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DOLLY VARDEN MINES LIMITED  
UPPER KITSAULT VALLEY, B. C.

I N T R O D U C T I O N

This report is based on several examinations that I have made of the various mine workings of the company since 1961 in my capacity of consulting geologist to Dolly Varden Mines and also on a study of the numerous maps and records that have been made available.

S U M M A R Y

The large group of claims owned by Dolly Varden Mines includes four important mining areas in which ore blocks totalling 407,000 tons of proved and probable ore averaging 13.7 oz silver per ton are already known.

Recent work has demonstrated the importance of the Wolf Mine and the programme of development there for this year may well increase the total reserve to one million tons of ore.

A profitable mine seems assured and the results of this year's work should determine the scale of production. If it is 500 tons per day then a working profit of \$7.00 per ton is estimated.

The geology is such that continuous exploration and development should sustain the ore reserve for many years of operation.

10099

PROPERTY

Dolly Varden Mines now owns <sup>27</sup> 56 crown granted claims that cover an irregular shaped area with a maximum length of 4 miles along the valley of the Kitsault River as shown in the accompanying map.

*claims held by lessees  
B.C. Government and control  
leased to B.C. Government  
leased to  
Kitsault  
Silver  
27  
20*

The township at the lower end of the claims is 17 miles by road from Alice Arm at the mouth of the river.

Regular services connect Alice Arm with Prince Rupert by float-equipped aircraft and by steamship.

The topography within the property is precipitous so that road building has been expensive. However it has been an advantage in development since adits can be driven to explore some of the ore-bodies.

HISTORY

The original discovery of silver ore in the Kitsault Valley was made on the Dolly Varden vein in 1907. Production from this vein awaited the building of a railway from Alice Arm for 17 miles to the mine. It amounted to about 1,300,000 ounces of silver during 1919 to 1921. Apart from about 60,000 ounces of silver produced by leasors in the late 1930 s the property remained idle until the present company re-opened the old workings in 1961.

In 1916 the Toric claim was staked and eventually became the key holding of Torbrit Silver Mines Ltd. which went into production in February 1949. The mine closed down in September 1959 after milling 1,374,832 tons of ore that produced 18,614,015 ounces of silver and 10,700,428 pounds of lead. Dolly Varden Mines has since purchased all the assets of Torbrit Silver Mines including an intact ore-body on the North Star vein, the mill rated at 400 tons per day, a variety of mining equipment, a valuable hydroelectric plant and a camp.

The records show that in 1917 a number of diamond drill holes were put down to test the veins on the Wolf property that belonged to the original Dolly Varden company.

*and 11 ~~claims~~ adjoining claims held under other  
a total of 60 mineral claims and fractions.*

27  
193

1/60

Nothing more was done until 1960 when limited diamond drilling was done to test some of the older work. A successful diamond drilling campaign in 1962 resulted in the main development work being centred on the Nos 1 and 2 Wolf veins.

The Sunshine Mining Company of Spokane recently entered into an agreement with Dolly Varden Mines to finance further development with a view to production.

#### GENERAL GEOLOGY

An excellent account with a map of the Geology of the Upper Kitsault Valley by J. M. Black appears in the <sup>British Columbia's</sup> Minister of Mines Report for 1951. *1951*

The area is underlain by sedimentary and volcanic rocks that have been intruded by minor masses of porphyritic rocks. Dykes of these intrusive rocks as well as of lamprophyres are common.

The sedimentary-volcanic series appears to be arranged in a syncline that plunges to the north-northwest and that has been cut up by faulting.

The predominant country rock for the known silver bearing ore-bodies is a series of volcanic breccias on the east limb of the syncline.

The Dolly Varden deposit is directly astride the projection of the axis of an elongated intrusion of porphyry that stretches for five miles in a south-southeast direction. The vein is 4000 feet south of the intrusion with the Torbrit and North Star veins half way between at the <sup>an</sup> 1000-ft elevation of *1000 feet above sea level*

Numerous faults provide a structural setting to the ore deposits. Thus Black shows a strong fault along Evindsen Creek that strikes north-northeast and another parallel one at 5600 feet to the west. It is quite likely that a third parallel fault is present at 5600 feet to the east of Evindsen Creek defined by Barite Creek and the segment of the Kitsault River immediately in line to the south. This fault direction is also found in the Dolly Varden Mine. It is also the direction of elongation of the small intrusion between Tiger and Musket Creeks. Curiously enough the axis of this intrusion when extended to the southwest passes through the

Torbrit ore-body, the old North Sar workings and just west of the developed section of the Dolly Varden mine.

The known silver deposits of the Kitsault Valley are confined to a narrow belt 2000 feet wide that strikes north for four miles from the Dolly Varden mine. This is also a fault direction in that mine and the vein direction in the Wolf mine.

#### MINERALIZATION

An attractive feature of the area is the large size of the veins which range up to 100 feet and more in width and in some cases can be traced for over two thousand feet.

They have been formed along faults in which there has been repeated movement during mineralization both along the veins and at other times across them.

Most of the veins are characterized by the presence of barytes which frequently amounts to 25% by volume. The predominant gangue mineral is usually quartz although calcite often attains 25% by volume. The crustiform nature of much of the vein filling and the frequent vugs testify to the relatively low temperature and pressure during vein formation. Jasper is common particularly in the brecciated parts of the veins.

Pyrite is a common sulphide and often forms 25% of the ore-bodies. Minor amounts chalcopyrite, sphalerite, galena and tetrahedrite are present along with small but important amounts of pyragyrite, argentite and native silver.

Previous observers have decided that the native silver in the very high grade ore was of secondary origin. However, the sulphides are usually completely fresh and unoxidized within a few feet of the surface due to the recent age of the glaciation in this valley so that it is unlikely that surface enrichment is responsible for the high grade ore. It is more likely that local structural conditions have lead to a concentration of primary silver mineralization and that additional surface enrichment is due to the subtraction of pyrite by weathering.

ORE DEPOSITS

WOLF MINE

Here there are three veins arranged en echelon striking N 15°E to N 30°E and dipping steeply west known as Nos 1, 2 and 3 veins in order from east to west.

It now seems possible that these three are segments of one vein that has been divided up by two faults striking due east and dipping 45° south and a third fault striking northwest and dipping 60° north.

No 1 Vein

X The topography here is extremely steep so that there has been some confusion over the true strike and dip of the vein. Thus diamond drilling in 1960 was set out for a strike of about N 60°E and a dip of 50 - 55°W. It was thought that the drill results indicated a still flatter dip. Actually the vein strikes N 30°E and dips 70°W as can be found by construction using the original diamond drilling results. This was also confirmed by the more recent drilling from underground.

All the information to date has been plotted on a vertical projection using this strike and dip and calculating the equivalent horizontal width for each drill hole intersection and open-cut exposure.

The discrepancy between the surface sampling and the values in the tunnel or diamond drill holes suggests that enrichment at least by leaching out of sulphides has taken place in the first few feet below the surface. Thus in the trench at elevation 1776 feet where the old sampling gave 12 feet averaging 10 oz Ag per ton recent sampling after blasting down to fresh, unoxidized sulphides gave 14 feet averaging 3.6 oz Ag per ton.

It is interesting to note however that high grade streaks can be traced by the assays in the tunnel through the nearer drill holes and that therefore high values obtained by drilling should not necessarily be reduced as being purely local erratic highs. It is guessed that the high value of 110 oz Ag reported in No 4 hole of the drilling in 1960 is not where indicated and belongs to one of the high grade streaks.

Recently the old tunnel at elevation 1450 feet was extended as a footwall drift for 170 feet and used as a base for diamond drilling. It was found that a strong fault that is visible in the tunnel with an easterly strike and dip of 45° south has completely cut off the vein so that it could not be located beneath the fault by drilling 70 feet beyond the projected position in the hangingwall and 200 feet into the footwall. The three holes above the fault all intersected ore.

It is quite possible that the apparent throw is about 160 feet to the west where it then becomes No 2 vein.

It is also surmized that a fault striking northwest and dipping 60° northeast probably displaces the vein outcrop at elevation 1690 feet about 30 feet horizontally to the southeast. Such a fault would account for the anomalous relative positions of some of the drill intersections in this area and also some in the recent drilling at the north end of No 2 vein.

Using the latest information I now calculate the ore reserve on No 1 vein to be :

|          | TONS<br>Short | GRADE<br>oz Ag |
|----------|---------------|----------------|
| Proven   | 40,000        | 15.0           |
| Probable | 25,000        | 12.0           |
| Possible | 35,000        | 8.00           |
| <hr/>    |               |                |
| Total    | 100,000       | 11.8           |

The proven ore is based on a continuous outcrop, a tunnel 80 feet long and 13 drill holes. The probable ore on a continuous but mostly inaccessible outcrop and 6 diamond drill holes. The possible ore is based on outcrops, 5 widely spaced drill holes and being next to probable ore.

The interpretation placed on the faults severely limits the possibility of finding further ore on No 1 vein as such.

No 2 Vein

The outcrops at the south end of this vein are 250 feet west of No 1 Vein and at a lower elevation. In 1917 drill holes 24 to 28 tested this portion of the vein at a shallow depth. In 1962 and 1963 some of a series of holes numbered W S 50 to W S 79 explored the vein further here and also immediately to the north where there are no outcrops. Because of the favourable results underground drifts were started at 3 elevations of which the lowest at the 1240 level is the main one.

Here a strike length of 400 feet has now been opened up and the face is still advancing in ore. Mineralization was found to extend over widths up to 75 feet as shown by systematic test-holing at about 12 ft centres into either wall of the drift.

There has been repeated fault movement within the vertical vein along its strike during the process of mineralization as shown by the banding and the fault planes. Bands with up to 50% fragments of jasper over widths of 1 to 5 feet are particularly evident. Pyrite is common throughout the vein and averages about 20%. Galena, sphalerite and tetrahedrite are seen only occasionally.

A post mineral fault dipping 45° north was encountered at 140 feet. It has moved the vein to the left for about 12 feet.

A dyke 5 feet wide is seen on the east side of the portal and in the tunnel there are several narrow seams of dyke up to 12 inches wide that invade the vein from the east side.

From the sampling results in the drift and the test holes I have calculated that on the level, between coordinates 14,380 N and 14,620 N, there is an area on the vein 270 feet long averaging 20 feet wide that has an average grade of 11.8 oz Ag per ton.

There is further low grade material on the east wall as follows :

at the south end an area 80 feet long that averages 3.0 oz Ag over 23 feet and at the north end another 110 feet long that averages 2.7 oz Ag over 11 feet.

In the 1350 adit which is vertically above the ore in the 1240 tunnel the scraper drift has apparently been on the hangingwall section of the vein as shown by the test holes that were put into the walls near the beginning of the tunnel where it is wide

enough. For 100 feet the muck samples average 5.2 oz Ag. For a length of 60 feet of which 30 feet is outside the portal the three test holes into the east wall average 6.1 oz Ag over 10 feet.

More test holes are required in the last 80 feet of the adit before an average grade can be obtained. Hole 65 that is a few feet above the face of the drift gave 25 feet of 12.4 oz Ag.

Two drill holes below the ore section on the 1240 level spaced at 130 feet apart gave values of 47.3 oz Ag over  $13\frac{1}{2}$  feet and 37.3 oz Ag over 9 feet at the 1100 level.

Another hole at 90 feet further north gave 9.86 oz Ag over 25 feet but at 100 feet west of the projected position of the vein so it is assumed to be a fault segment.

Three other holes at the 1200 elevation also gave good results.

The exploration work here to date has shown that there are 30,000 tons of proven ore averaging 11.80 oz Ag per ton above the 1240 level and another 120,000 tons of similar ore below the level down to the 1050 elevation, half of which is in the proven category.

In the first 120 feet of the 1240 tunnel the values are too dispersed to make ore at the present price of silver but there may well be ore at a lower horizon.

Further north and higher on the hillside there is a well exposed vein that has been assumed to be the continuation of No 2 vein. It has a length of 300 feet and a width of 20 feet between elevations 1500 and 1700 feet. It was explored in the early days with 8 open cuts and 12 diamond drill holes.

Most of the holes are clustered around the south end of this section where 5000 tons of probable ore averaging 13.0 oz Ag per ton can be calculated.

A tunnel has been started here at the 1500 level.

The diamond drilling in 1963 failed to find the vein at depth in this area and it now appears likely that another easterly striking fault that dips about  $45^{\circ}$  S could be separating this vein from No 3 vein that lies 140 feet to the west and at a lower elevation. In addition there could be another later fault striking northwest and dipping  $60^{\circ}$  NE passing just south of the 1500 portal.



No 3 Vein

This vein is exposed for 150 feet between elevations 1370 and 1460 feet over widths of 15 to 20 feet. There are five open-cuts in which the only significant assay was 48.8 oz Ag per ton over 5 feet at elevation 1476.

The south end of the vein was cut by drill hole W S 73 that was drilled at -58° to explore No 2 vein. A portion of the vein for a core length of 15 feet averaged 5.3 oz Ag per ton.

Hole W S 77 at 200 feet further north entered the vein at bedrock where it is 30 feet wide. Values of 2.9 oz Ag over 2.5 feet on the hangingwall and 2.4 oz Ag over 3 feet on the footwall were obtained.

This vein should be explored further by a series of holes designed to cut it about 100 feet below the surface and 100 feet apart.

ORE RESERVE

The present figures for the ore reserves on the Wolf veins are as follows :

|           | PROVED  |       | PROBABLE |       | POSSIBLE |       |
|-----------|---------|-------|----------|-------|----------|-------|
|           | Tons    | oz Ag | Tons     | oz Ag | Tons     | oz Ag |
| No 1 Vein | 40,000  | 15.0  | 25,000   | 12.0  | 35,000   | 8.0   |
| No 2 Vein | 90,000  | 11.8  | 65,000   | 13.0  |          |       |
| Totals    | 130,000 | 12.8  | 90,000   | 12.7  | 35,000   | 8.0   |

Total Wolf Veins 255,000 tons 12.7 oz Ag per ton

The Sunshine Mining Company plans to extend the 1240 level to the north along the vein and to sink 200 feet for a new level at the 1040 elevation. This work could well add another half million tons to the reserve.

NORTH STAR MINE

This property was extensively drilled by Torbrit Silver Mines and recently by Dolly Varden Mines.

The main exploration was the driving of the 1000 adit by Torbrit Silver Mines in 1958 which resulted in the discovery of an ore-body at 800 to 1100 feet along the vein from the portal. The ore was not exposed at the time but was proved by a series of diamond drill up holes from a 200 ft long cross-cut in the footwall. A raise was driven into this ore in 1963 and a well-mineralized vein with much galena was exposed.

The vein strikes N 30°E and dips 45°N W. It is cut up into segments by numerous faults that strike northwesterly.

In 1963 a series of holes were drilled into the vein immediately east of this ore-body but only low grade material was found.

Still further east however there is a more promising section of the vein where the old drilling suggests that there is a length of 90 feet that averages 18.2 oz Ag per ton over a width of 20 feet. A service raise that was started in 1963 in this area at 45° entered this ore at 30 feet and was still in it at 60 feet when it was stopped. The ore was reported to have been of good grade.

There is a set of three workings at much higher elevations that are almost certainly on the same vein. Because of the dirt and iron staining it was difficult to assess the true mineral content of the vein in these workings.

The topmost one consists of a 40 ft adit at elevation 1660 feet where a 20 ft vein is exposed containing about 20% pyrite and some galena. A few tons of sorted material on the dump contains considerable galena and presumably is of good grade.

At elevation 1560 a tunnel 200 feet long exposes a similar vein and J. M. Black reported a sample over 7 feet from it that assayed 36.7 oz Ag per ton. The distribution of the mineralization suggests that such values could exist for 140 feet along the adit.

At elevation 1490 feet an irregular tunnel was driven for 320 feet with some cross-cuts. It follows the vein in part but also the more easily drilled dykes.

The full width of the vein is only exposed by the cross-cutting at the inner end of the adit. Copper stains are frequent and when investigated were found to be associated with chalcopyrite. No assay plan is available for this level and there is no evidence of systematic sampling.

An attempt was made to follow the outcrop from the 1660 adit to the south. At about 200 feet, probably just inside the Dolly Varden No 1 claim, an outcrop of iron-stained quartz was found at the side of a pronounced gully and just west of an old cabin. The gully was followed to the portal of the 1780 level of the Dolly Varden mine and it therefore corresponds to the strong 304 fault. Some quartz was found in a few places on the east side of the gully.

#### ORE RESERVE

A geological plan of the 1000 level, cross sections of the ore-body and the complete logs of all the drill holes into the North Star Zone are available. I find that there are 125,000 tons averaging 12.5 oz Ag per ton with an average width of 20 ft

The 23 drill holes indicate that the thickness ranges from 10 to 38 feet and the grade from 7.4 to 31.0 oz Ag per ton. The lead assays that are available from 11 holes average 1.0% Pb.

In addition I estimate that the present evidence for the section of ore nearer to the portal of the 1000 adit gives 15,000 tons of probable ore averaging 12.5 oz Ag and a like amount of possible ore.

DOLLY VARDEN MINE

The accompanying map of the surface exposures at the Dolly Varden mine shows a westerly striking vein that dips from  $40^{\circ}$  to  $60^{\circ}$ N and is cut up into numerous segments by a series of northerly, northwesterly and northeasterly striking faults that usually dip from  $30^{\circ}$  to  $60^{\circ}$ W. This combination produces a flat rake to the individual segments of the vein. The horizontal fault movement may be as much as 140 feet so that it proved difficult to follow the vein underground.

The old maps are quite valuable especially as the upper workings are now inaccessible.

The mapping of J. T. Mandy (1936) shows that in the known ore-bearing section of the vein the hangingwall rock is volcanic breccia and the footwall is andesitic lava for a vertical range of about 375 feet. Higher up the hillside both walls consist of andesite and although the vein is quite strong and well mineralized at least with pyrite it is reported to be barren. On the bottom level (1410) only breccia is seen on both walls of the vein which is poorly mineralized and almost barren of silver. Thus the vein appears to occupy a reversed fault that has displaced a southerly dipping contact between andesite and the underlying breccia.

In the 'glory holes' the exposed vein is seen to contain about 30% pyrite with occasional patches of galena. The high grade material that was shipped originally was reported to consist mainly of galena with subsidiary tetrahedrite, argentite, native silver and ruby silver. Sphalerite and chalcopyrite are also present.

The known ore appears to be localized in the vein near cross faults that are known underground as the 403;304;417 and 206 that all dip to the west.

Between the 1640 and 1410 levels the ore has a lower limit that probably coincides with the contact of the breccia and the andesite where it leaves the plane of the vein on the footwall side. A downhole from the inner end of the 1640 level showed that the ore extended at least 90 feet below the level and against the 206 fault.

A fan of holes from the end of the main cross-cut on the 1640 level failed to find the next segment of the vein although it is known on the surface.

When seen in a composite plan the known ore occupies an area 550 feet long and up to 200 feet wide with a vertical range of 375 feet. At present it is limited at the western or inner end of the mine by the 206 fault. Since it appears likely that the ore is following the part of the vein that has dissimilar rocks on each wall it should be present at this horizon beyond the 206 fault.

The detailed mapping to a scale of 1 inch to 40 feet of Dr. J. T. Mandy was extended in 1961 to show the vein outcrops and cross faults for another 1200 feet to the west.

A most promising section was found between coordinates 1280 and 1440 west. Here there is a bluff of vein material about 50 feet high near the west end where there is a pronounced north-striking valley that no doubt follows a fault zone. There is also a large quartz outcrop at the east end of this section plus subsidiary outcrops of what must be faulted segments as shown on the map.

A self-potential survey over this area showed that the main segment contained considerable sulphides since it recorded a large area with a potential difference of 250 millivolts above background.

An old cut (now No. 16) at the foot of the bluff was deepened and extended to expose a horizontal width of 45 feet of fresh vein material. It was found to contain from 2 to 5% pyrite, 1 to 2% sphalerite, up to 0.5% chalcopyrite and up to 2% galena plus tetrahedrite in a gangue of mostly calcite with subsidiary quartz and a little barytes. The walls are not well-defined but the dip appears to be from 45° to 60°N. This exposure was sampled in 5 ft sections, as shown on the plan, giving an average of only 0.30 oz Ag per ton with the best section still only 0.80 oz Ag per ton.

Another cut (No 15) was made through the shallow overburden at the middle of the self-potential anomaly. Similar mineralization was encountered for a width of at least 39 feet after passing through masses of porous limonite, and black manganese wad that both contained malachite and azurite in places. In the fresh material more barytes was recognized than in cut No 16.

The footwall had not been reached and some sections were still partly oxidized

when the samples shown on the plan were taken. They give an average of only 0.21 oz Ag per ton, the best being 0.95 oz Ag per ton over 3 feet where a seam of galena and chalcopyrite was cut obliquely.

#### UNDERGROUND

The upper levels (1780 and 1716) are inaccessible due to caving from the glory holes.

In 1961 the 1640 level was drained of water that had been dammed back by a fall of ground for many years. As far as could be judged from the dirty state of the walls the old mapping of the mineralization, faults and dykes was correctly done.

The 1410 level consists of a 9 by 8 ft heading, 1000 feet long, that was to be the main haulage. It is all in purple and green volcanic breccia.

A piece of the Dolly Varden vein was encountered at 600 feet for 25 feet situated between two fault segments of the main northeast dyke known on the levels above. The old sampling here shows a value of 5.6 oz Ag over 5 feet on the north wall ; the balance assays 0.4 oz Ag for 20 feet. The south wall averages 0.5 oz Ag for 35 feet.

Drilling from two set-ups to the southeast at 850 feet and at the face picked up the vein again. A cross-cut at the 850 ft position exposed the vein 20 feet wide and dipping 55° N with some pyrite in the hanging and footwall sections. Chalcopyrite was also seen in the hangingwall and a few small streaks with fine galena were also recognized. The old sampling of the west wall gave an average of 2.5 oz Ag over 30 feet whilst a streak of galena on the south side near the face gave 128 oz Ag per ton. J. M. Black sampled the same 30 feet in 1951 and obtained an average of 0.70 oz Ag per ton with 0.3% Pb and 4.0% Zn.

Another cross-cut at the 920 ft position only reached the hangingwall of the vein.

There is little doubt from the position and appearance of this vein that it is the Dolly Varden structure; unfortunately it is not ore. Down holes from the 1640 level show that ore values are present 130 feet above this section.

The face of the heading has stopped at what appears to be the 206 fault. Two holes 150 feet long were fanned ahead in an unsuccessful attempt to locate the vein

again. More recently further holes were drilled from underground in this area without locating the vein.

Further to the west a vertical hole ( DVU 12) from the 1410 level cut ore from 55 to 70 feet below the 1640 level at a point 150 feet in from the portal and 80 feet north where 15 feet averages 10.7 oz Ag per ton.

Three holes were recently drilled from the surface near the No 2 Glory hole of the Dolly Varden mine.

No 200 passed through the 206 ore-body just above the 1780 level giving 39 feet averaging 26.6 oz Ag per ton.

No 201 cut the 252 ore at 20 feet above the 1780 level giving 6 feet of 19.1 oz Ag

No 203 gave 10 feet of low grade just below the 304 fault at 15 feet below the 1640.

These results confirm the good grade of ore shown in the old records.

It has been suggested that a substantial tonnage of ore could be obtained by the surface mining of the old glory hole areas of the Dolly Varden. This could be possible around Nos 1 and 2 glory holes between elevations 1780 and 1900 feet in an area approximately 200 by 200 feet. Much of the ore here has already been mined both from the glory holes and from the underground stopes. A series of vertical holes would be necessary to determine the tonnage and grade that might be available. An unknown amount of low grade but profitable ore is probably present in the dumps at the portals of the 1780 and 1638 levels. These would require deep trenching and sampling.

All rejects from assaying of samples should be saved for mill tests.

For exploration purposes there is an excellent geological possibility of a major deposit on the Dolly Varden structure between the 800 and 1300 ft elevations. This can best be tested by diamond drilling from the end of the 1000 level in the North Star workings.

There is also a good chance of further ore to the west of the Dolly Varden structure between the 1500 and the 1850 ft elevations especially down the dip and rake of the wide section of the vein that was explored on the surface in 1961. This area could be tested by vertical diamond drill holes from 300 to 500 feet deep.

ORE RESERVE

In the following estimates the assay values shown on the old company's plans are accepted but until new workings have penetrated the main blocks of new ore below the 1640 level there can be no certainty of the grade which at present is based on the assays on the level and a few diamond drill holes.

As much as 11,000 tons of probable ore averaging 25.0 oz Ag per ton is shown in the old stoping areas above the 1640 level on the old ore reserve section whilst another 36,000 tons at 30.0 oz Ag of probable ore could well be present as indicated between the 1410 and 1640 levels. Thus a total of 47,000 tons averaging 22.0 oz Ag per ton is probably available in the present mine.

TORBRIIT MINE

So far Dolly Varden Mines has not attempted to assess the value of any ore that may be left in this mine. At the time of its closure silver was worth 85¢ per ounce as compared with \$1.40 now.

There could be considerable tonnages of material averaging say 8 to 10 oz Ag per ton that is readily accessible to the old workings so as to be mineable at a good profit.



ORE RESERVES

The various blocks of ore that have been described above are now listed as follows:

|                      | PROVED         |             | PROBABLE                                  |             | POSSIBLE      |             |
|----------------------|----------------|-------------|---|-------------|---------------|-------------|
|                      | Tons short     | Grade oz Ag | Tons short                                | Grade oz Ag | Tons short    | Grade oz Ag |
| Wolf                 | 130,000        | 12.8        | 90,000                                    | 12.7        | 35,000        | 8.0         |
| North Star           | 125,000        | 12.5        | 15,000                                    | 12.5        | 15,000        | 12.5        |
| Dolly Varden         |                |             | 47,000                                    | 22.0        |               |             |
| <b>Totals</b>        | <b>255,000</b> | <b>12.7</b> | <b>152,000</b>                            | <b>15.6</b> | <b>50,000</b> | <b>9.3</b>  |
| <b>Total Reserve</b> |                |             | <b>457,000 tons at 13.2 oz Ag per ton</b> |             |               |             |

VALUE OF ORE

The following operating costs per ton of ore with a 500 tons per day mill are considered reasonable :

|                             |             |
|-----------------------------|-------------|
| Mining and hauling to mill  | \$ 3.50     |
| Milling                     | 2.50        |
| Development & Exploration   | 1.30        |
| Camp maintenance            | 1.00        |
| Overhead                    | 1.00        |
| <b>Total operating cost</b> | <b>9.30</b> |

At \$1.40 per ounce and with an 85% extraction the average ore is worth \$16.30 per ton so that a working profit of \$7.00 per ton is indicated.

## DEVELOPMENT

Of the various areas that could be further developed the most promising at this time is the Wolf Mine.

Sunshine Mining Company has agreed to spend a minimum of \$250,000 here this year. They are continuing the drift along the vein on the 1240 level which could involve at least 500 feet and also plan to sink to the 1040 level for a major development at that elevation which could amount to 1,500 feet or more of drifts and cross-cuts.

## CONCLUSION

During the past two years the property of Dolly Varden Mines has responded well to development.

The Sunshine Mining Company is concentrating its efforts on the Wolf Mine where there is the greatest potential at present of adding substantially to the ore reserve. Success here will justify the installation of a new mill.