Ministry of Energy, Mines & Petroleum Resources			BC Geo Asses	ological sment 38815	Sur Repo	vey ort	T COLORS
Mining & Minerals Division BC Geological Survey					1	Assessm Fitle Pag	ent Report ge and Summary
TYPE OF REPORT [type of survey(s)]: Geophysical				TOTAL	COST:	\$250,4	498.30
AUTHOR(S): Alex Walcott BSc, John McClintock P.Eng			SIGNATURE(S):				
NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): MX-8-280						YEAR O	F WORK: 2019
STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S	s): <u>Eve</u>	ent nu	mbers 576298	6			
PROPERTY NAME: Pemberton Hill Area of North Island Claim Bl	ock						
CLAIM NAME(S) (on which the work was done):	8335,	5160	78, 516527, 3	71777, 277	240, 50	06021, 3	315280, 516076
516076, 513930							
COMMODITIES SOUGHT: copper, gold molybdenum and rhenium MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN:	1						
MINING DIVISION: Nanaimo		NTS/	BCGS: 92L 12				
LATITUDE: <u>50</u> ° <u>37.8</u> ' LONGITUDE: <u>127</u>	0	<b>4</b> 6.2	2 " "	(at centre o	of work)		
OWNER(S): 1) North Island Mining Corp.	2)						
MAILING ADDRESS: 15th Floor, 1040 West Georgia Street							
Vancouver , B.C.							
OPERATOR(S) [who paid for the work]: 1) Northisle Copper and Gold Inc	2)						
MAILING ADDRESS: as above							
PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structu Bonanza Group volcanic rocks, andesite, Island Intrusions, qu polarizationation survey	re, alte artz d	ration, liorite,	mineralization, s advanced arg	size and attitu	ude): gillic alt	eration,	induced

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: 22374, 21053, 15876, 2190

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)	L		
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
	ne km	513929-31, 3/1/77, 398335, 516078, 516527, 516076, 315280, 506021, 277240,	125,697.00
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for)			
Silt			
Bock		— — — — — — — — — — — — — — — — — — — —	
(total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres) 20.5 km		same as IP	124,801.30
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/	rail		
Trench (metres)			
Underground dev. (metres)			
Other			
		TOTAL COST:	249,999.30

#### A REPORT

# <u>ON</u>

#### **INDUCED POLARIZATION SURVEYING**

# PEMBERTON HILLS PROPERTY COAL HARBOUR AREA, BRITISH COLUMBIA

NANAIMO M.D. 50° 37.8' N, 127° 46.2' W NTS 94L/12

**Claims Surveyed** 

371777,277240,506021,513929-31,515280,516076,516078

Work Dates

Aug 22<sup>th</sup> - Oct 20<sup>th</sup>, 2019

for

#### NORTHISLE COPPER AND GOLD INC.

Vancouver, British Columbia

by

Alex Walcott, BSc John McClintock, P.Eng *Revised 7 April 2020* 

# **TABLE OF CONTENTS**

## **Page**

INTRODUCTION	3
PROPERTY, LOCATION AND ACCESS	4
PHYSIOGRAPHY AND CLIMATE	7
HISTORY	7
REGIONAL GEOLOGY	8
SUBVEV SDECIFICATIONS	10
PURPOSE	12
DISCUSSION OF RESULTS.	13
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	18
Mineral Tenure InformationAppendix I	
Cost StatementAppendix II	
Certification and BibliographyAppendix II	

## **ACCOMPANYING MAPS**

Claim and Line Location Map	Scale 1:20,000
Line Location Map with Historic Residual TMI (nT)	Scale 1:20,000
IP Pseudosections 2500W, 500W,1000N,1600N,2900N	Scale 1:10,000
Loke 2D Inverted Sections 2500W, 500W,1000N,1600N,2300N,2900N	Scale 1:20,000
Loke 3D Inverted Sections 2500W, 500W,1000N,1600N,2300N,2900N	Scale 1:20,000
Loke 3D Inverted Plan Map – 200m below surface 3D Modelled Chargeability, 3D Modelled Resistivity	Scale 1:20,000

#### **INTRODUCTION.**

Between October 4<sup>th</sup> and 20<sup>th,</sup> Peter E. Walcott & Associates Limited undertook induced polarization surveying over parts of the Pemberton Hills property for Northisle Copper and Gold Inc.

Measurements - first to sixth separation - of apparent chargeability - the IP response parameter - and resistivity were made along the traverse lines using the pole-dipole technique utilising a 200-metre dipole.

In total, some 20.5-line kilometres of induced polarization surveying was completed on five traverses. Terrain varied between gentle and almost extreme with dense brush being ubiquitous to most areas.

The data are presented as individual pseudo sections at a scale of 1:20,000.

In addition to induced polarization surveying, horizontal / vertical positions of the line stations were measured using a Garmin handheld GPS unit.

## PROPERTY LOCATION AND ACCESS.

The Pemberton Hills claim group is located at the northern end of Vancouver Island near the community of Coal Harbour and town of Port Hardy, British Columbia.

Access to the survey areas was gained along a network of roads branching from the Coal Harbour Forest Access road.



Property Location Map

# PROPERTY LOCATION AND ACCESS con't.



## PROPERTY LOCATION AND ACCESS con't.



Claim Map with IP Lines 2019 Line in Blue

## **Physiography and Climate**

The area is characterized by moderate to steep relief in the order of 250 metres between valley bottoms and hill tops. Much of the area is best described as a plateau dissected by steep walled creeks, which from east to west are known as Steves and Youghpan creeks.

Much of the area has been logged with only a few stands of old growth remaining. Secondary growth has established in some areas. Traversing can be difficult particularly in areas of the most recent logging.

Climate in the area of the Property is typical of coastal areas of British Columbia with an annual precipitation of 2,500 mm, and a daily average temperature of 8.8°C (Environment Canada, 1971-2000). Winters are very wet, with 75% of the annual precipitation occurring from October to March, mostly as rainfall at lower elevation, but with significantly increasing percentage of snowfall accumulation above 300 m in elevation. Generally, exploration and development work is possible for most of the year, allowing for a long exploration field season.

### **History**

The area has seen two periods of prior exploration. The initial period of exploration was in the early 1980s when Utah explored the alteration zones of the upper plateau for gold bearing epithermal systems. In addition to geological mapping, magnetic surveys and induced polarization, Utah drilled 12 Xray holes and 3 deeper diamond core holes. The Xray holes were generally less than 30 metres deep and targeted an area of intense silicification. Later, Utah drilled 3 widely spaced holes, again targeting gold mineralization. The maximum depth of the holes was about 200 metres. The deepest hole is reported to have penetrated the silica cap and entered pyrite and chalcopyrite bearing volcanic rocks with low, but interesting copper grade of 0.14% at the end of the hole.

In 1990, the eastern part of the property was acquired by Moraga Resources as part of the WANN property. Three holes were drilled in the eastern part of the current area of interested. The deepest hole reached 134 metres and cut silicified and clay altered pyritic volcanic rocks and feldspar porphyry dykes (Pawliuk, 1992).

Since the work by Moraga, little exploration has been carried out on the property. In 2012, Northisle completed a limited induced polarization survey and large scale mapping. The visual similarity of the alteration at Pemberton Hills with that on Mount Macintosh, where the alteration overlies copper – gold porphyry mineralization at depth, prompted a TerraSpec Xray diffraction study (McClintock, 2017). The TerraSpec survey to confirm the mineralogical similarities between the two alteration systems. The results

of the 2017 TerraSpec survey were encouraging and justified a follow-up program in 2018 of IP surveying and widely spaced deep drilling to test for the presence of a porphyry copper system at depth. The location of the drill holes for the 2018 drilling were selected on the basis of clay mineralogy in surface exposures and to a lesser extent on the results of the IP survey.

### **Regional and Property Geology**

The regional geology of the Rupert area was mapped by Nixon et al. (2006) and the following summary is a synopsis of Nixon's paper. The map below shows the bedrock geology of northern Vancouver Island. Vancouver Island is comprised of Upper Paleozoic to Lower Mesozoic rocks of Wrangellia – a tectonostratigraphic terrane that occurs discontinuously northward as far as central Alaska. This terrane was amalgamated to the Alexander Terrane of the Alaskan Panhandle (together comprising the Insular Superterrane) by Late Carboniferous time. Subsequently, these terranes were accreted to North America between the Middle Jurassic and the mid-Cretaceous. Thus, Vancouver Island records an early allochthonous history, and a later history with commonality to the North American margin.

The pre-accretion history of Wrangellia is represented by the Paleozoic Sicker Group and the Middle Triassic Karmutsen Formation. The Sicker Group comprises marine Devonian to Early Permian volcanic and sedimentary rocks that host VMS deposits such as at Myra Falls. The Karmutsen conformably overlies the Sicker Group and comprises basaltic and minor sedimentary rocks that underlie about 50% of Vancouver Island. This unit is up to 6000 m thick. Richards et al. (1991) argued that the Karmutsen was initiated by, and extruded above a mantle plume and recent geochemical data support an oceanic plateau origin for the Karmutsen (Greene et al., 2006). The Karmutsen is in turn conformably overlain by the Quatsino Formation of limestone consistent with a period of quietude following impingement of a mantle plume.

The Bonanza Arc (DeBari et al., 1999) formed along the length of Vancouver Island during accretion of Wrangellia. Owing to later tiling, products of this arc from various crustal depths are all preserved. These include the Westcoast Crystalline Complex, Island Intrusions and the Bonanza Group volcanic rocks. DeBari et al. (1999) argue that all these components have similar ages and geochemical signatures and that they are therefore all products of a single arc.

With in the Pemberton Hills claim area are Bonanza Group and Island Intrusions. Rocks of the Bonanza Group are mainly andesite to basalt flows, pyroclastic and their volcaniclastic derivatives. The Island Intrusions vary from diorite to granodiorite. Ages for these rocks range from ca 190 to 169 Ma. Intrusive rocks of the Island Intrusions are responsible for porphyry copper mineralization on north Vancouver Island.

The area of the induced polarization survey covers both Bonanza Group volcanic rocks and the Island Intrusions as shown on a map by Massey et al. below.



#### **SURVEY SPECIFICATIONS.**

#### The Induced Polarization Survey.

The induced polarization (IP) survey was conducted using a pulse type system, the principal components of which were manufactured by Walcer Geophysics Ltd. of Enniskillen, Ontario, and by Instrumentation GDD of St. Foy, Quebec.

The system consists basically of three units, a receiver (GDD), transmitter (Walcer) and a motor generator (Honda). The transmitter, which provides a maximum of 9.0 kw dc to the ground, obtains its power from a 20 kw 60 cps alternator driven by a Honda 24 hp gasoline engine. The cycling rate of the transmitter is 2 seconds "current-on" and 2 seconds "current-off" with the pulses reversing continuously in polarity. The data recorded in the field consists of careful measurements of the current (I) in amperes flowing through the current electrodes  $C_1$  and  $C_2$ , the primary voltages (V) appearing between any two potential electrodes, P<sub>1</sub> through P<sub>7</sub>, during the "current-on" part of the cycle, and the apparent chargeability, (M<sub>a</sub>) presented as a direct readout in millivolts per volt using a 200 millisecond delay and a 1000 millisecond sample window by the receiver, a digital receiver controlled by a micro-processor – the sample window is actually the total of twenty individual windows of 50 millisecond widths.

The apparent resistivity ( $\int_a$ ) in ohm metres is proportional to the ratio of the primary voltage and the measured current, the proportionality factor depending on the geometry of the array used. The chargeability and resistivity 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 chargeability and resistivity are functions of the actual chargeability and resistivity of the rocks.

The survey was carried out using the "pole-dipole" method of surveying. In this method the current electrode,  $C_1$ , and the potential electrodes,  $P_1$  through  $P_{n+1}$ , are moved in unison along the survey lines at a spacing of "a" (the dipole) apart, while the second current electrode,  $C_2$ , is kept constant at "infinity". The distance, "na" between  $C_1$  and the nearest potential electrode generally controls the depth to be explored by the particular separation, "n", traverse.

On this survey a 200 metre dipole was employed and first to sixth separations readings were obtained. In total some 20.5 kilometres of surveying were completed.

## **SURVEY SPECIFICATIONS cont'd.**

#### Horizontal and vertical control.

The horizontal position of the stations were recorded using a GLONASS equipped Garmin C64 handheld GPS receiver.

## Data Presentation.

The data are presented as individual pseudo section plots of apparent resistivity and apparent chargeability at a scale of 1:20,000 generated using Geosoft Oasis Montaj. In addition, data was subjected to both 2D and 3D inversion and presented as model sections at a scale of 1: 20,000.

#### **PURPOSE**

The purpose of the 2019 induced polarization survey was to expand upon the previous years induced polarization survey in hopes of locating additional chargeable bodies potentially associated with porphyry style mineralization.

#### **DISCUSSION OF RESULTS.**

The combined results of the 2018/2019 induced polarization surveys show several features of potential interest.

The dominant chargeability features within the survey appear to flank the edge of a large resistive unit which underlies the central portion of the survey area. This region is also associated with a NW trending zone of elevated magnetics. This unit is likely associated the intrusive rocks of the Island Plutonic Suite.



*3D View of Modelled 3D Resistivity With Location of Chargeability Anomalies.* 

The large resistivity low in the western portion of the property appears to correlate with a mapped mafic volcanic unit. The elongation of the anomalies is potentially a function of the large a-spacing, orientation of the survey lines along strike, and the 2D algorithm used in the inversion.

Anomaly cHA is a moderate to high chargeability response on the flanks of the large resistivity features. This feature appears to be coincident with a mapped felsic volcanic unit. The anomaly appears to extend to depth in a plug like fashion observed in the 3D inversions model. It should be noted that the results of the 2D inversions yielded mixed depth information likely because the assumptions of the 2D code, were not satisfied.

The feature is contained within a zone of reduced magnetics as illustrated in the residual airborne magnetics below. It is also associated with a small near surface resistivity high observed in the 7200 Hz airborne resistivity. The near surface resistivity feature was not resolved in the IP due to the large a spacing utilized.



Residual TMI (nT) with IP line Locations. Western Side of Grid

Anomaly cMD is to the west of anomaly cHA. The anomaly lies within the same magnetic corridor as cHA.

The anomaly appears weaker in chargeability intensity; however, this is potentially due to the conductive cover overlying the feature. Like cHA, the anomaly is situated in a slight embayment as shown in the residual magnetics.



*3D View of Modelled 3D Resistivity With Location of Chargeability Anomalies.* 

Anomaly cHB is in the eastern portion of the survey area. This moderate to high chargeability anomaly is associated with zone of moderate resistivity, transitioning to a higher resistivity at depth. The core of the chargeability anomaly is associated with the upper resistivity unit, potentially a sedimentary unit.

The anomaly also appears confined to WNW trending magnetic low, which may be a slight dipole effect from the magnetic body to the south.

Immediately to the southwest of Anomaly cHB, a second subparallel anomaly (cMC) can be observed. This shallow narrow low to moderate intensity chargeability feature is associated with a moderate resistivity feature, along with a slightly elevated magnetic response.



3D Modelled Chargeability Slice – Line 2300N



3D Modelled Resistivity Slice – Line 2300N



Residual TMI (nT) with IP line Locations. Eastern Side of Grid

Anomaly cME is situated in the central portion of the survey grid. The anomaly is low to moderate intensity anomaly associated with a zone of slightly reduced resistivity. The anomaly appears to manifest into a more intense near surface anomaly as observed on the ends of line 500W and L1000N respectively and remains open. The feature is coincident with a zone of reduced magnetics.

## SUMMARY, CONCLUSIONS & RECOMMENDATIONS.

Between October 4<sup>th</sup> and 20<sup>th,</sup> Peter E. Walcott & Associates Limited undertook induced polarization surveying over parts of the Pemberton Hills property for Northisle Copper and Gold Inc.

Some 20.5-line kilometers of induced polarization surveying was completed on 5 traverses of varying direction, expanding on the 2018 survey grid. The survey was designed maps chargeability and resistivity features at depth potentially associated with porphyry style mineralization.

The results of the combined surveys yielded several targets of potential interest for follow up. A detailed review of all historic data should be undertaken in conjunction with the new geophysical results. If warranted additional lines of induced polarization should be carried out over the select targets utilizing a 100m spacing run orthogonal to the regional strike prior to drilling.

#### **APPENDIX I**

**Mineral Tenure Information** 

### **MINERAL TENURE INFORMATION**

The Pemberton Hills claim area is a portion of the North Island Claim Block consisting of twenty (20) mineral claims totaling 7,297.73 has. (Table 1). The property is located on NTS map sheet 94L/12W in the Nanaimo Mining Division, approximately 20 km southwest of Port Hardy, BC, Vancouver Island B.C. The geographic coordinates of the approximate property centre are 50 42.5' N latitude 127 57.8' W longitude (see maps on pages 5 and 6 for location).

Table 1: Mineral Ter	ures
----------------------	------

Record No.	Claim Name	Issue Date	Good to Date	New Good to Date	Area Has.
512088	Fill 3	2005/May/05	2021/Dec/01	2022/Dec/01	511.90
516529	Apple Bay Plus	2005/JUL/09	2022/Dec/11	2022/Dec/11	20.49
515277		2005/JUN/25	2022/DEC/11	2022/DEC/11	245.85
516527		2005/JUL/09	2022/DEC/11	2022/DEC/11	163.94
513929		2005/JUN/04	2022/DEC/11	2022/DEC/11	430.36
515285		2005/JUN/25	2022/Dec/11	2022/Dec/11	102.42
398335	Apple Bay Twenty	2002/NOV/16	2021/DEC/11	2022/DEC/11	500
516078		2005/JUL/05	2022/DEC/11	2022/DEC/11	286.99
374744	Apple Bay Four	2000/MAR/11	2022/DEC/11	2022/DEC/11	400
513931		2005/JUN/04	2021/DEC/11	2022/DEC/11	696.95
506021	Wanakana Central	2005/FEB/06	2022/DEC/11	2022/DEC/11	348.31

*Table continued next page* 

516074		2005/Jul/05	2021/DEC/11	2022/DEC/11	553.63
513930		2005/JUN/04	2021/DEC/11	2022/DEC/11	389.32
377240	Apple Bay Two	2000/MAY/17	2021/DEC/11	2022/DEC/11	500
516077		2005/JUL/05	2021/DEC/11	2022/DEC/11	389.65
371777	Apple Bay	1999/SEP/18	2022/DEC/11	2022/DEC/11	200
	Three				
515593		2005/JUN/30	2021/DEC/11	2022/DEC/11	656.14
515279		2005/JUN/25	2022/DEC/11	2022/DEC/11	184.47
515280		2005/JUN/25	2022/DEC/11	2022/DEC/11	471.44
516076		2005/JUL/05	2022/DEC/11	2022/DEC/11	245.87

The claims are currently registered in the name of North Island Mining Corp., a wholly owned subsidiary of Northisle Copper and Gold Inc.

APPENDIX II

#### Cost Statement for work carried out from 1 April to 30 October 2019

Preparatory Work

J. McClintock P.En	g	Preparatory work: contracts, planning, N	OW 30 hours @\$125 per hour	\$3,750.00
Field Related				
Wages				
	J. McClintock, P.Eng	Mine Supervisor, oversight:27 Aug to 8 Sep, 14Sep to24 Sep, 4 Oct to 8 Oct, 12 Oct to 21 Oct	284 hours@\$125 per hour	\$35,500.00
	B Game, PGeo	Mine Supervisor &oversight: 9 Sep to 13Sep and 9 Oct to 11 oct	64 hours @ \$100 per hour	6,400.00
Accomodation Mi	ne Supervisors Port Hardy 27 Sep	tember to 16 october		\$4,650.85
Flights / Truck and	d fuel / meals			\$6,344.23
Groceries				\$375.18
Misc. field supplie	S			\$251.57
Line cutting				
	G.U.E.S. (802580779BC0001 Lt	td.)		\$84,799.00
	R. Green	28 Aug to 17 Sep		
	T Mowatt	7 Sep to 17 Sep		
	S. Muldoe	28 aug to 17 Sep		
	J Pierre	11 Sep to 24 Sep		
	B Mattice	28 Aug to 24 Sep		
	M. Morrison	28 Aug to 24 Sep		
	D McLean	28 Aug to 24 Sep		
	Accomodations			\$9,683.25
	Fuel for trucks and saw			2,603.48

Induced Polarizat	ion Survey		
	Walcott Geophysics		\$91,486.81
	T Kocan	4 Oct to 20 Oct	
	W. Kennedy	4 Oct to 20 Oct	
	B Lajeunesse	4 Oct to 20 Oct	
	B Hall	4 Oct to 20 Oct	
	T Sam	4 Oct to 20 Oct	
	N. Svensson	4 Oct to 20 Oct	
	Fuel for trucks and genera	tor	\$2,653.93
Report Alex W	alcott		\$1,500.00
John M	cClintock		\$500.00
Total			\$250,498.30

## **CERTIFICATION.**

I, Alexander Walcott, of 38-181 Ravine Dr., Port Moody, British Columbia, hereby certify that:

- 1. I am a graduate of the University of Alberta with a B.Sc. Earth Sciences Major, with a Physics Minor.
- 2. I have been active in mineral exploration for the past 20 years.
- 3. I hold no interest, direct or indirect, in the property, nor do I expect to receive any.
- 4. I am responsible for all sections of this report excluding Mineral Tenure, History, Regional Geology, Bibliography and Cost Statement

#### Alexander Walcott, BSc

Coquitlam, B.C. January 2020

#### CERTIFICATION

I, John McClintock, residing at 902 – 1470 Pennyfarthing Drive, Vancouver, British Columbia, do hereby certify that:

1. I am a consulting Geologist;

2. I obtained a BSc (Hons) from the University of British Columbia in 1973 and an MBA from Simon Fraser University in 1989;

3. I have continually practised my profession as a geologist since 1973;

4. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia registration number 12078;

5. I visited the property from 30 June through 10 Dec, 2018 and am responsible for the work carried out on the property;

6. I own shares and have share options in Northisle Copper and Gold Inc. and am the President of the company.

7. I am responsible for the Mineral Tenure, History, Regional Geology, Bioliography and Cost Statement sections of the report

Dated at Vancouver, British Columbia, 7 April 2020

Signed and Sealed

John A. McClintock

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PETER E. WALCOTT & ASSOCIATES LIMITED





# 1601 N







# 2301 N





Instruments: HUNTEC 7.5kw Tx, GDD Rx

Frequency: 0.125 Hz. Operators: T.K., W.K.

Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...



Scale 1:10000 100<u>0 100 200 300 400 500 60</u>0 (meters)

NORTHISLE COPPER AND GOLD INC. INDUCED POLARIZATION SURVEY PEMBERTON HILLS PROPERTY British Columbia

Date: October 2019

PETER E. WALCOTT & ASSOCIATES LIMITED





# 2901 N







-2500



Modelled Resistivity (Ohm-m)

































































