



## Murphy Oil: Kikeh, Malaysia

The Kikeh discovery is located in 1,350 meters of water and lies in the southern part of Block K offshore Sabah. It is the first deepwater oil discovery made in Malaysia. The field consists of a Floating Production Storage and Offloading (FPSO) vessel receiving production from both wet-tree subsea wells and dry-tree wells drilled from a SPAR dry tree unit.

The FPSO was designed with an external moored turret to accommodate up to 17 flexible risers. MCS Kenny led the technical specification and acted as technical representatives during the design and bid reviews for the procurement of the flexible flowlines and risers. MCS Kenny then performed detailed verification of the designs produced respectively by Wellstream International and Technip.

During the installation campaign an MCS Kenny engineer went offshore to witness the vacuum testing of the flexible risers.

MCS Kenny also provided engineering support for the riser and completion tubing system installed on the Spar unit. The initial scope of work involved influencing and verifying the tubing design, modelling the tubing/riser interaction and developing the installation sequence to ensure the correct tension distribution between the tubing and riser systems. An MCS Kenny engineer then went offshore to supervise and ultimately coordinate the installation of the riser and tubing systems.

In Q1 2008, MCS Kenny kicked off the integrity management of the full subsea system (SS) and the flowline transfer system (FTL), which transfers the production fluid and injection fluid from the SPAR to the FPSO. The main focus is to identify the highest risks for SS and FTL systems; develop the strategy on how to mitigate and manage these risks; develop the inspection procedures for the offshore inspection campaign; and ultimately to provide an annual fitness statement of the SS & FTL systems. The integrity status of the SS & FTL systems is presented live in "Integrity Status" format via the ThruLife™ software.

The Kikeh development achieved first oil in 2007 with initial production rates of 40,000 barrels a day but is expected to ramp up to plateau of 120,000 barrels a day from 2008 onwards, with recoverable reserves in excess of 400 million barrels of oil.



## Scope of Delivery

- Development of the Flexible Pipe Specification and Design Premise for the procurement of the flexible pipe
- Participated in the technical bid review/appraisal process and dealt with all technical clarifications relating to flexible product design
- Acted as client representative for Murphy for detailed technical negotiation with the flexible pipe vendor
- Detailed verification of the design performed by Wellstream and Technip
- Offshore witnessing of the vacuum testing of the flexible risers offshore as the start point for integrity management of the full subsea and flowline transfer system
- Fatigue assessment of the completions tubing, centralizer spacing optimisation and evaluation of the forces exerted by the tubing at the top of the production riser during spar offset and of the necessary slack-off required
- An MCS Kenny engineer offshore to supervise and coordinate the installation of the Spar production riser and tubing
- Risk based integrity management strategy for the full SS & FLT.

## Benefits

- Strong negotiating position with the flexible pipe vendors due to prescriptive specification and expert technical knowledge throughout the negotiating process
- Robust riser design which will achieve full field design life
- Consistent approach and knowledge applied to the FPSO flexible risers and the SPAR steel top tensioned risers thus ensuring consistency and completeness
- Risk based integrity management strategy for the complete subsea and flowline transfer system which optimises the return for the offshore inspection campaign
- Up to date Integrity Status presented live through ThruLife™ software which can be accessed via the web from anywhere in the world.