

# GETTY COPPER CORP.

A GEOPHYSICAL ASSESSMENT REPORT ON AN INDUCED POLARIZATION AND GROUND MAGNETIC SURVEY ON THE HIGHLAND VALLEY PROJECT NEAR LOGAN LAKE, BRITISH COLUMBIA

> KAMLOOPS MINING DIVISION NTS 921

> > LONGITUDE 121°3'W LATITUDE 50°35'N

> > > BY

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

LLOYD GEOPHYSICS INC.

OCTOBER 1997 MAIAL SURVEY BRANCH ASSESSMENT REFORT

Lioyd Geophysics

## SUMMARY

During the periods February 14 to March 25, 1997 and June 21 to August 2, 1997, Lloyd Geophysics Inc. carried out induced polarization (IP) and ground magnetometer surveys on the North Valley and Glossie grids near Logan Lake, British Columbia for Getty Copper Corp.

The geophysical data contains a number of significant IP and magnetic signatures which can be used to identify areas of sulphide mineralization associated with a copper-gold porphyry system. It is recommended that in order to mount an intelligent drilling campaign the geophysical data should be compiled with the extensive geological and geochemical data obtained by Getty Copper Corp.



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#### **1.0 INTRODUCTION**

In an effort to identify areas of sulphide mineralization associated with a copper-gold porphyry system, Lloyd Geophysics Inc. carried out induced polarization and ground magnetic surveys on the Highland Valley project for Getty Copper Corp. The data was acquired during the periods of February 14 to March 25, 1997 and June 21 to August 2, 1997 on the North Valley Zone and Glossie Zone grids located to the west of Logan Lake, British Columbia.

## 2.0 PROPERTY LOCATION AND ACCESS

The Highland Valley project is located approximately 30 kilometres west of Logan Lake, British Columbia at 50°35'N latitude, 121°3'W longitude in the Kamloops Mining Division, NTS 921 (Figure 1).

Access to the property is by truck west along Highway 97C from Logan Lake and then north along logging roads.





3 - Amended Amel 17, 1948

# 3.0 PROPERTY STATUS AND CLAIM HOLDINGS

The North Valley Grid is comprised of 126.8 km of cut-line located on 58 contiguous claims which cover an area of approximately 25,955,856 square metres (Figure 1B, Grid Index Map). A list of these claims and pertinent information is listed below:

<u>Claim Name</u>	<u>Record No.</u>	<u>No. Units</u>	<u>Claim Name</u>	Record No.	<u>No. Units</u>
Cinder 1	344815	< 1 units	Getty 175	355595	1 units
Cinder 8	350442	~10 units	Getty 176	355596	1 units
Getty 116	353121	~8 units	Getty 177	355597	1 units
Getty 117	353122	16 units	Getty 178	355598	1 units
Getty 119	354298	~12 units	Getty 179	355851	< 1 units
Getty 126	354745	~2 units	Getty 180	355852	< 1 units
Getty 147	355560	1 units	Getty 181	355853	< 1 units
Getty 148	355561	1 units	Getty 182	355854	< 1 units
Getty 149	355562	1 units	Getty 183	355855	< 1 units
Getty 150	355563	1 units	Getty 184	355856	< 1 units
Getty 151	355564	1 units	Getty 185	355857	< 1 units
Getty 152	355565	1 units	Getty 186	355858	< 1 units
Getty 153	355566	1 units	Getty 188	355860	< 1 units
Getty 154	355567	l units	Getty 189	355861	< 1 units
Getty 155	355568	1 units	Getty 190	355862	1 units
Getty 156	355569	1 units	Getty 191	355863	1 units
Getty 157	355570	1 units	Getty 192	355864	1 units
Getty 158	355571	1 units	Getty 193	355865	< 1 units
Getty 159	355572	1 units	Getty 198	355897	1 units
Getty 160	355573	1 units	Getty 199	355898	1 units
Getty 161	355574	1 units	Getty 200	355899	< 1 units
Getty 162	355583	1 units	Getty 216	355915	l units
Getty 163	355584	1 units	Getty 217	355916	1 units
Getty 164	355585	1 units	Getty 218	355917	1 units
Getty 165	355586	1 units	Getty 219	355918	< 1 units
Getty 170	355591	1 units	Getty # 97	347996	20 units
Getty 171	355592	1 units	Getty # 101	352203	~6 units
Getty 172	355593	1 units	Getty # 102	352204	~10 units
Getty 174	355594	1 units	Getty # 104	352206	6 units

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The Glossie Grid is comprised of 72.4 km of cut-line located on 22 contiguous claims which cover an area of approximately 19,621,612 square metres (Figure 1B, Grid Index Map). A lsit of these claims and pertinent information is listed below:

<u>Claim Name</u>	Record No.	<u>No. Units</u>
	244915	10
Cinder 1	344815	$\sim 12$ units
Cinder 2	344816	~6 units
Cinder 3	344817	16 units
Cinder 4	344818	~12 units
Cinder 5	344819	~5 units
Cinder 6	344820	~10 units
Cinder 12	357801	< 1 units
Cinder 13	357802	< 1 units
Cinder 16	357805	< 1 units
Forge 4	344825	< 1 units
Forge 5	344826	< 1 units
Getty #85	218513	< 1 units
Getty #88	218522	< 1 units
Getty #91	218557	< 1 units
Getty #92	218558	1 units
Getty #97	347996	~6 units
Getty #100	352202	3 units
Getty 204	355903	1 units
Getty 205	355904	1 units
Getty 206	355905	1 units
Getty 212	355911	1 units
Getty 213	355912	1 units
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#### 4.0 GEOLOGY

The Highland Valley porphyry copper deposits occur within the Upper Triassic (205-230 my old) Guichon Creek Batholith which intruded sedimentary and volcanic strata of Triassic age. These rocks are locally unconformably overlain by early Jurassic (200 my) to middle Tertiary (25 my) aged sedimentary and volcanic strata.

The Bethlehem, Lornex, Highmont and Valley Copper open-pit mines, now combined within the Highland Valley Copper Partnership, occur in rocks that are similar in general composition and age to those hosting the Getty North, Getty South and JA deposits. Copper mineralization in the Highland Valley area porphyry copper deposits consists principally of chalcopyrite, bornite, molybdenite and very minor chalcocite; malachite, azurite and native copper are found in weathered rock. The deposits generally exhibit alteration zoning that is typical of porphyry copper systems, consisting of quartz stockwork and potassic alteration in the central volumes of rock containing the highest grades of copper, phyllic and argillic alteration in the areas containing medium to low copper grades and propylitic alteration in the non-economic areas surrounding the deposits. The best copper grades occur in the core areas where bornite occurs in addition to chalcopyrite. In the lower grade areas, chalcopyrite predominates. Fracture density is the most important single factor influencing ore localization and grade.

Of the producing and past producing deposits within the near vicinity, the Getty North deposit most resembles the several deposits that comprised the Bethlehem Mine. The Getty South deposit is a large breccia-hosted copper deposit that is, because of the magnitude of brecciation, unique in the area.

The areas contained within the Glossie IP grid and the North Valley IP grid are underlain by Guichon phase and Border phase granodiorites, which are intruded by Bethlehem phase porphyry dikes. Both areas contain Tertiary volcanics in contact with Guichon phase granodiorite, a relationship which also occurs at the Getty North, Getty South, Bethlehem, and Valley Deposits, and is thought to be an artifact of long-lived, hence favourable, structural systems.



# 5.0 INSTRUMENT SPECIFICATIONS 5.1 Induced Polarization Survey Equipment

The equipment used to carry out this survey was a time domain measuring system consisting of a Wagner Leland/Onan motor generator set and a Mark II transmitter manufactured by Huntec Limited, Toronto, Canada and a 6 channel IP-6 receiver manufactured by BRGM Instruments, Orleans, France.

The Wagner Leland/Onan motor generator supplies in excess of 7.5 kilowatts of 3 phase power to the ground at 400 hertz via the Mark II transmitter.

The transmitter was operated with a cycle time of 8 seconds and the duty cycle ratio: [(time on)/(time on + time off)] was 0.5 seconds. This means the cycling sequence of the transmitter was 2 seconds current "on" and 2 seconds current "off" with consecutive pulses reversed in polarity.

The IP-6 receiver can measure up to 6 dipoles simultaneously. It is microprocessor controlled, featuring automatic calibration, gain setting, SP cancellation and fault diagnosis. To accommodate a wide range of geological conditions, the delay time, the window widths and hence the total integration time is programmable via the keypad. Measurements are calculated automatically every 2 to 4 seconds from the averaged waveform which is accumulated in memory.

The window widths of the IP-6 receiver can be programmed arithmetically or logarithmically. For this particular survey the instrument was programmed arithmetically into 10 equal window widths or channels,  $Ch_0$ ,  $Ch_1$ ,  $Ch_2$ ,  $Ch_3$ ,  $Ch_4$ ,  $Ch_5$ ,  $Ch_6$ ,  $Ch_7$ ,  $Ch_8$ ,  $Ch_9$  (see Figure 2). These may be recorded individually and summed up automatically to obtain the total chargeability. Similarly, the resistivity  $(\rho_4)$  in ohm-metres is also calculated automatically.

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The instrument parameters chosen for this survey were as follows:

Cycle Time (T <sub>c</sub> )	= 8 seconds
Ratio <u>(Time On)</u> (Time Off)	= 1:1
Duty Cycle Ratio <u>(Time On)</u> (Time On) + (Time Off)	= 0.5
Delay Time (T <sub>D</sub> )	= 120 milliseconds
Window Width (t <sub>p</sub> )	= 90 milliseconds
Total Integration Time	= 900 milliseconds

## 5.2 Ground Magnetic Survey Equipment

The equipment used on this survey was the Omni Plus ground magnetometer and an Omni IV recording base station magnetometer both manufactured by EDA Instruments Inc., Toronto, Canada.

The system is completely software/microprocessor controlled. A portable proton precession magnetometer measures and stores in memory the total earth's magnetic field at the touch of a key. It also identifies and stores the location and time of each measurement and computes the statistical error of the reading and stores the decay and strength of the signal being measured. Throughout each survey day a similar base station magnetometer measures and stores in memory the daily fluctuations of the earth's magnetic field. The use of two magnetometers eliminates the need for a network of bases stations on the grid. At the end of each day, the field data is merged with the base station data in the field computer and automatic diurnal corrections are applied to correct the field data, resulting in a very accurate (+/- SnT) measurement of the earth's total magnetic field.



#### 6.0 SURVEY SPECIFICATIONS

## **6.1 Induced Polarization Survey Specifications**

The configuration of the pole-dipole array used for the survey is shown below:

#### POLE-DIPOLE ARRAY



x = 100 metres n = 1,2,3,4 and 5

The dipole length (x) is the distance between  $P_1$  and  $P_2$  and mainly determines the sensitivity of the array. The electrode separation (nx) is the distance between  $C_1$  and  $P_1$  and mainly determines the depth of penetration of the array.

The Induced Polarization survey was carried out with the current electrode,  $C_1$ , west of the potential measuring dipole  $P_1P_2$ . Here the survey lines were 150, 200 or 250 metres apart and measurements were taken for x =100 metres and n = 1,2,3,4 and 5.

## **6.2 Ground Magnetometer Survey Specifications**

The ground magnetic data was acquired at 25 metre station intervals on lines 150, 200 or 250 metres apart.





# **BRGM IP-6 RECEIVER PARAMETERS**

Figure 2



## 7.0 DATA PROCESSING

The data collected was processed in the field at the end of each survey day using a portable 486 computer and a Fujitsu printer.

The IP pseudo-sections were plotted out in the field and contoured using in-house software based on the mathematical solution known as kriging.

In the office, the data was transferred to mylar using a PENTIUM P90 computer coupled to an HP DesignJet plotter for the preparation of the final maps and pseudo-sections.

## 8.0 DATA PRESENTATION

The chargeability, resistivity and total field magnetic data obtained from the North Valley grid are presented, at a scale of 1:2500, on the 32 pseudo-sections tabulated below:

Pseudo-Sections (1:2500)				
<u>Line No.</u>	Dwg. No.	<u>Line No.</u>	<u>Dwg. No.</u>	
5200N	97405-NV-01	7650N	97405-NV-17	
5400N	97405-NV-02	7800N	97405-NV-18	
5550N	97405-NV-03	7950N	97405-NV-19	
5700N	97405-NV-04	8100N	97405-NV-20	
5850N	97405-NV-05	8250N	97405-NV-21	
6000N	97405-NV-06	8400N	97405-NV-22	
6150N	97405-NV-07	8600N	97405-NV-23	
6300N	97405-NV-08	8800N	97405-NV-24	
6450N	97405-NV-09	9000N	97405-NV-25	
6600N	97405-NV-10	9200N	97405-NV-26	
6750N	97405-NV-11	9400N	97405-NV-27	
6900N	97405-NV-12	9600N	97405-NV-28	
7050N	97405-NV-13	9800N	97405-NV-29	
7200N	97405-NV-14	10000N	97405-NV-30	
7350N	97405-NV-15	10200N	97405-NV-31	
7500N	97405-NV-16	10400N	97405-NV-32	



The chargeability, resistivity and total field magnetic data obtained from the Glossie grid are presented, at a scale of 1:2500, on the 41 pseudo-sections tabulated below:

<u>Line No.</u>	<u>Dwg. No.</u>	<u>Line No.</u>	<u>Dwg. No.</u>
1900N	97405-EL-01	5050N (EAST)	97405-EL-14A
2150N	97405-EL-02	5050N (WEST)	97405-EL-14B
2400N	97405-EL-03	5300N (EAST)	97405-EL-15A
2650N	97405-EL-04	5300N (WEST)	97405-EL-15B
2900N	97405-EL-05	5550N (EAST)	97405-EL-16A
3100(EAST)	97405-EL-06A	5550N (WEST)	97405-EL-16B
3100(WEST)	97405-EL-06B	5800N (EAST)	97405-EL-17A
3300 (EAST)	97405-EL-07A	5800N (WEST)	97405-EL-17B
3300(WEST)	97405-EL-07B	6050N (EAST)	97405-EL-18A
3550 (EAST)	97405-EL-08A	6050N (WEST)	97405-EL-18B
3550(WEST)	97405-EL-08B	6300N (EAST)	97405-EL-19A
3800 (EAST)	97405-EL-09A	6300N (WEST)	97405-EL-19B
3800(WEST)	97405-EL-09B	6550N (EAST)	97405-EL-20A
4050 (EAST)	97405-EL-10A	6550N (WEST)	97405-EL-20B
4050(WEST)	97405-EL-10B	6800N (EAST)	97405-EL-21A
4300 (EAST)	97405-EL-11A	6800N (WEST)	97405-EL-21B
4300(WEST)	97405-EL-11B	7050N (EAST)	97405-EL-22A
4550 (EAST)	97405-EL-12A	7050N (WEST)	97405-EL-22B
4550(WEST)	97405-EL-12B	7300N (EAST)	97405-EL-23A
4800 (EAST)	97405-EL-13A	7300N (WEST)	97405-EL-23B
4800(WEST)	97405-EL-13B		

### 9.0 CONCLUSIONS AND RECOMMENDATIONS

It has been concluded that the geophysical data presented in this assessment report contains a number of significant IP and magnetic responses which can be used to identify areas of sulphide mineralization associated with a copper-gold porphyry system.

In view of the large amount of geological and geochemical data acquired on this project by Getty Copper Corp. and not yet available to the writer, no formal stand alone interpretation of the geophysical data has been presented here. However it is strongly recommended that in order to mount an intelligent drilling campaign, the geophysical data presented in this report should be



compiled with the geological and geochemical information obtained by Getty Copper Corp.

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Respectfully submitted, LLOYD GEOPHYSICS INC.

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



# APPENDIX A

# PERSONNEL EMPLOYED ON SURVEY

Name	<b>Occupation</b>	Address	Dates Worked
J. Lloyd	Geophysicist	#455-409 Granville Street	Oct 1/97
		Vancouver, B.C. V6C 1T2	
J. Cornock	Geophysicist	#455-409 Granville Street	Feb 14-27/97
		Vancouver, B.C. V6C 1T2	Jun 21-Aug 2/97
			Sept 24-26/97
A. Lloyd	Geophysical	#455-409 Granville Street	Feb 14-Mar 25/97
• .	Technician	Vancouver, B.C. V6C 1T2	Jun 21-Jul 11/97
M. Cordiez	Geophysical	#445-409 Granville Street	Feb 14-27/97
	Technician	Vancouver, B.C. V6C 1T2	Jun 21-Aug 2/97
			Aug 18-23/97
G.Hoornenborg	Geophysical	#455-409 Granville Street	Jul 15-Aug 2/97
	Technician	Vancouver, B.C. V6C 1T2	
R. Wheater	Helper	#455-409 Granville Street	Mar 4-25/97
	-	Vancouver, B.C.V6C 1T2	
B. DeWitt	Helper	#455-409 Granville Street	Mar 19-25/97
	·	Vancouver, B.C.V6C 1T2	
A. Manchon	Helper	#455-409 Granville Street	Feb 26-Mar 18/97
	-	Vancouver, B.C.V6C 1T2	

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14 - Amended 17, 1998

#### APPENDIX B

#### COST OF SURVEY AND REPORTING

Lloyd Geophysics Inc. contracted the mobilization/demobilization and acquisition of the IP data on a per day basis. The ground magnetic data was acquired on a per kilometre basis. Truck rental, living and travelling expenses, data processing, computer plotting, map reproduction and interpretation and report writing were additional costs. The breakdown of these costs is as follows:

Mobilization/Demobilization and data Acqu	uisition:	\$90,796.00
Truck Charges		<b>\$</b> 9,494.98
Living and Travelling Expenses		\$12,675.00
Data Processing and Computer Plotting		\$ 4,550.00
Consumables		\$ 5,286.50
Reporting		<u>\$ 1,630.00</u>
	Subtotal	\$124,432.48
	<b>G.S.T</b> .	<u>\$ 8,710.27</u>
	Total Cost IP:	\$133,142,75

Costs of line cutting, road maintenance and program supervision (subcontracted directly by Getty Copper Corp.) were as follows:

G.R.T. Geological 147.8 km grid line 13.0 km base line		\$103,755.00
Auspis Holdings Ltd. Road construction, maintenance	and snow clearing:	<u>\$ 52,294,00</u>
	Total IP Support	\$156,049.00
	Total IP (from above)	<u>\$133,142.75</u>
	TOTAL:	\$289,191.75

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#### <u>APPENDIX C</u>

#### **CERTIFICATION OF THE AUTHOR**

I, John Lloyd, of #455 - 409 Granville 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, Technology and Medicine(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.
- 5. I have been practising my profession for over thirty years.

Vancouver, B.C.















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LLOYD GEOPHYSICS INC


















































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