690040

MITS DEVELOPMENT COMPANY LTD.

VANCOUVER, B.C.

REPORT

UPON THE

PROSPECTS FOR EXPLOITATION

OF

CERTAIN MICA DEPOSITS

IN BRITISH COLUMBIA

June 1978

H. S. HASLAM & ASSOCIATES LIMITED

CONSULTING COAL MINING ENGINEERS

2144 NELSON AVENUE

WEST VANCOUVER, B.C., CANADA V7V 2P7

Telephone (604) 922-2633

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MITS DEVELOPMENT COMPANY LTD.

INFORMATION SUMMARY

May 1, 1978.

PROPERTIES

The mica properties of MITS Development Company Ltd. are located in the following ten areas of British Columbia, but current plans call for mining and milling activities to be located at the Valemont deposits:

Valemont/Canoe River - Engineering reports indicate this deposit to be a minimum of 200,000 tons yielding 80% muscovite.

Clearwater/Canim Lake

Albreda/Camp Creek

Albreda

Armstrong

North of Mackenzie

Revelstoke/McCulloch Creek

Baker Inlet

Tete Jeune Cache area

McLellan

Drilling and additional exploration is required on all of these properties, and it is planned that some of this work will be accomplished during the summer of 1978. Sheet mica is available on at least one of the properties.

MARKETING

Distribution and Transportation

The market for the various types of processed mica is quite extensive with some users requiring only small quantities. The best method of distribution appears to be through dealers or distributors located in the various market areas, who could maintain warehouse facilities and in some cases be able to accept bulk carload shipments. Current plans and estimates call for the product to be shipped bagged and on pallets.

Railroad siding facilities at the MITS Development Company's Valemont mill would permit rail shipments, either palletized or if in bulk by hopper car (minimum shipping tonnage per car - 100 tons) or by truck averaging 23 tons per load.

Contacts to date with companies involved in distribution indicate that they are definitely interested in working with producers who have a quality product, with substantial reserves, and who can supply the product on a constant basis at reasonable prices.

Market Areas and Tonnages

The market area for the MITS Development Company's mica production is estimated to be the area of Central and Western Canada(not available to the only Canadian competitor, Martin Marietta International Ltd. at Boucherville, Quebec), the Northwestern United States, particularly the west coast states including California, Japan and Europe.

As a result of market survey and analysis, it is estimated that the following portion of customer requirements could be supplied:

Drill mud(oil exploration)	Alberta	700	tons per annum
Drywall -	Alberta	1000	" "
	B.C.	1200	" "
	Washington	3000	" "
	Oregon	2000	" "
	California	8000	" "
Paint -	B.C.	20	" "
	Alberta	15	" "
	Washington	50	" "
	Oregon	40	" "
	California	300	" "
	Total	16325	" "

No demand quantities have been established for the Far-East or the E.E.C. as it has been impossible to obtain statistics at this time. However, Japan has imported mica from Canada in the past and companies contacted have indicated a desire to do so again.

Other Considerations

At present, Western Canadian requirements for mica are met mainly by importation from the United States. The duty is 5%. A Canadian-produced product has an economic advantage over the U.S. product of about 16% related to duty and currency exchange.

The major requirements of the domestic United States market are supplied from Southeastern United States producers, who enjoy a preferential freight structure.

The average price of all mica imported into Western Canada and the Northwestern United States is $184.00 per ton. Harrison Crossfield, the largest distributor of mica in the U.S. and Canada, reports that its landed cost of material from production facilities in North Carolina at Los Angeles destination is in excess of $160.00 per ton.

India, which has historically been a major supplier of mica, particularly sheet mica, has increased prices dramatically over the last two years.

Plant

A plant has been designed with a capacity of three tons per hour, capable of dry and wet grinding, removal of discoloration, separating, bulk loading and bagging.

Initially, operations would be based on quarrying and bag filling on an eight hour basis with milling operations adjusted to production requirements; reference Note 2 to the financial projection. For example:

> Annual production of 18,000 tons - obtained from twenty-four hour plant operation over fifty weeks of five working days.

Annual capacity of 25,200 tons - obtained from twenty-four hour plant operation over fifty weeks of seven working days.

This plant would be installed in close proximity to the mica property at Valemont which is close to road and rail transportation.

Estimated capital costs for this plant and miscellaneous ancillary requirements is:

Plant	$563,900.00
Miscellaneous, including rail siding, laboratory equipment, etc.	186,600.00
Total	$750,500.00

MITS DEVELOPMENT COMPANY LIMITED

Mica Production And Sales

Financial Projection First Four Years

Year	Quantity Tons (Note 1)	Production Cost Per Ton (Note 2)	Amortization $750,000. @ 15% over ten years (Note 3)	G.& A. Costs Per Ton (Note 4)	Gross Cost Per Ton	Selling Price Per Ton	Profit Per Ton	Gross Income Before Tax
1	12,000	43.50	12.10	7.50	63.00	110.00	47.00	564,000.
2	16,000	43.50	9.07	5.62	58.19	110.00	51.81	828,960.
3	18,000	43.50	8.07	5.00	56.57	110.00	53.43	961,740.
4	25,000	43.50	5.80	3.60	52.90	110.00	57.10	1,427,500.

NOTES TO FINANCIAL FORECAST

Note 1 Product is dry ground scrap mica (muscovite).

Note 2 Details of production costs. Mining and transporting material to mill to be accomplished by a contractor at $6.00 per ton.

Plant labour -

- 1 combination lab.tech. plant mgr., mining engineer - single shift.
- 1 charge hand - gen.superintendent - single shift.
- 1 maintenance man and crusher operator combination single shift.
- 1 handler - front end loader, fork lift operator, crusher helper - single shift.
- 2 bagger - single shift.
- 6 plant operators - 2 per shift - 3 shift operation.

Cost per ton - Summary

mining and transportation to mill	$ 6.00
milling	27.00
bagging	8.00
palletizing	2.50
Total cost per ton	$43.50

Note 3 Amortization of capital cost is based on $750,000. over a ten year term at 15% or $142,200.00 per year.

e.g. cost per ton first year -

$$\frac{\$142,200.}{12,000.} = \$12.10 \text{ per ton.}$$

Note 4 General and administration management, legal, accounting, sales, travel and office rental, etc. estimated at $90,000.00 per annum.

1. INTRODUCTION

1.1 Increasing attention is being paid to the production of mica, in its various natural forms, to fulfil market applications which are both traditional and new to the mica industry.

1.2 Mica has been worked from a limited number of deposits in British Columbia over the years, as mentioned in the literature, but not to any great extent, nor of recent date.

1.3 Mica consumed by industry in British Columbia is imported from overseas, mainly from India and the United Kingdom, in addition to large quantities which come from the United States, thus freight costs account for a large proportion of the delivered cost.

1.4 It is intended that the Company should attain a position to compete in the British Columbia market by taking advantage of cheaper transportation costs for B.C. - produced mica, and thereafter to expand their market area, first to cover the north western United States and second to more distant areas.

1.5 It is appreciated that there are many grades of mica required by the market, of differing chemical analysis and physical characteristics, thus attracting a wide price range per ton. We believe that we should first match the simply-processed product of a given deposit to a section of the market, and then to develop, by more specialized processing techniques, a more highly priced product to satify market demand when this is identified.

2. SOME STATISTICS OF THE MICA INDUSTRY

2.1 World Production of Mica by Principal Countries in 1965.

Source: Client's Files.

Country	Type	'000s. Production (metric tons)	Total Prod'n %
United States	Sheet Scrap	325) 109,093)	55.71
Canada	All	402	.20
Brazil	All	1,500	.76
India	Block Splittings Scrap	1,442) 9,426) 26,663)	19.05
Malagasy (phlogopite)	Block Splittings	91) 538)	.32
Norway	All	3,000	1.52
South Africa	Scrap	2,268	1.15
Rhodesia	Block Crude	29) 80)	.05
Tanzania	Sheet	103	.05
Several other countries		42,040	21.34
World Total		197,000	100.00

2.2 Imports into Canada for 1976

Source: Fed.Dept.Ind.,Trade & Commerce.

Class	Commodity/Country	Tons	$/'000s. Value	Average per ton
479-33	Mica Blocks, sheets and Ground Mica			
	United Kingdom	51.8	22	$ 424.
	India	0.4	1	$2,500.
	United States	5,124.8	946	$ 184.
479-36	Mica Fabricated			
	United Kingdom	?	5	-
	Switzerland	?	1	-
	United States	?	560	-
479-39	Drilling Mud			
	United Kingdom	5.75	8	$1,391.
	Netherlands	904.05	951	$1,052.
	United States	30,762.40	6,499	$ 211.
	Total Value		8,993	

3. GENERAL INFORMATION ON THE MICA MARKET.

3.1 In EXHIBIT I we give an extract from "American Paint and Coatings Journal", issue of May 3rd.1976, to indicate the prices, in U.S.Dollars, of FILLERS AND EXTENDERS used in the manufacture of paints and allied products.
It is not suggested that all the minerals quoted can be replaced by mica, thus this list establishes the level of price which mica, duly processed, can command when compared with other minerals of the same industrial family.

3.2 To give an idea of the many and diverse present uses of mica, EXHIBIT II shows a number of advertisements of United States Companies who produce various types and grades. The source of this information is the 1977 Thomas Register.

3.3 EXHIBIT III gives a list of United States Companies who are concerned with DRILLING MUD for diamond drill holes. It is believed that a low grade mica can be successfully employed for these muds, in place of more expensive minerals of equivalent or less specific gravity. Source: Thomas Register 1977.

3.4 EXHIBIT IV gives a list of United States Companies who are concerned with EXPORTING AND IMPORTING mica and mica products.
Source: American Register of Exporters and Importers.

3.5 EXHIBIT V gives a list of European Companies who export and import mica and mica products.

3.6 EXHIBIT VI gives a list of Canadian Companies who are maufacturers of COATINGS for various purposes, such as abrasion resistant, concrete, roof and structural, phosphate, pipe and plastic. This is field of manufacturing in which mica and mica products can play an important role, and also be used as a substitute mineral for some of those presently used.

3.7 A list of a score, or so, of mineral dealers in the State of California is available to us, which should receive attention as time permits, as we believe it could yield valuable market possibilities.

4. MARKET DEVELOPMENT TO DATE

4.1 We envisage two phases for an attack upon the mica market, as follows:

(i) to replace mica and mica products presently imported into Canada, by production from deposits in B.C.

(ii) by producing mica and mica products from B.C. deposits which can substitute for minerals such as talc, gypsum, china clay (kaolin), drilling mud, asbestos and others.

This latter phase will require due market research effort.

MICA IMPORTERS & DEALERS

SHIOZAKI & CO., LTD.

AKASAKA COMMERCE BUILDING,
2 OF 10, 3-CHOME, AKASAKA, MINATO-KU,
TOKYO, JAPAN.

PHONES:
586-7711 (PILOT LINE)

CABLE ADDRESS: "MICASHIO" TOKYO
TELEX: J23652

January 11, 1978.

Messrs. Ets Tool Corporation,
535 Airport Road South,
Vancouver, B. C.,
Canada.

Dear Sirs, Attention: Mr. J. G. Mathieson.

Thank you for your letter of December 29, offering to supply Wet and Dry Ground Mica.

However, our market is limited for Ground Mica (mica powder), and the domestic requirements are amply met, for the present at least, from local production, which is mainly Muscovite Mica using material from India. The local manufacture is Wet Ground powder.

We would believe that your mica, if of Canadian origin, is of the Phlogopite Type, which we used to import regularly before WWII in the form of Blocks and Splittings from Hull, Ontario, but which material we were advised after the war is no longer available.

Of interest to us would be Phlogopite Mica Scrap (which material we believe you are using in the manufacture of Ground Mica), and if you can supply this Scrap material we would like to receive some samples together with information as to the price and quantities available on a monthly basis. Packing would be in strong gunny sacks of 50 kgs. net weight, and the scrap material should be free from stones, clay/mud and other non-mica foreign inclusions.

We will look forward to receiving your early reply on the above enquiry.

Yours very sincerely,
Shiozaki & Co., Ltd.

T. Hagiya

T. Hagiya.

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE

5.1 The following notes give the status of each of the mica deposits which have so far been investigated or recognised.

A map of British Columbia showing the location of each of these occurrences is given in EXHIBITS VII(a) and VII(b).

PROPERTY "A" - VALEMOUNT/CANOE RIVER

Registered Claims - August 5th.1977
Number of Claims - 6
Name of Claims - VTS GRID
Record Number - Revelstoke 467
- Cariboo Mining Division

Access - By good paved road off the main highway from Kamloops to Tete Jaune Cache/Jasper.

Reserves of ore - estimated at 200,000 tons. This figure may well be subject to upward revision with further exploration.

Former Operations at the Property.

A company known as Georgian Mineral Industries Ltd. formerly worked the property. They produced a raw mica which was crushed, flaked, dried and cleaned at their plant at Cedarside, B.C., which is 85 miles west of Jasper, Alberta. Final processing of this product was carried out by Magnet Cove Barium Corporation Ltd.('Magcobar') at a plant at Rosaling, Alberta, who sold the resultant product under the trade name of GEOMICA.

The mica claims were formerly held by Mrs. G. C. Short of Red Deer, alberta, but were allowed to lapse, and they have been now staked for MITS Development Co.Ltd.

EXHIBITS VIII(a), VIII(b) and VIII(c) are promotional literaure on the Geomica product.

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "A" - continued

A Memorandum written by Mrs. Short, then President of Magcobar, around July 24th.1961 is reproduced in EXHIBIT VIII(d) gives the situation of the operations of Georgian Minerals Ltd. at that time.

A drilling programme started in October,1961, and the Preliminary Report of this is given in EXHIBIT VIII(e).

Two samples of muscovite mica were submitted to the Federal Department of Mines and Technical Surveys in Ottawa for identification, and a letter from them to Magcobar dated January 10th.1962 contains the following paragraph :

> "An X-ray diffraction analysis of the clear, pink material (GM-9) indicated that it was garnet. In the same I found rare, shiny, black , metallic grains of rutile and ilmenite. A microscopic examination of the other sample (GM-12) shewed that the principal constituent had a dull bronze colour rather than black. It gave the X-ray diffraction pattern of pyrrhotite. Although I could not make any measurement of the magnetic properties, it seemed to me that this specimen was rather more strongly magnetic than most pyrrhotites"

Interesting details of the operation of Georgian Mineral Industries Ltd. are given in a letter from Mrs. G. C. Short, President, to Canadian Chieftain Petroleums Ltd. dated November 24th.1961. This is reproduced in EXHIBIT VIII(f).

EXHIBIT VIII(g) gives a spectrographic analysis of this mica ore

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "B" - CLEARWATER/CANIM LAKE

This property lies to the north of Canim Lake, and to the west of the western boundary of Wells Gray National Park.

(Mr. Inverarity will interview Mrs. Younger, of 4025, Cedar Hill Road, Victoria B.C. regarding an option on 26 acres of Crown Grant land west of Clearwater, as well as considering additional staking of land)

(Exhibits marked EXHIBIT IX relate to this property)

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "C" - ALBREDA/CAMP CREEK

Registered - September 22nd.1977
Number of Claims - 4
Name - Canoe GRID
Record Number - Quesnel 486
- Cariboo Mining Division

This deposit lies to the NNW of the hamlet of Albreda, and the mica is exposed on the west side of the main highway from Kamloops to Tete Jaune Cache/Jasper.

EXHIBIT X(a) shows the location of these claims.
EXHIBIT X(b) is an extract from the Report of the Minister of Mines of B.C., 1915, Pages K54 and K55.

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "D" - ALBREDA

Registered	-	November 22nd.1977
Number of Claims	-	3
Name	-	DEC GRID
Record Number	-	Quesnel 556
	-	Cariboo Mining Division

This property lies to the west of the Canadian National Railway line from Kamlooops to Tete Jaune Cache/ Jasper. Mica is exposed in a railway cutting some four miles north of Albreda station.

EXHIBIT XI(a) shows the location of these claims.

(A further Report will be made as opportunity permits.)

EXHIBIT VIII(g) gives a spectrographic analysis of this mica ore.

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "E" - ARMSTRONG

Registered	-	September 29th.1977
Number of Claims	-	2
Name	-	ARM GRID
Record Number	-	Vernon 387
	-	Vernon Mining Division

The Annual Report of the Minister of Mines of British Columbia, 1927, Page 213 reads as follows:

> "Sheets of mica measuring up to 7 by 10 inches are reported to occur in a pegmatite dyke near Armstrong station, on the Sicamous-Okanagan Landing branch of the Canadian Pacific Railway, 30 miles south of Sicamous. The dyke is about 100 feet wide and lies a short distance from a wagon road. No active development of the deposit has as yet taken place"

(Exhibits marked EXHIBIT XII relate to this property.)

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "F" - NORTH OF MACKENZIE

This property, consisting presently of one claim, has not been registered as yet by MITS D.Co.Ltd. It is in a remote pleace, 108 miles north of Mac-Kenzie, and access is only available for travel in the summer months. It is proposed to consider this property during the Summer of 1978.

The name of the Claim is FACTOR GRID.

(Exhibits marked EXHIBIT XIII relate to this property.)

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "G" - REVELSTOKE/MCCULLOCH CREEK

Number of Claims - 4

Name - RCGMC

- Revelstoke Mining Division

Lot No.	Registered Date	Record Number
2669	July 25th.1977	Revelstoke 377(7)
2658	Aug. 3rd.1977	Revelstoke 382(8)
2657	Aug. 3rd.1977	Revelstoke 381(9)
2661	Aug. 3rd.1977	Revelstoke 383(8)

Options are being negotiated on other claims and Crown Grant lands in this area from Mrs. Cutt and Mrs. Oakey, also from Stanmark Mines Ltd. of Victoria, B.C. in respect of the following lots:

2663	2500	2498
2768	2664	2499
2497	2725	

EXHIBIT XIV(a) shows the area referred to.

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "H" - BAKER INLET

Registered - November 14th. 1977
Number of Claims - 4
Name - BAKER GRID
Record Number - Prince Rupert 493
- Skeena Mining Division

This property lies 35 miles south of Prince Rupert on Baker Inlet, which is off the Grenville Channel. Additional exploration is required to outline the reserves and to permit staking of more claims. Reference is made to a portion of the land covered by the claims in the Annual Report of the Minister of Mines of British Columbia, 1934, Part B, which is quoted in EXHIBIT XV(a), and a map of the area is reproduced in EXHIBIT XV(b).

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "I" - TETE JAUNE CACHE AREA

None of these properties have yet been staked owing to inclement and winter weather conditions, but it is intended to do so when opportunity permits. Seven claims are involved, and these will be the subject of negotiation with Mr. John Morton of Vancouver, B.C. Their numbers are:

510	512	514
511	513	515 and 516.

They lie at elevations between 6,800 ft. and 8,160 ft. above sea level, on the west and east sides of Bonanza Creek near Mica Mountain, seven miles south of Tete Jaune Cache station on the Canadian National Railway line from Kamloops to Jasper.

Access is by an old road for approximately four miles and thence by three miles of trail. Staking would involve the use of a helicopter.

EXHIBIT XVI(a) shows a plan of the claims

EXHIBIT XVI(b) is a Report dated September 18th.1941 by J. M. Cummings of the British Columbia Department of Mines and Petroleum Resources.

EXHIBIT XVI(c) shows the Report of the Minister of Mines for B.C., 1921, Pages N95 and N96.

EXHIBIT XVI(d) shows the Report of the Minister of Mines for B.C., 1928, Page C188 and C189.

EXHIBIT XVI(e) is a Report upon four claims, known as the Barron Mineral Claims, which lie in the cirque to the north of Mica Mountain and are located in between or adjacent to Lots Nos. 510 to 516. The Report is by J. F. V. Millar, P.Eng., dated January 9th. 1959, and was registered as Serial 276 for

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "I" - TETE JAUNE CACHE - continued

assessment purposes with the British Columbia Department of Mines and Petroleum Resources.

Nothing of any moment can be done on the above property or claims until the Summer of 1978.

5. INVESTIGATIONS OF OCCURRENCES OF MICA TO DATE - continued

5.1 PROPERTY "J" - MCLELLAN

This property has not yet been staked owing to its remote location, which is some four miles west of the Kamloops - Tete Jaune Cache/Jasper Highway.
Access is difficult, and staking will involve the use of a helicopter.

6. EVALUATION OF PROPERTIES

Drilling and additional exploration is required on all of the properties, and it is planned that some of this work will be accomplished during the Summer of 1978.

Sheet mica is available on at least one of the properties.

TAMARS ENGINEERING LTD. 5351 AIRPORT ROAD, RICHMOND, B.C. V7B 1B5 PHONE (604) 278-6414 - 278-0534

7. MICA PROCESSING FACILITY - TECHNICAL AND OPERATING FEATURES

Engineering considerations

Study of mica processing shows two distinct basic methods of product preparation. The first method is the dry grinding of relatively clean mica ore along with its associated "free" silica. This material is used principally in the building trades for surface spraying purposes and its present production capacity is readily absorbed in an expanding market.

A second and more involved method is the wet process in which mica is separated from the "free" silica by floatation with added capabilities for acid washing to remove undesirable stain from the mica or silica should this be required. The second method produces a refined, silica free, clean mica product with wide application in dry wall manufacture and as a sealant for paint.

Market surveys indicate the need to meet a wide range of mica specifications, many of which may be attained by the two primary processes. However, there are many secondary requirements such as sheet mica in various sizes as well as silica and even dyes.

Because of the foregoing variations and possible wider range of product requirements which marketing may reveal in the oil well, insulation and electrical component industries, the watchwords "flexibility" and "expansion" were the first to be underscored in early engineering considerations of a facility.

It became obvious after early study of marketing requirements that a modern mica processing plant should have the capability to produce mica both by the wet and dry process. This is particularly true when the combined process methods and the selling price of each product is considered. Wet processed material of a more refined nature sells for three times the selling price of any processed material, yet the former costs only approximately 25% more to produce. Overall economy of this nature can be obtained by employing a combined process method in which the crushing, raw storage, materials handling, milling, drying, dust collecting, classifying and bagging facilities are common to both the wet and dry systems. The following describes such a process plant with estimates of capital and operating costs.

Description of the process

Primary separation: Run of mine mica at an approximate size of -12" will be selectively stockpiled in an open area adjacent to the crushing plant (see drawing MA 100 and flow sheet MA 101) and is withdrawn by a front-end loader and dumped into a feed hopper located over a belt or pan feeder which will discharge material to one of two crushers. Depending on the type of raw material being processed, it may be fed directly to an impact type crusher for severe and fine reduction or be diverted to a double rolls crusher

or similar machine when it is necessary to preserve sheet size mica. Primary crushed material is collected on a conveyor belt running below the crushers and discharges into the boot of a bucket elevator.

The material is then elevated to an operating level at the top of three(3) raw material storage silos upon which a double deck vibrating screen is located. Crushed material is spouted from the elevator over the screen where three(3) separations are made. Tentative sizing of the separations are -20 mesh, ¼" x 20 mesh and + ¼". Minus 20 mesh material dischargee directly into the wet process silo below the screen while ¼" x 20 mesh is spouted into the dry process silo. Plus ¼" material is either spouted back to the crusher in close circuit or diverted into the triangular bin formed by the exterior surfaces of the wet and dry process silos and closed by flat plates. This material would be withdrawn from the triangular bin by a vibrating feeder and passed over a picking belt before being returned to the crusher via a closed circuit conveyor. The third silo forming the operating level will store sand or silica and will be discussed later in the process.

Discharge spouts from the vibrating screen are arranged with gates to permit diversion of ¼" x 20 mesh material to the wet process bin or return to the crusher for further reduction. It can be seen from the drawings that ¼" x 20 mesh having once been deposited in the dry process bin say still be returned to the crusher for further reduction if more wet process material is required.

Dry process: Raw material, ¼" x 20 mesh, is withdrawn from the dry process silo via a distribution screw conveyor which runs below the three silos, and discharges into a pants 'leg feed hopper located above the fluid energy mill. Two screw feeders withdraw raw material from the hopper and discharge it at points feeding two (2) opposing high pressure air nozzles in the pulverizing chamber of the fluid energy mill. Here the material de-laminates and grinds against itself by natural edge contact of its single cleavage while flash drying in the high velocity streams of hot air. Although this is a "dry" process, it is anticipated that the raw material will have approximately ten percent (10%) surface moisture. The ground material is then air swept into a cyclone type dust collector from which the fines are aspirated and finally collected in a bag type dust filter. Oversize material from the cyclone is returned to the feed hopper by gravity flow and oversize return screw conveyor, where it is close-circuited with the fluid energy mill.

Fine material entrapped in the dust filter is continuously withdrawn and fed by screw conveyor to two (2) gyratory, multi-deck ecreens in parallel. These 10-deck screens separate -100 mesh product which is then transported via screw conveyor to a product-holding bin. Oversized material from the screens is returned by the oversize return screw conveyor to the mill feed hopper for additional grinding and is close-circuited with the fluid energy mill.

A fluid energy source of compressed air is provided by two (2) 300 HP air compressors delivering 3000 CFM of free air at 100 Psig. The compressed air is then passed through the heating coils of a gas-fired furnace and heated to a temperature of approximately 600° F before being distributed to the inlets of the opposing high pressure nozzles in the grinding mill. Temperature of the air will be determined by the moisture content of the raw material.

Energy in the compressed air is expanded in the pulverizing chamber by impact, expansion and drying. The material laden air is aspirated from the chamber, under the influence of an induced draft fan, through a vertical duct at slight negative pressure. The air passes through the cyclone, which separates oversized material, then carries the finer material into the bag type dust filter. Cleaned air, now at about 200° F, exits the collector and is discharged to atmosphere or to the service heat exchanger via the induced draft fan.

Product is withdrawn from the holding bin by a screw feeder to a weigh scale and single nozzle bagging machine where it is packed in 40-lb paper bags and stacked on wooden pallets. Fork lift trucks stack the loaded pallets in a storage area and load out te haulage trucks at an adjacent loading dock.

The dry process will produce a ground mica assaying approximately 30 - 40% free mica at a size of 100% passing 100 mesh and 60 - 70% passing 325 mesh.

If it should be necessary, the distributing screw conveyor is able to withdraw -20 mesh material from the wet process silo, or silica from its appropriate silo and process either of these materials as described above.

Wet process: The wet process demonstrates the duplicity of the system as it is actually performed in two distinct but continuous and successive stages; wet then dry! Briefly, the wet process simply refines the -20 mesh raw material by removing "free" silica and stain from the ore before grinding and drying it in the dry system.

Minus 20 mesh material is withdrawn from the wet process silo by a volumetric weigh feed where it is closely metered with water in a mixing tank to form a slurry of approximately 40% solids. The agitated slurry overflows from the mixing tank and is piped to a pumping station on thelower floor level. A high and low level switch controls the intake of material and water in the tank.

From the pumping station, the slurry is pumped to the second floor where it is discharged into flotation separation cells where, under air pulsation and aided by flotation media and frothing agents, the mica is floated from the depressed silica and washed from the cells. This mica concentrate may now be transferred to a second flotation cell where it will be subjected to multi-stage acid leaching if necessary after which the water-diluted concentrate is pumped to a centrifuge dewatering

device. When processing a mica concentrate not requiring acid leaching, the concentrate is pumped directly from the initial flotation oells to the centrifuge.

Under vacuum, moisture is drawn from the mica concentrate adhering to the rotating cloth-covered drum, leaving a filter cake of mica which is scraped from the drum by a "doctor plate". Filtrate from the mica concentrate is recirculated by pump to the mixing tank or acid leach tank depending on the operation. Filter cake at approximately 10% moisture drops from the centrifuge drum into a screw conveyor equipped with cut and fold flight. In this conveyor, the filter cake is chopped and granulated before transferring into the distributing screw conveyor which transports the material to the pants leg hopper for feeding into the fluid energy mill. It is at this point that the material enters the second stage of the process and is subjected to the grinding, drying and classification as described under the dry process.

One of the principal by-products of the wet system will be silica sand. As this material is separated from the mica in the flotation cells, it is drained off at a controlled rate and pumped to a sand washer dewatering device located at the operating level above the storage silos. In the reservoir section of the dewaterer, the silica settles out of the tailing slurry and is gently removed from the bottom of the reservoir by an inclined screw conveyor and discharged into the third silo. Strained tailings water overflowing from the dewaterer returns, in close circuit, to the mixing tank.

The collected silica can be withdrawn from the silo by means of the distributing screw at this point in the process and loaded directly into a truck for shipping or conveyed to the fluid energy mill for grinding, drying and classifying to meet a product specification.

This description provides for all products, by either system, to be collected in a common product bin from which they will be bagged for shipping. If it is necessary to provide bulk shipping of any or all products, the flow diagram will indicate the following method. The screw conveyor delivering material to the product bin will be capable of diverting its charge to the boot of a bucket elevator. This elevator will carry the material to the top of three silos, each with a capacity of approximately 3 days production, where a transfer screw conveyor will transport the material to its appropriate silo. The silos will be supported over a structural frame of sufficient height to allow hopper trailers to drive through for grevity loading. A system of two (2) screw conveyors will enable the product in any of these silos to be withdrawn and returned to the product bin where it can be bagged. Bulk loading and bagging of similar or different products may be performed simultaneously.

Operating Costs

The costs to be considered in this paper are those direct costs involved in producing a mica product from the time raw material is recovered from the stockpile for crushing until it is bagged or bulk loaded as a product.

Operating costs will be reduced to a figure representing dollars per ton and will be based on an average raw material containing 50% mica and 50% "frees" mica or other materials. The operating plant will produce mica at a rate of 3 tons per hour over a period of 2 shifts of 8 hours each per day and it is assumed that the primary crushing and screening facilities to have a nominal capacity of 25 tons per hour.

Those costs to be considered as product production costs will include, labor cost, power cost, fuel(heating and transport) cost, additive and acid costs, bags and pallet cost and maintenance and repair cost. Indirect costs and mining costs, etc. will be provided under a separate study.

Power costs will be based on a rate of $0.0515 for first 275 kwh and $0.35 (0.035?) per kwh thereafter. Fuel for transport and heating will be based on diesel oil at a rate of $0.682 per gallon and a heating value of 19,000 btu/lb.

Plant capacity: 3tph x 16 hrs = 48t - say 50 tons per day

Crushing operation: $\frac{50t}{0.5 \times 25\ t/hr}$ = 4 hrs per day

	Equipment	Conn HP	Hrs.Op.	P.F.	HP.Hrs.
Primary Crush'g. & Screening					
1001	belt feeder	5	4	.7	14
2	impact crusher	50	4	.8	160
3	roll crusher	50	-	-	-
4	conveyor belt	5	4	.6	12
5	bucket elevator	10	4	.7	28
6	d.d.vib. screen	5	4	.6	12
					226
Dry System					
2001	distrib.screw conv	5	16	.5	40
2a	feed screw conv	2	16	.8	25.6
2b	" " "	2	16	.8	25.6
5	dust filter	2	16	.5	16
6	screw conveyor	2	16	.8	25.6
7a	gyr screen	2	16	.6	19.2
7b	gyr screen.	2	16	.6	19.2
8	screw conv	5	16	.8	64
9	" "	2	16	.8	25.6
10	bagging machine	2	16	.5	16
12	screw conv	5	16	.8	64
13	bucket el. (bulk ld)	5	8	.7	28
14	screw conv.(bulk ld)	5	8	.8	32

(Operating costs cont'd.)

15	screw conv (bulk ld)	5	8	.8	32	
16	" " "	2	8	.8	12.8	
						445.6

Wet System

3001	volumetric feeder	1	16	.7	11.2	
2	agitator(mixing tank)	2	16	.8	25.6	
3a	pump	5	16	.8	64	
3b	pump	5	16	.8	64	
3c	pump	5	16	.8	64	
4a	separator drive	2	16	.6	19.2	
4b	" "	2	16	.6	19.2	
5	centrifuge	2	16	.6	19.2	
6	screw conveyor	2	16	.8	25.6	
7	water pump (vacuum)	15	16	.8	192	
8	sand dewaterer	.5	16	.8	64	
						568

Air Comp. & Heating

4001	air compressor(s)	600	16	.8	12,000	
3	i.d. fan	15	16	.8	192	
						12,192

Kwh = 12,863.6 x .746 = 9,596 kwh (dry system)

Kwh = 13,431.6 x .746 = 10,020 kwh (wet system)

Power cost (dry system)

$$\frac{275 \times 0.0515 \times 1.15}{50} = \$0.163$$

$$\frac{(12,863.6 - 275) \times 0.035 \times 1.15}{50} = \$5.067$$

$$\$5.23/\text{ton}$$

Power cost (wet system)

$$\frac{275 \times 0.0515 \times 1.15}{50} = \$0.163$$

$$\frac{(13,431.6 - 275) \times 0.035 \times 1.15}{50} = \$5.296$$

$$\$5.459/\text{ton}$$

(Operating costs cont'd.)

Labor Cost (based on 250 tons/5 day week)

Section	Crew	Man hrs. & rate*	= Cost/week
crushing	1 operator	20 @ $ 8.00	= $160.
	1 helper	20 @ 5.00	= 100.
grinding & bagging	1 operator	80 @ 8.00	= 640.
	2 helper	160 @ 5.00	= 800.
(wet process	1 operator	80 @ 8.00	= 640.)
(operation	1 helper	80 @ 5.00	= 400.)
Gen. plant	1 mech/elect.	40 @ 10.00	= 400.
	1 helper	40 @ 5.00	= 200.
Supervisor	1 supt/mgr.		= 500.

* Rate includes insurance & benefits, etc.

Labor cost(dry system) = $2,800.
Labor cost(wet system) = 3,840.

Labor cost per ton(dry system) = 2800/250 = $11.20/ton
Labor cost per ton(wet system) = 3840/250 = $15.36/ton

Maintenance & repair (based on 12,500 tpy)

Item	Annual cost
Fuel (diesel)	$3,500.
Lubricants	1,000.
F.E. mill nozzles	1,500.
Automotive spares (tires)	600.
Mechanical matls.	1,500.
Electrical matls.	1,500.
	$9,600. (say $10,000.)

$$\frac{10,000}{12,500} = \$0.80 \text{ per ton}$$

Drying fuel (diesel)

Dry system @ 50% mica = 250 x 2 = 500 t/week
Wet system @ 100% mica = 250 t/week

Moisture content = 10% = 500x 0.1 = 50 t/week h_2o

Heat quantity required = 2500 btu/lb h_2o
= 50 t. x 2000 lb/t x 2500 btu/lb
= 250 x 10^6 btu/week

(Operating costs cont'd.)

Heating value of oil = 19,000 btu/lb

Oil req'd/week = $\frac{250 \times 10^6 \text{ btu}}{19{,}000 \text{ btu/lb}} \times \frac{0.83267 \text{ G.US/G.imp}}{7.6 \text{ lb/gall}}$

= 1,440 say 1,500 galls.

Cost per ton (dry system) = $\frac{1{,}500 \times 0.55}{250}$ = $3.30/ton

Cost per ton (wet system) = $\frac{1{,}500 \times 0.55}{2 \times 250}$ = $1.65/ton

Additives (allowance)

Acid (100 lbs/ton mica make-up)	= $3.00
Flotation media, (allow/ton)	= 2.00
Depressants, frother, etc. (per ton)	= 2.00
Allowance per ton	= $7.00

SUMMARY

Cost Area	Dry System	Wet System
Power	$ 5.230	$ 5.459
Labor	11.200	15.360
Maintenance and repair	0.800	0.800
Fuel	3.300	1.650
Additives	-	7.000
	$20.530/ton	$30.469/ton

For bagged material, an additional charge for bags and pallets to be added:

In 40-lb bags	= 50/ton @ .12¢ ea.	= $6.00/ton
Pallets @ 1-ton capacity @ $2.50 ea.		= 2.50/ton
Bagging and pallets		$8.50/ton

CAPITAL COST SUMMARY

Equipment, Building and Construction Estimate

1000	crushing equipment	$24,250.	
2000	dry syatem equipment	26,700.	
3000	wet system equipment	11,600.	
4000	compressed air service	53,800.	
5000	fabricated materials	59,000.	
6000	support item and materials	32,500.	
7000	bulk loading	35,000.	$242,850.
	site preparation, fdns., etc.	24,500.	
	building steel	97,600.	
	roofing and siding	14,000.	136,100.
	lighting	8,000.	
	motor controls	15,000.	
	instrumentation	7,000.	
	electrical instal. and matls.	25,000.	
	piping, mat'ls.and instal.	20,000.	75,000.
	office, prod.storage, repair shop change room, toilets,etc. 60' x 30' x 10' eave p.e. bldg.		30,000.
	floor and partitions		5,000.
Engineering:			
	process engineering	10,000.	
	mechanical "	14,000.	
	civil "	7,000.	
	electrical "	4,000.	
	project management	40,000.	75,000.
	Total cost capital exp.		$563,950.

MICA PROCESSING FACILITY

Equipment and Construction Estimate

Item No.	Description	H.P.	Cost
1001	belt feeder 18" wide x 10' crs.	5	$ 1,000.
2	impactor crusher - 25t capacity	50	6,500.
3	roll crusher (or hydracone) 25t capacity	50	10,000.
4	conveyor belt 18" wide x 12' crs.40tph	5	750.
5	bucket elevator(continuous) 60' crs.40tph	10	4,000.
6	d.d.vibrating screen 4' x 8' 40tph	5	2,000.
			$24,250.
2001	distributing screw conv.9' dia x 30' lg.	5	2,000.
2a	feed screw conv. 9" dia x 9' lg	2	800.
2b	" " " "	2	800.
3	single mech.cyclone coll.(4000 cfm)	-	2,000.
4	double counterweighted valve 9"	-	800.
5	bag type dust coll(micropul or eq.) 5600 sq.ft.	2	7,000.
6	screw conveyor 6" dia x 10' lg	2	500.
7a	gyratory screen 10 d.30" x 30" (Koppers or eq.)	2	2,000.
7b	" " 10d.30" x 30"(Koppers or eq.)	2	2,000.
8	screw conveyor 9" dia x 23' lg	5	1,500.
9	" " 6" dia x 16' lg	2	700.
10	bagging machine,single nozzle 40lb cap.	2	5,000.
11	gravity flow conv. 18" wide x 20' lg	-	500.
12	screw conveyor 9" dia x 14' lg	5	1,100.
			$26,700.
3001	volumetric feeder,0-10tph 36" crs.	1	800.
2	mixing tank with agitator	2	300.
3a	pump, 50 gpm (glass lined or eq.)	5	500.
3b	" " "	5	500.
3c	" " "	5	500.
3c-1	diverting valve (acid service)	-	(see 5015)
4a	flotation separator, 6 cell, 1000 gall.	2	2,000.
4b	" " " "	2	2,000.
5	centrifuge (bird or eq.)4' dia.x 3' lg.	2	1,500.
6	screw conv.(cut & fold flight)9" dia x12'lg	2	1,000.
7	water pump (vacuum) 60 gpm	15	500.
8	sand dewaterer 12" dia x 14' lg.	5	2,000.
8-1	diverting valve (acid service)	-	(see 5015)
			$11,600.
4001	air compressors(s) 3000 cfm @ 100 psig. (2300 v)	600	50,000.
1a	air receiver	-	
2	air heater 3000 cfm inlet @ 600-800° F	-	1,500.
3	i.d. fan: 4000 cfm(actual) @ 200° F @ 8" s.p.	15	800.
4	waste heat exchanger	-	1,500.
			$53,800.

MICA PROCESSING FACILITY

Fabricated Material Estimate

Item No.	Description	Wt. lbs.	Cost
5001	crusher feed hopper 5' x 6' x 3'(¼")	1300	$ 1,500.
2	" " spouts 24"sq x 15'(¼")	1200	1,500.
3	screen disch. spouts (10g)	2000	3,000.
4	coarse bin 9' dia x 30' side 50° cone		6,000.
5	fines bin " " "		6,000.
6	silica bin " " "		6,000.
7	fuel tank		2,000.
8	acid/dye tank 4' dia x 15' lg (glass lined)		2,000.
9	product bin 6' sq. x 4' side 60° hopper (10g)	1500	1,700.
10	acid bath bit. lined (10g)	1200	1,500.
11	f.e. mill feed and hopper	1750	10,000.
12	misc. chutes, hoppers gates	3000	4,000.
13	ductwork hot air 12" dia & 9" dia. (10g)	2000	3,000.
14	heating ducts 12" sq. x 300' lg. 15 diffusers (16g)	3000	5,000.
15	valves, water, air, acid service (purchased)		2,500.
16	transfer pumps (5) 2s gpm (purchased)		1,500.
17	bin level & liquid sensors (purchased)		1,800.
			$59,000.

Support Items and Materials

6001	fork lift truck 3t capacity (2 req'd)	$ 6,000.
2	portable welding machine 300 amp	600.
3	small tools - maint. and repair	3,000.
4	materials - steel sht., bar stock, pipe	5,000.
5	spares: valves, bearings, hardware	5,000.
6	wooden pallets (1 ton) 1,000 reqd. 1st mo.	2,500.
7	paper bags 40 lbs. 50,000 reqd 1st mo.	6,000.
8	office equip. printing, furniture	4,400.
		$32,500.

Bulk Loading

7001	3 silos	$18,000.
2	support structure	10,000.
3	bucket elevator	3,000.
4	screw conveyor 9"Øx 20' lg	1,500.
5	" " "	1,500.
6	screw conveyor 9"Ø x 10' lg.	1,000.
		$35,000.

MICA PROCESSING FACILITY

Building, Civil and Services Estimate

Description			Cost
Site: preparation, muck, fill, drain, fence(allow)			$10,000.
foundations, ftgs. 75 yds. @ $120./yd in place			9,000.
conc. floor, 6" tk = 1500 sq.ft. (30 yds.)			3,500.
block and partition			2,000.
			$24,500.

Building Steel:

		Weight
columns	8w31 x 620' =	19,220
beams	21w44 x 200' =	8,800
	12x27 x 250' =	6,750
bracing	2½ x 2½ x ¼ TT x 1500'	=11,000
	" " " TT x 250'	= 2,000
	3 x 4 x ¼ TT x 500'	= 7,000

Roof:

truss beam	16w36 x 120' =	4,320
ridge	8w28 x 200' =	5,600
bracing	4 x 4 x ¼ TT x 340'	= 4,420
purlins	8c11.5 x 400' =	4,600

Wall:

purlins	8c11.5 x 1500' =	17,250
stairs	55 risers @ 150 =	8,250
misc. supp't. steel		7,500
deck plate ¼" diamond A = 1500 sq.ft.		15,000
		121,700 = 61t

61 tons @ $1,600/t. erected =	$97,600.
Roofing: corr.galv.steel(16g) 1830 sq.ft. @ $2.00 sq.ft.	3,700.
Siding: " " steel (20g) 5000 sq.ft. @ $2.00 sq.ft.	10,000.
Corr. translucent panels	300.
	$111,600.
Lighting: 40 units @ $200.00 ea. installed	$ 8,000.
motor controls. (600 HP @ 2300 v; 210 HP @ 550v)	15,000.
instrumentation, temp:press:bin levels:amps.	7,000.
electrical materials and installation	25,000.
piping, water, acid, air, drains, matl. & installation	20,000.
	$75,000.
P.E.B. combination - office, product storage, toilets, repair shop, change room, etc. 60' x 30' x 10' eave	$30,000.
floor and partitions 35 yds.	5,000.
	$35,000.

MICA PROCESSING FACILITY

Engineering and Project Management

Process engineering:

- i Material testing and analysis
  - a) grinding
  - b) separating
  - c) leaching
- ii Air transporting and drying
- iii Equipment specifications
- iv Plant design
- v Instrumentation

Mechanical engineering:

- i Piping design
  - a) water
  - b) air
  - c) acid
- ii Equipment design
  - a) F.E. mill
  - b) sand dewaterer
  - c) aspiration ductwork
  - d) waste heat exchanger
- iii Facility design/detail
  - a) holding bins
  - b) hoppers
  - c) chutes, gates

Civil engineering:

- i Site study
  - a) selection
  - b) soil testing
  - c) permits and licencing
- ii Foundations and footings
- iii Site prep - grading, draining
- iv Structural steel design
- v Environmental considerations

MICA PROCESSING FACILITY

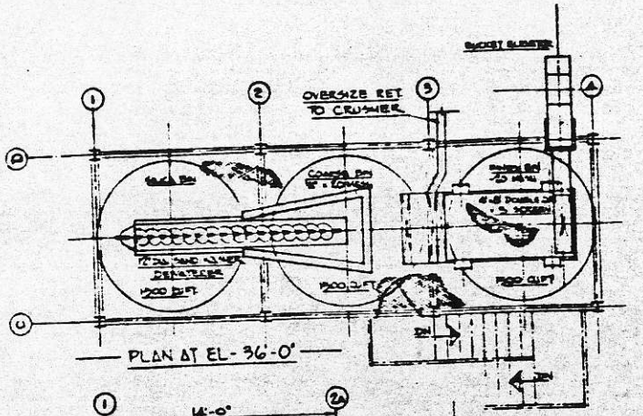
(Engineering and Project Management cont'd.)

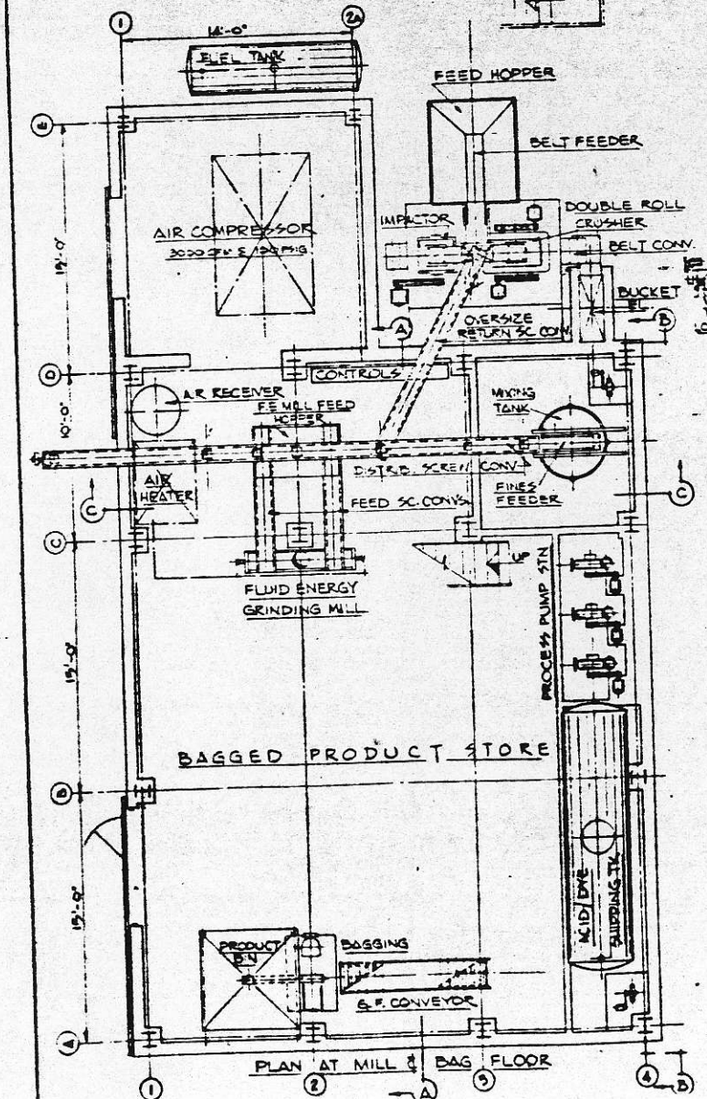
Electrical engineering:

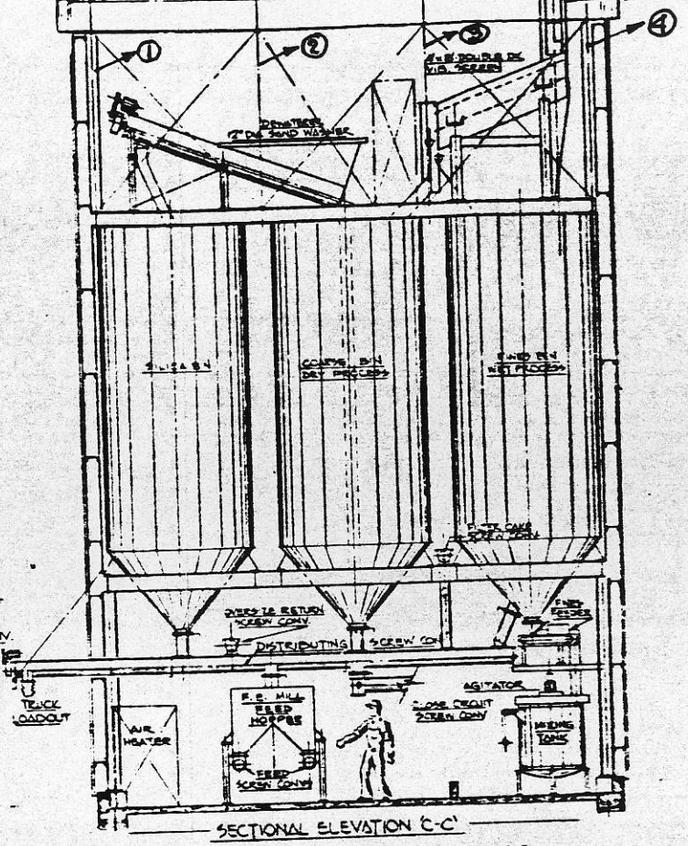
- i 2300-v and 550-v service
- ii Circuit breakers
- iii Transforming - 550-v and 110
- iv Service distribution
- v Motor control center
- vi Lighting

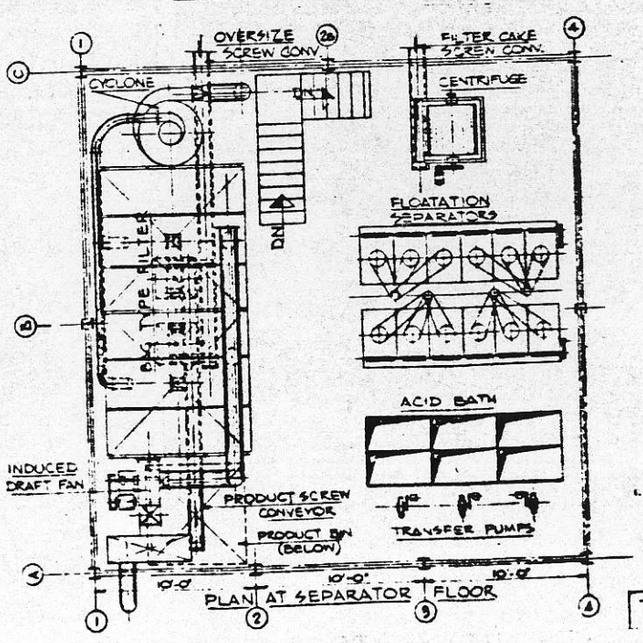
Project manager:

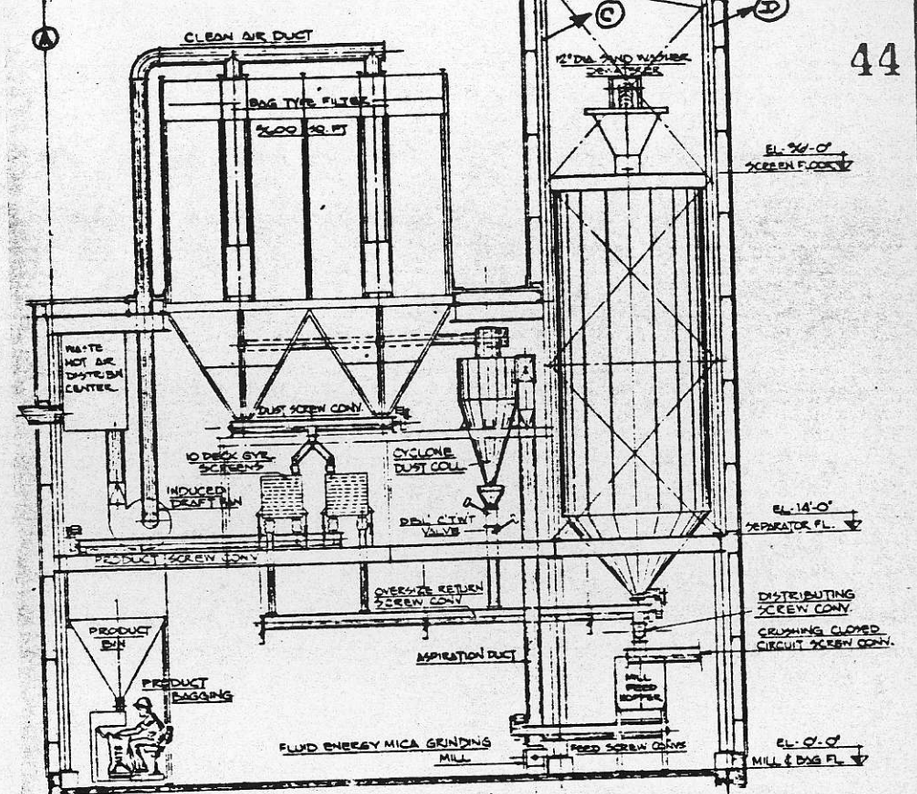
- i Prepare bid specs
- ii Analyze bids
- iii Purchase order prep:
  - a) materials
  - b) equipment
  - c) services
- iv Schedule preparation
- v Expediting
- vi Job accounting
- vii Field supervision
  - a) civil work
  - b) steel erection
  - c) fabrication
  - d) equipment install.
  - c) electrical install.
- viii Plant start-up - operation
- ix Operation manual

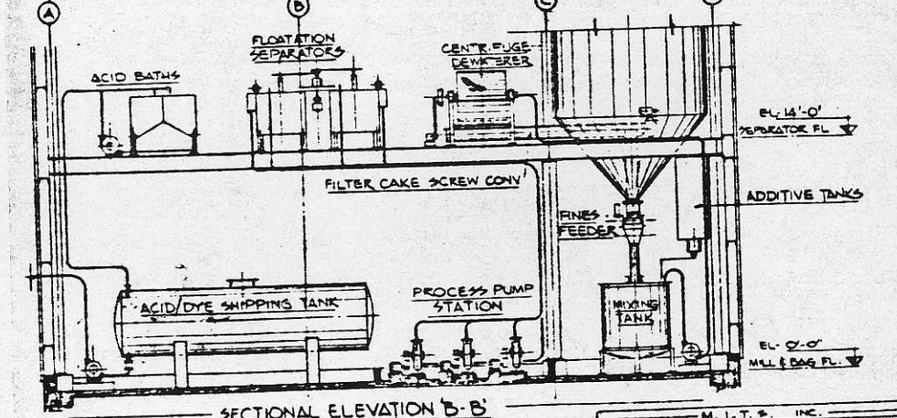












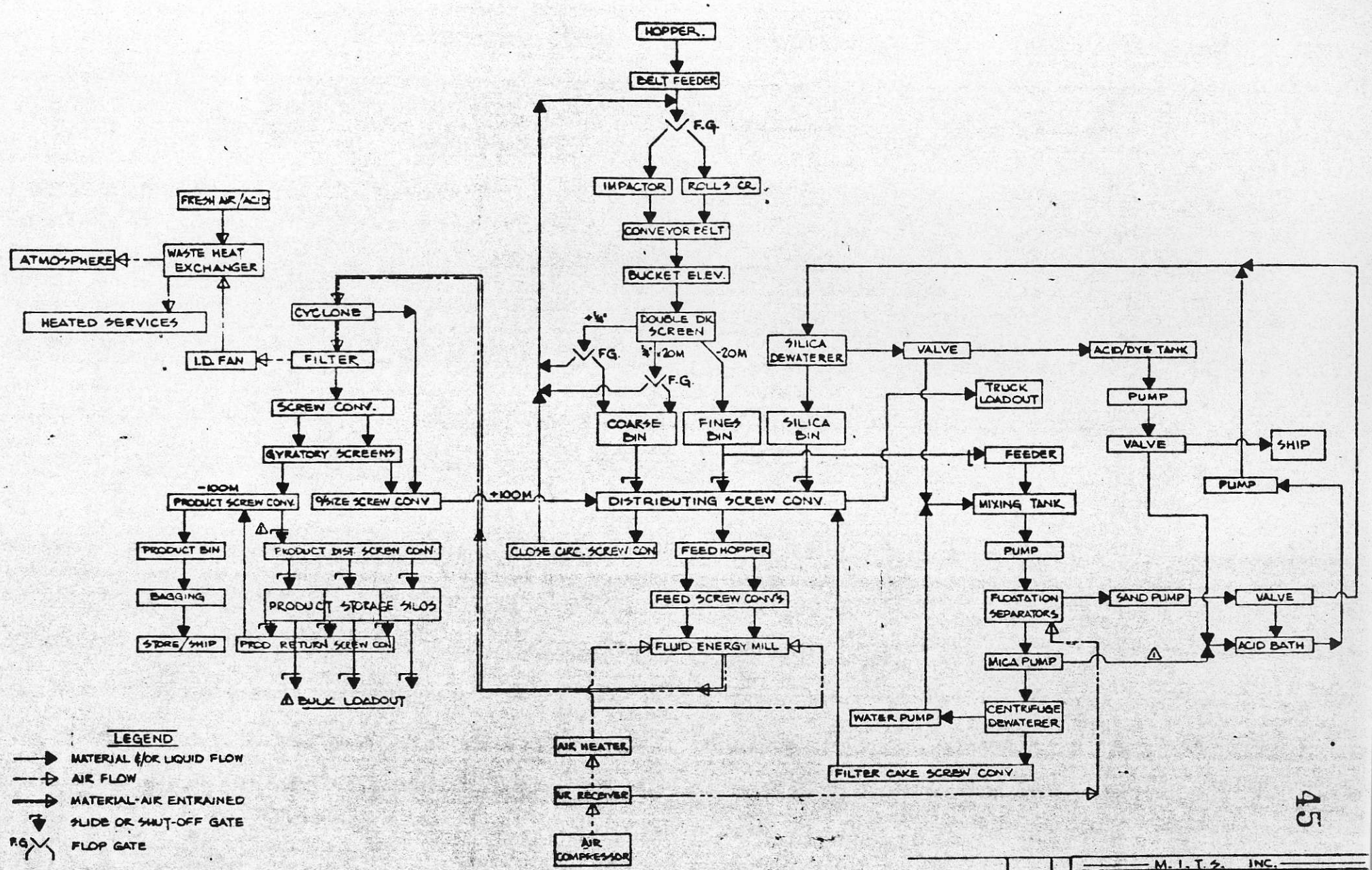
REFERENCE DRAWINGS
1. FLOW DIAGRAM. DRG NO. MA. 101

M. I. T. & INC.
VANCOUVER BRITISH COLUMBIA
FILE 3 STPH MICA PROCESSING FACILITY - PROPOSED COMBINED WET & DRY SYSTEMS.

TAMAR
Engineering Co. Ltd.
Vancouver B.C. Canada

DRG NO. MA-100 B

TECHNICON



REFERENCE DRAWINGS

1. PROPOSED PLANT DESIGN - DRG. NO MA-100

REVISIONS
1 9-27-78 MICA TO ACID BATH & BULK LOADING ADDED. TITLE BLOCK CHANGE.

M. I. T. S. INC.
VANCOUVER — BRITISH COLUMBIA
TITLE: MICA PROCESSING FACILITY - SYSTEM FLOW DIAGRAM.

TAMAR
Engineering Co. Ltd.
Vancouver B.C. Canada

DRAWN G.L.A. | CHKD | SCALE NONE
DESIGNER R.T. | APPD | JOB NO. 2050
DRG NO. MA-101 | REV 1

TECHNICON

GENERAL TESTING LABORATORIES

DIVISION SUPERINTENDENCE COMPANY (CANADA) LTD.
1001 EAST PENDER ST., VANCOUVER, B.C., CANADA, V6A 1W2
PHONE (604) 254-1647 TELEX 04-507514 CABLE SUPERVISE

46

TO:
E.T.S. TOOL CO. LTD.
5351 Airport Road South
Richmond, B.C.
V7B 1B5

CERTIFICATE OF ASSAY

No.: 7803-1351 DATE: Mar. 27/78

We hereby certify that the following are the results of assays on: Ore

MARKED	XXXXXXXXXX	Silica SiO_2 (%)	Titanium TiO_2 (%)	Alumina Al_2O_3 (%)	Iron oxide Fe_2O_3(%)	Magnesia MgO (%)	Sodium Na_2O (%)
Mica		36.52	0.10	26.01	2.03	0.99	1.46

Potassium oxide K_2O (%)	Fluorine F (%)	Loss On Ignition L.O.I.(%)	Bulk Density (lb/cu.ft)	XXX
6.10	0.01	26.37	36	

REMARK: L.O.I. performed at 950°C.

NOTE: REJECTS RETAINED ONE MONTH. PULPS RETAINED THREE MONTHS. ON REQUEST PULPS AND REJECTS WILL BE STORED FOR A MAXIMUM OF ONE YEAR.

L. WONG
PROVINCIAL ASSAYER

COPY

BACON, DONALDSON & ASSOCIATES LTD.
Consulting Engineers

117 East 4th Avenue · Vancouver, B.C. V5T 1G4 · Telephone 876-5507

File No: 1704

April 27th, 1978

Tamars Engineering Ltd.,
5351 Airport Road,
Richmond, B. C. V7B 1B5

Attention: Mr. Inverarity

Dear Sir,

We have prepared thin sections of mica samples which you delivered to our office in order to determine the mineralogy.

Two samples were received for study, one grey in color and the other stained brown. Sections of each were prepared and studied.

The grey and brown samples can both be referred to as a mica shist. The two samples are similar mineralogically with the difference in appearance resulting from surface oxidation of garnet (iron aluminosilicate) in the brown sample.

The samples have the following approximate composition:

25% - 40% quartz
25% - 30% garnet
50% - 30% mica

The mica is generally muscovite with minor sericite. Trace feldspars were observed in the sample.

The shist has likely been derived from a fine grained clayey sediment which has undergone low to medium grade regional metamorphism.

The garnet tends to be somewhat rounded and is commonly fractured. The muscovite consists of discontinuous foliations terminated by quartz and garnet. Maximum con-

... 2

April 27th, 1978 File No: 1704

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tinuous length of flakes seldom extends 4 mm and more commonly the muscovite consists of aggregates of broken and contorted fragments.

Yours truly,

BACON, DONALDSON & ASSOCIATES LTD.

M. J. Vreugde, P. Eng.

8. DESCRIPTION OF THE MICA PROCESSING PLANT
OF PETACA MINING COMAPNY, SANTE FE, NEW MEXICO,
- EXTRACTED FROM "ROCK PRODUCTS" - September 1957.

Mica processing—
the story of one plant's operation

HUNDREDS OF YEARS AGO, the hills of northern New Mexico contributed nothing that would fill a Spanish explorer's "petaca" or treasure chest. But these hills do contain valuable treasure, and today they are the site of one of the world's foremost mica-mining and milling operations. The Petaca Mining Company of Santa Fe, New Mexico, has expectations of becoming the world's largest producer of ground mica by using compressed air to pulverize and classify the mica to the exact particle size specifications demanded by the building trades.

Petaca is one of four mica processing companies using compressed air for fine grinding. This process is considered superior because there is no "iron contamination," usually associated with other methods. In the compressed-air process, mica is mined, processed and finally fed to a pulverizing and classification system at minus ½-in. mesh and plus 18 mesh which produces various closely controlled end particle sizes.

A fluid energy mill system does this exacting job of air pulverization and classification. The mica to be processed is fed by a screw feeder into the pulverizing chamber. Here the mica is impacted against itself, while entrained in two directly opposed high velocity streams of air. It is then carried to a classification section above the grinding chamber which provides precise control of the end product. This is done by controlling the rotational speed of the classifier blades and the amount of fan air introduced in this section, so only particles of suitable size are discharged from the mill. The oversize particles are returned to points at the ends of the opposing high pressure air nozzles, where they are entrained in the jets and accelerated to high velocity for further reduction in particle size.

Wet mica is dried (when the wet process is used) by the heat content and moisture-carrying capacity of the air. After discharge from the mill, the mica is conveyed (still in air suspension) to a collection system, and deposited in appropriate end-product bins.

The Petaca operation has a capacity of 60 tons of mica per 24 hour period. The fluid energy mill system accomplishes this with power provided by 2,500 cfm. of free air compressed to 100 psig. and heated to 800 deg. F., and then distributed, at these conditions, to the entrance of the two opposing high pressure nozzles.

EQUIPMENT USED BY PETACA MINING COMPANY

Fluid energy mill system, Majac Jet Pulverizer (1)	Worthington Corporation
Air compressors, Vertical Angle 2 cylinder	Worthington Corporation
Vertical Angle 3 cylinder	Worthington Corporation
ENB	

9. CERTIFICATION

This Report has been compiled from information gathered from many authoritative sources by members of the Board of Directors of MITS Development Company Ltd., and has been assembled by :

H. S. Haslam, P.Eng.

5351 Airport Road South,
Richmond, B.C.

June 5th. 1978

EXHIBITS

EXHIBIT I

RANGE OF PRICES OF FILLERS AND EXTENDERS

Source: American Paint and Coatings Journal
May 3rd. 1976

Fillers and Extenders

Aluminum silicate hydrous, C.l.,			
Air-floated bags,			
f.o.b. mine .....ton	10.00	—18.00	
Water-washed,			
f.o.b. mine .....ton	30.00	—71.50	
Surface coated, 4-3			
microns, f.o.b. mine.....ton	58.50	—81.50	
Asbestos shorts, 100-lb. bags,			
c.l., f.o.b. mine, Canada..ton	30.50	—91.50	
Barium Sulphate (see barytes			
or blanc fixe).			
Barytes—			
Domestic, refined, white,			
waterground, in paper			
bags, c.l.,			
St. Louis .....ton	135.00	-166.00	
F.o.b. St. Louis			
Southern off color, bags,			
c.l. mines .....ton	112.00	—	..
Bentonite, l.c.l., ex-whse....ton	53.00	—67.00	
Blanc Fixe—			
Direct Process (bags)—			
C.l. .....ton	430.00	—	..
L.c.l., N.Y., dlvd.....ton	450.00	—	..
Calcium Carbonate (see Whiting)			
Calcium Silicate (see Wollastonite)			
Calcium Sulphate, Anhydrous,			
f.o.b. mine, c.l. .....ton	..	—	..
Clay calcined,			
C.l., f.o.b. plant.....ton	120.00	-145.00	
F.o.b., N.Y., l.c.l.....ton	185.00	-225.00	
Clay, water-washed,			
C.l., f.o.b. Ga.....ton	58.00	-140.00	
Clay, delaminated,			
C.l., f.o.b. Ga. .....ton	89.00	—97.00	
Clay, China—			
English, bags .....ton	70.00	-143.00	
Dom., bags .....ton	17.00	—42.00	
Diatomite, f.o.b. plant, c.l.,			
White, bags .....lb.	.02½—	.12	
Magnesium Silicate (see Talc)			
Marble Flour (see Whiting)—			
Dry, ground, c.l., bags,			
f.o.b. wks. .....ton	70.00	—85.00	

Mica—			
Wet, ground, bags, c.l., f.o.b.			
wks., freight allowed.....ton	235.00	-240.00	
Plus $15 West of Mississippi			
Plus $25 West of Rockies			
Nepheline syenite, 50 lb. bags,			
c.l. or t.l., f.o.b. Ontario..ton	34.35	—47.85	
Oyster Shell, Powdered, f.o.b. Fla.			
1.6 micron Ave.....ton	41.80	—	..
22 Mesh .....ton	16.50	—	..
Pumice Stone—			
Lumps, bags .....lb.	.0665—	.09	
Powd., bags .....lb.	.0445—	.08	
Silica Amorphous—			
Bags, c.l., mill			
325 mesh (98-99.4% thru).ton	30.00	—	..
325 mesh (99.5% thru)...ton	42.00	—	..
Ultra fine grind			
(15 microns) .....ton	69.00	—	..
Silica, colloidal, c.l., f.o.b....lb.	.66	—	.84
Silica, Crystalline—			
C.l., wks. .....ton	20.50	—45.40	
Talc (Magnesium Silicate)—			
California, fibrous, white,			
high oil absorption, 325			
mesh, bags, c.l., mills...ton	34.00	—37.00	
California semi-fibrous,			
medium oil absorption, 325			
mesh, bags, c.l., mills..ton	32.00	—73.95	
Fine micron talcs.....ton	68.00	-111.50	
Montana, Ultra-fine grind,			
f.o.b. mill .....ton	70.00	—	..
N.Y. State fibrous and semi-			
N.Y. State non-fibrous			
bags, c.l., mills—			
325 mesh (98% thru)...ton	46.50	—50.50	
325 mesh (99.4% thru).ton	55.50	—	..
325 (trace retained)...ton	105.00	-105.00	
Whiting (Calcium Carbonate)—			
Domestic, f.o.b. wks., c.l.			
Natural water ground....ton	45.00	—65.00	
Dry ground, 99.5%, f.o.b.			
mill, 325 mesh.....ton	21.50	—36.00	
Whiting, Imported, ex-dock, N.Y.—			
Commercial .....ton	34.00	—56.50	
Fine, c.l., f.o.b. plant....ton	41.00	—	..
Wollastonite, paint grade—			
Extra gliders, bolted.....ton	35.00	—50.50	
Medium, c.l., f.o.b. plant.ton	29.00	—	..

MICA

EXHIBIT II

ADVERTISEMENTS OF COMPANIES IN THE UNITED STATES WHO MARKET MICA AND MICA PRODUCTS

Source: Thomas Register 1977

MICA

CONN HARTFORD
Polymica & Insulation Co., Inc 34 54T Arbor St. (Mica Products, Scrap, Ground Mica) ..... A

CONN STAMFORD
ENGLISH MICA CO., THE Ridgeway Center Bldg. (White Water Ground & Micro Mica) (203—324-9531) ..... **AAAA**

U.S. MICA COMPANY, INC. 26 Sixth St. (Ground Mica Up To 100 Mesh) (203—324-9531) ..... **AAA**

GA EAST POINT
All Mica Co 2732 Kimmeridge Dr. (Ground) ..... B

ILL BENSENVILLE
Magnetic Shield Div., Perfection Mica Co 742 N. Thomas Dr (Chicago Suburb) (All Types Of Mica) ..... AAAA

ILL BROADVIEW
Pilcher Hamilton Co., The 2352 S 27th Ave ..... AAAA

ILL CHICAGO
KRAFT CHEMICAL COMPANY 917 W. 18th St. (312—733-1919) ..... **AAAA**
(Waterground from 160 to 3000 mesh.)
United States Gypsum Co 101 S Wacker Dr ..... AAAA
United States Gypsum Co., Minerals Div 101 S Wacker Dr., TR 74 ..... AAAA

ILL LIBERTYVILLE
International Minerals & Chemical Corp IMC Plaza ..... AAAA

ILL SCHILLER PARK
Acra Electric Corp 3869 N 25th Ave (Inorganic & Silicone Bonded Heater Plate) ..... AAAA

MASS BRAINTREE
Columbia Technical Corp 220 Forbes Rd (components) ..... AAAA

MASS EVERETT
Barwood Manufacturing Corp., 10 Norman St ..... AAAA

MASS NEEDHAM HEIGHTS
New England Mica Inc., Div Kirkwood Industries, Inc 2200 Reservoir St ..... AAAA

MASS PEABODY
Essex International Inc., MWI Div./Huse-Liberty 247 Lynnfield St (Raw & Built-Up Cut, Discs, Electric, Ground, Washers, Etc.) ..... AAAA

MASS WILMINGTON
Franklin Mineral Products Co., Inc 635 Main St. P O Box O (Water Ground White Muscovite) ..... AAA
HAYDEN MICA COMPANY DIV. 633 Main St. (Water Ground, 100 to 325 Mesh) (617—658-2310) ..... **A**

MICH NILES
Brandywine FRP, Inc 2146 S. 11th St. (Rte. 31) ..... AAA

NH NEWMARKET
ESSEX INTERNATIONAL, MAGNET WIRE & INSULATION DIV. MACALLEN MICA PRODUCTS (Compressed Sheet, Cloth, Molded Mica Parts, Rings, Etc., India Amber & Domestic) (603—659-5555) ..... **AAAA**

NH PENACOOK
Concord Mica Corp. (Wet Ground) ..... AA

NJ CLIFTON
Mycalex Corp. Div. of Spaulding Fibre Co., Inc. ..... A
Monogram Company 125 T Clifton Blvd. (Synthetic Crystals, Powders, Flakes, Paper, Bonded & Unbonded) ..... AAAA

NJ ENGLEWOOD
INDUSTRIAL MICA A DIV OF COLUMBIA TECHNICAL CORP P.O. Box 268 (201—568-7200) ..... **AAA**

NJ ISELIN
PETERSON BROTHERS MFG. CO. Meridian Rd (Stamping, Short Runs) (201—549-1414) ..... **B**

NJ KENILWORTH
PETERSON STAMPING & MFG. CO. 79 N. Michigan Ave. (Stamping, Short Runs) (201—241-0900) ..... **A**

NJ LEDGEWOOD
Mykroy Ceramics Corp. An Alco Standard Corporate Partner Orben Dr. (Glass Bonded Mica Ceramic) ..... AAAA

NJ LIVINGSTON
Ernst Gage Co 250 S. Livingston Ave. (For Flat Gage Glass) ..... A

NJ MANASQUAN
American Mica Insulation Co 236 Parker Ave ..... AA

NJ NEWARK
MICACRAFT PRODUCTS, INC. 51 Liberty St (Corrugated, Etc.) (201—623-4074) ..... **B**
(Mica products cut, stamped, shaped, condensers, radio tube supports, heating elements, discs, diaphragms and other shapes fabricated to specifications. Specialists in the making of mica parts for electronic purposes and needs.)

MICA (Contd)

NJ ROCHELLE PARK
Mica Fabricating Co 85 Central Ave (Ground & Powdered, Sheet, Plate, Pulp, Roofing, Stove, Etc.) ..... A

NJ SOUTH PLAINFIELD
Whittaker, Clark & Daniels, Inc. 1000 Coolidge St. (Ground) ..... AAAA

NY BROOKLYN
Reliance Mica Co., Inc 342 39th St. (Saw, Sheet) ..... B
Victory Mica Mfg. Co., Inc. 1329 39th St. (Sheet, Stove, Oven, Window) ..... A

NY JAMAICA
Smith Chemical & Color Co., Inc. Dunkirk St. & Liberty Ave. (Dry Or Water Ground Mica, in Various Mesh Sizes, for Plastics, Roofing, Tires, Talc.; Automobile Tire Varnish, Wallpaper, Etc.) ..... AAA

NY NEW HYDE PARK
Mica Paper Div. 1400 Plaza Ave. X

NY NEW YORK
CHROMALLOY AMERICAN CORPORATION 641 Lexington Ave. (212—826-9277) ..... **AAAA**
(See Our Corporate Ad In A-Z, Vol. 8, For Nearest Sales Office of Division or Subsidiary.)
COLONY IMPORT & EXPORT CORP. 7 E. 44th St. (212—682-3160) ..... **AAA**
Mar-Lord Trading Corp 2315 Broadway (Imp. Indian & Mica Parts) X
Superior Materials, Inc 111 Broadway ..... A
United Mineral & Chemical Corp. Hudson & Beach Sts. (Fabricated or Manufactured Shapes & Stampings) (Silvered Mica Parts In Any Form) ..... AAA

NY SCHENECTADY
General Electric Co., Insulating Materials Product Dept. 1 Campbell Rd. (Products - Mica Mat Tapes) ..... AAAA

NC ASHEVILLE
Asheville Mica Co. Biltmore Dr. (Dry Ground Mica) ..... AAAA

NC KINGS MOUNTAIN
Kings Mountain Mica Co., Inc. ..... AAAA

NC PLUMTREE
Tar Heel Mica Co. Vance Bldg. (Stove & Electrical Plates, Mylar Backed Flexible Mica, Diaphragms, Segments) ..... AA

NC SPRUCE PINE
DIAMOND MICA COMPANY 1250 Altapass Rd (Wet Ground & Dry Ground) (704—765-9481) ..... AAA
HARRIS MINING CO P O Box 67R (All Grades For All Purposes) (704—765-4261) ..... AAA

Lawson United Feldspar & Mineral Co. P.O. Box 309 (Roofing) X
SPRUCE PINE MICA CO. Carters Ridge Rd. (Silvered For Capacitors) (704—765-4241) ..... A

OHIO: CHAGRIN FALLS
ELECTROLOCK, INC. 16838 Park Circle (Insulating Parts & Materials) (216—543-5125) ..... AAA

OHIO: CINCINNATI
Zimmerman, C L. Co 3635 Central Pky ..... A

OHIO CLEVELAND
[illegible] Co Inc 3835 Dept TR W 150th St ..... AAA
Cleveland Mica Co 1362 Hird Ave ..... A
Jaco Products Co 3402 Hamilton Ave. (Build Up & Glass Bonded) ..... AAA
MIDWEST MICA & INSULATION CO. 4847 W. 130th St. (216—267-6200) X

OHIO: COLUMBUS
National Electric Coil Div 800 King Ave. ..... AAAA

PA: LANCASTER
Narvon Mining and Chemical Co Box 1598-T (Dry, Inert Aluminum Silicate) ..... AAA

PA PHILADELPHIA
Rowley, George A & Co., Inc. 935 N Front St ..... AAA
WAGNER, CHARLES A., CO., INC. 4459 N 6th St. (Powder, Wet & Dry Ground) (215—457-0600) ..... AA

TEX HOUSTON
Arnold & Clarke Chemical Co Inc P O Box 10660 ..... AAAA

VA NEWPORT NEWS
Asheville Schoonmaker Mica Co 910 Jefferson Ave (Electronic & Radar Condenser Stove Films, Discs) ..... AAAA
Mica Co of Canada (N Y) Inc P O Box 318 X

CANADA BOUCHERVILLE QUE
BUZONITE MICA, MARIETTA RES INTL LTD & BOC MIN LAVIOLETTE INC Dept TR 77, 1478 Graham Blvd (514—932-2991) X

★MICA: ANNEALING
(see Mica)

CONN STAMFORD
U.S. MICA COMPANY, INC. 26 Sixth St. (Ground Mica Up To 100 Mesh) (203—324-9531) ..... AAA

★MICA: COMMUTATOR
(see Mica)

ILL SYCAMORE
IDEAL INDUSTRIES, INC. 1004 Becker Place (Undercutting Equipment) (815—895-5181) ..... AAAA
(For sales offices see Volume 6)

NC PLUMTREE
TAR HEEL MICA CO. Vance Bldg. (704—765-4535) ..... AA

OHIO CLEVELAND
MIDWEST MICA & INSULATION CO. 4847 W. 130th St. (216—267-6200) X

PA FLOURTOWN
MOTSON, J., FRANK CO. 1719 Bethlehem Pike (Conductive Circuitry Applied) (215—233-0500) ..... A
(Manufacturers and custom designers of circuitry on geometric shapes. Precision custom printing on plastics, glass, metals and ceramics.)
★ See our catalog in THOMCAT

★MICA: FABRICATED OR MANUFACTURED
(see Mica)

ILL BENSENVILLE
MAGNETIC SHIELD DIV., PERFECTION MICA CO 742 N Thomas Dr (Chicago Suburb) (All Types In Natural Built Up Bonded Tubes & Silvered) (312—766-7800) ..... AAAA

MICH NILES
BRANDYWINE FRP, INC. 2146 S. 11th St (Rte 31) (616—683-4922) ..... AAA
(See adv page 9874)

N.J NEWARK
MICACRAFT PRODUCTS, INC 51 Liberty St (201—623-4074) ..... B

NC PLUMTREE
TAR HEEL MICA CO Vance Bldg (Also Mylar Backed Flexible Mica) (704—765-4535) ..... AA

OHIO CLEVELAND
MIDWEST MICA & INSULATION CO 4847 W 130th St (216—267-6200) X
(See adv page 9874)

★MICA: GAGE GLASS
(see Mica)

NJ ENGLEWOOD
INDUSTRIAL MICA A DIV. OF COLUMBIA TECHNICAL CORP. P.O. Box 268 (201—568-7200) ..... AAA

NJ FARMINGDALE
ERNST, EUGENE PRODUCTS CO. P.O. Box 427 (201—938-5641) X

NJ LIVINGSTON
ERNST GAGE CO. 250 S. Livingston Ave. (201—992-1400) ..... A

NJ NEWARK
MICACRAFT PRODUCTS, INC. 51 Liberty St. (201—623-4074) ..... B

NY COLD SPRING HARBOR
CONNELLY, K. CORP. P.O. Box 103 (H.P. Gauge Sight & Annular Edge Glasses) (516—549-4333) ..... AAA

NY FREEPORT
WHITE, H. S., CO. 327 St. John's Pl. (516—623-5400) ..... AAA

NC SPRUCE PINE
SPRUCE PINE MICA CO. Carters Ridge Rd. (Mica Protective Shields) (704—765-4241) ..... A

★MICA: GLASS BONDED
(see Mica)

NJ CLIFTON
MYCALEX CORP. DIV. OF SPAULDING FIBRE CO., INC., A MONOGRAM COMPANY 125 T Clifton Blvd (201—779-8866) ..... AAAA

NJ EDGEWOOD
MYKROY CERAMICS CORP. AN ALCO STANDARD CORPORATE PARTNER Orben Dr. (201—398-7000) ..... AAAA

OHIO CLEVELAND
MIDWEST MICA & INSULATION CO. 4847 W. 130th St. (Inorganic Bonded Mica, Up To 1200 Degrees F. Operating Temperatures) (216—267-6200) X

PA VALLEY FORGE
SYNTHANE-TAYLOR CORP., AN ALCO STANDARD CORPORATE PARTNER Valley Forge Rd., P.O. Box 835 (215—666-0300) ..... AAAA

★MICA: GROUND & POWDERED
(see Mica)

CONN STAMFORD
ENGLISH MICA CO., THE Ridgeway Center Bldg. (White Water Ground, Micro Mica) (203—324-9531) ..... AAAA
U S MICA COMPANY, INC. 26 Sixth St. (Mica For Joint Compounds, Plastic, Paint, Filler) (203—324-9531) ..... AAA

ILL BENSENVILLE
MAGNETIC SHIELD DIV., PERFECTION MICA CO 742 N. Thomas Dr. (Chicago Suburb) (325 Ground & 24 Flake In Stock) (312—766-7800) ..... AAAA

MASS WILMINGTON
HAYDEN MICA COMPANY DIV. 633 Main St. (Water Ground, 100 To 325 Mesh) (617—658-2310) ..... A

MICH NILES
BRANDYWINE FRP, INC. 2146 S. 11th St. (Rte. 31) (616—683-4922) ..... AAA

NC SPRUCE PINE
DIAMOND MICA COMPANY 1250 Altapass Rd. (704—765-9481) ..... AAA

★MICA: INSULATION
(see Mica)

ILL BENSENVILLE
MAGNETIC SHIELD DIV., PERFECTION MICA CO. 742 N Thomas Dr (Chicago Suburb) (Electrical Grade & Heater Plate) (312—766-7800) ..... AAAA

ILL BROADVIEW
PILCHER-HAMILTON CO., THE 2352 S. 27th Ave. (312—343-8100) ..... AAAA

NJ ENGLEWOOD
INDUSTRIAL MICA A DIV. OF COLUMBIA TECHNICAL CORP. P O. Box 268 (201—568-7200) ..... AAA

EXHIBIT II - continued

NJ ENGLEWOOD
MYKROY CERAMICS CORP. AN ALCO STANDARD CORPORATE PARTNER Urban Dr (201—568 7000) ..... AAAA
NJ NEWARK
EISCO PLUS INC. 207 Thomas St (201—589 2978) X
MICACRAFT PRODUCTS, INC. 51 Liberty St (201—623 4074) ..... B
NY NEW YORK
UNITED MINERAL & CHEMICAL CORP. Hudson & Beach Sts. (212—966 4330) ..... AAA
NC PLUMTREE
TAR HEEL MICA CO. Vance Bldg. (704—765 4535) ..... AA
NC SPRUCE PINE
SPRUCE PINE MICA CO. Carters Ridge Rd. (704—765 4241) ..... A
(All types of natural & reconstituted mica fabricated to all sizes & dimensions, condenser mica & element cores wound for appliance use.)
OHIO CHAGRIN FALLS
ELECTROLOCK, INC. 16838 Park Circle (216—543 5125) ..... AAA
OHIO CLEVELAND
MIDWEST MICA & INSULATION CO. 4847 W. 130th St. (216—267 6200)

CANADA BOUCHERVILLE QUE
SUZORITE MICA, MARIETTA RES. INTL. LTD. & SOC. MIN. LAVIOLETTE INC. Dept. TR 77, 1475 Graham Bell St. (514—932 2991) X

★MICA: PLASTIC PAINT
(see Mica)

CONN STAMFORD
ENGLISH MICA CO., THE Ridgeway Center Bldg. (203—324-9531) ..... AAAA
U.S. MICA COMPANY, INC. 26 Sixth St. (203—324-9531) ..... AAA
MASS WILMINGTON
HAYDEN MICA COMPANY DIV. 633 Main St. (Water Ground For Impervious Film Of High Integrity) (617—658-2310) ..... A
NC SPRUCE PINE
DIAMOND MICA COMPANY 1250 Altapass Rd. (Mica For Plastics & Paints) (704—765-9481) ..... AAA
CANADA BOUCHERVILLE QUE
SUZORITE MICA, MARIETTA RES. INTL. LTD. & SOC. MIN. LAVIOLETTE INC. Dept. TR 77, 1475 Graham Bell St. (514—932 2991) X

★MICA: RADIO & TELEVISION
(see Mica)

ILL BENSENVILLE
MAGNETIC SHIELD DIV., PERFECTION MICA CO. 742 N. Thomas Dr. (Chicago Suburb) (Standard Transistor, Solators In Stock) (312—766 7800) ..... AAAA
NJ NEWARK
MICACRAFT PRODUCTS, INC. 51 Liberty St. (201—623-4074) ..... B
NY NEW YORK
UNITED MINERAL & CHEMICAL CORP. Hudson & Beach Sts. (Insulation In Any Form or Shape) (212—966-4330) ..... AAA
NC PLUMTREE
TAR HEEL MICA CO. Vance Bldg. (704—765-4535) ..... AA

★MICA: RAW
(see Mica)

ILL BENSENVILLE
MAGNETIC SHIELD DIV., PERFECTION MICA CO. 742 N. Thomas Dr. (Chicago Suburb) (Natural Sheet Mica) (312—766-7800) ..... AAAA
NJ ENGLEWOOD
INDUSTRIAL MICA A DIV. OF COLUMBIA TECHNICAL CORP. P.O. Box 268 (201—568 7200) ..... AAA
NJ NEWARK
MICACRAFT PRODUCTS, INC. 51 Liberty St. (201—623-4074) ..... B
NY NEW YORK
COLONY IMPORT & EXPORT CORP. 7 E. 44th St. (212—682-3160) ..... AAA
UNITED MINERAL & CHEMICAL CORP. Hudson & Beach Sts. (212—966-4330) ..... AAA
NC PLUMTREE
TAR HEEL MICA CO. Vance Bldg. (704—765 4535) ..... AA
NC SPRUCE PINE
SPRUCE PINE MICA CO. Carters Ridge Rd. (704—765 4241) ..... A
(All grades & qualities of block mica.)

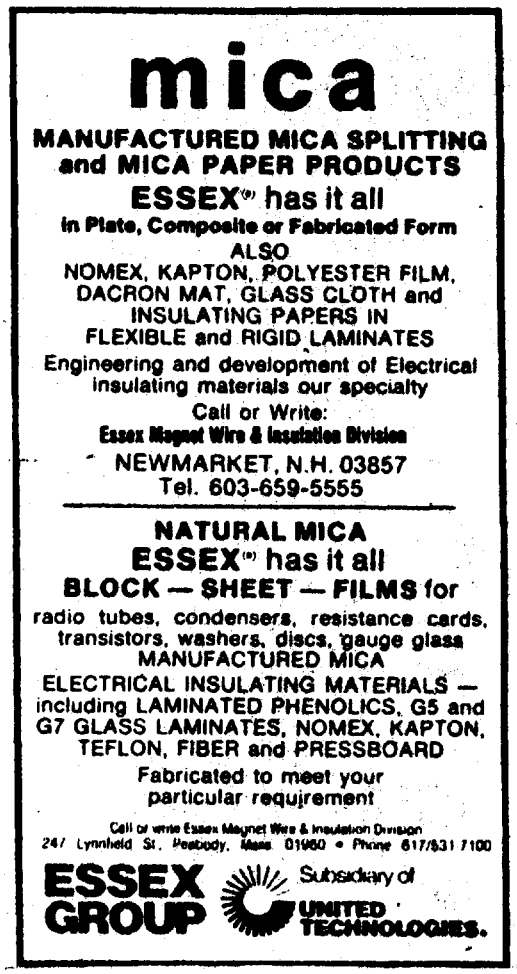
★MICA: ROOFING
(see Mica)

CANADA BOUCHERVILLE QUE
SUZORITE MICA, MARIETTA RES. INTL. LTD. & SOC. MIN. LAVIOLETTE INC. Dept. TR 77, 1475 Graham Bell St. (514—932 2991) X

★MICA: SHEET
(see Mica)

ILL BENSENVILLE
MAGNETIC SHIELD DIV., PERFECTION MICA CO. 742 N. Thomas Dr. (Chicago Suburb) (Electical Grade Heater Plate & Flexible) (312—766 7800) ..... AAAA

EXHIBIT II - continued



The English Mica Co.

Ridgeway Center Building, Stamford, Conn. 06905 Telephone 203/324-9531

USES

PAINTS The finer MICRO MICA C-1000 and C-3000 and the WATERGROUND MICA of 325 mesh are added to reinforce many solvent and aqueous system paints for increased weatherability, durability, greater adhesion, resistance to checking, reduced penetration and resistance to moisture and corrosive atmospheres. Mica is used to improve performance of latex and oleoresinous house paints, alkyd modified latex exterior paints, primers and sealers, traffic paints, corrosion-resistant and maintenance paints. Micro Micas are more easily dispersed in high speed mixing operations and produce a higher "fineness of grind".

RUBBER 160 or 325 Mesh WATERGROUND MICA is used as a lubricant on the airbag in tire manufacturing, on latex goods, hose and sponge rubber. Also in silicone dispersions for the same applications.

WALLPAPER White WATERGROUND MICA adds sheen and light reflection, giving a pearly or silky appearance.

PLASTICS MICRO MICAS and white WATERGROUND MICAS are excellent fillers and reinforcing agents for many types of plastics providing better dieletric properties, heat resistance, and added impact strength.

Heavy metals ranging from less than 1 ppm to a maximum of 20 ppm. Detailed information on request.

CHEMICAL ANALYSIS	TYPICAL
Moisture @ 100°C	0.10%
Loss on Ignition	4.30%
Silica (SiO_2)	47.90%
Iron Oxide (Fe_2O_3)	2.04%
Alumina (Al_2O_3)	33.13%
Calcium Oxide (CaO)	0.50%
Magnesia (MgO)	0.69%
Titanium Dioxide (TiO_2)	0.65%
Manganese (MnO_2)	0.02%
Sodium (Na_2O)	0.80%
Potash (K_2O)	9.80%
Phosphorous (P)	under 0.01%
Sulfur (S)	under 0.01%

PHYSICAL PROPERTIES	TYPICAL
Specific Gravity	2.82
Index of Refraction	1.58
Apparent Density lbs./cu. ft.	10-12
Wet Bulking Value gal./lb.	.04257
Oil Absorption (Spatula Method)	56-74
Hardness (Mohs)	2.5
pH	7.7

EXHIBIT II - continued

EXHIBIT III

ADVERTISEMENTS OF COMPANIES IN THE UNITED STATES IN THE DRILLING MUD SUPPLY FIELD.

Source: Thomas Register 1977

MUD: DRILLING

CAL: SOUTH GATE

Los Angeles Chemical Co 4545 Ardine (For use in Petroleum Drilling) ..... AAA

CONN: STAMFORD

PIEZOMETER RESEARCH & DEVELOPMENT CORP. 33-A Magee Ave. (Betonite Pellets For Sealing Waterflows) (203—327-0467) ..... B

ILL: SKOKIE

American Colloid Co 5100 Suffield Court, Dept TB (Wyoming Bentonite) ..... AAAA

NY: NEW YORK

CHROMALLOY AMERICAN CORPORATION 641 Lexington Ave. (212—826-9277) ..... AAAA
(See Our Corporate Ad In A-Z, Vol. 8, For Nearest Sales Office of Division or Subsidiary.)

NL Industries Inc 111 Broadway ..... AAAA

PA: PITTSBURGH

FLORIDIN CO. 222 Three Penn Center (412—243-7500) ..... AAAA

TEX: DALLAS

DRESSER INDUSTRIES, INC. Dresser Bldg., 1505 Elm St. (For Oil Field Drilling) (214—745-8000) ..... AAAA
(See Our Corporate Capability Insert in Vol. 8, A-Z for Nearest Office & Other Products.)

TEX: HOUSTON

Baroid Petroleum Services Div. P.O. Box 1675 (Colloidal) ..... AAAA

Dresser Minerals Div. P.O. Box 6504 (For Oil Field Drilling) ..... AAAA

IMCO Services 2400 West Loop South (Oil Water Base Drilling Fluids) ..... AAAA

International Chemicals & Consultants, Inc. 1212 Main (Ligno-Sulfonates, Lignates, etc.) X

Milwhite Co., Inc. P.O. Box 15038 (Colloidal, Weighing Material To Hold Gas Pressure & Pick Up Cuttings In The Oil Well) ..... AAAA

Oil Base, Inc. 3625 Southwest Freeway ..... AAAA

UTAH: SALT LAKE CITY

Custom Milling & Supply, Inc. 746 Everett Ave. ..... B

EXHIBIT IV

ADVERTISEMENTS OF COMPANIES IN THE UNITED STATES WHO EXPORT AND/OR IMPORT MICA AND MICA PRODUCTS

ASHEVILLE-SCHOONMAKER MICA CO.
910 Jefferson Ave., Newport News, Va.
EXPORT: Mica and Mica Products
Cable: Aosico

BLANCHARD MICA INC.
2315 Broadway, New York, N. Y.
IMPORT: Mica

B M T COMMODITY CORP.
233 Broadway, New York 7, N.Y.
EXPORT: Mica, Vegetable Oils, Waxes, Ores and Animal By-Products
Cable: Woodores

DIAMOND MICA CO.
Spruce Pine, N. C.
EXPORT: 325 Mesh wet ground mica & 160 mesh wet ground mica

THE ENGLISH MICA CO.
Ridgeway Center Bldg., Stamford, Conn.
EXPORT: Waterground and Micro-Mica from 160 Mesh to a 3000 Theoretical Mesh Size; White Watergrounc Biotite
Cable: Mica

FORD RADIO & MICA CORP.
542 63rd St., Brooklyn 20, N.Y.
EXPORT: Mica and Radium Apparatus and Parts
Cable: Fordmica

FRANKLIN MINERAL PRODUCTS CO.
Box O Wilmington, Mass. 01887
Plants at: Franklin, N.C. and Hartwell, Georgia
EXPORT: Manufacturers of Ground Mica Powders.
Cable: ALSIBRONZ — Wilmington, Mass.

GENERAL MINING ASSOCIATES
Monument & Cathedral Sts., Baltimore, Md.
EXPORT: Muscovite Mica

HARRIS CLAY COMPANY
CAROLINA-SOUTHERN MINING COMPANY
P.O. Box 429 Spruce Pine, N.C.
EXPORT: Air and Dry Ground Mica, North Carolina Primary Kaolin.

HAYDEN MICA COMPANY
645 Main St., Wilmington, Mass.
EXPORT: Mfrs. of Water Ground Mica
Cable: Haydenco

HOPE INTERNATIONAL CO., INC.
79 Wall St., New York, N. Y.
IMPORT: Mica

MACALLEN COMPANY, INC., THE
1 Bay Road
Newmarket, N. H. 03857
EXPORT: Mica for all purposes: Mica Plate, Insulation Tubes, Rings, Segments, Composite Sheet and Tape.

MANCHARD TRADING CORP.
2315 Broadway, New York, N.Y.
EXPORT: Importer Indian Mica

MICACRAFT PRODUCTS, INC.
51 Liberty St., Newark, N.J.
EXPORT: Fabrication of raw mica

UNITED MINERAL & CHEMICAL CORP.
129 Hudson St., New York 13, N.Y.
IMPORTERS and Fabricators of Mica, Technical Materials; Semiconductor Materials; Electronic Components; Aluminum Foil; Sheet Abrasives; Ceramic Insulation; Pressure Sensitive Tapes; Converters of Foil and Laminated Papers for Waterproof.

MICA FABRICATING CO.
55 Central Ave., Rochelle Park, N.J.
EXPORT: Washers, Condenser Films, Mica Punched and Blanked
Cable: Micminsuco

MICA INSULATOR CO., A SUB. OF MINNESOTA MINING & MFG. CO.
801 Broadway, Schenectady, N.Y.
EXPORT: Micanite and Isomica Built-up Mica Plate, Tapes and Tubes; Lamicoid, Laminated Plastic Sheets, Rods and Tubes
Cable: Micanite

NEW ENGLAND MICA COMPANY, INC.
200 Woerd Ave., Waltham, Mass. 02154
Phone: 894-3810—Area Code 617
EXPORT: High Temperature Mica Plates for Heating Devices and Nuclear and Space Applications, etc., Mica Plates, Tubes, Rings, Segments, Flexible Mica, Coated Products, etc.)
(Co. "Nemco") (Distributors in Major Cities) (P. & G.M.) Allen N. Towne; (S.M.) Charles O. Plimpton, Jr.; (P.A.) B. Schneider; (Dir. of Research) W. R. Mansfield; (Supt.) Karl Haugen; (Mgr. Proc. Eng.) Thomas Bombicino.

PARAMOUNT CORP.
744 Broad St., Newark 2, N.J.
Importers and Distributors of Mica in all forms
Cable: Jatell

PERFECTION MICA CO.
1324 N. Elston Ave., Chicago, Ill.
EXPORT: Mica, Corck, Bakelite Products
Cable: Permica

F. D. PITTS COMPANY
85 Chestnut Hill Rd., Boston, Mass.
EXPORT: Strategic mica
IMPORT: Mica

EXHIBIT V

LIST OF EUROPEAN COMPANIES WHO ARE IMPORTERS AND/OR EXPORTERS OF MICA AND MICA PRODUCTS.

■ MICA & MICANITE PRODUCTS

Austria

Alpen-Glimmerwerke GmbH, St. Andrä I. Lavental, Kaernten

Belgium

Drugmand & Meert S.A. 70 rue des Quatre-Vents, Brussels

France

A.M.C. (S.A.), 9 avenue Franklin-Roosevelt, Paris 8e
Kaolins d'Arvor, Lorient (Morbihan)
Marguet L. (S.A.), 28 rue des Prairies, Paris 20e

German Federal Republic

Glimmerwerenfabrik Paul Günther GmbH, Graf-Spee-Str. 2, 29 Oldenburg
GLISOMA-Werk Willi von Knoop, Postfach 24, 62 Wiesbaden-Schierstein
Possehl GmbH, Abt. Glimmerwarenfabrik, Rissener Str. 140, 2 Wedel

Great Britain

British Mica Co Ltd, 129 Barkers la, Bedford MK41 9RX
Clarke H. & Co (Manchester) Ltd, Atlas works, Patricroft, Manchester M30 ORR
Copeland & Jenkins, Paterson rd, Finedon rd, Industrial Estate, Wellingborough, Northants NN8 4QF
Micability Ltd,
234/248 Old st EC1V 9DJ.
Telephone 01-253 5663;
Telegrams, Endipro London Telex;
Telex 262868
Micalectric Ltd, Treforest Industrial Estate, Pontypridd, Glam. Telephone, Treforest 2353; T A Micalec Pontypridd; Telex 21792
Vandervelde L. Ltd, 22 Bargates, Christchurch, Hants BH23 1QN
Willmott, Son & Phillips Ltd. 52a, Blackstock rd. London N4

Italy

Indelve S.p.A. via Piave 6, Milan

Norway

Bach K. A. & Co. Mineral Supply Co. Grubbegaten 2-4, Oslo
Fivelstad Sigmund, P.O. Box 621, Oslo
Isola Fabrikker A/S, 3950 Brevik
Norsk Feldspat Co. A/S, Evje pr. Kristiansand-S

Poland

MINEX, Krakowskie Przedmiescie 79, P.O. Box 1002, Warsaw (importers). **See advert. near Minerals—Europe**

Romania

Mineralimportexport, 3 Colonadelor St. Bucharest (importers)

Sweden

Elektromikanit i Laxå AB, Laxå

Switzerland

Isola-Werke Schweizerische, Breitenbach, Solothurn

U.S.S.R.

V/O "Raznoexport", Verkhne-Kra Snoseiskaja Ul. 15, Moscow B-140

■ MICA POWDER

Great Britain

Deering Products Ltd, 140 Cromwell rd SW7 4HA. Tel 01-370 4303 & 373 6416; T A Prodeering London Telex; Telex 23336

WOOD TREATMENT LIMITED,

Bosley, Macclesfield, Cheshire. Telephone, North Rode 284, 285 & 286; Telegrams, Thompstone North Rode 284; Telex 668002 Woodflour Macclesfield

EXHIBIT VI

LIST OF CANADIAN COMPANIES WHO MANUFACTURE COATINGS FOR VARIOUS PURPOSES, AS INDICATED

Source: Canadian Trade Index, of the Federal Department of Industry, Trade and Commerce.

COATINGS, Abrasion Resisting.

Brospec Limited, Howick, Que. (Metal and ceramic).
★Canadian Everguard Corporation, Weston, Ont.
Deane & Company, Div. of Isbru Company Ltd., Pointe Claire, Que.
Garlock of Canada Limited, Toronto, Ont. (Metal, ceramic).
Grace, W. R., & Co. of Canada Ltd., Construction Products Division, Scarborough, Ont.
Permashell Corporation Limited, Concord, Ont.
Union Carbide Canada Limited, Toronto, Ont. (Metal and ceramic).
Wright, George A., & Son Machine Works Limited, Kingston, Ont. (Ceramic, tungsten carbide, etc.).

COATINGS, Chocolate.

★Cadbury Schweppes Powell Limited, Montreal, Que.
Chocolate Products Limited, Toronto, Ont.
General Foods, Limited, Toronto, Ont.
★Hershey Chocolate of Canada, Smiths Falls, Ont.
Lafave, W.J., & Sons Limited, St. Jerome, Que.
Les Industries Mont-Royal Inc., Montreal, Que.
★Neilson, William, Co., Limited, Toronto, Ont.
Nestlé (Canada) Ltd., Don Mills, Ont.

COATINGS, Concrete, Roof or Structural.

Anti-Hydro of Canada Sales Ltd., Montreal, Que.
Blachford, H. L., Limited, Montreal, Que.
Bondex International (Canada) Ltd., Montreal, Que.
Borden Chemical Canada, Division of Borden Products Limited, West Hill, Ont.
★Building Products of Canada Limited, Lachine, Que.
★Canadian Adhesives Limited, Montreal East, Que.
★Canadian Elastileum Limited, Richmond, B.C.
Canadian Gypsum Co., Limited, Toronto, Ont.
★Canadian Industries Limited, Montreal, Que. (Paints Div.).
★Chemcote Chemicals Limited, Weston, Ont.
Chemtron Manufacturing Ltd., Calgary, Alta.
Decpro Limited, Mississauga, Ont.
★DeSoto Coatings Limited, Toronto, Ont.
★Domtar Construction Materials Ltd.,. Montreal, Que.
★Edoco Healey Technical Products Ltd., Vancouver, B.C.
Elsro Asphalt Ltd., Edmonton, Alta.
Ensign Industrials Ltd.,. St. Catharines, Ont.
F.I.L. Coatings Ltd., Montreal, Que.
Flintkote Company of Canada Limited, The, Toronto, Ont.
★Glidden Company Division of SCM (Canada) Ltd., Toronto, Ont.
Grace, W. R., & Co. of Canada Ltd., Construction Products Division, Scarborough, Ont.
Iko Industries Ltd., Calgary, Alta.
★Laurentide Chemicals Inc., Shawinigan South, Que.
★Macnaughton-Brooks Limited, Weston, Ont.
Madison Chemical Industries Inc., Mississauga, Ont.
Masse Manufacturing Company, Limited, Toronto,
★Meadows, W. R., of Canada Ltd., Weston, Ont.
★Mulco Inc. St. Hubert, Que.
★Niagara Protective Coatings, Niagara Falls, Ont.
★Northern Paint & Varnish Co., Limited, The, Owen Sound, Ont.
★Pratt & Lambert, Inc., Fort Erie, Ont. (Wall).
★Quigley Company of Canada, Limited, Lachine, Que.
★Set Products (Canada) Limited, Toronto, Ont.
★Shamrock Construction Chemicals Limited, London, Ont.
SIKA CHEMICAL OF CANADA LTD., Pointe Claire, Que.
Sterling Varnish Company (Canada) Limited, St. Catharines, Ont.
★Sternson Limited, Brantford, Ont.
Synkoloid Company of Canada Ltd., The, Surrey, B.C.
★Texas Refinery Corp. of Canada Limited, Toronto, Ont.

COATINGS, Phosphate.

Amchem Products Inc., Rexdale, Ont.
★Armalite Company Limited, Toronto, Ont.
★Cromac Chemical Co., Limited, Toronto, Ont.
Deane & Company, Div. of Isbru Company Ltd., Pointe Claire, Que.
Diversey (Canada) Limited, Mississauga, Ont.
Kerns-Keystone Division, Pennwalt of Canada Limited, Oakville, Ont.
Kert Chemical Industries Inc., Weston, Ont.
Magnus Chemicals Limited, Boucherville, Que.
Oakite Products of Canada Ltd., Bramalea, Ont.
Parker Division Oxy Metal Finishing of Canada Ltd., Rexdale, Ont.
★Pennwalt of Canada Limited, Chemical Specialties Division, Oakville, Ont.
Van Camp Products and Sales Ltd., Toronto, Ont.

COATINGS, Pipe.

Canadian Collord Products, Limited, Windsor, Ont.
Chemtron Manufacturing Ltd., Calgary, Alta.
Ensign Industrials Ltd.,. St. Catharines, Ont.
Kendall Company, The, Toronto, Ont.
PVS Industries Limited, Weston, Ont.
★Plicoflex of Canada, Calgary, Alta.
Prudential Steel Ltd., Calgary, Alta.
Quebec Pipe Protection Ltd., LaSalle, Que.
Shaw Pipe Protection (Alberta) Limited, Calgary, Alta.
Shaw Pipe Protection Ltd., Rexdale, Ont.
Shaw Pipe Protection (Pacific) Ltd., Vancouver, B.C.
Sterling Varnish Company (Canada) Limited, St. Catharines, Ont.
TAPECOAT COMPANY OF CANADA LIMITED, THE, Rexdale, Ont.
★3M Canada Limited, London, Ont.

EXHIBIT VI - continued

COATINGS, Plastic.

Amercoat of Canada Limited, Burlington, Ont.
★Arndt-Palmer Laboratories of Canada, Division of Arndt-Palmer International Inc., Mississauga, Ont.
★Barry Manufacturing Company Limited, Mississauga, Ont.
★Blachford, H. L., Limited, Montreal, Que.
Borden Chemical Canada, Division of Borden Products Limited, West Hill, Ont.
British American Chemical Co. Ltd., The, Burnaby, B.C.
Canadian Coating Industries Ltd., Montreal, Que.
★Canadian Collord Products, Limited, Windsor, Ont.
★Canadian Elastileum Limited, Richmond, B.C. (Polyurethane type).
★Canadian Everguard Corporation, Weston, Ont.
★Canadian General-Tower Limited, Cambridge, Ont.
★Canadian Industries Limited, Montreal, Que. (Plastics Div.).
Canusa Coating Systems Ltd., Rexdale, Ont. (Cross-linked polyethylene).
Chemor Corporation Ltd., Montreal, Que.
Colour Coatings Limited, Scarborough, Ont. (Teflon).
Consumer Chemical Division, Borden Products Limited, Cobourg, Ont.
Cromac Chemical Co., Limited, Toronto, Ont.
Durable Release Coaters Limited, Bramalea, Ont. (and teflon).
Eastern Wire & Conduit, Rexdale, Ont.
Everlast Coatings Limited, Thornhill, Ont.
Ferox Coatings Inc., Montreal, Que.
Ferro Industrial Products Limited, Oakville, Ont.
★Fuller, H. B., Company (Canada) Ltd., Boucherville, Que. (Epoxy).
General Latex and Chemicals (Canada) Limited, Candiac, Que.
H. F. Products Limited, Candiac, Que.
Halliday-Armstrong Limited, Mississauga, Ont. (Epoxy).
House of Sturgeon (National) Limited, Weston, Ont. (Plastisol vinyl based).
Hudson Plating Co. Ltd., Vancouver, B.C.
★Industrial Adhesives Limited, Toronto, Ont.
International Lacquer Products Ltd., Montreal, Que.
International Paints (Canada) Limited, Montreal, Que.
Iroquois Chemicals Ltd., Cornwall, Ont. (Urethane).
★Korzite Industries Limited, Guelph, Ont. (plastic foam and coal tar epoxy).
★Lawjack Equipment Ltd., Montreal, Que.
Long, A.E., and Co., Limited, Toronto, Ont.

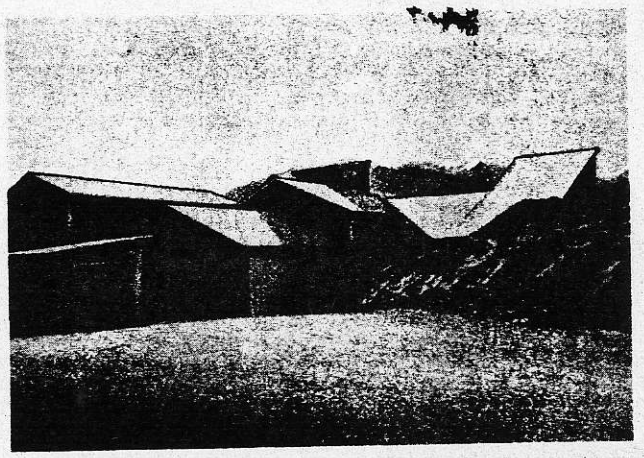
Madison Chemical Industries Inc., Mississauga, Ont.
METAL-CLADDING OF CANADA LTD., Fort Erie, Ont.
Mobil Chemical Canada, Ltd., Coatings, Division, West Hill, Ont. (Epoxy).
★Monsanto Canada Limited, LaSalle, Que.
Morton-Williams of Canada Ltd., Ajax, Ont.
NACAN Products Limited, Toronto, Ont.
★National Vintex Corporation, Candiac, Que.
★Niagara Protective Coatings, Niagara Falls, Ont.
PVS Industries Limited, Weston, Ont.
★Packaging Converters Ltd., Scarborough, Ont.
Parr Industries Limited, Weston, Ont.
Phoenix Manufacturing Co., Milton, Ont.
★Pierce & Stevens Canada Ltd., Fort Erie, Ont. (and hot melts).
Plastics Canada, Division of Hetman Canada Ltd., Mississauga, Ont.
Pramex Coating Industries Ltd., Chomedey, Que.
Schwartz Chemical of Canada Limited, Pickering, Ont.
★Sico Inc., Quebec, Que. (Epoxy and polyurethane).
Stahl Finish Canada, Montreal, Que. (Vinyl and urethane).
Standard Manufacturing Co. Ltd., The, St. John'S, Nfld. (Epoxy).
Sterling Varnish Company (Canada) Limited, St. Catharines, Ont.
Taylor Plastics Ltd., Calgary, Alta.
★3M Canada Limited, London, Ont.
Tower Paint & Laboratories Ltd., Edmonton, Alta.
Tube-Kote Div. of AMF Tuboscope Inc., Edmonton, Alta.
USM Limited, Montreal, Que.
Uniroyal Ltd., Don Mills, Ont.
Urethane Products Canada Limited, Mississauga, Ont. (Urethane).
Whitaker, Ray, & Sons Mfg. Ltd., Port Perry, Ont.

104 miles North of Mackenzie
F
EXHIBIT VII (a)
66
A
C
D
B
E
I
British Columbia
APPROXIMATE POPULATIONS OF CITIES AND TOWNS
Over 25,000
10,000 to 25,000
5,000 to 10,000
2,500 to 5,000
1,000 to 2,500
500 to 1,000
Under 500
ADDITIONAL DATA
Principal Recreation Areas
Government Campsites
Airline Stops
Principal Military Airports
Points of Interest
Summer Steamer Lines
Ferries, Toll Bridges
Elevations in Feet
Time Zone Boundaries
Railway Lines
SCALE OF MILES
Lambert Conformal Projection
1:1,980,000
One inch equals about 31 miles
H. S. HASLAM AND ASSOCIATES LIMITED
Mackenzie
Prince George
Quesnel
Williams Lake
100 Mile House
Kamloops
Vernon
Kelowna
Merritt
McBride
Valemount
Blue River
Clearwater
Salmon Arm
Vanderhoof
Wells
Barkerville
YELLOWHEAD HIGHWAY
BOWRON LAKE PROV PARK
WELLS GRAY PROVINCIAL PARK

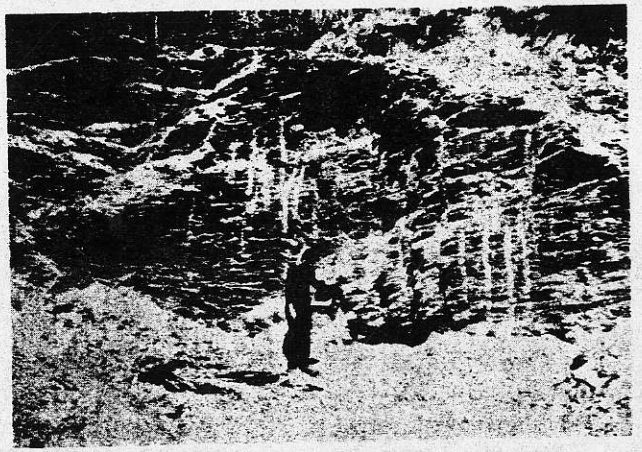
EXHIBIT VII (b)

Geomica

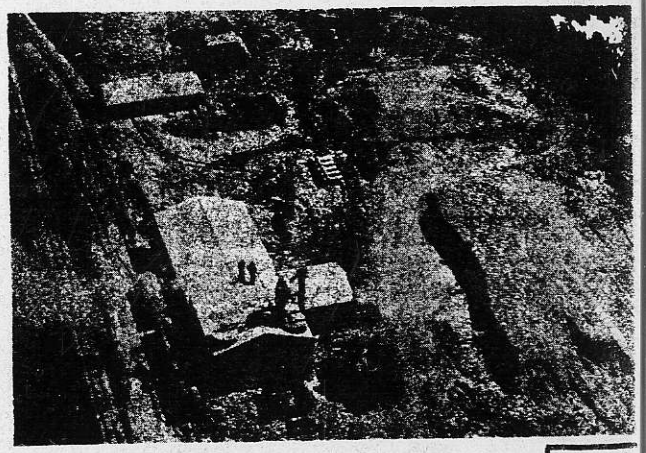
CANADIAN MICA PRODUCTS



Cedarside Mica Plant



Cedarside Mica Deposit



Rosalind Processing Plant

Magcobar

GEORGIAN MINERAL INDUSTRIES LTD.

OFFICE — CALGARY, ALTA.
PLANT — VALEMOUNT, B.C.

MAGNET COVE BARIUM CORP. LTD.

OFFICE — CALGARY, ALTA.
PLANT — ROSALIND, ALTA.

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EXHIBIT VIII(a)

GEOMICA

. . . is the tradename of a series of high quality Canadian mica products. They are being produced by GEORGIAN MINERAL INDUSTRIES LTD., at a plant at Cedarside, British Columbia, on the main line of the Canadian National Railway, 85 miles west of Jasper, Alberta. The plant is well situated for shipments east or west, as well as overseas through the port of Vancouver.

The mica occurs in a unique deposit of almost pure mica. Open pit drill proven reserves of high quality muscovite mica ore are sufficient for many years of volume production. The raw mica ore is crushed roughly, flaked, dried and cleaned at the Cedarside plant. At present, the oilwell lost circulation prevention material and a pure coarse mica feed product are produced at this plant. The majority of the pure mica product is shipped in bulk for further grinding to various specification.

MAGNET COVE BARIUM CORP. LTD., at a plant at Rosalind, Alberta, carries out the final processing, conducts the marketing and sales operation of GEOMICA. The product is therefore subject to the rigid and exacting quality control of the MAGCOBAR laboratory facilities.

MICA

. . . is a group name applied to a large number of minerals that have certain physical and chemical characteristics in common. Mica minerals are characterized by a very easy cleavage in a single direction and by a high degree of flexability, elasticity and toughness of the extremely fine flakes.

MUSCOVITE MICA possesses a high di-electric strength which makes it indispensable to the electrical industry. The material when flaked has a very low bulk density and the fine flakes have an exteremly high covering power per unit of weight when used for dusting or insulating.

As a filler, mica is exceptional in its bulk displacement in relation to the weight. Mica is fire and heat resistant and has a very low heat conductivity making it an excellant insulator or heat retainer.

When ground, mica maintains its platey structure which promotes a clean, bright lustre and offers a protective surface when used in paint or plaster. The platey nature of the material also trends to lower friction and promote lubrication between two mediums.

The bright reflective surface of clear mica is desireable for use in the manufacture of wall paper and as a decorative addition in concrete, stucco, etc.

EXHIBIT VIII(6)

USES

DUSTING — PIPELINE WRAP, ROOFING, ASPHALT PRODUCTS

Covering power far superior to alternate products and less severe on wearing parts and equipment.

FILLER — PLASTERS

Inert qualities of special value.

DECORATION — STUCCO, PLASTER, CONCRETE

Various size specifications for various effects.

LUBRICANT — GREASE

Lowers friction, keeps lubricant clean and gives body to the grease. Used particularly where an excess of grease or oil is objectionable.

— RUBBER MANUFACTURE

serves as lubricant and dusting agent during manufacture. Also used between inner tube and tire casing where it lowers friction and prevents sticking.

FILLER — HARD RUBBER, PHONOGRAPH RECORDS, SOME RUBBER GOODS, ENAMELS

The low density and its chemical inertness offer an ideal material to give body and opacity to a product.

PAINT —

A perfect reinforcing agent, completely inert and impervious to moisture. Excellent adhesion qualities. The particle shape adds to an impervious paint film. The cleavage plates of the thin mica sheets are extremely tough but elastic, flexable and transparent. Mica when added to other pigments increases the moisture and impedance value and aids in the non-settling in the can. The elastic limit of the paint is reinforced through the addition of mica, aiding the film in a normal chalking life. A good surface is thus retained for repainting.

INSULATION —

The poor heat conductivity makes it useful for packing and jackets of boilers and steam pipes.

ABSORBENT —

In nitroglycerine and disinfectants the mica is used as an extender and the porosity is high.

RESISTANCE TO ACIDS —

Used as a filler and extender in applications which require acid resistance.

SHIPMENTS

Normal shipments are prepared in 50 pound multiple paper bags in 50-ton lots.

Special arrangements can be made to ship in bulk in boxcars or covered cars.

Less than carload quantities are available, prices on request.

SAMPLES

Samples are available for testing in your plant.

LCL orders are available for bulk tests.

Laboratory facilities are available to determine the advisable specifications for possible markets, and on inquiry, tests can be carried out to explore the adaptability of GEOMICA to any process or application.

MARKETED BY:

MAGNET COVE BARIUM CORP. LTD.
CALGARY, ALBERTA

DISTRIBUTORS:

EXHIBIT VIII(d)

CONFIDENTIAL

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M E M O

TO: EXECUTIVE PERSONEL OF GEORGIAN MINERAL INDUSTRIES LTD.

FROM: G. C. SHORT

The Annual Meeting was held July 24th, 1961 and the Board of Directors remains unchanged for the coming year. I would like to thank you for your enthusiastic help during the past and for joining with me during the coming year.

During June the Industrial Development Bank approved a loan to the Company in the amount of $40,000.00. The basis of this loan was to improve present facilities at the Cedarside Mill and pay off any indebtedness on our equipment. The I.D.B. would not at this stage consider any other possibilities open to the company but suggested we initiate any such development with outside capital and after proving a market approach the I.D.B. again.

Serious consideration must now be given to all the potential developments open to the company.

PRESENT CEDARSIDE FLAKE MICA OPERATION

(a) The present plant provides sufficient product for the pipeline wrap industry only. The addition of an Allis Chalmers ball mill which was loaned for a two month production test will increase the output of finished product to ten tons per day.

(b) Markets open to a higher volume production are:-

1000 tons per month to the Northwest United States Roofing companies and potentially the Western Canadian roofing companies (who do not currently use this material since it is too expensive to import).

(c) It has now been found to our satisfaction through personal examination of any known mica schist deposits that Cedarside has the highest grade and largest known quantity of such material in Canada. Our deposits run over 80% mica while most average well below 20%. It would therefore be adviseable to develop this deposit to the fullest rather than attempt to gain additional production from other smaller deposits. We have however, staked property at Salmo and Oliver, B. C. on schist deposits in close proximity to the United States border.

(d) A large volume operation would require the necessity of proven reserves through drilling. We will therefore require to establish 200,000 tons reserve to cover a ten year program. The drilling operation will commence during the first week of August.

(e) Five claims formerly under lease-royalty agreement have been acquired and we are negotiating on a further five. These cover the main orebody. During drilling any extensions to the orebody will be covered by claims.

(f) A professional market survey will be required to establish the extent of this market, in preparation for future financing.

(g) A more efficient plant will be engineered to handle such a project. James Millar & Associates are currently in correspondence with the Dept. of Mines in Ottawa to look into the feasibility of a flotation plant which appears to be the economical method of handling large volume production. This process was considered prior to building the Cedarside plant, however, our capital was such that it could not be considered at that time.

(h) On completion of the above a compilation report will be required to cover these developments.

PULVERIZED MICA

(a) The initial test conducted on the Majac jet pulverizing equipment gave sufficient small samples to establish that our material is acceptable to the paint, drywall joint cement, rubber, plastic and welding rod industries. A larger scale test on one ton of material is now being conducted to provide production sized samples necessary for sales contracts to warrant installation of the equipment.

(b) Plant design would be necessary to incorporate this unit into the present flow sheet.

(c) A market survey would be necessary to establish the size of the Canadian market. This market appears to be substantial both from our own survey results and from the eight large Eastern Canadian distributors (industrial chemicals) who have approached us to handle our sales.

(d) Perhaps the largest market here will be the drywall joint cement, where mica forms approximately one-third of the formula and about one-half of the cost. Mechanical Drywall Company in Edmonton have doubled their consumption in the last two years and currently use one ton of mica per day.

They expect to increase it again this year. Their cost of importing U. S. pulverized mica is $250.00 per ton and they would use more if it were available at a lesser cost. The plaster board industry is highly competitive and even a dollar a ton makes a difference in their end product price.

JOINTING PLASTER MANUFACTURE

(a) Considering the above point, that mica is one of the main ingredients and the highest cost of the drywall joint cement plaster, it is possible that we could enter this field and manufacture the end product.

(b) This type of plant consists of warehouse area for the ingredients (all dry) - gypsum, whiting, casine, talc, clay, asbestos and mica. Material handling (conveying) equipment, mixer and bagger and finished product storage. An exact formula would either be available through hiring technical personel from the trade or through the National Research Council.

(c) A market survey covering the development of the drywall construction industry and its potential would be necessary. Although we do know that only five plants presently exist in Canada with none located between Edmonton and Toronto. The Edmonton plant is the smallest.

(d) A compilation report would be necessary to cover such phases of this investigation as markets, economics, plant sites, etc.

BONDEX MANUFACTURE

(a) One of the large markets for pulverized mica in the United States is in the preparation of a cement paint for use most particularly in the cement block field. This paint uses portland cement, waterproofing agent, dry pigment and mica. The mica fills in the porous surface of the block and gives a smooth painted surface. This material is sold dry and would prepared using the same equipment as the jointing cement manufacture.

(b) A market survey would also be necessary here.

(c) A formula would be necessary and we are now corresponding with the Portland Cement Association laboratory and the National Research Council in this regard.

OTHER PRODUCTS

(a) All drywall joint cement plants appear to be entering the pre-cast acoustic tile field where again mica is one of the main components.

(b) Mica (flake) is used locally in the decorating of acoustic tile and is sold at $3.50 per pound.

(c) Fireproofing of steel girders also uses mica and is becoming a large industry through the insurance advantages.

(d) A steel company is Eastern Canada are transporting red hot ingots and we have requested a test for the purpose of using mica as a heat retainer.

(e) Special purpose greases include mica.

(f) Pulverized mica is included in several pipeline enamel formulas.

ABRASIVE MANUFACTURE

(a) Although this by-product has been considered since the commencement of the flake mica operation, we will have further tests conducted to establish the best paper and glue.

(b) A market survey towards consumption of abrasives is necessary.

The Canadian National Railway have suggested the possibility of establishing an entire new rate structure to make our products competitive across Canada. They stated that this could not be considered prior to date since we had to prove that we were serious in using their line.

On the basis that the economics prove favourable a major financing program would be essential since such a program as outlined above would call for an investment of better than $250,000.

It has appeared during our own investigations that gypsum companies control the drywall joint cement industries, as well as allied construction programs. We also know that G. L. A. (I believe Canada's largest gypsum company) do not have a mine closer to the Western market than Gypsumville Manitoba. We have therefore acquired a gypsum property in the Canal Flats area of British Columbia to be held

through a subsidiary company - Georgian Gypsum Products Ltd. The initial work on this property is being handled through share interests. (Which will be small, since primarily only a seismic survey to establish overburden and some drilling to establish grade will be necessary.) The final outcome if favourable would provide for a mine, which is open pit, crushing and shipping. A. B. C. Forest Development Highway crosses our claims.

Our thinking here is that such a financing program may necessitate the entry of a larger company such as G. L. A. into Georgian and a deposit in this area would definitely be of interest to them.

Other possibilities are open to the company such as a larger loan from the Industrial Development Bank, private financing, commonstock underwriting, etc.

Your comments regarding the above will be most appreciated.

P. S.

The above project will require approximately $20,000 to prove reserves, markets and economics. I feel that it would be to the advantage of the company if I personally liquidated sufficient of my share holdings to cover this expense and since the program will greatly enhance the share value this should be no problem. This would allow the company to continue its current operations without any further indebtedness and since I am personally convinced that such potential not only exists but is essential to our growth I would be willing to handle the program in this manner.

APPENDIX II

EXHIBIT VIII(e)

Magcobar Mining *Company Limited*

ONE OF THE DRESSER INDUSTRIES

510 FIFTH STREET S.W.
CALGARY, ALBERTA

PRELIMINARY REPORT ON DRILLING PROGRAM CONDUCTED BY MAGCOBAR MINING COMPANY, LIMITED FOR GEORGIAN MINERAL INDUSTRIES LTD. FOR MICA AT CEDARSIDE, B.C.

Oct. 23 - Nov. 5, 1961.

On October 23, the drill unit started drilling above the mica mine owned by Georgian Mineral Industries Ltd. at Cedarside, B.C. This drilling program was arranged under mutual agreement to market mica produced at Magcobar Mining Co. Ltd.'s plant at Rosalind, Alberta, and the object was to prove reserves of mica that could be obtained by strip-mining methods.

The first two holes were drilled west of the workings and slightly above the mica horizon. At 16 feet, the hole caved in while trying to core the quartzite capping and the hole was abandoned. Drill hole GM-2 cut a 7 foot thickness of mica schist of which approximately 50% appeared to be ore; the remainder quartz and sand.

GM-3 was drilled with air 100 feet above the mine workings and no formation was encountered to a depth of 33 feet. Mica was found in the overburden at approximately 20 feet depth. This area was abandoned due to depth of overburden.

.....2

DH GM-4 approximately 400 feet west and 30 feet above was air drilled to 12'.0. At depth 10-12 feet a bed of mica schist was sampled which would make good ore. It was found to be underlain by 3 feet of quartzite on extremely hard rock which is fractured along jointing planes. At a depth of 15-18 feet much mica occurs in the quartzite sill and some could be mined and classified as ore.

From 18-40 feet mica schist occurs with few thin lenses of quartz containing mica. This quartz may slow up mining methods slightly, but in most cases should prove to be ore.

The bulk densities of the rock in this section were found to range between 2.70-2.75 increasing to 2.83 at 34-40 feet depth. Thus the density of the crude mica ore in the ground can be estimated at approximately 170 pounds per cu. ft. The grain densities of the mica were measured from the cores at 2.75-2.88 GMS/cc. and mostly from 2.82-2.88 on good mica ore. The average specific gravity of the mica would be approximately 2.83 or 175 lbs./cu. ft.

Most of the mica was found to be spotted with black specks of an unidentified mineral and also mixed in places with a brown stained mica. The schistosity was measured at 10^{o}-15^{o} and appeared to average 12^{o}. The recoverable mica from this ore should average 80-90%.

.....3

GM-5 offset south from this hole and on the same elevation showed very good ore from 18-27 feet depth, with an average grain density of 2.84. Quartz appears to have infiltrated from 27-29' but approximately 9 feet of mineable mica is available here above quartzite at 27'.0.

GM-6 was drilled further west and found from the cores to be almost impossible to mine. The density of this section 10-20' averaged approximately 2.70 GMS/cc. A minute trace of Chalcopyrite and Bornite was found at 16 feet depth. As this hole proved almost barren of mineable ore the drill was moved west and above this section stratigraphically.

GM-7 at an elevation of 3271 or approximately 200 feet above the present mine workings cut mica schist at 5'-20'. The densities or specific gravity of this mica ranged 2.88-2.90 and was brown stained on top. From 20.0-22.8 a quartzite containing mica schist was air drilled and found too high in quartz for ore, thus abandoned at an elevation of 3248. The mica sampled should run 85-90% recovery from this ore, with quartz 5-10%.

GM-8 drilled at elevation 3251 below this last hole showed hard and soft brown mica from 10.0-13.5 with quartzite underlying to 15.0 feet. Coring from this depth showed thin layers of quartz in mica schist from 15-22 feet. Some of this section would make ore, but in most cases the quartz would offer extremely difficult mining conditions.

.....4

GM-9 was drilled as an offset home from GM-4 northerly to trace the top mica bed. This was air drilled and sampled from 7.0-15 feet depth and found to be overlying quartzite. From 7-9 good mica ore should average 80% recovery and had a density of 2.81. Section below 9.0-15.0 contained quartz pebbles 1" and below, and would have less recoverable mica, probably about 50%, with a specific gravity of 2.76. A trace of Chalcopyrite was found in the cuttings and a small percentage of Tourmaline. This section should average 60-70% mica at least.

The next hole GM-10 was drilled further north at an elevation of 3220 feet. This showed only 2 feet of mica (Sp. Gr. 2.70) averaging about 20% mica with much quartz. The ore appears to be of poor quality and this area should be abandoned until a deeper hole is drilled to prove ore below the quartzite at 11.0 ft. depth.

The drill moved southwesterly and uphill from here to GM-11 at elevation 3235 feet. Good mica ore was cut here from 5-15 feet with specific gravities of 2.78-2.86. The quartz content varied from 5-20% with quartzite rock at 15 ft. depth. A dark sub-metallic mineral with a specific gravity of approximately 4.0 was found in these cuttings. It is quite magnetic and found to affect the Brunton compass when brought close to. In these samples this mineral was found to be associated mainly with quartz.

GM-12 was drilled in this area up strata and about 100 feet further west. Under 13 feet of glacial till mainly sand with a few small boulders,

.....5

mica schist was sampled from 12'.5 to 40'.0. All this section appears to be good ore except for interval 20.0-21.5 of a black sub-metallic substance which is mainly magnetic. This section would be mined out as waste, but the remainder should provide a 25 foot thick section of mica ore above a highly siliceous hard bed 39-40' depth. The ore in this hole appears fairly homogeneous and the Sp. Gr. ranges from 2.82 - 2.90 with impurities 5-20%.

A production sample of 150 pounds was obtained from the cuttings off this hole and will be screened and assessed at the Cedarside plant.

This area provides good chances for disposition of overburden when stip-mining. Also the section of mica schist is very thick and under little overburden which would mean low mining costs. It is recommended that this area be considered for future mine development plans. The elevation of this hole was surveyed at 3259 feet and sampled to a depth of 3219 feet, which is the same elevation as total depth on DH GM-11.

GM-13 was drilled offset 120 feet north and at the same elevation as GM-12. This hole proved to be very wet and water encountered at 18 feet. The only mica sampled was mixed with wet sand in the overburden and none proved economical to recover. This hole should limit stripping to the north as the wet sand and water exists to a depth of 19.5 feet.

.....6

GM-14 approximately 37 feet above this surface and located 300 feet northwest, proved another section or layer of mica schist above. The interval sampled proving good ore was between 15 and 28 foot depth. The specific gravities on these samples was from 2.85-2.91 and approximately 90% mica could be recovered. At depth 28 feet quartz has infiltrated and the ore becomes extremely hard. Thus the hole was ended at 28.3 feet or an elevation of 3258 feet.

In order to link up this section of schist with outcropping between GM-7 and GM-14, DH GM-15 was located approximately 260 feet south of this last hole and just below the exploration pit exposing the mica schist. Here the mica ore section contained many fragments and pebbles of quartz and the estimated recovery classified as fair, i.e. 30% - 60%. The specific gravities 2.78-2.89 verified the presence of quartz in the ore and a thickness of 10 feet could be mined to an elevation of 3259 feet.

Poor ore was found in small amounts (10%) in wet sand from 10.0-24.5 feet on GM-16, approximately 200 feet northwards. This hole proved similar to GM-13 and flowing water was encountered which caused abandonment. Thus this area to the north of the showing would prove edge or limits of the stripping should mining commence in the vicinity of GM-12. It would be wise to allow for seepage from the overlying sands here when planning strip-mining 100 feet south.

.....7

Two holes were drilled further northeast on a road, cut as a possible haul road, to the proposed new mine.

GM-17 was abandoned at 12 feet depth due to flowing water. This would be the same drainage as GM-16 and 13 further up slope.

GM-18 drilled to 38 feet also encountered water and was abandoned without reaching to bedrock or formation. Traces of mica were found in the overburden but none of sufficient quantity to warrant mining.

An exploration pit was dug approximately 100 feet south of GM-11 and mica exposed under a quartz sill at depth of approximately 5 feet. This proves the existence of mica schist under little overburden in the middle of the area drilled and it is most probable that mica schist ore of suitable grade for processing can be strip-mined between drill holes GM 4, 5, 7, 8, 9, 11, 12, 14 and 15.

This area is roughly estimated to contain 200,000 tons of crude mica ore, which at 80% recovery, would amount to at least 150,000 tons of processed mica. These reserves would probably be sufficient to supply the needs of total Canadian consumption for a period of more than 15 years, based on 10,000 tons per year. From market surveys conducted by Georgian Minerals, this rough estimate on Canadian consumption is probably very high and 5000 tons would be more realistic. This would mean that this deposit could supply the Canadian market for flake mica and associated

.....8

products for a period of at least 30 years.

These reserves can be increased with further drilling.

Recommendations:

From this preliminary drilling program, it is recommended that the present mine workings be mined out where stripped and the location of the mine changed. Future stripping should be carried out in the vicinity of DH GM-12 with plans to dump overburden in such a manner that it will not be moved a second time when stripping below at GM-4 and 9 down slope. Care should be taken to avoid water seepage from the north and plans made while stripping to provide good drainage from rain and spring thaws or run-off. A new haul road should be constructed to avoid the hills on the present road and shorten the distance to the plant.

A limited drilling program should be undertaken to further increase reserves and find the limits of the ore body westerly and northwards as the south and easterly limits have been established. Due to the presence of a magnetic mineral in the schist a dip needle or magnetometer survey should be carried out across the deposit to measure the intensities and observe if this method could be used to outline the presence of mica schist.

Respectfully submitted,

J.S. Carter

John S. Carter - Geologist
Magcobar Mining Company, Limited

JSC:vh

CORE LABORATORIES-CANADA LTD.
CALGARY ALBERTA

Company - MAGOBAR MINING CO. LTD.
MICA CLAIMS
CEDARSIDE AREA
Province - BRITISH COLUMBIA

Date Report - NOVEMBER 16, 1961
Remarks - Specific Gravities on Samples supplied by Client.

Page - 1 of 1
File - CNP-4-1342
Analysts - SS

SAMPLE NUMBER	DEPTH REPRESENTED FEET	CORE HOLE	BULK DENSITY
1	18.0-19.0	GM4	2.72
2	19.0-19.8	GM4	2.73
3	25.0-28.0	GM4	2.75
4	30.0-32.0	GM4	2.70
5	32.0-34.0	GM4	2.83

CANADA

DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

FILE NO

MINES BRANCH

40 Lydia Street,
OTTAWA, Ontario,
January 10, 1962.

Mineral Processing
Division

Mr. John S. Carter,
Magcobar Mining Company Limited,
510 Fifth St., S.W.,
Calgary, Alta.

Dear John:

I appreciated receiving your prompt reply to my last letter and also your offer to loan me the publications containing references to barytocalcite.

The first one you mentioned is in our library but for some reason the second, the I.M.M. Symposium on "The Future of Non-Ferrous Mining in Great Britain and Ireland", is not in our library and is not available at the G.S.C. If I could borrow your copy just long enough to extract the pertinent information, I would very much appreciate it.

The muscovite schist from Valemount, B.C., from which you extracted the mineral grains you submitted for identification, is, I presume, the Georgia Minerals material that your Mr. Parker mentioned when I was in Calgary.

An X-ray diffraction analysis of the clear, pink material (GM-3) indicated that it was garnet. In the same sample I found rare, shiny, black, metallic grains of rutile and ilmenite. A microscopic examination of the other sample (GM-12) showed that the principal constituent had a dull bronze colour rather than black. It gave the X-ray diffraction pattern of pyrrhotite. Although I could not make any measurement of the magnetic properties, it seemed to me that this specimen was rather more strongly magnetic than most pyrrhotites.

Our library has purchased a Xerox copy of Art Anderson's thesis from University Microfilms. I agree with you that it represents a good piece of work but I have not recovered from my surprise at his being a pharmacist.

Yours truly,

R. M. Buchanan, Head,
Ore Mineralogy Section.

EXHIBIT VIII(4)

86

November 24th, 1961

Mr. Stan Milner
c/o Canadian Chieftain Petroleums Ltd.
8631 - 109th Street
EDMONTON, Alberta

Dear Stan:-

Thank you for your helpful suggestions during our telephone conversation this morning. As mentioned I have prepared the following brief outline of the Company.

Capitalization	5,000,000 N.P.V.
Total O/S	1,068,628
(I hold 40,000 of these free shares)	
Less escrowed	675,000
Total held by public	353,628

The company is a Dominion incorporation, extra provincially registered in B. C. Initial sales to the public were at 50 cents per share, netting the treasury 37 1/2 cents.

We commenced pilot plant production last December and marketed the resulting material to the pipeline wrap producers in Western Canada. Once we established the fact that our material was acceptable to the markets, we commenced plans to expand our mill. This was accomplished through an Industrial Development Bank loan of $40,000 and an additional $20,000 working capital was advanced by our bank. The mill is now closed to shift the pilot plant equipment and new equipment into permanent position. This should be completed in about three weeks.

The mill, Cedarside, B. C., is located on the main line of the C.N. R. about eighty-five miles west of Jasper.

A stockpile of approximately 1,200 tons of raw ore (80 percent mica recovery) is located at the mill and around 70 tons of processed pure mica is ready for bulk shipment. Inventory of bagged material ready for market totals 70 tons, with 50 to be delivered to Building Products December 8th.

Our process involves crushing, drying, screening and air flotation. This gives us a pure flake product which can be marketed directly to the oilfield lost circulation markets. The roofing and pipeline wrap product is further processed at Magcobar's Rosalind plant.

The pulverized mica - used as filler in asphalt products, pipeline enamel, rubber and plastic manufacture, paint and drywall joint cement manufacture can also be produced at Rosalind. However, we eventually hope to install our own pulverizing equipment.

Magcobar have conducted an initial drilling program and are now assessing the geological information obtained. The second phase of the drilling program will be carried out in the spring. Our claims cover the ore body and it appears that this could well be the largest known source of flake mica. The area drilled was 500 feet by 500 feet and recovered 90 percent pure mica to a depth of 40 feet with the drill stopping in mica. Using only the top 12 feet of ore we have established a reserve picture of 150,000 tons. The further drilling will also include deep tests.

Annual markets are roughly estimated at 600 tons for Western Canadian pipeline wrap 10,000 tons to Eastern Canadian markets and 12,000 tons to Northwestern U. S. markets with a potential 1,000 tons to Western Canadian roofing. Other export markets are being negotiated.

Our mill will be capable of producing 8,000 to 10,000 tons this year and profit will be sufficient to enable expansion capable of eventually filling the potential market.

Costs can only be estimated at present but profit per ton unit is approximately $16.50 on eastern sales, $30.00 on Alberta sales and $26.00 on Northwest U. S. so it could be estimated that the company would make a profit of over $100,000 on sales of flake mica next year. We have the usual mining company three year tax exemption.

Our other holdings include 75 percent of Georgian Gypsum Products Ltd., a private B. C. company holding a large gypsum deposit in southeastern B. C. and a promising lead-zinc property in southern B. C. held by crown granted claims.

Two divisions of manufacture are open to the company. Drywall joint cement currently retailed by the gypsum producers under their plaster board trade names (and custom produced by only five drywall manufacturing plants in Canada.) Mica represents over 50 percent of the cost of the ingredients and gypsum is the main ingredient.

The finished drywall joint cement product retails from $224.00 to $360.00 a ton in Calgary with volume discounts. However, considering mica is over 50 percent of the cost and approximately one-fifth of the ingredient there appears to be an extremely high profit factor, as the cost of the other ingredients is known to be insignificant. This profit factor of course would be much higher to manufacturer producing his own mica.

Our research shows that approximately 2,500 tons of mica are used in Canada for joint cement costing Canadian producers from $125.00 to $250.00 per ton. Considering a profit of $50.00 we can expect a profit of $125,000.00 on sales of pulverized mica to this industry alone. This would be sufficient encouragement to enter the actual manufacturing of the finished product.

The above profit figures for the sale of mica are conservative and are based on the assumption that we can sell all we produce.

The other field of manufacturing open to us is the production of abrasive paper from our sized garnet by-product. There appears to be no such manufacturing plant in either Western Canada or United States. In the meantime however, sales of the garnet to sand blasting concerns should pay our plant costs to produce the mica.

Our money requirements would be towards either the gypsum development or manufacturing outlined above.

My interest in listing is probably premature but all these developments take so long in the negotiation stages that I felt I should start investigations now. The shares have traded on the Calgary unlisted from 64 cents to the current 48 cents. There is very little activity on our shares at the moment but then no news has been released on Magcobar's entry or the discovery of such a large ore body.

I appreciate your interest and will look forward to your

comments. My eastern trip will probably take place in December and I will look forward to chatting with Eddie Bowner. I rather like your suggestion of Vancouver and since we are active in their province it may be the best bet.

Thank you once again and congratulations on winning your campaign for alderman.

Sincerely,

(Mrs.) G. C. Short, President

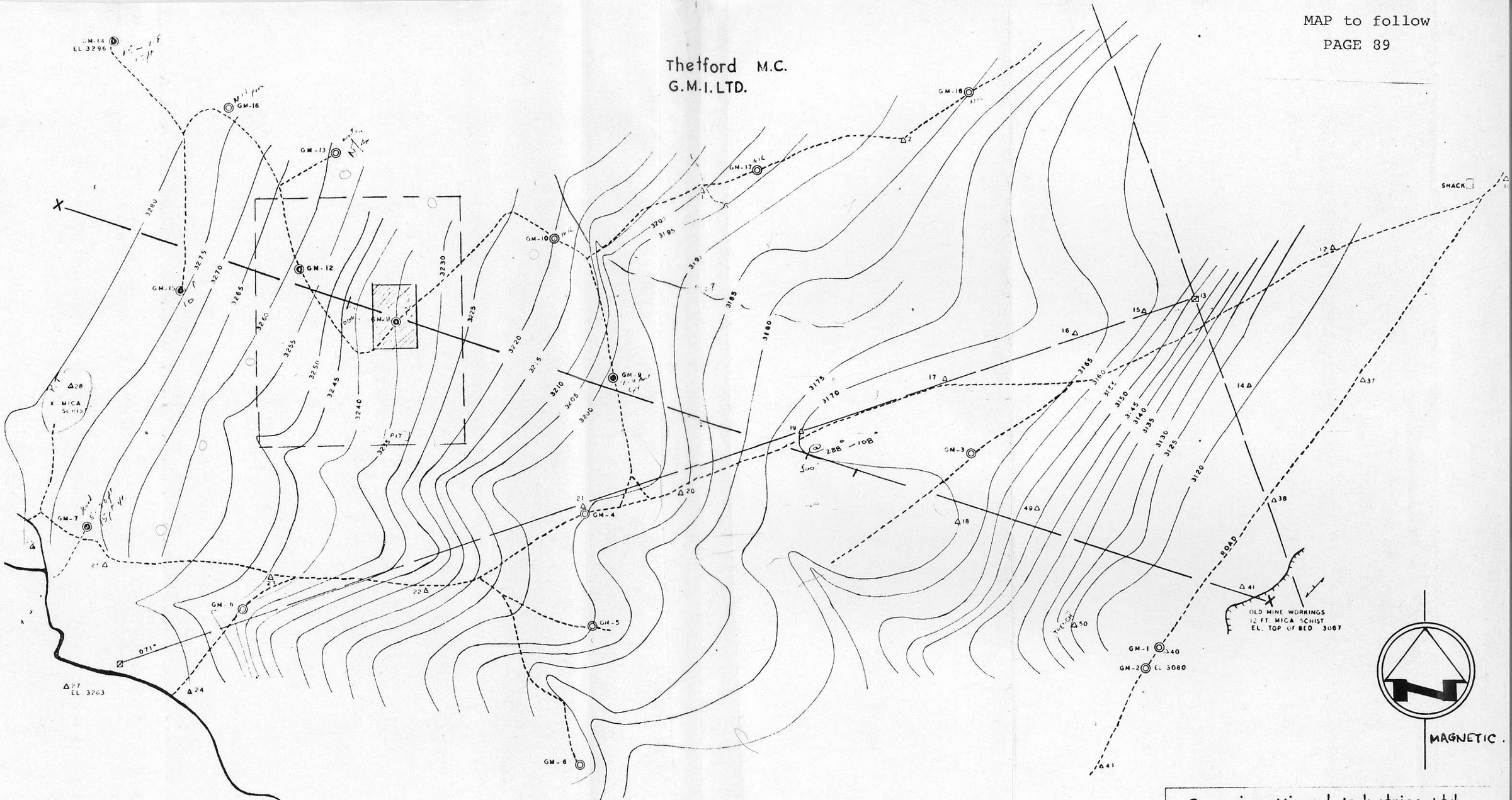
GCS/jh

P.S. I should mention Magcobar will be marketing our material as well as doing the custom milling. A portion of the figures in the letter would have to be paid to Magcobar for marketing

GCS.

MAP to follow
PAGE 89

Thetford M.C.
G.M.I. LTD.



Sunnyside M.C.
G.M.I. LTD.

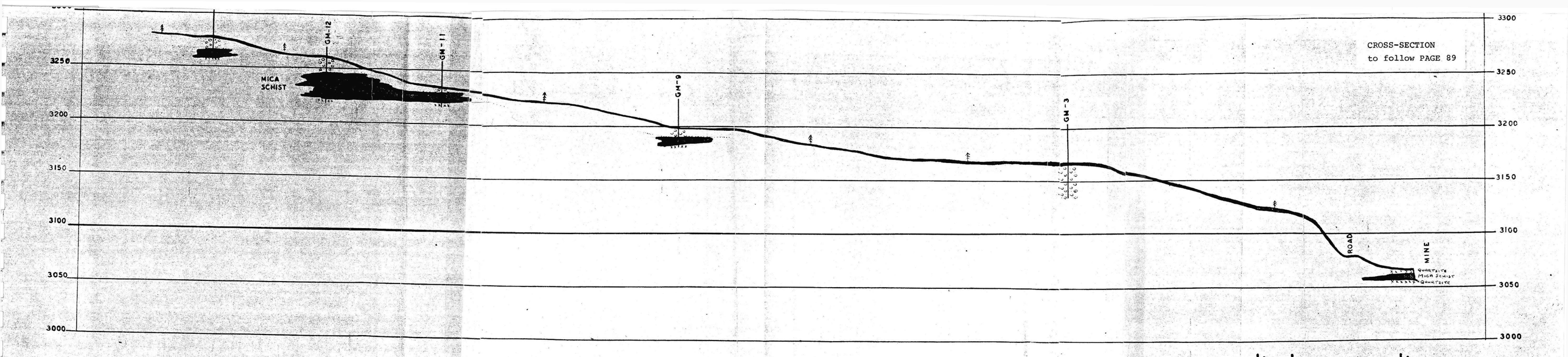
Georgian Mineral Industries Ltd.
Mica Deposit - Cedarside B.C.

Drilled by Magcobar Mining Co. Ltd.
Scale 1 Inch = 50 Feet

reduced to ±1"=100'

- ROADS
- DRILL HOLES
- SURVEY STATION
- OUTCROPS
- CONTOUR LINES APPROX ONLY

NOVEMBER 1951 J.S. CARTER - GEOLOGIST



CROSS-SECTION
to follow PAGE 89

Vertical Cross-section X-X
Mica - Cedarside B.C.
Scale 1 inch = 50 feet (288°-108° MAGS)

GENERAL TESTING LABORATORIES

DIVISION OF SUPERINTENDENCE COMPANY OF CANADA LTD

1001 EAST PENDER STREET VANCOUVER B.C. CANADA
PHONE (604) 254-1647 TELEX 04-507514 CABLE SUPERVISE

TO:
E.T.S. TOOL CO. LTD.
535 Airport Road South
Richmond. B.C.

90 SEMI QUANTITATIVE SPECTROGRAPHIC ANALYSES CERTIFICATE

No.: 7712-1551 DATE: Jan.5,1978

We hereby certify that the following are the results of spectrographic analyses made on:

		1	2	3	4	5
Aluminum	Al	.10	8.			
Antimony	Sb	ND	ND			
Arsenic	As	ND	ND			
Barium	Ba	0.07	0.07			
Beryllium	Be	TRACE	TRACE			
Bismuth	Bi	ND	ND			
Boron	B	TRACE	TRACE			
Cadmium	Cd	ND	ND			
Calcium	Ca	1.	1.			
Chromium	Cr	0.03	0.02			
Cobalt	Co	TRACE	TRACE			
Copper	Cu	0.03	0.02			
Gallium	Ga	0.004	0.002			
Gold	Au	TRACE	TRACE			
Iron	Fe	MAJOR	MAJOR			
Lead	Pb	TRACE	TRACE			
Magnesium	Mg	2.	1.			
Manganese	Mn	0.3	0.2			
Molybdenum	Mo	0.001	0.001			
Niobium	Nb	ND	ND			
Nickel	Ni	0.005	0.003			
Potassium	K	3.	3.			
Silicon	Si	MATRIX	MATRIX			
Silver	Ag	TRACE	0.001			
Sodium	Na	1.	1.			
Strontium	Sr	0.01	0.01			
Tantalum	Ta	ND	ND			
Thorium	Th	ND	ND			
Tin	Sn	ND	ND			
Titanium	Ti	0.5	0.5			
Tungsten	W	ND	ND			
Uranium	U	ND	ND			
Vanadium	V	0.01	0.008			
Zinc	Zn	TRACE	TRACE			

PROPERTY "A"
PROPERTY "D"

SAMPLE No.	DESCRIPTION:
1	176D – Canoe River
2	No Mark – Albreda (Railway Cutting)
3	
4	
5	

All results expressed as percentages

MATRIX — Major constituent
MAJOR — Above normal spectrographic range
TRACE — Detected but minor amounts
N.D. — Not detected
★ — Suggest assay

EXHIBIT VIII(g)

NOTES: Rejects retained one month.
Pulps retained three months.
On request pulps and rejects will be stored for a maximum of one year.

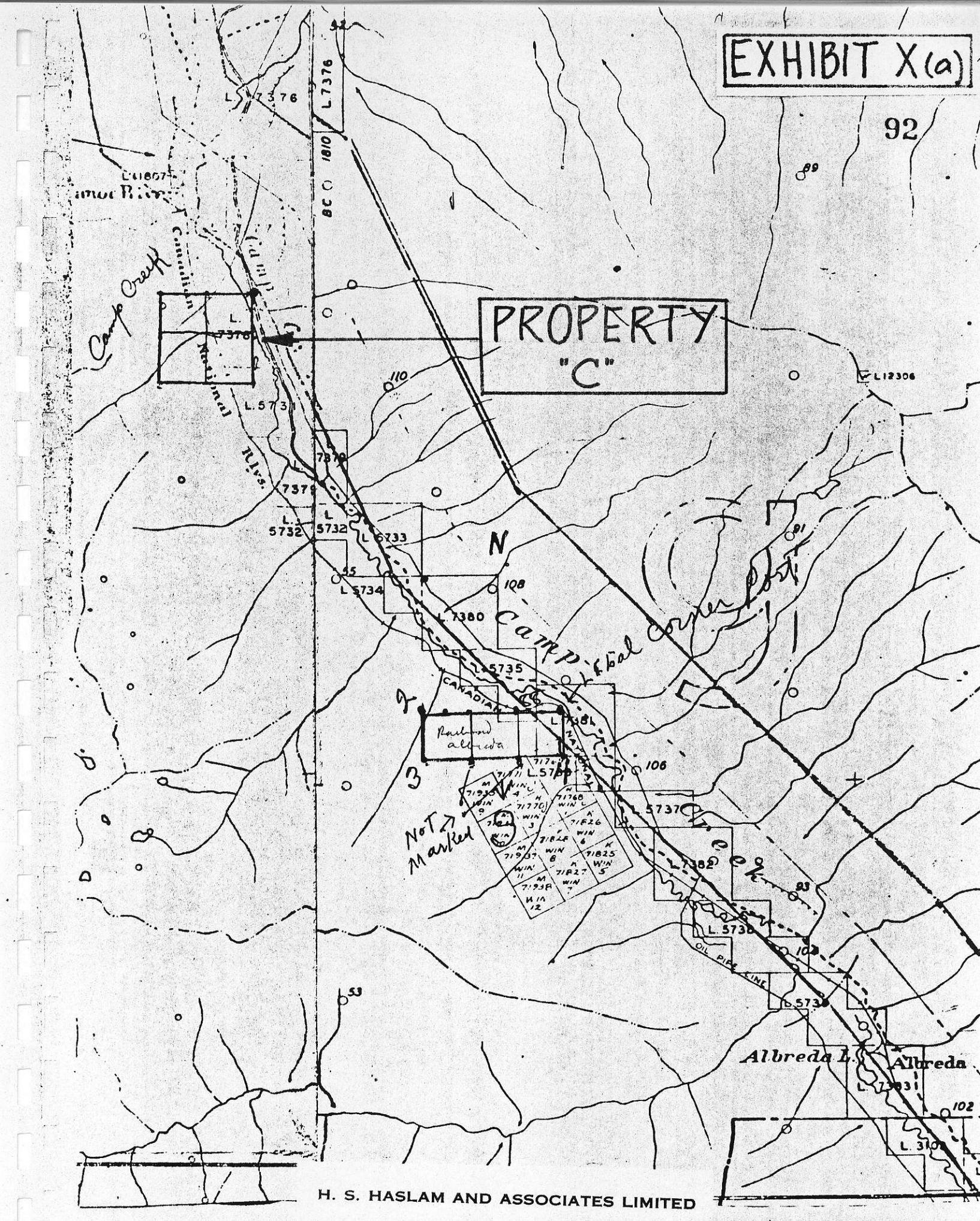
cp

L. WONG, Chief Assayer
SIGNATURE AND TITLE

EXHIBIT IX

Reserved for Information
on PROPERTY "B"

EXHIBIT X(a)



H. S. HASLAM AND ASSOCIATES LIMITED

EXHIBIT X(b)

Report of Minister of Mines for British Columbia for the Year 1915.

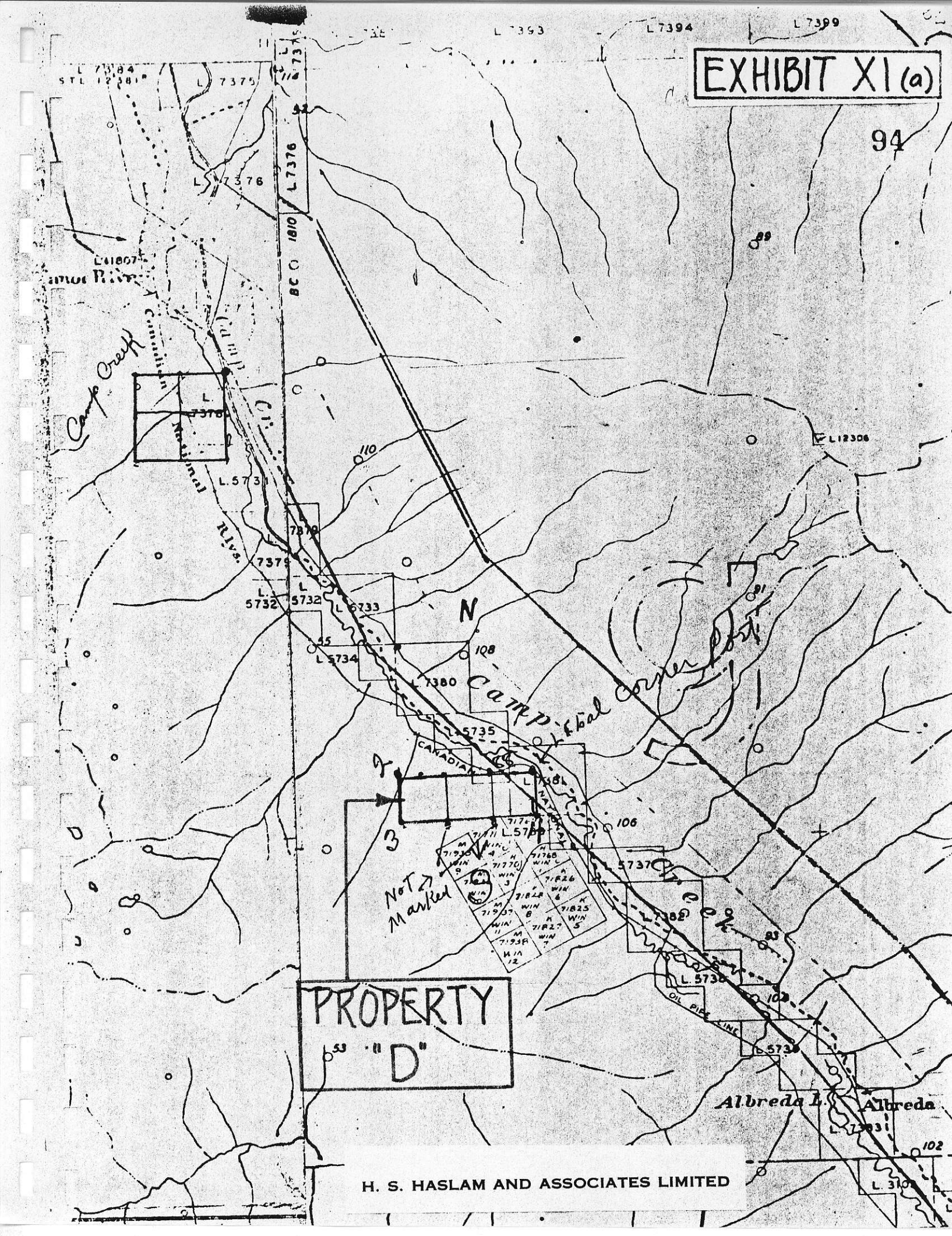
Pages K 54 and K 55

Mica.

The mica claims in the vicinity of Tete Jaune are attracting attention and some development-work was carried out during the year.

T. A. Wilson, manager of the *Albreda* group, reports as follows: "The *Albreda* group of mica claims are situate at the head of Camp creek, about thirty miles south of Tete Jaune, and about four miles back from the line of the Canadian Northern Railway. During the early part of the summer we built a good pack-trail from the Canadian Northern Railway to the claims for the purpose of taking in supplies and taking out samples.

"Development-work on the claims was done as follows: An open-cut was made on the east end of the group and a fine showing of mica was found, of the quality known as 'White Muscovite'; about 4 tons of mica was taken out, and about 4,000 lb. of this was packed down to the valley and thence hauled to Tete Jaune. Commencement was made on a tunnel on the west end of the group, with showings similar to that found in the open-cut, work being suspended at the end of August. The mica, which was hauled to Tete Jaune, is now being trimmed ready for the market. We hope during the coming season to do considerably more development work."



H. S. HASLAM AND ASSOCIATES LIMITED

EXHIBIT XII

Reserved for Information
on PROPERTY "E"

EXHIBIT XIII

Reserved for Information
on PROPERTY "F"

EXHIBIT XIV(a)

PROPERTY G

General Area of Claims.

ANN-CATHERINE 286 (10)

OLE THE BEAR 1 121 (3)

STAN 300 122(3)

BCD 1 123(3)

STAN 200

STAN 400 132(3)

MINERAL RESERVE O/C 2178, 29-9-56 RELEASE REQUIRED

STAN 500 133 (3)

MP 1 179 (4)

MP 2 180 (4)

LEN 1 177 (4)

BABE 2305

BAB 2295

M 82M.

H. S. HASLAM AND ASSOCIATES LIMITED

EXHIBIT XV(a)

BAKER INLET MICA CLAIMS

Mica Maid and Mica Boy. These claims are situated on Baker inlet, off Granville channel, about 35 miles south of Prince Rupert, and are owned by Harry Scott, of Prince Rupert. The showings consist of a vein from 1 to 5 feet in width carrying fine white mica in comparatively solid distribution. The vein is situated at about 800 feet distant from the north shore of the inlet, and at an altitude of about 600 feet, and runs parallel with the shore-line. It is reported to have been traced for a distance of about 1,000 feet. The mica is of an exceptionally white and lustrous quality and appears to be of good grade. Tests, however, carried out by the Bureau of Mines show it to contain some very finely distributed silica which, before the mica would be of commercial use in the available market, would have to be eradicated. The easy accessibility of this deposit and the comparative purity of the mica indicates that it may be worth investigation in the event of the broadening of the market for this type of material.

NON-METALLICS.

Sericite. This group comprises the *Sericite* and *Mother of Cloud* claims owned by C. Jedder and P. M. Ray, of Prince Rupert, with P. M. Ray acting as agent. The property is situated on the north shore of the sheltered harbour of Baker inlet, off Grenville channel, about 35 miles south of Prince Rupert. The occurrence consists of a pegmatitic zone with sericite mica lenses and pockets in gneissic rocks of the Prince Rupert series. The zone outcrops along a bluff at altitude 200 feet about 1,000 feet from the beach, strikes north-south, and dips 17 degrees west. It has been prospected by two open-cuts and some superficial stripping and can be traced for several hundred feet practically by natural exposure. Erratic widths, bulging and stringering typical of a pegmatitic structure, with, in some sections, stringers a few inches in width separated by horses of country-rock, characterize the zone.

As is typical of this type of deposit, the mica occurs in pockets and lenses. Two adjacent pockets of good-grade mica each about 10 feet in length and from 4 to 5 feet in width are exposed in the two cuts. An appreciable percentage of sericite is apparent in other exposed parts of the zone. The mica is of the type that would be adaptable to pulverizing. Samples of the raw material from one of the cuts were screened by P. M. Ray and gave the following results: Plus 10 mesh=30 per cent.; minus 10 mesh=50 per cent.; minus 80 mesh=20 per cent. All this material appears to be remarkably pure sericite. A bulk sample of the raw material from the cuts was also submitted to the Ore Testing Laboratory at Ottawa. This was submitted to dry grinding in a Raymond mill combined with a Rotex screen and Gaco air separator and screened on a double-deck Rotex screen of 100 and 200 mesh. The recovery from this test was as follows:—

Plus 100 mesh—77 per cent. of feed recovered of about 99 per cent. pure mica.

Minus 100 and plus 200 mesh—88 per cent. of feed recovered of about 99 per cent. pure mica.

Minus 200 mesh—68 per cent. of feed recovered of about 97 per cent. pure mica.

The showing is worthy of further exploration, and it is quite possible that stripping in both directions along the strike will expose a much greater continuity of the zone, with possibility for further good-grade mica pockets and lenses. The property is ideally located for economical operation and convenience to direct seaboard transportation.

Extracted from Report of Minister of Mines of British Columbia, 1934 Part B and quoted in the same series in 1941

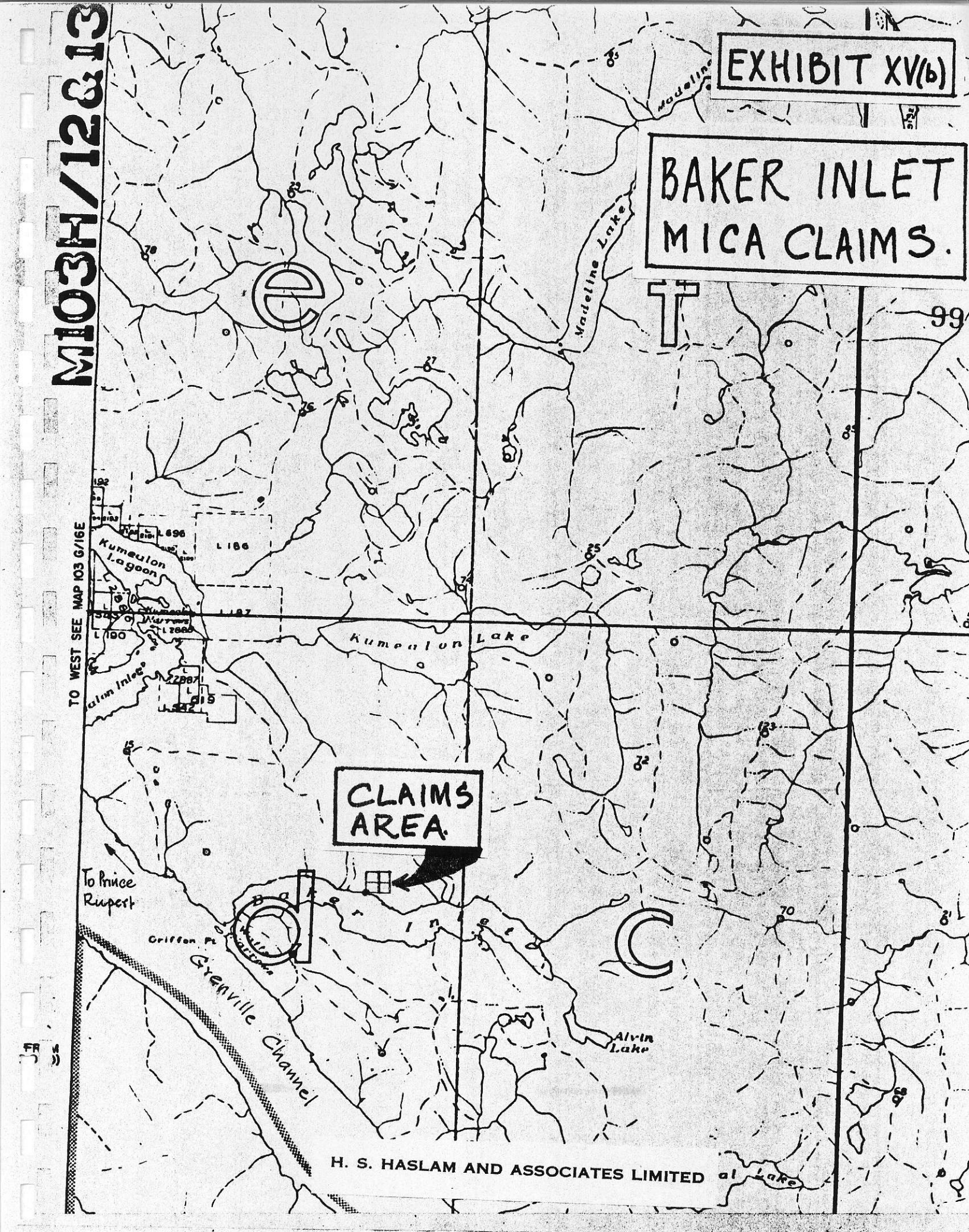


EXHIBIT XV(b)
BAKER INLET
MICA CLAIMS.
M103H/12&13
Madeline Lake
Kumealon Lagoon
Kumealon Lake
L 186
L 187
L 190
L 696
TO WEST SEE MAP 103 G/16E
CLAIMS AREA
To Prince Rupert
Griffon Pt
Grenville Channel
Alvin Lake
H. S. HASLAM AND ASSOCIATES LIMITED

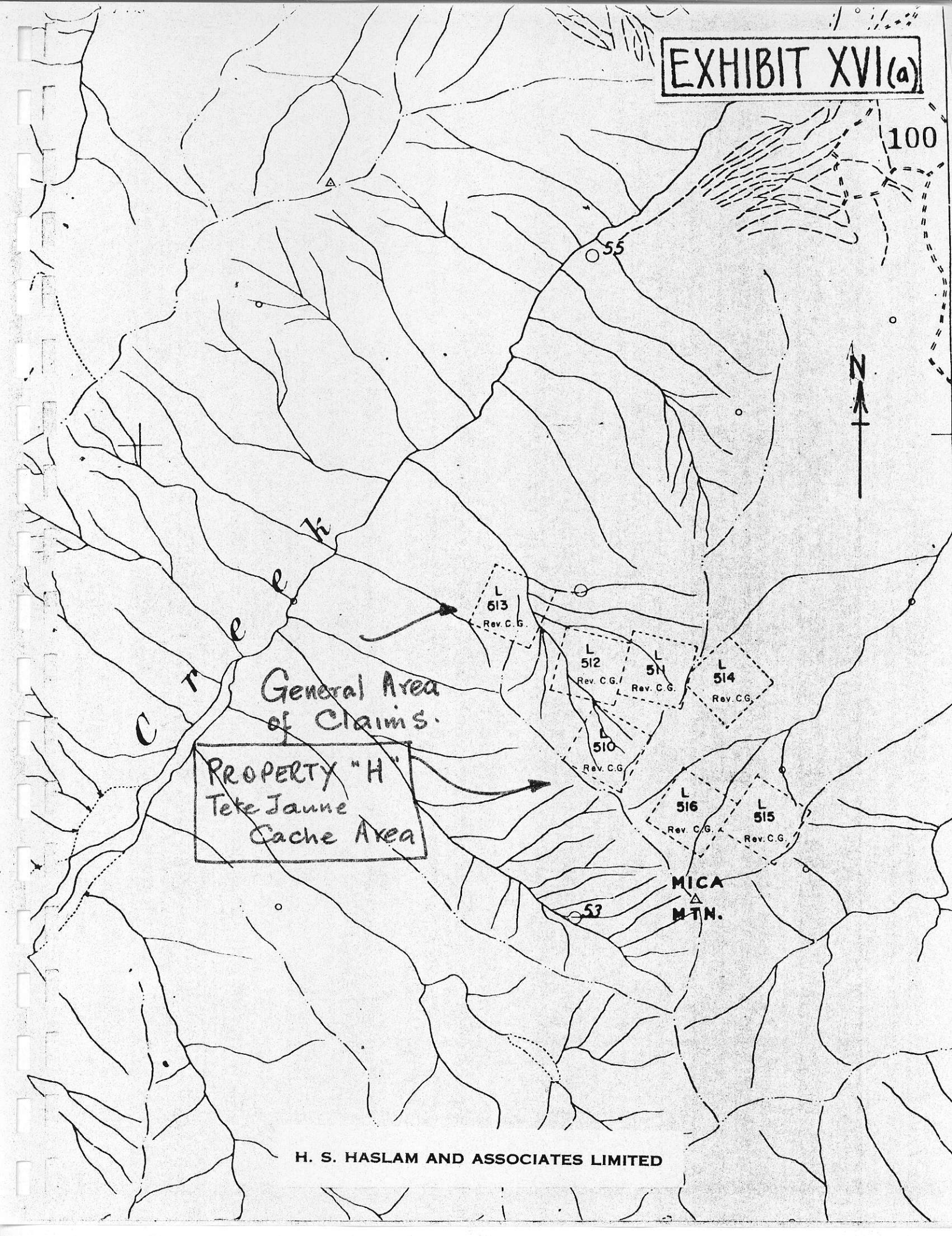


EXHIBIT XVI(a)
100
55
N
Creek
L 513 Rev. C.G.
L 512 Rev. C.G.
L 511 Rev. C.G.
L 514 Rev. C.G.
L 510 Rev. C.G.
L 516 Rev. C.G.
L 515 Rev. C.G.
General Area of Claims.
PROPERTY "H"
Tete Jaune Cache Area
MICA MTN.
53
H. S. HASLAM AND ASSOCIATES LIMITED

833/113E

52 EXHIBIT XVI(b)

Private and Confidential September 18, 1941.

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map
envelope at back

REPORT ON BONANZA MICA PROPERTY
MICA MOUNTAIN
TETE JAUNE, B.C.

by

J.M. Cummings,
Associate Mining Engineer,
B.C. Department of Mines.

Location and Access:

The property is situated on Mica Mountain about 7 miles south of Tete Jaune Station on the Canadian National Railway. Access is by old road for approximately 4 miles and trail for 3 miles.

Claims and Ownership:

The group comprises the following claims:

Claim	Lot	
Minnie Smith	510	Leased from Crown
Adventure	511	" " "
Boulder	512	" " "
Mammoth	513	" " "
Dreadnot	514	" " "
Premier	515	" " "
Bonanza	516	" " "
Mica	held on location	
Mica No. 1 Fraction	" " "	
Mica No. 2 Fraction	" " "	

The Crown-granted claims are held on lease from the Crown by F.W. Groves and Associates, Kelowna, B.C. The others were staked by the same men in September, 1940.

History and Development:

Lots 510, 511, 512, 513, 514, 515 and 516 were staked by J.F. Smith, of Kamloops, in 1893, and work necessary from Crown-granting done in 1894,-5, -6,-8,-9 and 1900. During this period Smith is reported to have mined a considerable quantity of sheet mica of excellent grade and to have transported it to Kamloops by pack-horse for subsequent sale. As far as can be ascertained, work appears to have been confined largely to a pegmatite dyke on the Bonanza claim (Lot 516) on which a short adit was driven for 15 feet. McEvoy, of the Geological Survey of Canada, examined the Bonanza mine in 1898 and mentioned [1] that J.F. Smith and eleven men were taking out mica from an opening in a vein 15 feet wide, covered to the north-west with talus and to the south-east with mica schist. Mica of excellent quality was being recovered and sheets up to 11 by 8 inches were frequently encountered.

Ownership was re-organized shortly afterwards but no further work done until the present time.

1. Annual Report, Geological Survey of Canada, 1898; p. 800 - J.C. McEvoy.

The Mica claim, staked by Groves in 1940, covers old workings on what was formerly the Reliance Mineral Claim, at one time owned by the Mica Syndicate and later by Mica Mines Limited. This is described in detail in Reports of the Minister of Mines of British Columbia for 1920, p. 95; and 1928, p. 188.

In recent years it was generally concluded [2] that the old workings on the Bonanza claim had been covered by slides and that a similar fate had overtaken alleged workings on the Boulder claim. In 1940, however, F.W. Groves re-discovered the former and decided that the latter had never existed.

The writer spent 2½ days on the property (Sept. -7,-8,-9, 1941) in company with Mr. Groves. Three men were engaged in removing ice from the Bonanza adit at the time, the work being completed before the writer's departure.

General Geology:

Mica Mountain is made up of highly metamorphosed sediments represented by mica-garnet schist, quartz-mica schist and quartz-feldspar-mica schist, changing locally to gneiss. The schists are intruded in places by pegmatite

2. D. Lay - B.C. Minister of Mines Report, 1928 - p. 188
A.W. Davis - B.C. Minister of Mines Report, 1924 - p. 152

dykes ranging from a few feet in size to 100 feet wide by 500 feet long. These dykes are irregular in shape, commonly lens-like and are composed essentially of feldspar and quartz in medium-grained association, with lesser amounts of disseminated muscovite in the form of "booklets" and aggregate up to 1 to 2 inches in size. Rarely mica books up to 3 or 4 inches in diameter were noted. In the Bonanza and Reliance workings, and in boulders on the Boulder claim, concentrations of larger crystals, up to 10 or 12 inches across, occur.

Description of Property:

The Mammoth, Boulder and Adventure Claims (Lots 513, 512 and 511) are located in a cirque-like basin on the Sand Creek slope of Mica Mountain. The Minnie Smith, Dreadnot, Bonanza and Premier Claims (Lots 510, 514, 516 and 515) lie in a similar basin facing the McLellan River. The Mica claim covers the sharp ridge between the two cirques.

Pegmatite dykes were examined on the Bonanza, Premier, Boulder and Mica claims. Several other dykes were noted on the cliffs circumvalling the two basins but were inaccessible.

Bonanza and Premier Claims (Lots 514 and 515):

These claims, situated on the south side of a large glacial cirque, extend from the basin-bottom up talus slopes to precipitous cliffs which rise steeply over a thousand feet to the summit of Mica Mountain. The area is considerably above timberline and is constantly exposed to slides and falling rock.

The Bonanza adit (elevation 7,850 feet) was driven 15 feet into a lens-like pegmatite dyke at the foot of a small bluff. On the surface the dyke is cut-off within a few feet of the south wall of the adit by enclosing mica schist. To the north it narrows abruptly to disappear within 15 feet of the north wall of the adit. The maximum surface dimensions of the dyke are 10 feet by 30 feet.

The roof of the adit is mica schist throughout its length, dipping 30° into the hill. At the portal the floor is pegmatite but changes to mica schist within 5 feet of the surface. The average width of pegmatite exposed in the south wall is 8 feet, in the north wall is 3 feet.

A winze, 5 feet deep, was sunk at the end of the adit. Both floor and roof are mica schist which come together in the face, 20 feet from the portal. Along the

south wall of the winze 6 feet of pegmatite is still exposed but the indicated convergence of floor and roof suggests a rapid pinching out of the deposit within a short distance.

A number of mica-books up to 10 inches in size remain in the walls of the working, particularly on the north side where mica constitutes at least 25 per cent of the dyke. Much of t is is contorted and twinned, however, and it is improbable that more than one-quarter of the mica present could be used commercially.

Four other pegmatite dykes (see map) were examined.

The first at elevation 8,160 feet is 50 to 75 feet wide and at least 500 feet long. Only the north end was accessible but apparently its composition is relatively homogeneous, consisting of feldspar, quartz and disseminated mica. The last occurs in the form of small flakes, aggregates and "booklets" ranging in general from ½-inch to 1 inch across, and constituting 5 to 10 per cent of the rock in places. Only at rare intervals do larger mica-books occur. Within an area of 2,500 square feet only four were noted, the largest

of which measured 3 by 4 inches in size. As far as could be ascertained there was no apparent tendency, for concentration of mica in any specific part of the dyke.

The other three dykes at elevations of 7,880 feet, 7,750 feet and 7,500 feet are similar to the above although smaller. No place was noted where mica occurred in sufficient size and concentration to permit mining.

Boulder Claim (Lot 512)

The Boulder Claim lies on the steep rocky wall of a cirque facing Sand Creek, approximately one mile north-west of the Bonanza workings.

A pegmatite dyke, elevation 7,120 feet, 50 to 75 feet thick and 400 to 500 feet long, is exposed near the base of cliffs which rise steeply for over a thousand feet to the ridge top above.

The extensive talus slide below the dyke is comprised largely of mica schist but contains several hundred boulders of pegmatite. On the slide below a point near the east end of the dyke several pegmatite boulders containing large books of mica occur. The most notable of these, about 8 by 10 by 12 feet in size, contains one hundred to two hundred pounds of mica in books up to 8 or

10 inches across. Not over one-quarter of this would be of commercial grade owing to the presence of abundant twinning, cremulations and other defects. The other boulders contain a much smaller proportion of mica. The point from which the mica-bearing rocks had broken-off was unfortunately inaccessible. To the west, however, the dyke was examined in detail for several hundred feet along its strike but no commercial mica seen. Where examined the pegmatite resembled those described on the Bonanza and Premier claims. The apparent dearth of workable mica in general is substantiated by its absence from all pegmatite boulders along the talus slope except the few mentioned above. The mica-bearing boulders originate from a minor swell in a narrow part of the dyke.

Mica Claim:

The Mica claim lies on the ridge top between the two cirques previously described. The old Reliance workings are situated at elevation 7,570 feet near the east boundary of the claim on the steep grass-covered sidehill facing McLellan River.

The workings consist of stripping and an adit of 10 feet in length, exposing the junction of two pegmatite dykes 10 to 15 feet wide. The greatest length uncovered is about 75 feet.

A considerable quantity of mica has been recovered as evidenced by dumps at the workings and old base camp. Sheets up to 10 inches across occur, but all the mica seen was "A" twinned to an extent which precluded its use for sheets. A small proportion might be recovered of "washer" size.

A number of books are exposed in the workings but are badly twinned. The proportion of sheet mica to rock is less than one-half per cent over the exposure as a whole, but in the vicinity of the adit probably exceeds 1 per cent.

Summary and Conclusions:

(1) The Bonanza workings evidently yielded some sheet mica of excellent quality as mentioned in old reports and indicated by material on the old dumps. The pegmatite dyke, however, is small and structural relations suggest that it was largely mined-out in the past. The body pinches out in the winze on the west and north. Only on the south wall does any face of pegmatite remain. At the surface the dyke cuts off within a few feet of the south side of the portal. It is probable that the same condition occurs underground. In view of the irregular shape of the pegmatite dykes as a whole, however, there is a possibility that the deposit might extend at least a short distance in a southerly direction.

Further work does not appear advisable under the circumstances. Such work, should it be undertaken, would be best directed to exploring the extent of the dyke south of the present winze.

(2) A concentration of sheet mica is indicated in float beneath a pegmatite dyke on the Boulder claim. The proportion is not large nor is the quality very good. Detailed prospecting of the dyke directly above the mica-bearing talus might indicate a mineable deposit. General relationships, however, suggest that such a deposit would be small.

(3) The greatest quantity of sheet mica exposed on the property occurs in the old Reliance workings. Ubiquitous twinning renders it valueless for anything larger than washer size and even for this recovery would be small.

(4) Of the other pegmatite dykes examined none was seen which contained sufficient mica to be mined. Examination was necessarily of a cursory nature and by no means precludes the possibility that pockets or concentrations of commercial mica might be found with detailed prospecting.

In brief, no mineable deposit of sheet mica from which more than a few pounds of commercial material could be recovered was seen by the writer. Intensive prospecting

might conceivably disclose other bodies similar to the original Bonanza deposit. The chances are not good, however, and coupled with the short operating season, difficult and expensive mining conditions, lack of timber and wood, cost of transportation, etc., make the property definitely unattractive.

CARIBOO MINING DIVISION.

TETE JAUNE SECTION.

The Mica Syndicate.

Introductory.—The Mica Syndicate is a mining partnership formed in Calgary for the purpose of acquiring and developing certain mica claims situated near Tete Jaune: the members of the syndicate are Albert Johnson, I. Nollet, A. Allen, S. E. Beveridge, T. Wilson, and four others.

The *Reliance* claim, which has been owned by T. Wilson for some years, has been obtained by the syndicate and five other claims have been staked. The main showings are on the *Reliance* claim. Some adjoining Crown-granted claims are held by New York interests.

Work was commenced by the syndicate on May 25th, 1920, and for the most of the summer consisted of road and trail construction and the building of camps. It was hoped that actual development of the property would be commenced in September, but with the arrival of snow at that time the work was stopped for the winter.

S. E. Beveridge is in charge of the work for the syndicate, and during the summer from five to eight men have been employed.

Location.—The mineral claims comprising this property are situated on the northern slope of that portion of Mica mountain locally called "Nigger's Nob" and are distant from Tete Jaune, a station on the Grand Trunk Pacific Railway, about 7 miles. Tete Jaune is 184 miles east of Prince George.

A wagon-road which was built this summer by the Mica Syndicate leaves the railway a short distance east of the Sand Creek bridge, which is 2 miles east of Tete Jaune Station, and extends 4 miles towards the base of Mica mountain. This road connects with a road running from Tete Jaune to Swift Creek, on the Canadian National Railway. At the end of this road two large and well-constructed log buildings have been erected, which form a good headquarters camp.

From this point a good trail on an even grade has been built up the mountain to the showings on the *Reliance* claim, a distance of about 3 miles. The elevation of the showings is about 6,000 feet, with timber-line at about 5,000 feet.

Geologic Features.—The dominating rock of Mica mountain is a coarse-grained garnetiferous mica-schist which has been classified by the Geological Survey as highly metamorphosed sedimentary material and provisionally placed in the Shuswap group of the Pre-Cambrian.

These schists have been intruded by granitic rocks which vary from normal granodiorite to pegmatite. The pegmatite dykes, of which there are a number cutting through the mountain, are important, as they are the source of the mica that is obtained. These dykes vary in width from a few feet up to 100 feet. They are approximately parallel in strike, having a trend of north-west and south-east. The dip is to the south-west at from 30° to 40°.

The essential minerals in these pegmatite dykes are quartz, feldspar, and muscovite mica, and in addition small quantities of accessory minerals such as garnet, tourmaline, cyanite, beryl, and apatite. The dykes vary greatly in texture, and only in certain bands, generally only a few feet wide, are the essential minerals segregated into large crystals or masses. It is in these bands that mica "books" are large enough to be of commercial value. Other parts of the dykes generally consist of a coarse-grained intergrowth of quartz, feldspar, and mica. As a rule the dykes seem to have a relatively small feldspar content, but have an excess of quartz.

The mica found in these pegmatite dykes is the variety known as muscovite. It is transparent and, in thin flakes, is almost white in colour with a slight greenish tint. It is generally twinned, very few single crystals being noted. Only surface samples of the mica can be obtained at present and these as a rule are somewhat rusty in appearance. This is probably due to surface oxidation and weathering, and it is expected that much cleaner mica will be obtained at a little depth, where the surface weathering would not have affected it.

[illegible] this mica to many experts and mica-buyers, 4 by 4 to 12 by 12 inches occur abundantly, and still larger are found. These crystals have a thickness of ½ inch up to 2 inches. These crystals have an excellent basal cleavage and are easily split into as fine flakes as is desired.

Development.—Very little development-work has been done on these claims. On the *Reliance* claim there is one large open-cut and a few small holes which expose a pegmatite dyke, but the greatest depth attained is not more than 5 feet. This dyke carries considerable mica and the open-cut shows a band from 3 to 4 feet wide in which large "books" of mica occur. On either side of this band there is finer-grained material in which the crystals of mica are about 1 square inch in size.

When the property was visited at the end of August the syndicate planned to commence development of this showing in a short time, but shortly after the work was stopped on account of snow. Operations will be resumed in the spring of 1921.

EXHIBIT XVI (d)

Report of the Minister of Mines 1928.

British Columbia

Pages C188 & C189

TETE JAUNE.

Mica-deposits.

For the past thirty years or so the mica-deposits on Mica mountain near Tete Jaune have engaged the attention of various operators at different times, but, for some reason or other, operations have not been continued for any length of time when started and no material amount of development has been done on any exposure. There are on this mountain several exposures, of which two are the more important. This year Mica Mines, Limited, was incorporated for the purpose of working the *Tete Jaune* group of four claims. This property appears to be much the same as that described in the Annual Report for 1920. It is understood that there is, or was, a good exposure in the large glacial cirque, which exists at the top of Mica mountain immediately to the south-east of the *Tete Jaune*, but that this has been recently covered up by a slide. The floor of this large cirque lies at an elevation of about 6,500 feet and the basin-walls rise up steeply for 2,000 feet or so. In the south-east wall of this cirque can be plainly seen from a distance what appears to be a large pegmatite vein, but which on this side is apparently quite inaccessible. Two remnants of the glacier remain which formerly occupied this cirque.

Tete Jaune.

Mica Mines, Limited (registered office, 608–609 Rogers Building, Vancouver), carried on small-scale operations during the year under the direction of E. E. Barnum. Full particulars of the geologic features of Mica mountain will be found in the 1920 Annual Report, which it is unnecessary to repeat here. It might be mentioned that this mountain presents many points of striking similarity, geologic, topographic, and geographic, to the other Mica mountain opposite Fort Grahame. The strike and dip of the pegmatite-mica dykes are the same in both cases, but the two micas are radically different. Both are apparently muscovite, but the Tete Jaune mica has a greenish cast and exhibits pronounced twinning of crystals.

The showings on this group lie at elevation 7,180 feet on the north slope of Mica mountain, just west of the large glacial cirque previously referred to. They are reached by a trail 3½ miles long from a base camp at elevation 3,920 feet, to which a road 5½ miles in length leads from Tete Jaune. This is evidently the same base camp as that described in the 1920 Annual Report, in which photographs are also to be found.

The chief exposure at 7,180 feet is a large open-cut, which shows the junction of two pegmatite veins, each from 6 to 10 feet in width. The strike is north-westerly and dip south-westerly, conforming with the schistosity planes of the enclosing mica-schist country-rock. Numerous books of muscovite mica showing a greenish cast were exposed. The majority were of good size, up to about 60 square inches in area, but pronounced twinned structure was apparent. The crystals showed no tendency to follow any particular part of the dyke. No crystals of striking size were seen, but it is stated that such occur. The slope of the mountain-side in this vicinity is about 25° and it would doubtless be an easy matter to transport mica mined at this point by aerial tram to a lower point reached by the construction of a new road. Alternatively, mica can now be readily packed down to the base camp on horses. Clearly the latter is the method to pursue until this deposit has been opened up and market established. The pick of the mica from Tete Jaune (whether from this deposit or not is not known) was stated by the Imperial Ministry of Munitions to be of good condenser quality. Mica Mines, Limited, states that offers have been received from buyers varying from $1.50 to $11 a pound. It remains to be seen to what percentage of the total mica such prices would apply. It would seem that development of this property should proceed with caution.

Two other pegmatite dykes were examined on this mountain, but these are not on the property of Mica Mines, Limited, and in any case they did not show mica of very large size at the point of exposure. One showing biotite, crystals of which are about 2 inches square, is exposed at elevation 5,020 feet on the Mica Mines, Limited, trail. It is from 15 to 20 feet in width, strikes N. 62° W. (mag.), and dips south-west at about 60°. At elevation 5,860 feet, close to the trail, at the top of the steep Sand Creek slope, another large dyke is exposed, which shows crystals of clear mica up to about 2 by 2 inches in size.

There is known to be a showing of mica within the glacial cirque, which has been previously referred to. But it is understood that it has been covered by a slide and its exact situation was not known to any of the staff of Mica Mines present at the time of inspection of that property. In the Geological Survey of Canada Report for 1898 J. McEvoy describes a property called the *Bonanza* mica-mine, which from the position marked is within the glacial cirque. The elevation is given as 5,300 feet above the Fraser river (elevation 2,400 feet); the width of the dyke is given as 15 feet, with another dyke, 30 feet below, 40 feet wide. The report says: "The crystals of muscovite, which are frequently 18 inches long and 11 inches wide, are found in greatest abundance near the hanging-wall. The mica is a transparent muscovite with a very slight greenish cast and of excellent quality." Refer also to Annual Report for 1920; also Department of Mines, Canada, Mines Branch Summary Report, 1913.

REPORT OF GEOLOGICAL SURVEY:

BARRON MINERAL CLAIMS,

TETE JAUNE CACHE, B. C.

BY J. F. V. MILLAR, P.Eng.

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REPORT OF GEOLOGICAL SURVEY:

BARRON MINERAL CLAIMS,

TETE JAUNE CACHE, B. C.

SURVEY

This report is submitted for the purpose of assessment work for the following four located mineral claims:

Name	Record No.	Tag No.
Barron No. 1	21474	217197
Barron No. 2	21475	217198
Barron No. 3	21476	217199
Barron No. 4	21477	217200

The geological examination was carried out during the 10 to the 17 of July, 1958, by a crew consisting of the following men: J. F. V. Millar, Professional Engineer B. C. and Alberta; L. Leary, Prospector; C. Brooks, Prospector. This work was done at the request of G. C. Short, for the purposes of examining the property and the pegmatite dykes thereon for the possible economic production of mica or other pegmatite minerals.

The area covered by the claims is devoid of trees or other growth, making geological mapping very simple. The claim line was used as the control for the survey, marked by cairns throughout its length. The severe topography made the use of pace and compass surveys inaccurate. However, a large number of closed lines were run, sketching geology and topography. Location control was provided by relocating of several crown grant posts.

The accompanying geological map was made using the above notes on a control map made from aerial photographs.

Some detailed geology was carried out on the main pegmatite over which the claims were staked.

LOCATION

The property is located at an approximate latitude 52 degrees 54' N. and longitude 119 degrees 30' W. The claims cover a total of approximately six miles southwest of the village of Tete Jaune Cache. They lie within the Cariboo mining division, and the Cariboo land district. (Ref: Maps, Appendix)

The closest settlement is that of Tete Jaune Cache which consists mainly of one small general store and station to service this ranching district. Tete Jaune Cache is approximately mile 70 on the Canadian National Railway line, Jasper to Prince Rupert. The rail distance from Tete Jaune Cache to Prince Rupert is 653 miles, and that from Tete Jaune Cache to Vancouver on the main line of the Canadian National Railways is 455 miles.

An excellent graded road connects Tete Jaune Cache with the town of Jasper, Alberta. A well constructed logging road may be followed from the town of Tete Jaune Cache out west across the lower part of Sand Creek to the base of Mica Mountain, approximately 4 miles. From this point, a pack trail leads to the claims in the cirque to the north of the peak of Mica Mountain. The distance by trail from the logging road to the main showings is approximately two and one half miles. The elevation of the claims is from 5000 to 7000 feet.

GENERAL

These claims lie immediately to the west of the Rocky Mountain

trench just within the geographic unit known as the Cariboo Mountain. In general, topography is extremely rugged and mountainous, and dissected by the deeply percipitous canyon of the post-glacial streams. Mountains of the Premier Group to the southwest rise 9 to 11,000 feet above sea level. The inter-stream areas have a fairly uniform elevation of about 8300 feet. The Barron claims are located on the side of a glacial cirque and straddling a long ridge running roughly north.

Timber line is approximately 6000 feet and is generally sharply marked, especially on the south and west slopes. The lower levels are heavily wooded with first growth spruce, balsam and fir. Logging operations are gradually working away from the main valley of the trench up the sides of the mountains.

From local reports, steady winter climate usually begins early in December and continues to March with the temperature varying from zero to freezing point. Some snow may fall at any time up until July and may start as early as September. Average percipitation is likely to be 10 to 12 inches of rain, and 70 to 80 inches of snow per year.

GEOLOGY

General

The Barron group of claims lie on the southwest slope of the Rocky Mountain trench, the very pronounced physiographic structure extending from the Yukon Territory down to the southern part of the state of Montana. Through this portion of its length of the Rocky Mountain trench is located on a continuous zone of faulting which is characterized by a great up- throw to the

southwest. The rocks to the southwest of the fault zone are Pre-Cambrian sediments, highly metamorphosed into mica and garnet mica schists. These older rocks, are more highly contorted and faulted than the later rocks to the northeast of the trench; that is, on the foot wall of the fault zone. In that section of the trench near Tete Jaune Cache, the metamorphosed sediments exhibit fairly regular steep dips to the southwest. Northerly in the same belt more pronounced folding has been mapped.

The Mica Mountain area is underlain by a complex of schists and gneisses containing varying amounts of mica from 10% to nearly 100%. On the lower reaches of Mica Mountain, adjacent to the trench, a zone of hornblende gneiss was noted.

The general zone of pegmatitic intrusions is most intense between the valleys of the Canoe River and Sand Creek, although some mica bearing pegmatites have been reported to be west of Albreda, 12 miles south of Canoe River. The absence or relative absence of pegmatites to the north of Sand Creek indicate the possibility of a major fault zone through the valley of Sand Creek.

Local Geology

The Barron mineral claims are underlain exclusively by coarse grained mica garnet schist. Other than a slight textural variation the only mineralogical difference throughout the claim area was a variation in garnet content from practically zero to as much as 20%.

The highly crushed and folded schists are intruded by many bedded quartz veins and pegmatite sills up to 100 feet in thickness. In general, the schist weathers to a dark brown. The general attitude of the schistosity, an probably the bedding, is northerly in strike with a dip of 45 to 55 degrees

westerly. Thereis a distinct change in strike from the southern boundary, along the ridge, towards the northern boundary. The strike of this schistosity along the northern section of the claim group is north 50 degrees W. There is, in addition, a slight flattening in dip north of the claim group to less than 40 degrees.

The pegmatite intrusions mapped are all sills except one five foot dyke on the ridge on Barron No. 1 claim. This dyke contained garnet and mica both. It cuts the schistosity on dip with a strike of north 10 degrees W. and a dip of 87 degrees E.

The main pegmatite sill mapped extends along the base line between Barron No. 1 and Barron No. 2 mineral claims. For the southern half of Barron claim No. 4 it is maskedby a tallis slide. The dyke contains smaller concentrations of smaller mica books throughout its length. These concentrations are generally within several feet of the walls. The width of the dyke is from 5 to 35 feet. Towards the southern end of the dyke the number of mica books were noted to be as large as 20 square inches. In addition, beryl crystals were noted in places along the foot wall contact. The crystals were approximately one-half inch in diameter and never longer than one and one-half inches. The majority of the remaining dykes noted on the property contained muscovite mica in books up to 10 square inches, generally concentrated in bands four to five feet wide on either the hanging or foot wall of the sill structure.

Swarms of barren or slightly iron stained quartz veins were mapped in several sections of the property. No mineralization of any kind was noted in the veins. They range in width from several inches to as much as six feet. The quartz is milky and only slightly fractured.

Two faults were mapped both cutting the main pegmatite dyke. The more northerly fault shows up on a small ravine to the east of the No. 2 post on the Barron No. 4 claim. An off-set of approximately fifteen feet was mapped. The other fault was nearly on the location line 400 feet north of the No. 2 post of the Barron No. 2 claim. This fault off-set the main sill structure some 30 feet.

One set of parallel dykes on the Barron No. 3 mineral claim contained a high percentage of biotite mica in books up to one quarter inch thick and one inch to one and one half inch square.

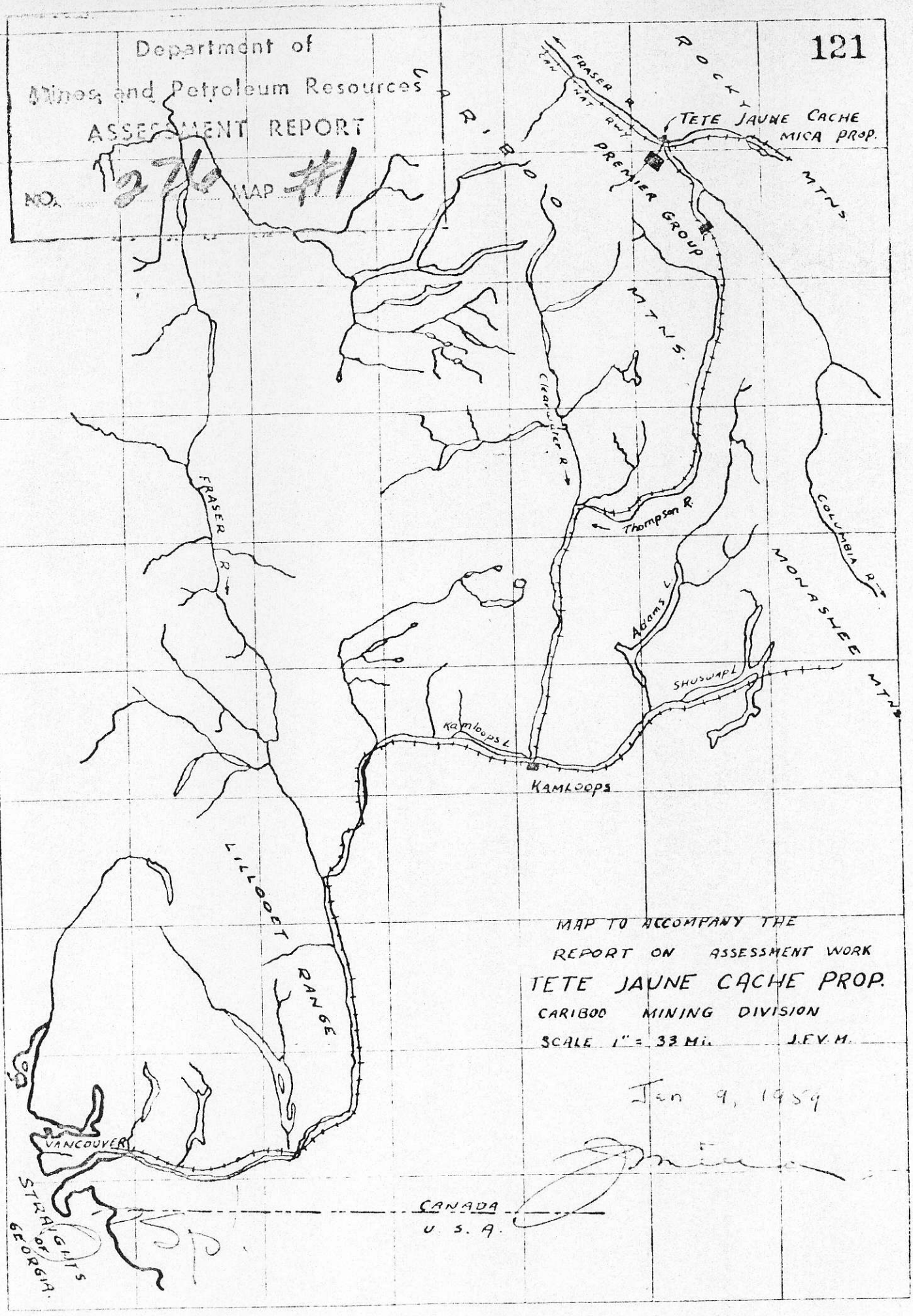
Economic Geology

From the examination of the property, the only potential economic minerals might be the beryl mineralization and muscovite mica mineralization on the south end of the main pegmatite dyke.

Mica from this sill was submitted for expert inspection. It was considered to be relatively unstained and was considered to have good dielectric qualities. Unfortunately all the samples submitted were weathered surface specimens and therefore could not be considered typical specimens.

The beryl mineralization is quite limited in extent and not amenable to hand cobbing of sufficient grade beryl ore for present purchase requirements However, diligent prospecting of other dykes and sills in the area may be successful in locating further deposits of this mineral.

J. F. V. Millar P. Eng.



MAP TO ACCOMPANY THE
REPORT ON ASSESSMENT WORK
TETE JAUNE CACHE PROP.
CARIBOO MINING DIVISION
SCALE 1" = 33 Mi. J.E.V.M.

Jan 9, 1959

January 9, 1959

CERTIFICATE

This is to certify that the writer, James F.V. Millar, is a graduate in mining engineering from the University of British Columbia, a registered professional engineer with the Association of Professional Engineers in Alberta and British Columbia, and a Consulting Mining Engineer with offices in Calgary, Alberta.

Further, this will certify that I have no financial or other interest in the mineral claims covered by this report.

J. F. V. Millar

EXHIBIT XVII

Reserved for Information
on PROPERTY "J"

RICHARDSON GEOLOGICAL CONSULTING LTD.
4161 CROWN CRESCENT, VANCOUVER, B.C. V6R 2A8
TELEPHONE: (604) 224-1282

March 10, 1979.

Land Registry Office,
Provincial Government Building,
Prince George, B.C.

Dear Sir:

I would appreciate your sending me the name and address of the owner of the surface rights on Lot 7384 which is on NTS Map Sheet 83 D/14 W. Attached is a xerox of the 1:250,000 topography map on which the lot is shown.

Also, if you have a larger scale plot on which the lot is shown, I would appreciate receiving a copy.

Yours very truly,

P. W. Richardson.


Tête Jaune Cache
Jackman
Valemount
Swift Creek
Cedarside
Canoe River
Albreda
Clemina
MT JOHN OLIVER
MICA MTN
MT RICHARD BENNETT
MT SIR MACKENZIE BOWELL
MT STANLEY BALDWIN
GUNBOAT MTN
MT SIR JOHN ABBOTT
MT SIR WILFRID LAURIER
PENNY MTN
MT ARTHUR MEIGHEN
MT LESTER PEARSON
MT MACKENZIE KING
MT LOUIS ST-LAURENT
DAVID PASS
MT SIR JOHN THOMPSON
TRIGON MTN
CHILKST PKS
MT CARPE
MT WITHERS
CHAMBERLIN PK
MT ZILLMER
MT KIMMEL
MT LULU
MT THOMPSON
MT MILTON
MT SIR ALLAN MACNAB
EMERALD RIDGE
PREMIER RANGE
CANOE RIVER FOREST
CARIBOO
SELWYN
MONASHEE RANGE
CARIBOO LAND DISTRICT
KAMLOOPS DIVISION OF YALE LAND DISTRICT
CANADIAN NATIONAL