W.A. NO. .....

NAME .....

SUBJECT ..... REPORTS .....

.....

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REGAL SILVER
MINE
82N003 ? OR 82N004 ?

82N004-07
PROPERTY FILE

005125

M28-1506

PROPERTY FILE
82N003 004

COI

WOOLSEY and SNOWFLAKE, Revelstoke Mining Division

Note: The Woolsey and Snowflake properties have been considered of interest as possible sources for tungsten and tin, and of silver, lead and zinc. Available information regarding values is from publications of the British Columbia Department of Mines, and from a report made available confidentially for this study. The report, based on examinations made by an engineer in private practice, quotes the findings of an engineer who examined the Woolsey property for the owners, and from a third engineer who examined the property for a prospective purchaser.

There has been controversy over values in the properties. For this reason the information available has been set forth at length and as it is so lengthy, it has been summarized in the following 10 pages.

Under silver-lead-zinc and under tin, estimates of grade cannot be accepted without question, and are to be regarded as the highest grades for which it is reasonable to hope, based on information available.

SUMMARY

The Woolsey and Snowflake properties adjoin and are reached by a common road and branch trails. The road runs northerly up Silver creek from Snowflake Siding on the main line of the Canadian Pacific Railway about 19½ miles easterly from Revelstoke. The Woolsey camp at 4450 feet elevation is about 7 miles from the railroad. Distant about 5½ miles from the railway and at 3800 feet elevation, a lower camp was connected with the Snowflake mine camp (elevation about 5400 feet) and with the principal workings, by a pack trail and a surface tramway.

The Woolsey has been referred to also as Morton-Woolsey, Regal and Regal Silver.

Workings on the two properties prospect the same vein system. The properties are under different ownership but are considered together here. In the absence of workings actually following a vein through, correlation of a vein exposed at one point with one exposed some distance away is conjectural. The main Snowflake working, Snowflake 4 level, elevation 5550, was extended easterly into Woolsey ground, no other working follows a vein across the property boundaries.

A good deal of work was done on the properties from 1936 to 1950; since 1938, there has been renewed interest in the Woolsey and an attempt to produce marketable scheelite concentrate. The Snowflake was explored by three short adits, elevations 5850, 5385, and 5945 feet, by No. 4, the principal level, elevation 5550 feet, and by a raise with some connected intermediate drifts between 4 and 2 levels. These workings have a combined length of about half a mile. The Woolsey has been explored in an extension of Snowflake 4 level, in adit levels numbered 3, elevation 5250 ft., 5, elevation 4963 ft., 8, elevation 4668 ft., 9, elevation 4578 ft., and 10, elevation 4455 ft., by Raise A connecting 10, 9 and 8 levels, and by two other raises. These workings have a total length of about 1½ miles.

The veins follow the bedding of argillaceous sediments, striking northwesterly and dipping 60 to 35 degrees northeastward. Vein widths up to 20 feet are recorded, filled largely with quartz and more or less altered wall rock. Original interest in both properties was in silver-lead-zinc sulphide mineralization. Later stannite, considered of interest as an ore of tin, was discovered; more recently scheelite - observed in 1929 in Snowflake 4 level - has been the mineral of primary interest in operations at the Woolsey. A mill built underground at the Woolsey in 1938 desighed to make a silver-lead and a tungsten concentrate, was not an economic success, and apparently was not a metallurgical success either. Milling procedure, indicated by testing in Ottawa in 1938, would doubtless make a better saving of the tungsten mineral.

Silver-lead-zinc mineralization occurs in parts of the veins and more or less stannite may be associated with it. Scheelite occurs as small masses scattered widely in the veins and as concentrations in pyritic lenses of some size in the veins. Kidneys of rather high grade scheelite occur within the pyritic lenses. The mineralization may be divided into three classes, silver-lead-zinc, tin and tungsten, based on the principal values reported in particular parts of the workings. It is probable that for effective milling the ores would have to be segregated, similarly, to make the most economical recovery of the principal values, while the minerals present as minor values might be less completely recovered as bye-products.

Silver-lead-zinc. Information from one private source, either not checked by any other available information, or in conflict with the limited other information available, indicates two sections of the Woolsey workings in which values silver-lead and minor zinc might be considered as marginal milling ore. In addition, it is probable that selective mining of high grade pockets with sorting would produce a little crude silver-lead ore of shipping grade.

The writer considers that close examination, including check sampling, is necessary before reliable estimates can be made, and that further testing in the form of drilling or crosscutting might also be required. The most optimistic information available suggests that a length of 240 feet on No. 5 vein opened by drifts on Woolsey No. 10 level, might be credited with 6500 tons of probable and possible ore averaging Silver 6.5 oz. per ton, lead 6%, zinc 1.5%, tin 0.1%, and might also yield a little bye-product tungsten.

The section of No. 5 vein opened by the eastern part of Woolsey No. 5 level might be credited with 9,000 tons of probable and possible ore, averaging Silver 5 - 6 oz. per ton, lead 4 - 6%, zinc 1 - 1½%, tin about 0.1%. Crosscutting or test hole drilling to define the width might permit increasing the estimate.

No other parts of the veins exposed appear to approach this grade in silver-lead-zinc values.

Tin. Information regarding Snowflake workings is based on a report by B.T.O'Grady, published in Bulletin No. 1, 1929, British Columbia, Department of Mines. The present writer considers that more closely spaced sampling would be desirable in order to determine grade more exactly, and that exclusion of a limited high grade section, included in O'Grady's average would probably more nearly represent average grade of any quantity of ore. O'Grady's figures might be interpreted as indicating on Snowflake ground, opened by 4 level drift east and the raise above it, probable and possible ore, total say 3500 tons, averaging Silver 6.39 oz. per ton, lead 0.65%, zinc 5.3%, tin 0.7%. Average of samples in the drift which did not include the high grade pocket was, Silver 3.5 oz. per ton, lead nil, zinc 4.59%, tin 0.28%.

In the continuation of Snowflake 4 level drift easterly into Woolsey ground, unchecked sampling is reported to have averaged over widths of 17 to 41 inches, Silver 3 oz. per ton, lead 0.4%, zinc 1.5%, tin 0.5%. This might be interpreted as indicating say 2600 tons of probable and possible ore, not allowing for dilution.

Exposures on No. 6 vein, Woolsey 10 level drift east and Raise B, sampled by the same engineer, might be taken as indicating 20,000 tons of probable and possible ore, averaging Silver 2.5 - 3 oz. per ton, lead 1.5% or better, zinc 0.9%, tin 0.5%. The average values are much higher than indicated by less complete sampling by another engineer.

Tin ore, subject to the accuracy of information available, and accepting the higher figures in the case of conflict, might amount to a total of 26,000 tons probable and possible, averaging about 0.5% tin, with silver, lead and zinc. A tin concentrate could probably be produced by flotation. This concentrate might assay about 20% tin, and could not be higher grade than 26% tin. It would contain substantial quantities of impurities. Metallurgical difficulties and rather high tin losses are to be anticipated in producing refined tin from such a concentrate. So far as the writer has been able to learn, no tin smelter has been accustomed to accepting material of this kind.

Tungsten. Information from three sources is in much better agreement regarding the tungsten content of several sections of the Woolsey workings.

The section on 8 level east of Raise A might well be credited with 5000 tons probable and possible ore, averaging 0.25% WO_3 per ton or better.

A section on No. 9 level west of Raise A may be credited with 1150 tons of probable and possible ore, averaging 0.3% WO_3 or better.

Both estimates are for width sampled and do not allow for dilution. In both cases there would be values in silver and lead which could probably be recovered in a bye-product lead concentrate.

Several other points in the workings where shheelite is exposed would doubtless yield moderate tonnages, but available information does not permit estimates. In a few places rather high grade scheelite is exposed and some could undoubtedly be mined selectively.

In milling the ore, sliming scheelite must be avoided, recovery of scheelite must be given precedence over recovery of silver-lead values. Tests at Ottawa indicated a concentrate assaying 55.9% WO_3 after roasting to eliminate sulphur.

Selective mining of high grade kidneys or lenses to produce crude tungsten ore of shipping grade would avoid loss of scheelite in sliming and the sorted crude ore might be of higher grade than a concentrate produced by milling. Rejects from selective mining and sorting could be milled with ore mined from low grade sections, if in sufficient quantity.

Estimates of Costs and of Net Returns

Preliminary studies suggest return from concentrates f.o.b. railway cars at Revelstoke per ton of ore milled, for silver-lead-zinc ore, and for tin ore, of about $3.50 per ton milled; tungsten ore might yield $6.00 to $7.00 per ton milled. Costs are apt to be from $4.00 to $8.00 per ton milled. Thus silver-lead-zinc, and tin mineralization are sub-marginal, some tungsten could probably be produced at present prices.

H. Sargent,
Mining Engineer.

Vancouver, B.C.
June 23, 1942.

WOOLSEY and SNOWFLAKE GROUPS

Revelstoke Mining Division

CONFIDENTIAL

WOOLSEY and SNOWFLAKE GROUPS, Silver Creek, Revelstoke Mining Division

Workings on two adjoining properties have explored a system of quartz veins, which in general follow the bedding of Precambrian argillites. Early interest in both properties was directed toward values in silver, lead and zinc. In 1928 stannite was reported at the Snowflake and attracted some attention. More recently, on the Woolsey property, scheelite has been the mineral of principal interest.

From a siding on the main line of the Canadian Pacific Railway, about 1½ miles southwesterly from Albert Canyon, and about 19½ miles northeasterly from Revelstoke, the Woolsey property is reached by a tractor road which runs northerly up Silver Creek about 7 miles to the Woolsey camp at 4455 feet elevation. The Snowflake, lying immediately to the west and northwest, is reached by trail which branches from the tractor road.

Ownership of the Woolsey group has changed several times and recently has been the subject of litigation. One former owner was "Morton-Woolsey Mining Company Limited," and a more recent one was "Regal Silver Mines Limited," the property has been referred to as Woolsey, Morton-Woolsey, Regal and Regal Silver. The present standing of Snowflake Mining Company, which was and may still be the owner of the Snowflake property, is unknown to the writer.

The Woolsey group under different names has been referred to in Annual Reports, Minister of Mines, British Columbia, 1918 - 1931, 1938, 1940 and 1941, also in Bulletin No. 10, Tungsten Deposits of British Columbia, by John S. Stevenson, 1941, pages 81-92. The Snowflake has been referred to in Annual Reports, Minister of Mines, British Columbia, 1922-1931, in a pamphlet "Reports on Snowflake and Waverley-Tangier Mineral Properties, compiled by John D. Galloway, 1928," and in "Bulletin No. 1, 1929,", pages 52-55, in which B.T.O'Grady gave detailed information about tin values. The Annual Report, Minister of Mines, British Columbia, 1929, gives some details about work done after the publication of Bulletin No. 1, 1929.

Both properties were described by H.C. Gunning, Geological Survey, Canada, Summary Report 1928, Part A, pages 182-187.

Milling tests designed to indicate a flow sheet providing for recovery of the tungsten and lead-silver values of Woolsey ore, were described in "Investigations in Ore Dressing and Metallurgy, July to December 1938", Canada, Department of Mines and Resources, pages 78-82.

Another source of information is a report on the Woolsey, dated October 1939, made by an engineer (X) in private practice for a prospective purchaser. This report quotes results of sampling by an engineer (Y) who made a report for the owner of the property, and also quotes a third engineer (Z) who reported for a prospective purchaser regarding tungsten values. Information from the examinations by these engineers is indicated later by the letters (X), (Y), or (Z).

There has been controversy over the ore positions of both properties, and the information available from several sources is not entirely in agreement, particularly in regard to silver-lead-zinc, and tin values. However, the available information indicates that the values are low, and that they approach marginal or commercial grade in limited parts of the veins only.

Under silver-lead-zinc, and under tin, in regard to which the information cannot be accepted without question, the estimates must be regarded as the maximum grade for which it is reasonable to hope, based on information available.

The properties are in a rugged area which has large annual snowfall. The upper part of the road is crossed by the courses of several snowslides. The Woolsey camp and other buildings are on a narrow timbered spur between two snowslide courses.

Both properties were provided with camps, facilities and equipment suitable for development work. Some buildings at the Snowflake were reported to have deteriorated since the property was shut down in 1930. Concerning the Woolsey, the Annual Report, Minister of Mines, British Columbia, 1941, says:

> "The property is equipped with a small complete mining plant and a combination gravity and flotation mill of about 70 tons daily capacity, the latter being located in a raise underground. From thirteen to nineteen men were employed under the direction of A.S. McCulloch. Efforts were directed to experimental work in an attempt to produce a marketable scheelite concentrate. A small roasting plant was built at Silver Creek siding on the railroad for this purpose."

Power is developed at the mine by oil-burning engines.

Adits on the Woolsey property are between 4460 and 5248 feet elevation, and on the Snowflake between 5550 and 5945 feet elevation. The principal workings are represented on a plan accompanying the present report, copied from a company plan. The nomenclature is that used by O'Grady (Bulletin No. 1, 1929) and by Stevenson (Bulletin No. 10, 1941).

A drift on Snowflake No. 4 level extends southeasterly into Woolsey ground, following the Snowflake No. 1 vein, which has been correlated with Woolsey 5a(?) vein, and another vein, referred to as the Snowflake No. 2 vein, which has been correlated with Woolsey 5b vein. Other correlations of veins on one property with those on the other are conjectural. In the absence of raises following the veins, correlation of veins from one level to another on the same property is conjectural to a degree.

At least five veins have been explored on Woolsey ground by adit-levels numbered 3 (elevation 5248 ft.), 5, 8, 9 and 10 (elevation 4400 ft.), by several raises, and by the drift on Snowflake No. 4 level. The total length of these workings including the long crosscut entry on 10 level is roughly 1½ miles. On Snowflake ground, four adit levels, a raise and a winze explore three veins, the total length of these workings is about half a mile. Shallow surface workings give some additional information about these and some other veins.

One vein on Woolsey ground had been tested in surface workings before the first mention of the property, in the Annual Report, Minister of Mines, British Columbia, 1918. The Snowflake was not mentioned until the 1922 report. Work was carried on actively on each property in the period from 1927 to 1931 since which time the Snowflake has been inactive. Beginning with 1938, there has been activity at the Woolsey property concerned with scheelite-bearing mineralization. A mill built underground that year proved unsatisfactory. According to report, the mill was being rebuilt late in 1940.

Occurring in argillaceous rocks overlain by quartzites and underlain by interbedded limestone and argillite, the veins in general follow the bedding of the sediments. They are filled with quartz and more or less altered wall rock, and contain sulphides which generally form a minor part of the vein filling. Vein widths range up to 20 feet, but such widths often contain wide horses of wall rock. At some points, veins feather out into quartz stringers in the argillite. There has been a good deal of faulting both across and along the veins. The veins strike northwesterly and dip 60 to 35 degrees northeastward.

The sulphides, which generally form a small part of the total vein filling, occur as scattered small masses in vugs and fractures in the quartz, as concentrations in crushed quartz and wall rock at the footwall of veins, as lenses developed along fractures in the quartz and at some points as concentrations near the hanging wall. At a few points, lead-zinc mineralization has been found filling fractures away from the larger veins.

The sulphides, pyrite, galena, sphalerite, stannite, tetrahedrite, have been reported as visible to the unaided eye, but tetrahedrite is apparently rare. Chalcopyrite, ruby silver and pyrrhotite have been recognized under the microscope. Native silver has also been reported from microscopic study.

Scheelite was recognized in the Snowflake workings in 1929 and is now known to occur rather widely in the Woolsey workings. Stannite, recognized in Snowflake workings, apparently occurs very sparingly, if at all, in most of the Woolsey workings, with the exception of the drift into Woolsey ground driven from Snowflake 4 level. Scheelite is the only tungsten-bearing mineral reported to be present in any quantity, and stannite is the only tin-bearing mineral which has been reported.

Silver-Lead-Zinc

Early interest in both properties was in silver-lead-zinc values, and small shipments of sorted silver-lead ore have been made from each property.

Snowflake. The following statement by J.D. Galloway, then Provincial Mineralogist, is quoted from "Reports on Snowflake and Waverley-Tangier Mineral Properties, 1923."

> "So far as development has gone, no important quantities of shipping-ore have been proven. In the upper workings on the No. 1 vein milling-ore is indicated in several places, but as yet no appreciable tonnage is proven. No commercial ore has been found in tne No. 4 crosscut tunnel.
>
> "The cutting of the vein in the No. 4 crosscut tunnel demonstrates the continuity of the vein at that depth, but not of the values. Further development by drifting on this level, however, may disclose shoots of galena ore.
>
> "The other veins on the property are similar to the No. 1 vein. They are parallel veins and can be developed by continuation of the No. 4 crosscut tunnel. Development of these should be left in abeyance until the economic value of No. 1 vein is demonstrated.
>
> "The property is still a prospect in the development stage, with the possibility of commercial ore-shoots being found, where structural conditions are favourable by reason of sufficient fracturing of the primary quartz to permit extensive replacement by metallic minerals."

Later work was described by B.T.O'Grady in Bulletin No. 1, 1929, and in the Annual Report, Minister of Mines, British Columbia, 1929. This work, including drifts on 4 level, and a raise driven from the east drift to 2 level, further explored the mineralization but does not seem to have blocked out or indicated any considerable tonnage of silver-lead-zinc ore.

Woolsey. Available information is principally from the report of the engineer (X) in private practice, who made examinations for a prospective purchaser, and in his report quoted results obtained by another engineer (Y) who had made a report for the owners of the property.

Results of sampling by (Y) on Woolsey 5 level and in Raise C driven from it, and by (X) in three crosscuts on 5 level are given in the Table I.

Table I

Woolsey No. 5 Level and Raise C

	Woolsey No. 5 Level							
	A	B	C	D	E	F	G	H
Width	5 ft.			16 ft.	5.75'	10.0 ft.	11.6'	15.5 f
Assay								
Ag oz/ton	5.0	7.5	5.0	5.0	5.7	1.9	2.8	1.8
Pb %	4.2	6.9	5.0	4.2	5.8	2.75	4.5	2.8
Zn %	1.0	1.1	1.2	1.5	1.4	1.61	1.6	4.2
Sn %	0.14	0.2	0.1	Tr	0.1	Nil	Nil	Nil
WO_3 %						0.05	0.05	0.14

Notes

Sampling by (Y)

A, Raise C, 0 to 138 ft. up dip from Woolsey No. 5 Level. Average width 5 ft.

B, In Raise C, average of samples, 25 to 88 ft. above 5 Level.

C, Average for all samples in length of 350 feet measured from the portal.

D, Average of sampling in No. 1, No. 2 and No. 3 crosscuts.

E, Average of samples in 120 foot length, 230 to 350 feet from portal.

Sampling by (X)

F, No. 1 Crosscut.

G, No. 2 Crosscut.

H, No. 3 Crosscut, combines footwall section of 10 ft. and hanging wall section of 5 ft. 6 in.

The section, incompletely explored by Woolsey No. 5 level and Raise C, with sampling data for 350 feet westerly from the portal and 132 feet up the raise, with a width of 5 feet, might be credited with 9000 tons of probable and possible ore, averaging Silver 5 oz. per ton, lead 4.2%, zinc 1%, tin 0.1%, without allowance for dilution. This estimate is based on available information, which should be checked by detailed examination and close sampling. If the average width is as great as indicated in the crosscuts, the tonnage might be considerably greater than 9000 tons. The raise is reported to have been advanced to a total slope distance of 220 feet from the level. The extra 88 feet of raise might permit increasing the tonnage estimate somewhat, but because of the irregular nature of the mineralization, the estimate could not be increased greatly.

On 10 level, No. 5 vein has been explored by drifts east and west of the crosscut entry. No. 5 vein drift east follows the vein 90 feet to the main fault, beyond which the working follows the fault. No. 5 vein drift west is generally in the footwall of the vein which was crosscut by several stub raises. These exposed a vein which for 150 feet west of the crosscut averaged 6 feet wide, according to (Y), beyond that the vein was narrower and poorly mineralized. Raise A followed the vein up the dip, and had advanced 208 feet when examined by (Y), who found the veins to be 1 to 6 feet in width with low values. An intermediate level was driven from Raise A/about 180 feet up the dip from 10 level. This level, later continued easterly to the surface, is now called No. 9 level. (Y) found the ground on it generally broken and did not find commercial values.

Results of sampling by (Y) are given in Table II. Sampling by (X) at one point in the 90 foot section on 5 vein drift east and at one point on 5 vein drift west are given under A and C in Table VIII in the section headed "Tungsten". Assays of samples taken by (X) are materially below those taken by (Y).

Table II

10 Drifts East and West, and Raise A

	A	B	C
Width	7.5 ft.	6.0 ft.	1.0 -6.0 ft.
Assays			
Ag Oz/ton	5.2	7.6	1.5
Pb %	5.3	6.6	1
Zn %	0.5	2.6	Tr
Sn %	0.2	Tr	Tr

Notes

Sampling by (Y)

A, Drift east, average of samples 0 - 90 feet from crosscut entry.

B, Drift west, average of samples 0 - 150 feet west of crosscut entry, vein exposed in crosscuts, and crosscutting stub raises.

C, Vein as exposed in Raise A, 0 - 208 ft. slope distance up dip from 10 level.

It seems probable that the vein is not well exposed east of the crosscut entry, and that it is exposed principally in crosscuts or stub, crosscutting, raise west of the crosscut entry. Sampling information therefore must be incomplete. The conflict between sampling by (X) and (Y) has been mentioned, sampling by (X) was probably less complete than by (Y), whose results on the level for a length of 240 feet indicates marginal ore; his sampling results in Raise A, and (X)'s results on the drifts on 5 vein, 10 level, are definitely sub-marginal. In the drifts (Y)'s results indicate for a length of 240 feet an average of, Silver, 6.5 oz. per ton, lead 6%, zinc 1.5%, tin 0.1%, and allowing a vertical extent of 50 feet the section could be estimated to contain about 6500 tons of possible ore. Conflict between results of the two samplings, incompleteness of the exposure and the low results in the raise, throw doubts on the estimate of grade. This doubt could be reduced in part by detailed examination and by check sampling.

The raise has since been carried through to No. 8 level, on which silver-lead-zinc mineralization appears to be definitely sub-marginal. Results of sampling in this and in various other workings are given in Tables in section headed "Tin" and "Tungsten". They show values much too low to be considered as silver-lead-zinc ore. If such material were treated for its tin or tungsten content, bye-product silver and lead would doubtless be recovered in a lead concentrate. The sampling shows very little zinc to recover.

Thus it appears that in No. 5 vein on Woolsey 5 and 10 levels, there are sections which may be marginal silver-lead-zinc ore. If check examination and sampling confirmed the results obtained by (Y), possible ore might be estimated at a total of 15,000 tons or so, and possibly considerably more, averaging Silver 5 to 6 oz. per ton, lead 4 - 6%, zinc 1 to 1½%, and tin about 0.1%. Material of this grade is patently marginal, but there might be some salvage in it if a substantial part of the overhead and capital expense would have to be made anyway, say for tin or tungsten recovery.

It is probable that a small tonnage of crude silver-lead ore could be won by selective mining and sorting from high grade pockets.

Tin

Information on tin values is principally from Bulletin No. 1, 1939, dealing with the Snowflake property. We also have some information from the report by (X) about tin on the Woolsey property. Except for the drift into Woolsey ground on the Snowflake 4 level, tin assays on the Woolsey property were given as Nil by the engineer (X). He quoted average assays (Y) of 0.5% Sn in No. 6 vein drift east 10 level and in the raise from it, and from 0.1 to 0.3% tin from other points in the workings. Thus for the drift and raise on 10 level, there is marked conflict between the two samplings but elsewhere they agree in showing that the tin content is negligibly small.

In Bulletin No. 1, 1939, tin assays from scattered workings on the Snowflake, including surface cuts which incompletely exposed veins, range from Nil to 2% tin. They are of interest as guides for prospecting but do not indicate any quantity of tin-bearing material.

Snowflake 4 level consists of a crosscut entry driven northeasterly from which a drift was driven northwesterly along the footwall of a vein, and another drift was driven southeasterly along the footwall of the vein, about 120 feet to the boundary of the Woolsey group. From this drift at a point 93 feet from the crosscut entry, a raise followed the vein up the dip. This raise had been driven 120 feet at the time of the examination reported in Bulletin No. 1, 1929. Later the raise was driven through to No. 2 level.

Samples taken by O'Grady in the west (more exactly northwest) drift, averaged Gold, nil, silver 0.22 oz. per ton, lead nil, zinc 1.42%, copper nil, tin nil. (Bulletin No. 1, 1929, p.53.

Concerning the drift east (more exactly southeast), the raise from it and workings at higher elevation in the same section, O'Grady wrote (Bulletin No. 1, 1929, p.53 and 54):

"Channel samples at 20-foot intervals along the east drift gave an average assay of: Gold, trace; silver 3.52 oz. to the ton; lead, nil; zinc 4.59 per cent; copper 0.46 per cent; tin 0.28 per cent; over an average width of 27½ inches and a length of about 112 feet. Sampling of the raise at similar intervals gave an average assay of: Gold, trace; silver, 8.86 oz. to the ton; lead, 1.21 per cent; zinc, 5.62 per cent; copper, 1.35 per cent; tin, 1.13 per cent; over an average width of 43 inches and a length of 120 feet. A very strong development of stannite occurs 25 feet up the raise, where a sample taken across a width of 38 inches, and included in the above average, assayed: Gold, trace; silver, 43.5 oz. to the ton; lead, 7.5 per cent; zinc, 6 per cent; copper 6.5 per cent; tin, 6 per cent. The combined average of the samples taken along the east drift and the raise therefrom is: Gold, trace; silver, 6.39 oz. to the ton; lead, 0.65 per cent; zinc, 5.31 per cent; copper, 0.94 per cent; tin, 0.73 per cent; over an average width of 34 inches. Although the samples taken in the east drift and raise were widely spaced, it appeared from an examination of the vein in both workings that the samples represented a fair average, in spite of the mineralization being of very irregular character.

"The 'backs' on the east drift to the No. 2 level, 335 feet vertically above it, have been estimated at about 550 feet. The raise in the east drift on the No. 4 level will when completed connect with the westerly drift on the No. 2 level a short distance from the crosscut intersection.

"The 'tin-shoot' in the east drift adjoins the boundary between the Snowflake and Regal Silver properties and its extension in strike and dip can be expected on the latter property, as the boundary-line forms an acute angle with the direction of the drift. The tin-bearing vein, with its dip of 52 degrees in the east drift, would enter Regal Silver ground in a slope-length of about 110 feet below the point of intersection of the crosscut and drift and in a few feet at the boundary line. There is, therefore, a small block of ground below the tin-shoot, triangular in shape, lying between the two properties. A sample across 18 inches in the face of the east drift adjoining the Regal Silver boundary assayed: Gold, trace; silver, 5.2 oz. to the ton; lead, nil; zinc, 13 per cent; copper, 1.1 per cent; tin, 0.7 per cent.

"The No. 1 and No. 2 levels of the Snowflake develop sections of the same No. 1 vein at elevations of 5,945 and 5,885 feet respectively, the elevation of the No. 4 level containing the tin-shoot being 5,550 feet. The westerly drifts in the upper two tunnels mentioned are situated approximately above the tin-shoot and, without allowances for any rake in the ore-body, might be expected to develop the upper part of the same shoot. The mineralization was not considered to be sufficiently continuous in these upper levels to warrant systematic sampling, and only a few samples were taken at promising points with a view to correlating silver-tin values if possible. In this connection three samples were taken in the No. 2 tunnel westerly drift and one sample in the face of the No. 1 tunnel westerly drift. A 64-inch sample taken at the intersection of the No. 2 level crosscut and drift gave an assay of: Gold, 0.02 oz. to the ton; silver, 11.8 oz. to the ton; lead, nil; zinc, 2 per cent; copper, 0.6 per cent; tin, 0.2 per cent. A 12-inch sample taken 85 feet along the westerly drift from the crosscut assayed: Gold, trace; silver, 0.85 oz. to the ton; lead, nil; zinc, 1.8 per cent; copper, nil; tin, nil. A sample across 18 inches in the face of the westerly drift on the same level assayed: Gold, trace; silver, 7.3 oz. to the ton; lead, 10.5 per cent; zinc, 3.8 per cent; copper, 0.1 per cent; tin, trace. A selected sample from a narrow but continuous streak in the same working was found to contain 8.4 per cent tungsten.

"A sample across 24 inches in the face of the westerly drift on the No. 1 level assayed: Gold, trace; silver, 15.5 oz. to the ton; lead, 3.3 per cent; zinc, 13.1 per cent; copper, 2 per cent; tin, 1.6 per cent."

It is obvious that "the combined average of samples taken along the east drift and the raise therefrom," would be very seriously reduced if the sample which assayed 6% tin, were not included. It appears that this represents a local enrichment of which repetition is unpredictable. As the complete sampling data were not published, it is impossible to analyze the sampling results, but it seems probable that conservative practice would be inclined to reject the single high tin assay in estimating the average grade for the block. A triangular block of which the base measures 112 feet along the drift, the apex is 120 feet up the dip at the top of the raise and the average thickness is 34 inches, contains 19,000 cubic feet and at 12 cu. ft. per ton would amount to 1580 tons. This might be allowed as "probable ore." Ground for a moderate depth below the drift and ground up the dip from the sloping sides of the triangular block, amounting to say an additional 2000 tons might be considered as possible ore. These estimates should be checked for continuity and grade by detailed examination and closely spaced samples should be taken to determine the grade.

Woolsey, on Snowflake 4 Level

Under arrangement between the owners of the two properties, the east drift of Snowflake 4 level was continued about 258 feet into Woolsey ground, near the end a crosscut was driven northeasterly about 25 feet and from it a drift on another vein was driven 140 feet or so southeasterly. An engineer (Y) reporting for the owners of the Woolsey property was quoted as giving average assays in the length of 258 feet of Silver 3.0 oz. per ton, lead 0.4%, zinc 1.5%, tin 0.5%, over widths ranging from 17 to 41 inches. The mean width then is 29 inches. With this width and length, and allowing for an extent of 50 feet on the dip, we can estimate say another 2600 tons of probable and possible ore. This also should be checked by detailed examination and close sampling.

10 Level

No. 6 vein, drift east

The vein is exposed in short crosscuts driven northerly short distances from the irregular drift. It is a strong vein sparingly mineralized with sulphides. The vein is explored by Raise B, for 200 feet above the level. Sampling data are recorded in Table III.

Table III

No. 6 Vein, 10 Level, Drift east and Raise B

	A	B	C	D	E	F
Width				8.0 ft.		4.5 ft.
Assay						
Au Oz/ton	0.02	Tr	Nil			
Ag Oz/ton	Tr	0.20	Nil	3.0	5.2	2.4
Cu %	Nil	Nil	Nil			
Pb %	1.22	1.63	1.63	1.5	4.1	2.7
Zn %	0.81	0.76	0.40	0.9	1.2	1.5
Sn %	Nil	Nil	Nil	0.5	0.4	0.5
WO_3 %	0.14	Nil	Tr			

Notes

Samples taken by (X)

A, In crosscut to north about 260 feet east of crosscut entry.

B, In crosscut to the north about 460 feet east of crosscut entry.

C, In crosscut to the north about 460 feet east of crosscut entry.

Samples taken by (Y)

D, Average for length of 520 feet, 0 to 520 feet, east of crosscut entry.

E, Average for length of 120 feet, 400 to 520 feet east of crosscut entry.

F, Average for 200 feet up Raise B.

CN (Y)'s figures probable and possible ore might be estimated at about 20,000 tons averaging Silver 2.5 to 3 oz. per ton, lead 1.5% or better, zinc 0.9% or better, tin 0.5%. It must be noted that the grade is entirely out of line with that indicated by the less complete sampling by (X).

The section opened by Snowflake 4 level and the Snowflake Raise on the two properties might be credited with a total of about 6000 tons of probable and possible ore, containing silver, lead and zinc in addition to about 0.5% tin. The section opened by 6 vein drift east on Woolsey 10 level, and by Raise B, might be credited with as much as 20,000 tons of probable and possible ore of similar grade, making a total of 26,000 tons.

The writer considers the estimates of grade are open to question, and that detailed examination and close sampling are necessary if dependable estimates are required.

Milling and Metallurgy

In the absence of information re milling tests, we can only guess what results would be obtained in milling ore containing pyrite, galena, sphalerite, tetrahedrite, stannite, etc. It is probable that a tin concentrate could be made by flotation. From the composition of the mineral, it seems probable that the flotability of stannite is intermediate between that of galena and sphalerite. Tetrahedrite and chalcopyrite are intermediate in flotability between galena and sphalerite. Accordingly, the "tin concentrate" to be produced would probably contain some galena and sphalerite, also a little chalcopyrite, and tetrahedrite, as well as the stannite; it would also probably contain some pyrite.

The analysis of the mineral determined as stannite, quoted by Cunning (C.S.C.Summary Report 1929, Part A, Page 135) is:

	Per cent
Sn.....	26.65
Cu.....	31.56
Fe.....	3.65
Zn.....	7.72
Mn.....	nil
Ni.....	nil
S.....	29.76
Total	99.34.

It is apparent that the "tin concentrate" would not exceed 26% tin and more probably would be nearer 20% tin. In addition to the constituents listed in the analysis of stannite, the "tin concentrate" would probably contain silver, lead, and antimony.

Commercial smelting of tin is based on concentrates of rather high purity, usually containing 60% tin or better, in the form of cassiterite. Impurities in the ore are apt to be reduced with and appear in the metallic tin produced. Elimination of the impurities complicates the smelting, adds to its cost, and increases loss of tin in smelting. So far as the writer has been able to learn, stannite has not been acceptable as either a major or considerable constituent of tin concentrates. It is apparent therefore that special provisions would have to be made to handle tin concentrates from these properties.

Tungsten

Information regarding tungsten on Snowflake ground and on Woolsey ground on Snowflake 4 level is limited to brief references in Bulletin No. 1, 1929, and Bulletin No. 10, 1941.

Concerning tungsten in the Woolsey workings, we have Stevenson's descriptions and estimates (Bulletin No. 10, 1941), and the report by the engineer (X), principally concerned with tungsten. This report quoted from engineers (Y) and (Z).

It appears that scheelite occurs most abundantly in parts of the veins in lenticular masses heavily mineralized with pyrite, which occur within the veins. These lenses also contain some galena and sphalerite. Fluorite has also been reported to occur with the scheelite. Stevenson describes the pyrite lenses as ranging in length from a few feet to 350 feet, and in width from 1 to 18 inches, with 6 inches a more common width. He also refers to kidneys of almost pure scheelite, which may occur within pyrite lenses, and to occurrences of scheelite in small masses up to ½ inch diameter, usually associated with small clusters of pyrite, scattered at wide intervals throughout the quartz veins. According to Stevenson, Woolsey No. 5 vein, explored on Woolsey 3, 5, 8, 9 and 10 adits, and on Snowflake 4 adit, is the only vein in which scheelite has been found in appreciable amounts.

Stevenson mentioned less important occurrences of scheelite, and gave estimates of the size of four important scheelite-bearing bands or lenses occurring in pyritic lenses. He stressed the difficulty in making quantitative estimates of the valuable content but presents estimates of the tungstic oxide (WO_3) content per vertical foot. He expressed the opinion that the vertical extent of the individual scheelite rich sections is not apt to exceed 50 feet.

His estimates are as follows:

No. 8 level - 150 to 250 feet east of A or Mill raise
(several disconnected short ribbons and one large kidney of scheelite)
Length 100 ft., average width 6 in.
Tungstic oxide content per foot of depth, 48 lb.

No. 9 level - 10 to 110 feet east of A or Mill raise.
Length 100 ft., average width 6 in.
Tungstic oxide content, 200 lb. per foot of depth.

40 to 225 feet west of A or Mill raise
Length 185 ft., average width 6 in.
Tungstic oxide content per foot of depth, 176 lb.

No. 10 level -
At northwestern end of exposure of No. 5 vein.
Length 17 ft., average width 7½ in.
Tungstic oxide content per foot of depth, 400 lb.

The following information, obtained from private sources, is based on sampling of widths considerably greater than the four sections for which Stevenson gave estimates. In connection with the results, it is desirable to keep in mind the fact that tungsten assays are difficult, and that different assayers may not check closely on the same sample; therefore a chemical determination should not be regarded as exactly representing the tungstic oxide content. Assays for the element tungsten (W) are reported by (X). These have been multiplied by 1.26 to convert them to tungstic oxide, and are given as WO_3 in the present report.

Scheelite has been reported from higher levels, but no occurrence of important size and grade has been reported from workings higher than the Woolsey 8 level.

Engineer (X) reported that the best values in tungsten were obtained from samples taken on 8 level. At the top of the Raise A he took a sample (A, Table I) across 30 inches, the width of a lens which pinched out 30 feet west of the raise. Another lens comes in and is 6 feet wide in the face, where he took a moiled sample (B, Table I). In the section from 50 to 240 feet east of the raise, he found much pyrite, some galena and some sphalerite in the vein. At 190 and 230 feet east of the raise, he found specimen scheelite; elsewhere he found it in small amount. In the section 50 to 287 feet east of the raise, he took five samples (C,D,E,F,G, Table I). The first three assayed well in tungstic oxide, their average is given in the Table (H). In the next section of the working extending about 150 feet southeasterly to the crosscut entry, seven samples average width 5½ ft., were taken, they are low in tungstic oxide, contain some silver, lead and zinc. They represent less regular vein and two en echelon lenses in the footwall. The average of the seven is given under I, Table IV.

After reducing the high sample (E) in the 50 to 287 feet east of Raise A, (X) computed the average for five samples (C,D,E,F,G) as:

Ag	Pb	Zn	WO_3
0.5 oz.per ton	1.5%	0.7%	0.43%

for a length of 237 feet and average width of 5.5 feet. For the same section (Z) obtained an average of 0.37% WO_3 for a length of 240 feet and average width of 4.5 feet. Stevenson's estimate, 100 feet of this section, is 48 lb. WO_3 per foot of depth. If we consider the same yield from a section 5 feet wide, 100 feet long and 1 foot high, or say 8½ tons, we have a little better than 0.25% WO_3 per ton. It seems probable that there would be some scheelite outside the width of 6 inches which Stevenson considered. Therefore in 100 feet of length at least there is fair agreement between the three, and for approximately 240 feet there is better agreement between (X) and (Z). A section 240 feet long, 5 feet wide, and 50 feet in vertical extent would contain 5000 tons.

Table IV

No. 8 Level, Woolsey, Sampling by (X)

Refer Note	A	B	C	D	E	F	G	H	I
Width	2.5 ft.	6.0	(X)	(1)	(1)	(1)	(1)	(1)	(1)
Assay(2)									
Au oz/ton	Tr	Tr	Tr	Tr	0.04	Tr	Tr		Tr
Ag oz/ton	Tr	5.20	0.40	0.36	2.66	Nil	0.06	1.14	0.29
Pb %	4.44	1.33	1.53	1.27	4.89	1.32	1.22	2.63	1.23
Zn %	1.86	0.35	0.67	0.46	0.93	0.66	0.86	0.69	0.72
WO_3 %	0.30	2.63	1.07	0.68	1.66	0.06	0.06	1.14	1.17

Notes

(1) Average width C - I inclusive, 5.5 ft.
(2) Copper and tin reported Nil throughout.

A, At top of Raise A, east side.
B, At face of drift, west of Raise A.

C)
D) In drift 50 to 240 feet easterly from top of Raise A
E) at increasing distances from raise.
F)
G)

H, Average of samples C, D and E.
I, Average of seven samples in 150 feet running southeasterly to crosscut entry.

Raise A

A 50-ton mill was installed underground in 1938 in an enlarged part of Raise A between 8 and 9 levels. This part of the raise has been called the "Mill Raise".

In cutting out for the mill, scheelite was exposed in the footwall of the raise. No. 5 vein is exposed in the raise from 10 level to 8 level, slope distance 388 feet. It is generally low grade from 10 level to a point above 9 level. Sampling data for this raise are recorded below in Table V.

Table V

Raise A, Sampling by (X)

	A	B
Width	1.5 ft.	5.7 ft.
Assay		
Au oz. per ton	0.01	0.04
Ag oz. per ton	0.05	3.06
Cu	Nil	Nil
Pb %	1.22	2.09
Zn %	0.71	0.81
Sn %	Nil	Nil
WO_3 %	2.80	0.16

Notes
A, Taken by (X) at footwall in Raise A.
B, Taken by (X), east side of raise 40 ft. above 10 level.

The section represented by the upper part of Raise A, (A Table V) and the drift west on 8 level (A and B, Table IV) contains scheelite but on the information available, no considerable tonnage of ore can be estimated.

No. 9 Level

Westerly from Raise A, (X) found a band consisting of argillite and quartz with a good deal of pyrite and a good deal of graphite. At one point, there is 3 feet of quartz ribboned with wall rock and containing some pyrite. Results of composite sampling by (X) of the section for about 150 ft. westerly from the raise are shown under A, Table VI. Sampling by (Z) in the section extending 175 feet westerly from the raise is shown under B, Table VI.

The value 0.96% WO_3 obtained by (X) for a length of 150 feet and a width of about 1 ft., is equivalent to 0.50% WO_3 in a width of 1.9 feet. The results of sampling by (Z) are given as 0.59% WO_3 for a length of 175 feet, and width of 1.9 ft. Stevenson's estimate of 176 lb. WO_3 per vertical foot in a length of 185 feet, and average width 6 in., is equivalent to 0.3% WO_3 in an average width of 1.9 ft., allowing 12 cubic feet per ton. It is probable that there would be some scheelite outside the band of which the average width is 6 inches. If we assume a vertical extent of 50 feet, length 150 ft., average width 1.9 ft., we can credit this section with say 1150 tons of possible ore, without allowance for dilution. The mean of the three values is a little more than 0.4% WO_3.

Easterly from the raise, the level shows a vein 5 feet wide at the raise, tapers to about 3.5 feet wide at the first crosscut, holds this width for about 40 feet and wedges out at 20 feet forth against the main fault. In a length of about 40 feet near the crosscut, there is a band rich in pyrite, about 12 inches wide, at the footwall and another 10 to 12 inches wide at the hanging wall. Samples cut by (X) across the vein C west of the crosscut, and D east of it, are listed in Table VI..

Table VI

No. 9 Level

	A	B	C	D
Width	1.0 ft.	1.9 ft.	5.0 ft.	4.0 ft.
Assay				
Au oz/ton	Tr		Tr	Tr
Ag oz/ton	1.40		0.04	0.20
Cu	Nil		Nil	Nil
Pb %	0.51		1.22	1.53
Zn %	0.60		0.53	0.81
Sn %	Nil		Nil	Nil
WO_3 %	0.96	0.59	0.30	0.25

Notes

9 Level drift west of Raise A.

A, taken by (X), composite of channels cut across graphic pyritic band in a length of 150 feet west of raise. Average width about 1.0 ft.

B, taken by (Z), composite of channels cut across band in a length of 175 feet, west of raise, average width 1.9 ft.

9 Level drift east of Raise A.

C, West of first crosscut.

D, East of first crosscut.

10 Level
No. 5 Vein Drift West of Crosscut Entry

The vein is exposed in the crosscut entry and in the drift to the west for about 200 feet; crosscuts show it to be up to 9 feet wide. Sampling by (X) in this section is recorded under A, Table VII.. Farther west, a branch drift or crosscut running northerly which, where it leaves the line of the drift, cuts a pyritic lens. The lens is exposed continuing in the western wall of the working. Results from assaying a composite of three channels 12 to 18 inches wide, cut by (X) across the lens, are given under B, Table VII.. Results of sampling by (Y), analyses not showing WO_3, are given in Table II.

No. 5 Vein Drift East

The vein is exposed in the drift to about 90 feet from the crosscut entry, crosscuts expose a width of 10 feet, average results from sampling by (Y) for the 90 ft. length are given in Table II. A sample taken by (X) midway along this section is recorded under C, Table VII.. The working swings northeasterly for 50 feet along a fault, which is largely filled by quartz. At the face of this drift, toward the right hand side, a vein is exposed which was sampled by (X); results are given under D and E, Table VII..

Table VII

No.10 Level

	A	B	C	D	E
Width	6.2 ft.		7 ft.	2.5 ft.	2.5 ft.
Assay					
Au oz/ton	0.02	Tr	Tr	Tr	Tr
Ag oz/ton	(1)	0.08	0.04	Nil	1.00
Cu %	Nil	Nil	Nil	Nil	Nil
Pb %	3.97	1.07	0.46	1.53	1.84
Zn %	0.55	0.55	0.71	0.73	0.73
Sn %	Nil	Nil	Nil	Nil	Nil
WO_3 %	0.18	6.02	Nil	0.43	0.40

Notes

All samples taken by (X)

(1) Silver erratic.

Drift West on No. 5 Vein

A, In first crosscut.

B, Composite of three channels across lens 12 to 18 inches wide, exposed at collar of crosscut, turns north from west end of drift.

Drift East on No. 5 Vein

C, At crosscut about 45 feet east of crosscut entry.

D, At face of northeast drift, breast high.

E, At lower left hand corner of face.

Sampling results in the drift east on 9 level, and in 5 vein drift east on 10 level, indicate mineralization of moderate grade in scheelite, but the information does not permit estimating any considerable tonnage. The lens indicated toward the west end of 5 vein drift west on 10 level is of quite high grade material apparently of small extent.

The sections on 8 level east of Raise A, and on 9 level west of Raise A, probably would yield 6000 tons averaging about 0.3% WO_3. It is likely that 5 vein at other points would yield a considerable additional tonnage.

Mineralization poorer in scheelite but richer in tin-bearing or in silver, lead and zinc minerals might yield some bye-product scheelite.

Milling

The mill built in 1938, provided for making a flotation silver-lead concentrate, followed by babling flotation tailings to recover scheelite. Fine grinding for flotation slimed the scheelite, which therefore was not recovered satisfactorily on the tables.

Report 756, Investigations in Ore Dressing and Metallurgy, July to December 1938, Canada, Department of Mines and Resources, deals with tests made on "a 700 pound sample of silver-lead tungsten ore..... received September 8, 1938, from the Regal Silver property." The procedure recommended is to table the ore, classified after a relatively coarse grind, then to grind the table concentrates and from them to float first a silver-lead concentrate and then a tungsten concentrate.

Overall Recoveries

In the tests, classified products were tabled separately to give a concentrate, middling and tailing. The concentrates from the + 65 mesh products were reground before flotation, the -65 mesh products were floated without regrinding.

The feed sample assayed:

Ag 0.955 oz. per ton Pb 0.84% Zn 0.36% WO_3 2.42%
Fe 15.68% S 15.48% Graphite 1.42%

Cleaning the flotation concentrates yielded the following final product:

From reground+65 mesh material (75% of ore after coarse grind)

	Assay				Distribution Per cent of material in + 65 mesh product		
	Ag Oz/ton	Pb %	Zn %	WO_3 %	Ag	Pb	WO_3
WO_3 conc't	0.06			46.23	0.4		88.1
Pb conc't	6.95	9.71	1.38	0.47	61.3	65.5	1.2

From -65 mesh material (24.8% of ore after coarse grind)

	Assay				Distribution Per cent of material in -65 mesh product		
	Ag Oz/ton	Pb %	Zn %	WO_3 %	Ag	Pb	WO_3
WO_3 conc't	0.09			45.26	0.2		65.0
Pb conc't	55.44	67.71	0.26		71.6	90.3	

Considerable parts of the values not in final products were in middlings which in a continuous operation would be recirculated and from which some recovery would be made.

The results were reported to indicate the following overall recoveries:

Tungsten	81.5%
Lead	88.5%
Silver	80.4%

The low grade of the lead concentrate made from the + 65 mesh table products was said to be because insufficient lime and depressants were used in cleaning the bulk sulphide concentrate. The grade of the lead concentrate made from the -65 mesh table concentrates was good.

A portion of the tungsten concentrate carrying 46.23% WO_3 and 10.37% sulphur was roasted in an open dish at 550 degrees C. The calcine was cleaned by refloating, yielding a product which assayed 55.9% WO_3, 0.30% sulphur.

Pure scheelite contains 80.6% WO_3. Stevenson refers to lenses of almost pure scheelite. The difficulty in making a high grade scheelite concentrate, and the considerable losses in milling, suggest the advisability of selective mining followed by cobbing and sorting to recover a considerable part of the scheelite as sorted crude ore. The yield would not be high but as the product is of high value, this procedure should be considered.

Net Return from Ore

The following estimates are for net return per ton of each of three classes of ore milled, from concentrates f.o.b. railroad cars. Present United States prices for silver, lead and zinc are used, duty is deducted, and net return is given in Canadian funds. For tin the price $0.45 per pound, and for tungsten the price $24.00 Canadian per unit is used.

Silver-lead-zinc

Taking as mean grade, Silver 5.5 oz. per ton, lead 5%, zinc 1.2%, tin 0.1%, return from silver and lead in a lead concentrate would be $3.00 to $3.50 per ton milled; zinc, tin and tungsten might yield an additional small amount, probably not more than $0.50 per ton.

Tin

We have no proven basis for estimating return from a tin concentrate, in which tin values are in stannite, and which assays say 30% tin, and also contains silver, lead and zinc. Neither have we any data on which to predict accurately recoveries and grades of concentrates.

Taking grade of ore to be milled as Silver 3 oz. per ton, lead 0.4%, zinc 1.5%, tin 0.5%, assuming recovery as payable metal, Silver 65%, lead 65%, tin 60%, and price for tin $0.45 Cdn. per pound, return from tin, lead and silver would be about $3.50 per ton milled. Zinc and tungsten might yield an additional few cents per ton.

Tungsten

Assuming grade of ore milled as .25% to 0.3% WO_3 and 80% recovery in concentrate assaying 60% WO_3 at $24.00 per unit, the tungstic oxide content per ton of ore would yield $5 to $6 per ton. Silver and lead might yield a few cents per ton.

Costs

Widths of ore range from less than 2 feet to more than 5 feet. Selective mining would be desirable. A good deal of handling would be required in moving ore from scattered workings. Milling would recover values in three and perhaps four products, the tungsten concentrates would probably have to be roasted. Transportation to and from the railway, 7 to 8 miles, would be an item of some importance. Uncertainty about these factors combine to make it difficult to predict costs, but the factors make it certain that costs would be high. Operating costs including development would probably be from $4.00 to $8.00 per ton of ore milled, assuming rate of production of 50 to 100 tons per day of milling ore of all classes. Capital charges are difficult to predict. However as the Woolsey is already largely equipped, charges for extra equipment should not be great. The uncertainty of the ore position and the fact that total ore is apt to be less than 100,000 tons indicate the wisdom of keeping further capital expense down even though that involves greater operating costs.

Some tungsten can probably be won at about the present price. Silver-lead-zinc and tin mineralization appears to be quite definitely sub-marginal.

834-37

Vancouver, B.C.
June [illegible]

H. Sargent,
Mining Engineer.

COPY

82N/4W
82N-4

WOOLSEY GROUP

Property: Regal Silver Mines, Ltd., property, formerly Woolsey Group.

Location: On Silver Creek, a tributary of the Illicilewaet River which joins the river 2 miles west of Albert Canyon, and 17 miles east of Revelstoke. The property is 6½ or 7 miles from the junction of the two streams.

Access: The main line of the Canadian Pacific Railway follows the Illicilewaet eastward from Revelstoke to the divide above Glacier. The railway passes the mouth of Silver Creek on the south side of the river, at which point a siding has been installed for the use of the Regal, Snowflake and Alco, mining properties on Silver Creek. A bridge suitable for trucks crosses the river and a road over which trucks have been driven for 5 miles follows Silver Creek to the Regal Silver property.

Several snow slide areas are passed over in the upper three miles of the road. Otherwise the topography presents no difficulties in the matter of road building. On account of the snowfall the road would not be easily kept open in winter, but with a tractor for winter use and by confining haulage to certain hours of the day, year round haulage should be possible. The snow slide menaced sections of the road would present problems during the period of sliding snow, generally a matter of a month or six weeks in the early spring. Probably a route could be chosen over which an aerial tramway could be operated and the danger from slides lessened.

Topography: The elevation at the Railway is about 2,150 feet and at the Regal Silver Camp 4,450 feet. The slide swept slopes about the camp rise two to three thousand feet higher - an area of rugged mountains. The veins of the property outcrop on the west side of the creek, and the natural slope of the mountain side affords reasonably convenient tunnel sites by means of which the veins may be opened over a vertical distance of 1,100 feet. By means of a long crosscut from the footwall side, still greater depths may be obtained.

Power: Diesel power is presently relied upon. Silver Creek has steep gradients and for a large part of the year carries much water, so is capable of development. The municipal slant of the city of Revelstoke is located on the Illicilewaet River, about 15 miles from the Silver Creek siding. A power line from it, twenty-five miles long would serve the Regal Silver property.

Timber: Cedar, spruce and fir trees are common in lower Silver Creek Valley and could be depended upon for part of the requirements.

Climate: The region is one of rather heavy rain and snow falls. Except for the limitations due to heavy snow, conditions are reasonably favorable, being comparable to the conditions at the interior camps as for temperature extremes and variations.

PROPERTY FILE

History: The Regal Silver or Woolsley property history is one of ups and downs, similar to that of the adjoining Snowflake Group. Early development work was done in an attempt to make a silver-lead-zinc mine. The grade of the large quartz vein precluded this. With the discovery of stannite in the Snowflake mine about 1928, misleading publicity caused much interest to be taken in the Snowflake property and the Woolsley, altho little or no tin had been found in its ore, shared in the interest. Much work was done underground, camps were built and the road improved. The boom period ended without a silver-lead-zinc-tin mine having been proven, but scheelite, an ore of tungsten had been detected in the Snowflake and the Regal veins and interest was kept alive and in 1938 a small underground mill was put on the Regal property. A few weeks operation showed it to be unfitted for the work and another shutdown resulted. Since that time the Regal Silver Interests have been attempting to secure capital for the further development of the Woolsley as a silver-lead-zinc-tin-tungsten mine.

Ownership: The ownership of the Woolsley property is at this time, probably rather involved, but as the large interests are apparently cooperating the transfer of a large interest in the property can probably be made without undue trouble. At one time fifty-three claims were held, but the number is now seventeen, of which twelve are crown granted. The original group was held by David Woolsley, the staker, and now belongs to his widow. Some claims are recent stakings. At different times work has been done by the Morton-Woolsley Company, a stock company, funds having been provided by interests identified with the Revenue Mining Company, which is also closely related thru personnel to the Regal Silver Mines, Ltd.

Equipment, Camps, Etc.: The camps on the property are not suitable for permanent use, either as to location or condition. The main camp is in a strip of timber about 150 feet wide, the shrinking remnant of a wider strip upon which the snowslides are slowly encroaching. The nearest place for a camp, safe from slides, is perhaps 4,000 feet down stream from the present camp, and main portal. At the down stream site a new main level could be driven perhaps 400 feet lower than the present or No. 10 Level. To reach the most promising, and presently most developed vein No. 5, a crosscut some 3,500 feet long would be required.

There is considerable machinery on the property, placed there at various times, so possibly the property of various companies. In the power plant near the main portal and under a fair roof, but subject to encroaching slides, are:

Petters vertical oil engine 36/42 450 RPM driving Holman vertical compressor.
Ruston-Hornby, horizontal oil engine (1cyl) driving 10 KW 125 volt generator D.C.
Fairbanks-Morse vertical 3 cyl. oil engine driving 440 volt, 52.5 amp. A.C. generator.
Small gasoline engine driving starting compressor
Rix 56 Portable compressor (275 cu. ft.)

1 R 51 Stoper - good condition
1 R 82 Drifter " "
1 R 75 Drifter fair "
1 Sullivan sharpener
1 Tugger Hoist
1 Air Hoist at #5 Level.

In the underground mill are the following pieces of machinery.

8" x 10" Jaw Crusher
12" Belt Feeder
4 x 4 Ball Mill (Union Iron Works, Spokane)
36" Wide Dorr Classifier
4 Cell Mechanical flotation machine
2 concentrator tables
Considerable air and water pipe, small tools, kitchen and dining room ware, mattresses, iron beds, stoves, etc., etc.
5 - 6 Drums fuel oil
35 boxes dynamite.

Geology - General: The Quartz veins at the Woolsley and Snowflake properties, are bedded veins in argillite of the Selkirk Series (Beltian) of Daly. As shown at the railway at Albert Canyon and along Silver Creek, the slates make a regular band a mile wide (2,000 ft. thick). At the railway as at the Woolsley property they dip to the north east, and are overlain by Illecillewaet quartzite and underlain by thin beds of quartzite and limestone also Selkirk. A great sill of biotite granite of the pre-Beltian, Shuswap Terrane underlies the Selkirk rocks, unconformably.

The argillites are metamorphosed to some extent, but not to the point of making true schists. The beds vary in strike and dip locally, but in general, in the mine area, show little deformation other than the tilting. Except for the quartz veins there are no igneous rocks present in the mine, dykes so common in other western mining districts being quite lacking. Presumably at some undetermined depth, the sedimentary and earlier rocks will be cut off by granite, but there is no way of telling where that will be, and deep seated veins may be expected. Some 2,000 feet of depth of vein is now observable, from the low point on the Woolsley to high points on the same vein system, if not the same vein, on the Snowflake property.

In the Snowflake Mine, the quartz vein carries the sulphides, galena, blende, pyrite, stannite, (copper-tin sulphide) and scheelite. Silver in small amounts and traces of gold or slightly better are present. In parts of the Woolsley mine scheelite is present in small amounts, in other parts it is lacking and in a few places specimen ore is present. Stannite has probably been found but in very small amount. The other sulfides are present, in some cases making ore, but in general the percentages are low. Fluorite accompanies the scheelite.

Two veins have been extensively developed in the Woolsley mine, and no less than 15 others have been reported as well enough determined to be given numbers, but there may be repetitions. At any rate six

veins have been noted in the long crosscut on the No. 10 Level, and Nos. 5 and 6 have been prospected on this Level and in raises from it.

Development:

Snowflake Level: The Woolsley vein system is developed by six different levels. At the top the easterly extension of Snowflake Vein workings, at 5550 elevation, crosses the common boundary of the Snowflake and Regal properties, and develops what is commonly regarded as the uppermost part of the No. 5 Woolsley (Regal) vein. The correlation is not certain but may be correct. The workings were not visited, but samplings shown on Company maps indicate a narrow (1.6 to 5.5) "spotty" and average low-grade vein, in which silver lead and zinc are the worthwhile metals. Tin and copper are noted, but the percentages are so low that their values are questionable.

The easterly part of the Snowflake vein, which contains a short ore shoot on Snowflake ground is also prospected on the Regal property. Sampling here, again indicates a lowgrade narrow vein. As shown on the Company maps, the Guernsey sampling shows, 272' of vein, 1'-5" to 3'-5" wide, which assays:

Ag Oz.	Pb %	Zn%	Sn%
3.0	0.4	1.5	.5

A drift from Crosscut No. 2E, prospects a parallel vein which is 9 feet wide at the crosscut. The drift shows relatively good silver and lead zinc values for 80 feet. Tin and copper are also noted. The vein has not been prospected to the west of No. 2E X-cut where it should be in the hanging wall of the Snowflake vein.

The workings at the Snowflake level, would seem to be west of the so-called "Fissure" fault which seems in some way to influence mineralization of the veins in the lower levels of the Woolsley Mine. With two or three exceptions the parts of the veins east of the fault are more regular and more uniformly mineralized than are the parts west of the fault. The Snowflake ore shoot is probably west of the fault, the existence of which in the workings at this level has not, perhaps, been established.

No. 3 Level - (Old No. 1 Adit): No. 3 Level at 5,250 elevation, prospects a vein about 5' wide, which as shown on Company maps, is somewhat irregular and low grade. This vein is correlated as No. 5, and may so be, but until connections have been made, the correlation must be tentative. The workings on No. 5 Level (Old No. 2) show a vein or veins that, because of position, seem unrelated to veins in the lower Levels, and veins showing above No. 5 cannot be definitely correlated with those below until connecting raises are put thru.

No. 5 Level (Old No. 2 Adit): When visited in 1922, the short No. 2 tunnel of the Woolsley property was the principal working on the claims. Since then much work has been done, without materially bettering the prospects. The vein has been

shown to have much greater lateral extent than then known but the average grade of the veins shown by the later development, is like that shown by the early prospecting, too low to warrant consideration.

Samples No. 26 to 30 inclusive were taken on this Level, and show low tungsten values. Company maps show low and somewhat erratic percentages of tin, but the samples taken at the recent examination failed to show tin. From a small stope, opened since 1929, a few tons of ore was taken and shipped; good ore, (see sample No. 26,) still shows in the east end of the stope, but the west end looks less promising due to an irregularity in the vein caused by a roll.

Raise "C" from this Level was not sampled. The Guernsey report, for 132 feet of raise, gives the average of all assays as:

Width	Ag Oz.	Lead %	Zinc %	Tin %
5 feet	5.0	4.2	1.0	0.14

The same report gives: "From a point 25' above the Level to a point 88' above, the values are somewhat better, averaging:

Silver Oz.	Lead %	Zinc %	Tin %
7.5	6.9	1.1	0.2

The raise has been driven 98 feet further up the vein since the Guernsey report was made, and the Company map says the values are the same. The Company map also reports scheelite in the raise. The Guernsey report sums up the sampling on this (No. 5) Level thus: - "An analysis of the sampling shows that for a distance of 350 feet, the average of all samples is: Silver 5.0 Oz. Lead 5%; Zinc 1.2%; Tin 0.1%; No. 1, No. 2 and No. 3 Crosscuts North show the vein to have an average width of 16 feet and channel samples cut across these average - "

Silver	Lead	Zinc	Tin
5.0 Oz.	4.2%	1.5%	trace

Channel samples cut under my direction at the time of the recent examination assayed

X-Cut	Sample No.	Width	Ag Oz.	Pb%	Zn%	Tin %	W %
No. 1	30	19'0"	1.9	2.75	1.61	Nil	.05
No. 2	29	11.7	2.80	4.54	1.56	"	.04
No. 3	27	10'F.W.	1.80	2.35	2.52	"	.13
No. 3	28	5.5 H.W.	1.90	3.16	7.21	"	.08

X-Cut No.	Sample No.	Width	Ag Oz.	Pb%	Zn%	Tin %		W %	
No. 1-1922 sampling	From Hanging Wall	3'	0.3	1.6	0.7	not	run	not	run
"	"	3'-6"	0.5	1.1	1.0	"	"	"	"
"	"	6'-17'	2.1	2.8	2.6	"	"	"	"
No. 2-1922 sampling	From end of X-cut (hanging wall not then determined)	4'	4.4	5;7	2.3	"	"	"	"
	From end X-cut	4'-8'	2.1	2.0	1.6	"	"	"	"
	" " " "	8'-11'	2.9	2.2	1.1	"	"	"	"

No. 8 Level: No. 8 Level at 4,668' elevation is the next level below No. 5. Levels 6 and 7 are proposed, but no work has been done upon them.

No. 8 Level was opened from "A" raise which starts at No. 10 (4,455 elevation) and follows No. 5 vein to 8 Level.

As the best assays for tungsten have been had from samples taken on this Level, the vein was sampled more or less systematically. The "fissure" fault cuts across the vein at the top of "Z" raise so that part of the Level east of the raise is east of the fault, in what has been commonly regarded as the best mineralized parts of No.s 5 & 6 veins.

At the top of A Raise on the west side, the vein 3½ feet wide is largely quartz which continues to about 30' from the raise. There it pinches, but another lens like vein comes in near the floor of the drift and continues to the face of the Level where the vein is six feet wide. It contains some galena and blende, and a moil sample, #13, showed much more tungsten than expected - 2.09%.

East of the raise the drift follows the fault zone for about 50 feet at which point the drift turns to the right and for 240 feet is in the vein. The vein at this Level and east of the fault carries much iron pyrite, small percentages of galena and blende, and erratic tungsten values, - see samples 14 to 25 inclusive. The average width samples was 5.5 feet. At the easterly end the vein was left in northerly wall, as the drift was turned, for no apparent reason, to the south east. Two narrow en echelon veins of quartz show in the footwall of the main vein, but these also lead into the northerly wall of the southeasterly trending drift.

A branch drift to the southwest is said to show what may be the No. 6 vein, but ore has been stored in the dead end and the vein cannot be clearly seen.

At two places in this 8 East drift, specimen scheelite shows, in the floor at 190 feet and in the shallow underhand stope at 230 feet. At other places it may sometimes show in small amounts, but the average amounts seem to be small. It accompanies heavy yellow iron-pyrite which, with fluorite, is a good indication of the tungsten mineral.

"A" Raise: The 50 ton mill installed, in 1938, is in an enlarged part of "A" raise between No. 8 and 9 Levels. In cutting out for the machinery scheelite was found in the footwall side of the No. 5 vein. Sample No. 12 was taken across 18" behind the flotation machine. Scheelite is visible here as indicated by the sample which ran 2.22% tungsten. No. 5 vein shows in "A" raise from No. 8 Level to No. 10 a slope distance of 388 feet but from No. 10 Level to above No. 9 the vein is low grade. The Guernsey sampling of the raise from No. 10 to above No. 9 showed:

Silver Oz.	Lead %	Zinc %	Tin %
1.5	1.0	Trace	Trace

No. 8 sample was taken on the east side of the raise, 40 feet above No. 10 Level at which point 5.7 feet of the vein is exposed in the raise. The sample assayed:

Silver Oz.	Gold Oz.	Lead %	Zinc %	Tin %	Tungsten %
3.06	0.04	2.09	.81	Nil	.13

No. 9 Level: No. 9 Level at elevation 4,578 feet was opened from "A" Raise to the surface on the east and to the west is open for about 300 feet. The Level is in the vein at the Raise, but going westerly the vein exposed in the drift consists, essentially, of a persistent clay seam on slickensided footwall, and a heavy pyrite, graphitic slate band from 1" to 24" wide.

At one point there is three feet of quartz, ribboned with slate and carrying some pyrite. The west end of the Level is caved. At sample, No. 11, of the pyrite, consisting of cuts across the iron stringer over a distance of about 150' and an average width of about 12 inches, assayed:

Silver Oz.	Gold Oz.	Lead %	Zinc %	Tin %	Tungsten %
1.40	Tr.	.51	.60	Nil	0.76

"Premier" sampling for 175 feet, from the Raise westerly shows an average width of 23" and 0.59% WO_3. The Level easterly from the "A" raise, shows a vein 5 feet wide, with iron and a little galena. This continues for about 40' (to the 1st X-cut left). Then for about 40 feet the vein, 3½ feet wide, carries two distinct iron bands, one on the footwall about 12" thick and one on the hanging wall about 10-12" - at about 60 feet from the X-cut the vein tapers to nil.

The "Fissure" fault is not as distinct at this Level as below and above. By projection it should be about where the vein tapers. The fault may coincide with the vein on this Level. The continuation of the vein east of the disturbance should have been intersected in the 2nd X-cut left (north), but there is no sign of it. Samples taken near the 1st X-cut north, where the heavy pyrite bands make up a large part of the vein assayed:

Sample No.	Width	Silver Oz.	Gold Oz.	Lead %	Zinc %	Tin%	Tungsten%
9	5'	0.4	Tr.	1.22	.53	Nil	.24
10	4'	.20	"	1.53	.81	"	.20

The poor vein exposed in No. 9 Level, between the No. 8 with its higher than average mineralization, and No. 10 with its strong quartz veins, is not easily accounted for, but more work should show the extent of the apparent weak area.

No. 10 Level: No. 10 Level at 4,455 elevation is the main level in the mine. At its portal the power house and camp buildings are crowded in the narrow strip of, as yet, slide free timber. The Level is a drift in the slates for a distance of about 200' from the portal. It then X-cuts the slates for 1,250 feet, in which distance five quartz veins are exposed. Two No. 5 and No. 6, showed enough mineralization by galena and blende to warrant development.

No. 5 vein on which drifts are opened east and west is a large quartz vein where X-cut by the main adit. In the drift westerly it is exposed for about 200 feet and crosscuts show it to be up to 9' wide. The Guernsey Report says the vein to the west for 150 feet averages:

Silver Oz.	Lead %	Zinc %	Tin %
7.6	6.6	2.6	Trace

for the six feet of width sampled. A moil sample cut across 6.2 feet in the 1st crosscut north 5 west, 10 Level assayed:

Silver Oz.	Gold Oz.	Lead %	Tin %	Tungsten	Zinc %
37.98	0.02	3.97	Nil	0.14	.55

The silver value is "out of line."

Going westerly the vein decreases in width and consists of quartz with slate ribbons and little sulphide at the 3rd X-cut north in the 5 west drift. Between the X-cut and the forks in the drift more pyrite shows in the vein. At the forks the pyrite vein, 12-18" wide, goes into the west wall of the north fork. A sample of the heavy pyrite taken from 3 cuts across the 12-18" vein assayed - Sample No. 4:

Silver Oz.	Lead %	Zinc %	Tin %	Tungsten %
0.08	1.07	.55	Nil	4.78

No. 5 East 10th Level: The quartz vein shows in the drift to the east to a point about 90 feet from the Main X-cut. At the X-cuts north and south it has a thickness of 10-12'. A sample in the south X-cut across 7' assayed:

Silver Oz.	Lead %	Zinc %	Tin %	Tungsten %
0.04	.46	.71	Nil	Nil

At the forks in the drift, the "Fissure" fault is encountered. The drift turns on the quartz filled "fissure" (or roll) which fills the drift for about 50 feet. At that point, (the end of the drift), in the right side of the face, a somewhat irregular vein 2½ feet wide shows. It contains little sulphide and assayed - No. 1

Silver Oz.	Lead %	Zinc %	Tin %	Tungsten %
Nil	1.53	.73	Nil	.34

In the lower left corner of the face similar looking quartz shows. A sample of this assayed - No. 1A

Silver Oz.	Lead %	Zinc %	Tin %	Tungsten %
1.00	1.84	.73	Nil	.32

The 50 feet, is supposed to be the distance the No. 5 vein is thrown by the "Fissure" fault. Certainly the strong quartz vein either is cut off, or changes direction at the turn in the drift. But work needs to be done to show the true relationship of the northwest-southeast veins and the east-west "Fissure" fault vein.

The fault vein is cut thru by the main crosscut, between No. 5 and No. 6 veins. The strike is roughly east and west and the dip here is nearly vertical, tho the average dip is probably 60° to the north. The fault zone is about 8 feet wide and well defined by shattered and disturbed slate and gouge seams. Thru the slate is a network of quartz seams, and minor amounts of sulphide. A sample across the vein on the northwest wall, No. 31, assayed:

Silver Oz.	Gold Oz.	Lead %	Zinc %	Tin %	Tungsten %
Tr	.02	.92	.61	Nil	.03

The "Fissure" fault shows again in No. 6 West 10 Level drift. The fault here shows considerable calcite and very little sulphide. No. 6 vein, a well defined and strong quartz vein in the workings to the east of the point where intersected in the 6 West drift, practically loses its identity west of the intersection, indicating that the fault is a structural feature of some consequence, but there is some reason for questioning the idea that it is a true fault. Instead it may be a true vein which crosscuts the bedding of the slates and the more quartzose veins are bedded branches of it. The fault has not been definitely identified at No. 5 Level, but the several breaks inside of C Raise, No. 5 Level, may represent it. Certainly they disrupt the striking regularity of the large quartz vein which shows to the east of the broken zone.

No. 6 vein 10 Level: No. 6 Vein shows as a strong quartz vein in the crosscuts from the east drift. It is sparingly mineralized with sulphides and sampling No. 5, 6, & 7, shows low to nil values in lead, zinc and tungsten, and tin. The Guernsey report gives the average width of the vein in No. 6 East, as 8 feet, and the average value for 500 feet of length as:

Silver Oz.	Lead %	Zinc %	Tin %
3.0	1.5	0.9	0.5

The most easterly 120 feet averaged rather higher, viz:

Silver Oz.	Lead %	Zinc %	Tin %
5.2	4.1	1.2	0.4

Riase "B" prospects the vein for 200 feet up the vein. The Guernsey report shows average low grade material in the raise over a width of 4.5 feet, viz:

Silver Oz.	Lead %	Zinc %	Tin %
2.4	2.7	1.5	0.5

The data are not in complete agreement as to the metallic mineral content of No. 6 vein, but the indications are that it is too low grade to warrant more than passing attention.

General: The Woolsley (Regal) property was originally prospected as a possible silver-lead-zinc producer. Extensive sampling has shown that under ordinary operating and average marketing conditions, profitable operation as a silver-lead zinc mine is impossible.

With the discovery of stannite (tin-copper pyrites) and scheelite in the adjoining Snowflake Mine in 1928 interest in the Woolsley was revived. Scheelite had not been generally recognized at the Woolsley in 1929, tho as now known, it was then exposed in the end of No. 5 E, 10 Level, (Samples 1 & 1 A) and possibly in No. 6 Vein on 10 Level. No. 2 Level samples now shown small percentages (Samples 29 and 30) where its presence was not then suspected. Assaying of samples taken in 1929 and at this time, has failed to show tin, even in small amounts, in the Woolsley veins. "Company" assaying, as well as that done for the Guernsey report (By Eldridge) show widespread tho low tin values in the Woolsley veins. The ore minerals which must be recovered from the Woolsley veins have the following compositions and specific gravities.

Galena	Pb 86.6%	S 13.4%	Sp. Gr.	7.4 to 7.6
Blende	Zn 67%	S 33%	" "	3.9 to 4.1
Scheelite	WO_3 80.6%	CaO 19.4%	" "	5.4 to 6.1
Stannite if present	(Cu.Sn.Fe.)	S Uncertain	" "	4.5 to 4.52.

Gangue Minerals:

Quartz	Si 46.7%	O 53.3%	Sp. Gr.	2.6 to 2.66
Pyrite	Fe 46.7%	S 53.3%	" "	4.9 to 5.2
Argillite, graphitic and with ferruginous carbonate			" "	2.4 approx.

In the mill installed in "A" Raise in early 1938, an attempt was made to take off a sulphide concentrate, after fine ball mill grinding. The tailing from the flotation machine was then tabled to separate the heavy scheelite from the non-sulphide gangue minerals. Due to the grinding in the vall mill the scheelite was "slimed" and the "saving" on the tables was unsatisfactory. The operation ended without a correction in the flow sheet having been made.

In September 1908 a 700 lb. sample of relatively high grade ore (2.42% WO_3) was sent to Ottawa for testing. The report - Ore Dressing

and Metallurgical Investigation No. 756 - indicates that the better procedure is to make a coarse primary grind, this to be followed by tabling in which a lead concentrate would be secured. The scheelite and light - or sulfides would be reground in a ball mill, the product to go to flotation cells, and a bulk concentrate made. The scheelite would go into the 1st run flotation tails from which it would be recovered by another flotation operation. The tests indicate that considerable sulphur in the shape of metallic sulphides follows the scheelite so roasting is resorted to, to make a low sulphur concentrate. By refloating the grade of the tungsten, concentrate was brought up to 55.90% WO_3 and the sulphur content was 0.32%.

The Ottawa tests indicated overall recoveries from the relatively high grade ore of:

Tungsten	81.6%
Lead	88.5%
Silver	80.4%

Tin is not mentioned in the report.

Value of Tungsten: Tungsten is classed as a minor metal. The uses are now many, but the quantity used is small compared to so many other metals. The quantity imported into the U.S.A. varies greatly, indicating varying consumption, and, of course, a varying price results. Ordinarily China is the principal producer of tungsten, but under the protection of a tariff, the U.S.A. now supplies a fair part of its requirements, and reference to the news notes of mining magazines shows numerous prospects are in course of development.

The quotations ordinarily given, pertain to tungstic trioxide (WO_3) of 60% or better purity, and the price is for a unit of that grade, that is for 20 pounds. Current quotations are, f.o.b. New York (E. & M.J. Nov. 1939)

Chinese, 65% duty paid per unit	$23.75
Domestic " and upward " "	$25.00

Canadian production is subject to Government regulations as for export and ultimate destination, so there is really no free market, though small lots can probably be disposed of. Shipments into the United States are subject to the import tariff of approximately $8.00 per short ton unit, so Canadian producers would receive only $17.00 per unit or roughly 85 cents per pound for concentrate assaying 65% WO_3.

The prices of lead and zinc are also indefinite and finally subject to Government control. "Trail," the nearest point for disposal of such products has contracted with the British Government to sell approximately 75% of its own output of zinc at 3.5 cents per pound and 60% of the lead output at 3 cents per pound. The price for zinc is much below the U.S. price, but the American market is not readily available to small Canadian producers.

Ore Reserves: As has been patent for years, the Woolsley property has at no time been, nor is it now, a potential silver-lead-zinc mine. The occurrences of tungsten and possibly tin, alterthe problem somewhat, but not much, as the best tungsten values are found in these parts of the No. 5 vein where the silver, lead and zinc values are low, so the base metals and the silver increase the gross value of the ore, but little. The lead and silver would be worth saving, but the zinc would not be, under average conditions.

The best showing of tungsten is in No. 8 East, where for 237 feet the vein averages 5.5 feet wide and assays

Silver Oz.	Lead %	Zinc %	Tin %	Tungsten %
0.5	1.5%	0.7%	Nil	0.34

(The"Premier" sampling shows .37% WO_3, tungsten trioxide (.30% tungsten) over 4.5 feet averaging width, for a length of 250 feet). This ore-shoot has not been found at No. 9 Level, nor has it been followed upward so no large tonnage can be definitely ascribed to it, though

$$\left(\frac{\text{thickness } 5.5 \times \text{length } 240 \times \text{height } 50}{10} \right)$$ 66,000 tons are indicated. Should the vein be found to extend easterly of the "fault" in S.E. 10 Level, and be found on No. 9 Level, a much larger tonnage would be indicated, but as yet those possibilities remain to be determined.

The gross value of this ore, assuming 80% recovery of the silver, tungsten and lead, would be -

Silver 0.50 oz. @ 80% @ 35¢ per oz.	$0.14
Lead 1.50% @ 80% @ 03¢ per #	.72
Tungsten .34%# x 1.26 @ 80% @ 85¢ per #	5.82
TOTAL	$6.68 per t.

1.26 is the factor for converting tungsten to tungsten trioxide.

Since the cost of equipment (Est. 50¢ to $1.00 per ton), development (Est. $1.00 per ton) mining (Est. $2.50 to $3.00 per ton) Milling (Est. 1.50 - 2.50 per ton)., selling etc., (Est. $1.00 per ton) must be borne by this gross recoverable value, it is apparent the prospect has little chance of becoming a profitable producer.

The ore in No. 9 West is higher grade than that in No. 8 East, but is very irregular as to thickness and grade. This ore because of the narrow width and erratic grade would be expensive to mine. The ore showing in 5 West, 10 Level, at the angle in the drift may represent the downward extension of the 9 West ore. If so there is a possible ore shoot here 225 feet long, 24 inches wide and (should it go to 10 Level, 200 feet deep). The possible tonnage is $\frac{225 \times 2 \times 200}{10}$ = 9,000 tons.

The Premier sampling of 9 West (21 samples) shows an average thickness of 24" (as used above) and grade of 0.60% of tungstic trioxide.

The one sample taken during this examination, across an average

width of 12" only, showed:

Silver Oz.	Lead %	Zinc %	Tungsten %
1.40	.51	.60	.76

The gross value of such ore would be, reducing the silver values and lead somewhat on account of the greater width taken, and using the 0.6 WO_3 for the tungsten.

Silver 1.1 Oz. @ 80% @ 35¢	$0.31
Lead 40 oz. @ 80% @ 03¢	0.19
Tungsten 60% @ 80% @ 85¢	8.16
	$8.66

On account of the width the mining cost would be greater than for the other ore shoot and the margin would still be too small to warrant the required expenditure.

Conclusions: At other places, such as 5 West, No. 8, 5 West No. 10 and the mill cut out in A Raise, good grade tungsten samples can be obtained, but the average grade and indicated tonnage are not such as to warrant participation in this project by outside interests, at the present price of metals, and on the terms named.

REPORT BY:

N.E.Nelson November, 1939

THE GRANBY CONSOLIDATED MINING, SMELTING & POWER CO., Ltd.

CERTIFICATE OF ASSAY

Allenby, B.C. November 10, 1939

Assay of Samples from -- N.E.Nelson

Description	% Copper Wet	Ounces per Ton Silver	Gold	% Pb	% Zn	% Sn	% W
Regal #1	Nil	Nil	Trace	1.53	.73	Nil	.34
#1A		1.00	"	1.84	.73	"	.32
#2	"	.04	"	.46	.71	"	Nil
#2A	"	Trace	"	4.44	1.86	"	.24
#3	"	37.98	.02	3.97	.55	"	.14
#4	"	.08	Trace	1.07	.55	"	4.78
#5	"	.20	"	1.63	.76	"	Nil
#6	"	Nil	Nil	1.63	.40	"	Trace
#7	"	Trace	.02	1.22	.81	"	.11
#8	"	3.06	.04	2.09	.81	"	.13
#9	"	.04	Trace	1.22	.53	"	.24
#10	"	.20	"	1.53	.81	"	.20
#11	"	1.40	"	.51	.60	"	.76
#12	"	.05	.01	1.22	.71	"	2.22
#13	"	5.20	Trace	1.33	.35	"	2.09
#14	"	.40	"	1.53	.67	"	.85
#15	"	.36	"	1.27	.46	"	.54
#16	"	2.66	.04	4.89	.93	"	1.24
#17	"	Nil	Trace	1.32	.66	"	.05
#18	"	.06	"	1.22	.86	"	.05
#19	"	Nil	"	.51	.71	"	.12
#20	"	"	"	Trace	.51	"	.15
#21	"	.04	"	1.85	.56	"	.11
#22	"	.56	"	2.04	.65	"	.12
#23	"	.72	"	1.94	.62	"	.09
#24	"	Nil	"	1.02	.62	"	.25
#25	"	.70	"	1.27	1.41	"	.09
#26	.290	36.94	.06	49.83	4.18	"	.06
#27	Nil	1.80	Trace	2.35	2.52	"	.13
#28	"	1.90	"	3.16	7.21	"	.08
#29	"	2.80	"	4.54	1.56	"	.04
#30	"	1.90	"	2.75	1.61	"	.05
#31	"	Trace	.02	.92	.61	"	.03

"R. Manning"
Assayer

Vancouver, B.C.,
January 8th, 1940.

SUPPLEMENTAL

In order to be more certain that the tungsten values determined in the Allenby assay laboratory were nearly correct, two composite samples were made up and sent to Ledoux and Company for assay. The arithmetical averages of the samples, according to "Allenby" were -

No. 1	No. 2
0.19 W	0.11 W

The Ledoux certificate shows -

After drying

	No. 1	No. 2
Tungsten Oxide (WO_3)	None	None
Tin	0.08%	0.12%

The Allenby analyses had shown no tin.

Since these results came in the Allenby office has done more work on the composite samples and now reports

	No. 1	No. 2
Tungstic Oxide	.24	.17
Tin	.06	.07

These results are in reasonable agreement with the arithmetical average obtained for the first Allenby determinations, but not in accord with the Ledoux assays.

A cut of the No. 1 composite was sent to E. Vaughn at Relief-Arlington. Mr. Vaughn, who at one time worked at Allenby, worked at the Regal Prospect and had done much work on the Regal ores, in fact, is credited with first noting the general distribution of the scheelite.

Vaughn reported:

	WO_3	Tin
Regal No. 1 Comp.	.456%	Tr

Such results make for lack of confidence in all the assaying, but at best, the values in the various metals are too low to warrant outside capital joining in the enterprise on the terms outlined by Mr. McCulloch.

N.E.Nelson

NEN:m
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82 N/4W
82N-4

June 30/20
K. W. Guernsey

REGAL SILVER MINE, 19 MINERAL CLAIMS

British Columbia, Revelstoke Mining Division, nine miles from Albert Canyon Station, on the Canadian Pacific Railway, and eight miles from Silver Creek Siding, from which point a good trail, wide enough to permit the use of carts or sleighs, leading to the lower camp.

The property extends from the West slope of the East Fork of Silver Creek, across the intervening valley to the North Fork of the Illecillaweet River. Map No. 1.

Deposits:

The area of the property upon which the greater portion of the work has been done is underlain by black carbonaceous slates with miner beds of black quartzite. These rocks are classed as belonging to the Selkirk series of the Pre-Cambrian Era, and the lode deposits are believed to have been formed by solutions which came up from the Magma of the granitic intrusions, possibly the granite which is exposed on the trail between the Railway and the property.

The lode deposits are represented by a series of quartz veins, the outcrop of which appear on the West slope of the East Fork of Silver Creek.

Surface prospecting has shown that several of the veins carry amounts of silver, lead and zinc sulphides, in the form of galena and sphalerite, and underground work on the adjoining property - the Snowflake - led to the discovery of tin, in the form of stannite.

- Refer to Map No. 1 -

The underground work undertaken has been for the purpose of furthering prospecting and exploring the lodes and consists of a main crosscut - No. 3 - with drifts on the 5 and 6 veins. A raise on the No. 5 vein to the Intermediate level and a raise on No. 6 vein. Drifting on No. 5 vein.

Description:

On the "May" claim on the west slope of the Creek at an elevation of 4,455 feet above Sea level, a crosscut tunnel - No. 3 - was started to cut the downward extension of the known outcrops.

- Refer to Map No. 2 -

At two hundred and seventy-two feet from the portal, a vein designated as No. 2 vein - was encountered, and as it did not show any values no work was done on it.

At eight hundred and sixty feet from the portal a number of stringers of quartz were cut not showing any values and this group of stringers has been called the No. 3 vein.

At nine hundred and sixty feet, No. 4 vein was cut, samples from here only gave low values.

At a point nine hundred and forty feet from the portal, No. 5 vein was reached. A section along the crosscut shows five feet of quartz called the upper No. 5 vein, then a slate parting of three feet, and then seven feet of quartz called the lower No. 5 vein.

A drift was started to the West - No. 5 West - and continued on the footwall side for a distance of one hundred feet, where a crosscut raise was driven to the North, showing a total width of vein of twelve feet, at this point a Raise - "Raise "A" - was started up the dip.

The drift was continued on in the footwall and at a point one hundred and fifty feet from the main crosscut a raise to the North exposes a width of five feet of vein.

At the two hundred foot point another crosscut was driven North showing a thickness of vein of one foot. ~~Further on bunches of pyrite are shown on the left side of the one foot~~. Further on bunches of pyrite are shown on the left side of the drift but very little galena mineralization is apparent.

The drift was continued on for fifty feet, and the face only shows a four inch streak of quartz. A crosscut was driven North with the hope of cutting No. 4 vein and a diamond drill hole run further North but cutting nothing of importance was exposed.

From the main crosscut, a drift was turned East - No. 5 East - and driven on the vein, the walls not being shown, at the fifteen foot point a short crosscut was driven, but the footwall of the vein was not reached. Here the vein shows pyrite dissiminated throughout the quartz and sparse galena.

The sampling shows that for a distance of one hundred and fifty feet West of the main crosscut, this vein has an average width of six feet and an average content of silver 7.6 ozs., lead 6.6%, zinc 2.6% and tin a trace. Beyond this point, the vein narrows and splits, the assay values being low, until the face only a four inch streak is shown, with no values.

East of the crosscut for ninety feet, the average width is seven and one half feet, and the content, silver 5.2 oz., lead 5.3%, zinc 0.5%, tin 0.2%. Where the fissure fault is reached, the quartz narrows the values are low, and at the face the width of vein is only two feet.

Raise "A", driven up the dip for a distance of two hundred and eight feet, shows width of vein varying from six feet to one foot. At this point one hundred and eight feet up a station was cut and the intermediate level started.

Sampling of the raise shows a low metal content. The average being silver 1.5 oz., lead 1%, zinc a trace, tin trace. The highest result was silver 5.2oz., lead 1.5%, zinc 0.45%, tin 0.43%.

The raise has been driven on the footwall of the lower No. 5 vein and this may account for the low results of the sampling.

No. 6 vein is cut by the main crosscut about eleven hundred and forty feet from the portal, and two hundred feet beyond No. 5 vein. A section along the crosscut shows eight feet of vein lamenated quartz-slate. Drifts were turned East and West running on the foot side of the vein.

[redacted]

To the west at forty feet, the drift - No. 6 West - cuts the fault shown in No. 5 East. Here also quartz fills the fault fissure. The drift was continued on for seventy-five feet in the slates, then turned to the left to crosscut the extension of the vein thrown by the fault fissure. The throw here is about seventy-five feet. The drift at first shows only a small seam of quartz which later widens, but does not contain values. At a point two hundred and fifty feet from the crosscut, bad ground is encountered with no values showing. The drift continues for one hundred and sixty feet further in broken ground, and the face only shows seams of barren quartz.

East of the main crosscut, the drift is driven on the footwall side of the vein. At a point thirty feet from the crosscut a raise - Raise "B" - was started. At seventy feet a crosscut - No. 1 North - shows ten feet of vein. The drift continues on, and at one hundred and fifteen feet crosscut No. 2 North, shows five feet of vein. At a point two hundred feet from the main crosscut, crosscut No. 3 North shows eight feet of vein rather banded with heavy pyrites on the hanging. At three hundred feet, Crosscut No. 4 North exposes ten feet of vein, and at four hundred feet crosscut No. 5 North shows ten feet of vein rather good looking. One hundred feet further on crosscut No. 6 North shows eight feet of vein. The vein apparently narrows here and where exposed in the face five hundred and sixty feet from the main crosscut three and one half feet of quartz with a slate parting is shown.

An analysis of the sampling of No. 6 vein shows the following: Eight feet of vein where the drift - No. 6 West - turns off gives low values. The drift is in the footwall up to the fault fissure, and the vein cannot be sampled. Beyond the fault fissure, the vein is represented by small seams with the exception of at one point where a small crosscut shows a lense of quartz with only low values.

East of the crosscut - drift No. 6 East - the average width as shown by crosscutting is eight feet. The values are, however, low, the average being about: Silver 3.0 oz., lead 1.5%, zinc 0.9%, tin 0.5%. At one point about four hundred and eighty feet from the crosscut, two samples gave: Tin 2.9%, but generally speaking, the tin values are low. From a point four hundred and forty feet from the crosscut to the end of the drift, one hundred and twenty feet, the metallic contents are somewhat better, the average being: Silver 5.2oz., lead 4.1%, zinc 1.2%, tin 0.4%.

Raise "B" was driven up the dip from No. 6 East for a distance of two hundred feet. The width of vein shown averages four and one half feet, and the face carries pyrite and galena in fair amount. The average of all assays gives: Silver 2.4oz., lead 2.7%, zinc 1.5%, tin 0.5% for a width of 4.5 feet.

At a point one hundred and fifteen feet above the level a value of silver 8.4 oz., lead 3.2%, zinc is shown and at one hundred and ninety feet above the level a value of silver, 7.7 oz., lead 11.1% is given. The general average is, however, low.

[redacted]

On the intermediate level one hundred and seven feet above No. 5 level, the drift to the West of the Raise "A" has not disclosed any commercial ore. The vein is not particularly well defined, being a series of short lenses and narrow seams of quartz. At the face of the West drift five hundred and forty feet from the Raise, there is a ten inch seam of quartz.

On the intermediate level, the ground is more or less disturbed, in this area to the West and there is no inducement to do any further work here.

East of the Raise, the drift shows the vein to have a width of from one to three feet, with low values. At a distance of about eighty feet from the Raise, the vein pinches and disappears into the hanging. On the assumption that the drift was on the lower vein, a crosscut was driven North without disclosing anything. At about eighty-five feet, the drift turns slightly to the North and at a point two-hundred and sixty feet from the raise another crosscut was driven North without any results. The drift continued and at about the three hundred and eighty foot point, a small seam was encountered. This is rather well mineralized, but only has a maximum width of ten inches. The drift continues until the face is reached about five hundred and forty feet from the Raise.

The vein on this level does not show the widths one would expect from what is shown below, and it is a question whether the work has been done on the main vein. Crosscuts have failed to find it to the North, and it may be that this horizon is in a narrow portion of the vein. However, from an examination of the drift, and the map, it looks as if the work had been done in the hanging, and there is a possibility that a crosscut South about the one hundred and fifty foot point, would locate the lost vein. This work, however, is not recommended at the present.

At an elevation of 4,958 feet above Sea-level, on the "Helena" claim, No. 2 tunnel was started in the footwall of a prominent outcrop of quartz, presumably of No. 5 vein.

At a distance of seventy-five feet a crosscut - No. 1 North - was driven showing a width of vein of fifteen feet. At one hundred and fifteen feet, crosscut No. 2 North was driven, exposing fifteen feet of vein. At this point a cross-cut - No. 1 South - was driven forty feet, cutting a parallel vein one and one half to four feet in width.

The main drift continues on, and at one hundred and seventy-five feet crosscut No. 3 North was driven, exposing 18 feet of vein. At about the two hundred and fifty foot point, the drift cuts the vein, and at two hundred and seventy-five feet, a small stope was started. In this stope is exposed on the hanging wall of the vein, about two feet of silver 40 oz., lead 40%, zinc 4.5%, tin 1.3%. The balance of the vein, thirteen feet, being quartz and scattered pyrite, and a little galena.

At three hundred and thirty feet from the portal, a Raise -Raise "C" - was started, and at the three hundred and fifty foot point a premineral fault is cut, which evidently has had an influence on the fissure, as beyond this a considerable roll is noticeable, and the vein narrows to a mere seam.

[redacted]

The exploration on this level has been continued on for seven hundred and forty feet, and three crosscuts made. What quartz is exposed is in the form of narrow seams and short leases and the sampling shows only low values. The country has been much disturbed with evidence of minor faulting, and the opinion is that the numerous small fissures tend to diffuse what mineralization there may have been over too great a territory, so that the chances are poor of finding a concentration of values which might be called economic.

An analysis of the sampling shows that for a distance of three hundred and fifty feet, the average of all samples are: Silver 5.0 oz., Lead 5.0%, Zinc 1.2%, Tin 0.1%.

No. 1, No. 2 and No. 3, crosscuts North, show the vein to have an average width of sixteen feet and channel samples cut across these average: Silver 5.0oz., Lead 4.2%, zinc 1.5%, Tin a trace.

From a point two hundred and thirty feet from the portal to where the vein is deflected by the fault fissure a distance of one hundred and twenty feet, the average width of sample is five and three quarters feet, with silver 5.7 oz., Lead 5.8%, zinc 1.4%, Tin 0.1%.

The average of the fifteen feet of the vein at the stope is about: Silver 8.0 oz., Lead 7.0%, Zinc 1.6%, Tin 0.3%.

Wherever the vein has been crosscut, the upper portion appears to carry more mineral than the lower portion, although the samples taken on the upper six feet do not show any material increase in values.

The parallel vein cut by crosscut No. 1 South was drifted on for a distance of one hundred and fifty feet, exposing a width of from one and one half feet to four feet. At several points a quantity of pyrite is shown with scattered galena, and a sample of three feet at the face assayed: Silver 5.7 oz., Lead 8.4%, Zinc 3.1%, Tin a trace.

The Raise "C", now up one hundred and thirty two feet, is driven on the foot side of the vein. It has quartz in the back all the way, and shows the lower portion of the vein to be sparsely mineralized with pyrite and galena.

The average of all the assays here shows: Silver 5.0oz., Lead 4.2%, Zinc 1.0%, Tin 0.14%.

From a point twenty-five feet above the level to a point eighty-eight feet, the values are somewhat better, averaging: Silver 7.5 oz., Lead 6.9%, Zinc 1.1%, Tin 0.2%.

Above the portal of No. 2 Tunnel, an open cut has been made, exposing the hanging of the vein. Here a twelve inch streak heavily mineralized with galena is shown. A shipment of sorted ore was made from this open cut.

[redacted]

On the "Alice" claim, at an elevation of 5,248 feet above sea-level, No. 1 tunnel was driven. The outcrop here shows ten feet of quartz with slate parting. The original prospecting drift was driven on a small seam on the hanging of the main vein. This was continued for eighty-five feet, the face showing a ten inch seam with sparse mineralization.

At a point sixty feet from the portal a crosscut was started and the main vein cut diagonally, the hanging of this carried the major portion of the mineralization. The foot being only sparesely mineralized. Drifting was continued practically in the footwall for a distance of forty-five feet, where a turn to the right was made again crosscutting the vein. A sample cut in the first crosscut covering six feet of the hanging side of the vein gave: Silver 2.6 oz., Lead 3.0%, Zinc, 2.3%, tin a trace.

Farther up the hill at an elevation of 5,610 feet, there is an outcrop of galena. This is definitely a continuation of the "Snowflake" Vein No. 1 on the "Alice" ground, and presumably an outcrop of the lower No. 5 vein of the "Regal".

Drifting from the "Snowflake" working started fourteen feet East of the "Snowflake" working Raise into the "Alice" claim. The drift follows the "Snowflake" vein to the East for a distance of two hundred and seventy-two feet. Crosscut No. 1, East, was started seventy feet from the raise, and driven to the North for forty-nine feet, cutting a vein two to three feet wide. Crosscut No. 2 East was started two hundred and fifty-six feet from the raise, and driven thirty-nine feet to the North, cutting a vein nine feet in width.

The drift shows the vein to vary from one and one half feet to three and one-half feet in width, with low values the greater part of the way, the average content being: Silver 3.00 oz., Lead 0.4%, Zinc 1.5%, Tin 0.5%.

From the start of the work up to a point of seventy-four feet from the raise -sixty feet- the average content was: Silver 8.0 oz., Lead 0.5%, Zinc 1.5%, Tin 1.3%. Stannite was noticed about fifty feet from the raise, and at a point two hundred and twenty feet from the raise, a sample of an eight inch streak here gave: Silver 6.9 oz., Lead 0.3%, Tin 1.4%.

Crosscut No. 2 East cut this vein where it was nine feet wide, a section from foot to hanging being four and one-half feet of quartz banded with two narrow partings of slate, and with seams of galena on the foot and hanging, and galena disseminated throughout the centre band of quartz, and four and one-half feet of mixed quartz and slate with practically no mineral.

Samples from where the crosscuts cut the vein gave: footside 4.5 feet: Silver 5.3 oz., Lead 5.9%, Zinc 2.2%, Tin 0.12%.

Hanging side 4.5 feet, Silver 0.8 oz., Lead 0.8%, Zinc 1.2%, Tin 0.1%.

[redacted]

Drifting is being proceeded with on this vein to the East and a sample of the face assayed: 4.5 feet: Silver 7.4 oz., Lead 8.8%, Zinc 3.4%, Tin 0.2%.

Stannite has not been recognized in any samples from this vein, the presence of tin being shown by analysis. The face of the drift, with the seams of galena, has a very favourable appearance, resembling faces exposed while the raise was being driven on the "Snowflake" vein.

It is estimated that by driving three hundred and fifty feet on this vein, the surface will be reached at a point below the outcrop mentioned on the "Alice" ground.

General Review:

From the foregoing it will be noted that on No. 3 level, there has been developed in No. 5 vein a shoot two hundred and forty feet in length, which will average six and one-half feet in width, and in contents: Silver 6.7 oz., Lead 6.1%, Zinc 1.8%, Tin 0.5%.

With silver at 34¢ per ounce, the Montreal price of lead at 5.3¢ per lb., Zinc at 5¢ per lb., and tin at 30¢ per lb., the gross value of this will be $10.83 per ton.

(Here it may be as well to point out that the losses in treatment and deductions in prices will reduce this to about $6.50 per ton, and in comparison, if Silver was 50¢ per ounce, Lead 6¢ per lb., Zinc 6¢ per lb., and Tin 40¢ per lb., the gross value would be $13.23 and after losses and deductions, the value would be around $9.00 per ton.)

While the development in raise "A" and on the intermediate level does not give any data to allow an estimate of even possible tonnage, it is the opinion that quite a respectable tonnage will be developed, which will return a profit on treatment.

The work on No. 6 vein has exposed a shoot five hundred and twenty-five feet in length, with an average width of eight feet, and a content of: Silver 3.0 oz., Lead 1.5%, Zinc 0.9%, Tin 0.5%, a gross value of $6.50 per ton.

Taking into account the rather higher values in the Raise "B" the average is increased to $6.90 per ton. Losses and deductions will reduce this to $4.25 per ton, which would not be profitable to work, except at a period of higher prices for metals.

On No. 2 level, there is a shoot three hundred and fifty feet long, with an average width of fifteen feet and content of: Silver 5.0 oz., Lead 5.0%, Zinc 1.2%, Tin 0.1%. This gives a gross value of $8.80 per ton.

Raise "C" has shown this shoot to continue upwards and the great width of vein would indicate a very substantial tonnage available for treatment.

[redacted]

While the results of the sampling in No. 1 Tunnel are low, there has been enough work done to determine either the width or contents of the vein. There is no reason to doubt, however, that the shoot exposed in No. 2 will be found on the No. 1 level.

As mentioned, all the development to the West on each level, shows a very much disturbed area. This has also been the experience in the "Snowflake" ground where the drift to the West encountered ground very much disturbed and twisted, and hard to hold. On the surface it is considered this area is indicated by a loose slatey formation shown on the ridge between the two properties, and by the path of a slide which passes near the "Snowflake" camp. The continuation of this on the Northeast side of the ridge is shown crossing the Northerly portion of the "Alice", the "Helena" and "May" claims.

From surface observation it is deduced that this disturbed belt is from two to three hundred feet wide, and it is considered that no further underground work should be contemplated at present in this Western area.

The development has shown that the favourable area lies within five hundred feet of the surface of the hillside.

The elevation of No. 2 tunnel being about eight hundred and fifty feet below the "Snowflake" workings and approximately half way between the No. 3 level of the "Regal" and the "Snowflake" is the logical point to base further work on. More development should be done on the No. 1 level, and the work of drifting on the vein from the "Snowflake" workings continued.

Further work on No. 3 level and the search for No. 5 vein on and above the intermediate level may be deferred, as the development above No. 2 level will make a tonnage available which will be sufficient to supply a mill of one hundred tons capacity for a number of years.

"F.W. Guernsey"

June 30, 1930.
Vancouver, B. C.

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F.W. Guernsey, Esq.,
736 Granville St.,
Vancouver, B.C.

November 30, 1930.

A.S. MacCulloch, Esq.,
Regal Silver Mines Limited,
Standard Bank Bldg.,
Vancouver, B.C.

Dear Sir:

Regarding the ore available in the workings of the Regal Mines Limited.

My opinion is that there has been enough work done to warrant the erection of a mill for the treatment of such ore. Sufficient openings have been made so that a production of one hundred tons per day ban be maintained for a number of years.

I am also of the opinion that the values as shown on No. 3 and No. 2 levels are of a grade so that the treatment will show a profit, even at the present prices of metals, and great consideration should be given to the fact that if the construction of a mill is started in the near future, at the time such mill is completed and ready for operation, the quotations for metals will be higher than at present, with a consequent increase in profits.

Yours truly,

"F.W. Guernsey"

82N/4W
82N-4

REGAL SILVER MINE, 19 MINERAL CLAIMS

British Columbia, Revelstoke Mining Division, nine miles from Albert Canyon Station, on the Canadian Pacific Railway, and eight miles from Silver Creek Siding, from which point a good trail, wide enough to permit the use of carts or sleighs, leading to the lower camp.

The property extends from the West slope of the East Fork of Silver Creek, across the intervening valley to the North Fork of the Illecillaweet River. Map No. 1.

Deposits:

The area of the property upon which the greater portion of the work has been done is underlain by black carbonaceous slates with miner beds of black quartzite. These rocks are classed as belonging to the Selkirk series of the Pre-Cambrian Era, and the lode deposits are believed to have been formed by solutions which came up from the Magma of the granitic intrusions, possibly the granite which is exposed on the trail between the Railway and the property.

The lode deposits are represented by a series of quartz veins, the outcrop of which appear on the West slope of the East Fork of Silver Creek.

Surface prospecting has shown that several of the veins carry amounts of silver, lead and zinc sulphides, in the form of galena and sphalerite, and underground work on the adjoining property - the Snowflake - led to the discovery of tin, in the form of stannite.

- Refer to Map No. 1 -

The underground work undertaken has been for the purpose of furthering prospecting and exploring the lodes and consists of a main crosscut - No. 3 - with drifts on the 5 and 6 veins. A raise on the No. 5 vein to the Intermediate level and a raise on No. 6 vein. Drifting on No. 5 vein.

Description:

On the "May" claim on the west slope of the Creek at an elevation of 4,455 feet above Sea level, a crosscut tunnel - No. 3 - was started to cut the downward extension of the known outcrops.

- Refer to Map No. 2 -

At two hundred and seventy-two feet from the portal, a vein designated as No. 2 vein - was encountered, and as it did not show any values no work was done on it.

At eight hundred and sixty feet from the portal a number of stringers of quartz were cut not showing any values and this group of stringers has been called the No. 3 vein.

At nine hundred and sixty feet, No. 4 vein was cut, samples from here only gave low values.

At a point nine hundred and forty feet from the portal, No. 5 vein was reached. A section along the crosscut shows five feet of quartz called the upper No. 5 vein, then a slate parting of three feet, and then seven feet of quartz called the lower No. 5 vein.

A drift was started to the West - No. 5 West - and continued on the footwall side for a distance of one hundred feet, where a crosscut raise was driven to the North, showing a total width of vein of twelve feet, at this point a Raise - "Raise "A" - was started up the dip.

The drift was continued on in the footwall and at a point one hundred and fifty feet from the main crosscut a raise to the North exposes a width of five feet of vein.

At the two hundred foot point another crosscut was driven North showing a thickness of vein of one foot. ~~Further on bunches of pyrite are shown on the left side of the one foot.~~ Further on bunches of pyrite are shown on the left side of the drift but very little galena mineralization is apparent.

The drift was continued on for fifty feet, and the face only shows a four inch streak of quartz. A crosscut was driven North with the hope of cutting No. 4 vein and a diamond drill hole run further North but cutting nothing of importance was exposed.

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The sampling shows that for a distance of one hundred and fifty feet West of the main crosscut, this vein has an average width of six feet and an average content of silver 7.6 ozs., lead 6.6%, zinc 2.6% and tin a trace. Beyond this point, the vein narrows and splits, the assay values being low, until the face only a four inch streak is shown, with no values.

East of the crosscut for ninety feet, the average width is seven and one half feet, and the content, silver 5.2 oz., lead 5.3%, zinc 0.5%, tin 0.2%. Where the fissure fault is reached, the quartz narrows the values are low, and at the face the width of vein is only two feet.

Raise "A", driven up the dip for a distance of two hundred and eight feet, shows width of vein varying from six feet to one foot. At this point one hundred and eight feet up a station was cut and the intermediate level started.

Sampling of the raise shows a low metal content. The average being silver 1.5 oz., lead 1%, zinc a trace, tin trace. The highest result was silver 5.2oz., lead 1.5%, zinc 0.45%, tin 0.43%.

The raise has been driven on the footwall of the lower No. 5 vein and this may account for the low results of the sampling.

No. 6 vein is cut by the main crosscut about eleven hundred and forty feet from the portal, and two hundred feet beyond No. 5 vein. A section along the crosscut shows eight feet of vein lamenated quartz-slate. Drifts were turned East and West running on the foot side of the vein.

To the west at forty feet, the drift - No. 6 West - cuts the fault shown in No. 5 East. Here also quartz fills the fault fissure. The drift was continued on for seventy-five feet in the slates, then turned to the left to crosscut the extension of the vein thrown by the fault fissure. The throw here is about seventy-five feet. The drift at first shows only a small seam of quartz which later widens, but does not contain values. At a point two hundred and fifty feet from the crosscut, bad ground is encountered with no values showing. The drift continues for one hundred and sixty feet further in broken ground, and the face only shows seams of barren quartz.

East of the main crosscut, the drift is driven on the footwall side of the vein. At a point thirty feet from the crosscut a raise - Raise "B" - was started. At seventy feet a crosscut - No. 1 North - shows ten feet of vein. The drift continues on, and at one hundred and fifteen feet crosscut No. 2 North, shows five feet of vein. At a point two hundred feet from the main crosscut, crosscut No. 3 North shows eight feet of vein rather banded with heavy pyrites on the hanging. At three hundred feet, Crosscut No. 4 North exposes ten feet of vein, and at four hundred feet crosscut No. 5 North shows ten feet of vein rather good looking. One hundred feet further on crosscut No. 6 North shows eight feet of vein. The vein apparently narrows here and where exposed in the face five hundred and sixty feet from the main crosscut three and one half feet of quartz with a slate parting is shown.

An analysis of the sampling of No. 6 vein shows the following: Eight feet of vein where the drift - No. 6 West - turns off gives low values. The drift is in the footwall up to the fault fissure, and the vein cannot be sampled. Beyond the fault fissure, the vein is represented by small seams with the exception of at one point where a small crosscut shows a lense of quartz with only low values.

East of the crosscut - drift No. 6 East - the average width as shown by crosscutting is eight feet. The values are, however, low, the average being about: Silver 3.0 oz., lead 1.5%, zinc 0.9%, tin 0.5%. At one point about four hundred and eighty feet from the crosscut, two samples gave: Tin 2.9%, but generally speaking, the tin values are low. From a point four hundred and forty feet from the crosscut to the end of the drift, one hundred and twenty feet, the metallic contents are somewhat better, the average being: Silver 5.2oz., lead 4.1%, zinc 1.2%, tin 0.4%.

Raise "B" was driven up the dip from No. 6 East for a distance of two hundred feet. The width of vein shown averages four and one half feet, and the face carries pyrite and galena in fair amount. The average of all assays gives: Silver 2.4oz., lead 2.7%, zinc 1.5%, tin 0.5% for a width of 4.5 feet.

At a point one hundred and fifteen feet above the level a value of silver 8.4 oz., lead 3.3%, zinc is shown and at one hundred and ninety feet above the level a value of silver, 7.7 oz., lead 11.1% is given. The general average is, however, low.

On the intermediate level one hundred and seven feet above No. 5 level, the drift to the West of the Raise "A" has not disclosed any commercial ore. The vein is not particularly well defined, being a series of short lenses and narrow seams of quartz. At the face of the West drift five hundred and forty feet from the Raise, there is a ten inch seam of quartz.

On the intermediate level, the ground is more or less disturbed, in this area to the West and there is no inducement to do any further work here.

East of the Raise, the drift shows the vein to have a width of from one to three feet, with low values. At a distance of about eighty feet from the Raise, the vein pinches and disappears into the hanging. On the assumption that the drift was on the lower vein, a crosscut was driven North without disclosing anything. At about eighty-five feet, the drift turns slightly to the North and at a point two-hundred and sixty feet from the raise another crosscut was driven North without any results. The drift continued and at about the three hundred and eighty foot point, a small seam was encountered. This is rather well mineralized, but only has a maximum width of ten inches. The drift continues until the face is reached about five hundred and forty feet from the Raise.

The vein on this level does not show the widths one would expect from what is shown below, and it is a question whether the work has been done on the main vein. Crosscuts have failed to find it to the North, and it may be that this horizon is in a narrow portion of the vein. However, from an examination of the drift, and the map, it looks as if the work had been done in the hanging, and there is a possibility that a crosscut South about the one hundred and fifty foot point, would locate the lost vein. This work, however, is not recommended at the present.

At an elevation of 4,958 feet above Sea-level, on the "Helena" claim, No. 2 tunnel was started in the footwall of a prominent outcrop of quartz, presumably of No. 5 vein.

At a distance of seventy-five feet a crosscut - No. 1 North - was driven showing a width of vein of fifteen feet. At one hundred and fifteen feet, crosscut No. 2 North was driven, exposing fifteen feet of vein. At this point a cross-cut - No. 1 South - was driven forty feet, cutting a parallel vein one and one half to four feet in width.

The main drift continues on, and at one hundred and seventy-five feet crosscut No. 3 North was driven, exposing 18 feet of vein. At about the two hundred and fifty foot point, the drift cuts the vein, and at two hundred and seventy-five feet, a small stope was started. In this stope is exposed on the hanging wall of the vein, about two feet of silver 40 oz., lead 40%, zinc 4.5%, tin 1.3%. The balance of the vein, thirteen feet, being quartz and scattered pyrite, and a little galena.

At three hundred and thirty feet from the portal, a Raise -Raise "C" - was started, and at the three hundred and fifty foot point a premineral fault is cut, which evidently has had an influence on the fissure, as beyond this a considerable roll is noticeable, and the vein narrows to a mere seam.

The exploration on this level has been continued on for seven hundred and forty feet, and three crosscuts made. What quartz is exposed is in the form of narrow seams and short leases and the sampling shows only low values. The country has been much disturbed with evidence of minor faulting, and the opinion is that the numerous small fissures tend to diffuse what mineralization there may have been over too great a territory, so that the chances are poor of finding a concentration of values which might be called economic.

An analysis of the sampling shows that for a distance of three hundred and fifty feet, the average of all samples are: Silver 5.0 oz., Lead 5.0%, Zinc 1.2%, Tin 0.1%.

No. 1, No. 2 and No. 3, crosscuts North, show the vein to have an average width of sixteen feet and channel samples cut across these average: Silver 5.0oz., Lead 4.2%, zinc 1.5%, Tin a trace.

From a point two hundred and thirty feet from the portal to where the vein is deflected by the fault fissure a distance of one hundred and twenty feet, the average width of sample is five and three quarters feet, with silver 5.7 oz., Lead 5.8%, zinc 1.4%, Tin 0.1%.

The average of the fifteen feet of the vein at the stope is about: Silver 8.0 oz., Lead 7.0%, Zinc 1.6%, Tin 0.3%.

Wherever the vein has been crosscut, the upper portion appears to carry more mineral than the lower portion, although the samples taken on the upper six feet do not show any material increase in values.

The parallel vein cut by crosscut No. 1 South was drifted on for a distance of one hundred and fifty feet, exposing a width of from one and one half feet to four feet. At several points a quantity of pyrite is shown with scattered galena, and a sample of three feet at the face assayed: Silver 5.7 oz., Lead 8.4%, Zinc 3.1%, Tin a trace.

The Raise "C", now up one hundred and thirty two feet, is driven on the foot side of the vein. It has quartz in the back all the way, and shows the lower portion of the vein to be sparsely mineralized with pyrite and galena.

The average of all the assays here shows: Silver 5.0oz., Lead 4.2%, Zinc 1.0%, Tin 0.14%.

From a point twenty-five feet above the level to a point eighty-eight feet, the values are somewhat better, averaging: Silver 7.5 oz., Lead 6.9%, Zinc 1.1%, Tin 0.2%.

Above the portal of No. 2 Tunnel, an open cut has been made, exposing the hanging of the vein. Here a twelve inch streak h heavily mineralized with galena is shown. A shipment of sorted ore was made from this open cut.

On the "Alice" claim, at an elevation of 5,248 feet above sea-level, No. 1 tunnel was driven. The outcrop here shows ten feet of quartz with slate parting. The original prospecting drift was driven on a small seam on the hanging of the main vein. This was continued for eighty-five feet, the face showing a ten inch seam with sparse mineralization.

At a point sixty feet from the portal a crosscut was started and the main vein cut diagonally, the hanging of this carried the major portion of the mineralization. The foot being only sparesely mineralized. Drifting was continued practically in the footwall for a distance of forty-five feet, where a turn to the right was made again crosscutting the vein. A sample cut in the first crosscut covering six feet of the hanging side of the vein gave: Silver 2.6 oz., Lead 3.0%, Zinc, 2.3%, tin a trace.

Farther up the hill at an elevation of 5,610 feet, there is an outcrop of galena. This is definitely a continuation of the "Snowflake" Vein No. 1 on the "Alice" ground, and presumably an outcrop of the lower No. 5 vein of the "Regal".

Drifting from the "Snowflake" working started fourteen feet East of the "Snowflake" working Raise into the "Alice" claim. The drift follows the "Snowflake" vein to the East for a distance of two hundred and seventy-two feet. Crosscut No. 1, East, was started seventy feet from the raise, and driven to the North for forty-nine feet, cutting a vein two to three feet wide. Crosscut No. 2 East was started two hundred and fifty-six feet from the raise, and driven thirty-nine feet to the North, cutting a vein nine feet in width.

The drift shows the vein to vary from one and one half feet to three and one-half feet in width, with low values the greater part of the way, the average content being: Silver 3.00 oz., Lead 0.4%, Zinc 1.5%, Tin 0.5%.

From the start of the work up to a point of seventy-four feet from the raise -sixty feet- the average content was: Silver 8.0 oz., Lead 0.5%, Zinc 1.5%, Tin 1.3%. Stannite was noticed about fifty feet from the raise, and at a point two hundred and twenty feet from the raise, a sample of an eight inch streak here gave: Silver 6.9 oz., Lead 0.3%, Tin 1.4%.

Crosscut No. 2 East cut this vein where it was nine feet wide, a section from foot to hanging being four and one-half feet of quartz banded with two narrow partings of slate, and with seams of galena on the foot and hanging, and galena disseminated throughout the centre band of quartz, and four and one-half feet of mixed quartz and slate with practically no mineral.

Samples from where the crosscuts cut the vein gave: footside 4.5 feet: Silver 5.3 oz., Lead 5.9%, Zinc 2.2%, Tin 0.12%.

Hanging side 4.5 feet, Silver 0.8 oz., Lead 0.8%, Zinc 1.2%, Tin 0.1%.

Drifting is being proceeded with on this vein to the East and a sample of the face assayed: 4.5 feet: Silver 7.4 oz., Lead 8.8%, Zinc 3.4%, Tin 0.2%.

Stannite has not been recognized in any samples from this vein, the presence of tin being shown by analysis. The face of the drift, with the seams of galena, has a very favourable appearance, resembling faces exposed while the raise was being driven on the "Snowflake" vein.

It is estimated that by driving three hundred and fifty feet on this vein, the surface will be reached at a point below the outcrop mentioned on the "Alice" ground.

General Review:

From the foregoing it will be noted that on No. 3 level, there has been developed in No. 5 vein a shoot two hundred and forty feet in length, which will average six and one-half feet in width, and in contents: Silver 6.7 oz., Lead 6.1%, Zinc 1.8%, Tin 0.5%.

With silver at 34¢ per ounce, the Montreal price of lead at 5.3¢ per lb., Zinc at 5¢ per lb., and tin at 30¢ per lb., the gross value of this will be $10.83 per ton.

(Here it may be as well to point out that the losses in treatment and deductions in prices will reduce this to about $6.50 per ton, and in comparison, if Silver was 50¢ per ounce, Lead 6¢ per lb., Zinc 6¢ per lb., and Tin 40¢ per lb., the gross value would be $13.23 and after losses and deductions, the value would be around $9.00 per ton.)

While the development in raise "A" and on the intermediate level does not give any data to allow an estimate of even possible tonnage, it is the opinion that quite a respectable tonnage will be developed, which will return a profit on treatment.

The work on No. 6 vein has exposed a shoot five hundred and twenty-five feet in length, with an average width of eight feet, and a content of: Silver 3.0 oz., Lead 1.5%, Zinc 0.9%, Tin 0.5%, a gross value of $6.50 per ton.

Taking into account the rather higher values in the Raise "B" the average is increased to $6.90 per ton. Losses and deductions will reduce this to $4.25 per ton, which would not be profitable to work, except at a period of higher prices for metals.

On No. 2 level, there is a shoot three hundred and fifty feet long, with an average width of fifteen feet and content of: Silver 5.0 oz., Lead 5.0%, Zinc 1.2%, Tin 0.1%. This gives a gross value of $8.80 per ton.

Raise "C" has shown this shoot to continue upwards and the great width of vein would indicate a very substantial tonnage available for treatment.

While the results of the sampling in No. 1 Tunnel are low, there has been enough work done to determine either the width or contents of the vein. There is no reason to doubt, however, that the shoot exposed in No. 2 will be found on the No. 1 level.

As mentioned, all the development to the West on each level, shows a very much disturbed area. This has also been the experience in the "Snowflake" ground where the drift to the West encountered ground very much disturbed and twisted, and hard to hold. On the surface it is considered this area is indicated by a loose slatey formation shown on the ridge between the two properties, and by the path of a slide which passes near the "Snowflake" camp. The continuation of this on the Northeast side of the ridge is shown crossing the Northerly portion of the "Alice", the "Helen" and "May" claims.

From surface observation it is deduced that this disturbed belt is from two to three hundred feet wide, and it is considered that no further underground work should be contemplated at present in this Western area.

The development has shown that the favourable area lies within five hundred feet of the surface of the hillside.

The elevation of No. 2 tunnel being about eight hundred and fifty feet below the "Snowflake" workings and approximately half way between the No. 3 level of the "Regal" and the "Snowflake" is the logical point to base further work on. More development should be done on the No. 1 level, and the work of drifting on the vein from the "Snowflake" workings continued.

Further work on No. 3 level and the search for No. 5 vein on and above the intermediate level may be deferred, as the development above No. 2 level will make a tonnage available which will be sufficient to supply a mill of one hundred tons capacity for a number of years.

"F.W. Guernsey"

June 30, 1930.
Vancouver, B. C.

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F.W. Guernsey, Esq.,
736 Granville St.,
Vancouver, B.C.

November 30, 1930.

A.S. MacCulloch, Esq.,
Regal Silver Mines Limited,
Standard Bank Bldg.,
Vancouver, B.C.

Dear Sir:

Regarding the ore available in the workings of the Regal Mines Limited.

My opinion is that there has been enough work done to warrant the erection of a mill for the treatment of such ore. Sufficient openings have been made so that a production of one hundred tons per day ban be maintained for a number of years.

I am also of the opinion that the values as shown on No. 3 and No. 2 levels are of a grade so that the treatment will show a profit, even at the present prices of metals, and great consideration should be given to the fact that if the construction of a mill is started in the near future, at the time such mill is completed and ready for operation, the quotations for metals will be higher than at present, with a consequent increase in profits.

Yours truly,

"F.W. Guernsey"

82N/4W
82N-4

REGAL SILVER MINE, 19 MINERAL CLAIMS

British Columbia, Revelstoke Mining Division, nine miles from Albert Canyon Station, on the Canadian Pacific Railway, and eight miles from Silver Creek Siding, from which point a good trail, wide enough to permit the use of carts or sleighs, leading to the lower camp.

The property extends from the West slope of the East Fork of Silver Creek, across the intervening valley to the North Fork of the Illecillaweet River. Map No. 1.

Deposits:

The area of the property upon which the greater portion of the work has been done is underlain by black carbonaceous slates with miner beds of black quartzite. These rocks are classed as belonging to the Selkirk series of the Pre-Cambrian Era, and the lode deposits are believed to have been formed by solutions which came up from the Magma of the granitic intrusions, possibly the granite which is exposed on the trail between the Railway and the property.

The lode deposits are represented by a series of quartz veins, the outcrop of which appear on the West slope of the East Fork of Silver Creek.

Surface prospecting has shown that several of the veins carry amounts of silver, lead and zinc sulphides, in the form of galena and sphalerite, and underground work on the adjoining property - the Snowflake - led to the discovery of tin, in the form of stannite.

- Refer to Map No. 1 -

The underground work undertaken has been for the purpose of furthering prospecting and exploring the lodes and consists of a main crosscut - No. 3 - with drifts on the 5 and 6 veins. A raise on the No. 5 vein to the Intermediate level and a raise on No. 6 vein. Drifting on No. 5 vein.

Description:

On the "May" claim on the west slope of the Creek at an elevation of 4,455 feet above Sea level, a crosscut tunnel - No. 3 - was started to cut the downward extension of the known outcrops.

- Refer to Map No. 2 -

At two hundred and seventy-two feet from the portal, a vein designated as No. 2 vein - was encountered, and as it did not show any values no work was done on it.

At eight hundred and sixty feet from the portal a number of stringers of quartz were cut not showing any values and this group of stringers has been called the No. 3 vein.

At nine hundred and sixty feet, No. 4 vein was cut, samples from here only gave low values.

At a point nine hundred and forty feet from the portal, No. 5 vein was reached. A section along the crosscut shows five feet of quartz called the upper No. 5 vein, then a slate parting of three feet, and then seven feet of quartz called the lower No. 5 vein.

A drift was started to the West - No. 5 West - and continued on the footwall side for a distance of one hundred feet, where a crosscut raise was driven to the North, showing a total width of vein of twelve feet, at this point a Raise - "Raise "A" - was started up the dip.

The drift was continued on in the footwall and at a point one hundred and fifty feet from the main crosscut a raise to the North exposes a width of five feet of vein.

At the two hundred foot point another crosscut was driven North showing a thickness of vein of one foot. ~~Further on bunches of pyrite are shown on the left side of the one foot.~~ Further on bunches of pyrite are shown on the left side of the drift but very little galena mineralization is apparent.

The drift was continued on for fifty feet, and the face only shows a four inch streak of quartz. A crosscut was driven North with the hope of cutting No. 4 vein and a diamond drill hole run further North but cutting nothing of importance was exposed.

From the main crosscut, a drift was turned East - No. 5 East - and driven on the vein, the walls not being shown, at the fifteen foot point a short crosscut was driven, but the footwall of the vein was not reached. Here the vein shows pyrite dissiminated throughout the quartz and sparse galena.

The sampling shows that for a distance of one hundred and fifty feet West of the main crosscut, this vein has an average width of six feet and an average content of silver 7.6 ozs., lead 6.6%, zinc 2.6% and tin a trace. Beyond this point, the vein narrows and splits, the assay values being low, until the face only a four inch streak is shown, with no values.

East of the crosscut for ninety feet, the average width is seven and one half feet, and the content, silver 5.2 oz., lead 5.3%, zinc 0.5%, tin 0.2%. Where the fissure fault is reached, the quartz narrows the values are low, and at the face the width of vein is only two feet.

Raise "A", driven up the dip for a distance of two hundred and eight feet, shows width of vein varying from six feet to one foot. At this point one hundred and eight feet up a station was cut and the intermediate level started.

Sampling of the raise shows a low metal content. The average being silver 1.5 oz., lead 1%, zinc a trace, tin trace. The highest result was silver 5.2oz., lead 1.5%, zinc 0.45%, tin 0.43%.

The raise has been driven on the footwall of the lower No. 5 vein and this may account for the low results of the sampling.

No. 6 vein is cut by the main crosscut about eleven hundred and forty feet from the portal, and two hundred feet beyond No. 5 vein. A section along the crosscut shows eight feet of vein lamenated quartz-slate. Drifts were turned East and West running on the foot side of the vein.

To the west at forty feet, the drift - No. 6 West - cuts the fault shown in No. 5 East. Here also quartz fills the fault fissure. The drift was continued on for seventy-five feet in the slates, then turned to the left to crosscut the extension of the vein thrown by the fault fissure. The throw here is about seventy-five feet. The drift at first shows only a small seam of quartz which later widens, but does not contain values. At a point two hundred and fifty feet from the crosscut, bad ground is encountered with no values showing. The drift continues for one hundred and sixty feet further in broken ground, and the face only shows seams of barren quartz.

East of the main rosscut, the drift is driven on the footwall side of the vein. At a point thirty feet from the crosscut a raise - Raise "B" - was started. At seventy feet a crosscut - No. 1 North - shows ten feet of vein. The drift continues on, and at one hundred and fifteen feet crosscut No. 2 North, shows five feet of vein. At a point two hundred feet from the main crosscut, crosscut No. 3 North shows eight feet of vein rather banded with heavy pyrites on the hanging. At three hundred feet, Crosscut No. 4 North exposes ten feet of vein, and at four hundred feet crosscut No. 5 North shows ten feet of vein rather good looking. One hundred feet further on crosscut No. 6 North shows eight feet of vein. The vein apparently narrows here and where exposed in the face five hundred and sixty feet from the main crosscut three and one half feet of quartz with a slate parting is shown.

An analysis of the sampling of No. 6 vein shows the following: Eight feet of vein where the drift - No. 6 West - turns off gives low values. The drift is in the footwall up to the fault fissure, and the vein cannot be sampled. Beyond the fault fissure, the vein is represented by small seams with the exception of at one point where a small crosscut shows a lense of quartz with only low values.

East of the crosscut - drift No. 6 East - the average width as shown by crosscutting is eight feet. The values are, however, low, the average being about: Silver 3.0 oz., lead 1.5%, zinc 0.9%, tin 0.5%. At one point about four hundred and eighty feet from the crosscut, two samples gave: Tin 2.9%, but generally speaking, the tin values are low. From a point four hundred and forty feet from the crosscut to the end of the drift, one hundred and twenty feet, the metallic contents are somewhat better, the average being: Silver 5.2oz., lead 4.1%, zinc 1.2%, tin 0.4%.

Raise "B" was driven up the dip from No. 6 East for a distance of two hundred feet. The width of vein shown averages four and one half feet, and the face carries pyrite and galena in fair amount. The average of all assays gives: Silver 2.4oz., lead 2.7%, zinc 1.5%, tin 0.5% for a width of 4.5 feet.

At a point one hundred and fifteen feet above the level a value of silver 8.4 oz., lead 3.5%, zinc is shown and at one hundred and ninety feet above the level a value of silver, 7.7 oz., lead 11.1% is given. The general average is, however, low.

On the intermediate level one hundred and seven feet above No. 5 level, the drift to the West of the Raise "A" has not disclosed any commercial ore. The vein is not particularly well defined, being a series of short lenses and narrow seams of quartz. At the face of the West drift five hundred and forty feet from the Raise, there is a ten inch seam of quartz.

On the intermediate level, the ground is more or less disturbed, in this area to the West and there is no inducement to do any further work here.

East of the Raise, the drift shows the vein to have a width of from one to three feet, with low values. At a distance of about eighty feet from the Raise, the vein pinches and disappears into the hanging. On the assumption that the drift was on the lower vein, a crosscut was driven North without disclosing anything. At about eighty-five feet, the drift turns slightly to the North and at a point two-hundred and sixty feet from the raise another crosscut was driven North without any results. The drift continued and at about the three hundred and eighty foot point, a small seam was encountered. This is rather well mineralized, but only has a maximum width of ten inches. The drift continues until the face is reached about five hundred and forty feet from the Raise.

The vein on this level does not show the widths one would expect from what is shown below, and it is a question whether the work has been done on the main vein. Crosscuts have failed to find it to the North, and it may be that this horizon is in a narrow portion of the vein. However, from an examination of the drift, and the map, it looks as if the work had been done in the hanging, and there is a possibility that a crosscut South about the one hundred and fifty foot point, would locate the lost vein. This work, however, is not recommended at the present.

At an elevation of 4,958 feet above Sea-level, on the "Helena" claim, No. 2 tunnel was started in the footwall of a prominent outcrop of quartz, presumably of No. 5 vein.

At a distance of seventy-five feet a crosscut - No. 1 North - was driven showing a width of vein of fifteen feet. At one hundred and fifteen feet, crosscut No. 2 North was driven, exposing fifteen feet of vein. At this point a cross-cut - No. 1 South - was driven forty feet, cutting a parallel vein one and one half to four feet in width.

The main drift continues on, and at one hundred and seventy-five feet crosscut No. 3 North was driven, exposing 18 feet of vein. At about the two hundred and fifty foot point, the drift cuts the vein, and at two hundred and seventy-five feet, a small stope was started. In this stope is exposed on the hanging wall of the vein, about two feet of silver 40 oz., lead 40%, zinc 4.5%, tin 1.3%. The balance of the vein, thirteen feet, being quartz and scattered pyrite, and a little galena.

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The Raise "C", now up one hundred and thirty two feet, is driven on the foot side of the vein. It has quartz in the back all the way, and shows the lower portion of the vein to be sparsely mineralized with pyrite and galena.

The average of all the assays here shows: Silver 5.0oz., Lead 4.2%, Zinc 1.0%, Tin 0.14%.

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On the "Alice" claim, at an elevation of 5,248 feet above sea-level, No. 1 tunnel was driven. The outcrop here shows ten feet of quartz with slate parting. The original prospecting drift was driven on a small seam on the hanging of the main vein. This was continued for eighty-five feet, the face showing a ten inch seam with sparse mineralization.

At a point sixty feet from the portal a crosscut was started and the main vein cut diagonally, the hanging of this carried the major portion of the mineralization. The foot being only sparesely mineralized. Drifting was continued practically in the footwall for a distance of forty-five feet, where a turn to the right was made again crosscutting the vein. A sample cut in the first crosscut covering six feet of the hanging side of the vein gave: Silver 2.6 oz., Lead 3.0%, Zinc, 2.3%, tin a trace.

Farther up the hill at an elevation of 5,610 feet, there is an outcrop of galena. This is definitely a continuation of the "Snowflake" Vein No. 1 on the "Alice" ground, and presumably an outcrop of the lower No. 5 vein of the "Regal".

Drifting from the "Snowflake" working started fourteen feet East of the "Snowflake" working Raise into the "Alice" claim. The drift follows the "Snowflake" vein to the East for a distance of two hundred and seventy-two feet. Crosscut No. 1, East, was started seventy feet from the raise, and driven to the North for forty-nine feet, cutting a vein two to three feet wide. Crosscut No. 2 East was started two hundred and fifty six feet from the raise, and driven thirty-nine feet to the North, cutting a vein nine feet in width.

The drift shows the vein to vary from one and one half feet to three and one-half feet in width, with low values the greater part of the way, the average content being: Silver 3.00 oz., Lead 0.4%, Zinc 1.5%, Tin 0.5%.

From the start of the work up to a point of seventy-four feet from the raise -sixty feet- the average content was: Silver 8.0 oz., Lead 0.5%, Zinc 1.5%, Tin 1.3%. Stannite was noticed about fifty feet from the raise, and at a point two hundred and twenty feet from the raise, a sample of an eight inch streak here gave: Silver 6.9 oz., Lead 0.3%, Tin 1.4%.

Crosscut No. 2 East cut this vein where it was nine feet wide, a section from foot to hanging being four and one-half feet of quartz banded with two narrow partings of slate, and with seams of galena on the foot and hanging, and galena disseminated throughout the centre band of quartz, and four and one-half feet of mixed quartz and slate with practically no mineral.

Samples from where the crosscuts cut the vein gave: footside 4.5 feet: Silver 5.3 oz., Lead 5.9%, Zinc 2.2%, Tin 0.12%.

Hanging side 4.5 feet, Silver 0.8 oz., Lead 0.8%, Zinc 1.2%, Tin 0.1%.

Drifting is being proceeded with on this vein to the East and a sample of the face assayed: 4.5 feet: Silver 7.4 oz., Lead 8.8%, Zinc 3.4%, Tin 0.2%.

Stannite has not been recognized in any samples from this vein, the presence of tin being shown by analysis. The face of the drift, with the seams of galena, has a very favourable appearance, resembling faces exposed while the raise was being driven on the "Snowflake" vein.

It is estimated that by driving three hundred and fifty feet on this vein, the surface will be reached at a point below the outcrop mentioned on the "Alice" ground.

General Review:

From the foregoing it will be noted that on No. 3 level, there has been developed in No. 5 vein a shoot two hundred and forty feet in length, which will average six and one-half feet in width, and in contents: Silver 6.7 oz., Lead 6.1%, Zinc 1.8%, Tin 0.5%.

With silver at 34¢ per ounce, the Montreal price of lead at 5.3¢ per lb., Zinc at 5¢ per lb., and tin at 30¢ per lb., the gross value of this will be $10.88 per ton.

(Here it may be as well to point out that the losses in treatment and deductions in prices will reduce this to about $6.50 per ton, and in comparison, if Silver Was 50¢ per ounce, Lead 6¢ per lb., Zinc 6¢ per lb., and Tin 40¢ per lb., the gross value would be $13.23 and after losses and deductions, the value would be around $9.00 per ton.)

While the development in raise "A" and on the intermediate level does not give any data to allow an estimate of even possible tonnage, it is the opinion that quite a respectable tonnage will be developed, which will return a profit on treatment.

The work on No. 6 vein has exposed a shoot five hundred and twenty-five feet in length, with an average width of eight feet, and a content of: Silver 3.0 oz., Lead 1.5%, Zinc 0.9%, Tin 0.5%, a gross value of $6.50 per ton.

Taking into account the rather higher values in the Raise "B" the average is increased to $6.90 per ton. Losses and deductions will reduce this to $4.25 per ton, which would not be profitable to work, except at a period of higher prices for metals.

On No. 2 level, there is a shoot three hundred and fifty feet long, with an average width of fifteen feet and content of: Silver 5.0 oz., Lead 5.0%, Zinc 1.2%, Tin 0.1%. This gives a gross value of $8.80 per ton.

Raise "C" has shown this shoot to continue upwards and the great width of vein would indicate a very substantial tonnage available for treatment.

While the results of the sampling in No. 1 Tunnel are low, there has been enough work done to determine either the width or contents of the vein. There is no reason to doubt, however, that the shoot exposed in No. 2 will be found on the No. 1 level.

As mentioned, all the development to the West on each level, shows a very much disturbed area. This has also been the experience in the "Snowflake" ground where the drift to the West encountered ground very much disturbed and twisted, and hard to hold. On the surface it is considered this area is indicated by a loose slatey formation shown on the ridge between the two properties, and by the path of a slide which passes near the "Snowflake" camp. The continuation of this on the Northeast side of the ridge is shown crossing the Northerly portion of the "Alice", the "Helena" and "May" claims.

From surface observation it is deduced that this disturbed belt is from two to three hundred feet wide, and it is considered that no further underground work should be contemplated at present in this Western area.

The development has shown that the favourable area lies within five hundred feet of the surface of the hillside.

The elevation of No. 2 tunnel being about eight hundred and fifty feet below the "Snowflake" workings and approximately half way between the No. 3 level of the "Regal" and the "Snowflake" is the logical point to base further work on. More development should be done on the No. 1 level, and the work of drifting on the vein from the "Snowflake" workings continued.

Further work on No. 3 level and the search for No. 5 vein on and above the intermediate level may be deferred, as the development above No. 2 level will make a tonnage available which will be sufficient to supply a mill of one hundred tons capacity for a number of years.

"F.W. Guernsey"

June 30, 1930.
Vancouver, B. C.

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F.W. Guernsey, Esq.,
736 Granville St.,
Vancouver, B.C.

November 30, 1930.

A.S. MacCulloch, Esq.,
Regal Silver Mines Limited,
Standard Bank Bldg.,
Vancouver, B.C.

Dear Sir:

Regarding the ore available in the workings of the Regal Mines Limited.

My opinion is that there has been enough work done to warrant the erection of a mill for the treatment of such ore. Sufficient openings have been made so that a production of one hundred tons per day ban be maintained for a number of years.

I am also of the opinion that the values as shown on No. 3 and No. 2 levels are of a grade so that the treatment will show a profit, even at the present prices of metals, and great consideration should be given to the fact that if the construction of a mill is started in the near future, at the time such mill is completed and ready for operation, the quotations for metals will be higher than at present, with a consequent increase in profits.

Yours truly,

"F.W. Guernsey"