

**General information**

Wellbore name	16/1-31 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	16/1-31
Seismic location	LN16201 inline 1421 crossline 2347
Production licence	338
Drilling operator	Lundin Norway AS
Drill permit	1748-L
Drilling facility	LEIV EIRIKSSON
Drilling days	62
Entered date	10.03.2019
Completed date	10.05.2019
Plugged date	10.05.2019
Release date	10.05.2021
Publication date	10.11.2021
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	LATE TRIASSIC
Kelly bushing elevation [m]	25.0
Water depth [m]	111.0
Total depth (MD) [m RKB]	2220.0
Final vertical depth (TVD) [m RKB]	2148.0
Oldest penetrated formation	BASEMENT
Geodetic datum	ED50
NS degrees	58° 51' 47.5" N
EW degrees	2° 18' 12.35" E
NS UTM [m]	6525178.00
EW UTM [m]	459820.31
UTM zone	31
NPDID wellbore	8655



Wellbore history

General

Well 16/1-31 S was drilled to test the Jorvik prospect on the Utsira High, about 4 kilometres northeast of the Edvard Grieg platform in the North Sea. The primary objective was to prove oil in conglomerates from the Triassic Age in an extension of the Edvard Grieg basin toward the east.

Operations and results

Appraisal well 16/1-31 S was spudded with the semi-submersible installation Leiv Eiriksson on 10 March 2019 and drilled to TD at 2220 m in conglomerates of indeterminate Triassic to Permian age. Operations proceeded without significant problems. The well was drilled with seawater and hi-vis pills down to 602 m and with Polymer water-based mud from 602 m to TD.

The well penetrated the Early Cretaceous Åsgard Formation directly overlying top of the target reservoir at 1938 m (1866.4 m TVD). The reservoir contained an oil column of about 30 metres in conglomerates and conglomeratic sandstones, presumably of Triassic Age and with generally poor reservoir quality. There was around one metre of sandstone of good quality in the upper part of the reservoir section. The oil/water contact was not proven. Pressure measurements showed that the area is in communication with the Edvard Grieg field. The reservoir pressure was depleted 9-10 bar compared to the Edvard Grieg before start of production.

Below 1968 m and down to 2028 m shows are described on cores as: faint to moderate odour, 40% patchy weak, dark yellow direct fluorescence, slow blooming good bluish white cut fluorescence, 30% moderately, cream fluorescent residue. Patchy shows (cut and fluorescence) was described on sidewall cores down to 2176.5 m.

Three cores were cut in the interval 1940 to 2034.5 m. Recoveries were 100%, 97.7%, and 99.3% in cores 1, 2 and 3 respectively. MDT fluid samples were taken at 1938.61 m (oil) and 1964.57 m (oil).

The well was plugged back for side-tracking (16/1-31 A) on 10 May 2019. The well was initially classified as a wildcat but has been reclassified as an oil appraisal well.

Testing

A drill stem test was conducted from perforations in the interval 1945.15 to 2001.9 m. The test produced oil and gas at relatively low rates, between 21 to 24 Sm³ oil and 4900 to 8000 Sm³ gas /day through a 26/64" choke. The GOR was between 233 and 333 Sm³/Sm³, but this was likely not representative due to slugging. The temperature at gauge depth 1920.9 m was 80.2°C.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
610.00	2220.00

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	1940.0	1967.2	[m]
2	1967.2	2004.1	[m]
3	2005.0	2034.3	[m]

Total core sample length [m]	93.4
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
MDT		0.00	0.00			YES
MDT		1939.57	0.00	OIL	17.04.2019 - 00:00	NO
MDT		1913.60	0.00	OIL	16.04.2019 - 00:00	NO

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
136	NORDLAND GP
136	UNDIFFERENTIATED
777	UTSIRA FM
871	UNDIFFERENTIATED
930	HORDALAND GP
945	SKADE FM
1194	NO FORMAL NAME
1510	NO FORMAL NAME
1604	GRID FM
1649	NO FORMAL NAME
1750	ROGALAND GP
1750	BALDER FM
1761	SELE FM



1793	LISTA FM
1874	VÅLE FM
1899	SHETLAND GP
1899	EKOFISK FM
1911	TOR FM
1923	HOD FM
1929	CROMER KNOLL GP
1929	SOLA FM
1931	ÅSGARD FM
1938	HEGRE GP

Logs

Log type	Log top depth [m]	Log bottom depth [m]
FMI MSIP GR	100	1912
FMI MSIP GR	1500	2221
HRLA PEX HNGS GR	1910	2221
MDT GR	1938	2080
MWD - GR PWD RES DIR AC	179	599
MWD - INC GR RES PWD CAL DEN N A	1335	2220
MWD - PWD DIR	221	590
MWD - PWD GR	147	192
MWD - RES PWD GR DIR AC	595	1334
XLR GR	1376	1600
XLR GR	1400	1905
XLR GR	1918	2199
XPT NEXT CMR	1910	2221

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	203.1	36	203.1	0.00	
SURF.COND.	20	595.0	26	602.0	1.50	FIT
PILOT HOLE		602.0	9 7/8	602.0	0.00	
INTERM.	13 3/8	1337.6	17 1/2	1345.0	1.88	LOT
LINER	9 5/8	1910.2	12 1/4	1911.0	1.65	LOT
LINER	7	2219.6	8 1/2	2220.0	0.00	

**Drilling mud**

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
203	1.05	1.0		PHB Sweep	
203	1.50	1.0		KCl/Polymer/GEM	
570	1.30	21.0		HP WBM	
602	1.30	15.0		HP WBM	
602	1.04	1.0		PHB Sweep	
602	1.50	17.0		KCl/Polymer/GEM	
610	1.30	16.0		HP WBM	
1020	1.30	20.0		HP WBM	
1345	1.30	19.0		HP WBM	
1345	1.45	23.0		HP WBM	
1399	1.45	25.0		HP WBM	
1911	1.12	19.0		HP WBM	
1911	1.45	30.0		HP WBM	
1930	1.12	16.0		HP WBM	
2035	1.12	17.0		HP WBM	
2035	1.14	13.0		HP WBM	
2080	1.12	14.0		HP WBM	
2220	1.30	21.0		HP WBM	
2220	1.13	1.0		KCl Brine	
2220	1.12	11.0		HP WBM	