

# **Prospecting Report Vanhall/VMS Property**

Alberni Mining Division  
Tenure Numbers:  
1048908, 1048909, 1048340, 1059229

NTS: 092E/16 and 092F/13

UTM Zone 10 (NAD 83)  
Easting 285020E  
Northing 5534500N

Work performed October 17, 2018 - March 04, 2019  
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June 02, 2019

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**Item 1: Summary**

The Vanhall and VMS properties consists of 4 claims (32 cells) covering an area of 656.64ha in one contiguous claim group. The claims cover the Vanhall, Weber West Vein, PF-2, OC 1-2, Della and the Chum Minfile showings located roughly 15km north-northeast of the community of Gold River on Vancouver Island in the Alberni Mining Division. The claims lie west of Strathcona Provincial park and straddle NTS mapsheets 092E/16 and 092F/13 and UTM zones 9 and 10. The centre of the property lies at 285000E, 5534500N UTM Zone 10U (Nad 83).

The area is accessed via active logging roads to an elevation generally less than 1000m above sea level giving excellent access for future exploration and development activities.

The majority of the property is underlain by grey-green weathering, quartz-calcite amygdaloidal basalt of the Upper Triassic Karmutsen Group. Regional 1:125,000 scale mapping (Muller, 1965) indicates that the property straddles the west limb of a NW-striking upright Anticline. The basalt sequence is cut by five distinct intrusive suites, which include: lamprophyre dykes; medium-grained, equigranular granodiorite dykes; strongly feldspar-hornblende porphyritic dykes of intermediate composition; a fresh, hornblende granodiorite stock of likely Early Cretaceous age; and a small, poorly exposed stock, or dyke, of dioritic composition near the north-west corner of the property.

Altered basalt in the main Horseshoe Creek valley (Vanstone Creek) is associated with very strong disseminated and vein pyrite mineralization. Chalcopyrite and molybdenite is observed sporadically throughout the altered basalt sequence. Both these minerals are most abundant in a series of 3-5 cm wide white quartz veins which are found along the southern and eastern margin of the area of altered basalt. Analytical values from bedrock sampling in the area of the present claims range up to 47% Fe, 0.9% Cu, 0.2% Zn, 0.02% Pb, 3.4g/t Au and 3.4g/t Ag. Several 10cm-60cm crudely banded semi-massive sulphide boulders/cobbles were discovered in Dahl (Della) and Silver creeks which drain the west side of the property. These boulders are comprised of varying quantities of pyrite, pyrrhotite, magnetite, chlorite, Fe-carbonate, quartz, epidote and chalcopyrite and grade up to 11.44% Cu, 43.6g/t Au, 85.8g/t Ag, 0.14% Zn, 1387ppm Co and 136ppb Pd.

Numerous minfile occurrences on the west side of Vanstone Creek note the presence of pyrrhotite as disseminations, lenses and in veins with pyrite, chalcopyrite and sphalerite in volcanic and intrusive rocks. Soil geochemical (B-horizon) surveys by Cominco north of Silver Creek have returned anomalous values in Cu to 844ppm, Co to 594ppm and Au to 95ppb. East of Vanstone Creek, Cominco completed two contour lines north of Harriet creek which returned a number of single station anomalies of Cu >100ppm. A single line was run south of Harriet creek on the eastern slopes in the area that the original 1972 surveys identified as being anomalous in multiple elements. This line returned wide areas of >100ppm and up to 303ppm Cu and 50ppb Au.

The current claims are 100% owned by the author in partnership with Ralph Keefe. It is the author's belief that previous exploration programs on the Vanhall/VMS property and surrounding area suggest a potential for VMS, polymetallic vein, skarn and potentially porphyry style mineralization. These programs also failed to adequately test this potential. Additional exploration in the form of geological, geophysical and geochemical surveys, mechanical trenching and drilling is warranted to determine if one or more economic mineralized bodies are present within the existing property boundaries.

## **Item 2: Introduction**

This report is being prepared by the author for the purposes of filing assessment on the Vanhall and VMS properties and to create a base from which further exploration will be completed.

### **2.1 Qualified Person and Participating Personnel**

Mr. Kenneth D. Galambos P.Eng. supervised the initial exploration program to assess certain target models developed during research on the project area in order to make recommendations to further test the economic potential of the area.

This report describes the property in accordance with the guidelines specified in National Instrument 43-101 and is based on historical information, an interpretation of technical and historical data and an initial prospecting program supervised by the author during the time period from October 17-20, 2018.

### **2.2 Terms, Definitions and Units**

- All costs contained in this report are denominated in Canadian dollars.
- Distances are primarily reported in metres (m) and kilometers (km) and in feet (ft) when reporting historical data.
- GPS refers to global positioning system.
- Minfile showing refers to documented mineral occurrences on file with the British Columbia Geological Survey.
- The term ppm refers to parts per million, equivalent to grams per metric tonne (g/t).
- ppb refers to parts per billion.
- The abbreviation oz/t refers to troy ounces per imperial short ton.
- The symbol % refers to weight percent unless otherwise stated. 1% is equivalent to 10,000ppm.
- Elemental and mineral abbreviations used in this report include: arsenic (As), copper (Cu), gold (Au), iron (Fe), lead (Pb), molybdenum (Mo), zinc (Zn), chalcopyrite (Cpy), molybdenite (MoS<sub>2</sub>) and pyrite (Py).

### **2.3 Source Documents**

Sources of information are detailed below and include the available public domain information and private company data.

- Research of the Minfile data available for the area at <http://www.empr.gov.bc.ca/Mining/Geoscience/MINFILE/Pages/default.aspx>
- Research of mineral titles at <https://www.mtonline.gov.bc.ca/mtov/home.do>

- Review of company reports and annual assessment reports filed with the government at <http://www.empr.gov.bc.ca/Mining/Geoscience/ARIS/Pages/default.aspx>
- Review of geological maps and reports completed by the British Columbia Geological Survey at <http://www.empr.gov.bc.ca/Mining/Geoscience/MapPlace/MainMaps/Pages/default.aspx> .
- Published scientific papers on the geology and mineral deposits of the region and on mineral deposit types.

#### **2.4 Limitations, Restrictions and Assumptions**

The author has assumed that the previous documented work in the area of the property is valid and has not encountered any information to discredit such work.

#### **2.5 Scope**

This report describes the geology, previous exploration history, interpretation of regional geophysical and geochemical surveys and an initial prospecting and sampling program completed on the claims. Research included a review of the historical work that related to the immediate and surrounding areas. Regional geological data and current exploration information have been reviewed to determine the geological setting of the mineralization and to obtain an indication of the level of industry activity in the area. The current exploration program consisted an initial prospecting and sampling program completed on the claims in mid-October, 2018.

#### **Item 3: Reliance on Other Experts**

Some data referenced in the preparation of this report was compiled by geologists employed by various companies in the mineral exploration field. These individuals would be classified as “qualified persons” today, although that designation did not exist when some of the historic work was done. The author believes the work completed and results reported historically to be accurate but assumes no responsibility for the interpretations and inferences made by these individuals prior to the inception of the “qualified person” designation.

#### **Item 4: Property Description and Location**

The Vanhall and VMS property consists of 4 claims (32 cells) covering an area of 656.64ha in one contiguous claim group lying approximately 15km north-northeast of the community of Gold River on Vancouver Island in the Alberni Mining Division. The claims lie west of Strathcona Provincial park and straddle NTS mapsheets 092E/16 and 092F/13. The centre of the property lies at 285020E, 5534500N UTM Zone 10U (Nad 83).

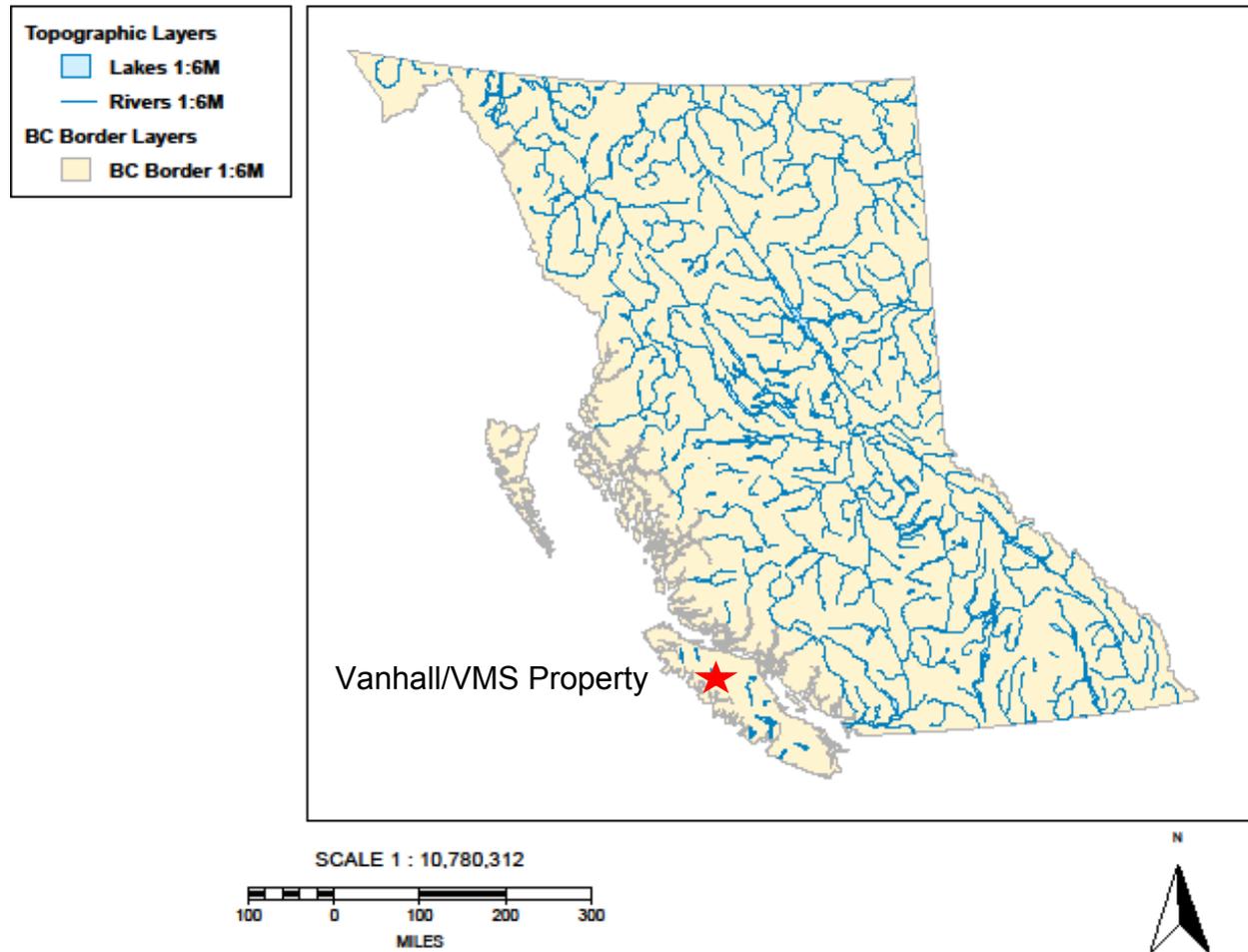


Figure 1: Vanhall/VMS Property location map

Upon acceptance of this report, the highlighted mineral tenures will have their expiry dates moved to February 04, 2022.

Table 1: Claim Data

Tenure #	Claim name	Issue date	Expiry date	Area in Hectares	Owner
1048908	Vanhall	2017/jan/03	2022/Feb/04	83.22	Galambos, Kenneth D 100%
1048909		2017/jan/03	2022/Feb/04	240.65	Galambos, Kenneth D 100%
1048340		2017/jan/03	2022/Feb/04	20.8	Galambos, Kenneth D 100%
1059229		2018/mar/10	2022/Feb/04	<u>311.97</u>	Galambos, Kenneth D 100%
				656.64	

The claims comprising the Vanhall and VMS property as listed above are being held as an exploration target for possible hardrock mining activities which may or may not be profitable. Any exploration completed will be subject to the application and receipt of necessary Mining Land Use Permits for the activities recommended in this report. There is no guarantee that this application process will be successful.

The Claims lie in the Traditional territories of a number of local First Nations and to date no dialog has been initiated with these First Nations regarding the Property. There is no guarantee that approval for the proposed exploration will be received.

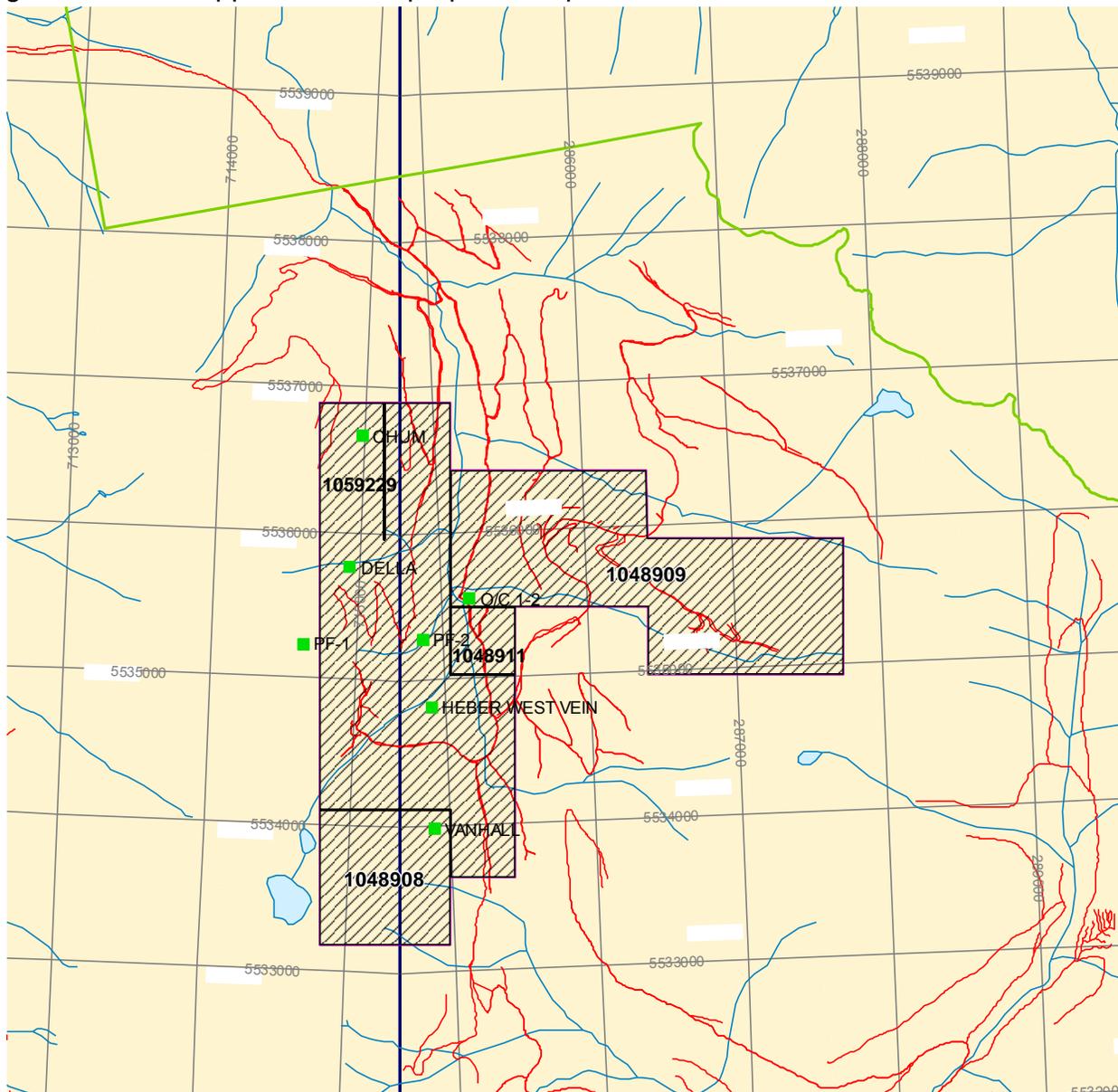


Figure 2: Vanhall/VMS Project Claim Map

#### **Item 5: Accessibility, Climate, Local Resources, Infrastructure and Physiography**

Access into the Vanstone Creek area is via logging roads which leave Provincial Highway 28 at a point roughly 7km northeast of the community of Gold River on Vancouver Island. Logging roads parallel the east side of Saunders Creek and loop to the east before entering the Horseshoe (Vanstone) Creek valley. Access currently extends past the headwaters of Vanstone Creek and to the upper reaches of Heber Creek.

These roads are usable during spring to fall, but are not reliably maintained when snow-covered.

The Gold River area has a Marine west coast climate with warm dry summers and mild rainy winters. Most precipitation falls as rain but snow is not uncommon in the winter months. The average annual precipitation is 2,851.1mm.

Table 2: Climate Data 1981-2010

Climate data for Gold River

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C	16.0	19.0	24.0	31.5	37.0	37.0	38.5	39.0	37.0	27.0	17.0	12.8	39.0
Average high °C	4.7	7.2	10.4	14.2	18.3	21.3	24.9	25.4	21.8	13.8	7.1	3.9	14.4
Average low °C	-0.6	-0.7	0.8	2.7	5.9	8.9	10.9	10.8	7.8	4.9	1.7	-0.7	4.4
Record low °C	-19.0	-14.0	-11.0	-5.0	-2.0	1.0	2.5	4.0	-2.0	-8.0	-17.0	-17.0	-19.0
Average precipitation mm	424.1	286.4	266.3	186.6	120.2	90.9	55.5	71.1	109.2	358.8	490.9	391.0	2,851.1

Source: Environment Canada

Vegetation consists of tall stands of conifers with significant portions of the immediate claim area having seen recent logging, even more so than as seen in the 2011 imagery below. The claim group lies in the Horseshoe Creek Valley with an elevation between 600 and 1400m.



Plate 1: Satellite Image of Vanhall/VMS Project

Infrastructure adequate for mine development is present in the region. A residential capacity power line follows Highway 28 between Campbell River and Gold River and lies 9km to the southeast. The lower-relief areas in the Horseshoe(Vanstone) Creek and Heber Creek valleys contains adequate space for concentrator site, tailing ponds or waste dumps required in any contemplated mine operation. The communities of Campbell River and Gold River contain adequate accommodation and basic services to support a mining operation. They also contain industrial and consumer suppliers, and a pool of labour skilled in logging, mining trades and professions.

#### **Item 6: History**

**1969:** The Vanhall property was explored by Moresby Mines Ltd., under the direction of David Arscott. At that time, the owners were Edward Vanstone and William Hall, both of Campbell River, B.C. Except for prospecting, there was no record of any previous geological work. Arscott noted outcrops of volcanics, with dykes and pods of granodiorite. The volcanics vary from andesite, with amygdaloidal and fragmental varieties, to basalt. The diorites contain 10 to 25% hornblende, and up to 10% pink feldspar. Lamprophyre dykes are present, of approximately andesitic composition. Alteration consists of silicification with locally developed epidote and calcite. Mineralization consists of consistent and almost continuous pyritization, in amounts of from 1 to 10% over an area 3500ft long by 1000ft wide. Associated with this are erratic copper assays with occasional silver values. Rock samples analysed had up to 1.72% copper and 0.95 opt silver. (Arscott, 1969)

**1972:** Moresby Mines Ltd. returned to the Vanhall property and completed a 548 sample geochemical survey over the 40 claims. Mainly B-horizon samples were collected and analysed for nine elements. Strongly-anomalous copper, cobalt, iron and manganese and smaller nickel, silver and molybdenum anomalies occur on the soil grid. Geological mapping noted that extensive fracturing is evident over a length of some 3,000 feet along Vanstone Creek and extends up most of the tributaries. Coarse brecciation occurs near the Hall Creek confluence and also on a tributary of Della Creek. As well as the strongly pyritic mineralization found on Vanstone Creek, high grade chalcopyrite was noted over in a zone 8ft x 50ft. The mineralization consisted of 3% chalcopyrite disseminated in silicified andesite and in a dacite porphyry dyke. A rough chip sample (DA-2) returned a value of 2.06% Cu, 1.37g/t Au and 2.06g/t Ag/8ft. A 14" wide massive sulphide boulder was discovered in Silver Creek (PF-2) which assayed 43.6g/t Au, 85.8g/t Ag, 11.44% Cu and 0.14% Zn. Numerous other bedrock and float showings were located. (Arscott, 1972).

**1980:** The Vanhall property was explored by Eastern Leaseholds Ltd. and reported by A.F. Roberts, P.Eng.. Additional soil sampling outlined a strong molybdenum anomaly, at the north end of the previous grid, 1200ft x 1600ft in size and open in several directions. Copper anomalies were also noted on the northernmost line. (Roberts, 1980)

**1981:** Eastern Leaseholds Ltd. commissioned an 88 line-km helicopter airborne magnetic and electromagnetic over the claim group in search of massive sulphide targets in an effort to identify the source of the reported geochemical anomalies, and to

pursue the possibility of a low-grade, large tonnage ore body in the area. The survey did not record any striking anomalies directly indicative of mineralization however, one area has been identified from the magnetic data where further investigation is recommended. This anomaly is noteworthy in that it shows uniformity over a strike of a kilometer or more, it is contiguous and subparallel to an apparent structural weakness along Vanstone Creek and it is coincident, in part, with Cu, Co, Mo anomalies on the east side of Vanstone Creek. The magnetic feature may represent a zone of increased magnetite or pyrrhotite in a fault zone where the rocks have been enriched by the nearby intrusive rocks. The anomaly lies south of and terminates at Harriet Creek. (Sheldrake, 1981)

**1994:** Cominco staked the Chumming property over approximately the same area as Eastern Leaseholdings. Cominco noted that ***“the Karmutsen basalt sequence is cut by five distinct intrusive suites, at least three of which are associated with significant pyrite+/-chalcopyrite mineralization”***. Cominco personnel completed several traverses and contoured soil sample lines adjacent to some new logging roads. Many samples are moderately to strongly anomalous for copper, and some rocks have strongly anomalous nickel and cobalt, elevated copper (to 844 ppm.), cobalt (to 594 ppm.), molybdenum (to 15 ppm.), iron (to 10.49%), gold (to 95 ppb.) and manganese (to 7023 ppm.) values. The silt samples show similar anomalies. Cominco concluded ***“A significant area of altered and weakly Cu-Mo mineralized Karmutsen basalt occurs within the Horseshoe Creek drainage. Porphyry-style mineralization and alteration appear to be related to a swarm of Cretaceous (?) granodiorite and feldspar porphyry dykes observed mainly within Horseshoe Creek itself. Cu-Mo mineralization is best developed along the southern and eastern margins of this zone. The semi-massive sulphide boulders located in drainages along the west side of the property, and results of the soil/silt sampling program in this area, suggest the presence of a second style of mineralization on the property”***. They recommended that future work on the property concentrate on defining the limits of the known porphyry mineralization in the valley bottom and on locating the source of the semi-massive sulphide boulders along the western side of the property.

**1995:** Cominco collected 85 chip samples (rock) from two areas, OC 1 and OC2 Area O/C 1 is located along a west-flowing tributary on the east side of Horseshoe Creek near the southern end of the current road access to the property. Here several feldspar-hornblende dykes cut strongly fractured and biotite-altered volcanic rocks. Ten to fifteen percent pyrite, with minor chalcopyrite and molybdenite, is present mainly as disseminations and fracture coatings. Twenty, five metre chip samples were obtained from this area averaging 288 ppm Cu and 11 ppm Mo. Sixty-five, three metre chip samples were obtained from area O/C 2. As at location O/C 1, this is an area of very strong fracturing, abundant pyrite mineralization and moderate to strong biotite alteration. Both feldspar-hornblende porphyry and granodiorite dykes are present in area O/C 2. The chip samples averaged 215 ppm Cu, 5 ppm Mo and 25.6 ppb Au. Cominco concluded: ***The 1995 work program on the Chumming property successfully located and better defined the central portion of a moderately strong magnetic high previously indicated by airborne data. This magnetic high is coincident with the up-slope cut-off of prominent Cu-Mo-Co-Au soil anomalies on***

***the north-western portion of the property. Numerous semi-massive to massive magnetite and pyrrhotite-bearing boulders encountered on the property are characterized by the same metal suite as the soil anomalies mentioned above.***

***Additional ground geophysics and target testing is recommended.*** The company completed additional ground magnetic, horizontal loop electromagnetic (HLEM) and geochemical surveys in the northwest portion of the property. Three bedrock samples of basalt with minor fracture filling sulphides returned values to 864ppm Cu and 203ppm Pb at the location of the magnetic high anomaly on the west side of Vanhall Creek. The limited HLEM survey did not reveal any strong conductors. Cominco completed two contour lines north of Harriet creek on the east side of Vanstone Creek which returned a number of single station anomalies of Cu >100ppm. A single line was run south of Harriet creek on the eastern slopes in the area that the original 1972 surveys identified as being anomalous in multiple elements. This line returned wide areas of >100ppm and up to 303ppm Cu and 50ppb Au.

**2011:** Universal Ventures conducted preliminary exploration on claims optioned from Bill Howell, P.Geo. and Barry Price, P.Geo.. The company collected fourteen rock samples, including eight chip samples from the Vanhall area. Select samples returned values up to 5842ppm Cu from logging roads near Hall Creek while chip sampling from east of the confluence of Hall Creek with Vanstone Creek returned values of up to 365ppm Cu and 102.9ppb Au/2m. Universal also completed a 576.26line-km high-resolution magnetic and radiometric airborne geophysical survey over their TIB property. Magnetic survey plots included: Residual Magnetic Field and Calculated Vertical Gradient. Radiometric plots included: Total Count, potassium K (cps), uranium U (cps), and thorium Th (cps). No interpretation of the airborne survey was completed.

**2012:** Universal Ventures commissioned an interpretation report for the airborne survey flown the previous year. 2D Plan Mapping shows that the area is dominated by a large number of weak, short strike-length magnetic trends that strike NW, particularly in the northwestern and western sections of the map. Most of these magnetic trends coincide with topography; with highs following ridges and lows following valleys. This response is typical when a nearly flat-lying geological unit underlies mountainous terrain. Both the topography and the magnetic trends reflect a northwesterly striking geology.

The display also reveals several linear trends that cross topography. One of the most dominant of these trends strikes N30°E across the west-central portion of the map. The Vanhall mineral showing is located where one of these major structures intersects an interpreted northerly trending fault. Interpreted faults are shown with zigzag lines in Figure 3 below.

The magnetic data also outlines several strong magnetic anomalies that form semicircular features. 3D magnetic inversions show that these anomalies likely originate from pipe-like ellipsoidal bodies that extend from surface to depth and are interpreted as possible intrusions. Several of these anomalies with both magnetic high and low intensities (shown with dashed lines) are located approximately 2 km east of the Vanhall showing. One of the anomalies coincides with geologically mapped occurrence of the

Island Plutonic Suite of granodioritic intrusive rocks. The magnetic data suggests these intrusions are smaller than the outlines presented on the geology maps. A large number of small, isolated magnetic highs with very limited depth extent are scattered across the area. Many of these are located along the topographic ridges and may be part of the background trends but several are found partway down the slopes or oriented at oblique angles to the local topography. These features exhibit a characteristic signature of magnetic skarns or other such localized pods of high susceptibility material. The suspected skarn occurrences are noted below.

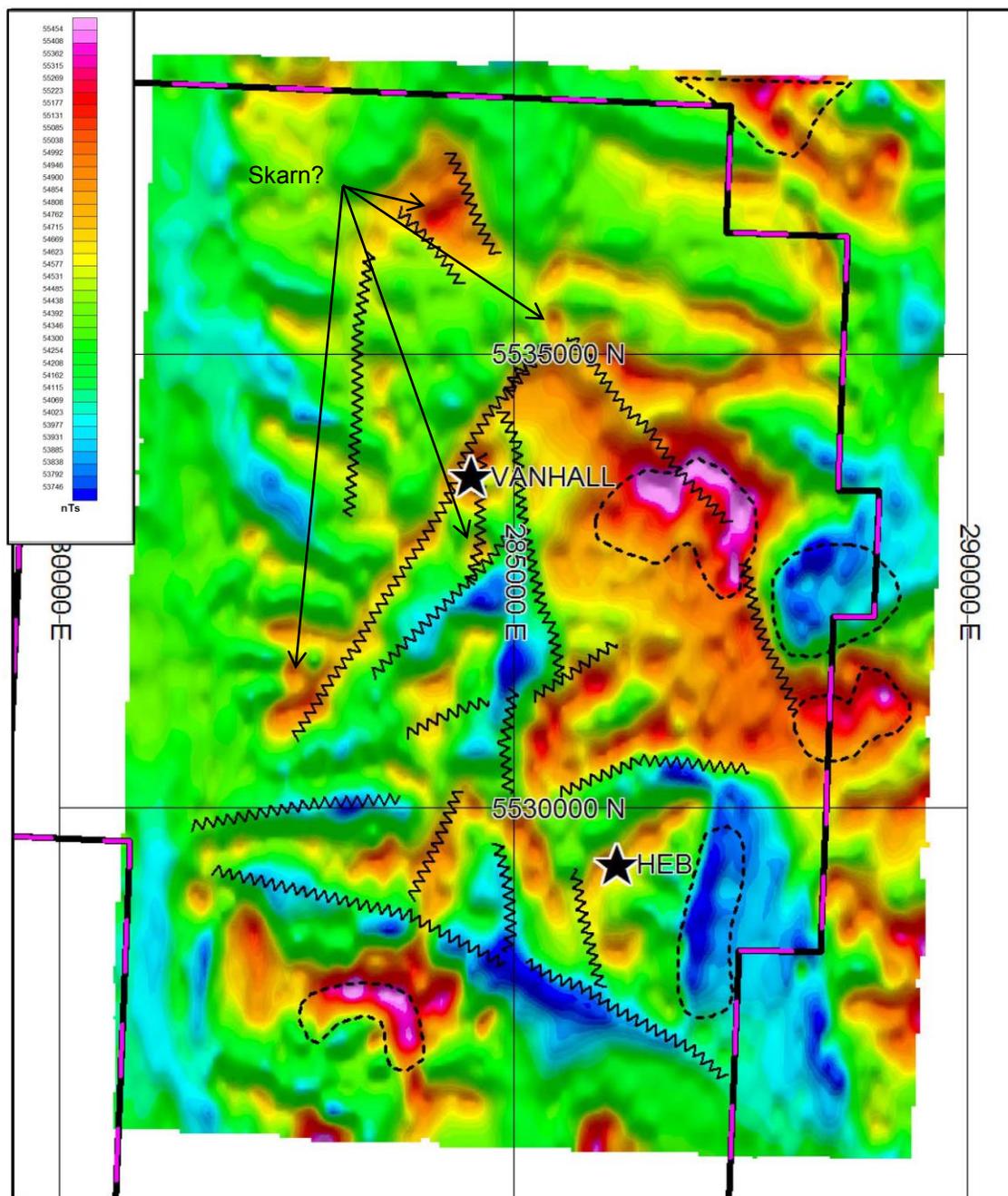
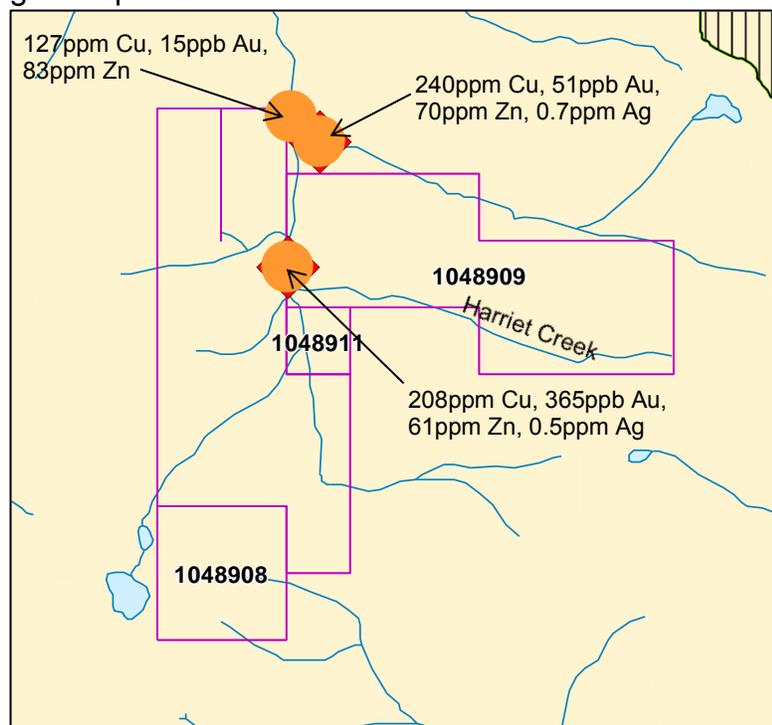


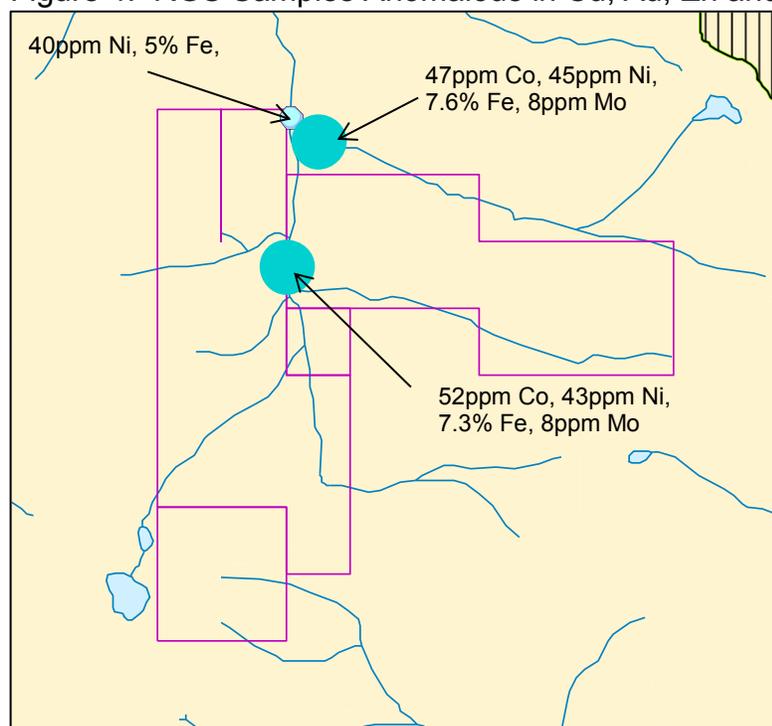
Figure 3: Total Magnetic Field Intensity Colour Contour Map (Linear Color Distribution) Shadow Enhanced with illumination from South

**2017:** A review and interpretation was completed by the author of all public domain data including Regional Geochemical Survey (RGS) data to determine drainages containing anomalous elements commonly associated with VMS or porphyry copper-gold deposits.



Review of RGS data show that the Vanhall/VMS claim area is highly anomalous in copper, gold, zinc and silver from three samples near the central and northern parts of the claim group. Two of the samples were taken from Vanstone Creek at points immediately downstream of an unnamed creek draining the northern edge of tenure 1048909 and downstream of the confluence with Harriet Creek. The third sample was collected from the northern unnamed creek

Figure 4: RGS Samples Anomalous in Cu, Au, Zn and Ag



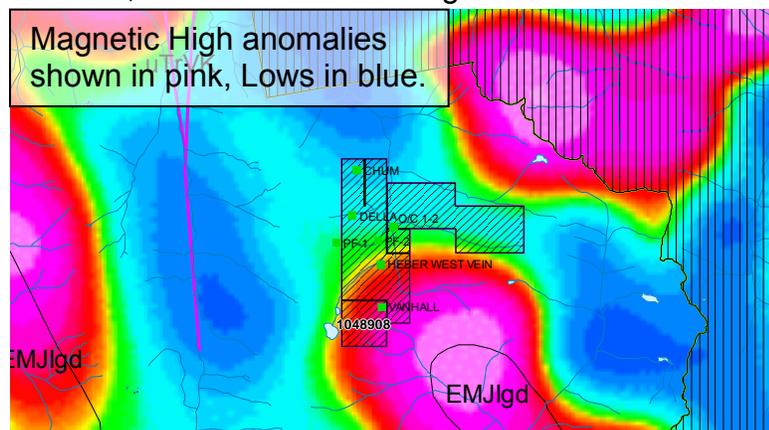
It should be noted that none of the western creeks were sampled during the Government sampling program. Numerous Minfile occurrences are documented for mineralized showings on Hall, Silver, Della and Chumming Creeks on the west side of Vanstone Creek.

The same sample sites also returned anomalous and highly anomalous values in cobalt, nickel, iron and molybdenum,.

Figure 5: RGS Samples Anomalous in Co, Ni, Fe and Mo

An interpretation of the regional geophysical surveys was completed to assess the claim area for magnetic anomalies. A review of the historical geochemical surveys was completed to evaluate potential trends to mineralization. Finally a detailed magnetic survey was flown over the property by Universal Ventures of Vancouver as part of a larger survey completed over their TIB property which covered the area now known and the Vanhall/VMS project. While the airborne survey was subject to a previous interpretation report dated 2012, this report failed to correlate much of the historic exploration in the Vanhall area including the extensive soil geochemical surveys completed over much of the property. Considerable time was spent reviewing the airborne survey data, the various geochemical and geological surveys and possible structural complications in an effort to reconstruct the geological and mineralogical history for the area. The primary focus for the exercise was to determine if there was potential for copper-cobalt rich Besshi Volcanic Massive Sulphide or Noranda/Kuroko VMS deposits within the present claim group. A secondary focus was for Porphyry Cu-Au targets associated with the intrusive activity present in the area.

The Government sponsored regional magnetic survey, 1<sup>st</sup> Vertical Derivative (1<sup>st</sup> VD) map shows a strong magnetic high anomaly associated with an oblong, Early to Middle Jurassic, Island Plutonic Suite granodioritic intrusion situated to the southeast of the



property. The intrusion has likely been emplaced along an earlier northwest trending deep-seated fault. A second magnetic high anomaly is shown to the north of the property, in Strathcona Park to the northwest, and is probably a similar aged and composition intrusion which has not been mapped.

Figure 6: Regional 1<sup>st</sup> VD Magnetic map

A review of the original 1972 Moresby Mines Ltd. and the mid-1990's Cominco Ltd. geochemical surveys reveals a good correlation with data despite survey lines being more or less perpendicular to each other. Soil values were believed to reflect underlying bedrock mineralization with some degree of glacial transport from the north to the south and possible minor soil creep due to steep topography.

The earlier 1972 survey, with lines run east-west, shows a strong north northwest trend to the strongly anomalous, >200ppm Cu (red dots, red lines) in the northern half of the grid. This parallels the suspected deep-seated faulting that may have been responsible for the emplacement of the Jurassic aged granodiorite intrusion located to the southeast and mentioned in the previous section. The moderately anomalous >100ppm but <200ppm Cu (blue dots, blue polygons) shows a more complicated picture with both northeast and northwest trends which may reflect later structures which crosscut the

previously emplaced mineralized zones. The copper in soils anomalies located in the southeast corner of the 1972 grid are difficult to explain and appear like beads on a string, one above the other within a fairly narrow zone where good mineralization (2.06% Cu, 1.37g/t Au and 2.06g/t Ag/8ft.) was found disseminated in silicified andesite and in a dacite porphyry dyke. One possible explanation for this pattern could be a series of northeast trending left-lateral faults which have shuffled north-south trending mineralization into its present position.

The Cominco survey to the north suggests both a north northwest trend similar to the earlier survey and an east-west trend to the copper-in-soil anomalies. The east-west anomalous trend may simply be due to solifluction or soil creep. The uphill edge to anomalous soils was found to coincide with a strong magnetic high anomaly which may represent a larger buried intrusion to what has been located in the general area. See ARIS 37381 for a more detailed view of the two historical surveys.

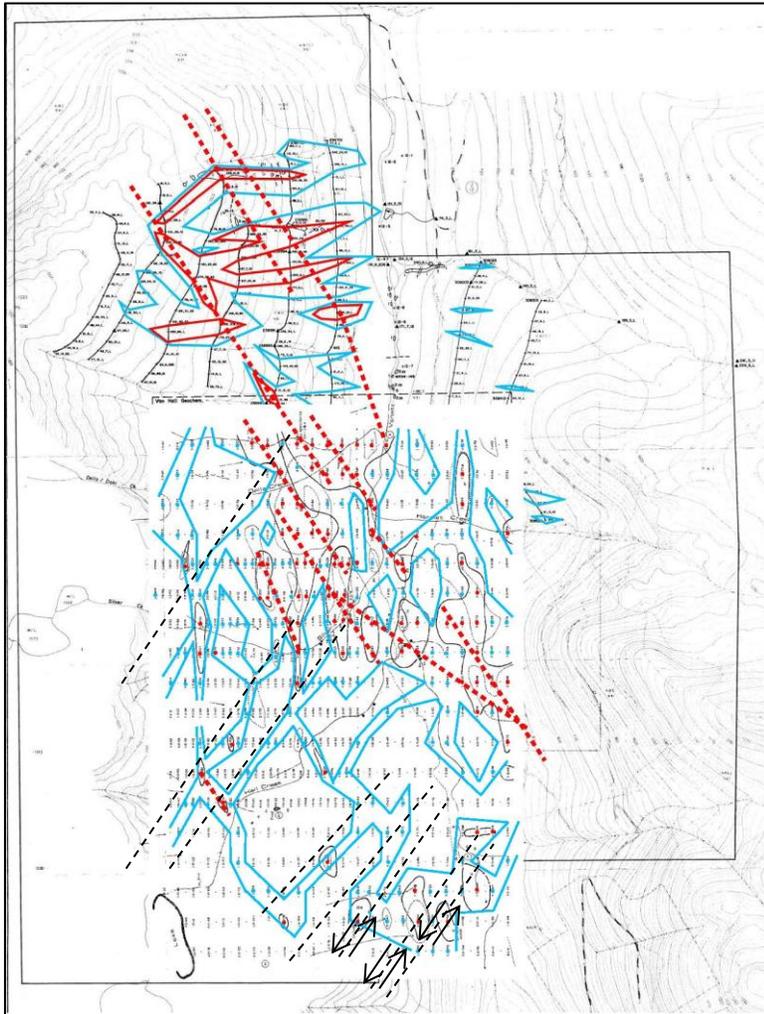


Figure 7: Historical Copper in B-Horizon Soils

A review of the Calculated Vertical Gradient Magnetics reveals a number of linear and bullseye magnetic high features which may represent pyrrhotite rich layers or lenses of massive sulphide mineralization. The initial VMS target is shown in the black oval below and lies between the geochemically anomalous unnamed creek and Harriet Creek on the east side of Vanstone Creek. This magnetic anomaly is approximately 300m wide and in excess of 3000m in strike length. If Vanstone Creek is the surface expression of a north trending normal fault, the east side is proposed to have been down-dropped bringing the potentially mineralized volcanics to the same elevation as the intrusion and associated soil geochemical anomalies on the west side of the creek. The smaller bullseye magnetic anomaly covered by the single cell claim lies in the same area as noted in the 1981 airborne magnetic survey which parallels to the east, the mineralization sampled in the Minfile OC1 and OC2 showings.

The linear magnetic high anomaly noted in the blue rectangle is the northeast end of a 5000m long anomaly which is interpreted as a fault. The orientation is similar to the proposed left-lateral faulting suspected of offsetting mineralization in the southeast corner of the current claim block. See previous section for details. The magnetic high anomaly in the northwestern parts of the property is the same outlined by Cominco Ltd. in the mid-1990s and is thought to be a buried intrusion. Samples of mineralized basalt from the most magnetic point in the anomaly returned values up to 864ppm Cu and 203ppm Pb. The soil geochemical anomalies located by Cominco terminate at the eastern edge of the intense magnetic anomaly. See ARIS 37381 for a more detailed view of the full aeromagnetic survey covering the VMS target.

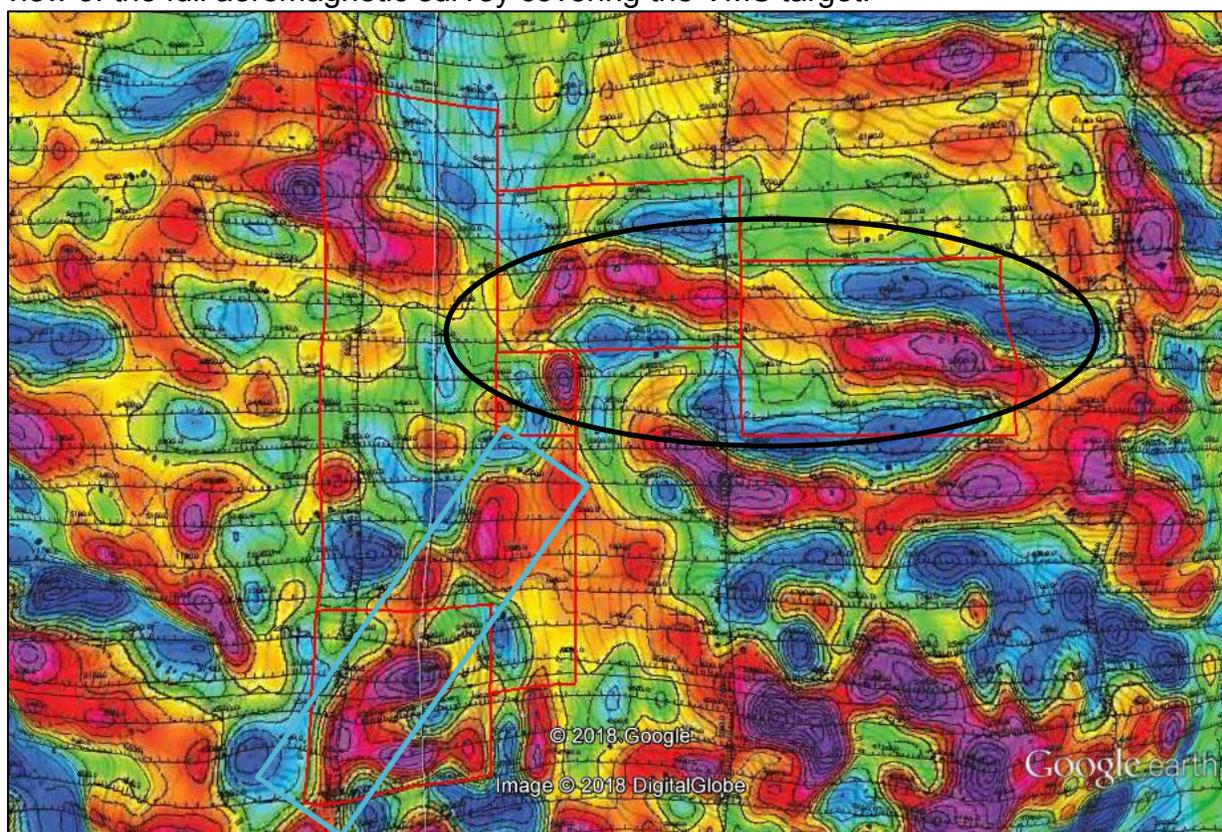


Figure 8: Calculated Vertical Gradient Magnetic Plot from 2011 survey

## Item 7: Geological Setting and Mineralization

### 7.1 Regional Geology

The Central Vancouver Island area is comprised of volcanic rocks of the Upper Permian Sicker or Vancouver Group (dominantly Karmutsen volcanics) and Eocene porphyritic intrusives. The volcanic suite consists of basalts, andesitic flows, tuff breccias and agglomeratic rocks that are locally weakly hornfelsed near the intrusive contacts. These lithologies are in fault contact with diorites of the Westcoast Complex. All of the older units were intruded by Jurassic age quartz monzonite sills and dykes. The entire assemblage was subsequently intruded by several phases of the Tertiary Intrusive Suite, which consist of porphyritic quartz diorite/granodiorite stocks (McDougall, 1976 Muller, 1981; and Nilsson, 2001).

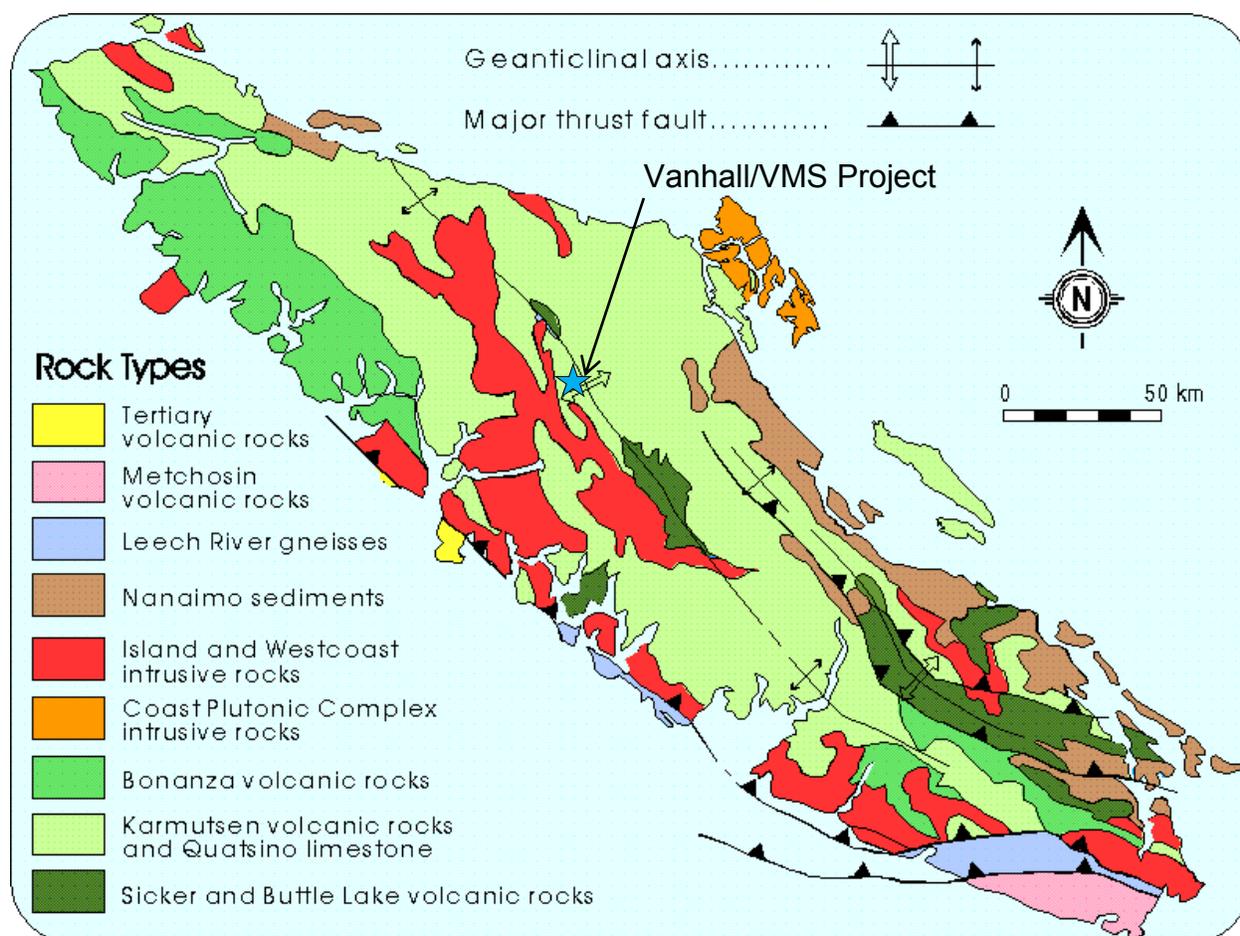


Figure 9: Vancouver Island simplified regional geology (from BCGS 1999)

### 7.2 Property Geology (from Wagner 1994)

Outcrop on the property is mainly limited to steep-sided exposures in Horseshoe Creek and its tributaries. Hillside exposures are present in some of the steeper areas. The majority of the property is underlain by grey-green weathering, quartz-calcite amygdaloidal basalt of the Upper Triassic Karmutsen Group. Regional 1:125,000 scale

mapping (Muller, 1965) indicates that the property straddles a NW-striking upright Anticline. Little in the way of top indicators or bedding measurements are available on the property. One bedding measurement from just north of the property, however, exhibited a similar strike to that indicated by Muller ( $138^{\circ}$ ) and a shallow south-westward dip.

The Karmutsen basalt sequence is cut by five distinct intrusive suites, which include; lamprophyre dykes, medium-grained, equigranular granodiorite dykes, strongly feldspar-hornblende porphyritic dykes of intermediate composition, a fresh, hornblende granodiorite stock of likely Early Cretaceous age and a small, poorly exposed stock, or dyke, of dioritic composition near the north-west corner of the property. At the north end of the property numerous less than one metre wide, fine-grained lamprophyre dykes were observed cutting unaltered Karmutsen basalt. The lamprophyre dykes typically trend  $015-020^{\circ}$ .

Within the main Horseshoe Creek valley two dyke suites cross-cut an area of strongly fractured, pyritic, chlorite+biotite-altered Karmutsen volcanics. The first are a series of medium-grained, equigranular granodiorite dykes ranging in width from 3 to 15 metres. These dykes are typically comprised of 15-20% chlorite-altered biotite, 5-10% quartz, 5% fine-grained pyrite and 65-75% feldspar. The granodiorite dykes are oriented between  $90$  and  $120^{\circ}$  and dip steeply to the south and north.

The second dyke suite cross-cutting strongly altered Karmutsen rocks in Horseshoe Creek is a series of 2-5 metre wide, strongly feldspar-hornblende porphyritic dykes of intermediate composition. The fine-grained matrix to these dykes is typically grey weathering and hosts 10-15% medium-grained crystals of white weathering plagioclase and 1-2% medium-grained hornblende. These feldspar porphyry dykes are commonly strongly fractured. Both the porphyry and granodiorite dykes are cross-cut by quartz-pyrite-chlorite +/- chalcopyrite veins. No cross-cutting relationships were observed between the two dyke suites.

Near the southern boundary of the property altered Karmutsen volcanic rocks are intruded by a fresh, hornblende granodiorite. The granodiorite is characterized by 10-15% medium-grained hornblende, 5-7% quartz, 2-3% biotite and 1-2% magnetite, making the rock moderately magnetic. Mafic xenoliths are abundant and minor potassium feldspar-epidote alteration is observed along the contact. Muller maps the southeastern extension of this stock as being part of the Jura-Cretaceous coast intrusion suite.

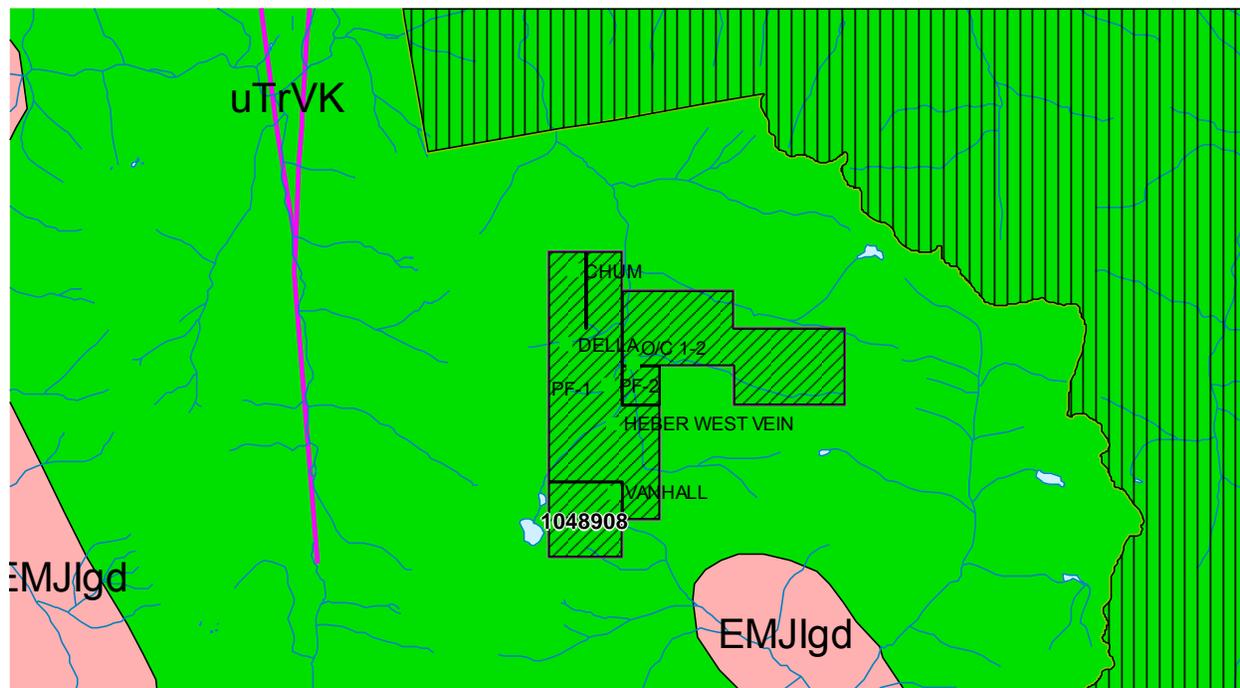


Figure 10: Property Geology.

### 7.3 Mineralization (from Wagner 1994)

A significant area of biotite-chlorite altered and pyrite mineralized Karmutsen is exposed in the main Horseshoe Creek drainage on the property. The altered basalts are characterized by strong fracturing, with fractures typically filled by narrow quartz-pyrite-chlorite veins, strong to locally intense fine-grained biotite and lesser chlorite alteration and up to 15% disseminated pyrite. Minor epidote and hematite alteration is also present throughout. The altered area is spatially related to the occurrence of the granodiorite and porphyry dyke suites described above and alteration is frequently most intense for 2-3 metres around individual dykes. In several instances small breccia bodies (to 3 metres) have formed adjacent these dykes. Pyrite mineralization occurs throughout the altered area as described above. The pyrite is typically fine to medium-grained and is occasionally haloed by chlorite. Chalcopyrite is observed molybdenum. Both these metals are most abundant in a series of 3-5 cm wide white quartz veins which are found along the southern and eastern margin of the area of altered basalt. Several 10-60 cm semi-massive sulphide boulders/cobbles were discovered in Dahl and Silver creeks which drain the west side of the property. These boulders are comprised of varying quantities of pyrite, pyrrhotite, magnetite, chlorite, Fe-carbonate, quartz, epidote and chalcopyrite. Analysis of these boulders returned elevated copper, silver, nickel, zinc, cobalt and gold values.

Numerous minifile occurrences on the west side of Vanstone Creek note the presence of pyrrhotite as disseminations, lenses and in veins with pyrite, chalcopyrite and sphalerite in volcanic and intrusive rocks

**Item 8: Deposit Types**

The economically-important mineral occurrences in the general area are the Noranda/Kuroko massive sulphide Cu-Pb-Zn deposits similar to the Myra Falls deposits located 148km to the northwest of the Property and the porphyry copper-molybdenite-gold deposits associated with the Early to Middle Jurassic Island Plutonic Suite intrusions such as at the Catface Developed Prospect 153km to the west-northwest, both of which are situated in similar rocks to the property. A number of Minfile showings to the north and southeast of the property exhibit mineralization thought to be Besshi massive sulphide deposit types. Of secondary importance would be copper magnetite skarn deposits such as at the former Alpha Beta mine (Minfile 092C 039) located near Lake Cowichan and polymetallic vein deposits.

**8.1 Noranda/Kuroko Massive Sulphide Cu-Pb-Zn deposits**

According to Høy (2005) Noranda/Kuroko Massive Sulphide Cu-Pb-Zn deposits are characterized by one or more lenses of massive pyrite, sphalerite, galena and chalcopyrite commonly within felsic volcanic rocks in a calcalkaline bimodal arc succession. The lenses may be zoned, with a Cu-rich base and a Pb-Zn-rich top; low-grade stockwork zones commonly underlie lenses and barite or chert layers may overlie them. The tectonic setting is that of an Island arc, typically in a local extensional setting or rift environment within, or perhaps behind, an oceanic or continental margin arc.

The depositional environment is typically associated with marine volcanism and commonly during a period of more felsic volcanism into an andesite (or basalt) dominated succession. Mineralization is locally associated with fine-grained marine sediments and is also associated with faults or prominent fractures.

Individual deposits consist of concordant massive to banded sulphide lens which is typically metres to tens of metres thick and tens to hundreds of metres in horizontal dimension; The ore horizon grades laterally and vertically into thin chert or sediment layers called informally "exhalites". Sometimes there is a peripheral apron of "clastic" massive sulphides; underlying crosscutting "stringer" zone of intense alteration and stockwork veining. The zones typically consist of an upper massive zone of pyrite, sphalerite, galena, chalcopyrite, pyrrhotite, tetrahedrite-tennantite, bornite and arsenopyrite. Lower massive zones contain pyrite, chalcopyrite, sphalerite, pyrrhotite and magnetite. Gangue mineralogy consists of barite, chert, gypsum, anhydrite and carbonate near top of lenses and carbonate, quartz, chlorite and sericite near the base. Footwall alteration pipes are commonly zoned from the core with quartz, sericite or chlorite to an outer zone of clay minerals, albite and carbonate (siderite or ankerite).

The deposits typically have geochemical signatures including Zn, Hg and Mg halos, K addition and Na and Ca depletion of footwall rocks, Cu, Ag, As, Pb in closer proximity to the deposit and Cu, Zn, Pb, Ba, As, Ag, Au, Se, Sn, Bi and As within the deposit.

Geophysical signatures of the sulphide lenses usually show either an electromagnetic or induced polarization signature depending on the style of mineralization and presence

of conductive sulphides. In recent years borehole electromagnetic methods have proven successful.

In British Columbia these deposits are typically Devonian and less commonly Permian-Mississippian, Late Triassic, Early (and Middle) Jurassic, and Cretaceous. Average deposit size is 1.5 Mt containing 1.3% Cu, 1.9 % Pb, 2.0 % Zn, 0.16 g/t Au and 13 g/T Ag (Cox and Singer, 1986). The largest are the H-W (10.1 Mt with 2.0 % Cu, 3.5 % Zn, 0.3 % Pb, 30.4 g/t Ag and 2.1 g/t Au) and Kutcho (combined tonnage of 17 Mt, 1.6 % Cu, 2.3 % Zn, 0.06 % Pb, 29 g/t Ag and 0.3 g/t Au).

British Columbia examples include: Homestake (082M 025), Lara (092B 001), Lynx (092B 129), Myra (092F 072), Price (092F 073), H-W (092F 330), Ecstall (103H 011), Tulsequah Chief (104K 011), Big Bull (104K 008), Kutcho Creek (104J 060), Britannia (092G 003). Other Canadian deposits include: Kidd Creek (Ontario), Buchans (Newfoundland), Bathurst-Newcastle district (New Brunswick), and Horne-Quemont (Québec) while notable international examples include: Kuroko district (Japan), Mount Lyell (Australia), Rio Tinto (Spain), Shasta King (California, USA), Lockwood (Washington, USA).

## **8.2 Besshi Massive Sulphide Zn-Cu-Pb (Au, Co, Sn, Mo, Cd) deposits**

According to Hōy (2005) Besshi deposits typically comprise thin sheets of massive to well layered pyrrhotite, chalcopyrite, sphalerite, pyrite and minor galena within interlayered, terrigenous clastic rocks and calcalkaline basaltic to andesitic tuffs and flows. The tectonic setting is that of Oceanic extensional environments, such as back-arc basins, oceanic ridges close to continental margins, or rift basins in the early stages of continental separation.

The depositional environment is typically terrigenous clastic rocks associated with marine volcanic rocks and sometimes carbonate rocks; these may overlie platformal carbonate or clastic rocks.

Individual deposits consist typically of a concordant sheet of massive sulphides up to a few metres thick and up to kilometres in strike length and down dip; can be stacked lenses. The deposits can be massive to well-layered, fine to medium-grained sulphides; gneissic sulphide textures common in metamorphosed and deformed deposits; durchbewegung textures; associated stringer ore is uncommon. Crosscutting pyrite, chalcopyrite and/or sphalerite veins with chlorite, quartz and carbonate are common.

The deposits typically have geochemical signatures with Cu, Zn, Ag, Co/Ni>1; Mn halos, Mg enrichment. Ore mineralogy includes pyrite, pyrrhotite, chalcopyrite, sphalerite, cobaltite, magnetite, galena, bornite, tetrahedrite, cubanite, stannite, molybdenite, arsenopyrite, marcasite. Alteration mineralogy includes quartz, chlorite, calcite, siderite, ankerite, pyrite, sericite, graphite.

Geophysical signatures of the sulphide lenses usually show either an electromagnetic or induced polarization signature depending on the style of mineralization and presence of conductive sulphides.

In British Columbia most deposits are Cambrian, Late Triassic and less commonly Mississippian-Permian in age. Average deposit size is highly variable. B.C. deposits range in size from less than 1 Mt to more than 113 Mt. For example, Goldstream has a total resource (reserves and production) of 1.8 Mt containing 4.81 % Cu, 3.08 % Zn and 20.6 g/t Ag and Windy Craggy has reserves in excess of 113.0 Mt containing 1.9 % Cu, 3.9 g/t Ag and 0.08% Co. The type-locality Besshi deposits average 0.22 Mt, containing 1.5% Cu, 2-9 g/t Ag, and 0.4-2% Zn (Cox and Singer, 1986).

British Columbia examples include: Goldstream (082M 141), Standard (082M 090), Montgomery (082M 085), True Blue (082FNE 002), Granduc (104B 021), Windy Craggy (114P 002), War Eagle (114P 020); *Greens Creek (Alaska, USA)*, *Besshi (Japan)*.

### **8.3 Porphyry Cu+/-Mo+/-Au (Calkaline porphyry Cu, Cu-Mo, Cu-Au.)**

Panteleyev (1995) describes the deposit type as stockworks of quartz veinlets, quartz veins, closely spaced fractures and breccias containing pyrite and chalcopyrite with lesser molybdenite, bornite and magnetite occur in large zones of economically bulk-mineable mineralization in or adjoining porphyritic intrusions and related breccia bodies. Disseminated sulphide minerals are present, generally in subordinate amounts. The mineralization is spatially, temporally and genetically associated with hydrothermal alteration of the hostrock intrusions and wallrocks.

The geological setting has high-level (epizonal) stock emplacement levels in volcano-plutonic arcs, commonly oceanic volcanic island and continent-margin arcs. Virtually any type of country rock can be mineralized, but commonly the high-level stocks and related dikes intrude their coeval and cogenetic volcanic piles.

Intrusions range from coarse-grained phaneritic to porphyritic stocks, batholiths and dike swarms; rarely pegmatitic. Compositions range from calcalkaline quartz diorite to granodiorite and quartz monzonite. Commonly there is multiple emplacement of successive intrusive phases and a wide variety of breccias. Large zones of hydrothermally altered rock contain quartz veins and stockworks, sulphide-bearing veinlets; fractures and lesser disseminations in areas up to 10 km<sup>2</sup> in size, commonly coincident wholly or in part with hydrothermal or intrusion breccias and dike swarms. Deposit boundaries are determined by economic factors that outline ore zones within larger areas of low-grade, concentrically zoned mineralization. Cordilleran deposits are commonly subdivided according to their morphology into three classes - classic, volcanic and plutonic.

Volcanic type deposits (e.g. Island Copper) are associated with multiple intrusions in subvolcanic settings of small stocks, sills, dikes and diverse types of intrusive breccias. Reconstruction of volcanic landforms, structures, vent-proximal extrusive deposits and subvolcanic intrusive centres is possible in many cases, or can be inferred.

Mineralization at depths of 1 km, or less, is mainly associated with breccia development or as lithologically controlled preferential replacement in hostrocks with high primary permeability. Propylitic alteration is widespread and generally flanks early, centrally located potassic alteration; the latter is commonly well mineralized. Younger mineralized phyllic alteration commonly overprints the early mineralization. Barren advanced argillic alteration is rarely present as a late, high-level hydrothermal carapace.

Classic deposits (e.g., Berg) are stock related with multiple emplacements at shallow depth (1 to 2 km) of generally equant, cylindrical porphyritic intrusions. Numerous dikes and breccias of pre, intra, and post-mineralization age modify the stock geometry. Orebodies occur along margins and adjacent to intrusions as annular ore shells. Lateral outward zoning of alteration and sulphide minerals from a weakly mineralized potassic/propylitic core is usual. Surrounding ore zones with potassic (commonly biotite-rich) or phyllic alteration contain molybdenite + chalcopyrite, then chalcopyrite and a generally widespread propylitic, barren pyritic aureole or 'halo'.

Plutonic deposits (e.g., the Highland Valley deposits) are found in large plutonic to batholithic intrusions immobilized at relatively deep levels, say 2 to 4 km. Related dikes and intrusive breccia bodies can be emplaced at shallower levels. Hostrocks are phaneritic coarse-grained to porphyritic. The intrusions can display internal compositional differences as a result of differentiation with gradational to sharp boundaries between the different phases of magma emplacement. Local swarms of dikes, many with associated breccias, and fault zones are sites of mineralization. Orebodies around silicified alteration zones tend to occur as diffuse vein stockworks carrying chalcopyrite, bornite and minor pyrite in intensely fractured rocks but, overall, sulphide minerals are sparse. Much of the early potassic and phyllic alteration in central parts of orebodies is restricted to the margins of mineralized fractures as selvages. Later phyllic-argillic alteration forms envelopes on the veins and fractures and is more pervasive and widespread. Propylitic alteration is widespread but unobtrusive and is indicated by the presence of rare pyrite with chloritized mafic minerals, saussuritized plagioclase and small amounts of epidote.

Ore mineralogy: Pyrite is the predominant sulphide mineral; in some deposits the Fe oxide minerals magnetite, and rarely hematite, are abundant. Ore minerals are chalcopyrite; molybdenite, lesser bornite and rare (primary) chalcocite. Subordinate minerals are tetrahedrite/tennantite, enargite and minor gold, electrum and arsenopyrite. In many deposits late veins commonly contain galena and sphalerite in a gangue of quartz, calcite and barite.

Texture/structure: Quartz, quartz-sulphide and sulphide veinlets and stockworks; sulphide grains in fractures and fracture selvages. Minor disseminated sulphides commonly replacing primary mafic minerals. Quartz phenocrysts can be partially resorbed and overgrown by silica. Gangue minerals in mineralized veins are mainly quartz with lesser biotite, sericite, K-feldspar, magnetite, chlorite, calcite, epidote, anhydrite and tourmaline. Many of these minerals are also pervasive alteration products of primary igneous mineral grains.

Alteration mineralogy: Quartz, sericite, biotite, K-feldspar, albite, anhydrite/gypsum, magnetite, actinolite, chlorite, epidote, calcite, clay minerals, tourmaline. Early formed alteration can be overprinted by younger assemblages. Central and early formed potassic zones (K-feldspar and biotite) commonly coincide with ore. This alteration can be flanked in volcanic hostrocks by biotite-rich rocks that grade outward into propylitic rocks. The biotite is a fine-grained, 'shreddy' looking secondary mineral that is commonly referred to as an early developed biotite (EDB) or a 'biotite hornfels'. These older alteration assemblages in cupriferous zones can be partially to completely overprinted by later biotite and K-feldspar and then phyllic (quartz-sericite-pyrite) alteration, less commonly argillic, and rarely, in the uppermost parts of some ore deposits, advanced argillic alteration (kaolinite-pyrophyllite). Secondary (supergene) zones carry chalcocite, covellite and other  $Cu_2S$  minerals (digenite, djurleite, etc.), chrysocolla, native copper and copper oxide, carbonate and sulphate minerals. Oxidized and leached zones at surface are marked by ferruginous 'cappings' with supergene clay minerals, limonite (goethite, hematite and jarosite) and residual quartz.

Ore controls: Igneous contacts, both internal between intrusive phases and external with wallrocks; cupolas and the uppermost, bifurcating parts of stocks, dike swarms. Breccias, mainly early formed intrusive and hydrothermal types. Zones of most intensely developed fracturing give rise to ore-grade vein stockworks, notably where there are coincident or intersecting multiple mineralized fracture sets.

Geochemical signature: Calcalkalic systems can be zoned with a cupriferous (\* Mo) ore zone having a 'barren', low-grade pyritic core and surrounded by a pyritic halo with peripheral base and precious metal-bearing veins. Central zones with Cu commonly have coincident Mo, Au and Ag with possibly Bi, W, B and Sr. Peripheral enrichment in Pb, Zn, Mn, V, Sb, As, Se, Te, Co, Ba, Rb and possibly Hg is documented. Overall the deposits are large-scale repositories of sulphur, mainly in the form of metal sulphides, chiefly pyrite.

Geophysical signature: Ore zones, particularly those with higher Au content, can be associated with magnetite-rich rocks and are indicated by magnetic surveys. Alternatively the more intensely hydrothermally altered rocks, particularly those with quartz-pyrite-sericite (phyllic) alteration produce magnetic and resistivity lows. Pyritic haloes surrounding cupriferous rocks respond well to induced polarization (I.P.) surveys but in sulphide-poor systems the ore itself provides the only significant IP response.

Other exploration guides: Porphyry deposits are marked by large-scale, zoned metal and alteration assemblages. Ore zones can form within certain intrusive phases and breccias or are present as vertical 'shells' or mineralized cupolas around particular intrusive bodies. Weathering can produce a pronounced vertical zonation with an oxidized, limonitic leached zone at surface (leached capping), an underlying zone with copper enrichment (supergene zone with secondary copper minerals) and at depth a zone of primary mineralization (the hypogene zone).

British Columbia porphyry Cu \* Mo ± Au deposits range from <50 to >900 Mt with commonly 0.2 to 0.5 % Cu, <0.1 to 0.6 g/t Au, and 1 to 3 g/t Ag. Mo contents are variable from negligible to 0.04 % Mo. Median values for 40 B.C. deposits with reported reserves are: 115 Mt with 0.37 % Cu, \*0.01 % Mo, 0.3g /t Au and 1.3 g/t Ag.

In the Canadian Cordillera these deposits formed primarily in the Triassic/Jurassic (210-180 Ma) and Cretaceous/Tertiary (85-45 Ma). Elsewhere deposits are mainly Tertiary, but range from Archean to Quaternary.

British Columbia examples include Volcanic type deposits (Cu + Au \* Mo) - Fish Lake (092O 041), Kemess (094E 021,094), Hushamu (EXPO, 092L 240), Red Dog (092L 200), Poison Mountain (092O 046), Bell (093M 001), Morrison (093M 007), Island Copper (092L 158). Classic deposits (Cu + Mo \* Au) - Brenda (092HNE047), Berg (093E 046), Huckleberry (093E 037), Schaft Creek (104G 015). Plutonic deposits (Cu \* Mo) - Highland Valley Copper (092ISE001,011,012,045), Gibraltar (093B 012,007), Catface (092F 120).

Associated deposit types include: Skarn Cu, porphyry Au, epithermal Au-Ag (low sulphidation) or epithermal Cu-Au-Ag (high-sulphidation) enargite-bearing veins, replacements and stockworks; auriferous and polymetallic base metal quartz and quartz-carbonate veins, Au-Ag in base metal.

#### **8.4 Cu Skarn**

Ray (1995) describes the deposit type as Cu-dominant mineralization (generally chalcopyrite) genetically associated with a skarn gangue (includes calcic and magnesian Cu skarns). They are most common where Andean-type plutons intrude older continental-margin carbonate sequences. To a lesser extent (but important in British Columbia), they are associated with oceanic island arc plutonism mostly Early to mid-Jurassic in age.

The deposit form is highly varied and includes stratiform and tabular orebodies, vertical pipes, narrow lenses, and irregular ore zones that are controlled by intrusive contacts. The deposit may have igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn. Some hornfelsic textures.

Ore mineralogy (Principal and subordinate): Moderate to high sulphide content. Chalcopyrite ± pyrite ± magnetite in inner garnet-pyroxene zone. Bornite ± chalcopyrite ± sphalerite ± tennantite in outer wollastonite zone. Either hematite, pyrrhotite or magnetite may predominate (depending on oxidation state). Scheelite and traces of molybdenite, bismuthinite, galena, cosalite, arsenopyrite, enargite, tennantite, loellingite, cobaltite and tetrahedrite may be present.

Alteration mineralogy: Exoskarn alteration: high garnet:pyroxene ratios. High Fe, low Al, Mn andradite garnet (Ad35-100), and diopsidic clinopyroxene (Hd2-50). The mineral zoning from stock out to marble is commonly: diopside + andradite (proximal); wollastonite ± tremolite ± garnet ± diopside ± vesuvianite (distal). Retrograde alteration

to actinolite, chlorite and montmorillonite is common. In British Columbia, skarn alteration associated with some of the alkalic porphyry Cu-Au deposits contains late scapolite veining. Magnesian Cu skarns also contain olivine, serpentine, monticellite and brucite. Endoskarn alteration: Potassic alteration with K-feldspar, epidote, sericite  $\pm$  pyroxene  $\pm$  garnet. Retrograde phyllic alteration generates actinolite, chlorite and clay minerals.

Ore controls: Irregular or tabular orebodies tend to form in carbonate rocks and/or calcareous volcanics or tuffs near igneous contacts. Veinlets within igneous stocks can be important. Cu mineralization is present as stockwork veining and disseminations in both endo and exoskarn; it commonly accompanies retrograde alteration.

Calcic Cu skarns are more economically important than magnesian Cu skarns. Cu skarns are broadly separable into those associated with strongly altered Cu- porphyry systems, and those associated with barren, generally unaltered stocks; a continuum probably exists between these two types (Einaudi et al., 1981). Copper skarn deposits related to mineralized Cu porphyry intrusions tend to be larger, lower grade, and emplaced at higher structural levels than those associated with barren stocks. Most Cu skarns contain oxidized mineral assemblages, and mineral zoning is common in the skarn envelope. Those with reduced assemblages can be enriched in W, Mo, Bi, Zn, As and Au. Over half of the 340 Cu skarn occurrences in British Columbia lie in the Wrangellia Terrane of the Insular Belt, while another third are associated with intraoceanic island arc plutonism in the Quesnellia and Stikinia terranes. Some alkalic and calcalkalic Cu and Cu-Mo porphyry systems in the province (e.g. Copper Mountain, Mount Polley) are associated with variable amounts of Cu-bearing skarn alteration.

Exploration guides: Geochemical signature: Rock analyses may show Cu-Au-Ag-rich inner zones grading outward through Au-Ag zones with high Au:Ag ratios to an outer Pb-Zn-Ag zone. Co-As-Sb-Bi-Mo-W geochemical anomalies are present in the more reduced Cu skarn deposits. Geophysical signature: Magnetic, electromagnetic and induced polarization anomalies.

Cu skarns average 1 to 2 % copper. Worldwide, they generally range from 1 to 100 Mt, although some exceptional deposits exceed 300 Mt. Craigmont, British Columbia's largest Cu skarn, contained approximately 34 Mt grading 1.3 % Cu. Historically, these deposits were a major source of copper, although porphyry deposits have become much more important during the last 30 years . However, major Cu skarns are still worked throughout the world, including in China and the U.S.

Examples (British Columbia - *Canada/International*): Craigmont (092ISE035), Phoenix (082ESE020), Old Sport (092L 035), Queen Victoria (082FSW082); *Mines Gaspé deposits (Québec, Canada), Ruth, Mason Valley and Copper Canyon (Nevada, USA), Carr Fork (Utah, USA), Ok Tedi (Papua New Guinea), Rosita (Nicaragua).*

### 8.5 Polymetallic Vein

Lefebure (1996) describes the deposit type as sulphide-rich veins containing sphalerite, galena, silver and sulphosalt minerals in a carbonate and quartz gangue. These veins can be subdivided into those hosted by metasediments and another group hosted by volcanic or intrusive rocks. The latter type of mineralization is typically contemporaneous with emplacement of a nearby intrusion. These veins occur in virtually all tectonic settings except oceanic, including continental margins, island arcs, continental volcanics and cratonic sequences.

Metasediment hosted veins are emplaced along faults and fractures in sedimentary basins dominated by clastic rocks that have been deformed, metamorphosed and intruded by igneous rocks. Veins postdate deformation and metamorphism. Igneous hosted veins typically occur in country rock marginal to an intrusive stock. Typically veins crosscut volcanic sequences and follow volcano- tectonic structures, such as caldera ring-faults or radial faults. In some cases the veins cut older intrusions. In many districts there are felsic to intermediate intrusive bodies with mafic igneous rocks less common. Many veins are associated with dikes following the same structures. Veins are typically steeply dipping, narrow, tabular or splayed veins. Commonly occur as sets of parallel and offset veins. Individual veins vary from centimetres up to more than 3 m wide and can be followed from a few hundred to more than 1000 m in length and depth. Veins may widen to tens of metres in stockwork zones.

Compound veins with a complex paragenetic sequence are common. A wide variety of textures, including cockade texture, colloform banding and crustifications and locally druzy. Veins may grade into broad zones of stockwork or breccia. Coarse-grained sulphides occur as patches and pods and fine- grained disseminations that are confined to the veins.

Ore mineralogy (Principal and *subordinate*): Galena, sphalerite, tetrahedrite- tennantite, other sulphosalts including pyrargyrite, stephanite, bournonite and acanthite, native silver, chalcopyrite, pyrite, arsenopyrite, stibnite. Silver minerals often occur as inclusions in galena. Native gold and electrum in some deposits. Rhythmic compositional banding sometimes present in sphalerite. Some veins contain more chalcopyrite and gold at depth and Au grades are normally low for the amount of sulphides present.

Gangue mineralogy (Principal and *subordinate*): Metasediment host: Carbonates (most commonly siderite with minor dolomite, ankerite and calcite), quartz, barite, fluorite, magnetite, bitumen. Igneous host: Quartz, carbonate (rhodochrosite, siderite, calcite, dolomite), sometimes specular hematite, hematite, barite, fluorite. Carbonate species may correlate with distance from source of hydrothermal fluids with proximal calcium and magnesium-rich carbonates and distal iron and manganese-rich species.

Macroscopic wall rock alteration is typically limited in extent (measured in metres or less). The metasediments typically display sericitization, silicification and pyritization. Thin veining of siderite or ankerite may be locally developed adjacent to veins. In the

Coeur d'Alene camp a broader zone of bleached sediments is common. In volcanic and intrusive hostrocks the alteration is argillic, sericitic or chloritic and may be quite extensive. Black manganese oxide stains, sometimes with whitish melanterite, are common weathering products of some veins. The supergene weathering zone associated with these veins has produced major quantities of manganese. Galena and sphalerite weather to secondary Pb and Zn carbonates and Pb sulphate. In some deposits supergene enrichment has produced native and horn silver.

Ore controls include regional faults, fault sets and fractures, however veins are typically associated with second order structures. In igneous rocks the faults may relate to volcanic centers. Significant deposits restricted to competent lithologies. Dikes are often emplaced along the same faults and in some camps are believed to be roughly contemporaneous with mineralization. Some polymetallic veins are found surrounding intrusions with porphyry deposits or prospects. The styles of alteration, mineralogy, grades and different geometries can usually be used to distinguish the polymetallic veins from stringer zones found below syngenetic massive sulphide deposits.

Historically these veins have been considered to result from differentiation of magma with the development of a volatile fluid phase that escaped along faults to form the veins. More recently researchers have preferred to invoke mixing of cooler, upper crustal hydrothermal or meteoric waters with rising fluids that could be metamorphic, groundwater heated by an intrusion or expelled directly from a differentiating magma. Any development of genetic models is complicated by the presence of other types of veins in many districts. For example, the Freiberg district has veins carrying F-Ba, Ni-As- Co-Bi-Ag and U.

Exploration guides: Geochemical signature: Elevated values of Zn, Pb, Ag, Mn, Cu, Ba and As. Veins may be within arsenic, copper, silver, mercury aureoles caused by the primary dispersion of elements into wallrocks or broader alteration zones associated with porphyry deposit or prospects. Geophysical signature: May have elongate zones of low magnetic response and/or electromagnetic, self potential or induced polarization anomalies related to ore zones. Strong structural control on veins and common occurrence of deposits in clusters can be used to locate new veins.

Typical grade and tonnage of Individual vein systems range from several hundred to several million tonnes grading from 5 to 1500 g/t Ag, 0.5 to 20% Pb and 0.5 to 8% Zn. Average grades are strongly influenced by the minimum size of deposit included in the population. For B.C. deposits larger than 20 000 t, the average size is 161 000 t with grades of 304 g/t Ag, 3.47 % Pb and 2.66 % Zn. Copper and gold are reported in less than half the occurrences, with average grades of 0.09 % Cu and 4 g/t Au.

The most common deposit type in British Columbia with over 2000 occurrences; these veins were a significant source of Ag, Pb and Zn until the 1960s. They have declined in importance as industry focused more on syngenetic massive sulphide deposits. Larger polymetallic vein deposits are still attractive because of their high grades and relatively easy beneficiation. They are potential sources of cadmium and germanium.

Age of mineralization is Proterozoic or younger and mainly Cretaceous to Tertiary in British Columbia.

Examples (British Columbia - *Canada/International*): Metasediment host: Silvana (082FNW050) and Lucky Jim (082KSW023), Slocan-New Denver-Ainsworth district, St. Eugene (082GSW025), Silver Cup (082KNW027), Trout Lake camp; *Hector-Calumet and Elsa, Mayo district (Yukon, Canada), Coeur d'Alene district (Idaho, USA), Harz Mountains and Freiberg district (Germany), Prábram district (Czechoslovakia)*. Igneous host: Wellington (082ESE072) and Highland Lass - Bell (082ESW030, 133), Beaverdell camp; Silver Queen (093L 002), Duthie (093L 088), Cronin (093L 127), Porter-Idaho (103P 089), Indian (104B 031); *Sunnyside and Idorado, Silverton district and Creede (Colorado, USA), Pachuca (Mexico)*.

## Item 9: Exploration

### 9.1 Current Prospecting and Sampling Program

A total of ten rock samples were collected on the claim group during the initial prospecting program. Results of the samples ranged from background to highs of 3.165% Cu, 1.58ppm Au, 141ppm Ag, 0.15% Zn, 265ppm Pb, and 470ppm Co.

A traverse was made up Silver Creek in an effort to find evidence of the heavily mineralized massive sulphide boulders reported in historic reports. In addition, the roadways that cross the VMS target on the east side of Vanstone Creek were prospected as were the roads to the east of the Vanhall showing. Mineralization was observed in the volcanic and sedimentary rocks over most of the areas prospected with the heaviest concentrations of pyrite with minor chalcopyrite located in the vicinity of the OC-1 and OC-2 Minfile locations and up Silver Creek where sulphide concentrations up to 10% was noted and sampled. Road deactivations in the northern parts of the property



Plate 2: Altered BFP Dyke Exposure

hindered exploration of the western side of Vanstone Creek underlying the Cominco soil grids.

Traverses east of Vanstone Creek located two highly clay and potassic altered biotite-feldspar porphyry intrusions. One dyke in excess of 10m width trended to the northeast with a strike of 065°. The dyke had a sharp southeastern contact as seen in the accompanying photo. Neither intrusion was mineralized.

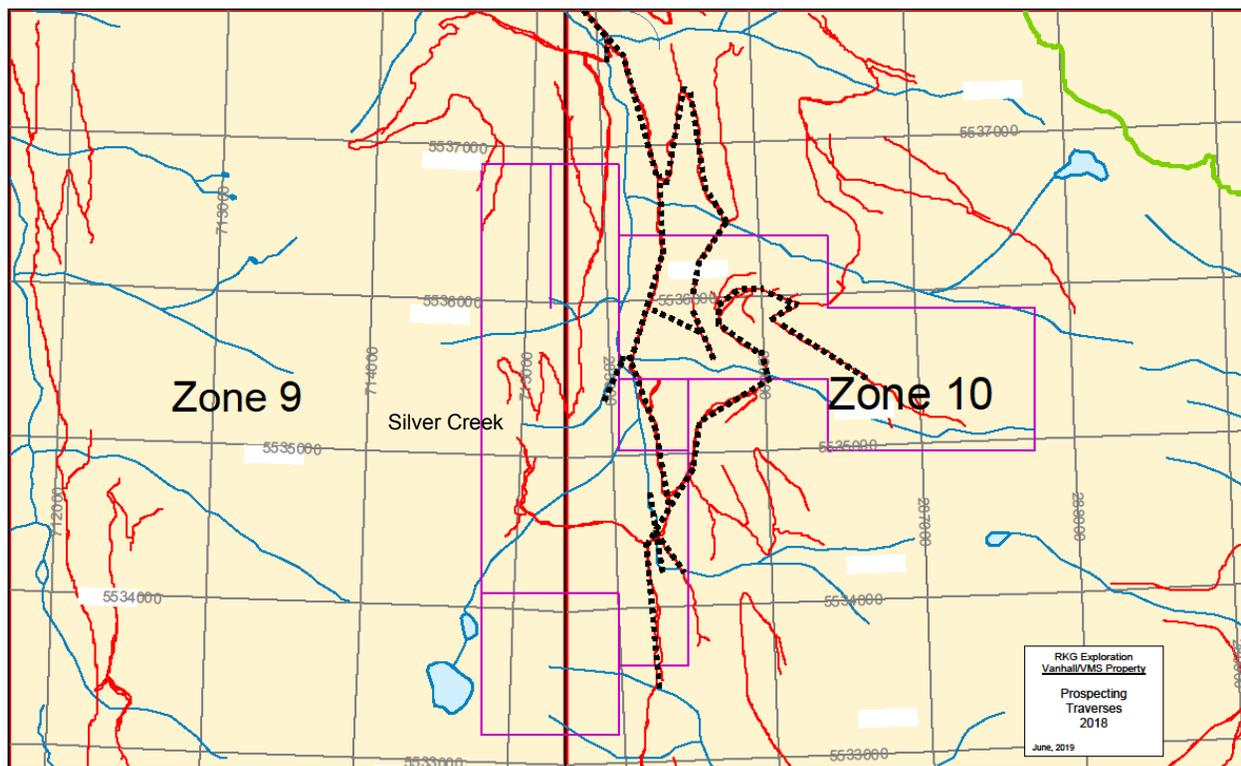


Figure 11: Prospecting Traverses

Sample locations were collected using NAD83 on UTM Zone 10.

Table 3: Rock Sample descriptions

Sample #	UTM Easting	UTM Northing	Sample type	Sample Description
1043754	285045	5535464	outcrop	dark grey, fine-grained sediment? with 10% Py/Cpy? in cross-cutting veinlets.
1043755	284961	5535372	float	small cobble of semi-massive sulphides in black waxy sediment?
1043756	284967	5535371	float	small cobble of siliceous Po? in medium-grey sediment?
1043757	285587	5535887	outcrop	80cm chip sample of very strong potassic alteration and veining. Strong clay alteration. Rock is very friable.
1043758	286354	5535663	outcrop	amygdaloidal andesite with layers of darker grey with trace Cpy.
1043759	285722	5535848	outcrop	Py/Cpy veining to 0.5cm in massive andesite near small fault 065°/85°S.
1043760	285823	5535334	float	20cm angular massive sulphide boulder in glacial till.
1043761	285787	5535316	float	10cm cobble of sulphide cemented dark grey volcanic rock. Ferricrete?
1043762	285529	5535035	outcrop	siliceous volcanic? with disseminated and fracture Py, Cpy(trace)
1043763	285779	5535768	outcrop	grab of 10+m wide biotite-feldspar-porphyry

				dyke with strong potassic alteration. Dyke strikes 065°/90°.
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Two small cobbles of massive sulphide float were found in Silver Creek confirming historic discoveries of similar material.



Plate 3: Sample 1043760

These samples returned values up to 7238ppm Cu, 0.507ppm Au, 141ppm Ag, 265ppm Pb and 831ppm Zn from sample 1043755. Two angular, small boulder to cobble sized massive and semi massive sulphide samples were collected east of Vanstone creek approximately 600m down-ice, and at the same elevation of the western end of the VMS target. Sample 1043760, a 20 cm very angular boulder found in glacial till returned values of 3.165% Cu, 1.58ppm Au, 93ppm Ag, 0.15% Zn and 0.029% Co.

Sample 1043759, located near the centre of the western end of the VMS target returned 1.395ppm Au from Py veining in andesite near a small north-east striking, near vertical fault.



Plate 4: Sample 1043759

A sample location map with is located in Appendix A, sample results in Appendix B. Assay certificates for the samples collected are located in Appendix C.

**Item 10: Drilling**

No drilling was completed as part of the exploration program.

**Item 11: Sample Preparation, Analyses and Security**

All rock samples collected were placed in clean 12x20 poly bags with a sample tag and tied closed with flagging tape. The samples were transported to Victoria where they were placed into a woven rice bag and sealed with a zip tie. Samples were then shipped to the MS Analytical laboratory in Langley, BC.

Rocks were initially crushed to 70% passing 2mm. A 250g sub-sample was then split and pulverized to 85% passing 75 microns. Rock samples were analyzed for 34 elements plus gold. 0.2g splits were subjected to a four acid digestion prior to Trace Level elemental determination using ICP-AES (ICP-230). Two highly mineralized samples were subjected to Ore Grade level determination using ICP-AES (ICP-240).

Gold determinations were completed using a Trace Level Fire Assay of a 30g split (FAS-111) with an AAS finish.

**Item 12: Data Verification**

No data verification was completed as part of the exploration program.

**Item 13: Mineral Processing and Metallurgical Testing**

No mineral processing or metallurgical testing was completed as part of the exploration program.

**Item 14: Mineral Resource Estimates**

No mineral resource estimates were completed as part of the exploration program.

**Item 15: Adjacent Properties****15.1 Myra falls (Price) (Minfile 092F 073, rev. Flower, 2013)**

The Price occurrence is located west of Thelwood Creek, approximately 800 metres south- south west of the creek mouth on Buttle Lake.

The Myra Falls Operation includes the Lynx (092F 071), Myra (092F 072), Price (092F 073) and H-W (092F 330) deposits and associated zones. The Price volcanogenic massive sulphide deposit occurs within the southern part of the Buttle Lake uplift. This discrete belt of northwest striking Upper Paleozoic rocks is bounded on the east by Upper Triassic Karmutsen Formation volcanics (Vancouver Group) and on the west by the Early to Middle Jurassic Island Plutonic Suite. The geology of the uplift has recently been reinterpreted and the stratigraphy has been reassigned to several new formations of a redefined Sicker Group and the new Buttle Lake Group (formerly the upper part of the Sicker Group), (Juras, 1987; Massey, Personal Communication, 1990).

The new Buttle Lake Group consists of: (1) the Lower Permian(?) Henshaw Formation composed of conglomerate, epiclastic deposits and vitric tuffs; and (2) the Lower Permian to Pennsylvanian Azure Lake Formation (formerly Buttle Lake Formation) consisting of crinoidal limestone and minor chert.

The Sicker Group consists of: (1) the Mississippian(?) or Pennsylvanian(?) Flower Ridge Formation largely comprising coarse mafic pyroclastic deposits; (2) the Lower Mississippian(?) Thelwood Formation, a bedded sequence of siliceous tuffaceous sediments, subaqueous pyroclastic deposits and mafic sills; (3) the Upper Devonian Myra Formation consisting of basaltic to rhyolitic flows and volcanoclastic rocks, lesser epiclastic sediments, argillites and cherts, and massive sulphide mineralization; and (4) the Upper Devonian or older Price Formation comprising feldspar-pyroxene porphyritic andesite flows, flow breccias and minor pyroclastic deposits.

The Buttle Lake uplift stratigraphy indicates deposition in a rift basin in an island arc environment. It has been intruded by granitic dykes related mainly to the Island Plutonic Suite. A 1 kilometre wide stock of Tertiary intrusives lies about 1.5 kilometres north of the deposit. This stock (formerly called Catface Intrusions) is probably related to the Mount Washington Intrusive Suite of Late Eocene to Early Oligocene age (Nick Massey, Personal Communication, May 1990).

The major occurrences in the Buttle Lake area lie along a northwest striking, 65 degrees southwest to steeply northeast dipping zone that is approximately 6 kilometres long. The rocks have been metamorphosed to lower greenschist facies, and have been deformed along northwest trending subhorizontal open folds. Several regional west-northwest to north trending faults occur with maximum lateral displacements of 850 metres. The faults are considered to be post- Mesozoic, and are probably related to Late Cretaceous uplift. The contact between the Myra Formation and the overlying Thelwood Formation is marked by a 2 to 40 metre wide zone of strong schistosity that may represent an Upper Paleozoic low angle fault.

The Myra Formation, dated at 370 million years (Juras, 1987), comprises intermediate to felsic volcanics, volcanoclastics, minor argillite and is host to the massive sulphide horizons. The Price, Lynx (092F 071) and Myra (092F 072) deposits lie at the same stratigraphic level of the Myra Formation (the "Mine Sequence" of Juras). The H-W deposit (092F 330) lies below them at the base of the Myra Formation. The Myra Falls Operations of Westmin Resources has developed these deposits into four mines. In 1990, the Lynx and H-W mines fed a 4000-tonne per day mill, the Myra mine is depleted and the Price deposit has yet to be used as a source of mill feed.

The major ore zone of the Price deposit, termed the Upper Price Zone, has been traced for about 502 metres. Lower, lesser mineralized zones are also present.

The massive sulphide horizon lies within a zone of quartz- feldspar rhyolite tuff and minor chert. The tuff is underlain by dacite flow breccia and tuff, breccia that includes clasts of H-W mineralization, andesite flows, the rhyolitic H-W horizon, and the Price Formation. Rocks in the feeder zone below the lower massive sulphide horizon have undergone sericitization and silicification. Pyrite alteration is evident from disseminated pyrite and pyrite stringer zones.

Overlying the massive sulphide horizon are pillow basalts, mixed pyroclastics and tuffs, felsic rhyolite and flow breccia. These are overlain by the Thelwood Formation.

The lenses of massive sulphides occur in a gangue of quartz, sericite, chlorite, calcite and talc and comprise banded chalcopyrite, galena, sphalerite, pyrite and pockets of barite. Minor tennantite, bornite, pyrrotite, digenite, covellite and stromeyerite are present. Significant amounts of gold, silver and cadmium are associated with the sulphides. The lenses pinch out along strike.

Table 4: Myra Falls Resources January 1, 1993

Name	Tonnes	Gold g/t	Silver g/t	Copper %	Lead %	Zinc %
H-W Mine	8,955,100	2.2	39.6	1.7	0.4	4.3
Lynx Mine	315,300	3.0	94.0	1.7	1.1	10.0
Price Mine	185,000	1.5	66.4	1.4	1.3	10.4
Gap Zone	634,400	3.2	151.5	1.8	1.1	13.3
Battle Zone	2,013,700	1.1	24.2	2.6	0.5	12.7
Extension (W37) Zone	231,100	1.2	60.4	1.7	0.4	3.8
Trumpeter Zone	61,200	3.2	68.9	6.3	0.3	4.6
<u>6 Level</u>	<u>120,500</u>	<u>1.3</u>	<u>91.4</u>	<u>0.4</u>	<u>0.9</u>	<u>6.0</u>
<b>Total</b>	<b>12,516,100</b>	<b>2.1</b>	<b>45.6</b>	<b>1.9</b>	<b>0.5</b>	<b>6.3</b>

Exploration in the Marshall zone encountered high-grade polymetallic sulphides. Preliminary underground test development started in 1999 and underground drilling revealed 23m of massive sulphides grading 11.3% zinc, 1.4% copper, 3.6g/t gold and 264.3g/t silver. As of end-2005, proven and probable reserves were 6Mt grading 6.4% zinc, 1.1% copper, 1.3g/t gold and 46g/t silver. Measured and indicated resources added a further 2.6Mt to the inventory.

### 15.2 Catface (Minfile 092F 120, rev. Flower, 2013)

The Catface occurrence is located in the southern Catface Range, approximately 6.5 kilometres south east of the community of Marktosis.

The deposit lies at the contact between mafic volcanics (Sicker(?) or Vancouver(?) groups rocks) and diorite of the Mesozoic and/or Paleozoic Westcoast Complex. The area of the contact has been intruded by the Early to Middle Jurassic Island Plutonic Suite and several phases of the Early to Middle Eocene Tofino Intrusive Suite (formerly Catface Intrusions, Personal Communication, N. Massey, May 1990). See also Irishman Creek (092F 251) and Hecate Bay (092F 231).

The mafic rocks consist of basalt and andesite flows, tuff breccia and agglomerate. It remains unclear as to whether these rocks belong to the Paleozoic Sicker Group or to the Upper Triassic Karmutsen Formation, Vancouver Group. The volcanic rocks have been weakly hornfelsed near the intrusions.

Rocks of the Westcoast Complex are considered to be intrusive and/or dioritized pre-Jurassic rocks that include Sicker Group rocks (Canadian Institute of Mining and Metallurgy Special Volume 15, page 301).

A sill-like quartz monzonite intrusion, containing xenoliths of volcanic rocks, was emplaced along the volcanic-diorite contact. The age of this quartz monzonite is unknown, but is probably related to the Island Intrusions. Propylitic alteration minerals in the quartz monzonite include chlorite, epidote, zoisite, and sericite. Kaolinite, quartz, biotite and magnetite are also recognized as alteration products.

Several phases of the Tertiary intrusions have intruded all other rocks. These include the Hecate Bay quartz diorite, dated at 48 million years, three porphyritic granodiorite phases and a late-stage porphyritic dacite. Their emplacement was, to some extent, controlled by pre-existing structures or contacts. Late (but pre-ore) andesite, dacite and quartz feldspar porphyry dykes trend north to northwest and dip 50 to 70 degrees east. Faults predate mineralization and strike northerly and easterly.

Jointing in the younger intrusive rock trends north to northeast, dipping 50 to 70 degree east. A less persistent joint set in these intrusions trends east to southeast and dips steeply north. Joints in the volcanic rocks trend 156 degrees and dip 51 degrees east.

Copper and molybdenum mineralization occur on dry fractures and in quartz veinlets. Molybdenite also occurs as rosettes in quartz veins, and disseminated copper mineralization is associated with mafic minerals.

Copper minerals include chalcopyrite, bornite and some chalcocite, with significant secondary carbonate and copper oxide minerals occurring on fractures. Other minerals recognized include pyrite, pyrrhotite, covellite, idaite, digenite, native copper, cuprite, valleriite, tenorite, limonite, goethite, magnetite, hematite, cupriferous chalcedony-opal and scheelite.

Mineralization shows distinct zoning, with a core of bornite- pyrite-pyrrhotite surrounded by a zone in which chalcopyrite predominates. The area of 0.2 per cent copper mineralization extends over 650 metres, to a depth of approximately 350 metres. The best mineralization is located in the volcanic rocks and in the younger porphyritic phases, but the grade is not consistent.

The earliest evidence of exploration at Catface is a caved adit driven about 5 metres into a highly fractured and oxidized shear; the main property was evidently not investigated between the turn of the century and 1960. In 1960, a local mine operator, John Jackson, and G. Davis, pilot prospector for Falconbridge Nickel Mines, made a brief visit to a cliff face displaying a conspicuous copper stain. Mineralized and high oxidized samples prompted a more thorough examination by Falconbridge geologist J. McDougall and company helicopter pilot R. Hepworth who then staked the property.

Falconbridge, through Catface Copper Mines Ltd., conducted exploration between 1961 and 1979. This included driving an 857-metre adit and drilling more than 19,000 metres in 127 surface and underground holes. Numerous metallurgical tests were conducted, and a bulk sample was shipped to Falconbridge's Tasu mine (103C 003) on the west coast of the Queen Charlotte Islands for processing. The geology of the property was mapped; soil and silt geochemical surveys were completed. Limited geophysical test surveys including I.P./resistivity, self-potential and magnetic surveys were conducted in selected areas. The claims were also surveyed at this time.

In 1989 and 1990, Falconbridge Limited re-activated the project to increase the resource and to determine gold content of the copper mineralization. The program included detailed adit sampling for copper and gold, geological mapping of selected areas, a 19 line-kilometre I.P./resistivity, VLF and magnetometer survey to cover accessible areas, 150 line-kilometre of combined airborne magnetometer and VLF (EM) surveys covering most of the claim block and metallurgical tests. An environmental base-line survey was also carried out. Four holes (1628 metres) were drilled to test chargeability anomalies.

Between 1960 and 1990, total expenditures by Falconbridge Limited on the Catface project amounted to nearly \$10 million (constant \$1990). In 1990, Falconbridge Limited planned to take the claims to mining lease status and a drilling program to test the large IP anomalies south of South Peak. Granting of required work permits was delayed by the Clayoquot Land Use dispute; consequently, the Catface project was abruptly cancelled and exploration funding was transferred to other projects. Catface lies within a General Integrated Management Zone designation (multiple use).

Unclassified reserves in 1971 were 181.4 million tonnes grading from 0.45 to 0.50 per cent copper (EMR Mineral Bulletin MR 223 B.C. 95). In 1990, Falconbridge calculated a drill indicated resource of 188 million tonnes of 0.42 per cent copper and 0.0084 per cent molybdenum (0.014 per cent  $\text{MOS}_2$ ) at a 0.30 per cent copper cutoff and 1.1:1 stripping ratio (CIM Special Volume 46, page 325). Other calculations are listed in Special Volume 46.

In 1999, Doublestar Resources Ltd. acquired the property from Falconbridge Limited. Doublestar has reported the following resources: 78.2 million tonnes 0.53 per cent copper at 0.4 per cent cutoff or 158.4 million tonnes at 0.44 per cent copper with 0.31 per cent copper cutoff.

In 2007, Doublestar was bought by Selkirk Metals Corp. Selkirk completed a diamond drill program in 2008 comprised of 8 holes totalling 2383 metres of drilling. In 2009 the company released an updated resource estimate for the Cliff Zone based on the 2008 drilling.

Table 5: Catface Resources September 2, 2009

Classification	Amount (tonnes)	Grade Cu(%)
Indicated	56,863,000	0.40
Inferred	262,448,000	0.38

In November 2009, Selkirk was bought by Imperial Metals Corporation. In 2010, Imperial completed a diamond drilling program of thirteen holes, totalling 3548.0 metres. Hole CF-10-56 intersected 275.5 metres grading 0.60 per cent Cu and 0.014 Mo within a 755.0 metre mineralized section grading 0.46 per cent Cu and 0.006 per cent Mo (News Release September 8, 2010 - [www.imperialmetals.com](http://www.imperialmetals.com)). Other drill holes yielded intercepts of 0.280 per cent copper over 34.7 metres from 445.5 metres to 480.2 metres depth in CF-10-66 extending the southern extent of the cliff zone (Assessment Report 31894).

### 15.3 Alpha-Beta (Minfile 092C 039, rev. Flower, 2013)

The Alpha-Beta occurrence is located on the Robertson River, near its junction with Long Creek.

The area is underlain by Lower Jurassic Bonanza Group volcanics consisting of lava, tuff and breccia of mainly basaltic to rhyolitic composition. It contains occasional interbeds and sequences of marine argillite and greywacke. A stock of the Early to Middle Jurassic Island Plutonic Suite (formerly called the Island Intrusions) lies to the southwest of the showings. The volcanics have been intruded by dykes and irregularly shaped bodies of granodiorite, granite porphyry and diorite porphyry. Limestone, reported to occur as lenses and roof pendants in both the volcanics and the intrusive, is probably related to the Quatsino Formation, Vancouver Group.

The lavas and sediments and the granodiorite have been locally silicified and altered to skarn. The skarns are of four main types: 1) garnet-epidote; 2) red garnetite; 3) light buff to brown garnetite; and 4) epidotite. Magnetite occurs most commonly in with the garnet-epidote skarn but also occurs with the others. Distribution of skarn in drill core indicates that it may form along favourable beds and also along fractures in tuff, andesite or granodiorite. Pyrite and chalcopyrite are found locally in the skarn and, like the magnetite, usually in the garnet-epidote type.

The original showings were located in 1904 at the confluence of the Robertson River and "Long" Creek. In 1928, an adit was collared in Long Creek and work continued until about 1930. The property was acquired in the early 1960's by Albeta Mines Limited and work continued. By the end of 1963, several hundred metres of diamond drilling and at least 233 metres of underground development had occurred as well as substantial stripping, trenching and geophysical work.

Ore sections opened up in the mineralized area shows some continuity for nearly 120 metres underground, averaging 1.4 to 3.0 per cent copper over widths averaging 1.5 to 1.8 metres. The host skarn is known to attain widths in excess of 27 metres. A high

grade series of ore shoots on a parallel zone averaged 8.60 per cent copper over a 1.4 metre true width, as ascertained from 5 diamond-drill holes.

A combined ore reserve figure calculated in April 1963, from 9 zones above the 920 level, was reported to total 11,482 tonnes grading an average of 2.20 per cent copper. Another 2700 tonnes in the probable and possible category were estimated below the 920 level; and 3,600 tonnes were estimated in the possible category above the 920 level (Progress Report for Sept., Oct., and Nov., 1963, Albeta Mines Ltd.).

In 1963, a total of 535 tonnes of ore with a grade of 4 per cent was mined and shipped from the Alpha-Beta property (Minister of Mines Annual Report 1963, page 122). From this ore, a total of 10,264 grams of silver, 187 grams of gold and 23,390 kilograms of copper were produced (Mineral Policy data). By November 1963, shipping-grade ore had been depleted and the mining operations were terminated.

In 2008 and 2011, geochemical sampling programs were completed on the area as the Juniper claim. In 2008, assays of tailings yielded values up to 9.1 per cent copper (Assessment Report 30705). In 2011, samples of chalcopyrite assayed 24.37 per cent copper and 27.9 per cent iron, while samples of magnetite assayed 1.62 per cent copper and 38.25 per cent iron (Assessment Report 32286).

#### **Item 16: Other Relevant Data and Information**

There is no other relevant data or information other than that included in this report.

#### **Item 17: Interpretation and Conclusions**

The Vanhall/VMS property covers an area highly anomalous in elements suggesting both VMS and porphyry Cu-Au sources. Regional Geochemical Survey samples returned high levels of copper, cobalt, zinc, gold, silver, nickel, iron which are all pathfinder elements for VMS deposits. The 3000m+ 1<sup>st</sup> VD magnetic high anomaly located east of Vanstone Creek may represent pyrrhotite rich beds in the Triassic basalts. The recent discovery of massive sulphide float grading 3.165% Cu, 1.58ppm Au, 93ppm Ag and 0.029% Co in glacial till approximately 600m down-ice of the magnetic anomaly supports the theory of possible VMS style mineralization being present on the claims. Pyrite veining in outcrop grading 1.395ppm Au in the middle of the magnetic anomaly and soil geochemical anomalies in Ni, Co, Pb, Zn, Ag, also support this target model. The geological, soil geochemical (Cu, Mo, Au, Ag) and magnetic data, especially in the central and western parts of the claim group also point to a significant porphyry potential.

Historical geological mapping noted that extensive fracturing and pyritization is evident over a length of some 3,000ft along Vanstone Creek and extends up most of the tributaries. Coarse brecciation occurs near the Hall Creek confluence and also on a tributary of Della Creek. This fracturing and pyrite mineralization present over several 100m width may represent a pyrite halo adjacent to a nearby porphyry deposit or a mineralized normal fault bringing younger Jurassic aged porphyry mineralization on the

west side of Vanstone Creek to the same level as older Triassic aged volcanic rocks and their overlying VMS mineralization.

The area is structurally complex as noted in the available outcrop exposures. Cominco mapped five separate intrusive phases intruding the blanket of volcanic rocks. Magnetic anomalies identified from the airborne survey appear to coalesce in the central property area. Uranium and thorium anomalies from the Universal Ventures airborne survey are present which may indicate the presence of larger volumes of intrusive rocks than previously mapped. A number of subtle potassium anomalies may represent areas of moderate to significant potassic alteration associated with these buried intrusions.

On review of the recent and historical exploration data in conjunction with the interpretations of RGS, regional magnetic and geochemical data, and the detailed magnetic/radiometric airborne survey, the Vanhall/VMS property presents as an intriguing exploration project with numerous possible target types which have only seen minimal exploration. The author believes that the project is a property of merit and has the potential of hosting one or more significant mineral deposits.

#### **Item 18: Recommendations**

The Vanhall/VMS property covers a large area with numerous exploration targets, most of which have received only preliminary evaluation in the past. As a result, a three phase program of exploration is proposed. Phase I would include a detailed prospecting and mapping program to determine areas of increased structural complication, alteration and mineralization. Concurrent with this program a reconnaissance geochemical grid should be established in an attempt to discover additional blind zones of mineralization. The eastern grid targeting the suspected VMS mineralization should consist of at least five lines spread over the 3000m+ magnetic anomaly, with samples collected at 50m intervals. This will result in the collection of approximately 125 Ah-humus over 6 line-kms. A sample of the appropriate medium should be collected at each sample site for pH measurements which should be analyzed daily to determine if individual lines need to be extended. The reconnaissance lines should be run at 000°AZ to cover the east-west magnetic trend. The area over the historic Cominco and Moresby Mines geochemical anomalies should be re-sampled to determine the amount of glacial transport and/or solifluction that has occurred in the area and to more accurately locate buried mineralization. Lines spaced 200m apart with Ah samples collected at 50m intervals would generate an additional 571 samples over 27.5 line-kms. These lines should be oriented east-west to cover suspected northwest or northerly trending mineralization.

Phase II would include infill lines in areas suggesting increased widths and grades of mineralization. The additional grid lines should be used for, the collection of geochemical and pH samples, and geophysical surveys. Electromagnetic surveys (HLEM) should be completed over any geochemical anomalies found to map conductors which may indicate the presence of VMS or polymetallic vein mineralization. A focused Induced Potential survey would help to locate areas of disseminated or semi-massive mineralization associated with VMS or porphyry styles of mineralization.

Phase III would be dependent on the results obtained in the geochemical and geophysical surveys and would include the drilling of 2000m of NQTW core in 10 holes over the property. Samples should be assayed in 2m intervals over any intrusions found with the entire interval assayed. Hanging wall and footwall rocks should be analyzed surrounding any mineralized horizons found in the volcanic rocks.

Proposed budget:

**Phase I**

Project Geologist (15 days @ \$600/day)	9,000
Prospector/sampler x 4 (15 days @ \$300/day)	18,000
Assaying (750 samples @ \$55/sample)	41,250
Room and Board (75 person days @ \$150/day)	11,250
Mob/demob/vehicle rental	2,000
Reporting	4,800
Contingency (15%)	<u>12,945</u>
Phase I Total	<u>\$99,245</u>

**Phase II**

Project Geologist (10 days @ \$600/day)	6,000
Prospector/sampler x 4 (10 days @ \$300/day)	12,000
Grid layout (20 line km @ \$100/km)	2,000
Assaying (450 samples @ \$55/sample)	24,750
Geophysical surveys mag/EM/IP (32 line km @ 2500/km)	80,000
Room and Board (100 person days @ \$150/day)	15,000
Mob/demob/vehicle rental	4,000
Reporting	4,800
Contingency (15%)	<u>22,283</u>
Phase II Total	<u>\$170,833</u>

**Phase III**

Project Geologist (70 days @ \$600/day)	42,000
Geologist (70 days @ \$500/day)	35,000
Core cutter (70 days @ \$200/day)	14,000
Drilling NQTW (2000m @ \$220/m)	440,000
Assaying (1000 samples @ \$55/sample)	55,000
Room and Board (510 person days @\$150/day)	76,500
Mob/demob	15,000
Reporting	20,000
Contingency (15%)	<u>104,625</u>
Phase III Total	<u>808,125</u>

Respectfully submitted this 2nd day of June, 2019.

Ken Galambos P. Eng.  
Victoria, British Columbia

**Item 19: References**

Arscott, D.; 1969; Geological Preliminary Examination of Vanhall Claims; Alberni Mining Division, BC; MEMPR Assessment Report #2436.

Arscott, D., Fitzgibbon, P.; 1972; Geochemical Survey Vanhall and DV Claims; Alberni Mining Division, BC; MEMPR Assessment Report #3953.

Galambos, K.; 2018; Interpretation Report Vanhall VMS Property; Alberni Mining Division, BC; MEMPR Assessment Report #37381.

Imperial Metals website; 2018; Imperial Reports on Drilling at the Catface Property news release; Retrieved from <https://www.imperialmetals.com/for-our-shareholders/press-releases/imperial-reports-on-drilling-at-the-catface-property>

Mining Technology website; 2018; Boliden Zinc, Copper, Gold and Silver Mine. Retrieved from <https://www.mining-technology.com/projects/myra/>

Nyrstar website; 2018; Myra Falls fact sheet; Retrieved from [www.nyrstar.com/en/about-us/operations/mining](http://www.nyrstar.com/en/about-us/operations/mining)

Price, B.J.; 2011; Assessment Work Report - Airborne Geophysical Survey TIB Property; Alberni Mining Division, BC; MEMPR Assessment Report #32983.

Roberts, A.F.; 1980; Geochemical Report on the Vanhall Claims; Alberni Mining Division, BC; MEMPR Assessment Report #8065.

Sheldrake, R.; 1981; Helicopter Magnetic And Electromagnetic Survey on the Vanhall and Shannon Claims; Alberni Mining Division, BC; MEMPR Assessment Report #9151.

Turner, J.; 2013; Assessment Report for the TIB Copper-Gold Property; Alberni Mining Division, BC; MEMPR Assessment Report #33706.

Vanderkley, D., Hall, D.; 1997; Magnetic/HLEM Survey and Soil Sampling on the Chumming Property; Alberni Mining Division, BC; MEMPR Assessment Report #25248.

Wagner, D.; 1994; Geological Mapping, Prospecting and Soil Sampling on the Chumming Property; Alberni Mining Division, BC; MEMPR Assessment Report #23654.

Wagner, D.; 1995; Magnetometer Survey and Soil Sampling on the Chumming Property; Alberni Mining Division, BC; MEMPR Assessment Report #24178.

**Item 20: Date and Signature Page**

1) I, Kenneth Daryl Galambos of 1535 Westall Avenue, Victoria, British Columbia am self-employed as a consultant geological engineer, authored and am responsible for this report entitled "Prospecting Report Vanhall/VMS Property", dated June 02, 2019.

2) I am a graduate of the University of Saskatchewan in Saskatoon, Saskatchewan with a Bachelor's Degree in Geological Engineering (1982). I began working in the mining field in 1974 and have more than 30 years mineral exploration and production experience, primarily in the North American Cordillera. Highlights of this experience include the discovery and delineation of the Brewery Creek gold deposit, near Dawson City, Yukon for Noranda Exploration Ltd.

3) I am a registered member of the Association of Professional Engineers of Yukon, registration number 0916 and have been a member in good standing since 1988. I am a registered Professional Engineer with APEGBC, license 35364, since 2010.

4) This report is based upon the author's personal knowledge of the region and a review of additional pertinent data.

5) As stated in this report, in my professional opinion the property is of potential merit and further exploration work is justified.

6) To the best of my knowledge this report contains all scientific and technical information required to be disclosed so as not to be misleading.

7) I am the owner of the mineral rights covered by the property in partnership with Ralph Keefe. My professional relationship is as a non-arm's length consultant, and I have no expectation that this relationship will change.

8) I consent to the use of this report for such assessment and/or regulatory and financing purposes deemed necessary, but if any part shall be taken as an excerpt, it shall be done only with my approval.

Dated at Victoria, British Columbia this 2nd day of June, 2019.

"Signed and Sealed"

Ken Galambos, P.Eng. (APEY Reg. No. 0916, APEGBC license 35364)  
KDG Exploration Services  
1535 Westall Ave.  
Victoria, British Columbia V8T 2G6

**Item 21: Statement of Expenditures**

Prospecting Trip - October 17-20, 2018

Ken Galambos 4 days @ \$600/day	\$2400.00
Ralph Keefe 4 days @ \$350/day	\$1400.00
Food 8 person days @ \$35/day	\$300.00
Vehicle 4 days @ \$100/day	\$400.00
Trailer 4 days @ \$50/day	\$200.00
Mileage Victoria - Vanhall return 810km @ \$0.50/km	\$405.00
Field supplies	\$30.00
Assays 10 samples @ \$55/sample	\$550.00
Shipping	\$30.00
Report 4 days @ \$600/day	\$2400.00
Management Fee @ 10%	<u>\$811.50</u>
Total	\$8926.50

**Item 22: Software used in the Program**

Adobe Acrobat 9

Adobe Reader 8.1.3

Google Earth Pro

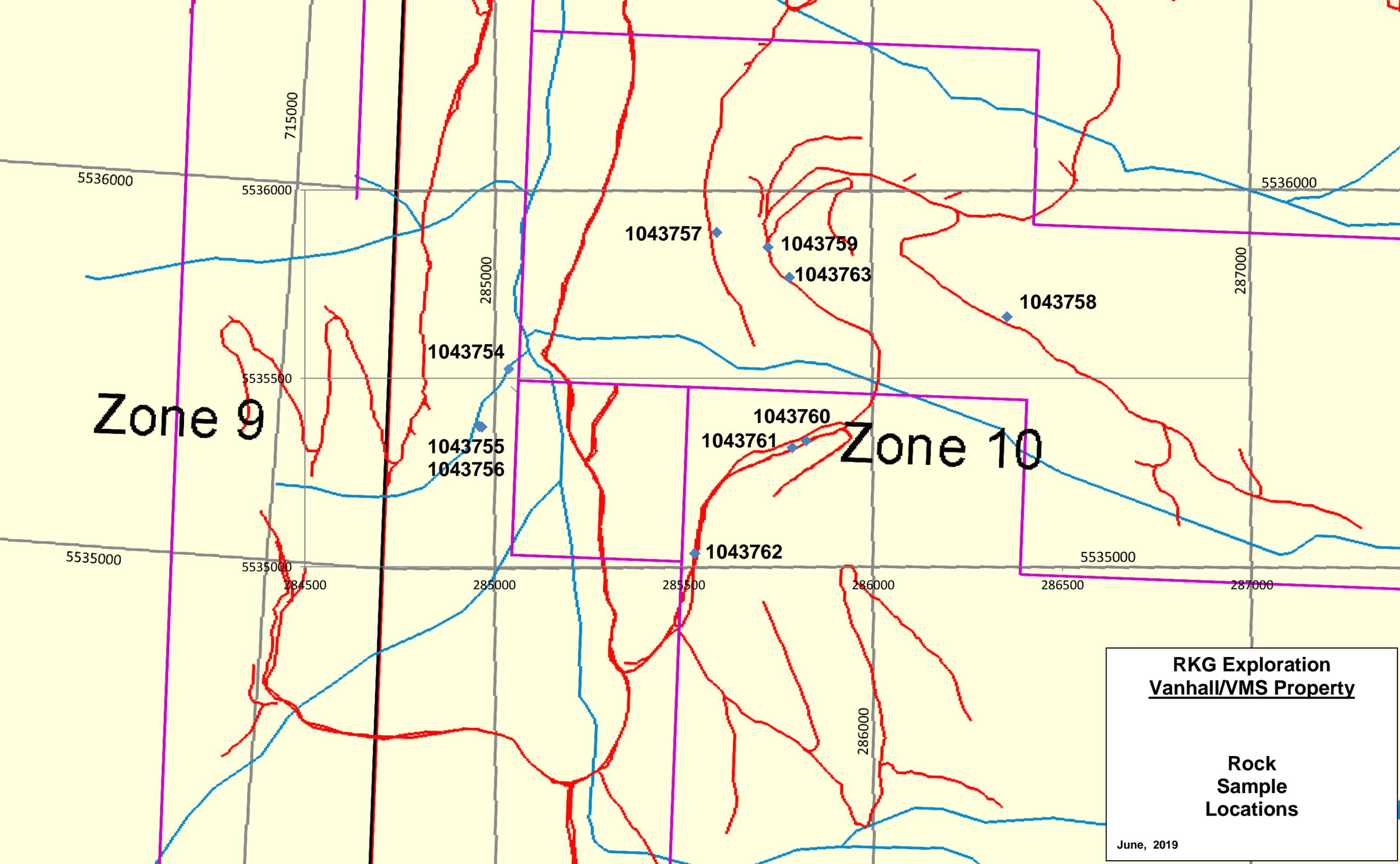
Internet Explorer

Microsoft Windows 7

Microsoft Office 2010

## **Item 23 Appendices**

**Appendix A**  
**Sample Location Map**



Zone 9

Zone 10

**RKG Exploration**  
**Vanhall/VMS Property**

**Rock**  
**Sample**  
**Locations**

June, 2019

1043757

1043759

1043763

1043758

1043754

1043760

1043761

Zone 9

1043755  
1043756

Zone 10

1043762

5536000

5536000

5536000

5535500

5535000

5535000

5535000

284500

285000

285500

286000

286500

287000

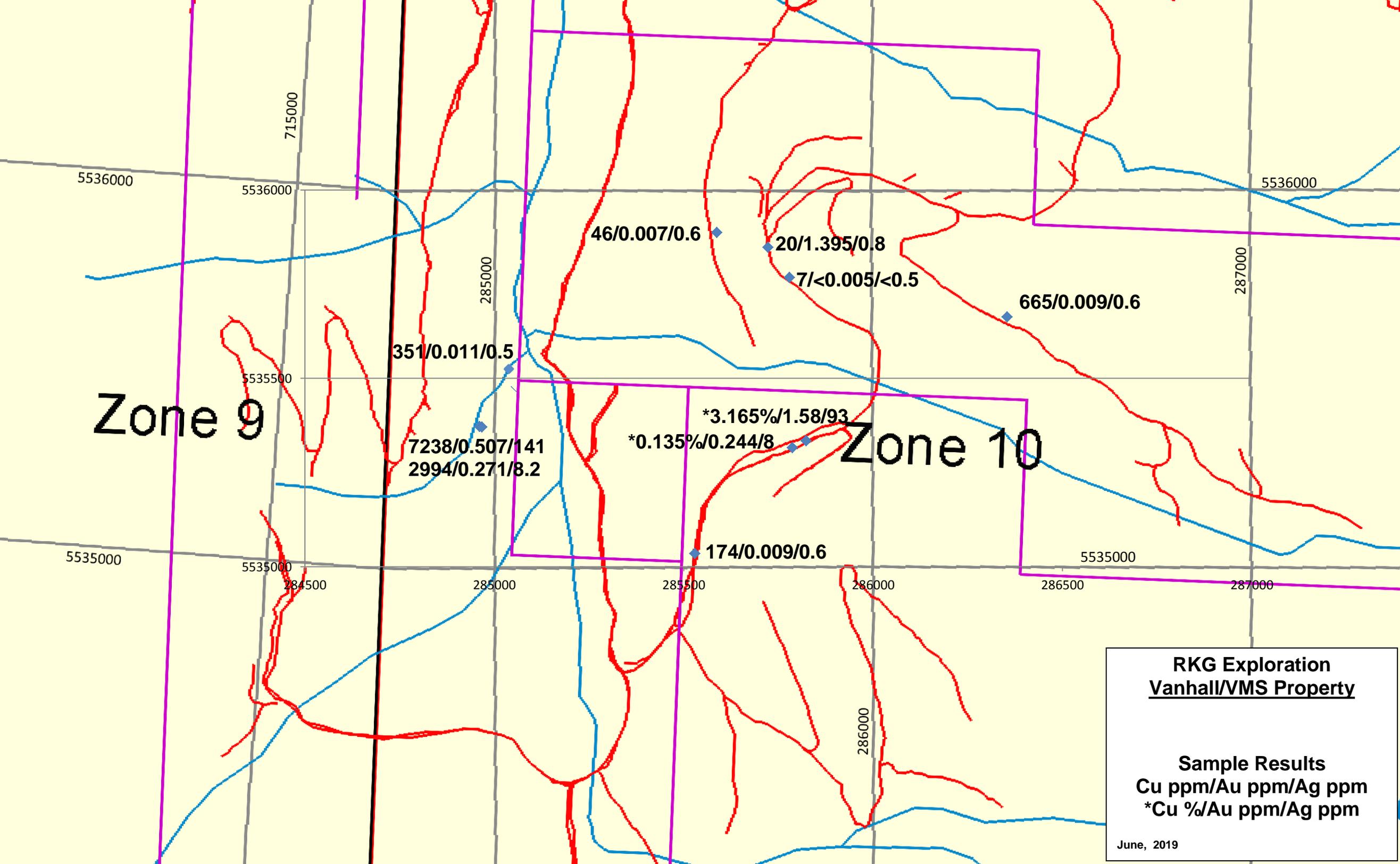
715000

285000

287000

286000

**Appendix B**  
**Sample Results**



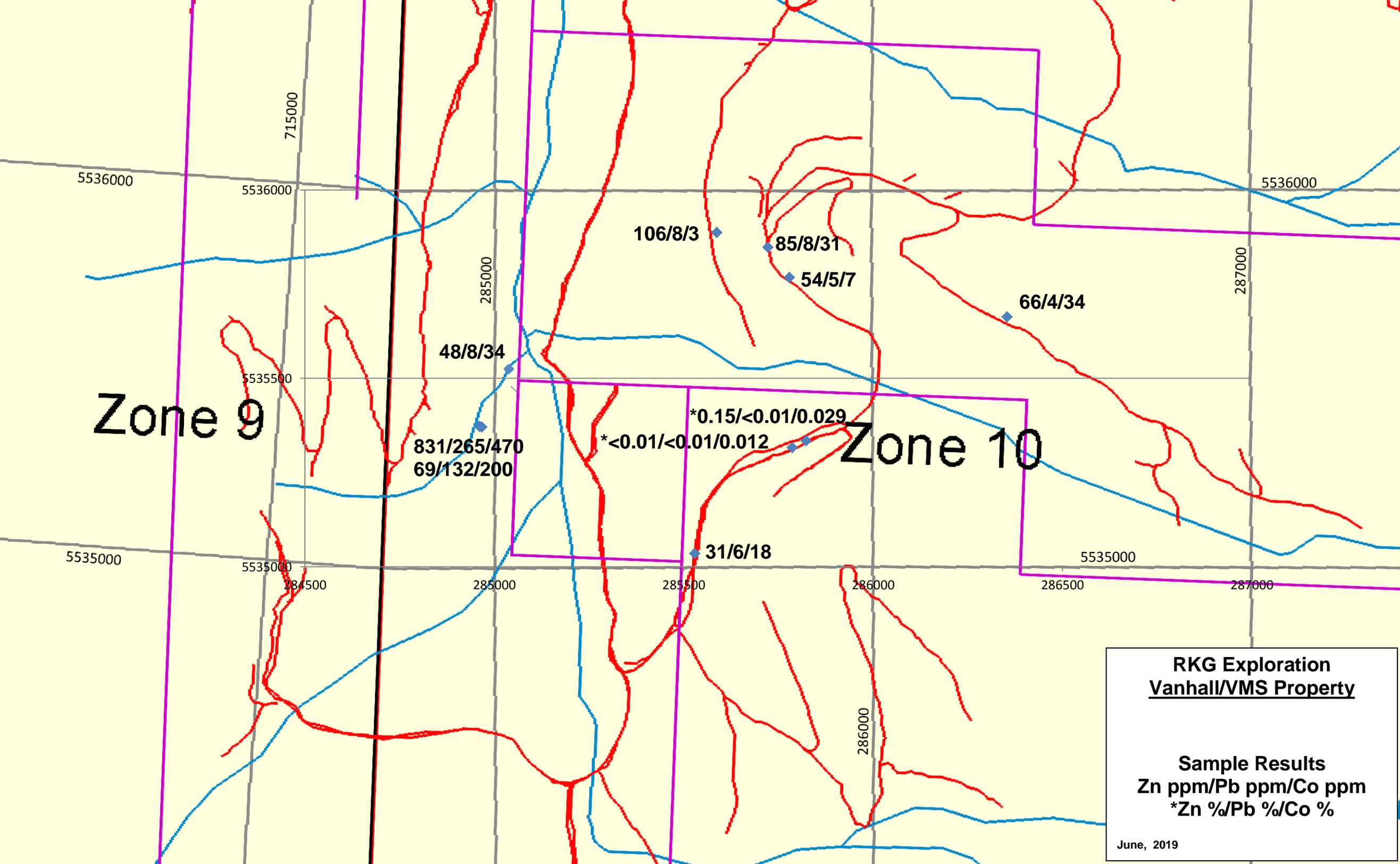
**Zone 9**

**Zone 10**

**RKG Exploration  
Vanhall/VMS Property**

**Sample Results**  
Cu ppm/Au ppm/Ag ppm  
\*Cu %/Au ppm/Ag ppm

June, 2019



Zone 9

Zone 10

**RKG Exploration**  
**Vanhall/VMS Property**

**Sample Results**  
Zn ppm/Pb ppm/Co ppm  
\*Zn %/Pb %/Co %

June, 2019

**Appendix B**  
**Assay Certificates**



**MS Analytical**

An A2 Global Company

MS Analytical  
Unit 1, 20120 102nd Avenue  
Langley, BC V1M 4B4  
Phone: +1-604-888-0875

To: **KDG Exploration Services**  
**1535 Westall Ave**  
**Victoria, BC, V8T 2G6**  
**Canada**

**CERTIFICATE OF ANALYSIS: YVR1910113**

Project Name:  
Job Received Date: 08-Jan-2019  
Job Report Date: 26-Jan-2019  
Number of Samples: 15  
Report Version: Final

**COMMENTS:**

Test results reported relate only to the samples as received by the laboratory. Unless otherwise stated above, sufficient sample was received for the methods requested and all samples were received in acceptable condition. Analytical results in unsigned reports marked "preliminary" are subject to change, pending final QC review. Please refer to MS Analyticals' *Schedule of Services and Fees* for our complete Terms and Conditions

SAMPLE PREPARATION	
METHOD CODE	DESCRIPTION
PRP-910	Dry, Crush to 70% passing 2mm, Split 250g, Pulverize to 85% passing 75µm

ANALYTICAL METHODS	
METHOD CODE	DESCRIPTION
FAS-111	Au, Fire Assay, 30g fusion, AAS, Trace Level
FAS-415	Au, Fire Assay, 30g fusion, Gravimetric
ICF-6Ag	Ag, 0.2g, 4-Acid, ICP-AES, Ore Grade
ICP-230	Multi-Element, 0.2g, 4-Acid, ICP-AES, Trace Level
ICP-240	Multi-Element, 0.2g, 4-Acid, ICP-AES, Ore Grade

**Signature:**

Yvette Hsi, BSc.  
Laboratory Manager  
MS Analytical



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**Canada**

**CERTIFICATE OF ANALYSIS: YVR1910113**

Project Name:  
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 Job Report Date: 26-Jan-2019  
 Report Version: Final

Sample ID	Sample Type	PWE-100 Rec. Wt. kg	Method Analyte Units	FAS-111 Au ppm	FAS-415 Au ppm	ICF-6Ag Ag ppm	ICP-230 Ag ppm	ICP-230 Al %	ICP-230 As ppm	ICP-230 Ba ppm	ICP-230 Be ppm	ICP-230 Bi ppm	ICP-230 Ca %	ICP-230 Cd ppm
Granite Blank	QC-P-BK	--	LOR	<0.005	0.05	1	0.5	0.01	5	10	0.5	2	0.01	0.5
Granite Blank	QC-P-BK	--		<0.005			<0.5	7.60	<5	731	1.0	<2	1.66	<0.5
103951	Rock	0.56		3.082			2.4	7.60	<5	752	1.0	<2	1.74	<0.5
103952	Rock	1.00		2.934			1.1	6.30	7416	117	<0.5	<2	0.77	2.4
103953	Rock	1.15		>10	9.92		3.1	4.61	165	139	<0.5	<2	2.27	56.7
1043752	Rock	0.39		0.026			0.5	0.79	5601	19	<0.5	4	1.11	9.2
1043753	Rock	0.34		0.024			0.8	8.93	22	808	1.2	<2	3.17	<0.5
1043754	Rock	1.69		0.011			0.5	8.67	16	338	0.6	<2	4.47	<0.5
1043755	Rock	0.53		0.501		138	>100	6.82	<5	137	0.8	<2	3.96	<0.5
1043755PD	QC-PD	--		0.507		141	>100	0.56	447	<10	<0.5	373	0.24	19.9
1043756	Rock	0.57		0.271			8.2	0.58	466	<10	<0.5	365	0.23	19.6
1043757	Rock	1.10		0.007			0.6	8.2	250	<10	<0.5	19	0.09	9.1
1043758	Rock	1.29		0.009			0.6	3.49	<5	964	0.8	<2	2.48	<0.5
1043759	Rock	1.05		1.395			0.6	8.52	<5	77	0.6	<2	6.23	<0.5
1043760	Rock	0.57		1.580			0.8	7.09	<5	178	0.7	2	2.95	<0.5
1043761	Rock	0.23		0.244			0.6	7.05	23	178	0.7	2	2.95	<0.5
1043762	Rock	1.17		0.009			<0.5	8.49	<5	911	1.2	<2	3.64	<0.5
1043763	Rock	0.49		<0.005				7.73	<5	163	1.4	<2	3.96	<0.5
DUP 103953				>10										
DUP 103953					9.83									
DUP 1043760							0.8	7.13	24	173	0.7	<2	2.98	<0.5
DUP 1043759														
STD BLANK				<0.005										

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Sample ID	Sample Type	PWE-100 Rec. Wt. kg	Method Analyte Units	FAS-111 Au ppm	FAS-415 Au ppm	ICF-6Ag Ag ppm	ICP-230 Ag ppm	ICP-230 Al %	ICP-230 As ppm	ICP-230 Ba ppm	ICP-230 Be ppm	ICP-230 Bi ppm	ICP-230 Ca %	ICP-230 Cd ppm
STD BLANK		0.01	LOR	0.005	0.05	1	0.5	0.01	5	10	0.5	2	0.01	0.5
STD BLANK					<0.05									
STD BLANK						<1	<0.5	<0.01	<5	<10	<0.5	<2	<0.01	<0.5
STD OxD127				0.452										
STD OxD90					25.10									
STD MP-1b							48.8	6.37	301	321	2.1	21	1.25	7.7
STD OREAS 601						147								
STD CDN-ME-1303														

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Project Name:  
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 Report Version: Final

	ICP-230 Co ppm	ICP-230 Cr ppm	ICP-230 Cu ppm	ICP-230 Fe %	ICP-230 Ga ppm	ICP-230 K %	ICP-230 La ppm	ICP-230 Li ppm	ICP-230 Mg %	ICP-230 Mn ppm	ICP-230 Mo ppm	ICP-230 Na %	ICP-230 Ni ppm	ICP-230 P ppm
Sample ID	1	1	1	0.01	10	0.01	10	10	0.01	5	1	0.01	1	10
Granite Blank	5	125	7	2.59	17	1.75	<10	<10	0.77	675	3	3.53	4	495
Granite Blank	5	135	7	2.66	19	1.79	<10	<10	0.77	670	1	3.50	6	497
103951	27	150	64	5.69	24	2.76	<10	<10	0.45	127	<1	0.05	46	537
103952	14	252	210	5.94	17	0.49	<10	<10	1.37	788	2	0.83	21	492
103953	9	371	172	9.06	11	0.26	<10	<10	0.05	66	6	0.02	20	23
1043752	6	77	2	3.52	24	1.99	<10	<10	1.02	746	2	2.53	1	1118
1043753	19	89	111	4.96	24	1.59	<10	<10	1.05	673	<1	3.69	11	1046
1043754	34	125	351	9.36	30	1.38	<10	<10	3.51	1176	11	0.94	48	1153
1043755	456	42	6929	46.79	49	<0.01	<10	<10	0.20	244	7	<0.01	150	<10
1043755PD	470	31	7238	47.15	51	<0.01	<10	<10	0.21	253	8	<0.01	150	<10
1043756	200	79	2994	31.07	51	0.12	<10	<10	1.76	588	<1	<0.01	59	298
1043757	3	80	46	3.81	19	2.46	<10	<10	0.81	913	1	1.60	3	875
1043758	34	122	665	8.45	31	0.43	<10	<10	3.72	1218	<1	2.26	66	652
1043759	31	130	20	10.53	30	1.45	<10	<10	2.36	1533	3	0.09	26	659
1043760														
1043761														
1043762	18	138	174	4.81	23	1.58	<10	<10	1.01	477	9	2.62	12	1255
1043763	7	53	7	3.22	21	0.86	<10	<10	0.97	973	<1	1.47	3	879
DUP 103953														
DUP 103953														
DUP 1043760														
DUP 1043759	32	132	22	10.65	30	1.48	<10	<10	2.38	1547	3	0.09	26	655
STD BLANK														

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Sample ID	ICP-230 Co ppm	ICP-230 Cr ppm	ICP-230 Cu ppm	ICP-230 Fe %	ICP-230 Ga ppm	ICP-230 K %	ICP-230 La ppm	ICP-230 Li ppm	ICP-230 Mg %	ICP-230 Mn ppm	ICP-230 Mo ppm	ICP-230 Na %	ICP-230 Ni ppm	ICP-230 P ppm
STD BLANK	1	1	1	0.01	10	0.01	10	10	0.01	5	1	0.01	1	10
STD BLANK	<1	<1	<1	<0.01	<10	<0.01	<10	<10	<0.01	<5	<1	<0.01	<1	<10
STD BLANK														
STD BLANK														
STD OxD127														
STD OxD90														
STD MP-1b														
STD OREAS 601	4	38	1007	2.45	26	2.08	17	15	0.38	469	3	1.53	24	453
STD CDN-ME-1303														

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	ICP-230 Pb ppm	ICP-230 S %	ICP-230 Sb ppm	ICP-230 Sc ppm	ICP-230 Sr ppm	ICP-230 Th ppm	ICP-230 Ti %	ICP-230 Tl ppm	ICP-230 V ppm	ICP-230 W ppm	ICP-230 Zn ppm	ICP-230 Zr ppm	ICP-240 Ag ppm	ICP-240 Al %
Sample ID	2	0.01	5	2	1	10	0.01	10	1	10	2	5	1	0.05
Granite Blank	5	0.06	<5	10	215	<8	0.25	<10	51	13	37	58		
Granite Blank	4	0.07	<5	10	219	<8	0.26	<10	55	11	35	57		
103951	107	4.76	8	30	7	<8	0.87	<10	278	<10	92	18		
103952	7	1.08	<5	15	124	<8	0.40	<10	118	12	2876	18		
103953	171	9.65	13	3	7	<8	0.06	<10	28	<10	397	<5		
1043752	12	0.27	<5	3	509	<8	0.23	<10	25	<10	118	58		
1043753	11	1.51	<5	14	222	<8	0.39	<10	205	<10	45	55		
1043754	8	4.92	<5	32	257	<8	0.84	<10	314	11	48	26		
1043755	257	>10	<5	<2	<1	<8	0.02	26	16	61	776	12		
1043755PD	265	>10	11	<2	<1	<8	0.02	28	17	108	831	12		
1043756	132	>10	15	5	<1	<8	0.05	23	61	12	69	22		
1043757	8	0.10	<5	6	249	<8	0.20	<10	33	11	106	66		
1043758	4	0.10	<5	38	313	<8	1.01	<10	310	<10	66	88		
1043759	8	3.55	<5	22	179	<8	0.60	<10	163	29	85	35		
1043760													93	0.45
1043761													8	1.99
1043762	6	1.56	<5	7	719	<8	0.24	<10	75	<10	31	44		
1043763	5	0.02	<5	8	309	<8	0.22	<10	71	<10	54	32		
DUP 103953														
DUP 103953														
DUP 1043760													95	0.44
DUP 1043759	7	3.59	<5	22	181	<8	0.61	<10	168	28	84	36		
STD BLANK														

\*\*\*Please refer to the cover page for comments regarding this certificate. \*\*\*



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Table with 15 columns (Sample ID, ICP-230 Pb, ICP-230 S, ICP-230 Sb, ICP-230 Sc, ICP-230 Sr, ICP-230 Th, ICP-230 Ti, ICP-230 Tl, ICP-230 V, ICP-230 W, ICP-230 Zn, ICP-230 Zr, ICP-240 Ag, ICP-240 Al) and 5 rows of data including STD BLANK and STD OREAS 601.

\*\*\*Please refer to the cover page for comments regarding this certificate. \*\*\*



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Table with 15 columns (Sample ID, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, La, Li, Mg) and multiple rows of data including sample IDs like 1043754, 1043755, 1043755PD, 1043756, 1043757, 1043758, 1043759, 1043760, 1043761, 1043762, 1043763, and DUP samples.

\*\*\*Please refer to the cover page for comments regarding this certificate. \*\*\*



An A2 Global Company

MS Analytical  
 Unit 1, 20120 102nd Avenue  
 Langley, BC V1M 4B4  
 Phone: +1-604-888-0875

To: **KDG Exploration Services**  
**1535 Westall Ave**  
**Victoria, BC, V8T 2G6**  
**Canada**

**CERTIFICATE OF ANALYSIS: YVR1910113**

Project Name:  
 Job Received Date: 08-Jan-2019  
 Job Report Date: 26-Jan-2019  
 Report Version: Final

	ICP-240 As %	ICP-240 Ba %	ICP-240 Be %	ICP-240 Bi %	ICP-240 Ca %	ICP-240 Cd %	ICP-240 Co %	ICP-240 Cr %	ICP-240 Cu %	ICP-240 Fe %	ICP-240 K %	ICP-240 La %	ICP-240 Li %	ICP-240 Mg %
Sample ID	0.005	0.001	0.001	0.005	0.05	0.001	0.001	0.001	0.001	0.05	0.1	0.005	0.005	0.05
STD BLANK	<0.005	<0.001	<0.001	<0.005	<0.05	<0.001	<0.001	<0.001	<0.001	<0.05	<0.1	<0.005	<0.005	<0.05
STD BLANK														
STD BLANK														
STD BLANK														
STD OxD127														
STD OxD90														
STD MP-1b	2.262	<0.001	<0.001	0.100	2.49	0.054	<0.001	<0.001	3.049	8.26	0.2	<0.005	<0.005	<0.05
STD OREAS 601														
STD CDN-ME-1303														

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	ICP-240 Mn %	ICP-240 Mo %	ICP-240 Na %	ICP-240 Ni %	ICP-240 P %	ICP-240 Pb %	ICP-240 S %	ICP-240 Sb %	ICP-240 Sr %	ICP-240 Ti %	ICP-240 Tl %	ICP-240 V %	ICP-240 W %	ICP-240 Zn %
Sample ID	0.01	0.001	0.05	0.001	0.01	0.01	0.05	0.005	0.01	0.05	0.005	0.001	0.01	0.01
Granite Blank														
Granite Blank														
103951														
103952														
103953														
1043752														
1043753														
1043754														
1043755														
1043755PD														
1043756														
1043757														
1043758														
1043759														
1043760	0.01	0.002	0.10	0.015	<0.01	<0.01	>10	<0.005	<0.01	0.06	<0.005	0.003	<0.01	0.15
1043761	0.07	<0.001	0.09	0.008	0.02	<0.01	2.97	<0.005	<0.01	0.40	<0.005	0.015	<0.01	<0.01
1043762														
1043763														
DUP 103953														
DUP 103953														
DUP 1043760	0.01	0.002	0.10	0.016	<0.01	0.01	>10	<0.005	<0.01	0.06	<0.005	0.003	<0.01	0.15
DUP 1043759														
STD BLANK														

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	ICP-240 Mn %	ICP-240 Mo %	ICP-240 Na %	ICP-240 Ni %	ICP-240 P %	ICP-240 Pb %	ICP-240 S %	ICP-240 Sb %	ICP-240 Sr %	ICP-240 Ti %	ICP-240 Tl %	ICP-240 V %	ICP-240 W %	ICP-240 Zn %
Sample ID	0.01	0.001	0.05	0.001	0.01	0.01	0.05	0.005	0.01	0.05	0.005	0.001	0.01	0.01
STD BLANK	<0.01	<0.001	<0.05	<0.001	<0.01	<0.01	<0.05	<0.005	<0.01	<0.05	<0.005	<0.001	<0.01	<0.01
STD BLANK														
STD BLANK														
STD BLANK														
STD OxD127														
STD OxD90														
STD MP-1b	0.05	0.029	0.09	0.001	0.02	2.08	>10	<0.005	<0.01	<0.05	<0.005	<0.001	0.12	16.69
STD OREAS 601														
STD CDN-ME-1303														

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