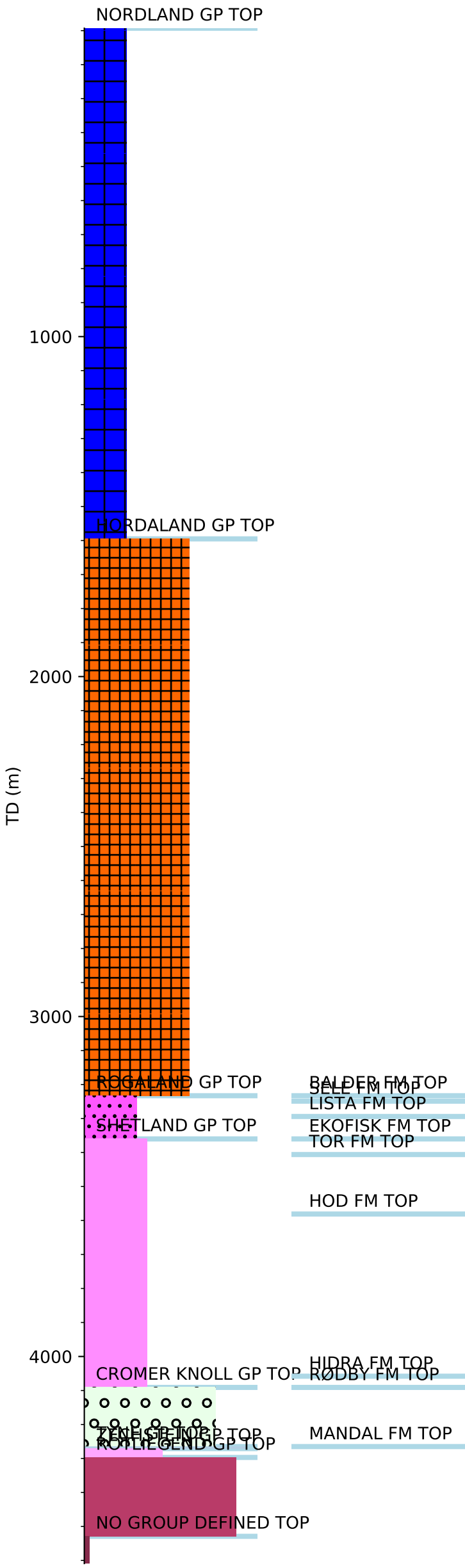
Groups

Formation Tops



Wellbore History

GENERAL

The 2/10-1 S "South East Eel" well is located in the Grensen Nose, close to the southern tip of the Norwegian sector. It was drilled in the Tertiary basin of the North Sea approximately 20 km south of the Embla discovery. The primary objective horizons were the Early Cretaceous - Late Jurassic clastic sediments and the Danian - Late Cretaceous limestones. Seismic data were interpreted as wedging out of the Early Cretaceous - Late Jurassic sediments up-dip to the west of the well location. These sediments produced oil in the Phillips 2/7-3 and 2/7-9 wells while Late Jurassic turbidite sands were present in the Eldfisk 2/7-1 well. In addition a small Danian/Late Cretaceous structure was defined on a seismic. The 2/7-2 well a few miles to the north in a similar geological situation produced 345 BOPD from the Danian. Secondary objectives were Tertiary and possible Rotliegendes sandstones.

OPERATIONS AND RESULTS

Exploration well 2/10-1 S was spudded with the semi-submersible installation Ocean Viking on 16 September 1975 and drilled deviated to TD at 4609 m (4267 m TVD RKB) in rocks of possibly Carboniferous age. While drilling the 8 1/2" section at 4028 m the weather deteriorated. The drill string was hung off before the rig started to drift, and had to be towed to Stavanger. Winds were reported up to 30 m/s and waves up to 22 m. Altogether 34 days were lost before the rig again was on location and could continue drilling. The well was drilled with sea water and gel down to 442 m and with PAC/sea water with 4% oil from 442 m to TD.

No oil shows were encountered during the drilling, however, a gas kick was noted when drilling into the top of the Rotliegendes sandstone section. No testing was carried out due to engineering difficulties although three drill stem tests in the Permian were planned. The well was drilled as per progress down to the base of the Cretaceous sediments. No clastics were developed in the Tertiary whilst the Danian/Late Cretaceous limestones were wet. The limestones exhibited good porosity. The Early Cretaceous consisted of the Rødby Formation and the Mandal Formation. No sands were present. Below the Cretaceous, the sediments wedging out proved to be older than expected. No Jurassic sediments were encountered. The well went first into barren red measures of possible Triassic age and then into Zechstein carbonates followed by the Rotliegendes. Three sandstone members (net 35 m thick) were developed in upper part of the Rotliegendes, the upper sand showing a good gas kick drilling at 4343 m, while the Lower Rotliegendes consisted of interbedded shales and volcanics. The possibly Carboniferous sediments at TD also consisted of interbedded shales and volcanics. Although the well proved to be different from the prognosis, the sand development and shows in the Rotliegendes are very encouraging. No cores were cut in the well and no fluid samples taken. The well was permanently abandoned on 23 April 1976 as a well with strong gas shows in Rotliegendes.

TESTING

Preparations for testing were made and two zones in Rotliegendes in the interval 4337 m to 4371 m were perforated, but the test was not carried out due to a leak in the casing.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/10-1 S