



**OTC 19484**

## **Kikeh Development: Sand Control Selection, Design and Implementation of ESS**

Tamara Webb, Jusni Omar, Rusty Desormeaux, Pat Moran, Kasim Selamat, Murphy Sabah Oil Co., Ltd., Steve Beare, Colin Jones, Kevin McWilliam, Weatherford International

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This paper was prepared for presentation at the 2008 Offshore Technology Conference held in Houston, Texas, U.S.A., 5–8 May 2008.

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### **Abstract**

Discovered in 2002, the Kikeh field is located 120 km northwest of the island of Labuan, offshore Sabah, East Malaysia. The water depth at Kikeh, Malaysia's first deep water development is 1,320m. The field development consists of a dry tree unit (Spar) and two subsea production hubs, all tied back to an FPSO. Two of the three productive intervals in the development were determined to require sand control, representing about two-thirds of the field's production.

This paper documents the selection and design process for a multi-zone sand control completion with zonal isolation to meet the requirements of both the open hole oil producers and the cased and perforated injector wells on Kikeh.

The primary objectives of the system being:

- Maximize productivity/injectivity
- Provide efficient sand retention
- Minimize cost and time
- Design for well life to minimize workovers and interventions
- Have a large bore to maximize the capability for future selective completions

After extensive testing and evaluation was performed on the seven appraisal wells across the field, including well tests with sand control, expandable sand screens (ESS) were selected as the primary sand control method. The evaluation, coupled with extensive local ESS installation experience in both Southeast Asia and Malaysia, gave the confidence that the installation objectives would be met.

This paper describes the evaluation of sand control methods and why ESS was determined to be the best choice for the Kikeh field development. It also describes the details of each ESS type (water injector, producer, and intelligent completion) and the testing required to qualify each system.

Swelling Elastomer Packers were used to provide zonal isolation in both the injector and producer wells. The qualification and selection process for these packers is also discussed.

Significant application learnings will be discussed and, lastly, well productivity and skin results will be reported.

### **Introduction**

Murphy discovered the Kikeh field offshore Sabah in 2002. A seven well appraisal program was conducted, which included well tests (two) with sand control. It was identified at this stage that one of the many challenges that the Kikeh field posed, was to find a sand face completion that could control the relatively unconsolidated, and poorly sorted sands present in Kikeh's geology. The system would have to be truly flexible in its multi-zone capabilities, to safely and efficiently exploit the highly laminated sands in Kikeh, while isolating the shales, throughout the expected 20-year life span of the field. As part of the design case, the system would have to provide a suitable interface for a future selective completion allowing for reservoir management as required.