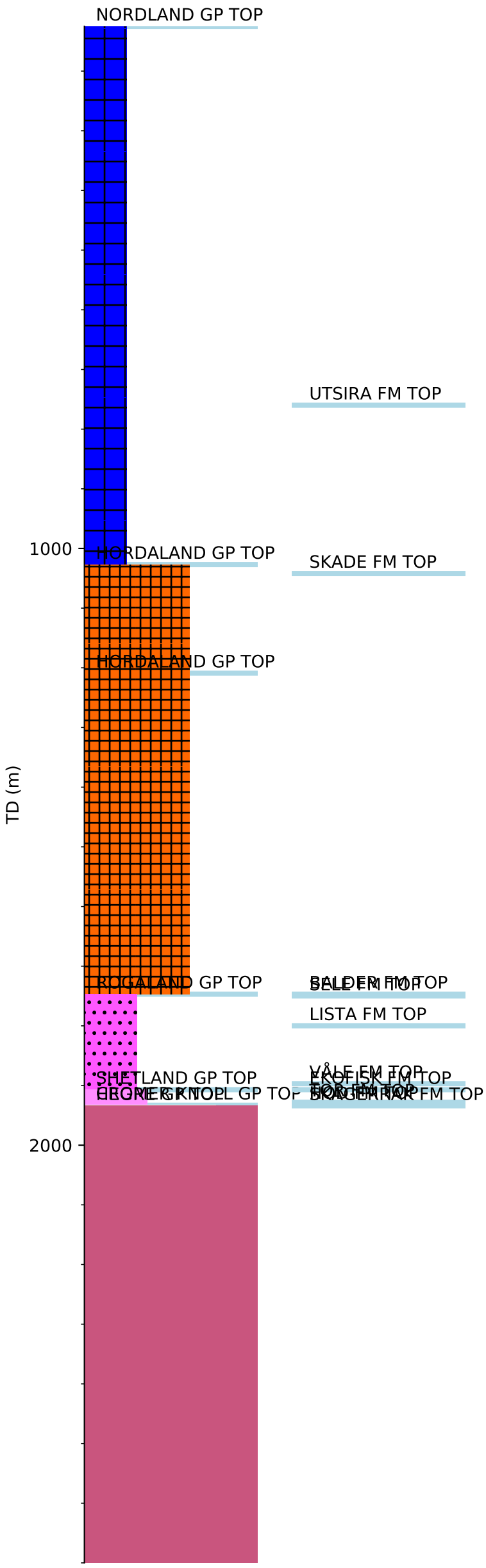
Groups

Formation Tops



Wellbore History

GENERAL

Well 16/4-8 S was drilled to appraise the Luno II discovery made by well 16/4-6 S in 2013 on the west flank of the Utsira High in the North Sea. Well 16/4-8 S targeted the Central South segment, located 4 km south of the Luno II discovery well. The objectives were to prove presence of good quality Jurassic/Triassic reservoir sandstone; to verify the petroleum potential in the Central South segment including the Luno II OWC at 1950 m MSL; and to calibrate the seismic interpretations for the Luno II sub-basin.

OPERATIONS AND RESULTS

Appraisal well 16/4-8 S was spudded with the semi-submersible Bredford Dolphin on 19 June 2014 and drilled to 2700 m (2670 m TVD) in the Triassic Skagerrak Formation. The well was drilled deviated from 2100 m to avoid a prognosed fault. Mud losses occurred when drilling the interval 2391 m to TD. LCM pills were pumped to amend this. Otherwise, no significant problem was encountered in the operations. The well was drilled with spud mud down to 610 m and with Aquadril mud from 610 m to TD.

Top reservoir Hegre Group, was encountered at 1934 m (1934 m TVD). No Jurassic sediments were present. The Skagerrak Formation held a total oil column of about 30 m, of which about 15 m had very good reservoir properties. The oil is saturated with a thin gas column on top. Between ca 1970 m and ca 1980 m the reservoir was mainly water bearing, and then a separate zone with biodegraded oil and water was sampled from 1980 to 1987. No clear OWC could be established from the well data. The reservoir rocks, including the water zone, consist of 500-metre thick sandstones over a 200-metre thickness of conglomerate rock. Pressure data shows there is no pressure communication between 16/4-8 S and the 16/4-6 S discovery well.

The first oil show appeared in sidewall cores in Shetland Group limestone from 1928 m, six meter above top reservoir. Variable but generally good oil shows were described throughout the oil-bearing reservoir and down to 2030 m. Local weak oil shows were described in the Hegre Group below 2030 m down to 2382 m.

Seventy-three meter core was recovered in seven consecutive cores in the interval 1935 to 2009 m (98.7% total recovery). MDT fluid samples were taken at 1934.5 m (condensate), 1942.3 m (oil), 1942.5 m (oil), 1945.5 m (oil), 1955.7 m (oil), 1962 m (oil), 1962.8 m (oil), 1967 m (oil), 1975 m (water), 1980 m (slightly biodegraded oil/water/gas), 1987 m (water and traces of mildly biodegraded oil), 2024 m (water), and 2508.2 m (water).

The well was permanently abandoned on 26 August 2014 as an oil and gas appraisal well.

TESTING

One production test was performed in the well 16/4-8 S. The interval 1940 to 1958 m was perforated and produced with a final flow rate of 63 Sm3 oil and 12030 Sm3 gas /day through a 28/64" fixed choke with a wellhead pressure of 17 bar. A GOR of 192 Sm3/Sm3 was measured at separator conditions of 44.2 °C and 8.7 bar. The on-site measured oil density at 15 °C was 0.89 g/cc and the gas gravity was 0.91(air = 1). The H2S and CO2 contents were less than 0.1 ppm and 0.2 % respectively. The maximum temperature recorded at gauge depth 1919.37 was 81°C, but due to significant Joule-Thompson effects the recorded temperatures varied widely, and the true formation temperature could not reliably be established.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 16/4-8 S