Report #1274

DIGHEM^V SURVEY
FOR
26BT RESOURCE DEVELOPMENT CO. LTD.
SINCLAIR MILLS AREA
BRITISH COLUMBIA

NTS 93I/4

Dighem, A division of CGG Canada Ltd.
Mississauga, Ontario
March 27, 1997

Michael Vumbaca
Geophysicist

GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

R1274MAR.97

2 of 2

25,034

SUMMARY

This report describes the logistics and results of a DIGHEM^V airborne geophysical survey carried out for 26BT Resource Development Co. Ltd., over a property located near Sinclair Mills, British Columbia. Total coverage of the survey block amounted to 361 km including tie lines. The survey was flown from February 8 to February 9, 1997.

The purpose of the survey was to detect zones of conductive mineralization and to provide information that could be used to map the geology and structure of the survey area. This was accomplished by using a DIGHEM^V multi-coil, multi-frequency electromagnetic system, supplemented by a high sensitivity Cesium magnetometer. The information from these sensors was processed to produce maps which display the magnetic and conductive properties of the survey area. A GPS electronic navigation system, utilizing a UHF link, ensured accurate positioning of the geophysical data with respect to the base maps. Visual flight path recovery techniques were used to confirm the location of the helicopter where visible topographic features could be identified on the ground.

The survey property contains some anomalous features, of which a few may be considered to be of moderate to high priority as exploration targets. Most of the inferred bedrock conductors warrant further investigation using appropriate surface exploration

techniques. Areas of interest may be assigned priorities on the basis of supporting geophysical, geochemical and/or geological information. After initial investigations have been carried out, it may be necessary to re-evaluate the remaining anomalies based on information acquired from the follow-up program.

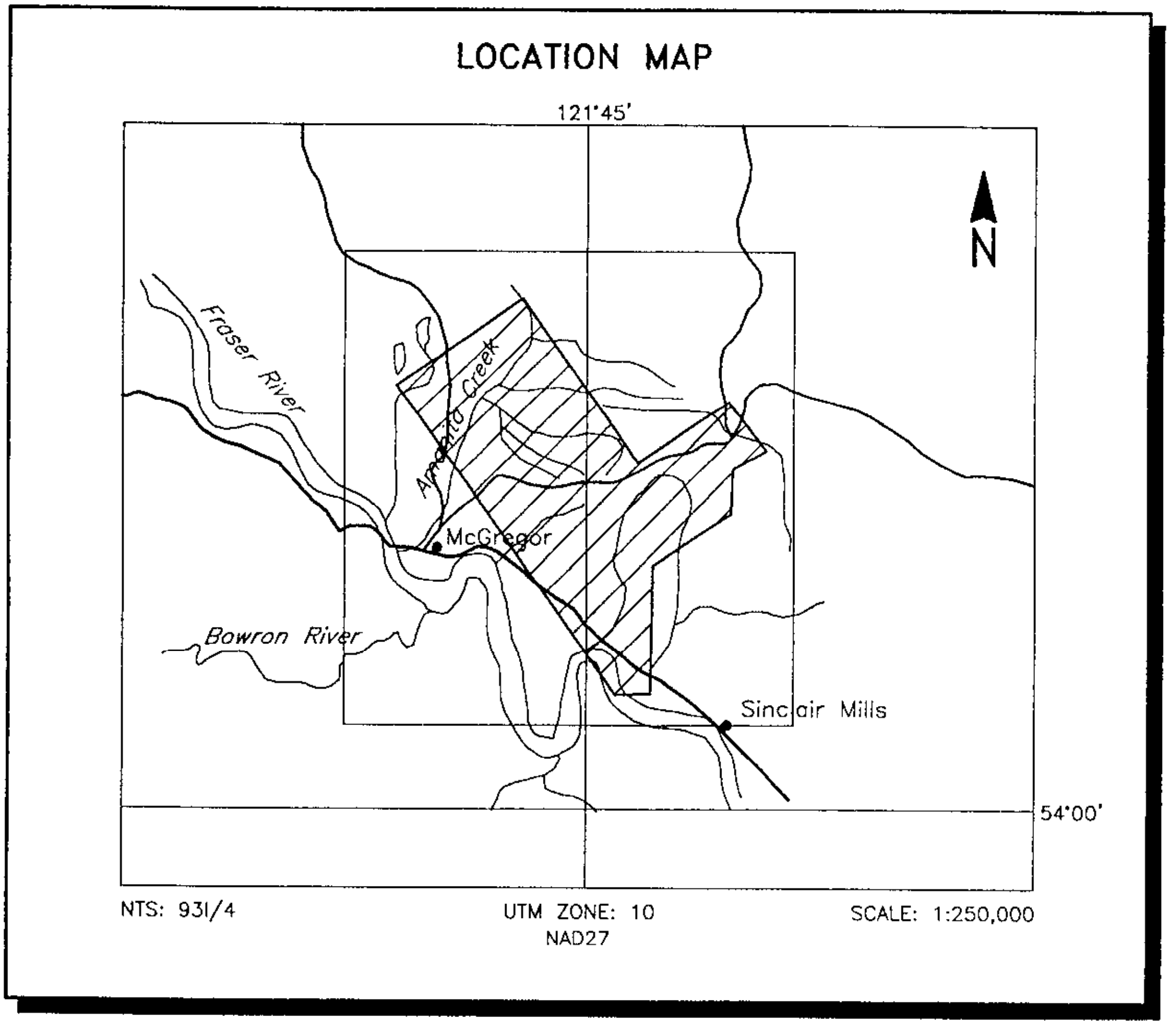


FIGURE 1
26BT RESOURCE DEVELOPMENT CO. LTD
SINCLAIR MILLS, B.C.
JOB #1274

CONTENTS

INTRODUCTION

A DIGHEM^V electromagnetic/resistivity/magnetic survey was flown for 26BT Resource Development Co. Ltd., from February 8 to February 9, 1997, over a survey block located near Sinclair Mills, British Columbia. The survey area can be located on NTS map sheet 93I/4 (see Figure 1).

Survey coverage consisted of approximately 361 line-km, including tie lines. Flight lines were flown in an azimuthal direction of 325° with a line separation of 200 metres.

The survey employed the DIGHEM^V electromagnetic system. Ancillary equipment consisted of a magnetometer, radar altimeter, video camera, analog and digital recorders and an electronic navigation system. The instrumentation was installed in an Aerospatiale AS350BA turbine helicopter (Registration CG-2PT) which was provided by Pacific Western Helicopters Ltd. The helicopter flew at an average airspeed of 107 km/h with an EM bird height of approximately 30 m.

Section 2 provides details on the survey equipment, the data channels, their respective sensitivities, and the navigation/flight path recovery procedure. Noise levels of less than 2 ppm are generally maintained for wind speeds up to 35 km/h. Higher winds may cause the system to be grounded because excessive bird swinging produces difficulties in flying the helicopter. The swinging results from the 5 m^2 of area which is presented by the bird to broadside gusts.

In some portions of the survey area, high canopy 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.

SURVEY EQUIPMENT

This section provides a brief description of the geophysical instruments used to acquire the survey data:

Electromagnetic System

Model:	DIGHEM^V
Type:	Towed bird, symmetric dipole configuration operated at a nominal survey altitude of 30 metres. Coil separation is 8 metres for 900 Hz, 5500 Hz and 7200 Hz, and 6.3 metres for the 56,000 Hz coil-pair.

Coil orientations/frequencies:

		nominal	actual
coaxial	/	900 Hz	1,057 Hz
coplanar	/	900 Hz	854 Hz
coaxial	/	5,500 Hz	6,500 Hz
coplanar	/	7,200 Hz	7,268 Hz
coplanar	/	56,000 Hz	57,640 Hz

Channels recorded:	5 inphase channels 5 quadrature channels 2 monitor channels
Sensitivity:	0.06 ppm at 900 Hz 0.10 ppm at 5,500 Hz 0.10 ppm at 7,200 Hz 0.30 ppm at 56,000 Hz
Sample rate:	10 per second

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.

Magnetometer

Model:	Picodas 3340
Type:	Optically pumped Cesium vapour
Sensitivity:	0.01 nT
Sample rate:	10 per second

The magnetometer sensor is towed in a bird 20 m below the helicopter.

Magnetic Base Station

Model:	Scintrex MEP-710
Type:	Digital recording cesium vapour

Sensitivity:	0.01 nT
Sample rate:	1 per second

A digital recorder is operated in conjunction with the base station magnetometer to record the diurnal variations of the earth's magnetic field. The clock of the base station is synchronized with that of the airborne system to permit subsequent removal of diurnal drift.

Radar Altimeter

Manufacturer:	Honeywell/Sperry
Type:	AA 220
Sensitivity:	0.3 m

The radar altimeter measures the vertical distance between the helicopter and the ground. This information is used in the processing algorithm which determines conductor depth.

Analog Recorder

Manufacturer:	RMS Instruments
Type:	DGR33 dot-matrix graphics recorder
Resolution:	4x4 dots/mm
Speed:	1.5 mm/sec

The analog profiles are recorded on chart paper in the aircraft during the survey. Table 2-1 lists the geophysical data channels and the vertical scale of each profile.

Digital Data Acquisition System

Manufacturer:	RMS Instruments
Model:	DGR 33
Recorder:	RMS TCR-12, 6400 bpi, tape cartridge recorder

The digital data are used to generate several computed parameters. Both measured and computed parameters are plotted as "multi-channel stacked profiles" during data processing. These parameters are shown in Table 2-2. In Table 2-2, the log

Table 2-1. 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	3 m	ALT
MAGC	magnetics, coarse	20 nT	MAG
MAGF	magnetics, fine	2.0 nT	
CXSP	coaxial sferics monitor		CXS
CPSP	coplanar sferics monitor		CPS
CXPL	coaxial powerline monitor		CXP
CPPL	coplanar powerline monitor		CPP

Table 2-2. The Digital Profiles

Channel Name (Freq)	Observed Parameters	Scale Units/mm
MAG	magnetics	10 nT
ALTR	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
CXS	coaxial sferics monitor	
CXP	coaxial powerline monitor	
	Computed Parameters	
DFI (900 Hz)	difference function inphase from CXI and CPI	2 ppm
DFQ (900 Hz)	difference function quadrature from CXQ and CPQ	2 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

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.

Tracking Camera

Type:	Panasonic Video
Model:	AG 2400/WVCD132

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 System (RT-DGPS)

Model:	Sercel NR106, Real-time differential positioning
Type:	SPS (L1 band), 10-channel, C/A code, 1575.42 MHz.
Sensitivity:	-132 dBm, 0.5 second update
Accuracy:	< 5 metres in differential mode,

The Global Positioning System (GPS) is a line of sight, satellite navigation system which utilizes time-coded signals from at least four of the twenty-four NAVSTAR satellites. In the differential mode, two GPS receivers are used. 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 while providing real-time guidance. The raw XYZ data are recorded for both receivers, thereby permitting post-survey processing for accuracies of approximately 5 metres.

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. For this survey, the base station was located at a latitude 54°06.0482'N, longitude 121°40.72283'W and a height above sea mean level of 875.94 metres. 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 system displayed on the base maps.

Field Workstation

Manufacturer:	Dighem
Model:	FWS: V2.80
Type:	80486 based P.C.

A portable PC-based field workstation is used at the survey base to verify data quality and completeness. Flight tapes are dumped to a 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

The following products are available from the survey data. Those which are not part of the survey contract may be acquired later. Refer to Table 3-1 for a summary of the maps which accompany this report, some of which may be sent under separate cover. Most parameters can be displayed as contours, profiles, or in colour.

Base Maps

A base map of the survey area was created by digitally scanning published topographic maps. This provides a relatively accurate, distortion-free base which facilitates correlation of the navigation data to the UTM grid. The digital topography is merged with the geophysical data to produce mylar composites, from which the blackline prints are made. The coordinates shown on the maps are based on UTM Zone 10, NAD27.

Electromagnetic Anomalies

Anomalous electromagnetic responses were selected and analysed by computer to provide preliminary electromagnetic anomaly maps. These preliminary maps were used

Table 3-1 Survey Products

1. Preliminary Products @ 1:20,000

   EM 5500 Hz coaxial profiles
   Total field magnetic contours

2. Final Transparent Maps (+3 prints) @ 1:10,000

   Dighem EM anomalies
   Total field magnetic contours
   Calculated vertical magnetic gradient contours
   Resistivity (7200 Hz) contours
   Resistivity (56,000 Hz) contours

3. Colour Maps (2 sets) @ 1:20,000

   Total field magnetics
   Calculated vertical magnetic gradient
   Resistivity (7200 Hz)
   Resistivity (56,000 Hz)

4. Additional Products

   Digital XYZ archive in Geosoft format (CD-ROM)
   Digital grid archives in I-POWER format (CD-ROM)
   Survey report (3 copies)
   Multi-channel stacked profiles
   Analog chart records
   Flight path video cassettes
   VISION software package

Note: Other products can be produced from existing survey data, if requested.

by the geophysicist, in conjunction with the computer-generated digital profiles, to produce the final interpreted EM anomaly map. This map includes bedrock, surficial and cultural conductors. Maps containing only bedrock conductors can be generated, if desired.

Resistivity

The apparent resistivity in ohm-m can be generated from the inphase and quadrature EM components for any of the frequencies, using a pseudo-layer halfspace model. A resistivity map portrays all the EM information for that frequency over the entire survey area. This contrasts with the electromagnetic anomaly map which provides information only over interpreted conductors. The large dynamic range makes the resistivity parameter an excellent mapping tool.

EM Magnetite (optional)

The apparent percent magnetite by weight is computed wherever magnetite produces a negative inphase EM response. This calculation is more meaningful in resistive areas.

Total Field Magnetics

The aeromagnetic data are corrected for diurnal variation using the magnetic base station data. The regional IGRF can be removed from the data, if requested.

Calculated Vertical Gradient

The total field magnetic data have been subjected to a processing algorithm which enhances the response of magnetic bodies in the upper 500 m and attenuates the response of deeper bodies. The resulting first vertical derivative magnetic map provides better definition and resolution of near-surface magnetic units. It also identifies weak magnetic features which may not be evident on the total field magnetic map.

Magnetic Derivatives

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

enhanced magnetics
second vertical derivative

magnetic susceptibility with reduction to the pole

upward/downward continuations

All of these filtering techniques improve the recognition of near-surface magnetic bodies, with the exception of upward continuation. 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.

Multi-channel Stacked Profiles

Distance-based profiles of the digitally recorded geophysical data are generated and plotted by computer. These profiles also contain the calculated parameters which are used in the interpretation process. These are produced as worksheets prior to interpretation, and can also be presented in the final corrected form after interpretation. The profiles display electromagnetic anomalies with their respective interpretive symbols.

Contour, Colour and Shadow Map Displays

The geophysical data are interpolated onto a regular grid using a modified Akima spline technique. The resulting grid is suitable for generating contour maps of excellent quality. The grid cell size is usually 25% of the line interval.

Colour maps are produced by interpolating the grid down to the pixel size. The parameter is then incremented with respect to specific amplitude ranges to provide colour "contour" maps. Colour maps of the total magnetic field are particularly useful in defining the lithology of the survey area.

Monochromatic shadow maps are 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. These techniques may be applied to total field or enhanced magnetic data, magnetic derivatives, VLF, resistivity, etc. The shadow of the enhanced magnetic parameter is particularly suited for defining geological structures with crisper images and improved resolution.

Conductivity-depth Sections (optional)

The apparent resistivities for all frequencies can be displayed simultaneously as coloured conductivity-depth sections. Usually, only the coplanar data are displayed as the quality tends to be higher than that of the coaxial data.

Conductivity-depth sections can be generated in two 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[1]; and,

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

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. Conductivity-depth sections are most useful in conductive layered situations, but may be unreliable in

---

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

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.

---

[2] 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.

SURVEY RESULTS

GENERAL DISCUSSION

The survey results are presented on a separate map sheet for each parameter at a scale of 1:20,000. Table 4-1 summarizes the EM responses in the survey area, with respect to conductance grade and interpretation.

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 should be more evident on the resistivity parameter. 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. Contoured resistivity maps, based on the 7200 Hz and 56,000 Hz coplanar data are included with this report.

TABLE 4-1

EM ANOMALY STATISTICS

SINCLAIR MILLS, B.C.

CONDUCTOR GRADE	CONDUCTANCE RANGE SIEMENS (MHOS)	NUMBER OF RESPONSES
7	>100	0
6	50 - 100	0
5	20 - 50	2
4	10 - 20	9
3	5 - 10	48
2	1 - 5	55
1	<1	0
*	INDETERMINATE	16
TOTAL		130

CONDUCTOR MODEL	MOST LIKELY SOURCE	NUMBER OF RESPONSES
B	DISCRETE BEDROCK CONDUCTOR	10
S	CONDUCTIVE COVER	82
H	ROCK UNIT OR THICK COVER	2
E	EDGE OF WIDE CONDUCTOR	22
L	CULTURE	14
TOTAL		130

(SEE EM MAP LEGEND FOR EXPLANATIONS)

Excellent resolution and discrimination of conductors was accomplished by using a fast sampling rate of 0.1 sec and by employing a common frequency (900 Hz) on two orthogonal coil-pairs (coaxial and coplanar). The resulting "difference channel" parameters often permit differentiation of bedrock and surficial conductors, even though they may exhibit similar conductance values.

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.

Magnetics

A Scintrex MEP-710 cesium vapour magnetometer was operated at the survey base to record diurnal variations of the earth's magnetic field. The clock of the base station was synchronized with that of the airborne system to permit subsequent removal of diurnal drift.

The total field magnetic data have been presented as contours on the base map using a contour interval of 5 nT where gradients permit. The map shows the magnetic properties of the rock units underlying the survey area.

There is some evidence on the magnetic maps which suggests that the survey area has been subjected to deformation and/or alteration. These structural complexities are evident on the contour maps as variations in magnetic intensity, irregular patterns, and as offsets or changes in strike direction.

If a specific magnetic intensity can be assigned to the rock type which is believed to host the target mineralization, it may be possible to select areas of higher priority on the basis of the total field magnetic data. This is based on the assumption that the magnetite content of the host rocks will give rise to a limited range of contour values which will permit differentiation of various lithological units.

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

Resistivity

Resistivity maps, which display the conductive properties of the survey area, were produced from the 7200 Hz and 56,000 Hz coplanar data. The maximum resistivity values, which are calculated for each frequency, are 8,000 and 20,000 ohm-m respectively. These cutoffs eliminate the meaningless higher resistivities which would result from very small EM amplitudes. In general, the resistivity patterns show moderately poor agreement with the magnetic trends. This suggests that many of the resistivity lows are probably related to conductive overburden rather than bedrock features such as in the southwestern portion of the survey block. There are some areas, however, where the magnetic and resistivity patterns correlate quite well, suggesting that both are responding to a common causative (bedrock) source.

Electromagnetics

The EM anomalies resulting from this survey appear to fall within one of four 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. Very few anomalies fall into this category.

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 usually 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, while other “broad” responses may be due to a shallow angle of intersection with the survey lines.

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.

The third anomaly category consists of quadrature responses which are associated with negative or suppressed inphase responses. Negative inphase responses are caused by magnetite. The effects of magnetite suppression are evident over the strong magnetic anomaly which dominates the southeastern portion of the property. 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.

The fourth anomaly type consists of those which have been attributed to culture, including railway lines, telephone or powerlines, fences, buildings, radio towers or other metallic objects. These anomalies are usually given an “L” or “L?” symbol denoting a probable line source.

As economic mineralization within the area may be associated with massive to weakly disseminated sulphides, which may or may not be hosted by magnetite-rich rocks, it is not practical to assess the relative merits of EM anomalies on the basis of conductance. 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.

POTENTIAL AREAS OF INTEREST

The electromagnetic anomaly map shows the anomaly locations with the interpreted conductor type, dip, conductance and depth being indicated by symbols. Direct magnetic correlation is also shown if it exists. No EM conductor axes have been shown on the EM anomaly maps, as very few anomalies could be correlated from line to line with a reasonable degree of confidence. When studying the map sheets, reference should be made to the multiparameter geophysical profiles which display the characteristics of all anomalous responses.

Approximately 30% of the survey block is underlain by moderate to highly conductive material. Most of the resistivity lows are associated with topographic depressions (streams and swamps) and have been attributed to conductive overburden. This upper layer has resulted in moderately broad, non-discrete EM anomalies, and may have masked the responses from underlying bedrock sources in some of the more conductive areas. The presence of magnetite has also suppressed the inphase parameter in several areas, yielding erroneously high (overstated) apparent resistivity values, which may also have affected anomalous signatures from magnetite-hosted conductors.

The magnetic data display a large dynamic range of more than 4380 nT. A very strong, large magnetic anomaly, which dominates the southeastern portion of the survey block, is reportedly due to a magnetite-rich intrusion containing up to 65% magnetite. It is possible that economic mineralization may be hosted by or associated with the peripheral contact of this large intrusive unit.

Both the total field and vertical gradient contours suggest that this complex unit has been intersected by at least two linear trends. One of these trends is evident as a narrow magnetic low which strikes about 185° through EM anomaly 10250D. A probable faulted contact intersects this same anomaly, with an orthogonal strike direction of approximately 117°. These intersecting trends are considered to be important, as they may have influenced or controlled mineral deposition in this area.

The south-trending magnetic low is associated with a moderate resistivity low, which tends to enhance its significance. Anomalies 10260A, 10250D and 10240E are all associated with this conductive trend. It is recommended that further work be carried out in this area in order to determine the source of this conductive zone. This structure may have been partially tested by a previous drill hole, several hundred metres to the south, which reportedly intersected anomalous Au values.

The magnetic results show two linear, dike-like trends which strike roughly 325° and 315°, nearly parallel to the flight line direction. The stronger western unit, which follows line 10120, exhibits a strike length of more than 11 km, and is open to the southeast. This linear unit may be related to fracture filling along a major regional fault zone.

This dike-like unit is intersected by at least three subtle trends. One strikes east-northeast through anomaly 10140C, a second through anomaly 10150A, and a third east-trending linear is suggested at the northern limit of this unit in the vicinity of fiducial 7625 on line 10130.

Although anomalies 10140C and 10150A are quite broad and poorly defined, both are considered to be potential areas for follow-up. They are associated with moderate to strong resistivity lows which tend to enhance their significance.

Anomalies 10130A, 10130B, 10140B and 10130C yield direct magnetic correlation, and appear to be associated with the western dike-like unit. To the south, there are other EM anomalies which either coincide with this magnetic high (10110E) or occur in close proximity to its eastern and western contacts (10100C,D,E,F and G, and 10130D). The poorly-defined, broad anomaly characteristics may be due to the very shallow angle of intersection with the survey lines. However, some of the resistivity trends display an east/west direction which does not always follow the magnetic trends. This suggests that the resistivity trends may be reflecting near surface variations in conductivity, while the magnetic data are dominated by the more prominent plug-like or linear intrusions.

A weaker, dike-like magnetic trend is evident between anomaly 10220B and fiducial 6560 on line 10280. The segmented nature of this trend may be partially due to the gridding/contouring methods, which often yield non-continuous circular highs along dike-like units which are nearly parallel to the survey lines. This segmented pattern may actually be due to a continuous dike-like unit, although the EM and resistivity data both suggest the presence of possible northeast to east-northeast offsets. Anomalies 10220B, 10210A, 10210D and 10230C, for example, are all associated with strong resistivity lows which strike roughly northeast. Some of these, such as 10230C to 10250C, occur at the edges of conductive zones, and may be due to edge effects or contacts. Anomalies 10220B and C both yield magnetic correlation, and may therefore be related to the same southeast-trending dike.

There are several broad anomalies in the survey area which have been given an "S?" symbol, denoting a possible surficial source. The "?" does not question the validity of the anomaly, but instead, indicates a degree of uncertainty as to which is the more appropriate model when there are two or more sources contributing to the anomalous response. Many of the interpreted "surficial" responses may be due to wide bedrock sources or conductors which are nearly parallel to the survey lines. These "non-discrete" EM conductors are more clearly defined on the resistivity maps.

There are a few resistivity anomalies which may warrant further investigation, although most are not considered to be high priority targets. The strong resistivity low along the southwestern edge of the survey area is likely due to a combination of overburden and cultural interference from the railway line and powerline. However, there is a weak magnetic low which follows the conductive zone, from anomaly 10011F to the south end of line 10090. The digital profiles also suggest the presence of a halfspace or a thick conductive zone, which may not be due to surficial cover only. These combined effects may be indicative of a relatively conductive, non-magnetic rock unit which coincides with the McGregor/Sinclair Mills highway.

Similarly, strong resistivity lows are evident in the northern portion of the survey block. Although conductive overburden may be a contributing factor, there are strong variations in resistivity over areas of low topographic relief. These highly conductive zones may reflect changes in the conductivity or thickness of the overlying material. However, some of the resistivity highs, such as those near anomaly 10170A or fiducial 7920 on line 10140 could reflect intrusions of resistive material or siliceous alteration. Some of the higher resistivities may also be caused by well-drained sand or gravel.

The 56,000 Hz resistivity map, which is usually more representative of the near surface material, displays an interesting circular, or "C-shaped" pattern between 10130E and 10140E. Moderately strong plug-like lows are also evident in the vicinity of 10120C, 10120E, 10160E, 10180F and 10290A. Most of these conductive areas occur in close proximity to structural breaks or magnetic contacts, which tends to enhance their significance.

The moderately strong resistivity low on lines 10400 to 10440 suggests a change in bedrock conductivity, although there is no obvious change in magnetic susceptibility in this area. The conductive zone appears to be deeper towards the southeast, and may be open in this direction. This is considered to be a low priority target unless geological/geochemical information suggests this is a favourable area for further work.

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 5-1 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 5-1. 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 5-1. 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 anomalies on the geophysical. However, patchy conductive overburden in otherwise resistive areas can yield discrete anomalies with a conductance grade (cf. Table 5-1) 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 increasingly 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 2000 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.

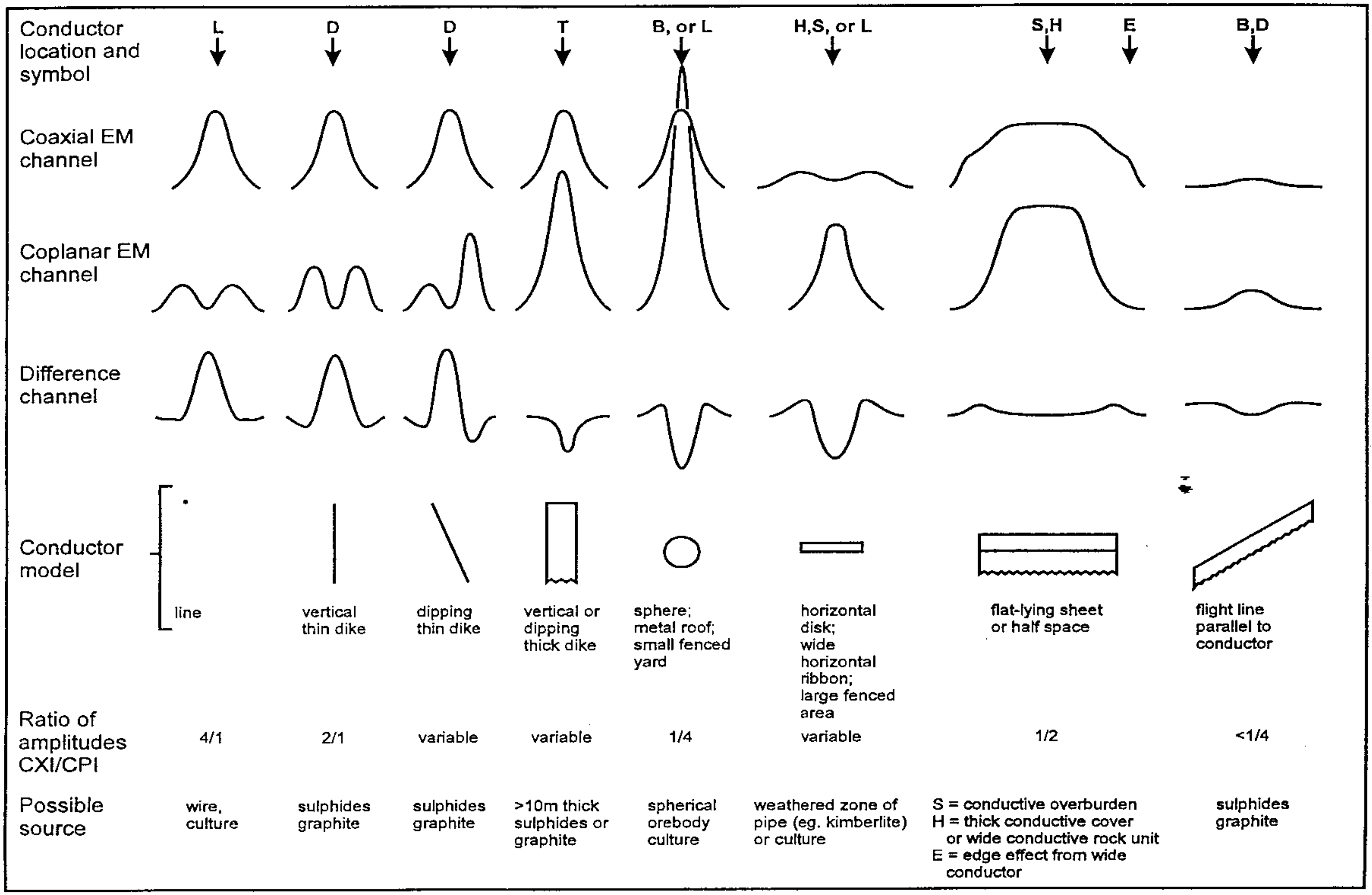
For each interpreted electromagnetic anomaly on the geophysical maps, a letter identifier and an interpretive symbol are plotted beside the EM grade symbol. The horizontal rows of dots, under the interpretive symbol, indicate the anomaly amplitude on the flight record. The vertical column of dots, under 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 5-1

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 wish this information. The map provides an interpretation of conductors in terms of length, strike and dip, geometric shape, conductance, depth, and thickness. The accuracy is comparable to an interpretation from a high quality ground EM survey having the same line spacing.

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 normally are 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 thin when the thickness is likely to be less than 3 m, and thick 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, anomalies 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)[3]. 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 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

---

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

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.

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 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 also exists. 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 magnetometry, 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.[4] 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

---

[4] See Figure 5-1 presented earlier.

metal roof or small fenced yard.[5] 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 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.

---

[5] 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.

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.

CONCLUSIONS AND RECOMMENDATIONS

This report provides a very brief description of the survey results and describes the equipment, procedures and logistics of the survey in the Sinclair Mills area.

There are few anomalies in the survey block which are typical of massive sulphide responses. The survey was also successful in locating several moderately weak or broad conductors which also warrant additional work. The various maps included with this report display the magnetic and conductive properties of the survey area. It is recommended that the survey results be reviewed in detail, in conjunction with all available geophysical, geological and geochemical information. Particular reference should be made to the computer generated data profiles which clearly define the characteristics of the individual anomalies.

Most EM responses in the area are moderately broad but poorly-defined. Many have been attributed to conductive overburden, wide bedrock units or deep weathering, although a few appear to be associated with magnetite-rich rock units. Others coincide with linear magnetic or resistivity gradients which may reflect faults or shears. Such structural breaks are considered to be of particular interest as they may have influenced mineral deposition within the survey area.

The interpreted bedrock conductors and some of the possible "surficial" zones defined by the survey should be subjected to further investigation, using appropriate surface exploration techniques. Anomalies which are currently considered to be of moderately low priority may require upgrading if follow-up results are favourable.

It is also recommended that image processing of existing geophysical data be considered, in order to extract the maximum amount of information from the survey results. Current software and imaging techniques often provide valuable information on structure and lithology, which may not be clearly evident on the contour and colour maps. These techniques can yield images which define subtle, but significant, structural details.

Respectfully submitted,

DIGHEM

Michael Vumbaca
Geophysicist

MV/sdp

R1274MAR.97

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 26BT Resource Development Co. Ltd. in the Sinclair Mills area, British Columbia.

Greg Paleolog	Manager, Helicopter Operations
Doug McConnell	Manager, Data Processing and Interpretation
Felix Dolezel	Senior Geophysical Operator
Ken Knight	Pilot (Pacific Western Helicopters Ltd.)
Gordon Smith	Data Processing Supervisor
Fadi Alfar	Geophysical Computer Processor
Paul A. Smith	Interpretation Supervisor
Michael Vumbaca	Project Geophysicist
Lyn Vanderstarren	Drafting Supervisor
Mike Armstrong	Draftsperson (CAD)
Susan Pothiah	Word Processing Operator
Albina Tonello	Secretary/Expeditor

The survey consisted of 361 km of coverage, flown from February 8 to February 9, 1997.

All personnel are employees of Dighem, except for the pilot who is an employee of Pacific Western Helicopters Ltd.

DIGHEM

per Michael Vumbaca
Geophysicist

MV/sdp

R1274MAR.97

APPENDIX B

STATEMENT OF COST

Date: March 27, 1997

IN ACCOUNT WITH DIGHEM

To: Dighem flying of Agreement dated January 20, 1997, pertaining to an Airborne Geophysical Survey in the Sinclair Mills area, British Columbia.

Survey Charges

345 km of flying @ $110.00/km plus mobilization costs of $5,000.00	$42,950.00

Allocation of Costs

- Data Acquisition	(80%)
- Data Processing	(10%)
- Interpretation, Report and Maps	(10%)

DIGHEM

per Michael Vumbaca
Geophysicist

MV/sdp

R1274MAR.97

APPENDIX C

EM ANOMALY LIST

```
              COAXIAL   COPLANAR   COPLANAR  .  VERTICAL   . HORIZONTAL CONDUCTIVE     MAG
              1057 HZ     854 HZ    7268 HZ  .    DIKE     .   SHEET       EARTH       CORR
                                             .             .
 ANOMALY/ REAL QUAD REAL QUAD REAL QUAD . COND DEPTH*. COND DEPTH RESIS DEPTH
FID/INTERP PPM  PPM  PPM  PPM  PPM  PPM .SIEMEN     M .SIEMEN     M OHM-M     M      NT
 ---------                              .             .
LINE 10011   (FLIGHT   2)               .             .
 A  8733S?  0    3    2    4    7   12  .    0.5    0  .    1     69   101   29    20
 B  8621S?  2   12    4   21   47   48  .    0.7    0  .    1     38    73    5     0
 C  8495S?  2    9    5    9   21   18  .    1.2    0  .    1     29    54    1     0
 D  8444L   3    4    4   15   40   39  .    4.3   39  .    1     24   105    0     0
 E  8435L   5    9    7   12   32   29  .    3.2   17  .    1     17    81    0     0
 F  8425L   3   17    5    9   77   47  .    0.9    0  .    1     22    63    0     0
 G  8363L   7   15    5    5   10    7  .    2.9    6  .    1     37    57    8     0
 H  8314S?  1    2    1    2    2    4  .     -     -  .    -      -     -    -     0
 ---------                              .             .
LINE 10020   (FLIGHT   2)               .             .
 A   732S?  1    2    2    6    8   15  .    0.8   10  .    1     62   117   22    20
 B   833S?  2    4    3    6   14   12  .    1.6    0  .    1     45   101    4     0
 C   947S?  2    8    3    3   29   27  .    1.2    0  .    1     39   137    1     0
 D   994S?  3   14    3   26   58   45  .    1.3    0  .    1     22   229    0     0
 E  1016E   4    8    6    2   39   25  .    2.4    0  .    1     23   250    0     0
 F  1072L   5    4    3    7   11   16  .    7.3   31  .    1     37    67    6     0
 G  1103S?  4   13    4   15   36   55  .    1.5    1  .    1     35    64    6     0
 H  1107S?  4   13    4   15   36   55  .    1.8    0  .    1     42    69   10     0
 ---------                              .             .
LINE 10030   (FLIGHT   2)               .             .
 A  1734S?  2    4    2    7   12   10  .    1.9   38  .    1     50   159   10    30
 B  1619S?  1    5    4    8   21   21  .    0.7    0  .    1     31   131    0     0
 C  1426S?  2    7    4   10   34   30  .    1.2    0  .    1      9   214    0     0
 D  1378E   6   19    3   13   21   82  .    2.0    0  .    1     15   107    0     0
 E  1338L   1    2    1    2    2    4  .     -     -  .    -      -     -    -     0
 F  1329L   6    8    3    7   13   19  .    4.7   19  .    1     30    64    1    11
 ---------                              .             .
LINE 10040   (FLIGHT   2)               .             .
 A  2091S?  1    6    3    9   23   23  .    0.5    0  .    1     26   172    0     0
 B  2298E   3   12    7    7   57   49  .    1.3    0  .    1     24   161    0     0
 C  2361L   3    3    3    5   17   17  .    6.0   32  .    1     28    75    0     0
 D  2367L   1    4    5    5   19   19  .    0.7    0  .    1     32    66    0    12
 ---------                              .             .
LINE 10050   (FLIGHT   2)               .             .
 A  2924S?  1    2    1    2    2    4  .     -     -  .    -      -     -    -     0
 B  2641E   1    2    1    2    2    4  .     -     -  .    -      -     -    -     0
 C  2577L  11   18   14   17   68   64  .    4.0    6  .    1     25    70    0    20
 ---------                              .             .
LINE 10060   (FLIGHT   2)               .             .
 A  3457E   2   11    6    7   50   44  .    0.6    0  .    1     25   233    0     0
 B  3541L   4    7    3   11   42   27  .    2.4    1  .    1     28    58    0     0

     .                                                                 .
     .* 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 OVERBURDEN EFFECTS.       .
```

```
             COAXIAL  COPLANAR  COPLANAR .  VERTICAL   . HORIZONTAL CONDUCTIVE    MAG
             1057 HZ    854 HZ   7268 HZ .    DIKE     .   SHEET       EARTH      CORR
                                         .             .
 ANOMALY/ REAL QUAD REAL QUAD REAL QUAD . COND DEPTH*. COND DEPTH RESIS DEPTH
FID/INTERP PPM  PPM  PPM  PPM  PPM  PPM .SIEMEN    M .SIEMEN    M OHM-M     M     NT
 ---------                               .             .
LINE 10060  (FLIGHT   2)                 .             .
 C  3566L?  1    3    3    6   11   10 .   1.4   19 .    1    42    65    10     0
 ---------                               .             .
LINE 10070  (FLIGHT   2)                 .             .
 A  3954E   3    9    6   12   44   41 .   1.7    0 .    1    24    69     0     0
 B  3935L   7   10    6    4   23   13 .   3.7    6 .    1    24    55     0     0
 ---------                               .             .
LINE 10080  (FLIGHT   2)                 .             .
 A  4689S?  0    5    0    9    9   39 .   0.4    0 .    1    39   572     0     0
 B  4858E   1    2    1    2    2    4 .    -     - .    -     -     -     -     0
 ---------                               .             .
LINE 10090  (FLIGHT   2)                 .             .
 A  5319S?  1    2    1    2    2    4 .    -     - .    -     -     -     -    13
 B  5193S?  1    4    1    7   16   44 .   0.7    5 .    1    21   503     0     5
 C  5180S?  1    4    1    7   13   35 .   0.7    0 .    1    39   672     0    20
 D  4995E   1    2    1    2    2    4 .    -     - .    -     -     -     -     0
 ---------                               .             .
LINE 10100  (FLIGHT   2)                 .             .
 A  5735S?  0    4    2    7   12   32 .   0.4    0 .    1    33   206     0     0
 B  5746S?  3    2    2    5   11   19 .   4.8   49 .    1    41   157     1     0
 C  5866S?  0    4    1    6   21   40 .   0.4    0 .    1    14   480     0     0
 D  5872B?  0    7    0   10   24   55 .   0.4    0 .    1    19   577     0     0
 E  5878S?  0    6    0    9   14   57 .   0.4    0 .    1    39   619     0     0
 F  5918S?  0    3    0    6   13   33 .   0.4    0 .    1    23   504     0     0
 G  5991S?  0    8    1   13   16   80 .   0.4    0 .    1    31   659     0     0
 H  6029E   3   10    5   19   51   39 .   1.4    0 .    1    33   136     0     0
 ---------                               .             .
LINE 10110  (FLIGHT   2)                 .             .
 A  6481S?  1    5    2    7   21   42 .   0.9    2 .    1    19   198     0     0
 B  6431S?  2    6    2   11   35   19 .   1.1    0 .    1    16   147     0     0
 C  6345S?  1    6    1   10   29   43 .   0.4    0 .    1     4   441     0     0
 D  6343B?  1    2    1    2    2    4 .    -     - .    -     -     -     -     0
 E  6335S?  0   10    1   17   39   82 .   0.4    0 .    1    11   558     0   100
 F  6290S?  0    6    0    9   11   40 .   0.4    0 .    1    30   661     0     0
 G  6207B?  0    7    0    7    7   74 .   0.4    0 .    1    33   662     0    40
 H  6178E   2    9    4   16   47   30 .   1.1    2 .    1    33   250     0     0
 ---------                               .             .
LINE 10120  (FLIGHT   2)                 .             .
 A  6775S?  1    3    1    5   14   13 .   1.1    5 .    1    31   206     0     0
 B  6811S?  4   10    5   15   46   36 .   1.9    0 .    1    18   132     0     0
 C  6917S?  1    8    2   16   40   56 .   0.4    0 .    1     2   392     0     0
 D  6928E   0   12    0   16   20   18 .   0.4    0 .    1    26   683     0     0
     .                                                                   .
     .* 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 OVERBURDEN EFFECTS.    .
```

1274

```
              COAXIAL   COPLANAR   COPLANAR .  VERTICAL   . HORIZONTAL CONDUCTIVE    MAG
              1057 HZ    854 HZ    7268 HZ  .    DIKE     .   SHEET       EARTH      CORR
                                            .             .
 ANOMALY/ REAL QUAD REAL QUAD REAL QUAD . COND DEPTH*. COND DEPTH RESIS DEPTH
FID/INTERP PPM  PPM  PPM  PPM  PPM  PPM .SIEMEN    M .SIEMEN    M OHM-M     M      NT
 ---------                              .             .
LINE 10120    (FLIGHT    2)             .             .
 E  6972S?   1    4    0    7   24   32 .   0.5    0 .    1    18   673     0     40
 F  7042B?   0    8    0   13   23   79 .   0.4    0 .    1    28   661     0      0
 ---------                              .             .
LINE 10130    (FLIGHT    2)             .             .
 A  7587S?   2    3    1    5   15    3 .   1.0    0 .    1    43    78    25    100
 B  7569S?   3    8    5   14   33   20 .   2.1    0 .    1    20   119     0     30
 C  7514S?   4    6    4    9   31   18 .   3.6   18 .    1    16   216     0     90
 D  7401S?   1    7    1   12   35    8 .   0.4    0 .    1     6   544     0      0
 E  7352S?   0    9    0   13   40   68 .   0.4    0 .    1    13   641     0      0
 ---------                              .             .
LINE 10140    (FLIGHT    2)             .             .
 A  7814S?   2    5    1    6   20   17 .   1.9   18 .    1    40   216     0      0
 B  7846S?   3    4    4    7    9    9 .   3.2   21 .    1    16   108     0     20
 C  7888B?   1    7    2   11   34   45 .   0.5    0 .    1    11   361     0      0
 D  7995S?   1    7    2   12   34   41 .   0.5    0 .    1     1   450     0      0
 E  8067S?   0    5    0    7   19   34 .   0.4    0 .    1    29   702     0      0
 ---------                              .             .
LINE 10150    (FLIGHT    3)             .             .
 A  1009S?   2    5    2    2    6   18 .   1.5   19 .    1    50   196     8      0
 B   937H    2    6    1    8   27   33 .   1.3    2 .    1    16   361     0      5
 C   813S?   1    5    1    7   25   20 .   1.0    0 .    1    18   586     0      0
 ---------                              .             .
LINE 10160    (FLIGHT    3)             .             .
 A  1232S?   2    3    3    5    7    3 .   1.0    0 .    1    35    57    19     11
 B  1305H    2    6    1    8   25   41 .   1.2    0 .    1    22   359     0      0
 C  1347S?   1    4    0    6   18   34 .   0.7    0 .    1    40   605     0      0
 D  1426S?   1    6    1    8   24   19 .   0.6    0 .    1    61   740     0      0
 E  1442S?   1   10    1   12   50   84 .   0.4    0 .    1    12   522     0      0
 ---------                              .             .
LINE 10170    (FLIGHT    3)             .             .
 A  1905B?   1    9    1   12   35   86 .   0.6    0 .    1    14   543     0      0
 B  1849S?   1    3    1    4   13   24 .   1.0   15 .    1    20   459     0     16
 C  1801S?   1    4    1    6   16   31 .   0.7    0 .    1    21   563     0      0
 D  1734S?   1    6    2   11   34   35 .   0.8    0 .    1    17   295     0      0
 E  1717E    1    2    1    3    9   16 .   0.5    0 .    1    23   251     0      0
 ---------                              .             .
LINE 10180    (FLIGHT    3)             .             .
 A  2308S?   3    5    3    8   10   10 .   2.4   16 .    1    34   124     0      0
 B  2363S?   2    5    1    7   25   27 .   1.7   10 .    1    14   294     0      0
 C  2411S?   1    6    2    9   15   51 .   0.8    2 .    1    19   434     0      0
 D  2466S?   0    2    1    2    2    4 .    -     - .    -     -     -     -     12
          .                                                    .
          .* 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 OVERBURDEN EFFECTS.    .
```

```
                COAXIAL   COPLANAR   COPLANAR .   VERTICAL    . HORIZONTAL CONDUCTIVE    MAG
                1057 HZ    854 HZ    7268 HZ .      DIKE      .   SHEET       EARTH      CORR
                                             .                .
 ANOMALY/ REAL QUAD REAL QUAD REAL QUAD . COND DEPTH*. COND DEPTH RESIS DEPTH
FID/INTERP PPM  PPM  PPM  PPM  PPM  PPM .SIEMEN    M .SIEMEN    M OHM-M     M      NT
 ---------                              .            .
LINE 10180    (FLIGHT    3)             .            .
 E  2527S?   1    5    3   10   30   31 .  0.[illegible]    0 .    1    23   221     0      0
 F  2545E    0    2    0    2    2    4 .   -      - .    -     -     -     -      0
 ---------                              .            .
LINE 10190    (FLIGHT    3)             .            .
 A  2925S?   1    8    2   13   36   52 .  0.5     0 .    1    21   248     0      0
 B  2872S?   1    2    1    2    2    4 .   -      - .    -     -     -     -      0
 C  2762E    1    7    2   11   28   50 .  0.5     0 .    1    27   384     0      0
 ---------                              .            .
LINE 10200    (FLIGHT    3)             .            .
 A  3198S?   2    9    1   17   44   68 .  0.7     0 .    1    28   217     0      0
 B  3255S?   2    6    2    8   22   41 .  1.0     5 .    1    25   270     0     17
 C  3260S?   3    9    2   13   32   51 .  1.3     0 .    1    21   283     0      0
 D  3316S?   1    2    1    2    2    4 .   -      - .    -     -     -     -      0
 E  3379E    4    4    2    6   16   30 .  4.7    36 .    1    26   641     0      0
 ---------                              .            .
LINE 10210    (FLIGHT    3)             .            .
 A  3869S?   2    5    2   10   31   21 .  1.6     1 .    1    32   179     0     20
 B  3832B?   2   16    4   27   74  117 .  0.6     0 .    1    16   201     0      0
 C  3805B?   1    7    0   10   23   60 .  0.5     0 .    1    32   376     0     30
 D  3707E    1    1    1    2    2    4 .   -      - .    -     -     -     -      0
 ---------                              .            .
LINE 10220    (FLIGHT    3)             .            .
 A  4107S?   3   10    4   16   48   41 .  1.2     0 .    1    19   111     0      0
 B  4138S?   2    5    2    8   28   14 .  1.2     0 .    1    19   167     0      0
 C  4179B?   1    8    1   15   39   71 .  0.5     0 .    1    25   446     0     90
 D  4187B?   2    5    2    9   25    8 .  1.5    17 .    1    18   253     0      0
 ---------                              .            .
LINE 10230    (FLIGHT    3)             .            .
 A  4746S?   3    8    1   11   38   49 .  1.8     9 .    1    16   267     0      0
 B  4689S    3   17    3   25   95  100 .  1.0     0 .    1     9   243     0      0
 C  4654E    2    6    3   10   50   12 .  1.7     7 .    1    19   211     0     40
 ---------                              .            .
LINE 10240    (FLIGHT    3)             .            .
 A  5096S?   1    9    2   15   39   78 .  0.5     0 .    1    13   235     0      0
 B  5129S?   3   11    2    5   42   30 .  1.1     0 .    1     1   401     0      0
 C  5141S    2    9    2   16   46   69 .  1.1     1 .    1    14   310     0      0
 D  5180E    3    6    4   11   47   22 .  2.5    13 .    1    22   177     0     40
 E  5320S?   0    5    0    7   29    7 .  0.4     0 .    1    37   749     0      0
 ---------                              .            .
LINE 10250    (FLIGHT    3)             .            .
 A  5695S?   2   10    4   17   56   68 .  0.9     0 .    1    14   215     0      0
       .                                                                  .
       .* 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 OVERBURDEN EFFECTS.    .
```

	COAXIAL 1057 HZ		COPLANAR 854 HZ		COPLANAR 7268 HZ		VERTICAL DIKE		HORIZONTAL SHEET		CONDUCTIVE EARTH		MAG CORR
ANOMALY/ FID/INTERP	REAL PPM	QUAD PPM	REAL PPM	QUAD PPM	REAL PPM	QUAD PPM	COND SIEMEN	DEPTH* M	COND SIEMEN	DEPTH M	RESIS OHM-M	DEPTH M	NT
LINE 10250	(FLIGHT		3)										
B 5663S?	2	8	3	10	38	42	1.0	2	1	14	347	0	0
C 5613E	2	8	4	12	12	14	1.0	0	1	24	182	0	17
D 5471S?	0	5	0	6	22	35	0.4	0	1	38	770	0	0
LINE 10260	(FLIGHT		3)										
A 6099S?	1	5	0	7	20	32	0.7	5	1	66	826	0	0
LINE 10290	(FLIGHT		3)										
A 6806E	2	5	5	9	19	14	1.6	3	1	42	125	1	10
LINE 10300	(FLIGHT		3)										
A 6910E	1	2	1	4	10	10	1.3	18	1	35	718	0	18
LINE 10310	(FLIGHT		3)										
A 7162S?	1	2	0	2	2	4	-	-	-	-	-	-	0
LINE 10320	(FLIGHT		3)										
A 7278S?	1	3	0	5	13	26	0.5	0	1	35	370	7	0
LINE 10400	(FLIGHT		1)										
A 1302S?	1	2	1	2	2	4	-	-	-	-	-	-	0
LINE 19020	(FLIGHT		3)										
A 8021L	1	2	1	2	2	4	-	-	-	-	-	-	7
B 7972S?	1	3	1	6	13	29	0.9	0	1	59	500	0	0
C 7918S?	1	3	1	6	17	19	1.1	12	1	36	714	0	0
D 7892E	1	7	1	12	37	53	0.4	0	1	37	264	0	0
E 7816S?	1	5	1	6	20	28	0.7	0	1	63	818	0	0

* 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 OVERBURDEN EFFECTS.