



Generell informasjon

Brønnbane navn	25/11-21 S
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	GRANE
Funn	25/11-15 Grane
Brønn navn	25/11-21
Seismisk lokalisering	NH 9301- ROW 1405 & COLUMN 1750
Utvinningstillatelse	169
Boreoperatør	Norsk Hydro Produksjon AS
Boretillatelse	832-L
Boreinnretning	TREASURE SAGA
Boredager	22
Borestart	23.10.1995
Boreslutt	14.11.1995
Frigitt dato	14.11.1997
Publiseringsdato	20.03.2003
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	OIL
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	PALEOCENE
1. nivå med hydrokarboner, formasjon.	HEIMDAL FM
Avstand, boredekk - midlere havflate [m]	26.0
Vanndybde ved midlere havflate [m]	129.0
Totalt målt dybde (MD) [m RKB]	1957.0
Totalt vertikalt dybde (TVD) [m RKB]	1889.5
Maks inklinasjon [°]	27.9
Temperatur ved bunn av brønnbanen [°C]	72
Eldste penetrerte alder	LATE CRETACEOUS
Eldste penetrerte formasjon	HOD FM
Geodetisk datum	ED50
NS grader	59° 9' 43.43" N



ØV grader	2° 27' 53.07" E
NS UTM [m]	6558372.45
ØV UTM [m]	469391.49
UTM sone	31
NPDID for brønnbanen	2701

Brønnhistorie

General

Well 25/11-21 S was drilled on the Grane Field. The primary objectives of well 25/11-21 S were to calibrate the depth conversion model with reference to top and base of the Grane reservoir and the oil-water contact, and to investigate horizontal and vertical reservoir barriers and reservoir heterogeneities. The secondary objectives of well 25/11-21 S were to obtain reservoir and fluid data and to investigate uncontaminated initial water saturation values in the oil zone. The well location was selected to allow building up hole angle for later drilling of a horizontal section (25/11-21 A) at the required depth and coordinates and at the same time to provide an accurate seismic tie, i.e. an area with minimal compaction effects and away from faults, in an area where there are indications of a thick sand on the seismic data.

Sidetrack well 25/11 -21 A was drilled to obtain 600 m to 900 m of horizontal reservoir information. The objectives were to appraise the reservoir in terms of reservoir quality and to confirm the structural top and base reservoir maps; to obtain lateral velocity information for calibration of the depth conversion model; to identify possible reservoir heterogeneities indicated on seismic; and finally to perform an extended test production in the horizontal section of the well.

Operations and results

Appraisal well 25/11-21 S was spudded with the semi-submersible installation "Treasure Saga" on 23 October 1995 and drilled to TD at 1957 m (1863.5 m TVD MSL) in Late Cretaceous Hod Formation. The well was drilled with seawater and hi-vis bentonite sweeps down to 1270 m and with KCl / Polymer mud from 1270 m to TD.

Heimdal Formation sand was penetrated at 1788 m (1711.5 m TVD MSL). A reservoir thickness of 88 m (79.5 m TVD) was defined, giving a net pay of 57.9 m. The pressure data from the Heimdal Formation indicates a 0.4 bar pressure difference to well 25/11-18 T2 and 1.7 bar difference to well 25/11-15 based on HP gauge measurements. The oil-water contact (FWL) in the well was found at 1765 m TVD MSL, i.e. more or less the same as in well 25/11-18-T2 and 2.5 meters deeper than in well 25/11-15. No free gas cap was found. Both the top and base reservoir seismic reflectors and the depth conversion model were proven to be correct in the area, and the reservoir characteristics as found in wells 25/11-15 and 25/11-18 T2 were confirmed. A walk away VSP and walk away AVO VSP were acquired in well 25/11-21 S yielding good quality high resolution data. The entire reservoir section was cored from 1778 m to 1880.5 m. The wire line logging programme was followed successfully except for an operational failure of the GHMT-tool. MDT Oil samples were taken at 1790 m (1713.09 m TVD MSL), 1796 m (1718.6 m TVD MSL), 1813 m (1734 m TVD MSL), 1828 m (1747.4 m TVD MSL), 1830 m (1749.4 m TVD MSL), 1837.5 m (1756.2 m TVD MSL), and 1845 m (1763 m TVD MSL). MDT water samples were taken at 1850 m (1767.5 m TVD MSL), 1855 m (1772.1 m TVD MSL), 1861.5 m (1777.9 m TVD MSL), and 1874 m (1789.2 m TVD MSL). Well 25/11-21 S was plugged back to the 13 3/8" casing shoe and suspended as an oil appraisal on 14 November 1995.

The well was re-entered with the semi-submersible installation "Treasure Saga" on 15



May 1996. Well 25/11-21 A was kicked off at 1262 m and drilled down to 1973 m in the Heimdal Formation. The hole was drilled with a too low angle to reach the 10 3/4" casing point within acceptable tolerances. Thus the hole was plugged back from 1973 m, and a technical sidetrack, 25/11-21 A T2, was drilled from 1783 m, continued inclined to horizontal, and drilled to TD at 3006 m (1801.4 m TVD MSL) in the Late Paleocene Lista Formation. The sidetrack was drilled water based with KCl / Polymer mud from kick off to 2448 m and with CaCO₃ / NaCl mud from 2448 m to TD. In well 25/11-21 A T2, the top of the Heimdal Formation sand was penetrated at 1837.5 m (1705.7 m TVD MSL). At a depth of 1749 m TVD MSL a 820 m horizontal section was drilled. Here a 3 m thick calcite cemented layer, corresponding to an intra reservoir reflector, was penetrated at 2514.5 m. A deformed shaly zone, penetrated at 2627.5 - 2652 was probably due to drilling very close to top reservoir in this area. The Base of the Heimdal Formation was reached at 1765.7 m TVD MSL. The reservoir quality of the Heimdal sand is good, showing average porosities of 33%, and a general porosity increase from the SW towards the NE along the well path. The net to gross ratio of the Heimdal Formation is 0.98, due to the penetrated cemented and shaly zones. The oil-water contact (FWL) was found at 1765.6 m TVD MSL, confirming the results from the wells 25/11-21 S and 25/11-18 T2. The average oil saturation within the oil zone is 90%. Only MWD logs were obtained in the sidetrack. No wire line logs were run; consequently no fluid samples were taken on wire line. No conventional or sidewall cores were cut in the sidetrack. Well 25/11-21 A was suspended as an oil appraisal on 1 October 1996

Testing

No drill stem test was performed.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
1280.00	1957.00

Borekaks tilgjengelig for prøvetaking?	YES
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Borekjerne i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1778.0	1785.2	[m]
2	1789.0	1807.7	[m]
3	1808.0	1826.8	[m]
4	1827.0	1846.0	[m]
5	1846.0	1865.7	[m]
6	1865.0	1874.9	[m]
7	1876.0	1880.5	[m]

Total kjerneprøve lengde [m]	97.8
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder



1778-1783m



1783-1785m



1789-1794m



1794-1799m



1799-1804m



1804-1807m



1808-1813m



1813-1818m



1818-1823m



1823-1826m



1827-1832m



1832-1837m



1837-1842m



1842-1846m



1846-1851m



1851-1856m



1856-1861m



1861-1865m



1865-1870m



1870-1874m



1876-1880m

Palynologiske preparater i Sokkeldirektoratet



Prøve dybde	Dybde enhet	Prøve type	Laboratorie
1280.0	[m]	DC	RRI
1300.0	[m]	DC	RRI
1310.0	[m]	DC	RRI
1330.0	[m]	DC	RRI
1340.0	[m]	DC	RRI
1360.0	[m]	DC	RRI
1370.0	[m]	DC	RRI
1390.0	[m]	DC	RRI
1400.0	[m]	DC	RRI
1420.0	[m]	DC	RRI
1430.0	[m]	DC	RRI
1450.0	[m]	DC	RRI
1460.0	[m]	DC	RRI
1480.0	[m]	DC	RRI
1490.0	[m]	DC	RRI
1510.0	[m]	DC	RRI
1520.0	[m]	DC	RRI
1560.0	[m]	DC	RRI
1570.0	[m]	DC	RRI
1590.0	[m]	DC	RRI
1600.0	[m]	DC	RRI
1620.0	[m]	DC	RRI
1630.0	[m]	DC	RRI
1650.0	[m]	DC	RRI
1660.0	[m]	DC	RRI
1680.0	[m]	DC	RRI
1690.0	[m]	DC	RRI
1700.0	[m]	DC	RRI
1705.0	[m]	DC	RRI
1710.0	[m]	DC	RRI
1715.0	[m]	DC	RRI
1722.0	[m]	DC	RRI
1725.0	[m]	DC	RRI
1732.0	[m]	DC	RRI
1737.0	[m]	DC	RRI
1740.0	[m]	DC	RRI
1745.0	[m]	DC	RRI
1750.0	[m]	DC	RRI
1757.0	[m]	DC	RRI



1762.0 [m]	DC	RRI
1770.0 [m]	DC	RRI
1775.0 [m]	DC	RRI
1783.0 [m]	C	RRI
1877.0 [m]	C	RRI
1878.0 [m]	C	RRI
1879.0 [m]	C	RRI
1880.0 [m]	C	RRI
1887.0 [m]	DC	RRI
1890.0 [m]	DC	RRI
1895.0 [m]	DC	RRI
1900.0 [m]	DC	RRI
1905.0 [m]	DC	RRI
1910.0 [m]	DC	RRI
1915.0 [m]	DC	RRI
1920.0 [m]	DC	RRI
1925.0 [m]	DC	RRI

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
155	NORDLAND GP
648	UTSIRA FM
710	NO FORMAL NAME
796	HORDALAND GP
796	SKADE FM
978	UNDIFFERENTIATED
1000	NO FORMAL NAME
1028	UNDIFFERENTIATED
1074	NO FORMAL NAME
1087	UNDIFFERENTIATED
1102	NO FORMAL NAME
1115	UNDIFFERENTIATED
1221	NO FORMAL NAME
1230	UNDIFFERENTIATED
1723	ROGALAND GP
1723	BALDER FM
1734	SELE FM
1745	LISTA FM



1788	HEIMDAL FM
1876	LISTA FM
1890	VÅLE FM
1908	SHETLAND GP
1908	EKOFISK FM
1929	TOR FM
1947	HOD FM

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
2701	pdf	0.30

Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
2701_25_11_21_S_COMPLETION_REPORT_AND_LOG	pdf	22.72

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CMR MSFL GR ACTS	1257	1955
DLL MSFL DSI GR SP AMS	1257	1956
LDL CNL FMS GR AMS	1256	1956
MDT GR ACTS	1769	1874
MDT GR ACTS	1790	1790
MDT GR ACTS	1830	1855
MWD - GR RES DIR	155	1957
VSP	308	1940

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
SURF.COND.	30	218.0	30	218.0	0.00	LOT





INTERM.	13 3/8	1270.0	17 1/2	1270.0	0.00	LOT
OPEN HOLE		1957.0	8 1/2	1957.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
173	1.25			WATER BASED	
216	1.02			WATER BASED	
217	1.25			WATER BASED	
1051	1.02			WATER BASED	
1150	1.36	22.0		WATER BASED	
1270	1.25			WATER BASED	
1275	1.36	16.0		WATER BASED	
1748	1.36	15.0		WATER BASED	
1827	1.36	15.0		WATER BASED	
1876	1.36	19.0		WATER BASED	
1911	1.36	21.0		WATER BASED	
1957	1.36	21.0		WATER BASED	

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]
2701 Formation pressure (Formasjonstrykk)	pdf	0.19

