

An airborne geophysical survey of the Waway Lake area, Saskatchewan, was flown by Sander Geophysical 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, 2001 using a Britton-Norman Islander BN2B-21 aircraft flying 120 m above the terrain at a mean speed of 220 km/h. The 1000 m spaced, north-south oriented control lines and 1000 m spaced control lines were planned using the SDCorps system. Infill lines were flown in the northwest section of the survey area to produce 500 m spacing. In-flight positional data were recorded using an Omnistar real-time 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 decay chains are far from equilibrium, the 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 Explorer 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 monitors 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 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 radiation of energies greater than 3000 keV was recorded in the cosmic window. The standard windows used are 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 variations of altitude from the planned terrain elevation and for variations of temperature and pressure prior to conversion to standard units. The conversion factors used were 102.3 cps/eU for potassium, 6.75 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 1:500 000 scale maps using a minimum curvature algorithm technique. The results of an airborne gamma-ray spectrometric survey represent the 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-422A cesium vapour magnetic sensor mounted in a stinger to the rear of the aircraft, connected to an RMS ADCU 27 sem magnetic compass installed in a microcomputer. The magnetic data were recorded every 0.1 m above the terrain at a noise level of less than 0.1 nT. Diurnal variations were monitored at 0.2 second intervals using a Geometrics cesium vapour base station magnetometer. After editing the survey data, low pass filtered diurnal values were subtracted from the unfiltered aeromagnetic data. The interpolated aeromagnetic data were then used to generate contour maps of the data and utilized for each data point. The intersections of traverse and control lines were determined and the differences in the magnetic values were compared against manually verified data. The aeromagnetic data were filtered and interpolated to a 200 m grid for the 1:250 000 and 1:500 000 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. This station was tuned to the 24.8 kHz station NUK 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 cell and combined with map surround information to create an RTI plot file, which was plotted using an HP DesignJet 2000CP colour plotter.

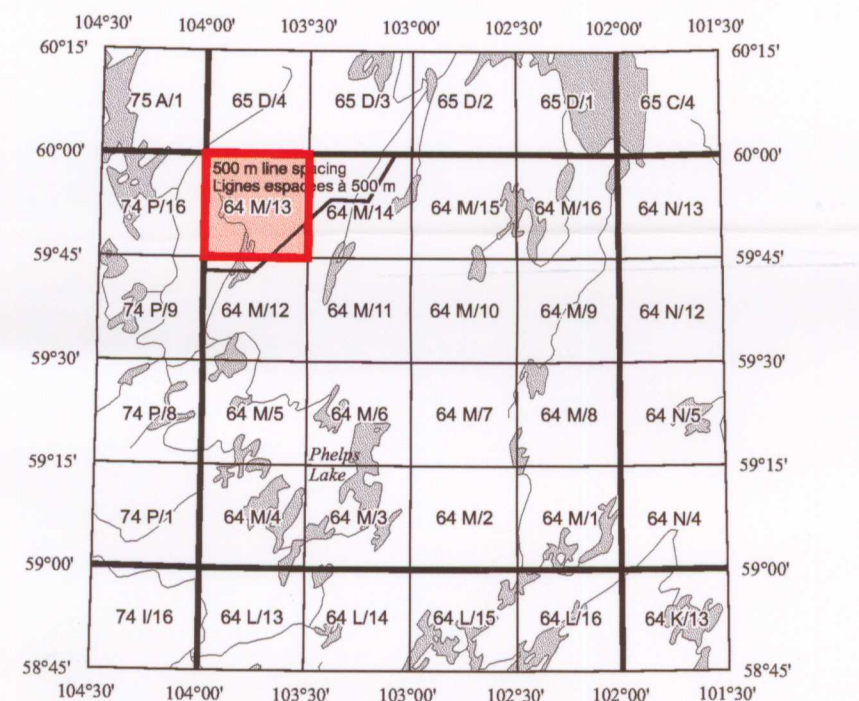
LEGEND / LEGENDE

| | |
|--|-------|
| 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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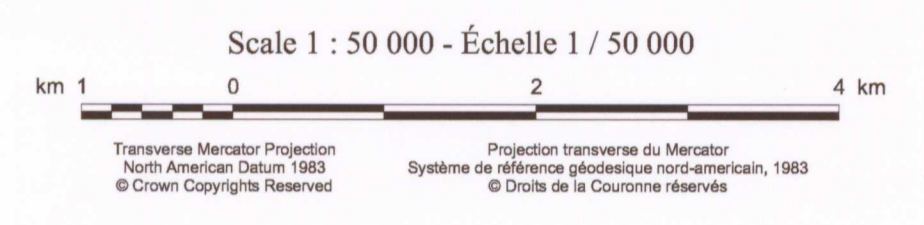


POTASSIUM MAP
CARTE DU POTASSIUM

WAWAY LAKE
SASKATCHEWAN

NTS / SNRC 64M/13

Scale 1 : 50 000 - Échelle 1 / 50 000



Open File
Dossier Public
3951_122
Geological Survey of Canada
Commission géologique du Canada
Ottawa
2001

SEM Open File 2001-2
Map 122 of 160

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POTASSIUM MAP
CARTE DU POTASSIUM

WAWAY LAKE
SASKATCHEWAN

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