

An airborne geophysical survey of the Patterson 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 islander aircraft flying 120 m above the terrain at a mean speed of 220 km/h.

The 1000 m spaced, north-south oriented survey lines and orthogonal 1000 m spaced contour lines were planned using the SGRDrape system. Infill lines were flown in the northwest section of the survey area to produce 500 m line spacing. In-fill positions were recorded using an Omnistar real-time differential GPS base system. GPS ground station data were combined with airborne GPS data to produce differential postprocessed data with an accuracy of 1.2 m.

Potassium is measured directly from the 1460 keV gamma-ray photons emitted by ⁴⁰K. Uranium and thorium were 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 Epsilon 2000 gamma-ray spectrometer using fourteen 102 x 102 x 406 mm NaI(Tl) crystals. The main detector array consisted of twelve crystals (total volume 5.4 m³). Two crystals (total volume 0.8 m³), shielded from the ground by the main array, were used to detect variations caused by atmospheric radon. The GR200 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 resulting spectra. 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 at energies greater than 3000 keV was recorded in the cosmic window. The standard windows used are 1370 - 1570 keV for potassium, 1650 - 1850 keV for uranium, 2410 - 2810 keV for thorium and 420 - 2810 keV for total activity data.

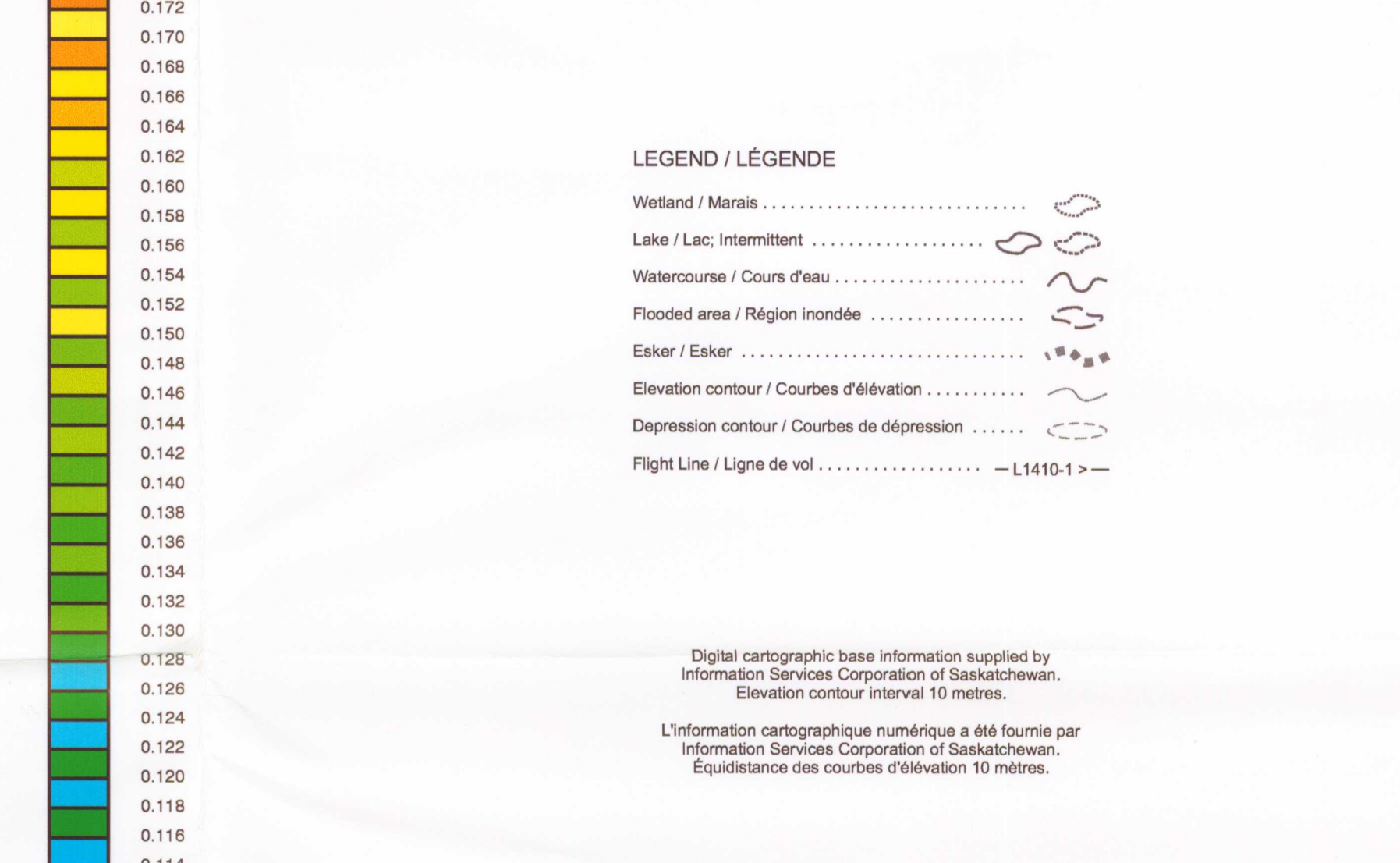
All window counts were corrected for dead time. The standard windows were corrected for background activity from cosmic radiation, the radioactivity of the aircraft and atmospheric radon decay products. The potassium, uranium and thorium window data were then corrected for spectral scattering in the ground, air and detectors. The four standard windows were corrected for variations of altitude from the planned terrain clearance and for variations of temperature and pressure prior to conversion to standard units. The conversion factors used were 102.3 cps/k for potassium, 6.73 cps/k for uranium, 6.37 cps/k for thorium and 33.28 cps/k 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 outcrops, 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-222A cesium vapour magnetometer mounted in a stinger to the rear of the aircraft, connected to an RMS ADCII 27 term magnetic compensator installed in a microcomputer. The magnetometer data were recorded every 0.1 seconds with a noise level of less than 0.01 nT. Current values were monitored at 0.2 second intervals using a Geometrics vapor magnetometer. After calibration, the magnetometer data were filtered and detrended values were subtracted from the unfiltered aeromagnetic data. The International Geomagnetic Reference Field was calculated and removed using the data and altitude for each data point. The International Geomagnetic Reference Field was calculated and removed using the data and altitude for each data point. The International Geomagnetic Reference Field was calculated and removed using the data and altitude for each data point. The International Geomagnetic Reference Field was calculated and removed using the data and altitude for each data point.

VLF 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 as a mean of a 1000 m grid.

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



LEGEND / LÉGENDE

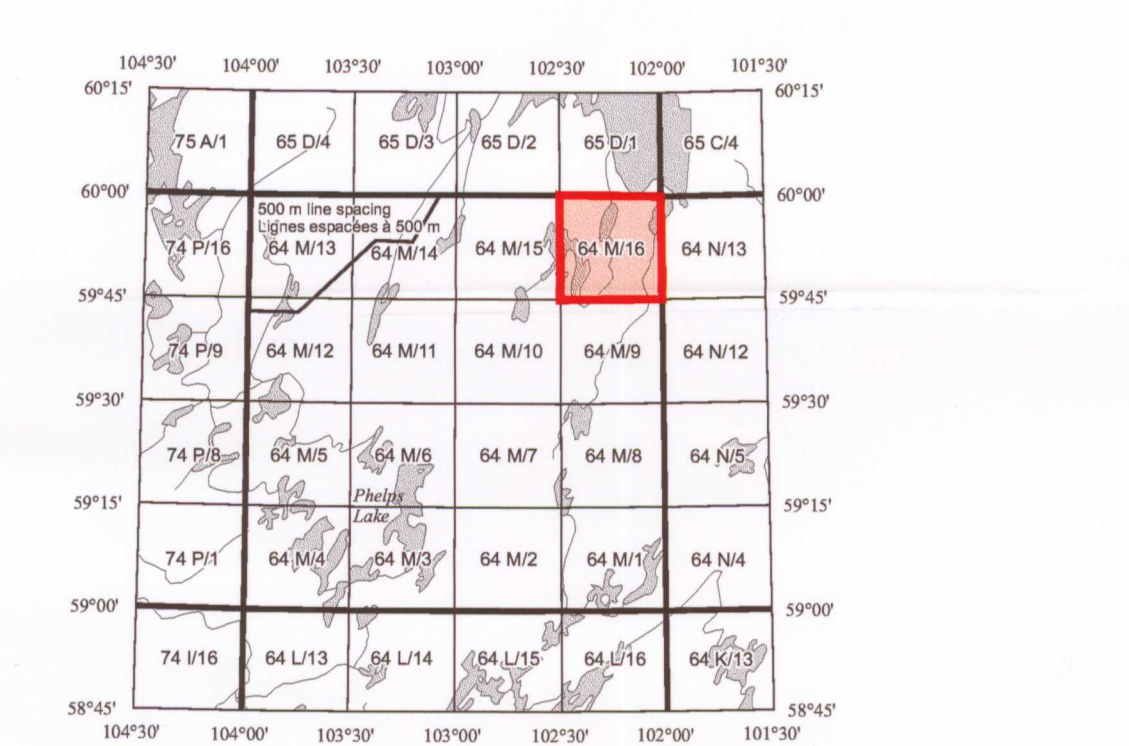
Wetland / Marais
 Lake / Lac, Intermittent
 Watercourse / Cours d'eau
 Flooded area / Région inondée
 Esker / Esker
 Elevation contour / Courbes d'élévation
 Depression contour / Courbes de dépression
 Flight Line / Ligne de vol L1410-1

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

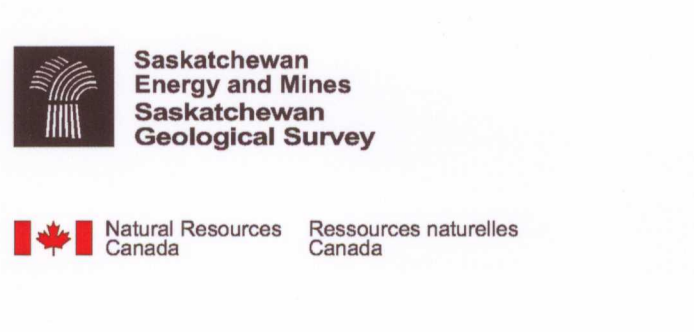
L'information cartographique numérique a été fournie par Information Services Corporation de Saskatchewan.
 Équidistance des courbes d'élévation 10 mètres.

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URANIUM / THORIUM MAP
CARTE DE L'URANIUM / THORIUM

PATTERSON LAKE
SASKATCHEWAN

NTS / SNRC 64M/16

Scale 1 : 50 000 - Échelle 1 / 50 000

km 1 0 2 4 km

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

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