SUMMARY

This report deals with the pre-treatment phase of a controlled catchment experiment which was conceived in the mid 1950's and initiated in 1963. The aim of the study is to assess the effects on both water yield and water quality of some forest practices commonly used in the management of mixed species eucalypt forest in Victoria. The Experimental Area is located 105km east of Melbourne near Reefton, and is managed by the Soil Conservation Authority in co-operation with other government agencies. There are six gauged catchments ranging in size from 70.4 to 521.2 ha. The larger catchments have perennial streams whereas streamflow tends to be ephemeral in two of the catchments. The Reefton Experimental Area forms part of the water supply catchment area for Melbourne.

Features of the catchments have been studied in detail. The catchments are underlain by Lower Devonian sediments consisting of sandstone, siltstone and claystone. Fracturing of these sediments is relatively common. Six major soil types have been identified in the catchments, these being red gradational (wet), brown gradational (wet transitional), yellow brown gradational (dry transitional), yellow brown gradational (dry), organic and gley soils, with the latter type being least common. Some physical properties of hydrologic significance for these soil types are presented.

The Experimental Area ranges in elevation from 380 to 840m. Catchment slopes commonly exceed 30°. The average annual rainfall (20 year period) is around 1300mm. The winter months are wettest when average monthly rainfall usually exceeds 130mm, though at least 50mm of rainfall can be expected for the drier months of summer and autumn. Most of the precipitation is in the form of rain. The hottest month is February with an average temperature of around 18°C, and the coldest month is July when an average temperature of around 7°C can be expected. Average annual pan evaporation is 722mm.

The catchment vegetation is an open forest dominated by mixed species eucalypts. Such forests comprise 38% of the forested catchment area managed by the Melbourne and Metropolitan Board of Works. In some parts of the Experimental Area, there has been considerable change to the vegetation as a result of past logging. The southern catchments contain mixed species of little commercial value such as *Eucalyptus radiata*, *E. dives* and *E. sieberi*. Stand top height increases at higher elevation and on southern aspects where dominant species are *E. cypellocarpa*, *E. obliqua* and *E. regnans*. *E. regnans* regrowth of 1939 origin is relatively common in the northern catchments. The vegetation has been mapped into 12 alliances based on structure and species composition of the overstorey, and a description of each alliance is given together with results of a timber assessment. This assessment revealed that there are a number of dispersed stands in four of the catchments which could be harvested for sawlog and pulpwood.

The catchments are well-instrumented to measure meteorological conditions and runoff. There is an extensive rain gauge network. The weir ponds for the six catchments are in three pairs, and have similar design and construction. The present weir plate configuration can he described as compound plate. Faults in the recording of water level have been the primary cause for the prolonged calibration of the catchments. Grab samples of stream-water have been collected at weekly intervals between 1964 and 1975 and analysed for a number of physical and chemical parameters. Accumulated sediment in each weir pond (bedload) has been measured annually for several years to complement this water quality programme.

Detailed calibration relationships are presented. The rain gauge network is shown to be consistent in time and space. Although individual rain gauges show a local topographic influence, catchment rainfall has been found to be independent of catchment characteristics. Streamflow in the catchments shows a strong seasonal pattern; mean annual runoff varies from 180 to 318mm. Several catchment characteristics related to runoff have been determined which indicate that no catchment is either atypical or exhibits major leakage. Annual runoff between five of the catchments have been found to be highly correlated. The minimum change in annual runoff which can be detected with 95% confidence in the first post-treatment year varies from 16 to 30% according to the treated catchment providing the post-treatment runoff approximates the pre-treatment mean. However, annual runoff data from one catchment has required log-transformation before valid regressions could be obtained. Annual catchment runoff has been found to be highly correlated with April to November rainfall for the smaller catchments, and with 13 months (November-November) rainfall for the larger catchments.

Less precise calibration has been obtained for the water quality data. For the bedload data, inter-catchment correlations of bedload volume are relatively low, and there is no simple relation between bedload volume and annual rainfall parameters which applies to all six catchments. Although inter-catchment correlations of the various water quality parameters are significant, further data analysis is being considered to improve the water quality calibration.

Treatment of three of the catchments is scheduled to commence in the summer of 1983/84, though details are yet to he finalised. It is proposed to subject one catchment to a Fuel Reduction Burn. A rehabilitation treatment is proposed for a second catchment involving a combination of extraction of sawlogs and pulpwood using conventional methods, thinning of regrowth stands by stem injection using an appropriate herbicide, and a simulated sawlog operation on steeper slopes by felling the overstorey using chainsaws with felled trees being left in situ. Appropriate regeneration procedures will follow. A third catchment will be roaded at a similar intensity to that used in the second catchment allowing the effects of roading and logging on water yield and quality to be separated. A fourth catchment will be retained as a control. Treatment proposals for the remaining two catchments will not be finalised until preliminary data are available from these treatments.