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

Made for

The Motherlode Sunset Mining Company, Ltd.

by

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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.

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

#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

#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

#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)

		% Cu	Oz.Au/ton
	115 Level Waste Block - 30' cut samples along Walls		
#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							2,150,000	0.73	0.034
Main	140,000	0.55 to 0.80	0.02				1,730,000	0.87	0.04
Long	26,000	0.45 to 0.80	0.02				1,416,000	0.95	0.04
Sunset Trestle	17,000	0.35 to 0.70	0.02				195,000	0.65	0.02
C.O.D. Trestle	12,000	0.64 to 0.70	0.02						
	195,000	0.65	0.02						

Total Inferred
Total Indicated
Total Assured
Total Dumps
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"