



General information





Wellbore name	16/1-23 S
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	16/1-23
Seismic location	LN12M02. inline 2474. crossline 6454
Production licence	338
Drilling operator	Lundin Norway AS
Drill permit	1536-L
Drilling facility	ROWAN VIKING
Drilling days	63
Entered date	24.06.2015
Completed date	25.08.2015
Release date	25.08.2017
Publication date	25.08.2017
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	TRIASSIC
1st level with HC, formation	SKAGERRAK FM
Kelly bushing elevation [m]	52.0
Water depth [m]	108.0
Total depth (MD) [m RKB]	2130.0
Final vertical depth (TVD) [m RKB]	2095.0
Maximum inclination [°]	24
Oldest penetrated formation	BASEMENT
Geodetic datum	ED50
NS degrees	58° 49' 47.06" N
EW degrees	2° 16' 55.78" E
NS UTM [m]	6521465.73
EW UTM [m]	458553.52
UTM zone	31
NPDID wellbore	7532



Wellbore history

General

Well 16/1-23 S was drilled appraise the Edvard Grieg Field on the Utsira High in the North Sea. The primary objective was to investigate the hydrocarbon potential in the South Eastern part of the Field. It was also designed to allow installation of a CaTS pressure gauge for long term monitoring of reservoir pressure.

Operations and results

Wildcat well 16/1-23 S was spudded with the jack-up installation Rowan Viking on 24 June 2015 and drilled to TD at 2130 m in basement rock. The well was drilled S-shaped with up to 24 ° deviation in the interval from 630 m to 1480 m. This was to avoid a fault at the reservoir level. Target location was approximately 43 m west of the spud location. No significant problem was encountered in the operations. The well was drilled with seawater and hi-vis sweeps down to 315 m, with KCl/polymer mud from 634 m to 1888 m, and with Aquadril mud from 188 m to TD.

Well 16/1-23 S proved a 66 metres gross oil column in conglomerates and sandstones with medium to good reservoir quality. The top of the reservoir, from 1953 to 1953.5 m, is a marine sandstone unit with a basal conglomeratic transgression lag belonging to the Åsgard Formation, the remaining reservoir is conglomerates and thin sandstone units belonging to the Triassic Skagerrak Formation. A Free Water Level was established from pressure gradients at ca 2020.4 m (1985.5 m TVD). The pressure points further proved an oil gradient with the same density as in the rest of the Edvard Grieg field. Fair to poor oil shows were recorded on cores below the FWL down to 2054 m.

Eight cores were cut. Core 1 was cut from 1681 to 1690 m in Hordaland Group claystone for hole instability studies. Core recovery was 104.1%. Cores 2 to 8 were cut from 1945.5 m in the Åsgard Formation to 2064.4 m in the Skagerrak Formation. Recovery varied from 92.5 to 100%. MDT fluid samples were taken at 1958.2 m (oil), 1990.0 m (oil), 1990.6 m (oil), 2015.21 m (oil), 2024.7 m (water), 2061.4 m (water), 2061.72 m (water), and 2030.85 m (water). Single stage separation of the oil samples gave oil densities in the range 0.857 to 0.886 g/cm³ and GORs in the range 149 to 111 Sm³/Sm³.

The CaTS reservoir pressure monitoring system was installed before the well was permanently abandoned on 25 August 2015 as an oil appraisal well.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
320.00	2129.00

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	1681.0	1690.4	[m]
2	1945.5	1954.8	[m]
3	1955.5	1974.2	[m]
4	1975.5	1979.4	[m]
5	1979.5	1992.2	[m]
6	1993.0	2021.5	[m]
7	2012.9	2040.0	[m]
8	2040.0	2064.5	[m]

Total core sample length [m]	134.0
Cores available for sampling?	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
160	NORDLAND GP
780	UTSIRA FM
1035	HORDALAND GP
1040	SKADE FM
1621	GRID FM
1750	ROGALAND GP
1750	BALDER FM
1761	SELE FM
1809	LISTA FM
1879	VÅLE FM
1901	SHETLAND GP
1901	EKOFISK FM
1916	TOR FM
1934	HOD FM
1943	CROMER KNOLL GP
1943	SOLA FM
1946	ÅSGARD FM
1953	HEGRE GP
1953	SKAGERRAK FM
2094	BASEMENT

**Logs**

Log type	Log top depth [m]	Log bottom depth [m]
DSL CN ZDL XMAC RTEX MLL	200	2129
DSL FLEX MREX	1850	2128
DSL SBT	1500	1992
DSL STAR HD UXPL	1880	2122
DSL SWC	1894	2103
DSL SWC	2065	2080
DSL VSP	200	2128
FST GR	1891	2018
FTWT GR	1955	2067
GR MDT STURN	1957	2061
MWD - ECD DIR	315	633
MWD - ECD GR DIR	160	303
MWD - GR ECD RES DIR	1882	1944
MWD - GR ECD RES DIR AC	315	634
MWD - GR ECD RES DIR DEN CAL NEU	1882	2129
MWD - GR RES ECD DIR CAL NEU NEU	633	1888

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	308.1	36	315.0	0.00	
SURF.COND.	20	626.0	26	633.0	1.60	FIT
PILOT HOLE		634.0	9 7/8	634.0	0.00	
INTERM.	9 5/8	1882.0	12 1/4	1888.0	1.68	LOT
OPEN HOLE		2130.0	8 1/2	2130.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
160	1.40	16.0		Water Based	
324	1.13	11.0		Water Based	
565	1.39	17.0		Water Based	



633	1.19	11.0		Water Based	
634	1.13	11.0		Water Based	
638	1.21	13.0		Water Based	
1146	1.30	14.0		Water Based	
1619	1.18	27.0		Oil Based	
1642	1.35	19.0		Water Based	
1888	1.40	23.0		Water Based	
1946	1.15	14.0		Water Based	
1993	1.18	16.0		Water Based	
2130	1.16	24.0		Oil Based	
2130	1.15	15.0		Water Based	