012905

HOLBERG MINES LTD.

924/12W & 102I/9E

TABLE OF CONTENTS

924-219

GEOLOGICAL REPORT

on the
300 Claim Property of

HOLBERG MINES LTD.

Situated at the Western
End of Holberg Inlet in the
Nanaimo Mining District of
Vancouver Island
British Columbia

N.T.S. 1021/9 (E) & 92L/12 (W)
Lat: 50°40'N Long: 128°00W

Report by: *David R. Morgan, P.Eng.*

2 March 1970
Vancouver, B.C.

1-0 SUMMARY

Two area mineralized with copper have been found so far on the 300 claim property of Holberg Mines Ltd. (N.P.L.) at the western end of Holberg Inlet, twenty five miles west of the Port Hardy mining camp.

The first, is the Crackerjack Creek area where trenching and short adits in early prospecting and diamond drilling more recently have shown that a volcanic horizon is intermittently mineralized along a strike length of one thousand feet.

The second, lies 36,000 feet southeast of Crackerjack Creek in the vicinity of Native Creek. In the upper part of this creek, the writer traced minor and intermittent copper mineralization in a volcanic horizon on strike for 1,500 feet. In the lower part of this creek, near its mouth, native copper has been found in earlier prospecting.

The amygdaloidal basalts that are host to the mineralization in both areas are similar and structural data indicates that they may be one and the same horizon.

A drilling program to explore the down dip extension of these basalts in the Crackerjack Creek area is considered justified.

Detailed mapping, and bulldozer trenching with diamond drilling contingent on encouraging results is considered justified in the Native Creek area.

In the remainder of the property, reconnaissance mapping should be completed in a search for additional target areas.

2-0 RECOMMENDATIONS

2-1 *Purposes*

1. To explore the volcanic rock unit that is host to the copper mineralization in the Crackerjack Creek area down dip to the southwest.
2. To explore the copper mineralization in the vicinity of Native Creek.
3. To explore the remainder of the property.

2-2 Program

It is assumed in the program which follows that line cutting geological mapping and drilling will be contracted.

Phase 1: (Two months – May-June 1970)

Crackerjack Creek

1. Camp Rehabilitation: A new oil space heater will be required in the main building and a certain amount of repair will be needed for doors and windows. Bedding, cooking equipment, lamps and other hardware will also be needed.

Core racks should be built in one of the smaller shacks with a capacity of 8,000 feet of core (4,400 from DDH No. 1-7 and 3,000 feet from future drilling). The core from drill holes No. 1, No. 2, No. 4, No. 5, No. 5A, No. 6 and No. 7 should be marked and stored in racks.

2. Geological Mapping: The geology in the vicinity of Crackerjack Creek should be mapped in detail. This mapping should be done on a scale of one inch to forty feet using the cut I.P. lines for survey control. The area mapped should have the following boundaries:

N.E. Boundary	Road
S.W. Boundary	2000 S
N.W. Boundary	3500 W
S.E. Boundary	2500 E

Particular attention should be paid to rock types and labelled specimens must be taken from each outcrop. Elevations should be taken at 100 foot intervals with an altimeter by the geologist. The geologist should re-log the drill core from drill holes No. 1, No. 2, No. 4, No. 5, No. 5A, No. 6 and No. 7.

It may be necessary to rechain and mark out the lines as the original lines were cut some time ago.

Native Creek

1. Line Cutting: A base line should be cut at 135° true (S.E.) from the mouth of Native Creek for 12,000 feet. Plastic flagged side lines should be turned off at 400 foot intervals and run out to the limits of the Hol 1-6, Jay 1-10 and Native 9-25 claim groups. Approximately 33 miles of such side line will be required.

2. Geochemical Survey: A program of soil sampling can be carried out by the crew that does the line cutting. Soils should be sampled at 100 foot intervals. A total of 1,650 samples will be taken. Such a survey will make it easier to trace the known mineralized volcanics and may reveal higher grade sections obscured by overburden. These samples should be run for copper only.

3. Geological Mapping: The geology of the claims listed above should be mapped at a scale of one inch to 200 feet. As with the mapping in the Crackerjack Creek area, specimens should be collected from each outcrop and the elevation of the line taken with an altimeter at 100 foot intervals.

Remainder of Property

1. Reconnaissance Geological Mapping: Reconnaissance geological mapping of the entire property should be completed at a scale of one inch to 1,000 feet. The Rayonier system of logging roads can be used for access and control. Most of the mapping can be done in any truck having an odometer which measures tenths of a mile.

The important area southwest of Crackerjack Creek and south of the divide is devoid of roads. Some traverses in this area can be laid out using the location line of Rick 1-4 and Kaye 1-6 for control. This location line should be chained and flagged.

Phase 2: (Three months – July-September 1970)

Crackerjack Creek

1. Drilling Program: The following program is designed to explore the volcanics that are host to the Crackerjack Creek mineralization down dip to the southwest. This program must await the completion of the detailed geological mapping of this area so that the consultant may modify the program below on the basis of the data obtained from the mapping.

Drill holes are recommended as follows:

Hole No.	Latitude	Departure	Elevation	Length	Vert. Angle
70-1	200 S	15 0 W	Approx. 500	600	90°
70-2	200 S	650 W	Approx. 500	600	90°
70-3	200 S	1150 W	Approx. 500	600	90°
70-4	200 S	900 W	Approx. 500	600	90°
70-5	200 S	400 W	Approx. 500	600	90°

The first hole to be drilled, 70-1 is in Crackerjack Creek just below the No. 3 Adit, the second hole, 70-2 will lie 500 feet to the west (magnetic) and the third hole 70-3, will lie 500 feet still further west. Contingent upon the consultant's recommendation, the two 'fill in' holes, 70-4 and 70-5, can then be drilled.

A cat trail will have to be driven up to these drill set-ups. The geologist will be able to decide on the best route for this trail during his mapping in Phase I.

Drilling should be carried out with a BBS-1 machine equipped with A.Q. wireline.

All core should be logged by a geologist and any mineralized sections split and sent for assay.

Native Creek

1. Trenching: Following a review of the results of the geological mapping and the soil sampling by the consultant, a program of bulldozer trenching of any target areas revealed can then be planned.

The geology of the trenches should be mapped and any mineralized sections sampled.

Remainder of the Property

1. The results of the reconnaissance mapping should be reviewed by the consultant and contingent on his recommendation, the further exploration of any target areas found can proceed. Such exploration would probably consist of line cutting and soil sampling, followed by detailed geological mapping. Provision for a program of this type has been made in the Cost Estimates in the following section.

Phase 3: (Two months – October-November 1970)

Crackerjack Creek and Native Creek

At the end of Phase 2 the consultant will review the results obtained. Contingent on his recommendation further drilling may be carried out in either or both of these areas.

Phase 1 - 2 months, May-June 1970

Crackerjack Creek

Camp rehabilitation, construction of core shack and racks	$ 2,000.00	
Re-chaining cut lines	500.00	
Detailed geological mapping	4,000.00	

Native Creek

Line cutting (34 miles @ $150/mile)	5,100.00	
Geochemical survey (1650 samples @ $5 each for collection and processing)	8,250.00	
Geological mapping	5,000.00	

Remainder of Property

Reconnaissance geological mapping	2,000.00	
Travelling expenses	500.00	
Consultant	1,000.00	
	28,350.00	
Contingency, 10%	2,800.00	
	31,150.00	$31,150.00

Phase 2 - 3 months, July-September 1970

Crackerjack Creek

Roads to drill set-ups and drill service	$ 5,000.00	
Drilling mobilization	1,000.00	
Diamond drilling (3000 feet @ $10/foot)	30,000.00	
Drilling de-mobilization	1,000.00	
Assays, core boxes, splitter etc.	1,000.00	

Native Creek

Bulldozer trenching (assuming ten target areas needing 30 hours each @ $25/hour)	7,500.00	
Mapping and sampling of trenches	1,000.00	
Assays	250.00	

Remainder of Property

Line cutting	$ 5,000.00	
Geochemical survey (2000 samples @ $5 each for collecting and processing)	10,000.00	

Detailed geological mapping	5,000.00	
Travelling expenses	500.00	
Consultant	2,000.00	
	69,250.00	
Contingency, 10%	6,900.00	
	76,150.00	$ 76,150.00

Phase 3 - 2 months, October-November 1970

Crackerjack Creek & Native Creek

Follow-up diamond drilling, and/or percussion drilling in either or both areas	$23,000.00	
	TOTAL	$130,300.00

Respectfully submitted,

"D.R. MORGAN"
D.R. Morgan, P.Eng.

3-0 INTRODUCTION

3-1 Scope and Dates of Examination

On 20th February 1970 the writer was retained by Holberg Mines Ltd. (N.P.L.), 103 - 709 Dunsmuir Street, Vancouver 1, B.C. to make some recommendations for an exploration program on the company's 300 claim property on Holberg Inlet, near Port Hardy, Vancouver Island, B.C.

The writer had previously visited the property from November 5-14, 1969 and also on 9, 10 December 1969.

This report is based on the writer's observations during these visits together with all previous geological reports on the property.

3-2 Title

The following informaion about the claims of Holberg Mines Ltd. was obtained at the Mining Recorder's office in Vancouver:

Name of Claims	Record Numbers	C of W Due	No. of Claims
Kaye 1-18 & 20	15568-85, 15587	15 Jan '71	19
Ace 1-47	16206-52	17 Jan '71	47
Flats 1-14	16180-93	17 Jan '71	14
Flats 15-19	23443-47	27 Feb '71	5
Bee 1-26 & 28	23448-73, 23475	27 Feb '71	27
Bee 35-42	23482-89	27 Feb '71	8
Cee 1-41	23490-530	27 Feb '71	41
Dee 1-12	23531-42	27 Feb '71	12
Jack 1-20	23569-88	27 Feb '71	20
Jill 1-26	23543-68	27 Feb '71	26
Lori 1-12	23589-600	27 Feb '71	12
J.B. 1-4	16309-12	18 Mar '71	4
May 1-8	14630-37	6 Apr '71	8
Lucky 3-4	14638-39	6 Apr '71	2
Rick 1-4, 7 & 8	14622-25, 14628-29	6 Apr '71	6
Rush 1-4	15718-21	26 Apr '71	4
Jay 1-10	21103-12	31 Oct '70	10
Lynx 1-4	21099-102	31 Oct '70	4
Hol 1-6	30248-53	26 Nov '70	6
Native 1-25	30254-78	27 Nov '70	25
		Total	300

3-3 History

The copper mineralized zones on Crackerjack Creek were first staked in 1916. The property was optioned by Consolidated Mining and Smelting in 1928 by which time three adits had been driven on the Crackerjack Creek zone. CM & S dropped their option in 1929. In 1954 Noranda Exploration Company restaked four claims and cleaned out the old under-ground workings. These claims were allowed to lapse in 1959. In the same year a group of forty claims including the area covered by those that had lapsed was staked by Roscoe-Calder and Associates and Holberg Mines Ltd. was formed on this ground.

A detailed description of the history of the property with reproductions of many of the reports

by examining engineers appears in a compilation by Weymark Engineering Limited in a report titled "Holberg Mines Ltd.: Evaluation of the copper-gold-silver deposit, San Josef-Goodspeed River area, Vancouver Island, B.C." Date: 15th of January, 1968.

4-0 GEOGRAPHY

4-1 Location

The property is located at the western end of Holberg Inlet on Quatsino Sound at the northern end of Vancouver Island, British Columbia. The property is in the Nanaimo Mining District, and straddles National Topographic Reference Areas 102 I/9(e) and 92 L/L2(w). The centre of the claim group has a latitude of 50°40'N and a longitude of 128°00'W.

4-2 Access

The property is accessible by 32 miles of logging road from Port Hardy. From Vancouver the property is accessible daily by Pacific Western Airline flights to Port Hardy. From Port Hardy amphibian aircraft charter to Holberg is available. Alternatively, a cab from Port Hardy to Holberg costs about the same amount as the amphibian charter.

4-3 Topography

Elevations on the property range from sea level to the peak of Mount Hansen at an elevation of 1,993 feet. The long axes of mountain ridges are generally parallel to Holberg Inlet. Slopes facing Holberg Inlet and on the sides of the Goodspeed Valley to the west are generally steep but to the south of these ridges, for instance in the valley of Pegattem Creek, slopes are moderate.

5-0 REGIONAL GEOLOGY

The geology of the Quatsino Sound area is characterized by a series of Upper Triassic volcanics and sedimentary units. Generally speaking, these rocks have northwesterly strikes and dips to the west. Northeasterly block faulting resulting in considerable offsets in the formations on strike appears to be common in the Quatsino Sound area. It is evident in the map of the geology of the Coal Harbour-Port Hardy area appearing on Page 85 in the B.C. Minister of Mines' report for 1968, and it is also evident in the area mapped by the writer. These volcanics and sediments have been intruded by stocks, sills and dykes ranging from gabbro to granite. The commonest intrusives, however, are quartzdiorite and granodiorite.

TABLE OF FORMATIONS

Age	Formation of Group	Lithology
Recent		Stream deposits, talus, soil till, gravel, sand, clay, erratics
	Unconformity	
Upper Jurassic and/or Lower Cretaceous	Coast Intrusives	Granodiorite, granite, diorite, quartzdiorite, minor syenite, related minor intrusions

Age	Formation of Group	Lithology
	Vancouver Group	
Upper Triassic and (?) Jurassic	Bonanza Group	Andesite, volcanic breccias and tuffs, basalt, dacite and trachyte
		Thin bedded argilitie, tuffaceous argillite, impure limestone, agglomeratic limestone and quartzite, numerous thin intercalated andesite flows and associated pyroclasic rocks
Upper Triassic	Quatsino Formation	Crystalline limestone, minor volcanic rocks
Upper Triassic and (?) earlier	Karmutsen Group	Basaltic and andesitic flows, tuffs, agglomerates and breccias, minor limestone

Six types of mineralization occur in the area:

1. Silicified volcanic fragmentals and flows and flows altered by silica-sericite carbonates and eipdote and mineralized by pyrite, chalcopyrite and molybdenite. (Utah Construction and Mining Co. orebody at Rupert Arm, Quatsino Sound.)
2. Pyrometasomatic copper and magnetite deposits.
3. Gold quartz veins.
4. Quartz-carbonate veins with sulphides.
5. Lead-zinc replacement deposits in limestone.
6. Copper deposits in basic lavas.

The copper deposits on the Holberg property belong in this last group.

6-0 GEOLOGY OF THE PROPERTY

6-1 General

Northwesterly striking and westerly dipping amygdaloidal basalts form the main unit in the geology of the Holberg property.

These basalts, enclosed in which are some narrow (100-foot wide) limestone beds, have been intruded by gabbro and diallage porphyry sills.

Block faults lying along Pegattem Creek and extending southwest from the log dump at mile zero have introduced a wide exposure of Quatsino limestone in the centre part of the property.

Disseminated bornite mineralization in the amygdaloidal basalts at Crackerjack Creek and on the Hol claims to the southeast is probably related to faulting and to the sills which appear in both areas.

6-2 Rock Types

These will be dealt with in order of abundance.

Basalt: Generally in wide flows, dark green, purplish or occasionally buff coloured on the weathered surface, on which amygdules appear white when calcitic, pale green when epidote, and

dark greenish black when chloritic. (On the fresh surface the basalt is generally dark green with amygdules common (nearly always seen in some part of an outcrop) and often quite large-up to 1 cm., typically 5 mm.).

Since this rock type is host to the mineralization on this property its study is of some importance.

Limestone: Apparently great thicknessess of limestone occur in the central part of the area mapped. These are the three main types:

a. Grey Limestone: Grey weathering, pale grey to buff grey and asphanitic on the fresh surface, usually with a conchoidal splintery fracture. This limestone is almost lithographic in its aphanitic purity. Great thicknesses occur in the southwestern part of the carbonate belt south of outcrops No. 1, No. 14, and No. 17.

b. Dolomitic Limestone: This rock is typically buff weathering, pale buff grey and aphanitic on the fresh surface. It too has splintery conchoidal fracture. It is represented between outcrops No. 5 and No. 1, No. 14 and No. 17.

c. Dark Grey Limestone: Dark grey to black on the weathered and fresh surface due to argillaceous or carbonaceous inclusions. Occasional fossiliferous, it appears in the northern part of the carbonate belt (outcrop No. 5) and is probably close to the bottom of the Quatsino.

Gabbro Sills: These rocks are massive, tough, splintery, sometimes buff weathering, dark greenish grey on the fresh surface, equigranular, fine grained (0.5 mm.). A waxy whitish mineral that is probably nepheline and a clear, bottle-green olivine form the accessory minerals. This rock type is distinguished by its lack of structure (such as flow contacts, amygdules, jointing, etc.) on the weathered surface. It is represented in outcrops at DDH No. 4, north of outcrop No. 23 and is possibly related to the diallage porphyry.

Diallage Porphyry Sills: Massive, buff or dark weathering with the phenocrysts usually showing clearly on the weathered surface as pale laths. This gives the weathered surface the appearance of straw fragments. On the fresh surface the porphyry has grey groundmass with a chaotic assemblage of pale greenish diallage crystals (average width 1 cm.) forming about 15-20% of the rockmass. In places, this diallage porphyry grades into a tough dark green splintery sill rock with only a few small diallage plates evident. A good example of this is at the southeast end of outcrop No. 86 where there is a transition from abundant diallage downwards into sill rock with almost no diallage in about 12 inches.

Feldspar Porphyry Dyke: A massive, splintery, tough K-feldspar porphyry dyke was seen at outcrops No. 20 and No. 21. The K-feldspar phenocrysts are subhedral and little more than 1 or 2 mm. in size. They are set in a greyish green groundmass. The absence of quartz, the presence of approximately 20% K-feldspar and the dark greenish grey appearance of the rock lead the writer to classify it as a latite.

Argillite: Black, aphanitic, thick-bedded, tough splintery argillites were seen only at outcrops No. 30 and No. 48 and to the east of outcrop No. 45.

Shales: Grey, poorly consolidated, muddy, thin-bedded shales were seen at outcrops No. 45, No. 49 and at outcrop No. 44 where they were interbedded alternately every six inches with massive grey splintery limestone.

Conglomerate: A most interesting outcrop (No. 59) of coarse conglomerate contains rounded pebbles (average size 2 inches) of various kinds of volcanics, but also occasionally of a fairly fresh diorite. Unfortunately this outcrop does not lie close to surveyed road and is not tied in. It lies

approximately 3,000 feet due south of outcrop No. 58.

Andesite: A tough, splintery andesite, greyish green and aphanitic was seen at outcrops No. 38, No. 46 and No. 47.

6-3 Structures

a. Rock Structures: Flow contacts were quite often observed in the basalts and conformed well with the regional strike and dip of the limestones.

Bedding in the limestones was usually well defined. A sink hole with a small twisted "shaft" at the bottom was seen in the limstones to the east of outcrop No. 45.

b. Rock Unit Structures: Major fracture systems of at least two ages cut the map area.

The master set follows the regional strike of 320° and is most obviously expressed in Holberg Inlet itself and possibly in a fault observed at outcrop No. 36 which may continue westwards down the valley of the San Josef River. A sub-parallel system expressed in Pegattem Creek, Glerup Creek and Hol Creek may be related to this set.

A second important fracture set with northeasterly strikes cuts the map area. The faults in Crackerjack Creek and in the creek emerging at the lop dump are examples of this set. Here, as elsewhere in the region, these northeasterly faults - probably block faults - have shuffled the three units of the Vancouver group so that the continuity of units on strike is repeatedly broken.

The limestones in the center of the map area clearly belong to the Quatsino. The absence of fragmental volcanics and the presence of thin limestone beds (eg. ocp No. 66, No. 67) indicate that the volcanic assemblages lying to the N.W. and to the N.E. of the limestone in the center of the map area should be assigned to the Karmutsen.

The conglomerate outcrop (No. 59) probably represents the downfaulted base of the Tertiary.

6-4 Alteration

The most important and noticeable alteration is evident in the basalts adjacent to hematized shears. Alteration is from the dark green typical of the basalts to a dark reddish green. The amygdules, typically calcitic or epidote, are altered to dark green chlorite nests. This type of alteration together with its fractured appearance drew the writer's attention to the quarry face at outcrop No. 71 which was found on closer examination to be mineralized with pyrite and bornite.

This type of alteration is best developed in the basalt at what appears to be a faulted hematized contact with the massive unaltered diallage porphyry sill.

Significantly, outcrop No. 73 to the west of the Glerup lakes shows these contact relations associated with alteration.

6-5 Mineralization

Amygdaloidal basalts are generally the host to fracture fillings and veinlets mineralized with bornite and minor chalcopyrite in both the Crackerjack Creek and the Native Creek areas. An important exception to this occurs at the No. 2 Adit in Crackerjack Creek where mineralization occurs in a pale green, aphanitic hard and splintery volcanic.

10210

6-5-1 Crackerjack Creek Area: The main surface showings in this area lie above the No. 2 Adit. Mineralization appears to be related to a westerly striking fault with a dip to the north of 70°. The unusually hard and splintery volcanics adjacent to this fault have been fractured and mineralization with bornite has taken place. This bornite was seen to occupy fractures up to one inch in width, but

widths are more typically of the order of one eighth inch. No bornite was seen more than five feet from this fault in the creek bed above the No. 2 Adit. Mineralization in the adit below also seems to be confined to a zone adjacent to the fault which was exposed by drifting and by cross cutting from the hanging wall side through to the foot wall side in three places.

Trenching to the northwest of this adit in the cuts called "Central Showings" has exposed a southwesterly dipping zone in volcanics mineralized with minor bornite and secondary malachite. The exposed width of this zone in this partly sloughed in trench is about three feet. No mineralization was seen in the walls of Crackerjack Creek on the projected strike of this zone.

Results of sampling in the No. 2 Adit appear on the accompanying assay plan. Since the mineralization is adjacent to the fault, most of the sampling has been done along the strike of the mineralized zone.

Results of sampling the "Central" and "West" showings are tabulated below:

Location	Width	Grade	Sampler	For	Date
Central Showings	10.0 ft.	6.40% Cu.	M.M. Menzies	Noranda	May '55
Central Showings	2.2 ft.	0.92% Cu.	M. Sato	Mitsui	Oct. '59
West Showings	6.0 ft.	5.35% Cu.	M.M. Menzies	Noranda	May '55
West Showings	10.0 ft.	5.80% Cu.	M.M. Menzies	Noranda	May '55
West Showings	7.0 ft.	0.88% Cu.	A.R. Allen	Owners	May '59
West Showings	6.5 ft.	2.63% Cu.	A.R. Allen	Owners	May '59
West Showings	2.2 ft.	0.58% Cu.	M. Sato	Mitsui	Oct. '59

Mineralization revealed by drilling some of the I.P. anomalies in the northern part of the Crackerjack Creek area are as follows:

D.D.H. No.	From	To	Intersection	Grade
2	354	366	12.0 ft.	2.35% Cu.
5A	370	386	16.0 ft.	0.53% Cu.
6	391	443.5	52.5 ft.	0.19% Cu.
7	866	910	44.0 ft.	0.60% Cu.

This drilling has shown that mineralization extends 700 feet to the northwest of the surface showings in the form of a steeply dipping vein system. As pointed out by H.H. Cohen in his report of 3 May 1966, this does not conform to the flat dipping structure exposed in the surface exposures to the south. These are therefore probably separate zones.

Approximately 12 I.P. anomalies remain untested. Drilling in this area proved difficult and costly in some locations due to deep overburden. A new geophysical study of overburden conditions using the known depths of overburden in the drill holes as control should be made before planning further drilling in this area.

6-5-2 Native Creek Area: Mineralization in this largely unexplored area which lies 36,000 feet to the south-east of Crackerjack Creek, has been found as follows:

Near the Mouth of Native Creek: A showing of native copper in amygdaloidal basalts occurs near the mouth of Native Creek. This showing was described by Gunning in G.S.C. Summary Report for 1929, Part A, page 139 A. The dimensions and grades of this exposure which the writer has not visited, are not known.

Showings along Logging Roads at the Head of Native Creek: On his first visit to the property the writer was asked to visit the showing at the mouth of Native Creek if time permitted. While mapping the geology along the logging roads near the upper part of Native Creek, some malachite staining and copper mineralization was noted in some of the quarries excavated by Rayonier to provide road fill.

This mineralization consisting of bornite and more rarely, chalcopyrite, occurs as disseminations in altered basalts adjacent to their apparently faulted contacts with a diallage porphyry sill. The mineralization seen as very minor and low in grade, but is widespread having been seen in outcrops No. 71, No. 72, No. 84, No. 85, No. 87 and No. 89.

The contact relations between the sill and the underlying basalt are best exposed in the quarry at outcrop No. 85, where the hematized and faulted contact strikes 340° and dips 23° west. A later fault with an attitude of 280°/82°N has cut both the sill and the basalt dropping the south block so that only the sill is visible. No sill rocks were seen at outcrops No. 87 and No. 90.

The sill itself is mineralized in one place with disseminated bornite. Large angular sill fragments bulldozed aside in roadbuilding at outcrop No. 84 showed this disseminated type of mineralization. The large outcrop of diallage porphyry No. 83 seems to be barren.

On a second visit to the property, the writer observed minor and intermittent copper mineralization in a volcanic horizon exposed along road number L 310 for over 1,500 feet. This section of the road is roughly parallel to the regional strike of 320°l Although this mineralization, which consists of disseminated bornite, is very minor and low in grade, it is certainly of interest as it lends weight to the theory of a favourable horizon for mineralization in the volcanic succession.

The copper showings at the mouth of Native Creek, in the quarries and along road number L 310 thus constitute a large target area for detailed exploration techniques.

7-0 EXPLORATION OF THE PROPERTY

7-1 Direct Exploration

7-1-1 Underground Workings: Three adits have been driven on the zone on Crackerjack Creek. These are described in various reports compiled by Weymark Engineering, 15 November 1967.

7-1-2 Diamond Drilling: Approximately 60 diamond drill holes have been drilled on this property mainly in the Crackerjack Creek area, but also on the Ace, Flats and Hole claim groups. These are also described in the Weymark Engineering report referred to above.

7-1-3 Trenching: A number of trenches were dug by early prospectors in the Crackerjack Creek area but most of these are mossy and overgrown. A large number of quarries dug by Rayonier to obtain rip-rap and road fill on their extensive logging road network over the property and beyond its limits, have been by far the most useful for mapping and prospecting property.

7-1-4 Sampling: Underground and drill hole sample results for the Crackerjack Creek area appear in the Weymark Engineering report mentioned. The mineralization in the vicinity of ocp No. 71 is as yet not systematically sampled.

7-1-5 Geological Mapping: A limited amount of geological mapping has been carried out in the vicinity of Crackerjack Creek.

A reconnaissance map made by the writer of part of the remainder of the property accompanies this report.

7-2 Indirect Exploration

7-2-1 Geophysical Surveys:

I.P. Surveys: An induced polarization survey has been carried out in the vicinity of

Crackerjack Creek.

Airborne Magnetometer Survey: This survey covered the entire property and detected low relief magnetic anomalies which it was the writer's job to investigate.

A close coincidence between relief and magnetic intensity was observed in ground magnetometer lines run across the anomaly lying north of outcrop No. 51. Rock types observed were confined to basalt. The magnetometer broke down on this survey so that the investigation of the remaining anomalies was made on the basis of geology and geochemistry.

The anomaly lying to the north of outcrop No. 23 is most probably due to a fairly large body of fine grained gabbro sill (?) that lies to the northwest of the Dump Creek fault. No mineralization was seen in this massive fresh and 'tight' looking intrusive, however, some mapping of its outer contacts to the northwest seems indicated.

The bay-shaped magnetic contour east of outcrop No. 45 was probably due to the abrupt change in rock types caused by the northeasterly striking fault (see geology map). No mineralization or alteration was evident in the outcrop on the steep banks of the creek that follows this fault.

The anomaly lying just south of the peak of Mt. Hansen was judged to be almost certainly topographic.

7-2-2 Geochemical Surveys: A reconnaissance geochemical survey was conducted on the property by Franklin L.C. Price and described in a report by him dated 29 October 1962. This program consisted of taking eight silt samples from various creeks and rivers draining the property. The results of this survey are tabulated below:

Sample No.	Cu. ppm.	Zn. ppm.	Mo. ppm.	Cu./Zn. ratio	Location
1.	20	110	0.8	0.19	San Josef R., 2 miles S.W. of R.C.A.F. Holberg base.
2.	23	130	0.8	0.18	San Josef R., 2 miles S.W. of R.C.A.F. Holberg base.
3.	37	120	24.0	0.30	Small creek draining W. Showing.
4.	73	120	0.8	0.60	Creek immediately E. of Crackerjack Creek.
5.	82	71	0.8	1.1	Approx. 2000 feet upstream from the mouth the N.E. flowing stream emerges near the mouth of Native Creek.
6.	120	120	0.8	1.0	Approx. 1300 feet upstream from the mouth of Native Creek.
7.	49	160	8.0	0.31	Approx. 2000 feet upstream from the mouth of Glerup Creek.
8.	57	140	0.8	0.42	Approx. 2000 feet upstream from the mouth of Pegattem Creek.

Price considered samples 5 and 6 anomalous. The native copper showing near the mouth of Native Creek and the copper mineralization found near the upper part of this creek have probably caused these anomalies.

In view of the fact that the Utah Construction orebody at Coal Harbour was first detected by soil sampling, geochemical prospecting on target areas such as the Native Creek area is considered an applicable and useful technique.

8-0 CERTIFICATE

I, David R. Morgan of 3424 West 6th Avenue, Vancouver 8, British Columbia, do hereby certify that:

1. I am a graduate of McGill University Montreal, Quebec. (B.Sc. Honours Geology, 1954)

2. Since graduating I have engaged in mining exploration in British Columbia, Quebec, Labrador, Ontario, Northwest Territories, the Yukon, Haiti, Arizona, Washington, Montana, Idaho and Mexico.

3. I am a consulting geologist.

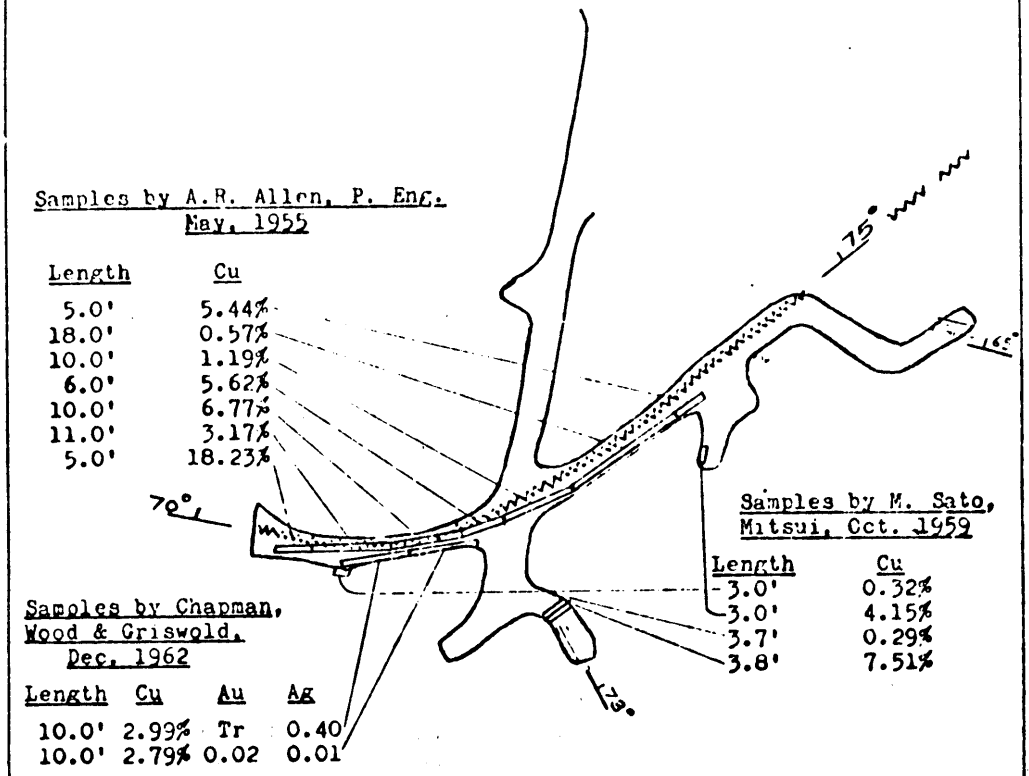
4. I am a registered member, in good standing, of the Association of Professional Engineers of British Columbia.

5. I personally examined the property of Holberg Mines Ltd. (N.P.L.) in the Holberg Inlet area, Vancouver Island on November 5-13, 1969.

6. I have not received, nor do I expect to receive, any interest, directly or indirectly in the properties or securities of Holberg Mines Ltd. (N.P.L.) or in those of any associated companies.

Signed: "D.R. MORGAN"
D.R. Morgan

Date: 2 March 1970
Place: Vancouver, B.C.



Samples by A.R. Allen, P. Eng.
May, 1955

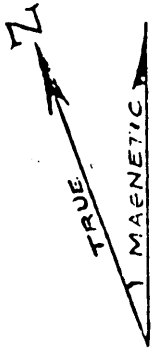
Length	Cu
5.0'	5.44%
18.0'	0.57%
10.0'	1.19%
6.0'	5.62%
10.0'	6.77%
11.0'	3.17%
5.0'	18.23%

Samples by M. Sato,
Mitsui, Oct. 1959

Length	Cu
3.0'	0.32%
3.0'	4.15%
3.7'	0.29%
3.8'	7.51%

Samples by Chapman,
Wood & Griswold,
Dec. 1962

Length	Cu	Au	Ag
10.0'	2.99%	Tr	0.40
10.0'	2.79%	0.02	0.01



HOLBERG MINES LTD (N.P.L.)

Holberg Inlet, Vancouver I.

ASSAY PLAN of #2 ADIT

Crackerjack Creek.

Scale: 1" to 20 ft.
Date: 2 March 1970
By: D.R. Morgan, P. Eng.
Source: Weymark Engineering report, 15 November 1967.