



## Wellbore History

### GENERAL

Well 16/4-6 S was drilled on the Luno II prospect about 15 km south of the Edvard Grieg field on the Utsira High in the North Sea. The primary objective of the well was to prove petroleum in Middle to Late Jurassic reservoir rocks. Secondary objective was to test the hydrocarbon potential in underlying older rocks.

### OPERATIONS AND RESULTS

Wildcat well 16/4-6 S was spudded with the semi-submersible installation Bredford Dolphin on 11 March 2013 and drilled to TD at 2233 m (2213 m TVD) in the Late Triassic Skagerrak Formation. No significant problem was encountered in the operations. The well was drilled with spud mud down to 610 m and with water based Performadril mud from 610 m to TD.

Top of the target reservoir was reached at 1950 m (1931 m TVD). The target reservoir is capped by a 10 cm thick Cromer Knoll Group at 1950 m (1931 m TVD). The reservoir section consisted of a 248 m thick sandstone sequence assigned mainly to the Skagerrak Formation with the exception of the top four meters that could belong to the Vestland Group, based on the occurrences of a few questionable terrestrial palynomorphs of Middle Jurassic age. The reservoir contained a gross oil column of ca 45 metres down to an OWC at 1995 m (1975 m TVD). About 30 metres of the oil-bearing zone had good reservoir properties. The oil is saturated and is in contact with a thin gas zone at the top of the reservoir, above the tested zone. Below the OWC, there is a zone of biodegraded oil shows in contrast to the non-biodegraded oil above. This suggest that there has been more than one generation of hydrocarbons present. Diminishing oil shows are described intermittently down to the base of the cored section at 2024 m.

Three cores were cut in the interval from 1943.5 in the Tor Formation to 2024 m in the Skagerrak Formation. The core recovery was 99.7 to 100%. The core depth is ca 1 m deeper than logger's depth for all three cores. MDT fluid samples were taken at 1951.34 m (wet gas), 1952.54 m (wet gas), 1966.39 m (oil), 1978.73 m (oil), 1991.29 (water with trace oil), 1995.9 m (water), and 2028.18 m (water).

The well was permanently abandoned on 3 May 2013 as an oil discovery.

### TESTING

One Drill Stem Test was performed from the interval 1960.6 to 1980.6 m. In the main flow the test produced 271 Sm<sup>3</sup> oil and 53900 Sm<sup>3</sup> gas /day through a 40/64" choke. The GOR was 209 Sm<sup>3</sup>/Sm<sup>3</sup>, the oil density was 0.85 g/cm<sup>3</sup>, and the gas gravity was 0.82 - 0.85 (air = 1). H<sub>2</sub>S and CO<sub>2</sub> contents were low, ca 0.1 ppm and 0.1 %, respectively. The DST temperature was 76.6 °C.

## LITHOSTRATIGRAPHY & HISTORY FOR WELL: 16/4-6 S