RESERVOIR EVALUATION OF AIR BENAKAT FORMATION IN THE MERUAP FIELD, SOUTH SUMATRA

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ABSTRACT

This paper describes the result of structural modelling and possible reasons for anomalous production decline experienced by several wells in Meruap Field in the northern area of Jambi Sub-Basin, South Sumatra. The Air Benakat Formation (ABF) reservoirs are Middle Miocene age — also known as Lower Palembang Formation. Since 1990, a total of 65 wells have been drilled in Meruap Field. Previous studies on the reservoir were mainly focused on the understanding of depositional setting. Anomalous production in several wells motivated a new study focused on better understanding of the reservoir connectivity.

Complete data sets from nine wells were utilized in this evaluation. Structural modelling was carried out based on high resolution data obtained from eight keys wells, i.e. borehole images and other open-hole and production data. A key stratigraphic facies was modeled based on the integration of borehole image logs and core descriptions. This key facies was then used to correlate stratigraphic units throughout Meruap Field. Structural dip was determined using borehole image data for each of these eight wells, followed by a near well-bore 3D model that was generated using structural dip data and the key facies model. The model result shows segregated divisions within Zone-1 reservoir due to faulting, explaining the anomalous production decline. The trend of fault displacement as observed in the model gives better direction for future development and production planning.

Keywords: Borehole Image, Structural Modeling, Reservoir Evaluation, 3D Modeling, Production Decline.

INTRODUCTION

Meruap Field is located in Sarolangun District in Jambi Province (Figure 1). Geologically, the field is situated in the onshore part of western South Sumatra Basin. The field was developed as an oil-gas field in the early nineties and is currently operated by Samudra Energy Meruap KSO.

The Air Benakat Formation (ABF) reservoirs were described by Ginger (2005) as Middle Miocene shallow marine deposits. The thickness of ABF varies from 100 m to 1100 m, and the formation was deposited during the early stage of the regressive cycle of deposition (Pulunggono, 1986). This formation is widely distributed in South Sumatra Basins.

Historically, Meruap Field has been a prolific oil producer, according to Paramita (2011) oil produced from Meruap was 10.3MMBO. An active drilling and workover campaign from 2008 to 2010 had increased production from 1700 BOPD to 4000 BOPD. However, for unknown reasons total production declined more than through normal pressure depletion. Numerous uncertainties such as facies identification, stratigraphy, faulting framework, sand body geometry on field scale remained unsolved at the time. For instance the production data from Zone-1 reservoir in wells W-2 and W-9 showed unexpected behavior in terms of the current structural model. Well-2, located downdip with relative to W-9 produced oil while W-9 was producing water (Figure 2).

Unexplained production decline and uncertainties in reservoir connectivity motivated the current study to reassess the structural field model and explain the production behavior. The study began with data integration followed by interpretation to generate 3D near well model by utilizing the structural dip from individual wells.

Data

This study is based on the data from nine wells W-1 thru W-9. Interpreted dips from high-resolution