

An airborne geophysical survey of the Phelps Lake area, Saskatchewan, was flown by Sander Geophysics Limited (SGL) for the Geological Survey of Canada and Saskatchewan Energy and Mines. The purpose of the survey was to obtain gamma-ray spectrometric, aeromagnetic and VLF-EM data. The survey was flown between August 14 and September 7, 2000 using a Britten-Norman Islander BN2B-21 aircraft flying 120 metres above the terrain at a mean speed of 230 km/h. The 1000 m spaced, northwest-southeast oriented survey lines and orthogonal 10 000 m spaced control lines were planned using the SGRDrape system. In-flight positional data were recorded using a Trimble real-time differential GPS system. GPS ground station data were combined with corrected positional data with an accuracy of 1 to 2 m.

Potassium is measured directly from the 1460 keV gamma-ray photons emitted by ⁴⁰K. Uranium and thorium must be measured indirectly from gamma-ray photons emitted by daughter products (²¹⁴Pb for uranium and ²¹⁴Pb 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 (eU) and equivalent thorium (eTh).

The airborne gamma-ray measurements were made with an Exploranium GR20 gamma-ray spectrometer using fourteen 102 x 102 x 406 mm NaI(Tl) crystals. The main detector array consisted of twelve crystals (total volume 50.4 litres). Two crystals (total volume 8.4 litres), shielded from the ground by the main array, were used to detect variations caused by atmospheric radon. The GR20 constantly monitored the natural potassium peak for each crystal, using a Gaussian least squares algorithm to adjust the gain for individual crystals.

Gamma-ray spectra were recorded at one-second intervals. Noise Adjusted Singular Value Decomposition (NASVD) analysis was carried out on full spectrum channels to reduce statistical noise in the windows used. During processing, the spectra were energy calibrated, and counts were accumulated into six energy windows. Counts from the radon detectors were recorded in a 1660 - 1860 keV window and radiation at energies greater than 3000 keV was recorded in the 2800 keV window. The standard windows used were 1370 - 1570 keV for potassium, 1660 - 1860 keV for uranium, 2410 - 2810 keV for thorium and 400 - 2810 keV for total activity data.

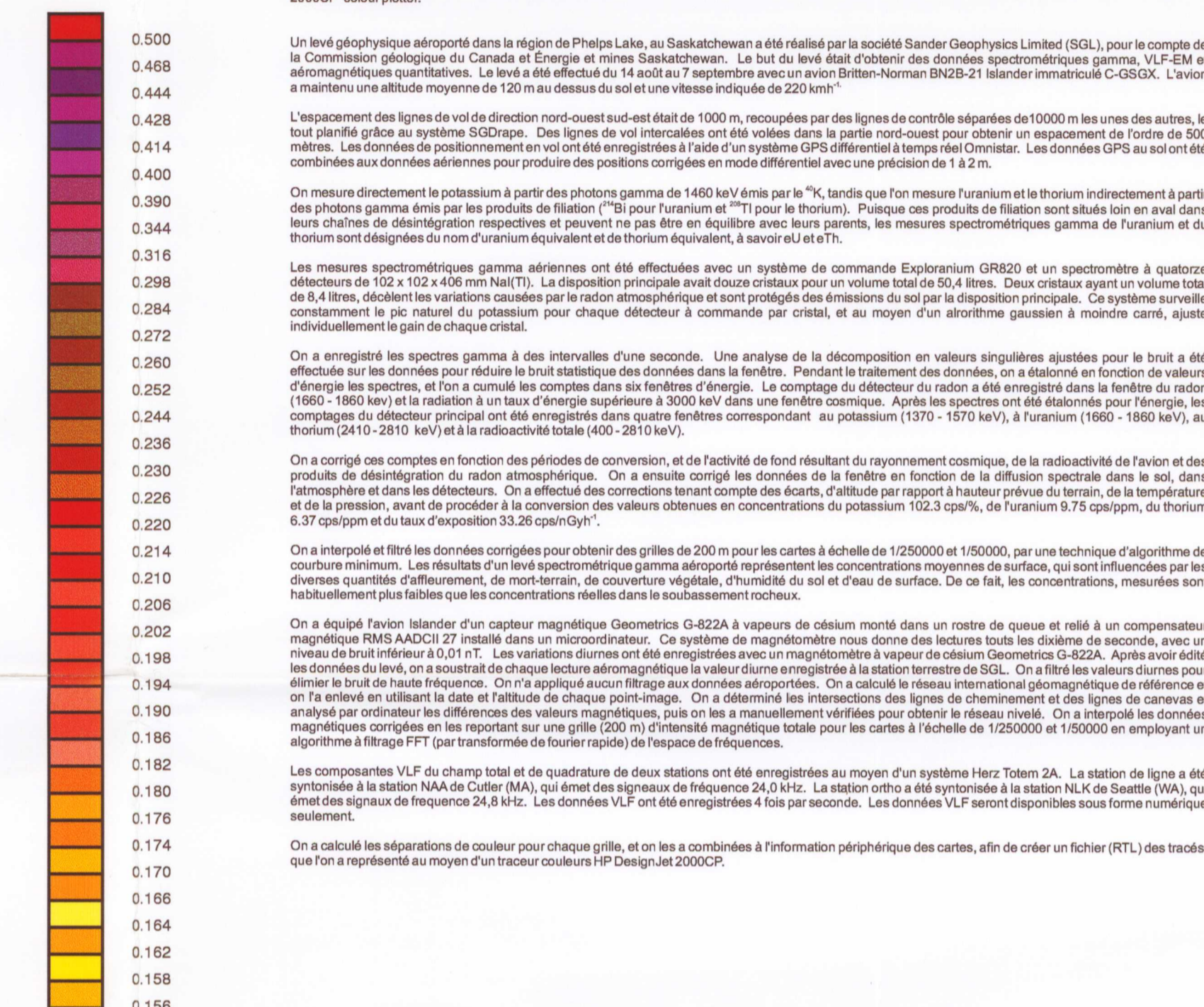
All window counts were corrected for dead time. The standard windows were corrected for background activity from cosmic radiation, the radioactivity of the aircraft and atmospheric radon decay products. The potassium, uranium and thorium window data were then corrected for spectral scattering in the ground, air and detectors. The four standard windows were corrected for deviations of altitude from the planned terrain clearance and for variation of temperature and pressure prior to conversion to standard units. The conversion factors used were 102.3 cps/eU for potassium, 9.75 cps/eU for uranium, 6.37 cps/eU for thorium and 33.25 cps/eU for total activity data.

Corrected data were filtered and interpolated to a 200 m grid for the 1:250 000 and 1:50 000 scale maps using a minimum curvature algorithm technique. 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 concentrations.

The aircraft was equipped with a Geometrics G-422A cesium vapour magnetic sensor mounted in a trailer to the rear of the aircraft, connected to an RMS-AACCI 27 term magnetic processor installed in a microcomputer. The magnetometer data were recorded from a single to the rear of the aircraft, connected to an RMS-AACCI 27 term magnetic processor installed in a microcomputer. The magnetometer data were recorded from a single to the rear of the aircraft, connected to an RMS-AACCI 27 term magnetic processor installed in a microcomputer. The magnetometer data were recorded from a single to the rear of the aircraft, connected to an RMS-AACCI 27 term magnetic processor installed in a microcomputer. The magnetometer data were recorded from a single to the rear of the aircraft, connected to an RMS-AACCI 27 term magnetic processor installed in a microcomputer.

VLF total field and quadrature components for two frequencies were recorded using a Herz Totem 2A system. The line station was tuned to station NAA at Cutler, MA, transmitting at 24.0 kHz. The orho station was tuned to the 24.8 kHz, station NLK at Seattle, WA. VLF data were recorded 4 times per second. VLF data will only be made available on request.

Colour levels were calculated for each grid cell and combined with map surround information to create an RTI plot file, which was plotted using an HP DesignJet 2000CP colour plotter.



LEGEND / LÉGENDE

Wetland / Marais

Lake / Lac; Intermittent

Watercourse / Cours d'eau

Flooded area / Région inondée

Esker / Esker

Elevation contour / Courbes d'élévation

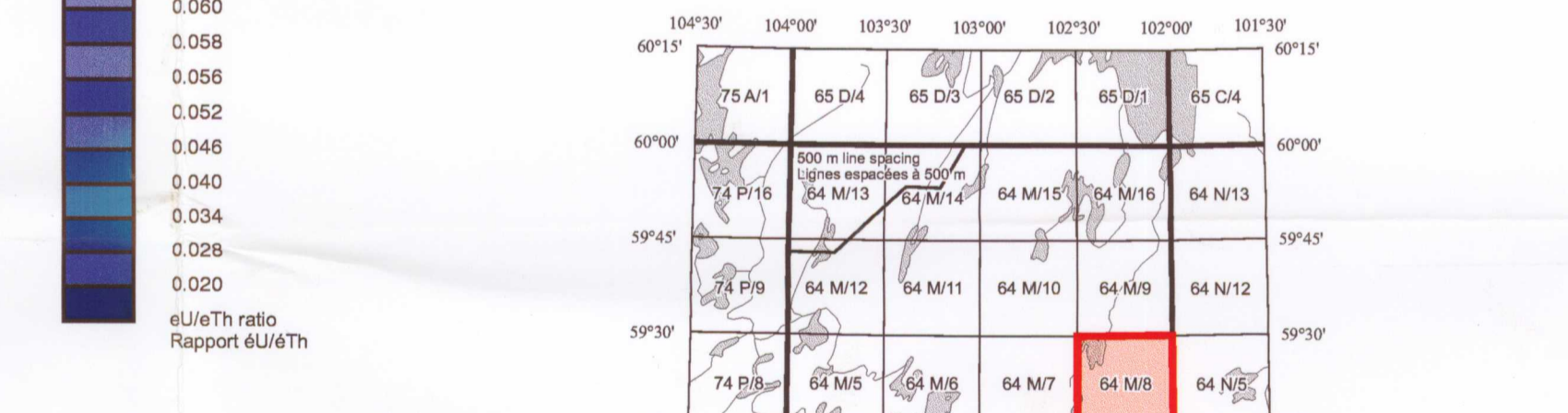
Depression contour / Courbes de dépression

Flight Line / Ligne de vol L1410-1

Digital cartographic base information supplied by Information Services Corporation of Saskatchewan. Elevation contour interval 10 metres. L'information cartographique numérisée a été fournie par Information Services Corporation of Saskatchewan. Équidistance des courbes d'élévation 10 mètres.

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Saskatchewan Energy and Mines
Saskatchewan Geological Survey

Natural Resources Canada
Ressources naturelles Canada

Location Map - Carte de Localisation



URANIUM / THORIUM MAP
CARTE DE L'URANIUM / THORIUM

NUNIM LAKE SASKATCHEWAN
NTS / SNRC 64M/8

Scale 1 : 50 000 - Échelle 1 / 50 000

km 1 0 2 4 km

Open File
Dossier Public
3951_75
Geological Survey of Canada
Commission géologique du Canada
Ottawa
2001

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Map 75 of 160

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URANIUM / THORIUM MAP
CARTE DE L'URANIUM / THORIUM

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