# PRODUCTION TECHNOLOGY STUDIES
# CASE STUDY

Sapura Energy - Block SK408

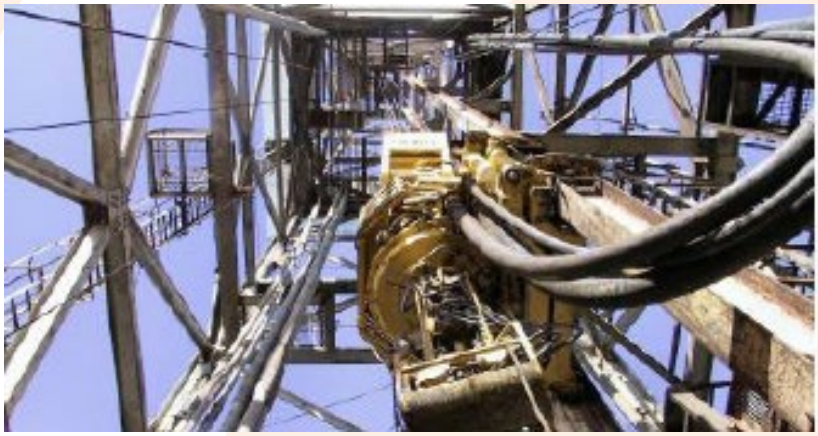
Offshore Sarawak, Malaysia

## AWT DISCIPLINES

**Production Technology**

**Completions Engineering**

**Flow Assurance**



## PROJECT BACKGROUND

The SK408 gas fields are part of the discoveries made by SapuraOMV Upstream in a drilling campaign in 2014. The Phase 1 development of SK408 Production Sharing Contract (PSC) aims to commercialize the gas reserves from Gorek, Larak and Bakong fields, which will help meet the growing gas demand in Asia. Under a long-term agreement with PETRONAS, SapuraOMV and its SK408 partners, will supply gas from these fields to the PETRONAS LNG complex in Bintulu, Sarawak.

SapuraOMV Upstream, headquartered in Kuala Lumpur, is a strategic partnership between Sapura Energy and OMV.

Sapura Energy (now SapuraOMV) planned to develop Larak, Bakong and Jerun (Gorek) Fields located in block SK408, about 150km North of Bintulu, offshore Sarawak in about 80m water depth.

Four (4) wells in each of the Larak and Bakong fields and 6 well in the Jerun field were expected. The wells are high rate gas wells with high flowing well temperatures.

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## AWT WORKSCOPE

AWT was requested to conduct a number of production technology studies to feed into the well completion Basis of Design to be prepared by Sapura Energy:

1. Well clean-up / unloading study (OLGA modelling)
2. Hydrate formation study with varying flow conditions, both surface and downhole
3. Downhole erosional and hydrate study (PROSPER Modelling)
4. Tubing stress analysis (WELLCAT Modelling)

Six representative wells were selected for modelling

- Larak-1 and Larak-2
- Bakong-1 and Bakong-2
- Jerun-A4 and Jerun-A6

Production profiles for each well were provided by Sapura Energy to enable the studies to be undertaken.

## AWT ADDED VALUE

The well clean-up study provided guidance for bean-up rates to ensure adequate completion fluids, mud and solids lifting during well unloading and well clean-up.

The hydrates formation study investigated well start-up conditions and cool down times for downhole and surface equipment and provided guidance for transient methanol injection.

The downhole erosion and hydrate study predicted acceptable tubing wall loss under solids free conditions. Recommendations for managing the risk under solids producing conditions were provided.

PROSPER models were constructed for each well and matched to the supplied production profiles for validation. Three completion design / tubing size concepts were compared, including the assessment of corrosion/erosion, hydrates and liquid loading over the life of the wells.

Triaxial tubing stress analysis also confirmed that the planned tubing metallurgy was acceptable, but identified that some load cases were approaching the collapse load design limits. The planned PBR seal assembly length and space-out was verified as acceptable. Wellhead growth and annular fluid expansion were also confirmed as being acceptable.

The studies provided a basis for finalising the completion designs and undertaking detailed design work for the project and production start-up was successfully commenced the following year.