Generell informasjon

Brønnbane navn	16/1-15
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Pressemelding	lenke til pressemelding
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	EDVARD GRIEG
Funn	16/1-8 Edvard Grieg
Brønn navn	16/1-15
Seismisk lokalisering	LN 0902 R10 inline 1488 & crossline 5496
Utvinningstillatelse	338
Boreoperatør	Lundin Norway AS
Boretillatelse	1334-L
Boreinnretning	BREDFORD DOLPHIN
Boredager	74
Borestart	22.01.2011
Boreslutt	05.04.2011
Frigitt dato	05.04.2013
Publiseringsdato	05.04.2013
Opprinnelig formål	WILDCAT
Gjenåpnet	NO
Innhold	OIL
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	EARLY CRETACEOUS
1. nivå med hydrokarboner, formasjon.	INTRA ÅSGARD FM SS
2. nivå med hydrokarboner, alder	PRE-DEVONIAN
2. nivå med hydrokarboner, formasjon	BASEMENT
Avstand, boredekk - midlere havflate [m]	25.0
Vanndybde ved midlere havflate [m]	111.0
Totalt målt dybde (MD) [m RKB]	2150.0
Totalt vertikalt dybde (TVD) [m RKB]	2150.0
Maks inklinasjon [°]	2.4
Temperatur ved bunn av brønnbanen [°C]	94

Eldste penetrerte alder	PRE-DEVONIAN
Eldste penetrerte formasjon	BASEMENT
Geodetisk datum	ED50
NS grader	58° 52' 23.82'' N
ØV grader	2° 15' 41.3'' E
NS UTM [m]	6526327.33
ØV UTM [m]	457412.51
UTM sone	31
NPDID for brønnbanen	6517

Brønnhistorie

General

Well 16/1-15 was drilled on the western side of the Utsira High in the North Sea. The objective was to test Jurassic/Triassic sandstones prognosed at 1925 in the Tellus prospect north of the Luno Discovery. The Luno Discovery has later been officially named the Edvard Grieg Field. The Tellus prospect was separated from Luno by a fault zone trending NW SE.

Operations and results

Wildcat well 16/1-15 was spudded with the semi-submersible installation Bredford Dolphin on 22 January 2011 and drilled to TD at 2150 m, 230 m into pre-Devonian basement rock. Due to possible shallow gas sands a precautionary 9 7/8" pilot hole was drilled down to 585 m. Only water filled sands were seen. Several incidents interrupted the progress where the most serious was a failed 20" casing cement job. The other incidents were related to the BOP and a stuck wire line string. The well was drilled with seawater and sweeps down to 585 m, and with Performadril mud from 585 m to TD.

The well proved an oil column of 48 metres in a thin, Intra Åsgard Formation Sandstone directly overlying weathered and porous / fractured basement. Top of fractured basement was at 1920 m. No Triassic or Jurassic sediments were identified in the well. The Intra Åsgard Formation Sandstone is a chalk arenite, 2.7m thick, with excellent reservoir properties. An oil/water contact was established at approximately 1965 m (1940 m TVD MSL). The acquired pressure, geochemistry and PVT data supports communication between the Luno and Tellus Discoveries, making the Tellus area a northern extension of the Luno Discovery.

Intermittent oil shows were described on core 1 immediately above the reservoir in a thin Hod Formation limestone. Below OWC shows were described on cores down to 1976 m. Further weak shows were described on cuttings down to 1997 m.

A total of 61 meter core was recovered in four cores from 1915 to 1976 m (all core depths 2.15 m deeper than logger's depth) in the Hod Formation, Intra Åsgard Formation Sandstones and Basement. The overall recovery rate was 85.2%. Fluid sampling, water and oil, was performed using an extra-large diameter MDT-probe and dual packer. Samples were taken in the oil bearing zone at 1918.99 m, 1921.47 m, 1923.81 m, 1932.96 m,1937.23 m, 1952.43 m, 1959.62 m, and 1967.04 m. A water sample was taken at 2030.52 m. The oil samples show an under saturated light oil similar to the oil found in the Luno Field. The typical GOR from the MDT samples was 125 Sm3/Sm3, the oil density was 0.72 g/cm3 and the gas gravity was 0.95 (air=1).

The well was plugged back to the 20" casing shoe on 5 April 2011 and a sidetrack 16/1-

15 A was prepared. Well 16/1-15 is classified as an oil appraisal.

Testing

Two drill stem tests were performed.

DST 1 tested the interval 1926 to 1960 m in the basement. After a slow initial production, the perforations were cleaned up and the well produced with a continuous flow to surface with an oil-rate of 105 sm3/d on a 40/64" choke and a bottom-hole pressure of 56.6 bar. No water was produced. This was the first successful full-scale production test of a reservoir consisting of cracked and porous bedrock on the Norwegian Continental Shelf.

DST 2 tested the interval 1917 to 1920 m in the Intra Åsgard Formation Sandstone. The main flow produced 470 sm3/d on a 36/64" choke with a bottom-hole pressure of 179.7 bar. No water was produced. The average GOR was 90 Sm3/Sm3. The maximum temperature at reference depth 1916.9 m was 84.5 deg C.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
590.00	2150.28

Borekaks tilgjengelig for prøvetaking?	YES

Borekjerner i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1915.0	1931.2	[m]
2	1931.2	1937.1	[m]
3	1946.0	1960.1	[m]
4	1960.3	1976.2	[m]

Total kjerneprøve lengde [m]	52.1
Kjerner tilgjengelig for prøvetaking?	YES

Oljeprøver i Sokkeldirektoratet

Test type	Flaske nummer	Topp dyp MD [m]	Bunn dyp MD [m]	Væske type	Test tidspunkt	Prøver tilgjengelig
DST		0.00	0.00			YES
MDT		2067.80	0.00	OIL	07.05.2011 - 00:00	NO

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
136	NORDLAND GP
774	UTSIRA FM
870	NO FORMAL NAME
944	HORDALAND GP
944	SKADE FM
1189	NO FORMAL NAME
1553	GRID FM
1642	NO FORMAL NAME
1766	ROGALAND GP
1766	BALDER FM
1778	SELE FM
1800	LISTA FM
1879	VÅLE FM
1889	SHETLAND GP
1889	EKOFISK FM
1906	TOR FM
1913	HOD FM
1915	CROMER KNOLL GP
1915	ÅSGARD FM
1917	INTRA ÅSGARD FM SS
1920	BASEMENT

Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsven til størrelse [mm]
1.0	1926	1960	15.8
2.0	1917	1920	15.8

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0				
2.0				

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	GOR [m3/m3]
1.0	105				
2.0	620				

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CMR XPT EDTC	1872	2146
FMI PPC MSIP PPC ECRD LEH QT	1466	1872
FMI PPC MSIP PPC ECRD LEH QT	1872	2149
HRLA PEX ECS HNGS	1872	2144
MDT GR LEH QT	1872	2149
MRX LEH QT	1872	2149
MWD LWD - GR RES DEN NEU AC PWD	557	2147
MWD LWD - GR RES PWD DIR	131	582
VSP GR	136	2085

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	214.0	36	214.0	0.00	LOT
SURF.COND.	20	576.0	26	585.0	1.70	LOT
PILOT HOLE		585.0	9 7/8	585.0	0.00	LOT
INTERM.	9 5/8	1874.0	12 1/4	1880.0	1.91	LOT
LINER	7	2148.0	8 1/2	2150.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
517	1.35	16.0		Polymer Mud	
585	1.29	27.0		PERFORMADRIL	
585	1.30	30.0		PERFORMADRIL	
585	1.30	30.0		Performadril WBM	
619	1.30	27.0		PERFORMADRIL	
635	1.35	16.0		Polymer Mud	
1880	1.35	41.0		PERFORMADRIL	
1914	1.20	29.0		PERFORMADRIL	
1931	1.20	27.0		PERFORMADRIL	
1939	1.20	26.0		PERFORMADRIL	
1960	1.20	26.0		PERFORMADRIL	
1976	1.20	27.0		PERFORMADRIL	
2150	1.20			sodium chloride brine	
2150	1.20	29.0		PERFORMADRIL	

Trykkplott

Porertrykksdataene kommer fra logging i brønnen hvis ingen annen kilde er oppgitt. I noen brønner der trykk ikke er logget, er det brukt informasjon fra formasjonstester eller brønnspark. Trykkdataene er rapportert inn til Oljedirektoratet og videre prosessert og kvalitetssikret av IHS Markit.

Dokument navn	Dokument format	Dokument størrelse [KB]
6517_Formation_pressure_(Formasjonstrykk)	pdf	0.22