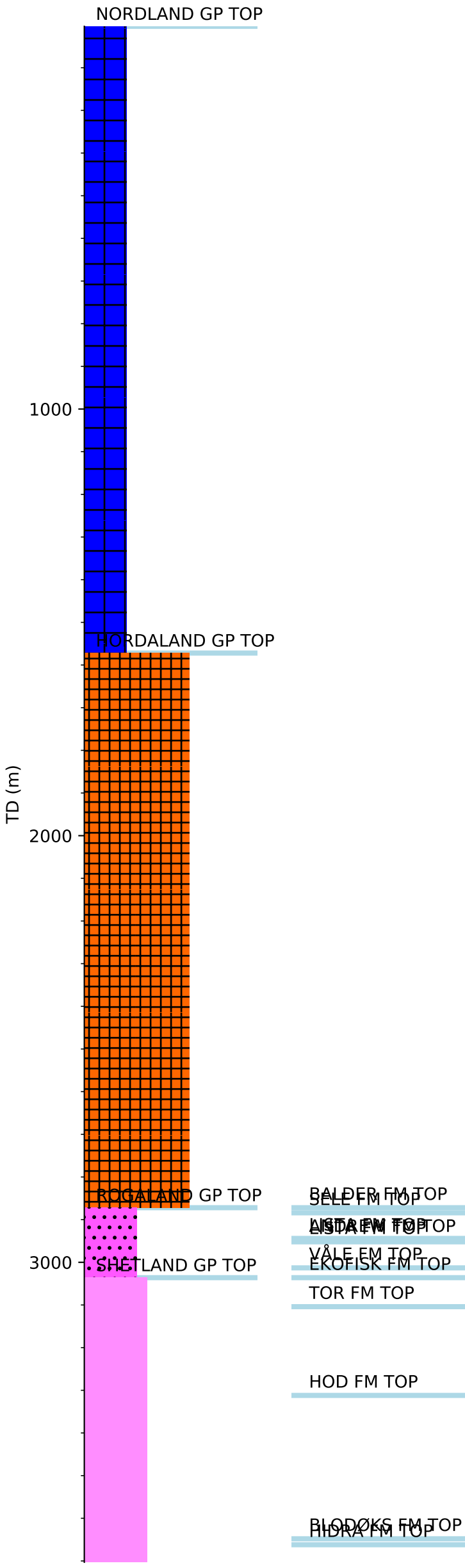
Groups

Formation Tops



Wellbore History

GENERAL

Well 1/9-1 was drilled on a salt diapir structure located in the Feda Graben in the southern North Sea. The primary objective was to test hydrocarbon accumulations in the Danian and Late Cretaceous chalk. A secondary objective was to test the Jurassic and Triassic sandstones.

OPERATIONS AND RESULTS

Wildcat well 1/9-1 was spudded with the semi-submersible installation Ross Rig on 14 October 1976 and drilled to TD at 3706 m in Cenomanian age limestone (Hidra Formation). The Jurassic was not reached. The anchor chain broke on three occasions. The third breakdown occurred during the last DST. The decision was then made to suspend the well for later re-entry. The well was drilled with seawater and gel slugs down to 433 m, and with seawater-lime-lignosulphonate from 433 m to TD.

The Danian chalk (Ekofisk Formation) was reached at 3043.5 m just below a marl section. It consisted of two hydrocarbon bearing zones. Zone 1 from 3043.5 m to 3071.5 m and a tighter zone 2 from 3071.5 m to 3103.5 m. Maastrichtian (Tor Formation) starts at about 3103.5 m and is also hydrocarbon bearing with water saturations below 50% down to 3141.5 m. A transition zone with gradually increasing water content is seen from 3134.0 m down to 3182.5 m. Apart from in the oil bearing reservoirs weak oil shows on minor sandstones were recorded in the interval 2947 to 2958 m; weak to good oil shows were seen on limestone in the interval 3300 m to 3500 m; and finally weak oil shows were seen occasionally from 3645 m to 3675 m.

The chalk section was cored in 11 cores from 3048 m to 3235.5 m (Ekofisk and Tor formations) and one core (core no 12) from 3327.2 m to 3336.7 m (Hod Formation). Total core recovery was nearly 100%. No wire line fluid samples were taken.

The well was suspended on 17 February 1977 as a gas/condensate discovery.

TESTING

Eight drill stem tests were performed in the Late Cretaceous and Danian chalk sections. The tests indicated an oil reservoir with a retrograde gas cap. However PVT analyses indicated that the hydrocarbon system was close to its critical point and therefore difficult to interpret.

DST 1B tested the intervals 3298 - 3302 and 3306 - 3312 m (Tor Formation). After acidizing the test produced water with less than 1% oil emulsion at a rate of 48 - 51 m3 /day on a 48/64" choke. Maximum recorded temperature was 120 deg C.

DST 2A tested the interval 3210 - 3220 m (Tor Formation). The test produced water at a rate of 53 m3 /day on a 48/64" choke. Maximum recorded temperature was 116 deg C.

DST 3 tested the interval 3174 - 3182 m (Tor Formation). The test produced water at a rate of 13 m3 /day on a 48/64" choke. Maximum recorded temperature was 117 deg C.

DST 4 tested the interval 3148 - 3157 m (Tor Formation). After acidizing the test produced 253 - 420 Sm3 oil, 152910 Sm3 gas and 108 - 180 m3 water /day on a 24/64" choke. The GOR was 365 - 606 Sm3/Sm3, oil density was 0.849 g/cm3 and gas gravity was 0.699 (air = 1). Maximum recorded temperature was 120 deg C.

DST 5 tested the interval 3120 - 3133 m (Tor Formation). After acidizing the test produced 405 - 461 Sm3 oil, 242000 -251000 Sm3 gas /day on a 24/64" choke. The GOR was 534 - 618 Sm3/Sm3, oil density was 0.818 g/cm3 and gas gravity was 0.680 (air = 1). Maximum recorded temperature was 120 deg C.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 1/9-1

DST 5A tested the interval 3129 - 3133 m (Tor Formation). The test produced 71 - 98 Sm3 oil with 1% water, 34000 - 45000 Sm3 gas /day on a 12/64" choke. The GOR was 409 - 640 Sm3/Sm3, oil density was 0.836 g/cm3 and gas gravity was 0.710 (air = 1). Maximum recorded temperature was 121 deg C.

DST 6 tested the interval 3105 -3108.5 m (Tor Formation). The test