



Wellbore History

GENERAL

Well 2/11-4 was drilled on the Lindesnes Ridge in the Southern North Sea. The objective was to delineate the Valhall discovery made by well 2/8-6 in 1975. The target was the Late Cretaceous chalks in the Tor and Hod formations.

OPERATIONS AND RESULTS

Appraisal well 2/11-4 was spudded with the jack-up installation Dyvi Beta on 20 March 1978 and drilled to TD at 2858 m in the Late Cretaceous Rødby Formation. No significant problems were encountered in the operations. The well was drilled with sea water and hi-vis pills down to 390 m, with sea water/gypsum mud from 390 m to 2559 m, and with Magcobar oil based "Oilfaze" mud from 2559 m to TD.

The well penetrated a normal Quaternary and Tertiary sequence. Good oil shows with free oil present in the mud was observed in siltstone and claystone from 1400 to 1800 m in the upper part of the Hordaland Group. Occasional spotty oil shows in claystones and limestones (direct and cut fluorescence) were recorded from 1800 to 2250 m. The Cretaceous Chalk was penetrated at a depth of 2587 meters some 23 meters higher than prognosed. The objective Tor Formation reservoir proved to be hydrocarbon bearing with a gross pay section of 18 meters and oil saturations up to 62%. Hydrocarbon saturation in the Hod Formation was insignificant due to low elevation on the structure. Fair to excellent oil shows were seen in the reservoir section down to 2607 m. Below 2607 m scattered poor shows were seen down to 2619 m.

Coring commenced at 2582.5 meters, 4.5 meters above top Chalk, to ensure recovery from the uppermost part of the pay section. A total of 5 conventional cores were attempted over the interval 2582.5 m to 2619 m. Cores no 1 and 2 had 53 and 10% recoveries, respectively, while core no 3 was a total misrun. Cores 4 and 5 had 100% recoveries. No wire line fluid samples were taken.

The well was permanently abandoned on 18 May 1975 as an oil appraisal well.

TESTING

Two drill stem tests were performed.

Test 1 tested the interval 2698 - 2707 m in the 100% water saturated Lower Hod Formation. The well was opened to flow on a 16/64" choke. The Well Head Flowing Pressure (WHFP) dropped from 2400 psig to 50 psig in two minutes and the WHFP stayed in that range for the total flow period of 14 hours and 15 minutes. The average flow rate was 22 m3 water/day measured into the tank. Reservoir temperature at the middle of the perforations (2702.5 m) was reported to be 96 deg C.

Test 2 tested the interval 2588 - 2595 in the oil zone of the Upper Tor Formation. The interval was tested first without stimulation, then with acid stimulation, and finally also with fracturing, with increasing flow rate in that order. The average flow rate at 32/64" choke (maximum flow) after fracturing was 212 Sm3 oil and 32000 Sm3 gas /day, giving a GOR of 150 Sm3/Sm3. The oil gravity in this flow was 28.5 deg API and the gas gravity was 0.730 (air =1).

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 2/11-4