

**General information**

Wellbore name	16/3-6
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	JOHAN SVERDRUP
Discovery	16/2-6 Johan Sverdrup
Well name	16/3-6
Seismic location	LN0902:inline 2365 & crossline 7792
Production licence	501
Drilling operator	Lundin Norway AS
Drill permit	1451-L
Drilling facility	BREDFORD DOLPHIN
Drilling days	37
Entered date	10.06.2013
Completed date	16.07.2013
Release date	16.07.2015
Publication date	13.08.2015
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	LATE JURASSIC
1st level with HC, formation	INTRA DRAUPNE FM SS
Kelly bushing elevation [m]	25.0
Water depth [m]	117.0
Total depth (MD) [m RKB]	2050.0
Final vertical depth (TVD) [m RKB]	2050.0
Maximum inclination [°]	2.2
Oldest penetrated age	PRE-DEVONIAN
Oldest penetrated formation	BASEMENT
Geodetic datum	ED50
NS degrees	58° 49' 7.86" N
EW degrees	2° 42' 11.4" E
NS UTM [m]	6520069.07
EW UTM [m]	482855.93



UTM zone	31
NPDID wellbore	7182

Wellbore history

General

Well 16/3-6 was drilled on the eastern part of the Johan Sverdrup Field on the Utsira High in the North Sea. The primary objective was to appraise the eastern part of the Johan Sverdrup Field between wells 16/2-13 S and 16/3-4. These two wells are located 5 km apart and found different Jurassic sequences and no oil water contact. Well 16/3-6 was drilled to determine which Jurassic sequences were present at this position as well as oil water contact, thickness of the sequences and depth to top reservoir.

Operations and results

A 9 7/8" pilot hole was drilled from seabed 706 m to check for shallow gas. No shallow gas was seen. Appraisal well 16/3-6 was spudded with the semi-submersible installation Bredford Dolphin on 10 June 2013 and drilled to TD at 2050 m in fractured granitic basement. No significant problem was encountered in the operations. The well was drilled with spud mud down to 698 m and with Performadril water based mud from 698 m to TD.

Top Draupne Formation/BCU was encountered close to prognosis at 1924 m. A well-defined 15-meter thick Draupne Formation shale was penetrated above 24 meters of excellent quality Late Jurassic Intra-Draupne Formation sandstone. The Draupne Formation shales are of late Volgian to early Valanginian age. The Intra-Draupne Formation sandstones were encountered at 1939 m. They are of early Kimmeridgian to ? late Kimmeridgian/early Volgian age and rest directly on solid granitic basement rocks at 1964.5 m. No middle Jurassic sequence was present as in the neighbouring well 16/2-13 S. The oil water contact was established at 1951 m, 4 meters deeper than predicted. Oil shows were described in the interval from 1925 m in the Draupne shales to 1956 m, 5 m below the oil water contact; no other shows were described in the well.

Two cores were cut from 1926 m in the Draupne Formation shale, through the Intra-Draupne Formation sandstone reservoir and down into the basement at 1968 m. The core recovery was close to 100% and the core-log shift was 1.2 m. Oil and water samples were acquired using SLB MDT tools. Oil samples were acquired at 1940.11 m, 1946.51 m and 1950.3 m. Water samples were acquired at 1952.9 m and 1962.5 m. The oil samples proved a GOR of ca 33 Sm³/Sm³, oil density of ca 0.892 g/cm³, and gas gravity of ca 1.06 (air = 1).

The well was plugged and abandoned on 16 July 2013 as an oil appraisal.

Testing

The hole was perforated between 1952.2 m and 1956.2 m, and two Expro Cats wireless downhole gauges were installed at 1900.7 m and 1885.2 m to monitor reservoir pressure and temperature. The gauges have battery capacity to sample data for up to 5 years. No DST was performed.

Cuttings at the Norwegian Offshore Directorate



Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
710.00	2050.00

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	1926.0	1953.2	[m]
2	1953.2	1967.6	[m]

Total core sample length [m]	41.6
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		1950.30	0.00	OIL	02.07.2013 - 00:00	YES
MDT		1946.50	0.00	OIL	02.07.2013 - 00:00	NO

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
142	NORDLAND GP
142	UNDIFFERENTIATED
815	UTSIRA FM
881	UNDIFFERENTIATED
955	HORDALAND GP
955	SKADE FM
993	NO FORMAL NAME
1350	NO FORMAL NAME
1375	ROGALAND GP
1375	BALDER FM
1404	SELE FM
1417	LISTA FM



1490	VÅLE FM
1500	SHETLAND GP
1500	EKOFISK FM
1526	TOR FM
1575	HOD FM
1709	TRYGGVASON FM
1724	BLØDØKS FM
1752	SVARTE FM
1789	CROMER KNOLL GP
1789	RØDBY FM
1879	SOLA FM
1890	ÅSGARD FM
1924	VIKING GP
1924	DRAUPNE FM
1940	INTRA DRAUPNE FM SS
1965	BASEMENT

Logs

Log type	Log top depth [m]	Log bottom depth [m]
GR ADT CMR MDT FMI	1940	1963
GR ADT HRLA FMI	1890	2000
GR HNGS ECS PEX HRLA ADT	1856	2047
GR MDT	1940	1962
GR MDT	1952	1954
GR MSIP PPC FMI	1856	2050
GR VSP	142	2040
GR XL ROCK	0	0
GR XPT CMR	1864	2043
MWD - GR PWD RES DIR DEN NEU SON	145	2036

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	220.0	36	222.0	0.00	
SURF.COND.	20	691.0	26	698.0	0.00	
PILOT HOLE		706.0	9 7/8	706.0	0.00	



INTERM.	9 5/8	1855.5	12 1/4	1864.0	0.00	
LINER	7	2035.0	8 1/2	2050.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
142	1.50	14.0		Water Based	
558	1.40	36.0		Water Based	
706	1.35	28.0		Water Based	
1864	1.40	38.0		Water Based	
2050	1.15	35.0		Water Based	
2050	1.18	33.0		Water Based	