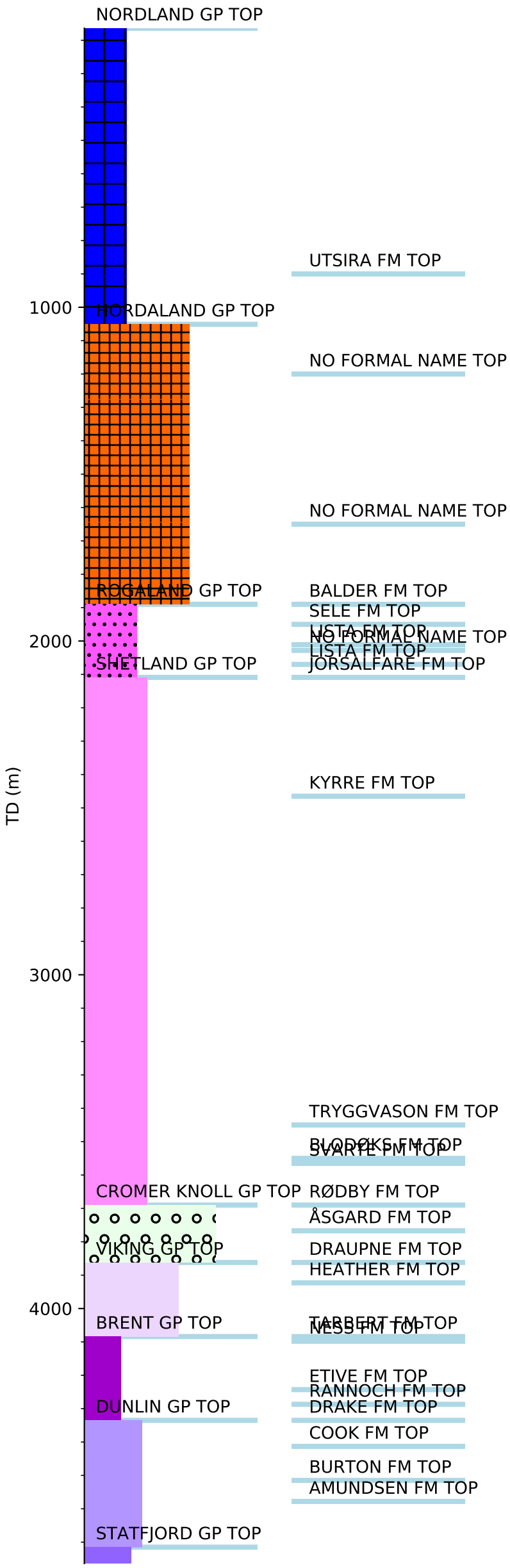
Groups

Formation Tops



Wellbore History

GENERAL

Well 34/10-23 was drilled on the Gullfaks Gamma structure, south-southeast of the Gullfaks Sør Field in the Northern North Sea. The objectives were to prove a significant hydrocarbon accumulation, with the Brent Group as the primary target and the Early Jurassic as secondary target. The first well on the structure, well 34/10-20, had the same targets as 34/10-23, but was terminated in the Early Cretaceous due to technical problems.

OPERATIONS AND RESULTS

Wildcat well 34/10-23 was spudded with the semi-submersible installation Dyvi Delta on 6 May 1985 and drilled to TD at 4764 m into Sinemurian /possibly Rhaetian age sediments of the Statfjord Formation. The well took 28 days more than prognosed to drill. The main part of the extra time came in the 8 1/2" section, where among many other things, the BOP stack was pulled for inspection and repairs. A flow occurred at 4080 m just above top Brent Group, and approximately three days were used to bring the well under control. At 4409 m (4406.5 m TVD RKB) the deviation exceeded 5 deg. The last survey, at 4514 m (4510.8 m TVD RKB) m showed 9.1 deg deviation. If this deviation is extrapolated the vertical depth at TD is 4756.2, ca 8 m short of measured depth. The well was drilled with seawater and hi-vis pills down to 1252 m, with gypsum/lignosulphonate mud from 1252 to 3118 m, and with gypsum/lignosulphonate/lignite mud from 3118 m to 4525 m. At 4509 m the pipe stuck, and imco-spot/pipelax pills with 3% diesel were placed to free it. The final section from 4525 m to TD was drilled with a gel/lignosulphonate/lignite/Anco Resin mud system.

The pore pressure increased through the entire Cretaceous section and reached a maximum of 1.96 g/cc at the top of the Brent Group. Gas bearing Brent sandstone was encountered at 4083 m, approximately 100 m deeper than prognosed. A gas-water contact established at 4120 m. Analyses of the gas and the DST liquids showed a condensate character with significant contents of heavier components up to C35, including biomarkers.

Oil shows were recorded in sandstones in the Lista Formation from 2020 to 2050 m, and in the Kyrre Formation around 2954 m. Weak shows on limestone was recorded in the Svarte Formation from 3640 to 3714 m. Intermittent fluorescence was recorded on sandstones on cores, sidewall cores and cuttings below the hydrocarbon-bearing reservoir down to TD. Some of these could be due to pipe-freeing agents added at 4509 m.

Eleven cores were cut from 4082 m to 4308 m in the Tarbert, Ness, Etive, and Rannoch formations with an average recovery close to 100%. RFT wire line fluid samples were taken at 4084 m, 4176 m, 4718.5 m, and 4718.6 m.

The well was permanently abandoned on 13 October 1985 as a gas/condensate discovery.

TESTING

One drill stem test, DST1, was performed in the interval 4085 - 4095 m. The test produced 1720000 Sm3 gas, 150 Sm3 oil, and 15 m3 water per day through a 22.2 mm choke. The initial reservoir pressure was 785.3 bar and the draw-down was 41 bar. The GOR was 11500 Sm3/Sm3. The DST temperature was 150 deg C.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 34/10-23