Success Story of Sub-Thrust Fault Play from New Era Exploration Phase in Sanga Sanga Area, Kutai Basin, East Kalimantan, Indonesia

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Abstract

Sanga Sanga Working Area has been producing hydrocarbons for more than 50 years with cumulative production up to 12 TCF gas and 370 MM barrels of oil. More than 1000 wells have been drilled and therefore causing the depletion of reservoir pressure, resulting in production decline of existing fields. In 2018, the operatorship has been awarded to PT. PERTAMINA together with 4 exploration wells as firm commitment to Government of Indonesia. To address this challenge two out of for exploration wells are sub-thrust play as opener for sustainability.

In Onshore Kutai Basin Area, a sub-thrust fault play is expected to be the combination of fault that was formed due to delta inversion during Miocene to Pliocene with a possibility of sand into shale facies juxtaposition as lateral seal. As for the reservoir, is a combination of multi-story channels and bars deposit with intra-formational seal as its vertical cap rock, while the source rocks are combinations of coals and shales with several organic shales.

Within this area, several previous drilling activities specifically targeting this sub-thrust play had resulted in dry wells without any hydrocarbon accumulation. Therefore, this paper proposes a combination of multi-analysis methods to unveil the sub-thrust fault play. A combination of semi-regional massive static models controlled by more than 1000 wells, faults and seal analysis, geochemistry and basin modelling, seismic CWT, and surface geochemistry analysis was performed during the project. All methods were integrated to pinpoint the new sweet spot of sub-thrust fault play that previously overlooked.

Finally, drilling activity was carried out and resulting in a discovery of hydrocarbon accumulation with very promising result gas discovery and oil indication, thus proving the sub-thrust fault play is working in this area. Combination of those methods provides a positive sign and will demonstrate the possibility of unveiling other similar sub thrust fault plays within Kutai Basin, and may provide insight for other basins by combining effective and reliable methods to detect sub-thrust fault play.