ESP WELL COMPLETION DESIGN CASE STUDY

Genting Oil & Gas Limited - Ande Ande Lumut Field

Natuna Sea, Indonesia

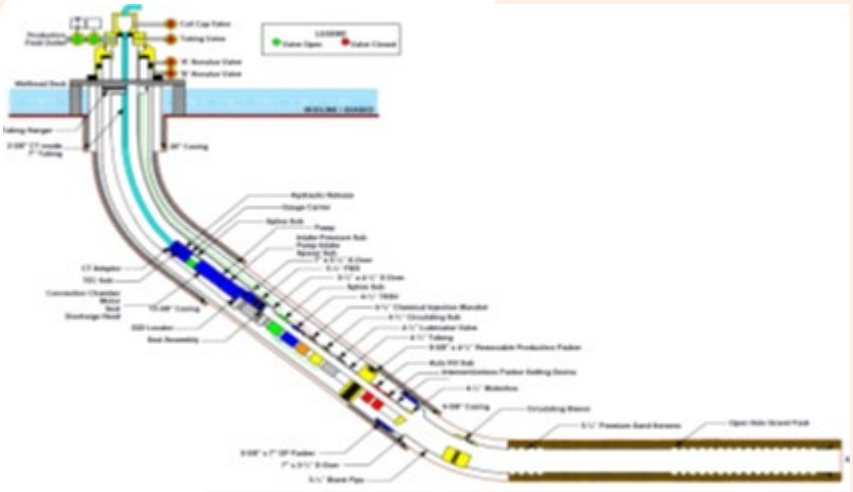
AWT DISCIPLINES

Reservoir Engineering

Flow Assurance

Production Technology

Completions Engineering



PROJECT BACKGROUND

The Ande Ande Lumut (AAL) oil field was discovered in 2000 by Premier Oil, and is located in the Natuna Sea in a water depth of 73m, close to the Malaysia-Indonesia maritime border. Owing to the challenges associated with developing the field's heavy crude, Premier relinquished the block in 2003. The block was subsequently awarded to Genting Oil & Gas in 2004 under the Northwest Natuna PSC.

Four vertical wells named AAL-1, AAL-2, AAL-2X-R and AAL-3X had been drilled into the J & K sands where AAL-3X is located in the centre of the Ande Ande Lumut Oil Discovery, about 3 km north of AAL-2X-R.

The oil In the K sands had an API gravity of 14-15 and the J sands the oil was even heavier. The sands were poorly consolidated, friable with permeabilities ranging from 45 to 6000 md and porosities ranging from 25-36%.

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AWT WORKSCOPE

The overall objective of this study was to propose the optimal completion design for the Ande Ande Lumut wells. This involved looking at the following factors:

- Flow assurance issues
- Sand control design
- ESP design
- Completion design
- Well operability and intervention plan

The study comprised of five stages:

- Review of all data required to make completion recommendations
- Sand control selection and design
- ESP design and conveyance method feasibility study
- Flow assurance review
- Final completion design including completion schedules and budgetary costing

AWT ADDED VALUE

- Oil-water separation was expected to be a major Issue due to the formation of emulsions. Therefore, downhole Injection of demulsifier was recommended.
- Three different ESP deployment options were considered; wireline, tubing and coiled tubing deployed ESP's. The assessment indicated a significant life cycle cost benefit by using coiled tubing to deploy the ESP's.
- The completion design for the AAL wells comprises three major sections:
    - Upper completion (7" tubing, ESP assembly), Lower completion (4-1/2" tubing, PBR, circulation and barrier valves, packer) and sand-face completion (Premium screens, gravel pack with beta breaker valve technology to prevent formation breakdown and early screen-out.
- Gravel packing with water pack was selected as the lowest cost option. The estimated cost for the shunt packing technique was more than one million USD more expensive.
- The cost and time estimate for a generic AAL completion was USD11.1 million (including 10% contingency) at an estimated total completion time of 10.4 days.