

Property File
082FSW001

002677

GEOLOGICAL REPORT
ON THE
ASPEN MINE
OF THE
SALMO-MALARTIC MINES, LTD.
Salmo, B.C.

To
Mr. Charles R. Blackburn, President,
Salmo-Malartic Mines, Ltd.

By Chas. C. Starr
December 1928.

SUMMARY

INTRODUCTION: The purpose of the examination was to gather data to guide future development.

LOCATION: On Deer Creek, eleven miles easterly from Salmo, B. C.

PROPERTY: Six Crown Granted claims and five held by location.

EQUIPMENT: A three drill portable gasoline driven air-compressor with all necessary tools and a good camp.

DEVELOPMENT: Over twenty open cuts and shallow shafts and four tunnels. Total underground work is as follows:- Crosscuts 1272 feet.; Drifts 485 feet; raises 113 feet; shafts and winzes 181 Ft.

GENERAL GEOLOGY: The mine is in a highly metamorphosed and altered belt of Pend d'Oreille limestones and schists which have been irregularly intruded by granite.

ROCKS: The rocks are massive marbleized limestones, thin bedded argillites, quartzites, and impure limestones, sometimes accompanied by basic sills and dikes, which are grouped under the name "schist". The above rocks have all been irregularly intruded by granite. The distribution of the rocks, so far as obtainable, is indicated on the maps herewith. The strike of the sedimentary rocks swings from northwest at the north end of the property, through north-south, to south southwest at the south end; the average dip is some 65° eastward. The granite is in the form of very irregular tongues, dikes, and masses.

STRUCTURE: The sedimentary rocks are bent into a very definite anticlinal fold the axis of which lies to the south and east of "C" tunnel; the structure is broken and complicated by the granite intrusions.

MINERALIZATION: Mineralization occurs along two quite definite zones, the upper developed by most of the open cuts and "A" and "B" tunnels, and the lower by "C" tunnel. It consists of galena, pyrite, and blende both as disseminations and as irregular streaks, in two quite definite bands of limestone.

GENERAL NOTES: The strongest mineralization occurs in certain favorable limestone beds where they are crumpled, folded, and cut by cross-fractures. Therefore the most favorable places for ore are where the ore-bearing beds are most strongly folded, i.e., around the apex of the anticline south and east of "C" tunnel. Work in this section is however made expensive and "blind" by the presence of many granite intrusions and a cover of soil which prevents study of the surface.

RECOMMENDATIONS: Drift northwest from "B" tunnel along the Upper ore-zone. Drift southeast in "C" tunnel along the Lower Ore Zone. Before making plans for more elaborate development a survey should be made by Radiore or some similar electrical prospecting method.

CONCLUSION: Geological conditions are favorable, and the mine has good possibilities, but is yet merely a prospect.

THE ASPEN MINE

INTRODUCTION: The study of the Aspen Mine on which this report is based was largely concerned with the geological features, in order to determine the factors governing the deposition of the ore, and to guide further development.

LOCATION: The property is situated on the east side of Deer Creek, a tributary of Sheep Creek, and is eleven miles easterly, by road, from Salmo, B. C., and thirty six miles southerly from Nelson.

PROPERTY: The property consists of six Crown Granted claims, the Aspen, Mohawk, International, Emma, Caroline, and Silverton Fraction, totaling 162 acres; and the following claims held by location - the Broken Hills and Aspen Nos. 1, 2, 3, and 4. The property is held under lease and bond by the Salmo-Malartic Mines Ltd.

TIMBER & WATER: Only a small part of the property is timbered, most of it having been denuded by forest fires, but there is sufficient timber remaining for several years work.

Water for domestic or milling purposes is plentiful, although a gravity supply at the mine and camp is quite limited at some seasons.

TOPOGRAPHY: The mine workings are on the western slope of a mountain and at about 4500 feet elevation. The principal workings are situated at the foot of the steep slope of the mountain, while the camp is a few hundred feet below on comparatively level ground. Above the lower tunnels the mountain rises steeply at an average angle of 30°.

The northern half of the property is quite rough and much bare rock is exposed, while on the southern half the slopes are smooth and for the most part deeply covered by soil.

TRANSPORTATION: A good road down Deer and Sheep Creeks connects the mine with Salmo, a station on the Nelson Branch of the Great Northern Railway.

EQUIPMENT: The following equipment is installed on the property;-

One Ingersoll-Rand portable gasoline driven air-compressor of three drill capacity, from which air is piped to the various working places.

All the necessary tools, Ingersoll-Rand Jackhamers, drill-steel, mine cars, rails, blacksmith shop, etc.

Camp, consisting of two bunk-houses, boarding house, and office, which are sufficient to care for fifteen or twenty men.

DEVELOPMENT: Development consists of numerous open-cuts, mostly along the Upper Ore Zone, several small shafts, and four tunnels, as follows:-

	Open cuts	Cross- cuts	Drifts	Raises	Shafts & Winzes	Total
	400*Ft	- Ft	- Ft	- Ft	75*Ft	475*Ft
Surface	400*Ft	- Ft	- Ft	- Ft	75*Ft	475*Ft
Upper "A" tunnel	-	95	22	23	-	140
"A" Tunnel	-	150	12	53	-	215
"B" Tunnel	-	562	176	-	-	738
"C" Tunnel	-	465	275	37*	6	783
	<u>400</u>	<u>1272</u>	<u>485</u>	<u>113</u>	<u>81</u>	<u>2351</u>

Note: * signifies that figures are approximate.

Upper "A" tunnel, "A" tunnel, and "B" tunnels develop the Upper Ore Zone, while "C" tunnel is on the Lower Ore Zone.

GENERAL GEOLOGY: The Aspen mine lies in a belt of highly metamorphosed and altered limestones and schists of the Pend d'Oreille Series, which is provisionally referred to

the Carboniferous Period. This belt is irregularly exposed from the eastern edge of the Ymir District south southwest to the International Boundary, some seventeen miles, and beyond into Washington; it contains numerous mineralized areas, many of which are now being explored, especially in the section adjacent to the Boundary.

These rocks have been highly altered and distorted, while at a considerable depth below the surface, by the heat and pressure attendant on the intrusion of the granites of the Nelson Batholith, and appear in places to have flowed like plastic material. Mineralization frequently occurs in the limestones on, and near, their contact with the granite, and near tongues and dikes of granite which have irregularly penetrated the limestones.

In the immediate vicinity of the Aspen Mine the Pend d'Oreille rocks come to the surface over an irregularly shaped area of perhaps a square mile in extent, north, east, and south of the mine. A short distance to the west of the mine massive granite outcrops. Near the mine there are frequent sills and occasional dikes of dark fine-grained intrusive rock which is provisionally considered to belong to the Rossland Volcanic Series. This rock generally occurs in the schists, occasionally in the limestones, but so far as known does not cut the granite, and is supposed to be older than the granite.

DESCRIPTION OF ROCKS: The following description of the rocks observed on the Aspen property is based on their appearance to the naked eye, or under an ordinary magnifying glass; no microscopic work has been done on them since it

would be of scientific, rather than practical interest, and would be of no assistance to the present problem.

Limestones Limestones cover the greater part of the area mapped. They are variously white, gray, bluish, and yellowish in color, often prominently mottled, and have been re-crystallized into calcite and marble. The texture is variable but generally rather coarse. Much of the bedding has been obliterated, so that many of the beds are now indistinguishable.

Schists "Schist" is here used as a general term to cover various thin-bedded sedimentary rocks such as argillite, quartzite, and impure limestone, which are distinct from the main thick-bedded limestones. They are frequently accompanied by small sills of black basic rocks.

Basic Dikes & Sills The rock forming these dikes and sills is hard, black, and too fine-grained to allow its mineralogical character to be definitely determined without a microscope, it seems probable however that it is an augite-porphyrite.

Granite The granite is a gray, medium grained rock and is typical of the border phases of the Nelson Batholith; it might more properly be termed granodiorite.

OCCURRENCE OF ROCKS: The distribution of the rocks in the area immediately surrounding the mine is shown on the two maps which accompany this report, in so far as it is possible to map them, for very considerable areas are so masked by soil that the underlying rocks can not be identified.

Limestones & Schists These sedimentaries are the oldest rocks exposed and represent a continuous period of marine deposition; they cover the greater part of the area mapped,

as well as extending beyond the limits of the mapping to the north, east, and south.

From the north to the south end of the area, the strike varies from N 45° W, to north and south, to S 20° W, and the dip from 45° to 90° eastward; there are however many local variations in both strike and dip, due to crumples and local folds.

From the camp, going eastward across the strata, schist probably predominates nearly to "G" Tunnel, then the limestones of the lower ore zone are crossed, then several hundred feet of predominantly schist to the main body of limestone which is over a thousand feet in thickness and extends beyond the area mapped.

Basic Dikes & Sills

These represent a period of igneous intrusion between the formation of the limestones and schists, and the intrusion of the granite. They cut both the limestones and schists, but show a strong tendency to follow the bedding planes, or contacts, of the schist in preference to the limestone. They are often extremely irregular and generally narrow, but occasionally swell out to twenty feet or more in width. On the accompanying maps no distinction is made between the schist and the dikes or sills, since to differentiate them would involve considerable detailed work without any valuable result. The "schist" areas southeast of "B" Tunnel and at the northwest end of the surface map both contain a considerable proportion of igneous material.

Granite

The limestones and schists have been very irregularly intruded by dikes, tongues, and masses of granite

which has been forced up from below under great pressure, causing much fracturing and distortion. The contacts are crooked and irregular, both in detail and in a broad sense.

To the west of the section mapped granite outcrops over a large area; in the center of the mapped area dikes and tongues of considerable size occur, but their boundaries are obscured by soil and cannot be accurately mapped.

STRUCTURE: It is evident from the dips and strikes of the sedimentary rocks, as given on the map, that a fairly sharp anticline whose axis strikes to the northeast and southwest passes across the property a few hundred feet south of "G" Tunnel. The regularity of this anticlinal fold has been greatly broken and complicated by the intrusion of the granite which is particularly in evidence near the apex of the anticline. Minor folds, or wrinkles, show in the massive limestones toward the north end of the property; the lower ore zone limestones and the adjoining schist beds are often highly contorted.

MINERALIZATION: Upper Ore Zone The upper ore zone consists of a series of banded and mottled blue-white limestone, averaging about sixty feet thick, which outcrop nearly level along the hillside on the Aspen Claim for a distance of nearly fifteen hundred feet; south of the gulch northeast of "G" tunnel it is masked by overburden. It has been opened by seventeen open cuts and three tunnels; in some of these workings more or less ore of the replacement type was found, while others were practically barren.

From north to south the most strongly mineralized

cuts may be described as follows:-

Cut 300 feet north of the line of "A" tunnel shows a few inches of pyrite with some galena, parallel to the bedding.

Cut and Incline 200 feet north of line of "A" tunnel shows slightly silicified limestone, somewhat fractured, containing a streak of galena and pyrite from one to six inches in width which has been followed by a southerly pitching incline for thirty feet or more.

Cut at portal of Upper "A" tunnel shows a forty foot length of mineralization from a few inches up to four or five feet wide. The sulphides occur sparingly, partly in streaks and partly as disseminations, and consist of pyrite, galena, and blende with unusually good silver values. Several small folds and some silicification and cross-fracturing are present. A few tons of ore were shipped.

First and second cuts south of "A" tunnel show small widths of disseminated galena and pyrite with fair silver values.

Third Cut south of "A" tunnel shows some warping of the strata, a little shearing, and a weak mineralization.

Cut and ten foot Shaft 50 feet north of line of "B" tunnel shows considerable mineralization in streaks and disseminations. The ore occurs on a small roll in the strata and is accompanied by silicification. A few tons of good silver ore were shipped from this cut.

Second cut south of the line of "B" tunnel is in fractured ground; several oxidised stringers indicate that sulphides were originally present,

Third cut south of line of "B" Tunnel shows broken ground and iron oxides.

Two small Shafts 200 feet south of gulch at 4900 feet elevation show strongly leached and ironstained limestone, with occasional specks of pyrite and galena. These shafts are not deep enough to reach the unoxidised material. It is probable, though not certain, that this showing is on the continuation of the Upper Ore Zone. The indications for ore at greater depth are good.

Upper "A" Tunnel shows weak irregular streaks and disseminations of galens, blende, and pyrite, occurring at intervals from the open-cut at the portal to the raise, a distance of fifty feet or more. In places there is sufficient concentration to form low grade milling ore;

In "A" Tunnel the mineralized zone is cut at 125 feet from the portal and its full width has probably not been exposed. Low grade disseminated galena, blende, and pyrite show

over an irregular width of fifteen feet in a slightly silicified zone.

"B" Tunnel cuts the ore zone at 400 feet from the portal (see small Map) and continues in it to 480 feet. It consists of the same blue-white banded limestone as on the surface, but the mineralization at the point cut is very weak and consists almost wholly of pyrite. The northwest drift from this tunnel shows a very little weak and spotty pyrite, and is to the east of the orezone proper.

Lower Ore Zone

The Lower ore zone is in a stratum 600 feet, geologically, below the Upper Ore Zone and is exposed for 250 feet on the surface and in the "G" Tunnel workings. It outcrops only over one small area just north of "G" tunnel and has not been found elsewhere on account of a thick covering of soil; nor can its probable location be predicted with any certainty on account of the distortion of the lower strata, and the presence of the granite intrusions. As now known, the ore is entirely of the replacement type and is contained in a single stratum of highly contorted, finely crystalline, blue-white limestone about twenty feet thick which lies between two tongues or dikes of granite and has been tilted into a flattened "S" with an average dip to the west, - the reverse of normal. The ore minerals are galena, blende, and pyrite, and occur in irregular stringers through the limestone, and as disseminations. The strongest mineralization occurs in parts of the beds that have been cut by a series of north northwest fractures dipping 65° eastward. The following is a description of the Ore Zone by working places:- (see small Map).

Cut north of "G" tunnel shows twenty five feet of sparsely

disseminated sulphides, but occasional spots of fair ore.

At the intersection of the crosscut from the north portal of "G" tunnel and the southeast drift, the top of the ore bed shows on a "roll", dipping under the crosscut to both the east and west. It appears again dipping west thirty feet from the face of the crosscut. The mineralization is galena and pyrite and is generally insufficient to form ore.

In the northwest drift from the south part of "G" tunnel the ore-bed is again exposed and shows a weak and erratic dissemination of sulphides with occasional irregular seams of galena. In the southwest drift, a few feet nearer to the south portal of the tunnel, the showing is very similar to that last described.

In the raise leading from "G" tunnel level to the upper east drift (shown in dashed lines on map), irregular streaks of galena, accompanied by blende and pyrite, occur up to two feet in width, with some disseminated sulphides adjoining the streaks, forming a small amount of milling ore.

In the east drift from the above mentioned raise, a seam of galena was followed for some forty feet. In strongly fissured ground above this crosscut galena occasionally occurs in concentrations along the walls of the fissure.

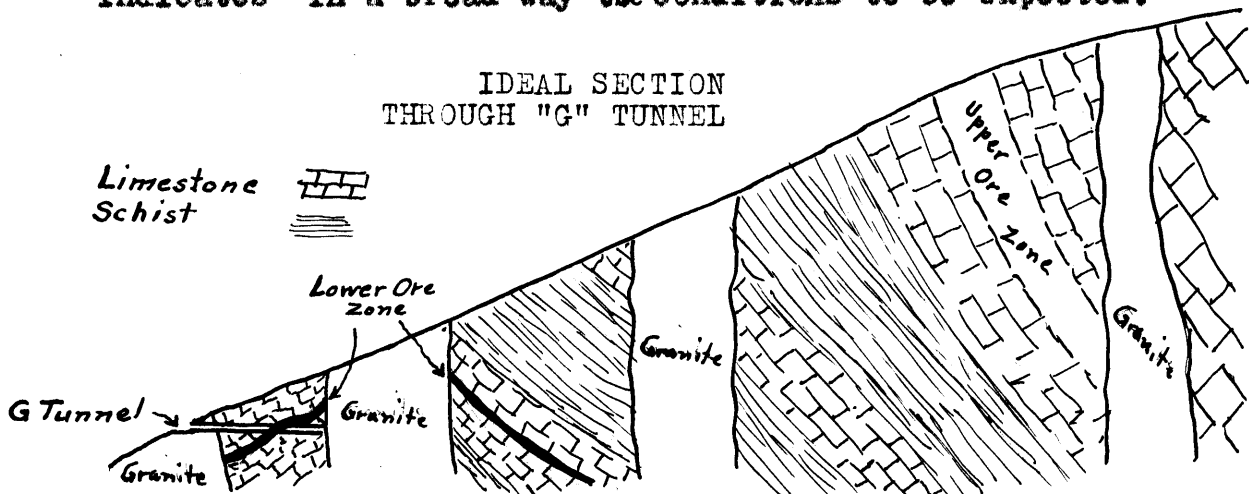
GENERAL NOTES: It is evident from the study that has been made, that the strongest mineralization occurs in certain favorable beds of limestone where they are crumpled and folded and cut by cross-fractures. These conditions are favorable to ore throughout the Kootenay region, especially when in the vicinity of granitic intrusions.

The surface geology shows that the most folded and fractured area on the property lies a few hundred feet to the south of "G" tunnel along a northeasterly and southwesterly direction, and that both the Upper and Lower Ore Zones pass through this area. It should therefore be the most favorable place on the property to prospect for ore.

In further prospecting of the Upper Ore Zone in

the vicinity of "B" tunnel there is no particular difficulty involved. To the south of the gulch conditions are not so favorable as regards getting results with a reasonable expenditure, since, to develop it through the extension of "C" tunnel would involve an, at present, unjustifiable length of crosscut; the topography will not permit the driving of a shorter tunnel without excessive distance for the depth obtained; and shaft sinking would be expensive and slow on account of the equipment required and probable water trouble.

The Lower Ore Zone comes to the surface to the northwest of "C" tunnel, and ends, both up and down the dip, against granite on the east and west. It may therefore be followed only to the southeast on the tunnel level. There is a strong probability that this ore-bed occurs again to the east of the granite tongue, and above the tunnel level, but it is advisable to determine its presence there by some cheaper means than crosscutting in the mine before starting such exploration. The following sketch shows the conditions to the northeast of "C" tunnel as indicated by the geology; it is not drawn to scale, nor is it possible to do so with the information now obtainable, - it simply indicates in a broad way the conditions to be expected.



RECOMMENDATIONS: Before the Aspen Mine shut down, work was started along the lines recommended in the Preliminary Report, and this work should be continued, viz.-

Drift along the Upper Ore Zone to the northwest from "B" tunnel, continuing the new drift that was started at 460 feet from the portal. From this drift crosscuts should be driven at intervals to cut the entire width of the ore zone. The length of drift that should be driven may best be left dependent on the results obtained in the first two hundred feet.

Continue the new drift in "G" tunnel to the southeast in the Lower Ore Zone indefinitely, depending on the conditions encountered.

Before any more elaborate program of development is undertaken, I would recommend that a survey be made by some type of electrical prospecting of recognized standing, such as the Radiore. Such a survey carried out over the ore zones should prove a valuable guide to further development, either by diamond drilling or by underground work, and save unnecessary expense.

CONCLUSION: Geological conditions are favorable to the presence of commercial ore-bodies in parts of the Aspen ground; they will probably be localized at points of greatest contortion of the strata, especially where accompanied by fracturing. Further development of the ore zones appears justified by the present showing, but a survey by an approved electrical prospecting method is advisable before an elaborate program of development is laid out.

It is my opinion that the Aspen property is one that has good possibilities, though no certainty, of developing into a mine of fair size; at the present time however it is decidedly in the prospective stage.

Respectfully submitted,

Chas. C. Starr