

600224

THE SHEEP CREEK GOLD ~~MINE~~ *Camp*

Summer Essay

Submitted by

Edward Lovitt

Fourth Year Geology

The University of British Columbia

November 1929

I N D E X

	<u>Page</u>
<u>Introduction</u>	1
History	1
Limitations	3
Acknowledgments	3
<u>General Geology</u>	3
<u>Economic Geology</u>	4
Ore Shoots	5
Faulting, etc.	6
<u>Properties</u>	6
Queen	6
Nugget-Motherlode	9
Kootenay Belle	11
Reno	13
<u>Conclusion</u>	15
<u>Mills</u>	14
Queen	14
Motherlode	14
Reno	15
<u>Conclusion</u>	15

THE SHEEP CREEK GOLD CAMP

INTRODUCTION

The Sheep Creek Gold Camp is the name given to one of the mining centres included in the Nelson Mining District, British Columbia. It occupies the territory contiguous to Sheep Creek, a small mountain torrent, rising in the Nelson mountains and flowing through a narrow valley, nearly due west twelve miles to the Salmon River. Salmo, a small railroad town, situated in the valley of the Salmon River, four miles from Sheep Creek and thirty miles from Nelson, is the nearest shipping point. For a number of years the area has been well supplied with roads. Early in the development of the camp an excellent road was constructed from Salmo to the Queen Mine and others were added as they became necessary. The relief ranges from 2200 feet in the valley bottom at the mouth of the creek, to nearly 8000 feet in the eastern section of the area. Numerous small streams provide an unusual and convenient supply of water, an easy source of power, while the adjacent mountain sides provide sufficient timber for present operations.

HISTORY

The early discovery of ore on Kootenay Lake, notably at the present site of the Bluebell Mine, and the subsequent discoveries of ore in the Slocan and Lardeau, led to intensive prospecting

throughout the entire country surrounding Kootenay Lake. Though attention was primarily concentrated on the mountains in the immediate vicinity of the first locations, it was not long before the search for ore was extended to the outlying, favorable and easily accessible horizons. As the limestones and quartzites of Sheep Creek are analogous to those that form the favorable strata, from the Lardeau, down the east side of Kootenay Lake, as far as Crawford Bay, and as they were rendered easily accessible by the Nelson and Fort Sheppard Railway, they were easily prospected.

One of the first locations was the Yellowstone, situated at the junction of Sheep and Wolf Creeks. Prior to 1900 a small stamp and amalgam was erected on the ground and a few shipments made. In 1900 the Queen, an adjacent property, commenced producing and incidentally continued to ship regularly until 1915. Perhaps more than anything else the continued production of this property created the keen interest that steadily rose in this camp. By 1906 many ledges were opened up and by 1907 activity was nearly as great as that of the early days in Rossland. Over two hundred locations were made in an area of four square miles during that year alone. Production reached its peak in 1913 and declined suddenly in 1916, due in part, to the fixed price of gold and the high war costs of mining and in part to the working out of the more easily mined ore shoots. Of recent years interest has been renewed in the district, but production has been on a very small scale with little or no development work.

OBJECT OF THIS PAPER

The camp embraces two widely different types of deposits. These include the gold deposits occurring in the schists and quartzites of the eastern part of the area and the later discovered zinc and lead deposits occurring in the limestones of the western section. Although the latter played a very important part in the history of the camp, this paper will deal only with the gold deposits. Further it is not the object of this paper to give a detailed description of the underground workings of any property nor to describe all the properties, but rather, to present to the reader, **certain** conceptions relating to the size, occurrence and importance of these deposits. In endeavoring to do this, however, the paper will include a more or less detailed description of a few of the most important properties.

ACKNOWLEDGMENTS

The writer acknowledges considerable of the information herein contained to **Dr. J. F. Walker** of the Geological Survey of Canada. He also has made frequent reference to Reports of the Minister of Mines of British Columbia for information concerning history and production.

GENERAL GEOLOGY

The Sheep Creek sedimentary areas are flanked in almost every direction by later granitoid rocks of the Nelson batholith and are extensively penetrated by them. The sediments are all more or less deformed and metamorphosed. They have a

general north and south trend and in the upper quartzites and schists have high east dips, while in the lower argillites and limestones they have varying dips to the east and west. There is considerable evidence of structure, certainly anticlinal folding in the lower formations, and possibly overturned folding in the upper. In addition to the Nelson batholith they have been intruded by a multitude of dykes, varying in width from a few inches to several hundred feet. These include both acid and basic types, of which the former are the more numerous. The acid dykes are usually aplitic or porphoritic and are probably closely related in age to the batholithic intrusion, while the basic types or lamprophyres are definitely later and are post mineral.

ECONOMIC GEOLOGY

The gold deposits occur, in every case, as fault fissure veins, cutting the schists and quartzites. As a rule the veins strike N 60° E to E and dip high to the south or vertical, while the sediments strike N to N 15° E and dip 50° E to vertical. One important exception occurs however. In the westerly Queen workings, the sediments dip to the west.

Again, with the exception of the Queen, all the present ledges owe their importance to secondary enrichment. This zone of enrichment is characterized by complete oxidation of the pyrite mineral, the alteration leaving the gold, for the most part, free. The oxidation extends to varying depths below the surface, depending, of course, entirely on the permeability of the strata, as determining the water level in the past. Incid-

entally, it would appear from the present evidence that the water table was originally lower. This latter deduction is indicated by the absence of water in certain adits that reveal considerable oxidation and the presence of water in adits directly above. Though these conditions may be due to preliminary draining at the higher level, through recent man-imposed conditions, such is not likely to be the case.

ORE SHOOTS

The values in the veins are most commonly concentrated in ore shoots. These shoots are extremely irregular in outline with a thickness that is small compared with the other dimensions. The maximum width rarely attains twelve feet and is as a rule not more than three feet, commonly less than the required mining width, necessitating the extraction of a foot or more of barren rock. However the depth may extend over several hundred feet as illustrated by the Queen, where the values have averaged well over six hundred feet and the length may be correspondingly great. The limits of the shoots are sometimes determined by the narrowing of the vein beyond practical widths, sometimes by the absence of pyrite stains, but in all cases, owing to the extreme irregularity of the values, stoping must be accompanied by careful assaying. The ore shoots rarely pitch or dip with the veins, but tend to rake with the sediments. They also appear to be confined entirely to the quartzites, the fissures being very tight and unimportant seams in the schists.



Reno Mine



Wolf Lake

Head of Wolf Creek

FAULTING - Etc.

For the most part faulting and fissuring have preceded mineralization and the intrusion of dykes has been the later process, but there are important exceptions. Faulting of veins has taken place to a minor extent. In the Queen, dykes have come in on two faults, and in the Motherlode a mica dyke cuts the vein and evidently the extension of a fault without any apparent displacement. The displacement on the original fault fissures varies from a few feet to about two hundred, and in all cases observed, the south wall had moved west in relation to the north wall. The later faults also show the same relative movement, but the displacement does not appear to be as great.

MINING PROPERTIES

THE QUEEN

This property, situated on Wolf Creek, a quarter of a mile above the junction of Sheep Creek, is the largest and most important in the area. Since 1915 it has lain idle but prior to this time it operated continuously for 15 years, during which time it produced 117,000 tons of ore averaging \$10.00 per ton.

The vein has been developed by three adits and four sub-levels, the latter being worked by means of a shaft from No. 3 level. These workings lie on both sides of the creek, extending four hundred feet below it. During the former period of production, they were connected to the mill on Sheep Creek by means of a horizontal tram from No. 3 level.

The vein is a quartz-filled fissure, striking N 67°E, and dipping very high to east, while the formation is largely quartzites and schists, striking N 15°E and dipping in the easterly and westerly workings to the east and west respectively. Above No. 3 the ore is oxidized but below the ore is primary or unoxidized.

Two main ore bodies have been developed, one in each section of the workings. These have been worked extensively and have yielded the greater portion of the tonnage cited above. The east ore body lies almost entirely between No. 3 and No. 6 levels. It has been stoped over an average length of 350 feet for a vertical elevation of 300 feet and has also been tapped from No. 7 level. The west ore body has been stoped continuously from the surface outcrops to No. 6 level, a total vertical depth of 500 feet and has also been tapped by a seventh level at 100 feet greater depth. Above No. 4 level this ore body really resolves itself into three ore shoots. Of these the first has been stoped over an average length of 50 feet for a vertical elevation of 200 feet; the second over an average length of 100 feet for a vertical elevation of 250 feet; the third over an average length of 250 feet for a vertical elevation of 150 feet. Between No. 4 and No. 5 levels it has been stoped for an average horizontal distance of 450 feet and between No. 5 and No. 6 levels for an average of 200 feet.

At present very little developed ore remains in the property. For a number of years great hopes have been entertained for the possibly existence of a third ore body in the easterly

extension of the vein, but the evidence up to the present at least, would tend to disprove such theories. The intersection by the McCune adit, two or three thousand feet farther east, reveals a very tight and unpromising seam, while the intersection by the Kootenay Belle No. 2 adit reveals a narrow fissure carrying very small values. Consequently it would appear that the only possibility of a further ore body lies in the westerly extension of the vein.

THE QUEEN

Production to 1915					
YEAR	TONS	GOLD OZ.	SILVER OZ.	TOTAL VALUE	
1902	4,519	2,445	924	50,990	
1903	144	213	159	4,480	
1904	4,846	1,624	491	33,808	
1905	6,078	3,149	1,174	65,664	
1906	7,025	2,501	1,040	52,204	
1907	8,845	5,011	1,650	104,385	
1908	8,798	6,235	2,308	130,006	
1909	11,288	5,308	2,237	110,811	
1910	12,359	6,180	1,517	128,759	
1911	14,350	7,621	2,898	159,249	
1912	11,301	3,903	1,149	81,374	
1913	7,173	2,192	618	45,609	
1914	9,801	5,517	1,557	114,778	
1915	9,549	5,090	1,819	106,209	
TOTALS	116,076	56,989	19,541	1188,326	

NUGGET and MOTHERLODE

The Nugget and Motherlode Group, including nine crown-granted claims, is situated on the north side of Sheep Creek, about a mile above the junction of Wolf Creek. The Motherlode workings are on the Sheep Creek slope, close to the summit of the ridge, while the Nugget workings lie over the ridge in Fawn Creek basin.

The Motherlode vein is developed by five adits and ^{the} two *sub-levels* while the Nugget veins, known as the Nugget and Nugget No. 2, are developed by four adits. The Motherlode workings are on the average, considerably lower in elevation than those of the Nugget and have been connected from the No. 5 level to the No. 4 of the Nugget, by a long crosscut and six hundred feet of raises. The lower level of the Motherlode mine has also been connected to the mill on Sheep Creek road by an aerial tram with a vertical drop of 1800 feet.

The Motherlode vein is a well-defined, almost vertical fissure, striking across the schists and quartzites at an oblique angle, and varying in width from a few inches to several feet. Two important ore bodies have been developed, one of which has been stoped over an average length of 250 feet for a vertical elevation of 550 feet, while the other has been stoped over an average length of 300 feet for a vertical elevation of 450 feet.

The Nugget veins are very similar to that of the Motherlode. They have been worked to the 400 foot level with the successful extraction of much valuable ore. Beyond this, the



Ripple Ridge in white quartzites.



Lower Reno Road

the writer has been unsuccessful in obtaining further information with regard to number and extent of the ore sheets.

Production to 1915

	YEAR	TONS	GOLD OZ.	SILVER OZ.	TOTAL VALUE
Motherlode	1906	72	385	137	\$ 8,025
Motherlode	1907	47	186	75	3,881
Nugget	1907	22	125	24	2,595
Motherlode	1908	374	1,026	350	21,379
Nugget	1908	1,209	1,742	684	36,342
Motherlode	1909	123	631	726	13,398
Nugget	1909	5,492	5,927	938	122,970
Motherlode	1910	216	882	975	18,737
Nugget	1910	5,248	3,673	---	75,921
Nugget	1911	3,500	2,622	843	54,721
Motherlode	1912	13,446	7,873	3,003	164,501
Motherlode	1913	24,266	15,947	5,814	332,907
Motherlode	1914	20,000	8,130	3,200	165,100
Motherlode	1915	2,792	2,093	745	43,672
TOTALS		76,807	51,242	17,514	\$1,064,149

THE KOOTENAY BELLE

This property, comprising the Yosemite, Yosemite Fraction, Rio Tinto, Rio Tinto Fraction, Pasadena and Sultana, is situated on the south side of Sheep Creek, about a quarter of a mile above the junction of Wolf Creek.

Two veins, known as the north or No. 1 vein, and the south or No. 2 vein, have been opened up on the property. These have been developed by three adits gaining a total depth of over 200 feet on No. 1 vein, and over 250 feet on No. 2 vein. The lower or No. 2 level has been connected to Sheep Creek road by a light aerial tram, with a vertical drop of 700 feet.

The No. 1 vein is a well-defined, quartz-filled fissure paralleling the hillside and dipping into it. It varies in thickness from a tight seam to several feet and averages in the shoots between three and four feet. The ore is determined from waste by the rusty colour of the oxidized pyrite, a fact that makes it possible to handpick roughly and ship direct. Two ore shoots have been developed on the surface of this vein. The easterly one has been tapped and stoped out from No. 1 level, while the westerly one has been tapped and partially stoped from No. 2 level, 90 feet of backs still remaining.

The No. 2 vein parallels the No. 1 vein, and is very similar in character. Two ore shoots have been developed on the surface in a distance of 1500 feet. One of these has been tapped by No. 1 level and stoped to the surface, but as

yet has failed to open up on No. 2 level.

A possible third ore shoot has been found on No. 2 vein by No. 2 level, which, although unfavorable, may develop commercial ore. However, in any event, though this property can still be mined for a limited time at a profit, there is not as yet sufficient ore in sight to justify any great expenditure, such as the construction of a mill.

Production to 1915

YEAR	TONS	GOLD Oz.	SILVER Oz.	TOTAL VALUE
1905	324	1,070	633	22,426
1906	739	1,157	1,055	24,431
1907	895	612	179	12,738
1908	1,476	1,130	327	23,517
TOTALS	3,434	3,969	2,194	83,112

THE RENO

This property is situated on the eastern slope of Fawn Creek, near its head, in what is known as Fawn Creek basin. There are sixteen claims, most of which were staked in 1912.

Several veins are in existence on the property, but only one has been developed. To date none of the others have shown commercial values on the surface. The important vein has been opened up by four adits, the lowest of which has been connected by an aerial tram to a mill constructed this summer.

This vein is a well-defined, quartz-filled fissure, cutting the schists and quartzites at an oblique angle and dipping high to the east. Two ore shoots have been developed, but at the time of examination very little stoping had been done or was being done, pending the completion of the mill. The easterly ore shoot has been tapped at No. 3 level and has exposed 181 feet of ore, averaging 3 oz. in gold over 1.7 feet, with a possibility of 145 feet or more of backs. The westerly ore shoot has been tapped on No. 4 as well as on No. 3 level, but unfortunately the ore at the greater depth is considerably lower in grade. However on No. 3 level the shoot has a developed length of 86 feet averaging 2.7 oz. over 1.5 feet with a possibility of 80 feet of backs.

Although these values appear to be high it must be remembered that the minimum mining width is two and a half feet. Consequently, the actual mined ore will be for the most part, decidedly decreased in value.

MILLS

There are at present three mills in the area - the Queen, the Motherlode and the Reno.

Queen

The Queen Mill, formerly the Yellowstone, was built in 1900, and has a normal capacity of 50 to 60 tons a day. The plant consists of a crusher, twenty stamps and four Wilfley tables, all driven by Pelton wheels. About 55 percent of the recovered values are in the amalgam and the balance in the concentrates, which consist of pyrite, galena and a little sphalerite.

Motherlode

The Motherlode cyanide plant is one of the most interesting features of the area. At the time of its construction in 1911, it was the most up-to-date mill of its kind in the province, in fact it still ranks among the important mills of British Columbia. It has a normal capacity of 100 tons but has treated 125 tons. Crushing is done in three stages, the latter two taking place directly in the cyanide solution. The ore is fed from the bins into a jaw crusher, from which the solution enters ten stamps using four mesh screens. Final grinding takes place in a 5 x 20 tube mill and this product is classified, the coarse material returning by the closed circuit method for regrinding. The slimes are dewatered in Dorr classifiers and agitated in Pachuca tanks. Final separation is effected by filtering through Merrill filters and precipitating

from a clear solution by zinc dust. The extraction is very high upwards of 98 percent and at the same time operating costs are low. Power is developed throughout by Pelton wheels.

Reno

The latest addition to the camp is the Reno Mill. Since its construction this summer, it has been operating quite satisfactorily. Preliminary crushing takes place in a jaw crusher and final grinding in a ball mill. The comminution product is run over amalgam plates and the tailings are treated with cyanide. In a small mill such as this, this method proves to be more economical than the straight cyanide treatment and obtains good results.

CONCLUSION

As has already been stated, these gold deposits occur in small ledges. Many of the veins are very persistent and can be traced for several thousands of feet. In addition, many others exist which have not been described above. The values near the surface are high, but the general experience of the camp has been to find them unworkable at depth.

Under existing conditions, considerable development must be done before milling can be carried out on anything like a moderate scale. Such development is hardly warranted on any individual property, but, if the properties adjacent to and including the Motherlode-Nugget and Queen mines could be united

by mutual agreement, then exploration and development with the view of operating one mill would seem to be justified. Otherwise production is likely to continue in a "hand-to-mouth" manner, as at present.

MAP of
SHEEP CREEK CAMP.
SCALE 1 INCH = 1/2 MILE.

