Identifying and evaluating producing horizons in fractured basement

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This paper will describe the results of development drilling to date in the basement reservoir of the Ruby Field in the Mekong Basin, Offshore Vietnam.

The results of joint research on the Ruby discovery wells and onshore basement exposures (Peter M. Tandom *et al.*, 1997) were used to develop an interpretation model for the fractured and weathered granite reservoir. This model has proven very robust, and has now been further enhanced by applying more quantitative formation evaluation techniques to determine fracture aperture and porosity. Various acquisition techniques and computation algorithms have been tested to come up with an optimized (single trip in the hole) logging program; giving consistent results compared with core analysis and production data.

Having developed a geological model for the field, and carefully matched well data with reprocessed 3D seismic, it has been possible to identify faults and fracture zones across the field. Fracture zones can be recognized by their lower acoustic impedance, and by the generation of characteristic diffraction patterns. These effects are often quite subtle, however, but with the help of Coherence Cube techniques, and after detailed comparison with the fracture properties where we have well control, we feel that not only faults, but also zones of fracturing can be identified with some confidence.

Directional wells drilled towards the NE and SW (perpendicular to the direction of maximum horizontal geostress), and penetrating sections where there is evidence of both faulting and fracturing on the seismic, have indeed proven to be the best producers.

It is now possible to predict with some certainty the most prospective hydrocarbon

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 25, No. 6, November-December 1999

bearing intervals, and work is currently being focused on the estimation of likely production rates. Failure to meet the expected well deliverables provides a criteria for identifying candidates for stimulation. These techniques will also be reviewed.

As more wells are drilled, it has become possible to better correlate and map the producing horizons. This clearly allows better planning of the location of future wells, and the thickness of the reservoir section which needs to be penetrated, so optimizing field economics.