



## Generell informasjon

|                                          |                                   |
|------------------------------------------|-----------------------------------|
| Brønnbane navn                           | 16/10-4                           |
| Type                                     | EXPLORATION                       |
| Formål                                   | WILDCAT                           |
| Status                                   | P&A                               |
| Faktakart i nytt vindu                   | <a href="#">lenke til kart</a>    |
| Hovedområde                              | NORTH SEA                         |
| Brønn navn                               | 16/10-4                           |
| Seismisk lokalisering                    | ES9401-inline 1486 & xline 4084   |
| Utvinningstillatelse                     | <a href="#">101</a>               |
| Boreoperatør                             | Norsk Agip AS                     |
| Boretillatelse                           | 931-L                             |
| Boreinnretning                           | <a href="#">TRANSOCEAN NORDIC</a> |
| Boredager                                | 31                                |
| Borestart                                | 11.07.1998                        |
| Boreslutt                                | 10.08.1998                        |
| Frigitt dato                             | 10.08.2000                        |
| Publiseringsdato                         | 31.10.2003                        |
| Opprinnelig formål                       | WILDCAT                           |
| Gjenåpnet                                | NO                                |
| Innhold                                  | DRY                               |
| Funnbrønnbane                            | NO                                |
| Avstand, boredekk - midlere havflate [m] | 39.0                              |
| Vanndybde ved midlere havflate [m]       | 77.0                              |
| Totalt målt dybde (MD) [m RKB]           | 2580.0                            |
| Totalt vertikalt dybde (TVD) [m RKB]     | 2580.0                            |
| Temperatur ved bunn av brønnbanen [°C]   | 109                               |
| Eldste penetrerte alder                  | LATE PERMIAN                      |
| Eldste penetrerte formasjon              | ZECHSTEIN GP                      |
| Geodetisk datum                          | ED50                              |
| NS grader                                | 58° 4' 59.56" N                   |
| ØV grader                                | 2° 11' 57.2" E                    |
| NS UTM [m]                               | 6438401.00                        |
| ØV UTM [m]                               | 452774.85                         |
| UTM sone                                 | 31                                |
| NPDID for brønnbanen                     | 3531                              |



## Brønnhistorie

### General

Well 16/10-4 was drilled on the Trond prospect located in the northeast part of PL 101, which is southeast of the existing Sleipner field. The prospect was a north-south elongated salt-induced structure with dip closure in all directions. The main purpose was to test the hydrocarbon potential within the upper Jurassic (Hugin) formation in the prospect and to obtain representative cores of that sand package.

### Operations and results

The jack up installation "Transocean Nordic" arrived on location on June 25 1998. Spud was significantly delayed due to insufficient leg penetration. Gravel boats had to be employed to dump gravel around the spud cans. This operation took 141 hours. With the gravel dumping completed, the weather became rough and the spud cans could not be lifted according to the plan. It took 162 hours before the weather was sufficiently calm to proceed with the pre-loading. Exploration well 16/10-4 was finally spudded on July 11 1998 and drilled to a total depth of 2580 m in Permian Zechstein anhydrites. The well was drilled with seawater and bentonite sweeps down to 380 m, with KCl / PAC mud from 380 m to 1230 m, and with KCl / PAC / glycol mud from 1230 m to TD.

All the formations encountered from top Balder were found above prognosis due to anomalous velocities in the gas chimney drilled by this well. The reservoir target (Hugin Formation) was encountered at 2474 m. (80 m below prognosis). The petrophysical properties of the reservoir were found to be good. The only interval with some gas shows was the Rogaland Group (1792-1888 m) where the total gas was between 2.6 and 4.4 % Ci-nC4, but no reservoir was encountered at this level. No direct shows were observed in the Hugin Formation and the total gas was below 0.1%. From FMT measurements, log analysis and all the information collected during the drilling phase, the reservoir was found to be water bearing. However, onshore geochemical analysis by Eni central laboratories in Milan reported significant traces of migrated hydrocarbons in core samples from 2478 to 2496 m and high levels of phenols with possible traces of altered oil in the FMT water sample.

One core was cut from 2477 to 2504 m in the soft, unconsolidated Hugin Formation (Previous wells in the area suffered no core recovery). The median porosity of the core was 25% and the median permeability was 260 m. Eight FMT pre tests and one segregated sample were taken from the Hugin reservoir. All pressure tests were good and gave a clear water gradient of 0,102 bar/m in the reservoir. The sample recovered was a mixture of mud filtrate and formation water.

The 16/10-4 well was permanently abandoned on 10 August as a dry well.

### Testing

No drill stem test was performed.

## Borekaks i Sokkeldirektoratet

| Borekaksprøve, topp dybde [m] | Borekaksprøve, bunn dybde [m] |
|-------------------------------|-------------------------------|
| 210.00                        | 2580.00                       |

|                                        |     |
|----------------------------------------|-----|
| Borekaks tilgjengelig for prøvetaking? | YES |
|----------------------------------------|-----|



### Borekjerne i Sakkeldirektoratet

| Kjerneprøve nummer | Kjerneprøve - topp dybde | Kjerneprøve - bunn dybde | Kjerneprøve dybde - enhet |
|--------------------|--------------------------|--------------------------|---------------------------|
| 1                  | 2477.0                   | 2499.5                   | [m ]                      |

|                                       |      |
|---------------------------------------|------|
| Total kjerneprøve lengde [m]          | 22.5 |
| Kjerner tilgjengelig for prøvetaking? | YES  |

### Palynologiske preparater i Sakkeldirektoratet

| Prøve dybde | Dybde enhet | Prøve type | Laboratorie |
|-------------|-------------|------------|-------------|
| 1050.0      | [m]         | DC         | RRI         |
| 1100.0      | [m]         | DC         | RRI         |
| 1150.0      | [m]         | DC         | RRI         |
| 1200.0      | [m]         | DC         | RRI         |
| 1250.0      | [m]         | DC         | RRI         |
| 1300.0      | [m]         | DC         | RRI         |
| 1350.0      | [m]         | DC         | RRI         |
| 1400.0      | [m]         | DC         | RRI         |
| 1450.0      | [m]         | DC         | RRI         |
| 1500.0      | [m]         | DC         | RRI         |
| 1550.0      | [m]         | DC         | RRI         |
| 1600.0      | [m]         | DC         | RRI         |
| 1650.0      | [m]         | DC         | RRI         |
| 1700.0      | [m]         | DC         | RRI         |
| 1750.0      | [m]         | DC         | RRI         |
| 1760.0      | [m]         | DC         | RRI         |
| 1770.0      | [m]         | DC         | RRI         |
| 1780.0      | [m]         | DC         | RRI         |
| 1790.0      | [m]         | DC         | RRI         |
| 1800.0      | [m]         | DC         | RRI         |
| 1810.0      | [m]         | DC         | RRI         |
| 1820.0      | [m]         | DC         | RRI         |
| 1830.0      | [m]         | DC         | RRI         |
| 1840.0      | [m]         | DC         | RRI         |
| 1850.0      | [m]         | DC         | RRI         |
| 1860.0      | [m]         | DC         | RRI         |



|            |    |        |
|------------|----|--------|
| 1870.0 [m] | DC | RRI    |
| 1880.0 [m] | DC | RRI    |
| 2420.0 [m] | DC | RRI    |
| 2430.0 [m] | DC | RRI    |
| 2440.0 [m] | DC | RRI    |
| 2450.0 [m] | DC | RRI    |
| 2460.0 [m] | DC | RRI    |
| 2470.0 [m] | DC | RRI    |
| 2477.5 [m] | C  | GEOLAB |
| 2490.0 [m] | DC | RRI    |
| 2490.8 [m] | C  | GEOLAB |
| 2498.0 [m] | C  | GEOLAB |
| 2500.0 [m] | DC | RRI    |
| 2510.0 [m] | DC | RRI    |
| 2520.0 [m] | DC | RRI    |
| 2530.0 [m] | DC | RRI    |
| 2550.0 [m] | DC | RRI    |
| 2560.0 [m] | DC | RRI    |
| 2570.0 [m] | DC | RRI    |
| 2580.0 [m] | DC | RRI    |

### Litostratigrafi

| Topp Dyb<br>[mMD RKB] | Litostrat. enhet                 |
|-----------------------|----------------------------------|
| 116                   | <a href="#">NORDLAND GP</a>      |
| 965                   | <a href="#">UTSIRA FM</a>        |
| 971                   | <a href="#">UNDIFFERENTIATED</a> |
| 1041                  | <a href="#">HORDALAND GP</a>     |
| 1792                  | <a href="#">ROGALAND GP</a>      |
| 1792                  | <a href="#">BALDER FM</a>        |
| 1820                  | <a href="#">SELE FM</a>          |
| 1830                  | <a href="#">LISTA FM</a>         |
| 1882                  | <a href="#">VÅLE FM</a>          |
| 1888                  | <a href="#">SHETLAND GP</a>      |
| 1888                  | <a href="#">EKOFISK FM</a>       |
| 1940                  | <a href="#">TOR FM</a>           |
| 2172                  | <a href="#">HOD FM</a>           |
| 2398                  | <a href="#">CROMER KNOLL GP</a>  |
| 2398                  | <a href="#">SOLA FM</a>          |



|      |                                  |
|------|----------------------------------|
| 2408 | <a href="#">ÅSGARD FM</a>        |
| 2449 | <a href="#">VIKING GP</a>        |
| 2449 | <a href="#">DRAUPNE FM</a>       |
| 2474 | <a href="#">VESTLAND GP</a>      |
| 2474 | <a href="#">HUGIN FM</a>         |
| 2547 | <a href="#">NO GROUP DEFINED</a> |
| 2547 | <a href="#">SKAGERRAK FM</a>     |
| 2550 | <a href="#">ZECHSTEIN GP</a>     |

### Spleisede logger

| Dokument navn        | Dokument format | Dokument størrelse [KB] |
|----------------------|-----------------|-------------------------|
| <a href="#">3531</a> | pdf             | 0.23                    |

### Geokjemisk informasjon

| Dokument navn          | Dokument format | Dokument størrelse [KB] |
|------------------------|-----------------|-------------------------|
| <a href="#">3531_1</a> | pdf             | 1.14                    |

### Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

| Dokument navn                                  | Dokument format | Dokument størrelse [KB] |
|------------------------------------------------|-----------------|-------------------------|
| <a href="#">3531_16_10_4_COMPLETION_REPORT</a> | .pdf            | 53.64                   |

### Logger

| Type logg          | Topp dyp for logg [m] | Bunn dyp for logg [m] |
|--------------------|-----------------------|-----------------------|
| FMT GR             | 2481                  | 2527                  |
| HDIL MAC DSL SP GR | 2104                  | 2585                  |
| HDIP GR            | 2104                  | 2585                  |
| LWD - DPR RAW GR   | 380                   | 2580                  |
| VSP                | 0                     | 0                     |





Foringsrør og formasjonsstyrketester

| Type utforing | Utforing diam.<br>[tommer] | Utforing dybde<br>[m] | Brønnbane diam.<br>[tommer] | Brønnbane dyp<br>[m] | LOT/FIT slam<br>eqv.<br>[g/cm3] | Type formasjonstest |
|---------------|----------------------------|-----------------------|-----------------------------|----------------------|---------------------------------|---------------------|
| CONDUCTOR     | 30                         | 195.0                 | 36                          | 205.0                | 0.00                            | LOT                 |
| SURF.COND.    | 20                         | 373.0                 | 26                          | 380.0                | 1.42                            | LOT                 |
| INTERM.       | 13 3/8                     | 1219.0                | 17 1/2                      | 1230.0               | 1.70                            | LOT                 |
| INTERM.       | 9 5/8                      | 2104.0                | 12 1/4                      | 2110.0               | 1.75                            | LOT                 |
| OPEN HOLE     |                            | 2580.0                | 8 1/2                       | 2580.0               | 0.00                            | LOT                 |

Boreslam

| Dybde MD [m] | Egenvekt, slam<br>[g/cm3] | Viskositet, slam<br>[mPa.s] | Flytegrense [Pa] | Type slam | Dato, måling |
|--------------|---------------------------|-----------------------------|------------------|-----------|--------------|
| 89           | 1.05                      | 70.0                        |                  | SPUD MUD  |              |
| 225          | 0.00                      | 7.0                         |                  | SPUD MUD  |              |
| 380          | 1.20                      | 32.0                        |                  | KCL / PAC |              |
| 648          | 1.21                      | 24.0                        |                  | KCL / PAC |              |
| 1179         | 1.61                      | 43.0                        |                  | KCL / PAC |              |
| 1230         | 1.36                      | 21.0                        |                  | KCL / PAC |              |
| 1500         | 1.39                      | 35.0                        |                  | KCL / PAC |              |
| 1867         | 1.46                      | 42.0                        |                  | KCL -PAC  |              |
| 2110         | 1.50                      | 33.0                        |                  | KCL / PAC |              |
| 2470         | 1.35                      | 31.0                        |                  | DUMMY     |              |
| 2504         | 1.46                      | 35.0                        |                  | KCL / PAC |              |
| 2580         | 1.45                      | 36.0                        |                  | KCL / PAC |              |

Trykkplott

Porertrykksdataene kommer fra logging i brønnen hvis ingen annen kilde er oppgitt. I noen brønner der trykk ikke er logget, er det brukt informasjon fra formasjonstester eller brønnspark. Trykkdataene er rapportert inn til Oljedirektoratet og videre prosessert og kvalitetssikret av IHS Markit.

| Dokument navn                                             | Dokument format | Dokument størrelse [KB] |
|-----------------------------------------------------------|-----------------|-------------------------|
| <a href="#">3531_Formalion_pressure_(Formasjonstrykk)</a> | pdf             | 0.22                    |

