82M (Big Bend)
810997

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North Surrey, British Columbia

July 11, 1960

Mr. W. S. Van de Mark, Vice President
Cyprus Mines Corporation
523 West Sixth Street
Los Angeles, California

Dear Mr. Van de Mark,

As a result of our discussion about the mineral possibilities of the "Big Bend" area, I am enclosing a geological map which accompanied "Summary Report (1928) Part A" in which Dr. H. C. Gunning has made a one-season reconnaisance study of the Big Bend for the Geological Survey of Canada. Dr. Gunning subsequently became Dean of the Mining Faculty of University of British Columbia, and represented New Jersey Lead & Zinc here. His judgment is highly regarded. This 1928 Summary Report is unfortunately out of print, so I am obliged to quote excerpts from it obtained at the Canada Department of Mines' reference room here. There are many old Provincial Department of Mines references also, a few of which are quoted in part.

Historically interest was first shown in the "Big Bend" during the early gold rush periods. About 8000 miners worked Goldstream, McCullough Creek and French Creek in the sixth decade of the last century. There was a town of 1800 people at the mouth of Goldstream River where a sawmill and other facilities were available. No trace of this remains. River steamers from United States territory carried freight and passengers this far north up the Columbia River. Some millions of dollars in placer gold were taken here.

Interest in lode mining became evident from 1895, and was at first intense, subsequently sporadic.

Dr. Gunning's map of the Big Bend shows many miles of either sustained or repeating mineral occurrence in a zone running from southeast to northwest through Precambrian formation. It seems certain that these formations, both in the Big Bend and also in the Lardeau country to the southeast, will become eventually a major source of base metals, silver and gold.

I am sending separately a report which I put together several years ago about some properties in the Lardeau District in which I am interested. Accompanying it are: Geological Survey of Canada Memoir No. 161; recent provincial government maps by J. Eastwood in the Ferguson area; a report by Dr. A.C. Skerl on the Pipestem Group on Pool Creek; older reports by Newton Emmons, M. E., on a portion of the same property; and by Douglas Sterrett, Geologist, on the Alma-Paymaster Group higher up on Pool Creek.

Current mining activity in the Big Bend has been carried on by Bralorne at its lead-zinc property northwest of Revelstoke on the Jordan River; and by Highland-Bell Mining Company which has taken over the large "Mastodon" zinc property northeast of Revelstoke, now being put into operation. Please refer to the news clipping attached.

In the Lardeau area, Consolidated Mining & Smelting Limited is developing a mine on the "J. G." property on the shore of Duncan Lake not far from the head of Kootenay Lake. Both Newmont and Bunker Hill explored this property earlier, but insufficiently.

The same formation containing base metal replacement in "Badshot" lime formation continues for many miles, and it is on this very strong lime belt that our "Lost Chord Group" formerly known as the "Big Five" is located (refer Memoir No. 161, pages 28 and 99), and near it to the northwest is our "Wide West Group". In proposing to bond these two groups for his company in 1959, one of the most competent students of the geology of the Lardeau district intended also to stake the northwest extension of the formation as far as Incomappleux River. In a line from the north fork, Lardeau River (or Ferguson Creek) to Incomappleux River is a distance of about eight miles ranging in elevation from 2000 feet at Incomappleux River rising steeply to 8000 feet and holding at high altitudes the entire eight miles. Southeasterly from the Big Showing (Memoir 161, page 100) at 5000 feet elevation on the southern slope above the Incomappleux River valley, strong iron capped leads can be traced through nearly the entire distance. I staked much of this in 1926 from above the head of Lexington Creek to the peak of Goat Mountain. This continuity of mineralization is characteristic of the Lardeau and because of it, and because the geology of mineral occurrence and the stratigraphy are becoming understood as demonstrated by the Consolidated Mining & Smelting Limited operation at Duncan Lake where both Newmont and Bunker Hill were previously unsuccessful, the reasonable probability exists of a strong company being able to take control over large areas where favourable folding has resulted in major mineral deposition such as I have indicated, with expectation of obtaining very large tonnages.

Consideration should be given to the building of a smelter in any long term planning.

The remainder of this letter deals solely with the "Big Bend" district. Further information about the "Lardeau" is to be found in the reports thereon being sent you separately, which I shall appreciate having returned in due course.

I have no ownership, nor do I represent any of the Big Bend properties, and I hope if my information should lead to your becoming active there, some arrangement perhaps in the nature of a finder's fee would be considered.

INFORMATION CONCERNING GEOLOGY AND MINERAL OCCURRENCES OF BIG BEND DISTRICT, REVELSTOKE MINING DIVISION.

GENERAL GEOLOGY OF THE BIG BEND MAP-AREA, BRITISH COLUMBIA, SUMMARY REPORTS, CANADIAN GEOLOGICAL SURVEY REPORT, 1928, PART A (Page 140A.)

" Underlying the map-area is a great series of metamorphosed Precambrian sediments which strike from north to northwest and dip to the east. Extrusive greenstones are interbedded with the sediments at certain horizons and intrusive rocks of similar appearance are rather sparingly developed. All these rocks are complexly folded in a series of essentially isoclinal anticlines and synclines. The sediments include crystalline limestones, quartzites, mica schists, slates, phyllites, arigillites, and chlorite schists, and are cut by numerous stocks, dykes, and sills of granitic rock of Mesozoic age. The latter include granite, porphyritic granite, grandodiorite, quartz diorite, granite pegmatite, aplite, and a few fine-grained lamprophyre dykes. Ortho- and paragneisses are abundantly developed in the southwestern corner of the map-area."

FROM SUMMARY REPORT, 1928, PART A (Page 160A), GEOLOGY AND MINERAL DEPOSITS OF BIG BEND MAP-AREA, B.C., BY H. C. GUNNING.

MINERAL PROPERTIES (IN PART).

" COPPER DEPOSITS.

MONTGOMERY GROUP

The Montgomery Group is between Canyon Creek and Boulder Creek, principally on the slopes draining into the former. A fair trail, about 7 miles long, leads from the Columbia River trail just north of Downie Creek to Boulder Creek. From the mouth of Boulder Creek, at elevation 2,000 feet, a steep trail, now in poor repair, climbs for about 4 miles to the property at elevation 5,200 feet. The owner of the property is J. C. Montgomery of Revelstoke, B. C. On the western end of the group additional claims are held by E. E. McBean, A. McIntosh, and others. Mr. Montgomery staked the claims, which are in exceedingly rugged country, in 1896. Since then considerable surface stripping has been done. In 1917 Granby Consolidated Mining, Smelting & Power Company took an option on the property and made several large open-cuts. There is a small cabin near the workings. There is some good timber on the claims, and on Downie Creek, between Canyon and Boulder Creeks, on ground held by Mr. Montgomery, abundant timber and water power are available.

On the claims a series of pure white to grey crystalline limestones interbedded with quartzites, argillaceous quartzites,

black and grey slates, mica schists, chlorite schists, and impure calcareous members strike north 25 degrees to 40 degrees west and dip 25 degrees to 40 degrees northeast. Limestones occur principally near and above (northeast of) the mineralized zone. Below the latter the rocks are mica schists, light green chlorite schists, andalusite schists, and impure argillaceous and quartzitic sediments. All the sediments are strongly metamorphosed. The limestones are fine to coarsely crystalline and Mica is widespread in the non-calcareous members. Garnet and epidote are quite abundantly developed. Tremolite is present in much of the limestone and some actinolite was observed.

Intruding the sediments, to the south of the ore zone, is a large stock of granite. The main body, near the showings, is of fine to intermediate grain. Orthoclase and microline are the abundant feldspars, albiteoligoclase forming from 10 to 15 per cent of the rock. Micrographic intergrowths of quartz and orthoclase occur. Biotite and muscovite are the principal accessory minerals. The granite extends southward from the showings to and across Downie Creek and several miles southeast from Boulder Creek. Where observed on the trails the main mass varies from coarse irregular to fine grained. Pegmatitic dykes cut the granite. Near the workings many fine-grained, granitic dykes cut the overlying sediments. The garnets, epidotes, tremolite, and actinolite noted in the sediments have been formed during contact metaphorism by the granite. At its easterly side the granite is in conformable or nearly conformable contact with overlying limestones, the contact dipping east beneath the sediments. Elsewhere the contacts are steep and very irregular. Many of the associated dykes are also conformable with the bedding of the sediments.

The ores occur as bedded replacements. The mineralization consists of pyrrhotite, some pyrite, chalcopyrite, and a little sphalerite. Galena is very rarely present in minute amounts. The essential sulphides are pyrrhotite and chalcopyrite, the values being in copper with a small amount of gold and silver. The gangue is quartz and silicified wall-rock, with occasional garnet, epidote, and actinolite and, in some places, considerable dark green chlorite. The sulphides occur in grey to greenish, siliceous, vitreous rocks which probably varied originally from quartzitic to calcareous sediments. No ore was observed in the pure limestones, but metamorphism has greatly altered the original composition of the rocks within the mineralized zone.

The main ore zone has been developed by five major open-cuts. The lowest cut, a short distance east of the cabin, at elevation 5,200 feet, on a steep hillside sloping south, is 80 feet long and cuts across the ore zone from foot-wall to hanging-wall at an oblique angle. Consequently the exposed width of mineralization is at least double the actual width. Much of the cut exposes massive pyrrhotite containing only very small quantities of chalcopyrite and a little watery quartz.

On the hanging-wall side of the cut there are about 6 feet of light grey silicified rock and quartz that contains much chalcopyrite, a little pyrrhotite, and small quantities of spalerite. A short distance southeast of and below the cut are many fine-grained granitic dykes, offshoots of the nearby granite. The relation of these dykes to the ore was not determined. The same general zone of mineralization follows the strike of the sediments across and up the hillside to the northwest and has been exposed by four additional open-cuts. In these cuts the mineralization extends across widths up to 40 feet. Massive pyrrhotite, lower grade in copper as before, occupies widths of from 5 to 15 feet. In three of the cuts from 1 to 3 feet of higher grade copper ore occurs in the grey, silicified rock on the hanging-wall side of the ore zone. In one cut, the first above the lowest one described, the same material is found within the more massive pyrrhotite. On the divide between the waters of Boulder and Canyon Creeks, at elevation about 6,000 feet, northwest of the above-described cuts, the ore zone has notbeen clearly exposed, but is probably represented by considerable iron oxide on the surface. It is stated that, on the Boulder Creek slope, some good ore occurs on this and other, more northeasterly, leads.

Seven hundred feet vertically above and north of the first cut described, is a second zone of mineralization. In it, on the face of a steep bluff, is about 40 feet of disseminated pyrrhotite in siliceous, altered sediments. Garnet and chlorite are developed and it is probable that the original rocks were, in part at least, calcareous. The copper content, in the parts observed by the writer, is very low. Overlying the ore zone are grey, siliceous slates. Between this and the lower zone of mineralization is a series of grey siliceous garnetiferous sediments, mica schists, and impure grey limestones, all cut by granitic dykes. The ore zone was traced for several thousand feet northwest to the Boulder Creek divide. Practically no work has been done on it, but signs of mineralization could be found at intervals.

The owner states that there are other less important leads on the property, some of which contain considerable zinc blende. A specimen given by him, and said to come from the Boulder Creek slope, consists of fine-grained pyrite, cut by minute veinlets of sphalerite, very little chalcopyrite, and a trace of galena.

The mineralization occurs as replacement deposits following the bedding of the sediments and is very persistent along the strikes and through a vertical range of about 1,000 feet. The more massive sulphides evidently occur as lens-like or irregularly outlined bodies within the wider zones of mineralization. Chalcopyrite occurs most abundantly in light grey, siliceous country rock on the hanging-wall side of the main ore zone, occasionally in similar manner within the ore zone. Much of the pyrrhotite, however, also contains low values in copper. Values in gold and silver are said to be low.

The property has not been developed to a stage where its possibilities can be fully realized. A brief examination indicates, however, that the mineralization is sufficiently extensive to encourage further investigation. The question to be decided is whether, over widths suitable to large, low-cost mining operations, the values would be sufficiently high to yield a profit. To determine this, considerable open-cutting and careful large-scale sampling would be necessary."

G.D.H. comment: There are now 16 staked claims in good standing but a very large number of others staked in the same group during the copper boom of several years back have been dropped.

PROVINCE OF BRITISH COLUMBIA,MINISTER OF MINES' REPORT, 1917. Page K192.

"The Montgomery Copper Claims, seven in number, are situated about fifty miles from Revelstoke in the Big Bend District, on Downie Creek, a tributary of the Columbia River. An exhaustive examination was made of the above group during the year and a number of samples collected for assay, which gave very good commercial values in copper, gold and silver. The character of the ore makes it a very desirable ore for smelting, as it carries all of the required fluxes.

The zone in which the ore is encased is about 150 feet wide, and the vein is from 8 to 20 feet. Associated with the copper which is held in the very heavy iron, is a quartz vein which also carries chalcopyrite and excellent gold values. The vein as a whole carries commercial ore requiring treatment on the ground owing to the low character of the ore and the magnetic base. Nature has developed all the necessaries requisite for economic operations, as unlimited water power can be had in close proximity, with timber for all purposes, and a very easy grade for a road. The Columbia River affords means of transportation aside from the excellent river grade for either auto trucks or railway."

PROVINCE OF BRITISH COLUMBIA,MINISTER OF MINES' REPORT, 1917. Page K192.

"The Mastodon Group of mineral claims, situated about twenty-three miles from Revelstoke (eighteen miles north along the Columbia River and about five miles east), between LaForme and Carnes Creeks, consists of ten mineral claims and includes the property which in former years was known as the Noble Three Group. A force of men was put to work last summer developing, and worked steadily until Christmas. A company has been formed known as the "Mastodon Mining Company", with head office at Lethbridge, Alberta, to take over the properties, and will start work in January of the new year, and the balance of the winter will be spent in developing. The property has three separate and distinct veins on it, the work thus far having been done on what is called the middle vein.

This vein is enclosed in lime and schists and is from 3 to 6 feet wide, carrying a fine-grained solid sulphide ore as well as carbonates; some coarse-grained galena also occurs in the vein, and the ore consists of an intimate mixture of galena, zinc-blende, copper and iron pyrites, and grey-copper. A sample shipment of 1 ton of the ore was sent to the Trail smelter and showed values as follows: silver, 23.3 oz. a ton; lead, 46.7 per cent.; and zinc, 15.7 per cent.

The work going on consists of sinking a shaft on the ore. This shaft is now down 60 feet and the ore-shoot varies in width from 1 to 4 feet; the valves have improved with depth and the walls are well defined".

G.D.H. demment:

In recent years a large expenditure has been made bringing this property to the point of production. As shown in the news clipping attached Highland-Bell Mining Company has obtained the Mastodon at a bargain price and I have been informed is now going ahead to put it into production. The complexity of the ore held back this property for many years.

PROVINCE OF BRITISH COLUMBIA, MINISTER OF MINES' REPORT, 1899.

"CARNES CREEK.

ROSEBERY GROUP. On this creek the principal set of claims is that known as the Rosebery Group, comprising 10 claims, all owned and being developed by the Carnes Creek Consolidated Co., Limited. Development work has been continued throughout the past season with a view to placing the property on a thorough working and producing basis. On the Rosebery itself, an upper tunnel was driven to prove the lead, and continued for over 100 feet, assays being made frequently of the ore (arsenical pyrites, carrying gold), which were highly satisfactory. A lower tunnel has been driven some 350 feet, exposing the same kind of ore, but with some yellow copper (chalcopyrite) showing. As this lower tunnel is deep enough to prove the ore body continuous for at least 200 feet from the surface, there should be a mine here in the near future. Very comfortable cabins for stores, sleeping and eating, have been built convenient to the property, whilst a third tunnel has been commenced at a still lower depth. A large ore bin has been constructed to receive the output of the mine, and it is proposed to construct an aerial tramway to a convenient point on the North Fork of Carnes Creek, whence the existing trail (to the mouth of Carnes Creek) can be readily widened for rawhiding the ore out to the Columbia River. Once there, river steamers can take it to Revelstoke, to connect with the C.P.R., or can pursue their way down the river to the smelter at Trail. The development of these claims has been prosecuted under unavoidably high trransportation expenses.

Extending from the Rosebery Group across the North Fork of Carnes Creek and up the slope that separates Carnes Creek from Standard Basin is a mineral belt of iron capping with strong indications of copper".

PROVINCE OF BRITISH COLUMBIA, MINISTER OF MINES' REPORT, 1898, Page 1059

"KEYSTONE MOUNTAIN.

STANDARD GROUP. This camp had its first locations made in 1895 but owing to lack of transportation facilities has not developed very fast; it is situated about 40 miles north of Revelstoke and has a large number of claims (about sixty).

The principal work has been assessment, with the exception of two groups on which about 300 feet of tunnel have been run, of which 200 feet are on the Carbonate Chief and 100 feet on the Keystone, and preparations are now being made to work several claims this coming winter.

The character of the ore is arsenical iron carrying gold, copper, galena, and copper pyrites. The iron leads are generally heavily capped, showing strong and continuous veins. Lead ores run from 60 to 80 per cent. lead and as high as 80 oz. in silver.

The Standard Basin Group adjoins Keystone Mountain on the east side and has some 20 claims; the first located a year ago. This year only assessment work and preparatory work for more active development another season, was done. The ore is composed of arsenical iron and copper pyrites, the copper predominating. On the STANDARD CLAIM a cross-cut of 60 feet has been run and a chamber excavated and ready for sinking. The formation is lime, serpentine and shale, with dykes of porphyry and granite. This promises to be a good camp with development. A trail was built this year to connect the camp with the Keystone Trail."

G.D.H. comment:

There are many extremely favourable early reports on the Standard Group. Considerable tunnelling was done. In later Provincial Government Annual Reports (30 years later) a more cautious attitude has been taken. Dr. H. C. Gunning also appears less favourably impressed with the results of the work performed. Criticism of the methods of development have been made by some examiners.

PROVINCE OF BRITISH COLUMBIA ANNUAL REPORT OF MINISTER OF MINES, 1926, Page 269.

"J. & L.

The wagon road which is being gradually extended up the

Columbia River into the Big Bend country has already been a great benefit to prospectors and others who have interests in that part of the district. This road is now constructed to within a few miles past LaForme Creek.

For a time the interest of mining men and others was chiefly centred on the operations being undertaken by the Porcupine Goldfields Development and Finance Company at the J. & L., situated on Carnes Creek and owned by I. McBean, where a crew of about 10 men was put to work at driving a low tunnel. After accomplishing a limited amount of work the option was relinquished: the complex character of the ore, rather than the ore occurrence of the ore itself, is the principal reason given for the abandonment of the property: for reference see the Minister of Mines' Annual Report for 1922.

PROVINCE OF BRITISH COLUMBIA, MINISTER OF MINES' REPORT, 1933, Page A210.

"A. AND E. At this group of eight claims, situated on the southern side of the upper end of the North Fork of Carnes Creek, 10 miles by trail from the Big Bend road at the 26-Mile board, A. Kitson, of Revelstoke, continued prospecting work. The geology of the area is shown on Map 237A accompanying Geological Survey of Canada Summary Report, 1928, Part A, "Geology and Mineral Deposits of Big Bend Map-Area", by H. C. Gunning. The rocks in the vicinity of the deposits, which are exposed at points through a vertical range of from 6,000 to 7,200 feet above sea-level, are crystalline limestones and schists of pre-Cambrian age. They are the north-westerly extension of the sedimentary series which crosses the main line of the Canadian Pacific Railway in the Albert Canyon-Flat Creek area and which contains practically all the known metallic deposits of importance in this part of the Revelstoke Division. The workings developing the main zone of mineralization consist of a tunnel at 6,000 feet elevation and open-cuts along the outcrop to the south-east. The vein is formed along the contact of grey marbleized limestone (on the hanging-wall) and black schist striking N. 17°W. and dipping 45° to 50° to the northeast (in the tunnel). The contact lead stands out prominently in the precipitous bluffs on both sides of a glacial basin. According to H. C. Gunning, the sulphides have apparently replaced the limestone along the contact shear-zone and are arranged along the zone as lenticular bodies. Solid sulphides from 20 to 42 inches in width can be seen at numerous points, indicating continuity of mineralization. The sulphides consist mainly of pyrite, sphalerite, and galena, with some arsenopyrite. Gold and silver values fluctuate considerably, the presence of galena and (or) arsenopyrite being apparently good indicators of gold values. In the tunnel, 98 feet long, solid sulphides were encountered 67 feet in from the portal and followed to the face, the width of the pay-streak varying from 10 to 24 inches in width. A sample across 20 inches, 5 feet back from the face, assayed: gold, 0.10 oz. per ton; silver, 11 oz. per ton; lead, NIL; zinc, 7.5 per cent; and a grab-sample from a pile of selected material at the portal assayed: gold, 0.20 oz. per ton; silver, 13.6 oz. per ton; copper, 0.2 per cent; lead, 11 per cent; zinc, 8 per cent. On the foot-wall side

of the pay-streak the rock contains disseminated sulphides and quartz stringers over a width of from 18 to 36 inches. Going south-easterly from the tunnel across the basin there are three open-cuts proving the continuity of the vein. The first two open-cuts, about 700 and 850 feet to the south-east respectively, expose 3 feet of decomposed oxidized material containing remnants of sulphides. About 300 feet farther to the south-east in an open-cut, at the lower end of a showing 100 feet long or more, as exposed in the bluffs at the top of a rock-slide, there is a band of sulphides of irregular width up to 3.5 feet. Over the summit, a claim-length away, an open-cut exposes a similar width of massive sulphides. A parallel mineralized zone, mentioned by H. C. Gunning, was not inspected, due to snow-storms which occurred when the property was visited late in 1933. Extensive and systematic sampling to delimit the zones of better gold and silver values would be necessary for assessing the economic potentialities of the deposits, and the metallurgy of the ore would be an important factor. The continuity of the vein and the numerous exposures of mineralization are impressive."

It is hoped that the descriptive matter herein may serve to present a useful picture of the Big Bend country's mining characteristics.

I find that the geological map by Dr. Gunning mentioned in my first sentence, is at our summer place on Shuswap Lake, (address: Tappen, British Columbia). I am returning there in a few days and will send it along.

The reports on the Lardeau district were placed in today's mail.

Yours very truly

G. D. Humphrey

GDH/i