

## FMC KONGSBERG SUBSEA A/S

PO Box 103 5346 Ågotnes Norway

## STATOILHYDRO F4/H NORNE Field North Sea, Norway

# FINAL REPORT SUMMARY SEALMAKER SUBSEA 1/4" CONTROL LINE LEAK REPAIR

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### **1.0 GENERAL INFORMATION**

- This report documents the control line leak repair by SEALMAKER International Limited on Well No. F4/H on the Norne F Template from the vessel "Far Saga" in the Norwegian sector, North Sea on 18-Oct-09 thru 24-Oct-09
- A large leak was confirmed to exist in the ¼" control line fitting at the penetrator head entering into the wellhead from the SCM and discharging directly into the sea. The leak was documented via ROV survey confirming the location and significant wash out from the threaded connection on the penetrator head
- To gain access to the leak from the FAR SAGA, the SCM was recovered via FMC URT and a dummy pod was installed. A 500m (10,000psig) 3/8" reel was then used to deploy the sealant through a hot-stab connection into the DHSV line in the wellhead through the HP1 port on the dummy pod
- The leak repair was observed visually via ROV beginning at 17:45pm 18-Oct-09
- The control line leak was repaired successfully at 510 bar then flushed using pressuriztion/flowback technique and tested prior to re-installing the SCM and placing the well back in service

#### 2.0 OBJECTIVE

The objective was to seal the ¼" control line fitting/ penetrator head leak on Norne well F4/H by using *SEALMAKER INTERNATIONAL Limited's* control line sealants. The leak rate was estimated in original diagnostics in excess of 10 Liters/min at full system pressure at 500 bar The well is subsea in the Norne field.



#### **3.0 JOB SUMMARY**

This operation was a continuation of the preceding D3/H repair which commenced on 12-Oct-09 via the intervention vessel FAR SAGA. The surface equipment consisted of a NTOS 10,000psig (3/8" hose) hydraulic reel with FMC Hot-Stab connection, an FMC Dummy Pod to isolate the hot-stab into the HP1 access port, a 10,000psig air-driven SEALMAKER International hydraulic pump and a back-up NTOS Haskel 20,000psig air driven hydraulic pump. ROV video was run to the SEALMAKER hydraulic pump on the main deck to visually observe the leak repair operation subsea. The hot-stab was disconnected at the surface and loaded with 5 Liters of SEALMAKER sealant and followed with 2 liters Oceanic HW443. The hot-stab was reconnected, leak tested, and then deployed to the seabed. After connecting the hot-stab into the Dummy HP1 port, the ROV was moved into position to monitor the leak visually. The reel was pressurized from the surface using the SMI hydraulic pump to 200 bar and the leak was visually confirmed with the ROV feed. Initial leak-off was 200-135 bar/ 1 min. HW443 was confirmed exiting the leak followed by the SEALMAKER chemical as the pressure fell below 120 bar. A complete seal was established at 118 bar and all fluid leakage was eliminated. The seal was shut-in and allowed to cure for 1 hour with zero pressure loss and confirmed with zero leakage visually. The line was then stepped up incrementally in two hour segments at 250, 350, 510 bar with zero pressure loss. The pressure was then cycled between 510-200 bar and then shut in at 510 bar for 5 hours. The pressure/bleed cycling was repeated 3 hours later with zero leakage occurring. The dummy pod was pulled and minor modification were made to bleed the pressure subsea and then re-installed. A thorough flushing procedure was performed with 18 pressure/bleed cycles ran to ensure as much sealant was removed from the control line as possible. The dummy was then pulled and the SCM re-installed. The line was then pressure tested at 458 bar from the Norne FPSO without leakage and the well was then placed into service.



### 4.0 APENDIXES

#### 4.1 **OPERATIONAL DETAILS/CHARTS**



