

**Report on a Helicopter-Borne
AeroTEM[®] II Electromagnetic
& Magnetometer Survey**



**Aeroquest Job # 04023
Turnagain Project**

Northern British Columbia
NTS 104I/06,07,10, 11

for

Hard Creek Nickel Corporation

1060-1090 West Georgia Street

Vancouver, B.C.

V6E 3V7

by

 AEROQUEST LIMITED

4-845 Main Street East

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January, 2005

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TABLE OF CONTENTS

1. INTRODUCTION	1
2. SURVEY AREA	1
3. GENERAL GEOLOGY	2
4. SURVEY SPECIFICATIONS AND PROCEDURES	2
5. AIRCRAFT AND EQUIPMENT	4
6. PERSONNEL	9
7. DELIVERABLES	10
8. DATA PROCESSING AND PRESENTATION	10
9. RESULTS AND INTERPRETATION	10

Figures

- Figure 1:** Regional Location Map
- Figure 2:** Turnagain Property Claim Map
- Figure 3:** The EM and Mag Birds
- Figure 4:** The Instrument Rack
- Figure 5:** Schematic of Tx and Rx waveforms
- Figure 6:** EM anomaly samples

Appendices

- Appendix 1:** Survey Block Co-ordinates
- Appendix 2:** Description of Database Fields
- Appendix 3:** Technical Paper: "AeroTEM Design Considerations"
- Appendix 4:** Instrumentation Specification Sheet
- Appendix 5:** Statement of Qualifications

MAPS

The results of the survey are presented in a series of 1:20000 line and colour maps. The central part of the survey area was also chosen for a series of 1:10000 scale maps. The geophysical parameters are plotted as follows:

1:20000 sheets:

- Map 1A:** Flight path with EM anomaly centres, North Sheet
- Map 1B:** Flight path with EM anomaly centres, South Sheet
- Map 2A:** Total Magnetic Intensity (TMI) colour grid with EM Anomalies, N. Sheet
- Map 2A:** Total Magnetic Intensity (TMI) colour grid with EM Anomalies, S. Sheet
- Map 3A:** AeroTEM Z3 Off-Time Profiles with EM Anomalies, North Sheet
- Map 3B:** AeroTEM Z3 Off-Time Profiles with EM Anomalies, South Sheet
- Map 4A:** Late on-time Tau colour grid with EM Anomalies, North Sheet
- Map 4B:** Late on-time Tau colour grid with EM Anomalies, South Sheet
- Map 5A:** Early off-time Tau colour grid with EM Anomalies, North Sheet
- Map 5B:** Early off-time Tau colour grid with EM Anomalies, South Sheet

1:10,000 sheets:

- Map 1C:** Flight path with EM anomaly centres
- Map 2C:** Total Magnetic Intensity (TMI) colour grid with EM Anomalies
- Map 3C:** AeroTEM Z3 Off-Time Profiles with EM Anomalies
- Map 4C:** Late on-time Tau colour grid with EM Anomalies
- Map 5C:** Early off-time Tau colour grid with EM Anomalies

All maps show the flight path, skeletal topography, and EM anomalies represented by computed off-time conductance classified symbols. An anomaly identifier label and the off- and on-time conductance in siemens are posted alongside the anomaly symbol. Colour contour maps show colour fill plus superimposed line contours.

DIGITAL DATA ON CD-ROM

The results of the survey are archived in a single CD-ROM as Geosoft (binary) databases as well as Geosoft maps and grids. A readme.txt file maybe found on the CD which which describes the disc contents in more detail.

For the reader's convenience, a copy of Geosoft's Oasis Montaj Ver 6.0.1 Free Interface is included on the CD as well as tutorial documentation on its usage.

The CD also contains a digital version of this report in PDF (Adobe Acrobat) format including a technical paper by Balch et al. in the appendix. Adobe Acrobat Reader Ver 7.0 has been included on the CD.

Report on a Helicopter-Borne AeroTEM[®] Electromagnetic and Magnetic Survey

Turnagain Property
Northern British Columbia

1. INTRODUCTION

This report describes a helicopter-borne geophysical survey carried out on behalf of Hard Creek Nickel Corporation on the Turnagain Project, northern British Columbia.

The principal geophysical sensor is Aeroquest's exclusive AeroTEM[®] II time domain helicopter electromagnetic system which is employed in conjunction with a high-sensitivity cesium vapour magnetometer. Ancillary equipment includes a real-time differential GPS navigation system, radar altimeter, video recorder, and a base station magnetometer. Full-waveform streaming EM data is recorded at 37,800 samples per second. The streaming data comprise the transmitted waveform, and the X component and Z component of the resultant field at the receivers. A secondary acquisition system (RMS) records the ancillary data.

The total line kilometres flown on the Turnagain Project is 1866.15 Km. The survey flying described in this report took place on September 22-25, 2004.

Bedrock EM anomalies were auto-picked from the Z-component off-time data and graded according to the off-time conductance. These anomalies were then reviewed by a geophysicist to remove any false picks. This report describes the survey logistics, the data processing, presentation, and provides a brief interpretation of the results.

2. SURVEY AREA

The Turnagain Property is located approximately 65 kilometers to the east of Dease Lake and 300km northwest of Fort Ware in northern British Columbia. Its precise location is in the Kechia Forest area of the Cassiar Mountains and is centred at 58° 29' N and 128° 52' W. The property is accessed via the Cassiar highway to the west and from Dease Lake along tracks following the Turnagain River which gives the property its name.

The claim blocks may be located on NTS 1:50,000 map sheets 104I/06, 07, 10 & 11. Appendix 1 provides a tabulation of the UTM corner co-ordinates for the survey area. Figure 1 depicts the survey area relative to regional topography and infrastructure. Figure 2 illustrates the survey area relative to Hard Creek and other mining claim blocks.

The survey crew was accommodated in an exploration camp on the property. The camp was owned and operated by Hard Creek Nickel.



Figure 1: Regional Location Map

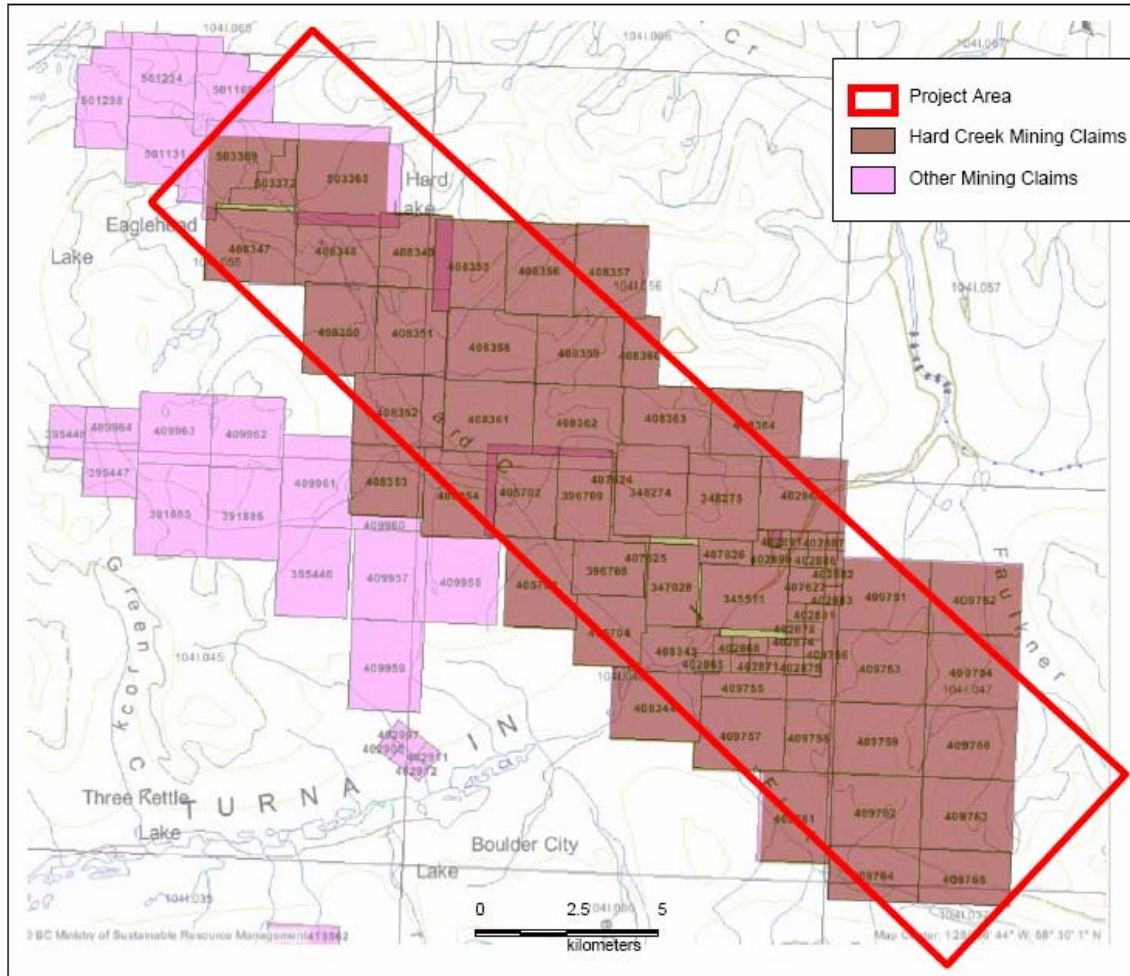


Figure 2: Turnagain Property Claim Map (©BC Ministry of Sustainable Resource Management)

3. PROPERTY GEOLOGY

Taken from: Government of British Columbia – Ministry of Energy and Mines - <http://www.em.gov.bc.ca/mining/geolsurv/minfile/mapareas/104icov.htm>.

The Turn (Discovery) occurrence is located about 70 kilometres east of Dease Lake.

The prospect is hosted in an Alaskan-type ultramafic intrusive complex. This zoned complex consists of a dunite core and surrounding peripheral peridotites, pyroxene-rich peridotite, and olivine pyroxenite. The complex has maximum dimensions of 3 by 8.2 kilometres. It was intruded in the Late Triassic into Upper Paleozoic (?) and/or Triassic (?) metavolcanic and metasedimentary rocks of the Quesnel Terrane. It is in faulted contact on the east and north with slate and phyllite of the Paleozoic Road River Group (Ancestral North America).

Concentrations of iron-nickel-copper sulphides occur in several places in the ultramafic rocks flanking the central dunite. The dunite is conspicuously barren of primary

sulphides. Primary sulphide occurs as disseminated blebs, interconnecting blebs (net-texture) and massive bands up to a few centimetres thick.

Falconbridge Nickel Mines optioned the Cobalt and Pyrrhotite claims in 1966 and then acquired the Turn 1-76 claims. Work from 1966 to 1973 included geological surveys, airborne and ground magnetometer and electromagnetic surveys, and 2742 metres of diamond-drilling in 28 holes and 123 metres of packsack-drilling in 11 holes. Maps from 1972 Assessment Report 3735 show that these diamond-drill holes were put down mainly on or in the vicinity of the Northwest (104I 051), Horsetrail (104I 119) and Fishing Rock (104I 120) occurrences. The Turn (Discovery) has one nearby packsack hole and the Cliff (104I 118), which occurs at the east end of the complex, was examined by 4 packsack drillholes. The Agnes (Davis) showings (104I 038 and 117) occur a few kilometres north of the Northwest showings within the complex and were apparently worked initially by Union Miniere Explorations and Mining in 1971. In 1986, some of the Falconbridge core was resampled by Supreme Resources Limited for gold and platinum and this work provides most of the available description for the Falconbridge drillholes (see Assessment Report 16458). Also in 1986, Equinox Resources Limited held claims that covered the Agnes (Davis), Discovery, Cliff, Northwest and possibly the Fishing Rock showings. Equinox conducted a program to evaluate platinum and palladium potential throughout the complex but primarily in the Cliff and Northwest occurrence areas. Bren-Mar Resources conducted drilling and metallurgical work in 1997 and 1998.

Specifically at the Discovery showing, net textured pyrrhotite with minor amounts of chalcopyrite and pentlandite are hosted in serpentinite and associated with magnetite and clinopyroxenite. The showing occurs in an area along the Turnagain River that is about 1 by 5 metres in size. The rocks are highly sheared in this area due to a shear zone inferred to be paralleling the river (Clark, 1975 and Assessment Report 15994).

Detailed reports often describe mineralization encountered in drillholes and elsewhere as pertaining to the Turn property in general, and fail to report with which particular showing it may be associated. The following is such information and is included with this occurrence description, although it may properly belong to one or all of those showings listed above.

Primary sulphides occurring in the ultramafic complex include pyrrhotite, pentlandite, chalcopyrite and bornite. Oxides intimately associated with these sulphides are chromite, ilmenite and magnetite. Non-primary sulphides in the complex include violarite, valleriite, molybdenite, pyrite, marcasite and possibly mackinawite (Clark, 1975).

Clark reports that high concentrations of nickel-rich sulphides, assaying about 1 per cent nickel, are normally only a few centimetres thick. Moderately high concentrations, assaying more than 0.4 per cent nickel, attain thicknesses of at most 20 metres (Clark, 1975).

Chromite is the most widespread oxide mineral but is not considered to occur in economic quantities. It normally occurs as fine-grained disseminations, but locally occurs

as wispy, schlieren- like concentrations in dunite and as massive to near massive layers. Chromite concentrations are found only in dunite. Massive layers have a length of up to 10 metres and a maximum thickness of about 2 centimetres (Canadian Journal of Earth Sciences, Volume 15, No.12, 1978).

Molybdenite associated with pentlandite-rich pyrrhotite was found over less than a metre of drill core and low grade intersections of tungsten (scheelite) were also encountered (Assessment Report 3735). Values for gold, platinum and palladium were typically low (Assessment Reports 15994 and 16458).

During 1996 and 1997, Bren-Mar Resources Ltd. completed a 14- hole, 2467-metre diamond-drilling program; all holes intersected nickel-bearing sulphide mineralization. Mineralization is associated with the olivine pyroxenite and pyroxenite rocks within an ultramafic complex of Late Triassic age, approximately 8 kilometres long and up to 3 kilometres wide. Sulphides have been intersected over a strike length of 3.7 kilometres, a width of 2 kilometres and up to 300 metres in depth. Three of 14 holes drilled in the past two years returned broad intercepts of nickel and cobalt, from 90 to 260 metres averaging 0.24 to 0.31 per cent nickel and 0.016 per cobalt. Metallurgical testing, including flotation and leaching studies, has been initiated. The company's geologic model and exploration target is a bulk tonnage (>225 million tonnes) nickel-cobalt deposit.

Canadian Metals Exploration Ltd., carried out an induced polarization study during 2002 covering much of the complex and drilled three diamond drill holes. Drilling in 2002 occurred in the vicinity of the Horsetrail occurrence (104I 119).

4. SURVEY SPECIFICATIONS AND PROCEDURES

The survey specifications are summarised in the following table:

Area Name	Line Spacing (m)	Line Direction	Survey Coverage (line-km)	Dates Flown (2004)
Turnagain Project	100m and 200m	NE-SW Azimuth 40.5°	1866.15	Sept. 22-25

The kilometres flown are calculated by adding up the survey and control (tie) line lengths as presented in the final Geosoft database. All the survey lines were flown with an azimuth of 40.5° relative to the UTM grid north-south direction. The control (tie) lines were flown perpendicular to the survey lines.

The nominal EM bird terrain clearance is 30m (98 ft). The GPS antenna and magnetometer sensor are mounted in a smaller bird connected to the tow rope 21 metres above the EM bird and 17 metres below the helicopter. Nominal survey speed is 75 km/hr. Scan rates for ancillary data acquisition is 0.1 second for the magnetometer and altimeter, and 0.2 second for the GPS determined position. The EM data is acquired as a data stream at a sampling rate of 38,400 samples per second and is processed to generate

final data at 10 samples per second. The 10 samples per second translates to a geophysical reading about every 2-3 metres along the flight path.

Navigation is carried out using a GPS receiver, an AGNAV2 system for navigation control, and an RMS data acquisition system which records the GPS coordinates. The x-y-z position of the aircraft, as reported by the GPS, is recorded at 0.2 second intervals.

Unlike frequency domain electromagnetic systems, the AeroTEM[®] II system has negligible drift due to thermal expansion. The system static offset is removed by high altitude zero calibration lines and employing local leveling corrections where necessary.

The operator is responsible for ensuring the instrument is properly warmed up prior to departure and that the instruments are operated properly throughout the flight. He also maintains a detailed flight log during the survey noting the times of the flight and any unusual geophysical or topographic features.

On return of the pilot and operator to the base usually after each flight, the ProtoDAS streaming EM data and the RMS data are carried on removable hard drives and FlashCards, respectively and transferred to the data processing work station. At the end of each day, the base station magnetometer data are retrieved from the base station unit.

Data verification and quality control includes a comparison of the acquired GPS data with the flight plan; verification and conversion of the RMS data to an ASCII format XYZ data file; verification of the base station magnetometer data and conversion to ASCII format XYZ data; and loading, processing and conversion of the streaming EM data from the removable hard drive. All data is then merged to an ASCII XYZ format file which is then imported to an Oasis database for further QA/QC and for the production of preliminary EM, magnetic contour, and flight path maps.

Survey lines which show excessive deviation from the intended flight path are re-flown. Any line or portion of a line on which the data quality did not meet the contract specification was noted and re-flown.

5. AIRCRAFT AND EQUIPMENT

5.1 Aircraft

A Eurocopter (Aerospatiale) AS350B2 "A-Star" helicopter - registration C-FPTG was used as survey platform. The helicopter was owned and operated by Hi-Wood Helicopters Ltd., Calgary, Alberta. The survey aircraft was flown at a nominal terrain clearance of 220 ft (70 m).



Figure 3: The magnetometer bird (foreground) and AeroTEM II EM bird

5.2 Magnetometer

The AeroQuest airborne survey system employs the Geometrics G-823A cesium vapour magnetometer sensor installed in a two metre towed bird airfoil attached to the main tow line, 17 metres below the helicopter. The sensitivity of the magnetometer is 0.001 nanoTesla at a 0.1 second sampling rate. The nominal ground clearance of the magnetometer bird is 51 metres (170 ft.). The magnetic data is recorded at 10Hz by the RMS DGR-33.

5.3 Electromagnetic System

The electromagnetic system is an AeroQuest AeroTEM[®] II time domain towed-bird system. The current AeroTEM[®] transmitter dipole moment is 38.8 kNIA. The AeroTEMII[®] bird is towed 38 m (125 ft) below the helicopter. More technical details of the system may be found in Appendix 4.

The wave-form is triangular with a symmetric transmitter on-time pulse of 1.150 ms and a base frequency of 150 Hz. The current alternates polarity every on-time pulse. During every Tx on-off cycle (300 per second), 126 contiguous channels of raw x and z component (and a transmitter current monitor, itx) of the received waveform are measured. Each channel width is 26.455 microseconds starting at the beginning of the transmitter pulse. This 126 channel data is referred to as the raw streaming data. The AeroTEM[®] system has two separate EM data recording streams, the conventional RMS DGR-33 and the PROTODAS system which records the full waveform.



Figure 4: AeroTEM II Instrument Rack

PROTODAS Acquisition System

The 126 channels of raw streaming data are recorded by the PROTODAS acquisition system onto a removeable hard drive. The streaming data are processed post-survey to yield 33 stacked and binned on-time and off-time channels at a 10 Hz sample rate. The timing of the final processed EM channels is described in the following table:

Channel	Width	Gate	Start	Stop	Mid	Width
1 ON	1	26	677.1	703.1	690.1	26.04
2 ON	1	27	703.1	729.2	716.1	26.04
3 ON	1	28	729.2	755.2	742.2	26.04
4 ON	1	29	755.2	781.3	768.2	26.04
5 ON	1	30	781.3	807.3	794.3	26.04
6 ON	1	31	807.3	833.3	820.3	26.04
7 ON	1	32	833.3	859.4	846.4	26.04
8 ON	1	33	859.4	885.4	872.4	26.04
9 ON	1	34	885.4	911.5	898.4	26.04
10 ON	1	35	911.5	937.5	924.5	26.04
11 ON	1	36	937.5	963.5	950.5	26.04
12 ON	1	37	963.5	989.6	976.6	26.04
13 ON	1	38	989.6	1015.6	1002.6	26.04
14 ON	1	39	1015.6	1041.7	1028.6	26.04
15 ON	1	40	1041.7	1067.7	1054.7	26.04
16 ON	1	41	1067.7	1093.8	1080.7	26.04
0 OFF	1	44	1145.8	1171.9	1158.9	26.04
1 OFF	1	45	1171.9	1197.9	1184.9	26.04
2 OFF	1	46	1197.9	1224.0	1210.9	26.04
3 OFF	1	47	1224.0	1250.0	1237.0	26.04
4 OFF	1	48	1250.0	1276.0	1263.0	26.04
5 OFF	1	49	1276.0	1302.1	1289.1	26.04
6 OFF	1	50	1302.1	1328.1	1315.1	26.04
7 OFF	1	51	1328.1	1354.2	1341.1	26.04
8 OFF	1	52	1354.2	1380.2	1367.2	26.04
9 OFF	1	53	1380.2	1406.3	1393.2	26.04
10 OFF	1	54	1406.3	1432.3	1419.3	26.04
11 OFF	1	55	1432.3	1458.3	1445.3	26.04
12 OFF	1	56	1458.3	1484.4	1471.4	26.04
13 OFF	4	57	1484.4	1588.5	1536.5	104.17
14 OFF	8	61	1588.5	1796.9	1692.7	208.33
15 OFF	16	69	1796.9	2213.5	2005.2	416.67
16 OFF	32	85	2213.5	3046.9	2630.2	833.33

RMS DGR-33 Acquisition System

In addition to the magnetics, altimeter and position data, six channels of real time processed off-time EM decay in the Z direction and one in the X direction are recorded by the RMS DGR-33 acquisition system at 10 samples per second and plotted real-time on the analogue chart recorder. These channels are derived by a binning, stacking and filtering procedure on the raw streaming data. The primary use of the RMS EM data (Z1 to Z6, X1) is to provide for real-time QA/QC on board the aircraft.

The channel window timing of the RMS DGR-33 6 channel system is described in the table below.

RMS Channel	Start time (microsec)	End time (microsec)	Width (microsec)	Streaming Channels	Noise tolerance
Z1, X1	1269.8	1322.8	52.9	48-50	20 ppb
Z2	1322.8	1455.0	132.2	50-54	20 ppb
Z3	1428.6	1587.3	158.7	54-59	15 ppb
Z4	1587.3	1746.0	158.7	60-65	15 ppb
Z5	1746.0	2063.5	317.5	66-77	10 ppb
Z6	2063.5	2698.4	634.9	78-101	10 ppb

5.4 Ancillary Systems

Magnetometer and GPS Base Station

An integrated GPS and magnetometer base station is set up to monitor the static position GPS errors to permit differential post-processing and to record the diurnal variations of the Earth's magnetic field. Each sensor, GPS and magnetic, receiver/signal processor was attached to a dedicated laptop computer for purposes of instrument control and/or data display and recording. The laptops are, in turn, linked together to provide a common recording time reference using the GPS clock.

The base magnetometer was a Gem Systems GSM-19 overhauser magnetometer coupled with a Picodas MEP-710 frequency counter/decoupler. Data logging and magnetometer control was provided by the Picodas *basemag.exe* software. The logging was configured to measure at 1.0 second intervals. Digital recording resolution was 0.1 nT. The sensor was placed on a tripod away from potential noise sources near the camp. A continuously updated profile plot of the base station values is available for viewing on the base station display.

The GPS base station employed a Leica Mx9212 12 channel GPS receiver with external antenna mounted near the magnetometer sensor. Although the GPS receiver was controlled by the Picodas *cdu510.exe* software, logging was not engaged as the aircraft employed a real-time differential GPS receiver. The base GPS was used only for the GPS clock for synchronization purposes.

Radar Altimeter

A Terra TRA 3500/TRI-30 radar altimeter is used to record terrain clearance. The antenna was mounted on the outside of the helicopter beneath the cockpit. The recorded data represents the height of the antenna, i.e. helicopter, above the ground. The Terra altimeter has an altitude accuracy of +/- 1.5 metres.

Video Tracking and Recording System

A high resolution colour VHS/8mm video camera is used to record the helicopter ground flight path along the survey lines. The video is digitally annotated with GPS position and time and can be used to verify ground positioning information and cultural causes of anomalous geophysical responses.

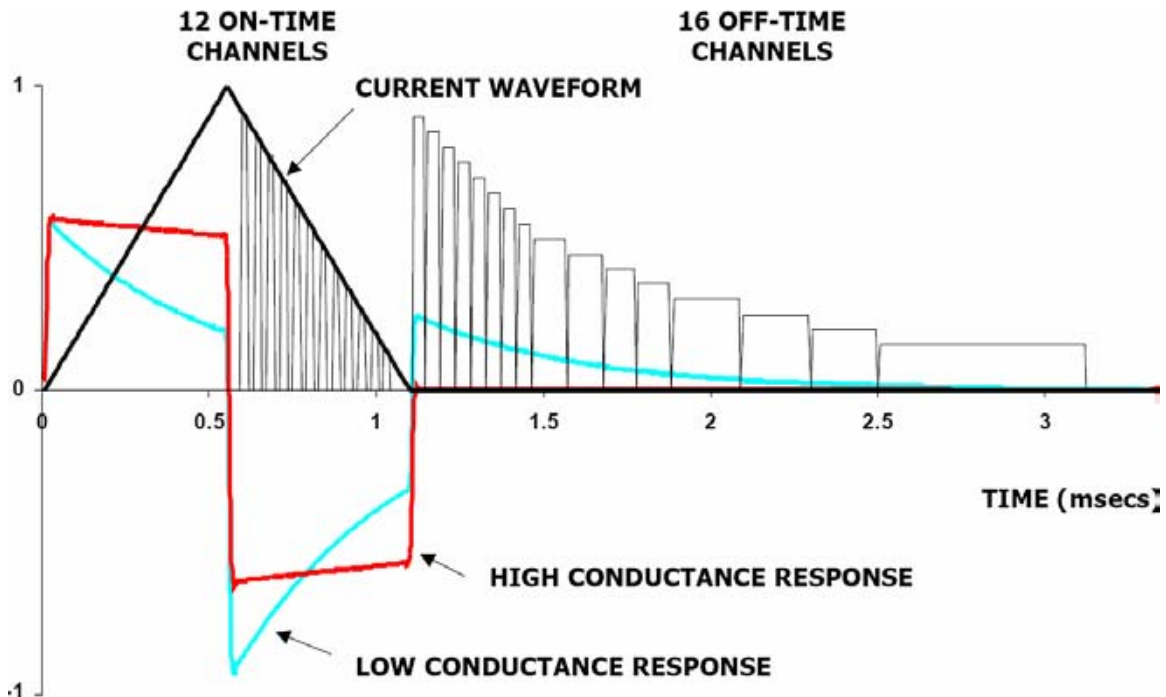


Figure 5: Schematic of Transmitter and Receiver waveforms

GPS Navigation System

The navigation system consists of an Ag-Nav Incorporated AG-NAV2 GPS navigation system comprising a PC-based acquisition system, navigation software, a deviation indicator in front of the aircraft pilot to direct the flight, a full screen display with controls in front of the operator, a Mid-Tech RX400p WAAS-enabled GPS receiver mounted on the instrument rack and an antenna mounted on the magnetometer bird. WAAS (Wide Area Augmentation System) consists of approximately 25 ground reference stations positioned across the United States that monitor GPS satellite data. Two master stations, located on the east and west coasts, collect data from the reference stations and create a GPS correction message. This correction accounts for GPS satellite orbit and clock drift plus signal delays caused by the atmosphere and ionosphere. The corrected differential message is then broadcast through one of two geostationary satellites, or satellites with a fixed position over the equator. The corrected position has a published accuracy of under 3 metres. A recent static ground test of the Mid-Tech WAAS GPS yielded a standard deviation in x and y of under 0.6 metres and for z under 1.5 metres over a two-hour period.

Survey co-ordinates are set up prior to the survey and the information is fed into the airborne navigation system. The co-ordinate system employed in the survey design was WGS84 [World] using the UTM zone 9N projection. The real-time differentially corrected GPS positional data was recorded by the RMS DGR-33 in geodetic coordinates (latitude and longitude using WGS84) at 0.2 second intervals.

Digital Acquisition System

The AeroTEM[®] received waveform sampled during on and off-time at 126 channels per half-cycle, 300 times per second, was logged by the proprietary PROTODAS data acquisition system. The channel sampling commences at the start of the Tx cycle and the width of each channel is 26.445 microseconds. The streaming data was recorded on a removable hard-drive and was later backed-up onto DVD-ROM from the field-processing computer.

The RMS Instruments DGR33A data acquisition system was used to collect and record the analogue data stream, i.e. the positional and secondary geophysical data, including processed 6 channel EM, magnetics, radar altimeter, GPS position, and time. The data was recorded on 128Mb capacity FlashCard. The RMS output was also directed to a thermal chart recorder.

6. PERSONNEL

The following AeroQuest personnel were involved in the project:

- Manager of Operations: Bert Simon
- Field Data Processors: Markus Svilans, Steve Balch
- Field Operators: Bert Simon, Markus Svilans
- Data Interpretation and Reporting: Jonathan Rudd, Marion Bishop

The survey pilot, Paul Kendall, was employed directly by the helicopter operator – Hi-Wood Helicopters Ltd., Calgary, Alberta..

7. DELIVERABLES

The report includes a set of geophysical maps plotted at a scale of 1:20,000. A central area of interest was plotted at a scale of 1:10,000. The maps are described as follows:

1:20000:

Map 1A: Flight path with EM anomaly centres, North Sheet

Map 1B: Flight path with EM anomaly centres, South Sheet

Map 2A: Total Magnetic Intensity (TMI) colour grid with EM Anomalies, North

Map 2A: Total Magnetic Intensity (TMI) colour grid with EM Anomalies, South

Map 3A: AeroTEM Z3 Off-Time Profiles with EM Anomalies, North Sheet

Map 3B: AeroTEM Z3 Off-Time Profiles with EM Anomalies, South Sheet

Map 4A: Late on-time Tau colour grid with EM Anomalies, North Sheet

Map 4B: Late on-time Tau colour grid with EM Anomalies, South Sheet

Map 5A: Early off-time Tau colour grid with EM Anomalies, North Sheet

Map 5B: Early off-time Tau colour grid with EM Anomalies, South Sheet

1:10000

Map 1C: Flight path with EM anomaly centres

Map 2C: Total Magnetic Intensity (TMI) colour grid with EM Anomalies

Map 3C: AeroTEM Z3 Off-Time Profiles with EM Anomalies

Map 4C: Late on-time Tau colour grid with EM Anomalies

Map 5C: Early off-time Tau colour grid with EM Anomalies

The coordinate/projection system for the maps is NAD83 Canada Mean Universal Transverse Mercator Zone 9 north. For reference, the latitude and longitude in NAD83 are also noted on the maps. All the maps show flight path trace, skeletal topography, and conductor picks represented by an anomaly symbol classified according to calculated off-time conductance. The anomaly symbol is accompanied by postings denoting the calculated on-time and off-time conductance, an anomaly identifier label, and the type of source (thick or thin). The anomaly symbol legend is given in the margin of the maps. Colour contour maps show colour fill plus superimposed line contours.

The geophysical profile data is archived digitally in a Geosoft GDB binary format database. The database contains the processed streaming data, the RMS data, the base station data, and all processed channels. A description of the contents of the individual channels in the database can be found in Appendix 2. This digital data is archived at the Aeroquest head office in Milton, ON.

8. DATA PROCESSING AND PRESENTATION

All in-field and post-field data processing was carried out using Aeroquest proprietary data processing software, and Geosoft Oasis montaj software. Maps were generated using 36-inch wide Hewlett Packard ink-jet plotters.

8.1 Base Map

The geophysical maps accompanying this report are based on positioning in the NAD83 Canada Mean datum. The survey geodetic GPS positions have been projected using the Universal Transverse Mercator projection in Zone 9 North. A description of the map datum and projection are as follows:

- Ellipse: GRS 1980
- Ellipse major axis: 6378137m eccentricity: 0.081819191
- Datum: North American 1983 (Canada; Central America; Mexico; USA (ex Hawaii Aleutian Islands)
- Map Projection: Universal Transverse Mercator Zone 9 (Central Meridian 129°W)
- Central Scale Factor: 0.9996
- False Easting, Northing: 500,000m, 0m

The skeletal topography was derived from data supplied by the client and also from the Federal Government's 1: 250,000 NTS map series (sheet no 104I).

8.2 Flight Path & Terrain Clearance

The position of the survey helicopter was directed by use of the Global Positioning System (GPS). Positions were updated five times per second (5Hz) and expressed as WGS84 latitude and longitude calculated from the raw pseudo range derived from the

C/A code signal. The instantaneous GPS flight path, after conversion to UTM coordinates, is drawn using linear interpolation between the x/y positions. The raw Digital Terrain Model (DTM) was derived by taking the satellite position altitude and subtracting the radar altimeter. The calculated values are relative and are not tied in to surveyed geodetic heights.

8.3 Electromagnetic Data

The raw streaming data, sampled at a rate of 38,400 Hz (126 channels, 300 times per second) was reprocessed using a proprietary software algorithm developed and owned by Aeroquest Limited. Processing involves the compensation of the X and Z component data for the primary field waveform. Coefficients for this compensation for the system transient are determined and applied to the stream data. The stream data are then pre-filtered, stacked, binned to the 33 on and off-time channels and checked for the effectiveness of the compensation and stacking processes. The stacked data is then filtered, leveled and split up into the individual line segments. Further base level adjustments may be carried out at this stage.

The filtering of the stacked data is designed to remove or minimize high frequency noise that can not be sourced from the geology. An overburden stripped response was generated by subtracting the off-time response from the on-time response for the X1 to X16 and Z1 to Z16 channels. New RMS emulation channel windows, Z1New to Z6New and X1New, were calculated based on the original 6 z-component and 1 x-component channels that the AeroTEM I system recorded in order to provide for compatibility and comparisons with earlier AeroTEM surveys.

The picked EM anomalies plotted on the survey maps are hand interpreted with the aid of an automated pick of the stream data. Apparent bedrock EM anomalies are auto-picked from positive peak excursions in the off-time Z channel responses. These auto-picked anomalies were then reviewed and edited by a geophysicist to discriminate between bedrock and conductive overburden responses.

The auto-pick algorithm is based on two criteria, 1) a minimum ZOff0 threshold of 2.5 nT/s and 2) a peak in ZOff0 channel as defined by two leading values that are increasing, and two trailing values that are decreasing. At each conductor pick, estimates of the on-time and off-time conductance have been generated based on a threshold of 5.0 nT/s on and 2.5 nT/s off. The number of off-time channels of response (from channels ZOff0-ZOff15) above the threshold is also noted.

In addition, a conductance (COND) value has been calculated based on a horizontal plate source model for those data points along the line where the response amplitude is sufficient to yield an acceptable estimate. The conductance is computed on the off-time channels unless the on-time channels are of sufficient amplitude. The on-time data are used in this case because the on-time data provide a more accurate measure of the conductance of high-conductance sources.

The final processing step was to merge the processed EM data with the other data sets into a Geosoft GDB file. The EM fiducial is used to synchronize the two datasets. The processed channels are labeled in the "streaming" database as Zon1 to Zon16, Zoff0 to Zoff16, Xon1 to Xon16, and Xoff0 to Xoff16. The original RMS data (channels Z1RMS to Z6RMS, and X1RMS) have been converted from ppm to nT/s and are included in the final database. The processed AeroTEM EM channels are expressed as nT/s.

Each conductor pick has been given an identification letter label and has also been classified according to a set of seven ranges of calculated off-time conductance values. The anomalies were then plotted on the plan maps with one of seven symbols reflecting that classification level. The maximum possible number of off-time channels is 16 given the last channel of the 17 measured is not included.

During the high elevation checks, an internal 5 second wide calibration pulse in all EM channels was generated in order to ensure that the gain of the system remained constant and within specifications.

8.4 Magnetic Data

Prior to any leveling the magnetic data was subjected to a lag correction of -0.1 seconds and a spike removal filter. The filtered aeromagnetic data were then corrected for diurnal variations using the magnetic base station and the intersections of the tie lines. No corrections for the regional reference field (IGRF) were applied. The corrected profile data were interpolated on to a grid using a random grid technique with a grid cell size of 25 metres. The final leveled grid provided the basis for threading the presented contours which have a minimum contour interval of 10 nT.

9. RESULTS AND INTERPRETATION

9.1 Magnetic Response

The survey was successful in mapping the magnetic and conductive properties of the geology throughout the survey area. The magnetic data provide a high resolution map of the distribution of the magnetic minerals in the survey area. The sources for anomalous magnetic responses are generally thought to be predominantly magnetite because of the relative abundance and strength of response (high magnetic susceptibility) of magnetite over other magnetic minerals such as pyrrhotite. The magnetic data ranges from lows of approximately 55,000nT to highs of up to 63,000nT with an average background of 57,800nT.

The magnetic data are dominated by an oblate high central to the survey area. This high reflects the high magnetite and pyrrhotite concentration within the Turnagain layered gabbro intrusion. Magnetic lows within this intrusion may reflect either areas where iron is still tied up in silicates, or areas where there area sedimentary rafts within the intrusion.

The magnetic response outside the intrusion is primarily reflecting local increases in magnetite concentration within the sedimentary units. Where these features are linear, the

magnetite is likely primary, and where the magnetic high features are localized, the source of the magnetite is more likely related to alteration due to deformation and intrusion.

9.2 EM Anomalies – General comments

The EM anomalies on the maps are classified by conductance (as described earlier in the report) and also by the thickness of the source. A thin, vertically orientated source produces a double peak anomaly in the z-component response and a positive to negative crossover in the x-component response (see Figure 6a). For a vertically-oriented thick source (say, greater than 10m), the response is a single peak in the z-component response and a negative to positive crossover in the x-component response (see Figure 6b).

Because of these differing responses, the AeroTEM system provides discrimination of thin and thick sources and this distinction is indicated on the EM anomaly symbols. Where multiple, closely spaced conductive sources occur, it can be difficult to uniquely determine the type (thick vs. thin) of the source, so in these cases all possible sources are indicated by picking both thick and thin response styles. It is also possible where the source has a shallow dip, that the characteristics of both thick and thin sources are evident (see Figure 6c). In these cases both thick and thin sources may be indicated – the ‘thin’ pick will be located over the edge of the source, whereas the ‘thick’ pick will fall over the downdip ‘heart’ of the anomaly. Another specific case is when a conductive source exists where the thickness of the source is large enough that the x-component responds to each of the edges of the conductive source and then returns to a null response in the middle. The z-component, however, still responds as a single broad peak to the entire source. In this case, both edge responses may be picked as thin sources and the broad central peak as a thick source.

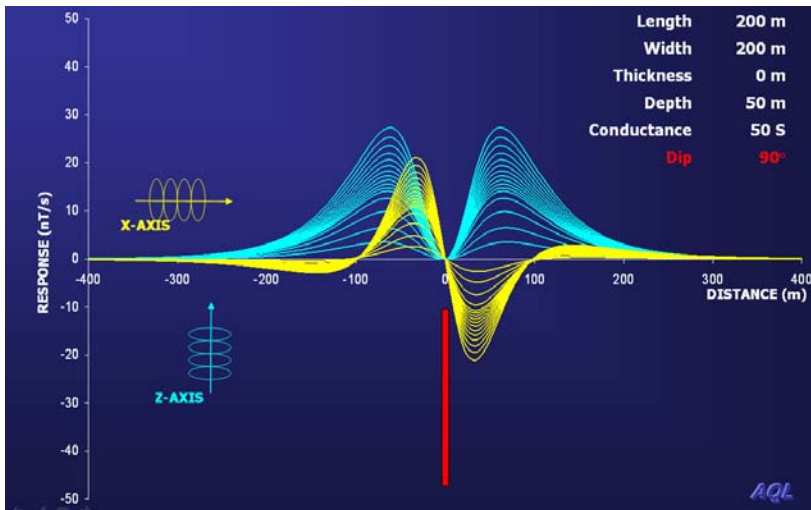


Figure 6a: AeroTEM response to a thin source

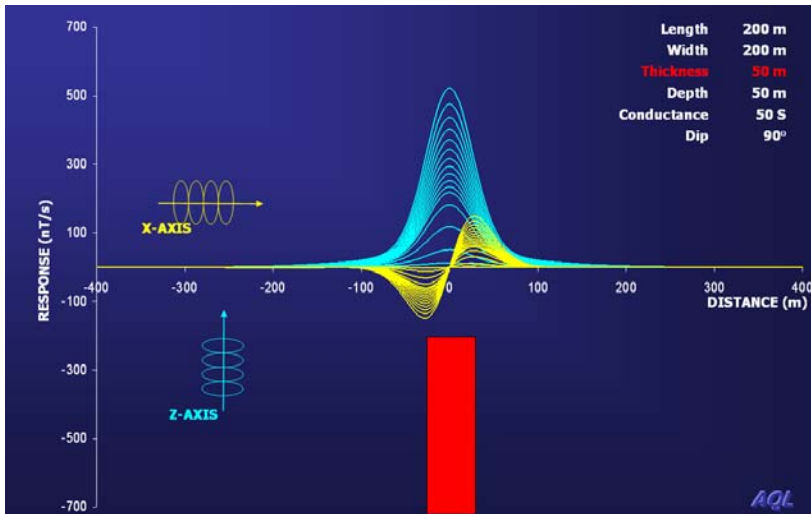


Figure 6b: AeroTEM response to a thick source

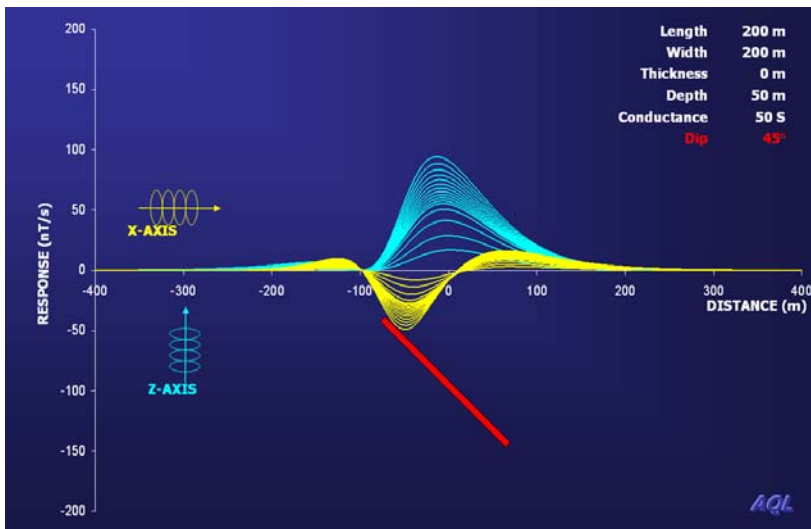


Figure 6c: AeroTEM response to a dipping source

When analyzing the interpreted picks and prioritizing for follow-up, all of these cases should be considered. Specific anomalous responses which remain as high priority should be subjected to numerical modeling prior to drill testing to determine the dip, depth and probable geometry of the source.

The EM data is dominated by the response from the conductive sedimentary units which extend across the area. This response is seen as a high amplitude response in the early on- and off-time Z component responses. The response decays steadily indicating a low to moderate conductance typical of geology of this type. The areas where the response persists to the later channels likely indicates the presence of thicker or more conductive units. The x-component response confirms the sources as moderately to steeply dipping.

The vast majority of these sources correlate with sedimentary units and are not of interest under the current exploration target of Ni-Cu-PGE. Numerous anomalies do occur within the intrusion inferred from the elevated magnetic responses. These anomalies must be treated as high priority in any follow-up programme. The AeroTEM II system penetrates to depths of up to 250m for large conductive bedrock sources.

Respectfully submitted,

Jonathan Rudd, P.Eng.
Aeroquest Limited
April 21, 2005

APPENDIX 1 –Survey Boundary Information

Survey Corner Coordinates (UTM Zone 9 – NAD83)

492300 6491300

496700 6496200

519900 6476600

515200 6471100

APPENDIX 3 - Description of Database Fields

The GDB file is a Geosoft binary database. In the database, the Survey lines and Tie Lines are prefixed with an "L" for "Line" and "T" for "Tie".

Database (04023_Hardcreek-final.gdb):

Column	Units	Description
emfid		PROTODAS Fiducial
utctime	hh:mm:ss.ss	UTC time
Lat_wgs84	dd.dddddd	Raw GPS latitude (WGS-84)
Long_wgs84	dd.dddddd	Raw GPS longitude (WGS-84)
x	m	UTM Easting (NAD83, zone 09N)
y	m	UTM Northing (NAD83, zone 09N)
bheight	m	Terrain clearance of EM bird
dtm	m	Digital Terrain Model
magf	nT	Final leveled total magnetic intensity
basemagf	nT	Base station total magnetic intensity
ZOn1-ZOn16	nT/s	Processed Streaming On-Time Z component Channels 1-16
ZOff0-ZOff16	nT/s	Processed Streaming Off-Time Z component Channels 0-16
XOn1-XOn16	nT/s	Processed Streaming On-Time X component Channels 1-16
XOff0-XOff16	nT/s	Processed Streaming Off-Time X component Channels 0-16
Anom_labels		Letter label of conductor pick
Thick_Thin		Letter label of thick (K) or thin (N) conductor type
on_con	S	On-time conductance
off_con	S	Off-time conductance
grade		Classification from 1-7 based on conductance of conductor pick

APPENDIX 3: Aeroquest Limited – AeroTEM Design Considerations



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AEROTEM Helicopter Electromagnetic System

System Characteristics

- Transmitter: Triangular Pulse Shape Base Frequency 30 or 150 Hz
- Tx On Time - 5,750 (30Hz) or 1,150 (150Hz) μ s
- Tx Off Time - 10,915 (30Hz) or 2,183 (150Hz) μ s
- Loop Diameter - 5 m
- Peak Current - 250 A
- Peak Moment - 38,800 NIA
- Typical Z Axis Noise at Survey Speed = 8 ppb peak
- Sling Weight: 270 Kg
- Length of Tow Cable: 40 m
- Bird Survey Height: 30 m or less nominal

Receiver

- Three Axis Receiver Coils (x, y, z) positioned at centre of transmitter loop
- Selectable Time Delay to start of first channel 21.3 , 42.7, or 64.0 ms

Display & Acquisition

- PROTODAS Digital recording at 126 samples per decay curve at a maximum of 300 curves per second (26.455 μ s channel width)
- RMS Channel Widths: 52.9, 132.3, 158.7, 158.7, 317.5, 634.9 μ s
- Recording & Display Rate = 10 readings per second.
- On-board display - six channels Z-component and 1 X-component

System Considerations

Comparing a fixed-wing time domain transmitter with a typical moment of 500,000 NIA flying at an altitude of 120 m with a Helicopter TDEM at 30 m, notwithstanding the substantial moment loss in the airframe of the fixed wing, the same penetration by the lower flying helicopter system would only require a sixty-fourth of the moment. Clearly the AeroTEM system with nearly 40,000 NIA has more than sufficient moment. The airframe of the fixed wing presents a response to the towed bird, which requires dynamic compensation. This problem is non-existent for AeroTEM since transmitter and receiver positions are fixed. The AeroTEM system is completely portable, and can be assembled at the survey site within half a day.

APPENDIX 5: Statement of Qualifications

Jonathan Rudd, P.Eng.

1. I am a full-time employee of Aeroquest Limited, based in Milton, Ontario, Canada.
2. My residence is at 54 Alona Avenue, Cambridge, Ontario, N3C 3Y4.
3. I graduated with an honours B.Sc.E. in Geological Engineering in Geophysics, 1988, from Queen's University, Kingston, ON.
4. I have been practicing continuously as an exploration geophysicist for 16 years.
5. I am a registered as a Professional Engineer and am entitled to engage in the practice of professional engineering in the province of Ontario under the terms of the Professional Engineers Act, Revised Statutes of Ontario, 1990, Chapter p 28 .
6. Non-professional affiliations : Society of Exploration Geophysicists, Prospectors and Developers Association of Canada, Sudbury Prospectors and Developers Association, Sudbury Geological Discussion Group, Ontario Prospectors Association
7. I directly supervised the airborne geophysical work as described in this report.