

Report

on

Western Uranium Cobalt Mines Limited

Skeena Crossing, B. C.

ROCHER DE BOULE MINE

The following is a joint report by H. L. Hill and R. E. Legg of the firm of Hill, Legg and Hemsworth, Consulting Mining Engineers. The sampling was carried out by an experienced sampler under the direct supervision of R. E. Legg. Due to snow conditions no examination could be made of the surface outcrops and geology.

SUMMARY AND CONCLUSIONS

The Rocher de Bould Mine, owned by Western Uranium Cobalt Mines Limited, situated on Rocher de Boule mountain two miles from the Red Rose Mine, near Hazelton, B. C. has been found to contain only 11,050 tons of commercial ore in two ore shoots located as follows:

No. 2 Vein on West end of 1200 level		
Ore shoot	147.5 feet long containing	6250 tons
Ore shoot	130 feet long containing	<u>4800</u> tons
		11,050 tons

The average grade of this 11,050 tons is:

Gold	0.28 oz.
Silver	7.20 oz.
Copper	2.74%
Cobalt	0.15%
Tungsten	0.07% W ₃

It is calculated that the total operating profit which can be made on the indicated ore reserves (11,050 tons) at current metal prices for gold, silver, cobalt and tungsten and with copper at 27.5¢ per pound (the official world price at December 6, 1951) is \$86,632. If copper can be sold at 45¢ per pound, the operating profit can be increased to \$170,280.

As the capital investment necessary to bring the mine into production on the basis of 150 tons per day is several times greater than the indicated profit - even assuming copper to sell at 45¢ per pound - it is our opinion that the Rocher de Boule mine should not be brought into production until such time as sufficient ore has been found.

While it is realized that much of the necessary capital expenditure has already been made towards placing the mine on a productive basis, nevertheless it is our firm opinion that all work should be stopped on the Rocher de Boule property, which at present shows no reward for the shareholders, and that all efforts be concentrated on the Red Rose property which does offer a real reward for the shareholders. Later on when the Red Rose is in operation and making substantial profits, an exploration campaign could be carried out at the Rocher de Boule property in an effort to increase the ore reserves.

The facts, which supports the conclusion which has been arrived at, are contained in the following report.

The Rocher de Boule mine, owned by Western Uranium Cobalt Mines Limited, is situated on Rocher de Boule mountain on the north side of Juniper Creek near Hazelton, British Columbia. The camp is situated at an elevation of 4,000 feet, and the claims extend up and along the mountain side to the top which is at an elevation of 6,000 feet.

HISTORY

The mine was discovered around 1910 when the building of the Grand Trunk Railway to Prince Rupert focussed attention on this part of British Columbia. Serious production from the property commenced in 1915, and between that year and the end of 1918 some 39,833 tons of copper ore were shipped to the smelter. This ore averaged 7.2% copper, 0.105 oz. gold and 1.57 oz. silver. It will be noted that this production took place during World War 1, when the price of copper was sufficiently high to permit the profitable shipment of ore. When the war ended and the price of copper fell, the mine was closed down. A study of old Annual Reports by the B.C. Minister of Mines describing the mine workings makes it abundantly clear that there was no high grade shipping ore left, and even lower grade milling ore was not sufficient in quantity to warrant the erection of a concentrator. The mine reopened around 1928 under the stimulus of a higher copper price, but after a few cars of hand-sorted ore were shipped, operations were suspended. The property then remained closed until acquired by the present owners.

GEOLOGY

The ore bodies occur in strong fissures or shear zones which traverse a granodiorite intrusive which forms the core of Rocher de Boule mountain. These zones outcrop along the mountain side with a strike roughly east-west. They dip north into the mountain from 35 to 65 degrees. On the west side of the property it is noted that the granodiorite is in contact with sandstones, argillites

and tuffaceous sediments which are described as such by the Geological Survey of Canada. These shear zones apparently acted as channels for ascending mineralizing solutions. Irregular ore shoots have been formed along these shear zones in which the predominant ore mineral is chalcopyrite. The occurrence of a number of other minerals was noticed and those of economic importance are safflorite (ore of cobalt) and scheelite (ore of tungsten). The precious metals - gold and silver - occur in varying quantities.

DESCRIPTION OF ORE BODIES

There are only two important ore-bearing shear zones on the property, and these are known as the No. 2 and No. 4 veins. The No. 4, or upper vein, outcrops highest up the hill, while the No. 2 or lower vein, outcrops approximately 1,000 feet lower.

The No. 4 Vein

This vein produced the bulk of the tonnage shipped during World War I. The workings on this vein, or, more strictly speaking, shear zone, extend along the shear for a length of over 1,000 feet and down to a depth of 500 feet. They are shown on the attached plan entitled "Plan Underground Workings" dated Nov. 22, 1951, which plan is a copy of that made in 1918 by D. J. Williams, who was then manager at the property.

An examination was made in November of 1951 of the accessible parts of these old workings. It was not possible to examine the 500 level or any of the stopes between the 300 and 500 levels as these are flooded. Also, owing to bad ground, only two-thirds of the 100 level could be examined. All of the 300 level was carefully checked over and the greater part of the 100 level. Entry was made into the old stopes wherever possible, but decayed timbers and caved ground made this a hazardous job.

The ore shoots are completely mined out in the drifts. While the shear zone is continuous, the ore is not. The shoots start and stop abruptly, and no worthwhile sections of unmined lower grade ore were noticed. Where possible, the ends of the stopes were examined, and where seen, all shipping ore had been removed. With the exception of possibly a few hundred tons representing remnants of lower grade ore here and there, it can be said that these accessible workings on the No. 4 vein do not reveal any ore. In other words, all of the ore has been mined from the ore shoots. For this reason no sampling was done in these workings. The shear zone was examined for scheelite with the aid of the fluorescent lamp. A few traces of this tungsten mineral were noticed, but most certainly the average assay would be nil.

The following revealing description of the No. 4 vein by Mr. J. D. Galloway, Government Mining Engineer, who was later Provincial

Mineralogist, is given herewith:

Annual Minister of Mines Report for Year 1916 - Page K 107.

"The vein was not mineralized to any extent where it was first struck, but drifting to the east on the vein soon revealed a good pay-shoot of ore. This drift was run some distance to the east and four distinct ore-shoots were found, the first being 80 feet long, and the second 160 feet; the lengths of the other two were not noted, but were in the neighborhood of 100 feet. These first two shoots were stoped out right to the surface, and the others nearly to the surface. The average width of ore is not known to the writer, but it fluctuated from 1 to 8 feet. The sulphide minerals in these pay-shoots are chalcopyrite and pyrite, and very occasionally a little tetrahedrite (grey-copper). Along the hanging-wall of the vein there is, as a rule, from a few inches to 1 foot of crushed broken granite which in mining cannot be kept from falling into the ore, and therefore lowers the grade of the ore. This, of course, only occurs where the pay-shoot is developed against the hangingwall. The pay-shoot may be found on either wall, and sometimes it splits into a shoot on each wall, separated by a band of waste rock of varying width. The ore-shoots, as a rule, cut off abruptly, and low-grade ore carrying disseminated chalcopyrite is not of frequent occurrence. The values are mainly in copper, together with small gold and silver values. The production for 1915 was 17,000 tons, averaging about \$1.65 in gold and silver to the ton and 8 per cent copper. When it is considered that, mining in this way and shipping without hand-sorting, a large amount of waste-rock necessarily is included in the ore, it is evident that the clean shoots of ore carry a high percentage of chalcopyrite. The production for 1916 was 16,800 tons, containing 1200 oz. gold, 16,700 oz. silver and 1,619,145 lb. copper (recovered copper)."

It is considered that Mr. Galloway has given an accurate description of the ore bodies. At the time he visited the mine, it was in operation, and he would be in a position to enter the stopes and could more accurately assess the situation than can be done today.

The longitudinal section through the stopes on the ore shoots in the No. 4 vein, which is attached hereto, shows that these ore shoots are relatively small. Galloway reports on page K 111 of the 1918 Annual Report of the B.C. Minister of Mines that no ore-shoots of importance were found on the 500 level, and that this level was therefore abandoned.

For the reasons described, no ore reserves can be attributed to the No. 4 vein. Even if the remnants of ore, previously referred to, should prove to be greater than anticipated and amount to a figure of, say, 2,000 tons, they still could not be considered as ore reserves, as the cost of putting these old workings, which are

roughly 1,000 feet above the camp, back on a productive basis would far exceed the profit which might be won from such a small tonnage of lower grade ore.

The No. 2 Vein.

The No. 2 vein produced the balance of the tonnage shipped from the property during World War I. The actual tonnage from this vein is not known, but out of the 40,000 tons shipped from the property, it is estimated that less than a fifth came from this vein.

This No. 2 vein has been opened up by extensive workings on the 1,000 and 1,200 levels. These levels are approximately 150 and 400 feet down the dip of the vein from the surface outcrop. The total distance in which drifting has been carried out along the shear zone on both of these levels is approximately 3450 feet. The total length of the ore shoots opened up by this drifting is 527 feet. Thus only 15% of the drifting is in ore, which is a very poor percentage in any mine. The attached "Plan Underground Workings" dated Nov. 22, 1951 shows the results of sampling carried out in November on both levels.

SAMPLING RESULTS NO. 2 VEIN Sampling 950 level

This small surface adit, which opens up the No. 2 vein for 100 feet in length, was not sampled. The ore between this adit and the surface cannot be more than around 40 to 50 feet in height and the ore length, according to the Company's own assay plan, is 50 feet. As this ore is so near the surface it is not known what the mill recovery will be owing to the heavy oxidation. The ore is stoped out below the level. As this ore is so doubtful, the small tonnage indicated (400 to 500 tons) is excluded from the ore reserves.

Sampling Results, 1000 Level

A mineralized section at the west end of the main drift on the 1000 level was sampled at 10-foot intervals for a length of 160 feet, and the following average values were obtained across an average width of 24".

Gold	0.043 oz.
Silver	5.97 oz.
Copper	1.89%
Cobalt	0.17%
Tungsten	0.06% WO ₃

Assuming the average stoping width to be 48", the calculated average grade of ore which would be mined from this section would be:

Gold	0.02 oz.
Silver	2.99 oz.
Copper	0.95%
Cobalt	0.085%
Tungsten	0.03% WO ₃

This ore is below commercial grade at current metal prices and even with copper at 45¢ per pound. A careful examination was made for any mineralization outside of the sample widths and yet within the 48" stoping width, but almost without exception it can be said that the mineralization, and hence the values, is confined to a narrow width in this section of the shear zone. A careful check for scheelite content was made with the fluorescent lamp. There are little patches of scheelite here and there, and it was noted that previous sampling for scheelite had been carried out just at the places where these small concentrations of scheelite occurred. The average scheelite content of the sampling covered by this report along this section is 0.06% WO₃, and it is considered that this result is in agreement with the visual inspection along this 160 foot length.

Going further east along the main drift there is a length of 550 feet which shows scattered, irregular and narrow mineralization along the shear, which would be lower in grade on the average than the 160-foot length described in the previous paragraph. Short sections of better mineralization can occur, and one such section occurring at point "A" on the attached map has been sampled along a length of 20 feet. This small ore shoot, which terminates abruptly at both ends, averages 0.17 oz. gold, 2.83 oz. silver and 3.66% copper across 37". This is a fair grade of ore, but what tonnage can be expected? If the shoot has the same height as its length, then it would yield 130 tons, which can hardly be called an ore reserve.

From "E" to "C" a mineralized zone has been sampled for a length of 280 feet. These samples show the following average values across an average width of 26".

Gold	0.03 oz.
Silver	1.97 oz.
Copper	2.23%
Cobalt	less than 0.1%
Tungsten	Traces scheelite.

Across a stoping width of 48" the calculated values for this ore are:

Gold	0.02 oz.
Silver	1.10 oz.
Copper	1.21%
Cobalt	0.05%
Tungsten	Traces scheelite

Tungsten assays were not made on these samples since an examination by the fluorescent lamp showed only scattered traces of scheelite. This 280-foot length of mineralization is well below commercial grade.

From "C" to "D" there is a length of from 225 to 250 feet of ore which has been stoped above the level. Entry was made into the stope, and where possible, the ends of the stope were examined. Some ore has been left where the vein narrowed down. It would be low grade when the dilution factor is considered. There is a very limited tonnage left, since the surface is probably only around 125 feet above the level. Particular attention was paid to the widths of this old stope. Few indeed were the places where it was held to 5 feet in width, and the average would be close to 6 feet. It appears that a high percentage of waste rock was broken during the stoping operation.

Sampling Results 1200 Level

There are two ore shoots exposed on this level and they are both found in the westerly end of the long drift following the shear zone. Here the mineralization is fairly consistent along a length of 400 feet, and two ore shoots occur along lengths of 147.5 feet and 130 feet. They are separated by a 70-foot length which is below commercial grade. The average values for these two ore shoots are as follows:

Average Width	<u>147.5' Ore Shoot</u> 29"	<u>130' Ore Shoot</u> 18"
Gold	0.087 oz.	1.54 oz.
Silver	13.40 oz.	16.5 oz.
Copper	5.00%	6.23%
Cobalt	.30%	.31%
Tungsten	.11% WO ₃	.203% WO ₃

The average values for these two ore shoots calculated across a 48" stoping width are as follows:

	<u>147.5' Ore Shoot</u>	<u>130' Ore Shoot</u>
Average width	48"	48"
Gold	0.052 oz.	0.58 oz.
Silver	8.0 oz.	6.20 oz.
Copper	3.02%	2.34%
Cobalt	.18%	.10%
Tungsten	0.066% WO ₃	0.076% WO ₃

Note: The average values for the 130-foot ore shoot have been determined by taking the average figures for both the drift and winze samples.

The shear zone between points "E" and "F" marked on the map was closely examined, and there are no other stretches along the shear which could be classed as ore or "near ore". In fact nothing worth sampling.

Tungsten Values on 1200 Level

The shear was examined under the fluorescent lamp for its entire length. A new extra powerful mineralight was used for this purpose. The only part of this shear zone which occasionally showed small concentrations of scheelite was in the westerly end containing the two ore shoots which have been described. The rest of the shear contains negligible scheelite values.

This westerly section was very carefully examined for scheelite. Washing of the vein was done where necessary, and fresh faces were exposed by picking into the soft shear to remove dust covered areas. The scheelite was observed to occur in irregular patches, often near the hangingwall contact. There is absolutely no continuity of same. The average values in the two ore shoots, as determined by the assaying, are in line with what was expected from the visual inspection with the fluorescent lamp. As these results were so very much lower than results previously reported, an attempt was made to determine how the earlier samples were taken. A map at the mine office showed the results of five samples which had been assayed for WO_3 content. All of these samples were taken on the 1200 level west of the winze, but not at regular intervals.

The results on these five samples, as taken from the map just referred to, are as follows:

<u>Sample No.</u>	<u>Width</u>	<u>% WO_3</u>
1 WO	24"	8.80%
2 WO	12"	0.6
3 WO	Selected	6.0
4 WO	14"	11.1
5 WO	28"	<u>4.14</u>

Average of five assays - 6.0% WO_3

The exact location of only one of these five samples could be determined, namely sample number 1 WO. The number "1 WO" was marked on the wall of the drift just right where a sample was cut, and this sample cut across a small patch of massive scheelite about 6" by 4", and as expected, it assayed high, namely 8.8% WO_3 . If the sample had been cut only a foot away in either direction, it would have yielded a very low assay. Sample 3 WO was a selected sample, and therefore meaningless. It could not be determined where the other samples were taken. However, it can be stated definitely that the average figure of 6% must only represent the average of a few selected samples.

Tungsten Values in Winze Below 1200 Level

Scattered patches of scheelite can be seen on the walls and on the back of the winze leading from the 1200 to 1300 level. The average of 11 samples is 0.207% WO_3 . In places the scheelite makes a good showing on the back of the winze, but this scheelite is misleading, inasmuch as it can be termed "skin deep". It occurs at the hangingwall contact on a slickensided face, and breaking into this face with a heavy pick showed that it rarely penetrated more than half an inch.

Tungsten Values on 1300 Level

The water on the 100 odd feet of drifting on this level was waist high, which prevented a close examination of the drift with the fluorescent lamp. However, about 30 feet of drifting near the winze would be examined, and the scheelite values are negligible. A report at the mine stated that lamping on this level from the winze to the west face of the drift showed no scheelite values.

ORE RESERVES

The only ore which is included in the ore reserves is that which will result in net smelter returns of \$15.00 or more per ton. It is considered that operating costs at the mine will be \$15.00 per ton and any ore which will not yield that amount per ton is therefore not profitable. In calculating ore reserves, the following metal prices have been taken.

Gold	\$ 37	per ounce
Silver	95¢	" "
Copper	45¢	" pound
Cobalt	50¢/lb.	contained in the concentrates
Tungsten	\$ 65	per Unit WO_3

The only two ore sections which meet the above definition of profitable ore are the 147.5-foot and 130-foot ore shoots at the west end of the 1200 level. It will be noted that copper has been taken at 45¢ per lb. in evaluating the ore. Currently the official world price of copper is 27.5¢ per lb., but is assumed that the company can make a favourable contract at the higher price mentioned (45¢). This assumption is based on very recent correspondence and discussions which Western Uranium Cobalt Mines Ltd. have had with an established overseas ore buying firm, which information has been made available to the writers of this report. It is noted that no firm offer has been made to pay for copper at the rate of 45¢ per lb., but rather a statement was made quoting the current free market price at from 45¢ to 55¢ per lb. This matter of price is vital to the value of

Rocher de Boule ore. If copper cannot be sold at this free market price of 45¢ per lb., as against the world official price of 27.5¢ per lb., then the value of the Rocher de Boule ore reserves will have to be revised downward on the basis of the official price for copper or on the basis of some firm offer from a purchaser.

Tonnage in 147.5-foot Ore Shoot

Length of ore 147.5'
Height " " 147.5'
Thickness 4' (4' stoping width assumed)

At 12 cu. feet per ton this shoot contains

$$\frac{147.5 \times 147.5 \times 4}{12} = 7250 \text{ tons}$$

Less 1,000 tons mined by former owners from drift, small stope above level and small underhand stope below the level now filled with water.

Ore available in 147.5-foot ore shoot - 6250 tons

Tonnage in 130-foot Ore Shoot

Length of ore 130'
Height " " 130'
Thickness 4' (4' stoping width assumed)

At 12 cu. ft. per ton this shoot contains

$$\frac{130 \times 130 \times 4}{12} = 5633 \text{ tons}$$

Less ore mined from winze, drift and small stope above drift - 833 Tons.

Ore available in 130-foot ore shoot - 4800 Tons.

Total ore available in both ore shoots - 11,050 Tons.

Average grade of 11,050 Tons is:

Gold	0.28 oz.
Silver	7.20 oz.
Copper	2.74%
Cobalt	0.15%
Tungsten	0.07% WO ₃

It will be noted that in calculating the tonnage available in both ore shoots, it had been assumed that both shoots have the same height as length. For the larger or 147.5-foot ore shoot there is little evidence to support this assumption. There are no raises going up on this ore, but one small stope follows the shoot about 30 feet above the drift with the stope face still in ore. A small underhand stope follows the ore down for 12 to 15 feet, but the bottom of this stope cannot be examined as it is full of water. On the other hand there is evidence to support the assumption that the 130-foot ore shoot will have the same height as length. The winze follows down on this ore shoot for 100 feet and a raise directly above the winze continues in ore for about 30 feet above the level. It does not appear as if this ore shoot would have a height greater than about 130 feet for two reasons, namely:

- (1) the drift on the 1300 level directly below the ore shoot is barren.
- (2) the raise which goes up for about 250 feet above the 1200 level runs out of ore about 30 feet above the level. ✓

The mineralized sections which have been sampled on the 1000 level do not constitute commercial ore. The best section is the 160-foot section at the west end of the drift. The gross value per ton of this ore is as follows:

Gold	0.02 oz. @ \$38/oz.	\$ 0.76
Silver	2.99 oz. @ 95¢	2.84
Copper	19 lbs. @ 45¢	8.55
Cobalt	1.7 lbs. @ 50¢	.85
Tungsten	(0.03% not recoverable)	-
		<u>\$13.00</u>

When mill and smelting losses are considered together with smelting charges and freight on concentrates, it will be realized that the net value of ore per ton will be around \$9.00 per ton or very much lower than the cost of production. The gross value per ton of this same grade of ore with copper at the present official world price of 27.5¢ per lb. is \$9.67 per ton.

Profit from Indicated Ore Reserves of 11,050 Tons

Net Value Per Ton of Ore - Copper at 45¢ per lb.

Assay	Content Per Ton	Price	Gross Value	Mill Recovery	Smltr. Payment	Net Return before Deductions for smltg. chgs. freight, etc.
Gold	0.28	0.28 oz. \$37/oz.	10.38	90%	95%	8.87
Silver	7.20	7.20 95¢	6.84	90%	95%	5.84
Copper	2.74%	54.8 lbs. 43¢/lb.	23.97	90%	94.6%*	20.40
Cobalt	0.15%	3 lbs. 50¢	1.50	80%	100%	1.20
Tungsten	0.07%	1.4 lbs. \$65/unit	4.55	70%		N11*
			<u>47.24</u>			<u>36.31</u>

* In computing smelter payment on the copper, a deduction of 1.4% has been made from the copper price and 1.3% has been made from the grade of the copper concentrate. These deductions are in accordance with a recent offer made to Western Uranium Cobalt Mines Ltd. by an established overseas ore buying firm. The grade of copper concentrate has been assumed at 24% Cu. If 1.3% is deducted, then total deduction is 5.4%. Smelter therefore pays for 94.6%.

** Until tests are made it is not known what recovery would be made on this very low scheelite content. It is possible that the extra cost of milling to recover this scheelite might offset the value recovered.

Smelting charges per ton of concentrates \$ 8.50

Freight and handling charges, Mine to
Europe per ton of concentrates
(including bagging) \$ 51.50
\$ 60.00

Ratio of concentration - 10 to 1

Smelting charges and freight per ton of ore - 6.00

Net return per ton of ore (\$36.31 - \$6.00) 30.31
Deduct Mine operating costs at 14.90
Operating profit per ton of ore \$ 15.41
Operating profit on 11,050 tons of ore
\$170,280.

Net Value per Ton of Ore - Copper at 27.5¢ per lb.

With copper selling at the official world price of 27.5¢ per lb., the operating profit per ton of ore is \$7.84.

Total operating profit on 11,050 tons of ore is - \$86,632.

MINE & MILL BUILDINGS, EQUIPMENT, ETC.*

No comments are offered in respect to such matters as mine buildings and equipment, mill building and equipment, housing facilities, power, transportation, etc., since it is believed that such comments have little value to a property in the exploration stage. These matters should all be dealt with when an ore supply sufficient for production is assured.

Respectfully submitted,

HILL, LEGG & HEMSWORTH
Consulting Mining Engineers.

"H. L. Hill"

H. L. Hill, P. Eng.

"R. E. Legg"

R. E. Legg, P. Eng.

S E A L

H. L. Hill
Mining Engineer

Professional Engineers of the Province of British Columbia

February 27, 1952.

Comments on the HILL, LEGG REPORT on
ROCHER DE BOULE MINE.

by S.Holland.

- Page 2 Sections on "History" and "Geology" state the facts briefly but accurately.
- Page 3 The statement "these accessible workings on #4 vein do not reveal any ore" coincides with my own observations.
- Page 4 On present knowledge I agree that no ore reserves should be attributed to #4 vein.
- Page 5 The sampling done by Hill and Legg on the 1000 level on #2 vein does not indicate the presence of an oreshoot. The sampling appears to have been adequate for the purpose and combined with visual estimates of grade of copper, should be sufficient. My recollection of the 1000 level was that although there are spots along the vein where good grade ore is apparent, there was no obvious oreshoot of length.
- Page 6 Hill and Legg's sampling indicate two oreshoots on the west end of #2 vein on 1200 level. This coincides with observations of vein mineralization. The drift on the vein shear between E and F on their plan does not expose any section of well mineralized vein. No calculated ore reserve is possible on that section.
- Page 9 The calculation of indicated tonnage is according to accepted engineering practise and on the basis of their results no other is possible.
- I would judge the Hill and Legg estimate of ore reserve tonnage

to be based on adequate sampling results combined with estimates of grade in unsampled sections of the vein.

Dr. J.F. Walker,
Deputy Minister of Mines,
Buildings.

93M/4E
93M-71

June 20th 52

55-127 S.W.

Re: Rocher de Boule Mine.

The sampling data obtained by Merritt and James are enough to show that no solid ground exists for estimating assured or probable tonnage of ore-grade material substantially in excess of the reserves calculated by Hill and Legg in their report dated December 14, 1951.

The comments by Dr. S.S. Holland, dated February 27, 1952, deal adequately on "The Kohanowski Report on the Rocher de Boule Mine" dated December 12, 1951.

The data now available on the property, augmented by additional sampling and by reasonably detailed geology should be consolidated and made available in case of future need. The best way to achieve this objective is to have the workings mapped in reasonable detail by a geologist who will in his examination pay particular attention to:

- (a) The trace of the veins.
- (b) The extent of recognizable mineralization in the veins.
- (c) The assay content of the more poorly mineralized parts of the veins, i.e., those parts between or beyond oreshoots.
- (d) The assay content of wall rocks within the workings.
- (e) Any geological controls of mineralization.
- (f) The prospects for ore in the walls, and beyond the present faces.
- (g) The physical possibilities for investigating prospects that may be considered under (f).

Dr. J.F. Walker

-2-

June 20th, 1952.

The geologist will have to consider the sampling data now available. If the descriptions leave doubt as to what determined the width sampled, or if the width sampled is not readily related to vein width and adjacent wall rock, he will have to re-sample sections already sampled. He may have to do additional sampling between and beyond oreshoots. He will have to pay especial attention to ore possibilities on the 1000 level and in stopes and raises on the No. 2 vein. Because of the variability of mineralization, special procedures in sampling may be necessary.

The geologist should be free to engage competent assistance for sampling if he can do so, and if, upon analysis, it appears that the sampling required is apt to take five working days or more.

The file including copies of four sampling plans is returned herewith. The file includes "Report of the Mineral Dressing and Process Metallurgy Division, Department of Mines and Technical Surveys, Ottawa, January 30, 1952, Investigation No. MD2871, dealing with a sample of ore from the Rocher de Boule Property". In due course the said report should be filed in the library.

HS/ef
Enc.

H. Sargent
Chief, Mineralogical Branch.

93M/4E
93M-71MEMORANDUM

TO Col. E. Pepler,
Deputy Attorney-General,
Buildings.

FROM THE

DEPARTMENT OF MINES

VICTORIA, B.C., June 26, 1952

WHEN REPLYING PLEASE REFER
TO FILE NO.....

Re: Western Uranium Cobalt Mines Limited

Further to our correspondence regarding this Company we are now in a position to comment on the reports made to the Company by the firm of Hill and Legg (now Hill, Legg and Hemsworth) and by Professor N. N. Kohanowski.

The reports by Hill and Legg and by Kohanowski were submitted to two engineers and a geologist on our staff for their individual opinions. They did not consult each other. The geologist visited the property last summer. One of the engineers has since visited the property.

All three note the fact that Kohanowski, without any factual information to support it, estimated ore reserves at 67,808 short tons of reasonably assured ore and 311,192 short tons of indicated ore having an estimated gross value of \$23,584,240.00, with a net profit to be expected in the neighbourhood of \$10,698,240.00.

At the time of Kohanowski's examination there were no proper assay maps of the property. He took only twelve samples.

All three are of the opinion that the report submitted by Hill and Legg more truly represents the economic possibilities of the property.

Hill and Legg, on the basis of their sampling and examination of the workings, give detailed information as to tonnages and costs. Assuming a world price for copper of 45¢ per pound, as against the U. S. ceiling price of 27¢ per pound, they estimate 11,050 tons of commercial ore. They do not consider mill construction justified as the property is in the exploration stage.

There appeared to us to be one weakness in the report by Hill and Legg, namely the lack of sampling along sections of the vein between the obvious possible ore shoots.

Our Inspector at Lillooet was instructed to:

- (1) obtain sufficient samples from No. 2 vein where no sampling had been done by Hill and Legg to determine whether or not there might be ore in these sections of the vein,
- (2) check-sample the wall-rock of the No. 2 vein at sufficient places where Hill and Legg had sampled to determine whether or not mineralization extended into the wall-rock beyond their sampling,
- (3) examine the workings where there was evidence of sampling to see how it had been done,
- (4) obtain a copy of Mr. M. Jasper's assay plan of the mine.

Our Inspector took eighty-one channel samples from No. 2 vein and made a careful examination of the vein on the 1000 and 1200 foot levels and wherever else it was possible to see the vein in workings from these levels.

Our Inspector noted that:

- (1) the Hill and Legg samples were mostly confined to the vein matter but where concentration of sulphides of estimated ore grade occurred in the wall-rock, and appeared to be readily mineable with the vein matter, the samples were usually extended to include them.

- (2) in his opinion samples should have been taken by Hill and Legg in certain additional places to help delimit ore boundaries,
- (3) samples taken by the Company were mostly taken from fresh faces but that in some instances the channel had been located in such a position that it would include an isolated mass of chalcopyrite and, therefore, would not be representative of that general area,
- (4) Company samples were also taken where concentrations of scheelite existed,
- (5) in both the 1000 and 1200 levels a considerable number of samples had been taken by the Company that were not shown on the assay plan and our Inspector was advised that these samples were being assayed. (This was between March 13th and 17th, 1952),
- (6) since the present Company commenced operations no new exploration had been done on No. 2 vein,
- (7) it was with a certain amount of reluctance that the management released a copy of Mr. Jasper's assay plan and it was our Inspector's impression the management was conscious of the fact that the mine had been inadequately sampled and was embarrassed when asked for this information which might enable one to ascertain how Professor Kohanowski obtained his calculation of ore reserves.

Mr. James Mackee, President of the Company, was in camp at the time of our Inspector's examination and from his remarks, our Inspector inferred that he had not questioned Professor Kohanowski's report because his mine manager, Mr. A. L. Clark, had advised him the tonnages were substantially correct.

It should not be forgotten it was a year ago that A. L. Clark, without any mine sampling, estimated ore reserves at the Rocher Deboule at 200,000 tons and it should also not be forgotten that it was Clark who recommended Kohanowski.

Our Inspector's sampling on the 1200 level does not indicate any ore shoot east of the ore shoot shown on the assay plan by Hill and Legg. The ore on this level is, therefore, confined to the section sampled at ten-foot intervals by Hill and Legg.

Our Inspector's preliminary sampling at wide intervals on the 1000 level indicates that sections on this level may possibly average as much as 3 per cent copper and 3 ounces of silver across 3 feet.

Computing values for this mineralization on the same basis used by Hill and Legg for copper, namely a deduction of 1 1/4 cents per pound and 1.3 per cent from the grade of the estimated copper concentrate and allowing payment for 95 per cent of the silver at 82 3/4 cents per ounce, the gross value is \$17.35 per ton. Deducting \$6.00 per ton for freight and smelting charges leaves \$11.35 per ton to cover mining and milling and all other charges, which is insufficient to meet the mine operating costs estimated by Hill and Legg at \$14.90 per ton, which appears reasonable to us.

The mineralization on the 1000 level can at best be described in part as sub-marginal. There is no ore on the 1200 level down the dip from the sub-marginal ore on the 1000 level, except under the extreme west end of the 1000 level. The sub-marginal ore does not extend more than about 60 feet down the dip in the middle raise from the 1200 level. The extent of this sub-marginal ore above and below the 1000 level can not be estimated. At best it can not be assumed to extend more than 50 feet above and below the level and this would amount to only 32,500 tons.

At the moment the only acceptable ore estimate is the one made by Hill and Legg. There is no solid ground for estimating any tonnage of ore-grade substantially in excess of it.

Your copies of the Hill and Legg report and the Kohanowski report are returned herewith. I have had copies made of these reports and the plans accompanying them for our records.

Approved
JFW:DB
Encs.

John Z. Walker
Deputy Minister.