



## **General information**





|                                    |                                 |
|------------------------------------|---------------------------------|
| Wellbore name                      | 2/2-2                           |
| Type                               | EXPLORATION                     |
| Purpose                            | WILDCAT                         |
| Status                             | P&A                             |
| Factmaps in new window             | <a href="#">link to map</a>     |
| Main area                          | NORTH SEA                       |
| Discovery                          | <a href="#">2/2-2 (Desmond)</a> |
| Well name                          | 2/2-2                           |
| Seismic location                   | SG 8052 - 302 SP 285            |
| Production licence                 | <a href="#">066</a>             |
| Drilling operator                  | Saga Petroleum ASA              |
| Drill permit                       | 336-L                           |
| Drilling facility                  | <a href="#">DYVI ALPHA</a>      |
| Drilling days                      | 55                              |
| Entered date                       | 04.07.1982                      |
| Completed date                     | 27.08.1982                      |
| Release date                       | 27.08.1984                      |
| Publication date                   | 29.06.2004                      |
| Purpose - planned                  | WILDCAT                         |
| Reentry                            | NO                              |
| Content                            | GAS                             |
| Discovery wellbore                 | YES                             |
| 1st level with HC, age             | OLIGOCENE                       |
| 1st level with HC, formation       | VADE FM                         |
| Kelly bushing elevation [m]        | 25.0                            |
| Water depth [m]                    | 66.0                            |
| Total depth (MD) [m RKB]           | 3127.0                          |
| Final vertical depth (TVD) [m RKB] | 3124.0                          |
| Maximum inclination [°]            | 2.25                            |
| Bottom hole temperature [°C]       | 103                             |
| Oldest penetrated age              | LATE PERMIAN                    |
| Oldest penetrated formation        | ZECHSTEIN GP                    |
| Geodetic datum                     | ED50                            |
| NS degrees                         | 56° 56' 40.61" N                |
| EW degrees                         | 3° 22' 46.81" E                 |
| NS UTM [m]                         | 6311426.05                      |
| EW UTM [m]                         | 523099.44                       |
| UTM zone                           | 31                              |
| NPDID wellbore                     | 80                              |



## Wellbore history

### General

Well 2/2-2 was located near the crest of an elongated salt-induced domal structure in the NW corner of the block. The main target was the Late Jurassic Ula Formation shallow marine sandstone. Sandstones of Middle Jurassic and Late Triassic age were possible secondary targets, having the same structural definition as the Ula sand. Secondary objectives were further represented by the Late Cretaceous chalk and a sandstone of Oligocene age.

According to the license agreement, the well should be drilled into the Triassic, salt or a maximum depth of 5000 m whatever came first. The well reached a TD of 3124 m in Permian anhydrites thus fulfilling the work commitment.

### Operations and results

Well 2/2-2 was spudded with the semi-submersible installation Dyvi Alpha on 4 April 1992 and drilled to TD at 3124 m in the Late Permian Zechstein Group. When drilling the 36" hole, the pipe stuck. After the pipe was worked free, the drilling continued. The well took a kick at 2425 m. The well was drilled with seawater and bentonite down to 715 m, with polymer/gypsum/"SST 202" mud from 715 m to 1965 m, and with lignite mud from 1965 m to TD.

The well penetrated porous layers in the Oligocene, the Cretaceous and the Jurassic. A full suit of logs was run in these sections. In the interval 1978-2057 m of the Oligocene, a bioturbated and cross-laminated very fine sandstone, interbedded with siltstone and shale was found (the Vade Formation). The upper part of the sand was found gas bearing from 1978 m down to a GWC at 2002 m. Net pay thickness was 14 metres. A segregated RFT gas sample was taken at 1996.4 m. The sand has a porosity of 24% with a shale content of 25%. A water saturation of 40% was estimated. The core analysis gave an average porosity of 27 %, but this is probably too high because the core-plugs were drilled mainly in clean silt/sandstone intervals. Below the gas water contact, a net sand thickness of 13 m with a porosity of 23% was calculated. The Cretaceous chalk, 2512 m to 2754 m, was water bearing. A net thickness of 111 m was counted with an average porosity of 22%. The chalk is clean, but large washouts indicate poor consolidation. The Middle Jurassic Sandstone, from 2909 m to 2995 m (Mandal and Bryne Formations), was found water bearing. The sand turned out to have a shale content of 27%. The porosity averaged 15%, and the net sand thickness is 16 m. Two cores were cut in the 12 1/4" section, one in the Oligocene and one in the Middle Jurassic. The RFT-measurements indicated a reservoir pressure of 431.2 bar (6254 psig) at 2959 m. This gave a gradient to surface of 0.15 bar/m (0.65 psi/ft), which shows the Middle Jurassic Sandstone to be over-pressured. The average permeability calculated from the RFT-measurements was 0.5 mD.

The well was permanently abandoned on 27 August 1982 as a gas discovery.

### Testing

The well was tested over the interval 1980 m to 1988 m in the Oligocene sand. Initial flow lasted 794 minutes. Flow-rates varied due to technical problems with the choke. Problems with plugging of the choke and hydrate build-up also occurred. A stabilized flow rate of 280 000 Sm<sup>3</sup>/d(10mm scf/d) through 9.53 mm (3/8") choke, at a drawdown of 6.3 bar (92 psi). The corresponding wellhead pressure was 178.7 bar (2541 psig). The analysis gave a reservoir pressure of 216.9 bar (3145 psia) at 1947 m and a permeability of 104 mD, which is in good agreement with the RFT-measurements. The pressure corresponds to a gradient of 0.11 bar/m (0.49 psi/m) to the surface, which is close to the hydrostatic gradient. The reservoir temperature is 82.2 deg C (180 deg F).



The produced gas was very dry with a specific gravity of 0.57 (air = 1). The fourth flow period was designed to define the minimum flow-rate at which sand production occurred. Produced solids were found to be a mixture of cement and mud particles. The produced gas was very light and dry, with a gravity of 0.57 (air = 1). No condensate, formation water or H<sub>2</sub>S was noticed during the test.

**Cuttings at the Norwegian Offshore Directorate**

| Cutting sample, top depth [m] | Cutting samples, bottom depth [m] |
|-------------------------------|-----------------------------------|
| 230.00                        | 3122.00                           |

|                                  |    |
|----------------------------------|----|
| Cuttings available for sampling? | NO |
|----------------------------------|----|

**Cores at the Norwegian Offshore Directorate**

| Core sample number | Core sample - top depth | Core sample - bottom depth | Core sample depth - uom |
|--------------------|-------------------------|----------------------------|-------------------------|
| 1                  | 1979.3                  | 1994.3                     | [m ]                    |
| 2                  | 2939.7                  | 2947.0                     | [m ]                    |

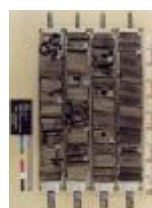
|                               |      |
|-------------------------------|------|
| Total core sample length [m]  | 22.3 |
| Cores available for sampling? | YES  |

**Core photos**

1980-1982m



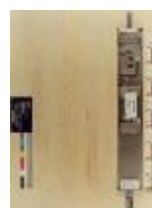
1983-1986m



1987-1990m



1991-1993m



1994-1994m



2940-2943m



2944-2946m



2946-2947m

**Palynological slides at the Norwegian Offshore Directorate**

| Sample depth | Depth unit | Sample type | Laboratory |
|--------------|------------|-------------|------------|
| 1650.0       | [m]        | DC          | RRI        |
| 1660.0       | [m]        | DC          | RRI        |
| 1680.0       | [m]        | DC          | RRI        |
| 1690.0       | [m]        | DC          | RRI        |
| 1710.0       | [m]        | DC          | RRI        |
| 1720.0       | [m]        | DC          | RRI        |
| 1750.0       | [m]        | DC          | RRI        |
| 1770.0       | [m]        | DC          | RRI        |
| 1780.0       | [m]        | DC          | RRI        |
| 1800.0       | [m]        | DC          | RRI        |
| 1810.0       | [m]        | DC          | RRI        |
| 1850.0       | [m]        | DC          | RRI        |
| 1860.0       | [m]        | DC          | RRI        |
| 1880.0       | [m]        | DC          | RRI        |
| 1890.0       | [m]        | DC          | RRI        |
| 1900.0       | [m]        | DC          | OD         |
| 1910.0       | [m]        | DC          | OD         |
| 1910.0       | [m]        | DC          | RRI        |
| 1920.0       | [m]        | DC          | RRI        |
| 1920.0       | [m]        | DC          | OD         |
| 1930.0       | [m]        | DC          | OD         |
| 1940.0       | [m]        | DC          | OD         |
| 1940.0       | [m]        | DC          | RRI        |
| 1950.0       | [m]        | DC          | RRI        |
| 1950.0       | [m]        | DC          | OD         |
| 1960.0       | [m]        | DC          | OD         |
| 1970.0       | [m]        | DC          | OD         |
| 1970.0       | [m]        | DC          | RRI        |
| 1980.0       | [m]        | DC          | RRI        |
| 1980.0       | [m]        | DC          | OD         |
| 1981.5       | [m]        | C           | RRI        |
| 1984.4       | [m]        | C           | OD         |
| 1984.5       | [m]        | C           | RRI        |
| 1984.8       | [m]        | C           | OD         |
| 1986.5       | [m]        | C           | RRI        |
| 1987.4       | [m]        | C           | RRI        |
| 1990.0       | [m]        | DC          | OD         |
| 1992.3       | [m]        | C           | RRI        |



|        |     |    |     |
|--------|-----|----|-----|
| 2000.0 | [m] | DC | OD  |
| 2000.0 | [m] | DC | RRI |
| 2010.0 | [m] | DC | OD  |
| 2010.0 | [m] | DC | RRI |
| 2020.0 | [m] | DC | OD  |
| 2030.0 | [m] | DC | OD  |
| 2030.0 | [m] | DC | RRI |
| 2040.0 | [m] | DC | RRI |
| 2040.0 | [m] | DC | OD  |
| 2045.9 | [m] | C  | RRI |
| 2050.0 | [m] | DC | OD  |
| 2060.0 | [m] | DC | OD  |
| 2060.0 | [m] | DC | RRI |
| 2070.0 | [m] | DC | RRI |
| 2070.0 | [m] | DC | OD  |
| 2080.0 | [m] | DC | OD  |
| 2090.0 | [m] | DC | OD  |
| 2090.0 | [m] | DC | OD  |
| 2090.0 | [m] | DC | RRI |
| 2100.0 | [m] | DC | OD  |
| 2100.0 | [m] | DC | RRI |
| 2110.0 | [m] | DC | OD  |
| 2120.0 | [m] | DC | RRI |
| 2120.0 | [m] | DC | OD  |
| 2130.0 | [m] | DC | OD  |
| 2130.0 | [m] | DC | RRI |
| 2140.0 | [m] | DC | OD  |
| 2150.0 | [m] | DC | OD  |
| 2150.0 | [m] | DC | RRI |
| 2160.0 | [m] | DC | RRI |
| 2160.0 | [m] | DC | OD  |
| 2170.0 | [m] | DC | OD  |
| 2180.0 | [m] | DC | OD  |
| 2180.0 | [m] | DC | RRI |
| 2190.0 | [m] | DC | RRI |
| 2190.0 | [m] | DC | OD  |
| 2200.0 | [m] | DC | OD  |
| 2210.0 | [m] | DC | RRI |
| 2220.0 | [m] | DC | RRI |
| 2240.0 | [m] | DC | RRI |



|        |     |     |     |
|--------|-----|-----|-----|
| 2250.0 | [m] | DC  | RRI |
| 2270.0 | [m] | DC  | RRI |
| 2280.0 | [m] | DC  | RRI |
| 2300.0 | [m] | DC  | RRI |
| 2310.0 | [m] | DC  | RRI |
| 2330.0 | [m] | DC  | RRI |
| 2340.0 | [m] | DC  | RRI |
| 2360.0 | [m] | DC  | RRI |
| 2370.0 | [m] | DC  | RRI |
| 2390.0 | [m] | DC  | RRI |
| 2400.0 | [m] | DC  | RRI |
| 2420.0 | [m] | DC  | RRI |
| 2430.0 | [m] | DC  | RRI |
| 2450.0 | [m] | DC  | RRI |
| 2465.0 | [m] | DC  | RRI |
| 2480.0 | [m] | DC  | RRI |
| 2490.0 | [m] | DC  | RRI |
| 2515.0 | [m] | DC  | RRI |
| 2520.0 | [m] | DC  | RRI |
| 2800.5 | [m] | SWC | RRI |
| 2813.5 | [m] | SWC | RRI |
| 2829.5 | [m] | SWC | RRI |
| 2871.5 | [m] | SWC | RRI |
| 2901.0 | [m] | SWC | RRI |
| 2909.0 | [m] | SWC | RRI |
| 2909.4 | [m] | SWC | RRI |
| 2912.5 | [m] | SWC | RRI |
| 2915.0 | [m] | DC  | HRS |
| 2933.0 | [m] | DC  | HRS |
| 2940.7 | [m] | C   | HRS |
| 2944.5 | [m] | C   | HRS |
| 2945.8 | [m] | C   | HRS |
| 2946.5 | [m] | C   | HRS |
| 2964.0 | [m] | SWC | RRI |
| 2993.0 | [m] | DC  | HRS |
| 3002.0 | [m] | DC  | HRS |
| 3026.0 | [m] | DC  | HRS |

**Lithostratigraphy**



| Top depth<br>[mMD RKB] | Lithostrat. unit                 |
|------------------------|----------------------------------|
| 91                     | <a href="#">NORDLAND GP</a>      |
| 1502                   | <a href="#">HORDALAND GP</a>     |
| 1978                   | <a href="#">VADE FM</a>          |
| 2057                   | <a href="#">NO FORMAL NAME</a>   |
| 2326                   | <a href="#">ROGALAND GP</a>      |
| 2326                   | <a href="#">BALDER FM</a>        |
| 2358                   | <a href="#">SELE FM</a>          |
| 2389                   | <a href="#">LISTA FM</a>         |
| 2512                   | <a href="#">SHETLAND GP</a>      |
| 2512                   | <a href="#">TOR FM</a>           |
| 2639                   | <a href="#">HOD FM</a>           |
| 2754                   | <a href="#">CROMER KNOLL GP</a>  |
| 2908                   | <a href="#">TYNE GP</a>          |
| 2908                   | <a href="#">MANDAL FM</a>        |
| 2917                   | <a href="#">VESTLAND GP</a>      |
| 2917                   | <a href="#">BRYNE FM</a>         |
| 2995                   | <a href="#">NO GROUP DEFINED</a> |
| 2995                   | <a href="#">SMITH BANK FM</a>    |
| 3105                   | <a href="#">ZECHSTEIN GP</a>     |

**Composite logs**

| Document name      | Document format | Document size<br>[MB] |
|--------------------|-----------------|-----------------------|
| <a href="#">80</a> | pdf             | 0.52                  |

**Geochemical information**

| Document name        | Document format | Document size<br>[MB] |
|----------------------|-----------------|-----------------------|
| <a href="#">80_1</a> | pdf             | 1.75                  |

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





| Document name                                  | Document format | Document size [MB] |
|------------------------------------------------|-----------------|--------------------|
| <a href="#">80_01_WDSS_General_Information</a> | pdf             | 0.18               |
| <a href="#">80_02_WDSS_completion_log</a>      | pdf             | 0.23               |

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

| Document name                                      | Document format | Document size [MB] |
|----------------------------------------------------|-----------------|--------------------|
| <a href="#">80_2_2_2_COMPLETION_REPORT_AND_LOG</a> | pdf             | 16.15              |

**Drill stem tests (DST)**

| Test number | From depth MD [m] | To depth MD [m] | Choke size [mm] |
|-------------|-------------------|-----------------|-----------------|
| 1.0         | 1980              | 1988            | 11.2            |

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

| Test number | Oil [Sm3/day] | Gas [Sm3/day] | Oil density [g/cm3] | Gas grav. rel.air | GOR [m3/m3] |
|-------------|---------------|---------------|---------------------|-------------------|-------------|
| 1.0         |               | 314000        |                     | 0.570             |             |

**Logs**

| Log type          | Log top depth [m] | Log bottom depth [m] |
|-------------------|-------------------|----------------------|
| CST               | 1970              | 3101                 |
| DLL MSFL GR       | 1946              | 2250                 |
| HDT               | 1946              | 2125                 |
| HDT               | 2865              | 3127                 |
| ISF DDBHC GR      | 203               | 714                  |
| ISF DDBHC GR      | 705               | 1968                 |
| ISF DDBHC MSFL GR | 1946              | 2570                 |
| ISF DDBHC MSFL GR | 2550              | 3124                 |
| LDT CNL GR        | 1946              | 2571                 |
| LDT CNL GR        | 2550              | 3127                 |





|     |      |      |
|-----|------|------|
| RFT | 1981 | 2449 |
| RFT | 2937 | 2994 |
| VSP | 205  | 3127 |

**Casing and leak-off tests**

| Casing type | Casing diam.<br>[inch] | Casing depth<br>[m] | Hole diam.<br>[inch] | Hole depth<br>[m] | LOT/FIT mud<br>eqv.<br>[g/cm3] | Formation test<br>type |
|-------------|------------------------|---------------------|----------------------|-------------------|--------------------------------|------------------------|
| CONDUCTOR   | 30                     | 203.0               | 36                   | 206.0             | 0.00                           | LOT                    |
| SURF.COND.  | 20                     | 706.0               | 26                   | 715.0             | 1.57                           | LOT                    |
| INTERM.     | 13 3/8                 | 1945.0              | 17 1/2               | 1965.0            | 1.77                           | LOT                    |
| INTERM.     | 9 5/8                  | 3124.0              | 12 1/4               | 3124.0            | 0.00                           | LOT                    |

**Thin sections at the Norwegian Offshore Directorate**

| Depth   | Unit |
|---------|------|
| 1988.00 | [m ] |
| 1993.00 | [m ] |
| 2940.00 | [m ] |

**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<br>format | Document size<br>[MB] |
|---------------------------------------------------------|--------------------|-----------------------|
| <a href="#">80 Formation pressure (Formasjonstrykk)</a> | pdf                | 0.23                  |

