



## Wellbore History

### GENERAL

Well 25/11-14 SR re-entry was drilled centrally on the Balder Field on the Utsira High in the North Sea. This field was discovered in 1967 by the 25/11-1 well, and was the first well on the Norwegian shelf that proved oil. Primary well 25/11-14 S was planned to be completed for a long term test by the FPV Petrojarl 1. The well was planned deviated with kick-off at 1060 m in order to avoid possible shallow gas at 235 m, 254 m, and 515 m. The main objective of this well was to test two Paleocene Heimdal Formation sands; the IB4 sand at 1863 m and the IB3 sand at 1897 m. The Heimdal Formation had previously proved oil-bearing in the three neighbouring wells 25/11-6, -7, and -8. Eocene sands constituted a secondary objective for testing. Based on data from surrounding wells, no abnormal pressure was expected. The surface location and well trajectory for this well, was designed so that a later plug-back and sidetrack to a horizontal completion could be accomplished.

The 25/11-14 SR re-entry was made to fulfil the primary objective of well 25/11-14 S, which was terminated too shallow and without logging and testing due to stuck pipe.

### OPERATIONS AND RESULTS

Appraisal well 25/11-14 SR kicked off at 1571 m in 25/11-14 S on 19 October 1990. It was drilled with the semi-submersible installation Byford Dolphin to final TD at 2081 m in sands of the Paleocene Heimdal Formation IB3 sand. After coring the IB3 sand the well was drilled a further 11 m but was TD'ed early as it encountered lost circulation problems between 2077 and 2081 m. It was decided at this point to run casing as quickly as possible to avoid further formation damage prior to the well's main objective of the extended production test. The well was drilled with seawater down to 452 m and with KCl/polymer/gel mud from 452 m to TD.

The secondary target Eocene sands and the upper Heimdal sand IB4 were found missing in the re-entry as it was in the primary well bore. The IB3 sand came in at 1998 m (1753 m TVD RKB). The IB3 sand was oil bearing and the OWC came in as prognosed at 2055 m (1785.3 m TVD / 1760.3 m TVD MSL).

Seven cores were cut in the IB3 sand in the interval 2010 to 2070 m in 25/11-14 SR. These cores proved massive, fine to very fine sandstone of excellent porosity and permeability. Wire line logs were run through casing only due to potential hole problems. No wire line fluid samples were taken in the well bores.

The well was suspended on 31 December 1990 and completed for long term testing. This test was performed with FPV Petrojarl 1 over 146 days during 16 May to 8 October in 1991, classified as test well 25/11-T-14 S. After the test the well bore was again re-entered, this time with the semi-submersible installation Dyvi Stena, and permanently abandoned on 2 December 1991 as an oil appraisal.

### TESTING

One DST test was performed in the Heimdal Formation IB3 sand in the sidetrack bore hole in two steps, step one without a gravel packer and step two with a gravel packer. The perforated test interval was from 1999.2 m to 2015.2 m. Step one produced 508 Sm<sup>3</sup>/d through a 13.7 mm choke. Maximum production in step two was 985 Sm<sup>3</sup> oil through a 25.4 mm choke. The GOR varied between 36 and 47 Sm<sup>3</sup>/Sm<sup>3</sup>, the oil gravity was 23 deg API, and the gas gravity 0.67 (air = 1). No CO<sub>2</sub> or H<sub>2</sub>S was detected. The down-hole temperature recorded in the test, at gauge depth 1986 m (1721 m TVD MSL), was 75.6 deg C. Corrected, stabilized temperature was estimated to be 76.7 deg C.

## LITHOSTRATIGRAPHY & HISTORY FOR WELL: 25/11-14 SR