GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES

AIRBORNE GEOPHYSICAL SURVEY
1986

EASTERN LISCOMB PLUTON
NOVA SOCTIA
11E/1, 2, 7, 8 (parts of)

Gamma Ray Spectrometric Colour Maps
and VLF-EM Profile Maps

Geological Survey of Canada Open File 1473

Canada Nova Scotia Mineral Development Agreement

Entente Canada Nouvelle-Écosse sur l'exploitation minérale

Nova Scotia
Department of
Mines and Energy

Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

Canada

AIRBORNE GEOPHYSICAL SURVEY - EASTERN LISCOMB PLUTON AREA
NOVA SCOTIA

In the summer of 1986 a multi-parameter geophysical survey was flown in the area of the Eastern Liscomb Pluton of Nova Scotia. The area surveyed is shown on the index map. The main purpose of the survey was to produce quantitative gamma ray spectrometric information to assist with the identification of various phases of a composite suite of granitic rocks, and using radioelements as indicator or pathfinder elements, to aid exploration for granophile element mineralization.

Data are presented as a set of eight 1:50 000 radioelement colour maps (total count, potassium, equivalent uranium and equivalent thorium concentrations, the eU/eTh, eU/K and eTh/K ratios, and the ternary radioelement map (J. Broome, J.M. Carson, J.A. Grant and K.L. Ford, 1987, A Modified Ternary Radioelement Mapping Technique and its Application to the South Coast of Newfoundland, GSC Paper 87-14)). Accompanying the colour maps are two 1:50 000 VLF profile maps, with flight lines and a topographic base of the survey area.

The airborne VLF measurements were obtained using a Herz Totem 1A airborne VLF system. The primary electromagnetic field is generated by VLF station NSS at Annapolis, Maryland, which transmits at 21.4 kHz. The secondary field is generated by eddy currents flowing in near-surface conductors. The profiles presented are the total field value (vector sum of the horizontal and vertical components) and the quadrature (out-of-phase) component of the vertical field. The total field is expressed in percent of the local primary field and the quadrature in percent of the along-track component. The mean values of the total field and quadrature component were removed along each flight line. The quadrature which depends on the flight line directions, was inverted for lines flown from north to south. A 5 point filter was applied to both total field and quadrature data for final presentation. Anomalies over conductors produce positive peaks on the total field trace and are of the cross-over type (negative to positive) on the quadrature trace.

All data were sampled at 1 second intervals. The airborne radiometric measurements were made using a 256 channel spectrometer, with twelve 102x102x406 mm NaI (T1) detectors, flown at a mean terrain clearance of 125 m at 190 km/h. North-south flight lines were at 250 metre line spacing.

Potassium is measured directly from the 1.46 MeV gamma ray photons emitted by ^{40}K, whereas uranium and thorium are measured indirectly from gamma ray photons emitted by daughter products in their decay chains. Uranium is monitored by means of gamma ray photons at approximately 1.76 MeV from ^{214}Bi, and thorium, from 2.62 MeV photons emitted by $^{208}T1$. The energy windows used are as follows:

Total Count		0.41-2.81 MeV
Potassium	^{40}K	1.36-1.56 MeV
Uranium	^{214}Bi	1.66-1.86 MeV
Thorium	$^{208}T1$	2.41-2.81 MeV

Total count, uranium, thorium and potassium counts have been corrected for dead time, ambient temperature changes, background radiation, spectral scattering and deviations of terrain clearance from the planned survey altitude. In areas of extreme topographic variations accurate terrain corrections are difficult. Thus, estimates of radioelement concentrations may be inaccurate in these areas. The computer programs used to produce the contour maps and profiles are modified from Geological Survey of Canada Open File 109 "Airborne Gamma Spectrometry Data Processing Manual"

The values for the radioelement concentrations shown on the maps are "average surface concentrations", that is, an average for the area on the ground viewed by the spectrometer, an area which may contain varying amounts of outcrop, overburden and surface waters. As a result the concentrations shown are usually considerably lower than the concentrations in the bedrock. However, the radioelement distribution shown by the maps reflects the relative distribution of the elements in the bedrock.

Factors for converting airborne measurements to element concentration were determined by relating the corrected airborne count rates over a test strip in the Ottawa area to the known ground radioelement concentrations (R.L. Grasty and B.W. Charbonneau, 1974, Gamma-Ray Spectrometry Calibration Facilities, G.S.C. Paper 74-1B, pp. 69-71).

The conversion factors used are those listed below:

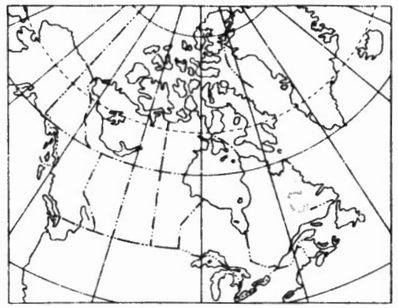
1 Ur Total Count	161 cps
1% K	91.0 cps
1 ppm eU	9.1 cps
1 ppm eTh	7.0 cps

Total count measurements are presented as units of radioelement concentration (Ur), as defined in International Atomic Energy Agency Technical Report Series No. 174, 1976.

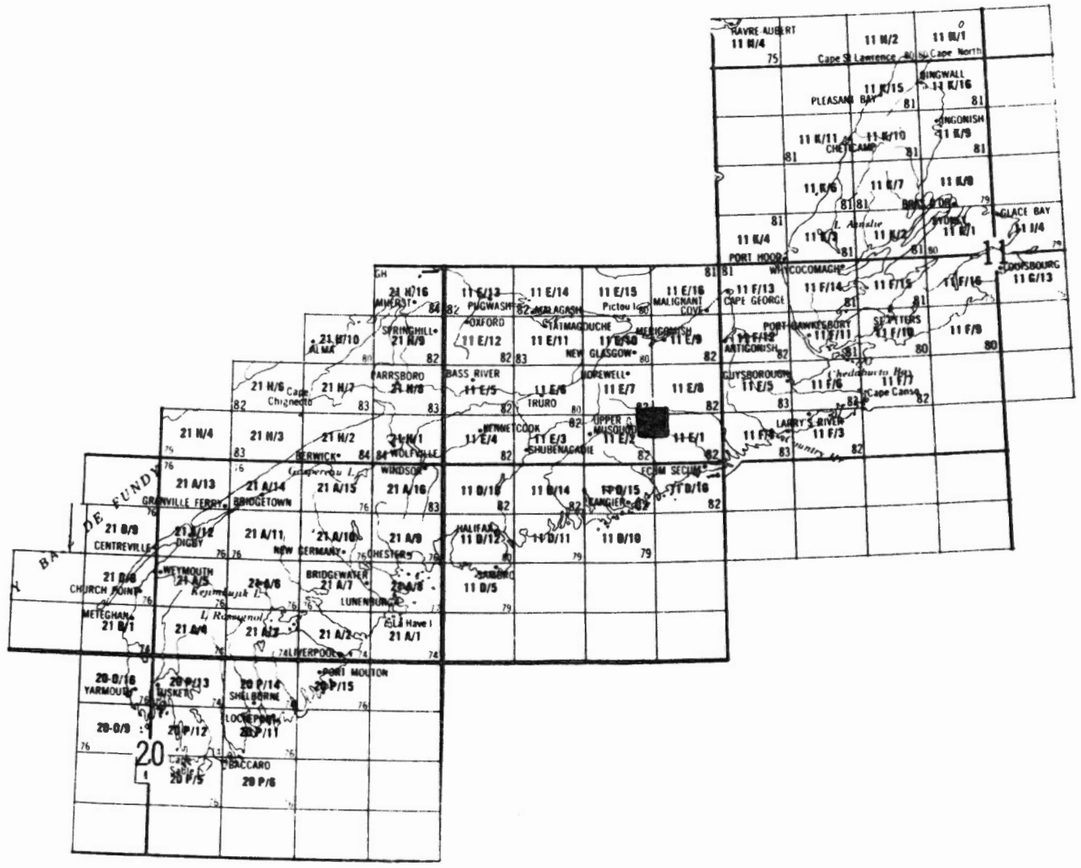
Information regarding the availability of this Open File release may be obtained from: Geological Survey of Canada, 601 Booth St., Ottawa, Ontario, K1A 0E8. Telephone (613) 995-4342

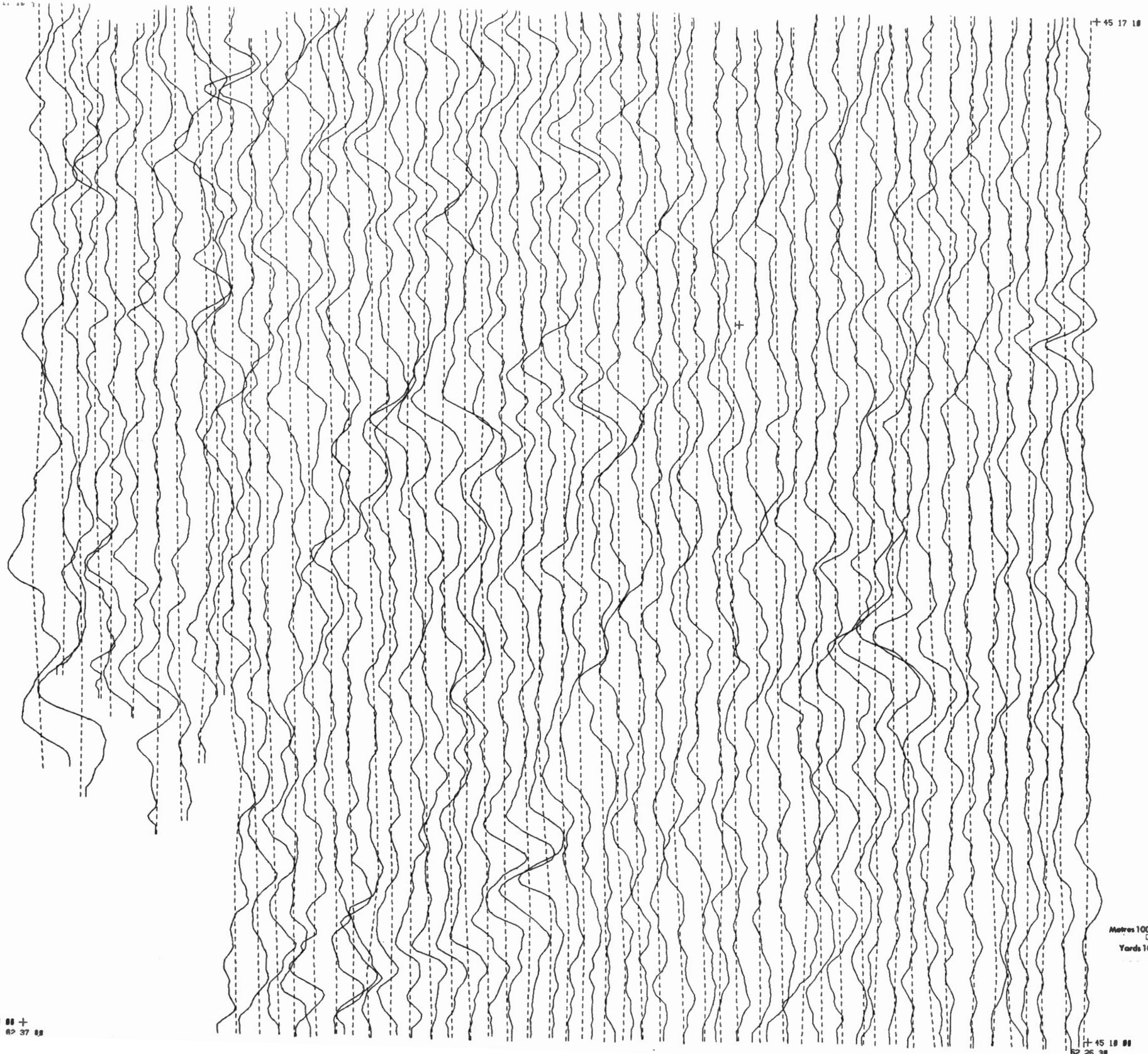
Base map material supplied by Surveys and Mapping Branch

Airborne gamma ray spectrometric, VLF and magnetic survey
flown, compiled, and funded by Geological Survey of Canada
as a
Contribution to Canada-Nova Scotia
Mineral Development Agreement 1984-89
a subsidiary agreement under the
Economic and Regional Development Agreement



INDEX MAP





VLF TOTAL FIELD

Scale: 15.0%/cm

---- Flight track

Eastern Liscomb Pluton

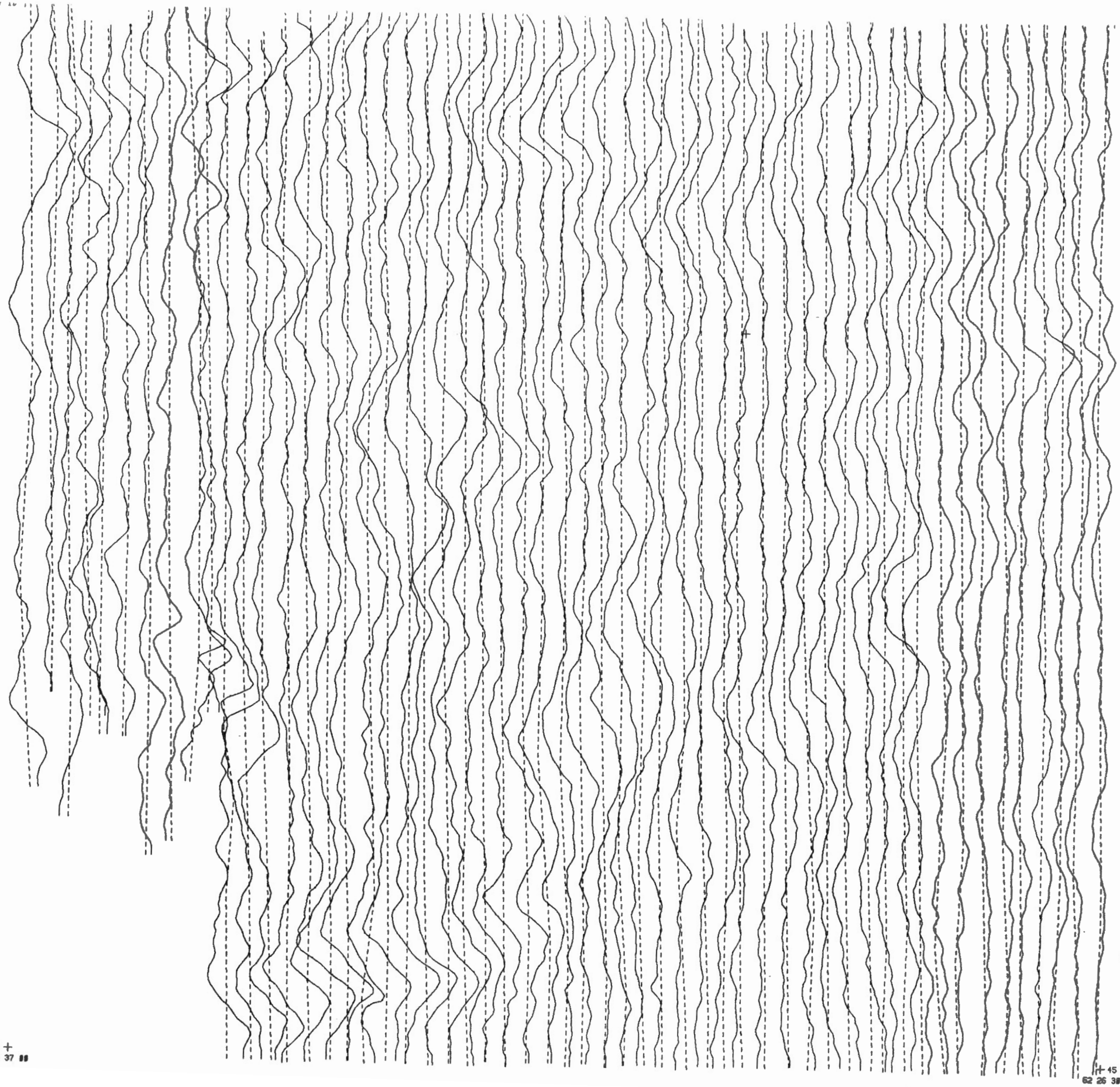
Nova Scotia

11E/1,2,7,8 (Parts of)

VL

Easte

11E



Metres 1000 0

Yards 1000 0

45 18 88 +
62 37 88

+ 45 18 88
62 26 38

62 37 00

62 26 30

45 17 10

45 10 00

Eastern Liscomb Pluton

Nova Scotia

11 E/1,2,7,8 (parts of)

Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

SCOMB SANCTUARY

LISCOMB GAME

Cormacs Brook

Crooked Brook

Archies Lake

Cameron Settlement

Caribou Lake

Long John Lake

Black Brook

Black Brook Lakes

Hattie Lake

Chisholm Lake

Little Liscomb Lake

Little Liscomb Lake

Bottle Brook Lake

Bottle Brook

Bottle Brook Lake

Fraser Lake

Seventeen Mile

First Rocky Lake

Bruin L

Hungry Lake

Big Liscomb Lake

Middle Lake

Ellis Lake

Second Rocky Lake

Oliphant Lake

Princess Pine Lake

MacDonald Lake

Lower Rocky Lake

Dayspring Lake

Mile Stream

Fifteen

Parker Lake

Cruickshank Lake

Otter Lake

Round Lake

Seventeen Mile Lake

Grassy Lake

North Brook

North Lake Brook

Alex Lake

North Lake

Barren Lake

Rush Lake

The Keyhole

Laura Lake

Seloam

Seloam

CYS MUNICIPALITY

AX MUNICIPALITY

GUYSBOROUGH COUNTY

HALIFAX COUNTY

45 17 10

WEST RIVER ST. MARYS FAULT

Long John Lake Road

Chisholm Lake

Bottle Brook Lake

Big Liscomb Lake

Lower Rocky Lake

Rush Lake

Sanctuary Road

Seloam Lake

Seloam Lake Road

RLG

Ch

€Og

€Oh

DCg

5a

5b

7a

7b

1

2

3

4

6

65 75 55 80 85 70 30

LEGEND

LOWER CARBONIFEROUS
Ch *Horton Group*

DEVONIAN CARBONIFEROUS
DCg *Seloam Lake Pluton*

7a Muscovite ± biotite monzogranite - medium to coarse grained, pale pink to buff, equigranular muscovite > biotite monzogranite.

7b Leucomonzogranite - fine to medium grained, pale pink, equigranular.

DCg *Liscomb Pluton*

6 Leucomonzogranite - fine grained, pale pink, equigranular.

5a Two-mica monzogranite - medium grained, pale pink to buff, equigranular biotite > muscovite, low eU/eTh ratio phase.

5b Two-mica monzogranite - medium grained, buff coloured, equigranular muscovite > biotite, high eU/eTh ratio phase.

4 Biotite-muscovite monzogranite - fine to medium grained, pale pink, subporphyritic biotite > muscovite monzogranite (Bottle Brook Lake Phase).

3 Biotite-muscovite monzogranite - fine grained, pale pink to grey, subporphyritic biotite > muscovite monzogranite.

2 Biotite monzogranite - coarse grained, grey, porphyritic biotite monzogranite.

DCg *Lower Rocky Lake Stock*

1 Biotite-muscovite monzogranite - fine grained, grey, equigranular biotite > muscovite monzogranite.

CAMBRO-ORDOVICIAN
Meguma Group

€-Og Goldenville Formation - quartz metawacke with interbedded slate.

€-Oh Halifax Formation - black slate with silty metawacke beds.

UNKNOWN AGE
RLG *Rocky Lake Gneiss*

Geological contact (approximate)
Bedding (vertical, inclined)
Cleavage (vertical, inclined)

Granite geology by K. Ford, 1986-87 with additional information from Henderson, J.R., 1986; Geology Ecum Secum Area, Nova Scotia; Geol. Surv. Can., Map 1648A and Geological Map of Nova Scotia, 1:500,000 scale, 1979.

Metres 1000 0 1000 2000 3000 4000 Metres

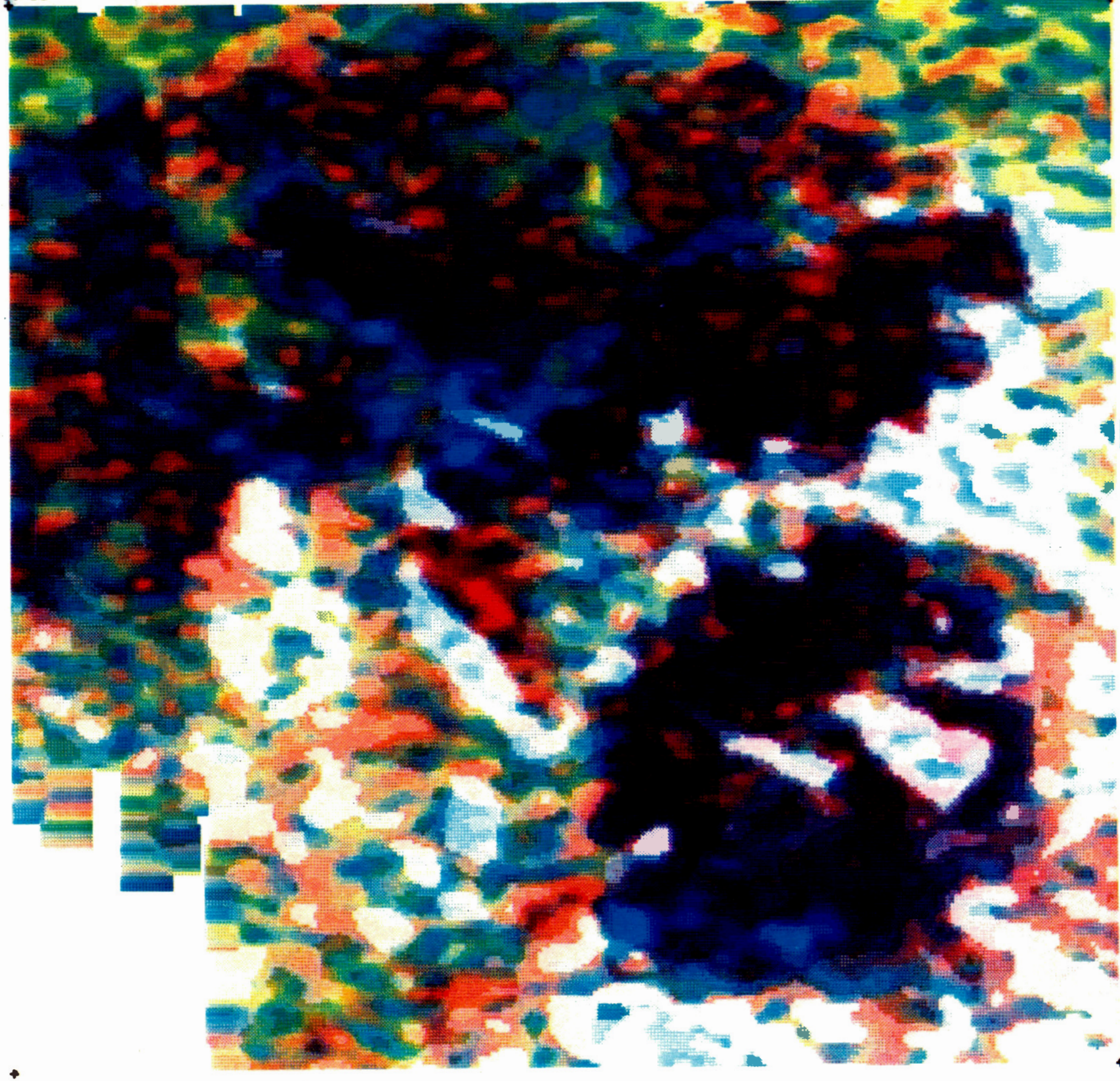
Yards 1000 0 1000 2000 3000 4000 Yards

45 10 00

62 37 00

62 28 30

45 17 10



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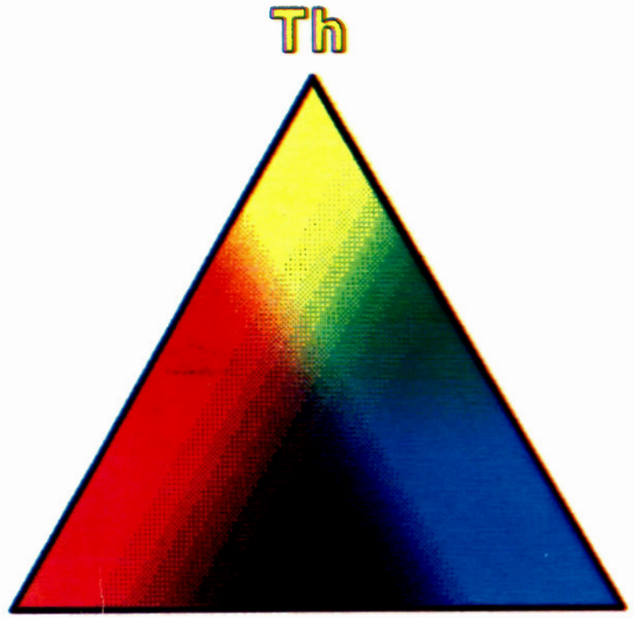


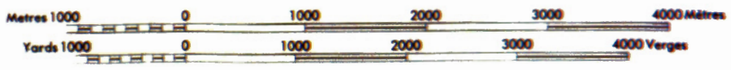
EASTERN LISCOMB PLUTON, N.S.
Ternary Radioelement Map

Software developed by : J. Broome
Lithospheric Geophysics Section
Lithosphere and Canadian Shield Div.
Data compiled by : K. Ford
Airborne Geophysics Section
Mineral Resources Division
Geological Survey of Canada

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)



62 37 00

62 26 30
45 17 10

13.0
12.0 – 13.0
11.0 – 12.0
10.0 – 11.0
9.0 – 10.0
8.0 – 9.0
7.0 – 8.0
6.0 – 7.0
5.0 – 6.0
4.0 – 5.0
3.0 – 4.0
2.0 – 3.0
1.0 – 2.0
1.0

Total Count (Ur)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

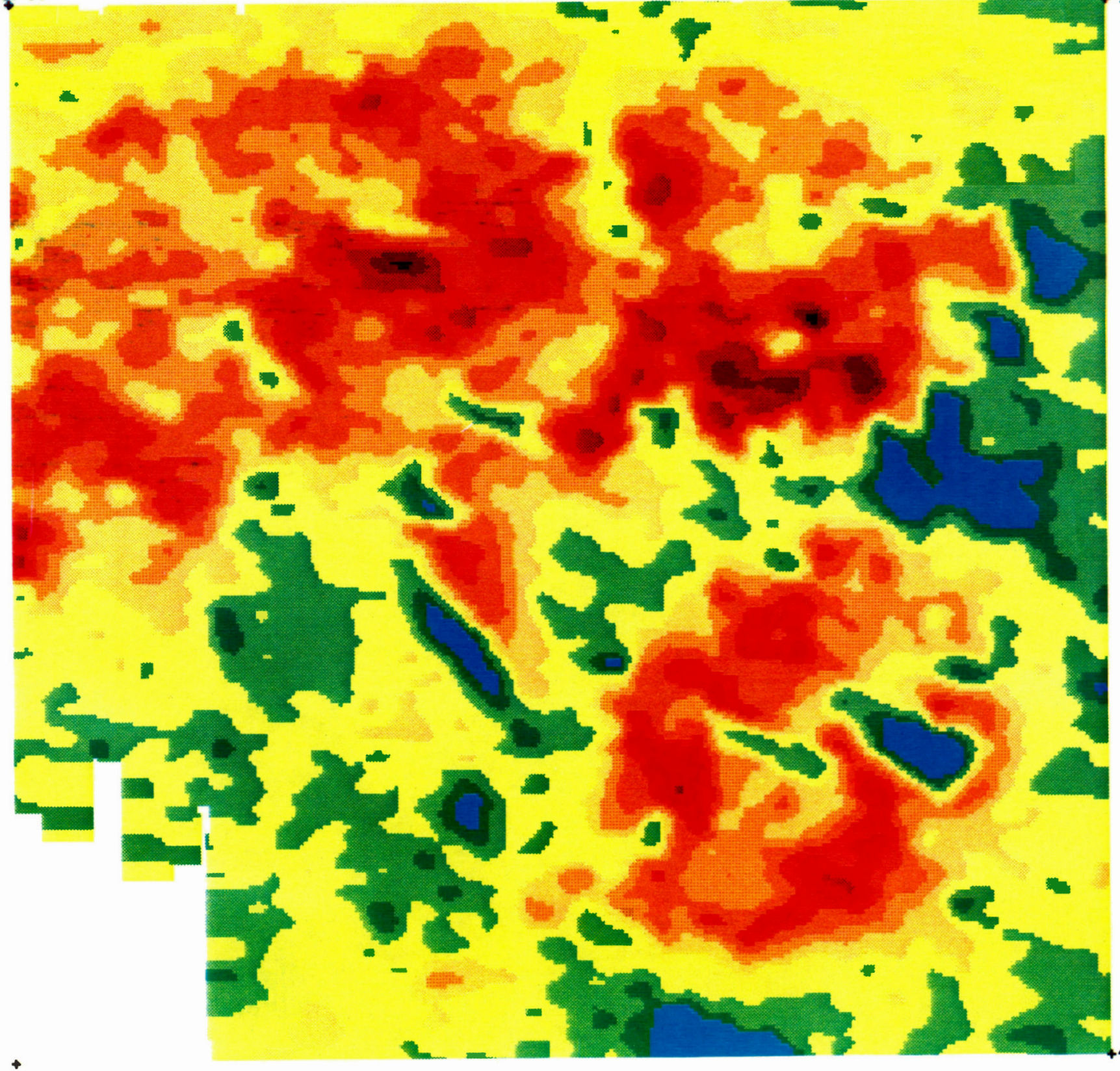
Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

+45 10 00

62 37 00

62 28 30
45 17 10



3.25
3.00 – 3.25
2.75 – 3.00
2.50 – 2.75
2.25 – 2.50
2.00 – 2.25
1.75 – 2.00
1.50 – 1.75
1.25 – 1.50
1.00 – 1.25
0.75 – 1.00
0.50 – 0.75
0.25 – 0.50
0.25

Potassium (percent)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

Metres 1000 0 1000 2000 3000 4000 Mètres

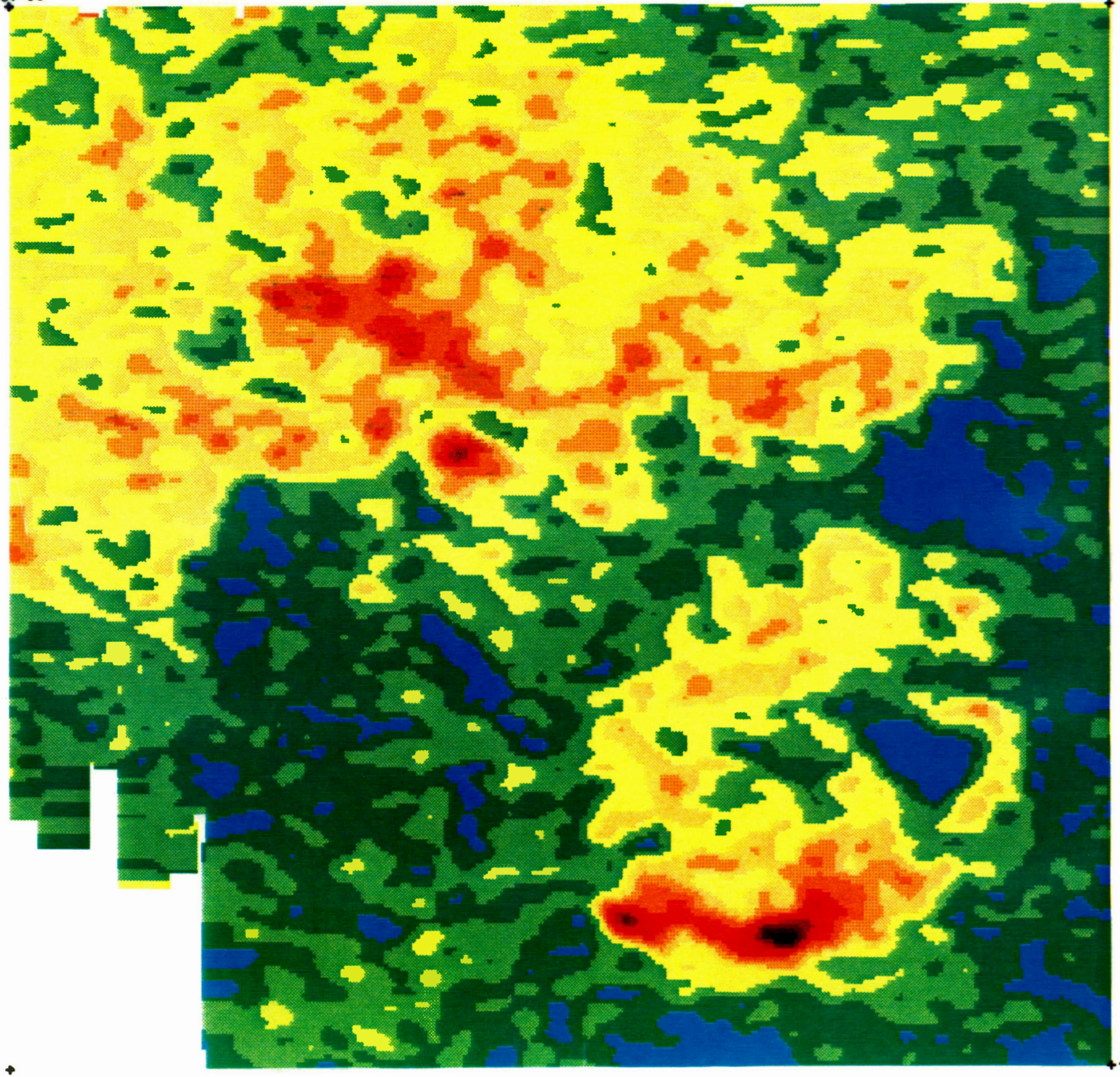
Yards 1000 0 1000 2000 3000 4000 Verges

45 10 00

62 37 00

62 26 30

45 17 10



45 10 00

6.5
6.0 – 6.5
5.5 – 6.0
5.0 – 5.5
4.5 – 5.0
4.0 – 4.5
3.5 – 4.0
3.0 – 3.5
2.5 – 3.0
2.0 – 2.5
1.5 – 2.0
1.0 – 1.5
0.5 – 1.0
0.5

equivalent Uranium (ppm)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

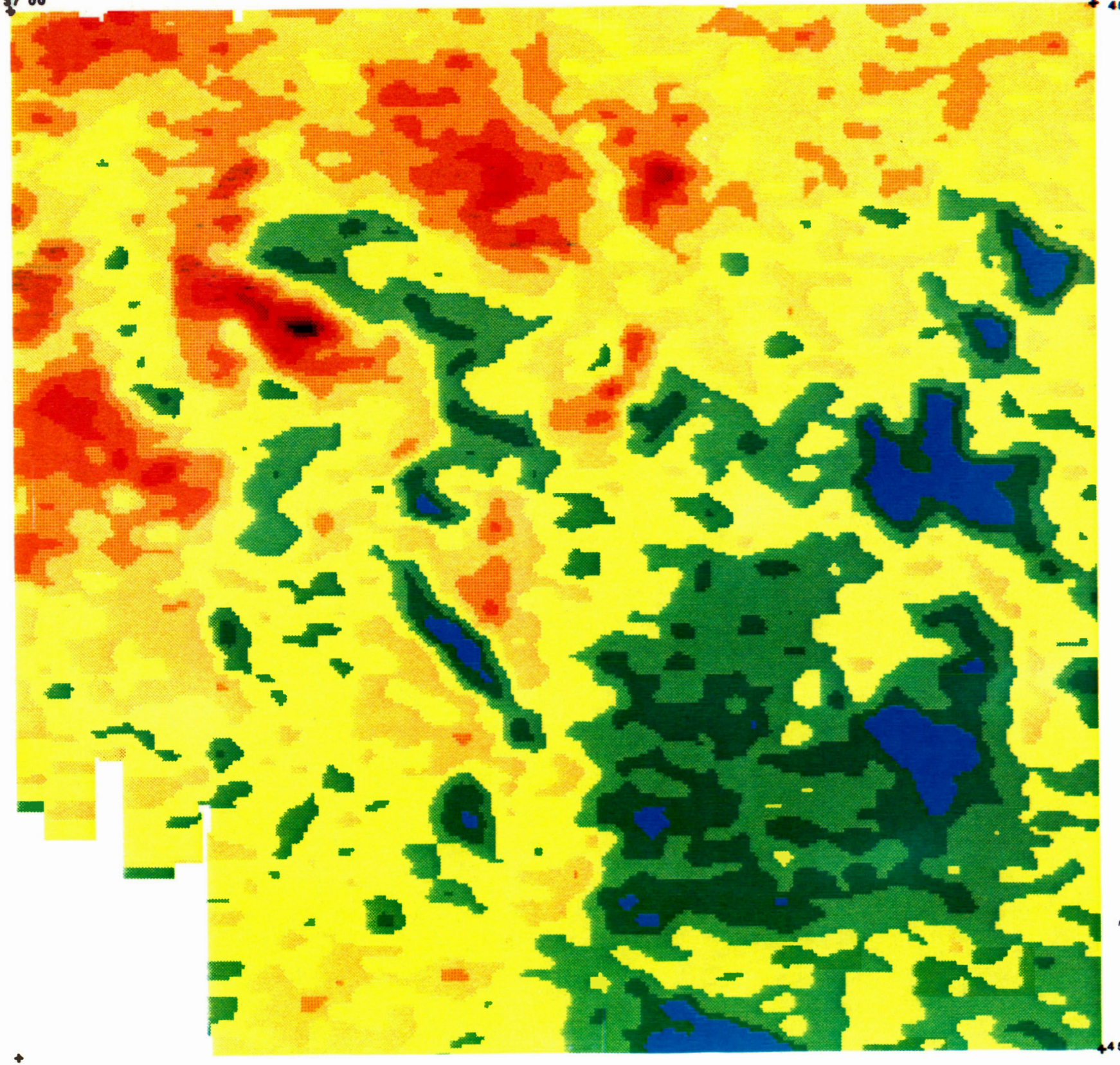
Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

62 37 00

62 28 30

45 17 10



13.0
12.0 – 13.0
11.0 – 12.0
10.0 – 11.0
9.0 – 10.0
8.0 – 9.0
7.0 – 8.0
6.0 – 7.0
5.0 – 6.0
4.0 – 5.0
3.0 – 4.0
2.0 – 3.0
1.0 – 2.0
1.0

equivalent Thorium (ppm)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

Metres 1000 0 1000 2000 3000 4000 Mètres

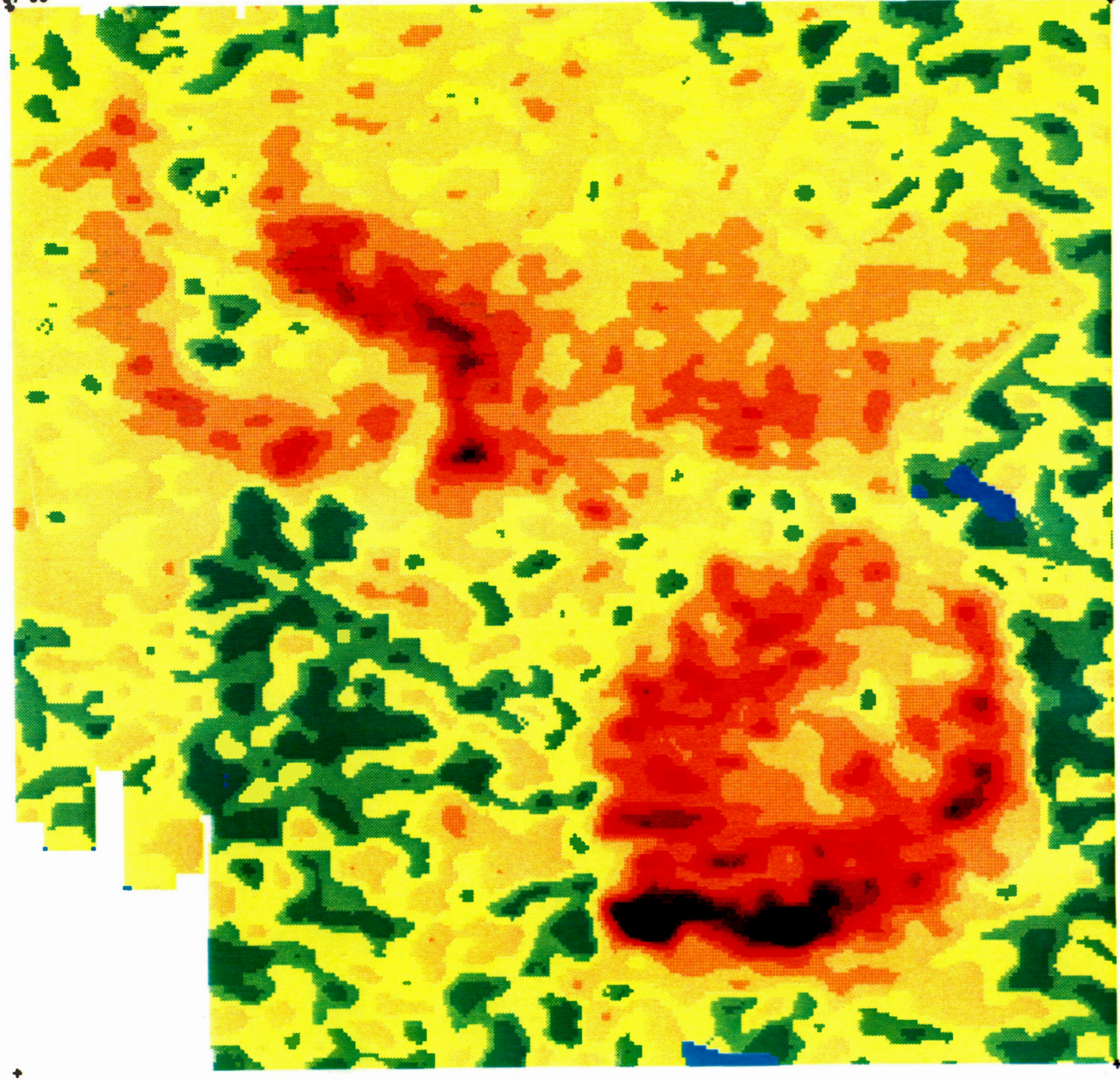
Yards 1000 0 1000 2000 3000 4000 Verges

45 10 00

62 37 00

62 28 30

45 17 10



	2.50
	2.25 – 2.50
	2.00 – 2.25
	1.75 – 2.00
	1.50 – 1.75
	1.25 – 1.50
	1.00 – 1.25
	0.75 – 1.00
	0.50 – 0.75
	0.33 – 0.50
	0.25 – 0.33
	0.20 – 0.25
	0.10 – 0.20
	0.10

Uranium/Thorium (ratio)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

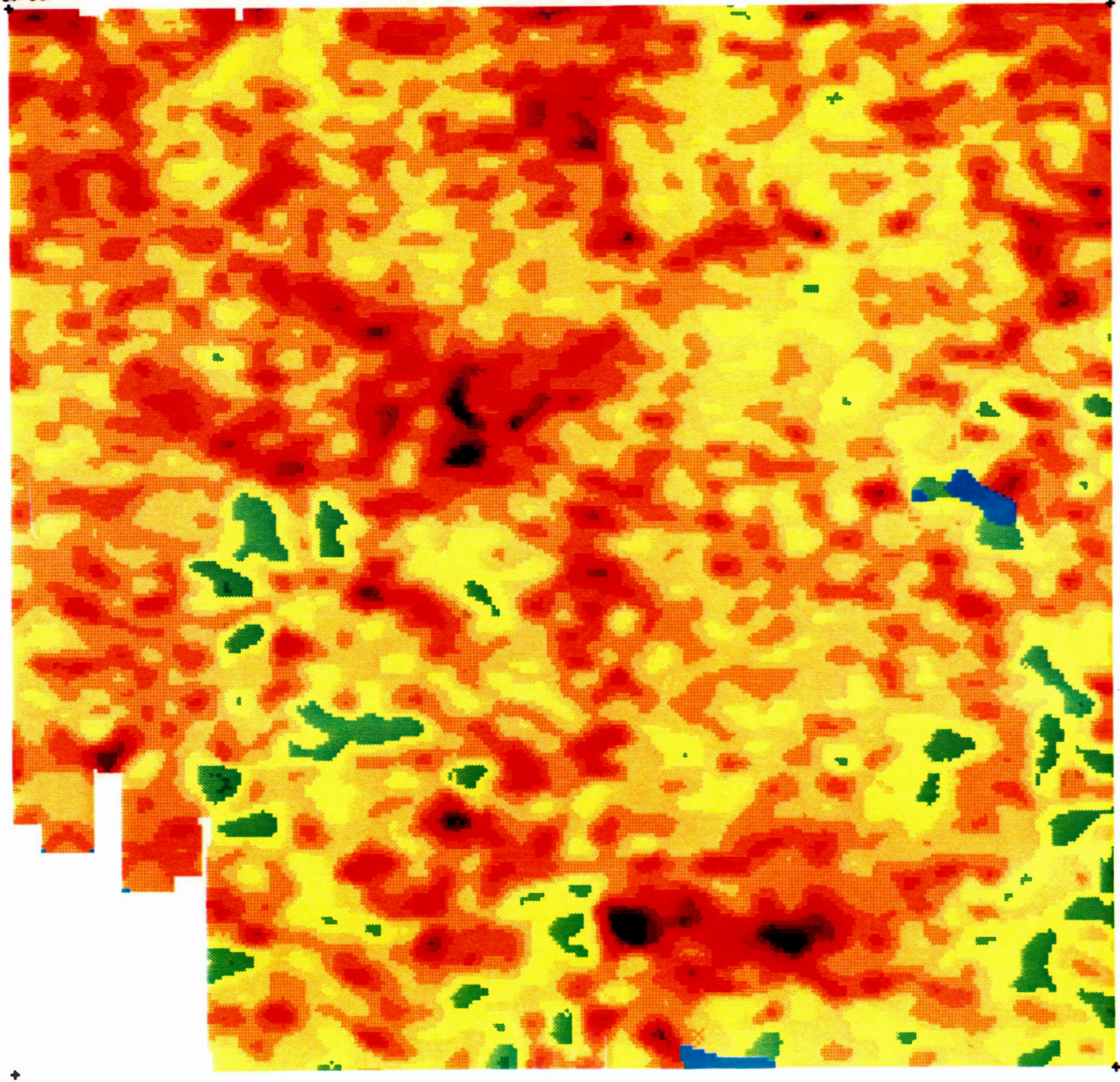
Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

45 10 00

62 37 00

62 26 30
45 17 10



3.3
3.0 – 3.3
2.8 – 3.0
2.5 – 2.8
2.3 – 2.5
2.0 – 2.3
1.8 – 2.0
1.5 – 1.8
1.3 – 1.5
1.0 – 1.3
0.8 – 1.0
0.5 – 0.8
0.3 – 0.5
0.3

Uranium/Potassium (ratio)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

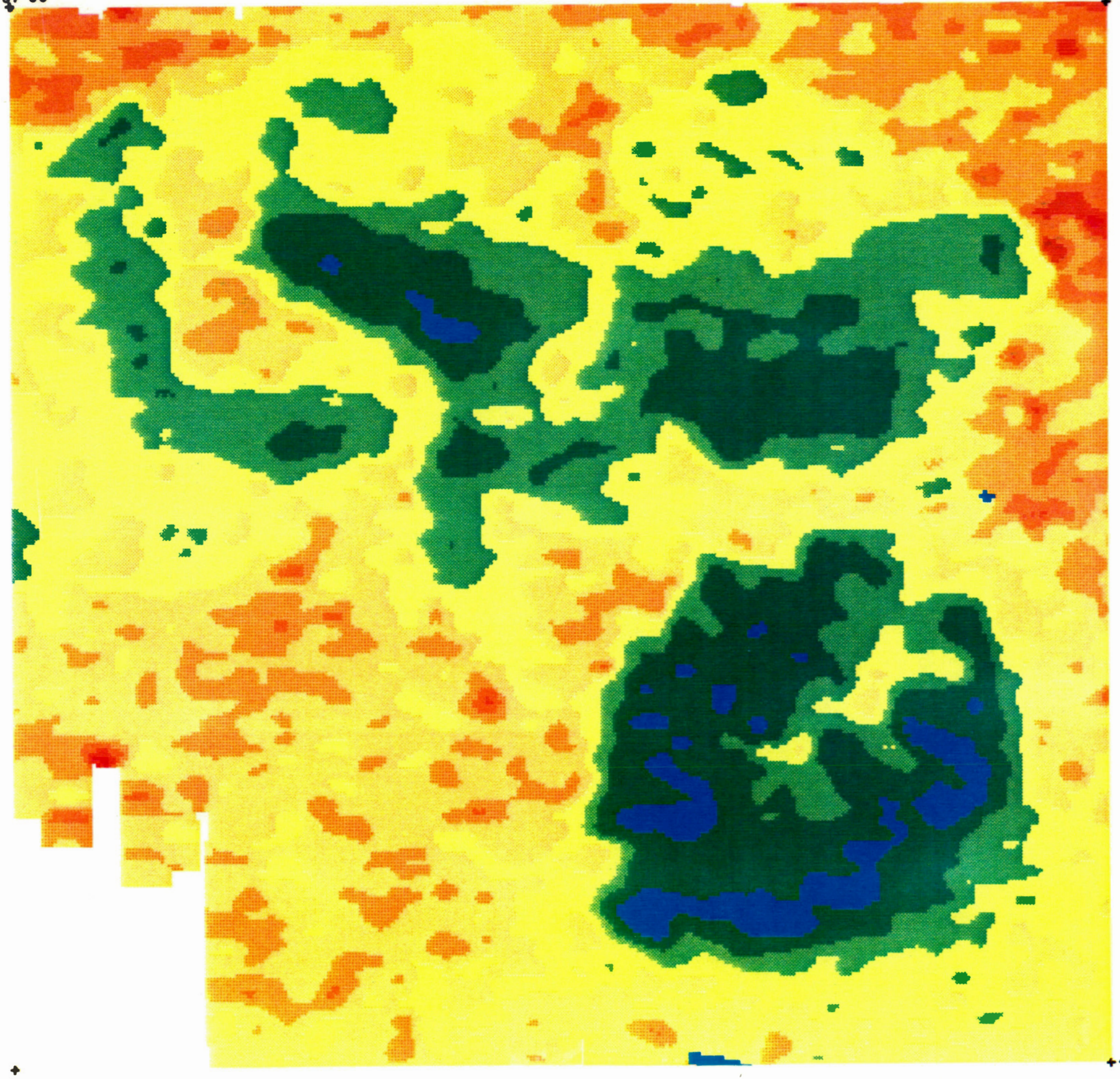
Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

45 10 00

62 37 00

62 26 30
45 17 10



	13.0
12.0 –	13.0
11.0 –	12.0
10.0 –	11.0
9.0 –	10.0
8.0 –	9.0
7.0 –	8.0
6.0 –	7.0
5.0 –	6.0
4.0 –	5.0
3.0 –	4.0
2.0 –	3.0
1.0 –	2.0
	1.0

Thorium/Potassium (ratio)

Eastern Liscomb Pluton

Nova Scotia

11E/1,2,7,8 (Parts of)

Metres 1000 0 1000 2000 3000 4000 Mètres

Yards 1000 0 1000 2000 3000 4000 Verges

45 10 00