



Wellbore History

GENERAL

Exploration well 2/5-10 is located in the Central Graben on the Steinbit Terrace. The well was drilled with Late Jurassic sandstone of Oxfordian age, in a combination trap with structural and dip closing elements, as the primary target. Secondary targets were the Middle Jurassic Bryne Formation in the same combination trapping configuration, while the Late Cretaceous Chalk and the Lower Cretaceous Cromer Knoll Group were stratigraphic trap targets. After reaching TD evaluation of the cores and electric logs concluded that a fault had been intercepted within the main Jurassic target, justifying a sidetrack in search of a better pay zone. Well 2/5-10 was therefore plugged back in and well 2/5-10 A sidetracked.

OPERATIONS AND RESULTS

Well 2/5-10 was spudded with the semi-submersible installation "Polar Pioneer" on 23 May 1993 and drilled to TD at 4701 m in rocks of the Triassic Smith Bank Formation. The well was drilled with sea water and hi-vis sweeps down to 865 m, with KCl/Polymer mud from 865 m to 4235 m, and with HPHT/Polymer mud from 4235 m to TD. Shallow gas was encountered after drilling the 8 1/2" pilot hole, prior to opening up the hole to 26" and running 20" casing. In order to ensure a good 20" casing cement job without compromising rig safety it was decided to plug back the gas bearing zone and set 20" casing at 509m, 291m shallower than originally planned 800m. To avoid gas migration the cement slurries for the 20" and 13 3/8" were redesigned with gas tight cement (microblock added).

Top reservoir was encountered at 4582 m, 174 m deeper than prognosis due to complex geology and higher than expected shale interval velocities in the Late Jurassic. The main part of the Late Jurassic sandstone target was removed by faulting, and Triassic strata were encountered 5 m below top reservoir through a fault plane. The Late Jurassic sandstone was highly affected by the faulting, and the reservoir quality was poor. The secondary target Middle Jurassic Bryne Formation was not present. The Smith Bank Formation was encountered 5 m below top reservoir through a fault plane. A small hydrocarbon accumulation was found in the main target Late Jurassic Oxfordian age sandstone. Weak shows were encountered also in the Chalk and in the Vestland Group.

Two conventional cores were cut from 4575 m in the Late Jurassic sandstone and down to 4591 m in the Smith Bank Formation. Two samples collected at 4594.3 m and 4583.1 m in the Vestland Group during the MDT run contained weak hydrocarbon shows, a discontinuous film of oil in sample #1 and gas traces in sample #2. Because of a failure of the MDT tool's equalization valve, a leakage between the two chambers was considered likely and therefore the location of these hydrocarbon shows is doubtful. However they should more likely be attributed to the top part of the Late Jurassic SST as confirmed by the sample #3 collected in the following RFT run which contained at 4594.3 m (same depth as sample #1) formation water. Only mud filtrate was finally recovered in the sample #4 taken at 4614 m. Well bore 2/5-10 was subsequently plugged back and permanently abandoned on 26 August 1993 as a well with shows.

Sidestep 2/5-10 A was kicked off from 4306 m in 2/5-10 on 27 August 1993 and was drilled to a total depth of 4715 m in the Triassic Smith Bank Formation. The well was drilled with HPHT/polymer mud from kick-off to TD. The expected reservoir was encountered at 4616 m with a thickness of 57 m and with poor to medium reservoir characteristics. The shows encountered were poor, and no hydrocarbons could be extracted using downhole testing tools. Three conventional cores were cut in the Late Jurassic sandstone from 4612 m to 4640.1 m. Four RFT samples collected at 4619 m, 4624.1 m, 4630 m and 4657 m contained formation water and mud filtrate with only traces of oil. Sidetrack 2/5-10 A was permanently plugged and abandoned on 25 September 1993 as a well with shows.

TESTING

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/5-10

No drill stem test was performed.