

**Gamma-ray Spectrometric Data**

The airborne gamma-ray measurements were made with an Exloranium GR820 gamma-ray spectrometer using nine 102 × 102 × 406 mm NaI(Tl) crystals. The detector system consisted of eight crystal clusters (three 33.5 liters). One crystal (total mass = 2.7 liters), shielded by the main array, was used to detect variations in background radiation caused by atmospheric radon. The system constantly monitored the natural thorium 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  $^{40}\text{K}$ , whereas uranium and thorium are measured indirectly from gamma-ray photons emitted by daughter products  $^{214}\text{Pb}$  for uranium and  $^{214}\text{Th}$  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 ( $^{40}\text{K}$ )	1360 - 1560 keV
Uranium ( $^{214}\text{Pb}$ )	1650 - 2050 keV
Thorium ( $^{214}\text{Th}$ )	2410 - 2810 keV

Gamma-ray spectra were recorded at one-second intervals at a planned terrain clearance of 135 m and an air speed of 120 km/h. Noise Adjusted Singular Value Decomposition (NASVD) analysis was carried out on the full spectrum 256 channel data to reduce statistical noise in the windowed data. During processing, the spectra were energy calibrated, and counts were accumulated into the windows described above. Counts from the radon detectors were recorded in a 1650–1860 keV window and radiation at energies greater than 3000 keV was recorded in the cosmic window. The window counts were corrected for dead time, 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 detectors of altitude from the planned terrain clearance and for variation 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	56.5 cps/% (2004)	50.0 cps/% (2005)
Uranium	9.0 cps/ppm (2004)	6.3 cps/ppm (2005)
Thorium	3.7 cps/ppm (2004)	3.2 cps/ppm (2005)

Corrected data were filtered and interpolated to a 100m grid for both the 1:50 000 scale and 1:250 000 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 400 and 2810 keV.

### Magnetic Data

The helicopter was equipped with a Sinterex CS-2 cesium vapour massic sensor mounted in a bird suspended 30 m below the aircraft. The system recorded readings every 0.1 seconds with a noise level of less than 0.02 nT. Magnetic interferences caused by aircraft maneuvers were compensated using an RMS AADCII Magnetic compensator. Diurnal variations and GPS fluctuations were recorded using a Sander Geophysics Ground Station Recording System. The International Geomagnetic Reference Field was calculated daily and removed for each flight. The airborne magnetometer data was IGRF corrected, using the location, altitude and date of each point. The IGRF was calculated using the IGRF 2000 model.

The corrected magnetic data was interpolated to a 100m 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

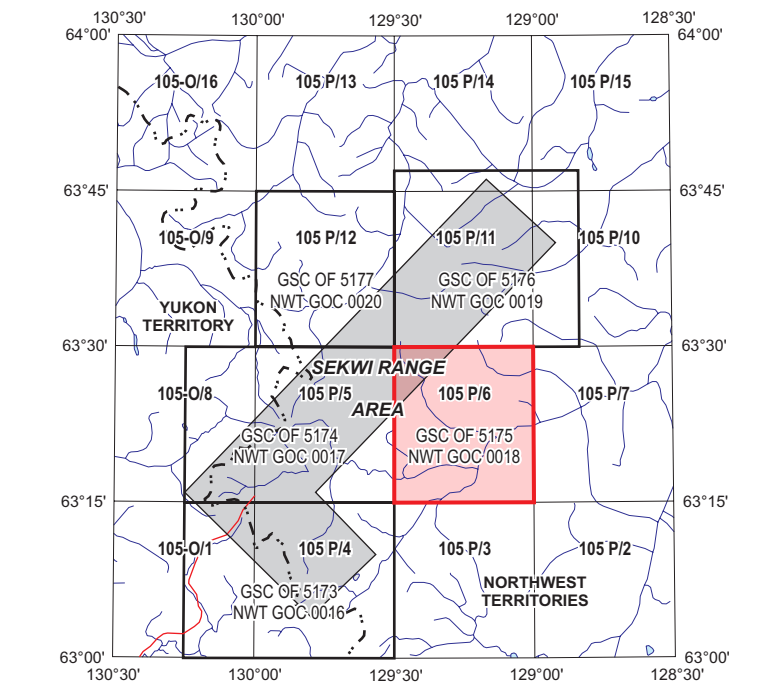
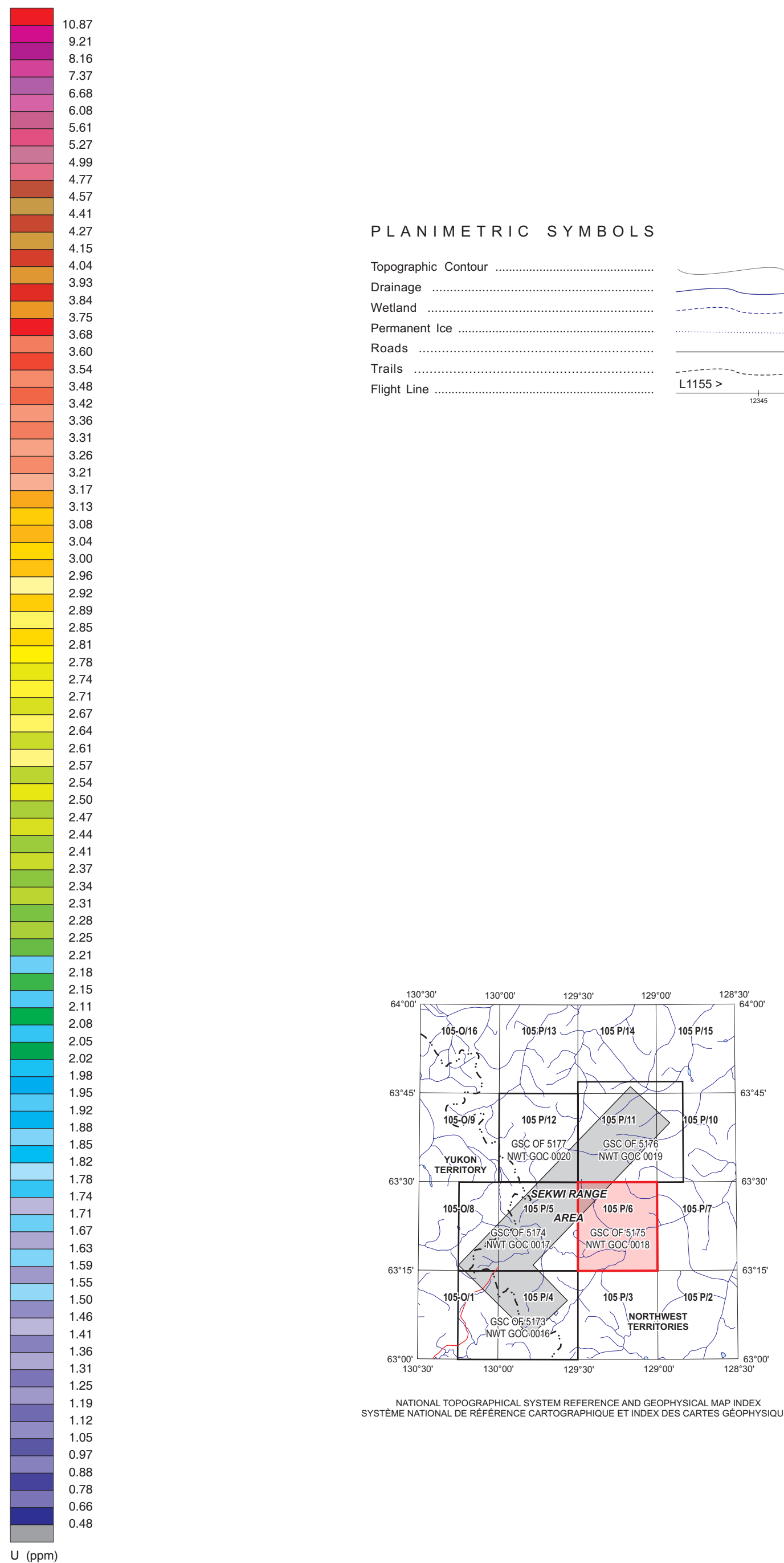
**Positional data** – The survey spacing of 500 m and control line spacing of 4000 m was used for the Prairie Creek, Caribou River and Flat River survey blocks. Survey line spacing of 500 m and control line spacing of 2400 m was used for the Sekwi Range survey block. Survey lines were oriented N-S for the Prairie Creek and Caribou River areas. For the Flat River area survey lines were oriented NW-SE and for the Sekwi Range survey lines were oriented SW-NE. Survey and control line positions were pre-planned using Sander Geophysics Limited, Smooth Drape software. Terrain clearance was monitored by radar altimeter. Positional data were recorded using a dual frequency Novatel Millennium system. GPS ground station 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 HP RTL plot files, which were plotted using SGI's HP DesignJet colour plotters.

### Project Funding

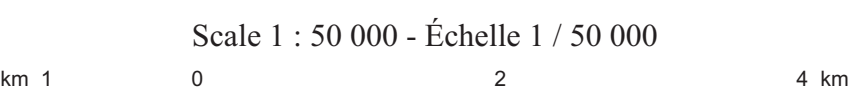
The Prairie Creek, Caribou River and Flat River surveys were funded by Parks Canada through the Mineral and Energy Resource Assessment Project. The Sekwi Range survey was funded by the Northwest Territories Geoscience Office. Technical expertise and contract administration were provided by the Radiation Geophysics and Regional Geophysics Sections of the Geological Survey of Canada.



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

This airborne geophysical survey and the production of this map were funded by the Northwest Territories Geoscience Office.

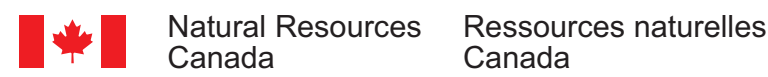
## URANIUM MAP



Universal Transverse Mercator Projection  
North American Datum 1983  
© Her Majesty the Queen in Right of Canada 2006

Projection transverse universelle de Mercator  
Système de référence géodésique nord-américain, 1983  
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Digital Topographic Data provided by Geomatics Canada, Natural Resources Canada



Location Map

**NWT GEOSCIENCE  
OFFICE  
CONTRIBUTION**

**0018**

2006

SHEET 3 OF 10

## URANIUM MAP

**NORTHWEST TERRITORIES**  
**NTS 105 P/6**