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Quatsino Iron Ore
Loram Ltd.

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Empire Dev
Corp -

810694

Room 103, 239 Sixth Ave. W.,
Calgary, Canada,
December 23rd, 1957.

Personal & Confidential

Mr. Alfred R. Thomas,
Executive Vice-President,
Cyprus Mines Corporation,
523 West Sixth Street,
Los Angeles 14, California.

Dear Al:

I wish to thank you very much for the comprehensive report given by Mr. Paul Allen concerning the Empire Development project which was attached to your letter of November 20th. Your letter was received in this office while I was in the United Kingdom as a member of the Canadian Trade Mission.

This report is very much appreciated and to say the least, it would draw to anyone's attention, and particularly mine, that we have some problems on this deal. Fortunately, we have done some re-organizing and we are getting many of the bugs eliminated. We are making mechanical revisions in order to increase our production to approximately 40,000 - 50,000 tons per month and these will be completed between Christmas and the New Year; we are also reviewing the reserves situation. If we ever bail ourselves out of this one, I will let you know how it was done, as it is a rather tough situation.

I repeat, I really appreciate your interest and the time that Mr. Allen spent in reviewing this project. We would be pleased to pay any expenses entailed in this report if you would forward an account to us.

I anticipate being in Los Angeles around the first of the year with my wife and I will give you a call to see if we can get together for dinner or something of that nature with you and your charming wife.

I wish to convey our Best Wishes for A Merry Christmas to you and hope all goes well with you in 1958.

Sincerely yours,

F. C. Mannix
F. C. Mannix
President.

NO
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12/26

Loram Ltd.

Room 103, 239 Sixth Ave. W.,
Calgary, Canada,
December 23rd, 1957.

Personal & Confidential

Mr. Paul W. Allen,
Vice-President,
Cyprus Mines Corporation,
523 West Sixth Street,
Los Angeles 14, California.

Dear Mr. Allen:

I have received your report of November 13th on the Empire Development project from Mr. A. R. Thomas and appreciate very much the work you went to in compiling it. It will certainly be helpful to us in crystallizing the corrective measures that will have to be taken on the job. The hazards and problems that we have run into are well explained in your report, for which we thank you.

Kindest personal regards to you and Mr. Rundle and Best Wishes for the Festive Season and the New Year ahead.

Sincerely yours,



F. C. Mannix
President.

FCM/ra

Project File

November 20, 1957

Mr. Fred C. Mannix
Mannix, Ltd.
239 Sixth Avenue
Calgary, Alberta, Canada

Dear Fred:

Enclosed is the memorandum about Empire Development Company, Ltd. written by Paul W. Allen, vice president in charge of our domestic mining operations. If you should want to talk with Paul on the telephone, or arrange a meeting, I'm sure he would be glad to discuss the situation with you, at any mutually convenient time and place.

With kindest personal regards,

Sincerely,



ART:m
Encl.

enc marked "personal"

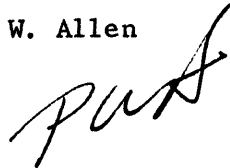
November 14, 1957

To: A. R. Thomas
From: P. W. Allen
Subject: Revised Report on Empire Development Company

Herewith are copies of my report on Empire Development Company of October 29, which have been revised in accordance with my memorandum of November 11 and your changes of November 13.

I notice that the copy which you marked did not delete the last sentence on page 10 or the first paragraph on page 11, but I assume that you want to take this out and I have done so.

P. W. Allen

A handwritten signature in cursive script, appearing to read 'PWA', is written below the typed name.

PWA:g

November 13, 1957


TO: P. W. ALLEN
FROM: A. R. THOMAS
RE: YOUR REPORT ON EMPIRE DEVELOPMENT COMPANY

Today I talked with Mr. Fred Mannix on the phone in Calgary. I told him that you had made a report and mentioned to him that it was critical of the operation in a number of respects so I was hesitant about sending it to him. Mr. Mannix said that he would like very much to see the report and said that they "didn't go to the doctor to get a pat on the back". They really would welcome frank criticism. He added that they have changed the management at the property and are now turning out 1100 tons a day, will get up to 1500 this month, and expect to reach 2000 tons a month on the beach.

day
I mentioned that in your report you arrived at a waste ore ratio of 2.12/1.00 vs the 0.51/1.00 shown by the Empire Development figures. Mr. Mannix immediately said, "That indicates we don't have enough ore developed to fulfill our initial contracts".

Mr. Mannix has asked that we send the report direct to him and if, after you have finished your revision you will let me have it, I will prepare a covering letter.

Mr. Mannix may want to talk with you after reading the report. Meanwhile he expressed his thanks and gratitude for the fact that you and Bill Rundle took the time when he knew you were busy, to make this inspection and to write the report.


A. R. THOMAS

ART:m

November 13, 1957

To: A. R. Thomas
From: P. W. Allen
Subject: Empire Development Company, Ltd.

Summary and Conclusions

- 1) The reserves estimated by Empire Development are said to be 1,146,430 short tons averaging 57.5% iron. We can find reserves of only 1,150,127 short tons averaging 42.1% iron. The latter will yield approximately 670,000 long tons of shipping product containing 58% iron.
- 2) Empire Development data indicate a waste/ore ratio of 0.51/1.00, the waste figure including that discarded at the mine plus tailings from the magnetic concentrator. We find a ratio of 2.12/1.00.
- 3) Other magnetite outcrops and magnetic anomalies exist, but many are situated on steep hillsides where exploration and development cost will be high. No drilling has been done on any of these.
- 4) Primary crushing plant at the mine elevation (2500 ft. above sea level) requires revision to provide a larger stockpile of crushed ore.
- 5) The skip system for lowering ore from primary crusher to mill is entirely inadequate. It seems doubtful that it will ever develop the required capacity.
- 6) Concentrator appears to have required capacity and metallurgical ability to upgrade a 40-45% Fe feed to a 58% concentrate. However, no good metallurgical control was in effect on October 10-11.
- 7) Capital costs were \$5,518,000 instead of the \$3,000,000 originally estimated.

General

On October 10, W. J. Rundle and I met Mr. Roland Legg in Vancouver, B. C., and the three of us then met representatives of Empire Development and proceeded to visit the property. These representatives were Mr. James A. Scott, president, and Brigadier Alan B. Connelly, vice president and general manager. Scott lives in Calgary, Alberta, while A. B. Connelly lives in Vancouver, B. C.

Mr. Legg is an independent mining and geological consultant of Vancouver, who was a CMC employee under Evan Just in a period from about 1953-1955. I asked him to join us as a special consultant because of his familiarity with iron ores on Vancouver Island.

The five of us flew in a plane belonging to Mannix Company, Ltd. to Port Hardy on Vancouver Island. A small seaplane then took us to the wharf of the Alaska Pine Company on Alert Bay, near which Empire Development has its own wharf for loading iron ore into ships. We reached the Empire Development wharf at about 11:00 A.M. on October 10.

Officers and Staff

While at the property we met the following principal officers and staff members:

James A. Scott	President
Alan B. Connelly	Vice Pres. & Gen. Mgr.
S. M. Manning	Mine Manager
James C. Welch	Mine Superintendent
A. H. Lineham	Chief Assayer

Ore Reserves

Empire Development reports and office data list the following proven "reserves of ore":

<u>Zone</u>	<u>Short tons</u>	<u>Long tons</u>	<u>% Iron</u>
Main (Merry Widow)	651,650	582,000	57.2
South	135,290	121,000	58.6
East (Kingfisher)	359,490	321,000	57.5
Total	1,146,430	1,024,000	57.5

It should be noted, however, that these figures are really intended to mean "reserves of concentrate that can be produced". There were no figures available to show the grade and tonnage of ore that would be mined to produce the concentrates. However, mill operations since late September show that the mill feed is ranging from 40 to 45% Fe and that the concentrate is approximately 58% Fe. Also, it is taking about 100 tons of crude ore to yield 70 tons of concentrate.

Empire Development described their method of calculating reserves as follows. The portions of diamond drill core which were of "ore grade" were listed separately from the lean or barren material. These ore grade portions were then averaged to give the grade of the "reserves". Tonnages were obtained by taking the lengths of the ore grade portions and the distances between holes. The waste and lean material excluded from this calculation are assumed to be rejected in the course of mining or magnetic concentration. It is stated that 525,000 tons of waste must, therefore, be rejected while obtaining the 1,024,000 tons of concentrate.

The waste-ore ratio thus indicated is only 0.51 to 1.00. However, inspection of the cross sections drawn through the orebodies and the proposed open pit outlines indicates a far worse ratio. Therefore, we obtained the plans and cross sections in accordance with which the mine operations are being conducted. Careful measurement of the data presented thereon by Empire Development gives far different results than the figures they quote from the report of a consultant, Mr. Hill.

Ore Zone	Ore-Waste Tonnages (short tons)					
	Empire Development (per Hill)			CMC		
	Ore	% Fe	Waste	Ore	% Fe	Waste
Main (Merry Widow)	651,650	57.2	402,070	614,310	38.4	880,000
South	135,290	58.6	110,200	167,817	39.6	
East (Kingfisher)	359,490	57.5	75,950	368,000	49.5	316,500
Total	1,146,430	57.5	588,220	1,150,127	42.1	1,196,500

If one assumes that the reserves calculated by us are graded up to a 58% concentrate with a recovery of 90% of the iron, then there will be the following products:

	Short tons	% Wt	% Fe	Tons Fe	Distribution %
Concentrate	751,350	65.3	58.0	435,783	90.0
Tailing	398,777	34.7	12.1	48,420	10.0
Feed	1,150,127	100.0	42.1	484,203	100.0

The 751,350 short tons of concentrate give only 670,000 dry long tons of shipping product in contrast to the 1,023,601 long tons quoted by Empire Development from Hill's report. Moreover, we calculate that the following waste must be discarded:

	Short tons
At the mine	1,196,500
At the mill	398,777
Total	1,595,277

This gives a ratio of waste to shipping product of 2.12/1.00 versus the 0.51/1.00 shown by Empire Development's figures.

We were shown two areas where magnetite outcrops and where magnetic anomalies exist. However, none of the information had been plotted on maps in a manner that would permit study or interpretation. Both outcrops occur on the flank of a steep mountain side. Making a road to either location will involve a lot of costly rock excavation. No diamond drilling has been done at either outcrop and the pioneer road for this work will not be cheap. At the moment, these outcrops constitute no more than a hoped for reserve.

In the area where mining is now going on there are two or three small outcrops of magnetite which are also in the category of "hoped for reserve". Roads to these areas will be easy to construct, but there has been no time or funds for such work or for diamond drilling. The general philosophy was that only enough drilling was done to outline a million tons of shipping product and that additional reserves would be developed as the need arose. Our calculations would indicate that now there is need for development of additional orebodies.

Mine

Mining operations are located on a ridge at about elevation 2500 feet. The "main" ore zone has been cut by three benches and some benching has been done in the nearby "south" zone. The plans call for benches at 25 foot vertical intervals, but the work is in such an early stage of development that little pattern is evident.

Tractor-mounted wagon drills (Gardner Denver Air Trac) are used for drilling blast holes (either vertical or horizontal). The hole is collared with a 3-1/2 inch bit. Machines of this type are well suited to the mining which must be done during the early stages of development. Later on, it will be much cheaper to use equipment like an Ingersoll Rand Drillmaster which will provide vertical holes of six inch diameter.

There are two diesel driven P & H shovels, Model 955-A, of 2.5 cubic yard capacity. These load four Euclid trucks of 22-ton capacity. All this equipment was bought new about a year ago. It is well suited to the operation. However, the steep slopes which flank the orebody place a serious limit on the operating space that is available. Roads are steep with as much as 15% grades, and these do not make for good truck operation. Also, the turns are very sharp.

Inspection of Empire Development's mine plans and cross sections show that they are considering excessively steep final slopes. These range from 80° on individual quarry faces that are 100 feet high to

70° on over-all faces which include berms. It will be impossible to maintain these angles without damage to personnel and equipment, particularly where freezing and thawing occur. At some future date, Empire Development will have to reduce the slope angles and thereby mine even more waste than we calculated from their sections.

Trucks haul the ore to a primary crusher about half a mile from the mine. The loads are dumped into a flaring steel hopper over a pan conveyor which moves the ore into the 42 x 48 inch jaw crusher. Although less than 25,000 tons have been crushed, the hopper is badly battered. It will be quite inadequate to handle the required 2500 tons per day and very expensive to maintain.

The crusher itself, a new Pioneer, will probably suffice for the quantity and type of ore being treated. However, the 42 x 48 inch opening will require careful sizing of material in the mine if the crusher is not to be plugged frequently. On the other hand, the pan feeder will facilitate the handling of large pieces.

The jaw crusher product, about six inches in the longest dimension, is conveyed to what is intended to be a stockpile of 3000 ton capacity. Under the pile are a tunnel, feeder and conveyor which transfer the ore to the skip system. Unfortunately, the conveyor (No. 1) from the crusher does not discharge directly over the feeder to the conveyor (No. 2) in the tunnel. Instead, it was assumed that the discharge from No. 1 would slide down the slope of the hill to the feeder. However, the angle of repose is so steep, especially with the ore containing as much topsoil as it does during this stage of mine development, that the effective "live" capacity of the stockpile is less than 500 tons. Consequently, any serious delay in the skip system has an almost immediate effect on the mining and primary crushing.

The problem of storage between the crusher and skip system will be made more difficult by winter conditions. Snow and freezing temperatures will not only further reduce the live storage capacity, but there may even be trouble in getting the ore to the feeder at all. One logical solution is to extend No. 1 conveyor until it discharges directly over the feeder.

Skip System

Ore from the storage pile just described is conveyed to a steel loading hopper over the skipway. The hopper has been designed so that the ore does not slide easily from it to the skips. Crowbars, vibrators and a stream of water are used to urge the ore out of the hopper. The arrangement is such that the top of the skips is two feet away from the bottom of the hopper and much spillage results. The consequence of these problems is the long time required for loading the skips and this interferes seriously with the skip cycle. Immediate revision of these facilities is necessary.

The skips themselves operate on tracks (30 inch gauge) which have been laid on the slope of the mountain from elevation 2400 to elevation 900. While the average slope is said to be 30°, it varies between 15° and 45°. Skip capacity was expected to be eight tons, but actual operation so far shows an average of only six tons per skip. The loading arrangement makes it difficult to fill the skips to capacity. In addition, there is a substantial amount of ore retained in the skips after they dump because of the stickiness of the ore and the design of the skips. The latter problem could be alleviated by installing loose conveyor belting in the bottom corner of the skip.

The skips discharge into a hopper from which the ore is taken to a stockpile by a feeder and a conveyor (No. 3). It appeared that arrangements could have been made for the skips to discharge directly on to the pile, but the feeder and conveyor are causing no problem except for the maintenance which they will require. Much more serious was the problem caused by the lack of a man at the skip dump to see that the skips were ready to be hoisted up the mountain. Twice, while we were at the property, the hopper became over-full and the skip jammed against the timber framework. Each instance caused a delay of four hours and damaged the timber structure.

The ropes used to lower and raise the skips are supposed to be carried on rollers set between the rails. However, there is an insufficient number of rollers compared to the total required for smooth operation. The rope travels frequently at one or the other side of the rollers. As a result of these and other factors, the outer wires of the cables have been reduced to 50% of their original diameter in only a few weeks of operation.

The winding engine uses a 200 horsepower motor which runs as a generator to absorb the energy produced by lowering the ore. Wood-lined, band-type friction brakes control the winding machine during periods of acceleration and deceleration while the motor is not up to an effective speed. The noise emitted by these brakes can be taken as an indication of vibrations and strains which are bound to cause serious maintenance problems.

Empire Development's skipway and equipment were purchased second hand from a former mining operation where 400 tons per day was being handled. Empire Development is now expecting to lower 2400 tons per day. At six tons per skip, this would mean dumping a skip every 3.6 minutes during a 24 hour day. That, in itself, would be a prodigious feat with the equipment available, but, in addition, the skip system is the only means of transporting personnel and supplies between the mine and the base of the mountain. Therefore, one should allow close to 33%, or eight hours per day, for such traffic. In the remaining 16 hours, the skips would have to dump at the rate of one every 2.4 minutes, but the design of the system makes 3.0 minutes the minimum attainable.

Another factor is the impact of winter weather. Empire Development expects at least six feet of snow at the mine elevation. It is a certainty that snow in such an amount will delay the skips seriously and it is quite probable that the entire system may be out of operation for periods of a week or more. The only way to remove snow from the skip rails is by hand shoveling or by fastening a rotary plow on the skips. The former would be a difficult feat to accomplish, and no provision has been made for the latter.

Concentrator

Ore is delivered by conveyor No. 3 to the head of the mill building where it is screened into the following fractions:

+ 3-1/2"
- 3-1/2" + 1-1/2"
- 1-1/2" + 7/8"
- 7/8" + 1/4"
- 1/4"

Each of the first four sizes is stored, more or less dry, in a 100 ton bin, while the -1/4 inch is fed in slurry form directly to a magnetic separator.

The +3-1/2" and -3-1/2" +1-1/2" fractions are drawn from their bins by vibrating feeders on to conveyors with magnetic head pulleys. The -1-1/2" +7/8" and -7/8" +1/4" fractions are conveyed from their bins to a chute leading down to magnetic drum separators. Each of these four operations yields a concentrate, middling and tailing. The middling is conveyed to a separate screening and crushing building where four foot and three foot Symons cone crushers make a further size reduction. The crusher discharges are combined and returned to the head of the mill.

The -1/4 inch slurry passes through a Dings double drum wet magnetic separator which makes a tailing and a concentrate. The latter assays from 59% to 62% Fe.

The plant is running two shifts per day and appears to have plenty of capacity for the 2400 tons it is expected to handle. There is nothing radically wrong with the general design and all the equipment is new.

Metallurgical control in the plant is discussed but not practiced. No daily metallurgical balances and reports are made -- partly because few samples are taken. In general, the plant feed appeared to be running 40-45% Fe and the concentrate about 58% Fe. It was said that 90% of the iron was being recovered and that 1.3 tons of feed yielded 1.0 tons of concentrate (a 77% weight recovery). In spite of the poor metallurgical control, it is probable that reasonably good results are being obtained because the ore should not be difficult to treat in the facilities available. No significant amount of disseminated magnetite was seen.

Haul to Port

A contractor named Reynolds has undertaken to haul the concentrate from the mill to the port over about 25 miles of road at a price of 5-1/4 cents per ton mile. The total cost is to be \$1.31 per ton. The road is all of gravel surface and generally of one lane width with passing areas. Grades and curves are reasonable considering the terrain. However, it is no highway and the contractor's price seems very reasonable. Reynolds is using six Kenworth trailer trucks of 50-ton capacity like those at Marcona in Peru.

We observed no difficulties in the hauling operation except that of discharging the loads. The material sticks in the bodies and has to be barred or vibrated loose. The delay is serious but should be possible to overcome by using more or stronger vibrators.

Reynolds was concerned by the lack of tonnage for his trucks to haul. He is expecting to move 40,000 tons per month, or about 2000 tons per operating day. He has scheduled his equipment to run 18 hours per day (two shifts of nine hours each). However, the concentrator is producing only about 1000 tons per day. Reynolds is apt to seek a revision of his contract price if this situation continues.

Port Facilities

These include a conveyor system for transferring truck loads of concentrate to a stockpile and another conveyor system for moving the concentrates from storage to ships. The latter system is carried on a T-shaped wharf. All these facilities seem to be well built and should operate effectively.

The first cargo was being loaded during our visit. The 14,000 ton vessel had tied up on September 30, but the shore facilities were not ready to start loading until October 7. The ship finished loading on October 11.

Housing

There are groups of family dwellings at the wharf and concentrator areas, but a majority of the force is housed in dormitories. All of the accommodations are meager by good mining camp standards in the States, but will probably suffice. However, the use of dormitories and men on single status must cause a high labor turnover, which raises operating and equipment maintenance costs. Only an investment in more and better facilities will solve the problems of a high turnover.

Financing and Costs

The entire project was originally estimated to cost \$3,000,000. This was to be financed about 50-50 by a first mortgage loan and by debentures. Mannix, Ltd. agreed to finance the costs over \$3,000,000 by advancing a second mortgage. The over-run was approximately \$2,500,000, the present amount of the second mortgage.

We were given the following tabulation of capital costs:

Road & tramway	\$1,670,000
Wharf & loading system	717,000
Concentrator	1,111,000
Quarry	906,000
Hauling equipment & vehicles	37,000
Power generating equipment	233,000
Camp & housing	152,000
Exploration	6,000
Professional fees	130,000
General expense - Admin.	496,000
Preliminary financing exp.	60,000
Total	<u>\$5,518,000</u>

There was no detailed explanation offered as to the high costs except that adverse weather, difficult terrain, the pressure of time and consequent overtime work were all contributing factors.

Operating costs have been estimated as follows:

	<u>Per ton of concentrate</u>
Mine	\$1.07
Mill & power	.56
Tram	.07
Wharf & beach	.13
Road	.31
Haul	1.31
Mess hall	.20
Road rent	.05
Administration	.11
Engineering	.06
Assaying	.02
General	.12
Total	<u>\$4.01</u>

In view of the greater waste/ore ratio that we determine, there must be some revision of the above. Empire Development says it will cost \$1.07 for all the mining charges against a ton of concentrate,

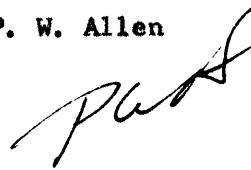
this amount to include the cost of moving half a ton of waste. That is 71.5 cents per ton of material. If the total waste/concentrate ratio is 2.12/1.00 as we figure, the cost becomes $3.12 \times 71.5\text{¢} = \underline{\$2.23}$ per ton of concentrate. Further, the milling cost will be higher because of lower grade ore than was apparently estimated. In general, the total cost per ton of shipping product might be expected to rise to \$5.00 per ton.

Empire Development has one contract to ship 511,000 dry long tons at an average price of about \$8.40 per ton. If one deducts operating costs of \$5.00, the remaining \$3.40 is available to cover interest and to amortize the capital costs. Thus, over 2,000,000 tons must be shipped before any profit can be realized. Even more must be shipped, if the price for additional tonnages is to be lower than the \$8.40 used here.

Organization

The difficulty of making this a successful operation would tax the ability of the most experienced and competent organization. A careful appraisal of the competence of each individual to carry the responsibilities entrusted to him would seem warranted, in the light of the operating problems that appear to be present in this situation.

P. W. Allen



PWA:g

November 11, 1957

To: A. R. Thomas
From: P. W. Allen
Subject: Revision of Report on Empire Development Company, Ltd.

Attached is a copy of my report of October 29 which has been marked so as to show material that might be deleted before giving the report to Mr. Mannix. I should like to comment on these deletions:

- p. 2 Item (8) can be left out because it applies only to internal CMC thinking. However, I should think Mannix will want some specific explanation of our refusal to join his enterprise.
- Item (9) can be left out to spare the feelings of Mannix and his organization, but he should know about this point. Otherwise, we are glossing over one of the most serious deficiencies.
- p. 5 Leave out - either as "not pertinent" or "impertinent".
- p. 7 ditto
- p. 10 Omit last sentence and the first paragraph on p. 11 as per your suggestion. I agree that we need not communicate our surmises on a subject which Mannix must know in detail.
- p. 11 Omit last three lines of last paragraph under Financing and Costs - this is a comment significant to us but of no use to Mannix.
- p. 11
& 12 Note that I suggest leaving out the first and last paragraphs under Organization. However, I have put a question mark there because I really believe, as per my comment above about p. 2, that Mannix should be apprised of this.
- p. 12 Omit paragraph about CMC participation as per my comment above about p. 2.

P. W. Allen

PWA:g

November 6, 1957

To: A. R. Thomas *AMJ 11/6/57*

From: P. W. Allen

Subject: Empire Development Company and British Columbia
Mining Tax

The attached clipping was just sent to us by the consultant, R. E. Legg, whom we engaged in Vancouver. The provincial cabinet has ordered a tax of 50 cents per mined ton of ore averaging 50% Fe. Ore containing less than 50% Fe is to be taxed on a pro rata basis. In the case of Empire Development whose crude ore is running 42-45% Fe, this might mean about a 45 cent tax. Since they recover only 70% of the crude ore in the form of a shipping product which averages 58% Fe, the 45 cent tax would amount to 64 cents per ton of product. This is a very serious addition to the total operating costs which they estimated at about \$4.00 per ton.

P. W. Allen

PWA

PWA:g
attachment

To discourage export

Iron ore tax set at 50 cents a ton

VICTORIA — The provincial government will tax iron ore at 50 cents per mined ton, effective on all production for all of this year.

The tax has been ordered by the cabinet as the first step to discourage out-of-province shipments, mostly to Japan, and to encourage the creation of a smelting industry in B.C.

The cabinet moved with authority granted in legislation passed at the last session of the legislature.

THE STEP CAME while another ship is being loaded with ore for Japan.

The 50-cent rate will be on ore with 50 per cent iron, with a pro rata basis for ore with less than 50 per cent iron.

In effect, only the iron ore going outside the province will pay the tax.

This is because there is companion legislation which will provide for a bonus of \$5 a ton on pig iron produced within B.C.

MINES MINISTER Kenneth Kiernan said he anticipated that the new tax system will spur a new hunt for iron ore on Vancouver Island and other coastal islands.

The search will be to broaden B.C.'s iron ore potential and find enough to support a smelting industry within the province.

MINING INDUSTRY leaders

were "surprised" by the new tax formula and said the levy may discourage new iron ore exploration "unless the government is prepared to give some concessions."

Immediately affected under the ruling will be the province's two remaining iron operations — Empire Development Co. Ltd. at Port McNeill on the north end of Vancouver Island, and Texada Mines Ltd. on Texada Island.

Revisions by ART
- Nov. 13, 1957

October 29, 1957

To: A. R. Thomas
From: P. W. Allen
Subject: Empire Development Company, Ltd.

Summary and Conclusions

- 1) The reserves estimated by Empire Development are said to be 1,146,430 short tons averaging 57.5% iron. We can find reserves of only 1,150,127 short tons averaging 42.1% iron. The latter will yield approximately 670,000 long tons of shipping product containing 58% iron.
- 2) Empire Development data indicate a waste/ore ratio of 0.51/1.00, the waste figure including that discarded at the mine plus tailings from the magnetic concentrator. We find a ratio of 2.12/1.00.
- 3) Other magnetite outcrops and magnetic anomalies exist, but many are situated on steep hillsides where exploration and development cost will be high. No drilling has been done on any of these.
- 4) Primary crushing plant at the mine elevation (2500 ft. above sea level) requires revision to provide a larger stockpile of crushed ore.
- 5) The skip system for lowering ore from primary crusher to mill is entirely inadequate. It seems doubtful that it will ever develop the required capacity.
- 6) Concentrator appears to have required capacity and metallurgical ability to upgrade a 40-45% Fe feed to a 58% concentrate. However, no good metallurgical control was in effect on October 10-11.
- 7) Capital costs were \$5,518,000 instead of the \$3,000,000 originally estimated.

- 8) High capital costs, probable high operating costs and limited ore reserves make Empire Development unattractive from the standpoint of possible CMC participation.
- 9) Empire Development management is deficient in experience and skill required for the operations involved.

General

On October 10, W. J. Rundle and I met Mr. Roland Legg in Vancouver, B. C., and the three of us then met representatives of Empire Development and proceeded to visit the property. These representatives were Mr. James A. Scott, president, and Brigadier Alan B. Connelly, vice president and general manager. Scott lives in Calgary, Alberta, while A. B. Connelly lives in Vancouver, B. C.

Mr. Legg is an independent mining and geological consultant of Vancouver, who was a CMC employee under Evan Just in a period from about 1953-1955. I asked him to join us as a special consultant because of his familiarity with iron ores on Vancouver Island.

The five of us flew in a plane belonging to Mannix Company, Ltd. to Port Hardy on Vancouver Island. A small seaplane then took us to the wharf of the Alaska Pine Company on Alert Bay, near which Empire Development has its own wharf for loading iron ore into ships. We reached the Empire Development wharf at about 11:00 A.M. on October 10.

Officers and Staff

While at the property we met the following principal officers and staff members:

James A. Scott	President
Alan B. Connelly	Vice Pres. & Gen. Mgr.
S. M. Manning	Mine manager
James C. Welch	Mine superintendent
A. H. Lineham	Chief assayer

Ore Reserves

Empire Development reports and office data list the following proven "reserves of ore":

<u>Zone</u>	<u>Short tons</u>	<u>Long tons</u>	<u>% Iron</u>
Main (Merry Widow)	651,650	582,000	57.2
South	135,290	121,000	58.6
East (Kingfisher)	359,490	321,000	57.5
Total	1,146,430	1,024,000	57.5

It should be noted, however, that these figures are really intended to mean "reserves of concentrate that can be produced". There were no figures available to show the grade and tonnage of ore that would be mined to produce the concentrates. However, mill operations since late September show that the mill feed is ranging from 40 to 45% Fe and that the concentrate is approximately 58% Fe. Also, it is taking about 100 tons of crude ore to yield 70 tons of concentrate.

Empire Development described their method of calculating reserves as follows. The portions of diamond drill core which were of "ore grade" were listed separately from the lean or barren material. These ore grade portions were then averaged to give the grade of the "reserves". Tonnages were obtained by taking the lengths of the ore grade portions and the distances between holes. The waste and lean material excluded from this calculation are assumed to be rejected in the course of mining or magnetic concentration. It is stated that 525,000 tons of waste must, therefore, be rejected while obtaining the 1,024,000 tons of concentrate.

The waste-ore ratio thus indicated ^{being} is only 0.51 to 1.00. However, ~~inspection~~ inspection of the cross sections drawn through the ore-bodies and the proposed open pit outlines indicates a far worse ratio. Therefore, we obtained the plans and cross sections in accordance with which the mine operations are ~~supposed to be~~ conducted. Careful measurement of the data presented thereon by Empire Development gives far different results than the figures they quote from the report of a consultant, Mr. Hill.

Ore Zone	Ore-Waste Tonnages (short tons)					
	Empire Development (per Hill)			CMC		
	Ore	% Fe	Waste	Ore	% Fe	Waste
Main (Merry Widow)	651,650	57.2	402,070	614,310	38.4	880,000
South	135,290	58.6	110,200	167,817	39.6	
East (Kingfisher)	359,490	57.5	75,950	368,000	49.5	316,500
Total	1,146,430	57.5	588,220	1,150,127	42.1	1,196,500

If one assumes that the reserves calculated by us are graded up to a 58% concentrate with a recovery of 90% of the iron, then there will be the following products:

	Short tons	% Wt	% Fe	Tons Fe	Distribution %
Concentrate	751,350	65.3	58.0	435,783	90.0
Tailing	398,777	34.7	12.1	48,420	10.0
Feed	1,150,127	100.0	42.1	484,203	100.0

The 751,350 short tons of concentrate give only 670,000 dry long tons of shipping product in contrast to the 1,023,601 long tons quoted by Empire Development from Hill's report. Moreover, we calculate that the following waste must be discarded:

	Short tons
At the mine	1,196,500
At the mill	398,777
Total	1,595,277

3

This gives a ratio of waste to shipping product of 2.12/1.00 versus the 0.51/100 shown by Empire Development's figures.

We were shown two areas where magnetite outcrops and where magnetic anomalies exist. However, none of the information had been plotted on maps in a manner that would permit study or interpretation. Both outcrops occur on the flank of a steep mountain side. Making a road to either location will involve a lot of costly rock excavation. No diamond drilling has been done at either outcrop and the pioneer road for this work will not be cheap. At the moment, these outcrops constitute no more than a hoped for reserve.

In the area where mining is now going on there are two or three small outcrops of magnetite which are also in the category of "hoped for reserve". Roads to these areas will be easy to construct, but there has been no time or funds for such work or for diamond drilling. The general philosophy was that only enough drilling was done to outline a million tons of shipping product and that additional reserves would be developed as the need arose. ~~This naive approach to the problem is typical of many other phases of the operation. Our calculations would indicate that now there is need for development of additional ore bodies.~~

Mine

Mining operations are located on a ridge at about elevation 2500 feet. The (so-called) "main" ore zone has been cut by three benches and some benching has been done in the nearby "south" zone. The plans call for benches at 25 foot vertical intervals, but the work is in such an early stage of development that little pattern is evident.

Tractor-mounted wagon drills (Gardner Denver Air Trac) are used for drilling blast holes (either vertical or horizontal). The hole is collared with a 3-1/2 inch bit. Machines of this type are well suited to the mining which must be done during the early stages of development. Later on, it will be much cheaper to use equipment like an Ingersoll Rand Drillmaster which will provide vertical holes of six inch diameter.

There are two diesel driven P & H shovels, Model 955-A, of 2.5 cubic yard capacity. These load four Euclid trucks of 22-ton capacity. All this equipment was bought new about a year ago. It is well suited to the operation. However, the steep slopes which flank the orebody place a serious limit on the operating space that is available. Roads are steep with as much as 15% grades, and these do not make for good truck operation. Also, the turns are very sharp.

Inspection of Empire Development's mine plans and cross sections show that they are considering excessively steep final slopes. These range from 80° on individual quarry faces that are 100 feet high to

70° on over-all faces which include berms. It will be impossible to maintain these angles without damage to personnel and equipment, particularly where freezing and thawing occur. At some future date, Empire Development will have to reduce the slope angles and thereby mine even more waste than we calculated from their sections.

Trucks haul the ore to a primary crusher about half a mile from the mine. The loads are dumped into a flaring steel hopper over a pan conveyor which moves the ore into the 42 x 48 inch jaw crusher. Although less than 25,000 tons have been crushed, the hopper is badly battered. It will be quite inadequate to handle the required 2500 tons per day and very expensive to maintain.

The crusher itself, a new Pioneer, will probably suffice for the quantity and type of ore being treated. However, the 42 x 48 inch opening will require careful sizing of material in the mine if the crusher is not to be plugged frequently. On the other hand, the pan feeder will facilitate the handling of large pieces.

The jaw crusher product, about six inches in the longest dimension, is conveyed to what is intended to be a stockpile of 3000 ton capacity. Under the pile are a tunnel, feeder and conveyor which transfer the ore to the skip system. Unfortunately, the conveyor (No. 1) from the crusher does not discharge directly over the feeder to the conveyor (No. 2) in the tunnel. Instead, it was assumed that the discharge from No. 1 would slide down the slope of the hill to the feeder. However, the angle of repose is so steep, especially with the ore containing as much topsoil as it does during this stage of mine development, that the effective "live" capacity of the stockpile is less than 500 tons. Consequently, any serious delay in the skip system has an almost immediate effect on the mining and primary crushing.

More difficult → The problem of storage between the crusher and skip system will be made ~~worse~~ by winter conditions. Snow and freezing temperatures will not only further reduce the live storage capacity, but there may even be trouble in getting the ore to the feeder at all. ~~The only~~ logical solution is to extend No. 1 conveyor until it discharges directly over the feeder. *One*

Skip System

Ore from the storage pile just described is conveyed to a steel loading hopper over the skipway. The hopper has been designed so that the ore does not slide easily from it to the skips. Crowbars, vibrators and a stream of water are used to urge the ore out of the hopper. ~~Furthermore,~~ The arrangement is such that the top of the skips is two feet away from the bottom of the hopper and much spillage results.

The consequence of these problems is the long time required for loading the skips and this interferes seriously with the skip cycle. Immediate revision of these facilities is necessary.

The skips themselves operate on tracks (30 inch gauge) which have been laid on the slope of the mountain from elevation 2400 to elevation 900. While the average slope is said to be 30°, it varies between 15° and 45°. Skip capacity was expected to be eight tons, but actual operation so far shows an average of only six tons per skip. The loading arrangement makes it difficult to fill the skips to capacity. In addition, there is a substantial amount of ore retained in the skips after they dump because of the stickiness of the ore and the design of the skips. The latter problem could be alleviated by installing loose conveyor belting in the bottom corner of the skip.

The skips discharge into a hopper from which the ore is taken to a stockpile by a feeder and a conveyor (No. 3). It ~~(was intended)~~ that arrangements could have been made for the skips to discharge directly on to the pile, but the feeder and conveyor are causing no problem except for the maintenance which they will require. Much more serious was the problem caused by the lack of a man at the skip dump to see that the skips were ready to be hoisted up the mountain. Twice, while we were at the property, the hopper became over-full and the skip jammed against the timber framework. Each instance caused a delay of four hours and damaged the timber structure.

The ropes used to lower and raise the skips are supposed to be carried on rollers set between the rails. However, there is only a handful of rollers compared to the total required. Also, the rope travels frequently at one or the other side of the rollers. As a result of these and other factors, the outer wires of the cables have been reduced to 50% of their original diameter in only a few weeks of operation.

The winding engine uses a 200 horsepower motor which runs as a generator to absorb the energy produced by lowering the ore. Wood-lined, band-type friction brakes control the winding machine during periods of acceleration and deceleration while the motor is not up to an effective speed. The ~~(ear-splitting)~~ noise emitted by these brakes can only be taken as an indication of vibrations and strains which are bound to cause serious maintenance problems.

~~It is difficult to convey the general impression which the skip system creates. The roller coasters in an amusement park would be more suited to Empire Development's needs than the system they have selected. Empire Development's skipway and equipment were purchased second hand from a ~~defunct~~ mining operation where 400 tons per day was being handled. Empire Development is now expecting to lower 2400 tons per day. At six tons~~

appeared
appeared

for smooth operation

an insufficient number

taken as an

James

A-
6

per skip, this would mean dumping a skip every 3.6 minutes during a 24 hour day. That, in itself, would be a prodigious feat with the equipment available, but, in addition, the skip system is the only means of transporting personnel and supplies between the mine and the base of the mountain. ~~There is not even a foot trail up to the mine.~~ Therefore, one should allow close to 33%, or eight hours per day, for such traffic. In the remaining 16 hours, the skips would have to dump at the rate of one every 2.4 minutes, but the design of the system makes 3.0 minutes the minimum attainable.

~~Said~~ Another factor is the impact of winter weather. Empire Development expects at least six feet of snow at the mine elevation. It is a certainty that snow in such an amount will delay the skips seriously and it is quite probable that the entire system may be out of operation for periods of a week or more. The only way to remove snow from the skip rails is by hand shoveling or by fastening a rotary plow on the skips. The former would be a ~~superhuman~~ *difficult* feat and no provision has been made for the latter. *to accomplish,*

Concentrator

Ore is delivered by conveyor No. 3 to the head of the mill building where it is screened into the following fractions:

$$\begin{array}{r}
 + 3-1/2'' \\
 - 3-1/2'' \quad + +1-1/2'' \\
 - 1-1/2'' \quad + 7/8'' \\
 - 7/8'' \quad + 1/4'' \\
 - 1/4''
 \end{array}$$

Each of the first four sizes is stored, more or less dry, in a 100 ton bin, while the -1/4 inch is fed in slurry form directly to a magnetic separator.

The +3-1/2" and -3-1/2" + 1-1/2" fractions are drawn from their bins by vibrating feeders on to conveyors with magnetic head pulleys. The -1-1/2" + 7/8" and -7/8" + 1/4" fractions are conveyed from their bins to a chute leading down to magnetic drum separators. Each of these four operations yields a concentrate, middling and tailing. The middling is conveyed to a separate screening and crushing building where four foot and three foot Symons cone crushers make a further size reduction. The crusher discharges are combined and returned to the head of the mill.

The -1/4 inch slurry passes through a Dings double drum wet magnetic separator which makes a tailing and a concentrate. The latter assays from 59% to 62% Fe.

The plant is running two shifts per day and appears to have plenty of capacity for the 2400 tons it is expected to handle. There is nothing radically wrong with the general design and all the equipment is new.

Metallurgical control in the plant is discussed but not practiced. No daily metallurgical balances and reports are made -- partly because few samples are taken. In general, the plant feed appeared to be running 40-45% Fe and the concentrate about 58% Fe. It was said that 90% of the iron was being recovered and that 1.3 tons of feed yielded 1.0 tons of concentrate (a 77% weight recovery). In spite of the poor metallurgical control, it is probable that reasonably good results are being obtained because the ore should not be difficult to treat in the facilities available. No significant amount of disseminated magnetite was seen.

Haul to Port

A contractor named Reynolds has undertaken to haul the concentrate from the mill to the port over about 25 miles of road at a price of 5-1/4 cents per ton mile. The total cost is to be \$1.31 per ton. The road is all of gravel surface and generally of one lane width with passing areas. Grades and curves are reasonable considering the terrain. However, it is no highway and the contractor's price seems very reasonable. Reynolds is using six Kenworth trailer trucks of 50-ton capacity like those at Marcona in Peru.

We observed no difficulties in the hauling operation except that of discharging the loads. The material sticks in the bodies and has to be barred or vibrated loose. The delay is serious but should be possible to overcome by using more or stronger vibrators.

Reynolds was concerned by the lack of tonnage for his trucks to haul. He is expecting to move 40,000 tons per month, or about 2000 tons per operating day. He has scheduled his equipment to run 18 hours per day (two shifts of nine hours each). However, the concentrator is producing only about 1000 tons per day. Reynolds is ~~sure~~ to seek a revision of his contract price if this situation continues. *apt*

Port Facilities

These include a conveyor system for transferring truck loads of concentrate to a stockpile and another conveyor system for moving the concentrates from storage to ships. The latter system is carried on a T-shaped wharf. All these facilities seem to be well built and should operate effectively.

The first cargo was being loaded during our visit. The 14,000 ton vessel had tied up on September 30, but the shore facilities were not ready to start loading until October 7. The ship finished loading on October 11. ~~We understand that it then ran aground before reaching the open Pacific. Nevertheless, the vessel was floated free with little damage and proceeded on to Japan.~~

Housing

There are groups of family dwellings at the wharf and concentrator areas, but a majority of the force is housed in dormitories. All of the accommodations are meager by good mining camp standards in the States, but will probably suffice. However, the use of dormitories and men on single status must cause a high labor turnover, which raises operating and equipment maintenance costs. Only an investment in more and better facilities will solve the problems of a high turnover.

Financing and Costs

The entire project was originally estimated to cost \$3,000,000. This was to be financed about 50-50 by a first mortgage loan and by debentures. Mannix, Ltd. agreed to finance the costs over \$3,000,000 by advancing a second mortgage. The over-run was approximately \$2,500,000, the present amount of the second mortgage.

We were given the following tabulation of capital costs:

Road & tramway	\$1,670,000
Wharf & loading system	717,000
Concentrator	1,111,000
Quarry	906,000
Hauling Equipment & vehicles	37,000
Power Generating Equipment	233,000
Camp & Housing	152,000
Exploration	6,000
Professional fees	130,000
General Expense - Admin.	496,000
Preliminary financing exp.	60,000
Total	<u>\$5,518,000</u>

There was no detailed explanation offered as to the high costs except that adverse weather, difficult terrain, the pressure of time and consequent overtime work were all contributing factors. ~~We were surprised to see the "road and tramway" lumped together as one item of \$1,670,000.~~

~~they made no pretense of being mine operators and readily admitted their reliance on personnel at the property, we felt they had much too meager a grasp of what was going on. In the absence of personal knowledge, one must at least be able to judge the qualifications of those selected to supply that knowledge.~~

Manning, the resident manager, has a record of mining education and experience that might be presumed to qualify him for his present post. Notwithstanding, I judge him to be a man whose work has been mostly in field exploration, and I would rate him as capable of supervising little ~~more than the operation of two diamond drills and their crews~~

rather than in supervising operations of this magnitude.

Welch, the mining superintendent, is a man whose long record with Mannix, Ltd. should qualify them to judge him well. His experience, though, was largely in a coal stripping project and not in the sort of mining that faces Empire Development. ~~He is certainly not the man to provide the assistance which Manning requires.~~

An example which typifies the whole organization at Empire Development is worth quoting. They were most anxious to show us the outcrops where it was hoped they would develop the greater reserves which they recognize to be essential if their investment is to be recouped. Accordingly, the president, general manager, resident manager, mine superintendent and geologist -- all the top personnel of the company -- devoted an entire morning to climbing through the woods on the steep hillside in order to show us two areas where only the most meager outcrops of magnetite were visible through the overburden and vegetation. The geologist alone would have been quite competent and sufficient for the task. Meanwhile, of course, a ship was lying at the wharf waiting for concentrate to be delivered by facilities that were beset by difficulties even when fully staffed.

Possible CMC Participation in Empire Development

It was suggested that CMC might acquire half of Mr. Mannix's interest in return for taking up half of his second mortgage. CMC would, therefore, be required to pay \$1,250,000 for a 17% equity. The meager reserves, high capital costs and high operating costs that will arise from the various problems enumerated above make it inadvisable for CMC to pursue the matter further.

P. W. Allen

PWA:g

~~No one seemed to know what each part cost. One might guess that \$250,000 would have bought and installed the tramway, leaving \$1,420,000 for the 12-13 miles of new road construction.~~

Operating costs have been estimated as follows:

	<u>Per ton of concentrate</u>
Mine	\$1.07
Mill & Power	.56
Tram	.07
Wharf & beach	.13
Road	.31
Haul	1.31
Mess hall	.20
Road rent	.05
Administration	.11
Engineering	.06
Assaying	.02
General	<u>.12</u>
Total	\$4.01

In view of the greater waste/ore ratio that we determine, there must be some revision of the above. Empire Development says it will cost \$1.07 for all the mining charges against a ton of concentrate, this amount to include the cost of moving half a ton of waste. That is 71.5 cents per ton of material. If the total waste/concentrate ratio is 2.12/1.00 as we figure, the cost becomes $3.12 \times 71.5\text{c} = \underline{\$2.23}$ per ton of concentrate. Further, the milling cost will be higher because of lower grade ore than was apparently estimated. In general, the total cost per ton of shipping product might be expected to rise to \$5.00 per ton.

Empire Development has one contract to ship 511,000 dry long tons at an average price of about \$8.40 per ton. If one deducts operating costs of \$5.00, the remaining \$3.40 is available to cover interest and to amortize the capital costs. Thus, over 2,000,000 tons must be shipped before any profit can be realized. Even more must be shipped, if the price for additional tonnages is to be lower than the \$8.40 used here. ~~Of course, this arithmetic is just as obvious to Empire Development as to us, but we do not see where the additional shipping tonnage is to be obtained at a reasonable cost, if at all.~~

Organization

~~We were struck by the ignorance of Scott and Connelly as to mining problems and general organization of a mining operation. While~~

The difficulty of making this a successful operation would be the ability of the most experienced and competent organization, a careful appraisal of the competence of each individual to carry the responsibilities, ~~attended to him~~

in the light of the operating problems that appear to be present in this extraction

Loram Ltd.

Room 103, 239 Sixth Ave. W.,
Calgary, Canada,
October 29th, 1957.

Mr. Paul W. Allen,
Cyprus Mines Corporation,
523 West Sixth Street,
Los Angeles 14, Calif.

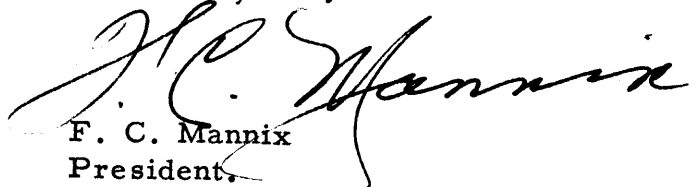
Dear Mr. Allen:

With reference to your letter of
October 21st and my Secretary's reply of October 24th.

I was very pleased to receive your letter concerning your visit to the properties of Empire Development and would welcome the opportunity of meeting with you to review your appraisal of our operation. Due to other commitments, which I have already made, I must leave the City tomorrow for approximately one week, but immediately upon my return I shall contact you further in order that we might arrange a meeting time and place.

Kindest regards.

Sincerely yours,


F. C. Mannix
President.

FCM/ra

cc: Mr. A. R. Thomas

X *Loram Ltd.* *R*

Room 103, 239 Sixth Ave. W.,
Calgary, Canada,
October 24th, 1957.

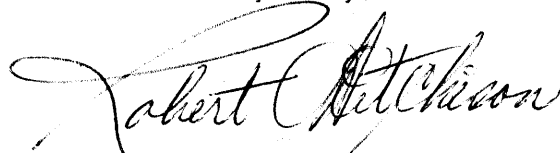
Mr. Paul W. Allen,
Cyprus Mines Corporation,
523 West Sixth Street,
Los Angeles 14, Calif.

Dear Mr. Allen:

In the absence of Mr. F. C. Mannix
from the City, I should like to acknowledge your letter
of October 21st addressed to him.

I know that Mr. Mannix has been
looking forward to hearing from you following your visit
to Empire Development's project at Port McNeill and
he will no doubt get in touch with you personally upon his
return to Calgary, October 28th.

Yours very truly,



Robert Aitchison
Secretary to F. C. Mannix

cc: Mr. A. R. Thomas

R

October 21, 1957

Mr. Fred C. Mannix, President
Loram, Ltd.
239 Sixth Avenue West
Calgary, Alberta
Canada

Dear Mr. Mannix:

You are probably wondering why you have had no word from us concerning the visit which Mr. Rundle and I made to Empire Development's property. However, as Jim Scott undoubtedly told you, we borrowed cross-sections of the orebodies with the intention of using them to work up figures as to the grade and tonnage of crude ore reserves and the amounts of waste rock to be moved in an open pit recovery of these reserves. Prints of the sections had to be made in Vancouver and are now in transit to us. I expect that our figures should be ready by the end of this week.

After discussing the situation with Mr. Thomas, it appeared best to prepare these figures before discussing our thoughts about the property with you. While there would appear to be little chance of our participating in the venture, we would be glad of the opportunity to meet with you and relay our appraisal of the operation. Possibly this could take place about a week hence, if convenient to you.

Mr. Rundle and I wish to express our gratitude for the hospitality shown to us by all of your organization. We had a most interesting and enjoyable visit.

Very truly yours,

Paul W. Allen

PWA:g

cc - A. R. Thomas
H. T. Mudd

R. E. LEGG

Consulting Mining Engineer

25 - 425 HOWE STREET
VANCOUVER 1, B.C.

October 18, 1957

Brig. A. B. Connelly,
Empire Development Company Ltd.,
Vancouver Block,
Vancouver, B.C.

Dear Mr. Connelly:

I am returning to your office
this date the following tracings which your engineering office
at the mine loaned to me for the purpose of making prints.

Merry Widow Level Plans	13
" " Composite	1
" " Sections	13
Kingfisher Level Plans	10
" Dev. Plan B	1

Mr. Little of your engineering staff
said he would like to have two prints made of each tracing for
use at the mine. I am therefore delivering two prints of each
tracing with the compliments of Cyprus Mines Corporation. It was
suggested to me that I leave the tracings and prints at your
office to be forwarded to the mine from there.

Yours very truly,


R. E. Legg

c.c. to Cyprus Mines Corp. ✓

R. E. LEGG

Consulting Mining Engineer

25 - 425 HOWE STREET
VANCOUVER 1, B.C.

October 17, 1957

Cyprus Mines Corporation,
1206 Pacific Mutual Building,
523 West Sixth Street,
Los Angeles 14, Calif.

Dear Sirs:

Herewith is a brief report on the ore reserve position and on the economics generally of the iron ore deposits on Vancouver Island, British Columbia, recently brought into production by Empire Development Company of Vancouver.

Ore Reserves.

Based on the mine plans and sections supplied by Empire Development Company, copies of which have been sent to your office, I have independently checked the ore reserves. My figures are shown in comparison with those given me by the company. Both sets of figures are expressed in short tons.

	R. E. Legg		Empire Development Co.	
	Ore	Waste	Ore	Waste
Main Ore Body (Merry Widow)	716,300	868,600	651,650	402,070
South Ore Body	141,230	112,000	135,290	110,200
East Ore Body	<u>291,200</u>	<u>306,400</u>	<u>359,490</u>	<u>75,950</u>
Totals	1,148,730	1,287,000	1,146,430	588,220

I have calculated the average iron content of the 1,148,730 tons to be 49.0%. In arriving at this average grade I made due allowance for the varying specific gravities of the different ore blocks.

It will be noted that there is a very large difference between my figure of tons of waste, which would have to be broken, and that given by Empire Development Company. This is explained by the fact that my figure includes both the waste discarded at the pits and that passing through the mill, whereas the company's figure includes only waste which would go through the mill. Owing to the erratic occurrence of the ore bodies, it is difficult to estimate with any degree of accuracy what percentage of waste can be discarded at the open pits. In the case of the East Ore Body 200,000 tons could be so discarded, and possibly from 300,000 to 400,000 tons from the other two ore bodies. Assuming a total of 550,000 tons to be discarded by the shovels, there would remain a balance of 737,000 tons of waste to pass through the mill.

A combined tonnage of 1,148,730 tons of ore averaging 49% iron and 737,000 tons of waste would result in a total of 1,885,730 tons of mill feed averaging 29.8% iron. This grade of mill feed is about in line with those of the two large producers of iron ore in the Province, one of which is still operating and the other which operated from 1951-56. Both of these operations were on deposits of magnetite having similar characteristics to those of Empire Development Company.

Total Recovery of Iron Concentrates.

I have compiled two sets of figures showing what tonnages of iron concentrates would be produced with mill tailings averaging 10% and 6% iron respectively. During the brief period which the mill has been operating, the mill feed has been much higher than the average grade. Tailings have been running around 10% iron, but during this initial period there have been the usual small troubles to overcome, and it is very possible that the tailings will be reduced when the operation becomes smoother. However, I have noticed in the 1956 Annual Report of the B.C. Department of Mines that the Argonaut Mine on Vancouver Island, which has been operated by Utah Construction Company, treated 521,000 tons of tailings in 1956 which gave a mill recovery equivalent to 9% iron in the feed. This indicates that their original mill tailings were in excess of 10% iron.

Recovery of iron concentrates from 1,885,730 tons ore averaging 29.8% iron with mill tailing of 10% iron would be 778,593 short tons averaging 58% iron. (It is assumed that average grade of concs. would be 58% Fe.)

Recovery of iron concentrates from 1,885,730 tons ore averaging 29.8% iron with mill tailing of 6% iron would be 865,000 short tons averaging 58% iron.

Net Proceeds from Sale of Concentrates.

Purchase price by Japanese ore buyers for 58% iron concentrates is \$8.05 per long ton f.o.b. ship.

<u>Short tons</u>	<u>Long Tons</u>	<u>Net Proceeds.</u>
778,593	695,283	\$ 5,597,028
865,000	772,445	6,218,182

Operating Costs.

The operating costs have been estimated by the management at \$4.30 per long ton of concentrates. The breakdown of this figure is as follows:

Mine	\$ 1.069
Mill & Power House	.556
Tramway	.067
Wharf & Beach Power	.126
Road Maintenance	.050
Trucking Contract	1.312
Cookhouse Loss	.204

Road Rental	\$.045
Administration	.108
Engineering Office	.064
Assaying	.024
General Office	.115
	<u>3.74</u>
Contingencies 15% of \$3.74	<u>.56</u>
Total	4.30

The item which appears to be away out of line on the above breakdown is the tramway cost of 0.067 per ton of concentrate, which is the equivalent of \$0.03 per short ton of ore moved over the tramway. This, I believe, is a most inadequate figure. However, the 15% allowance for contingencies should take care of this inadequacy. On the whole the cost of \$4.30 is a reasonable estimate, but it will only be reached if steady production is attained. The mill was designed to handle 230 long tons per hour on a 2 to 1 ratio, but I do not believe anything like this tonnage can be handled over the tramway. I believe this tramway will have to be redesigned before it can handle the tonnage required to give the above estimate of operating costs, which must be based on handling 1800 to 2000 short tons per day.

Total of Operating Costs.

<u>Long Tons of Concentrates</u>	<u>Unit Cost</u>	<u>Total</u>
695,283 (10% tails)	\$ 4.30	\$ 2,989,716
772,445 (6% tails)	4.30	3,321,513

Capital Expenditures

The company states that the capital expenditure to date is five and a half million dollars. Such expenditure is still going on in respect to housing facilities. At the outset it would appear that \$100,000 would be more than ample to cover this. In order to make a comparison of income against expenditures (capital and operating), a figure of \$5,600,000 is assumed for capital expenditure. To reconstruct the tramway will require additional capital, but no estimate of this cost is available.

Comparison of Income vs Expenditures.

<u>Income</u>	<u>Expenditures</u>			<u>Deficit</u>
	<u>Capital</u>	<u>Operating</u>	<u>Total</u>	
\$ 5,597,028 (10% tails)	5,600,000	2,989,716	8,589,716	2,992,688
6,218,182 (6% ")	5,600,000	3,321,513	8,921,513	2,703,331

Conclusion.

Unless further ore is found, which can be mined at an adequate profit, the people who have provided the funds for the Empire Development operation are going to suffer a very serious financial loss. Mention is made in the report recently prepared by

Oct. 17, 1957

the company that there was the possibility of finding an additional one and a half million tons of ore. There was practically no information given to support such a view. Nevertheless the history to date in this Province on occurrences of this nature has shown that more ore has always been found than that given in the original estimate. In this case a limited amount of geophysical surveying has been done and has shown two other anomalies to exist, one of which is confirmed by a good looking outcrop having approximate dimensions of 100 feet by 75 feet. The other appears to be a weaker anomaly. It is possible that additional ore may occur at greater depth below that already indicated in the ore zones which have already been drilled. Any such ore would have to be mined by underground methods, and it would become purely a matter of economics to decide if this should be done. Adjoining claims with favourable geology are owned by the Consolidated Mining & Smelting Company of Canada, and it is possible that an arrangement could be made with them to mine any iron ore found on their claims, if such deposits should prove extensive enough to warrant the transportation arrangements.

It seems obvious that any company putting additional capital into this venture would have to do so under a preferred arrangement. In such an event it is vital that the sale of the product is assured.

Yours very truly,



R. E. Legg
Consulting Mining Engineer

R
R. E. LEGG
Consulting Mining Engineer

25 - 425 HOWE STREET
VANCOUVER 1, B.C.

October 16, 1957

Mr. Paul Allan,
Cyprus Mines Corporation,
1206 Pacific Mutual Building,
523 West Sixth Street,
Los Angeles 14, Calif.

Dear Paul:

The prints will not be ready until tomorrow. I will be mailing them to you tomorrow afternoon by ordinary mail. Monday was a holiday here so the best thing I could do was to take them to the printing firm early yesterday morning.

You may have heard that the Japanese ship we saw loading ran onto a reef a few miles from Port McNeil. Luckily she was not damaged and was pulled off at high tide.

I have almost completed my analysis of the Empire Development Company iron venture and will mail you my brief report tomorrow. I am not optimistic. To come even on the venture they will have to find a lot more ore, but this is always possible.

It was a pleasure to meet you and I trust we will meet again sometime..

Yours very truly,

R. E. Legg
R. E. Legg

Gympire Development Company limited

1. Check Canadian tax laws re new corporations engaged in mining.
2. What was the cost of the road?
3. Working capital requirements?
4. Ship chartering
5. Complex capital structure
Subordinated debenture holders widespread & diverse
6. Control of directors not simply a matter of agreement between Wocam & Quatano - how about other shareholders?
7. Size of project small for CMC to oversee.
Short indicated life. 16.9% of Cyp cash recov. = \$394m
8. Weather conditions in winter.
9. Additional capital expenditure required? How much?
10. Are sales contracts abrogated by delayed delivery?
11. Tight cash flow schedule - by deprec. ^{100% of Wocam debt} + retire subord deb.
12. Increase in costs 1957-60?

13. Out of stock capital of 150 K shares,
39,250 or 26% went to lenders +
brokers for nominal consideration - This
came out of margin 60%.

Curt

October 16, 1957

Mr. Roland E. Legg
425 Howe Street
Vancouver, B. C.

Dear Mr. Legg:

Upon checking through the Company library, we found a complete set of the Annual Report of the Minister of Mines of British Columbia. Therefore, it will not be necessary for you to procure and send the reports to us.

Very truly yours,

W. J. Rundle

WJR:s

Pass to Paul Allen - C.A.

INTER-OFFICE CORRESPONDENCE

REC'D OCT 14 1957
Action Date

FROM David A. Duff CITY Toronto
TO Evan Just
SUBJECT EMPIRE DEVELOPMENT CO.

A C	DATE Oct. 11, 1957
E J	A
H K	
L W	1 10-14

A = Action C = Comment
I = Information

The following extract from the Canadian Mines Handbook (1957 Edition) gives the minimum facts re this company, i.e.:

"EX.O.: 546 Howe St., Vancouver. INC: 1948, B.C. chart. CAP: Auth, 100,000 shs, \$1 par. DEBENTURES: Auth, \$1,500,000 6 1/2% subordinated debentures. Oper; 60% int held by Mannix Ltd. of Calgary, & 40% by Quatsino Copper-Gold Mines. Prop: Iron ore prop, 73 claims, Elk River, Quatsino min div, Vancouver Island, B.C, 24.5 miles from tidewater at Port McNeil. Dev: Extensive d d by Quatsino indicated 2,523,000 tons magnetite aver 57.6% iron. In 1956-7 this co started installation of beneficiation plant at prop, & dock facilities at Port McNeil; plans call for mining 3,200 tons daily, from which 1,600 tons concentrate to be prod. Co has contracts for sale of 1,380,000 tons of concentrate to Japan, over 3-year period, with start of prod scheduled for mid-1957.

As you will note, the ore reserves appear limited and probably not too cheaply mined. The capital structure would appear out of line with requirements as per article in the Northern Miner of yesterday's date. The concentrate has a truck haul of 40 miles and a stockpiling charge near the dock. In fact it appears a very unattractive set-up on the basis of these two sources of information. With an ore body of 2,523,000 tons available for concentration, a contract for 1,300,000 tons of concentrate and a pre-production expense of \$5,000,000 it means \$2.00 per ton charge before you start and unless more ore can be found that is it. You may wish to read the report in the Northern Miner, page 8, issue of Oct. 10th and headed "Development cost for Quatsino Iron close to \$5,000,000".

Dave

DAD:lw

Inter-Office Correspondence

To P. W. ALLEN Company or
Division

From A. R. THOMAS Company or
Division

Date 10-3-57 Subject EMPIRE DEVELOPMENT COMPANY
(owned by Loram Ltd.)

Mr. Fred Mannix telephoned from Calgary to inquire about our thinking in regard to the iron ore mine on Vancouver Island. I said that we have not come to a definite conclusion but that in reading over the material which Mr. Connelly sent us, it seemed to me that there was not much profit in the ore developed so far.

Mr. Mannix agreed with this, but said that they have not attempted to determine the extent of the ore body. He believes that there is most likely 4 or 5 million tons of iron ore in this deposit. He also said that Consolidated Mining and Smelting has a copper deposit a few miles away and the whole area is mineralized. Mannix believes that if they get this iron ore project running, they can make a deal with Consolidated Mining for an open pit operation on the copper.

He would like to have some of our men take a look at the iron ore operation and give him our judgment about it. If he is wrong in his optimism, he would like to be told now, rather than find it out some months from now.

They are now loading the first boat and some of the ore is running between 65% and 70% Fe but he says this is because they are taking the highest grade ore available.

Mr. Mannix will be on Vancouver Island October 7, 8, 9, and 10 and if we could have somebody up there at that time he would like to go over the project with him. I told Mr. Mannix I would let him know about this through his office in Calgary within the next few days.

ART:m

September 25, 1957

Mr. Eric Connelly
Treasurer
Lorain Ltd.
Room 103
239 Sixth Avenue West
Calgary, Alberta, Canada

Dear Eric:

Thank you for your letter of September 20th, which was received today along with statements, schedules, and information on Empire Development Company, Limited.

We will review this material promptly, and will communicate with you in the near future.

With kindest personal regards,

Sincerely yours,



ART:m

1206
HSN
LDC
PWA

September 24, 1957

MEMORANDUM REGARDING MANNIX, LTD.:

Fred Mannix, President of Mannix Ltd., phoned from Calgary today. He said that Eric Connelly, their Financial Vice President, has written us a review of Empire Development. This is one of their companies which operates an iron ore mine on Vancouver Island. Mr. Mannix said it is now in production, with the first ship to be loaded tomorrow. He said that there isn't any money in the first deal, but it looks profitable for the future.

Another deal will be forthcoming: Max Bell wants to bid around \$5 million for oil in the ground - Pembina field - and would like a partner. He is making an analysis now. The sale will come up about October 15th or 20th. Mr. Bell figures that the very tight money situation in Canada may make this a worthwhile opportunity. Fred Mannix would like to come in for a small amount. He knows the Pembina field through his control of the Pembina Pipe Line.

If either of these propositions interest us, Mr. Mannix and Mr. Connelly will come to Los Angeles to talk them over.


A. R. THOMAS

ART:m

copy in -
Mannix
Enterprises

Telex

WESTERN UNION

Telex

SENDING BLANK

CALL
LETTERS

FTJ NIGHT LETTER

CHARGE
TO

CYPRUSMINESCOP FAX LOSA 8-13-57

FRED MANNIX
332 SEVENTH AVENUE WEST
CALGARY, ALBERTA, CANADA

MRS. THOMAS AND I PLAN TO ARRIVE PALLISER HOTEL SATURDAY
EVENING AUGUST SEVENTEENTH RETURNING TO CALIFORNIA THURSDAY
AUGUST TWENTY-NINTH. WILL BE IN CLAGARY FIRST PART OF STAY
AND PROBABLY VISIT JASPER BANFF AND LAKE LOUISE DURING
SECOND WEEK. HOPE TO HAVE OPPORTUNITY OF SEEING YOU. REGARDS
ALFRED THOMAS

ART:m 1206B-F Chg CMC

Send the above message, subject to the terms on back hereof, which are hereby agreed to

PLEASE TYPE OR WRITE PLAINLY WITHIN BORDER—DO NOT FOLD

1269—(R 4-55)

ALL MESSAGES TAKEN BY THIS COMPANY ARE SUBJECT TO THE FOLLOWING TERMS:

To guard against mistakes or delays, the sender of a message should order it repeated, that is, charged in addition. Unless otherwise indicated on its face, this is an unrepeatable message and the Telegraph Company as follows: charged back to the originating office for comparison. For this, one-half the message and paid for as such, in consideration whereof it is agreed between the sender of the message and the Telegraph Company as follows:

1. The Telegraph Company shall not be liable for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the unrepeatable message rate beyond the sum of five hundred dollars; nor for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the repeated-message rate beyond the sum of five thousand dollars, unless specially valued; nor in any case for delays arising from unavoidable interruption in the working of its lines.

2. In any event the Telegraph Company shall not be liable for damages for mistakes or delays in the transmission or delivery, or for the non-delivery, of any message, whether caused by the negligence of its servants or otherwise, beyond the actual loss, not exceeding in any event the sum of five thousand dollars, at which amount the sender of each message represents that the message is valued, unless a greater value is stated in writing by the sender thereof at the time the message is tendered for transmission, and unless the repeated-message rate is paid or agreed to be paid and an additional charge equal to one-tenth of one per cent of the amount by which such valuation shall exceed five thousand dollars.

3. The Telegraph Company is hereby made the agent of the sender, without liability, to forward this message over the lines of any other company when necessary to reach its destination.

4. The applicable tariff charges on a message destined to any point in the continental United States listed in the Telegraph Company's Directory of Stations cover its delivery within the established city or community limits of the destination point. Beyond such limits and to points not listed in the Telegraph Company's Directory of Stations, the Telegraph Company does not undertake to make delivery but will endeavor to arrange for delivery by any available means as the agent of the sender, with the understanding that the sender authorizes the collection of any additional charge from the addressee and agrees to pay such additional charge if it is not collected from the addressee.

5. No responsibility attaches to the Telegraph Company concerning messages, until the same are accepted at one of its transmitting offices; and if a message is sent to such office by one of the Telegraph Company's messengers, he acts for that purpose as the agent of the sender; except that when the Telegraph Company sends a messenger to pick up a message, the messenger in that instance acts as the agent of the Telegraph Company in accepting the message, the Telegraph Company assuming responsibility from the time of such acceptance.

6. The Telegraph Company will not be liable for damages or statutory penalties when the claim is not presented in writing to the Telegraph Company. (a) within ninety days after the message is filed with the Telegraph Company for transmission in the case of a message between points within the United States (except in the case of an intrastate message in Texas) or between a point in the United States on the one hand and a point in Alaska, Canada, Mexico, or St. Pierre-Miquelon Islands on the other hand, or between a point in the United States and a ship at sea or in the air; (b) within 90 days after the cause of action, if any, shall have accrued in the case of an intrastate message in Texas; and (c) within 180 days after the message is filed with the Telegraph Company for transmission in the case of a message between a point in the United States and a foreign or overseas point other than the points specified above in this paragraph; provided, however, that this condition shall not apply to claims for damages or overcharges within the purview of Section 415 of the Communications Act of 1934, as amended.

7. It is agreed that in any action by the Telegraph Company to recover the tolls for any message or messages the prompt and correct transmission and delivery thereof shall be presumed, subject to rebuttal by competent evidence.

8. Special forms governing the transmission of messages according to their classes, as enumerated below, shall apply to messages in each of such respective classes in addition to all the foregoing terms.

9. No employee of the Telegraph Company is authorized to vary the foregoing.

4-54

CLASSES OF SERVICE

DOMESTIC SERVICES

TELEGRAM

The fastest domestic service.

DAY LETTER (DL)

A deferred same-day service, at low rates.

NIGHT LETTER (NL)

Economical overnight service. Accepted up to 2 A. M. for delivery the following morning, at rates lower than the Telegram or Day Letter rates.

INTERNATIONAL SERVICES

FULL RATE (FR)

The fastest overseas service. May be written in code, cipher, or in any language expressed in Roman letters.

LETTER TELEGRAM (LT)

For overnight plain language messages, at half-rate. Minimum charge for 22 words applies.

SHIP RADIOGRAM

For messages to and from ships at sea.

1206
HTM
HSNC
O
P
Y

November 1, 1956

Mr. Fred C. Mannix
President
Mannix, Ltd.
332 Seventh Avenue West
Calgary, Alberta, Canada

Dear Fred:

Under separate cover we are returning to you the information on the Proposed Iron Ore Development of Quatsino Copper Gold Mines Ltd. Properties, which you kindly sent us. I understand from a telephone conversation with Eric Connelly that the financing has been completed.

Thank you for considering us in this matter. With kindest personal regards.

Sincerely yours,

Alfred R. Thomas
Executive Vice President

ART:m

Telefax

WESTERN UNION

SENDING BLANK

Telefax



CALL CHARGES FTJ NIGHT LETTER CHARGE TO CYPRUSMINESCORP FAX LOSA 10-11-56

F C MANNIX
MANNIX LTD
332 SEVENTH AVE WEST
CALGARY ALBERTA CANADA

L A File

YOUR LETTER OF OCTOBER THIRD REGARDING THE IRON ORE
PROPOSITION RECEIVED ONLY TODAY STOP HAVE NOT YET
RECEIVED THE FOLDER DESCRIBING THE PROPOSITION IN
DETAIL REGARDS

A R THOMAS

ART:m 1206B-F ART chg

Send the above message, subject to the terms on back hereof, which are hereby agreed to

PLEASE TYPE OR WRITE PLAINLY WITHIN BORDER—DO NOT FOLD

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LETTER TELEGRAM (LT)

For overnight plain language messages, at half-rate. Minimum charge for 20 words applies.

SHIP RADIOGRAM

For messages to and from ships at sea.

LA File

MANNIX

Ltd.
GENERAL CONTRACTORS

F. C. MANNIX
PRESIDENT

October 3, 1956

A. R. Thomas,
Cyprus Mines,
1206 Pacific Mutual Building,
523 West 6th Street,
Los Angeles, California.

RECD.	OCT 11 1956				
ANSD.					
FR					
ART					
REN		GDD		LDC	
WSV		BWS		PWA	
CWS		KKW		WFS	
JHS		SAS		EW	

Dear Al:

Under separate cover I am sending you a brochure concerning our Quatsino - Empire Development Company proceedings on the iron ore properties on Vancouver Island, near Port McNeil. There have been subsequent negotiations dealing with contracts and financing as I told you over the phone.

As I stated, our arrangements for financing the deal consist of a first mortgage, and a second mortgage which will be completed in the next thirty days.

My thoughts are that if you or your associates are interested, you would receive a First Mortgage on the mine and equipment for \$3,000,000, bearing interest at 5 per cent per annum, and twenty per cent (20%) equity.

It was a pleasure to visit with you on the phone, and I hope everything is going well with you.

Yours sincerely,

F. C. Mannix
F. C. Mannix

FCM:dgw
u/sep cov

*ca 11-1
deal out - financing
arranged elsewhere per art*

Quatsino 's Iron Ore Property
Earlier Corres. between LA & Evan Just 1952 & 1953

June 29, 1953

Mr. E. W. Littlefield
Utah Construction Company
1 Montgomery Street
San Francisco, California

Dear Mr. Littlefield:

Henry Mudd asked me to check with Allen Christensen with respect to the attached correspondence on the possibility of doing aeromagnetic work on Vancouver Island.

As I had presumed, Cyprus would not care to proceed in this area unless Utah wishes to do so as a joint venture. I do not by this mean to indicate a commitment, but simply a willingness to study the problem further if Utah is interested.

I recognize that Utah may be proceeding in the area on its own and may prefer to continue that way. At any rate, I would appreciate your reaction at your convenience.

Sincerely yours,

Evan Just
Vice President

EJ:CM
ENC.

INTER-OFFICE CORRESPONDENCE

FROM: Evan Just

CITY: New York

DATE: 6/11/53

*OK but
refer to AC*

TO: Henry T. Mudd


SUBJECT: Possible Aeromagnetic Survey for Iron
Ore on Vancouver Island

The enclosed letter from Legg raises a possible program which was vetoed before because Cyprus was not then interested in iron ore. Now that the company is in the iron ore business, the subject seems worth reviewing. I concur with Legg in believing that, looking forward to a West Coast market, an aeromagnetic survey has a reasonable chance of finding iron ore deposits of future economic potentiality.

I presume that Cyprus would not wish to compete with Utah in this area, thus that any such enterprise would be considered as a joint venture.

Provided that a sufficient area were surveyed so that the cost of moving in and out would be distributed over a considerable number of work units, I would anticipate a cost of \$8 to \$10 per linear mile, or from \$28 to \$35 per square mile on quarter-mile intervals.

Please give me your reaction at convenience so I can reply to Legg.



Evan Just

EJ:CM
ENC.

REC'D JUN 8 1953
Action Date

INTER-OFFICE CORRESPONDENCE

E J	A	6-11
H K		
I W		
		DATE: 6/3/53

FROM: R. E. Legg

CITY: Vancouver, B.C.

TO: Evan Just

A = Action C = Comment
I = Information

SUBJECT: Iron Ore - Vancouver Island.

The iron prospect on Vancouver island, brought to my attention by Cecil Dixon of Port Alberni, is still snow covered. When I was on Vancouver island last week I did notice that there was still considerable snow in the hills above 3000 feet. However, as summer is now at hand it should soon disappear. Dixon told me that he would advise me when it was time to go in.

In my letter to you of July 5th last year I stated that I thought an airborne magnetometer survey on Vancouver island would reveal the presence of unknown magnetite deposits. When I was in Victoria the other day visiting the B.C. Department of Mines, I had a very interesting talk on iron with Dr. J.F. Walker, the deputy minister of Mines. He said he understood that a limited amount of such work had been done with very encouraging results. He could not disclose who was doing this work, but my guess is that it was the Argonaut Co. Ltd., which, as you know, is controlled by Utah Construction Company. As you can appreciate, when an airborne magnetometer survey is carried out it would be almost entirely over unstaked ground, and therefore the mining company doing the work would want the utmost secrecy maintained. Having studied the known locations of magnetite deposits on Vancouver island in conjunction with the incomplete geological map of the island, it seems certain that many many more deposits exist under the heavy forest growth which covers the island. Sooner or later a thorough airborne survey is going to be made.

The eventual win to any mining company finding several million tons of ore should be great, but it is difficult to visualize any short term success due to marketing problems. It is true that there is a market at the present time in Japan, but this seems an unnatural market, which may not exist in two years time. Eventually there will be a market in B.C. or on the U.S. west coast. If Cyprus should be interested in iron ore exploration in British Columbia, then now is the time. I cannot give you any information relative to the cost of an airborne magnetometer survey, but if Cyprus should be interested, then I can get this information.

I stopped at the Argonaut office on Vancouver island and obtained some interesting information on their operation. You probably know that it is not too profitable, but I feel sure that this has been due to poor management. A capital expenditure of four millions has been made, which is far too great in my opinion. The capital write-off per ton of ore is consequently far too high. Another factor which is unfavourable is that their overall recovery runs from 75 to 80% due to disseminated ore. Their final product assays

Very TNA
Answer
Legg
when answer recd.

6/3/53

55% iron, 0.2% sulphur and trace copper. I was able to get the above information from a friend of mine who worked for Argonaut, but I would ask you not to repeat where I got the information from.

I learned that Canadian Collieries Ltd., an old company which has operated the coal mines on Vancouver island for many years, was drilling an iron deposit west of Ladysmith. I tried to find out where this deposit was, but no one on the island could tell me. I even scouted around the area without success. The Mines Dept. in Victoria knew nothing about it. However, on my return to Vancouver I found out that the deposit occurred on one of the land grants owned by the E.& N. Railway, a C.P.R. subsidiary. I talked today to the C.P.R. land agent here in Vancouver and he said the deposit was on land grant 51. Canadian Collieries have plenty of protection so there is little chance of finding an extension of the deposit on open ground. The E.& N. Railway own the minerals on their land grants, other than precious metals, but if a deposit should occur on their land grants then they are agreeable to making a deal on a royalty basis. It is interesting to note that a former manager of Argonaut is in charge of the work for Canadian Collieries.

I will look forward to hearing from you in respect to the airborne survey.

REL/FE

R. E. Legg
R. E. Legg

B.C. Iron Ore

REC'D

JAN 15 1953
Action Date

INTER-OFFICE CORRESPONDENCE

FF	1	1-15
FK		
LW	1	1-21

FROM: R. E. Legg

CITY: Vancouver

TO: Evan Just

DATE: Jan 12/53
A = Action C = Comment
I = Information

SUBJECT: Iron Ore Development

Thank you for your memorandum of January 9th on the above subject.

In case you do not know it, perhaps I should explain the regulation in B.C. covering the staking of iron ore deposits. The British Columbia Government is anxious to retain iron ore in the province for use in a future steel industry. Several years ago it brought down legislation that prevented the staking of claims for iron and manganese. It does not have the power to prevent the export of iron ore from claims which were held prior to this legislation. However, it is possible to stake claims on iron ore deposits and not mention what they are being staked for. Ground could thus be held until such time as the current legislation is amended. If I knew of a large iron ore deposit which was not staked then I would stake it immediately. That is how I am viewing the deposit which Dixon mentioned to me when I saw him in Alberni early in December.

Copper

R. E. Legg.
R. E. Legg

REL:FE

Evan Just

New York

~~1/9/53~~
1/9/53

R. E. Legg

Iron Ore Developments

I note from a recent letter from Jim Bruce to you, that Los Angeles believes there is some possibility of proceeding with iron ore developments in British Columbia in collaboration with Utah Construction Company.

For your information, the association to which Mr. Bruce refers is that we have undertaken jointly with Utah to develop the Marcona iron ore deposit on the coast of Peru about halfway between Lima and the Chilean border. The deposit contains a substantial tonnage of highgrade reserves and a much larger tonnage of lower grade material which might possibly at some future date lend itself to development through roasting off the sulphur content. This situation was attractive not only because of the highgrade and substantial tonnage but because it can be brought into production very rapidly. Thus it is possible to effect a rapid amortization of the investment before developments in Venezuela and Labrador overtake the present scarcity of iron ore on the eastern seaboard.

Benefiting by Utah's background in iron ore, I think it is quite possible that this association may proceed with further development on the west coast. Although I am remote from the picture, I have hopes that the assurance of adequate ore supplies may foster the building of furnaces on the West coast, both in the U. S. and Canada. Such developments would of course improve the market opportunities for iron ore. One hand washes the other, so to speak, and it seems to me that Utah, with its energetic General Manager, Allen Christensen, might be an effective catalyst.

I am certainly pleased to hear that Mrs. Legg is now home and definitely on the mend.

Evan Just

EJ:CV

NY File

JAN

Evan Just

New York

10/31/52

Roland E. Legg

Quatsino Iron Property, B. C.

It took me some time to get around to the memo on this subject of 9/11/52 which you sent me enclosing Mr. Hill's report. If this property is well located so that it could be put into production quickly, I think it is possible that Cyprus might be interested in undertaking the financing. I say this because I believe that there will be a lively market for iron ore for about three years--until Labrador and Venezuela get to shipping large tonnages. I presume that if the owners are interested in outside financing they would be prepared to give a controlling portion of the equity for undertaking this task. Also, I feel sure that our interest would be conditioned upon engineering findings that would show an expectancy of amortisation within three years.

I don't know if you had any such thing in mind when you sent me the memo, but there you are anyway.

Evan Just

EJ:CV

NY File

INTER-OFFICE CORRESPONDENCE

FROM: R. E. Legg

CITY: Vancouver, B.C.

DATE: 9/11/52

To: Evan Just

SUBJECT: Iron Ore, British Columbia.

As a matter of interest I am enclosing herewith a report dated August 21, 1952 by my partner, H. L. Hill, on the magnetite-iron property on Vancouver Island owned by Quatsino Copper-Gold Mines Ltd. I am also enclosing a newspaper clipping from "The Vancouver Province" of today's date dealing with the sale of iron ore to Japanese buyers.

A diamond drilling programme of 7050 feet and a magnetometer-dip needle survey have been the means of determining the proved, indicated and inferred ore.

I think you will find Mr. Hill's figures of interest.

A. E. Legg

REC'D SEP 15 1952
Action Date

A C		
E J	A	10-30
H K		
L W	I	9-15

A = Action C = Comment
I = Information

REC'D SEP 15 1952
Action Date

A C		
E J	/	
H K		
L W	/	9-15

August 21, 1952

President and Directors,
Quatsino Copper-Gold Mines Ltd.,
572 Howe Street,
Vancouver, B.C.

A = Action C = Comment
I = Information

Dear Sirs:-

The following summary report covers my visit to your property from July 29th to August 4th, 1952. This report will deal only with ore reserves, costs and capital expenditures relative to bringing your magnetite-iron property into production.

The results of the recently accelerated exploration programme have been very favorable. The magnetometer-dip needle survey and prospecting work resulted in the discovery of four additional ore zones. Diamond drilling two of these new ore zones and additional holes on the main ore zone has resulted in a very material increase in ore reserves.

In the writer's opinion, sufficient iron ore has now been developed to justify the capital expenditure necessary to bring the property into production. Proven ore reserves are considered ample to repay the initial investment and also to provide the necessary reward for such an investment.

It is recommended that exploration work be started on the Snowbird Group and also be continued in the present area to increase our known ore reserves.

ORE RESERVES

The following table summarizes the re-calculated ore reserves. This estimate is considered conservative.

	<u>Tonnage (Long Tons)</u>	<u>Grade % Fe.</u>
Proven Ore	960,000	57.6
Indicated Ore	460,000	55.0
Inferred Ore	<u>900,000</u>	<u>55.0</u>
	<u>2,320,000</u>	<u>55.8%</u>

The estimate of proven ore was calculated from the results of vertical diamond drilling at 50 foot centres on a regular grid pattern. 49 diamond drill holes averaging 145 feet have been drilled to date. The total footage of diamond drilling amounts to 7050 feet.

The estimate of Indicated and Inferred ore was computed from the area of highly potential ground indicated by surface outcrops of iron ore and the dip needle survey on the South and East ore zones. An average depth of 50 feet was assumed when calculating tonnages.

No estimate has been made of the possible ore on the two additional dip needle anomalies in the Merry Widow area, the Eastern extension of the East Zone or on the Snowbird ore zone. It would not be unreasonable to expect these areas to produce an additional 1,000,000 tons.

Details of the proven ore reserves are summarized in the following tables.

Zone	Area sq.ft.	Mining Depth Feet	Ore Length Feet	Grade % Fe.	Tonnage Long Tons	% Ore in Holes
Main	91,500	91	48.5	57.6	650,000	53.5
East	15,000	117	97.7	58.3	220,000	83.5
South	10,000	72	60.7	57.0	90,000	84.0
<hr/>						
TOTAL				57.6%	960,000	63.0%

The following notes cover the method of computing the above data.

(a) Area of Ore

The area of the ore zones, which are shown on the map accompanying the report in red, cover the ore zones as proven by diamond drilling. The zones have been extended in most cases 25 feet beyond the outside drill holes.

(b) Mining Depth

After a study of the drill logs an arbitrary cut-off was made at the lowest ore section that could be economically mined. The mining depth includes the footage of ore and waste in each hole and thus would represent the amount the material to be mined.

(c) Ore Length

The ore length is an addition of all the ore sections in each hole down to the mining depth.

(d) Grade

All the diamond drill holes were completely revalued during my last visit to the property. Disseminated ore intersections assaying below 55%, which would require fine crushing for up grading, were eliminated. Intersections assaying below 55% Fe, which did not contain disseminated ore, were re-calculated and an estimate made of the footage of ore which would assay higher than 55%. A complete set of diamond drill logs showing the results of the recalculation is attached to this report. The writer feels that the above method of drastically eliminating disseminated ore is conservative. However, test work will be required before an accurate estimate can be placed on the quantity of iron that will be recovered from the disseminated ore without being penalized for fines.

The following analysis shows the low impurities in the three ore zones.

	<u>Ore Zone</u>		
	<u>Main</u>	<u>South</u>	<u>East</u>
Sulphur (S)	.11%	.016%	.002%
Titanium oxide (TiO ₂)	.08	.099	.049
Phosphorous pentoxide (P ₂ O ₅)	.08	.08	.02

(e) Tonnage

The ore tonnage figure was obtained in each ore zone by multiplying the surface area of the ore zone by the average depth of ore and dividing by six. This figure was then reduced to long tons by multiplying by 0.89.

(f) % Ore in Holes

The recovery of ore in each ore zone was obtained by dividing the length of ore by the mining depth. The weighted average for the proven ore amounts to 63.0%. Mining 1.59 tons will thus produce 1.0 tons of shipping grade ore. On the East and South zones 1.2 Tons mined will produce 1.0 Tons of shipping grade ore. The depth of overburden over the proven ore reserves is negligible.

COST ESTIMATE

Costs are estimated on the assumption:

- (a) That 1,000,000 long tons of shipping grade ore is available at the mine.
- (b) That ore will be shipped at the rate of about 50,000 Tons per month.
- (c) That an adequate road for low cost hauling will be constructed.
- (d) That the operation will be properly designed and that efficient equipment will be properly installed to allow low operating and maintenance costs.
- (e) That the property will be efficiently managed.
- (f) That sufficient storage will be provided to maintain a production schedule through a fire closure period or abnormal weather conditions.

A. Estimated operating costs per long ton shipped.

Stripping and clearing	\$.05
Mining	1.28
Milling	.75
Hauling	1.25
Loading Ships	.25
Overhead & Engineering	.12
Add 5% Contingency	<u>.18</u>
	<u>\$3.88</u>

Mining the East orebody will show costs at about 50¢ per ton lower than the above estimate.

B. Estimate Capital Expenditures.

Road Construction	500,000
Dock	80,000
Loading Equipment including tunnel	75,000
Treatment plant	300,000
Mining Equipment	150,000
Camp	70,000
Add Contingency	<u>75,000</u>
Total	<u>\$1,250,000</u>

The above estimate is made on the assumption that all hauling will be done by contract.

The estimate of capital expenditure is made after obtaining information from the Argonaut Mine at Campbell River, the Texada Mine and study of information on other properties.

ECONOMICS

Price FOB vessel 55% Fe (approximate current price)	\$8.90 per long ton
Operating Costs	<u>3.88</u> " "
<u>Profit</u>	<u>\$5.02</u>
Operating profit on 1,000,000 Tons	\$5,020,000
Capital Expenditures	<u>1,250,000</u>
<u>Profit</u>	<u>\$3,770,000</u>

Assuming capital expenditures are an additional \$250,000 and operating costs are increased to \$4.00, the profit after capital write-off will amount to \$3,400,000 on the 1,000,000 Tons of proven ore.

Profit on each additional 1,000,000 Tons of ore developed will amount to \$5,000,000.

SUMMARY

The foregoing economic analysis of the Quatsino property indicates the reward justifies the capital expenditure necessary to bring the property into production.

In the event a suitable firm contract can be negotiated for the sale of 1,000,000 tons of iron ore, it is recommended without hesitation, that an expenditure of \$1,250,000 to \$1,500,000 be made to bring the property into production at the earliest possible date.

Yours very truly,
HILL, LEGG, HEMSWORTH & GRIMWOOD

Henry L. Hill.

Iron Ore Order Boosted 1,000,000 Tons To Japan

Shipments of B.C. iron ore to Japan will be stepped up another 1,000,000 tons with announcement here today that contract is being for export from the Quatsino property, Vancouver Island.

The announcement follows a visit of representatives of the Nippon Steel Tube Company. Shipments are slated to begin in 1953.

C. T. Takahashi & Co., Vancouver, are negotiating the deal. The company handles shipments from the Quinsam mine, also on Vancouver Island. The Japanese "big four" steel mills have taken approximately 470,000 tons of iron ore from the Quinsam deposit since exports commenced in Sept., 1951.

Current shipments are at the rate of 50,000 to 60,000 tons a month, of which 20,000 tons go to Baltimore, Maryland, for American steel mills.

More than \$3,500,000 was spent on opening up the Quinsam property and construction of docks at Campbell River.

PROVIDE FINANCES

The Quatsino deal, if completed, would provide finances for similar development at the property where exploration has indicated a large-scale iron deposit with traces of cobalt and copper.

The property, held by Quatsino Copper-Gold Mines Ltd., is situated about eight miles east of Port Alice near Elk and Kathleen lakes.

BANQUET GUEST

C. D. Schultz & Co., Vancouver, have surveyed a road from the property to Jeune Landing, site of the proposed dock for ore export. Four miles of the 16 miles of proposed road have been built as a logging trail, Jeune Landing

(Continued on Next Page)
(See IRON ORE)

IRON ORE

(Continued from Page 1)

is approximately four miles north of Port Alice.

Shinge Kawata, head of the Nippon Steel Tube Co., was guest at a banquet here this week. He was accompanied by Tatsuichi Kaneko and Kaneme Mochizuki, directors of the firm, and Toshiro Baba, chief public relations officer.

Mr. Kawata explained that B.C. iron ore is being used in Japanese steel mills for manufacture of such items as ship plates, oil well casings and priority products for the United Nations.

He expressed gratitude for Canadian co-operation in contributing strategic materials to the United Nations effort.

EXPANDING MARKETS

Quatsino Japan's new program, he saw promise of expanding markets for Canadian raw materials.

Takeshi Yasukawa, Japanese consul at Vancouver, expressed his willingness to assist in development of a friendly industrial relationship with his country. This would assist, he said, in opening up Canada's natural resources, particularly in B.C.

C. T. Takahashi was host to the Japanese visitors during a tour which included an inspection trip to the iron ore properties on Vancouver Island and a conference with Quatsino officials.

QUATSINO JUMPS

Quatsino shares flared up on the Vancouver Stock Exchange Wednesday and today as rumors of the pending deal circulated in brokerage offices.

The stock jumped from .54 to .70 to buck a declining market on Wednesday with a turnover of 33,500 shares.

It hit a high of .75 in early trading today before settling back to around .70.

B.C. IRON ORE *NY* **GOES TO U.S.A.** *File*

Argonaut Company Sends First Boatload to Bethlehem Steel at Baltimore *N.M. 8/21/52*

For the first time in history, iron ore from British Columbia has been sold to a United States market.

This was revealed last week in a report from the Argonaut Co., Ltd. property at Quinsam Lake, Vancouver Island, which stated that, on Saturday, August 9th, 1952, a ship, loaded with 10,250 tons of iron ore left Campbell River bound for the Bethlehem Steel Co. plants at Baltimore, Ohio.

M. E. Braun, manager of the Argonaut company, stated that the contract with Bethlehem, which will run for an indefinite period, calls for two shiploads per month.

Until recently, the entire output of the mine, which had reached a monthly production of approximately 60,000 tons, had been sold to Japanese steel mills. To date, 47 shiploads had been sold to far eastern mills, since operations were started in March, 1951. The shipment to Bethlehem was the largest single one ever made.

The Argonaut Co. is a subsidiary of the Utah Construction Co. which also operates an iron mine on Texada Island about 60 miles north of Vancouver. Its shipments of iron ore to Japan have been under considerable fire by those who believe the ore should be retained until a steel mill is built on the west coast.

In this connection it was also reported this week that a trial shipment of one carload of Quinsam ore had been shipped to Vancouver last Tuesday where it will be tested by Western Canada Steel, Ltd., formed by recent amalgamation of Vancouver Steel Co., Ltd., Vancouver Rolling Mills, Ltd., and Pacific Bolt Manufacturing Co., Ltd. Operations of these companies are based on scrap and it is felt that the tests to be made on the smelting of the Vancouver Island ore brighten prospects for eventual large-scale smelting operations at the Pacific Coast. Currently, these companies produce steel for the B.C. market at the rate of 3,000 tons monthly.

Add to file L.P. 9/11

Evan Just

New York

8/11/52

Henry T. Mudd

Iron Ore, British Columbia

As past correspondence has indicated, I have been very qualified in my answers to Legg on this subject.

I am passing the enclosed copy of his latest memo on the subject to see if it arouses interest.

Legg will probably be here about August 20 for a conference. He is coming to Montreal on outside business. Please let me know if this memorandum arouses interest as my present position is that to be interested we would have to have some liaison with a consuming entity that would give us better than an outsider position in the market.

Evan Just

EJ:CV
ENC.

REC'D AUG 11 1952
Action Date

Add to File

A C		
E J	A	8-11
H K		
L W	/	8-11

INTER-OFFICE CORRESPONDENCE

A = Action C = Comment
I = Information

FROM: R. E. Legg

CITY: Vancouver, B.C.

DATE: 8/7/52

TO: Evan Just

SUBJECT: Iron Ore - British Columbia

Further to my memo of yesterday's date on Iron Ore in British Columbia, I thought it might interest you to know that my partner, H.L.Hill, who returned today from a visit to the iron ore property of Quatsino Gold Copper Mines Ltd. at the northern end of Vancouver Island, states that they are getting some remarkably good results in their current diamond drilling programme. The last hole completed (all holes are vertical) went to a depth of 246 feet, and 200 feet of this would assay 55% iron. The hole now being drilled has gone down 160 feet, with ore still in the bottom of the hole. Of this 160 foot length, only 17 feet is waste, the balance being 55% ore. These deposits have all the ear marks of a commercial proposition.

While you have appeared lukewarm to tackling iron ore out here, yet I feel there are good opportunities in this direction, provided (1) a property can be acquired at low cost, and (2) location and transportation facilities are right. There seems to me no reasons why Quatsino's results cannot be duplicated elsewhere. It is almost a full time job to go into this sort of an investigation, but if you should want to do so, then the time to do it is when there is not too much interest being taken in such deposits.

R. E. Legg

REL/pd

REC'D AUG 8 1952
Action Date

B. Col.

A C		
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H K		
L W	1	8-11

INTER-OFFICE CORRESPONDENCE

A = Action C = Comment
I = Information FROM R. E. Legg

CITY: Vancouver, B.C.

DATE: 8/6/52

To: Evan Just

SUBJECT: Iron Ore - British Columbia

Thank you for your memos of July 28th and 31st on the above subject. I agree with you that the iron deposits described in the bulletin I mailed to you do not sound important. Moreover, I would say that in every case the ore would have to be beneficiated. Nevertheless, these are in almost all cases just raw prospects found in the early days by prospectors who were looking for copper ore. My partner, H. L. Hill, has for some time now acted for a company called Quatsino Gold Copper Mines Ltd which is exploring iron ore deposits at the northern end of Vancouver Island. This company started out as a copper-gold venture, and their copper ore was associated with the magnetite. It was soon found that the copper values were not important, and in the past two years attention has been focussed on the iron possibilities. Diamond drilling has continuously expanded the ore supply, and the company is getting close to a tonnage objective which will enable them to consider a half million dollar haulage road connecting the deposits with tidewater. I think that this situation can be repeated elsewhere along the coast. However, I would suggest that the matter stay in abeyance for the time being. If and when you come to Vancouver, we could discuss it then. It is a big subject, and one cannot do justice to it in a letter.

R. E. Legg

REL/pd

Evan Just
Roland Legg

New York

7/31/52

Iron Ore in British Columbia

I have the following from Los Angeles:

"Henry asked me to write you that he is lukewarm to iron unless it is high grade, low in Sulphur and Phosphorus and well located. I might add, aside from above, that the admission fee is also important to determine the long pull possibilities."

These considerations plus those which I have already mentioned do not seem to make our participation in iron ore developments out there very likely. However, these reservations do not entirely preclude the possibility of working something out, which I shall leave to your judgment.

Evan Just

EJ:CV

TO: MR. EVAN JUST
FROM: George D. Dub
DATE: July 28, 1952
SUBJECT: IRON ORE IN
BRITISH COLUMBIA

Before Henry Mudd left on his vacation, he asked me to write you regarding Mr. Legg's comment on Iron Ore in British Columbia.

Copy of your Semi-monthly Report to Henry of 7/23/52 has just come across my desk, and I note your statement that you have written Legg as per copy sent here. I have not seen the copy.

Q Henry asked me to write you that he is lukewarm to iron unless it is high grade, low in Sulphur and Phosphorus and well located. I might add, aside from above, that the admission fee is also important to determine the long pull possibilities.

Best regards.


George D. Dub

GDD:ft

Evan Just

New York

7/28/52

Roland Legg

Iron Ore Development

I sent Henry Mudd a copy of my memo to you on our interest in iron ore development. He says that he will send me a memo on this subject and when received I will transmit his views to you. Meanwhile, I have gone over the bulletin which you sent me on the iron ores of British Columbia and the Yukon and I find nothing there that makes me feel particularly optimistic. The deposits seem to be relatively small and those which would lend themselves more readily to magnetic prospecting are apparently of a type which would probably be either of fairly small extent or would require rather thorough beneficiation. Briefly, my impression is that people anxious to start a steel industry in British Columbia have a reasonable hope of being able to supply their needs from several sources, but the individual sources do not seem likely to excite someone whose primary interest is mining.

It seems to me that our interest in iron ore up there would be contingent on finding responsible parties who want to make steel and want us as partners on the mining side. Please do not consider this a final opinion as I do not wish to be arbitrary in such matters.

If you have a rebuttal on these points, I shall be pleased to hear from you and as stated above will pass the views of the Los Angeles office on when received.

Evan Just

EJ:CV

Excerpt from Evan Just's Progress Report 7-23-52
Original filed in Separate folder-Exploration-SF

in BC Exploration
SF "Legg has sent you a copy of his letter to me of July
③ covering trip to the Salmo and Slocan areas, from
which nothing developed that he considered worth re-
commending.

He also suggested that we should become interested
in iron ore development. Per copy sent to you, I
replied that the Company is not interested in getting
into the steel business and to enter iron mining would
have to have some kind of a preferred status with a
customer so as not to be an outsider in an industry
which is dominated by integrated enterprises.

RECD.	JUL 11 1952		
ANSW.	BY		
RETUR	PLEASE REPLY		
HSM	✓	RM	✓
HTM	✓	BWS	✓
JLB		NRW	
GDD		IP	
CWS		SAS	✓

Evan Just

New York

7/11/52

Roland E. Legg

Iron Ore, British Columbia

In answer to yours of July 5 on this subject, the inclination of our executives is to stay in the mining business. They believe that products of an iron mine are likely to be hard to sell on favorable terms unless it is captive to a steel mill or vice versa, and are not inclined to get into the steel business.

Thus, our interest in this possibility would be contingent on an arrangement that would leave us on the mining side of the picture (without the necessity of acquiring steel-making know-how or a selling organization) but would give us some "tie" that would give us a better than average position in the market as compared to other non-captive mines.

Mr. Harvey Mudd, our President, is in New York right now and when I mentioned this to him he also believed that the sulphur content of iron ore in that area would be a problem.

I have not yet received the bulletin to which you refer, but will study it as you suggest when it arrives.

Evan Just

EJ:CV

CC: Mr. H. T. Mudd ✓
 Mr. C. H. E. Stewart

R. E. LEGG
MINING ENGINEER

~~110 CEDAR STREET
NELSON, B.C.~~

311 Credit Foncier Bldg.,
Vancouver, B.C.
July 5, 1952

Mr. Evan Just,
Cyprus Mines Corporation,
161 E. 42nd Street,
New York 17, N.Y.

Iron Ore - British Columbia.

Dear Mr. Just:

I am mailing to you under separate cover Canadian Geological Survey Report "The Iron Ores of Canada, Volume 1, British Columbia and the Yukon", which was published in 1926. I am not asking you to read this report of some 250 pages, but if you read the first chapter and study the map on pages 18 and 19, you will have an appreciation of the iron ore position in this Province.

In view of the great rate of expansion of population and industry in both British Columbia and the neighboring province of Alberta, it seems certain that in the not too distant future there will be a steel industry started in British Columbia. Therefore, from a long range point of view, the acquisition of economic iron ore deposits would appear to be justified.

The British Columbia Gov't. would welcome a steel industry here. For that reason, illogical as it may seem at first glance, the Gov't. has withdrawn from staking all iron deposits. The reason for this is that the Gov't. does not wish to see iron ore mined and shipped out of the Province in the raw state. If any company were to come in here with the intention of finding iron ore for use in the Province, then I am sure the co-operation of the Gov't. would be obtained.

The Provincial Gov't. has no power to prevent iron ore being mined and exported from Crown Granted claims. In fact, this is now being done. An American firm, The Argonaut Co. Ltd., is now mining between 2000 and 3000 tons per day on Vancouver Island and passing it through a magnetic separation plant. The finished product is shipped to Japan.

What I am convinced of is that, if an effective search were made for iron ore, the results would prove favourable. Magnetite ore bodies are fairly common along the British Columbia coast. Prospecting for same is not easy, owing to the heavy forest growth which covers the coast. If an airborne magnetometer were put into use, it seems certain that many unknown deposits would be located.

Unless you were interested in a venture of this type, there is not much point in my discussing it with the

July 5, 1952

senior officials of the B.C. Department of Mines. I am sure that one could conduct an airborne magnetometer survey over a chosen area, but it would be necessary to reach some sort of agreement with the Gov't. before incurring such a heavy expenditure.

I would be glad to have your reaction to this matter.

Yours very truly,

R. E. Legg

R. E. Legg

REL/PD

C.C. to H. T. Mudd

WORKING PAPERS

Empire Development Co. Ltd.

Ore Reserve Estimates

Short Tons

	Legg		Empire		CMC		
	Ore	Waste	Ore	Waste	Ore	%Fe	Waste
Main	716,300	868,600	651,650	402,070	614,310	38.4	} 880,000
South	141,230	112,000	135,290	110,200	167,817	39.6	
East	291,200	306,400	359,490	75,950	368,000	49.45	316,500
Total	1,148,730	1,287,000	1,146,430	588,220	1,150,127	42.1	1,196,500
	@ 49.0%		57.5%				

Full

Grade - Tonnage Average

Sec	Tons	%	
1	43866	49.4	2570980.4
2	50001	49.7	2460049.7
3	35001	51.9	1816551.9
4	91665	51.3	4702414.5
5	17223	50.6	871483.8
6	86112	48.0	4133376.0
7	52251	48.1	2513273.1
8	89780	52.3	4695494.0
9	36111	46.5	1680661.5
10	13332	51.5	686598.0
11	14442	58.6	846301.2
12	21000	56.9	1194900.0
	<u>550764</u>	<u>51.17%</u>	<u>28,181,483.6</u>
	Average Grade		

Merry Widow Mine
Port McNeill, B.C.

Bodies

	Square Ft.	Distance	Cu. Ft	Cu Yds	Tons
Sec 1	9400	17+25=42	394800	14622	43866
Sec 2	9000	7888 50'	450000	16667	50001
Sec 3	6300	50	315000	11667	35001
Sec 4	16500	50	825000	30555	91665
Sec 5	3100	50	155000	5741	17223
Sec 6	15500	50	775000	28704	86112
Sec 7	9400	50	470000	17417	52251
Sec 8	10400	50	520000	19260	59780
Sec 9	6500	6448 50	325000	12037	36111
Sec 10	2400	50	120000	4444	13332
Sec 11	2600	50	130000	4814	14442
Sec 12	4500	42	189000	7000	21000
		Ore Total cu Ft.	4668800	172928	550764

Assume 3 long tons to cu yd =

Net Waste or Stripping - (Total Pit less Ore Section)

Sec 1	26200	50	1310000
Sec 2	36500	38784 50	1825000
Sec 3	30200	50	1510000
Sec 4	34000	50	1700000
Sec 5	43400	50	2170000
Sec 6	16400	50	820000
Sec 7	17900	50	895000
Sec 8	6700	50	335000
Sec 9	1500	3776 50	75000
Sec 10	1300	50	65000
Sec 11	3900	50	195000
Sec 12	1200	50	60000
Sec 13	2900	25	72500
		waste total Cu Ft	10,982,000
		Cu. Yds	406,740

Merry Widow Mine
Port McNeill, B.C.

#1

Grades.

3

73.0x	50.8	3708.4
8.5x	44.0	459.0
14.5x	61.6	893.2
12.5x	41.7	553.8
22.1x	50.3	1106.6
14	42.2	590.8
7.7	47.8	367.5
22	49.7	1089.0
6.5	41.0	266.5
21.5	41.6	104.0
12.8	46.5	545.2
3.5	51.4	179.9
<u>200.5</u>	<u>494.7%</u>	<u>9913.9</u>

73.0x	54.6	=	3985.8
14.0x	50.0		700.0
11.0x	39.7		426.7
17.5x	36.3		635.3
15.5x	44.8		694.4
<u>131.0</u>	<u>49.2</u>		<u>6452.2</u>

#3

31.5	60.2	1896.3
7.5	66.0	495.0
9.0	32.4	345.6
6.5	59.0	253.5
14.5	37.6	545.2
20.0	45.1	1353.0
11.0	60.0	660.0
24.0	56.0	1344.0
7.5	60.6	454.5
<u>141.5</u>	<u>51.9</u>	<u>7347.1</u>

#4

8.5	62.8	533.8
10.0	33.6	336.0
30.0	46.3	1389.0
50.0	61.2	3060.0
3.0	45.6	136.8
9.0	55.5	499.5
8.0	49.7	398.6
15.0	42.6	229.0
40.0	57.7	2308.0
20.0	51.2	1024.0
16.0	53.2	851.2
5.0	56.8	123.2
7.0	49.4	345.8
6.0	59.6	357.6
22.0	62.2	1368.4
5.5	46.2	254.1
9.0	22.2	210.6
<u>66.5</u>	<u>43.5</u>	<u>2892.2</u>
<u>330.5</u>	<u>51.3%</u>	<u>16865.4</u>

#5

80.0	57.1	1713.0
11.0	59.8	657.8
7.0	47.4	331.8
38.0	49.8	1892.4
22.0	54.8	1205.6
12.0	53.5	642.0
12.0	44.2	530.4
4.0	59.6	238.4
4.0	55.2	220.8
17.0	54.6	928.2
25.5	57.0	1453.5
11.0	24.6	325.6
16.0	57.8	825.8
10.0	39.6	246.0
10.0	35.9	359.0
<u>229.5</u>	<u>50.6</u>	<u>11617.7</u>

24.0	44.8	1075.2
16.5	42.3	797.0
17.0	41.0	705.5
27.0	56.0	1512.0
12.0	46.8	442.4
15.5	51.0	790.5
16.5	44.4	732.6
<u>134.5</u>	<u>42.0%</u>	<u>6455.2</u>

#7

85.0	51.9	4411.5
5.0	53.0	265.0
9.0	34.0	306.0
37.0	54.6	2020.2
8.0	53.0	424.0
16.0	48.4	774.4
30.0	31.3	939.0
<u>190.0</u>	<u>48.1</u>	<u>9140.1</u>

#8

20.0	54.8	1096.0
7.5	53.4	200.5
14.5	57.4	832.3
57.0	54.3	3223.1
10.0	47.8	478.0
24.0	36.9	885.6
7.0	35.8	250.6
23.0	55.0	1265.0
<u>163.0</u>	<u>52.3</u>	<u>8531.1</u>

#9

68.0	57.3	3498.4
57.8	43.5	2444.3
5.0	54.6	273.0
12.0	42.2	506.4
12.0	46.0	552.0
10.0	39.5	395.0
<u>164.8</u>	<u>46.5</u>	<u>7669.1</u>

#10

60.0	51.5	3090.0
------	------	--------

#11

8.0	57.2	457.6
12.8	60.6	727.2
4.8	58.8	235.2
4.9	50.0	200.0
47.0	59.7	2805.9
13.0	55.0	715.0
3.0	54.0	162.0
<u>91.0</u>	<u>58.6</u>	<u>5332.9</u>

#12

4.0	58.8	235.2
47.0	59.7	2805.9
3.0	54.0	162.0
44.0	62.8	2763.2
6.0	47.0	282.0
5.5	42.8	235.4
5.0	50.5	252.5
34.0	50.4	1713.6
<u>148.5</u>	<u>56.9</u>	<u>8449.8</u>

Merry Widow Mine.

Merry Widow Ore

Main

South

Level	Area ^{D"}	Ave End ^{D"}	Cu Ft.	Grade	Cu Ft Grade	Area ^{D"}	Ave E.A.	Cu. Ft.	Grade	Cu Ft x Grade
2270	2.23									
2250	9.62	5.925	189,600	54.4	103,142	5.46				
2230	17.64	13.63	436,160	49.7	216,772	6.34	5.90	188,800	46.4	87,603
2210	12.58	15.11	483,520	30.8	148,924	8.50	7.42	237,440	52.7	125,131
2190	14.84	13.71	438,720	31.3	137,319	6.82	7.66	245,120	44.8	109,814
2170	21.10	17.97	575,040	43.8	251,868	4.42	5.62	179,840	43.4	78,051
2150	19.29	20.195	646,240	38.8	250,741	4.96	4.69	150,080	72.2	18,310
2130	13.34	16.315	522,080	33.1	172,808	3.92	4.44	142,080	30.2	42,908
2110	14.98	14.16	453,120	34.2	154,967	2.27	3.095	99,040	36.4	36,051
2090	8.98	11.98	383,360	33.1	126,892		1.135	36,320	25.0	9,080
2070	4.32	6.65	212,800	29.7	63,202			1,278,720	39.6	506,948
2050	5.87	5.095	163,040	55.9	91,139		7.53			169,817
2030	1.76	3.815	122,080	46.3	56,523					
			4,625,760	38.4	1,774,297					
		÷ 7.53	614,310	short tons						

$40140 = 1600 \frac{D^2}{D} \times 20 = 32000 \frac{C.F.}{D^2}$

Kingfisher (East)

Level	Area Waste	Influence	Area Used	Ore	Ave E.A.	Grade % Fe	Co. Ft.	Gr x c.f.
2425	3.19	1/2	1.595					
	6.66	1/2	3.33					
2400	2.10	1/2	1.05	2.24				
2375	3.35	1	3.35	5.03	3.685	50.0	147400	7,3700
2350	7.95	1	7.95	8.25	6.64	41.9	265600	111,284
2325	17.79	1	17.79	8.54	8.395	59.8	335800	200,808
	25.04	1/2	12.53					
2300	9.06	1/2	4.53	8.30	8.42	49.0	336800	165,032
2275	10.17	1	10.17	7.87	8.085	44.9	323,400	145,207
2250	8.86	1	8.86	8.78	8.325	55.5	333,000	184,815
2225	9.27	1	9.27	6.83	7.805	51.6	312,200	161,095
2200	8.63	1/2	4.315	6.81	6.82	39.9	272,800	108,847
			84.740					
						49.45	2,327,000	1,150,788

$\div 7.53 = 368,000 \text{ short tons}$

$84.74 \times 1600 \times 25 = 3,389,600 \text{ c.f.}$

$= 125,540 \text{ c.y.} \times 2.25 = 282,465 \text{ Long tons Waste}$

$= 316,500 \text{ short tons Waste}$

Total Waste

Merry Widow
Main and South

Level	Area \square "	Infl.	Area Used
2270	6.94	1/2	3.47
2250	16.26	1	16.26
	33.03	1/2	16.515
2230	20.35	1/2	10.175
2210	33.46	1	33.46
2190	43.76	1	43.76
2170	41.38	1	41.38
2150	47.65	1	47.65
	62.19	1/2	31.095
2130	31.56	1/2	15.78
2110	24.37	1	24.37
	12.54	1/2	6.27
2090	0.70	1/2	0.35
2070	0.70	1	0.70
2050	1.10	1	1.10
2030	0		

Ramp extra $4.42' \times \frac{1}{2} \times 20 \times 1600 =$
 $70800 \text{ cf} = 2600 \text{ cy}$

$$292.335' \times 1600 \times 20 = 9,354,700 \text{ cf.}$$

$$= 346,470 \text{ cy}$$

$$\frac{2600}{349,070 \text{ cy}} \times 2.25 = 785,407 \text{ long tons}$$

$$= 880,000 \text{ short tons}$$

2050-2030 20x65 1300
 20x0 0
 19x63.5 1207
 1x0 0
 20x60.1 1202
80 46.3 3709

2070-250 20x59.8 1196
 590? 20x50.4 1008
 1090 20x57.6 1152
60 55.9 3356

2090-2070 1x0 0
 19x46.2 878
 8x35.2 282
 12x0 0
 4x0 0
 16x23.4 374
 10x59.0 590
 10x0 0
 20x45.9 918
 3x58.8 176
 11x0 0
6x58.2 349
 120 29.7 3567

Main
 2110-2090 20x52.6 1052
 20x53.2 1064
 14x37.2 521
 6x0 0
 11x46 506
 9x0 0
 4x47.8 191
 16x0 0
 14x35.1 491
 6x0 0
 1.5x0 0
 16.5x44.4 733
 2x0 0
 11x0 0
 9x47.0 423
 3x0 0
 15x48.6 729
 2x0 0
 19x48.8 927
 1x0 0
200 33.1 6637

2110-2090 S orebody
 9x0 0
 11x42.2 464
 2.5x0 0
 13x46.5 604
 4.5x0 0
 12x0 0
8x54.0 432
 60 25.0 1500

3x0 0
 15x48.6 729
 2x0 0
 19x48.8 927
 1x0 0
200 33.1 6637

2130-2110 S orebody
 17x60.8 1034
 3x0 0
 10x50.3 503
 10x0 0
 10.5x61.6 647
 9.5x0 0
60 36.4 2184

2130-2110 Main
 5x0 0 20x47.4: 948
 8x49.2 394 4x0 0
 7x0 0 16x58.4 934
 4x55.2 221 11x60.6 667
 8x0 0 9x0 0
 8x48.8 390 160 5474
 3.5x0 0 34.2
 16.5x40.8 673
 9x59.5 555
 11x0 0
 20x44.6 892

2150-2130 S orebody

8x	0	0
12x	50.3	604
<hr/>		
20	30.2	604
	?	

2150-2130 M orebody

12.5x	44.8	560	20x51.7	1034
7.5x	0	0	14x56.6	792
4x	49.0	196	6x0	0
5x	0	0	20x47.1	942
11x	60.0	660	18x49.3	887
1x	36.8	37	2x0	0
2x	0	0	<hr/>	<hr/>
6x	59.6	358	264	9009
9x	0	0	33.1	
2x	62.8	126		
18x	0	0		
6x	47.4	284		
9.5x	51.1	485		
10.5x	0	0		
18.5x	53.8	995		
11.5x	0	0		
15.5x	51.0	790		
1.5x	0	0		
14.0x	48.4	678		
6x	0	0		
4x	46.2	185		
16x	0	0		

2170-2150 S orebody

5.5x	44.3	244
14.5x	0	0
<hr/>		
20		244
	12.2	

2170-2150 Main

9x40.0	360	20x49.7	994
5x0	0	20x58.3	1166
6x44.8	269	<hr/>	<hr/>
20x45.5	910	200	7766
20x62.4	1248		
8x29.4	235	38.8	
12x0	0		
11x48.2	530		
9x0	0		
9x49.5	445		
4x0	0		
7x44.2	309		
16x46.8	749		
4x0	0		
4.5x0	0		
8.5x53.4	454		
5x0	0		
2x48.4	97		

2190-2170 S everybody

18 x 64.1	1154
2 x 0	0
20 x 60.6	1212
5 x 48.6	243
15 x 0	0
<hr/>	<hr/>
60	2609
43.4	

Main

5.5 x 48.0	264
6 x 0	0
8.5 x 32.4	275
20 x 56	1120
14 x 54.2	759
6 x 0	0
1 x 0	0
19 x 37.3	709
11 x 56	616
7 x 0	0
2 x 46.8	94
15 x 58	870
5 x 0	0
20 x 56.1	1122
20 x 59.3	1186
<hr/>	<hr/>
160	7015
43.8	

2210-2090 S

4.5 x 56.6	255
7.5 x 0	0
8 x 48.6	389
20 x 61	1220
20 x 44.5	890
17.5 x 47.5	831
2.5 x 0	0
<hr/>	<hr/>
80	3585
44.8	

Main

17.5 x 0	0
2.5 x 37.6	94
5 x 45.6	228
12 x 0	0
3 x 61.8	185
18 x 33.6	605
2 x 0	0
8 x 29.0	232
12 x 0	0
2.5 x 33.6	840
17.5 x 0	0
2 x 0	0
11 x 59.8	658
7 x 0	0
20 x 56	1120
20 x 52.2	1044
<hr/>	<hr/>
160	5006
31.3	

2230-2210 S.

Main

20x	51.2	1024
20x	47.2	944
<u>20x</u>	<u>60.0</u>	<u>1200</u>
60	52.7	<u>3168</u>

5x	39.7	198
15x	0	0
8x	0	0
12x	37.6	451
10x	0	0
7.5x	60.6	454
2.5x	0	0
13x	58.6	762
4x	0	0
3x	45.6	137
20x	42.8	856
1x	0	0
19x	51.5	978
3.5x	62.2	218
9x	0	0
7.5x	33.6	252
1x	0	0
16x	51.8	829
3x	29.0	87
1.5x	45.8	69
4.5x	0	0
14x	45.7	640
5x	48.6	243
15x	0	0
<u>200</u>	<u>308</u>	<u>6174</u>

2250-2230 S.

Main

13x	42.4	551
17x	42.0	714
17x	63.0	1071
<u>47</u>	<u>49.7</u>	<u>2336</u>

20x	62.3	1246
20x	36.1	722
11x	55.6	612
9x	0	0
12x	50.8	658
2.5x	0	0
5.5x	45.8	252
20x	57.5	1150
<u>100</u>	<u>46.4</u>	<u>4640</u>

2270-2250 . Main

20157.7	1154
20151.0	<u>1020</u>
<u>40</u>	
54.4	2174

2375 24 x 60.0 = 1440
 1 x 0.0
 4 x 65.0 260
 21 x 0.0
 20 x 65.3 1306
 2 x 0.0

 72 41.9 3006

2350 24.5 x 62.7 = 1536
 0.5 x 0
 25 x 54.2 1355

 25 x 64.1 1603
 75.0 598 4494

2325 20 x 60.5 1210
 5 x 0
 25 x 50.3 1258
 22 x 54.8 1206
 3 x 0

 75 49.0 3674

2300 23 x 53.6 1233
 2 x 0
 11 x 53.8 592
 6 x 0
 8 x 53.6 429
 21 x 53.0
 4 x 0

 75 44.9 3367

2275 25 x 61.4 1535
 25 x 55.4 1385
 25 x 49.4 1235

 75 55.5 4155

2250 25 x 62.8 1575
 1.5 x 60.6 91
 2.5 x 0
 21 x 54.0 1134
 15.5 x 51.9 804
 9.5 x 0

 25 x 62.2 1555
 100 51.6 5159

2225 2 x 62.4 125
 4 x 0
 7 x 62.0 434
 4 x 0
 8 x 27.4 219
 14 x 39.0 546
 5 x 49.8 249
 25 x 56.6 1415

 75 39.9 2988

2200 25 x 54.3
 25 x 61.3
 5.03 79 16.65
 8.25 8.325
 13.28 16.17
 6.64 8.085
 13.64
 15.61 6.82

40 x 40 = 1600

15000 40000 cuft

Magnetite 72.4% Fe = 311.8 lbs/cuft
 48% Fe = ?

$$\frac{48}{72.4} = \frac{66.3\% \text{ is magnetite} @ 312}{72.4} = 206.856$$

$$\frac{33.7 \text{ is limestone} @ 168}{72.4} = \frac{56.616}{72.4} = 263.472 \text{ #/cuft}$$

= 7.6 cuft / short ton
 = 8.55 cuft / long ton

$$\frac{49.45\% \text{ Fe}}{72.4} \quad \frac{67.3 \times 312}{31.7 \times 168} = \frac{213}{53} = 266 \text{ #/cuft}$$

9 cuft / long ton = 249 lbs/cuft
 266 = 8.43 ^{cuft} / long
 = 7.53 cuft / short

5
 3 tons / yd = 270

$$\frac{2240}{3} = 676.0$$

406 cy waste

$$27 \overline{) 6720} \\ \underline{25} \\ 54 \\ \underline{54} \\ 132 \\ \underline{135} \\ 3$$

Empire Development, Ltd., Vancouver!

Mine, elevation approximately 2200.

25ft Belcher, stripping less than 1 ton/ton of ore.

2 - Gardner Denver Air Trac wagon drills

2 - 600 CFM Worthington compressors

2 - 2 1/2 cy P&H shovels (used?)

4 - 22 ton Euclid trucks Poyer?



230 TPH ^{more} 1/2 mile to primary crusher (3680 T.P.H. 2 shifts)



Primary crusher



48" Open feeder



42" x 48" Pioneer jaw crusher set at 6" (270 T.P.H.)



36" conveyor to 3000 ton stockpile



30" conveyor, variable speed, 120 to 230 TPH.



Either of 2 eight ton tram bins



Tramway:

3 rail system with 4th rail for passing at midpoint.

One drum hoist

Track average 30°, 2600 feet long, drops from

2100 to 800, less than 4 minutes per single trip.

Tramway to operate 3 shifts, 120 to 150 trips per shift
(960 to 1200 T per shift or 2880 to 3600 TPD)

↓
Storage Bin
↓

30" conveyor, 230 TPH, to 3000 ton stockpile

↓
2 reciprocating plate feeders
↓

Conveyor to plant
↓

Screen ?

-6 + 3 1/2"

-3 1/2 + 1 1/2"

-1 1/2 + 7/8"

-7/8 + 1/4"

Stearns Electro-Magnetic Head Pulleys (30" x 36")

Stearns Electro Mag. Drum Seps.

↓
Concentrate
↓

↓
Mid
↓

↓
Tails
↓

Segregated by size in 4 bins

4 ft Symons Cone
↓

3 ft Symons Cone
↓

Dirig Electro Mag Double Drum Net
↓

Cone

Tails

(bins 36" x 13'-4")

Bin

Classifier (bins 36" x 13'-4")

Classifier - Tailing Storage

Plant designed to produce 2 tons product from 3 tons feed or a 1/3 rejection

First ore thru plant rejecting $\frac{.3}{1.3} = 23\%$

Capacity, 2 shifts 3400 long tons or 212 TPH
 $3400 \times \frac{2}{3} = 2264$ TPD concentrate

Power from 3-200 KW 440 volt, 3 ϕ generator.

Primary crusher power stepped up to 2200 volts and moved 3500 ft where stepped down to 440.

Water moved 1000 ft at 200 ft head.

Concentrate Haul

5000 ton stockpile ?



Vibrating feeder to conveyor



45 ton truck and trailer units (5 minutes loading)
6 units, Kennecott, with Truebauf trailers,
working 2-9 hour shifts, 3 round trips per unit.
25 miles one way, less than 6% grade, 600 ft drop.
Road 22 miles single lane and 3 miles double lane.
Contract, 5.25¢ / long ton mile = \$1.31 per long ton.



50 ton buffer at the beach



Conveyor with weighometer



4

Stocking conveyor and surface stockpile
20000 tons live capacity, 40000 tons total.



3 vibrating feeders



Conveyor (700 TPH)



how weighed?

To ship

Sampling of cargo in boats for settlement

Power from 2 - 100KW and 1 - 75KW generator.

Empire Development Sta.

Direct Cost per ton of product first 1,380,000 tons

Mining including stripping	1.5 tons ore 1.5 tons waste @ 58¢/ton	1.65
Tramway and conveyor to mill	1.5 tons ore	0.25
Milling including coarse crushing	1.5 tons ore	0.90
Contract haul		1.31
Loading at dock		0.17
Contingency		0.40
Total		\$ 4.68

$$\$6,452,325 \div 1,380,000 = \$4.68$$

Basis of ore selling price

58% Fe = base price

Each 1% below down to 56% (minimum acceptable) - \$0.30/long ton

Each 1% above 58%, add \$0.20/long dry ton.

$$65\% \text{ Fe, with no deduction} = 8.05 + 7 \times 0.20 = \$9.45$$

Penalty, $\text{SiO}_2 + \text{Al}_2\text{O}_3$, each 1% between 12 and 15%, - \$0.05

Sulfur 5 0.05% above 0.2% to 0.35 - \$0.15

Phos. P 0.05% above 0.10 to 0.20 - 0.08

\$1.50/wet ton for quantity of -1/4" over 40% of total
 seller pays freight for moisture over 5%.

Analysis -

Preliminary analysis from sample at Vancouver, faint of loading. One sample sealed for possible sample.

Trial settlement on basis of Buyers sample unless the varies more than 2% and "a large difference in S content or in sieging test. If no agreement is reached then both samples will be submitted to a board of arbitration.

Empire Development Co Ltd.

16,890 CMC

Year	Description	Amount	CMC share
End 1961	Loan to loan repaid		
" 1962	Debiture repaid plus \$1,046,666 Cash available	\$1,046,666	\$175,840
63	Taxes ?	1,279,500	214,956
64	after taxes ?	1,519,000	255,192
65		1,313,000	220,920
66		1,178,000	197,900

One reserve

Enough proven, inferred and indicated to carry till mid 1962

Proven reserve	1,000,000
Inferred & indicated	<u>1,500,000</u>
	2,500,000 x 73 recovery = 1,670,000 product
shipped by end 1961	<u>1,500,000</u>
Balance	170,000

Why use 3% for conversion U.S. - Can \$? 6%?

Mine for ton conc 2.76 tons total/lot conc.	1.07	
Mill & power house	.56	
Tramway	.07	
Wharf & black power	.13	
Road maintenance	.05	
Trucking contract	1.31	
Cash house loss	.20	
Road rental	.05	
Administration	.11	
Engineering & geology	.06	
Crushing	.02	
General office	.12	<u>3.75</u>
Contingency 15%	.55	
Total	<u>4.30</u>	

Weekly Milling Rate

	LT.	Pack	CF.
Main mill more conc	9231	3.373	2785
Tailing	<u>4108</u>	2.25	<u>1827</u>
	13339	2.94	4562
Grinding	<u>12185</u>	2.25	<u>5416</u>
	25524	2.56	9978

ART
PWA

Empire Development Co. Ltd. - Preliminary Report

Space
Insert
General

The following comments are submitted as a preliminary ^{memorandum} ~~report~~ while more detailed data are being prepared for a final report.

On Oct. 10, A.S. Pundell and I met Mr. Roland Legg in Vancouver, B.C. and the three of us then met representatives of E.D. and proceeded to visit the property. These representatives were Mr. James A. Scott, president, and ~~the~~ Brigadier Alan B. Connelly, ^{vice pres.} general manager. Scott lives in Calgary, Alberta, while A.B. Connelly lives in Vancouver, B.C. ~~The~~

Mr. Legg is an independent mining and geological consultant of Vancouver who was a C.M.C. employee under Cranford in a period from about 1953-1955. I asked him to join us as a special

Insert

(1A)

Summary + Conclusions

- 1) The reserves estimated by E.D. are said to be $\frac{1,146,430 \text{ short}}{1,024,000}$ tons averaging 57.5% iron. We can find reserves of only $1,150,127$ short tons averaging 42.1% iron. These latter will yield approximately 670,000 long tons of shipping product containing 58% iron.
- 2) E.D. data indicate a waste/ore ratio of $0.51/1.00$, the waste figure including that discarded at the mine plus tailings from the magnetic concentrate. We find a ratio of $2.12/1.00$.
- 3) Other magnetite outcrops and magnetic anomalies exist, but many are situated on steep hillsides where exploration and development cost will be high. No drilling

has been done on any of these.

- 4.) Primary crushing plant at the mine (elevation 2500 above sea level) require revision to ~~provide~~ provide a larger stockpile of crushed ore.
- 5.) The skip system for lowering ore from primary crusher to mill is entirely inadequate. It seems doubtful that it will ever develop the required capacity.
- 6.) Concentrator appear to have required capacity and metallurgical ability to upgrade a 40-45% Fe feed to a 38% concentrate. However, no good metallurgical control was in effect on Oct. 10-11
- 7.) Capital costs were \$5,518,000 instead of \$3,000,000 originally estimated.
- 8.) High capital costs, probable high operating costs, and limited ore reserves make E.D. unattractive from standpoint

* of possible CMC participation.

9.) E.D. management is ~~is~~ deficient in experience and skill required for the operations involved.

consultant because of his familiarity with iron ores on Vancouver Island.

The first of us flew to in a plane belonging to Mannix Co. Ltd to ~~Port Hardy~~ Port Hardy on Vancouver Island. A small seaplane then took us to the wharf of the Alaska Pine Co ^{on Alert Bay} near which E.D. has its own ~~boat~~ wharf for loading iron ore into ships. We reached the E.D. wharf ~~at~~ at about 11 AM on Oct 10.

Officers & Staff

While at the property we met the following principal officers and staff members:

- James A. Scott, pres.
- Alan B. Connelly ^{J.P.} gen'l mgr.
- S. M. Manning, mine manager
- James C. Welch, mine supt.
- A. A. Lineham, chief assayer.

Ore Reserves

E.D. reports and office data list the following proven reserves of ore:

<u>Zone</u>	<u>Short Tons</u>	<u>Long Tons</u>	<u>% Iron</u>
Main (Merry Widow)	651,650	582,000	57.2
East (Kingfisher)	359,490	321,000	57.5
South	135,290	121,000	58.6
Total	1,146,430	1,024,000	57.5

It should be noted however, that these figures are really intended to mean "reserves of concentrate that can be produced". There were no figures ^{available} to show the ~~grade of~~ grade and tonnage of ore that would be mined to produce the concentrates. However, mill operations since late September show that the mill feed is ranging from 40 to 45% Fe and that the concentrate is approximately 58% Fe. Also, it is taking ~~to~~ about 100 tons of crude ore to yield 70 tons of concentrate.

E.D. described their method of calculating reserves as follows.

The ~~portions~~ ^{portions} of diamond drill core which were of "ore grade" were listed separately from the lean or barren material. These ore grade ~~portions~~ ^{sections} were then averaged to give the grade of the "reserves".

Tonnages were obtained by taking the lengths of the ore grade ~~sections~~ ^{portions} and the distances between ~~center~~ ^{center} holes. The waste and lean material excluded from this calculation are assumed to be rejected in the course of mining or magnetic concentration.

It is stated that 525,000 tons of waste must, therefore, be rejected while obtaining the 1,024,000 tons of concentrate.

The waste-ore ratio thus indicated is only 0.51 to 1.00.

However, a cursory inspection of the cross section drawn through the rebody and the proposed open pit outlines indicate a ~~ratio~~

far more ratio. ~~Accordingly~~ ^{therefore} we obtained the plans and cross sections in accordance with which the mine operations are ~~supposed~~ ^{supposed} to be conducted. Careful ^{through} measurement of the data presented by E. D. gives far different results than the figures they quote from the report of ~~the~~ a consultant, Mr. Hill.

Ore Zone	Ore - Waste Tonnages (short tons)			C.M.C.		
	Empire Devel. (per Hill)					
	Ore	%Fe	Waste	Ore	%Fe	Waste
Main (Merry Widow)	651,650	57.2	402,070	614,310	38.4	} 880,000
South	135,290	58.6	110,200	167,817	39.6	
East (Kingfisher)	<u>359,490</u>	57.5	<u>75,950</u>	<u>368,000</u>	49.5	<u>316,500</u>
Total	1,146,430	57.5	588,220	1,150,127	42.1	1,196,500

If we assume that the reserves calculated by us are graded up to a 58% concentrate with a recovery of 90% of the iron, then there will be the following products:

5A

	Short Tons	% WT	% Fe	Tons Fe	Distribution %
Concentrate	751,350	65.3	58.0	435,783	90.0
Tailing	<u>398,777</u>	<u>34.7</u>	12.1	<u>48,420</u>	<u>10.0</u>
Feed	1,150,127	100.0	42.1	484,203	100.0

The 751,350 short tons of concentrate give only 670,000 ~~dry~~ long tons of shipping product in contrast to the 1,023,601 long tons quoted by E.D. from Hill's report. Moreover, we calculate that the following waste must be discarded:

	Short tons
at the mine	1,196,500
At the mill	<u>398,777</u>
Total	<u>1,595,277</u>

This gives a ratio of waste to shipping product of $2.12/1.00$ versus the $0.51/1.00$ shown by E.D.'s figures.

something like 3.0 to 4.0. We are
 obtaining prints of the sections and
 will ~~make~~ determine the exact
 ratio from the data available.

We were shown two areas
 where ~~are~~ magnetite outcrops
 and where magnetic anomalies
 exist. ^{However,} None of the information
 had been plotted on maps in a
~~handy~~ manner that would
 permit study or interpretation.
 Both outcrops occur on the
 flank of a ~~very~~ steep mountain
 side. Making a road to either
 location will involve a lot of
~~very~~ costly rock excavation. No
 channel drilling has been done
 at either outcrop and the pioneer
 road for this work will not be
 cheap. At the moment, these
 outcrops constitute no more than
 a hoped for reserve. ~~There are~~

In the area where mining
 is now going on there are two
 or three small outcrops of
 magnetite which are also in the

(6)

category of "hoped for reserve" Roads to these areas will be easy to construct, but there has been no time or funds for such work or for diamond drilling.

The general philosophy was that only enough drilling was done to outline a million tons of shipping product and that additional reserves would be developed as the need arose. This naive approach to the problem is typical of many other phases of the operation.

Mine

Mining operations are located on a ridge at about elevation 2500 feet. The so-called "main" ore zone has been cut by three benches and some benching has been done in the nearby "south" zone. The plans call for benches at 25-foot vertical intervals, but the work is in such an early stage of development that little pattern is evident.

Traction-mounted wagon drills (Cordner Denver Air Trac) are used for drilling blast holes (either vertical or horizontal). The ^{hole} is collared with a 3 1/2 inch bit. Machines of this type are well suited to the mining which must be done during the early stages of development. Later on, it will be much cheaper to use equipment like an O'Driscoll Hand Drillmaster which will provide vertical holes of six inch diameter.

Insert for p 8

Inspection of E'D's mine plans and cross sections show that they are considering excessively steep final slopes. These range from 80° on individual ^{quarry} faces that are 100 feet high to 70° on over-all faces which include berms. It will be impossible to maintain these angles without damage to personnel and equipment, particularly where freezing and thawing occur. At some future date, E'D. will have to reduce the slope angles and thereby mine even more waste than ~~is~~ are calculated from their sections.

diesel driven

There are two P & H shovels, Model 955-A, of 2¹/₂ cubic yard capacity. These load four Euclid trucks of 22 ton capacity. All this equipment was bought new about a year ago. It is well suited to the operation.

However, the steep slopes which flank the ore body place a serious limit on the operating space that is available. Roads are steep with as much as 15% grades, and these do not make for good truck operation. Also, the turns are very sharp (Insert on p 8A)

Primary Crusher
+ Storage

Trucks haul the ore to a primary crusher about half a mile from the mine. The loads are dumped into a flaring steel hopper over a pan conveyor which moves the ore into the 42 x 48 inch jaw crusher. Although less than 25,000 tons have been crushed the hopper is badly battered. It will be quite ~~badly~~ inadequate to handle the required 2500 tons per day and

very expensive to maintain.

The crusher itself, a new Pioneer, will probably suffice for the quantity and type of ore being treated. However, the 42x48 inch opening will require careful sizing of material in the mine if the crusher is not to be plugged frequently. On the other hand, the jaw feeder will facilitate the handling of large pieces.

The jaw crusher product, about six inches in the largest dimension, is conveyed to what is intended to be a stockpile of 3,000 ton capacity. Under the pile are a tunnel, feeder and conveyor which transfer the ore to the ship system. Unfortunately, the conveyor ^(No. 1) from the crusher ~~to~~ does not discharge directly over the ~~regular~~ feeder to the conveyor (No. 2) in the tunnel. Instead, it was assumed that the discharge from No. 1 would

slide down the slope of the hill to the feeder. However, the angle of repose is so steep, especially with the ore containing as much topsoil as it does during this stage of mine development, ~~that~~ the effective "live" capacity of the stockpile is less than 500 tons. Consequently, any ^{serious} delay in the ship system has an almost immediate effect on the mining and primary crushing.

The problem of storage between the crusher and ship system will be made ^{worse} by the winter conditions. Snow and freezing temperatures will not only further reduce the live storage capacity, but there may even be trouble in getting the ore to the feeder at all. The only logical solution is to extend No. 1 conveyor until it discharges directly over the feeder.

Skip System

ore from the storage pile just described is conveyed to ~~the~~ a steel loading hopper over the skipsway. The hopper has been designed so that the ore does not slide easily from it to the skips. Crowbars, ~~and~~ vibrators and a stream of water are used to urge the ore out of the hopper. Furthermore, the arrangement is such that the top of the skips is two feet away from the bottom of the ~~hopper~~ hopper and much spilling results. The ^{consequence} result of these problems is the long time required for loading the ships and this interferes seriously with the ship cycle. ^{Immediate} revising of these facilities is necessary.

The ships themselves operate on tracks (30 inch gauge) which have been ~~not~~ laid on the slope of the mountain from elevation 2400 to elevation 900. While the average slope is said to be 30°, it varies between 15° and 45°. Ship

capacity was expected to be eight tons, but actual operation so far shows an average of only six tons per ship. The loading arrangement makes it difficult to fill the ships to capacity. In addition, there is a substantial amount of ore retained in the ships after they dump because of the stickiness of the ore and the design of the ships. The latter problem could be alleviated ~~to the~~ ~~present~~ ~~ships~~ by installing loose conveyor beltting in the bottom corner of the ships.

The ships discharge into a hopper from which the ore is taken to a stockpile ~~by~~ ~~means~~ ~~of~~ ~~a~~ ~~feeder~~ and a conveyor (No. 3). It was obvious that ^{arrangements could have been made for} the ships ~~to~~ ~~have~~ discharged directly out on to the pile, but the feeder and conveyor are causing no problem except for the maintenance which they will require. Much more

serious was the problem caused by the lack of a man at the ship dunnage to see that the ships were ready to be hoisted up the mountain. Twice, while we were at the property, the hopper became over full and the ship jammed against the timber framework. ~~Of~~ Each instance caused a delay of four hours and damaged the timber structure.

The ropes used to lower and raise the ships are supposed to be carried on rollers set between the rails. However, there is only a handful of rollers ~~to~~ compared to the total required. Also, the rope travels frequently at one or the other side of the rollers. As a result of these and other factors, the outer wires of the cables have been reduced to 50% of their original diameter in only a few weeks of operation.

The winding engine uses a 200 horsepower motor which runs

$$\frac{270}{1440} \text{ min}$$

$$6 \frac{2400}{400} \text{ skip}$$

(14)

$$\frac{1440}{400} = 3.6 \text{ min/sk.}$$

$$\frac{1200}{400}$$

3.0 min/sk.

$$25 \frac{140,000}{716,000} \text{ tpd.}$$

2300

as a generator to absorb the energy produced by lowering the re. The Wood-lined ^{band-type} friction brakes control the winding machine ~~or~~ during periods of acceleration and deceleration while the motor is not up to an effective speed. The ear-splitting noise emitted by these brakes can only be an indication of vibrations and strains which are bound to cause serious maintenance problems.

It is difficult to convey the general impression which the ship system creates. The roller coasters in an amusement park would be more suited to E.D.'s needs than the system they ^{have} selected. E.D.'s shipway and equipment were purchased second hand from a defunct mining operation where 400 tons per day was being handled. E.D. is now expecting to lower 2400 tons per day. At six tons per ship, this would mean

(15)

400 $\frac{16}{60}$
 $\frac{160}{24}$

dumping a ship every 3.6 minutes during a 24 hour day. That, in itself, ~~is~~ would be a prodigious feat ~~with~~ with the equipment available, ~~But~~, in addition, the ship system is the only means of transporting personnel and supplies between the mine and the base of the mountain. There is not even a foot trail up to the mine. Therefore, one ~~should~~ ^{should} allow close to 33%, or ~~8~~ ⁸ hours per day, for such traffic. In the remaining ~~16~~ ¹⁶ hours, the ships would have to dump at the rate of one every ~~18~~ ^{2.4} minutes, but the design of the system makes 3.0 minutes the minimum attainable.

Still another factor is the impact of winter weather. E.D. expects at least six feet of snow at the mine elevation. It is a certainty that snow in such an amount will delay the

ships seriously and it is quite probable that the entire system may be out of operation for periods of a week or more. The only way to remove snow from the ship rails is by hand shovelling or by fastening a rotary plow on the skips. The former would be a superhuman feat and no provision has been made for the latter.

~~C~~

Concentrator

Ore is delivered by Conveyor No. 3 to the head of the mill building where it is screened into the following fractions:

+3 1/2" ✓
 -3 1/2" + 1 1/2" ✓
 -1 1/2" + 7/8" ✓
 -7/8" + 1/4" ✓
 - 1/4" ✓

Each of the first four sizes is stored, more or less dry, in a 100 ton bin, while the ~~minus~~ -1/4" inch is fed directly to a magnetic separator in slurry form.

The +3 1/2" and -3 1/2" + 1 1/2" fractions are drawn from their bins by vibrating feeders ^{on top} ~~and~~ conveyors with magnetic head pulleys. The -1 1/2" + 7/8" and -7/8" + 1/4" fractions are conveyed from their bins to a chute leading down to magnetic drum separators. Each of these four operations yield a concentrate, middling and tailing.

The middling is conveyed to a separate screening and crushing building where four foot and three foot Symons cone crushers make a further size reduction. The crusher discharges are combined and returned to the head of the mill.

The -1/4 inch slurry passes through a ^{Dings} double drum wet magnetic separator which makes a tailing and a concentrate. The latter assays from 59% to 62% Fe.

66%?

The plant is running two shifts per day and appears to have plenty of capacity for the 2400 tons it is expected to handle. There is nothing radically wrong with the general design and all the equipment is new.

Metallurgical control in the plant is discussed but not practiced. No daily metallurgical reports are made. Balances and report are made - partly because few samples are

taken. In general, the plant feed appeared to be running 40-45% Fe and the concentrate about 38% Fe. It was said that 90% of the iron was being recovered and that 1.3 tons of feed yielded 1.0 ton of concentrate (a 77% weight recovery). In spite of the poor metallurgical control, it is probable that reasonably good results are being obtained because the ore should not be difficult to treat in the facilities available. No significant amount of disseminated magnetite was seen. ~~it was~~
~~either~~

Haul to Port

A contractor named Reynolds has undertaken to haul the cement from the mill to the port over about 26-25 miles of road at a price of 5 1/4 cents per ton mile. The total cost is to be \$1.31 per ton. The road is all of gravel surface and generally of one lane width with passing areas. Grades and curves are reasonable considering the terrain. However, it is no highway and the contractor's price seems very reasonable. Reynolds is using six Kenworth trailer trucks of 150 ton capacity like those at Maroon in Ft. Peck.

We observed no difficulties in the hauling operation except that of discharging the loads. The material sticks in the bodies and has to be barred or vibrated loose. The delay is serious but should be possible to overcome by using more or stronger vibrators.

Reynolds was concerned by

(2)

the lack of tonnage for his trucks to haul. He is expecting to move 40,000 tons per month, or about 2000 tons per operating day. He has scheduled his equipment to run 18 hours per day (two ~~min~~ shifts of nine hours each). However, the concentrator is producing only about 1000 tons per day. Reynolds is sure to seek a revision of his contract price if this situation continues.

Port Facilities

These include a conveyor system for transferring truck loads of concentrates to a stockpile and another conveyor system for moving the concentrates from storage to ships. The latter system is carried on a T-shaped wharf. All these facilities seem to be well built and should operate effectively.

The first cargo was being loaded ~~ships~~ during our visit. The 14000 ton vessel had tied up on Oct. Sept. 30, but the shore facilities were not ready to start loading until Oct. 7. The ship finished ~~receiving~~ loading on Oct. 11. We understand that it then ran aground before reaching the open Pacific. Nevertheless, the vessel was floated free with little damage and proceeded on to Japan.

Housing

There are groups of ~~men~~ family dwellings at the wharf and concentrator areas, but a majority of the force is housed in dormitories. All of the accommodations are meager by good mining camp standards in the States, but will probably suffice. However, the use of dormitories and men on single status must cause a high labor turnover, ~~of~~ which raises operating and ^{equipment} maintenance cost. Only an investment in more and better facilities will solve the ~~set~~ problems of a high turnover.

Financing and Costs

The entire project was originally estimated to cost \$3,000,000

This was to be financed about 50-50 by a first mortgage loan and by debentures. Morrison, Ltd agreed to finance the costs over \$3,000,000 by advancing a second mortgage.

The over-run was approximately \$2,500,000, the present amount of the second mortgage.

We were given the following tabulation of capital costs:

(1)

There was no detailed explanation offered as to the high costs except that adverse weather, difficult terrain, the pressure of time and consequent overtime work all were all contributing factors. We were surprised to see the "road and tramway" lumped together as one item of \$1,670,000. No one

①

Empire Development Co. Ltd.

Road & Tramway	\$ 1,670,000 ✓
Wharf & Loading System	717 ✓
Concentrator	1,111 ✓
Quarry	906 -
Hauling Equip ^{ment} & Vehicles	37 -
Power Generat ^{ing} Equip ^{ment}	233 -
Camp & Housing	152 -
Exploration	6 ✓
Professional fees	130 -
Gen ^{eral} Exp ^{ense} — Admin	496 -
Prelim ^{inary} Fin ^{ancing} Exp ^{ense}	<u>60 -</u>
Total	\$ 5,518 -

(over)

2

	Per ton of concentrate
Mine	\$1.07 ✓
Mill + Power	.56 ✓
Tram	.07 ✓
Wharf + Beach	.13 ✓
Road	.31 ✓
Haul	1.31 ✓
Mess hall	.20 ✓
Road for Rent	.05 ✓
Admin.	.11 ✓
Engineering	.06 ✓
Assaying	.02 ✓
General	.12 ✓
	<u>\$4.01 ✓</u>

seemed to know I what each part cost. One might guess that \$250,000 would have bought and installed the tramway, leaving \$1,420,000 for the 12 $\frac{1}{3}$ miles of new road construction.

Operating costs have been estimated as follows:

2

In view of the greater waste/ore ratio that we determine, there must be some revision of the above. E.D. says it will cost \$1.07 for all the mining charges against a ton of concentrate, ~~plus~~ this amount to include the cost of ~~moving~~ moving half a ton of waste. That is 71.5 cents per ton of material. If the total waste/Concentrate ratio is 2.92/1.00 as we figure, the cost becomes $3.12 \times 71.5¢ = \$2.23$ per ton of concentrate. ~~The~~ Further, the milling cost will be higher because of lower grade ore

1,750
1,750
1,650
5,900

than was apparently estimated. In general, the total cost per ton of shipping product might be expected to ~~rise~~ ^{rise} to ~~5.00~~ ^{5.00} per ton.

E.D. has one contract to ship ~~between~~ 311,000 dry long tons at an average price of about \$8.40 per ton. If one deducts operating costs of \$5.00, the remaining \$3.40 is available to cover interest and to amortize the capital costs.

Thus, ^{over 2,000,000} ~~1,625,000~~ tons must be shipped before any profit can be realized.

Even more must be shipped, if the price for additional tonnage is to be lower than the \$8.40 used here.

Of course, this arithmetic is just as obvious to E.D. as to us, but we do not see where the additional shipping tonnage is to be obtained at a reasonable cost, if at all.

16
10000
8000
59
6.700

Organization

We were struck by the ignorance of Scott and Connelly as to mining problems and general organization of a mining operation. While they made no pretense of being mine operators and readily admitted their reliance ~~off~~ on personnel at the property, we felt ~~that~~ they had ~~only~~ much too meager a grasp of what was going on. In the absence of personal knowledge, we must at least be able to judge the qualifications of those selected to supply that knowledge.

Manning, the ~~the~~ resident manager, has a record of mining education and experience that might be presumed to qualify ~~to~~ him for his present post. Notwithstanding, I judge him to be a ~~man~~ whose work has been mostly in field exploration and I would rate him as capable of supervising

little more than the operation of two diamond drills ~~uses~~, and their crews.

Helch, the mining superintendent, is a man whose ^{long period} ~~experience~~ with Manning, Ltd should qualify them to judge him well. His experience, though, was largely in a coal stripping project and not in the sort of mining that faces E.D. He is certainly not the man to provide the assistance which Manning requires.

An example which typifies the whole organization at E.D. is worth quoting. They were most anxious to show us the outcrops where it was hoped they would develop the greater reserves which they recognize to be ~~necessary~~ essential if their investment is to be recouped. Accordingly, the president, general manager, resident manager, mine superintendent and geologist — all the top personnel of the company — devoted an entire

morning to climbing through the woods on the steep hillside in order to show us two areas where only the most meager ~~amounts~~ ^{outcrops} of magnetite were visible through the overburden and vegetation. The geologist ~~all~~ alone would have been quite competent and sufficient for the task. Meanwhile, of course, the ship was lying at the wharf waiting for concentrate to be delivered by facilities that were beset by difficulties even when fully staffed.

P

Possible CMC Participation in E.D.

It was suggested that CMC might acquire half of Mr. Mannix's interest in return for taking up half of his second mortgage. CMC would, therefore, be required to pay \$1,150,000 for a 17% equity. The major reserves, high capital costs and high operating costs that will arise from the various problems enumerated above make it inadvisable for CMC to pursue the matter further.