Amerada Hess Scott platform converts to through-tubing rotary drilling
Kevin Peake
Dave Koller
KCA Deutag Drilling Ltd.

The principle of TTRD is based on using a slender drillstring. In the Scott drilling facility, a 2 7/8-in. diameter drillstring was used as opposed to a conventional 5 1/2-in. drillstring. The slimmer drillstring is inherently more flexible and can be used to drill side tracks to areas in the reservoir that were previously uneconomic or too difficult to access. The slim bore drilling can drill through existing completion tubulars, reducing drilling costs.

Like many mature North Sea platforms, the Scott has a limited lifespan for conventionally drilled wells. At a TTRD project peer review, it was acknowledged that without TTRD drilling only three more conventional wells would be viable, with the possibility that drilling would cease during
2003. With the introduction of TTRD, 11 or 12 targets become possible, extending the drilling life of the platform and enhancing production.

**Status and approach**

Progress was excellent against a very tight schedule. The key to this success was the use of a team approach, with good integration among Amerada Hess, Varco, and the KCA Deutag engineering, operations, and maintenance departments.

The installation upgrade was completed over a 28-day construction and commissioning program that was immediately followed by a TTRD pipe handling trial to familiarize the drill crew with TTRD handling and operations, and to prove the functionality of the equipment.

At the end of this period, the rig was returned to conventional operations so Amerada Hess could conduct a six- to eight-week conventional operation for production. The break in the program was used to introduce lessons learned during the trial period before moving the rig to full-time TTRD operations. The work was completed safely under safety management systems. All construction and commissioning work was risk assessed, and much effort went into joint planning with Varco.

The Scott drilling facilities required upgrades in several areas to allow TTRD operations:

- The drilling derrick automated pipe-handling system required modifications to the topdrive, pipe-handling machine, and power slips to make them compatible with the thinner drillstring
The existing 85-ft racking board required modification to allow "switching" between the existing 5 1/2-in. racking board and a new racking board that would accept 2 7/8-in. pipe.

A new intermediate racking board, suitable for 2 7/8-in. drillstring, was required at the 45-ft level due to the increased flexibility of the slimmer drillstring.

The drilling mud returns system had to be modified. TTRD operates on much reduced volumes; hence, the sensitivity of the system needed to be increased covering influx detection, mud pit level detection, and the addition of a booster line to increase mud flow velocity in the drilling riser/drill pipe annulus. This was all subject to hazardous operations study.

Several other pieces of existing drilling equipment required component change-out: new mud pump liners, new fine mesh shale shaker screens, and power tongs dressed for 2 7/8-in. pipe.

Innovations

Several important firsts were achieved through the installation of TTRD on the Scott:

- The use of a complete full-length 2 7/8-in. drill string for the entire depth of the well, and driven directly from the top drive, is thought to be an industry first in the North Sea. Previous North Sea TTRD upgrades have used a slightly larger diameter drill pipe (i.e., 3 1/2 in.) for the upper section of the drillstring to transfer the torque from the top drive.

- Installation of a TTRD system into a fully automated drilling derrick is unique in the North Sea. This has required many changes to pipe-handling systems and drill equipment. Software and control systems were also amended to allow switching between TTRD and conventional drilling modes.

- The existing 85-ft racking board was replaced by a pair of racking boards, one suitable for 5 1/2-in. pipe and the other suitable for 2 7/8-in. pipe. Both racking boards are permanently installed and have the ability to be lifted in or out of position, from "operating" mode to "storage" mode, in a drawbridge fashion. Pneumatic air supplies to the automatic finger latches on each racking board can also be "switched" by newly installed pipework and valves. This arrangement of dual racking boards allows for safe change-out and will significantly reduce drilling downtime when switching between TTRD and conventional drilling modes.

The upgrade has been safely and successfully completed, with the equipment handed over to drilling operations.