

**General information**

Wellbore name	31/2-7
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	TROLL
Discovery	31/2-1 (Troll Vest)
Well name	31/2-7
Seismic location	8007 - 147 SP 998
Production licence	054
Drilling operator	A/S Norske Shell
Drill permit	326-L
Drilling facility	BORGNY DOLPHIN
Drilling days	54
Entered date	22.04.1982
Completed date	14.06.1982
Release date	14.06.1984
Publication date	19.12.2007
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL/GAS
Discovery wellbore	NO
1st level with HC, age	LATE JURASSIC
1st level with HC, formation	SOGNEFJORD FM
Kelly bushing elevation [m]	25.0
Water depth [m]	338.0
Total depth (MD) [m RKB]	1660.0
Final vertical depth (TVD) [m RKB]	1660.0
Maximum inclination [°]	1
Bottom hole temperature [°C]	71
Oldest penetrated age	LATE JURASSIC
Oldest penetrated formation	HEATHER FM
Geodetic datum	ED50
NS degrees	60° 51' 25.93" N
EW degrees	3° 27' 9.21" E
NS UTM [m]	6747126.56
EW UTM [m]	524587.90



UTM zone	31
NPDID wellbore	70

Wellbore history

General

Well 31/2-7 was drilled in the Troll West oil province in the Northern North Sea. The primary objective was to appraise the oil accumulation in the area west of well 31/2-4 in the Troll Field.

Operations and results

Well 31/2-7 was spudded with the semi-submersible installation Borgny Dolphin on 22 April 1982 and drilled to TD at 1660 m in the Late Jurassic Heather Formation. No significant problems were encountered during operations. Tight spots were encountered in the 17 1/2" section. The well was drilled with seawater and hi-vis pills down to 455, with seawater/gel/CMC/Drispac from 455 m to 825 m, with KCl/polymer mud from 825 m to 1517 m, and with KCl/polymer/gel/lingo mud from 1517 m to TD.

The well penetrated 11 m of Late Jurassic Draupne shale at 1535 m before entering the Sognefjord Formation reservoir sands at 1546 m. The Heather Formation was encountered at 1601 m. The Sognefjord Formation was hydrocarbon bearing with a 20.5 m gas column from 1545.5 - 1566 m and a 27.5 m oil column from 1566 to 1593.5 m. The gas reservoir consisted of alternating micaceous, bioturbated fine to medium grained sandstones and cross laminated, massive fine to coarse grained sandstones. The upper part of the oil reservoir (down to 1586 m) was of the same quality as the gas reservoir. Below 1586 m the sandstones were very fine to medium grained with high mica content. Weak shows (fluorescence and cut) were recorded on cores down to 1635 m.

Six fibreglass sleeve cores were taken from 1547.0 m to 1635.0 m in the 8 1/2" section. Thus 88 m of core were cut of which 72.25 m (82%) was recovered. In order to verify the higher than expected GOC several unsuccessful (due to probe plugging) attempts were made to obtain RFT fluid samples at around 1570 m. Eventually one of the RFT chambers was filled at 1568 m. After a few more attempts the other chamber was filled at 1566.5 m. At surface the contents of both chambers were checked and found to be 29 API oil. This proved a 27.5 m oil column in the well and thus the existence of oil above 1547 m SS (1572 m), which had been interpreted as the GOC in all previous wells.

The well was permanently abandoned on 14 June 1982 as an oil and gas appraisal.

Testing

The well was gravel packed and acidized before testing. A production test was carried out over the external gravel packed interval 1584 - 1590.5 m. The objectives were to investigate inflow performance and sand control, obtain representative fluid samples for PVT analyses, and to evaluate well coning performance. At maximum rate in the 92 hour long main flow the well flowed 1113 Sm³ oil/day on a 180/64" choke. The GOR was between 53 and 45 Sm³/Sm³, the oil density was 0.89 g/cm³ (27.5 deg API), and the gas gravity was 0.640. Maximum down-hole temperature recorded was 67.8 deg C.

Cuttings at the Norwegian Offshore Directorate



Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
470.00	1660.00

Cuttings available for sampling?	YES
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Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	1547.0	1556.5	[m]
3	1562.0	1577.8	[m]
4	1587.5	1597.0	[m]
5	1597.0	1615.8	[m]
6	1616.0	1634.7	[m]

Total core sample length [m]	72.3
Cores available for sampling?	YES

Core photos

1547-1553m



1553-1556m



1562-1568m



1568-1574m



1574-1577m



1587-1593m



1593-1597m



1597-1603m



1603-1609m



1609-1615m



1615-1616m



1616-1622m



1622-1628m



1628-1634m



1634-1635m

**Palynological slides at the Norwegian Offshore Directorate**

Sample depth	Depth unit	Sample type	Laboratory
1537.5	[m]	SWC	SHELL
1541.0	[m]	SWC	SHELL
1542.5	[m]	SWC	SHELL
1548.0	[m]	C	SHELL
1548.5	[m]	C	SHELL
1549.5	[m]	C	SHELL
1550.0	[m]	C	SHELL
1552.0	[m]	C	SHELL
1554.0	[m]	C	SHELL
1555.0	[m]	C	SHELL
1555.6	[m]	C	SHELL
1556.6	[m]	C	SHELL
1562.2	[m]	C	SHELL
1570.5	[m]	C	SHELL
1590.5	[m]	C	SHELL
1591.1	[m]	C	SHELL
1592.3	[m]	C	SHELL
1592.4	[m]	C	SHELL
1592.6	[m]	C	SHELL
1592.8	[m]	C	SHELL
1592.9	[m]	C	SHELL
1593.0	[m]	C	SHELL
1593.5	[m]	C	SHELL
1593.6	[m]	C	SHELL
1594.2	[m]	C	SHELL
1596.1	[m]	C	SHELL
1596.8	[m]	C	SHELL
1598.0	[m]	C	SHELL
1600.0	[m]	C	SHELL
1600.9	[m]	C	SHELL
1603.0	[m]	C	SHELL
1605.0	[m]	C	SHELL
1607.0	[m]	C	SHELL
1608.5	[m]	C	SHELL
1609.5	[m]	C	SHELL
1610.4	[m]	C	SHELL



1610.7	[m]	C	SHELL
1616.0	[m]	C	SHELL
1617.5	[m]	C	SHELL
1617.5	[m]	C	SHELL
1617.6	[m]	C	SHELL
1617.6	[m]	C	SHELL
1618.9	[m]	C	SHELL
1621.7	[m]	C	SHELL
1621.8	[m]	C	SHELL
1621.9	[m]	C	SHELL
1621.9	[m]	C	SHELL
1625.7	[m]	C	SHELL
1633.8	[m]	C	SHELL
1634.7	[m]	C	SHELL
1644.0	[m]	SWC	SHELL
1654.0	[m]	SWC	SHELL
1658.0	[m]	SWC	SHELL

Oil samples at the Norwegian Offshore Directorate

Test type	Bottle number	Top depth MD [m]	Bottom depth MD [m]	Fluid type	Test time	Samples available
DST	DST1	1584.00	1590.00		06.06.1982 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
363	NORDLAND GP
776	HORDALAND GP
1304	ROGALAND GP
1304	BALDER FM
1366	SELE FM
1406	LISTA FM
1524	VÅLE FM
1531	CROMER KNOLL GP
1535	VIKING GP
1535	DRAUPNE FM



1546	SOGNEFJORD FM
1601	HEATHER FM

Documents - older Norwegian Offshore Directorate WDSS reports and other related documents

Document name	Document format	Document size [MB]
70_01_WDSS_General_Information	pdf	0.16
70_02_WDSS_completion_log	pdf	0.11

Documents - reported by the production licence (period for duty of secrecy expired)

Document name	Document format	Document size [MB]
70_01_31_2_7_Completion_Report_and_Completion_log	PDF	9.78
70_02_31_2_7_Appraisal_well_proposal_encl_1	pdf	0.34
70_02_31_2_7_Appraisal_well_proposal_encl_2	pdf	0.38
70_02_31_2_7_Biostratigraphy_appraisal	pdf	1.78
70_02_31_2_7_Drilling_programme	pdf	1.09
70_02_31_2_7_Drilling_programme_encl_1	pdf	0.37
70_02_31_2_7_Drilling_programme_encl_2	pdf	0.34
70_02_31_2_7_Drilling_programme_encl_3	pdf	1.78
70_02_31_2_7_Frozen_core_analysis	pdf	2.16
70_02_31_2_7_Gravel_pack_operation	pdf	1.47
70_02_31_2_7_Investigation_of_cores	pdf	2.30
70_02_31_2_7_Mr-six_Press.survey_report	pdf	1.42
70_02_31_2_7_Mud_logging_report	pdf	2.50
70_02_31_2_7_Rel.perm.Measurements	pdf	0.61
70_02_31_2_7_Reservoir_Fluid_study	pdf	0.71
70_02_31_2_7_Resistivity_index_capp.pressure	pdf	0.93
70_02_31_2_7_Sieve_analysis	pdf	1.51
70_02_31_2_7_Special_core_analysis	pdf	2.56
70_02_31_2_7_Well_summary_by_Anchor	pdf	1.36
70_02_31_2_7_Well_testing_report	pdf	13.38
70_31_02_07_Appraisal_well_proposal_by_Shell	pdf	0.59
70_02_31_2_7_Bronntestrapport	pdf	3.31



**Drill stem tests (DST)**

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	1584	1590	71.0

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				68

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	1113		0.887		45

Logs

Log type	Log top depth [m]	Log bottom depth [m]
BGT GR	1518	1593
BGT GR	1522	1592
BGT GR	1529	1593
CBL VDL GR CCL	606	1660
CST	812	1510
CST	1498	1770
DLL MSFL GR	1498	1656
FDC CNL GR CAL	440	824
FDC CNL GR CAL	812	1510
FDC CNL GR CAL	1495	1660
HDT	1495	1660
ISF BHC GR	363	822
ISF BHC GR	812	1510
ISF BHC GR	1495	1659
LDT NGT CAL	1495	1660
RFT	0	0
VELOCITY	776	1650
WST	776	1650

**Casing and leak-off tests**

Casing type	Casing diam. [inch]	Casing depth [m]	Hole diam. [inch]	Hole depth [m]	LOT/FIT mud eqv. [g/cm3]	Formation test type
CONDUCTOR	30	449.0	36	455.0	0.00	LOT
SURF.COND.	20	812.0	26	825.0	1.54	LOT
INTERM.	13 3/8	1495.0	17 1/2	1517.0	1.59	LOT
INTERM.	9 5/8	1652.0	12 1/4	1660.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
465	1.07	50.0		waterbased	
600	1.09	50.0		waterbased	
800	1.10	50.0		waterbased	
800	1.10	48.0		waterbased	
950	1.31	47.0		waterbased	
1150	1.31	47.0		waterbased	
1650	1.19	54.0		waterbased	

Pressure plots

The pore pressure data is sourced from well logs if no other source is specified. In some wells where pore pressure logs do not exist, information from Drill stem tests and kicks have been used. The data has been reported to the NPD, and further processed and quality controlled by IHS Markit.

Document name	Document format	Document size [MB]
70 Formation pressure (Formasjonstrykk)	PDF	0.16

