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REPORT

MOTHERLODE SUNSET MINE

Greenwood, B. C.

Francis H. Frederick Aug. 31, 1951.

FRANCIS H. FREDERICK
Mining Geologist

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August 30, 1951.

Mr. H. W. Coke, President
Motherlode Sunset Mining Company, Ltd.
Jamestown, California.

Dear Mr. Coke:

Herewith is my report on the Mother Lode and Sunset Mines, near Greenwood, British Columbia, based on an examination of the mines in June and July made, at your request, to determine the tonnage and grade of positive ore at the mines and to indicate the ore possibilities in addition to the assured ore.

I find that there is an assured tonnage of 1,416,000 tons containing 0.95% copper and 0.04 ounces gold per ton. Some of that ore might actually average better than the figures used to arrive at that average. Reasons for that belief are given in the report. The contents shown are figures which can be considered positive. There is also an indicated tonnage of 1,730,000 tons of ore containing 0.87% copper and 0.04 ounces gold per ton. Inferred ore amounts to 2,150,000 tons averaging about 0.73% copper and .034 gold. Considerable of that ore is expected to be 0.9 to 1.0% copper content. The coarse waste dumps of so-called sorted rejects total 195,000 tons containing an average of about 0.65% copper and 0.02 ounce gold per ton. Silver content of the mine ore is from 0.3 to 0.4 ounce per ton, of the dumps is 0.2 ounce.

There is considerable magnetite content in the ore, some of the ore will exceed 80% magnetite content, particularly at the Sunset Mine and in the SW parts of the Mother Lode pit area. Almost all of the ore contains some magnetite, much of it going 10 to 15%. The average magnetite content could not be arrived at as there are no production records regarding the megnetite content. It appears that the average content might be from 15 to 25% magnetite.

If calculations show that mill construction investment plus reasonable profit return can be made on the assured ore during the 3 year tax free period for new mine operations in Canada, it would be wise to defer all exploration and development expense at the operation until such time as such costs can be deferred to and charged against ore to be mined and produced after the three year tax free period.

The conditions at the property are excellent for a low cost open pit mining operation with opportunity to strip certain areas of obstructing waste rock very economically. Operation should be by power shovel or drag-line cranes, or both. Excellent mill sites are available close to the ore body and where blasting at the pits will not menace the mill. Waste stripping will be a very minor cost during the mining of the first 700,000 tons of mining. The first operations can start on some of the best grade of ore and almost no waste stripping will be involved.

A direct path for trucks and shovels down into the pit, when it becomes necessary to go below the present pit floor, can be made right in the indicated "Sulfide" ore body, thus avoiding stripping waste rock in order to get lower into the main ore body.

Exploration for the inferred ore can be largely done by dip-needle or magneto-meter surveys at very low cost. There is no point in carrying out such surveys at this time as there is ample ore for many years operation at rates of from 500 to 1,000 tons per day.

Respectfully submitted,

"FRANCIS H. FREDERICK"

Report on The Mother Lode and Sunset Mines
Near Greenwood, British Columbia

Made for

The Motherlode Sunset Mining Company, Ltd.

by

Francis H. Frederick

August 30, 1951

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Report on the Mother Lode and Sunset Mines
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Location, Property, and Accessibility

The Mother Lode and Sunset Mines are situated about 2.5 miles airline distance northwesterly from the town of Greenwood, British Columbia and about 7.5 miles from the United States boundary. Greenwood is a shipping point on the Canadian Pacific Railway and is on the main Canadian Highway No. 3, 21 miles from Grand Forks, B. C.

The mines are 4 miles by roads of easy grade from Greenwood. Concentrate haul would be all down hill or level. Elevation at the Mother Lode Mine is 3450 feet above sea level and is 950 feet elevation above Greenwood.

The property held by The Motherlode Sunset Mining Company, Limited, totals 168.31 in one block of Crown Grant claims. The boundaries of the individual lots or Crown Grants are shown on Plate 1 as far as the limits of the map will allow. The heavy boundary line on the map is the boundary of the block of claims held by the Company. The claim name, lot number, and acreage of each claim is shown on the map.

Power Supply, Water Supply, and Climate

Electric power is available from a main sub-station at Greenwood.

Water is available from Deadwood Creek which flows through the property, and from Copper Creek (also named Mother Lode Creek) which joins Deadwood Creek about 3200 feet down creek from the portal of the Mother Lode mine 200 level tunnel. In June and July, 1951, the streams were running much more water than would be needed for a 500 ton or 1,000 ton per day operation. The poorest flow of the year is probably in the coldest part of the winter when some of the sources might be frozen. If there is a water supply problem at that time of year it can no doubt be taken care of by means of a storage reservoir in one of the creeks and by also returning some of the mill water for re-use.

It is reported that 18 inches of snow on the ground is unusual. Usual snow depths attained on the ground during the winter months is reported to be 6 to 10 inches, mostly January to March. Most of the precipitation is as rain in other parts of the year. Extreme cold weather runs for 6 or 8 weeks in mid-winter and temperatures as low as 10 and 20 degrees below zero are reported. Summer and Fall temperatures are moderate. The mine and mill can operate throughout the year with no difficulty.

Labor and Mining Costs

Labor is available in the area. There will be no housing problem at the mine as Greenwood and other nearby settlements can supply living quarters for the employees of the Company.

Operating costs will be a little lower than in the United States for the same working conditions. A mining contract arrangement made by the Company in 1951 shows what the costs will be. An arrangement was made to have a mining contracting firm mine and deliver the ore from the Mother Lode Pit to the mill for $0.83 per ton on truck hauls of less than 2500 feet. Dumps would be loaded and hauled for $0.25 per ton. On hauls of over 2500 feet to the mill the price would increase $0.04 per 1000 feet.

Milling and Metallurgy

Metallurgical tests were made on the Mother Lode and Sunset ores in 1937 by the Canada Department of Mines; in 1949 by American Cyanamid Company, and in 1950 and 1951 by Hugh W. Coke. The tests are in agreement as to the method of treatment, the grade and character of the product, the high percentage of recovery, and the relative simplicity and low operating cost of the type of mill required. Copper recovery will be from 90 to 92% into a concentrate containing 22 to 24% copper. Gold recovery will be from 80 to 85% into the copper concentrate. Silver recovery will be 60 to 70%.

The mill will be a standard crushing, grinding, flotation mill making a bulk concentrate containing the copper, gold and silver. Grinding will be by one or more ball mills depending on the tonnage put through per day.

Magnetite will be extracted from the ground ore by magnetic separators and then cleaned by flotation to remove the non-magnetite fraction. The final magnetite product will contain about 65 to 67% iron and be a highly desirable material for iron and steel plants. The magnetite concentrate will be free from unfavorable contents such as sulfur, titanium, and phosphorus. No estimate is made here as to the milling costs.

Topography

Photograph No. 1 - the panoramic photo - shows the general topography of the area. The ore bin in about the center of the picture is the old railroad ore bin from which 40 ton railroad cars were filled for the run to the smelter. The smelter would be just off the picture to the right in the valley trough between the sunlight and shadow at the right edge of the picture. The center photo of the panorama picture is taken looking about N60°E which is about the same direction one looks on map Plate 1 when it is in the normal reading position. The Sunset ore bin and pits are at about the center of the picture at the right of the composite group.

The elevation of the flat on which the bin stands is 3450 feet. That is also the elevation of the 60 Level which has largely been removed by the mining operations.

Maps and Mapping

There are 20 maps and sections with this report. All the maps and section are at a scale of 100 ft. to one inch. They are marked as Plates 1 to 20, as follows:

Plate 1. Plan Map of Surface, showing contours, some geology, some assays from recent sampling, claim lines, property boundary, position of waste dumps and pits. In pocket,

Plate 2. Plan of 60 Level and Sunset Pits, showing assay data of the two mine areas, and the position of the ore blocks. In pocket.

Plate 3. Plan Map of 115 Level, showing my survey and sampling of the 115 waste block, position of ore blocks, and stoped area close to 115 Level elevation.

Plate 4. Plan Map of 200 Level showing ore blocks, stoped areas, and some geology. In pocket.

Plate 5. Plan Map of 300 Level, showing stoped area and general shape of the ore zone at that level. In pocket.

Plate 6. Plan Map of 400 Level, showing stoped area and probable position of main ore zone.

Plate 7. Plan Map of 500 Level, showing core drill holes and geologic data from old map (interpretation is by F.H. Frederick).

Plate 8. Plan Map of Pit Outline as now and as in 1910, showing old quarry positions, and area of caving and settling after the big blast mining system was used.

Plate 9. Vertical Section- Projection across Mother Lode and Sunset Pits. Showing position of ore reserves for power shovel operation.

Plate 10. Vertical Section- Projection of Mother Lode Mine and Pit, showing position of ore reserve blocks.

Plate 11 to Plate 20. Vertical Cross Sections of Mother Lode Mine and Pit, showing position of ore blocks, some geologic data, assay data, and stoped areas.

Much of the surface map is based on survey work done in June and July, 1951 for this report. Some of the topography has been taken from the map accompanying the bulletin by O.E. LeRoy, Mother Lode and Sunset Mines, Boundary District, B.C., published by the Canada Department of Mines, 1913. The field work for the 1913 bulletin was done in 1909 and 1910.

The survey of the pit as shown on Plate 1 is based on my survey this year.

The accessible parts of the 115 and 60 Levels were surveyed in June and July in order to tie the surface survey in to the survey of the set of underground maps that were available. The underground maps available were of about 1910 date, excepting a map of the 200 Level which was made several years after 1910. Stoping information of later date than 1910 has been added to the maps submitted with this report. Such data was obtained by consultation with mine foremen that worked at the mine, from B.C. Copper Company annual reports, and from Government reports.

General History of the Mother Lode and Sunset Mines

The Mother Lode claim, which produced most of the ore, was recorded in 1891. Important development of the ore body began in 1898 with a crosscut tunnel at elevation 3560 near what is now the center of the pit. The portal and part of the dump of the tunnel are shown on the map - Plate 1 - at the west rim of the pit. The British Columbia Copper Company, which operated the property from 1898 to its close in November 1918 held title to 6 claims and fractional claims in the Mother Lode group until 1910 when that company also took over control of the Sunset, Crown Silver, C.O.D., and Florence claims and fractional claims. By the end of 1910 the B.C. Copper Company controlled about the same group of claims as is now held by the Motherlode Sunset Mining Company, Ltd.

By the end of 1899 the Mother Lode Shaft had been sunk to a depth of 280 ft. and the 200 Level had been run 457 feet northerly from the shaft and reported to be "all in the ore body which appears to be 200 feet wide, some of the ore assaying 3 to 4% copper and $2 to $4 in gold."

At that time the Sunset mine was under development by the Montreal and Boundary Creek Mining Company. By 1900 the Sunset group was controlled by the Montreal and Boston Company which purchased the smelter at Boundary Falls where the Sunset ore was then being treated. The Dominion Copper Company was formed in 1905 and assumed control of the Sunset Group and the Boundary Falls smelter until the B. C. Copper Company obtained control of the Sunset Group in 1909 or 1910. Thereafter the Sunset ore was treated at the B. C. Copper Company Smelter.

In 1900 construction was under way on the smelter of the B.C. Copper Company at Greenwood. The first furnace went into production February 18, 1901. The smelter of the Granby Company at Grand Forks, B.C., commenced production in 1900 on ores from the Knob Hill-Ironsides Mines at Phoenix about 4 miles east of Greenwood.

The second furnace of the B.C. Copper Company was installed in 1902 giving a daily capacity of 700 to 800 tons. Smelter capacity was further increased in 1906 with three new furnaces to a total daily rate of 1800 to 2100 tons. In 1910, plant capacity was further increased to a rate of 2600 tons per day, or a maximum annual rate of 950,000 tons.

Production rate of the mine, by years, is shown in the Production Table in this report. The greatest annual production from the Mother Lode mine was 365,622 tons in 1912 when the custom ores and ores from other mines of the B.C. Copper Company totaled 279,643 tons, making that year the greatest production in the smelter's history - a total of 645,265 tons, or 82% of the smelter capacity. After 1913 the custom business at the smelter decreased markedly and costs

General History (Continued)

mounted drastically at the smelter. At that same time the ores produced from the Mother Lode mine cost more per ton to get, as all the ore had to be hoisted via the Mother Lode Shaft, and also considerable ore tonnage was lost due to caving conditions in the east half of the mine.

The Mother Lode Mine was developed to the 300 Level by the end of 1905 at which time the shaft was down 350 feet. Ore at the 300 Level was reported to be as wide as at the 200 Level. By the end of 1906 the shaft was down 475 feet to the present bottom of the shaft, and Levels had been established at 60, 200, 300 and 400 ft. points. The 400 Level was run in 1907. Between 1907 and the end of 1909 a winze was sunk from an ore area at the 400 Level to the 500 Level where a diamond drill station was established and a few holes were drilled No mineable ore was discovered by the work done there.

The first large volume of production was chiefly from a series of glory holes along the length of the ore body. The glory holes were separated by quarry pillars, some of which remain as highgrade ore reserves now. The glory holes and quarries were first mined by drawing the ore through chutes into large ore cars at the Mule Level haulage tunnel which was part of the 60 Level. That ore was hauled directly to the crusher installed in a pit next to the ore bin and railroad siding. The crushed ore was elevated to the bin by bucket elevators. Later the ore was trammed to pockets at the main shaft where the ore was hoisted to a crusher plant at the surface close to the shaft, from there the crushed ore was conveyed by belt to the ore bin. Ore was transported by the Canadian Pacific Railroad from the mine to the smelter at Greenwood on a 5 mile spur line built for that purpose. The spur line also ran along side the Sunset mine and pits.

Underground mining methods used were spiral stope raises and pillar and room stopes between levels. Chutes were about 35 feet apart on the haulage levels. The spiral stopes were used throughout in some areas but toward the end of the operation straight raises with shrinkage stopes were used. In 1912 a system of drilling out large blocks of pillars and parts of the levels above the 200 was inaugurated and is referred to in this report as the big blast system of mining. In 1913 The Big Blast was made. It was largely in the east side of the ore body and glory hole and was reported to have successfully broken a block of ground 235 ft. deep, 205 ft. long, and 180 ft. wide. Later evidence showed that the large blast was actually disastrous to the operation of the mine and smelter. That single blast involved 4,834 drill holes of 14 to 15 feet each, 24.77 tons of 40% dynamite, and 87,048 feet of copper blasting wire. It was estimated that 400,000 to 450,000 tons of ore was broken by the blast. The big blast system was started in 1912 and the production record shows an almost immediate drop in the grade of the ore. By 1913 the conveyor belt to the ore bin was converted into sort of a sorting belt so that the grade of ore going to the smelter could be kept up. As long as the big blast area and caving areas were being drawn the heads never attained the copper content that was usual before the big blast system was used. In 1915 the hoist house was moved from the north side of the shaft to the south side in order to make available for mining a large tonnage of ore closer to the shaft than mining had been done before. The copper content of the ore was increased as soon as that ore got into the production. (See the production table in this report).

General History (Continued)

Rising costs of railroad haul on the ores, increased costs of coke and all supplies and equipment after 1914, higher labor costs, high cost for special ores for blending with the Mother Lode ores, a decrease in the volume of custom business at the smelter, and a general average decrease in the grade of the Mother Lode ores after mid-1912 caused the shutdown of the entire operation. In effect, it was a lack of ore that shut the mine down. However, the kind of ore that was lacking was the high daily tonnage of 1.2% copper ore that was self fluxing, and capable of being produced by the mining methods then possible at the mine. (It was found during the operation that the smelters could not handle the copper ore that contained high garnet content as that ore would slow down or freeze the smelting. There are some imposing bluffs of garnet copper ore in the west part of the pit). The mining operation was not successful financially after 1912 except for a brief period of very high copper price in 1917 and 1918. After 1912, over-all operation was successful as long as the custom ore volume was large at the smelter.

The property has remained idle since December, 1918.

It is important to note that when the mine shut down the ore being produced averaged better than 1.1% copper. The average daily production rate for the last year of operation was the capacity of the smallest furnace which was about 500 tons per day. The Granby Company's Grand Forks smelter closed forever within 6 months after the close down of the Mother Lode operation. At the same time there was a general shutdown of almost all low grade copper operations in British Columbia and little, if any, custom ore was available for the smelters. The Copper Mountain Mine, near Princeton, B.C., was thoroughly developed and prepared for large scale mining by 1922, work having been started there in 1913 by the B. C. Copper Co., but the mine was not put into production until 1924 because of the relationship between the price of copper and the costs of operation. That ore body was then estimated to contain a proven tonnage of over 6,000,000 tons of 1.75% copper ore with some gold and silver content.

Production History

The Table following on the next page shows the production of the Mother Lode and Sunset Mines by years.

PRODUCTION FROM MOTHER LODE AND SUNSET MINES

	Mother Lode Mine			Sunset Mine	Other Ores	
Year	Tons	% Cu	Gold Oz/Ton	Tons	to B.C.Copper Co. Smelter	Notes
1900	B. C. Copper Co. smelter under construction. Grand Forks Smelter started production.					
1901	99,548			800		Start of smelter production.
1902	136,657			6,750		
1903	137,000	1.34	0.042	7,450		
1904	172,753	1.32	.048	2,800		Smelter at 78% capacity.
1905	172,821	1.27	.057	20,000		
1906	101,173	1.21	.050	50,000	20,000	Smelter down for 3 mos., enlarged to 720,000 tons annually.
1907	211,576	1.21	.050	31,258	No data	Down 1 mo., International 'Panic'.
1908	291,711	1.20	.047	No data	"	Down 5 mos., " "
1909	328,925	1.20	.049	No data	"	Down 2 mos., coal & coke shortage.
1910	339,649	1.20	.055	No data	49,313	Down 1 mos., smelter enlarged to 950,000 tons annual capacity.
1911	315,337	1.07	.045	No data	"	Irregular operation due to coal and coke shortage
1912	365,622	0.98	.034	None	279,643	Big blast mining system started.
1913	282,065	0.84	.032	None	330,842	Biggest blast at mine. Smelter at 82% capacity.
1914	166,867	0.87	.024	No data	No data	Down $4\frac{1}{2}$ mos., World War troubles.
1915	109,201	0.95	.040	2,242	15,187	Down 5 mos., " " "
1916	242,883	1.02	.041	9,629	43,455	
1917	176,412	1.11	.048	2,155	No data	
1918	154,369	1.11	.052	2,697	No data	Only one furnace operated, ceased all operations Nov. 1918.
1919	None			None	None	Grand Forks Smelter ceased all operations June 1919.
Total	3,804,569			135,781 (Incomplete)		

COMPANY COST INFORMATION - 1908 to 1913

	1908	1909	1910	1911	1912	1913
Copper yield lbs.	17.8	17.7	18.0	16.4	13.6	12.18
Gold & Silver returns	$.985	$1.03	$1.23	$1.13	$0.76	$0.57
Copper price	$.135	.1308	.1278	.1233	.1666	.1507
Cost/# copper after credit for Au, Ag returns	$.0999	.0983	.0905	.1163	.1285	.1798
Cost/ton mkt. mng. & Smelt.costs	$2.63	2.68	2.76	2.88	2.46	2.81
Ore Content lbs.copper	24.0	24.00	24.00	20.14	19.60	16.80
Copper Recovery	73.3%	73.8%	75.0%	69.0%	69.5%	72.5%

General Geology

The rock formations of the Mother Lode and Sunset mines area are chiefly limestone, chert, quartzite, and volcanic ash and tuff deposits that have been intruded by granitic rocks and largely metamorphosed to crystalline limestone, marble, tactite or skarn, (a metamorphic rock close to or in contact with granitic rocks and containing contact minerals such as epidote, garnet, actinolite, magnetite, other lime silicate minerals, and often pyrite and chalcopyrite), silicious rocks, and chlorite and actinolite schists.

There are also several dike rocks of various ages, some of the late dikes, such as the pulaskite dikes, are barren of mineralization. Some of the barren dikes are massive and interfere with efficient underground mining. Such barren masses can be readily stripped out by power shovel mining methods.

The granitic rocks are monzonite and granodiorite and, although not much in evidence near the ore bodies at the surface, appear to be quite prominent in the lower levels of the Mother Lode Mine and very much in evidence in the general area around the mine property.

Mineralization appears to be greatest where the limestone formations have been intensively converted to tactite.

The ore deposit, in general, has a semicircular shape and appears to rim or ring around the outside of a mass of granodiorite situated deep underground east of the south end of the Mother Lode pit. Some of the maps and sections with this report show the distribution of some of the granodiorite. It is believed that the ore ring is essentially continuous from the Sunset through the "Sulfide" ore zone and then northerly to the north end of the Mother Lode pit. The area lying between the Sunset and the Mother Lode pit - the Crown Silver area - is essentially the metamorphosed roof over an irregular shaped mass of granodiorite. The visible small masses of magnetite ore, and other ore at the surface and in the tunnels and shafts in the Crown Silver area suggest that there may be larger lenses of ore throughout the area. Any ore bodies found there would be pendants in the roof of the granitic rocks. The magnetite masses of ore mined at the Mother Lode mine are apparently very close to fingers or masses of granodiorite. From that evidence it is believed that the Sunset Mine area which is so abundant in magnetite, is closely underlain by an extensive mass of granitic rock.

The maps of the Mother Lode mine show clearly that the main ore bodies and general mineralization is less at the 400 and 500 levels than at the upper Levels. Probably much of those levels is in a fine grained granitic contact rock. It is possible that the 115 Level waste block is a fine grained contact phase of the granodiorite but highly altered by mineralization. Such granitic waste blocks can be underlain or overlain by ore as the granodiorite may be in plug-like fingers with very irregular margins.

A search for isolated masses of ore in the general area bounded by the Mother Lode Pit, the "Sulfide" Ore Zone, and the Sunset Mine can be conducted at very low cost by means of a dip-needle or magnetometer survey at the surface. A dip-needle survey would probably be the simplest, quickest, most effective and least expensive way to determine areas for core drilling to test for additional isolated lenses of ore mineable by open pit methods. It is not proposed that such work be conducted now as there is sufficient ore in sight to support a large efficient operation for a number of years. It is believed

General Geology (Continued)

that such isolated ore masses might each contain anywhere from 10,000 tons to 200,000 tons of ore similar to that in the current reserves, with a possible total of about 500,000 tons.

Sampling - General

A number of samples were taken from 1934 to 1937 by the Company owning the property. The general average of the samples taken of the broken rock in the Mother Lode Pit was 1.07% copper. Those samples probably represent somewhat select samples taken to represent the ore that would go to a mill after sorting out the obvious waste rock at a sorting belt. That average of 1.07% copper is in line with my observations and sampling. By sorting the 0.90% Cu ore that will come out of the pit operation north of the Shaft Ore Block, it might well be that the mill heads will exceed 1% copper.

Samples taken by the owner Company from the 60 Level average about the same as the very large samples taken from the 60 Level shaft area for this report.

A group of 37 samples, taken after the mine shutdown, averaging 1.1% copper, were reported to have been taken in or near the Shaft Block on the 200 Level. It has not been possible to determine the exact location of the individual samples so they have not been used in the estimates of ore reserves presented in this report.

Diamond drill core drill holes drilled by the operating Company in 1905 and 1906 and the samples taken in June and July, 1951, are the main basis for determining the grade and size of the Shaft Ore Block. A total of 13 drill holes were drilled in the Shaft Ore Block, 11 of the holes were vertical down holes drilled to determine the grade of the shaft block for the operating Company. Cross-section Plates 11, 12 and 13, show the assays of the drill holes.

Sampling - Samples Taken For this Report

The dumps were sampled with a truck. Truck loads were taken to a jaw crusher set up at the property for that purpose, and the samples were crushed and split. In sampling the dumps, sorting appeared desirable and the sampled material was sorted as if at a sorting belt and the percentage sorted out was noted. The C.O.D. Trestle dump was sampled by hand by taking chip samples of the coarse rock and scoop samples of the middle and fine sizes. The six samples taken at the C.O.D. dump averaged about 50 pounds each. All other samples ran about 40 to 160 pounds per sample.

The final splits of the samples were assayed by Black & Deason, - Salt Lake City, Utah. Description of the samples taken and showing copper and gold assays appears in the Table in the following list.

Sampling - Samples Taken For this Report (Continued)

Sample and Assay List

60 Level near shaft

	% Cu	Oz.Au/ton
#1 cut sample along walls	0.18	0.01
#2 " " " "	1.02	0.02
#3 " " " "	0.65	0.02
#4 " " " "	1.90	0.08
#5 " " " "	1.10	0.09
#6 " " " "	1.45	0.04
#7 " " " "	0.95	0.04
#8 " " " "	1.65	0.15

60 Level N.W. of Pit 400' N. of Shaft

	% Cu	Oz.Au/ton
#1 cut sample along walls	0.78	0.03
#2 " " " "	0.20	0.005
#3 " " " "	0.25	0.005
#4 " " " "	0.20	0.005
#5 " " " "	0.53	0.025

In Pit Area West Side

	% Cu	Oz.Au/ton
#1 High Grade Specimen from near shaft	16.70	0.54
#2 Magnetite Samples at Random	1.07	0.10
#3 East wall under Shaft	1.66	0.04
#4 Broken ore, West side, 100' N. of Shaft	0.95	0.03
#5 " " " " 150' N. of Shaft	0.75	0.03
#6 " " " " 200' N. of Shaft	0.70	0.03
#7 " " " " 260' N. of Shaft - Megnetite	1.13	0.03
#8 Broken Ore, West of #7, Magnetite	0.58	0.02
#9 Cut Sample of Magnetite Ore Zone at entrance to Pit, 310' N. of Shaft	0.42	0.015
#10 Cut Sample at West Limit of stope, west of main Pit, 260' N.W. of Shaft	0.40	0.015
#11 Ore, Broken and in place at old Quarry Pillar, 620' N. of Shaft	1.75	0.04

Pit Area - East Side

	% Cu	Oz.Au/ton
#12 Slide rock from East wall, 180' N. of Shaft	0.60	0.02
#13 " " " " " 200' N. of Shaft	0.35	0.01
#14 " " " " " 270' N. of Shaft	0.50	0.03
#15 " " " " " 310' N. of Shaft	0.40	0.02
#16 Bluff, high on E. wall, 480' N. E. of Shaft	0.45	0.02
#17 Slumped Hill in Pit, near E. Rim, 530' N.E. of Shaft	0.67	0.02
#18 High hill in Pit near E. Rim, 600' N.E. of Shaft	0.50	0.08
#19 " " " " " " " 640' N.E. of Shaft	0.35	0.10

Sample and Assay List (Continued)

115 Level Waste Block - 30' cut samples along Walls	% Cu	Oz.Au/ton
#1 West end under stope	0.48	0.02
#2 Next to #1 under stope	0.85	0.02
#3	0.15	0.005
#4	0.10	0.005
#5	0.12	0.005
#6	0.10	0.005
#7	0.12	0.005
#8	0.10	0.005
#9	0.15	0.005
#10	0.12	0.005
#11 North end near caved stope	0.60	0.02
#12	0.12	0.005
#13	0.12	0.005
#14	0.12	0.005
#15 At South end of waste Block in Shaft Ore Block	0.68	0.10
Crown Silver Tunnel		
#1 Chip Sample at face	0.90	0.02
Dump Samples		
#1 Main Dump, bottom part, coarse, 7% barren sorted out	0.50	0.022
#2 Main Dump, top part, fines and coarse 6% barren sorted out	0.63	0.025
#3 Long Waste Dump, top part, 8% barren sorted out	0.30	0.008
#4 " " " bottom part, 7% barren sorted out	0.60	0.02
#5 Sunset Trestle Dump, East part, no sorting	0.48	0.015
#6 " " " West part, no sorting	0.20	0.005
#7 50# Samples C.O.D. Trestle Dump, coarse rock, West side, 10% sorted out	0.65	0.03
#8 C.O.D. Trestle Dump, Coarse Rock, East Side, 11% sorted out	0.95	0.02
#9 C.O.D. Trestle Dump, Middle size, West Side, no sorting	0.80	0.03
#10 C.O.D. Trestle Dump, Middle size, East side, no sorting	0.45	0.01
#11 C.O.D. Trestle Dump, Fines size, West side, no sorting	0.60	0.01
#12 C.O.D. Trestle Dump, Fines size, East side, no sorting	0.50	0.03
#13 Garnet Dump near Entrance to Main Pit	0.75	0.025

Ore Reserves - Shaft Block

The plan dimensions of the Shaft Ore Block are shown on the 60 Level map, (Plate 2), on the 115 Level Plan, (Plate 3), and on the 200 Level Plan, (Plate 4). The Shaft Ore Block area shown on the 200 Level map is projected to the map from a position at 25 feet above the floor of the 200 Level as it is assumed, for this report, that the Block bottoms above the level. The old core drill holes that reached the level were low grade close to the level, so for my ore reserve estimates the Shaft Ore Block is assumed to terminate at 25 feet above the floor of the 200 Level. Plate 12 shows the assay data regarding the holes. Above that horizon the ore grade of the drill holes is excellent. The average grade of the 11 vertical holes in the ore block is 1.7% copper. The ore block averages 1.1% copper at Section B (Plate 12). The samples taken for this report at the 60 Level are shown on Plate 2. The average grade of the 60 Level in the Shaft Ore Block is also 1.1% copper.

Sampling on the 115 Level shows a large plug like mass of waste there that does average about 0.12% copper. The north, west and south edges of the waste plug were also sampled and show material of ore grade. The entire area just above the 115 Level was largely stoped with some remnant ore pillars left which have been sampled. It is possible that there is also ore below the 115 Level waste area but for the ore reserve estimates it has been assumed that the plug of waste in this area extends below the 200 Level. There are some magnetite ore stopes in the area just below the 200 Level but for now it is assumed that there is no ore at the 200 Level in that particular area. The waste plug is shown in green color on Plate 3. The 115 Level waste rock is a very fine grained green rock that might be a highly altered and mineralized mass of fine grained granitic rock. A sample taken in the ore part of the 115 Level near the shaft assays only 0.68% copper but contains 0.10 ounce gold per ton which makes it very good ore.

Excavation for the new crushing plant installed in 1904 showed a large body of ore which produced several thousand tons of ore during the excavation. The crushers were then being installed south of the shaft so that the ore could feed directly from the shaft bin to the crushers and then be conveyed to the railroad ore bins. That ore body has not been mined and is part of the Shaft Ore Block. The crusher installation extended 95 feet south from the shaft. The Shaft Ore Block has been calculated to only 75 feet from the shaft at that elevation.

The original hoist house that stood at 60 to 100 feet from the center of the shaft was moved from the north side of the shaft to the south side in 1915 to make some of the Shaft Ore Block available for production. Production started from the hoist house reserve in 1916 and the ore grade showed a marked improvement. About 100,000 tons was made available by that move. Mining went as close to the shaft as safety permitted as can be seen in some of the photos in this report.

Near the east edge of the pit in the shaft block is a vein of highgrade chalcopyrite ore that contains from 10 to 15% copper. It strikes southeasterly and dips steeply northeasterly. A similar vein with about the same strike and dip is reported to exist in one of the 400 Level stopes. That kind of ore can be mined profitably by any method of mining. Assays from that high grade vein are not included in estimating the ore reserves.

Ore Reserves - Main Pit Block

In 1913 the mine manager reported that the ore reserves had not been reduced during the year and that there was two years ore in sight (at the 1913 rate that would be 565,000 tons), and that recovery of some of the ore lost due to caving had been made. The next year the reserves were stated to be much lower which indicates that a large tonnage of ore had been lost due to caving. Such ore that could not be retrieved by underground methods would be readily available to a power shovel mining operation working down from the top. The caves and runs of waste that cut off the ore were from the hanging wall and would only dilute the ore in the easterly part of the mine even though all chutes might be drawing the waste at the lower levels. By working from the top in the upper westerly part of the ore it is possible to mine relatively clean ore without much interference from the waste runs from the hanging wall. In 1913 and 1914 the operating company was deliberately taking ore from the Mother Lode mine even though it was operating the mine at a loss. The ore was needed toflux the high tonnage of profitable custom ores that were then being treated. When the custom volume dropped the management then abandoned the unprofitable low grade ore and attempted to mine a smaller tonnage of better grade ore. On that basis alone a considerable tonnage of 0.8 to 1.0% copper ore should be expected in the areas of the mine being worked in 1914 and 1915. The total tonnage available to a modern operation in the areas ruined for underground mining by caving, and the areas abandoned because of unprofitable 0.9% copper ore should be substantial.

Selective stoping at the north end of the mine underground, and later by the High Line mining in the pit produced ore averaging higher than 1.2% copper. The highest monthly average for a month with substantial production was in 1904 when a month's run of 14,681 tons averaged 1.51% copper and 0.054 ounces gold per ton. There are 27 months of record during the life of the operation when the monthly average exceeded 1.3% copper. There is a record of over 453,000 tons from the Mother Lode Mine averaging better than 1.3% copper. The highest single month's run was for a very small production of 1100 tons averaging 1.99% copper and 0.109 ounces gold per ton. This information is given here to show the expected grade of ore when selective mining is done.

Ore Reserves - West Part and High Grade Pillars

A map of the 200 Level of later date than the 1910 maps of the 60, 300, 400 and 500 Levels shows that the long haulage drift in the west part of the ore body at the 200 Level was not taken out by big blast mining operations and the subsequent caving. Current evidence in the pit floor shows that the 200 Level west side was being used for drawing ore from the pit area at the termination of operations in 1918. Two mine foremen, formerly in charge of underground operations stated to me that the 200 Level haulage drift was used to the very end to draw ore from the pit area and the extreme north and northeast end of the ore zone. It would not have been possible for the underground operations to have economically salvaged the last haulage drift at the footwall part of the ore zone after the hanging wall zone started to cave. Apparently what salvaging was done above the west part of the 200 Level helped to keep the ore grade above 1% copper during the last three years of operations. Without question there are important pillars of ore supporting the 200 Level workings on the west side of the ore body. It is quite likely that the 0.90% copper grade assigned to the West part of the Main Pit Block, as shown in the Ore Reserve Table is too low. It is possible that the remnant pillars could average close

Ore Reserves - West Part and High Grade Pillars (Continued)

to 1.2% copper, as did the mine production for over 10 years before the big blasts and caving of the east side were started. The measureable 30,000 ton quarry pillar of 1.7% copper ore is an example of such remnant material. There was apparently no way the underground mining methods could salvage all the pillars without dilution from the east side low grade ore which had been so heavily drawn on in the years when the operation needed a great tonnage of fluxing ores for use with the custom ores, and when the operation could handle the low grade at an overall smelter profit. Surface mining methods with power shovels and dragline cranes will be able to mine relatively clean undiluted ore from the pit area at a very low mining cost. Modern mill methods will also make a better recovery of copper than was made by the direct smelting operations on the Mother Lode ores. Modern mills will recover 90% of the copper. Recoveries averaged from 69 to 75% from 1907 to 1914.

Ore Reserves- Main Pit Block, East Part

The ore areas delineated on the maps and sections give due regard to the future manner of mining and the need of stripping in certain areas. No reserves are shown in areas where stripping would be excessive. The maps do not attempt to show the ultimate shape of pits as a result of the planned stripping and mining. The amount of stripping of waste for the ore reserves as used in this report is less than 1 ton of waste per 3 tons of ore. The large blocks of potential low grade reserves indicated on the plans and sections in the east side of the pit area are shown in order to indicate the additional possibilities of ore reserves should these slide filled areas and pillars prove to be of profitable grade when mining and stripping is underway. An increased price for the materials produced, or discovery that the dilution is not great and that the diluting material is of marginal grade itself might well make mining profitable in the east zone. The samples of the slide rock from the high east bluffs above the open pit, and the samples from the bluffs show the character of some of the rock that has caved into the pit and has partly filled the east part of the stoped blocks above the 200 Level. The assays range from 0.35 to 0.67% copper and from 0.02 to 0.10 ounces gold per ton.

A rough calculation of the volume of waste rock moved out from the open part of the pit east of the known ore zone indicates that a larger volume of waste rock went out of that part of the pit area than the mine workings and stopes can contain, even though it is assumed that the caving and filling went all the way down to the 400 Level. (There probably was not much caving and filling below the 200 Level). That indicates that there was a large tonnage, in the order of 1,000,000 tons, of east wall waste material that went to the smelter along with the regular mine ore, and that therefore (1) the so-called waste rock was probably marginal ore, or (2) that the undiluted mine ore was very much higher grade than has been reported or than is indicated by the production statistics. Therefore it is possible that the ore grade assigned to the Main Pit Block-East Part in the Ore Reserve Table, is way too low.

It was reported to me by two foremen of the underground workings of the productive operation that 200,000 to 250,000 tons of the 400,000 to 450,000 tons broken in the one Big Blast still remains in the mine as the east side

Ore Reserves - Main Pit Block, East Part (Continued)

ore chutes on the 200 Level in the Big Blast area started caving and running hanging wall low grade and granitic waste soon after the Big Blast, and the ore could not be retrieved. The hanging wall waste and low grade ore would draw down to the chutes beneath much of the broken ore lying away from the hanging wall area and would cut off the draw hole run of broken ore. By working the broken ore reserve from the top with power shovels or drag-line cranes it will be possible to recover most or all of the ore lost to the underground draw holes. Caving was extensive all along the east side of the ore zone because the big blast system was used for several years, and it is known that considerable broken and unbroken ore was lost by the underground operation.

Sunset Ore Reserves

Information as to the copper content of the Sunset shipments is not available here. A record of two small daily shipments averages 0.91% copper and 0.04 ounces gold per ton. Some samples taken in 1908 in the quarries assayed as follows:-

Around walls of No. 3 Quarry	1.7% Cu	0.04 Oz. gold
Around edges of No. 3 Quarry	1.2	0.03
NE side of North Quarry	1.6	0.09

Most of the Sunset ore is massive magnetite containing visible chalcopyrite. The Sunset ore will average 30 to 40% magnetite content, some of the ore is 80% magnetite. There are bands of actinolite ore between the wide bands of massive magnetite ore, some of which will have to be stripped out and sent to waste. Ratio of ore to stripping waste is about 3 tons ore to one ton of waste.

Assay data of the Sunset area is posted on the map of the Sunset Pits on Plate 2.

From 1934 to 1937 a total of 144 samples were taken in the Sunset area. J. W. James took 123 samples in several sections across the full width of the ore zone and obtained an average of 0.94% copper and 0.07 ounces gold per ton. In 1937 Mr. W. J. Pascoe took 21 samples from selected ore bands and obtained an average of 1.26% copper and 0.09 ounces gold per ton.

The 1903 Minister of Mines Report states that "the ore body above the 100 Level has been opened up and is ready for stoping. The orebody is 115 feet wide and is estimated to contain 250,000 tons." The ore body was later opened to a much greater width at the surface. The ore exposed in the pits and cuts and tunnels is now seen to be over 200 feet wide.

The Sunset ore reserve shown in this report is based on the lowest average of the various samples - the average of the 458 tons shipped and for which the assay record is available. The Sunset Ore reserves, as shown in the Ore Reserve Table, are 150,000 tons assured ore containing 0.91% copper and 0.04 ounces gold per ton, and 150,000 tons of indicated ore of the same grade.

Ore Reserves - "Sulfide" Block

It is reported that the sulfide stope was better above the 200 Level than between the 200 and 300 Levels. That fits the record of diamond drill hole #40, drilled in 1906, which shows that the ore drilled from the surface by that hole averaged better than the stoping. The drill hole shows 20 feet of width averaging about 1.9% copper. The entire hole, representing a width of about 90 feet of ore zone averages 0.71% copper. The stoping is reported to have been about 40 feet wide. The stopes have been partly filled with mine run waste that will probably average about the same as the better waste dumps. Waste was dropped into the stopes from the surface via the Air Shaft shown on some of the plan maps. The sulfide stope ore contained some magnetite as well as the extra pyrite that caused its name to be Sulfide Stope.

The "Sulfide" zone will make an excellent route to get to the deeper parts of the future open pit, particularly in the shaft block. By using a route via the "Sulfide zone" it will not be necessary to strip a waste road down into the future deep pit. Refer to Plates 1, 2 and 9 to get a picture of that idea. Reference to Panoramic picture, No. 1 will help also. The "Sulfide" ore zone surfaces at the base of the hill some distance to the right of the railroad ore bin.

"Waste" Dumps

The dumps were sampled by J. W. James in 1934, and by W. J. Pascoe in 1937, and during the examination for this report in July, 1951. Mr. James took a total of 252 samples from the four main reject dumps. Mr. Pascoe took a total of 100 samples from the four dumps. A comparison of the results is as follows:

	Pascoe		James		Frederick		
	% Cu	Oz.Au	% Cu	Oz.Au	% Cu	Oz.Au	Tons
Main Dump	0.82	0.04	0.74	0.04	0.55	0.02	140,000
Long Dump	0.65	0.04	0.80	0.04	0.45	0.015	26,000
Sunset Trestle	0.72	0.04	0.69	0.04	0.34	0.01	17,000
C.O.D. Trestle	1.06	0.06	0.69	0.04	0.64	0.02	12,000

The tonnage assigned to the respective dumps are the result of my measurements. The assay figures given in the Ore Reserve Table are rather broad because of the differences shown in the table above. The dumps are considered as measureable ore in the sense that the supply is there and is measured, and the copper content is known within reasonable limits, as shown. The above data rather strongly suggests that the Frederick column represents minimum metal content. It would not be possible to sample the dumps to arrive at a single final figure for the average content without undue expense. When there is an operation at the property, the dumps can be more accurately tested if that becomes necessary.

It is reported by a man who was foreman of the picking belt operation that the ore was usually mucky and was not washed before sorting and that unless the ore was dry it was not possible to distinguish the pure waste from the good ore. Sometimes all of the ore was scraped off the belt into the waste chutes in order to make a showing of ore sorting. There were often 8 men at the belt. A large amount of fines went to the waste dumps as a result of the scraping practice. The sampling of the waste dumps shows that the sorting was not well done. Only about 7% of the main waste dumps is barren material (limestone and pulaskite dike), and there are considerable fines in those dumps.

ORE RESERVE TABLE

Mine Ore	Assured Tons	Assured % Cu.	Assured Oz.Au	Indicated Tons	Indicated % Cu.	Indicated Oz.Au	Inferred Tons	Inferred % Cu.	Inferred Oz.Au
Shaft ore block	430,000	1.02	0.05	110,000	1.00	0.05			
Main Pit block West part	806,000	0.90	0.03						
Main Pit block East part				520,000	0.80	0.03	950,000	0.55	0.02
Main Pit block Higrade Quarry Pillar (West)	30,000	1.75	0.04						
North Pit area "Highline area"				100,000	1.00	0.05	100,000	1.00	0.05
"Sulfide" Block SE of Shaft				150,000	0.71	0.05	200,000	0.71	0.05
Below 200 Level Mother Lode Mine				700,000	0.90	0.04	400,000	0.90	0.04
Sunset Pit Area	150,000	0.91	0.04	150,000	0.91	0.04			
Other Surface ore between Mother Lode and Sunset area							500,000	0.90	0.04
Totals	1,416,000	0.95	0.04	1,730,000	0.87	0.04	1,200,000	0.88	0.045
						and	950,000	0.55	0.02

"Waste" Dumps	Tons	% Cu.	Oz.Au
Main	140,000	0.55 to 0.80	0.02
Long	26,000	0.45 to 0.80	0.02
Sunset Trestle	17,000	0.35 to 0.70	0.02
C.O.D. Trestle	12,000	0.64 to 0.70	0.02
	195,000	0.65	0.02

	Tons	% Cu.	Oz.Au
Total Inferred	2,150,000	0.73	0.034
Total Indicated	1,730,000	0.87	0.04
Total Assured	1,416,000	0.95	0.04
Total Dumps	195,000	0.65	0.02
Total All Classes	5,491,000	0.83	0.038

NOTE: The mine ore also contains from 0.3 to 0.4 ounce silver per ton. The Waste Dumps contain 0.2 ounce silver per ton.

The Ore Reserve Table on the preceding page succinctly summarizes the results of my examination. Detailed information given in the discussions of the various ore reserve blocks shows that the figures given in the table are conservative. It is quite evident that there is sufficient ore known to be present to keep a 500 ton per day mill in continuous operation (365 days per year) for over 7 and a half years.

"FRANCIS H. FREDERICK"

PLATE I.

Florence Fraction
Lot 1470 - 39 acres
100 ft east to waste dump under
R.R. trestle in C.O.D.
12,000 tons
0.64% to 0.70% Cu
True North
Established from old claim surveys
1500 east of M.L. shaft north line
Crown Silver
Lot 789
16.6 acres
Mother Lode
Lot 704
20.66 acres
C.O.D. - Lot 928 - 49.26 acres
Primrose Fraction - Lot 827
(Two parcels)
Sunset - Lot 768 - 20.2 acres
Section K (projection)
SUNSET SHAFT
Quarry floor
Long waste dump
26,000 tons
0.4% to 0.60% Cu
Sunset trestle waste dump
12,000 tons
0.35% to 0.70% Cu
CROWN SILVER SHAFT
Crown Silver Shaft
Section L (projection)
Section J
Rim of Pit
Sunset 100 Level
portal, El. 3360
Same granodiorite
in dump
Greenwood
Road
Sunflower
Lot 916
16.5 acres
Sunset Creek
Fallen 4x4 post
Lot 789
Primrose Fraction - Lot 827
27.64 acres
PRIMROSE SHAFT
To Mother Lode 200 Level
Mother Lode 200 Level
Air shaft
Sulfide Ore Zone
Section A
Section K (projection)
MOTHER LODE SHAFT
El. 3310
Garnet dump
0.75% Cu
Entrance to 60 Level
R.R. Origin
Old Railroad Grd
Road
Main waste dump
140,000 tons
0.35% to 0.80% Cu
Mother Lode
El. 3315
Section L (projection)
Caved
Portal of
200 Level
El. 3310
Road
Deadwood Creek
Ten Brock
Lot 1221 - 11.35 acres
Ls Limestone
GD Granite rocks
To Mineralized formation (Tactite)
Fe Magnetite
Copper mineralization
P Pulaskite (Mineralized dykes)
QP Quartz porphyry
SURFACE PLAN
MOTHER LODE AND SUNSET MINES
NEAR
GREENWOOD, BRITISH COLUMBIA
Prepared for
MOTHER LODE SUNSET MINING COMPANY LTD.
August 27, 1951 by Francis H. Frederick
Scale: 1 inch = 100 feet
Traced by D.D.F. from copy of original.

PLATE 2.

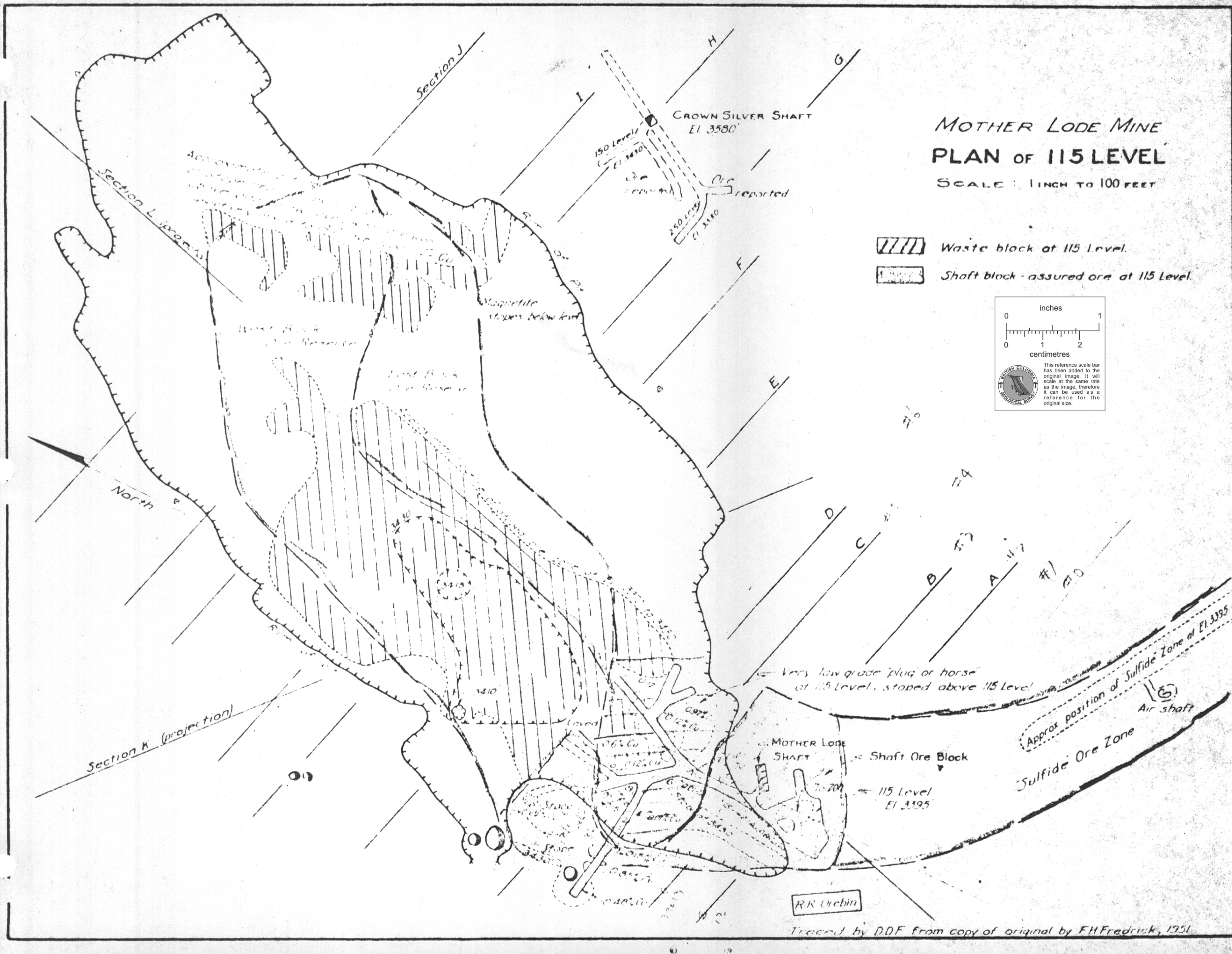
No.	oz Au	% Cu
1	0.3	0.78
2	0.1	0.20
3	0.1	0.25
4	0.1	0.20
5	0.2	0.53

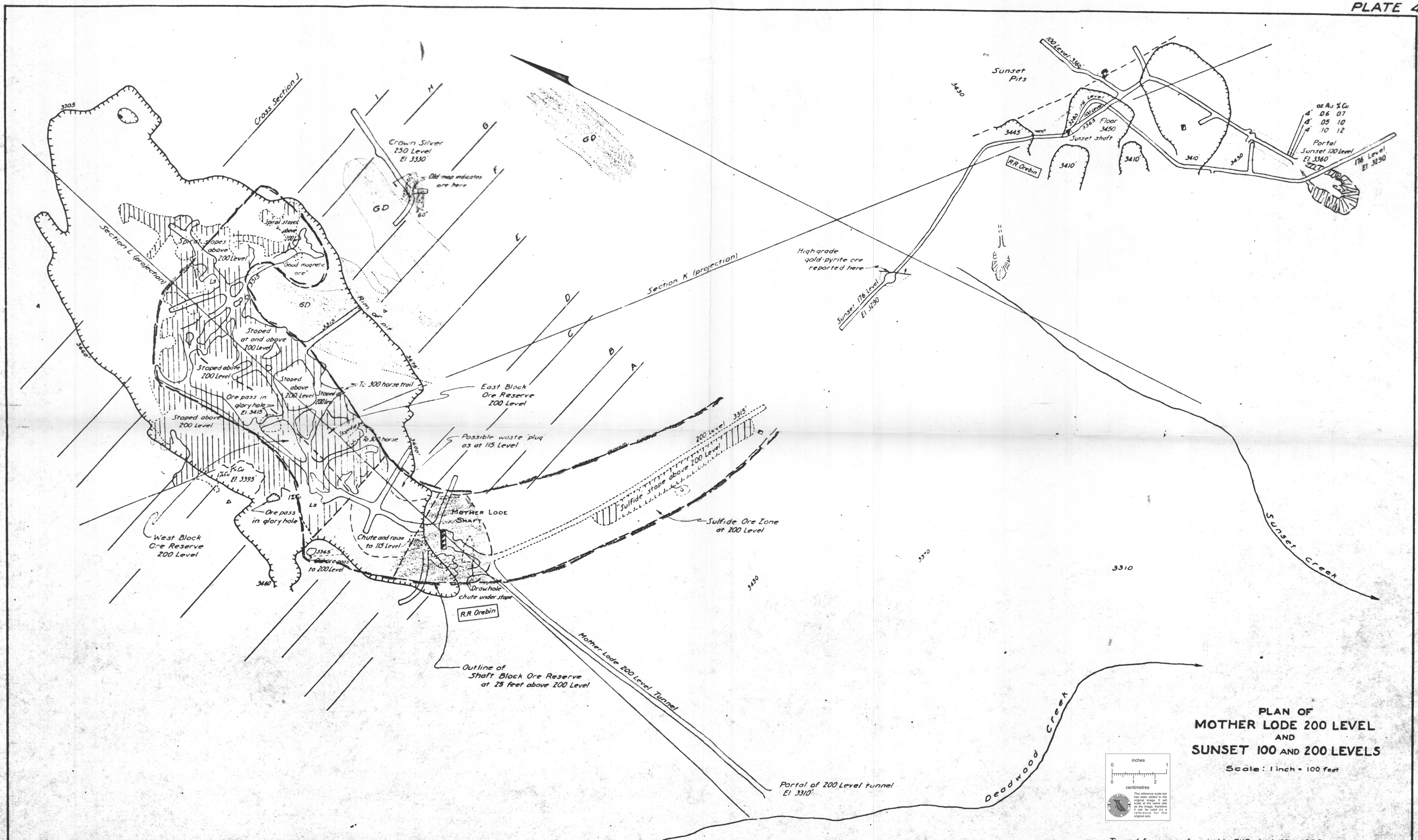
oz Au	% Cu	No.
0.4	0.95	7
.04	1.45	6
.09	1.10	5
.08	1.90	4
.02	0.65	3
.02	1.02	2
.01	0.18	1

PLAN OF MOTHER LODE 60 LEVEL AND SUNSET PITS

Scale: 1 inch = 100 feet

Traced by D.D.F. from a copy of the original by F.H. Frederick July 1951


MOTHER LODE MINE
PLAN OF 115 LEVEL
SCALE: 1 INCH TO 100 FEET
Waste block at 115 Level.
Shaft block - assured ore at 115 Level.
inches
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
CROWN SILVER SHAFT
El 3580'
150 Level
El 3430
Ore reported
250 Level
El 3330
Section J
Section L (proj.)
Section K (projection)
North
Magnetite stopes below level
Very low grade "plug" or horse" at 115 Level, stoped above 115 Level
MOTHER LODE SHAFT
Shaft Ore Block
115 Level
El 3395'
Approx position of Sulfide Zone at El 3395
Sulfide Ore Zone
Air shaft
R.R. Urebin
Traced by DDF from copy of original by F.H.Fredrick, 1951.

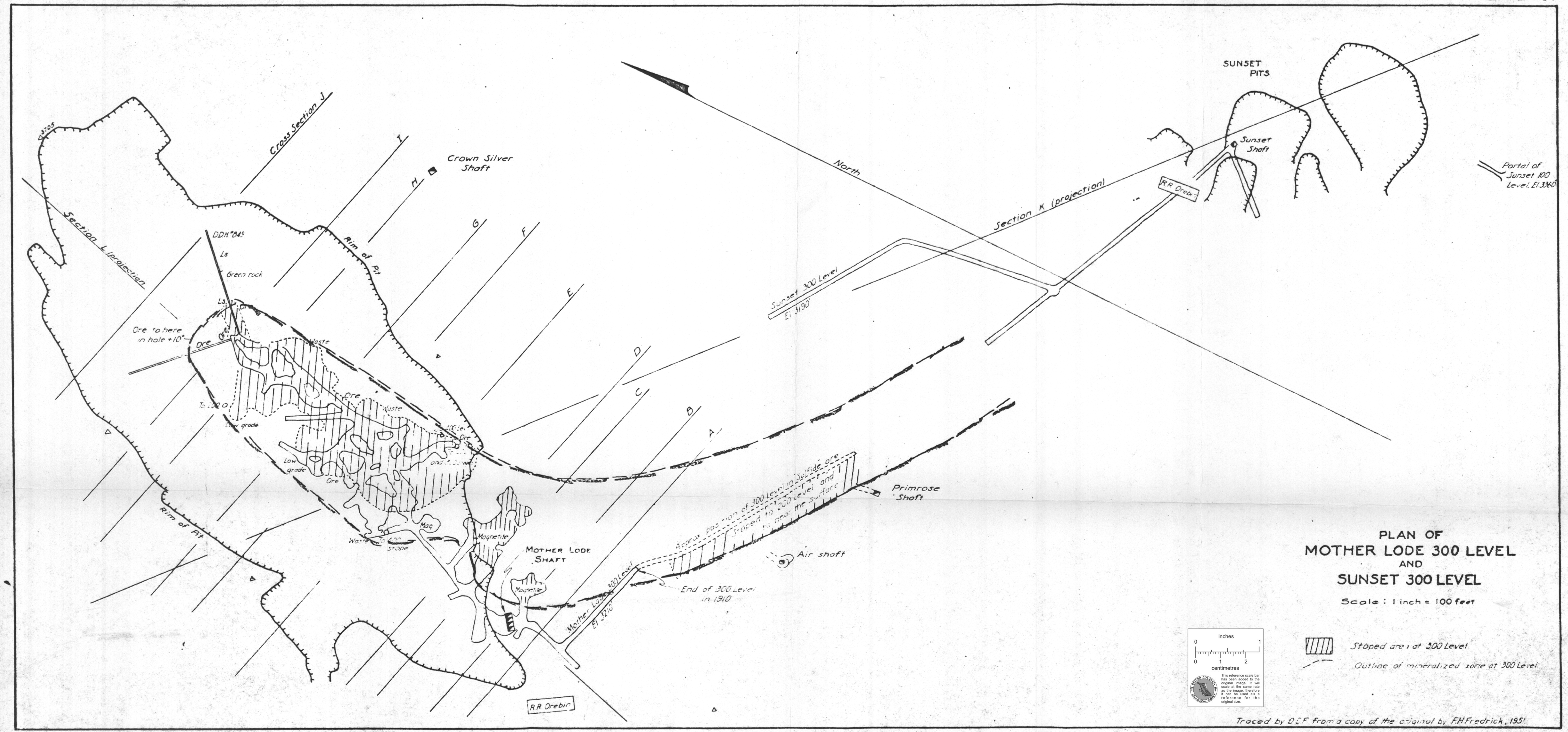


PLAN OF MOTHER LODE 200 LEVEL AND SUNSET 100 AND 200 LEVELS

Scale: 1 inch = 100 feet

Traced from copy of original by F.H. Fredrick, 1951. - D.D.F.

PLATE 5.



PLAN OF
MOTHER LODE 300 LEVEL
AND
SUNSET 300 LEVEL
Scale: 1 inch = 100 feet
Stoped area at 300 Level
Outline of mineralized zone at 300 Level
SUNSET PITS
Sunset Shaft
Portal of Sunset 100 Level. El. 3360
R.R. Orebin
North
Section K (projection)
Sunset 300 Level
El. 3190
Cross Section J
I
H
Crown Silver Shaft
G
F
E
D
C
B
A
Section L (projection)
Rim of Pit
Ls
Green rock
Ore to here in hole +10'
Ore
Waste
Low grade
Mag
Magnetite
Stope
MOTHER LODE SHAFT
Mother Lode 300 Level
El. 3210
End of 300 Level in 1910
Approx position of 300 Level in sulfide ore
Stoped to 200 Level and to near the surface
Primrose Shaft
Air shaft
R.R. Orebin
inches
centimetres
Traced by D.S.F. from a copy of the original by F.H. Fredrick, 1951.

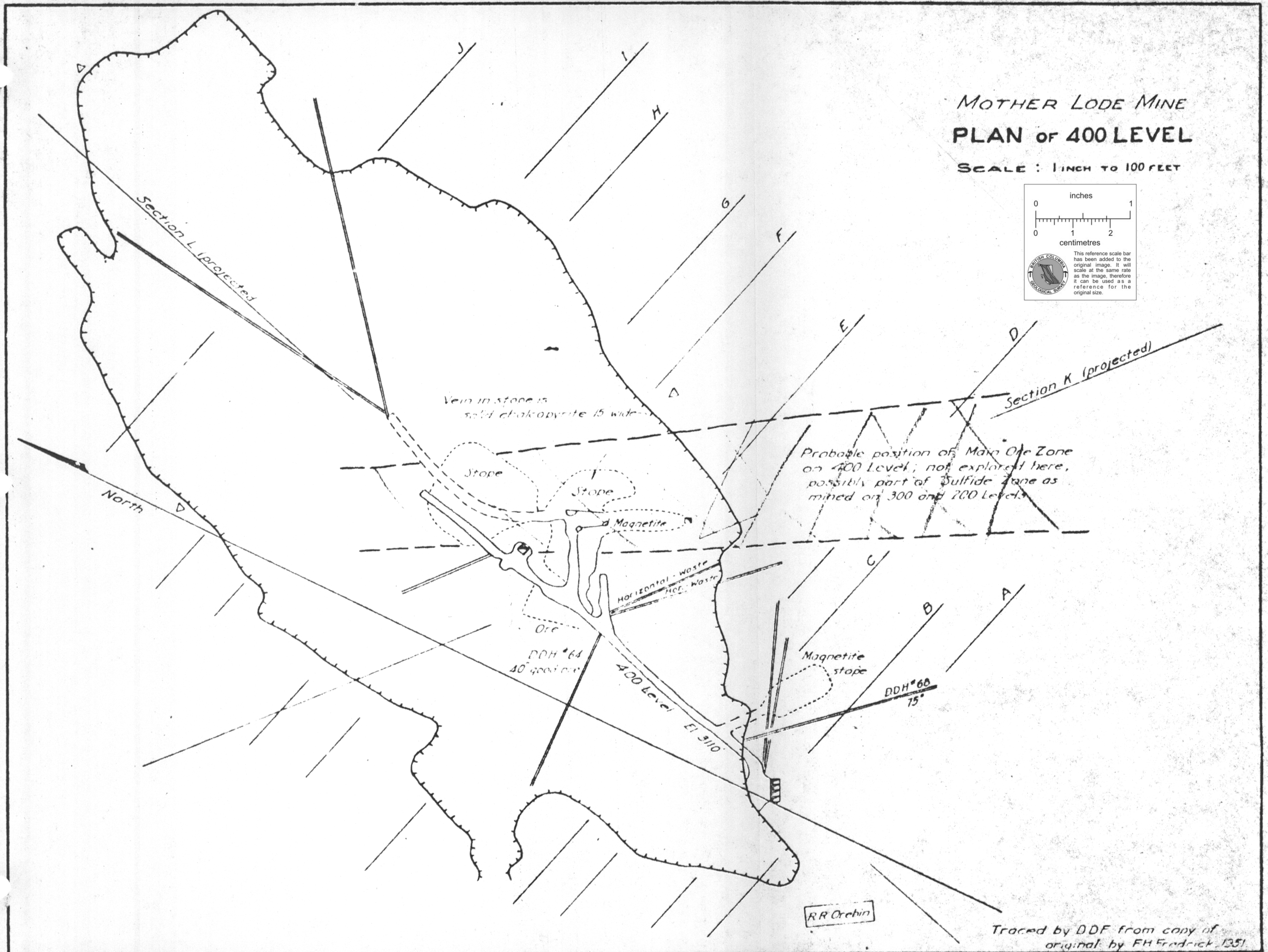
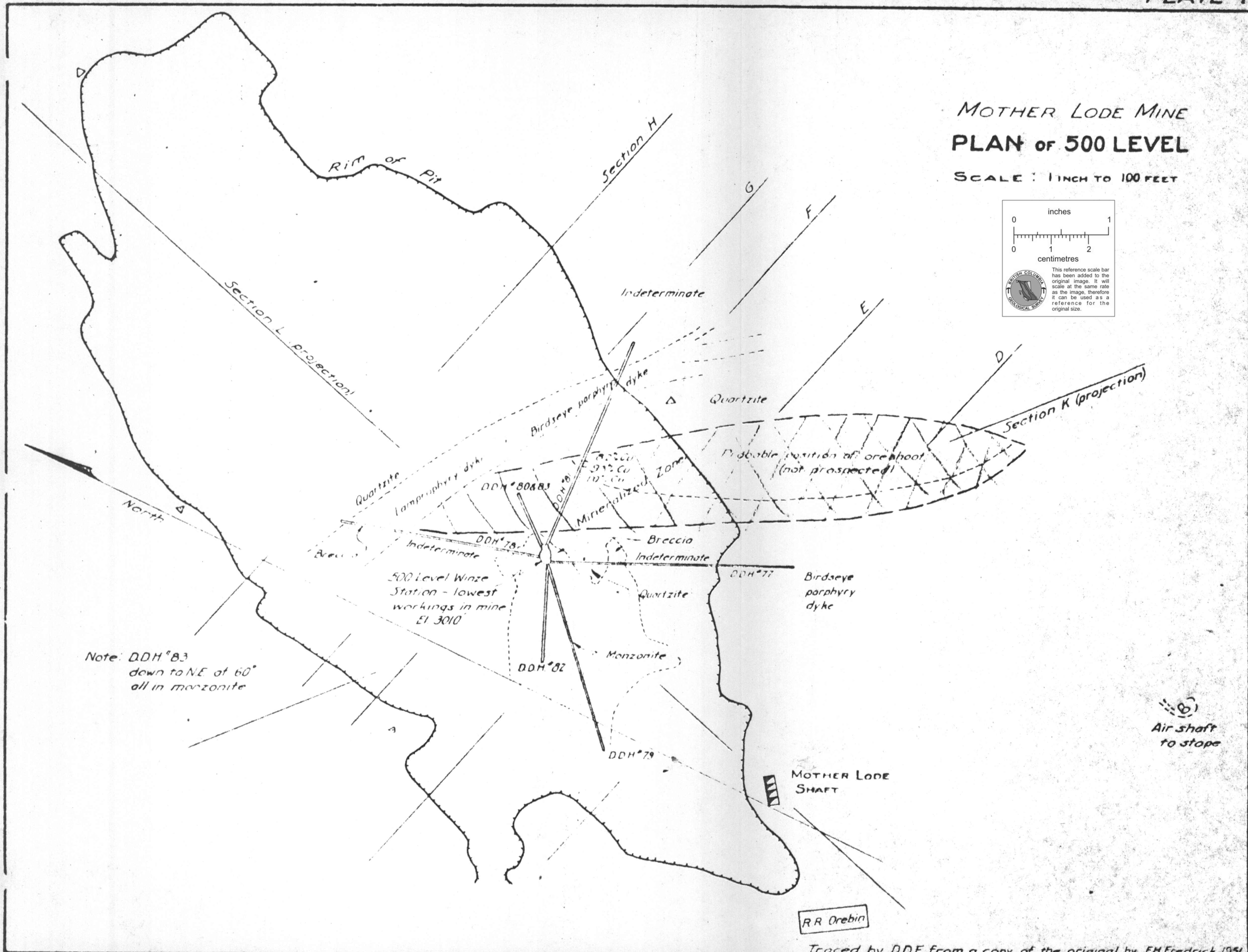

Mother Lode Mine
PLAN of 400 LEVEL
Scale : 1 inch to 100 feet
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
J
I
H
G
F
E
D
C
B
A
Section L projected
Section K (projected)
North
Vein in stope is solid chalcopyrite 15 wide
Probable position of Main Ore Zone on 400 Level; not explored here, possibly part of Sulfide Zone as mined on 300 and 200 Levels
Stope
Stope
Magnetite
Horizontal Waste
Hor. Waste
Ore
DDH #64
40' good ore
400 Level
El 3110'
Magnetite stope
DDH #68
75°
R R Orebin
Traced by DDF from copy of original by FH Fredrick 1951

PLATE 7.


MOTHER LODE MINE
PLAN OF 500 LEVEL
SCALE: 1 INCH TO 100 FEET
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA
GEOLOGICAL SURVEY
Rim of Pit
Section H
G
F
E
D
Section L (projection)
Section K (projection)
Indeterminate
Birdseye porphyry dyke
Quartzite
Quartzite
Lamprophyry dyke
Mineralized Zone
Probable position of oreshoot (not prospected)
DDH #80 & 83
DDH #81
DDH #78
Breccia
Breccia
Indeterminate
Indeterminate
DDH #77
Birdseye porphyry dyke
North
500 Level Winze Station - lowest workings in mine El 3010'
Quartzite
Monzonite
DDH #82
DDH #79
Note: DDH #83 down to N.E. at 60° all in monzonite
Mother Lode Shaft
Air shaft to stope
R R Orebin
Traced by DDF from a copy of the original by F.H. Fredrick 1951

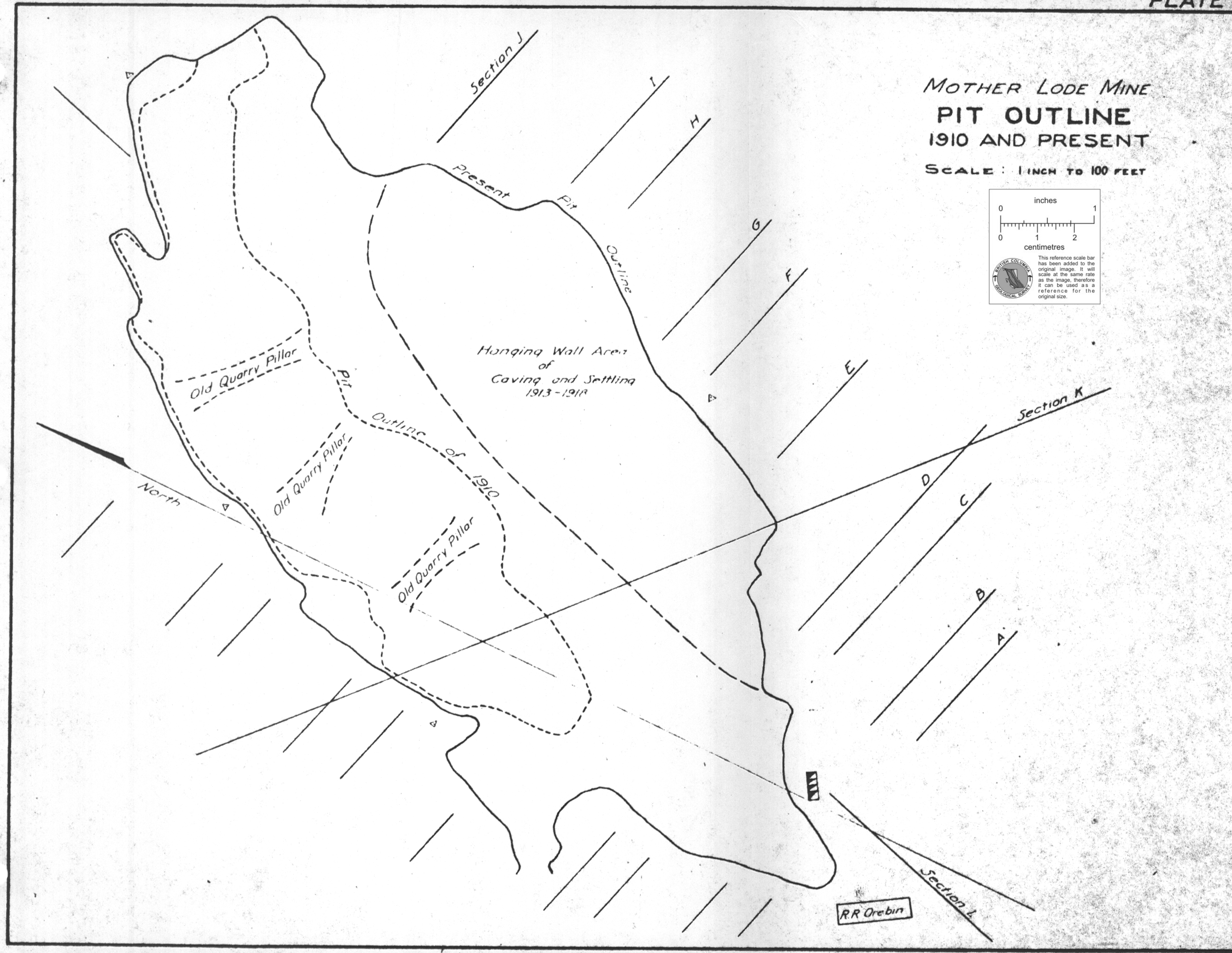
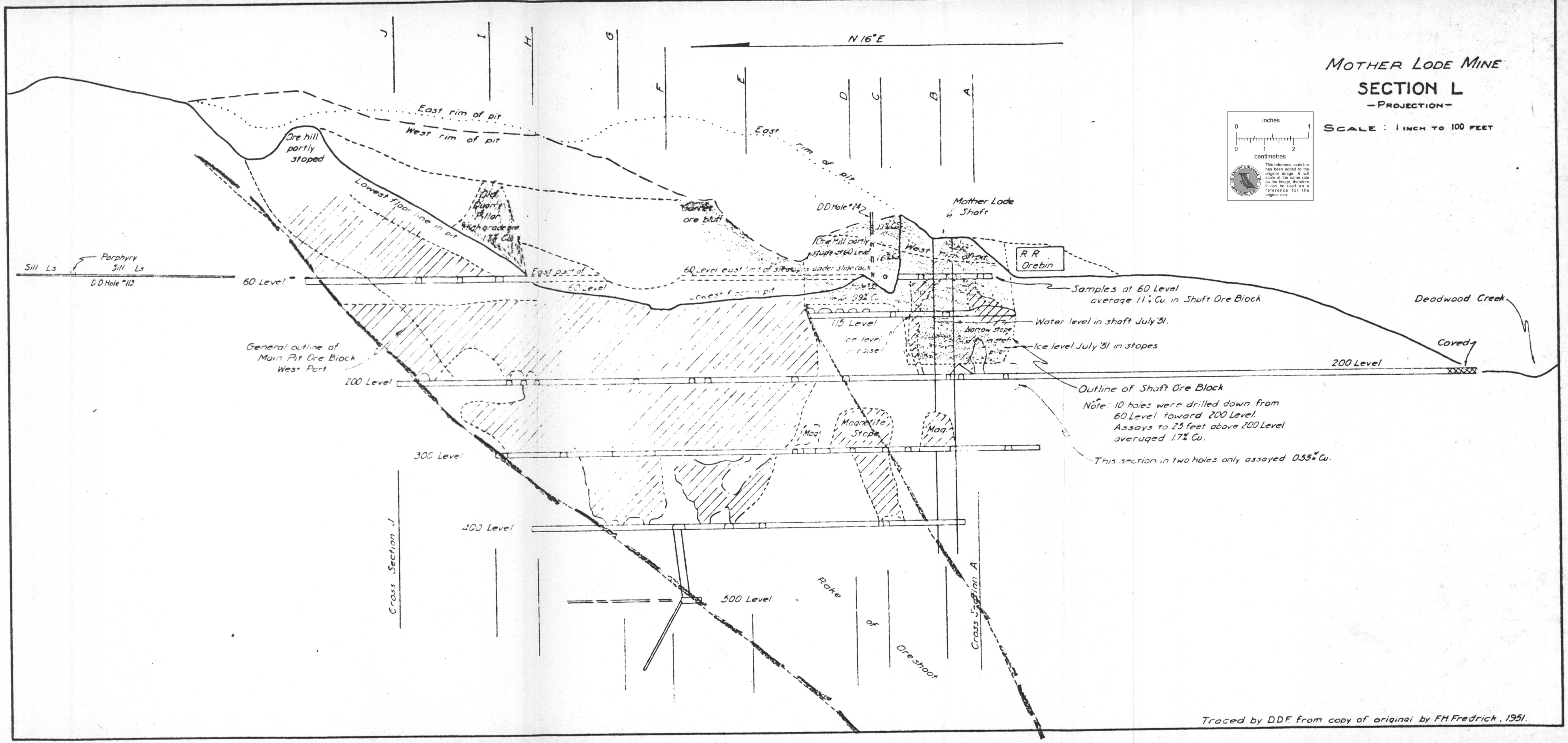

MOTHER LODE MINE
PIT OUTLINE
1910 AND PRESENT
SCALE: 1 INCH TO 100 FEET
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
Section J
I
H
G
F
E
D
C
B
A
Section K
Section L
North
Present Pit Outline
Pit Outline of 1910
Hanging Wall Area of Caving and Settling 1913 - 1918
Old Quarry Pillar
Old Quarry Pillar
Old Quarry Pillar
R.R. Orebin

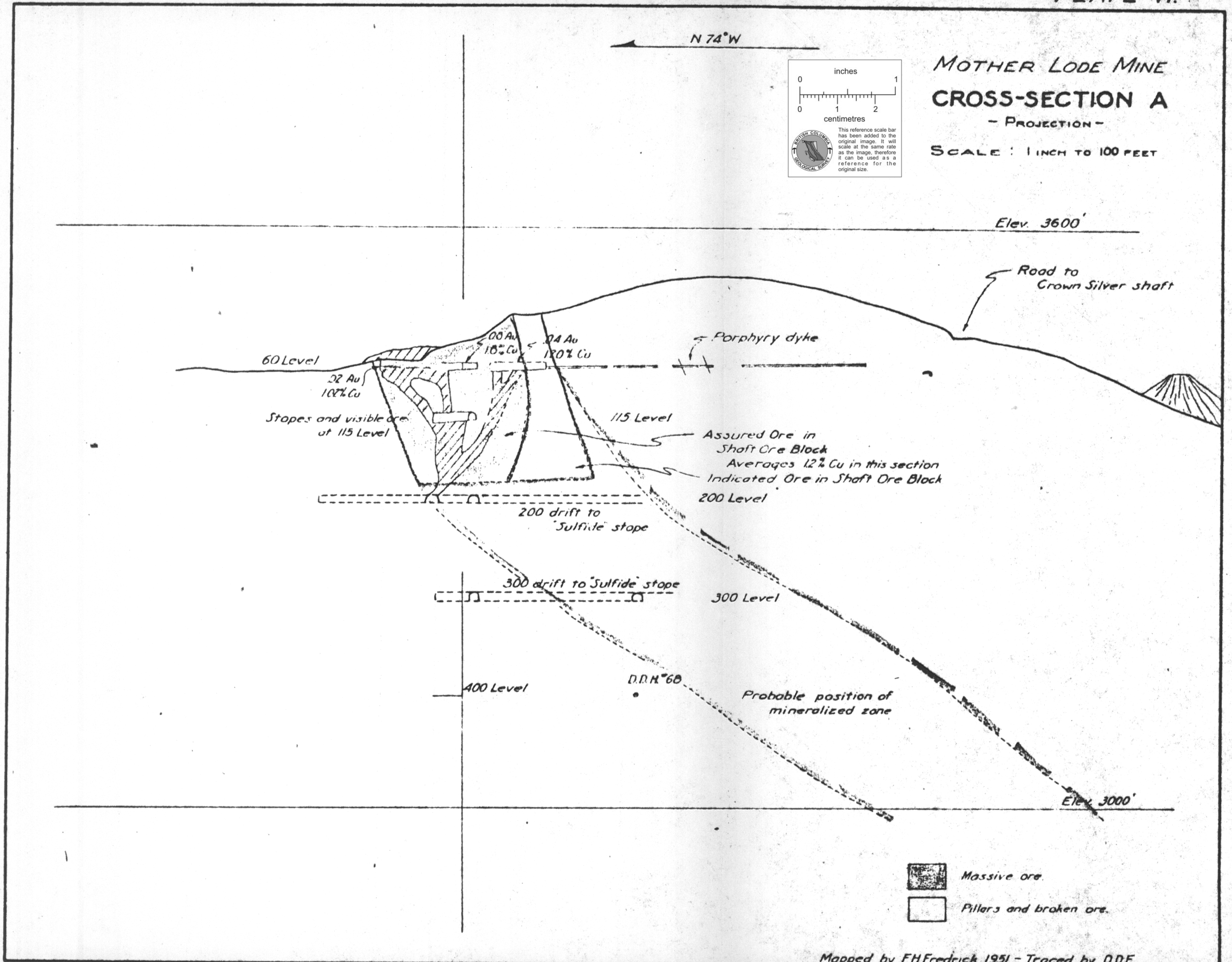

PLATE 9.
MOTHER LODE MINE
SECTION K
-PROJECTION-
SCALE: 1 INCH TO 100 FEET
inches
centimetres
N48°W
Surface on 1910 map
Present surface
Elev. 3600'
Waste removed and caved
Ore removed
East edge sill stope at 60 Level
Pit line
Waste dump
Mother Lode shaft
Ore Bin
60 Level
R.R. Grade
Road to Crown Silver shaft
Primrose shaft
Airshaft
Long Waste dump
R.R. Grade - Sunset trestle
Waste fill under trestle
Sunset Mine
Surface east of pit is ore
Old R.R. bed
Shaft projected to section for reference line
Stopes
200 Level
300 Level
Ore
Probable bottom of commercial ore in Sunset pit area
15 ounce gold ore reported
100 Level
176 Level
176.6
300 Level
Main Ore Zone at 400 Level is probably 250 to 300 feet east of shaft and has not been explored at 400 Level
400 Level
500 Level
15' of 0.5% Cu
Elev. 3000'
This zone has not been explored by drilling or underground work at 500 Level and is probably the main ore zone here. All drilling was done too far to the north and west.
Blocks mineable by open pit and power shovel (includes ore pillars, new ore, broken ore, caved ore, and "waste")
Traced by D.D.F. from copy of original by F.H. Fredrick, 1951.

PLATE 10.



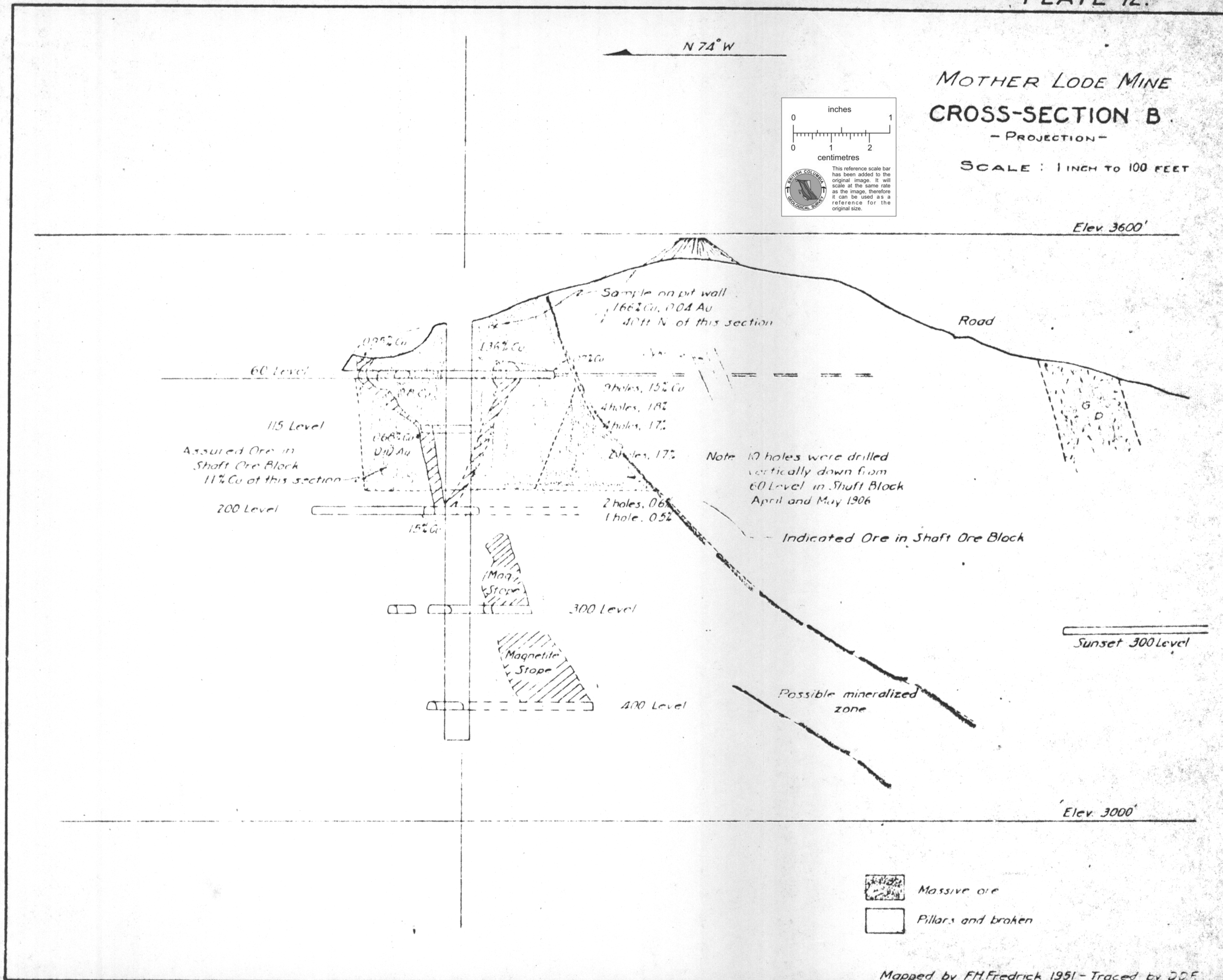
Mother Lode Mine
SECTION L
-Projection-
Scale : 1 inch to 100 feet
N 16° E
J
I
H
G
F
E
D
C
B
A
East rim of pit
West rim of pit
East rim of pit
Ore hill partly stoped
Lowest floor line in pit
Old Quarry Pillar
ore bluff
DD Hole #24
Mother Lode Shaft
Ore hill partly stoped at 60 Level
West
R R Orebin
Porphyry
Sill Ls
Sill Ls
DD Hole #113
60 Level
East part of
60 Level
60 Level east limit of stopes under slide rock
Lowest floor in pit
9.9% Cu
115 Level
Narrow stope
Samples at 60 Level average 11% Cu in Shaft Ore Block
Water level in shaft July '51.
Ice level July '51 in stopes
Deadwood Creek
Caved
200 Level
General outline of Main Pit Ore Block West Part
200 Level
Outline of Shaft Ore Block
Note: 10 holes were drilled down from 60 Level toward 200 Level. Assays to 25 feet above 200 Level averaged 1.7% Cu.
This section in two holes only assayed 0.55% Cu.
Mag
Magnetite Stope
Mag
300 Level
400 Level
500 Level
Cross Section J
Rake of Oreshoot
Cross Section A
Traced by D.D.F. from copy of original by F.H. Fredrick, 1951.

PLATE 11.



N 74° W
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
MOTHER LODE MINE
CROSS-SECTION A
- PROJECTION -
SCALE : 1 INCH TO 100 FEET
Elev. 3600'
Road to Crown Silver shaft
.00 Au
1.0% Cu
.04 Au
1.20% Cu
Porphyry dyke
60 Level
.02 Au
1.02% Cu
Stopes and visible ore at 115 Level
115 Level
Assured Ore in Shaft Ore Block
Averages 1.2% Cu in this section
Indicated Ore in Shaft Ore Block
200 Level
200 drift to "Sulfide" stope
300 drift to "Sulfide" stope
300 Level
400 Level
D.D.H. 68
Probable position of mineralized zone
Elev. 3000'
Massive ore.
Pillars and broken ore.
Mapped by F.H. Fredrick 1951 - Traced by D.D.F.

PLATE 12.



N 74° W
MOTHER LODE MINE
CROSS-SECTION B.
– PROJECTION –
SCALE : 1 INCH TO 100 FEET
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
Elev. 3600'
Sample on pit wall
1.66% Cu, 0.04 Au
40 ft N. of this section
Road
1.36% Cu
60 Level
115 Level
200 Level
300 Level
400 Level
Assured Ore in
Shaft Ore Block
1.1% Cu at this section
3 holes, 1.5% Cu
4 holes, 1.8%
2 holes, 1.7%
2 holes, 1.7%
2 holes, 0.6%
1 hole, 0.5%
Note: 10 holes were drilled
vertically down from
60 Level in Shaft Block
April and May 1906
Indicated Ore in Shaft Ore Block
1.5% Cu
Mag. Stope
Magnetite Stope
Sunset 300 Level
Possible mineralized
zone
G
D
Elev. 3000'
Massive ore
Pillars and broken
Mapped by F.H. Fredrick 1951 – Traced by D.D.F.

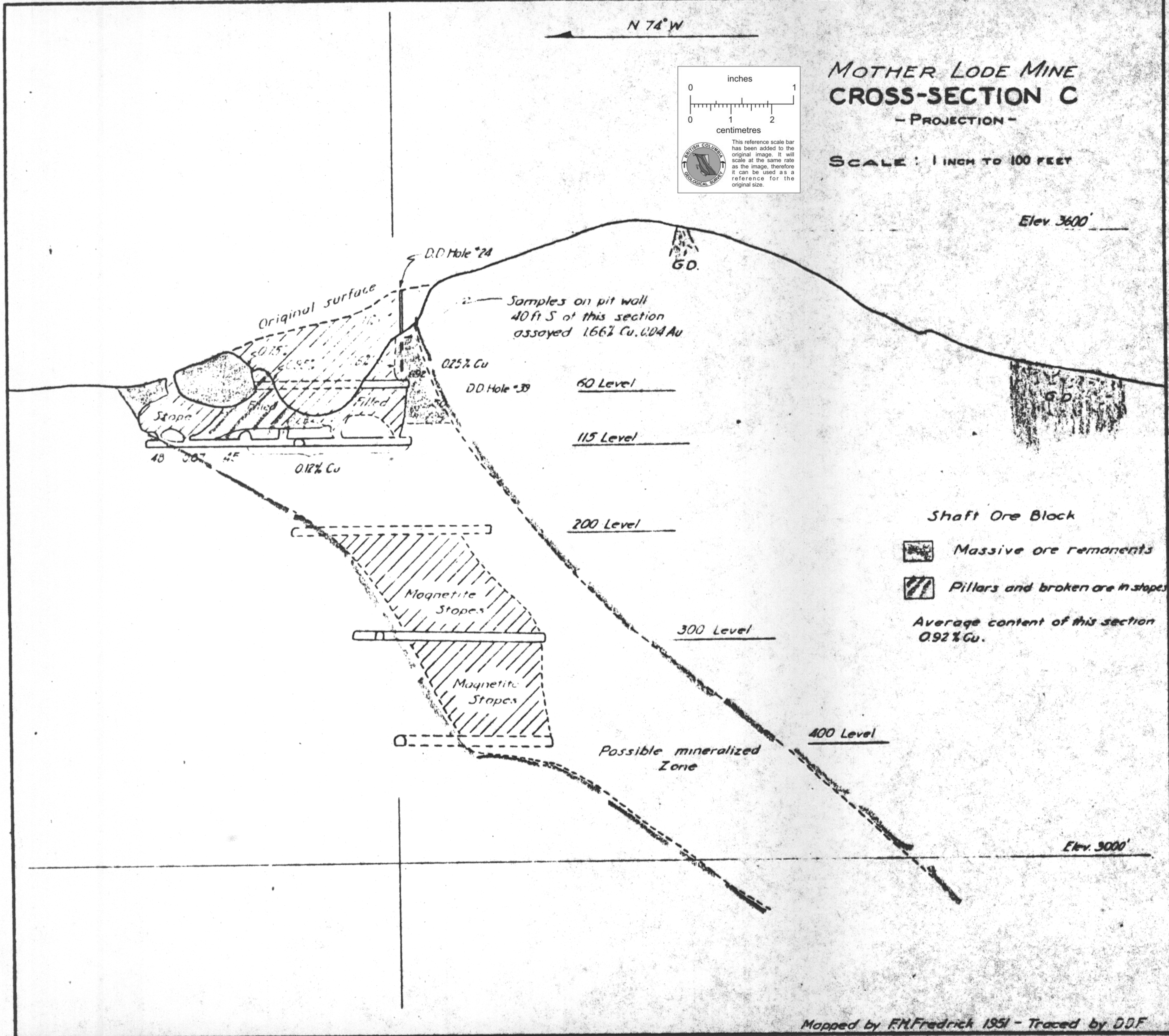
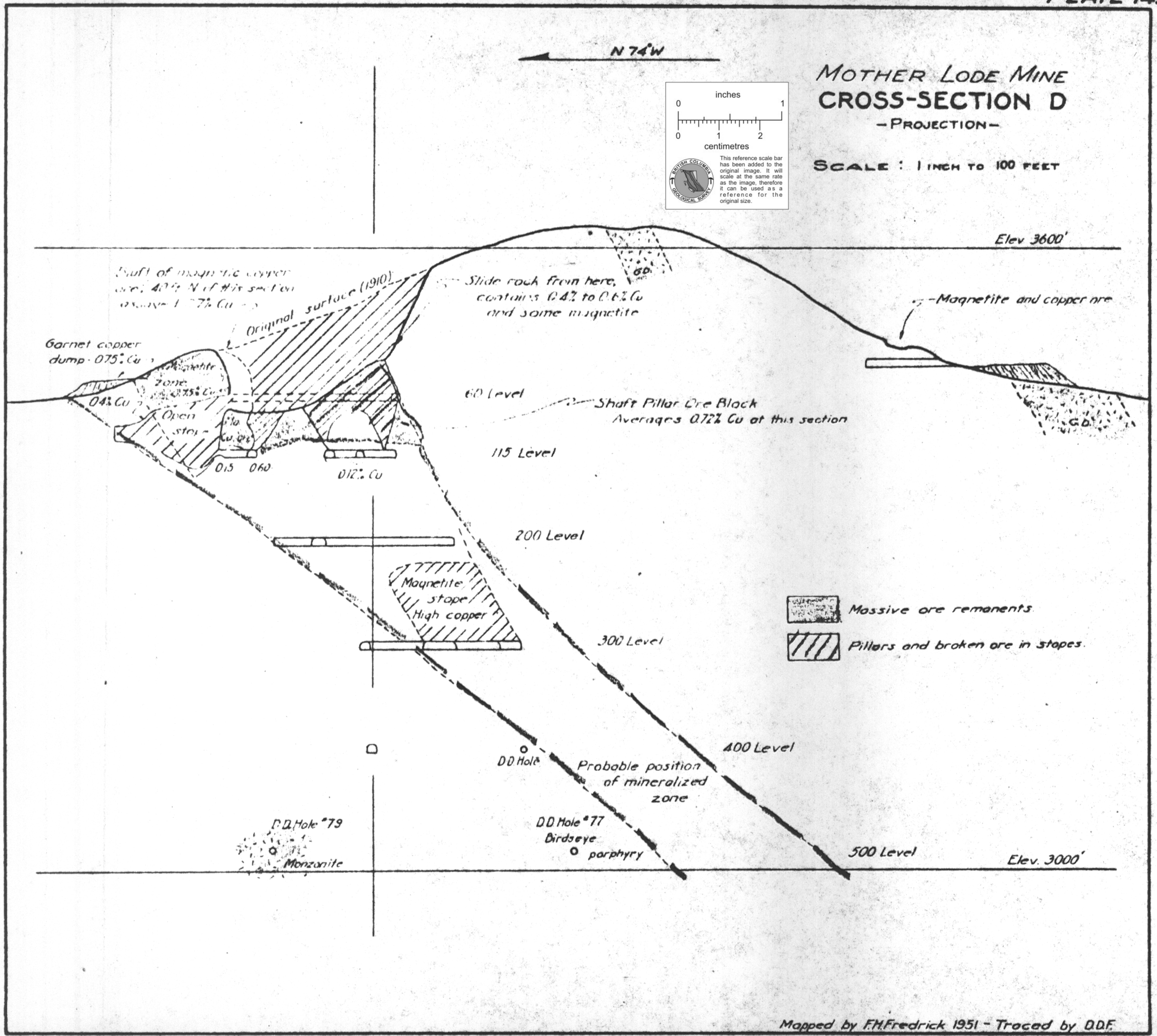

MOTHER LODE MINE
CROSS-SECTION C
- PROJECTION -
SCALE: 1 INCH TO 100 FEET
N 74° W
inches
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
Elev. 3600'
G.D.
D.D Hole #24
Original surface
Samples on pit wall 40 ft S of this section assayed 1.66% Cu, 0.04 Au
0.25% Cu
D.D Hole #39
60 Level
115 Level
Stope
Filled
Filled
0.12% Cu
200 Level
300 Level
400 Level
Magnetite Stopes
Magnetite Stopes
Possible mineralized Zone
Shaft Ore Block
Massive ore remanents
Pillars and broken ore in stopes
Average content of this section 0.92% Cu.
Elev. 3000'
Mapped by F.M. Fredrick 1951 - Traced by D.D.F.

PLATE 14.



N 74°W
MOTHER LODE MINE
CROSS-SECTION D
-PROJECTION-
SCALE : 1 INCH TO 100 FEET
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
Elev 3600'
Original surface (1910)
Slide rock from here, contains 0.4% to 0.6% Cu and some magnetite
Magnetite and copper ore
Garnet copper dump - 0.75% Cu
0.4% Cu
Open stope
60 Level
Shaft Pillar Ore Block Averages 0.72% Cu at this section
115 Level
0.15
0.60
0.12% Cu
200 Level
Magnetite stope High copper
300 Level
Massive ore remanents
Pillars and broken ore in stopes
D
D.D. Hole
Probable position of mineralized zone
400 Level
D.D. Hole #79
Monzonite
D.D. Hole #77
Birdseye porphyry
500 Level
Elev. 3000'
Mapped by F.M. Fredrick 1951 - Traced by D.D.F.

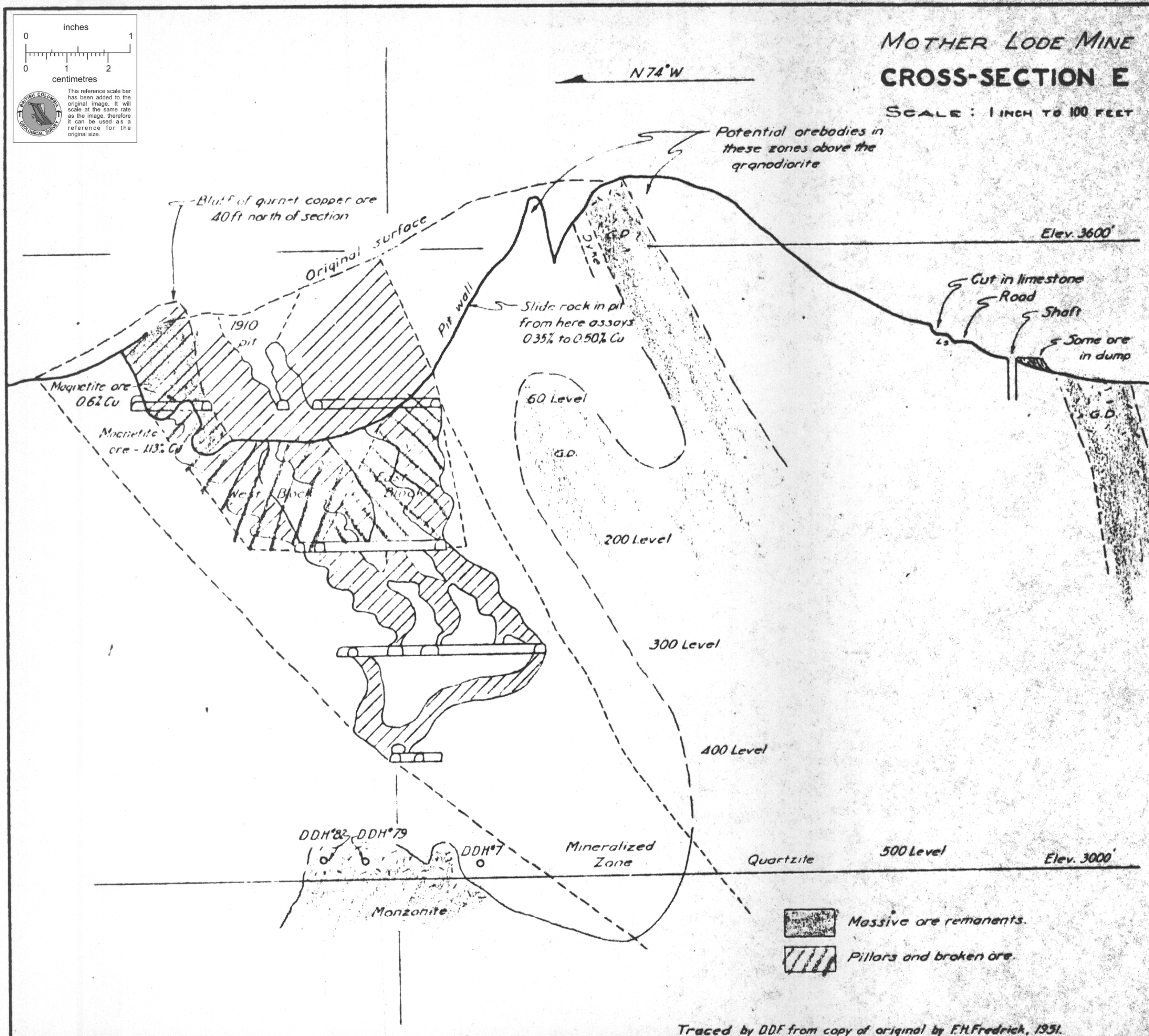
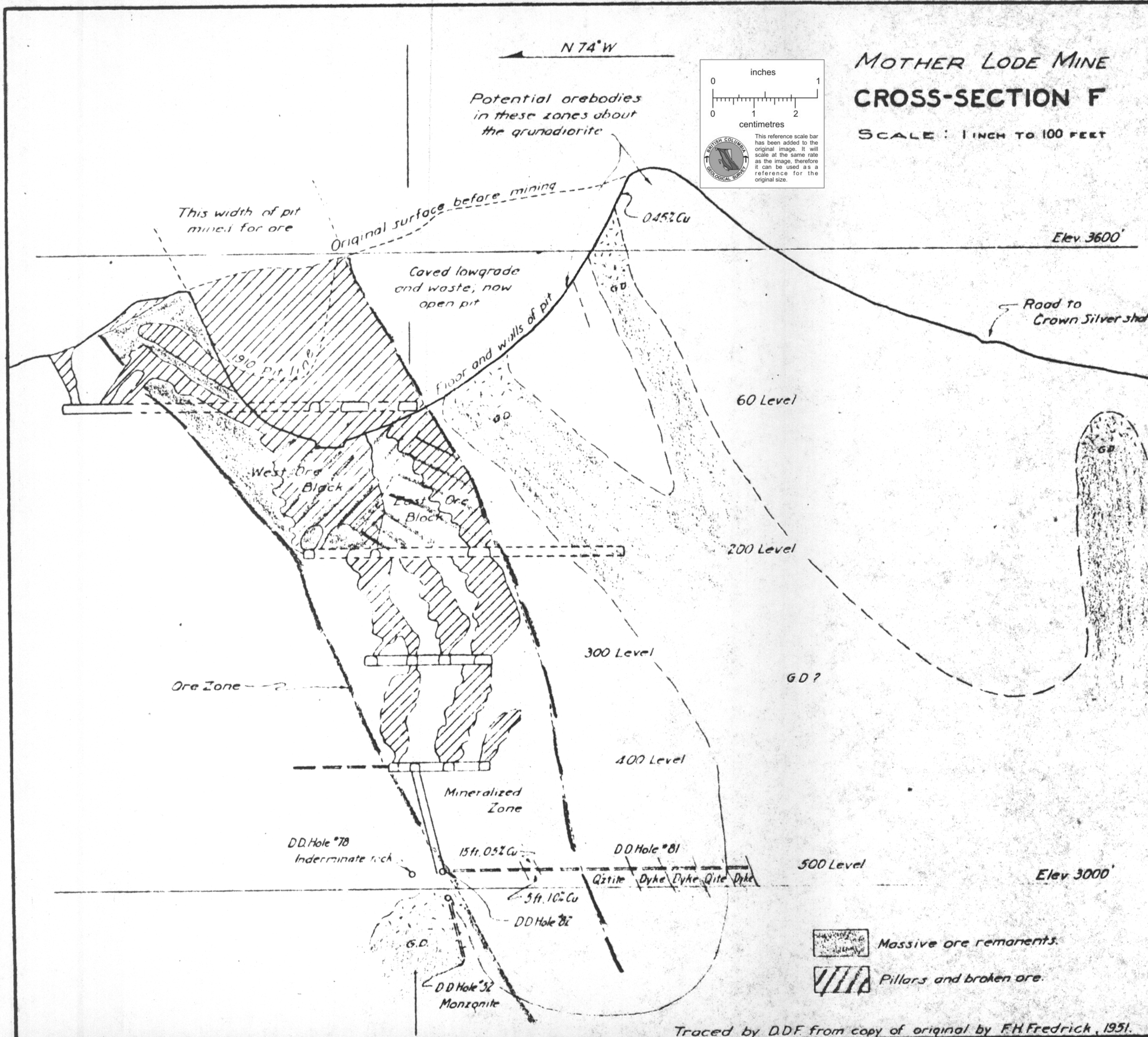

MOTHER LODE MINE
CROSS-SECTION E
SCALE: 1 INCH TO 100 FEET
N74°W
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
Potential orebodies in these zones above the granodiorite
Bluff of garnet copper ore 40 ft north of section
Original surface
Elev. 3600'
G.D.
1910 pit
Pit wall
Slide rock in pit from here assays 0.35% to 0.50% Cu
Cut in limestone
Road
Shaft
Some ore in dump
L.S.
G.D.
Magnetite ore 0.6% Cu
Magnetite ore - 1.13% Cu
60 Level
G.D.
West Block
East Block
200 Level
300 Level
400 Level
DDH°82
DDH°79
DDH°7
Mineralized Zone
Quartzite
500 Level
Elev. 3000'
Monzonite
Massive ore remanents.
Pillars and broken ore.
Traced by DDF from copy of original by F.H. Fredrick, 1951.

PLATE 16.



Mother Lode Mine
CROSS-SECTION F
Scale: 1 inch to 100 feet
N 74° W
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
Potential orebodies in these zones about the granodiorite
This width of pit mined for ore
Original surface before mining
0.45% Cu
Elev. 3600'
Caved lowgrade and waste; now open pit
GD
Road to Crown Silver shaft
1910 Pit Line
Floor and walls of pit
60 Level
GD
West Ore Block
East Ore Block
200 Level
GD
300 Level
GD ?
Ore Zone
400 Level
Mineralized Zone
D.D. Hole #78 Inderminate rock
15 ft. 0.5% Cu
D.D. Hole #81
500 Level
Qztite
Dyke
Dyke
Qite
Dyke
Elev. 3000'
5 ft. 1.0% Cu
D.D. Hole #82
G.D.
D.D. Hole #52 Monzonite
Massive ore remanents.
Pillars and broken ore.
Traced by D.D.F. from copy of original by F.H. Fredrick, 1951.

PLATE 17.

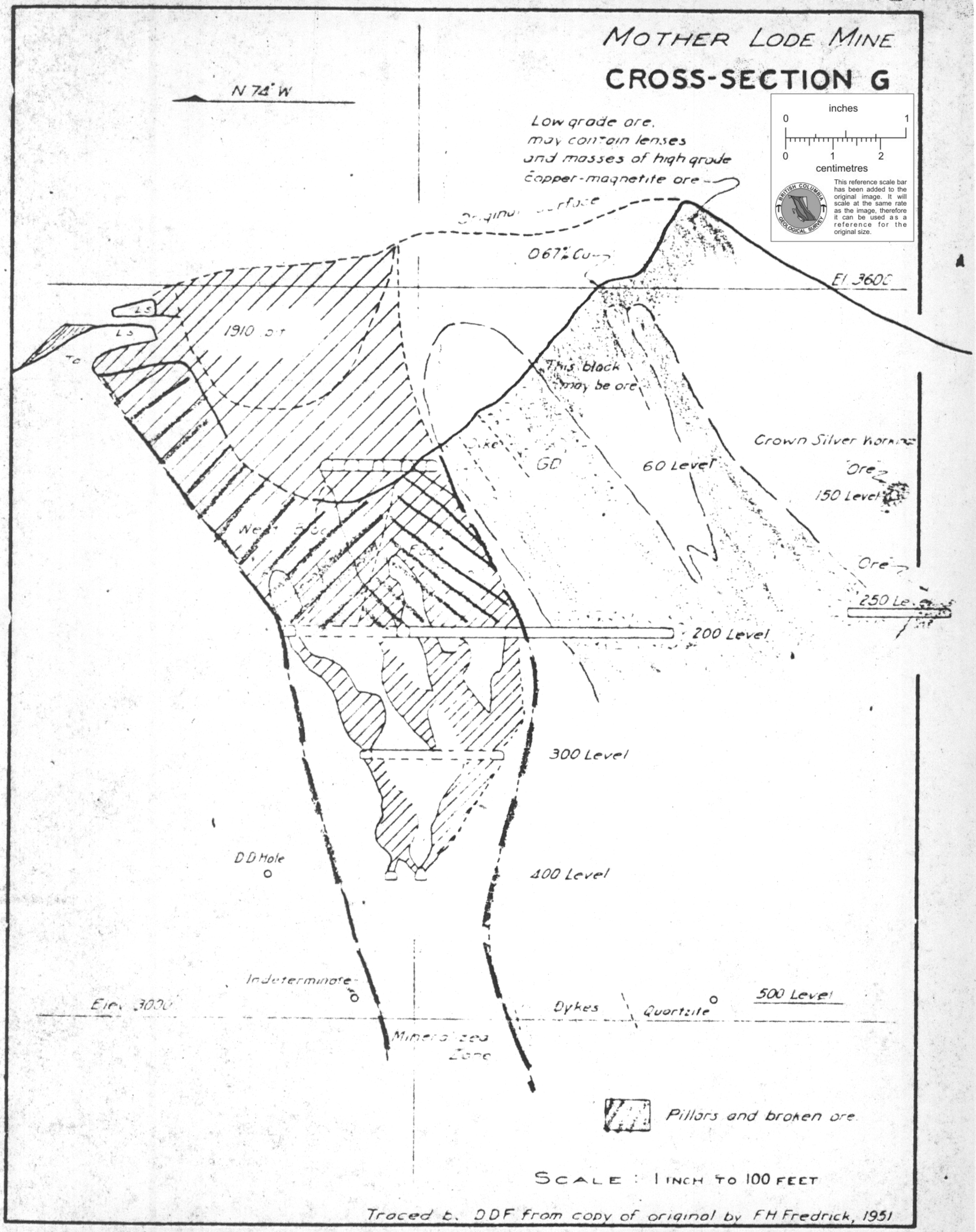
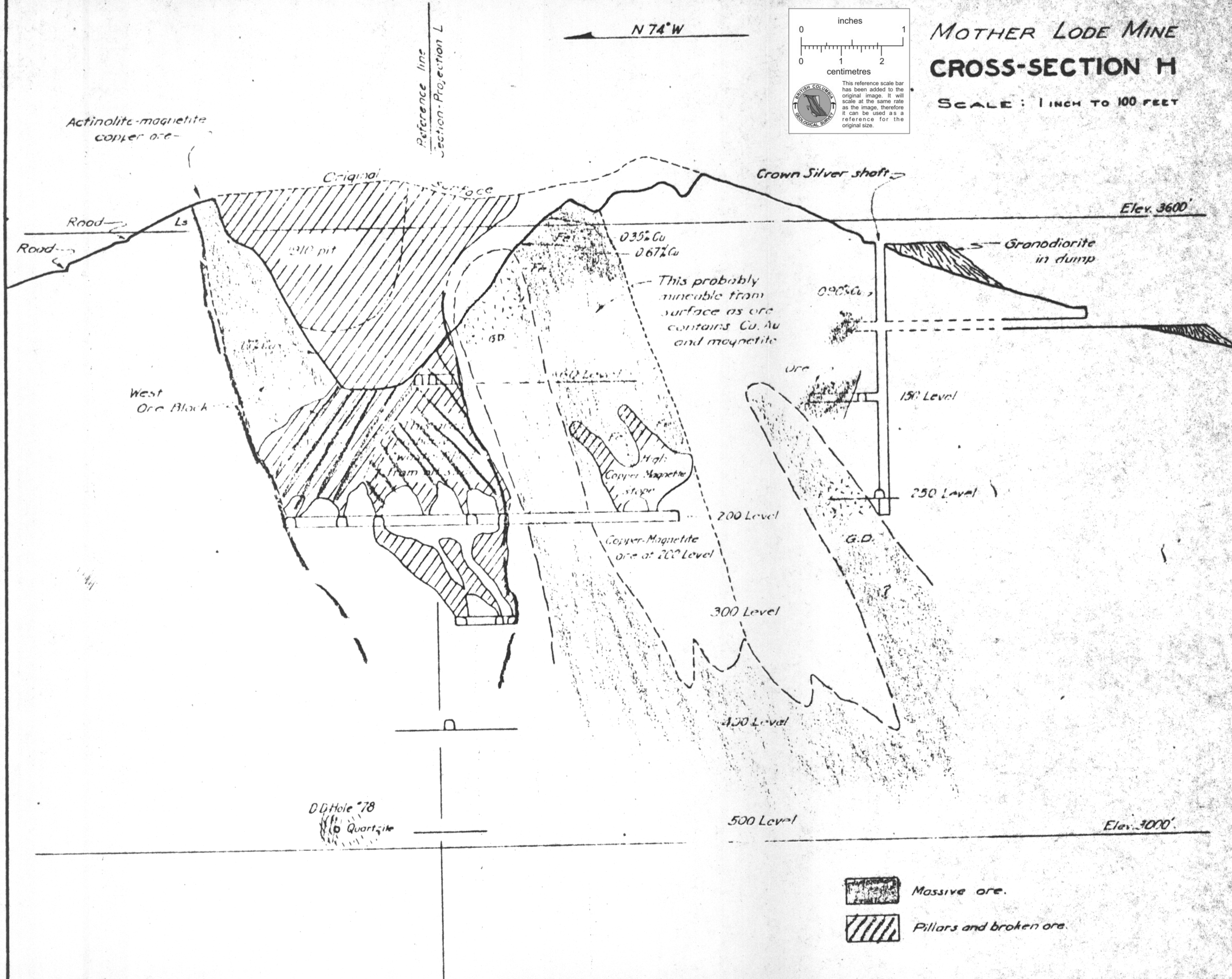

MOTHER LODE MINE
CROSS-SECTION G
N 74° W
inches
0
1
0
1
2
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
BRITISH COLUMBIA GEOLOGICAL SURVEY
Low grade ore.
may contain lenses
and masses of high grade
copper-magnetite ore
Original surface
0.67% Cu
El. 3600
LS
LS
1910 pit
This block
may be ore
Dike
GD
60 Level
Crown Silver Workings
"Ore"
150 Level
West Block
"Ore"
250 Level
200 Level
300 Level
DD Hole
400 Level
Indeterminate
500 Level
Elev. 3000
Dykes
Quartzite
Mineralized
Zone
Pillars and broken ore.
SCALE: 1 INCH TO 100 FEET
Traced by DDF from copy of original by F.H. Fredrick, 1951

PLATE 18.

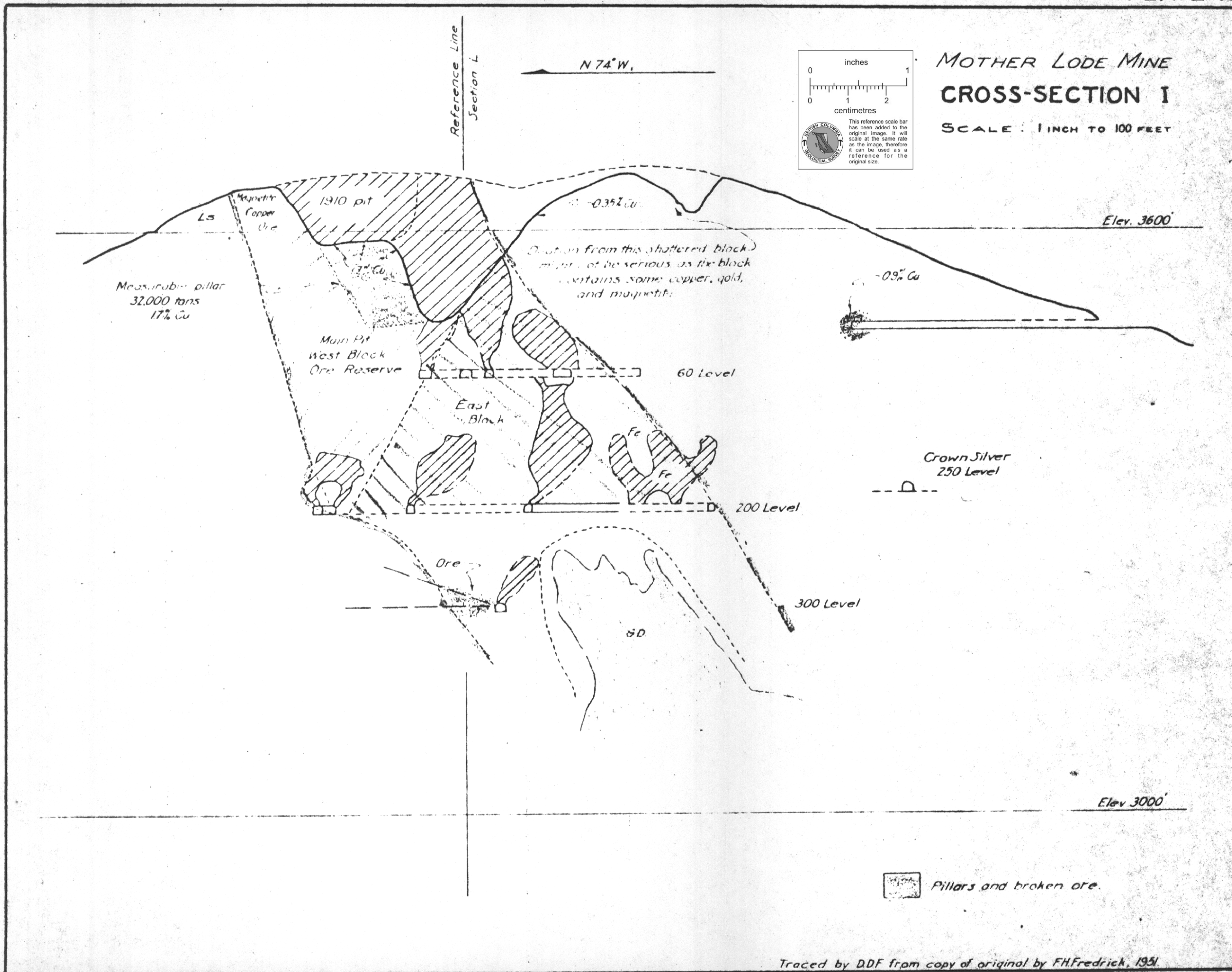
MOTHER LODE MINE

CROSS-SECTION H

SCALE : 1 INCH TO 100 FEET



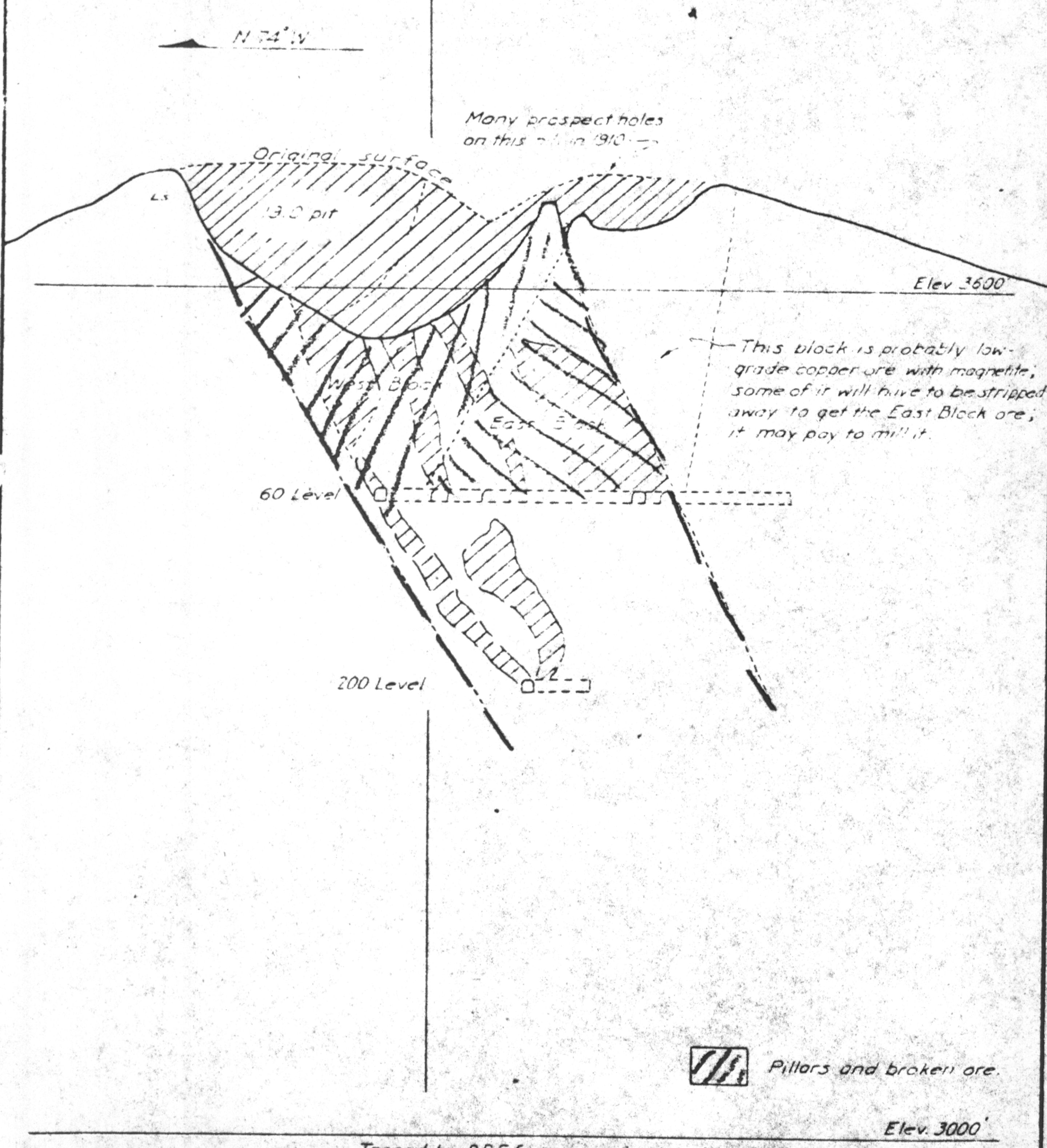
Traced by D.D.F. from copy of original by F.H. Fredrick. 1951.


MOTHER LODE MINE
CROSS-SECTION I
SCALE: 1 INCH TO 100 FEET
N 74° W.
Reference Line
Section L
1910 pit
Magnetite Copper Ore
Ls
1.7% Cu
–0.35% Cu
Elev. 3600'
Dilution from this shattered block might not be serious as the block contains some copper, gold, and magnetite
Measurable pillar 32,000 tons 1.7% Cu
–0.9% Cu
Main Pit West Block Ore Reserve
60 Level
East Block
Fe
Fe
Crown Silver 250 Level
200 Level
Ore
300 Level
G.D.
Elev 3000'
Pillars and broken ore.
Traced by D.D.F. from copy of original by F.H. Fredrick, 1951.

MOTHER LODE MINE

CROSS-SECTION J

SCALE 1 INCH TO 100 FEET



Traced by DDF from copy of original by F.H. Fredrick. 1951