General information

Wellbore name	16/1-13
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Press release	link to press release
Factmaps in new window	link to map
Main area	NORTH SEA
Field	EDVARD GRIEG
Discovery	16/1-8 Edvard Grieg
Well name	16/1-13
Seismic location	LN0803 OBS -inline 3179 & crossline 2503
Production licence	338
Drilling operator	Lundin Norway AS
Drill permit	1279-L
Drilling facility	TRANSOCEAN WINNER
Drilling days	53
Entered date	30.11.2009
Completed date	21.01.2010
Release date	21.01.2012
Publication date	21.01.2012
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	EARLY CRETACEOUS
1st level with HC, formation	NO FORMAL NAME
2nd level with HC, age	LATE JURASSIC
2nd level with HC, formation	INTRA DRAUPNE FM SS
3rd level with HC, age	JURASSIC/TRIASSIC
3rd level with HC, formation	UNDEFINED GP
Kelly bushing elevation [m]	26.0
Water depth [m]	109.5
Total depth (MD) [m RKB]	2303.0
Final vertical depth (TVD) [m RKB]	2301.0
Maximum inclination [°]	4.1
Bottom hole temperature [°C]	92
Oldest penetrated age	LATE TRIASSIC
Oldest penetrated formation	HEGRE GP

Geodetic datum	ED50
NS degrees	58° 51' 17.39'' N
EW degrees	2° 15' 17.8'' E
NS UTM [m]	6524276.81
EW UTM [m]	457013.22
UTM zone	31
NPDID wellbore	6232

Wellbore history

General

Well 16/1-13 was drilled to appraise the Luno Discovery on the southern part of the Utsira High in the North Sea. The Luno discovery was made after drilling the 16/1-8 well in 2007 and confirmed by the appraisal well, 16/1-10. The objectives of well 16/1-13 were to confirm the resource estimates for the Luno Discovery, prove the presence of Jurassic sediments with good reservoir properties, and to improve understanding of the reservoir facies distribution.

Operations and results

Appraisal well 16/1-13 was spudded with the semi-submersible installation Transocean Winner on 30 November 2009 and drilled to TD at 2303 m in the Late Triassic Hegre Group. A precautionary 9 7/8" pilot hole was drilled from seabed to a depth of 606 m MD RKB. MWD logs in the pilot hole confirmed that all permeable formations were water bearing and shallow gas was not present. Minor gas sands were observed in the main bore at 631 and 726 m, but no gas flow occurred. The well was drilled with Seawater and hi-vis pills down to 606 m and with Glydril mud with 4 - 6 % glycol from 606 m to TD.

Well 16/1-13 proved a 50 m oil column in Jurassic / Triassic sandstones with excellent reservoir characteristics. The pressure at the top of the reservoir was measured at 193.2 bar (equivalent to a gradient of 1.028 g/cc). Pressure measurements and samples established an oil gradient of 0.069 bar/m with an oil-water contact at 1966.5 m (1939 m TVD MSL). A water gradient of 0.101 bar/m was established below the OWC. The water zone lithology consisted of sandstones and conglomerates, the latter of relatively poor reservoir quality. The first oil shows in well 16/1-13 were observed in the shale at the top of core number 2 at 1918 m. From 1967.4 m (1965.4 m TVD) in core number 4 the sandstones became thickly interbedded with tightly cemented conglomerates. The latter did not contain any visible hydrocarbon shows; however shows were present within the sandstone layers down to 1972.7 m (1970.7 m TVD). Below this depth and above reservoir level no oil shows were seen.

An extensive data acquisition program was undertaken. In total five cores were cut from 1917.0 to 2001.1 m with 97 % total recovery. Four cores covered the complete oil column and one core was taken in the water zone. MDT fluid samples were taken at 1924.5 m (oil), 1965 m (oil), 1967.2 m (water and trace oil), and 1973 m (water and trace oil).

The well was permanently abandoned on 21 January 2010 as an oil appraisal.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
610.00	2303.50

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	1917.0	1917.7	[m]
2	1917.7	1919.5	[m]
3	1919.7	1944.7	[m]
4	1946.7	1973.3	[m]
5	1973.7	2001.1	[m]

Total core sample length [m]	81.5
Cores available for sampling?	YES

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		1924.50	0.00			YES
DST		1965.00	0.00			YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
135	NORDLAND GP
766	UTSIRA FM
878	HORDALAND GP
952	SKADE FM
1467	GRID FM
1764	ROGALAND GP
1764	BALDER FM

1771	SELE FM
1787	LISTA FM
1877	VÅLE FM
1888	SHETLAND GP
1888	EKOFISK FM
1917	HOD FM
1918	CROMER KNOLL GP
1918	ÅSGARD FM
1919	VIKING GP
1919	INTRA DRAUPNE FM SS
1920	UNDEFINED GP
1960	HEGRE GP

Composite logs

Document name	Document format	Document size [MB]
6232_16_1_13	pdf	0.47

Logs

Log type	Log top depth [m]	Log bottom depth [m]
FMI PPC MSIP PPC EDTC ACTS ECRD	1875	2304
HRLA PEX ECS HNGS ACTS LEH QT	1875	2298
MDT GR	1924	1973
MRX GR ACTS ECRD	1890	2301
MSCT GR ECRD	1890	2301
MWD LWD - GR RES PWD DIR	135	606
MWD LWD - GR RES PWD DIR	1881	1917
MWD LWD - GR RES PWD DIR	2200	2303
MWD LWD - GR RES PWD DIR SON DEN	606	1881
MWD LWD - GR RES PWD DIR SON DEN	1917	2200
VSI	616	2295
XPT GR ACTS ECRD	1918	2185

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	213.0	36	213.0	0.00	LOT
SURF.COND.	20	600.0	26	606.0	1.61	LOT
PILOT HOLE		606.0	9 7/8	606.0	0.00	LOT
INTERM.	9 5/8	1875.0	12 1/4	1881.0	1.81	LOT
OPEN HOLE		2303.0	8 1/2	2303.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
217	1.04			Water	
290	1.00			Water	
606	1.04			Water	
1881	1.37			Water	
2001	1.21			Water	
2119	1.21			Water	
2200	1.21			Water	
2269	1.21			Water	
2303	1.27			Water	
2303	1.20			Water	
2303	1.21			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]
6232_Formation_pressure_(Formasjonstrykk)	pdf	0.23