INTRODUCTION

An amplitude anomaly is present on the seismic data over the Pipipa Deep Prospect within the top mid M.diversus - base lower M.diversus palynological zones (Pelican Zone). It lies between 1.8 and 2.0 seconds two-way time on the seismic data, and has an areal extent of up to 30 square kilometres (Figure 1). Seismic line TNK4-79, shown on the montage of Enclosure 1, is a dip line through the proposed Pipipa Deep well location. The anomaly is readily identifiable between shotpoints 720-920: a horizontal distance of 6,000 metres, and it has a vertical relief of over 300 metres.

The aim of the seismic modelling project was to introduce gas into a sand sequence within the Pelican Zone predicted to have a lithology distribution similar to that encountered in the Pelican 5 well, and see if the observed characteristics of the anomaly could be reproduced by modelling.

MODELLING PROGRAM

The modelling program available at SAGASCO Resources is part of an integrated seismic data management and processing system based on a suite of programs supplied by Sattlegger Ingenieurburo Fur Angewandte Geophysik. It is a two-dimensional modelling program simulating a Huygens-Fresnel approximation to an upgoing wave field. Ray fans emitted from closely spaced points along the interfaces in the depth domain are traced upwards in order to obtain diffraction travel time curves. The amplitudes of each diffraction curve depend on the reflection coefficients at the point sources. Additionally, a geometric correction is applied to the amplitudes in order to take focussing or defocussing of reflection energy into account. The resulting spike trace file is filtered with a minimum phase wavelet to produce the synthetic time section.

MODEL CONSTRUCTION

The depth model is shown on the montage (Enclosure 1), and was constructed using the dip line TNK4-79 to define structure and relief. The velocity boundaries of the depth model are based on those defined for the Pelican Zone of the Pelican 5 well, where a generalised lithology model was used. The major velocity boundaries, such as those associated with coals, were maintained, while other intervals that are relatively indistinguishable by velocity were combined together, and an average velocity function applied. The velocity and density information was taken directly from the Pelican 5 well logs.

The effect of changing the fluid content of a sandstone reservoir from water to gas will reduce the interval velocity by 15-20%. The velocity of the water-saturated sands was taken from the Pelican 5 logs to be 3950 m/sec, and the gas-sand velocity was calculated to be approximately 3300 m/sec. Note that if the sands were oil filled, then a corresponding increase of approximately 6 porosity units would be required to reduce the interval velocity of the reservoir by 15% (Schlumberger Chart Book, 1989).