



Generell informasjon

Brønnbane navn	31/2-13 S
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	TROLL
Funn	31/2-1 (Troll Vest)
Brønn navn	31/2-13
Seismisk lokalisering	81 007-412 SP 337.5 & 82-430 SP 102
Utvinningstillatelse	054
Boreoperatør	A/S Norske Shell
Boretillatelse	401-L
Boreinnretning	BORGNY DOLPHIN
Boredager	74
Borestart	02.01.1984
Boreslutt	15.03.1984
Frigitt dato	15.03.1986
Publiseringsdato	19.12.2007
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	OIL/GAS
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	LATE JURASSIC
1. nivå med hydrokarboner, formasjon.	SOGNEFJORD FM
Avstand, boredekk - midlere havflate [m]	25.0
Vanndybde ved midlere havflate [m]	333.0
Totalt målt dybde (MD) [m RKB]	2010.0
Totalt vertikalt dybde (TVD) [m RKB]	1727.6
Maks inklinasjon [°]	46.2
Temperatur ved bunn av brønnbanen [°C]	60
Eldste penetrerte alder	MIDDLE JURASSIC
Eldste penetrerte formasjon	FENSFJORD FM
Geodetisk datum	ED50
NS grader	60° 47' 14.15" N



ØV grader	3° 26' 3.43" E
NS UTM [m]	6739329.73
ØV UTM [m]	523646.72
UTM sone	31
NPDID for brønnbanen	93

Brønnhistorie

**General**

Well 31/2-13 S was drilled as an appraisal in the Troll West oil province in the Northern North Sea. The main objectives of were to investigate the reservoir properties and accumulation conditions between the wells 31/2-5 and 31/2-11. Water and/or gas - coning tests were to be conducted.

Operations and results

Appraisal well 31/2-13 S was spudded with the semi-submersible installation Borgny Dolphin on 2 January 1984 and drilled to TD at 2010 m in the Middle Jurassic Fensfjord Formation. Due to bad weather the string parted and was observed lying across the temporary guide base when the well was spudded. The fish was recovered. Straight hole was drilled down to 500 m where the hole was kicked off with an angle of 1 1/2 degree. Some problems due to tight hole occurred in the 17 1/2" hole. Mud losses to the formation occurred at 1531 and 1700 m, 100 bbls at each depth. A drill break occurred at 1744 m in the 12 1/4" hole section. The well was drilled with seawater and viscous pills down to 473 m, with Gelled mud from 473 m from 473 m to 750 m, with seawater from 750 m to 825 m, and with oil based mud from 825 m to TD. The Oil based mud used was termed "Fazekleen, low toxicity invert oil emulsion mud, based on Shell Sol D70 oil"

Top reservoir (top Sognefjord Formation) was penetrated at 1732 m (1526.5 m TVD), top Heather Formation at 1855 m (1613 m TVD), and top Fensford Formation sandstone at 1934 m (1671 m TVD). Oil and gas were encountered in the Sognefjord Formation. The GOC was at 1790 m (1567 m TVD) and the FWL was estimated at 1828.5 m (1594 m TVD). Strong to moderate fluorescence was observed on the cores down to 1844 m (1606 m TVD), but heavy contamination from the oil-based mud made shows detection somewhat uncertain. The upper half of the oil bearing formation consisted of generally clean sandstones. Below 1555 m TVD the sands were micaceous. Tight calcareous streaks occurred over the whole section. The core permeability in the clean sands ranged from 4 D to 15 D. In the micaceous sands the permeability were from 10 mD to 100 mD.

Eight fibreglass sleeve cores were cut from 1744 to 1844 m in the Sognefjord Formation sands. Seventy metres (70%) were recovered. An RFT segregated fluid sample was taken in the oil zone at 1800 m.

The well was permanently abandoned on 15 March 1984 as a gas and oil appraisal well.

Testing

A Production test was performed through a 5" production tubing in the Late Jurassic sequence. During clean-up producing 810 Sm³/day gas cap gas broke through. The well was then produced at rates up to 604 Sm³/day. The gas-oil ratio increased from solution GOR (57 Sm³/Sm³) to 552 Sm³/Sm³. The produced oil had a gravity 0.88 - 0.89 G7cm³ (28 deg API), the gas 0.70-0.63 (air = 1). No formation water produced. The estimated critical rate (to gas coning) in 31/2-13, ca 315 Sm³/day, was significantly lower than in 31/2-5 (795 Sm³/day). Maximum down-hole temperature recorded in the production test was 65.2 deg C.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
480.00	2006.00

Borekaks tilgjengelig for prøvetaking?	YES
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Borekjerne i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1744.0	1754.0	[m]
2	1754.0	1757.0	[m]
3	1772.0	1782.0	[m]
4	1784.0	1795.0	[m]
5	1795.0	1807.0	[m]
6	1807.0	1813.0	[m]
7	1813.0	1824.0	[m]
8	1825.0	1840.7	[m]

Total kjerneprøve lengde [m]	78.7
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder



1744-1756m



1756-1774m



1774-1778m



1778-1781m



1781-1786m



1786-1789m



1789-1793m



1793-1796m



1796-1800m



1800-1803m



1803-1807m



1807-1811m



1811-1814m



1814-1817m



1818-1822m



1822-1825m



1826-1829m



1829-1832m



1833-1837m



1837-1839m

Oljeprøver i Sokkeldirektoratet

Test type	Flaske nummer	Topp dyp MD [m]	Bunn dyp MD [m]	Væske type	Test tidspunkt	Prøver tilgjengelig
DST	DST1	1801.00	1806.00	OIL	03.03.1984 - 00:00	YES

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
358	NORDLAND GP
783	HORDALAND GP
1460	ROGALAND GP
1460	BALDER FM
1540	SELE FM
1577	LISTA FM
1718	VÅLE FM
1728	SHETLAND GP
1732	VIKING GP
1732	SOGNEFJORD FM
1855	HEATHER FM
1934	FENSFJORD FM

Dokumenter - eldre Sokkeldirektoratets WDSS rapporter og andre relaterte dokumenter

Dokument navn	Dokument format	Dokument størrelse [KB]
93_01_WDSS_General_Information	pdf	0.18
93_02_WDSS_completion_log	pdf	0.19





Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
93 01 31 2 13 Completion Report and Completion log	PDF	7.74
93 02 31 2 13 Core description core 2-8	pdf	5.93
93 02 31 2 13 Data from meas. on samples	pdf	0.10
93 02 31 2 13 Directional drilling report	pdf	0.72
93 02 31 2 13 Drilling fluids summary	pdf	2.16
93 02 31 2 13 Drilling programme a	pdf	1.50
93 02 31 2 13 Drilling programme b	pdf	1.03
93 02 31 2 13 Drilling programme encl 1	pdf	0.43
93 02 31 2 13 Grain size distribution analysis	pdf	0.26
93 02 31 2 13 High Acc.press.temp	pdf	1.63
93 02 31 2 13 High acc.pressure Report post acid 82014	pdf	6.68
93 02 31 2 13 High acc.pressure Report post acid 83064	pdf	5.80
93 02 31 2 13 High acc.pressure Report pre acid a	pdf	2.66
93 02 31 2 13 High acc.pressure Report pre acid b	pdf	2.27
93 02 31 2 13 High rate gas flow test	pdf	0.72
93 02 31 2 13 Palynological results	pdf	0.91
93 02 31 2 13 Petrofysisk hurtig-evaluering	pdf	0.87
93 02 31 2 13 Petrofysisk hurtig-evaluering encl 1	pdf	0.83
93 02 31 2 13 Poro perm results	pdf	0.44
93 02 31 2 13 Poro perm results encl 1	pdf	0.14
93 02 31 2 13 Production test program	pdf	1.74
93 02 31 2 13 Production test program encl 1	pdf	0.20
93 02 31 2 13 Production test program encl 2	pdf	0.26
93 02 31 2 13 Production test program encl 3	pdf	0.15
93 02 31 2 13 Reservoir fluid study	pdf	0.77
93 02 31 2 13 Special core analysis study	pdf	2.45
93 02 31 2 13 Special core analysis study	pdf	0.72
93 02 31 2 13 Well testing report	pdf	26.29





Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsven til størrelse [mm]
1.0	1801	1807	21.0

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0				60

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	GOR [m3/m3]
1.0	540	144180	0.880	0.630	267

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CBL VDL GR	635	1697
CBL VDL GR	1450	1968
CST	0	0
DIL BHC GR	805	1675
DIL LSS GR	1699	2006
ISF BHC GR	455	823
LDL CNL GR	804	1677
LDL CNL GR	1699	2007
LDT CNL GR	455	825
NGS	1699	2007
RFT	1800	1800
RFT GR HP	1750	1992
VELOCITY	455	2006

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	455.5	36	468.0	0.00	LOT
SURF.COND.	20	806.0	26	813.0	1.81	LOT
INTERM.	13 3/8	1700.0	17 1/2	1710.0	1.61	LOT
INTERM.	9 5/8	1999.0	12 1/4	2007.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
500	1.05			WATER BASED	
550	1.07			WATER BASED	
600	1.10			WATER BASED	
800	1.12			WATER BASED	
830	1.30			OIL BASED	
900	1.31			OIL BASED	
1140	1.40			OIL BASED	
1550	1.41			OIL BASED	
1750	1.25			OIL 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]
93 Formation pressure (Formasjonstrykk)	pdf	0.17

