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BHP MINERALS CANADA LTD.

ISLAND COPPER MINE

ASSESSMENT REPORT

DIAMOND DRILLING

EAST-94 GROUP OF CLAIMS

NTS: 92L/11W

J.A. Fleming, P.Geo.

February 10, 1994

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

23,276

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1. Introduction	1
2. Location and Access	1
3. Physiography	1
4. Exploration History	2
5. General Geology	2
6. Objectives	2
7. Work Performed	4
8. Drilling Results	5
9. Interpretation of Results	6
10. Recommendations	7
12. References	7
13. Cost Statement	8

APPENDICES

Appendix

- I. Laboratory Procedures
- II. Drill Logs, and Assay, RQD and Mag Susceptibility Results.

TABLE OF FIGURES

<u>Figure</u>	<u>Following Page</u>
1. Index Map -- Scale 1:250 000	1
2. Claim Map -- Scale 1:50 000	1
3. Hole Location Map -- Scale 1:24 000	2
4. Hole Location Map -- Scale 1:12 000	Back Pocket
5. Far East Anomaly Section -- Scale 1:2 400	5
6. M-1 Anomaly Area Section -- Scale 1:4 800	5
7. Rupert Stock Area Section -- Scale 1:4 800	5

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Diamond Drilling (August December 1992 - February 1993)	4

1. INTRODUCTION

Between the 11th and 24th of August, 1993, three NQ size diamond drill holes (Table 1) totalling 648.3 meters (2127 feet) were drilled immediately to the east of Rupert Inlet (Figure 1). The program was designed to test for $\geq 0.20\%$ Cu grade porphyry copper type mineralization in three target areas: 1) the Far East Anomaly, 2) the M-1 anomaly and 3) the Rupert Stock areas. The holes were all follow-up to holes previously drilled in each area. The Far East geophysical anomaly area was previously tested by one drill hole (R-16) that had encountered rhyodacite porphyry and moderately to strongly altered Bonanza volcanics. A hole drilled in the M-1 anomaly area (R-18) had encountered hydrothermally altered volcanic rocks indicative of a nearby porphyry source. The Rupert Stock area had been previously drilled with porphyry copper mineralization in Bonanza volcanics encountered in several holes.

2. LOCATION AND ACCESS

The exploration area (Figure 1) is located east of Rupert Inlet in the Nanaimo Mining Division. It falls on NETS map sheet 92L/11w with co-ordinates $50^{\circ} 35'$ and $127^{\circ} 23'$.

The claims (Figure 2) can be reached by following the Rupert Mainline logging road from the Island Highway - Port Alice road junction onto the Beaver Mainline, or from the Port Alice road or by the Coal Harbour and mine roads and M&B main to the end of Rupert Inlet. Holes R-19 and R-21 were drilled from logging roads. Hole R-20 can be reached by following a cat trail west from the south end of Beaver Main.

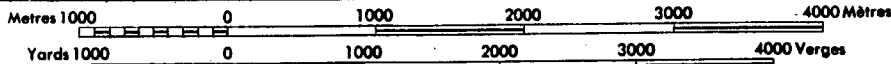
3. PHYSIOGRAPHY

The area is in the Nahwitti lowlands of the Coastal Trough physiographic subdivision that divides the Insular Mountains of Vancouver Island from the Coast Mountains on the mainland. The area is characterized by rounded, gently-rolling hills with a maximum relief of about 150 meters. The target area extends from the east end of Rupert Inlet to the east end of the claims near the Island Highway - Port Alice road junction. The area south of Rupert Main is generally flat lying while north of the mainline the topography rises with the Washlawlis Hill being the most prominent topographic feature. A Loran C transmitter tower is located east of Washlawlis Hill and is visible for a considerable distance.

MARISA 4
231124

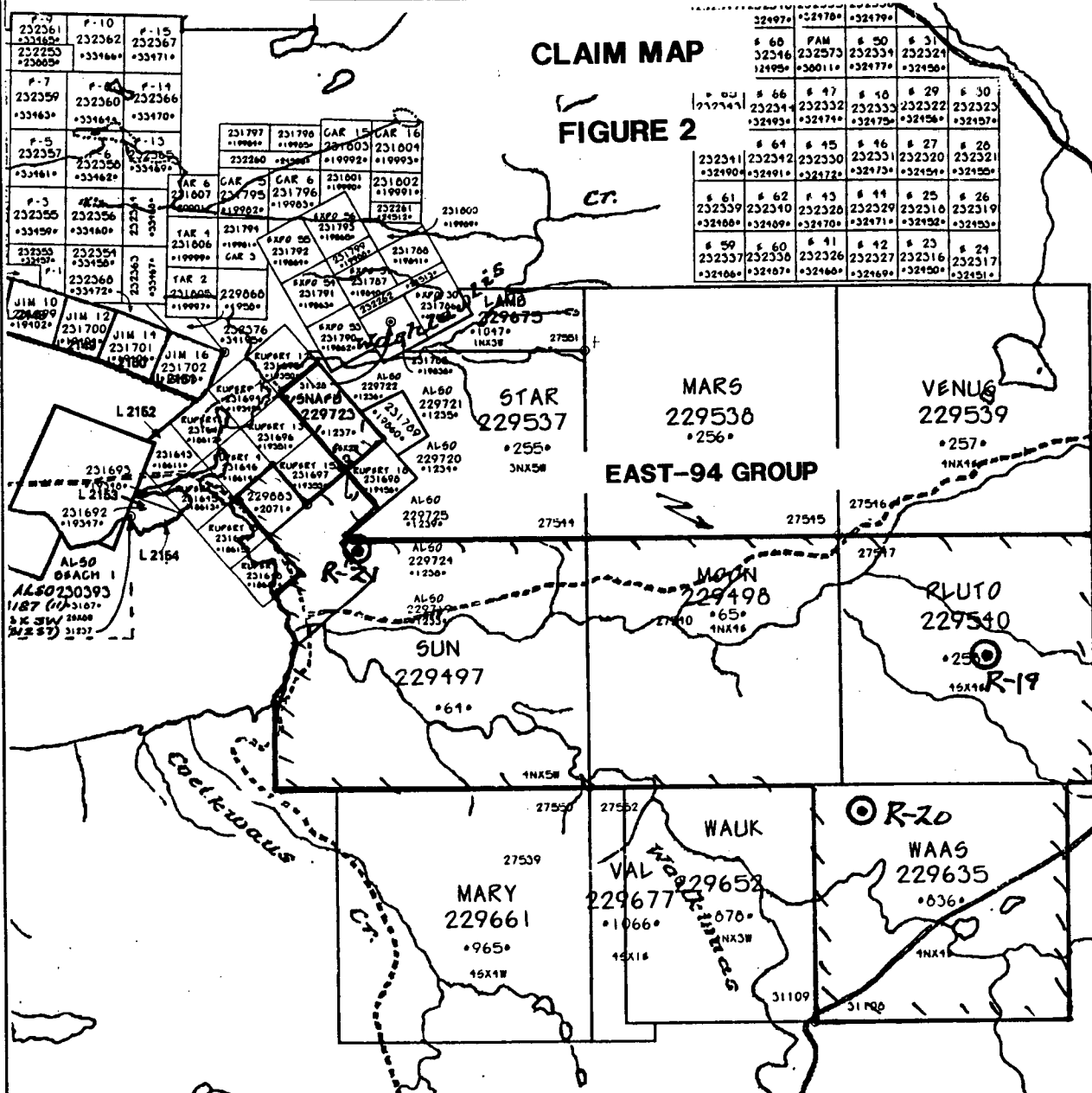
0.3942 Miles
15X56

Scale 1:50,000 Échelle



CLAIM MAP

FIGURE 2

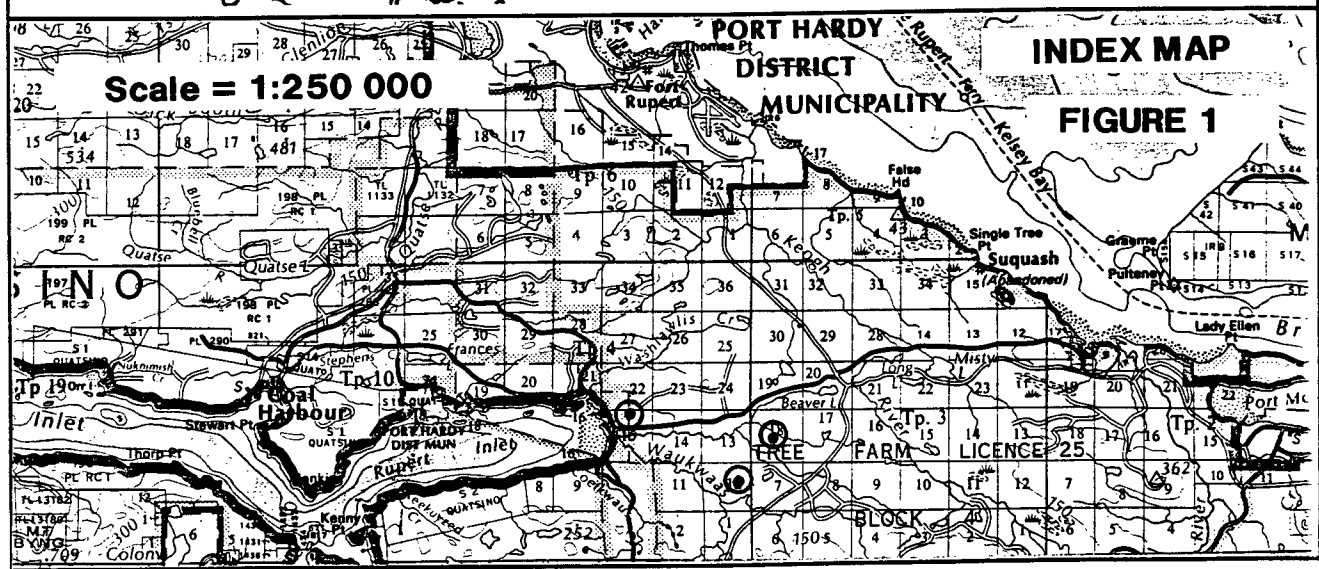


Scale = 1:250 000

PORT HARDY DISTRICT MUNICIPALITY

INDEX MAP

FIGURE 1



4. EXPLORATION HISTORY

The Island Copper porphyry copper-molybdenum-gold deposit to the west of the area was discovered in 1967 and exploitation of the deposit by open-pit mining has taken place since 1971. The deposit occurs mainly in hydrothermally altered, crackled and brecciated basalt tuffs of the lower Jurassic Bonanza Volcanics where intruded by 180 million year old rhyodacite porphyry dykes of the Island Plutonic Suite.

Exploration activity east of Rupert Inlet has been conducted intermittently by BHP Minerals (Utah Mines Ltd. prior to takeover by BHP) from July 1974 and included geological mapping, line cutting, soil geochemical surveys, ground magnetometer and I.P. geophysical surveys, and a total of 18 drill holes. Results of much of this work has been documented in various assessment reports. A number of magnetic anomalies coupled with chargeability anomalies were identified or confirmed in the property surveys. Three areas with chargeability and/or magnetic anomalies were previously drill tested and were the subject of this follow-up drilling program (Figure 3). The Far East anomaly consists of a linear magnetic anomaly with a central, subparallel chargeability anomaly. The M-1 magnetic anomaly is a circular to oval-shaped magnetic anomaly without an associated chargeability anomaly. The Rupert Stock area contains overlapping, east-west trending magnetic and chargeability anomalies.

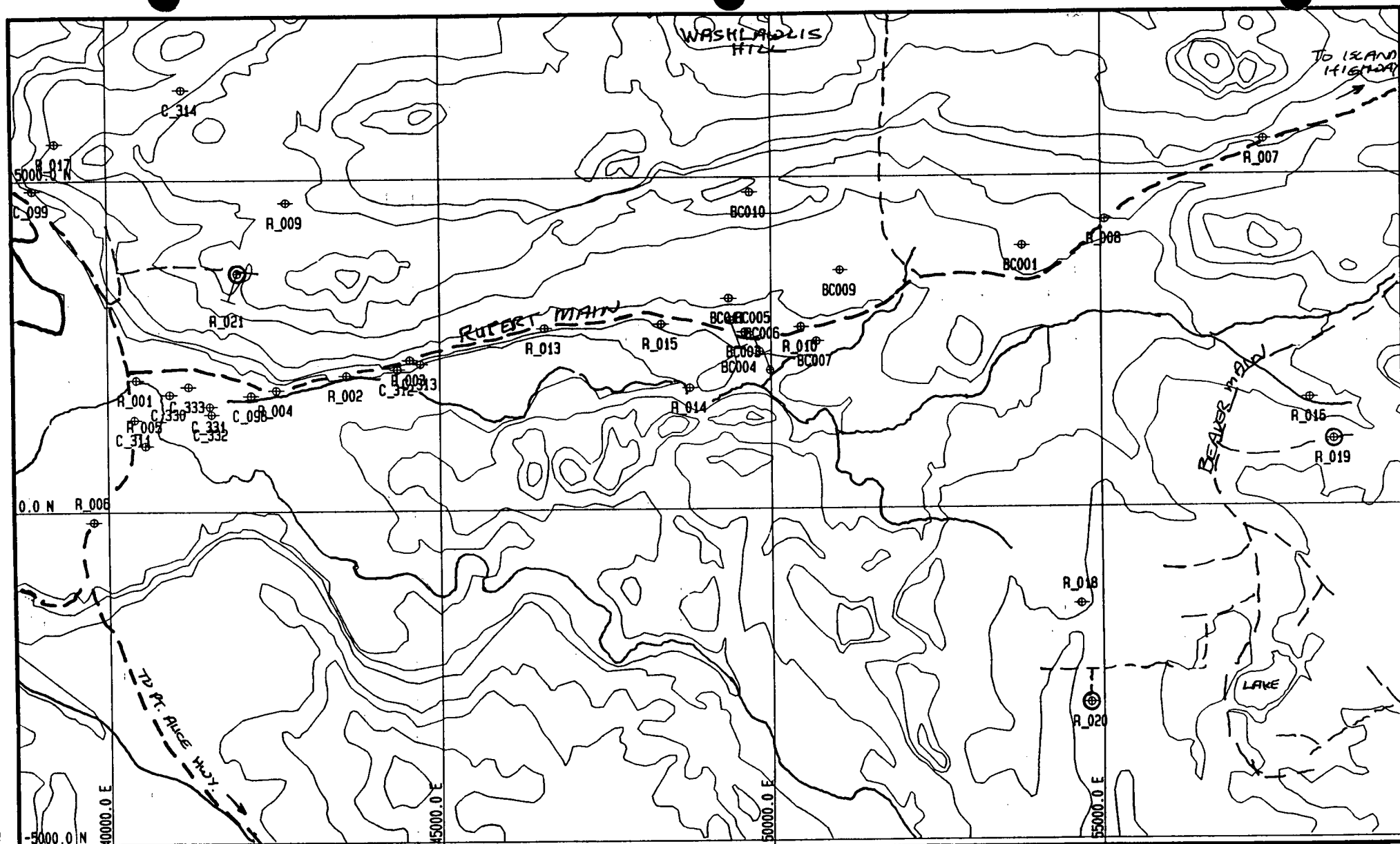
5. GENERAL GEOLOGY

The area is bounded by the Rupert Stock on the west and on the south by the postulated north-northwest striking Holberg (Dawson) Fault. From south to north the area is underlain by the southward dipping, progressively older sequence of Lower Jurassic Bonanza Group andesitic and basaltic tuffs and flows, and the Upper Triassic Vancouver Group sequence of Parson Bay Formation clastic sediments, Quatsino Formation limestones and the thick package of Karmutsen Formation pillow basalts, breccias, tuffs and flows. These rocks are intruded by Early to Middle Jurassic granitoids of the Island Plutonic Suite of which the Rupert Stock granodiorite porphyry at the northeast end Rupert Inlet, and the quartz feldspar porphyry dykes and the granitic rocks encountered east of Rupert Inlet are members. The geology of the region has recently been mapped and described by Nixon et al. (1993). All the holes in this program were drilled in the Bonanza volcanic rocks.

6. OBJECTIVES

Far East Anomaly Area

Hole R-16 drilled in the magnetic anomaly in 1984 (assessment



BHP Minerals Canada Ltd.

P.O. Box 370
Port Hardy, BC
V0N 3P0

DATE: 02/08/94 TIME: 21:56:36

SCALE (HOR) 1" = 2000' SCALE (VERT) 1" = 2000'

DIAMOND DRILLING 1993
East of Rupert Inlet

Scale = 1 : 24 000

Figure 3

report #85-53-14234) confirmed that the quartz feldspar porphyry dyke system encountered in drill holes to the west closer Rupert Inlet, and which was predicted by the magnetic and chargeability survey results, did in fact extend through to the east end of the mineral property. Although the volcanic wallrocks encountered in the hole were not mineralized, they were moderately to strongly quartz and magnetite altered. This suggested that the hole may have intersected the core of the system and that the biotite altered (and mineralized) volcanic rocks lay further to the south to the footwall of a northward dipping porphyry intrusive. In addition, if the intrusive were a late (unmineralized) phase as occurs in the Island Copper deposit (Perello et al, 1989), there could be an associated mineralized phase adjacent to R-16 or at depth. Testing this model was the objective of hole R-19.

M-1 Anomaly Area

The M-1 magnetic anomaly which was first detected by the Federal / Provincial regional aeromagnetic survey of 1962-63 and later confirmed by ground magnetic surveying was tested by hole R-18 in 1987 (assessment report # 87-340-15884). Thick overburden was anticipated and was realized when the hole penetrated some 146 metres (488 feet) before intersecting weakly to moderately magnetite altered ash and lapilli tuffs, with patchy brown hydrothermal biotite developed towards the bottom of the hole. Although there was no significant copper mineralization, the above alterations and the network of zeolite veins made the rock appear very similar to the altered tuffs in the hanging wall and footwall of the Island Copper porphyry dyke system. Again, a model of a northward-dipping dyke with a mineralized zone to the south of R-18 was considered worth testing. A vertical electrical sounding survey using a Wenner array conducted over the site area prior to drilling substantiated the earlier interpretation of resistivity data that the thick overburden cover was thinning to the south. On this basis it was decided to test the anomaly with a second hole.

Rupert Stock Area

The objective of the hole was to penetrate the Rupert granodiorite porphyry stock to determine if there were any significant copper mineralization within the stock and adjacent volcanic wallrocks. Some copper mineralization in altered Bonanza volcanic rocks had been encountered in earlier holes drilled south of the Rupert Main and quartz feldspar porphyry dyke rock was located both in outcrop and in drill core. The overlapping magnetic and chargeability anomalies located south of the road were well tested, but there was no drill hole in the anomalies north of the road west of hole R-13 (Figure 3)

7. WORK PERFORMED

The drill program was designed and supervised by the author, J. A. Fleming, P.Geo., Chief Geologist, and A.T. Reeves, P.Geo., staff geologist at the Island Copper Mine. The core was logged by Andrew MacIntosh, B.Sc., independent contract geologist, under the direction of the author. The diamond drillers maintained a written log of the type of cuttings returned to surface while triconing through overburden and these logs are included with the geological logs and other records. Graphic logs at scales of 1:120 and 1:2 400 are included in Appendix II. The drill hole collar data are summarized in Table 1.

Three NQ size holes totalling 648.3 metres were drilled in the anomaly areas with hole R-19 in the Far East Anomaly area, hole R-20 in the M-1 Anomaly area and hole R-21 in the Rupert Stock area (Figures 1 - 4).

The core was measured for 1) magnetic susceptibility using an EDA K-2 susceptibility meter, 2) rock quality designator (RQD) and 3) recovery. The core was split and sampled on 3.05 meter (10 foot) sample lengths every 12.2 meters (40 feet). The samples were assayed for copper, molybdenum, gold, silver, lead and zinc at the Island Copper assay laboratory. A summary of laboratory methods is included in Appendix I and assay results are included in Appendix II.

The drilling results have been plotted on 1:2 400 and 1:4 800 scale cross-sections (Figures 5 - 7).

TABLE 1

Diamond Drilling -- August 11 - 24, 1993

HOLE	CO-ORDS ¹	ELEV ²	AZIM	DIP	LENGTH ³	CLAIM	START	FINISH
R_019	E 58500 N 1000	1220	0	-90	204.8 (672.0)	PLUTO	08/11	08/15
R_020	E 54800 N -2590	1210	0	-90	214.6 (704.0)	WAAS	08/15	08/19
R_021	E 41950 N 3600	1220	198	-55	228.9 (751.0)	SUN	08/19	08/24

Total: 3 holes and 648.3 meters (2127.0) feet

1. BHP mine grid system in feet
2. Elevation in feet with Sea Level = 1000 feet
3. Metres / Feet

8. DRILLING RESULTS

Hole R-19 (Far East Anomaly Area)

The hole penetrated 24.4 metres (80 feet) of overburden compared to only 4.6 metres (feet) in hole R-16 to the north (Figure 5). From bedrock to about 80 metres (260 feet) the hole intersected propylitically altered andesitic / basaltic lapilli tuffs. Epidote alteration is very strong with up to 20 per cent epidote through the section. Moderate magnetite alteration occurs to about 55 metres (180 feet). Chlorite-sericite (SCC) alteration is moderate to strong, particularly along fractures and shears. The pyrite content is low at 1 to 3 per cent except where amounts to 10 per cent occur with sericite. Quartz-carbonate veins are scattered throughout the section. The core is cut by an increasing number of shears and faults with pyritic sericite-clay gouge with depth in the hole. No copper mineralization was noted. From about 80 to 98 metres (260 - 320 feet), sericite-pyrite alterations are strong occurring with multiple shears and breccia seams and as alteration of albite. From about 98 metres to the end of the hole the rock is propylitically altered ash tuff (andesite / basalt flow?) with less epidote alteration and increased albite alteration and weak to moderate magnetite alteration. Quartz-carbonate ± pyrite veins are common to locally abundant. The rock is also very pyritic with up to 5 to ≥10 per cent pyrite throughout.

R-20 (M-1 Anomaly Area)

The hole was drilled to 214.6 metres (704 feet) in overburden (Figure 6). Bedrock was not reached and the hole was abandoned.

R-21 (Rupert Stock Area)

The hole penetrated 30.1 metres (feet) of overburden followed by altered Bonanza tuffs through to the end of the hole (Figure 7). No intrusive rock was encountered in the hole. From bedrock to about 170 metres (560 feet) the rock is a chlorite-epidote-magnetite-albite-sericite (SCC) ± hematite altered lapilli - ash tuff with scattered quartz-pyrite veins. Pyrite content is moderate to high (to 10%) to about 75 metres (250 feet) and low to the end of the section. From 170 (560 feet) to the end of the hole the rock is a pyritic (generally 5 - 10 per cent pyrite) chlorite - albite ± magnetite ± biotite ± amphibole ± sericite altered lapilli - ash tuff. Amphibole was noted mainly near the bottom of the hole. There are only a few spots of chalcopyrite noted in the hole.

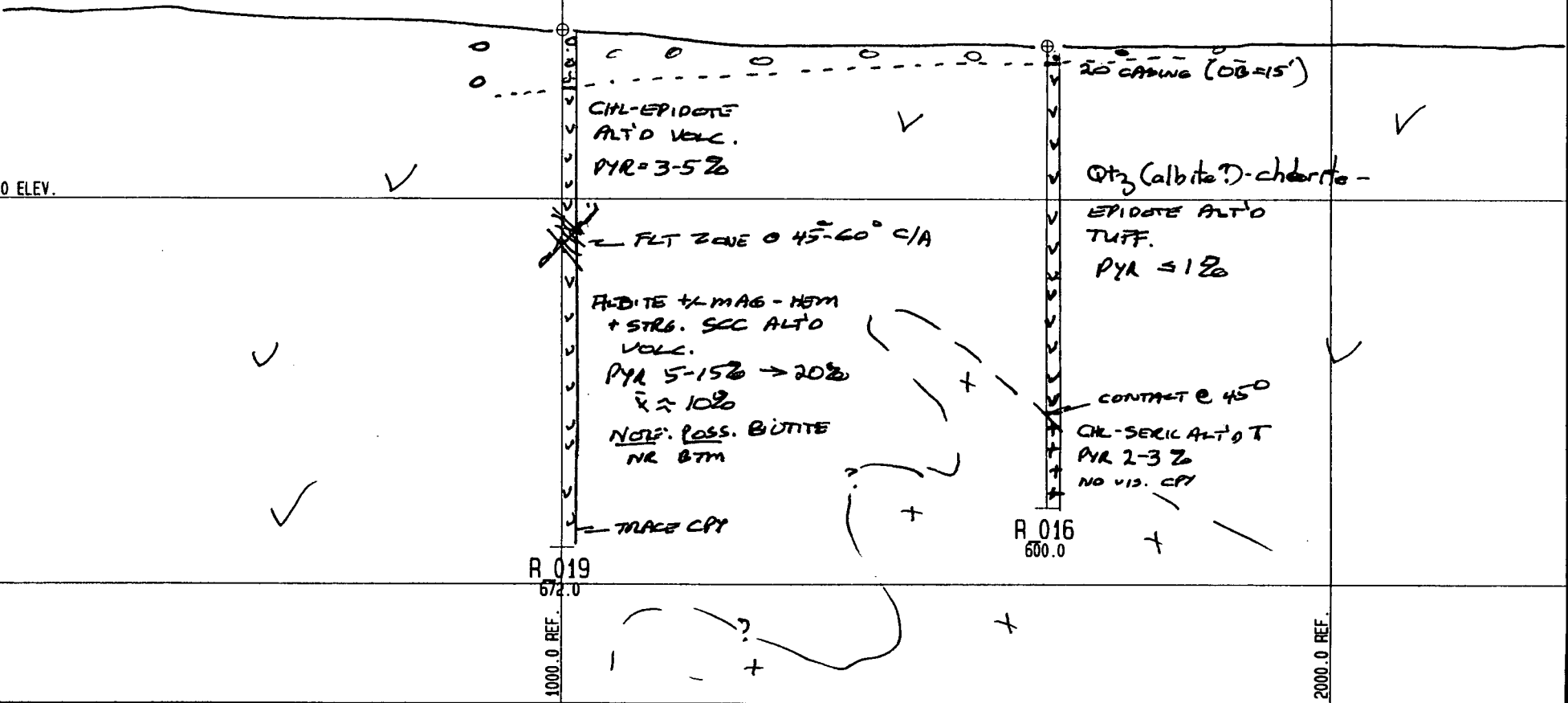
N+100
1000.0 REF.
672.0

N+200
2000.0 REF.

MAG. ANOMALY

IP ANOMALY

1000.0 ELEV.



CHL-EPIDOTE
ALT'D VOLC.
PYR = 3-5%

20' CAVING (CB=15')

Qtz (albite?) - chlorite -
EPIDOTE ALT'D
TUFF.
PYR = 1%

FLT ZONE @ 45-60° C/A

EPIDITE + MAG - HSM
+ STRG. SEC ALT'D
VOLC.
PYR 5-15% → 20%
R ≈ 100
NOTE: POSS. BITITE
NR BTM

CONTACT @ 45°
CHL-SERIC ALT'D T
PYR 2-3%
NO VIS. CPT

TRACE CPT

R 016
600.0

R 019
672.0

R-16 AND R-19 DRILL HOLES NORTH-SOUTH SECTION LOOKING WEST

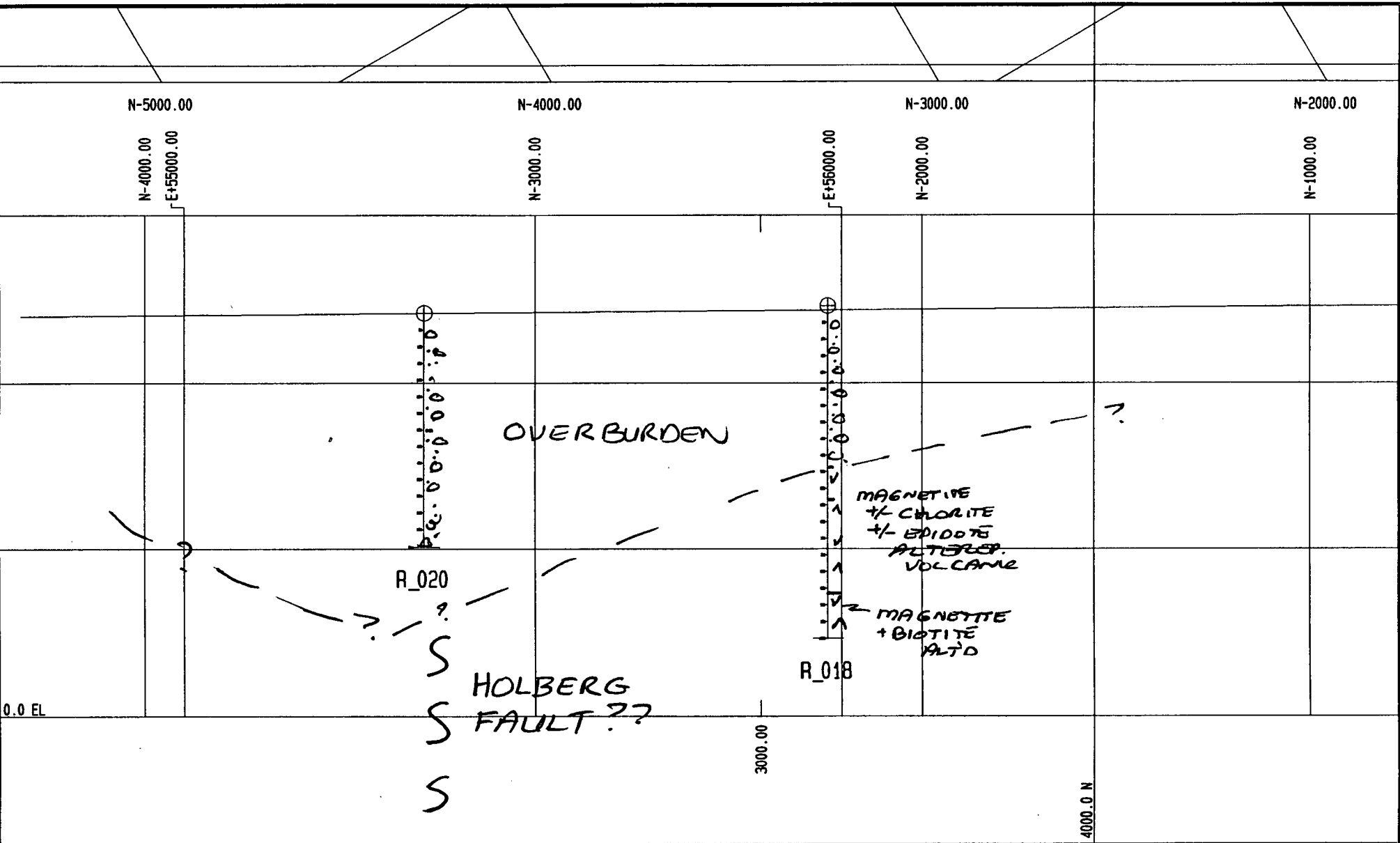
FIGURE 5

BHP Minerals Canada Ltd.

P.O. Box 370
Port Hardy, BC
VON 3P0

DATE: 08/16/93 TIME: 16:39:21

SCALE (HOR) 1": 200' SCALE (VERT) 1": 200'



BHP Minerals Canada Ltd.
 P.O. Box 370
 Port Hardy, BC
 V0N 3P0

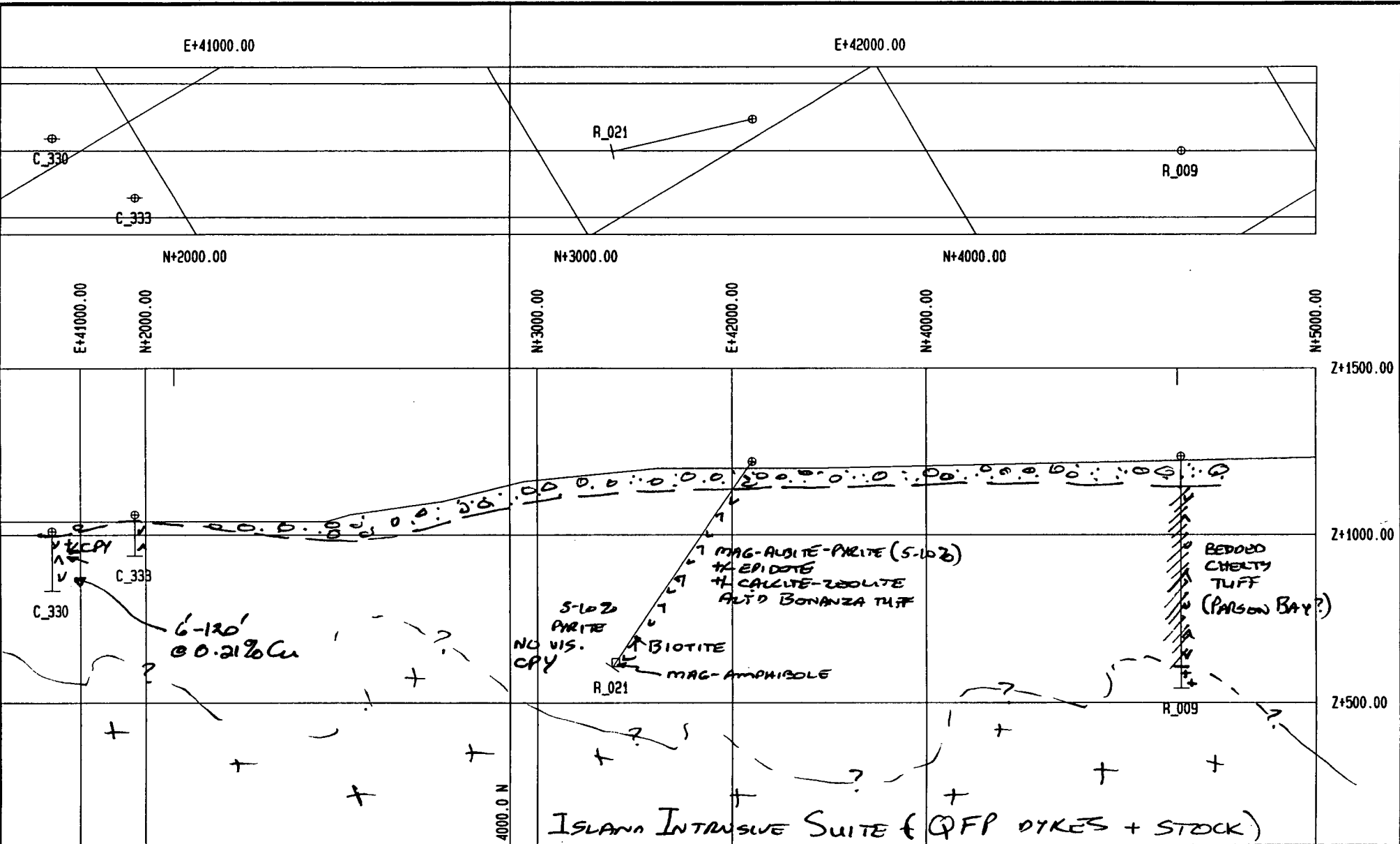
EAST END DRILLING 1993

DATE: 08/26/93 TIME: 18:52:12

SCALE (HOR) 1" : 400' SCALE (VERT) 1" : 400'

M-1 ANOMALY AREA

FIGURE 6



BHP Minerals Canada Ltd.

P.O. Box 370
 Port Hardy, BC
 V0N 3P0

DATE: 08/26/93 TIME: 20:20:26

SCALE (HOR) 1" : 400' SCALE (VERT) 1" : 400'

EAST END DRILLING 1993 RUPERT STOCK ANOMALY AREA

LAGOON SECTION (LOOKING WEST)

FIGURE 7

9. INTERPRETATION OF RESULTS:

Hole R-19 (Far East Anomaly Area)

The hole was drilled through the outer margins of a porphyry-related hydrothermal alteration system (Figure 5). The increase of magnetite and the quartz veins towards the bottom of the hole indicates that the hole was approaching the transition zone between the propylitic and potassic zones. The proximity of the hole to R-16, however, which intersected quartz-feldspar porphyry indicates that there is little room for a mineralized potassic zone to exist. Also, the high pyrite content of the system suggests that it is a "failed" porphyry system with little potential for a significant deposit of copper mineralization. A case could be made, however, for potential mineralization in the area west of R-16. The area is bounded by the BC series of holes (Figure 3) which contain minor amounts of copper mineralization and it is on the dyke trend. The area to the north is close to the Parson Bay contact and there appears to be limited space within the Bonanza for a sizeable deposit,

Hole R-20 (M-1 Anomaly Area)

The hole appears to have been drilled in the Holberg (Dawson) Fault till valley. This adds evidence to the location of the fault. The geophysical surveys did not predict the extreme overburden thickness in the drilled area. A series of low-level magnetic anomalies to the west of the M-1 anomaly were considered, prior to drilling R-20, to be reasonable targets for testing. The projection of the fault valley till deposits through this area indicates that thick overburden likely covers those areas and eliminates them as reasonable targets for porphyry-style mineralization. The overburden-thickness data was provided to the Geological Survey Branch, Environmental Geology, Surficial Geology group along with the overburden thicknesses of all the other Island Copper exploration drill holes for use in surficial-geology research.

R-21 (Rupert Stock Area)

The hole started in propylitically altered Bonanza tuffs and passed through weakly biotite altered volcanics and ended in amphibole altered rock. This sequence of alterations based on the Island Copper alteration model indicates that the hole approached the porphyry dyke system that extends eastward from Rupert Stock. The lack of copper mineralization in the biotite altered rocks indicates that the system is low in copper and the area is not favourable for a significant deposit. Although the objective of testing the granodiorite porphyry Rupert Stock was not met, the hole greatly reduced the potential for a large deposit in the area. A small deposit(s) could exist, however.

10. RECOMMENDATIONS

Far East Anomaly

No further drilling is recommended. The absence of copper mineralization in the volcanics coupled with the weak geochemical signature for the area despite the relatively thin overburden indicates that there is probably little potential for a significant porphyry copper deposit in the area.

M-1 Anomaly

The overburden is too thick to consider further drilling in this area or to the east towards Rupert Inlet. The model of a porphyry dyke system causing the anomaly is still considered valid.

Rupert Stock Area

No further drilling is recommended. The porphyry system is not strongly mineralized in the area and the untested area is considered too restricted in size to contain a large porphyry deposit.

11. REFERENCES

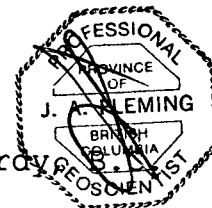
Nixon, G.T., Hammack, J.L., Koyanagi, V.M., Payie, G.J., Panteleyev, A., Massey, N.W.D., Hamilton, J.V., and Haggard, J.W., 1993: Preliminary Geology of the Quatsino - Port McNeill Map Areas, Northern Vancouver Island (1/12,11); in: Geological Fieldwork 1993, Grant, B. and Newel, J.M. Editors, B.C. Ministry of Energy, Mines and Petroleum Resources, Paper 1994-1.

Perello, J.A., 1989: Arancibia, O., Burt, P., Clark, A.H., Clarke, G., Fleming, J., Himes, M.D., Leitch, C., and Reeves, A., 1989: Porphyry Cu-Mo-Au Mineralization at Island Copper, Vancouver Island, B.C.; Geological Association of Canada, Cordilleran Section, Porphyry Copper Workshop, Vancouver, April (Abstract).

12. STATEMENT OF QUALIFICATIONS

J.A. Fleming, P.Geo.
Chief Geologist

Island Copper Mine, BHP Minerals Canada Ltd., Port Hardy



- 1) Professional Geoscientist, (1992) A.P.E.G. of B.C.
- 2) Fellow of the Geological Association of Canada
- 3) B.Sc. (Major Geology) 1971, McGill University
- 4) Employed as a geologist since 1968 and as Chief Geologist at Island Copper since 1982.

13. **COST STATEMENT**

Contractor's Costs:

Olympic Drilling & Consulting Ltd.

<u>Hole #</u>	<u>Lengths</u>	<u>Drilling* Cost</u>	
R-19	204.8 m	\$12,775.00	
R-20	214.6 m	14,316.00	
R-21	228.9 m	11,424.00	
Total	684.3 m	\$38,515.00	\$ 38,515.00

Port Hardy Bull (drill site access trail construction)

Hoe:	27 hrs. @ \$110/hr.	\$ 2,970.00	
Lowbed:	5 hrs. @ 90/hr.	450.00	
Faller:	1 day @ 450/day	450.00	
		<u>\$ 3,870.00</u>	\$ 3,870.00

H.A. Davis Transport Ltd. (move drill rig and equipment)

Highboy:	6 hrs. @ \$65/hr	\$390.00	
Lowbed:	5 hrs. @ \$85/hr	425.00	
		<u>\$815.00</u>	\$ 815.00

BHP Minerals Canada Ltd.

Core Logging:			
1 geologist x 7 days x \$200 / day			\$ 1,400.00
Core Shack Labour			
1 labourer @ \$140 / day x 7 days			980.00
Supervision:			
1 supervisor x 13 days x 50% x \$200 / day			1,300.00
Overhead:			
20% (max) of Supervision & Labour			700.00
Assays:			
33 samples x \$30 / sample			990.00
Vehicle:			
1 truck @ \$41 / day x 13 days			533.00
Core Storage:			
378.9 metres @ \$1.48 / metre			560.00
Report Preparation:			500.00
TOTAL:			<u>\$50,163.00</u> =====

Total Drilling = 648.3 meters (2,127 feet)
Unit Cost = \$76.12 per meter (\$23.20 per foot)

APPENDIX 1

Laboratory Procddures

Island Copper Mine
Drill Core Assaying Procedures

Sample Preparation:

Split cores are received in the laboratory and the whole sample received is crushed to 95% less than 2 cm using a jaw crusher. A one quarter fraction of this material is obtained using a Jones riffle splitter (2 passes). This fraction is then dried for 2 hours at 150 °C and crushed to 95 % less than .5 cm using a cone crusher and split again to 1/16 of the original sample using a Jones riffle splitter (2 more passes). This fraction is then pulverized to 95% less than 150 mesh using a Bico plate pulverizer and placed in a tin top sample bag for assay.

Base Metals;

Drill core samples are analysed for Copper, Molybdenum, Iron, Lead and Zinc as follows.

- 1) 2.5 g of sample is weighed into a 250 ml digesting flask, pulp standards of similar matrix are carried along with the samples.
- 2) Samples are digested with 10 ml Nitric acid, 10 ml Hydrochloric acid and 7 ml Perchloric acid on a bare (300 °C) hotplate until they cease to evolve NO₂ fumes (5 minutes) then 20 ml of a solution of 2 % AlCl₃ in 50 % Hydrochloric acid is added and the samples are digested a further 5 minutes.
- 3) Samples are cooled, bulked to 250 ml with deionized water and shaken then allowed to settle.
- 4) Base metal levels are measured using flame Atomic Absorption Spectrometry (A.A.S.).

Precious Metals;

Drill cores are analysed for Gold and Silver using the following method.

- 1) 5.0 grams of sample is weighed into 250 ml digesting flasks. Pulp standards are carried along with samples.
- 2) 20 ml of Nitric acid is added to the samples and they are allowed to stand at room temperature for 30 minutes. Then 80 ml of Hydrochloric acid is added and the samples are allowed to stand at room temperature for a further 30 minutes. Samples are then boiled on a padded hotplate (150 °C) for 30 minutes.
- 3) Samples are cooled and bulked to 250 ml with deionized water then shaken and allowed to settle.
- 4) This solution is analysed for silver using heated graphite atomization A.A.S..

5) 50 ml of the digest is measured in a 250 ml flask containing 20 ml of Methyl Isobutyl Ketone (MIBK). These flasks are stoppered and shaken mechanically for 3 minutes. The samples are then bulked till the MIBK is near the top of the flask with 10 % Hydrochloric acid and shaken manually for 15 seconds to back extract iron from the MIBK.

6) The MIBK layer is then analysed for gold using heated graphite atomization A.A.S.

APPENDIX 2

Drill Hole Data

PROJECT Island Copper

T.D. 672'

COLLAR ELEVATION _____

CONTRACTOR _____

INCLINATION _____

BEARING _____

DATE STARTED August 15/93 COMPLETED _____

COORDINATES _____

LOGGED BY Andrew McIntosh

SURVEY REFERENCES _____

Footage	ALTERATION												STR.	VISUAL EST.						Sample No. & Interval	LOG SCALE 1" = 100' BASIC GEOLOGY: rock types, metallization, structures alterations, one column system	LITHOLOGIC DESCRIPTIONS. NOTES & SKETCHES	ROCK UNIT															
	Core Recovery	Oxide	Quartz	Sericite	Clay/Pyrop	Blotite	K-spar	Chlorite	Epidote	Carb-Zeo	Garnet	Pyroxene		Amphibole	A	B	C	D	Sulf. Veins					Frac. Inten	Est. Cu. Mo	CuFeS ₂	FeS ₂	Cu ₂ FeS ₄	Fe ₃ O ₄	MoS ₂								
320																																						
330																																						
340																																						
350																																						
360																																						
370																																						

Weak
Weak

strong sericite leopage
← 30cm albite + sericite
same as 311 (less gangue)
← 5mm qz vein (80° dip)
5% ± 5mm qz veins
45-60° dips
← moderate albite bleaching
20cm
10% ± 1cm qz veins
90cm 5-10% 1mm py stringers
10% disc. py 75° dips
1-2cm albite vein
5% py 80° dip
5% impy stringers with
← 1cm qz carb vein (albite env type?)
← 2-3mm like 333
1-2%
1mm py stringers.
1-2cm qz breccia vein
5ft moderate albite bleaching
minor epidote.
← 3mm qz vein 5% py
← 2-3% py/albite stringers.
5mm qz vein
← cross cutting py/albite stringers
5mm calcite vein
← 30cm moderate albite
bleaching 10% 1-2mm
calc, qz veins x cutting albite
+ py
3cm qz.

Medium grey - green
crystal ash tuff
(or basalt/andesite flow?)
weak to moderate
propylitic alteration
similar to 80-244
but less SCC top
and more albite top.

minor sericite
in fractures

1-5% 1mm
py stringers.
± 5mm albite envelopes

290-
672

PROJECT Island Copper
 CONTRACTOR _____
 DATE STARTED August 15 COMPLETED _____
 LOGGED BY Andrew McIntosh

T.D. 672' COLLAR ELEVATION _____
 INCLINATION _____ BEARING _____
 COORDINATES _____
 SURVEY REFERENCES _____

Footage	ALTERATION											STR.	VISUAL EST.					Sample No. & Interval	LOG SCALE <u>1"=100'</u> BASIC GEOLOGY: rock types, metallization, structures alterations, one column system	LITHOLOGIC DESCRIPTIONS, NOTES & SKETCHES	ROCK UNIT		
	Core Recovery	Oxide	Quartz	Sericite	Clay/Pyrop	Blotite	K-spar	Chlorite	Epidote	Caro. Zoo	Garnet		Pyroxene	Amphibole	A	B	C					Sulf. Veins	Frac. Inten

430																											pervasive moderate albite bleaching. 5% 1-5mm qz, py veins 5cm qz py vn.	medium grey ash tuff 5% angular to subangular black lapilli	290-677
440																											2-3mm qz vein, 20% py 15cm qz pyvn 40% py 5mm qz calcite vein	Dips 45°-60°	
450																											25mm qz + 50% py near verticle 5mm qz vein 10% py 70° dip 2-3mm py stringer 70° dip 1cm qz calcite vein 20% py 70° dip	crite stringers.	
460																											30cm 5% parallel 2mm calcite stringers. 20cm moderate scc 1cm qz py vein 1-2cm white qz vein. minor calcite near verticle. dip	3-5% ± 1cm qz PY (≤50%) cross cut by later qz veins.	
470																											10% qz veins, minor calcite. ± 10% py dips range from 45° to 90°	py strong scc in wall rock	
480																											30% qz over 30cm 10% 1-2cm qz vn. (verticle) 1cm py qz, calcite vn strong sericite on fracture 1-2cm like 472 2cm mod. mag 4.76 s 25mm qz calcite vein sericite on fracture		
490																											5cm qz calcite vein 5% py 1-2cm qz py vein 40% py		
490																											40cm strong albite 10% qz vs. 10% py 1-2 mm stringers.		

PROJECT Island Copper
 CONTRACTOR _____
 DATE STARTED August 16/93 COMPLETED _____
 LOGGED BY Andrew McIntosh

T.D. 672' COLLAR ELEVATION _____
 INCLINATION _____ BEARING _____
 COORDINATES _____
 SURVEY REFERENCES _____

Footage	ALTERATION											STR.	VISUAL EST.						Sample No. & Interval	LOG SCALE <u>1"=100'</u> BASIC GEOLOGY: rock types, metallization, structures alterations, one column system	LITHOLOGIC DESCRIPTIONS. NOTES & SKETCHES	ROCK UNIT							
	Core Recovery	Oxide	Quartz	Sericite	Clay/Pyrop	Biitite	K-spar	Chlorite	Epidote	Carb/Zeol	Garnet		Pyroxene	Amphibole	A	S	C	Sulf. Veins					Frac. Inten	Est. Cu. Mo	CuFe ₂ S ₄	FeS ₂	Cu ₂ FeS ₄	Fe ₃ O ₄	MoS ₂
490																											3-5 cm qz py vein 20% py minor calcite 1cm like 492 3cm like 492 - strong sericite on fracture 40cm strong albite moderate silica. 20cm qz py veins (50%) 5mm qz py 1cm white qz vein		
500																											1cm qz py moderately magnetic 1-2% 1mm py stringers with albite envelopes		
510																											40cm strong albite 20% qz vein 20% py veins 1-2% qz catbuns 1-2mm 2-3cm qz, calcite, 50% py vein 4-5 ft like 510		
520																											1-2cm breccia gouge with qz calcite vein		
530																											strong albite with moderate sericite development 5% 1-2mm qz py stringers moderate mag. over 15cm possible biotite. moderate sericite.		
540																											Strong albite bleaching 10-15% diss. py 30% py over 20cm moderately magnetic 5% 1-2mm py stringers.		
550																													

290-672

BHP MINERALS CANADA - Island Copper Mine

HOLE-ID	EAST	NORTH	ELEV
R_019	58500.0	1000.0	1220.0

DOWN-HOLE SURVEY INFORMATION:

FROM	TO	AZIMUTH	DIP
------	----	---------	-----

FROM	TO	CU	MO	FE	AU	AG	PB	ZN	TAG
80.0	90.0	0.01	<0.001	5.8	<0.01	0.10	0.003	0.009	18181
120.0	130.0	<0.01	<0.001	5.5	<0.01	0.20	0.004	0.010	18182
160.0	170.0	<0.01	<0.001	6.1	<0.01	0.10	0.003	0.010	18183
200.0	210.0	<0.01	<0.001	8.3	0.01	0.20	0.005	0.009	18184
240.0	250.0	<0.01	<0.001	7.4	0.01	0.20	0.004	0.007	18185
280.0	290.0	<0.01	<0.001	8.5	0.01	0.40	0.004	0.008	18186
320.0	330.0	<0.01	<0.001	4.8	0.01	0.10	0.004	0.008	18187
360.0	370.0	<0.01	<0.001	7.4	<0.01	0.20	0.004	0.004	18188
400.0	410.0	<0.01	<0.001	10.3	0.01	0.10	0.004	0.002	18189
440.0	450.0	0.04	0.002	9.0	0.01	0.20	0.004	0.002	18190
480.0	490.0	0.03	<0.001	9.0	0.01	0.10	0.007	0.002	18191
520.0	530.0	0.02	<0.001		0.11				18192
560.0	570.0	0.01	<0.001						18193
600.0	610.0	0.03	<0.001	6.0	0.01	0.20	0.003	0.002	18194
640.0	650.0	0.02	0.002	6.0	0.01	0.30	0.003	0.016	18195

Key punched
Aug 29/93 (40)

ROCK QUALITY DESIGNATION

HOLE NO.: R 19

DATE: AUG. 14 / 93

LOGGED BY: N.J.L.

FOOTAGE (FT)		INTERVAL		RECOVERY		TOTAL CUM.	RQD	FRACTURE
FROM	TO	INCHES	CUMULATIVE	INCHES	%	PIECES > 4"	%	INTENSITY
80	87			62		10		
87	97			123		33		
97	107			118		38 39		
107	117			124		38		
117	127			123		64		
127	137			121		29		
137	147			114		28		
147	157			124		15		
157	167			125		66		
167	170.5			43		26		
170.5	181			127		67		
181	188.5			92		48		
188.5	197			104		47		
197	207			119		30		
207	215.5			94		20		
215.5	223.5			95		36		
223.5	233.5			122		48		
233.5	244			123		31		
244	254			122		26		
254	262			93		22		
262	272			118		28		
272	282			120		35		
282	292			118		22		
292	297			60		37		
297	307			119		90		
307	317			123		64		
317	327			121		47		
327	337			123		44		
337	347			116		43		
347	357			117		27		
357	367			124		28		
367	377			122		67		

ROCK QUALITY DESIGNATION

HOLE NO.: 1219

DATE: AUG. 14 / 93

LOGGED BY: M.O.L.

FOOTAGE (FT)		INTERVAL		RECOVERY		TOTAL CUM.	RQD	FRACTURE
FROM	TO	INCHES	CUMULATIVE	INCHES	%	PIECES > 4"	%	INTENSITY
377	387			124		62		
387	397			121		52		
397	407			120		71		
407	417			120		92		
417	427			120		93		
427	437			119		66		
437	447			120		82		
447	457			119		54		
457	467			123		72		
467	477			121		70		
477	483.5			75		36		
483.5	493.5			120		67		
493.5	503			114		46		
503	507			49		22		
507	510.5			42		11		
510.5	519			100		24 24		
519	527			86				
527	537			121		52		
537	543			65		13		
543	550.5			90		37		
550.5	560.5			118		55		
560.5	570.5			114				
570.5	580.5			114		53		
580.5	594			72		35		
594	594			119		60		
594	602			85		32		
602	607			64		36		
607	617			123		43		
617	620			35		11		
620	620							

HOLE NO.: R-19

DATE: _____

LOGGED BY: _____

FOOTAGE (FT)		INTERVAL		RECOVERY		TOTAL CUM.	RQD	FRACTURE
FROM	TO	INCHES	CUMULATIVE	INCHES	%	PIECES ≥ 4"	%	INTENSITY
620	627			89		232		
627	637			112		21		
637	647			100		24		
647	654			72		110		
654	664			116		58		
664	672			91		26		
672 680								
620	630							
630	640							
640	650							
650	660							
660	670							

MAGNETIC SUSCEPTIBILITY

LE NO. R 19

DATE AUG. 14 / 93

INTERVAL:

VALUE:

FOOTAGE	STARTING POINT VALUE	+2'	+4'	+6'	+8'	INTERVAL AVERAGE
80-90						.23
90-100						.20
100-110						.25
110-120						.82
120-130						.62
130-140						.52
140-150						.59
150-160						.50
160-170						.52
170-180						.29
180-190						.11
190-200						.17
200-210						.08
210-220						.09
220-230						.05
230-240						.04
240-250						.03
250-260						.05
260-270						.02
270-280						.03
280-290						.02
290-300						.02
300-310						.01
310-320						.07
320-330						.01
330-340						.39
340-350						.36
350-360						.36
360-370						.15
370-380						.16
380-390						.03
390-400						.03
						.02

Aug 12/92

R-19

0-10 F. 11 + 100 m ^{brown}

10-26 Boulders + clay ^{gray}

16-26 " " " ✓

26-36 " " " ✓

36-46 " " " ✓

46-56 CLAY

56-60 CLAY

60 to 64 DARK CLAY

64 to 70 BOULDERS SAND

DRILLERS LOG OF
OVERBURDEN IN HOLE

R-19

BHP MINERALS CANADA - Island Copper Mine

HOLE-ID	EAST	NORTH	ELEV
R_020	54800.0	-2950.0	1210.0

DOWN-HOLE SURVEY INFORMATION:

FROM	TO	AZIMUTH	DIP
0.0	704.0	0.0	-90.0

FROM	TO	CU	MO	FE	AU	AG	PB	ZN	TAG
------	----	----	----	----	----	----	----	----	-----

R-20

0 To 20 = CLAY AND SAND
 20 to 30 = CLAY + BOLDERS
 30 to 36 = HARD CLAY
 36 to 50 = HARD CLAY
 50 - 56 = " "
 56 - 66 = Clay + Rocks
 66 - 76 = " "
 76 - 86 = Clay + Rocks
 86 - 96 = Blue Clay + Rocks
 96 - 106 = CLAY + Rocks
 106 - 116 " "
 116 - 126 = CLAY + Rocks
 126 - 136 = Rocks
 136 - 146 = Boulder
 146 - 156 = Boulder + clay

156 - 166 = HARD PAN
 166 - 176 = " "
 176 - 186 = sticky BLUE CLAY
 186 - 188 = " "
 188 - 196 = BOLDERS
 196 - 206 = BOLDERS + HARD CLAY
 206 - 216 = " "
 216 - 226 = " "
 226 - 236 = " "
 236 - 246 = " "
 246 - 256 = mostly clay
 256 - 266 = CLAY + BOLDERS
 266 - 276 = " "
 276 - 286 = " "

286 - 296 = CLAY
 296 - 306 = CLAY
 306 - 316 = CLAY + SAND
 316 - 326 = SAND, CLAY + Boulder
 326 - 336 = HARD PAN
 336 - 346 = Boulders
 346 - 356 = Boulders
 356 - 366 = Boulders
 366 - 376 = BOLDERS + SAND
 376 - 386 = CLAY
 386 - 396 = CLAY + SAND
 396 - 406 = CLAY
 406 - 416 = CLAY
 416 - 426 = CLAY
 426 - 436 = " "

436 - 441 = CLAY
 441 - 446 = CLAY
 446 - 456 = CLAY + SAND
 456 - 471 = CLAY + SAND
 471 - 483 = CLAY
 483 - 492 = CLAY
 492 - 504 = CLAY + Rocks
 504 - 514 = CLAY + Rocks
 514 - 524 = CLAY
 524 - 526 = CLAY
 526 - 536 = CLAY + Rocks
 536 - 546 = CLAY + Rocks
 546 - 556 = CLAY
 556 - 566 = CLAY + rocks
 566 - 576 = CLAY + Rocks
 576 - 586 = HARD PAN

586 - 596 = HARD PAN
 596 - 606 = HARD PAN
 606 - 616 = Rocks + CLAY
 616 - 626 = " "
 626 - 636 = sticky CLAY
 636 - 646 = HARD PAN
 646 - 656 = " "
 656 - 666 = " "
 666 - 676 = " "
 676 - 686 = " "
 686 - 696 = " "
 696 - 704 = BOLDERS + CLAY

R-20

O.B.

O-704' + ?

EST. LOCATION

54800E - 2950N 12.

BHP MINERALS CANADA - Island Copper Mine

HOLE-ID	EAST	NORTH	ELEV
R_021	41950.0	3600.0	1220.0

DOWN-HOLE SURVEY INFORMATION:

FROM	TO	AZIMUTH	DIP
0.0	751.0	198.0	-55.0

FROM	TO	CU	MO	FE	AU	AG	PB	ZN	TAG
100.0	105.0	0.03	<0.001	5.7	0.01	0.40	0.003	0.010	18278
130.0	140.0	0.03	<0.001	10.3	0.01	0.20	0.002	0.011	18534
170.0	180.0	0.04	<0.001	8.1	<0.01	0.10	0.004	0.013	18535
210.0	220.0	0.04	0.001	7.6	<0.01	0.20	0.005	0.011	18536
250.0	260.0	0.03	<0.001	7.5	0.01	0.20	0.005	0.016	18537
280.0	290.0	<0.01	<0.001		<0.01	0.10			18280
290.0	300.0	0.02	0.001		<0.01	0.10			18280
330.0	340.0	0.03	<0.001	7.3	<0.01	0.20	0.004	0.016	18538
370.0	380.0	0.03	<0.001	8.5	<0.01	0.10	0.005	0.014	18539
410.0	420.0	0.03	<0.001	8.1	<0.01	0.10	0.005	0.014	18540
450.0	460.0	0.02	<0.001	8.6	<0.01	0.10	0.003	0.015	18541
490.0	500.0	0.02	<0.001	8.4	<0.01	0.20	0.004	0.009	18542
530.0	540.0	0.02	<0.001	6.9	<0.01	<0.01	0.004	0.006	18543
570.0	580.0	0.03	0.001	6.9	<0.01	<0.01	0.003	0.005	18544
610.0	620.0	0.04	<0.001	11.6	0.01	0.10	0.004	0.005	18545
650.0	660.0	0.04	<0.001	10.4	<0.01	0.20	0.003	0.006	18546
690.0	700.0	0.04	<0.001	9.1	<0.01	0.10	0.003	0.006	18547
730.0	740.0	0.04	<0.001	8.8	<0.01	0.30	0.003	0.026	18548

Key punched
 Aug 27/93
 JRB

ROCK QUALITY DESIGNATION

HOLE NO.: R 21

DATE: August 23/93

LOGGED BY: S. Oakley

FOOTAGE (FT)		INTERVAL		RECOVERY		TOTAL CUM.	RQD	FRACTURE
FROM	TO	INCHES	CUMULATIVE	INCHES	%	PIECES ≥ 4"	%	INTENSITY
101	106			46		0		
106	117			109		28		
117	127			119		8		
127	137			120		22		
137	146			106		11		
146	148			24		12		
148	156			84		15		
156	166			120		27		
166	176			121		35		
176	186			122		28		
186	191			62		9		
191	195			48		5		
195	197.5			30		5		
197.5	202			54		6		
202	206			49		20		
206	213			84		30		
213	219			73		20		
219	222			29		4		
222	226			49		10		
226	232			73		16		
232	236			50		10		
236	240			50		28		
240	250			122		35		
250	257			84		16		
257	266			103		28		
266	276			110		11		
276	286			122		21		
286	296			123		27		
296	303			82		15		
303	311			116		60		
311	313			23		7		
313	323			1A		27		

ROCK QUALITY DESIGNATION

HOLE NO.: R-21

DATE: AUG. 26/93

LOGGED BY: N. LINDBLER

FOOTAGE (FT)		INTERVAL		RECOVERY		TOTAL CUM.	RQD	FRACTURE
FROM	TO	INCHES	CUMULATIVE	INCHES	%	PIECES ≥ 4"	%	INTENSITY
323	335			145		49		
335	345			104		39		
345	353			92		32		
353	363			116		9		
363	373			125		39		
373	383			121		73		
383	395			142		60		
395	406			128		33		
406	413			91		13		
413	423			105		19		
423	433.5			125		42		
433.5	436			32		4		
436	446			124		57		
446	456			127		42		
456	466			128		22		
466	476			123		53		
476	486			129		42		
486	496			137		49		
496	506			125		23		
506	516			129		33		
516	526			93		42		
526	534			123		55		
534	544			124		43		
544	546			30		6		
546	556			123		23		
556	565			114		44		
565	575			129		49		
575	585			130		14		
585	590			57		8		
590	596			84		42		
596	603			79		14		
603	612			123		36		

MAGNETIC SUSCEPTIBILITY

LE NO. R-21

DATE Aug. 24/93

INTERVAL:

VALUE:

FOOTAGE	STARTING POINT VALUE	+2'	+4'	+6'	+8'	INTERVAL AVERAGE
100-110						.71
110-120						.09
120-130						.87
130-140						3.6
140-150						2.2
150-160						6.7
160-170						2.8
170-180						2.7
180-190						2.5
190-200						2.8
200-210						4.9
210-220						1.5
220-230						1.0
230-240						1.2
240-250						.31
250-260						2.7
260-270						4.3
270-280						2.3
280-290						2.7
290-300						4.3
300-310						7.0
310-320						3.2
320-330						5.6
330-340						1.2
340-350						.68
350-360						1.2
360-370						.27
370-380						2.4
380-390						2.3
390-400						.38
400-410						1.1
410-420						.80

MAGNETIC SUSCEPTIBILITY

LE NO. R-21

DATE Aug 24 /93

INTERVAL:

VALUE:

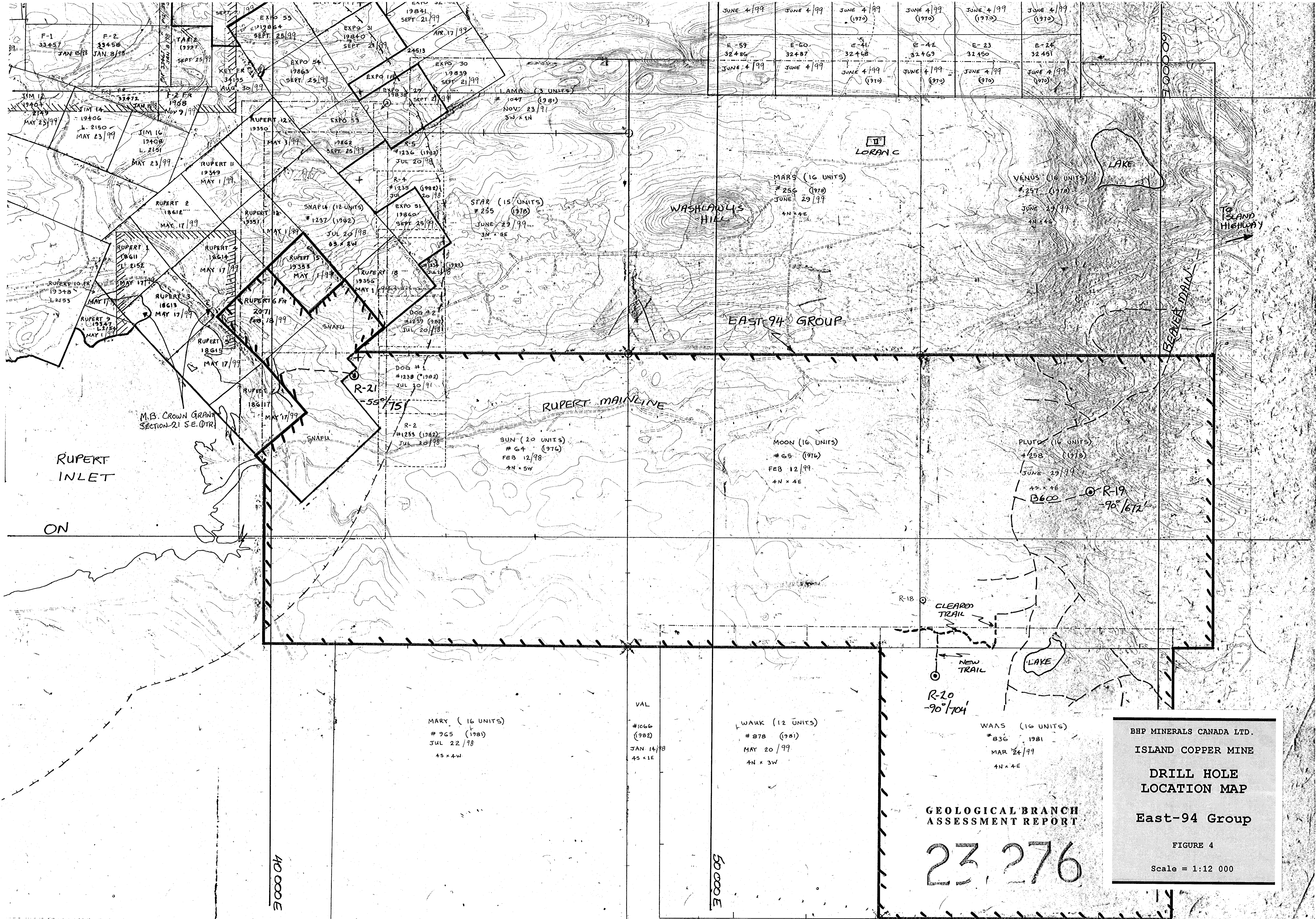
FOOTAGE	STARTING POINT VALUE	+2'	+4'	+6'	+8'	INTERVAL AVERAGE
420-430						.44
430-440						.10
440-450						.44
450-460						.66
460-470						1.9
470-480						1.8
480-490						.86
490-500						2.2
500-510						2.4
510-520						2.7 1.5
520-530						.5
530-540						3.0
540-550						1.3
550-560						.6
560-570						.03
570-580						.03
580-590						.04
590-600						.06
600-610						.17
610-620						.45
620-630						1.0
630-640						.1
640-650						.05
650-660						.24
660-670						.11
670-680						.28
680-690						.44
690-700						.67
700-710						.27
710-720						.51
720-730						.43

R-21

O.B. 0-98'

0-14	CLAY & ROCKS
14-24	" "
24-34	" "
34-44	ROCKS
44-54	HARD PAN
54-64	HARD PAN & ROCKS
64-74	" " " "
74-84	" " " "
84-94	" " " "
94-98	" " " "
98-100	BED ROCK

Aug 20/93



M.B. Crown Grant
SECTION 21 S.E. (QTR)

RUPERT
INLET

ON

RUPERT MAINLINE

WASHLAWLIS
HILL

LORAN C

EAST-94 GROUP

LAKE

TO ISLAND
HIGHWAY

BEAVER DAM

MARY (16 UNITS)
965 (1981)
JUL 22/98
45 x 4W

VAL
#1066
(1982)
JAN 14/98
45 x 1E

WAWK (12 UNITS)
878 (1981)
MAY 20/99
4N x 3W

WAAS (16 UNITS)
836 (1981)
MAR 24/99
4N x 4E

GEOLOGICAL BRANCH
ASSESSMENT REPORT

23,276

BHP MINERALS CANADA LTD.
ISLAND COPPER MINE
DRILL HOLE
LOCATION MAP
East-94 Group
FIGURE 4
Scale = 1:12 000

40 000 E

50 000 E

60 000 E

70 000 E

80 000 E

90 000 E

100 000 E

110 000 E

120 000 E

130 000 E

140 000 E

150 000 E

160 000 E

170 000 E

F-1
33457
JAN 8/78

F-2
33458
JAN 8/78

EXPO 55
19841
SEPT 21/99

EXPO 31
19840
SEPT 21/99

EXPO 30
19839
SEPT 21/99

EXPO 27
19838
SEPT 21/99

LAMB (3 UNITS)
1047 (1981)
NOV 23/91
5W x 1N

E-59
32486
JUNE 4/99

E-60
32487
JUNE 4/99

E-41
32468
JUNE 4/99 (1970)

E-42
32469
JUNE 4/99 (1970)

E-23
32450
JUNE 4/99 (1970)

E-24
32451
JUNE 4/99 (1970)

SIM 12
19404
MAY 23/99

SIM 14
19406
MAY 23/99

SIM 16
19408
MAY 23/99

RUPERT 12
19350
MAY 1/99

EXPO 53
19862
SEPT 25/99

R-5
#1236 (1982)
JUL 20/98

MARS (16 UNITS)
256 (1970)
JUNE 29/99
4N x 4E

VENUS (16 UNITS)
257 (1970)
JUNE 29/99
4N x 4E

STAR (15 UNITS)
255 (1970)
JUNE 29/99
3N x 5E

SNAFU (12 UNITS)
1237 (1982)
JUL 20/98
53 x 2W

R-4
#1235 (1982)
JUL 20/98

EXPO 51
19860
SEPT 25/99

RUPERT 18
19356
MAY 1/99

DOG #2
#1239 (1980)
JUL 20/98

RUPERT 15
19353
MAY 1/99

RUPERT 14
19351
MAY 1/99

RUPERT 13
19349
MAY 1/99

RUPERT 12
19347
MAY 1/99

RUPERT 11
19345
MAY 1/99

RUPERT 10
19343
MAY 1/99

RUPERT 9
19341
MAY 1/99

RUPERT 8
19339
MAY 1/99

RUPERT 7
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