GEOLOGY PAPER 8

THE ONSHORE TO OFFSHORE DENT GROUP, EASTERN SABAH FROM SEQUENCE STRATIGRAPHIC PERSPECTIVE: IMPLICATION TO PETROLEUM EXPLORATION

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The prospective Sandakan sub-basin has been less explored even though some oil and gas discoveries has been made in addition to the numerous thermogenic gas show encountered in most of the exploration wells in the offshore Eastern Sabah. The gas and condensate was tested with flow rate as high as 15mmcfg and 500 bc/d in one of the wells, however the discovery of commercial size has yet to be made. The probable reason for this lack of success is insufficient seal integrity due to very high percentages of sand vs. shale.

Field observation of the Dent Group outcropping in Dent Peninsula shows the occurrence of thick shale belonging to Sebahat Formation, the equivalent to the main reservoirs in the offshore. This formation together with younger Ganduman and Togopi Formations are collectively known as the Dent Group of Middle Mioecene to Pleistocene. The Group consists of post-rift sedimentary packages, overlying the older syn-rift Segama Group. It consists of fluviodeltaic to marine sediments, characterized by strong southeastward progradation into the offshore area.

The onshore to the offshore correlation of the Dent Group is achieved through application of sequence stratigraphy. The group can be divided into 2 mega-sequences that consist of several higher order composite sequences, namely Composite-Sequence 1 and 2. The older Composite-Sequence 1, consists of lithological units that has been described as Sebahat and Ganduman formations, while the younger, Composite-Sequence 2 consists of the Togopi Formation.

The occurrences and distribution of the lithofacies of the Dent Group can be explained through subdivision of the sequence into composite systems tracts. The lowstand sequence set of Composite-Sequence 1 mostly sub-cropping in the offshore area, while the Sebahat Formation in the onshore represents the transgressive sequence set. The Ganduman Formation is interpreted as the highstand sequence set of the sequence.

The transgressive Sebahat Formation offers a new look for its sealing capacity as well as reservoir potentials. The thick Sebahat shale outcropping on the Dent Peninsula is occurring in the offshore as well, and potentially sealing. On the offshore seismic sections, this shale is observed overlying the transgressive carbonate and thick lowstand sequence set of Composite-Sequence 1, which contain good reservoir facies. The facies of the lowstand sequence set is interpreted to consist of turbidites forming the fan-system and stacks of shoreface deposits forming the lowstand set of prograding wedges.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 37, No. 1, January-March 2011