Re-define Basement Configuration of E-15 Graben and Its Impact to New Petroleum System Play in Offshore North West Java Basin

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ABSTRACT

Offshore North West Java (ONWJ) is a mature area; it has been explored and exploited for almost 49 years. All large conventional prospects that target the Parigi, Main, Massive, Baturaja and Talang Akar formations have been drilled and produced. New concepts and ideas are therefore needed to find new resources in ONWJ, especially in Pre-Talang Akar Formation (Pre-TAF) and Basement.

This study focuses in E-15 graben since it was not recognized as a prolific hydrocarbon kitchen, because the previous interpretation suggested that top basement at 2,500 ms. In 2015, ONWJ has re-classified the definition of basement, several wells have not penetrated the real geological basement, and this conclusion may also lead to the new interpretation that the top basement horizon is deeper than estimated before (Aveliansyah, 2016). As a consequence, the E-15 Graben area is suspected as being a new matured sub-basin in ONWJ.

The objective studies are to re-map E-15 graben area with new basement interpretation, and determined the possibility of Pre-Talang Akar Formation (Pre-TAF) occurrence as the new prolific source rock in E-15 graben. Among 45 exploration wells drilled in the E-15 graben area reached the basement, and 17 of them has hydrocarbons indication. The wells data have combined with 3D and 2D regional seismic data, rock geochemistry analysis and 1D Basin Modeling in order to define the Pre-TAF source rock quality in E-15 Graben.

The study result shown that the top geological basement interpretation of E-15 graben is around 3,000 ms, it is 500 ms deeper than estimated before, as consequence E-15 Graben area could be a new matured sub-basin in Eastern Part of ONWJ. The geochemistry analysis of FWO-1 contains very good organic richness, low Hydrogen Indices indicate the presence of limited gas prone kerogen (Type III/IV), and vitrinite reflectance values range from 2.26 % to 2.33 % suggesting the existence of post mature sediments. All analysis concluded that E-15 graben is the new hydrocarbon kitchen which has generated gas and directly charges the hydrocarbon into the Basement and Pre-TAF reservoir. It is reinforced by the gas presence in Pre-TAF and Basement of UQO-1, FZO-1, HO-1, EAO-1, and EBO-1 wells.

This conclusion made the E-15 graben more attractive to be reviewed, and become a new hidden potential area in ONWJ. The GnG study has found 4 prospects and 5 Leads targeting Pre-TAF and Basement play, with total recoverable resources 180 MMBOE.