



Technical Information
 This map was compiled from data acquired during an airborne electromagnetic survey carried out by Geotech Canada Inc. utilizing Geotech's VTEM Max Three-Domain Electromagnetic (TDEM) system. The system was mounted on a Eurocopter AS330 helicopter (registration C-GLHX) and the survey was carried out between December 1, 2022 and March 13, 2023. The helicopter flight altitude was maintained at 100 m above the ground with a clearance of 6 m, with an average speed of 90 km/h. Aircraft navigation used a 14-channel Novatel dual frequency GPS system. Post-flight differential corrections were applied to the flight path position. A vertically mounted video camera was used to record imagery of the ground. The TDEM system was recorded at 100 lines per second using a 175A2000 transmitter. The magnetic data were recorded 10 times per second using a Geometrics G823A cesium magnetometer installed in a bid 10 below the helicopter.

Electromagnetics
 The TDEM system operated at a base frequency of 30 Hz and transmits a 7 m half square wave from a four-turn, 340 m horizontal loop mounted approximately 48 m behind and 8 m behind the helicopter. This configuration generates a peak dipole moment of 733 200 Am². The responses of conductors in the subsurface were recorded at 100 mHz over the entire waveform using a three axis (X, Y and Z) electromagnetic receiver coiled with the transmitter. The receiver was mounted on a 1.5 m long boom extending 10 m from the stream for each of the three components. The EM receiver directly measures the change in the magnetic field with respect to time (dB/dt) (nT/s) and the secondary magnetic field (B) is numerically integrated. High-altitude background sections from at the start and end of each flight allowed for accurate removal of system drift.

Apparent Conductivity
 The apparent conductivity values (mS/m) were derived from the electromagnetic decays using selected early channels 4 to 14 (0.021 - 0.096 ms), middle channels 15 to 30 (0.110 - 0.880 ms) and late channels 31 to 46 (1.010 - 8.083 ms) of the off-time signal. The nomogram indicates the correspondence between the value of dB/dt (nT/s) and heli-copter conductivity. Forward thin plate modeling is used to estimate the depth to the top of target (m) for the VTEM MAX TDEM system.

Electromagnetic Decay Constant
 Decay constant (Tau) values were obtained by fitting the data from selected early Z channels 4 to 14 (0.021 - 0.096 ms), middle channels 15 to 30 (0.110 - 0.880 ms) and late channels 31 to 46 (1.010 - 8.083 ms) of the off-time signal to a single exponential. In semi-log space, the slope of this function will reflect the exponential decay rate of the transient field and, therefore, the strength of the conductivity. A slow rate of decay, reflecting a high conductivity, will be represented by a high decay constant.

Magnetics
 The magnetic field was sampled 10 times per second using a cesium vapour magnetometer (leveling $\pm 0.001 \text{ nT}$). Differences in magnetic values at the intersections of control and traverse lines were analysed to obtain a mutually levelled set of flight-line magnetic data. The levelled values were then integrated to 40 m for EM system contacts at high magnetic latitudes (Hood, 1965). The first vertical derivative of the magnetic field reduced to the pole was calculated using the fast Fourier transform with a grid cell size of 50 m.

Availability
 This map is available for free download through GEOSCAN (<https://geoscan.nrc.ca/geoscan>). Corresponding digital profile and grid data as well as raw data for selected control and geophysical surveys can be downloaded, at no charge, from Natural Resources Canada's Geophysical Data Library for Geophysical Data (<https://geophysicaldata.library.gc.ca/>). For more information, please contact the Geophysical Data Centre, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0S8. Email: gdlib@geoscan.nrc.ca.

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References
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 Meis, M.A., 1998. Short Note: A simple method of transient electromagnetic data analysis. *Geophysics*, v. 63, p. 405-410.
 McNeill, J.D., 1980. Applications of Transient Electromagnetic Techniques. Technical Note TN-7, G. Geonco Limited, Mississauga, Ontario.

Survey Area Parameters:

Traverse line azimuth	N147°E
Traverse line spacing	200 m
Tie line azimuth	N57°E
Tie line spacing	1200 m
Aircraft average clearance	94.6 m
EM transmitter nominal clearance	46.6 m
Magnetic sensor nominal clearance	84.6 m
EM receiver nominal clearance	46.6 m

Electromagnetic System Specifications:

Base frequency	30 Hz
Waveform	Polygonal
Transmitter pulse width	7 ms
Transmitter area	940 m ²
Transmitter off-time	8.7 ms
Transmitter loop diameter	34.6 m
Transmitter peak current	195 A
Dipole moment (peak)	733 200 Am ² (4 turns)
Windward data sampling rate	10 Hz
Receiver	3-component induction coils (Z, X, Y)
Measured response	Voltage (dB/dt)
Digital recording	Z: 4-46 channels X, Y: 20-46 channels
1 st off-time Z channel	Channel 4 at ~0.021 ms after pulse turn off
Tx-Rx configuration	In-loop concentric

PLANIMETRIC SYMBOLS

- Project Limit
- Drainage
- Topographic Contour
- Road

MAP LOCATION

MAP SHEET SUMMARY

- Sheet 1: Time Decay Constant (Tau-Z) - Early Channels 4 to 14 (0.021 - 0.096 ms)
- Sheet 2: Time Decay Constant (Tau-Z) - Mid Channels 15 to 30 (0.110 - 0.880 ms)
- Sheet 3: Time Decay Constant (Tau-Z) - Late Channels 31 to 46 (1.010 - 8.083 ms)
- Sheet 4: Apparent Conductivity - Early Channels 4 to 14 (0.021 - 0.096 ms)
- Sheet 5: Apparent Conductivity - Mid Channels 15 to 30 (0.110 - 0.880 ms)
- Sheet 6: Apparent Conductivity - Late Channels 31 to 46 (1.010 - 8.083 ms)
- Sheet 7: Residual Total Magnetic Field
- Sheet 8: First Vertical Derivative of the Magnetic Field
- Sheet 9: Interpretation

742.687
 129.355
 73.174
 46.331
 30.969
 19.128
 10.999
 6.004
 2.835
 1.029
 0.367
 0.355
 0.344
 0.332
 0.320
 0.309
 0.297
 0.285
 0.274
 0.262
 0.250
 0.212
 0.000
mS/m

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NTS Map Sheet numbers in black
Geological Survey of Canada Open File numbers in red

Saskatchewan Geological Survey
Geophysical Map series numbers in blue

NATIONAL TOPOGRAPHIC REFERENCE SYSTEM AND GEOGRAPHICAL MAP INDEX

GEOLOGICAL SURVEY OF CANADA OPEN FILE 8966
SASKATCHEWAN GEOLOGICAL SURVEY GEOPHYSICAL MAP GP 2023-1
ELECTROMAGNETIC SURVEY OF THE EASTERN WOLLASTON AREA
 SASKATCHEWAN
 Parts of NTS 64-E/5, 6, 11 and 12

APPARENT CONDUCTIVITY - LATE CHANNELS 31 to 46 (1.010 - 8.083 ms)

Scale 1:50 000

Universal Transverse Mercator Projection
 North American Datum (NAD83) 1983
 UTM Zone 13N

© His Majesty the King in Right of Canada, as represented by the Minister of Natural Resources, 2023
 Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications
 Contour interval 20 metres. Elevations in metres above mean sea level

OPEN FILE / DOSSIER PUBLIC
8966
 GEOLOGICAL SURVEY OF CANADA
 COMMISSION GEOLOGIQUE DU CANADA
 2023
 Sheet 6 of 9 / Feuille 6 de 9

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GEOGRAPHICAL MAP
CARTE GÉOPHYSIQUE
GP 2023-1
 SASKATCHEWAN GEOLOGICAL SURVEY
 COMMISSION GÉOLOGIQUE DU CANADA
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