General information

Wellbore name	31/2-12
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	31/2-12
Seismic location	82 - 41081 SP 956
Production licence	054
Drilling operator	A/S Norske Shell
Drill permit	373-L
Drilling facility	BORGNY DOLPHIN
Drilling days	93
Entered date	26.05.1983
Completed date	09.09.1983
Plugged and abondon date	09.09.1983
Release date	09.09.1985
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
2nd level with HC, age	MIDDLE JURASSIC
2nd level with HC, formation	FENSFJORD FM
Kelly bushing elevation [m]	25.0
Water depth [m]	334.0
Total depth (MD) [m RKB]	1615.0
Final vertical depth (TVD) [m RKB]	1615.0
Maximum inclination [°]	2
Bottom hole temperature [°C]	71
Oldest penetrated age	MIDDLE JURASSIC
Oldest penetrated formation	FENSFJORD FM
Geodetic datum	ED50
NS degrees	60° 50' 5.4'' N

EW degrees	3° 30' 48.47'' E
NS UTM [m]	6744659.32
EW UTM [m]	527916.41
UTM zone	31
NPDID wellbore	14

Wellbore history

General

Well 31/2-12 was drilled as an appraisal well in the Troll West oil province in the Northern North Sea. The main objectives were to evaluate various techniques for gas production wells in the Troll field, to establish the reservoir quality in the central part of the Troll field gas accumulation, and to provide additional data point for the correlation and mapping of the depositional units.

Operations and results

Well 31/2-12 was spudded with the semi-submersible installation Borgny Dolphin on 26 May 1983 and drilled to TD at 1615 m in the Middle Jurassic Fensfjord Formation. On 4 June, after running the BOP-stack, operations were interrupted by a labour dispute. After the strike ended on 17 June problems with the BOP lead to a further 4 days delay before normal drilling operations were resumed. Some instability problems and well kicks were encountered while drilling and testing in the reservoir. The well was drilled with Seawater and gel down to 807 m, with KCl/polymer mud from 807 m to 1338 m, and with CaCl2/CaCO3/polymer mud from 1338 m to TD.

Top reservoir in well 31/2-12 was encountered at 1365 m. The formations were interpreted to be gas bearing all through the Sognefjord Formation, the Heather Formation (1487 - 1541 m), and down to a clear GOC at 1570.5 m in the Fensfjord Formation. The upper part of the Sognefjord Formation consisted of generally clean sandstones. Below 1455 m the sands were micaceous and silty. Tight calcareous streaks occurred over the whole section. Oil was interpreted from 1570.5 m down to 1581.0 m, where an abrupt drop in resistivity was interpreted as the oil/water contact. The contact was somewhat obscured however by a change in lithology from clean, but rather tight, sandstone to micaceous sandstone. No movable oil was calculated below this depth, but shows (fluorescence and cut) was observed on sidewall cores down to 1608 m.

Ten cores were cut in the Late Jurassic Sognefjord reservoir section. From a total of 89.5 m in the intervals 1366 - 1424 m and 1427 - 1458.5 m 86.7 m core (97%) was recovered. All cores were taken using fibreglass sleeve techniques to achieve better recovery in the poorly consolidated sands. Two gas samples were recovered from the uppermost reservoir section during RFT run 1. Recovery of an oil sample during RFT run 2 failed because of plugging by chalk particles in the mud cake. During a separate run with a modified "long nose" RFT probe an oil sample from the thin oil column at 1576 m was obtained.

The well was permanently abandoned on 9 September 1983 as an oil and gas appraisal well.

Testing

Two intervals in the clean sands were tested. From 1428 to 1452 m the well bore was underreamed to 16 inch and completed with an external gravel pack (E6P). This test (PT1) produced 563700 Sm3 gas/day through a 17.5" choke. A second test (PT-2) used an internal gravel pack (IGP) over the interval from 1385 to 1405 m. During this test the well took a kick and had to be closed in. The production-string was cut and the well killed. After fishing out the production string a successful gravel pack test was performed. This test produced 684100 Sm3 gas/day through a 17.5" choke. The gas produced in the tests was dry (gas gravity = 0.61) with a gas/condensate ratio of 35622 Sm3/Sm3. The condensate produced had a gravity of 51 degAPI. The gas contained 1.5% N2, 0.6% C02 and 0.05 ppm H2S. The maximum down-hole temperatures measured in the two tests were 62.8 and 61.7 deg C in PT1 and PT2, respectively.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
480.00	1615.00

Cuttings available for sampling?	YES

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	1366.0	1375.5	[m]
2	1375.0	1378.7	[m]
3	1380.0	1386.0	[m]
4	1389.0	1398.2	[m]
5	1398.0	1407.2	[m]
6	1407.0	1416.0	[m]
7	1416.0	1424.2	[m]
8	1427.0	1436.0	[m]
9	1436.0	1449.0	[m]
10	1449.0	1458.5	[m]

Total core sample length [m]	86.3
Cores available for sampling?	YES

Core photos


1366-1372m


1372-1375m


1375-1378m


1380-1386m


1386-1387m


1389-1395m


1395-1397m


1398-1403m


1404-1407m


1407-1413m


1413-1416m


1416-1422m


1422-1424m


1427-1433m


1433-1436m


1436-1442m


1442-1447m


1448-1449m


1449-1455m


1455-1458m

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	1428.00	1452.00	CONDENSATE	30.07.1983 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
359	NORDLAND GP
730	HORDALAND GP
1181	ROGALAND GP
1181	BALDER FM
1234	SELE FM
1258	LISTA FM
1354	VÅLE FM
1365	VIKING GP
1365	SOGNEFJORD FM
1487	HEATHER FM
1541	FENSFJORD FM

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

Document name	Document format	Document size [MB]
14_01_WDSS_General_Information	pdf	0.19
14_02_WDSS_completion_log	pdf	0.18

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

Document name	Document format	Document size [MB]
14_01_31_2_12_Completion_Report_and_Completion_log	PDF	11.38
14_02_31_2_12_Amendment_no.1_to_drilling_program	pdf	0.11
14_02_31_2_12_Drilling_programme	pdf	1.50
14_02_31_2_12_Grain_size_analysis	pdf	0.68
14_02_31_2_12_High_acc._press._rep._ELS-83.49A	pdf	1.18
14_02_31_2_12_High_acc._press._rep._ELS-83.49B	pdf	4.07
14_02_31_2_12_High_acc._press_temp_measurements	pdf	5.81
14_02_31_2_12_PVT_lab._and_consult.service	pdf	1.13
14_02_31_2_12_Routine_core_analysis	pdf	1.55
14_02_31_2_12_Testanalyse_gasstest	pdf	0.65
14_02_31_2_12_The_comp._of_Norwegian_Trol_well_by_THORNTO	pdf	1.18
14_02_31_2_12_Well_summary	pdf	2.85
14_02_31_2_12_Well_testing_report_83-2301-33	pdf	13.78
14_02_31_2_12_Well_testing_report_83-2301-34	pdf	23.30

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	1428	1452	17.5
2.0	1385	1405	17.5

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				
2.0				

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0		564000			
2.0		684000			

Logs

Log type	Log top depth [m]	Log bottom depth [m]
BGT GR	1423	1453
CBL	797	1428
CNL	1365	1419
CNL GP	1335	1405
CNL NGT	1337	1423
CST	1337	1423
CST	1424	1507
CST	1509	1604
DLL MSFL CAL GR	1424	1615
DLL MSFL GR	1337	1423
DLL MSFL GR	1424	1460
GR	1240	1424
GR CCL SH	1300	1340
GR CCL SH	1300	1350
GR ISF	1337	1423
HDT	1424	1614
ISF BHC GR	458	551
ISF BHC GR	551	806
ISF BHC GR	801	1336
ISF BHC GR	1424	1613
LDT CNL CAL NGT	1424	1614
LDT CNL GR CAL	458	552
LDT CNL GR CAL	551	807
LDT CNL GR CAL	801	1338
LDT GR CAL	1337	1423

LDT GR CAL	1424	1460
RFT HP	1368	1408
RFT HP	1472	1600
SHDT GR	1424	1614
SONIC GR CBL VDL	1337	1423
WST	608	1610

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	458.0	36	468.0	0.00	LOT
SURF.COND.	20	802.0	26	810.0	1.54	LOT
INTERM.	13 3/8	1338.0	17 1/2	1348.0	1.63	LOT
INTERM.	9 5/8	1424.0	12 1/4	1427.0	0.00	LOT
OPEN HOLE		1600.0	8 1/2	1615.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
360	1.04	100.0		water based	
600	1.04	84.0		water based	
850	1.25	54.0		water based	
1000	1.28	54.0		water based	
1100	1.31	54.0		water based	
1500	1.28	63.0		water based	

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]
14_Formation_pressure_(Formasjonstrykk)	pdf	0.17