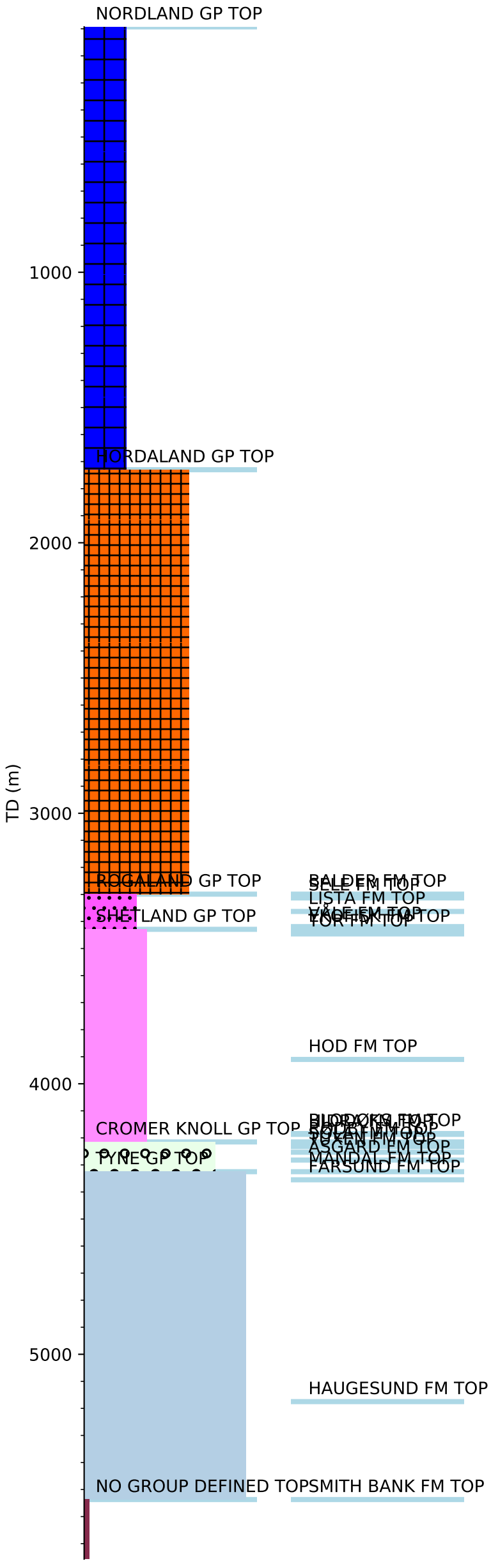
Groups

Formation Tops



Wellbore History

GENERAL

Well 2/12-2 S is located just 400 m south-west of the 2/12-1 Freja discovery well. The Freja Discovery (named Mjølner up to 1998) lie in a complex faulted area in the North Sea between the Feda Graben to the west and the Gertrude Graben to the east, just north of the border from Danish sector. The reservoir is very deep, ca 4900 m, and the reservoir pressure is one of the highest on the Norwegian continental shelf. Well 2/12-2 S was designed to drill on segment E in the Freja Discovery. Segment E is separated from segment A by a major fault. It was not known if this fault is sealing or not. The main objective for the well was to test the mapped hydrocarbon in place in a Late Jurassic sand unit west of the 2/12-1 compartment. There was no secondary target level known at the time of planning. The well was designed for further use as an oil producer and/ or for extended/ long term testing. Shallow gas was predicted at 467 m and 534 m.

OPERATIONS AND RESULTS

Well 2/12-2 S was spudded with the semi-submersible installation Mærsk Jutlander on 15 February 1990 and drilled to TD at 5757 m (5337 m TVD RKB) in rocks of Triassic age. A total of 73 days (34%) was counted as lost time in this well. It was drilled deviated from below the 30" casing shoe, with kick-off at 219 m. Drilling proceeded with only minor problems down to planned TD for the 17 1/2" section at 2790 m. When pulling out the string stuck at 2631 m. It was backed off at 2280 m, leaving a fish in the hole. The well was plugged back and sidetracked from 2102 m. Drilling commenced to 2800 m where the 13 3/8" casing was set. When drilling out cement in the top 12 1/4" section the pipe stuck again and eventually a second fish was left in the hole. A second technical sidetrack was performed with kick-off between 2602 and 2632 m. A third incident of stuck pipe occurred at 3585 m, but this time the pipe was freed and drilling could commence. After setting the 7" liner shoe at 5008 m a BOP test failed and the BOP stack was pulled for repair. The well was drilled with spud mud down to 1302 m, with KCl/polymer mud from 1302 m to 4681 m. After the pipe got stuck at 3585 m a pipe-lax solution was spotted and Magcolube was added. From 4681 m to TD the mud was changed to a high-temperature mud by adding pre-hydrated bentonite, Resinex, Polydrill, HTHP Desco, and Alcomer. No shallow gas was encountered

The main target, an Intra-Haugesund Formation Sand, was encountered water bearing at 5525 m (5116 m TVD). Shows were observed in chalk, limestone and claystone in the Cretaceous. Good shows were seen in claystone, dolomite and sandstones of the Late Jurassic Tyne group from 4325 m to 5525 m. Below 4800 m the shows were only observed in dolomite stringers.

One conventional core was cut in the interval 5530.0 to 5542.0 m with 76.5 % recovery. A total of 117 sidewall cores were attempted in five runs. Only 20 sidewall cores were recovered. Attempts were made to obtain RFT pressures in the Late Jurassic sand unit, but no formation pressure measurements were recorded, either due to seal failure or tight formation. No RFT fluid samples were taken. A maximum pore pressure gradient of 2.03 was is thought to occur between 5000 m (4608 m TVD) and 5150 m (4755 m TVD) based on maximum deflection of sonic log data.

The well was suspended on 14 September 1990 as a dry well with shows.

TESTING

No drill stem test was performed.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/12-2 S