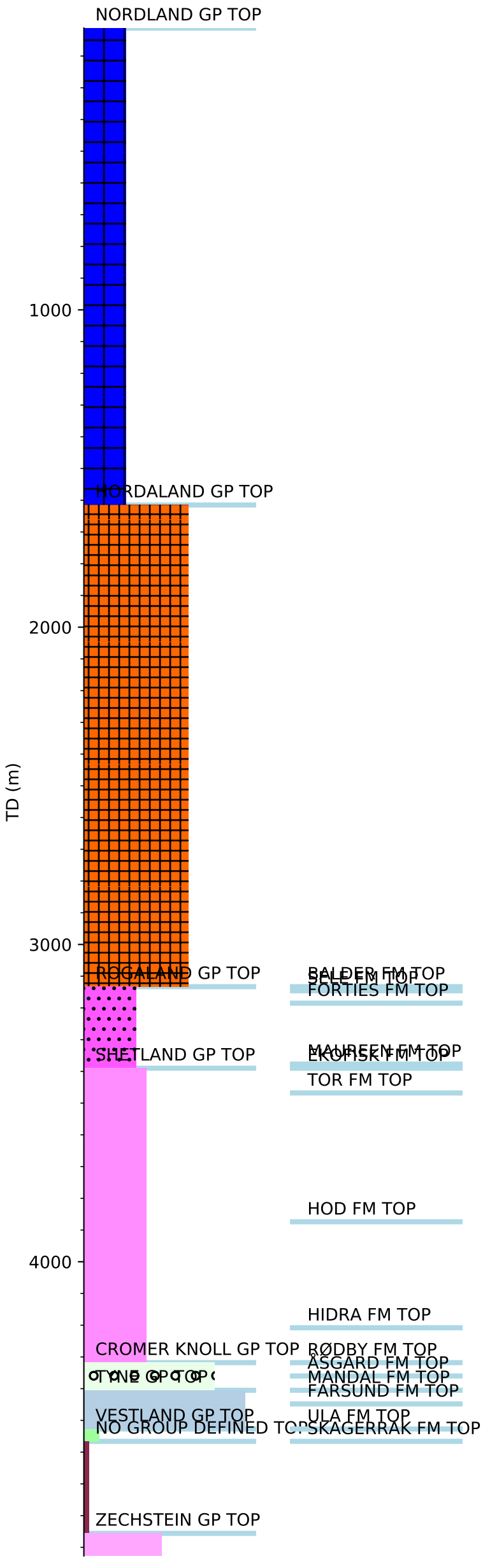

Wellbore History

GENERAL

The primary objective of the wildcat 7/11-7 S was Late Jurassic sandstone surrounding a small salt piercement below the Paleocene Cod Field reservoir. Several discoveries had been made in the vicinity of Cod, in the Upper Jurassic Ula Formation. The Triassic and Permian constituted secondary targets. The well was drilled from the Cod platform with planned bottom hole location ca 0.9 km to the east.

OPERATIONS AND RESULTS

Wildcat well 7/11-7 S was spudded from the fixed installation Cod on 29 December 1982 and drilled deviated to TD at 4927 m (4661 m TVD) m in the Late Permian Zechstein Group. The well was scheduled as a 150-day project but a full drilling crew was still present on day 349 and it took until day 364 to set a plug above the last set of perforations. The length of this project was due to problems in drilling and extended testing to adequately evaluate the three zones of interest. There were delays in setting plugs, running casing, fishing, and installing necessary 10,000 psi surface equipment. The testing delays included problems with setting DHSV's, parted tubing, aborted stimulations, bad weather, and bailing operations. The well was drilled with seawater/lignite and Desco, an organic thinner.

The well reached all three targets. Late Jurassic Ula Formation sandstone was encountered at 4527 m. The Ula Formation rested unconformable on Triassic Skagerrak Formation sandstone at 4566 m. The Permian Zechstein dolomites were encountered at 4856 m. Good shows were recorded in the Ula Formation, with weaker shows extending down to 4609 m in the Triassic Skagerrak Formation. A second Triassic zone with weak shows was observed at 4785 m to 4810 m. Source rock formations were found in the Tertiary interval from 1820 m to 2500 m, and in the Late Jurassic shales of the Mandal and Farsund Formations at 4405 m to 4527. The Tertiary interval had TOC in the range 2 - 4 %, Hydrogen Index from 100 to 120 mg HC/g rock, and was immature. The Late Jurassic had TOC in the range 4 - 8 %, HI in the range 80 - 200 mg/g and peak/late oil window maturity (% Ro around 0.8 and Tmax around 445 deg C). Six cores were cut in the Ula Formation and the upper part of the Skagerrak Formation. RFT results from the Triassic to Jurassic sandstones indicated mainly tight formation, but with some permeability in the upper part of the Ula Formation and possibly also in the top of the Skagerrak Formation. No fluid sample was taken on wire line.

The well was suspended on 25 December 1983 as a minor Jurassic oil discovery. Later the well was re-entered and set in production on the Cod Field.

TESTING

Three independent production tests were carried out. DST 1 from 4850 m to 4870 m in the Permian Zechstein Group did not produce. DST 2 test tested from three different zones (4779 m to 4789 m, 4670 m to 4684 m, and 4625 m to 4646 m) in the Triassic Skagerrak Formation. In this test the tubing failed. The fish was not recovered and a cement plug was set. DST 3 from the interval 4550 m to 4577 m in the Jurassic Ula Formation produced small amounts of oil and water. The flow was not stabilized and no reliable pressures were measured. Before acid stimulation the production was not sufficient to completely unload the well bore contents, though some oil (API 37-39) and gas samples were recovered. After acid stimulation the well produced a total of 116 bbls of oil. The gravity of the oil increased throughout this flow period to 41.1 deg API.

It is probable that the mud program damaged the reservoir rock in the near well bore extensively, which in turn adversely affected the test flow rates. This was particularly important for DST 3 in the Ula Formation, the last of the three tests. This reservoir contained on average of 14% illite clay. When exposed to a low-KCl mud for an extended period of time this clay had probably swelled and severely reduced the permeability in the formation.