

## Realizing Potential in The Overlooked Reservoir in Mature Krisna Field

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### ABSTRACT

Southeast Sumatra Block has a long history of petroleum exploration and production going back to 1970 with the discovery of Cinta field in Sunda Basin. Since then, over 35 oil and gas fields have been discovered including six “giant fields”, one of them is Krisna field. The main oil producer in Krisna field is carbonate Baturaja reservoir, with low potential indication of clastic Talang Akar and Air Benakat reservoir that produce oil only from one well.

The Krisna member sandstone of the Air Benakat Formation has been considered as the shallowest potential reservoir within the Sunda Basin. All this time Air Benakat sandstone is not considered as potential reservoir in Sunda Basin, as the Gumai shale is believed to be a regional seal in the Sunda Basin petroleum system. The Talang Akar and Baturaja reservoirs are the most oil productive within the Sunda Basin. Although the Air Benakat sandstone may have thickness about 200 feet, the reservoir quality is relatively poor since the average water saturation is above 68%.

Krisna Sand was first encountered in Krisna field since Krisna-01 exploration well was drilled on January 1976. After that a large number of wells in Krisna field have penetrated the sandstone, however only a few wells encountered significant oil shows. Combined studies of geochemical and hydrocarbon accumulation model indicate that sediments stratigraphically equivalent to the Krisna Sand are generally too immature to generate hydrocarbons, and the potential hydrocarbon accumulation in the Krisna sandstone reservoir particularly in fault-sourced traps. Oil to source rock correlations provides evidence that oil accumulated in the Krisna Sand was sourced from Talang Akar and Banuwati shales. This evidence implies that vertical migration seems to play a very important role in the trapping mechanism, and fault is the only prominent vertical pathway that can connect oil-bearing structures with a deeply buried source rock within the Sunda Basin.

Krisna Sand reservoir was produced since 1998 from one well producer with good productivity. The initial production was 462 BOPD with 23% water cut. The initial reservoir pressure is 2,209 psi. After producing almost 20 years with the cumulative oil production 270 MBO from 1 well, current reservoir pressure become 1,400 psi. Currently, Krisna Sand produces with high water cut (95%) and good fluid production (1,000 BFPD). Calculated OOIP of Krisna Sand is 4,395 MBO with Recovery Factor is only about 6.1%. With this condition, the production of Krisna Sand still has potential to be improved by adding the number of well production.

This paper is intended to discuss better understanding of possible trapping mechanism and thus, it will explain the potential hydrocarbon and reservoir distribution in the Krisna Sand. As the shallowest potential reservoir, Krisna Sand has the best chance to have any oil accumulated that might have migrate upward through or around the Gumai seal. Further research and advanced study provides a better understanding of the

geological framework along with the reservoir characterization, and might lead into a better evaluation of the hydrocarbon prospects. It is not impossible that Air Benakat Formation can be a new potential reservoir in Sunda Basin.