
 GEOLOGICAL SURVEY OF CANADA
 DEPARTMENT OF ENERGY, MINES AND TECHNOLOGY
AIRBORNE RADIOACTIVITY MAP
DISTRICT OF MACKENZIE
NORTHWEST TERRITORIES
86A,B,C,F,G,H
URANIUM

Airborne gamma-ray spectrometry data collected by the Geological Survey of Canada in the District of Mackenzie, N.W.T., in the summer of 1972 are presented as 7 contour maps and profiles along 47 flight lines. A geological map of the area, compiled by J. Holman and showing the location of the survey flight lines accompanies this Open File Release.

Airborne radioactivity measurements were made using a four-window spectrometer, with 12, 22.86 cm by 10.16 cm NaI(Tl) detectors, flown at a mean terrain clearance of 100 metres and 150 km/hour. Uranium, thorium and potassium counts were measured over 2-second intervals; isotopic counts over 0.5-second intervals. Each uranium, thorium and potassium measurement relates to the closest concentration in the uppermost 30 centimetres of a surface roughly 200 metres wide and 300 metres along the flight line.

The data have been corrected for background, height variation and Compton scattering. The computer program used to produce the contour maps and profiles are described by R. L. Grady, 1972, "Airborne Gamma Spectrometry Data Processing Manual", GSC Open File No. 108.

Values shown on the maps and profiles represent counts per 2.5 seconds. (Integral counts per 0.5 seconds). For this survey an approximate ground concentration can be obtained using the following relations:

- 1 ppm Uranium = 21 counts
- 1 ppm Thorium = 8 counts
- 1 Potassium = 157 counts

With the wide (5 km.) flight line spacing, data along the flight lines were averaged over 20 points (2.5 km) and the effect of background count rates over lakes was removed in order to produce contour maps of integral Uranium, Thorium and Potassium distribution. Some of the data were removed for the contour maps, as counting counts along the flight lines to accumulate a minimum of 500 counts per peak before calculating the value of the ratio. As a result of these smoothing techniques the contour maps show the regional radioactivity distribution pattern, with detailed information applicable to exploration can be seen on the profiles.

The integral uranium, thorium and potassium contour maps all show similar patterns with high levels of radioactivity west of the Simpson fault zone in the Barren and Slave Provinces, and lower levels east of the fault. In the Barren and Slave Provinces, highest regional radioactivity concentrations relate to coarse granitic gneisses of the Great Slave Batholith. The three ratio maps show four prominent anomalies. The U/Pu ratio generally is below the 0.5 contour level (U/Pu concentration ratio = 0.21) and only a few locations on the map exceed a value of 0.6 (U/Pu concentration ratio = 0.28). In 1972 one such location was found near the southeast corner of Bay 20.

The unsmoothed profile data were detailed information and show several anomalies. Four horizons of four wide, which may indicate zones of mineralization. For example, on flight line 28 west between fiducials 6 and 7, an increase in uranium occurs with a high U/Pu ratio and a U/Pu value of 1.25 (U/Pu concentration ratio = 0.5).

Similar type anomalies (high uranium, U/Pu and U/Pu) occur on:

- Flight Line 30 west near fiducial 5
- Flight Line 32 west near fiducial 13
- Flight Line 27 East near fiducial 1
- Flight Line 45 west between fiducials 8 and 9.

Several less prominent anomalies of this type, such as:

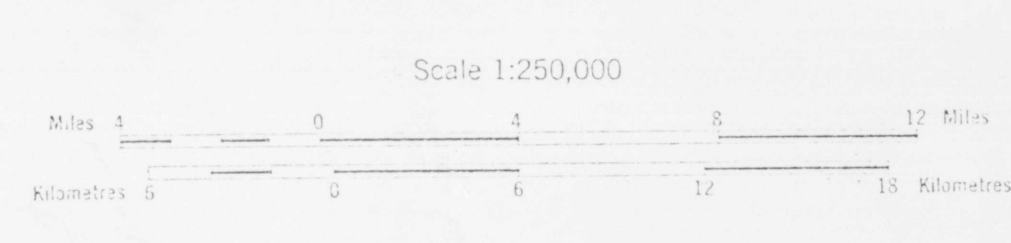
- Flight Line 23 west near fiducial 11
- Flight Line 38 west between fiducials 13 and 16
- Flight Line 29 west between fiducials 4 and 5

may also be significant.

A second type of anomaly, characterized by high uranium and thorium ratios, with little increase in the U/Pu ratio, can be seen on:

- Flight Line 21 west east of fiducial 4
- Flight Line 28 east between fiducials 4 and 5
- Flight Line 38 west between fiducials 5 and 6

Airborne Radioactivity Survey 1972
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