

Radioactivity Maps of Nova Scotia

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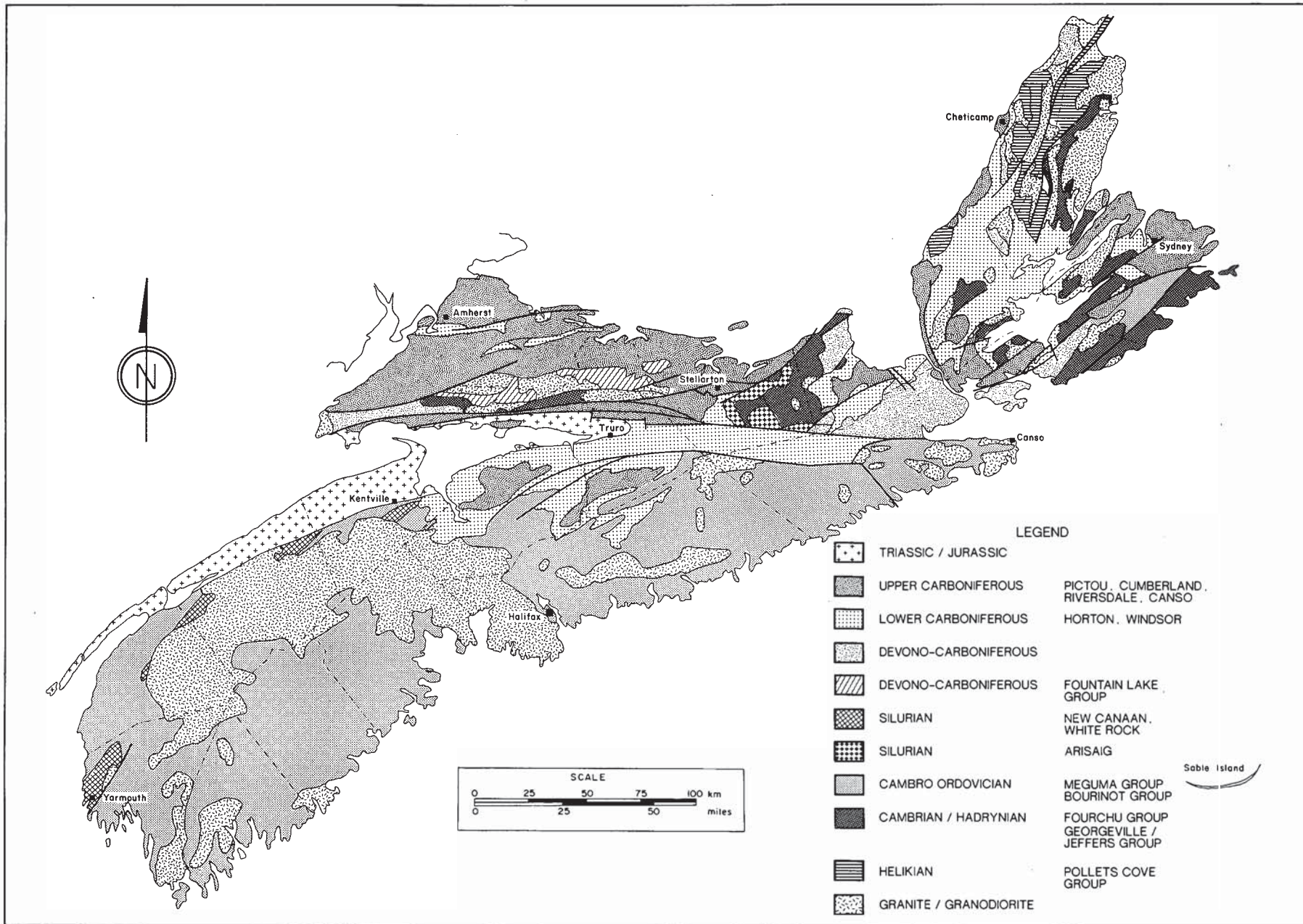
Results of airborne gamma ray spectrometric surveys flown over the province of Nova Scotia by the Geological Survey of Canada between 1976 and 1990 have been published as a series of eight colour maps at 1:2,000,000 scale (Geological Survey of Canada Open File 2375). Four of these maps are reproduced here; the Ternary Radioelement Map, Potassium (pct), equivalent Uranium/equivalent Thorium, and equivalent Thorium/Potassium ratios. Other maps, not reproduced here, are Exposure Rate (uR/hr), equivalent Uranium (ppm), equivalent Thorium (ppm), and equivalent Uranium/Potassium ratio. Most of these data were previously released as 1:50,000-scale black-line contour maps and as a series of eight, 1:500,000-scale colour radioactivity maps of Nova Scotia (Ford *et al.*, 1989). All data were collected using 50 L of sodium iodide detectors flown at a nominal terrain clearance of 120 m, with a ground speed of 190 km/hr and a flight line spacing of 1000 m. Uranium, thorium and potassium counts were measured over one-second intervals. Flight line data were averaged and interpolated to a 250 x 250 m grid. The general principles of airborne gamma ray spectrometric surveying have been recently reviewed by Grasty *et al.* (1991).

Several studies (Ford *et al.*, 1989; O'Reilly *et al.*, 1988; Ford and O'Reilly, 1985) have demonstrated that airborne gamma ray spectrometry is a valuable aid to regional and detailed bedrock and surficial geological mapping and multi-element geochemical exploration in granitic terrains similar to that of the Meguma Zone in southern Nova Scotia. The radioelement distribution patterns as measured by the airborne surveys accurately reflect the relative variations in K, U and Th in the bedrock and surficial materials. Any interpretation for bedrock mapping applications, however, must involve an understanding of the Pleistocene geology. In areas where bedrock radioelement contrasts are reflected in associated overburden, the airborne gamma ray surveys provide excellent predictive tools for mapping both the Pleistocene and bedrock geology. In the granitic rocks of southern Nova Scotia, studies have shown that the radioelement distribution patterns are controlled by variations in magmatic differentiation and by superimposed effects of late- and/or post-magmatic metasomatism and hydrothermal alteration. The ability

of the airborne gamma ray surveys to recognize areas of pervasively altered rocks or cryptic compositional zonation is an important application for granophile-element mineral deposits and, as has been shown in other areas (Charbonneau *et al.*, 1992), some forms of precious and base metal mineralization.

Requests for map products or digital gridded or line data may be directed to any of the authors or to Publications, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8; Telephone (613) 995-4342. The accompanying geological map was supplied by Dr. D. Kontak, Nova Scotia Department of Natural Resources.

- CHARBONNEAU, B.W., SHIVES, R.B.K., and LEGAULT, M. 1992. Application of gamma spectrometry to gold exploration. *In* Geological Survey of Canada, Minerals Colloquium, Program with Abstracts, January 22-24, 1992.
- FORD, K.L. and O'REILLY, G.A. 1985. Airborne gamma ray spectrometric surveys as an indicator of granophile element specialization and associated mineral deposits in the granitic rocks of the Meguma Zone of Nova Scotia. *In* High Heat Production (HHP) Granites, Hydrothermal Circulation and Ore Genesis. Institution of Mining and Metallurgy, St. Austell, Cornwall, England, pp. 113-133.
- FORD, K.L., CARSON, J.M., GRANT, J.A., and HOLMAN, P.B. 1989. Radioactivity Maps of Nova Scotia. Geological Survey of Canada, Geophysical Series Map 35006G, Scale 1:500,000.
- FORD, K.L., MACDONALD, M.A., FINCK, P.W., BONER, F.J., HAM, L.J., HORNE, R.J., COREY, M.C., and GRAVES, R.M. 1989. Airborne gamma ray spectrometry, and bedrock and surficial geology of the Davis Lake Pluton. *In* Mines and Minerals Branch, Report of Activities, 1989, Part A. Edited by D.R. MacDonald and K.A. Mills. Nova Scotia Department of Mines and Energy, Report 89-3, pp. 169-171.
- GRASTY, R.L., MELLANDER, H., and PARKER, M. 1991. Airborne gamma ray spectrometer surveying. International Atomic Energy Agency, Technical Reports Series No. 323, Vienna, 97 p.
- O'REILLY, G.A., COREY, M.C., and FORD, K.L. 1988. The role of airborne gamma ray spectrometry in bedrock mapping and mineral exploration: case studies from granitic rocks within the Meguma Zone, Nova Scotia. *Maritime Sediments and Atlantic Geology*, 24, pp. 47-60.



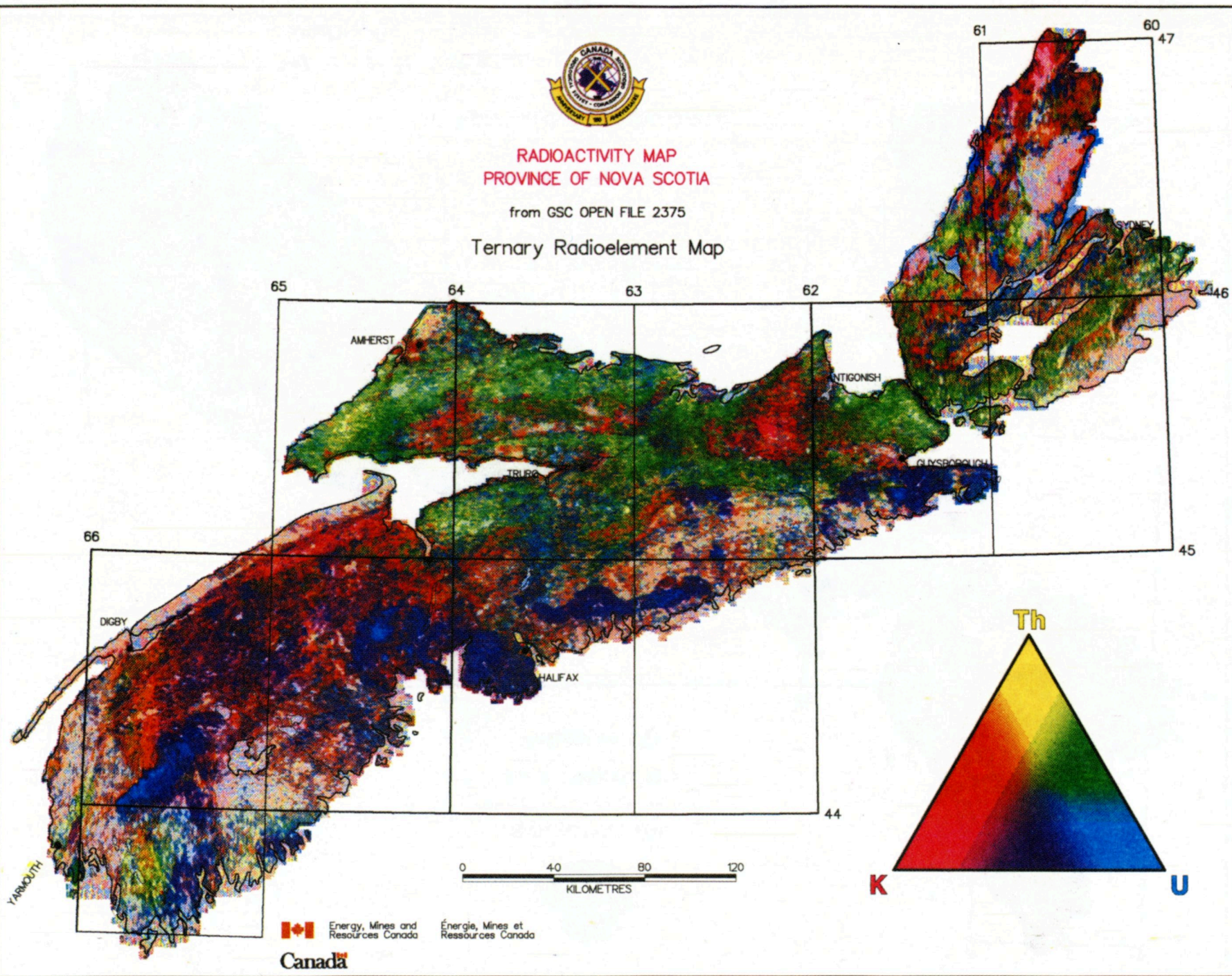
Simplified geological map of the province of Nova Scotia.



**RADIOACTIVITY MAP
PROVINCE OF NOVA SCOTIA**

from GSC OPEN FILE 2375

Ternary Radioelement Map

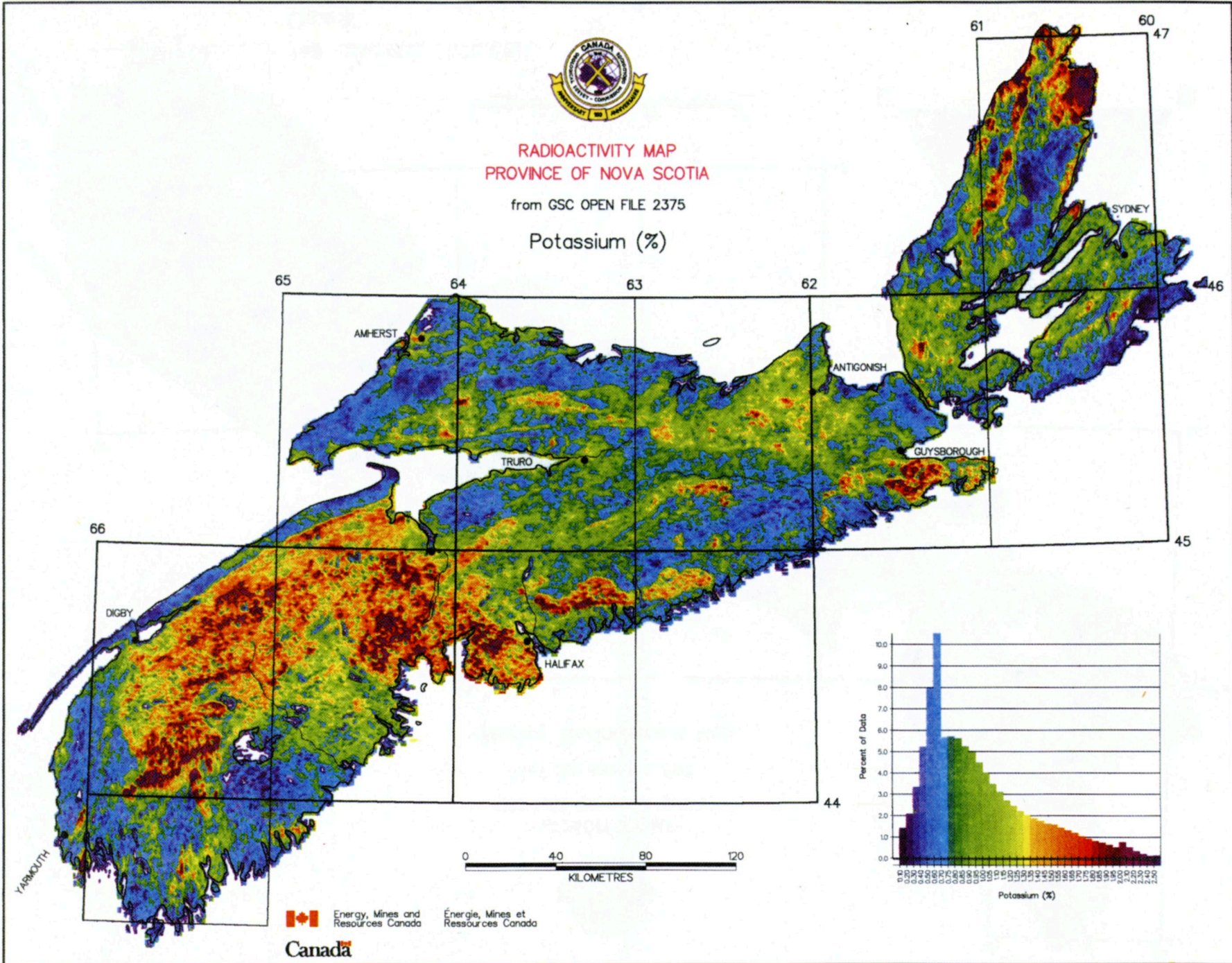




RADIOACTIVITY MAP
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Potassium (%)



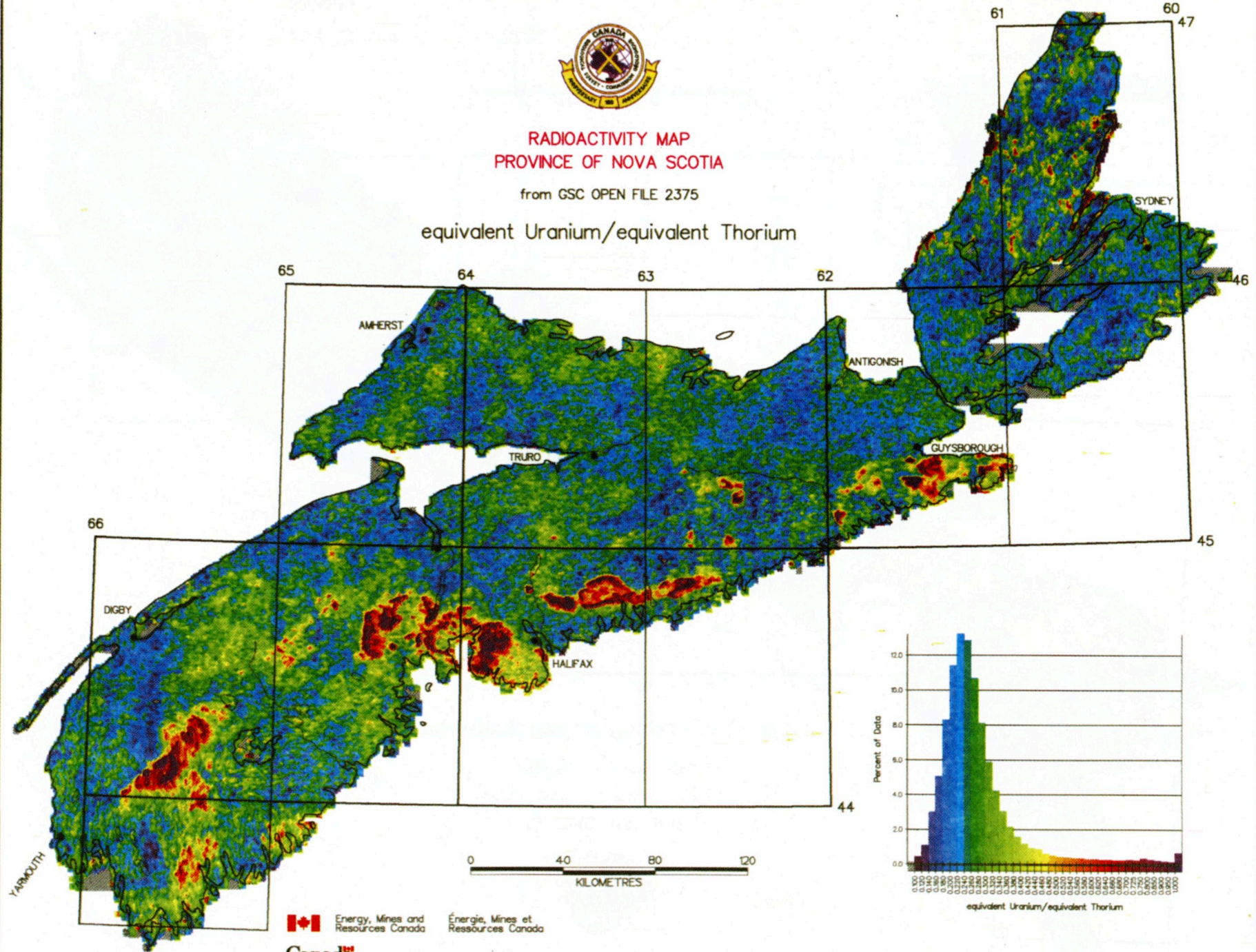
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Canada



RADIOACTIVITY MAP
PROVINCE OF NOVA SCOTIA

from GSC OPEN FILE 2375

equivalent Uranium/equivalent Thorium





RADIOACTIVITY MAP
PROVINCE OF NOVA SCOTIA

from GSC OPEN FILE 2375

equivalent Thorium/Potassium ($\times 10^4$)

