	3805.0
Bottom hole temperature [°C]	141
Oldest penetrated age	MIDDLE JURASSIC
Oldest penetrated formation	NOT FM
Geodetic datum	ED50
NS degrees	64° 51' 46.05'' N
EW degrees	7° 1' 21.25'' E
NS UTM [m]	7194806.98
EW UTM [m]	406280.05
UTM zone	32
NPDID wellbore	2796

Wellbore history

General

Well 6407/1-4 was drilled primarily to appraise the 6407/1-3 Tyrihans Nord Discovery. The specific target was to encounter a free oil-water-contact in the Garn Formation. Secondary objective was to gather information from the possibly oil bearing Campanian sandstone interval (Nise Formation).

Operations and results

Appraisal well 6407/1-4 was spudded with the semi-submersible installation Byford Dolphin on 6 June 1996 and drilled to TD at 3805 m in the Middle Jurassic Not Formation. Due to a labour conflict the MWD services was not run in the top hole down to 810 m. In addition 183 hrs rig time was lost during the strike. The well was drilled with seawater and prehydrated bentonite sweeps down to 816 m, from 816 m to 1810 m with ANCO 2000 mud, and with oil based Ancovert mud from 1810 m to TD.

The upper part of the Nise Formation was dominated by siltstone with abundant thin laminas of very fine sandstone and rare limestone stringers. From 2560 m the siltstone progressively grades to claystone, becoming 100 % claystone at 2620 m. Top Garn reservoir came in 101 m thick at 3675 m, 18 m deep to prognosis, so rock-volume above proven OWC was reduced. The reservoir was more cemented than expected. Trace fluorescence and crush cut was recorded in a single siltstone cutting sample from the Springar Formation at 2470 m, otherwise no shows were seen above the shales and claystones of the Late Jurassic Spekk and Melke Formations. Gas on oil on water was encountered in the Garn Formation reservoir. The gas/oil contact was at 3681 m, while the oil/water contact was at 3705 m. No shows were recorded below the OWC. One conventional core was cut from 2498 m to 2526 m in the Nise Formation. Two conventional cores were cut across both fluid contacts from 3679.0 m to 3740.0 m in the Garn Formation, A FMT water sample was taken below the OWC at 3709 m. Two segregated FMT samples were taken to collect gas (3679.2 m) and oil (3691.2 m).

The well was permanently abandoned on 23 August 1996 as an oil and gas appraisal well.

Testing

One drill stem test was performed from 3687 m to 3693 m in the oil zone in the Garn Formation. The test produced at the end of the multirate period 29505 Sm3 gas and 243.9 Sm3 oil /day. The GOR was 120 Sm3/Sm3 and the oil density was 0.86 g/cm3.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
830.00	3805.00

Cuttings available for sampling?	YES

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	2498.0	2526.0	[m]
2	3679.0	3706.6	[m]
3	3706.6	3739.0	[m]

Total core sample length [m]	88.0
Cores available for sampling?	YES

Core photos


2498-2502m


2502-2506m


2506-2510m


2510-2514m


2514-2518m


2518-2522m


2522-2526m


3679-3684m


3684-3689m


3689-3694m


3694-3699m


3699-3704m


3704-3706m


3706-3711m


3711-3716m


3716-3721m


3721-3726m


3726-3731m


3731-3736m


3736-3739m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1860.0	[m]	DC	RRI
1870.0	[m]	DC	RRI
1890.0	[m]	DC	RRI
1900.0	[m]	DC	RRI
1920.0	[m]	DC	RRI
1930.0	[m]	DC	RRI
1950.0	[m]	DC	RRI
1960.0	[m]	DC	RRI
1980.0	[m]	DC	RRI
1990.0	[m]	DC	RRI
2010.0	[m]	DC	RRI
2020.0	[m]	DC	RRI
2040.0	[m]	DC	RRI
2050.0	[m]	DC	RRI
2070.0	[m]	DC	RRI
2080.0	[m]	DC	RRI
2100.0	[m]	DC	RRI
2110.0	[m]	DC	RRI
2130.0	[m]	DC	RRI
2140.0	[m]	DC	RRI
2160.0	[m]	DC	RRI
2170.0	[m]	DC	RRI
2190.0	[m]	DC	RRI
2200.0	[m]	DC	RRI
2220.0	[m]	DC	RRI
2230.0	[m]	DC	RRI
2250.0	[m]	DC	RRI
2260.0	[m]	DC	RRI
2280.0	[m]	DC	RRI
2290.0	[m]	DC	RRI
2310.0	[m]	DC	RRI
2320.0	[m]	DC	RRI
2340.0	[m]	DC	RRI
2350.0	[m]	DC	RRI
2370.0	[m]	DC	RRI
2380.0	[m]	DC	RRI
2400.0	[m]	DC	RRI
2410.0	[m]	DC	RRI

2430.0	[m]	DC	RRI
2440.0	[m]	DC	RRI
2460.0	[m]	DC	RRI
2461.0	[m]	SWC	WESTL
2470.0	[m]	DC	RRI
2470.5	[m]	SWC	WESTL
2490.0	[m]	DC	RRI
2498.2	[m]	DC	WESTL
2503.7	[m]	C	WESTL
2508.8	[m]	C	WESTL
2513.8	[m]	C	WESTL
2519.7	[m]	C	WESTL
2525.8	[m]	C	WESTL
2539.0	[m]	SWC	WESTL
2540.0	[m]	DC	RRI
2550.0	[m]	DC	RRI
2570.0	[m]	DC	RRI
2580.0	[m]	DC	RRI
2600.0	[m]	DC	RRI
2610.0	[m]	DC	RRI
2630.0	[m]	DC	RRI
2640.0	[m]	DC	RRI
2660.0	[m]	DC	RRI
2670.0	[m]	DC	RRI
2690.0	[m]	DC	RRI
2700.0	[m]	DC	RRI
2720.0	[m]	SWC	WESTL
2720.0	[m]	DC	RRI
2730.0	[m]	DC	RRI
2750.0	[m]	DC	RRI
2760.0	[m]	DC	RRI
2780.0	[m]	DC	RRI
2800.0	[m]	DC	RRI
2820.0	[m]	DC	RRI
2830.0	[m]	DC	RRI
2850.0	[m]	DC	RRI
2860.0	[m]	DC	RRI
2880.0	[m]	DC	RRI
2890.0	[m]	DC	RRI
2910.0	[m]	DC	RRI

2920.0	[m]	DC	RRI
2940.0	[m]	DC	RRI
2948.0	[m]	SWC	WESTL
2950.0	[m]	DC	RRI
2970.0	[m]	DC	RRI
3120.0	[m]	DC	RRI
3122.5	[m]	SWC	WESTL
3135.0	[m]	SWC	WESTL
3140.0	[m]	DC	RRI
3150.0	[m]	DC	RRI
3160.0	[m]	SWC	WESTL
3170.0	[m]	DC	RRI
3180.0	[m]	DC	RRI
3186.0	[m]	SWC	WESTL
3200.0	[m]	DC	RRI
3210.0	[m]	DC	RRI
3230.0	[m]	DC	RRI
3240.0	[m]	DC	RRI
3260.0	[m]	DC	RRI
3270.0	[m]	DC	RRI
3290.0	[m]	DC	RRI
3300.0	[m]	DC	RRI
3317.0	[m]	SWC	WESTL
3320.0	[m]	DC	RRI
3330.0	[m]	DC	RRI
3350.0	[m]	DC	RRI
3356.0	[m]	SWC	WESTL
3356.0	[m]	SWC	RRI
3360.0	[m]	DC	RRI
3380.0	[m]	DC	RRI
3390.0	[m]	DC	RRI
3406.5	[m]	SWC	WESTL
3410.0	[m]	SWC	WESTL
3410.0	[m]	DC	RRI
3420.0	[m]	DC	RRI
3440.0	[m]	DC	RRI
3450.0	[m]	DC	RRI
3452.0	[m]	SWC	WESTL
3470.0	[m]	DC	RRI
3480.0	[m]	DC	RRI

3482.5	[m]	SWC	WESTL
3492.5	[m]	SWC	WESTL
3500.0	[m]	DC	RRI
3531.0	[m]	DC	RRI
3540.0	[m]	DC	RRI
3546.0	[m]	DC	RRI
3549.5	[m]	SWC	WESTL
3552.0	[m]	DC	RRI
3558.0	[m]	DC	RRI
3564.0	[m]	DC	RRI
3576.0	[m]	DC	RRI
3582.0	[m]	SWC	WESTL
3582.0	[m]	DC	RRI
3587.0	[m]	SWC	WESTL
3588.0	[m]	DC	RRI
3594.0	[m]	DC	RRI
3600.0	[m]	DC	RRI
3604.0	[m]	SWC	WESTL
3606.0	[m]	DC	RRI
3608.0	[m]	SWC	WESTL
3612.0	[m]	DC	RRI
3618.0	[m]	DC	RRI
3622.5	[m]	SWC	WESTL
3624.0	[m]	DC	RRI
3630.0	[m]	DC	RRI
3636.0	[m]	DC	RRI
3642.0	[m]	DC	RRI
3648.0	[m]	DC	RRI
3654.0	[m]	DC	RRI
3660.0	[m]	DC	RRI
3666.0	[m]	DC	RRI
3672.0	[m]	DC	RRI
3676.0	[m]	DC	RRI
3680.4	[m]	C	RRI
3685.4	[m]	C	RRI
3688.9	[m]	C	RRI
3696.8	[m]	C	RRI
3701.2	[m]	C	RRI
3704.1	[m]	C	RRI
3704.6	[m]	C	RRI

3707.6	[m]	C	RRI
3713.8	[m]	C	RRI
3717.9	[m]	C	RRI
3725.6	[m]	C	RRI
3730.6	[m]	C	RRI
3734.4	[m]	C	RRI

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	DST1	0.00	0.00	OIL	03.08.1996 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
311	NORDLAND GP
311	NAUST FM
1444	KAI FM
1878	HORDALAND GP
1878	BRYGGE FM
2220	ROGALAND GP
2220	TARE FM
2284	TANG FM
2347	SHETLAND GP
2347	SPRINGAR FM
2479	NISE FM
2780	KVITNOS FM
3116	CROMER KNOLL GP
3116	LYSING FM
3154	LANGE FM
3547	LYR FM
3571	VIKING GP
3571	SPEKK FM
3595	MELKE FM
3675	FANGST GP
3675	GARN FM

3776	NOT FM

Composite logs

Document name	Document format	Document size [MB]
2796	pdf	0.38

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

Document name	Document format	Document size [MB]
2796_6407_1_4_COMPLETION_REPORT_AND_COMPLETION_LOG	pdf	20.47

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3693	3687	12.7

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0		3.000	15.100	136

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	244	29505	0.860	0.690	121

Logs

Log type	Log top depth [m]	Log bottom depth [m]
DEL2 HDIL MAC CAL DSL CHT	1400	3677
DSL2 ZDL CN GR	3670	3805
HDIL MAC DSL GR CHT	3670	3805
HEXDIP GR CHT	1800	3677
HEXDIP GR CHT	3670	3807

MAC GR CHT	1800	3677
MWD - DPR2	810	1806
MWD - DPR2A	1806	2485
MWD - DPR2A	2845	3668
RCI GR CHT	3667	3765
RCORE GR CHT	2461	3623
VSP GR	950	3655
VSP GR	3565	3800
ZDL CN DSL CHT	1800	3677

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	371.0	36	373.0	0.00	LOT
SURF.COND.	20	810.0	26	813.0	1.35	LOT
INTERM.	13 3/8	1802.0	17 1/2	1804.0	1.78	LOT
INTERM.	9 5/8	3670.0	12 1/4	3674.0	1.50	LOT
LINER	7	3805.0	8 1/2	3805.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
860	1.07	16.0		ANCO 2000	
1810	1.30	18.0		ANCO 2000	
2040	1.63	57.0		ANCO VERT	
2190	1.63	57.0		ANCO VERT	
2498	1.72	52.0		ANCO VERT	
2526	1.72	50.0		ANCO VERT	
3675	1.72	54.0		ANCO VERT	
3706	1.20	21.0		ANCO VERT	
3805	1.20	25.0		ANCO VERT	

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]
2796_Formation_pressure_(Formasjonstrykk)	PDF	0.27