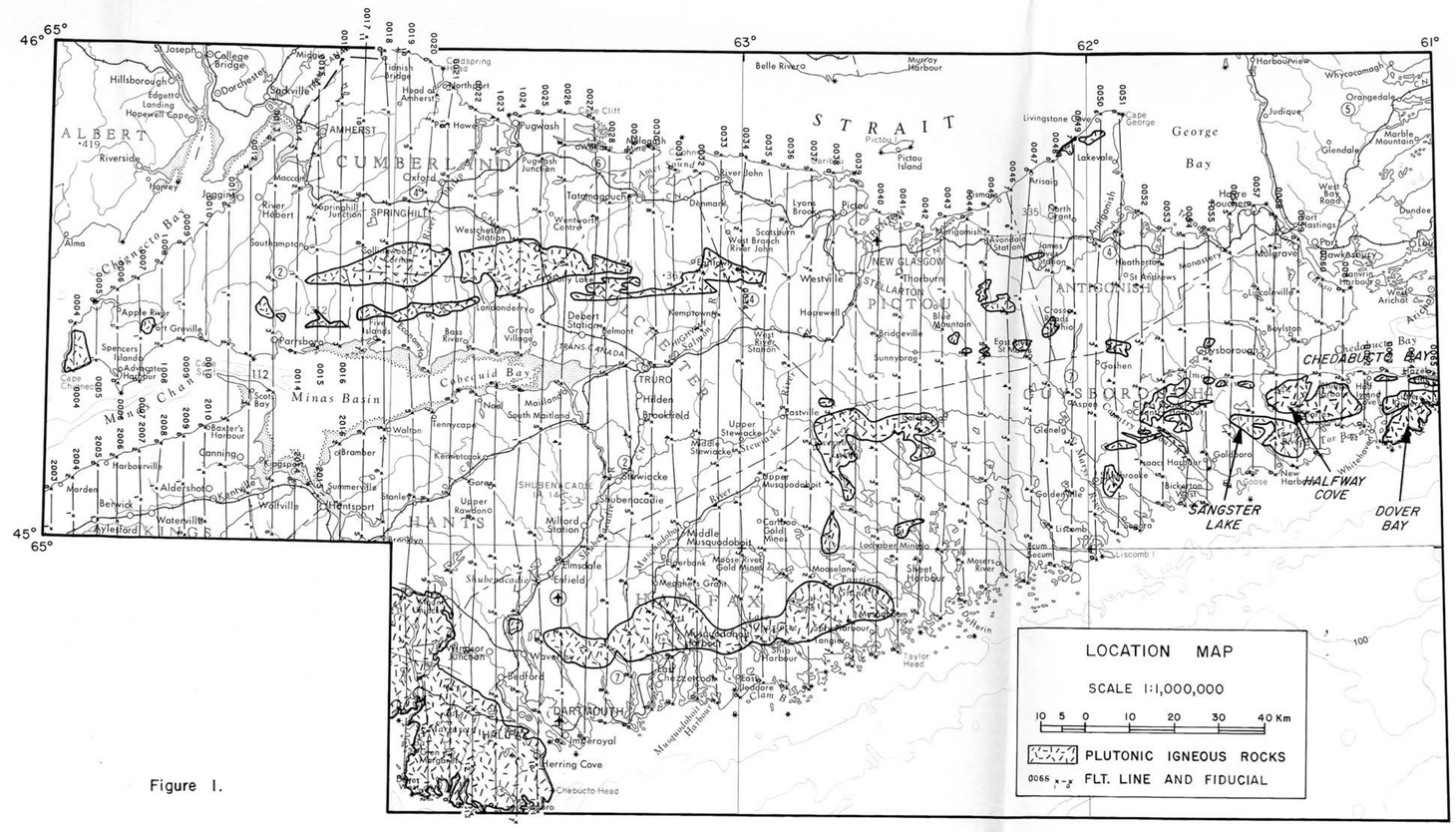

Figure 1.

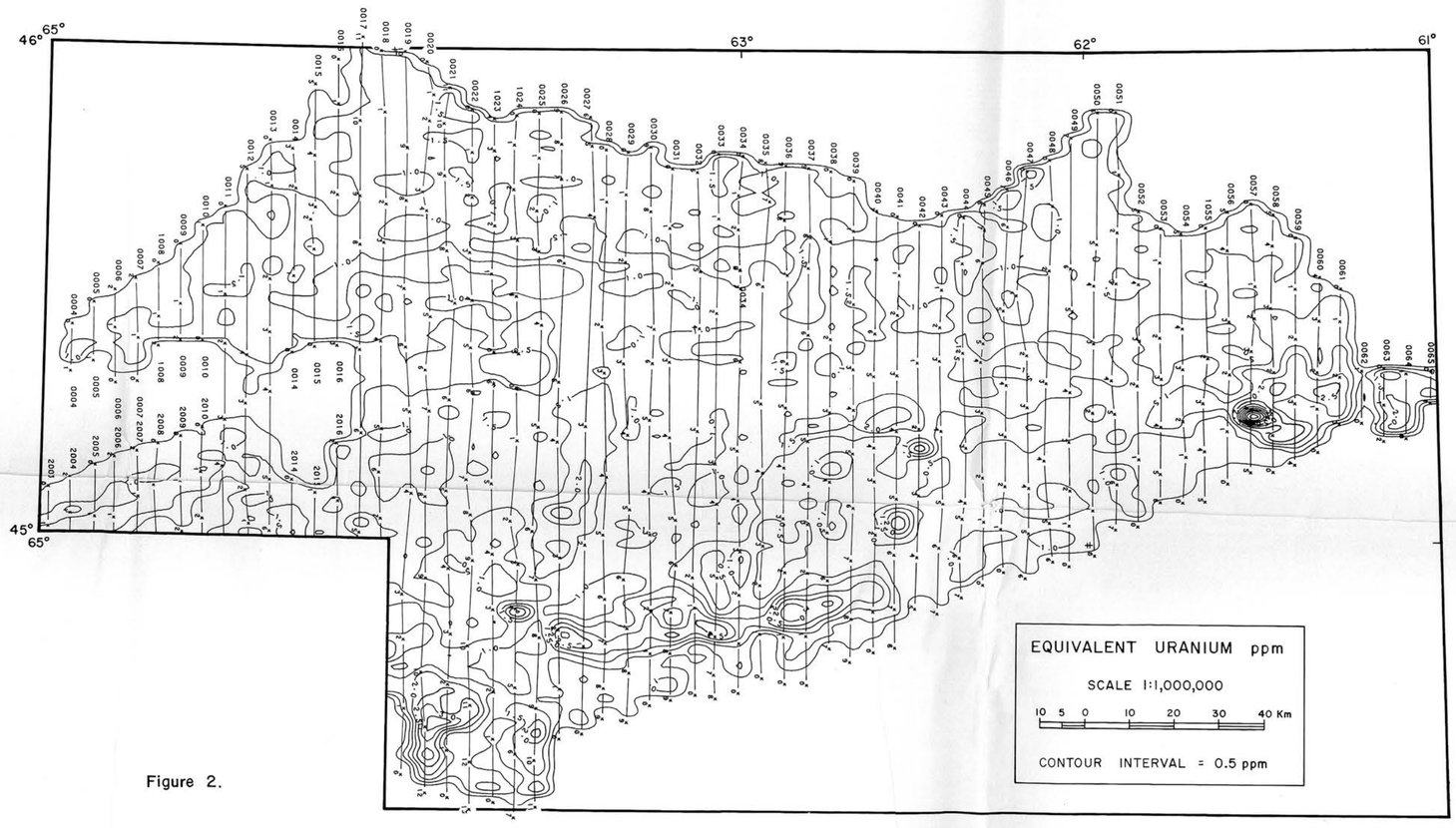

Figure 2.

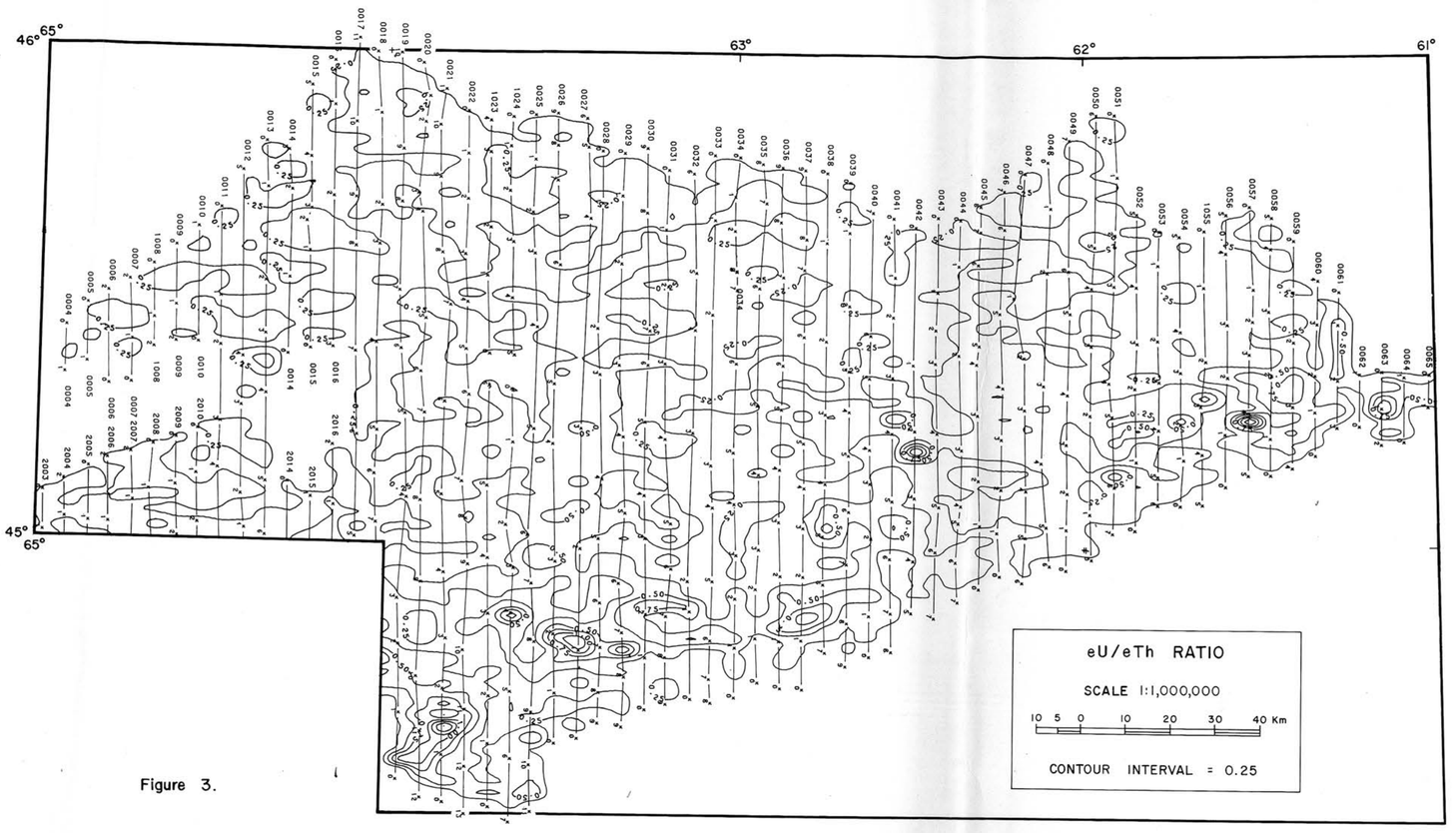

Figure 3.

TABLE 1

Representative Chemical Analyses
from the Chedabucto Bay Area Granites

Sample Number	Sangster Lake				Halfway Cove			Dover Bay	
	NS-135	NS-139	NS-148	NS-148A	NS-158	NS-161A	NS-167	NS-169	NS-174
SiO_2 (%)	71.30	76.30	72.30	67.90	70.50	72.40	69.30	72.20	73.20
TiO_2	.17	.15	.02	.11	.29	.15	.45	.27	.10
Al_2O_3	17.00	13.80	17.00	18.90	15.40	15.00	16.20	14.40	15.10
Fe_2O_3	.40	.50	.30	1.30	.70	.90	.40	.00	.80
FeO	1.10	.70	.30	.80	1.20	.20	2.30	1.90	.30
MnO	.06	.06	.03	.23	.06	.03	.11	.02	.03
MgO	.34	.31	.03	.37	.58	.28	1.08	.39	.17
CaO	.47	.32	.14	.25	.51	.54	1.97	.51	.40
Na_2O	4.20	3.60	4.10	3.90	3.10	3.40	3.50	3.00	3.60
K_2O	4.19	3.49	4.12	4.29	4.77	4.62	3.51	5.29	4.62
H_2O	1.00	.80	1.00	1.00	.80	.60	.50	.40	.30
CO_2	.10	.30	.40	.20	.50	.20	.40	.20	.20
P_2O_5	.48	.36	.34	.36	.33	.37	.15	.23	.34
TOTAL	100.9	100.8	100.2	99.7	98.9	98.9	100.1	98.9	99.4
Sr (ppm)	50	50	80	50	100	100	160	100	50
Ba	50	70	20	40	380	310	430	470	80
Rb	510	310	600	540	300	250	200	240	360
Zr	60	40			70	50	110	80	30
F	1000	600	400	700	500	400	400	200	500
Cl	300	400	200	400	500	200	500	300	200
Li	362	242	81	168	185	49	134	35	89
Cs	90.0	34.0	22.0	30.0	40.0	8.8	8.1	2.4	6.6
Nb	20	10	26	42	7	3	2	4	6
Sn	31	15	42	47	11	15	6	5	10
U(*)	16.7	10.2	9.2	21.0	6.8	5.7	5.1	4.4	3.0
Th(*)	4	4	1	2	7	4	11	16	4
U/Th	4.17	2.55	9.20	10.50	.97	1.42	.46	.27	.75
eU(**)	17.5	10.9	9.0	30.7	6.4	9.0	5.0	5.2	6.1
eTh(**)	5.3	4.3	1.4	2.3	9.8	8.8	11.2	22.5	5.4
eU/eTh	3.28	2.51	6.44	13.50	.65	1.02	.45	.23	1.13

Analytical Methods

(*) Analysis by delayed neutron counting.

(**) Analysis by in-situ gamma-ray spectrometry.

Major and minors, Sr, Rb, Ba, Zr, Sn, Nb analyzed by x-ray fluorescence, F by fusion and specific-ion electrode, Cl by colorimetric methods, Li and Cs by atomic absorption.

GEOLOGICAL SURVEY OF CANADA — COMMISSION GÉOLOGIQUE DU CANADA

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

PRELIMINARY AIRBORNE GAMMA RAY SPECTROMETRIC MAPS AND GROUND INVESTIGATIONS, CENTRAL NOVA SCOTIA

N.T.S. 11D,E. Parts of 11F and 21H

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Resource Geophysics Subdivision
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Preliminary airborne gamma ray spectrometric data covering N.T.S. sheets 11L and E. and parts of N.T.S. sheets 11F and 21H over mainland Nova Scotia are presented here as 1:1,000,000 scale contour maps of equivalent uranium concentration and eU/eTh ratio. Stacked profiles for two of the survey flight lines showing magnetometer, total count, potassium, equivalent uranium, equivalent thorium, eU/eTh, eU/K, eTh/K and associated altimeter traces are also included.

The survey, wholly funded by the Federal Department of Energy, Mines and Resources was flown in 1978 using the GSC high sensitivity airborne gamma-ray spectrometer system with 12 (102 mm x 102 mm x 406 mm) NaI(Tl) detectors. The survey was flown at a nominal air speed of 190 km/hr and at a planned terrain clearance of 120 meters with a flight line spacing of 5 kms.

The radiometric maps are presented in this preliminary form along with two selected profiles to illustrate the use of the radioelement distribution patterns to distinguish and delineate various granitic phases in Nova Scotia. This facilitates the recognition of potential host areas for various economic minerals such as tin, tungsten, and niobium as well as uranium.

Ground investigations were conducted mainly in the Chedabucto Bay region at the eastern edge of the survey area (Figure 1). These investigations included brief visits to a number of granitic bodies in the area to measure, by in-situ gamma-ray spectrometry, the radioelement contents and to collect a representative suite of samples for chemical and petrographic analysis.

Table 1 illustrates the geochemical composition of a small suite of granitic rocks of the Chedabucto Bay area and shows the considerable and significant variation between and within the individual granitic bodies. The locations of the various granitic bodies sampled are shown in Figure 1.

The equivalent uranium map (Figure 2) and the eU/eTh ratio map (Figure 3) show the Sangster Lake granite to have significantly higher values compared to the Halfway Cove, Dover Bay and other bodies in the Chedabucto Bay area. In-situ gamma-ray spectrometric analyses confirming this variation are shown in Tables 1 and 2. Table 2 is a compilation of in-situ gamma-ray spectrometric measurements taken on the various granites of the Chedabucto Bay area. The Sangster Lake granite has high equivalent uranium, and low equivalent thorium contents compared to other granites of the area, and relative to the average crustal abundance for granitic rocks of 4 ppm U and 20 ppm Th (Clark et al. 1966).

The high eU/eTh ratio of the Sangster Lake granites seems to be characteristic of several granitic bodies in Nova Scotia, in particular some of the two-mica adamellite phases of the South Mountain Batholith (Chatterjee and Muecke, 1980; Geol. Surv. Can., 1977). Various workers in the South Mountain Batholith (Chatterjee and Muecke, 1980; McKenzie and Clarke, 1975) have noted that the younger more differentiated phases of this batholith tend to have a high eU/eTh ratio due to increased uranium and decreased thorium contents compared with the older less differentiated phases. This trend of uranium enrichment and thorium depletion also occurs in the Chedabucto Bay area with the more differentiated Sangster Lake granite having a much higher eU/eTh ratio. Table 1 also shows that the Sangster Lake granite is depleted in Sr, Ba and Zr and enriched in Rb, Li and Cs. Also of particular significance are the high Nb and Sn concentrations associated with the high eU/eTh ratio phases.

This variation of uranium and thorium contents resulting in some phases (usually the more differentiated) having very high eU/eTh ratios is particularly well illustrated on the profiles in Figures 4A and 4B. Even within the same granite body the radioelement content can be extremely variable as suggested on Figure 4B. Figures 2 and 3 indicate other granitic bodies within the survey area with features similar to the Sangster Lake granite.

The results included here from the Chedabucto Bay area are part of a regional interpretation of the airborne radiometric patterns of Nova Scotia and New Brunswick. The results of this study are currently being prepared for publication (K.L. Ford, in preparation).

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TABLE 2

Average Radioelement Content of Chedabucto Bay Area Granites
Measured by In-Situ Gamma Ray Spectrometry

Location		No. of Values	eU (ppm)	eTh (ppm)	eU/eTh
Sangster Lake	A	20	12.0	5.1	2.40
	B	5	24.1	2.6	9.00
	AVERAGE		14.5	4.6	3.72
Halfway Cove	A	11	6.6	9.6	0.70
Dover Bay	A	5	5.3	17.6	0.33
	B	4	4.6	6.9	0.75
	AVERAGE		4.9	11.6	0.56

A - muscovite-biotite granite.

B - minor muscovite-rich phases with some quartz viens.