

**General information**

Wellbore name	16/10-4
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Well name	16/10-4
Seismic location	ES9401-inline 1486 & xline 4084
Production licence	101
Drilling operator	Norsk Agip AS
Drill permit	931-L
Drilling facility	TRANSOCEAN NORDIC
Drilling days	31
Entered date	11.07.1998
Completed date	10.08.1998
Release date	10.08.2000
Publication date	31.10.2003
Purpose - planned	WILDCAT
Reentry	NO
Content	DRY
Discovery wellbore	NO
Kelly bushing elevation [m]	39.0
Water depth [m]	77.0
Total depth (MD) [m RKB]	2580.0
Final vertical depth (TVD) [m RKB]	2580.0
Bottom hole temperature [°C]	109
Oldest penetrated age	LATE PERMIAN
Oldest penetrated formation	ZECHSTEIN GP
Geodetic datum	ED50
NS degrees	58° 4' 59.56" N
EW degrees	2° 11' 57.2" E
NS UTM [m]	6438401.00
EW UTM [m]	452774.85
UTM zone	31
NPDID wellbore	3531



Wellbore history

General

Well 16/10-4 was drilled on the Trond prospect located in the northeast part of PL 101, which is southeast of the existing Sleipner field. The prospect was a north-south elongated salt-induced structure with dip closure in all directions. The main purpose was to test the hydrocarbon potential within the upper Jurassic (Hugin) formation in the prospect and to obtain representative cores of that sand package.

Operations and results

The jack up installation "Transocean Nordic" arrived on location on June 25 1998. Spud was significantly delayed due to insufficient leg penetration. Gravel boats had to be employed to dump gravel around the spud cans. This operation took 141 hours. With the gravel dumping completed, the weather became rough and the spud cans could not be lifted according to the plan. It took 162 hours before the weather was sufficiently calm to proceed with the pre-loading. Exploration well 16/10-4 was finally spudded on July 11 1998 and drilled to a total depth of 2580 m in Permian Zechstein anhydrites. The well was drilled with seawater and bentonite sweeps down to 380 m, with KCl / PAC mud from 380 m to 1230 m, and with KCl /PAC / glycol mud from 1230 m to TD.

All the formations encountered from top Balder were found above prognosis due to anomalous velocities in the gas chimney drilled by this well. The reservoir target (Hugin Formation) was encountered at 2474 m. (80 m below prognosis). The petrophysical properties of the reservoir were found to be good. The only interval with some gas shows was the Rogaland Group (1792-1888 m) where the total gas was between 2.6 and 4.4 % Ci-nC4, but no reservoir was encountered at this level. No direct shows were observed in the Hugin Formation and the total gas was below 0.1%. From FMT measurements, log analysis and all the information collected during the drilling phase, the reservoir was found to be water bearing. However, onshore geochemical analysis by Eni central laboratories in Milan reported significant traces of migrated hydrocarbons in core samples from 2478 to 2496 m and high levels of phenols with possible traces of altered oil in the FMT water sample.

One core was cut from 2477 to 2504 m in the soft, unconsolidated Hugin Formation (Previous wells in the area suffered no core recovery). The median porosity of the core was 25% and the median permeability was 260 m. Eight FMT pre tests and one segregated sample were taken from the Hugin reservoir. All pressure tests were good and gave a clear water gradient of 0,102 bar/m in the reservoir. The sample recovered was a mixture of mud filtrate and formation water.

The 16/10-4 well was permanently abandoned on 10 August as a dry well.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
210.00	2580.00

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	2477.0	2499.5	[m]

Total core sample length [m]	22.5
Cores available for sampling?	YES

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1050.0	[m]	DC	RRI
1100.0	[m]	DC	RRI
1150.0	[m]	DC	RRI
1200.0	[m]	DC	RRI
1250.0	[m]	DC	RRI
1300.0	[m]	DC	RRI
1350.0	[m]	DC	RRI
1400.0	[m]	DC	RRI
1450.0	[m]	DC	RRI
1500.0	[m]	DC	RRI
1550.0	[m]	DC	RRI
1600.0	[m]	DC	RRI
1650.0	[m]	DC	RRI
1700.0	[m]	DC	RRI
1750.0	[m]	DC	RRI
1760.0	[m]	DC	RRI
1770.0	[m]	DC	RRI
1780.0	[m]	DC	RRI
1790.0	[m]	DC	RRI
1800.0	[m]	DC	RRI
1810.0	[m]	DC	RRI
1820.0	[m]	DC	RRI
1830.0	[m]	DC	RRI
1840.0	[m]	DC	RRI
1850.0	[m]	DC	RRI
1860.0	[m]	DC	RRI
1870.0	[m]	DC	RRI



1880.0	[m]	DC	RRI
2420.0	[m]	DC	RRI
2430.0	[m]	DC	RRI
2440.0	[m]	DC	RRI
2450.0	[m]	DC	RRI
2460.0	[m]	DC	RRI
2470.0	[m]	DC	RRI
2477.5	[m]	C	GEOLAB
2490.0	[m]	DC	RRI
2490.8	[m]	C	GEOLAB
2498.0	[m]	C	GEOLAB
2500.0	[m]	DC	RRI
2510.0	[m]	DC	RRI
2520.0	[m]	DC	RRI
2530.0	[m]	DC	RRI
2550.0	[m]	DC	RRI
2560.0	[m]	DC	RRI
2570.0	[m]	DC	RRI
2580.0	[m]	DC	RRI

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
116	NORDLAND GP
965	UTSIRA FM
971	UNDIFFERENTIATED
1041	HORDALAND GP
1792	ROGALAND GP
1792	BALDER FM
1820	SELE FM
1830	LISTA FM
1882	VÅLE FM
1888	SHETLAND GP
1888	EKOFISK FM
1940	TOR FM
2172	HOD FM
2398	CROMER KNOLL GP
2398	SOLA FM
2408	ÅSGARD FM



2449	VIKING GP
2449	DRAUPNE FM
2474	VESTLAND GP
2474	HUGIN FM
2547	NO GROUP DEFINED
2547	SKAGERRAK FM
2550	ZECHSTEIN GP

Composite logs

Document name	Document format	Document size [MB]
3531	pdf	0.23

Geochemical information

Document name	Document format	Document size [MB]
3531_1	pdf	1.14

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

Document name	Document format	Document size [MB]
3531_16_10_4_COMPLETION_REPORT	.pdf	53.64

Logs

Log type	Log top depth [m]	Log bottom depth [m]
FMT GR	2481	2527
HDIL MAC DSL SP GR	2104	2585
HDIP GR	2104	2585
LWD - DPR RAW GR	380	2580
VSP	0	0

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	195.0	36	205.0	0.00	LOT
SURF.COND.	20	373.0	26	380.0	1.42	LOT
INTERM.	13 3/8	1219.0	17 1/2	1230.0	1.70	LOT
INTERM.	9 5/8	2104.0	12 1/4	2110.0	1.75	LOT
OPEN HOLE		2580.0	8 1/2	2580.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
89	1.05	70.0		SPUD MUD	
225	0.00	7.0		SPUD MUD	
380	1.20	32.0		KCL / PAC	
648	1.21	24.0		KCL / PAC	
1179	1.61	43.0		KCL / PAC	
1230	1.36	21.0		KCL / PAC	
1500	1.39	35.0		KCL / PAC	
1867	1.46	42.0		KCL -PAC	
2110	1.50	33.0		KCL / PAC	
2470	1.35	31.0		DUMMY	
2504	1.46	35.0		KCL / PAC	
2580	1.45	36.0		KCL / PAC	

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]
3531 Formation pressure (Formasjonstrykk)	pdf	0.22

