



Generell informasjon

Brønnbane navn	31/4-9
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	BRAGE
Funn	31/4-3 Brage
Brønn navn	31/4-9
Seismisk lokalisering	NH 8501 - 129 SP 610
Utvinningstillatelse	055
Boreoperatør	Norsk Hydro Produksjon AS
Boretillatelse	534-L
Boreinnretning	POLAR PIONEER
Boredager	44
Borestart	23.01.1987
Boreslutt	07.03.1987
Frigitt dato	07.03.1989
Publiseringsdato	06.01.2014
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	OIL
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	MIDDLE JURASSIC
1. nivå med hydrokarboner, formasjon.	FENSFJORD FM
Avstand, boredekk - midlere havflate [m]	23.0
Vanndybde ved midlere havflate [m]	147.0
Totalt målt dybde (MD) [m RKB]	2480.0
Totalt vertikalt dybde (TVD) [m RKB]	2480.0
Maks inklinasjon [°]	2.4
Temperatur ved bunn av brønnbanen [°C]	100
Eldste penetrerte alder	EARLY JURASSIC
Eldste penetrerte formasjon	DRAKE FM
Geodetisk datum	ED50
NS grader	60° 32' 2.29" N



ØV grader	3° 5' 26.92" E
NS UTM [m]	6711042.08
ØV UTM [m]	504983.64
UTM sone	31
NPDID for brønnbanen	1026

Brønnhistorie

General

Well 31/4-9 was drilled as an appraisal well on the Brage Field on the Bjørgvin Arch in the North Sea. The main objective was to establish the OWC and confirm reservoir trends, hydrocarbon column and reserve potential in the east flank of the structure. TD was prognosed at 2500 m, 70 m into the Dunlin Group.

Operations and results

Appraisal well 31/4-9 was spudded with the semi-submersible installation Polar Pioneer on 23 January 1987 and drilled to TD at 2480 m in the Early Jurassic Drake Formation. No significant problem was encountered in the operations. The well was drilled with spud mud down to 974 m, with KCl/polymer mud from 974 m to 2027 m, and with NaCl/CaCO₃/polymer mud from 2027 m to TD.

The Fensfjord reservoir came in at 2168.5 m and consisted mainly of fine to medium grained sandstones grading into and interbedded with siltstones. The Fensfjord Formation was oil bearing down to the oil-water contact at 2172 m. The Brent sandstone was found to be water bearing. Oil shows were described in the cored sections from 2103.5 m in the Draupne Formation down to 2222 m in the Fensfjord Formation.

An attempt to take two cores in the Tertiary claystones failed. Eight cores were cut with good recovery in the interval 2103 to 2222 m in the Heather and Fensfjord formations. RFT oil samples were taken at 2171.5 m topmost in the Fensfjord Formation

The well was permanently abandoned on 7 March 1987 as an oil appraisal well.

Testing

Two drill stem tests were performed in the Fensfjord Formation.

DST 1 tested water from the interval 2193.1-2208.1 m through a 50.8 mm choke. The maximum production rate was 577.5 Sm³/day. An injection test was also performed with a maximum injection rate of 576 Sm³/day. Flowing bottom hole temperature was 90.8 deg C.

DST 2 tested oil from the interval 2169.6-2171.6 m through a 12.7 mm choke. The maximum flow rate for the oil was 311.1 Sm³/day and for the gas 23253 Sm³/day. DST 2 also produced 7-8% water and emulsion on average. The GOR was 75 Sm³/Sm³, the oil gravity was 0.875 g/cm³, and the gas gravity was 0.769 (air=1) with 0.5 - 1.0 % CO₂. Flowing bottom hole temperature was 88.1 deg C.

Borekaks i Sokkeldirektoratet



Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
980.00	2480.00

Borekaks tilgjengelig for prøvetaking?	YES
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Borekjerne i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
3	2105.0	2106.8	[m]
4	2107.0	2114.9	[m]
5	2116.5	2131.5	[m]
6	2132.5	2151.1	[m]
7	2149.5	2164.5	[m]
8	2164.5	2176.5	[m]
9	2176.5	2194.4	[m]
10	2194.0	2222.0	[m]

Total kjerneprøve lengde [m]	116.2
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	DST2	2169.60	2171.60	OIL	01.03.1987 - 00:00	YES

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
170	NORDLAND GP
685	UTSIRA FM
846	HORDALAND GP
1793	ROGALAND GP
1793	BALDER FM
1852	SELE FM



1892	LISTA FM
2043	SHETLAND GP
2043	HARDRÅDE FM
2093	CROMER KNOLL GP
2102	VIKING GP
2102	DRAUPNE FM
2118	HEATHER FM
2169	FENSFJORD FM
2368	BRENT GP
2368	NESS FM
2398	RANNOCH FM
2411	DUNLIN GP
2411	DRAKE FM

Geokjemisk informasjon

Dokument navn	Dokument format	Dokument størrelse [KB]
1026_1	pdf	0.28
1026_2	pdf	0.86
1026_3	pdf	0.57

Dokumenter - eldre Sökkeldirektoratets WDSS rapporter og andre relaterte dokumenter

Dokument navn	Dokument format	Dokument størrelse [KB]
1026_01 WDSS General Information	pdf	0.38
1026_02 WDSS completion log	pdf	0.20

Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
1026_31_4_9 Completion log	pdf	3.54
1026_31_4_9 Completion report	.pdf	14.45

Borestrengtester (DST)





Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsven til størrelse [mm]
1.0	2193	2208	50.8
2.0	2170	2172	12.7

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0				90
2.0				88

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstygde rel. luft	GOR [m3/m3]
1.0					
2.0	311	23253	0.875	0.769	75

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CBL CST VDL GR	1500	2389
CST	2008	2471
DIL LSS GR SP	945	1855
DITE LDL CNL NGT	1998	2471
DLL MSFL SDT GR	1998	2471
GR	170	945
MWD - GR RES	181	2480
RFT	2120	2409
RFT	2171	0
SHDT	1998	2474
VSP	360	2466

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	254.0	36	254.0	0.00	LOT
SURF.COND.	13 3/8	974.0	17 1/2	974.0	0.00	LOT



INTERM.	9 5/8	1998.0	12 1/4	2077.0	0.00	LOT
LINER	7	2479.0	8 3/8	2480.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
169	1.20	29.0	10.0	WATERBASED	09.03.1987
253	1.03			WATERBASED	26.01.1987
466	1.03	99.0	99.0	WATERBASED	26.01.1987
849	1.20	29.0	10.0	WATERBASED	06.03.1987
920	1.03	99.0	99.0	WATERBASED	26.01.1987
970	1.03			WATERBASED	27.01.1987
974	0.00	25.0	15.0	WATERBASED	29.01.1987
974	1.03	99.0	99.0	WATERBASED	28.01.1987
1087	1.25	27.0	18.0	WATERBASED	30.01.1987
1363	1.25	25.0	17.0	WATERBASED	02.02.1987
1458	1.40	27.0	15.0	WATERBASED	02.02.1987
1800	1.20	29.0	10.0	WATERBASED	05.03.1987
1962	1.40	30.0	17.0	WATERBASED	04.02.1987
2027	1.40	34.0	20.0	WATERBASED	02.02.1987
2027	0.00	31.0	18.0	WATERBASED	03.02.1987
2033	1.20	28.0	9.0	WATERBASED	05.02.1987
2105	1.20	30.0	11.0	WATERBASED	09.02.1987
2115	1.20	27.0	8.0	WATERBASED	09.02.1987
2141	1.20	28.0	9.0	WATERBASED	09.02.1987
2159	1.20	29.0	10.0	WATERBASED	04.03.1987
2177	0.00	36.0	12.0	WATERBASED	27.02.1987
2177	0.00	35.0	11.0	WATERBASED	02.03.1987
2177	0.00	35.0	12.0	WATERBASED	02.03.1987
2177	0.00	29.0	10.0	WATERBASED	03.03.1987
2177	1.21	25.0	7.0	WATERBASED	09.02.1987
2222	1.21	27.0	10.0	WATERBASED	10.02.1987
2242	1.20	33.0	10.0	WATERBASED	20.02.1987
2242	0.00	33.0	10.0	WATERBASED	23.02.1987
2242	0.00	33.0	10.0	WATERBASED	24.02.1987
2242	0.00	30.0	10.0	WATERBASED	25.02.1987
2242	0.00	36.0	12.0	WATERBASED	26.02.1987
2377	1.21	29.0	10.0	WATERBASED	11.02.1987



2394	1.20	31.0	10.0	WATERBASED	19.02.1987
2479	1.20	26.0	8.0	WATERBASED	18.02.1987
2479	0.00	25.0	8.0	WATERBASED	18.02.1987
2479	0.00	25.0	7.0	WATERBASED	18.02.1987
2479	0.00	31.0	10.0	WATERBASED	18.02.1987
2480	1.20	26.0	10.0	WATERBASED	12.02.1987
2480	0.00	26.0	10.0	WATERBASED	13.02.1987
2480	0.00	26.0	10.0	WATERBASED	18.02.1987

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]
1026 Formation pressure (Formasjonstrykk)	pdf	0.22

