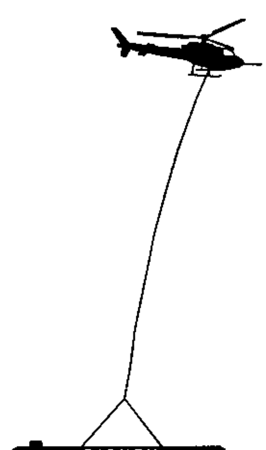
Report #1297

DIGHEM^{V} SURVEY
FOR
EUREKA RESOURCES INC.
BOWRON RIVER AREA
BRITISH COLUMBIA

REF: NTS 93/H5



Geoterrex-Dighem, a division of CGG Canada Ltd.
Mississauga, Ontario
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GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

25,746

SUMMARY

This report describes the logistics and results of a DIGHEM^V airborne geophysical survey carried out for Eureka Resources Inc. in the Bowron River Area, British Columbia. Total coverage of the survey block amounted to 441 line km. The survey was flown from February 13 to 15, 1998.

The purpose of the survey was to map the geophysical characteristics of the geology in the survey area in order to provide information that could be used to map the bedrock geology and structure. In addition, the survey was flown to identify prospective targets in the exploration for massive sulphide mineralization. These purposes were accomplished by using a DIGHEM^V multi-coil, multi-frequency electromagnetic system and a high sensitivity cesium magnetometer. The data were processed to produce maps which display the conductive and magnetic properties of the survey area.

The geophysical data are presented on a single map sheet for each of the plotted parameters at a scale of 1:15,000. All of the colour and monochrome maps present the final interpreted EM anomalies as symbols in a vector overlay. The following geophysical parameters are provided with this report as maps or as grids:

- apparent resistivity - 900 Hz
- apparent resistivity - 7,200 Hz
- total magnetic field
- calculated vertical magnetic gradient
- DIGHEM^V electromagnetic anomalies

Apparent resistivity is computed from the inphase and quadrature EM components for two of the three coplanar frequencies (900 and 7200 Hz) using a pseudo-layer halfspace model. The IGRF or IGRF gradient have not been removed from the corrected total field data for the current survey. The final corrected total magnetic field data are processed to produce a calculated vertical gradient map. The final, corrected geophysical data sets are

interpolated onto a regular 25 m grid using a modified Akima spline technique. All of the final maps depict the local topography.

The area is largely covered with overburden and is underlain with rocks of the Antler Group which include Paleozoic volcanics. Volcanogenic massive sulphide in float was discovered within the survey area. The nature of the float indicates that transport was less than 2 km. The local geologic trends are east and southeast with dips from vertical to 55 degrees toward the northeast and southwest.

The total magnetic field amplitudes range from 57,100 nT to 58,300 nT with a background varying smoothly from 57,520 nT in the southwest to 57,580 nT in the northeast. The total magnetic field data set is relatively inactive over a large portion of the area with local areas of high magnetic activity in the southern portion of the area. Other isolated highs occur in the east and northeast portion of the area.

In general, the apparent resistivity patterns show good agreement with the magnetic trends. This suggests that many of the resistivity lows are probably related to bedrock features, rather than conductive overburden. There are some areas, however, where the apparent resistivity data sets appear to reflect conductive surficial material.

There are several apparent resistivity lows in the area typical of "formational" conductors. Other resistivity lows which occur in regions of higher topography reflect relatively conductive lithologic units. Attention may be focused on areas where these zones appear to be faulted or folded or where anomaly characteristics differ along strike.

The interpreted bedrock EM anomalies are relatively sparse across the entire survey area and are generally of low conductance. Several interpreted bedrock features are of interest in light of the exploration target. These occur in relatively high topography and all have a low computed conductance indicating either weakly conductive or a low concentration of conductive mineralization.

The survey was successful in defining the magnetic, conductive properties of the survey area and in identifying prospective weakly conductive EM anomalies. The survey results should be reviewed in detail, in conjunction with all available geophysical, geological and geochemical information in order to prioritize the prospective areas and specific targets for further exploration. After the initial prioritization of prospective areas and responses, the highest priority targets should be investigated further using appropriate surface exploration techniques.

CONTENTS

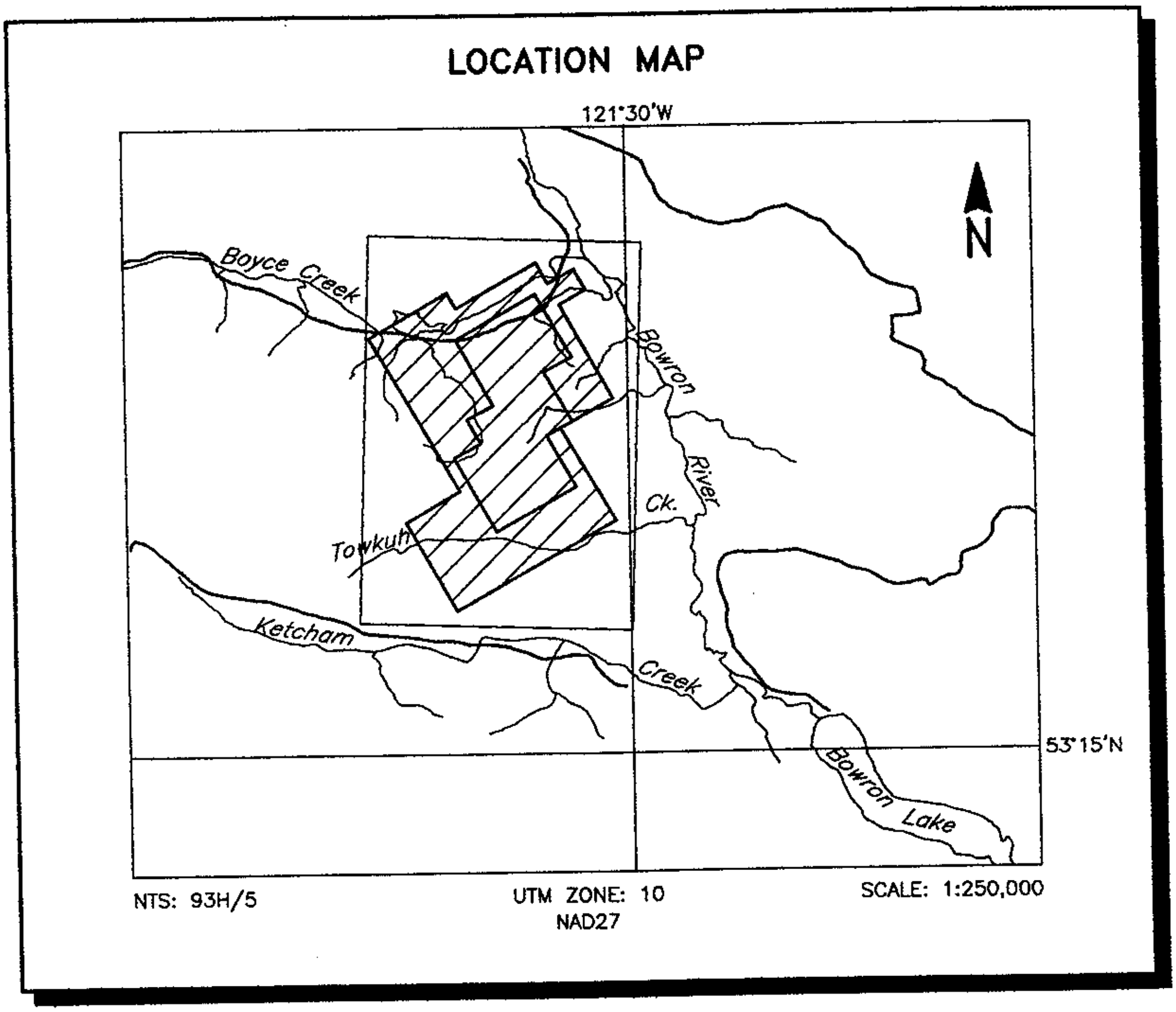
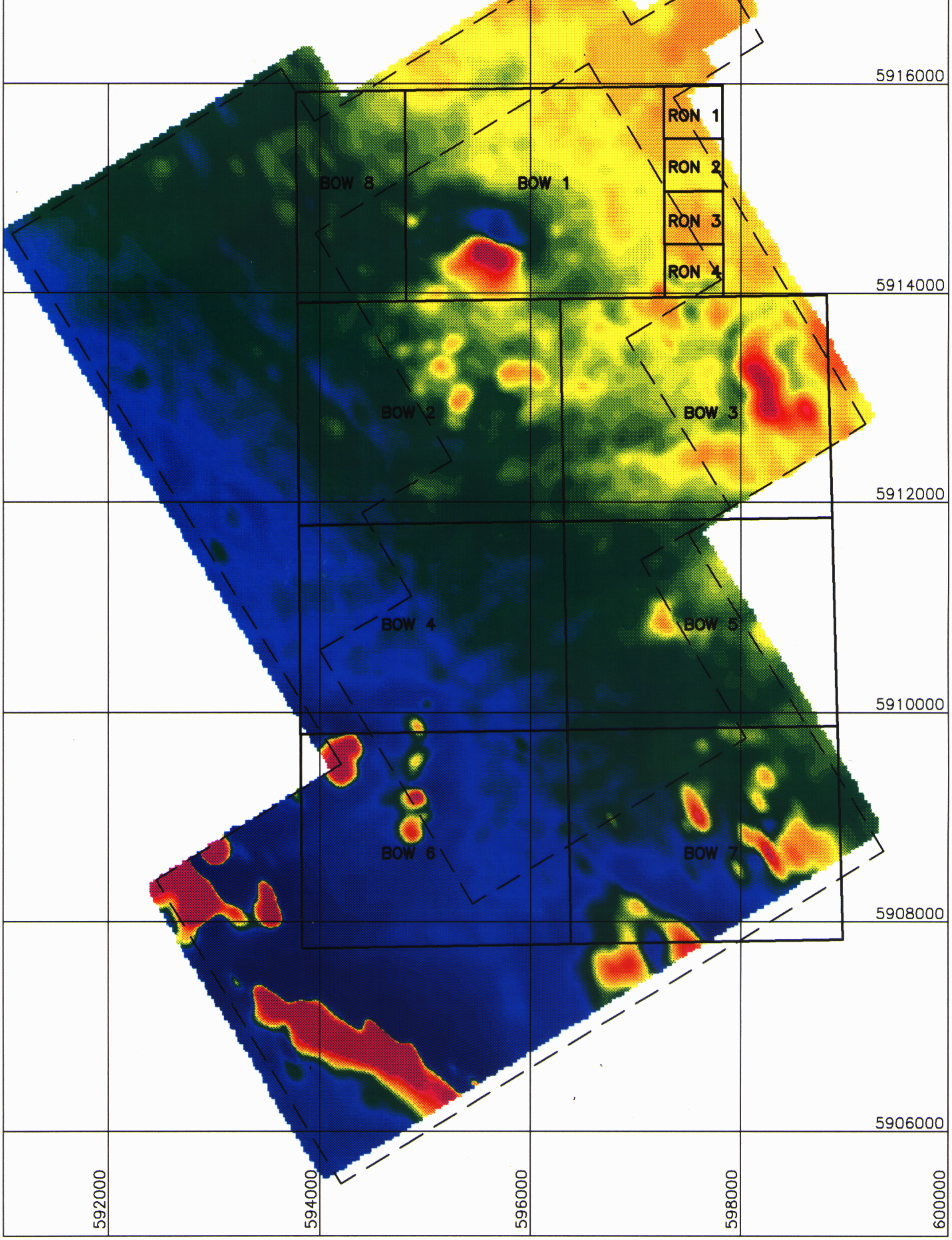


FIGURE 1
EUREKA RESOURCES INC.
BOWRON RIVER AREA, B.C.
JOB #1297

FIGURE 2: CLAIM MAP
TOTAL MAGNETIC FIELD



INTRODUCTION

A DIGHEM^V electromagnetic/resistivity/magnetic survey was flown for Eureka Resources Inc., from February 13 to 15, 1998, over a survey block located in the Bowron River Area, British Columbia, Canada. The survey area, presented in Figure 1, is situated on the National Topographic Series map 93H/5. Figure 2 presents the total magnetic field results from the survey in relation to the claim boundary.

The survey area lies 30 km north of Barkerville and approximately 80 km southeast of Prince George. The survey consists of approximately 441 line km, including the tie lines. The entire survey area was flown with a nominal line separation of 200 m. A large portion in the centre of the block was flown with infill lines to provide coverage with a nominal line spacing of 100 m for this detail area. The cross lines were flown with a nominal azimuth of 60 degrees and two tie lines were flown perpendicular to the cross lines.

The survey was flown using the DIGHEM^V electromagnetic system. Ancillary equipment consists of a magnetometer, radar altimeter, video camera, analog and digital recorders, and an electronic navigation system. The instrumentation is installed in an AS-350B2 turbine helicopter (Registration C-GBKV) provided by Questral Helicopters Ltd. The average airspeed of the helicopter is 103 km/h and the nominal EM sensor height is 30 m.

Section 2 gives a description of the survey equipment and specifications and an outline of the field procedures. The on-board analogue output of the geophysical data is also described. Section 3 describes the processing techniques and lists the products which are delivered with this report. Descriptions of additional products which can be generated from the survey data sets are presented in Appendix E. Section 4 describes the results for each of the survey areas, and the conclusions and recommendations for further work are given in Section 5.

SURVEY EQUIPMENT AND FIELD PROCEDURES

This section describes the geophysical instrumentation and the field procedures used in acquiring the survey data. Table 2.1 presents the specifications for each of the instruments used in the survey.

Table 2.1 Equipment Specifications

Equipment	Manufacturer	Model	Type	Accuracy	Sensitivity	Rate	Nominal Survey Altitude
Electromagnetic System	Geoterrex-Dighem	DIGHEM^{V}	Towed bird symmetric dipole	____	0.06 to 0.3 ppm	10 samples/s	30 m
Magnetometer Sensor	Geometrics	G822	Optically pumped cesium vapour	____	0.01 nT	10 samples/s	30 m
Magnetometer Processor	Picodas	MEP 710	____	____	0.001 nT	10 samples/s	____
Magnetometer Base Station	GEM Systems	GSM-19T	Digital recording proton precession	____	0.10 nT	0.2 samples/s	____
Radar Altimeter	Honeywell/ Sperry	AA220	4.3 GHz short pulse modulation	____	0.3 m	10 samples/s	60 m
Analog Recorder	RMS Instruments	DGR33	Dot matrix graphics recorder	4x4 dots/mm	____	1.5 mm/s	____
Digital Data Acquisition System	RMS Instruments	DGR33	____	____	____	Up to 9600 bytes/s	____
Digital Recorder	Connor	C1SN2H CP3100	80 Mb removable hard drive	____	____	____	____
Video System	Panasonic	AG 2400/ WVCD 132	VHS colour (NTSC)	____	____	Continuous	60 m
GPS Navigation	Sercel	NR106	SPS (L1 band) 12 channel L/A code 1575.42 MHz	<5 m in differential mode	-132 dBm	2 updates/s	60 m
GPS Navigation	Ashtech Glonass	GG24	SPS (L1 band) 24 channel C/A code 1575.42 MHz	<5 m in differential mode	-132 dBm	2 updates/s	60 m
Field Workstation	Dighem	FWS V2.80	PC processing system	____	____	____	____

Electromagnetic Survey

Table 2.2 presents the detailed configuration of the electromagnetic system for the current survey.

Table 2.2 Electromagnetic System Survey Specifications

Coil-pair Name	Actual Frequency (Hz)	Coil Separation (m)	Sensitivity (ppm)	Sample Rate (seconds^{-1})	Channels Recorded	Nominal Altitude (m)
900 Hz coaxial	1,056	7.98	0.06	10	inphase/quadrature	30
900 Hz coplanar	900	7.98	0.06	10	inphase/quadrature	30
5,500 Hz coaxial	5,665	7.98	0.10	10	inphase/quadrature	30
7,200 Hz coplanar	7,190	7.98	0.10	10	inphase/quadrature	30
56,000 Hz coaxial	56,350	6.33	0.30	10	inphase/quadrature	30

Four monitor channels are recorded to identify the occurrence of power line and sferic related noise. The power line monitor data were measured from the 900 Hz coaxial and 7,200 Hz coplanar receiver coils by extracting the 60 Hz data from the total response. The sferics monitor data are recorded from the same two coil pairs by rejecting the response from a frequency band encompassing the transmitted frequencies.

The electromagnetic system utilizes a multi-coil coaxial/coplanar technique to energize conductors in different directions. The coaxial coils are vertical with their axes in the flight direction. The coplanar coils are horizontal. The secondary fields are sensed simultaneously by means of receiver coils which are maximum coupled to their respective transmitter coils. The system yields an inphase and a quadrature channel from each transmitter-receiver coil-pair.

The DIGHEM^{V} calibration procedure involves four stages; primary field bucking, phase calibration, gain calibration, and zero adjust. At the beginning of the survey, the primary field at each receiver coil is canceled, or "bucked out", by precise positioning of five bucking coils.

The phase calibration adjusts the phase angle of the receiver to match that of the transmitter. A ferrite bar, which produces a purely in-phase response, is positioned near each receiver coil. The bar is rotated from minimum to maximum field coupling and the responses for the in-phase and quadrature components for each coil pair/frequency are measured. The phase of the response is adjusted at the console to return an in-phase only response for each coil-pair. Phase checks are performed daily.

The gain calibration uses extreme coils designed to produce an equal response on in-phase and quadrature components for each frequency/coil-pair. The coil parameters and distances are designed to produce pre-determined responses at the receiver due to the current induced in the calibration coil by the transmitter when a switch closes the loop at the coil. The gain at the console is adjusted to yield a secondary response of exactly 100 ppm. Gain calibrations are carried out at the beginning and the end of the survey.

The phase and gain calibrations each measure a relative change in the secondary field rather than an absolute value. This relative measurement removes any dependency of the calibration procedure on the secondary field due to the ground, except under circumstances of extreme ground conductivity.

During each survey flight, internal (Q-coil) calibration signals are generated to recheck system gain and to establish zero reference levels. These calibrations are carried out at intervals of approximately 20 minutes with the system out of ground effect. At a sensor height of more than 250 m, there is no measurable secondary field from the earth. The remaining residual is therefore established as the zero level of the system. Linear system drift is automatically removed by re-establishing zero levels between the Q-coil calibrations.

Magnetic Survey

One mobile and two base station magnetometer sensors are used in the survey. The mobile sensor is housed in the EM bird, 30 m below the helicopter.

The data from the two base station magnetometers are used to record the diurnal variation of the earth's magnetic field. The base station sensors are situated within 40 km of the survey block in an area where the magnetic field is relatively inactive in order to minimize the effects of local variations in the diurnal field. The clocks of the base stations are synchronized with that of the airborne system to permit subsequent diurnal correction. The base station data are filtered with a 30s low pass filter to remove any high frequency content in the data prior to correcting the total field data.

Radar Altimeter

The radar altimeter is fixed to the helicopter and is positioned to measure the vertical distance between the helicopter and the ground.

Analog Recorder

The analog profiles are recorded on chart paper in the aircraft during the survey. Table 2-3 lists the geophysical data channels and the vertical scale of each profile.

Table 2-3. The Analog Profiles

Channel Name	Parameter	Scale units/mm	Designation on Digital Profile
1X9I	coaxial inphase (900 Hz)	2.5 ppm	CXI (900 Hz)
1X9Q	coaxial quad (900 Hz)	2.5 ppm	CXQ (900 Hz)
3P9I	coplanar inphase (900 Hz)	2.5 ppm	CPI (900 Hz)
3P9Q	coplanar quad (900 Hz)	2.5 ppm	CPQ (900 Hz)
2P7I	coplanar inphase (7200 Hz)	5 ppm	CPI (7200 Hz)
2P7Q	coplanar quad (7200 Hz)	5 ppm	CPQ (7200 Hz)
4X7I	coaxial inphase (5500 Hz)	5 ppm	CXI (5500 Hz)
4X7Q	coaxial quad (5500 Hz)	5 ppm	CXQ (5500 Hz)
5P5I	coplanar inphase (56000 Hz)	10 ppm	CPI (56 kHz)
5P5Q	coplanar quad (56000 Hz)	10 ppm	CPQ (56 kHz)
ALTR	altimeter (radar)	3 m	ALTR
CMGF	total magnetic field, fine	2 nT	
CXSP	coaxial sferics monitor		CXS
CPSP	coplanar sferics monitor		CPS
CXPL	coaxial powerline monitor		CXP
CPPL	coplanar powerline monitor		CPP
4XSP	coaxial (high) sferics monitor		4XS

Digital Data Acquisition System

The digital data are stored on a removable hard drive and are downloaded to the field workstation PC at the survey base for verification, backup and preparation of in-field products.

Video Flight Path Recording System

Fiducial numbers are recorded continuously and are displayed on the margin of each image. This procedure ensures accurate correlation of analog and digital data with respect to visible features on the ground.

Navigation (Global Positioning System)

The Sercel NR106 utilizes time-coded signals from at least four of the twenty-four NAVSTAR satellites. In differential mode, two GPS receivers are used, one as a base station and one as a mobile unit. The base station unit is used as a reference which transmits real-time corrections to the mobile unit in the aircraft, via a UHF radio datalink. The on-board system calculates the flight path of the helicopter which, coupled with a PNAV navigation system, provides real-time guidance. The raw XYZ data are recorded for both receivers, thereby permitting post-survey processing for accuracies of approximately 5 metres.

The Ashtech GG24 is a line of sight satellite navigation system which utilizes time-coded signals from at least four of forty-eight available satellites. Both Russian GLONASS and American NAVSTAR satellite constellations are used to calculate the position and to provide real time guidance to the helicopter. The Ashtech system is combined with a

RACAL differential receiver which further improves the accuracy of the flying and subsequent flight path recovery to better than 5 metres. The differential corrections, which are obtained from a network of virtual reference stations, are transmitted to the helicopter via a spot beam satellite. These virtual reference stations eliminate the need for a local GPS base station.

Although the base station receiver is able to calculate its own latitude and longitude, a higher degree of accuracy can be obtained if the reference unit is established on a known benchmark or triangulation point. The GPS base station was located at latitude 53 degrees 6.1937 minutes, longitude 121 degrees 33.8547 minutes west at an elevation of 1203.73 m a.m.s.l. The GPS records data relative to the WGS84 ellipsoid, which is the basis of the revised North American Datum (NAD83). Conversion software is used to transform the WGS84 coordinates to the UTM system displayed on the base maps.

Field Workstation

A portable PC-based field workstation is used at the survey base to verify data quality and completeness. Flight data are transferred to the PC hard drive to permit the creation of a database. This process allows the field operators to display both the positional (flight path) and geophysical data on a screen or printer.

PRODUCTS AND PROCESSING TECHNIQUES

This section describes the processing of the data and the presentation of the final delivered products. Table 3-1 lists the maps and other products which have been provided under the terms of the survey agreement. A description of other products which can be produced from the existing data sets can be found in Appendix E.

Each of the geophysical parameters are plotted on a single sheet at a scale of 1:15,000. The maps are presented with reference to zone 10 of the Universal Transverse Mercator projection using the NAD27 datum. This coordinate system is used in agreement with the NTS map sheet for the survey area.

An outline of the claims is presented on all of the maps.

Electromagnetic Anomalies

All of the colour and monochrome maps present the final interpreted EM anomalies as a vector overlay. The interpreted conductor type, dip, conductance and depth are indicated by symbols. Direct magnetic correlation is also indicated if it exists.

The process of interpreting the EM anomalies begins by filtering the EM data with a spike rejection filter. Appropriate median and/or Hanning filters are applied to reduce high frequency noise to acceptable levels. EM test profiles are then created to allow the interpreter to select the most appropriate EM anomaly picking controls for a given survey area. The EM picking parameters depend on several factors but are primarily based on the dynamic range of the resistivities within the survey area, and the types and expected geophysical responses of the geologic target models.

Table 3-1 Survey Products

1. Final Transparent Maps (plus 4 paper prints) @ 1:15,000
   DIGHEM^V EM anomalies
   Total magnetic field
   Calculated vertical magnetic gradient
   Apparent resistivity 900 Hz
   Apparent resistivity 7,200 Hz

2. Colour Maps (2 sets) @ 1:15,000
   Total magnetic field
   Calculated vertical magnetic gradient
   Apparent resistivity 900 Hz
   Apparent resistivity 7,200 Hz

3. Digital Archive - 1 copy on CD-ROM
   Grids in Geosoft binary format for the following parameters:
   - apparent resistivity - 900 Hz
   - apparent resistivity - 7,200 Hz
   - total magnetic field
   - calculated vertical magnetic gradient

   Line data archive in Geosoft XYZ format
   Anomaly listing in Geosoft XYZ format

4. Additional Products
   Survey report (4 copies)
   Multi-channel stacked profiles
   Analog chart records
   Flight path video cassettes
   VISION software package

Note: Other products can be produced from the existing survey data, if requested (see Appendix E).

Anomalous electromagnetic responses are selected and analysed by computer to provide a preliminary set of electromagnetic anomalies. These preliminary anomalies are reviewed and corrected where necessary by the geophysicist to produce the final interpreted EM anomaly maps. Excellent resolution and discrimination of conductors was accomplished by employing a common frequency (900 Hz) on two orthogonal coil-pairs (coaxial and coplanar). The computed "difference channel" parameters often permit differentiation of bedrock and surficial conductors where the computed conductance alone can not.

The anomalies shown on the electromagnetic anomaly maps are based on a near-vertical, half plane model. This model best reflects "discrete" bedrock conductors. Wide bedrock conductors or flat-lying conductive units, whether from surficial or bedrock sources, may give rise to very broad anomalous responses on the EM profiles. These may not appear on the electromagnetic anomaly map if they have a regional character rather than a locally anomalous character. These broad conductors, which more closely approximate a half space model, will be maximum coupled to the horizontal (coplanar) coil-pair and will be evident on the resistivity maps. Resistivity maps, therefore, may be more valuable than the electromagnetic anomaly maps in areas where broad or flat-lying conductors are considered to be of importance (see next - Apparent Resistivity).

Apparent Resistivity

Apparent resistivity is computed from the inphase and quadrature EM components for two of the three coplanar frequencies (900 and 7200 Hz) using a pseudo-layer halfspace model. The resultant apparent resistivity maps portray the variation in apparent resistivity for the given frequency over the entire survey area. This full coverage contrasts with the electromagnetic anomaly map which provides information only over interpreted discrete conductors. The large dynamic range afforded by the multiple frequencies in the DIGHEM^{V} system makes the apparent resistivity parameter an excellent mapping tool.

Preliminary apparent resistivity maps and images are carefully inspected to identify lines or line segments which may require base level adjustment. Subtle changes between in-flight calibrations of the system can result in line to line differences which are more readily recognizable in resistive (low signal amplitude) areas. If required, manual levelling is carried out to eliminate or minimize resistivity differences which can be attributed to changes in operating temperature. These levelling adjustments are usually subtle, and do not result in the degradation of discrete anomalies from valid bedrock sources.

After the levelling process is complete, revised resistivity grids are created. These grids are filtered using a 3 cell by 3 cell smoothing filter prior to the preparation of the final maps. This final filter will not degrade the apparent resistivity given the broad 'footprint' of the parameter and the assumption of a homogeneous half space used in the computation of the apparent resistivity.

The calculated apparent resistivity values are clipped at a maximum value for each of the 900 and 7,200 Hz data sets. These maxima, approximately 1,000 and 8,000 ohm-m, respectively, eliminate the meaningless high apparent resistivity values which would result from very small EM amplitudes. A minimum apparent resistivity cutoff value of 1.7×10^{-5} times the frequency is applied in order to eliminate errors due to the lack of an absolute phase control for the EM data.

Contoured resistivity maps, based on the 900 Hz and 7,200 Hz coplanar data sets are included with this report. The calculated apparent resistivity for the two coplanar frequencies are included in the XYZ and grid archives. Values are in ohm-metres on all final products.

Total Magnetic Field

A spike-rejection filter is applied to the raw magnetic data during the loading process. Any remaining spikes for which no cultural or other source can be discerned are removed. The aeromagnetic data are then corrected for diurnal variation using the magnetic base station data. Manual adjustments are applied to any lines that require levelling, as identified by shadowed images of the gridded magnetic data.

The final, levelled total magnetic field data are then gridded for presentation on the maps and for archiving. The IGRF gradient across the survey block is left intact. This procedure ensures that the magnetic contours will match contours from any adjacent surveys which have been processed in a similar manner. The total field magnetic data have been presented as contours on the final maps using a contour interval of 5 nT where gradients permit.

Calculated Vertical Magnetic Gradient

The final corrected total magnetic field data are subjected to a fast Fourier transform processing algorithm which enhances the response of near-surface magnetic sources and attenuates the response from deeper bodies. The resulting vertical gradient map provides better definition and resolution of near-surface magnetic units and enhances weak magnetic features which may not be evident on the total field map. However, regional magnetic variations and changes in lithology may be better defined on the total magnetic field map.

Colour and Monochrome Contour Map Displays

The final, corrected geophysical data sets are interpolated onto a regular grid using a modified Akima spline technique. The grid cell size is 25m which is 25% of the nominal line spacing for the detail area. Contour vectors are generated from these gridded data sets.

Colour maps are produced by interpolating the grid down to the final plotted pixel size. The individual grid cells are then assigned a specific colour by data amplitude range in order to produce colour contour maps.

Topography Layer

All of the final maps include a greyscale layer depicting the local topography. The NTS topographic map is digitized by scanning to a bitmap format. The bitmap is combined with the geophysical data for plotting of the final maps. The digitization process ensures a relatively accurate, distortion-free image which facilitates correlation of the geophysical information to the local topography.

Multi-channel Stacked Profiles

Distance-based profiles of the geophysical data sets are generated from the digital database and plotted. The profiles are produced as worksheets prior to interpretation and contain all of the computed parameters used in the interpretation process. The profiles are re-plotted in their final corrected form displaying the electromagnetic anomalies with their respective interpretive symbols. Table 3-2 shows the parameters and scales for the multi-channel stacked profiles.

In Table 3-2, the log resistivity scale of 0.06 decade/mm means that the resistivity changes by an order of magnitude in 16.6 mm. The resistivities at 0, 33 and 67 mm up from the bottom of the digital profile are respectively 1, 100 and 10,000 ohm-m.

Table 3-2. Multi-channel Stacked Profiles

Channel Name (Freq)	Observed Parameters	Scale Units/mm
MAG	total magnetic field	5 nT
MAG	total magnetic field	50 nT
ALT	bird height	6 m
CXI (900 Hz)	vertical coaxial coil-pair inphase	2 ppm
CXQ (900 Hz)	vertical coaxial coil-pair quadrature	2 ppm
CPI (900 Hz)	horizontal coplanar coil-pair inphase	2 ppm
CPQ (900 Hz)	horizontal coplanar coil-pair quadrature	2 ppm
CXI (5500 Hz)	vertical coaxial coil-pair inphase	4 ppm
CXQ (5500 Hz)	vertical coaxial coil-pair quadrature	4 ppm
CPI (7200 Hz)	horizontal coplanar coil-pair inphase	4 ppm
CPQ (7200 Hz)	horizontal coplanar coil-pair quadrature	4 ppm
CPI (56,000 Hz)	horizontal coplanar coil-pair inphase	10 ppm
CPQ (56,000 Hz)	horizontal coplanar coil-pair quadrature	10 ppm
CPSP	coplanar sferics monitor	
CPPL	coplanar powerline monitor	
CXSP	coaxial sferics monitor	
	Computed Parameters	
DFI (5500 Hz)	difference function inphase from CXI and CPI	4 ppm
DFQ (5500 Hz)	difference function quadrature from CXQ and CPQ	4 ppm
RES (900 Hz)	log resistivity	.06 decade
RES (7200 Hz)	log resistivity	.06 decade
RES (56,000 Hz)	log resistivity	.06 decade
DP (900 Hz)	apparent depth	6 m
DP (7200 Hz)	apparent depth	6 m
DP (56,000 Hz)	apparent depth	6 m
CDT	conductance	1 grade

SURVEY RESULTS AND DISCUSSION

The purpose of the survey is to aid in the geologic mapping of the survey area and to identify priority areas for further exploration in the search for conductive massive sulphide mineralization. The area is largely covered with overburden with the thickest sections expected where the topography is low. The survey area is underlain with rocks of the Antler Group which includes Paleozoic volcanics. These volcanic rocks are expected to be felsic to intermediate in composition. Sedimentary rocks with graphite are not expected to occur in the survey area. Volcanogenic massive sulphide in float form was discovered within the survey area. The nature of the float indicates that transport was less than 2 km. Based on the composition of the float, the target is massive sulphide (95%) with mineralization including pyrite and chalcopyrite with minor pyrrhotite. Another sample is described as massive (70% to 80%) with mineralization comprising coarse grained pyrite and chalcopyrite with sphalerite.

The local geologic trends are east and southeast with dips from vertical to 55 degrees toward the northeast and southwest.

Magnetics

The total magnetic field amplitudes range from 57,100 nT to 58,300 nT with a background varying smoothly from 57,520 nT in the southwest to 57,580 nT in the northeast. The total magnetic field data set is relatively inactive over a large portion of the area with local areas of high magnetic activity in the southern portion of the area. Other isolated highs occur in the east and northeast portion of the area. The magnetic data reflect the east and southeast trends in the central portion of the survey but highlight a

TABLE 4-1

EM ANOMALY STATISTICS

CONDUCTOR GRADE	CONDUCTANCE RANGE SIEMENS (MHOS)	NUMBER OF RESPONSES
7	>100	0
6	50 - 100	0
5	20 - 50	0
4	10 - 20	1
3	5 - 10	1
2	1 - 5	22
1	<1	197
*	INDETERMINATE	70
TOTAL		291

CONDUCTOR MODEL	MOST LIKELY SOURCE	NUMBER OF RESPONSES
B	DISCRETE BEDROCK CONDUCTOR	79
S	CONDUCTIVE COVER	169
H	ROCK UNIT OR THICK COVER	41
E	EDGE OF WIDE CONDUCTOR	2
TOTAL		291

(SEE EM MAP LEGEND FOR EXPLANATIONS)

high structural complexity in other areas of the grid where truncation and discontinuities in the magnetic features are common.

The total magnetic field and calculated vertical gradient of the total magnetic field reflect the relatively uniform magnetic mineral content in the rocks over the majority of the survey area. One large linear feature extends 1.8 km from the southeastern limit of the property to line 10350 at fiducial 3667. Other more isolated highs occurring throughout the survey area reflect local concentrations of magnetic mineralization with short strike length. These more localized features are interpreted to reflect possible intrusion of magnetic units or alteration.

The magnetic data set can be used in conjunction with any known geologic information to locate and extend geologic boundaries and structural features where the bedrock may be covered. In this way, exploration areas based on lithology can be delineated in order to further prioritize discrete anomalous responses.

The magnetic results, in conjunction with the other geophysical parameters, provide valuable information which can be used to effectively map the geology and structure in the survey areas.

Apparent Resistivity

In general, the apparent resistivity patterns show good agreement with the magnetic trends. This suggests that many of the resistivity lows are probably related to bedrock features, rather than conductive overburden. There are some areas, however, where contour patterns appear to be strongly influenced by conductive surficial material. These are evident in the southern portion of the area centred around line 10360 at fiducial 3530, around line 10290 at fiducial 1630, and around lines 30010 at fiducial 1160. These are interpreted to reflect significant accumulations of sediment along the streams and may reflect areas where the bedrock topography is lower than other areas along the creeks.

There are several rather extensive apparent resistivity lows in the area. These can often reflect "formational" conductors which may be of minor interest as direct exploration targets. The first of these trends easterly extending from the eastern limit of the survey on line 10270, fiducial 2370 to line 20110, fiducial 3520 and has a breadth of approximately 600 m. The second extends northwest from the western limit of the first feature to the western limit of the survey at line 10030, fiducial 1505. Both of these features correlate with magnetic highs with amplitude ranging from a few nT over their western portions to over 25 nT at the eastern limit of the first feature. Other resistivity lows which occur in regions of higher topography reflect relatively conductive lithologic units. Examples of these are centred at the southern end of line 20220 and near the southwestern limit of lines 10070 and 30020. Attention may be focused on areas where these zones appear to be faulted or folded or where anomaly characteristics differ along strike.

Discrete Electromagnetic Anomalies

Table 4-1 summarizes the discrete EM anomalies for the survey area with respect to conductance grade and interpretation. A full listing of the interpreted electromagnetic anomalies can be found in Appendix C.

The EM anomalies resulting from this survey appear to fall within one of 3 general categories. The first type consists of discrete, well-defined anomalies which yield marked inflections on the difference channels. These anomalies are usually attributed to conductive sulphides or graphite and are generally given a "B", "T" or "D" interpretive symbol, denoting a bedrock source. Anomalies symbolized with a "B?" can be described as possible bedrock conductors because they do not display all of the characteristics of bedrock anomalies.

The second class of anomalies comprises moderately broad responses which exhibit the characteristics of a half space and do not yield well-defined inflections on the difference channels. Anomalies in this category are given an "S" or "H" interpretive symbol. The lack of a difference channel response usually implies a broad or flat-lying conductive source such as overburden. Some of these anomalies may reflect conductive rock units or zones of deep weathering.

The effects of conductive overburden are evident over portions of the survey area. Although the difference channels (DFI and DFQ) are extremely valuable in detecting bedrock conductors which are partially masked by conductive overburden, sharp undulations in the bedrock/overburden interface can yield anomalies in the difference channels which may be interpreted as possible bedrock conductors. Such anomalies usually fall into the "S?" or "B?" classification but may also be given an "E" interpretive symbol, denoting a resistivity contrast at the edge of a conductive unit.

In areas where EM responses are evident primarily on the quadrature components, zones of poor conductivity are indicated. Where these responses are coincident with magnetic anomalies, it is possible that the inphase component amplitudes have been suppressed by the effects of magnetite. Examples of this can be seen near the southwestern limit of the survey area between lines 10280 and 10390. Most of these poorly-conductive magnetic features give rise to resistivity anomalies which are only slightly below background. If it is expected that poorly-conductive economic mineralization may be associated with magnetite-rich units, most of these weakly anomalous features will be of interest. In areas where magnetite causes the inphase components to become negative, the apparent conductance and depth of EM anomalies may be unreliable.

For a large portion of the survey areas, the steep topography forced the pilot to exceed normal terrain clearance for reasons of safety. It is possible that some weak conductors may have escaped detection in areas where the bird height exceeded 120 m.

In areas where near-vertical climbs are necessary, the forward speed of the helicopter is reduced to a level which permits excessive bird swinging. This problem, combined with the resulting severe stresses on the bird, gives rise to aerodynamic noise levels which are higher than normal on some lines. Where warranted, reflights were carried out to minimize the adverse effects on the noise levels in the data sets.

Anomalies which occur near the ends of the survey lines (i.e., outside the survey area) should be viewed with caution. Some of the weaker anomalies could be due to aerodynamic noise (i.e., bird bending) which is created by abnormal stresses to which the bird is subjected during the climb and turn of the aircraft between lines. Such aerodynamic noise is usually manifested by an anomaly on the coaxial inphase channel only, although severe stresses can affect the coplanar inphase channels as well.

As the target mineralization within the area is conductive (py, po, cpy) to weakly conductive (sphalerite is essentially a resistor) massive to semi-massive sulphides, which may or may not be hosted by magnetite-rich rocks, it is difficult to assess the relative merits of EM anomalies on the basis of conductance alone. However, the definition of the conductivity thickness product (conductance) suggests that the higher the conductance, the higher the probability that the source is conductive and thick.

It is recommended that an attempt be made to compile a suite of geophysical "signatures" over areas of interest. Anomaly characteristics are clearly defined on the computer-processed geophysical data profiles which are supplied as one of the survey products.

A complete assessment and evaluation of the survey data should be carried out by one or more qualified professionals who have access to, and can provide a meaningful compilation of, all available geophysical, geological and geochemical data.

CONDUCTORS IN THE SURVEY AREA

The interpreted bedrock EM anomalies are relatively sparse across the entire survey area and are generally of low conductance. Several of the interpreted bedrock anomalies occur at or near the margin of conductive geology and may indeed reflect a sharp change in the thickness of conductive overburden. It is virtually impossible to distinguish a sharp change like this from valid bedrock sources.

The most interesting interpreted bedrock feature in light of the exploration target extends from line 20220, fiducial 5484 to line 10310, fiducial 1043. No anomaly has been interpreted on line 20230 indicating a discontinuity in the conductivity of the feature. The computed conductance is low along the entire length indicating either a low concentration of conductive mineralization or more poorly conductive mineralization. Other interpreted bedrock features occur in the western portion of lines 1005 through 10100. All of these features are of low conductance and are interpreted to reflect weakly conductive mineralization. Other conductive bedrock features are interpreted on lines 10050, fiducial 5606 to line 90060, fiducial 1875, 10390, fiducial 2655, line 10410, fiducial 1918, and line 10440, fiducial 1012. These should all be considered as prospective sources of conductive mineralization. Prioritization of these features should be carried out through correlation with any available geological, geochemical, and other geophysical information.

CONCLUSIONS AND RECOMMENDATIONS

This report describes the equipment, procedures and logistics of the survey and provides a very brief description of the survey results. The survey was successful in defining the magnetic, conductive properties of the survey area and in identifying prospective weakly conductive EM anomalies.

The survey results should be reviewed in detail, in conjunction with all available geophysical, geological and geochemical information in order to prioritize the prospective areas and specific targets for further exploration.

When prioritizing the individual anomalies, particular reference should be made to the stacked digital data profiles which clearly define the various geophysical characteristics of each anomalous response. Anomalies which coincide or are in close proximity to structural features should be assigned a higher priority where structural breaks are considered of importance in the mineralization process. Where the target is conductive mineralization, the highest conductance anomalies should be assigned high priority because the conductance parameter is a function of both the conductivity and the thickness of the source.

After the initial prioritization of prospective areas and responses, the highest priority targets should be investigated further using appropriate surface exploration techniques.

Respectfully submitted,

GEOTERREX-DIGHEM

Jonathan Rudd, P.Eng.
Geophysicist

JCR/sdp

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APPENDIX A

LIST OF PERSONNEL

The following personnel were involved in the acquisition, processing, interpretation and presentation of data, relating to a DIGHEM^{V} airborne geophysical survey carried out for Eureka Resources Inc., in the Bowron River area, British Columbia.

Greg Paleolog	Manager, Helicopter Operations
Doug McConnell	Manager, Data Processing and Interpretation
Michael White	Senior Geophysical Operator
Victor Chen	Second Operator/Field Processor
Luke Kukovica	Pilot (Questral Helicopters Ltd.)
Gordon Smith	Data Processing Supervisor
Duane Griffith	Geophysicist - Processing
Jonathan Rudd	Geophysicist - Interpretation
Lyn Vanderstarren	Drafting Supervisor
Mark Diebel	Draftsperson (CAD)
Susan Pothiah	Word Processing Operator
Albina Tonello	Secretary/Expeditor

The survey consists of 441 kilometers of coverage, flown from February 13 to 15, 1998.

All personnel are employees of Geoterrex-Dighem, except for the pilot who is an employee of Questral Helicopters Ltd.

APPENDIX B

STATEMENT OF COST

Date: March 26, 1998

IN ACCOUNT WITH GEOTERREX - DIGHEM

To: Geoterrex-Dighem flying of Agreement dated January 13, 1998, pertaining to an Airborne Geophysical Survey in the Bowron River area, British Columbia.

Survey Charges

377.5 km of flying @ $105.7/km plus mobilization charge of $7,000.00	$46,901.75

Allocation of Costs

- Data Acquisition	(60%)
- Data Processing	(20%)
- Interpretation, Report and Maps	(20%)

APPENDIX C

EM ANOMALY LIST

Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10010													
A	1423.7	B?	592223	5914577	2.3	3.7	3.3	12.7	1.4	1.8	---	---	0
B	1440.8	S	592794	5914931	12.8	56.1	22.5	126.7	1.6	23.5	0.4	0	0
C	1539.4	S	595496	5916611	1.9	10.9	3.9	21.3	0.6	4.2	0.2	0	0
LINE L10020													
A	1284.0	B?	591737	5914018	0.0	0.8	0.5	0.7	3.6	2.3	---	---	0
B	1262.1	S	592198	5914327	0.6	6.1	3.4	15.1	0.3	2.4	0.2	0	0
C	1222.1	S	593377	5915030	14.0	38.8	59.1	104.3	4.7	26.8	0.6	0	0
D	1169.1	S	594807	5915939	0.0	8.3	2.5	19.9	1.0	2.6	0.1	0	0
E	1158.4	S	595113	5916128	0.0	10.2	1.7	22.7	1.0	4.6	0.1	0	1
F	1104.0	H	596521	5917007	0.0	1.3	6.0	6.5	1.2	2.0	0.8	32	12
G	1100.5	B?	596592	5917040	0.0	3.3	2.8	5.2	0.5	0.2	---	---	0
LINE L10030													
A	915.2	S	593502	5914892	7.0	15.8	11.2	25.9	0.8	6.2	0.5	0	0
LINE L10040													
A	5891.8	S	592382	5913963	1.5	13.9	2.3	28.0	0.0	5.7	0.1	0	2
B	5880.0	S	592710	5914159	2.1	9.4	3.7	17.6	0.0	4.3	0.2	1	0
C	5822.3	S	594173	5915074	3.2	12.9	7.1	31.2	0.0	7.1	---	---	0
D	5811.4	S	594487	5915280	2.5	8.6	1.9	16.5	0.0	3.3	0.3	11	2
LINE L10050													
A	5439.3	S	591847	5913399	3.9	20.2	3.5	34.6	0.7	8.2	0.2	0	0
B	5458.0	B?	592333	5913697	5.3	14.2	4.1	23.7	0.0	5.1	0.4	9	3
C	5480.2	S	592979	5914098	3.8	11.9	3.6	23.6	0.0	3.6	0.3	11	5
D	5530.2	S	594300	5914922	2.3	11.1	3.2	25.4	0.0	5.1	0.1	0	0
E	5553.0	S	594965	5915333	2.1	14.2	2.5	33.5	0.0	6.8	0.1	0	0
F	5564.7	S	595318	5915543	2.0	9.1	2.1	18.5	0.0	3.9	0.2	5	0
G	5606.2	B?	596393	5916202	5.9	9.7	2.5	11.2	0.0	2.3	0.5	22	2
LINE L10060													
A	5367.5	B?	591978	5913231	2.9	10.1	4.1	12.2	0.2	1.9	---	---	0
B	5351.7	B	592324	5913462	8.0	22.3	2.6	30.4	0.8	5.5	0.5	8	3
C	5344.2	S	592508	5913571	3.0	12.0	0.1	11.7	0.2	2.9	0.3	6	0
D	5335.8	B?	592728	5913704	1.3	8.7	0.0	4.8	0.7	1.0	0.1	10	0
E	5331.3	B?	592846	5913783	1.2	9.5	3.5	17.1	0.0	3.3	0.2	8	0
F	5323.7	H	593049	5913907	0.7	6.8	3.1	17.8	0.9	4.0	0.1	0	0
G	5272.3	S	594556	5914854	1.9	11.8	0.7	15.4	0.0	3.1	0.2	2	0
H	5260.1	S	594930	5915077	1.4	7.4	1.3	14.4	0.2	2.9	0.2	13	2
I	5245.1	S	595404	5915363	1.9	6.7	1.7	11.4	0.1	2.6	---	---	0
J	5229.6	S	595839	5915645	4.0	6.2	1.3	7.2	0.0	1.4	0.5	26	1
K	5207.0	S	596429	5916002	2.8	4.3	2.7	6.9	0.0	1.1	---	---	0

CX = COAXIAL
CP = COPLANAR

Note: EM values shown above are local amplitudes

EM Anomaly List

* Estimated Depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or magnetite/overburden effects.

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10070													
A	4943.0	B?	591959	5913002	3.0	9.4	8.7	21.3	0.1	4.2	---	---	0
B	4951.0	B?	592141	5913104	4.3	18.5	14.3	38.7	0.7	9.0	0.4	3	0
C	4962.0	S	592409	5913271	4.1	6.2	4.3	18.2	0.9	3.2	0.2	0	0
D	4974.0	S	592750	5913477	3.5	11.9	5.8	18.0	1.2	3.1	---	---	0
E	4978.4	B?	592874	5913559	4.3	20.5	3.3	24.4	1.2	4.2	0.2	0	0
F	4997.0	S	593339	5913856	4.7	3.0	3.8	6.5	0.8	1.2	---	---	0
G	5035.5	S	594326	5914448	1.0	5.1	1.6	7.4	0.1	1.3	---	---	0
H	5089.4	S	595903	5915435	1.8	5.7	0.9	6.6	0.0	2.3	---	---	0
I	5116.7	S	596641	5915881	0.8	11.1	1.6	20.9	0.0	3.8	0.1	0	0
LINE L10080													
A	4863.7	B?	592352	5912998	4.5	16.3	3.4	18.0	0.1	2.5	0.3	6	0
B	4855.7	B?	592535	5913112	8.5	22.0	4.0	23.2	0.1	5.2	0.5	8	5
C	4841.6	S	592865	5913329	7.4	19.3	8.5	32.2	0.6	6.3	0.5	5	0
D	4817.2	S	593440	5913659	2.5	3.1	2.6	5.0	1.2	1.8	---	---	0
E	4746.6	S	595252	5914790	1.8	6.4	1.9	9.5	0.6	2.5	---	---	0
F	4731.8	S	595687	5915078	1.3	8.2	0.6	14.5	0.2	3.1	0.1	8	0
G	4692.5	S	596787	5915754	0.6	11.7	0.9	19.0	0.0	2.9	0.1	2	0
H	4673.2	S	597275	5916047	1.7	8.9	2.6	21.2	0.0	4.5	---	---	0
LINE L10090													
A	4379.5	E	592478	5912845	2.7	17.0	7.4	32.4	0.5	7.0	0.2	0	2
B	4386.0	H	592650	5912964	2.8	2.7	1.8	2.7	0.5	0.8	---	---	0
C	4394.0	B?	592871	5913100	2.7	14.4	7.7	28.7	0.2	6.6	0.3	0	3
D	4508.8	H	595675	5914834	3.3	12.8	3.3	17.7	0.0	3.9	0.2	0	0
E	4569.4	S	597408	5915907	2.4	9.4	5.8	26.7	0.0	5.8	---	---	0
LINE L10100													
A	4231.6	B?	592608	5912697	5.2	16.4	3.4	21.2	1.6	5.4	0.4	1	6
B	4203.7	B?	593163	5913010	3.7	5.3	1.6	5.6	1.4	2.4	---	---	0
C	4053.8	S	596724	5915249	2.0	5.6	1.3	6.3	0.0	2.2	---	---	0
D	4031.6	B?	597344	5915620	13.5	27.4	25.4	56.7	0.4	14.0	0.7	4	0
E	4026.1	S	597497	5915714	6.1	19.1	14.2	35.4	0.5	8.9	0.4	7	0
LINE L10110													
A	3820.7	S	593925	5913277	3.3	2.8	3.1	3.6	0.0	1.9	---	---	0
B	3953.6	S	597015	5915197	1.5	5.0	2.8	11.0	0.0	2.1	---	---	0
C	3972.0	B?	597515	5915496	17.8	31.0	22.7	48.0	0.5	11.9	0.7	10	0
LINE L10120													
A	3632.6	B	593113	5912516	2.7	5.2	0.1	1.7	1.8	1.1	---	---	0
B	3571.9	B?	594035	5913081	4.2	6.0	0.9	0.7	0.0	0.5	---	---	0
C	3409.4	S	597679	5915368	11.6	14.9	29.6	43.7	1.7	10.3	1.0	19	0

CX = COAXIAL
CP = COPLANAR

Note: EM values shown above are local amplitudes

EM Anomaly List

* Estimated Depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or magnetite/overburden effects.

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10130													
A	3127.8	B?	594165	5912955	2.8	8.2	3.6	5.9	0.0	0.6	0.3	49	0
B	3134.4	S	594316	5913052	1.1	6.3	3.3	13.6	0.0	2.3	---	---	0
C	3152.0	S	594612	5913218	0.2	4.5	0.8	10.4	0.0	1.6	0.1	3	0
D	3299.5	S	597347	5914926	2.2	7.3	3.9	16.8	0.0	3.1	0.2	0	0
LINE L10140													
A	2845.5	B	594125	5912684	3.4	4.9	7.9	7.3	0.7	2.4	1.1	34	0
B	2833.9	B	594312	5912796	4.6	5.0	2.3	9.3	0.0	1.2	---	---	0
C	2828.5	S	594417	5912866	6.3	24.6	4.2	35.2	0.0	7.1	0.3	0	4
D	2679.1	S	597421	5914737	2.9	15.2	6.1	32.2	0.0	6.9	0.2	0	7
LINE L10150													
A	2339.5	B?	592862	5911662	3.5	5.2	1.0	9.5	0.0	2.0	---	---	0
B	2412.1	B?	594125	5912454	7.0	2.3	5.5	6.0	0.0	2.4	6.8	29	7
C	2417.1	S	594262	5912541	6.0	8.2	13.0	13.4	0.0	7.4	0.7	38	7
D	2423.5	B?	594443	5912639	6.1	13.2	10.8	23.8	0.0	5.4	0.5	19	2
E	2430.6	B?	594622	5912753	1.4	5.7	1.3	3.0	0.0	1.0	---	---	0
F	2594.7	S	597490	5914537	6.6	27.3	15.3	55.1	0.0	11.9	0.3	0	0
LINE L10160													
A	2265.0	S?	593051	5911544	0.0	7.9	0.0	10.9	0.0	2.3	0.1	9	27
B	2120.0	H	594390	5912373	1.1	2.6	1.8	2.4	0.0	1.2	0.4	66	0
C	2102.1	S	594801	5912630	4.4	6.8	3.5	12.8	0.0	3.0	0.5	29	0
D	2097.3	S	594917	5912702	2.3	7.1	0.0	12.9	0.0	3.0	---	---	0
E	1957.1	B?	597468	5914285	2.1	15.1	2.7	22.1	0.0	5.1	0.1	0	0
F	1948.4	H	597723	5914443	4.4	11.3	7.6	25.4	0.0	4.5	0.3	1	0
LINE L10170													
A	1711.7	B?	594138	5911978	3.9	3.6	0.5	6.0	0.0	1.6	---	---	2
B	1719.3	S	594286	5912065	4.5	1.5	4.1	2.7	0.0	1.5	---	---	1
C	1743.0	S	594890	5912444	3.9	10.3	9.2	26.5	0.0	7.2	---	---	0
D	1787.3	S	595689	5912958	3.7	4.8	0.7	7.0	0.0	1.5	---	---	0
E	1882.0	H	598001	5914384	0.9	0.2	2.4	10.3	0.0	1.8	0.2	3	0
LINE L10180													
A	5024.6	S	595103	5912354	9.8	4.6	17.7	4.3	0.5	4.9	3.8	23	0
B	5008.4	B?	595527	5912617	1.3	7.8	1.0	9.2	0.0	2.1	0.1	10	0
C	5005.6	B?	595580	5912653	2.8	11.0	1.1	11.6	0.0	2.5	---	---	0
D	4927.6	S	597027	5913535	1.9	8.8	2.1	15.3	0.5	3.4	---	---	0
E	4898.5	S	597707	5913971	5.1	11.9	10.3	38.2	2.0	8.3	0.5	16	9
F	4881.0	H	598174	5914256	2.6	6.2	2.5	6.2	1.4	1.5	---	---	4
LINE L10190													
A	4708.4	H	595108	5912107	4.3	0.3	2.6	4.0	0.8	1.4	32.4	68	8
B	4725.5	S	595626	5912428	9.8	29.5	18.5	61.0	2.1	14.4	0.5	0	0

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CP = COPLANAR

Note: EM values shown above are local amplitudes

EM Anomaly List

* Estimated Depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or magnetite/overburden effects.

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10190													
C	4788.0	S	597230	5913431	3.9	8.4	0.3	12.1	0.0	2.6	0.5	28	0
D	4795.1	S	597482	5913584	4.2	7.8	2.2	12.9	0.0	1.9	0.4	44	0
E	4813.0	H	598098	5913979	7.6	7.4	8.8	16.8	1.1	5.1	1.3	32	0
LINE L10200													
A	4401.7	S	594987	5911778	9.2	25.1	8.5	40.9	0.0	7.5	0.5	3	8
B	4375.2	H	595653	5912220	4.9	11.2	6.9	9.8	0.7	4.8	0.5	29	0
C	4361.7	S	596030	5912456	4.7	5.3	9.3	12.2	0.1	3.2	0.7	29	0
D	4314.6	S	597164	5913158	1.3	4.5	0.7	6.1	0.0	1.5	---	---	0
E	4275.0	H	598187	5913794	2.2	6.6	7.2	17.3	1.1	4.4	0.4	7	2
LINE L10210													
A	3991.4	S	593768	5910829	3.6	8.9	0.1	2.4	1.2	0.7	0.4	27	0
B	4041.0	S	595114	5911655	8.7	20.6	7.5	32.2	0.4	6.7	0.6	7	0
C	4081.3	S	596312	5912403	10.3	12.0	15.0	14.2	0.6	5.7	1.1	21	0
D	4134.5	S	597934	5913415	6.7	16.0	3.6	15.4	0.0	3.3	0.5	10	0
E	4138.1	S	598064	5913495	2.8	12.1	5.1	15.7	0.0	3.5	0.3	5	0
F	4148.0	H	598405	5913702	0.9	6.5	4.4	11.3	0.8	2.5	0.3	11	-1
LINE L10220													
A	3891.0	S	593617	5910476	4.0	10.2	2.2	10.2	0.0	2.5	0.4	3	0
B	3871.5	S	594041	5910750	3.1	4.2	0.9	6.0	0.0	2.0	0.8	47	0
C	3814.8	S	595062	5911382	9.9	8.1	4.0	22.7	0.0	4.8	1.8	21	0
D	3808.6	S	595223	5911481	4.9	11.7	4.1	22.9	0.0	4.4	0.5	14	0
E	3758.0	H	596331	5912178	12.0	20.9	12.0	47.4	0.8	10.4	0.6	27	0
F	3710.7	S	597549	5912917	1.7	12.8	1.9	19.9	0.7	3.5	0.1	0	0
G	3691.5	B?	597988	5913201	9.0	19.2	4.0	19.3	0.4	3.9	0.6	15	0
H	3665.6	H	598582	5913573	5.3	12.3	8.0	35.6	0.4	7.6	0.5	19	0
LINE L10230													
A	3480.1	S	595288	5911294	2.5	17.7	2.3	35.5	0.4	6.7	0.2	0	0
B	3533.7	S	596873	5912292	10.1	14.1	17.6	32.1	0.4	10.0	0.8	18	0
C	3545.7	S	597191	5912479	14.9	35.1	24.9	73.4	1.5	16.8	0.7	4	0
D	3580.0	S?	598213	5913120	6.0	19.1	10.8	30.9	0.5	8.3	0.4	3	0
LINE L10240													
A	3239.6	B?	596113	5911576	5.9	2.5	3.1	9.7	0.1	2.2	3.8	14	0
B	3204.2	S	596968	5912102	9.0	11.6	9.3	17.4	1.2	4.4	0.9	14	0
C	3173.9	H	597689	5912537	16.5	26.0	23.1	39.5	1.3	13.1	0.8	22	0
D	3155.7	S	598176	5912844	4.4	13.7	8.0	20.9	0.9	4.6	0.5	13	0
E	3121.6	S	598931	5913304	12.3	32.2	21.5	55.0	1.5	12.7	0.6	7	0
LINE L10250													
A	2915.0	S	594955	5910607	6.2	8.9	12.3	21.3	1.2	5.4	---	---	0
B	3066.4	B?	598750	5912969	13.1	15.3	14.0	24.3	0.7	6.4	1.2	15	0

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10260													
A	2643.9	S	595089	5910453	3.6	4.4	10.1	15.6	0.9	4.5	---	---	4
B	2629.2	B?	595448	5910687	3.4	13.2	0.3	12.2	1.4	0.9	0.3	6	2
C	2616.6	B?	595699	5910834	2.1	9.0	0.9	14.2	0.2	2.9	0.2	15	1
D	2508.2	B?	597785	5912135	6.8	14.1	13.5	20.5	0.2	6.7	0.6	11	0
LINE L10270													
A	2230.3	S	595257	5910335	6.9	5.7	7.3	9.4	0.7	3.4	1.6	20	4
B	2365.3	S	598382	5912269	4.5	11.0	7.9	24.8	0.9	7.8	---	---	4
C	2373.8	S	598654	5912447	7.5	16.4	18.0	42.1	2.0	10.4	0.6	9	0
LINE L10280													
A	2065.5	S?	592671	5908468	2.1	5.2	1.6	12.9	0.0	2.0	0.4	17	678
B	1993.0	B?	594350	5909531	2.4	2.8	2.8	0.2	0.0	0.2	35.8	92	0
C	1943.0	S	595392	5910165	10.8	10.0	13.2	17.7	1.1	5.6	1.5	23	0
D	1840.4	S	597326	5911378	2.1	1.9	1.2	5.1	0.1	1.0	---	---	0
LINE L10290													
A	1568.5	S	593802	5908970	2.1	3.8	2.9	6.8	1.1	2.0	---	---	0
B	1605.6	S	594822	5909583	1.2	8.3	2.3	8.9	1.5	2.1	---	---	0
C	1630.1	S	595551	5910046	10.5	7.6	12.0	15.3	1.1	4.2	2.3	15	0
LINE L10300													
A	1412.8	S	593497	5908518	4.6	13.9	6.0	21.2	0.1	4.4	0.3	0	0
B	1330.4	B?	595298	5909645	4.9	6.7	8.4	13.7	0.5	3.5	---	---	0
C	1320.6	B?	595555	5909801	8.2	9.3	11.0	11.9	0.1	4.3	1.0	16	0
D	1302.3	S	596067	5910122	4.4	15.6	6.3	18.6	0.5	3.9	0.3	0	0
LINE L10310													
A	901.4	B?	593619	5908341	9.3	17.8	7.7	19.8	2.8	3.6	0.5	21	0
B	1042.7	B	595320	5909423	5.7	9.3	4.0	11.6	0.5	2.0	0.5	32	0
C	1059.1	B?	595833	5909746	17.0	31.1	33.4	59.0	2.1	18.0	0.6	16	0
D	1082.0	S	596393	5910091	2.1	11.4	5.5	25.8	0.8	4.5	---	---	0
LINE L10320													
A	4738.4	H	593208	5907861	4.3	3.8	2.3	0.7	3.0	0.8	---	---	0
B	4731.7	S	593354	5907968	11.9	41.3	23.2	79.2	0.3	19.4	0.5	0	0
C	4719.9	B?	593647	5908143	10.0	39.9	5.6	50.3	1.7	10.8	0.4	0	0
D	4711.0	B?	593854	5908268	4.9	27.0	5.5	33.1	1.0	6.8	0.2	0	0
E	4607.8	H	595928	5909583	13.1	24.4	23.5	41.7	0.6	12.0	0.6	21	2
LINE L10331													
A	1432.4	S	593565	5907856	4.7	13.1	5.5	13.1	0.0	3.2	0.3	7	0
B	1343.2	S	596104	5909440	12.7	33.5	16.6	61.2	0.0	13.2	0.6	0	7
C	1270.3	S	597905	5910560	1.9	8.5	0.6	10.7	0.0	1.3	0.2	6	0
D	1264.3	S	598050	5910656	1.8	8.0	1.7	13.8	0.0	3.2	---	---	0

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10340													
A	3985.8	B?	596154	5909207	3.8	4.1	1.2	2.4	0.0	0.6	0.9	41	0
B	3974.3	S	596461	5909404	2.8	15.1	3.0	26.3	0.0	5.1	0.1	0	0
LINE L10350													
A	3664.1	H	593322	5907294	4.6	2.5	2.8	4.6	1.4	1.3	2.2	34	0
B	3694.6	H	594333	5907906	8.6	11.0	9.7	12.8	1.8	4.8	0.9	28	0
C	3744.4	B?	595713	5908769	4.0	7.2	3.2	6.0	0.3	1.5	0.4	42	0
D	3763.2	B	596282	5909136	8.0	15.2	5.9	19.9	0.2	3.9	0.5	36	0
LINE L10360													
A	3570.9	S?	593695	5907259	0.9	21.4	3.0	25.0	0.0	5.4	0.1	0	0
B	3533.9	S	594594	5907811	29.6	55.9	38.2	84.8	2.5	20.1	0.7	6	0
C	3464.8	S	596341	5908879	8.7	16.5	12.3	37.5	0.1	7.9	0.5	24	6
D	3453.8	B	596633	5909070	1.6	9.7	0.4	15.3	0.0	3.2	0.1	5	0
E	3382.1	B?	598263	5910101	1.8	11.3	1.1	8.7	0.8	2.2	0.1	4	0
LINE L10370													
A	3088.0	B?	593630	5906980	5.4	20.6	3.5	38.3	0.0	7.8	0.3	3	0
B	3140.5	H	595061	5907873	11.6	25.8	16.2	53.1	2.2	12.2	0.6	2	0
C	3160.2	B?	595637	5908247	4.4	18.8	5.5	16.0	0.0	3.9	0.3	5	0
D	3173.9	S	595962	5908454	1.0	5.3	0.0	11.6	0.2	1.4	---	---	0
E	3192.2	B?	596424	5908752	8.8	26.4	9.5	32.4	1.1	7.2	0.5	0	0
F	3211.2	S	596929	5909062	3.9	13.5	2.1	18.3	0.4	3.5	0.3	6	0
G	3260.0	S	598239	5909875	0.9	7.6	1.8	11.6	0.0	2.9	0.1	3	0
LINE L10380													
A	2935.0	S	594376	5907196	3.5	10.3	4.2	18.7	0.4	2.8	0.2	0	0
B	2883.5	S	595590	5907951	7.1	17.6	10.6	26.0	0.6	6.2	0.5	5	0
C	2869.4	S	596015	5908219	0.0	9.2	1.2	13.5	0.0	3.0	0.1	0	0
D	2851.4	B?	596432	5908466	6.3	15.7	7.5	31.4	0.6	6.2	0.5	8	0
E	2836.1	S	596818	5908707	2.5	10.6	3.6	14.3	0.6	3.5	0.2	2	0
F	2827.0	S	597065	5908861	2.0	13.1	3.8	21.4	0.2	3.2	0.2	0	0
G	2807.7	S?	597597	5909196	0.7	9.0	3.2	18.9	1.7	3.6	0.1	0	0
LINE L10390													
A	2538.7	S	594300	5906914	5.3	22.3	6.3	29.5	1.7	5.8	0.3	2	0
B	2603.7	S	595970	5907938	3.5	20.6	5.5	27.6	0.9	5.6	0.2	0	0
C	2622.3	B?	596508	5908265	5.8	11.7	5.6	14.1	1.0	3.6	0.4	32	0
D	2655.4	B	597416	5908859	3.3	14.2	2.9	15.8	1.1	3.9	0.2	2	0
E	2676.6	S	598050	5909246	3.8	16.0	2.6	25.2	0.3	5.3	0.3	0	0
LINE L10400													
A	2369.3	S?	594698	5906923	0.0	13.4	0.5	30.0	0.0	5.4	0.1	0	0
B	2302.2	S	596107	5907812	3.2	15.6	2.9	22.0	0.9	4.1	---	---	0
C	2289.1	S	596473	5908031	7.2	16.8	9.5	30.5	0.7	6.4	---	---	0

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L10400													
D	2279.7	S	596724	5908187	3.3	10.8	3.3	16.6	0.8	3.3	0.3	9	0
E	2223.0	S	598321	5909172	1.6	8.6	2.1	10.6	0.3	2.2	0.1	3	0
LINE L10410													
A	1918.3	B	594083	5906308	2.9	10.9	4.0	12.0	1.1	2.9	0.3	2	0
B	1934.3	B	594379	5906485	0.0	2.5	0.0	3.8	1.9	0.8	---	---	0
C	1955.3	S?	594832	5906777	4.7	12.3	3.6	11.8	3.4	2.3	0.4	6	0
D	2017.5	H	596572	5907868	7.6	12.3	13.6	18.1	1.4	5.5	0.6	21	0
E	2061.3	S	597953	5908723	2.1	12.5	1.2	18.2	0.0	3.6	0.2	3	0
LINE L10420													
A	1798.5	S	594116	5906078	0.0	7.0	3.2	11.6	0.5	2.7	0.2	8	0
B	1638.6	H	596725	5907699	4.3	10.9	10.6	20.9	0.8	5.7	0.4	14	0
LINE L10431													
A	968.5	B?	595125	5906474	5.2	3.9	1.7	5.3	0.8	1.4	1.6	16	90
B	1033.2	S	596886	5907563	10.5	21.5	16.7	45.8	0.0	10.0	0.7	6	0
C	1046.3	S	597299	5907823	2.8	7.7	4.6	19.2	0.0	3.2	---	---	0
D	1059.4	S	597666	5908053	0.5	10.0	2.0	20.0	0.0	2.8	---	---	0
LINE L10440													
A	1113.0	S	595623	5906561	0.4	8.8	7.0	12.5	0.8	3.6	---	---	0
B	1025.8	S	597151	5907526	5.5	10.9	10.9	16.7	1.2	5.2	0.4	31	0
C	1012.4	B	597534	5907746	14.0	57.4	24.9	103.5	0.2	19.9	0.4	0	93
D	992.7	B?	598136	5908119	0.0	15.6	4.0	23.6	0.5	4.0	0.2	0	0
LINE L20010													
A	1804.1	S	594429	5914174	3.6	0.5	0.4	2.5	0.0	0.9	12.3	73	7
B	1775.6	S	595194	5914647	2.8	8.8	2.3	12.8	0.0	2.2	0.3	18	0
C	1714.9	S	596951	5915735	0.5	7.2	0.6	10.7	0.0	2.2	---	---	3
LINE L20025													
A	1935.7	H	595854	5914829	2.5	12.5	4.1	15.7	0.0	3.9	0.2	0	4
B	1988.2	S	597365	5915817	5.0	11.2	8.5	25.9	0.0	5.2	0.5	9	0
LINE L20030													
A	2059.9	S	596248	5914823	2.5	2.9	2.9	5.9	0.0	1.1	---	---	0
LINE L20060													
A	2622.0	S	597411	5914849	1.8	7.8	4.3	16.6	0.0	3.6	0.2	0	4
LINE L20070													
A	2670.0	H	597567	5914728	1.3	1.7	3.6	6.8	0.6	1.4	0.3	47	0
LINE L20080													
A	2971.8	H	597653	5914528	4.8	9.6	4.1	12.8	0.5	3.8	0.5	23	0

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LINE L20090													
A	3083.0	B?	597485	5914180	2.3	13.3	6.0	12.4	0.9	3.2	0.4	22	8
B	3075.5	H	597686	5914322	4.8	8.7	3.2	6.6	0.5	1.2	---	---	0
LINE L20100													
A	3257.1	S	595067	5912415	7.7	11.2	17.9	36.5	1.9	7.5	0.7	16	0
B	3376.0	H	597868	5914198	6.7	13.2	7.1	15.5	1.5	4.1	0.4	35	1
LINE L20110													
A	3521.6	H	594919	5912129	6.4	4.6	11.0	10.9	1.7	6.6	1.9	41	9
B	3505.5	B?	595393	5912425	7.8	36.9	6.1	39.0	1.0	7.3	0.3	0	0
C	3502.5	S	595484	5912485	20.1	74.0	35.4	155.0	3.4	32.9	0.5	0	0
LINE L20120													
A	3610.8	H	595411	5912185	8.0	17.2	17.2	34.3	2.4	9.4	0.6	0	0
LINE L20130													
A	3790.7	S	595053	5911719	8.7	21.2	8.2	40.3	1.5	8.3	0.5	8	2
B	3770.7	H	595623	5912095	4.8	4.0	7.0	9.4	0.6	3.3	0.6	10	0
LINE L20140													
A	3863.1	S	595184	5911567	2.5	9.4	1.4	19.0	0.4	2.9	---	---	0
B	3901.5	H	596328	5912288	15.6	26.5	30.1	51.3	3.4	15.6	0.7	17	0
LINE L20150													
A	4126.1	S	595028	5911241	5.5	17.1	7.2	39.8	1.1	8.3	0.4	5	4
B	4052.6	S	597156	5912567	7.8	10.2	10.0	17.2	0.6	4.4	0.8	27	0
C	4038.3	S	597572	5912830	4.9	21.3	9.8	52.5	1.0	10.5	0.2	0	1
LINE L20160													
A	4270.7	S	594905	5910950	4.0	7.2	5.6	13.6	0.5	2.3	0.4	12	2
B	4356.8	H	597301	5912427	9.7	29.5	19.0	61.7	2.9	13.8	0.5	3	0
LINE L20170													
A	4530.4	B?	594474	5910425	4.2	5.5	1.6	8.2	0.9	1.6	0.7	44	0
B	4521.4	B?	594697	5910568	2.1	2.8	4.9	10.8	1.1	3.7	---	---	0
C	4514.6	S	594873	5910696	1.9	2.4	3.6	7.9	1.7	1.9	---	---	1
D	4431.5	S	597043	5912040	6.3	7.8	11.6	17.0	0.9	4.1	0.8	19	1
E	4412.0	H	597513	5912303	5.2	14.7	10.0	27.9	1.9	7.5	0.4	11	0
LINE L20180													
A	4651.1	B?	595438	5910806	2.2	8.9	0.5	17.3	0.4	2.3	0.2	15	0
B	4747.7	H	597747	5912244	11.8	24.7	20.6	47.9	1.9	14.0	0.6	5	0
LINE L20190													
A	4992.4	S	595166	5910380	7.9	12.0	14.9	23.6	0.7	5.2	0.6	12	12

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LINE L20190													
B	4899.6	S	596714	5911364	1.8	4.2	2.2	7.5	0.5	1.0	---	---	0
LINE L20200													
A	5130.1	S	595384	5910282	8.4	5.7	12.5	11.1	1.0	3.4	2.2	26	5
LINE L20210													
A	5354.7	S	595394	5910070	7.3	7.8	12.7	16.3	1.0	4.7	---	---	0
LINE L20220													
A	5484.1	B?	595357	5909809	5.0	9.6	19.7	18.7	1.8	6.9	1.4	11	0
B	5545.7	S	596921	5910777	2.6	4.0	1.5	5.5	0.2	1.7	---	---	0
LINE L20230													
A	5677.5	H	595698	5909783	12.0	13.7	23.4	33.0	2.5	10.2	1.2	12	0
B	5651.9	S	596465	5910248	4.2	15.1	4.2	30.9	0.1	6.4	0.1	0	0
LINE L20240													
A	5805.2	S?	595887	5909653	19.7	50.7	48.8	117.8	0.9	28.0	0.5	0	0
B	5837.6	S	596709	5910169	1.9	8.9	3.6	19.1	0.7	3.5	0.2	0	0
LINE L20250													
A	5979.9	B?	595971	5909472	11.9	24.5	16.8	46.4	1.7	10.4	0.7	3	0
B	5912.2	S	597779	5910598	3.2	8.3	1.2	9.5	0.2	1.8	0.4	5	0
LINE L20260													
A	6106.1	B?	596128	5909335	16.8	42.9	21.5	78.5	2.5	17.9	0.6	0	1
B	6116.3	S	596430	5909525	2.5	9.1	3.5	9.7	1.5	2.4	---	---	0
LINE L20270													
A	6298.1	S	595316	5908590	6.7	6.2	6.2	10.6	1.5	2.8	1.3	35	0
B	6271.0	B	596200	5909141	6.2	6.6	3.8	5.2	0.8	2.2	1.0	31	0
C	6260.4	S	596541	5909360	1.4	9.1	1.4	19.5	1.6	3.9	---	---	5
D	6212.4	B?	597880	5910178	3.9	9.7	4.1	19.2	1.3	4.3	0.2	0	0
LINE L20280													
A	6369.2	S	595386	5908394	6.6	20.0	11.9	40.6	1.2	9.1	0.5	2	0
B	6406.6	S	596382	5909019	7.1	19.0	13.5	47.3	2.0	10.1	0.5	9	2
C	6462.1	S	598012	5910045	0.9	7.5	3.2	14.7	1.6	4.5	---	---	0
LINE L20290													
A	6591.8	S	595487	5908236	6.6	22.5	13.7	63.1	1.2	13.0	0.4	2	4
B	6564.7	S	596342	5908772	9.3	19.1	15.4	38.9	0.7	8.6	0.6	8	0
C	6549.0	S	596887	5909110	3.4	13.8	1.9	25.1	1.0	5.1	0.3	1	0
D	6500.4	S	598211	5909948	1.4	6.0	2.0	9.3	0.3	1.6	0.1	16	0

CX = COAXIAL
CP = COPLANAR

Note: EM values shown above are local amplitudes

EM Anomaly List

* Estimated Depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or magnetite/overburden effects.

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Label	Fid	Interp	XUTM m	YUTM m	CX 5665 HZ Real ppm	CX 5665 HZ Quad ppm	CP 7190 HZ Real ppm	CP 7190 HZ Quad ppm	CP 900 HZ Real ppm	CP 900 HZ Quad ppm	Vertical Dike COND siemens	Vertical Dike DEPTH* m	Mag. Corr NT
LINE L30010													
A	1110.0	B	591260	5914208	10.5	9.8	16.5	24.0	2.3	6.7	1.5	21	4
B	1152.5	E	592467	5914951	11.2	34.0	12.7	54.3	0.4	11.9	0.5	0	0
C	1158.6	H	592628	5915045	0.6	0.0	1.5	1.6	5.9	9.4	---	---	0
LINE L30020													
A	1316.9	S	592606	5915284	18.4	60.0	21.4	102.0	1.6	20.2	0.5	0	6
B	1278.5	S	593681	5915962	3.2	14.2	3.3	18.8	0.4	5.3	0.2	0	0
LINE L30030													
A	1503.7	H	592174	5915233	10.7	16.0	15.1	29.2	1.4	2.3	0.8	16	5
B	1505.2	B?	592223	5915263	10.7	16.0	14.5	30.3	1.2	2.5	0.8	13	5
C	1542.0	H	593119	5915833	2.8	3.1	5.5	10.0	1.2	2.9	---	---	0
LINE L90040													
A	2384.2	S	594342	5914343	0.0	5.5	1.2	6.9	0.0	1.0	0.1	0	0
LINE L90050													
A	2072.4	S	595017	5914995	1.5	8.1	2.0	10.5	0.0	1.7	0.2	8	1
B	2114.6	S	596182	5915722	1.4	8.1	3.0	15.2	0.0	3.1	---	---	0
LINE L90060													
A	1940.5	S	594564	5914962	3.4	13.2	4.4	28.9	0.0	5.7	---	---	0
B	1923.9	S	595016	5915231	3.0	14.9	3.6	33.2	0.0	7.1	0.1	0	0
C	1874.6	B	596458	5916131	6.8	10.1	1.1	7.4	0.0	0.9	0.6	21	0
LINE T19010													
A	3493.7	B?	595302	5909595	5.7	5.4	7.7	8.6	1.3	4.2	1.2	29	0
B	3469.8	B?	595707	5908923	5.8	5.4	1.8	5.5	0.0	0.5	1.3	31	0
C	3422.0	B?	596440	5907751	7.3	10.3	9.8	13.0	0.0	3.2	0.7	19	0
LINE T19020													
A	2945.6	H	594529	5915093	1.9	7.9	0.1	9.7	0.0	2.6	0.2	16	0
B	2968.0	B?	594763	5914744	2.7	5.2	1.1	6.5	0.0	1.1	0.3	57	0
C	3124.5	H	596461	5912277	5.6	10.6	11.3	15.9	2.9	6.2	0.4	24	0

CX = COAXIAL
CP = COPLANAR

Note: EM values shown above are local amplitudes

EM Anomaly List

* Estimated Depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or magnetite/overburden effects.

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APPENDIX D

BACKGROUND INFORMATION

BACKGROUND INFORMATION

Electromagnetics

DIGHEM electromagnetic responses fall into two general classes, discrete and broad. The discrete class consists of sharp, well-defined anomalies from discrete conductors such as sulphide lenses and steeply dipping sheets of graphite and sulfides. The broad class consists of wide anomalies from conductors having a large horizontal surface such as flatly dipping graphite or sulphide sheets, saline water-saturated sedimentary formations, conductive overburden and rock, and geothermal zones. A vertical conductive slab with a width of 200 m would straddle these two classes.

The vertical sheet (half plane) is the most common model used for the analysis of discrete conductors. All anomalies plotted on the geophysical maps are analyzed according to this model. The following section entitled **Discrete Conductor Analysis** describes this model in detail, including the effect of using it on anomalies caused by broad conductors such as conductive overburden.

The conductive earth (half space) model is suitable for broad conductors. Resistivity contour maps result from the use of this model. A later section entitled **Resistivity Mapping** describes the method further, including the effect of using it on anomalies caused by discrete conductors such as sulphide bodies.

Geometric Interpretation

The geophysical interpreter attempts to determine the geometric shape and dip of the conductor. Figure C-1 shows typical DIGHEM anomaly shapes which are used to guide the geometric interpretation.

Discrete Conductor Analysis

The EM anomalies appearing on the electromagnetic map are analyzed by computer to give the conductance (i.e., conductivity-thickness product) in siemens (mhos) of a vertical sheet model. This is done regardless of the interpreted geometric shape of the conductor. This is not an unreasonable procedure, because the computed conductance increases as the electrical quality of the conductor increases, regardless of its true shape. DIGHEM anomalies are divided into seven grades of conductance, as shown in Table C-1. The conductance in siemens (mhos) is the reciprocal of resistance in ohms.

The conductance value is a geological parameter because it is a characteristic of the conductor alone. It generally is independent of frequency, flying height or depth of burial, apart from the averaging over a greater portion of the conductor as height increases. Small anomalies from deeply buried strong conductors are not confused with small anomalies from shallow weak conductors because the former will have larger conductance values.

Table D-1. EM Anomaly Grades

Anomaly Grade	Siemens
7	> 100
6	50 - 100
5	20 - 50
4	10 - 20
3	5 - 10
2	1 - 5
	< 1

Conductive overburden generally produces broad EM responses which may not be shown as discrete anomalies on the geophysical maps. However, patchy conductive overburden in otherwise resistive areas can yield discrete anomalies with a conductance grade (cf. Table D-1) of 1, 2 or even 3 for conducting clays which have resistivities as low as 50 ohm-m. In areas where ground resistivities are below 10 ohm-m, anomalies caused by weathering variations and similar causes can have any conductance grade. The anomaly shapes from the multiple coils often allow such conductors to be recognized, and these are indicated by the letters S, H, and sometimes E on the geophysical maps (see EM legend on maps).

For bedrock conductors, the higher anomaly grades indicate higher conductances. Examples: DIGHEM's New Insco copper discovery (Noranda, Canada) yielded a grade 5 anomaly, as did the neighbouring copper-zinc Magusi River ore body; Mattabi (copper-zinc, Sturgeon Lake, Canada) and Whistle (nickel, Sudbury, Canada) gave grade 6; and DIGHEM's Montcalm nickel-copper discovery (Timmins, Canada) yielded a grade 7 anomaly. Graphite and sulfides can span all grades, but in any particular survey area, field work may show that the different grades indicate different types of conductors.

Strong conductors (i.e., grades 6 and 7) are characteristic of massive sulfides or graphite. Moderate conductors (grades 4 and 5) typically reflect graphite or sulfides of a less massive character, while weak bedrock conductors (grades 1 to 3) can signify poorly connected graphite or heavily disseminated sulfides. Grades 1 and 2 conductors may not respond to ground EM equipment using frequencies less than 2,000 Hz.

The presence of sphalerite or gangue can result in ore deposits having weak to moderate conductances. As an example, the three million ton lead-zinc deposit of Restigouche Mining Corporation near Bathurst, Canada, yielded a well-defined grade 2 conductor. The 10 percent by volume of sphalerite occurs as a coating around the fine grained massive pyrite, thereby inhibiting electrical conduction. Faults, fractures and shear zones may produce anomalies which typically have low conductances (e.g., grades 1 to 3). Conductive rock formations can yield anomalies of any conductance grade. The conductive materials in such rock formations can be salt water, weathered products such as clays, original depositional clays, and carbonaceous material.

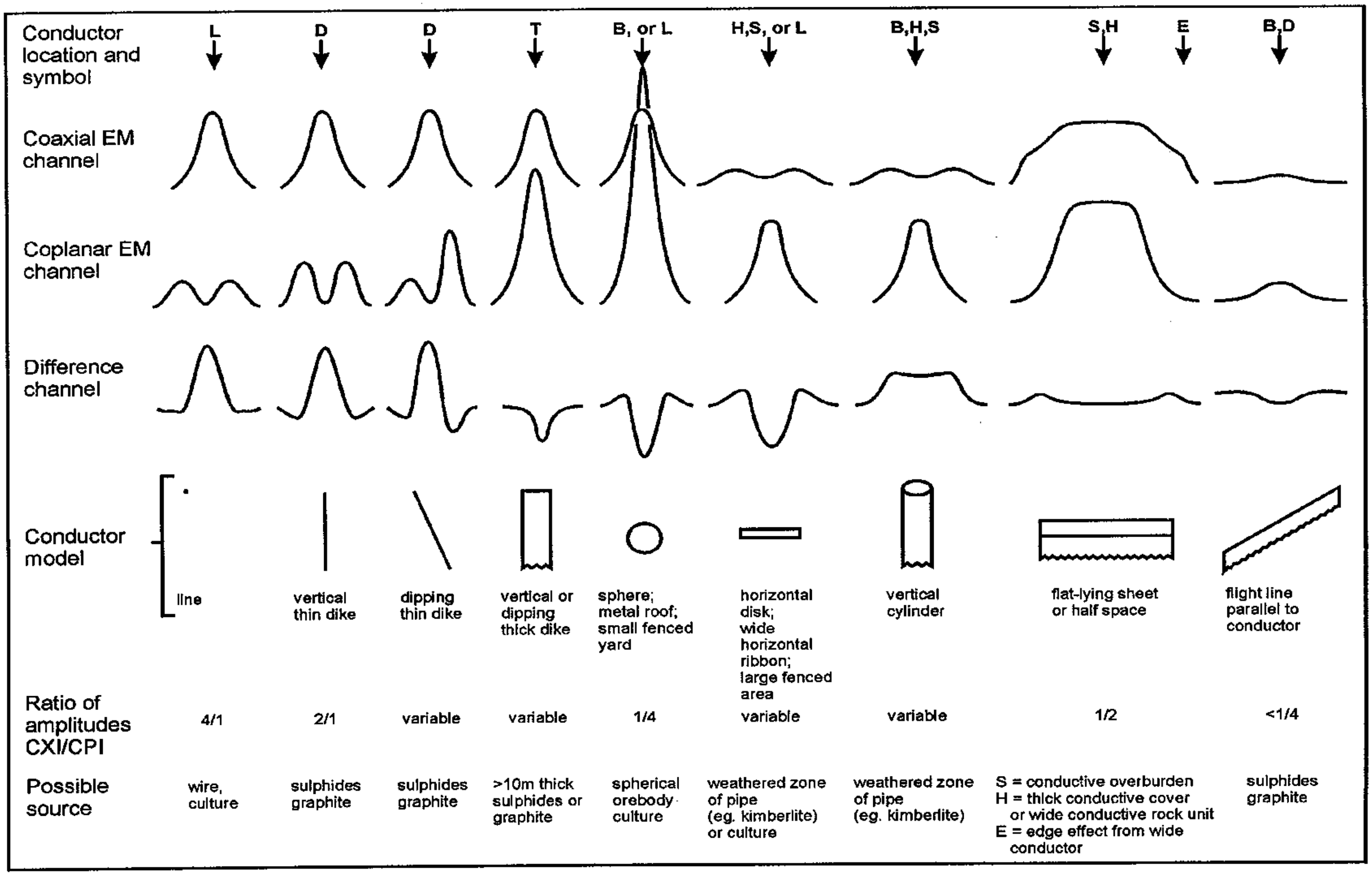
For each interpreted electromagnetic anomaly on the geophysical maps, a letter identifier and an interpretive symbol are plotted beside the EM grade symbol. The horizontal rows of dots, under the interpretive symbol, indicate the anomaly amplitude on the flight record. The vertical column of dots, under the anomaly letter, gives the estimated depth. In areas where anomalies are crowded, the letter identifiers, interpretive symbols and dots may be obliterated. The EM grade symbols, however, will always be discernible, and the obliterated information can be obtained from the anomaly listing appended to this report.

The purpose of indicating the anomaly amplitude by dots is to provide an estimate of the reliability of the conductance calculation. Thus, a conductance value obtained from a large ppm anomaly (3 or 4 dots) will tend to be accurate whereas one obtained from a small ppm anomaly (no dots) could be quite inaccurate. The absence of amplitude dots indicates that the anomaly from the coaxial coil-pair is 5 ppm or less on both the inphase and quadrature channels. Such small anomalies could reflect a weak conductor at the surface or a stronger conductor at depth. The conductance grade and depth estimate illustrates which of these possibilities fits the recorded data best.

The conductance measurement is considered more reliable than the depth estimate. There are a number of factors which can produce an error in the depth estimate, including the averaging of topographic variations by the altimeter, overlying conductive overburden, and the location and attitude of the conductor relative to the flight line. Conductor location and attitude can provide an erroneous depth estimate because the stronger part of the conductor may be deeper or to one side of the flight line, or because it has a shallow dip. A heavy tree cover can also produce errors in depth estimates. This is because the depth estimate is computed as the distance of bird from conductor, minus the altimeter reading. The altimeter can lock onto the top of a dense forest canopy. This situation yields an erroneously large depth estimate but does not affect the conductance estimate.

Dip symbols are used to indicate the direction of dip of conductors. These symbols are used only when the anomaly shapes are unambiguous, which usually requires a fairly resistive environment.

A further interpretation is presented on the EM map by means of the line-to-line correlation of bedrock anomalies, which is based on a comparison of anomaly shapes on adjacent lines. This provides conductor axes which may define the geological structure over portions of the survey area. The absence of conductor axes in an area implies that anomalies could not be correlated from line to line with reasonable confidence.



Typical DIGHEM anomaly shapes
Figure D-1

DIGHEM electromagnetic anomalies are designed to provide a correct impression of conductor quality by means of the conductance grade symbols. The symbols can stand alone with geology when planning a follow-up program. The actual conductance values are printed in the attached anomaly list for those who wish quantitative data. The anomaly ppm and depth are indicated by inconspicuous dots which should not distract from the conductor patterns, while being helpful to those who require this information. The map provides an interpretation of conductors in terms of length, strike and dip, geometric shape, conductance, depth, and thickness.

The attached EM anomaly list provides a tabulation of anomalies in ppm, conductance, and depth for the vertical sheet model. The EM anomaly list also shows the conductance and depth for a thin horizontal sheet (whole plane) model, but only the vertical sheet parameters appear on the EM map. The horizontal sheet model is suitable for a flatly dipping thin bedrock conductor such as a sulphide sheet having a thickness less than 10 m. The list also shows the resistivity and depth for a conductive earth (half space) model, which is suitable for thicker slabs such as thick conductive overburden. In the EM anomaly list, a depth value of zero for the conductive earth model, in an area of thick cover, warns that the anomaly may be caused by conductive overburden.

Since discrete bodies are normally the targets of EM surveys, local base (or zero) levels are used to compute local anomaly amplitudes. This contrasts with the use of true zero levels which are used to compute true EM amplitudes. Local anomaly amplitudes are shown in the EM anomaly list and these are used to compute the vertical sheet parameters of conductance and depth. Not shown in the EM anomaly list are the true amplitudes which are used to compute the horizontal sheet and conductive earth parameters.

Questionable Anomalies

DIGHEM maps may contain EM responses which are displayed as asterisks (*). These responses denote weak anomalies of indeterminate conductance, which may reflect one of the following: a weak conductor near the surface, a strong conductor at depth (e.g., 100 to 120 m below surface) or to one side of the flight line, or aerodynamic noise. Those responses that have the appearance of valid bedrock anomalies on the flight profiles are indicated by appropriate interpretive symbols (see EM legend on maps). The others probably do not warrant further investigation unless their locations are of considerable geological interest.

The Thickness Parameter

DIGHEM can provide an indication of the thickness of a steeply dipping conductor. The amplitude of the coplanar anomaly (e.g., CPI channel on the digital profile) increases relative to the coaxial anomaly (e.g., CXI) as the apparent thickness increases, i.e., the thickness in the horizontal plane. (The thickness is equal to the conductor width if the conductor dips at 90 degrees and strikes at right angles to the flight line.) This report refers to a conductor as <u>thin</u> when the thickness is likely to be less than 3 m, and <u>thick</u> when in excess of 10 m. Thick conductors are indicated on the EM map by parentheses "( )". For base metal exploration in steeply dipping geology, thick conductors can be high priority targets because many massive sulphide ore bodies are thick, whereas non-economic bedrock conductors are often thin. The system cannot sense the thickness when the strike of the conductor is subparallel to the flight line, when the conductor has a shallow dip, when the anomaly amplitudes are small, or when the resistivity of the environment is below 100 ohm-m.

Resistivity Mapping

Resistivity mapping is useful in areas where broad or flat lying conductive units are of interest. One example of this is the clay alteration that is associated with Carlin-type deposits in the south west United States. The Dighem system was able to identify the clay alteration zone over the Cove deposit. The alteration zone appeared as a strong resistivity low on the 900 Hz resistivity parameter. The 7,200 Hz and 56,000 Hz resistivities show more of the detail in the covering sediments, and delineate a range front fault. This is typical in many areas of the south west United States, where conductive near surface sediments, which may sometimes be alkalic, attenuate the higher frequencies.

Resistivity mapping has proven successful for locating diatremes in diamond exploration. Weathering products from relatively soft kimberlite pipes produce a resistivity contrast with the unaltered host rock. In many cases weathered kimberlite pipes were associated with thick conductive layers which contrasted with overlying or adjacent relatively thin layers of lake bottom sediments or overburden.

Areas of widespread conductivity are commonly encountered during surveys. These conductive zones may reflect alteration zones, shallow-dipping sulphide or graphite-rich units or conductive overburden. In such areas, anomalous amplitudes can be generated by decreases of only 5 m in survey altitude as well as by increases in conductivity. The typical flight record in conductive areas is characterized by inphase and quadrature channels which are continuously active. Local EM peaks reflect either increases in conductivity of the earth or decreases in survey altitude. For such conductive areas, apparent resistivity profiles and contour maps are necessary for the correct interpretation of the airborne data. The advantage of the resistivity parameter is that anomalies caused by altitude changes are virtually eliminated, so the resistivity data reflect only those anomalies caused by conductivity changes. The resistivity analysis also helps the interpreter to differentiate between conductive bedrock and conductive overburden. For example, discrete conductors will generally appear as narrow lows on the contour map and broad conductors (e.g., overburden) will appear as wide lows.

The apparent resistivity is calculated using the pseudo-layer (or buried) half space model defined by Fraser (1978)[1]. This model consists of a resistive layer overlying a conductive half space. The depth channels give the apparent depth below surface of the conductive material. The apparent depth is simply the apparent thickness of the overlying resistive layer. The apparent depth (or thickness) parameter will be positive (ie. below surface) when the upper layer is more resistive than the underlying material, in which case the apparent depth may be quite close to the true depth.

The apparent depth will be negative when the upper layer is more conductive than the underlying material, and will be zero when a homogeneous half space exists. The apparent depth parameter must be interpreted cautiously because it will contain any errors which may exist in the measured altitude of the EM bird (e.g., as caused by a dense tree cover). The inputs to the resistivity algorithm are the inphase and quadrature components of the coplanar coil-pair. The outputs are the apparent resistivity of the conductive half space (the source) and the sensor-source distance. The flying height is not an input variable, and the output resistivity and sensor-source distance are independent of the flying height when the conductivity of the measured material is sufficient to yield significant inphase as well as quadrature responses. The apparent depth, discussed above, is simply the sensor-source distance minus the measured altitude or flying height. Consequently, errors in the measured altitude will affect the apparent depth parameter but not the apparent resistivity parameter.

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[1] Resistivity mapping with an airborne multicoil electromagnetic system: Geophysics, v. 43, p.144-172

The apparent depth parameter is a useful indicator of simple layering in areas lacking a heavy tree cover. The DIGHEM system has been flown for purposes of permafrost mapping, where positive apparent depths were used as a measure of permafrost thickness. However, little quantitative use has been made of negative apparent depths because the absolute value of the negative depth is not a measure of the thickness of the conductive upper layer and, therefore, is not meaningful physically. Qualitatively, a negative apparent depth estimate usually shows that the EM anomaly is caused by conductive overburden. Consequently, the apparent depth channel can be of significant help in distinguishing between overburden and bedrock conductors.

Interpretation in Conductive Environments

Environments having low background resistivities (e.g., below 30 ohm-m for a 900 Hz system) yield very large responses from the conductive ground. This usually prohibits the recognition of discrete bedrock conductors. However, DIGHEM data processing techniques produce three parameters which contribute significantly to the recognition of bedrock conductors in conductive environments. These are the inphase and quadrature difference channels (DFI and DFQ, which are available only on systems with common frequencies on orthogonal coil pairs), and the resistivity and depth channels (RES and DP) for each coplanar frequency.

The EM difference channels (DFI and DFQ) eliminate most of the responses from conductive ground, leaving responses from bedrock conductors, cultural features (e.g., telephone lines, fences, etc.) and edge effects. Edge effects often occur near the perimeter of broad conductive zones. This can be a source of geologic noise. While edge effects yield anomalies on the EM difference channels, they do not produce resistivity anomalies. Consequently, the resistivity channel aids in eliminating anomalies due to edge effects. On the other hand, resistivity anomalies will coincide with the most highly conductive sections of conductive ground, and this is another source of geologic noise.

The recognition of a bedrock conductor in a conductive environment therefore is based on the anomalous responses of the two difference channels (DFI and DFQ) and the resistivity channels (RES). The most favourable situation is where anomalies coincide on all channels.

The DP channels, which give the apparent depth to the conductive material, also help to determine whether a conductive response arises from surficial material or from a conductive zone in the bedrock. When these channels ride above the zero level on the digital profiles (i.e., depth is negative), it implies that the EM and resistivity profiles are responding primarily to a conductive upper layer, i.e., conductive overburden. If the DP channels are below the zero level, it indicates that a resistive upper layer exists, and this usually implies the existence of a bedrock conductor. If the low frequency DP channel is below the zero level and the high frequency DP is above, this suggests that a bedrock conductor occurs beneath conductive cover.

The conductance channel CDT identifies discrete conductors which have been selected by computer for appraisal by the geophysicist. Some of these automatically selected anomalies on channel CDT are discarded by the geophysicist. The automatic selection algorithm is intentionally oversensitive to assure that no meaningful responses are missed. The interpreter then classifies the anomalies according to their source and eliminates those that are not substantiated by the data, such as those arising from geologic or aerodynamic noise.

Reduction of Geologic Noise

Geologic noise refers to unwanted geophysical responses. For purposes of airborne EM surveying, geologic noise generally refers to EM responses caused by conductive overburden and magnetic permeability. It was mentioned previously that the

EM difference channels (i.e., channel DFI for inphase and DFQ for quadrature) tend to eliminate the response of conductive overburden.

Magnetite produces a form of geological noise on the inphase channels of all EM systems. Rocks containing less than 1% magnetite can yield negative inphase anomalies caused by magnetic permeability. When magnetite is widely distributed throughout a survey area, the inphase EM channels may continuously rise and fall, reflecting variations in the magnetite percentage, flying height, and overburden thickness. This can lead to difficulties in recognizing deeply buried bedrock conductors, particularly if conductive overburden is present as well. However, the response of broadly distributed magnetite generally vanishes on the inphase difference channel DFI. This feature can be a significant aid in the recognition of conductors which occur in rocks containing accessory magnetite.

EM Magnetite Mapping

The information content of DIGHEM data consists of a combination of conductive eddy current responses and magnetic permeability responses. The secondary field resulting from conductive eddy current flow is frequency-dependent and consists of both inphase and quadrature components, which are positive in sign. On the other hand, the secondary field resulting from magnetic permeability is independent of frequency and consists of only an inphase component which is negative in sign. When magnetic permeability manifests itself by decreasing the measured amount of positive inphase, its presence may be difficult to recognize. However, when it manifests itself by yielding a negative inphase anomaly (e.g., in the absence of eddy current flow), its presence is assured. In this latter case, the negative component can be used to estimate the percent magnetite content.

A magnetite mapping technique was developed for the coplanar coil-pair of DIGHEM. The method can be complementary to magnetometer mapping in certain cases. Compared to magnetometry, it is far less sensitive but is more able to resolve closely spaced magnetite zones, as well as providing an estimate of the amount of magnetite in the rock. The method is sensitive to 1/4% magnetite by weight when the EM sensor is at a height of 30 m above a magnetitic half space. It can individually resolve steep dipping narrow magnetite-rich bands which are separated by 60 m. Unlike magnetometry, the EM magnetite method is unaffected by remanent magnetism or magnetic latitude.

The EM magnetite mapping technique provides estimates of magnetite content which are usually correct within a factor of 2 when the magnetite is fairly uniformly distributed. EM magnetite maps can be generated when magnetic permeability is evident as negative inphase responses on the data profiles.

Like magnetic surveys, the EM magnetite method maps only bedrock features, provided that the overburden is characterized by a general lack of magnetite. This contrasts with resistivity mapping which portrays the combined effect of bedrock and overburden.

Recognition of Culture

Cultural responses include all EM anomalies caused by man-made metallic objects. Such anomalies may be caused by inductive coupling or current gathering. The concern of the interpreter is to recognize when an EM response is due to culture. Points of consideration used by the interpreter, when coaxial and coplanar coil-pairs are operated at a common frequency, are as follows:

1. Channels CXP and CPP monitor 60 Hz radiation. An anomaly on these channels shows that the conductor is radiating power. Such an indication is normally a guarantee that the conductor is cultural. However, care must be taken to ensure that the conductor is not a geologic body which strikes across a power line, carrying leakage currents.

2. A flight which crosses a "line" (e.g., fence, telephone line, etc.) yields a centre-peaked coaxial anomaly and an m-shaped coplanar anomaly.[2] When the flight crosses the cultural line at a high angle of intersection, the amplitude ratio of coaxial/coplanar response is 4. Such an EM anomaly can only be caused by a line. The geologic body which yields anomalies most closely resembling a line is the vertically dipping thin dike. Such a body, however, yields an amplitude ratio of 2 rather than 4. Consequently, an m-shaped coplanar anomaly with a CXI/CPI amplitude ratio of 4 is virtually a guarantee that the source is a cultural line.

3. A flight which crosses a sphere or horizontal disk yields centre-peaked coaxial and coplanar anomalies with a CXI/CPI amplitude ratio (i.e., coaxial/coplanar) of 1/4. In the absence of geologic bodies of this geometry, the most likely conductor is a metal roof or small fenced yard.[3] Anomalies of this type are virtually certain to be cultural if they occur in an area of culture.

4. A flight which crosses a horizontal rectangular body or wide ribbon yields an m-shaped coaxial anomaly and a centre-peaked coplanar anomaly. In the absence of

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[2] See Figure D-1 presented earlier.

[3] It is a characteristic of EM that geometrically similar anomalies are obtained from: (1) a planar conductor, and (2) a wire which forms a loop having dimensions identical to the perimeter of the equivalent planar conductor.

geologic bodies of this geometry, the most likely conductor is a large fenced area.[5] Anomalies of this type are virtually certain to be cultural if they occur in an area of culture.

5. EM anomalies which coincide with culture, as seen on the camera film or video display, are usually caused by culture. However, care is taken with such coincidences because a geologic conductor could occur beneath a fence, for example. In this example, the fence would be expected to yield an m-shaped coplanar anomaly as in case #2 above. If, instead, a centre-peaked coplanar anomaly occurred, there would be concern that a thick geologic conductor coincided with the cultural line.

6. The above description of anomaly shapes is valid when the culture is not conductively coupled to the environment. In this case, the anomalies arise from inductive coupling to the EM transmitter. However, when the environment is quite conductive (e.g., less than 100 ohm-m at 900 Hz), the cultural conductor may be conductively coupled to the environment. In this latter case, the anomaly shapes tend to be governed by current gathering. Current gathering can completely distort the anomaly shapes, thereby complicating the identification of cultural anomalies. In such circumstances, the interpreter can only rely on the radiation channels and on the camera film or video records.

Magnetics

Total field magnetics provides information on the magnetic properties of the earth materials in the survey area. The information can be used to locate magnetic bodies of direct interest for exploration, and for structural and lithological mapping.

The total field magnetic response reflects the abundance of magnetic material, in the source. Magnetite is the most common magnetic mineral. Other minerals such as ilmenite, pyrrhotite, franklinite, chromite, hematite, arsenopyrite, limonite and pyrite are also magnetic, but to a lesser extent than magnetite on average.

In some geological environments, an EM anomaly with magnetic correlation has a greater likelihood of being produced by sulphides than one that is non-magnetic. However, sulphide ore bodies may be non-magnetic (e.g., the Kidd Creek deposit near Timmins, Canada) as well as magnetic (e.g., the Mattabi deposit near Sturgeon Lake, Canada).

Iron ore deposits will be anomalously magnetic in comparison to surrounding rock due to the concentration of iron minerals such as magnetite, ilmenite and hematite.

Changes in magnetic susceptibility often allow rock units to be differentiated based on the total field magnetic response. Geophysical classifications may differ from geological classifications if various magnetite levels exist within one general geological classification. Geometric considerations of the source such as shape, dip and depth, inclination of the earth's field and remanent magnetization will complicate such an analysis.

In general, mafic lithologies contain more magnetite and are therefore more magnetic than many sediments which tend to be weakly magnetic. Metamorphism and alteration can also increase or decrease the magnetization of a rock unit.

Textural differences on a total field magnetic contour, colour or shadow map due to the frequency of activity of the magnetic parameter resulting from inhomogeneities in the distribution of magnetite within the rock, may define certain lithologies. For example, near surface volcanics may display highly complex contour patterns with little line-to-line correlation.

Rock units may be differentiated based on the plan shapes of their total field magnetic responses. Mafic intrusive plugs can appear as isolated "bulls-eye" anomalies. Granitic intrusives appear as sub-circular zones, and may have contrasting rings due to contact metamorphism. Generally, granitic terrain will lack a pronounced strike direction, although granite gneiss may display strike.

Linear north-south units are theoretically not well-defined on total field magnetic maps in equatorial regions due to the low inclination of the earth's magnetic field. However, most stratigraphic units will have variations in composition along strike which will cause the units to appear as a series of alternating magnetic highs and lows.

Faults and shear zones may be characterized by alteration that causes destruction of magnetite (e.g., weathering) which produces a contrast with surrounding rock. Structural breaks may be filled by magnetite-rich, fracture filling material as is the case with diabase dikes, or by non-magnetic felsic material.

Faulting can also be identified by patterns in the magnetic total field contours or colours. Faults and dikes tend to appear as lineaments and often have strike lengths of several kilometres. Offsets in narrow, magnetic, stratigraphic trends also delineate structure. Sharp contrasts in magnetic lithologies may arise due to large displacements along strike-slip or dip-slip faults.

Radiometrics

Radioelement concentrations are measures of the abundance of radioactive elements in the rock. The original abundance of the radioelements in any rock can be altered by the subsequent processes of metamorphism and weathering.

Gamma radiation in the range that is measured in the thorium, potassium, uranium and total count windows is strongly attenuated by rock, overburden and water. Almost all of the total radiation measured from rock and overburden originates in the upper .5 metres. Moisture in soil and bodies of water will mask the radioactivity from underlying rock. Weathered rock materials that have been displaced by glacial, water or wind action will not reflect the general composition of the underlying bedrock. Where residual soils exist, they may reflect the composition of underlying rock except where equilibrium does not exist between the original radioelement and the products in its decay series.

Radioelement counts (expressed as counts per second) are the rates of detection of the gamma radiation from specific decaying particles corresponding to products in each radioelements decay series. The radiation source for uranium is bismuth (Bi-214), for thorium it is thallium (Tl-208) and for potassium it is potassium (K-40).

The uranium and thorium radioelement concentrations are dependent on a state of equilibrium between the parent and daughter products in the decay series. Some daughter products in the uranium decay are long lived and could be removed by processes such as leaching. One product in the series, radon (Rn-222), is a gas that can easily escape. Both of these factors can affect the degree to which the calculated uranium concentrations reflect the actual composition of the source rock. Because the daughter products of thorium are relatively short lived, there is more likelihood that the thorium decay series is in equilibrium.

Lithological discrimination can be based on the measured relative concentrations and total, combined, radioactivity of the radioelements. Feldspar and mica contain potassium. Zircon, sphene and apatite are accessory minerals in igneous rocks that are sources of uranium and thorium. Monazite, thorianite, thorite, uraninite and uranothorite are also sources of uranium and thorium that are found in granites and pegmatites.

In general, the abundance of uranium, thorium and potassium in igneous rock increases with acidity. Pegmatites commonly have elevated concentrations of uranium relative to thorium. Sedimentary rocks derived from igneous rocks may have characteristic signatures which are influenced by their parent rocks, but these will have been altered by subsequent weathering and alteration.

Metamorphism and alteration will cause variations in the abundance of certain radioelements relative to each other. For example, alterative processes may cause uranium enrichment to the extent that a rock will be of economic interest. Uranium anomalies are more likely to be economically significant if they consist of an increase in the uranium relative to thorium and potassium, rather than a sympathetic increase in all three radioelements.

Faults can exhibit radioactive highs due to increased permeability which allows radon migration, or as lows due to structural control of drainage and fluvial sediments which attenuate gamma radiation from the underlying rocks. Faults can also be recognized by sharp contrasts in radiometric lithologies due to large strike-slip or dip-slip displacements. Changes in relative radioelement concentrations due to alteration will also define faults.

Similar to magnetics, certain rock types can be identified by their plan shapes if they also produce a radiometric contrast with surrounding rock. For example, granite intrusions will appear as sub-circular bodies, and may display concentric zonations. They will tend to lack a prominent strike direction. Offsets of narrow, continuous, stratigraphic units with contrasting radiometric signatures can identify faulting, and folding of stratigraphic trends will also be apparent.

APPENDIX E

OPTIONAL PRODUCTS

OPTIONAL PRODUCTS

The following products have not been provided with the current survey but can be produced from the survey datasets.

Optional Map Presentation

Monochromatic shadow maps and colour shadow maps can be generated by employing an artificial sun to cast shadows on a surface defined by the geophysical grid. There are many variations in the shadowing technique such as the angle and azimuth of incidence of the artificial sun. This mapping technique can be applied to virtually any geophysical parameter, however, shadowing is particularly well suited for the definition of geological structure in the total magnetic field data set.

Optional Electromagnetic Products

Conductivity-depth Sections

The apparent resistivity for all frequencies can be displayed simultaneously as coloured conductivity-depth sections. Usually, only the coplanar data are displayed given that the coaxial frequencies are close to those of the coplanar coils and add little information to what is offered by the coplanar coils. Furthermore, the coaxial data sets offer The sections can be plotted by “draping” the section over the digital terrain model surface. The digital terrain model is calculated from the GPS barometric altimeter and radar altimeter.

Conductivity-depth sections are best suited in areas where the geology is flat-lying and conductive, and may be unreliable in areas of moderate to high resistivity where signal amplitudes are weak. In areas where inphase responses have been suppressed by the effects of magnetite, the computed resistivities shown on the sections may be unreliable.

Conductivity-depth sections can be generated in three formats:

(1) Sengpiel resistivity sections, where the apparent resistivity for each frequency is plotted at the depth of the centroid of the inphase current flow[4]; and,

(2) Differential resistivity sections, where the differential resistivity is plotted at the differential depth[5].

(3) Occam[6] or Multi-layer[7] inversion.

Both the Sengpiel and differential methods are derived from the pseudo-layer halfspace model. Both yield a coloured conductivity-depth section which attempts to portray a smoothed approximation of the true resistivity distribution with depth. The differential resistivity technique, developed by Geoterrex Dighem, has a higher degree of sensitivity to changes in the earth's resistivity and it has greater depth sensitivity.

---

4 Approximate Inversion of Airborne EM Data from Multilayered Ground: Sengpiel, K.P., Geophysical Prospecting 36, 446-459, 1988.

5 The Differential Resistivity Method for Multi-frequency Airborne EM Sounding: Huang, H. and Fraser, D.C., presented at Intern. Airb. EM Workshop, Tucson, Ariz., 1993.

6 Occam's inversion: a practical algorithm for generating smooth models from electromagnetic sounding data: Geophysics, 52, 289-300.

7 Huang H., and Palacky, G.J., 1991, Dumped least-squares inversion of time domain airborne EM data based on singular value decomposition: Geophysical Prospecting, 39, 827-844.

Both the Occam and Multi-layer inversions compute the layered earth resistivity model which would best match the measured EM data to within a specified tolerance. The Occam inversion uses a series of thin layers of fixed thickness (usually 20 layers of 5 m in thickness) and assigns resistivity values to each of the layers to fit the observed EM data. The multi-layer inversion computes the resistivity and thickness for each of a defined number of layers (typically 3-5 layers) to best fit the data.

EM Magnetite

The apparent percent magnetite by weight is computed wherever magnetite produces a negative inphase EM response. This calculation is more meaningful in resistive areas where positive responses due the conductive nature of the geology are minimal. Appendix

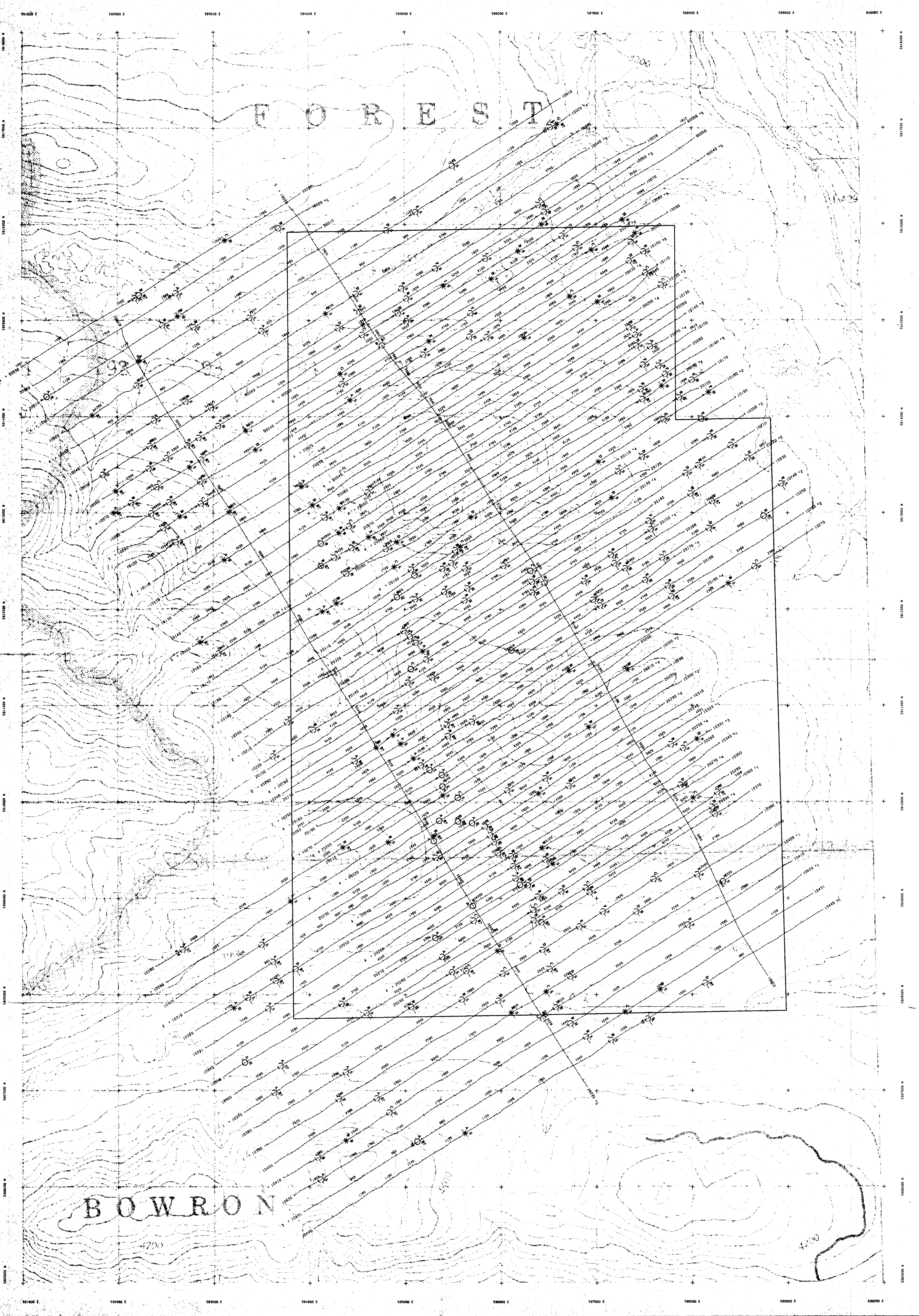
Optional Magnetic Products

Magnetic Derivatives

The total magnetic field data can be subjected to a variety of filtering techniques to yield maps of the following:

second vertical derivative
reduction to the pole/equator
apparent magnetic susceptibility
upward/downward continuation
analytic signal
enhanced magnetics

All of these filtering techniques with the exception of upward continuation enhance the recognition of near-surface magnetic sources. Any of these parameters can be produced on request. Dighem's proprietary enhanced magnetic technique is designed to provide a general "all-purpose" map, combining the more useful features of the above parameters.



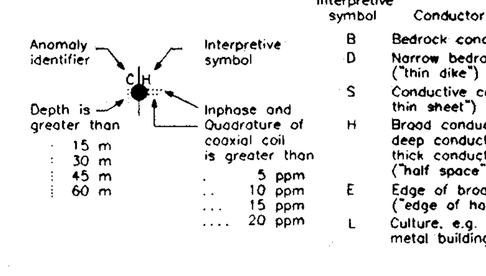
TECHNICAL SUMMARY

Navigation . . . . Ashtech/Racal GPS positioning
Data reduction grid interval . . . . 25 metres
Terrain clearance . . . . Helicopter 57 m
Electromagnetic sensor 30 m
Magnetometer 30 m
Data sampling interval . . . . 0.1 second
Magnetometer / sensitivity . . . . . Cesium / 0.01 nT
Electromagnetic system . . . . DIGHEM*

Frequency	Sensitivity	Coil Orientation
900 Hz	0.1 ppm	Vertical coaxial
5500 Hz	0.2 ppm	Vertical coaxial
900 Hz	0.1 ppm	Horizontal coplanar
7200 Hz	0.2 ppm	Horizontal coplanar
56000 Hz	0.5 ppm	Horizontal coplanar

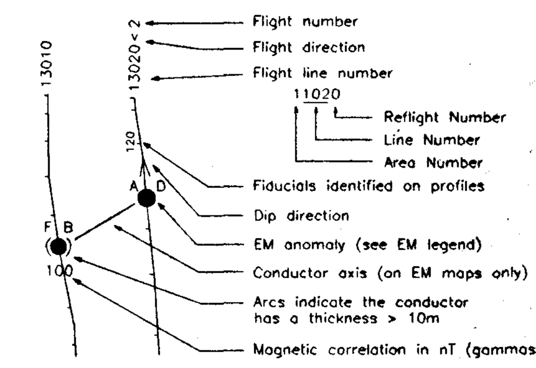
ELECTROMAGNETIC ANOMALIES

Grade	Anomaly	Conductance
7	●	>100 siemens
6	◕	50–100 siemens
5	◑	20–50 siemens
4	◔	10–20 siemens
3	⊕	5–10 siemens
2	○	1–5 siemens
1	◌	< 1 siemens
–	✳	Questionable anomaly



Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g. power line, metal building or fence

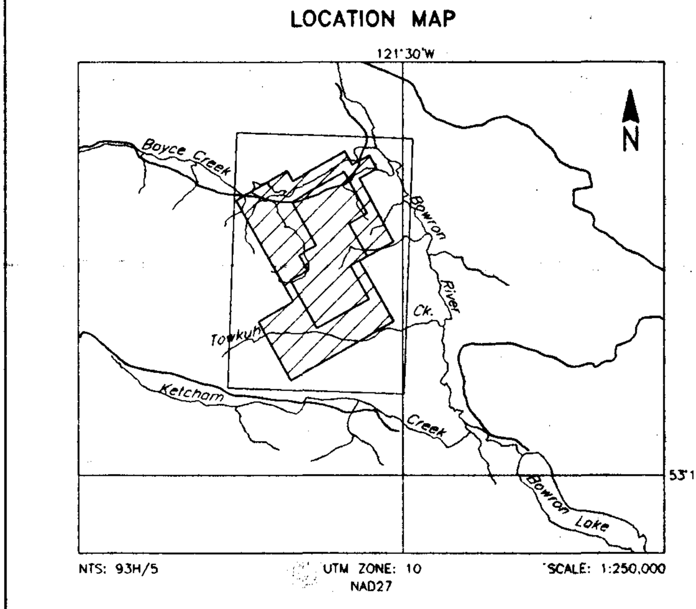
FLIGHT LINES WITH EM ANOMALIES



GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

25,746

LOCATION MAP



EUREKA RESOURCES INC.
BOWRON RIVER AREA, B.C.

ELECTROMAGNETIC ANOMALIES

DIGHEM* SURVEY	NTS: 93H/5	GEOPHYSICIST: JR
DATE: FEBRUARY, 1998	JOB: 1297	SHEET: 1

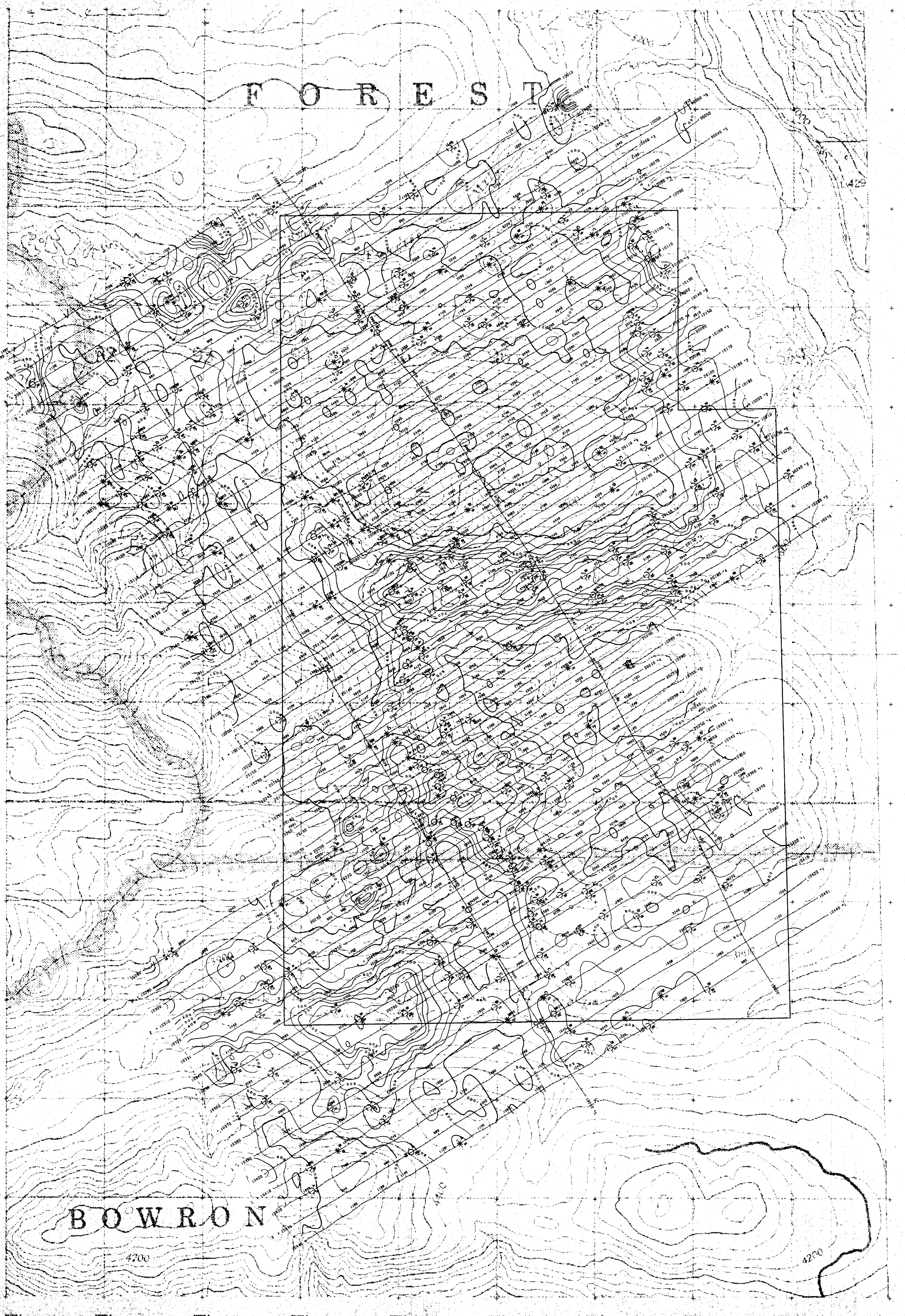
Geoterrex–Dighem, A division of CGG Canada Ltd.

500m 0 1 Km

Scale 1:15 000

geoterrex-dighem

Airborne & Ground Geophysical Services



TECHNICAL SUMMARY

Navigation	Ashtech/Racal GPS positioning
Data reduction grid interval	25 metres
Terrain clearance	Helicopter 57 m
	Electromagnetic sensor 30 m
	Magnetometer 30 m
Data sampling interval	0.1 second
Magnetometer / sensitivity	Cesium / 0.01 nT
Electromagnetic system	DIGHEM*

Frequency	Sensitivity	Coil Orientation
900 Hz	0.1 ppm	Vertical coaxial
5500 Hz	0.2 ppm	Vertical coaxial
900 Hz	0.1 ppm	Horizontal coplanar
7200 Hz	0.2 ppm	Horizontal coplanar
56000 Hz	0.5 ppm	Horizontal coplanar

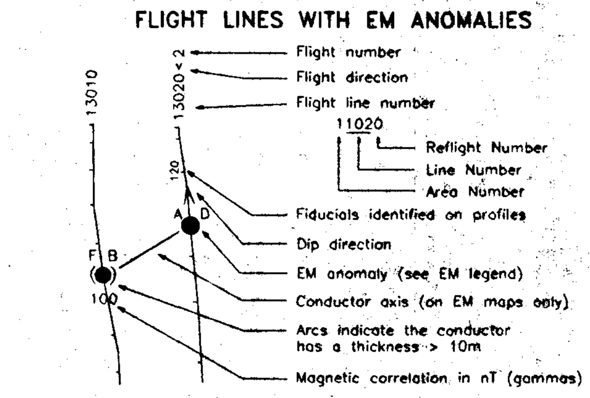
ELECTROMAGNETIC ANOMALIES

Grade	Anomaly	Conductance
7	●	>100 siemens
6	◕	50–100 siemens
5	◒	20–50 siemens
4	⊕	10–20 siemens
3	⊕	5–10 siemens
2	○	1–5 siemens
1	◌	< 1 siemens
–	✳	Questionable anomaly

Anomaly identifier
Interpretive symbol
Depth is greater than
. 15 m
: 30 m
⋮ 45 m
⋮ 60 m
Inphase and Quadrature of coaxial coil is greater than
. 5 ppm
.. 10 ppm
... 15 ppm
.... 20 ppm

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g. power line, metal building or fence

FLIGHT LINES WITH EM ANOMALIES



RESISTIVITY CONTOURS

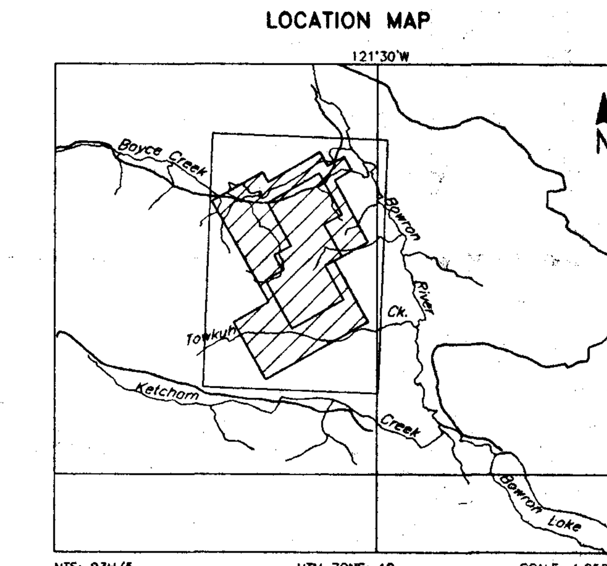
1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORT

25,746

LOCATION MAP



EUREKA RESOURCES INC.
BOWRON RIVER AREA, B.C.

APPARENT RESISTIVITY
900 Hz COPLANAR

DIGHEM* SURVEY	NTS: 93H/5	GEOPHYSICIST: JR
DATE: FEBRUARY, 1998	JOB: 1297	SHEET: 1

Geoterrex–Dighem, A division of CGG Canada Ltd.

500m 0 1 Km
Scale 1:15 000

geoterrex-dighem
Airborne & Ground Geophysical Services

TECHNICAL SUMMARY

Navigation	Ashtech/Racal GPS positioning
Data reduction grid interval	25 metres
Terrain clearance	Helicopter 57 m Electromagnetic sensor 30 m Magnetometer 30 m
Data sampling interval	0.1 second
Magnetometer / sensitivity	Cesium / 0.01 nT
Electromagnetic system	DIGHEM

Frequency	Sensitivity	Coil Orientation
900 Hz	0.1 ppm	Vertical coaxial
5500 Hz	0.2 ppm	Vertical coaxial
900 Hz	0.1 ppm	Horizontal coplanar
7200 Hz	0.2 ppm	Horizontal coplanar
56000 Hz	0.5 ppm	Horizontal coplanar

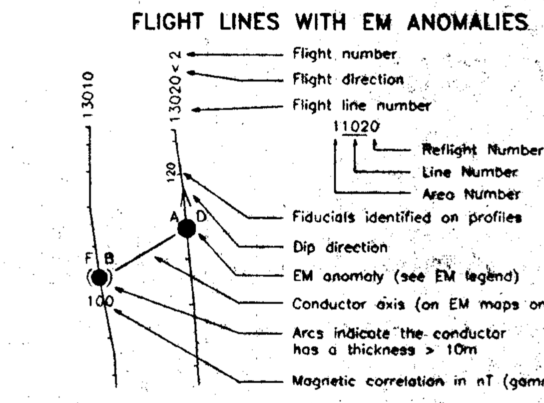
ELECTROMAGNETIC ANOMALIES

Grade	Anomaly	Conductance
7	●	>100 siemens
6	◕	50–100 siemens
5	◒	20–50 siemens
4	⊕	10–20 siemens
3	⊕	5–10 siemens
2	○	1–5 siemens
1	◌	<1 siemens
–	✳	Questionable anomaly

Anomaly identifier
Interpretive symbol
Depth is greater than
: 15 m
: 30 m
: 45 m
: 60 m
Inphase and Quadrature of coaxial coil is greater than
. 5 ppm
.. 10 ppm
... 15 ppm
.... 20 ppm

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g. power line, metal building or fence

FLIGHT LINES WITH EM ANOMALIES



GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

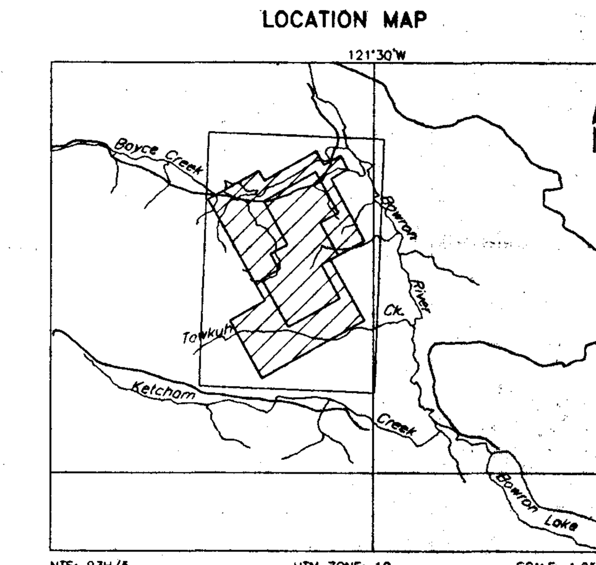
25,746

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

LOCATION MAP



EUREKA RESOURCES INC.
BOWRON RIVER AREA, B.C.

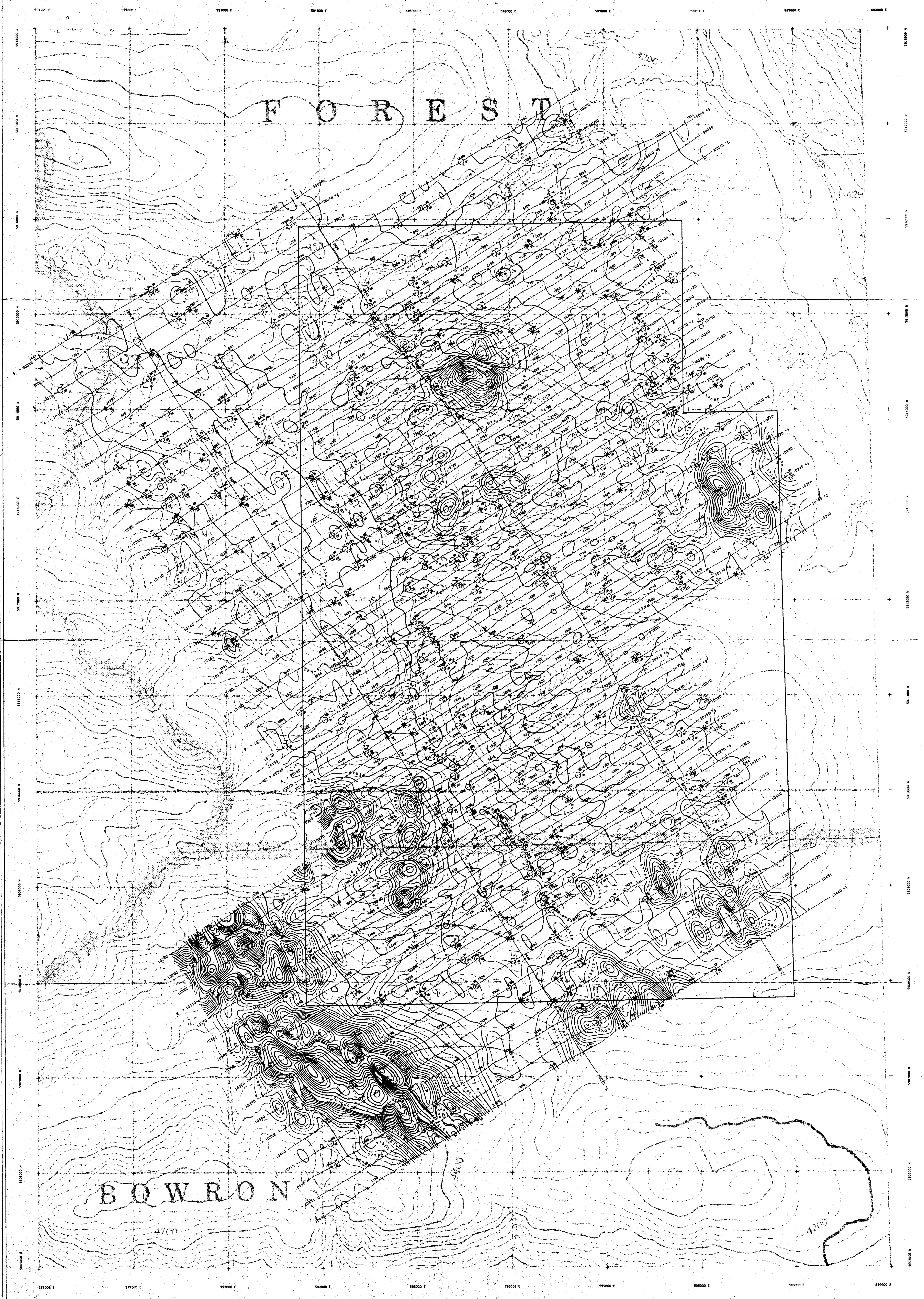
APPARENT RESISTIVITY
7200 Hz COPLANAR

DIGHEM SURVEY	NTS: 93H/5	GEOPHYSICIST: TR
DATE: FEBRUARY, 1998	JOB: 1297	SHEET: 1

Geoterrex–Dighem, A division of CGG Canada Ltd.

500m 0 1 Km
Scale 1:15 000

geoterrex-dighem
Airborne & Ground Geophysical Services



TECHNICAL SUMMARY

Navigation . . . . Ashtech/Racal GPS positioning
Data reduction grid interval . . . . 25 metres
Terrain clearance . . . . Helicopter 57 m
Electromagnetic sensor 30 m
Magnetometer 30 m
Data sampling interval . . . . 0.1 second
Magnetometer / sensitivity . . . . . Cesium / 0.01 nT
Electromagnetic system . . . . . . DIGHEM

Frequency	Sensitivity	Coil Orientation
900 Hz	0.1 ppm	Vertical coaxial
5500 Hz	0.2 ppm	Vertical coaxial
900 Hz	0.1 ppm	Horizontal coplanar
7200 Hz	0.2 ppm	Horizontal coplanar
56000 Hz	0.5 ppm	Horizontal coplanar

N

ELECTROMAGNETIC ANOMALIES

Grade	Anomaly	Conductance
7	●	>100 siemens
6	◕	50–100 siemens
5	◓	20–50 siemens
4	⊕	10–20 siemens
3	⊕	5–10 siemens
2	○	1–5 siemens
1	◌	< 1 siemens
–	✳	Questionable anomaly

Anomaly identifier
Interpretive symbol
Depth is greater than
15 m
30 m
45 m
60 m
Inphase and Quadrature of coaxial coil is greater than
. 5 ppm
.. 10 ppm
... 15 ppm
.... 20 ppm

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g. power line, metal building or fence

FLIGHT LINES WITH EM ANOMALIES

13010
13020 < 2
Flight number
Flight direction
Flight line number
11020
Reflight Number
Line Number
Area Number
120
A D
F B
100
Fiducials identified on profiles
Dip direction
EM anomaly (see EM legend)
Conductor axis (on EM maps only)
Arcs indicate the conductor has a thickness > 10m
Magnetic correlation in nT (gammas)

GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

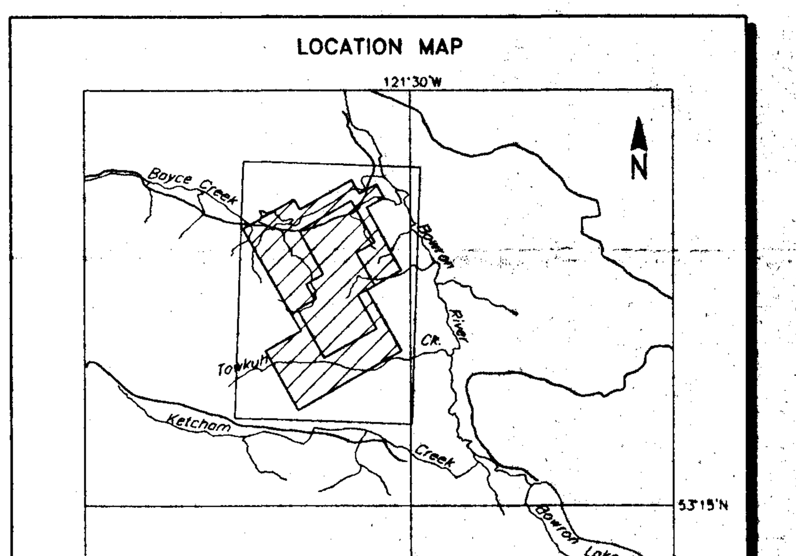
25,746

TOTAL FIELD MAGNETIC CONTOURS

. . . . 250 nT
. . . . 50 nT
. . . . 10 nT
. . . . 5 nT
. . . . magnetic low

Magnetic inclination within the survey area: 74 degrees N
Magnetic declination within the survey area: 22 degrees E

LOCATION MAP



NTS: 93H/5 UTM ZONE: 10 NAD27 SCALE: 1:250,000

EUREKA RESOURCES INC.
BOWRON RIVER AREA, B.C.

TOTAL FIELD MAGNETICS

DIGHEM SURVEY	NTS: 93H/5	GEOPHYSICIST: JR
DATE: FEBRUARY, 1998	JOB: 1297	SHEET: 1

Geoterrex–Dighem, A division of CGG Canada Ltd.

500m 0 1 Km
Scale 1:15 000

geoterrex-dighem
Airborne & Ground Geophysical Services

TECHNICAL SUMMARY

Navigation	Ashtech/Racal GPS positioning
Data reduction grid interval	25 metres
Terrain clearance	Helicopter 57 m Electromagnetic sensor 30 m Magnetometer 30 m
Data sampling interval	0.1 second
Magnetometer / sensitivity	Cesium / 0.01 nT
Electromagnetic system	DIGHEM[V]

Frequency	Sensitivity	Coil Orientation
900 Hz	0.1 ppm	Vertical coaxial
5500 Hz	0.2 ppm	Vertical coaxial
900 Hz	0.1 ppm	Horizontal coplanar
7200 Hz	0.2 ppm	Horizontal coplanar
56000 Hz	0.5 ppm	Horizontal coplanar

ELECTROMAGNETIC ANOMALIES

Grade	Anomaly	Conductance
7	●	>100 siemens
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4	⊕	10–20 siemens
3	⊕	5–10 siemens
2	○	1–5 siemens
1	◌	< 1 siemens
–	*	Questionable anomaly

Anomaly identifier — Interpretive symbol

Depth is greater than
. 15 m
: 30 m
⁝ 45 m
⁞ 60 m

Inphase and Quadrature of coaxial coil is greater than
. 5 ppm
.. 10 ppm
... 15 ppm
.... 20 ppm

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
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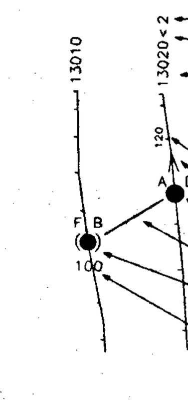
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g. power line, metal building or fence

FLIGHT LINES WITH EM ANOMALIES



- Flight number
- Flight direction
- Flight line number
  - Reflight Number
  - Line Number
  - Area Number
- Fiducials identified on profiles
- Dip direction
- EM anomaly (see EM legend)
- Conductor axis (on EM maps only)
- Arcs indicate the conductor has a thickness > 10m
- Magnetic correlation in nT (gammas)

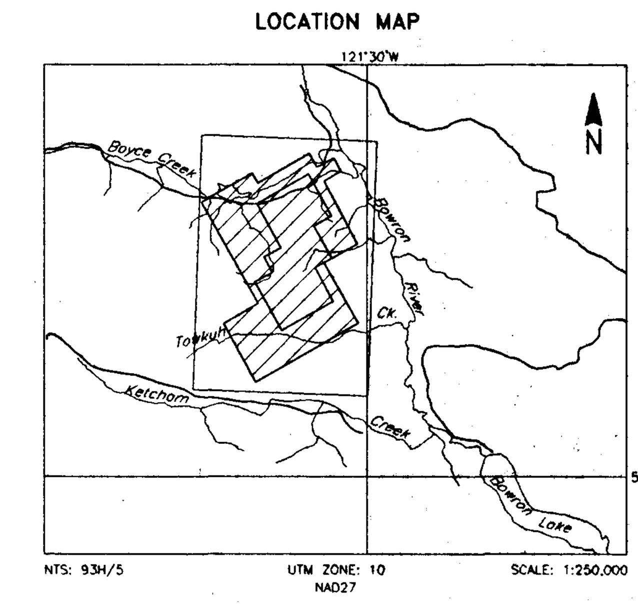
GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

25,746

CALCULATED VERTICAL GRADIENT CONTOURS

————	2.5 nT/metre
————	0.5 nT/metre
————	0.1 nT/metre
— — — —	0.05 nT/metre

LOCATION MAP



EUREKA RESOURCES INC.
BOWRON RIVER AREA, B.C.

CALCULATED VERTICAL GRADIENT MAGNETICS

DIGHEM[V] SURVEY	NTS: 93H/5	GEOPHYSICIST: JR
DATE: FEBRUARY, 1998	JOB: 1297	SHEET: 1

Geoterrex–Dighem, A division of CGG Canada Ltd.

500m 0 1 Km

Scale 1:15 000

geoterrex-dighem
Airborne & Ground Geophysical Services