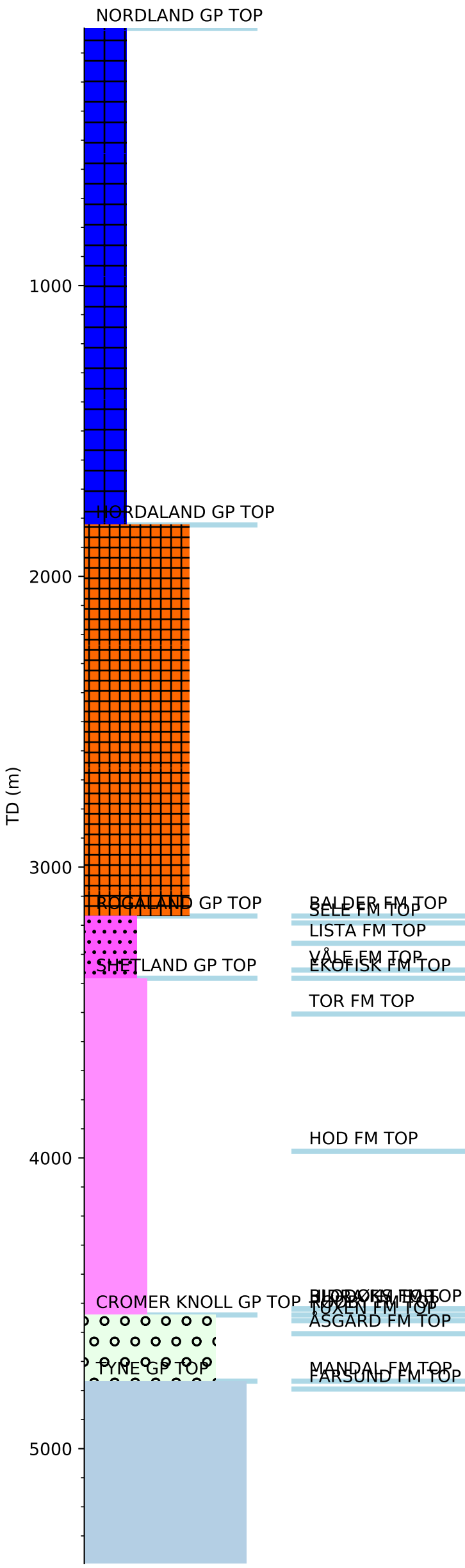
Groups

Formation Tops



Wellbore History

GENERAL

Well 2/4-21 was drilled on the King Lear prospect in the Central Graben of the Norwegian North Sea, approximately 20 km north of the Ekofisk Field. The prospect was considered a part of the same reservoir as in the 2/4-14 well that ultimately ended up in a major underground blowout in 1989. The main objective of the well was to prove commercial hydrocarbons in intra-Farsund Formation sandstone units.

OPERATIONS AND RESULTS

Well 2/4-14 was spudded with the jack-up installation Mærsk Gallant on 24 May 2012 and drilled to TD at 5395 m in the Late Jurassic Farsund Formation. No over-pressured shallow gas was seen, but a 2-3 m thick sand at 627 m contained normal-pressured gas with a composition consistent with a biogenic origin. The well was planned as an HPHT well with pressure prognosis based on results from the 2/4-18 well. Pressures proved to be even higher than prognosed and at 5029 m influx of gas occurred. The well was shut in and after several days control operations the mud was weighted up to 2.1 g/cm3 and drilling continued to TD. Well 2/4-21 was plugged back after having reached TD. All data acquisition was carried out in the main track, but it was decided to drill a parallel vertical sidetrack (2/4-21 T2) for the purpose of achieving good cores from the main reservoir level (the Farsund II sandstone). The sidetrack was kicked off successfully at 4933m and the operations were carried out according to plan. The well was drilled with sea water/spud mud down to 248 m, with spud mud/KCl/Polymer mud from 248 to 453 m, with KCl/polymer/GEM mud from 453 to 1019 m, with oil based XP07-low ECD mud from 1019 m to 3022 m, and with oil based XP07-HPHT mud from 3022 m to TD. Oil based XP07-HPHT mud was used also in the coring side track.

Top Mandal Formation was encountered at 4767 m and top Farsund Formation at 4795 m. A main Intra Farsund Formation sandstone was penetrated as prognosed from 5122 to 5173 m. This interval had 23 m good quality reservoir sand with 21% porosity and 13 mD permeability. It contained rich gas-condensate in a gas-down-to situation. The pressure survey indicated pressure depletion compared to thin sandstones above and below the main reservoir due to the underground blow-out in well 2/4-14. Prognosed sandstone units below this level proved to be thin cemented sandstone and limestone stringers. No fluorescent shows are described from the cuttings in the Farsund II unit / main reservoir. Descriptions from the sidewall cores indicate oil stain and hydrocarbon odour on samples as shallow as 4996 m and tar filled voids down to 5182 m.

One core was cut in the Farsund Formation in the primary well bore from 5069 m to 5083. 5 m. Two further cores were cut in the Farsund Formation in the 2/4-21 T2 sidetrack from 5116 m to 5166 m. Wire line fluid samples were taken at 5053.5 m (oil and gas; considered as the best sample with only 2.3% mud contamination), 5122.5 m (oil and gas; medium quality sample), and 5167.5 m (oil and gas). PVT analyses of the samples showed a GOR in the range 1200 - 1400 Sm3/Sm3.

The well was permanently abandoned on 24 May 2012 as a gas-condensate discovery.

TESTING

No drill stem test was performed.

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LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/4-21