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Mine
Examinations
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708 Bank of Nova Scotia Building
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May 5th, 1958

Mammoth Silver Mines Limited, (N.P.L.)
Marine Building,
Vancouver, B.C.

Dear Sirs:

In accordance with your request I have made an examination of your Mammoth Silver Group of Mineral Claims which is situated in the Upper Salmon River region of the Portland Canal Mining Division of British Columbia. Attached hereto please find my report. I trust that it will provide you with the information you require.

Yours very truly

"B. W. W. McDougall" P. Eng.,
Consulting Mining Engineer.

THE MAMMOTH SILVER MINERAL CLAIM GROUP

SALMON RIVER REGION

PORTLAND CANAL MINING DIVISION, B. C.

INTRODUCTION

This report describes an aggregation of Crown-Granted mineral claims which has been assembled with much care to form the basis of what is believed should be a profitable gold-silver mining operation. These claims are situated in the Upper Salmon River region of the Portland Canal Mining Division of Northern British Columbia. The site is partly adjacent to, and otherwise is in the general vicinity of the extensive Crown-Granted mineral claim holdings of the once-famous Premier Gold Mine which, during its comparatively short lifetime, had a remarkable gold and silver production record and its operating Company enjoyed an equally interesting dividend record.

Among the earlier prospectors to this Upper Salmon region was Mr. O. B. Bush who, commencing in the year 1910, acquired partly by purchase and partly by staking, most if not all of the mineral-bearing territory from which the profitable ore production of Premier originated. Later he acquired and sold to development organizations the B.C. Silver, Sebakwe and other claims in the Upper Salmon River area which properties, for the most part, were eventually acquired by Premier. In the earlier years of the Camp Mr. Bush enjoyed the advantage of close friendship with Mr. R. K. Neil, a very capable mining engineer under whose immediate supervision the first important orebodies were located and developed. Mr. Bush's initial knowledge of this extensively-mineralized area of rugged terrain thus began in those sections from which all the profitable production, to date, has been taken. He has returned to the Camp many times during and subsequent to the Premier's very profitable mining operation and few, if any, have given more study and thought to ore and ore-bearing structures in this Upper Salmon River area.

It might be stated here that, many years ago, Mr. Bush acquired for cash a number of mineral claims in this region. These were bought because of known sulphide mineral occurrences and their relation to known geological structures which were traced out by himself and confirmed by others. The cost of acquiring and of paying taxes on these claims over a long period of years has been considerable. A number of these claims form the nucleus of the Mammoth Silver mineral claim group. Other claims have been obtained by purchases of Crown Grant leases from the Government to cover extensions of known structural zones and the aggregate area is considered to include or enclose numbers of gold and silver-bearing pre-mineral fault zones of important sizes and ore-bearing probabilities.

The writer of this report has had extensive experience in the Portland Canal district having examined mineral occurrences and, in some cases having supervised exploratory operations, in practically all regions of this large and rugged area including numbers situated in Alaska territory. These experiences have occurred over a period of 30 years and include numbers of detailed examinations of mineral claims and mineral showings on and in the close vicinity of those claims with which this report

is concerned. Also, in the autumn of 1957, in company with Mr. O. B. Bush, he visited the property now known as Mammoth Silver to observe special features concerned, principally, with geological structures.

PROPERTY

MINERAL CLAIMS: The Crown Granted Mineral Claims owned or controlled under lease from the Government, at the present time, are listed as follows: it is understood, however, that additional territory may be acquired at a later time.

The Company will own outright the Crown-Granted Mineral Claims described as follows:

Exchange No. 3	L 1845	X10U8	L. 5180
X10U8 No. 2	L 5181	X10U8 No. 3	L. 5182
X10U8 No. 4	L 5183	X10U8 No. 5	L. 5184
X10U8 Fraction	L 5185	Three	L. 5188
Five Fraction	L 5192	Sunshine	L. 4194

The Company will also own outright Crown-Granted Mineral Claim leases which have been purchased from the Government and are described as follows:

Maple Leaf No. 1	L 4451	Maple Leaf No. 2	L. 4450
Maple Leaf No. 3	L 4449	Maple Leaf Fr.	L. 4452
Maple Leaf No. 5	L 4447	Four Fraction	L. 5191
Brookland	L 511	X10U8 No. 6	L. 5185
Three Fraction	L 5189	One Fraction	L. 5190
Exchange No. 4	L 1846	Exchange No. 2	L. 1844
Exchange No. 5	L 1847	Exchange No. 1	L. 1843
Exchange Fraction	L 1848	Cobalt	L. 4053
Cobalt No. 2	L 4054	Winner	L. 4116
Lucky Fraction	L 4281	Cabin	L. 3922

(45) International Fr - L 3923

There are thus in all some 32 Crown Granted and surveyed claims and the aggregate acreage is estimated at about 1,000 acres.

TOPOGRAPHY: Some knowledge of the principal topographic features of the Upper Salmon River region is desirable for an understanding of how these affect the obvious external circumstances affecting mining operations - such circumstances, for instance, as access, transportation, availability of water-power, water, lumber and timber - as well as how these features have been affected by the development of geological structures throughout the region.

The only transport entry to the region is the road up the east side of the Salmon River from Hyder through Alaskan territory. This road re-enters British Columbia some 13 miles from Stewart. It crosses the International boundary at an altitude of about 700 feet. The principal source of the Salmon River is from beneath the Salmon glacier which forms the western margin of the Upper Salmon River region. The principal tributary is Cascade River or Creek which flows from North to

South across the region and makes confluence with the Salmon in Alaskan territory near the boundary. The Easterly boundary of the area is the Bear River ridge. The region is thus of a triangular shape and about 10 miles long in a north-south direction by about 3 miles in width.

The Bear River ridge culminates in peaks of from 5,500 to upwards of 6,000 feet in altitude. The westerly base of this short mountain ridge is marked by Divide Lake, elevation 3,745' on the north of the map area, the valley of Cascade River south to Long Lake, elevation 3,315 feet, and this depression continues southerly via the East Fork of Cascade River and on to the confluence of the two prongs of Cascade River half a mile north of the International boundary. Immediately west of the valley at the foot of the Bear River ridge which depression contains Divide, Long and Monitor Lakes, a rock ridge with a general north-south trend separates it from a second depression which marks the course of Silver Creek. West of this depression another north-south trending ridge occurs and this plunges steeply westerly to the deep depression now occupied by the Salmon River glacier. The area is thus a triangular-basin-shaped region lying immediately to the west of a lofty through-going ridge traversed by two high, rugged and through-going folds and dropping off steeply to a major ice-filled depression on the west side. The terrain rises from about 700 feet at the road crossing of the International boundary to 3,315 feet at Long Lake. The area is drained into the Salmon River by Cascade River and its extensive system of tributaries, a short distance S.W. of the boundary line. Some of the many creek courses are through canyon-like depressions and some, if not all, are, doubtless, the vestiges of a profound system of geological structure.

CONCERNING GENERAL ECONOMICS

External circumstances affecting mining and milling conditions and circumstances in the Portland Canal area - and especially in connection with the Premier Gold Mine's operations - have been thoroughly described in numerous Dominion and Provincial geological and mining publications which are readily available; further descriptions of these matters here, for this reason are unnecessary.

Stewart is situated at the head of the inlet or fiord which is known as the Portland Canal, which waterway is navigable from the Pacific at Dixon Entrance to its head - a distance of about 90 miles. Two rivers flow into the inlet at its head; the Bear River which drains entirely from and through Canadian territory, enters at its head at Stewart. The Salmon River enters from the north at Hyder, Alaska, two miles south from Stewart. It drains Alaskan territory to the west through its tributary known as Texas Creek but the major amount of drainage is from the principal sources, the Salmon glacier in Canadian territory and Cascade River which drains the area with which this report is concerned. The geography, though somewhat complicated to describe, is readily understood from maps which are readily available. The main valleys of both rivers give access to the 'back country' without gradients of any major consequence but the terrain adjoining these valleys rises abruptly to altitudes of perhaps from 4,000 to upwards of 5,000 feet.

[illegible] near Silver Lake. Certain of the claims of the Premier

A good road extends from Stewart to Hyder along the west shore of the Canal - a distance of 2 miles - thence it follows the east side of the Salmon River to the Alaska-British Columbia boundary at the 13-mile point - thence by several switch-backs to the sites of the Premier Gold Mine's plant and camp buildings. A branch road turns off from this road at the 15.5-mile point, which is 1,040 feet above sea level, and continues northwards some 6 miles to the operating site of the Big Missouri Mine and passing through claims of the Mammoth Silver Group. Much of Premier's in-going and out-going transportation was via an eleven-mile-long aerial tramway from mine to the deep-sea wharf at Stewart. During the later stages of the operations at this mine, however, the tramway was dismantled and the sole means of transport was by motor vehicles. At the present time Stewart has weekly steamer service between Vancouver and other coastal points. It also has scheduled airplane service with southern points.

It will be understood that in 1910, when operations first began at Premier, all this country was a wilderness without facilities of any sort save the availability of certain water-power sites and a sufficiency of hemlock trees. When the operation was discontinued there had been expended for good roads, for an eleven-mile aerial tramway, for diesel plant, mill, camp and miscellaneous plant buildings, for very extensive equipment of other mining properties, all of which capital along with more than twenty millions of dollars paid out in dividends to the shareholders - originated with the sale of ores. Most of the access facilities are still available without the necessity of great expenditures for preparatory work. It is now probably possible to commute employees to and from Stewart and, in some important measure, to avoid the necessity of operating boarding houses on mining premises throughout all seasons of the year.

Hydro electric power, to the amount of about 1,000 horse power, was developed by Premier on Cascade Creek near its confluence with the Salmon. Substantially more was developed by the C.M.&S. Co. on Cascade near its outflow from Long Lake. A very considerable amount of additional hydro-electric energy available in the region never has been developed. In general external circumstances affecting operating conditions, which now obtain in the Upper Salmon River region, are about the same now as during the heyday of the Premier operation.

HISTORY

It is recorded that prospectors first arrived in the Stewart region in 1898 in the belief that the great inlet piercing the Coast Range mountains might provide another, and perhaps a safer and easier route, to the newly-found placer creeks of the Klondike. Of the original group, several returned and the first mineral claims to be staked were in the Bear River area and were recorded in 1899. At that time the Alaska-British Columbia boundary had not been surveyed. The first attempt at serious mining and ore production was that of the Portland Canal Mining Company, in 1907, on mineral claims located in the Glacier Creek area about four miles north from Stewart.

The first claims to be staked in the Upper Salmon River region were in the vicinity of Silver Lake near territory now included in the Mammoth Silver Mineral Claim holdings. These claims, as well as some of the Big Missouri Group, were recorded in 1904. High-grade gold-bearing float was reported found near Silver Lake. Certain of the claims of the Premier

Group, including those from which most of the Premier ore production was won, were staked in 1910. These claims were purchased by Mr. O. B. Bush soon after. The area was visited and examined by Mr. R. K. Neil, M.E. a little later and subsequently acquired for development by the famous partnership of Trites, Wood, Wilson and Neil. In about the year 1917 control of this organization was purchased by the American Smelting and Refining Company.

By this time the entire Upper Salmon River region, of more than 25 square miles, had been staked and, to a large extent, surveyed and Crown Granted. Many exploration operations have been conducted over this section of the district during subsequent years. Many of the pyritic gold-bearing occurrences in this area are superficially impoverished and mineable orebodies, predominantly pyritic in character, characteristically, do not outcrop. There are probably but few claims on which no exploratory or development work was done during the '20's and later. In the aggregate, and by numerous mining organizations, many hundreds of thousands of dollars have been expended. From the results of 'findings' from such workings and additional prospecting a pattern of geological structure, checked by some geophysical testing, has been a long time under study and mapped out by Mr. Bush.

Intimate details of the Premier Gold, Big Missouri and many other smaller operations may be followed in the Minister of Mines Reports dating from the early 1900's down to the present.

REFERENCES

CANADIAN GEOLOGICAL SURVEY:

1913: Memoir 32 by R. G. McConnell - Portions of Portland Canal and Skeena Divisions, Skeena District, B.C.;

1922: Memoir 132 by S. J. Schofield and G. Hansen - Geology and Ore Deposits of Salmon River District, B.C.;

1929: Memoir 159 by G. Hansen - Bear River and Stewart Map Areas, Cassiar District, B.C.;

1935: Memoir 175 by G. Hansen - Portland Canal Area, B.C.;

MAPS ACCOMPANYING C.G.S. REPORTS:

1913: Map 50A - Part of Portland Canal Area;

1922: Salmon River Area, Portland Canal Mining Division;

1935: Map 315A; Portland Canal Area showing location of properties;

1935: Map 307A; Portland Canal Area showing Geology.

BRITISH COLUMBIA DEPARTMENT OF MINES:

The Annual Reports of the Minister of Mines, B.C. - from 1898 down to the present;

Mineral Reference Map No. 4 T 269;

Portland Canal area showing geography, topography and Mineral Claim Groups as of 1928 - by Dalby B. Merkill, B.C.L.S.;

A copy each of C.G.S. Map 307A and 4 T 269 accompany this report. The information contained in the publications listed above is, in the aggregate, comprehensive.

GEOLOGY

REGIONAL: The oldest rocks in the Portland Canal and adjacent regions are a series of fragmental and flow volcanics together with intercalations of argillaceous sedimentaries. These rocks, locally known as the Bear River Series, are more widely referred to as a part of the Hazelton Group. They are largely Triassic in age and they are exposed through a vertical range of more than 6,000 feet in the region and their base is not exposed. These Triassic rocks are intruded by Upper Jurassic granitics in the forms of sills, dykes, bosses and batholiths which rock masses constitute the Coast Range intrusives and which extend from south of the 49th parallel to Keno Hill in the near Arctic regions of Yukon Territory. The ore occurrences, of which many are known along this thousand-mile belt, are genetically related to the intrusive rocks.

It is believed that the volcanic and sedimentary accumulations of Triassic and early Jurassic times are, essentially, marine deposits and that the great coastal uplift, which resulted in the forming of the Coast Range mountains, came in the Upper Jurassic period. There is believed to have been some further intrusive activity during the eocene period of the Tertiary era. Erosion has since removed the major portion of the earlier accumulations of volcanic and sedimentary rocks to expose the underlying granitics (mostly granodiorites), deep below the original tops - also to expose ore occurrences which, originally, were deeply buried. Some of these, doubtless, have been entirely removed - others remain undiscovered or are still hidden by overlying rock formations or by glacial or other unconsolidated sedimentary accumulations.

The general trend of the Coast Range mountains is northwesterly. On the northeast flank the intrusive rocks which form its core, dip out under the older rocks which include Triassic and Jurassic volcanics, sedimentaries and metamorphics as well as remnants of earlier rock formations. Many ore deposits have been found in the rock masses overlying the intrusive granitics. These, commonly, occupy sheared, fractured, faulted or otherwise drastically disturbed rock formations which gave access to invading metal-bearing influences originating from the Jurassic intrusives. Mines and ore-bearing localities which are known to occur along this easterly Coast Range contact belt include Britannia, Tatlayoco Lake, Bridge River, Anyox, Alice Arm, the many mineral deposits of the Bear and Salmon River regions of the Portland Canal district, Atlin, Tulsequah, Keno Hill and others.

The emplacement of ore deposits is almost always associated with intrusive rocks, accompanied by associations of certain specific rock formations which have been affected by regional disturbances resulting in the development of certain specific geological structural conditions. From reference to maps it will be noted that the great salt water inlet known as the Portland Canal reaches inland and northerly from the Pacific to the mouth of the Bear River, a distance of 90 miles. The Portland Canal trench continues northerly another 14 miles up the Bear River to American Creek and a further 15 miles to the head of American Creek. That this entire depression, some 120 miles or more in length, marks the course of a great fault, which reaches entirely across the Coast Range mountains into the sedimentary complex on their northeast flank, can scarcely be doubted. It is, for instance, known that a granitic dyke which is a part of the Coast Range intrusives, has been displaced a horizontal distance of more than 4 miles and through some unknown vertical distance probably amounting to many hundreds of feet - all this in the Bear River valley a few miles north of Stewart. There is, undoubtedly, an extensive tributary system of deep-seated faulting and fracturing relating to this master fault zone - evidences to such system are to be seen in many sections of this district including that of the Upper Salmon River region.

LOCAL: The foregoing descriptions and discussion applies somewhat intimately to the geological formations, structures and history of the Upper Salmon River region. The oldest rocks underlying the area are the Bear River Series - more widely known as the Hazelton Series or Group. Of these the basal or oldest type is of fragmental volcanics - of which both the 'fragments' and the groundmass are largely of andesite and of which a broad belt of purple-colored fragmentals is a conspicuous component and is locally known as the Purple Tuffs. The base of these rocks is not known to be exposed in the area and the exposed thickness is given as 2,000 feet.

This rock series - termed by Drs. Schofield and Hanson in C.G.S. Memoir 132 the Bear River Series - is conformably overlain by a formation having pebbles of the underlying volcanics in a fine-grained groundmass and this agglomerate mass being interbedded with beds of chert. This sub-formation is the Salmon River formation. It is about 300 feet in thickness and it occurs in several places in the area - notably it flanks the east side of the Salmon glacier west of Mt. Dilsworth and it partly circles, and underlies the base of Slate Mountain.

Overlying the Salmon River formation and resting conformably on it is a series of quartzitic argillites - considered to be of Jurassic age and of marine origin as are the other volcanic and sedimentary rocks of the district. These argillites outcrop from Slate Mountain extending northwards on both east and west sides of Long and Divide Lakes. On Slate Mountain they have a thickness of about 1,000 feet. These three conformable formations, Bear River tuffs, Salmon River conglomerates and the Nass River slates are essentially but variants of the Hazelton Series. The tuffs and, in many places the Purple Tuffs, are important host rocks for ore occurrences in this region.

It would appear that towards the end of the great volcanic stage and before the general coastal uplift set in, great masses of granitic rocks were intruded between the bedding planes of the Bear River rocks, as sills. These minor intrusions, known as the Premier Sills, are of grandiorite or quartz porphyry. There followed, in Upper Jurassic times, or somewhat later, the great orogenic disturbances which more or less immediately pre-

ceded the coastal uplift and which resulted in the forming of the Coast Range mountain system by the massive multiple granitic intrusives. The immediate effects of these intrusions is believed to have been the compression of the off-shore volcanics and sedimentaries into NW - SE - trending folds across the hundred-mile width of the Cordilleran. Ore mineralization is believed to have occurred over the many thousands of square miles of territory affected, as an end phase of the long-continued intrusive activity.

In the Upper Salmon River region granodiorites of the Coast Range intrusives occur west of the Salmon glacier - dykes, sills and other forms in the Triassic rocks of the area and certain of these minor intrusives would appear to be more or less contemporaneous with sulphide mineral emplacements.

The principal geological structures which developed during the uplift and intrusion periods have left their traces throughout this area even though erosion has removed many hundreds of feet from the original cover rocks. The remainder of the geological history of the area is mainly that of erosion throughout the long Tertiary era. In Pleistocene times the terrain was overlain and drastically deformed by the continental glaciers and there are still remnants of glaciers and ice-fields in the district. The latest regional land-mass movements in the district appear to have occurred following the retreat of the ice from the district when, supposedly, due to release from the weight of the great overlying ice-fields, the terrain rose, or was uplifted, to a height of 500 feet above sea level. Marine shells are to be seen in unconsolidated sediments at this altitude along the roadside near the Alaska-British Columbia boundary.

As already noted, the mineralization of the region is related, in origin, to mineralizing agencies which were active during the closing phases of the Coast Range intrusions. There are at least four different types of ore occurrences:

1. Quartz-sulphide veins carrying more or less massive pyrite galena, and sphalerite in a quartz gangue and with important values in gold and silver;

2. North-South shear veins in or near quartz-perphyry sills with more or less massive pyrite carrying very important values in gold and silver;

3. East-West fissure veins with gold-bearing pyrite and minor base-metal values;

4. Jasper-barite-bearing veins carrying low values mostly in silver.

Most primary sulphide mineralization appears to have been by replacement; secondary or supergene enrichment, particularly with respect to silver content, may extend downwards to a depth of 700 feet below the outcrop. The extraordinary high silver values encountered in the Premier Mine were obviously the result of this process. The very high gold values may have been primary. There is some reason for anticipating that ore-bodies which may be discovered at horizons of about 2,000 feet, which is approximately that of the Premier outcrops, will be found to have the greater depth-distances of commercial ore.

Much more of interest can be recorded concerning the ore geology of Premier Gold and adjacent areas. The foregoing descriptions are intended to indicate that the geological formations and structures, apparently similar to those which occur at the Premier Gold Mine, and which must be interpreted as probably being necessary conditions for the emplacement of Premier-type orebodies, occur elsewhere in this region and that such knowledge as at present exists, in regard to this point, has been employed in assembling the Mineral Claims now included in the Mammoth Silver property holdings.

MINERAL-BEARING STRUCTURES ETC.

The claims of the Mammoth Silver Group are located immediately to the north of the Premier Gold Mines territory. They are traversed by the two southerly-sloping depressions and by the ridge which separates these depressions as has been described under the caption "Topography" on pages 2 and 3. Altitudes range from about 700 feet near the International boundary to a high of over 3,000 feet on the Sunshine claim and more than 4,000 feet on Slate mountain. The Sunshine claim lies on the lower slopes of Bear River ridge and its rugged slopes, for the most part, are above timberline and the surface, for the most part, is relatively free from soil or drift mantle. A considerable amount of exploratory tunnelling was effected on this claim and certain geological structures are well exposed here. Prospecting work of one type or another has also been effected on most of the claims of the group on mineral showings of one sort or another. Oxidized outcrops are known to occur in structures which persist across this property in two or more directions. As has already been explained, the precious-metal-bearing pyritic outcrops of Premier-type orebodies are oxidized and impoverished of value content. Structures with accompanying zones of oxidation persist over long distances and numbers of these are considered to be of decided mineral interest and as well warranting exploration.

CONCLUSIONS

In the writer's opinion there are excellent reasons for believing that important orebodies occur on claims of the Mammoth Silver Group and that these claims, accordingly, warrant extensive exploration in the reasonable expectation that such properly-directed work will result in locating and outlining such occurrences for more extensive development. Some of the more important points which lead to such conclusion are:

1: The entire region is situated on the NE flank of the Coast range intrusives and in a section of this region which has long been known to be extensively mineralized;

2: The near-by precedent of the Premier Gold Mine, together with the firm belief that numbers of similar geological structures to those of Premier and the identical geological formations - persist across Mammoth Silver Group;

3: The metals to be anticipated are principally, if not exclusively, gold and silver - which metals could, if it should be so desired, be recovered free from gangue and other valueless materials before marketing.

RECOMMENDATIONS

The mineral claims comprising the Mammoth Silver Group are traversed by the Big Missouri road and most parts of this somewhat rugged terrain can be made accessible by spur roads from the main one. From presently available information the known and (or) suspected linear distances of veins, shear structures and other possible ore-bearing zones aggregate more than 4 miles and widths range from 5 to upwards of 50 feet. This figure is given not to suggest that ore-bearing outcrops occur over any such impressive lengths and widths - but to indicate the possible and likely magnitude of the exploration work required to thoroughly test the area. These are numbers of good methods for conducting such explorations. I suggest a procedure approximately as follows:

1: Verify the location of the zones and trace their courses and widths by a geophysical method. Check indicated anomalies carefully over the full possible widths.

2: By means of diamond drills, using EX size drill bits and core barrels, check the 'strong'anomalies to a vertical depth of 100 feet below the surface. Where ore occurrences may be encountered these should be drilled over such lengths and widths as will give an approximate idea of their magnitude.

3: Where topography permits, ore occurrences indicated by geophysical anomalies and diamond drilling should be further tested by open-cutting or adit driving.

4: In addition to the foregoing it will probably be necessary to prepare approach facilities by bulldozing.

5: Using a Jeep-type station wagon or a light four-wheel-drive truck workmen for this project could live in Stewart and commute to and from the operating sites.

In order to carry out this program of testing or exploration work efficiently and thoroughly, working capital to the amount of one hundred thousand ($100,000) dollars should be made available.

Respectfully submitted

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May 5th, 1958.

(SEAL)
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