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GROUND RADIOMETRIC INVESTIGATIONS
KENNETCOOK AREA, NOVA SCOTIA

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As a result of ground investigations which have taken place within the Kennetcook map sheet and immediately adjacent areas during the summer of 1977 a new and unusual type of uranium occurrence has been discovered. Preliminary data from the ground investigations are presented at this time. Location of the Kennetcook airborne survey is shown in Figure 1, with the regional geology taken from the Geological Map of Nova Scotia (N.S. Dept. of Mines, 1965).

Examination of the Kennetcook airborne spectrometer survey results soon after initial compilation, in the spring of 1977, revealed the presence of several areas exceeding 2 ppm equivalent uranium. Ratios greater than 0.5, i.e. more than twice the average crustal U/Th ratio, were measured. Such an increase in uranium along with the increase in U/Th ratio often indicates a zone of uranium mineralization. It was noted that a string of these uranium anomalies with attendant ratio increase correlated with the base of the marine Mississippian Windsor Group overlying continental Horton Group sandstone and shale as mapped in the area.^{1,2} This correlation was particularly evident between Five Mile River and Noel Lake.

It was decided to study one of these anomalies in some detail in order to gain an understanding of the significance of these features. An anomaly in the Five Mile River area just west of South Maitland was chosen because of reasonable access, relatively undisturbed surface and the presence of some outcrop exposure along the river and adjacent slopes. The location of this anomaly which is on the south limb of a syncline can be seen on Figure 1.

Initial indications were that some rock material underlying the anomaly was enriched in uranium. Values in excess of 70 ppm were measured by laboratory gamma-ray spectrometry and by in situ gamma spectrometry.

During the first three weeks of August 1977 work was concentrated on the South Maitland anomaly. Figure 2 shows the location of ground gamma-ray spectrometry and scintillometry traverses made with 50 m. station spacing, plotted on the geology map. The location of the 2 ppm equivalent uranium contour from the airborne survey is also drawn on Figure 2. The uraniumiferous rocks were restricted to a relatively thin horizon. This horizon was composed of Pembroke formation limestone conglomerate and brecciated Macumber formation laminated carbonate. Since no consensus exists as to the absolute criteria for separating brecciated Macumber formation from Pembroke conglomerate (personal communication P. Giles, N.S. Dept. Mines) we have grouped the two units as basal Windsor on Figure 2. It would appear that the mineralized rocks lie between the Horton sandstone and shales (which had uniformly low uranium concentration in this area) and the evaporitic sequences above the Pembroke-Macumber which are again uniformly low. The mineralized horizon appeared in all exposures to be grey to grey-brown in colour. Characteristically a fetid gas smell was noticed when the rocks were struck with a hammer.

Radioactive spots exceeding 10x background values with the scintillometer were noted at eight localities in a zone about 100 m. wide on surface along some two km. of strike. The nature of the uranium concentrations is spotty but as can be seen from the distribution of the (U) symbols on Figure 2 the enrichments are on the whole quite continuous. All of the (U) symbols indicated are on bedrock. Equivalent uranium values determined by in situ gamma-ray spectrometry were above 100 ppm at two localities near the western extremity of the anomaly at (U) 1 and (U) 2. Sample material from (U) 1, gave a laboratory gamma-ray spectrometric analysis of 150 ppm eUranium and sample material from locality (U) 2 gave a result of 425 ppm eUranium. The average elemental uranium analyses by neutron activation for locality (U) 1 was 32 ppm (4 determinations) and for locality (U) 2 was 135 ppm (4 determinations). The difference between the radiometric and elemental uranium values indicates significant disequilibrium in the uranium decay series for this type of uranium occurrence. The mineralization can best be observed and sampled at locality (U) 1 in a cross section cut by a creek flowing into Five Mile River. More highly radioactive material than the above was found in float slabs near locality (U) 1.

Because of the relatively short time between the field season and the preparation of this report little work has been completed on the sample material. Autoradiographs were attempted for three days but even with sample material in the 100 ppm equivalent uranium range no discrete sources were observed, suggesting the uranium may be in a dispersed state. A phosphate analysis of one specimen yielded a low result of about 0.04%. Two polished sections that were examined contained sulphide (pyrite?) in fragments of Macumber formation.

Minor radioactive increases to 3x background were noted on overburden within the anomaly near Hardwood Lands in the southeast corner of the Kennetcook map area. The area is underlain by rocks of upper Windsor age. This suggests that uranium concentrations may exist higher in the section than the basal Windsor. Airborne anomalies similar in appearance to the basal Windsor anomalies are also found over the Ordovician Meguma Group.

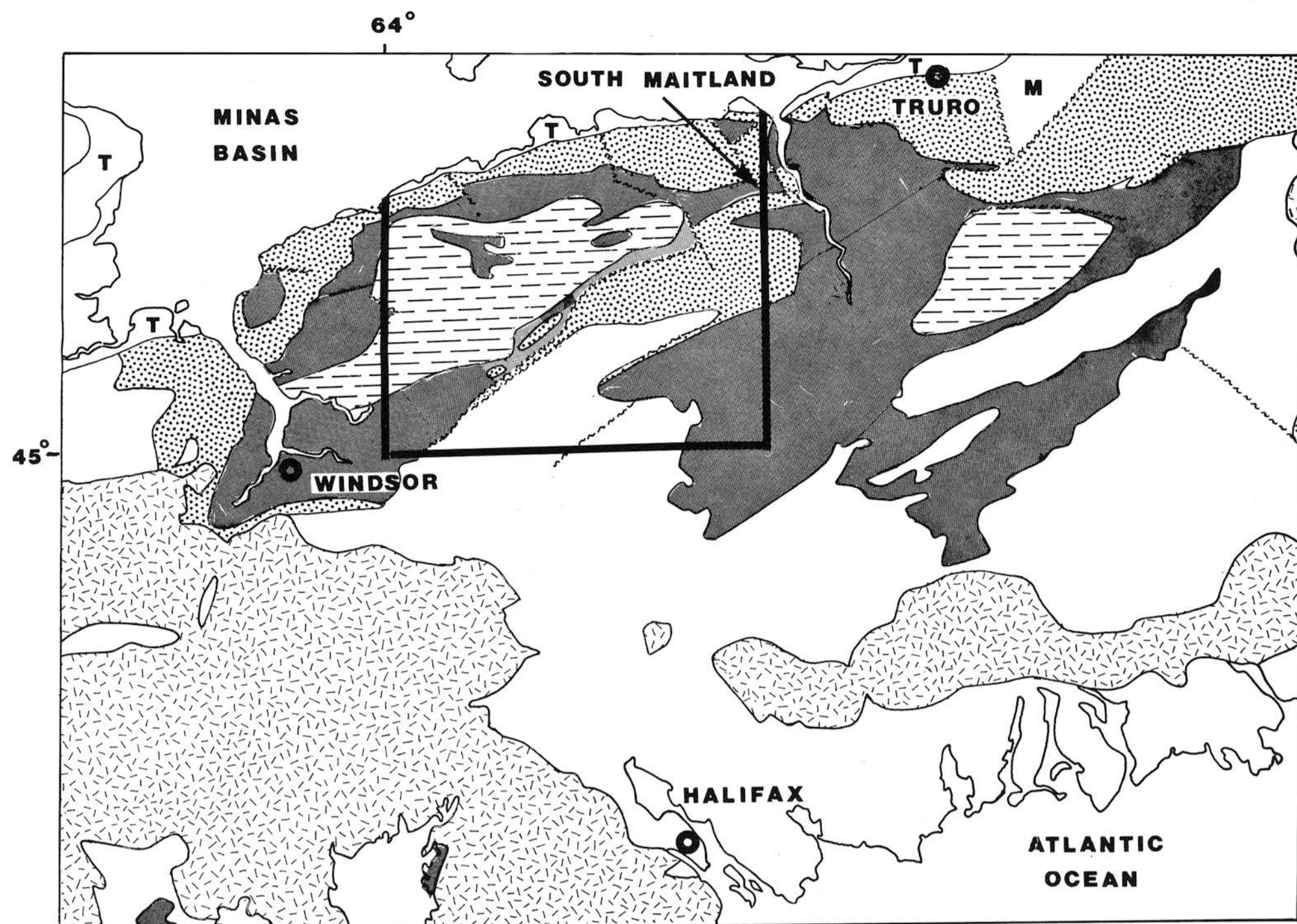
Large airborne anomalies which exist in the Uniacke sheet to the south appear to relate to the presence of muscovite-biotite bearing (two mica) granitoids. This type of lithology in other parts of Canada often has a high radioactivity and high uranium/thorium ratio for example north of Yellowknife, N.W.T. The Uniacke granitoids could be source material for uranium concentrations in the basal Windsor Group.

Some isolated concentrations of uranium of about 50 ppm were found in grey zones in the Horton Group near the Windsor contact west of Kempt Shore near copper occurrences reported by R.W. Boyle.³ This is in the Walton area which is west of the Kennetcook map sheet. These observations suggest that mineralization may actually extend down into the Horton Group elsewhere although at South Maitland this did not appear to be the case.

A more complete paper describing the above work is planned for inclusion in Geological Survey of Canada Paper 78-1, Part A "Current Research".

References

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1959: Shubenacadie and Kennetcook Map Areas, Colchester, Hants and Halifax Counties, Nova Scotia; Geol. Surv. Canada, Mem. 302.
3. BOYLE, R.W.
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T	TRIASSIC	ANNAPOLIS GROUP
	PENNSYLVANIAN	RIVERSDALE GROUP
M	MISSISSIPPIAN	CANSO GROUP
	II	WINDSOR GROUP
	II	HORTON GROUP
	DEVONIAN	GRANITE
	ORDOVICIAN	MEGUMA GROUP

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LIMITS OF AIRBORNE SURVEY

figure 1

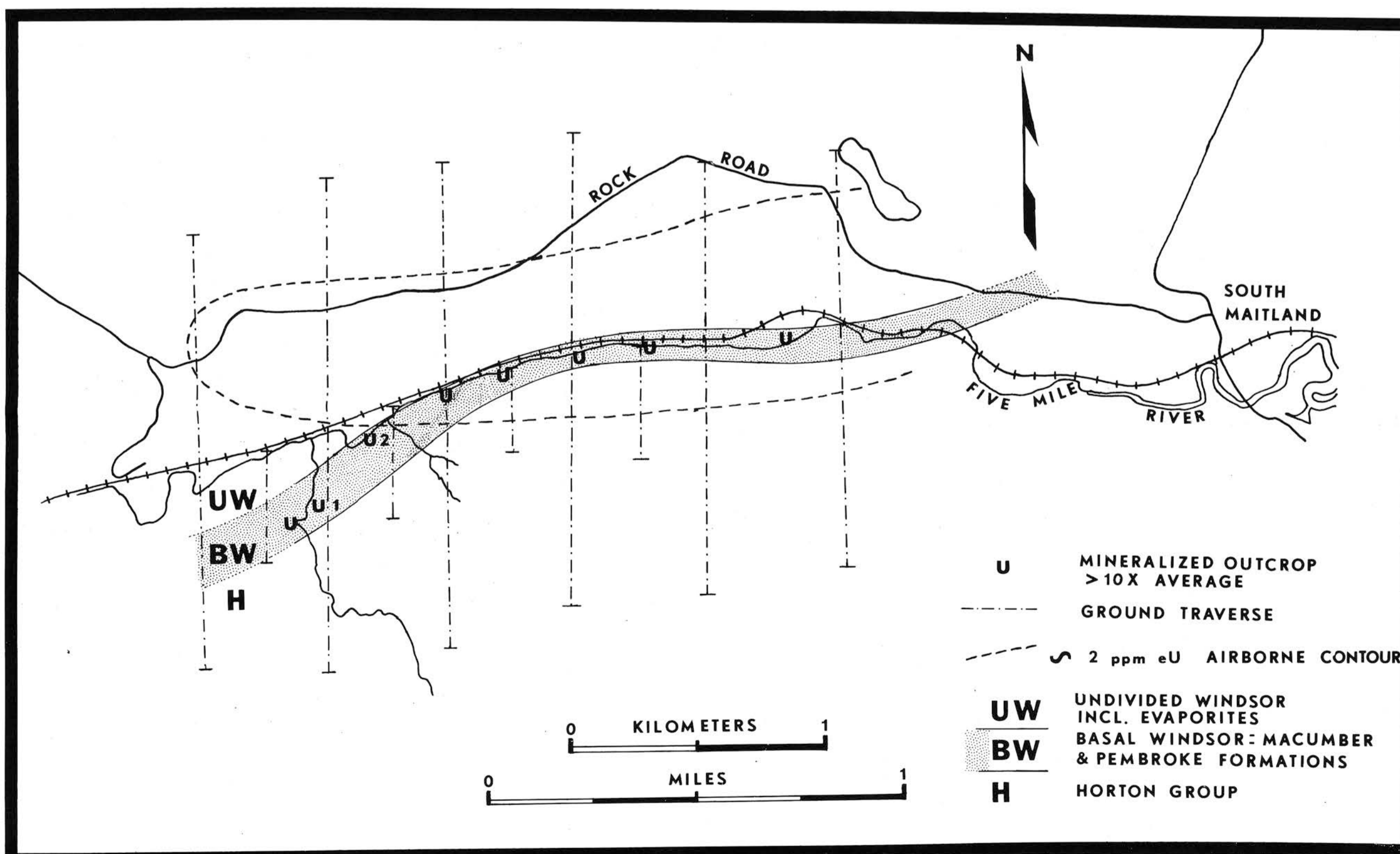


figure 2