X-ray diffraction studies can establish correlation among tills in separated sections within the area investigated. Furthermore, comparison of the chlorite modes in heavy mineral separates from Vermont samples to their chlorite/quartz ratios demonstrates that *x*-ray diffraction has a sensitivity to provenance changes comparable to that of heavy mineral analysis.

The *x*-ray data have been found to be reproducible and are probably less subject to observational bias than other provenance indicators.

DISTRIBUTION OF MAJOR MINERALS IN A STOCK OF NELSON PLUTONIC ROCK, SOUTH-CENTRAL BRITISH COLUMBIA

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A 21 square mile, porphyritic, leuco-quartz monzonite stock of Nelson plutonic rock is centred about Mt. Carlyle in Slocan mining camp, West Kootenay district, south-central British Columbia. The pluton intrudes the Triassic Slocan Series of quartzite, pelitic sediment, and limestone. Limestone is abundant north and east of the intrusion, giving way to quartzites and pelitic sediments to the west and south. The Slocan Series south of the pluton forms a septum several hundred feet wide that separates the stock from the main body of the Nelson batholith.

Modes, excluding K-feldspar phenocrysts, were determined for 62 sample locations. Large stained rock slabs were projected onto a grid and 500 points counted.

First to fourth order trend surfaces were established from plagioclase, K-feldspar, and quartz modal data. Percentages of plagioclase and K-feldspar vary systematically, quartz is more erratic. Planar trend surfaces show a southwesterly increase in K-feldspar and a corresponding decrease in plagioclase. Plagioclase planar residuals are high near the border of the intrusion, whereas those of K-feldspar are low. Cubic and quartic surfaces approximate hand contoured data.

The planar trend data are consistent with an hypothesis of Ca-enrichment related to calcareous contact rocks to the north and east of the stock. Peripherally high plagioclase and low K-feldspar planar residual values may be related to differentiation during progressive crystallization.

MELTING RELATIONS IN UNDERSATURATED ALKALINE ROCKS II

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Experimental data are presented on the melting relations of undersaturated alkaline rocks whose liquidus temperatures and crystallization sequences have been determined at water vapor pressure up to 2,000 kg/cm^2 and under controlled P_{O_2} conditions. Plutonic rocks are represented by naujaite, foyaite, and lujavarite from Ilimaussaq complex Greenland and foyaite from Grounedal-Ika complex, Greenland showing agpaitic tendencies, and four phonolites and nepheline syenites from Tanganyika and Kenya were investigated.

The experimentally determined sequence of crystallization in many of the rocks studied is feldspar, pyroxene, and nepheline or pyroxene, feldspar, and nepheline. There is a relationship between the amount of volatile bearing minerals and the melting interval in some of the rocks which reflects the probable role of volatiles in their genesis. The partial pressure of oxygen was controlled by buffer assemblages for some of the iron-rich rocks resulting in liquidus temperatures being lowered for only minor changes in the crystallization sequence. The possible genesis of alkaline rocks by processes involving crystal $\rightleftharpoons$ liquid equilibrium is discussed in the light of this data.