Correctly landing and drilling highly deviated wells in thin reservoirs can be challenging. In recent years, development of the Belida Field in the West Natuna Basins has focused on the Gamma 1B which is a thin (8-10 ft.) thick sand within the Upper Miocene Arang Formation. In order to economically exploit this thin interval, it was determined that horizontal wells were required. These wells needed to be carefully planned and used detailed petrophysical modeling and geosteering techniques in order to land them in the optimal location on the structure and to stay within the zone during the horizontal section.

The well data in the field shows that there is uncertainty in the depth to the top and continuity of Gamma 1B. This uncertainty makes it very difficult to predict the penetration point of the Gamma 1B. To mitigate these risks, the well was planned near existing well control. The next challenge was staying within zone during drilling. This challenge was mitigated by using resistivity modeling in combination with a geosteering tool. Resistivity modeling shows that the resistivity profile consists of a sharp base and a fining upward top. This resistivity information could be combined with a geosteering tool during the drilling of the horizontal section of the well to determine the location of the bit within the reservoir interval. This modelling and implementation of the geosteering tool made it possible to drill 1018‘ of section entirely within the 10 foot gas-bearing reservoir interval without exiting the top or the base.

Drilling highly deviated wells in thin reservoirs can be very challenging. In the case of the Gamma 1B sand in the Belida Field, using a combination of offset well data, resistivity modeling and geosteering proved to be an effective method to successfully drill a horizontal well in this interval.

Keywords: Belida Field, Gamma 1B, Horizontal drilling, Geosteering, Petrophysical Modeling

INTRODUCTION

The Belida structure is a low relief 3-way structure, which is bounded to the South by an East-West trending reverse fault. The structure formed as a result of structural inversion of a half-graben during Early Miocene regional compression. The sedimentary section that overlies the Cretaceous granitic basement ranges in age from Oligocene to Holocene. Both oil and gas bearing reservoirs are present in the Belida field in the Miocene Arang, Udang and Intra Barat Formations. The focus of this study is on gas bearing sands in the middle part of the Arang Formation.

Within the middle Arang Formation, there are three gas pay zones informally referred to as Beta, Gamma and Delta. (Figure 2). These three intervals are interpreted to have been deposited in a tidally influenced near-shore deltaic to fluvial setting. Based on well correlation and wireline log data, the Delta zone is laterally continuous, while the Gamma and Beta zones appear to restricted lenticular bodies in the field. Based on the seismic data, the field appears to be a simple structural trap but well correlation of the Beta, Gamma and Delta zones