SILVER CUP MINE, LARDEAU
REGIONAL FRAME-WORK AND STRUCTURAL ORE CONTROL

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ABSTRACT

The Silver Cup mine is about 10 miles east of Trout Lake in the Central Lardeau. From 1895 to 1915 it produced about 1.5 million oz. of silver and some lead, zinc, and gold. The problem of the paper is to study its geological setting and structural ore controls.

Eastwood has shown that the mine is close to the axial plane of a major isoclinal anticline that is dipping to the northwest and plunging to the northeast. He has correlated the greenstones in the core of the anticline with the top of the Bunker Hill Group and has named the overlying black slates and phyllites Triune Formation. These two stratigraphic units were divided into three and four members respectively. The repetition of certain horizons and the trend of contacts indicates that the major anticline here has two apices separated by a tightly compressed syncline.

Ninety five per cent of the production of the mine came from a zone that has a maximum length of 300 feet, a maximum width of 200 feet and has been stoped down to 1200 feet below its outcrop. Geological mapping shows that the ore is contained in openings of a structure that is a combination of a drag fold and a compressional bulge which is dipping with the host horizon to the northeast and raking

steeply to the northwest. Host is the basal member of the Triune formation, a siliceous graphitic slate.

Three other ore zones in the vicinity of the main zone have a similar lenticular shape and steep rake and are contained in the same member, but they are not all in the same structural position with respect to the two apices of the major anticline. These observations suggest that the mechanical properties of the host rock rather than a continuous structure such as a fault or a shear zone are responsible for the localization of ore. It is shown how the texture of the host rock, the thickness of the host member and the texture of the overlying rocks facilitate the formation of lens like openings if differential stresses are applied.

Due to the steep rake of the structures, these stresses cannot be related to relative movement of outer layers towards the apices of the anticline. Their origin is not known but two hypotheses based on field evidence are offered.

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TABLE OF CONTENTS

PART II

Page

SILVER CUP MINE, LARDEAU

REGIONAL FRAME-WORK AND STRUCTURAL ORE CONTROL

INTRODUCTION

I. Silver Cup Mine

1. Location and Access

The Silver Cup mine is located 50° 38'N, 117° 22'W at an elevation of 6800 feet in the Central Lardeau. It lies on a northwesterly sloping hillside below the Silver Cup peak and above the south fork of Lardeau Creek.

The mine can be reached in the following way: a road, passable for cars, leads from Trout Lake through Ferguson to Eight mile, (distance about 8 miles). The continuation from there to Towser camp. about two miles long, is now in poor repair but could easily be reconditioned for truck use. Two cabins can be used at present in Towser camp. The road from the camp site to No. 7 level has a steep grade and is in places covered by slides.

Trout Lake itself may be reached by road from Kaslo

via Lardeau and Gerard, by road and ferry from Revelstoke, via Arrowhead and Beaton, or directly by seaplanes.

2. Distribution of Ore Zones

Ninety five per cent of the production came from two leads that are parallel to each other and approximately parallel to the bedding which is dipping steeply to the northeast. The northeastern zone, called "Silver Cup lead", has been mined from 12 levels to about 1200 feet below its outcrop. The southwestern zone, named "Blind lead" did not crop out and ends a few hundred feet above the lowest workings. These leads apparently consisted of lenticular shoots of high grade ore connected by low grade material and sparsely mineralized quartz stringers.

About 1200 feet northwest of the main zone, another ore body called the "Sunshine" zone has been stoped to about 200 feet below the outcrop.

3. History, Development, and Production

All mineralized zones in the area were discovered early in the eighteen nineties. In the first stages the surface exposure of the Silver Cup lead was developed by a shaft. When, from a lower point of the hill side, the Silver Cup cross cut (No. 3 level) was driven, a second zone of mineralization, called the "Blind lead", was encountered. The next lower adit (No. 4level) was placed 400 feet to the northwest.

It encountered little mineralization here, only the area directly below the stopes of No. 3 level and the surface workings contained ore. The next step in the development was a winze sunk from No. 4 level in the vicinity of the Silver Cup lead.

While this work was in progress, the Sunshine bodies had been developed from two levels. The lower level was extended southward and, at 1700 feet from the portal, reached the Silver Cup lead. Although this drift followed shear zones for most of its way, no high grade ore was found. From then on these workings, known as the No. 7 level, became the main haulage and base for development. At first, two levels were opened up above the No. 7 level, then four levels below. Below No. 10 level, no workings on the Blind lead are to be seen on Mine maps, and the drifts on the Silver Cup lead are short. The costs of pumping water and hoisting ore from the lower levels became exceedingly high and at the same time extensive exploration on No. 8 level did not find a continuation of the Sunshine ore bodies. Therefore, by 1914, all development was stopped and the levels below No. 7 surrendered to the water. Thereafter only minor quantities of ore were taken out of the upper levels by leasers.

The history of the mine has been influenced significantly by the methods of milling. In the first period, only high grade ore was taken out and shipped to Tacoma, the low

grade material being stored in the stopes or dumps. In order to treat this material a mill was built in 1905 at Five-Mile and connected with the Silver Cup mine by a tram line. This mill also served the Netti L mine. Several thousand tons of ore were milled, but due to exceedingly high tailing losses the plant had to be shut down after one year of operation. After this failure, the customary method of high grading was continued. The ore shipped by 1914 had an approximate grade of; Gold $6.00 per ton, silver 150 oz. per ton, lead 30% and some copper and zinc. The grade of the material left on the dumps was estimated as ; Gold $3.50 - $8.00; lead 3.5 - 4%, copper 1.0 - 1.5%, silver 30 - 50 oz., zinc 5 - 20%. In 1936 - 37, a small flotation mill was set up at Towser camp and a tram line to the dump of No. 7 level was constructed. In that year 290 tons of concentrates were shipped to Trail. Apparently the mill was also operated in 1941.

At present there are still considerable quantities of low grade ore left on the dumps of No. 3 and No. 4 levels and of the old Silver Cup shaft that will be useful should the property ever be put into production again. The total production of the mine amounts to 9600 tons of shipping ores and several thousand tons of mill feed.

A new programme of exploration in this mine was started in 1952 -53 by the Granby Mining and Smelting Company.

Number 7 and No. 9 levels were drained, rehabilitated, mapped, and sampled. Ten diamond drill holes, 200 to 250 feet long were completed to test for parallel structures. This work, however, had no further consequences.

II. Other Ore Zones

In the vicinity of Silver Cup mine are three other ore zones that will be treated briefly. All were discovered at the same time as the Silver Cup mine and all produced the same type of ore.

1. Triune Mine

The Triune mine is on the northwestern face of Triune Mountain, about 4,000 feet southeast of the main zone of the Silver Cup mine.

The mine has four adits that are stacked on dip above each other and are between 350 and 650 feet long. The upper three levels are connected by a raise.

The mineralized zone was probably about 200 feet long, 500 feet deep, and 4 to 5 feet wide and situated between the upper three levels. It did not extend down to the lowest level.

In the years 1901 to 1905, 534 tons of high grade ore were shipped which were assaying Ag 240-400 oz., Pb 35-50%, and Au .9 oz. The property stayed idle then and was

worked again from 1916 to 1919. In this period similar high grades were produced; the quantities are unknown.

2. Towser Tunnel

"Towser Tunnel" is situated about 1800 feet northwest of the Sunshine zone. The workings are about 500 feet long and consist of drifts, crosscuts and a raise to the surface, The ore body was about 175 feet long, between 4 and 5 feet wide and terminated at a depth of about 50 feet from the surface. The total production is not known.

3. Free Coinage Workings

The Free Coinage workings are situated about 300 feet southeast of the main zone and comprise more than 1000 feet of drifts, crosscuts, and raises and several open cuts. There are no orebodies, only a large number of small and sparsely mineralized quartz veins.

III. Previous Geological Work and Sources of Information

The only comprehensive description of the geology of the Lardeau has been given by J.F. Walker, W.F. Bancroft, and H.C. Gunning in the G.S.C. memoir 161 (1929).

Since 1953 G.E.P Eastwood of the British Columbia Department of Mines has been studying a section in the central Lardeau trying to work out structure and stratigraphy in more detail. His work also covered the area of Silver Cup and

Triune mines. A preliminary map is to be published in 1957.

Information about development and production of the mine is contained in the annual reports of the British Columbia Minister of Mines. In 1903 R.W. Brock made a brief description for the Geological Survey of Canada. Gunning's work at the Silver Cup mine and in its vicinity includes a study of the mineralogy of the ore, the gangue, and the regional alteration, some underground mapping, and descriptions of structures. Confidential reports in connection with exploration work were written by D.M. Cannon in 1941, by W.S. Hamilton in 1951, and by J. Sullivan in 1953. Sullivan also did the geological mapping of No. 7 and No. 9 levels.

IV. Problem of the Thesis

Problem of the thesis in general is to determine the geological setting of the mine within the regional frame work that has been established by Eastwood and to find the structural ore control. A particular question arises from the distribution of ore bodies and from the history of the mine: several ore zones occur on strike, and the concept of continuous veins has guided exploration. However, the ore bodies are horizontally very short and extensive only in depth. Long exploration drifts like the No. 4, No. 7, and No. 8 tunnels of the Silver Cup mine and the Free Coinage workings have shown no lateral extension of the high grade zones. The question is, whether more or less continuous veins exist; and

if not, why the ore bodies are approximately on strike. The mineralogy of the ore will be treated only very briefly. This subject has been studied by Gunning from a regional point of view.

V. Current Field Work by the Author

The author spent eight weeks of the season 1956 on the problem supported by a crew of one to three helpers. In this time the maps accompanying the paper were prepared. The geological map of the surface of the main zone is based on plane table work. The geological map of the Silver Cup mine was produced mainly by plane table work but supplemented by tape and compass traverses and combined with old mine plans. The sheet is an outcrop map but such outcrops that are insignificant for the location of contacts because of their situation or because they are too highly altered were neglected. The geology of the area not covered by the plane table survey was plotted on a base map at the scale of 1000 feet to the inch. Later on this base map was enlarged, and the major results of the plane table survey were transferred to it. Only the levels No. 3, No. 4, No. 7 and No. 8 of the Silver Cup mine, the Towser tunnel and the Free Coinage workings were accessible or could be opened up. Because Gunning had mapped the Free Coinage workings and Sullivan the No. 7 level; and because the Towser tunnel was flooded with two to three feet of water and the No. 8 level has no mineralization or interesting features we only mapped the levels No. 3 and No. 4.

PART I. GENERAL GEOLOGY

I. Stratigraphy

1. General Statement

Eastwood recognized three major stratigraphic units in the area. The oldest are green phyllites that he correlated with the top of the Bunker Hill group. They are overlain by the graphitic slates and phyllites of the Triune formation. The youngest formation is the Ajax Quartzite. The age of these rocks is not exactly known. Hundreds of feet lower in the section is the Badshot Formation that has been correlated with an older Cambrian limestone member of the Laib formation. Considerably higher up is the Christie Point Group (coinciding in part with the previous Milford Group) that contains Mississippian fossils. Therefore the rocks in this area probably belong somewhere in the older Palaeozoic. The two older units were divided by the author into three and four members respectively. Because some rock types appear in several members, at first the lithology will be described in general and then, briefly, the individual formations and members.

3. Lithology

All rocks in the area show the characteristics of low-grade regional metamorphism and fit into the greenschist facies. They also have been subjected to carbonate, silica and chromium-mica alteration. (See Part II, 1-2).

A. Green Phyllite

Macroscopic Characteristics:

The rock is a green phyllite with a poor schistosity. In some places fine, lighter colored spots show up that are probably lithic fragments.

Microscopic Characteristics:

A few thin sections show that the rock is made up dominantly of lenticular fragments of volcanic rocks which are in the order of a millimeter in size. In the other sections the original rock fragments are only weakly suggested. The mineral assemblage consists dominantly of chlorite, (mostly penninine), actinolite, members of the epidote group, ferristilpnomelane, leucoxene and plagioclase; wherever it was possible to determine the composition of the plagioclase, it was found to be albite. The schistosity of the rock is due to the arrangement of the chlorite. The microscopic characteristics of the rock and its close association with the lapilli tuff suggest an original tuff.

Alteration:

The green phyllite in many places is carbonatized. The carbonate usually is present in uniformly distributed grains that are about 200 microns in size and often elongate parallel to the schistosity. The carbonate weathers rusty brown and at incipient stages gives a sprinkled appearance to the surface. With higher degrees of alteration the whole mass becomes red.

B. Green Phyllite with "Augen" Structure

Macroscopic Characteristics:

Like the tuff this rock is a green phyllite, but characteristic for it are lighter colored "augen" that are uniformly distributed through the whole mass.

These lenticular fragments vary in size and are in the average, perhaps a cm. long. Some of them show vesicular texture.

Microscopic Characteristics:

Microscopic examination shows that the rock is a lapilli tuff. The "augen" appear to be fragments of various volcanic rocks such as amygdaloidal flows and feldspar and pyroxene-porphyries. The matrix consists dominantly of chlorite, fine needles of actinolite and minerals of the epidote group, and of some leucoxene.

Alteration:

Like the other greenstones, this rock is often carbonatized, and higher degrees of alteration destroy its diagnostic characteristics; but at moderate degrees the augen structure can still be recognized as lighter colored spots within a network of dark brown lines.

C. Graphitic Slate (approaching phyllite)

Macroscopic Characteristics:

The rock is black and has shiny cleavage planes; in cross-section it appears rather siliceous. Usually the cleavage is not pronounced, but when strongly weathered, the slate is quite fissile and resembles very closely the black phyllite. The absence of higher degrees of alteration then is the only diagnostic feature.

Microscopic Characteristics:

The dominant component of the rock is quartz. The grains are generally between 5 and 50 microns in size and most commonly between 10 and 20 microns. They are fairly angular and vary from elongate to equidimensional in shape. Up to 10% of the section may consist of carbonaceous matter that occurs in fine parallel layers which often show folds. A minor constituent is muscovite. This mineral is not concentrated in layers but occurs as individual flakes oriented in various directions between adjacent quartz grains.

Alteration:

The rock is affected by silicification and carbonatization, but it is not subject to a complete alteration that obliterates its diagnostic properties. Iron carbonates may be present as brownish weathering nodules that usually are uniformly distributed. White quartz has been introduced in larger or finer veins that are parallel to schistosity or occupy cross fractures. Such cross veins often show peculiar curved shapes due to differential movements within the member.

D. Black Phyllite

Macroscopic Characteristics:

In the member T2 the rock is very dark fragile, and fissile. In the member B1 the color varies to a bluish grey and the texture becomes more massive.

Microscopic Characteristics:

The dominant component of this rock is carbonaceous matter that usually amounts to more than 50% of the section. It is arranged in parallel layers and may be associated with muscovite or chlorite. Quartz and perhaps feldspar may comprise a third or less of the rock. The grain size is between a few and 50 microns. The grains are usually lenticular and elongate parallel to the schistosity.

Alteration:

This rock type is to a much higher degree subject to alteration than the graphitic slate. At incipient stages nodules of carbonates appear. With higher degrees the rock gradually loses its schistosity and is tranformed into a massive aggregate consisting dominantly of carbonates that may be veined by quartz and chromium mica and on first sight can hardly be distinguished from highly altered greenstones. On closer examination, however, it is mostly possible to detect the original cleavage as silvery planes with dark brown spots within the rusty weathering mass.

E. Quartzite

The quartzite is grey and has a poor cleavage. It is made up mainly of poorly sorted and rather angular grains of quartz and some feldspar that range in size between .2 and 2 mm. Small amounts of micaceous material, dominantly muscovite, are arranged in fine, parallel layers. Grains of carbonate and opaque iron minerals are scattered through the mass.

4. Description of the Formations and Members

A. Bunker Hill Group, Uppermost Formation

Member Bl.

This member is exposed only in the core of the south-

western anticline where it wedges out to the northwest. The maximum thickness here is about one hundred feet. The member is made up of thinly interbedded black and green phyllites; the green phyllites appear to be lithic tuffs. Due to the lack of exposure and the high degree of alteration it was not possible to trace individual beds, but it seems that the two types interfinger irregularly. The thickness of individual beds varies from several feet to fractions of an inch.

Member B2.

This member consists of green phyllite that probably is a lithic tuff. It is about 50 feet thick.

Member B3.

Member B3 is a green phyllite with augen structure and a lapilli tuff. It is about 50 feet thick.

B. Triune Formation

Member T1

The member T1 is made up of graphitic slate. On the southwest limb of the major anticline its thickness varies from a few to 150 feet, on the northeast limb it ranges from 30 to 300 feet. These variations may in part be due to sedimentary reasons, partly they may be plastic deformations.

Member T2

This member is made up dominantly of black phyllite but it also contains lenses of lapilli tuff and tuff and of green phyllites that were not studied in thin sections. The

thickness of T2 varies: on the southwest limb it ranges between 200 feet and 400 feet, on the southeast limb it is about 250 feet.

Member T3

The lithology of this member is the same as of Member T1: it consists of graphitic slate. The apparent thickness of the southwest limb is about 1000 feet, of the northeast limb about 550 feet; but there may be repetitions due to folding or faulting.

Member T4

Member T4 is present only on the southwest limb where it is about 200 feet thick. It consists of interbedded graphitic slate and quartzite. The missing of this member may be due to sedimentary reasons or it may have been caused by squeezing, which is quite characteristic for the northeast limb of the major anticline.

5. Environments of Deposition

The presence of carbonaceous matter in the Bunker Hill group as well as in the Triune formation indicates deposition in a basin with restricted circulation and oxygen supply. The dominant feature during most of the time represented in this section is the sedimentation of silt which suggests a slope (clinoform) environment. In the early period this process was briefly overshadowed by a volcanic explosion

in the source area resulting in the deposition of pyroclastics. The restricted lenticular shape of the last pyroclastic facies may be explained by submarine erosion. At the end of the period deposition shifted towards coarser sediments that finally dominated in the Ajax Quartzite. This shift may indicate a change towards a shelf environment.

II. Major Structure

Eastwood has shown that a major fold which has been traced for several miles, extends into the area of Silver Cup and Triune mines. It is an isoclinal anticline that is overturned to the southwest and plunges to the northwest. Our mapping indicates that this anticline in the vicinity of Silver Cup mine has two apices separated by a tightly compressed syncline.

This concept is based on the repetition of certain horizons and the trend of contacts. No information was obtained from drag folds. Although such structures are common farther out on the limbs, here, in the core of the anticline, no drag fold was found that could be related with confidence to the relative movement of outer layers towards the apex of the major anticline. Furthermore, no conclusions about fold structure could be drawn from bedding-cleavage relations because the cleavage dips steeper than the bedding on all limbs and generally strikes 10° west of the axial planes. No explanation can be given at present for this anomalous relation;

it is not yet known if there was a second period of regional stress.

The outcrop map shows that none of the members could be traced continuously, but the distribution of T1 and B3 may be used as the key to the structure. Rocks of this type are exposed not only at the southwest and northeast limbs of the major anticline, but also in its centre. In the centre B3 borders T1 to the northeast and to the southwest and both wedge out to the southeast. The repetition could be explained by cyclic deposition and the wedging by the combined effect of the rising topography and an anticlinal structure. If this were true, B3 should widen with depth and T1 appear in its centre on the steep southeastern slope of the ridge between Alpha and Silver Cup peaks, that provides an almost vertical section. However, B3 thins out and T1 does not appear at all. This indicates a northwesterly plunging syncline. This explanation is supported by two other features: (1) In the core of the major structure, near Towser tunnel, black phyllite crops out. The appearance of this rock type can be explained by synclinal keel of the member T2. Supposing an anticlinal structure, we would have to postulate a facies change or a complicated fold for which there is no other evidence. (2) Southwest of the centre the members B1 and B2 seem to pinch out to the northwest which indicates a northwesterly plunging anticline complementary to the central syncline.

Considering the trends of the contacts, the topography, and the approximate thickness of the members, the plunge of these folds was calculated to be about 35°. This is relatively steep; plunges obtained on drag folds of the Ajax Quartzite are normally between 20° and 30°. Apparently the plunge increases in the core of the anticline near the Triune basin. The occurrence of mineralization and later intrusives in this area might have a relation to such a structural anomaly. But, at present this is a mere hypothesis that is based on little evidence. It may well be that the trend of contacts has been influenced largely by facies changes or structural squeezing and does not allow to reconstruct the anticline in such a manner. Nevertheless, a composite cross-section has been prepared from sections at various levels (Figure1). A plunge of 33° and parallel trend of the limbs were used in this illustration.

No major fault was observed in the area.

PART II. ECONOMIC GEOLOGY

I. Mineralization and Alteration

1. Mineralization

The mineralogy of the mine has been described by Gunning from a regional point of view. A few polished sections were studied by the author but no additions could be made. The ore minerals in their paragenetic sequence are:

(oldest) pyrite, carrying small amounts of submicroscopic gold.
sphalerite, with minute blebs of exsolved chalcopyrite
freibergite
galena.

In the early stages of mining ruby silver was also reported.

Of the gangue minerals quartz was found to be later than sphalerite and earlier than galena. Carbonate fills fine fractures in all other minerals and appears to be the latest mineral.

The assemblage seems to be typical for a mesothermal lead-zinc-silver deposit. The exsolution temperature of chalcopyrite from sphalerite, however, was determined by Buerger as 350°-400°C, (Edwards, p.98), which suggests a temperature slightly higher than that proposed by Lindgren for the mesothermal group.

21 Rock Alteration

As pointed out by Gunning, rock alteration is a common feature in the Lardeau and perhaps related to the mineralization. The dominant mineral group introduced are Ca Mg Fe carbonates; less abundant are quartz and chromium bearing mica of the fuchsite-mariposite series.

Field evidence and microscopic examinations show that in the Silver Cup area the chromium mica is always associated with quartz and that both are later than the carbonates.

The alteration is wide spread. Due to the lack of exposure the structural controls could not be clearly recognized, but a lithological control is apparent; the green and black phyllites are much more susceptible to alteration than the siliceous black slate. Because the graphitic slate is the most favourable rock type for ore deposits in this area alteration cannot be used as a guide for exploration here.

3. Age of the Mineralization

The age of the mineralization is not known with certainty. However, a lower limit is given by the probable age of the host rocks - lower Paleozoic, and it is likely that, as Gunning has pointed out, the mineral deposits in the Lardeau are related to neighbouring batholithic intrusions which are probably mostly Mesozoic in age.

III. Structural Ore Control

1. Structural Control of the Main Ore Zone

A. Information from the surface:

Detailed mapping on the surface revealed certain structural anomalies that probably are related to the localization of the ore shoots.

The most obvious feature is a pronounced curvature in the contact between B3 and T1, a feature quite unusual in this region where contacts are generally straight. This curvature resembles a dragfold indicating relative movement of the T1 horizon to the northwest. A small dragfold southeast of the main deflection is in the same sense and rakes steeply (about 60°) to the northwest. However, the trends of schistosity do not everywhere conform to the dragfold pattern. As shown on Figure 2, at a zone southwest of the contact the strata no longer follow a parallel course, but start curving in the opposite direction. In the centre of this zone of divergence are the old shaft and the first stopes of the Silver Cup lead. The structural position of the Blind Lead is less clear. The stopes of the lead are contained in the major "Bulge " but the contact T1 - T3 is poorly exposed; only a few structural trends were available, and it is also not quite clear where and to what extent the zone here was mineralized.

B. Information from Mine Maps

The distribution of stoped areas indicates that nowhere is the orezone more than 300 feet long whereas the rake length is more than 1200 feet. The zone is relatively short at the surface, lengthens to its maximum depth between No. 3 and No. 7 levels, then shortens at greater depth. The total width of the zone does not exceed 150 feet and is usually less than 100 feet. It dips about 66° to the northeast and rakes about 86° to the northwest.

C. Information from Geological Mapping Undergound

The observations underground may be summed up in three points.

(i) The ore stays in the same member T1 and at about the same distance from the member B3 as at the surface. It was not possible, however, to outline the "bulge" underground. This structure was noticed at the surface by a deflection of the contact and the trends of schistosity. The contact, however, is exposed underground at a few places only, and the structural trends were not apparent because the drifts usually follow shear zones that are highly crumpled and show very irregular attitudes.

(ii) Little ore has been left in the levels examined. Wherever observed, the vein material is present in stringers or veins parallel to the schistosity of the country rock. Individual stringers of vein material range in width between

a fraction of an inch and a foot, mineralized zones as a whole are up to several feet wide. The wall rock is highly crumpled. The crumpling seems to be in all directions and dragfolds do not have uniform attitudes or sense of movement. The contortion usually dies out within ten or twenty feet from the vein normal to strike but persists on strike from one stope to the next. The two leads are not continuously mineralized but made up of a series of lenticular ore shoots.

(iii) A new feature underground not apparent on the surface (perhaps due to lack of exposure) is the existence of extensive crumpled zones outside the high grade zone that are only sparsely mineralized. A few perfect dragfolds were obtained in No. 4 and No. 7 levels indicating relative movement of the footwall to the northwest but there is also dragfolding in other directions. The general pattern shows so little uniformity that no conclusions can be drawn concerning the relative movement in these zones.

D. Interpretation

Examination of the surface showed three significant features:

1. The contact T1-B3 resembles the section through a dragfold with steep rake.
2. The trends of schistosity are not uniformly parallel to this contact but, at a certain distance, are deflected in the opposite direction. The trends of the attitudes are lenticular in the overall picture.

3. The Silver Cup lead is located in the centre of divergent attitudes. The structural control of the Blind lead is not clear but it is contained in the major zone of deformation.

From the distribution of stoped areas on mine plans we concluded that the high grade ore zone is lenticular, dips with the host horizon to the northeast, and rakes steeply to the northwest.

Correlating these observations we arrive at the concept that the strata form a structural bulge that is lenticular in vertical and horizontal section. This structure contained zones of open space and low pressure that caused the deposition of ore. Some internal shearing may have taken place; but the crumpling of the wall rock is perhaps mostly due to the adjustment of strata remaining in the centre of such openings to the general shortening of the structure.

Dragfolds at the contact B3-T1 indicate relative movement of the T1 to the northwest. This movement is thought to be responsible for the formation of the major bulge. It probably involved much larger parts of the horizon, as indicated by the shear zones in No. 4 and No. 7 levels. But the shearing alone did not provide sufficient open space for ore localization.

2. Structural Control of Minor Ore Bodies

Due to the lack of exposure or access, the inform-

mation about the other ore bodies in the vicinity of the main zone is much poorer. However, a few features common to most of them were noticed and these features are significant for the interpretation of the structural ore control in the area as a whole.

A. Sunshine Zone

This mineralized zone is located at the contact between T1 and B3 and present in both members; but control and grade in the two rock types are different. In the greenstone the mineralization occurs in small fissures and faults that are commonly striking to the northeast and dipping to the southeast. Such veinlets are exposed in an open cut above the No. 7 level portal and about 250 feet from the portal within the level. This type apparently was not economic because it has generally not been mined, and the exploration drifts and raises of No. 8 level obviously avoided the greenstone. Host rock of the ore was the member T1. Judging from remnants exposed in No. 7 level it occurred in lenses between bulging planes of schistosity. It is reported that in the upper level two lenses were present that were 10 and 25 feet long and persisted down to No. 7 level. The width of the stopes is about six feet, the ore zone possibly was narrower. The depth probably did not exceed 200 feet. These dimensions again indicate a high grade zone that is short, narrow, but relatively deep and resembles in that respect the Silver Cup and Blind leads and the Triune body. Several small

dragfolds in No. 7 level indicate relative movement of T1 to the northwest and one dragfold suggests upward movement of the hanging wall. Due to the lack of exposure at the surface, however, an interpretation of the major structure could not be made.

B. Triune Mine

The mine was not inspected underground. From the surface exposures and from old reports the following information was obtained.

1. The dimensions of the stoped zone are roughly 500 feet in depth, 200 feet in length, and 5 feet in width, which indicates a relatively short and flat body that is elongate along dip. The similarity of proportions to the main zone suggests perhaps another manto shaped body.
2. The ore zone is contained dominantly in the horizon T1; the mineralization in the greenstone seems to be insignificant. It dips with the host member steeply to the northeast.
3. The member T1 here is bordered by a large greenstone mass to the northeast and a smaller body to the southwest that thins out upward and to the southeast. The upper limit of the ore zone seems to lie approximately where the greenstone ends.
4. At the surface some shearing is visible in the horizon T1. At one place small dragfolds, plunging 30° to the northeast indicate upward movement of the hanging wall. Emmens states

that the host rock of the ore is "much broken and twisted by local disturbance".

From this information it appears that the ore is localized in a shear zone within the member T1 and that the shearing is possibly related to the greenstone body at the southwest. (See section 4C)

C. Free Coinage Workings

The workings are mainly in the members T1 and T2; a crosscut extends through B3 and into B2. No ore bodies are present, only a large number of small quartz veins which are sparsely mineralized. Gunning's underground mapping shows a large shear zone which reflects the warping of the T1 horizon at the surface. This shear zone is the major control. Structurally the quartz veins are of three types:

1. Relatively narrow veins parallel to schistosity.
2. Irregular, short but often relatively wide lenses related to intense crumpling.
3. Tension fractures related to major warps. These fractures are dipping steeply to the northwest.

D. Towser Tunnel

The Towser ore body is about 175 feet long, 4 to 5 feet wide. It terminates about 50 feet below the present surface but may have extended considerably above it. Host rock is the member T1. Drusy cavities are present and the ore

seems to have formed by open space filling. But due to limited access and exposure the controlling structure was not recognized.

3. Summary and Conclusions

Two features are common to the four producing zones:

1. They are all in the basal member of the Triune formation.
2. Triune, main and Sunshine zone are deep but narrow and short and seem to be lenticular. The same may be true for the Towser body, but erosion has obscured the picture here.

On the other hand, the zones are not all in the same structural position with respect to the two anticlines: the main zone and the Sunshine zone are on the southwest limb of the southwestern anticline, the Towser body is on the southwest limb of the northeastern anticline, and on Triune mountain the two apices are no longer recognizable; the mine here is on the southwest limb of the major anticline. There seems to be a certain preference of the showings for the southwest side that may have been caused by structural reasons, but perhaps is only accidental because this area is better exposed.

The deposits are isolated and certainly not parts of continuous veins. They may, in their origin, be related to extensive shear zones. But the shear zones themselves, where exposed in the No. 4 and No. 7 levels of the Silver Cup mine and in the Free Coinage workings, do not contain ore.

The only certain conclusion we can draw is that T1 seems to be the favourable member. This implies a stratigraphic ore control. Stratigraphic ore controls are of different types: they may be sedimentary, chemical (with replacement deposits) or mechanical (with open space fillings). These deposits are certainly neither sedimentary nor of the replacement type; (replacement deposits would have preferred the greenstone). It seems, therefore, that the mechanical properties of the host horizon under certain stress conditions were favourable for the formation of lenticular openings which localized ore deposits. Next we will investigate what these properties were like and how such openings may have been formed.

4. Causes of Ore Controlling Structures

A. Texture of the Host Rock

Microscopically the member T1 consists of silt sized quartz grains with fine layers of graphitic material in between. Two important mechanical properties result from this texture:

1. Low cohesion between the layers of graphitic material and the quartz,
2. fair competence within the quartz layers.

The graphitic layers are potential shear planes. If the rock is subjected to differential pressures it will most

likely react to the components parallel to the schistosity by slippage on these planes. Due to the competence of the quartz layers these movements may be transmitted relatively far but will die out because of crumpling. In this process of movement and crumpling, layers that are separated by high concentrations of carbonaceous material may break apart and bend in different directions, leaving lens like openings in the centre. The length and the width of these openings will be determined by the strength of the rock and by the confining pressure. The third dimension, however, is not dependent on these factors; it is limited only by the extent of the front at which the differential forces are acting. Thus may be produced openings that are short and narrow but relatively deep.

The other rock types in the area do not possess this combination of mechanical properties and therefore do not produce the same type of structure. The black phyllite has a much more pronounced schistosity but a low competence. This rock frequently shows intense crumpling, but the deformations extend only over short distances and consist of short folds.

The greenstone, on the other hand, possesses a fair competence but a poor schistosity. It does not show crumpling at all and seems to react to force by plastic deformation.

Mineralized openings in the greenstone consist of joints or faults. These structures are essential controls in the Sunshine Lardeau mine at Camborne, but they have no importance in the Silver Cup area.

B. Thickness of the host horizon and mechanical properties of the overlying phyllite

With respect to lithology the horizon T3 is as favourable for ore localization as the member T1. Why do we not find these lenticular structures in T3? One difference between the two members is their thickness: T1 is very narrow, usually less than 100 feet, whereas T3 ranges up to 1000 feet in thickness. But what may be the influence of thickness?

The amplitude of these drag or crumple folds, that seem to be the ore control in the Silver Cup and Triune area, depends on the competence of the overlying horizons. The black phyllite of the horizon T2 is less competent than the siliceous slate of T1 and T3. The formation of folds within the narrow T1 certainly is facilitated by the incompetence of the bordering T2. Only a marginal zone of the member T3, however, has the same advantage. Further inside of this horizon there will be a higher resistance to deformation. The problem remains, why there are no ore deposits within the marginal zone of T3. In the next section a few more pecul-

iarities of T1 will be pointed out that may provide an answer to this question.

C. Differential Forces

(a) General Statement

The rake of the ore controlling drag and crumple folds is steep, almost vertical, whereas the major anticline probably plunges not more than 30° or 40°. Therefore these structures cannot be explained by relative slippage of outer layers towards the apices of the major fold; they seem to be related to horizontal movements.

At this stage of mapping no obvious cause of such movements is visible. All we notice is a remarkably uniform trend of the folds which indicates a uniform pressure normal to the axial planes. The horizontal displacements may have been caused by forces of which we have no knowledge; at present we only can try and relate them somehow to the general regional pressure.

The two hypotheses offered are based on the following field observations:

1. Immediately southeast of the main zone the basal Triune begins to thin and acquires the shape of a wedge pointing to the southeast.
2. The thinning is accompanied by a series of deformations

that appear to be continuous: at the main zone is the "bulge"; southeast from here, in the vicinity of the Free Coinage adit, the horizon is warped; and farther southeast, near the ridge, there is evidence of intensive shearing. The dragfolds near the main zone indicate relative movement of the member T1 to the northwest. It seems that the movement, the thinning, and the deformation are related.

The thinning of the T1 may have had two possible causes: either sedimentary changes or structural deformation. It definitely does not indicate the keel of a southwesterly plunging syncline because there is no repetition of stratigraphic horizons about such a fold axis. In the first hypothesis, sedimentary changes are assumed; in the second deformations; both hypotheses do not exclude each other.

(b) Hypothesis I.

If the thinning was sedimentary the following mechanism may have acted: the regional force pressing on the wedge's inclined face had a component directed to the northwest. The component is given by

$$f \sin \alpha \cos \alpha$$

where f is the regional force and alpha the angle between the wedge's face and the axial plane of the folds. The factor that has to be applied to the major foce is 0.07. It is

thought that the basal Triune reacted to this component like a not very competent body, mainly by crumpling and partly by movement that resulted in the formation of drag folds. The question is whether the northwesterly component of the regional force was strong enough to overcome cohesion and friction of the rocks.

(c) Hypothesis II

In the vicinity of the Silver Cup mine the thinning of the Tl is most pronounced where the overlying Tl contains greenstone facies. Southeast from here, in the Triune basin, the Tl is covered by drift. Where it appears again, on Triune mountain, it still is very narrow and bordered to the southeast by a greenstone unit that may be continuous with the mass on the northwest side of the basin. Then the greenstone thins out and the basal Triune member begins to widen; on the Top of Triune mountain it has regained its original width. The greenstone, containing considerable amounts of feldspathic material and possessing a poor schistosity is a more competent rock than the black phyllite which is made up dominantly of carbonaceous matter and muscovite. This implies that the greenstone will transmit stresses to a higher degree than the phyllite which absorbs more energy in the various processes of compaction, internal shearing, and contortion. The spatial relation between the thinning of the basal Triune member and the presence of greenstone suggests that in the

process of folding the latter rocks were pressing harder on the underlying Tl and squeezed it out to the northwest on the Silver Cup side and to the southeast on the Triune side. The thinning is thought to have been accomplished by differential movements on the planes of schistosity. As a result of these shear movements the dragfolds and bulges developed that subsequently localized ore. Again it is a problem whether the differences in stress were sufficient to accomplish such deformations.

5. Practical Applications

The practical result of the paper is that the Silver-lead-zinc deposits of the Silver cup and Triune area occur in steeply raking, narrow, short, but deep, lenticular zones within the basal member of the Triune formation. This member should be explored systematically from the surface with suitable geophysical or geochemical methods. Unfortunately, electrical methods cannot be employed because of the graphitic nature of the host rock.

Wherever ore is found, development should primarily follow down its rake with the hope that the zone is many times as deep as it is long or wide. However, erosion may have removed considerable parts of the orebodies. Extensive exploration drifts, as present on the No. 4, No. 7 and No. 8 levels of the Silver Cup mine and in the Free Coinage workings

do not seem to be promising because the deposits are not of the vein type.

Judging from its lenticular shape the main ore zone of the Silver Cup mine may extend to greater depth, but it is not likely that the stope length should increase; unless another, similar structure were encountered for which there is no evidence at present.

BIBLIOGRAPHY

Brock, R.W., Summary Report on the Operations of the Geological Survey for the year 1903, Ottawa, 1904, pp. 66A-71A.

Cannon, D.W., Report on the Property of the Silver Cup mine, Ferguson, British Columbia. Copper Mountain, B.C., 1941. (Confidential).

Eastwood, G.E.P., Maps and Reports, Central Lardeau Map-area. (Unpublished).

Edwards, A.B., Textures of the Ore Minerals and their Significance. Melbourne, 1954.

Hamilton, W.S., Silver Cup Mine, Preliminary Report, (Confidential).

Sullivan, J., and Pickard, E.H., Silver Cup Property, 1953, (Confidential).

Walker, J.F., and Bancroft, M.F., Lardeau Map-area. General Geology. Mineral Deposits by H.C. Gunning.

S I L V E R C U P P R O P E R T Y

Revelstoke Mining Division.
North Lardeau District.
Ferguson, B. C.

INTRODUCTION

During the periods from May 12th, 1952, till July 4th, 1952, and from August 28th, 1952, till February 6th, 1953, a program of diamond drilling and sampling was carried on at the Silver Cup properties.

The number of men employed varied from four to eighteen.

Rehabilitation of camp and underground workings was necessary.

Time did not permit a thorough examination of all the included properties. Underground work was confined to 7, 8 and 9 levels and the surface sampling confined to 5, 6, 7 and 8 level dumps.

SUMMARY

Drill hole U7-1 was the only hole with any indication of outlying ore bodies and this was by no means a good intersection.

On the mine dumps 30,500 tons of the best material was outlined. The recoverable value of this material is $9.80 per ton in U.S. currency and at current metal prices.

Other than the drill hole mentioned, there was no good indications of tonnages or ore extensions in the areas covered.

CONCLUSIONS

There is no mineable ore body on No. 7 level within the areas covered by the diamond drilling. Likewise there are no mineable ore bodies between present levels 7 and 9.

RECOMMENDATIONS

If work is continued on the Silver Cup properties

the following recommendations should be considered:

1. The shaft from 7 level should be dewatered to its full extent to permit examination of 11 and 12 levels.

2. The "X" Sunshine lead should be investigated on 8 level.

3. An effort should be made to trace the downward extension of ore structures into the area of the Towser tunnel.

OBJECTIVE

The objective of the exploration work at the Silver Cup mine from August 27th, 1952, till February 6th, 1953, was to sample, and map geologically, all the available workings; to explore by diamond drilling the areas northeast and southwest of No. 7 level, and to determine the tonnage and values in the mine dumps. The flooded and dangerous condition of most of the levels necessitated a renovating program in advance of the exploration. Only a third of some 12,000 feet of working was covered so that the underground program was by no means completed.

The surface work on the dumps had to be stopped because of the heavy snowfalls. Therefore the surface program, like the underground work, was not fully completed.

LOCATION & ACCESSIBILITY

The Silver Cup property is located nine miles southeast of the town of Ferguson, British Columbia, in the North Lardeau area of the Revelstoke Mining Division. The nearest railhead is at Arrowhead, B. C. and from this point shipment is via boat for nine miles to Beaton and then by truck to Ferguson, a distance of sixteen miles. Arrowhead can be reached by rail or road from Revelstoke or from Nelson by rail or road and boat.

A road has been pushed through from Trout Lake, B.C. four miles from Ferguson to Gerrard, B. C. a distance of seventeen miles. Present government plans call for completion of this road as a gravel highway by the end of next summer. This will then provide direct road connection from Ferguson through to Nelson.

For emergency trips and where the time element is important, a seaplane can be chartered from Nelson to land at Trout Lake,

this trip taking approximately forty-five minutes.

The road from Ferguson to Eight Mile turnoff is a public road of 4 miles, suitable during summer months for ordinary vehicle traffic. The road from Eight Mile to the Towser Camp, three and one half miles, is a jeep road for 4-wheel drive only. The road from the Towser camp to 7 level portal is also a 4-wheel drive road averaging 17% grade over a distance of one and one quarter miles.

CLIMATE AND TOPOGRAPHY

The elevation at Ferguson is 3,022 feet and at the Towser camp 5,214 feet. Elevation of the main portal at 7 level is 6,312 feet.

The country is typical mountainous terrain, well timbered in the valleys and up to 4,500 feet with cedar, hemlock and some fir and white pine. On the road from Eight Mile to the Towser Camp there are several stands of particularly good cedar and hemlock. On the higher slopes spruce is predominant.

Drainage of this area is taken care of by the Lardeau River. Numerous creeks, some glacier fed, run into the North and South Forks of the Lardeau River and these in turn join at Ferguson and flow into Trout Lake four miles away. Silver Cup creek runs into the South Fork.

Snowfall is generally heavy during the months of December, January and February, averaging eighteen (18) feet in Ferguson and twenty-five (25) feet at the Towser camp. At the 7 level portal another three (3) feet is probable.

Temperatures are moderate with perhaps a few days of below zero weather in January. With proper equipment operations could be on a year round basis. For surface work only, from May 1st till November 30th would be considered a good season.

MINERAL CLAIMS:

The Silver Cup Group of Mineral Claims is comprised of the following:-

Crown Granted Claims

Name	Lot No.	Name	Lot No.
Towser	1565	Excellsior	2621
Sunshine	1564	Mountain	2626
Gold Bug	3053	Excellsior Fraction	2625
Silver Cup	768	Mountain Fraction	3052
Silver Cup Fraction	2622		
Free Coinage	1588	Old Mill Site 5 mile	4730
		Ferguson Townsite	5371

Claims Held by Location

Name	Lot No.	Name	Lot No.
Kalispell No. 1	2698 G	Lulu Belle No. 3	2550
Kalispell No. 2	2699 G	Scottish Chief	2436 K
Kalispell No. 3	2700 G	Daisy Fraction	190 H
Lulu Belle No. 1	2548	Yuill	86 M
Lulu Belle No. 2	2549	Diamond Jubille Fraction	189 H

Work covering the Scottish Chief and the Lulu Belle Nos. 1, 2 and 3, sufficient to keep these claims in good standing until August 8th, 1953, and October 15th, 1953, respectively, was recorded by Mr. W. Hamilton of Nelson, B. C.

Three mineral claims, Kalispell Nos. 1, 2 and 3 were staked on June 1st, 1952, and transferred to Mr. Marsh A. Cooper of Toronto. These claims are situated on the northwest limits of the Silver Cup group.

PREVIOUS INFORMATION

The mine is situated in rocks of the Lardeau series close to the axial plane of a great trough. These rocks, of sedimentary origin, are composed of schists, phyllites, quartzites, slates and limestones, correlated with the Windermere series of late precambrian age.

Deep folds and high dips characterize the district. The immediate regional structure appears to be a northwest trending with intruding greenstone sills.

No doubt a good deal of the information that has been gathered in the past about the Silver Cup property is lost to us now.

However, the Geological Survey of Canada and the B.C. Department of Mines has much valuable information in their publications of the Lardeau District. One or two of the more salient features from these publications will be mentioned here.

....."Due to the smelter penalty for zinc that existed at the time of operation, much ore containing considerable zinc was accumulated on the dumps at the mine".....

It was generally believed that several thousand tons of milling ore had accumulated at the portals of the old workings because of the hand sorting operations that were carried out to give clean shipping ore and zinc-free mill feed.

....."On the Free Coinage and Silver Cup claims, about 100 to 150 feet south of the dyke, is a band, up to 40 feet wide, of so-called 'spotted phyllite'. .....All commercial ore so far discovered lies northeast of it".....(1)

The recent geological mapping and diamond drilling has substantiated these statements for the area between the seventh and eighth levels. Further it has been stated that the carbonated greenstone can be as favourable as host rock for the mineralization as the sediments. (1)

....."In addition to the two main lodes, there is a series of subsidiary veins connecting the two. .....The proportion of shipping ore to the actual tonnage of rock broken is very small, and, as in the case of the Nettie L. the real value of this property lies in its larger masses of comparatively low grade ore." (2)

(1) H.C. Gunning, G.S.C. Memoir 161, 1929, pages 63-65.

(2) B.C. Report of Minister of Mines 1914 - pages K-301 to K-302.

The subsidiary veins mentioned were noted in the work covered by this paper and it appears likely that these subsidiaries carried the cleanest shipping ore. It appears certain from the report from which the latter quotation was taken that low grade ore is bountiful at the Silver Cup and perhaps the recent work was not carried far enough.

Period May 12th, 1952, until July 4th, 1952. - Surface Work

Roadwork

The D6 Caterpillar belonging to the Samson Mines Ltd. was hired by Mr. W. Hamilton of Nelson, B.C. to clear the road from Ferguson to the Towser Camp. Up until May 21st a total of 108 hours was put in on this work at a cost of $972.00. Of this amount $360.00 was spent on the main public road from Ferguson to the Eight Mile turnoff and $612.00 on the road from Eight Mile to the Towser Camp.

On June 17th the D6 Caterpillar of Mollie Mac Mines Ltd. was hired to finish a small section of road directly below the Towser camp. This required an expenditure of $228.00.

On June 19th the work of building the upper road to 7 level portal was started. A D6 caterpillar tractor was rented from the Interior Contracting Company of Kamloops, B. C. A total of $1,301.58 was spent on this work up until July 4th when operations were stopped. One third of a mile of new road had been built.

Running planking was laid on the decking of the main bridge across the south fork of the Lardeau River. Several culverts were built on the road from Eight Mile to the Towser Camp. A small bridge, constructed from local timber, was built across the creek on the upper road to 7 level portal.

Opening Towser Camp

While tractor work was progressing on the road from Eight Mile to the Towser Camp, several trips were made up to the campsite and 7 level portal for inspection purposes. Buildings on the Towser consisted then of: log cookhouse, small frame bunkhouse, blacksmith shop, mill building, and storehouse. These were of little value but good enough for summer operation. The first trip to the camp was on May 20th and at that time there was still four feet of snow on the ground. On May 21st the first trip to 7 level portal was made. Snow there was six feet deep and the portal almost covered. By June 15th most of the snow had gone and an inspection of the portal showed considerable cave for a distance of 20 feet. Beyond this a ventilation door, still iced shut,

prevented further entrance. From local information the season then was a month behind time, the snow usually being gone by the middle of May.

On June 19th supplies were moved up to the Towser site and camp was established there. Previous to this the road crew had been working out of Ferguson. The frame for another 4-man bunkhouse was erected from salvage timber on one of the old foundations.

Underground

The 7 level portal was mucked out and the tunnel inspected for a distance of approx. 500 feet. It was found to be in bad condition. The Towser portal was also cleaned out and old timber removed.

Period from August 27th, 1952, to February 6th, 1953.

Surface Work - Road Construction

The D6 Caterpillar tractor rented from the Mollie Mac Mines Ltd. started work on the road below camp on September 3rd and finished on September 8th at a cost of $684.00.

On September 18th the work of building the road at the way to 7 level portal commenced. This was also done with the Mollie Mac D6 and was completed at a cost of $1,620.14 on October 7th.

While moving the Jaeger 250 c.f.m. compressor to 7 level portal, it was used on several rock sections that had to be drilled and blasted. For drilling short holes before obtaining the portable compressor, a Warsop gas motor drill was used.

On the last switchback a wet area was crossed that had to be built up with mine rock hauled from the top dump in a Willys half-ton pickup. This truck was rented from Samson Mines Ltd.

During November, when shaft pumps were operating, trouble was encountered with anchor ice forming in the ditch and culvert

that carried the mine water to the creek. These would build up and overflow onto the road, making it impassable even for the tractors. It was necessary to shut down the pumps for one shift on different occasions in order to blast the road clear and open the ditch and culvert.

The company removing the equipment from the Towser mill put new guard timbers on the second bridge beyond Eight Mile. This was after they had lost one load into the creek while crossing.

All machinery was removed from the mill but they were forced to leave the ball mill at Eight Mile due to snow conditions.

Snow Plowing

Up until the first week in January the D-4 Caterpillar and the Cletrac BD were able to handle all the snow plowing necessary. After January 6th it snowed continuously for the rest of the month and on January 17th another machine, a TD 14 International, was rented from Sartoris Sawmills of Beaton, B.C. to plow the main road from Ferguson to Eight Mile. Application was made to the Department of Public Works for assistance, financial or otherwise, on this part of the road. This application has not been finalized yet.

The D4 Caterpillar and the Cletrac BD were kept busy on the upper roads. In addition to the normal snow plowing, two slide areas came down, one of them requiring a week's work to clear. What snow removal work that was done will make possible an earlier opening of the roads this coming season.

Buildings and Miscellaneous

The second bunkhouse was completed using salvaged lumber and galvanized roofing from the Towser mill building. A compressor house large enough to hold the Jaeger 250 portable and the Rand 325 stationary compressors was erected at the 7 level portal. Salvaged material was also used in its construction.

Eighty feet of snow shed was built from the portal

to the ore dump. Reclaimed 8" wood pipe was used in a 40 ft. diversion ditch from the portal to the south side of the ore dump. Both trucks and both tractors were used for fuel hauling to portal - road conditions governing the type of transport used.

Surveying and Sampling (surface)

A complete set of plans was available for the Silver Cup mine from a previous survey. No survey notes accompanied these plans, and none of the stations had been plotted. A set of coordinates were laid over these old maps in such a manner that 10,000 ; 10,000 intersection fell on #7 level very near the portal. The grid was oriented with true north as indicated by the arrows on the plans. A transit hub was set on or close to the above mentioned coordinate intersection and another was set at the first turn in the drift about 40 feet in from the portal. The bearing of the two hubs, G1 and G2 when plotted in their apparent positions on the old maps is the basis for all subsequent mapping.

A plan of the campsite near the Towser tunnel was plotted on a scale of 1" = 20'. This map is independent of the other maps made, and was oriented with respect to the tram line to portal and 7 level.

A chain and transit traverse was carried from No. 7 portal to No. 8 portal, then down the hill to the Towser portal. This traverse was tied to the northwest cornerpost of the Sunshine M.C. and ended there. It is unfortunate that no other corner post of the original claim survey could be found to check the bearing used between G1 and G2.

The samples taken from the dumps, which was the only surface sampling done by the party at the Silver Cup were located with respect to the portals from where they came. The crown and skirt for each dump were outlined by stadia sights so that an assay plan could be made and the volumes calculated.

One three hundred pound sample for milling tests was taken from the dump of No. 7 level and stored in the warehouse at Ferguson.

The larger dumps were sampled by pitting at 20 foot intervals along lines staked out completely across the dump. Each sample

line was set 20 feet apart measured in the horizontal. Thus the pits appear as a grid of 20 foot squares when viewed in plan.

The smaller dumps were done in a similar manner, but the samples were taken from trenches dug completely across the dumps, instead of at 20 foot intervals.

The surface sampling was stopped because of the heavy snowfall, and the mine dump from No. 3 level was not touched. Results from dump sampling are as follows:

Table 1.

Assay Plan No.	Dump	No. of Samples	Tonnage	Average Grade. Au/ton	Ag/ton	Pb.%	Zn.%
502-41	5	29	6,500	.024	11.12	1.10	.80
502-35	6½	32	1,000	.009	8.54	1.81	.69
502-40	7	90	17,000	.020	3.92	.60	1.40
*	3	-	6,000	-	-	-	-
	Total		30,500	.019	5.72	.78	1.21

* = estimated, but not surveyed or sampled.

Table 2.

Recoverable values in the Silver Cup mine dumps derived from the prices of U.S. commodities, Feb. 25, 1953.

Commodity	#recovery	Total weights	Price in $	$ value
Silver	92%	174,500 ozs.	.88¢	$ 142,000
Gold	87	580 ozs.	$ 35.00	17,680
Lead	91	476,000 lbs.	.135	58,500
Zinc	95	737,000 lbs.	.115	80,500
			Total value =	$298,680
			Recoverable value per ton =	$9.80 (U.S.)

UNDERGROUND WORK.

Mine Rehabilitation - 7 level cleanup.

The Towser Camp was reopened on August 27th and work started on timbering the adit and mucking out 7 level from the portal to the shaft. It was necessary to lay new track and ties, as advance was made, the web of the old rail being rusted through in many places. The ties were made from timbers salvaged from the old mill on the Towser. Up until October 5th all mucking was by hand. On that date a portable Jaeger 250 cu.ft. compressor was brought up from Ferguson. This machine was on a rental-purchase basis from Purvis-Ritchie of Vancouver. The Eimco Rockershovel and cars had already been brought up to the portal. The cleanup job was finished on October 29th - the last 200 feet being mucked by hand and sluiced out with water discharged by the shaft pumps.

A 2" victaulic air line was carried in from the compressor to the main receiver about 230 ft. from the shaft. This was the original receiver on 7 level but was tested to 160 p.s.i. before being put in service and found satisfactory.

During the level cleanup the main drift was barred down thoroughly and all old timber and ventilation pipe removed.

= recoveries as reported to Messrs. James & Buffam by the Dept. of Mines & Technical Surveys, Ottawa, July 7, 1952.

Shaft Pumping

Pumping operations were started on October 27th. Two C.I.R. No. 35 sump pumps were used at the same time to a distance of 60 feet but beyond this depth the one compressor could not supply sufficient air. A second compressor, the Waukesha-Rand 325 c.f.m. unit was put into service on November 10th, increasing the volume of discharge from the pumps a great deal.

At a depth of 120 feet a large dam was set up in the shaft and the water lifted in two stages from this point down. The top pump was assisted by the addition of a blowjack to the discharge line at its lowest point. At 175 feet the pumps were taking the total output of the two compressors and the diamond drill was having trouble from lack of air when drilling beyond a depth of 100 feet. A control valve was installed in the line at the drill so the runner could govern his air supply and cut down the volume to the pumps when necessary.

On December 8th the portable compressor broke down and pumping was suspended until December 18th.

The first sub-level was de-watered by November 1st, 9 level on November 15th and when operations were suspended on December 19th the water was then one foot below the back of 10 level. While shut down the water rose in the shaft at the rate of 3 feet in 24 hours and was almost on 9 level when pumping was resumed January 21st. On conclusion of operations January 27th the water was then 2 feet below the back of 10 level.

While running, the pumps had to be watched closely and the water agitated frequently. This was to prevent the fine silt that rolled down the footwall from forming around the pump intake and clogging it completely. Some trouble was also experienced from freezing despite the fact that one receiver was used at the compressors and two inside near the shaft.

The rate the water lowered in the shaft was always irregular due to many reasons. One of these was the stopes below 7 level were also draining and on one occasion a stope that must have been blocked off let go and the water in the shaft actually came back up during a 12 hour pumping period. Another reason was the variable amount of air the diamond drill was using, depending on the hole depth and nature of the ground.

Mine Conditions

Below 7 level:

The general condition of the shaft as far as dewatering was concerned was found to be quite good. The main timbers were sound but all lagging dividing the compartments had come down when spikes rusted through. This condition also applied to the ladders and all rungs had to be replaced. The footwall was covered with six inches of fines that gradually dried up. The walls and back were in good condition and no barring down of loose rock was necessary. With a small amount of work the skipway could be made serviceable.

The first sublevel was in bad condition and had over two feet of silt on it. Stopes on both sides of the shaft, through to 9 level, were apparent but due to cave and fallen timber examination was not possible.

9 level was much cleaner and entry was made after giving it 24 hours to drain. Timber was found sound and all chutes still in place. Two drifts could not be examined but these constituted a small percentage of the development on this level.

On and Above 7 level:

The adit elevation is 6,312'. The main drift was cleaned and put in good condition. No other work was attempted in drifts, x-cuts or raises where timber etc. was required. One sublevel and a small section of 7 level, other than the main drift, was examined and sampled. The sublevel itself was in good shape but the service manway up to it required work on it. Two ventilation doors were installed on the main drift at 20 feet and 100 feet from the portal.

8 level:

A separate adit and tunnel of 940 ft. with three small crosscuts and two raises comprise the 8 level workings. Adit elevation is 6,107 feet. The raises were driven at 55 deg. and 70 deg. to distances of 50' and 75' respectively in a direction towards the

7 level workings. General conditions on 8 level were good.

Towser Tunnel:

Some work on this adit was completed earlier in the year but more should be done at an early date. Side pressure is forcing posts and lagging out of place. Some mucking required in main drift. Adit elevation 5,423'.

Mine Inspection

Mr. W. Peck, Government Mine Inspector, visited the property on December 15th and found conditions satisfactory in that part of the mine where operations were being conducted.

Diamond Drilling

Drill crew and equipment were supplied by T. Connors Diamond Drill Company, Vancouver, B.C. The first hole U-7-10 was collared on November 11th and drilling followed as closely as possible the drill plan as laid out by Mr. M.A. Cooper of Toronto. All holes called for "A" size core, drilled +5 deg. sludge samples taken every 5 feet, bearings N30E and S30W. Holes were at 300' intervals and taken to depths of 200' and 250' with the exception of hole U7-10 that broke through into a parallel drift and was stopped at 90'. A total of ten holes was drilled.

On the first set up the B.B.U.#1 machine was used but when the ground was found good drilling a change was made to the lighter JV #1 machine which proved satisfactory. Water pumped from the shaft was used while drilling holes U7-10, U7-9 and U7-7. Beyond depths of 150 feet this gave trouble from the mud in the water plugging the course between core barrel and tube. Fortunately holes U7-7 and U7-8 both made water that developed good pressure. These were fitted with valves and the remainder of the drilling amply supplied with good water from this source. The last hole, U7-11 was completed on December 18th. One drill, the B.B.U.#1 and its equipment was shipped out to Connors Diamond Drill Co., Nelson Branch on December 29th, and the other, the JV #1, on February 3rd, 1953.

Economically the drill holes showed little results.

They did, however, give a clearer picture of the geological setting within the mine. All siliceous zones or those containing sulphides were sampled. Out of the 2,140 feet of drilling only 45 intersections were split for sampling, about half of these for silver and gold only. The most interesting hole was U7-1, collared above the underhand stoping of "X" Sunshine lead. Here small stringers and veinlets of sulphides were cut showing narrow but high grade concentrations. Most of these veinlets were close to the beginning of the hole but small values were also intersected at a distance of 160 feet from the drift where the hole entered some banded argillites on the north-east side of the large greenstone sill.

The core recovery was good, being in the order of 95% or better. The black schists and slates were often recovered in buttons or short lengths, but the greenstone, which formed the major portion of the rock drilled, gave nearly 100% recovery.

Survey and Level Plans

Chain and transit traverses were run on No. 8 level, and the main drift of No. 7 level as far as the shaft. These levels were plotted separately to a scale of 1" = 20'. A plan showing No. 7, No. 8 and the Towser was plotted to a scale of 1" = 100'. And, finally, a plan showing the workings with respect to the claim boundaries appears on a scale of 1" = 200'.

Sampling

The underground sampling covered levels 7, 8, 9 and 6½. Samples were cut in maximum lengths of 5 feet in intervals of 20 feet at the greatest, and in 10 foot intervals where mineralization was most concentrated. All available openings on each level were covered.

The control for the sampling on 8 level and 7 level main drift was the hubs for the chain and transit survey. In all other workings the plans were pantographed from the old 30 scale maps to 20 scale maps. Drift intersections were used as reference points.

Economic Geology:

1. Mineralogy:

The vein material consists of galena sphalerite,

pyrite, with minor amounts of chalcopyrite, arsenopyrite, illmenite, and tetrahedrite, set in a gangue of quartz, carbonates and soft altered wall rock. Pyrite is the most abundant sulphide occurring in fine to coarse crystalline forms. The galena is the most abundant ore mineral present in fine to coarse irregular grains. The sphalerite has a similar mode of occurrence as the Galena, and these two minerals are often closely associated with each other. Both appear to have been precipitated later than the pyrite.

Minerals of gold and silver were not observed, but negative evidence indicates that galena, and probably tetrahedrite, is argentiferous.

(Dept. of Mines & Tech. Surveys, Mineral dressing and process metallurgy div. Investigation No. MD 2898, Ottawa, July 7, 1952).

2._ Geological_Mapping_

Because the upper workings of the mine are in dangerous condition and the lower workings are flooded, the mapping program was a slow process that advanced only as various portions of the mine were made accessible. Heavily coated walls in the portions that had been flooded made mapping difficult but had to be accepted, for the party was not set up for the extensive washing program that would have been required.

No. 7 level, the longest level in the mine, and the one from which the diamond drilling was done, was the first to be mapped and affords the best geological information for any one level.

The underlying rocks encountered on this level by the drill and the mapping were a schistose, graphitic, argillaceous unit, a somewhat similar but more banded argillite, and an intruding highly altered greenstone unit, with complex zones composed of the latter two units.

A well defined contact between the intrusive and the graphitic schist lies immediately northeast of the portal and angles away from the main drift gradually as it proceeds in the direction of

the winze. The main drift follows a shear zone that appears to be parallel with the bedding in the graphitic schist as does the contact mentioned to the northeast. One or the other must be at a small angle with the strike. There is another feature that tends to converge on the intrusive contact near the portal. This is a knotty zone within the graphitic schist that generally lies to the southwest of the main drift.

Both in the "X" Sunshine lead near the portal and the main Sunshine lead near the winze it can be seen that the mineralization follows the shear zones when in the black schist, and in both cases the ore is close to intrusive contacts. When the shear zone crosses the contacts into the more competent intrusive rock it is deflected to the north but regains its former bearing when leaving the intrusive. The best ore has localized in the most highly contorted and broken contact rocks where the shear zone has undergone a change in angle.

It appears then that the knotty zone and the main drift follow a shearing plane that is deflected to the north on entering the highly altered intrusive, and it is in the areas around these deflection points where the ore localizes. Whether this condition is the same throughout the mine it is not known but this seems to be the case on both 7 and 9 levels. (4).

On No. 8 level the drift portion has followed a shear zone in the graphitic schist on the favourable side of the knotty zone and close to an intrusive contact. The point where the shearing intersects the intrusive has not been opened up, and may have considerable economic interest. This area of interest is shown on fig. 1 on the following page. (5).

(4) See geological plan of #9 level, map sheet 502-42
(5) See geological plan of #8 level, map sheet 502-43

APPENDIX 1

Road Work Costs - period from May 12th to July 4th, 1952.

May 12th to May 21st.
D6 caterpillar tractor (old model) rented from Samson Mines Ltd.
(40 hrs. @ $9.00 on public road to Eight Mile)..... $360.00
(68 hrs. @ $9.00 - Eight Mile to Towser Camp)..... 612.00

June 17th to June 19th.
D6 caterpillar tractor rented from Mollie Mac Mines Ltd.
(19 hrs. @ $17.00 - Eight Mile to Towser Camp)..... 228.00

June 19th to July 4th:
D6 caterpillar tractor rented from Interior Contracting Co.
(94 hrs. @ $11.00 - upper portal road.....$1,034.00
travel costs 256.75
ferry charges 21.50
$1,312.25
Less - one drum fuel oil - 10.27
$1,301.98 .. 1,301.98

Sartoris Lumber Company - 3" x 12" planking 115.61

Labour:
On public road to Eight Mile - 80 hrs. @ $1.582 = $126.56

On road from Eight Mile to Towser Camp = 208.73

On upper road to 7 level portal = 339.64 ..... 674.93

TOTAL $3,292.52

APPENDIX 2.

Cost Sheet Silver Cup Road Work

Eight Mile to Towser Camp road - rental D6 Cat. from Mollie Mac Mines 57 hrs. @ $12.00 ..... 684.00

Towser Camp to 7 level Portal Road:
Rental D6 cat. from Mollie Mac Mines.
Period ending October 7th $1,620.14
Compressor 20 hrs. @ $1.875 = 37.50
Willys ½ ton - 7 days @ $8.00 56.00
Powder and fuse 186.56 ..... 1,900.20

Labour
August $27.32
September 400.25
October 170.06 ..... 597.63
TOTAL $3,181.83

APPENDIX 3.

Snow Plowing Costs

Public Road - Ferguson to Eight Mile as shown on application for Gov't. grant.

Rental TD-14 International from Sartoris Sawmills, Beaton, B.C. Period ending Jan. 26th 87 hrs. @ $9.85	$856.95
D4 caterpillar - own equipment - 75 hrs. @ $6.50	487.50
	$1,344.45

APPENDIX 4

Diamond Drill Costs - November & December 1952, Silver Cup

Wages etc.	$3,612.79
Drill operations & supplies	711.79
Diamond loss	595.15
Setting & blanks	405.42
Drill rental	200.00
	$5,525.15
Board deductions	564.00
	$4,961.15

APPENDIX 5

Machinery & Equipment

Two compressors, one an Ingersoll Rand with Waukesha diesel engine, producing 325 c.f.m., and the other a Jaeger 250 c.f.m. portable compressor supplied air for drilling and pumping purposes. The latter unit was on a rental purchase basis from Purvis Ritchie Ltd. of Vancouver.

Diamond drill equipment was furnished by T. Connors Diamond Drill Co. of Vancouver. The Rand jackleg with Copco steel was used for cutting out drill stations.

Sump pumps used in dewatering lower workings were two Ingersoll-Rand #35 type.

For transporting men and lighter equipment from the Towser camp to 7 level portal an English Land Rover jeep was used. For heavier work the Willys half ton pickup met the need. Both these vehicles had 4-wheel drive and under certain conditions each was indispensable. For mud and wet roads the Willys excelled but for snow and icy conditions the Land Rover was best.

The D4 caterpillar tractor and the Oliver Cletrac tractor were both used for hauling purposes and snow plowing.

An Eimco Model 12-B Rockershovel was used on the 7 level mucking job.

The Rand compressor unit was left at 7 level portal until the roads are better for moving it out. This machine is in good condition. The Jaeger portable compressor was brought down and shipped to Vancouver for a major overhaul.

Drill equipment was returned to T. Connors, Nelson Branch. Sump pumps and hoses are stored in the Ferguson warehouse. Both are in new condition and have spare impellers. The Land Rover jeep is in the Ferguson garage and requires repairs to the transmission. Just prior to closing down a temporary repair job was made to it but it should be taken to a recognized Rover dealer for a check before being driven another season.

The Eimco Rockershovel and cars were also left at the portal. This machine is in new condition and the cars are in good shape.

SILVER CUP MINE October 25th, 1951.

Preliminary Report

The mine was opened up at three adits, the No. 1 Silver Cup Crosscut, the McNeill Crosscut and the Sunshine Tunnel, or No. 7 level. The Cup Crosscut opens up the uppermost level of the Mine and gives access to the workings on the Cup vein and the Blind vein. The McNeill Crosscut is approximately one hundred feet below the Cup crosscut and explores, though not thoroughly, the same two veins. Both the above two levels have been pretty thoroughly worked out and there was not much left to sample on the ore shoot itself. However, numerous samples were taken so that no clue that might lead to more ore would be missed.

No. 7 Sunshine drive was also opened up. This level opens up the lowest working above the shaft. There are four more levels below this but these do not go out to surface. When the mine closed down these levels were flooded and consequently later leasers were not able to gut it out.

Three hundred and fifty feet due North of the Sunshine tunnel, and approximately twenty feet higher in elevation, a hole was made into another old tunnel. This tunnel appears to have been driven on the Towser vein. There did not seem to be any ore in this tunnel.

Two hundred and fifty feet below, a lower Sunshine tunnel has been driven. In general this appears to be void of ore with the exception of a few patches.

With the expected advent of snow and a blanketing of the surface it was decided to sample the dumps first. Very conservative calculations were made on tonnage. Pits were dug down two to three feet deep, spotted throughout the dump areas at regular intervals. Material excavated from these pits were coned and quartered down to 10 lb. samples and the samples from each dump were averaged. There are five dumps on the mine. No. 1 Dump, outside of No. 1 Crosscut and the highest adit level in the mine - 3000 tons. No. 2 Dump, outside of McNeill Crosscut approximately 100 feet below No. 1 Dump - 3000 tons.

No. 3 Dump, outside of No. 7 Sunshine Tunnel. This is the #7 level dump referred to in Lovitt's report and examined by him in September 26th, 1943. Since that time there has not been any change. The product of the sorting sheds seems to have been scattered and no account is taken of it. Calculations check with Lovitt's 20,000 tons reasonably closely. Below No. 3 Dump spring freshets and sliding snow has scattered an estimated ten thousand tons between this level and the level of the mill erected on the Towser claim. It would not be too difficult an undertaking to scrape this down to this mill level. At present this is not being taken into account and may be regarded as a reserve measure for the sake of conservatism.

No. 4 Dump. This was known as the "transfer" dump. Ore was trammed down from the workings to this point and transferred to the mill at "four mile". When it was desired to send supplies and equipment up to the mine, these were loaded into a bucket. The upper bucket at the workings was filled with waste as a counter-balance to get these supplies up. It is not quite clear exactly how the transfer of ore took place, and also whether the "waste" referred to was taken from the dumps (which were very much mixed up) or from tunnelling muck. Owing to the lack of men and time this has not yet been sampled.

No. 5 Dump. This dump is situate beside the Lardeau River and below the Government road, on the "8-Mile" mill site. This was the original dump. The ore came down to this level where high-grade material was sorted out to be conveyed by wagon teams to the boat for shipment to the Smelter. The rejects were piled up on this dump. Conservative calculations give a minimum of 15,000 tons here. This dump was carefully sampled.

As a full report is still awaiting some assay results and sample maps to be drawn, and expediency demands that information be relayed to Toronto as soon as possible, it has been decided to split the report into sections.

As more information has been gleaned on the dumps than on the other workings these shall be made the subject of the first section and follow in a supplementary report.

Respectfully Submitted,
W.S. Hamilton P. Eng.

October 25th, 1951.

SILVER CUP MINE

SUPPLEMENTARY REPORT #1 - DUMPS

NO. 1 DUMP:

Twenty-four samples were taken and averaged. Results were:-

Au. 0.15 ozs/ton; ag. 14.85 ozs./ton; Pb. 2.5%; Zn. 3.4%. Calculated tonnage 3000 tons.

NO. 2 DUMP:

Fourteen samples were taken and averaged. Among these was a high silver assay of 123.6 ozs. An average was first worked out. Then this average was substituted for the high assay and a second average worked out. The high assay was due to tetrahedrite.

Uncut Average: Au. .11 ozs; Ag. 19.2 ozs; Pb. 1.5%; Zn. 1.7%

Cut Average: Au. .11 ozs; Ag. 11.8 ozs; Pb. 1.5%; Zn. 1.7%

The cut average was accepted. Calculated tonnage 3000 tons.

NO. 3 DUMP: (#7 Sunshine)

Nine samples taken and averaged. Results:-

Au. .09 ozs; Ag. 3.86 ozs; Pb. 1.6%; Zn. 2.15%.

Lovitt's Sampling:- Au. .06 ozs; Ag. 5.1 ozs; Pb. 1.3%; Zn. 0.8%.

An average of the two was accepted. This average:-

Au. .07 ozs; Ag. 4.5 ozs; Pb. 1.4%; Zn. 1.5%.

Calculations were made on the easily available dump and these closely checked Lovitt's 20,000 tons which figure was accepted. Below this dump Lovitt has estimated another 20,000 tons. Of this 10,000 tons can be retrieved by scraper operation. There appears to be a good percentage of good grade ore in this scattered material. For the present it is not being put into the calculations.

NO. 5 DUMP: (Terminal)

Tonnage was calculated at a very conservative 15,000 tons. Average values from ten samples were:-

Au. .09 ozs; Ag. 7.0 ozs; Pb. 2.0%; Zn. 1.6%.

TOTAL:

The following tabulation was worked out:-

Dump	Tons	AU. Ozs/Ton	AU. Ozs.	AG. Ozs/Ton	AG. Ozs.	PB. %	PB. Tons	ZN. %	ZN. Tons
#1	3000	.15	450	14.85	44550	2.5	75.0	3.4	102.0
#2	3000	.11	330	11.8	35400	1.5	45.0	1.7	51.0
#3	20000	.07	1400	4.5	90000	1.4	280.0	1.5	300.0
#5	15000	.09	1350	7.0	105000	2.0	300.00	1.0	150.0
TOTAL	41000	.08	3530	6.7	274950	1.7	700.0	1.5	603.0

Smelter Schedule:

The C.M. & S. schedule for payment effective for lead shipments follow:

Gold - 97½% at Royal Mint price less $1.25 per lb.

Silver - 95% at E. & M.J. New York quotation.

(Base charge $15.00 for 30% ore)
(Credit 10¢ per unit in excess)Debit 10¢ per unit under.
(Credit Silica and Lime at 14¢)per unit.

Lead - 92½% contained lead at E. & M.J. New York quotation less 2.0 per lb.

Schedule for zinc concentrates follow:-

Concentrates containing Zinc to the extent of	Percentage paid for	Following Treatment charge will apply
62% and over	87%	$11.00
60% to 62%	86	11.00
58% to 60%	85	12.00
56% to 58%	84	12.00
54% to 56%	83	12.00
52% to 54%	82	12.00
50% to 52%	81	12.00
40% to 50%	80	13.00

Based on these Smelter Schedules the following calculations are made to ascertain the net amount obtainable at the Smelter, presuming the dumps were milled and the concentrates shipped to Tadanac, assuming 60% concentrates. The price of 17¢ for lead and 17½¢ for zinc is used rather than the present higher price tonnage - 41,000. Zinc

payment above percentages @ 17.5 less 3.25-14.25.

	GOLD	SILVER	LEAD	ZINC
Gross Value	3530 ozs.	274950 ozs.	700 tons	603 tons
Mill Recovery 90%	3177 ozs.	247455 ozs.	630 tons	542.7 tons
Metals Paid for	97½%	95%	92%	86%
Amount	3097.5 ozs.	235082 ozs.	592.75 tons	466.72 tons
Prices	$35.50	90¢	15¢ per lb.	14.25¢/lb.
Value	$109,961.00	$211,573.00	$177,825.00	$133,015.00
Total Value	$632,374.00			
Total Value per ton	$ 15.41			

Marketing Cost of 60% Concentrates:-

	Lead	Zinc
Dry Tons	700	603
Wet Tons 12% H_2O	784	675.4

	Lead	Zinc	PER TON CONCENTRATES	TOTAL
Smelter Base rate	$15.00	$11.00	$10,500.00	$7429.00
Moisture Penalty	1.40	1.20	980.00	723.60
Trucking	5.00	5.00	3,920.00	3377.00
C.P.R.	10.00	10.00	7,840.00	6754.00
Credit for Silica 15% @ .14	2.10 Cr	2.10 Cr	1,470.00 Cr.	1266.00 Cr.
Credit lead 30% @ .10	3.00 Cr	------	2,100.00 Cr.	--------
Total Marketing Cost	$26.30	$ 25.10	$19,670.00	$17,010.00

Total $36,680.00

Average of Lead and Zinc $25.70

= 90¢ per ton ore.

Total Value of Dumps	$632,374.00
Total Marketing Cost	36,680.00
Net Value	$595,694.00
Net Value per ton	$14.52

Assuming a sink float plant is erected for preliminary treatment, followed by treatment in a 100 ton flotation plant.

Cost of Operating and Milling Dumps:- (41,000 tons).

Scraping dumps - say	$2.00 per ton	$ 82,000.00
Trucking	0.50 per ton	20,500.00
Handling etc.	0.50 per ton	20,500.00
Sink float treatment	1.00 per ton	41,000.00
		$164,000.00
	Initial Treatment	
Milling (20,500 tons)	say 2.00	41,000.00
Exigencies - say	1.00	20,500.00
Total Operating costs		$225,500.00
Net Value of dumps		595,694.00
Operating profit on dumps		$370,194.00

For the above operation the capital outlay necessary would be:

Sink Float plant	$ 50,000.00
100 ton flotation mill	150,000.00
	$ 200,000.00

The only preliminary expenditure would be repairs to bridge, repair to present road, and bulldozing out new roads to the various dumps, where necessary. An expenditure of $30,000.00 would cover this. Buildings, trucks, bulldozer, scraper equipment - maximum $40,000.00 Total $ 70,000.00

Payment on property 100,000.00

In other words the dumps would pay for the erection of a flotation mill and sink float plant, give you a lot of equipment for further operating, and pay off the purchase price of the property.

This is not an argument for the treatment of the dumps alone, but, rather, it shows that even at this early stage, that payments on the property are justified. Usually a great deal of work and expenditure has to be undertaken in a hurry in order to be able to make a decision as to whether the payments are justified or not.

I believe we can make a favourable decision right now.

For the next month, or possibly two, work can proceed at a fairly normal cost, but once the snow starts falling in earnest, the normally high snowfall of twenty feet in this part of the country is going to make things difficult and extremely costly. A D6 bulldozer is an absolute necessity and the cost of this balanced against a small crew is going to throw costs off balance. Normally, I would advise against the expensive winter operation but other matters are now cropping up which postpones this decision.

Trout Lake Mines Ltd. are planning to continue during this winter. They are in a more or less protected position. It is for the next mile beyond their Nettie L mine that slides are bad.

They have purchased the old mill equipment on the Towser claim, which belongs to the Malone Estate, and are putting in a low level crossing across the river, and are repairing the road in order to bring this machinery in. The Government were to put this crossing in and to do the road work, but are at present putting a road up Gainer Creek and I have no idea when they can finally get down to our road. Trout Lake Mines want to know whether we can help towards the cost. I think it will be a good idea, but am not committing myself. This will at least keep our road open. Their equipment is small and it might be equal to the task for the next month or two, or until they get the equipment out.

Gainer Mac Syndicate, working on the Mollie Mac up Gainer Creek, also plan to stay open. However, they are barely beyond the prospect stage as far as equipment etc. are concerned and are only now financing. The Government has agreed to keep the road open to "Ten Mile" which leaves two miles of our road and two miles of Mollie Mac's road to be looked after. I have given Trout Lake some little help and in fact will shortly be sending you a report for Mr. Webster's perusal, and they may want more help. If I can arrange some co-operation between the three properties it will ease the burden considerably, particularly with Trout Lake keeping our road open. They have only a D4 but are buying a blower to go with it. If this will do the job - of which I am

rather doubtful - and I can arrange matters satisfactorily, then, by all means, we should try and go through the winter. I will be seeing them soon and will keep you posted. Reports on the mine itself will follow in a day or two. I may have to run in again in a hurry.

Yours very truly,

"W.S. HAMILTON" P. Eng.

N..ember 5th, 1951.

SILVER CUP MINE.

SUPPLEMENTARY REPORT #2 - NO. 1 LEVEL

NOTES ON SAMPLING.

NO. 1 LEVEL:

This level is entered by the "Silver Cup" Crosscut at an elevation of 6791 feet and is the uppermost underground level in the mine. A small hole had been opened up at the portal and it was draining out. On my last visit to do the mapping a partial cave had occurred and the water was again too high in the drifts to do any of this work. The "Blind" lead had been stoped for a length of 90 feet North-West of the Cup crosscut and almost the entire distance South-East of it - approximately 250 feet. The stopes were not accessible. The old time work of taking down backs was a thorough job and only low values were left in the drift backs. The best sample was #148 at a point 60 feet East of the small crosscut where a channel of 2.5 feet assayed .04 gold; 4.4 silver; 2.5 lead and 2.5 zinc.

The cup lead showed two small stopes. A length of 60 feet between these showed some interesting values. Also one sample at the Eastern extremity of the stope. The stopes themselves were not accessible. These were:-

Sample No.	Particulars	Width	Ozs. Au.	Ozs. Ag.	% Pb.	% Zn.
118		5'	.20	40.3	9.7	1.2 tetrahedrite
119		2.5'	.03	.4	2.3	1.2
120		3.5'	.44	23.5	1.2	1.2 tetrahedrite
121		3.5'	.01	.2	0.8	1.1
122		3'	.10	4.4	1.2	1.6
123		3.5'	.30	.40	1.2	0.6

The remainder of the drift showed teasing values but none of them commercial.

SILVER CUP MINE

SUPPLEMENTARY REPORT #3 - NO. 2 LEVEL

NO. 2 LEVEL:

The No. 2 level is opened up by the McNeill Crosscut bearing North-Easterly at an elevation of 6649 feet barometric. Approximately 220 feet from the portal a drift was driven North-Westerly (No. 10 Drift) and South-Easterly along a stringer zone. This may or may not be the weak North-Western extension of the Blind lead. At a point 100 feet South-East of the McNeill Crosscut the Morgan crosscut was put in Northerly. Two veins were opened up which could be branches of the Cup vein or could be the Blind and Cup leads. At this point they are in greenstone and carry very low values. The nearest one ran .04 gold, 1.2 silver, 1.1 lead and 1.1 zinc across 3 foot width. The most northerly one has not been sampled but a close guess would give it values similar to the more Southerly vein. East of the Morgan crosscut there is a 200 foot length of these two veins unexplored and which could be easily tested with a small diamond drill.

No. 9 Drift swings Easterly to intersect the Blind vein, and a short crosscut near the Big Winze connects this with the Cup vein.

BLIND LEAD:

This has been timbered and stoped for nearly 200 feet followed by 70 feet of pillar averaging .05 gold, 2.3 silver, 1.1% lead and 2.0% zinc across 3½ feet. At the South-Eastern end of the pillar a short stope has been put up 20 feet. Four samples were taken in this stope as follows:

#102	North-West end	2.5' width	.02 au.	.10 ag.	0.8% pb.	3.0% zn.
#103		3.5' "	.16 au.	18.0 ag.	5.4% pb.	6.2% zn.
#104		3.5' "	.17 au.	19.4 ag.	3.1% pb.	7.1% zn.
#105	South-East end	4.5' "	.16 au.	22.0 ag.	1.6% pb.	0.8% zn.

It appears that with the material in the pillar, there is a block of ore between the present backs and the level above.

Silver Cup Supplementary Report #3 - No. 2 level.

In the South East end of the drift a small raise was put up 15 feet. The face assayed, 14. gold, 10.0 silver, 0.8 lead and 2.0 zinc. Odd values in the drift would seem to indicate good possibilities of obtaining ore by raise exploration, also by advancing south-eastward into Free Coinage ground, the present face being very close to the boundary.

CUP LEAD:

The Cup Lead on this level was timbered and stoped for nearly 200 feet. The North-West face showed low values but enough to encourage drifting in this direction. A small winze near the West end gave interesting values in one sample and some exploratory work should be followed up here. The pillars near the winze also gave encouraging results. The vein, or a branch of it, appears to be converging towards the Blind Lead and there appears to be a network of veining with cross veins running into both of these main leads. Ore shoots seem to have occurred to sweetened at these areas of intersections.

RECOMMENDATIONS:

1. From face of McNeill Crosscut fairly long exploration Diamond Drill Hole North Easterly to test for parallel structures. The Towser and one other vein should be picked up. This hole would be purely geological. It is very likely any veins intersected will be in the Greenstone area and it is not expected to have high values, but any vein indicated could be again checked some distance East where it would be in the more favourable slates.

2. Several short holes North-Easterly from No. 9 Drift to test Cup and Blind Leads between Morgan Crosscut and present North-Western extremities.

3. Holes North-Easterly from ore zone in Cup Lead to probe for parallel occurrences (also spur veins) in favourable ore zone.

4. Raise exploration, taking down backs, and continuation of stope at Easterly end of Blind vein.

5. Advance Blind Lead South-Easterly into Free Coinage territory, testing North-Westerly at intervals.

SILVER CUP MINE.

SUPPLEMENTARY REPORT #4 - NO. 7 SUNSHINE LEVEL.

CARBONATED ZONE:-

From the portal the drift follows a zone of rather discontinuous quartz stringers until a point 240 feet south East of the portal. Here it apparently runs into an ore shoot. Most of this has been stoped out breaking through eventually at surface. However, some pillar material has been left which indicates the possibility of picking up some ore in this area. Samples in the pillars:-

#150 Back of Drift 140' NW of c.c. Width 4 ft. .08 au; 6.4 ag; 1.7% pb; 4.1 zn.

#151 " " " 130' " " " " 4 ft. .01 au; 0.2 ag; .8% pb; 5.0 zn.

#152 " " " 100' " " " " 7 ft. .06 au; 8.4 ag; 2.4% pb; 5.6 zn.

#153 " " " 20' " " " " 4 ft. .10 au; 0.3 ag; 1.7% pb; 3.4 zn.

In the area adjacent to 150 feet North West of the c.c (or 240' South East of portal) considerable carbonatisation has occurred in the greenstone and stringers of zinc blende run Northerly. Some of these stringers are up to 12 inches wide. Some slashing has been done but not sufficient to expose the whole carbonate area. The ground is very drummy and unsafe and a thorough sampling cannot be attempted at present. One sample, #50, was taken across a 3 foot width values being: .03 Au; 4.0 Ag; .9% Pb; 8.2% Zn. This area is ear marked for further work. The stringers would seem to indicate a cross structure, and it looks as if some tonnage can be developed here. Near the South Westerly end a narrow carbonate zone occurs near the air receiver. Ground is bad and the drift has had to be timbered. The walls are too dirty and slimy to do a good job but at this vicinity the drift passes out of the greenstone area into dark gray slates and schists. At the end of the timbering some ore is exposed. Sample #160 - .12 Au; 4.4 Ag; 2.7 Pb; Zn 3.1. Width 3 feet.

On the North West side of the Sunshine Raise some good ore can be seen running upwards for a considerable distance. Ladder rungs are rotten and need repairing. Sample #161 - .08 Au; 6.0 Ag; 2.8 Pb; 10.7 Zn; Width 3 feet was taken at the bottom of this shoot of ore.

The timbering turns South Easterly for 250 feet. The Cup Lead continues on to the face with a short shoot of ore in it South East of the shaft. There does not seem to be much ore in the face but the structure is still fairly strong and should be followed. The chute gates in the branch vein contain good ore in them and there is a pile of good ore in one of the Cup Lead chutes, where a cross vein seems to have made a good ore shoot.

The Blind Lead has been timbered from a point just South East of the crosscut between the two leads for a length of 60 feet long. Past this point is a long distance of timbering, not measureable because of an underhand stope at least 60 feet long and full of water. The pillar shows medium grade vein matter. Just past this pillar is a drift curving Southerly with a short raise at the end of it. It connects with a sub drift into part of the stope, which is blocked off by planking, this possibly being the sides of the chute. A strong quartz vein 5 feet wide can be seen and good ore is visible through the cracks of the planks. The remainder of the Blind vein is not accessible. The main shaft is full of water. Rumours persist that the last leasers threw all their waste down the shaft and it is half full, but this is not likely. (No sign of this in pumping operation). The hoist is broken down and a heavy ore bucket sits at the gate to the shaft. It would not be possible to move this in order to dump waste down the shaft. Besides, the logical thing for a leaser to do is to muck the waste aside and leave it in the stopes. Possibly the rumour mongers are a little confused. A good deal of the leasing went on in the 1st and 2nd levels. There is a big raise between the 7th and the 2nd, which was used as an ore chute and which is now inaccessible. This may have caused the rumor. As a lot of these rumors were repeated by engineers who were definitely trying to get this mine they may be safely ignored.

RECOMMENDATIONS:

1. In greenstone area near the portal, make safe, slash and follow ore which seems to head off Northerly. Sample when roof is timbered.

2. Shaft area - Dewater shaft and examine lower levels.

3. Timber up inaccessible areas for examination.

4. Repair Sunshine raise so as to give access to levels above. Examine North-West Wall of raises and follow up findings.

5. Drill across from face of Blind lead to intersect Cup lead ahead of present face.

6. Drill from cup lead down holes exploring Blind lead below present levels.

7. Drill from Blind lead down holes exploring Cup Lead below present level.

8. Flat holes Northerly from Cup lead and Southerly from Blind lead exploring for known and unknown parallel structures. Watch for cross-leads and follow up any encouraging results.

9. Any encouragement south Easterly either in drilling results or appearance of vein should be followed by drifting in this direction.

10. The Sunshine drift has approximately 2 feet of silt on the floor and is still draining. In the portions already dug out no air pipe is visible as yet. If the air pipe should be located, is in place, and in good condition, it may be barely possible to snake up a small compressor to pump air into the shaft area and proceed with shaft pumping and diluting and washing down the silt. This, however, is mixed up with rock and sluffing from the sides. For some unknown reason the roof of the drift is more than twelve feet high, and there is a doubtful hanging wall. When the two or more feet of silt and debris is cleared out this hanging wall will tend to come down, and will have to be stalled as the work advances. A mucking machine may or may not do the job of mucking out the drift. Both compressor and mucking machine will be rather costly to get up to the portal on account of snow. Cats will have to be hired to do the job. An alternative is to do the job by hand, which might be considered. Only two men can work at one time so two or three shifts would have to be put in. At present there is no cook and there is accommodation for

Four men though six might be squeezed in. If a bulldozer is hired or purchased then it would be distinctly uneconomical to keep the road open for only three men and it would pay to increase the crew. All these matters are on the agenda for discussion as soon as this can be done.

Respectfully submitted,

"W.S. HAMILTON", P. Eng.

WSH/k

REPORT ON THE PROPERTY OF

THE SILVER CUP MINE

FERGUSON, BRITISH COLUMBIA

D.M. CANNON,
Geologist,
Copper Mountain, B.C.

Sept. 28, 1941.

INTRODUCTION:

The Lardeau River area has been noted since late ninteenth century for its abundant though scattered mineralization. The Silver Cup Mine has been the most profitable producer in the area.

This mine is situated 10 miles southeasterly from Ferguson, B.C. which is the terminal of the government road from Beaton, B.C. which is 8 miles across the northwest arm of Arrow Lake from Arrowhead where the nearest railroad terminates. Arrowhead and Beaton are connected by a steam ferry running three times weekly.

From Ferguson the mine can be reached by automobile, and wagon road. At present the road can be traversed for only ten miles by automobile, the remaining two and one half miles being covered by caterpillar tractor.

The property consists of four crown granted mineral claims; Silver Cup, Sunshine, Towser and Yuill, lying in a northwesterly, southeasterly direction to one another.

The claims lie up along the sidehill and valley of the Silver Cup Creek. From the northern extremity of the Yuill claim to the southern extremity of the Silver Cup claim there is a rise in altitude from approx. 5,200' to 7,500'. The property is heavily timbered with good sized, cedar, hemlock balsam and fir, very suitable for mine timbering. The overburden is not deep in most places, as there are numerous outcrops and the trails show an average depth of approx. three feet to the bedrock.

The mountains surrounding the property are very rugged and some reach well up beyond the timber line.

CLIMATE:

The climate of the country is variable but there is usually considerable rainfall in the spring and fall and rain and snowfall in the winter. At the upper workings of the mine the snow remains for 9 months of the year.

GEOLOGY:

The rock of the district is predominantly sedimentary phyllites, graphitic schists and slates. Paralleling the schistosity of these rocks are lenses or beds of a coarsely schistose rock that may be igneous dykes and sills or may be more competent sedimentary beds of quartzite and siliceous lime that have been broken rather than twisted as the phyllites. Both types of rock carry vein material.

....2

MINERAL DEPOSIT:

The mineral deposits of the Silver Cup Mine are lenticular quartz veins with abundant phyllite inclusions carrying, argentiferous galena and tetrahedrite, sphalerite and pyrite. These veins are roughly parallel to the schistosity and seem to be controlled by the irregular beds of quartzite and siliceous lime as the mineralization lies between the two. There are two main leads striking S 45° E and dipping 63 to 67° E, known locally as the Silver Cup lead and the "Blind" lead. The Silver Cup lead lies on the west side of the quartzite bands and the Blind lead lies on the east side of the siliceous lime. The Silver Cup lead has been followed for a distance of 1,850 feet and for a vertical depth of 1,200 feet.

The Blind lead was discovered underground and followed to a depth of 1,200' (Minister of Mines Report 1914).

The phyllites and slates between these two main leads are impregnated with small quartz veinlets carrying sulphides, predominantly pyrite that carries traces of gold and silver. There are also low lead and zinc values.

DEVELOPMENT:

The development to date on the Silver Cup claim consists of 12 main levels, comprising 12,000', drifts and crosscuts, three of which are adit levels. No. 7 the lowest adit level is connected by winzes to the upper and lower workings. The main ore shoots have been stoped out above No. 7 at least, at the time of the examination the lower levels were water filled so that no data could be obtained, Assays of samples taken in the Silver Cup workings are as follows:

PLACE	OZS. PER TON SILVER	OZS. PER TON GOLD	% INSOL.	% SILICA
Face - 5 Level	-	-	-	-
#1 - #7 Main Tunnel	2.28	.02	8.91	3.46
2 " " "	Tr	.02	.53	.87
3 " " "	1.20	.10	.45	1.66
4 - Refer to map	1.38	.02	.57	.69
5 " " "	Tr	Tr	.53	Nil
6 " " "	Tr	.02	.63	Nil
7 " " "	Tr	.04	.16	Nil
8 " " "	.66	Tr	Nil	.69
9 " " "	5.60	Tr	3.16	6.23
10 " " "	Tr	Tr	.26	Nil
11 " " "	1.10	Tr	.47	.43
12 " " "	Tr	.02	.26	Nil
13 " " "	Tr	.02	.21	Nil

.....3

PLACE	OZS. PER TON SILVER	OZS. PER TON GOLD	% INSOL.	% SILICA
14 - Face of prospect, tunnel near 6 Level.	16.00	Tr	5.19	15.79
15 - #5 Level 100' from adit	Tr	Tr	.46	.61
16 - #5 " 125' " "	Tr	Tr	.82	Nil
17 - Face #6 Level	Tr	Tr	.43	Nil
18 - Face #2 East X-C, 3 Level	1.98	.02	1.06	.36
19 - " " West " " "	Tr	Tr	1.06	Nil
22 - #1 Stope	Tr	Tr	Nil	Nil
24 - Refer to map	5.40	Tr	1.82	.26
7-1 0-10	Tr	Tr	.32	Nil
10-20	Tr	Tr	.37	Nil
20-30	Tr	Tr	.21	Nil
30-40	Tr	Tr	Nil	Nil
40-50	Tr	.02	Nil	Nil
50-60	Tr	Tr	Nil	Nil
60-70	Tr	Tr	.37	Nil
70-80	Tr	Tr	.45	Nil
80-90	Tr	.02	.50	Nil
90-100	Tr	Tr	Nil	Nil
100-110	Tr	Tr	.55	Nil
7-2 0-10	Tr	Tr	.53	Nil
10-20	Tr	.04	.53	.32
20-30	Tr	.04	.61	.51
30-40	.34	.06	.57	Nil
40-50	.20	.04	.83	Nil
50-60	Tr	.02	.52	.32
60-70	Tr	Tr	.94	.26
70-80	1.20	Tr	.46	Nil
80-90	Tr	Tr	.46	1.32
90-100	Tr	Tr	.31	Nil

On the Sunshine claim there is a x-cut 149' long with two short raises driven from it. This tunnel does not follow the main leads and no notable ore concentrations were noted.

The Towser workings consist of a 300' x-cut and a drift with a small stope to the surface. The drift follows a quartz lead varying in width from 2' to 10'. The vein strikes S 16° E. Two samples taken from the face and across the back at the stope assays as follows:

.....4

	GOLD	SILVER	LEAD	ZINC
Face. X-C West	Tr	Tr	.81%	Nil
Back of Stope	.06 oz.	3.94 oz.	2.74%	Nil
#23 - Face X-C right	Tr	.04 oz.	.26%	Nil

There are four large dumps on the property at the mouths of the four adit tunnels, with an estimated total tonnage of 75,000 tons. These dumps are the rejected material from a sorting system used by the former companies. The present leasers are working the #7 dump and are reportedly making a $75 concentrate. The following are assays of samples taken from the four dumps.

	GOLD	SILVER	LEAD	ZINC
#3 Dump	.06	7.54	1.53	1.16
#5 "	.06	9.54	2.05	3.17
#6 "	.06	7.34	1.65	1.32
#7 "	.08	6.32	2.34	.84

As no value is given to the zinc present the dump that is being worked, #7, will average $7.78 gross per ton.

During the latter part of 1937 and the beginning of 1938 leasers shipped a total of 208,353 pounds of concentrates with the following results:

DRY WEIGHT	GOLD OZ.TON	SILVER OZ. TON	LEAD %	ZINC %
35,263	1.15	128.90	20.80	14.6
40,590	.81	81.45	12.20	20.2
37,590	.879	90.30	14.10	20.7
36,712	1.176	109.05	18.50	19.8
31,398	1.310	127.55	24.40	19.8
26,800	1.400	132.30	25.00	16.9

....5

EQUIPMENT:

The property is equipped with a 35 ton mill situated on the Towser claim that is connected to the mine by a two bucket aerial jig-back tramway capable of handling 45 tons in 8 hours. There is no mining or hoisting machinery in workable condition.

BUILDINGS:

The buildings on the property consist of cookhouse and adjoining bunkhouse of rough lumber, office, manager's residence, and three other small buildings of log, and rough lumber.

POWER:

The power being used at present is generated by a 60 HP deisel engine, but water power is available from the Silver Cup Creek.

TRANSPORTATION & COSTS:

The concentrates at present are transported by caterpillar and truck to the boat at Beaton and across the lake on the boat to Arrowhead for $1.50 ton. From Arrowhead to Trail they are shipped by rail. The shipping from Arrowhead, and smelting costs total $12.00 per ton. Assuming a cost of $3.00 ton for transportation from the mine to Beaton, then the total transportation and smelting costs run at $16.50 per ton of concentrate. Mr. A.F. Keene records freight charges from True Fissure to Trail at $5.90 per ton of concentrates, slightly lower than our estimate.

CONCLUSION:

The portion of the property examined does not warrant further work, as the commerical ore has all been stoped out and shipped or is in the dumps. There is a possibility however, that there is further ore in the lower levels and below that has not been stoped out. It is reported that there is ore in the bottom of the winze.

The information obtained at the time of examination was not extensive enough to warrant any definite conclusions but any money expended on the property would, in the examiner's opinions be a gamble.