Generell informasjon

Brønnbane navn	31/2-4 R
Type	EXPLORATION
Formål	APPRAISAL
Status	SUSPENDED
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	TROLL
Funn	31/2-1 (Troll Vest)
Brønn navn	31/2-4
Seismisk lokalisering	624445 SP: 195
Utvinningstillatelse	054
Boreoperatør	A/S Norske Shell
Boretillatelse	261-L2
Boreinnretning	BORGNY DOLPHIN
Boredager	180
Borestart	09.10.1980
Boreslutt	06.04.1981
Frigitt dato	06.04.1983
Publiseringsdato	15.02.2006
Opprinnelig formål	WILDCAT
Gjenåpnet	YES
Årsak til gjenåpning	DRILLING
Innhold	OIL/GAS
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	LATE JURASSIC
1. nivå med hydrokarboner, formasjon.	SOGNEFJORD FM
2. nivå med hydrokarboner, alder	MIDDLE JURASSIC
2. nivå med hydrokarboner, formasjon	FENSFJORD FM
Avstand, boredekk - midlere havflate [m]	25.0
Vanndybde ved midlere havflate [m]	336.0
Totalt målt dybde (MD) [m RKB]	5035.0
Totalt vertikalt dybde (TVD) [m RKB]	5035.0
Maks inklinasjon [°]	4
Temperatur ved bunn av brønnbanen [°C]	141

Eldste penetrerte alder	EARLY TRIASSIC
Eldste penetrerte formasjon	HEGRE GP
Geodetisk datum	ED50
NS grader	60° 51' 23.57'' N
ØV grader	3° 30' 44.33'' E
NS UTM [m]	6747077.42
ØV UTM [m]	527835.00
UTM sone	31
NPDID for brønnbanen	502

Brønnhistorie

General

Well 31/2-4 is located some 10 km NNW of the discovery well 31/2-1 in a separate fault compartment near the crest of the Jurassic gas accumulation. This crestal area appeared also to coincide with the culminations of all deeper horizons that could be mapped. The well had two main objectives. The first was to appraise the Jurassic gas accumulation in the 31/2-1 Troll Discovery in a location with nearly maximum gross hydrocarbon column. The well should test lateral variations in this reservoir. The second major objective was to explore deeper Triassic/Palaeozoic Formations. The well would test possible hydrocarbon accumulations under the Late Jurassic Troll reservoir, explore possible pre-Jurassic source rocks, and provide geological ages for deep horizons and thus improve the regional geological setting.

TD of the well was proposed to be 5000 m below sea level or in Palaeozoic formations whatever came first.

Well 31/2-4 was originally drilled with Borgny Dolphin down to 815 m in 1980. The well was however suspended on 13 September 1980 due to a blow out on 34/10-10, where Borgny Dolphin's services were immediately required.

Operations and results

Well 31/2-4 was re-entered (31/2-4 R) with the semi-submersible installation Borgny Dolphin on 9 October 1980 and drilled to TD at 5035 m in Early Triassic sediments of the Hegre Group. The well bore deviation did not exceed 4 deg and at 4693 m, the deepest survey point reported, there was only 2 m difference between drilled and true vertical depth. The top hole down to 815 m had previously been drilled with seawater and hi-vis pills. From 815 m to 1280 m the well was drilled with KC/polymer mud, from 1280 m to 1951 m it was drilled with KCl/polymer converting to gel/lignosulphonate, from 1951 m to 4029 m it was drilled with seawater/gel/dispersed lignosulphonate, and from 4029 m to TD it was drilled with a gypsum/lignosulphonate mud.

The top of the gas-bearing reservoir was found at 1364.5 m. The accurate pick of the GOC from logs was hampered severely by lithology effects placing the GOC somewhere between 1567 and 1573 m, with 1568 m as a likely place. A depth of 1572 m is however, more consistent with other wells in the field. OWC was found at 1580 m.

Lithologically, the reservoir sequence in 31/2-4 R is similar to that encountered in earlier wells in the block. A largely unconsolidated high porosity - high permeability sand occurred in the top part of the reservoir (Sognefjord Formation). This was underlain by a finer grained, better consolidated, but strongly micaceous sandstone (Heather Formation), in which porosity was somewhat reduced and permeability was low. Beneath

this micaceous interval was a zone of more variable lithology, comprising interbeds of fine, micaceous sands and coarser cleaner sands (Fensfjord Formation). Thin (generally less than 1 m thick) carbonate cemented bands occurred throughout the reservoir and formed very low porosity - permeability horizons. Carbonate cementation did not appear to be restricted to any one particular litho-type, and the individual bands were not believed to be of significant lateral extent, (lateral contacts between cemented and non-cemented lithologies have been cored).

The seal in 31/2-4 is formed by a thick sequence of Palaeocene claystones. Reworked Late Cretaceous fauna occur in these claystones immediately above the reservoir.

No significant hydrocarbon indications were seen in the section below the main Jurassic accumulation. The well drilled Triassic sediments from 2422 m (Hegre Group) to TD. The upper section down to 3345 m was dominantly claystones/siltstones with interbedded sandstones. The lithology below 3345 was dominantly sandstone. One RFT run acquired pressure data points over the Jurassic reservoir section and two more runs acquired twelve good pressure points from the Early Jurassic to Triassic formations from 2142 m to 4969 m. The latter two runs showed two hydrostatic water gradients with a break somewhere between 2713 m and 3262 m. The break towards a higher gradient could represent a more saline water in the deeper section. An RFT gas sample was taken at 1566 m, just above the anticipated GOC. An extensive coring programme was carried out with a total of 29 recovered cores. Top coring point was in the Paleocene cap rock above the reservoir, and coring continued over the entire hydrocarbon bearing Late/Middle Jurassic reservoir section. A bottom hole core (core no 29) was taken at TD in the well.

After Logging at TD the rig went on hire to Shell UK Exploration and Production. The well was suspended on 6 April 1981 for possible testing and abandonment at a later stage. The well was classified as a gas and oil appraisal well. **Testing**

No drill stem test was performed.

Borekjerner i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1320.0	1325.7	[m]
2	1326.0	1326.5	[m]
3	1338.0	1347.0	[m]
4	1347.0	1357.0	[m]
5	1365.0	1378.0	[m]
6	1379.0	1397.0	[m]
7	1397.0	1410.0	[m]
8	1410.0	1415.0	[m]
9	1415.0	1425.0	[m]
10	1426.5	1426.7	[m]
11	1443.5	1452.5	[m]
12	1452.5	1454.2	[m]
13	1454.5	1468.3	[m]
14	1472.5	1479.5	[m]

15	1482.5	1483.2	[m]
16	1484.5	1490.0	[m]
17	1490.0	1506.8	[m]
18	1508.0	1524.6	[m]
19	1526.0	1543.3	[m]
20	1544.0	1562.0	[m]
21	1562.0	1566.9	[m]
22	1567.0	1582.8	[m]
23	1585.0	1599.2	[m]
24	1603.0	1606.6	[m]
25	1607.0	1621.0	[m]
26	1621.0	1626.1	[m]
27	1627.0	1644.4	[m]
28	1645.0	1662.9	[m]
29	5025.0	5033.4	[m]

Total kjerneprøve lengde [m]	291.8
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder

1320-1323m

1323-1325m

1325-1326m

1326-1327m

1338-1340m

1340-1343m

1343-1346m

1346-1347m

1347-1349m

1349-1352m

1352-1355m

1355-1357m

1365-1367m

1367-1370m

1370-1373m

1373-1375m

1375-1378m

1379-1381m

1381-1384m

1384-1387m

1387-1389m

1389-1392m

1392-1395m

1395-1397m

1397-1399m

1399-1402m

1402-1405m

1405-1407m

1410-1412m

1412-1415m

1415-1418m

1418-1420m

1420-1423m

1423-1425m

1426-1427m

1443-1446m

1446-1448m

1448-1451m

1451-1452m

1452-1454m

1454-1457m

1457-1459m

1459-1462m

1462-1465m

1465-1468m

1468-1468m

1472-1475m

1475-1477m

1477-1479m

1482-1483m

1484-1487m

1487-1489m

1489-1489m

1490-1492m

1492-1495m

1495-1498m

1498-1500m

1500-1503m

1503-1506m

1506-1506m

1508-1510m

1510-1513m

1508-1516m

1516-1518m

1518-1521m

1521-1524m

1521-1524m

1524-1525m

1526-1528m

1528-1531m

1531-1534m

1534-1536m

1536-1539m

1539-1542m

1542-1543m

1544-1546m

1546-1549m

1549-1552m

1552-1554m

1554-1557m

1557-1560m

1560-1562m

1562-1564m

1564-1566m

1567-1569m

1569-1572m

1572-1575m

1575-1577m

1577-1580m

1580-1582m

1585-1587m

1587-1590m

1590-1593m

1593-1595m

1595-1598m

1598-1599m

1603-1605m

1605-1606m

1607-1609m

1609-1612m

1612-1615m

1615-1617m

1617-1620m

1620-1621m

1621-1623m

1623-1626m

1627-1629m

1629-1632m

1632-1635m

1635-1637m

1637-1640m

1640-1643m

1643-1644m

1647-1650m

1650-1653m

1653-1655m

1655-1658m

1658-1661m

1661-1662m

5025-5027m

5027-5030m

5030-5033m

5033-5034m

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
361	NORDLAND GP
494	NO FORMAL NAME
528	NO FORMAL NAME
724	HORDALAND GP
1203	ROGALAND GP
1203	BALDER FM
1234	SELE FM
1256	LISTA FM

1357	VÅLE FM
1365	VIKING GP
1365	SOGNEFJORD FM
1460	HEATHER FM
1520	FENSFJORD FM
1625	KROSSFJORD FM
1710	HEATHER FM
1784	BRENT GP
1902	DUNLIN GP
1902	DRAKE FM
2008	COOK FM
2107	AMUNDSEN FM
2126	JOHANSEN FM
2241	AMUNDSEN FM
2256	STATFJORD GP
2422	HEGRE GP

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
502	pdf	1.04

Dokumenter - eldre Sokkeldirektoratets WDSS rapporter og andre relaterte dokumenter

Dokument navn	Dokument format	Dokument størrelse [KB]
502_01_WDSS_General_Information	pdf	0.09

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	446.0	36	450.0	0.00	LOT
SURF.COND.	20	807.0	26	815.0	1.71	LOT
LINER	16	1272.0	22	1280.0	1.71	LOT
INTERM.	13 3/8	1927.0	15 3/4	1946.0	0.00	LOT
INTERM.	9 5/8	3982.0	12 1/4	4029.0	0.00	LOT

OPEN HOLE		5035.0	8 1/2	5035.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
820	1.56			seawater	
1665	1.62			seawater	
2000	1.46			seawater	
2310	1.46			seawater	
3480	1.46			seawater	
3640	1.44			seawater	