INTERPRETATION REPORT

AIRBORNE ELECTROMAGNETIC (INPUT) SURVEY

COMSTAFF SOUTH LEASES
TASMANIA, AUSTRALIA

for

AUSTRALIAN ANGLO AMERICAN LIMITED

by

GEOTERREX PTY. LIMITED

83-184

Have requested on + MAG PLANS DD 11/5/85

OTTAWA, CANADA
SEPTEMBER, 1975

G. BUTT
J. HANSEN
W. FINNEY

Geophysicists

geoterrex LTD

TABLE OF CONTENTS

Accompanying this Report

geoterrex LTD

I. INTRODUCTION

During the period April 3 to 15, 1975, Geoterrex Pty. Limited conducted an airborne electromagnetic INPUT survey for Australian Anglo American Limited over the Comstaff South Leases near Rosebery, Tasmania. The survey, flown from Devonport, covered two irregular shaped areas with E-W lines spaced at 400 metres. A total of 1054.7 line kilometers were surveyed.

The purpose of the survey was to search for possible massive sulphide mineralization. Of particular interest was the response of the AEM system over known mineralized zones, and the Tertiary basalt cover in the area. The performance of a fixed wing aircraft in this terrain was also under observation. Attempts were made to obtain satisfactory coverage in any areas where the terrain clearance was marginally too great by reflying the lines in the opposite direction, or by breaking the lines and flying them in two sections. In the vicinity of Chester two north - south lines were included for better coverage.

The survey was conducted with a Super Canso PBY-5A, under registration VH-EXG, which is operated by Executive Air Services on charter to Geoterrex Pty. Limited. It was equipped with the Barringer Mark V INPUT system, a Geometrics 803 nuclear precession magnetometer, a Honeywell visicorder, an APN-1 radio altimeter, a 50-Hz monitor, and a 35 mm continuous strip tracking camera.

Navigation was by visual means utilizing airphoto mosaics at an approximate scale of 1:20,000, and a mean terrain clearance between 400 and 600 feet was observed. The flight path was recovered in the field on 1:10,000 mosaics, and a geophysicist selected the anomalies which were then plotted on transparent overlays to the mosaics.

Field data compilation and reflights were arranged in consultation with D. Orr and D. Trussell in Devonport. All originally scrubbed lines are included in the final presentation unless they were too short or too resistive to be of interest.

Complete compilation and interpretation of the data were performed in Ottawa, Canada.

II. PERSONNEL

The following Geoterrex personnel participated in this survey:

Pilot	J. Edwards
Co-Pilot	C. Moody
Aircraft Engineer	M. Rolfe
Electronics Technician	C. Sawyer
Data Compiler	J. Gaw
Geophysicist	G. Butt

The electromagnetic data was interpreted in Ottawa by G. Butt, J. Hansen and W. Finney, geophysicists.

Final compilation and drafting was carried out in Ottawa under the direction of R. Schingh and P. Tallyhoe.

III. DATA PRESENTATION

Eight airphoto mosaics at a scale of approximately 1:10,000 have been used to provide the base for the geophysical maps. Two mosaics cover the southern survey area; the remaining six sheets cover the northern survey area. There are two types of maps - an EM Plan Map and an Isomagnetic Contour Map. Each map is presented on a clear overlay to the airphoto mosaic and includes sufficient planimetry to allow correlation to other data maps of the area. Ozalid copies of both maps are attached to the back of this report.

The EM Plan Map is a combined data and interpretation map. It portrays the key characteristics of the INPUT anomalies using our conventional symbolism. This symbolism, which is explained in the map legend, includes the following:

- anomaly peak position,
- anomaly half-peak width,
- number of channels affected,
- amplitude of the first and fourth channels, in units of 1/10 inch chart deflection,
- terrain clearance of the aircraft, in feet,
- amplitude of any apparent associated magnetic anomaly, in gammas.
- any associated response on the 50 Hz monitor

All INPUT anomalies interpreted as genuine are plotted. The peak position of the response gives the approximate axis of the conductor except in the case of broad or dipping zones.

See discussion on edge effect in Appendix B. In the case of relatively narrow conductors the half-peak width of the anomaly would be broader than the actual width of the body.

A lag of 4.5 seconds is used to plot the INPUT anomalies. All amplitudes and half-peak widths are measured from the true zero level. There is sometimes an element of subjectivity in deciding how many channels are affected, or whether a weak inflection represents a conductor axis, or in measuring the amplitude of the later channels.

When the profiles indicate a possibly significant correlation between an INPUT and a magnetic anomaly the amplitude of the magnetic response is shown on the EM Plan Map. If the EM anomaly is located on the flank or edge of a magnetic feature, the magnetic amplitude is affixed with an arrow pointing in the direction of the offset of the magnetic anomaly relative to the conductor.

During the course of data evaluation, groups of anomalies are outlined to show our interpretation of the extent of the geologically conductive zones. If any doubt exists, the outlines are dashed. Conductors of interest are numbered to facilitate reference to the report. In some instances it is suggested that only a portion of a conductor be examined. A rectangular outline and a zone number serve to identify these selections.

If any anomaly is interpreted as having a cultural (man-made) source it is accompanied by a "C". A "C?" indicates that a reasonable element of doubt exists and most such features are recommended for ground checks.

On the Isomagnetic Contour Map the total field magnetic data is presented in conventional form by isomagnetic contours. The contour interval used is 10 gammas wherever gradient permits and values are taken from an arbitrary datum.

There are two magnetometer traces on the INPUT records. One contains magnetic data at a scale of 40 gammas per inch (minimum step two gammas). The second trace records the same information at a coarser scale of 400 gammas per inch (minimum step 20 gammas). There is one step every 1.05 second. Positive is downwards. No lag is needed to plot the magnetic data.

The original INPUT records containing the geophysical information are presented in a folder. The various traces are identified on Line 201E. A copy of this line is included as page 8 of this report.

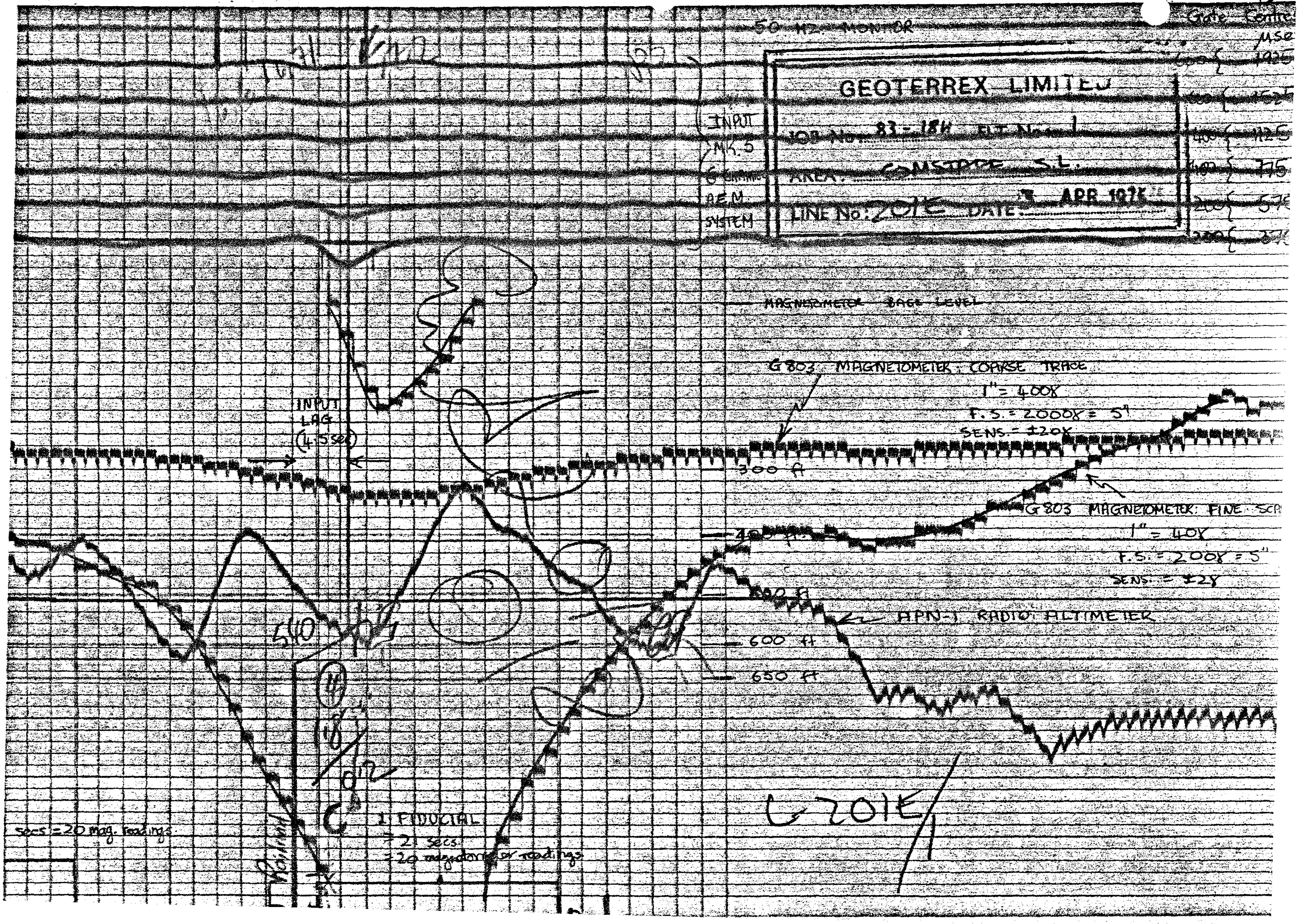
The negative 35 mm. tracking film is delivered in seven rolls. Flight 8 is attached to the flight 7 roll.

One can refer to the flight log or to the information which is noted on each of the records in order to relate the film to the geophysical records and maps.

The point picking airphotos along with the tracking film must be consulted for accurate location of any ground followup investigation.

169010

009



50 HZ MONITOR
Gate Centre µsec
GEOTERREX LIMITED
JOB No. 83-184 FLT No. 1
AREA: CONSTRPE S.L.
LINE No: 201E DATE: 3 APR 1975
INPUT MK.5 6 CHANNEL AEM SYSTEM
MAGNETOMETER BASE LEVEL
G803 MAGNETOMETER: COARSE TRACE
1" = 400γ
F.S. = 2000γ = 5"
SENS. = ±20γ
INPUT LAG (4.5 sec)
300 ft
G803 MAGNETOMETER: FINE SCALE
1" = 40γ
F.S. = 200γ = 5"
SENS. = ±2γ
400 ft
500 ft
APN-1 RADIO ALTIMETER
600 ft
650 ft
510
1 FIDUCIAL = 2 secs = 20 magnetometer readings
secs = 20 mag. readings
G 201E/1

III.A INSTRUMENT SPECIFICATIONS

MARK V INPUT SYSTEM

TRANSMITTER : Pulse Width : 1.0 msec
Pulse Separation : 2.47 msec.

RECEIVER :

CHANNEL	GATE CENTRE (usec)	GATE WIDTH (usec)
1	375	200
2	575	200
3	775	400
4	1125	400
5	1525	600
6	1925	600

Calibration: 2mV at cable amplifier input = 1.5 in. response
Primary field at cable amplifier input = 750 mV.
0.1 in. ≈ 178 ppm. of primary field
1 mm ≈ 70.0 ppm. of primary field

MAGNETOMETER : Geometrics Model 803

	Sensitivity	Scale
Fine Scale : 200 γ Full Scale	± 2 γ	inch = 40 γ
Coarse scale : 2000 γ Full Scale	± 20 γ	inch = 400 γ

Total field increases downwards.
Magnetometer reads every 1.05 sec.

ALTIMETER : Model APN-1
Approximate scale : 1 inch - 200 feet
Height increases downwards.

FIDUCIAL SYSTEM :
1 fiducial = 21 secs = 20 magnetometer readings,
INPUT lag = 4.5 secs = .214 fiducials

geoterrex LTD

IV. INTERPRETATION - GENERAL

The primary purpose of the airborne survey and of this interpretation is the direct exploration for conductive massive sulphides. The INPUT system is the prime tool and the selection of prospects is based mainly on conductor characteristics as interpreted from the INPUT data.

The apparent conductivity, as determined by the rate of decay of the INPUT response, is an important criterion in our analysis of conductors. Other important factors taken into account include:

- the shape and size of the INPUT anomalies,
- the length and degree of isolation of the conductor,
- the pattern of conductors,
- the associated geophysical parameters like the aeromagnetics,
- the position with respect to the direction of structures,
- the geological environment and the relationship of anomalies to known mineralization,
- local variation of characteristics within the conductor.
- the position with respect to features on the airphoto mosaics.

Conductors, as detected by the INPUT system, can be placed in three distinct categories according to their most probable origin; Cultural, Surficial or Bedrock.

Cultural conductors are man-made conductors such as pipelines, railways, powerlines and fences. The Burnie-Rosebery railway is the main contributor of cultural anomalies in the survey area.

Surficial conductors are geological conductors located in the overburden or electrolytes found in shears. Common surficial conductors are some residual soils, weathered layers, salty deposits, clay minerals, or river deposits. In this area, recent alluvial sediment causes low conductivity surficial responses. Other surficial-looking responses occur in tuffaceous Cambrian sequences and in younger basalt flows. However the conductivity of these anomalies is high and is related to material that is within the fresh rock, and hence they may be classified more accurately as "bedrock" responses.

Bedrock conductors are those geological conductors located in the bedrock, such as massive sulphides, graphitic materials, massive magnetite and some serpentinized ultrabasic rocks. This classification is normally used to encompass all those conductors occurring in rocks thought to be favourable hosts for mineralization. In this survey area the term is also applied to the conductors associated with the Tertiary basalts. Even though these are not a potential host, the apparent conductivity is comparable to that of the foregoing bedrock types, and furthermore, the source material appears to be in the fresh rock, not in a weathered derivative.

For a more complete description of our interpretive proceduresand anomaly rating system, the reader is referred to Appendix B at the back of this report.

V. INTERPRETATION OF SURVEY DATA

In this section all conductors considered to have a reasonable chance of being bedrock are tabulated in zones and discussed in detail. They are classified according to their most probable type (bedrock, surficial or cultural) and then rated as either good, fair or poor sulphide prospects if they should prove to be a bedrock source. Zone numbers, line numbers, fiducial numbers and channel one to four ratios are included to facilitate reference to the tapes and plan maps. The order of zone numbers bears no relation to the relative importance of the conductors.

Highly conductive formational units, often significantly related to active magnetic trends, are the dominant geophysical features of the area. They appear to be related to conductors in Cambrian ultramafic intrusives and the PreCambrian Renison Bell shales. Other highly conductive zones occur adjacent to and possibly underlying the Tertary basalt cover at the northern end of the survey area. The extent of the conductivity does not always coincide with the magnetically active region which probably defines the limits of the basalts. Our experience elsewhere imply that basalts are less conductive than would seem the case here. Hence either recent alluvial sediment or conductive sections of the underlying Cambrian tuff sequences may be responsible.

The Cambrian Read Volcanics are highly resistive throughout the area.

An understanding of our zone rating system specifically in the vicinity of Renison Bell involves a number of factors. Since the main conductive trend in this vicinity could be caused by pyrrhotite "sills", then our selections of enhanced anomalies within this trend should correspond to locations where the sulphides are either more conductive or more massive than those elsewhere in the trend. However, the relation between tin ore and sulphide concentrations in this area is not known to us. Thus our selections do not necessarily indicate the most prospective areas for tin occurrences. In fact tin in quartz lodes may relate to more resistive areas on the EM Plan map.

If the main conductive trend is related to carbonaceous material rather than to sulphides, then our selections could correspond to sulphide "pockets". Enhanced magnetic activity at these locations would then be a good indicator of the possible presence of pyrrhotite.

Zone CS-1 Bedrock - Poor

From Line 101 to Line 106A
Line 102W Fiducial 184.98 Ratio 4.5/1.0 Altitude 540'

This is a broad, irregular-shaped zone which is characterized by poorly-defined, small amplitude anomalies. However, the apparent conductivity indicated by these anomalies is high and suggests that a bedrock source is present.

The most interesting response is listed above. It is the only one displaying reasonable shape and symmetry, and has a character not unlike the anomalies of Zone CS-6. This suggests a possibe joining of these two zones somewhere south of the survey area. However, there is a magnetic high coincident with Zone CS-6, whereas the anomalies of Zone CS-1 locate about 1,000 feet east of a similar magnetic high. This casts some doubt on any relationship between the two zones.

The zone also does not locate in a similar magnetic environment to that of the ultramafic bedrock zones which occur to the north, apparently on strike with Zone CS-1. Thus no definite statement can be made about its conductive source. Carbonaceous material could be a major contributor to the conductivity.

Zone CS-2 | Bedrock - Poor

Line 102W	Fid. 184.28	Ratio 1.5/?	Altitude 540'
103W	180.88	1/-	620'
104W	176.94	1/-	640'

The zone consists of very small amplitude anomalies and defines a generally low conductivity trend positioned slightly to the west of a 200 gamma magnetic high.

The characteristics of the INPUT responses are not encouraging but we recognize that these could have been much stronger if the terrain clearance were closer to 400 feet. Both the isolation and the lining-up of the anomaly peaks are the main reasons for selection of the zone since these are favourable indicators of a bedrock source.

However it is a low priority target for ground checking, because we are not confident that the apparent conductivity is high on Line 102. The fourth channel trace of this anomaly is not activated but the decay rate on the first three channels, and the fifth channel deflection, indicate a good conductor.

18

169019

Zone CS-3 Bedrock - Good

Line 105AE Fid. 171.26 Ratio 3/1.2 Altitude 400

The INPUT characteristics are favourable for a massive sulphide source - very slow amplitude decay and narrow symmetrical shape, possibly indicating short strike length.

A southerly extension is possible, but there is no coverage in this direction. Nevertheless there is still a chance that this is a discrete, isolated anomaly.

There is a shallow 120 gamma magnetic high associated with the conductor on Line 105A, and any ground check should include coverage of possibly related magnetic highs on Line 106B at Fiducials 161.69 and 162.06.

Since the geophysical parameters are consistent with a massive sulphide source, and the conductor is located in Renison Bell shales, the source could be a pyrrhotite conductor of short strike extent.

There is no culture associated with this anomaly.

Zone CS-4 Surficial - Poor

From Line 109 to 121

Line 110E Fiducial 132.38 Ratio 7/1.1 Altitude 440'

Zone CS-4 merges with CS-9 CS-10 and CS-11 between Lines 111A and 112.

The INPUT responses are broad and of surficial character. Apparent conductivity is intermediate to low and there is an indication of two anomaly peaks on each line, implying a broad flat lying source.

The response on Line 110 listed above is certainly an enhanced response within the zone, and although it may be an "edge effect", it warrants further attention. If a ground check is encouraging, then Line 110A at Fiducial 134.67 should be investigated as well.

The zone occurs on a strong magnetic high and on its associated gradient. The apparent conductivity of this zone is much less than others which are assumend to have an ultramafic source. The strong conductor on Line 110 falls well away from any ultramafic unit.

Zone CS-5 Bedrock - Poor

Line 109A to 112

Line	110AW	Fid. 135.43	Ratio 5/0.5	Altitude 580'
	111E	124.62	12/1.5	460'
	111AW	127.64	10/1.2	470'

There is strong magnetic support with this zone. The width of the zone is defined by the anomaly positions on lines flown in opposite directions - the width is approximately twice that of the INPUT response on any individual line. The anomalies are thus enhanced edge effects of a broad, possibly flat lying, conductor. The INPUT responses are unlike normal edge effects in that they show excellent symmetry. They are fairly broad at the base with rounded peaks. The variation in relative anomaly position from line to line lessens the probability of a sulphide source.

The broad nature of the zone, and the strong associated magnetic activity are more typical of an ultramafic source, and the high apparent conductivity could indicate that the ultramafics are serpentinized.

This particular zone is short in strike length; it may be faulted near Line 109A, the nearby anomalies on Lines 107, 108 and 109 being possibly part of the same zone. Other zones with similar characteristics have a longer strike length. (CS-8 CS-9 and CS-14).

If sulphides are expected in the vicinity, each of the three anomalies listed should be ground checked,

Zone CS-6 Bedrock - Poor

From Line 105A to Line 116

The anomalies within this trend are distinguished by their slow decay rate and their broad, sometimes multiple peaked, nature. The zone consistently follows a magnetic trend and there is a 60 to 80 gamma offshoot defined between Lines 110A and 111A. It would appear that the conductive and magnetic horizons are related. Unlike the ultramafic trends in the area, this zone shows no peak shift with alternate line direction. We are probably dealing with a steeply dipping source. Two or more closely spaced separate conductors could produce broad anomalies, and double peaks (such as those occurring on Line 109).

A double source is also suggested by the broad magnetic highs, notably those showing two peaks on Lines 106B, 109, 110, and 111.

The cause of this multiple formational bedrock zone could be a series of pyrrhotite conductors, thus accounting for the conductive-magnetic association. It is not uncommon for pyrrhotite conductors to have this strike length, and they are a known geological occurrence in the area.

From Line 112 to 114 man-made conductors near Renison Bell may be contributing to the anomaly shape. In the same location a strong 500 gamma magnetic closure is evident, but the associated apparent conductivity and anomaly amplitudes have not changed noticeably.

Three locations, where the responses are particularly enhanced have been selected for followup. The other responses in the zone are also considered to have a good chance of yielding massive sulphides. (especially on Lines 107 and 109).

Zone CS-6A Bedrock - Good

Line 110E	Fiducial 130.94	Ratio 4.5/1.1	Altitude 450
110AW	136.30	2/0.1	630

The anomaly on Line 110 is the more interesting of the two in this zone. The slow decay rate indicates a high conductivity source.

The "good" rating is based on the high conductivity and possible isolation of the source. Furthermore, the profiles show a directly correlating magnetic high. However, this is not totally supported by the EM Plan Map which shows that the conductor may in fact be related to the one just west of it (Zone CS-6B). The magnetic contours do not indicate a specific closure but imply a narrow magnetic "neck" between two broader highs. Hence the "good" rating may be too optimistic.

<u>Zone CS-6B</u> <u>Bedrock - Good</u>

Line 110E	Fiducial 130.66	Ratio 7/2.1	Altitude 540
111E	123.64	9/2.7	450
111AW	128.90	4/1.0	590

The zone represents the eastern "branch" of Zone CS-6. It correlates with a sharp 60 to 80 gamma magnetic high which merges with the broader high referred to in Zone CS-6.

The INPUT anomalies are broad but indicate a highly conductive source. There is no marked peak shift from channel to channel nor from line to line, so that these conductors are thought to be of bedrock origin. Considering the altitudes at which these anomalies were surveyed, they are stronger responses than the others in Zone CS-6, hence their selection for follow-up.

The Line 111E anomaly is the most interesting. The response on Line 110A is poor, most probably owing to the high altitude over this location.

A possible source is formational pyrrhotite, but the enchanced anomalies in this section indicate a shallower, or, more massive conductor than elsewhere in Zone CS-6.

There is considerable man-made development in the area, but the responses do not display any cultural character.

Zone CS-6C Bedrock - Fair

Line 113E Fiducial 108.98 Ratio 7/1.1 Altitude 410

This is a narrow well defined response suggesting high conductivity. Although the shape on the late channels is fairly broad, the anomaly is considered to be of bedrock type. It is thought unlikely that a cultural source is responsible, even though there are numerous roads in the vicinity.

The enhancement in character appears to be confined to one line and this is the main reason for selection of this section of Zone CS-6 for further evaluation. We note a definite coincident "altitude low" with this anomaly which could largely explain the improved character.

Supporting the idea of a separate, or additional, conductor at this location is the associated strong magnetic closure. The EM response on Line 112 at Fiducial 120.80 also falls on the same magnetic feature. The shape of the INPUT anomaly on this line is typical of a broad flat lying source and does not suggest a discrete conductor as in the case of CS-6C.

Zone CS-7 Bedrock - Good

Line 117W	Fiducial 086.67	Ratio 28/5.5	Altitude 510
117W	086.97	23/4.5	540

These two anomalies form a very conductive, high amplitude, isolated zone with a direct magnetic correlation. Both the magnetics and the INPUT show a dual source, but while the magnetic profile has similarities to those in Zone CS-6, the INPUT anomalies have quite different character. They are much larger in amplitude and have very good narrow shape. Hence if they result from pyrrhotite, these conductors are probably quite shallow and electrically well-connected, i.e., more massive.

If the magnetic expression proves to be coincidental, then either non-magnetic sulphides or black shales are the likely cause. Black shales commonly yield multiple-peaked INPUT responses and high conductivity. Alternatively, the magnetics may be indicating a WNW geological strike in this location, in which case the INPUT anomalies could represent two edges of a broad conductor.

The photomosaic and flight film position the anomalies on distinctive features in a zone which has undergone man-made development. If these features are outlining a "tailings dump" or "settling ponds" then we must suspect electrolytic solutions as the possible source of the conductivity.

Zone CS-8 Bedrock - Poor

Line 113 to Line 127

Line	116E	Fiducial	089.72	Ratio	13/1.2	Altitude	430'
	120E		057.85		20/4.0		460'
	126E		077.04		9.5/2.0		430'
	127W		075 95		7/1.6		430'

This zone has similar characteristics to zones CS-5, CS-9 and CS-14. It is highly conductive with large amplitude anomalies, especially at the northern end where the source appears to both broaden and thicken.

It also closely follows a strong and broad magnetic high. However, Zone CS-8 does not break down into multiple anomalies except at the northen end. (Lines 126 and 127). At the southern end it loses amplitude and becomes less distinct, so it appears the conductive source has thinned or is buried deeper here.

The source material of Zone CS-8 is likely to be the same as for Zones CS-5, CS-9 and CS-14, i.e., a serpentinized ultramafic unit, which displays high conductivity, strong magnetic activity and broadness emphasized by anomaly peaks shifting with opposite line direction. The four specific anomalies listed above are recommended for checking. The response on Line 116 is listed so that the less conductive anomalies at the southern end are sampled. The response on Line 120 is the strongest of the zone. The anomalies on Line 126 and 127 appear to be narrow enhancements of the main trend, and are the most interesting responses of the zone.

Zone CS-9 Bedrock - Poor

Line 112 to Line 127

Line	116E	Fiducial	090.94	Ratio	8/1.0	Altitude	530'
	119W		067.98		9/0.7		460'
	120E		059.88		10/0.5		460'
			060.19		8/2.0		490'
	121W		049.43		10/2.0		430'
			049.75		11/2.1		510'
	124E		017.41		4/0.8		480'

The complex conductive environment of Zones CS-9 and CS-10 makes delineation of their boundaries difficult. Zone CS-9 is a conductive trend which follows the magnetic structure The magnetic high narrows considerably south of Line 118, and the INPUT responses in this area are smaller in amplitude and have a surficial nature. The anomalies north of Line 118 are of bedrock type. There is considerable variation in anomaly character along strike, and between Line 120 and Line 124, the zone broadens to incorporate at least two main conductors. The magnetic high does not have a dual nature in this vicinity.

The zone is caused by a formational bedrock conductor most likely to be a serpentinized ultramafic unit. A number of locations (listed above) have been selected for followup to determine the source of the zone and to test for any massive sulphide contribution to the responses. They are described below.

The anomaly on Line 116 at Fiducial 090.94 is broad and surficial in nature, but its amplitude and conductivity are high relative to the adjacent lines. It is a good place to sample the southern end of the zone.

The anomaly on Line 119 at Fiducial 067.98 falls directly on the magnetic high, and this represents the most southerly part of the main strong magnetic feature. It should provide a good comparison to Line 120, on which the zone consists of two conductors. The western branch of the zone may pinch out at Line 123, whereas the eastern branch would seem to be the "main" trend of the zone and continue through to Line 127.

The anomaly distribution between Lines 121 to Line 124 is complex. The proximity of Zone CS-10 in this area and the two responses in Zone CS-9 suggest that additional source material is present. This may be bedrock or fault related, and it would be advisable to carry out thorough ground checks, possibly of responses additional to those listed on Line 121.

Zone CS-10 Bedrock - Fair

Line 112 to Line 122A

Line 113AW	Fiducial 112.82	Ratio 4/1.1	Altitude 510'
114AW	104.35	10/3.0	400'
115W	096.59	5/1.0	490'
116E	091.52	5/1.0	510'
118E	076.29	12/2.2	520'
119W	067.50	11/1.7	450'
121W	049.28	10/1.0	430'

The distribution of anomalous conductivity in Zones CS-9and CS-10 is complex and makes meaningful zoning difficult. Thus, the zone outlines used are mainly to facilitate description of the responses rather than to give an entirely accurate depiction of the conductivity distribution.

Zone CS-10 is a long narrow zone with conductivity similar to that of the ultramafic zones, but it has no consistent magnetic support. On Line 114A there is a good isolated magnetic high centred some 400 feet west of the INPUT anomaly. However, this association could be fortuitous, since the high may be one of a series of magnetic highs running north-south along the faulted eastern boundary of the Mt. Read Volcanics.

The anomalies on Line 114A and on Line 118 are the most interesting, displaying reasonable amplitude, good shape and symmetry, high conductivity and minimal line to line staggering of position. All the anomalies listed above show distinct bedrock characteristics.

The zone tapers at its northern end and seems to terminate before Line 122. The boundary of the zone is not clearly defined north of Line 121. At this point both Zones CS-9 and CS-10 encompass a multiple peaked response which could be related to bedrock material, and in addition, conductive fault zones.

Carbonaceous material or sulphides are likely sources for Zone CS-10 conductivity, and they may extend into Zone CS-9, yielding the multiple-peaked anomalies mentioned.

Possible fault zones on Line 114A and Line 119 are locations where we might expect mineralization.

Zone CS-11 | Surficial - Poor

Line 114A to Line 127

This is a long zone of broad surficial responses often showing development of two peaks. The anomalies are all of low amplitude except those associated with Zone CS-11A. Conductivity is also generally higher near this zone.

The responses are not well-defined except in the north-east where culture contributes as a source of the conductivity. Anomalies thought to be culturally derived are marked as such.

There is no direct magnetic association along the zone.

Zone CS-11A — Surficial - Fair

Line 118AW	Fiducial 080.18	Ratio 10/1.1	Altitude 550'
118E	077.48	10/1.0	480'
119W	066.40	9/1.0	430'

The high conductivity of this zone, and its good amplitude anomalies are the reasons for its selection as a follow-up target. Its surficial rating derives from the rounded and asymmetrical shape of the anomalies on Lines 118 and 118A as well as from the line direction dependence of the anomaly positions. However, the INPUT character of the response on Line 119 shows definite bedrock characteristics, and any ground investigation should start here.

There is no magnetic or cultural association. The probable cause is flat-lying carbonaceous or clay material, but a shallow dipping sulphide body should not be discounted.

If the ground investigation is encouraging, other INPUT anomalies which are possibly bedrock related, and which are located north and south of Zone CS-11A, should be followed up.

Zone CS-12 Surficial - Fair

Line 209E	Fiducial 115.95	Ratio 3/0.4	Altitude 730'
210AE	054.52	4/0.5	520'
211E	147.18	2/0.1	460'

Zone CS-13 Surficial - Fair

Line 211A W Fiducial 118.69 Ratio 1/0.1 Altitude 700'

CS-12 is an isolated well-defined zone showing high conductivity and good amplitude relative to the small surficial conductors in the vicinity.

The shapes and widths of the anomalies suggest a surficial source, but since all three lines are flown in the same direction there is no line to line shift in anomaly position to definitely support this.

The zone has no extension to the north indicated on Line 211A, but it remains open to the south. Considering the altitude flown, the Line 209 response is the strongest and best looking anomaly in the zone, and so a southerly extension is likely.

There is no magnetic association, and so the conductivity here does not relate to an ultrabasic source as do the long formational conductors in the west of the survey area.

CS-13 is a small single line response which is probably worth checking out at the same time as CS-12 is being evaluated. The anomaly is very weak, but since the aircraft terrain clearance was 700', it is possible that a more substantial anomaly would have resulted at a lower altitude. The decay rate is difficult to establish because the amplitude on channels 3 and 4 are close to the noise level. However, the possibility of a small bedrock source exists.

The ideal geological setting in Mt. Read volcanics, and the favourable geophysical parameters make these zones high in priority for followup even though they are classified as surficial.

Zone CS-14 Bedrock - Poor

From Line 201A to Line 215

Line	203E	Fiducial	031.11	Ratio	8.5/0.9	Altitude	470'
	207E		076.93		11/2.1		500'
	208W		099.18		13/2.0		460'

This conductive trend is probably a continuation northward of Zone CS-9. It consistently follows a strong, broad magnetic high, and at several locations the zone broadens to include two or more apparent conductors. The responses have similar character and conductivity along the length of the zone except at the extremities where the responses narrow and become smaller in amplitude. The broad anomaly shapes and strong line directional stagger of peak position suggest a flat lying or shallow dipping source.

The zone is caused by a broad formational bedrock conductor. A serpentinized ultramafic is the likely source, but there are a number of locations where it is possible that additional conductors are present.

These have been listed above for followup, to check if there is any massive sulphide contribution to the conductivity.

The most interesting anomaly is the response at Fiducial 031.11 on Line 203. It has narrow shape in addition to good decay rate and none of the adjacent lines show similar development of a double peak.

The anomalies on Lines 207 and 208 may be related. They are both broader and less well defined than the Line 203 anomaly. They are each part of a double peaked response, but represent that part of the response farthest removed from the nearby magnetic trend. Thus they may have a conductivity source different to the main source of the zone.

We note also that the adjacent anomalies at Fiducial 098.78 on Line 208 and at Fiducial 079.63 on Line 207A show only a minor shift in peak position with alternate line direction. Since the anomaly at Fiducial 098.78 shows improved shape on the early channels, then these locations may be worthy of further evaluation.

Zone CS-15 Surficial - Poor

Line 201E	Fiducial 014.39	Ratio 1.5/0.1	Altitude 410'
201AW	003.95	1.5/0.1	420'

This zone consists of two anomalies having very small amplitude and very narrow width. The zone has no expression on Line 202 to the north and to the south there is no further INPUT coverage. There is no magnetic association.

The conductivity of the source is intermediate to low, and the anomaly character is similar to the responses over the Rosebery railway line south of Farrell Junction; hence, a cultural source cannot be discounted, even though a film check gives no support for this. The air photo mosaic shows that the anomaly may be coincident with a river gully, but this is not expected to be the source of the conductivity.

If visual followup offers no reasonable explanation for this anomaly, it is possible that there is a short strike length bedrock conductor present. Small amplitude and low conductivity make this a low priority prospect.

<u>Zone CS-16</u> <u>Bedrock - Poor</u>

Line 206W Fiducial 071.80 Ratio 2/0.2 Altitude 580'

This is a one line anomaly which occurs in very close proximity to Zone CS-14. There is reason to think it may be merely an edge effect related to Zone CS-14, especially since there are similarly shaped edges on Lines 205 and 207.

However, the response on Line 206 has definitely higher conductivity than these other edges, and for that reason it is outlined as a separate zone. It is a very narrow response but there is no altimeter peak or cultural evidence to suggest that it is not a bedrock response.

Zone CS-16 plots near the edge of the steep magnetic gradients associated with Zone CS-14, and there appears to be no residual magnetic anomaly to support the idea of a localized lithologic unit.

If a bedrock source of limited dimensions is outlined by followup work then perhaps it deserves a higher rating as a possible massive sulphide prospect. The low rating is due to its small amplitude and moderate conductivity.

Zone CS-17 Surficial - Poor

Line 209E	Fiducial 105.19	Ratio 1/-	Altitude 570'
210W	128.99	1.5/-	510'

The character of the INPUT anomalies in this zone is poor. They have very small amplitude, low conductivity, and lack symmetry. There is no indication by the altimeter that these anomalies are due to instrumental noise.

An important distinguishing feature of the zone is its proximity to a small inflection on the magnetic trace. This magnetic anomaly may be related to one which occurs further south, especially on Line 205 at approximately Fiducial 051.60. These magnetic features have no anomalous conductivity directly associated with them, but may prove interesting in any case; their strike extent does not exlude the possibility of sulphides.

The EM characteristics favour a weak surficial conductor as the source. It may be related to a bedrock source of limited dimensions and should be considered for followup on a low priority basis.

Zone CS-18 Bedrock - Fair

Line 211E	Fiducial 134.45	Ratio 1/-	Altitude 640'
212W	161.08	4/1.0	490'
213E	345.38	2/0.4	580'
214W	340.50	4/1.1	510'
215E	308.80	2/0.4	490'
216W	304.90	3/0.6	440'

These anomalies form a narrow zone along the eastern boundary of Zone CS-14 and parallel to it. The conductivity of both these zones is comparable, and so there is reason to believe that they are due to similar conductive material. However, there is no secondary magnetic feature associated with Zone CS-18 comparable to the strong high which correlates with Zone CS-14.

The character of the anomalies on Lines 212, 213, 214 and 216 is very favourable for a massive sulphide target. They show slow decay (high conductivity), symmetrical and narrow shape, and no line to line displacement of peaks dependent upon line direction. The smaller amplitude anomaly on Line 211 indicates that the conductor either dies out or becomes more deeply covered at its extremity. There is no indication of it dying out to the north.

If followup of this zone is encouraging, then it would be advisable to check Zone CS-19 also. The responses of both these zones on Line 213 are very similar.

Zone CS-19 Bedrock - Poor

Line	213E	Fiducial 345.09	Ratio 2/0.3	Altitude 640'
	214W	340.78	4/0.8	530'
	215E	308.47	2.5/-	570'

Zone CS-19 is a poorly-defined group of three anomalies which occur between Zones CS-14 and CS-18. There is no apparent extension north or south.

The anomalies are characterized by their small amplitudes, high conductivity and narrow shape. There is no stagger from line to line which is good support for a bedrock source rather than an edge effect of the ultramafic conductor. A ground check of this zone is advisable to establish its position geologically, especially if Zone CS-18 proves to be interesting. Considering the altitude flown, the response on Line 213 is the best one for followup but the overall priority for this zone is low.

Zone CS-20 | Surficial - Poor

From Line 226 to 234A

This is a large zone of generally weak, small amplitude anomalies indicating a low conductivity source. The responses are typically surficial, being broad and ill-defined, and displaying considerable line directional shift.

Some responses, however, are enhanced both in amplitude and in decay rate. These do not seem closely related and possibly represent regions of increased conductivity of the surficial source, rather than additional bedrock conductors. If the zone is of geological interest the anomalies at Fiducial 086.11 on Line 230 and at Fiducial 053.68 on Line 231 could be used to check the source of conductivity.

Two sharp anomalies located within the zone may also be of interest. They occur at Fiducial 019.55 on Line 233 and at Fiducial 016.65 on Line 234A; thus they are close to each other and could relate to the same source, which is possibly additional to the main surficial conductor.

Zone CS-21 — Bedrock - Fair

From Line 231 to Line 235

Line	232W	Fiducial	051.07	Ratio	2/0.3	Altitude	530
	233E		020.58		2/0.5		540
	234E		089.34		2.5/0.4		530
	234AW		015.68		8/1.4		420

The above locations are the positions of the anomalies which show best conductivity in the zone. Only the response on Line 234A is suggested for initial followup, but if the results are encouraging the other locations should be checked.

Generally the zone consists of small amplitude, slowly decaying, broad anomalies. There is no line to line shift of peak positions.

The zone is upgraded by the anomaly on Line 234A. This response has good amplitude and the symmetrical shape indicative of a good bedrock conductor. It falls directly on a 160γ magnetic high, but the isomagnetic contour map indicates that the magnetic trend does not continue to coincide with the conductive trend.

The character of the Line 234A anomaly with its reasonably broad shoulders, is similar to the responses from the long formational conductors in the southern survey area, noteably those in Zone CS-10. The conductive source on Line 234A could be serpentinized ultramafic, but the fact that the conductive trend traverses the magnetic trend is not encouraging, either for an ultramafic or a pyrrhotite source.

Zone CS-24, which locates on the western flank of the same magnetic high, but further north, may be a continuation of Zone CS-21. However Lines 235A, 236 and 237A, which give coverage between these zones, indicate a deep valley here, and no responses were recorded.

The anomalies of both Zone CS-21 and Zone CS-22 occurring on Line 234 show very similar characteristics. This may mean that the two zones share a similar type of conductive source. Zone CS-22 locates along the eastern flank of the strong magnetic feature on sheet 6, but trends away to the north-east on sheet 8.

Zone CS-22 Bedrock - Poor

From Line 231 to Line 240

Line 236E	Fiducial 021.59	Ratio 5/1.0	Altitude 690
237AE	017.84	4/1.0	710

This zone consists of broad, asymmetrical, low amplitude anomalies which show considerable variation from line to line.

The five southernmost lines have anomalies with fast decay and small amplitude. Lines north of these, when flown to the east, show narrower anomalies with high apparent conductivity, better defined peaks, but retaining small amplitude. The definite enhancement of the anomalies when heading east indicates the geometry of the conductor is affecting the response: the conductor is probably dipping to the east.

The most northern anomaly of the zone is on an east-bound line and is poor in character, so it is probable that the zone terminates here. However there is an element of doubt since the next line to the north (Line 241A) is flown high at this location.

The zone is expected to have a formational bedrock source. It is considered to be too broad, and to have too long a strike extent to be a good sulphide prospect.

Zone CS-23 Bedrock - Fair

Line 239W Fiducial 247.94 Ratio 4/0.8 Altitude 580

This discrete, one-line anomaly occurs adjacent to the eastern edge of Zone CS-22. It shows slow decay but low amplitude, similar to the Zone CS-22 anomaly on the same line, yet it is much narrower and is more symmetrical.

It appears that the anomaly is detached from Zone CS-22 and hence an isolated sulphide conductor is a possibility. Lines flown north and south of the zone are too high to give any indication of possible extensions in these directions.

A small isolated magnetic closure occurs to the southeast, but Line 238, which also traverses this closure, shows no coincident conductivity.

Zone CS-24 Bedrock - Poor

From Line 239A to Line 254

Line 241AE	Fiducial 215.85	Ratio 3/0.6	Altitude 500
244E	132.40	8/1.3	420

This long bedrock zone is characterized by its generally narrow width, and its variable along-strike conductivity. There is a noticeable decrease in line-directional dependence when compared to some of the long formational (ultramafic) zones in the southern survey area.

There is a definite relationship between the conductivity and a trend of strong magnetic activity. The anomalies locate along the western flank of the magnetic high south of Line 245. On Line 246 there is no anomaly due to the flight height, but it appears that here the zone has either crossed the magnetic trend or truncates. The zone continues north of Line 247 on the eastern flank of the magnetic high.

North of Line 249A the anomalies are broader and less well-defined owing to the ubiquitous conductivity in the area. Zone outlines here are dashed since doubt exists as to the exact positioning of the boundaries.

Conductive ultramafic rocks are thought to be causing the anomalous conductivity, but they have different INPUT characteristics to the other ultramafics in the south. They have not previously been mapped geologically in the Mt. Ramsay area, and so they may not outcrop. However, the magnetic profiles indicate a shallow source.

Selections for followup have been made from the best anomalies, since mineralized zones could accompany these intrusives. They are discussed below. Two other good anomalies from the main trend of the zone are listed above for possible additional investigation.

It is probable that Zones CS-21 and CS-24 are related.

Zone CS-24A Bedrock - Fair

Line 241AE Fiducial 215.55 Ratio 3.5/0.3 Altitude 450

This anomaly defines an offshoot of Zone CS-24, and is probably related to the anomaly at Fiducial 176.91 on Line 242. The magnetic high also branches at this point, a secondary high trending to the north-west.

The INPUT characteristics of this anomaly favour a bedrock, possibly massive sulphide, source; there is slow decay, narrow width and good well-defined shape. The anomaly position is not isolated, but points to there being more than one conductor present at this location.

The anomaly bears close resemblance to the response at Fiducial 215.85 on the same line, and both should be subject to ground investigation.

There are no cultural features apparent at either location.

Zone CS-24B Bedrock - Fair

Line 247E	Fiducial 068.60	Ratio 3/0.6	Altitude 600'
248W	063.60	13/2.3	420'

These two anomalies are located in the main trend of Zone CS-24. They display high conductivity and symmetrical shape, and peak shift with different direction is minimal. The better response is on Line 248, although the Line 247 response is no doubt diminished due to the altitude at which it was flown.

Both anomalies are east of the associated magnetic high, which on Line 248 has a broad double peak. The responses should be investigated on the ground to check for possible enhancement due to the presence of sulphides.

Zone CS-25 Bedrock - Poor

From Line 242 to Line 254

This zone encompasses all the high conductivity anomalies in the north-western corner of the survey area. The source is considered to be bedrock due to its high apparent conductivity, but, as for Zones CS-27, CS-29, CS-30 and CS-31, the conductivity is not limited to the areas inside the mapped boundaries of the basalt. There are conductors west of Zone CS-24 in Zone CS-25 where no basalts are mapped nor are they suggested by the magnetic map. The Webb Creek tuffs may contain conductive material in this region.

There are no particularly interesting anomalies amongst the broader surficial-looking responses. A number of these could be used to check for the source material. Of more interest as potential responses to sulphides are the anomalies at Fiducial 048.20 on Line 249 and at Fiducials 043.21 and 043.65 on Line 249A.

Typical basaltic magnetic activity is limited to the eastern side of Zone CS-25.

Zone CS-26 Surficial - Fair

Line 247E	Fiducial 066.76	Ratio 8/0.1	Altitude 490
248W	065.54	8/0.4	430

Although this zone is located within the Meredith Granite (as mapped) it occurs close to an apparently isolated magnetic high. There does not appear to be any conductivity associated with this magnetic anomaly on Line 246.

Lining up the anomaly peaks defines a NE-SW trend which could indicate a line of faulting. The magnetic contour map seems to support this. Thus the conductivity could be due to conductive material trapped in the fault zone.

The anomalies have medium amplitude, and fairly sharp peak shape, but do not have the strong conductivity expected from a bedrock source. However they should be ground checked to definitely determine their source, and to investigate the cause of the isolated magnetic anomaly.

Zone CS-27 Surficial - Poor

From Line 217 to Line 246A

The shapes of anomalies in this zone generally have surficial appearance, and the conductivity is variable. South of Line 239 the responses have low apparent conductivity, but maintain similar amplitude to those north of the line, where conductivity is significantly higher.

There is a consistent "line-directional effect", thus defining a zone somewhat broader than the width of the individual anomalies. A surficial source at the southern end is almost certain, since the zone here closely follows mapped recent alluvial sediments.

The abrupt change in conductivity at Line 239 indicates either a thickening of, or a change in conductivity of, the source. The zone width also increases at this point, and there are multiple peaked anomalies indicating either varying thicknesses of the conductor, or that more than one conductor is present. Two selections of possible bedrock anomalies have been made from amongst the narrower responses.

The zone cuts across boundaries defined by the isomagnetic contour map. Basalts are mapped in this northern part of the survey area but the outline of CS-27 does not follow the presently known boundaries of the basalts. Furthermore, from our experience basalts usually exhibit lower conductivities than is observed in this INPUT zone.

Zone CS-27A Bedrock - Fair

Line 243W	Fiducial 163.53	Ratio 9/1.0	Altitude 500
243CE	144.83	7/1.4	570

These two anomalies are narrow responses within Zone CS-27. An important characteristic is the coincidence of their peak positions on lines flown in opposite directions and coincidence with a magnetic feature. Both anomalies are reasonably well defined, and have fast decay. Several other anomalies in Zone CS-27 have equally fast decay but lack supporting evidence for bedrock responses.

The zone occurs on the north-eastern limb of a magnetic high, and it is thought to be an ideal location to check if any basalts are associated with either the magnetic activity or the conductivity.

<u>Zone CS-27B</u> <u>Bedrock - Poor</u>

Line 241W Fiducial 206.28 Ratio 8/0.8 Altitude 510

This anomaly is similar in shape and conductivity to those in Zone CS-27A, yet it occurs in a different magnetic setting. It lies on the eastern edge of Zone CS-27 and may be a weak edge effect related to the broad flat-lying conductive source of that zone.

Follow-up of both Zones CS-27A and CS-27B should help to establish whether there is a change of conductive source within Zone CS-27 and if so, if it is related to the change in magnetic activity and/or the basalts.

Zone CS-28 — Surficial - Fair

Line 239W	Fiducial 240.06	Ratio 3/-	Altitude 380
240E	228.59	3/-	350
241W	205.91	3/0.1	380

This short zone is characterized by low conductivity, poorly shaped anomalies which have been selected because of a possible association with a magnetic inflection. A similar magnetic feature occurs on Line 238W to the south, but there is no associated conductivity.

There is a peak shift with line direction but in the sense opposite to that normally associated with flat lying conductors, so that the peak positions define a non-linear trend. This trend may define either the irregular boundary of a surficial conductor or possibly a folded bedrock conductor.

Followup should aim at clarifying a possible relation between the INPUT responses and the magnetics, and also investigate any connection between Zones CS-27B and CS-28.

<u>Zone CS-29</u> <u>Bedrock - Poor</u>

From Line 239 to Line 246A

This is a broad zone of multiple-peaked anomalies with conductivity, shape and amplitude similar to Zone CS-27. The two zones merge north of Line 245W.

The zone closely coincides with the area of magnetic activity probably associated with the Tertiary basalts mapped in the area. The southern part of the zone consists of small amplitude, low conductivity anomalies and is apparently within the mapped basalts. This leads to the assumption, as for Zones CS-27, CS-30 and CS-31, that there may be an additional conductive layer present, possibly underlying the basalts.

The additional layer could be recent alluvial sediments (quite likely for Zone CS-27) or conductive shales in the underlying Read tuffs (quite possible for Zone CS-30). In both cases it is thought that the basalt sequence is not thick enough, or weathered enough, to produce the type of anomaly we observe here.

It is also thought that the amplitude of the responses in the zones could be indicative of conductive shales at depth, that is, under a basalt cover. Shales at surface should develop larger amplitudes, as displayed in Zone CS-30A.

One selection has been made for followup in Zone CS-29 to check either for the general source material, or for the possibility of an underlying favourable bedrock conductor.

Zone CS-29A — Bedrock - Fair

Line	Fiducial	Ratio	Altitude
242E	185.89	14/2.0	350
243W	162.24	5/0.1	470
243CE	146.00	11/1.5	390
244E	140.82	14/1.5	340
244BE	149.27	15/1.2	390
245W	115.30	8/1.0	510

The anomalies listed make up the eastern side of double-peaked responses which extend from Line 242 to Line 245. These anomalies may be related to a magnetic trend which has its maximum amplitude at Fiducial 149.27 on Line 244B, and which has a strike similar to the north end of the EM zone.

The anomalies forming the eastern and western axes of this zone are not well defined with respect to each other, and so will be dicussed together. They are of intermediate amplitude, show high conductivity, and together form a rather broad anomaly. The separate peaks are more distinctly defined north of Line 244, but, even here, it is likely that the two anomalies are due to the same conductive material, possibly in separate steeply-dipping layers.

Since the anomaly peaks do not shift with opposite line direction, a bedrock source is probable, and it is unlikely that one shallow dipping conductor is responsible, since both peaks are evident for each flight direction.

Either conductive shale bands or massive sulphides could be responsible for the conductivity. The latter is more likely if the magnetic activity is reflecting pyrrhotite and is not being caused by magnetite in the basalts.

Zone CS-30 Bedrock - Poor

From Line 230 to Line 246A

This long zone consists of generally broad, rounded, surficial - looking anomalies that have a strong directional shift dependent upon line direction. Amplitudes are low to intermediate and there tend to be two, well-separated anomalies especially south of Line 242, the peak on the eastern edge always having larger amplitude.

Amplitudes are particularly low on Lines 243 and 244, and this may indicate a change of conductive source material. North of these lines the zone broadens and coincides with a magnetic influence. Here the conductor is thought to be flat-lying, but south of Line 243 the relative amplitudes and shapes indicate a bedrock conductor dipping to the west.

Geologically the zone coincides with Tertiary basalts as well as with the Read tuff sequence. A selection for followup has been made to check some of the enhanced responses along the eastern side of the zone. Conductive shales are the probable cause, since these have been mapped in this region. The character of the INPUT responses supports this.

Zone CS-30A — Bedrock - Poor

From Line 232 to Line 242A

Line	234AW	Fiducial	003.60	Ratio	40/3.0	Altitude	440
	235CW		057.71		14/2.0		470
	235W		039.06		19/2.7		460
	237W		003.74		25/2.3		390

These are the anomalies with the most enhanced amplitude and symmetry in Zone CS-30A.

They all occur on westbound lines, and each shows a strong tendency for its later channels to peak further westward than channel one. Both these factors indicate a westerly dip, with any surface expression of the conductor likely to occur at the fiducial positions listed above. The anomalies probably define a bedrock source, because of the high apparent conductivity, good amplitude and well-defined edges.

There is no magnetic support for a bedrock conductor. The source material is thought to be conductive shales which are mapped along the eastern edge of the Read Tuff sequence.

The INPUT conductor extends further north than the mapped shale unit, which terminates near Line 240. It is possible that other shale beds occur in the northern section of Zone CS-30.

Zone CS-31 — Bedrock - Poor

From Line 242A to Line 246

Line 245W	Fiducial 109.08	Ratio 13/1.3	Altitude 460
246E	106.28	5/0.1	390

The anomalies are fairly typical of a surficial conductor, but in this case the Tertiary basalts may be the source material. This is supported by the general association of the zone with the more magnetically active region.

The anomaly on Line 245 is a broad, medium amplitude response which falls on a shallow magnetic high. This anomaly has some characteristics more in keeping with a bedrock conductor. The possibility exists that shales, on strike from Zone CS-30A, are the source. In this case the magnetic association is fortuitous. If the source is related directly to the magnetics then the possibility of it being a sulphide conductor is higher.

If some of the lower conductivity sections are to be investigated then the anomaly on Line 246 is recommended because of its proximity to a narrow 60 gamma magnetic peak

<u>Zone CS-32</u> <u>Surficial - Poor</u>

Line	241W	Fiducial	201.09	Ratio	1/-	Altitude	440
	242E		190.04		1/-		400

<u>Zone CS-33</u> <u>Surficial - Poor</u>

Line	241W	Fiducial	200.68	Ratio	1/-	Altitude	430
	242E		190.58		1/-		400

These two zones are grouped together since they display similar INPUT characteristics, and are located in close proximity to each other. The anomalies bear close resemblance to the responses immediately north of the "Mackintosh" anomaly in Zone CS-34. They are also isolated and have short strike length. Hence the zones are considered as possible followup targets. The followup region should extend beyond the limits of the airborne zones since it is possible that some of these weak responses are off the end of a short, good conductor lying between the flight lines.

The INPUT character of the anomalies is discouraging; they indicate a small low conductivity source with no magnetic support. This explains the poor rating even though the zones are isolated and have short strike length.

169065

Zone CS-34 Bedrock - Fair

Line	235BE	Fiducial	122.61	Ratio	6/0.7	Altitude	390?
	236E		034.64		1.5/-		410
	236AE		118.15		1/-		480
	237W		002.00		1/-		460

This zone is thought to represent the recently discovered Mackintosh ore body, although the exact position of the deposit is not known to the author.

The best response occurs on Line 235B, and the characteristics of this anomaly satisfy most of the criteria established for good bedrock conductors. It is a narrow, symmetrical, one-line anomaly, indicating an isolated, short strike-length conductor. Lines flown 400 metres to the north and 300 metres to the south have not yielded similar anomalies. The small amplitude of the anomaly may be due in part to the interpreted short strike length, as well as to possible depth of the conductor.

The fair rating is due in part to the loss of magnetic data on this line, and in part to the lack of response on the fifth and sixth INPUT channels. Although the anomaly shows high conductivity (slow amplitude decay), massive sulphide conductors are usually expected to give responses on more channels.

It is not possible to make a definite statement about dip of the conductor, since there is no coverage in both flight directions, however the symmetry of the anomaly indicates that the dip would be steep.

The other responses listed define a northward continuation of conductivity, but the character of these INPUT anomalies is poor. Their fast decay indicates an apparent conductivity lower than that indicated on Line 235B, and their amplitudes are also considerably reduced. They may be due either to disseminated sulphides related to the ore body, or to other surficial material. Followup should establish this.

VI. TABLE I - Summary of Selected Conductors

Bedrock			Surficial		
Good	Fair	Poor	Good	Fair	Poor
CS-3	CS-6C	CS-1		CS-11A	CS-4
CS-6A	CS-10	CS-2		CS-12	CS-11
CS-6B	CS-18	CS-5		CS-13	CS-15
CS-7	CS-21	CS-6		CS-26	CS-17
	CS-23	CS-8		CS-28	CS-20
	CS-24A	CS-9			CS-27
	CS-24B	CS-14			CS-32
	CS-27A	CS-16			CS-33
	CS-29A	CS-19			
	CS-34	CS-22			
		CS-24			
		CS-25			
		CS-29			
		CS-30			
		CS-30A			
		CS-31			

VII. CONCLUSIONS AND RECOMMENDATIONS

1. Table 1 summarizes the selected conductors. These are placed in "Bedrock" or "Surficial" categories according to their most probable origin. The "Good", "Fair" and "Poor" ratings refer to the probability of locating massive sulphides if ground followup proves the source is of "Bedrock" origin.

2. "Bedrock-Good" selections are mandatory followup targets. Zones CS-3 and CS-7 are isolated conductors, whereas CS-6A and CS-6B are enhancements of a conductive trend.

3. "Bedrock-Fair" selections are enhancements of conductive trends, or are isolated zones generally with no magnetic support. However this latter criterion may not be diagnostic for Rosebery lead-zinc type mineralization. The interpreted "Mackintosh" anomaly (Zone CS-34) is rated fair due to the lack of magnetic data. Zones CS-10, CS-18 and CS-23 are the best prospects in this category.

4. "Surficial-Fair" selections are mostly small zones where anomalies lack definite bedrock character. Nevertheless, follow-up is recommended especially on Zones CS-12, CS-13 and CS-26 which have the isolation expected of a bedrock source.

5. "Poor" selections consist of responses reflecting both low and high conductivity sources in the area. The "Poor" rating stems from the very large strike extent of these zones and hence their low probability of yielding economic massive sulphides.

6. "Bedrock-Poor" zones probably related to ultramafic units are Zones CS-5, CS-8, CS-9, CS-14, and CS-24. Specific locations, where additional conductors are suspected within these formational zones, are upgraded in the text and are the recommended places for followup.

7. Other "Bedrock-Poor" selections include Zones CS-25, CS-29, CS-30, and CS-31 which appear to be associated with the Tertiary basalts in the northern part of the area. The apparent conductivity of these sources is higher than usually experienced from basalts, and hence there is some suspicion of additional conductors underlying the basalt. Some sections within these are upgraded to "Fair" prospects and are the recommended places to evaluate these zones. In particular, Zone CS-29A has improved bedrock characteristics.

8. Zone CS-6 is a formational "Bedrock-Poor" zone which is possibly caused by massive sulphides with high pyrrhotite content. In this case the "Poor" rating reflects the uneconomic nature of this sulphide. The selected enhancements are locations to check for either a change in the type of sulphide, or for tin which is possibly associated.

9. The "Surficial-Poor" selections are poor prospects and generally require geological support to justify followup.

10. Cultural looking responses are thought to be adequately explained by features on the tracking film, and so have not been zoned.

11. Conductive zones occur in the vicinity of the known Renison and Mackintosh ore bodies.

Respectfully submitted,

G. Butt,

per J. Hansen,

W. Finney

W. Finney,

GEOPHYSICISTS.

APPENDIX A

'INPUT' EQUIPMENT AND PROCEDURES

I. BARRINGER 'INPUT' SYSTEM

a) General

The INPUT (INduced PUlse Transient) method is based uponthe study of the decay of secondary electromagnetic fields created in the ground by short pulses generated from an aircraft. The time-varying characteristics of the decay curve are analyzed and interpreted in terms of information concerning the conductivity characteristics of the terrain.

The principle of separation in time between the production of the primary field and the detection of the measured secondary signal, gives rise to an excellent signal-to-noise ratio and an increased depth of penetration compared to conventional continuous wave electromagnetic systems. It also makes the INPUT system relatively independent of air turbulence.

At a normal survey altitude of 400 feet (120 metres) above terrain, the typical effective depth penetration is estimated at about 400 feet (120 metres) below surface, depending on the conductivity contrast between the conductive body and surrounding rocks, the size and attitude of the conductor and the presence or lack of conductive overburden. In optimum conditions a penetration of 600 feet (185 metres) subsurface can be achieved.

One of the major advantages of the INPUT method lies in good differentiation between flat-flying surface conductors and bedrock conductors, so that the latter can be detected even under a relatively thick overburden such as glacial or pedological formations (laterite, weathered zone, etc.).

However, the application of the airborne INPUT electromagnetic method is limited to the solution of problems that are characterized by a reasonable resistivity contrast. The method is not considered to be applicable to the direct search for disseminated mineralization, except where this resistivity contrast exists.

b) Equipment

The INPUT system has been developed by Barringer Research Limited of Toronto, Canada.

The transmitted primary field is discontinuous in nature (Fig.1A) with each pulse lasting one millisecond; the pulse repetition rate is 288 per second. The electromagnetic pulses are created by means of powerful electrical pulses fed into a 3-turn shielded transmitting loop surrounding the survey aircraft and fixed to the nose and tail of the fuselage and to the wing tips.

The secondary field reception is made by means of a receiving coil wound on a ferrite rod and mounted in a "bird"

12

169073

INPUT SIGNAL

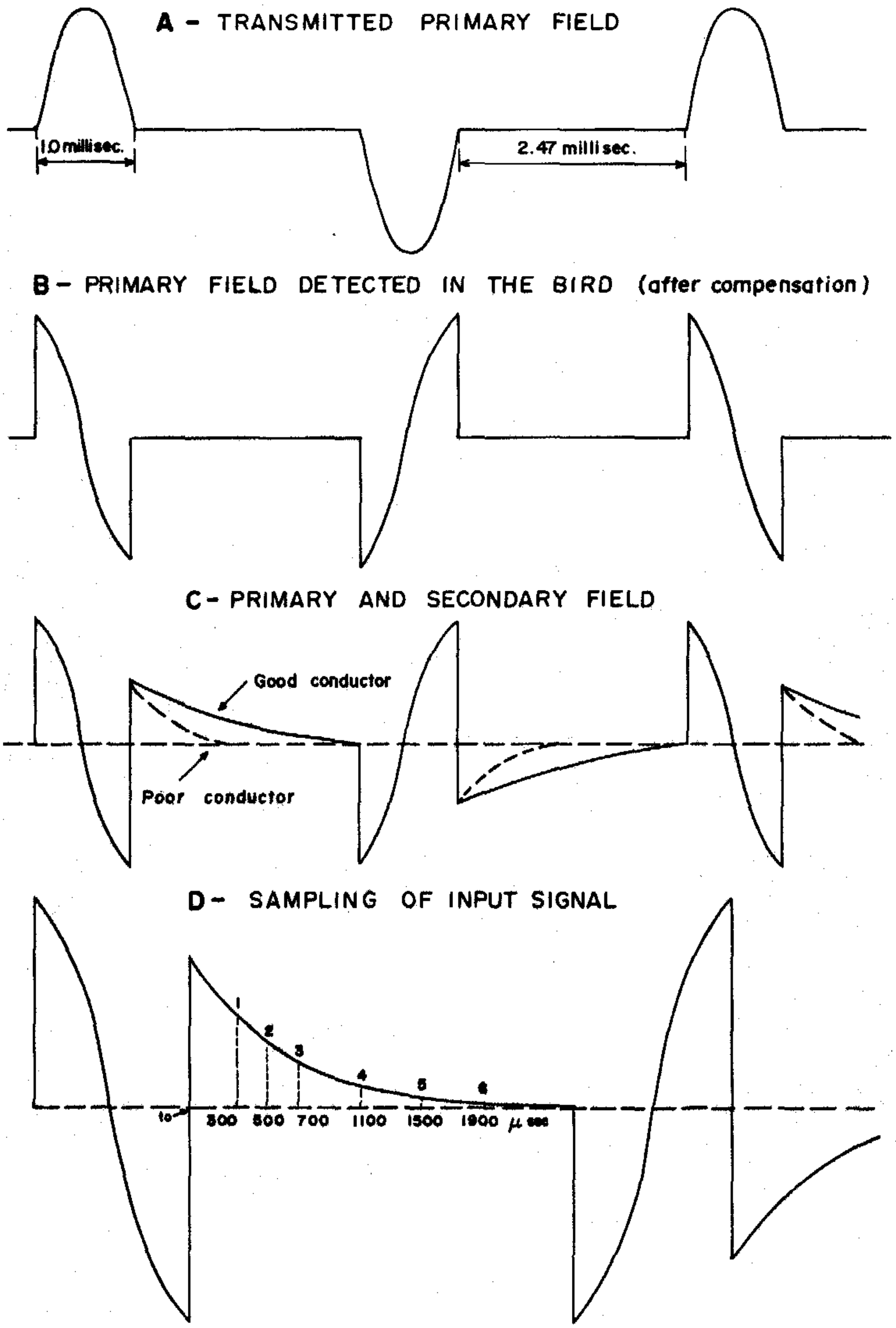


FIGURE 1

towed behind the aeroplane on a 500-foot (150 metre) co-axial cable. The axis of the pickup coil is horizontal and parallel to the flight direction. Gaps of two and a half milliseconds between successive primary pulses (Fig.1B) are used for detecting the INPUT voltage, which is a transient voltage (Fig.1C) corresponding in time to the decay of the eddy currents in the ground.

The analysis of the signal is made in the INPUT receiver by sampling the decay curve at several points or gates, the centre and width of which have a fixed relationship with respect to time zero (t_o) corresponding to the termination of the pulses. The INPUT system has six sampling gates, the centres of which are commonly at a mean delay of 300, 500, 700, 1100, 1500 and 1900 microseconds after time zero (Fig.1D).

The signals received at each sampling gate are processed in a multi-channel receiver to give six analog voltages recorded as six continuous analog traces (Fig.2) on a Honeywell Visicorder direct-reading optical galvanometer recorder. Each trace represents the coherent integration of the transient sample, the time constant of integration being about three seconds on the Mark V INPUT system. One channel is sometimes operated at a time constant of 0.6 seconds in addition to the normal time constant. This integration delay, plus the separation between the receiving bird and tracking camera installed in the aircraft, introduces a delay which has to be taken into consideration and corrected prior to correlating the electromagnetic data with the other simultaneously recorded data. Other recorded data are:

TYPICAL INPUT RECORDING

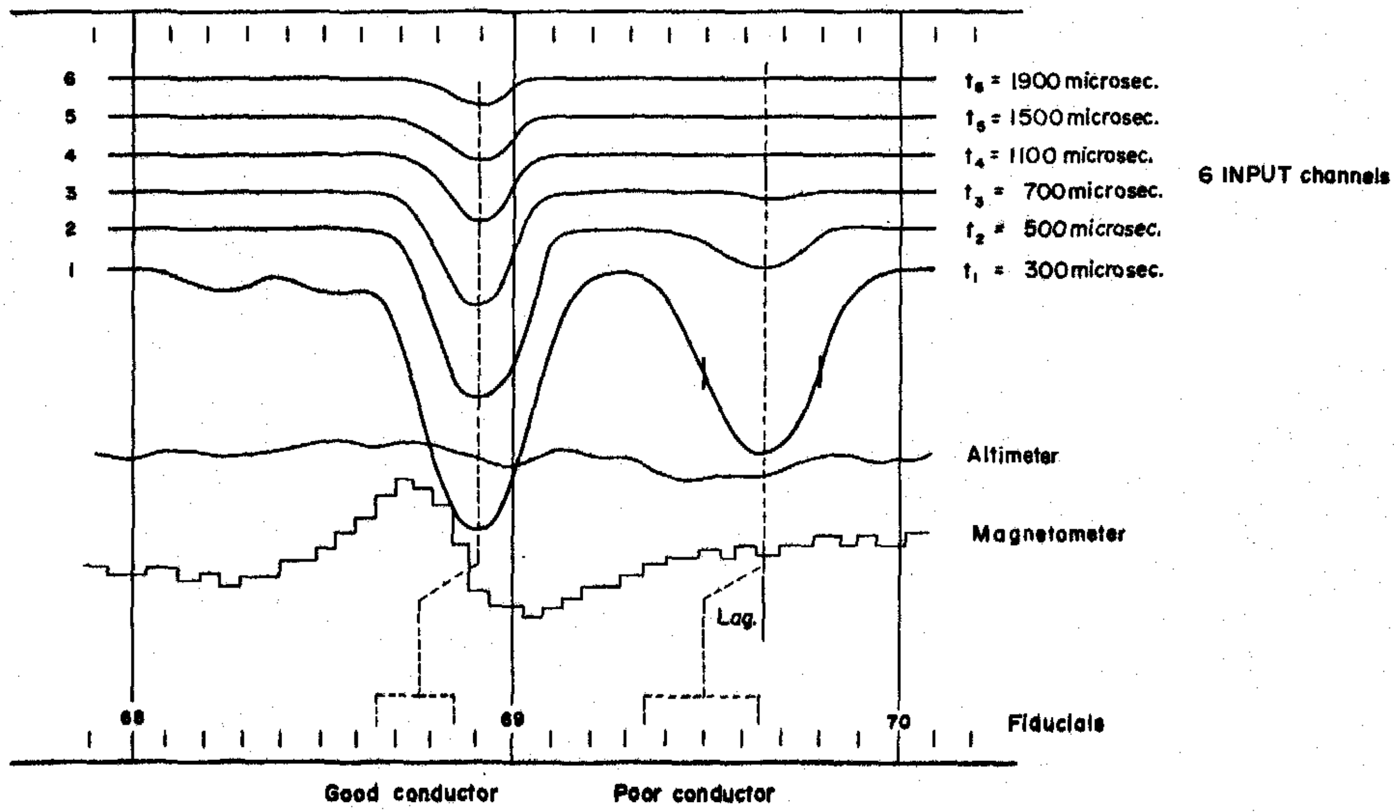


FIGURE 2

- fiducial marks
- altimeter trace
- earth's total magnetic field
- Hz monitor
- radiometric levels (optional)

An eddy current is induced in the airframe by the primary field. To compensate for this effect a special device is used which feeds into each channel of the INPUT receiver a signal equal in amplitude and waveform but opposite in polarity to the signal induced by the airframe eddy current. The compensation signal is derived from the voltage induced in the receiving coil by the primary field. It is constantly proportional to the inverse cube of the distance between the bird and the aircraft. Thus, swinging of the bird and changes of coupling are automatically corrected. The compensation adjustment is a simple procedure carried out during flight at a terrain clearance of 2,000 feet (600 metres) to eliminate the interference of ground conductors.

II. MAGNETOMETER

The magnetometer is a Geometrics G-803 nuclear precession unit especially adapted to operate in conjunction with the INPUT equipment. Readings are taken approximately every second with a sensitivity of plus or minus 2 gammas and recorded at a full scale of 5 inches for 200 gammas. The coarse trace is recorded at a full scale of 5 inches for 20,000 gammas, or at a full scale of 5 inches for 2000 gammas. The sensing head is mounted at the end of a 3-metre stinger, on the tail of the PBY aircraft. The magnetometer record is also shown in Figure 2.

III. OTHER EQUIPMENT

The tracking camera is a 35 mm continuous strip camera equipped with a wide-angle lens. The 35 mm film is synchronized with the geophysical record by means of fiducial marks printed approximately every 20 seconds, the counter of the intervalometer being driven by the clock of the magnetometer.

An APN-1 or a Sperry Altimeter is used, and its output is recorded on the chart.

In most cases a Hz monitor tuned to the local domestic power distribution frequency, is employed to assist in the detection of power lines.

Optional equipment can include a Doppler navigation system, frame camera (in addition to the strip camera), spectrometer and a digital recorder.

IV. PROCEDURES

a) Field Operations

The flight line spacing is normally in the range of 1/8 mile (200 metres) to 1/4 mile (400 metres). During survey flights the altitude of the aircraft is maintained at approximately 400 feet (120 metres) above the ground with the bird flying about 200 feet (60 metres) below the aircraft.

The heading of the aircraft is such that two adjacent lines are normally flown in opposite directions. Visual navigation is based on airphoto mosaics or in some cases on topographic maps of suitable scale.

Just after take-off, the calibration of the altimeter is checked by flying straight and level over the runway at a barometric altitude AGL of 400 feet (120 metres). The compensation adjustment is checked during ferry from the base to the survey area.

b) Compilation

At the end of each flight, all records and films are developed, edited and all synchronized fiducial marks are checked. Then, the actual flight path recovery is made by picking visible marks common to both 35 mm film and photo mosaics. Identified points with their fiducial number are plotted on the mosaic. Then, the electromagnetic anomalies are transferred from the records onto the mosaic overlay by interpolation according to their own fiducial number.

The position of the INPUT anomalies must be corrected to take into account the separation between the bird and the aircraft, as well as the delay introduced in the integration circuitry. This offset, or lag, is plotted towards the smaller fiducial numbers (to the left on the record).

The INPUT anomalies are represented on a map by means of symbols that condense the most significant characteristics: the location of the centre and half-peak width of the electromagnetic anomaly; the number of INPUT channels affected by a noticeable deflection; the peak amplitudes of the first and fourth channels. Shown also are the altitudes at which the anomalies were recorded, the amplitude of any magnetic features which coincide with INPUT anomalies and any associated response on the Hz monitor.

The only subjective elements introduced by this processing are in the decision as to whether a deflection corresponds to a genuine anomaly or to a noise source (electrostatic atmospheric discharge, compensation noise, etc.), and in the correlation of the anomalies from line to line to delineate a conductive zone.

579

169080

APPENDIX B

INPUT INTERPRETATION

I. INTRODUCTION

Although the approach to interpretation varies from one survey to another depending upon local conditions, the following generalizations may provide the reader with some helpful background information.

The main purpose of the interpretation is to determine the probable origin of the conductors detected during the survey and to suggest recommendations for a further exploration programme by taking into account a limited amount of available geophysical data. This is possible through an objective analysis of all characteristics of the different types of conductors and correlating magnetics, if any. Then, the maps of electromagnetic results are compared to the available geological maps. A certitude is seldom reached, but a high probability is obtained in the appreciation of the conductive causes in most cases. One of the most important problems is usually the differentiation between non-economic surface conductors and bedrock conductors.

II. TYPES OF CONDUCTORS

a) Bedrock Conductors:

The different types of bedrock conductors that are normally encountered are the following:

1. Graphites (including a large variety of carbonaceous rocks) occur in the sedimentary formations of the Precambrian as well as in volcanic tuffs, often concentrated in shear zones. They correspond generally to long, multiple conductors lying in parallel bands. They are not magnetic unless associated with pyrrhotite or magnetite. Their conductivity is variable but generally high.

2. Massive sulphides. Syngenetic sulphides often correspond to long multiple conductors and their conductivity which varies considerably may be very high, as for graphites. Pyrrhotite, often associated with other sulphides may be the cause of coincident magnetic anomalies. Generally, sulphides are not as frequently encountered as is graphite.

Isolated orebodies of massive sulphides give rise to short conductors of high conductivity. They present quite often a direct magnetic anomaly and are easily recognized. However, some sulphide orebodies are not magnetic, some are not very conductive (discontinuous mineralization), and they can be located among formational conductors so that one must not be too dogmatic in the selection of the prospects.

3. Magnetite and some serpentinized ultra-basic rocks are conductive and very magnetic.

4. Manganese oxides may give a weak electromagnetic response.

b) Surface Conductors:

1. Clayey alluvium or residual soils, some swamps and brackish groundwater are usually poorly conductive to medium conductive.

2. In unglaciated areas lateritic formations, residual soils and the weathered layer of the bedrock often cause surface anomalous zones, the conductivity of which is generally low to medium but can occasionally be high. Their presence is often related to the lithology of the underlying bedrock.

c) Man-Made Conductors (Cultural):

1. Power Lines. These frequently, but not always produce a conductive type response on the INPUT record. In the case of direct radiation of their field, the anomaly shows phase changes with the different channels which are recognized easily. In the case of a grounded wire, or steel pylon, the anomaly may look very much like a bedrock conductor.

2. Grounded fences or pipelines. These will invariably produce responses much like a bedrock conductor. Whenever they cannot be identified positively a ground check is recommended.

3. General Culture. Metal barns or houses, tailings ponds, dumps, etc., may produce INPUT anomalies. However, their instances are rare and can generally be verified by identification on the path recovery film.

III. ANALYSIS OF THE CONDUCTORS

The apparent conductivity alone is not generally a decisive criterion in the diagnosis, and other factors are also very important:

- the pattern of conductors
- the shape and size
- the associated geophysical parameter (aeromagnetics)
- the position with respect to the direction of structures
- the geological environment
- the local variations of characteristics within conductive zones.

The first objective of the interpretation, then, is to classify each zone under one of three categories, according to its most likely origin. The categories are cultural, surficial, and bedrock. A second objective is to give each zone a rating as either good, fair, or poor, according to its potential as a sulphide prospect <u>if</u> it were considered as a bedrock conductor.

The characteristics of each of the three major classifications are discussed below in subsections a, b, and c,

169084

For any particular anomaly or zone the criteria used to analyze it are applied as rigorously and consistently as possible in order to establish the correct classification. In the vast majority of zones finally selected, the evidence is never totally conclusive. Consequently, the ultimate class selection is the one which appears to be the most probable, bearing in mind that every zone which is discussed in detail has some chance of being a bedrock conductor.

The experience of handling a large amount of INPUT data and observing the ground followup results over a large portion of this data has confirmed the validity of our interpretational criteria.

a) Cultural Conductors

The vast majority of cultural anomalies occur along roads and are accompanied by an Hz response. Power lines are clearly the most common source. Although some power lines are recognized immediately on the records by virtue of phase reversals or an abnormal rate of decay, most yield INPUT anomalies of a normal "high conductivity" character which would be mistaken for bedrock responses. There are also many power lines which cause no INPUT response whatsoever.

Fences, pipelines, communication lines, railways and other man-made conductors can give rise to INPUT responses, the strength of which will obviously depend on the grounding of these objects.

Our analysis of suspected cultural anomalies is helped a great deal by the Hz monitor. It is important to note, however, that the Hz response must be sharply peaked in order to be a reliable indicator and it is equally noteworthy that the Hz response along a power line will occasionally vanish on one or more lines.

The exact location of an INPUT anomaly with respect to the associated Hz response is important. In cases where a definite cultural conductor is known, the lag between the monitor and INPUT responses is consistent from line to line. Any departure of the lag interval from the "normal" would raise suspicion of an additional conductor being present.

The direction of the power line must also be considered, as the inductive response diminishes, sometimes markedly, with reduced coupling when the power line makes a shallow angle with the flight line. In other cases, the shallow angle results in a broadening of the anomaly shape and of the Hz response.

Geological conductors often carry Hz response in the vicinity of power lines, but these usually have the appearance of broad swells on the monitor record rather than sharp peaks.

Invariably, there are a few borderline cases which are uncertain; hence the "Hz?" nomenclature appears occasionally on the maps.

It is also necessary to utilize the tracking film. The exact positions of all anomalies, with the exception of the obvious broad surficial features, are checked on the film and possible cultural sources, or the lack thereof, are noted on the work sheets. In this way, cultural features are located which may not be apparent on the planimetric maps, as are small offsets from cultural features which can be very significant in the interpretation of the data.

Another facet of this analysis is the line-to-line comparison of anomaly character along suspected man-made conductors. In general, cultural anomalies should be very narrow, sometimes exhibiting small negatives on their leading edge, and the lag for plotting is often slightly greater than for geological conductors. The INPUT amplitude, the rate of decay, and the anomaly width should not vary a great deal along any one man-made conductor, except for the variation in amplitude related to terrain clearance variation. A marked departure from the average response character along any given feature gives rise to the possibility of a second conductor.

Any monotonous string of narrow anomalies along a road with a sharp Hz response can be discarded immediately. Even the more localized narrow anomalies can usually be eliminated if a potential cultural source is evident on the tracking film and there is a sharp Hz response. A response over a farm or a farm laneway can be eliminated with confidence if the source of power to the farm is obvious. Similarly, an apparently isolated response along a road can often be discarded by checking for feeble, unplotted anomalies on adjacent lines or for Hz responses with no INPUT anomalies.

Anomalies identified as cultural with a very high degree of reliability (designated by "C") can be ignored in the followup programme. In those cases where any reasonable element of doubt remains as to the type of source and/or where the anomalies have sufficiently favourable character to be considered sulphide prospects, a "C?" is shown and the conductive zone is outlined and a ground check is usually recommended.

In most cases a visual examination of the site will suffice as it is only necessary to verify the presence of a man-made conductor. In a few instances we know already that one cultural conductor is present and the object of the ground check is to determine if there is a second cultural source, a variation in the construction of the single source, a change in the grounding conditions, or perhaps a bedrock source. This type of check is obviously more difficult to accomplish.

b) Surficial Conductors

This term is used for geological conductors in the overburden, either glacial or residual, and in the weathered layer of the bedrock. Most surficial conductors are probably caused by clay minerals. In some environments, salty deposits give rise to highly conductive surficial features.

Other possible electrolytic conductors are residual soils, swamps, brackish groundwater and lake or river-bottom deposits.

Fortunately, most conductive surficial features have low, or at best, intermediate conductivity so they are not easily mistaken for highly conducting bedrock features. Many of them are very broad features and their anomaly shapes are typical of broad horizontal sheets.

When the conductivity is higher, it is usually still possible to identify a flat-lying surficial conductor, thanks to a typical asymmetry in the INPUT responses observed on both edges of the conductor (edge effect) when flying adjacent lines in opposite directions (Figure 1). Flying from A to B, the coupling between the transmitting coil and the flat-lying conductor AB is maximum when the coil is over the leading edge A and minimum when the coil is over the edge B. The INPUT phenomenon is reversed when flying from B to A. The actual limits of the conductive zone correspond, in fact, to the envelope of the leading edges of staggered anomalies. In practice there are many variations on this basic pattern caused by variations in width, thickness and conductivity.

Other surficial conductors may be recognized by analyzing the radio-altimeter trace, e.g. conductive deposits in the valleys or increased thickness of the weathered zone on top of the hills. Also, a comparison to the altimeter profile is essential when flying over a surface layer of

68

EDGE EFFECT

169089

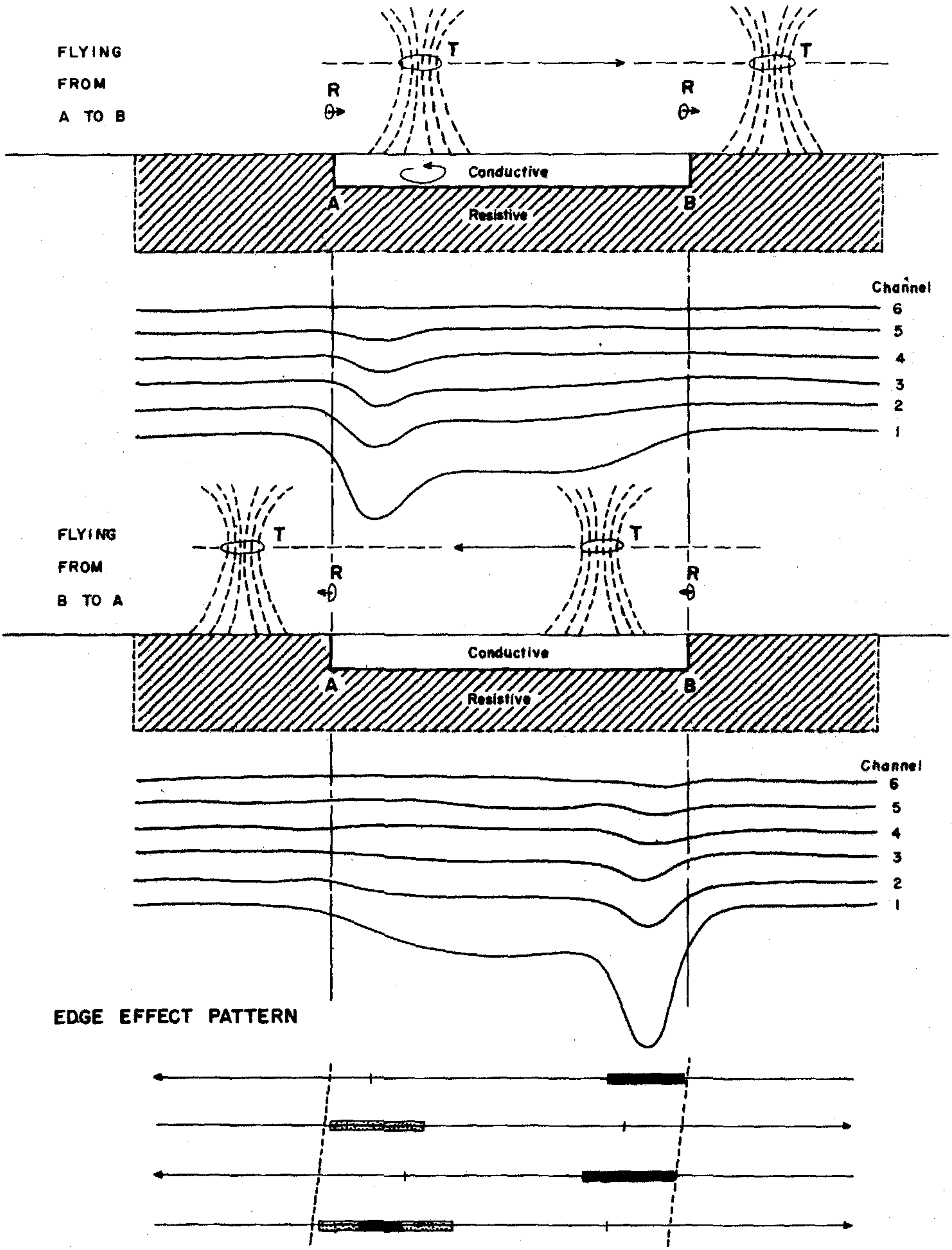


FIGURE 1

apparently high conductivity where a sudden dip of short duration (or small hill) can cause an apparent anomaly which is quite sharp.

However, the existence of surficial conductors related to bedrock lithology does introduce ambiguities into the interpretation. There are instances where we cannot distinguish between weakly conductive serpentine or poorly developed graphite within the bedrock and weakly conducting soils or weathered layer above the bedrock. This does not generally detract from the prime purpose of the survey which is the location of highly conducting massive sulphides, but it does complicate the overall analysis of the data.

If the anomaly shapes show a dependence on line direction, a surficial source is probable; if they show multiple peaking and a lack of dependence on line direction a bedrock source is probable; but in the weaker anomalies the shape is often insufficiently clear for a reliable interpretation.

Formational surficial conductors seem to be most commonly related to rocks of intermediate to basic composition, as they tend to follow magnetic highs. (This is also true of most of the formational bedrock conductors). However, there are also examples of formational surficial conductors in acidic environments.

Surficial conductors are not always portrayed completely on the EM Map because weaker INPUT responses are not usually plotted. Sometimes, the distribution of this type of conductor is indicated by the stronger sections which are plotted and by the conductor outline which delineates the entire zone.

Any outlined conductive zones which are not assigned an identification number can be taken as interpreted surficial features. Similarly, any isolated anomalies which bear no zone number and no "C" designation are interpreted as surficial.

c) Bedrock Conductors

This category is comprised of those anomalies which do not fit the criteria laid down for classifications a and b. It is difficult to assign a specific set of values which signify bedrock conductivity because any individual zone or anomaly might exhibit some, but not all, of these values and still be a bedrock conductor.

The criteria considered as favourable pointers to a bedrock conductor are:

1. Intermediate to high conductivity. Channels five and six are generally affected. Where the conductivity drops (i.e. first to fourth channel ratios greater than 15) it is difficult to distinguish narrow surficial conductors from bedrock ones.

2. Good anomaly shape. Narrow, relatively symmetrical, anomalies with well defined peaks are preferred to wider anomalies with rounded peaks. The leading flank

should show a gradual increasing response with no abrupt change in slope or tendency to go negative.

3. No serious displacement of anomaly peak position with line direction, i.e. edge effect. Some displacement can be expected from a wide bedrock source or banded bedrock source which is not resolved into more than a single peak. However, major displacements in peak position appears to be associated with surficial conductors only.

4. Small to intermediate amplitude. Large amplitudes do occur but, generally, the amplitude of the response is smaller than for thick, extensive surficial conductors. The amplitude varies according to the depth of the source.

5. A degree of continuity. Maintenance of any, or all, of characteristics 1, 2, 3 and 4 is strong evidence in favour of a bedrock conductor.

6. Associated magnetic response with similar strike. A related magnetic response is usually interpreted as signifying a lithologic unit carrying the magnetic and conductive material.

However, as discussed in subsection b, some basic rocks which weather to produce a conductive upper layer will possess this magnetic association. In the absence of characteristics 1, 2, 3 or 4, the related magnetic response does not help to distinguish between surficial conductivity related to a bedrock feature and genuine bedrock conductivity.

Interference, then, with a conductive overburden can make the identification of a bedrock conductor somewhat difficult but a careful and consistent comparison of residual responses to the above criteria results in a high level of success.

Residual anomalies, basically, are those which, in comparison to other deflections, appear to be located "on" rather than "in" the INPUT traces.

Most obvious bedrock conductors occur in long, relatively monotonous, sometimes multiple zones following formational strike. Graphitic material is usually the most probable source. Massive syngenetic sulphides running for many miles are known in nature but, in general, they are not common.

Other sources of bedrock conductivity are massive magnetite and serpentine. We rely heavily on the amplitude and dimensions of the associated magnetic activity plus the geological setting of the conductor to distinguish these cases.

169094

The criteria used for selection of a bedrock conductor which is considered to have a good chance of being due to a massive sulphide are:

- high conductivity,
- good anomaly shape,
- small to intermediate amplitude,
- isolation,
- short strike length,
- preferably with a localized, small amplitude magnetic anomaly of the same width.

If the magnetic anomaly has similar lateral dimensions, has an amplitude of the order of 20 to 400 gammas, and correlates directly with the EM response, there is a strong possibility of pyrrhotite being present.

We must consider, however, the possibility of localized occurrences of massive sulphides within or near formational conductors. The selection of targets from within these extensive belts is a difficult problem. They are singled out primarily on the basis of a marked local increase in conductivity and/or amplitude or some evidence for a relatively localized occurrence. Variations within the conductive formations themselves can account for these characteristics so the reliability of this type of selection is considered to be quite poor.

Localized magnetic correlations within long formational conductors can be taken as evidence of pyrrhotite. In some environments, however, this criterion is very difficult to apply due to the prevalent association of conductors to magnetically active rock types. The compilation of the magnetic data into isomagnetic contour maps assists this type of selection.

169096

INPUT LEGEND

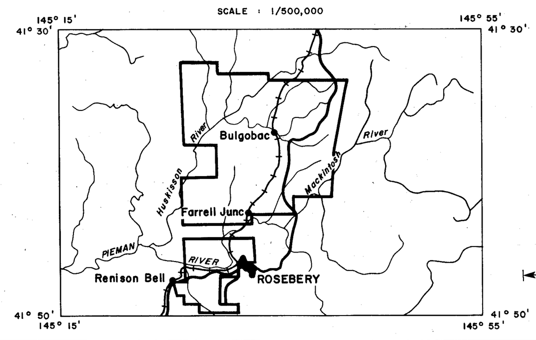
6 CHANNEL ANOMALY
5 CHANNEL ANOMALY
4 CHANNEL ANOMALY
3 CHANNEL ANOMALY
2 CHANNEL ANOMALY
1 CHANNEL ANOMALY
PEAK POSITION
1ST and 4TH CHANNEL AMPLITUDES — 18/2.5
ALTITUDE (FEET) — 420
COINCIDENT MAGNETIC ANOMALY (gammas) — 60γ
OFFSET MAGNETIC ANOMALY — 60γ
50 Hz WITH NORMAL ANOMALY — Hz
50 Hz WITH ABNORMAL ANOMALY — Hz

INTERPRETATION LEGEND

CONDUCTOR OUTLINE
IDENTIFICATION NUMBER — CS-3
SELECTED CONDUCTOR
CULTURAL ANOMALY — C

N

LOCATION MAP



SHEET INDEX

8	7
6	5
4	3
2	
1	

5 cm

SURVEYED & COMPILED BY
geoterrex ltd

FOR
AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES, TASMANIA

ELECTROMAGNETIC MAP

SHEET 1 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2

001

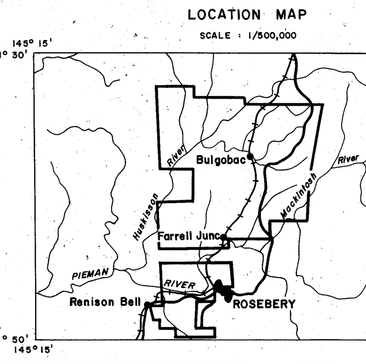
INPUT LEGEND

- 6 CHANNEL ANOMALY
- 5 CHANNEL ANOMALY
- 4 CHANNEL ANOMALY
- 3 CHANNEL ANOMALY
- 2 CHANNEL ANOMALY
- 1 CHANNEL ANOMALY
- PEAK POSITION
- 1ST and 4TH CHANNEL AMPLITUDES (18/2.5)
- ALTITUDE (FEET) (420)
- COINCIDENT MAGNETIC ANOMALY (gammas) (60γ)
- OFFSET MAGNETIC ANOMALY (60γ)
- 50 Hz WITH NORMAL ANOMALY (Hz)
- 50 Hz WITH ABNORMAL ANOMALY (Hz)

INTERPRETATION LEGEND

- CONDUCTOR OUTLINE
- IDENTIFICATION NUMBER (CS-3)
- SELECTED CONDUCTOR
- CULTURAL ANOMALY (C)

LOCATION MAP



SHEET INDEX

8	7
6	5
4	3
2	
1	

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR **AUSTRALIAN ANGLO AMERICAN LTD.**

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ELECTROMAGNETIC MAP

SHEET 2 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2

002

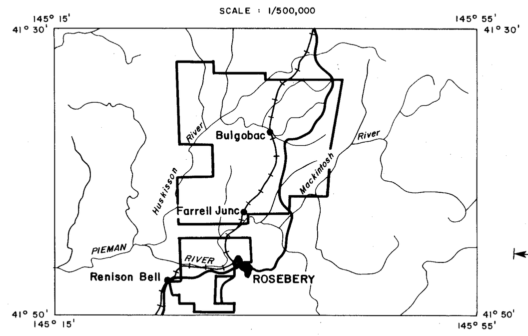
INPUT LEGEND

6 CHANNEL ANOMALY
5 CHANNEL ANOMALY
4 CHANNEL ANOMALY
3 CHANNEL ANOMALY
2 CHANNEL ANOMALY
1 CHANNEL ANOMALY
PEAK POSITION
1ST and 4TH CHANNEL AMPLITUDES — 18/2.5
ALTITUDE (FEET) — 420
COINCIDENT MAGNETIC ANOMALY (gammas) — 60γ
OFFSET MAGNETIC ANOMALY — 60γ
50 Hz WITH NORMAL ANOMALY — Hz
50 Hz WITH ABNORMAL ANOMALY — Hz

INTERPRETATION LEGEND

CONDUCTOR OUTLINE
IDENTIFICATION NUMBER — CS-3
SELECTED CONDUCTOR
CULTURAL ANOMALY — C

N



5 cm

SHEET INDEX

8	7
6	5
4	3
	2
	1

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ELECTROMAGNETIC MAP

SHEET 3 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ...400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 003

INPUT LEGEND

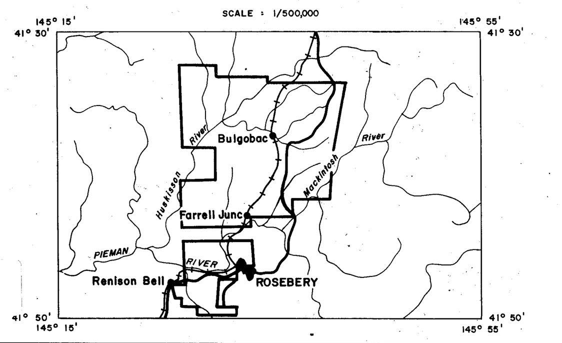
- 6 CHANNEL ANOMALY
- 5 CHANNEL ANOMALY
- 4 CHANNEL ANOMALY
- 3 CHANNEL ANOMALY
- 2 CHANNEL ANOMALY
- 1 CHANNEL ANOMALY
- PEAK POSITION
- 1ST and 4TH CHANNEL AMPLITUDES (18/2.5)
- ALTITUDE (FEET) (420)
- COINCIDENT MAGNETIC ANOMALY (gammas) (60γ)
- OFFSET MAGNETIC ANOMALY (60γ)
- 50 Hz WITH NORMAL ANOMALY
- 50 Hz WITH ABNORMAL ANOMALY

INTERPRETATION LEGEND

- CONDUCTOR OUTLINE
- IDENTIFICATION NUMBER (CS-3)
- SELECTED CONDUCTOR
- CULTURAL ANOMALY (C)

LOCATION MAP

SCALE 1:500,000



SHEET INDEX

8	7
6	5
4	3
2	
1	

SURVEYED & COMPILED BY geoterrex ltd

FOR AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES TASMANIA

ELECTROMAGNETIC MAP

SHEET 4 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 004

INPUT LEGEND

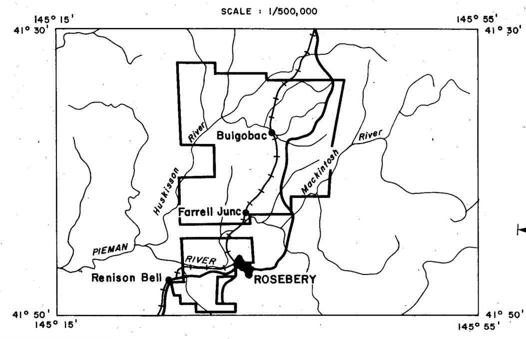
6 CHANNEL ANOMALY
5 CHANNEL ANOMALY
4 CHANNEL ANOMALY
3 CHANNEL ANOMALY
2 CHANNEL ANOMALY
1 CHANNEL ANOMALY
PEAK POSITION
1ST and 4TH CHANNEL AMPLITUDES (18/2.5)
ALTITUDE (FEET) (420)
COINCIDENT MAGNETIC ANOMALY (gammas) (60γ)
OFFSET MAGNETIC ANOMALY (60γ)
50 Hz WITH NORMAL ANOMALY (Hz)
50 Hz WITH ABNORMAL ANOMALY (Hz)

INTERPRETATION LEGEND

CONDUCTOR OUTLINE
IDENTIFICATION NUMBER (CS-3)
SELECTED CONDUCTOR
CULTURAL ANOMALY (C)

LOCATION MAP

SCALE : 1/500,000



5 cm

SHEET INDEX

8	7
6	5
4	3
	2
	1

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR **AUSTRALIAN ANGLO AMERICAN LTD.**

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
.BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ELECTROMAGNETIC MAP

SHEET 5 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ...400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 005

INPUT LEGEND

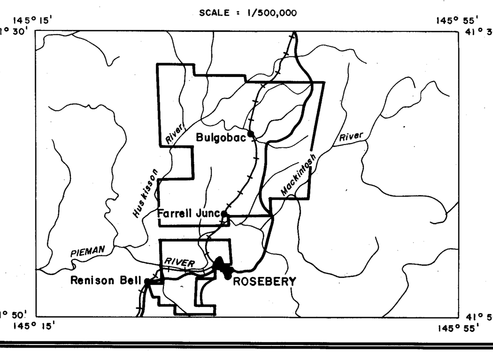
- 6 CHANNEL ANOMALY
- 5 CHANNEL ANOMALY
- 4 CHANNEL ANOMALY
- 3 CHANNEL ANOMALY
- 2 CHANNEL ANOMALY
- 1 CHANNEL ANOMALY
- PEAK POSITION
- 1ST and 4TH CHANNEL AMPLITUDES (18/2.5)
- ALTITUDE (FEET) (420)
- COINCIDENT MAGNETIC ANOMALY (gammas) (60γ)
- OFFSET MAGNETIC ANOMALY (60γ)
- 50 Hz WITH NORMAL ANOMALY (Hz)
- 50 Hz WITH ABNORMAL ANOMALY (Hz)

INTERPRETATION LEGEND

- CONDUCTOR OUTLINE
- IDENTIFICATION NUMBER (CS-3)
- SELECTED CONDUCTOR
- CULTURAL ANOMALY (C)

LOCATION MAP

SCALE = 1/500,000



5 cm

SHEET INDEX

6	7
4	5
4	3
2	
1	

5 cm

SURVEYED & COMPILED BY

geoterrex ltd

FOR

AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ELECTROMAGNETIC MAP

SHEET 6 OF 8	HORIZONTAL CONTROL ...... BASED ON	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C.
SCALE : 1/10,000	PHOTOMOSAICS	FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

006

85-2397 2/2

INPUT LEGEND

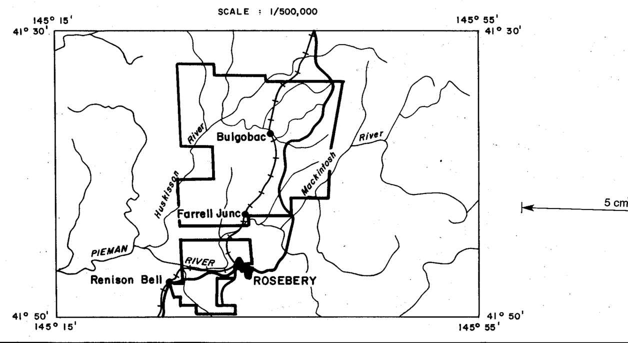
- 6 CHANNEL ANOMALY
- 5 CHANNEL ANOMALY
- 4 CHANNEL ANOMALY
- 3 CHANNEL ANOMALY
- 2 CHANNEL ANOMALY
- 1 CHANNEL ANOMALY
- PEAK POSITION
- 1ST and 4TH CHANNEL AMPLITUDES (18/2.5)
- ALTITUDE (FEET) (420)
- COINCIDENT MAGNETIC ANOMALY (gammas) (60γ)
- OFFSET MAGNETIC ANOMALY (60γ)
- 50 Hz WITH NORMAL ANOMALY (Hz)
- 50 Hz WITH ABNORMAL ANOMALY (Hz)

INTERPRETATION LEGEND

- CONDUCTOR OUTLINE
- IDENTIFICATION NUMBER (CS-3)
- SELECTED CONDUCTOR
- CULTURAL ANOMALY (C)

LOCATION MAP

SCALE : 1/500,000



5 cm

SHEET INDEX

8	7
6	5
4	3
2	
1	

5 cm

SURVEYED & COMPILED BY
geoterrex ltd

FOR
AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ELECTROMAGNETIC MAP

SHEET 7 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ...400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 007

INPUT LEGEND

6 CHANNEL ANOMALY
5 CHANNEL ANOMALY
4 CHANNEL ANOMALY
3 CHANNEL ANOMALY
2 CHANNEL ANOMALY
1 CHANNEL ANOMALY
PEAK POSITION
1ST and 4TH CHANNEL AMPLITUDES (18/2.5)
ALTITUDE (FEET) (420)
COINCIDENT MAGNETIC ANOMALY (gammas) (60γ)
OFFSET MAGNETIC ANOMALY (60γ)
50 Hz WITH NORMAL ANOMALY (Hz)
50 Hz WITH ABNORMAL ANOMALY (Hz)

INTERPRETATION LEGEND

CONDUCTOR OUTLINE
IDENTIFICATION NUMBER (CS-3)
SELECTED CONDUCTOR
CULTURAL ANOMALY (C)

LOCATION MAP

SCALE 1/500,000

SHEET INDEX

SURVEYED & COMPILED BY **geoterrex** ltd

FOR **AUSTRALIAN ANGLO AMERICAN LTD.**

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ELECTROMAGNETIC MAP

SHEET 8 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

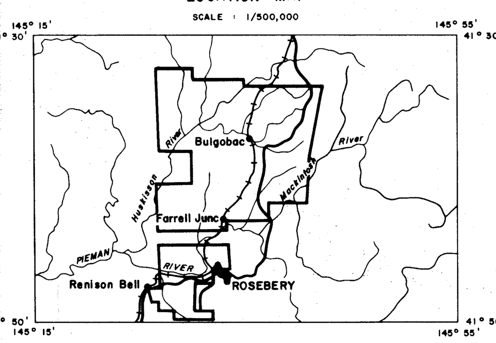
85-2397 2/2

008

MAGNETIC LEGEND

500 GAMMAS
100 GAMMAS
20 GAMMAS
10 GAMMAS

MAGNETIC LOW
CONTOUR INTERVAL .... 10 GAMMAS



SHEET INDEX

8	7
6	5
4	3
2	
1	

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR

AUSTRALIAN ANGLO AMERICAN LTD.

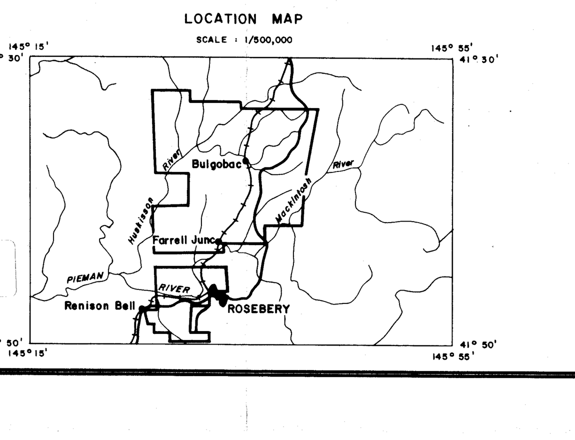
COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ISOMAGNETIC CONTOUR MAP

SHEET 1 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10GAMMAS	FLIGHT ALTITUDE ...400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 009



MAGNETIC LEGEND

500 GAMMAS
100 GAMMAS
20 GAMMAS
10 GAMMAS

MAGNETIC LOW
CONTOUR INTERVAL . . . . 10 GAMMAS

SHEET INDEX

8	7
6	5
4	3
	2
	1

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR **AUSTRALIAN ANGLO AMERICAN LTD.**

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ISOMAGNETIC CONTOUR MAP

SHEET 2 OF 8	HORIZONTAL CONTROL . . . . . . BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE . . . 400' M.T.C
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

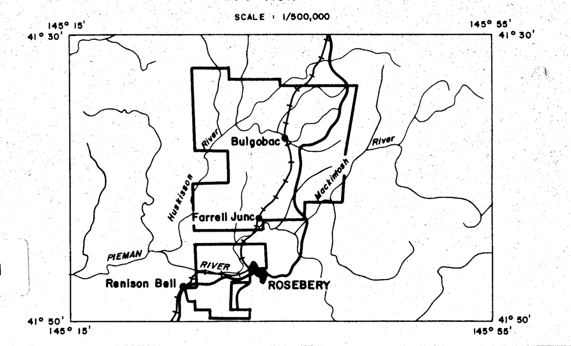
85-2397 2/2

010

MAGNETIC LEGEND

500 GAMMAS	
100 GAMMAS	
20 GAMMAS	
10 GAMMAS	
MAGNETIC LOW	
CONTOUR INTERVAL	10 GAMMAS

LOCATION MAP



SHEET INDEX

8	7
6	5
4	3
2	
1	

5 cm

SURVEYED & COMPILED BY
geoterrex ltd

FOR
AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ISOMAGNETIC CONTOUR MAP

SHEET 3 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2

011

SURVEYED & COMPILED BY geoterrex ltd

FOR AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

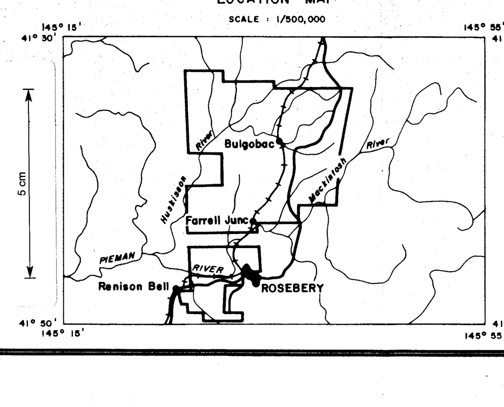
ISOMAGNETIC CONTOUR MAP

SHEET 4 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 012

MAGNETIC LEGEND
500 GAMMAS
100 GAMMAS
20 GAMMAS
10 GAMMAS
MAGNETIC LOW
CONTOUR INTERVAL .... 10 GAMMAS

LOCATION MAP



SHEET INDEX

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR **AUSTRALIAN ANGLO AMERICAN LTD.**

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
.BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

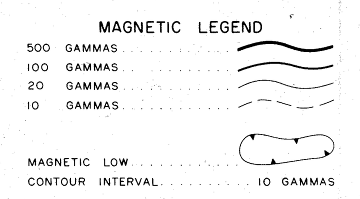
COMSTAFF SOUTH LEASES
TASMANIA

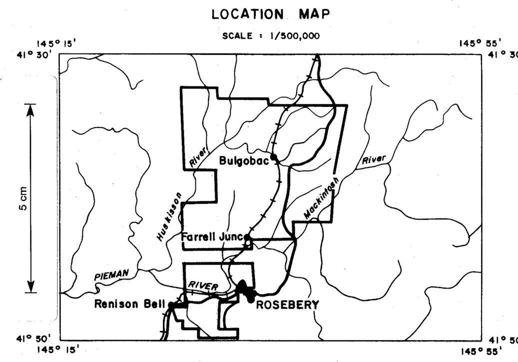
ISOMAGNETIC CONTOUR MAP

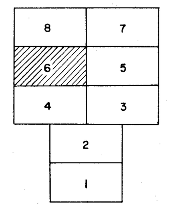
SHEET 5 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE ...400' M.T.C.
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/2 013

169109







5 cm

SURVEYED & COMPILED BY
geoterrex ltd

FOR
AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ISOMAGNETIC CONTOUR MAP

SHEET 6 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

014

85-2397 2/2

169110

5 cm

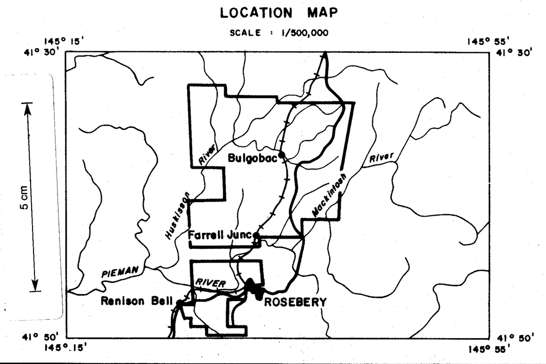
MAGNETIC LEGEND

500 GAMMAS ....
100 GAMMAS ....
20 GAMMAS ....
10 GAMMAS ....

MAGNETIC LOW ....
CONTOUR INTERVAL .... 10 GAMMAS

LOCATION MAP

SCALE - 1/500,000



SHEET INDEX

8	7
6	5
4	3
2	
1	

SURVEYED & COMPILED BY
geoterrex ltd

FOR
AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ISOMAGNETIC CONTOUR MAP

SHEET 7 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE ..400' M.T.C
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

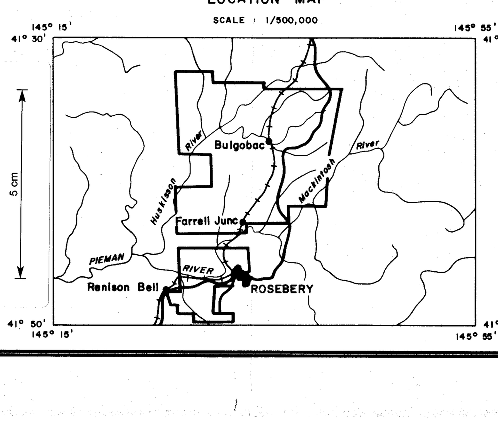
85-2397 2/2

C 015

MAGNETIC LEGEND

500 GAMMAS
100 GAMMAS
20 GAMMAS
10 GAMMAS

MAGNETIC LOW
CONTOUR INTERVAL ... 10 GAMMAS



SHEET INDEX

8	7
6	5
4	3
2	
1	

169111

5 cm

SURVEYED & COMPILED BY **geoterrex** ltd

FOR

AUSTRALIAN ANGLO AMERICAN LTD.

COMBINED AIRBORNE EM AND MAGNETOMETER SURVEY
BARRINGER "INPUT" ELECTROMAGNETIC SYSTEM

COMSTAFF SOUTH LEASES
TASMANIA

ISOMAGNETIC CONTOUR MAP

SHEET 8 OF 8	HORIZONTAL CONTROL ...... BASED ON PHOTOMOSAICS	CONTOUR INTERVAL: 10 GAMMAS	FLIGHT ALTITUDE ... 400' M.T.C
SCALE : 1/10,000		FLOWN IN APRIL, 1975	GEOTERREX PROJECT No. 83-184

85-2397 2/26 016