

General information

Wellbore name	16/4-1
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Well name	16/4-1
Seismic location	NH 8105 - 306 SP. 752
Production licence	087
Drilling operator	Norsk Hydro Produksjon AS
Drill permit	432-L
Drilling facility	TREASURE SEEKER
Drilling days	72
Entered date	08.09.1984
Completed date	18.11.1984
Release date	18.11.1986
Publication date	24.09.2004
Purpose - planned	WILDCAT
Reentry	NO
Content	DRY
Discovery wellbore	NO
Kelly bushing elevation [m]	25.0
Water depth [m]	96.0
Total depth (MD) [m RKB]	2909.0
Final vertical depth (TVD) [m RKB]	2909.0
Maximum inclination [°]	2.5
Bottom hole temperature [°C]	96
Oldest penetrated age	PRE-DEVONIAN
Oldest penetrated formation	BASEMENT
Geodetic datum	ED50
NS degrees	58° 38' 18.33" N
EW degrees	2° 8' 17.03" E
NS UTM [m]	6500262.06
EW UTM [m]	449959.99
UTM zone	31
NPDID wellbore	229

Wellbore history

General

Well 16/4-1 is located on the Utsira High. The primary objective of the well was to test the Paleocene Heimdal Formation. Secondary objectives were Jurassic and Triassic sandstones, Zechstein carbonates and Rotliegendes conglomerates. The well was planned to reach TD at 2850 m + 100 m after having identified a seismic reflector at this depth, interpreted to represent Top Metamorphic Basement.

Operations and results

Wildcat well 16/4-1 was spudded with the semi-submersible installation Treasure Seeker on 8 September 1984 and drilled to TD at 2909 m in crystalline/metamorphic basement of Early Paleozoic age. Under the 30" casing shoe a 17 1/2" pilot hole was drilled. At 494 m in Pleistocene sand and shale, the well started to flow up the annulus from a small gas pocket. The well died out by itself but there were problems with lost circulation, so a cement plug was set from 494 - 415 m. The cement was drilled out to 480 m and the hole was underreamed to 26" before landing of the 20" casing. No other major problems occurred during drilling of this well. The well was drilled with seawater and bentonite down to 494 m, with KCl/polymer mud from 494 m to 2052 m, and with NaCl/polymer mud from 2052 m to TD.

The well 16/4-1 encountered water-bearing sandstones in the Paleocene Heimdal Formation as well as in the Triassic. The latter is a 36 m thick sand in between the Smith Bank Formation and the Zechstein Group. The Heimdal Formation Sandstones occur as interbedded sand/claystone in the upper part (2100 m to 2142 m) and as a massive sandstone, which is homogenous and very clean in the lower part (2142 m 2277 m). The Triassic sandstones (2394 m to 2430 m) were very fine-to-fine grained with a considerable amount of silt and mica. Log evaluations over these sands gave the following results: The interval 2100 m to 2142 m gave a net/gross ratio of 0.095, with an average porosity of 23,06% and a shale volume of 43,58% after cut-off. The interval 2142 m to 2277 m had a N/G of 0,89 with 26,36% average porosity and 11,19% shale volume. The Triassic interval (2394 m to 2430 m) had a net/gross of 0,37 with 22,88% average porosity and 18,54% shale volume. All these values are calculated after a cut-off of 20% (1 mD). Twenty-five pressure tests (RFT) were performed from 2083 m to 2422.4 m. These gave a water gradient of 0,445 psi/ft (1.024 g/cc) in the Heimdal Fm sandstones. No pressure data were obtained from the Triassic.

Three cores were cut in this well, the first and second in sandstones of the Heimdal and Smith Bank formations respectively. The third core was taken in metamorphic/crystalline basement. Core 1 was cut from 2161 m to 2174 m in the Heimdal formation. The recovered core of 11 m (85%) consisted of very fine to medium grained, poorly sorted sandstone with claystone in the interval 2170-71 m. Core 2 was cut from 2404 m to 2422 m and 17.5 m (97%) was recovered. The core was cut in the Triassic sand under the Smith Bank Formation. It consisted of micaceous sandstones and siltstones with subordinate clay clasts. Core 3 was cut from 2907 m to 2909 m in the Basement and 100% was recovered. The core consisted of schist and granite. No fluid samples were collected. The well was permanently abandoned on 18 November 1984 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	2907.00

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

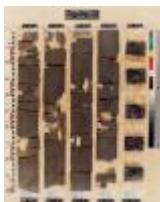
Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	2161.0	2172.0	[m]
2	2404.0	2421.5	[m]
3	2907.0	2909.0	[m]

Total core sample length [m]	30.5
Cores available for sampling?	YES

Core photos



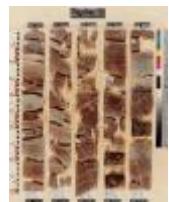
2161-2166m



2166-2171m



2171-2172m



2404-2409m



2409-2414m



2414-2419m



2419-2421m



2907-2909m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
2035.0	[m]	SWC	RRI
2057.0	[m]	SWC	RRI
2073.0	[m]	SWC	RRI

2092.0	[m]	SWC	RRI
2108.0	[m]	SWC	RRI
2118.5	[m]	SWC	RRI
2131.0	[m]	SWC	RRI
2146.0	[m]	SWC	RRI
2161.0	[m]	C	RRI
2171.3	[m]	C	RRI
2172.0	[m]	C	RRI
2196.0	[m]	SWC	RRI
2258.0	[m]	SWC	RRI

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
121	NORDLAND GP
761	UTSIRA FM
998	HORDALAND GP
1147	SKADE FM
1185	UNDIFFERENTIATED
1280	NO FORMAL NAME
1311	UNDIFFERENTIATED
1989	ROGALAND GP
1989	BALDER FM
2011	SELE FM
2036	LISTA FM
2142	HEIMDAL FM
2277	VÅLE FM
2285	SHETLAND GP
2315	CROMER KNOLL GP
2315	SOLA FM
2325	ÅSGARD FM
2333	VIKING GP
2333	INTRA DRAUPNE FM SS
2337	NO GROUP DEFINED
2337	SMITH BANK FM
2394	NO FORMAL NAME
2430	ZECHSTEIN GP
2430	UNDIFFERENTIATED
2619	KUPFERSCHIEFER FM

2621	ROTLIEGEND GP
2885	BASEMENT

Composite logs

Document name	Document format	Document size [MB]
229	pdf	0.59

Geochemical information

Document name	Document format	Document size [MB]
229_1	pdf	0.62

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

Document name	Document format	Document size [MB]
229_01_WDSS_General_Information	pdf	0.22
229_02_WDSS_completion_log	pdf	0.28

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

Document name	Document format	Document size [MB]
229_16_4_1_COMPLETION_LOG	pdf	1.92
229_16_4_1_COMPLETION_REPORT	pdf	12.08

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL	125	2015
CET CBL VDL	450	2015
CST	2035	2340
CST	2345	2896
ISF LSS GR SP	206	2027

ISF LSS GR SP	2406	2907
ISF MSFL LSS GR SP	2028	2666
LDL CNL CAL GR	472	2907
RFT	2083	2422
SHDT	2016	2908
VSP	200	2909

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	206.0	36	280.0	0.00	LOT
SURF.COND.	20	480.0	26	497.0	1.37	LOT
INTERM.	16	626.0	22	650.0	1.89	LOT
INTERM.	13 3/8	2028.0	17 1/2	2066.0	1.79	LOT
OPEN HOLE		2909.0	12 1/4	2909.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
150	0.00			WATER BASED	14.11.1984
280	1.09	5.0	2.0	WATER BASED	10.09.1984
494	1.10			WATER BASED	12.09.1984
494	1.10			WATER BASED	13.09.1984
494	1.10			WATER BASED	14.09.1984
494	1.10			WATER BASED	16.09.1984
494	1.10			WATER BASED	17.09.1984
494	1.10			WATER BASED	18.09.1984
494	1.10			WATER BASED	13.09.1984
494	1.10			WATER BASED	17.09.1984
494	1.10			WATER BASED	18.09.1984
494	1.10			WATER BASED	20.09.1984
494	1.10			WATER BASED	19.09.1984
494	1.10			WATER BASED	20.09.1984
494	1.10			WATER BASED	14.09.1984
494	1.10			WATER BASED	16.09.1984
494	1.10			WATER BASED	19.09.1984
497	1.15	17.0	95.0	WATER BASED	25.09.1984

572	1.25	15.0	7.0	WATER BASED	12.11.1984
625	1.16	16.0	9.0	WATER BASED	25.09.1984
625	1.16	14.0	9.0	WATER BASED	26.09.1984
625	1.16	14.0	10.0	WATER BASED	27.09.1984
625	1.16	14.0	11.0	WATER BASED	01.10.1984
625	1.16	14.0	11.0	WATER BASED	01.10.1984
625	1.16	14.0	9.0	WATER BASED	26.09.1984
625	1.16	14.0	10.0	WATER BASED	27.09.1984
650	1.15	15.0	8.0	WATER BASED	01.10.1984
712	1.16	19.0	8.0	WATER BASED	01.10.1984
1112	1.16	19.0	8.0	WATER BASED	01.10.1984
1507	1.18	19.0	10.0	WATER BASED	02.10.1984
1507	1.25	15.0	9.0	WATER BASED	03.10.1984
1507	1.25	15.0	9.0	WATER BASED	03.10.1984
1602	1.30	17.0	10.0	WATER BASED	04.10.1984
1813	1.30	18.0	8.0	WATER BASED	07.10.1984
1825	1.30	16.0	8.0	WATER BASED	14.10.1984
1870	1.25	16.0	8.5	WATER BASED	12.11.1984
1870	1.25	16.0	8.5	WATER BASED	14.11.1984
1870	1.25	16.0	8.5	WATER BASED	14.11.1984
1957	1.30	16.0	8.0	WATER BASED	07.10.1984
1988	1.30	24.0	13.0	WATER BASED	14.10.1984
2052	1.30	32.0	11.0	WATER BASED	14.10.1984
2052	1.30	9.0	10.0	WATER BASED	15.10.1984
2052	1.25	20.0	13.0	WATER BASED	16.10.1984
2052	1.30	18.0	9.0	WATER BASED	08.10.1984
2052	1.30	18.0	8.0	WATER BASED	10.10.1984
2052	1.30	15.0	8.0	WATER BASED	11.10.1984
2052	1.30	18.0	9.0	WATER BASED	08.10.1984
2052	1.30	18.0	8.5	WATER BASED	09.10.1984
2052	1.30	18.0	8.0	WATER BASED	10.10.1984
2052	1.30	15.0	8.0	WATER BASED	11.10.1984
2052	1.30	32.0	11.0	WATER BASED	14.10.1984
2052	1.30	9.0	10.0	WATER BASED	15.10.1984
2052	1.25	20.0	13.0	WATER BASED	16.10.1984
2052	1.30	18.0	12.0	WATER BASED	07.10.1984
2052	1.30	18.0	8.5	WATER BASED	09.10.1984
2066	1.23	16.0	8.0	WATER BASED	17.10.1984
2161	1.20	19.0	9.5	WATER BASED	18.10.1984
2161	1.20	14.0	5.0	WATER BASED	22.10.1984

2161	1.21	15.0	9.5	WATER BASED	21.10.1984
2161	1.21	15.0	9.5	WATER BASED	21.10.1984
2161	1.20	14.0	5.0	WATER BASED	22.10.1984
2174	1.20	13.0	7.0	WATER BASED	23.10.1984
2283	1.25	20.0	7.0	WATER BASED	24.10.1984
2355	1.25	18.0	7.0	WATER BASED	25.10.1984
2404	1.25	17.0	8.0	WATER BASED	29.10.1984
2440	1.25	18.0	9.0	WATER BASED	29.10.1984
2501	1.25	18.0	9.0	WATER BASED	29.10.1984
2573	1.25	46.0	10.0	WATER BASED	31.10.1984
2588	1.25	18.0	10.0	WATER BASED	31.10.1984
2588	1.25	18.0	10.0	WATER BASED	01.11.1984
2588	1.25	18.0	10.0	WATER BASED	01.11.1984
2672	1.25	19.0	9.0	WATER BASED	02.11.1984
2733	1.25	19.0	8.0	WATER BASED	05.11.1984
2795	1.25	19.0	8.0	WATER BASED	05.11.1984
2854	1.25	19.0	8.0	WATER BASED	05.11.1984
2892	1.25	45.0	25.0	WATER BASED	06.11.1984
2907	1.25	18.0	8.5	WATER BASED	07.11.1984
2909	1.25	18.0	8.5	WATER BASED	08.11.1984
2909	1.25	18.0	8.5	WATER BASED	09.11.1984
2909	1.25	15.0	7.0	WATER BASED	12.11.1984
2909	1.25	18.0	8.5	WATER BASED	09.11.1984
2909	1.25	15.0	7.0	WATER BASED	12.11.1984

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]
229_Formation_pressure_(Formasjonstrykk)	pdf	0.22

