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Full Field Development With Open Hole Concept at SUDP-A

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Abstract

Sumandak Area Integrated Field Development Project comprises of 2 phases, which includes Sumandak Main, Sumandak Tengah, Sumandak Selatan, Sumandak Tepi and Sumandak Ujong. Sumandak Main field development is considered as Phase 1 of the total Sumandak Area development. Figure A-1 shows the location of Sumandak Field Development area within Samarang – Asam Paya blocks in Sarawak region, east of Malaysia. A 28 slots four-legged platform, Sumandak-A (SUDP-A) platform was successfully installed at location on October 2006. SUDP-A field development project has opted for open hole completion for all of the 21 wells. This completion system was deployed to 14 oil producers (OP), 2 water injectors (WI) , 1 gas well and 4 combination wells of OP and WI. With the advancement of technology, the drilling team decided to use open hole completion with wire wrapped screen (WWS) for sand control and swell packer for zonal isolation. With this type of sand control and completion, operation such as running and cementing production casing, scraper run and perforation can be eliminated. In addition, significant rig time savings due to simple rig operations and direct tool cost savings make this technology viable and attractive. Open hole completion has its own risks and challenges that require detail consideration beforehand and with sheer determination, the project team has managed to calculate the risks and came up with proper solution and recommendation. Full field development with open hole concept in Sumandak Main development Project is considered another milestone achievement by Petronas Carigali Sdn Bhd (PCSB). This paper precisely discusses all the strategies and steps taken to ensure that this concept can be successfully carried out by the project team, and also lessons learnt throughout the operation at SUDP-A platform.

Introduction

SUDP-A Development area has unconsolidated production section, low productivity indexes with low critical drawdown; thus a full scale evaluation was done to justify the usage of open hole completion for the entire project. The concept was introduced in the development of SUDP-A in order to improve the productivity index of the wells, which leads to better oil production rates besides having lower CAPEX. The concept has been studied to be the optimum technology and innovation solutions to overcome low reserve wells assigned to Sumandak fields. The main objective of the completion design is to provide a safe and cost effective design for all producers while maintaining well integrity and maximizing recovery over its life cycle. It was also designed with simpler well intervention and re-completion work to be done in the future. Some of the analysis that was carried out includes sand failure analysis, risk region analysis, sand production, multiple zone completion on stacked reservoir analysis, sand screen retention and open hole zonal isolation analysis. All combined analysis led to the successful deployment of the concept with realization in time and overall cost savings.

Sand Control Requirement

Sand control requirement for all development wells in Sumandak area was studied. Topics on determining the sand failure tendency, factors that affect the sand control system selection up to proposal of sand control designs are presented below.

Sand Failure Tendency Study

Sand failure tendency study was conducted in house with analysis on compressional sonic transit time, t_c, geological description of the core samples, regional experience in sand production, calculation of mechanical properties of the sand bodies via MPL (Schlumberger) and CME methods and worldwide experience on sand failures from water injectors.

Sonic Transit Time and Depth Relationship

Figure A-2 shows the compressional sonic transit time (t_c) taken from 6 of the exploration/appraisal wells in Sumandak area. The t_c is plotted against true vertical depth (TVD) covering from 1249 to 1510 m TVDS. The wells are representing oil sands from Unit 1.1 down to Unit 9.3. A few conclusions have been made with respect to the plot.