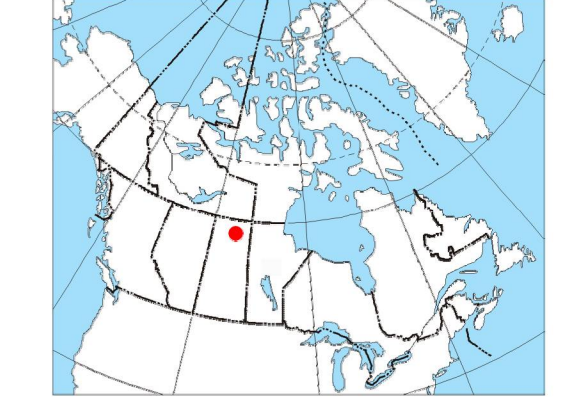


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GEOPHYSICAL SERIES / SÉRIE DES CARTES GÉOPHYSIQUES AIRBORNE GEOPHYSICAL SURVEY OF THE NORTHWESTERN ATHABASCA BASIN, SASKATCHEWAN / LEVÉ GÉOPHYSIQUE AÉROPORTÉ DE LA PARTIE NORD-OUEST DU BASSIN ATHABASCA, SASKATCHEWAN

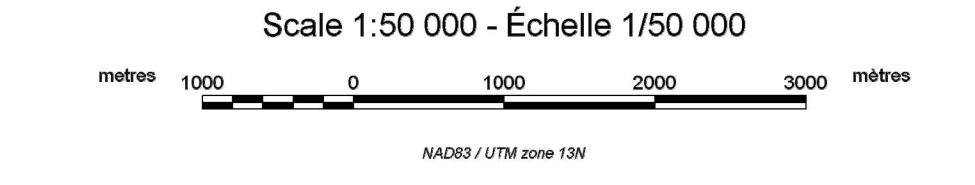
URANIUM

Authors: Fortin, R., Coyle, M., Buckle, J., Hefford, S.W. and Delaney, G.

Data acquisition, compilation and map production by Gaisuk Airborne Survey, Saskatoon, Saskatchewan. Contact and project management by the Geological Survey of Canada, Ottawa, Ontario.

Auteurs : Fortin, R., Coyle, M., Buckle, J., Hefford, S.W. et Delaney, G.

L'acquisition, la compilation des données ainsi que la production de cette carte furent effectuées par Gaisuk Airborne Survey, Saskatoon, Saskatchewan. Le gestion et le suivi du projet furent effectués par la Commission géologique du Canada, Ottawa, Ontario.



Vertical datum: North American Datum 1983 / Projection: Universal Transverse Mercator / Datum: North American Datum 1983

Digital versions of this map, corresponding digital point and gridded data, and similar data for adjacent aeromagnetic and gamma-ray spectrometric surveys can be downloaded, at no charge, from Natural Resources Canada's Geoscience Data Repository at <http://tdr.nrc.ca>.

On peut télécharger gratuitement, depuis l'Empire de données géophysiques de Ressources naturelles Canada à l'adresse Web <http://tdr.nrc.ca>, des versions numériques de cette carte, des données numériques correspondantes en format griddé et en format points, ainsi que des données similaires issues des levés aéromagnétiques et spectrométriques adjacents. On peut se procurer les versions imprimées, respectivement des cartes, les coordonnées ou l'Empire de données géophysiques de la Commission géologique du Canada, 615, rue Booth, Ottawa (Ontario) K1A 0E8. Téléphone: (613) 995-5200; courriel: info@gsg.nrc.gc.ca.

Introduction
A quantitative gamma-ray spectrometric and aeromagnetic survey of the Northwest Athabasca Basin, Saskatchewan, was completed by Gaisuk Airborne Survey. The survey was from June 26 to September 21, 2011 using two F4U-210 aircraft (C-CUBA, C-CUBB) and one Cessna Caravan (C-GLDX). The control lines and control line spacings were, respectively, 400 m and 240 m, and the aircraft flew at a nominal terrain clearance of 125 m at an altitude between 200 and 270 m. Transverse lines were oriented 135° with respect to the control lines. The flight path was corrected following post-flight georeferencing corrections to the data recorded by a Global Positioning System.

Gamma-ray Spectrometric Data
The airborne gamma-ray measurements were made with a Radiation Systems RS-500 gamma-ray spectrometer using Kurrier 152x102x606 mm NaI (Tl) crystals. The main detector array consisted of twelve crystals (total volume 54 litres). Two crystals (total volume 8.4 litres), shielded by the main array, were used to detect variations in background radiation caused by atmospheric radon. The system consisted of a radon detector for each crystal, and using a Gaussian level-gate algorithm, adjusted the gain for each crystal.

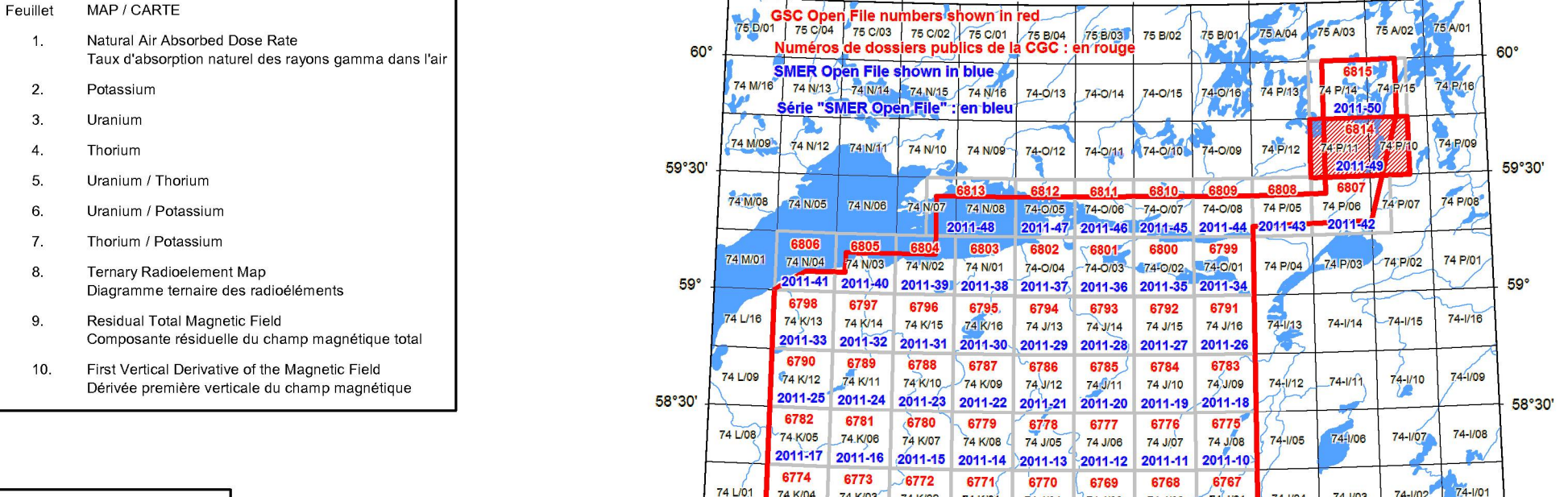
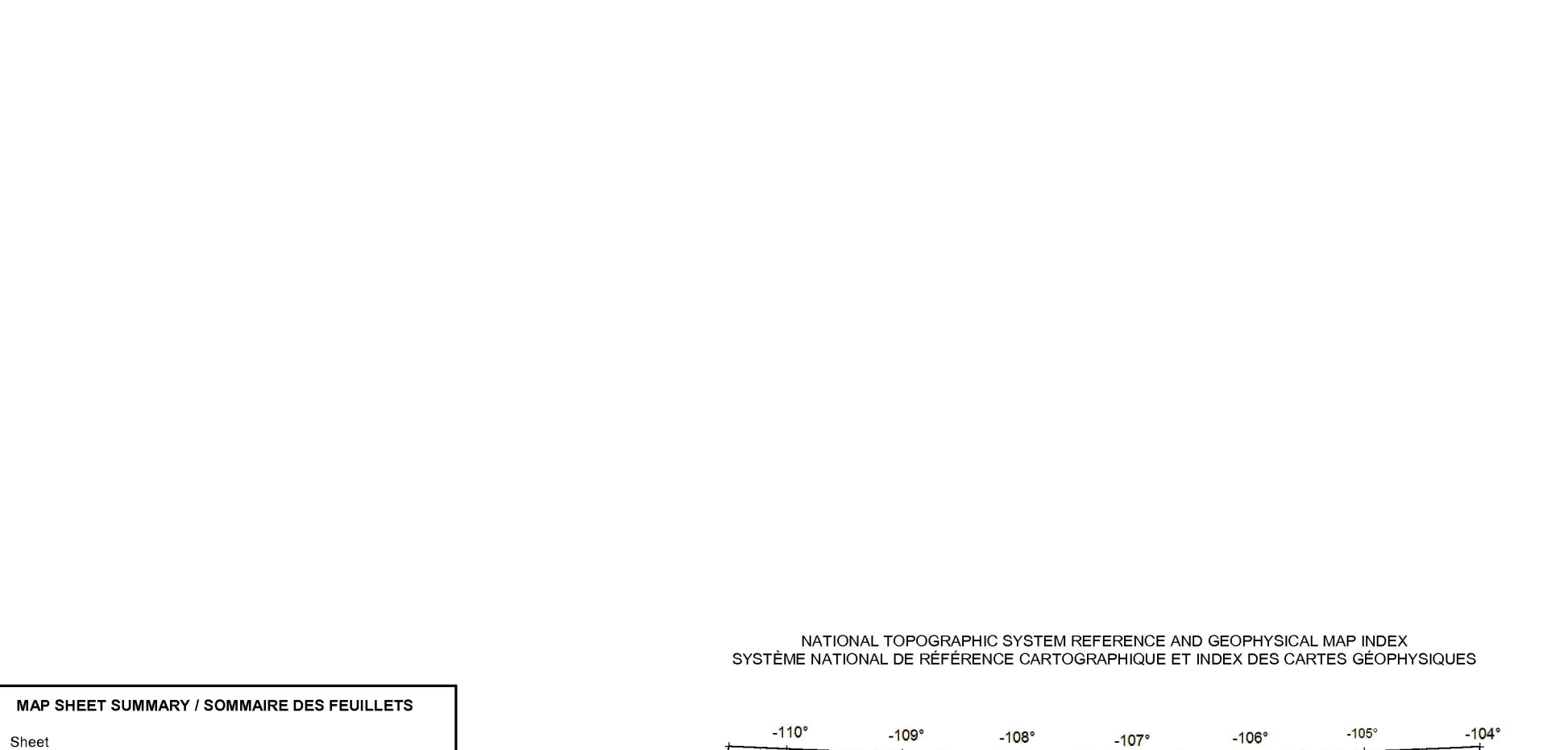
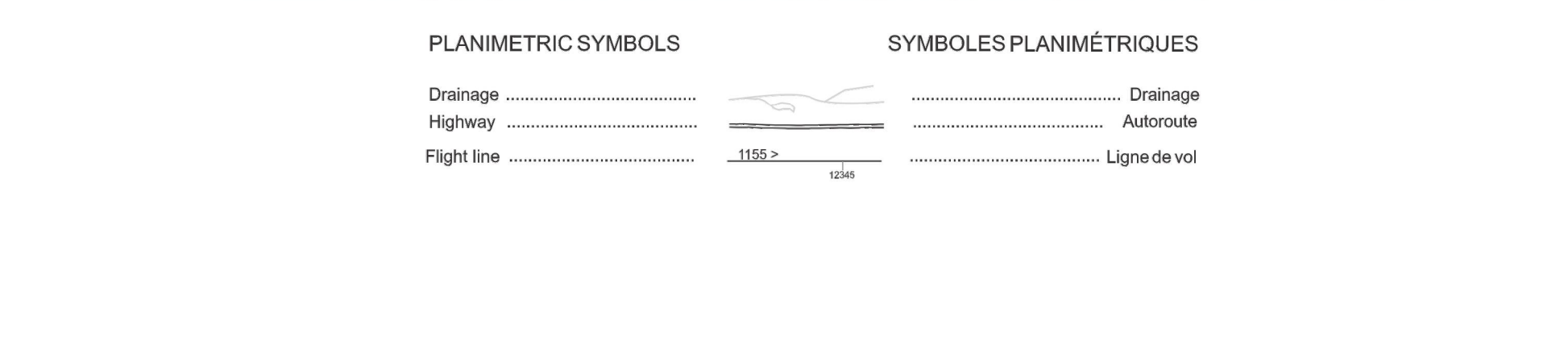
Potassium and Thorium
Potassium and thorium are measured indirectly from the gamma-ray photons emitted by their daughter products (Bi-214 for potassium and Th-232 for thorium). Although these daughters are far from their respective decay chains, they are assumed to be in equilibrium with their parents. The gamma-ray spectrometric measurements of potassium and thorium are, respectively, 1370-1570 keV and 2615-2940 keV. The energy window used to measure potassium, uranium and thorium are, respectively, 1370-1570 keV, 1660-1860 keV and 2410-2810 keV.

Gamma-ray spectra were recorded at one-second intervals. Data processing followed standard procedures as described in IAEA, 1991 and IAEA, 2003. During processing, the spectra were energy calibrated and were then converted into the standard units. Counts from the radon detectors were recorded in a 1600-1860 keV window and radiation at energies greater than 3000 keV was recorded in the cosmic window. The window counts were corrected for dead time, background activity from cosmic radiation, radon activity of the air and atmospheric radon progeny, and the activity of the ground, sea and ocean. Corrections for deviations from the planned terrain clearance and for variations in temperature and pressure were made prior to conversion to ground concentrations of potassium, uranium and thorium using factors determined from flights over the Danvers, Saskatchewan test area in 1998. The factors for potassium, uranium, and thorium are listed in Table 1.

Table 1. Gamma Ray Spectrometer Sensitivities for each aircraft. Columns include C-CUBA, C-CUBB, C-GLDX for Potassium (ppm%), Uranium (ppm), and Thorium (ppm).

Corrected data were filtered and interpolated to a 100 m grid interval. The results of an airborne gamma-ray spectrometry survey represent the average surface concentrations that are influenced by varying amounts of outcrop, vegetation cover, soil moisture and surface water. As a result the measured concentrations are usually lower than the actual bedrock concentrations. The total air absorbed dose rate in mR/hour per hour was produced from measured counts between 400 and 2510 keV.

Magnetic Data
The magnetic field was sampled 10 times per second using a split-beam cesium vapour magnetometer (sensitivity = 0.005 nT) rigidly mounted to the aircraft. Differences in magnetic values at the locations of control and survey lines were not interpolated. The level of the magnetic field was 21 September 2010, before of two entire F4U-210 aircraft (C-CUBA, C-CUBB) and one Cessna Caravan (C-GLDX). The International Geomagnetic Reference Field (IGRF) defined at the average GPS altitude of 510 m for the year 2010.01 was then removed. Removal of the IGRF for aeromagnetic mapping is the standard practice in the Earth Sciences Sector.



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This document is available in French and English. The English version is the authoritative one.