

Paper 4

A quantitative study of the seismic time-amplitude reflection characteristics in an oil field

NG TONG SAN¹, IDRUS MOHD. SHUHUD² & LEONG LAP SAU³
¹PETRONAS Carigali Sdn. Bhd.

Wisma Peladang, Jalan Bukit Bintang
 P.O. Box 12407

50776 Kuala Lumpur

²PETRONAS Petroleum Research Institute

Lot 1026, PKNS Industrial Estate

54200 Hulu Klang, Selangor

³School of Physics

Universiti Sains Malaysia

11800 Penang

The seismic time-amplitude reflection characteristics of selected sandstone horizons in a recently developed oil field are examined for effects of thicknesses, continuity and bed quality. This study uses an integrated approach of well data calibration, forward seismic modelling and 3D seismic data set for interpretation.

In this area, wireline logs indicate velocity to be a poor lithologic descriptor. The acoustic impedance at sand-shale interfaces could be accounted for by changes in the density instead. Gassman's equation confirms the minor effect of velocity perturbation with gas. Forward amplitude modelling 1D for sandstone encased in shale in the selected stratigraphic horizons permit values of tuning thicknesses to be ascertained for each lithologic unit. This learning phase quantizes subsequent reflection parameters and aids 3D seismic interpretation.

Preliminary results suggest an east-west trending sandstone reservoir with thicker and better developed sandstone horizons towards the flanks of the anticlinal structure.

Nov-Dec 1993