General information

Wellbore name	31/2-1
Type	EXPLORATION
Purpose	WILDCAT
Status	SUSPENDED
Factmaps in new window	link to map
Main area	NORTH SEA
Field	TROLL
Discovery	31/2-1 (Troll Vest)
Well name	31/2-1
Seismic location	77 - 6046 SP 461
Production licence	054
Drilling operator	A/S Norske Shell
Drill permit	219-L
Drilling facility	BORGNY DOLPHIN
Drilling days	116
Entered date	17.07.1979
Completed date	09.11.1979
Release date	09.11.1981
Publication date	15.02.2006
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL/GAS
Discovery wellbore	YES
1st level with HC, age	LATE JURASSIC
1st level with HC, formation	SOGNEFJORD FM
Kelly bushing elevation [m]	24.0
Water depth [m]	324.0
Total depth (MD) [m RKB]	2433.0
Final vertical depth (TVD) [m RKB]	2433.0
Bottom hole temperature [°C]	65
Oldest penetrated age	LATE TRIASSIC
Oldest penetrated formation	HEGRE GP
Geodetic datum	ED50
NS degrees	60° 46' 19.16'' N
EW degrees	3° 33' 15.87'' E
NS UTM [m]	6737677.61
EW UTM [m]	530201.60
UTM zone	31
NPDID wellbore	398

Wellbore history

General

Well 31/2-1 is the Troll West gas and oil Discovery well. The purpose of the well was to establish the basic stratigraphy in the area, and to evaluate the prospectivity of the Jurassic sequence. The structure is formed by a tilted Jurassic fault block on the Sogn Spur High between the North Viking Graben and the Horda Basin. A migration path from the Viking Graben kitchen area is provided by monoclinal fault blocks. The most dominant characteristic of the structure was the presence of a "flatspot", which was believed to be associated with a present hydrocarbon/water contact. Sealing of the potential Jurassic reservoir is provided by Cretaceous and Paleocene Claystones, overlying the reservoir sandstones.

The well is Type Well for the Johansen, Krossfjord, Fensfjord, and the Sognefjord Formations, and Reference Well for the Amundsen, Cook, and Drake Formations.

Operations and results

Wildcat well 31/2-1 was spudded with the semi-submersible installation Borgny Dolphin on 17 July 1979 and drilled to TD at 2433 m in the Late Triassic Hegre Group. Severe problems with setting the 30" casing led to abandoning of the first hole and re-spudding on 24 July, 50 m to the south of the original spud position. The well was drilled with gel polymer down to 793 m, and with gypsum/lignosulphonate mud from 793 m to TD.

The well 31/2-1 proved the existence of a Late - Middle Jurassic gas bearing reservoir sequence in the Flathead A structure (block 31/2). A gross commercial gas column of 134.5 metres with top at 1439.5 m was encountered in good-moderate quality coastal - shallow marine sands. Good oil shows with oil bleeding from cores were encountered from 1567 m to 1597 m, below the gas. It is possible that both a gas-oil contact and an oil-water contact occur in this zone, however, data available suggested tight formation. From the pressure data the plausible interpretation is that a gas-water contact effectively exists at the intersection of the extrapolated gas and water pressure gradients at 1574 m (1550 m SS), which would imply that the oil observed in cores is actually residual. Indications of oil occurred down to 1622 m. The well results showed that the marked seismic flatspot seen on seismic lines across the structure at 1685 msec was closely related to the base of the gas column. For a detailed evaluation of the reservoir it was decided to take diamond bit cores over the whole hydrocarbon bearing Jurassic interval. A total of 18 cores were cut in the interval from 1450 to 1668 m, with a recovery length of 182 m (86%). The cored interval extends from just below the top reservoir to below the hydrocarbon/water contact. Extensive RFT pressure measurements showed the accumulation to be under hydrostatic conditions. Good RFT gas samples were recovered from 1442 m, 1468 m, 1482 m, 1515 m, 1547.5 m, 1573 m, and 1574 m. They showed a consistent dry gas composition with 93% methane, 0.5% CO2, and 1.5% N2. Only trace C4+ and no H2S was recorded. A number of RFT water samples were found to be heavily contaminated by the mud and not representative for the Formation.

The well was suspended on 9 November for re-entry and possible testing at a later stage.

Testing

After RFT testing preparations were made for drill stem testing of the interval where oil had been observed bleeding from cores (1565 to 1622 m). Due to severe weather and technical problems the test was aborted.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
480.00	2433.00

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	1450.0	1453.5	[m]
2	1454.0	1455.5	[m]
3	1456.6	1465.6	[m]
4	1465.6	1474.6	[m]
5	1474.6	1485.6	[m]
6	1488.0	1493.3	[m]
7	1514.0	1521.8	[m]
8	1523.6	1532.7	[m]
9	1533.0	1541.8	[m]
10	1542.0	1559.0	[m]
11	1560.0	1577.4	[m]
12	1577.4	1595.5	[m]
13	1595.5	1613.5	[m]
14	1613.5	1616.6	[m]
15	1617.5	1634.1	[m]
16	1634.1	1638.4	[m]
17	1638.4	1652.1	[m]
18	1652.3	1662.7	[m]

Total core sample length [m]	183.6
Cores available for sampling?	YES

Core photos


1450-1452m


1452-1453m


1454-1455m


1456-1459m


1459-1462m


1462-1464m


1464-1465m


1465-1468m


1468-1471m


1471-1473m


1373-1474m


1474-1477m


1477-1480m


1480-1482m


1482-1485m


1485-1486m


1488-1490m


1490-1493m


1514-1516m


1516-1519m


1519-1521m


1523-1526m


1526-1529m


1529-1531m


1531-1531m


1533-1535m


1535-1538m


1538-1541m


1541-1542m


1542-1544m


1544-1547m


1547-1550m


1550-1552m


1552-1555m


1555-1558m


1558-1559m


1560-1562m


1562-1565m


1565-1568m


1568-1570m


1570-1573m


1573-1576m


1576-1577m


1577-1580m


1580-1582m


1582-1585m


1585-1588m


1588-1590m


1590-1593m


1593-1595m


1595-1598m


1598-1600m


1600-1603m


1603-1606m


1606-1609m


1609-1611m


1611-1613m


1613-1616m


1616-1617m


1620-1622m


1622-1625m


1625-1628m


1628-1631m


1631-1633m


1633-1634m


1634-1636m


1636-1638m


1638-1641m


1641-1643m


1643-1646m


1646-1649m


1649-1651m


1651-1652m


1652-1655m


1655-1657m


1657-1660m


1660-1663m

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
348	NORDLAND GP
525	HORDALAND GP
1184	ROGALAND GP
1184	BALDER FM
1250	SELE FM
1322	LISTA FM
1393	VÅLE FM
1405	CROMER KNOLL GP
1414	VIKING GP
1414	DRAUPNE FM
1440	SOGNEFJORD FM
1532	HEATHER FM
1595	FENSFJORD FM
1742	KROSSFJORD FM

1880	HEATHER FM
1881	BRENT GP
1985	DUNLIN GP
1985	DRAKE FM
2093	COOK FM
2134	AMUNDSEN FM
2176	JOHANSEN FM
2273	AMUNDSEN FM
2293	STATFJORD GP
2381	HEGRE GP

Composite logs

Document name	Document format	Document size [MB]
398	pdf	0.35

Geochemical information

Document name	Document format	Document size [MB]
398_1	pdf	0.74
398_2	pdf	3.93
398_3	pdf	1.13
398_4	pdf	0.63

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

Document name	Document format	Document size [MB]
398_01_WDSS_General_Information	pdf	0.12
398_02_WDSS_completion_log	pdf	0.17

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

Document name	Document format	Document size [MB]
398_31_2_1_COMPLETION_REPORT_AND_LOG	pdf	16.05

Logs

Log type	Log top depth [m]	Log bottom depth [m]
BGT GR	426	798
BGT GR	793	1324
CBL VDL	1310	2074
CBL VDL GR	344	2035
DLL MSFL SP GR	1310	1703
FDC BHC GR SP	1310	1703
FDC CNL CAL GR	426	575
FDC CNL CAL GR	793	1323
FDC CNL CAL GR	1310	1381
FDC CNL CAL GR	1550	2070
FDC CNL CAL GR	2063	2432
HDT	1310	2070
HDT	2063	2432
ISF BHC GR SP	426	578
ISF BHC GR SP	793	1322
ISF BHC GR SP	1310	1379
ISF BHC GR SP	1310	1703
ISF BHC GR SP	1550	2070
ISF BHC GR SP	2063	2432
ISF GR SP	793	1220
LSS GR	426	479
LSS GR	793	1321
LSS GR	1310	2070
MSFL GR CAL	1310	1379
RFT	1308	1336
RFT	1308	1701
RFT	1308	2433
VELOCITY	0	0

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	423.0	36	470.0	0.00	LOT
SURF.COND.	20	793.0	26	805.0	1.52	LOT

INTERM.	13 5/8	1308.0	17 1/2	1322.0	1.67	LOT
INTERM.	9 5/8	2061.0	12 1/4	2074.0	1.60	LOT
OPEN HOLE		2433.0	8 1/2	2433.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
793	1.09			waterbased	
1308	1.37			waterbased	
2080	1.33			waterbased	
2433	1.33			waterbased	