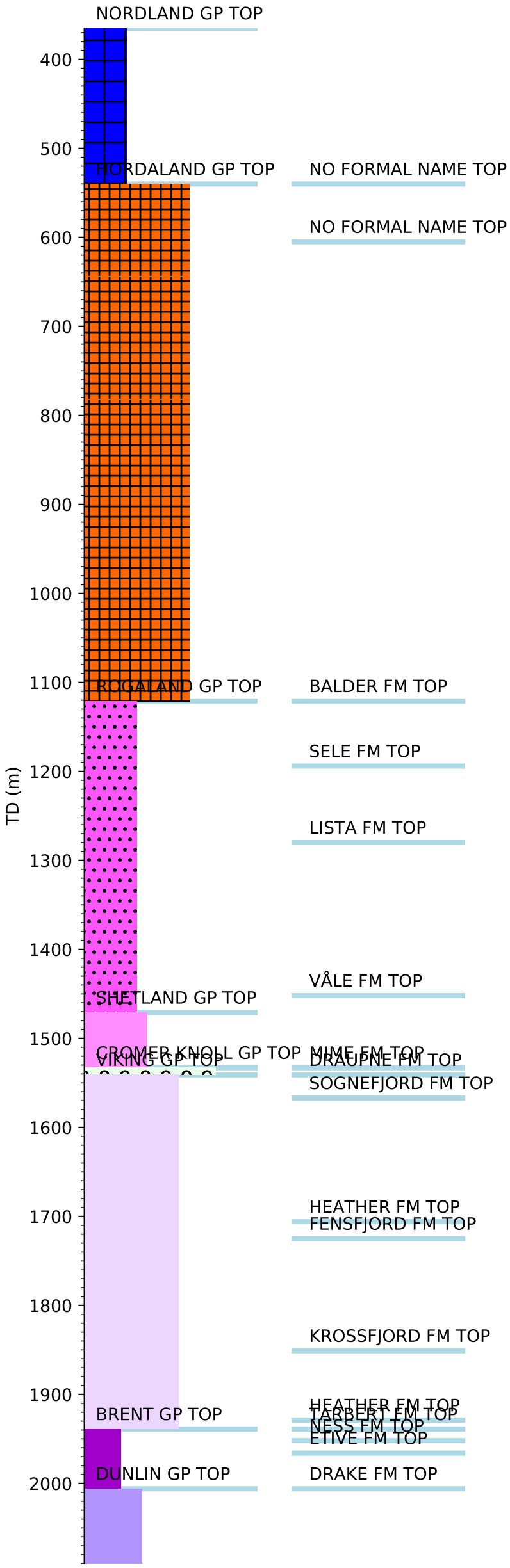
Groups

Formation Tops



Wellbore History

GENERAL

Well 31/3-2 was drilled immediately to the southeast of a fault that was interpreted as a boundary fault between Troll West and Troll East. The main objectives of the appraisal well 31/3-2 were to determine if hydrocarbons were present on the downthrown south side of the fault, to determine the contacts, and to determine the degree of communication across the fault plane. A test would be performed in the case of moveable hydrocarbons, in order to observe boundary effects where the pay zone is narrow and thin. The well was planned to reach total depth in the Early Jurassic Drake Formation at 2050 m if drilling through the "boundary fault". In the case of drilling entirely within the hanging-wall block the total depth was estimated to 2130 m.

OPERATIONS AND RESULTS

Well 31/3-2 was spudded with the semi-submersible installation Treasure Seeker on 5 March 1984 and drilled to TD at 2090 m in claystones of the Early Jurassic Drake Formation. No significant technical problems occurred during drilling and testing. The well was drilled with pre-hydrated gel/seawater with sweeps of high viscous mud down to 629 m and with KCl/polymer mud from 629 m to TD.

The Sognefjord Formation (1567 - 1706 m) was found oil bearing down to 1578.5 m where the oil/water contact was established. The oil-bearing reservoir consisted of very fine to very coarse-grained sandstones. They are friable to loose with only traces of siliceous or calcareous cement. The total net sand in the Sognefjord Formation was calculated to 132 m out of 139 m gross thickness, giving a net/gross ratio of 0.95 and an average porosity of 26.6%. A thin (0.5 m) gas cap could be present on top of the oil column. This was identified from LDT/CNL logs and was also consistent with the GOR development during the test, but was not confirmed by RFT data. There were no oil shows above the Sognefjord Formation, and no oil shows below1595 m, and the Middle to Early Jurassic sandstones was found water bearing.

Evidence from seismic interpretations, dip meter analysis, and subsequent geometrical considerations indicated that well 31/3-2 penetrated the "boundary fault" at top Brent Group level, between 1940 and 1955 m. In this zone two calcite cemented bands were encountered thought to be associated with the fault plane. The OWC was found to be 3.5 m shallower than in well 31/2-6, but the pressure data from wells in the area did not have sufficient reproducibility and resolution to support different pressure regimes in the different compartments.

Five cores were cut between 1565 m and 1640 m from the lower part of the Draupne Formation and into the Sognefjord Formation. RFT pressure recordings and sampling were performed in the reservoir interval and pressure tests were also made in sand intervals in the underlying formations with the deepest point in the Drake Formation (Dunlin Group). Segregated RFT fluid samples were recovered from 1567.6 m (two samplings, one with oil and one with gas and oil), 1576 m (mud filtrate and water), and 1577.8 m (mud filtrate with trace oil and gas),

The well was permanently abandoned on 30 April 1984 as a gas and oil appraisal.

TESTING

One production test was performed over the interval 1567 - 1577 m in the oil zone at the top of the Sognefjord Formation. The test produced 1271.9 Sm3 /day of 27.5 deg. API oil together with 562588 Sm3/day of gas with gravity 0.620 (air = 1). The choke size was 63.5 mm. The GOR was 442 Sm3/Sm3 and the CO2 content was 1.0%. The pore pressure at the top of the reservoir was measured to be 158.15 bara (2293.8 psi). The temperature measured during the test was 69.5 deg. C.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 31/3-2