



**BC Geological Survey  
Assessment Report  
38708**



Ministry of Energy & Mines  
Energy & Minerals Division  
Geological Survey Branch

ASSESSMENT REPORT  
TITLE PAGE AND SUMMARY

TITLE OF REPORT [type of survey(s)] Prospecting and Geochemical Survey on the Zeballos Gold Project TOTAL COST \$3,424.04

AUTHOR(S) Dan V. Oancea SIGNATURE(S) [Signature]

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S) — YEAR OF WORK 2019

STATEMENT OF WORK - CASH PAYMENT EVENT NUMBER(S)/DATE(S) 5759760, 5764542

PROPERTY NAME Zeballos Gold

CLAIM NAME(S) (on which work was done) Golden Gate

COMMODITIES SOUGHT Copper

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN 092L 005, 092L 007, 092L 006, 092E 002, 092E 003

MINING DIVISION Alberni NTS 092E15W, 092L62W

LATITUDE 50 ° 0 ' 09 " LONGITUDE 126 ° 47 ' 42.5 " (at centre of work)

OWNER(S)  
1) North Bay Resources Inc. 2) \_\_\_\_\_

MAILING ADDRESS  
PO Box 162, Skippack, Pennsylvania  
19474 USA

OPERATOR(S) (who paid for the work)  
1) same 2) \_\_\_\_\_

MAILING ADDRESS  
\_\_\_\_\_  
\_\_\_\_\_

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):  
Upper Triassic calc-alkaline volcanic rocks Bonanza Group  
Early to Middle Jurassic Island Plutonic group (granodiorite, gabbro),  
Eocene to Oligocene Mt. Washington Plutonic suites (diorite)  
quartz-calcite veins, gold, copper, alkalic copper-gold porphyry

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS 5019, 12772, 32298  
34249, 35166, 36167, 37024

(OVER)

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
<b>GEOLOGICAL (scale, area)</b>			
Ground, mapping _____			
Photo interpretation _____			
<b>GEOPHYSICAL (line-kilometres)</b>			
Ground			
Magnetic _____			
Electromagnetic _____			
Induced Polarization _____			
Radiometric _____			
Seismic _____			
Other _____			
Airborne _____			
<b>GEOCHEMICAL</b>			
(number of samples analysed for ...)			
Soil _____			
Silt _____			
Rock _____	8 (eight)	Golden Gate	
Other _____			
<b>DRILLING</b>			
(total metres; number of holes, size)			
Core _____			
Non-core _____			
<b>RELATED TECHNICAL</b>			
Sampling/assaying _____		Golden Gate	\$401.97
Petrographic _____			
Mineralographic _____			
Metallurgic _____			
PROSPECTING (scale, area)	1:1,000 5 ha	Golden Gate	\$3,022.07
<b>PREPARATORY/PHYSICAL</b>			
Line/grid (kilometres) _____			
Topographic/Photogrammetric (scale, area) _____			
Legal surveys (scale, area) _____			
Road, local access (kilometres)/trail _____			
Trench (metres) _____			
Underground dev. (metres) _____			
Other _____			
TOTAL COST			\$3,424.04

**ASSESSMENT REPORT**

**Geochemical Survey**

**on the**

**ZEBALLOS GOLD PROJECT**

**Alberni Mining Division, British Columbia, Canada**

**Latitude: 50° 0' 0.9" N; Longitude: 126° 47' 42.5" W**

**UTM Zone 09 (NAD83)**

**Northing 5541250, Easting 658000**

**BCGS 092E096, 092E097, 092L006, 092L007**

**NTS 092E15W, 092L02W**

**For**

**NORTH BAY RESOURCES INC.**

**PO Box 162**

**Skippack Pennsylvania**

**19474**

**USA**

**By**

**Dan V. Oancea, PGeo**

**December 11, 2019**

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## 1. Summary

The Zeballos Gold Project is in the Alberni Mining Division of British Columbia, Canada. The mineral claims cover an area of 581.54 ha (1,437.76 acres) and are situated about 2 km (1.24 miles) north of the Village of Zeballos on the western coast of the Vancouver Island.

The property can be accessed from Mainland by using the BC Ferries services and then by travelling north on Highway 19 about 140 km past the city of Campbell River to the Zeballos road intersection. From there a well-maintained 42 km gravel road can be followed to the Village of Zeballos.

The Zeballos Gold mineral property consists of two mineral claims 100% owned by North Bay Resources Inc of Skippack, Pennsylvania, USA. It is mostly situated on the eastern bank of the Zeballos River and straddles some of its eastern tributaries - the Golden Gate Creek and the Hidden Valley Creek. The property lies within the Vancouver Island's mountain range and stretches from sea level to over 1,200 m in elevation.

Rocks underlying the property are represented by the Lower Jurassic Bonanza Group calc-alkaline volcanic rocks conformably underlain by Lower Triassic to Upper Triassic Vancouver Group - Parson Bay Formation composed of limestone, slate, siltstone and argillite. Early Jurassic to Middle Jurassic Island Plutonic Suite represented by gabbro/granodiorite had intruded all older rocks. Quartz diorite intrusive rocks of the Eocene to Oligocene Mt. Washington Plutonic suite are spatially related with most of the area's gold-quartz veins.

The Zeballos Mining District has produced 294,308 ounces of gold plus byproduct silver, copper, lead and zinc from 0.627 million tonnes of ore mined from 17 past-producing mines between 1929 and 1975.

The Zeballos Gold Project encompasses three small past producing gold mines and two mineral prospects of the intrusion related gold type and of the skarn and replacement type. Mineral production from these past producers totaled 202 ounces of gold, 115 ounces of silver, 220 pounds of copper and 130 pounds of lead.

Most of the mineralization is of the vein type hosted by narrow shear zones that are continuous over significant strike lengths and down-dip extensions.

1970s and 1980s exploration programs identified a gold-copper-mercury geochemical and a coincident geophysical anomaly at the headwaters of Hidden Valley Creek and Golden Gate Creek. Prospecting efforts also resulted in the identification of mineralized floats carrying significant gold mineralization on the Hidden Valley Creek. Unexplored mineralized structures were also reported on the Upper Golden Gate Creek.

Since 2011, North Bay Resources has engaged in assessment work that resulted in field validation of several of the past producers located on its mineral claims. The Company also effectuated focused geochemical surveys which confirmed the presence of precious metals in the western part of the Project area. Anomalous copper values were also returned from rock sampling of the Bonanza volcanics located in the central part of the property.

During the month of October 2019, the writer undertook a short prospecting and rock sampling survey of the west side of the mineral property. The scope of the survey was mapping, and sampling of the Bonanza Group rocks and intrusives that are outcropping on the west side of the Zeballos River. Assay results better delineated the anomalous copper zone occupying the west-central part of the claims. The anomalous values can be possibly related to the presence of an Island Copper-type intrusive and copper-gold mineralization.

## **2. Conclusions**

Several areas of the Zeballos Gold Project are prospective to contain gold, silver, copper, lead and zinc mineralization:

- The Lower Hidden Valley Creek and Golden Gate Creek area is prospective for hosting copper and gold mineralization in a possible Island Copper-type setting.
- The Upper Hidden Valley Creek area is prospective for hosting the inferred extension of a northeast-southwest structural corridor that hosts the Spud Valley/Gold Field and the Mt. Zeballos gold veins.
- The Upper Golden Gate Creek is prospective for hosting extensions of the gold quartz veins from the Golden Gate Mine.

- Undiscovered gold-copper mineralization could be present in the geochemically and geophysical anomalous "B" Zone located at the Golden Gate Creek and Hidden Valley Creek headwaters.

### **3. Recommendations**

The prospective areas of the mineral property must be mapped and sampled.

A geophysical (Mag-EM) drone survey is recommended to be undertaken over the most prospective parts of the property. Anomalies are to be validated by focused geochemical surveys.

Contingent on positive surveys results a LIDAR survey should also be flown over the whole property.

### **4. Introduction**

#### **4.1 Location, Access and Physiography**

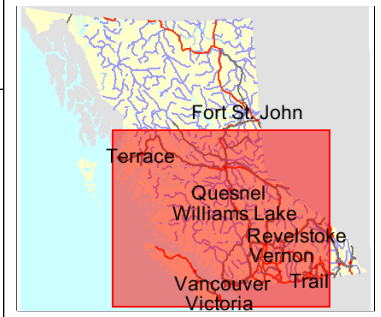
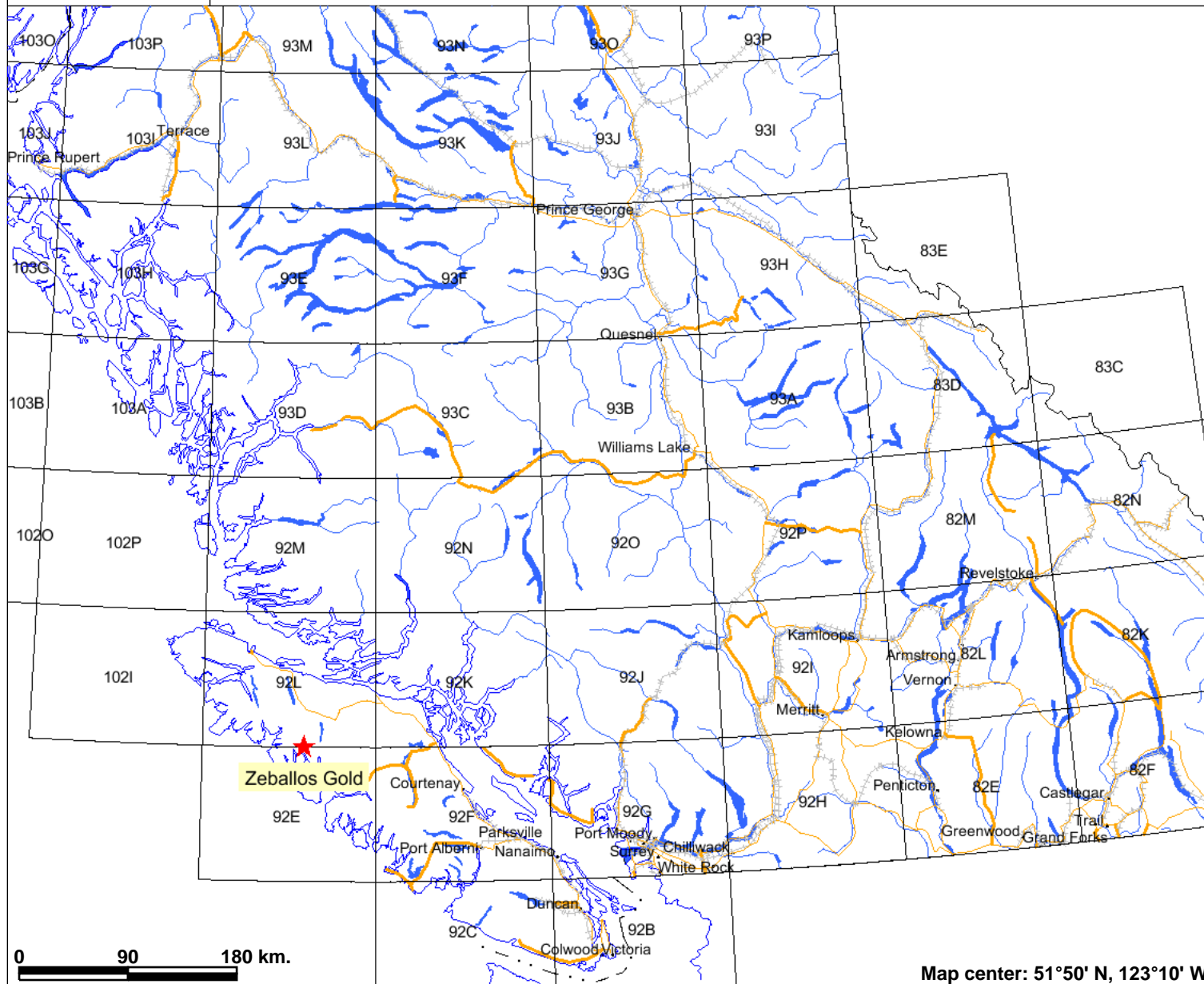
The Zeballos Gold mineral property is located on the western coast of the Vancouver Island in British Columbia, Canada. It is part of the Alberni Mining Division and is covered by NTS Map sheet 092E and 092L.

The property can be accessed from Mainland by using the BC Ferries services and then by travelling north on Highway 19 about 140 km past the city of Campbell River to the Zeballos road intersection. From there a well-maintained all season 42 km gravel road can be followed to the Village of Zeballos.

Access to the project's past producing mines is best described in North Bay Resources' 2011 technical report (AR32298). The Answer and Tagore Mines can be accessed from the main Zeballos road. The Golden Gate Mine can be accessed by hiking through the lush temperate rainforest. The Beano and Friend can be accessed by means of water taxi followed by travelling on decommissioned logging roads and hiking through the forest.

The Zeballos Gold Project is about 2 km north of the 150-200 people Village of Zeballos. The Village sits at the head of Zeballos Inlet, gateway to Nootka Sound,

# Fig.1 - Zeballos Index Map



## Legend

- Provincial Boundary (1:6M)
- Boundary (International)
- Boundary (Interprovincial)
- NTS Grid
- Transportation - Lines (1:6M)**
  - Road - Trunk
  - Road - Main
  - Rail Line
- Water - Lines (1:6M)**
  - River/Stream - Definite
  - Lake - Definite
  - Island - Definite
  - Coastline - Definite
- Water - Polygons (1:6M)**
  - River/Stream - Definite
  - Lake - Definite
- Major Cities

0 90 180 km.

Map center: 51°50' N, 123°10' W



Scale: 1:5,000,000

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Notes: Dan V. Oancea for North Bay Resources Inc. - December 2014



world-famous for salmon fishing and kayaking opportunities. The inlet gained its name in 1792 when Captain Alejandro Malaspina named it after one of his lieutenants, Ciriaco Cevallos.

The mineral project covers ground that stretches from sea level to 1,221 m in elevation (Mt. Beano). Physiography is rugged with hillsides being steep and bluff. At higher elevations creeks are flowing through steep canyons and present numerous waterfalls.

The Zeballos Project encompasses the Hidden Valley Creek and the Golden Gate Creek as eastern tributaries of the Zeballos River which flows into the Pacific Ocean at the Zeballos Village. The project area also encompasses the headwaters of the Spud Creek, Friend Creek and Bingo Creek.

#### 4.2 Mineral Claims

The Zeballos Gold Project consists of two mineral claims that cover 581.54 ha (1,437.76 acres). The claims are 100% owned by North Bay Resources Inc. and are centered at 50° 0' 0.9" N and 126° 47' 42.5" W. The mineral property is covered by the BCGS 092L006, 092L007, 092E096 and 092E097 maps.

**TABLE 1: MINERAL TITLES AT THE ZEBALLOS GOLD PROJECT**

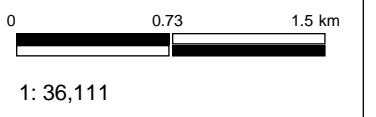
Tenure Number	Claim Name	Owner	NTS Map Number	Good to Date*	Status	Area (ha)
1071606	Golden Gate	204090	092L006, 092L007, 092E096, 092E097	Aug 16, 2021	GOOD	519.22
1071605	Golden Gate 2	204090	092E096	Aug 16, 2021	GOOD	62.32
<b>TOTAL</b>						<b>581.54</b>

- Subject to acceptance of the present Assessment Report.

Fig.2: Zeballos Gold Project Mineral Titles

**Legend**

- National Parks - Outlined
- National Parks - Colour Fille
- Ecological Reserves - Tanta
- Protected Areas - Tantalis -
- Recreation Areas - Tantalis
- Conservancy Areas - Tantal
- Mapsheet Grid (1:20,000)
- Mapsheet Grid (1:250,000)
- Contours - (1:20,000)
- FCODE
- Contour - Index
- Contour - Index Indefinite
- Contour - Index Depression
- Contour - Index Depression Indr
- Contour - Intermediate
- Contour - Intermediate Indefinite
- Contour - Intermediate Depressi
- Contour - Intermediate Depressi
- Federal Transfer Lands - Ou
- Federal Transfer Lands - Cc
- Mineral Title - Current (Oper
- TENURE\_SUB\_TYPE\_DESCR
- Claim
- Lease



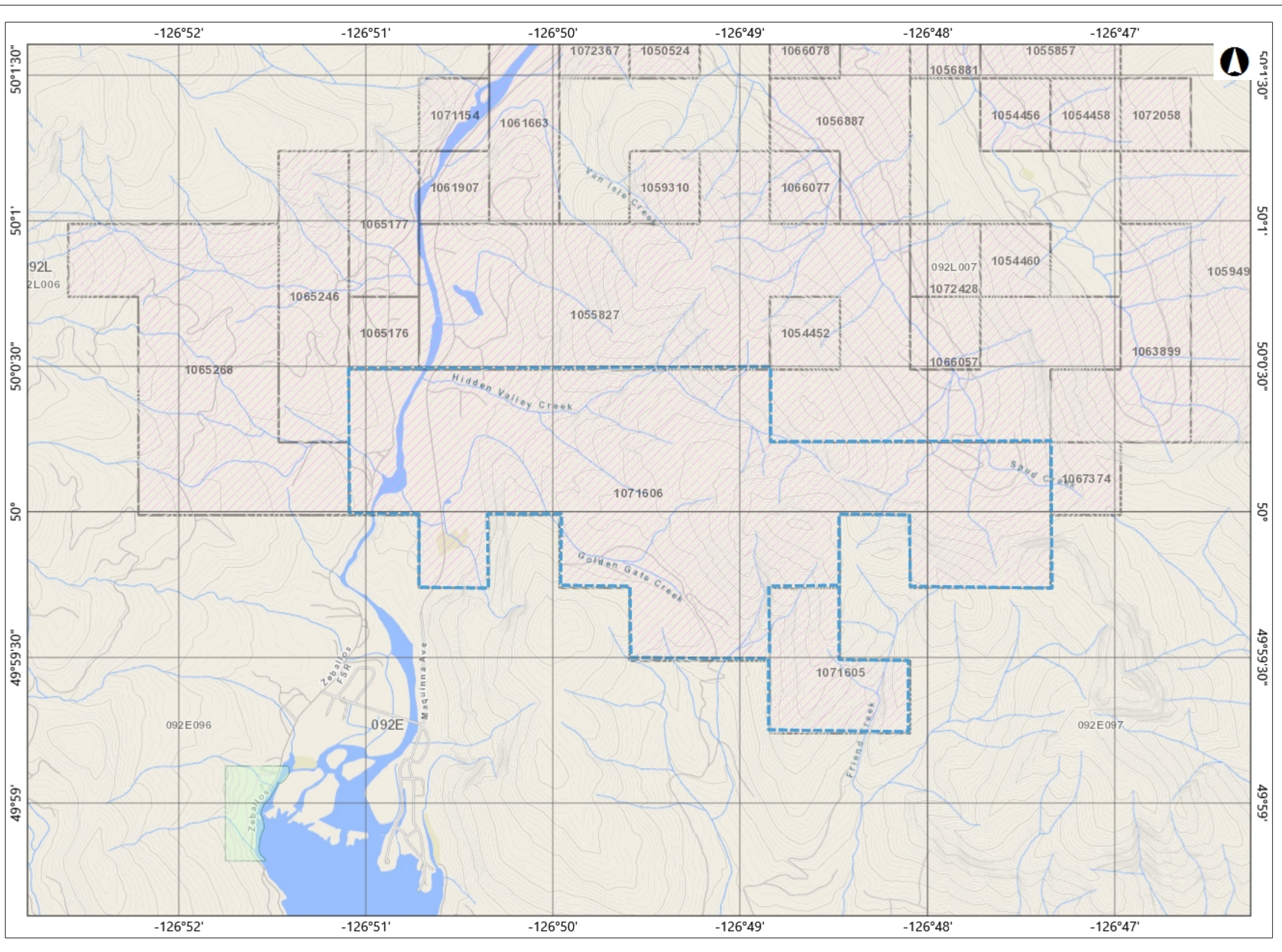
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Datum: NAD83  
Projection: Web Mercator

**Key Map of British Columbia**



The Zeballos Gold mineral claims partially overlap the following Crown Grant mineral lots: DL482, Answer No.1 MC (R); DL483, Answer No.2 MC (R); DL500, Answer No.6 MC (R); DL1757, J MC; DL1759 Flobald MC; DL1760, St. George MC; DL1762, Big Apple MC; DL1770, XY MC (R); DL1771, XX MC (R); DL1772, XZ MC (R); DL1779, Blue Ox No.1 MC; DL1801, Prosperity No.1, MC; DL1802, Prosperity No.4 MC.

According to BC government's on-line search and retrieval tool GATOR the Crown Grants marked with (R) are expired / reverted.

### **4.3 Climate, Local Resources, Infrastructure**

The climate is wet and mild. Most of the five meters of average annual precipitation occur from October through May. Snowfall is never more than a few inches at the beach but is heavier at higher elevations.

Logging is the prominent industrial activity in the area and parts of the project area have also been recently logged. Fishing, fish processing and tourism are also mainstays of the local economy.

Infrastructure is good with well-maintained logging roads connecting the project area with Highway 19.

Accommodation, food and gas could be provided and sourced from the Village of Zeballos.

### **4.4 History and Development**

According to John S. Stevenson (1950) small amounts of placer gold were found on the Zeballos River as early as 1907 but the staking of the first gold-quartz vein (Zeballos Gold Project's Tagore mine) happened only in 1924. In 1926 the King Midas was staked and by 1929 forty claims had been staked in the valley. Tagore made the camp's first ore shipment during the same year.

Small pockets of coarse placer gold had been found at the mouth of the Spud Creek and in 1933 rich gold-quartz floats were also identified. The floats were followed upstream and in 1935 the Gold Field veins were identified.

Most of the gold mines closed during the WWII and the last mine to operate was the Privateer which closed gates in 1948. The Ford iron ore mine (092L 028) operated in the 1962 to 1969 period; it mined a magnetite skarn.

The most complete documentation of the geology and mineral deposits of the Zeballos Mining Camp is in BCDM Bulletin 27 (Stevenson, J.S., 1950). The most recent study of the gold mineralization and geology of the Zeballos area is in Paper 2005-1 (Marshall, D., et.al, 2004).

It should be noted that a 1974 soil sampling program and a subsequent 1984 VLF-EM survey of a 600 ft by 1,200 ft area (the "B" zone) located at the Golden Gate Creek and Hidden Valley Creek headwaters resulted in the identification of a gold-copper geochemical anomaly and of a coincident VLF-EM geophysical conductor.

Mineralized rock floats carrying economic gold mineralization had also been discovered in the Lower Hidden Valley Creek (AR5079).

The same section of the creek was prospected in 2013 by Houle, J. and his moss sampling returned highly anomalous gold sample results (AR34249).

## **5. Geology and Mineralization**

### **5.1 Regional Setting**

The study area is part of the Insular Belt of the Canadian Cordillera which is comprised of several accreted volcanic terranes.

The Zeballos gold camp represents an area underlain by a Lower Jurassic Bonanza Group Island arc sequence of basaltic to rhyolitic volcanic rocks. Conformably underlying the Bonanza rocks are limestone and limy clastics of the Quatsino and Parson Bay formations, and the tholeiitic basalts of the Karmutsen Formation, all belonging to the Upper Triassic Vancouver Group.

Dioritic to granodioritic Jurassic plutons of the Zeballos intrusion phase of the Island Plutonic Suite have intruded all older rocks. The Bonanza Group rocks are the volcanic equivalent of the Island Plutonic Suite.

The Eocene Zeballos stock, a quartz diorite phase of the Catface Intrusions, is spatially related to the area's gold-quartz veins. Bedded rocks are predominantly northwest striking, southwest dipping, and anticlinally folded about a northwest axis.

## 5.2 Mineralization and Deposits

The Zeballos mining camp's mineralization is related to the emplacement of the Tertiary Mount Washington intrusive rocks. The Camp's mineralization is of the intrusion related gold mineralization type.



**Plate 1: Zeballos Gold Project Geology Map (MapPlace)**

## **Legend:**

**uTrBP:** Upper Triassic Bonanza Group - Parson Bay Formation

**UTrJBV:** Upper Triassic to Lower Jurassic Bonanza Group (calc-alkaline volcanic rocks)

**EMJlgd:** Early Jurassic to Middle Jurassic Island Plutonic Group (granodiorite)

**EOM:** Eocene to Oligocene Mt. Washington Plutonic Suite (diorites)

Recorded production for the Camp totals 9,465 kilograms gold and 4,119 kilograms silver, from 652,000 tonnes of ore mined. Most of the production came from the Spud Valley and Privateer deposits.

Stevenson (1950): "The mineral deposits of the area include gold-bearing quartz veins and high temperature replacement deposits, which contain copper and iron, and one gold-bearing replacement deposit. The gold-quartz veins are economically the most important. Magnesian limestone in the area is potentially of economic importance."

Minfile (092L 005) notes that: "In the Zeballos gold camp, generally narrow (10 to 30 centimetres) quartz-calcite veins, trending north or east (Fieldwork 1983, page 230) cut all rock types. Vein mineralogy includes pyrite, sphalerite, galena, chalcopyrite and locally arsenopyrite."

Stevenson (1950) considers that "fractures and consequently veins formed under tension are the most favorable for ore, those veins or parts of veins that strike close to north 62 degrees east and are vertical are the most likely to contain the best oreshoots."

According to Stevenson (1950) host rock alteration as it relates to veins is dependent upon the type of rocks. Granite and quartz diorite are altered to a silvery white rock with feldspar plagioclase completely sericitized and biotite and hornblende destroyed and replaced by chlorite. The lime-silicate rocks are only slightly altered along the vein walls. The feldspar tuff, green volcanic tuff and lava have been altered for distances up to 6 inches from the vein shear to a light buff dense rock (sericite + carbonate) that contains cubes of pyrite. Assays of the wallrock along the gold rich

veins show that no gold of economic importance seeped into the wallrock of the veins.

The sequence of mineralization is pyrrhotite, arsenopyrite, pyrite, sphalerite, chalcopyrite, galena and gold. In the quartz-sulphide ore the amount of gold is not only proportional to the sulphide content but is also dependent on the presence of sphalerite and galena. Quartz veins that contain either pyrite or arsenopyrite only do not as a rule contain much gold.

### **5.3 Property Geology and Mineralization**

The Bonanza Group is an island arc sequence consisting of basaltic to rhyolitic volcanic rocks. Conformably underlying the Bonanza Group rocks are limestones and limy clastics of the Quatsino and Parson Bay formations, and Karmutsen Formation tholeiitic basalts, all belonging to the Upper Triassic Vancouver Group. Dioritic to granodioritic plutons of the Zeballos intrusion phase of the Early-Middle Jurassic Island Plutonic Suite have intruded all older rocks. The Eocene Zeballos stock, a quartz diorite phase of the Tertiary Catface Intrusions, is spatially related to the area's gold-quartz veins. Bedded rocks are predominantly northwest striking, southwest dipping, and anticlinally folded about a northwest axis.

The Zeballos Gold Project encompasses three past producing gold mines i.e. Tagore (092L 006), Golden Gate (092L 005), Beano (092E 002), and two mineral prospects - Answer 2 (092E 023). Mineral production from these past producers totaled 202 ounces of gold, 115 ounces of silver, 220 pounds of copper and 130 pounds of lead.

All these deposits (except the Beano skarn) are of the gold vein deposit type and are hosted by small shear zones within the Bonanza Group volcanic rocks and/or the Parsons Bay limestones.

Vein mineralization consist of quartz, calcite, pyrrhotite, chalcopyrite, galena, pyrite and free gold.

A detailed geological description of the Tagore and Golden Gate Mines was provided by John S. Stevenson (1950) and reported in previous assessment reports.

The skarn mineralization at Beano is hosted by an actinolite altered limestone; its mineralization consists of three different styles: 1) zones of quartz-calcite-pyrrhotite stringers 2) disseminated pyrrhotite 3) lenses of massive pyrrhotite measuring to 0.3 by 1.2 metres, as en-echelon replacement of limestone along fractures. The limestone and lime silicate rocks were intruded by the Eocene Mt. Washington stock and by Island gabbro intrusions. A detailed description of the geology and mineralization for each of these mines could also be found in North Bay Resources' 2011 technical report (AR32298).

The auriferous band of limestone outcropping at Beano might continue undercover (through the creeks' headwaters geochemically anomalous "B" area) towards the Prosperity copper showing (092L 007) located on Hidden Valley Creek where another package of 600 ft of limestone and lime-silicate rocks outcrops and is sandwiched in between dark green andesitic volcanics.

The Friend occurrence (092E 003) is comprised of three widely spaced quartz veins occurring along Friend Creek in a sequence of dark green argillaceous tuff, actinolite-altered limestone and andesite of the Bonanza Group. The three veins occur in a north-trending structure marked by a 15-metre wide chlorite alteration zone.

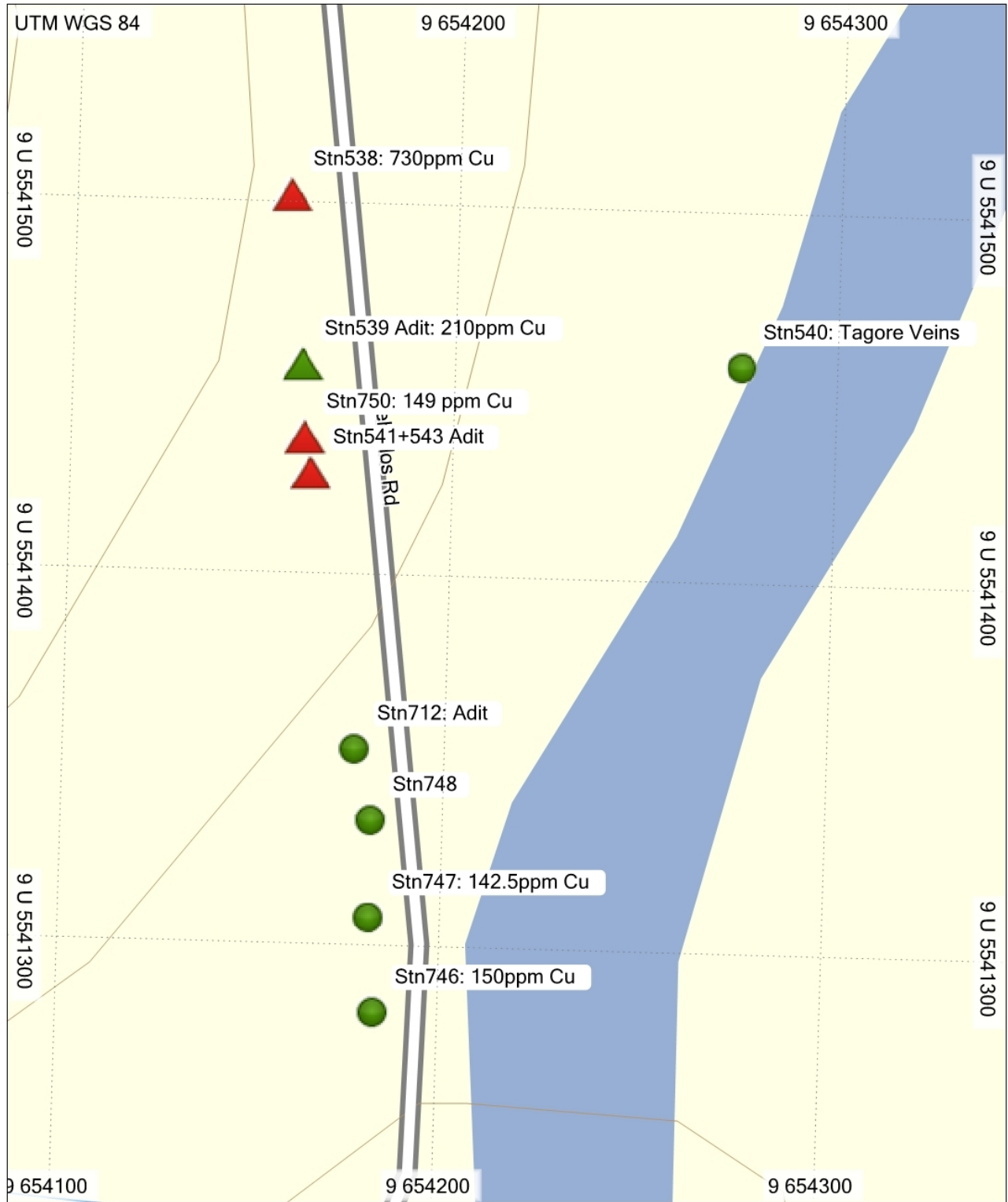
On the Lower Hidden Valley Creek mineralized actinolitic floats containing pyrrhotite and chalcopyrite were noted near an old trail. They assayed up to 1.2 g/t gold and 0.16% copper (AR5079).

The same section of the creek was prospected in 2013 by Houle, J. and his moss sampling survey returned anomalous samples grading up to 1.31 ppm (g/t) gold. Houle's moss sampling of the Golden Gate Creek also returned anomalous gold values up to 1.3 ppm gold, 0.6 ppm silver and 213 ppm zinc. (AR34249).

## **6. Prospecting & Geochemical Survey**

A one-day prospecting survey was undertaken during the month of October 2019. The scope of the survey was mapping, and sampling of the Bonanza Group rocks and intrusives outcropping on the west side of the Zeballos River.

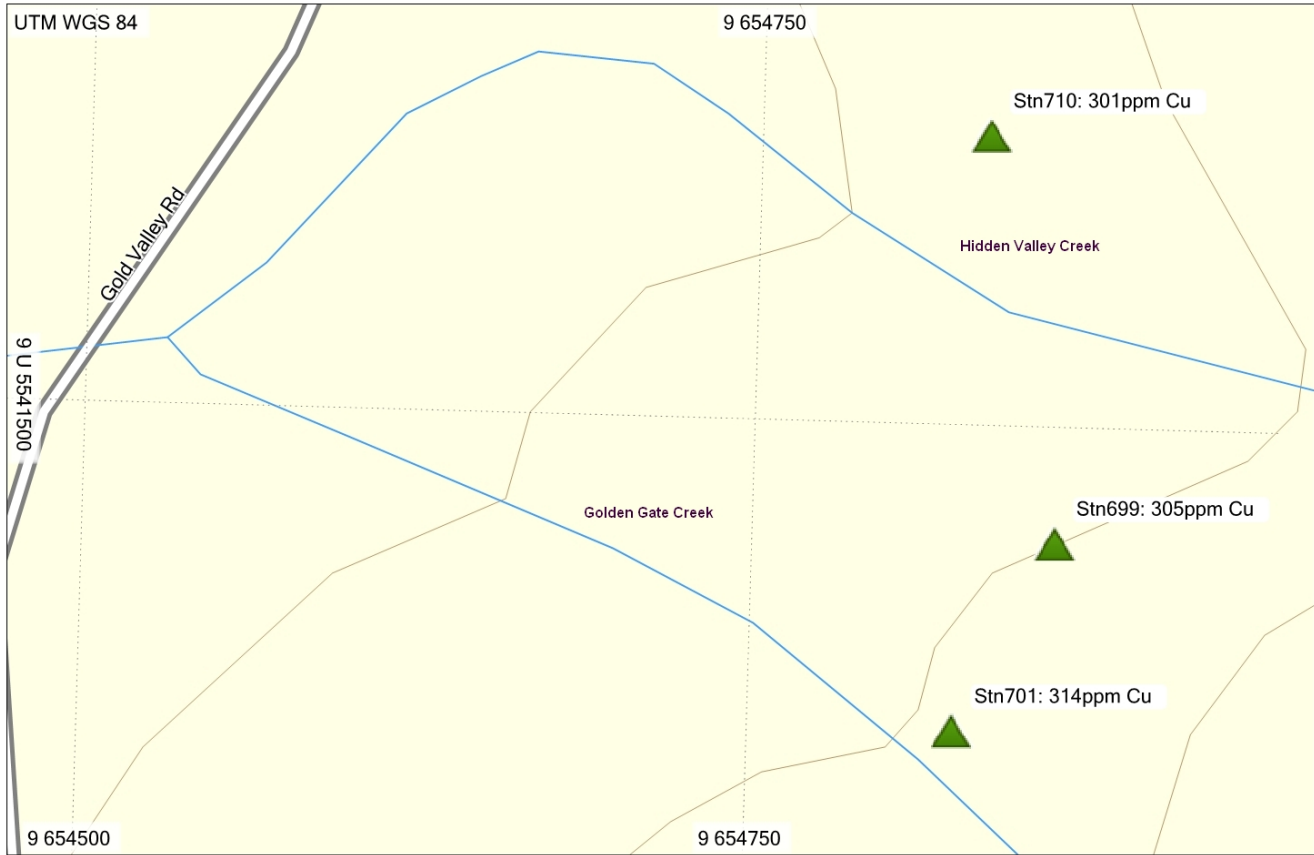




**Fig.3: Zeballos Gold Project Sampling Map**

**LEGEND**

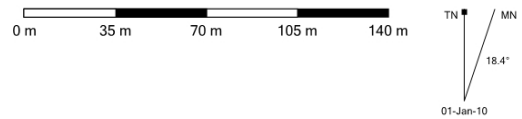
- Green Circle: Hornfelsed Bonanza Group Volcanics
- Green Triangle: Altered Bonanza Group Volcanics
- Red Triangle: Island Intrusives (Gabbro/Diorite)
- Stn476: Station 476



**Fig.4: Zeballos Gold Project Sampling Map (2)**

**LEGEND**

- Green Triangle: Altered Bonanza Group Rocks
- Stn701: Station 701



Well-maintained logging roads provide an easy access to the west side of the Zeballos River and side of the road outcrops.

Country rock is represented by dark-grey greenish chloritized / epidotized Bonanza Group volcanic rocks which are usually hard silicified and displaying an aphanitic texture. Most of the rocks have been hornfelsed and are traversed by calcite-quartz fissures which are at times mineralized with pyrite, pyrrhotite, sphalerite and other sulphides. Disseminated sulphides are often present within the rock.

Intrusive rocks are represented by both gabbro and dioritic rocks. They are part of the Island Plutonic Suite and intrude the Bonanza volcanic rocks as noted on the side of the road outcrops.

The gabbro belongs to the intrusive stock that outcrops east of the Zeballos River. The River cut a deep gorge in its rocks immediately north of the Village. The gabbro rock has at times a more mafic character being fine grained and traversed by fissured filled with epidote and pyrite. Fine grained sulphides are also present as disseminated in its mass.

The diorite has a greenish tinge caused by propylitization processes. The rock is at time limonitized due to the presence of fine-grained sulphides on hairline fissures.

A light colored felsic brecciated intrusive dyke containing clasts of greenish and limonitized volcanic Bonanza rocks was also noted in contact with the volcanics (Plate 2).

Mineralized rocks samples have been collected. The purpose of the sampling exercise was to identify possible geochemically anomalous zones that could be correlated with the local geology and the results of the previous surveys and used in generating a new geological model that could guide future exploration programs.

## **7. Discussion & Conclusions**

The Zeballos Gold Project is located in a favorable geological setting represented by the presence of the productive Mt. Washington/Zeballos stock intrusion and/or in its proximity.

An analysis of the Camp's mines and mineralization done by government geologists (AR12772, p.13) indicate that the greatest potential for economic mineralization seems to be within 1,000 m of the large intrusive bodies i.e. the Mt. Washington / Zeballos stock intrusion which not only hosts most of the Camp's gold mines, but also provided the gold-base metals mineralization and fluids that permeated the adjacent Bonanza group rocks, as well as the Parson Bay limestone/lime-silicates rocks. The eastern part of the Zeballos Gold Project overlaps the western side of the Mt. Washington/Zeballos stock intrusion while most of the Project area is located within the aforementioned 'fertile' zone i.e. being within 1,000 m of the intrusion, which makes the project prospective for hosting undiscovered economic mineralization.

It should be noted that most of the veins are located in a part of the Camp where an 'apophyse' of the Eocene intrusion protrudes into the surrounding Bonanza Group rocks. It is the writer's opinion that the location of these veins is the result of a ground preparation event (faulting, shearing) that is synchronous or postdates the emplacement of the Eocene stock.

By following on Stevenson's observation that Zeballos mining camp veins are continuous over significant strike lengths and by taking into consideration Marshall, D.'s 2005 geological map one can infer that the structural corridor that hosts the important Spud Valley / Gold Field Mine and the Mt. Zeballos Mine continues southwest on the Company's claims and joins the Hidden Valley Creek somewhere in the general Prosperity Adit area.

Stevenson (1950) also noted that the shear zone that hosts the Golden Gate (Portal) Mine vein can be recognized some 250 m upstream on the east side of the Golden Gate Creek. At this location it is hosting an oxidized quartz vein. This observation indicates that the Upper Golden Gate Creek is also prospective for hosting gold mineralization.

The historic gold-copper in-soil geochemically anomalous "B" zone (AR5079) has not been surveyed but nevertheless represents an important exploration target for it is in a promising geological setting. A follow-up 1984 geophysical survey (AR12772) identified a buried conductor which could represent a mineralized zone located either within an auriferous band of limestone extending west from the Beano mine, or the mineralized contact between different lithologies.

According to AR12772 the "B" zone is "covered with alluvial and slide material from an intermittent stream, and partly by swamp. Geologically the depression represents the contact of a gabbro or dioritic stock extending from the Golden Portal property about

elevation 750 feet southeastward toward Friend Creek. Light to dark green volcanics crop out on the steep slope above the depression, and limestone and lime-silicate rocks are thought to trend from the Beano showing toward similar units well-exposed in Hidden Valley Creek, across the upper part of the "B" grid."

The authors of the report continue by saying that the "moderately to strong conductor" identified in the area has an "apparent trend of 110 degrees, sub parallel with the trend of tuffaceous bands and limestone lenses in the area, and probably with the gabbro-volcanic contact. Rusty pyritized tuffaceous rocks, hard and siliceous (probably hornfelsed from proximity to the gabbro stock) were seen on two of the grid lines; these could be the source of gold, copper, and mercury values in soil."

Historic surveys also considered that the creek that flows south into the topographically low "B" zone must also be prospected and sampled as it might be possibly responsible for the creation of the geochemical anomaly. (AR5079)

Another prospective zone within the Zeballos Gold Project area is represented by the Hidden Valley Creek area below the Prosperity adit as described in AR5079. The report states that "mineralized actinolite float was seen near the trail. This float, containing pyrrhotite and chalcopyrite, and resembling the altered material at the Beano showing, appears to be coming from steep cliffs adjacent to the trail. Limestone float is present in the same area." The mineralized rock floats assayed up to 1,600 ppm (0.16%) copper and 1.2 g/t (1,200 ppb) gold.

It is the writer's opinion that Houle J. (2013) collected anomalous moss samples from a location immediately below the aforementioned mineralized section of the creek. The Houle location was also visited by the writer in June 2019 and his rock sampling exercise returned 301 ppm copper from mineralized volcanic rocks (Stn 710). It should be noted that these rocks are not the same as the rocks/mineralized floats described in AR5079 and which were most likely collected/originated from a nearby upstream location.

Houle J. (2013) also shared the opinion that "The highly elevated value of 1.31 ppm gold in the sample combined with the low gold values obtained from all three tributaries upstream from the sample site suggest the presence of an undiscovered source of gold in the immediate area upstream from E5123146, but much lower than the Prosperity occurrence."

Other types of mineralization might also be hosted by the Bonanza Group rocks and the writer's brief rock sampling exercise tried to identify some of these anomalous areas.

Assay results of the Bonanza Group rocks were reported in AR5079 and AR35166. They were generally in the 50-150 ppm copper range. The exception would be the aforementioned Hidden Valley Creek samples, and other rock samples collected by the writer during his June 2019 survey from the Lower Hidden Valley Creek and the Lower Golden Gate Creek area - they assayed over 300 ppm copper (Stn 699 & 701).

The number of rock samples was not high enough to allow for a statistical estimation of a background value for copper but considering the aforementioned facts the writer considers that the Lower Hidden Valley Creek and the Lower Golden Gate Creek flow through a slightly anomalous copper zone hosted by Bonanza Group volcanics which are mineralized with pyrrhotite, pyrite +/- chalcopyrite.

An interesting fact that was mentioned by Gunning (1932) but has not been followed up by subsequent explorers is represented by the existence of 'contact mineralization' that hosts the auriferous vein at Tagore (AR37024).

According to historical reports this type of zinc mineralization continues for hundreds of feet south-east of the vein and was pit sampled in 1925. Because neither high gold values nor other auriferous quartz veins have been found within the contact zone no further exploration was done in the area.

As previously mentioned by other authors the Tagore auriferous quartz veins are younger than the contact mineralization as they cut and are sometimes hosted by the contact metamorphism zone rocks.

There is also a historic mentioning of gold stringers hosted within or in the vicinity of a diorite intrusion that was explored by means of an adit and unspecified mineralization was also found in underground. The latest survey identified some of these intrusions.

The writer's October 2019 survey as well as literature search resulted in a new geological interpretation of the central and western part of the property which encompasses the Lower Hidden Valley Creek and the Lower Golden Gate Creek.

The 'contact mineralization' described by Gunning and validated by the writer represents hornfelsed Bonanza Group volcanic rocks mineralized with different types of sulphides including sphalerite which is more abundant in the Tagore Mine area.

The copper enriched Bonanza Group rocks of the Lower Hidden Valley Creek and of the Lower Golden Gate Creek are also hornfelsed and hydrothermally altered. Silicification is widespread.

It should be noted that elevated copper values in the Bonanza rocks are always accompanied by high phosphorus values which might indicate the presence of apatite – a mineral that is known to be present in hydrothermal alteration zones and porphyry copper deposits.

Sampling maps that are part of this report feature relevant locations and assay results from both the June and the October 2019 reports.

Literature search indicates that the geological setting of the Company's mineral claims is to a certain extent similar to that existent at the former past producing Copper Island Mine (092L 158). This regional Mine has produced 2.7 billion lbs copper, 1.3 million oz gold, 9.45 million oz silver, and 70.6 million lbs molybdenum.

The writer is drawing a few parallels in between the Island Copper Mine and the Zeballos Gold Project area.

The Mine is underlain by the same type and groups of rocks as those present in the Company's Project area.

The Mine's rocks are intruded by a quartz feldspar porphyry dyke bordered and capped by breccias enclosing volcanic and intrusive fragments. The same type of dyke and breccias have been noted on the west bank of the Zeballos River (Stn750).

The Mine host rocks have been subjected to contact thermal metamorphism and hydrothermal alteration. Zonation around the intruding stock include an inner zone characterized by biotite and magnetite, an intermediate chlorite zone, and an outer epidote zone. The hydrothermal alteration affects small volumes of rock (fractures, quartz-carbonate veinlets) and is closely related to fracturing and brecciation. Similar chlorite-epidote alteration zones have been noted within the Project area's Bonanza Group rocks. Silicification is also well represented in both the Mine's area and the Project area.

The Mine's orebody is divided into hanging wall and footwall zones with the hanging wall being more significant. They are hosted by the Bonanza volcanic rocks with only a minor amount of ore occurring into the dyke. Orebodies are enclosed by a halo of lower grade copper mineralization hosted by the volcanic rocks. The Project area Bonanza rocks also host elevated copper values similar to the Mine orebodies' halo. Copper values as high as 730 ppm have been returned from sampling of the dioritic intrusions / dykes outcropping on the west side of the Zeballos River. Both the gabbroic and the diorite

rocks present in the Project area belong to the Early-Middle Jurassic Island Plutonic Suite same as the Mine's dyke.

At the Mine sphalerite rich zones occur inside and outside the ore zone. Sphalerite is hosted by carbonate-zeolite veinlets at times associated with pyrite and rarely with chalcopyrite. The Tagore Mine area is similarly known to host zinc enriched zones.

## **8. Recommended Work**

Further exploration work is warranted on the Zeballos Gold mineral property.

The Lower Hidden Valley Creek area should be prospected, mapped and sampled in an effort to identify the source of the precious metals mineralized float material encountered by historic surveys.

The Upper Hidden Valley Creek above the Prosperity adit should also be prospected, mapped and sampled to identify a possible extension of the aforementioned structural corridor which is known to host gold mineralization.

It is recommended to undertake a detailed geological and confirmatory soil sampling survey of the "B Zone". Contingent on the results of a subsequent geophysical survey the coincident geochemical and geophysical anomalies would be trenched and sampled. Exploratory drilling could be employed to test any anomalous ground if mechanized trenching would be difficult to accomplish. A local creek that flows into the geochemically anomalous zone should also be mapped and sampled as the anomaly might be generated by mineralized material transported by the creek into the topographically lower B Zone.

Government rock sampling (BNO-4) of a skarn outcrop located 330 m WNW of the Beano occurrence assayed 25 g/t gold, 121 ppm zinc and 5 ppm Pb. The area needs to be revisited mapped, sampled and assessed for its mineral potential.

The area encompassed by the Hidden Creek and Golden Gate Creek is considered to be a high priority target for it is prospective for hosting mineralization similar to the one encountered at the Island Copper Mine. It should be noted that at the Mine copper mineralization indicates a positive correlation with fracture density and the presence of magnetite.



A geophysical magnetic drone survey (UAV-MAG) is recommended to be undertaken over the most prospective parts of the property. While linear breaks in the magnetic field could reveal faults and possibly gold mineralized structures it is the magnetic highs hosted by Bonanza volcanics that can reveal possible alteration zones (hydrothermal magnetite) linked to Island Copper type mineralization.

Follow-up focused geochemical soil sampling surveys have to be conducted over areas hosting significant geophysical anomalies.

Contingent on positive surveys results a LIDAR survey should also be flown over the whole property in order to be able to identify topographical features of interest that are masked by the lush temperate forest that covers the ground.

## 9. Cost Statement

### Salaries:

Dan Oancea, PGeo (October 15-17, 2019):

- 2.0 Days (incl. mob/demob) @ \$577.50/day.....\$1,155.00

**Truck Rental** .....\$181.85

**Gas** .....\$181.87

**BC Ferries:** .....\$152.10

**Accommodation** .....\$141.25

### Food:

- 2.0 Days @ \$80/day.....\$160.00

### Analytical (ALS Chemex):

- 8 Samples.....\$401.97

### Report Cost:

Dan Oancea PGeo.....\$1,050.00

**TOTAL** **\$3,424.04**

## 10. References

1. An Update on the Mineral Deposit Potential of the Nootka Sound Region by Marshall, D et al, in Round Up 2005 poster;
2. Assessment Reports (AR): 5079, 12772, 32298, 32298, 34249, 35166, 36167, 37024;
3. Geology and Mineral Deposits of the Zeballos Mining Camp, British Columbia, 1950 by John S. Stevenson in Bulletin No. 27, British Columbia Department of Mines;
4. Geology of the Island Copper Mine, Port Hardy, BC (PhD Thesis) by Cargill, G.D. in UBC. 1975
5. Gold Mineralization and Geology in the Zeballos Area, Nootka Sound, by Marshall D. et al, in BCGS Geological Fieldwork 2004, Paper 2005-1;
6. Minfile 092E 002, 092E 003, 092E 023, 092L 005, 092L 006, 092L 007, 092L 013, 092L 158, 092L 211;

## 11. Statement of Qualifications

I, **Dan V. Oancea**, of 507-1148 Heffley Crescent, Coquitlam do hereby certify that:

1. I am a member in good standing with the Association of Engineers and Geoscientists of the Province of Columbia, Canada. I hold a Professional Geoscientist designation. I am also a Fellow of the Geological Association of Canada (GAC), of the Association for Mineral Exploration British Columbia (AMEBC), and of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM).
2. I have graduated a 5-year Engineering Program (Thesis) equivalent to a Master's Degree and obtained a Geological Engineering Diploma in Geology and Geophysics (1987) from the Babes Bolyai University of Cluj-Napoca, Romania.
3. I have practiced my profession for 22 years. As a professional geologist in the mining industry, I have extensive geological, geochemical, and exploration experience, management skills, and a solid background in research techniques, and training of technical personnel. I have been involved in underground and surface exploration projects in Canada and Europe.
4. As a result of my experience and qualification I am a Qualified Person as defined in National Instrument 43-101.
5. I have authored this report which is based upon review and compilation of data relating to the Zeballos Gold Project and upon personal knowledge of the property gained from on-site survey work carried out in the 2014 - 2019 period.
6. I do not own an interest in the Zeballos Gold mineral property.

Vancouver, BC

Respectfully submitted

December 11, 2019

Dan V. Oancea PGeo

**Table 2 – Zeballos Gold Project Important Locations**

Station	Grab Sample No.	UTM E	UTM N	Description
538	#	654227	5541505	Chloritized/epidotized diorite type rock (730ppm Cu)
539	#	654238	5541458	Rock floats collected from the collapsed entrance to a small adit: Bonanza volcanics epidotized and cut by mm thick fissures with calcite+ quartz mineralized with py, sulphides; and, chloritized/epidotized diorite type rock (210ppm Cu)
540	#	654283	5541458	Tagore Gold Veins outcrop
541	#	654247	5541431	Mafic fine-grained rock cut by fissures with vugs filled by epidote, py
697	#	654978	5541775	Dark color silicified fine-grained volcanic rock mineralized with py, po on calcite/quartz fissures
699	#	654863	5541455	Silicified fine-grained grey volcanic rock mineralized with py, po, +/-cpy as disseminated and streaks (305ppm Cu)
701	#	654827	5541382	Silicified fine-grained grey volcanic rock mineralized with py, po, +/-cpy as disseminated and streaks (314ppm Cu)
710	#	654835	5541611	Greenish/chloritized fine-grained volcanic rock mineralized with py/po, +/-cpy as disseminated and streaks (301ppm Cu)
712	Z-19-807 & Z-19-808	654229	5541355	Aphanitic grey silicified hornfelsed Bonanza volcanic rock (-807 & pyritized -808). Limonitization & argillization zone adjacent to hydrothermal fissure veins. Tagore Mine area prospecting adit.
746	Z-19-806	654231	5541283	Hornfelsed silicified Bonanza volcanics sericite altered and featuring disseminated sulphides incl. py (150ppm Cu)
747	Z-19-801	654232	5541308	Hard silicified hornfelsed Bonanza volcanics with disseminated py, po (142.5ppm Cu)
748	Z-19-802 & Z-19-803	654223	5541337	Dark grey Bonanza volcanics hornfelses with disseminated sulphides (-803) assaying 149ppm Cu, cut by calcite veinlets carrying py, sph (-802)
750	Z-19-804 & Z-19-805	654257	5541430	Gabbro with disseminated and on fissures sulphides (-804) grading 149ppm Cu; also, felsic intrusive rock dyke (brecciated) at the contact with Bonanza volcanics (-805)

**\*UTM Zone 09 NAD 83**

\* py = Pyrite

\* po = Pyrrhotite

\* cpy = Chalcopyrite

\* sph = Sphalerite

# Previous Assessment Reports Sampling & Assaying



**Plate 2: Brecciated leucocratic dyke featuring country rock clasts (Stn 750)**

## **APPENDIX**

**ALS CHEMEX INVOICES, ANALYTICAL CERTIFICATES**

**&**

**CHEMICAL PROCEDURES**



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**SKIPPACK PA 19474**  
**USA**

**INVOICE NUMBER 4938307**

BILLING INFORMATION		
Certificate:	<b>VA19263257</b>	
Sample Type:	<b>Rock</b>	
Account:	<b>NOBARE</b>	
Date:	<b>20-NOV-2019</b>	
Project:	Zeballos	
P.O. No.:		
Quote:		
Terms:	<b>Due on Receipt</b>	<b>C3</b>
Comments:		

QUANTITY	CODE	ANALYSED FOR DESCRIPTION	UNIT PRICE	TOTAL
1	BAT-01	Administration Fee	37.60	37.60
8	PREP-31	Crush, Split, Pulverize	8.50	68.00
2.86	PREP-31	Weight Charge (kg) - Crush, Split, Pulverize	0.85	2.43
8	ME-MS61	48 element four acid ICP-MS	34.35	274.80

SUBTOTAL (CAD) \$ 382.83

R100938885 GST \$ 19.14

**TOTAL PAYABLE (CAD) \$ 401.97**

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**CERTIFICATE VA19263257**

Project: Zeballos

This report is for 8 Rock samples submitted to our lab in Vancouver, BC, Canada on 19-OCT-2019.

The following have access to data associated with this certificate:

P. LEOPOLD	DAN OANCEA
------------	------------

SAMPLE PREPARATION	
ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize up to 250g 85% <75 um

ANALYTICAL PROCEDURES	
ALS CODE	DESCRIPTION
ME-MS61	48 element four acid ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

\*\*\*\*\* See Appendix Page for comments regarding this certificate \*\*\*\*\*

**Signature:**   
 Saa Traxler, General Manager, North Vancouver



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Project: Zeballos

**CERTIFICATE OF ANALYSIS VA19263257**

Sample Description	Method Analyte Units LOD	WEI-21	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
		Recvd Wt. kg	Ag ppm	Al %	As ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Ce ppm	Co ppm	Cr ppm	Cs ppm	Cu ppm	Fe %
		0.02	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2	0.01
Z-19-801		0.52	0.21	9.10	3.0	320	1.06	0.06	4.21	0.16	25.4	26.3	18	2.24	142.5	6.53
Z-19-802		0.44	0.03	3.28	47.0	10	0.24	0.09	32.9	3.25	7.47	5.3	26	0.06	4.8	3.02
Z-19-803		0.58	0.14	8.83	6.0	380	3.09	0.07	4.61	0.22	14.75	15.3	65	0.66	45.7	5.40
Z-19-804		0.24	0.10	7.46	3.2	300	1.52	0.13	1.85	0.07	39.4	19.8	9	0.16	149.0	3.65
Z-19-805		0.22	0.06	7.12	1.8	300	1.60	0.07	2.24	0.06	50.3	11.0	13	0.07	79.1	2.35
Z-19-806		0.32	0.26	8.73	2.8	410	0.76	0.21	1.68	0.05	16.40	38.9	153	3.72	150.0	8.96
Z-19-807		0.38	0.05	6.74	1.4	560	1.79	0.06	1.22	0.11	49.2	5.5	9	0.14	27.1	3.28
Z-19-808		0.16	0.18	7.70	20.0	10	0.20	0.06	16.55	0.71	5.85	29.2	102	0.10	80.0	7.21

\*\*\*\*\* See Appendix Page for comments regarding this certificate \*\*\*\*\*



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Sample Description	Method Analyte Units LOD	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	
		Ga ppm 0.05	Ge ppm 0.05	Hf ppm 0.1	In ppm 0.005	K % 0.01	La ppm 0.5	Li ppm 0.2	Mg % 0.01	Mn ppm 5	Mo ppm 0.05	Na % 0.01	Nb ppm 0.1	Ni ppm 0.2	P ppm 10	Pb ppm 0.5
Z-19-801		20.3	0.09	0.5	0.084	0.52	12.0	4.4	2.13	1300	1.47	4.07	4.1	7.9	1260	7.4
Z-19-802		5.74	<0.05	0.7	0.034	0.05	4.0	0.7	0.59	2190	1.48	0.07	1.7	10.4	250	41.7
Z-19-803		17.70	0.07	0.9	0.161	1.02	6.1	4.7	0.64	5700	7.36	3.95	4.1	16.0	330	5.1
Z-19-804		20.6	0.10	0.5	0.046	0.62	16.5	3.8	0.66	532	1.56	4.52	7.9	3.7	780	2.8
Z-19-805		20.2	0.13	0.7	0.041	0.79	21.5	2.7	0.47	386	1.10	4.47	8.4	5.4	560	2.5
Z-19-806		14.50	0.08	0.1	0.035	1.37	7.5	5.7	1.10	824	1.08	4.62	5.1	26.6	430	9.1
Z-19-807		22.0	0.14	1.2	0.122	1.73	21.2	1.4	0.12	572	2.57	4.39	8.9	0.6	280	3.4
Z-19-808		13.55	0.05	1.4	0.051	0.02	2.8	5.7	3.16	2580	0.73	0.10	2.9	20.9	350	5.1



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Project: Zeballos

**CERTIFICATE OF ANALYSIS VA19263257**

Sample Description	Method Analyte Units LOD	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	
		Rb ppm	Re ppm	S %	Sb ppm	Sc ppm	Se ppm	Sn ppm	Sr ppm	Ta ppm	Te ppm	Th ppm	Ti %	Tl ppm	U ppm	V ppm
		0.1	0.002	0.01	0.05	0.1	1	0.2	0.2	0.05	0.05	0.01	0.005	0.02	0.1	1
Z-19-801		28.3	0.002	0.69	0.10	29.9	1	1.0	511	0.24	0.07	1.55	0.654	0.21	0.6	200
Z-19-802		2.7	0.005	0.07	0.62	10.5	2	0.4	445	0.08	<0.05	0.45	0.219	0.02	2.9	79
Z-19-803		30.0	0.016	2.37	0.21	21.1	1	0.9	550	0.24	0.05	1.09	0.411	0.17	3.3	112
Z-19-804		10.6	<0.002	0.47	0.28	15.0	2	0.8	176.0	0.54	<0.05	4.18	0.467	0.05	1.3	47
Z-19-805		10.2	<0.002	0.16	0.30	11.7	1	0.6	190.5	0.60	<0.05	5.54	0.342	0.04	1.8	27
Z-19-806		49.3	<0.002	3.13	0.11	28.3	1	0.8	465	0.26	0.17	0.75	0.929	0.29	0.8	305
Z-19-807		41.2	<0.002	1.53	0.10	10.2	<1	2.3	144.5	0.54	<0.05	3.32	0.208	0.18	1.2	1
Z-19-808		1.0	<0.002	1.14	1.14	26.5	1	0.9	536	0.15	<0.05	0.58	0.604	<0.02	1.1	251



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Project: Zeballos

**CERTIFICATE OF ANALYSIS VA19263257**

Sample Description	Method Analyte Units LOD	ME-MS61 W ppm 0.1	ME-MS61 Y ppm 0.1	ME-MS61 Zn ppm 2	ME-MS61 Zr ppm 0.5
Z-19-801		0.4	25.2	99	11.7
Z-19-802		0.2	7.0	874	23.2
Z-19-803		0.2	25.1	76	21.0
Z-19-804		0.4	52.9	38	7.4
Z-19-805		0.2	52.7	23	10.1
Z-19-806		0.8	20.4	43	2.3
Z-19-807		0.4	62.7	46	24.9
Z-19-808		0.6	6.4	208	49.8



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Finalized Date: 20-NOV-2019  
Account: NOBARE

Project: Zeballos

**CERTIFICATE OF ANALYSIS VA19263257**

<b>CERTIFICATE COMMENTS</b>									
	<p style="text-align: center;"><b>ANALYTICAL COMMENTS</b></p> <p>Applies to Method: REE's may not be totally soluble in this method. ME-MS61</p>								
	<p style="text-align: center;"><b>LABORATORY ADDRESSES</b></p> <p>Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.</p> <table><tr><td>CRU-31</td><td>LOG-22</td><td>ME-MS61</td><td>PUL-31</td></tr><tr><td>SPL-21</td><td>WEI-21</td><td></td><td></td></tr></table>	CRU-31	LOG-22	ME-MS61	PUL-31	SPL-21	WEI-21		
CRU-31	LOG-22	ME-MS61	PUL-31						
SPL-21	WEI-21								

## GEOCHEMICAL PROCEDURE

# ME- MS61

## ULTRA- TRACE LEVEL METHOD USING ICP- MS AND ICP- AES

### SAMPLE DECOMPOSITION

HF-HNO<sub>3</sub> -HClO<sub>4</sub> acid digestion, HCl leach (GEO-4A01)

### ANALYTICAL METHOD

**Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES)**

**Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)**

A prepared sample (0.25 g) is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and analyzed by inductively coupled plasma- atomic emission spectrometry. Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples meeting this criterion are then analyzed by inductively coupled plasma-mass spectrometry. Results are corrected for spectral interelement interferences.

**NOTE:** Four acid digestions are able to dissolve most minerals; however, although the term “near- total” is used, depending on the sample matrix, not all elements are quantitatively extracted.

ELEMENT	SYMBOL	UNITS	LOWER LIMIT	UPPER LIMIT
Silver	Ag	ppm	0.01	100
Aluminum	Al	%	0.01	50
Arsenic	As	ppm	0.2	10,000
Barium	Ba	ppm	10	10,000
Beryllium	Be	ppm	0.05	1,000
Bismuth	Bi	ppm	0.01	10,000
Calcium	Ca	%	0.01	50
Cadmium	Cd	ppm	0.02	1,000
Cerium	Ce	ppm	0.01	500
Cobalt	Co	ppm	0.1	10,000
Chromium	Cr	ppm	1	10,000
Cesium	Cs	ppm	0.05	500
Copper	Cu	ppm	0.2	10,000
Iron	Fe	%	0.01	50
Gallium	Ga	ppm	0.05	10,000
Germanium	Ge	ppm	0.05	500
Hafnium	Hf	ppm	0.1	500

# ME- MS61

ELEMENT	SYMBOL	UNITS	LOWER LIMIT	UPPER LIMIT
Indium	In	ppm	0.005	500
Potassium	K	%	0.01	10
Lanthanum	La	ppm	0.5	10,000
Lithium	Li	ppm	0.2	10,000
Magnesium	Mg	%	0.01	50
Manganese	Mn	ppm	5	100,000
Molybdenum	Mo	ppm	0.05	10,000
Sodium	Na	%	0.01	10
Niobium	Nb	ppm	0.1	500
Nickel	Ni	ppm	0.2	10,000
Phosphorous	P	ppm	10	10,000
Lead	Pb	ppm	0.5	10,000
Rubidium	Rb	ppm	0.1	10,000
Rhenium	Re	ppm	0.002	50
Sulphur	S	%	0.01	10
Antimony	Sb	ppm	0.05	10,000
Scandium	Sc	ppm	0.1	10,000
Selenium	Se	ppm	1	1,000
Tin	Sn	ppm	0.2	500
Strontium	Sr	ppm	0.2	10,000
Tantalum	Ta	ppm	0.05	100
Tellurium	Te	ppm	0.05	500
Thorium	Th	ppm	0.2	10,000
Titanium	Ti	%	0.005	10
Thallium	Tl	ppm	0.02	10,000
Uranium	U	ppm	0.1	10,000
Vanadium	V	ppm	1	10 000
Tungsten	W	ppm	0.1	10,000
Yttrium	Y	ppm	0.1	500
Zinc	Zn	ppm	2	10,000
Zirconium	Zr	ppm	0.5	500



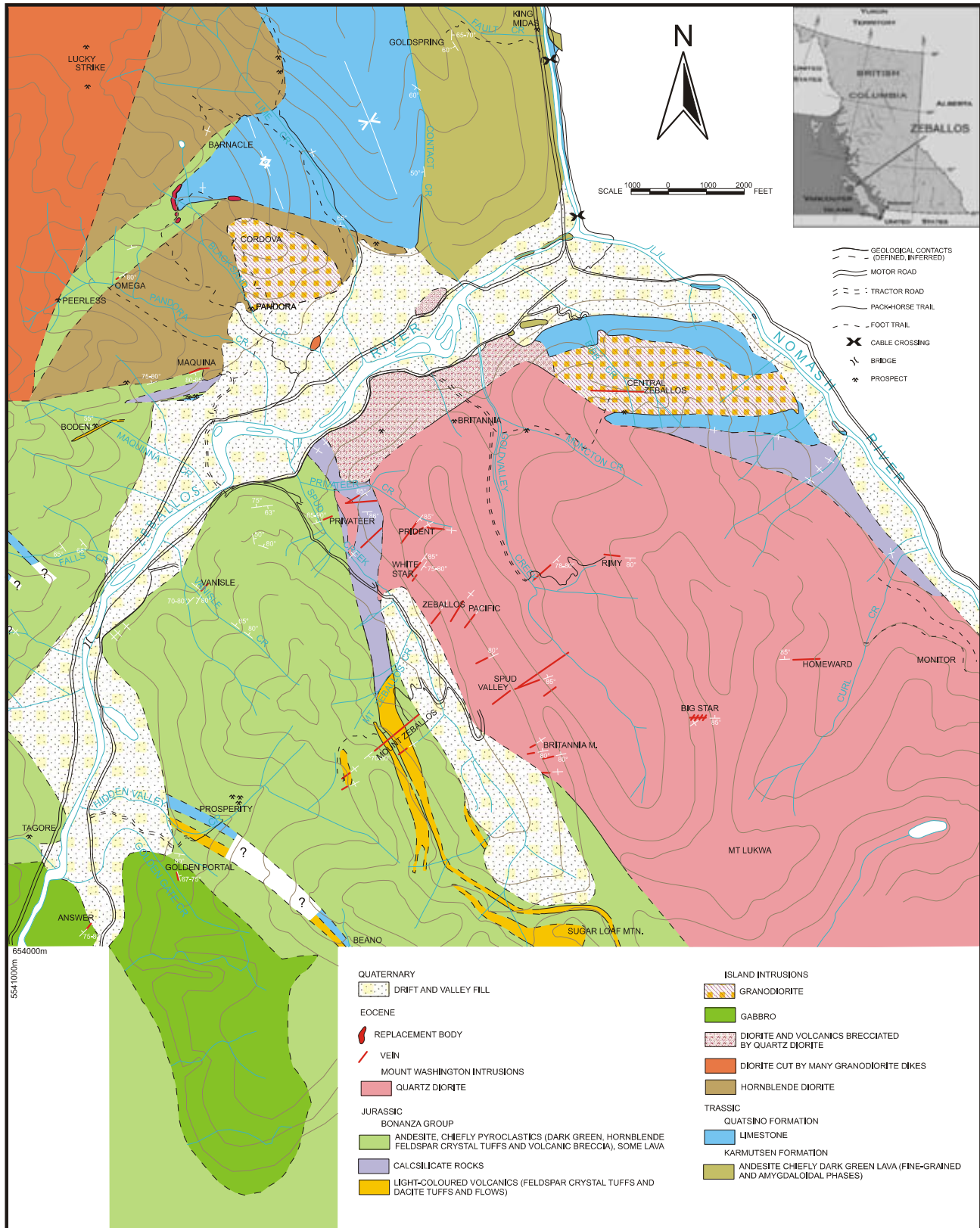


Figure 1. Geology of the Zeballos region (modified from Stevenson, 1950).

