



Wellbore History

GENERAL

Well 2/1-6 is located on the northern side of the Gyda structure on the Cod Terrace in the North Sea. The main target was the Late Jurassic Sandstone, informally called the Gyda sandstone member. The well was located such that it should prove the oil water contact of the 2/1-3 oil discovery, and by this establish whether 2/1-3, 2/1-4 and 1/3-3 all have encountered the same oil accumulation on the two sides of the saddle point. It should also test further the extent and the quality of this Upper Jurassic reservoir.

OPERATIONS AND RESULTS

Appraisal well 2/1-6 was spudded with the semi-submersible installation Dyvi Alpha on 30 April 1984 and drilled to TD at 4583 m (4588 m loggers depth), one metre into Late Triassic sediments of the Skagerrak Formation. The well was drilled with seawater and pre-hydrated bentonite spud mud down to 635 m, with KCl/polymer mud from 635 m to 3424 m, with lignosulfonate mud from 3424 m to 4124 m, and with high temperature polymer mud from 4124 m to TD.

The Gyda sandstone member was penetrated at 4173 m logger's depth. The reservoir is 205 metres thick, generally very fine to fine grained sandstone, but with a 28 metre thick siltstone incorporated in the uppermost part. Reservoir properties were very variable. Reasonable reservoir properties were found near the top of the reservoir. They were poor in an upper siltstone zone, in an intermediate 77 metre thick quartz overgrowth zone and at the base of the 2/1-3 sand where it shaled out into the Farsund Formation. Shows were recorded from 4174 to 4178 m in a sandstone that had very low permeability, and could not be tested. Minor patchily developed shows were observed from 4178 down to 4203 m, all within the fairly tight siltstone. No OWC was seen in the well. However, a possible OWC has been established at 4185 m (4160 m MSL), on the basis of a re-interpretation of RFT data from the wells 2/1-3, 4, 6 and 1/3-3 combined with pressure readings in the water zone of 2/1-6.

Eight cores were cut between 4127 and 4165.35 m. Four cores were cut between 4303 and 4391.5 m. Recovery was 100% for all cores. For all cores the core depth is 4 m less than logger's depth. The RFT tool was run for pressure and fluid samples. A fluid sample was taken at 4208 m. Rig site resistivity measurements and laboratory water analysis confirmed the samples to be mud filtrate. Sampling was attempted in the interval 4173-4175 m. The sand interval was tight and neither pressure measurements nor sample were obtained.

The well was permanently abandoned on 12 August 1984 as a dry appraisal well.

TESTING

Two drill stem tests/water injection tests were performed in the Gyda member sandstone. Both tests confirmed the reservoir to be water bearing.

DST1 perforated 4328.75 - 4340.75 m and produced 288 B/D of water with 1.17 specific gravity in the main flow period, through a 64/64" choke. In the following injection period the final injection rate was 240 B/D of treated sea water and the final surface injection pressure was 7000 psig.

DST2 perforated 4210 - 4241 m and produced 3379 B/D of water with 1.17 specific gravity in the main flow through a 28/64" choke. In the following injection period the final injection rate, before acidization, was 2880 B/D of treated sea water and the final surface injection pressure was 5245psig. After acidization the final injection rate was 7544 B/D of treated sea water and the final surface injection pressure was 4955 psig.

A number of temperature sensors were employed in the tests and maximum temperatures of 319 deg F (159.4 deg C) and 318 (158.9 deg C) in DST1 and DST2 respectively seem to be the more representative and in agreement with corrected wire line temperatures.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/1-6