## 5.2   Stacking Velocity

The only possible control on variations of the velocity field away from the Yolla 1 well, is the information contained in the stacking velocity data determined during processing.

The post-DMO stacking velocities, calculated at 1000 metre intervals, were loaded into the mapping system.   The velocity data were extracted at the relevant interpreted seismic levels, and then converted, using the DIX equation, to a pseudo-derived Average Velocity.   These were used to create an average velocity grid of data, as displayed in Drawing numbers 13838, 13859 and 13867 of Appendix 1. These grids of average velocity were then combined with the appropriate time maps to produce maps in depth.

The limitations with this method involve the presence of the shallow Miocene volcanics, and how they cause distortion of the hyperbolic move-out on the gathers, and hence in the NMO equation.

The acquisition direction for the swathe of in-lines either side of Yolla 1, was northeast. As the seismic boat, and hence the front part of the spread approaches the zone of high velocity volcanic material, the seismic waves travelling through the volcanics, produce distorted gathers. The stacking velocities are incorrectly chosen to overcompensate for this distortion.   The resulting velocity field is typified by "bulls eyes" of high-low-high velocity, as illustrated in Figure 26.

This technique is therefore applicable in areas away from the Miocene volcanic material, but likely produces unreal depth results in the Yolla 1 and in particular the Yolla North fault compartments.

## 5.3   Interval Velocity Model

The depth conversion technique most favoured here is that using interval velocities. The well derived interval velocities, as shown in Table 4, are combined with the interpreted seismic time thicknesses which are then summed to produce the depth data.   A model was also developed to predict the velocity of the Miocene volcanics interval.

As illustrated in Figure 27, a replacement velocity was determined for the volcanics interval at specific points, based on the observed push down or pull up affect, and the thickness of the extrusive material. This technique produced a complex velocity field, as shown in Figure 28, with individual volcanoes exhibiting both fast and slow velocity characteristics.

These results were independently confirmed by inspection of several pre-stack depth migrations.  The volcanics interval for in-line 535 was depth migrated using a range of constant velocities between 2200 and 2900 m/sec. A visual inspection of the stack response identified the areas, and at which velocity the stack was best. This resulted in a velocity profile very similar to that determined above, as shown in Figure 29, and confirms that the individual volcanic piles can vary sufficiently in character to produce both fast and slow velocity affects.