

GEOLOGICAL REPORT ON THE

CVS COPPER PROSPECT

KAMLOOPS MINING DIVISION, B.C.

804302

N.T.S. 92 I/7W

BY

S. G. Enns, P.Geo.

and

A. G. Troup, P.Eng.

July 1993

LOCATION: 50° 22' North Latitude
120° 52' West Longitude

OWNER: Aucumo Resources Ltd.

OPERATOR: Hudson Bay Exploration and Development Co. Limited

CONTRACTOR: Aucumo Resources Ltd.

SUMMARY

The CVS property is located on the southeast side of the Guichon Creek batholith in south central British Columbia that hosts the large, well known, Highland Valley copper-molybdenum deposits. Twenty claims (276 units) cover an area underlain by favourable geology.

Past exploration was fragmented, with results indicating widely scattered copper mineralization including malachite, bornite, minor chalcocite and chalcopyrite, and several weak chargeability anomalies on the property. Recent work on the claims established a strong regional copper anomaly in streams and lakes. Limited, new IP/resistivity work showed a large, weak chargeability anomaly, with improvement at depth.

A government airborne survey shows that the Valley Copper, Lornex and Highmont ore bodies are closely associated with a southeast trending 300nT magnetic gradient that extends onto the CVS claims.

This report presents the results of a short geological mapping programme over the most important parts of the CVS claims. The work established a geological data base for evaluation of results from a new, deep penetrating IP/resistivity survey. Distribution of important phases of the Guichon Creek batholith were defined. They include Chataway granodiorite underlying the east two-thirds of the claims block. Bethlehem granodiorite, Skeena and Bethsaida quartz monzonite underlie the western part. A number of regional east-west cross faults were interpreted from the distribution of the lithologies.

Several large areas were identified, that were affected by important hydrothermal alteration and weak copper mineralization. These are the Three Creeks, Bob 6 and Mystery Lake areas. Elsewhere, areas of weak but widespread copper mineralization were identified in Chataway granodiorite. Some of these may become significant with the interpretation of the new IP data.

INTRODUCTION

The objective of the 1993 geological work was to provide an updated geological data base that would help evaluation of the 1993 IP/resistivity survey results and allow effective planning of a follow-up drilling programme.

This was achieved by:

1. Mapping and prospecting newly constructed logging roads for bedrock and possible mineralization;
2. Examining areas of reported surface mineralization and alteration;
3. Accurately locating and plotting previous drilling and trenching activity in the field on an uncontrolled 1:10,000 scale orthophoto; and
4. Mapping the most readily accessible outcrops to establish the position of important phases of the Guichon Creek batholith.

The completed geological mapping is not regarded as comprehensive, nor was it intended to be. Not all existing outcrops were examined due to budget and time limitations. However, sufficient mapping was completed in the important areas to establish contacts between the younger plutonic phases. In addition, a number of unreported trenches and drilling sites were discovered. More than 300 hand samples were collected from the field to assist consistent identification of the different plutonic phases. They are available for examination or testing purposes.

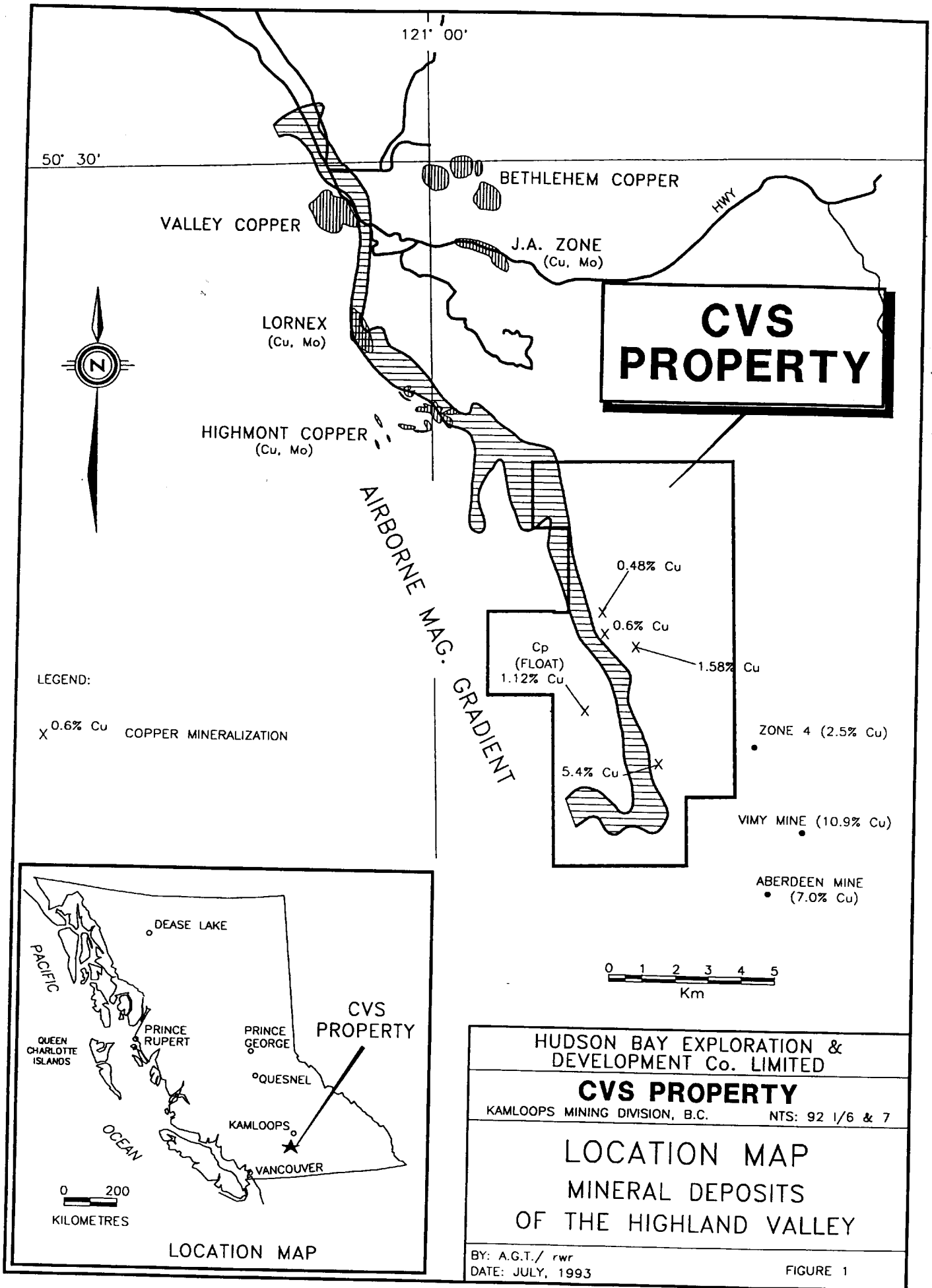
Initial mapping concentrated in the north and western parts of the claims where compilation results indicated the most favourable geology. The south part of the claims was covered more quickly by examining what few outcrops were reported there. In addition, new exposures of bedrock were found by a few traverses through the bush.

The work was completed in 40 man-days during the period June 4 to 27.

LOCATION AND ACCESS

The CVS copper prospect is located in south central British Columbia (Figure 1) on the southeast side of the Guichon Creek batholith, seven kilometres south of the Highmont Copper Mine. A point at the centre of the property is defined by latitude 50°21'N and longitude 120°55'W.

The claims are located 25 kilometres north of Merritt, a ready source for services and supplies. Access to the centre of the property is provided by the Pimanus-Tyner fire access road which intersects Highway 8 approximately nine kilometres west of Merritt. A network of old exploration and logging haul roads provides additional access to most parts of the property. The property is



50° 30'

121° 00'

BETHLEHEM COPPER

VALLEY COPPER

J.A. ZONE
(Cu, Mo)

LORNEX
(Cu, Mo)

**CVS
PROPERTY**

HIGHMONT COPPER
(Cu, Mo)



AIRBORNE MAG. GRADIENT

LEGEND:

X 0.6% Cu COPPER MINERALIZATION

0.48% Cu

0.6% Cu

1.58% Cu

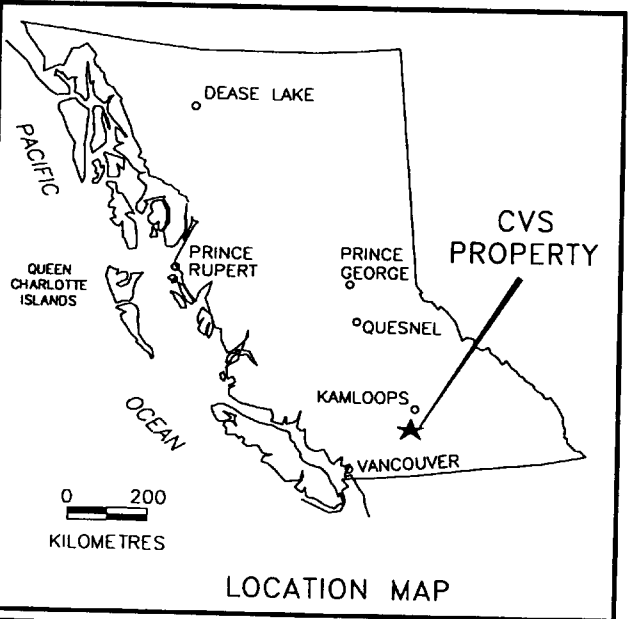
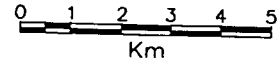
Cp
(FLOAT)
1.12% Cu

5.4% Cu

ZONE 4 (2.5% Cu)

VIMY MINE (10.9% Cu)

ABERDEEN MINE
(7.0% Cu)



HUDSON BAY EXPLORATION &
DEVELOPMENT Co. LIMITED

CVS PROPERTY

KAMLOOPS MINING DIVISION, B.C.

NTS: 92 1/6 & 7

LOCATION MAP
MINERAL DEPOSITS
OF THE HIGHLAND VALLEY

BY: A.G.T./ rwr
DATE: JULY, 1993

FIGURE 1

presently being logged. Extensive clear-cut areas and accompanying haul-roads improve access on the claims.

High voltage transmission lines are located near the north boundary of the claim block.

PHYSIOGRAPHY, VEGETATION AND CLIMATE

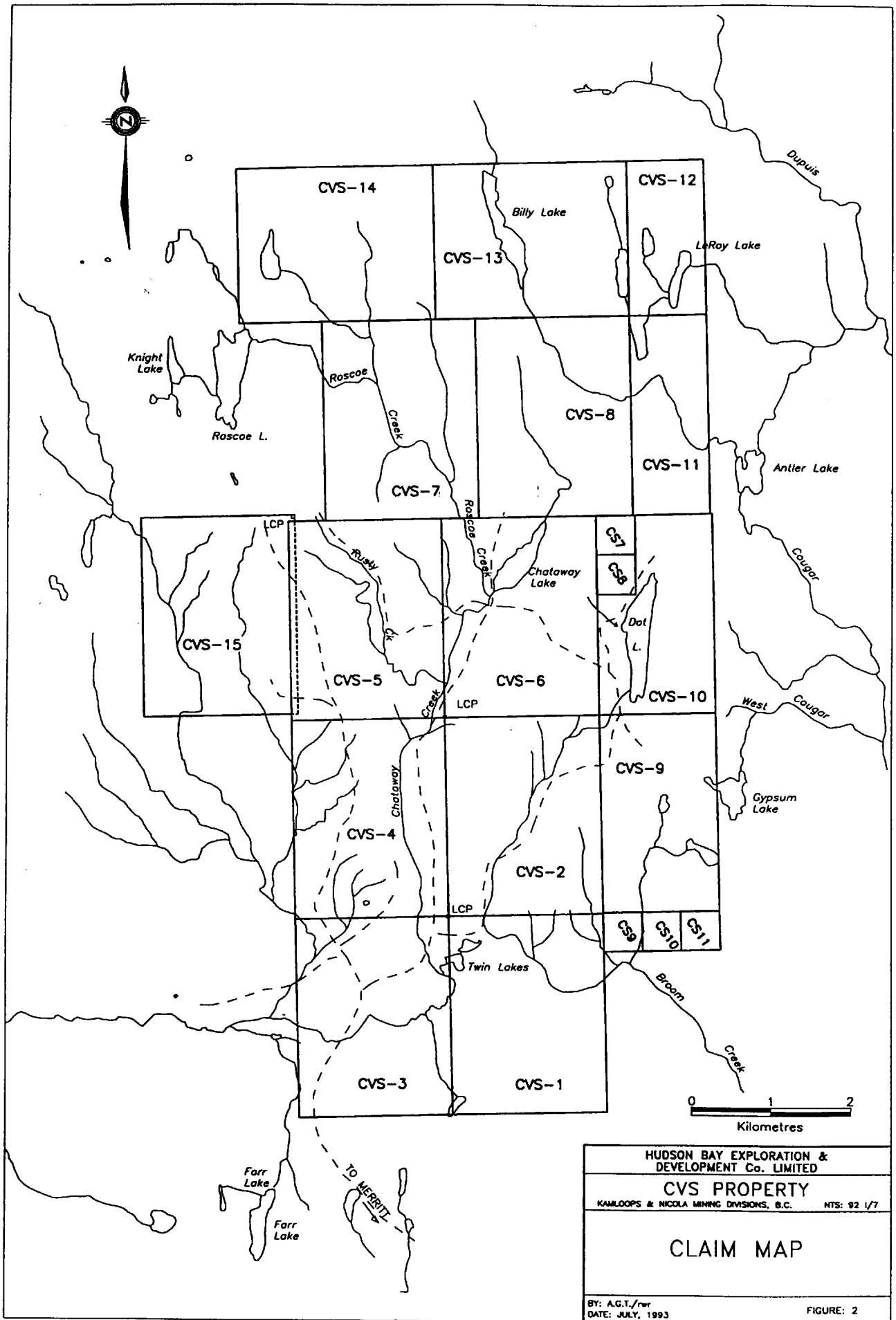
Topography of the claims is typical of the plateau-like terrain found in the Highland Valley region. Little relief is present; it is between 100 and 220m with maximum elevations of 1550m at the north end of the claims. Local canyons from glacial outwash streams provide the most extreme relief in the southwest and southeast parts of the claim block. The Chataway Creek valley is a broad, thick, overburden-covered valley with no exposures.

The bush is generally well-spaced lodgepole pine with intervals of dense, second-growth pine stands and deadfall from old forest fires. Scattered patches of aspen and birch occur on south and west-facing slopes, and spruce, fir and mountain alder grow in damp areas along streams and swamps. Low lying areas are covered by swampy meadows in many areas, and frequently they reflect the most recent southeast glacial direction.

The climate is typical of the southern interior, with warm, dry summers and moderately long, cold winters. Temperature extremes extend from more than +30°C in August to -30°C in January. Average annual precipitation is 31 cm, with most of this falling as snow in late fall, winter and early spring. The snow-free period lasts from late April to mid-November. Due to the light snowfall, geophysical surveys and drilling can be carried out all winter.

PROPERTY INFORMATION

Most of the claims are in the Kamloops Mining Division, the eastern claims are located in the Nicola Mining Division. At present, the property contains 276 units in 20 claims as shown in Figure 2. The claims were staked between 1991 and 1993. The pertinent claims data are given in Table 1.



HUDSON BAY EXPLORATION &
 DEVELOPMENT Co. LIMITED
CVS PROPERTY
 KAMLOOPS & NICOLA MINING DIVISIONS, B.C. NTS: 92 1/7
CLAIM MAP

BY: A.G.T./rwr
 DATE: JULY, 1993

FIGURE: 2

TABLE 1

LIST OF CLAIMS

*now called.
- tenure #*

<u>CLAIM</u>	<u>UNITS</u>	<u>RECORD NUMBER</u>	<u>ANNIVERSARY</u>
CVS-1	20	219885	May 10
CVS-2	20	219886	May 11
CVS-3	20	219887	May 10
CVS-4	20	219888	May 11
CVS-5	20	219889	May 12
CVS-6	20	219890	May 12
CVS-7	20	308682	April 18
CVS-8	20	308683	April 19
CVS-9	18	314627	November 10
CVS-10	15	314628	November 10
CVS-11	10	314629	November 10
CVS-12	8	314630	November 11
CVS-13	20	314631	November 9
CVS-14	20	314632	November 10
CVS-15	20	318562	June 21
* CVS-16	5	322,235	Nov 3
CS-7	1	308684	April 19
CS-8	1	308685	April 19
CS-9	1	314633	November 7
CS-10	1	314634	November 7
CS-11	1	314635	November 7
* CS-12	1	322,236	Nov. 3
* CS-13	1	237	"
* CS-14	1	238	"

* Staked in November

- JB file.

REGIONAL GEOLOGY

The CVS claim group covers the southeast portion of the Upper Triassic Guichon Creek batholith. This batholith is elliptical and extends 60 km along its north long axis. It is about 25 km wide and intrudes sedimentary and volcanic rocks of the Permian Cache Creek Formation, and the overlying Upper Triassic Nicola Formation, a dominantly volcanic group of rocks. Sediments of the Jurassic Ashcroft Formation unconformably overlie the intrusive rocks at a number of locations. To the north, intrusive rocks are covered by volcanic flows and tuff of the Eocene Kamloops Group.

The Guichon Creek batholith is a plutonic complex with concentric phases that generally decrease in grain size and increase in mafic content from a central core to the outer margin. McMillan (1985) subdivided the plutonic rocks into two broad categories. The outer, older phases include more mafic rocks of granodiorite to quartz diorite composition known as Border and Highland Valley phases. The Highland Valley phase was subdivided into Guichon and Chataway granodiorite varieties. Younger, inner phases, form the second broad category including a transitional Bethlehem granodiorite phase, followed by Skeena granodiorite to quartz monzonite and Bethsaida quartz monzonite. Quartz aplite, granophyre and various quartz feldspar dykes are also included with the younger phases.

The younger magmas are more evolved and much less mafic. They are important because timing of the ore disposition in the Highland Valley is associated with their emplacement. In the Highland Valley, the principal Cu-Mo deposits are situated within, and along the margins of Bethsaida, Skeena or Bethlehem phase rocks.

K-Ar average dates for the batholith are 202 ± 8 Ma, and by rubidium-strontium methods, 205 ± 10 Ma, which is slightly younger than the faunal ages for the Nicola Group (McMillan, 1985). The ages are interpreted to reflect an initially subvolcanic batholith, the younger phases of which rose higher into the crust and probably intruded the lower part of the comagmatic, but slightly older volcanic pile.

The geology of the Guichon Creek batholith was first mapped by Northcote, in the mid-1960s, and later updated by McMillan in the early- to mid-1970s.

The CVS claims lie in an area of poor outcrop. This region received less attention by previous exploration activity as well as less intensive government mapping. McMillan observed (oral communication 1993) that the rock types in this region are more transitional than elsewhere in the Guichon Creek batholith, and that poorly exposed east-west cross structures are likely to be present.

PROPERTY GEOLOGY

Surficial Geology

Outcrops on the claims are sparse. The numerous eskers and kettles, abundant on the claims, and the deep glacial overburden attest to the extensive glacial deposition that this region has undergone. Areas of natural outcrop are generally confined to topographic highs, the north end of eskers, and steeply incised streams. The extensive trenching and abundant road cuts also provide good bedrock exposures. A new logging road, built last winter exposed fresh bedrock in places and one new mineral occurrence near Roscoe Creek.

The north half of the claim block generally offers more outcrop, while the south half of the claims has poorly exposed geology due to thick glacial cover.

Lithologic Distribution

Early phases such a Border and Highland Valley quartz diorite to granodiorite have not been mapped on the CVS claims. They may occur in the extreme southeast and east parts of the claim block which were not covered by mapping.

The eastern two-thirds of the CVS claims is underlain by Chataway granodiorite (Figures 3a and 3b). In places, this phase extends beyond the boundary. The west third of the claims is broadly underlain by a northwest-trending plutonic succession. From east to west, this includes Roscoe granodiorite (200 to 1200m wide), Bethlehem granodiorite (500 to 800m wide), Skeena granodiorite to quartz monzonite (about 1000m wide) and Bethsaida quartz monzonite. Contacts between different phases are variable. They may be sharp, but often are gradational with definite observable changes in rock type up to hundreds of metres apart (McMillan, oral communication 1993). This is particularly the case with Bethlehem, Skeena and Bethsaida phases.

The Roscoe granodiorite is an informally named mappable phase that consistently occurs between the Bethlehem and Chataway granodiorite. Although displaying an average lower total mafic content than Chataway phase, it is probably a sub-phase of, and transitional to, Chataway granodiorite, because it shares some of the common characteristic features of the Chataway phase. In places, the distribution of Roscoe rocks suggests that it cuts the Chataway phase, elsewhere, it occurs as local magmatic segregations within Chataway.

The Bethlehem granodiorite is transitional between Chataway and Bethsaida phases, and marks the first occurrence of the younger, more evolved magmas. Significant mineralization is related to Bethlehem granodiorite in the Highland Valley. Bethlehem

granodiorite dykes cut Roscoe and Chataway granodiorite. A small elliptical stock of Bethlehem granodiorite was mapped north of Twin Lakes.

Skeena and Bethsaida quartz monzonite occur in the extreme west parts of the claims. These two phases are gradational and probably represent a magmatic continuum. Contacts between the two are ill-defined. Both have a low mafic mineral content with minor hornblende and large conspicuous quartz crystals.

Quartz aplite as small bodies and dykes cut all phases, but are more conspicuous in abundance in Skeena and Bethsaida rocks. Consequently, they tend to occur most frequently in the west parts of the claim block.

One occurrence of crowded feldspar porphyry as a probable dyke was observed in an isolated trench south of Dot Lake. Faint malachite is associated with mafic clots in the porphyry. Quartz feldspar porphyry float occurs in the west part of the claims but was not observed in place.

Rock descriptions and the phases' characteristic features used to discriminate them, together with photographed examples of the main intrusive phases are given in Appendix A.

Regional Magnetic Gradient

A high level, government airborne magnetometer survey, flown in 1967, shows a distinct, 300nT, northwest-trending magnetic gradient that crosses the CVS claim block. North of the CVS property, the Valley Copper, Lornex and Highmont orebodies are all associated with this magnetic feature (Figure 1). The geologic explanation for the magnetic gradient appears to be its spatial association with the Bethsaida-Bethlehem contact. Higher magnetic susceptibility occurs east of this sharp gradient in the hornblende dominant, more mafic-rich phases of the Guichon Creek complex, whereas the biotite dominant, mafic poor core phases of the complex found to the west, have a low magnetic susceptibility.

At a more detailed, property scale, the magnetic gradient is a narrow band that mimics the mapped contact between Bethlehem and combined Roscoe-Chataway phases on the CVS-5 and CVS-7 claims. However, north of Roscoe Lake, the gradient broadens and its west margin swings sharply westward, suggesting the presence of an east-west, cross structure that transported Chataway phase rocks westward. South of the CVS-5 claim, in the region of sparse bedrock exposures, the magnetic gradient broadens slightly over rocks mapped as dominantly Chataway, before it abruptly turns west as a complex west-trending pattern. This complex west-trending

pattern of the magnetic gradient suggests a west-trend of the Bethlehem-Roscoe and Chataway sequence which may possibly have been dismembered by several northwest-oriented faults in the vicinity west of Twin Lakes (as shown in the interpretation in Figure 3b).

Structure

The contacts between the plutonic phases generally display a northwest trend. Westward, these phases show a consistent and predictable sequential order from oldest (Chataway) to youngest and least mafic (Bethsaida) phases. Apparent disruptions in the plutonic phases are evident in the geology. These geologic mismatches are a strong indication of the effect of east-west faults as post-magmatic cross-structures.

At least three such east-west structures have been interpreted and are shown on the geology map (Figures 3a and 3b). They are known (from north to south) as Chataway, Moss and Twin Lakes faults. The main evidence supporting such interpretation is the disruption of the northwest-trending plutonic contacts. Of these interpreted cross-faults, the Chataway fault is supported by the greatest degree of geological confidence, whereas the Moss cross-fault, with the lack of bedrock, and consequently poorly constrained lithologic patterns makes the weakest case. The Twin Lakes fault at the south end of the property is supported by airphoto lineaments and was also interpreted by McMillan (1985). A complex disruption of the magnetic gradient immediately west of Twin Lakes suggests several possible and perhaps related northwest faults in this vicinity.

The above interpretation differs in detail from that shown by McMillan's (1985) geology map. His map shows two pinched-out wedges of Bethlehem rocks, (one to the north and one to the south) between Chataway and Skeena rocks. In a general way Mcmillan's map effectively portrays the geology at a small scale, but lacks the additional geological information from trenches and road cuts. The detailed geology is undoubtedly even more complex than the re-interpretation suggests. At present, the new interpretation should be regarded as a working hypothesis, subject to revision as more geological data becomes available.

A northwest-oriented fault is indicated by the geology, along lower Roscoe Creek. Old reports (Willars, 1972) also make reference to it.

On a more detailed scale, important structural directions are indicated by the orientation of mineralized veins and fractures that define broad classes. These are: 020°/vertical; 080° to 090°/steep south; 100° to 110°/moderate south; and 150° to 160°/steep southwest.

Mineralization and Alteration

Where observed on the property, mineralization as copper sulphide tends to be predominantly bornite, with minor chalcocite and chalcopyrite. Very little pyrite is present on the property. This has positive future implications for high copper content of future copper concentrates, and low potential acid generation problems.

Weak mineralization dominantly as faint malachite, occurs in all phases on the CVS claims. The faint malachite is a direct reflection of the characteristic copper sulphide assemblage found on the property. It could also reflect, in part, deep oxidation of copper sulphide. Since the mode of occurrence of copper mineralization within the Highland Valley camp is fracture and vein controlled, instead of being disseminated, structural preparation and a high density of mineralized fractures are of potential economic importance. This feature, together with favourable geology (Bethsaida, Skeena and Bethlehem phases) and evidence of significant hydrothermal alteration combine to make some of the mineralized localities more attractive than others.

The two most significant, exposed mineralized localities, occur in the Three Creeks to Bob 6 region, and at Mystery Lake. In both regions, extensive hydrothermal alteration (structurally controlled and locally pervasive) is present together with widespread, weak copper mineralization in host rocks associated with the Bethsaida and Skeena contacts.

1. Three Creeks to Bob 6 region

At Three Creeks, widespread malachite-filled fractures and local veins of bornite and chalcopyrite occur in Chataway granodiorite, intruded by quartz aplite and Skeena dykes. Associated with the weak mineralization, are conspicuous fracture-controlled, ankerite-sericite alteration envelopes up to two cm wide. Locally, mafic minerals and feldspars are pervasively sericite altered. Fracturing is well developed in the area, and the alteration and mineralization occur over a wide area measuring 150 by 200m. The altered zone is open to the south, west and northwest. At the nearby Bob 6 showing, on the west boundary of the CVS-7 claim, the predominant Skeena quartz monzonite host rock is cut by a northwest-trending, fractured quartz aplite dyke that is about 60m wide. Locally, Skeena rocks have been sericite altered. Chlorite fractures are common and widespread. Malachite is present in fractures over an area of more than 50m within altered Skeena rocks as well as within the quartz aplite dyke.

Hydrothermal alteration as sericitization of mafic minerals with scattered malachite on fractures in Bethlehem rocks, is exposed in trenches 600m to the north near Roscoe Creek. This may be part of the same alteration system that affected the rocks in the Bob 6 area.

As shown on Figure 3a, hydrothermal alteration and mineralization at Three Creeks was interpreted to be separated from the Bob 6 alteration and mineralization zone by the Chataway fault. Location of alteration and mineralization near a large structure suggests the possibility that the structure was geologically long-lived, and may have been an early feature which was reactivated. Such features are favourable because they are often sites of focus for hydrothermal fluids in porphyry systems. Any large and subtle chargeability anomaly in this region with indicated, increased sulphide potential at depth would be regarded as a prime drill target.

2. Mystery Lake

At Mystery Lake, in the northwest part of the claim block, widespread hydrothermal alteration seen as pervasive sericite alteration of feldspars and mafic minerals, occurs over a distance of at least 600m. Locally, this alteration is intense. Both Bethlehem and intruding quartz aplite rocks were altered and contain widespread malachite mineralization. Local quartz-bornite veins cut the aplite. Since the trenches were flooded by water, no determination of the style and size of the quartz aplite bodies was possible at the time of mapping, but the altered zone is open to the south and west. Nearby unaltered Skeena quartz monzonite was mapped north of Mystery Lake, and west of trenches that exposed Bethlehem rocks. Thus the Skeena-Bethlehem contact was interpreted along to lie somewhere along the long dimension of the lake.

A subtle, large chargeability anomaly associated with the hydrothermal alteration and mineralization, or as an extension of it (to the south or southeast where geological data is lacking) would be regarded as highly favourable for a drill target in this vicinity.

3. Yubet

The Yubet showing occurs on the adjacent Roscoe claim owned by the Highland Valley Corporation. It is located less than 500m from the south boundary of the Roscoe claim. The copper mineralization occurs in an intense, pervasive sericite altered, quartz aplite to quartz granophyre stock that cuts Skeena rocks near the Bethsaida quartz monzonite contact. The small stock trends north-south and is cut by aplite dykes indicating a complex intrusive history.

Copper mineralization consists of locally spectacular bornite and chalcopyrite in a weak quartz stockwork that also has a north-south trend. This zone of mineralization may extend south onto the

adjacent, recently staked CVS-15 claim. McMillan (1985) reported an estimated 109,000 tonnes of mineralized material with a grade of 2.25% copper. Mineralization at Yubet may be related at depth to a common, large hydrothermal system, parts of which are also evident at the Three Creeks and Bob 6 areas.

4. Jay 11

Little is known about this showing, because it is located in a region of poor outcrop where many trenches failed to encounter bedrock. The area was covered by staking CVS-15 to cover potentially prospective geology. Sparse outcrops and locally derived float, indicate the presence of Skeena rocks that may be near the Bethlehem contact. One percussion hole D-8C was reported to have intersected 1917 ppm Cu over an unknown width (Willars, 1972). The general area is regarded favourably because of its close proximity to the Three Creeks hydrothermal system.

5. Arts' Showing

A new copper showing was exposed in Chataway rocks by the construction of a new logging road crossing Roscoe Creek. Mineralization, as malachite-bornite fractures with a density of about one per metre, is exposed across about 15m in moderately fractured granodiorite. Mineralized fractures are dominantly oriented $106^{\circ}/40^{\circ}\text{S}$ and $162^{\circ}/70^{\circ}\text{SW}$. Red to pink zeolite (laumontite) coated fractures, accompanied by calcite and gypsum, are generally associated with copper mineralization, although they are cut by later bornite veining. The Chataway host rock shows weak pervasive chlorite alteration of mafic minerals, as well as local development of fine grained, secondary biotite in places. Near the north end of the exposure, Roscoe granodiorite segregations with malachite stained fractures are present within the Chataway rocks. This exposure may be the distal edge of a mineralized zone to the northeast. Two Bethlehem dykes were mapped 500m to the northwest and may be significant for mineralization. A weak, large, chargeability anomaly at depth would justify a drill target in this vicinity.

Scattered bornite and malachite mineralization occurs in Chataway granodiorite along Roscoe Creek, between Art's showing and the Roscoe showing. At present, its significance is unknown because the granodiorite host rocks in this region appear to be unaltered.

6. Moss 4

The Moss 4 mineral occurrence is in an area of sparse bedrock exposure. Most of the trenches failed to reach bedrock. A few trenches encountered altered Bethlehem granodiorite cut by a quartz aplite dyke with a strike of 085° . Weak malachite is present in quartz-ankerite veins and in fractured granodiorite. The Moss

fault has been interpreted to occur in this vicinity as a cross-structure (Figure 3b). Its location near the Bethsaida contact would be a favourable structural feature. However, this locality is presently given low priority status because no geophysical surveys were planned this season for the region. An evaluation of the region will certainly need to include high resolution, deep penetrating IP surveys.

7. Sho 11

The mineral occurrence is situated north of Twin Lakes, along Broom Creek. The main showing in a highly fractured Chataway granodiorite host is a 1 to 2m wide zone with a strike of 132° in malachite stained, intense sericite altered, granodiorite. It is north of a small elongate Bethlehem stock. Away from the main zone, weak malachite on fractures, accompanied by chlorite and early hematite show a dominant orientation of $125^{\circ}/65$ SW, but the malachite fracture density is sparse. Local, remnant specks of bornite are present in sparse mineralized veins that are seldom less than one cm in width. Weak malachite fractures are also present in the nearby, well fractured, Bethlehem stock. Pale red to pink zeolite (laumontite) coatings are generally associated as a broad halo with the copper mineralization. This is a low priority target for which no geophysical coverage was planned this season.

8. Unnamed Showing

The showing is situated at the end of an old trenching road about 500m east of Twin Lakes (Figure 3b). Trenching exposed a zone of weak malachite mineralization over a width of about 40m in well fractured Chataway granodiorite rocks. The mineralized fractures contain malachite, sericite, chlorite and specularite with local, remnant bornite. Sericite envelopes, up to one cm in width, were noted in some places. Dominant vein orientation is $120^{\circ}/80$ S. As elsewhere, abundant pale red to pink zeolite (laumontite) accompanies the mineralization as a broad halo. No geophysical coverage was planned for this region. The nearby Chataway rocks exposed in the Broom Creek canyon to the northeast generally appear unaltered, with sparse malachite and bornite along fractures here and there.

9. Billy Lake

Considerable trenching activity was completed in the past on the west side of Billy Lake. The prevailing host rock underlying this region is unaltered Chataway granodiorite. Only minor mineralization is evident from the trenching and is best developed at the north end of the series of trenches. There, three or four sericite-malachite veinlets up to one cm wide, with minor bornite occur over a width of one metre. Near the lake a south-dipping

shear zone about one-half metre wide contains sericite, quartz and minor malachite. Pink zeolite veins are broadly associated with the weak copper mineralization. This area is regarded as low priority, given the large volume of well exposed unaltered Chataway granodiorite.

10. Billy Lake Road

Several trenches and some drilling indicate exploration west of the Billy Lake road and near the newly constructed logging road on the CVS-8 claim. Examination of the trenches and local outcrops indicate a weak, northwest-trending zone of weak copper mineralization, defined by faint malachite fractures in generally unaltered Chataway granodiorite. The best mineralization and hydrothermal alteration is present in the most northerly trench west of the Billy Lake road. There, malachite fractures and minor bornite in silicified veins up to two cm wide occur with chlorite and sericite, in a locally altered zone about 20m wide. A nearby casing with -40° bearing 280° indicates that the zone was tested at the north end by at least one drill hole. Results are unknown.

11. Roscoe Showing

According to Willars (1972), two adits tested mineralization without success in moderately fractured, mildly altered Chataway granodiorite rocks that contain sporadic malachite. Nearby, several malachite fractures show an orientation of $085^{\circ}/75^{\circ}\text{S}$. The lower adit has a bearing of 135° . No examination was made of the underground workings, which were reported to include several cross-cuts at the end of the drift. Grades and width of the mineralization are unknown.

CONCLUSIONS

The present mapping programme has shown the eastern two-thirds of the CVS property to be underlain by Chataway granodiorite. This unit extends east beyond the border of the property. The west third of the property is underlain by a northwest-trending plutonic succession of Roscoe granodiorite, Bethlehem granodiorite, Skeena granodiorite and quartz monzonite, and Bethsaida quartz monzonite.

The plutonic phases all display a northwest trend. Locally, abrupt lithological offsets interrupt this trend, these are believed to be caused by east-west cross faults. Three east-west structures have been interpreted.

The best porphyry targets (based on mapping) are on the west side of the CVS claims within Bethlehem-Skeena-Bethsaida geology. These targets have, however, received the greatest amount of past exploration as is evident from trenching activity there, but the intensity of drilling appears to have been limited and the holes shallow. In this region, encouraging chargeability results indicating higher sulphide content at depth, possibly due to intense oxidation of sulphide, would justify aggressive drilling to test for significant mineralization.

Widespread mineralization in the Chataway granodiorite phase has previously received very little exploration attention. Any large chargeability anomaly in Chataway granodiorite, particularly if supported by minor surface mineralization should therefore be viewed with interest, because it might represent a new type of porphyry-style mineralization, not yet recognized in the Highland Valley camp.

The nature of mineralization in the Highland Valley is a fracture-controlled sulphide assemblage (chalcopyrite-bornite), that is sulphur poor. Pyrite is virtually absent. With this sulphide assemblage, a low percentage of sulphide minerals can represent significant mineralization. However, the low amount of sulphides and their mode of occurrence produce subtle chargeability anomalies that are easily overlooked. On the CVS claims, mineralization is also fracture-controlled, and the copper minerals are bornite and chalcocite, with minor chalcopyrite.

RECOMMENDATIONS

1. Additional mapping of selected areas of interest should be completed at a scale of 1:2000 to evaluate their mineral potential before drilling. These areas include the Mystery Lake region, Three Creeks and Bob 6, as well as those regions underlain by IP anomalies from the 1993 survey.
2. Laboratory chargeability and magnetic susceptibility tests should be conducted on a suite of rock samples from the area underlain by chargeability anomalies between Chataway and Det Lakes. This would determine the background chargeability levels for these unmineralized rocks, and would show what effect magnetite content has on chargeability readings.
3. Several VLF traverses should be completed in a generally north-south direction to locate and define major east-west cross structures. Traverses could be run along the conveniently accessible roads, the 50+00E base-line and the 32+00E tie-line. The VLF data should be Hjelt filtered to determine any structures' dip magnitude and direction.
4. The legal corner posts of important claims should be surveyed to determine if any fractions exist, and also to accurately define the perimeter of the CVS claims. This should be completed before any drilling is started, especially if drilling is planned near the outer claim boundary. All the open ground west of the claim block, between the CVS claims and those held by Highland Valley Corp. should be acquired. The most important legal corner posts are as follows: Roscoe, CVS-5, CVS-7, CVS-14 and CVS-15.
5. If the project continues beyond the first drilling stage, the area should be covered by updated digital air-photogrammetry. This would provide a current database accurately portraying the locations of all the old trenches, drill sites, 1993 grid lines, roads, clear cut areas and current claims posts. Existing surveys should be incorporated into the database.

Respectfully submitted at Vancouver, British Columbia.
Dated this seventh day of July, 1993.

S.G. ENNS, P. Geol.

A.G. Troup, P. Eng.

REFERENCES CITED

- Goodwin, C. 1971. Chataway Property, Geological Compilation Map for Amoco Canada Petroleum Co.
- McMillan, W. J. 1978. Geology of the Guichon Creek Batholith. B.C. Department of Mines and Petroleum Resources. Preliminary Map 30.
- McMillan, W. J. 1985. Geology and Ore Deposits of the Highland Valley Camp. Field Guide and Reference Manual No. 1.
- Troup, A. G. 1992. Geological, Geochemical and Geophysical Report on the CVS Copper Prospect. Kamloops Mineral Division B.C. NTS 92I/7 Assessment Report.
- Willars, J. G. 1972. Report on Geological Survey and Diamond Drilling on Chataway Exploration Co. Property in the Highland Valley for International Mogul Mines Ltd. Assessment Report No. 4050.

APPENDIX A.
ROCK DESCRIPTIONS

ROCK DESCRIPTIONS

1. Chataway granodiorite.

This unit is medium to coarse grained (with occasional fine grained varieties) with the highest average mafic mineral content of all phases on the property. It has a relatively uniform mafic distribution. These features and the large poikilitic K-feldspar grains measuring 1 to 1.5cm across are characteristic features of the phase. Total mafic content is between 15 and 25%, and is usually hornblende dominant, with amounts of 12 to 15% as 2 to 6mm grains. Biotite content varies between 5 and 8% with local exceptions as high as 10% in fine grains, or as 5 to 6mm large patches. The quartz content varies between 15 and 25%. The variability of the mafic mineral proportions is another characteristic feature that results in the greatest range of textural and compositional variability being displayed by this phase.

2. Roscoe granodiorite.

This unit is medium to coarse grained granodiorite that differs from the Chataway phase in its overall lower mafic content, and the crisp-textured hornblende dominant appearance. Mafic content varies little, in contrast to the Chataway phase, with the exception of one outcrop of sub-pegmatitic hornblende-feldspar in the Three Creeks area. Total mafic content is 12 to 16%, of which 8 to 10% are 3 to 6mm hornblende, together with 3 to 4% biotite. Quartz content is 15 to 20%. The unit often displays a faint pink mottled appearance in fresh hand specimens (from K-feldspar content?). Pale pink, poikilitic K-feldspars 1 to 1.5cm in size are conspicuous. This unit is distinct and mappable although it may be a sub-phase of the Chataway; it occurs consistently between the varietal Chataway and Bethlehem granodiorite phases along most of the north to south length of the claims.

3. Bethlehem granodiorite.

This unit is fine to coarse grained granodiorite. It characteristically displays an inequigranular or bimodal mafic population distribution (instead of uniform mafic distribution), a lower overall mafic mineral content and it has an average higher biotite content than the Chataway and Roscoe phases. Large poikilitic K-feldspar grains are absent. The medium to coarse grained rocks contain 10 to 15% total mafic minerals of which 6 to 8% accounts for hornblende with distinctly different population sizes that are 1 to 2mm and 3 to 6mm. The large hornblende crystals often are characteristically poikilitic with tiny crystals of feldspar, apatite and sphene. Biotite accounts for 4 to 6% of the mafic minerals and may be either fine or coarse grained. The fine grained rocks contain 12 to 15% total mafic minerals with 8 to 10% hornblende. They also display the characteristic but more subdued bimodal size distribution of 1 to 2 and 3 to 4mm hornblende

crystals. Biotite content is 4 to 5% and generally is fine grained. Mafic minerals commonly exhibit a weak foliation. Quartz content at 20 to 25% is slightly higher in this phase, compared with Chataway and Roscoe phases.

4. Skeena granodiorite to quartz monzonite.

This unit is distinctly lower in colour index with a mottled creamy white appearance caused by higher K-feldspar and quartz contents. Total mafic content is 7 to 8% with biotite the dominant constituent. Fresh biotite books 6 to 8mm across are common. Hornblende content varies from 1 to 4% as fine grained crystals, or coarse xenocrysts 6 to 7mm, even even exceeding one cm in some cases, as poikilitic crystals. Quartz content is 25 to 30% of the rock as 5 to 10mm subhedral to nearly square grains.

5. Bethsaida quartz monzonite.

This unit is similar to the Skeena phase and is probably gradational into it. Bethsaida is distinguished from Skeena mainly on the basis of lower total mafic mineral content which is entirely biotite. According to McMillan (oral communication 1993), only in the south part of the Guichon Creek complex covered by the CVS claims does the Bethsaida phase contains minor hornblende. The contacts between Bethsaida and Skeena phases generally extend over tens to hundreds of metres.

6. Quartz aplite and quartz granophyre.

This is a minor unit on the claims. It is composed of a fine grained mixture of 1 to 2mm quartz and K-feldspar with variable 3 to 5mm quartz eyes that are present in amounts of 3 to 7%. The unit is commonly highly fractured, and cuts all other phases, including Bethsaida, as dykes, small stocks and veins. It is most abundant in Bethsaida and Skeena phases indicating that these three late phases of the complex are closely related in time.

7. Feldspar porphyry dyke.

A single occurrence of crowded feldspar porphyry dyke was observed in a trench about 800m southeast of Dot Lake. It contains 60 to 70%, 1 to 4mm equant feldspars, 7 to 8% quartz and chloritized, 3 to 6mm hornblende aggregates that contain minor specks of bornite. The relationship of this unit to other phases such as widespread Chataway granodiorite mapped in the area is unknown, but it is assumed to be a late igneous phase.

SELECTED ROCK SAMPLES FOR THE CVS CLAIMS

BETHSAIDA:

E90, along 2200 haul road on CVS-15 claim

SKEENA:

E5, E7

BETHLEHEM:

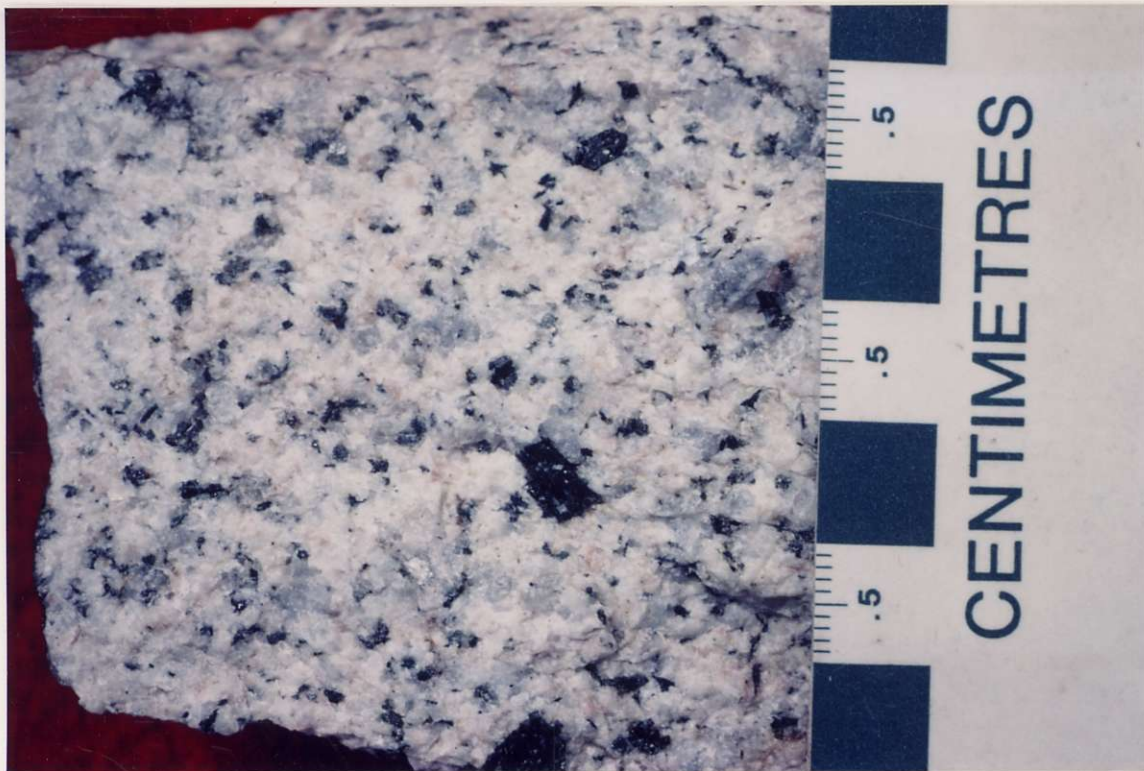
E20, E36, E53, E57, E86, E100

ROSCOE:

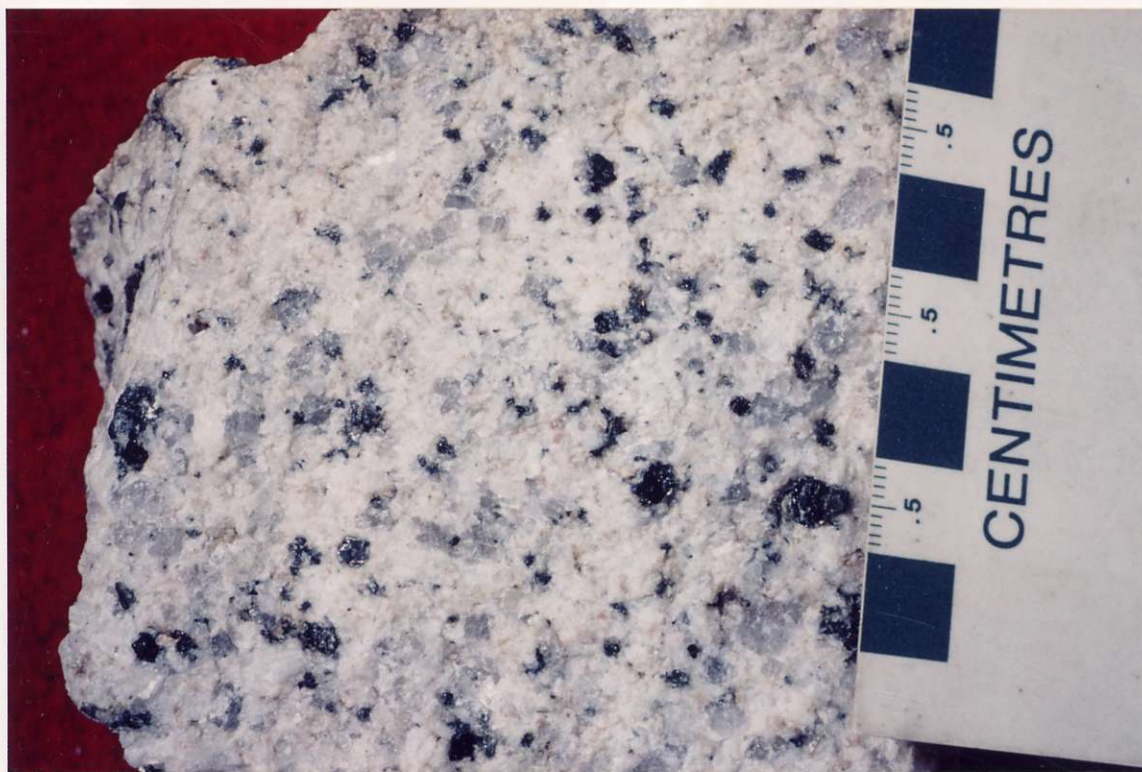
T5, T15, E18, E21, E85

CHATAWAY:

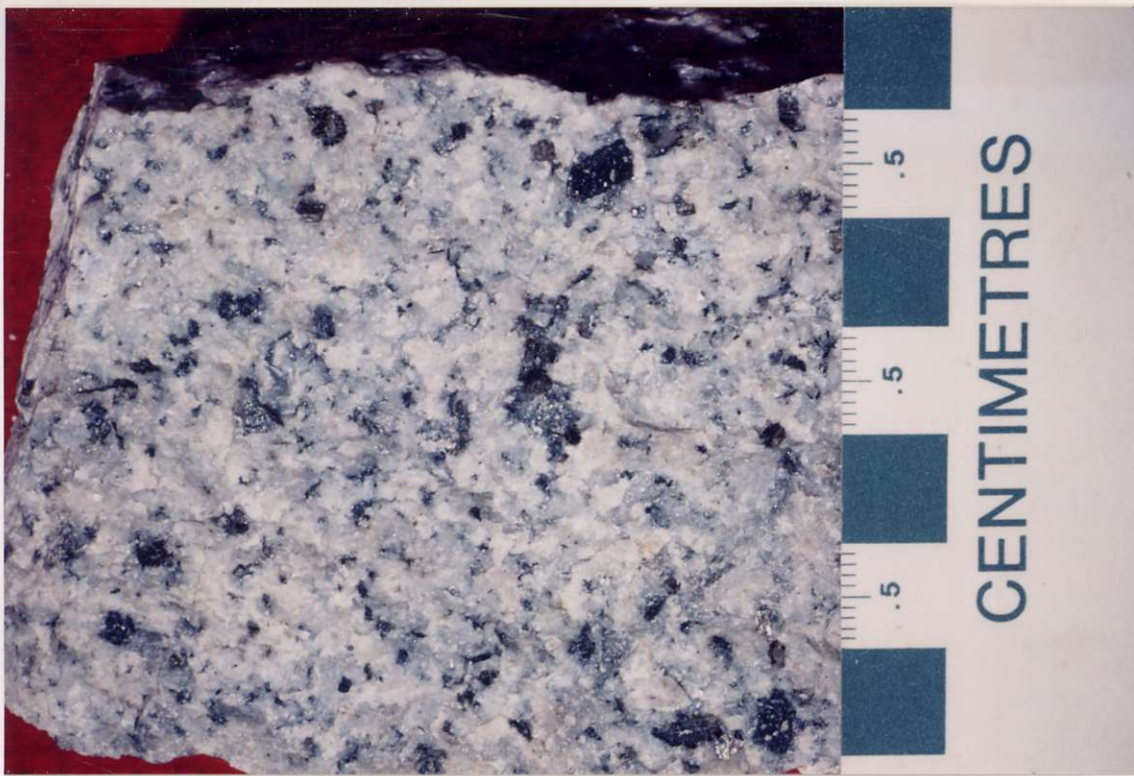
E1, E9, E27



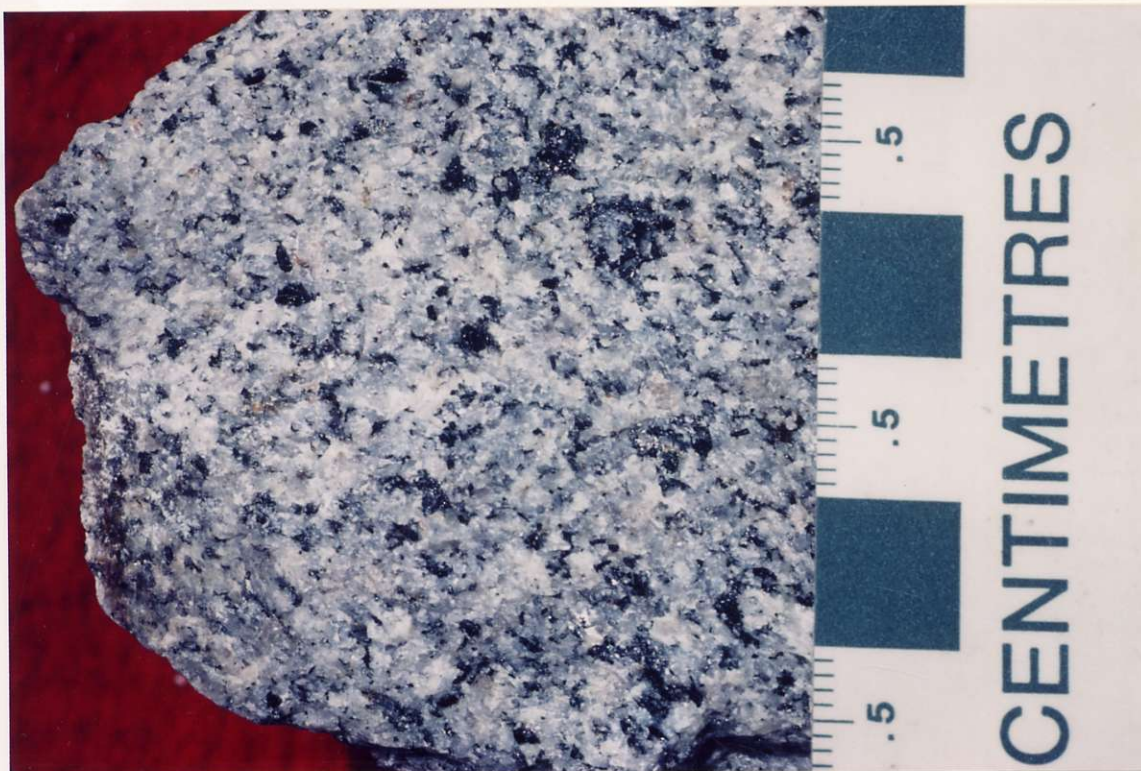
Skeena quartz monzonite from E-5.



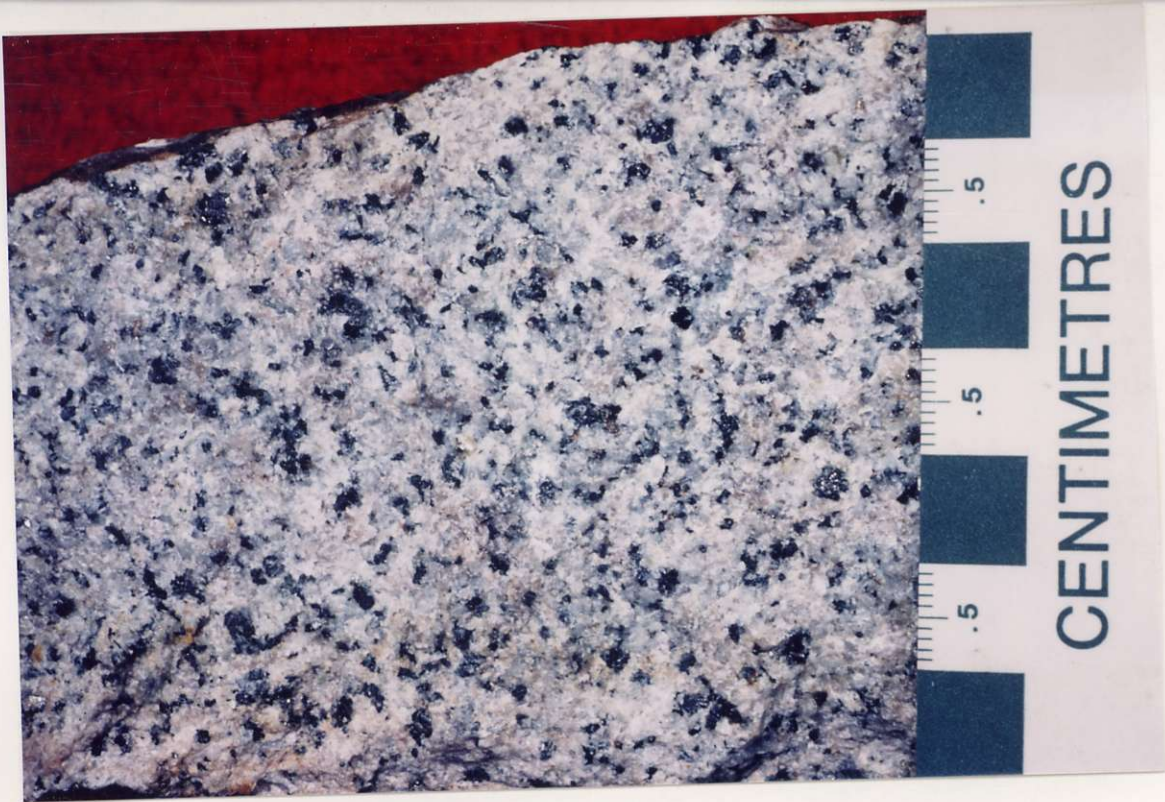
Bethsaida quartz monzonite from CVS-¹⁵ claim.



Bethlehem granodiorite from E-57. Note the poikilitic hornblende and bimodal mafic population.



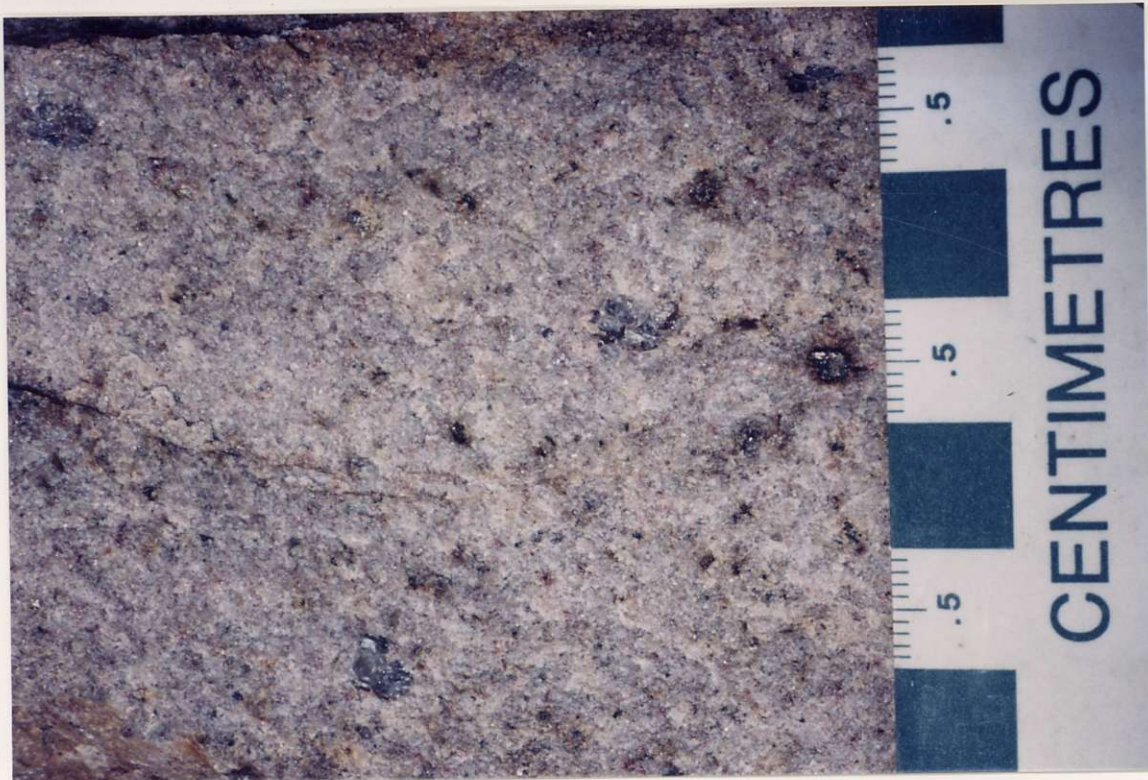
Fine grained Bethlehem granodiorite dyke from E-100.



Chataway granodiorite from E-36.



Roscoe granodiorite from E-18.



Quartz aplite from the CVS-4 claim.

MAGNETIC SUSCEPTIBILITY OF TYPE SAMPLES
(average of 5 readings per sample)

10×10^{-6} cgs. Oct 18, 1983

CHATAWAY

	E-1	1.6	Belly Lake
Dot	E-9	2.0	Dot Lake
Dot	E-9	1.6	Dot Lake
	E 27.	2.5	

ROSCOE

	T-5	1.9	
	T 15	2.1	
	E 18	2.0	
	E 18	2.0	
	E 21	1.7	
	E 85	1.9	
	E 100	1.5	- very coarse variety from 3 chs area by Trenches

BETHLEHEM

	E 20	1.2	- high total magnetic content - a 13% - 15% - uniform distribution
	E 36	1.4	- has conspicuous porphyritic 1cm kspres - may be Chataway?
	E 55	1.9	- mixed Ba-Cp fracture - W. of Mystery Lake, swampy etc
	E 57	1.3	above trenches lot of Mystery L.
	E 86	1.7	- southwest of Moss
	E 100	1.5	- Sho II area
	E 50	1.1	- w/ Cp vein

SKEENA

	E 5	1.3	Roscoe Lake area.
	E 7	1.1	Road - Main haul - mile (km 26),

BETHSaida

	E 90	.46	
"Bethsaida"	1.0		large flat sample.
"	1.1		
"	1.4		
"	1.1		
"	1.4		
"	1.5		
"	.73		small triangular fist-sized piece
"	1.1		flat sample.

PINK APLITE

	.23	west of Moss
E 48	.36	Trench sample - L 3. Fdsp. II sample.
SHO II sample	1.4	- green malachite + tenorite coated.
E 97	----	altered sample too low to read (off scale).

- make up in homogeneity (magnetic clasts w/ Mt etc.)
 - near altered vein - pink Ksp
 - secondary mineralization
 - shewing → clay.
 - irregular contact w/ flat surface.

altd 1¹⁻² sides of mag. include less.
 .01-.1

Reflects \$ left in hole.
 The casing on #12 was left in after all; it sticks out only 2" & therefore is hard to spot.

TABLE VI: CVS DRILLING COSTS TO THE END OF HOLE 93CVS-11

Hole	Casing @ \$10.97	0-1000' @ \$10.97	>1000' @ \$12.97	Tests @ \$25/h	Mud @ \$100	Left in hole	Hours @ \$60/c
CVS-1	80'	866'	0	4h	2	0	5c
946'	\$878	\$9,500					
CVS-2	32'	868'	0	4h	2	32'+s	2c
900'	\$351	\$9,522				\$606	
CVS-3	50'	868	0	4h	2	140'+s	4c
918'	\$549	\$9,522				\$1,778	
CVS-4	10'	990'	346'	6h	4	0	6c
1346'	\$110	\$10,860	\$4,488				
CVS-5	10'	883'	326'	4h	4	0	7c+6h
893'	\$110	\$9,686					
>5,000'	@ \$10.36	@ \$10.36	@ \$12.36				
433'		107'	326'				
1326'		\$1,108	\$4,029				
CVS-6	22'	978'	353'	4h	3	0	11c
1353'	\$228	\$10,132	\$4,363				
CVS-7	20'	901'	0	4h	2	0	6c
921'	\$207	\$9,334					
CVS-8	66'	934'	39'	4h	1	0	5c+2h
1039'	\$684	\$9,676	\$482				
CVS-9	20'	820'	0	4h	1	0	8c
840'	\$207	\$8,495					
CVS-10	42'	803'	0	4h	2	0	10c
845'	\$435	\$8,319					
CVS-11	14'	972'	0	4h	5	\$350	19.5c
986'	\$145	\$10,069					
\$135,233	\$3,904	\$106,223	\$13,362	\$1,150	\$2,800	\$2,734	\$5,060
11,420'	= \$11.84 per ft.						