no corrections for topography have been calculated. The approximate temperature gradients found are:

Ivigtut: 1.5 °C/100 m
Kvanefjeld: 1.3 °C/100 m
Narssaq Elv valley: 1.9 °C/100 m

The portion of the curves corresponding to the upper 100-150 m of the holes indicates a climatic amelioration during the last century.

The amount of heat conducted from the mantle and the crust, the heat flow, is the product of the temperature gradient and the thermal conductivity of the rocks. The world average heat flow is about 1.5 μcal/cm^{2}sec. Measurements of thermal conductivity have not yet been made on the cores and therefore it is not possible at the moment to present any heat flow results from SW Greenland. The Ivigtut values are expected to be slightly lower than the world average due to its position in a Precambrian shield. On the other hand the heat flow values from Ilímaussaq should be higher than the values from the Ivigtut gneiss because of radioactive heat generation in the U- and Th-bearing nepheline syenites. With known average radioactive concentrations and a "background" heat flow comparable to the basement values in Ivigtut, it may be possible to estimate the thickness of the radioactive Ilímaussaq rocks.

If the rock types in the cores from Ivigtut and Ilímaussaq have about the same conductivity, the temperature gradient in the high radioactivity Ilímaussaq should be steeper than in Ivigtut. This is found not to be the case. Explanations for this can only be tentative. If the amount of heat conducted from the mantle is assumed to be the same in the two areas, then the heat generated in the crust below a shallow Ilímaussaq intrusion must be less than is general elsewhere suggesting that Ilímaussaq is underlain by a basic layer of very little radioactivity; such a supposition is relevant not only to the regional heat flow but also to the evolution of the Gardar magma.

FIELD MEASUREMENTS OF THORIUM AND URANIUM IN LUJAVRITES FROM THE ILÍMAUSSAQ INTRUSION

Poul Sørensen

During last summer 3388 field measurements of the thorium and uranium content of the lujavrites from the Ilímaussaq intrusion were carried out with a portable spectrometer (Løvborg, 1967; Løvborg *et al.* 1968; Løvborg *et al.* in press) consisting of a scintillation detector and a single-channel pulse-height analyser. Within selected small areas measurements were made at the joints of a 1 m grid.

The investigation had two purposes. 1) To obtain representative mean values for Th and U and the Th/U ratio which could be of some help for the final evaluation of the thorium-uranium deposit of Kvanefjeld. 2) To make comparisons with lujavrite outside the Kvanefjeld area and to investigate whether differences in radioactivity could be matched with petrographic differences of the rocks.

1. On a radiometric map (geiger countings) of part of the area of economic interest at Kvanefjeld, published by Sørensen *et al.* 1969, it was shown that the distribution of Th and U is very variable. To cover this variation four sub-areas on the radiometric map, characterised by very high, high, medium and low radioactivity approximately 30 m × 30 m were selected so that representative mean values for the whole area could be obtained.

The combined mean values for the four areas were calculated to be 1408 ppm Th and 666 ppm U with corresponding standard deviation of 1227 ppm Th and 434 ppm U. The frequency distribution of Th and U was almost log normal.

2. Table 1 gives the mean values of exposures of different varieties of lujavrite from small selected areas. It shows the differences in radioactivity between the occurrences from Kvanefjeld and those from elsewhere. The Kvanefjeld lujavrites are very heterogeneous and contain remnants of lavas which originally formed part of the roof of the intrusion. The lujavrites from the other occurrences are more homogeneous and uncontaminated by contact rocks. The table also shows that arfvedsonite lujavrites have lower Th/U ratios than aegirine lujavrites. Outside the Kvanefjeld area arfvedsonite lujavrites are slightly enriched in uranium when compared with the aegirine lujavrites. Comparison of detailed geological and radiometric maps of the selected areas show that there is good correlation between variations in radioactivity and mineralogical composition of the lujavrites.

Table 1.

	Rock type	locality no	Th ppm	U ppm	Th/U
Kvanefjeld	fine-grained arfvedsonite lujavrite	5	410	280	1.54
	med.-to coarse-grained arfvedsonite lujavrite	6, 7, 8, 9	1064	538	2.01
	fine-grained aegirine-arfvedsonite lujavrite	1	1030	450	2.13
	fine-grained naujakasite lujavrite	4	880	375	2.41
	fine-grained aegirine lujavrite	2	1660	720	2.42
	med.- to coarse-grained aegirine lujavrite	2	710	260	2.97
elsewhere	fine-grained arfvedsonite lujavrite	16	170	250	0.68
	– – –	15	170	200	0.83
	– – –	11, 12, 14	115	130	0.92
	fine-grained aegirine lujavrite	17	180	110	1.61
	– – –	11, 13, 14	95	80	1.15

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DETAILED MAPPING IN THE SOUTHERN PART OF THE ILÍMAUSSAQ INTRUSION (KANGERDLUARSSUK FJORD)

A. Demin

Detailed mapping at a scale of 1 : 10 000 of an area around the head of the Kangerdluarssuk fjord in the southern half of the Ilímaussaq intrusion was made. The purpose of this was to map accurately the relations of naujaite inclusions in the lujavrites. During the work it became clear that a detailed study of the transitions between the lujavrites and kakortokites was of much greater importance. The reader is referred to Ferguson (1970, p. 338) for a summary of the previous ideas about the origin of the lujavrites.

The field observations of last summer showed that the green aegirine lujavrites and the black arfvedsonite lujavrites belong to different phases of intrusion (cf. Sørensen, 1962). The green lujavrites form the upper part of a unit which is continuous with the kakortokites. Between the green lujavrites and the kakortokites there is a sequence of transitional rocks (cf. Brooks & Bohse, 1969). It consists of fine-grained bands, black, white and red in colour, reminiscent of the colour variation in the banded kakortokites more to the south. The uppermost red band of the transitional sequence is always underlain by a 1 m thick layer of green lujavrite and grades over a distance of 4 m into the overlying lujavrites. The contacts between the bands are parallel and in general gradual, although locally the upper red bands have sharp contacts.

The black lujavrites crystallised from a late magma phase which was injected, possibly due to tectonic movements, while the crystallisation of the green lujavrites was still in progress. In the lower levels the newly injected magma consolidated by a