

Dolly Varden Property

Upper Kitsault Valley Area, British Columbia

NTS 103P/11, 12

Recommended 1999 Exploration Program

For

New Dolly Varden Minerals Inc.

By

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SUMMARY

The most profitable producing mine in British Columbia and the jewel in the Homestake Mining Company stable is the Eskay Creek gold-silver deposit in the Stewart area. The Eskay Creek mine began production with mineable reserves of 1.19 million tons grading 1.91 oz/ton Au, 85.45 oz/ton Ag, 5.7 % Zn, 0.77 % Cu and 2.89 % Pb and a geological resource of 4.73 million tons grading 0.84 oz/ton Au and 30.24 oz/ton Ag. On January 1, 1999 total production reached 506,900 tons grading 1.875 oz/ton Au, 90.64 oz/ton Ag, plus minor lead and zinc while mineable reserves stood at 1.60 million tons grading 1.68 oz/ton Au and 72.70 oz/ton Ag. During 1998, Eskay Creek produced 504,800 ounces of gold equivalent at a cash cost of \$133 per ounce of gold equivalent.

The major deposits in the Stewart Complex occur in two geological associations: firstly, epithermal gold-silver veins and porphyry Cu-Au deposits occur in the lower sequence of Hazelton group and secondly, volcanogenic Au-Ag-Zn and -Cu deposits occur in the upper sequence of Hazelton group. The distinction is quite dramatic and important in exploration planning.

Located within the upper Hazelton sequence, the Eskay Creek mine has few parallels in mining history. Geological studies now identify it as a shallow sub-aqueous hot spring deposit. Exceptional grades of gold occur within a volcanogenic massive sulphide deposit. Recent geological studies show the metals contained within the deposit and the associated intrusions and volcanic rocks have a chemical signature of a very deep-seated magma. This rare mineralizing source is in distinct contrast to the island arc setting of most of the other deposits of the region.

The Eskay Creek mine formed within a tectonic rift. Conditions of that rift event are present in the following principal areas of the Stewart region:

1. McQuillan ridge -Eskay Creek area: The Eskay Creek mine is located within a local rift of Hazelton group rocks that have been infilled with Betty Creek and Salmon River formation rocks. The shallow hot spring setting has altered and veined the Betty Creek volcanics and vented the massive sulphide and exhalative deposits of the Eskay Creek mine. Bedded sulphides and sulphates are located within Salmon River formation.
2. Upper Kitsault Valley: Claims owned by New Dolly Varden Minerals Inc. contain strata and a geological setting correlative with the Eskay Creek mine section. The shallow hot spring has altered several "stacked" horizons in Betty Creek formation

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and vented massive sulphide and exhalative deposits of the Dolly Varden, North Star and Torbrit mines. Bedded sulphides and sulphates are located within Betty Creek formation. The uppermost horizon in the stack is correlative with the volcanic base of the Salmon River formation. The volcanic exhalative mineralization indicates a large mineralizing system persistent for long span of time.

The volcanogenic deposits of the upper Hazelton sequence include the Eskay Creek mine (Au-Ag-Zn-Pb-Cu), the Dolly Varden mines (Ag and Ag-Zn-Pb-Cu-Au) and the Anyox mine (Cu and some Au). Together, the localities of these three producing / past-producing mines comprise the greatest known volumes of volcanic exhalative sulphide and sulphate deposition in the Stewart area. Geologically, the Dolly Varden deposits are impressive in the accumulation of very large, thick beds of massive barite, sulphides, silica and carbonates up to 20m (60 ft.) in thickness and distributed over greater than five kilometres of strike length.

Deposits with a volcanogenic genesis are known to cluster. Priority for exploration is on the upper Hazelton sequence within the Red Point-Kitsol zone. Analogous to Eskay Creek, the zone represents a transition from Betty Creek volcanism to volcanism and turbidite sequences of Salmon River formation. The zone includes all the significant gold occurrences on the property.

Proposed herein is a 1999 program of exploration and expenditures totalling \$1.45 million.

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INTRODUCTION

The principle mine in the Stewart area is the Eskay Creek gold-silver deposit. See Figures 1 and 2 for the location of the Stewart mining camp.

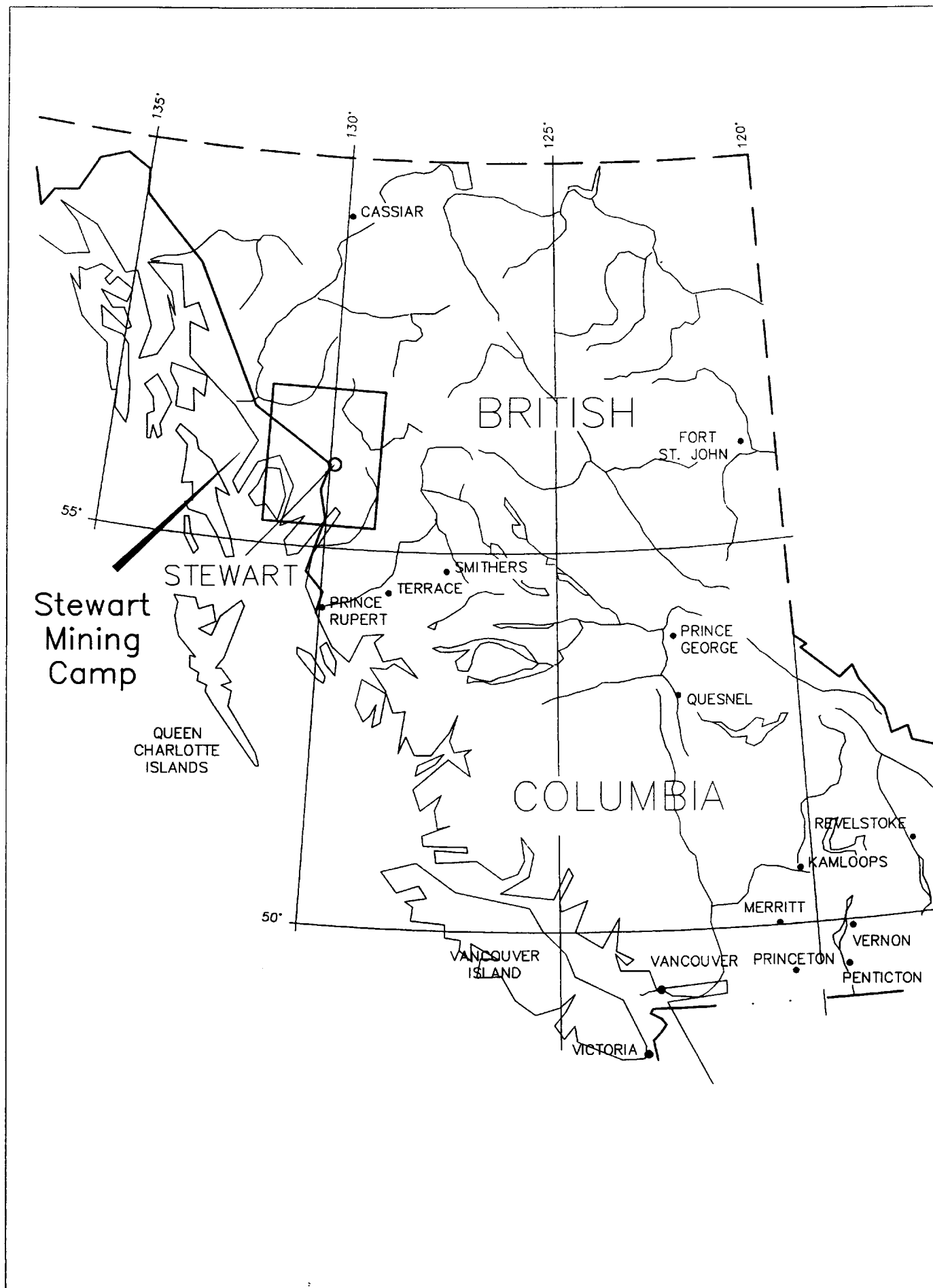
The Eskay Creek mine began production with mineable reserves of 1.19 million tons grading 1.91 oz/ton Au, 85.45 oz/ton Ag, 5.7 % Zn, 0.77 % Cu and 2.89 % Pb and a geological resource of 4.73 million tons grading 0.84 oz/ton Au and 30.24 oz/ton Ag. On January 1, 1999 total production reached 506,900 tons grading 1.875 oz/ton Au, 90.64 oz/ton Ag, plus minor lead and zinc while mineable reserves stood at 1.60 million tons grading 1.68 oz/ton Au and 72.70 oz/ton Ag. During 1998, Eskay Creek produced 504,800 ounces of gold equivalent at a cash cost of \$133 per ounce of gold equivalent.

The Eskay Creek-type deposits are very attractive because of their bonanza grades of gold and silver in a polymetallic massive sulphide. Significantly, the massive sulphides tend to occur in clusters. Exploration of these massive sulphide environments requires a sound understanding of the geological setting.

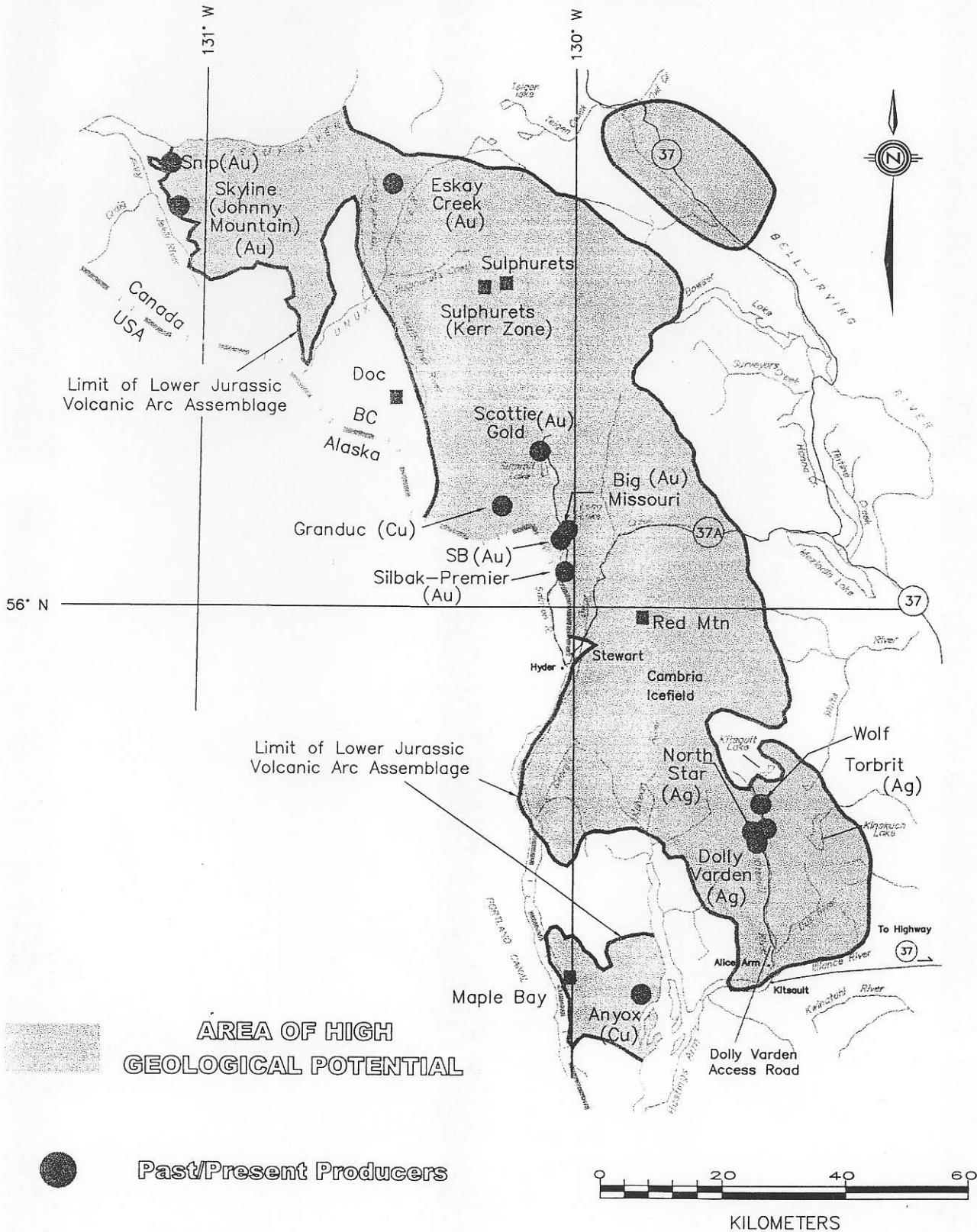
The principal holding of the Company in the Stewart area is the Dolly Varden precious metal property, which is comprised of approximately 20 square kilometres. The property represents the culmination of efforts, extending over 40 years, to consolidate the once famous and very substantial Western Canadian Mining Camp. It now includes the Dolly Varden mine, the Torbrit mine, the Wolf Mine, the North Star mine and other excellent exploration targets, such as the Dolly Varden Goldbelt prospects.

The southern end of the Stewart Complex is underlain mostly by the Eocene-age coast range batholith. The Jurassic Hazelton volcanic, sedimentary and intrusive rocks occur in two principal localities: within a roof pendant at Anyox / Maple Bay and also east of the batholith at the Dolly Varden property in the Upper Kitsault valley. Rocks of the upper Hazelton sequence dominate at both localities.

The volcanogenic deposits of the upper Hazelton sequence include the Eskay Creek mine (Au-Ag-Zn-Pb-Cu), the Dolly Varden mines (Ag and Ag-Zn-Pb-Cu-Au) and the Anyox mine (Cu and some Au). Together, the localities of these three producing / past-producing mines comprise the greatest known volumes of volcanic exhalative sulphide and sulphate deposition in the Stewart area. Geologically, the Dolly Varden deposits are impressive in the accumulation of very large, thick beds of massive barite, sulphides, silica and carbonates up to 20m (60 ft.) in thickness and distributed over greater than five kilometres of strike length.



STEWART MINING CAMP



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The unique chemistry of the belt is due to very high heat flow, fluid circulation and volcanism within restricted, rift-related, sub-aqueous basins. Until very recently, the setting and age of these deposits was not well understood. Advances in mapping and dating of the local volcanics and sediments have indicated a common geological setting and age of these deposits. The deposits were probably formed in a continental rift analogous to the present day Gulf of California.

The Anyox deposit is copper-rich and dominated by volcanics likely emplaced in the center of the rift and in a deeper oceanic setting. Importantly, the Eskay Creek and Dolly Varden deposits show geochemical features indicative of formation in a related continental rift but deposition in much shallower water. Precious metals dominate the economics of both. They are essentially volcanogenic massive sulphide deposits with significant precious metals, base metals such as zinc and lead and accessory minerals such as barite.

Historically, exploration and mining at the Dolly Varden property has focussed on the Dolly Varden-North Star-Torbrit mines. These past producers are now seen to be in the middle of the highly prospective upper Hazelton sequence. Two to four hundred meters stratigraphically higher on the property is a sequence of altered and mineralized volcanics and debris flows that have seen little modern exploration. Proposed herein is a comprehensive exploration program targeting both the extensions of the mined horizons and the higher level stratigraphy.

Land Status.

All claims constituting the Dolly Varden property are 100% owned by New Dolly Varden Minerals Inc.

The Dolly Varden property consists of 42 crown granted mineral claims, 69 units or claims of reverted crown grants or two-post mineral claims or four-post (Modified Grid System) mineral claims and 7 mining leases (see Map 1). The total area of the Dolly Varden property is approximately 1966 hectares or 4857 acres.

History of Exploration and Production

The Dolly Varden property lies within the southeasterly extremity of the Stewart Complex. The Stewart Complex is best known for its high-grade gold-silver deposits such as the Silbak-Premier mine, SB, Sulphurets, Skyline (Johnny Mtn.) mine, Snip mine, Red Mtn. and the Eskay Creek mine. The important Anyox deposits of Hidden Creek

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volcanics and sediments (Eskay Creek member, Mt. Dillworth formation, Betty Creek formation and Salmon River formation).

See Figure 3 for the Table of Formations of the lithologies in the Stewart Complex. Figures 4, 5 and 6 show the comparative stratigraphy and intrusive history of the Eskay Creek, Anyox and Dolly Varden (Upper Kitsault Valley) areas.

Lower Hazelton Sequence: Unuk River Formation

Volumetrically, most of the Hazelton group is comprised of a typical calc-alkaline island arc assemblage. The base of the Hazelton is locally Unuk River formation of Lower Pliensbachian to Hettangian age. It comprises the lower Hazelton sequence. Intrusions coeval with Unuk River formation are spatially associated with porphyry Cu-Au and epithermal Au-Ag vein deposits.

Island arc formation probably ceased in late Pliensbachian time or Toarcian time.

Upper Hazelton Sequence

This sequence comprises an important rift-infilling assemblage distinct from both the underlying pre-Toarcian Hazelton and from the Bathonian and younger Bowser Lake Group.

Pliensbachian Sediments and Volcanics

Pliensbachian time was marked by a hiatus in volcanism over much of Stikinia and the start of back-arc rifting and possibly continental rifting. Restricted basins of highly variable stratigraphy are common. East of the property, near the Kitsault Lake, the Pliensbachian rocks include some volcanics and stratiform zinc mineralization. The zinc occurs in an exotic association with barite, strontianite and celestite plus accessory arsenopyrite and orpiment. Footwall volcanics are dated as 193 ma or Pliensbachian age.

Aalenian to Toarcian Volcanics – Eskay Creek Member / Mt. Dillworth Fm. and Betty Creek Fm.

The upper sequence rocks were deposited in irregular structurally controlled basins and stratigraphic thickness varies markedly over short distances. The upper sequence strata are termed Betty Creek (intermediate volcanics and sediments) and Mt. Dillworth (felsic volcanics). Locally the names have been superseded by the term "Eskay Creek Member"

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and others were mined principally for copper. Figure 1 shows the Dolly Varden property in relation to the other major deposits of the Stewart Complex.

Significant exploration success in the late 1980's further fuelled a staking rush in the Stewart Complex. All the interesting ground in the area was staked by mid-1988. The focus of staking then shifted beyond the Stewart Complex, northward to the Galore Creek area. The southeastern extension of the Stewart Complex has escaped the increased attention, due to the dominant, pre-existing land position controlled by The Company (Maple Bay and the Kitsault Valley) and Comineo (Anyox).

The first staking in the Dolly Varden area occurred in 1910 with location of the Red Point No. 1 mineral claim. The first claims for silver in the Dolly Varden mine area were staked in 1911. The Sportsman and North Star were staked in 1912 and 1914 respectively.

Extensive prospecting, test pitting and drifting was carried out over the next seven years to develop the Dolly Varden silver deposit and bring it to production in 1919. The Dolly Varden mine produced 1,315,678 ounces of silver from 36,854 tons of ore, at an average grade of 35.7 ounces silver per ton. Mineral reserves in the Dolly Varden deposit have been estimated at 47,000 tons grading 22 ounces silver per ton.

The only other deposit in the area to see production was the Torbrit. From 1949 to 1959 Torbrit Silver Mines Limited produced 18,706,847 ounces of silver and 5,386 tons of lead from 1,377,832 tons of ore. The average grade was 13.6 ounces silver per ton and 0.39 percent lead. Present mineral resources range from 294,500 tons to 867,000 tons grading 9.5 ounces and 9.1 ounces silver per ton respectively, depending on the source of the calculation.

Although never in production, the North Star deposit has a mineral resource of 141,577 tons (diluted) grading 11.7 ounces silver per ton above the 1025-ft. level. Although not considered in the resource calculation, zinc is abundant enough to make it more valuable than the silver in many mineralized intersections.

During production at the Torbrit, exploration and development continued on the North Star and Wolf prospects. Lesser amounts of exploration were conducted on the Moose Lamb, Tiger and Surprise showings. From 1969 to 1973 Dolly Varden Mines Ltd. (the "Company") conducted surface exploration and diamond drilling on other mineralized quartz-barite occurrences in the area.

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From 1979 to 1981 The Company commissioned consultants Derry, Michener and Booth to conduct diamond drill exploration and resource calculations of the silver deposits.

In 1986, B. Devlin working on behalf of Derry, Michener, Booth and Wahl, and The Company, recognised the probable volcanogenic origin of the Dolly Varden-North Star-Torbrit silver deposits. Devlin completed a thesis on the Dolly Varden deposits in defence of his M.Sc. degree at the University of British Columbia.

In 1989, the Company initiated a comprehensive, multistage surface exploration program that included 7,404 feet of drilling on the Red Point and Red Point Extension showings along with detailed geologic mapping and geochemical sampling of a limited area of the extensive Goldbelt alteration. In conjunction with this work, a surface diamond-drilling program on the North Star deposit was completed, consisting of 7,864 feet in 6 holes, to verify drilling done by Torbrit Silver Mines Limited in 1957. The program confirmed the previous results and indicated the presence of an extensive volcanic exhalative horizon. The 1989 program was conducted from a camp in the Red Point area and drill core is stored there.

From June 1 to August 31, 1990 a comprehensive surface diamond-drilling program was conducted on portions of the North Star, Dolly Varden, Torbrit deposits and the "V" zone. Diamond drill core is stored at the 1990 campsite, located 5 km north of Alice Arm near the Kitsault River. The site is accessible by road.

REGIONAL GEOLOGY

Lower Jurassic: Hazelton Group and Co-eval Intrusions

The major focus of precious and base metal exploration programs in the Stewart area is on island arc and rift-related rocks of Jurassic age. The Jurassic rocks are part of the Triassic-Jurassic Stikinia assemblage. Figure Two shows the major Jurassic rock formations of the Stewart area. The principal subdivisions of Hazelton group are as follows:

- Lower Hazelton sequence: Island arc rocks of Pliensbachian to Hettangian age (Unuk River formation).
- Upper Hazelton sequence: Mostly rift related volcanics and sediments of Aalenian to Pliensbachian age. Highly variable sequence ranging from shallow to deep water

FIG. 3: MAJOR VOLCANIC AND SEDIMENTARY FORMATIONS OF THE STEWART-ISKUT BELT

EPOCH/STAGE	SETTING	GROUPS / FORMATIONS	LITHOLOGIES	DEPOSITS
Middle Jurassic / Bathonian	Successor basin	Bowser Lake / Ashman	Turbidites, wackes, intra formational conglomerates, basal chert pebble conglomerates in northeast, not seen in Stewart-Iskut.	Coal
Lower to Middle Jurassic / Toarcian to Bajocian	Rift / Back-arc basin	Hazelton (Upper) / Salmon River	Pyjama beds: thinly bedded turbidites, alternating siltstone and argillite. Basal fossiliferous limestone or fossiliferous wacke. Locally, basal sections of Salmon River locally contain bimodal basalt-rhyolite volcanism and intercalated mudstone sections with volcanic exhalative mineralization and sulphide/sulphate debris flow deposits.	Eskay Creek, Dolly Varden & Anyox deposits occur in Salmon River fm. and Eskay Creek member.
Lower Jurassic / Upper Pliensbachian to Toarcian	Rift / Back-arc basin	Hazelton (Upper): Eskay Creek Member or Betty Creek Formation	Dacitic ash and lapilli tuff, some welded ash flow. Hematitic volcanic sediments, turbidites; Dacitic and andesitic tuffs, lapilli tuffs and flows. Base of the section is U. Pliensbachian sediments correlative with back-arc basins in Stewart-Smithers areas.	Eskay Creek, Dolly Varden & Anyox deposits occur in Salmon River fm. and Eskay Creek member.
Lower Jurassic / Sinemurian or Hettangian (?) to Pliensbachian	Island arc.	Hazelton (Lower) / Unuk River	Two feldspar and hornblende porphyritic tuffs and flows. Massive tuffs and lapilli tuffs with local volcanic sediments. Locally intercalated with turbidite, siltstone and minor limestone.	Cu-Au Porphyry and Au-Ag epithermal deposits including Silbak-Premier, Scottie Gold, Sulphurets. Kerr Cu-Au porphyry
Upper Triassic / Norian to Karnian	Island arc	Stuhini	Pyroxene porphyry flows and tuffs. Siltstone, limestone and conglomerate.	

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describing some of the rocks in the Eskay Creek area. Realistically, formation names are difficult to employ in this setting due to the rapid facies changes.

Together with Salmon River formation, the Toarcian volcanics comprise the bulk of the upper sequence in the Hazelton group.

Toarcian to Bajocian – Salmon River Formation

Salmon River formation rocks were deposited in restricted Toarcian to Bajocian age basins. In the Stewart area, the formation most frequently contains a basal limestone or fossiliferous wacke. Other sediments include turbidites, siltstone and argillite. Locally, highly variable volumes of pillowed basalt flows occur within Salmon River. The base of the formation is comprised of rhyolite and/or basalt that locally interfinger with the fossiliferous sediments, notably at Eskay Creek, Anyox and Dolly Varden/Torbrit.

At the Eskay Creek mine site, an assemblage of volcanics of distinctive chemistry lies at the base of the Salmon River formation. Basal rhyolite flows and breccia interfinger with mudstone and turbidite. The contact zone with the rhyolite is the main mineralized horizon at Eskay Creek, comprised of volcanic exhalative massive sulphides exceptionally rich in gold and silver. Above the contact zone are mostly turbidites and basalt flows and sills.

In area of interest to the Company, the geology is summarised in the sections following.

At the Eskay Creek and Upper Kitsault Valley, Hazelton group rocks belong mostly to the upper sequence, spanning Toarcian to Aalenian-Bajocian age.

Upper Kitsault River Area

Since completion of the extensive 1989-90 exploration program, no new data is available in the Upper Kitsault Valley area. Information assembled in the 1980's and early 1900's by the BC Geological Survey branch and by Dolly Varden has well defined the geology. The base of the interpreted back-arc / rift assemblage is the basaltic andesite-andesite sequence of the Dolly Varden-North Star-Torbrit. East of the Torbrit mine, at Kitsault Lake, lie volcanics and sediments of Late Pliensbachian age.

Baritic-precious metal-base metal rich exhalites occur at three principle stratigraphic horizons on the Dolly Varden property within the basal, mid- and top levels. The section is mixed sub-aqueous and sub-aerial. The top of the sequence is a fossiliferous wacke lying on the top of the rift-filling volcanic sequence and at the transition to the

Figure 7. Comparison of the Geological Features of Eskay Creek and Dolly Varden Deposits.

<i>Geological Feature</i>	<i>Eskay Creek Deposits</i>	<i>Dolly Varden Deposits</i>
Commodities Major metals Minor metals Trace metals	Au, Ag Zn, Cu <u>Hg, Sb, As</u>	Ag, Pb Zn <u>Sb, As</u> Hg at Kitsault Lake
Sub-Aqueous Hotspring Geology Bedded pyrite/sulphides Bladed barite Jasper/silica Sulphide/ Sulphate Debris Flows	All zones 21B and 21C zones Yes Feature of 21B zone	Top of DVT zones North Star & Torbrit Accessory, all zones Top of DVT zone & Red Point - Kitsol zones. Some debris flows contain Au-Cu.
Epithermal Footwall Stringer Zones Chlorite-Pyrite Potassium Felspar Alteration Chalcedony Au-Ag-Cu	Yes, in Betty Creek Formation. Yes Yes Yes in discovery area	Yes, all zones in Betty Creek Fm Yes, in Red Point Yes, in Red Point Yes, in Red Point especially in chalcedonic/k-spar area
Host Rock Formations Salmon River Fm. Betty Creek Fm	Turbidites, basal pyritic felsic and basic volcanics Flows, breccias, volcaniclastics	Turbidites, basal pyritic felsic volcanics Flows, breccias, volcaniclastics

PROPERTY GEOLOGY

Introduction

The Dolly Varden property was geologically mapped at a scale of 1:5,000 from June 15 to August 10, 1990. Walter Melnyk, P.Eng. and Garnet Dawson, P.Geo. mapped approximately 18 square km centred on the Dolly Varden - North Star - Torbrit Mine area. The 1990 mapping program resolved the complex stratigraphy and determined the time-stratigraphic setting of the Dolly Varden exhalative mineralization (DVT zone) with the expectation of discovering extensions. Descriptions of the property geology herein are adopted from the report by Melnyk and Dawson, with changes to ages and unit names to reflect the recent refinements of the regional geology.

Lithologies

Hazelton Group (Lower Jurassic): Unuk River Formation

Sinemurian and Pliensbachian age Unuk River Formation crops out on the eastern and western fringes of the Dolly Varden property. The rocks consist of an assemblage of heterolithic pebble and cobble conglomerate, siltstone, argillite and wacke. Some intermediate volcanic flows and breccias occur. The unit is distributed as shown on geology map 1 and is labelled Unit 3a and 3b.

Melnyk and Dawson described these rocks as Upper Triassic. However, Mortensen and Kirkam dated by U-Pb a rhyolite flow at Kitsault Lake as 193.5 Ma. This indicates the section along strike is early Pliensbachian. The rhyolite lies in the footwall of a strontianite-celestite-pyrite-sphalerite exhalite. That exhalite belongs either to Unit 3 or the younger Unit 4 of this map area.

Hazelton Group (Lower Jurassic) Eskay Creek Member, Betty Creek Fm. and Mt. Dillworth Fm.

The distribution of Toarcian and Aalenian rocks is not clearly understood on the Dolly Varden property. The rocks are mapped as occurring in a broad arcuate band from the headwaters of Black Bear Creek to the west, straddling Homestead Creek to the southwest, and trending easterly across Kitsault River.

Basal Sequence of Betty Creek:

sedimentary sequence. The volcanic-fossiliferous wacke-argillite sequence is correlative in lithology and age to the Eskay Creek sequence further to the northwest.

Geological Setting of the Base Metal and Gold-Silver Deposits

Base and precious metal deposits of the Stewart Complex occur in several distinct geological settings, mostly within rocks of the Hazelton Group. The lower Hazelton sequence is characterized by sub-aqueous and sub-aerial calc-alkaline island arc volcanism. **Epithermal precious metal vein deposits** occur near high-level intrusive stocks and volcanic conduits and locally pass downwards into broad zones of **porphyry copper-gold mineralization**. Some of the Early Jurassic-age mesothermal and porphyry copper-gold deposits occur at depths well below the stratovolcanoes, within the Permo-Triassic basement rocks.

An extensional structural environment dominates in the upper Hazelton sequence, and is mostly Toarcian to Aalenian in age. Recent chemical analyses and petrographic work at Anyox and Eskay Creek have indicated the basaltic volcanic rocks associated with both those deposits are products of deep tapping of the mantle and/or sources in an oceanic spreading ridge. The setting is analogous to rift-related volcanism of the White Island area of the North Island, New Zealand (Barrett, personal communication) or the rifting in the Guaymas basin of Mexico. The trace element signature in the rare earth elements precludes subduction zone or back-arc extensional environment sources for the basalts (Barrett, personal communication).

Stratabound, volcanogenic-exhalative precious metal deposits occur in those facies, where volcanic exhalations precipitate base and precious metals onto the floor of a shallow ocean. The principal example is the world class, extremely rich gold-silver deposit at Eskay Creek. At Dolly Varden -Torbrit, volcanic exhalative mineralization is silver-zinc rich with some lead, copper and gold. The fossiliferous sediments and ignimbrites of the Dolly Varden suggest a very shallow water depth akin to Eskay Creek.

See Figure 7 for the comparison of the geological features of the Eskay Creek deposit and the Dolly Varden deposits.

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A narrow band of geographically restricted, basal Betty Creek Formation rocks occurs near the Moose-Lamb prospect and trends northerly beyond Tiger Creek. Near the Moose-Lamb prospect, these rocks are truncated by the Moose-Lamb Fault. These rocks consist of a distinct basal unit consisting of black feldspar phyric andesite to basalt rocks, with minor argillite, wacke, and siltstone. A minor brick-red feldspar phyric epiclastic unit overlies or is intercalated with the black unit near the Moose-Lamb prospect.

Elsewhere, the base of the Betty Creek formation includes two additional units of green and/or maroon feldspar phyric andesite to dacite pyroclastic rocks and flows (Unit 4a), and green feldspar, amphibole andesite porphyry with minor lenses of chert and argillite (Unit 4d). Marker horizons have not been identified within the lower Betty Creek sequence. The lower sequence consists of dark green and/or maroon andesite to basalt pyroclastic rocks (ash tuff, lapilli tuff, and tuff breccia) with lesser flows, flow breccia and sub-volcanic sills and dykes. Pyroclastic rocks are poorly sorted and mainly monolithic. Epidote-calcite-chlorite alteration is locally developed.

Within the basal Unit 4 sequence is the David Copperfield exhalite zone.

Mid- to High- Levels in the Sequence.

Higher in the section, Toarcian Mt. Dillworth and Betty Creek Formation on the Dolly Varden property are mapped as Unit 7. Rocks of the mid to high level in the Betty Creek sequence represent two facies:

- Firstly, east of Evinsen Creek / Mitchell Fault occur ignimbrites and maroon coloration indicative of sub-aerial or shallow sub-aqueous deposition and possibly indicative of a local emergent or very shallow water volcanic center. Brick-red and maroon feldspar phyric dacite and welded pyroclastic rocks are common and include dust tuff, ash tuff, crystal tuff, lapilli tuff and tuff breccia. The unit is massive to thickly bedded with local horizons of fiamme (ignimbrite), accretionary lapilli and bombs. Lapilli tuff and tuff breccia clasts are heterolithic and often feldspar phyric.
- Secondly, along strike to the east and northeast, the Unit 7 rocks pass into an important sub-aqueous facies. East of Mitchell Fault they consist of a sequence of dacitic and andesitic pyroclastics, flows, and intercalated maroon and green andesite and basalt-andesite ash tuff, lapilli tuff, and their derived epiclastic sediments. The rocks were deposited in a shallow marine basin with strong local relief and are characterized by rapid changes in facies and thickness. The debris flows and exhalite deposits occur in this facies.

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The rocks of the sub-aqueous facies host the volcanic exhalative silver-zinc-lead showings and deposits. Progressively eastward the principle deposits are the Dolly Varden, North Star, Torbrit, Torbrit East and Moose-Lamb. Volcanic exhalative deposits on the Dolly Varden property are mapped as Unit 7h. Unit 7h is comprised of stratiform volcanic exhalative sulphides, sulphates, carbonates, oxides and native silver. The variable facies within the exhalite horizons have not been mapped in detail, but they consist of the following principal exhalite facies as determined from 1989 and 1990 diamond drilling and underground mapping:

- **Oxide-rich facies:** silica-carbonate-sulphate-oxide-(sulphide) facies containing quartz, chalcedony, jasper, calcite, barite, hematite, sulphides, magnetite and native silver. Sulphide minerals comprise less than 10% of the unit and include sphalerite, galena, pyrite, chalcopryite, pyrargyrite and tetrahedrite.
- **Sulphide-rich facies:** Silica-carbonate-sulphate-sulphide facies contain quartz, chalcedony, calcite, barite, sulphides, magnetite, hematite, and native silver. Sulphides range from 5 to 50% and consist of pyrite, sphalerite, galena, chalcopryite, pyrargyrite and tetrahedrite.
- **Carbonate-rich facies:** carbonate-silica-(sulphate-sulphide) facies contain mostly calcite, quartz and chalcedony, with very minor barite, pyrite, sphalerite, galena and chalcopryite.

Poly lithic exhalitic breccia (Unit 7g) is closely associated with the exhalite facies. Most commonly, the breccia lies in the hanging wall of the exhalite. Poly lithic exhalitic breccia consists of fragments of all exhalite facies, mixed with altered and unaltered volcanic fragments. Usually, the breccia is interpreted to be a debris flow facies that formed when semi-consolidated exhalite deposits slumped during formation.

The debris flow facies recognised on the Dolly Varden property mostly contain fragments of oxide-rich and carbonate-rich exhalite. "Transported ore" facies of sulphide-rich exhalite have not been recognised, except as minor proportions of accidental fragments in other breccias. All sulphide-rich exhalite seen to date is in-situ.

Felsic volcanics of Unit 7k cap the Betty Creek sequence. Contact relationships indicate Unit 7k was deposited in a shallow sub-aqueous basin of the same configuration that saw the later deposition of Unit 8. Unit 7k might belong to Salmon River formation and correlate with the basal felsic volcanic of Eskay Creek and the newly determined Aalenian sequence of felsic volcanics and sediments in the East Georgia River area.

Dolly Varden Property: Proposed 1999 Exploration Program.

Lower to Middle Jurassic Salmon River Fm.

Rocks of the Toarcian to Bajocian age Salmon River Formation on the Dolly Varden property are mapped as Unit 8. They consist of a sequence of thinly bedded, alternating siltstone and argillite (Unit 8b) with a basal member of fossiliferous limestone or fossiliferous wacke (Unit 8a). The basal fossiliferous wacke is interpreted as a shallow water facies.

On the Dolly Varden property, Salmon River Formation rocks crop out in the Kitsault River valley, north of Evindsen Creek. The rocks occupy the core of the gently, northwesterly plunging Kitsault Valley syncline.

Late Intrusions

Eocene and younger lamprophyre and basaltic dykes in the Dolly Varden map area are mapped as Unit 11. These dykes occupy northeast trending, steeply dipping faults. Lamprophyre dykes occur frequently in swarms with 4 to 5 occurring over widths of 15 to 45 m, as seen in the Torbrit Mine workings and North Star drill core. Minor diorite and microdiorite dykes are mapped as Unit 10.

Structure

Deformation

Mapping by the Melnyk and Dawson (1990), Aldrick (1986), and Devlin (1987) indicates the strata in the upper Kitsault Valley are deformed into a gently, northwesterly plunging syncline, termed the Kitsault Valley Syncline.

Several important, minor-scale fold structures occur within the broad keel of the Kitsault Valley Syncline. Using the DVT exhalite, and the footwall volcanics as marker horizons, three structures are identified. The Torbrit syncline lies on the eastern flank of the Kitsault Valley Syncline. The keel of the Torbrit syncline passes near the Torbrit deposit and might be responsible for a significant structural thickening. The axis of the syncline plunges 30° to 40° to the northwest. A minor anticline passes through the North Star Mine. Fold axis measured in the North Star, 1025 level, plunge 30° to 55° towards the northwest. The Dolly Varden Syncline passes through the Dolly Varden Mine (Dolly Varden East Zone). The Dolly Varden Syncline lies on the western flank of the broad Kitsault Valley Syncline.

Faulting

Direct evidence of major faulting was not measured during the 1990 surface mapping program. Abundant circumstantial evidence was gathered to confidently identify the Mitchell, North Star and Moose-Lamb faults as well as several structures of lesser magnitude. Diamond drilling in 1989 identified the North Star Fault as a major structure separating the North Star Mine mineralization from the Dolly Varden Mine. Drilling determined the North Star Fault attitude at 160° azimuth and dipping 45° southwest. The North Star fault is identified on surface by a curvilinear topographic trace off-setting surface mineralization of the Dolly Varden and North Star zones. Normal dip-slip displacement is left-lateral and is estimated to be 140 m.

The Mitchell fault is a major post-mineral structure trending northerly and dipping steeply westerly. The Mitchell fault offsets the Dolly Varden West zone from the Silver Tip; however, the displacement appears to be minimal. Six hundred (600) m north of the confluence of Kitsault River and Evindsen Creek, the Mitchell fault offsets Salmon River Formation sediments but absolute movement is uncertain. The North Star fault may terminate against the Mitchell fault near Evindsen Creek. Alternately, the major structure might be the North Star fault.

The Moose-Lamb fault is located near the Moose-Lamb prospect and trends approximately 305°/60° southwest. An apparent offset of 700 m is indicated by the contact with the Pliensbachian sediments. The Moose-Lamb fault closely parallels the Kitsault valley synclinal axis and may terminate at the Mitchell fault near the Kitsault River.

Mineralization and Alteration Suites

Sericite-Pyrite-Quartz (S, SQ)

A large area of moderate pervasive sericite-pyrite-quartz alteration occurs in the Red Point-Combination Lake area. A narrow band of alteration 0 to 50 m wide, parallels the Betty Creek/Mt. Dillworth and Salmon River Formation contact northerly to the vicinity of Gash Creek where the alteration zone widens to 220 m. Beyond Gash Creek, the alteration zone attains widths of 600 m approaching West Kitsault River.

A second broad zone, 600 m wide, of sericite-pyrite-quartz alteration occurs in Evindsen Creek, west of the Silver Tip prospect, and trends southerly toward Homestead Creek.

Dolly Varden Property: Proposed 1999 Exploration Program.

This alteration assemblage occurs as felted masses of sericite with fine-grained pyrite and numerous 1 mm to 10 cm wide quartz \pm barite veinlets and stringers. Alteration has partially or completely destroyed original rock textures.

The Dolly Varden exhalite is bounded above and below by sericite-pyrite alteration in the vicinity of the Dolly Varden mine workings. The North Star exhalite is bounded by sericite-pyrite alteration up to 30 m wide in underground workings.

Potassium Feldspar (Kfp)

The Red Point mineralized zones are characterized by an earlier stage of potassic alteration in the form of K-feldspar which has pervasively altered the rocks along several northwest trending fault zones as determined from 1989 diamond drilling. The alteration has transformed the sericite-pyrite altered rock into hard, dense and glassy rock with little or no original texture visible. Potassium staining techniques are required to identify the presence and extent of this alteration.

Although not directly associated with the precious metal values at Red Point, the potassic alteration is associated with the mineralising event.

Hydrothermal Breccia (ChBx)

Diamond drilling in 1989 intersected a black hydrothermal crackle breccia with breccia clasts of the previously altered rock in the Red Point mineralized zones. Frequent drill core samples from the Red Point zones contain potassic altered breccia clasts surrounded by black chlorite and pyrite. Although this phase of alteration is barren of precious metals it is very significant in its type and nature.

Quartz-Copper-Gold-Silver Stockworks (Qst)

Copper-gold-silver mineralization occurs sporadically in the Red Point showings.

Red Point style precious metal mineralization occurs within quartz and chalcedony filled stockworks, breccias and veins. It is intimately associated with chalcopyrite, galena and sphalerite usually in a gangue consisting of 55% quartz (chalcedony), 20% carbonate (calcite/ankerite), 15% chlorite (black-dark green) and 5 to 8% sulphides. These siliceous zones are frequently vein-like and can be described as silicified crackle breccia or stockwork zones.

Similar mineralization occurs in several other showings along the Gold Belt, namely the Medallion, Starlight, Copper Cliff, and Dan Patch.

Dolly Varden Property: Proposed 1999 Exploration Program.

In comparison to the Eskay Creek deposit, the chalcedonic stockworks are significant in their elevated gold content and stratigraphic position. At Dolly Varden, the stockworks are possibly stringer / feeder zones to exhalative mineralization higher in the sequence.

Volcanic Exhalative Deposits (Unit 7g, 7h)

Volcanic exhalative mineralization is the prime economic target in the Kitsault Valley. Since this style of mineralization forms stratiform rock units, it is described in Section "Lithologies".

Chloritic Stringer Zones (Chst)

Chlorite alteration is well developed in the Red Point Extension North area. Dark green and black chlorite occurs as matrix replacement and with calcite-sulphide stringers. Gold values were found to be highest where chalcopryite and dark green chlorite occur. Drilling on the North Star deposit in 1989 encountered chlorite-sulphide stockwork zones in four drill holes beneath the exhalative horizon. This alteration style is similar to a volcanic massive sulphide stringer zone and is indicative of a volcanogenic massive sulphide environment.

Stratabound Mineralization Zones

David Copperfield Exhalite Zone

The David Copperfield zone occurs in the basal horizons of the upper Hazelton sequence. The zone straddles the Kitsault River and extends for 400m. on the David Copperfield and Surprise crown granted claims.

Three closely spaced exhalite horizons are developed within flows of Unit 4a, stratigraphically below the DVT exhalite horizon. An upper horizon within the interflow exhalite contains the David Copperfield exhalite zone. The exhalative horizon consists of silica-barite-sulphides and calcite.

The possible equivalent stratigraphic horizon is the focus of past exploration near the northern fringe of the property, at the Homestake (Noranda) and Kitsault Lake properties.

Dolly Varden Property: Proposed 1999 Exploration Program.

Dolly Varden – North Star – Torbrit (DVT) Exhalite Zone

The zone of exhalite and polyolithic exhalative breccia extends almost continuously eastward from the Silver Tip prospect, through Dolly Varden West, the Dolly Varden Mine, North Star Mine, Torbrit Mine, Torbrit East and Moose-Lamb deposits. Collectively, these exhalite deposits comprise the "DVT Exhalite Zone". The "DVT Exhalite Zone" is the principal exhalite/mineralized zone on the property.

The hanging wall volcanic rocks to the main DVT Exhalite horizon are mapped as Unit 7i. This unit consists of maroon and/or green dacite to andesite±feldspar phytic, pyroclastic rocks including ash tuff, crystal tuff, lapilli tuff, flows and occasional rare lenses of argillite and limestone. The unit is generally heterolithic with rare fiamme and may represent the sub-aqueous equivalent of the ignimbrite units located west of Evinsen Creek. Locally, the base of the unit is a distinctive, fine laminated chloritic ash tuff.

Red Point - Kitsol - Musketeer Zone Alteration / Exhalite Zone

The top of the upper Hazelton sequence on the Dolly Varden property is a zone of altered and mineralized felsic and intermediate volcanic rocks and argillite. From Copper creek south to Red Point, eastward to Kitsol and Musketeer and northward to Wolf is the following sequence of lithologies, described from the base upwards:

- Sercite-pyrite (-quartz) altered volcanics (Units S, SQ) with local areas of chlorite-pyrite stringer zones and stockworks of quartz (chalcedony)-carbonate-chlorite-sulphide (Unit Qst). Intercalated argillite indicates a sub-aqueous environment. Some exhalite and exhalitic debris flow breccias are known (Units 7g, h).
- Pyritic felsic volcanics that are locally cut by Qst stockworks.
- Fossiliferous wacke lies conformably on the felsic volcanic horizon.
- Siltstone and sandstone turbidites.

Analogous to Eskay Creek, the zone represents a transition from Betty Creek volcanism to Salmon River volcanism and turbidite sequences. The zone includes all the significant gold occurrences on the property. The potential for a major gold-silver rich massive sulphide deposit is greatest in the Red Point-Kitsol zone. Up section from the argillite beds of Red Point / Dan Patch and the exhalite occurrence of Musketeer to the basal sections of the Salmon River turbidites is the most prospective. See figure 8 for the distribution of the major mineralized zones.

RECOMMENDATIONS: 1999 EXPLORATION PROGRAM

Recent geological work has shown the same volcanic-sedimentary contact (in both age and lithology) in the Stewart area contains world class massive sulphide copper deposits (Anyox) and volcanic exhalative gold-silver deposits (Eskay Creek). Therefore, most emphasis in the 1999 Program should be placed on targets higher in the stratigraphic sequence from the North Star-Torbrit exhalative horizon. Notably, gold mineralization was previously encountered higher in the sequence at the Red Point, hosted by a brecciated, chloritic quartz stringer zone. Gold mineralization is present within meters of the important volcanic – sedimentary contact. It is recommended that a program be laid out in the Red Point area (up section of the stringer zone) and along the same contact in the hanging wall of the North Star-Torbrit. Most importantly, the Surprise and Wolf showings lie at this contact and have yet to see modern exploration programs.

A key exploration method in this target will be ground EM and induced polarisation geophysical methods. Since prior geology programs have delineated the targets, ground systems have better effectiveness despite the higher unit cost. The program envisioned would see the following, comprising a \$1.45 million expenditure (see Appendix A):

1. Mobilize a helicopter base/fuel cache to the old logging campsite to economise on logistics. All equipment and camp gear would be mobilized to this location.
2. House exploration crews housed in a central camp in the floor of the upper Kitsault valley, near the Surprise showing. All grid work and geophysics would be conducted on foot from the central camp. Many useable horse trails cross the valley floor and are serviceable for access to most of the major exploration targets. All drilling sites will be accessible on foot with drill moves supported by helicopter.
3. Conduct geological mapping, geochemical soil sampling and geophysics over the Red Point - Kitsol zone. Deep penetrating EM and induced polarization surveys would be conducted over the Red Point – Kitsol zone as a priority.
4. Conduct alteration studies to determine the most altered footwall stringer zones and incorporate the data in targeting of the overlying contact zone. Retrospectively survey the Torbrit-Northstar-Dolly Varden baritic silver rich exhalite and its footwall for targeting information in those zones.
5. Drill the contact zone beginning in mid-program, overlapping with the grid programs. Drilling could commence now but is better deferred until geophysical data is available.

APPENDIX A
NEW DOLLY VARDEN MINERALS INC.
Recommended 1999 Exploration Program
7/16/1999

		<u>QUANTITY</u>	<u>UNIT</u>	<u>RATE</u>	<u>SUBTOTAL</u>	<u>TOTAL</u>
LOGISTICS COSTS						
Camp Supplies	Camp in U. Kitsault Valley/ Re-us				\$40,000.00	
Camp Constructio	Contract Labour				\$15,000.00	
Genset		2.50	mo	\$1,200.00	\$3,000.00	
Vehicles	2 4x4	5.00	mo	\$1,200.00	\$6,000.00	
5 ton Hiab		2.50	mo	\$3,000.00	\$7,500.00	
SatPhone	Same cost as last time...				\$14,000.00	
Expediting					\$10,000.00	
Camp Provisions	Geological Program	2.50	mo	\$6,000.00	\$15,000.00	
Fuel					\$2,500.00	
Propane					\$1,200.00	
Labour	Cook	80.00	d	\$250.00	\$28,000.00	
	Bull Cook	80.00	d	\$200.00	\$16,000.00	
Camp Manager	Tom Drown, Manager/Geo	100.00	d	\$650.00	\$65,000.00	
Barging	Kitsault to Alice Arm				\$7,000.00	
Helicopter	Camp Construction	30.00	h	\$850.00	\$25,500.00	
Helicopter	Camp Supply, People	40.00	h	\$850.00	\$34,000.00	
Sub-total:					\$281,700.00	\$281,700.00
GEOLOGICAL - SURVEY PROGRAM						
Linecutting	200 m spacing, Re use some line	50.00	km	\$1,500.00	\$75,000.00	
Trail building		50.00	km	\$500.00	\$25,000.00	
Rentals	Survey gear	2.50	m	\$2,000.00	\$5,000.00	
IP Surveys	Orientation	20.00	km	\$2,000.00	\$40,000.00	
EM/Mag	Orientation	50.00	km	\$1,000.00	\$50,000.00	
Geochemical		1,500.00	spls	\$18.00	\$27,000.00	
Assay		50.00	spls	\$30.00	\$1,500.00	
Age Determinations		3.00	spls	\$7,000.00	\$21,000.00	
Alteration geochem		100.00	spl	\$60.00	\$6,000.00	
Alteration Geology	Dr. Tim Barrett or Sherlock	30.00	d	\$750.00	\$22,500.00	
Senior Geologist	Dane Bridge	100.00	d	\$750.00	\$75,000.00	
Senior Geologist	Stu Fraser	60.00	d	\$650.00	\$39,000.00	
Senior Geologist	P McGuigan Visits	20.00	d	\$750.00	\$15,000.00	
Travel Costs	Airfares, Mileage, Hotels				\$20,000.00	
Equipment	Computer/Radios/Survey				\$20,000.00	
Helicopter	Positioning Equipment/ People	40.00	h	\$850.00	\$34,000.00	
Sub-Total					\$476,000.00	\$476,000.00
DIAMOND DRILLING						
Drilling Charge	NQ drilling	4,000.00	m	\$60.00	\$240,000.00	
Operating Extras	Man Machine Hours				\$15,000.00	
Materials Extras	Allowance				\$30,000.00	
Fuel					\$5,000.00	
Pad Construction	Equipment Rental				\$1,500.00	
Labour	Client Labour to build sites	60.00	d	\$300.00	\$18,000.00	
Camp Provisions	Drilling Program	2.00	mo	\$6,000.00	\$12,000.00	
Senior Geologist	Stu Fraser	60.00	d	\$650.00	\$39,000.00	
Assay		200.00	spls	\$30.00	\$6,000.00	

APPENDIX A
NEW DOLLY VARDEN MINERALS INC.
Recommended 1999 Exploration Program
7/16/1999

Helicopter	Driller Moves	40.00 h	\$850.00	\$34,000.00	
Helicopter	Drill Moves/ Mob Demob	100.00 h	\$850.00	\$85,000.00	
Helicopter	Sites	10.00 h	\$850.00	<u>\$8,500.00</u>	
	Sub-total:			\$494,000.00	\$494,000.00
				\$0.00	
REPORTING AND SUPPORT					
Planning	Dane Bridge	10.00 d	\$750.00	\$7,500.00	
	Stu Fraser	10.00 d	\$650.00	\$6,500.00	
Engineering Repor	Qualifying Report, if needed			\$9,000.00	
Final Report	Dane Bridge	20.00 d	\$750.00	\$15,000.00	
	Stu Fraser	10.00 d	\$650.00	\$6,500.00	
CAD Support	M Pond - Archive Rescue	80.00 h	\$70.00	\$5,600.00	
	M Pond - New Maps - Bases	50.00 h	\$70.00	\$3,500.00	
	Reporting/Analysis	150.00 h	\$70.00	\$10,500.00	
Materials	Map Products/ Repro			<u>\$6,000.00</u>	
	Sub-total:			\$70,100.00	\$70,100.00
	SUB-TOTAL, OF BUDGETED ITEMS :			\$1,321,800.00	\$1,321,800.00
	MANAGEMENT FEE: 10%				\$132,180.00
LAND COSTS					
	TOTAL LAND COSTS:			\$0.00	<u>\$0.00</u>
	TOTAL ESTIMATE, IN CDN FUNDS:				\$1,453,980.00

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