

**General information**

Wellbore name	16/1-14
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Press release	link to press release
Factmaps in new window	link to map
Main area	NORTH SEA
Discovery	16/1-14 (Apollo)
Well name	16/1-14
Seismic location	Ln0902-inline1354 & crossline 5260
Production licence	338
Drilling operator	Lundin Norway AS
Drill permit	1315-L
Drilling facility	TRANSOCEAN WINNER
Drilling days	66
Entered date	26.09.2010
Completed date	30.11.2010
Release date	30.11.2012
Publication date	30.11.2012
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	YES
1st level with HC, age	EOCENE
1st level with HC, formation	INTRA BALDER FM SS
2nd level with HC, age	PALEOCENE
2nd level with HC, formation	HEIMDAL FM
3rd level with HC, age	EARLY CRETACEOUS
3rd level with HC, formation	INTRA ÅSGARD FM SS
Kelly bushing elevation [m]	26.0
Water depth [m]	110.0
Total depth (MD) [m RKB]	2550.0
Final vertical depth (TVD) [m RKB]	2550.0
Maximum inclination [°]	10
Bottom hole temperature [°C]	99
Oldest penetrated age	LATE TRIASSIC
Oldest penetrated formation	SKAGERRAK FM
Geodetic datum	ED50



NS degrees	58° 53' 9.28" N
EW degrees	2° 12' 10.46" E
NS UTM [m]	6527772.15
EW UTM [m]	454052.09
UTM zone	31
NPDID wellbore	6399

Wellbore history

General

Well 16/1-14 was drilled to explore the Jurassic Apollo Prospect situated south of the Draupne Discovery and down flank of the Luno Discovery. The well is located on the eastern margin of the South Viking Graben in the North Sea. The structure is situated between eastern part of the Gudrun Terrace and the western flank of the Utsira High. The primary objective was to test the Vestland Group, Hugin Formation sands and to verify communication with the 16/1-9 Draupne Discovery. A thickening and improving reservoir quality in the Hugin Formation, when compared to well 16/1-9 was expected towards the Apollo. Prospect.

Operations and results

Well 16/1-14 was drilled with the semi-submersible installation Transocean Winner. First a 9 7/8" pilot hole was drilled to 606 m. This hole was abandoned due to shallow gas and it was named 16/1-U-6. Wildcat well 16/1-14 was spudded ca 15 m west of 16/1-U-6 on 26 September 2010 and drilled to TD at 2550 m in Late Triassic sediments of the Skagerrak Formation. As the Cretaceous to Eocene hydrocarbon bearing reservoirs were insufficiently logged and cored a sidetrack was decided. The 16/1-14 T2 sidetrack was made through a window in the 9 5/8" casing at 1800 m. The sidetrack was drilled to TD at 2295 m (2293.4 m TVD) in the Late Jurassic Draupne Formation. The well was drilled with seawater and hi-vis sweeps down to 378 m and with Glydril mud from 378 m to TD in both well tracks.

The primary objective of the well was not realised because the Hugin Formation was found to be dry. However, well 16/1-14 encountered oil in three levels, the Balder Formation, the Heimdal Formation and one in the Lower Cretaceous (Berriasian to Valangian) Åsgard Formation. Free water levels were estimated to be at 2004 m (1978 m TVD MSL) in the Paleocene (Balder-Heimdal) discovery and at 2181 m (2155 m TVD MSL) in the Lower Cretaceous Åsgard discovery. In well 16/1-14 several thin sands were encountered in the Lista Formation. The sands were oil-filled and displayed moderate properties from log analysis. However, no fluid gradients could be acquired from pressure-points. In the sidetrack, 16/1-14 T2, the corresponding sand intervals were found to be missing or to be thinner. In the Heimdal Formation 6.5 to 7 m net sand of good quality was interpreted from the logs. Oil was confirmed by sampling. In the Åsgard Formation, a 9 m interval of very good sand was oil filled. Mobilities derived from the MDT results showed up to 3500 mD/cp. A water filled Intra Draupne Formation sandstone was found 16 m thick in the primary well bore, but was only 4 m thick in the sidetrack, indicating a pinch-out of this sand towards the south-west. The primary target Hugin Formation came in at 2472 m; deeper than prognosed and water bearing. However, oil shows were recorded from 2472 m to 2495 m. Weak oil shows were also recorded in intervals in siltstones and claystones of the Draupne and Heather formations.

Three conventional cores were cut in the main wellbore from 2373 m to 2454.6 m, and four additional cores were cut in the sidetrack from 2052 m to 2101 m and from 2167 m



to 2221.46 m. In 16/1-14 fluid scanning (LFA) confirmed oil at 2063.3 m, and at 2098.1 m, where 3 oil samples were acquired. A further MDT water sample was acquired at 2491.5 m. In the sidetrack MDT oil samples were acquired at 1998 m (Balder Formation), 2002.8 m (Balder Formation), 2102.2 m (Heimdal Member) and 2174 and 2178.8 m (Åsgard Formation). MDT water samples were acquired in the sidetrack at 2106 m (Heimdal Member) and 2188 m (Åsgard Formation).

The well was permanently abandoned on 30 November 2010 as an oil discovery.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
380.00	2548.00

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	2373.0	2413.1	[m]
2	2400.1	2427.7	[m]
3	2427.7	2454.0	[m]

Total core sample length [m]	94.0
Cores available for sampling?	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
136	NORDLAND GP
783	UTSIRA FM
886	NO FORMAL NAME
951	HORDALAND GP
951	SKADE FM



1244	NO FORMAL NAME
1607	GRID FM
1798	NO FORMAL NAME
1962	ROGALAND GP
1962	BALDER FM
1998	INTRA BALDER FM SS
1999	BALDER FM
2023	SELE FM
2056	LISTA FM
2094	HEIMDAL FM
2108	LISTA FM
2135	TY FM
2145	VÅLE FM
2162	SHETLAND GP
2162	EKOFISK FM
2168	CROMER KNOLL GP
2168	ÅSGARD FM
2174	INTRA ÅSGARD FM SS
2205	ÅSGARD FM
2236	VIKING GP
2236	INTRA DRAUPNE FM SS
2251	DRAUPNE FM
2392	HEATHER FM
2472	VESTLAND GP
2472	HUGIN FM
2496	NO GROUP DEFINED
2496	SKAGERRAK FM

Geochemical information

Document name	Document format	Document size [MB]
6399 01 16 1 14 gch transfer 1	txt	0.00
6399 02 16 1 14 gch results 1	txt	0.55

Logs

Log type	Log top depth [m]	Log bottom depth [m]
MDT GR	1478	2235





MDT GR	2491	2491
MSCT	2238	2530
MWD - DIR GR RES PWD	136	606
MWD - DIR GR RES PWD SON DEN NEU	1478	2549
MWD - DIR PWD GR RES SON	372	1473
PEX HRLA MSIP	2227	2523
VSI	789	2540
XPT GR	2227	2548

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	211.0	36	215.0	0.00	LOT
SURF.COND.	20	371.0	26	378.0	1.60	LOT
PILOT HOLE		606.0	9 7/8	606.0	0.00	LOT
INTERM.	13 3/8	1478.0	17 1/2	1484.0	1.99	LOT
INTERM.	9 5/8	2228.0	12 1/4	2235.0	1.57	LOT
OPEN HOLE		2550.0	8 1/2	2550.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
166	1.05			Water	
300	1.25			Water	
378	1.20			Water	
477	1.50			Water	
1053	1.23			Water	
1484	1.29			Water	
1517	1.29			Water	
2079	1.25			Water	
2235	1.38			Water	
2295	1.25			Water	
2550	1.20			Water	

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]
6399 Formation pressure (Formasjonstrykk)	PDF	0.21
6399 T2 Formation pressure (Formasjonstrykk)	pdf	0.23

