

ST. PAUL GROUP OF MINERAL CLAIMS, OSOYOOS DISTRICT, B.C.

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Figure 9 - St. Paul workings, St. Paul group, Monashee mountain

Introduction

The St. Paul group comprising the Toughnut, Zilpah, Minerva, and Black Bess Crown Granted claims and the Pioneer, Iron Horse, and Sheppard claims, held by location occupied part of the summit and northwestern slopes of Monashee mountain, Vernon Mining Division, Osoyoos District, British Columbia. The property is owned by St. Paul Mines Ltd. a company consisting of three individuals, Dr. O. Van Etter, New Westminster, B.C. and Messrs. O.M. Sheppard and Rube Brown of Bellingham, Washington.

The group is accessible from the Vernon-Edgewood Highway. A branch road, one mile long, leads off from the highway about 42 miles east of Vernon and is continued by a trail which follows up the valley of Yeoward (Porcupine)¹ Creek on a gentle gradient for about 2½ miles to an old camp and 2 stamp mill belonging to the company and situated on the Sheppard claim. The trail here crosses to the south side of the mountain, passing the St. Paul mine workings on the Toughnut claim, at an elevation of 1220 feet above Yeoward creek (about 4800 feet above sea-level) and reaching the old Morgan workings (on the Minerva claim)

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1 -- A southern tributary on Monashee (south fork of Cherry) creek

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on the summit of Monashee mountain, at an additional height of 1000 feet. From this summit the trail continued westerly down the easterly slope of Monashee Pass creek to connect again with the Edgewood-Vernon highway.

The property has experienced a varied history over a period of about forty years, during which intervals of active prospecting and development have alternated with relatively long intervals of idleness. In the early days effort was entirely concentrated on the upper most or Morgan workings, named after the trapper who first staked the claim on which they lie. This claim and adjoining ground after being restaked and after many changes in ownership was acquired, in 1926, by the present owners. In all a few hundreds of tons of ore have been shipped or given mill tests and reported to carry high values in gold. More recently, in 1927, 11 tons of ore from No.1 adit on the Toughnut claim were shipped to Trail smelter and ran: gold, 0.50 oz; silver 147.9 oz; to the ton-- lead, 12.4%; zinc, 0.2%; antimony, 17%; sulphur, 17.4%; silica, 25.4%; iron, 13.2%; lime, 0.7% ¹ and had a gross value of \$1074.64. In addition ore now stacked at the mine includes 8 tons or more of high-grade silver ore and about 40 tons of good-looking mill-feed.

The workings on the Minerva claim are quite inaccessible. They include two shafts, one reported to be 80, and the other 35 feet deep. The 35 foot shaft and a drift run from it are stated to have provided most of the tonnage produced from this claim. The St. Paul mine workings are in good repair. They include five adits varying from 35 to 330 feet in length, and a number of trenches which have exposed the underlying formations over distances of from a few feet to about 150 feet. A couple of open cuts and two winzes complete the development work at this locality.

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1 -- Annual Report, B.C. Minister of Mines, 1927, page 213
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GENERAL GEOLOGY

The rocks exposed in the vicinity are largely greenish volcanics with some intercalated sediments. One intrusive body, of diorite, is known. The trail up Yeoward (Porcupine) creek exposes volcanic types at a number of places and similar rocks outcrop at intervals along the trail between St. Paul and old Morgan workings. The hillside below the Morgan workings is heavily drift covered and no outcrops were observed. The St. Paul workings expose a belt of sediments, including argillaceous types and some limestone, and the same rocks appear in the bottom of a creek a few hundred feet west of the mine, but in the opposite direction they may have a more considerable width. The upper slopes of the mountain and the summit in the vicinity of the old Morgan workings are underlain chiefly by greenish, andesite, volcanic rocks. The volcanics and sediments have a general east strike and for the most part a southerly dip. They lie in an area mapped by Dawson as occupied by the Cach Creek series regarded by him as being Upper Palaeozoic.¹

The St. Paul mine workings have exposed an intrusive body of diorite of unknown but, apparently, considerable dimensions. It is a medium-grained, nearly equigranular, dark grey rock carrying disseminated pyrite and in places quite heavy mineralized with this iron sulphide. At the surface and partly as a result of this mineralization the rock readily weathers to a highly decomposed rusty rock. A specimen of the fresher rock obtained underground was examined microscopically and found to consist largely of plagioclase feldspar (about oligoclase-andesine -Ab, 70; and An 30), and biotite, with 5 to 10 percent of

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 1 - Dawson, G.M.: Geological Survey, Canada, Shuswap Sheet.

orthoclase and a like amount of pyroxene, probably diopside. A very little quartz is present. Alteration products include chiefly calcite and chlorite. The plagioclase is partly zoned. Beyond the immediate vicinity of the mine workings the extent of the body is unknown not is it known whether other bodies of intrusives are or are not present beneath the drift on the slope of the mountain. The diorite may be supposed to be related to the Mesozoic batholithic intrusion so extensively represented a few miles to the south of Monashee mountain and between there and Arrow Lakes.

ECONOMIC GEOLOGY

Mineralization at the Morgan and St. Paul workings occurs chiefly in the form of quartz veins. Those that have been investigated on the Minerva claim (Morgan workings) carry free gold and are valued chiefly for the gold content associated with the sulphide minerals, whereas the ore from the veins of the lower or St. Paul workings is notable for its high silver values and though always carrying some gold this has not been noted in the free form.

The vein system at the upper or Morgan workings is not clearly indicated by what could be seen. From earlier reports it appears that development work was concerned with two or more quartz veins averaging about $1\frac{1}{2}$ feet thick, trending northwesterly and dipping about 45 degrees southwest and with at least one important cross-vein striking about at right angles to the others. Specimen from small piles of broken vein quartz indicate that in addition to occasional specks of free gold the quartz carried an irregular dissemination of pyrite with some arsenopyrite here and there a little galena and zinc blende. The "cross" vein developed from the 35-foot shaft. The northwesterly striking veins or vein may extend down the hill to the vicinity of the St. Paul workings.

though as the two localities are half a mile or more apart and are separated by an interval of poor exposure the continuity of particular veins over this distance would be difficult to verify.

The vein system at the St. Paul workings is better exposed. Vein quartz has been found at a number of places in surface and underground workings mostly within and not far from the southern contact of the diorite body. This contact is marked by strong faulting or shearing. The relative positions of the exposure of vein quartz underground and at the surface suggests that in the vicinity of the southern contact there are probably two principal veins with others of subsidiary importance. One principal quartz vein is exposed by Nos. 1, 2, and A adits, (see figure 9). In No. 2 adit it is visible for a length of 30 feet, commencing about 10 feet from the portal and continuing to the right angle turn in the adit, it strikes northeasterly and dips at a low angle to the southeast. In the workings of No. 1 adit it dips at a low angle to the south, passing below the floor towards the north limit of the workings. It is visible along the length of A adit in which it strikes southeasterly and dips at low angles to the southeast. This vein probably averages a foot in thickness and has provided much of the ore extracted.

What appears to be a second vein of importance has been recently found in No. 3 adit about 50 feet from the portal. At the time visited this vein was continuous to the face of the adit, a further distance of about 20 feet. In this distance the vein dips at a low angle to the south or southeast. At the face it has a maximum width of between 3 and 4 feet composed of heavily mineralized diorite and from several inches to 2 feet of nearly solid sulphides, principally a mixture of arsenical

iron with streaks and small kidneys of antimonial sulphides mostly jamesonite. A sample taken by the management across 2 feet of such ore is reported to have assayed 0.28 oz. gold and 11.7 oz. silver to the ton. The writer is informed that since he examined the property, No.3 adit has been extended 50 feet or so, all in diorite, and that at the present face a quartz vein 3 inches wide was encountered from which a sample assayed: gold, 5.12 oz; silver, 5.5 oz; and 9% lead. This small vein is stated to dip about 40 degrees to the south. It may be continuous of the vein developed in No.2 adit.

A small quartz vein (or veins) is exposed in trenches Nos.2,3, 4, and 5, (see figure 9). Whether these exposures represent different veins or faulted continuation of one vein (or veins) is not certain. The vein quartz in each case varies from 2 to 6 inches in width and is poorly mineralized.

A showing somewhat similar to the main sulphide showing in No.3 adit is exposed in the bed of a small creek 70 feet south of the portal of No.4 adit. This is an outcrop of heavily mineralized vein matter of indefinite shape but evidently several feet in width.¹ It probably represents a mineralized zone closely following the northern contact of the diorite body. Mineralization of somewhat similar character was encountered in No.4 adit about 70 feet from the portal and it is understood that since the visit by the writer, some drifting has been done on this from the adit level. A number of assays of samples taken from the creek showing are reported in most cases to have disclosed low values in silver and gold not exceeding \$5 a ton combined. One sample representing about 100 pounds of massive sulphide material is stated by

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 1 - It is probably the "large body of arsenical-iron" referred to in the Annual Report of the B.C. Minister of Mines for 1913

the owners to have assayed 0.41 ounces in gold and 38.8 ounces in silver to the ton.

The gangue of the veins in most of the showings at the St. Paul mine, is largely quartz. With it is associated a varying proportion of sulphide minerals occurring as disseminations or as streaks, bunches, or small kidneys of nearly solid mineral. The sulphides are principally arsenopyrite, antimonial sulphides pyrite and pyrrhotite in about this order of abundance. Very small amount of galena, sphalerite and copper pyrites are present and native silver occurs in microscopic specks. The sulphides of the creek showing are chiefly arsenopyrite and pyrite and the proportion of quartz is smaller than elsewhere. Samples from all the various vein exposures are reported to have carried \$2 to \$10 in gold a ton. No free gold has been observed. Silver values vary with the amount of antimonial sulphides present. At least three such sulphides are present. The most abundant of these carries lead and resembles jamesonite in its physical and microchemical properties. Intimately intergrown with it is another with very similar properties and which is probably stibnite. The third is tetrahedrite (grey copper) and occurs in very minor amounts and mostly in microscopic particles. The sulph-antimonides occur in various ways: as streaks or irregularly lying bands in the quartz and varying from less than an inch to several inches in thickness; as bunches or small kidneys lying either in quartz or in masses of other sulphides; intimately associated with other minerals chiefly arsenopyrite; and as crystals disseminated through the quartz. They may occur massive or finely granular or in masses with a coarsely fibrous and bladed structure.

Arsenopyrite is abundant. It occurs in small, well-formed crystals scattered through the quartz and in crystalline masses or aggregates intimately associated with the other sulphides. Pyrite is

much less plentiful. A little pyrrhotite is also present. Galena and sphalerite are even less conspicuous. The gold values appear to be associated with arsenical and iron sulphides or at any rate seem to be quite independent of the amount of antimony sulphides present.

As stated on an earlier page 11 tons of ore shipped to Trail in 1927 carried in addition to gold and silver:

	<u>Per cent</u>
Lead.....	12.4
Zinc.....	0.2
Antimony.....	17.0
Sulphur.....	17.4
Silica.....	25.4
Iron.....	13.2
Lime.....	<u>0.7</u>
	86.3%

Arsenopyrite is an abundant consistent of the ore and if it be assumed; that the arsenic content of the shipment was 13 percent and was wholly carried by the arsenopyrite; that the iron not present in the arsenopyrite was combined with sulphur to form pyrite and pyrrhotite; that the lead was carried by jamesonite; and that the antimony not required for the jamesonite was present in stibnite the mineral composition of the 11 ton shipment would be about as follows:

	<u>Percent</u>
Arsenopyrite.....	28.2
Pyrite and pyrrhotite.....	6.9
Jamesonite.....	26.7
stibnite.....	11.4
Quartz.....	25.4
Other minerals.....	<u>1.4</u>
	100.0

As stated on a previous page, very little can now be seen at the old Morgan workings on the Minerva claim. According to statements made in provincial reports, it appears that picked samples of the quartz vein carried attractive values in gold and most of the gold was free gold.

In 1914, 130 tons of ore were treated in a 5-stamp mill and the writer has been informed that the gold content was high. Any further work on the Minerva claim should first consist of systematic surface prospecting to determine the widths and lengths of the quartz veins and the veins should be carefully sampled at close intervals. The information thus obtained would indicate what development work if any, should then be undertaken.

In the case of the St. Paul workings much information regarding the veins is available. Apparently they lie within or close to the edge of the intrusive body of diorite which at the workings is narrow and dips south at rather high angles. It follows, therefore, that any further prospecting work might profitably take the form of tracing, on the surface the boundaries of the diorite body or of searching for mineralized veins in the vicinity of such boundaries. Furthermore, it seems advisable in the case of further work to confine it mainly to the surface in an endeavour to determine the size and character of the veins already found and any that may be found. Sampling should be systemically conducted, should be representative of the vein or veins as a whole, and should not consist of selected samples or specimen.