

**General information**

|                                    |                                       |
|------------------------------------|---------------------------------------|
| Wellbore name                      | 16/4-11                               |
| Type                               | EXPLORATION                           |
| Purpose                            | APPRAISAL                             |
| Status                             | P&A                                   |
| Press release                      | <a href="#">link to press release</a> |
| Factmaps in new window             | <a href="#">link to map</a>           |
| Main area                          | NORTH SEA                             |
| Field                              | <a href="#">SOLVEIG</a>               |
| Discovery                          | <a href="#">16/4-6 S Solveig</a>      |
| Well name                          | 16/4-11                               |
| Seismic location                   | LN12M02R14 Inline 2810 Crossline 2122 |
| Production licence                 | <a href="#">359</a>                   |
| Drilling operator                  | Lundin Norway AS                      |
| Drill permit                       | 1685-L                                |
| Drilling facility                  | <a href="#">COSLIinnovator</a>        |
| Drilling days                      | 54                                    |
| Entered date                       | 07.02.2018                            |
| Completed date                     | 01.04.2018                            |
| Release date                       | 01.04.2020                            |
| Publication date                   | 01.04.2020                            |
| Purpose - planned                  | APPRAISAL                             |
| Reentry                            | NO                                    |
| Content                            | OIL                                   |
| Discovery wellbore                 | NO                                    |
| 1st level with HC, age             | TRIASSIC                              |
| 1st level with HC, formation       | SKAGERRAK FM                          |
| Kelly bushing elevation [m]        | 25.0                                  |
| Water depth [m]                    | 100.0                                 |
| Total depth (MD) [m RKB]           | 2475.0                                |
| Final vertical depth (TVD) [m RKB] | 2475.0                                |
| Maximum inclination [°]            | 4.8                                   |
| Bottom hole temperature [°C]       | 94                                    |
| Oldest penetrated age              | PERMIAN                               |
| Oldest penetrated formation        | ROTLIEGEND GP                         |
| Geodetic datum                     | ED50                                  |
| NS degrees                         | 58° 40' 16.11" N                      |
| EW degrees                         | 2° 14' 25.3" E                        |
| NS UTM [m]                         | 6503833.13                            |



|                |           |
|----------------|-----------|
| EW UTM [m]     | 455939.97 |
| UTM zone       | 31        |
| NPDID wellbore | 8353      |

## Wellbore history

### General

Well 16/4-11 was drilled on the Luno Discovery on the Utsira High in the North Sea. The primary objective of the well was to delineate the southwest flank of the 16/4-6 S (Luno II) discovery, to investigate the reservoir properties, and to investigate the type of oil and total oil column in this part of the discovery.

### Operations and results

Appraisal well 16/4-11 was spudded with the semi-submersible installation COSL Innovator on 7 February 2018. A 9 7/8" pilot hole was drilled from below the 30x36" casing shoe at 195 m to 475 m. Shallow gas was observed in the interval 469 m to 471 m. The 20" casing was therefore set shallow at 409.5 m, above the shallow gas zone. From there the well was drilled to TD at 2475 m in the Permian Rotliegendes Group. Operations proceeded without significant problems. The well was drilled with seawater and hi-vis pills down to 409.5 m, with KCl/polymer mud from 409.5 m to 1922 m, and with Aquadrill mud from 1922 m to TD.

Top of the target reservoir, Hegre Group, was encountered at 1950 m. It was oil-bearing down to a clear oil-water contact at 1971.5 m. Good shows were described in the oil-bearing reservoir section. Below the OWC shows continued down to the base of the cored interval at 2004 m. These shows are described as having no odour, 100% even weak yellowish direct fluorescence, slightly blooming weak bluish white cut fluorescence, and 10% moderate bluish white fluorescent residue. The conventional core and sidewall cores from the Permian sandstone had shows that weakened with depth in the interval 2090 to 2329 m. These are typically described as having no odour, yellowish brown direct fluorescence, no to diffuse blue-white fluorescent cut, and no to 80% blue white cream fluorescent residue.

Three cores were cut in the well. Cores 1 and 2 were cut in the top of the Hegre Group reservoir from 1952 to 2004.1 m with 100% recovery. Core 3 was cut in the Permian sandstones from 2090 to 2099 m with 94.2% recovery. MDT fluid samples were taken at 1952.1 m (oil), 1963 m (oil), 1970.1 m (oil), 1971.61 m (water), 1978.3 m (water), 2001.72 m (water), and 2075 m (water). Single flash of the uppermost oil sample gave a GOR of 233.4 Sm<sup>3</sup>/Sm<sup>3</sup> and an oil density of 0.8482 g/cm<sup>3</sup>.

The well was permanently abandoned on 1 April 2018 as an oil appraisal.

### Testing

No drill stem test was performed.

## Cuttings at the Norwegian Offshore Directorate

| Cutting sample, top depth [m] | Cutting samples, bottom depth [m] |
|-------------------------------|-----------------------------------|
| 420.00                        | 2476.00                           |



|                                  |     |
|----------------------------------|-----|
| 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                  | 1952.0                  | 1976.7                     | [m ]                    |
| 2                  | 1976.7                  | 2004.1                     | [m ]                    |
| 3                  | 2090.0                  | 2098.5                     | [m ]                    |

|                               |      |
|-------------------------------|------|
| Total core sample length [m]  | 60.6 |
| Cores available for sampling? | YES  |

**Lithostratigraphy**

| Top depth [mMD RKB] | Lithostrat. unit                 |
|---------------------|----------------------------------|
| 125                 | <a href="#">NORDLAND GP</a>      |
| 125                 | <a href="#">UNDIFFERENTIATED</a> |
| 760                 | <a href="#">UTSIRA FM</a>        |
| 922                 | <a href="#">UNDIFFERENTIATED</a> |
| 1010                | <a href="#">HORDALAND GP</a>     |
| 1010                | <a href="#">UNDIFFERENTIATED</a> |
| 1022                | <a href="#">SKADE FM</a>         |
| 1188                | <a href="#">NO FORMAL NAME</a>   |
| 1329                | <a href="#">NO FORMAL NAME</a>   |
| 1613                | <a href="#">NO FORMAL NAME</a>   |
| 1772                | <a href="#">ROGALAND GP</a>      |
| 1772                | <a href="#">BALDER FM</a>        |
| 1782                | <a href="#">SELE FM</a>          |
| 1819                | <a href="#">LISTA FM</a>         |
| 1914                | <a href="#">VÅLE FM</a>          |
| 1925                | <a href="#">SHETLAND GP</a>      |
| 1925                | <a href="#">EKOFISK FM</a>       |
| 1950                | <a href="#">HEGRE GP</a>         |
| 1950                | <a href="#">SKAGERRAK FM</a>     |
| 2069                | <a href="#">ROTLIEGEND GP</a>    |

**Logs**



| Log type                       | Log top depth [m] | Log bottom depth [m] |
|--------------------------------|-------------------|----------------------|
| FMI PPC MSIP PPC GR            | 1500              | 2474                 |
| LWD - GR RES DEN NEU CAL AC    | 1890              | 2474                 |
| LWD - MPR GR CAL DEN NEU AC    | 1213              | 1922                 |
| LWD - PWD DIR                  | 195               | 415                  |
| LWD - PWD DIR GR               | 130               | 183                  |
| LWD - PWD DIR GR RES AC        | 164               | 473                  |
| LWD - PWD DIR GR RES AC        | 344               | 1311                 |
| LWD - PWD DIR NBRES NBGR       | 1890              | 2474                 |
| LWD - PWD DIR NBRES NBGR NBINC | 1213              | 1922                 |
| LWD - PWD DIR NBRES NBGR RES   | 1866              | 1952                 |
| MDT CMR GR                     | 1940              | 2474                 |
| MFRAC GR                       | 1935              | 1935                 |
| MSCT GR                        | 1951              | 2329                 |
| PEX HRLA HNGS ECS XPT GR       | 1921              | 2475                 |

**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   | 36                  | 193.5            | 30                | 195.3          | 0.00                     |                     |
| SURF.COND.  | 20                  | 409.5            | 26                | 415.0          | 1.35                     | FIT                 |
| PILOT HOLE  |                     | 475.0            | 9 7/8             | 475.0          | 0.00                     |                     |
| INTERM.     | 13 3/8              | 1297.0           | 17 1/2            | 1315.0         | 1.96                     | LOT                 |
| LINER       | 9 5/8               | 1921.1           | 12 1/4            | 1922.0         | 1.67                     | LOT                 |
| OPEN HOLE   |                     | 2474.5           | 8 1/2             | 2474.5         | 0.00                     |                     |

**Drilling mud**

| Depth MD [m] | Mud weight [g/cm3] | Visc. [mPa.s] | Yield point [Pa] | Mud type           | Date measured |
|--------------|--------------------|---------------|------------------|--------------------|---------------|
| 125          | 1.03               | 5.0           |                  | Bentonite Spud Mud |               |
| 194          | 1.05               | 25.0          |                  | Bentonite Spud Mud |               |
| 194          | 1.39               | 23.0          |                  | Gel/Polymer        |               |
| 195          | 1.50               | 23.0          |                  | Gel/Polymer        |               |
| 195          | 1.03               | 15.0          |                  | Bentonite Spud Mud |               |



|      |      |      |  |                |  |
|------|------|------|--|----------------|--|
| 300  | 1.26 | 20.0 |  | Aquadrill      |  |
| 398  | 1.39 | 24.0 |  | Gel/Polymer    |  |
| 415  | 1.39 | 24.0 |  | Gel/Polymer    |  |
| 415  | 1.20 | 15.0 |  | Aquadrill      |  |
| 475  | 1.25 | 22.0 |  | Gel/Polymer    |  |
| 475  | 1.50 | 19.0 |  | Gel/Polymer    |  |
| 723  | 1.20 | 16.0 |  | Aquadrill      |  |
| 1315 | 1.22 | 15.0 |  | Aquadrill      |  |
| 1315 | 1.23 | 14.0 |  | AQUA-DRILL WBM |  |
| 1555 | 1.35 | 16.0 |  | AQUA-DRILL WBM |  |
| 1947 | 1.12 | 21.0 |  | AQUA-DRILL WBM |  |
| 2475 | 1.12 | 25.0 |  | AQUA-DRILL WBM |  |
| 2475 | 1.17 | 19.0 |  | AQUA-DRILL WBM |  |