Antarctic soils is likely to be low due to the coarse soil textures. The osmotic effect of salts in soils from an older surface in the Dry Valleys was shown to play a major role in determining the soil water potential (Klingler and Vishniac 1988). However, very little investigation has been undertaken into the available water capacity of Antarctic soils.

Summer soil surface temperatures ranging from +18 to -15° C have been reported for short measurement periods for three sites in the Ross Sea region (Campbell *et al.* 1997b), and for a whole year, giving a range from +15 to -34° C, at Marble Point (Balks *et al.* 1995). The main factor affecting the diurnal thermal regime of Antarctic soils in summer is surface albedo (Campbell *et al.* 1997b). It is hypothesised that where fuel spills result in formation of a dark surface coating, thus decreasing the surface albedo, the soil's capacity to absorb heat will be increased.

In this paper we present preliminary data on the moisture and temperature regimes of hydrocarbon-contaminated and nearby control soils from three contrasting sites in the Ross Sea region of Antarctica.

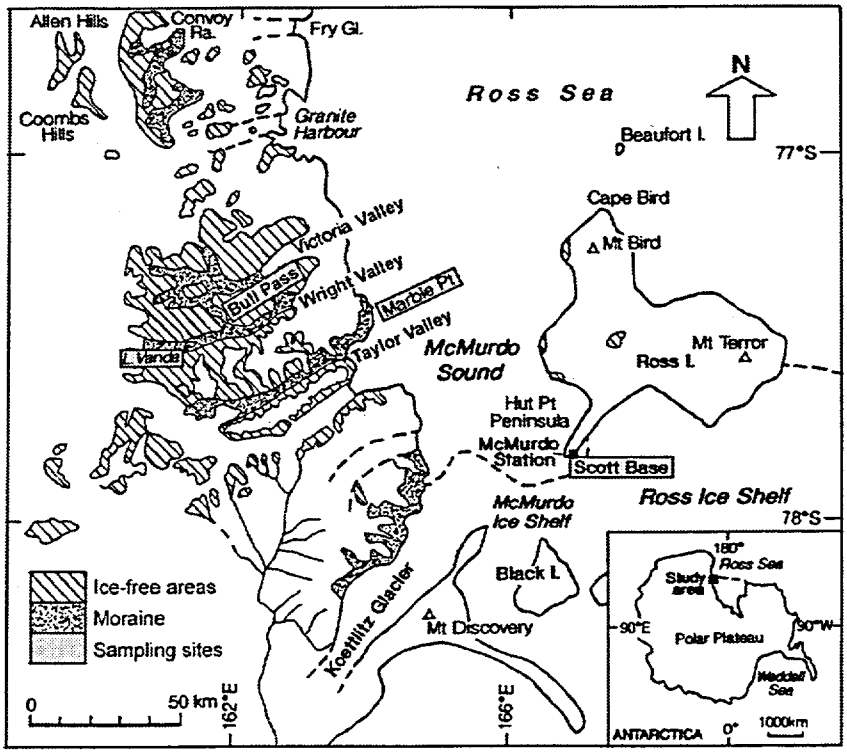

Figure 1 Location of oil-spill sampling sites at Scott Base, Marble Point, and Bull Pass.

Materials and Methods

Site and soil description

Hydrocarbon-contaminated and nearby control sites were identified at Scott Base, Marble Point, and near Bull Pass in the Wright Valley (Figure 1). At Scott Base, a hydrocarbon-contaminated site was sampled near a former storage area for drums of hydraulic and lubricating oils. At Marble Point, the soil sampled was situated near the old Marble Point camp that was inhabited from 1957 to about 1963 (Broadbent 1994). Oil stains were visible on the surface of the soil and it is assumed they have been there for over 30 years. The hydrocarbon-contaminated soil sampled in the Wright Valley came from a spill site near Bull Pass that occurred during seismic bore-hole drilling activities in 1985. The sampled site at Bull Pass was down-hill from the bore-hole and it is likely the fuel flowed to the sampling site along the interface between the soil and the relatively impermeable underlying bedrock. At each of the three sites, the extent of the contamination appears to be limited to less than 100 m^2.

The soils at the three sampling sites have differing parent materials and climates, leading to a range in soil properties and differences in soil classifications (Table 1). The control sites were all within 400 m of the oil-contaminated sites and the contaminated soils were generally similar to those of the adjacent control sites. However, in the contaminated soil at the Marble Point site, the glacic (ice saturated) layer, that was described in the control site and is widespread in the Marble Point area, was not observed. At the Bull Pass contaminated site, the granite bedrock was encountered at a depth of 65 cm, whereas bedrock was at a depth greater than 1 m at the control site.

Hydrocarbon analyses of soil

For total petroleum hydrocarbon (TPH) analyses, approximately 50 g of soil were placed in tin cans, and stored at room temperature until analysis in New Zealand. Levels of TPH were determined by extracting the samples in methylene chloride, then