

The Malay Basin — play types of the past, present and future

TAN, BEE HOON

Amerada Hess (M) Ltd.
Suite 9.02, Level 9, Menara Tan & Tan
207, Jalan Tun Razak
50400 Kuala Lumpur

The Malay Basin, located along northeastern part offshore of Peninsular Malaysia, is one of the several hydrocarbon bearing Tertiary Basins discovered in Southeast Asia. Many of the simple anticlinal fields have now been discovered and exploration is starting to concentrate on subtle and/or stratigraphic traps, where the various trap styles become the critical factor on the success of a play.

Hydrocarbons were first proven in the Malay Basin in the early 60's and the first commercial oil discovery was made in 1969 through Tapis-1. The Tapis Field is located in the southeast depocenter of the basin. The field is a simple large inverted anticlinal trap. Following the discovery, other similar inversion features were targeted and a few more major fields such as Bekok and Seligi southeast of Tapis were discovered. A study of 20 fields drilled on the inversion structures indicates that most of these fields are large with a mean field size of

approximately 300 MMBOE. In addition, 17 of the fields studied resulted commercial discoveries while the other 3 were sub-commercial, indicating that drilling on the simple inverted anticline has a low commercial risk. The result of this phase of exploration was that the cumulative hydrocarbon reserves in Malay Basin increased from about 1270 MMBOE in 1969 to 3500 MMBOE in 1972 (Fig. 1).

By the late 1970's and early 1980's, more complex inversion features were drilled with improved 2D seismic resolution, resulting in the discovery of a few large, more structurally complex fields such as Guntong, Tabu and Liang. 37 fields drilled on the faulted structures were studied and 26 or 65% of the fields were found to be commercial. The mean reserve of this trap type is lower, approximately 110 MMBOE, compared to the simple anticlinal traps. The relatively lower reserves of the play is most likely due to limited fault seal which had confined the hydrocarbon column. Despite of the faulted anticlines, fault dependent closures and basement drapes were also the exploration targets throughout late 1970s to 1990s but contribute to a much smaller total reserves (mean value ranges from 30 to 50 MMBOE each). Figure 1 shows the cumulative reserves through time from the beginning of the hydrocarbon exploration in the Malay Basin to recent. Figure 2 summarizes the number of wells drilled on various main trap types through time.

As fewer and fewer undrilled anticline structures were found in the Malay Basin, companies have started to look for new play types. Throughout the 1990's a handful wells have been drilled for pure stratigraphic traps. Most of these early wells were drilled on 2D seismic data where the trap/reservoir was not well understood. In the last few years companies have started to acquire 3D surveys which are permitting the better imaging of stratigraphic traps in areas where they had not previously been identified. The first quality 3D seismic surveys in the mid-late 1980's permitted the identification and exploration of more subtle features such as separate compartments and channels. More recently companies have acquired 3D seismic surveys as an exploration tool. These have been shot prior to any discovery to look for new play types/concepts (Fig. 3). Such surveys are currently being acquired in the Malay Basin.

The exploration history of the Malay Basin has spanned now 3 decades. Stratigraphic traps both within the basin and on its flanks, away from existing discoveries, may well sustain exploration for decades to come (Fig. 4).