

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 Birtan-Norman Islander BN25-21 aircraft flying 120 m above the terrain at a mean speed of 220 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 an Omnistar real time differential GPS system. GPS ground station data were combined with airborne data to produce differentially corrected positional data with an accuracy of 2.0 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 Explorerium 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. Note Adjusted Singular Value Decomposition (NASVD) analysis was carried out on full spectrum 256 channel data to reduce statistical data in the windows of interest. The spectra were then corrected for spectral scattering in the ground, air, aircraft and atmospheric radon decay products. The potassium, uranium and thorium windows were then corrected for variations in temperature and pressure prior to conversion to standard units. The conversion factors used were 102.3 cps/k for potassium, 9.75 cps/k for uranium, 6.37 cps/k for thorium and 53.26 cps/k for total absorbed dose rate. 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 concentration. The aircraft was equipped with a Geometrics G-822A cesium vapour magnetic sensor mounted in a stinger to the rear of the aircraft, connected to an RMS-ADC/27 term magnetic compensator installed in a microcomputer. The magnetometer data were recorded every 0.1 seconds with a noise level of less than 0.1 nT. Diurnal variations were monitored at 0.2 second intervals using a dual channel fluxgate magnetometer. After editing the survey data, low pass filtered diurnal values were subtracted from the unfiltered aeromagnetic data. The International Geomagnetic Reference Field was calculated and removed using the data and altitudes for each data point. The intersection of the filtered aeromagnetic data and the International Geomagnetic Reference Field was then computer analyzed and manually verified to obtain the leveled network. The corrected magnetic data were interpolated to a 200 m grid for the 1:250 000 and 1:50 000 scale maps using a minimum curvature algorithm. The vertical gradient of the magnetic field was calculated from the total magnetic intensity grid using an FFT based algorithm. 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 ortho 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 upon request. Colour levels were calculated for each grid and combined with map surround information to create an RTL plot file, which was plotted using an HP DesignJet 2000CP colour plotter.

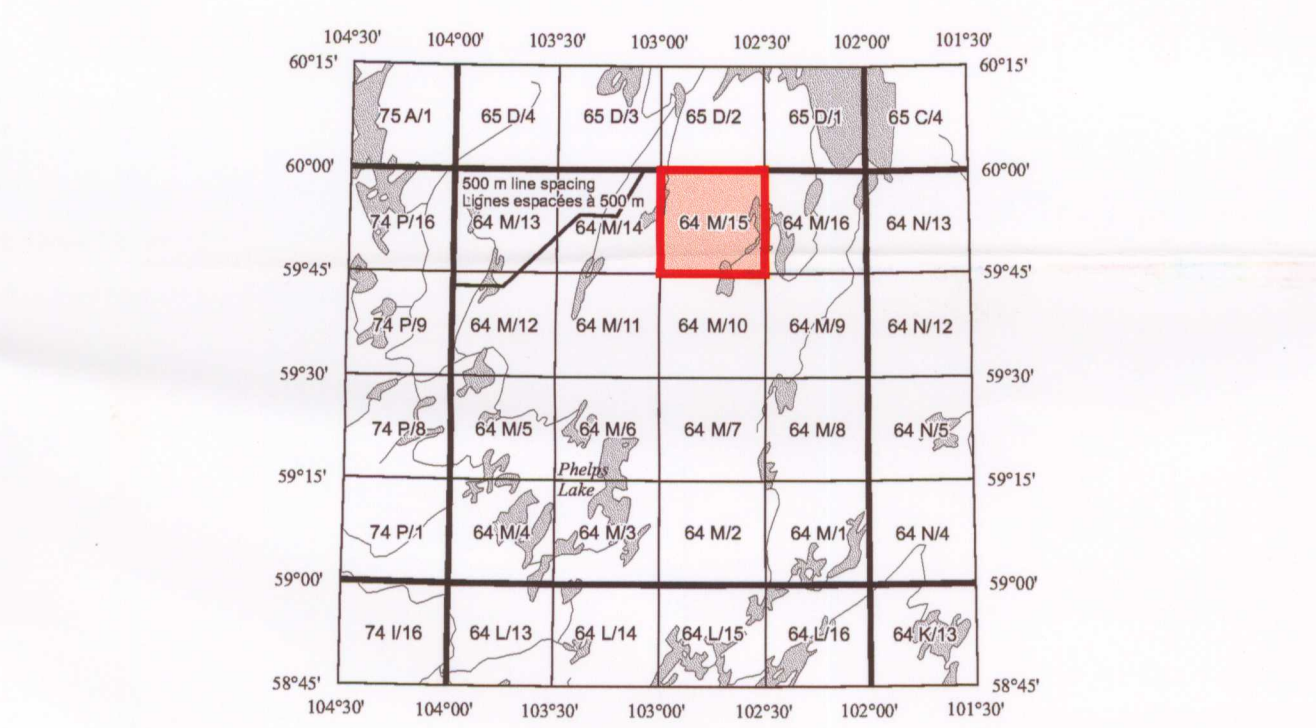
LEGEND / LÉGENDE

- 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

Digital cartographic base information supplied by Information Services Corporation of Saskatchewan.
Elevation contour interval 10 metres.

L'information cartographique numérique a été fournie par Information Services Corporation of Saskatchewan.
Équidistance des courbes d'élévation 10 mètres.

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Location Map - Carte de Localisation

**THORIUM MAP (eTh)
CARTE DU THORIUM (éTh)**

**WARREN LAKE
SASKATCHEWAN**
NTS / SNRC 64M/15

Scale 1 : 50 000 - Échelle 1 / 50 000

Transverse Mercator Projection
Système de coordonnées géométriques nord-américain, 1983
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Open File
Dossier Public
3951_144
Geological Survey of Canada
Commission géologique du Canada
Ottawa
2001

SEM Open File 2001-2
Map 144 of 160

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**THORIUM MAP (eTh)
CARTE DU THORIUM (éTh)**
WARREN LAKE
SASKATCHEWAN
NTS / SNRC 64M/15

