WANDERIE ROAD AREA
HYDROGEOPHYSICAL

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1. INTRODUCTION

During the period 17 to 19 March 1987, a small seismic refraction survey was completed on Mr L Ah Toy's property at the intersection of Pioneer and Wanderrie Roads.

During the three days of field activities a crew comprising two geophysicists and two filed assistants completed approximately 4.3 line km of continuous seismic refraction profiling.

The present work was aimed at outlining favourable locations for the siting of water bores required for agricultural development in the area.

2. GEOLOGY

The basement geology of the area is known to comprise massive dolomite and dolomitic schists of the early Proterozoic Coomalie Dolomite. These rocks are unconformably overlain by a variable cover of claystones and sandstones of the early cretaceous Darwin Member (Bathurst Island Formation). A strongly developed laterite profile is typically present in the upper three to four metres of these latter lithologies.

3. INSTRUMENTATION AND PROCEDURES

The present survey employed two EG&G Geometrics GS-1225 seismographs configured as a single 24 channel recording system. Standard reciprocal cables used along with normal low frequency refraction geophones.

A geophone spacing of .5 metres was used throughout the survey resulting in a total spread length of 360
metres. This was employed in a continuous profiling technique involving a half spread (12 channel) overlap between successive spreads.

Records were taken with a single shot of AN60 gelignite at a depth of between two and three metres in predrilled shot holes. Typically 30 sticks were required for end shots while 20 sticks were used for centre shots. Shots were initiated with a single instantaneous submarine detonator fired by a Geometrics HVB-1 blaster.

4. RESULTS

The travel time data acquired on the present survey was interpreted by Hawkins' reciprocal technique. The results are presented as depth sections on Sheet 1.

The data are adequately explained by three layers. In order of increasing depth and velocity these are:

Layer 1: A relatively thin surface cover showing variable velocities in the range 500 to 1200 metres/second. This layer correlates with the upper aerated zone of the geological section comprising unconsolidated sands, clays and laterite.

Layer 2: An intermediate layer with velocities in the range 1800 to 2500 metres/second. This layer appear to reflect saturated and consolidated cretaceous sediments as well as weathered (low velocity) section of the underlying proterozoic lithologies.
Layer 3: A basement layer showing variable velocities in excess of 3000 metres/second. This layer correlates with Proterozoic rocks of the Coomalie Dolomite. The observed variations in velocity probably reflect lithology changes and/or weathering effects. High velocities are compatible with massive dolomite. Large zones of lower velocities probably indicate a change to interbedded dolomitic schists while more local decreases in velocity arguably reflect weathering effects.

Depths derived by the present interpretation scheme have been plotted directly below the geophones and not treated as the normal distances to the refractor surface. Consequently the plotted refractors appear misleadingly irregular. Additionally with the recent scheme the velocity analysis process can produce spurious velocity changes in the vicinity of local undulations in the refractor surface.

Due to the lack of adequate coverage of the main refractor at the end of traverses time depths were obtained by the normal technique of assuming a constant velocity in these locations. In one location in particular there is some evidence that this may be inappropriate. Between shot points 1 and 2 on line 3 it is likely that the shelving basement depths on sheet 1 are inappropriate and that an increase in basement velocity to the west at constant depth is a more likely model. Evidence of this is provided by a previous seismic traverse in the area.