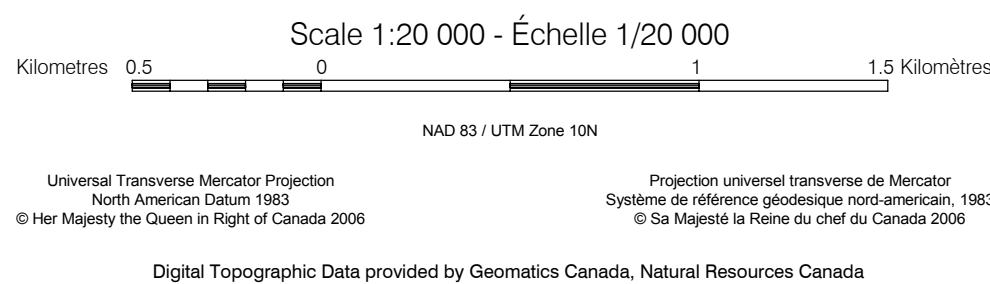




NATURAL AIR ABSORBED DOSE RATE



**OPEN FILE
DOSSIER PUBLIC**

5286

**GEOLOGICAL SURVEY OF CANADA
GÉOLOGIQUE DU CANADA**

2006

SHEET 1 OF 10

Open files are products that have not gone through the GSC formal publication process.

Les dossiers publics sont des produits qui n'ont pas été soumis au processus officiel de publication de la GGC.

COMMISSION GÉOLOGIQUE DU CANADA

High Sensitivity Airborne Gamma-Ray Spectrometric and Aeromagnetic Surveys
Central British Columbia, 2004 - 2006

In 2004 and 2005, Fugro Airborne Surveys completed nine multi-sensor airborne geophysical surveys in the central region of British Columbia for The Geological Survey of Canada, the British Columbia and Yukon Chamber of Mines, Yekochie First Nation, and five industry partners, including Searex Resources Inc., Vankeo Hot Minerals Ltd., Richfield Ventures Corp., GWR Resources Inc., and Arreco Resources Ltd. The Geological Survey of Canada provided survey supervision and control. The purpose of the surveys was to obtain geophysical, gamma-ray spectrometric and aeromagnetic data. The surveys were flown over two seasons, from September 18 to September 17, 2004 and June 15 to August 8, 2005 using Astar 350-B2 and 350-B3 helicopters. © GECI, and C-FGSC.

Gamma-ray Spectrometric Data

Gamma-ray Spectrometric Data

The airborne gamma-ray measurements were made with an Explorerium GREGO gamma-ray spectrometer using nine $102 \times 102 \times 406$ mm NaI (Tl) crystals. The main detector array consisted of eight crystals (total volume 33.6 litres). One crystal (total volume 4.2 litres), shielded by the main array, was used to detect variations in background radiation caused by atmospheric radon. The system constantly monitored the natural potassium peak for each crystal, and using a Gaussian least squares algorithm, adjusted the gain for each crystal.

Potassium is measured directly from the 1460 keV gamma-ray photons emitted by ^{40}K , whereas uranium and thorium are measured indirectly from gamma-ray photons emitted by daughter products (^{214}Pb for uranium and ^{208}Tl for thorium). Although these daughters are far down their respective decay chains, they are assumed to be in equilibrium with their parents; thus gamma-ray spectrometric measurements of uranium and thorium are referred to as equivalent uranium and equivalent thorium, i.e. eU and eTh. The energy windows used to measure potassium, uranium and thorium are:

Potassium (^{40}K) 1390 - 1590 keV
Uranium (^{234}Bq) 1690 - 1890 keV
Thorium (^{232}Th) 2410 - 2810 keV

Gamma-ray spectra were recorded at one-second intervals at a planned mean clearance of 120m or 300m depending on the survey area and an air speed of 125km/h. The total, potassium, uranium and thorium window counts were derived from the recorded 256 channel spectra. During processing, the spectra were energy calibrated, and counts were accumulated into the windows shown in Figure 1 above. Counts from the radiation detectors were recorded on a 1600 x 1600 grid. The window counts were corrected for dead time, and for background activity from cosmic radiation, the radioactivity of the aircraft and atmospheric radon decay products. The window data were then corrected for spectral scattering in the ground, air and detectors. Corrections for deviations of the aircraft from the planned flight altitude, and for variations of temperature and pressure were made prior to conversion to ground concentrations of potassium, uranium and thorium, using factors determined from flights over a calibration range near Ottawa.

Potassium 57.3 cps/% (2004) 56.9 cps/% (2005)
Uranium 6.7 cps/ppm (2004) 6.4 cps/ppm (2005)
Thorium 3.6 cps/ppm (2004) 3.7 cps/ppm (2005)

Corrected data were filtered and interpolated to a 100m grid for the 1:250 000 scale maps and to a 50m grid for the 1:200 000 and 1:50 000 scale maps. The results of an airborne gamma-ray spectrometer survey represent the average surface concentrations that are influenced by varying amounts of outcrop, overburden, vegetation cover, soil moisture and surface water. As a result, the measured concentrations are usually lower than the actual bedrock concentration. The total air absorbed dose rate in nanograys per hour was produced from measured counts between 410 and 2810 keV.

Magnetic Data

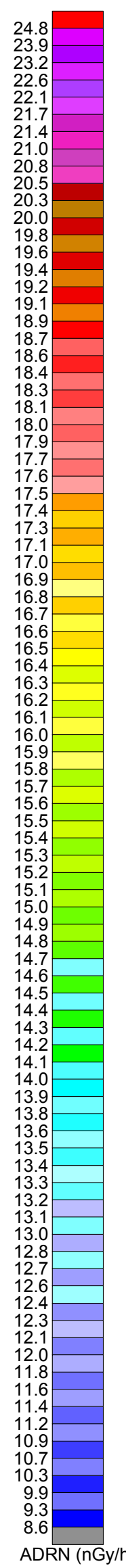
The helicopter was equipped with a Scintrex CS-2 cesium vapour magnetic sensor mounted in a HM1 high-resolution single sensor stinger mounted system. The system recorded readings every 0.1 seconds with a noise level of less than 0.01 nT. Magnetic interferences caused by aircraft maneuvers were compensated using an RMS ADCII Magnetic compensator. Diurnal variations and GPS fluctuations were recorded using a Fugro CFI base station.

After editing the survey data, the intersections of traverse and control lines were determined and the differences in the magnetic values were computed, analyzed and manually verified to obtain the leveling network. The International Geomagnetic Reference Field was calculated and removed using a fixed date of October 19, 2004 and an altitude of the differentially corrected GPS height for each data point. The corrected magnetic data was interpolated to a 50m grid using a minimum curvature algorithm. The first vertical derivative grid was calculated from the corrected total magnetic intensity grid using a FFT based frequency domain filtering algorithm.

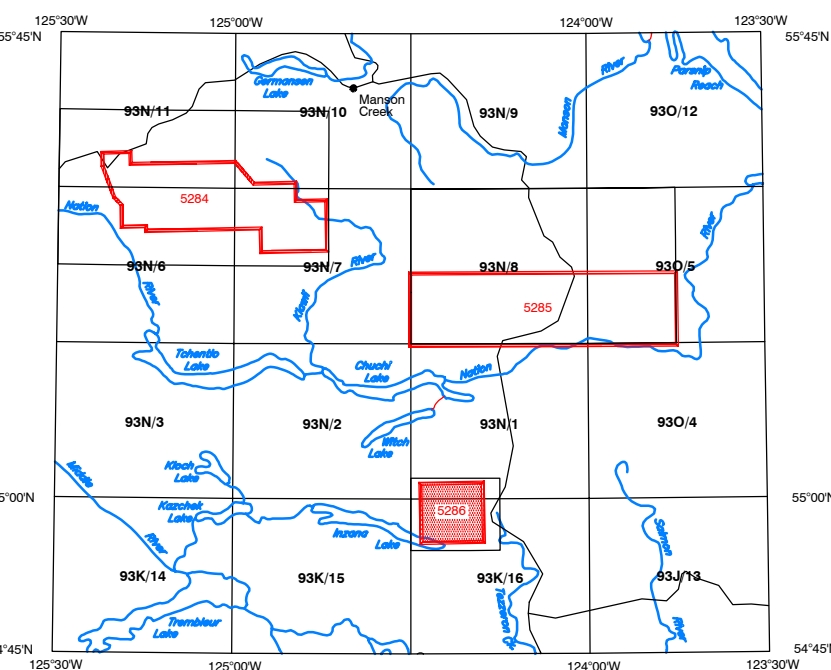
Positional Data

Line spacing and direction for survey and control lines were selected for each block to ensure the best intersection of local geological features. Terrain clearance was monitored by radar altimeter. Positional data were recorded using a dual frequency Novatel Millennium system. GPS groundstation data were combined with airborne GPS data to produce differentially corrected positional data with an accuracy of 2 to 5 m.

Data Presentation
Colour levels and contours were calculated for each grid and combined with map surround information to create postscript plot files, which were plotted using HP DesignJet colour plotters.



Planimetric Symbols



NATIONAL TOPOGRAPHICAL SYSTEM REFERENCE AND GEOPHYSICAL MAP INDEX
SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE ET INDEX DES CARTES GÉOPHYSIQUES

NATURAL AIR ABSORBED DOSE RATE

WITTICHICA CREEK
BRITISH COLUMBIA
93N/1, 93K/16