



Wellbore History

GENERAL

Well 25/2-4 was drilled in the north west corner of block 25/2. It lies on the eastern flank of the Viking basin in the Viking Graben and to the east of the Frigg Field and Frigg Kitchen. The main targets was the Jurassic with a mapped seismic structure of 30 ms vertical closure and 30 square km acreage spreading on the Shell block 30/11. Well 25/2-4 was located on the west flank near the top of the structure. Agreement with Shell management was signed for a bottom hole contribution with obligation for the operator to reach the Triassic red shales or to set TD at 3360 m.

The well is Reference Well for the Drake Formation.

OPERATIONS AND RESULTS

Exploration well 25/2-4 was spudded with the semi-submersible installation Neptune 7 on 14 may 1975 and drilled to TD at 4384 m in the Triassic Smith Bank Formation. The well was drilled water based with salt/gel/Flosal/seawater down to 733 m and with FCL/LC mud from 733 m to TD. At 3375 m the well kicked due to an under balanced hydrostatic mud pressure.

The well penetrated Danian, Paleocene and Eoceneá sandstone sequences (Frigg Formation, Intra Balder Formation Sandstones, Hermod and Ty formations). All these sands were water wet without shows. In the Late Cretaceous limestones were found fairly well developed overlying a thick shaly and marly sequence with some more limestone levels, particularly in the Campanian and Turonian. The latter limestones contained significant shows, but a production test proved tight formation. The Kimmerian unconformity was penetrated at 3632 m with 8 m Draupne shale. In the Jurassic two reservoir sandstone sequences were encountered: the Vestland Group and the Statfjord Formation. The Vestland sequence was first interpreted as oil and gas bearing from 3640 m to 3708 m (Hugin Formation) with a probable gas/oil contact 3660 m and an oil/water contact between 3704 m to 3708 m. Net pay in the 25/2-4 Hugin reservoir was estimated around 40 m with porosity from logs averaging 25% and water saturation lower than 25%. The Statfjord sandstones had similar reservoir properties, but were water wet. Due to high pressure the hydrocarbon zone in Hugin Formation was not production tested, in stead fifteen FIT samples were taken, of which five were taken in the "gas zone" and 11 in the "oil zone". Four of the tests were unsuccessful, the remaining samples recovered oil and gas but PVT analyses indicated that the fluids were not fully representative of the formation fluid. After a well test in a later well, 25/2-12 A, it became clear that the reservoir fluid was actually gas with high condensate content. Logs in 25/2-12 confirmed the hydrocarbon/water contact found in 25/2-4 (3678m MSL).

Shows were recorded as follows: At 2750 m gas index and formation pressure increased significantly and remained high down to 3710 m. Peaks of gas were recorded when entering limestone stringers throughout the Late Cretaceous and at the top of the Jurassic sandstones. Direct fluorescence and cuts were observed over the interval 2900 m to 3877 m on limestones and sandstones.

Three cores were cut in the Hugin Formation and three in the Sleipner Formation, 81.75 m in total. In addition to the FIT samples in the Hugin Formation one FIT was taken in the Tryggvason Formation (3374 m: mud filtrate and trace gas) and one in the Statfjord Formation (4116 m: mud filtrate only).

TESTING

Campanian limestones were tested over the interval 2902m to 2913 m. No significant flow was recorded even after acid treatment. Only 3.2 m of mud mixed with water and gas were recovered by reverse circulation. No production test was conducted on the Jurassic oil column because rig equipment was inadequate for the reservoir pressures encountered.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 25/2-4