



## Wellbore History

### GENERAL

Well 3/7-4 was designed to drill a prospect on the Lulita culmination. The Lulita prospect extends in to Danish waters, and forms part of an elongated, N-S trending, salt induced feature on the western margin of the Søgne Basin. The present structural features were developed during mid Cretaceous time, and closure at Late Cretaceous and Tertiary levels essentially reflects compaction and drape over the Jurassic high. The Jurassic Lulita closure is separated from the area tested by the 3/7-3 well by a faulted saddle, which also is well expressed at Tertiary and Cretaceous levels, providing a vertical closure of some 75 metres. The well had as primary objective to test the hydrocarbon potential of Middle Jurassic sandstones within a structural/stratigraphic trap, and as secondary objective to testing the potential in possible Late Jurassic and Early Cretaceous sandstones, within a structural trap. Additional objectives included testing of Late Cretaceous Chalk, found hydrocarbon bearing in the nearby Harald field, Paleocene/Eocene turbiditic sandstones, and the reservoir quality of the Triassic sequence. The well should drill some 150 m into rocks of Triassic age. Shallow gas could be encountered at 317 to 388 m, at 485, and at 515 m according to seismic anomalies.

### OPERATIONS AND RESULTS

Wildcat well 3/7-4 was spudded with the semi-submersible installation Hunter on 20 September 1989 and drilled to TD at 3723 m in the Permian Zechstein Group. At 3472.9 m the string was backed off, and a cement kick off plug was set. The hole was sidetracked from 3405 m. The well was drilled with seawater and hi-vis spud mud down to 622 m, with KCl polymer from 622 m to 3473 m, and with seawater/polymer from 3473 m to TD. No shallow gas was encountered.

A 160 m hydrocarbon column from top Ula Formation and down to 3572 m in the Bryne Formation was found from well-logs, core shows, and RFT pressure gradients. Strong shows were recorded throughout the reservoir. Below the ODT shows died out, and were not seen below 3600 m. The RFT pressures indicated a light condensate-type fluid gradient of 0.39 bar/10m in the hydrocarbon-bearing zone. The secondary and additional objective levels were evaluated: A 29 m thick sequence of Maureen Formation sandstone was encountered in the Tertiary, no reservoir quality sands or chalk was found in the Late Jurassic and Cretaceous, and the Triassic was missing. Weak shows were recorded in the Maureen sandstone.

Two segregated RFT fluid samples were obtained. The first (No. 1) from 3564.5 m contained gas, condensate and water, whilst the second (No. 2) from 3442.5 m contained gas and water only. A total of 123.5 m conventional core was recovered in eight cores in the interval 3416 m to 3574 in the Ula and Bryne Formations. Core no 1 was cut in the first hole, the remaining seven cores were cut in the sidetrack.

The well was permanently abandoned on 23 January 1990 as a gas/condensate discovery.

### TESTING

Two DST tests were performed in this well. Test no 1A in the interval 3473 to 3537 m produced 665 Sm<sup>3</sup>/d liquid hydrocarbons of 0.804 g/cm<sup>3</sup> and 884450 Sm<sup>3</sup> gas through a 19 mm choke. The Gas/Liquid ratio was 1330 Sm<sup>3</sup>/Sm<sup>3</sup>. Test no 1B in the interval 3440 to 3537 m produced 611 Sm<sup>3</sup>/d of 0.796 g/cm<sup>3</sup> liquid and 838292 Sm<sup>3</sup> gas through a 19 mm choke. The GLR was 1372 Sm<sup>3</sup>/Sm<sup>3</sup>. The gas gravity (air = 1) was 0.72 in both tests. Temperature measurements during the tests gave a reservoir temperature of 131 deg C.

## LITHOSTRATIGRAPHY & HISTORY FOR WELL: 3/7-4