



LITHOSTRATIGRAPHY & HISTORY FOR WELL: 7/12-2

Wellbore History

GENERAL

Well 7/12-2 was drilled on a salt induced structure on the east side of the Cod Terrace in the North Sea. The primary objective was to evaluate potential Upper Jurassic and Triassic reservoirs

The well is Type well for the Ula Formation and Reference well for the Farsund Formation.

OPERATIONS AND RESULTS

Wildcat well 7/12-2 was spudded with the semi-submersible installation Norskald on 4 July 1976 and drilled to TD at 3676 m in the Early Jurassic Gassum Formation. The well was drilled with seawater/gel down to 158.5 m and with seawater/lime Drispac mud from 158.5 m to TD down to 495 m and with a lime/Drispac mud from 495 m to TD.

Well 7/12-2 penetrated a major Late Jurassic reservoir (Ula Formation) and was terminated within a hydrocarbon bearing sequence of poor quality sands and interbedded shales in the Gassum Formation. Core analysis and log interpretation indicate an Ula Formation sandstone reservoir of 128 m net thickness (154 m gross) with porosities ranging from 14 to 28%, permeabilities from a few millidarcy to over two darcy and water saturations from 5 to over 50%. The Ula Formation was oil bearing from top to base at 3532 m in an oil down-to setting. The Gassum Formation sandstones have a porosity between 11 and 19%, average permeability of 1 md and water saturation generally in excess of 70%.

Eleven cores were cut in the well. Cores one to ten were cut in succession from 3385.75 m (3380.95 m logger's depth) to 3476.9 m (3470.9 m logger's depth) in the Ula Formation. The overall core recovery for this section was 97.3%. Core no 11 was cut in the Early Jurassic from 3634.2 to 3652.3 m with 100% recovery. The core-log depth shifts varied from -4.8 m to -6.0 m. No fluid samples were taken on wire line.

The well was suspended on 23 September 1976 for later re-entry and testing of reservoir productivity. It is classified as an oil discovery.

TESTING

Six drill stem tests were performed: DST 1 and 1a in the Early Jurassic Gassum Formation and the others in the Late Jurassic Ula Formation.

DST 1 tested the interval 3640.5 to 3665.5 m. the test did not produce oil to the surface, but about 3 - 5 gallons of clean oil was found in the drill collars immediately below the downhole valve. The oil gravity was estimated to 40°API. The DST temperature was 145.6 °C.

DST 1a was a retest of the DST 1 interval with a different test string. Again the test did not produce to surface, but about 0.6 m3 (four bbls) of clean oil was reversed out of the test string. The oil gravity was 41.3 °API and the gas gravity was 0.805 (air = 1). The gas and oil had an aromatic smell, guessed to be from toluene.

DST 2 tested the interval 3525 to 3532 m. The test produced small quantities of gas but no oil to surface. Based on reversed content the rates in the test was estimated to 24 Sm3 oil /day. The oil gravity was 37.7 °API. The DST temperature was 145.6 °C.

DST 3 tested the interval 3426.5 to 3438.7 m. The test produced 795 Sm3 oil /day through a 1" choke. The GOR was 102 Sm3/Sm3, the oil gravity was 40.2 °API and the gas gravity was 0.748 (air = 1). The test was a mechanical misrun, as the valves were not fully shut during build-ups.

DST 3a was a retest of the DST 3 interval with a different test string. The test produced up to 1132 Sm3 oil /day through a 0.5" choke. The GOR was 107 Sm3/Sm3, the oil gravity was 40.4 °API and the gas gravity was 0.751 (air = 1). The DST temperature was 146.1 °C and this temperature was regarded as the most representative of all DST temperatures in the well.

DST 4 tested the interval 3383.7 to 3393 m. The test did not achieve stabilised rates but produced on average ca 95 Sm3 oil /day. The GOR was similar as in DST 3a, the oil gravity was 41.0 °API and the gas gravity was 0.817. The DST temperature was 145.6.