



Wellbore History

GENERAL

Well 1/6-3 is located on the Albuskjell Field in the southern Norwegian North Sea. The primary objective was appraisal of reservoir development in the western part of the Albuskjell field. A Danian - Maastrichtian gas condensate field had previously been confirmed by two wells (A/S Norske Shell 1/6-1 and Phillips 2/4-9) drilled farther east along the WNW - ESE trending structure. Secondary objectives were to investigate Danian Chalk prospect and possible deeper prospects.

OPERATIONS AND RESULTS

Appraisal well 1/6-3 was spudded with the jack-up installation Zapata Nordic on 12 April 1974. Three sidetracks had finally to be drilled, of which the second and deepest reached 3343 m in the Late Cretaceous Tor Formation. The first sidetrack was kicked off at 314 m after unsuccessful fishing (lost hole opener). The second sidetrack was kicked off at 3022 m when it was realised that a core point had been missed so that a Danian porous zone and 37 m of Maastrichtian had not been cored. Lost circulation and stuck pipe led to the third side track, which was kicked off at 2995 m. Further lost circulation problems and the discovery that there was a break in the casing at 3140 m finally led to abandonment of the well without investigating the deeper prospects. The well was drilled with seawater down to 417 m, with shale-trol/lignosulphonate from 417 m to 1221 m, with shale-trol/lignosulphonate and lime from 1221 m to 2500 m, and with lignosulphonate and lime from 2500 m to TD. A diesel/pipe lax pill was spotted at 314 m.

As prognosed, gas was encountered both in the Danian and Late Maastrichtian Chalk. Hydrocarbons were present from Top Ekofisk at 3110 m down to an OWC at 3289.7 m in the Tor Formation. The net thicknesses were respectively 91 and 45 m. The great thickness of the Danian reservoir was in contrast to the findings from wells 1/6-1 and 2/4-9, where only a thin hydrocarbon-bearing zone was present in an otherwise tight Danian.

Eleven conventional cores were cut over the interval 3123.3 to 3343.0 m. Of these, the first core was cut from 3123.3 to 3141.5 m in the first sidetrack, cores 2 to 9 were cut from 3162.3 to 3343 m in the second sidetrack, and cores 10 and 11 were cut from 3136.4 to 3163.8 m in the third sidetrack. No fluid samples were taken on wire line.

The well was permanently abandoned on 11 September 1974 as a gas/condensate appraisal.

TESTING

Two thin zones in the Maastrichtian chalk (Tor Formation) were Drill Stem Tested to obtain water samples. DST 1 tested the interval 3298 to 3299.5 m and started to produce gas, which had flown down the 7" / 8 1/2" annulus in preference to water from the formation opposite the perforations. The well was killed immediately for safety reasons. DST 2 was then attempted from the interval 3302.5 to 3304 m after a cement squeeze to shut of the annulus gas stream. The Formation proved tight and only gas cut mud was obtained. No water sample was obtained.

The hydrocarbon bearing zones were Production Tested in two intervals: PT 1 from 3227.8 to 3265.9 m in the Maastrichtian chalk (Tor Formation) and PT 2 from 3125.7 to 3166.9 m in the Danian chalk (Ekofisk Formation). PT 1 produced after acid treatment on a 28/64" choke 541000 Sm³ gas and 409 Sm³ oil /day The GOR was 1325 Sm³/Sm³, the oil gravity was 47 deg API, and the gas gravity was 0.67 (air = 1). Maximum reservoir temperature (from build up period between 1. and 2. flow period) was 137.2 deg C. Unfortunately, no successful test was made of the Danian reservoir in Test 2, from the interval 3125.7 to 3166.9 m. This was due to plugging by formation and lost circulation material from the tested interval. In this zone, the Danian consisted of very friable, fractured chalk. The well slugged badly and gave unstable measurements. Average test rates of 72000 Sm³ gas and 2000 Sm³ oil /day, with similar fluid characteristics as in Test 1.

LITHOSTRATIGRAPHY & HISTORY FOR WELL: 1/6-3