GEOLOGICAL REPORT on MT. SICKER MINES LTD. (N.P.L.)
Duncan, B.C. Victoria Mining Division.
Claim Names: Field Group (32): N14150-N14159 inc., N14162-N14169 inc.,N14174; L36G, L41G, L39G, L53G, L51G, L54G, L59G, L21G, L50G, L44G, L47G, L18G, L46G. South Group (23): R14185-R14188 inc., R14197-R14202 inc.; L108G, L63G, L110G, L43G, L18G, L19G, L37G, L60G, L35G, L20G, L87G, L85G, L86G.
Location: 14 road miles northwest of City of Duncan, B.C. (48° 123° NW)
Authors: E.P.Sheppard,P. Eng.,D.M.Basco, B.Sc.
Holder of Claims: Mt. Sicker Mines Ltd. (N.P.L.)
Dates: May 25/67 (1 day) Sheppard; June 25-28, July 6-9, July 17-Aug.21/67 (44 days) Basco.

92B/13W

4011

1104

SUMMARY REPORT

ON

MT. SICKER MINES LTD.

Victoria Mining Division

British Columbia

BY
E. P. Sheppard, P. Eng.
Consulting Geologist

Vancouver, B.C.
June 17, 1967

I N D E X

CONCLUSIONS AND RECOMMENDATIONS

APPENDIX:

MAPS:

INVOICE

* * *

CONCLUSIONS AND RECOMMENDATIONS

The properties owned or held under option by Mt. Sicker Mines Ltd. (N.P.L.) on Mount Sicker have not been assessed under current economic conditions, nor in view of advances in technology. It appears that there is a possibility of locating more of the high grade ore bodies as well as low grade but economic occurrences in the main fracture zone and in parallel structures.

Bacterial leaching of much of the materials on the dumps has been found to be feasible and a pilot leaching plant is under construction.

It is recommended that a total expenditure of $253,000.00 be made to repair service facilities; to rehabilitate part of the underground workings to permit mapping, sampling and diamond drilling; to complete the surface mapping; to diamond drill from surface the original ore zones and geological structures as well as the anomalies on the lands held under the Patriarche option; and to complete and operate the pilot leach plant on the property.

Upon the completion of these programs the results should be studied to indicate what further work should be carried out.

* * *

THE PRESIDENT AND DIRECTORS
MT. SICKER MINES LTD., N.P.L.
P.O. Box 576
VICTORIA, B.C.

DEAR SIRS:

ACTING UPON YOUR INSTRUCTIONS, WE HAVE MADE AN EXAMINATION OF YOUR PROPERTY NEAR DUNCAN, ON MOUNT SICKER, VANCOUVER ISLAND.

WE INSPECTED THE ACCESSIBLE UNDERGROUND WORKINGS, THE AVAILABLE PERTINENT MINE DATA, AND STUDIED NUMEROUS GEOLOGICAL, PROGRESS AND OPERATION REPORTS DATING FROM 1897 TO THE PRESENT, AS WELL AS THE APPENDED PROGRESS REPORT ON A FEASIBILITY STUDY FOR THE LEACHING OF MT. SICKER ORES.

PROPERTY

THE MT. SICKER MINES LTD. PROPERTY CONSISTS OF 3340 ACRES, MORE OR LESS, LYING ON THE FLANKS OF MOUNT SICKER IN THE VICTORIA MINING DIVISION, BRITISH COLUMBIA, (48° 123° N.W.).

THE HOLDINGS ARE MADE UP OF 29 MINERAL CLAIMS, 26 CROWN GRANTED MINERAL CLAIMS AND FRACTIONAL CLAIMS, TOTALLING APPROXIMATELY 800 ACRES, PLUS AN OPTION ON LANDS HELD BY V. H. PATRIARCHE UNDER A MINING AGREEMENT DATED OCTOBER 1, 1963, WITH CANADIAN PACIFIC OIL & GAS LIMITED, TOTALLING ABOUT 2540 ACRES.

29 MINERAL CLAIMS - CHEMAINUS DISTRICT

C. F. GROUP NUMBERS:

14150 TO 14159	INCLUSIVE	10 CLAIMS
14162 TO 14169	"	8 "
14174		1 "
14185 TO 14188	"	4 "
14197 TO 14202	"	6 "

26 Crown Granted Mineral Claims and Fractions

Lot No.	Name	Lot No.	Name
35 G	Lenora*	43 G	N T Fraction*
36 G	Tyee*	39 G	Richard III*
37 G	Key City*	41 G	Magic Fraction*
60 G	International Fraction*	53 G	Estelle*
18 G	Tony*	18 G	Donagan***
19 G	X L*	54 G	Westholme*
63 G	Donald*	51 G	Blue Bell*
108 G	Muriel Fraction*	50 G	Moline Fraction*
87 G	Doubtful Fraction**	59 G	Westholme Fraction***
85 G	Thelma Fraction**	21 G	Dixie Fraction***
86 G	Imperial Fraction**/***	44 G	Golden Rod*
20 G	Herbert*	47 G	Nellena*
110 G	Phil Fraction**	4 G	Acme***

* Chemainus District ** Seymour District *** Somenos District

Lands Optioned From V. H. Patriarche

"All those parcels of land situate in the Chemainus Land District on Vancouver Island in the Province of British Columbia lying within the boundaries of the area outlined in red shown on the attached sketch marked Plate I described as commencing at a point nine thousand (9000) feet due east of the northwest corner of Block 278, thence due north in a straight line a distance of six thousand (6000) feet, thence east at a right angle in a straight line to the western boundary of the east one-half of section seven (7), range one (1), thence northerly along said western boundary of the east one-half of section seven (7), range one (1) to the northern boundary of section seven (7), thence easterly along said northern boundary of section seven (7) to the eastern boundary of range two (2), thence southerly along said eastern boundary of range two (2) to the point of intersection with the southern boundary of the Chemainus Land District, thence westerly along the said southern boundary of the Chemainus Land District to a point on said southern boundary being the intersection of the southerly extension of the first described line, thence northerly along said extension to point of commencement, the area herein described comprising twenty-five hundred and forty (2540) acres, more or less."

OWNERSHIP

The properties described above are owned or held under option by Mt. Sicker Mines Ltd, N.P.L.

LOCATION AND ACCESS

Situated about 14 miles by road from the city of Duncan, the property lies upon the slopes of Mount Sicker, which is a heavily-wooded mountain of medium to rugged relief rising to an elevation of nearly 2300 feet above sea level. The Chemainus River flows along the northerly base of the mountain.

The mine and mill sites are serviced by eight miles of all-weather road, partly paved, partly gravelled, which joins Trans-Canada I six miles north of Duncan.

Electric power and telephone services are four or five miles distant; however, for preliminary work, diesel-driven units could be rented. Labour and supplies for a surface and underground program should not be a problem. Water can be taken from hillside creeks or pumped from the Chemainus River. Timber required for underground renovation is in good local supply. The old office and Change House buildings can be repaired and put to good use. A 150-ton concentrator on the property is not in good condition and is being disposed of.

HISTORY

The Mount Sicker area owes its development to the fact that in 1897 a forest fire and subsequent rains swept bare the hillside, disclosing a gossan outcrop which proved to be the surface exposure of the Lenora and Tyee south orebodies. During that year separate interests began surface and underground work on each claim.

A brief history of the three main claims (Lenora, Tyee and Richard III) is given in chronological order. Much of the following information was gleaned from the annual reports of the Minister of Mines of British Columbia.

LENORA

1898 Drifting, crosscutting and sinking. Two parallel ore zones identified.

1899 Development and stoped ore stored in dumps. Some hand-picked ore sent to a smelter.

1900 to mid-1902 Lenora-Mount Sicker Mining Company formed. Development and stoping continued. Shipped ore by wagon, narrow-gauge railway, E & N RAILWAY, to Ladysmith thence by steamer to Van Anda, Everett and Tacoma smelters.

Late 1902 Railroad completed to the mine. Smelter completed at Crofton. Shortly after shipments commenced to Crofton the mine was closed because of litigation.

1903 to 1907 Minor work done and small shipments of ore from the dump made to Crofton.

1924 Re-opened under lease and bond by R. G. Mellin, primarily to re-examine the north ore zone, which was reported to assay 2% copper, 7% zinc, with $1.50 in gold and silver. This ore had become attractive because of advances made in separating copper and zinc by flotation.

1925 No work.

1926 Ladysmith Tidewater Smelters Ltd. took over assets of Tyee mine and smelter and leased the Lenora. Under the direction of R. G. Mellin an adit was started on the Lenora to connect both mines to provide efficient working conditions.

1929 The lease on Lenora was dropped and work ceased.

TYEE

1897 to 1901 Explored and developed the property with drifts, crosscuts and shafts. Made a small shipment of sorted ore in 1901 which ran 8% copper, $5 in gold and $5 in silver per ton. The bulk of production stored in surface dumps.

1902 to 1907 Completed construction of aerial tramway to Somenos where ore was transshipped by E & N Railway to the newly-built Tyee smelter at Ladysmith. A 1250-foot shaft sunk to develop lower grade ore zone found on 1000, 1150 and 1250 levels. Much development, exploration and production during these years. Concentration tests were being made on low grade ore when mine closed due to low price of copper. Work done on Tony, XL, Key City and Westholme claims disclosed some copper mineralization.

1928 Tyee holdings taken over by Pacific Tidewater Mines, Ltd, which then obtained from Mellin the Lenora lease. The adit being driven on the Lenora towards the Tyee was continued and ore was encountered.

1929 Pacific Tidewater Mines,Ltd. taken over by Ladysmith Tidewater Smelters, Ltd. No work done on Tyee or Lenora, and Lenora lease dropped.

RICHARD III

1898 to 1907 Developed and explored sporadically but lacked sufficient working capital for efficient operations. Shipped some ore from dump to Tyee Smelter. When work stopped ore was showing on floor of the 500 level.

1924 to 1925 Victoria interests undertook further exploration of north ore zone through drifting, crosscutting and sinking after which no further work done until the beginning of World War II.

SHEEP CREEK GOLD MINES LTD

1939 Sheep Creek optioned Lenora, Tyee and Richard III.

1940 A considerable amount of diamond drilling and development was done before option dropped due to low zinc price.

TWIN J MINES LTD

1942 to 1944 Taken over by Twin J Mines Ltd. who drilled and sampled followed by underground rehabilitation and preparation of mine site. Milling began in mid-1943 at 125-150 tons daily. Much exploration and development done. Operations suspended in 1944 when sales contract with Wartime Metals Corporation was cancelled. Most production came from the Lenora North ore zone.

1946 1947 Retimbered underground operations. Mining and milling resumed. Concentrate shipped to Tacoma and Trail. Closed in September.

1949 Property taken over by Vancouver Island Base Metals Ltd. They repaired Tyee shaft, retimbered tunnels, developed and drilled before ceasing work.

1951 1952 Re-opened and milled 9,754 tons. Modest exploration program carried out. Closed in January 1952.

1964 to 1966 1967 The present interests blasted an outcrop on the Lenora and shipped 167 tons to Tacoma Smelter. Subsequently, Mt. Sicker Mines Ltd. was formed to work the property. A feasibility study has been made with regard to leaching of copper from the ore zones and dumps.

PRODUCTION RECORD

Period	Tons	Gold ounces	Silver ounces	Copper pounds	Zinc pounds	Lead pounds
1898-1907	252,678	35,600	738,019	19,078,049		
1943-1944	34,893	2,617	71,531	921,175	4,270,903	418,716
1947	8,295	507	15,878	173,952	536,995	
1951-1952*	9,754	316	15,554	86,773	713,954	85,757
1964	167	12	294	5,814		

* 2,629 lbs. of cadmium recovered.

COMPARATIVE METAL PRICES

Year	Copper U.S. cents/ pound	Copper L.M.E. pounds/ long ton	Silver U.S. cents/ ounce	Lead U.S. cents/ pound	Zinc U.S. cents/ pound	Gold U.S. dollars/ ounce
1901	16.12	66.79	58.95	4.33	4.08	20.67
1902	11.63	52.46	52.16	4.07	4.84	"
1903	13.24	57.97	53.57	4.24	5.40	"
1904	12.82	58.59	57.22	4.31	4.93	"
1905	15.59	69.47	60.35	4.71	5.88	"
1906	19.28	87.28	66.79	5.66	6.20	"
1907	20.04	87.01	65.33	5.33	5.96	"
1908	13.21	59.90	52.86	4.20	4.73	"
1939	10.97	48.26	39.08	5.05	5.11	35.00
1940	11.30	62.00	34.77	5.18	6.34	"
1943	11.78	62.00	44.75	6.50	8.25	"
1944	11.78	62.00	44.75	6.50	8.25	"
1947	20.96	130.54	71.82	14.67	10.50	"
1951	24.20	233.00	89.37	17.50	18.00	"
1952	24.20	259.48	84.91	16.47	16.22	"
1966	36.09	408.89	129.30	15.00	15.00	"
Canadian Prices:						
1966 Nov.	45.00	490.00	140.50	14.00	14.50	37.85
1967 June	47.25	402.50	180.17	14.00	13.75	37.84

The U.S. and London prices were taken from the Engineering and Mining Journal. The 1966 and 1967 Canadian prices were taken from The Northern Miner.

GEOLOGY

The area is underlain by a series of cherty tuffs, graphitic schists, sodic-andesites, porphyry, sodic-rhyolite porphyry and sodic-diorite. The cherty tuffs are light grey rocks, usually consisting of 1/8" to 1/2" laminae of cherts separated by thin layers of sericite schist. Where undeformed, the rocks are slaty, but where they are deformed they possess laminae and are bent into small canoe-shaped folds. Where intensely deformed, either by close shearing or folding, the tuffs are very schistose and it is difficult to identify the former chert layers which serve to distinguish these rocks from the more schistose phases of the rhyolite porphyry. The cherty tuffs are always associated with black graphitic schists.

Much of the black schist has been folded into a succession of small drag-folds, and where dragfolding has been so extreme that it passes into shearing, the thin laminae of the schist have been nearly destroyed and are difficult to identify in the resultant sheared rock. This series is classified tentatively as belonging to the Mount Sicker Group of rocks.

The series strikes N 70° W and dips 50° to the southwest. The andesite porphyry is intrusive into the sediments, andesite porphyry and early phases of the diorite, but it is cut by the later phases of the diorite. Diorites are generally older than both the sediments and the andesite porphyry but some phases are younger than the rhyolite porphyry and other phases are older than the rhyolite.

ORE DEPOSITS

The ore deposits occur as a replacement of folded, cherty tuffs and related graphitic schists. There are two separate, easterly-trending bodies about 150 feet apart known as the North orebody and the South orebody. The ore is of two closely allied types; one type, called "Barite ore", consists mainly of barite and sulfides with small amounts of quartz; the second type, called "Quartz ore", consists mainly of quartz and chalcopyrite. The two orebodies are parallel and lie along two main dragfolds in the band of sediments. Study of the ore deposits from underground openings is impossible because of caved workings.

The North orebody measures about 1700 feet along the strike, 120 feet down dip, and from one to 10 feet in width.

The South orebody lies about 150 feet south of the North orebody and has a length of 2100 feet, a depth of about 150 feet, and a thickness of 20 feet or more. The upper limit of this orebody is about 150 feet higher than the North orebody.

Post Ore Faults: Two main faults striking east and west and dipping vertically displaced the orebodies. The north fault is between the two orebodies. This fault strikes into the South orebody at a small angle. Near the Richard III shaft it is 26 feet north of the ore, further west near the Tyee shaft it is closer, and near the portal of No. 1 adit it makes the north wall of the ore. The fault displaces the South orebody 200 feet upward and an unknown distance eastward with respect to the North orebody. Long sections of barite drag-ore may be seen in the north fault below the South orebody.

The south fault lies 80 to 100 feet south of the Tyee shaft and south of the South orebody. Very little is known about this fault. Diagonal faults, which moved segments of the ore southward and downward relatively small distances, give a resultant plunge to the orebody that is steeper than the horizontal crestlines of the drag fold. However, because of reversal of the vertical displacement in some of the diagonal faults, the orebody does not exhibit any appreciable plunge.

Ores: The Barite ores are a fine-grained mixture of pyrite, chalcopyrite, sphalerite and a little galena in a gangue of barite, quartz and calcite. The order of mineralization from oldest to youngest is as follows: barite, calcite, pyrite, sphalerite, chalcopyrite and galena, quartz and late calcite. A characteristic of this ore is its banded appearance. Quartz ore is fairly uniformly mineralized with chalcopyrite. Mineralogical composition of this ore is as follows: Pyrite 4.1%, chalcopyrite 20.5%, sphalerite 0.3%, galena trace, barite 1.1%, quartz 68.1%, calcite 5.6%. In addition, some of the chalcopyrite occurs as layers or streaks that follow unreplaced layers of schist in the quartz.

Barite: The presence of barite as a gangue mineral in the "barite ore" and as separate occurrences in the mine adds another economic consideration to the ores. It is reported that an appreciable tonnage of barite was indicated by early operators. Tentative markets for the barite have been investigated and samples have been sent to an interested company for analysis and study. The Mount Sicker areas have been mentioned in the 1947 report of the Minister of Mines of British Columbia as a source of by-product barite. This mineral occurrence warrants further consideration.

The ores are later than both the folding and metamorphism of the sediments. They appear to be closely related to the sodic-rhyolite porphyry and sodic-diorite. This association has been observed in important pyrite deposits of the Rio Tinto district in Spain and elsewhere.

The localization of the orebodies has been controlled structurally by a regional fracture zone and by drag folds in the narrow band of tuffs and graphitic schists. The fracture zone is a regional feature, which can be traced for a total distance of eight miles and was encountered on the bottom level of the 1250-foot Tyee shaft. Little is known about the mineralization along the full length and depth of this zone because the early operators largely ignored it as uneconomic, but it constitutes a potential exploration target of great importance.

Lands Under Patriarche Option: Because of the scarcity of outcrops, these lands were explored by geochemical methods. The results were subsequently checked and reasonably confirmed the Self-Potential surveys. Several anomalous areas and zones up to 1000 feet in length were found to be lying approximately parallel to the major regional fracturing and to the Twin J orebodies. Soil samples indicate the presence of copper, lead and zinc mineralization.

These areas should be explored by shallow diamond drill holes.

LEACHING

Leaching of sulphide ores may be defined in general terms as the process which, when carried out under favourable conditions employing one or more species of bacteria, oxidizes mineral sulfides to mineral sulfates which are often soluble in water. The metals contained in the solution are treated to produce saleable metallic compounds which frequently command premium prices because of their relatively high purity.

Metals such as copper, and later on, iron and uranium have been profitably recovered by leaching in many parts of the world including Spain, the U.S.A. and Canada.

Although bacterial action has been used in heap leaching, mostly in copper mines, since the earliest recorded time, it was not until the 1940's that it was realized that the leaching action in sulfide ores was due to bacterial action and that the presence of bacteria speeded up the oxidation process by one thousand or more times the natural rate. This discovery has spurred research into the possibility of recovering by leaching metals such as molybdenum, mercury, lead, zinc and others.

Late in 1966, Bio Metals Corporation Ltd agreed to undertake a feasibility study to determine whether or not the dumps and mineral-bearing zones at Mt. Sicker could be leached.

Work done includes trips to the property for examination, sampling and design layout; continuous leaching tests on prepared samples done in the Bio Metals laboratory; chemical tests and assays to determine ore characteristics and values; engineering estimates and reports on work begun in November 1966 and currently in progress; design of a pilot plant, partial construction of two liquid retaining ponds and preparation of a site for the leach heap in the Lower Lenora dump area which is below the lowest drainage point of the mine.

The Tyee, Upper Lenora, and Lower Lenora dumps were surveyed and sampled. Respectively the dumps are estimated to contain 50,000 to 150,000 tons assaying 0.48% Cu; 20,000 to 50,000 tons assaying 0.22% Cu;

and an unknown scattered tonnage assaying 0.17% Cu. Laboratory results indicate that a probable cut-off grade of 0.2% Cu would be profitable.

The pilot plant will consist of a leach base or pad, two reservoirs for the storage of fresh water and leach solutions, and a processing plant, all situated just below the lowest (Lenora No. 3) adit.

Initially it is proposed to use the Upper Lenora dump for heap material on the leach base. Removal of this dump will expose a good cross-section of the ore zone which could permit some open pit mining if required. Later on the Tyee dump will be leached in place as it is ideally situated and some of the leach solutions may be directed through parts of the old underground workings and would flow by gravity to the pilot plant reservoirs.

It is indicated from past records that the unmined ore zones in the Richard III, the Tyee, and the Lenora mines contain enough copper to warrant further investigation of in situ leaching.

Experiments by Bio Metals on the Mt. Sicker ores suggest that the areas might be further fractured by blasting or by hydraulic fracture. The rock mechanics analysis indicates several sets of planes of preferred shear. More work in the laboratory and in the field should be done before planning a rock fracturing program.

SUMMARY

The Mt. Sicker Mines Ltd. property in the Victoria Mining Division, British Columbia, was discovered in 1897 and has produced important amounts of gold, silver, copper and zinc, as well as lesser amounts of lead and cadmium.

The property is located 14 road miles from Duncan, B.C., and consists of 800 acres of mineral claims and Crown Granted mineral claims, plus 2540 acres of land optioned from V. H. Patriarche. It is favourably located with regard to transportation, water supply, electric power, labour and supplies. There are no severe weather conditions which might cause work stoppages.

In general, the surface of the property has not been adequately prospected and mapped. Some detailed mapping was done in 1943 and 1944, but this was not correlated to the underground work.

Underground development, exploration and mining have been extensive. Most of it was done in areas of high grade ore during the early part of the century when metal prices were low or when metallurgical processes were relatively crude. Modern methods would permit efficient

recovery of more of the economic minerals.

Metal prices are much higher now than during the period 1901 to 1908. For example, the U.S. copper price is 2.4 times higher, while silver and gold prices are up 2.2 and 1.7 times respectively.

The high grade orebodies located to date occur within a major fracture zone which has been traced on surface for eight miles and which has been encountered, still strongly going down, at a depth of 1250 feet near the Tyee shaft bottom. From these observations it appears to be persistent on both strike and dip. Sulfide mineralization in the fracture zone has been reported by the former operators, but was not considered to be ore at that time.

The possibility of marketing crude barite is being investigated by an interested company.

A progress report prepared by Bio Metals Corporation Ltd. on the feasibility of leaching at Mt. Sicker indicates that:

(1) A pilot leach plant is justified and should return a profit during the fifth month of operation.

(2) Material for the leach heap is available from the Upper Lenora dump.

(3) Exposure of the ore zone covered by the Lenora dump may lead to limited mining from surface to provide ore to replenish the original heap.

(4) The Tyee dump can be leached in place. It seems probable that in this case some of the ore zone underlying the dump would be leached in situ and the solutions would flow by gravity through the underground mine to the pilot plant for treatment.

ESTIMATED COST OF EXPLORATION PROGRAM

An exploration program is envisaged which would require some rehabilitation of underground workings, repair of the old change house buildings, a limited program of underground mapping, sampling and diamond drilling, completion of surface mapping and correlation with underground data, and a surface drilling program on the main ore zones and the Patriarche option. The estimated cost is as follows:

Repair surface facilities	$ 7,000.00
Underground rehabilitation	60,000.00
Underground exploration	25,000.00
Surface exploration	48,000.00
	$140,000.00

ESTIMATED COST OF LEACH PILOT PLANT

Bio Metals estimates that the following capital or pre-production expenses are required to put a pilot leach plant into operation on a profitable basis:

Water reservoir completion	$ 500.00
Access roads	500.00
Heap base construction	5,000.00
Move 20,000 tons of Upper Lenora dump to base	6,000.00
Processing plant	6,000.00
Acid storage	3,500.00
Pumps	3,000.00
Piping	4,000.00
Precipitation (iron powder)	2,000.00
Solution storage tanks	3,000.00
Culture tanks, etc.	2,000.00
Laboratory equipment	2,500.00
Filters, dryers, handling equipment	21,000.00
Utility vehicle	4,000.00
Contingencies	5,000.00
Labour to production	10,000.00
Engineering to production	10,000.00
Operating costs prior to receipt of sufficient proceeds from sales	25,000.00
	$ 113,000.00

Respectfully submitted

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
E. P. SHEPPARD

E Percy Sheppard

E. Percy Sheppard, P.Eng.
Consulting Geologist

Vancouver, B.C.

June 17, 1967.

C E R T I F I C A T E

I, E. PERCY SHEPPARD, do hereby certify that I am an independent Consulting Geologist with offices at 402 West Pender Street, Suite 314, Vancouver 3, British Columbia.

I am a member of the Association of Professional Engineers of British Columbia, the Geological Association of Canada, the Society of Exploration Geophysicists, and the A.I.M.E.

I have been active in mining geology and geophysics for the past thirty years.

I am a graduate of Dalhousie University, Halifax, Nova Scotia, with a B.Sc. in Geology.

The information for the accompanying report was obtained from an examination of the property and a study of records, publications, assay plans, and pertinent reports, during the periods October 31, 1966 and May 25, 1967.

I further certify that I have no direct or indirect interest in the property described herein, nor in the share capital or securities of Mt. Sicker Mines Ltd, and do not anticipate any interest as a result of writing this report.

E. Percy Sheppard

E. Percy Sheppard, P. Eng
Consulting Geologist

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
E. P. SHEPPARD

June 17, 1967
Vancouver, B.C.

REFERENCES

Various Annual Reports of the Minister of Mines for British Columbia from 1897 on.

Robert Musgrave: Copper Deposits of Mt. Sicker, Vancouver: The Engineering & Mining Journal, pages 673 and 674, October 27, 1904.

Walter H. Weed: Notes on the Tyee Copper Mine: The Engineering & Mining Journal, pages 199 to 201, January 25, 1908.

John S. Stevenson: Geology of the Twin J Mine: The Canadian Institute of Mining & Metallurgy Transactions, Volume XLVIII, 1945, pages 294 to 308.

J. E. Reeves: Barite 1965, Mineral Processing Division, Mines Branch, Department of Mines & Technical Surveys, Ottawa, Ontario.

* * *

INTERIM

GEOLOGICAL REPORT

MT. SICKER MINES LTD. (N.P.L.)

As recommended in the accompanying Geological Report dated June 17, 1967, a detailed geological study of a relatively small area being proposed for development by Mt. Sicker Mines Ltd. was made by the writer, under the direct supervision of E. P. Sheppard, P. Eng., on June 25-28, July 6-9, July 17-August 21, 1967, a 44-day period. The area covered in detail was 7600' long, trending E-W, and 3000' wide, trending N-S. Several days of preliminary reconnaissance traverses of the whole property were made before undertaking the mapping (scale: 1"= 100') of the surface and accessible underground openings of the relatively small area in question. Dennis Compton assisted the writer throughout the field work. The following discussion briefly summarizes the results of the writer's observations on the area which is being prepared for development.

Within the vicinity of the mine area, the rocks recognized are the sedimentaries consisting of closely associated cherty tuffs and carbonaceous slates; the igneous rocks which include quartz-feldspar porphyry and its phase or facies of feldspar porphyry, and fine to medium-grained gabbro-diorite or sodic-diorite; and the low-grade metamorphics such as graphitic quartz-sericite schist, quartz-sericite schist with minor chlorite, and quartz-chlorite schist with minor sericite.

The sedimentaries are believed to be the oldest rocks in the area into which were intruded as sills, dykes and irregular masses, the igneous rocks. Some andesitic flows are reported to occur with the sedimentary rocks in places. Moderate folding and faulting took place, followed by the emplacement of the granodiorite not shown on the accompanying map as it outcrops a few miles to the northwest and southeast of the area under consideration. The low-grade metamorphics were formed along shear zones affecting all rock types of pre-granodiorite age. The spatial relation of the schists, their gradational contacts, and the presence of certain features or components in them may serve to disclose the identity of the primary rocks from which they were derived. For instance, the graphitic quartz-sericite schist points clearly to the sedimentary origin, while the chlorite-rich schist indicates gabbro-diorite as its source, whereas the warty appearance of the cleavage surfaces of a quartz-sericite schist shows that it is probably a derivative of feldspar porphyries as evidenced by its gradational contacts elsewhere.

Several shear zones have been observed in the area and their positions coincide with the resulting rock alteration or low-grade metamorphism delineated as QSS, CQS, and QCS on the map. Of these, the one which occupies a zone of strong fracture and, incidentally, follows a relatively narrow band of sedimentary rocks now altered to graphitic quartz-sericite schist situated between igneous rocks, is

the most significant one economically as this zone contains all the known orebodies on the property.

The orebodies are in the form of shallow-occurring lenticular masses, localized within two easterly trending closely related parallel ore zones; the northern and southern ore zones, 150 feet apart laterally, confined within a narrow band of sheared and dragfolded graphitic quartz-sericite schist, underlain and overlain by feldspar porphyries and/or gabbro-diorites which locally transect the schist in places. On the surface the narrow band of graphitic quartz-sericite schist is about 200 feet wide, 2800 feet long, striking west-northwest with an average dip of 50° south-southwest. It split up into two parallel bands for the most part as a result of post-ore vertical displacement along a strike fault, and as these bands are both mineralized, they are here designated as north ore zone (North Orebody) and south ore zone (South Orebody). The richer massive ore was almost depleted by earlier mining operations. Nevertheless, some sizeable orebodies of lower grade category and disseminated sulphides suitable for "in-situ" leaching are believed to exist in the mineralized schist.

The rest of the claims in the vicinity of the Richard III were visited to examine the rocks where geophysical anomalies occur. No specific relationship exists between rock types and anomalies.

RECOMMENDATION

It is recommended that the other phases of the work be carried out as outlined by E. P. Sheppard in his Geological Report dated June 17, 1967, as follows:

> "It is recommended that a total expenditure of $253,000.00 be made to repair service facilities; to rehabilitate part of the underground workings to permit mapping, sampling and diamond drilling; to complete the surface mapping; to diamond drill from surface the original ore zones and geological structures as well as the anomalies on the lands held under the Patriarche option; and to complete and operate the pilot leach plant on the property."

Daniel M. Bosco

Daniel M. Bosco, B.Sc.
Geologist

October 20, 1967
Vancouver, B.C.

CURRICULUM VITAE

NAME: Daniel M. Basco, Landed Immigrant in Canada since October 27, 1964.
PLACE & BIRTH DATE: Guagua, Pampanga, Philippines, July 21, 1911.
MARITAL STATUS: Married with 2 dependent children.

RESUME OF TRAINING & EXPERIENCES

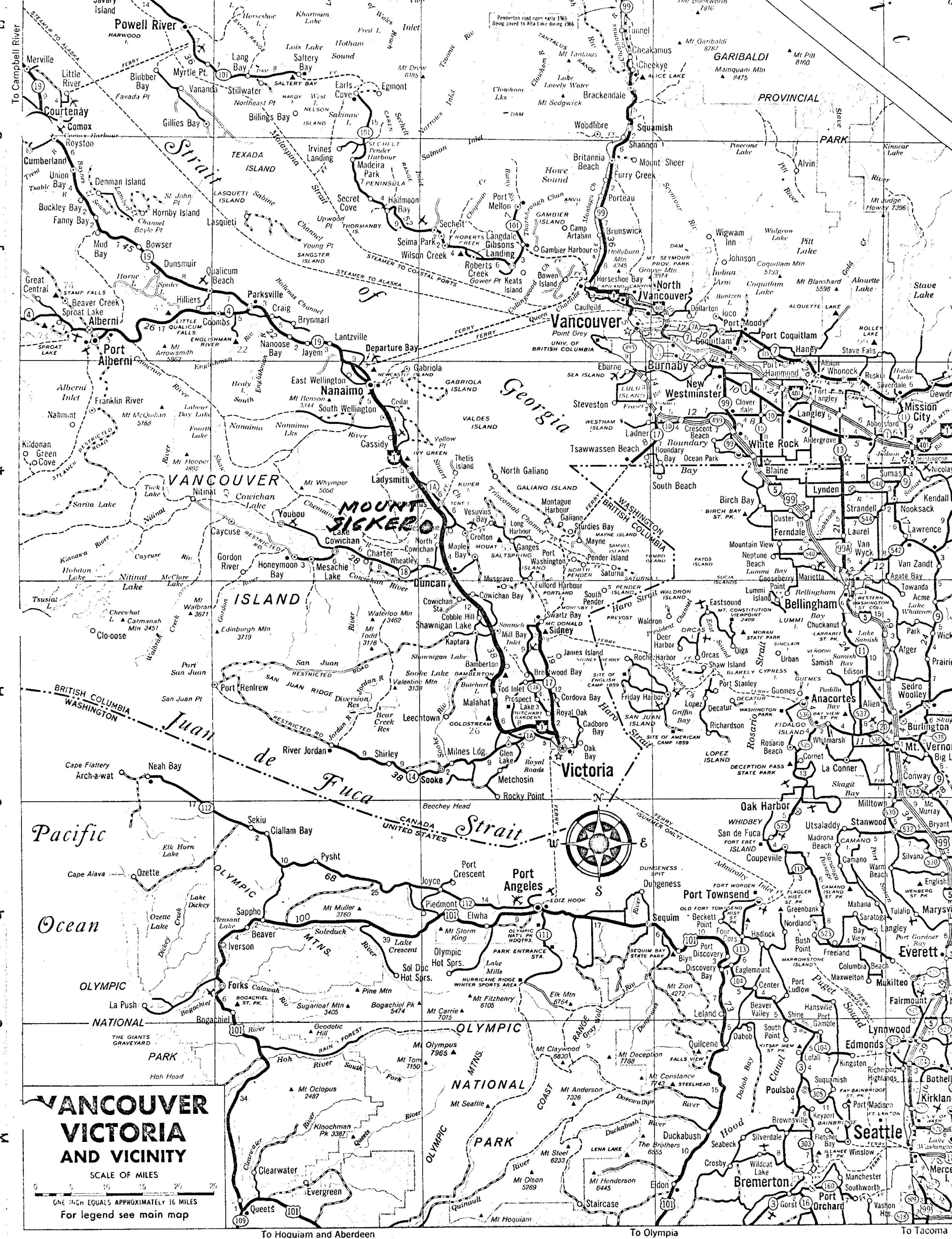
March 1935	Awarded BACHELOR OF SCIENCE degree in GEOLOGY by the UNIVERSITY OF THE PHILIPPINES.
1935 - 1936	Geologic Trainee, Marsman & Company, American owned mining corporation in the Philippines.
1936 - 1942	Instructor in Geology, University of the Philippines.
1942 - 1945	Geologist, Mitsui Mining & Smelting Company which operated copper mines in the Philippines during the 2nd World War.
1945 - 1948	Instructor in Geology, University of the Philippines.
1948 - 1951	Professor of Geology, Legazpi College, Legazpi City, Philippines.
1951 - 1954	Geologist, Philippines Bureau of Mines, Manila, Philippines.
1954 - 1956	Field Geologist, LUZTEVECO, Manila, Philippines.
1956 - 1964	Chief Geologist, Marinduque Mining & Industrial Corporation and its subsidiary Island Oil & Industrial Corp., Manila, Philippines.
Spring-Summer 1957	Made studies and observations of base-metal exploration projects in Japan under the auspices of Mitsui Mining & Smelting Co. and Nanyo Bussan, Tokyo, Japan.
1962 - 1964	Editor, Mineral Engineering Magazine, Manila, Philippines.
1964 - 1965	Vice- President, the Geological Society of the Philippines.
1965 - 1967	Geologist, Western Mines Limited, Vancouver Island, B. C.
June 1967-date	Geologist, Sheppard & Graham Consultants, Vancouver, B. C.

REGISTRATION, MEMBERSHIPS IN PROFESSIONAL & SCIENTIFIC SOCIETIES

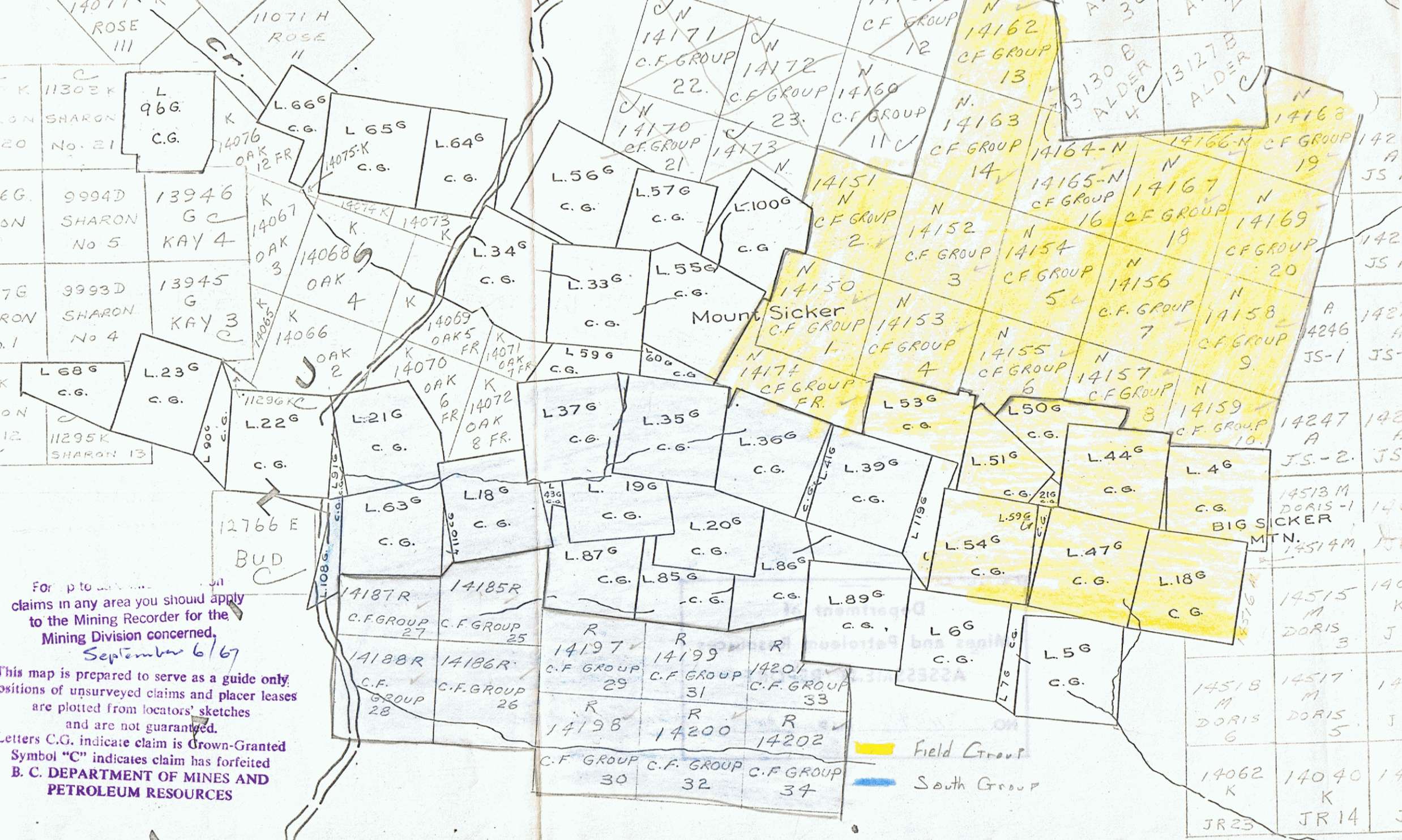
Registered Geologist, Certification No. 8, Republic of the Philippines.
Associate, National Research Council of the Philippines.
Member, the Geological Society of the Philippines.
Member, Philippine Society of Mining, Metallurgical & Geological Engineers.
Member, American Institute of Mining, Metallurgical & Petroleum Engineers.
Fellow, Geological Association of Canada.

Daniel M. Basco
Daniel M. Basco
.....
SIGNATURE

August, 1967



VANCOUVER
VICTORIA
AND VICINITY
SCALE OF MILES
0 5 10 15 20 25
ONE INCH EQUALS APPROXIMATELY 16 MILES
For legend see main map
MOUNT SICKER
Pemberton road open early 1966
Being paved to Alta Lake during 1966
To Campbell River
Powell River
Merville
Courtenay
Comox
Royston
Cumberland
Union Bay
Denman Island
Hornby Island
Buckley Bay
Fanny Bay
Mud Bay
Bowser
Dunsmuir
Qualicum Beach
Great Central
Beaver Creek
Sproat Lake
Alberni
Port Alberni
Parksville
Craig
Brynmarl
Coombs
Nanoose Bay
Jayem
Lantzville
Departure Bay
Nanaimo
East Wellington
South Wellington
Gabriola
Cedar
Cassidy
Ladysmith
Chemainus
Youbou
Lake Cowichan
Caycuse
Honeymoon Bay
Mesachie Lake
Gordon River
Charter
North Cowichan
Wheatley
Duncan
Cowichan Bay
Cobble Hill
Shawnigan Lake
Kaptara
Bamberton
Malahat
Leechtown
Port Renfrew
River Jordan
Shirley
Sooke
Milnes Ldg.
Glen Lake
Metchosin
Rocky Point
Royal Roads
Victoria
Royal Oak
Cadboro Bay
Oak Bay
Cordova Bay
Brentwood Bay
Prospect Lake
Tod Inlet
Saanich
Sidney
Swartz Bay
James Island
Fulford Harbour
Ganges
Vesuvius Bay
Crofton
Maple Bay
Port Washington
Pender Island
Saturna
Mayne
Galiano
Montague Harbour
North Galiano
Thetis Island
Lasqueti
Texada Island
Lang Bay
Myrtle Pt.
Stillwater
Blubber Bay
Vananda
Gillies Bay
Saltery Bay
Egmont
Earls Cove
Irvines Landing
Madeira Park
Pender Harbour
Halfmoon Bay
Secret Cove
Sechelt
Selma Park
Wilson Creek
Roberts Creek
Gibsons Landing
Langdale
Port Mellon
Keats Island
Bowen Island
Gambier Harbour
Horseshoe Bay
Brunswick
Porteau
Furry Creek
Britannia Beach
Mount Sheer
Shannon
Squamish
Woodfibre
Brackendale
Cheekye
Cheakamus
Alice Lake
Garibaldi
Provincial Park
Alvin
Howe Sound
Strait of Georgia
North Vancouver
Vancouver
Caulfeild
Dollarton
Ioco
Port Moody
Port Coquitlam
Coquitlam
Burnaby
Haney
Stave Falls
Port Hammond
Whonock
Ruskin
Mission City
Fort Langley
Langley
Abbotsford
Aldergrove
New Westminster
Cloverdale
Eburne
Steveston
Ladner
Crescent Beach
White Rock
Tsawwassen Beach
Boundary Bay
South Beach
Blaine
Lynden
Sumas
Birch Bay
Custer
Ferndale
Laurel
Van Wyck
Van Zandt
Mountain View
Neptune Beach
Lummi Island
Bellingham
Chuckanut
Samish
Alger
Edison
Anacortes
Sedro Woolley
Burlington
Mt. Vernon
La Conner
Oak Harbor
Stanwood
Coupeville
Marietta
Eastsound
Orcas
Olga
Deer Harbor
Roche Harbor
Friday Harbor
Lopez
Richardson
Waldron
Haro Strait
Rosario Strait
British Columbia
Washington
Juan de Fuca Strait
Canada
United States
Pacific Ocean
Cape Flattery
Neah Bay
Sekiu
Clallam Bay
Pysht
Ozette
Sappho
Beaver
Forks
La Push
Bogachiel
Olympic National Park
Joyce
Port Crescent
Port Angeles
Ediz Hook
Piedmont
Elwha
Lake Crescent
Olympic Hot Sprs.
Sol Duc Hot Sprs.
Sequim
Dungeness
Blyn
Port Townsend
Port Discovery
Discovery Bay
Quilcene
Leland
Brinnon
Dabob
Port Ludlow
Kingston
Suquamish
Poulsbo
Bremerton
Port Orchard
Seattle
Everett
Edmonds
Lynnwood
Mukilteo
Hood Canal
Puget Sound
Seabeck
Crosby
Duckabush
Eldon
Staircase
Queets
Clearwater
Evergreen
Mt Olympus 7965
To Hoquiam and Aberdeen
To Olympia
To Tacoma



For up to date information on claims in any area you should apply to the Mining Recorder for the Mining Division concerned.

September 6/67

This map is prepared to serve as a guide only. Positions of unsurveyed claims and placer leases are plotted from locators' sketches and are not guaranteed.

Letters C.G. indicate claim is Crown-Granted

Symbol "C" indicates claim has forfeited

B. C. DEPARTMENT OF MINES AND PETROLEUM RESOURCES

EXPLANATION

For Symbols Shown on Sections Along Easting Coordinates

Stoped Ore.

Quartz Sericite Schist & Graphitic Schist, interlayered, sheared, contorted & dragfolded. Derived from sediments of alternating cherty tuff & carbonaceous slates. A possible Ore Zone. (Graphitic Quartz-Sericite Schist on Geologic Plan Map).

Quartz Sericite Schist. Derived from alteration of quartz feldspar and/or feldspar porphyry.

Quartz Chlorite Schist. Derived from alteration of gabbro-diorite.

Quartz Feldspar and/or Feldspar Porphyry.

Gabbro-Diorite and/or Sodic Diorite.

Sedimentary Rock of interbedded cherty tuff and carbonaceous slates.

Fault. Defined and ill-defined respectively.

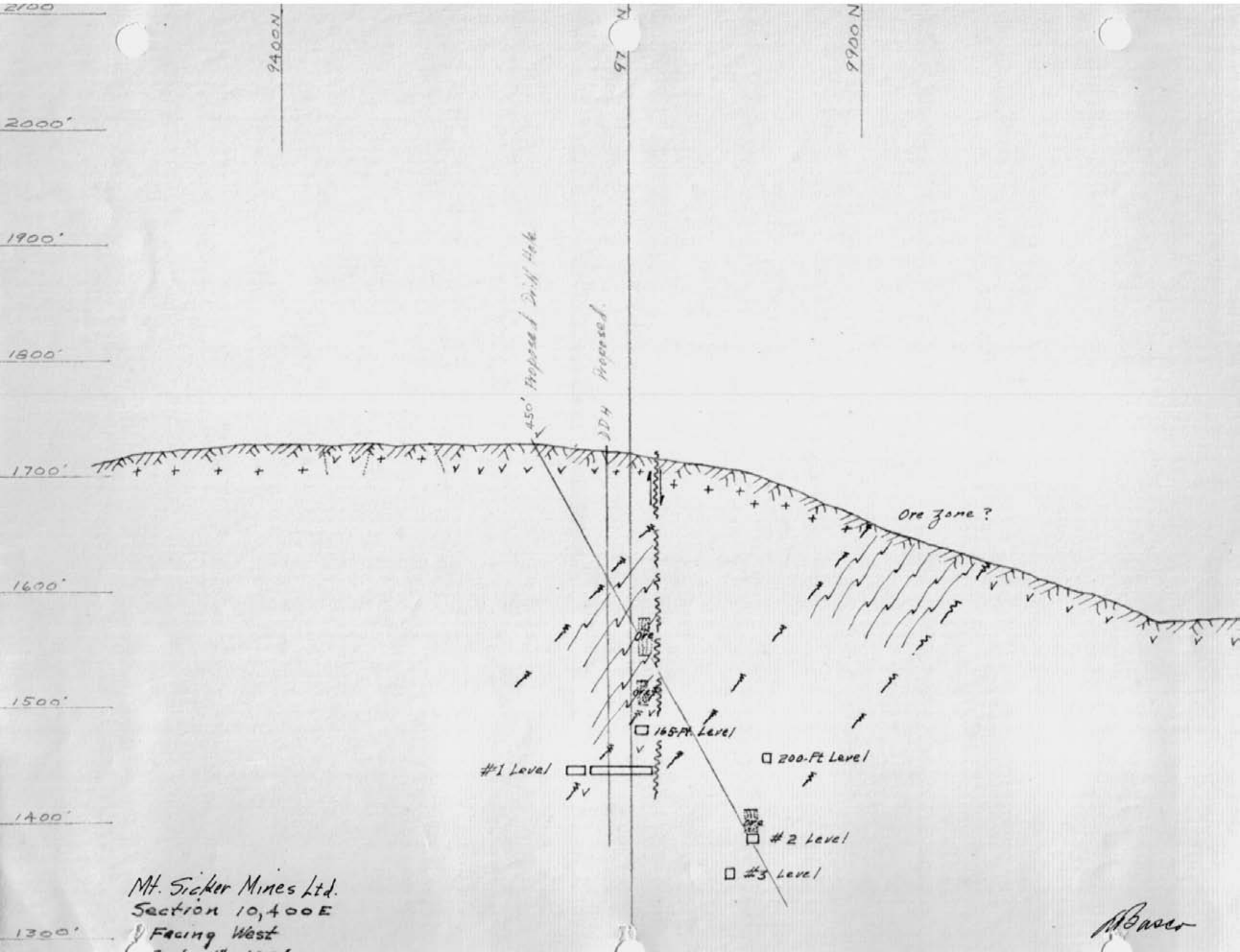
Geologic Contact. Assumed or gradational.

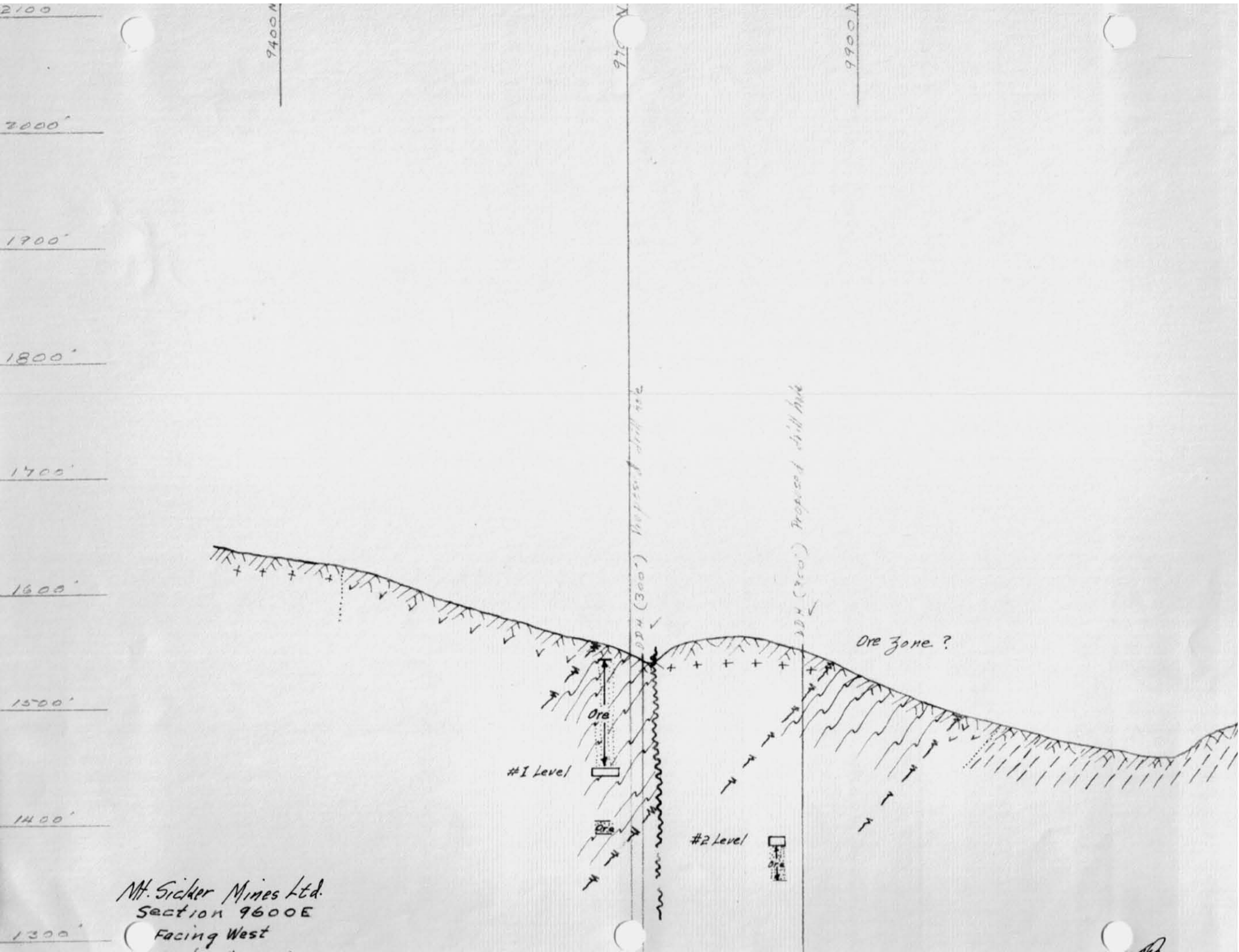
Sections of drifts, levels or cross-cuts.

Shears and/or Shear Contact.

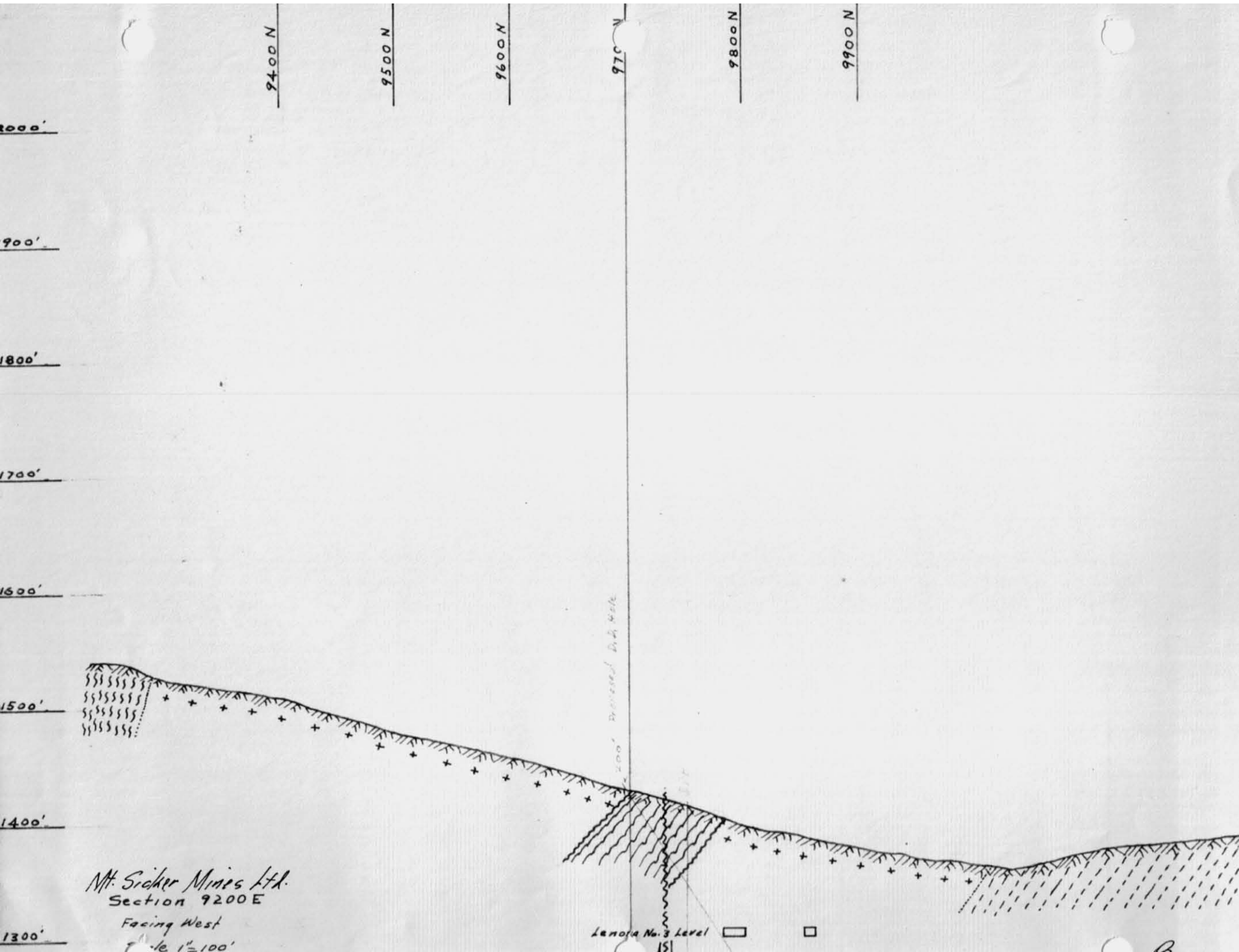
Mt. Sicker Mines Ltd.

Daniel M. Basco

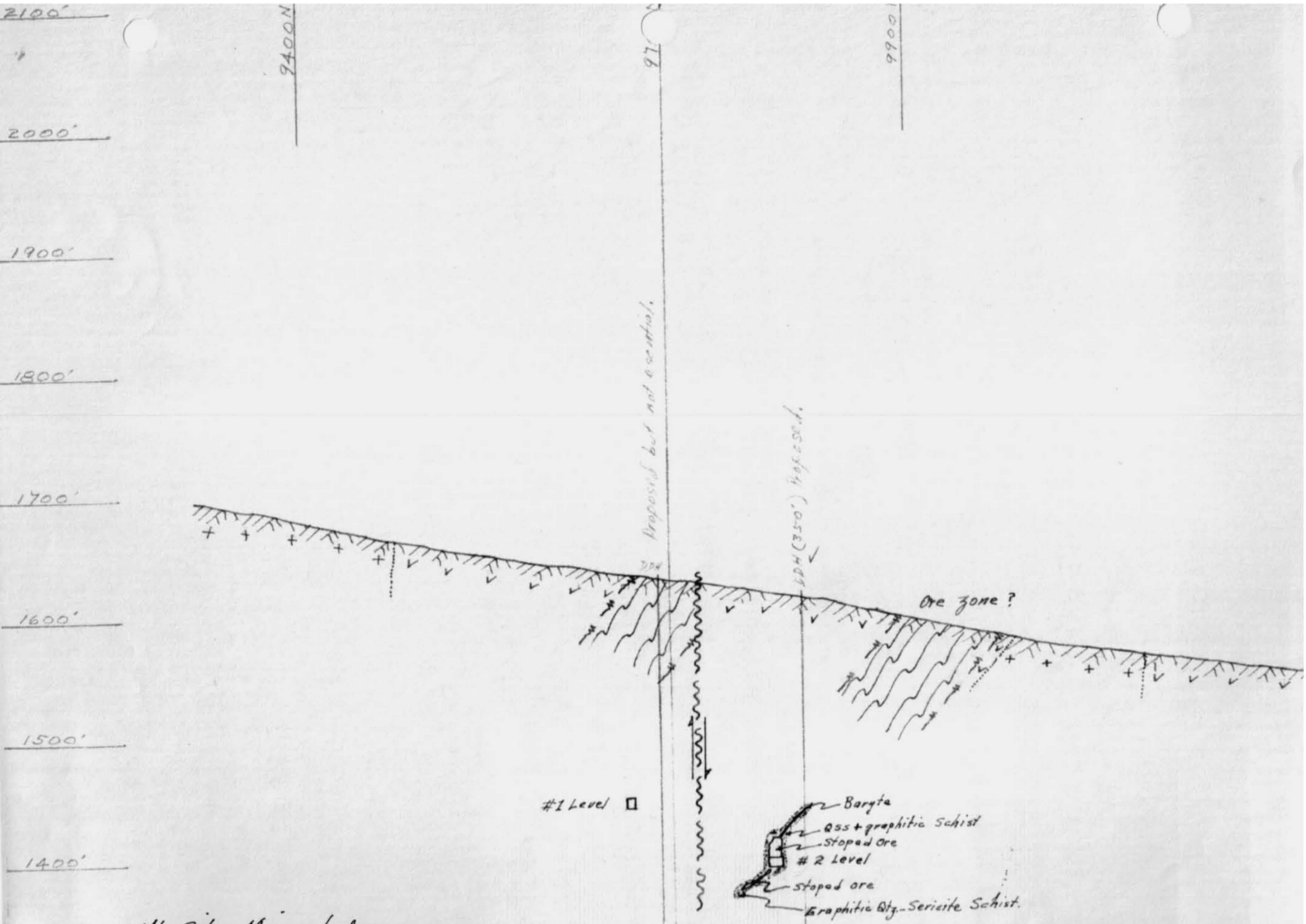

2100'
2000'
1900'
1800'
1700'
1600'
1500'
1400'
1300'
9400N
9700N
9900N
450' Proposed Drill Hole
DDH Proposed
Ore Zone ?
Ore
Ore
165-Ft. Level
#1 Level
200-Ft Level
#2 Level
#3 Level
Mt. Sicker Mines Ltd.
Section 10,400E
Facing West



Mt. Sicker Mines Ltd.
Section 9600E
Facing West



Mt. Sicker Mines Ltd.
Section 9200E
Facing West
Scale 1"=100'



Mt. Sicker Mines Ltd.
Section 10,000E
Facing West

E. PERCY SHEPPARD
CONSULTING GEOLOGIST

402 WEST PENDER STREET, SUITE 517
VANCOUVER, B.C.

October 20, 1967

INVOICE

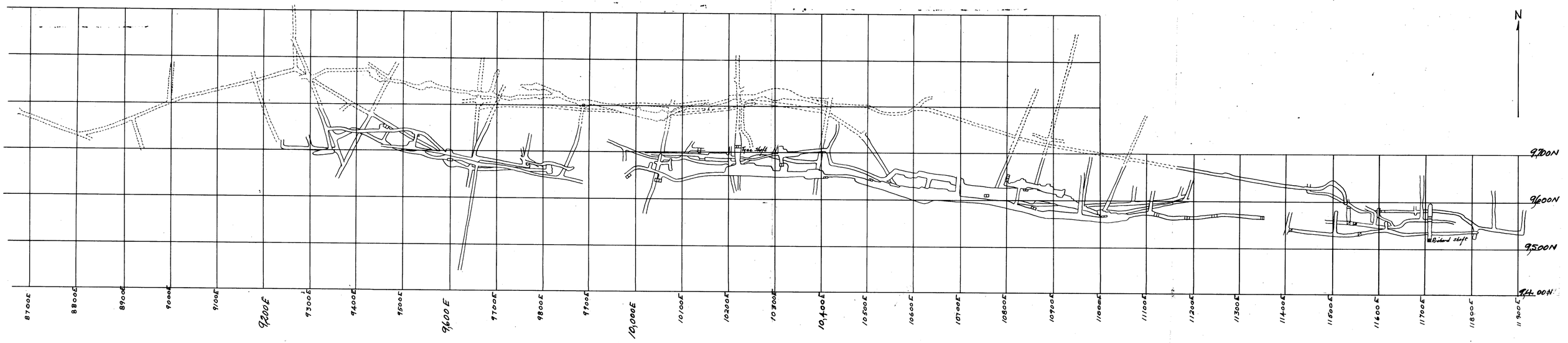
In Account With:
Mt. Sicker Mines Ltd
P. O. Box 576
Victoria, B.C.

Field Work (Senior Geologist) Daniel M. Basco
110 hours @ $21.00/hour, 6-hour day ....$ 2310.00

Office Compilation (Maps & Reports)
15 hours @ $6.00/hour 90.00

TOTAL .....$ 2400.00


LEGEND & SYMBOLS
GQS GRAPHITIC QUARTZ - SERICITE SCHIST
QSS QUARTZ - SERICITE SCHIST
QCS QUARTZ - CHLORITE SCHIST
QFP QUARTZ FELDSPAR AND/OR FELDSPAR PORPHYRY
GD GABBRO - DIORITE OR SODIC DIORITE
TS SEDIMENTARY ROCKS: INTERBEDDED CHERTY TUFF & CARBONACEOUS SLATES
TRACE OF THE ORE ZONE
FAULT: DEFINED & ASSUMED
GEOLOGIC CONTACT: ASSUMED AND/OR GRADATIONAL
SCHISTOSITY OR FOLIATION: VERTICAL AND DIPPING
SHAFT
MINE ROAD
GEOPHYSICAL ANOMALY
1104
Mt. SICKER MINES LTD. (npl)
GEOLOGIC MAP
MINE AREA & VICINITY
DATE: October 24, '67
SCALE: 1" = 100'
DRAWN BY: D.M. BASCO
To ACCOMPANY GEOLOGICAL REPORT ON Mt. SICKER MINES
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 1104 MAP 4
1104



Mt. Sicker Mines Ltd.

Composite Plans Map

of

Underground Workings

Scale 1" = 100'

To accompany Geological Report on Mt. Sicker Mines

Oct. 20, 1967

Ronald M. Brace

1104

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 1104 MAP 3