



Wellbore History

Well is located in the Egersund Basin south-west of the Yme field in the North Sea. The main target for the well was a faulted four way anticlinal structure (rotated fault block) with Late Permian Rotliegendes sandstones at a prognosed depth of 5134 m. About 400 m of Rotliegendes sandstone was expected. The objective was to test the hydrocarbon potential in this structure. Dry gas was expected. The key risks were the Palaeozoic source, reservoir adequacy, and top seal. The well should TD just below the base Rotliegendes (Saalian Unconformity) to obtain full stratigraphic and lithological control for the Rotliegendes.

OPERATIONS AND RESULTS

Well 9/4-5 was spudded with the jack-up installation Mærsk Gallant on 6 January 2006 and drilled to TD at 5881 m (5874 m TVD RKB), 44 m into volcanic tuffs below the base of the Permian Rotliegendes Group. Rotliegendes drilling was very slow, about 1-2 m/hour. The well encountered a five meters thick halite bed at 5224 m, the base of the Zechstein in the 9 7/8" hole. On several bit trips in and out of the hole, the halite was seen slowly moving into the well, giving some problems coming into the well and pulling out of hole, most of the times this interval needed to be reamed. When drilling at 5503 m with 13 ppg mud weight, a salt water kick occurred. ECD at this time was 13.7 ppg. The mud weight was gradually increased to 15.5 ppg to stop the salt water influx into the well. The well was drilled with seawater and hi-vis sweeps down to 605 m, with Glydril mud containing 3% glycol from 605 m to 2534 m, and with Paratherm oil based mud containing alkanes mainly in the range C12-C18 from 2534 m to TD.

The well encountered Top Rotliegendes at 5278.5 m (5272 m TVD RKB), 138 m deep to prognosis. The total Rotliegendes was 559 m thick, consisting of about 500 m of tight sandstones and conglomerates. A few meters of the sandstone beds had porosity up to about 8%. These porous beds were water wet. The lowest part of the Rotliegendes consists of 60 m with brown to red clay stones, with a sharp log contact to varicoloured tuffs. The well was dry. Apart from some elevated gas in the Tau formation only background gas was encountered and frequent fluorescence observed in deeper parts of the well, in the reservoir section, was due to the base oil in the mud. Post-well organic geochemical analyses confirmed this picture. Vitrinite reflection analyses (%Ro) proved an immature well down to ca 2600 m where %Ro exceeded 0.5.

Two cores were cut in different reservoir facies in the Rotliegendes section, the first core showing grey tight sandstones and the second core, deeper down in the reservoir, showing red tight conglomerates and red sandstones with 8% porosity. Extensive wire line logging was done at TD, including Earth Imager, MREX (Magnetic Resonance), XMAC (Sonic), HDIL (Resistivity) and Check shots. Formation pressures and samples were attempted with the RCI Probe and RCI Straddle Packer tools. The fluid sampling failed. A number of long-time BHT's measured on wire line tools repeatedly gave maximum temperatures in the range 145 - 148 deg C. Horner correction gave a static temperature at final TD in the range 149 - 152 deg C.

The well was permanently abandoned on 1 August 2006 as a dry well.

TESTING

No drill stem test was performed.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 9/4-5