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Geology of Kinabalu field and its water injection scheme

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This paper will discuss the geology and development of the L reservoir unit in the Kinabalu field, Sabah and includes the discussion on the innovative water injection scheme being implemented for pressure maintenance to sustain oil production.

Kinabalu field, situated 55 km west-north-west of Labuan Island was discovered in 1989 by KN-1 well with a total pay counts of 1,043 ft NOS, 113 ft NGS and 310 ft NHS. The field contains 519 MMstb oil-in-place, developed in 1997 and to date some 45 million barrels had been produced. The gas and oil are transported by pipelines through Samarang facilities and then onwards to Labuan Crude Oil Terminal for storage and export. The major producing reservoirs in the Kinabalu field are K and L units trapping hydrocarbons against the Kinabalu growth fault.

The intercalated sands and shales of L reservoirs were deposited in a shallow marine environment during Middle Miocene time. Production performance and a very fast pressure drop in these reservoirs suggested very limited to no water-drive. Several options were investigated to provide pressure support to this major oil reservoir, including injecting sea-water scheme and dumping of shallower formation water. In the Kinabalu field, water is produced from the shallower sand bodies (B & C-Sands) and injected into the L reservoir unit through two horizontal wells. To date a natural dumping rates up to 1,200 barrels per day are experienced in these wells and electric submersible pumps (ESP) will be installed soon to increase the injection rate up to 20,000 barrels per day. Some 16 million barrels oil will be realized from this pressure maintenance scheme thus adding some 2,000 to 4,000 barrels oil per day to the Kinabalu field production.

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