

An airborne geophysical survey of the Phalaris 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 Interim BN2B-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 1000 m spaced control lines were planned using the 500Draps system. Infill lines were flown in the northwest-southeast direction at 1000 m spacing. Additional GPS ground station data were recorded using a Trimble receiver and a differential GPS system. GPS ground station data were combined with airborne GPS data to produce differentially 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 from 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 GR200 gamma-ray spectrometer using fourteen 102 x 102 x 406 mm NaI(Tl) crystals. The main detector array consists 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 GR200 constantly monitored the natural potassium peak for each crystal, using a Gaussian least-squares algorithm to adjust the individual crystal data.

Gamma-ray spectra were recorded at one-second intervals. Noise Adjusted Singular Value Decomposition (NASVD) analysis was carried out on 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 six energy windows. Counts from the radon detectors were recorded in a 1600-1800 keV window and radon at energies greater than 2000 keV were recorded in the cosmic window. The standard windows used are 1370-1570 keV for potassium, 1600-1800 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, and pressure prior to conversion to standard units. The conversion factors used were 102.3 cps/g for potassium, 6.75 cps/g for uranium, 6.37 cps/g for thorium and 33.26 cps/m²g^h for total air 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 spectrometric 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 to a stinger to the rear of the aircraft, connected to an RMS ADC 27 m magnetic compass. The magnetic sensor was mounted to a stinger to the rear of the aircraft, connected to an RMS ADC 27 m magnetic compass. The magnetic sensor was mounted to a stinger to the rear of the aircraft, connected to an RMS ADC 27 m magnetic compass. The magnetic sensor was mounted to a stinger to the rear of the aircraft, connected to an RMS ADC 27 m magnetic compass.

Diurnal variations were monitored at 2 second intervals using a Geometrics cesium vapour base station magnetometer. After setting the survey data, low pass filtered diurnal values were subtracted from the collected magnetic data. The International Geomagnetic Reference Field was calculated and removed using the date and altitude for each data point. The intersections of traverse and control lines were determined and the difference between the measured and expected magnetic values was used to identify and correct for any errors in the ground truth 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 with trend enforcement. 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 24.8 kHz. The ortho station was tuned to the 24.8 kHz station NAA at Seattle, WA. VLF data were recorded 4 times per second. VLF data will only be made available with the digital data.

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 printer.

LEGEND / LÉGENDE

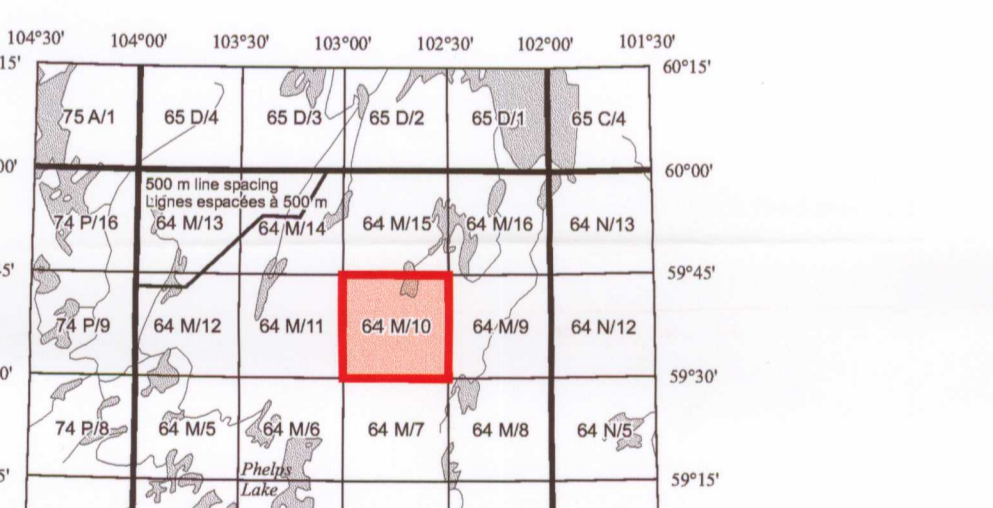
Wetland / Marais
Lake / Lac; Intermittent
Watercourse / Cours d'eau
Flooded area / Région inondée
Esker / Esker
Elevation contour / Courbes d'élévation
Depression contour / Courbes de dépression
Flight Line / Ligne de vol

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

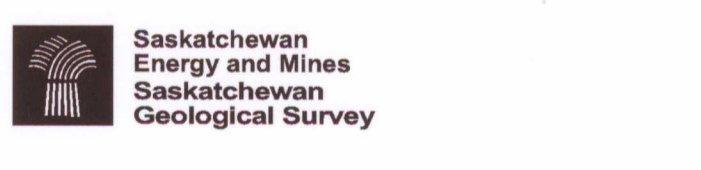
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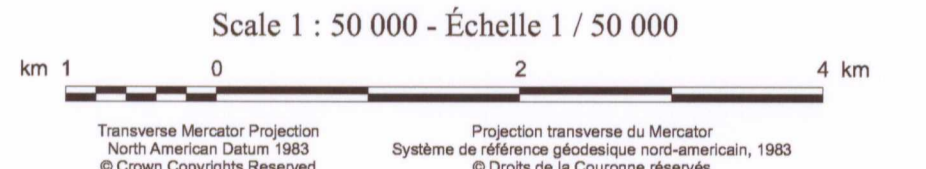
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MAGNETIC ANOMALY MAP (RESIDUAL TOTAL FIELD)

CARTE DES ANOMALIES MAGNÉTIQUES (CHAMP RÉSIDUEL TOTAL)

EMERSON LAKE
SASKATCHEWAN
NTS / SNRC 64M/10



Scale 1 : 50 000 - Échelle 1 / 50 000
Transverse Mercator Projection
North American Datum 1983
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Open File
Dossier Public
3951_99
Geological Survey of Canada
Commission géologique du Canada
Ottawa
2001

SEM Open File 2001-2
Map 99 of 160

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MAGNETIC ANOMALY MAP (RESIDUAL TOTAL FIELD)
CARTE DES ANOMALIES MAGNÉTIQUES (CHAMP RÉSIDUEL TOTAL)

EMERSON LAKE
SASKATCHEWAN
NTS / SNRC 64M/10

