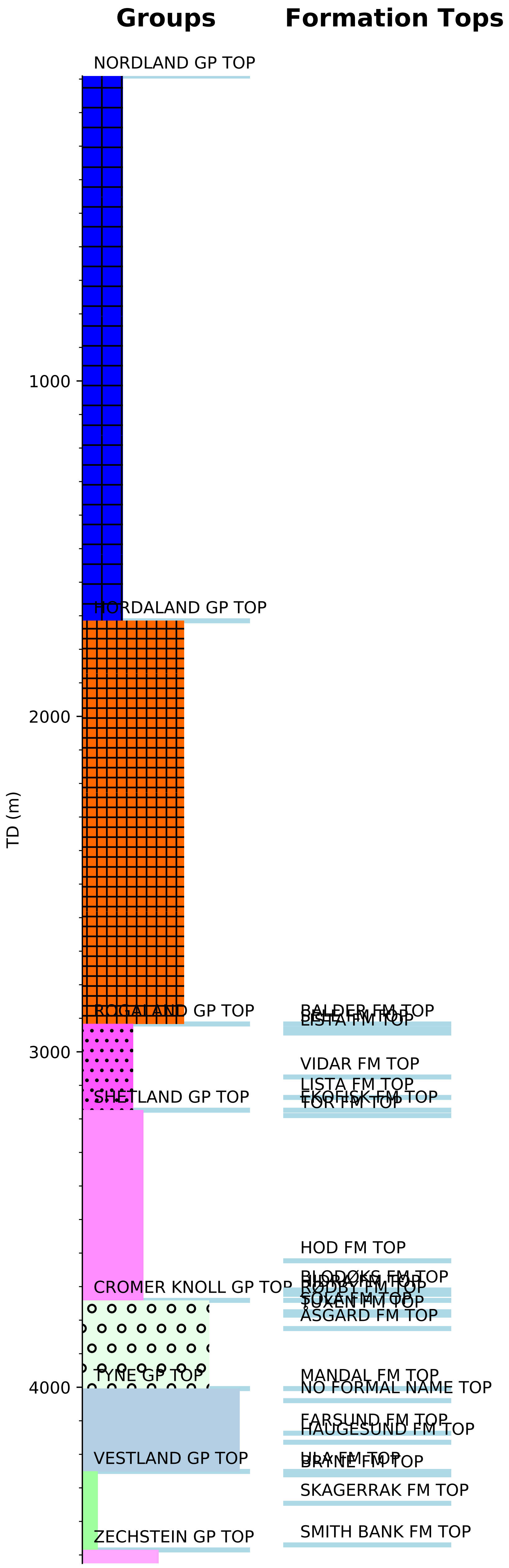
LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/1-4



Wellbore History

GENERAL

Well 2/1-4 was drilled on the margin between the southern Vestland Arch and the Central Trough in the North Sea. The first well in the block, well 2/1-1 drilled in 1972, was abandoned after taking a kick in the Late Jurassic. The second well, well 2/1-2 drilled in1978 encountered water wet Late Jurassic sandstones. The 2/1-3 well was drilled in 1980 on the downthrown side of a NW-SE trending fault complex and found oil in a 60 m thick Late Jurassic sandstone. A second Jurassic sandstone in 2/1-3 (Ula Formation) was water wet. The primary objective of the 2/1-4 well was to appraise the oil in the Late Jurassic "2/1-3 sandstone" (Gyda member). Secondary objectives were to test the Ula and Bryne Formations and the Triassic.

The well is reference well for the Vidar Formation.

OPERATIONS AND RESULTS

Appraisal well 2/1-4 was spudded with the semi-submersible installation Aladdin on 5 April 1982 and drilled to TD at 4525 m in the Late Permian Zechstein Group. The first and second spuds were unsuccessful and only the third spud, on 12 April and 60 + 50 ft in direction 315 deg away from the planned location, was successful. The 17 1/2" section from 633 to 2006 m and the upper part of the 12 1/4" section were drilled with severe swelling shale (gumbo) problems. The well was drilled with seawater and hi-vis pills down to 633 m, with CMC/gypsum mud from 633 m to 2006 m, and with CMC/gypsum/lignoslulfonate mud from 2006 m to TD.

Well 2/1-4 penetrated the top of the Late Jurassic sandstone at 4040 m and the log and core analysis confirmed the formation to be oil bearing. The log evaluation and core studies showed the Late Jurassic sandstone to consist of two main zones. The upper zone (4040 m to 4101 m) had a net pay of 47.9 m and an average water saturation of 30%. The lower zone (4101 m to 4137 m) had a net pay of 18.7m and an average water saturation of 62%. The secondary targets of the Ula and Bryne formations were penetrated at 4251 m and 4262 m respectively. Both formations were found to be water saturated. The top of the "Triassic Group" was penetrated at 4346 m and proved to be water wet. No shows were observed above base Cretaceous. Good oil shows were observed in the Late Jurassic sandstone down to 4137 m. Good shows were also recorded throughout a dolomitic mudstone section within the Haugesund Formation and poor shows were recorded in the sandstone within the Bryne and Gassum formations. In the Triassic poor shows were observed in the sandstone of the Skagerrak formation.

Five cores were cut in the interval 4036 to 4138 m with 100% recovery in the Late Jurassic sandstone member. One RFT wire line fluid sample was taken at 4113.9 m. Only mud filtrate was recovered in the sample chambers.

The well was permanently abandoned on 3 August 1982 as an oil appraisal.

TESTING

Three drill stem tests were carried out in the Late Jurassic sandstone to determine whether an oil water/contact was present, confirm formation parameters and obtain samples of the reservoir fluids.

DST 1 perforated the interval 4120.5 to 4129.7 m. It produced 1 bbl (0.16 m3) of oil during the flow period and an estimated 1.5-2 bbls on reversing out. A total of 18.6 bbls (3.0 m3) of water cushion was also produced at surface with no trace of formation water. H2S and CO2 levels were zero throughout the test. The produced oil density was 0.81 g/cm3. Production of dry oil from DST 1 proved the oil-water contact to be below 4130 m (4105 m MSL). The maximum bottom hole temperature recorded in DST 1 was 153 deg C.

DST 2 perforated the intervals 4101 to 4110 m, 4112 to 4117 m, and 4120.5 to 4129.7 m. It produced dry oil at a final production rate of 182 Sm3 and gas at a final production rate of 20275 Sm3 through a 16/64" fixed choke. The GOR was 112 Sm3/Sm3 and the oil density was 0.816 g/cm3. The gas gravity was 0.758 (air = 1) with 30 ppm H2S and 2.8% CO2. The maximum bottom hole temperature recorded in DST 2 was 159 deg C.

DST 3 perforated the interval 4061.5 to 4087 m. It produced dry oil at a final production rate of 99 Sm3 and gas at a final production rate of 11412 Sm3 through an 8/64" fixed choke. The GOR was 115 Sm3/Sm3 and the oil density was 0.816 g/cm3. The gas gravity was 0.750 (air = 1) with 8