## General information

| | |
|---|---|
| Wellbore name | 15/9-13 |
| Type | EXPLORATION |
| Purpose | APPRAISAL |
| Status | P&A |
| Factmaps in new window | link to map |
| Main area | NORTH SEA |
| Field | SLEIPNER ØST |
| Discovery | 15/9-9 Sleipner Øst |
| Well name | 15/9-13 |
| Seismic location | 610 - 160  SP 110 |
| Production licence | 046 |
| Drilling operator | Den norske stats oljeselskap a.s |
| Drill permit | 319-L |
| Drilling facility | ROSS RIG (1) |
| Drilling days | 68 |
| Entered date | 21.03.1982 |
| Completed date | 27.05.1982 |
| Release date | 27.05.1984 |
| Publication date | 11.03.2015 |
| Purpose - planned | APPRAISAL |
| Reentry | NO |
| Content | GAS/CONDENSATE |
| Discovery wellbore | NO |
| 1st level with HC, age | PALEOCENE |
| 1st level with HC, formation | HEIMDAL FM |
| 2nd level with HC, age | MIDDLE JURASSIC |
| 2nd level with HC, formation | HUGIN FM |
| Kelly bushing elevation [m] | 25.0 |
| Water depth [m] | 81.0 |
| Total depth (MD) [m RKB] | 3280.0 |
| Final vertical depth (TVD) [m RKB] | 3279.0 |
| Maximum inclination [°] | 3.7 |
| Bottom hole temperature [°C] | 91 |
| Oldest penetrated age | LATE PERMIAN |
| Oldest penetrated formation | ZECHSTEIN GP |
| Geodetic datum | ED50 |
| NS degrees | 58° 22' 25.96'' N |
| EW degrees | 1° 56' 2.86'' E |

| | |
|---|---|
| NS UTM [m] | 6470978.02 |
| EW UTM [m] | 437653.70 |
| UTM zone | 31 |
| NPDID wellbore | 45 |

## Wellbore history

### General

Well 15/9-13 was drilled on the Sleipner East Field in the Viking Graben in the North Sea. The objective was to delineate the hydrocarbon accumulation found in the Heimdal Formation of the 15/9 Gamma structure. Secondary objectives were to test possible hydrocarbons in sandstones of Jurassic - Triassic age. The well is reference well for the Utsira and Skade formations.

### Operations and results

Appraisal well 15/9-13 was spudded with the semi-submersible installation Ross Rig on 21 March 1982 and drilled to TD at 3280 m in the Permian Zechstein Group. No significant problem was encountered in the operations. The well was drilled with seawater and hi-vis slugs down to 518 m, with gel/lignosulphonate mud from 518 m to 1165 m, gypsum/lignosulphonate mud from 1165 m to 2642 m, and gel/lignosulphonate mud from 2642 m to TD.

The well proved gas and condensate in the Heimdal Formation. Shows on cores indicate that all sandstones in the Heimdal Formation are gas filled to a probable down-to contact in top Shetland Group at 2440 m. Gas and condensate were also encountered in a Jurassic sandstone from 2763 to a probable down-to contact at 2791 m. No hydrocarbons were found in Triassic sandstones. No shows were recorded outside of the hydrocarbon-bearing sections in the well.

Seven cores were cut. Cores 1 - 3 were cut from 2404 m in the Heimdal Formation to 2453.5 m in the Tor Formation with 84 to 100% recovery. Cores 4 - 7 were cut from 2763 m to 2801.6 m in the Hugin Formation with 90 to 100% recovery. Segregated RFT fluid samples were taken at 2400 m, 2437 m, 2765.8 m, and 2766.5 m.

The well was permanently abandoned on 27 May 1984 as a gas/condensate appraisal well.

### Testing

Two DST's were performed on this well.

DST 1 tested gas and condensate from 2765 to 2769 m in the Jurassic sand through the 7" liner. During the main flow on a 64/64” choke, the test produced on average 804500 Sm3 gas and 388 Sm3 condensate /day. The GOR was 2073 Sm3/Sm3, the condensate density was 0.783 g/cm3 and the gas gravity was 0.742 (air = 1). The gas contained 0.8 ppm H2S and 1.0 % CO2. The gauge temperature at final build-up was 98.3 °C.

DST 2 tested gas and condensate from 2422 to 2427 m in the Heimdal sand through the 9 5/8" casing. During the clean-up period on a 64/64” choke, the test produced on average 758600 Sm3 gas and 401 Sm3 condensate /day. The GOR was 1891 Sm3/Sm3, the condensate density was 0.76 g/cm3 and the gas gravity was 0.702 (air=1). The gas contained 0.4 ppm H2S and 0.3 % CO2. The gauge temperature at final build-up was 90.3 °C.

## Cuttings at the Norwegian Offshore Directorate

| Cutting sample, top depth [m] | Cutting samples, bottom depth [m] |
|---|---|
| 180.00 | 3278.00 |

| 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 | 2404.0 | 2420.0 | [m ] |
| 2 | 2423.0 | 2434.5 | [m ] |
| 3 | 2435.0 | 2453.5 | [m ] |
| 4 | 2763.0 | 2772.3 | [m ] |
| 5 | 2772.7 | 2778.0 | [m ] |
| 6 | 2778.0 | 2786.0 | [m ] |
| 7 | 2787.0 | 2799.9 | [m ] |

| Total core sample length [m] | 81.4 |
|---|---|
| Cores available for sampling? | YES |

## Core photos


2404-2409m


2409-2414m


2414-2419m


2419-2420m


2423-2428m


2428-2433m


2433-2434m


2435-2440m


2440-2445m


2445-2450m


2450-2453m


2763-2768m


2768-2772m


2792-2797m


2772-2777m


2777-2778m


2778-2783m


2783-2788m


2787-2792m


2792-2797m


2797-2799m

**Palynological slides at the Norwegian Offshore Directorate**

| Sample depth | Depth unit | Sample type | Laboratory |
|---|---|---|---|
| 800.0 | [m] | DC | FUGRO |
| 810.0 | [m] | DC | FUGRO |
| 820.0 | [m] | DC | FUGRO |
| 830.0 | [m] | DC | FUGRO |
| 840.0 | [m] | DC | FUGRO |
| 850.0 | [m] | DC | FUGRO |
| 860.0 | [m] | DC | FUGRO |
| 870.0 | [m] | DC | FUGRO |
| 880.0 | [m] | DC | FUGRO |
| 890.0 | [m] | DC | FUGRO |
| 900.0 | [m] | DC | FUGRO |
| 910.0 | [m] | DC | FUGRO |
| 920.0 | [m] | DC | FUGRO |
| 920.0 | [m] | DC | FUGRO |
| 930.0 | [m] | DC | FUGRO |
| 930.0 | [m] | DC | FUGRO |

| | | | |
|---|---|---|---|
| 940.0 | [m] | DC | FUGRO |
| 940.0 | [m] | DC | FUGRO |
| 950.0 | [m] | DC | FUGRO |
| 950.0 | [m] | DC | FUGRO |
| 960.0 | [m] | DC | FUGRO |
| 960.0 | [m] | DC | FUGRO |
| 970.0 | [m] | DC | FUGRO |
| 970.0 | [m] | DC | FUGRO |
| 980.0 | [m] | DC | FUGRO |
| 980.0 | [m] | DC | FUGRO |
| 990.0 | [m] | DC | FUGRO |
| 990.0 | [m] | DC | FUGRO |
| 1000.0 | [m] | DC | FUGRO |
| 1000.0 | [m] | DC | FUGRO |
| 1010.0 | [m] | DC | FUGRO |
| 1030.0 | [m] | DC | FUGRO |
| 1040.0 | [m] | DC | FUGRO |
| 1050.0 | [m] | DC | FUGRO |
| 1060.0 | [m] | DC | FUGRO |
| 1070.0 | [m] | DC | FUGRO |
| 1080.0 | [m] | DC | FUGRO |
| 1090.0 | [m] | DC | FUGRO |
| 1100.0 | [m] | DC | FUGRO |
| 1170.0 | [m] | DC | OD |
| 1170.0 | [m] | DC | OD |
| 1190.0 | [m] | DC | OD |
| 1190.0 | [m] | DC | OD |
| 1250.0 | [m] | DC | OD |
| 1250.0 | [m] | DC | OD |
| 1280.0 | [m] | DC | OD |
| 1280.0 | [m] | DC | OD |
| 1300.0 | [m] | DC | OD |
| 1300.0 | [m] | DC | OD |
| 1310.0 | [m] | DC | OD |
| 1310.0 | [m] | DC | OD |
| 1320.0 | [m] | DC | OD |
| 1320.0 | [m] | DC | OD |
| 1330.0 | [m] | DC | OD |
| 1330.0 | [m] | DC | OD |
| 1340.0 | [m] | DC | OD |

| | | | |
|---|---|---|---|
| 1360.0 | [m] | DC | OD |
| 1370.0 | [m] | DC | OD |
| 1400.0 | [m] | DC | OD |
| 2215.0 | [m] | SWC | STATOIL |
| 2222.0 | [m] | SWC | STATOI |
| 2235.0 | [m] | SWC | STATOI |
| 2247.0 | [m] | SWC | STATOI |
| 2260.0 | [m] | SWC | STATOI |
| 2270.0 | [m] | SWC | STATOI |
| 2287.0 | [m] | SWC | STATOI |
| 2298.0 | [m] | SWC | STATOI |
| 2305.0 | [m] | SWC | STATOI |
| 2325.0 | [m] | SWC | STATOI |
| 2325.0 | [m] | SWC | STATOI |
| 2332.0 | [m] | SWC | STATOI |
| 2348.0 | [m] | DC | |
| 2350.0 | [m] | SWC | STATOIL |
| 2364.0 | [m] | SWC | STATOI |
| 2376.0 | [m] | SWC | STATOI |
| 2378.0 | [m] | DC | |
| 2399.0 | [m] | SWC | STATOIL |
| 2408.0 | [m] | DC | |
| 2453.0 | [m] | DC | |
| 2597.0 | [m] | DC | |
| 2630.0 | [m] | DC | |
| 2660.0 | [m] | DC | |
| 2690.0 | [m] | DC | |
| 2720.0 | [m] | DC | |
| 2747.0 | [m] | SWC | RRI |
| 2750.0 | [m] | DC | RRI |
| 2756.3 | [m] | SWC | |
| 2762.0 | [m] | SWC | RRI |
| 2762.9 | [m] | SWC | RRI |
| 2769.3 | [m] | SWC | RRI |
| 2771.1 | [m] | SWC | RRI |
| 2804.0 | [m] | DC | |
| 2834.0 | [m] | DC | |
| 2864.0 | [m] | DC | |
| 2894.0 | [m] | DC | |
| 2924.0 | [m] | DC | |

| | | | |
|---|---|---|---|
| 2954.0 | [m] | DC | |
| 2984.0 | [m] | DC | |
| 3014.0 | [m] | DC | |
| 3044.0 | [m] | DC | |
| 3074.0 | [m] | DC | |
| 3101.0 | [m] | DC | |
| 3134.0 | [m] | DC | |
| 3170.0 | [m] | DC | |
| 3191.0 | [m] | DC | |
| 3221.0 | [m] | DC | |
| 3251.0 | [m] | DC | |
| 3280.0 | [m] | DC | |

**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 | TEST1 | 2765.00 | 2769.00 | | 16.05.1982 - 14:00 | YES |
| DST | TEST2 | 2422.00 | 2427.00 | | 20.05.1982 - 00:00 | YES |

**Lithostratigraphy**

| Top depth [mMD RKB] | Lithostrat. unit |
|---|---|
| 106 | NORDLAND GP |
| 869 | UTSIRA FM |
| 1053 | UNDIFFERENTIATED |
| 1143 | HORDALAND GP |
| 2198 | ROGALAND GP |
| 2198 | BALDER FM |
| 2246 | SELE FM |
| 2330 | LISTA FM |
| 2395 | HEIMDAL FM |
| 2440 | SHETLAND GP |
| 2440 | TOR FM |
| 2593 | HOD FM |
| 2650 | BLODØKS FM |
| 2664 | SVARTE FM |

| | |
|---|---|
| 2674 | CROMER KNOLL GP |
| 2674 | RØDBY FM |
| 2690 | SOLA FM |
| 2698 | ÅSGARD FM |
| 2741 | VIKING GP |
| 2741 | DRAUPNE FM |
| 2762 | HEATHER FM |
| 2764 | VESTLAND GP |
| 2764 | HUGIN FM |
| 2791 | SMITH BANK FM |
| 3256 | ZECHSTEIN GP |

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

| Document name | Document format | Document size [MB] |
|---|---|---|
| 45_01_WDSS_General_Information | pdf | 0.18 |
| 45_02_WDSS_completion_log | pdf | 0.26 |

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

| Document name | Document format | Document size [MB] |
|---|---|---|
| 45_15_9_13_Completion_report_and_log | pdf | 18.06 |

**Drill stem tests (DST)**

| Test number | From depth MD [m] | To depth MD [m] | Choke size [mm] |
|---|---|---|---|
| 1.0 | 2765 | 2769 | 25.4 |
| 2.0 | 2422 | 2427 | 25.4 |

| 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 | 388 | 804000 | 0.783 | 0.742 | 2073 |
| 2.0 | 401 | 758000 | 0.760 | 0.702 | 1891 |

**Logs**

| Log type | Log top depth [m] | Log bottom depth [m] |
|---|---|---|
| CBL GR | 100 | 1172 |
| CBL VDL GR | 1050 | 2463 |
| CBL VDL GR | 2300 | 3139 |
| CST | 1287 | 2464 |
| CST | 2670 | 3189 |
| CST | 2701 | 3194 |
| CST | 2734 | 3189 |
| DLL MSFL GR | 2800 | 2950 |
| GEODIP | 2800 | 2950 |
| HDT | 2463 | 3202 |
| ISF BHC GR | 172 | 1191 |
| ISF BHC MSFL GR | 1178 | 3201 |
| LDT CNL GR | 1178 | 3202 |
| LDT GR | 498 | 1191 |
| RFT | 2923 | 3090 |
| VELOCITY | 175 | 3200 |

**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 | 169.0 | 36 | 169.0 | 0.00 | LOT |
| SURF.COND. | 20 | 502.0 | 26 | 517.0 | 1.44 | LOT |
| INTERM. | 13 3/8 | 1150.0 | 17 1/2 | 1165.0 | 1.76 | LOT |
| INTERM. | 9 5/8 | 2623.0 | 12 1/4 | 2642.0 | 1.83 | LOT |
| LINER | 7 | 3240.0 | 8 1/2 | 3280.0 | 0.00 | LOT |

**Drilling mud**

| Depth MD [m] | Mud weight [g/cm3] | Visc. [mPa.s] | Yield point [Pa] | Mud type | Date measured |
|---|---|---|---|---|---|
| 615 | 1.08 | | | waterbased | |
| 1215 | 1.12 | | | waterbased | |
| 1810 | 1.14 | | | waterbased | |
| 2220 | 1.11 | | | waterbased | |
| 2340 | 1.15 | | | waterbased | |
| 2505 | 1.20 | | | waterbased | |
| 2765 | 1.31 | | | waterbased | |
| 3080 | 1.30 | | | 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] |
|---|---|---|
| 45_Formation_pressure_(Formasjonstrykk) | pdf | 0.22 |