



Generell informasjon

Brønnbane navn	16/4-8 S
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Pressemelding	lenke til pressemelding
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	SOLVEIG
Funn	16/4-6 S Solveig
Brønn navn	16/4-8
Seismisk lokalisering	LN0902:inline 4360 & crossline 1508
Utvinningstillatelse	359
Boreoperatør	Lundin Norway AS
Boretillatelse	1510-L
Boreinnretning	BREDFORD DOLPHIN
Boredager	69
Borestart	19.06.2014
Boreslutt	26.08.2014
Plugget og forlatt dato	26.08.2014
Frigitt dato	26.08.2016
Publiseringsdato	26.08.2016
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	OIL/GAS
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	TRIASSIC
1. nivå med hydrokarboner, formasjon.	HEGRE GP
Avstand, boredekk - midlere havflate [m]	25.0
Vanndybde ved midlere havflate [m]	100.0
Totalt målt dybde (MD) [m RKB]	2700.0
Totalt vertikalt dybde (TVD) [m RKB]	2670.0
Maks inklinasjon [°]	23.2
Eldste penetrerte alder	TRIASSIC
Eldste penetrerte formasjon	SKAGERRAK FM
Geodetisk datum	ED50
NS grader	58° 39' 53.32" N



ØV grader	2° 16' 24.76" E
NS UTM [m]	6503106.93
ØV UTM [m]	457856.97
UTM sone	31
NPDID for brønnbanen	7415

Brønnhistorie

**General**

Well 16/4-8 S was drilled to appraise the Luno II discovery made by well 16/4-6 S in 2013 on the west flank of the Utsira High in the North Sea. Well 16/4-8 S targeted the Central South segment, located 4 km south of the Luno II discovery well. The objectives were to prove presence of good quality Jurassic/Triassic reservoir sandstone; to verify the petroleum potential in the Central South segment including the Luno II OWC at 1950 m MSL; and to calibrate the seismic interpretations for the Luno II sub-basin.

Operations and results

Appraisal well 16/4-8 S was spudded with the semi-submersible Bredford Dolphin on 19 June 2014 and drilled to 2700 m (2670 m TVD) in the Triassic Skagerrak Formation. The well was drilled deviated from 2100 m to avoid a prognosed fault. Mud losses occurred when drilling the interval 2391 m to TD. LCM pills were pumped to amend this. Otherwise, no significant problem was encountered in the operations. The well was drilled with spud mud down to 610 m and with Aquadril mud from 610 m to TD.

Top reservoir Hegre Group, was encountered at 1934 m (1934 m TVD). No Jurassic sediments were present. The Skagerrak Formation held a total oil column of about 30 m, of which about 15 m had very good reservoir properties. The oil is saturated with a thin gas column on top. Between ca 1970 m and ca 1980 m the reservoir was mainly water bearing, and then a separate zone with biodegraded oil and water was sampled from 1980 to 1987. No clear OWC could be established from the well data. The reservoir rocks, including the water zone, consist of 500-metre thick sandstones over a 200-metre thickness of conglomerate rock. Pressure data shows there is no pressure communication between 16/4-8 S and the 16/4-6 S discovery well.

The first oil show appeared in sidewall cores in Shetland Group limestone from 1928 m, six meter above top reservoir. Variable but generally good oil shows were described throughout the oil-bearing reservoir and down to 2030 m. Local weak oil shows were described in the Hegre Group below 2030 m down to 2382 m.

Seventy-three meter core was recovered in seven consecutive cores in the interval 1935 to 2009 m (98.7% total recovery). MDT fluid samples were taken at 1934.5 m (condensate), 1942.3 m (oil), 1942.5 m (oil), 1945.5 m (oil), 1955.7 m (oil), 1962 m (oil), 1962.8 m (oil), 1967 m (oil), 1975 m (water), 1980 m (slightly biodegraded oil/water/gas), 1987 m (water and traces of mildly biodegraded oil), 2024 m (water), and 2508.2 m (water).

The well was permanently abandoned on 26 August 2014 as an oil and gas appraisal well.

Testing

One production test was performed in the well 16/4-8 S. The interval 1940 to 1958 m was perforated and produced with a final flow rate of 63 Sm³ oil and 12030 Sm³ gas /day through a 28/64" fixed choke with a wellhead pressure of 17 bar. A GOR of 192 Sm³/Sm³ was measured at separator conditions of 44.2 °C and 8.7 bar. The on-site measured oil density at 15 °C was 0.89 g/cc and the gas gravity was 0.91 (air = 1). The H₂S and CO₂ contents were less than 0.1 ppm and 0.2 % respectively. The maximum temperature recorded at gauge depth 1919.37 was 81°C, but due to significant Joule-Thompson effects the recorded temperatures varied widely, and the true formation temperature could not reliably be established.



Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
620.00	2700.00

Borekaks tilgjengelig for prøvetaking?	YES
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Borekjerne i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1935.0	1948.1	[m]
2	1948.1	1960.0	[m]
3	1960.4	1970.9	[m]
4	1970.9	1985.8	[m]
5	1986.0	1997.0	[m]
6	1996.0	2002.2	[m]
7	2002.2	2008.6	[m]

Total kjerneprøve lengde [m]	74.0
Kjerner tilgjengelig for prøvetaking?	YES

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
125	NORDLAND GP
760	UTSIRA FM
1027	HORDALAND GP
1042	SKADE FM
1209	HORDALAND GP
1747	ROGALAND GP
1747	BALDER FM
1750	SELE FM
1800	LISTA FM
1897	VÅLE FM
1907	SHETLAND GP
1907	EKOFISK FM
1928	TOR FM
1932	HOD FM
1933	CROMER KNOLL GP
1934	HEGRE GP



1934	SKAGERRAK FM
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Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsven til størrelse [mm]
1.0	1940	1958	11.1

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningsstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0				44

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	GOR [m3/m3]
1.0	63	12030			192

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
ADT MDT	1934	2383
ADT MDT	1934	2673
ADT MDT	1962	2508
DSL CN ZDL ORIT XMAC RTEX MLL	1859	2704
DSL CN ZDL ORIT XMAC RTEX MLL	1865	2409
FLEX MREX	1917	2403
FLEX MREX	2337	2707
GEO WAVES	354	2389
GEO WAVES	829	2689
MAXCOR	1928	2365
MDT	1934	2024
MSCT	1928	2366
MWD - GR RES DEN NEU SON DIR PWD	573	2697
MWD - GR RES SON DIR PWD	125	607
STAR-HD ORIT UXPL	1875	2398
STAR-HD ORIT UXPL	2328	2696
XL-ROCK	2029	2682



Foringsrør og formasjonsstyrketester

Type utforing	Utforing diam. [tommer]	Utforing dybde [m]	Brønnbane diam. [tommer]	Brønnbane dyp [m]	LOT/FIT slam eqv. [g/cm3]	Type formasjonstest
CONDUCTOR	30	203.0	36	203.0	0.00	
SURF.COND.	20	602.0	26	610.0	1.81	LOT
PILOT HOLE		610.0	9 7/8	610.0	0.00	
OPEN HOLE		615.0	17 1/2	615.0	0.00	
PROD.	9 5/8	1910.0	12 1/4	1918.0	1.50	FIT
OPEN HOLE		2700.0	8 1/2	2700.0	0.00	

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
125	1.03	111.0		Water Based	
610	1.03	111.0		Water Based	
1174	1.35	21.0		Water Based	
1657	1.40	22.0		Water Based	
1913	1.20	19.0		Water Based	
1918	1.40	22.0		Water Based	
2009	1.20	19.0		Water Based	
2407	1.20	21.0		Water Based	
2700	1.10	30.0		Water Based	