Paper 15

Discriminating hydrocarbons and lithology with seismic data in the Cakerawala Field, Malaysia-Thailand Joint Development Area (MTJDA), Block A18

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The Cakerawala field is located in the Malaysia-Thailand Joint Development Area (MTJDA), Block A18 approximately 150 km off the East coast of Peninsular Malaysia (Fig. 1). As is the case in many other gas fields in the Gulf of Thailand, seismic amplitude anomalies provide a highly effective means of finding hydrocarbons in Block A18. Since 1995, sixteen successful

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wells have been drilled in the block. In all cases the primary tool for identifying drillable targets has been the presence of seismic amplitude anomalies that have conformed to structure.

For the Cakerawala field development program the use of 3D seismic data has been extended beyond simple mapping of "bright spots" to include the full range of seismic analysis on multiple sub-volumes that is becoming the norm in our industry. Proper integration of well data and incorporation of the depositional model through the use of facies analysis at the well locations and the use of time slices and horizon slices between the wells forms the basis of this approach (Fig. 2). The seismic data provide both the structural framework for the reservoir model and the measurements of reservoir quality that have been tied to amplitude variations and to indicators of the depositional environment such as the horizon slices. In addition, seismic amplitude and estimates of acoustic impedance derived from seismic are used in a visualization environment to select the development drilling targets (Fig. 3). Geostatistical approaches that take account of the uncertainties in the relationships between seismic measurements and lithology and between lithology and both porosity and permeability are also incorporated in the methodology (Fig. 4).

Despite the success experienced with 3D seismic data, a number of significant challenges remain. In particular, success is hampered by the ubiquitous presence of shallow gas, by the limitations imposed by the resolution of the seismic data and by the presence of numerous thin coal beds that produce "false-positive" direct hydrocarbon indicator (DHI) responses.