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ABSTRACT

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Exploration Geology of the Sebuku Block Offshore Kalimantan, Indonesia

The Sebuku Block lies on the Paternoster Platform, a regional high south of the Adang-Paternoster Fault Zone that separates the Kutei Basin from the East Java Basin to the south. The block lies in water depths that range from 50 to 3000 feet but averages about 200 feet over the more prospective areas. This block is located 274 km south east of Balikpapan and 70 km east of the industrial development triangle on Pulau Laut.

The play concepts in the Sebuku Block area rest on the recognition that the Makassar Graben is a hydrocarbon kitchen containing source rocks of Eocene age. Source rocks have been proved to be present within the Eocene Lower Tanjung lacustrine shales and fluvio-deltaic shales and coals. Biostratigraphic analysis in the lacustrine shale indicates predominantly amorphous organic material and significant occurrences of fresh water algae (*Pediastrum* spp and *Botrycoccus* spp). This lacustrine shale has TOC of 4% to 6% and exhibits HI ranging from 294 to 456 that suggests mainly oil prone kerogen type II. In the fluvio-deltaic shale section has TOC ranging from 0.74% to 2.54% and exhibits low HI ranging from 121 to 148 which suggests moderate source potential to generate primarily gas. However, the coal section has TOC ranging from 20% to 43% and exhibits moderate HI range from 181 to 293 which suggests mainly gas prone but some marginal oil prone kerogen.

Offshore Basin Screening (OBS) has also been conducted which indicates natural hydrocarbon seepage in the Sebuku Block. The nature of the slicks suggests a greater likelihood that these seepage slicks are derived from leaking gas-condensate or light oil traps, rather than from a black oil source. Of particular interests are those that lie above the basin margin and within the graben which helps confirm the widespread existence of a working Eocene source and an extensive petroleum system in the Makassar Graben along with the discovered hydrocarbons in the Makassar Straits-1 (gas) and Pangkat-1 (oil) structures.

The principal reservoir rock in the Paternoster Platform so far is the Berai Carbonate that has been proven to contain and flow gas by Makassar Straits-1. This carbonate is a basinal type of carbonate. Fractured basement has also tested oil at Pangkat-1. However, there are also large reefal build-ups both within the Berai and Upper Warukin Formations that form attractive exploration targets as well as clastic

reservoirs of the Lower Tanjung Formation within the Makassar graben system of the Sebuk Block.