

REPORT ON MINERAL EXPLORATION
(GEOLOGICAL AND MAGNETOMETER SURVEY)
ON THE
GRASSHOPPER CLAIMS
(FRM CLAIMS)
SIMILKAMEEN MINING DIVISION, B. C.

Location - Coalmont Area
Approximately 6 miles southwest
of Coalmont, B.C.

Co-Ordinates - Lat. 49° 50'N 30
Long. 120° - 50'W

Claim Owner - Fort Reliance Minerals Limited

Date of Work - September 23, 1969 to
September 3, 1970

Reported by - P. C. M. Roberts, P. Eng.
P. E. Hirst, P. Eng.
J. A. Harquail, P. Eng.
John Buchholz, B.Sc., Geologist

2742

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2742 M.P.

September 3, 1970

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Summary and Recommendations	1
The Property	2
History	4
Magnetometer Survey	4
Geology	5
Property Geology	6
Block "A"	6
Block "B"	7
Block "C"	7
Block "D"	9
Personnel Involved in Exploration Program	10
Statement of Expenditures	11
<u>Maps Accompanying Report</u>	
Bound Into Report - Map "A" - Trenching and Geology - FRM 92-93	
Map "B" - Trenching and Geology - FRM 99	
In Envelope - Map No. 1 - Plan of Grasshopper Claims and General Geology, P. E. Hirst, P.Eng.	
Map No. 2 - Geology and Magnetometer Survey - "A" Block	
Map No. 3 - Geology and Magnetometer Survey - "B" Block and northern part of "C" Block	
Map No. 4 - Geology and Magnetometer Survey - Central and Southern "C" Block and "D" Block	

INTRODUCTION

During May and June of 1970, a program of geological mapping, prospecting, magnetometer surveying and trenching was conducted on the "Grasshopper" claims of Fort Reliance Minerals Limited, located in the Similkameen Mining District of southern British Columbia. Mineral exploration was performed by the personnel of Surveymin Limited under the supervision of P.C.M. Roberts, P.Eng. (see appendix for total personnel). Field operations were conducted between May 18, 1970 and June 23, 1970.

Accompanying this report are two reports prepared for Fort Reliance Minerals on these claim groups prior to the 1970 program. These two reports are:

1. Report of October 31, 1969, by John Buchholz, Geologist, Vancouver, B.C.
2. Report of October 31, 1970, by P. E. Hirst, P.Eng., Geologist,
Vancouver, B.C.

SUMMARY AND RECOMMENDATIONS

Geological mapping added little to the published data on the Tulameen Ultrabasic Complex. The magnetometer survey, conducted on a reconnaissance basis, failed to yield any correlation between anomalies and base metal occurrences; no really extensive high areas were delineated which might suggest the presence of economic bodies of iron ore. The magnetics were particularly helpful in establishing the dimensions and the contacts of the basic and ultrabasic units with the older rocks of the Nicola Group. Prospecting and geological surveying were greatly hampered by the extensive snow cover which blanketed most of the claim blocks for all but the last week or so of exploration. Two trenches were bull-dozed in areas of conspicuous sulphide mineralization within Block "C".

Assays of copper ranged up to 0.5% and nickel 0.04%, primarily in the southern part of Block "C". The best locales for copper-nickel mineralization are the most basic units of the zoned mass particularly south of the major fault transecting Block "C" as well as the contacts of these rocks with the Nicola Group. Assays for chromium were made, employing this metal as a pathfinder element in the search for platinum, but insufficient samples render the present status inconclusive.

As the program further enhanced the potential of the Tulameen ultrabasic complex, the following program of exploration for copper, nickel and platinum is recommended.

1. Soil sampling location lines, and intermediate lines to be cut, on 200 foot centers, assaying for copper, nickel and chromium.
2. Geochemical rock sampling-assaying for the above metals.
3. Stream and creek sampling - assaying for the above metals.
4. Detail geochemical sampling on cut grids depending upon the results of the above surveys.
5. Detailed prospecting.

6 Trenching and pitting depending on the above.

Cost of the above program, less Stage 6, is estimated at \$7,000 maximum and the work should preferably be undertaken on the following claims, the remaining being allowed to lapse:

<u>Block</u>	<u>Reasons for Staking</u>	<u>FRM Claims (to be retained)</u>	<u>Total</u>
A	Proximity to Dunite; retention of Olivine clinopyroxenite; retention of mineralized contact with Nicola Group.	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 41, 42, 48, 50, 51, 52, 53, 54, 55, 56, 57, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159	33
B	Proximity to iron deposit of Imperial Metals and Power Ltd.	181, 182, 174, 175, 183, 185	6
C	Showings of Cu., Ni. and Pt. scattered; volcanic-ultrabasic contacts adjacent to Anaconda drilling.	71, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86A, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103	32
	To protect major cross-fault.	105, 106, 107, 108, 109, 167, 122, 124, 111, 126, 125	11
D	Six claims (none to be retained).		—
Recommendation - Total claims to be retained			<u>82</u>

THE PROPERTY

The Grasshopper property, consisting of 172 mineral claims, is located in the Similkameen Mining District of southern British Columbia. The claims are owned by Fort Reliance Minerals Limited, Suite 302, 550 Burrard Street, Vancouver, B.C. All these claims are within four blocks, as illustrated on the accompanying maps, Nos. 1 and 2, and are legally described below:

<u>Block</u>	<u>Claim Name</u>	<u>Claim Number</u>	<u>Expiry Date</u>
A (60 claims)	FRM 1-18	25896-25913	September 10, 1970
	FRM 19-24	25914-25919	"
	FRM 150-159	25945-25954	"
	FRM 29-42	25920-25933	"
	FRM 47-51	25934-25938	"
	FRM 52-53	25939-25940	"
	FRM 54-57	25941-25944	"
	FRM 148	26001	September 23, 1970
B (10 claims)	FRM 172	26156	September 23, 1970
	FRM 174, 175	26158, 26159	"
	FRM 177	26160	"
	FRM 179-182	26161-26164	"
	FRM 183	26165	"
	FRM 185	26166	"
C (96 claims)	FRM 65-72	25957-25964	September 10, 1970
	FRM 73-85	25965-25977	"
	FRM 86A	25979	"
	FRM 86	25978	"
	FRM 87-93	25980-25986	"
	FRM 94-103	25987-25996	"
	FRM 160-161	26144-26145	September 23, 1970
	FRM 162	26146	"
	FRM 163	26147	"
	FRM 164-166	26148-26150	"
	FRM 147, 148	26142, 26143	"
	FRM 141	26137	"
	FRM 142A	26138	"
	FRM 143A, 145A	26139, 26140	"
	FRM 145A	26141	"
	FRM 173	26157	"
	FRM 105-114	26101-26110	"
	FRM 119-120	26115-26116	"
	FRM 115-118	26111-26114	"
	FRM 167, 168	26151, 26152	"
FRM 169	26153	"	
FRM 170, 171	26154, 26155	"	
FRM 121-130	26117-26126	"	
FRM 131-140	26127-26136	"	
D (6 claims)	FRM 62	25955	September 10, 1970
	FRM 64	25956	"
	FRM 142	25997	"
	FRM 143	25998	"
	FRM 144	25999	"
	FRM 145	26000	"

The above claims are situated about six miles west-southwest of Coalmont, B.C. in the vicinity of Olivene and Lodestone Mountains. Access from Coalmont to the property by road is generally excellent except in the springtime when mud makes driving on the timber roads prohibitive. A 4-wheel drive truck is advisable as there will be difficult stretches in any weather.

HISTORY

The Tulameen area was one of Canada's oldest placer mining camps. The district at one time was the principal producer of platinum on the North American continent; approximately \$800,000 of gold and platinum were mined following 1885. Although small workings were noticed on virtually all the streams draining the property, the bulk of production came from the north flank of Olivene Mountain down to the Tulameen River.

Over the years the Lodestone-Olivene Mountain areas have been repeatedly prospected and staked but, as far as the writer is aware, no systematic or comprehensive exploration, followed by pattern drilling, was conducted. A few years ago, the Olivene Mountain area was scrutinized by Olivene Explorations Limited with no apparent success. At present, Imperial Metals and Power Limited is considering production on its iron ore (approximately 15% in magnetite) deposit on Tanglewood Hill north of Block "B". Anaconda, during the time during which exploration for Fort Reliance Minerals was proceeding, was drilling a copper showing in pyroxemite within the claim block adjoining the south border of Block "C".

MAGNETOMETER SURVEY

After the claim location lines were surveyed with Brunton compass and chain, magnetometer surveys were conducted upon most of them. A McPhar M-500 fluxgate magnetometer was utilized for the survey with maximum scale sensitivity of 20 gammas per division. A base station, located in the north-east sector of the Block "B" Map, was arbitrarily set at 200 gammas. Because of the extensive length of the location lines, their relatively wide separation, and the reconnaissance nature of the survey, looping from sub-base stations over 1-1/2 hour intervals was thought to be justified. Diurnal variation studies revealed the daily range to be less than 250 gammas. Readings as plotted on the map are thus subject to an error of 50-75 gammas. Readings were ordinarily taken at 100 foot intervals; in areas of high relief this interval was halved. The geophysical operator was A. Willy of Saskatoon, Saskatchewan. Field assistants for this survey, as well as line cutting, etc., were Harry Hencheroff and Tom Sledge of Princeton, B.C.

The main purposes of the magnetometer survey were to obtain some knowledge of the magnetic character of the intrusive complex, the position of contacts and the general structural picture, and to detect the presence of any large mass of iron ore.

The magnetic relief is extremely high from 32,000 gammas negative to over 100,000 gammas positive, but areas, either very high or very low, tend to be very restricted in areal extent. A few of the larger ones are shown on the map of Blocks "C" and "D". Magnetic response is due invariably to magnetite content of the ultrabasics as pyrrhotite content is insignificant and with minimal susceptibility; no hematite was observed.

The Nicola rocks, the syendiorite, and the syenogabbro, to a lesser extent, are all magnetically low and their contacts with the more basic units of the intrusive complex can be reasonably magnetically delineated. However, distinguishing magnetically between such members of the complex as the Olivine Ainoxenoite and the Hornblende Ainoxenoite was not possible. Also no correlation could be established between magnetics and sulphide occurrences.

No anomalies were detected which might be indicative of the existence of an iron ore deposit irrespective of the reconnaissance (location) line spacings. Even the two traverses on claim block "B" yielded unusually low readings except in the extreme north in the vicinity of the syenogabbro/syenodiorite-hornblende clinopyroxenoite contact. North of this contact on Tanglewood Hill lies the magnetite deposit of Imperial Metals. It is extremely unlikely that any deposits of magnetite, even sub-economic, occur on these claims but the northerly ones should be retained for their strategic position.

The magnetics relevant to individual claim blocks are further discussed below in conjunction with geology.

GEOLOGY

The Tulameen Complex is a composite ultramafic (ultrabasic)-gabbroic intrusion that outcrops over 20 square miles within the Southern Cordillera. The complex has intruded Upper Triassic (meta) Volcanics and (meta) sediments of the Nicola Group, and on the basis of geologic relations and a "K-ar age" determination is tentatively dated as "Late Triassic".

The principal ultramafic units - dunite, olivine clinopyroxenoite and hornblende clinopyroxenoite - form an elongate non-stratiform body whose irregular internal structure is best explained by deformation contemporaneous with crystallization of the rocks. The derivation of the ultramafic rocks is attributed by some investigators to fractional crystallization of an ultrabasic magma. The gabbroic mass, which consists of syenogabbro and syenodiorite, partly borders and partly overlies the ultramafic body and was apparently intruded by it.

For the aeral picture, the reader is referred to G.S.C. Paper 45-5 "Second Preliminary Map, Princeton, British Columbia" by H.M.R. Rice, 1945. The complex itself and its immediate peripheries has been recently studied in detail by D. C. Findlay ("Origin of the Tulameen Ultramafic-Gabbro Complex, Southern British Columbia; Canadian Journal Earth Sciences, Vol. 6, p.p. 399-425, 1969). Findlay has suggested that the ultramafic and gabbroic parts of the complex probably formed from separate intrusions of

different magmas, but the two suites have sufficient mineralogical and chemical features in common to indicate an ultimate petrogenic affinity of the magmas. Also, he states that comparison of the Tulameen rocks with nearby intrusions of the same general age, in particular the Copper Mountain Stock, suggests that they are members of a regional suite of alkalic intrusions.

On the accompanying three geologic-magnetic maps have been plotted the extent and contacts of the major lithologic units as noted above. This information has been transcribed from Findlay's publications but modified somewhat as a result of mapping by the writer, P. Dumont, B.Sc. and M. Boucher, B.Sc. Our geologists observations were essentially compatible with Findlay's except for the detection, primarily on the basis of magnetic results, of an ultramafic bulge in the vicinity of FRM 154-159 (Block "A") swinging the contact with the Nicola Volcanics further to the west in that area of more economic significance is the observation of a large Olivine clinopyroxenite outcrop on claim FRM 145A (Block "C") within the hornblende clinopyroxenite unit, suggesting the existence of other bodies of this type in the area, such more basic lithologies being regarded as more favorable host rocks for base metal and platinum-bearing mineralization. Extensive mapping in the vicinity of FRM 92 and 93 (Block "C") indicates that Findlay's syenogabbro-syenodiorite unit in this area is mostly non-existent.

PROPERTY GEOLOGY

Rock outcrops, especially because of the unusual snow-cover existing at the time the mapping was undertaken, are primarily confined to the high ground. The most abundant exposures were observed on Block "A" and the southern sector of Block "C". For detailed lithologic descriptions, the reader is referred to Findlay's paper. Samples were variously subjected to geochemical rock analysis, where expressed in pounds per million (P.P.M.) conventional hot acid extraction and 30 metals semi-quantitative spectrometer analysis by Technical Service Laboratories of Vancouver. The analyses for copper, nickel, chromium, gold, silver and platinum are plotted upon the accompanying maps. Regretfully a few of the better mineralized samples, particularly from the trench areas, were lost in transit. Visually they were expected to assay at least 1% copper in a geological setting conceivably amendable to open pit mining.

BLOCK "A"

Outcrop is essentially confined to that area above the 5600 foot contour and the rock characteristics and contacts, where observable, agree with Findlay's findings. Eleven representative rock samples were analyzed for copper, nickel, chromium and gold with results reported in parts-per-million. Assays for platinum were not feasible at the time but the writer contends that the chromium analyses are a good index of platinum content. Insufficient chromium analyses were made to warrant any comments on the statistics of range and distribution of platinum and further rock geochemical studies are recommended, considering the excellent potential of the ultramafic units.

Samples AB-4 and AB-5 were selected in and near an old copper (chalcopyrite) showing located on PRM 52. The host rock is hornblende clinopyroxenite and the mineralization, on the basis of a limited investigation, appears spotty; the contact with the Nicola Group in this area at least appears particularly promising and further work along such contact is also warranted even though the copper assays were only 0.16% and 0.13% respectively and the nickel assays were minimal. Gold assays were typical for the property - negligible. Nickel and copper assays were of no economic significance but their number was limited.

A magnetometer survey was conducted over all location lines except 5 and 6; traverse orientations were not optimal as they essentially paralleled and geological strike and the wide spacing between lines, here as well as over all the blocks, generated information only of a general nature. Magnetic background is high and a large number of highly anomalous zones were delineated. As these anomalies are undoubtedly due to erratic small masses of magnetite distributed throughout the ultramafic units, it is highly doubtful if magnetometer surveys are an effective exploration tool within this block, much less the whole property, except as to outline the more basic rock units and the contacts with the Nicola Group. For example, magnetic results on location line 5 revealed a buldge in the hornblende clinopyroxenite deflecting the contact with the Nicola Group to the west.

It is recommended that the claims in the north part of the block be retained because of the proximity of the dunite and olivene clinopyroxenite and those on the west be retained because of the favorable contact with the Nicola Group. Geochemical surveys, noted previously, are also recommended in conjunction with prospecting.

BLOCK "B"

Outcrops here are very rare; the block is underlain almost entirely by syenogabbro and syenodiorite containing in hand specimen very little magnetite or sulphides. Two samples assayed for copper, nickel, chromium and gold yielded nothing of economic significance.

Magnetic background was very low and highs were only noted at the presumed contact with the hornblende clinopyroxenite.

It is recommended that 6 claims be retained in the north part of this block only because of their proximity to the iron ore deposit of Imperial Metals on Tanglewood Hill. No ground surveys are advisable for the immediate future.

BLOCK "C"

With the exception of the discrepancies and additions previously mentioned under the topic of general geology, our geological observations were compatible with those of Findlay. Outcrops occur in the block, particularly in the south, more frequently than usual over the property, even then, they are primarily confined to the high ground. The most intensive investigations were conducted in the vicinities of location lines 3 and 6.

Copper showings were detected on claims FRM 73(99) and FRM 92, both with hornblende clinopyroxenite as host rock. Spotty occurrences of pyritiferous mineralization were noted on FRM 85 and FRM 110. The copper (chalcopyrite) showings trend north to northwest with maximum exposed length of 200 feet, average widths appear to be of the order of 20 feet but dips are unknown. Accurate determination of grades are difficult due to extensive weathering and the highly disseminated nature of the mineralization. Maximum assays obtained were 0.5% copper and 0.04% nickel; gold as usual was negligible and the chromium results were inconclusive. Three platinum assays yielded results of no economic importance, but traces of silver and molybdenum were detected.

The sulphide zones appear to be confined within north-northwest trending fracture zones in the hornblende clinopyroxenite which is characterized by rhythmic banding flow structures which trend north-east and are accompanied by enrichment in magnetite and olivine. Where magnetite is excessively high, sulphide content is low, e.g. samples CD-1, CD-2 and CD-3. As with the property as a whole, the syenogabbro-syenodiorite unit was devoid of sulphide mineralization. Limited rock geochemical assaying within the block strongly indicates the advisability of further work.

Thorough prospecting was conducted in the vicinity of the major north-east trending fault transecting the block and no outcrops were encountered. It still remains a favorable area for exploration by geochemical methods.

The location lines were surveyed magnetically and again the method was successful in delineating major contacts. Numerous magnetically high zones were detected, such as those surveyed in more detail on FRM 92, but they are definitely too small to be of economic importance for iron.

A single trench was bulldozed and each of FRM 73(99) and FRM 92 with respective lengths of 330 feet and 490 feet. The trenching was undertaken by Tri-Valley Construction Ltd. of Princeton, B.C., employing a D-7 tractor. A detailed geological map for each trench accompanies this report. Visually the samples from these trenches intended for assay somewhat exceeded 1% copper but the mineralization occurs quite erratically so any estimate of overall or average grade would be hazardous. Unfortunately the samples for assay as of this date have been still misplaced in transit.

The work undertaken to date strongly warrants additional detailed prospecting plus a comprehensive rock stream and soil geochemical sampling program. These activities should be carried out on retained claims within the south sector of the block in addition to the cross fault vicinity. The presence within the block of copper showings, the favorable contact with the Nicola Group, the good potential for platinum, the known copper showing to the south within the Anaconda claims renders this block the most promising of Fort Reliance Mineral's holdings in the Tulameen Complex.

BLOCK "D"

Although access is relatively easy, no outcrops were found in this relatively flat-lying area. The ground presumably is underlain by rocks of the Nicola Group. No magnetometer work was undertaken. The claims are regarded as of minimal priority and should be allowed to lapse.

Respectfully submitted,



P. C. M. Roberts, M.Sc.[Applied], M.B.A., P.Eng.

August 19, 1970
Rankin Inlet, N.W.T.

PERSONNEL INVOLVED IN EXPLORATION PROGRAM

ON GRASSHOPPER CLAIM GROUP

SEPTEMBER 23, 1969 TO SEPTEMBER 3, 1970

P. C. M. Roberts, 100 Spadina Road, Toronto, Ontario
P. E. Hirst, 450 Granville Street, Vancouver, B.C.
J. A. Harquail, 42 Glenallan Road, Toronto, Ontario
John Buchholz, 470 Granville Street, Vancouver, B.C.
P. Dumont, 3550 Ed. Montpetit, Montreal, Quebec
M. Boucher, 771 Ste. Melanie, Co. Joliette, Quebec
A. Willy, 628 First Avenue N.E., Saskatoon, Saskatchewan
T. Sledge, Princeton, B.C.
H. Hencheroff, Printeton, B.C.

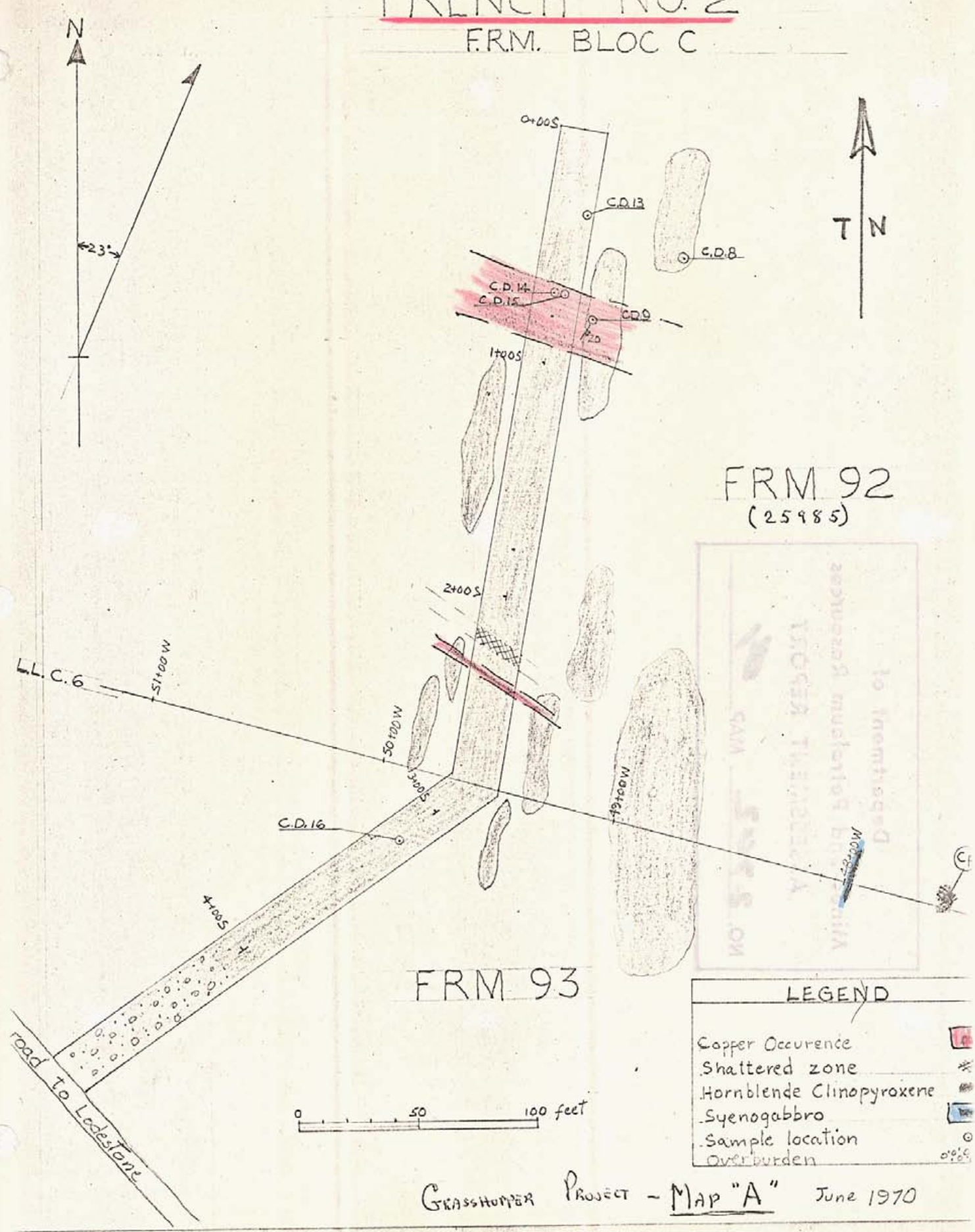
GRASSHOPPER GROUP

STATEMENT OF EXPENDITURES

SEPTEMBER 23, 1969 TO SEPTEMBER 3, 1970

<u>Name</u>	<u>Category</u>	<u>Rate</u>	<u>Days Worked</u>	<u>Period</u>	<u>Total</u>
P.C.M.Roberts	Prof. Eng.	\$150/day	May 18 to June 23/70 Aug. 15-19/70	5 5	\$4,500.00
P.E.Hirst	Prof.Eng.	\$150/day	October, 1969	1	150.00
J.A.Harquail	Prof.Eng.	\$200/day	Aug.15-Sept.3/70	4	800.00
J.Buchholz	Geologist	\$75/day	Sept. 23-Oct.31/70	10	750.00
P. Dumont	Geologist	\$967/month	May 16-June 23/70	32	1,013.33
M.Boucher	Geologist	\$875/mo.	May 16-June 23/70	32	929.17
A. Willy	Technician	\$750/mo.	May 16-June 23/70	32	796.78
T.Sledge	Geol.Asst.	\$60/day	June 12-17/70	2-1/2	150.00
H.Henzeroff	Geol.Asst.	\$60/day	June 13	1	<u>60.00</u>
Salaries and fees - total					9,149.28
Air fare and travelling expenses					1,242.37
Rental of magnetometer]					176.00
Maps and reproductions					140.65
Food and lodging					1,294.64
Sampling and assaying					82.50
Tractor rental					832.00
Rental of Land Rover					440.00
Western Geological Services - Oct. 1969 - field expenses					760.29
Surveymin Limited - Nov. 28, 1969 - Engineering expenses					1,703.92
D. O'Shannessy - Drafting services - Aug. 1970					200.00
Surveymin Limited - report typing and preparation - Aug.Sept. 1970					<u>50.00</u>
					\$16,071.65

GEOLOGIC
TRENCH NO. 2
 F.R.M. BLOC C



FRM 92
 (25985)

FRM 93

Department of
 Geological Engineering
 and Sciences
 Stanford University
 Stanford, California
 94305

LEGEND	
Copper Occurrence	
Shattered zone	
Hornblende Clinopyroxene	
Syenogabbro	
Sample location	
Overburden	

GEOLOGICAL TRENCH NO. 1

FRM 99
(25992)



GRASSHOPPER PROJECT - MAP "B" June 1970

Grasshopper Syndicate

F.R.M. Mineral Claims

Princeton, B.C.

INTRODUCTION

The Olivine Mountain ultrabasic stock varying in composition from peridotite to pyroxenite to augite syenite has long been a source of interest to individuals and companies engaged in mineral exploration. A number of economic minerals including chromite, platinum, chalcopyrite, gold and magnetite occur either as lode deposits within the ultrabasic stock or as placer deposits near the fringes of the stock. Production from placer deposits during 1886 amounted to 193,000 dollars. Production remained high for about 10 years and resulted in the district being recognized as the most important producer of platinum in North America. The origin of the platinum in the streams near the Tulameen and in the Tulameen itself is the ultrabasic body known as the Olivine Mountain Stock. Gold is derived from gold bearing quartz veins near the edge or within the stock in the vicinity of Grasshopper Mountain. Assays of ultrabasic rock containing chromite and visible grains of platinum have returned values as high as 2 ounces of platinum a ton. (G.S.C. Memoir 243 pp 60) The Olivine Mountain ultrabasic stock presents a geological environment

with significant economic potential which merits modern and optimistically oriented geological investigations.

ACCESS AND LOCATION

The claims are located in 4 separate blocks within the ultrabasic stock between Granite Creek on the south and Tulameen river on the north approximately 14 miles west of Princeton, British Columbia. Access to the claims is by means of a main road to Coalmont then by maintained roads to Lodestone Lake. A number of logging roads and generally open bush facilitate access to most of the area. The claims lie between 4000 and 6000 feet in elevation and cover areas of moderately rugged terrain.

CLAIM STAKING

A total of 172 mineral claims were acquired by Fort Reliance Minerals Limited during the fall of 1969. The claims were staked at the request of J. A. Harquail, president of Fort Reliance, and were located as shown on the accompanying map. Due to the magnetic characteristics of the rocks it was not possible to make use of Brunton compasses in many places. Consequently a number of the location lines were run by means of pickets and chain. In addition previous staking by others was found to be complex and erratic so that "tie-in" surveys

to old posts revealed discrepancies of positions of posts located on maps of up to one mile or more. Because of the large errors in claim locations previous claims are not shown on the accompanying claim map. The claims held by Fort Reliance, similarly may be incorrectly plotted in part and overstaking of previous claims may be more extensive than shown. Until such time as a transit survey of the claims is completed, the accuracy of locations of the F.R.M. claims cannot be determined, although, generally the claims are probably located with reasonable accuracy. The claims were staked each 1450 feet long; tie lines were run between location lines which were 2800 feet apart. Four men were employed during the first two weeks of staking (August 23 - September 10,) after which time two men remained for an additional two weeks. The cost of acquiring the claims is approximately \$43.50 per claim.

Approximately 50% of the ultrabasic stock has been staked by Fort Reliance. The remaining 50% is held by other companies and individuals including Consteel Explorations Bethex and Imperial Metals. The outline of the stock is shown on the map. The stock is elongated NW - SE with dimensions of 10 x 3 1/2 miles at its widest points.

FUTURE WORK

The base of any extensive future operations should be centrally located at Lodestone Lake or at cabins along the road north of Lodestone Lake. Future work might include geological mapping and sampling, magnetometer surveys and bulldozer trenching. Prospecting would precede these steps and additional information could be gathered by literature research and examination of old trenches and workings. Assays for platinum should include occasional checks for the typical precious metals usually associated with platinum--namely osmium, irridium and palladium.

Due to the high cost of assaying for platinum - palladium, an alternate method of outlining areas of above average mineralization should be sought. One such method utilizing stream sediments to determine areas of interest has the added advantage of providing rapid and complete coverage over large areas which possess well developed and adequate drainage systems.



John Buchholz
WESTERN GEOLOGICAL SERVICES LTD.
October 1969

P. E. Hirst & Associates Ltd.

CONSULTING GEOLOGISTS

522 - 470 GRANVILLE STREET
VANCOUVER 2, BRITISH COLUMBIA

TELEPHONE 688-4022

October 31, 1969

Mr. J. A. Harquail,
Surveymin Limited,
#915-25 Adelaide Street East,
Toronto 1, Ontario.

RECEIVED NOV 3 1969

Dear Jim:

Re: Grasshopper Syndicate
Lodestone Mountain

Further to your letter of instructions of October 2, 1969 I examined these properties in the period October 14 - 17, 1969. Since then I have undertaken considerable research on the Tulameen Complex and have talked with a number of people regarding other work on the mountain, including most recently, a lengthy telephone conversation with Dr. Findlay of the Geological Survey in Ottawa.

The basic facts are these:

- (1) The Tulameen ultramafic-gabbroic complex is the source (or main source) of the planitiferous sands and gravels that have supported intermittent placer operations in the Tulameen district for a number of years, principally in the period 1884 - 1905. The richest placer deposits were found in the Tulameen river between Champion creek and Olivine creek in the vicinities of Olivine and Grasshopper mountains.
- (2) The Tulameen ultramafic-gabbroic complex was originally mapped and described by Camsell in 1913. More recently, the complex was mapped (Findlay, G.S.C.) in 1960 and 1961 on a scale of 1" to 1,000 feet, and examined in considerable detail via petrographic and analytical work. Some aspects of this most recent work are contained in a paper by D. C. Findlay entitled the "Origin of the Tulameen ultramafic-gabbro complex, southern British Columbia" published in the Canadian Journal of Earth Sciences, Volume 6, No. 3, pp. 399 - 425, June 1969. Although the 1" = 1,000' geological map has not yet been published, Dr. Findlay has ~~available~~ a manuscript copy that he expects to be able to make available. An abbreviated copy of the map is included with the paper and I am enclosing a copy for your information.

Mr. J. A. Harquail,

October 31, 1969

More detailed chemical data have been collected than are contained in the paper, and in particular, a fairly comprehensive study of the platinum content and its distribution was also done.

- (3) The Tulameen complex is a member of a fairly unique series of concentrically zoned ultramafic intrusions that contain significant (though uneconomic) amounts of platinum. Gabbroic and dioritic rocks form over 50 percent of the complex and are earlier than the ultramafic intrusions.
- (4) Early work on the platinum content of the Tulameen ultramafic complex by Kemp (1902) showed that the highest amounts of platinum were contained in the ultramafic rocks, principally where the rocks were rich in chromite. The distribution was very uneven, even in samples of chromite.
- (5) Camsell's work (reported in GSC Memoir 26, p. 154) essentially corroborated Kemp's findings. He concluded that the chances of finding sufficient platinum in rock values to mine are small. These findings were further elaborated on by Poitevin in GSC Summary Report pt. A, pp. 84-101, 1923 and by O'Neill and Gunning in GSC Econ. Geol. Series #13, 1934.

More recent work by the GSC (see attached abstract and comments by Findlay) has been of a more systematic nature and provides a good picture of the platinum distribution. The dunite contains the highest platinum values, averaging 85 ppb or approximately 0.003 ozs. per ton. The other ultramafic rocks, principally olivine clinopyroxenite and hornblende pyroxenite contain lesser amounts. The gabbroic rocks are not favourable host rocks for platinum.

Significantly higher platinum values occur in the chromite contained in the dunite (averaging 2,600 ppb or 0.08 ozs. per ton). This has to be viewed in the perspective of the total contained chromite in the dunite which varies from 0.005% to a high of 1.8% and averages 0.6% (see table VII - Findlay, page 412). Calculated percentages are mine based on the ppm values for Cr.

The economic implications of these data are self-obvious and somewhat disheartening, particularly when viewed in the total perspective of metallurgical recoveries and even allowing for a certain degree of optimism that some zones containing higher amounts of platinum (and chromite) could possibly exist.

Mr. J. A. Harquail,

October 31, 1969

- (6) My examination of the claims generally corroborates the known geology, and although outcrops are widely distributed, it is obvious that no dunite (which rock contains the highest platinum values) occurs in the claim area. Some olivine pyroxenite and hornblende pyroxenite does underlie a part of the FRM claims, but these rocks contain even less platinum. The platinum content of the dioritic and gabbroic rocks which underlie a large portion of the southern block of claims is negligible to non-existent. I am having prepared a claim map which shows the geology as mapped by Findlay and expect to be able to send you this next week.
- (7) Among the other economic minerals that may be worthy of consideration are magnetite, and this is mainly confined to the pyroxenites, particularly the hornblende pyroxenite, where it occurs in the range of 5 - 25%, and averaged considerably less than 20 percent. This is not a viable source of iron ore. Copper possibilities could be said to exist, but considerable prospecting and other detailed work over the years has not revealed any significant mineralization and the possibilities of any significant copper zones remaining to be discovered are remote in the extreme. As a broad characterization, this is a general reflection of the sulphur deficient nature of the complex.
- (8) To sum up I can only conclude that the Lodestone Mountain area has no known or even inferred economic potential for platinum and copper (and iron), and consequently I am unable to recommend any work.

I hope that the above description and attached data will fairly describe the situation to you and when you have studied this I suggest that I call you to discuss it. The general concept that there could be economic platinum in rock values had a certain original merit and validity, but viewed in the light of the considerable data it has no solid economic foundation.

Knowing full well the magnitude of the project in terms of outlay to acquire the large block of ground this has not been an easy decision, but I feel that a complete abandonment of the project would be in your best interests.

Yours very truly,

P. E. Hirst

P. E. Hirst

PEH/LA
Encls.

Distribution Of Platinum In The Tulameen Complex
Yale District, B.C.

by D.C. Findlay, Geological Survey of Canada, Ottawa

~~Prospectors and Developers Association Ann. Meeting~~
~~Toronto, March 7-10, 1965~~

key delivered →

Abstract

From 1884 to 1905 the Tulameen district in south-central British Columbia was the leading platinum producing area in North America, with nearly 10,000 ounces won from placers of the Tulameen River and its tributaries. The source of the platinum, the Tulameen Complex, is a crudely stock-like ultramafic-mafic intrusion similar to those of the great platinum belt of the Central Urals, U.S.S.R. Early assays of Tulameen ultramafic rocks yielded erratic values, in places reportedly to nearly 2 oz./ton Pt., but primary economic deposits were not located.

In the present study, 110 assays of rocks and minerals of the complex were done at the Mines Branch, to determine the distribution of platinum in the body. In rocks, platinum is confined to the principal ultramafic units, dunite (65 to 340 Parts Per Billion, mean 85 PPB), olivine pyroxenite (< 65 to 170 PPB, mean 59 PPB), and hornblende pyroxenite (detected in only 2 of 10 samples, mean 45 PPB). In minerals, platinum occurs mainly in massive chromite of dunite (100 to over 8,000 PPB) and in lesser amounts in zirconite of hornblende pyroxenite (130 to 520 PPB). In chromite, platinum is concentrated in magnetic fractions of samples up to 20 times that of non-magnetic fractions.

The distribution of platinum in the ultramafic rocks suggests that it was originally mainly concentrated in the upper on-reef zones of the dunite mass, a large part of which has subsequently been eroded. ***

* Kemp, J.F. (1902) The geological relations and distribution of platinum and associated metals; U.S. Geol. Surv. Bull. 193 Econ. Geol. 14.

** 10 of 19 samples assayed > 1,000 PPB; 5 of 19 samples assayed > 5,000 PPB. Average Pt. content of Cr. separates (19 samples) was ~ 2,000 PPB.

*** Only 5 samples assayed, average Pt. content = 400 PPB.

**** This is based on the apparent concentration of "higher" (avg. > 1000 PPB) Pt. values near Olney Mt. summit and near Cr. separates with 5.0% Cr. content. There is significant - probably, large Pt. fraction

52 Samples
20 Samples
low of Pt
samples with
low Pt. values
indicated by
no significant Pt.



Department of Energy, Mines and Resources
Ministère de l'Énergie, des Mines et des Ressources

Geological Survey of Canada
Commission géologique du Canada

File Number
N° à rappeler

Mr. Peter Hunt
Suite 4522,
470 Granville St.
Vancouver 2, B.C.

Rm 436
Geological Survey
601 Booth Street
Ottawa, Ont.

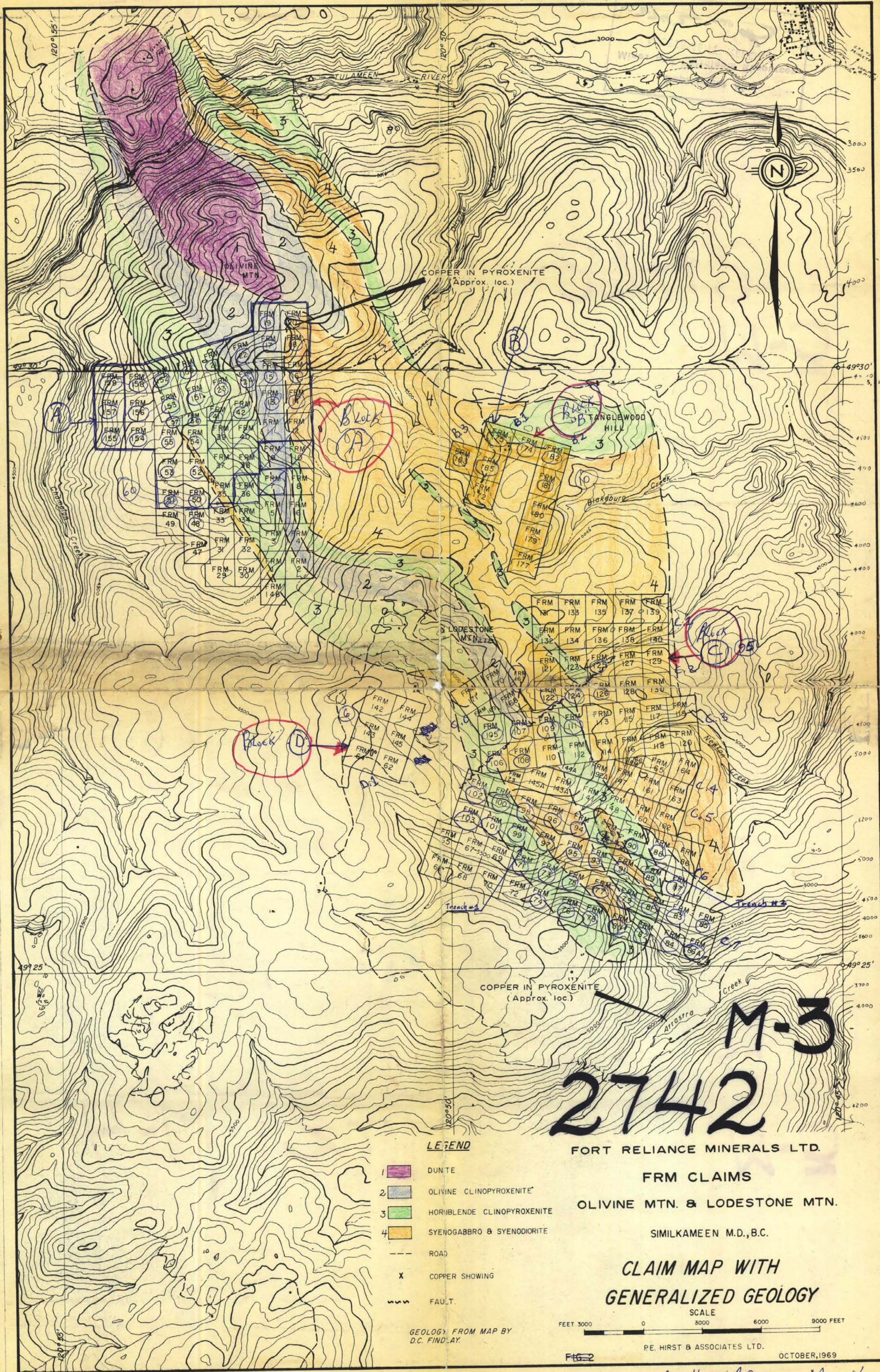
Oct. 24/69

Dear Mr. Hunt:

Further to our telephone conversation yesterday I am enclosing a copy of an abstract of a paper on Tulumite Pt. that never got written (to date). The abstract, plus the footnotes probably will provide some of the information you require. As I indicated on the telephone, I cannot say too very optimistic about the possibility of finding economic amounts of Pt. in place in Tulumite-like Placeration mechanism much more efficient than any desired by man seems necessary to provide economic concentrations of the element in place form. You might be interested in looking at a publication called - "The Great Basin Placer Deposits, Alaska" - U.S. Geol. Surv. Bull. 918 - which is an account of place Pt. or deposits associated with a similar (to the Tulumite) intrusion. Incidentally, in the initial stages of the Tulumite work, we tested samples for the other Pt-group metals. Except for Pd which was detected in v. minor amounts in one or two of the chromite samples, none were present. Most stratiform intrusions (e.g. Bushveld Complex) have low Pt/Pd ratios, and the extremely high Pt/Pd ratios of Tulumite and similar intrusions seems to be one of their characteristic - along with abnormally Fe^{+++} -rich chromites (15-25%) which is rare in most mafic and ultramafic intrusions.

If you need further information, please let me know

Sincerely,
J. H. [Signature]



LEGEND

- 1 DUNTE
- 2 OLIVINE CLINOPYROXENITE
- 3 HORNBLENDE CLINOPYROXENITE
- 4 SYENOGABBRO & SYENODIORITE
- ROAD
- x COPPER SHOWING
- ~ FAULT

GEOLOGY FROM MAP BY D.C. FIND'AY.

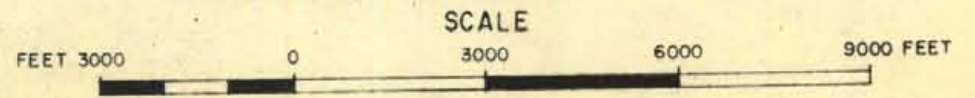
FORT RELIANCE MINERALS LTD.

FRM CLAIMS

OLIVINE MTN. & LODESTONE MTN.

SIMLKAMEEN M.D., B.C.

CLAIM MAP WITH GENERALIZED GEOLOGY

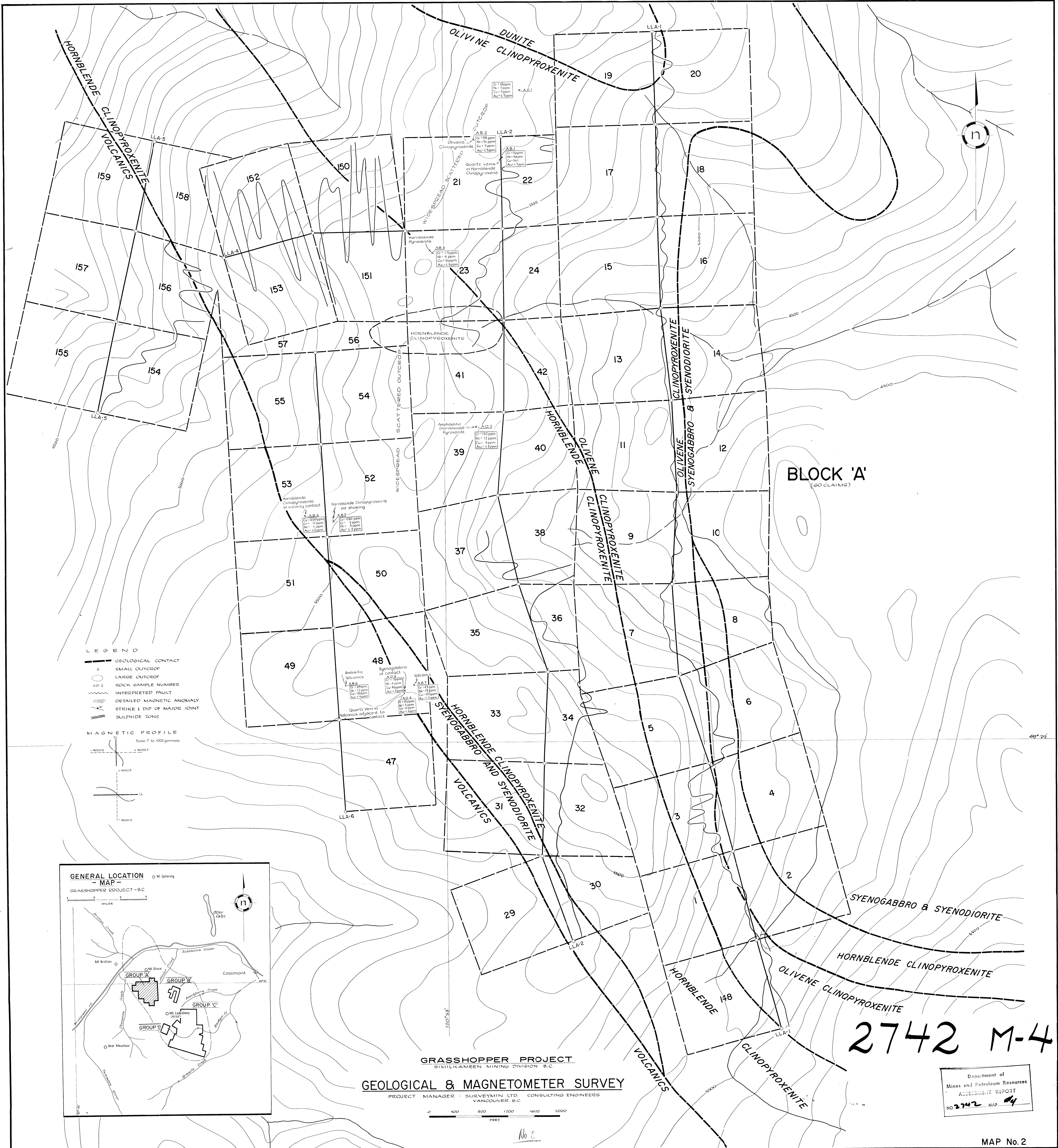


P.E. HIRST & ASSOCIATES LTD.

OCTOBER, 1969

M-3
2742

P.E. HIRST P. Eng. VANCOUVER, B.C. MAP No. 1



HORNBLende CLINOPYROXENITE
VOLCANICS

OLIVINE DUNITe
CLINOPYROXENITE

BLOCK 'A'
(50 CLAIMS)

Andesitic
Volcanics
Syenogabbro
all contact
Volcanics
Quartz vein in
volcanics adjacent to
contact

SYENOGABBRO & SYENODIORITE

HORNBLende CLINOPYROXENITE

OLIVINE CLINOPYROXENITE

HORNBLende

CLINOPYROXENITE

VOLCANICS

HORNBLende CLINOPYROXENITE
AND SYENODIORITE
VOLCANICS

GRASSHOPPER PROJECT
SIMILKAMEEN MINING DIVISION B.C.

GEOLOGICAL & MAGNETOMETER SURVEY

PROJECT MANAGER - SURVEYMIN LTD. CONSULTING ENGINEERS
VANCOUVER B.C.

0 400 800 1200 1600 2000
FEET

No. 2

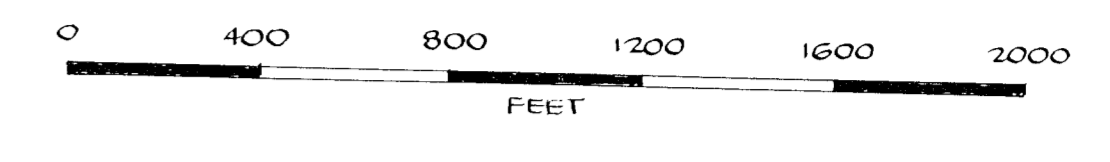
MAP No. 2

MAIN BASE STATION FOR ALL BLOCKS - ARBITRARILY SET AT 200 GAMMAS

GRASSHOPPER PROJECT SIMILKAMEEN MINING DIVISION B.C.

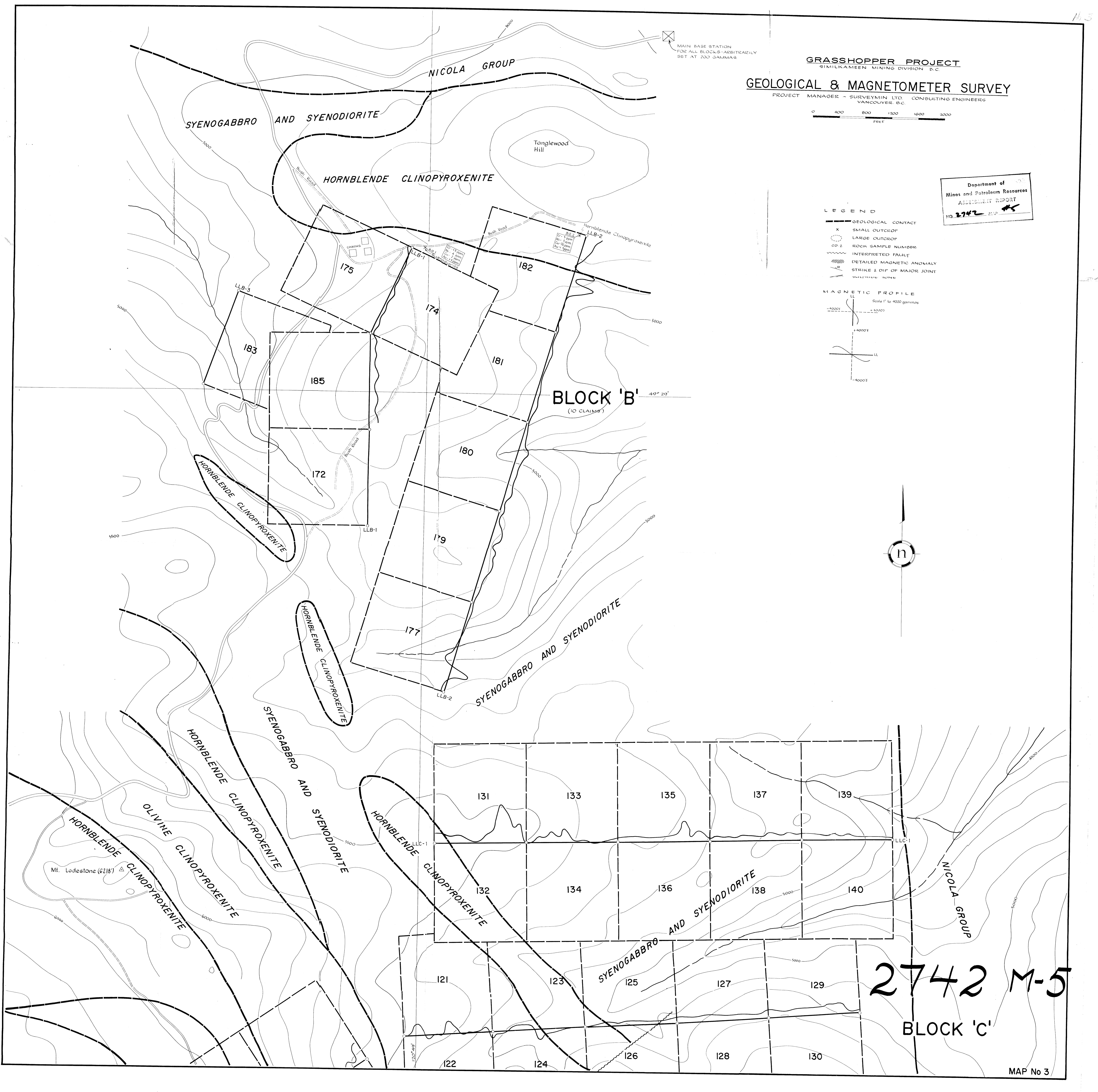
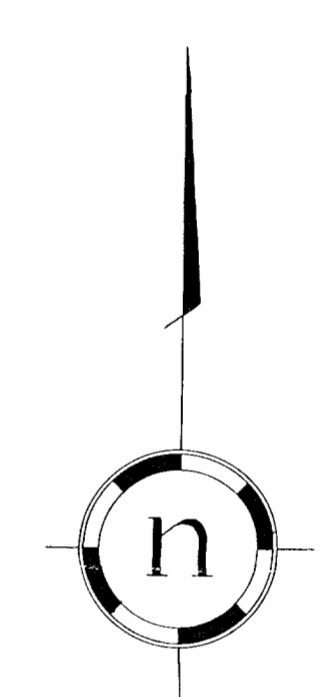
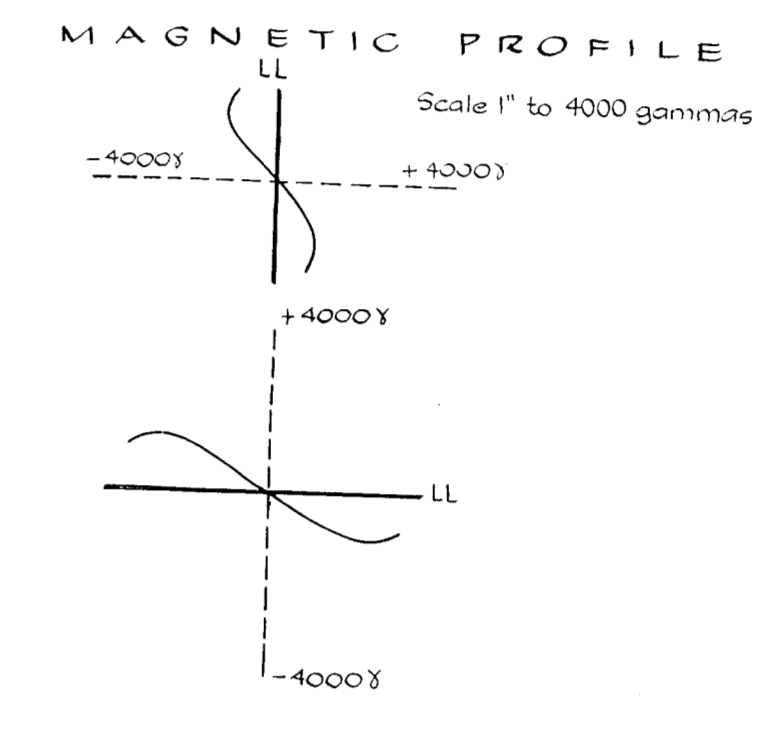
GEOLOGICAL & MAGNETOMETER SURVEY

PROJECT MANAGER - SURVEYMIN LTD. CONSULTING ENGINEERS
VANCOUVER B.C.



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2742 MSP

- LEGEND**
- GEOLOGICAL CONTACT
 - x SMALL OUTCROP
 - LARGE OUTCROP
 - CD 2 ROCK SAMPLE NUMBER
 - ~ INTERPRETED FAULT
 - ▨ DETAILED MAGNETIC ANOMALY
 - ⊕ STRIKE & DIP OF MAJOR JOINT
 - SURFICIAL ZONE



2742 M-5
BLOCK 'C'

