680938
SLIDE

A GEOPHYSICAL REPORT ON A TIME DOMAIN INDUCED POLARIZATION SURVEY

FOR

I. M. WATSON & ASSOCIATES LTD.

VANCOUVER, BRITISH COLUMBIA

BY

LLOYD GEOPHYSICS LIMITED

VANCOUVER, BRITISH COLUMBIA

NOVEMBER, 1983

LLOYD GEOPHYSICS LIMITED
CONSULTING AND CONTRACTING SERVICES
IN MINING AND ENGINEERING GEOPHYSICS

A Geophysical Report on a Time Domain Induced Polarization Survey on the SLIDE Claims Caribou Mining Division, British Columbia

by

John Lloyd M. Sc., P. Eng.

LLOYD GEOPHYSICS LIMITED
CONSULTING AND CONTRACTING SERVICES
IN MINING AND ENGINEERING GEOPHYSICS

SUMMARY

During the periods August 27 to August 31 and September 9 to September 15, 1983, Lloyd Geophysics Limited carried out a time domain Induced Polarization (IP) survey on the SLIDE property near Quesnel, British Columbia for I. M. Watson & Associates Ltd. of Vancouver, British Columbia.

The survey detected a strong IP anomaly which has been strongly recommended for testing with a 10 hole drill programme totalling 1000 metres.

TABLE OF CONTENTS

1. INTRODUCTION

During the periods August 27 to August 31 and September 9 to September 15, 1983, Lloyd Geophysics Limited carried out a time domain Induced Polarization (IP) survey on the SLIDE property near Quesnel, British Columbia for I. M. Watson & Associates Ltd. of Vancouver, British Columbia.

The property is situated 70 kilometres northeast of Williams Lake and 48 kilometres southeast of Quesnel, at Slide Mountain on the north bank of the Quesnel River, in the Caribou Mining Division of British Columbia (Fig. 1). The property is centred at Latitude 50°40', Longitude 120°48', and the N.T.S. map sheet reference is 93A/12W.

Road access to the property is by the Quesnel River/Dragon Mountain road from Quesnel to Gravell Ferry and thence by a new graded and ditched forestry road to Ducks Creek, at the north-eastern corner of the SLIDE property. The road continues south-east across the SLIDE claims to the Dome camp on the QR property. Road distance from Quesnel to the SLIDE property is 55 kilometres.

Two cat roads, presently impassable by vehicle, provide access to the south-eastern and south-western parts of the property.

The greater part of the property lies north of the Quesnel River, and is characterized by gently sculptured, low relief topography coated by thick immature forest. The north-westerly glacial trend and the predominant north-westerly strike of the Quesnel Belt rocks impose a strong topographic 'grain'. The Quesnel River runs along and just within the southern boundary of the property, and the high steep banks and cliffs provide the greatest relief on the property, from 620 metres to over 1100 metres at Slide Mountain.

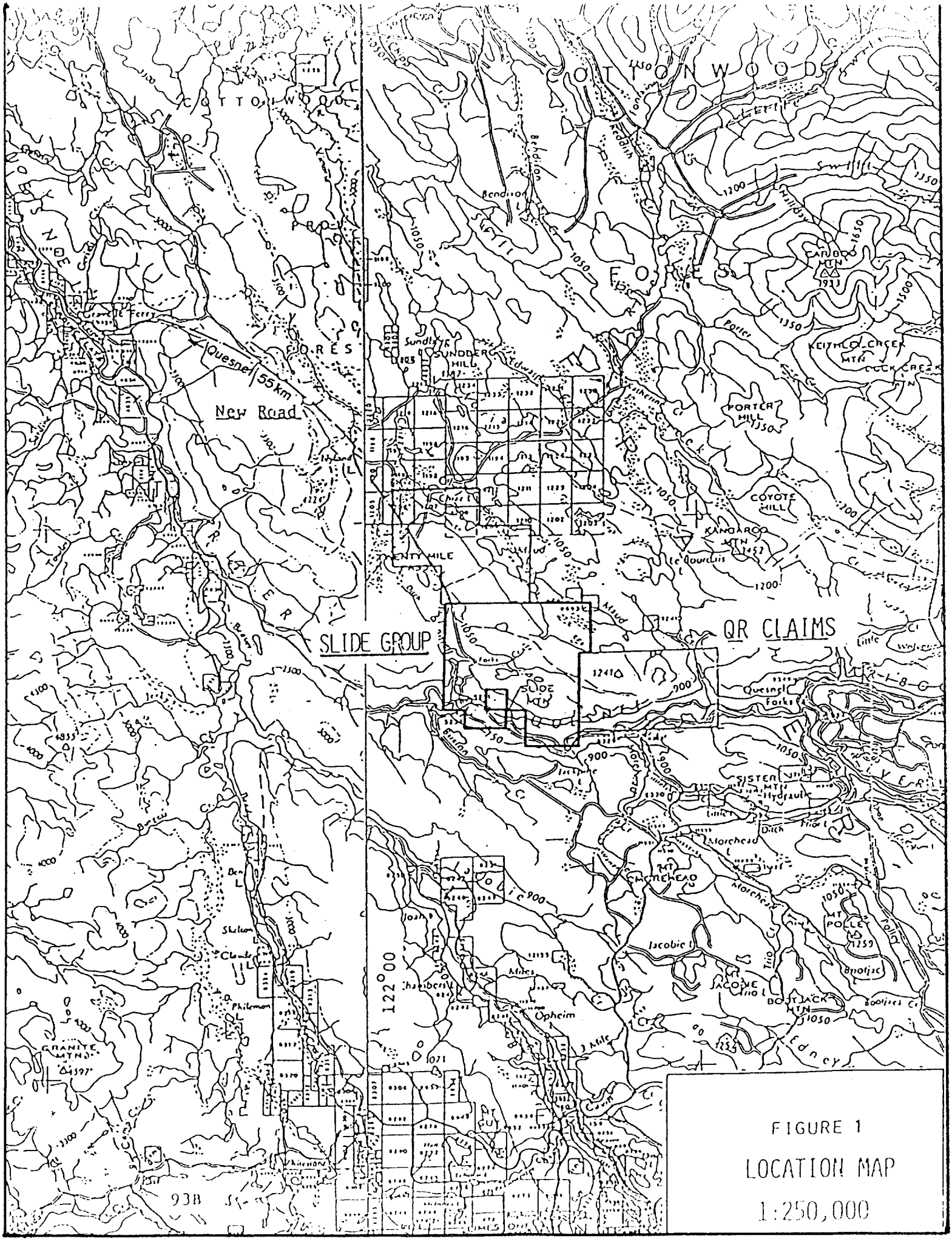


FIGURE 1

LOCATION MAP

1:250,000

Outcrop is relatively abundant, for this part of the country, and forms steep bluffs along the Quesnel and prominent, rounded, north-westerly trending ridges along the centre and north portion of the property.

The property consists of 11 claims, containing a total of 186 units listed as follows (Fig. 2):

CLAIM NAME	NO. OF UNITS	RECORD NO.	RECORDING DATE
Slide 1	20	3361	April 8, 1981
Slide 2	20	3351	April 8, 1981
Slide 3	20	3352	April 8, 1981
Slide 4	15	3353	April 8, 1981
Slide 5	15	3354	April 8, 1981
Slide 6	20	3355	April 8, 1981
Slide 7	20	3356	April 8, 1981
Slide 8	20	3357	April 8, 1981
Slide 9	8	3358	April 8, 1981
Slide 10	16	3359	April 8, 1981
Slide 11	12	3360	April 8, 1981

The SLIDE 1-11 claims were staked by Canorex in March, 1981. According to information supplied by Vanco and Curator, the claims are registered in the name of Vanco Explorations Ltd., and, under the terms of the Canorex-Vanco joint venture agreement, were owned jointly and equally by both companies. Subsequently, the Canorex interest has been optioned to Curator Resources Ltd.

Sufficient work has been filed to keep the claims in good standing until April, 1989.

The purpose of the IP survey was to search for and outline sulphide rich alteration zones similar in 'style' to the QR gold deposit discovered by Dome Mines Limited on the adjoining property to the southeast. The QR zone was originally discovered in 1975

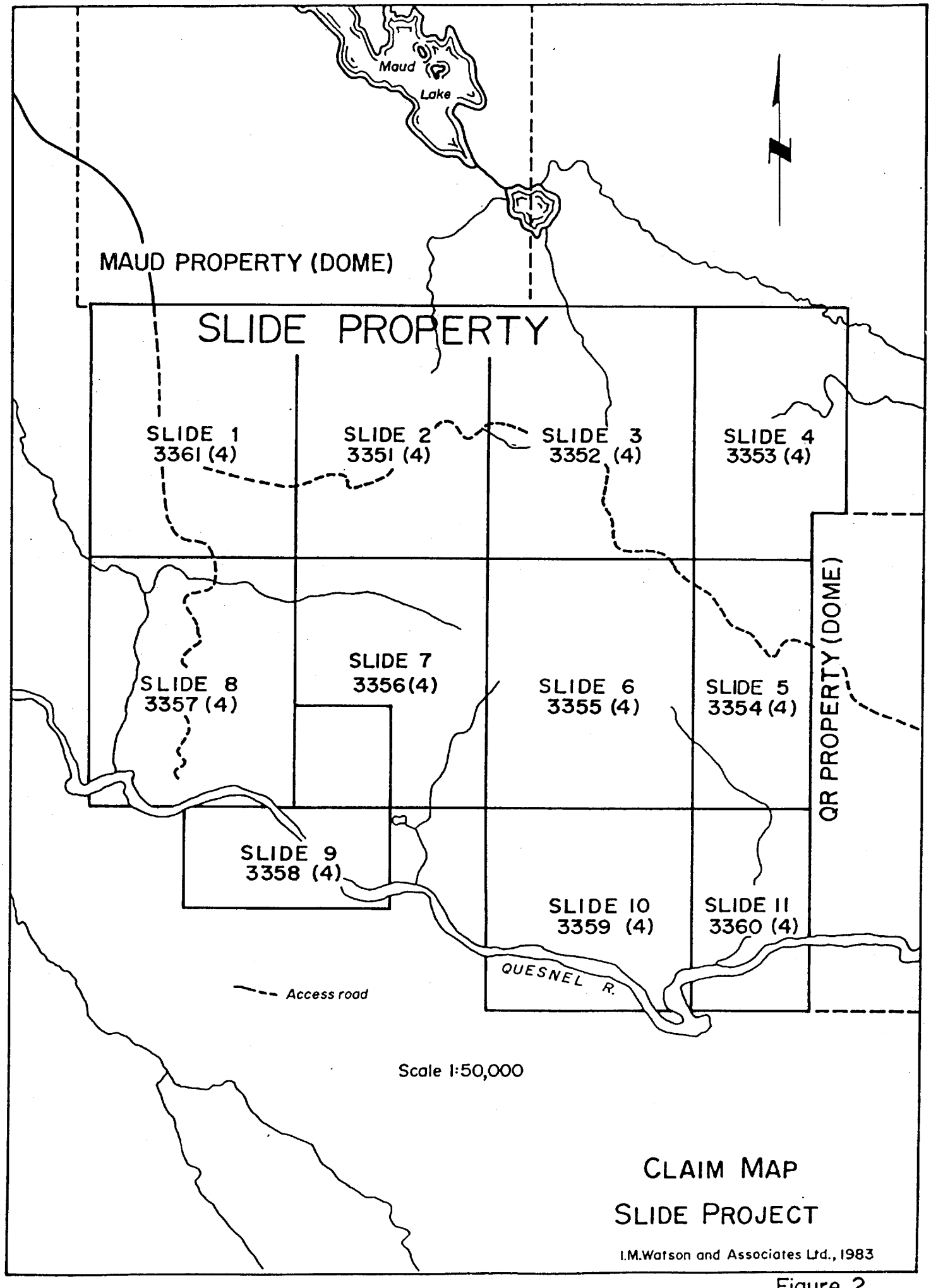

Maud Lake
MAUD PROPERTY (DOME)
SLIDE PROPERTY
SLIDE 1
3361 (4)
SLIDE 2
3351 (4)
SLIDE 3
3352 (4)
SLIDE 4
3353 (4)
SLIDE 8
3357 (4)
SLIDE 7
3356(4)
SLIDE 6
3355 (4)
SLIDE 5
3354 (4)
QR PROPERTY (DOME)
SLIDE 9
3358 (4)
SLIDE 10
3359 (4)
SLIDE 11
3360 (4)
QUESNEL R.
Access road
Scale 1:50,000
CLAIM MAP
SLIDE PROJECT
I.M.Watson and Associates Ltd., 1983

Figure 2

by Fox Geological Consultants Ltd., who were carrying out exploration for porphyry copper deposits on behalf of Dome Exploration Limited. During this exploration programme, the writer was involved in the IP surveys carried out for Fox Geological Consultants Ltd.

2. GEOLOGY

2.1 Regional Geology

The property lies within the Quesnel Belt at the Morehead Lake-Quesnel River area 'constriction'. The succession in this area consists mainly of Mesozoic Takla Group volcanic rocks and derived sediments, and minor marine sediments. Intruding the volcanics and sediments are complex intrusive stocks and sills of quartz-monzonite, diorite and syenite. Examples of this type of intrusion, with associated porphyry copper type mineralization, are Mt. Polley (Cariboo Bell) and Morehead Creek stocks south of the Quesnel River and the QR and Maud property stocks north of the Quesnel River.

The trend of the Belt is dominantly north north-westerly, with dips towards central axis; at the Quesnel River, this trend swings abruptly east-west.

The structural style of the Belt is characterized by north-easterly trending block-faults. Folding is rare. A major north-westerly trending lineament or fault system is recognizable north and south of the Slide Mountain area, and coincides with the alkalic stocks at Maud, Shiko and Kwun Lakes.

2.2 Property Geology

The 1982 mapping programme by I. M. Watson & Associates Ltd., has shown that the property is underlain by a dominantly volcanic sequence, and less abundant sedimentary rocks.

The volcanic suite is lithologically complex and structurally chaotic, and interpretation and correlation are correspondingly difficult. Two main types of volcanic rocks have been recognized: coarse basic to felsic polylithic breccias; and basalts and basalt breccias. There are numerous sub-units and varieties of these

main types, some of which are mappable and distinguishable with the aid of the magnetometer. The stratigraphic order of the units is far from certain, but an attempt has been made to construct a succession based on field observations.

3. INSTRUMENT SPECIFICATIONS

The IP equipment used to carry out this work was a time domain measuring system developed and manufactured by Huntec Limited of Toronto, Ontario. The system consists of a transmitter, a motor generator and a Mark III receiver unit incorporating a digital display read-out for chargeability measurements.

The transmitter, which provides a maximum of 10 kw D.C. to the ground, obtains its power from a 10 kw, 400 cycle, 3 phase Bendix alternator driven by a 25 H.P. Onan gasoline engine. The total cycle time for the transmitter was 8 seconds and the duty ratio (R) was 1 to 1. This means the cycling rate of the transmitter was 2 seconds current "ON" and 2 seconds current "OFF" with the pulses reversing continuously in polarity.

The Mark III receiver presents digitally four individual (M) values of the decay curve at each station. The (M) value reading is the ratio of the secondary decay voltage (V_s) divided by the primary voltage (V_p) expressed as a percentage. The quantity (V_p) is displayed separately.

The parameters measured by this unit are shown in Figure 3. The delay time (t_d) and the integration interval (t_p) of the receiver define completely the measurements (M_1), (M_2), (M_3) and (M_4).

The delay time (t_d) may be set to 15, 30, 60, 120 or 240 milliseconds: similarly the integration interval (t_p) may be set to 20, 30, 40, 50 or 60 milliseconds. This provides twenty-five different sets of values for each of the four sample points (t_1), (t_2), (t_3) and (t_4) of Figure 3. These quantities have been calculated and are shown in Table 1, together with the limits of integration corresponding to each of the intervals (M_1), (M_2), (M_3) and (M_4).

For this survey the delay time (t_d) was fixed at 120 milliseconds

and the integrating interval (t_p) at 60 milliseconds; this gives a total integrating time (T_p) of 900 milliseconds. See Table 1.

The apparent chargeability (M_a) in milliseconds is obtained by summing the (M) factors, weighted for their individual integrating times as follows.

$$M_a = t_p \times 10^{-2} \sum (M_1+2M_2+4M_3+8M_4) \text{ milliseconds} \quad -- (1)$$

The apparent resistivity (ρ_a) in ohm-metres is obtained by dividing (V_p) by the measured current (I_g) and multiplying by a factor (K) which is dependent on the geometry of the array used. The absolute value of (V_p) is obtained by multiplying the digital voltmeter reading by the scale factor of the input attenuator.

The chargeabilities and resistivities obtained are called apparent as they are values which that portion of the earth sampled would have if it were homogeneous. As the earth sampled is usually inhomogeneous, the calculated apparent chargeabilities and resistivities are functions of the actual chargeabilities and resistivities of the rocks.

The majority of geophysicists, using time domain equipment, quote the apparent chargeability measurements in units of milliseconds. This is an unfortunate choice of units since these units are really millivolt seconds per volt. Therefore data obtained by different transmitters and receivers using different timing and sampling sequences will yield different "millisecond" values over the same orebody or mineralized zone. The interpreter must therefore pay special attention to the transmitter cycling time, the receiver delay time, and the receiver integrating interval and total integrating time before making comparisons between data obtained with different systems.

$$M_1 = \frac{e(t_1)}{Vp} = \sum_1^n \int_{(td)}^{(td+tp)} Vs \cdot dt \Big/ Vp \cdot tp$$

$$M_2 = \frac{e(t_2)}{Vp} = \frac{1}{2}\sum_1^n \int_{(td+tp)}^{(td+3tp)} Vs \cdot dt \Big/ Vp \cdot tp$$

$$M_3 = \frac{e(t_3)}{Vp} = \frac{1}{4}\sum_1^n \int_{(td+3tp)}^{(td+7tp)} Vs \cdot dt \Big/ Vp \cdot tp$$

$$M_4 = \frac{e(t_4)}{Vp} = \frac{1}{8}\sum_1^n \int_{(td+7tp)}^{(td+15tp)} Vs \cdot dt \Big/ Vp \cdot tp$$

$$Ma = t_p \times 10^{-2} \sum (M_1 + 2M_2 + 4M_3 + 8M_4) \quad \text{(Milliseconds)}$$

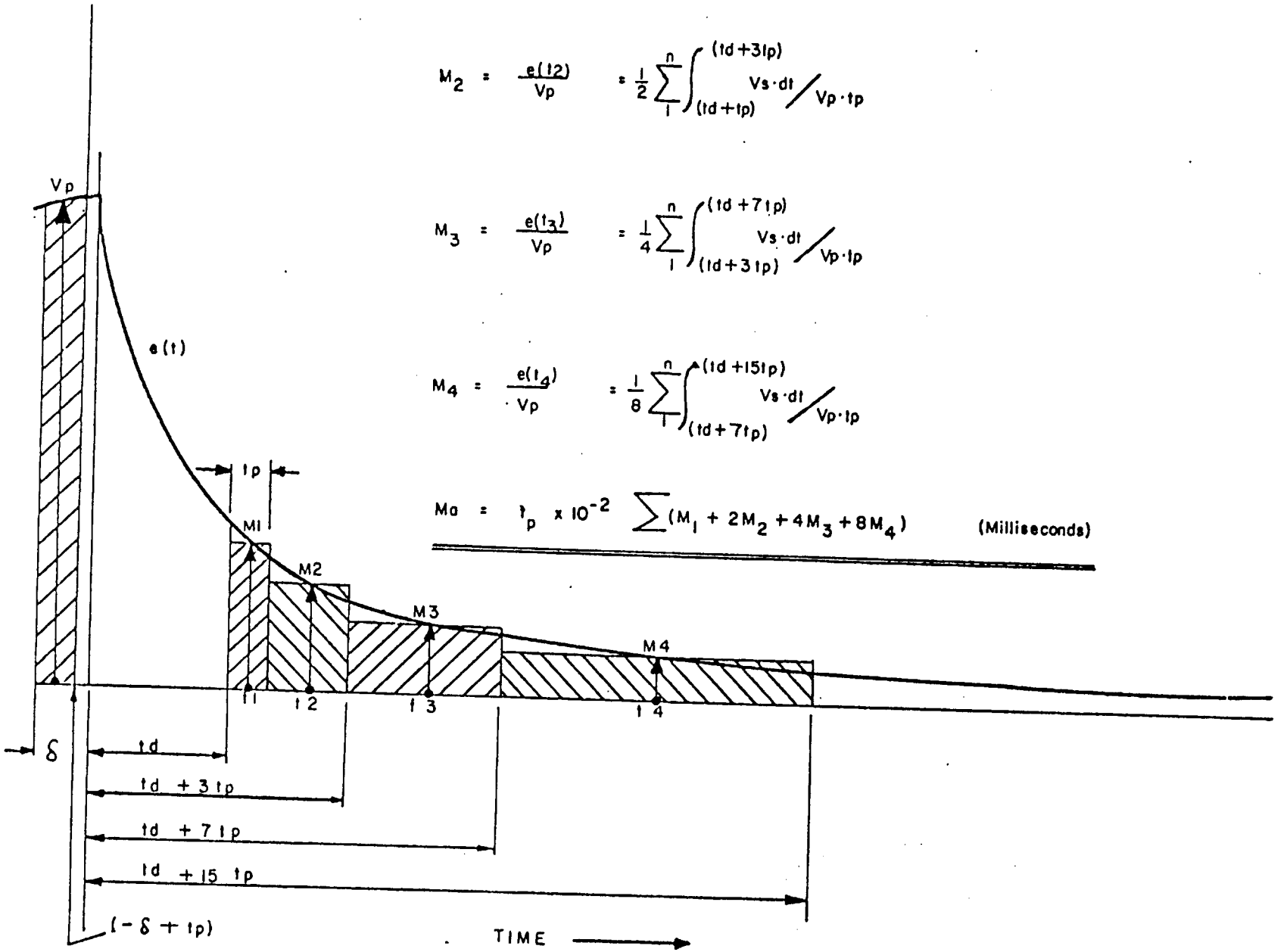


FIGURE 3

PERIOD t_p IN MILLISECONDS	DELAY TIME t_d IN MILLISECONDS															
	15			30			60			120			240			
	S	M	E	S	M	E	S	M	E	S	M	E	S	M	E	
20	15	25	35	30	40	50	60	70	80	120	130	140	240	250	260	M_1
	35	55	75	50	70	90	80	100	120	140	160	180	260	280	300	M_2
	75	115	155	90	130	170	120	160	200	180	220	260	300	340	380	M_3
	155	235	315	170	250	330	200	280	360	260	340	420	380	460	540	M_4
30	15	30	45	30	45	60	60	75	90	120	135	150	240	255	270	M_1
	45	75	105	60	90	120	90	120	150	150	180	210	270	300	330	M_2
	105	165	225	120	180	240	150	210	270	210	270	330	330	390	450	M_3
	225	345	465	240	360	480	270	390	510	330	450	570	450	570	690	M_4
40	15	35	75	30	50	70	60	80	100	120	140	160	240	260	280	M_1
	75	95	135	70	110	150	100	140	180	160	200	240	280	320	360	M_2
	135	215	295	150	230	310	180	260	340	240	320	400	360	440	520	M_3
	295	455	615	310	470	630	340	500	660	400	560	720	520	680	840	M_4
50	15	40	65	30	55	80	60	85	110	120	145	170	240	265	290	M_1
	65	115	165	80	130	180	110	160	210	170	220	270	290	340	390	M_2
	165	265	365	180	280	380	210	310	410	270	370	470	390	490	590	M_3
	365	565	765	380	580	780	410	610	810	470	670	870	590	790	990	M_4
60	15	45	75	30	60	90	60	90	120	120	150	180	240	270	300	M_1
	75	135	195	90	150	210	120	180	240	180	240	300	300	360	420	M_2
	195	315	435	210	330	450	240	360	480	300	420	540	420	540	660	M_3
	435	675	915	450	690	930	480	720	960	540	780	1020	660	900	1140	M_4

Table 1

S - time in milliseconds from turn off at which integration commences.

E - time in milliseconds from turn off at which integration ceases.

M - the mid point between S and E.

☐ - Instrument Parameters selected for this survey.

4. SURVEY SPECIFICATIONS

The pole-dipole array was used for this survey. With this array the one current electrode C_1 and the two potential electrodes P_1 and P_2 are moved in unison along the survey lines. The second current electrode C_2 is grounded on "infinite" distance away, which is at least 10 times the distance between C_1 and P_1 for the largest electrode separation.

The dipole length (x) is the distance between P_1 and P_2 and the electrode separation (nx) is the distance between C_1 and P_1 and is equal to or some multiple of the distance between P_1 and P_2.

For a sulphide body of some particular size, shape, depth and true chargeability, the dipole length (x) determines mainly the sensitivity of the array, whereas the electrode separation (nx) determines mainly the depth of penetration of the array.

IP readings were taken at 75 metre station intervals on lines which were generally 100 metres apart. The dipole length (x) for making these measurements was 75 metres and chargeability and resistivity measurements were made for 2 electrode separations that is for n = 1 and n = 2 except on line 15+50N where measurements were made for n = 1, n = 2, n = 3 and n = 4.

All lines were surveyed with the current electrode C_1 to the southwest of the measuring dipole P_1P_2.

5. PRESENTATION OF DATA

The data obtained from the survey described in this report are presented as follows:

Chargeability Profiles	-	Dwg. No. L83238-1
Resistivity Profiles	-	Dwg. No. L83238-2

Both of these drawings are in the map pocket bound into the back of this report.

6. DISCUSSION OF RESULTS

An IP response depends largely on the following factors:

1. The number of pore paths that are blocked by sulphide grains.

2. The number of sulphide faces that are available for polarization.

3. The absolute size and shape of the sulphide grains and the relationship of their size and shape to the size and shape of the available pore paths.

4. The volume content of sulphide minerals.

5. The electrode array employed.

6. The width, depth, thickness and strike length of the mineralized body and its location relative to the array.

7. The resistivity contrast between the mineralized body and the unmineralized host rock.

The sulphide content of the underlying rocks or, since rocks containing magnetite, graphite or clay minerals, frequently give rise to any IP response, an equivalent sulphide content is one of the critical factors that we would like to determine from field measurements. However, experience has shown that this is both difficult and unreliable, mainly because of the large number of factors, described above, which contribute to an IP response. These factors vary considerably from one geological environment to another. Despite this, some interpreters have developed empirical rules for making rough estimates of the percent sulphides by volume contained within rocks giving anomalous IP responses.

Interpretation procedures have been most completely developed in situations of mineralized horizontal layering, where the electrode separations used are often small compared with the lateral extent of the mineralized bodies. Geologically, the porphyry coppers of large lateral extent are practical examples where such interpretation procedures can be used to best advantage.

In this area, where the electrode separations used are often large compared with the lateral extent of the bodies themselves, the complex problem of resolving the combined effects of dip, depth, width, thickness and true chargeability of such bodies, together with the physical characteristic of the overburden and country rocks have only recently been studied in detail. The interpreter must therefore use empirical solutions, type curves obtained from theoretical investigations, plus experience gained from surveys over known orebodies and the results of both computer and tank model studies.

The IP survey outlined a well defined zone of increased chargeability. This zone is approximately 2900 metres long and 75 to 100 metres wide in subcrop.

The chargeability background ranges from 5 to 10 milliseconds and the maximum chargeability response over the core of the anomalous zone ranges from 25 to better than 30 milliseconds.

The resistivity values throughout the area surveyed range from about 200 ohm-metres to slightly less than 2000 ohm-metres. There is a weak resistivity low approximately coincident with the well defined chargeability high. This low is of insufficient magnitude to give a significant VLF-EM response.

The shape, size and attitude of the body causing the strong increase in chargeability is difficult to determine, however certain general remarks are appropriate.

Although the upper surface of the feature causing the anomaly most probably lies directly beneath the overburden (which is expected to be very shallow) it certainly lies within one dipole length, that is within 75 metres of surface.

The long linear nature of the anomaly raises the question as to whether or not the anomaly is caused by a fault. From the resistivity evidence alone a fault does not seem likely. This is further substantiated by the fairly sharp variations in chargeability along the length of the anomaly. Despite these two pieces of evidence of course, a fault interpretation cannot be ruled out.

The dip and true width of the body causing the anomaly, as determined by comparing the IP profiles with type curves, is equally difficult to determine. It appears to vary in dip from very shallow (5° to 10°) to moderately steep (50° to 60°). Based on which interpretation we chose its true thickness will vary between 75 to 100 m and 15 to 25 m. The body appears to dip towards the southwest.

Despite the uncertainties in determining the geometry of the body causing the anomaly, there are no problems in designing an initial drill programme to test the nature of the material causing the anomaly. A 10 hole drill programme totalling 1000 metres is recommended to test the anomaly.

The location attitude and depth of each of these holes are described in Section 7 of this report.

7. CONCLUSIONS AND RECOMMENDATIONS

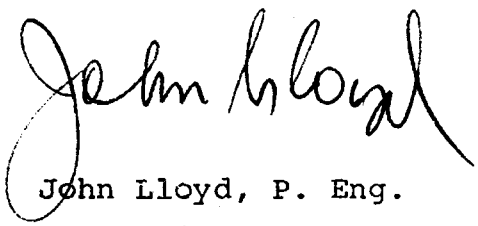
From a study of the IP data obtained from the survey described in this report it has been concluded that the strong linear IP anomaly detected by the survey is worthy of further investigation by drilling.

A 10 hole drill programme, totalling 1000 metres, is recommended. The priority order, the locations, the attitude and the length of each of these holes is set out below.

PRIORITY NO.	LINE NO.	STATION	ATTITUDE	DEPTH
1	14+50N	260 m NE of BL	Vertical	120 m
2	14+50N	290 m NE of BL	Vertical	95 m
3	14+50N	230 m NE of BL	Vertical	95 m
4	13+50N	275 m NE of BL	Vertical	95 m
5	13+50N	245 m NE of BL	Vertical	95 m
6	23+50N	335 m NE of BL	Vertical	120 m
7	23+50N	305 m NE of BL	Vertical	95 m
8	23+50N	365 m NE of BL	Vertical	95 m
9	22+50N	350 m NE of BL	Vertical	95 m
10	22+50N	320 m NE of BL	Vertical	95 m

Respectfully submitted,

LLOYD GEOPHYSICS LIMITED



JL:lm

John Lloyd, P. Eng.
Geophysicist

Vancouver, B.C.
November, 1983

8. CERTIFICATION

I, John Lloyd, of 960-625 Howe Street, in the City of Vancouver in the Province of British Columbia, do hereby certify that:

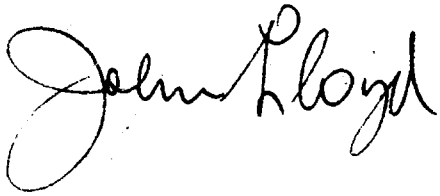
1. I graduated from the University of Liverpool, England in 1960 with a B.Sc. in Physics and Geology, Geophysics Option.

2. I obtained the diploma of the Imperial College of Science and Technology (D.I.C.), in Applied Geophysics from the Royal School of Mines, London University in 1961.

3. I obtained the degree of M.Sc. in Geophysics from the Royal School of Mines, London University in 1962.

4. I am a member in good standing of the Association of Professional Engineers in the Province of British Columbia, the Society of Exploration Geophysicists of America, the European Association of Exploration Geophysicists and the Canadian Institute of Mining and Metallurgy. I have been practising my profession for the last twenty-one years.

5. I have no, direct or indirect, interest in the property discussed in this report.



Vancouver, B.C.
November, 1983

John Lloyd, P. Eng.


Quesnel 55 km
MAUD 3
Corner Post 5N 4W
I.D. Post 4S 4W
SLIDE 1
UTM 7240
Ducks Cr.
I D Post 3N 3N
SLIDE 1 SLIDE 2
I D Post 2N 2N
ID Post 5N 4E 3N 4W
ID Post IN4W IN4E
SLIDE 2 SLIDE 3
Corner Post ON 4E ON 4W OS 4E OS 4W
SLIDE 7 SLIDE 6
LCP N5 W4 N5 E4 S5 W4 S5 E4
SLIDE 8 SLIDE 7
SLIDE 3 SLIDE 4
LCP N5 W4 N5 E3 S5 W4 S5 E3
SLIDE 6 SLIDE 5
BASELINE
Maud Cr.
UTM 7940
7+00E
300° BL 0+00E
IP GRID
Trench
Forks Creek
Birrell Creek
QUESNEL RIVER
UTM 7236
UTM 7936
Slide Mountain
I.D. Post 5S 2W
SLIDE 6
SYMBOLS
Claim post and line
Survey line and stations
Dirt road
Cat track
Building
Magnetic base stations
Swamp
inches
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
23°25'
Contour interval 50 feet
SLIDE PROJECT
I P SURVEY GRID
SCALE 10,000
N.T.S 93A/12
DATE 3/84
DWG. No
SCALE
metres
I.M. WATSON & ASSOCIATES LTD.

7+00E

L 39+50N

L 35+50N

L 34+50N

L 33+50N

L 29+50N

L 28+50N

L 27+50N

L 26+50N

L 25+50N

L 24+50N

L 23+50N

L 22+50N

L 21+50N

L 20+50N

L 19+50N

L 18+50N

L 17+50N

L 16+50N

L 15+50N

L 14+50N

L 13+50N

L 12+50N

L 11+50N

L 10+50N

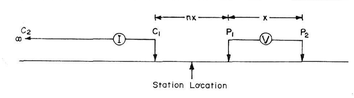
L 6+50N

7+00E

Scale 1:2500

LEGEND

SOUTHWEST — POLE-DIPOLE ARRAY — NORTHEAST



C_1 always to the SOUTHWEST of P_1P_2

x = 75m

Vertical scale: 1 cm. = 5 msec.

- CHARGEABILITY n = 1
- CHARGEABILITY n = 2
- CHARGEABILITY n = 3
- CHARGEABILITY n = 4

} Line 15+50N only

Zone of strong chargeability

Fault (interpreted)

Proposed drill hole

To accompany a report dated November 1983, by

John Lloyd, M.Sc., P.Eng.

VANCO EXPLORATIONS LTD.

SLIDE PROJECT

INDUCED POLARIZATION SURVEY
CHARGEABILITY PROFILES

SCALE	N.T.S.	DATE		DWG. No.
1:2500	93A/12	Nov. 1983		L83238-1

SCALE 100 0 100 200 metres

LLOYD GEOPHYSICS LTD.

7+00 E

L 39+50N

L 35+50N

L 34+50N

L 33+50N

L 29+50N

L 28+50N

L 27+50 N

L 26+50N

L 25+50N

L 24+50N

L 23+50N

L 22+50N

L 21+50N

L 20+50N

L 19+50N

L 18+50N

L 17+50N

L 16+50N

L 15+50 N

L 14+50 N

L 13+50N

L 12+50N

L 11+50 N

L 10+50N

L 6+50 N

7+00 E

LEGEND

SOUTHWEST — POLE - DIPOLE ARRAY — NORTHEAST

C_1 always to the SOUTHWEST of P_1P_2

x = 75 m

Vertical scale: 1 cm = 500 ohm-m

RESISTIVITY n = 1

RESISTIVITY n = 2

RESISTIVITY n = 3

RESISTIVITY n = 4 } Line 15+50N only

Zone of strong chargeability

Fault (interpreted)

Proposed drill hole

To accompany a report dated November 1983, by

John Lloyd, MSc., P.Eng.

VANCO EXPLORATIONS LTD.

SLIDE PROJECT

INDUCED POLARIZATION SURVEY
RESISTIVITY PROFILES

SCALE	N.T.S.	DATE		DWG. No.
1:2500	93A/12	Nov. 1983		L83238-2

SCALE

100 0 100 200 metres

LLOYD GEOPHYSICS LTD.

inches / centimetres

This reference scale bar has been added to the original drawing. It was plotted at the same rate as the image, therefore it can be used as a reference for the original size.