84-1372-12971
12/85

(PLORATION AND DEVELOPMENT FILED ... Dec 28th 1984

Snowflake Claim (2-post)

Gold, Silver

Y NUMBER(S), IF KNOWN

050Y005 ... NTS ... ~~49~~

9°13' ... LONGITUDE ... 119°3

mineral tenures in good standing (when work was done) that form the property

12971
Part 1 of 2

Province of British Columbia | Ministry of Energy, Mines and Petroleum Resources

ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TYPE OF REPORT/SURVEY(S): GEOPHYSICAL: VLF-EM Survey

TOTAL COST: $953.58

AUTHOR(S): N. C. LENARD P.Eng. P.Geol. SIGNATURE(S): N.C. Lenard

DATE STATEMENT OF EXPLORATION AND DEVELOPMENT FILED: Dec 28th 1984 YEAR OF WORK: 1984

PROPERTY NAME(S): SNowflake Claim (2-post)

COMMODITIES PRESENT: Gold, Silver

B.C. MINERAL INVENTORY NUMBER(S), IF KNOWN: ....

MINING DIVISION: 050Y005 NTS: ~~49°13'~~ 82E/4E

LATITUDE: 49°13' LONGITUDE: 119°35' W

NAMES and NUMBERS of all mineral tenures in good standing (when work was done) that form the property [Examples: TAX 1-4, FIRE 2 (12 units); PHOENIX (Lot 1706); Mineral Lease M 123; Mining or Certified Mining Lease ML 12 (claims involved)]: 31320?

SNOWFLAKE CLAIM Record No. 31320
RAM #1693 - EVE #1692
LAMB 1, 2+3 #1700-1761-1762 SEARCH #1659

OWNER(S)
(1) ~~Vermilion Resources Inc.~~ (2) VERMILION RESOURCES INC.

MAILING ADDRESS
~~Box 1595~~
~~Princeton B.C. V0X 1W0~~

402 - 1755 W. BROADWAY
VAN BC V6J 4S5

OPERATOR(S) (that is, Company paying for the work)
(1) as above (2) AS ABOVE

MAILING ADDRESS
as above — AS ABOVE

SUMMARY GEOLOGY (lithology, age, structure, alteration, mineralization, size, and attitude):
Workings and claim located on a fault traversing a contact of two intrusive phases of the Oliver quartz monzonite plutonic complex, possibly Jurassic-Cretaceous age. Gold and silver values occur in quartz veins, sericitized, with copper staining and minor galena mineralization. Some native gold and Hessite are present.

REFERENCES TO PREVIOUS WORK: Shipment in 1962.
Assessment reports: 1981 NC Lenard; 1978 Beaty+Culver; both on adjoining ground.

(over)

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	COST APPORTIONED
GEOLOGICAL (scale, area)			
Ground			
Photo			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic	VLF-EM: 0.3 line-km	SNOWFLAKE CLAIM	$953.58
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for ....)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralogic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY/PHYSICAL			
Legal surveys (scale, area)			
Topographic (scale, area)			
Photogrammetric (scale, area)			
Line/grid (kilometres)			
Road, local access (kilometres)			
Trench (metres)			
Underground (metres)			
		TOTAL COST	$953.58

FOR MINISTRY USE ONLY	NAME OF PAC ACCOUNT	DEBIT	CREDIT	REMARKS:
Value work done (from report)				
Value of work approved				
Value claimed (from statement)				
Value credited to PAC account				
Value debited to PAC account				
Accepted .... Date	Rept. No.			Information Class

GEOLOGICAL BRANCH
ASSESSMENT REPORT

12,971

PART 1 OF 2

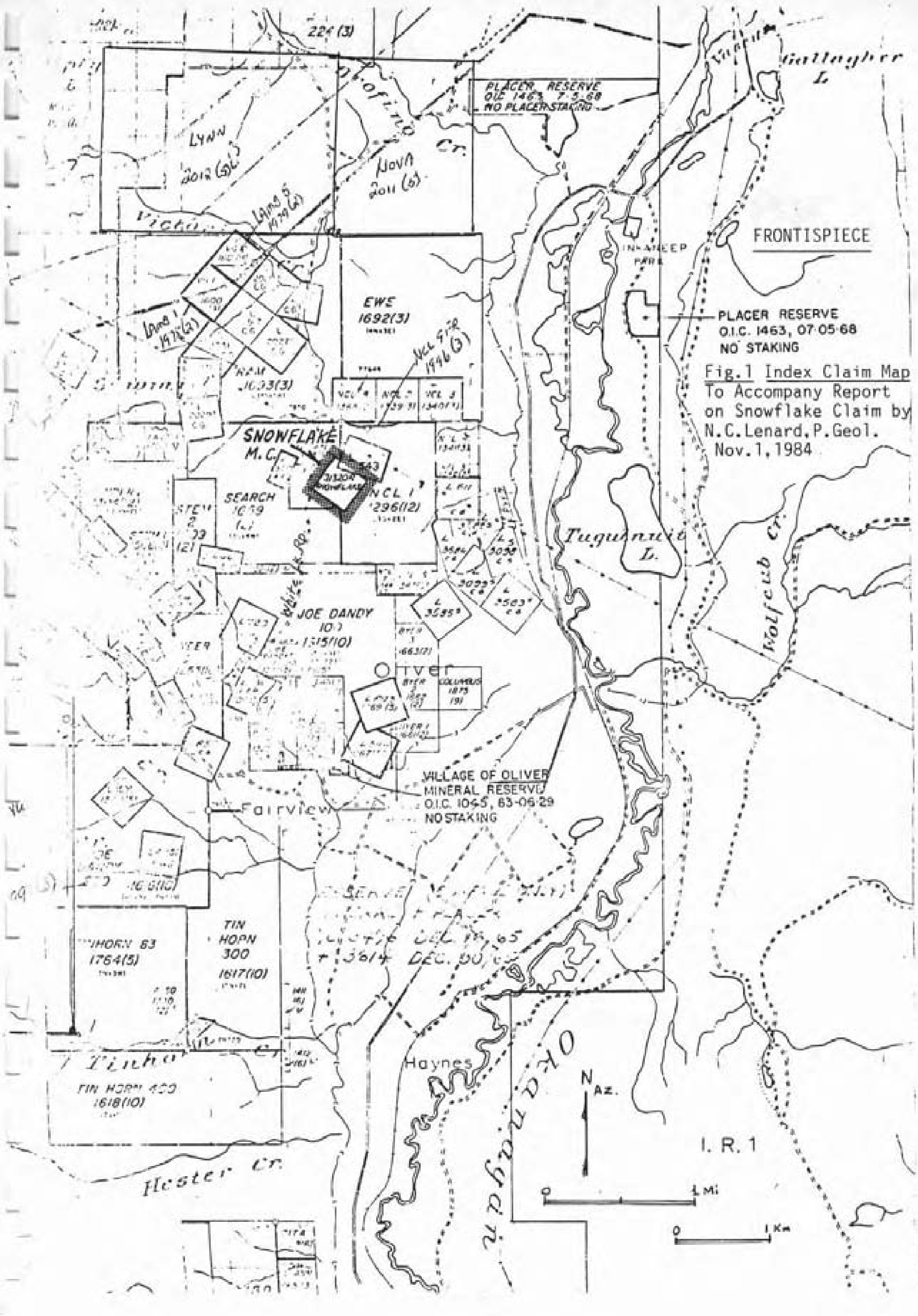
GEOPHYSICAL REPORT
ON THE SNOWFLAKE 2-POST CLAIM
FAIRVIEW GOLD CAMP, OLIVER SECTOR

49°13'N, 119° 35'W: NTS 82E/4E
(1.5 mi.) 2.4Km NW of Oliver
OSOYOOS MINING DIV., BRITISH COLUMBIA

by

N.C.Lenard, P.Geol, P.Eng., Cons.Geol.
Box 863, Westbank, B.C. VOH 2AO
Nov. 1, 1984

Field Work Done: October 21, 1984
Owner: Vermilion Resources Inc.
Box 1595, Princeton, B.C.
VOX 1WO



FRONTISPIECE

Fig.1 Index Claim Map
To Accompany Report
on Snowflake Claim by
N.C.Lenard, P.Geol.
Nov.1,1984

-CONTENTS-

ILLUSTRATIONS

INTRODUCTION:

At the request of Vermilion Resources Inc., a preliminary VLF-Electromagnetic survey was carried out on October 21, 1984 on the Snowflake 2-post claim near Oliver, British Columbia. In the Oliver granite sector of the Fairview gold camp, the claim contains the old Standard gold mine, last operated in 1962.

Aim of the work was to evaluate this geophysical method for outlining the complex fault system that hosts quartz veins with gold-silver values as an aid in correlating recent drilling and further exploration on the property.

Two main sites were traversed: below the upper adit over a faulted quartz vein segment; and uphill near the southwest end of the mined trend of the quartz vein mapped by Arnott (1963).

Total surveyed line distance was 300m.

SUMMARY & CONCLUSIONS:

Although the limited extent of the survey limits conclusions on the results, the following tentative inferrences may be valid:

1. Insufficient data are available for contouring purposes, but two potential, weak conductors are suggested by the filtered data (Fig. 5 & 6):

   (a) Line A (LA) @ 52.5mE, near DH 84-3 drill collar;

   (b) Line D (LD) @ 22.5 - 37.5m W over the southeast-dipping main vein trend.

2. Plotting of the subject grid lines on the old Arnott surface map of the workings contains some probable error due to weak ground control, and mapping of recent roads and property survey data should clarify this concern.

3. Although the VLF method can give anomalies from unwanted sources such as topographic highs, swamp edges and creeks, its tendency to respond to poor conductors is an aid to mapping faults and rock contacts. On this basis, the potential conductors on LA and LD may reflect concentrated metallic sulphides in the vein system or, the fault systems lithologic contrasts.

The LD potential conductor was accompanied by a slight increase in field strength, averaging 6%, which adds to its validity (Fig.4).

The LA potential conductor had a similar but lower accompanying increase in field strength, averaging 2.5%, which may not mark significant conductivity.

RECOMMENDATIONS:

As the VLF-EM method appears to have potential for mapping vein-controlling faults on this property, especially if augmented with magnetics and rock and soil geochemistry, the following program is proposed for delineating ore-controlling structures on the claim.

(A) Contract a VLF-EM and ground magnetic survey for the property based on a surveyed grid control appropriate to the structural grain on the claim. Use 15m (50-foot) VLF stations on 60m line spacing.

(B) Map geology and sample fresh outcrops every 60m for rock geochemistry analyses for gold, silver, and lead to outline ore halos if mappable as targets for detailed exploration.

(C) Collect B zone soil samples every 30m on the survey grid, and follow-up any anomalous lead, copper, silver or gold anomalies with 10m-spaced detailing. Sample C-zone soils also where available on a wider grid for correlation and orientation.

(D) Consider evaluating any derived anomalies by reverse-circulation drilling as a more cost-effective exploration method than stripping and diamond coring.

(E) Specific exploration targets other than the Standard vein system and extensions for priority are:

(i) The 30-inch (0.8m) galena and free gold-bearing quartz vein east of the upper adit, which strikes south.

(ii) The recently seen old Quartz Queen 2m wide vein that lies on or near the southwest edge of the Snowflake claim. Copper staining and sporadic galena in that vein marks precious metal values in this locale. A shear zone on its strike, which parallels that of the Standard vein, outcrops about 200m northeast on the claim. Tentatively, then, the Quartz Queen vein occupies a parallel southerly fault with the Standard vein and has similar gold-silver potential.

(iii) The projected intersection of the Quartz Queen fault and the south strike of the 0.8m vein east of the Standard should be prospected for enhanced structural plumbing and possible rich mineralization.

PROPERTY & ACCESS:

Access is by two or four wheel drive from the White Lake paved road, about ½ Km west of the adits.

The property was recorded by Wm. Hegan of Box 30, Kaledan on Dec. 5, 1974 and is under option to Vermilion Resources Inc., of Box 1595, Princeton, B.C., VOX 1WO.

The claim is in good standing until Dec. 5, 1987.

WORK HISTORY:

Exploration work dates back to the 1930's, the last shipment made in 1961-1962 of a reported 405 tons grading 1.43 oz. gold per ton.

Vermilion Resources Inc. is presently diamond core drilling to develop ore reserves along the main zone of the old Standard Mine vein. The subject preliminary geophysical work is the first known to supplement that of Arnott(1963).

GEOLOGY:

General Geology

The Snowflake Claim is sited on a major north-trending fault in an embayed contact of two phases of the Oliver quartz-monzonite complex. The large quartz body mined by Pacific Silica, about 1.5 Km east, is on this contact.

Auriferous quartz veins extend to the interior of the complex, which is the youngest phase (Beaty et al, 1978). The Beaty et al map illustrates a westerly extension of the youngest monzonite west of the Standard Mine, which might be a structurally high area with prospective quartz-filled fracture systems.

Economic Geology

The quartz vein of the mine strikes about 040° Az. and drips 65° southeast. It is cut by many faults and by lamprophyre dykes. The vein varies from hairline to eight feet (2.4m) wide (Arnott, 1963). Principal control of the vein appears to be the monzonite fracture system. The younger, fresher dyke of augite lamprophyre cuts and offsets both the quartz vein and the older, altered lamprophyre dyke.

A recently rediscovered 2m-wide well mineralized quartz vein occurs in a shaft at the extreme south part of the claim. This is inferred to be the old Quartz Queen vein, prospected around 1900. A legal survey may be needed to learn if the shaft is on this claim, but strike of the vein is well inside the southeast sector of the Snowflake claim.

GEOPHYSICS:

Preliminary VLF-EM geophysics was run over four short lines on the gold-silver bearing quartz vein of the old Standard Mine on the Snowflake claim: two parallel lines 30m apart, LA and LB, on the northeast end of the structure between the two adits; and, two similar parallel lines, also east-west, across the vein near a ventilation shaft. Vein trend is about 040° Azimuth.

The instrument used was a Phoenix VLF-2 receiver, Serial No. L1048. The SW (Seattle, Washington) station was used for signal source. All data were filtered using the Fraser method. Fifteen-metre (50-foot) stations were used on the reconnaissance lines, which are nearly perpendicular to northerly structural grain in the locale.

The geophysical data measured and filtered, are plotted with field notes and inferred potential conductors and presented in following pages after the property map, Fig.2.

++

-REFERENCES-

British Columbia Ministry of Energy, Mines, Petr. Res.:

Assessment Reports -

(a) No. 6949 R.J. Beaty & R.J. Culver, 1978: Geological, Geophys. Report on the Oliver Property, Oliver, B.C.

(b) N.C. Lenard, 1981: Geophysical, Geochemical Report on the NCL 1-8 Claims, Oliver, B.C.

Arnott, E.L., 1963: University of B.C. Thesis (B.A.Sc.) The Mineralogy and Petrology of Standard Mine, Oliver, B.C.

Northwest Mining Association, Spokane, WA. 1980: Practical Geophysics

-CERTIFICATION-

I, Neall Curtis Lenard, of the settlment of Westbank, in the Province of British Columbia do hereby certify:

1. that I am a consulting geologist with an office mailing address of Box 863, Westbank, British Columbia VOH 2AO.

2. that I am a graduate of the University of British Columbia, (BA) Honors Geology 1949,

3. that I have practised my profession continuously for 33 years,

4. that I have an indirect interest in the subject claim by previous market purchase of shares of Vermilion Resources Inc.,

5. that the statements made in this report are based on personal examination of the claim and on a study of published and unpublished reports on the property area,

6. that I am a member of the Associations of Professional Engineers of British Columbia and Alberta,

7. that no legal survey has been conducted over the subject mining claim, and, therefore, in accordance with the mining laws of the appropriate jurisdiction in which such property is situate, the existence of and the area of such property could be in doubt; and,

8. that I attended short courses on Exploration Geochemistry at the University of Calgary in 1970 and in mining at Spokane, Washington sponsored by the Northwest Mining Association in April, 1981.

DATED AT: The Settment of Westbank, in the Province of British Columbia, this 1st day of November, 1984.

PROVINCE OF N. C. LENARD BRITISH COLUMBIA ENGINEER

Ex. Date Dec. 31/1984

Neall Curtis Lenard, P.Eng.,P.Geol.

-EXPENDITURES-

Personnel:		
	N.C.Lenard, P. Geol. Oct. 21,1984 1 Day @ $400.	$400.00
Transporation:		
	Auto: 1 day @ $30.	30.00
Geophysical Equipment:	Rental,Air cargo, insurance	53.58
Report Costs:		
	N.C.Lenard, P.Geol. 1 Day @ $400.00	400.00
	Office Costs:	70.00
		$953.58

I certify that the above statement is an accurate representation of expenditures made for the survey of the Snowflake 2-Post Claim conducted on October 21, 1984.

N. C. Lenard

N.C.Lenard, P. Eng., P. Geol.

PROVINCE OF N. C. LENARD BRITISH COLUMBIA ENGINEER

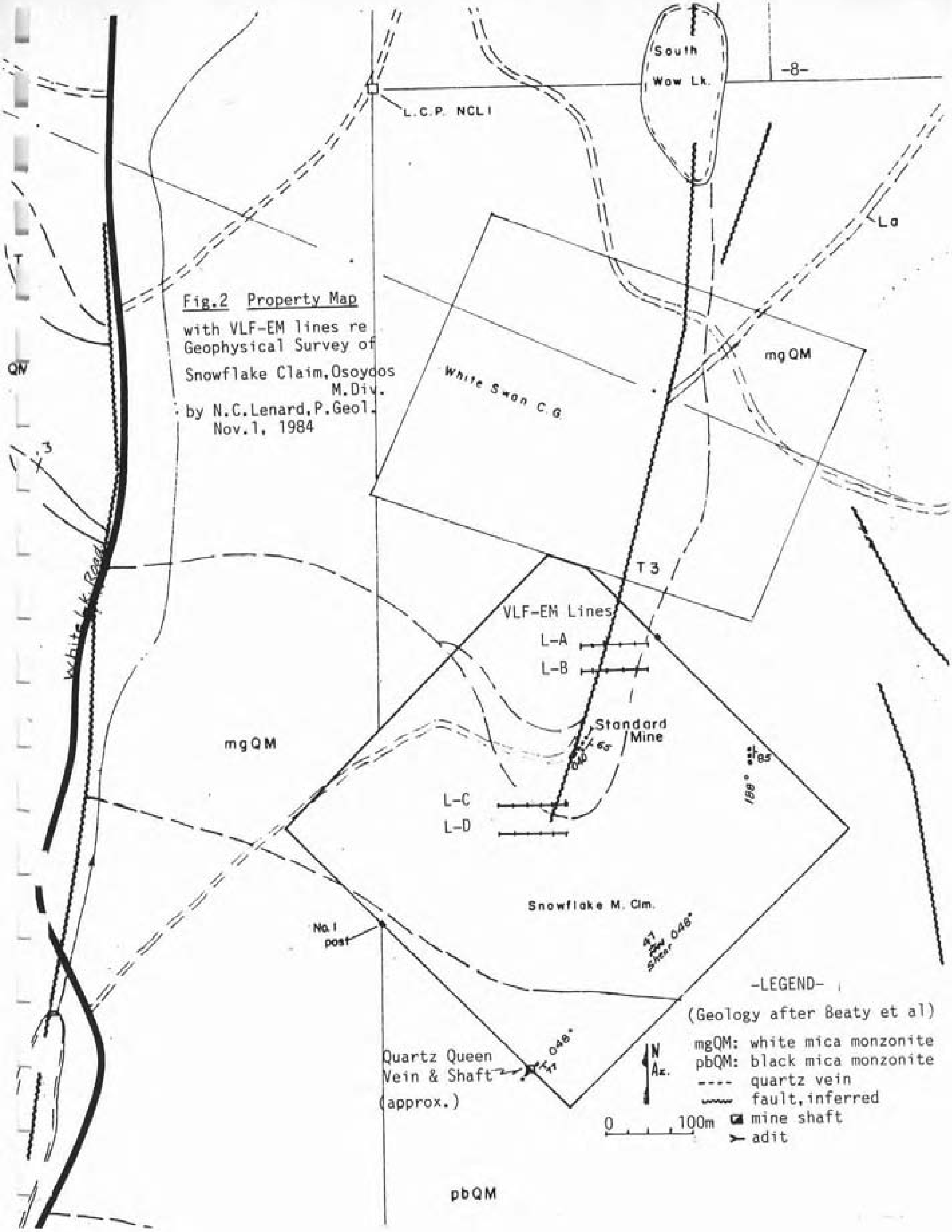


Fig.2 Property Map
with VLF-EM lines re
Geophysical Survey of
Snowflake Claim, Osoyoos
M.Div.
by N.C.Lenard, P.Geol.
Nov.1, 1984
South
Wow Lk.
-8-
L.C.P. NCL I
La
White Swan C.G.
mgQM
QN
White Lk. Road
T 3
VLF-EM Lines
L-A
L-B
Standard
Mine
L-C
L-D
mgQM
Snowflake M. Clm.
No.1
post
shear 048°
048°
Quartz Queen
Vein & Shaft
(approx.)
N
Az.
0
100m
-LEGEND-
(Geology after Beaty et al)
mgQM: white mica monzonite
pbQM: black mica monzonite
quartz vein
fault, inferred
mine shaft
adit
pbQM

Fig.3: Plotted Measured Dips & Filtered Values

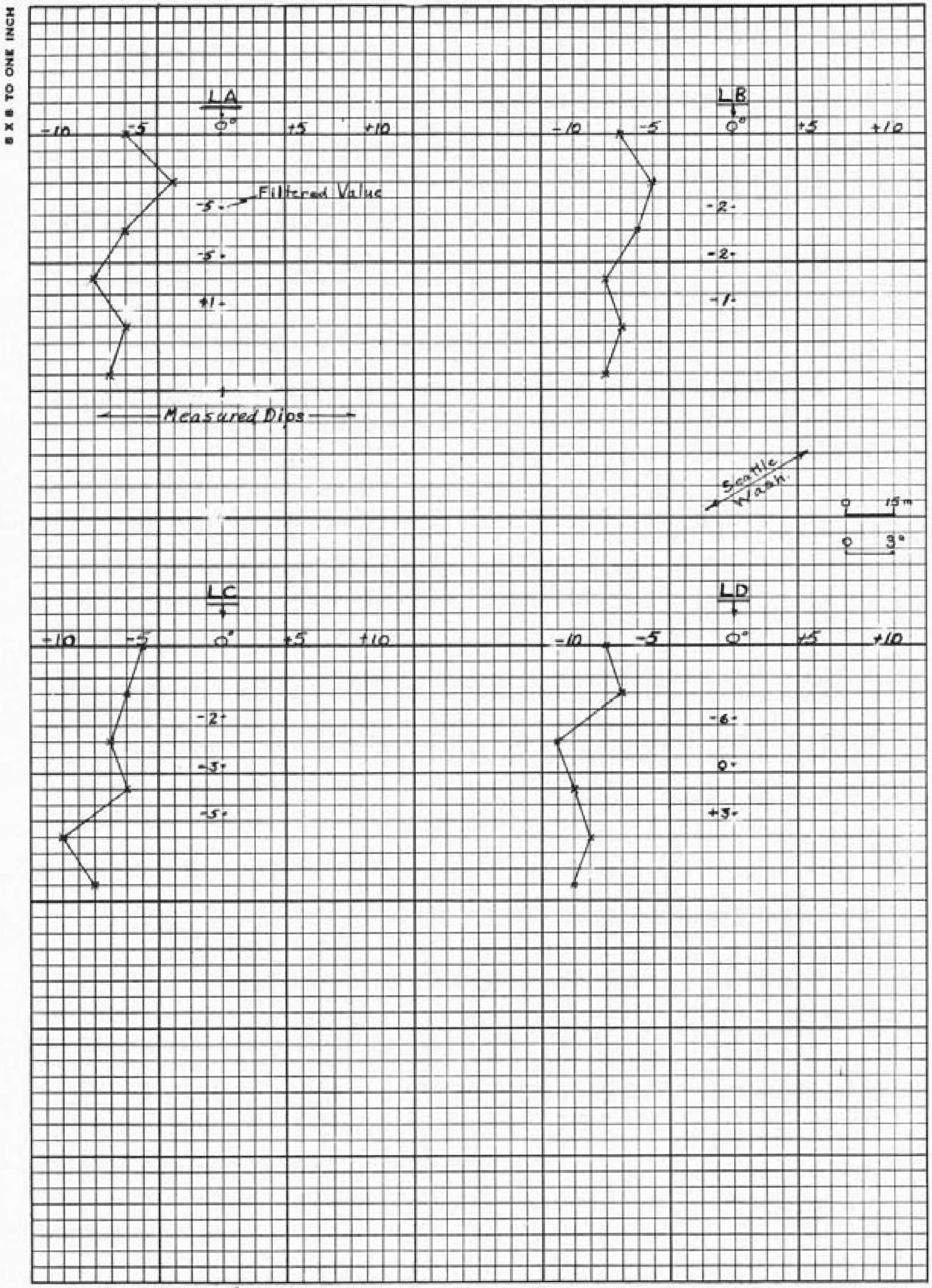
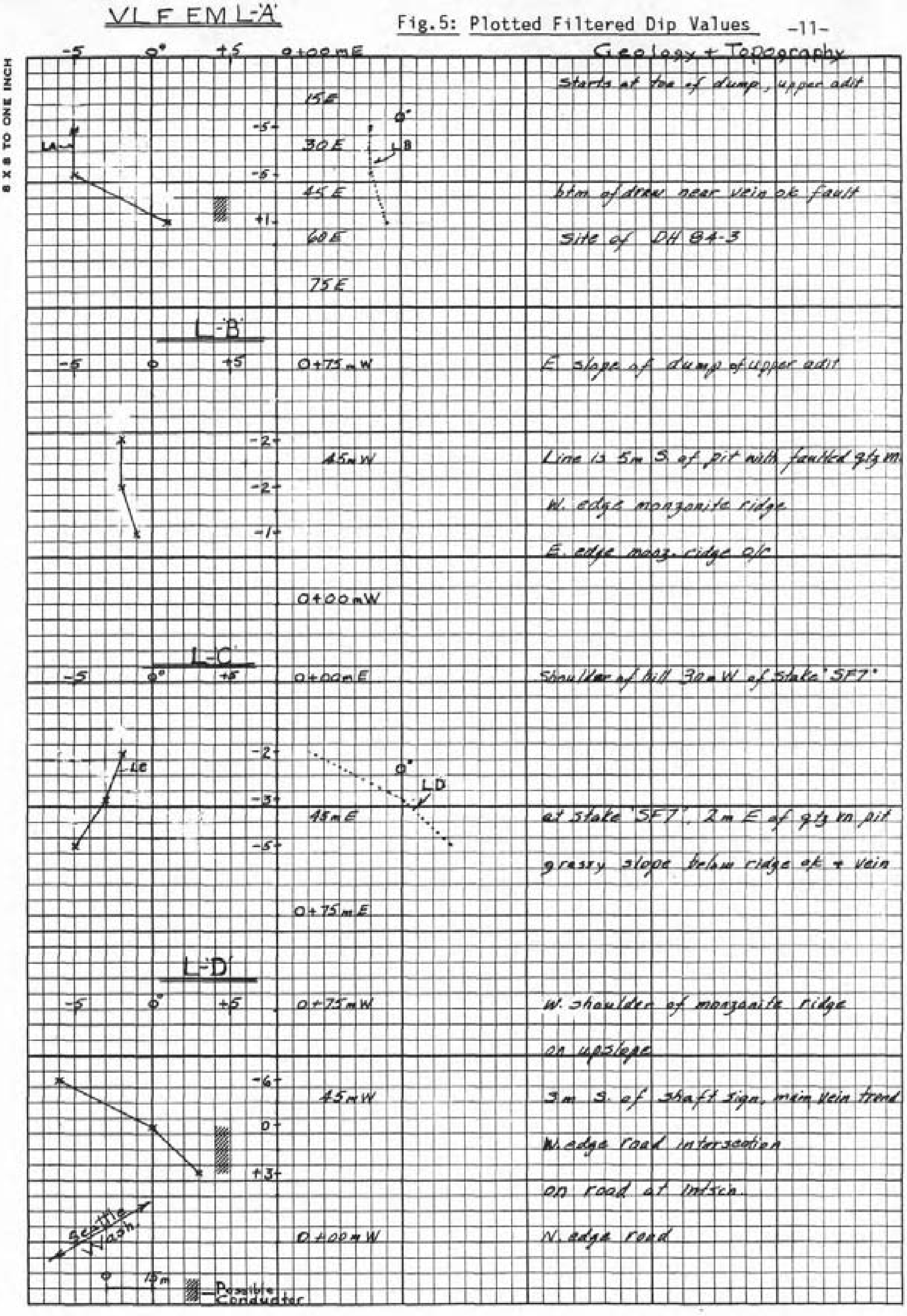
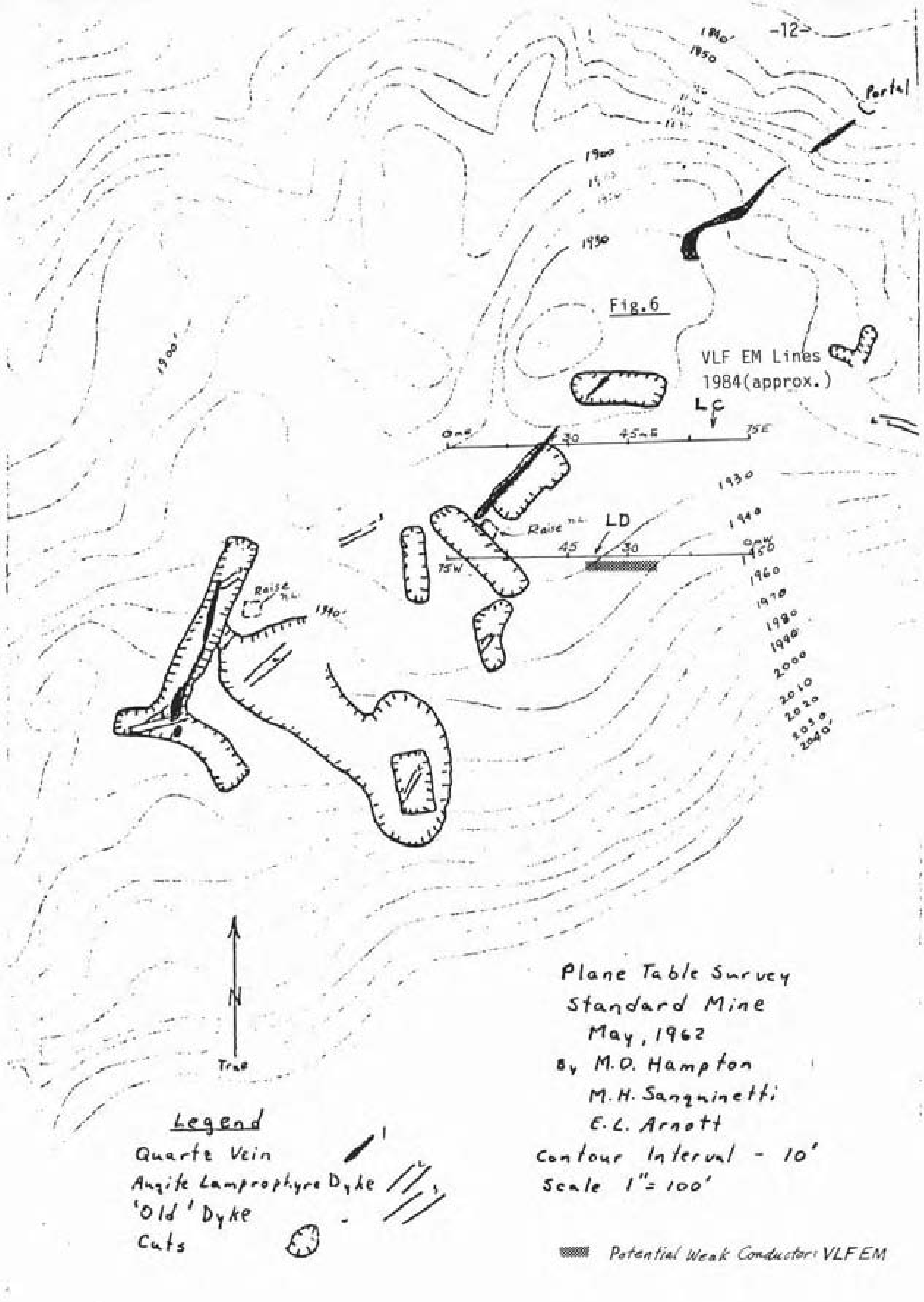


Fig.4: VLF-EM Data Processing

Location	Measured Dip°		Filtered Value		Horizontal Field Strength
LINE A (LA)					%
0+00 m East	-6(S)				100
15	-3 S	-9			99
30	-6 S	-9	-5		99
45	-8 S	-14	-5		97
60	-6 S	-14	+1	} Potential Weak Conductor	100
0+75 m E.	-7 S	-13			99
LINE B (LB)					
75m West	-7 S				98
60	-5 S	-12			99
45	-6 S	-11	-2		96
30	-8 S	-14	-2		98
15	-7 S	-13	-1		97
0+00 m West	-8 S	-15			100
LINE C (LC)					
0+00 m East	-5 S				100
15	-6 S	-11			100
30	-7 S	-13	-2		100
45	-6 S	-13	-3		100
60	-10 S	-16	-5		100
0+75 m E	-8 S	-18			100
LINE D (LD)					
0+75m West	-8 S				100
60	-7 S	-15			101
45	-11 S	-18	-6		105
30	-10 S	-21	0	} Potential Weak Conductor	107
15	-8 S	-18	+3		106
0+00 m W	-10 S	-18			105

Fig.5: Plotted Filtered Dip Values




Portal
1940'
1950
1900
1930
Fig.6
VLF EM Lines
1984(approx.)
LC
0
30
45
75E
1900'
1930
1940
LD
Raise
45
30
75W
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040'
Raise
1940'
N
True
Plane Table Survey
Standard Mine
May, 1962
By M.O. Hampton
M.H. Sanguinetti
E.L. Arnott
Contour Interval - 10'
Scale 1" = 100'
Legend
Quartz Vein
Augite Lamprophyre Dyke
'Old' Dyke
Cuts
Potential Weak Conductor: VLF EM

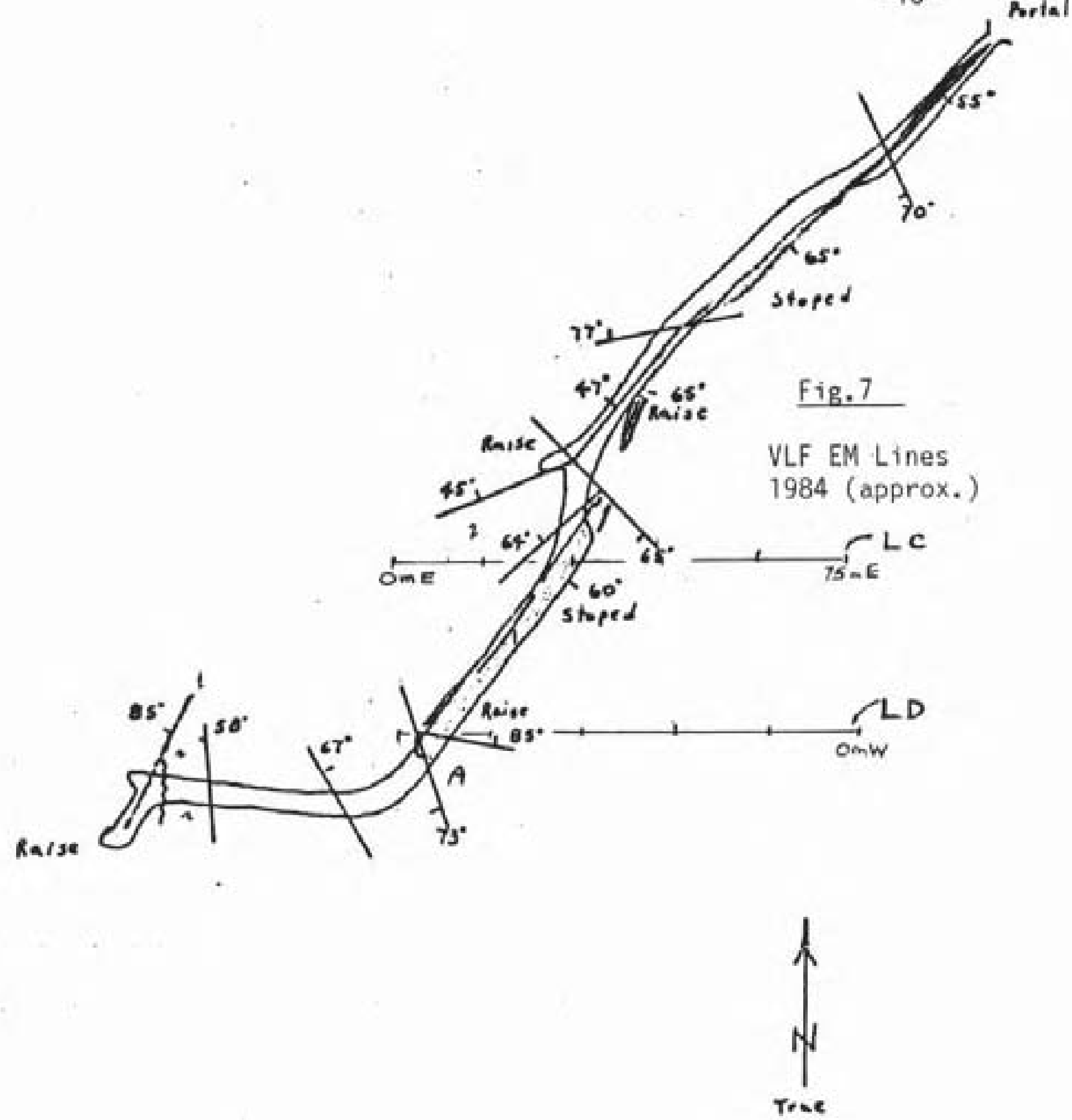


Fig.7

VLF EM Lines
1984 (approx.)

Legend

Quartz Vein
Dykes
Granite
Faults

Standard Mine
Oliver, B.C.

Scale 1"= 100'

Mapped Oct.20,21/62

E.L. Arnott
M.H Sanguinetti

U.B.C. Thesis, B.A.Sc.
1963

ABSTRACT

THE MINERALOGY AND PETROLOGY OF STANDARD MINE, OLIVER, B.C.

by

E.L. Arnott

In the spring of 1962, the surface geology of the Standard Mine, Oliver, B.C. was mapped by plane-table. The underground mapping of the mine was done in the fall of the same year. These were coupled with a magnetometer survey and microscopic studies of rock and mineral samples to formulate the history of the mine geology. It is as follows: emplacement and fracturing of granitic body; intrusion of lamprophyre dyke; formation and mineralization of quartz vein with pyrite, galena, hessite, sphalerite, chalcopyrite, and gold; faulting of system; and intrusion of augite lamprophyre dyke.

Recent alluvium, glacial drift — 1

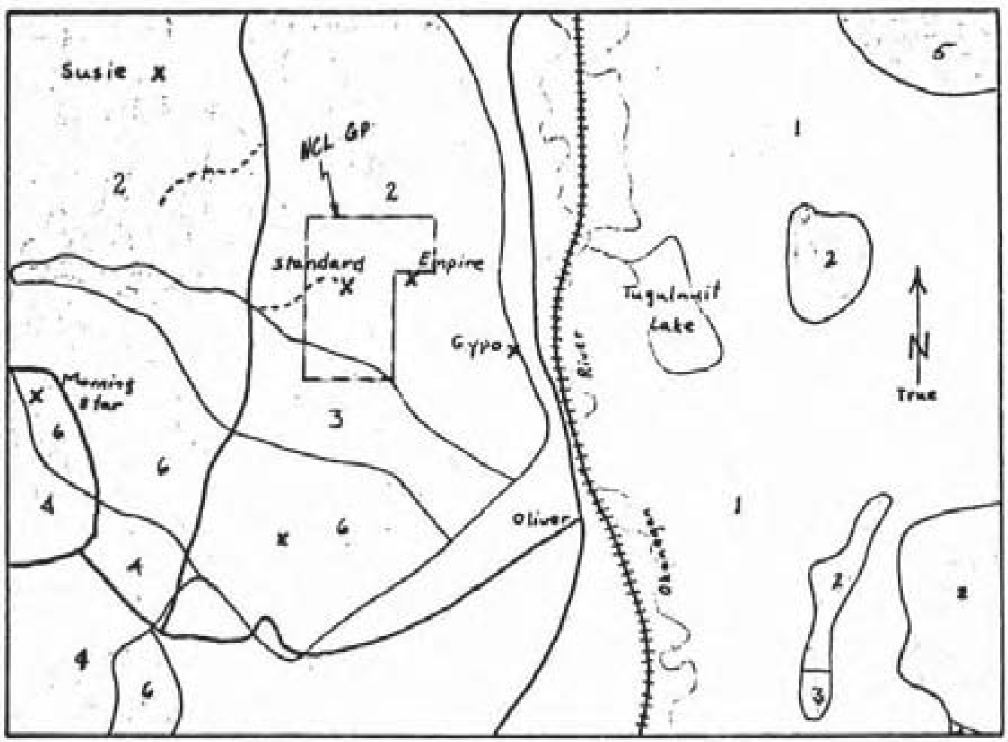
Oliver granite — 2

Oliver Syenite — 3

Fairview granodiorite — 4

Pegmatite, gnessic granite — 5

Quartzite, schist, greenstone — 6



Scale 1 inch = 1 mile

Figure 1

Regional Geology and Geography[1]

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[1]Bostock, H.S. Map 341A Keremeos, B.C., Canada, Department of Mines and Resources, Mapped 1929, 1930.

THE MINERALOGY AND PETROLOGY OF STANDARD MINE, OLIVER, B.C.

INTRODUCTION

It is the intention of the author to investigate, in this paper, the geology of the Standard Mine, Oliver, B.C. A possible chronological history of events leading to the formation of the Mine is proposed, with particular emphasis placed upon mineralogy and petrology.

The mine is located two miles north-west of Oliver, B.C. It can be reached by gravel road, travelled regularly by local residents. A second road leads from the main one, up around a hill to the north-east side where the portal is located.[2] Although this road is rough, it provides adequate access to the mine.

Historically, the mine is part of the Fairview Gold Camp. The first report is given in the 1897 Report of the Minister of Mines.[3] It states here that the mine was owned, at that time, by the Fairview Consolidated Gold Mines Company. A later report[4] states that the mine was owned by A.S. Hatfield and associates of Penticton. In the summer of 1962 the mine

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[2] See Figure 1.

[3] "Mining Operations for Gold, Coal, etc., in the Province of B.C." Annual Report of the Minister of Mines, 1897, Victoria, B.C., B.C. Queens Printer, 1898, p. 602.

[4] Annual Report of the Minister of Mines of the Province of British Columbia for 1933, Victoria, B.C. King's Printer 1934 (p.168)

was being developed by Mr. Smeddle of the Continental Consolidated Mines Limited. However, the mine operation was suspended in November of the same year.

GEOLOGY

GENERAL GEOLOGY[5]

The quartz vein in which the mine is founded strikes approximately N40°E and dips sixty-five degrees to the southeast. It occurs in the Oliver granite and is cut by both faults and dykes. This granite intrudes the metamorphosed, stratified rocks of the Kobau Group. The main mines of the Fairview Camp are located in this group and within about one mile of its contact with the Oliver granite. The granite at the contact is more basic than the main portion of the intrusion and in places grades into the Oliver syenite. The geology of the mine will be discussed in the following order: mineralogy of the vein minerals; petrology of the granite and dyke rocks; and then structural complications.

MINERALOGY

As previously mentioned, the valuable minerals occur in a quartz vein striking N40°E and dipping approximately

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[5] Bostock, H.S. Map 341A Keremeos, B.C., Canada, Department of Mines and Resources, Mapped 1929, 1930.

sixty-five degrees to the south-east[6]. The minerals occur as fracture fillings in the vein and therefore were probably deposited later than the quartz. The mineralization appears to be concentrated in "pockets" along the vein with no apparent structural control other than the vein itself.

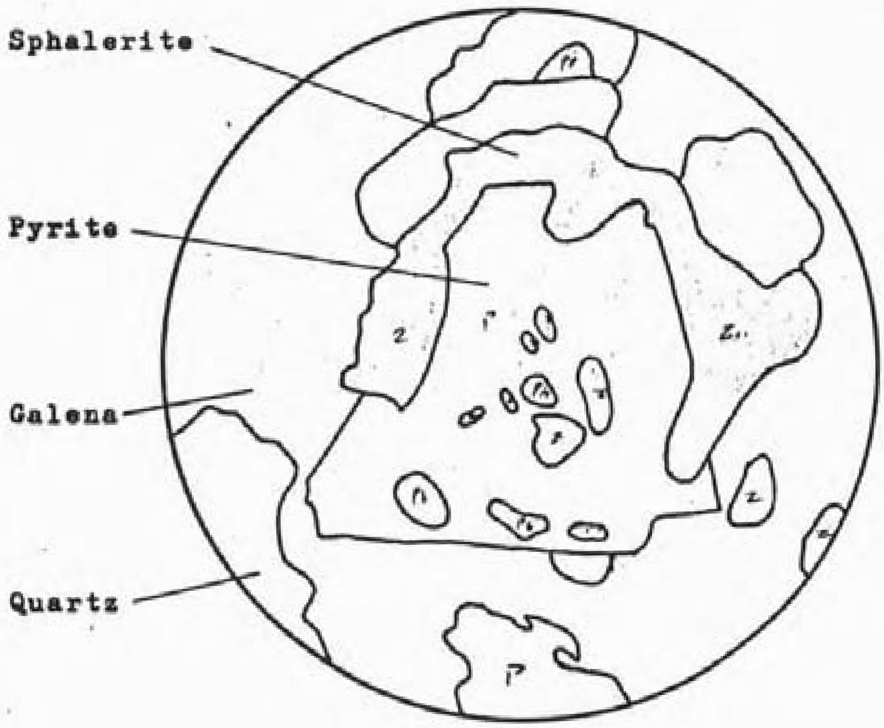

Figure 2

Partially Replaced Euhedral Pyrite

Scale 60 X

Megascopic

The quartz is translucent to milky white in colour and highly fractured. Where the vein outcrops, the quartz is generally highly rust-stained. Sphalerite, galena and pyrite

[6]See Appendix.

are the three most abundant sulphides. There is also some chalcopyrite. The sphalerite is dark in colour and probably has a high iron content. None of these sulphides are present in high enough concentration to be valuable as ore constituents. The two valuable minerals in the vein are gold and hessite. They are both closely associated with the galena and easily identified by their sectility.

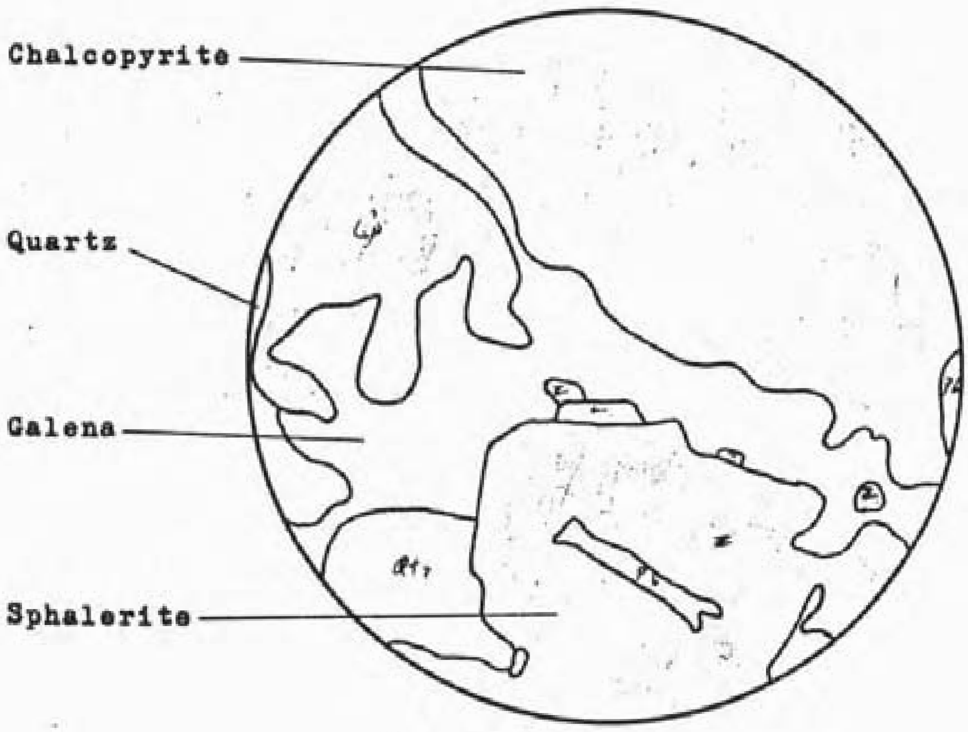

Figure 3

Sphalerite and Chalcopyrite Cut by Galena

Scale 230 X

Hessite has a lighter colour and its luster is less metallic than galena. Both gold and hessite are found in small fractures in the quartz.

Microscopic

The gold grains are too small for etch tests, but are easily identified by their sectility and colour. Hessite takes a fair polish and shows no pitting. It has a yellowish-pink tinge and shows anisotropism. The colours under crossed nicols are blue to reddish-tan to tan. No twinning was seen but the mineral has a spotted appearance. [7]Etch tests give the following results: HNO_3, effervesces almost immediately to give a brown to black stain; $FeCl_3$, fiery orange, red, blue, green and yellow; $HgCl_2$, strong reddish-brown stain; KCN, very weak reaction; KOH and HCl, negative. Microchemical tests on hessite gives slow positive tests for both silver and tellurium.

Vein Minerals: (in approximate order of amount)

Quartz	SiO_2	
Sphalerite	(Zn, Fe)S	
Galena	PbS	(No secondary minerals
Pyrite	FeS_2	were found.)
Chalcopyrite	$Cu\ Fe\ S_2$	
Hessite	Ag_2Te	
Gold	Au	

Significant Textures and Paragenesis

The mineralization in the vein occurs as fracture

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[7]Probably due to relic isometric structure. See Uytenbogaardt, W. Microscopic Identification of Ore Minerals. Princeton, New Jersey, Princeton University Press, 1951, p. 35.

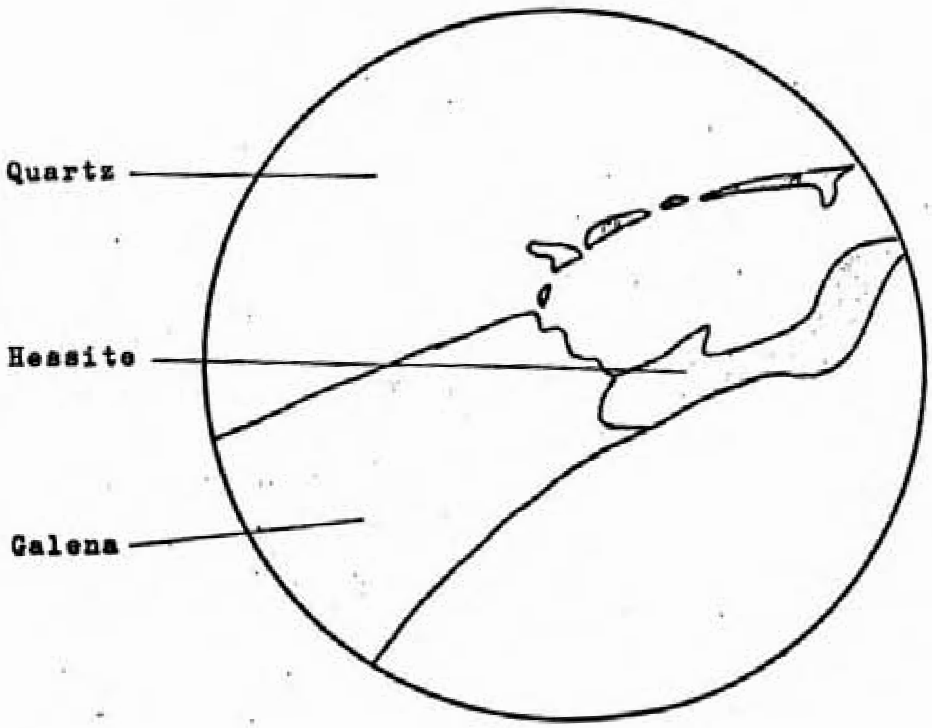

Figure 4

Galena and Hessite

Scale 60 X

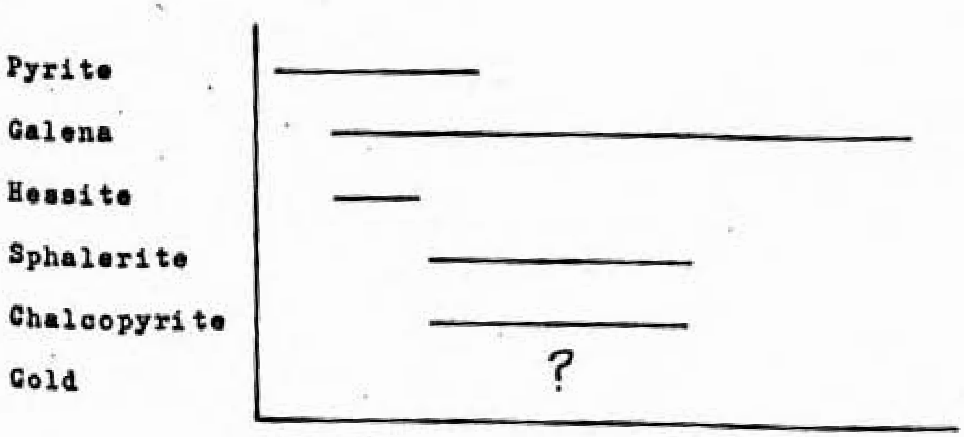

Figure 5

Paragenesis Chart

PETROLOGY

Granite

As noted already, the quartz vein cuts Oliver granite.[10] This rock is light-coloured and has an hypidiomorphic granular texture. In this section the following minerals were identified:

Microcline	- plaid twinning.
	- low negative relief.
Quartz	- highly fractured.
	- low positive relief.
	- biaxially positive.
Plagioclase	- very low negative relief.

The composition was found by measuring 'X' against 010 in sections perpendicular to 'a'. An_0 to An_5 - Albite.

Clinochlore	- medium positive relief.
	- pleochroic - pale to dark green.
	- length slow.
Muscovite	- low positive relief.
	- parallel extinction.
	- length slow.
	- tan-white colour.
	- one good cleavage.
	- medium birefringence.

---

[10]See Figure 1

Calcite	- variable relief.
	- high orders birefringence.
Garnet	- very high positive relief.
	- isotropic.
	- euhedral.
	- fractured.
Zircon	- very high positive relief.
	- parallel extinction.
	- length slow,
	- moderate birefringence.
Biotite	- moderate relief.
	- pleochroic.
	- tan to brown.
Opaques	- (probably magnetite)
	- bluish caste in reflected light.

Mode - 37% Microcline; 32% Quartz; 22% Albite; 3% Clinochlore; 3% Sericite; 1% Muscovite; ½% Garnet; ½% Calcite; and 1% Zircon, Opaques, and Biotite.

Origin - The main minerals - microcline, quartz and plagioclase - are anhedral and equigranular. They give no clue as to the order of crystallization. The other primary minerals - clinochlore, muscovite and garnet - are subhedral and likewise show no order of crystallization. The albite is partially altered to sericite. There are tiny veins and blebs of calcite throughout most of the rock. It was likely deposited from circulating groundwater. The magnetite is closely associated with clinochlore and is probably secondary.

In summary, microcline, quartz, plagioclase, clinochlore, muscovite and garnet are primary minerals and sericite, calcite, zircon, magnetite and biotite are secondary.

__Dykes__[11]

There are at least two different dykes closely related to the quartz vein. However, the two dyke intersections in the mine are petrologically the same. They are from either the same dyke or from closely related ones. These dykes cut and offset the quartz vein. On the surface another dyke is also seen. This one is cut by the quartz vein. The first dykes will be called "Type A" and the second "Type B".

Type A - Phenocrysts of dark pyroxene in the lighter - coloured rock give it the characteristic lamprophyric texture. However, in contrast to the usual lamprophyre, these dykes also contain large phenocrysts of plagioclase. The following is the microscopic identification and description of dyke constituents:

Orthoclase - low negative relief.
- the main alteration products are talc, sericite and possibly some clay minerals. These are extremely fine-grained.

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[11] See Appendix, Overlay #1

Plagioclase - large anhedral phenocrysts.

- typically lense-shaped.

A few have plaid twinning and closely resemble microcline except for low positive relief. These lenses in some cases appear to be zoned and also are enclosed by a lower relief feldspar.

Augite
- pale tan-green colour.
- non-pleochroic.
- typically euhedral eight - sided crystals with two fair cleavages at approximately ninety degrees.
- optically positive.
- 2 V of approximately sixty degrees obtained from optic axis figure.
- birefringence approximately 0.027.
- some twins were found.
- measuring '100 against z = 48°' giving positive identification as augite.

Opaques
- As mentioned previously, some opaques are found as alterations of the olivine. This is probably secondary magnetite. There are also a few subhedral to euhedral magnetite crystals which are probably primary.

Olivine
- clear grains of moderate positive relief.
- euhedral to subhedral.
- little or no cleavage.
- optically negative.

Olivine continued

- 2 V approximately eighty degrees, obtained from an optic axis figure (probably iron-rich). This is altered partially or wholly to iddingsite (brownish-red mineral) and opaques (probably secondary magnetite and limonite). Another alteration product is chlorite.

Apatite
- clear.
- euhedral to subhedral crystals.
- medium-high positive relief.
- parallel extinction.
- length fast.
- uniaxial negative.

Calcite
- appears as small anhedral blebs throughout the altered areas.

Biotite
- tiny anhedral grains in the altered areas of the plagioclase.

Chlorite
- a few small veins cutting all minerals.

Mode - K-feldspar 39%; Plagioclase 23%; Augite 11%; Opaques 5%; Olivine 4%; Apatite 2%; Chlorite ½%; Alteration of K-feldspar 15½%; (Biotite 3%; Calcite 2½%).

Name - Augite Lamprophyre - however, it could possibly be called spessartite due to the high percentage of plagioclase.

Origin - Both euhedral apatite and magnetite are found enclosed by augite and olivine. Augite, apatite, olivine and magnetite appear to show the following origin: the apatite and magnetite began to crystallize almost together. Then the augite, olivine and plagioclase began to crystallize and thus contain some apatite and magnetite. After these had finished crystallizing, the remaining magma crystallized to orthoclase plus some biotite.

The olivine and orthoclase then began to alter as follows: olivine to secondary magnetite, iddingsite and some chlorite; orthoclase to sericite, talc and probably some clay minerals. Along small fractures in the rock there was also alteration producing the veins of chlorite. The magnetite in some cases partially altered to limonite. Along with this alteration was a formation of calcite probably deposited from groundwater.

Zoning on the plagioclase phenocrysts is possibly due to some disturbance of the crystallization rate which soon reverted back to normal. As noted earlier, the phenocrysts appear to have a rim of lower relief plagioclase. This is due to a reaction with the melt which later crystallized to K-feldspar and biotite.

Type B - These dykes do not appear to have any effect on the geological picture. As seen from a surface cut, one dyke is offset by a quartz vein. The other outcrop, although not as thoroughly chloritized, is probably the same dyke. They have roughly the same mode as the other dykes. However, the augite is almost entirely altered to chlorite and much of the magnetite is altered to limonite. The feldspars are also more high altered.

STRUCTURAL GEOLOGY

The quartz vein is cut by a large number of faults, but the only major one is indicated at point 'A' of Appendix Overlay #1. East of this fault the vein varies in strike from 192° to 230° and in dip from 55° to 65° south-east. It also varies in thickness from almost nothing up to eight feet wide. The vein, especially where narrow, often cuts obliquely across the granite from fracture to fracture. However, the fractures in the granite appear to be the dominating control of the vein.

West of the fault at point 'A'[12], a vein is again encountered. However, the dip is changed considerably to 85° northwest. By putting Overlay #1 over the Plane Table Map it is possible to see that this quartz vein, found underground, cannot possibly be the same one as found at the surface unless there is considerable change in dip between the two or another major fault. It is quite possible that this change of dip does occur, as the rocks are cut here by at least two dykes.

Referring again to the main Appendix, one can see two main types of dykes. This was determined previously in petrological work. The older or more highly altered dyke is cut by the quartz vein. The fresher, augite lamprophyre dyke

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[12] Appendix Overlay #1

(referred to earlier as Type 'A'), cuts and offsets the quartz vein and also the 'old' dyke. The Magnetometer Map outlines the upper part of the augite lamprophyre dyke.[13] It seems to split into two dykes. This dyke dips approximately 45° to 55° to the north and has a variable strike from west to south-west. Following this dyke from east to west across the map sheet, we find:

a) Dyke strikes approximately west-south-west and dips to the north at about 50°. This portion cuts the vein at the first intersection in the mine.

b) Dyke splits.

c) Southern dyke strikes south-south-west and dips approximately 60° to the west. This one is the second intersection in the mine.

d) Northern portion strikes west-south-west; dip is not known. This portion is seen on the surface, cutting the quartz vein.

This later dyke does not appear to be offset by the major fault and thus likely intruded after the faulting took place.

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[13] See Appendix Overlay #2.

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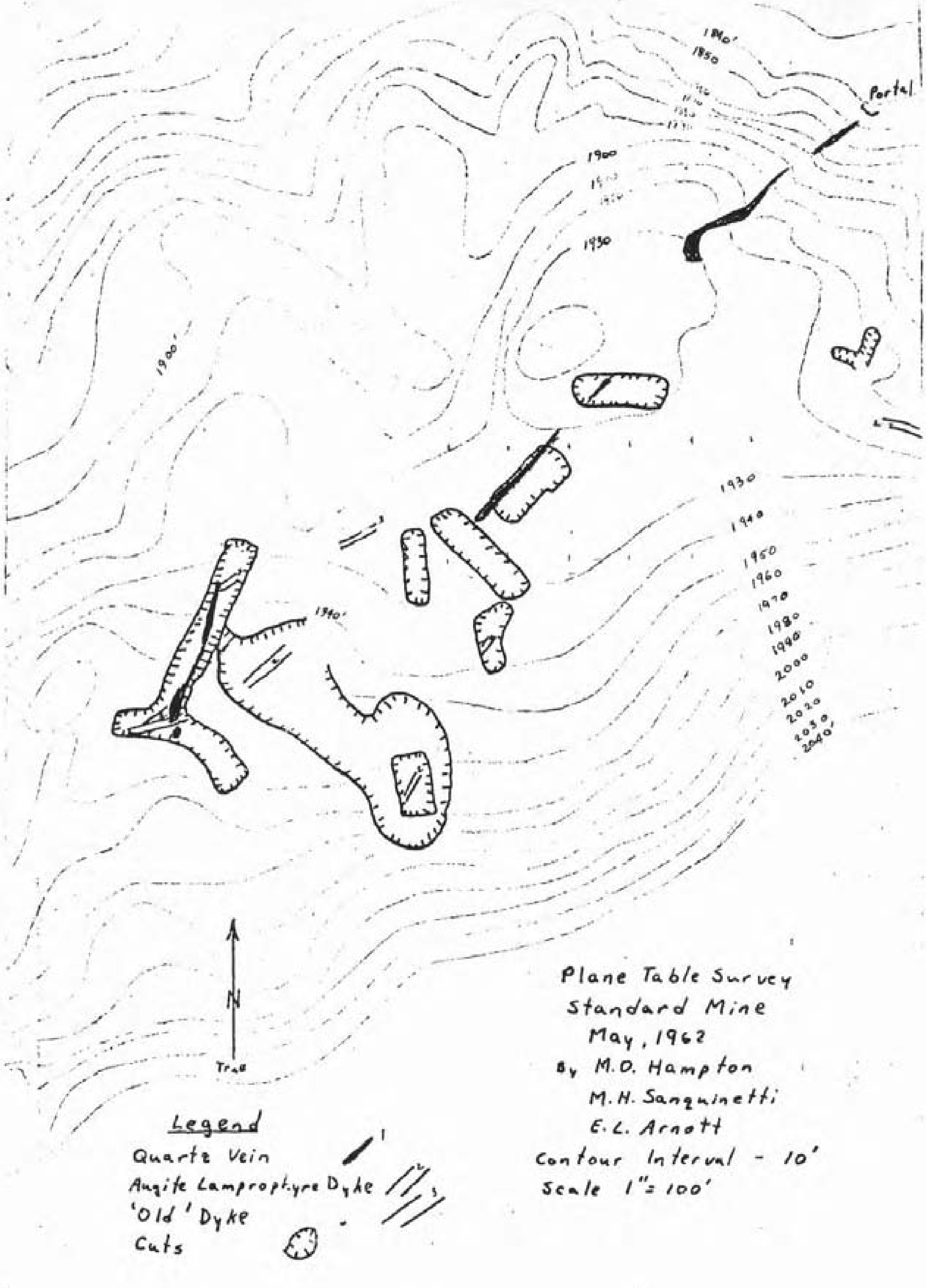
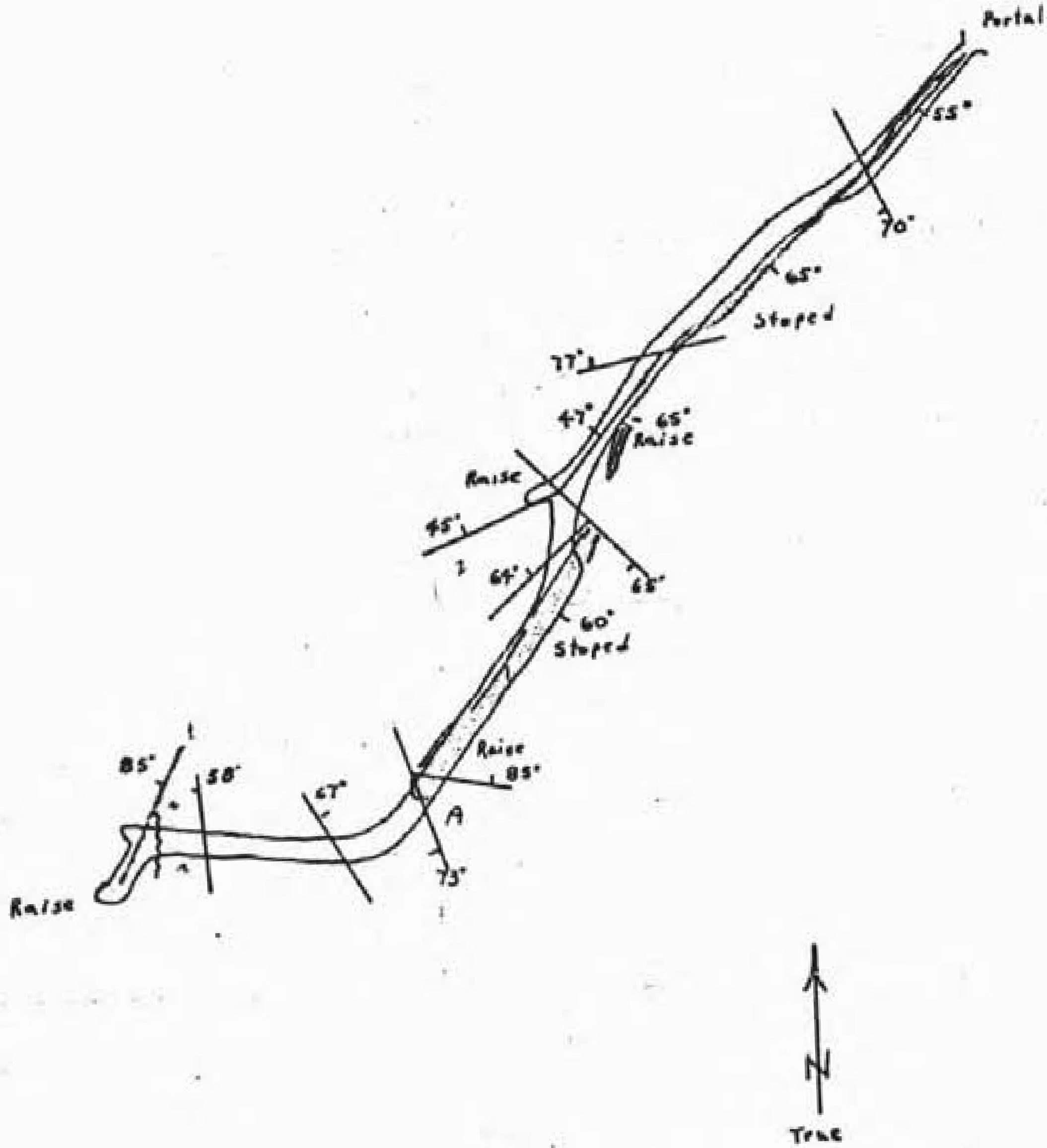
CONCLUSIONS

The following sequence of events is seen to have n place at the Standard Mine, Oliver, B.C.:-

1. Granite formed and then fractured;
2. Dyke intruded into granite (now highly altered);
3. Quartz vein formed in fractures in the granite;
4. Pyrite, galena, hessite, sphalerite, chalcopyrite and gold deposited in the quartz vein;
5. Whole system faulted;
6. Augite lamprophyre/dyke intruded into above system.



1840'
1850
Portal
1900
1930
1900'
1940'
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040'
N
True
Legend
Quartz Vein
Augite Lamprophyre Dyke
'Old' Dyke
Cuts
Plane Table Survey
Standard Mine
May, 1962
By M.O. Hampton
M.H. Sanguinetti
E.L. Arnott
Contour Interval - 10'
Scale 1" = 100'



Legend

Quartz Vein

Dykes

Granite

Faults

Standard Mine
Oliver, B.C.

Scale 1" = 100'

Mapped Oct. 20, 21/62

E.L. Arnott
M.H Sanguinetti