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Ministry of Energy, Mines & Petroleum Resources Mining & Minerals Division BC Geological Survey	Assessment Report Title Page and Summary
TYPE OF REPORT [type of survey(s)]: Geological	<b>TOTAL COST:</b> \$ 7,500.00
AUTHOR(S): Laurence Sookochoff, PEng	SIGNATURE(S Laurence Sookochoff
NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):	YEAR OF WORK: 2014
STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S	: 5522128 September 12, 2014
PROPERTY NAME: Bertha	
CLAIM NAME(S) (on which the work was done): 585375 679148	
COMMODITIES SOUGHT: Copper Gold	
MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: 092ISE009	
MINING DIVISION: Kamloops	NTS/BCGS: 0921.047 0921.057
LATITUDE: 50 ° 27 ' 44 " LONGITUDE: 12	0 40 48 " (at centre of work)
OWNER(S): 1) Guy Delorme	2) Christopher Delorme
MAILING ADDRESS: 818-470 Granville Street	340 Logan Lane
Vancouver BC V6C 1V5	Merritt BC V1K 1P7
OPERATOR(S) [who paid for the work]: 1) Guy Delorme	2) Christopher Delorme
MAILING ADDRESS: 818-470 Granville Street	340 Logan Lane
Vancouver BC V6C 1V5	Merritt BC V1K 1P7
PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structu Eocene, feldspar porphyry intrusives, Upper prodTriassic, Nic	
Western Volcanic Facies. Within Tenures 585375 679148 no	thwest and east-west major structures, three cross-structures.
At the Ford past producer (092ISE009) mineralized shear zor	e at 040 degrees; east trending faults; chalcocite(?). Bornite
and some malachite occur in amygdules and associated vein	s in flow tops. 0.22 to 2.8 per cent copper over less than a metre.
REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT	REPORT NUMBERS: 2252 3778 4051 4576 13792 15134 17337
18048 34738	

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation	699 hectares	585375 679148	\$ 7,500.00
GEOPHYSICAL (line-kilometres) Ground			
Magnetic			
Seismic			
Other			
Aishama			
GEOCHEMICAL (number of samples analysed for)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/tr			
Trench (metres)			
		TOTAL COST:	\$ 7,500.00

# **GUY & CHRISTOPHER DELORME**

(Owners & Operators)

# **GEOLOGICAL ASSESSMENT REPORT**

(Event 5522128)

on a

# STRUCTURAL ANALYSIS

work done from

July 14, 2014 to July 18, 2014

on

Tenures 585375 & 679148

of the six claim

Bertha 585375 Claim Group

**Kamloops Mining Divisions** 

#### BCGS 092I.047/.057

Centre of Work

**5,592,606N, 664,685E** 10 NAD83

Author & Consultant

Laurence Sookochoff, PEng Sookochoff Consultants Inc.

Submitted February 11, 2015

Amended October 8, 2015

BC Geological Survey Assessment Report 35117

January 18, 2015

Sookochoff Consultants Inc.

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## SUMMARY

The six claim 2221 hectare Bertha 585375 Claim Group is located 216 kilometres northeast of Vancouver in the Highland Valley of south-central British Columbia within 24 kilometres of the Highland Valley Copper mine, one of the largest copper mining and concentrating operations in the world.

The Highland Valley low-grade copper/molybdenum deposit lies within the Late Jurassic Guichon Creek batholith in Bethsaida phase porphyritic quartz monzonite and granodiorite. The Highland Valley porphyry deposits are prime examples of structurally controlled mineral deposits such as at the Highland Valley/Lornex mineral deposits which originated as a single mineral zone at the intersection of the east-west trending Highland Valley fault and the north-south trending Lornex fault which was subsequently split into two mineral zones by the four kilometre strike-slip displacement along the Lornex fault resulting in the two mineral deposits.

The Bethlehem (East Jersey) deposit is partly controlled by faults and is localized in breccia bodies and intensely fractured zones.

As indicated by the MapPlace geology map, the Bertha 585375 is predominantly underlain by volcanics of the Nicola Group, not the preferred host to mineral deposits (except for the limestone units and fractured zones adjacent to mineralized porphyritic intrusives), smaller intrusives occurring as satellitic stocks of the Guichon Batholith outcrop on the Property which may be the primary mineral host. These stocks can be surface indicators of intrusive related mineralization at depth.

The three cross-structural locations resulting from the structural analysis of Tenure 585375 as indicated on Figures 5 and 7 would be the prime prospective areas to explore for surficial geological indicators of a potential underlying mineral resource.

The structural intersections would be a zone of increased fractural intensity and/or localized breccias which would be ideal conduits for pressurized or convectional mineralized hydrothermal fluids to be deposited within any well fractured intervening area which may result in an economic zone of porphyritic mineralization.

Although the Bertha 585375 Claim Group is shown to be predominantly underlain by volcanics of the Nicola Group, satellitic stocks of the Guichon Batholith which outcrop in the Property area may be an indication of a peripheral primary intrusive related mineral host.

One of these stocks is adjacent to the SA (092ISE167) mineral zone hosted by Nicola limestone which may be an indication of nearby intrusive related mineralization. At the Rhyolite (092ISE021) mineralization within a Nicola shear zone trending northwesterly to cross-structure "C" (*Figure 5*) may be an indication of increased surficial geological indicators at "C" for interpretation to a potentially "blind" mineral resource.

Thus cross-structural locations within the Nicola volcanics are significant in that these prospective areas should reveal the best surficial geological information to interpret for any potential sub-surface mineral resource. The three cross-structural locations as indicated on Figures 5 & 7 with UTM coordinates reported in Table II would be the prime areas of exploration.

The ten Minfile descriptions copied herein from a BC Government supported Minfile directory, provide information as to the potential geological indicators of a productive mineral deposit or for surficial geological indicators within intrusives or volcanics.

## INTRODUCTION

In July 2014 a structural analysis was completed on Tenures 585375 & 629148 of the six claim Bertha 585375 claim group (Property). The purpose of the program was to delineate potential structures which may be integral in geological controls to potentially economic mineral zones that may occur on Tenures 585375 & 629148 or other claims of the Property.

Information for this report was obtained from sources as cited under Selected References.



## **PROPERTY LOCATION & DESCRIPTION**

## Location

The Bertha 585375 Claim Group is located within BCGS Maps 092I.047 & 092I.057 of the Kamloops Mining Division, 216 kilometres northeast of Vancouver, 42 kilometres north of Merritt, 35 kilometres southwest of Kamloops, and within 24 kilometres east of the world-class producing Highland Valley Copper (*Minfile 092ISW012*) mine.

## Description

The Property is comprised of six contiguous claims covering an area of 2221.0069 hectares. Particulars are as follows:

#### Property Location and Description (cont'd)

Table I. Tenures of Bertha 585375 Claim Group

			-	
Tenure Number	<u>Type</u>	<u>Claim Name</u>	<u>Good Until</u> *	<u>Area</u> (ha)
<u>570172</u>	Mineral		20150925	20.5609
<u>580997</u>	Mineral	LOGAN	20150821	513.9286
<u>580998</u>	Mineral		20150925	472.9771
<u>585374</u>	Mineral		20150925	514.1139
<u>585375</u>	Mineral		20150925	514.2697
<u>679148</u>	Mineral		20150925	185.1567

\*Upon the approval of the assessment work filing, Event Number 5522128.

## ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

#### Access

From Logan Lake, the Bertha 585375 claim group can be accessed by traveling east from Logan Lake on Highway 97D for five kilometres to the western boundary of Tenure 580997, the northernmost claim of the Bertha 585375 claim group. Access on the Property is provided by numerous secondary roads.

#### Climate

The local climate is typical of south central British Columbia. Annual temperatures range from 35°C to -40°C. Negative temperatures can be typically expected between late October and late March. Annual precipitation ranges around an average of 30 cm.

#### Local Resources & Infrastructure

Merritt, or Kamloops, historic mining centres could be a source of experienced and reliable exploration and mining personnel and a supply for most mining related equipment. Kamloops is serviced daily by commercial airline and is a hub for road and rail transportation. Vancouver, a port city on the southwest corner of, and the largest city in the Province of British Columbia is four hours distant by road and less than one hour by air from Kamloops. Logan Lake, where many of the Highland Valley Copper Mine employees reside, has many facilities to accommodate any preliminary exploration crew.

## Physiography

The Property is located within the Thompson Plateau of Southern British Columbia. Topography on Tenures 585375 & 679148 is of gentle to moderate slopes, with elevations ranging between 1,200m in the southeast to 1,400m in the southwest corner.

## WATER & POWER

There would be an ample water supply for the needs of any exploration program from the many lakes, rivers, or streams within the confines of the Property.

A 550 KV power line traverses the western portion of Tenures 585375 & 679148.

## Figure 2. Claims Location

(Base Map from MapPlace &Google Earth)

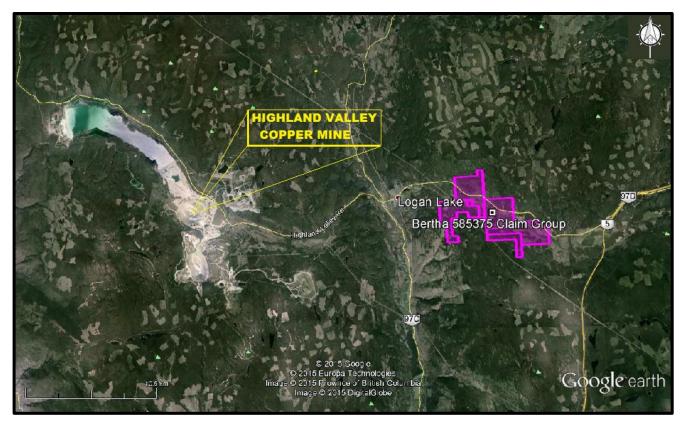
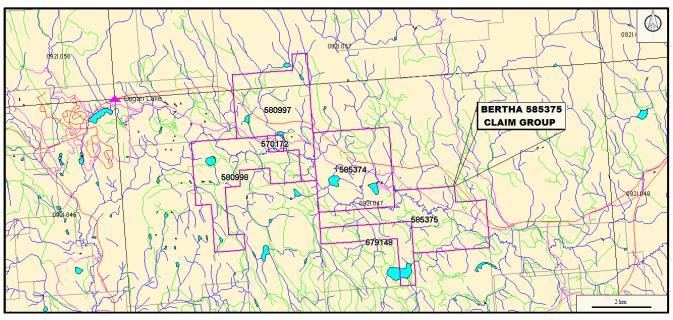


Figure 3. Claim Map (from Google Earth)



## HISTORY: BERTHA 585375 CLAIM GROUP AREA

The history on some of the more significant mineral MINFILE reported occurrences, prospects, and past producers peripheral to the Bertha 585375 Claim Group is reported as follows. The distance to the Minfile locations is relative to Tenures 585375 & 679148 of the Bertha 585375 Claim Group.

## **BETHLEHEM (EAST JERSEY)** past producer (Porphyry Cu +/- Mo +/- Au)

MINFILE 092ISE002 Nineteen kilometres west

The East Jersey pit was mined from 1962 until 1965, when the pit wall failed. See Bethlehem mine (092ISE001) for production statistics.

*HIGHLAND VALLEY COPPER* producer (Porphyry Cu+/-Mo+-Au)

MINFILE 092ISW012

Twenty two kilometres west

Highland Valley Copper was created in mid-1986 by bringing together the Highland Valley mining operations of Lornex Mining Corporation Ltd. and Cominco Ltd. into a new single entity, structured as a partnership.

On the south side of the valley was the Lornex mine which started mining in 1972. In 1981, the Lornex concentrator had been expanded to become one of the largest in the industry.

On the north side was Bethlehem Copper (092ISE001) which started mining in 1963. In 1981, this operation was absorbed by Cominco who already owned the Valley orebody (092ISW012) located west of the Lornex pit on the south side of the valley. Mining of the original Bethlehem Copper pits ceased in 1982.

Production from the Lornex mine (092ISW045) was combined with the Valley operations in 1987.

The Highmont mill on the south side of the valley was acquired in 1988 when Highmont Mining Company joined the partnership. This mill had been closed down in 1984 when the Highmont deposit (092ISE013) became uneconomical. Lornex Mining Corporation Ltd. was wound up at the end of 1988 with the result that Rio Algom Limited, Teck Corporation and Highmont Mining Company obtained direct participation in the cash flow from the partnership.

In 1995, with Explore B.C. Program support, Highland Valley Copper carried out 197 line kilometres of high-powered induced polarization surveys for very deep penetration, and drilled 1701 metres in 4 holes. This work was done on the Lornex SW Extension, Roscoe Lake and JA zones. No anomalies of merit were detected in Lornex SW Extension, and Roscoe Lake gave only limited encouragement. IP work on the JA zone detected an anomaly extending to the south, well beyond the limits of known mineralization, and another anomaly 2000 by 1500 metres in size at the east end of the grid. Both anomalies warrant drill testing (Explore B.C. Program 95/96 - M80).

At the end of 1996, mine plans called for another 200 metres in depth in the Valley pit to the 2008. In addition, the partnership may consider mining the remaining 120 million tonnes grading 0.33 per cent copper estimated to exist in the Lornex pit (Information Circular 1997-1, page 8).

Highland Valley Copper suspended mining on May 15, 1999; they resumed August 30, 1999.

In September 2005, Highland Valley announced that mine life would be extended by five years to 2013. Very late in the year, Teck Cominco also announced that it is considering building a modern hydrometallurgical refinery on site.

# History: Bertha 585375 Claim Group Area (cont'd)

## Highland Valley Copper producer (cont'd)

Most ore comes from the Valley pit, augmented by a small amount from the Lornex pit. Following a successful 300,000 tonne bulk sample test, the Highmont East pit, closed since the mid-1980s, was re-opened in the fall of 2005 to take advantage of higher molybdenum prices. In addition, exploration drilling was conducted nearby in the Highmont South area and results are being evaluated.

## **BERTHA - MOLLY** past producer (Stockwork) MINFILE 092ISE012

In 1942, George Campbell did some surface-stripping on a copper showing, about 457 metres west of an old shaft. Production from this occurrence, known as the Lost group, was 31 tonnes, yielding 218 grams of silver and 626 kilograms of copper.

*RHYOLITE* showing (Porphyry Cu +/- Mo +/- Au)

MINFILE 092ISE021

100 metres south

*Trenches, 1.25 kilometres north-northwest of Homfray Lake, 8.5 kilometres south-southeast from Logan Lake (Assessment Report 18048).* 

**PLUG** showing (Volcanogenic) MINFILE 092ISE196

Two kilometres southwest

Between 1986 and 1988, Western Resources Technologies completed programs of geological mapping, prospecting, soil geochemical sampling and geophysical (VLF-EM and magnetometer) surveys. A grab sample of carbonate altered rock from the west- central zone along Meadow Creek assayed 7.5 grams per tonne gold and 67.5 grams per tonne silver (Assessment Report 18048). In 1992, G.F. Crooker completed a program of magnetometer and VLF-EM surveys on the JB claims.

In 1995, Goldcliff Resource acquired the property as the S 1 to 48 claims and between then and 2006 they completed programs of prospecting, geochemical sampling, geophysical surveys, trenching and drilling. In 1995, five rock samples returned gold values ranging from 0.060 to 2.620 grams per tonne and silver values ranging from 1.8 to 114.5 grams per tonne (Assessment Report 24862). In 1997, trench-02 gave an average of 4.35 grams per tonne gold and 52.2 grams per tonne silver over a strike length of 11.98 metres and a width on 1.33 metres; including 20.78 grams per tonne gold and 113.0 grams per tonne silver over a width of 0.56 metre. The same year, percussion drilling (PDH-02) tested trench-02 and returned an average of 1.30 grams per tonne gold and 17.2 grams per tonne silver over a length of 9.91 metres (Assessment Report 25405). Commerce Resource Corporation reports a best mineralized drill intersection of 3.5 metres containing 2.83 grams per tonne gold and 37.7 grams per tonne silver (Press Release June 14, 2002).

## **GEOLOGY: REGIONAL**

The Bertha 585375 Claim Group is located on the southern Intermontane Belt of British Columbia on the southern extent of the Quesnel Trench. The central geological features of this region are the Late Triassic island-arc volcanic rocks of the Nicola Group, and Late Triassic mudstone, siltstone and shale clastic sedimentary rocks located to the east, and intrusive granodioritic rocks of the Late Triassic to early Jurassic. The Nicola Group is a succession of Late Triassic island-arc volcanic rocks. The Nicola Group volcanic rocks form part of a 30km to 60km wide northwest-trending belt extending from southern B.C. into the southern Yukon. This belt is enclosed by older rocks and intruded by batholiths and smaller intrusive rocks. Major batholiths in the area of the Logan Copper Property include the Guichon Creek Batholith to the west, the Wild Horse Batholith to the east, and the Iron Mask Batholith to the north northeast (see Figure 6 for regional geology).

The Guichon Creek batholith is a large, composite intrusion with a surface area of about 1,000 square kilometers. A cluster of nine major porphyry copper deposits lie within a 15 square kilometer zone in the center of the batholith. The Bertha 585375 Claim Group is situated on the eastern contact of the Guichon Creek Batholith and the Nicola volcanics within 11 kilometres of the Highland Valley Copper Mine.

The batholith is a semi-concordant composite intrusive that is elliptical and elongated slightly west of north. A central, steeply plunging root or feeder zone is inferred under Highland Valley, and the major deposits lie around the projection of the feeder zone to the surface. The batholith has intruded and metamorphosed island-arc volcanic and associated sedimentary rocks of the Nicola Group, and a metamorphic halo up to 500 meters wide is developed adjacent to the contact. Rocks along the edge of the batholith are older and more mafic, and successive phases moving inward toward the core are younger and more felsic.

Although contacts can be sharp, they are generally gradational and chilled contacts are not common. Variations in the batholiths geochemistry indicate local areas of assimilated country rock in the border zone and roof pendants in the intrusion. Outcrop areas have inclusions of amphibolite and "granitized" metamorphic rocks and compositional variations.

Two younger volcanic-dominated successions are important in the area. First, a northwest trending belt of Cretaceous continental volcanic and sedimentary rocks of the Spences Bridge Group unconformably overlie both the Nicola Group country rock and intrusive rocks along the southwest flank of the batholith. Distribution of the Spences Bridge Group rocks was locally controlled by reactivation of older faults that were important mineralization conduits in the batholith, such as the Lornex fault. Second, continental volcanic and sedimentary rocks of the Tertiary Kamloops Group cover extensive areas of the batholith and also overlie Triassic and Jurassic rocks from north of Highland Valley to the Thompson River. These also form isolated outliers and local intrusive centers south of the Highland Valley

## **GEOLOGY: BERTHA 585375 CLAIM GROUP AREA**

The geology of some of the more significant mineral MINFILE reported occurrences, prospects, and past producers peripheral to the Bertha 585375 Claim Group is reported as follows. The distance to the Minfile locations is relative to Tenures 585375 & 679148 of the Bertha 585375 Claim Group.

**BETHLEHEM (EAST JERSEY)** past producer (Porphyry Cu +/- Mo +/- Au)

MINFILE 092ISE002 Nineteen kilometres west

January 18, 2015

## Bethlehem (East Jersey) past producer (cont'd)

The property lies within the Early Jurassic-Late Triassic Guichon Creek batholith and straddles an intrusive contact where younger Bethlehem phase quartz diorite to granodiorite forms an irregular embayment in older Guichon variety granodiorite. Igneous breccias are believed to have been forcefully emplaced. The granodiorites and breccias are intruded by north trending swarms of dacite porphyry dykes which dip steeply and are up to 60 metres wide.

The Bethlehem (East Jersey) deposit is partly controlled by faults and is localized in breccia bodies and intensely fractured zones. Potassic, phyllic and propylitic alteration are confined to areas of ore concentration. Alteration minerals include biotite, sericite, kaolinite, epidote and chlorite and are typically zoned.

Quartz, calcite and zeolite (laumontite) veining and vug-filling is common. The principal ore minerals are molybdenite, bornite and chalcopyrite and occur with numerous supergene copper minerals and copper oxides. An age date from a sample of a mixture of magmatic and hydrothermal biotite from the Iona ore zone (092ISE006) returned 199 Ma +/- 8 Ma

## *HIGHLAND VALLEY COPPER* producer (Porphyry Cu+/-Mo+-Au)

## MINFILE 092ISW012

Twenty four kilometres west

The Valley deposit lies within the Late Triassic to Early Jurassic Guichon Creek batholith and is hosted by Bethsaida phase porphyritic quartz monzonite and granodiorite. Feldspar porphyry and quartz feldspar porphyry dykes 0.6 to 35 metres wide dip steeply eastward in the western and central areas, and northward in the southern area of the deposit. These dykes are cut by mineralized fractures and quartz veinlets, and have been dated at 204 Ma +/- 4 Ma.

The Bethsaida granodiorite is also intruded by aplite dykes up to 30 centimetres wide, tan-coloured felsite dykes up to 4.5 metres wide, and three types of lamprophyre dykes (spessartite, hornblende vogesite, vogesite).

The most prominent structural features are the north trending, west dipping Lornex fault and the east trending Highland Valley fault.

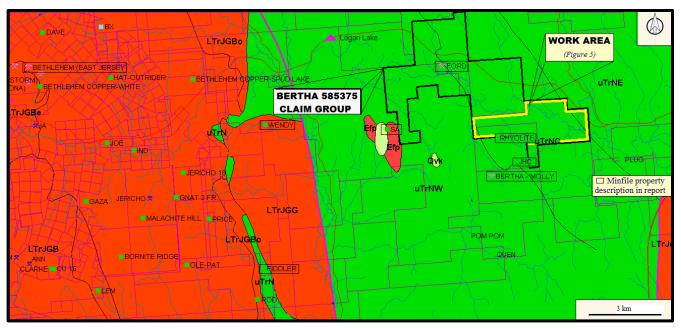
Faults and fractures in the deposit comprise four main sets. Quartz veinlets are subparallel to two of the earlier formed fault and fracture sets. These veinlets are moderately abundant within the 0.3 per cent copper isopleth. An area of well-developed barren quartz veinlets, generally 0.5 to 1.3 millimetres wide, without alteration envelopes, occurs in the southeastern part of the deposit.

In the west-central part of the deposit, potassium feldspar is associated with vein sericite in some replacement zones, as veinlet envelopes along fractures, and disseminated in quartz veinlets. Hydrothermal biotite occurs in small amounts. Flaky sericite and quartz, both as replacement zones and as envelopes around quartz veinlets, constitute the most common type of alteration associated with copper mineralization.

Strong phyllic alteration coincides with the 0.5 per cent copper isopleth. Phyllic alteration is closely associated with pervasive argillization, which is strongest where fractures are most closely-spaced.

#### Bertha 585375 Claim Group

## Geology: Bertha 585375 Claim Group Area (cont'd) Figure 4. Geology, Claim, Index & Minfile (Base Map from MapPlace)



#### **GEOLOGY MAP LEGEND**

#### Mivb

# Miocene-unnamed

## Basaltic volcanic rocks

#### EKav

Eocene-Kamloops Group Undivided volcanic rocks

#### EPrb

Eocene-Penticton Group Andesitic volcanic rocks

#### Efp

Eocene unnamed feldspar porphyry intrusive rocks

#### Upper Triassic-Nicola Group uTrNC

Central Volcanic Facies undivided volcanic rocks

#### uTrNE

basalt volcanic rocks

#### uTrNW

Western Volcanic Facies undivided volcanic rocks Late Triassic to Early Jurassic

#### LTrJGB

#### **GUICHON CREEK BATHOLITH**

 LTrJGBe – Bethlehem Phase granodioritic intrusive rocks
 LTrJGB – Bethsaida Phase quartz monzonitic intrusive rocks
 LTrJGH – Highland Valley Phase granodioritic intrusive rocks
 LTrJGG – Gump Lake Phase granodioritic intrusive rocks
 LTrJGBo – Border Phase quartz dioritic intrusive rocks

### Highland Valley Copper producer (cont'd)

Feldspars are altered to sericite, kaolinite, quartz and calcite. The phyllic-argillic zone grades outward to a peripheral zone of weak to moderate propylitization, characterized by clay, sericite, epidote, clinozoisite and calcite replacing plagioclase, and chlorite and epidote replacing biotite. The age of hydrothermal alteration is approximately 191 Ma.

At the Valley deposit, gypsum is interpreted to be secondary and post-ore. It is commonly fibrous and white to orange but locally it forms large platy crystals or may be massive. Anhydrite, which is also present, provides indirect evidence for the secondary nature of the gypsum. It is apparently the same age as and associated with sericitic and potassic alteration. Quartz-gypsum veins and quartz-potash feldspar veins in which gypsum fills interstices provide more direct evidence for its secondary nature. Gypsum is believed to have formed at the expense of anhydrite which was deposited from the ore-forming fluids. Gypsum veins are common in the lower portion of the orebody (Open File 1991-15).

Sulphides occur chiefly as disseminations in quartz veinlets, and in phyllic (bornite) and potassic (chalcopyrite) alteration zones. Mineralization includes bornite and chalcopyrite, with minor digenite, covellite, pyrite, pyrrhotite, molybdenite, sphalerite and galena. The oxide zone averages 4.5 metres in thickness, and contains limonite, malachite, pyrolusite, digenite, native copper, and tenorite(?).

## **BERTHA - MOLLY** past producer (Stockwork)

MINFILE 092ISE012

Two kilometres south

The Dupont Lake area is underlain mainly by Upper Triassic Nicola Group intermediate volcanics and derivatives. Approximately 8 kilometres to the west, Nicola Group rocks are in contact with the Lower Jurassic Guichon Creek batholith. Quartz diorite outcrops southwest of Dupont Lake.

The Bertha-Molly showing is hosted by purplish amygdaloidal andesites with intercalated reddish tuffs. These rocks are strongly fractured and chloritized. The original shaft was sunk at a point where patches of cuprite occur in fractures. Small shipments were made.

**RHYOLITE** showing (Porphyry Cu +/- Mo +/- Au) MINFILE 092ISE021

100 metres south

The area straddles a northwest trending contact between two volcanic sequences of the Upper Triassic Nicola Group. To the west are plagioclase, plagioclase-augite intermediate pyroclastic and epiclastic breccia, conglomerate, tuff, sandstone, local shale and augite porphyry bodies. The central portion to the east is underlain by aphanitic pillowed mafic flows. The contact between these two sequences hosts the Rhyolite occurrence.

The Rhyolite showing is underlain by grey, green or black amygdaloidal basalt of the Upper Triassic Nicola Group. Varicoloured calcite amygdules occur within an aphanitic groundmass. Several beds of maroon to green volcaniclastic breccia occur within the basalt and contain maroon, subrounded to subangular clasts ranging up to 30 by 15 centimetres. Two northwest trending, light grey-green, aphanitic, siliceous and pyritic felsic dykes, 3 to 4 metres wide, also occur.

**FIDDLER** showing (Porphyry Cu +/- Mo +/- Au) MINFILE 092ISE072 Eleven kilometres southwest

The Fiddler showing is situated immediately east of the eastern border of the Lower Jurassic Guichon Creek batholith. To the east are rocks of the Upper Triassic Gump Lake quartz monzonite stock. The area to the west is underlain by leucocratic hornblende-biotite quartz diorite to granodiorite of the Highland Valley phase of the batholith. Pegmatitic granite lenses within this unit have quartz-epidote knots, some containing magnetite and chalcopyrite.

The main showing is underlain by fine to coarse-grained biotite granodiorite with gneissic foliations striking north and dipping steeply. About 125 metres to the southeast in the South zone, layers of foliated and gneissic or schistose granodiorite alternate. Pyritic aplite is present as stringers and lenses lying within the metamorphic foliation and as larger crosscutting bodies with biotite- rich and leucocratic layers.

*JHC* showing (Volcanic redbed Cu) MINFILE 092ISE147 One kilometre south

The property lies west of Homfray Lake and is underlain by volcanic rocks of the Upper Triassic Nicola Group. The area straddles a northwest trending contact between two volcanic sequences. East of the contact zone are very fine-grained red flows with occasional feldspar (plagioclase?) phenocrysts. The matrix contains moderate amounts of hematite disseminations. To the west are grey volcanics with an aphanitic to fine-grained matrix and associated feldspar and/or augite phenocrysts. Alteration consists of epidote, chlorite and carbonate. The contact zone parallels the main northwest structural trend. Northeast and north trends are also evident. Drilling (1971) intersected disseminated chalcocite in porphyritic and amygdaloidal basalt.

**WENDY** prospect (Porphyry Cu +/- Mo +/- Au)

MINFILE 092ISE154 Nine kilometres west

The Wendy showing is situated along the eastern edge of the Guichon Creek batholith where Lower Jurassic quartz diorites and granodiorites have intruded Upper Triassic Nicola Group intermediate volcanics and sediments. These rocks were subsequently intruded by Gump Lake phase granodiorite to quartz monzonite.

The eastern portion of the property is underlain by hornfels, hornfelsed schists and granitic gneisses which have a rough north trending foliation of variable dip. The metamorphosed rocks are intruded by leucocratic, fine to medium-grained granitic dykes which increase in abundance to the west until the hornfelsic units grade into granitic units. The southwestern part of the property is underlain by fine to medium-grained diorite or granodiorite and coarse grey granite.

SA showing (Stockwork, Disseminated) MINFILE 092ISE167 Four kilometres west

SA showing (cont'd)

The property lies within the Upper Triassic Nicola Group approximately 3 kilometres east of the Lower Jurassic Guichon Creek batholith. Locally Tertiary volcanic flows and minor intrusives overlie the Triassic rocks.

The area is underlain by a conformable succession of epiclastic rocks with subordinate interlayered lavas. The sedimentary sequence is best exposed at the main showing where the succession is about 90 metres thick. This unit is comprised of 50 to 100 metres of volcanic conglomerate composed of subangular to rounded red to green clasts of flow rocks cemented by a friable sandy matrix. Weakly bedded, coarse-grained fossiliferous limestone overlies the conglomerate and is again overlain by at least 60 metres of conglomerate grading upward into massive volcanic breccia. An upper unit of poorly bedded, well sorted greywacke caps the succession. Amygdaloidal basalt and andesite outcrop to the east and south where they are interlayered with the epiclastic rocks. Vesicles are filled with carbonate, zeolite and chalcocite.

#### **PLUG** showing (Volcanogenic) MINFILE 092ISE196 Two kilometres southwest

The area is underlain by volcanic rocks of the Upper Triassic Nicola Group that are cut by small granitic plugs and sills. Sparse outcroppings of Nicola Group rocks along Meadow Creek consist of altered andesite, lapilli tuff, amygdaloidal basalt and minor lenses of limy sediments that strike east to southeast and dip steeply to the north. Alteration minerals include chlorite, epidote, carbonate and hematite. A quartz-mariposite-carbonate rock outcrops along Meadow Creek and is in contact with a chlorite-mica-feldspar schist that strikes 20 degrees and dips 65 to 90 degrees to the east. The schist and mafic dioritic to hornblende andesite sills form a southeastward plunging asymmetrical syncline. The quartz mariposite carbonate rock contains minor amounts of silver-bearing galena, sphalerite and chalcopyrite. An outcrop of highly pyritic quartz feldspar porphyry contains minor amounts of chalcopyrite.

## GEOLOGY: BERTHA 585375 CLAIM GROUP

The Bertha 585375 is shown to be predominantly underlain by volcanics of the Nicola Group, not the preferred host to mineral deposits (except for the limestone units and fractured zones adjacent to mineralized porphyritic intrusives), smaller intrusives occurring as satellitic stocks of the Guichon Batholith outcrop on the Property which may be the primary mineral host. These stocks can be surface indicators of intrusive related mineralization at depth.

#### *FORD* past producer (Volcanogenic) MINFILE 092ISE009 Within Tenure 570172

The Ford occurrence occupies the area north of Meadow Creek, which is underlain by dark grey to purplish red porphyritic amygdaloidal flows of the Upper Triassic Nicola Group. The lavas are typically amygdaloidal and vary in composition from olivine basalt to augite andesitic basalt. Alteration consists of albitization of plagioclase and propylitization of pyroxene to epidote, zoisite and calcite, with or without chlorite. The rock is locally shot through with sericite and epidote. Flows averaging 1.8 metres thick strike 050 degrees and dip 30 degrees northeast.

## MINERALIZATION: BERTHA 585375 CLAIM GROUP AREA

The mineralization on some of the more significant mineral MINFILE reported occurrences, prospects, and past producers peripheral to the Bertha 585375 Claim Group is reported as follows. The distance to the Minfile locations is relative to Tenures 585375 & 679148 of the Bertha 585375 Claim Group.

## BETHLEHEM (EAST JERSEY) past producer (Porphyry Cu +/- Mo +/- Au)

MINFILE 092ISE002

Nineteen kilometres west

Reserves for the East Jersey are 20.6 million tonnes of 0.40 per cent copper (CIM Special Volume 46, page 175).

## HIGHLAND VALLEY COPPER producer (Porphyry Cu+/-Mo+-Au)

MINFILE 092ISW012

Twenty four kilometres west

Highland Valley Copper operates two distinct mines, the Valley mine and the Lornex mine, and between the two has measured and indicated ore reserves of 761 million tonnes of 0.408 per cent copper and 0.0072 molybdenum. The ore reserves of each mine are: Valley mine - 627 million tonnes at 0.418 per cent copper and 0.0056 per cent molybdenum; Lornex mine - 135 million tonnes at 0.364 per cent copper and 0.0144 per cent molybdenum. The individual mine reserves are calculated at an equivalent cutoff grade of 0.25 per cent copper using a molybdenum multiplying factor of 3.5 (CIM Bulletin July/August 1992, pages 73,74).

## BERTHA - MOLLY past producer (Stockwork)

MINFILE 092ISE012

Within Tenure 679413

Recent development has exposed malachite, azurite, chalcopyrite, cuprite and pyrite hosted by shears and fracture-fillings in vesicular volcanics and red tuffs. Mineralization is structurally controlled with an apparent north trend. A common alteration is calcite and epidote with silicification becoming stronger at depth.

*RHYOLITE* showing (Porphyry Cu +/- Mo +/- Au)

MINFILE 092ISE021

100 metres south

Mineralization occurs in amygdaloidal basalt near the flow-volcaniclastic contact and is related to narrow quartz-carbonate veinlets within shears. Several old trenches indicate the shear zone strikes approximately 335 to 345 degrees and dips steeply west. Pyrite is present with minor chalcopyrite, azurite, malachite and sphalerite. Rock samples from this zone assayed up to 0.377 per cent copper, 0.218 per cent zinc and are weakly anomalous in gold and silver values.

**FIDDLER** showing (Porphyry Cu +/- Mo +/- Au) MINFILE 092ISE072 Eleven kilometres southwest

Mineralization is not obviously related to the sericitic and limonitic alteration of the aplite and the granodiorite. Chalcopyrite occurs as disseminations in relatively fresh quartzose or biotite- rich zones in the granodiorite, as disseminations in biotite aplite, and in veins or pockets with quartz, alone or with pyrite, potassium feldspar or epidote.

## Mineralization: Bertha 585375 Claim Group Area (cont'd)

### Fiddler showing (cont'd)

Some veins parallel foliation, others dip gently. A chip sample across a 75 centimetre veined, rusty mineralized zone assayed 0.35 per cent copper with traces of gold and silver (Geology, Exploration and Mining in British Columbia 1974). Some molybdenite was reported when the showing was first discovered (1915). Post-mineralization shears cut both the aplite and country rock. The most prominent fault zones are 2.7 metres wide, strike north and dip steeply subparallel to foliation. Lesser shears strike southeast and dip moderately to the southwest. Malachite or copper oxides are usually present.

*JHC* showing (Volcanic redbed Cu) MINFILE 092ISE147 One kilometre south

Drilling (1971) intersected disseminated chalcocite in porphyritic and amygdaloidal basalt. Fracturing and narrow shears in amygdaloidal andesite contain epidote, carbonate, quartz, malachite and chalcopyrite. A chip sample assayed 4.27 per cent copper and 14.2 grams per tonne silver (Assessment Report 17337).

**WENDY** prospect (Porphyry Cu +/- Mo +/- Au) MINFILE 092ISE154 Nine kilometres west

Minor chalcopyrite and malachite occur as narrow veins or along joint planes and as fine disseminations in the intrusive rocks.

*SA* showing (Stockwork, Disseminated) MINFILE 092ISE167 Four kilometres west

On the SA showing, highly fractured, malachite stained, rusty weathering limestone(?) is exposed for 45.7 metres along the east side of an old logging access road. Stringers and disseminated grains of chalcocite, bornite and rarely chalcopyrite are visible on freshly broken surfaces. Much of the rock is strongly oxidized to a soft, rusty gossan locally rich in malachite.

**PLUG** showing (Volcanogenic) MINFILE 092ISE196 Two kilometres southwest

The quartz mariposite carbonate rock contains minor amounts of silver-bearing galena, sphalerite and chalcopyrite. An outcrop of highly pyritic quartz feldspar porphyry contains minor amounts of chalcopyrite.

## **MINERALIZATION: BERTHA 585375 CLAIM GROUP**

The mineralization on the mineral MINFILE reported occurrences, prospects, and past producers within the Bertha 585375 Claim Group is reported as follows

*FORD* past producer (Volcanogenic) MINFILE 092ISE009 Within Tenure 570172

#### Mineralization: Bertha 585375 Claim Group (cont'd)

Ford past producer (cont'd)

The original open cuts (pre-1915) expose copper carbonate ore with occasional flecks of bornite and chalcocite along fracture planes in amygdaloidal flows. The adit follows a mineralized shear zone striking 040 degrees and intersects an east trending set of faults.

Chalcocite(?), bornite and some malachite occur in amygdules and associated veins in flow tops. Gangue minerals include chlorite, sericite, clinozoisite, zeolite and calcite.

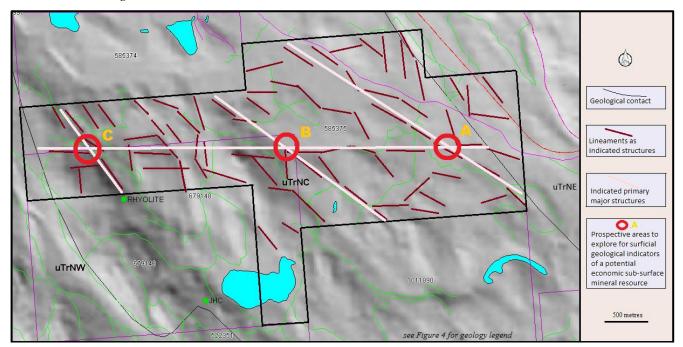
Some mineralization also occurs in calcite veins, calcite-epidote-sericite veins, sericite-zoisite veins and chlorite veins. Carbonate-zeolite veins are barren.

Drill core assays range from 0.22 to 2.8 per cent copper over an interval of less than one metre (Minister of Mines Annual Report 1973).

## **STRUCTURAL ANALYSIS**

The structural analysis was performed on a DEM image hillshade map of Tenures 585375 & 629148 by viewing of the map and marking the lineaments as indicated structures thereon. A total of 83 lineaments were marked (*Figure 5*), compiled into a 10 degree class interval, and plotted as a rose diagram as indicated on *Figure 6*.

The centre of the work area at 5,592,606N, 664,685E (10) (NAD 83).



## Figure 5. Indicated Lineaments on Tenures 585375 & 629148

#### Structural Analysis (cont'd)

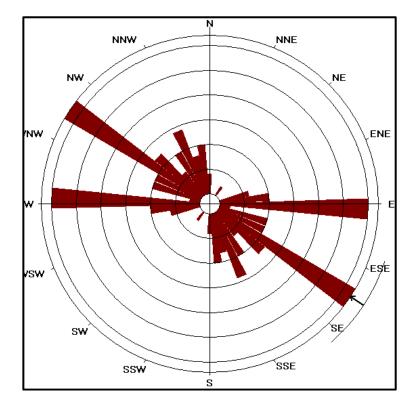


Figure 6. Rose Diagram from lineaments (Figure 5) of Tenures 585375 & 629148

# **STATISTICS**

Axial (non-polar) data No. of Data = 83 Sector angle =  $8^{\circ}$ Scale: tick interval = 3% [2.5 data] Maximum = 19.3% [16 data] Mean Resultant dir'n = 123-303 [Approx. 95% Confidence interval =  $\pm 15.3^{\circ}$ ] (valid only for unimodal data)

Mean Resultant dir'n = 123.4 - 303.4Circ.Median = 125.0 - 305.0Circ.Mean Dev.about median =  $24.6^{\circ}$ Circ. Variance = 0.14Circular Std.Dev. =  $31.01^{\circ}$ Circ. Dispersion = 1.50Circ.Std Error = 0.1346Circ.Skewness = -1.35Circ.Kurtosis = -30.09 kappa = 1.34 (von Mises concentration param. estimate)

Resultant length = 46.21 Mean Resultant length = 0.5567

'Mean' Moments: Cbar = -0.2191; Sbar = -0.5118 'Full' trig. sums: SumCos = -18.1843; Sbar = -42.4766 Mean resultant of doubled angles = 0.068 Mean direction of doubled angles = 021

(Usage references: Mardia & Jupp,
'Directional Statistics', 1999, Wiley;
Fisher, 'Statistical Analysis of Circular Data',
1993, Cambridge University Press)
Note: The 95% confidence calculation uses
Fisher's (1993) 'large-sample method'

#### Structural Analysis (cont'd)

Figure 7. Cross structural and Minfile locations on Google Earth (Base Map: Google Earth)



 Table II. Approximate UTM locations of Figure 5 & 7 cross-structures

 (UTM-NAD 83)

Location	UTM East	UTM North	Elevation
<b>Cross-structures</b>			(metres)
Α	665,943	5,592,445	1,201
В	664,348	5,592,490	1,221
С	662,441	5,592,538	1,310
Minfiles			
Rhyolite	662,782	5,592,043	1,310
Plug	667,989	5,590,908	
JHC	663,554	5,591,016	1,300

## INTERPRETATION and CONCLUSIONS

The three cross-structural locations resulting from the structural analysis of Tenure 585375 as indicated on Figures 5 and 7 would be the prime prospective areas to explore for surficial geological indicators of a potential underlying mineral resource.

The structural intersections would be a zone of increased fractural intensity and/or localized breccias which would be ideal conduits for pressurized or convectional mineralized hydrothermal fluids to be deposited within any well fractured intervening area which may result in an economic zone of porphyritic mineralization.

The Highland Valley porphyry deposits are prime examples of such structurally controlled mineral deposits such as at the Highland Valley/Lornex mineral deposits which originated as a single mineral zone at the intersection of the east-west trending Highland Valley fault and the north-south trending Lornex fault which was subsequently split into two mineral zones by the four kilometre strike-slip displacement along the Lornex fault resulting in the two mineral deposits.

The Bethlehem (East Jersey) deposit is partly controlled by faults and is localized in breccia bodies and intensely fractured zones. The Huestis (092ISE004), Iona (092ISE006), and Snowstorm (092ISE005) are controlled by north trending faults and are localized in zones of closely-spaced fractures. Mineralization is concentrated in breccia bodies, faults and highly fractured areas. The Jersey fault cuts through the centre of the Jersey pit.

Although the Bertha 585375 Claim Group is shown to be predominantly underlain by volcanics of the Nicola Group, not the preferred host to mineral deposits (except for the limestone units and fractured zones adjacent to mineralized porphyritic intrusives), smaller intrusives occurring as satellitic stocks of the Guichon Batholith outcrop on the Property may be an indication of a peripheral primary intrusive related mineral host.

One of these stocks is adjacent to the SA (092ISE167) mineral zone hosted by Nicola limestone which may be an indication of nearby intrusive related mineralization. At the Rhyolite (092ISE021) mineralization within a Nicola shear zone trending northwesterly to cross-structure "C" (*Figure 5*) may be an indication of increased surficial geological indicators at "C" for interpretation to a potentially "blind" mineral resource.

Thus the cross-structural locations within the Nicola volcanics are significant for the prospective areas to explore for the surficial geological indicators of any potential sub-surface mineral resource. The geological indicators may be expressed as associated or pathfinder minerals and/or alteration which could provide interpretive information to the location of a potential mineral resource or .

Guy & Christopher Delorme

Respectfully submitted Sookochoff Consultants Inc.



Laurence Sookochoff, PEng

## SELECTED REFERENCES

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**Hemsworth, F.J.** - Report on the Geochemical Survey of the Ezra Claims for New Indian Mines Ltd. December, 1964. AR 606.

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Marshak, S., Mitra, G. – Basic Methods of Structural Geology. pp 258-259, 264\*. Prentice-Hall Inc. 1988

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092ISE002 – BETHLEHEM (EAST JERSEY) 092ISE009 – FORD 092ISW012 – HIGHLAND VALLEY COPPER 092ISE012 – BERTHA – MOLLY 092ISE021 – RHYOLITE 092ISE072 – FIDDLER 092ISE147 – JHC 092ISE154 – WENDY 092ISE167 – SA 092ISE196 – PLUG

Sookochoff, L., Zhonghua, P. – Dansey Project Technical Report for Logan Copper Inc. January 16, 2010.

**Sookochoff, L.** 2011: Geological Assessment Report on Tenure 833943 of the Toni 833943 Claim Group of the Victory Resources Corporation Toni Property. AR 32,520.

**Sookochoff, L.** 2013: Geological Assessment Report on Tenure 940390 of the Toni 940390 Claim Group for Victory Resources Corporation. Event 5458240. AR 34,903.

## **STATEMENT OF COSTS**

Work on Tenure 585375 was done from July 14, 2014 to July 18, 2014 to the value as follows:

Structural Analysis	
Laurence Sookochoff, P Eng. 3 days @ \$ 1,000.00/day	\$ 3,000.00
Maps	1,000.00
Report	<u>3,500.00</u>
	\$ 7,500.00
	======

## CERTIFICATE

I, Laurence Sookochoff, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geologist and principal of Sookochoff Consultants Inc. with an address at 120 125A-1030 Denman Street, Vancouver, BC V6G 2M6.

I, Laurence Sookochoff, further certify that:

1) I am a graduate of the University of British Columbia (1966) and hold a B.Sc. degree in Geology.

2) I have been practicing my profession for the past forty-eight years.

3) I am registered and in good standing with the Association of Professional Engineers and Geoscientists of British Columbia.

4) The information for this report is based on information as itemized in the Selected Reference section of this report and from work the author has performed in the Bertha Property area.

5) I have no interest in the Bertha 585375 Claim Group as described herein.



Laurence Sookochoff, P. Eng.