

B. W. W. McDOUGALL, B.A., B.Sc.
CONSULTING MINING ENGINEER

REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

TELEPHONES:

OFFICE, PACIFIC 1631
RESIDENCE, YORK 2726

Horn Silver

825522

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MINE
EXAMINATIONS
REPORTS
APPRAISALS
CONSULTATIONS
MANAGEMENT

708 BANK OF NOVA SCOTIA BUILDING

VANCOUVER 2, B.C.

December 6th, 1957;

Canada Radium Corporation Ltd.,
85 Richmond Street W., Suite 1024,
Toronto, Ontario;

Dear Sirs:

In accordance with your instructions I have made an examination of the Horn Silver Mine which is situated in the general vicinity of Richter mountain on the easterly side of the Similkameen valley in southern British Columbia. Attached hereto please find my report. I trust that this will provide you with the information you require.

Yours very truly

B. W. W. Mc Dougall
P. Eng..

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REPORT ON
THE HORN SILVER MINE
VICINITY OF RICHTER MOUNTAIN
OSOYOOS MINING DIVISION
SIMILKAMEEN VALLEY
BRITISH COLUMBIA

708 Bank of Nova Scotia Bldg.,
Vancouver, B.C.,
December 6th, 1957.

B. W. W. McDougall, P. Eng.,
Consulting Mining Engineer.

THE HORN SILVER MINE
OSOYOOS MINING DIVISION
BRITISH COLUMBIA

INTRODUCTION

This report on the Horn Silver Mine has been compiled from information known to me over a considerable period of time. In order that I might bring this information up to date I have made a special examination visit to the mine in November of 1957. On this occasion I was accompanied and assisted by Mr. K. G. L. MacKenzie, a B.C. mining engineer and a resident of the district well known to me and Mr. Elwood Bromley, also well known to me and under whose immediate supervision much of the earlier development and production work at Horn Silver was done.

The purpose of this report is to present data descriptive of the mine in regard to its geographic and geologic setting and the principal economic circumstances affecting its operation. It is desired, too, that it include opinions as to the property merits and suggestions as to methods of exploration and development procedure.

CONCLUSION

In my opinion this property warrants the expenditure of substantial capital in its further exploration and development. The vein is of the manto, or flat-lying, type and it has been considerably disturbed by faulting. Most of the ore exposed by the underground workings has already been mined and shipped to smelters. While some, and perhaps considerable, unmined ore still exists on the margins of the developed sections of the mine, the really important ore possibilities lie in the still-unopened vein areas which lie farther up the slopes of the mountain. Continuity is known to occur over a very considerable area. Values, though varying, have been good from the adit portals to the present limits of the workings. Since similar geologic formations and structures persist across many hundreds of feet ahead, or up-slope, it is, I think, reasonable to anticipate that the vein and orebodies, also, persist. At the outset, however, the mining problem is properly to be considered as one of exploration.

PROPERTY

MINERAL CLAIMS: As at present constituted the property includes the mineral claims listed as follows:

Horn Silver	(Crown Granted)	L 1928
Silver Bell	(" ")	L 2393
Silver Bell Nos. 1, 2, 3, 4, 5, 7, and 8		Location claims.

There are thus 2 Crown Granted and 7 location claims. The area is estimated as approximately 350 acres.

SITUATION: The mine and mineral claim Group are situated on the westerly

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slopes of Richter mountain, on the east side of Similkameen valley and four miles north of the Canada - United States boundary line. The mine workings are less than one mile distant from the Similkameen valley highway which extends southerly from the town of Keremeos and enters the United States a few miles north of the Washington-State community of Night Hawk. It is in the Osoyoos Mining Division of British Columbia.

NEIGHBORING MINING PROPERTIES: Immediately adjacent to the Horn Silver Mineral Claim Group are two other small Groups which, on account of the names of the present owners, may be referred to as the Bromley and Shurson Groups. Most of the area now included in these smaller Groups, however, was a part of the Horn Silver property at an earlier time. There are ore occurrences associated with Mesozoic intrusives in Fairview Camp adjacent to the Okanagan valley 10 miles north from Richter mountain and at Olalla Camp 15 miles northwest from the Horn Silver.

TOPOGRAPHY: The Similkameen valley and the Okanagan valley to the east are, in many respects, similar. The latter, however, is the broader of the two. At the latitude of Horn Silver the separating mountain range is about 8 miles wide. This range, or mountain spur, extends northerly from which region it extends as a finger from the great Interior Plateau. The range is steep and, in many places, almost precipitous. It is characterized by many deeply-cut, steep-walled stream courses and numbers of semi-isolated peaks. Altitudes vary from about 1,200 feet in Similkameen valley below Horn Silver to upwards of 6,000 feet on the higher peaks of the range. The region to the west of Similkameen valley is one of greater relief, more extensive creek and river systems, and is more rugged generally.

However, entry to this entire region, through the master valleys, from the population centers of the Province, is easy. At the easterly margin of Similkameen valley, four miles north of the 49th parallel of north latitude the altitude of the river is about 1,200 feet. The terrain slopes upward at an angle of 6 to 8 degrees to the margin of the valley at an elevation of about 1,500 feet. At this margin a narrow gulch debouches. The trail to the mine follows this steep-walled gulch to about the 2,600-foot horizon at which elevation the gulch divides into two prongs both of which continue upwards. The mine workings commence at the 2,700 foot horizon in the topographic 'nose' between the two gulches.

The sides of the gulch, in places, are precipitous. The topographic setting, together with certain other characteristics of the working sites have, without doubt, retarded the more complete development of the property though access is, even now, not at all difficult. A road can be constructed to the adit sites. This matter will be discussed under the heading of Transportation.

ECONOMICS

CLIMATE: The average annual precipitation in the area is about ten inches which figure includes the water from the winters' snow. Snow depths in the valleys seldom exceed 6 or 8 inches though greater depths may occur at the higher altitudes. In winters temperatures of 20 degrees below zero

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may occur but such temperatures are somewhat extreme and seldom last over long periods. The springs and autumns are often mildly rainy. In the summers temperatures seldom exceed 90 degrees and even this degree of heat is tempered by a low humidity. Irrigation is essential for fruit ranching and produce-raising generally. From the point of view of climate mine operating conditions are excellent.

TIMBER: In respect to forest growth the mountains on both sides of the Similkameen valley are parklike. Though, on the whole, there is considerable merchantable timber in the area this occurs in scattered clumps rather than in continuous dense growths. There is but little underbrush and the open un-timbered slopes at the valley margins are overgrown with sage brush.

On the Horn Silver Group there is scattered tree growth commencing at about the 2,500-foot horizon and continuing across the higher claims of the Group. There is probably sufficient timber for underground props and stulls. The principal varieties are fir and pine.

At the present time there are two large sawmills in operation at Keremeos. A good deal of the output from these goes to make fruit containers and a considerable amount is exported. Normally, in mountainous terrain, it is usually cheaper and more satisfactory to purchase sawn timber and lumber from near-by mills than to attempt to use trees from mountainous sites which are often difficult to reach with transport vehicles.

WATER: Except during the spring run-off there is no water in the two gulches adjacent to the mine workings. There is water, in certain sections of the mine workings, which is probably in adequate volume for drilling and engine-cooling requirements. At an altitude of about 1,650 feet a short adit was once driven to the 'V' bottom of the gulch or ravine. The portal was tightly blocked to prevent loss and it was found that the water thus collected was about enough to provide continuous flow to fill a one-inch pipe. The mountain side, generally, is decidedly arid.

Water for every possible requirement, including that of milling, can be had by pumping from Similkameen river through a head of about 300 feet and over a distance of about 1,900 feet.

POWER: A power line of the West Kootenay Power and Light Company extends southerly down the Similkameen valley from Keremeos. Dependable electric power is thus conveniently available. Should diesel power be needed for any particular purpose the necessary fuel is available at Keremeos 13.5 miles distant from the property.

ACCESS & TRANSPORTATION: The town of Keremeos is situated at the junction of the Similkameen river with one of its tributaries which is known as Keremeos creek. This may be thought of as the headquarters town for the mining operation at Horn Silver. Keremeos is about 225 miles, over continuous black-top highway from Vancouver. The town is on the southern link of the Trans-Canada highway. Numbers of Greyhound busses, long-distance truck carriers, oil trucks and, in fact, all sorts of vehicles travelling in both directions, pass through here daily.

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Some highway distances are listed as follows:

Keremeos to Vancouver,	225 miles,
Keremeos to Hedley,	19 " ,
Keremeos to Princeton,	43 " ,
Keremeos to Penticton,	31, " ,
Keremeos to Horn Silver Mine,	13.5 " .

The highway leading southerly down the Similkameen valley past the Horn Silver Mine is also black-topped. There are no hills of consequence on this road.

From the valley margin, below the mine workings, to the mine adits a 'home made' type of aerial tramway once provided a means of transport for out-loading ore for direct shipment to smelters and to a mill which operated on the premises for a short time. In later years there has been no means of transport save that possible by pack animals over a steep trail.

It is possible to construct a road from the highway to the mine adits. The former mill was constructed near the valley margin and the mouth of a gulch to which reference has already been made. The slope distance along the old tramway from the mill to the adits is 2,540 feet and the difference in elevation from the valley margin to the adits is about 1,200 feet. Construction of this road, which would be from $1\frac{1}{2}$ to 2 miles in length may be expected to cost from \$6,000 to \$7,500 as a considerable amount of rock work would be required. For an access road of this sort the Provincial Government normally reimburses operators to the extent of 50% of the cost. Assuming a mill at the rim of the valley, ore would be conveyed from mine to mill over this road - probably by 3-ton trucks loaded to about 5 tons.

GENERAL: The operation of this property can best and most cheaply be arranged by making use of the town as a headquarters. The travelling time to and from the mine is about 20 minutes and workmen would doubtless prefer commuting to and from work rather than to live in quarters at the mine. Such quarters were once in use but the buildings are now in ruins.

A branch line of the Great Northern Railway extends up the valley to Keremeos from Washington State points. This branch line was built through to Princeton in 1907. This railway provides a convenient means of shipping out-going ore.

All external circumstances affecting to mining operations at this mine are thus reasonably favorable and, considered as a whole, may be thought of as being unusually favorable.

HISTORY

The first claim of the Horn Silver Group was staked in 1901 and it has been stated that the first ore ever to be shipped from this entire region, including Princeton and Hedley, originated at the Horn Silver Mine. Historical details descriptive of this property and its operations through a time-interval of half a century and extending from a time of horse-

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drawn transport over rough and crooked roads to fast-moving trucks over black-topped highways have little interest or is, at best, known only to few.

The first event of really major importance to this entire region was the completion of the branch line of the G. N. Railway to Princeton, through Keremeos and Hedley, in 1907. Little development was done until the years of the first world war. During the years from 1915 to 1921 the mine was energetically worked under lease from the owners by the Condit brothers. It is recorded in the Minister of Mines Report for the year 1915 that 115 tons of ore carrying 0.20 oz/t in gold and 67 oz/t in silver was shipped. The aerial tramway was constructed during this year and all ore subsequently shipped, including the small amount sent to the mill, was transported down to the valley by means of this device.

Subsequent to 1922 the mine has been operated intermittently and mostly by leaser-type operations. Very little development of a real serious nature has been attempted since 1927. Ore which was made partly accessible in that year was later tapped by up-raises and largely mined out later.

ORE PRODUCTION

It is unfortunate that the records of ore tonnages shipped and the metal contents of the aggregate of such shipments are not complete. In 1927 I was able to get an incomplete record giving lot numbers, shipment tonnages, gold and silver assays of individual shipments, gold and silver contents in total ounces and gross and net dollar values.

From this record the following details:

The record includes details from 75 separate shipments, most were car loads. The aggregate tonnage of these 75 lot shipments is 3,250 tons.

Total gold contents 486.38 oz - Total silver contents 186,177 ounces. Average metal contents, gold 0.158 ozs per ton and silver 57 ozs per ton.

The highest silver assay recorded for a single shipment is that of lot 35 which assayed 485.7 ozs/t;

The highest gold assay recorded is that of lot 22 which assayed 1.34 ozs per ton.

From other old records I had formerly estimated that the total tonnage of ore shipped up to 1927 was approximately 5,500 tons having a gross value, at that time, of about \$275,000. Assuming that the unrecorded production details carried the same average metal contents as that of the 3,250 tons for which records exist the total production figure up to 1927 becomes:

Total silver content 312,400 ounces; total gold content 817 ounces;
total gross value \$303,000.

Estimating that between 1927 and 1957 the shipments amounted

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to 500 tons, which figure is probably too small, and that the same average values obtained for this tonnage as for the former, the total production figures down to 1957 would become:

Total silver produced 342,500 ounces,
Total gold produced 895 ounces;
Total gross production \$ 329,500.

The above figures as of 1927 and 1957 are, of course, approximations and have been obtained by slide rule from data contained in the list of 75 shipments which aggregated 3,250 tons. The total shipments up to 1957 are estimated at 6,000 tons. The metal averages of the 75 shipments are of importance is estimating the probable ore values which may be anticipated in the still unopened vein areas.

GEOLOGY

REGIONAL: The Similkameen and Okanagan valleys, together with the separating mountain range of which Richter mountain is a part constitute the region which is of geological interest to the Horn Silver vicinity. The geology is given in Map 341 A, (Keremeos Sheet), of the Canadian Geological Survey. The areas immediately north of the 49th parallel and east of Similkameen valley is underlain by granodiorite, hornblende syenite and pyroxenite - all of which are Mesozoic intrusives into Palaeozoic quartzites and greenstones. The intrusives have merging rather than abrupt contacts. The complex of formations has been deeply eroded since Mesozoic times to expose both intruded and intrusive rocks perhaps as much as 2,000 feet below Mesozoic outcrops. It is, I think, proper to regard the Horn Silver vein and ore occurrence as quite deep-seated.

LOCAL: The Horn Silver claims are underlain, entirely, by hornblende syenite which, in places, merges into monzonite. The host rock is essentially basic in composition and coarsely crystalline.

The ore occurrence is a quartz vein having an approximate E-W strike and a southerly dip of 0 to 30 degrees. It varies in width from a few inches to a maximum of 6 feet - the average width is probably under 30 inches. In most places it is 'frozen' to both walls and there would appear to have been little movement along vein walls. The vein is somewhat sparsely mineralized with pyrite, galena, sphalerite and quite minor grey copper. Numbers of silver-bearing minerals, probably all secondary in origin, include native silver, argentite and other less common compounds.

The gangue minerals, in addition to quartz, include minor amounts of carbonates some of which are probably of secondary origin. The vein pinches and swells within short distances. In places it splits into strands to include, as horsts, five or six feet of host rock some of which width may be threaded with vein stringers. The strands recombine after short distances. In places the full width of the vein is soft and crumbly while in others it is wholly hard, banded, quartz.

It is properly described as a manto-type vein being, in many places, almost flat. The syenite host rock, along with the included vein,

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is displaced by many faults and the vein, at the limits of present development, is probably not more than 150 to 175 feet below the present surface. As a consequence oxidation has been severe. In many places the fault gouge carries important silver values; silver, also, is to be found in cracks and crevices which, in many places, extend downwards from the footwall of the overlying deposit.

The aerial extent of this mineral deposit has not been determined. There is but little of it showing on the outcrop. It extends into the flank of the mountain and the succession of faults, for the most part, lifts the vein upwards. There are some reverse faults blocks and segments of the vein have been displaced downwards.

Besides being of distinct economic interest the vein is of unusual geologic interest. The unusual features stem from its mantle attitude and occurring, as it does, in massive intrusive formation. Veins of this type which occur in sedimentary formations are readily understandable. It can be reasonably assumed, I think, that ore mineralization came from deeper horizons in the hornblende syenite, most likely in vapor phase, but the reason for the mantle attitude of the quartz vein, with its relatively sparse sulphide content, is not immediately clear. It poses a number of problems which are difficult to answer with assurance.

MINE WORKINGS

As already mentioned, the mine workings are in the steeply-rising ridge core between the two branches of the main gulch. On the west side the west branch of the gulch would seem to be a fault plane. At any rate no section of the vein is seen on the opposite side of the gulch. To the East, however, the gulch there seems, merely, to have been eroded through the vein as this seems to be in place on the opposite side of the ravine. The vein probably also occurs in the higher terrain above that part which has been eroded from the gulch floor.

The mine workings are shown in plan on a map accompanying this report. There are two main adits at approximately the same horizon of 2,700 feet. These are connected by a trail which traverses the steep mountainside around the curve of the topographic 'nose'. In addition to the workings shown there are two additional adits 25 feet or more above. These are partly caved. Due to the flat dips, with occasional plunges, and numbers of fault displacements - also the leaser-type of operations which were conducted - these workings are exceedingly irregular and difficult to map so that they could be properly understood. The matter of mapping all these workings in plan with numbers of cross sections would require a great deal of time and such drawings are not considered essential for illustrating the present description.

The workings at the 2,700-foot horizon extend over a width of about 1,000 feet and to a depth, into the 'nose' of about 400 feet. Workings at the slightly higher horizon - not shown on the map - are, in part, inaccessible through caving and back-filling. The vein is considered to be continuous over the map area shown and there is, undoubtedly, considerable unmined ore remaining in this area. It is quite impossible to

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compute or to value it. It will be understood that the vein and the stopes on it, over much of the map area, and due to multiple block faulting, are at numbers of differing levels.

Good ore values occur at the inside limits of the workings. On the Horn Silver No. 2 claim, owned by Elwood Bromley and partners, a recent drift adit has been driven a distance of 70 feet on the vein. Sample No. 12, taken over a width of 36 inches returned an assay of gold 0.17 ozs/t and silver 49.75 ozs/t. It might be noted that the east drift as shown on the map was extended for a part of its distance under the vein. Raises were later driven to tap the vein and much of the ore was mined. I recall an incident which occurred in 1927: A rich segment of the vein had faulted downwards. A winze was sunk a distance of 10 feet or more intersected the dislocated vein where the mineralization consisted of a six-inch width of galena with abundant native silver and argentite and the assay value was upwards of 500 ozs/t.

From these descriptions it will be appreciated that the successful mining of orebodies such as these requires up-to-the-minute surveys and mapping in order that the individual fault blocks be located and mined with the least possible 'dead' work.

Much of the ore adjacent to the east drift is soft and crumbly as is also the case in the west adit. In many of such places there are no visible sulphides though the lode, almost everywhere, carries silver values. There would appear to be probability that, as workings follow the vein farther into the mountain to where it may attain a depth of 400 feet or more below the present surface, the ore minerals there will be found to have been less affected by oxidation and other complex secondary processes.

RE MINE SAMPLES & ASSAYS

Accompanying this report there are three schedules of assays: the individual samples are, for the most part, described in the schedules.

Schedule No. 1 includes assays of samples from sections of the workings taken by me, or under my supervision, in 1927.

Schedule No. 2 includes assays of samples from sections of the workings taken by K.G.L. MacKenzie in the autumn of 1957.

Schedule No. 3 is the assayer's certificate covering 12 samples taken by me, or under my direct supervision, in November 1957.

It will be understood that most of the samples listed in all three schedules have been taken from stope fringes.

CONCERNING METALLURGY

Gold values in the 'soft' ores probably occur as minute 'free' particles residual from limonitized pyrite. In such ores silver values are largely of the 'earthy' type such as chlorides. Precious metals can be recovered from such ore only by chemical means. Much of the ore, however, contains both primary and secondary silver and gold-bearing sulphides. The

B.W.V. MacKenzie

precious metal values in such material can be recovered by jigging, tabling and (or) flotation. Native silver and argentite, which minerals are somewhat plentiful in some sections of the mine, can probably best be recovered by an intercircuit jig - that is, a jig inserted between the ball mill and the classifier.

Another problem is concerned with dilution which is unavoidable if the maximum recovery of precious metals from the vein is to be obtained. As already noted, important values sometimes occur in fault gouges, in vertical crevices and cracks extending downwards into host rock from the footwall of the orebodies and from regular sections of the lode where the vein is 'stranded' over considerable widths and lower-than-normal grades of ore occur over much greater-than-normal widths. In order to eliminate as much of such waste as possible from such material jigs, used as scavengers, can be very useful.

A processing procedure including a crusher, a ball mill - classifier unit including an intercircuit jig, one or two scavenger jigs and a flotation unit - these to provide a high grade concentrate which, mixed with the softer ores which cannot be concentrated, would be treated by a batch cyanide process to produce gold-silver bullion on the property. I have been reliably informed that the Granby Company, at Copper Mountain, have recently made some preliminary tests on treating Horn Silver more and that while the processing procedure best suited to this ore was not necessarily determined, it was concluded that an overall metal saving of upwards of 95% was possible.

RECOMMENDATIONS

There are differing methods of exploring and developing this ore occurrence. At this time I prefer to offer suggestions as to procedure rather than unalterable recommendations:

1: Construct a 16-foot road from the valley margin to the adit portals at the 2,700-foot horizon.

2: At the approximate site of the old mill install an electrically-driven compressor having a minimum capacity of 300 cfm and lay a ~~2~~^{2 1/2} or 3-inch plastic or steel compressed air line from the compressor to the adit sites. The approximate length of such pipe line would be about 2,700 feet including rises and sags from the straight-line distance.

A: As a preliminary alternative during the earlier stages of the exploration program - acquire a diesel-driven compressor of about the capacity already mentioned and install it under cover near the mine workings. This alternative suggestion would save a very considerable amount on the initial or preparatory expense.

3: Plan from the outset to use Keremeos as operation headquarters and arrange that working crews commute to and from the mine to billets in town. This will save a considerable amount of capital for providing camp accommodations and be, otherwise, much more satisfactory in every way.

4: The mine should be completely and systematically surveyed and mapped in such detail as is necessary to indicate the locations of

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faults and displaced vein blocks. Permanent survey points should be provided underground and computed co-ordinates and other survey detail should be filed systematically.

5: Such geological mapping as is necessary at this time is entirely concerned with mapping the faults. This, along with recording the assay detail, is all the geological mapping that is required at the present time.

6: A great deal of valuable exploration work, both underground and on surface, can be effected with a light diamond drill. One which provides EX (7/8) inch core is to be preferred.

7: The management to be continuously alert to place development openings in such manner as to avoid unnecessary crosscutting and raising. It is obvious that a flat-lying vein disturbed by block faulting must require careful planning and attention to detail in order to avoid getting workings in the wrong places. It is already indicated that adit openings at higher horizons will soon be needed.

8: Ore encountered in exploration and initial development work should, of course, be shipped: but the objective should be to open adequate ore reserves to warrant having a mill in operation at the earliest possible time. Space for stock-piling development ore on the mountain slope is limited.

9: A point not heretofore mentioned concerns the possibility that other manto-type ore occurrences may exist at deeper horizons. This possibility should be given consideration and, at a convenient time, a diamond drill hole should be drilled to a minimum depth of 500 feet below the 2,700-foot horizon.

SUMMARY

The Horn Silver Group of Mineral Claims embraces an approximate area of 350 acres. It is situated on the east side of the Similkameen valley four miles north of the Canada - United States boundary. Its nearest town is Keremeos some 13.5 miles distant to the north. The mine and mineral claim site is in steep mountainous terrain more than 1,200 feet above the floor of the valley. The site can be made accessible by the construction of a truck road to the mine-entry sites. External circumstances affecting operations are all favorable in that normal mining and milling operations can be carried forward throughout the year at costs favorably comparable with those prevailing elsewhere in the southern interior of the Province.

The vein is of the flat-lying or manto-type and it is extensively faulted. Over a period of more than 50 years it has been operated in intermittent fashion. It is estimated that over this period of time ore shipments aggregating about 6,000 tons have been made and that the metal contents of the total shipments were, approximately 342,000 ounces of silver and 895 ounces of gold. The average metal contents, as computed from the available records applying to 3,250 tons shipped, is calculated to be 0.158

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ozs/t gold and 57 ozs/t silver. A considerable amount of lower grade material remains in the developed part of the mine - some of which still stands as stope margins, some as pillars and some as stope fills. The general type of mining, in some places, is similar to the longwall system of coal mining.

It is believed that the vein occurs over much greater areas than are opened by the present workings which have partly explored an area about 1,000 feet wide and 400 feet long (or into the mountain). Some proof exists as to this point. The possibilities that other flat-lying veins occur at greater depths have been explained.

Successful metallurgical treatment leading to a high percentage of precious metal recovery involves a combination of jigging and flotation together with batch cyaniding the fines and the concentrates. The metals would be recovered as gold-silver bullion.

The exploration and development of this property along lines which have been more or less specifically outlined in this report is considered by the writer as well warranted in the reasonable hope and expectation that a profitable operation will eventually result.

Respectfully submitted

B. W. W. McLaughlin P. Eng.,
Consulting Mining Engineer.

708 Bank of Nova Scotia Bldg.,
Vancouver, B.C.,
December 6th, 1957.

The Horn Silver Mine:

SCHEDULE OF ASSAYS NO. 1:

<u>Sample No.</u>	<u>Width</u>	<u>Ozs/t Au</u>	<u>Ozs/t Ag</u>	<u>Descriptions</u>
1	14"	0.02	3.8	From undeveloped outcropping on Horn Silver No. 2 claim;
2	16"	0.10	18.4	From bottom of winze at north fringe of workings;
3	18"	0.02	26.3	Horn Silver workings - a stope pillar on east side;
4	16"	0.27 x	70.2	From stope pillar near Glory Hole stope;
5	24"	0.02	7.0	From winze below No. 2 west drift - Old workings;
6	18"	0.08	43.6	9 feet below collar of winze - No. 2 west drift - old workings;
7	14"	0.48 y	90.7	Top point of first big stope - old workings - east side;
8	9"	0.18 y	62.5	Main east drift - two vein stringers in FW of main vein;
9	4"	0.86 z	247.2 x	10 feet east of No. 8. Back of drift a stringer in FW of main vein;
10	6"	0.04	45.6	Top fringe of stope nearest face of main east drift;
11	6"	0.20 v	379.4 z	Same stope as Nos. 10 and 11 - red and black oxides - soft vein material;
12	12"	0.12	21.7	From same stope - soft friable material heavily oxidized;
13	26"	0.08	20.1	First raise in No. 2 east drift - from where last car of ore mined;
14	4"	1.18 x	259.9 y	From a streak of soft ore in the same stope;
15	24"	0.18	34.1	Near No. 14 - clean quartz with some sulphides;
16	26"	0.02	14.7	At portal of tunnel on Silver Bell Mineral Claim;
17	1.5"	0.58 y	1,168.2 x	Black sulphides etc under the Glory Hole stope;
18	28"	0.01	21.0	Woodrow claim, north wall of vein - badly oxidized quartz;
19	24"	0.06	8.0	Woodrow claim - face of 10-foot adit - badly oxidized;
20	---	0.04	82.8	Grab sample from about 1,000 lbs. of sacked and sorted ore from Woodrow;
21	---	Tr	4.0	Grab sample of cyanide tailing from mill dump;

Samples 1 to 17 assayed by G. S. Eldridge & Co. - samples 18 to 21 assayed by J. R. Williams & Son - both firms are Provincial Assayers of Vancouver, B.C..

These assays are of samples taken by me, or under my direct supervision, in 1927 on the occasion of my first inspection of the Horn Silver property.

B.W.W. 1927

The Horn Silver Mine:

SCHEDULE OF ASSAYS NO. 2:

<u>Sample No.</u>	<u>Au Ozs/t</u>	<u>Au Value</u>	<u>Ag Ozs/t</u>	<u>Remarks</u>
A 101	0.20 *	\$ 7.00	32.2	Channel samples 2' wide and 18 to 24" apart combined:
A 102	0.10	3.50	16.2	Ditto
A 103	0.08	2.80	21.8	"
A 104	0.04	1.40	10.2	"
<hr/>				
B 101	0.18 *	6.30	62.4	"
B 102	0.04	1.40	20.6	"
B 103	0.04	1.40	29.7	"
B 104	0.04	1.40	9.9	"
<hr/>				
C 101	0.54 *	18.90	79.0	Grab - from sacked ore
<hr/>				
E 101	0.06	2.10	29.2	Channels 2' wide - 18 to 24 inches apart:
E 102	0.04	1.40	10.4	Ditto
E 103	0.04	1.40	7.0	"
E 104	0.04	1.40	2.3	"
E 105	0.04	1.40	9.0	"
<hr/>				
H 101	0.12 †	4.20	28.5	"
H 102	0.06	2.10	11.1	"
H 103	0.12	4.20	10.2	"
H 104	0.06	2.10	17.5	This Channel is 36" wide
H 105	0.03	1.05	2.8	"
H 106	0.02	0.70	3.2	"

NOTE: These are assays are of samples taken by K.G.L. MacKenzie, October 14th, 1957:

The A to H designations indicate the localities into which the workings have been divided so that underground localities may be referred to with some degree of precision.

Most if not all of these samples are from stope fringes. Much of the south drift on the east side is under the vein and the stope fringes are not fully accessible at the present time.

B.W.L. MacKenzie

The Horn Silver Mine:

SCHEDULE OF ASSAYS NO. 3:

THIS IS A COPY OF ASSAY CERTIFICATE OF J. R. WILLIAMS & SON, PROVINCIAL ASSAYERS
VANCOUVER, B.C..

<u>Sample No.</u>	<u>Widths</u>	<u>Au Ozs/t</u>	<u>Ozs/t Ag</u>	<u>Locations</u>
1	Grab	0.76	70.65	<u>East Drift</u> From 4 sacks of sorted ore taken near sta A10;
2	12"	0.06	80.20	South wall of drift 20 ft west of sta A10;
3	15"	0.20	54.75	North wall of drift 40 ft west of sta A10;
4	10"	1.92	205.00	North wall of drift 24 ft west of sta A10; <u>West Drift</u>
5	18"	0.26	21.55	Top of first raise from portal;
6	18"	0.035	25.00	Drift back at No. 2 raise; soft oxidized material;
7	36"	0.03	10.15	Drift back at No. 3 raise from portal - sift crumbly mtl.;
8	48"	0.03	7.25	Rt. side back at No. 4 raise; hard stranded quartz - light sulph's;
9	24"	0.02	2.45	At inside end of short drift 250 ft from portal;
11	20"	0.13	35.80	From stope 12 ft back from inside face of this west drift;
10	39"	0.02	3.00	Banded quartz 320 feet from portal;
12	36"	0.17	49.75	From face of Bromley adit - 70 ft from adit portal: Horn Silver No. 2 Fraction M.C.. X

NOTE: These assays are of ore samples taken at the Horn Silver Mine by me, or under my direct supervision on November 22nd and 23rd, 1957.

B. J. W. Mc Dougall

B. W. W. McDOUGALL, B.A., B.Sc.

CONSULTING MINING ENGINEER

REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA

TELEPHONES:

OFFICE, PACIFIC 1631
RESIDENCE, YORK 2726

MINE

EXAMINATIONS
REPORTS
APPRAISALS
CONSULTATIONS
MANAGEMENT

708 BANK OF NOVA SCOTIA BUILDING

VANCOUVER 2, B.C.

December 6th, 1957;

CERTIFICATE OF QUALIFICATIONS:

I, B. W. W. McDougall, present, herewith, my technical qualifications in regard to the attached report on the Horn Silver Mine.

I am a graduate of Queen's University of Kingston, Ontario with the degrees B.A. (1911) and B.Sc. Mining & Metallurgy (1913) and have been continuously engaged in, or associated with, mining operations since graduation. I am a registered Professional Engineer of the Province of British Columbia and for the past twenty-five years, as a consultant, with headquarters in Vancouver, have been engaged in mines and mineral lands examination work and in the directing of mining operations.

My knowledge of the Horn Silver Mine dates from 1927 in which year I directed certain exploratory operations on the property. Also, at one time or another, I have examined most of the mines and prospects in this section of the Province and have conducted or advised concerning the development of other properties throughout the area. More particularly, however, I have again examined the Horn Silver Mine, in November of 1957, to observe the results of the exploration and development work which has been effected since my earlier visits.

I have no financial interest in the Horn Silver property, direct or indirect, or in the securities of any Company, past or present, which has, or has had, ownership or operating interest in this property.

B. W. W. McDougall
P. Eng..

REPORT OF THE
THREE SISTERS MINING CLAUDE
(SILVER STAR MINE)
OSOYOOS MINING DIVISION
BRITISH COLUMBIA

Penticton, B. C.
July 11, 1964.

C. J. Cryderman,
Grad. Prov. Inst. Min. Ont.

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Haps

Sketch Plan Silver Star Showing
Section - Silver Star Showing
Property Plan

INTRODUCTION

This report has been prepared at the request of Mr. Andrew Robertson, and describes the property formerly known as the Silver Star and presently known as the Three Sisters group in the Similkameen District of British Columbia.

The information contained in this report was obtained from Map 341 A with marginal notes published by the Canadian Department of Mines and Resources, Mines and Geology Branch 1940; Mr. Elwood P. Bromley, life-time resident of the area, who supervised part of this development work on the old Silver Star claim; and from personal examination of the Three Sisters claim group between the 2nd and 8th of July 1964.

PROPERTY

The property is comprised of 10 located mineral claims designated Three Sisters #1, 2, 3, 4, 6, 7, 9, 10, 11, 12.

The west boundary of Indian Reserve Number 8 angles through the claim group reducing the total acreage by an estimated 25%. The main showing is located within the boundary of Indian Reserve Number 8. That portion of the claim group within the bounds of the Indian Reserve is invalid.

LOCATION AND ACCESS

The Three Sisters claim group is located on the east facing slope of the mountain, facing the west side of the Similkameen Valley approximately $4\frac{1}{2}$ miles north of the Canada-United States boundary line and about 12 miles south of the town of Keremeos.

The Similkameen Valley is serviced by the Great Northern Railway and the southern Trans-Provincial Highway which passes about 2 miles from the claim group. A dirt road passes within 1,000 feet of the east boundary of the claim group. The distance to Vancouver is approximately 240 miles; to Penticton 46 miles.

TOPOGRAPHY

The terrain is mountainous with elevations in the valley of 1,200 feet above sea level and isolated mountain peaks, to the west, with elevations up to 8,500 feet above sea level. The Silver Star adit is located about 500 feet above the valley floor at the top of the talus slopes. The east facing slope of the mountain in the vicinity of the claims group is very rugged.

The climate in the valley is mild and dry, with annual precipitation of from 6 to 8 inches.

SERVICES

Good transportation facilities exist.

The forest growth is park-like and would provide only an absolute minimum of timber, but there is an adequate supply in the area. There are 2 sawmills operating in the Valley.

Dependable electric power is available, the West Kootenay Power and Light transmission lines pass within 1½ miles of the claim group.

There is no water supply on the property but the Similkameen River would supply abundant water for all purposes.

HISTORY

Work was started on the old Silver Star adit approximately forty years ago and work has been carried on in the form of assessment work to date, but no serious work appears to have been done in recent years. The property has changed hands many times due to the claims lapsing and being staked by different parties.

Early in the history of the property an attempt was made to ship ore but the venture proved unprofitable.

At present, the property is registered in the names of Paula Lawrence and Gloria Boulton of Osoyoos, B. C.

GENERAL GEOLOGY

The rocks underlying the general area range from Palaeozoic to Upper Cenozoic. East of the Similkameen Valley Carboniferous quartzite, schist and greenstone. To the west of the Valley, Triassic greenstone, basalt flows, sills and bosses, some diorite, chert and tuff. The whole is intruded by numerous bodies of Upper Mesozoic or Jurassic age. The intrusive rocks consist of granite, granodiorite, diorite, syenite, hornblendite and Pyroxenite. The floor of the Similkameen Valley is overlain by a recent aluvium and glacial drift. The rocks in which the silver bearing quartz veins occur is granodiorite, syenite body, of concentrically zoned structure centred about four miles south of the Silver Star showing. The outer zone along the northeast contact is a medium grained syenite rich in dark minerals mainly pyroxene. This zone is about 2,500 feet wide. Inward from this a second zone composed of medium grained, dark, and more feldspathic alkali syenite forms the main part of what is known as the Kruger syenite, extends from a point $1\frac{1}{2}$ miles northwest of the Similkameen River to the International boundary. Inward from this a third zone about 1,000 feet wide follows the contact between the Kruger syenite and the granodiorite. This rock is coarser grained and more feldspathic than the other two zones. The silver star quartz vein occurs in the nose of Kruger syenite on the west side of the valley, midway between the volcanic and granodiorite contacts.

LOCAL GEOLOGY

The Three Sisters mining claims group is partly underlain by the Kruger syenite in the easterly central sector, by the Triassic volcanics in the northeasterly sector and by the granodiorite in the western and southwestern sector.

The quartz vein which is located on what was formerly known as

the Silver Star, occurs in the Kruger syenite. The vein is in a fracture zone where most of the rock has a crushed appearance. The vein occupies a well-defined fracture containing gouge with quartz filling, and lenses of well-mineralized quartz. The vein strikes N 80 degrees East, and has an average dip of 33 degrees North. The fracture containing the quartz vein, is well-defined with a uniform dip, and is visible in the cliff face for a length of over 150 feet. There is a strong vein of barren-looking white quartz in the fracture with occasional lenses of hard white quartz mineralized with pyrite, chalcocopyrite, tetrahedrite, malachite, and azurite. To the north, the vein terminates at a fault with a vertical dip which strikes north 70 degrees E. To the south the vein lenses out up dip, what appears to be a continuation of the vein, is visible on the north side of the fault on some 60 to 70 feet above the vein on the south side of the fault. This vein has the same characteristics as the one on the south side of the fault but contained only barren-looking quartz stringers up to 1 inch.

Copper mineralization occurs in short lenses along the north-south trending faults and shears.

The area in the vicinity of the showings is traversed by north-south and east-west trending faults.

The Silver Star vein appears to be limited to an area bounded on the west and north by faults.

DEVELOPMENT AND PRODUCTION

Four adits ranging from 21 to 40 feet have been driven in from the cliff face on the vein.

The number 1 or upper adit was collared on a strong-looking lense of well-mineralized quartz and driven for a distance of 40 feet. The vein

DEVELOPMENT AND PRODUCTION (Cont'd.)

5.

is breast-high at the portal and sill level at the face. The mineralized lenses of quartz pinch out completely in several places over the length of the adit. It is reported that approximately 35 tons of ore were shipped from this adit which netted fifty dollars.

Three other adits were collared on the vein down dip from the Number 1 adit and driven for lengths up to 21 feet but no vein material resembling ore was encountered. A sample of the best-looking material from Number four, or the bottom adit, assayed nil in gold and 0.2 ounces silver.

About 1700 feet southwest of the Silver Star showing an adit has been driven about 15 feet on a weathered quartz vein which strikes north and dips about 30 degrees to the west. Samples here across 1.1 foot and 1.2 feet arrayed 0.01 ounces gold and 1.0 and 1.7 ounces silver respectively. An adit driven 30 feet below and on the same bush, failed to open up a quartz vein.

CONCLUSIONS AND RECOMMENDATIONS

The information obtained from the examination of the Three Sisters group of claims, tends to indicate that the only mineralization approaching commercial interest is confined to the fault block in which the Silver Star vein occurs.

The values obtained from the Silver Star vein are from a vein that is too small and too erratic to be of commercial interest. The portion of the claim on which the Silver Star vein occurs, is that portion of the claim located on the Indian Reservation and is therefore invalid.

There are veins reported to occur on the claim group that were not located by the writer.

CONCLUSIONS AND RECOMMENDATIONS (Cont'd)

6.

Some prospecting may be warranted. Any prospecting carried out should be confined to the Kruger Syenite and the Syenite volcanic contact lying outside of the Indian Reservation. Such prospecting would be contingent on the demands of the property owners.

Respectfully submitted,

C. J. Cryderman
C. J. Cryderman,

Grad. Prov. Inst. Min.

July 13, 1964.

Penticton, B. C.

DECLARATION

I, C. J. Cryderman, of the Village of Keremeos, in the Province of British Columbia, hereby declare:-

1. I am a graduate of the Provincial Institute of Mining at Haileybury, Ontario. Date of graduation, 1947.
2. I have been employed in responsible positions in all phases of mining, from prospecting through development to production for a period of over thirty years.
3. The information contained in the accompanying report is based on a personal examination, Map 341A Published by the Canadian Department of Mines and Resources with marginal notes, and information provided by Mr. Elwood P. Bromley, a former owner of the property and life-time resident of the area.
4. I have no direct or indirect interest whatsoever, in the mineral claims nor do I expect to receive any interest or shares in the future.

Dated at Penticton, British Columbia, this 11th day of July, 1964.


.....
C. J. Cryderman.

SAMPLE SUMMARY

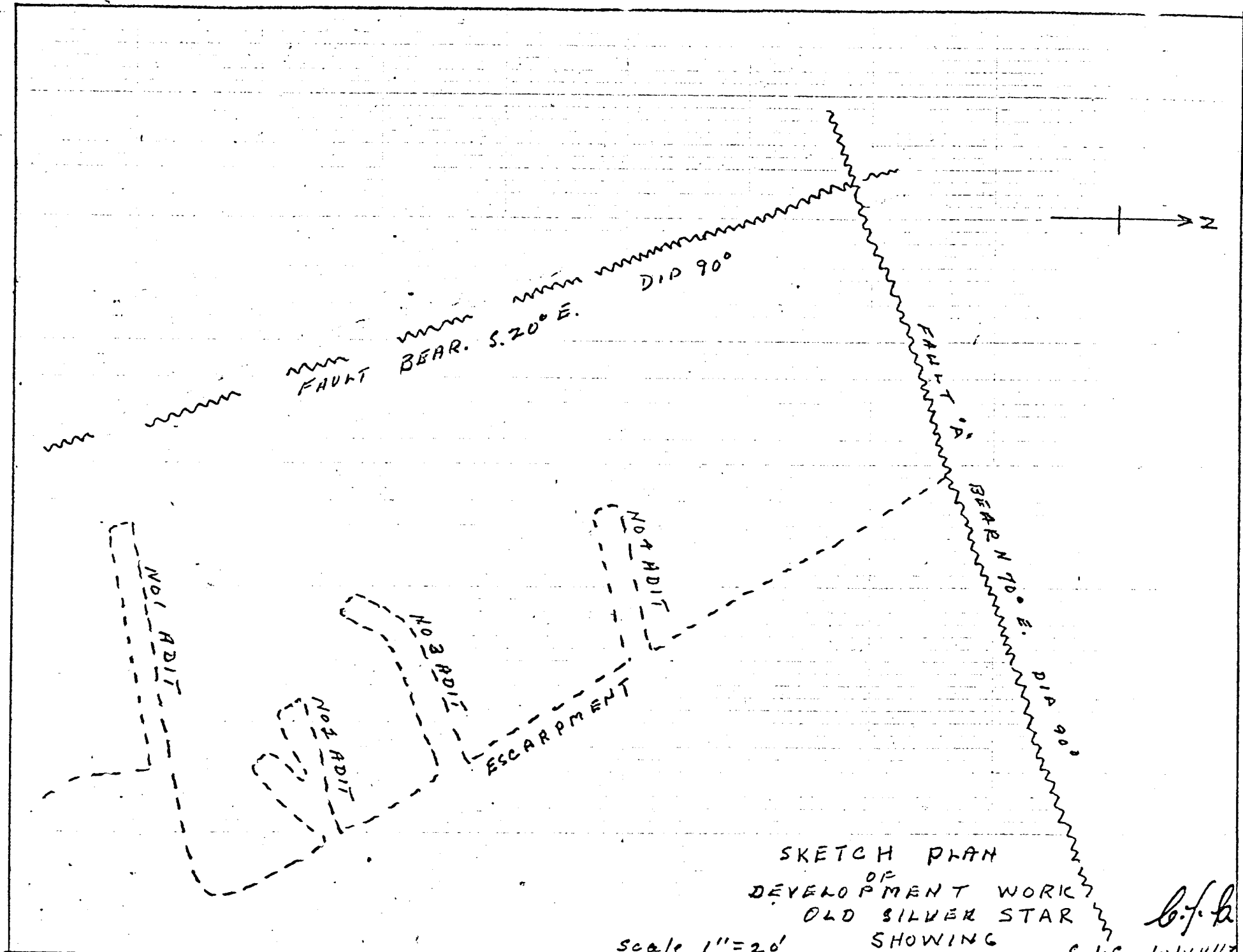
Sample No.	Location	Description	Width	Oz. Gold	Oz. Silver	% Cu.
3S-1	From lense of rusty qtz. in N-S fault 5.0' S of junction with E-W fault.	Rusty qtz. minor Malachite	1.4'	tr.	0.4	-
3S-2	From lense of rusty glassy qtz. in E-W. fault 3.0' E. of junction with N-S fault.	Rusty glassy qtz. minor Pyrite and Malachite	0.9'	nil	0.1	-
3S-3	N. E. Wall No. 4 Adit 5-0' W. of Portal	Irregular qtz. in brecciated Syenite Minor Pyrite	1.0'	nil	0.2	-
3S-4	From brow above portal of No. 1 adit	Hard white qtz. Tetrahedrite, Chalco, Malachite, Azurite	0.8'	0.12	50.0	1.25
3S-5	No. 1 Adit, South Wall at Portal	Hard white qtz. with Malachite,	1.0'	0.03	12.8	0.82
3S-6	No. 1 Adit S. Wall, 10' W. of Portal	Weathered vein material some white qtz.	0.9'	nil	0.6	0.14
3S-7	No. 1 Adit, 20' W. of Portal	Qtz. and gouge material Pyrite, Chalco, Malachite, Azurite	1.2	0.04	19.8	0.75
3S-8	No. 1 Adit, 30' W. of portal	Hard white qtz. Chalco, Tetrahedrite, Azurite, Malachite	0.7'	0.20	122.6	4.21

SAMPLE SUMMARY (Cont'd.)

Sample No.	Location	Description	Width	Oz. Gold	Oz. Au.	% Cu.
3S-9	No. 1 Adit at face 40' W. of Portal	Qtz. and gouge material some Malachite	0.9'	0.02	7.2	0.26
3S-10	South Adit at face	Rusty vein material	1.1'	0.07	1.7	-
3S-11	South Adit 10' S. E. at face.	Rusty vein material	1.2'	0.01	1.0	-

DETAILS OF RECORD - THREE SISTERS CLAIM GROUP

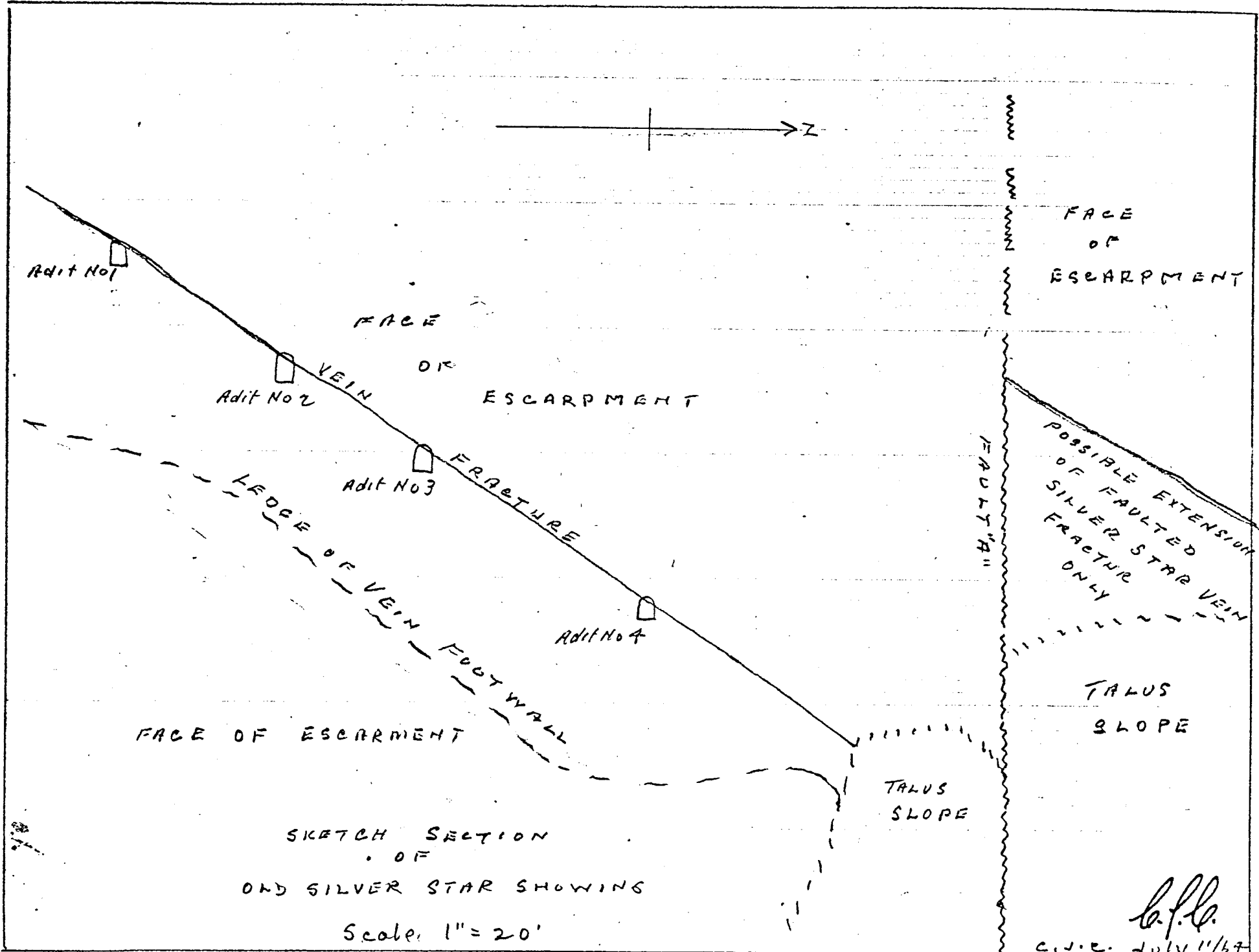
Name of Claim Three Sisters	Reg. No.	Date Work Due	Registered Owner
Number 1	7051	May 13/65	Paula Lawrence
Number 2	7052	May 13/65	Gloria Boulton
Number 3	9204	April 30/65	Paula Lawrence
Number 4	9205	April 30/65	Paula Lawrence
Number 6	7307	May 14/65	Gloria Boulton
Number 7	7341	June 20/65	Paula Lawrence
Number 9	7726	April 19/66	Gloria Boulton
Number 10	7785	April 19/66	Gloria Boulton
Number 11	7787	April 19/66	Gloria Boulton
Number 12	8803	May 30/65	Gloria Boulton



SKETCH PLAN
OF
DEVELOPMENT WORK
OLD SILVER STAR
SHOWING

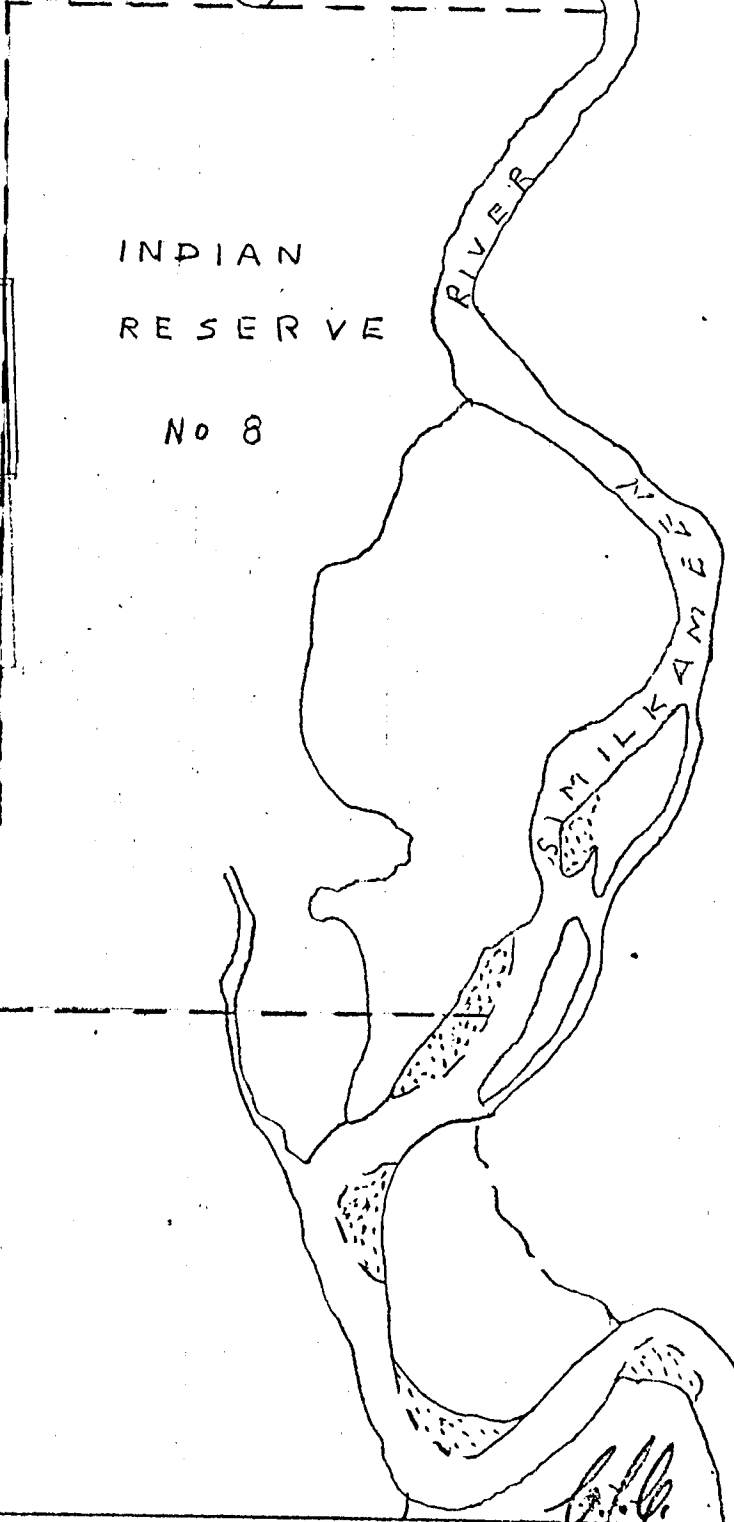
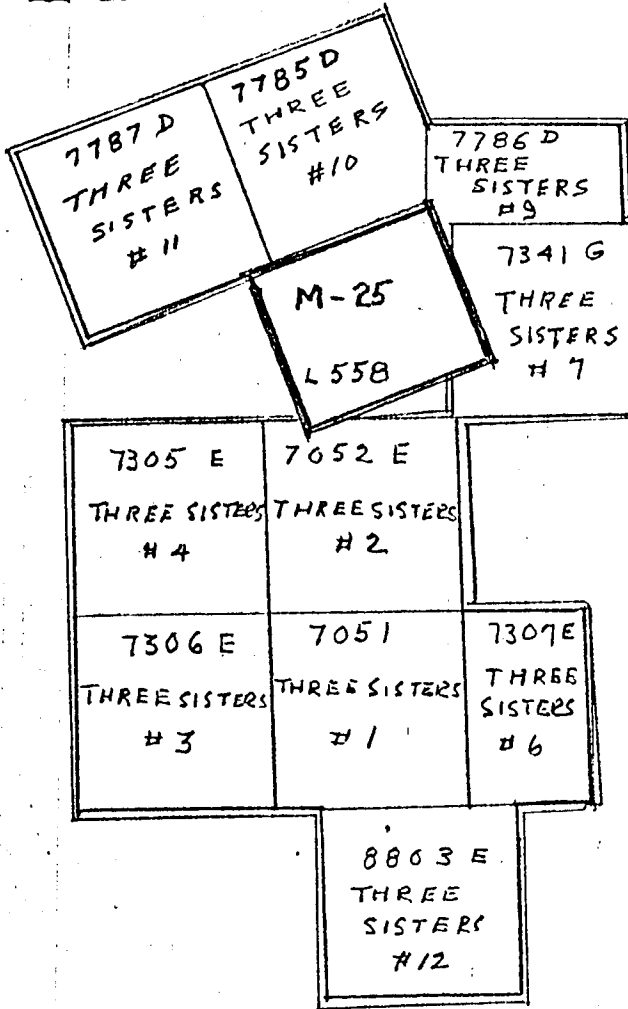
Scale 1" = 20'

C.L.C. July 11/63 *C.L.C.*



SKETCH SECTION
 OF
 OLD SILVER STAR SHOWING
 Scale: 1" = 20'

L.F.L.
 C.I.C. JULY 11/67

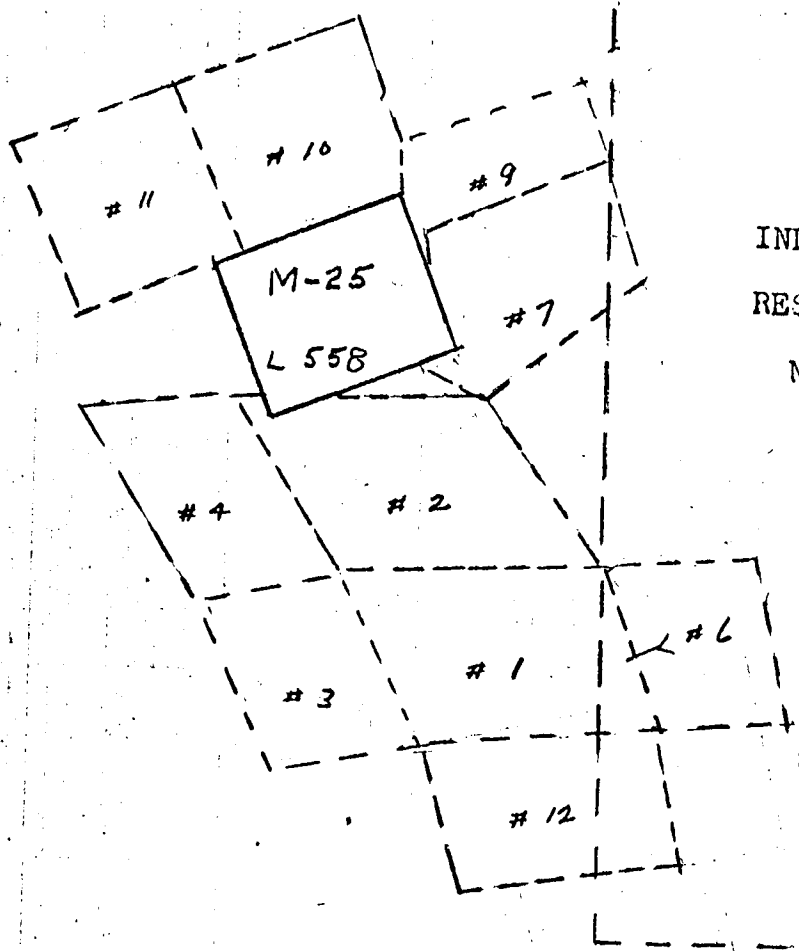


PROPERTY PLAN
OF
THREE SISTERS GROUP

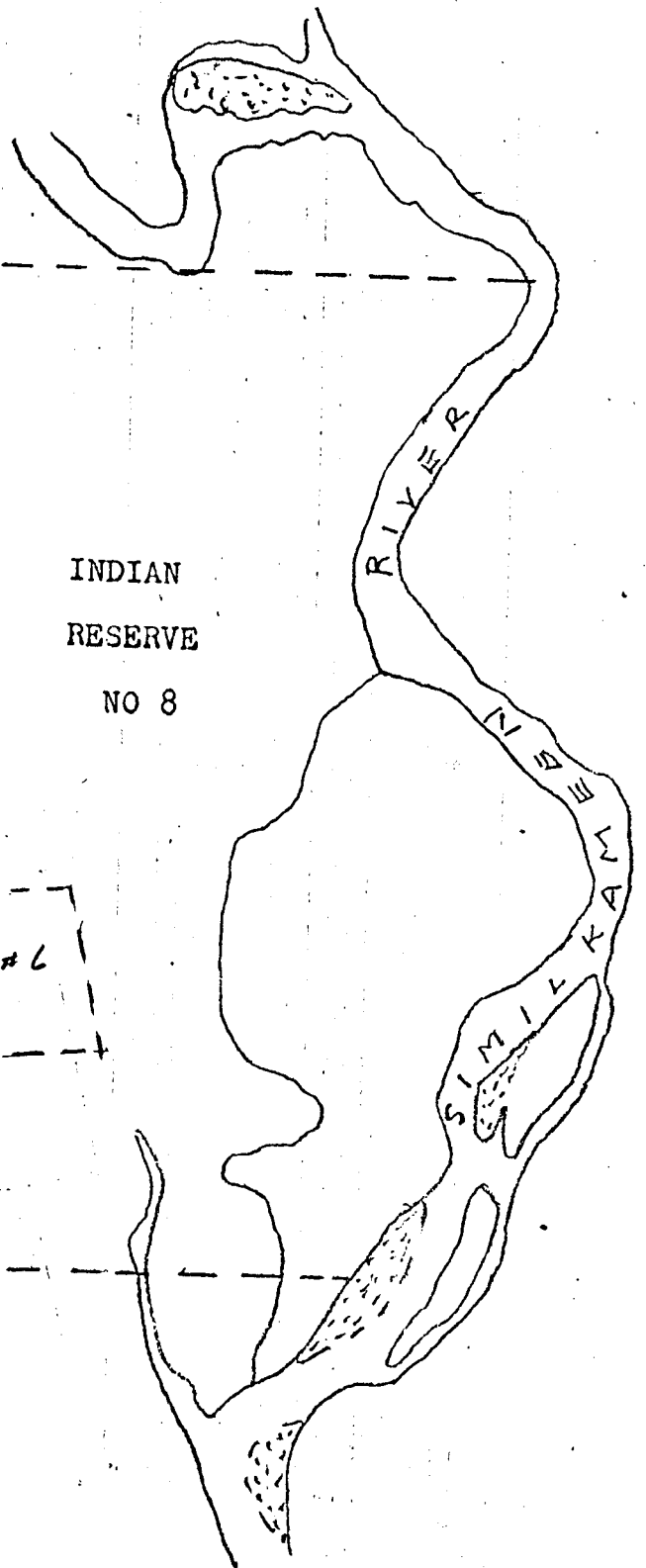
Traced From Official
Claim Map

Scale 1" = 1500' Approx.

C.J.C. July 11/64



INDIAN
RESERVE
NO 8



LOCATION OF CLAIMS
AS SUGGESTED BY PACE & COMPASS TRAVERSE

Scale 1" = 1500' Approx

C.J.C. July 11/64

C.J.C.

PHONE 495-5367

P. O. BOX 100

FILE No. 7477

DATE July 9th., 64

To:—

Mr. C. J. Cryderman
Kerameos B.C.

JOHN O. DOLPHIN
ASSAYER
CHEMIST
METALLURGIST
OSOYDOS, B.C.

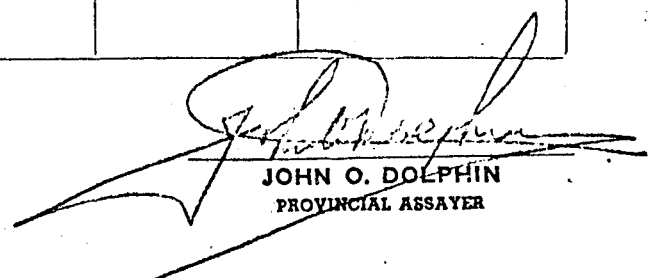
Assay Certificate

I HEREBY CERTIFY that the following are the results of the submitted samples.

MARKED	GOLD		SILVER		Copper		TOTAL VALUE PER TON
	OZS.	PER TON	OZS.	PER TON	%	PER TON	
3 S - 1	tr		0.4				
2	nil		0.1				
3	nil		0.2				
4	.12		50.0		1.25		
5	.03		12.8		0.82		
6	nil		0.6		0.14		
7	.04		19.8		0.75		
8	.20		122.6		4.21		
9	.02		7.2		0.26		
10	.01		1.7				
11	.01		1.0				

CHARGES:

\$42.00



JOHN O. DOLPHIN
PROVINCIAL ASSAYER