General information

Wellbore name	16/1-4
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Discovery	16/1-4
Well name	16/1-4
Seismic location	ST 9109 206/206A & SP. 450
Production licence	167
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	754-L
Drilling facility	ROSS RIG (2)
Drilling days	28
Entered date	17.03.1993
Completed date	13.04.1993
Release date	13.04.1995
Publication date	29.08.2003
Purpose - planned	WILDCAT
Reentry	NO
Content	GAS/CONDENSATE
Discovery wellbore	YES
1st level with HC, age	PRE-DEVONIAN
1st level with HC, formation	BASEMENT
Kelly bushing elevation [m]	24.0
Water depth [m]	111.0
Total depth (MD) [m RKB]	2010.0
Maximum inclination [°]	2.68
Bottom hole temperature [°C]	80
Oldest penetrated age	PRE-DEVONIAN
Oldest penetrated formation	BASEMENT
Geodetic datum	ED50
NS degrees	58° 51' 55.2'' N
EW degrees	2° 17' 56.12'' E
NS UTM [m]	6525418.88
EW UTM [m]	459562.76
UTM zone	31
NPDID wellbore	2072

Wellbore history

General

The objectives of exploration well 16/1-4 were to test Paleocene sandstones (Heimdal Formation) in prospect C and Eocene sandstones (Grid Formation) in prospect D. Prospect C was the main target. Oil was the prognosed hydrocarbon type. It was expected to penetrate a pre-Cretaceous sedimentary sequence, although the well location was not optimal for a test of the pre-Cretaceous.

Operations and results

Wildcat well 16/1-4 was spudded with the semi-submersible installation "Deepsea Bergen" on 17 March 1993 and drilled to TD at 2010 m, 146 m into basement rocks. The well was drilled with spud mud / hi-vis pills down to 324 m and with "ANCO 2000" mud from 324 m to TD. Well 16/1-4 penetrated sedimentary rocks of Quaternary, Tertiary, and Cretaceous ages, in addition to basement rocks of unknown age. No pre-Cretaceous sediments were present in the well. In the Tertiary, reservoir quality sandstones were present in the Miocene and the Oligocene (Utsira and Skade Formations) and in the Eocene Grid Formation. The Grid sandstones were thinner than expected. No sandstones were developed in the Paleocene (Rogaland Group) at the well location. The carbonates in the Shetland Group were dated to be of Early Paleocene, Danian age. The lower Cretaceous sediments in well 16/1-4 are 4 m thick (1860 m -1864 m) and consist of clay stone/marls and immature sandstones with grains of igneous rocks similar to the basement rocks below. These sediments are dated to be of Early Aptian age and have been identified as the Sola Formation of the Cromer Knoll Group. The basement rocks consist mainly of brecciated igneous rocks. No hydrocarbon shows were observed in the Grid Formation sandstones. Gas-condensate was encountered in the upper part of the drilled basement section. Cores were cut in the Eocene Grid Formation and in the Hordaland Group shales between upper and lower Grid Formation (cores 1-3), in the Paleocene Balder- and Sele Formations (cores 4-6), and in basement rocks (core 7).

The cores show well-developed clean sandstones in the Grid Formation. The boundary between the Balder- and the Sele Formations is present in core 4. The basement core generally consists of a mafic plutonic rock (gabbro/diorite) with intrusions of a felsic rock (syenite). The rocks are strongly brecciated. Petrologic analysis indicates that the plutonic igneous rocks are hydrothermally altered. FMT samples from1867.5 m and 1867.4 m in the Basement contained wet gas / condensate. Onshore geochemical analyses indicated low maturity for both the gas and the condensate components. The well was permanently abandoned as a minor gas/condensate discovery on 13 April 1993.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
330.00	2010.00

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	1549.0	1559.0	[m]
2	1561.0	1568.7	[m]
3	1590.0	1607.6	[m]
4	1695.0	1699.0	[m]
5	1699.0	1706.0	[m]
6	1708.0	1724.2	[m]
7	1936.0	1941.7	[m]

Total core sample length [m]	68.0
Cores available for sampling?	YES

Core photos


1549-1553m


1553-1557m


1557-1559m


1561-1565m


1565-1568m


1590-1594m


1594-1598m


1598-1602m


1602-1606m


1606-1607m


1695-1699m


1703-1706m


1708-1712m


1712-1716m


1716-1720m


1720-1724m


1724-1724m


1936-1940m


1940-1942m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
357.5	[m]	SWC	OD
402.5	[m]	SWC	OD
454.5	[m]	SWC	OD
480.5	[m]	SWC	OD
536.5	[m]	SWC	OD
574.5	[m]	SWC	OD
613.5	[m]	SWC	OD
646.5	[m]	SWC	OD
650.0	[m]	DC	OD
660.0	[m]	DC	OD
670.0	[m]	DC	OD
673.5	[m]	SWC	OD
680.0	[m]	DC	OD
681.5	[m]	SWC	OD
685.5	[m]	SWC	OD
688.5	[m]	SWC	OD
690.0	[m]	DC	OD
697.5	[m]	SWC	OD
700.0	[m]	DC	OD
710.0	[m]	DC	OD
720.0	[m]	DC	OD
730.0	[m]	DC	OD
732.5	[m]	SWC	OD
740.0	[m]	DC	OD
750.0	[m]	DC	OD
760.0	[m]	DC	OD
763.5	[m]	SWC	OD
767.5	[m]	SWC	OD
768.5	[m]	SWC	OD

770.0	[m]	DC	OD
784.5	[m]	SWC	OD
828.5	[m]	SWC	OD
857.5	[m]	SWC	OD
860.0	[m]	DC	OD
870.0	[m]	DC	OD
880.0	[m]	DC	OD
882.5	[m]	SWC	STATOIL
882.5	[m]	SWC	OD
890.0	[m]	DC	OD
900.0	[m]	DC	OD
906.5	[m]	SWC	STATOIL
906.5	[m]	SWC	OD
910.0	[m]	DC	OD
912.5	[m]	SWC	OD
914.5	[m]	SWC	STATOIL
914.5	[m]	SWC	OD
916.5	[m]	SWC	OD
920.0	[m]	DC	OD
930.0	[m]	DC	OD
940.0	[m]	DC	OD
950.0	[m]	DC	OD
960.0	[m]	DC	OD
970.0	[m]	DC	OD
980.0	[m]	DC	OD
981.5	[m]	SWC	STATOIL
981.5	[m]	SWC	OD
990.0	[m]	DC	OD
1000.0	[m]	DC	OD
1003.5	[m]	SWC	STATOIL
1003.5	[m]	SWC	OD
1010.0	[m]	DC	OD
1020.0	[m]	DC	OD
1030.0	[m]	DC	OD
1030.5	[m]	SWC	STATOIL
1030.5	[m]	SWC	OD
1040.0	[m]	DC	OD
1043.5	[m]	SWC	STATOIL
1043.5	[m]	SWC	OD
1050.0	[m]	DC	OD

1059.5	[m]	SWC	STATOIL
1059.5	[m]	SWC	OD
1060.0	[m]	DC	OD
1070.0	[m]	DC	OD
1074.5	[m]	SWC	STATOIL
1074.5	[m]	SWC	OD
1080.0	[m]	DC	OD
1088.5	[m]	SWC	STATOIL
1088.5	[m]	SWC	OD
1090.0	[m]	DC	OD
1100.0	[m]	DC	OD
1104.5	[m]	SWC	STATOIL
1104.5	[m]	SWC	OD
1110.0	[m]	DC	OD
1120.0	[m]	DC	OD
1130.0	[m]	DC	OD
1140.0	[m]	DC	OD
1144.5	[m]	SWC	STATOIL
1150.0	[m]	DC	OD
1160.0	[m]	DC	OD
1170.0	[m]	DC	OD
1178.5	[m]	SWC	STATOIL
1178.5	[m]	SWC	OD
1180.0	[m]	DC	OD
1183.5	[m]	SWC	OD
1187.5	[m]	SWC	OD
1190.0	[m]	DC	OD
1191.5	[m]	SWC	STATOIL
1191.5	[m]	SWC	OD
1194.5	[m]	SWC	OD
1200.0	[m]	DC	STATOIL
1200.0	[m]	DC	OD
1200.0	[m]	DC	OD
1210.0	[m]	DC	OD
1210.5	[m]	SWC	STATOIL
1210.5	[m]	SWC	OD
1220.0	[m]	DC	STATOIL
1220.0	[m]	DC	OD
1230.0	[m]	DC	OD
1234.5	[m]	SWC	OD

1239.5	[m]	SWC	STATOIL
1240.0	[m]	DC	OD
1250.0	[m]	DC	STATOIL
1260.0	[m]	DC	OD
1266.5	[m]	SWC	STATOIL
1266.5	[m]	SWC	OD
1270.0	[m]	DC	OD
1280.0	[m]	DC	STATOIL
1280.0	[m]	DC	OD
1290.0	[m]	DC	OD
1296.5	[m]	SWC	STATOIL
1296.5	[m]	SWC	OD
1300.0	[m]	DC	OD
1310.0	[m]	DC	STATOIL
1310.0	[m]	DC	OD
1320.0	[m]	DC	OD
1326.5	[m]	SWC	STATOIL
1326.5	[m]	SWC	OD
1330.0	[m]	DC	OD
1340.0	[m]	DC	STATOIL
1340.0	[m]	DC	OD
1350.0	[m]	DC	OD
1354.5	[m]	SWC	STATOIL
1354.5	[m]	SWC	OD
1360.0	[m]	DC	OD
1370.0	[m]	DC	STATOIL
1370.0	[m]	DC	OD
1380.0	[m]	DC	OD
1390.0	[m]	DC	OD
1390.5	[m]	SWC	STATOIL
1390.5	[m]	SWC	OD
1400.0	[m]	DC	OD
1400.5	[m]	SWC	STATOIL
1400.5	[m]	SWC	OD
1410.5	[m]	SWC	STATOIL
1425.0	[m]	DC	STATOI
1440.0	[m]	DC	STATOI
1452.0	[m]	SWC	STATOI
1462.0	[m]	SWC	STATOI
1476.0	[m]	DC	STATOI

1488.0	[m]	SWC	STATOI
1494.0	[m]	SWC	STATOI
1502.0	[m]	SWC	STATOI
1512.0	[m]	DC	STATOI
1521.0	[m]	DC	STATOI
1532.0	[m]	SWC	STATOI
1536.0	[m]	SWC	STATOI
1545.0	[m]	DC	STATOI
1552.7	[m]	C	STATOI
1555.3	[m]	C	STATOI
1561.6	[m]	C	STATOI
1566.1	[m]	C	STATOI
1568.5	[m]	C	STATOI
1576.0	[m]	SWC	STATOI
1583.0	[m]	SWC	STATOI
1599.4	[m]	C	STATOI
1617.0	[m]	DC	STATOI
1626.0	[m]	SWC	STATOI
1632.0	[m]	SWC	STATOI
1641.0	[m]	DC	STATOI
1650.0	[m]	DC	STATOI
1659.0	[m]	DC	STATOI
1668.0	[m]	DC	STATOI
1678.0	[m]	SWC	STATOI
1688.0	[m]	SWC	STATOI
1695.0	[m]	C	STATOI
1698.5	[m]	C	STATOI
1702.4	[m]	C	STATOI
1708.6	[m]	C	STATOI
1712.4	[m]	C	STATOI
1717.9	[m]	C	STATOI
1724.1	[m]	C	STATOI
1733.0	[m]	SWC	STATOI
1740.0	[m]	SWC	STATOI
1752.0	[m]	DC	STATOI
1764.0	[m]	SWC	STATOI
1772.0	[m]	SWC	STATOI
1780.0	[m]	SWC	STATOI
1797.0	[m]	SWC	STATOI
1845.0	[m]	DC	STATOI

1851.0	[m]	DC	STATOI
1869.0	[m]	DC	STATOI
1878.0	[m]	DC	STATOI
1902.0	[m]	DC	STATOI
1911.0	[m]	DC	STATOI
1926.0	[m]	DC	STATOI

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
135	NORDLAND GP
768	UTSIRA FM
855	UNDIFFERENTIATED
918	HORDALAND GP
918	SKADE FM
1170	NO FORMAL NAME
1539	GRID FM
1556	NO FORMAL NAME
1584	GRID FM
1626	NO FORMAL NAME
1686	ROGALAND GP
1686	BALDER FM
1696	SELE FM
1734	LISTA FM
1817	VÅLE FM
1834	SHETLAND GP
1834	EKOFISK FM
1860	CROMER KNOLL GP
1860	SOLA FM
1864	BASEMENT

Composite logs

Document name	Document format	Document size [MB]
2072	pdf	0.29

Geochemical information

Document name	Document format	Document size [MB]
2072_1	pdf	1.64
2072_2	pdf	0.96

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

Document name	Document format	Document size [MB]
2072_16_1_4_S_COMPLETION_REPORT_AND_LOG	pdf	21.43

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL GR	500	1438
CNL	1438	2001
COREGUN	357	1982
DIFL ACL ZDL GR	100	2001
FMT HP GR	1544	1925
FMT HP GR	1867	1867
HR-DIP GR	1442	2000
MWD - GR RES DIR	321	1549
MWD - GR RES DIR	1571	1590
MWD - GR RES DIR	1608	1695
MWD - GR RES DIR	1724	1936
MWD - GR RES DIR	1942	2010
VSP	500	1000
VSP	600	1986
VSP	1000	1985

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	195.0	36	195.0	0.00	LOT
INTERM.	20	314.0	26	314.0	1.42	LOT

INTERM.	13 3/8	1440.0	17 1/2	1440.0	1.93	LOT
OPEN HOLE		2010.0	12 1/4	2010.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
316	1.03			WATER BASED	
321	1.03			WATER BASED	
362	1.20	18.0		WATER BASED	
1100	1.25	23.0		WATER BASED	
1445	1.25	28.0		WATER BASED	
1450	1.25	29.0		WATER BASED	
1571	1.25	23.0		WATER BASED	
1628	1.25	20.0		WATER BASED	
1699	0.00	20.0		WATER BASED	
1708	1.25	22.0		WATER BASED	
1723	1.25	21.0		WATER BASED	
1819	1.25	20.0		WATER BASED	
1868	1.25	23.0		WATER BASED	
1914	1.25	24.0		WATER BASED	
1942	1.25	23.0		WATER BASED	
2010	1.25	23.0		WATER BASED	