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Memorandum

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PRELIMINARY REPORT ON THE EMERALD PROPERTY, SOUTH OF SALMO, B. C., WITH SPECIAL REFERENCE TO TUNGSTEN MINERALIZATION.

no. 1

Reference: G.S.C. Memoir 172, Geology and Mineral Deposits of Salmo Map-area, British Columbia, J. F. Walker.

At the time of examination by J. F. Walker in 1934 this property was of interest only with reference to lead-zinc mineralization. As a result of this Memoir 172 makes no mention of the particular conditions with which tungsten mineralization is associated. Considerable underground development was done over a period of years in the search for lead-zinc but none of this work appears to be of use in the present connection.

The property consists of the following Crown-granted claims: Jersey, Gold Standard, Standard fraction, Emerald, Emerald fraction, Morning, Sunshine, Dodger, Invincible, Job Trotter, Empire, Pickwick, Royal Canadian, Last Chance, Mark Tapley, King Alfred, King Solomon and several others which are held by right of location. The Crown-granted claims cover the principal showings of lead-zinc mineralization as well as those in which scheelite occurs.

The property is located 8 miles south of the town of Salmo and is accessible from that centre by good road. Old camp buildings are being renovated at the present time and will provide accommodation for ten to fifteen men. Little timber is available on the claims, but lumber can be secured from a saw mill located on the main road within 4 miles of the property. Water supply is sufficient for domestic needs only and

any milling operation of major proportions would have to be either on Sheep Creek, on the south fork of the Salmon river or on the Salmon river itself. To move ore from the mine to any of these mill sites would necessitate either construction of aerial tram or improved conditions for road haulage.

The area is underlain by rocks of the Pend d'Oreille series of white or blue grey limestones and dark argillites or argillaceous limestones intruded by the granites of the Nelson batholith. The sediments strike generally at north 15 to 20 degrees east and dip from 15 to 60 degrees eastward. The granite intrusions display contacts which follow the strike of the sediments approximately. There is no definite proof that there is any relation between the igneous and sedimentary members by which the granite bodies could be termed sills although there is a definite tendency for the granite masses to be elongated in the direction of the strike of the sediments. Recrystallization of the sediments has proceeded to a marked degree especially in the neighborhood of the granitic contacts or where the sediments have been especially susceptible to change. Also, at or near the contacts there has been marked development of the usual assemblage of minerals typical of metamorphic conditions, namely pyroxenes, amphiboles, garnets, epidote and mica. Within the susceptible bands of sediments, apparently often at considerable distances from the granitic contacts, these evidences of metamorphism are repeated. This is noticeable especially in four bands of sediments which outcrop along the hillside and which have been termed tentatively as "metamorphic bands".

The old underground workings and the present surface showings are located in or on a 35 degree hillside which faces westward; this means that the contours of the hill and the strike of the sediments are approximately conformable. Rock exposures are exceptionally good and it is possible to trace the various members of the sedimentary series with little difficulty. Well up on the hillside at elevations above 4450 feet the old workings for the development of lead-zinc mineralization were driven in massive white, grey or blue limestones. Below these rocks in the series, and generally lower down the hill, are the exposures of sedimentary members in which occurs the tungsten mineralization. Again below these members, and extending to the floor of the valley, is the main granite mass.

Mineralization by scheelite, commonly associated with small amounts of molybdenite, has been discovered both in the metamorphic bands and at direct contacts between the granite and the sediments. The original discovery of scheelite was made in the metamorphic bands. These strike slightly east of north, outcrop one above the other, on the slope of the hillside, in measures which underlie the limestone in which the original lead-zinc mineralization was developed. The present natural exposures indicate that there are four of these bands and that they vary in width from 5 to perhaps 50 feet. The highest one follows the 4600 contour approximately and is exposed over a length of some 350 feet. The next is exposed just below the 4550 contour, swings uphill slightly to the east on its

southward extension and apparently joins the top band; the total indicated length for this second band is in the order of 1000 feet. The third lowest band is exposed at an elevation of 4425 feet at the north end and is exposed from here for at least 500 feet to the south along the contour. The lowest of the four bands is exposed irregularly for a length of approximately 1500 feet at elevations which vary from 4275 to 4325 feet.

Examination of the "metamorphic bands" by the ultraviolet lamp showed that the scheelite mineralization is finely disseminated in all cases. No where was it seen in form sufficiently massive to permit selective mining of high-grade tungsten ore. The individual isolations of the mineralization seldom exceed a quarter of an inch in any dimension and are generally of a size considerably smaller than this. The fluorescence varies from tin white to almost an orange-yellow and considerable difficulty was encountered in correlating assay results and the amount of fluorescence until it was established that there has been development of powellite as a secondary mineral from molybdenite. Even yet the gradation in colour from the tin white to the orange-yellow has not been standardized and there is still doubt as to the lowest degree of yellow which may be evidenced and still be indicative of pure scheelite. There appears to be little concentration of scheelite within any particular part of the "metamorphic bands" except that it may be less in some sections where alteration has not been as intense as usual. This condition occurs sometime toward the foot-wall side where there tends to be a gradational phase outward from the zones of intense alteration. Apart from this the scheelite may occur anywhere within the full width of the zone.

Since the original discovery of scheelite in the "metamorphic bands" it has also been discovered along a contact between the sediments and granite at an elevation of approximately 4225 feet. This lowest showing lies on the hillside below all of the "metamorphic bands" and is thus the nearest to the main body of granite which outcrops in the valley floor. Some years ago the contact between the two rock types was explored by open cutting and by one 80 foot crosscut adit. The indicated length of scheelite mineralization along this contact is slightly over 800 feet. Examination with the lamp shows fluorescence in each of seven cuts along the contact and in the adit which is at the extreme southern end of the length at a depth of 40 feet below the surface. In six of the seven cuts the rock exposed is sedimentary, limy in nature and oxidized to considerable degree. Apparently there was considerable primary mineralization of the sediments from the granite by various iron sulphides, principally pyrite, arsenopyrite and pyrrhotite. In the cases of these old cuts these sulphides have become decomposed with resultant heavy staining of the rocks. The scheelite appears to be closely associated with the sulphides and to occur either along fractures or shearing within the sediments or as disseminated mineralization through the silicified contact zone. In the first connection it seems unlikely that the fractures or shears can be expected to extend more than a short distance from the granite contact or that they are more than erratic occurrences which may provide occasional concentrations of scheelite. The disseminated occurrence of mineralization can be expected to be typical. This probably extends for short distances into the granite side of the contact but the usual preference seems to be toward the sedimentary side and in the silicified contact zone where identification of the original rock is now generally impossible.

In the 80 foot crosscut adit driven eastward at the south end of the 800 foot length fresh rock contains amounts of scheelite apparently comparable to the best seen on the surface. In this adit silicification has been so extreme that it is not possible to establish the contact between the two rock types; the portal is probably in sediments and it is clear that the face is in granite. Scheelite mineralization, crosscut by this adit extends over 9 feet 2 inches on one wall and over 15 feet on the opposite wall. The contacts of the mineralization are irregular; a shearing which appears to provide the westward limit strikes north 70 degrees east, while the line of the eastern side is approximately north 5 degrees east. It will be noted that the strike of the westward contact varies considerably from the established strike of the granite sedimentary contact and the general strike of the sediments while that of the eastward contact of the mineralization almost conforms.

The most northward cut on the contact zone, and the only surface work to have been done recently, shows additional fresh rock in which there is mineralization by scheelite. As in the crosscut adit this fresh rock is heavily silicified and most of the original characteristics are obliterated. Across the exposed width of 30 feet there are several bands which are almost pure quartz and one band which is apparently oxidized and rusted argillaceous material; the remainder is apparently granite host rock intensely silicified. Across this entire width strong scheelite mineralization is maintained. There is some doubt as to the dip of the granite-sediment contact and hence some doubt as to the true width which this 30 foot opencut represents. Locally it appears that the granite contact dips to the west at approximately 60 degrees; if this is correct it would reduce the exposed width

of the zone to 15 feet. However, the opencut has not yet determined the eastward limit for the scheelite mineralization which is just as strong at the present eastward face of the cut as elsewhere in the exposed width.

SAMPLING. The writer took representative samples from three of the metamorphic bands, principally in an effort to establish the distinctions between the fluorescence of scheelite and powellite. Detailed results on these samples are of interest.

No. 244: From the highest metamorphic band--in which are the best showings of molybdenite--at station 176, selected canary yellow fluorescence: Oxide of tungsten--trace. MoS_2 (not yet reported).

No. 245: On the same band, 20 feet north of station 176, sample containing MoS_2 coated with material which displayed typical canary yellow fluorescence; Oxide of tungsten--trace. MoS_2 (not yet reported).

No. 246: On the same band, at station 179, sample containing heavy MoS_2 coated with material displaying deep canary fluorescence: Oxide of tungsten--trace. MoS_2 (not yet reported).

No. 247: At the same location as No. 246; sample of quartz stringer, showing no MoS_2, displaying medium yellow fluorescence. Oxide of tungsten--3.8%. It is to be noted that this type of fluorescence was not confined only to this stringer but shows as well over the width of the band. The sample was selected from the stringer only because there appeared to be no molybdenite within its limits and the object of the sampling was to prove that both scheelite and powellite existed within the same part of the zone.

No. 248: From third lowest metamorphic band--at crossing of band by trail--heavy ferromagnesium mineralization; no MoS_2 visible; many small fluorescent specks of medium to deep yellow specks of medium to deep yellow color; this band reported to be 8 to 15 feet wide; representative sample, oxide of tungsten 1.4%.

No. 249: From lowest metamorphic band, just north of tram tower; no MoS_2 visible in sample; fine dissemination of medium yellow fluorescent specks concentrated principally within narrow darker colored banding in the rock. Sample from darker colored bands; Oxide of tungsten 1.6%.

No. 250: Twenty feet north of sample No. 249. In this sample the fluorescent specks are slightly larger than in 249, are less sharply edged; fluorescence is medium to pale yellow in color. The scheelite here is not confined to the dark banding to nearly the same extent as in the sample 249 location but is disseminated generally across the full width of the showing. Representative sample, Oxide of tungsten 1.4%.

In the 60 foot length of the lowest metamorphic band from which samples 249 and 250 were taken the exposed width varies from 8 to 20 feet. Later sample Nos. 328 to 343 were channeled at regular intervals across this exposure and will provide a true figure for grade. The locations of these samples are indicated on the accompanying assay plan. All of them represent surface-weathered rock, with the exception of 337 to 339 inclusive and 343. At the location of these four samples the cliff face was plugged to a depth of 12 inches.

No. 337: Select sample of 2 inch vertical stringer varying from pure quartz to considerable femic content; heavy MoS_2; deep yellow fluorescence: Oxide of tungsten ; MoS_2.

No. 338: Select sample of 2 inch band, following bedding, feeding from vertical stringer of sample 337 and apparently fading to ordinary altered sediments at 18 inches from vertical stringer. Where sampled, within the 18 inch length, replacement filling of the sediments similar in nature to the 337 stringer gangue; some MoS_2, Oxide of tungten:

No. 339: Sample of altered sediments for width of 2 inches on both sides of No. 338; slight pale yellow fluorescence, No MoS_2; Oxide of tungsten:

No. 343: Channel down face of plugged section; this crosses the strike of the sediments and includes samples 338 and 339, may be taken as typical of fresh rock at this particular location; a little pale yellow fluorescence. Oxide of tungsten:

At the present time the operator is concentrating development on the contact zone in preference to the metamorphic bands as the grade appears to be higher in the former occurrence although assays are not yet available. Current sampling of the contact zone is admittedly applicable principally to surface dimensions only because so little work has been done below the surface. However the adit at the south end provides reason to hope that the scheelite mineralization is a primary rather than entirely a surface condition and that it will persist to at least shallow depths. Locations of samples taken from this zone are indicated on the accompanying plan.

SUMMARY.

In summary, little can be said about the metamorphic bands except that they represent a large tonnage in which there is sufficient scheelite mineralization to warrant investigation.

With regard to the contact zone the information available is that, on the surface, a condition of scheelite mineralization follows a granite-sedimentary contact for a length of 800 feet; that widths of mineralization vary up to at least 30 feet. Further, the only underground exposure, at the extreme south end of the 800 foot length, shows scheelite mineralization apparently as concentrated as in the surface exposures, across an average width of 12 feet. Finally, the only new surface cut, at the extreme north end of the 800 foot length, shows comparatively fresh rock, similar in appearance to that in the south end adit. In this new cut strong scheelite mineralization is exposed across a width of 30 feet, with one margin still covered. The true width of this exposure is not known but it is certainly not less than 15 feet. On the assumption of a length of 800 feet, an average width of 10 feet and a depth of 20 feet there is an indicated tonnage of some 16,000 tons in this occurrence. The writer expects these figures for width and depth to be improved, can see no reason why the length should not be extended to the south, and, on the basis of fluorescence, expects the tungsten grade to be higher than in the metamorphic bands.