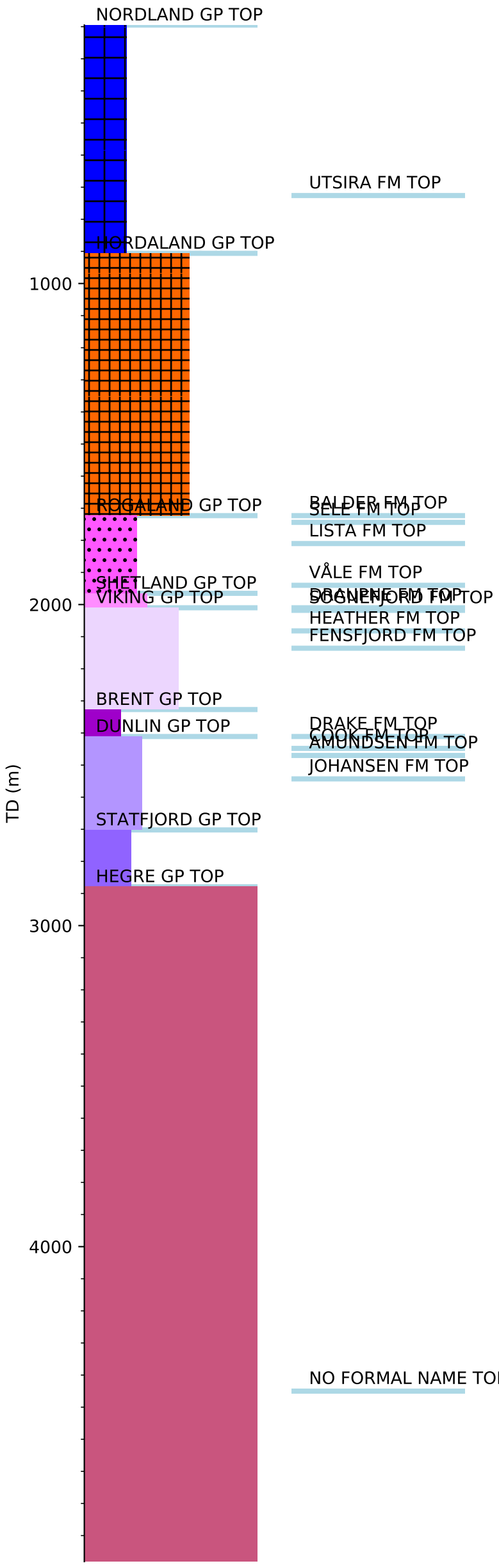
Groups

Formation Tops



Wellbore History

GENERAL

Well 31/4-3 was drilled on the Bjørgvin Arch in the North Sea, east of the Oseberg main field. Near-by well 31/4-2 on the southern part of the Brage Horst had recently found live oil and gas in small quantities in the Brent Group. The primary objectives were sandstones within the Early Jurassic Dunlin and Statfjord Formation. They were thought to be separate reservoirs with different hydrocarbon/water contacts. A secondary objective was to penetrate a deep seismic marker assumed to be a Paleozoic unconformity. Accumulation of hydrocarbons in Early Triassic and pre-Triassic sandstones were considered possible if adequate seal and source rocks were present.

OPERATIONS AND RESULTS

Wildcat well 31/4-3 was spudded with the semi-submersible installation Treasure Seeker on 24 December 1979 and drilled to TD at 4981 m in rocks of Triassic/Permian age. The well was drilled with seawater and hi-vis sweeps down to 906 m, with XP-20/Spersene/Drispac mud from 906 m to TD.

Two separate hydrocarbon-bearing sandstone intervals were encountered in the Late Jurassic Heather Formation. The Oxfordian to Kimmeridgian "Intra Heather Sand I" from 2018 m to 2082 m had gas down to a gas/oil contact at ca 2035 m and oil down-to 2048 m. The section below 2048 had silty to shaley sand with 82% water saturation. The OWC could be somewhere in this section between 2048 and 2054 m. The Callovian "Intra Heather Sand II" (Fensfjord Formation) from 2136 to 2246 m had oil (57.7% average water saturation) down to a possible OWC at 2172. This section was a silty/shaley sand and the net pay was 24 m. Below this the well penetrated 45 m of Middle Jurassic Brent Group sandstones, a 291 m thick Dunlin Group with sandstone in the Cook Formationand the Johansen Formation, and a 177 m thick Statfjord Group consisting of clean sandstone with some shale beds. These sandstones were all found to be water-bearing. Below the Statfjord Group the well penetrated 1571 m of the Triassic Hegre Group, and ended up in rocks of possibly Permian age. These sections were also water-bearing. Apart from shows in the hydrocarbon bearing Intra Heather Formation sandstones only a weak oil show in the Lista Formation at 1890 to 1905 m was recorded.

A total of seven cores were cut in the well, five in the Jurassic sands and two at total depth. RFT fluid samples were taken at 2043.5 m (oil) and at 2165.3 m (minor air/gas and mud filtrate).

The well was permanently abandoned on 11 May 1980 as an oil and gas discovery.

TESTING

Two Drill stem tests were performed in the Intra Heather Formation sandstones.

DST 1 tested the interval 2152 to 2167 m. It flowed 170 m3 water and 170 Sm3 oil/day. The GOR was 64 Sm3/Sm3, the oil gravity was 34.7 deg API, and the gas gravity was 0.74 (air = 1).

DST 2 tested the interval 2023 to 2040 m, across the gas/oil contact. It flowed hydrocarbons at a rate of 245 Sm3 /day. The GOR was 641Sm3/Sm3 and the oil gravity was 40 deg API, and the gas gravity was 0.674 (air = 1). These values represent a blend of fluids from the oil leg and the gas cap. Maximum bottom hole temperature was 89.4 deg C.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 31/4-3