INLAND PENETRATION OF CYCLONE ORSON

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1. INTRODUCTION

When preparing the design wind speed data for AS1170.2-1989 it was recognised that one of the (many) problems which remained unresolved was that of the inland penetration of tropical cyclones or more specifically the decay of wind speeds along the path of a tropical cyclone as it passes over land. In recent times the passage of Cyclone Orson (23.4.89) has provided one of the best examples to study as it was a very significant tropical cyclone event with peak gust wind speeds in excess of 70 ms^{-1}, putting it somewhere around a 100 year event for the NW Cape region.

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2. PROVISION OF AS1170.2-1989

The Australian Standard, Wind Loading Code, AS1170.2-1989 has defined two steps down in tropical cyclone design wind speed from that over the approaching sea and the first 50 km inland to that over the next 50 km and then to the normal Region A for all of inland and non-tropical cyclone Australia. These provided approximately a 15% reduction at each step for all but the NW Cape, Region D. Specifically for the NW Cape the Ultimate Limit State and Permissible Stress wind speed steps are as follows:

	0 = 50 km	50 - 100 km	>100 km
V_u	85 ms^{-1}	70	50
V_p	69	57	41
Ratio	1.0	0.83	0.59

3. The track of the centre of Cyclone Orson was almost due south crossing the coast just west of Karratha then passing within 50 km of Pannawonica and Paraburdoo. This path and the estimates of position, central pressure, and maximum gust wind speed near the centre as given by the WA State Emergency Service are given in Figure 1. These wind speeds as a ratio of the coast crossing value are then shown plotted as a function of distance from the coast and compared with provisions of AS1170.2-1989 in Figure 2.

4. CONCLUSIONS

It can be concluded that the decay of maximum wind speeds in Cyclone Orson as it passed inland was much less than that provided in AS1170.2.-1989. This is primarily because in this region the steps are from Region D to C to A missing out on the intermediate step of Region B. In all other tropical cyclone regions the two 15% steps would have reasonably approximated Cyclone Orson, but on the NW Cape a further intermediate step would be needed.

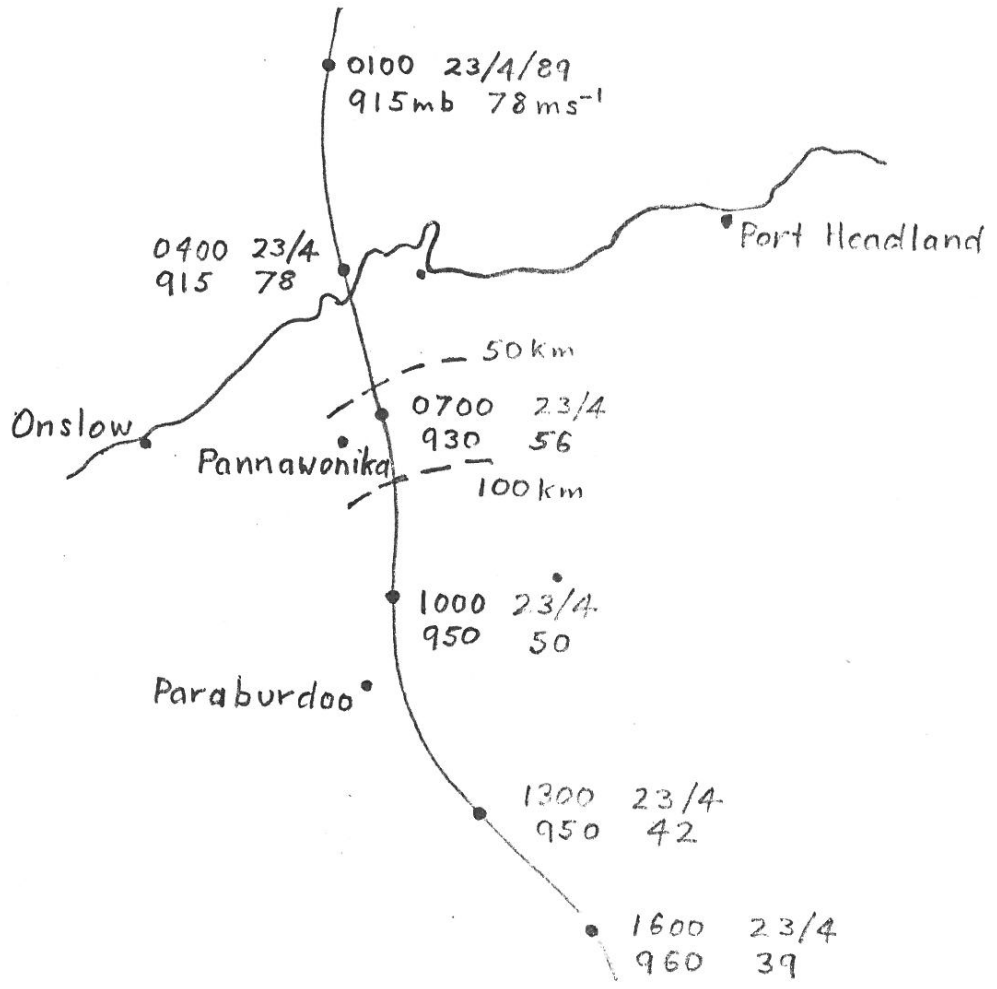

FIG. 1 Track of Cyclone Orson
Time, Date, Central Pressure, Max. Gust Wind Speed

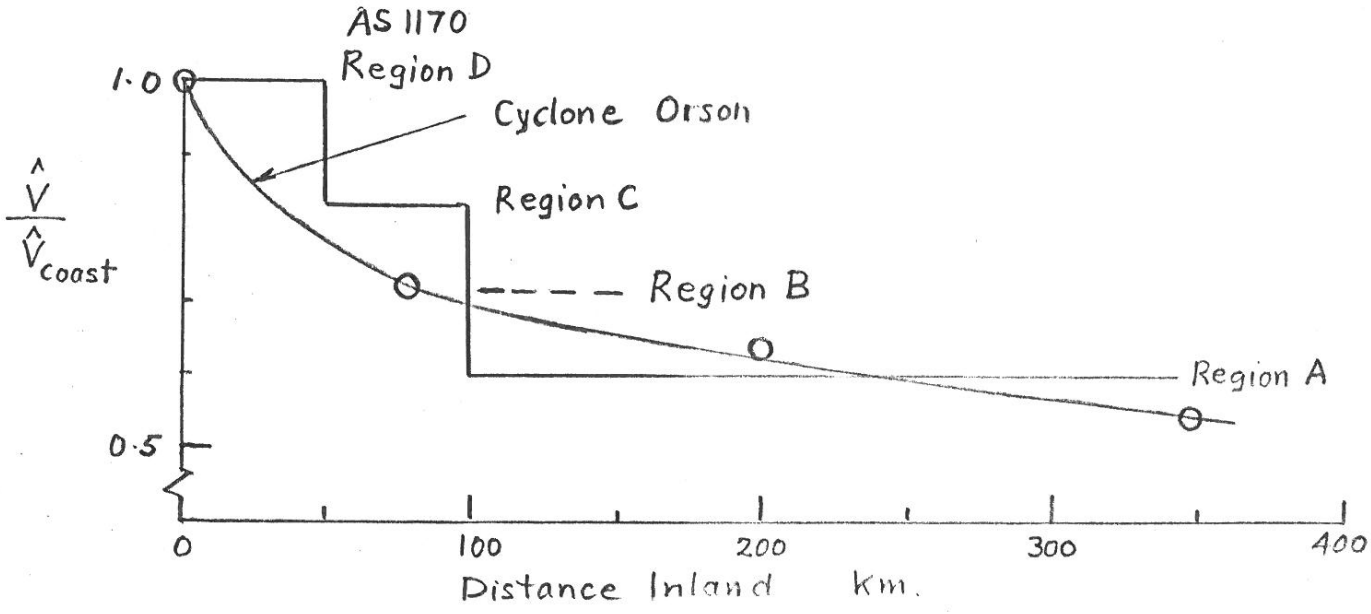

FIG. 2 Decay of max. gust wind speeds in Cyclone Orson after landfall compared with provisions of AS1170.2-1989