



LITHOSTRATIGRAPHY & HISTORY FOR WELL: 33/9-9

Wellbore History

GENERAL

Well 33/9-9 was drilled in the northern part of the Statfjord field, about 1.6 km southeast of 33/9-3 well on the Tampen Spur in the northern North Sea. The objectives were to provide structural and stratigraphic control on the Brent reservoirs, and to provide stratigraphic control and to establish an oil/water contact for the Statfjord reservoir.

OPERATIONS AND RESULTS

Appraisal well 33/9-9 was spudded with the semi-submersible installation Borgny Dolphin on 27 July 1977 and drilled to TD at 3100 m in Late Triassic sediments in the Statfjord Formation. The well was drilled with seawater down to 486 m and with a seawater/lignosulphonate mud system from 486 m to 1993 m. At 1993 m, TD in the 17 1/2" section, the hole was displaced to a freshwater/Lignosulphonate mud system. At the same point diesel was added to free the 13 3/8" casing which had become differentially stuck. After that the mud contained initially 5% diesel decreasing to traces of diesel at to 2489 m. From 2489 m to final TD the freshwater/Lignosulphonate mud system was without measurable diesel.

No hydrocarbon shows were reported above the Brent Group. The Brent Group was found at 2413 m, 77.5 m deeper than prognosed 44.0 m thinner than anticipated in comparison to 33/9-3. Good oil shows were encountered at the top of the Brent Formation and continued throughout the reservoir down to top Dunlin Group at 2504 m. The entire Brent Group was oil-filled and it was above the field oil/water contact of 2609.1 m (2584.1 MSL). Log calculations showed that of the 87.0 m of gross oil section 84.6 m was net sand with 27.5% average porosity and 13.1% average water saturation. The Dunlin Group came in at 2504 m and log interpretation indicated a 23.2 m gross oil bearing reservoir between 2528.4 and 2551.6 m with 17.9 m net oil sand. The interval had 20.2% average porosity and 34.6% water saturation. Oil shows were reported from ditch samples and side wall cores in the Dunlin sand between 2535 and 2575 m. No OWC was established in the Dunlin Group. It was assumed that Brent and Dunlin had a common OWC at 2609.1 m (2584.1 MSL), outside well position. The Early Jurassic Statfjord Formation was penetrated at 2715.0, only 5.0 m deep to prognosis confirming that the Statfjord seismic reflector is a reliable mapping horizon. Good oil shows were reported from the top down to about 2850.0 m. The lowest potential pay sand indicated on the CPI log occurs between 2847.5 and 2852.5 m, but a test in this interval, DST No. 2, produced water with only trace oil. The anticipated oil/water contact was not found. The lowest-known-oil in the well at 2815.0 m (2790.0 m MSL) is 13.1 m above the lowest-known-oil previously established in the 33/12-2, which falls within a section of tight sands and shales in 33/9-9.

A total of 23 cores were cut in the well. Cores no 1 to 8 were taken through the Brent reservoir and into the shaly top of Dunlin, while cores no 9 to 23 were cut in the Statfjord Formation. A significant error in core depth is noted for the first 16 cores. For these 11.3 m must be added to the registered core depths in order to match with the logger's depth. The last seven cores had core-log mismatch within +/- 2 m.

The well was permanently abandoned on 17 November 1977 as n oil and gas appraisal well.

TESTING

Six separate zones were successfully tested, requiring a total of nine attempts. The purpose of the tests was to obtain information from six separate zones in the Brent, Dunlin and Statfjord Sands in order to further evaluate the reservoirs. The tests for the first two zones were designed primarily for production data, bottom hole pressures and formation fluid samples, with sustained sand production expected only if very thin unconsolidated sand stringers were present. The last four zones where sand bonding was weak, as calculated from the well log data, had the additional test requirement of measuring the oil rate at which the formation sand broke down.

DST 1 in the interval 2847.5 to 2852.5 m in the Statfjord Formation was a misrun.

DST 2 in the interval 2847.5 to 2852.5 m in the Statfjord Formation produced 215 Sm3 water and only trace oil /day through a 3/4" choke. The recorded bottom hole temperature was 91.1 deg C. Sand was produced throughout the test, at rates from 1200 to 300 pounds/thousand barrels