

DIAMOND DRILLING

and

GEOLOGIC REPORT

on the

OLALLA COPPER-MOLYBDENITE  
(GOLCANDA) PROPERTY

MAX 1-4, DAVE 1 & 2, HIL #1  
Owned by D. Lawlor

LOCATED IN THE OSOYOOS MINING DIVISION

N.T.S. 821/5W *821-E/5W*

LAT. 49°15' LONG. 119°51'

by

A.R. POLLMER

BRENDA MINES LTD.  
EXPLORATION GROUP

NOVEMBER 1978

7039

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## CHAPTER ONE

### 1-1 Location and Access (Figure 1)

The Max 1-4, Dave 1 & 2, and Hill #1 mineral claims are located just west of Olalla, a small settlement on Highway #3A, 6 km north of Keremeos, B.C. The property straddles Olalla Creek and Colcanda Creek which is a south tributary to Olalla Creek.

Access to the property is via a gravel road which climbs steeply out of the Keremeos Creek valley. The gravel road and Highway #3A junction is situated on the southern town limits of Olalla. The road provides access to the mill site and to all of the adit portals.

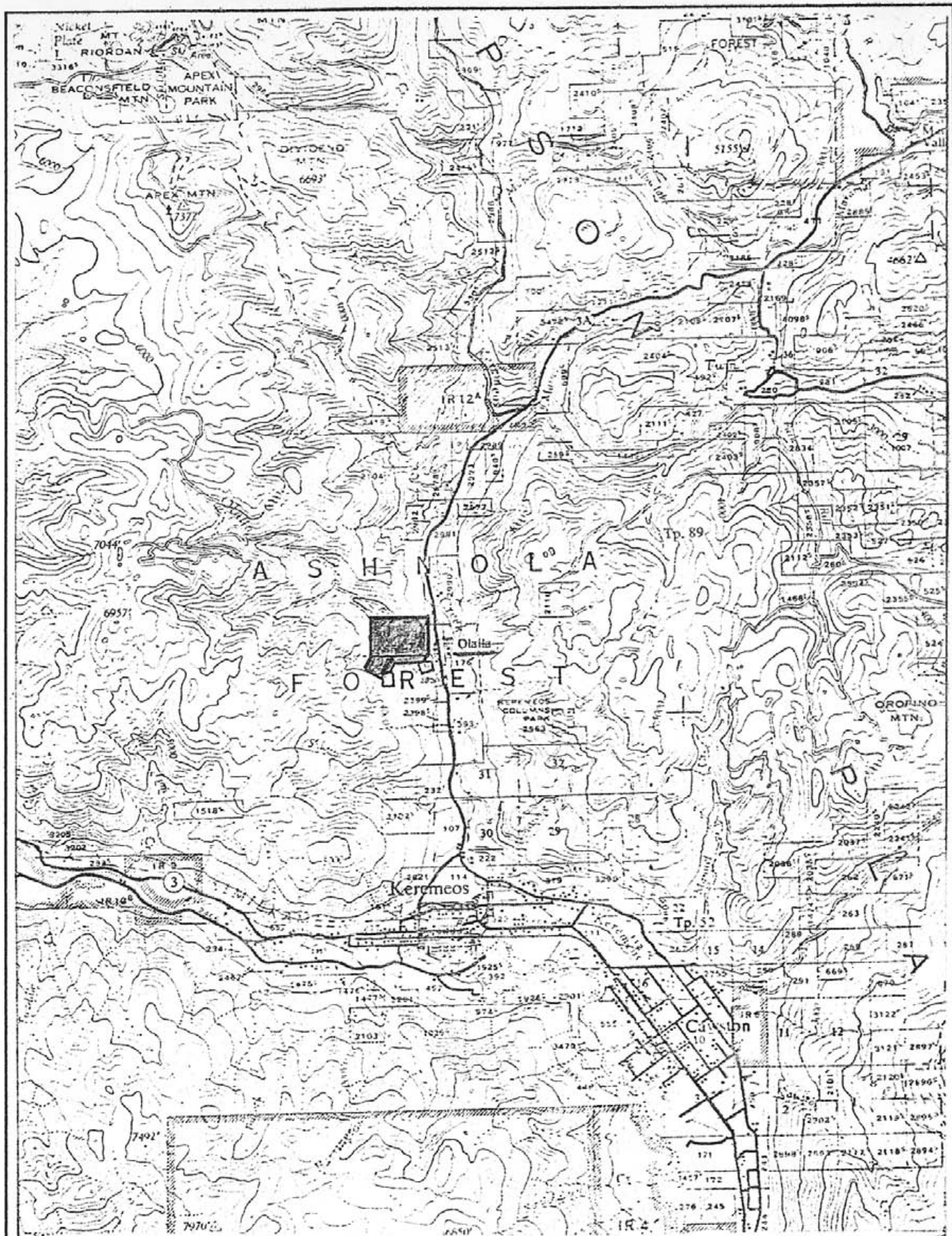
### 1-2 Property Definition

The main occurrence is a mineralized shear zone hosting chalcopyrite, molybdenite and minor silver, which was originally discovered in the late 1800's and named the Colcanda Property.

The first recorded mining on the property occurred in 1914.

Since that time several attempts have been made by small mining companies to extract and concentrate the copper-molybdenum profitably. The last mining was done by Adams Milling Limited who commenced operations in 1970 and suspended work in the spring of 1971.

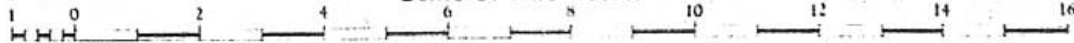
The property was staked by Dave Lawlor in 1974 when the old claims became open. In June 1978, Brenda Mines Ltd. optioned the mineral property from Mr. Lawlor with a view to reassessing it in relation to new molybdenum prices.



Scale 1:125,000 or 1 Inch to 2 Miles approximately



Scale of Kilometres



1-3 Claim Statistics

All of the claims described below lie within the Osoyoos Mining District.

Claim Name	Record No.	Group No.	Units	Record Date
Dave 1	31002 )	1322	Frac.	July 4, 1974
Dave 2	31218 )		Frac.	October 22, 1974
Max 1	31150 )	1352	1	September 12, 1974
Max 2	31151 )		1	September 12, 1974
Max 3	31152 )		1	September 12, 1974
Max 4	31153 )		1	September 12, 1974
Hil #1	325(11)		6	November 29, 1977

See Figure #2 for claim locations.

1-4 Summary of Work Done, 1978

Work was performed on the property from June 16 to November 20.

Crew members were:

Arnold Pollmer	- Supervising Geologist
Paul Bankes	- Assistant Geologist
Peter Stomph	- Junior Assistant
Don Anderson	- Surveyor
Tonto Drilling Company	- Diamond Drill Contractor.

1-4-1 Line Survey

The presence of magnetite in the area was found to affect compass readings so that an accurate control could not be established using the conventional compass grid line method. For this reason a survey using an AGA Laser Geodimeter, Model 710, and a standard stadia were used to establish control. All roads, adits and trenches were surveyed and plotted. In addition the survey was tied into the

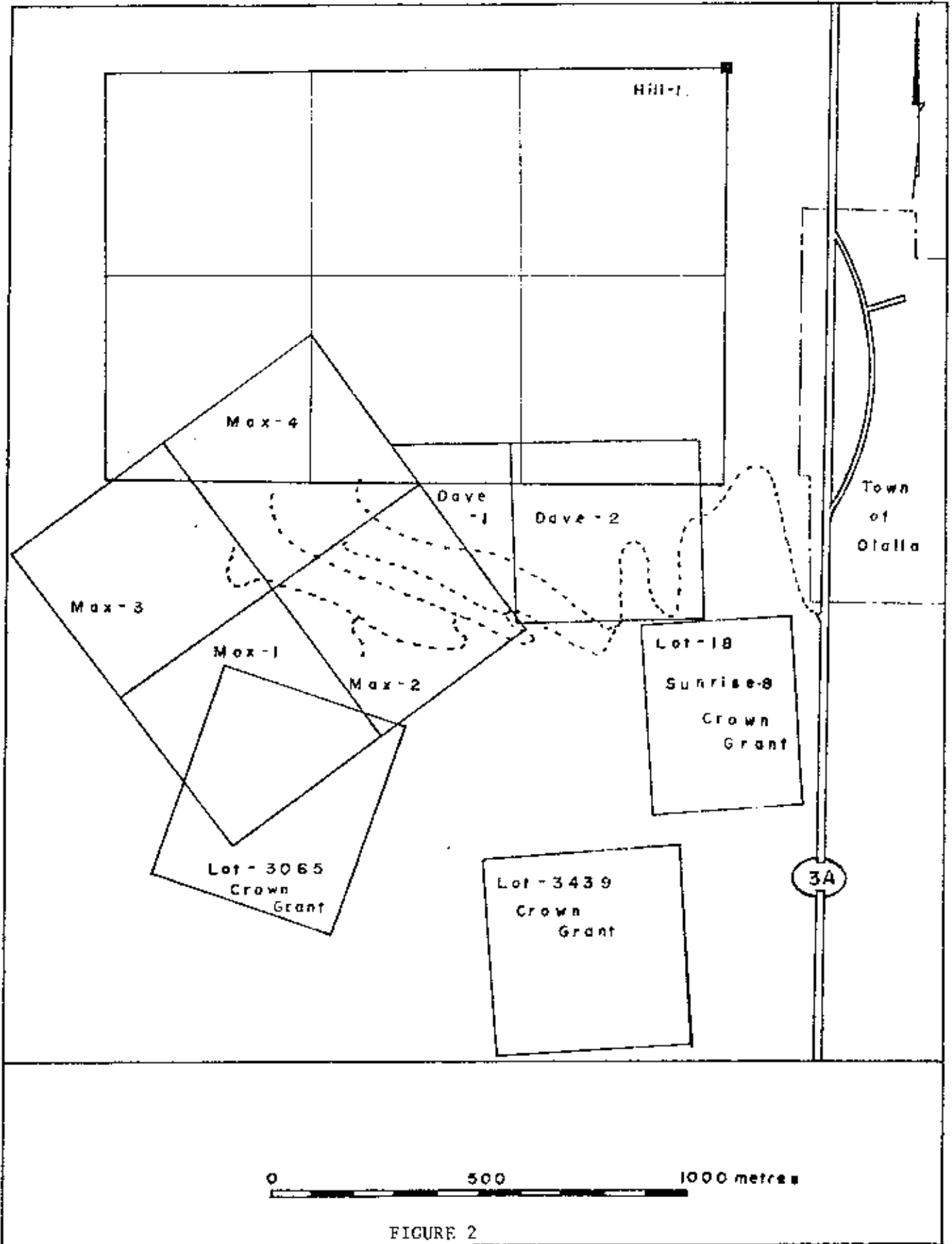


FIGURE 2

existing underground survey where possible. A previous survey done by McElhanney Associates of Vancouver, B.C. in 1972 was used to establish control points.

A surface baseline was surveyed and marked using pickets, bearing North 42 degrees West and running parallel to the direction of the shear zone.

#### 1-4-2 Geological Survey

All available outcrops were mapped on a scale of 1:2000 (1 cm to 20 m, 1 inch to 423 feet approximately). Underground adits were not included because workings were considered to be unsafe.

#### 1-4-3 Diamond Drilling

Four holes were placed to locate the shear zone along strike and down dip of the area previously mined. Tonto Drilling Limited was contracted to drill 3000 feet of NQ ( 1 7/8 inch diameter core). A total of 892.2 m (2927 feet) was drilled. Hole locations and bearings can be located on Figure # 3.

## CHAPTER TWO

### GEOLOGY

#### 2-1 Regional

The regional geology is described in side notes in Geological Survey of Canada Map 15-1961, Kettle River (West Half) map sheet (Little H.N., 1959). It is suggested that the rocks in the Olalla area are predominately pyroxenite which intruded sediments of the Koban Group, Shoemaker Formation (Triassic). The pyroxenite appears as a stock and has been intruded by an alkaline syenite near the southern contact and diorite intrusive situated on the western contact of the pyroxenite and the Shoemaker formation.

#### 2-2 Property Geology (Figure 4)

##### 2-2-1 Introduction

Because little geological work had been done by the previous operations, mapping of the general region and outcrops on the property was required in order to gain a better understanding of structures and sequence which may have created the shear and a source to which the mineralization could be associated. The molybdenite mineralization in an ultra-basic country rock is an unusual geologic association which cannot be compared to the more common molybdenite deposit environments.

##### 2-2-2 Shoemaker Formation

This formation consists mainly of cherts, volcanics and greenstone in the area surrounding the pyroxenite stock. Along the contact these rocks have been highly fractured and mineralized by pyrite. This creates a distinctive gossan zone marking the contact.



2-2-3 Pyroxenite

This basic to ultra basic rock unit appears as a round stock approximately 3.2 km across in an east-west direction and 2.4 km in a north-south direction. The chief rock type on the property is a coarse-grained, dark green pyroxenite which appears to be composed solely of pyroxene and biotite. The biotite occurs as disseminated flakes or in books with crystals up to 15 mm in size. Xenoliths of calcite, calcite-epidote, garnet clusters and magnetite are common. The weathered exposures often appear white due to what is believed to be calcite staining. Chloritic slips and gouge zones are numerous, especially in areas adjacent to the shear zone.

2-2-4 Syenite

The largest exposure is along a road cut on Highway #3A just south of Olalla. This alkaline rock unit is coarse grained and quite massive. There are a number of dykes cutting the pyroxenite on the property which appear to be related to the syenite. These dykes range in size from 3 to 30 cm.

2-2-5 Diorite

Outcropping along the western side of Colcanda Creek is a diorite intrusive which occurs very close to the mineralized shear zone. The diorite is equigranular, has no apparent alteration, and is quite massive. The diorite contact appears to be directly in the creek valley so no visual observation of the contact could be made. No evidence of diorite dykes was found in the surrounding rock units.

2-2-6 Structure

The overall geology, seemingly simple, shows a pyroxenite stock intruded by at least two different rock types. The mineral assemblage hosted by the shear zone, so far goes unexplained, but the chalcopyrite-molybdenite and pyrite do not appear to be related to the two known intrusives.

Located in two different areas close to the shear zone are light-coloured, generally very fine grained, granitic dykes, which may have a more direct association with the deposit genesis.

CHAPTER THREE  
MINERALIZATION

The chalcopyrite-molybdenite mineralization occurs only in the shear zone located on Max 1, 2, 4 mineral claims and is not exposed on surface. Other quartz veins hosting copper, galena and pyrite assemblages occur in the pyroxenite stock near and on the property and these were looked at.

3-1 Surface Mineralization

The mineralization visible on surface occurs in quartz veins that have been extensively trenched or exposed by small adits. Malachite staining is predominant with only minor chalcopyrite and galena visible in the quartz.

The only molybdenite exposed on surface is on dumps near the mine workings. Abundant chalcopyrite and molybdenite were visible on the dumps near Level #2 and Level #5.

3-2 Underground Mineralization

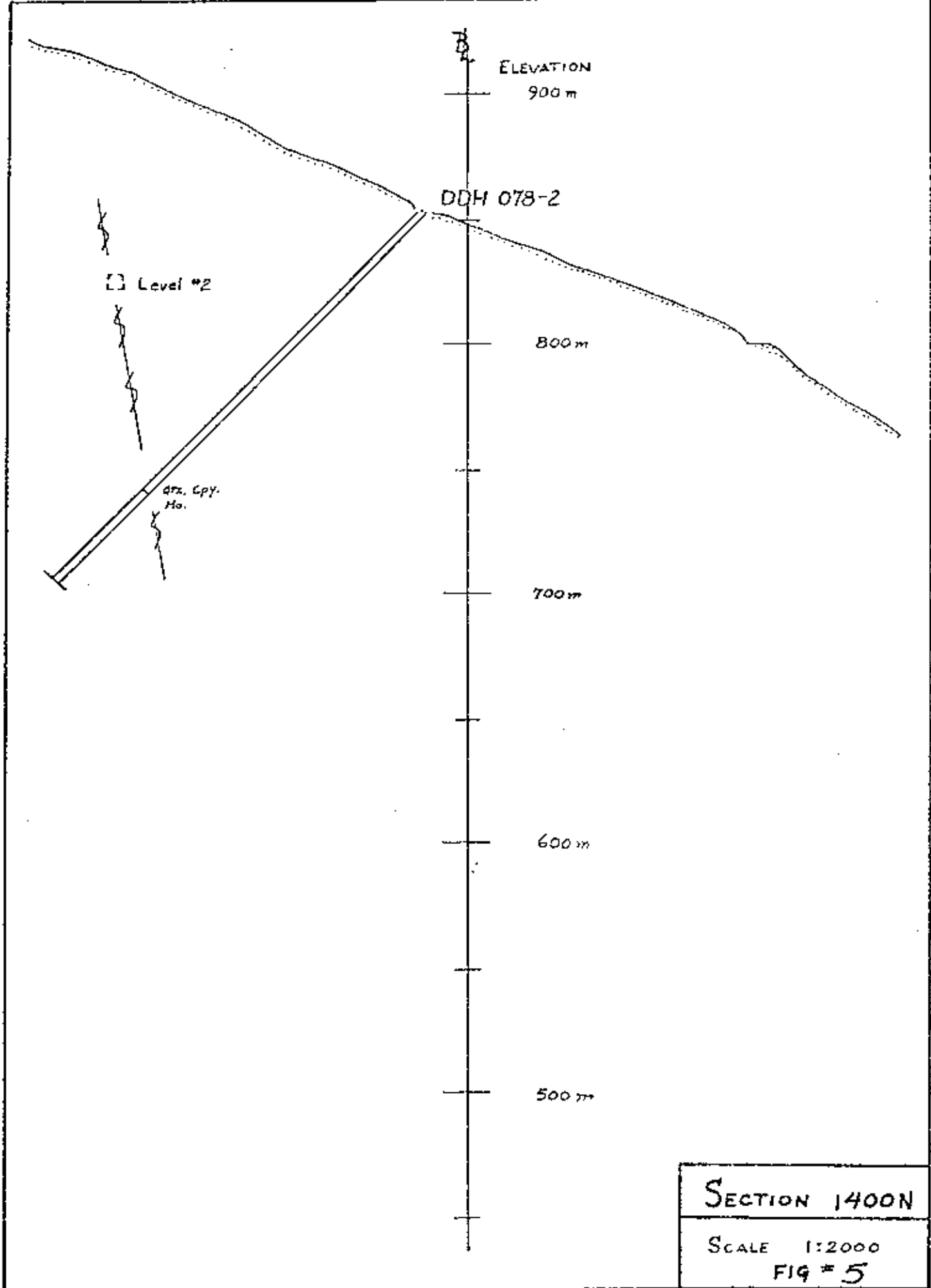
Level #1 adit was accessible for a short distance and at the intersection of the shear zone the following minerals were identified in order of abundance: chalcopyrite, molybdenite, malachite, and pyrite. The shear zone was 20 - 35 cm in width and consisted of broken quartz fragments in a chlorite gouge matrix. The molybdenite occurred as a coating along small shears, showing post ore movement. Based on channel sampling of the shear zone done on two levels during a time when the mine was in operation, the following averaged grades and widths have been calculated.

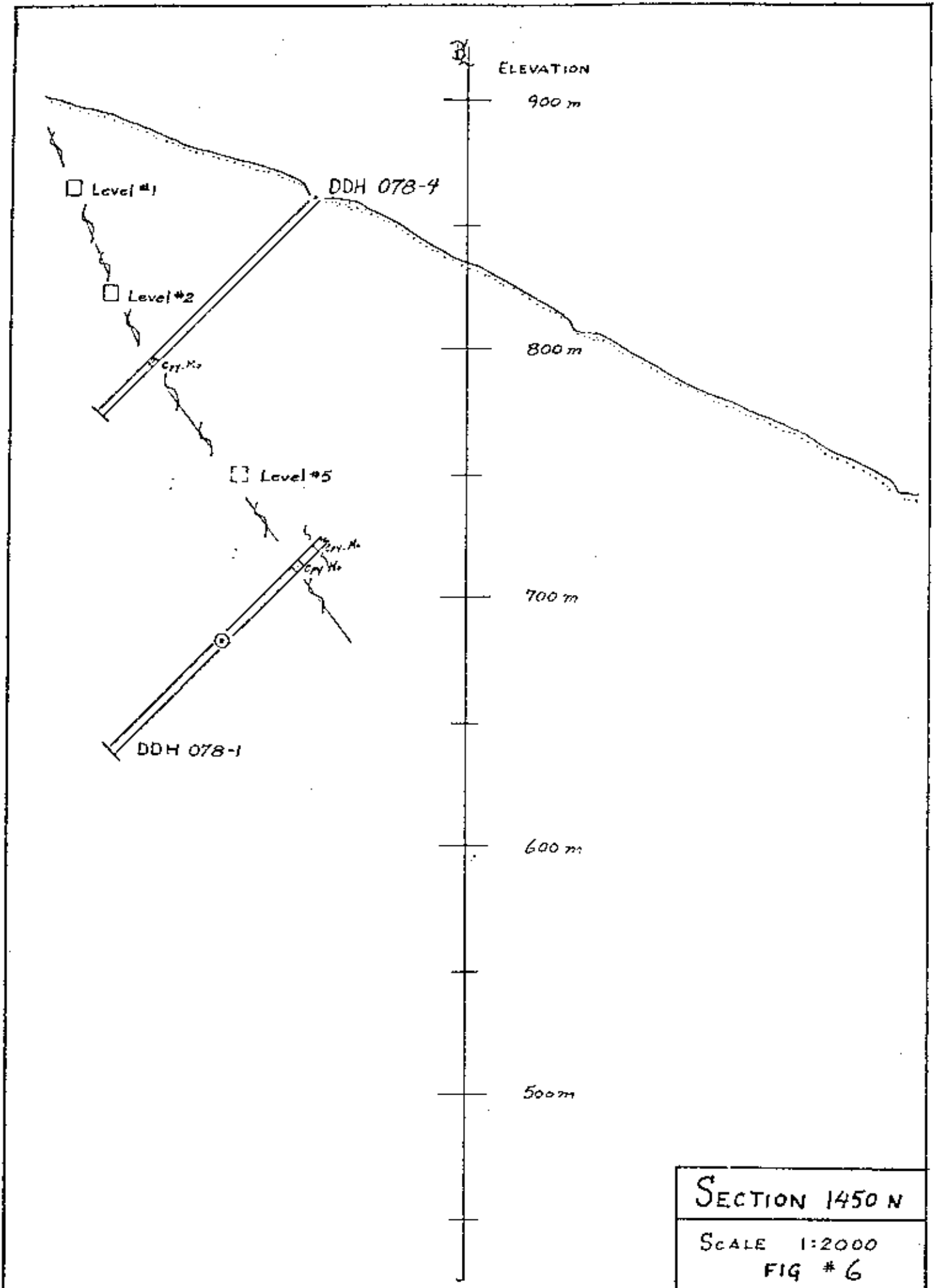
	Cu %	Mo %	Average Width
Level #1	0.84	0.35	15.8 inches
Level #2	<u>1.83</u>	<u>0.63</u>	<u>27.9 inches</u>
	1.51	0.53	21.85 inches

3-3 Diamond Drill Core (Figures 5, 6, 7, 8)

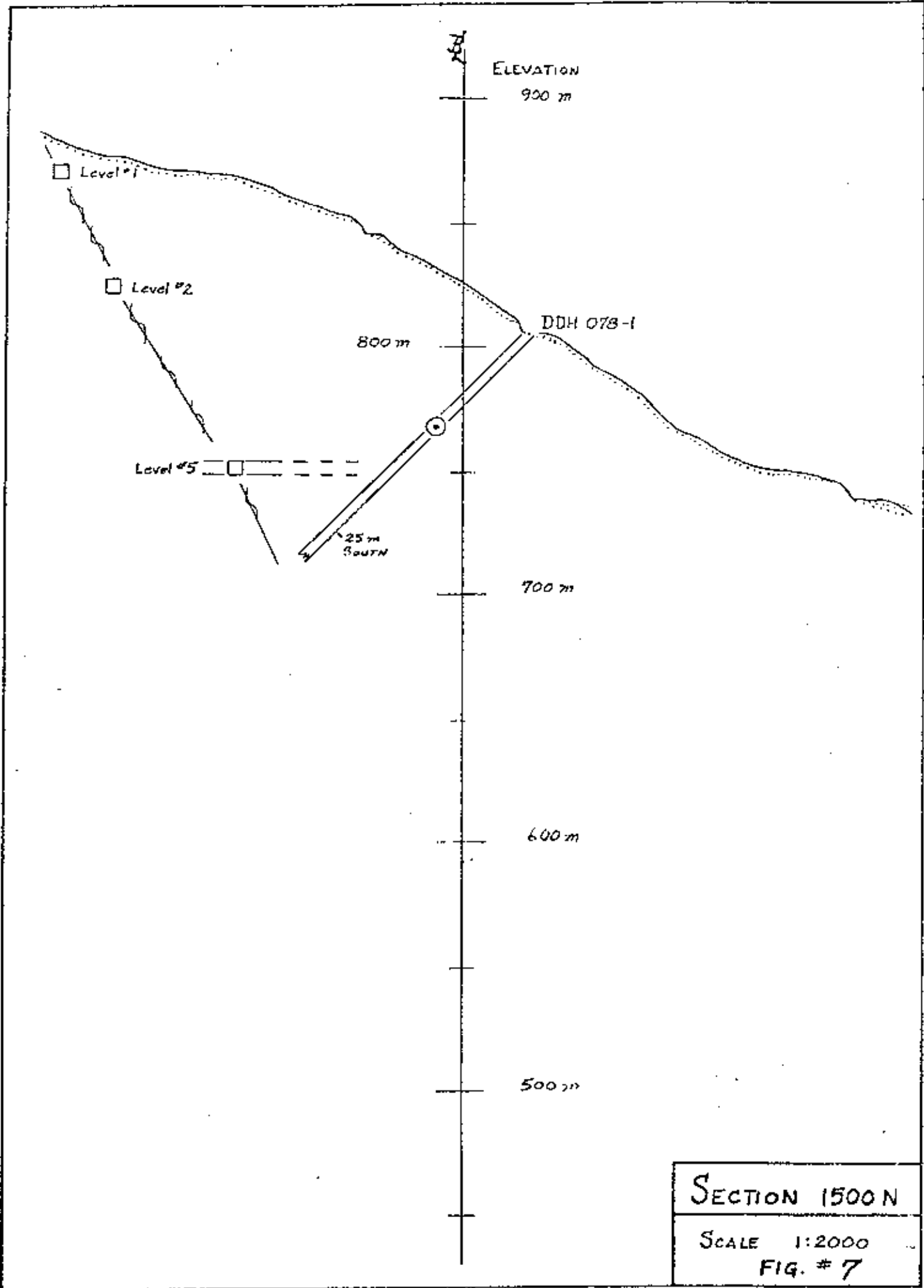
Diamond drilling was done to establish whether the shear zone continued down strike to the southwest and down dip to a greater depth. In all four drill holes the shear zone was intersected but the mineral grades were low. The shear appears to pinch out to the southwest but does continue down dip for a vertical distance of 180 m (600') below the lowest mined area. A major difficulty was the inability to position surface drill sites due to the steep terrain and limited access.

The holes were logged but no assays have been done. Based on visual estimates only sub-economic copper-molybdenite values were observed. The mineralization was hosted in chloritic gouge zones with the exception to the most easternly hole (DDH 078-2) which was a quartz vein bearing only minor chalcopyrite and molybdenite. The best mineral intersection was in DDH 078-4 which was located close to the known workings.

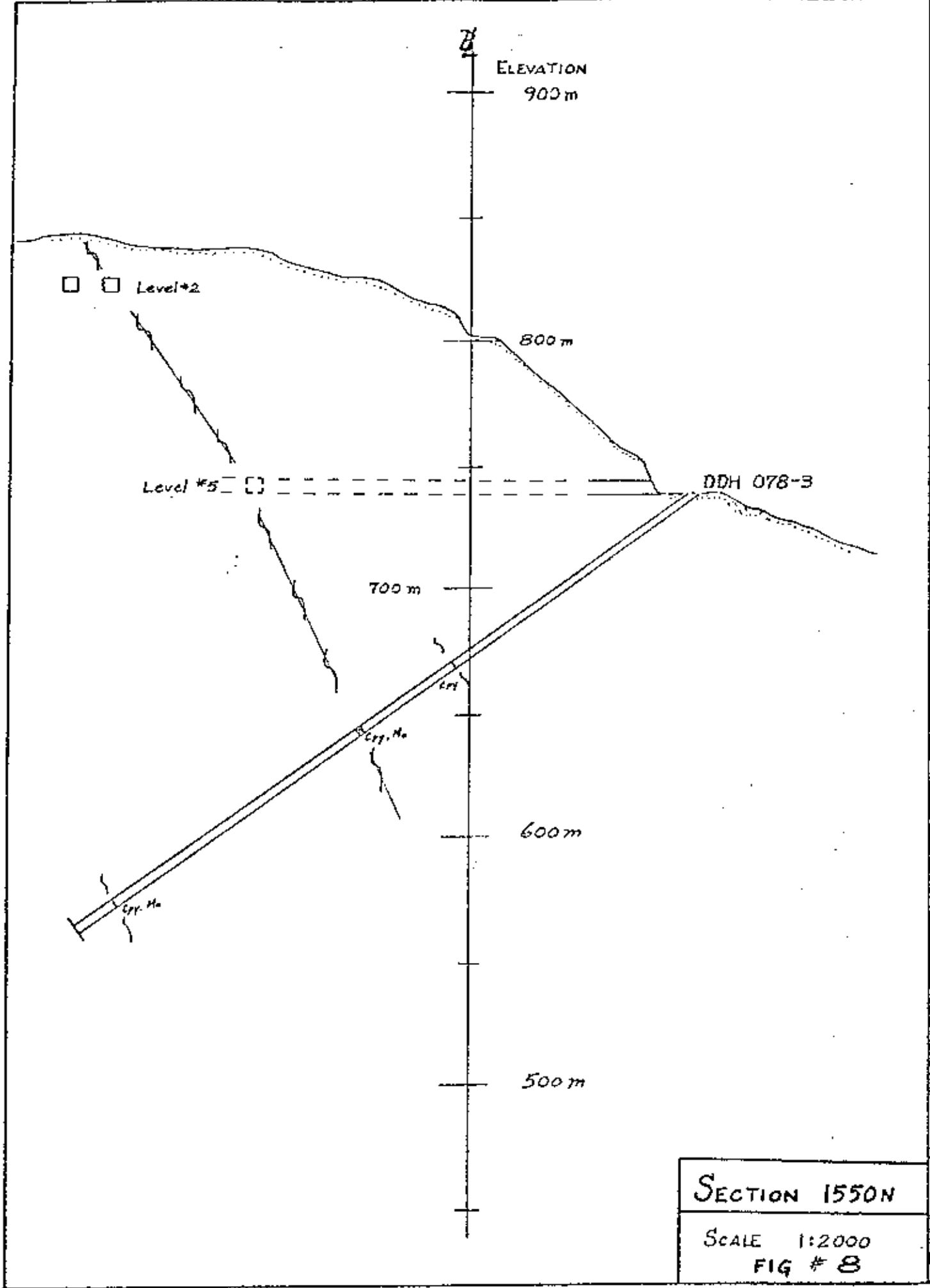




SECTION 1450 N  
SCALE 1:2000  
FIG # 6



SECTION 1500 N
SCALE 1:2000
FIG. # 7



SECTION 1550N  
SCALE 1:2000  
FIG # 8



## CHAPTER FOUR

### 4-1 Conclusion

The copper-molybdenite occurrence at Olalla appears to be confined to one shear zone which hosts sub-economic to possibly economic mineral values. The diamond drilling showed that the shear zone continues with depth but these intersections were only sparsely mineralized. It appears that mineral concentrations are not consistent throughout the shear and better values are obtained in areas where the shear zone is quartz rich.

### 4-2 Recommendations

The drilling done during 1978 was designed as a preliminary evaluation to gain a better understanding of the shear zone. In order to evaluate the mineral grade much closer drill hole spacing would be required and this would be better accomplished by an underground drill program.

Should a further program be warranted, it is recommended that the lowest adit (Level #5) could be rehabilitated, and drill sites slashed out from which underground drilling could be done.

APPENDIX I STATEMENT OF QUALIFICATION

CERTIFICATE

I, Paul Bankes, of the town of Peachland, Province of British Columbia,  
do hereby certify that:

1. I am a geologist residing in Peachland with Post Office Box 9.
2. I am a graduate of the University of Western Ontario, with a BSc  
in geology (1978).
3. I have worked within the profession for four field seasons.

Paul C. Bankes  
P. C. Bankes, BSc

Dec 16, 1978  
Date

STATEMENT OF QUALIFICATIONS

I, Arnold R. Pollmer of Peachland, Province of British Columbia, do certify that:

- 1) I have been employed as a geologist by Noranda Mines Limited from December 1973 to June 1977, I have been employed as the senior exploration geologist by Brenda Mines Ltd. since June 1977.
- 2) I am a graduate of the University of Wisconsin with a Bachelor of Science Degree in Geology (1972).
- 3) I am a member of the Canadian Institute of Mining and Metallurgy.
- 4) I am a fellow of the Geological Association of Canada.



---

Arnold R. Pollmer  
Senior Exploration Geologist  
Brenda Mines Ltd.

APPENDIX II DRILL LOGS









D.D.N. 6 078-2

Bearing \_\_\_\_\_  
 Dipping \_\_\_\_\_  
 Elev. \_\_\_\_\_  
 Angle - 45°  
 Bearing 228°  
 Depth 210 mm (689')

Dip Tests 106 m @ 44°  
 210 m @ 46°  
 \_\_\_\_\_  
 \_\_\_\_\_

Started Nov. 6, 1978  
 Completed Nov. 6, 1978

Logged By: A. R. Pollmer

Meters Drill Size: NQ

FROM/TO	DESCRIPTION	FROM/TO	% Cu	% Mo	Comb.
0.00 - 3.05	Overburden				
3.05	Pyroxenite				
3.05 - 210.00	Pyroxenite consisting of mainly pyroxene and biotite with minor augite, calcite.				
	Texture: medium to coarse grain, in places porphyritic with biotite phenocryst set in a pyroxene matrix.				
	Colour: light to dark green.				
	Biotite: occur throughout as disseminated flakes or in pegmatite books.				
	Calcite: occurs in small veinlets or in xenoliths with epidote and or magnetite.				
	Magnetite: occurs in veinlets up to .5 cm or as blebs.				
	Chlorite: occurs on numerous small slips often with minor serpentine or in gouge zones with pyrite cubes.				
3.05 - 10.05	Pyroxenite				
10.05	82 mm granite dyke				
10.05 - 20.11	Pyroxenite				
20.11	25 mm syenite dyke				
20.11 - 46.63	pyroxenite				
46.63	50 mm syenite dyke				
46.63 - 93.57	Pyroxenite				

BRENDA MINES LTD.  
D.D.H. # 078-2

Bearing \_\_\_\_\_  
 Easting \_\_\_\_\_  
 Elev. \_\_\_\_\_  
 Angle \_\_\_\_\_  
 Bearing \_\_\_\_\_  
 Depth \_\_\_\_\_  
 Meters \_\_\_\_\_

Dip Tests \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Started \_\_\_\_\_  
 Completed \_\_\_\_\_  
 Logged By: \_\_\_\_\_

FROM/TO	DESCRIPTION	FROM/TO	% Cu	% Mo	Comb.
1.57	200 mm calcite, garnet and magnetite xenolith				
93.57 -	Pyroxenite				
108.81					
108.81 -	Andesite - andesite porphyry dyke 62° to core				
114.30					
114.30 -	Pyroxenite				
129.85					
129.85	150 mm calcite, garnet and magnetite xenolith				
130.00 -	Pyroxenite				
140.51					
140.51	130 mm calcite, garnet magnetite xenolith				
140.64 -	Pyroxenite				
154.53	50 mm syenite dyke				
154.53 -	Pyroxenite				
156.97					
156.97 -	180 mm quartz vein with Mo smear on contact, minor				
157.15	disseminated chalcopyrite, vein 42° to core				
157.15 -	Pyroxenite				
189.89					
189.89 -	78 mm granite porphyry dyke				
189.97	Biotite, hornblende phenocryst quartz-feldspar matrix				
189.97 -	Pyroxenite				
200.86					
200.86 -	70 mm calcite, garnet and epidote xenolith				
200.93 -	Pyroxenite				
210.00	E.O.H.				

BRENDA MINES LTD.  
D.D.M. 7 078-3

Nothing \_\_\_\_\_  
 Easting \_\_\_\_\_  
 Elev. \_\_\_\_\_  
 Angle - 35° \_\_\_\_\_  
 Bearing 225° \_\_\_\_\_  
 Depth 306 m (1005') \_\_\_\_\_  
 Meters Core Size: NQ

Dip Tests 152 m 36° \_\_\_\_\_  
 306 m 45° \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Started Nov 10, 1978  
 Completed Nov 16, 1978  
 Logged By: A.R. Pollmer

FROM/TO	DESCRIPTION	FROM/TO	% Cu	% Mo	Comb.
0.00 - 3.35	Overburden				
3.35 -					
306.00	Pyroxenite consisting of mainly pyroxene and biotite with minor augite, calcite.				
	Texture: medium to coarse grain, in places porphyritic with biotite phenocryst set in a pyroxene matrix.				
	Colour: light to dark green				
	Biotite: occur through as disseminated flakes or in pegmatite books.				
	Calcite: occurs in small veinlets or in xenoliths with epidote and or magnetite				
	Magnetite: occurs in veinlets up to .5 cm or as blebs.				
	Chlorite: occurs on numerous small slips often with minor serpentine or in gouge zones with pyrite cubes.				
35 -	Pyroxenite				
14.00					
.00	50 mm quartz vein, minor pyrite and biotite				
14.05 -	Pyroxenite				
25.29					
.29	38 mm Andesite dyke at 45° coarse grain.				
25.33 -	Pyroxenite				
42.67					
2.78	78 mm garnet and pyrite vein				
.85 -	80 mm basalt dyke				
51.81					

D.D.H. # 078-3
 Nothing \_\_\_\_\_  
 Easting \_\_\_\_\_  
 Elev. \_\_\_\_\_  
 Angle \_\_\_\_\_  
 Bearing \_\_\_\_\_  
 Depth \_\_\_\_\_

 Dip Tests \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

 Started \_\_\_\_\_  
 Completed \_\_\_\_\_  
 Logged By: \_\_\_\_\_

Meters Core Size: NQ

FROM/TO	DESCRIPTION	FROM/TO	% Cu	% Mo	Comb.
5.89 -	Pyroxenite				
76.81	78 mm garnet xenolith				
7.89 -	Pyroxenite				
77.72					
77.72	38 mm andesite dyke				
77.76 -	Pyroxenite				
84.43					
8.43	52 mm andesite dyke at 80°				
84.43 -	Pyroxenite				
113.48					
119.48	100 mm serpentine, asbestos, pyrite and calcite vein, minor cpy and Mo.				
120.70	300 mm biotite, chlorite gouge zone				
130.70 -	Pyroxenite				
163.68					
13.68 -	78 mm chlorite gouge with pyrite, molybdenite and chalcopyrite				
164.90					
164.90 -	Pyroxenite				
200.66					
205.66	38 mm granitic dyke at 60°				
206.70	Pyroxenite				
207.27	38 mm granitic dyke at 60°				
207.31 -					
214.58	Pyroxenite				
214.58	26 mm granite dyke at 30°				
215.50	28 mm granite dyke at 30°				
217.32	28 mm granite dyke at 30°				
219.46	130 mm granite dyke at 20°				



D.D.H. # 078-4

Bearing \_\_\_\_\_  
 Easting \_\_\_\_\_  
 Elev. \_\_\_\_\_  
 Angle - 45°  
 Bearing 228°  
 Depth 154 m (505')

Dip Tests \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Started Nov 16, 1978  
 Completed Nov 21, 1978  
 Logged By: A. R. Pollmer

FROM/TO	DESCRIPTION	FROM/TO	% Cu	% Mo	Comb.
.00 - 3.35	Overburden				
.35 - 154	Pyroxenite consisting of mainly pyroxene and biotite with minor augite, calcite.				
	Texture: medium to coarse grain, in places porphyritic with biotite phenocryst set in a pyroxene matrix.				
	Colour: light to dark green.				
	Biotite: occur throughout as disseminated flakes or in pegmatite books.				
	Calcite: occurs in small veinlets or in xenoliths with epidote and or magnetite.				
	Magnetite: occurs in veinlets up to .5 cm or as blebs.				
	Chlorite: occurs on numerous small slips often with minor serpentine or in gouge zones with pyrite cubes.				
.35 - 56.69	Pyroxenite				
56.69	7 mm magnetite vein				
56.70 - 68.28	pyroxenite				
8.28	Chalcopyrite on small fracture				
68.28 - 80.47	Pyrox				
80.47	Chalcopyrite and pyrite on fracture				
80.47 - 90.83	Pyroxenite				



APPENDIX III STATEMENT OF COSTS



BRENDA MINES LTD.

EXPLORATION GROUP

STATEMENT OF COST

Project Olalla

a) Wages

No. of days	16	8	
Rate per Day	80.80	63.84	
Dates: from	Nov 1 - 16	Nov 16 - 22	
Total Wages	\$1,292.80	\$510.72	
			<hr/>
			\$ 1,803.52

b) Preparation of Report

Author	3 days @ \$80.80 =	\$ 242.40	
Drafting	2 days @ \$80.80 =	161.60	
Typing	1 day @ \$70.00 =	70.00	
			<hr/>
			\$ 474.00

c) Other

Drill mobilization/demobilization	665.00/632.50	\$ 1,297.50
Drill supplies	1,732.19	1,732.19
Drill dozer rental	1,470.00	1,470.00
Drill hourly charges	1,757.74	<u>1,757.74</u>
		\$ 6,257.43

d) Unit Cost for Diamond Drilling

0 - 244 m @ 41.01/m		
244 - 365 m @ 44.29/m		
Unit costs 852 m @ 41.01 =	28,624.98	\$34,925.00
66 m @ 45.00 =	2,923.14	<u>2,970.00</u>
		\$37,895.00

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Total Cost \$46,429.95



HIGHWAY 3A

MINERAL RESOURCES BRANCH  
ASSESSMENT DIVISION  
**1039**

Brenda Mines Ltd

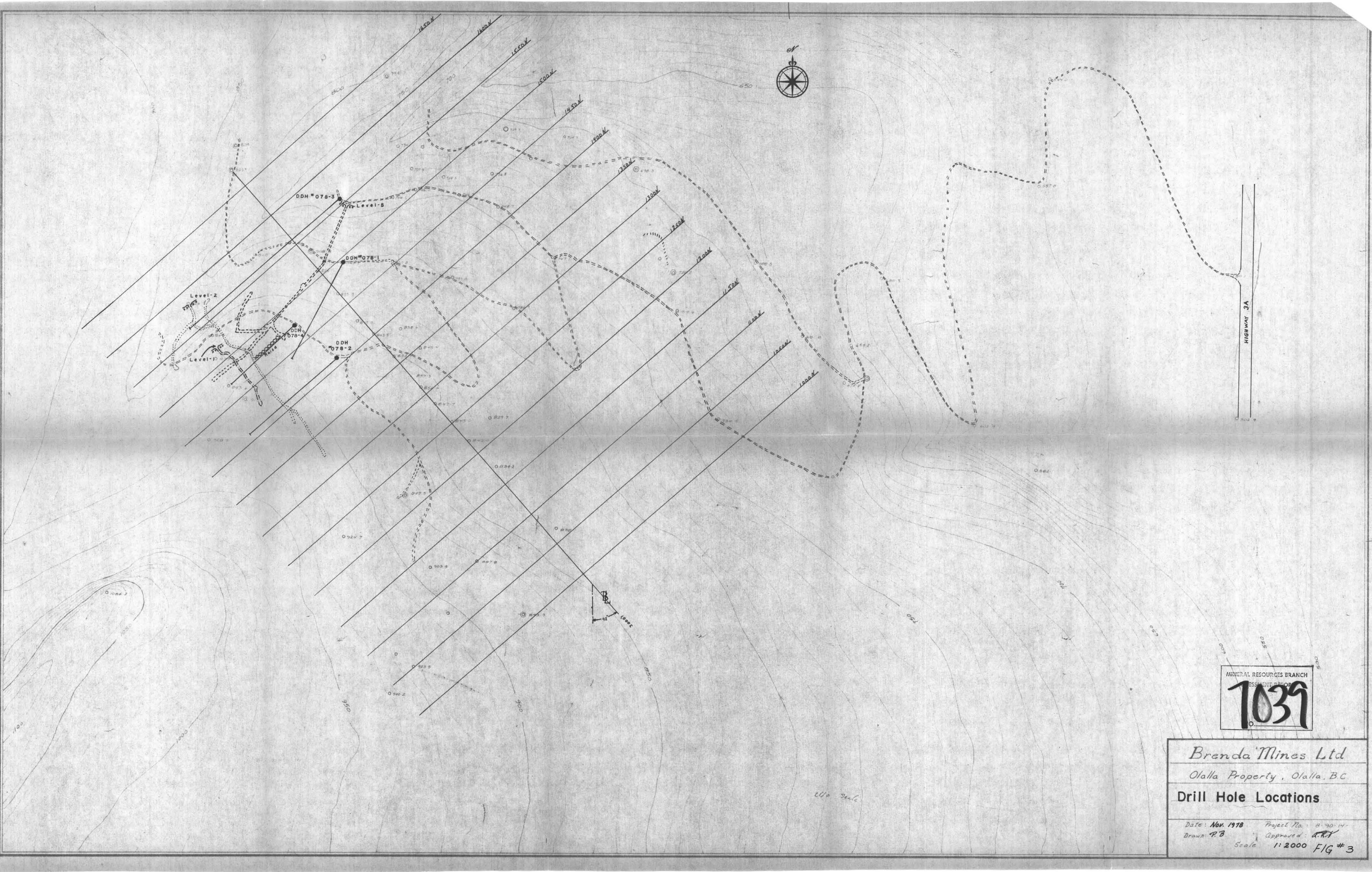
Olalla Property, Olalla, B.C.

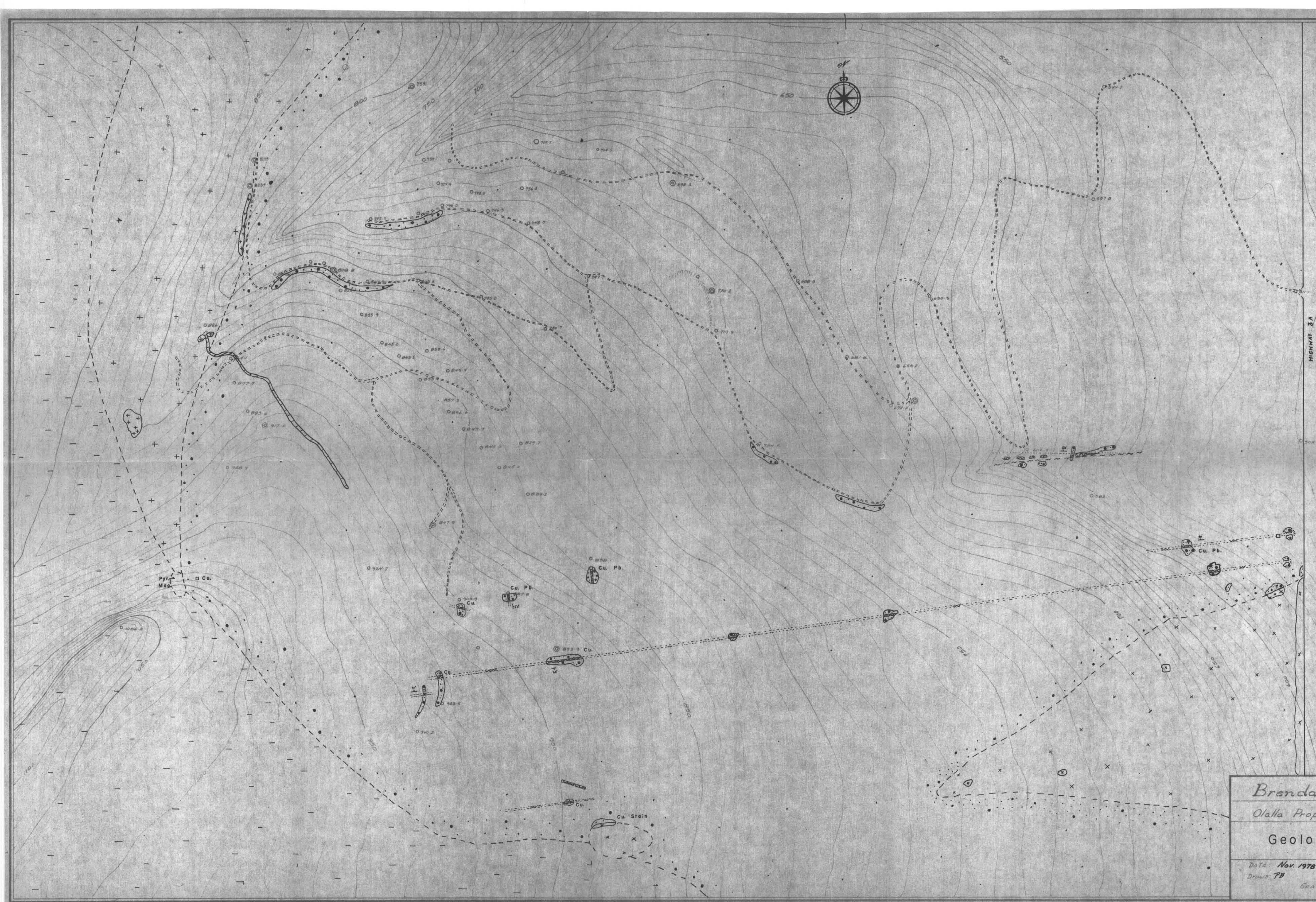
Drill Hole Locations

Date: Nov. 1978 Project No: B-90-14

Drawn: RB Approved: A.R.Y.

Scale: 1:2000 FIG # 3





- ### Legend
- ⊗ Syenite
  - ⊕ Diorite
  - ⊙ Pyroxenite
  - Shoemaker Formation  
Volcanics Cherts
  - Outcrop
  - Adit
  - Contact
  - cu Chalcopyrite or Malachite
  - Pb Galena
  - Py Pyrite
  - Mes Magnetite
  - Quartz Vain
  - ↗ Strike Dip
  - - - Fault
  - Shear Zone  
Projected from Level 2
  - ⋯ Road

MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT  
**7039**

*Brenda Mines Ltd*  
Olalla Property, Olalla, B.C.  
**Geology**  
Date: Nov. 1978 Project No. 8-90-14  
Drawn: PB Approved: *[Signature]*  
Scale 1:2000 FIG #4