83-#415-#11054 2

ASSESSMENT REPORT

AIRBORNE INPUT ELECTROMAGNETIC AND MAGNETOMETER SURVEY

BONANZA GROUP

Bonanza 1-16 3404-3419; Imp 3427, Erial 3428;
Met 3430; Yet 3429; Again Fr. 3431; Black Bear 2877;
Moly Bear #1 and #2 2939 and 2940

SKEENA MINING DIVISION

103P/5W

55° 23' N   129° 52' W

FOR

BONANZA JOINT VENTURE

(Imperial Metals Corporation)
(Procan Exploration (B.C.) Ltd.)

by

Stephen P. Quin B.Sc., ARSM

Mining Geologist

Imperial Metals Corporation

Robert deCarle B.A.Sc.

Chief Geophysicist

Questor Surveys Limited

February 1983

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,054

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List of Illustrations

1. Introduction

Imperial Metals Corporation, the operator of the Bonanza Joint Venture, contracted Questor Surveys Limited to fly helicopter borne INPUT Electromagnetic and a total field magnetometer survey of the Joint Venture property.

In June of 1982 a total of 155 km of survey was flown over the property.

2. *The Property*

2.1. *The Claims*

The Bonanza area consists of 90 contiguous units comprised of 4 modified grid blocks, 18 2-post claims, 1 reverted crown grant and one fractional mineral claim. They were grouped as the Bonanza Group in September 1982.

The claims are;

Name of Claim	*No. of units*	*Record No.*	*Record Date*
Bonanza 1-16	*16*	*3404-3419*	*25 March*
Imp	*20*	*3427*	*19 April*
Erial	*12*	*3428*	*19 April*
Met	*18*	*3430*	*19 April*
Yet	*20*	*3429*	*19 April*
Again Fr.	*1*	*3431*	*19 April*
Black Bear	*1*	*2877*	*12 March*
Moly Bear #1/#2	*2*	*2939, 2940*	*12 March*

See Figure 1.

2.2. *Title to Claims*

Title to all the above listed claims is in the name of Procan Exploration (B.C.) Limited, subject to a joint venture agreement. This agreement gives Procan Exploration (B.C.) Limited, (henceforth "Procan") a 100% working interest in the Bonanza Group and Imperial Metals Corporation a 20% net profits interest.

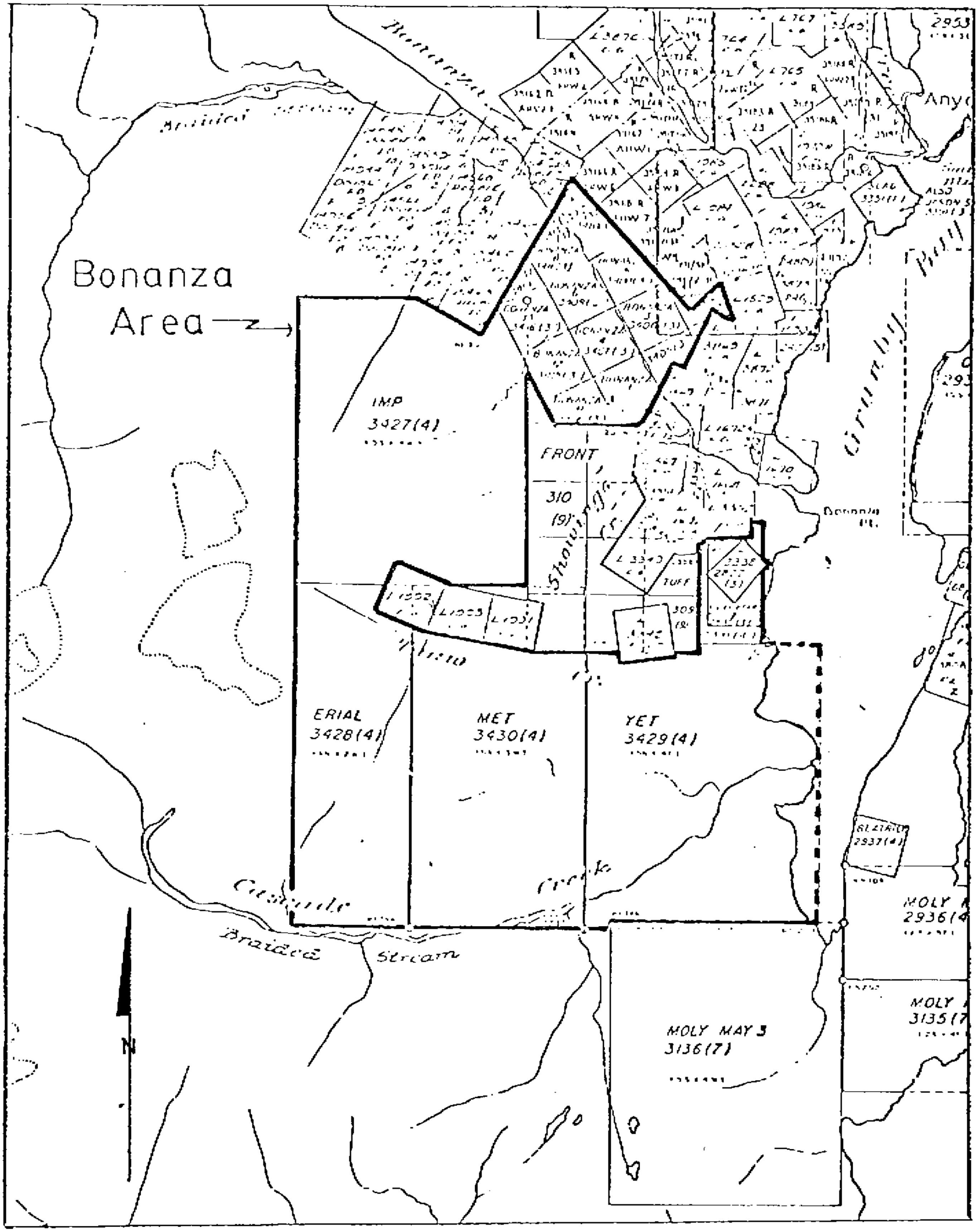


Figure 1: Claim Map
Bonanaza Group
Map 103P/5W
Scale 1:50,000

2.3. Location of the Claims

The Bonanza claim block are located in Hastings Arm, approximately 125 km north of Prince Rupert and 25 km west of the Kitsault Mine. The centre of the claim block is approximately at a latitude of 55° 23' north and a longitude of 129° 52' west (see Figure 2).

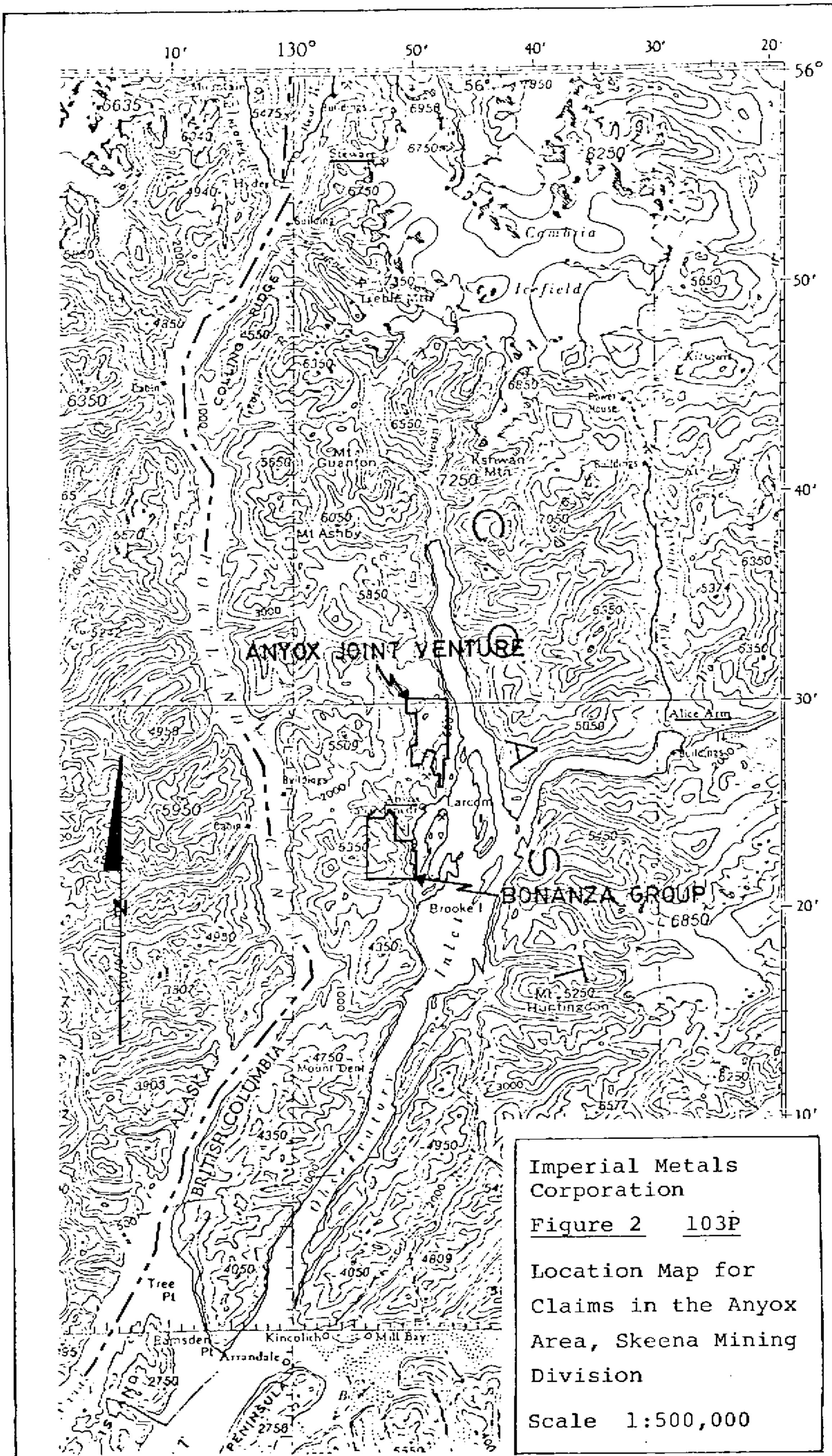
2.4. Access to the Claims

The claim area is reached by scheduled airline services to Kitsault, 25 km to the east, from Prince Rupert and then by helicopter based in Kitsault. Alternatively there is road access to Kitsault from Terrace while heavy equipment is best barged from Prince Rupert to the abandoned Anyox townsite.

2.5. Topography and Climate

The claims cover an area that rises from sea level to 1640 m above sea level. The area consists of a single large mountain with steep sides and a relatively flat top area, capped by a glacier, and is deeply dissected by several valleys. The lower elevations are covered by extremely dense underbrush and young trees. This thins as the elevation increases to only moss cover at the highest elevations.

The climate is typical of the coast mountains, with high rates of precipitation that may fall as snow at the higher elevations all year round. There is a heavy winter snowcover. Heavy fog and mist combined with low cloud can make helicopter access difficult, especially in the spring and fall.



Imperial Metals Corporation

Figure 2 103P

Location Map for Claims in the Anyox Area, Skeena Mining Division

Scale 1:500,000

3. *History (From Minister of Mines Reports 1898-1936)*

3.1. *Discovery*

In the last decade of the 19th century placer miners investigated the Anyox area making only minor discoveries. However, while prospecting Bonanza Creek, outcropping massive sulphides were discovered in the creek bed which were staked in 1901. Exploration of the area subsequently revealed outcropping massive sulphides on Hidden Creek in 1902 and disseminated sulphides just north of the mouth of Tauw Creek in 1904. Exploration undertaken by Hidden Creek Mining continued erratically until 1908 when Granby Mining and Smelting purchased Hidden Creek. Development commenced in 1909 and production commenced in 1915.

3.2. *The Production Years*

Ore was produced from the Hidden Creek mine from 1915-1935 and was supplemented by ore from the Bonanza Mine from 1928 until Hidden Creek closed down. Production rose from 462,000 tons in 1914, to a peak of 1,742,000 tons in 1935 with an output of 16 million lbs copper, 143,000 oz silver and 3,600 oz gold in 1914 rising to 37 million lbs of copper, 220,000 oz silver and 2,800 gold on close down.

Initially the ore was smelted directly, but during the second decade of production lower ore grades necessitated the use of a mill. During the 20 years of production some 25 million tons of rock were mined, producing 740 million lbs of copper, 7 million oz of silver and 124,000 oz of gold. Grades averaged 1.55% copper, 0.28 oz silver/ton and 0.01 oz/gold per ton from Hidden Creek and 2.18% copper, 0.39 oz/ton silver and little gold from the Bonanza Mine (Grove 1982).

The mine finally shut down in August 1935, due to low copper prices that had been falling since 1930, lower ore grade and higher production costs. The mine was not worked out. Cominco purchased the mine in 1936.

3.3. Exploration Since Shut Down

There has been sporadic exploration by various parties since 1935 resulting in several new discoveries, namely the Double Ed in Bonanza Creek in 1950 (2 million tons of 1.3% copper and 0.6% zinc drilled out), the Redwing in Tauw Creek explored in 1965-1967 (265,000 tons of 1.8% copper) and numerous relatively unexplored showings widely scattered over the Anyox pendant. There has been no systematic exploration of the pendant as a whole, though Cominco has investigated the surface potential of most of its claim area.

In the spring of 1982 a joint venture agreement was signed between Mitsui Mining and Cominco that resulted in an intensive drilling programme in the Hidden Creek area. Prior to this Imperial Metals had secured all the remaining potentially favourable land by staking and purchase agreements. Imperial then embarked on an intensive exploration programme of all its lands. Figure 3 shows the location of most of the known massive sulphide bodies and prospects.

ments. Imperial then embarked on an intensive exploration programme of all its lands. Figure 3 shows the location of most of the known massive sulphide bodies and prospects.

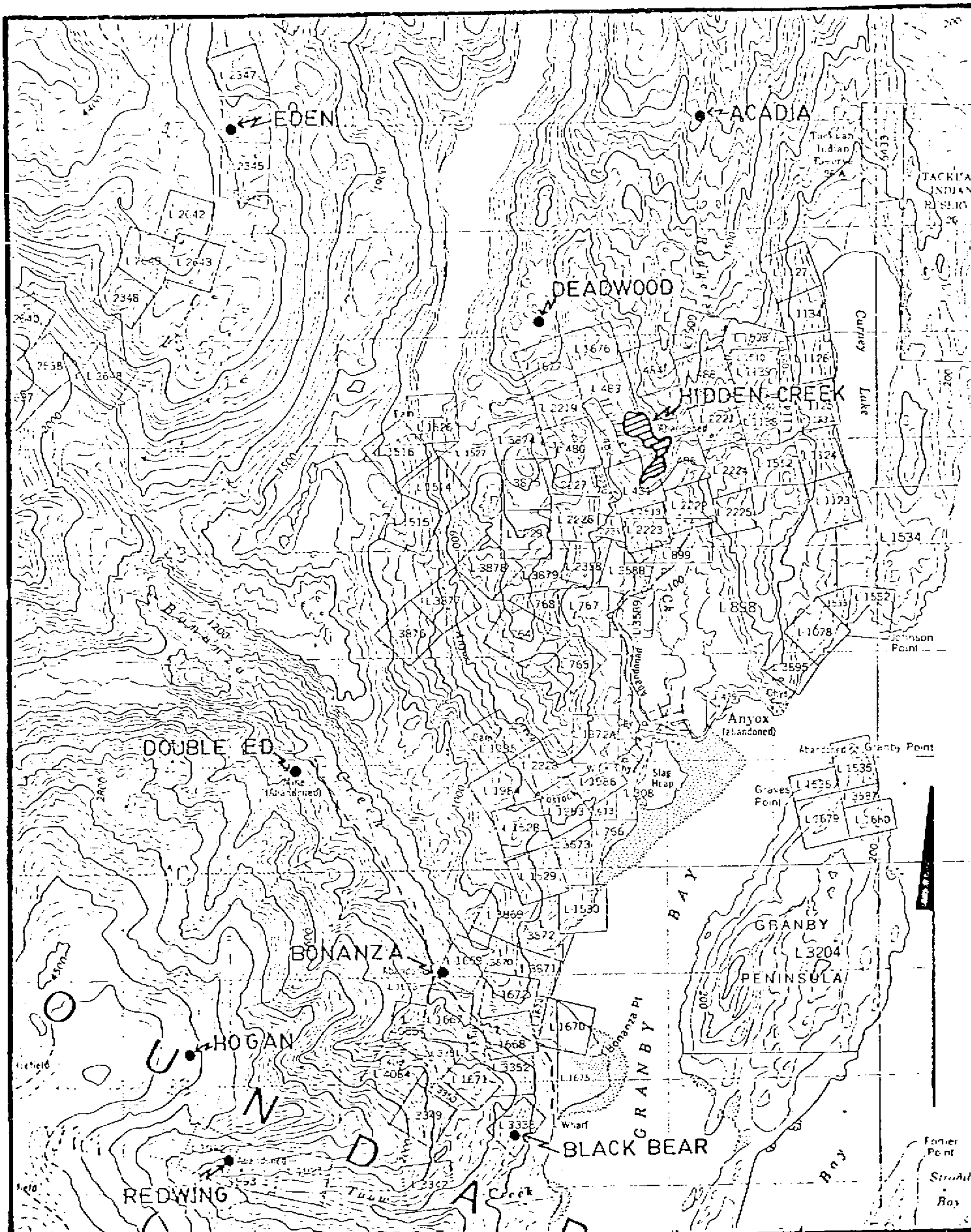


Figure 3. Scale 1:50,000

MASSIVE SULPHIDE BODIES & PROSPECTS IN THE ANYOX AREA

4. *Itemized Cost Statement*

1. June 21 - 28, 4 days;

   Helicopter borne INPUT Electromagnetic survey

   Proton Precession total field magnetometer survey

	Contract Price	$17,236
2. Mobilization to and from Anyox		3,540
	TOTAL COST	$20,776

5. Statement of Qualifications

I, Stephen Paul Quin, of 1504 - 1260 Nelson Street, Vancouver, B.C. state that

a) I am a permanent employee of Imperial Metals Corporation with offices at suite 3104 - 1055 Dunsmuir Street, Vancouver, B.C.

b) I graduated from the Royal School of Mines, London, Great Britain, with a Bachelor's Honours degree in Mining Geology in 1980.

c) I have been employed by Imperial Metals Corporation and its predecessor, Invex Resources Limited, for a period of two-and-a-half years, since graduation.

15 February 1983.

Stephen P. Quin B.Sc., ARSM
Mining Geologist

NAME	:	ROBERT J. deCARLE
OCCUPATION	:	Chief Geophysicist
EDUCATION	:	Graduated from Lakehead University in 1967 receiving a Mining Technology Diploma. Michigan Technological University - B.A.Sc. in Geophysics, 1970.
PROFESSIONAL AFFILIATIONS	:	Society of Exploration Geophysicists Canadian Institute of Mining & Metallurgy Canadian Exploration Geophysical Society (KEGS)
EXPERIENCE	:	1965 — Summer spent with Noranda Mines Ltd., as underground scram helper.
	:	1966 — Summer spent with Anaconda American Brass carrying out electromagnetic and magnetic surveys in Ontario.
	:	1967-69 — Summers spent with Hudson Bay Exploration and Development Co., as a geophysical technician and prospector.
	:	1970-Present — Joined Questor Surveys Limited as a Geophysicist. Responsible for reduction of airborne data both in the field and in-house. Also carried out interpretation and report writing. Became Chief Geophysicist in 1975, responsible for all data reduction personnel, geophysicistts and geologists associated with airborne surveys.
COUNTRIES WORKED IN	:	Canada, United States, South Africa.
LANGUAGES SPOKEN	:	English, French.
PASSPORT #	:	FB 334746 Expires June 16, 1986.

6. Geophysical Report

The geophysical report, as written by R. deCarle, is enclosed herewith in its entirety.

HELICOPTER INPUT E.M. SURVEY

IMPERIAL METALS CORPORATION

BONANZA AREA, BRITISH COLUMBIA

FILE NO: 24H35B OCTOBER, 1982

Questor Surveys Limited, 6380 Viscount Road, Mississauga, Ontario L4V 1H3

C O N T E N T S

INTRODUCTION

This report contains the results of a helicopter MK VI INPUT survey flown in the Bonanza Area, near Anyox, British Columbia, on June 25, 26 and 28, 1982.

A brief description of the survey procedure is included.

The survey mileage was 155 line kilometres and the survey was performed by QUESTOR SURVEYS LIMITED. The survey aircraft was a Bell 205 Helicopter C-GLMC and the operating base was Stewart, British Columbia.

The area outline is shown on a 1:50,000 map at the end of this report. This is part of the National Topographical Series, Sheet Number 103P/5.

The following were the personnel involved with the airborne survey:

Pilot	- Dan Davis
Navigator	- Bill Smith
Operator	- Keith Higgenbottom
Engineer	- Laughin Currie
Geophysicist	- Robert de Carle

SURVEY PROCEDURE

Terrain clearance was maintained as close to 122 metres as possible, with the E.M. Bird at approximately 45 metres above the ground. Rough terrain could be a factor for the helicopter not being at 122 metres. A normal S-pattern flight path using approximately one half kilometre turns was used. Consecutive lines were flown in alternate directions for the sole purpose of interpreting dipping conductors. This phenomenon will be dealt with later.

A line spacing of 150 metres was used over the entire survey area with an approximate east-west line direction.

The equipment operator logged the flight details and monitored the instruments. It was the responsibility of the geophysicist to maintain and check the ground magnetic station, Geometrics G-806, which was recording the daily diurnal changes. The results of these recordings have been included in the final shipment.

MAP COMPILATION

The base map for navigation and flight path recovery was supplied to the contractor by the client. This mylar transparency was at an approximate scale of 1:10,000. The final map was reproduced at a scale of 1:10,000 on stable transparent film from which white prints can be made. A copy of the map layout is located on each sheet using topographical reference numbers. The map sheet is a 7.5 minute photographic quadrangle.

Flight path recovery was accomplished by comparison of the 35mm half frame film with the mosaic in order to locate the fiducial points. Most picked points are between 300 and 600 metres depending on the difficulty of the area, some picked points are much in excess of this figure.

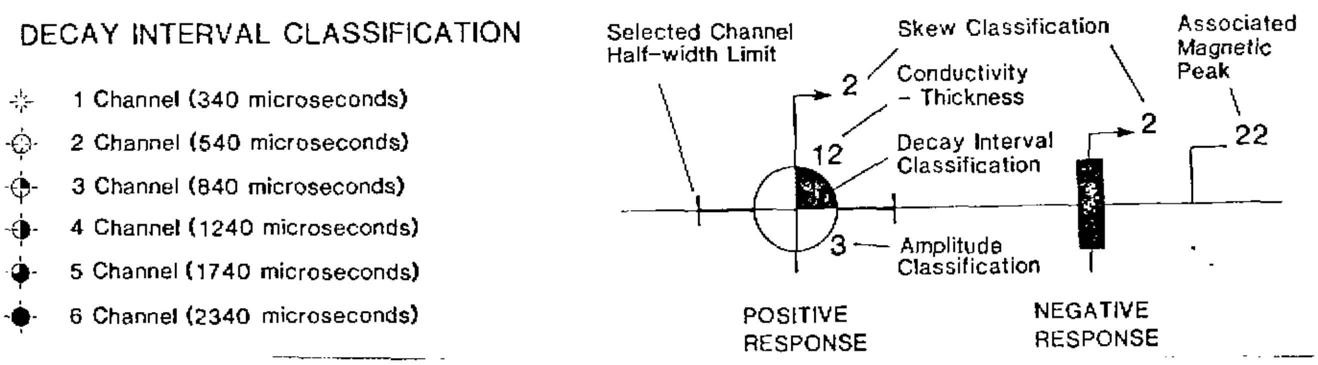
DATA PRESENTATION

The results of the INPUT survey are presented to the client in the following manner:

- a blank 7.5 minute photographic base at a scale of 1:10,000;
- a photographic base showing combined INPUT anomalies, half peak width of channel 2, conductive overburden, selected targets, skew classification and flight lines;
- a clear overlay showing the contoured form of the total magnetic field.

See Appendix for a comprehensive description of the interpretational approach used in helicopter INPUT surveys.

QUESTOR's conventional form for presenting the helicopter INPUT data on a base map is as follows and is self-explanatory:



RESULTS

The survey area is located some 65 kilometres south of Stewart, British Columbia and also, roughly 2 kilometres south of Anyox. It is an area which has seen considerable amounts of exploration work carried out over the years. A number of deposits or showings occur within the survey block, namely, the Bonanza, Redwing, Double Ed and the Golkish. The biggest deposit in the area and for a time, the biggest copper producer in British Columbia, is the Hidden Creek Mine, located approximately 6.5 kilometres north of the survey block. Twenty-three million tons of 1.55% copper was produced from this deposit between 1914 and 1936.

Volcanic and sedimentary rocks which underlie most of the Granby Bay area form a large inclusion in a granitic matrix of the Coast Range complex. The surrounding granitic rocks are generally coarse-grained granodiorites which grade variably between hornblende quartz diorite and leucocratic quartz monzonite. The volcanic rocks in the Granby Bay inclusion consist largely of altered, pillowed, and massive andesites, some banded crystal tuffs, and massive basic sills. The volcanics have been intruded by small gabbroic plugs and various dykes. The overlying sediments include thinly striped argillites, colour-banded dark siltstones, dark sandstones and minor limestone as lenses.

All major mineralized deposits occur at or near a volcanic-sedimentary contact and are largely confined to shear zones apparently controlled by hinge (or 'nose') structures in the contact zone. Mineralization in these deposits is similar and generally consists of massive, variably banded sulphides, of which pyrite, pyrrhotite, and chalcopyrite are the most common.

The Bonanza deposit, which incidently, the INPUT system did not pick up, produced in the order of 724,000 tons of 2.18% copper between 1928 and 1935. This deposit is also on a contact between the argillites and volcanic lavas. It would appear that two flight lines were flown over the deposit, lines 20290W and 20300E. The continuity of the mineralized lenses must be very poor or the zones, for the most part, have been mined out. There was also no magnetic anomalies intercepted over the deposit which suggests the absence of any pyrrhotite.

A fair electromagnetic response was picked up over the Redwing deposit however. Anomalies were also picked up to the east, ZONE B12, which may be related to the Redwing. The mineralization here consists of disseminated to crudely banded massive pyrite, pyrrhotite, and chalcopyrite with some brown sphalerite located in a chlorite schist zone about 400 feet west of the steep west contact between volcanics and siltstones.

There were no INPUT anomalies intercepted over the Double Ed or the Golkish deposits.

A number of interesting targets were intercepted during the course of this helicopter INPUT survey. Some are located entirely within the volcanics while others are associated with the metasediments. One aspect which must not be forgotten is that some of the conductors intercepted over the sedimentary horizon may in fact be associated with the volcanics. If we are dealing with a relatively thin overlying sedimentary layer, this would make some of these targets quite attractive.

Some of the more promising selective targets would be ZONES B5, B6, B8, B14, B22, B26, B30 and B32. A brief discussion on these and the remainder of the outlined zones follows:

ZONE B1

Extremely weak INPUT responses which appear to coincide with a fault zone. The rock type would appear to be granodiorite. It is possible that the responses may be related to minor amounts of sulphides within the fault zone. However, a low priority is given to this trend.

ZONE B2

A very weak response which could be correlating with a possible fault zone. It is on strike with ZONE B4 which also appears to be correlating with the same fault zone. Rock types have been described as being granodiorite and quartz diorite. A very low priority target.

ZONE B3

The anomaly displays a relatively broad electromagnetic response (2 channels) which may indicate that the flight line is hitting the conductive trend at an oblique angle. A decrease in amplitudes may also result from intercepting the conductor at a low angle. Note the possible relationship with a fault zone. Granodiorite is the rock type. This zone would be considered a low-medium priority target. In other words, a reconnaissance survey should be carried out but at a time when some of the other more important zones have been checked out.

ZONE B4

As mentioned previously, this isolated intercept may be correlating with a fault zone. The response does look like it is bedrock related and not produced from conductive overburden. There is magnetic association which suggests that pyrrhotite may be the source within the fault zone. A low priority target.

ZONE B5

This zone is definitely due to a bedrock source as it displays fair to good conductivity. It is also associated with a magnetic low which suggests that graphite and/or pyrite is the probable cause. The interpreted dip is in a westerly direction with a rather steep angle. Salmon River or Goose Bay metasediments would appear to be the rock units in this particular area and have been described as being argillites, fine grey argillaceous and carbonaceous sandstones, and a few thin beds of impure limestone. Their proximity to the volcanics to the west would seem to make this zone an attractive target. Although there is plenty of ice fields atop this mountain, location of anomalies are plotted as accurately as possible so that intercepting the conductor should not prove to be difficult.

ZONE B6

This is a rather attractive target. Intercept 20110A displays a good electromagnetic response and is also correlating with a broad magnetic high. It is not believed that the conductivity and magnetic susceptibility are related to the same source. Note the slight stagger of the negative response in an easterly direction. This indicates that the conductor is dipping towards the east. Intercept 20130A also displays a fair E. M. response. Intercept 20120B may be an extension of the conductor to the northeast. Referring to the geology map, it will be noted that ZONE B6 is associated with or is very close to the volcanic-metasedimentary contact, an important horizon for economic sulphide deposits. It should also be noted that the southern extent of the conductor is cut off by a major north-south trending fault zone. A ground reconnaissance survey is highly recommended.

ZONE B7

The lone intercept displays a very weak E. M. response and also, there is no magnetic association. No further work is warranted.

ZONE B8

All of the anomalies, which are located on top of the mountain, display very poor electromagnetic responses and also, have little or no magnetic association. The responses are generally broad, possibly indicating that the flight lines are hitting the conductor at a low angle. The trend is not that attractive, however, it is suggested that while checking out ZONE B5, located to the south, a ground check could be made on B8 to determine whether or not sulphides are the cause of this weak conductor. It is suggested that any preliminary work which is initiated in this area should be carried out in the vicinity of intercept 20150A.

ZONE B9

A very poor anomaly which is not recommended for further work.

ZONE B10

Considering the general quiet background of the INPUT traces (noise levels), it is ascertained that this response is due to a bedrock source. Although very weak on channel 2, there is a 30 part-per-million amplitude response on channel 1. There is no magnetic association. Referring to the geology map, it will be noted that this poor looking anomaly is located to the south and on strike with a known deposit or showing. The writer suspects that it is called the Golkish deposit. It consists of a quartz vein averaging about 6 feet in width and lying in black argillite parallel to the bedding planes. Pyrrhotite and pyrite are freely disseminated throughout the argillites. The deposit was worked primarily as a supply of siliceous flux for the smelter at Anyox. Further work in the vicinity of the INPUT anomaly is not warranted.

ZONE B11

This zone would appear to be related to the Redwing deposit of Canusa Mines Ltd., which was first detected back in 1909. The Redwing is one of several significant copper properties in the Anyox area which are found in shear zones along or near the pillow volcanic-sedimentary contact. Results from 1964-1965 drilling have outlined two major mineralized zones or lenses within the shear and these appear to trend northward, dip steeply east and plunge to the northeast at a high angle. The mineralization as outlined in the No. 1 Adit and by drilling, consists of disseminated to crudely banded massive pyrite, pyrrhotite, and chalcopyrite with some brown sphalerite. Tonnage is not known to the writer.

Intercept 20240A does display a weak electromagnetic response but is definitely due to a bedrock source. There is also a subtle magnetic feature, in the order of 10 gammas, suggesting that pyrrhotite is present. Intercept 29021B displays a relatively broad but weak response and this could be due to the control line being flown parallel or at a low angle to the conductor. Intercept 29021A, located just to the north beneath the ice cap, may also be related to the Redwing zones.

As mentioned earlier, the conductor is correlating with or is very close to the pillow volcanic-metasedimentary contact, an important horizon for economic sulphides.

The weakness of the INPUT responses may reflect the discontinuity of the sulphides within this deposit. However, this is merely speculation. Large tonnage would seem to be out of the question. Naturally, any final assessment of this area will be based on other factors such as geological interpretation, structural characteristics (faulting) etc.

ZONE B12

These three INPUT anomalies display very weak electromagnetic responses but do have subtle magnetic anomalies associated with them. The multiple response and the weakness of the channel amplitudes may be due to the fact that the flight line has been flown at an oblique angle to the conductor. It is suspected that a bedrock source does exist here.

In close proximity to the Redwing deposit, ZONE B12 may, in fact, be due to a viable zone of mineralization. The rock types, as described on the geology maps, have been described as being pillowed lavas and metasediments (argillites). It would seem that the outlined area is located close to the ridge of the mountain.

A reconnaissance survey is warranted.

ZONE B13

This extremely weak electromagnetic response may be due to a bedrock source but any further work in this area should be as a low priority and only if other considerations, such as favourable geology, are encouraging.

Volcanics appear to be the host rocks.

ZONE B14

Intercept 20290C displays quite a good electromagnetic response in that the decay rate of the transient is relatively slow. This indicates a reasonable conductance value for the mineralization. Note that there is an absence of magnetic susceptibility suggesting magnetic sulphides and/or graphite as the probable cause.

Intercept 20290D, to the west, is very weak and should not be pursued.

ZONE B14 is considered a worthwhile target for further investigation. Note the portion of an anomaly on the west end of line 20270W. This indicates that the conductor is a good one and extends to the south, at least another 600 feet.

ZONE B15

The lone intercept, 20270F, displays a weak 2 channel response which could very well, in fact, be due to a bedrock source. The weakness of the response could be related to the flight line being flown at an oblique angle. The magnetics certainly suggest this.

Metasediments may be the host rock.

Since a reconnaissance survey is recommended for B14, 900 feet to the west, it is suggested that a field check be carried out in the vicinity of B15.

ZONES B16 TO B20

All of these zones are considered weak conductors which have little or no magnetic association. ZONE B18 displays a little more amplitude than the other intercepts and may, in fact, be due to a bedrock source.

Referring to the geology maps, it will be seen that B16, B17 and B18 correlate with metasediments while B19 and B20 seem to be correlating with volcanic lavas.

ZONE B18 is the better target and thus, follow-up on the ground is warranted.

ZONE B21

This isolated anomaly displays an extremely weak electromagnetic response and does not have any magnetic association. It does, however, appear to be correlating with or is very close to the pillow lava-metasedimentary contact which is the important horizon for economic sulphides.

However, based on its extremely weak response and its possible relationship with a narrow stringer of mineralization, further work is not recommended.

ZONE B22

Intercept 20320A displays a very good E. M. response and is also correlating with a magnetic anomaly, in the order of 22 gammas. Although showing a little weaker E. M. response, intercept 20330A is still considered to be due to a bedrock source. There is every probability that pyrrhotite is the source mineral.

Note the stagger of the channel peaks for intercept 20320A in a westerly direction. This characteristic indicates that the conductor is dipping to the west at a relatively shallow angle.

The host rock would appear to be metasediments although volcanics should not be discounted. A thorough field check should be made in this area to fully identify the source for this conductor.

ZONES B23 AND B24

The multiple responses within the outlined areas of both zones suggest the possibility that the flight lines have been flown parallel or at a very low angle to the strike of the conductors. The magnetics certainly suggest this phenomenon. There is also a northeast-southwest trending fault zone in the vicinity of ZONE B24 which may be coincident with the conductor.

Metasediments have been described as being the rock type in both areas.

Reconnaissance surveys are suggested but on a low priority basis only.

ZONE B25

The outline of this long, conductive trend coincides with the western extremity of saline material which has been deposited over the years within Granby Bay. The electromagnetic responses are quite strong yielding conductance values as high as 85 siemens.

Note the negative responses on the lines which were flown west. The peak of these negative responses coincide with the edge of the conductive material and the stagger in an east direction indicates a thickening or slope of the bedrock in an easterly direction.

ZONE B26

The isolated intercept is definitely due to a bedrock source and not related whatsoever to the road which is parallelling Bonanza Creek. Conductive overburden is also out of the question. There is a subtle magnetic feature associated with this anomaly which suggests that pyrrhotite may be the source mineral.

Note the major fault zone which coincides with Bonanza Creek. It is possible that the anomaly may be related to this structural feature.

Metasediments have been described as being the rock types, chiefly argillite. Graphite may also be the cause.

It is suggested that a ground reconnaissance survey be carried out in this area. Easy access to the zone along the road should hasten the follow-up to provide the answers to the cause.

ZONES B27, B28, B29 AND B30

All of these intercepts display rather weak electromagnetic responses but for the most part, are due to bedrock sources. Intercepts 20361A, E and F, however, should not be given any further consideration in the field. Even though intercepts 20361B, C and D display a little better response, they do seem to be correlating with metasediments which may indicate that graphite is the source mineral.

ZONE B30 could very well be correlating with or is very close to the pillow lava-metasedimentary contact. An investigation in this particular area is warranted.

ZONES B31 AND B32

Both of these trends display good electromagnetic responses and only B31 has any magnetic association. Actually, it correlates high up on the flank of the magnetic feature which is located to the west. This suggests the possible association with a geological contact.

ZONE B32 is the better target of the two with recommendations for follow-up in the vicinity of intercept 20430A. Note the stagger of the channel peaks in an easterly direction. This indicates that the conductor is dipping to the east.

The Double Ed deposit is located just to the west of ZONE B31 and the close proximity of the two, makes ZONES B31 and B32 interesting targets.

<u>ZONES B33 AND B34</u>

Both of these intercepts, 20390A and B display very weak electromagnetic responses and do not have any magnetic association. Graphite may be the source mineral.

Metasediments (argillite) have been described as being the rock type.

No further work is warranted in these two areas.

QUESTOR SURVEYS LIMITED

R. J. de Carle

R. J. deCarle,

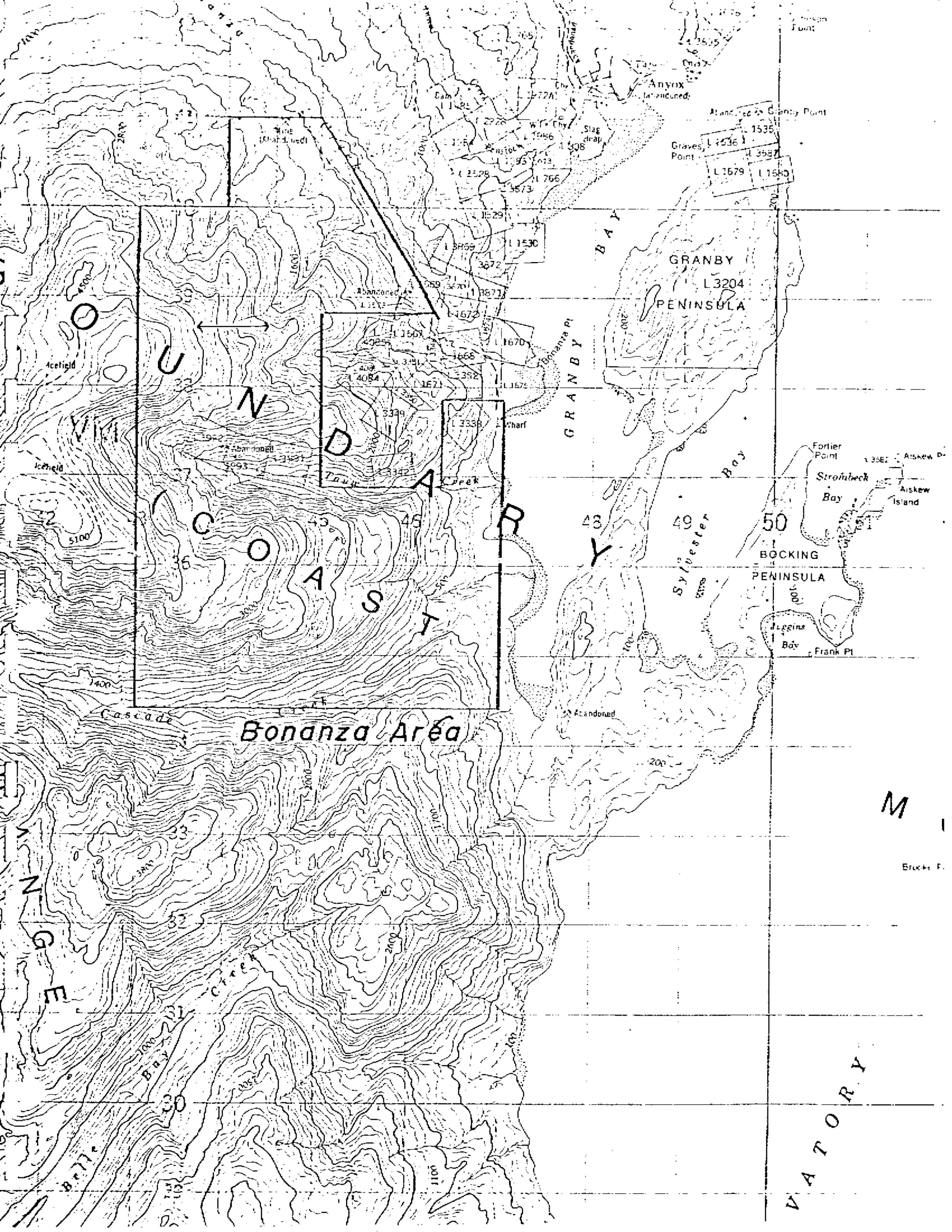
Chief Geophysicist

Selected References:

Dolmage, V., 1922, Coast and Islands of British Columbia between Douglas Channel and the Alaskan Boundary, Summary Report, 1922, Part A, Geological Survey of Canada, pp. 9-34.

Minister of Mines and Petroleum Resources, Annual Report for the year ended December 31, 1965, pp. 57-59.

Sharp, R., Osatenko, M., 1978, Regional Geology of the Anyox Area, map supplied to Questor Surveys Limited by Imperial Metals Corporation.


Bonanza Area
BOUNDARY
COAST
RANGE
GRANBY BAY
GRANBY PENINSULA
L 3204
BOCKING PENINSULA
Sylvester Bay
Strombeck Bay
Juggins Bay
Frank Pt
Fortier Point
Aiskew Island
Anyox (abandoned)
Granby Point
Graves Point
Bonanza Pt
Wharf
Cascade Creek
Belle Bay
Iceheld
Abandoned
OBSERVATORY
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APPENDIX

EQUIPMENT

The helicopter is equipped with a Mark VI INPUT (R) E.M. system and Sonotek P.M.H. 5010 Proton Magnetometer. Radar altimeters are used for vertical control. The outputs of these instruments together with fiducial timing marks are recorded by means of galvanometer type recorders using light sensitive paper. Thirty-five millimeter half frame cameras are used to record the actual flight path.

BARRINGER/QUESTOR MARK VI INPUT (R) SYSTEM

The Induced Pulse Transient (INPUT) system is particularly well suited to the problems of overburden penetration. Currents are induced into the ground by means of a pulsed primary electromagnetic field which is generated in a transmitting loop around the helicopter. By using half sine wave current pulses and a loop of large turns-area, the high output power needed for deep penetration is achieved.

The induced current in a conductor produces a secondary electromagnetic field which is detected and measured after the termination of each primary pulse. Detection is accomplished by means of a receiving coil towed behind the helicopter on two hundred and fifty feet of cable, and the received signal is processed and recorded by equipment in the helicopter. Since the measurements are in the time domain rather than the frequency domain common to continuous wave systems, interference effects of the primary transmitted field are eliminated. The secondary field is in the form of a decaying voltage transient originating in time at the termination of the transmitted pulse. The amplitude of the transient is, of course, proportional to the amount of current induced into the conductor and, in turn, this current is proportional to the dimensions, the conductivity and the depth beneath the helicopter.

The rate of decay of the transient is inversely proportional to conductivity. By sampling the decay curve at six different time intervals, and recording the amplitude of each sample, an estimate of the relative conductivity can be obtained. By this means, it is possible to discriminate between the effects due to conductive near-surface materials such as swamps and lake bottom silts, and those due to genuine bedrock sources. The transients due to strong conductors such as sulphides exhibit long decay curves and are therefore commonly recorded on all six channels. Sheet-like surface materials, on the other hand, have short decay curves and will normally only show a response in the first two or three channels.

The samples or gates are positioned at 340, 540, 840, 1240, 1740 and 2340 micro-seconds after the cessation of the pulse. The widths of the gates are 200, 200, 400, 400, 600 and 600 micro-seconds respectively.

For homogeneous conditions, the transient decay will be exponential and the time constant of decay is equal to the time difference at two successive sampling points divided by the log ratio of the amplitudes at these points.

SONOTEK P.M.H. 5010 PROTON MAGNETOMETER

The magnetometers which measure the total magnetic field have a sensitivity of 1 gamma and a range from 20,000 gammas to 100,000 gammas.

Because of the high intensity field produced by the INPUT transmitter, the magnetometer results are recorded on a time-sharing basis. The magnetometer head is energized while the transmitter is on, but the read-out is obtained during a short period when the transmitter is off. The precession frequency is being recorded and converted to gammas during the 0.2 second interval when there is no power in the transmitter loop.

For this survey, a lag factor has been applied to the data. Magnetic data recorded on the analogue records at fiducial 10.00 for example would be plotted at fiducial 9.95 on the mosaics.

DATA SYMBOLOGY

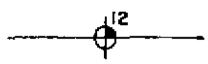
The symbols used to designate the anomalies are shown in the legend on each map sheet and the anomalies on each line are lettered in alphabetical order in the direction of flight. Their locations are plotted with reference to the fiducial numbers on the analog record.

A sample record is included to indicate the method used for correcting the position of the E.M. Bird and to identify the parameters that are recorded.

All the anomaly locations, magnetic correlations, conductivity-thickness values and the amplitudes of channel number 2 are listed on the data sheets accompanying the final maps.

POSITIVE ANOMALY SYMBOL 

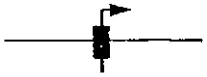
A symbol ascribed to spatially represent the position of peak response amplitude from a conventional secondary field direction. The convention is based on the response type most frequently detected with the geometrical configuration of the system.

CONDUCTIVITY-THICKNESS 

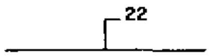
A numerical value based on a ratio between early and late channel amplitudes. It normalizes the DECAY INTERVAL CLASSIFICATION against the AMPLITUDE CLASSIFICATION to derive a value based on the temporal rate of decay of the secondary field.

SELECTED CHANNEL HALF WIDTH LIMIT 

A planimetric representation of the profile-derived half-width of a positive response. It may also be used to indicate the group half-width of multiple responses.

NEGATIVE ANOMALY SYMBOL 

A symbol ascribed to spatially represent the position of peak response amplitude from a reverse secondary field direction- (see POSITIVE ANOMALY SYMBOL)

ASSOCIATED MAGNETIC PEAK 

A symbol ascribed to spatially represent the position and magnitude of a magnetic susceptibility anomaly proximate to a recognized conductivity anomaly. For purposes of plotting simplifications, only positive monopoles and the positive component of dipolar responses are mapped in this manner.

GENERAL INTERPRETATION

The INPUT system will respond to conductive overburden and near-surface horizontal conducting layers in addition to bedrock conductors. Differentiation is based on the rate of transient decay, magnetic correlation and the anomaly shape together with the conductor pattern and topography.

Power lines sometimes produce spurious anomalies but these can be identified by reference to the monitor channel.

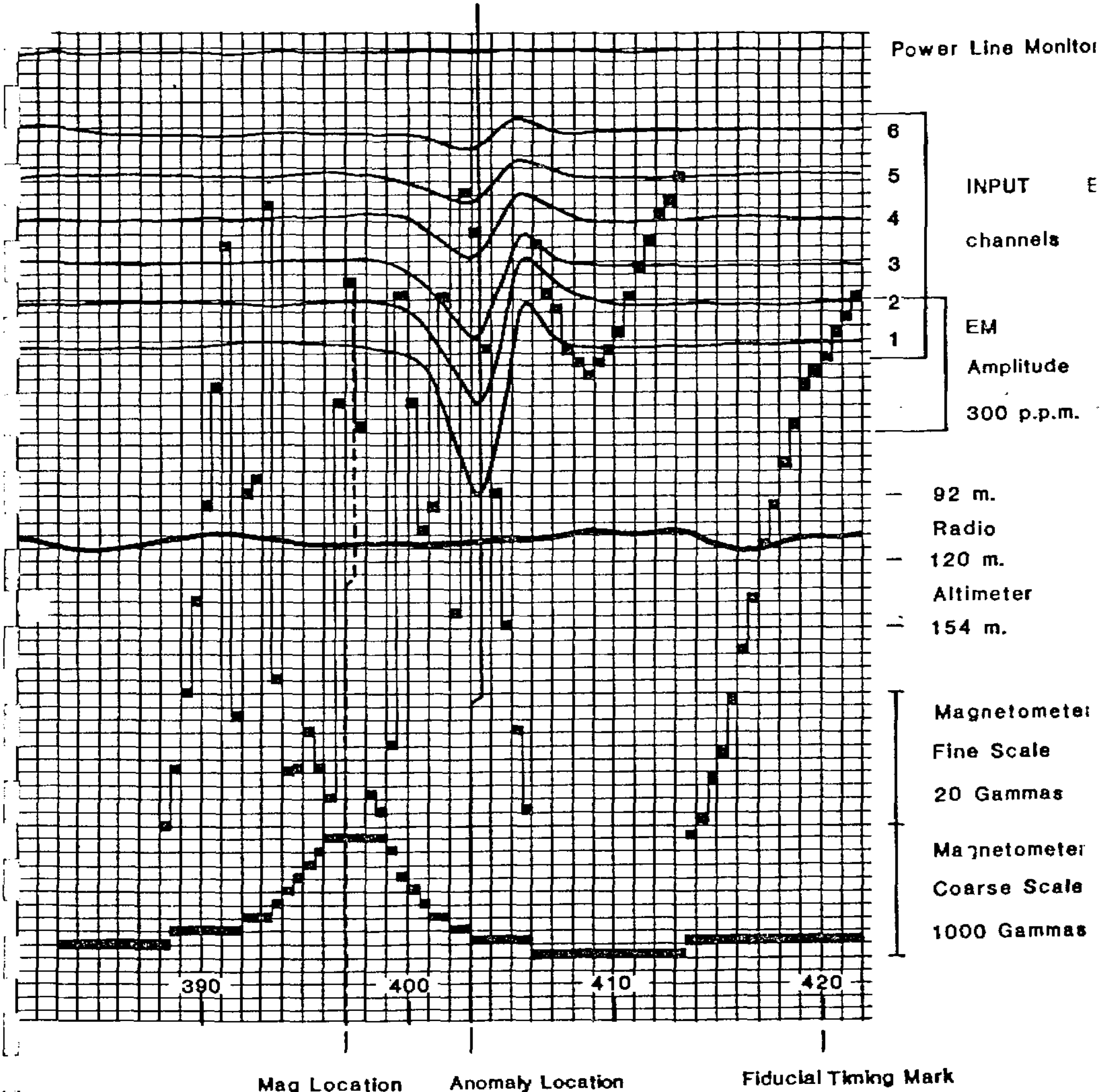
Railroad and pipeline responses are recognized by studying the film strips.

Graphite or carbonaceous material exhibits a wide range of conductivity. When long conductors without magnetic correlation are located on or parallel to known faults or photographic linears, graphite is most likely the cause.

Contact zones can often be predicted when anomaly trends coincide with the lines of maximum gradient along a flanking magnetic anomaly. It is unfortunate that graphite can also occur as relatively short conductors and produce attractive looking anomalies. With no other information than the airborne results, these must be examined on the ground.

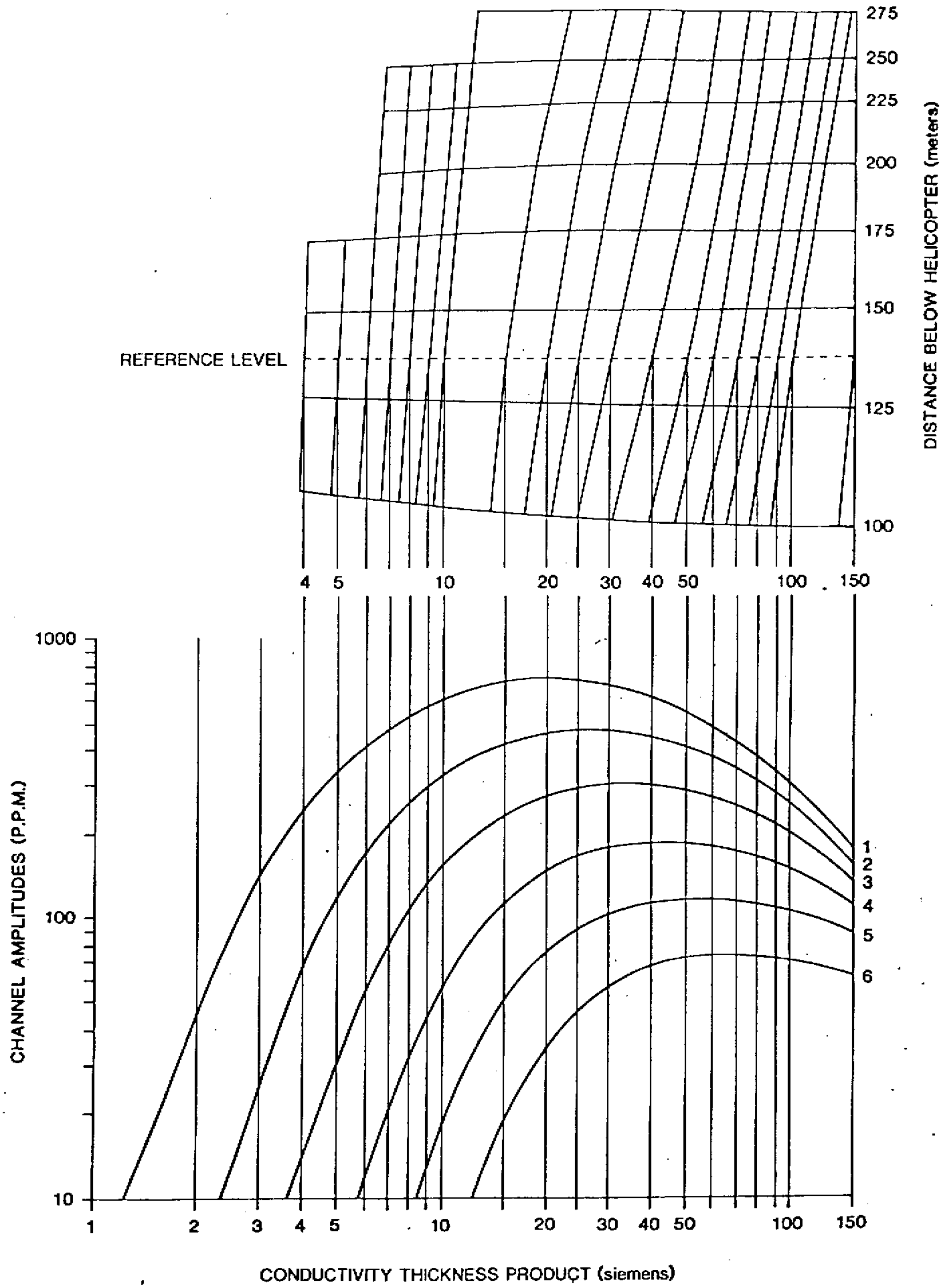
Serpentinized peridotites often produce anomalies with a character that is fairly easy to recognize. The conductivity which is probably caused in part by magnetite, is fairly low so that the anomalies often have fairly large response on channel # 1, they decay rapidly and they have strong magnetic correlation. INPUT E.M. anomalies over massive magnetites show a relationship to the total Fe content. Below 25-30%, very little or no response at all is obtained but as the percentage increases the anomalies become quite strong with a characteristic rate of decay which is usually greater than that produced by massive sulphides.

Commercial sulphide ore bodies are rare and those that respond to helicopter survey methods usually have medium to high conductivity. Limited lateral dimensions are to be expected and many have magnetic correlation caused by magnetite or pyrrhotite. Provided that the ore bodies do not occur within formational conductive zones as mentioned above, the anomalies caused by them will usually be recognized on an E.M. map as priority targets.



Representative INPUT Magnetometer and Altimeter Recording

HELICOPTER INPUT
VERTICAL HALF PLANE
CONDUCTIVITY / DEPTH NOMOGRAM



ANOMALY	FIDUCIAL	CHANNELS	HALF WIDTH LEFT	HALF WIDTH RIGHT	HW	AMPLITUDE CLASS	SKEW	SIG-T	ASSOCIATED MAG POSITION	MAGNETIC VALUE
20010A	50.15	2				1				
20020 A	60.55	2				1				
20050 A	95.47	2				1			95.29	4
20060 A	98.92	2				1			98.36	16
20080 -	114.80	6					2E			
20090 -	22.34	6					3E			
20090 A	23.59	2				1			23.69	8
20100 A	143.34	3	143.20	143.47	0.27	1		6		
-	143.65	2								
20100 B	150.19	6	149.99			3	4E	50		
20110 -	150.87	6					4E			
20110 A	155.16	6	155.02	155.27	0.24	2		19	155.28	6
-	155.45	6					2E			
20111 A	160.37	4				1		22		
20120 A	166.90	2				1				
20120 B	170.02	2				1			169.88	4
20130 A	177.67	3	177.57	177.79	0.23	1		14	177.90	16
20130 B	179.02	2				1				
20130 C	180.96	2				1			180.84	5
20130 D	181.45	2				1				
20140 A	187.18	3				1		16		
20140 B	192.78	6	192.58	192.90	0.33	3	2E	69	192.72	7
20140 C	193.28	6		193.50		2	2E	85		
20140 D	193.87	6	193.71			1	1W	50		
20140 E	194.44	3				1		21		
20140 F	196.25	3				1		42	196.34	4
20150 A	105.54	3				1		1		
20160 A	92.44	5		92.52		1	2E	9		
-	92.65	6					2E			
20160 B	100.70	2				1				
20170 A	91.77	6				2	2E	37		
20180 -	76.40	6					2E			
20195 A	12.77	6	12.68	12.83	0.15	4	1E	61		
-	13.00	6					2E			
20215 A	16.18	6		16.27		3	2E	54		
-	16.40	6					2E			
20225 A	18.63	2				1				

ANOMALY	FIDUCIAL	CHANNELS	HALF WIDTH LEFT	HALF WIDTH RIGHT	HW	AMPLITUDE CLASS	SKEW	SIG-T	ASSOCIATED MAG POSITION	MAGNETIC VALUE
20225 B	19.47	6	19.33	19.60	0.27	4	2E	79		
-	19.72	6					2E			
20230 A	131.70	2				1			131.47	52
20235 A	20.50	6		20.59		2	1E	20		
-	20.75	6					2E			
20240 A	136.98	3				1		4	136.95	10
20245 A	26.19	5	26.06			1		14		
20250 A	32.08	2				1			32.08	5
20250 B	32.28	3				1		8		
20250 C	32.61	3				1		59		
-	27.17	6					3E			
20260 A	36.11	2				1				
20270 A	37.02	6		37.18		3	1E	69		
-	37.57	6					2E			
20270 B	38.66	6	38.48	38.93	0.45	1	1W	5		
20270 C	40.29	3	40.08	40.48	0.40	1	2E	16	40.51	64
20270 D	40.80	3				1		1		
20270 E	41.42	2				1		1		
20270 F	43.04	3				1	1E	4	42.97	4
20280 A	45.52	2				1			45.71	40
20280 B	46.38	2				1	1E	-		
20280 C	47.12	3				1		1		
20280 D	48.94	5	48.74			2	1W	73		
20280 E	49.57	6	49.34			4	1E	50		
20290 A	49.99	6		50.09		3	2E	52		
-	50.40	6					4E			
20290 B	55.64	2				1				
20290 C	56.95	4	56.74	57.15	0.41	1		59		
20290 D	57.92	3				1		2		
20300 A	59.01	2				1				
20302 A	45.26	3				1		1	44.96	6
20310 A	52.28	2				1				
20310 B	52.66	2				1				
20310 C	53.10	2				1				
20310 D	53.59	2				1				
20310 E	53.96	2				1				
20310 F	54.43	3				1		1	54.40	4
20310 G	55.37	3				1		1		
20310 H	55.74	3				1		5		
20310 J	56.19	3				1		1		

ANOMALY	FIDUCIAL	CHANNELS	HALF WIDTH LEFT	HALF WIDTH RIGHT	HW	AMPLITUDE CLASS	SKEW	SIG-T	ASSOCIATED MAG POSITION	MAGNETIC VALUE
20310 K	57.05	2				1				
20310 L	57.80	3				1		1		
20320 A	69.68	5	69.57	69.79	0.23	1	1W	28	69.40	22
-	69.99	3								
20330 A	72.77	3				1		1		
20331 A	40.23	2				1				
20331 B	40.69	2				1				
20331 C	41.10	3				1		6		
20331 D	41.96	2				1				
20331 E	42.38	2				1				
20331 F	42.82	2				1				
20331 G	44.54	2				1				
20361 A	22.32	3				1		1		
20361 B	22.71	2				1				
20361 C	23.13	3	23.02	23.24	0.22	1		1	23.13	10
20361 D	23.99	3	23.82	24.11	0.29	1		1		
20361 E	24.67	3				1		1		
20361 F	25.50	2				1				
20361 G	25.93	4				1		1		
20380 A	71.36	4	71.27	71.46	0.19	1		3	71.45	5
20390 A	64.09	2				1				
20390 B	64.81	3				1		1		
20390 C	65.91	5				1		47		
20390 D	66.35	3				1		2	66.10	14
20400 A	59.93	2				1			59.78	25
20410 A	57.16	2				1			57.66	52
20410 B	57.89	2				1				
20420 A	51.92	4	51.73	52.04	0.31	1	4W	3	51.39	11
20420 B	52.46	4				1	1E	1		
20430 A	46.97	6	46.70	47.17	0.47	3	4E	5	46.23	26
29010 A	17.70	3				1		6		
29010 B	19.01	4				1	2S	36		
29010 C	24.17	2				1			24.41	6
29010 D	24.88	2				1				
29010 E	26.41	3				1		7		
-	27.06	6					4S			
021A	37.08	2				1			36.95	8
021B	37.68	2				1			37.75	18

7. *References*

Carter, N. and Grove E. 1972 Preliminary Map No. 8 "Geological Compilation Map of the Stewart, Anyox, Alice Arm and Terrace Areas.

Grove, E. 1982 "Anyox Mineral Deposits."

Ministry of Mines 1898-1936 Annual Reports.

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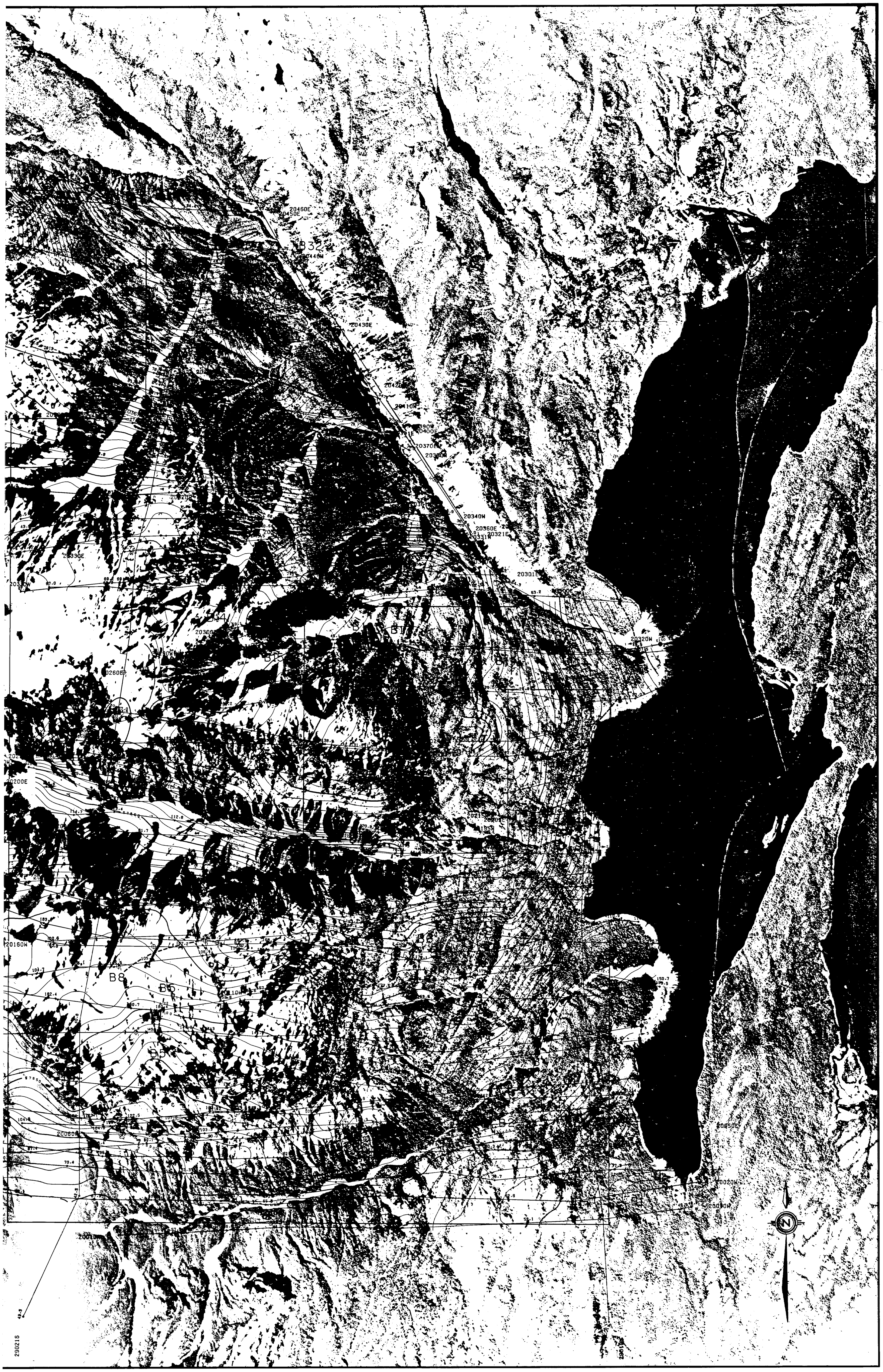
Sharp, R. 1980 MSc Thesis "Geology, Geochemistry and Sulphur Isotopes of the Anyox Massive Sulphide Deposits.



INPUT

DECAY INTERVAL CLASSIFICATION

1 Channel (340 microseconds)
2 Channel (540 microseconds)
3 Channel (840 microseconds)
4 Channel (1240 microseconds)
5 Channel (1740 microseconds)
6 Channel (2340 microseconds)

POSITIVE RESPONSE — NEGATIVE RESPONSE

AMPLITUDE CLASSIFICATION
(UNCORRECTED FOR ALTITUDE)

Class 1 (<100 ppm)
Class 2 (100-199 ppm)
Class 3 (200-399 ppm)
Class 4 (400-1000 ppm)
Class 5 (>1000 ppm)

SKEW CLASSIFICATION
(DIP INDICATION)

Class 1 <.25 subfiducial
Class 2 .25 - .49 subfiducial
Class 3 .50 - .74 subfiducial
Class 4 >.74 subfiducial
(Arrow indicates skew direction)

10 GAMMA CONTOUR LINE

50 GAMMA CONTOUR LINE

500 GAMMA CONTOUR LINE

(1 GAMMA = 1 NANOTESLA IN SI UNITS)

MAGNETIC DEPRESSION

INTERPRETATION

20 Conductor Axis, with reference number (good definition)

20 Conductor Axis, with reference number (poor definition)

Vertical Conductor

Conductor Dip

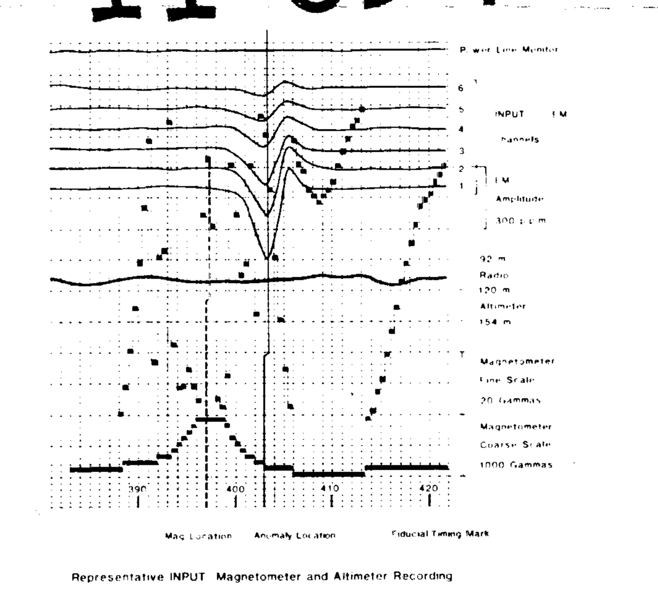
20 Selected Zone, with reference number

Surficial Conductivity

Fault Zone

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,054



Representative INPUT Magnetometer and Altimeter Recording

DESCRIPTIVE NOTES

The aircraft is equipped with the Barringer/Questor Mark VI INPUT* airborne E.M. System and the Sonotek PMH 5010 Proton Precession Magnetometer and Sonotek SDS-1200 Series Data Acquisition System. The INPUT* system will respond to conductive overburden and near-surface horizontal conducting layers in addition to bedrock conductors. Discrimination of conductors is based on the rate of transient decay, magnetic correlation and the anomaly shape, together with the conductor pattern and topography.

* Registered Trade Mark of Barringer Research Limited

INTERPRETATION REFERENCES

Becker, A., Gauvreau, C. and Collett, L.S.
1972 Scale Model Study of Time Domain Electromagnetic Response of Tabular Conductors. Canadian Mining and Metallurgical Bulletin, Volume 65, No. 725, p. 90-96

Dyck, A.V., Becker, A., and Collett, L.S.
1974 Surficial Conductivity Mapping with the Airborne INPUT* System. Canadian Mining and Metallurgical Bulletin, Volume 67, No. 744, p. 104-109

Lazenby, P.G.
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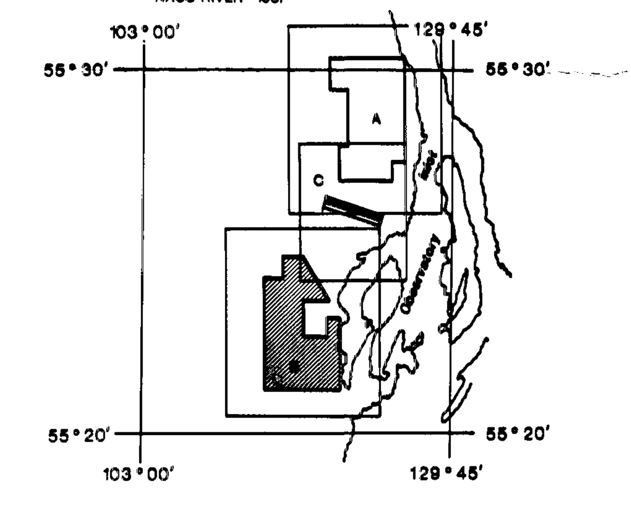
NASS RIVER 103P



Approx. Scale 1: 10000

HELICOPTER MK VI INPUT® SURVEY
(Horizontal Coil)
TOTAL MAGNETIC INTENSITY SURVEY

IMPERIAL METALS CORPORATION

BONANZA AREA

Province of BRITISH COLUMBIA

FILE NO.	SHEET NO.	DATE	DRAWN BY
24H35B	1 of 1	June, 1982	Dataplotting Services Inc

Questor Surveys Limited
Mississauga, Ontario Canada

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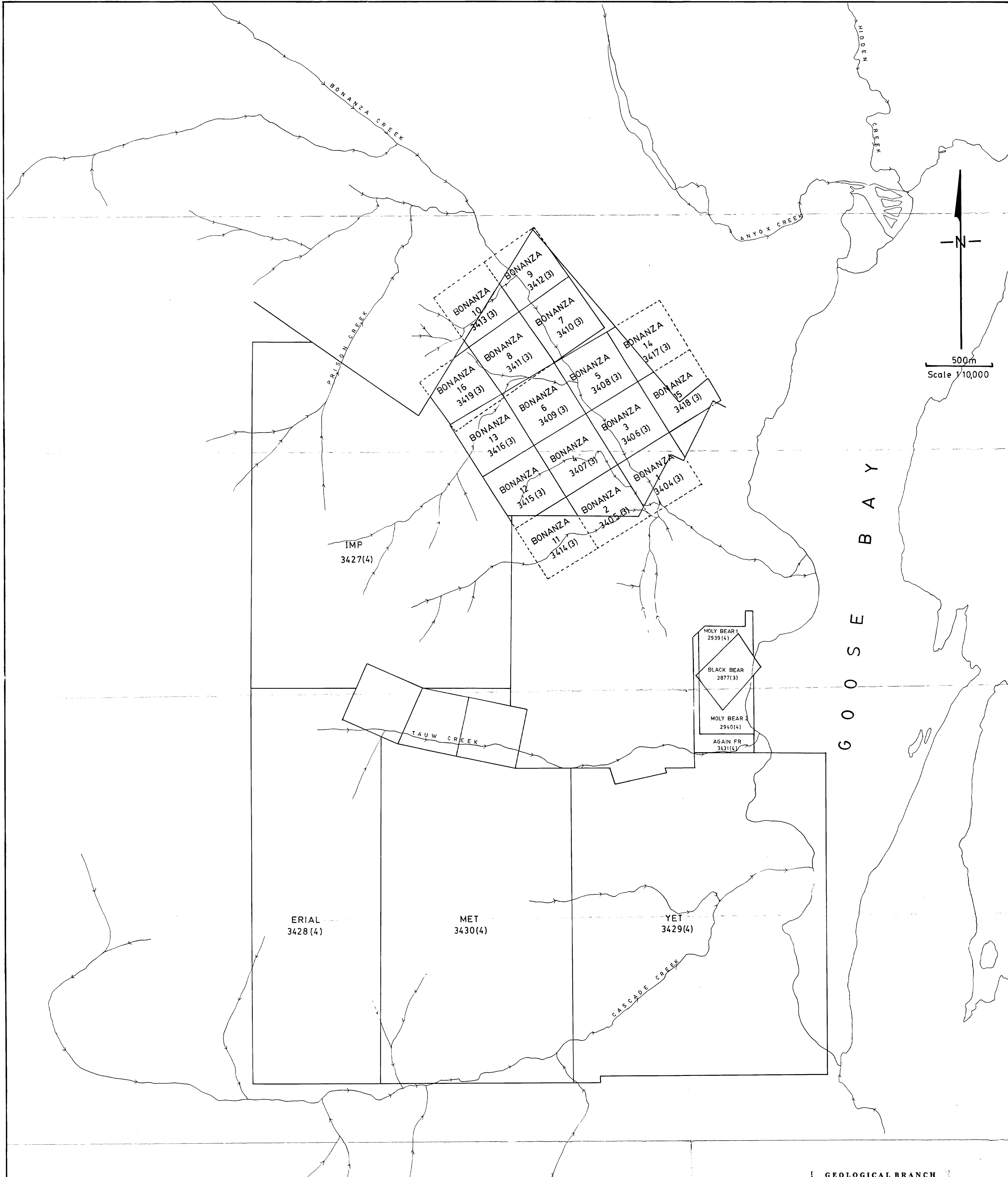

GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,054

Imperial Metals Corporation		
Anyox Joint Venture		
CLAIM MAP		
Bonanza Group, Skeena Mining Division (2)		
October 1982	Figure 6	S.P.Quin B.Sc.