Generell informasjon

Brønnbane navn	31/3-2
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	TROLL
Funn	31/6-1 (Troll Øst)
Brønn navn	31/3-2
Seismisk lokalisering	ST 8007 - 338 A SP. 204.5
Utvinningstillatelse	085
Boreoperatør	Norsk Hydro Produksjon AS
Boretillatelse	403-L
Boreinnretning	TREASURE SEEKER
Boredager	57
Borestart	05.03.1984
Boreslutt	30.04.1984
Frigitt dato	30.04.1986
Publiseringsdato	06.06.2006
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]	340.0
Totalt målt dybde (MD) [m RKB]	2090.0
Totalt vertikalt dybde (TVD) [m RKB]	2090.0
Maks inklinasjon [°]	1.4
Temperatur ved bunn av brønnbanen [°C]	73
Eldste penetrerte alder	EARLY JURASSIC
Eldste penetrerte formasjon	DRAKE FM
Geodetisk datum	ED50
NS grader	60° 52' 11.41'' N

ØV grader	3° 40' 41.79'' E
NS UTM [m]	6748639.40
ØV UTM [m]	536836.48
UTM sone	31
NPDID for brønnbanen	100

Brønnhistorie

General

Well 31/3-2 was drilled immediately to the southeast of a fault that was interpreted as a boundary fault between Troll West and Troll East. The main objectives of the appraisal well 31/3-2 were to determine if hydrocarbons were present on the downthrown south side of the fault, to determine the contacts, and to determine the degree of communication across the fault plane. A test would be performed in the case of moveable hydrocarbons, in order to observe boundary effects where the pay zone is narrow and thin. The well was planned to reach total depth in the Early Jurassic Drake Formation at 2050 m if drilling through the "boundary fault". In the case of drilling entirely within the hanging-wall block the total depth was estimated to 2130 m.

Operations and results

Well 31/3-2 was spudded with the semi-submersible installation Treasure Seeker on 5 March 1984 and drilled to TD at 2090 m in claystones of the Early Jurassic Drake Formation. No significant technical problems occurred during drilling and testing. The well was drilled with pre-hydrated gel/seawater with sweeps of high viscous mud down to 629 m and with KCl/polymer mud from 629 m to TD.

The Sognefjord Formation (1567 - 1706 m) was found oil bearing down to 1578.5 m where the oil/water contact was established. The oil-bearing reservoir consisted of very fine to very coarse-grained sandstones. They are friable to loose with only traces of siliceous or calcareous cement. The total net sand in the Sognefjord Formation was calculated to 132 m out of 139 m gross thickness, giving a net/gross ratio of 0.95 and an average porosity of 26.6%. A thin (0.5 m) gas cap could be present on top of the oil column. This was identified from LDT/CNL logs and was also consistent with the GOR development during the test, but was not confirmed by RFT data. There were no oil shows above the Sognefjord Formation, and no oil shows below1595 m, and the Middle to Early Jurassic sandstones was found water bearing.

Evidence from seismic interpretations, dip meter analysis, and subsequent geometrical considerations indicated that well 31/3-2 penetrated the "boundary fault" at top Brent Group level, between 1940 and 1955 m. In this zone two calcite cemented bands were encountered thought to be associated with the fault plane. The OWC was found to be 3.5 m shallower than in well 31/2-6, but the pressure data from wells in the area did not have sufficient reproducibility and resolution to support different pressure regimes in the different compartments.

Five cores were cut between 1565 m and 1640 m from the lower part of the Draupne Formation and into the Sognefjord Formation. RFT pressure recordings and sampling were performed in the reservoir interval and pressure tests were also made in sand intervals in the underlying formations with the deepest point in the Drake Formation (Dunlin Group). Segregated RFT fluid samples were recovered from 1567.6 m (two samplings, one with oil and one with gas and oil), 1576 m (mud filtrate and water), and 1577.8 m (mud filtrate with trace oil and gas),

The well was permanently abandoned on 30 April 1984 as a gas and oil appraisal.

Testing

One production test was performed over the interval 1567 - 1577 m in the oil zone at the top of the Sognefjord Formation. The test produced 1271.9 Sm3 /day of 27.5 deg. API oil together with 562588 Sm3/day of gas with gravity 0.620 (air = 1). The choke size was 63.5 mm. The GOR was 442 Sm3/Sm3 and the CO2 content was 1.0%. The pore pressure at the top of the reservoir was measured to be 158.15 bara (2293.8 psi). The temperature measured during the test was 69.5 deg. C.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
460.00	2090.00

Borekaks tilgjengelig for prøvetaking?	YES

Borekjerner i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1565.0	1575.5	[m]
2	1581.0	1590.7	[m]
3	1593.0	1606.3	[m]
4	1608.0	1626.0	[m]
5	1626.0	1639.9	[m]

Total kjerneprøve lengde [m]	65.3
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder


1565-1570m


1570-1575m


1575-1576m


1581-1586m


1586-1590m


1593-1598m


1598-1603m


1603-1606m


1608-1613m


1613-1618m

1618-1623m 1623-1626m 1626-1631m 1631-1636m 1626-1639m

Palynologiske preparater i Sokkeldirektoratet

Prøve dybde	Dybde enhet	Prøve type	Laboratorie
700.0	[m]	DC	RRI
720.0	[m]	DC	RRI
740.0	[m]	DC	RRI
760.0	[m]	DC	RRI
780.0	[m]	DC	RRI
800.0	[m]	DC	RRI
820.0	[m]	DC	RRI
880.0	[m]	DC	RRI
940.0	[m]	DC	RRI
960.0	[m]	DC	RRI
980.0	[m]	DC	RRI
1000.0	[m]	DC	RRI
1020.0	[m]	DC	RRI
1040.0	[m]	DC	RRI
1060.0	[m]	DC	RRI
1080.0	[m]	DC	RRI
1100.0	[m]	DC	RRI
1120.0	[m]	DC	RRI
1140.0	[m]	DC	RRI
1160.0	[m]	DC	RRI
1180.0	[m]	DC	RRI
1200.0	[m]	DC	RRI
1220.0	[m]	DC	RRI
1240.0	[m]	DC	RRI
1260.0	[m]	DC	RRI
1280.0	[m]	DC	RRI
1300.0	[m]	DC	RRI
1320.0	[m]	DC	RRI
1340.0	[m]	DC	RRI
1360.0	[m]	DC	RRI
1380.0	[m]	DC	RRI
1400.0	[m]	DC	RRI
1420.0	[m]	DC	RRI
1440.0	[m]	DC	RRI

1460.0	[m]	DC	RRI
1480.0	[m]	DC	RRI
1565.0	[m]	C	OD
1566.0	[m]	C	OD
1567.0	[m]	C	OD
1569.0	[m]	DC	OD
1571.0	[m]	DC	OD
1575.0	[m]	C	OD
1582.5	[m]	C	OD
1583.5	[m]	C	OD
1584.7	[m]	C	OD
1588.0	[m]	C	OD
1590.3	[m]	C	OD
1593.0	[m]	C	OD
1597.5	[m]	C	OD
1600.8	[m]	C	OD
1610.8	[m]	C	OD
1610.9	[m]	C	OD
1613.2	[m]	C	OD
1613.6	[m]	C	OD
1614.6	[m]	C	OD
1614.7	[m]	C	OD
1615.5	[m]	C	OD
1616.0	[m]	C	OD
1616.1	[m]	C	OD
1617.0	[m]	C	OD
1618.0	[m]	C	OD
1618.2	[m]	C	OD
1618.8	[m]	C	OD
1620.1	[m]	C	OD
1622.2	[m]	C	OD
1624.5	[m]	C	OD
1626.0	[m]	C	OD

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
365	NORDLAND GP
540	HORDALAND GP

540	NO FORMAL NAME
605	NO FORMAL NAME
1121	ROGALAND GP
1121	BALDER FM
1194	SELE FM
1280	LISTA FM
1452	VÅLE FM
1471	SHETLAND GP
1533	CROMER KNOLL GP
1533	MIME FM
1541	VIKING GP
1541	DRAUPNE FM
1567	SOGNEFJORD FM
1706	HEATHER FM
1725	FENSFJORD FM
1851	KROSSFJORD FM
1929	HEATHER FM
1939	BRENT GP
1939	TARBERT FM
1952	NESS FM
1966	ETIVE FM
2006	DUNLIN GP
2006	DRAKE FM

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
100	pdf	0.32

Geokjemisk informasjon

Dokument navn	Dokument format	Dokument størrelse [KB]
100_1	pdf	0.33
100_2	pdf	3.30

Dokumenter - eldre Sokkeldirektoratets WDSS rapporter og andre relaterte dokumenter

Dokument navn	Dokument format	Dokument størrelse [KB]
100_01_WDSS_General_Information	pdf	0.18
100_02_WDSS_completion_log	pdf	0.21

Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
100_01_31_3_2_Completion_repor_and_Competion_log	pdf	13.56
100_01_31_3_2_Final_Well_Report_by_Exlog	pdf	5.88
100_02_31_3_2_Drilling_program	pdf	3.26
100_02_31_3_2_Prospect_descr.and_prognosis	pdf	2.30
100_02_31_3_2_Prospect_descr_and_prognosis_encl_1	pdf	0.52
100_02_31_3_2_Prospect_descr_and_prognosis_encl_2	pdf	9.51
100_02_31_3_2_Prospect_descr_and_prognosis_encl_3	pdf	8.08
100_02_31_3_2_Prospect_descr_and_prognosis_encl_4	pdf	0.38
100_02_31_3_2_Prospect_descr_and_prognosis_encl_5(7)	pdf	0.24
100_03_31_3_2_Biostrat._kerogen_analysis_by_Stratlab	pdf	10.30
100_03_31_3_2_Formation_resistivity_meas	pdf	0.27
100_03_31_3_2_Grain_size_distr.analysis	pdf	0.68
100_03_31_3_2_Historie-tilpasning_by_Statoil	pdf	0.97
100_03_31_3_2_Hydrocarbon_characterisation	pdf	3.55
100_03_31_3_2_Permeability_thin_section	pdf	0.12
100_03_31_3_2_Petrophysical_evaluation	pdf	1.97
100_03_31_3_2_Petrophysical_evaluation_encl_1	pdf	0.71
100_04_31_3_2_Core_gamma_surface_log	pdf	0.15
100_04_31_3_2_Routine_core_analysis	pdf	1.79
100_05_31_3_2_31_3_2_High_acc.press.temp.meas_82816_Flopetrol	pdf	4.43
100_05_31_3_2_Drillsteam_test_report	pdf	8.08
100_05_31_3_2_High_acc.press.temp.meas_82816_encl_1	pdf	0.16

100_05_31_3_2_High_acc.press.temp.meas_82802_Flopetrol	pdf	6.25
100_05_31_3_2_Oil_test_program	pdf	2.30
100_05_31_3_2_Pressure_survey_report	pdf	2.40
100_05_31_3_2_Production_test_report	pdf	1.39
100_05_31_3_2_PVT_Analyse_av_olje_fra_Troll	pdf	1.40
100_05_31_3_2_Repeated_formation_tester	pdf	0.30
100_05_31_3_2_Results_and_implications	pdf	1.28
100_05_31_3_2_Results_and_implications_encl_1	pdf	0.17
100_05_31_3_2_Results_of_the_quality_by_Oilplus	pdf	2.86
100_05_31_3_2_Sampling_report	pdf	1.68
100_05_31_3_2_SDP_CRG_press.and_temp.survey0_by_Flopetrol	pdf	10.05
100_05_31_3_2_SDP_CRG_press.and_temp.survey_29C_Flopetrol	pdf	10.28
100_05_31_3_2_SDP_CRG_press.and_temp.survey_29C_encl_1	pdf	0.13
100_05_31_3_2_SDP_CRG_press.and_temp.survey_29E_encl_1	pdf	0.16
100_05_31_3_2_SDP_CRG_press.and_temp.survey_29E_encl_2	pdf	0.14
100_05_31_3_2_SDP_CRG_press.and_temp.survey_29E_Flopetrol	pdf	9.98
100_05_31_3_2_SDP_CRG_press.and_temp.survey_encl_1	pdf	0.12
100_07_31_3_2_Borehole_geoph.well_Geophone	pdf	0.24
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_1	pdf	0.38
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_10	pdf	0.42
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_11	pdf	0.44
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_12	pdf	0.34
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_13	pdf	0.28
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100_07_31_3_2_Borehole_geoph.well_Geophone_encl_18	pdf	0.17
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_19	pdf	0.35
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_2	pdf	1.09
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_20	pdf	0.31
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100_07_31_3_2_Borehole_geoph.well_Geophone_encl_23	pdf	0.31
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_24	pdf	0.32
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_25	pdf	0.19
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_26	pdf	0.16
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100_07_31_3_2_Borehole_geoph.well_Geophone_encl_29	tif	0.14
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_3	pdf	0.03
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_4	pdf	0.04
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_5	pdf	0.82
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_6	pdf	1.06
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_7	pdf	3.81
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_8	pdf	3.34
100_07_31_3_2_Borehole_geoph.well_Geophone_encl_9	pdf	0.09

Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsventil størrelse [mm]
1.0	1567	1577	63.5

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	1272	563000	0.890	0.620	442

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CBL VDL	610	1499
CBL VDL	1390	1705
CBL VDL	1400	1736
CET GR	1385	1702
CST	1040	1494
CST	1505	1979
CST	1750	2087
DLL MSFL GR SP CAL	1502	1639
HDT	610	1492
ISF LSS GR SP	451	622
ISF LSS GR SP	610	1491
ISF LSS GR SP	1502	2085
LDT CNL CAL GR	451	624
LDT CNL CAL GR	610	1493
LDT CNL CAL GR	1502	1639
LDT CNL CAL GR	1502	2086
RFT	1567	1567
RFT	1567	1725
RFT	1567	1567
RFT	1576	1576
RFT	1577	1577
RFT	1725	2022

SHDT	1502	2087
VSP-O	1000	2075

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	451.0	36	451.0	0.00	LOT
SURF.COND.	20	609.0	26	625.0	1.45	LOT
INTERM.	13 3/8	1502.0	17 1/2	1515.0	1.56	LOT
INTERM.	9 5/8	1805.0	12 1/4	2090.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
460	1.06			WATER BASED	
560	1.37	11.0		WATER BASED	
650	1.20	18.0		WATER BASED	
1250	1.25	19.0		WATER BASED	
1355	1.30	18.0		WATER BASED	
1650	1.22	40.0		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]
100_Formation_pressure_(Formasjonstrykk)	pdf	0.19