



General information





Wellbore name	33/2-2 S
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	33/2-2 S (Morkel)
Well name	33/2-2
Seismic location	EOTW11:inline 8343 & crossline 15329
Production licence	579
Drilling operator	Lundin Norway AS
Drill permit	1557-L
Drilling facility	BREDFORD DOLPHIN
Drilling days	100
Entered date	03.03.2015
Completed date	10.06.2015
Release date	10.06.2017
Publication date	10.06.2017
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL
Discovery wellbore	YES
1st level with HC, age	TRIASSIC
1st level with HC, formation	LUNDE FM
Kelly bushing elevation [m]	25.0
Water depth [m]	340.0
Total depth (MD) [m RKB]	3530.0
Final vertical depth (TVD) [m RKB]	3524.0
Maximum inclination [°]	7.5
Oldest penetrated age	TRIASSIC
Oldest penetrated formation	TEIST FM
Geodetic datum	ED50
NS degrees	61° 45' 7.58" N
EW degrees	1° 36' 40.6" E
NS UTM [m]	6847511.82
EW UTM [m]	426672.46
UTM zone	31
NPDID wellbore	7630



Wellbore history

General

Well 33/2-2 S, was an exploration well drilled to test the Morkel prospect on the eastern down faulted terrace of the Makrell Horst. The well is located 1.7 km northeast of the closest neighbouring well, 33/5-1 (1979), which was drilled on the crest of the horst. The primary exploration target for the well was to prove petroleum in Late and Middle Jurassic reservoir rocks (Intra-Draupne Formation sandstone and the Brent group). The secondary exploration target was to prove hydrocarbons in Early Jurassic (the Statfjord Group) and Late Triassic reservoir rocks (the Lunde Formation).

Operations and results

Wildcat well 33/2-2 S was spudded with the semi-submersible installation Bredford Dolphin on 2 March 2015 and drilled to TD at 3530 m in the Triassic Teist Formation. No significant problem was encountered in the operations. The well was drilled with seawater and hi-vis pills down to 435 m, with Aqua-Drill mud from 435 m to 1754 m, with Carbo-Sea oil based mud from 1754 m to 2793 m, and with Aqua-Drill mud from 2793 m to TD.

The Early Cretaceous Mime Formation rest unconformably on the Triassic in the well. The Jurassic, including the primary exploration target was not encountered. In the secondary exploration target, the well encountered oil in the Lunde Formation from 2945 m to 3113 m, of which 12 m sandstone of poor reservoir quality. An ODT at 3112 m (3105 m TVD) is supported by the data, but it is not possible to establish hydrocarbon contacts confidently. Hydrocarbon shows were observed in greater parts of the well: from 1410 to 1650 m, from 2242 to 2260 m, and more or less the whole well below 2941 m.

Four cores were cut in the Triassic section. Core 1 and 2 were cut from 2943 to 2960.4 m. Core 3 was cut from 2988.7 to 2997.2 m, and core 4 from 3049 to 3059 m. Core recovery was from 81 to 98%. MDT fluid samples were taken at 2946.3 m (water), 3005.8 m (oil), 3066.9 m (oil), 3079.4 m (oil). Single stage separation of the samples gave GOR's in the range 193 to 219 Sm³/Sm³ and stock-tank oil density in the range 0.819 to 0.822 g/cm³.

The well was permanently abandoned on 10 June 2015 as an oil discovery.

Testing

One drill stem test was performed from the interval 3007.5 to 3115 m in the Lunde Formation. The test produced approximately 20 Sm³ oil and 4500 Sm³ gas /day through an 18/64" choke. The DST confirms the logging and poro-perm assessment indicating that the reservoir formation is rather tight and has low producibility. The DST temperature was 121.5 °C

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
440.00	3530.00

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	2943.0	2948.6	[m]
2	2949.1	2960.1	[m]
3	2988.7	2995.3	[m]
4	3049.0	3058.0	[m]

Total core sample length [m]	32.2
Cores available for sampling?	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
365	NORDLAND GP
365	NAUST FM
910	UNDIFFERENTIATED
1092	UNDIFFERENTIATED
1104	HORDALAND GP
1104	UNDIFFERENTIATED
1530	ROGALAND GP
1530	BALDER FM
1548	SELE FM
1561	LISTA FM
1653	SHETLAND GP
1653	JORSALFARE FM
1952	KYRRE FM
2829	TRYGGVASON FM
2897	BLODØKS FM
2935	CROMER KNOLL GP
2935	MIME FM
2946	HEGRE GP
2946	LUNDE FM
3113	ALKE FM
3276	TEIST FM



Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3008	3115	7.1

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				121

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	20	4500			

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CMR XPT JAR	2792	3526
FMI MSIP PPC GR JAR	365	3529
MDT SAMP JAR	3098	3098
MDT XLD JAR	2920	2936
MSCT GR 1H	2975	0
MSCT GR 1I	2963	3092
MSCT GR 1J	3097	3112
MSCT GR 1K	2934	3478
MWD - GR PWD RES CAL DEN NEU SON	2879	3527
MWD - GR PWD RES DIR	365	422
MWD - GR PWD RES DIR SON	435	1194
MWD - GR RES PWD DIR DEN NEU SON	1752	2785
MWD - GR RES PWD DIR SON	1207	1745
MWD - PWD GR RES CAL DEN NEU SON	2793	2940
MWD - RES GR DIR	407	1205
UBI HRLA PEX HNGSECS JAR	2788	3525
VSP	409	3460

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	431.5	36	434.5	0.00	
PILOT HOLE		1200.0	12 1/4	1200.0	0.00	
SURF.COND.	20	1207.0	26	1215.0	1.60	LOT
INTERM.	13 5/8	1745.0	17 1/2	1754.0	1.79	LOT
LINER	9 5/8	2792.0	12 1/4	2793.0	1.91	LOT
LINER	7	3196.0	8 1/2	0.0	0.00	
OPEN HOLE		3530.0	8 1/2	3530.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
385	1.51	21.0		Water Based	
435	1.03	1.0		Water Based	
906	1.51	21.0		Water Based	
984	1.30	11.0		Water Based	
1215	1.40	14.0		Water Based	
1865	1.55	39.0		Water Based	
2485	1.48	18.0		Water Based	
2720	1.65	47.0		Water Based	
3157	1.71	1.0		Water Based	
3530	1.78	33.0		Water Based	