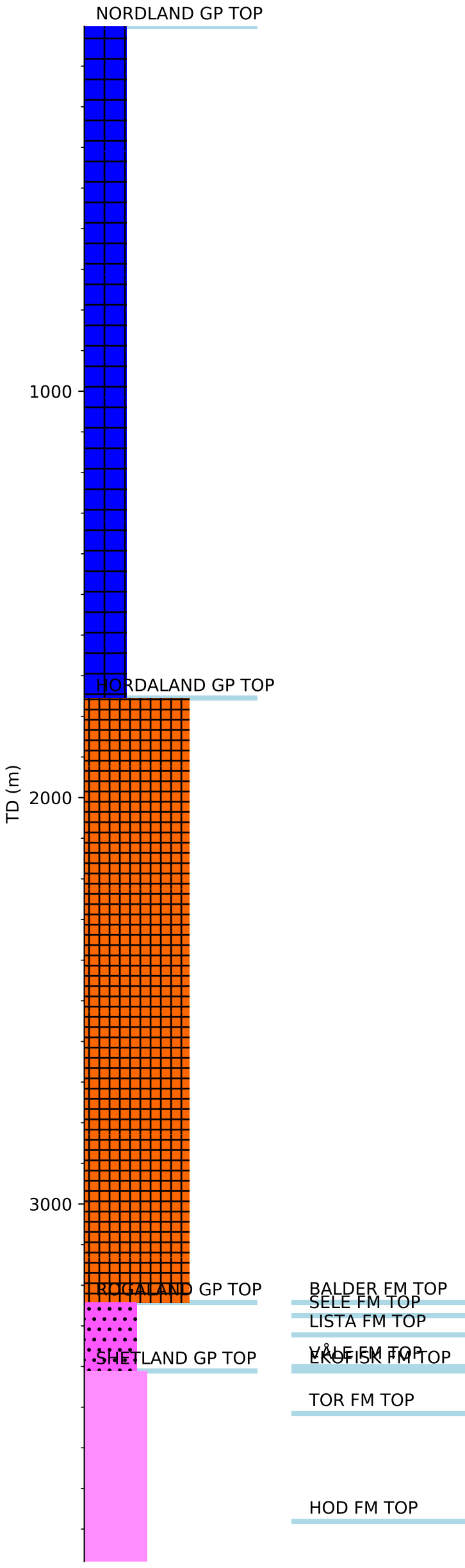
Groups

Formation Tops



Wellbore History

GENERAL

Well 1/9-6 S was drilled on the north-west flank of the Tommeliten Gamma structure in the Feda Graben in the southern North Sea. The main objective was to appraise the Tommeliten Field. The well was drilled deviated due to the planned use of this well as a production well. The main targets were the Ekofisk and Tor formations.

OPERATIONS AND RESULTS

Appraisal well 1/9-6 was spudded with the semi-submersible installation Sedco 703 on 21 March 1982. Drilling of the 36" and 26" holes went without incident. There was some difficulty in getting logging tools in the 17 1/2" hole. Gumbo problems occurred while drilling the 12 1/4" hole and both open hole and cased hole logging runs were plagued with tool failures. Differential sticking also occurred while drilling the bottom part of the 8 1/2" hole. TD was set 3880 m, 99 m into the Late Cretaceous Hod Formation. After retrieving the RFT the well began flowing and sloughing large amounts of shale below the 9 5/8" shoe. While circulating and reaming to TD, the pipe became stuck many times due to shale sloughing above the bit. A bit and bit sub were left in the hole during these hole problems, and were never recovered. The well was drilled with "native" mud/seawater down to 1471 m and with polymer/dispersed solids/lignosulphonate/seawater from 1471 m to TD.

Top Ekofisk Formation was penetrated at 3411 m (3110 m TVD) and top Tor Formation at 3516 m (3199 m TVD). Both formations were gas/condensate bearing. No other permeable section in the well had indications of hydrocarbons.

A total of 14 cores were cut in the interval 3415.7 - 3619 m in the Ekofisk and Tor formations. Problems with jamming and differential sticking occurred while coring. The overall recovery was 90%. One run with the RFT tool on wire line was conducted, taking 14 good pressure points, but no fluid sample due to tight formation and stuck tool.

After testing the well was suspended on 1 December as a possible future producer. It is classified as a gas/condensate appraisal well.

TESTING

Four DST's were performed in this well. Technical and operational problems plagued all tests.

DST1 tested the interval 3771.6 - 3776.8 m (3424.0 - 3428.6 m TVD) in the water zone at base Tor Formation. A few m3 water was produced in each of several flow periods. The temperature recorded in DST 1, at measurement depth 3750.4 m varied between 130.7 deg C and 133.0 deg C for different periods and gauges, with 131.7 deg C taken as a representative temperature.

DST 2, 2A, and 2B tested the interval 3636.3 - 3654.6 m (3301.0 - 3316.7 m TVD) in the lower Tor Formation. The first test, DST 2, was aborted due to technical problems. Maximum rate achieved from DST 2A was 536604 Sm3 /day of gas and 477 Sm3 /day of condensate on 32/64" choke. GOR was 1125 Sm3/Sm3, oil density was 0.810, and gas gravity was 0.689 (air = 1). H2S was measured to be 4-6 ppm and the CO2 content was measured to be 3%. This test was aborted when the tester valve cut the wire line, and the zone was retested as DST 2B. The maximum flow rates were then close to 700 x 10 Sm3 /day of gas and 500 - 550 Sm3 /day of condensate on a 28/64". The maximum temperature in different flows from this interval, measured at 3652 m, varied between 121.8 and 122.4 deg C

DST 3 tested the intervals 3587.5 - 3578.4 m, 3569.2 - 3560.1 m and 3550.9 - 3523.5 m in the Tor Formation. It flowed 243808 Sm3 gas and 231 Sm3 condensate/day on a 16/64" choke after acidizing. GOR was 1054 Sm3/Sm3, condensate density was 0.823 g/cm3 and gas gravity was 0.680 (air = 1). Final build-up period was terminated mid-way due to technical problems. Same interval was tested in DST3A without further acidizing. This test produced 243259 Sm3 gas and 202 Sm3 condensate/day on a 20/64" choke. The GOR was 1196 Sm3/Sm3, the oil density was 0.791 g/cm3 and gas gravity was 0.684 (air = 1). The temperature measured at 3522.6 m was 131.1 deg C

DST 4 was perforated in two intervals, the upper zone from 3416.8 - 3426.0 m (3114.8 - 3122.7 m TVD) and the second from 3444.2 - 3459.4 m (3138.2 - 3151.3 m TVD), both in the Ekofisk formation. It produced gas and condensate after stimulation. The maximum rates from these intervals