

VOLUME ONE

A GEOPHYSICAL REPORT ON A GROUND MAGNETOMETER, INDUCED POLARIZATION AND RESISTIVITY SURVEY OVER THE VIP PROSPECT, TOODOGGONE AREA, OMINECA MINING DIVISION, NORTH CENTRAL BRITISH COLUMBIA

> LATITUDE 57° 10' NORTH LONGITUDE 126° 52' WEST NTS: 094E02W

> > By

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LLOYD GEOPHYSICS INC. VANCOUVER, BRITISH COLUMBIA JANUARY 2003

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SUMMARY

During the period August 24 to September 29, 2002, Lloyd Geophysics Inc. carried out a ground magnetometer and an induced polarization (IP) and resistivity survey over the VIP copper-gold skarn prospect, in the Toodoggone area of north central British Columbia, for Stealth Minerals Ltd.

The combination of magnetic and chargeability (IP) data was very successful in detecting the various skarn zones which lie within the survey grid area. Additional trenching is recommended to further test the East, North and North East skarn zones prior to drilling.

In an effort to locate the surface trace or strike direction of these relatively small, near vertical skarn zones consideration should be given to testing a small area of the East skarn zone with both a magnetic and gradient IP survey on lines 25 metres apart with 10 metre station intervals.

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IP PSEUDO-SECTIONS WITH MAGNETIC PROFILES MAGNETIC AND IP PLAN MAPS, COMPILATION MAP

1.0 INTRODUCTION

During the period August 24 to September 19, 2002, Lloyd Geophysics Inc. carried out a ground magnetometer and an induced polarization (IP) and resistivity survey over the VIP copper-gold skarn prospect, in the Toodoggone area of north central British Columbia, for Stealth Minerals Ltd.

Since skarn zones generally contain both magnetite and sulphides the purpose of the combined ground magnetometer and IP surveys was to outline the lateral extent of the known skarn zones, while at the same time searching for any new skarns that may be present on the property.

2.0 PROPERTY LOCATION AND ACCESS

The VIP prospect lies within a broad region of prospects and mines known as the Toodoggone mining camp in north central British Columbia. The prospect is located about 20 kilometres northwest of the Kemess South Mine, which in turn is about 500 kilometres north-northwest of Prince George, British Columbia (Figure 1). The prospect is located in the Omineca Mining Division, on NTS sheet 094E02W at latitude 57[°] 10′ north and longitude 126[°] 52′ west. The Stealth camp is approximately 20 kilometres north-northwest of the Kemess South Mine. Access to the property for this work was by helicopter operating out of the Kemess South minesite.

3.0 CLAIM HOLDINGS

The following claim information was provided by Stealth Minerals Ltd. at the time of preparing this report:



Name	Tenure #	Units	Anniversary Date	Expiry Date	Registered
Sky 1	363244	18	98/05/29	2003MAR31	107591
Sky 2	363245	18	98/05/30	2003MAR31	107591
Sky 3	363246	18	98/05/30	2003MAR31	107591
Gov	363248	20	98/05/26	2004MAR31	107591

The location of the geophysical survey grid, with respect to the above mentioned claims is shown in Figure 2.

4.0 GEOLOGY

The area is underlain by Asitka Group volcanic, siliciclastic and carbonate rocks, Permian in age, Stuhini/Takla Group basalt-andesite, Upper Triassic-Lower Jurassic in age, and Hazleton Group-Toodoggone Formation dacite-andesite volcaniclastic rocks, Lower to Middle Jurassic in age. Granodiorite, monzodiorite to quartz monzonite and locally pyroxene gabbro intrusive rocks of the Omineca/Black Lake plutonic suite, Lower to Middle Jurassic in age, cut previous lithology. Sub-parallel intrusive and volcanic arcs trend northwest and are associated with major deep-seated regional faults; conjugate, dilation faults cross-cut and in part offset these structures, and may impart a secondary control on intrusive, volcanic and hydrothermal activity.

The Toodoggone Formation is comprised of subaerial, calc-alkaline quartzhornblendefeldspar crystal dacite-andesite pyroclastic rocks deposited within an island arc environment, and appear in part, coeval with the Black Lake quartz monzonite intrusive rocks. These Omineca intrusions host porphyry deposits such as Mt. Milligan, Kemess, Pine, Brenda and Pil deposits, and may in part be a source for most of the regions prolific porphyry, skarn and epithermal gold mineralization.

The VIP prospect is located on the north side of the Finlay River. In this area, Asitka Group marble and meta-volcanic-sedimentary rocks occur as pendants overlying Black



Lake intrusive rocks of granodiorite derivation. Widespread biotite-garnet-pyroxene hornfelsed meta-volcanic-sediments contain predominantly pyrite, and local structurally controlled zones of silicification contain elevated gold values.

Skarn zones are comprised of predominantly garnet-epidote-diopside-magnetitehematite in proximity to contacts between granodiorite to quartz monzonite and calcareous meta-sediments and marble. Mineralization is comprised dominantly of chalcopyrite, with minor pyrite, bornite, and associated copper, gold and silver values; locally sphalerite, molybdenite and other copper minerals occur. Skarn zones occur with variable concentrations of magnetite, or hematite, and occur locally without. The mineralized skarn zones that occur on the south side of the baseline trend northeastsouthwest in outcrop, however, cross-cutting faults and shears also occur; the zones appear to dip northwest, locally beneath pyrite-bearing, hornfelsed meta-volcanicsedimentary rocks.

The underlying Omineca intrusive rocks are locally potassic altered and contain widespread disseminated pyrite. Structurally controlled zones of quartz-chlorite alteration accompanied by pyrite-chalcopyrite mineralization occur. A significant area of this type of mineralization occurs on the southwest end of the grid, in particular near Lines 3400W and 3600W. Prospecting located similar rocks and copper-gold mineralization approximately 2.5 kilometres southwest of Line 3600W.

5.0 INSTRUMENT SPECIFICATIONS

5.1 Ground Magnetometer System

The system consists of 2 Omni total field proton precession magnetometers manufactured by EDA Instruments Inc., Toronto, Canada. The system is completely software controlled. The field magnetometer measures and stores in memory, via the keypad, the time, the location and the value of the earth's total magnetic field at each

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station. The base station magnetometer measures and stores in memory, automatically, the daily fluctuations of the earth's total magnetic field throughout each day.

At the end of each survey day, the 2 sets of data are merged and downloaded to a field computer. The field data is automatically corrected, via software, for diurnal variations recorded by the base station magnetometer.

5.2 Induced Polarization System

The system used to carry out this survey was a 7.5 kw time domain unit consisting of a 400 hertz Onan/Wagner Leland motor generator set and a Mark II transmitter manufactured by Huntec Limited, Toronto, Canada and a 6 channel IP-6 receiver manufactured by Iris Instruments, Orleans, France.

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 survey the instrument was programmed arithmetically into 10 equal window widths or channels. Ch₀, Ch₁, Ch₂, Ch₃, Ch₄, Ch₅, Ch₆, Ch₇, Ch₈, Ch₉, (Figure 3). These are recorded individually and summed up automatically to obtain the

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total chargeability. Similarly, the resistivity (R) in ohm-metres is also calculated automatically.

The instrument parameters chosen for this survey were as follows:

Cycle Time (T _c)	= 8 seconds
Ratio	
<u>(Time On)</u> (Time Off)	= 1:1
Duty Cycle Ratio	
(<u>Time On</u>)	= 0.5
(Time On) + (Time Off)	
Delay Time (T _D)	= 120 milliseconds
Window Width (t _p)	= 90 milliseconds
Total Integration Time (T_p)	= 900 milliseconds

6.0 SURVEY SPECIFICATIONS

6.1 Ground Magnetometer Survey

The magnetometer survey measurements were recorded at 12.5 metre station intervals, on lines 100 metres apart.

6.2 Induced Polarization Survey

The pole-dipole array was used for this survey, with the dipole length (x) equal to 50 metres and measurements were recorded for n=1 through 5. The current electrode (C₁) was always located to the **south** of the potential measuring dipole (P₁P₂) as depicted on each pseudo-section drawing.

7.0 DATA PROCESSING AND PRESENTATION

The magnetic data collected in the field is merged with the base station data, downloaded to a field computer, automatically corrected and plotted in profile form on the pseudo-sections.

The IP data was processed at the end of each survey day using a Pentium laptop computer and a Fujitsu printer. In the Vancouver office, the data was transferred to a high-speed desktop computer coupled to an HP DesignJet colour plotter to make the final pseudo-sections and plan maps. The numerical value obtained from a 15 point triangular filter, of the IP data, applied consecutively at every station on each line is also plotted on the pseudo-sections.

The IP and magnetic data are presented on 16 pseudo-sections, 4 plan maps and a Compilation map. All pseudo-sections and plan maps are located in a separate map case which forms Volume 2 of this report.

Line No.	Drawing No.
600W	02454 - VO1
800W	02454 - V02
1000W	02454 - V03
1200W	02454 - V04
1400W	02454 - V05
1600W	02454 - V06
1800W	02454 - V07
2000W	02454 - V08
2200W	02454 - VO9
2400W	02454 - V10
2600W	02454 - V11

Pseudo-Sections with Magnetic Profiles

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Line No.	Drawing No.	
2800W	02454 - V12	
3000W	02454 - V13	
3200W	02454 - V14	
3400W	02454 - V15	
3600W	02454 - V16	

Contoured Plan Maps

Description	Drawing No.
Total Field Magnetics (12.5m stations)	02454 - V17
Total Field Magnetics (100m stations)	02454 - V18
Filtered Chargeability	02454 - V19
Filtered Resistivity	02454 - V20
Compilation Map	02454 - V21

8.0 DISCUSSION OF RESULTS

In the case of skarn zones, where magnetite is often a major component of the mineral assemblage, a magnetic survey can be equally as important as an IP survey.

An IP response depends largely on the following factors:

- The volume content of sulphide minerals.
- The number of pore paths that are blocked by sulphide grains.
- The number of sulphide faces that are available for polarization.
- 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.
- The electrode array employed.

- The width, depth, thickness and strike length of the sulphide body and its location relative to the array.
- The resistivity contrast between the sulphide body and the barren host rock.

There are several critical factors that we would like to determine from IP field measurements made over a sulphide body. These are the sulphide content, the width, length, depth of burial and thickness of the body. Experience has shown that this is both difficult and unreliable because of the large number of variables, described above, which contribute to an IP response. **The problem is further complicated by the fact that rocks containing magnetite, graphite, clay minerals and variably altered rocks produce IP responses of varying amplitudes.**

It is difficult to resolve the actual position of multiple sulphide sources from a pseudosection alone. Nevertheless, it is doubtful if any significant deposits have gone undiscovered where drilling has been based largely on a complex pseudo-section.

During the 1990's, various research workers have developed special inversion software capable of generating realistic chargeability and resistivity models. While such models are often a good representation of the geological cross-section of a sulphide body, **they do not provide a unique solution**, **but rather a probable solution**. These models appear to be most useful for bodies of large lateral extent, for example porphyry deposits and less useful over smaller bodies, for example massive sulphide and skarn deposits.

For easy reference the assay results from the sampling of the 17 trenches cut on the property to date are shown in the Table on page 12.

In a general way the magnetic response over the intrusive rocks is somewhat higher than the magnetic response over the metasediments. However, on certain parts of the grid this situation is much less evident. Therefore, it is difficult to establish boundaries

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VIP Trench Sampling Summary

VIP		Length	From	То	Width	CU	ĀĞ	Au	Rock Type
Zone	#	<u>m</u>	m		m	%	gm/mt	gm/mt	and alteration
West_L32+10W	1	48	0	6	6	0.10	2.60	0.83	Ga-Ep-D-Mag Skn
West_L32+10W	1		18	36	18	0.33	13.36	3.19	Ga-Ep-D-Mag Skn
West_L32+50W	2	54	0	15	15	0.24	10. 92	1.53	Ga-Ep-D-Mag Skn
West_L32+50W	2		24	48	24	0.22	22.75	2.77	Ga-Ep-D-Mag Skn
	2	includes	36	42	6	0.72	6.56	9.40	Fp Mz
West_L34W	3	234	114	129	15	0.14	0.27	0.39	Ga-Ep-D-Mag Skn
West_L34W	3		183	204	21	0.47	12.10	0.96	Ga-Ep-D-Mag Skn
	3	includes	183	189	6	0.83	23.35	1.87	Ga-Ep-D-Mag Skn
West_L34W	3a	at 18m,1	0mNE>	>NE	5.1	1.13	44.42	2.79	Ga-Ep-D-Mag Skn
SouthWest_L35W	4	14	0	14	14	0.27	8.51	0.01	QFp/Gd -open
North_L22W	5	25	12	15	3	0.09	0.3	0.01	Ga-Ep-D-Mag Skn
North_L24W	6	63	9	15	6	1.1 6	52.00	3.61	Ga-Ep-D-Mag Skn
North_L26W	7	87	63	66	3	0.28	< .3	0.03	Marble_Ga_Skn
East_L17W	8	50.0	0.0	50.0	50.0	no samp	les taken		Chl-k-feld_Gd,Tr Qtz
East_L17+25W	9	21.0	3.0	6.0	3.0	0.36	5.50	0.20	Ga-Ep-D-Mag Skn
East_L17+70W	10	33.0	12.0	18.0	6.0	0.50	11.65	0.01	Ga-Ep-D-Mag Skn
East_L18W	11	87.0	15.0	27.0	12.0	0.38	12.23	0.41	Ga-Ep-D-Mag Skn
East_L18W	11		at 16.5m	>NE	3.1	0.59	15.70	1.14	Ga-Ep-D-Mag Skn
East_L18+45W	12	15	0.0	3.0	3.0	0.45	7.70	0.06	Marble- open to NW
East_L18+75W	13	18	0.0	3.0	3.0	0.12	1.5	0.04	Marble- open to NW
East_L19W	14	50	0.0	25.0	25.0	no samp	les taken		Overburden
East_L19W	14	•	25.0	50.0	25.0	no samp	les taken		Chi-k-feld_Gd
East_L19+75W	15	57	12.0	18.0	6.0	0.94	2.78	0.66	Marble+ Ga Skarn
East_L19+75W	15		24.0	27.0	3.0	1.27	20.30	0.90	Marble+ Ga Skarn
East_L19+75W	15		36.0	42.0	6.0	1.41	32.60	5.81	Marble+ Ga Skarn
East_L19+75W	15	at 45m	high-gra	de grabNE	1.3	9.67	45.10	5.46	Ga-Ep-D-Mag Skn
East_L20+25W	16	67	0.0	3.0	3.0	0.03	0.3	0.01	Ga-Ep-D-Mag Skn
East_L20+25W	16		65.0	66.0	1.0	0.18	6.1	0.03	Hnf_Ga_Skn
East_L22W	17	21	3.0	9.0	6.0	0.03	< .3	0.01	Marble+ Ga Skarn

Marble	Marble
Fp	Feldspar porphyry
Qfp	Quartz Feldspar porphyrg
Gd	Granodiorite
Mz	Monzonite

Hnf Homfels/ metasediment Skn Skarn Chl Chlorite Qtz Quartz Sil Silicification Hem Hematite/specularite py pyrite Chip Chip sample Grab Grab sample Tr Trace

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Ga Garnet

Ep Epidote

k-feld K-Feldspar

Mag Magnetite

D Diopside

Mineralized zones are comprised of garnet-epidote-diopside-magnetite+specular hematite skarn within Asitka Group marble and hornfelsed meta volcanic-sediment pendants cut by granodiorite to quartz-monzonite Sulphides are comprised predominantly of chalcopyrite, pyrite, and locally sphalerite and bornite Trenches are generall oriented from the northwest to southeast, parallel grid lines

between these two rock types based on magnetics alone.

The resistivity of the intrusive rocks is generally higher than the resistivity of the metasediments. However, where this situation is reversed, for example on the North skarn zone, the overlying metasediments are expected to be much thinner than those which overlie the other skarn zones.

In addition to the two well defined magnetic linears over the East skarn zone there is a preponderance of short wavelength, moderate amplitude, magnetic anomalies throughout the grid area. These anomalies appear to be best developed in the metasediments to the northwest and southeast of the West skarn zone. Along strike these magnetic anomalies form a series of northeast-southwest trending magnetic linears, where average widths vary from about 10 to 40 metres and average amplitudes from about 200 to 1000 nT. There is no simple method of screening this plethora of weak magnetic linears, however they should not be ignored where they have been shown to exist in the immediate vicinity of the various skarn zones.

The IP survey established 6 chargeability anomalies all with fairly moderate amplitudes. Two of these anomalies, number 5 and number 6, overlie 13 of the 17 trenches which have been cut to date on the grid.

The salient features of the geophysical data as they relate to the individual skarn zones are described below:

The West Skarn Zone (Trenches T1, T2 and T3)

Trenches T1 and T2 are located at 3210W and 3250W respectively and extend from about 230S to 280S. There is a very weak magnetic linear near the south end of these two trenches on line 3200 W, but no significant chargeability response.

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Trench T3 is located immediately west of line 3400W, is 234 metres long, and extends from about 40S to about 275S. It cuts IP anomalies number 1 and number 2 and is associated with a series of weak magnetic linears.

Trench T4, located at about 700S on line 3500W, was cut into intrusive rocks and lies within an area of slightly elevated chargeability values.

The North Skarn Zone (Trenches T5, T6 and T7)

The three trenches, T5, T6 and T7 lie within chargeability anomaly number 5, which is approximately 750 metres long and 175 metres wide.

Trench T5 may not have cut the core of the IP anomaly and appears to lie just north of a weak magnetic linear. Assay results from this trench were disappointing.

Trench T6, on line 2400W, appears to have cut both the core of the IP anomaly and the 800 nT magnetic linear with which it is coincident. Assay results from a 6 metre section of this trench returned 1.16% copper, 52 grams per tonne silver and 3.61 grams per tonne gold.

Trench T7, on line 2600W, appears to have cut both the core of the IP anomaly and the very strong, 3500 nT, magnetic anomaly centred at 250N, with which it is coincident. However, assay results from the best 3 metre section of this trench were disappointing, returning only 0.28% copper, less than 0.3 grams per tonne silver and only 0.03 grams per tonne gold.

There is a 1500 nT magnetic linear centred at 170N, on line 2500W which has yet to be tested by trenching.

The East Skarn Zone (Trenches T8 through T17)

This zone is characterized by two sub-parallel magnetic linears, approximately 900 metres long and whose distance apart varies from about 80 to 130 metres.

Trench T8 to T13 would appear to have adequately tested the northern most magnetic linear and the strong near surface expression of the chargeability high at about 125S on line 1800W. However, trenches T14, T15 and T16 will need to be extended to the north, if possible, to adequately test the northern most magnetic linear.

Line 1600W is characterized by a shallow near surface chargeability high at about 125S and three weak magnetic linears to the immediate south of the chargeability high. Trenching at this location is recommended.

Line 1800W shows some spectacular magnetic results. Two extremely strong magnetic anomalies were detected. The northern most magnetic anomaly, at 125S, reaches approximately 12,000 nT above background and the southern most magnetic anomaly, at 215S, approximately 18,000 nT above background. These two very strong magnetic anomalies have been interpreted to represent two near vertical, predominantly magnetite, bodies approximately 25 metres wide. Trench T11 would appear to have tested the northern most magnetic anomaly and the associated chargeability high centred at about 125S, but did not extend far enough south to test the stronger southern most magnetic anomaly centred at about 215S.

Lines 2000W and 2200W both have extremely weak coincident magnetic and chargeability highs at about 225S and 250S respectively. Trench T17 tested the coincident magnetic and chargeability high on line 2200W with disappointing results.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Below is a summary of the geophysical responses over those trenches which were cut on or very close to a specific IP line.

Trench Number	Trench Location	Magnetic Response	Chargeability Response	Assay Results *	
T1	10m W – L 3200W	Weak	Weak	Excellent	
Т2	5m W – L 3200W	Weak	Weak	Excellent	
Т3	on L 3400W	Moderate	Excellent	Excellent	
T6	on L 2400W	Moderate	Strong	Excellent	
77	on L 2600W	Strong	Very Strong	Fair	
T11	on L 1800W	Very Strong	Very Strong	Excellent	
T16	on L 2000W	None	None	Poor	
T17	on L 2200W	Moderate	Moderate	Poor	

* Detailed assay results are shown in the Table on Page 12

From a study of the geophysical data described in this report, and from the summary table above, it has been concluded that the combination of magnetic and chargeability (IP) data was very successful in detecting the various skarn zones within the survey grid area. Nowhere is this evidence more compelling than on line 1800W where trenching (T11) of an extremely strong coincident magnetic and chargeability anomaly returned a 12 metre section containing 0.38% copper, 12.23 grams per tonne silver and 0.41 grams per tonne gold along with a 3.1 metre section containing 0.59% copper, 15.70 grams per tonne silver and 1.14 grams per tonne gold.

The following additional trenching is recommended to further test the **East skarn** zone:

• To the east of trench T8 to test the IP anomaly at about 125S on line 1600W.

- To the west of trench T16 to test the strong magnetic linear located at about 100S on line 2100W and, depending on results, maybe further to the west.
- By extending trenches T14, T15 and T16 to the north, since they may not have cut the magnetic linear at this location.
- By extending trench T11 about 100 metres to the south to cut the 18,000 nT magnetic anomaly which forms part of a 900 metre long magnetic linear located about 100 metres south of trenches T8 through T16.

Additional trenching on the **North skarn** zone on line 2500W at 170N, 260N and 330N and on the **North East skarn zone** on line 1600W from 250N to 350N, is also recommended.

Finally, consideration should be given to testing a small area of the **East skarn zone** with both a magnetic and IP gradient array survey on lines 25 metres apart with 10 metre station intervals.

Respectfully submitted, LLOYD GEOPHYSICS INC.

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

APPENDICES

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APPENDIX A

COST OF GEOPHYSICAL SURVEYS

Lloyd Geophysics contracted the acquisition of the magnetic data on a per kilometre basis and the IP data on a per diem basis. Mobilization, demobilization, traveling expenses, truck charges, data processing, computer plotting, consumables, reprographics, interpretation and report writing were additional costs:

Item	GST	Amount
Mobilization / Demobilization	282.63	\$4,037.50
Living and Traveling Expenses	133.37	1,550.88
Truck Charges	217.58	3,237.47
Magnetic and IP Data Acquisition	1,761.03	25,157.50
Data Processing and Computer Plotting	178.50	2,550.00
Consumables and Reprographics	366.40	5,234.26
Interpretation and Report Writing	224.00	3,200.00
	3,163.51	44,967.61
Sub Total		44,967.61
GST (as shown)		3,163.51
TOTAL COST		\$48,131.12

<u>APPENDIX B</u>

CERTIFICATION OF THE AUTHOR

I, John Lloyd of 805 – 4438 West 10th Avenue, in the City of Vancouver, in the Province of British Columbia, do hereby certify that:

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

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.

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

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 practicing my profession for over thirty-five years.

Vancouver, B.C. January 2003