

**General information**

Wellbore name	6407/1-3
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	TYRIHANS
Discovery	6407/1-3 Tyrihans Nord
Well name	6407/1-3
Seismic location	ST 8110 - 435 SP 140
Production licence	073
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	388-L
Drilling facility	DYVI DELTA
Drilling days	122
Entered date	17.09.1983
Completed date	16.01.1984
Release date	16.01.1986
Publication date	13.12.2005
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL/GAS
Discovery wellbore	YES
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	FANGST GP
Kelly bushing elevation [m]	29.0
Water depth [m]	286.0
Total depth (MD) [m RKB]	4469.0
Final vertical depth (TVD) [m RKB]	4467.0
Maximum inclination [°]	4.2
Bottom hole temperature [°C]	153
Oldest penetrated age	LATE TRIASSIC
Oldest penetrated formation	GREY BEDS (INFORMAL)
Geodetic datum	ED50
NS degrees	64° 52' 25.48" N
EW degrees	7° 2' 53.47" E
NS UTM [m]	7195989.53
EW UTM [m]	407531.49



UTM zone	32
NPDID wellbore	29

Wellbore history

**General**

Wildcat well 6407/1-3 was drilled in the Haltenbanken area off shore Mid Norway. It is situated on a separate but related structure to 6407/1-2, which found gas-condensate in the Middle Jurassic Garn Formation. The primary target of well 6407/1-3 was Middle Jurassic sandstones. Secondary target was Early Jurassic sandstones. Other zones of interest were the Late and Early Cretaceous and the coal unit in the Early Jurassic.

The well is Type Well for the Brygge Formation and Reference Well for the Hordaland Group, it is Type Well for the Garn Formation, and it is Reference Well for the Ile and Not Formations.

Operations and results

Wildcat well 6407/1-3 was spudded with the semi-submersible installation Dyvi Delta on 17 September 1983 and drilled to TD at 4469 m in Late Triassic sediments of the Åre Formation. Hole problems occurred when running back in the hole after a period of bad weather. The hole had collapsed and had to be reamed back to bottom at 3136 M. A drilling break occurred at 3746 to 3748 m. All in all, there was a total of 16 days downtime caused by bad weather. Still, the well was drilled 22 days faster than prognosed. This was mainly due to fast penetration in the 17 1/2" and 6" hole, an efficient coring operation and favourable weather conditions compared to well 6407/1-2. The well was drilled with seawater/gel down to 948 m, with lignosulphonate/gypsum from 948 m to 3608 m, and with bentonite gel from 3608 m to TD.

Hydrocarbon bearing Middle Jurassic sandstones (Garn Formation) were encountered at 3600 m. A gas cap extended to 3687.5 m followed by an oil zone down to 3709 m. At this point the sand grades rapidly into the underlying silt and clay of the Not Formation at 3709.5 m. This makes it difficult to conclude on an OWC for the discovery. The Nise Formation from 2448 m to 2601 m had good gas shows whilst drilling and oil contamination of drilling mud. Mud log data suggested a possible light oil accumulation with associated gas and an oil water contact at approximately 2560 m. Reservoir properties were however poor with a lithology consisting of siltstone grading to very fine sandstone interbedded with claystone. Hydrocarbon shows were also recorded in zones in the Early Cretaceous and in the lower parts of the "Coal Unit". None of these zones were of good reservoir quality. The Early Jurassic sandstones showed only traces of hydrocarbons. No good source rocks were found above base Cretaceous. Late Jurassic shales from 3521 m to 3545 m had excellent source potential with type II/III kerogen and TOC in the range 3 -7%. Hydrogen Index was typically 400 - 500 mg HC/g TOC and the shales had reached early oil window maturity. Also Early Jurassic shales and coals has potential for light oils and gas.

Seven cores were cut in the Middle Jurassic sandstones from 3619 m to 3717 m and from 3748 m to 3758 m. RFT pressure points were sampled over the Middle to Early Jurassic sandstone sequences. Three RFT fluid samples were taken at 3695 m, 3692 m, and at 3676.2 m.

The well was permanently abandoned on 16 January 1984 as an oil and gas discovery.

Testing

Two drill stem tests were performed in the Middle Jurassic sandstone in the oil zone from 3697.5 - 3702.5 m and in the gas zone from 3665 - 3670 m. DST1 produced 396.1 Sm3 oil and 58430 Sm3 gas per day, with a gas/oil ratio of 148 Sm3/Sm3. DST2 produced 191.8 Sm3 oil and 725400 gas per day, with a gas/oil ratio of 3782 Sm3/Sm3.

Cuttings at the Norwegian Offshore Directorate



Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
420.00	4467.50

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	3619.0	3619.7	[m]
2	3621.0	3639.0	[m]
3	3639.0	3657.7	[m]
4	3657.0	3684.0	[m]
5	3684.0	3710.4	[m]
6	3711.0	3716.2	[m]
7	3748.0	3758.0	[m]

Total core sample length [m]	106.0
Cores available for sampling?	YES

Core photos



3619-3624m



3624-3628m



3628-3632m



3632-3636m



3636-3640m



3640-3644m



3644-3648m



3648-3652m



3652-3656m



3656-3658m





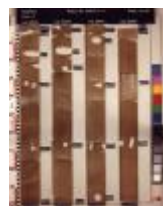
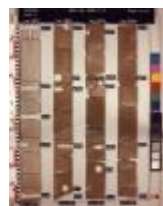
3659-3663m

3663-3667m

3667-3671m

3671-3675m

3675-3679m



3679-3683m

3683-3687m

3687-3691m

3691-3695m

3695-3699m



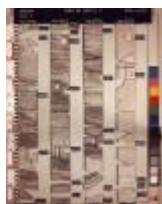
3699-3703m

3703-3707m

3707-3711m

3711-3715m

3715-3750m



3750-3754m

3754-3758m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
2110.0	[m]	DC	LAP
2190.0	[m]	DC	LAP
2215.0	[m]	DC	LAP
2230.0	[m]	DC	LAP
2245.0	[m]	DC	LAP
2260.0	[m]	DC	LAP
2275.0	[m]	DC	LAP
2290.0	[m]	DC	LAP
2305.0	[m]	DC	LAP
2333.0	[m]	SWC	LAP
2335.0	[m]	DC	LAP
2339.9	[m]	SWC	LAP
2365.0	[m]	DC	LAP
2367.0	[m]	SWC	LAP



2380.0 [m]	DC	LAP
2440.0 [m]	DC	LAP
2455.0 [m]	SWC	LAP
2470.0 [m]	DC	LAP
2476.0 [m]	SWC	LAP
2507.0 [m]	SWC	LAP
2515.0 [m]	DC	LAP
2521.9 [m]	SWC	LAP
2526.0 [m]	SWC	LAP
2537.0 [m]	SWC	LAP
2546.0 [m]	SWC	LAP
2555.0 [m]	SWC	LAP
2565.0 [m]	SWC	LAP
2570.0 [m]	DC	LAP
2579.9 [m]	SWC	LAP
2585.0 [m]	DC	LAP
2585.0 [m]	SWC	LAP
2600.0 [m]	DC	LAP
2615.0 [m]	DC	LAP
2630.0 [m]	DC	LAP
2645.0 [m]	DC	LAP
2660.0 [m]	DC	LAP
2675.0 [m]	DC	LAP
2690.0 [m]	DC	LAP
2695.0 [m]	SWC	LAP
2705.0 [m]	DC	LAP
2720.0 [m]	DC	LAP
2735.0 [m]	DC	LAP
2750.0 [m]	DC	LAP
2765.0 [m]	DC	LAP
2780.0 [m]	DC	LAP
2795.0 [m]	DC	LAP
2810.0 [m]	DC	LAP
2825.0 [m]	DC	LAP
2840.0 [m]	DC	LAP
2855.0 [m]	DC	LAP
2870.0 [m]	SWC	LAP
2885.0 [m]	DC	LAP
2900.0 [m]	DC	LAP
2915.0 [m]	DC	LAP



2930.0	[m]	DC	LAP
2945.0	[m]	DC	LAP
2960.0	[m]	DC	LAP
2975.0	[m]	DC	LAP
2990.0	[m]	DC	LAP
3005.0	[m]	DC	LAP
3020.0	[m]	DC	LAP
3035.0	[m]	DC	LAP
3040.0	[m]	DC	LAP
3050.0	[m]	DC	LAP
3065.0	[m]	DC	LAP
3080.0	[m]	DC	LAP
3090.0	[m]	SWC	LAP
3095.0	[m]	DC	LAP
3110.0	[m]	DC	LAP
3125.0	[m]	DC	LAP
3155.0	[m]	DC	LAP
3160.0	[m]	SWC	LAP
3170.0	[m]	DC	LAP
3185.0	[m]	DC	LAP
3195.0	[m]	SWC	LAP
3200.0	[m]	DC	LAP
3215.0	[m]	DC	LAP
3230.0	[m]	DC	LAP
3230.0	[m]	SWC	LAP
3245.0	[m]	DC	LAP
3260.0	[m]	DC	LAP
3275.0	[m]	DC	LAP
3280.0	[m]	SWC	LAP
3290.0	[m]	DC	LAP
3305.0	[m]	DC	LAP
3320.0	[m]	DC	LAP
3335.0	[m]	DC	LAP
3350.0	[m]	DC	LAP
3365.0	[m]	DC	LAP
3380.0	[m]	DC	LAP
3395.0	[m]	DC	LAP
3410.0	[m]	DC	LAP
3424.0	[m]	SWC	LAP
3425.0	[m]	DC	LAP



3440.0 [m]	DC	LAP
3455.0 [m]	DC	LAP
3462.0 [m]	SWC	LAP
3464.9 [m]	SWC	LAP
3470.0 [m]	SWC	LAP
3470.0 [m]	DC	LAP
3484.0 [m]	SWC	LAP
3485.0 [m]	DC	LAP
3495.1 [m]	SWC	LAP
3499.0 [m]	SWC	LAP
3500.0 [m]	DC	LAP
3530.0 [m]	DC	LAP
3545.0 [m]	DC	LAP
3560.0 [m]	DC	LAP
3575.0 [m]	DC	LAP
3590.0 [m]	DC	LAP
3598.0 [m]	SWC	LAP
3599.0 [m]	SWC	LAP
3605.0 [m]	DC	LAP
3619.0 [m]	C	LAP
3620.0 [m]	DC	LAP
3621.0 [m]	C	LAP
3630.9 [m]	C	LAP
3642.5 [m]	C	LAP
3645.0 [m]	C	LAP
3653.6 [m]	C	LAP
3666.1 [m]	C	LAP
3667.2 [m]	C	LAP
3689.3 [m]	DC	LAP
3689.6 [m]	DC	LAP
3693.4 [m]	C	LAP
3693.5 [m]	C	RRI
3698.3 [m]	DC	LAP
3704.5 [m]	C	LAP
3704.6 [m]	C	LAP
3704.7 [m]	C	LAP
3705.5 [m]	C	LAP
3709.4 [m]	C	LAP
3709.7 [m]	C	LAP
3709.7 [m]	C	RRI



3710.1	[m]	C	LAP
3711.2	[m]	C	LAP
3713.8	[m]	C	RRI
3715.1	[m]	C	LAP
3715.6	[m]	C	LAP
3716.1	[m]	C	LAP
3716.2	[m]	C	RRI
3717.0	[m]	SWC	LAP
3725.0	[m]	SWC	LAP
3730.0	[m]	SWC	LAP
3733.0	[m]	SWC	LAP
3735.0	[m]	SWC	LAP
3739.0	[m]	SWC	LAP
3744.0	[m]	SWC	LAP
3748.1	[m]	C	LAP
3751.0	[m]	C	LAP
3752.6	[m]	C	LAP
3756.1	[m]	C	LAP
3760.0	[m]	DC	LAP
3775.0	[m]	DC	LAP
3790.0	[m]	DC	LAP
3794.0	[m]	SWC	LAP
3805.0	[m]	C	LAP
3820.0	[m]	C	LAP
3835.0	[m]	C	LAP
3847.0	[m]	SWC	LAP
3850.0	[m]	C	LAP
3854.0	[m]	SWC	LAP
3865.0	[m]	C	LAP
3880.0	[m]	C	LAP
3883.0	[m]	SWC	LAP
3895.0	[m]	C	LAP
3910.0	[m]	C	LAP
3915.0	[m]	SWC	LAP
3925.0	[m]	C	LAP
3928.0	[m]	SWC	LAP
3937.0	[m]	SWC	LAP
3940.0	[m]	C	LAP
3944.0	[m]	SWC	LAP
3954.0	[m]	SWC	LAP



3955.0 [m]	C	LAP
3963.0 [m]	SWC	LAP
3970.0 [m]	C	LAP
3982.0 [m]	SWC	LAP
3985.0 [m]	C	LAP
3987.0 [m]	SWC	LAP
4000.0 [m]	C	LAP
4015.0 [m]	C	LAP
4030.0 [m]	C	LAP
4045.0 [m]	C	LAP
4047.0 [m]	SWC	LAP
4060.0 [m]	C	LAP
4075.0 [m]	C	LAP
4090.0 [m]	C	LAP
4092.0 [m]	SWC	LAP
4105.0 [m]	C	LAP
4117.9 [m]	SWC	LAP
4120.0 [m]	C	LAP
4125.0 [m]	SWC	LAP
4135.0 [m]	C	LAP
4150.0 [m]	C	LAP
4165.0 [m]	C	LAP
4180.0 [m]	C	LAP
4195.0 [m]	C	LAP
4210.0 [m]	C	LAP
4225.0 [m]	C	LAP
4240.0 [m]	C	LAP
4255.0 [m]	C	LAP
4270.0 [m]	C	LAP
4285.0 [m]	C	LAP
4300.0 [m]	C	LAP
4315.0 [m]	C	LAP
4330.0 [m]	C	LAP
4345.0 [m]	C	LAP
4360.0 [m]	C	LAP
4375.0 [m]	C	LAP
4390.0 [m]	C	LAP
4405.0 [m]	C	LAP
4420.0 [m]	C	LAP
4435.0 [m]	DC	LAP



4450.0	[m]	DC	LAP
4460.0	[m]	DC	LAP
4465.0	[m]	DC	LAP
4467.5	[m]	DC	LAP

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	TEST1	3697.50	3702.50		22.12.1983 - 00:00	YES
DST	TEST2	3665.00	3670.00		04.01.1984 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
315	NORDLAND GP
315	NAUST FM
1449	KAI FM
1763	HORDALAND GP
1763	BRYGGE FM
2213	ROGALAND GP
2213	TARE FM
2300	TANG FM
2346	SHETLAND GP
2346	SPRINGAR FM
2448	NISE FM
2601	CROMER KNOLL GP
2601	LANGE FM
3466	NO FORMAL NAME
3470	LANGE FM
3500	LYR FM
3521	VIKING GP
3521	SPEKK FM
3545	MELKE FM
3600	FANGST GP
3600	GARN FM
3704	NOT FM



3741	ILE FM
3813	BÅT GP
3813	ROR FM
3950	TILJE FM
4150	ÅRE FM
4455	GREY BEDS (INFORMAL)

Composite logs

Document name	Document format	Document size [MB]
29	pdf	0.81

Geochemical information

Document name	Document format	Document size [MB]
29_1	pdf	1.03
29_2	pdf	1.20
29_3	pdf	0.25
29_4	pdf	5.46
29_5	pdf	0.65
29_6	pdf	1.06

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

Document name	Document format	Document size [MB]
29_01_WDSS_General_Information	pdf	0.22
29_02_WDSS_completion_log	pdf	0.36

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

Document name	Document format	Document size [MB]
29_01_CompletionReport & Completionlog	pdf	38.11
29_02_Biostratigraphy_Kerogen_Analysis	pdf	4.48
29_03_Core_Analyses_Report	pdf	4.26





29_04_Core_Photos_Sedimentary_Features	pdf	87.24
29_05_Discovery_Evaluation_Report	pdf	18.62
29_06_DST1_and_DST2	pdf	22.11
29_07_Final_DLWD	pdf	5.62
29_08_Oil_Correlation	pdf	2.26
29_09_Partial_Fluid_Study	pdf	1.23
29_10_Petrophysical_Evaluation	pdf	2.16
29_11_Pressure_Survey_Test1_Run1	pdf	7.20
29_12_Pressure_Survey_Test2_Run2	pdf	3.08
29_13_Pressure_Temperature_DST1_Gauge3_719m	pdf	6.79
29_14_Pressure_Temperature_DST1_Gauge3_722m	pdf	5.95
29_15_Pressure_Temperature_DST2_3649,47m	pdf	4.73
29_16_Pressure_Temperature_DST2_3658,88m	pdf	8.94
29_17_PVT_Analysis_DST1	pdf	1.12
29_18_Report_Mud_and_Reservoired_Gas_Stable_Isotopes	pdf	1.24
29_19_Reservoir_Fluid_Analysis_DST2	pdf	2.34
29_30_RFT_report	pdf	1.52
29_31_RFT_chamber_Sample_Evaluation	pdf	1.23
29_32_RFT_chamber_Sample_Transfer	pdf	1.47
29_33_Source_Rock_Evaluation	pdf	10.02
29_34_Supplement_Oil_Oil_Correlation	pdf	1.20
29_35_TBP_Distillation_Condensate_DST2	pdf	1.28
29_36_TBP_distillation_Oil_DST1	pdf	1.27
29_37_Wax_Analysis	pdf	1.16

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3698	3703	19.1
2.0	3665	3670	25.4

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





Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	137	867000	0.872	0.665	158
2.0	253	875000	0.776	0.655	3458

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL GR	1980	2280
CBL VDL GR	3082	3595
CBL VDL GR	3385	4469
CST	2333	3598
CST	3597	3963
CST	3982	4469
DLL MSFL SP GR	3595	3976
ISF BHC MSFL SP GR	3964	4469
ISF BHC SP GR	3595	3976
ISF LSS MSFL SP GR	315	3606
LDL CNL GR	3596	3975
LDL CNL NGL	2288	3601
LDL GR	947	2297
MWD - GR RES DIR	2280	3970
NGT	3300	3600
NGT	3595	3976
RFT GR	2288	3467
RFT GR	3393	4024
RFT GR	3595	3950
SHDT GR	2288	3608
SHDT GR	3595	3976
SHDT GR	3964	4469
TEMP	795	4469
VSP	595	4469

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	415.0	36	415.0	0.00	LOT



SURF.COND.	20	948.0	26	965.0	1.70	LOT
INTERM.	13 3/8	2286.0	17 1/2	2300.0	1.87	LOT
INTERM.	9 5/8	3595.0	12 1/4	3608.0	1.82	LOT
LINER	7	3969.0	8 1/2	3976.0	0.00	LOT
OPEN HOLE		4469.0	6	4469.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
450	1.08	66.0		WATER BASED	
575	1.09	50.0		WATER BASED	
670	1.10	60.0		WATER BASED	
920	1.11	47.0		WATER BASED	
1040	1.08	44.0		WATER BASED	
1210	1.12	45.0		WATER BASED	
1380	1.15	47.0		WATER BASED	
1480	1.16	47.0		WATER BASED	
1610	1.15	44.0		WATER BASED	
1800	1.27	44.0		WATER BASED	
1890	1.40	55.0		WATER BASED	
2205	1.55	58.0		WATER BASED	
2310	1.66			WATER BASED	
2525	1.66	51.0		WATER BASED	
2600	1.70	48.0		WATER BASED	
3720	1.20	55.0		WATER BASED	
4320	1.30	73.0		WATER BASED	
4450	1.29	77.0		WATER BASED	

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]
29 Formation pressure (Formasjonstrykk)	pdf	0.28

