



Wellbore History

GENERAL

Well 30/10-5 was drilled on the northern tip of the Frigg Field. Its main purpose was to explore a deep-seated closure at Middle Jurassic level. This structure was targeted already in the 30/10-1 and 30/10-4 wells, but it was not reached because well 30/10-1 was terminated in the Late Cretaceous due to high-pressure problems and well 30/10-4 became junked in the Miocene due to an unrecoverable fish.

OPERATIONS AND RESULTS

Exploration well 30/10-5 was spudded with the semi-submersible steel installation Neptune 7 on 25 August 1974 and drilled to TD at 5185 m in the Late Triassic Hegre Group. Reaming of the 12 1/4" hole to 17 1/2" for setting the 13 3/8" casing was delayed due to several twist-offs, junk in hole, pod trouble and weather. After setting the 13 3/8" casing drilling was resumed. At 2943 m, lost circulation was encountered, however; after setting a cement plug, drilling was continued without difficulties. Drilling from the sea floor to 747 m was with seawater and gel. Below 747 m a fresh-water Spersene XP 20 (lignosulphonate) mud system was used.

The Oligocene section consisted entirely of siltstone and clay. The Eocene, section contained a sandstone reservoir (Frigg Formation, first informally termed "Frigg Clastic Tongue") from 1964 m to 2150 m. Good gas shows were present from 1965 m to 1974 m and good oil shows from 1974 m to 1978 m. Below 1978 m the section was water wet. The Rogaland Group contained 159 m of potential sandstone reservoirs but no shows were encountered. The Danian consisted of silty limestone and dark grey shale. The Late Cretaceous consisted primarily of interbeds of tight micritic limestone, marl and shale. Numerous gas shows were noted in limestone stringers in the uppermost part of this section. The limestone section between 2917 m and 2943 m was sandy and contained some gas. A second zone between 3628 m and 3534 m also contained some gas. Log analysis indicated that this zone had an average porosity of 17.8 percent and water saturation of 58.3 percent. The Early Cretaceous was primarily a shale. The Middle Jurassic Brent Group had sands present from 4583 m to 4654 m, 4692 m to 4761 m, and 4793 m to 4806 m. The porosity ranged from 19 to 22 per cent. The Early Jurassic consisted of shale and sandstone stringers. The Triassic consisted of shale and thin limestone stringers. The only oil shows encountered in 30/10-5 were in the Eocene Frigg Formation and the Middle Jurassic Brent Group. The latter had a slight fluorescence and cut in the upper 9 m.

The well had an extensive sidewall-coring programme, recovering 232 sidewall cores in 12 runs from 874 m to 5176 m. One conventional core was cut from 4590.0 m to 4599.1 m in Brent sand with coaly layers. No fluid samples were taken on wire line. The well was permanently abandoned on 1 May 1975 as an oil and gas appraisal of the Frigg Discovery.

TESTING

One drill stem test was made. The 9 5/8 inch casing was perforated from 3638 m to 3644 m in the Late Cretaceous. With the packer set at 3635 m the tool was open for 3 minutes, and then closed for 30 minutes for initial build up, then open for 3 hours. During the 3 hours the well flowed 3 1/4 barrels, insufficient for identification of reservoir fluid. Upon completion of flowing the well was shut in for 6 hours and 10 minutes for final pressure build up. A maximum reservoir pressure could not be determined, but the results indicated high pressure and low permeability. Two pressurized bottom hole samples were taken during the test. Both turned out to contain mud and gas, and one of them also contained some water.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 30/10-5