REPORT ON THE MAMMOTH COPPER PROPERTY

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APPENDIX IV: Geophysical Survey Report by Dr. S. S. Szetu, Cana Exploration Consultants Ltd., October 28th, 1967.

ABSTRACT

The Mammoth Copper Property consists of 108 mineral claims owned jointly by Mr. L. I. Proctor and Mr. L. J. Brown. The claims are located 98 airmiles north of Elsa, Yukon, the terminus of an all-weather highway from Whitehorse. Present access is by means of float-equipped aircraft to Fairchild Lake and thence by means of a helicopter to the property, a total flight distance of 129 miles from the Stewart River at Mayo, Yukon.

A preliminary reconnaissance survey has indicated the feasibility for the construction of an all-weather truck road to the property. The construction of this road will bring the property within a trucking distance of 400 miles to the railhead at Whitehorse.

The owners have located and partially explored an entirely new discovery of copper-cobalt-silver mineralization in a previously unmapped area. Mr. A. R. Archer, Consulting Geologist, in collaboration with Dr. D. C. Findlay, Resident Federal Geologist, has correlated the geology of the property to conform with the regional geology on G.S.C. Map Areas located 8 miles to the north and 16 miles to the south.

The mineralization is generally widespread throughout the property. The first season's program of geological prospecting, assisted by geophysical and geochemical surveys, has resulted in the mapping of fifteen mineralized showings of possible commercial significance. These showings are in very favourable geological formations. There are deposits of massive copper-iron and cobalt-arsenopyrite in metamorphosed Pre-Cambrium Dolomite overlain by Upper Triassic Volcanic rocks and a younger series of carbonate formations containing copper-tetrahedrite and iron mineralization. These three formations have been intruded by stocks and sills

of diorite and altered, sheared, quartz-diorite containing 'porphyry copper' type mineralization. There is accessory mineralization in trace quantities of cobalt, molybdenum, manganese, nickel, gold and silver. The mineralization is definitely of magmatic origin.

The aforementioned deposit of massive copper and cobalt mineralization is classed as a high-temperature pyrometasomatic contact replacement deposit in deformed metamorphosed Pre-Cambrium Dolomite adjacent to a dioritic stock and overlain by Upper Triassic Volcanic rocks and a younger sequence of carbonate rocks. This geological environment is considered to be ideal for the formation of massive copper and iron mineralization replacing the carbonate rock and, in places where the metamorphosed Dolomite has been intensely folded and fractured, large masses of rock may become entirely replaced by massive mineralization. There are good indications of this in the Dolomite bedding exposed above the talus in the fold-crest of the cirque. There is a three-foot width of massive chalcopyrite in the bedding at this location. The mineralization is expected to improve with depth, beneath the talus and toward the contact of the diorite.

There are two sills of leached, unmineralized diorite in the cirque floor at about 5750' elevation and a few hundred feet from the above showing. These sills may bear some relationship to an intrusive mass of mineralized quartz-diorite which outcrops 8000 feet south of the replacement deposit at the 4000 foot elevation. The quartz-diorite is sheared, altered and mineralized with disseminated chalcopyrite, magnetite and hematite. A geophysical survey indicates this deposit to be 800 feet long in an east-west direction and 300 feet wide, open to the north in the direction of diorite sills in the cirque. The mineralization is very

evenly diffused throughout the structure of the intrusive rock. At an average of 0.30% Copper it may be too low in grade to be worked by itself. However, if it is mined in conjunction with the comparatively high grades of ore from the replacement deposit, it will provide the bulk tonnage for large-scale operation on a commercial basis.

Both deposits can be mined from the surface downward by very low-cost openpit mining methods. Good concentrator and metallurgical recoveries are expected. A very preliminary estimate, subject to qualification after the proposed diamond drilling program, is possible ore reserves in the two deposits described above, amounting to 1,500,000 tons of ore containing recoverable values in copper, cobalt and silver of $21.00 per ton ore milled. Total operating costs, including the transportation costs of shipping concentrates to the smelter, is expected to be not more than $9.00 per ton of ore milled.

Recommendations include the construction of a winter road and an aircraft landing strip followed by diamond drilling, further geological prospecting, and geophysical surveys during 1968 at an estimated cost of $265,000.00. The owners of the property have already spent $60,000.00 on preliminary exploration. The owners are advised to option their property forthwith to a Mining and Exploration Company in order to finance all future expenditures through regular channels.

INTRODUCTION

The original discovery of massive, replacement-type, copper mineralization in dolomitic limestone was made near the mouth of Discovery Creek by Mr. L. J. Brown, of Mayo, Yukon. Since this area is difficult of access except by aircraft, Mr. Brown enlisted the services of Nordex Exploration Limited, a private company owned by Mr. L. I. Proctor, to assess the original discovery, to explore the area further and to stake and record mineral claims on any findings that might be of economic significance.

As mining consultant for Nordex Exploration Limited, I was called upon to examine the new discovery early in June, 1967. By this time, with the assistance of fixed-wing and rotary-wing aircraft supplied by Nordex, a copper-cobalt discovery had been made in the cirque at the head of Cobalt Creek. I at once recommended the staking of 56 contiguous mineral claims to cover both of the new showings and the ground between them and, since this area has not been mapped by the Geological Survey of Canada, we instituted a program of geological mapping by Archer, Cathro & Associates, Geological Consultants, assisted by two teams of experienced prospectors. Dr. D.C. Findlay, Resident Federal Geologist at Whitehorse, kindly consented to assist at this time. He was flown to the property and, with the use of our helicopter, was able to inspect much of the surrounding area in order to give his opinion as to the ages of the various rock formations.

During this first season, some 12 additional showings of geological significance were discovered and mapped, including several outcrops of intrusive rocks containing 'porphyry-type' copper mineralization. Additional claims were staked to cover possible extensions to the known

area of mineralization and, by year end, the property consisted of 108 mineral claims recorded jointly in the names of the owners, Mr. L. I. Proctor and Mr. L. J. Brown.

The following Engineering Report on the Mammoth Copper Property is a composite summary of all the season's reports submitted by Mr. A. R. Archer of Archer, Cathro & Associates; Dr. S. S. Szetu of Cana Exploration Consultants Limited of Toronto, and interim reports by the writer. Also included are the results of subsequent test work and analyses of rock specimens from the property. This test work was conducted by Dr. Peter A. Peach of Toronto under the direction of Dr. S. S. Szetu in order to clarify the relationship of volcanic extrusive rocks in contact with sedimentary rocks and dioritic intrusives.

PROPERTY AND OWNERSHIP

The property consists of 108 contiguously staked mineral claims recorded jointly in the names of the owners, Mr. L. I. Proctor, P.O. Box 264, Whitehorse, Yukon, and Mr. L. J. Brown, P.O. Box 146, Mayo, Yukon.

The claims are registered as follows:

Claim Name:	Grant Numbers	Expiry Dates:
Mammoth 1 to 56	Y6719 to Y6774 incl.	June 28th, 1968.
57 " 76	Y6791 " Y6810	July 12th, 1968.
77 " 84	Y6843 " Y6850	Aug. 18th, 1968.
85 " 92	Y6827 " Y6834	Aug. 1st, 1968.
93 "100	Y6835 " Y6842	Aug. 1st, 1968.
101 "108	Y6851 " Y6858	Aug. 18th, 1968.

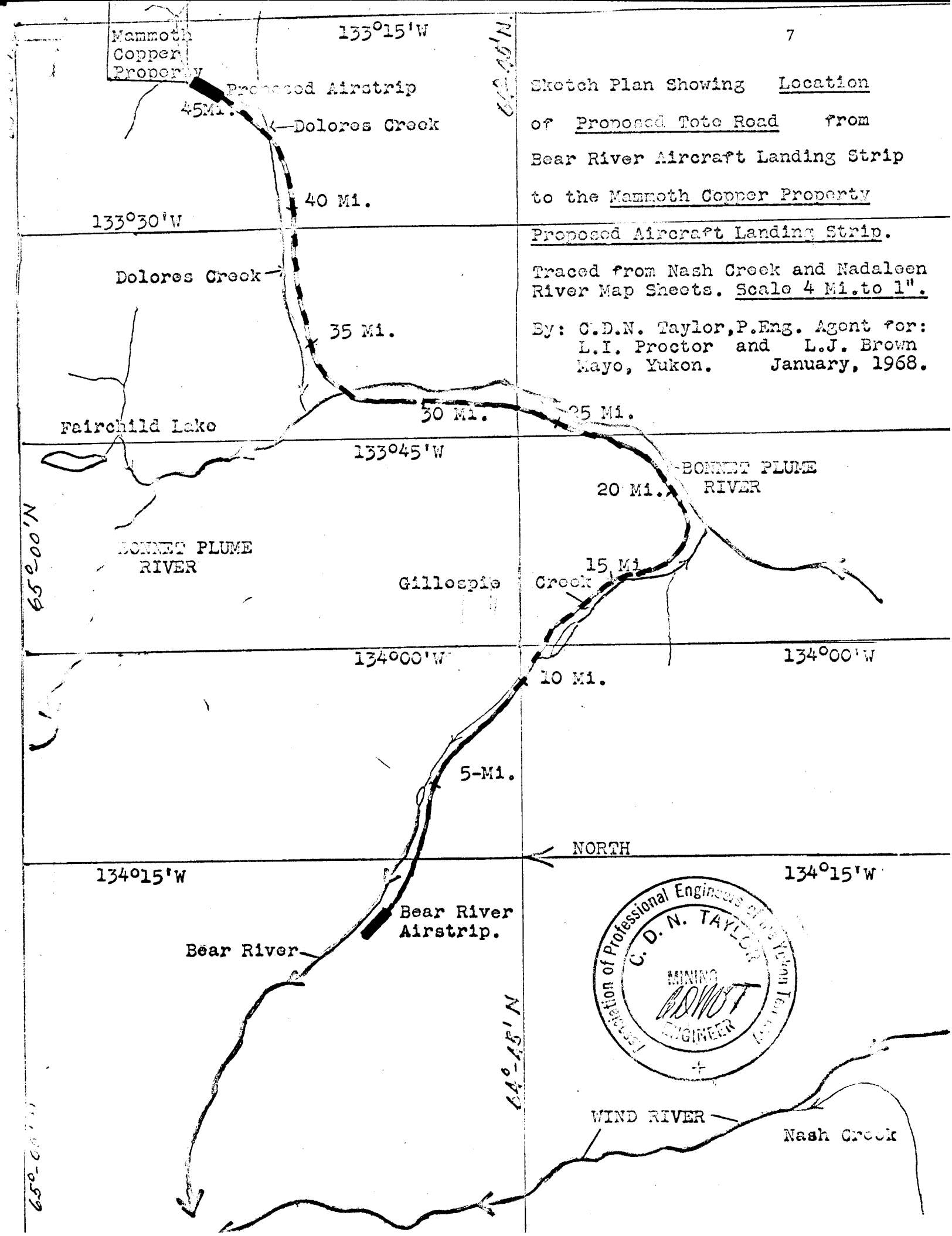
On the basis of last season's exploration expenditure on the property and on the submission of all Engineering Reports and Maps to the Mining Recorder, application has gone forward to group the claims and to record the representation work for a period of four years to the common anniversary expiry date of August 18th, 1971. (Please refer to Property Plan in folder.)

LOCATION AND ACCESS

The property is located 98 airmiles north of the mining town of Elsa, Yukon, at 64°55' latitude and 133°18' West longitude. This location is on the west side of the Bonnet Plume Range of Mountains. All of the creek drainages from the property flow into Dolores Creek which is a tributary to the Bonnet Plume River.

Present access to the property is by float-equipped aircraft from Mayo Landing to Fairchild Lake, a distance of 116 miles plus an additional 13 miles by Helicopter from Fairchild Lake to the property.

The Wind River Trail, a winter trucking road from Elsa to the Peel Plateau oil field is within 56 miles of the property. On October 31st,



Sketch Plan Showing Location of Proposed Toto Road from Bear River Aircraft Landing Strip to the Mammoth Copper Property

Proposed Aircraft Landing Strip.

Traced from Nash Creek and Nadaleen River Map Sheets. Scale 4 Mi. to 1".

By: C.D.N. Taylor, P.Eng. Agent for: L.I. Proctor and L.J. Brown Mayo, Yukon. January, 1968.

Association of Professional Engineers of the Yukon Territory
C. D. N. TAYLOR
MINING ENGINEER

1967, Mr. A. A. Wright of the Department of Public Works in Whitehorse was able to conduct a preliminary reconnaissance of the McClusky Lake pass between the Wind River Trail and the Bonnet Plume River and on to the Mammoth Property. Mr. Wright states that it appears to be quite feasible, by this route, to construct an all-weather highway a distance of 105 miles from the highway near Elsa to the Mammoth Property. The construction of this highway would bring the property within a trucking distance of 400 miles to the railhead at Whitehorse, Yukon. This distance is comparable to the present truck-haul by Cassiar Asbestos Corporation from their Clinton Creek Property west of Dawson, Yukon, to the railhead at Whitehorse. As a preliminary measure it has been proposed to construct a winter road from the Bear River airstrip to the property, a distance of 45 miles.

TOPOGRAPHY, GEOMORPHOLOGY AND WATER SUPPLY

The property lies within a mountainous area and most of the peaks and ridges extend steeply to six and seven thousand feet from a base elevation of 3500 feet. With reference to the attached plans, there appear to be two westerly trending faults occupied by the upper feeders of Cobalt Creek on the north part of the property and, by Camp Creek on the south. Intersecting the latter structure are three southerly trending fault structures occupied by Cobalt, Discovery and Tetrahedrite Creeks respectively. The three steep ridges separating the creeks cross the property within a lateral distance of four miles.

Rock outcrops are abundant at all the higher elevations but are generally obscured by talus and lateral moraines on the lower slopes. The soil cover is thin and consists of a layer of peat muck covering

fragmented country rock. Surface erosion is extremely rapid due to thin vegetation and consequent exposure to seasonal precipitation and frost action in the bedded sedimentary rocks and in the jointed intrusive rocks.

There was an ample supply of water for milling and camp purposes in Dolores Creek early last spring and late this fall. A minimum flow of 100 cubic feet per second is estimated at the 3000 foot elevation. This flow is not expected to diminish much after freeze-up because, compared to other creeks in this latitude, there is no evidence of ice accumulation (glaciers) in the creek bottoms. This leads one to the conclusion that permafrost, if there is any at all, must be very deep-seated and below the watertable. Under these conditions the creek waters will be free-running under the ice during winter.

EXPLORATION DURING 1967

Exploration during the season of 1967 consisted of geological prospecting assisted by geophysical and geochemical surveys organized through the facilities of Nordex Exploration Limited under my direction. The work was conducted as follows:

A. Geological Surveys Assisted by Prospecting:

Prospecting commenced June 15th and continued during most of the summer until September 15th, 1967. Two-man crews, an experienced prospector and a helper were used in the interests of safety and in order to cover more ground in each traverse.

Archer, Cathro & Associates, Consulting Geological Engineers of Whitehorse, supplied field crews to check and to correlate the prospectors' findings and to geologically map the property. These geological examinations took place between July 1st and 11th inclusive; also,

between September 1st and 10th inclusive. Mr. F. Marshall Smith, an experienced graduate Geologist, accomplished most of the geological mapping. A senior Geologist of the firm, Mr. Alan R. Archer, made the geological interpretations and submitted two Geological Reports on the property. In this, Mr. Archer conferred with Dr. D. C. Findlay, Resident G.S.C. Geologist of Whitehorse, and with Dr. S. L. Blusson, a G.S.C. Geologist of Ottawa who has been studying similar rock formations to the south-east of the property. In this manner, the geological setting of this previously unmapped area was correlated with published G.S.C. Maps 10-1963 and 53-7-1954 which describe the geology of the areas 8 miles to the north and 16 miles to the south of the property respectively.

During these two periods of geological surveying and mapping, 2 two-man crews of prospectors were provided to assist the Geologists and, to facilitate the traverses, a Helicopter was in constant attendance to despatch and pick up the men on pre-determined schedules. Mr. Louie Brown headed up one prospecting team and Mr. Michael Chefkoi the other. Between the above two periods, prospecting of the property was continued by Michael Chefkoi and one assistant but without the assistance of the Helicopter.

B. Geophysical Survey: (Refer to Plate III)

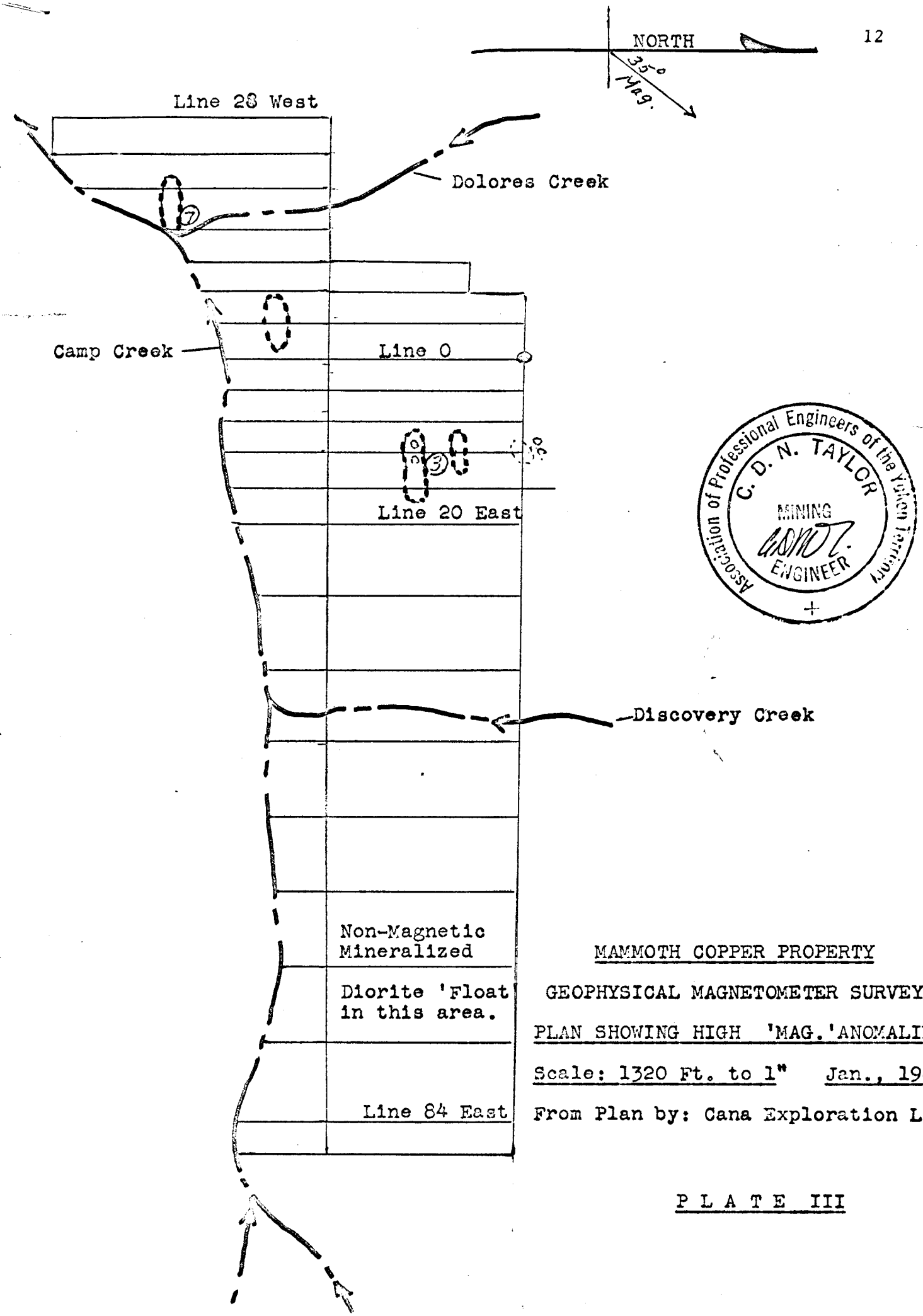
Following the discovery of an outcropping of a syeno-diorite intrusive formation containing chalco-pyrite, magnetite and hematite mineralization, it was decided to conduct a ground geophysical magnetometer survey across the southern part of the property which is more heavily overburdened than the higher, more northerly portions. The survey was designed to delineate the dimensions of the known mineralized intrusive

and to map the locations of magnetic anomalies which may indicate the presence of other mineralized intrusives under overburden.

The work was conducted by Cana Exploration Consultants Limited of Toronto and is described at length by Dr. S. S. Szetu in his report on the property dated October 26th, 1967. North-south picket lines were laid out on 400 and 800 foot intervals and stations were established at 100 foot centres along the picket lines and the baseline. Eight miles of picket line were cut and surveyed. A Sharpe A-2 Magnetometer was used for the survey and the readings were plotted to a scale of 1 inch to 200 feet.

The survey outlined several magnetic anomalies having high readings of from 1000 to 2000 gammas against background readings in the order of 500 gammas. The strongest anomaly occurs over the known outcrop of mineralized syeno-diorite. The indicated length of this structure is 800 feet in an east-west direction and the width is at least 300 feet, open to the north on a steep, unsurveyed area. There are similar anomalies to the east of this and under overburden. The closest rock outcrops to these anomalies consist of diorite with some chalcopyrite mineralization. (Showing No. 7 on the Map.)

In the light of some recent test work in Toronto, the magnetometer survey is far from complete in that the line spacing is too great east of Discovery Creek, and the survey should be extended north and west of the mapped magnetic anomalies. Some non-magnetic, mineralized diorite 'float' rock has been found east of Discovery Creek in an area showing magnetic readings of less than 400 gammas. It is thought that closer line spacing and readings may indicate magnetic 'lows' in this area, and that the magnetic 'lows' may indicate increased copper values. The non-magnetic 'float' diorite assays higher in copper than the magnetic syeno-



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MINING
ENGINEER

MAMMOTH COPPER PROPERTY

GEOPHYSICAL MAGNETOMETER SURVEY

PLAN SHOWING HIGH 'MAG.'ANOMALIES

Scale: 1320 Ft. to 1" Jan., 1968

From Plan by: Cana Exploration Ltd.

P L A T E III

diorite to the west of Discovery Creek. This may be important in that it is evident that additional copper has replaced the magnetite fraction of the intrusive to increase the grade and the economic value of the intrusive body. Assays of this non-magnetic 'float' diorite vary from 0.87% Copper and 3.4% Iron to 1.72% Copper and 6.52% Iron. Recent test work on this diorite by the Davis Tube Method indicates only traces of magnetic iron. As a comparison, the magnetic mineralized syeno-diorite found west of Discovery Creek assays not more than 0.31% Copper and 5.0% Iron.

C. Geochemical Surveys:

(1) Silt Sampling: Early in July a preliminary geochemical silt sampling survey was made by Mr. A. R. Archer of Archer, Cathro & Associates. Assisted by the use of the helicopter, Mr. Archer took some 38, widely spaced samples of silt from streams on or bordering the property. The samples were assayed by Chemex Laboratories Limited of Vancouver, using the hot acid method of extraction. In his report of October 14th, Mr. Archer states that: "The Assay results indicate an excellent contrast between mineralized and unmineralized areas but are of little assistance in locating specific zones of mineralization within the boundaries of the property. It is interesting to note that a reconnaissance sample density of only one silt sample per two square miles would have been required to clearly outline the general area of greatest interest".

The assay values were generally lower than expected; however, the assays of silt samples from streams draining the property are approximately twice the value of the assays of silt samples from streams draining the unmineralized areas bordering the property.

(2) Soil Sampling: (Refer to Plate IV)

Early in September, Archer, Cathro & Associates conducted a geochemical soil sampling program over the surveyed grid lines across the southern part of the property. 312 soil samples were taken on 200-foot centres using mattock grub-hoes to dig beneath the moss and peat to obtain the organic-free material beneath for each soil sample. Samples were bagged in standard Kraft soil sample envelopes and were assayed for Copper by Chemex Laboratories Limited of Vancouver, British Columbia, using the standard hot acid extraction method.

Assays varied widely from 6 parts per million in glacial till to 1490 parts per million in the area of the porphyry-copper intrusive outcrop. (Showing No. 3.) Regarding the results of this soil sampling survey, Mr. Archer states:

"Strongly anomalous values are found in the vicinity of the porphyry showing and up the hill from it. The area of high values above the outcrop is due to mineralized syenite 'float' from an unprospected area further up the hill. Soil sampling is not a particularly useful tool in this geomorphological setting because there is almost no soil development. Mineralized areas can be found and evaluated just as effectively by detailed prospecting."

It must be noted from the above that the area up the hill from the highly anomalous 'porphyry-copper' showing should be soil sampled further, or should be prospected thoroughly using a grub-hoe to uncover the rock fragments under the thin layer of peat and moss. The area east of Discovery Creek is covered to too great a depth with lateral moraine material to be prospected effectively by hand methods. Prospecting with a bulldozer is recommended there.

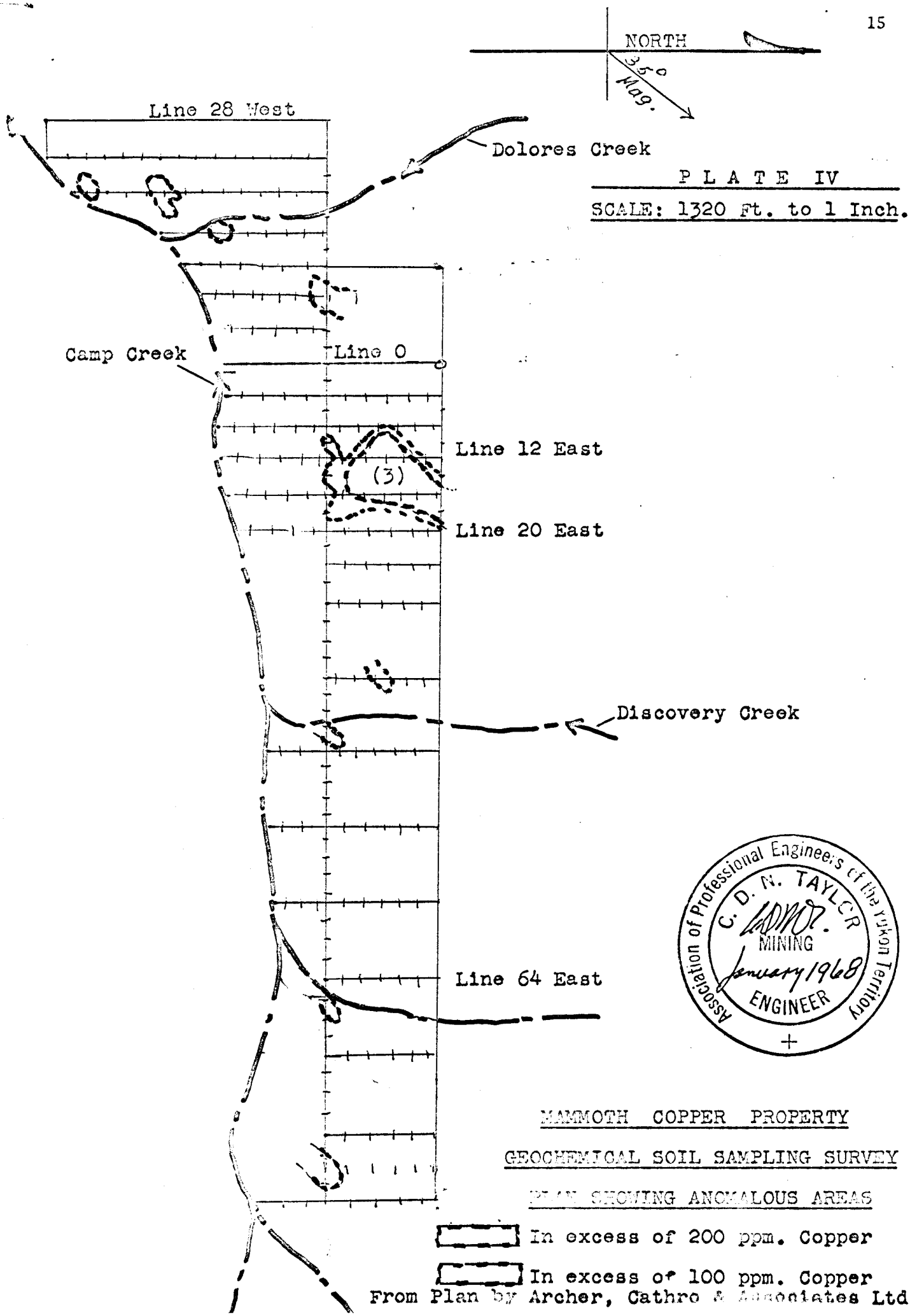

PLATE IV

SCALE: 1320 Ft. to 1 Inch.

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January 1968
ENGINEER

MAMMOTH COPPER PROPERTY

GEOCHEMICAL SOIL SAMPLING SURVEY

PLAN SHOWING ANOMALOUS AREAS

In excess of 200 ppm. Copper

In excess of 100 ppm. Copper

From Plan by Archer, Cathro & Associates Ltd.

D. Exploration Costs: (See Appendix I(3) Affidavit)

More than $56,000.00 was expended during 1967 in the staking and exploration of the Mammoth Copper Property, as follows:

Expenses as per Audit Statement dated December 12th, 1967:

Claim Staking and Recording, 108 Mineral Claims			$ 10,203.77
Exploration Expense: Geological Surveys assisted by Prospecting		$30,976.49	
Line-cutting and Survey,	8.0 line-miles	6,519.34	
Geophysical Survey,	8.0 line-miles	3,825.46	
Geochemical Surveys,	350 samples	3,253.04	
Total Exploration Expense as per Audit			$ 44,574.33
Add, test work, rock analyses and reporting subsequent to Audit of December 12th..			1,221.90
Total Exploration Expenditure for Year 1967			$ 45,796.23
Total Expenditure in Staking and Exploration			$ 56,000.00

NOTE: The above total expenditure does not include any remuneration for the time the two owners spent on the property, nor does it include the Nordex Exploration office expense or general overhead expenses estimated at ... ... $ 4,000.00

The above exploration costs are unusually high due to increased dependability on the services of the helicopter. All personnel and supplies had to be ferried from Fairchild Lake by helicopter, a return distance of 26 miles.

Of the total exploration expenditure, $45,796.23 is being applied as representation work on the 108 mineral claims for a period of four years.

E. Names and Addresses of Personnel:

The following personnel assisted with the various phases of exploration work on the property during 1967:

Names:	Addresses:
Mr. L. I. Proctor	P.O. Box 264, Whitehorse, Yukon.
Mr. L. J. Brown	P.O. Box 146, Mayo, Yukon.
C. D. N. Taylor, P.Eng.	3943 Locarno Lane, Victoria, B.C.
Mr. C. E. Ford	P.O. Box 1080, Whitehorse, Yukon.
Mr. E. A. Nelson	P.O. Box 827, Whitehorse, Yukon.
Dr. A. E. Aho	355 Burrard Street, Vancouver.
Mr. Michael Chefkoi	P.O. Box 41, Dawson City, Yukon.
Mr. David Moses	General Delivery, Mayo, Yukon.
Mr. Frank Germaine	" " " "
Mr. Neil Hager	" " " "
A. R. Archer, P.Eng.	Bentall Centre, Vancouver, B.C.
F. Marshall Smith, P.Eng.	P.O. Box 1708, Whitehorse, Yukon.
Dr. S. S. Szetu	12 Richmond St. E., Toronto, Ont.
Mr. Monty Hall	12 Richmond St. E., Toronto, Ont.
Mr. Robert VanWyk	P.O. Box 130, Whitehorse, Yukon.
Mr. R. Parker	P.O. Box 146, Mayo Landing, Y.T.
Mr. P. Lucas	General Delivery, Mayo, Yukon.
Mr. L. Johnny	" " " "
Mr. Harry Baum	" " " "
Mr. F. Alfred	" " " "

GEOLOGY - TABLE OF FORMATIONS

The geology of the region has not yet been reported on or mapped by the Geological Survey of Canada. Mr. A. R. Archer, Consulting Geologist, in collaboration with Dr. D. C. Findlay, Resident Federal Geologist at Whitehorse, and with Dr. S. L. Blusson of the G. S. C. in Ottawa, has arrived at the following Table of Formations which will conform with G.S.C. Maps 10-1963 and 57-7-1954 of areas eight miles to the north and sixteen miles to the south of the property, respectively:

Unit:	Era:	Period:	Description:
1.	Pre-Cambrian	Proterozoic	The Katherine Group of the oldest rock formations including dolomite, limestone, slate, phyllite and quartzite and iron formation.
2.	Cambrian	Mesozoic	The Rapitan Group. Coarse agglomerate with volcanic flow rocks overlain by Upper Triassic carbonate rocks and intruded by diorites, syenites and andesites.
3.	Cambrian and Younger	Tertiary	A younger sequence of thick carbonate rocks overlying Unit 2. Buff-coloured coarsely crystalline dolomite overlain by grain dolomitic limestone.

Unit 1: This unit occurs west of the headwall of Cobalt Creek Cirque at the north-west part of the property. It is folded into an anticline so that the outcrops west of the cirque headwall have beds dipping steeply to the west. There is evidence of local folding and faulting. There is an intrusive sill of leached diorite crossing the cirque in a north-south direction with one arm of it extending easterly toward the centre part of the cirque. (See Map attached, also Plate I.) There is a quartzitic iron formation about 750 feet wide which crosses the country for miles north of the property in a northerly direction, to

terminate abruptly at an assumed fault marked by the location of Cobalt Creek. The stratigraphic sequence of Unit 1 in the Cobalt Creek area is described by Mr. Archer as follows:

" ... Youngest Formation - Black Slate
Iron Formation (Hematite, Jasper)
Quartzite
Cherty Dolomite
Green Slate

Intrusive Sills - Diorite

Chert
Black Slate (minor chert)
Dolomite
Iron Formation
... Oldest Formation - Dolomite.. .. .. "

Unit 2: This unit lies unconformably over Unit 1 and has a variable thickness up to 3000 feet. It is composed mainly of coarse agglomerate and extrusive volcanic rocks which lie generally in a northeast direction across the property. These flow structures have engulfed large masses of dolomitic limestone from Unit 1. These sedimentary masses strike northerly and dip steeply to the east. Unit 2 is intruded by randomly-spaced dioritic stocks or sills which, possibly, may be off-shoots from a batholitic structure at depth.

The agglomerate of Unit 2 contains coarse, angular fragments of Unit 1 bonded with a fine-grained, reddish, volcanic flow rock. When in contact with intrusive stocks or plugs of diorite, the agglomerate assumes the characteristics of an explosion breccia. (See Plate II.) Specular hematite occurs generally throughout the agglomerate in coarse flakes bordering the rock fragments or in fine-grained disseminations throughout the matrix.

A sample of the mineralized syenite, Showing No. 3 on the plan (Ref. Plates III & IV), was sent to Professor Peter A. Peach of Toronto University for microscopic study. Dr. Peach describes this intrusive rock as follows:

"Sample A. The rock consists of a medium-grained network of oligoclase-andesine crystals with some interstitial quartz and a little orthoclase. There are no recognizable ferro-magnesian minerals present. The entire rock has been crushed or sheared, bending some of the plagioclase grains and developing zones of cataclastic texture. These have some fine-grained magnetite developed in them and a lot of carbonate and rutile. The chalcoprite-pyrite-pyrrhotite mineralization is confined to isolated patches and is not related to the zones of crushing. The rock is a diorite or a quartz-diorite, sheared and partly altered." This rock assays 0.305% Copper.

Also in Unit 2, there are outcroppings of mineralized diorite along Dolores Creek near the mouth of Camp Creek, Showing No. 7 on the plan (see also Plates III & IV). Dr. Peach describes this intrusive rock as follows:

"Sample B. This rock consists of a medium to fine-grained network of oligoclase-andesine lath-shaped crystals, strongly saussuritized and much replaced by carbonate with some zones of crushing replaced by quartz. Throughout this there is uniformly scattered euhedral to subhedral grains of magnetite, sometimes accompanied by leucoxene. The rock is very highly altered and looks as if it is a phase of Sample 'A'. It is probably a fine-grained diorite or gabbro-diorite." This rock assays 0.210% Copper.

A dark green volcanic rock found out-cropping on the right limit

of Contact Creek between the 5000 and 6000 foot elevations and containing chalcopyrite mineralization (Refer to Showing No. 12 on the Plan), is described by Dr. Peach as follows:

"Sample C. This is a fine-grained network of andesine or oligoclase-andesine laths in an almost basaltic texture with some interstitial chlorite, serpentine,orthoclase and magnetite. There is a great deal of carbonate replacement of the rock and quite a bit of secondary fibrous amphibole. Some quartz, accompanying the carbonate in patches, cannot positively be identified as primary or secondary. No sulphides were seen but much of the magnetite is too fine-grained to be positive in identification in thin section. The rock is almost certainly a highly altered basalt." It is noteworthy that the above sample of basalt assayed 1.39% Copper which, apparently, was too finely disseminated to be seen in thin section.

Some non-magnetic, mineralized diorite 'float', picked up on the sidehill some 3500' east of Discovery Creek at the 4000' elevation (Refer to No. 15 on the Plan), may have originated in Unit 2 at about the 6000' elevation. This intrusive rock assays 0.87% Copper, 0.90% Magnetic Iron and 3.4% total Iron. It is described by Dr. Peach as follows:

"The sample consists of crushed mineral grains of which the most abundant mineral is carbonate which is readily soluble in dilute hydrochloric acid and is therefore calcite. Cleavage fragments of feldspar are next most abundant. These seem to be in the ratio of about 5 to 1 of orthoclase to plagioclase. The plagioclase is about oligoclase in composition. There is a small amount of quartz. The only ferromagnesian mineral is chlorite which is present in only a small amount. There are some fragments of rutile. The opaque minerals consist of both magnetite and some sulphides with both pyrite and chalcopyrite showing.

From the assemblage of minerals it looks as if the original rock is a syenite. The plaglioclase is not sufficiently calcic for it to be a monzonite, and, although quartz is present, it does not seem to be sufficiently abundant for the rock to be granite or granodiorite."

Unit 3: This youngest geological unit is a thick carbonate sequence which overlies Unit 2. It consists of buff-coloured, coarsely crystalline dolomitic limestone containing veinlets of calcite, quartz and siderite.

At the north-eastern end of the property there is a noticeable colour anomaly displayed in the rock formations bordering the contact between Units 2 and 3. This evidence of rock alteration and the development of skarn minerals causes a sharp colour contrast between the lighter shades of dolomite and the deeper, reddish and orange-brown discolouration of the dolomite near the head of the Tetrahedrite Creek basin. Just south-west of this (Refer to Showing No. 4 on the Plan), in Unit 3, are two outcrops of apparent volcanic origin. Near these at about the 5500' elevation, there is the development of sedimentary hematite and magnetite partially replaced by chalcopyrite and tetrahedrite in the bedding planes of the dolomite. This mineralization contains higher values in silver than anywhere else on the property. This sequence is overlain by gray-coloured dolomitic limestone having a northerly strike and dips varying from 20 to 40° to the east.

MINERALIZATION

(Please refer to the attached plan and to the spectrographic analyses appended in this report.)

Iron and copper mineralization is widespread throughout the entire property. However, the past season's program of geological prospecting has resulted in the mapping of certain areas where commercial mineralization is most likely to occur, as follows:

1. The fold crest area at the head of Cobalt Creek cirque. (See Plate I.) This area is in Unit 1, the oldest formation, which is characterized by unconformable layers of slate and mudstone overlying dolomitic limestone which has been distorted and upthrust by dioritic and volcanic intrusives to form an anticline. The west limb of the anticline has been partially eroded to form a cirque which is quite precipitous above the talus slopes from about the 6000 foot elevation to the top of the fold crest at about 6700 feet.

There is a noticeable rock alteration halo extending round the cirque for a distance of about 4000 feet from relatively light coloured, pure, crystalline dolomite on the north-west side to an exposure of dark, argillaceous rocks to the southwest. The carbonate formation between has been subjected to intense alteration which has resulted in bright, rusty-red and orange-brown discolouration streaked with various shades of green. Random patches and disseminations of copper and of cobalt mineralization may be found anywhere in the cirque within the alteration zone, and this mineralization is clearly marked on the rocks by malachite staining and cobalt bloom (erythrite) respectively.

Massive copper-iron and cobaltite replacement-type mineralization occurs near the centre of the cirque under the apex of the fold crest. Here, at about the 6000 foot elevation, the distorted carbonate bedding

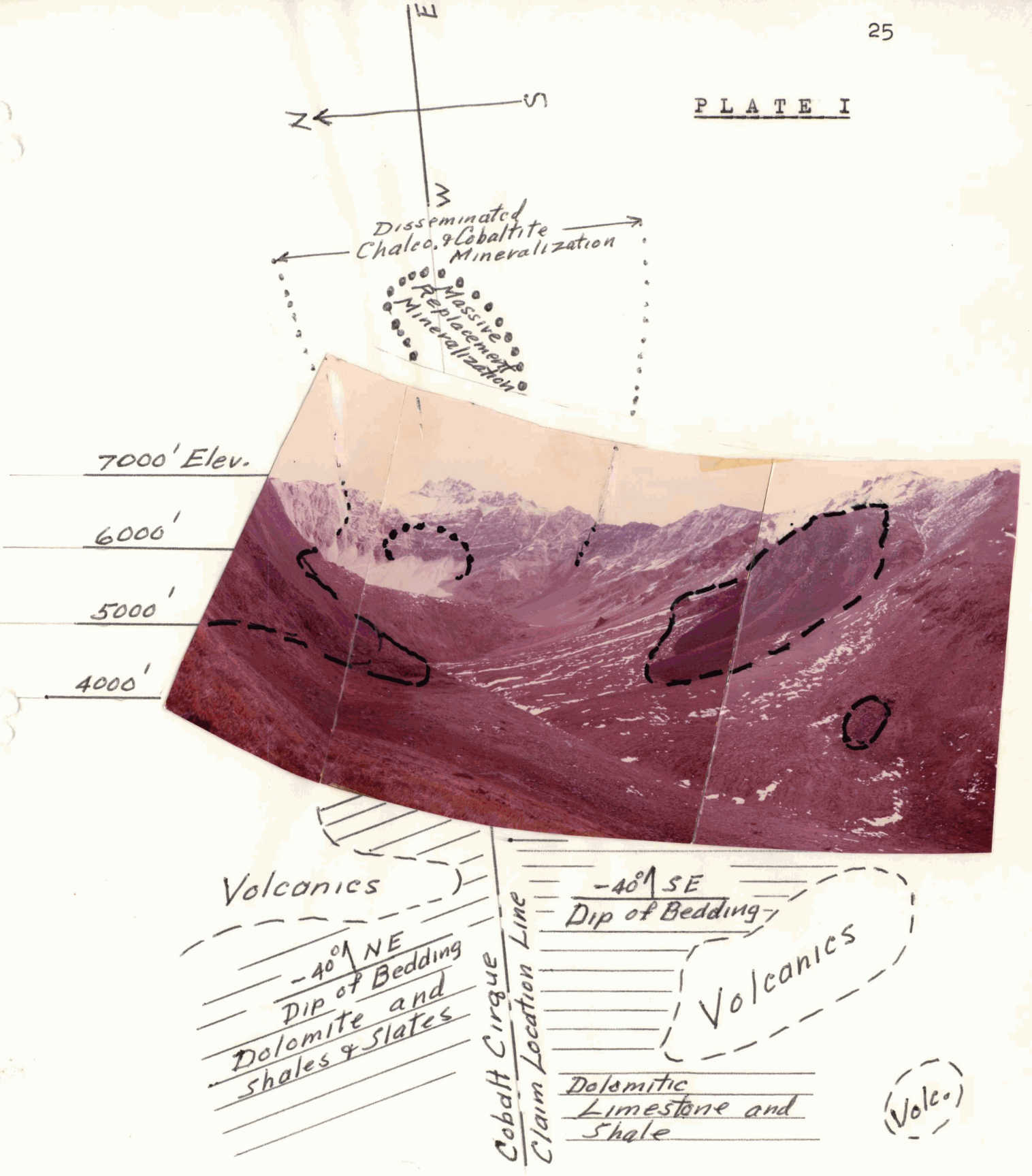
has been invaded by a boxwork of siderite-quartz-calcium-barite fracture fillings which have cemented all cracks, fissures and ruptures occurring transversely to the bedding. The boxwork 'veining' is almost invariably accompanied by varying degrees of replacement mineralization, usually chalcopyrite, magnetite and hematite replacing the dolomitic limestone, and, in strata above this, cobaltite and arsenopyrite replacing thinly-bedded dolomite, mudstone and slate.

The main zone of replacement-type ore occurs over a length of 420 feet and for a height of 130 feet above the talus. The widths of massive ore vary from 1 to 48 inches for chalcopyrite mineralization and from thin veinlets to 4 inches of cobaltite. The massive ore occurs intermittently in the bedding which dips easterly into the cirque at from 20° to 40°. Thus the mineralization may extend beneath the talus for an unknown depth toward the diorite and volcanic intrusives which lie adjacently to the west.

It is noteworthy that the massive chalcopyrite mineralization, assaying in the order of 18.2% Copper, carries very little in Cobalt values, with no arsenic; whereas, the massive cobaltite mineralization, (located in the bedded strata a few feet above the former), assaying in the order of 15.8% Cobalt, carries very little copper but is high in arsenic. Typical assays of the above formations are as follows:

		Assays:			Type of Mineralization
Sample:	Width:	Cu.:	Co.:	Ag.:	Descriptions:
#4170	18.0'	0.73%	Tr.	Tr.	Disseminated Chalcopyrite.
4171	6.0	4.20	Tr.	0.20zAg/T.	Disseminated Chalcopyrite.
4808	2.5	Tr.	0.54%	0.01 "	Disseminated Cobaltite.
4187	60.0	1.44	Tr.	Tr.	Partially replaced Dolomite.
4186	3.0	18.2	0.02	0.50zAg/T.	Massive Chalcopyrite.
4172	4.0"	0.3	15.8%	0.20zAg/T.	Massive Cobaltite.
4806	110.0'	0.76	Tr.	Tr.	Disseminated Chalcopyrite.

PLATE I



Panorama of Cobalt Creek Cirque Showing Mineralized Areas with Respect to Volcanic Outcrops. Mammoth Mineral Claims 1, 2, 3 and 4. Bonnet Plume River Mines Ltd., Yukon.

Photographs Courtesy of Alan Archer, Consulting Geologist.

The first six samples, above, were all taken on the cirque bluffs just above the talus at elevations between 6000 feet and 6200 feet. The last sample, No. 4806, was taken from a dolomite bluff on the north side of Cobalt Creek some 3000 feet west of the former samples and at an elevation of about 5000 feet. This bluff consists of sheared dolomite containing fairly consistent disseminations of copper and iron minerals. It is exposed for a width across the bedding of 120 feet of which 110 feet is accessible for chip sampling. It strikes northerly and dips at 70° westerly. It is almost certain to be the west limb of the fold crest and the anticline at the head of the cirque. This carbonate sequence lies between the iron formation to the west and the dioritic intrusive to the east. Thus it is about 2000 feet thick. This may be a significant guide as to the thickness of the mineralized carbonate strata on the east limb of the anticline where only about a 700-foot thickness is exposed above the talus and accumulated rubble.

Both east and west limbs of the anticline are considered to be prime targets for exploratory diamond drilling beneath the cirque bottom towards the intrusive rocks.

2. Sedimentary-to-Volcanic-to-Sedimentary Contact Zones:

Two main contact zones cross the property in a north-easterly direction. One of these is between the Katherine formation, the oldest group, and the overlying Rapitan volcanic formations. The other is between the Rapitan and the younger, overlying sedimentary formations.

Geological prospecting to date has resulted in the mapping of six mineral showings which outcrop at or near these two contact zones. With reference to the plan, these are Nos. 2, 4, 9, 10, 11 and 12. These 'contact' deposits are described as follows:

(2) This is the original discovery of replacement ore. It was found in a bluff near the mouth of Discovery Creek at an elevation of 3950 feet. It is a typical replacement of dolomitic limestone bedding by a massive concentration of copper minerals, iron minerals and quartz. It is located on the contact between the volcanics and the younger Tertiary limestones and it marks the lowest elevation at which replacement ore has been found on the property.

Character Sample No. 4168 of an 8" width of the massive mineralization assays 32.4% Copper and 1.2 Ounces Silver per ton. A cut chip sample, No. 4167, over an eight foot width of partially replaced limestone, assays 14.7% Copper and 0.40 Ounces Silver per ton.

(4) This showing is south of the Tetrahedrite Creek fault. It consists of chalcopyrite and tetrahedrite mineralization replacing hematite along the bedding planes of limestone overlying a volcanic intrusion. Sample No. 4183 of this assays 6.38% Copper and 12.1 Ounces Silver per ton over a width of 12 feet. The total iron in this sample assays 26.2% Iron and it is interesting to note that the magnetic fraction of the iron amounts to only a trace.

(9) An impure limestone remnant within a fine-grained diorite near the head of Discovery Creek contains disseminated chalcopyrite mineralization which appears to extend across the valley bottom over a considerable width covered by debris. Sample No. 4184 was taken across a ten-foot width of bedded strata on the south side of the outcrop remnant. This sample assayed 0.90% Copper but is not considered to be representative of the entire mass of the outcrop.

(10) Near the head of Tetrahedrite Creek at the 5200 foot elevation there is a 208-foot width of sheared dolomite striking northerly into the volcanic formation from an east-west fault which marks the contact

between the Rapitan volcanics and the overlying younger sediments. This sheared dolomite remnant contains thin veinlets and seams containing disseminated tetrahedrite heavily stained with malachite and some azurite. Sample No. 4182 across the 208-foot width of bedding assays 0.22% Copper and 0.04 Ounces Silver per ton. The dip of the bedding is almost vertical and there is a good chance to obtain diamond drill hole intersections of this deposit below the alteration zone.

(11) An outcrop of dolomite mineralized with chrysocolla crystal specimens is located near the head of Discovery Creek at the Rapitan/ Katherine contact. No sulphides accompanied the chrysocolla mineralization.

(12) There is a steep bluff of mineralized basalt on the right limit of Contact Creek between the 5000 and 6000 foot elevations. The basalt appears to be about 300 feet in width and is overlain by younger sedimentary rocks. Sample No. 4812, taken over a 10-foot width of bedded flow rock at the foot of the bluff assayed 1.39% Copper.

3. The Rapitan Volcanic Zone - Unit 2:

This zone, overlying Unit 1 and underlying Unit 3, crosses the entire property in a north-easterly direction. It is intruded by randomly-spaced dioritic sills and stocks. Some of the intrusives contain various degrees of mineralization which may be described as 'porphyry-type iron and copper mineralization'. They are considered to be important in that they may lead to the discovery of economic porphyry-copper deposits which can be exploited from the surface by very low cost mining methods.

Three of these have been discovered to date - Nos. 3 and 8 by surface prospecting, and No. 7 by a ground magnetometer survey. No. 15, a diorite 'float' area, is a fourth possibility as the 'float' may have originated east of Discovery Creek and within Unit 2. It is mentioned

here because it is well mineralized with copper and iron minerals but is non-magnetic and so must be prospected by other than geophysical magnetometer surveys. These showings are described as follows:

(3) 'Porphyry' Showing: (Refer to Plate II.) This is an outcropping of a mineralized intrusive rock called 'syenite' or 'syeno-diorite' in the field but identified under the microscope by Dr. P. A. Peach as "a diorite or quartz-diorite, sheared and partly altered". The outcrop consists of a steep bluff about 150 feet long and 30 feet high along a steep hillside. The geophysical and geochemical surveys over this area indicate that this mineralized intrusive is 800 feet long in an east-west direction and is at least 300 feet wide and open to the north on a steep, unsurveyed area. It is bounded on the north-west by a clastic explosion breccia of unknown proportions and to the north-east by an impure limestone remnant which strikes northerly and dips at 65° to the east. The mineralized diorite assays in the order of 0.30% Copper and 5.0% total Iron of which 2.7% is magnetic Iron. (Sample Nos. 1918-19 and 4188.)

(7) This is a geo-magnetic high anomaly resulting from a magnetometer survey in an overburdened area north-west of Dolores Creek. The nearest rock outcropping is an altered diorite to be found in a cutbank of the creek about 100 yards from the anomaly. This diorite is weakly mineralized with chalcopyrite and assays 0.21% Copper.

(8) An outcrop of weakly mineralized diorite on the left limit of Dolores Creek at about the 4500 foot elevation.

(15) This is a location in which non-magnetic, mineralized 'float' is found at the 4000 foot elevation, east of Discovery Creek. Sample No. 4811 of this float assayed 0.87% Copper and 3.4% total Iron of which the magnetic fraction is 0.9%.

The assaying and spectrographic analyses of rock samples indicate that there are certain similarities between the replacement mineralization

WEST ⟷ EAST

Dolomite Bedding 165°

Syenite to Dolomite Contact N 15°E at -65° Dip to E. Elev. 4250'

Clastic Injection Breccias located west of and above the mineralized Syenite.

Outcrop and Talus at 3250' Elev. of Porphyry-Copper in Syenite .

East Contact of Syenite to Dolomitic Limestone at 4250'.

PLATE II

of carbonate rocks as compared to the disseminated mineralization of underlying intrusive rocks; also, there are differences in the mineralization at the west end of the property as compared to the east. The following table attempts to illustrate these similarities and differences:

No.of Showing :	Type of Mineralization Location and Elevation	Copper:	Magnetic Iron:	Total Iron:	Accessory Minerals:
1	Carbonate Replacement at West end of Prop. at 6150' Elevation	18%	5%	10%	Cobalt, high Silver, low Molybdenum Nickel Vanadium
3	Disseminated in Diorite at West end of prop. at 4200' Elevation	0.53%	2.7%	5.0%	Cobalt, Tr. Silver, Tr. Nickel, Tr. Vanadium,Tr.
2	Carbonate Replacement Centre of Property at 3950' Elevation	32.4%	1.0%	8.0%	Silver, 1 Oz. Not analysed for other Minerals
4	Hematite Replacement East end of Prop. at 5250' Elevation	6.4%	Tr.	26.2%	Silver, 12Oz. Nickel, Tr. Not analysed for other Minerals
15	Disseminated in Diorite Centre of Property Float, 4000 to 6000'	1.7%	Tr.	6.5%	Cobalt, Tr. Silver, Tr. Molybdenum Tin, Tr. Vanadium

It is noted from the above that in the carbonate and intrusive formations lying generally west of Discovery Creek, the Copper mineralization is accompanied by a greater proportion of magnetic iron to total iron, generally low Silver content and the presence of accessory mineralization containing Cobalt, Molybdenum, Nickel and Vanadium, whereas in the carbonate and intrusive formations lying east of Discovery Creek, the

Copper mineralization is generally accompanied by little or no magnetic iron, high total iron content, and comparatively high values in Silver. There has been insufficient spectrographic and thin section analyses of the carbonate mineralization at the east end of the property. It is noted, however, that the mineralized intrusive diorite east of Discovery Creek contains accessory cobalt, silver, tin and vanadium mineralization but no nickel.

Pyrite mineralization on the property is limited generally to widely scattered, minute cubes of pyrite disseminated in the country rock and in quartz veins and stringers. Some 10,200 feet west of the property, in a canyon near the head of Dolores Creek, there is a heavier concentration of large-cubed pyrite accompanied by visible galena in narrow quartz veins cutting an argillaceous dolomite formation. A sample taken here, at the 4500' elevation, in a quartz-filled fracture cutting a very folded argillite, Sample No. 4803, assayed 0.005 Ounces Gold per ton, 0.06 Ounces Silver per ton, 2.2% lead, and 4.07% Copper, over a 12-inch width.

Another pyritized formation lies at the 6300 foot elevation, some 3500 feet east of the property, facing the Snake River on the east side of the divide. Here, within a skarn area, there is a 25-foot width of sheared limestone overlain by a purple-coloured slate formation striking N60°E and dipping flatly to the west. The sheared limestone is cut by pyritized quartz stringers containing some visible galena and much malachite and azurite stain. Sample No. 4810, taken over the most mineralized portion of the shear zone, assayed trace Gold, 0.20 Ounces Silver per ton, 2.4% Lead and 6.9% Copper, over a width of 2.5 feet.

GENESIS OF MINERALIZATION

The mineralogical characteristics of this property include the deposition of massive cobalt-arsenopyrite mineralization and the deposition of massive copper-iron mineralization in pre-Cambrian dolomite. This formation is overlain by volcanic rocks and a younger series of carbonate strata containing copper, tetrahedrite and iron mineralization. These formations have been intruded by dioritic stocks which are in themselves mineralized with copper and iron minerals containing trace quantities of cobalt.

The above characteristics are unique in that they have not been duplicated elsewhere on the North American continent. There are deposits of straight Cobalt Ore in Idaho; also, deposits of Copper-Iron Ore in British Columbia. Both types result from the injection of mineralized solutions, having their source in early Tertiary magma into pre-Cambrian sedimentary rocks, Mezozoic volcanic rocks, and overlying Upper Triassic Carbonate rocks.

The mineralogical characteristics of this property are comparable, however, to those governing the formation of the large Copper-Cobalt deposits in Northern Rhodesia, namely, the Baluba, Chibuluma and Rhokana Mines. The ore from these mines has an average grade of 3.5% Copper and 0.16% Cobalt which is probably higher than the average grade which will be experienced at the Mammoth Copper property; however, included in the above grade is the customary 'blanket' of rich supergene mineralization, typical only of hot, humid climatic conditions and not to be experienced in the dry, arid regions of northern Yukon.

With reference, then, to the Mammoth Property, it is generally believed that the essential folding, fracturing and faulting of the oldest, Katherine Group of sedimentary rocks began during the extrusion of the

Rapitan Volcanics and during the deposition of the associated younger carbonate formations.

The first stage of mineralization took place late in this period. Cobalt-bearing and iron-bearing gaseous solutions were expelled forcibly and at high temperatures from a magma chamber in which they originated into the brecciated and fractured formations above. Rock-splitting and fracturing of the rock formations would be progressively enhanced by the heat and pressure generated by the volcanic activity at this time to permit the mineralized solutions to penetrate even into the more impervious, thin-bedded siltstones and slates overlying the dolomite. Finally the rock-polluted solutions would cool and crystallize into cobaltite and arsenopyrite.

This period was followed by further volcanic activity, the completion of Tertiary sedimentary deposition and final structural adjustments resulting from the second stage of injection mineralization. This stage was characterized by the injection of copper and iron-bearing solutions from their magmatic sources along the channelways and fractures previously opened up by the cobalt-bearing solutions. The copper minerals were deposited as disseminations and veinlets in the various openings in the rock during this latter period of adjustment, metamorphism and cooling. In some areas where the emanations encountered dolomite or limestone, these rocks were replaced by copper and iron minerals. In other areas, where optimum chemical conditions prevailed, the copper minerals replaced pyrite, magnetite and other iron minerals deposited during the initial phases of mineralization. The copper minerals did not penetrate the carbonate strata as far as the cobaltite did but are deposited in much greater quantity in the dolomite strata underlying the thin-bedded siltstones and slates. The mineralization of the younger

volcanic and carbonate rocks at the east end of the property by copper and iron minerals accompanied by tetrahedrite may have occurred in yet another phase of mineralization, possibly emanating from the volcanic rocks, since there is no evidence of cobalt mineralization in these areas except in the underlying intrusive diorite.

The above concepts of high temperature deposition of minerals throughout the property are supported by the following observations:

(1) The alteration halo effected on most of the mineralized outcrops is most pronounced. The variety of greenish, orange and reddish-brown discolourations of the formations must have resulted from high-temperature chloritization and rock splitting, followed by secondary iron-staining along minute cracks and fractures in the rock surfaces. Unmineralized areas are not so obviously marked.

(2) There is no evidence of the deposition of low temperature minerals such as galena within the boundaries of this property.

(3) Great pressures must have been involved in ejecting fluids containing copper, cobalt and iron mineralization from the location of the batholith or magma chambers beneath the lowest topographic relief of 3000 feet or less to the highest expression of mineralization on the ridges at about 6700 feet elevation.

ECONOMICS

The Property has two obviously important Copper deposits on the west side of Discovery Creek - the Copper-Cobalt replacement deposit at the 6000 foot elevation near the head of the Cobalt Creek cirque, and the Copper 'porphyry' deposit at the 4000 foot elevation on a steep slope above Camp Creek. There are other mineral showings located east of Discovery Creek but less is known about them so they will not be included in the following preliminary estimates of economic potential.

The Copper-Cobalt replacement deposit is classed as a high-temperature pyrometasomatic contact replacement deposit in deformed precambrium dolomite adjacent to a dioritic stock and overlain by Upper Triassic Volcanic rocks and a younger formation of carbonate rocks. This type of geological environment normally lends itself to the formation of massive iron and copper mineralization and, in places where the dolomite strata has been subjected to intensive folding and metamorphism, it is not uncommon to find that huge masses of rock have been replaced by massive ore. Also, the grade and tenor of the ore usually improves with depth toward the contact of the intrusive stock.

It is believed that the above conditions exist at the cirque deposit. Selected grades of massive ore assay 18.2% Copper, 15.8% Cobalt and 0.5 Ounces Silver per ton. There is disseminated mineralization of much lower grade in proximity to the massive ore. By mining both, from the top of the ridge to the top of the talus one would expect an average overall grade of about 1% Copper, 0.2% Cobalt and 0.2 Ounces Silver per ton. However, as mentioned above, it is reasonable to expect a far larger proportion of massive replacement ore below the elevation of the talus and toward the dioritic intrusive beneath. This would increase the overall average grade and I would guess at a grade of something in

the order of 3% Copper, 0.2% Cobalt and 0.3 Ounces Silver per ton.

The 'Porphyry Copper' deposit outcrops at the 4000 foot elevation some 8000 feet due south of the above replacement deposit. Present indications point to a large tonnage potential having an average grade of 0.30% Copper with trace values in Cobalt, Molybdenum, Manganese, Nickel, Gold and Silver. Laboratory work on the 'syenite' host rock has reclassified it as a "quartz diorite, sheared and altered". This is an excellent host rock for porphyry copper mineralization. It is believed to be of late Mesozoic age. The presence of trace elements of Cobalt gives assurance that the mineralization, including the Copper, will be found evenly distributed throughout the whole mass of the deposit. The accessory mineralization by Cobalt, Molybdenum, Manganese and Nickel is characteristic of economic Porphyry Copper deposits in British Columbia and the Western United States. The grade at 0.3% Copper is submarginal at this northern location if it were to be exploited by itself. However, there appears to be no reason why it should not be worked in conjunction with the cirque deposit which contains higher grades of replacement-type ore.

Both of the deposits are located on steep hillsides bearing little or no overburden. Both deposits can be mined from the surface down for several hundred feet, by large-tonnage, low-cost mining methods. Grade control to the concentrator will be facilitated by having the two types of ore to draw from. The recovery of Copper and of Cobalt should be excellent due to the fact that these metals are not intimately associated as they were deposited in the rock during different periods of mineralization.

Allowing for 10% barren rock dilution in the pits and for a 90% metal recovery in the concentrator, it would not be improbable to arrive

at a net recoverable value of Copper, Cobalt and Silver amounting to $21.00 per ton. On a large tonnage basis of 1000 tons of ore milled per day, the total costs will not exceed $9.00 per ton ore milled including the transportation costs of the Copper Concentrates to the smelter. This will leave about $12.00 per ton of ore milled to pay for the plant and to cover interest payments, administrative costs and dividend payments. A preliminary, very modest estimate of possible ore reserves amounts to 1,500,00 tons or sufficient for at least 4 1/2 years of operation. The above estimates are necessarily conservative at this preliminary stage of exploration.

Metal market prices at the present time are in excess of 50¢ per pound for Copper, $2.00 per ounce for Silver and $3.00 per pound for Cobalt. The demand for Copper and Silver is high and is expected to remain so for the foreseeable future. The price for Cobalt is high in Canada because refining costs are high due to the fact that most of the supply comes as a by-product of the nickel industry and the cobalt content of most nickel ores is very low indeed, usually less than 0.10%, which makes recovery difficult and expensive. The demand for Cobalt is presently increasing due to stepped-up programs for the manufacture of permanent magnets and high-temperature-high-strength 'super-alloys'. These alloys are being used more for jet aircraft engines and for the equipment used in outer space programs. Most of the world's supply of Cobalt comes from the comparatively high-grade copper-cobalt ores mined in very unstable republics located in North Africa. Thus the major source of Cobalt at present is not too dependable and it is increasingly important to develop new sources of Cobalt on the North American continent for strategic requirements.

CONCLUSIONS

The Mammoth Copper Property in the Bonnet Plume River area of the Yukon is an important new discovery. The geological characteristics of the property and the types of mineralization are comparable with typical geological and mineralogical conditions found in the large producing mines in Northern Rhodesia, the high mountains of South America and in the mountainous regions of western North America.

The property is not heavily overburdened and most of the mineral deposits can be mined from the surface by comparatively very low-cost mining methods.

The initial program of geological, geophysical and geochemical surveys, assisted by prospecting, has resulted in the mapping of widespread mineralization indicative of a large production potential. This property warrants a further expenditure for continued exploration and development.

RECOMMENDATIONS

Mr. A. R. Archer, of Archer, Cathro & Associates Ltd., Consulting Geologists of Whitehorse, Yukon, has made the following recommendations in his report of October 14th, 1967:

Phase 1 - To be accomplished by April 1st, 1968:

Winter road construction and construction of an Aircraft Landing Strip on the Property	$ 30,000.00
Camp Construction	10,000.00
Diamond Drilling 2 Geomagnetic Anomalies . . .	60,000.00
	$100,000.00

Phase 2 - From May to October, 1968:

Exploration by a Geologist and two prospectors, salary and wages @ $80.00 per day . .	$ 12,000.00
Aircraft Support	12,000.00
Camp Costs and General Overhead	6,000.00
Contingencies (such as emergent diamond drilling). . . .	20,000.00
	$ 50,000.00
Total Expenditure recommended by Mr. Archer	$150,000.00

Dr. S. S. Szetu, of Cana Exploration Consultants Ltd., in his report of October 26th, 1967, has recommended a combined helicopter-borne magnetic and electro-magnetic survey followed by the photo-interpretation of 50 square miles surrounding the property to assist in the development work on the property as recommended by others. He estimates the cost at:

$ 15,000.00

The total of the above recommendations is $165,000.00

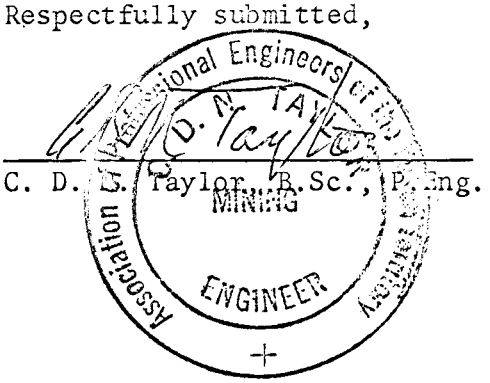
I concur in the above recommendations; however, since the equipment will be at the property to carry them out, I would recommend an additional expenditure for bulldozer trenching and continued diamond drilling throughout the summer season about as follows:

To employ a ripper-equipped bulldozer to trench across the mapped contact zones between the volcanic and sedimentary rocks and in areas of known intrusive formations where possible and where contact zones are obscured by overburden, and to assist in preparing diamond drill sites and to move the diamond drill equipment - 1500 hours	$ 36,000.00
To continue diamond drilling new target areas during the season, informational drilling	60,000.00
Extra Camp and Aircraft Support costs	4,000.00
	$100,000.00
In summary, all of the above recommendations for the year 1968, amount to	$265,000.00

The owners and discoverers of this property have already spent $60,000.00 on staking and recording the 108 mineral claims comprising the property and in carrying out the initial geological, geophysical and geochemical surveys required to provide information as to the potential of the property.

As agent for the owners of the property, I recommend that any further expenditures on this property be made through regular channels by optioning the property to a Mining and Exploration Company, for continued exploration and development.

Respectfully submitted,



C. D. S. Taylor, B.Sc., P.Eng.

APPENDIX I

(1) CERTIFICATE

I, C. D. N. Taylor, of the City of Victoria, in the Province of British Columbia, do hereby certify that:

(1) I am a Mining Engineer, residing at 3943 Locarno Lane, Victoria, British Columbia.

(2) I am a Registered Professional Engineer of the Province of British Columbia, also a Registered Professional Engineer of the Territory of Yukon and that I have been practising my profession continuously since the year 1932.

(3) I have no direct or indirect interest in the Property designated as the Mammoth Mineral Claims Nos. 1 to 108 inclusive, in the Bonnet Plume River area of the Yukon, nor in any associated company or securities pertaining thereto.

(4) I personally directed the various exploration programs on this property during 1967 by Archer, Cathro & Associates, Consulting Geological Engineers, of Whitehorse, and Cana Exploration Consultants Limited, of Toronto; and that I have known the Principals of these companies, Mr. A. R. Archer and Dr. S. S. Szetu, for many years and can vouch as to their Certification and competency.

(5) I examined the property personally during June 20th to 22nd; July 25th to 27th; August 15th to 18th, and September 12th to 13th, 1967. All the samples included in this report were taken by me and were assayed under the signature of 'George Spalding' of the Assay Office in Whitehorse, except where noted to the contrary.

(6) I have checked on the registry of the mineral claims described herein and find that they are in good standing and are registered under the joint ownership of Mr. L. I. Proctor and Mr. L. J. Brown, for whom I act as Agent.

Respectfully Submitted,

C. D. N. Taylor, B.Sc., P.Eng.

Dated at Victoria,
British Columbia,
this 31st day of
January, 1968.

T S L Laboratories Limited
325 HOWE STREET - VANCOUVER 1, B.C.
TELEPHONE 684-1374

ASSAYERS
CHEMISTS
GEOCHEMISTS

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Nordex Explorations Map Location I-B

cc. Mr. Proctor
Mr. Taylor

CHARACTER OF CHALCOPYRITE

SAMPLE(S) OF SAMPLE NO. 4186 ASSAYING 18.6% COPPER

REPORT NO.
T-06993
V-2214

Semiquantitative Spectrographic Analysis:

	Sample #1	Sample	Sample		Sample #1	Sample	Sample
Antimony	-			Lithium (Li_2O)	-		
Arsenic	-			Manganese	.005%		
Barium	.003%			Mercury	-		
Beryllium (BeO)	-			Molybdenum	.005%		
Bismuth	-			Nickel	.0005%		
Cadmium	-			Silver	.5oz:ton		
Cerium (CeO_2)	-			Tantalum (Ta_2O_5)	-		
Chromium	.03%			Thorium (ThO_2)	-		
Cobalt	.02%			Tin	-		
Columbium (Cb_2O_5)	-			Titanium	.01%		
Copper	MH			Tungsten	-		
Gallium	-			Uranium (U_3O_8)	-		
Germanium	-			Vanadium	.003%		
Indium	-			Zinc	.1%		
Iron	H			Zirconium (ZrO_2)	.03%		
Lead	.01%						

Figures are approximate:

CODE

H — High	— 10 —	100% approx.	
MH — Medium High	— 5 —	50% approx.	
M — Medium	— 1 —	10% approx.	
LM — Low Medium	— .5 —	5% approx.	
L — Low	— .1 —	1% approx.	
TL — Trace Low	— .05 —	.5% approx.	
T — Trace	— .01 —	.1% approx.	
FT — Faint Trace	— approx. less than .01%.		
PT — Possible Trace	— Presence not certain.		
— — Not Detected	— Elements looked for but not found.		

DATE January 18, 1968.
Original Sent June 2, 1967.

SIGNED

DIVISION OF TECHNICAL SERVICE LABORATORIES

T S L

Laboratories Limited

325 HOWE STREET - VANCOUVER 1, B.C.
TELEPHONE 684-1374

ASSAYERS
CHEMISTS
GEOCHEMISTS

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Whitehorse Assay Office
Map Location 1-B

cc/ Mr. C.D.N. Taylor CHARACTER OF COBALTITE

SAMPLE(S) OF PULP OF SAMPLE NO. 4172 ASSAYING 15.8% COBALT

REPORT NO. V-2426

Semiquantitative Spectrographic Analysis:

	Sample #4172	Sample	Sample		Sample #4172	Sample	Sample
Antimony	-			Lithium (Li_2O)	-		
Arsenic	MH			Manganese	.2%		
Barium	.02%			Mercury	-		
Beryllium (BeO)	-			Molybdenum	-		
Bismuth	-			Nickel	1-2%		
Cadmium	-			Silver	.3oz:ton		
Cerium (CeO_2)	-			Tantalum (Ta_2O_5)	-		
Chromium	-			Thorium (ThO_2)	-		
Cobalt	MH			Tin	-		
Columbium (Cb_2O_5)	-			Titanium	.1%		
Copper	.3%			Tungsten	-		
Gallium	-			Uranium (U_3O_8)	-		
Germanium	-			Vanadium	-		
Indium	-			Zinc	-		
Iron	2%			Zirconium (ZrO_2)	-		
Lead	.1%						

Figures are approximate:

CODE

H — High	— 10 — 100% approx.	TL — Trace Low	— .05 — .5% approx.
MH — Medium High	— 5 — 50% approx.	T — Trace	— .01 — .1% approx.
M — Medium	— 1 — 10% approx.	FT — Faint Trace	— approx. less than .01%.
LM — Low Medium	— .5 — 5% approx.	PT — Possible Trace	— Presence not certain.
L — Low	— .1 — 1% approx.	— — Not Detected	— Elements looked for but not found.

DATE January 18, 1968.

SIGNED _____

Original Sent July 13, 1967.

DIVISION OF TECHNICAL SERVICE LABORATORIES

T S L Laboratories Limited

325 HOWE STREET - VANCOUVER 1, B.C.
TELEPHONE 684-1374

ASSAYERS
CHEMISTS
GEOCHEMISTS

CERTIFICATE OF ANALYSIS

Semiquantitative Spectrographic

SAMPLE(S) FROM Whitehorse Assay Office
Map Location #15
CHARACTER OF MINERALIZED DIORITE 'FLOAT'

SAMPLE(S) OF PULP OF SAMPLE NO. 4811

REPORT NO.
T-08236
V-2741

	Sample 4023-4811	Sample	Sample		Sample 4023-4811	Sample	Sample
Antimony	-			Phosphorus	-		
Arsenic	-			Platinum	X		
Barium	.005%			Rhenium	X		
Beryllium (BeO)	-			Rhodium	-		
Bismuth	-			Rubidium	X		
Boron	-			Ruthenium	-		
Cadmium	-			Silver	<.1oz:t		
Cerium (CeO_2)	-			Strontium	-		
Caesium	X			Tantalum (Ta_2O_5)	-		
Chromium	.01%			Tellurium	-		
Cobalt	-			Thallium	-		
Columbium (Cb_2O_5)	-			Thorium (ThO_2)	-		
Copper	LM2%			Tin	.001%		
Gallium	.002%			Titanium	LM1%		
Germanium	-			Tungsten	-		
Gold	X			Uranium (U_3O_8)	-		
Hafnium	-			Vanadium	.02%		
Indium	-			Yttrium (Y_2O_3)	.003%		
Iridium	-			Zinc	-		
Lanthanum (La_2O_3)	-			Zirconium (ZrO_2)	.02%		
Lead	.02%			ROCK FORMING METALS			
Lithium (Li_2O)	-			Aluminum (Al_2O_3)	MH10%		
Manganese	.1%			Calcium (CaO)	M7%		
Mercury	-			Iron (Fe)	M4%		
Molybdenum	.002%			Magnesium (MgO)	MH10%		
Neodymium (Nd_2O_3)	-			Silica (SiO_2)	H		
Nickel	-			Sodium (Na_2O)	M4%		
Palladium	-			Potassium (K_2O)	LM3%		

Figures are approximate:

CODE

H — High — 10 — 100% approx.
MH — Medium High — 5 — 50% approx.
M — Medium — 1 — 10% approx.
LM — Low Medium — .5 — 5% approx.
L — Low — .1 — 1% approx.
TL — Trace Low — .05 — .5% approx.
T — Trace — .01 — .1% approx.
FT — Faint Trace — approx. less than .01%.
PT — Possible Trace — Presence not certain.
— — Not Detected — Elements looked for but not found.
X — Not looked for

DATE January 18, 1968.
Original Sent September 8, 1967.

SIGNED _____

DIVISION OF TECHNICAL SERVICE LABORATORIES

• CHEMICAL RESEARCH AND ANALYSIS
• INSTRUMENT SALES AND SERVICE

TECHNICAL SERVICE LABORATORIES
DIVISION OF BURGENER TECHNICAL ENTERPRISES LIMITED
355 KING ST. W., TORONTO 2B, ONT., CANADA
TELEPHONE : 362-4248

Representing . . .
JARRELL-ASH COMPANY
HILGER & WATTS LIMITED
SADTLER RESEARCH
ULTRA CARBON CORPORATION
METALS RESEARCH LIMITED

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Bonnet Plume River Nordex Exploration Ltd.,
c/Cana Exploration Consultants,
Suite 427,
12 Richmond Street East,
Toronto, Ont.

REPORT NO. T-09119

SAMPLE(S) OF Mineralized Diorite 'Float'

Attn: Dr. S.S. Szetu

Sample No.	#4811
Copper (Cu)%	1.72
Cobalt (Co)%	< 0.01
Total Iron (Fe)%	6.52
Magnetics %	trace

Samples, Pulps and Rejects discarded after six months

DATE Nov. 14'67

SIGNED

C.S. JOYCE, B.Sc., Manager of Laboratories

CTA

APPENDIX I

(3) BIBLIOGRAPHY

Description:	Year:	Author:
Geological Survey of Canada Paper	67-40	Dr. D. C. Findlay
" " " " "	53- 7	Dr. J. O. Wheeler
" " " " " Map 10	1963	Director, G.S.C.
Metallic & Industrial Mineral Deposits	1966	Dr. Carl A. Lamey
Mineral Facts & Problems, Bull, 630	1965	U.S. Bureau of Mines
Geology of the Porphyry Copper Deposits of SW North America	1966	Titley and Hicks.
Geology and Mineral Deposits of Highland Valley, B.C.	1956	White, Thompson and McTaggart
Replacement Magnetite on Vancouver Island, BC.	1965	Dr. G.E.P. Eastwood
Pyrometasomatic Iron-Copper Deposits on the West Coast of B.C.	1962	Dr. A. Sutherland Brown
Some Features Pertinent in Exploration of Porphyry Copper Deposits	1963	Dr. S. E. Jerome
Geological Variations of Geophysical Significance in Porphyry Coppers	1964	Dr. S. E. Jerome
Cobalt Mineralization in the Blackbird District, Lemhi County, Idaho	1943	Dr. Alfred L. Anderson
Geology and Mineralogy of the Coast Copper Mine, Benson Lake, B.C.	1962	John C. Lund
Paragenesis - Econ. Geology, Vol. 59	1964	Konrad B. Krauskopf

CHAMBERS, PHILLIPS & CO.

CHARTERED ACCOUNTANTS

100 WEST PENDER STREET • VANCOUVER 3, CANADA

GRAHAM A. CHAMBERS, C.A.
EARLE PHILLIPS, C.A.

TELEPHONE
VANCOUVER 683-2451

December 12, 1967.

To The Shareholders,
Nordex Explorations Ltd.,
Vancouver, British Columbia.

We have examined the books and accounts of Nordex Explorations Ltd. for the year ended November 30, 1967 and have obtained all the information and explanations we have required.

In our opinion and according to the best of our information and the explanations given to us and as shown by the books of the company the attached statement of expenditures on Mammoth Claims numbered 1 to 108 is properly drawn up so as to exhibit a true and correct statement of such expenditures.

Chambers Phillips & Co

3943 Locarno Lane,
Victoria, B.C.

I have examined the invoices covered by the attached statement of expenditures on Mammoth Nos. 1 to 108 Mineral Claims as drawn up by Chambers, Phillips & Co., Chartered Accountants. The invoices were all paid in full by Mr. L. I. Proctor, President and owner of Nordex Exploration Limited and co-owner with Mr. L. J. Brown of Mammoth Mineral Claims Nos. 1 to 108 inclusive. I hereby swear that all of these invoices and payments represent expenditures made on this property between June 1st and November 15th, 1967. The exploration program was under my direction.

Sworn before me at Victoria, B.C.
this 22nd day of December, 1967

Ernest Allen Tutte

A NOTARY PUBLIC
IN AND FOR THE PROVINCE OF BRITISH COLUMBIA

Association of Professional Engineers of the Province of British Columbia
D. N. TAYLOR
ENGINEER

D. N. Taylor, P.Eng.

NORDEX EXPLORATIONS LTD.

Statement of Expenditures on Mammoth Claims
June 1, 1967 to November 30, 1967

Payment Date	Description of Invoice	Claim Staking & Recording	Prospecting Geological Geochemical Geophysical	Total
Jun. /67	Aircraft Charter	$ 6,827.07	$	$
Jun. 2/67	Freddy Alfred Cheque 587	425.00		
	Harry Baum Cheque 588	425.00		
Jun.28/67	Louis J. Brown	280.00		
	Receiver General	280.00		
	Receiver General #589	57.50		
	Receiver General #590	57.00		
Jun.16/67	Great Northern Airways - Aircraft fuel		94.50	
Jun.26/67	L. I. Proctor - mobilization		128.46	
Jun.29/67	Regina Hotel - mobilization		22.00	
TOTAL JUNE PAYMENTS		8,351.57	244.96	8,596.53
Jul. /67	Aircraft Charter		9,898.67	
Jul.11/67	Receiver General	246.00		
Jul.17/67	Nielsen & Hudson	60.00		
Jul.11/67	Mike Chefkoi - Prospecting		400.00	
	Peter Lucas - Prospecting		225.00	
	Lonny Johnny - Prospecting		225.00	
	Louis J. Brown - Prospecting - Cheque #592		500.00	
Jul.13/67	Explosives Ltd. - Cheque #594		31.69	
Jul.17/67	Great Northern Airways Fuel - Cheque #598		295.50	
	Northern Commercial - Groceries - Cheque #602		113.89	
	Huttons Service Fuel - Cheque #599		167.46	
	C.D.N. Taylor - Professional Services - Cheque #605		237.28	
	Taylor & Drury - Truck in Mayo		46.15	
	Tim-O-Lou Motel - Mobilization - Cheque #607		32.00	
	Mike Chefkoi - Prospecting advance		300.00	
	Regina Hotel - telephone mobilization - Cheque #611		2.40	
TOTAL JULY PAYMENTS		306.00	12,475.04	12,781.04

Payment Date	Description of Invoice	Claim Staking & Recording	Prospecting Geological Geochemical Geophysical	Total
Aug. /67	Aircraft Charter	$	$ 4,314.53	$
Aug.18/67	Mike Chefkoi - Prospecting & Geological Survey		400.00	
	Louis J. Brown - Geological Survey - Cheque #613		210.00	
	David Moses - Geological Survey		200.00	
Aug.14/67	Northern Commercial - Groceries		21.50	
Aug.22/67	Hougens - Line Cutting Supplies - Cheque #624		5.26	
	Archer, Cattro - Geological Report & Survey		1,175.40	
	Atlas Copco - Rental on Drill Equipment - Cheque #617		372.10	
	Capital Dry Cleaners - Geological Survey - Cheque #621		7.00	
	Chateau Mayo Hotel - Transport Meals - Cheque #622		102.15	
	Great Northern Airways - Aircraft Fuel - Cheque #623		432.00	
	Hutton's Service - Aircraft Fuel - Cheque #625		390.49	
	Nelsons Ltd. - Explosives - Cheque #626		11.88	
	Northern Commercial - Groceries - Cheque #628		512.97	
	C.D.N. Taylor - Services & Geological Report - Cheque #621		343.20	
	Taylor & Drury Motors - Truck Rental - Cheque #632		13.45	
	Tim-O-Lou Motel - Mobilization - Cheque #634		154.00	
	Whitehorse Star - Geological Supplies - Cheque #635		2.34	
	White Pass - Camp Supplies - Cheque #636		6.14	
	Cana Explorations Ltd. - Geophysical Survey - Cheque #639		1,000.00	
Aug.18/67	Mining Recorder	160.00		
Aug. 2/67	McCulloch, Jarvis & Doolan - Incorporation Expense	334.38		
	Mining Recorder - Recording Claim - Cheque #613	160.00		
Aug.14/67	L. I. Proctor - Incorporation Expense	288.11		
Aug.22/67	C. N. Telegram	2.00		
	Tilden - Incorporation Expense	47.00		
TOTAL AUGUST PAYMENTS		991.49	9,674.41	10,665.90

EDM07

Payment Date		Claim Staking & Recording	Prospecting Geological Geochemical Geophysical	Total
Sep. /67	Nordex Exploration - Aircraft - Invoice 1413	$	$ 10,063.20	$
Sep.14/67	M. Chefkoi - Line Cutting - Geophysical		500.00	
	R. Van Wyk - Line Cutting - Geophysical		396.00	
	Neal Hager - Line Cutting - Geophysical		320.00	
	David Moses - Line Cutting - Geophysical		400.00	
Sep.15/67	Tourist Services - Groceries - Cheque #655		43.99	
	Explosives Ltd. - Powder Flagging - Cheque #643		42.48	
	Burns & Co. - Meat - Cheque #646		107.64	
	C.P.A. - Freight on Drill Equipment - Cheque #647		24.00	
	Chateau Mayo - Meal Acct. - Cheque #648		46.85	
	Radio Calls - C.N.T. - Cheque #649		2.00	
	General Enterprises - Geophysical Survey - Cheque #650		49.90	
	Great Northern Airways - Aircraft Fuel - Cheque #651		207.75	
	Hougens - Expendable Camp Supplies - Cheque #652		14.04	
	Hutton's Service - Aircraft Fuel - Cheque #653		231.02	
	Nelsons Ltd. - Camp Supplies - Cheque #657		86.18	
	Northern Commercial - Camp Supplies - Cheque #659		240.84	
	Seely's Ltd. - Camp Supplies - Cheque #660		157.55	
	C.D.N. Taylor - Geological Services - Cheque #662		719.30	
	Tim-O-Lou Motel - Mobilization - Cheque #663		99.00	
	Whitehorse Star - Survey Supplies - Cheque #671		6.96	
	Taku Hotel - Geophysical Travel - Cheque #661		8.00	
	M. Chefkoi - Line Cutting - Geophysical		10.00	
Sep.14/67	Receiver General - Claims Transfer	28.50		
Sep.15/67	McCulloch, Jarvis - Company Register	297.00		
	Yukon Drugs - Claim Staking - Cheque #666	7.88		
	Mining Recorder - Claim Sheets	2.50		
TOTAL SEPTEMBER PAYMENTS		335.88	13,776.70	14,112.58

62807

Payment Date	Description of Invoice	Claim Staking & Recording	Prospecting Geological Geochemical Geophysical	Total
Oct. 4/67	Receiver General - Claim Recording	$ 130.00	$	$
	Mining Recorder - Transfer Fees	33.50		
	L. I. Proctor - expense on claims	55.33		
	David Moses - Geophysical Line Cutting		325.00	
Oct. 7/67	Atlas Copco - Drill Rent - Cheque #672		160.00	
	C.P.A. - Freight on Parts - Cheque #673		20.00	
	C.P.A. - Freight on Fuel - Cheque #674		11.76	
	Chateau Mayo - Mobilization Meal Sheet - Cheque #675		117.40	
	Great Northern Airways - Aircraft Fuel - Cheque #677		408.00	
	Hutton's Service - Aircraft Fuel - Cheque #678		573.70	
	Northern Commercial - Camp Supplies - Cheque #680		137.93	
	Tim-O-Lou Motel - Crew Accommodation - Cheque #681		177.00	
	Trans North Turbo Air Ltd. - Charter Helicopter - Cheque #682		458.00	
	Whitehorse Assay Office - Assaying - Cheque #684		394.00	
	C.D.N. Taylor - Geological Report - Cheque #683		198.00	
Oct.11/67	L. I. Proctor - Geophysical Survey Expense		34.42	
Oct.13/67	Cana Exploration - Geophysical Survey Operator		1,545.66	
Oct.27/67	Archer, Cattro & Assoc. - Geological Survey & Report		2,562.55	
Nov. /67	Cana Exploration - Dr. Szetu - Inspection & Report		1,279.80	
TOTAL OCTOBER AND NOVEMBER PAYMENTS		218.83	8,403.22	8,622.05
GRAND TOTAL		$ 10,203.77	$ 44,574.33	$ 54,778.10

Issued in accordance with our accompanying report dated December 12, 1967.

Clarkson Phillips Co.

Chartered Accountants.

MAMMOTH CLAIMS

IRON FORMATION

DIORITE SILL

Diorite Sill

1-A 45°

1-B 35°

14.

13.

COBALT

C.R.

DISCOVERY

C.R.

TETRAHEDRITE C.R.

Mineralized Syenite

Mineralized Diorite Float

Skarn

Skarn

10.

12.

11.

9.

8.

3.

2.

6.

5.

4.

7.

CREEK

PROPOSED AIRSTRIP CONSTRUCTION

DOLORES

5000

7000

3000

35° 15' E North Magnetic

N

BONNET PLUME RIVER MINES LTD. (N.P.L.)

PROPERTY PLAN

SCALE : 1 IN. = 1320 FT.

FROM: CLAIM SHEET 106C-14 YUKON

APPROX. GEOGRAPHIC POSITION 64° 56' N 133° 16' W

4. Pencilled Notes as to Geology and Map Locations. To Date: August 15, 1967

Association of Professional Engineers of the Yukon Territory
C. D. N. TAYLOR
MINING ENGINEER

PRELIMINARY REPORT

MAMMOTH 1 TO 56 MINERAL CLAIMS

BONNET PLUME AREA - YUKON TERRITORY

For: Nordex Exploration Limited

By: C. D. N. Taylor, P. Eng.

July 1st, 1967.

Property: The Mammoth Nos. 1 to 56 Mineral Claims are located as per the attached claim Map. The recording numbers are not available as of this writing.

Location: Latitude 64° 55', Longitude 133° 18' West.

This location is approximately 40 air-miles from the Bear River Landing Strip which is at 3500' elevation at Lat. 64° 50', Long. 134° 23' West. For the use of float-equipped aircraft the location is 15 miles from Fairchild Lake or 8 miles from a smaller un-named lake to the west of the property. The distance by Winter Road is approximately 160 miles from the highway at Elsa, Yukon. This can be reduced to approximately 120 miles by the relocation of the Wind River Trail. A road to the property would benefit Pacific Giant Steel Limited who are drilling an Iron deposit on Bear River. The Crest iron deposit on the Snake River is located approximately 40 miles north-east of the Mammoth Claims.

Topography: The claims are located in the headwaters of Dolores Creek which is a side stream on the right limit of the Bonnet Plume River. The terrain is quite rough and is characterized by a series of sharp, northerly-trending ridges rising to elevations in excess of 6000 feet. These ridges drop off sharply to approximately 3500' elevation. Rockslides, talus slopes and exposed bedrock generally prevail, and there is little or no soil in evidence.

Timber: The property is above timberline. Adequate supplies of Spruce construction timber can be obtained in the valley bottoms of the Snake and the Bonnet Plume Rivers about 25 miles south-easterly.

Water: There is an ample supply of water at the lower elevations on the property during the spring and summer: however, at this latitude and elevation, a sufficient supply of water for milling and townsite purposes may be a problem during the winter months. Possibly a system of well drilling may have to be considered.

Geology: Most of the property remains unexplored at present. There are no Geological Survey of Canada bulletins covering this part of the North in detail. The writer has examined about one-third the area of the property with the use of a helicopter.

The exposed formation is predominately Dolomite limestone running generally in a north-south direction and dipping at various attitudes from 5° easterly to almost vertically dipping beds. Relatively pure, light coloured limestones appear near the ridge tops. Beneath these there is a considerable thickness (in the order of from 500' to 1000') of brownish coloured, impure limestone veined to various degrees with quartz and barite veinlets. Bordering these veinlets the limestone is replaced with primary and secondary copper minerals containing minor amounts of molybdenum, cobalt, gold, silver, and chromium. Greenish coloured slates, shale and silt-stone overlie the limestone beds.

Diorite, andesite and basic dyke intrusives underlie the limestone bedding and have uplifted it to various degrees. These rocks can be found in place in the creek banks at the lower elevations. Some peridotite 'float' was also observed in the creek beds and in view of the presence of nicollite found in some of the ore specimens, there is the possibility of locating some nickel mineralization in the intrusive rocks.

The following minerals were observed in the limestone replacement zones - pyrite, magnetite, chalco-pyrite, chalcosite, cuprite, azurite, malachite, vein quartz, barite, molybdenite, cobalt bloom, ~~cobalt bloom~~, cobalt metal, chromium and nicollite. No free gold or silver was observed; however, on the basis of the few assays taken, the ore appears to contain recoverable amounts of both precious metals if the ore is concentrated. For instance, a 45% copper concentrate would be expected to contain approximately one-half an ounce of silver and one ounce of gold per ton of concentrate.

Sampling: Due to the limited time available and to the presence of deep snow on steep slide rock, only six samples were taken, three at a low elevation and three, some 9000 feet north-westerly and at a high elevation, as follows:

Sample No.	Location on Map	Elevation Feet	Width Feet	Description:
4167	#1	3950	8.01	14.7% Copper and 0.40 oz. Silver per T. Near Discovery Creek at SW portion of the property. Mineralized limestone bedding partially exposed.
4168	#1	3950	Character	32.4% Copper and 1.20 oz. Silver per T. Same location. Massive ore only.
4169	#1	3950	12.0'	0.01% Copper and 0.08 oz. Silver per T. Lightly mineralized limestone, quartz and barite overlying the heavily mineralized limestone Sample No. 4167.
4170	#2	6000	18.0'	0.73% Copper and Trace Silver. The northern part of the cirque. Thin-bedded limestone slightly mineralized and lying beneath slate capping.
4171	#2	5975	6.0'	4.2% Copper and 0.2 oz. Silver per T. Chalcopyrite and malachite in thin-bedded limestone underlying slate.
4172	#2	6025	Character	Trace Copper, Trace Nickel, 15.8% Cobalt, 0.06 oz.Ag/T, 0.12 oz.Au./T. A 4" width of heavily mineralized limestone, $\frac{1}{2}$" stratifications, heavy cobalt bloom and arsenical cobaltite.

T S L

Laboratories Limited

325 HOWE STREET - VANCOUVER 1, B.C.
TELEPHONE 684-1374

ASSAYERS
CHEMISTS
GEOCHEMISTS

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Nordex Explorations
c. Mr. Proctor
Mr. Taylor
SAMPLE(S) OF Massive Copper Ore

REPORT NO. V-2214

Ore from Mammoth Property

Semiquantitative Spectrographic Analysis:

	Sample # 1	Sample #1	Sample		Sample # 1	Sample #2	Sample
Antimony	-	-		Lithium (Li_2O)	-	-	
Arsenic	-	-		Manganese	.005%	0.005%	
Barium	.003%	0.003%		Mercury	-	-	
Beryllium (BeO)	-	-		Molybdenum	.005%	0.005%	
Bismuth	-	-		Nickel	.0005%	0.0005%	
Cadmium	-	-		Silver	.5oz:ton	0.50z/ton	
Cerium (CeO_2)	-	-		Tantalum (Ta_2O_5)	-	-	
Chromium	.03%	0.03%		Thorium (ThO_2)	-	-	
Cobalt	.02%	0.02%		Tin	-	-	
Columbium (Cb_2O_5)	-	-		Titanium	.01%	0.01%	
Copper	MH	MH		Tungsten	-	-	
Gallium	-	-		Uranium (U_3O_8)	-	-	
Germanium	-	-		Vanadium	.003%	0.003%	
Indium	-	-		Zinc	.1%	0.1%	
Iron	H	H		Zirconium (ZrO_2)	.03%	0.03%	
Lead	.01%	0.01%					

Figures are approximate: Pulps are stored for 6 months, then discarded.

CODE

H — High	— 10 —	100% approx.	
MH — Medium High	— 5 —	50% approx.	
M — Medium	— 1 —	10% approx.	
LM — Low Medium	— .5 —	5% approx.	
L — Low	— .1 —	1% approx.	

TL — Trace Low	— .05 — .5% approx.
T — Trace	— .01 — .1% approx.
FT — Faint Trace	— approx. less than .01%.
PT — Possible Trace	— Presence not certain.
ND — Not Detected	— Elements looked for but not found.

DATE June 2, 1967

SIGNED

DIVISION OF TECHNICAL SERVICE LABORATORIES

Conclusions: The above few sample results indicate that the property contains certain beds of limestone replacement ore. In the preliminary stages of investigation in two sampling locations some 9000 feet apart and having a difference in elevation of 2000 feet, it has been determined that each sample location contains ore grade material which can be mined from the surface down. Between these two locations an examination of the rubble and sliderock from the cirque above, insofar as it is presently exposed by the receding snow, indicates that there are probably continuous beds of mineralized limestone, possibly 'en echelon' over a distance of about 9000 feet.

The extent of the mineralization in the limestone will vary proportionately to the extent and frequency of the injections of quartz and barite veinlets into the limestones and the slate and shale capping. The sulphide minerals appear to invade the thin-bedded limestones to a lesser extent than the replacement in thicker stratified beds of limestone. These questions, also the depth characteristics of the orebodies, can only be answered after the property is diamond drilled.

Since the area of mineralization is quite extensive it is expected that an adequate diamond drilling program will involve a very considerable expenditure. It is suggested, therefore, that a continued prospecting program now, at a comparatively modest expense, may provide sufficient interest and information to attract a large mining company to participate in future diamond drilling and surface exploration.

Recommendations: It is proposed to employ two pairs of prospectors under the direction of a field Geologist (5-man total) for a period of two weeks to prospect and to sample the deposit over an area of some 22 mining claims, and that a program of geological mapping over the entire property be accomplished also. This will involve the use of a helicopter to establish two camps, one in the cirque at the northern part of the property from which one party can prospect 10 claims between the elevations of 5000 and 6500 feet, and the other on Discovery Creek from which the other party can prospect 12 claims between the elevations of 3500 and 5500 feet. The cost of this program will cover the representation work requirements on the 56 mineral claims for a period of one year.

It is believed that this property warrants the immediate expenditure of $10,000.00 about as follows:

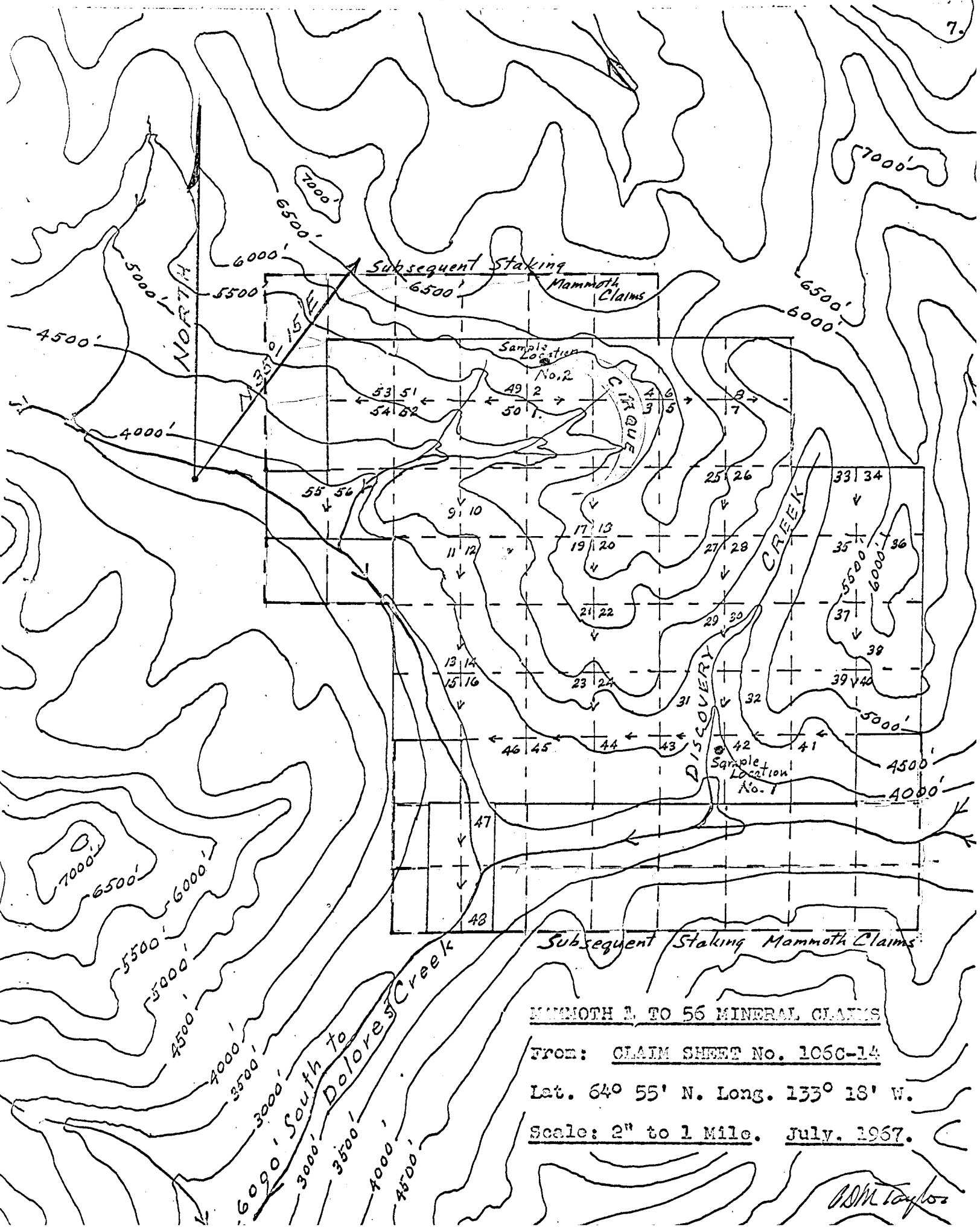
1.	Cost of staking and recording 56 claims, est.		$ 2,500.00
2.	Four prospectors, wages and board, 2 weeks ..	$2,000	
3.	Field Geologist and Geological Report, est. .	1,400	
4.	Assaying expense, estimate ..	1,000	
5.	Aircraft, 2 days to establish camp and 1 day to break camp ..	1,600	$ 6,000.00
6.	Miscellaneous expense, engineering and overhead		1,500.00
	Total Estimated Expenditure		$10,000.00

Respectfully submitted,

C. D. N. Taylor, P. Eng.

Association of Professional Engineers of the Yukon Territory
C. D. N. TAYLOR
MINING
ENGINEER

July 1st, 1967.



MAMMOTH 1 TO 56 MINERAL CLAIMS

From: CLAIM SHEET No. 1060-14

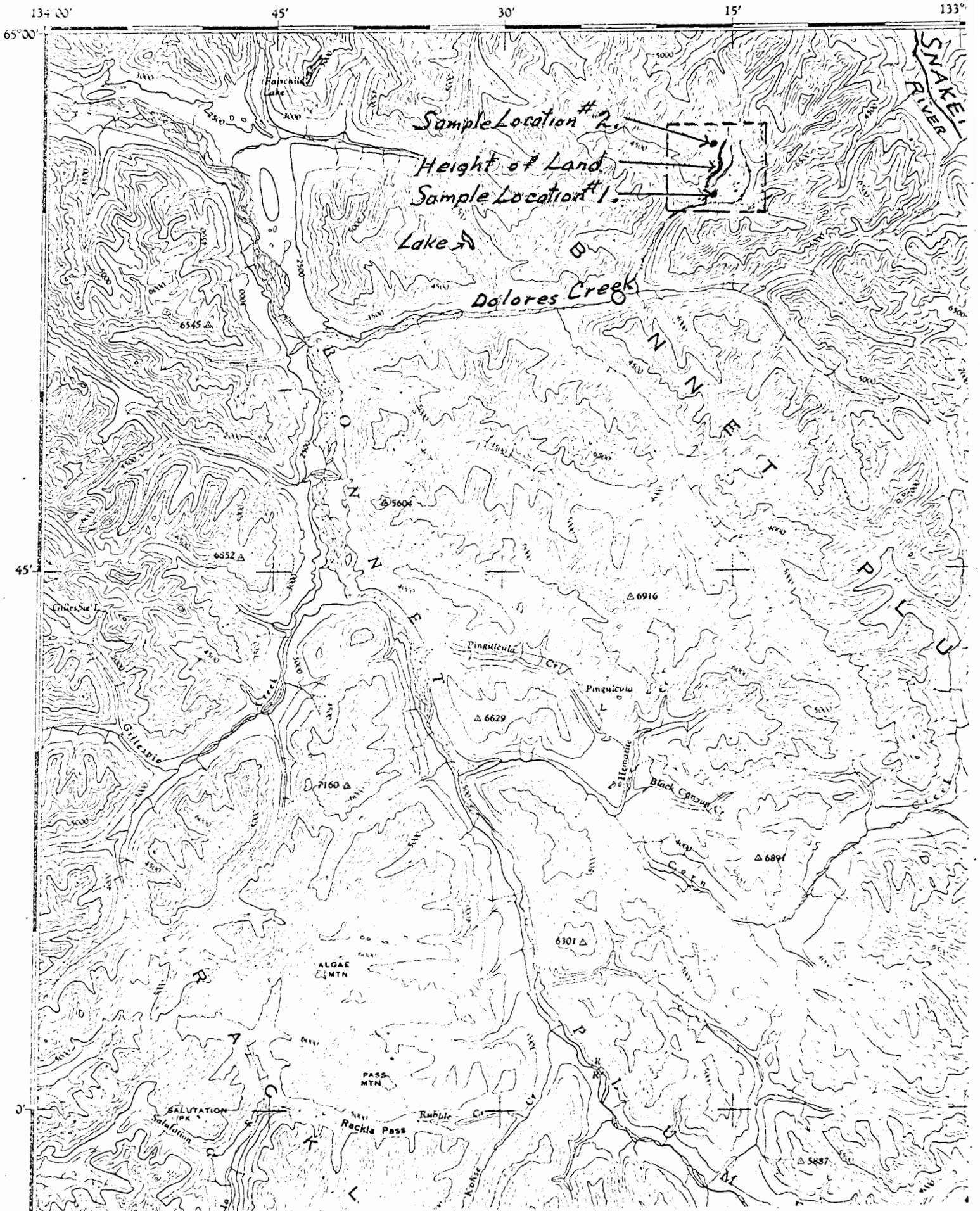
Lat. 64° 55' N. Long. 133° 18' W.

Scale: 2" to 1 Mile. July. 1967.

A.M. Taylor

NATIONAL TOPOGRAPHIC SYSTEM 1:250,000 CAN

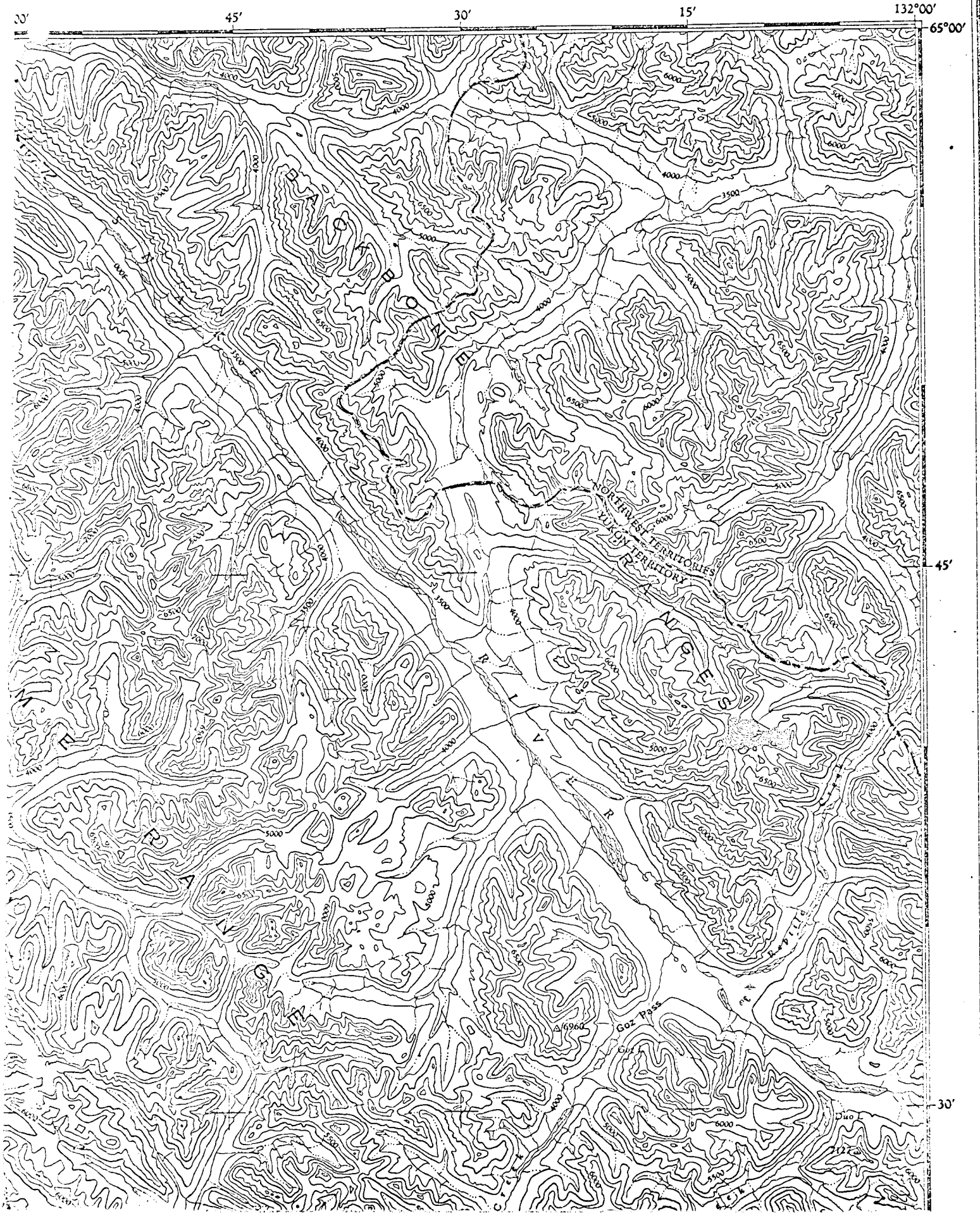
4 Miles to 1 Inch



ADA

FIRST EDITION

SHEET 106 C

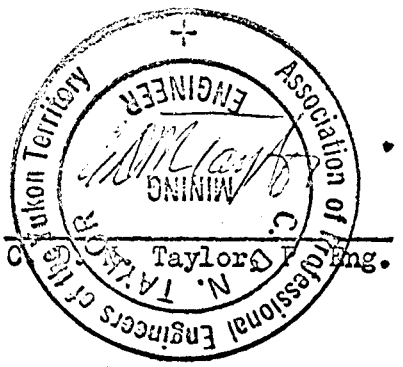


Certification

The Mammoth Nos. 1 to 56 Mineral Claims cover a new discovery of Copper Ore located by Mr. Louis J. Brown, Licensed Guide and Big Game Hunter of Mayo, Yukon, while hunting sheep.

The property is owned 50% by the discoverer, Mr. L. J. Brown, and 50% by Mr. L. I. Proctor, President of Nordex Exploration Ltd., Whitehorse, Yukon. Mr. Proctor has agreed to pay all costs relative to the staking, recording, and to keeping the 56 claims in good standing for a period of one year from their respective recording dates.

I hereby certify that I am the Mining Consultant retained by Nordex Exploration Ltd.; that I am a Professional Engineer registered with the Province of British Columbia and with the Territory of Yukon. I have no direct interest in the Mammoth Mineral Claims Nos. 1 to 56 or in any securities pertaining thereto. This preliminary report is based on a personal examination of the property made by me on June 20th and June 21st, 1967. The six samples referred to in this report were taken by me personally. The assays of these samples were determined by the Whitehorse Assay Office under the signature of 'George Spalding', Provincial Assayer.



July 1st, 1967.

INTERIM REPORT

MAMMOTH 1 TO 108 MINERAL CLAIMS

BONNET PLUME RIVER AREA, YUKON

For: Nordex Exploration Limited

By: C. D. N. Taylor, P.Eng.

August 15th, 1967.

INTRODUCTION: Subsequent to my preliminary examination and report, Archer & Cathro, Consulting Geological Engineers of Whitehorse, Yukon, were engaged to explore, examine and report on the property. One of their Field Geologists, Mr. F. M. Smith, was flown there with two prospectors and two assistants employed by Nordex Explorations Ltd. Mr. Alan R. Archer, a senior geological consultant, spent July 10th and 11th on the property examining the findings of his field geologist and the prospectors.

In his report dated July 16th, 1967, Mr. Archer recommends a ground control survey followed by aerial mapping on a 50 feet to the inch scale of the 'Cirque Showing', followed by geological mapping and sampling at 50' intervals over the more extensively mineralized areas. Also recommended is a control grid consisting of lines at 100 feet intervals to be established over the syenite-porphyry-copper showing, to be followed by mapping in detail and a geophysical magnetometer survey to determine the shape, extent and nature of the intrusive mass. Mr. Archer placed particular emphasis on a need for the regional exploration of at least 50 square miles surrounding the known mineral showings including silt sampling, creek prospecting and the spot checking of outcrops and gossan zones at an estimated cost of $30,000.00.

This regional survey has not been completed in total; however, the owners of the property, Mr. L. J. Brown and Mr. L. I. Proctor, have made a close reconnaissance of the surrounding area by means of a helicopter, and, during the latter part of July, further exploration by prospectors led to the staking of 52 additional mineral claims adjoining the original claim recordings on three sides.

The attached interim report records the results of a re-examination of the property made by the writer during July 25th, 26th and 27th, 1967. In the text of this report frequent references are made to my preliminary report and to the Archer, Cathro & Associates Report of July 16th, 1967. The three reports are complementary and should be read together to get a complete recording of fact regarding this property.

PROPERTY: The Bonnet Plume River mining property recorded in the name of the owners, Messrs. L. J. Brown and L. I. Proctor, now amounts to 76 contiguous mineral claims as follows:

Mammoth 1 to 56 incl. Y6719 - Y6774, June 28th, 1968
Mammoth 57 to 76 " Y6791 - Y6810, July 12th, 1968

Thirty-two additional claims adjoining the above have been staked recently to cover new mineral showings. These claims are located as per the attached property plan and they will be recorded in the names of the owners in due course. Thus the total Mammoth claim holdings now consist of 108 mineral claims.

LOCATION AND ACCESS: Latitude 64°57', Longitude 133°17'. This location is 98 air miles north of the silver mining camp of Elsa, Yukon. Elsa is served by an all-weather highway from the railhead at Whitehorse, Yukon. The Wind River Trail, a winter road from Elsa to the Peel Plateau oil fields, can be partially re-located to serve the Bonnet Plume mining property. The trucking distance via this road will be approximately 120 miles from Elsa or about 400 miles from the railhead at Whitehorse.

Present access is 116 miles by float plane from Mayo to Fairchild Lake plus 13 miles by helicopter from the lake to the property.

The owners of the property have located a gravel bench suitable for landing-strip construction on Mammoth Claim No. 48 at an elevation of about 3,200 feet. The construction of a landing strip here will permit the use of wheel or ski-equipped aircraft for a flight distance of 120 miles from the Mayo airport.

TOPOGRAPHY: The terrain is quite rough. It is characterized by a series of three sharp, northerly trending ridges which cross the property within a lateral distance of four miles. These ridges separate Cobalt, Discovery and Tetrahedrite Creeks which are tributary to the main branch of Dolores Creek which crosses the south part of the property in an east to westerly direction. Local relief amounts to about 3,000 feet from the mouths of the Creek Tributaries to the cirque tops at 6,600 feet.

GEOLOGY: The Geological Survey of Canada mapping (see Map 10, 1963) covers the area approximately four miles north of the property and describes the general geological age of the area to be mainly pre-cambrian. G. S. C. Paper 53-7 describes the area some 16 miles south of the property. This descriptive geology corresponds very well with the geology of the Mammoth Property. Excerpts applicable to the Mammoth Property are quoted as follows:

> "reddish brown weathering dolomite with minor amounts of grey limestone, dark grey slate, and quartzite ... much of the rock shows irregular banding, which in places is interrupted by minute ruptures transverse to the banding ... cemented by white calcite and quartz ... dark grey and black slates associated with varying amounts of grey and white quartzite overlie the dolomites with apparent conformity at many localities ... a few bands of hematite-bearing quartzite from 1" to 2 or 3 inches thick and totalling 12 to 14 inches occur in a section about 700 feet thick ... associated with them are purple and greenish mud-cracked and oscillation ripple-marked slates, and at the

top of that part of the section in which the hematite is found is a 1-foot bed of brown weathering siderite and, a few feet above it, another bed, also a foot thick, of grey-brown, very dense limestone showing incipient replacement by siderite".

In describing the intrusive rocks of the area, G. S. C. Paper 53-7 states, and I quote further excerpts applicable to the Bonnet Plume property:

"the stocks are composed of coarsely jointed, medium grained, mottled green diorite which locally contains clots of plagioclase grains ½ inch in size ... some bodies are considerably sheared, altered and veined by calcite. Many of the dykes are porphyritic and contain some amygdules near their borders. Phenocrysts of plagioclase and pyroxene up to 5 mm. long are set in a dense, bluish green matrix. The amygdules are 3 to 4 mm. across, and are composed of calcite ... limestones cut by diorite dykes are veined by calcite at the dyke contacts ... all the contacts between the sedimentary rocks and the diorite were seen to be intrusive and no fragments of diorite are observed in rocks younger than the crumpled slates and limestones ... the lack of secondary foliation in the granitic bodies suggest that they have undergone little or no deformation since their intrusion. The preferred orientation of feldspar laths in the trachytoid syenite probably represents primary flow structure, and the roughly circular or rectangular plans of the intrusive bodies does not evidence any control by the structure of the folded rocks. An idea of the age of the intrusives can be gained only by indirect evidence. They were intruded after volcanic rocks were laid down on an eroded surface of sedimentary rocks ... many quartz veins, 4 inches to a foot wide and generally striking west and dipping steeply or vertically contain specks of chalcopyrite and pyrite. The quartz, much of which is rusty, is vuggy and exhibits a coral structure ... the observed association of hematite with quartzite may, however, be important ... In addition, quartz veins up to 4 inches wide containing lenses and veinlets ½ inch to 1 inch wide of pyrrhotite, some chalcopyrite and pyrite cut the syenite. The wallrock also contains scattered grains of these metallic minerals and a little molybdenite and arsenopyrite ... a 3-pound grab sample from one of the quartz veins assayed: gold trace; silver 0.18 ounces per ton; copper 0.31 per cent, and nickel 0.06 per cent."

The oldest and commonest rocks on the Mammoth Property are dolomitic limestones ranging from thin-bedded impure types of dolomite to relatively pure, crystalline limestone. Topping the limestones are green slates with chert and, above this, are beds of black slate and silt stone.

Intruding and distorting the above sediments are several sills and dykes, some of which are mineralized with magnetite, hematite and chalcopyrite. One sill of diorite 350 feet wide has been traced across the cirque at the northern part of the property (see plan) from Mammoth Claim 73 across claims 2, 1 and 3. A stock of mineralized syenite occurs on claim 44 and basic intrusives have been found in place on claims, 23, 47 and 48. Several clastic intrusive breccias have been noted. An iron formation about 700 feet wide crosses the northwest corner of the property on claims 74, 75, 49 and 52. This consists of hematite and jasperoid in ferruginous quartzite.

A number of outcrops of quite massive skarn are to be noted at or near formation contacts between the sedimentary and intrusive rocks. The skarn is characterized by the presence of epidote, pyroxene and calcite. The skarn locations appear to be coincidental to magnetite and hematite deposits which have replaced limestone. Thus skarn locations may serve as a guide to discovering deposits of chalcopyrite which have (in turn) replaced or partially replaced the magnetite and/or hematite in the sedimentary beds.

MINERALIZATION

The main controls governing replacement type mineralization on the property appear to be: a limestone contact; proximity to an intrusive rock such as diorite, and tight folding and crumpling of the sedimentary bedding. These three control conditions obtain at the main showing of ore on the property, in the cirque at the head of Cobalt Creek.

Map Location 1-A and 1-B: Here at 6,000 feet elevation there is a fold crest in bedded limestone, dolomite and slate which has been invaded by quartz, siderite, calcite and minor barite which has cemented the cracks, fissures and ruptures occurring transversely to the irregular banding or bedding of the sediments. This boxwork of cemented fractures occurring in the distorted beds of limestone and slate is almost invariably accompanied by varying degrees of replacement mineralization, usually chalcopyrite, magnetite and hematite replacing the more crystalline limestone, or cobaltite and arsenopyrite replacing the impure, thin-bedded limestones and slates overlying the above. It is noteworthy that the replacement chalcopyrite ore, assaying in the order of 18.2 per cent Copper, carries very little Cobalt and no arsenic, whereas the replacement cobaltite ore, located just above the chalcopyrite and assaying in the order of 15.8 per cent Cobalt, carries very low Copper values and high arsenic, (see assay records and spectrographic analyses appended herewith). An intrusive sill of diorite has been traced across the cirque west of and not far below the replacement ore zone.

The cirque face above the talus is very precipitous. However, one can observe malachite stain and cobalt bloom on the rock faces for a length of 420 feet and a width of 130 feet, and can take samples of the mineralization over about one-half of this area. The deposit appears to dip slightly (20° to 40°) into the hill in a south-easterly direction and thus much of it lies obscured under the talus. Discontinuous chalcopyrite and cobaltite mineralization can be found in the slates on the ridge-tops 250 feet above the main showing; also to the east and west of the sampled area.

On the basis of the examination and sampling to date, there is sufficient ore grade material in this cirque deposit to warrant a large capital expenditure for surveying, diamond drilling, metallurgical testing and feasibility studies. The replacement ore could be mined by relatively selective underground methods as a low-tonnage, high-grade operation of say 300 tons per day with millheads assaying 8.5 per cent Copper, 1.5 per cent Cobalt, and 1.5 ounces Silver per ton, to yield a daily operating profit of about $10,000.00 for a period of three years or more, depending on depth characteristics of the ore body. The alternative method of extraction is by a large-tonnage, low-grade surface mining method at say 10,000 tons per day of material, assaying about 1 per cent Copper, 0.2 per cent Cobalt, and 0.2 ounces Silver per ton, to yield a daily operating profit of $15,000.00 for a period of five years or more followed by an underground operation under the open pit workings dependent on depth characteristics as determined by deep diamond drilling.

The indicated potentials as described above are necessarily very rough estimates. Surveys, diamond drilling and metallurgical testing will have to be undertaken before the actual reserves in this deposit can be estimated accurately.

However, the above examples serve to point out that a large scale low-grade surface mining operation will result in more metal being mined out of the mountain for a longer period and at a greater overall profit, whereas the underground operation, being restricted to the relatively high-grade, massive beds of ore due to the high cost of underground development and mining, will be a comparatively short-lived operation with less overall profit.

Map Location No. 2: Here at the 3,950 foot elevation on the left limit of Discovery Creek on Mammoth Claim No. 43 is the discovery Deposit of chalcopyrite replacing dolomitic limestone. This is at the lowest elevation at which replacement ore has been found to date. Here again there are the geological controls governing the formation of replacement type ore deposits, viz. a bed of limestone within 50 feet of an inferred fault, vertically folded bedding on a northerly strike and a body of mineralized syenite outcropping less than 2,000 feet to the west. A character sample of massive chalcopyrite at this location assayed 32.4 per cent Copper and 1.20 ounces Silver perton. A 20 foot width of the mineralized bedding assayed 5.9 per cent Copper, and 0.2 ounces Silver per ton. This is not a good diamond drilling chance due to the presence of a bluff to the east and away from the fault; however, a few percussion drill holes were blasted into the bluff a few feet to disclose a persistence of the replacement ore for that distance anyhow.

The presence of replacement copper here under the aforementioned controls is considered to be important. A geophysical magnetic and I.P. survey over the immediate area is suggested.

Map Location No. 3: An outcrop of syenite porphyry mineralized with chalcopyrite, magnetite and hematite occurs between the 4,000 and 4,200 foot elevations on Mammoth Claim No. 44, about 2,000 feet west of Discovery Creek. The exposed portion of the outcrop is about 150 feet along the bluff: however, judging from the position of the mineralized float train beneath it, the syenite porphyry stock may extend 800' westerly to a small creek where there appears to be a contact N 15° E and dipping vertically with an intrusive clastic conglomerate. About 400 feet to

the east of the syenite outcrop is a bluff of impure dolomitic limestone trending N 15° E and dipping 65° easterly. A bulk sample taken across the talus below the outcrop by Cathro & Archer was assayed in Whitehorse and ran 0.28 per cent Copper and trace in silver and gold. A split from this bulk sample was sent to Coast Eldridge in Vancouver and assayed 0.305 per cent Copper. A semiquantitative, spectrographic analysis of the syenite is attached herewith.

This also is a poor diamond drilling chance due to the steepness of the topography. It is proposed to run a geomagnetic grid survey over the area prior to cutting diamond drill stations from which 'fan' drilling can be done. The presence of a porphyry copper intrusive beneath the No. 1 and to the west of the No. 2 replacement ore deposits may be of geological and commercial significance.

Map Location No. 4: Mr. Archer found some float siderite and tetrahedrite in a dolomite talus slope on the left limit of the creek on Mammoth Claims Nos. 91 and 93. The bluff above this was prospected at a later date and at about 5,250 feet elevation an almost vertical bed of sedimentary hematite in limestone was discovered. The hematite and limestone was partially replaced by chalcopyrite, tetrahedrite and stained with azurite and malachite. The exposure is almost obscured by slide rock and talus. More work, possibly a geomagnetic survey, will be necessary to determine the true attitude and dimensions of the mineralized deposit. A sample over a 12 foot width of mineralized bedding assayed 6.38 per cent Copper and 12.1 ounces Silver per ton.

Map Locations Nos. 5 & 6: These are oxidized zones of siderite 30 and 50 feet wide outcropping on the right limit of Tetrahedrite Creek at about 4,250' elevation on Mammoth Claim No. 84. The zones strike westerly into the side-hill and carry low copper and silver values.

Map Locations Nos. 7, 8 & 9: These are outcrops of intrusive rocks containing occasional chalcopyrite mineralization in disseminations. It may be important to note their various locations with respect to the overlying sedimentary rocks. These outcrops are being prospected further.

Map Location No. 10: This is a deposit of low-grade tetrahedrite in skarn and impure limestone located on Mammoth Claims 89 and 90 between 5,500 and 5,550 feet elevations. The bedding trends due north and dips 80° easterly. The deposit is cut off to the south by a small creek which may be a local fault. The mineralized area is 208 feet wide by 260 feet long and is heavily stained with iron oxide, malachite and azurite. A 10 foot width of heavily mineralized bedding in the centre of this deposit containing siderite and tetrahedrite stained with azurite and malachite assayed 1.32 per cent Copper and 1.50 ounces Silver per ton. A chip sample over the full 208 foot width of the deposit assayed 0.27 per cent Copper and 0.04 ounces Silver per ton. This area is relatively flat with very little overburden and is considered to be a good diamond drilling chance using angle holes to obtain intersections below the zone of oxidization.

Map Location No. 11: An outcrop of dolomite containing beautiful specimens of chrysocolla (copper hydroxide) was located on Mammoth Claim No. 26 on the right limit of Discovery Creek at about the 5,000 foot elevation. There was no chalcopyrite in evidence so no samples were taken. However, the location is slightly above and 1,100 feet north of a mineralized intrusive rock and thus may have geological significance.

Map Location No. 12: There is an impure dolomitic limestone remnant located in the centre of the cirque at the head of Discovery Creek at about 5,200 feet elevation. The outcrop is eroded on three sides and is stained with malachite over a 50 foot width. It trends N 15° W, parallel to the creek fault, and dips 60° easterly, away from the fault. A sample taken over 10 feet containing tetrahedrite, siderite and minor chrysocolla assayed 0.90 per cent Copper and trace Silver.

Map Location No. 13: Below the cirque on Cobalt Creek on Mammoth Claims 49 and 50, there is a wide bluff of thin-bedded limestone lying between 5,300 and 5,500 feet in elevation. The bedding trends N 15° W and dips 77° westerly, away from the aforementioned diorite sill which lies some 1,000 feet to the east. A 120 foot width of the bedding is lightly mineralized with siderite, disseminated chalcopyrite and is stained with malachite. The mineralization was considered to be too sparse to warrant sampling; however, its location between the diorite sill to the east and a wide iron formation (described below) to the west may be quite important in the overall geological picture.

Map Location No. 14: This is a very prominent iron formation some 700 feet wide and extending in a northwesterly direction across Mammoth Claims 51 and 75 and off the property for several miles to the northwest. The south-east boundary of it is on the property under talus and appears to be cut off by faulting as it does not appear on the south side of Cobalt Creek. The iron formation is a banded, hematite-bearing quartzite which carries very scattered crystals of magnetite and chalcopyrite. No samples were taken.

SAMPLE RECORD: Samples taken during my last two examinations of the property are recorded as follows:

Sample No.	Mapped Location:	Elev. Feet:	Sample Width:	Description, Location and Assays:
4170	1-A	6000	18.0'	No. 4 Claim 500' N of location line. Thin bedded lime beneath slate capping. 0.73 per cent Copper, trace Silver.
4171	1-A	5975	6.0'	25'N of above and underlying it. Chalco and malachite stained thin-bedded limestone. 4.2% Copper, 0.2 oz. Silver/ton.
4172	1-A	6025	4"	Character of cobaltite. No. 2 Claim 500' N of loc. line. A 4" width of ½"-bedded limestone heavily replaced with cobaltite and stained with erytherite. 15.8% Cobalt, trace Nickel, trace Copper, 0.18 oz. Silver/ton.
4185	1-B	6175	2.5'	No. 5 Claim 100' SE of loc. line. Thin-bedded limestone and slate partially replaced with arsenical cobaltite trends N35°E and dips 35° easterly. Cobalt 0.54%, Nickel trace, Copper trace, Silver trace.
4186	1-B	6150	3.0'	No. 5 Claim 300'SE of loc. line. Limestone underlying sample 4185, heavily replaced with hematite and chalcopyrite. Copper 18.2%, Silver trace, Nickel trace.
4187	1-B	6160	60.0'	Same loc. limestone beds partially replaced with siderite, magnetite, chalco and malachite stain. 1.44% Copper, Silver trace.
4167	2	3950	8.0'	No. 43 Claim 50' E of Discovery Creek. Siderite, magnetite and chalco replacing limestone, much malachite stain. 14.7% Copper, 0.40 oz. Silver per ton.
4168	2	3950	8"	Character of massive chalco, bornite and malachite. 32.4% Copper, 1.2 oz. Silver/ton.
4169	2	3950	12.0'	Impure limestone and siderite stained quartz capping the above to the west. 0.01% Copper, 0.08 oz. Silver per ton.
4188	3	4200		Character of syenite porphyry Claim 44, 2000' W of Discovery Creek, disseminated hematite, magnetite and chalco with malachite stain. Copper 0.52% (see spectro.analysis attached).
4183	4	5250	12.0'	Claim 94. Limestone replaced with tetrahedrite, hematite and chalco. 6.38% Copper, 12.1 oz. Silver per ton.
4180	10	5550	10.0'	Claim 89 siderite and tetrahedrite in altered limestone, malachite stained. 1.32% Copper, 1.50 oz. Silver/ton, Nickel trace.
4181	10	5500	11.0'	Claim 90. Fault breccia stained with secondary copper. 0.43% Copper, Silver trace.
4182	10	5525	208.0'	Claim 89. Altered limestone beds bordered by epidote-siderite skarn to E & W, trend northerly dip 80°E, malachite stained. Copper 0.22%, Silver 0.04 oz. per ton.
4184	12	5200	10.0'	Limestone remnant at head of Discovery Creek in centre of cirque, malachite stain and minor chrysocolla. 0.90% Copper, trace Silver.

T S L

Laboratories Limited

325 HOWE STREET - VANCOUVER 1, B.C.
TELEPHONE 684-1374

ASSAYERS
CHEMISTS
GEOCHEMISTS

CERTIFICATE OF ANALYSIS

SAMPLE(S) FROM Whitehorse Assay Office B. P. COPPER,

cc/ Mr. C.D.N. Taylor MAMMOTH PROPERTY,

SAMPLE(S) OF PULP ORE - CHARACTER.

REPORT NO. V-2426

Semiquantitative Spectrographic Analysis:

	4172 Sample V-2426 Cobalt Ore	Sample	Sample #1 V-2214 Copper Ore		4172 Sample V-2426 Cobalt Ore	Sample	#1 Sample V-2214 Coppur Ore
Antimony	-		-	Lithium (Li_2O)	-		-
Arsenic	MH		-	Manganese	.2%		0.005%
Barium	.02%		.003%	Mercury	-		-
Beryllium (BeO)	-		-	Molybdenum	-		.005%
Bismuth	-		-	Nickel	1-2%		.0005%
Cadmium	-		-	Silver	.3oz:ton		.5oz:ton
Cerium (CeO_2)	-		-	Tantalum (Ta_2O_5)	-		-
Chromium	-		.03%	Thorium (ThO_2)	-		-
Cobalt	MH		.02%	Tin	-		-
Columbium (Cb_2O_5)	-		-	Titanium	.1%		.01%
Copper	.3%		MH	Tungsten	-		-
Gallium	-		-	Uranium (U_3O_8)	-		-
Germanium	-		-	Vanadium	-		.003%
Indium	-		-	Zinc	-		.1%
Iron	2%		H	Zirconium (ZrO_2)	-		.03%
Lead	.1%		.01%				

Figures are approximate:

Report No. 2214 of June 2nd, 1967 is typed in the 3rd column for comparison purposes.

CODE

H — High	— 10 —	100% approx.	
MH — Medium High	— 5 —	50% approx.	
M — Medium	— 1 —	10% approx.	
LM — Low Medium	— .5 —	5% approx.	
L — Low	— .1 —	1% approx.	
TL — Trace Low	— .05 —	.5% approx.	
T — Trace	— .01 —	.1% approx.	
FT — Faint Trace	— approx. less than .01%		
PT — Possible Trace	— Presence not certain.		
— — Not Detected	— Elements looked for but not found.		

DATE July 13, 1967 SIGNED

DIVISION OF TECHNICAL SERVICE LABORATORIES

No. 1920 is of Cobaltite, metallurgical Assay 2.6% Cobalt.
No. 1918-1919 is a composite sample of Porphyry-Copper Syenite having a metallurgical assay of 0.305% Copper.

TO:
Archer, Cathro & Assoc. Ltd.,
P. O. Box 1703
Whitehorse, Y. T.

ACCTLC
Member Canadian Testing Association

PHONE: TRinity 6-4111
CABLE ADDRESS "ELDRICO"

FILE NO. A. 3-A.1-67-35435

DATE Aug 3, 1967

SEMI QUANTITATIVE SPECTROGRAPHIC ANALYSES

COAST ELDRIDGE

ENGINEERS & CHEMISTS LTD.

125 EAST 4TH AVE. VANCOUVER 10, CANADA

We Hereby Certify that the following are the results of semi quantitative spectrographic analyses made on _____ samples submitted.

SAMPLE IDENTIFICATION	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Ga	Au	Fe
Cobaltito (ref. P.9 report) 1920	5.0	ND	Major	ND	ND	ND	0.01	ND	2.0	0.005	Major	0.01	ND	Trace	3.0
Composite 1918 - 1919 Syenite Porphyry (ref. P.11)	8.0	ND	ND	0.01	0.001	ND	ND	ND	2.0	ND	0.003	0.3	ND	Trace	5.0

SAMPLE IDENTIFICATION	Pb	Mg	Mn	Mo	Nb	Ni	Si	Ag	Sr	Ta	Sn	Ti	W	V	Zn
1920 Cobaltite	ND	2.0	0.1	0.001	ND	0.1	Matrix	Trace	0.01	ND	0.003	0.2	ND	ND	ND
1918-1919 Syenite Porphyry	0.01	2.0	0.3	0.001	ND	Trace	Matrix	Trace	0.007	ND	ND	0.5	ND	0.001	ND

MAJOR = Above normal spectrographic range

/jn All results are expressed as percent by weight.

Note: Rejects retained one week.
Pulps retained three months.

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C-95

COAST ELDRIDGE ENGINEERS & CHEMISTS LTD.

Allan Wong
CHIEF CHEMIST

14.

No. 1920 is of Cobaltite, metallurgical Assay 2.6% Cobalt.
No. 1918-1919 is a composite sample of Porphyry-Copper Syenite
being a metallurgical assay of 0.305% Copper.

TO:
Archer, Cathro & Assoc. Ltd.,
P. O. Box 1703
Whitehorse, Y. T.

SEMI QUANTITATIVE SPECTROGRAPHIC ANALYSES

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ENGINEERS & CHEMISTS LTD.

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FILE No. A. 3-A.1-67-35435

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We Hereby Certify *that the following are the results of semi quantitative spectrographic analyses made on* ____ *samples submitted.*

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Composite 1918 - 1919 Syenite Porphyry (ref. P.11)	8.0	ND	ND	0.01	0.001	ND	ND	ND	2.0	ND	0.003	0.3	ND	Trace	5.0

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MAJOR = Above normal spectrographic range

/jm

All results are expressed as percent by weight.

Note: Rejects retained one week.
Pulps retained three months.

COAST ELDRIDGE ENGINEERS & CHEMISTS LTD.

CHIEF CHEMIST

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14.

CONCLUSIONS: The physical and geological characteristics of the rock formations throughout the property are favourable toward generally widespread mineralization and potentially large ore deposits which can be mined economically by surface mining methods.

The surface exploration of this property is far from complete. However, recently discovered deposits of copper-cobalt ore and copper-silver ore replacing limestone and limey sediments; also, an intrusive deposit of syenite porphyry containing appreciable amounts of chalcopyrite, magnetite and hematite are of sufficient interest to warrant a large capital expenditure for surveys, mapping, diamond drilling and feasibility studies.

RECOMMENDATIONS:

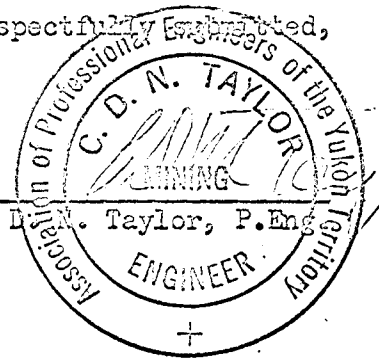
In view of the new discoveries of mineralization and the additional staking of claims since the initial Geological Report on the property was made, I would recommend an expenditure by the owners of $10,000.00 for a program of further geological exploration assisted by prospectors and servied by helicopter about as follows:

1.	Aircraft, fixed-wing: 2 days to establish camp and 1 day to break camp	$ 1,600.00
	Helicopter 30 hours in 7-day program	4,050.00
2.	1 Senior Geologist, 1 prospector and 2 assistance for 7 days including camp costs to take geochemical silt samples on all creeks cutting the property including creek prospecting and the examination and sampling of all mineralized showings	2,000.00
3.	Assaying and Silt Sample Analyses	1,350.00
4.	Geological reporting and miscellaneous overhead	1,000.00
	Total Estimated Expenditure	$10,000.00

It is suggested that the cost of the two geological examinations and reports, when applied to representation work requirements, will keep the property in good standing for a period of two years. During this period the owners are urged to dispose of all or part of their interest in the property at a suitable profit.

It is estimated that after this initial year of prospecting, all future expenditures for exploration, development and production will be extremely large. Thus future financing should be through regular channels by a major mining company, not by the individual discoverers and owners of the property.

Respectfully Submitted,



C. D. N. Taylor, P.Eng.

August 15th, 1967.

APPENDIX

Feasibility of Future Operation:

When one first arrives at this property by helicopter one tends to surmise that it might be difficult to operate a mining venture at this northern latitude and at a high elevation. However, by comparing operating conditions with other highly successful mining operations in the Yukon and in northern British Columbia, I would point out that the operating difficulties in the Bonnet Plume River area will be nominal, as follows:

1. Isolation: The property is 120 air miles from the Mayo airport and approximately the same distance in road miles from the all-weather trucking highway at Elsa, Yukon. There is an excellent construction site for an aircraft landing strip on the Mammoth property. There are no problems in extending the winter road via the Wind River Trail, now serving the Giant Pacific Steel Limited at Bear River, the extra 40 miles to the property.

   Thus for preliminary exploration purposes, all heavy equipment, fuel, supplies and a camp can be hauled to the property during winter, and the aircraft landing strip can be completed at that time to bring the property within one hour's flying time of Mayo, Yukon. For example, a very few years ago five Socony Mobile oilwell drilling camps, located from 100 to 175 miles further north on the Wind River Trail, were moved in during winter to be successfully operated on a year-round basis in this manner.

   For production purposes an all-weather highway will be required to connect with the Elsa highway a distance of 120 miles. The Federal and Territorial governments' policy in past years has been to provide good trucking roads to mines having assured ore reserves. There are no highway building problems and the total trucking distance between the property and the railhead at Whitehorse will be approximately 400 miles which is about the same distance as from the Clinton Creek Mine operated by Cassiar Asbestos Corporation.

2. Climatical: There is less precipitation and annual snowfall in the Bonnet Plume area than in the northern British Columbia mountains where Cassiar Asbestos Corporation work their open pit asbestos property on a year round basis with great success. Winter temperatures in the low-lying valley bottoms will be very low, probably 60° below zero for weeks at a time. However, we have found out in the Keno Hill and other mountainous areas that there is at least a 10° rise

in temperature for every 1,000 foot increase in elevation during the winter months. Thus the temperatures at the locations of the mining operations on the property at between 4,000 and 6,000 feet in elevation are not expected to be any colder than 30° below zero during the cold spells. Open pit mining operations in northern Quebec and in northern British Columbia are operated successfully at this temperature.

3. Rugged Topography: Many of the mineralized zones on the property are located on steep hillsides or on the sides of steep-walled cirques. Therefore, surface diamond drilling will be difficult and expensive unless it is limited to locations in cirque bottoms and saddles where the topography is less rugged. It is proposed, therefore, to diamond drill the most inaccessible deposits from underground exploratory adit cross-cuts driven into the hillsides and cirque walls above the talus slopes.

For instance, a centrally located tractor road can be built up Discovery Creek to the head of the cirque to about the 6,000 foot elevation. At this location (refer to map) an adit cross-cut about 1,500 feet in length and with diamond drill stations cut at 100' intervals for ring drilling purposes can be driven through the ridge to break-through at a point below the exposed ore on the west side, in the vicinity of the No. 2 Posts of Claims 3 and 4. In a similar manner, access from the tractor road to the head of Tetrahedrite Creek can be effected by driving an adit cross-cut easterly at about the 5,500 foot elevation through Claim 34 to Claim 37.

The above facts and thoughts are offered in good faith as preliminary assistance to anyone concerned with making feasibility studies regarding mining operations in this area.

Respectfully submitted,

Association of Professional Engineers of the Province of British Columbia
C. D. N. TAYLOR
MINING
ENGINEER

C. D. N. Taylor, P.Eng.

August 15th, 1967.

REPORT ON

BONNET PLUME COPPER PROPERTY

(MAMMOTH 1 - 76 CLAIMS)

for

L.I. PROCTOR

July 16, 1967

Alan R. Archer Consultant Whitehorse, Y.T.

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RECOMMENDED EXPLORATION APPROACH for CIRQUE and CAMP CREEK SHOWINGS	
LOCATION MAP	1" = 65 miles
CLAIM AND MINERAL SHOWING LOCATION MAP	1" = 1/2 mile
GEOLOGY CIRQUE SHOWING	1" = 400 feet

INTRODUCTION

The writer made a cursory examination of the Bonnet Plume Copper Property on July 10 and 11, 1967. Previous to this examination, my assistant, F.M. Smith spent ~~six~~ eleven days examining the major areas of interest and prospecting their immediate vicinities.

The following report is based on direct observations by the writer and F.M. Smith; on assays and reports submitted by L.I. Proctor; discussions with D.C. Findlay, resident government geologist, Whitehorse; and Geological Survey of Canada mapping of adjoining areas (map 10-1963 and map 53-7). All assaying, except where otherwise mentioned in the text, was done by George Spalding, Whitehorse Assay Office.

PROPERTY

The property consists of 76 contiguous mineral claims recorded in the Mayo Mining District as follows:

Claim Name	Grant Number	Owner	Expiry Date
Mammoth 1-56	Y6719-Y6774	L. Brown & L.I. Proctor	28 June, 1968
Mammoth 57-76	Y6791-Y6810	L. Brown & L.I. Proctor	12 July, 1968

LOCATION AND ACCESS

The property is situated in the Wernecke Mountains at latitude 64°57' and longitude 133°17'. It lies 98 air

miles north of Elsa, the closest community and all-weather highway.

Present access is by float plane from Mayo to Fairchild Lake (116 miles) and by helicopter from the lake to the property (13 miles). Winter road access would be possible by construction of a 56 mile branch east from the existing Elsa-Peel Plateau winter road. The total distance from the property to Whitehorse by road would be about 400 miles. It is thus approximately the same distance from Whitehorse as is the Clinton Creek Mine and about 50 miles further than the Cassiar Mine.

HISTORY

Copper float was first discovered in the area by L. Brown of Mayo, game guide and outfitter. Further prospecting by Brown led to the discovery of a small copper showing in the early 1960's and a larger copper-cobalt showing in 1967.

The property was examined by C.D. Taylor, Mining Consultant, on June 20 and 21, 1967. Following this examination a camp was established and parts of the property prospected in a cursory manner.

GEOLOGY

REGIONAL

The property lies in the high mountain wall that defines the northeastern side of the Western Cordillera. Topography is extremely rugged with mountains rising steeply to over 7000 feet from a base elevation slightly below 3000 feet. Pleistocene glaciation consisted of valley glaciers to an elevation of approximately 5000 feet and small alpine glaciers along the northern slopes to a higher elevation. Glacial deposits are not extensive in the mountains and where seen consist primarilly of lateral moraines along the lower slopes of creek valleys and accumulations of rubble on cirque floors.

The area has not been mapped by the Geological Survey of Canada alghough mapping extends to eight miles north and sixteen miles south. Rock formations consist of Cambrian to Precambrian sediments. The larger drainage courses have a northwesterly trend that likely defines major regional faulting. Most of the larger river valleys are wide, U-shaped and extensively covered by glacial till.

PROPERTY

The basic rock types on the property are slates, phyllites, limy shales with dolomite lentils, cherty sandstone and dolomite. This assemblage generally strikes

a little east of north and appears to form a broad steep limbed anticline trending northsouth. A series of northeast and eastwest faults is indicated by the drainage pattern and the discontinuity of formations on either side of the larger streams.

The sequence of sedimentation observed on the northern side of the property, from youngest to oldest, is black slate, iron formation (hematite, jasper), and quartzite, cherty dolomite, green slate, an intrusive sill, chert, black slate with chert, green slate with chert and finally dolomite. This sequence probably correlates with Precambrian sediments mapped some 8 miles north by the Geological Survey of Canada(map 10-1963).

An intrusive sill approximately 350 feet wide was traced for several thousand feet across a cirque on the northern side of the property. The sill is diabasic along its margins with a central core of medium to coarse-grained diorite. Outcrops of intrusive material, usually diabasic to basaltic in nature, were observed in several other localities on the property, but whether these occur as dikes, sills or small plugs could not be determined. An outcrop of intrusive material consisting primarily of orthoclase feldspar was found on the Mammoth 44 claim and could represent either a small syenite stock or a segregation within a dyke or sill. Several outcrops of breccias, possibly intrusive, were seen. These breccias appeared to consist of fragmental country rock

cemented with fine grained intrusive material. Both the breccia and the intrusives are very limy. The intrusive outcrops do not have any characteristic features that allow them to be readily distinguished from thick bedded sediments from the air.

Outcrop is abundant in the higher areas and is more or less obscured by talus on the lower slopes. However, sufficient outcrop can be found in the talus covered areas to determine the overall setting. The present cycle of solifluction is extremely rapid due to the steep slopes and the frost action on the bedded sediments.

GEOCHEMISTRY

Seven silt samples were taken by the writer. The location of each sample, and its assay in parts per million copper is shown on Figure 2. Samples were analyzed at Chemex Labs Ltd., Vancouver, using a hot acid extraction technique.

Although the assay values are lower than the writer expected, samples from streams draining the property are approximately twice the value of those from streams draining an unmineralized area to the southeast. Thus the indications are that silt sampling, if carefully done, may prove a reliable regional exploration tool. The geomorphological conditions prevailing in the district are, in theory at least, ideally suited for silt sampling exploration techniques.

MINERALIZATION

GENERAL

Reconnaissance prospecting has indicated that copper and iron mineralization is widespread both on the property and beyond the property boundaries. Cobalt mineralization has been found along the headwall of a cirque on the north part of the property. The minerals observed were hematite, magnetite, siderite, pyrite, chalcopyrite, tetrahedrite, cobaltite, and oxides of copper and cobalt. The observed mode of occurence of each mineral is as follows:

Hematite--Occurs both as a distinct sedimentary iron formation and as specular hematite. The iron formation, up to several hundred feet thick, crosses the northwest side of the property. It consists of hematite, jasper and iron stained quartzite. Specular hematite is disseminated in all of the country rocks and is most abundant in the cherts and intrusives. Concentrations can be found along joints and fault surfaces.

Magnetite--Was noted in abundance within the intrusives--particularly the coarse-grained fractions. A small amount of magnetite likely occurs within the iron formation.

Siderite--Has been injected as vein fillings where ever fracturing has occured and, along with quartz, is the main gangue mineral for the copper, cobalt and tetrahedrite mineralization. Segregations and disseminations of siderite were also seen to a small degree within the country rocks with the exception of the intrusives.

Pyrite--Is the most common accessory mineral occuring in the mineral showings. Pyrite also occurs as numerous small crystals scattered throughout the sedimentary rocks and as an accessory mineral within the intrusives.

Chalcopyrite--This mineral is the main constituent of the various showings. It occurs as massive replacements and disseminations within siderite veins, as an accessory mineral within the intrusives and intrusive breccias, and as fine disseminations (usually near intrusions or siderite veins) within the country rock. Malachite staining can be found wherever chalcopyrite has been exposed to weathering.

Tetrahedrite--Occurs as a very minor accessory mineral associated with chalcopyrite. Float from a tetrahedrite-siderite vein was found about 3000 feet east of the property boundary.

Cobaltite--Significant quantities of this mineral were found only in one area where it occurs as masses of find grained mineralization replacing siderite veins, as well defined crystals disseminated in siderite and as minor fine disseminations throughout the surrounding sedimentary rocks. This distinctive pink cobalt oxide, Erythrite, is seen wherever cobaltite is exposed to weathering.

Arsenopyrite

MINERAL SHOWINGS

The location of each mineral showing discussed below is referred to by number on Figure 2:

1. Cirque Showing

Sketch mapping of this area is shown on Figure 3. Mineral showings are exposed on the steep east wall of the cirque. The base of the cirque is covered by talus slides and the floor by thick accumulations of locally derived glacial rubble. Alternating bands of black and green slates are folded into a northsouth trending anticline, the axis of which lies along the cirque ridge. Thus, the sediments on the easternmost part of the wall are almost on the crest of the fold and exhibit a nearly horizontal attitude. As the cirque wall trends around to the northwest and southwest, the

sediments rapidly assume a steep westerly attitude being further removed from the axis of the fold onto the steep dipping west limb.

The main zone of copper and cobalt mineralization is found near the fold crest on the cirque face. This area has been invaded by a box work of siderite-quartz fracture fillings. There are no actual fault structures and the fracture fillings are neither numerous nor individually continuous. The fractures contain disseminated to massive chalcopyrite and cobaltite over widths from several inches to four feet, with the average width being approximately twelve inches. Any particular fracture is usually mineralized with either cobaltite or chalcopyrite but not both. Individual fractures seldom exceed 50 feet in length and exhibit radical changes in attitude along strike.

Cobaltite and chalcopyrite are also disseminated in the country rock throughout the cirque face, particularly in the vicinity of the fracture fillings. These disseminations often lie in the bedding direction of the sediments and usually occur with or near small amounts of quartz or siderite. There seems to be little doubt that the disseminated mineralization is related to the vein fillings, and is younger than the country rock rather than syngenetic.

Sampling or even visual estimation of the grade of the mineralized zone in the cirque face is impossible without climbing equipment. The irregularity of the mineralization

itself makes accurate sampling difficult under the best of conditions. The area of best mineralization, outlined in Figure 3, could average up to 1% copper and 0.2% cobalt but because of the inaccessibility of most of the zone, this visual estimate could be in error by a large factor one way or the other.

Character samples of the more massive chalcopyrite and cobalt mineralization were taken in order to determine the precious metal content. The chalcopyrite assayed 17.9% copper, 0.12 ounces silver per ton and .005 ounces gold per ton, while the cobaltite assayed 2.6 % cobalt, [illegible] ounces silver per ton and [illegible] ounces gold per ton. Spalding reported that a similar specimen from the same area, assayed for Mr. Proctor returned trace in platinum metals. A specimen of the cobaltite has been sent to Coast Eldridge, Vancouver, for a semi-quantitative spectrographic analysis but assay results were not available at the time of writing of this report.

Samples of vein material were tested with an ultra-violet lamp and a geiger counter. No fluorescent minerals were observed and except for one specimen of cobaltite that was three times background, no radioactivity was found.

2. Discovery Showing

The original discovery is located along the base of a steep bluff of thick bedded dolomite in a shallow gorge cut by Discovery Creek. The dolomite is cut by a weak steep

dipping fault striking easterly. The vein is only several inches wide and pinches out to the east and is cut off by a major northerly trending fault (in Discovery Creek) in the west. An area approximately 8 feet wide and 12 feet high on one wall of the vein has been partially replaced by siderite and quartz and is well mineralized with chalcopyrite. An 8.01 foot wide chip sample taken by C.D. Taylor across this zone assayed 14.7% copper and 0.40 oz/ton silver. A similar sample was sent to TSL Laboratories Ltd., Vancouver, by Mr. Taylor for semiquantitative spectrographic analysis but no additional minerals of interest were detected.

No other significant mineralization was seen in the immediate area and the possibility of the Discovery showing extending more than a few feet into the bluff is extremely remote. No fluorescent minerals were found in samples of wallrock and mineralization from the showing.

3. Camp Showing

This showing was found by prospecting several days before the writer's visit. An outcrop of syenite forms a bluff about 150 feet long and 30 feet high along the steep hillside on the north side of Camp Creek at an elevation of 4300 feet. This rock is composed primarily of medium grained, pinkish orthoclase feldspar with a little quartz and 10 to 15% hornblende. Accessory minerals are magnetite, specular hematite and chalcopyrite. Outcrop in the area is partially

obscured by blocky talus that is overgrown with buckbrush. The extent of the syenite does not appear to be much larger than the outcrop area as it is overlain by sedimentary rocks and is surrounded by intrusive breccias on either side. Immediately below the bluff is a boulder train of the syenite that extends at least 800 feet downhill, almost to the creek, and obscures all outcrop. It is impossible to tell whether the syenite is the nose of an intrusive plug or a coarse grained fraction of a large sill or dike.

The syenite contains about 1% chalcopyrite that is almost equally distributed throughout as finely disseminated particles. It is weakly jointed and chalcopyrite is occassionally more abundant near the joints. Magnetite and hematite are similarly distributed throughout and compose 1-2% of the mass. The only other minerals seen were an occassional fleck of pyrite and malachite on the outcrop surface.

A bulk sample of the syenite was obtained by randomly chipping fragments from approximately 100 blocks of float immediately below the outcrop. This sample was crushed at the Whitehorse Assay Office and split into 2 samples. The first sample was assayed by Spalding and returned 0.28% copper and traces of silver and gold. The second assay was sent to Coast Eldridge, Vancouver, for copper assay and a semiquantitative spectrographic analysis but results were not available at the time of writing this report. ← Sample No. 1918 0.30
" " 1919 0.31

4, 5 & 6

These three mineral showings were found by the writer on a reconnaissance traverse. Showing number 4 consisted of siderite and tetrahedrite float in a dolomite talus slope. This float was found along the hillside for approximately 1000 feet and it is thought to be derived from narrow veins. A composite sample of the float assayed 3.71% copper, 3.02 oz/ton silver and 0.02 oz/ton gold.

Showing number 5 is a steeply dipping 30 foot wide zone (possibly a vein) of highly oxidized siderite that outcrops on the west side of a small creek. The zone strikes westerly into the creek bank under a terminal moraine and is cut off to the east by a fault that follows the creek bed. Grab samples assayed 0.33% copper, 4.03 oz/ton silver, and 0.01 oz/ton gold.

Showing number 6 consists of a similarly oxidized zone about 1500 feet further downstream. This zone is 50 feet wide and grab samples assayed trace in gold, silver and copper.

7, 8 & 9

These three showings consist of disseminated chalcopyrite in intrusive rocks. Only showing number 7 was seen by the writer. In this showing the occassional dissemination of chalcopyrite was found over a small area within the intrusive. No samples were taken as the copper content was negligible.

Small specimens of intrusive rock picked up by prospectors from locations 8 and 9 were noted by the writer to contain considerable fine flecks of chalcopyrite.

11

A specimen of chrysocolla was found at this locality by one of the prospectors but the writer did not have time to visit the showing.

12

A specimen of chalcopyrite occuring in narrow quartz-siderite veinlets was found in this area by one of the prospectors, but the writer did not have time to visit the showing.

CONCLUSIONS AND RECOMMENDATIONS

The two most significant features of the property are the widespread extent of the mineralization and its occurence in all the intrusive rocks seen. This suggests that the potential is good for large, relatively low-grade deposits in either an intrusive or sedimentary environment.

The relatively small amount of prospecting done so far has located two mineral showings which have tonnage potential and which are worthy of further work. However, the limits of the mineralized district are still unknown, and, in all probability, the best showings have yet to be found. In fact, at this stage there is no way of even knowing if the claims are located in the best part of the district.

Before exploring the known showings, top priority should be given to regional exploration of at least 50 square miles,

to outline the extent of the intrusives and to locate other mineralized areas. The exploration approach should be a combination of silt sampling, creek prospecting, and spot checking of outcrops and gossan zones. Following this regional reconnaissance, a fresh reappraisal will be necessary to evaluate the significance and potential of the district and to assign priorities and select follow-up methods. Assuming that more showings will be found, a large staking program will be required.

The cost of this program, exclusive of the staking, is estimated as follows:

Wages-- &Camp Costs	senior geologist & 2 helpers 15 to 20 days	$ 4,000.00
Helicopter	120 hrs @ $135.00	16,000.00
Fixed wing charter Avgas		6,500.00
Rock and geochemical analysis		3,500.00
	TOTAL	$30,000.00

Respectfully submitted

ARCHER, CATHRO AND ASSOCIATES, LTD.

Alan R. Archer

Alan R. Archer, B.A.Sc., P.Eng.

July 16, 1967

CERTIFICATE

I, Alan R. Archer, with business and residential address in Vancouver, British Columbia, do hereby declare that:

1. I am a consulting geological engineer.
2. I am a graduate of the University of British Columbia, 1957.
3. I am a registered professional engineer in Yukon Territory and in the Province of British Columbia.
4. From 1957 to 1966 I was engaged in mining and mining exploration for a number of companies as a geological engineer. I was chief geologist for United Keno Hill Mines Ltd. when I retired in 1966 to practice as a consulting geological engineer.
5. I have personally studied all maps and data referred to in this report.
6. I have no interest, directly or indirectly or expected in any properties referred to in this report.

Respectfully submitted

A. R. Archer

A.R. Archer, B.A.Sc., P.Eng.

RECOMMENDED EXPLORATION APPROACH for CIRQUE and CAMP CREEK SHOWINGS

These recommendations have been put in the Appendix to emphasize that they are secondary to the immediately recommended program for further work on the property. Both the Cirque and Camp Creek showings merit further exploration. The approach should be as follows:

Cirque Showing

The cirque face should be photographed from a helicopter and a photo mosaic prepared on a scale of 1 inch equals 50 feet. Measured ground control points, marked with white cloth, must be established prior to the photography. The entire cirque wall should then be mapped, and chip sampled if mineralized, from the top to bottom on lines 100 feet apart. The more extensively mineralized areas should be sampled and mapped at 50 foot intervals. An experienced mountain climber and a geologist will be required for the project, and , with good weather, should complete it in three weeks. An additional week should be devoted to mapping the east side of the mountain.

The above program should provide a fair estimation of the extent and grade of the mineralized area. If results are favourable, drilling will be required for further evaluation.

Camp Creek Showing

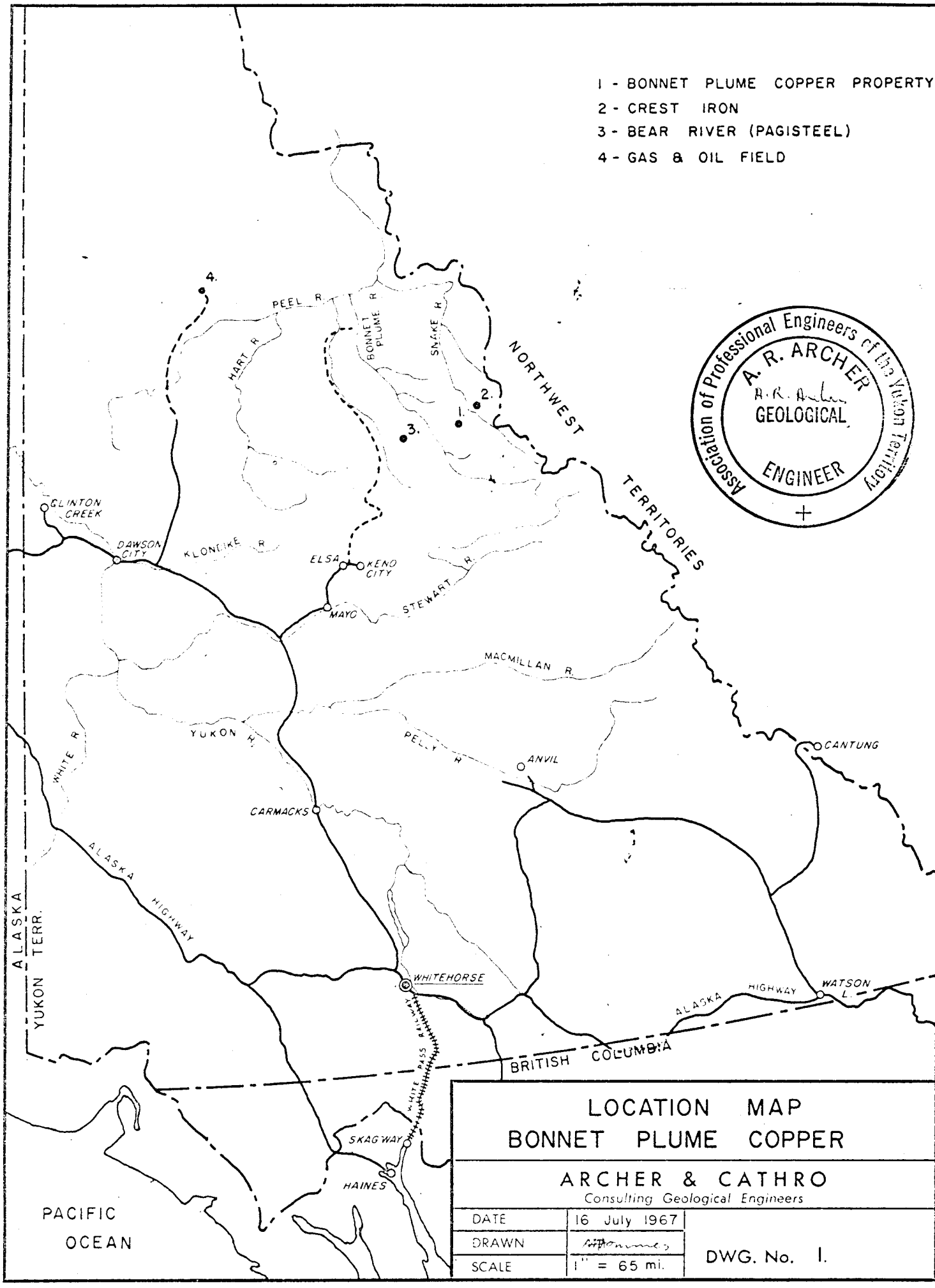
A control grid consisting of lines at 100 foot intervals

running up and down the hill should be established over the showing and immediate area. This area should be then surveyed with a magnetometer and mapped in detail. Samples of the intrusives should be taken for detailed petrographic studies. Further exploration by diamond drilling will be contingent on the shape, extent and nature of the intrusive mass as determined by the above work.

The total cost of the above program is estimated at $20,000 to $30,000. If drilling is anticipated, an airphoto mosaic on a scale of 1 inch equals 1/4 miles should be prepared for the entire property. Government photos will be adequate for the mosaic but if an opportunity presents itself, new photos at a lower elevation should be taken.

Respectfully submitted
ARCHER, CATHRO AND ASSOCIATES, LTD.

Alan R. Archer


1 - BONNET PLUME COPPER PROPERTY
2 - CREST IRON
3 - BEAR RIVER (PAGISTEEL)
4 - GAS & OIL FIELD
PEEL R.
HART R.
BONNET PLUME R.
SNAKE R.
NORTHWEST TERRITORIES
GLINTON CREEK
DAWSON CITY
KLONDIKE R.
ELSA
KENO CITY
MAYO
STEWART R.
MACMILLAN R.
YUKON R.
WHITE R.
PELLY R.
ANVIL
CANTUNG
CARMACKS
ALASKA HIGHWAY
ALASKA
YUKON TERR.
WHITEHORSE
WHITE PASS RAILWAY
ALASKA HIGHWAY
WATSON L.
BRITISH COLUMBIA
SKAGWAY
HAINES
PACIFIC OCEAN
Association of Professional Engineers of the Yukon Territory
A. R. ARCHER
GEOLOGICAL
ENGINEER
LOCATION MAP
BONNET PLUME COPPER
ARCHER & CATHRO
Consulting Geological Engineers
DATE 16 July 1967
DRAWN
SCALE 1" = 65 mi.
DWG. No. 1.

ARCHER, CATHRO
AND ASSOCIATES LTD.
CONSULTING GEOLOGICAL ENGINEERS

CASCA BUILDING, WHITEHORSE, Y.T. 667-4113 BENTALL CENTRE, VANCOUVER, B.C. 688-3022 OR 522-1562

POST OFFICE BOX 1708
WHITEHORSE, Y.T.

BONNET PLUME COPPER PROPERTY

BONNET PLUME RIVER MINES LTD.

October 14, 1967

A.R. ARCHER CONSULTANT WHITEHORSE, Y.T.

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APPENDIX

Assay certificate, Coast Eldridge
Figure 1- Property location plan---------- 1"=65 miles

ENVELOPE-1

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ENVELOPE 2

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SUMMARY

The Bonnet Plume Copper property consists of 108 mineral claims located 98 air miles north of Elsa, Yukon Territory. Present access is by aircraft, but winter road access could be obtained by construction of a 56 mile branch road from the existing Wind River Trail. Total distance from the property to Whitehorse by road would be about 400 miles.

The geological setting consists of a series of Precambrian clastics and carbonates which are overlain unconformably by Cambrian agglomerates, flows and intrusive sills, dikes and stocks. These in turn are overlain unconformably by a thick carbonate sequence. Chalcopyrite has been found as fracture fillings in the sediments and as an accessory mineral in the coarsely crystallized phases of the volcanics. Considerable potential exists for large tonnages of relatively low grade material and two showings have already been found that merit further work. Good grade float on the property suggests that further deposits can be found by careful prospecting.

A program of exploration and development to cost a total of $150,000.00 is recommended for 1968. Included in this total is an allowance for construction of a winter road and an all-weather air strip.

INTRODUCTION

A preliminary report on the property dated July 16, was based mainly on a two day reconnaissance by the writer and a ~~six~~ *an eleven* day mapping program of Cobalt Cirque by his assistant, F.M. Smith. During early September the writer and Smith, spent seven days reconnaissance mapping and silt sampling the entire property and mapping Grid A in detail (approximately 2 miles long and 2000 feet wide on the north side of Camp Creek). All of the reconnaissance work was restricted to creek bottoms and lower elevations due to an unseasonally early snowfall. Cut lines were established on Grid A and a picketline magnetometer survey and reconnaissance Ronka EM 16 survey was done by Cana Exploration Consultants Ltd. The same lines were soil sampled by the writer's crew.

This report is based on direct observations; on reports by C.D.N. Taylor, P. Eng., dated July 1 and August 15, 1967; discussions with D.C. Findlay, Resident Geologist, G.S.C., Whitehorse; and G.S.C. mapping of nearby areas (Map 10-1963 and Map 53-7). All assaying, except where otherwise mentioned, was done by George Spalding, Whitehorse Assay Office.

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PROPERTY

The property consists of 108 unpatented contiguous mineral claims, recorded jointly in the names of Mr. L.J. Brown and L.I. Proctor. They are registered at Mayo, Yukon as follows:

Claim Name	Grant Number	Expiry Date
Mammoth 1-56	Y6719-Y6774	28 June, 1968
" 56-76	Y6791-Y6810	12, July, 1968
" 77-84	Y6843-Y6850	18 Aug. 1968
" 85-92	Y6827-Y6834	1 Aug. 1968
" 92-100	Y6835-Y6842	1 Aug. 1968
" 101-108	Y6851-Y6858	18 Aug. 1968

LOCATION AND ACCESS

The property is situated in the Wernecke Mountains at Latitude 64°57' and Longitude 133°17'. It lies 98 air miles north of Elsa, the closest community accessible by all-weather highway.

Present access is 116 miles by float plane from Mayo to Fairchild Lake and 13 additional miles by helicopter from the lake to the property. Winter road access would be possible by construction of a 56 mile branch east from the existing Wind River Trail, a winter road from the Keno Hill district to the Peel Plateau oil and gas fields. The total distance by road from the property to railhead at Whitehorse would be about 400 miles. It is thus approximately the same road distance from Whitehorse as the

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Clinton Creek Mine and only 50 miles further than the Cassiar Mine.

Development of the nearby multibillion ton sedimentary iron ore deposit owned by Crest Exploration Limited is a distinct future possibility and would result in rail transportation within a few miles of the Bonnet Plume copper property. A gravel bench suitable for landing strip construction is located at an elevation of about 3,200 feet on the Mammoth 48 claim. Construction of this strip would permit the use of wheel or ski-equipped aircraft from the Mayo airport some 120 air miles to the south.

HISTORY

Copper float was first discovered in the area by L. Brown of Mayo, game guide and outfitter. Further prospecting by Brown led to the discovery of a small copper showing in the early 1960's and the copper-cobalt mineralization in Cobalt Cirque in 1967. Initial staking followed the examination by C.D.N. Taylor, Mining Consultant, on June 20 and 21, 1967.

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TOPOGRAPHY AND GEOMORPHOLOGY

The property lies in the high mountain wall that defines the northeastern side of the Cordillera. Topography is rugged with mountains rising steeply to 7000 feet from a base elevation slightly below 3000 feet. Three northerly trending ridges cross the property within a lateral distance of four miles and are separated, from east to west, by the south flowing Tetrahedrite, Discovery and Cobalt Creeks.

Pleistocene glaciation consisted of valley glaciers to an elevation of approximately 5000 feet and intense alpine glaciation in the higher areas. Although no glaciers are now seen in the area, evidence of very recent alpine glaciation can be seen along the higher northern slopes. Glacial deposits are not extensive and consist primarily of lateral moraines along the lower slopes of the larger creeks and accumulated glacial debris below the cirques.

Outcrop is abundant in the higher areas and is more or less obscured by talus and lateral moraines on the lower slopes. Soils consist only of a thin layer of black peaty material overlying fragmented country rock or glacial till. The present cycle of erosion is extremely rapid due to the steep slopes and the frost action on the bedded sediments and jointed intrusives.

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GEOLOGICAL SETTING

The overall setting is fairly simple. A series of clastic and carbonate rocks are overlain unconformably by a thick sequence of aggolmerates and instrusives that in turn are overlain by a carbonate sequence. For purposes of discussion, these three formations are called Unitsl, 2 and 3 respectively. Although the regional geology has not yet been mapped by the G.S.C., a tentative correlation with nearby formations is:

youngest	Unit 3	Cambrian or younger	
	Unit 2	Cambrian	Rapitan group
oldest	Unit 1	Proterozoic	Katherine group

Unit 1- The basic rocktypes are slate, phyllite, quartzite, chert and dolomite. This sequence occupies the northwestern part of the property including Cobalt Creek and Cobalt Cirque. It is folded into a broad, steep limbed anticline, the crest of which strikes north across the top of the headwall of Cobalt Cirque. Thus all of the outcrops of Unit 1 west of the ridge of Cobalt Cirque have steep westerly dips. Local folding and faulting within the western limb was seen along Dolores Creek and near the mouth of Cobalt Creek.

The stratigraphic sequence observed in the Cobalt Creek area is:

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Youngest	Black slate
	Iron formation (hematite, jasper)
	Quartzite
	Cherty dolomite
	Green slate
	Intrusive sill
	Chert
	Black slate (minor chert)
	Dolomite
	Iron Formation
Oldest	Dolomite

This sequence probably correlates with the Precambrian Katherine Group mapped some five miles to the north by the G.S.C. (Map 10-1963).

The intrusive sill is approximately 350 feet wide and has been traced across Cobalt Cirque. It is composed of medium grained diorite with chilled, diabasic margins.

Unit 2- is composed of coarse agglomerate with occasional, randomly distributed volcanic flows. It is probably over 3000 feet thick, crosses the property in a northeast direction and overlies Unit 1. The contact between Units 1 and 2 has not been seen but regional attitudes suggest that it is unconformable.

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The flows are thin, discontinuous, dark colored and often vesicular. The central part of Unit 2 contains intrusive andesites that occur as lenticular sills, dikes or small stocks. These bodies are occasionally well crystallized and exhibit a medium grained, equigranular texture. In some areas they are weakly sheared with considerable chlorite alteration and are best classified as greenstones. A sill of syenite outcrops on the north side of Camp Creek (showing No. 2) and other syenite intrusives are indicated by abundant float in the lateral morrain from Tetrahedrite Creek.

The agglomerate contain coarse, angular fragments of Unit 1 and fragments of a fine grained reddish volcanic flow rock. It is not uncommon to see fragments of three or four rock types (i.e. limestone, shale, quartzite) represented in a single outcrop. These fragments generally have a baked appearance and are cemented by dark, aphanitic rock. Rock fragments vary in size from small pebbles to blocks weighing several tons, but generally average 1 to 2 inches in diameter. Specular hematite is ubiquitous throughout the unit and typically occurs as coarse flakes surrounding rock fragments or disseminated throughout the fine grained matrix.

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The agglomerate may actually be a fanglomerate cemented with volcanic flows, or an explosion breccia. The difference is subtle and will require more study before the origin is conclusively known. The writer favours the agglomerate theory.

This unit probably correlates with the Rapitan Group, mapped to the north by the G.S.C. The following is an extract from the descriptive notes on this formation accompanying Map 10-1963.

"In Northern Mackenzie Mountains a thick, conglomeratic mudstone succession containing iron-formation occurs as a wedge-shaped mass up to about 4000 feet thick. Constituent pebbles suggest the succession represents fanglomerate and associated sediments derived locally from the Macdougal and Katherine Groups." This formation is further described by L.H. Green in G.S.C. Paper 63-38, pages 15-18, as follows: "The unit (Rapitan) thickens to the west and in the Rapitan Creek area, some 10 miles southwest of the staked area (Crest Iron), was considred tuffaceous and referred to as the Rapitan Volcanics by oil company geologists"---------"the basal conglomerate of the Rapitan Groups rests with slight

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angular discordance on a sequence of buff, orange, and a grey-weathering shale and a carbonate."--------"The Rapitan Group is overlain with angular unconformity by a thick sequence of massive grey-weathering carbonate"---- "the Rapitan Group is probably of Cambrian age."

The writer discussed this formation at length with S.L. Blusson, of the G.S.C. Mr. Blusson has studied a similar formation to the south in the Mackenzie Mts. in detail and is of the opinion that it is a fanglomerate cemented with volcanic flows.

Unit 3- This unit unconformably overlies the volcanics and is composed of a thick carbonate sequence. Immediately overlying the volcanics is a buff coloured, coarsely crystalline dolomite that contains numerous veinlets of white calcite, quartz and siderite. Above this is impure grey dolomites with occasional interbedded silty and cherty grey limestone. This unit strikes northeast, dips from 20° to 40° southeast, and is less deformed than Unit 1.

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MINERALIZATION

General

Prospecting has indicated that copper and iron mineralization is widespread throughout the property. Cobalt mineralization has been found along the headwall of Cobalt cirque in the north part of the property. The minerals observed are hematite, magnetite, siderite, pyrite, chalcopyrite, tetrahedrite, cobaltite, and oxides of copper and cobalt. The observed mode of occurence of each mineral is as follows:

Hematite- Occurs both as a distinct sedimentary iron formation and as specular hematite. In Unit 1 an iron formation, up to several hundred feet thick, crosses the northwest side of the property. It consists of hematite, jasper and iron stained quartzite. Specular hematite is disseminated in all of the country rocks and is most abundant in the cherts and agglomerates. Concentrations can be found along joints and fault surfaces in all three units.

Magnetite - is noted in abundance within the intrusives- particularly the coarse-grained fractions. A small amount of magnetite likely occurs within the iron formation. Magnetite and chalcopyrite are closely associated and usually one is not found without the other.

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Siderite- Has been injected as vein fillings wherever fracturing has occured and, along with quartz, is the main gangue mineral for the copper, cobalt and tetrahedrite mineralization. Segregations and disseminations of siderite are also seen to a small degree within all country rocks with the exception of the intrusives.

Pyrite- is the most common accessory mineral occuring in the mineral showings. Pyrite also occurs as numerous small crystals scattered throughout the sedimentary rocks and as an accessory mineral within the intrusives.

Chalcopyrite- This mineral is the main constituent of the various showings. It occurs as massive replacements and disseminations within siderite veins, as an accessory mineral within the intrusives and as fine disseminations (usually near intrusions or siderite veins) within the country rock. Malachite staining can be found wherever chalcopyrite has been exposed to weathering.

Tetrahedrite- occurs as a very minor accessory mineral associated with chalcopyrite. The main occurance is in siderite veins and thin veinlets in Unit 3 usually immediately above Unit 2.

Cobaltite- Significant quantities of this mineral are found only in Cobalt Cirque area where it occurs as

masses of fine grained mineralization replacing siderite veins, as well defined crystals disseminated in siderite and as minor fine disseminations throughout the surrounding sedimentary rocks. The distinctive pink cobalt oxide, Erythrite, is seen wherever cobaltite is exposed to weathering.

MINERAL SHOWINGS

The location of each numbered mineral showing discussed below is shown on Figure 2.

1. Cobalt Cirque Showing- Sketch mapping of this area is shown on Figure 3 and a composite photograph of the cirque face is on the following page. The writer attempted to sample this showing during early September but had to abandon the project due to falling rock caused by melting snow on the cirque face. The following description is mostly copied from the writer's July 16, 1967, report.

Mineral showings are exposed on the steep east wall of the cirque. The base of the cirque is covered by talus slides and the floor by thick accumulations of locally derived glacial rubble. Alternating bands of black and green slates of Unit 1 are folded in to a northsouth trending anticline, the axis of which lies

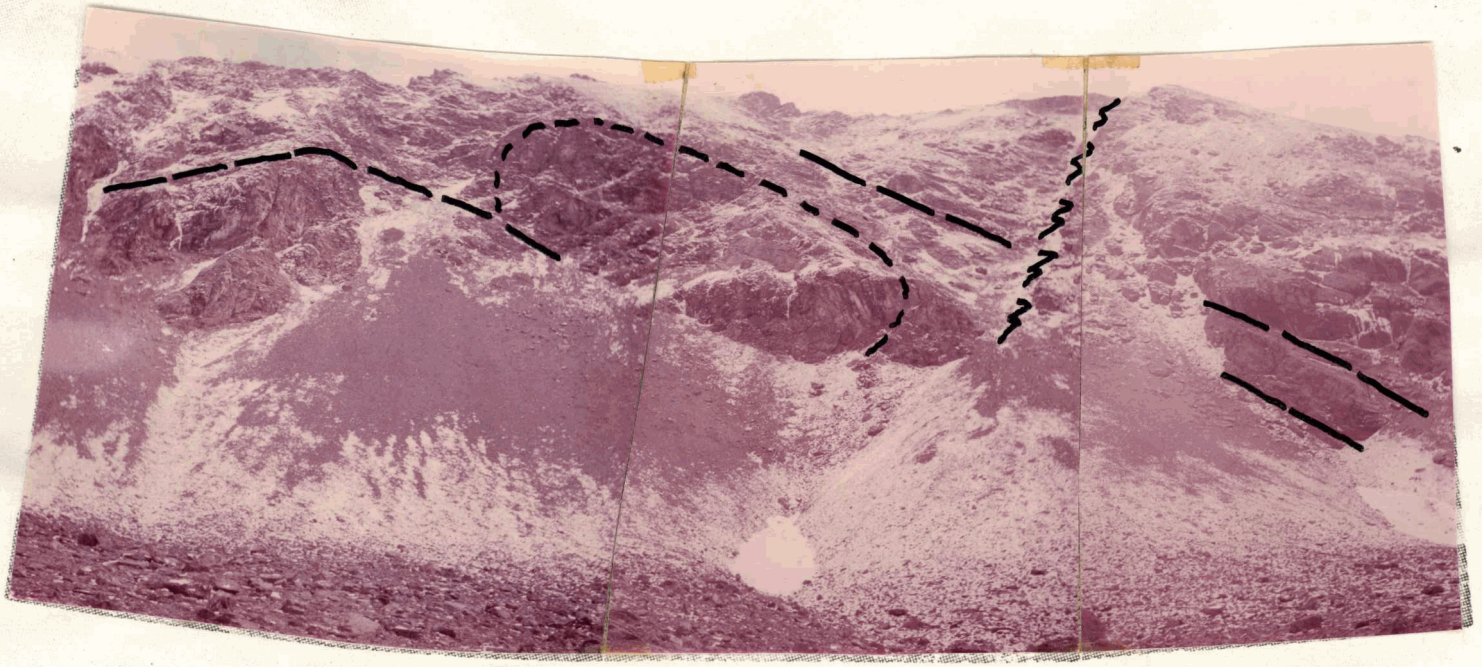

PHOTO 1 — PANORAMIC VIEW OF COBALT CIRQUE

——— ——— BEDDING DIRECTION

ᔓᔓᔓ POSSIBLE FAULT

- - - - - - - - AREA OF BEST MINERALIZATION

along the cirque ridge. Thus, the sediments on the easternmost part of the wall are almost on the crest of the fold and exhibit a nearly horizontal attitude. As the cirque wall trends around to the northwest and southwest, the sediments rapidly assume a steep westerly attitude being further removed from the axis of the fold onto the steep dipping west limb.

The main zone of copper and cobalt mineralization is found near the fold crest on the cirque face. This area has been invaded by a box work of siderite-quartz fracture fillings. There are no actual fault structures and the fracture fillings are neither numerous nor individually continuous. The fractures contain disseminated to massive chalcopyrite and cobaltite over widths from several inches to four feet, with the average width being approximately twelve inches. Any particular fracture is usually mineralized with either cobaltite or chalcopyrite but not both. Individual fractures seldom exceed 50 feet in length and exhibit radical changes in attitude along strike.

Cobaltite and chalcopyrite are also disseminated in the country rock throughout the cirque face, particularly in the vicinity of the fracture fillings. These disseminations often lie in the bedding direction of the sediments and usually occur with or near small amounts of quartz or siderite. There is little doubt

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that the disseminated mineralization is related to the vein fillings, and is younger than the country rock rather than syngenetic.

Sampling or even visual estimation of the grade of the mineralized zone in the cirque face is impossible without climbing equipment. The irregularity of the mineralization itself makes accurate sampling difficult under the best of conditions. The area of best mineralization, outlined in Figure 3, could average up to 1% copper and 0.2% cobalt but because of the inaccessibility of most of the zone, this visual estimate might be in error by a large factor one way or the other.

Character samples of the more massive chalcopyrite assayed 17.9% copper, 0.12 ounces silver per ton and .005 ounces gold per ton, while the cobaltite assayed 26.0% cobalt, trace silver and .005 gold per ton. Spalding reported that a similar speciment from the same area, assayed for Mr. Proctor returned trace in platinum metals. A copy of the results of a semi-quantitative spectrographicanalysis on a specimen of cobaltite by Coast Eldridge, Vancouver is included in the Appendix.

Samples of vein material were tested with an ultraviolet lamp and a geiger counter. No fluorescent minerals

were observed and except for one specimen of cobaltite that was three times background, no radioactivity was found.

2. Porphyry Showing- This showing was found by routine prospecting in early July. An outcrop of syenite forms a bluff about 150 feet long and 30 feet high along the steep hillside on the north side of Camp Creek at an elevation of 3800 feet. This rock is composed primarily of medium grained, pinkish orthoclase feldspar with a little quartz and 10 to 15% hornblende. Accessory minerals are magnetite, specular hematite and chalcopyrite. Outcrop in the area is partially obscured by blocky talus that is overgrown with buckbrush. The extent of the syenite is probably not a great deal larger than the outcrop as volcanic rocks are seen in place both above and below. Immediately below the bluff is a boulder train (see Photos 2 and 3 on the following page) of the syenite that extends at least 800 feet downhill, almost to the creek, and obscures most outcrop. It is impossible to tell whether the syenite is the nose of an intrusive plug or a lens-like sill or dike.

The syenite contains about 1% chacopyrite that is almost equally distributed throughout as finely disseminated

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PHOTO 2 — TALUS MINERALIZED SYENITE
(PORPHYRY SHOWING)

PHOTO 3 — MINERALIZED SYENITE

SCALE ABOUT 1 INCH = 1 FOOT

particles. It is weakly jointed and chalcopyrite is occasionally more abundant near the joints. Magnetite and hematite are similarly distributed throughout and compose 1-2% of the mass. The only other minerals seen were an occassional fleck of pyrite and malachite on the outcrop surface.

A bulk sample of the syenite was obtained by randomly chipping fragments from approximately 100 blocks of float immediately below the outcrop. This sample was crushed at the Whitehorse Assay Office and split into 2 samples. The first sample was assayed by Spalding and returned 0.28% copper and traces of silver and gold. The second sample was assayed by Coast Eldridge, Vancouver, and returned 0.305% copper. A semiquantitative spectrographic analysis is included in the appendix.

3. Discovery Showing- The original discovery is located along the base of a steep bluff of thick bedded dolomite in a shallow gorge cut by Discovery Creek. The dolomite is cut by a weak steep dipping vein fault striking easterly. The vein is only several inches wide and pinches out to the east and west. An area approximately 8 feet wide and 12 feet high on one wall of the vein immediately east of Discovery Creek has been partially replaced by siderite and quartz and is well mineralized with chalcopyrite.

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PHOTO 4 — VIEW SOUTHWEST OF PORPHYRY SHOWING

A – JUNCTION CAMP CREEK AND DOLORES CREEK
B – PROPOSED AIRSTRIP LOCATION

PHOTO 5 — OUTCROP MINERALIZED DIORITE AT HEAD OF DISCOVERY CREEK

------ AREA OF BEST MINERALIZATION

An 8.01 foot wide chip sample taken by C.D. Taylor across this zone assayed 14.7% copper and 0.40 oz/ton silver. A similar sample was sent to TSL Laboratories Ltd., Vancouver, by Mr. Taylor for semiquantitative spectrographic analysis but no additional minerals of interest were detected.

No other significant mineralization was seen in the immediate area and the possibility of the Discovery showing extending more than 15 or 20 feet in to the bluff is extremely remote. No fluorescent minerals were found in samples of wallrock and mineralization from the showing.

4. This is a showing of tetrahedrite mineralization in dolomite near the contact with Unit 2. Tetrahedrite occurs as very thin veinlets and disseminations in coarsely crystalline dolomite over a width of 15 feet and a length of several hundred feet (see Photo 7 on Following page). There is no obvious control for the occurence. A chip sample taken by the writer across the best part of the showing assayed 0.24% copper and 0.30 ounces silver per ton over a 15 foot width.

5 and 6 - These two showings are oxidized siderite vein zones, 30 feet and 50 feet wide respectively, that outcrop on the west side of Tetrahedrite Creek. Both zones are weakly mineralized with tetrahedrite, chalcopyrite and pyrite. Chip sampling returned a maximum value of 0.18 ounces silver per ton and 0.01% copper over these widths.

PHOTO 6— LOOKING AT WEST SIDE OF CONTACT CREEK

X MINERALIZED GREENSTONE SHOWING

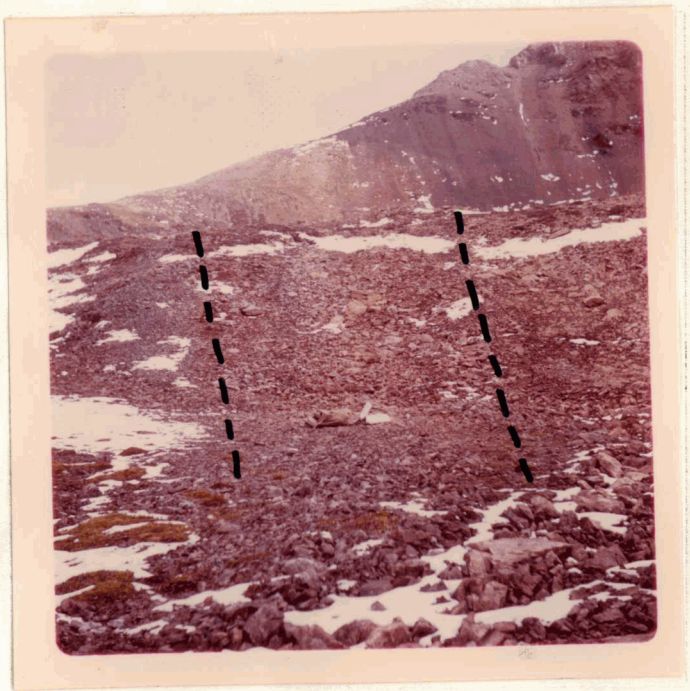

PHOTO 7— LOOKING NORTHEAST AT HEAD OF TETRAHEDRITE CREEK

- - - - - OUTLINE OF MINERALIZED AREA

7. This showing was not seen by the writer. It is described by C.D.N. Taylor as being a chalcopyrite and tetrahedrite replacement of limestone. Most of the exposure is apparently obscured by slide rock. A sample over a 12 foot width is reported to assay 6.3% copper and 12.1 ounces per ton silver.

8, 9, 10, 11, 12-- These five showings all consist of disseminated chalcopyrite in intrusive rocks. Showing 8 has disseminated chalcopyrite and associated magnetite over an area of approximately 100 feet by 30 feet (see Photo 6) in a greenstone. A random chip sample of the mineralized area assayed 0.13% copper.

Showing 9 has patches of disseminated chalcopyrite in a fine grained dioritic intrusive outcropping on the floor of the headwaters of Discovery Creek (see Photo 5). The entire mass is estimated to assay about 0.1% copper while the area of best mineralization might assay 0.3% copper.

Showing 10 is an outcropping of a fine grained diorite weakly mineralized with chalcopyrite. The outcrop was not sampled and the copper content is estimated at 0.1%. Showing 11 and 12 are similarly weakly mineralized dioritic outcrops.

13. This showing consists of a sheared dolomite formation outcropping as a bluff on the north side of Cobalt Creek. Disseminated chalcopyrite and siderite are seen where the shearing is most intense and a sample across the best zone assayed 0.82% copper over a 13.0 foot width.

. . 19.

Other Areas- Other significant areas of mineralization are indicated by float. Mineralized syenite float similar to showing No. 2 but with a higher copper content was seen uphill from showing 2, (see location on Figure 5) and as boulders within the lateral moraine on the north side of the junction of Camp Creek and Tetrededrite Creek.

Float of chalcopyrite mineralization in fractured shales was found along the west side of Discovery Creek at an elevation of about 4800 feet. Float consisting of tetrahedrite and siderite was found for 1000 feet along the east side of Tetrahedrite Creek just downstream from the junction with Contact Creek. A sample of this float assayed 3.71% copper and 3.02 ounces silver per ton.

SILT SAMPLING

A number of silt samples were taken by the writer and the location and assay of each is shown on Figure 4. This work was done to investigate the possibility of using silt sampling as a regional reconnaissance tool to locate other mineralized areas wotthy of ground prospecting.

Assay results indicate an excellent contrast between mineralized and unmineralized areas but are of little assistance in locating specific zones of mineralization within the boundaries of the property. It is interesting to note that a reconnaissance sample density of only one sample per two square miles would have been required to clearly outline the general area of greatest interest.

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SOIL SAMPLING

Lines were cut for a ground magnetometer survey at 400 foot intervals over showings 2 and 11 and at 800 foot intervals over an area to the east. These lines were also soil sampled at 200 foot intervals to provide orientation data of the known showings and to prospect for additional mineralized areas. Samples were obtained by digging below the moss and peat layer with a mattock grub-hoe to obtain organic free material generally consisting of fairly coarse fragments of country rock. Samples were collected in individual Kraft bags and were analyzed for copper by Chemex Labs Ltd., North Vancouver, using a standard hot acid extraction technique.

Figure 7 shows a distribution curve for a total of 212 soil samples and Figure 6 shows the location and assay of the individual samples. The location of soil anomalies in relation to the geology is shown on Figure 5. An area of low copper values in glacial tills on the west side of Dolores Creek creates a strong break in the distribution curve between 20 and 50 parts per million. A standard shaped distribution curve with a mean value of 55 ppm copper is obtained if this low background area is not included. Strongly anomalous values are found in the vicinity of the porphyry showing and uphill from it. The area of high values above the outcrop is due to

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mineralized syenite float from an unprospected area further uphill.

Soil sampling is not a particularly useful tool in this geomorphalogical setting because there is almost no soil development and mineralized areas can be found and evaluated just as effectively by detailed prospecting.

GEOPHYSICAL SURVEYS

A magnetometer survey was done over the grid lines by Cana Exploration Consultants Ltd. and will be reported on separately by that firm. The purpose of the survey was to outline the extent of mineralized syenite at showing 2 and to locate other areas of mineralization covered by talus or glacial till. This is assumed possible because the observed abundance of magnetite in all of the mineralized intrusive rocks is directly proportional to the chalcopyrite content.

Uncorrected field data indicated that showing 2 is less than 200 feet wide and 1000 feet long. A strong magnetic anomaly was found immediately west of the junction of Dolores and Camp Creeks.

CONCLUSIONS & RECOMMENDATIONS

The most significant features of the property are the widespread extent of copper mineralization and its occurrence in the intrusive rocks. This suggests that the potential is good for large relatively low-grade deposits in either an intrusive or sedimentary environment.

The exact origin of the dioritic and syenitic phases of the finer grained volcanic rocks is not completely clear. However, with a single exception, these rocks are confined to the sequence of agglomerates and flows that extends beyond the property boudaries to the northeast and southwest.

The prospecting done to date has located two mineral showings, numbers 1 and 2, which have tonnage potential and are worthy of further development. Additional undiscovered showings of interest are indicated by the presence of well mineralized float on the property and by the presence of a magnetic anomaly west of Dolores Creek.

An integrated exploration program is recommended, to be directed, in order of priority, towards (a) evaluation of showings 1 and 2 (b) exploration of the property for additional showings and (c) regional exploration of the volcanic formation beyond the property boundarees. In order to facilitate future work a winter road should be constructed to the

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property and an airstrip suitable for summer use built near the junction of Dolores and Camp Creeks. Details of the recommended program are as follows:

Phase 1-

Cut a winter trail to the property in November from the existing Wind River Trail. Build the airstrip in late November and establish a winter camp near the junction of Dolores and Camp creeks. Explore showing 2 and the magnetic anomaly west of Dolores Creek by drilling before break-up.

Road & airstrip construction--------	$30,000.00
Camp construction----------	10,000.00
Drilling (assume 2000 feet)----------	60,000.00
	$100,000.00

Phase 2-

Hire an exploration crew consisting of a geologist and two helpers for the summer months to grid prospect the southwestern portion of the property where the best float has been found. This same crew can explore without helicopter support, the volcanic formation southwest of the property boundary.

After thawing is complete on the face of Cobalt Cirque an attempt must be made to sample showing 1 to provide a rough estimation of the potential grade. If this

estimate is economically attractive the downward extension of the zone into the cirque floor should be investigated by drilling after freeze-up. Estimated costs, not including the drilling, are:

Labour	$12,000.00	
Camp costs	6,000.00	
Aircraft support	12,000.00	
		$30,000.00
Total Phase 1 and 2		130,000.00
Contingencies		20,000.00
Total		$150,000.00

Respectfully submitted,

ARCHER, CATHRO & ASSOC. LTD.

Alan R. Archer

Alan R. Archer, P. Eng.

Association of Professional Engineers of the Province of British Columbia
A. R. ARCHER
Oct 16, 1987
GEOLOGICAL
ENGINEER

ARA.pc

ARCHER, CATHRO
AND ASSOCIATES LTD.
CONSULTING GEOLOGICAL ENGINEERS

CASCA BUILDING, WHITEHORSE, Y.T. 667-4113 BENTALL CENTRE, VANCOUVER, B.C. 688-3022 OR 522-1562

POST OFFICE BOX 1708
WHITEHORSE, Y.T.

October 14, 1967

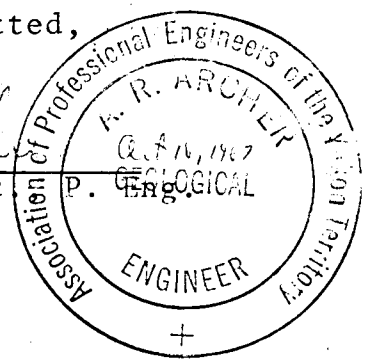
CERTIFICATE

I, Alan R. Archer, with business and residential address in Vancouver, British Columbia, do hereby declare that:

1. I am a consulting geological engineer.
2. I am a graduate of the University of British Columbia, 1957.
3. I am a registered professional engineer in the Yukon Territory and in the Province of British Columbia.
4. From 1957 to 1966 I was engaged in mining and mining exploration for a number of companies as a geological engineer. I was chief geologist for United Keno Hill Mines Ltd. when I retired in 1966 to practice as a consulting geological engineer.
5. I have personally studied all maps and data referred to in this report.
6. I have no interest, directly or indirectly or expected in any properties referrred to in this report.

Respectfully submitted,

A.R. Archer, B.A.Sc. P. Eng.



ACCTLC
Member Canadian Testing Association

PHONE: [illegible] 6-4111

CABLE ADDRESS "ELDRICO"

TO: Anchor, Cabins & Access Ltd.,

P. O. Box 1703

Whitehorse, Y. T.

FILE NO. A. 3-A.L-67-29439

DATE Aug 3, 1967

SEMI QUANTITATIVE SPECTROGRAPHIC ANALYSES

COAST ELDRIDGE

ENGINEERS & CHEMISTS LTD.

125 EAST 4TH AVE. VANCOUVER 10, CANADA

We Hereby Certify *that the following are the results of semi quantitative spectrographic analyses made on* _____ *samples submitted.*

SAMPLE IDENTIFICATION	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Ga	Au	Fe
1920 COBALTITE	5.0	ND	Major	ND	ND	ND	0.01	ND	2.0	0.005	Major	0.01	ND	Trace	3.0
Composite 1918 - 1919 SYENITE PORPHYRY	0.0	ND	ND	0.01	0.001	ND	ND	ND	2.0	ND	0.003	0.3	ND	Trace	5.0

SAMPLE IDENTIFICATION	Pb	Mg	Mn	Mo	Nb	Ni	Si	Ag	Sr	Ta	Sn	Ti	W	V	Zn
1920 COBALTITE	ND	2.0	0.1	0.001	ND	0.1	Matrix	Trace	0.01	ND	0.003	0.2	ND	ND	ND
SYENITE PORPHYRY	0.01	2.0	0.3	0.001	ND	Trace	Matrix	Trace	0.007	ND	ND	0.5	ND	0.001	ND

MAJOR = Above normal spectrographic range

/ja All results are expressed as percent by weight.

Note: Rejects retained one week.
Pulps retained three months.

COAST ELDRIDGE ENGINEERS & CHEMISTS LTD.

CHIEF CHEMIST

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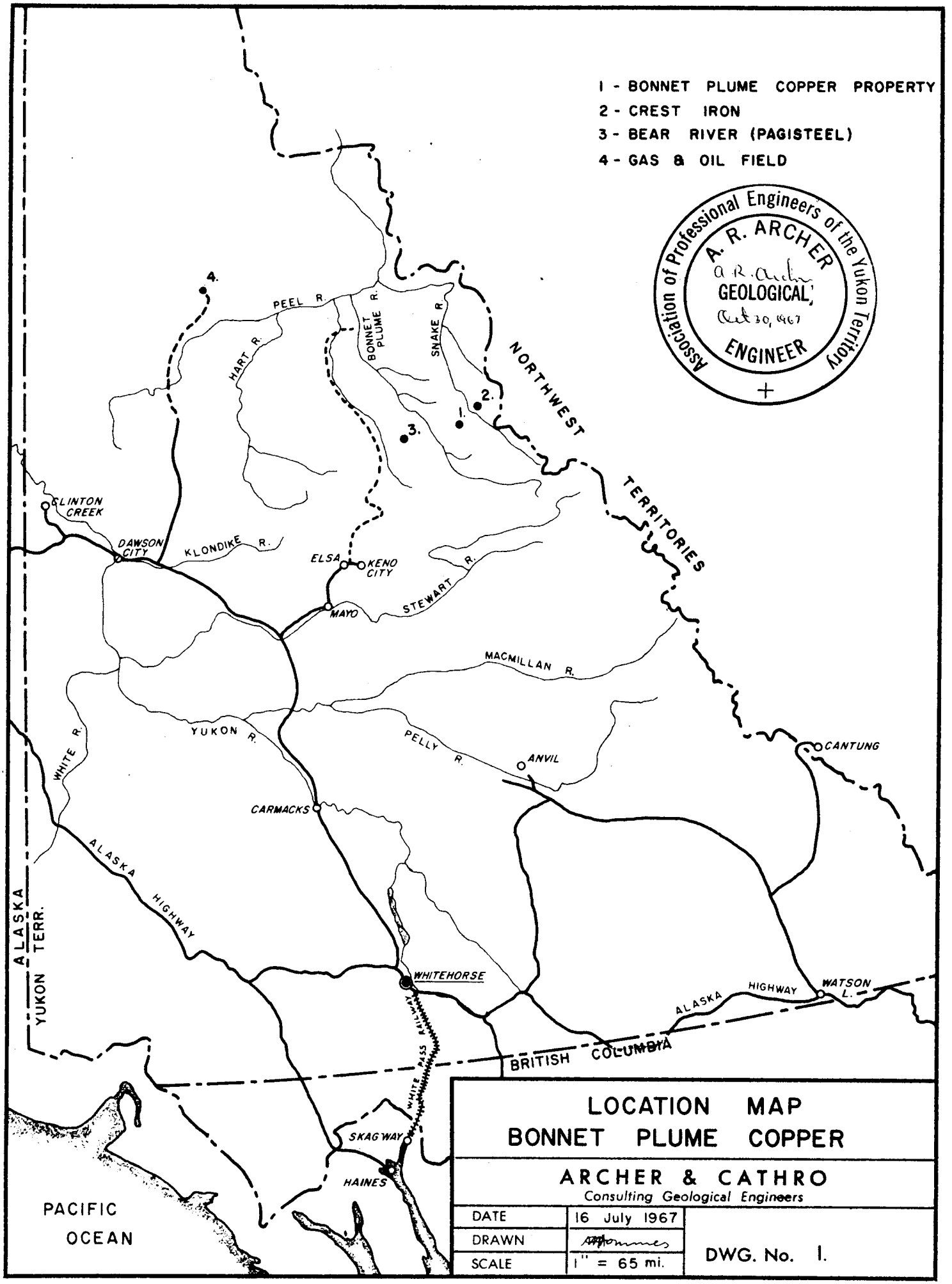
C-95


1 - BONNET PLUME COPPER PROPERTY
2 - CREST IRON
3 - BEAR RIVER (PAGISTEEL)
4 - GAS & OIL FIELD
Association of Professional Engineers of the Yukon Territory
A. R. ARCHER
GEOLOGICAL
ENGINEER
PEEL R.
HART R.
BONNET PLUME R.
SNAKE R.
NORTHWEST TERRITORIES
CLINTON CREEK
DAWSON CITY
KLONDIKE R.
ELSA
KENO CITY
MAYO
STEWART R.
MACMILLAN R.
YUKON R.
WHITE R.
PELLY R.
ANVIL
CANTUNG
CARMACKS
ALASKA HIGHWAY
ALASKA
YUKON TERR.
WHITEHORSE
WHITE PASS RAILWAY
ALASKA HIGHWAY
WATSON L.
BRITISH COLUMBIA
SKAGWAY
HAINES
PACIFIC OCEAN
LOCATION MAP
BONNET PLUME COPPER
ARCHER & CATHRO
Consulting Geological Engineers
DATE 16 July 1967
DRAWN
SCALE 1" = 65 mi.
DWG. No. 1.

SEE FIG. 3.

IRON FORMATION

DIORITE SILL

COBALT CREEK

DISCOVERY CREEK

CONTACT CREEK

TETRAHEDRITE CREEK

CAMP CREEK

DOLORES CREEK

SEDIMENTS VOLCANICS

VOLCANICS SEDIMENTS

PROPOSED AIRSTRIP

5000

7000

3000

LEGEND

■ 4 - REFER TO DESCRIPTION IN TEXT

— CREST OF ANTICLINE

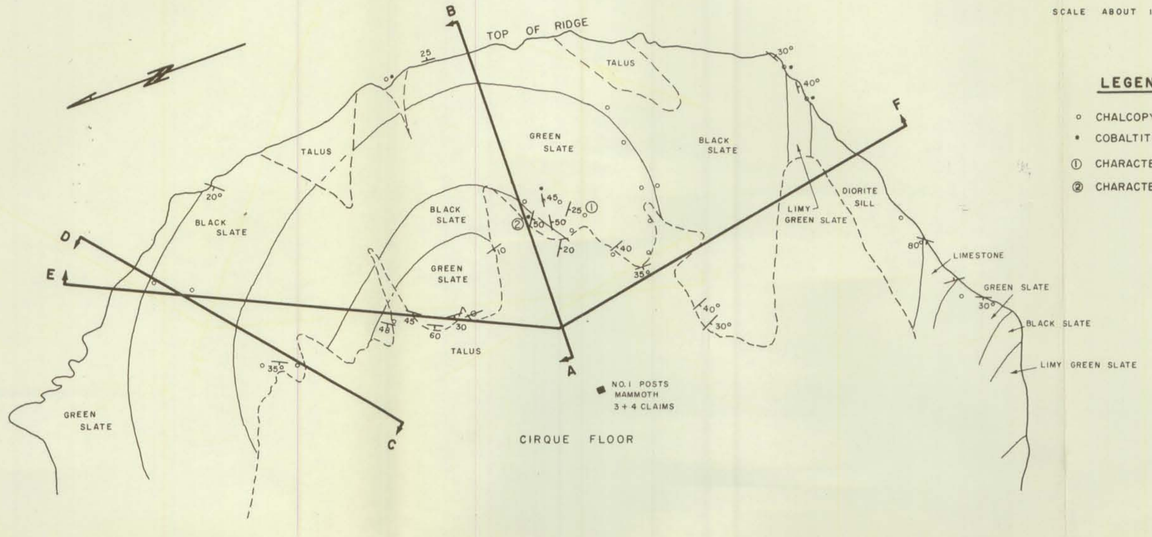
— OBSERVED CONTACT

— — ASSUMED CONTACT

~~~ — OBSERVED FAULT

Association of Professional Engineers of the Yukon Territory
A. R. ARCHER
GEOLOGICAL
ENGINEER

0 1320 2640 3960 Ft.

Claim locations from Claim sheet 106C - 14 Yukon.

BONNET PLUME RIVER MINES LTD.

MAMMOTH CLAIMS

BONNET PLUME RIVER AREA, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	13 Sept. 1967		
DRAWN	[illegible]	DWG.	2.
SCALE	1" = 1320'		
~~~

RADIAL GEOLOGICAL SKETCH NORMAL TO CIRQUE FACE.

SCALE ABOUT 1" = 200'



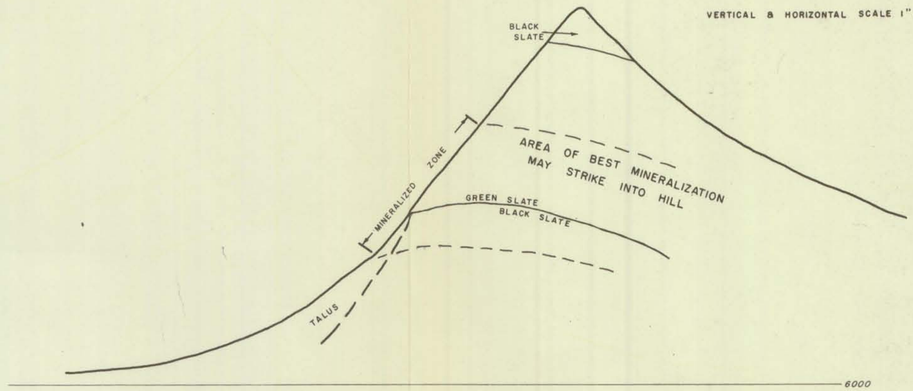
LEGEND

- ○ CHALCOPYRITE
- • COBALTITE
- ① CHARACTER SAMPLE CHALCOPYRITE
- ② CHARACTER SAMPLE COBALTITE

Section A - B

LOOKING NORTH

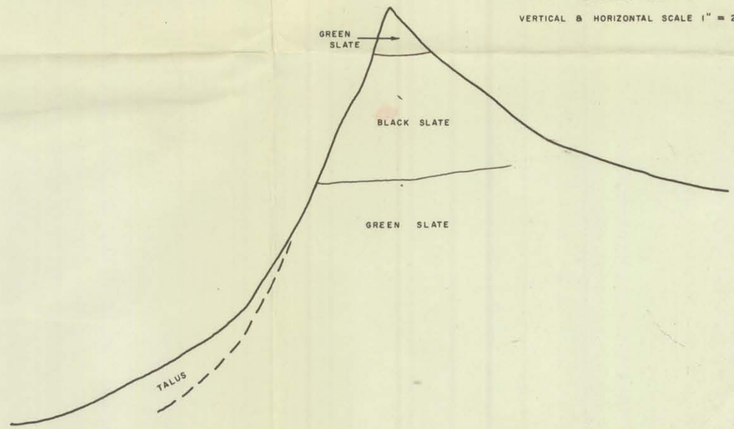
VERTICAL & HORIZONTAL SCALE 1" = 200



Section C - D

LOOKING NORTH

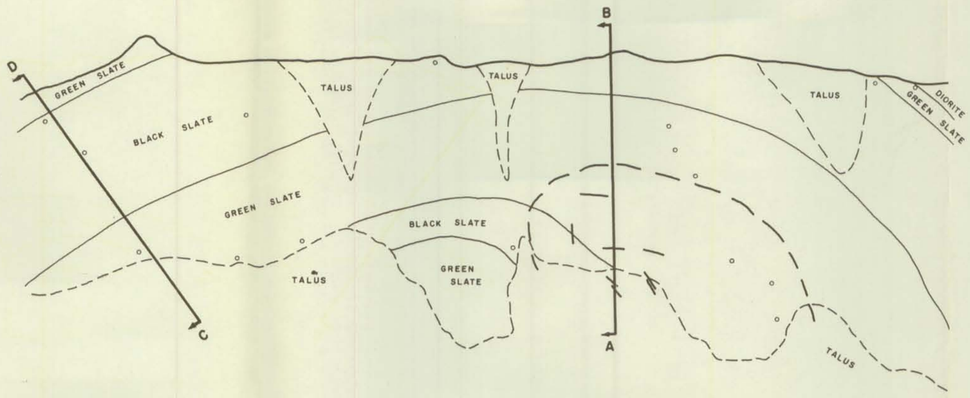
VERTICAL & HORIZONTAL SCALE 1" = 200'



Section E - F

LOOKING EAST

SCALE ABOUT 1" = 130'



LEGEND

- ○ MINERAL SHOWING
- — VEIN
- — — AREA OF BEST MINERALIZATION

Association of Professional Engineers of the Province of British Columbia
A. R. ARCHER
GEOLOGICAL
Oct 30, 1967
ENGINEER

CIRQUE SHOWING BONNET PLUME COPPER PROPERTY		
ARCHER & CATHRO *Consulting Geological Engineers*		
DATE	16 July 1967	
DRAWN	[illegible]	
SCALE	AS SHOWN	DWG. Nº 3.

38 78

36 24

5000 6000 7000

VAULT MTN.

43 51 54

COBALT CREEK

42 148 11 40

MAMMOTH
1—108 CLAIMS

260 179 114

CONTACT CREEK

87 80 60

CREEK

103 240

DISCOVER CREEK

138

TETRAHEDRITE

147 195

38 74 40 51

CAMP CREEK

50

35 32 42 42

4000

DOLORES CREEK

3000

X75 – Silt sample assay
for Copper, Hot acid extraction

Drawn from
Claim sheet 106 C – 14 Yukon.

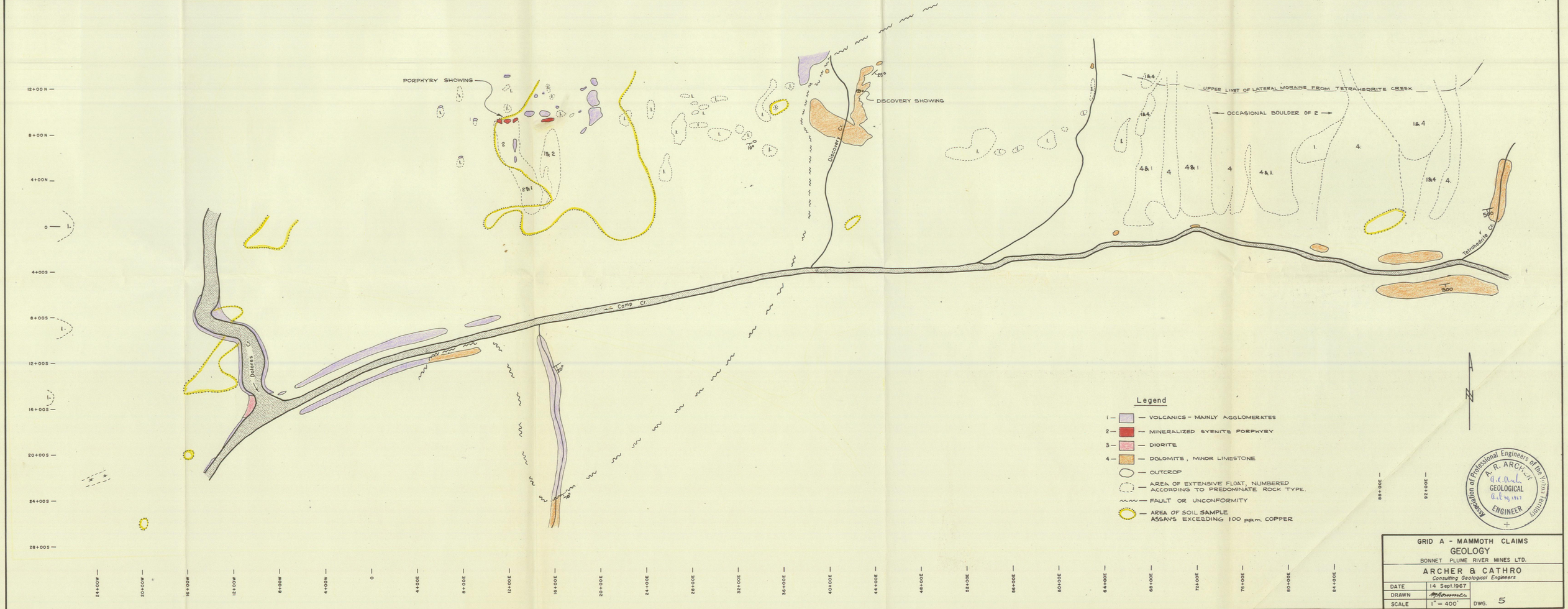
0 1500 3000 4500 6000 Ft.

Association of Professional Engineers of the Yukon Territory
A. R. ARCHER
GEOLOGICAL
Oct 30, 1967
ENGINEER

BONNET PLUME RIVER MINES LTD.
SILT SAMPLING
BONNET PLUME RIVER AREA, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	13 Sept. 1967	
DRAWN	[illegible]	
SCALE	1" = 1/2 mi.	DWG. 4


PORPHYRY SHOWING
DISCOVERY SHOWING
Discovery Cr.
Camp Cr.
Dolores Cr.
Tetrahedrite Cr.
UPPER LIMIT OF LATERAL MORAINE FROM TETRAHEDRITE CREEK
OCCASIONAL BOULDER OF 2
Legend
1 — VOLCANICS - MAINLY AGGLOMERATES
2 — MINERALIZED SYENITE PORPHYRY
3 — DIORITE
4 — DOLOMITE, MINOR LIMESTONE
OUTCROP
AREA OF EXTENSIVE FLOAT, NUMBERED ACCORDING TO PREDOMINATE ROCK TYPE.
FAULT OR UNCONFORMITY
AREA OF SOIL SAMPLE ASSAYS EXCEEDING 100 ppm COPPER
Association of Professional Engineers of the Province of British Columbia
A. R. ARCHER
GEOLOGICAL
ENGINEER
GRID A - MAMMOTH CLAIMS
GEOLOGY
BONNET PLUME RIVER MINES LTD.
ARCHER & CATHRO
Consulting Geological Engineers
DATE 14 Sept. 1967
DRAWN
SCALE 1" = 400'
DWG. 5

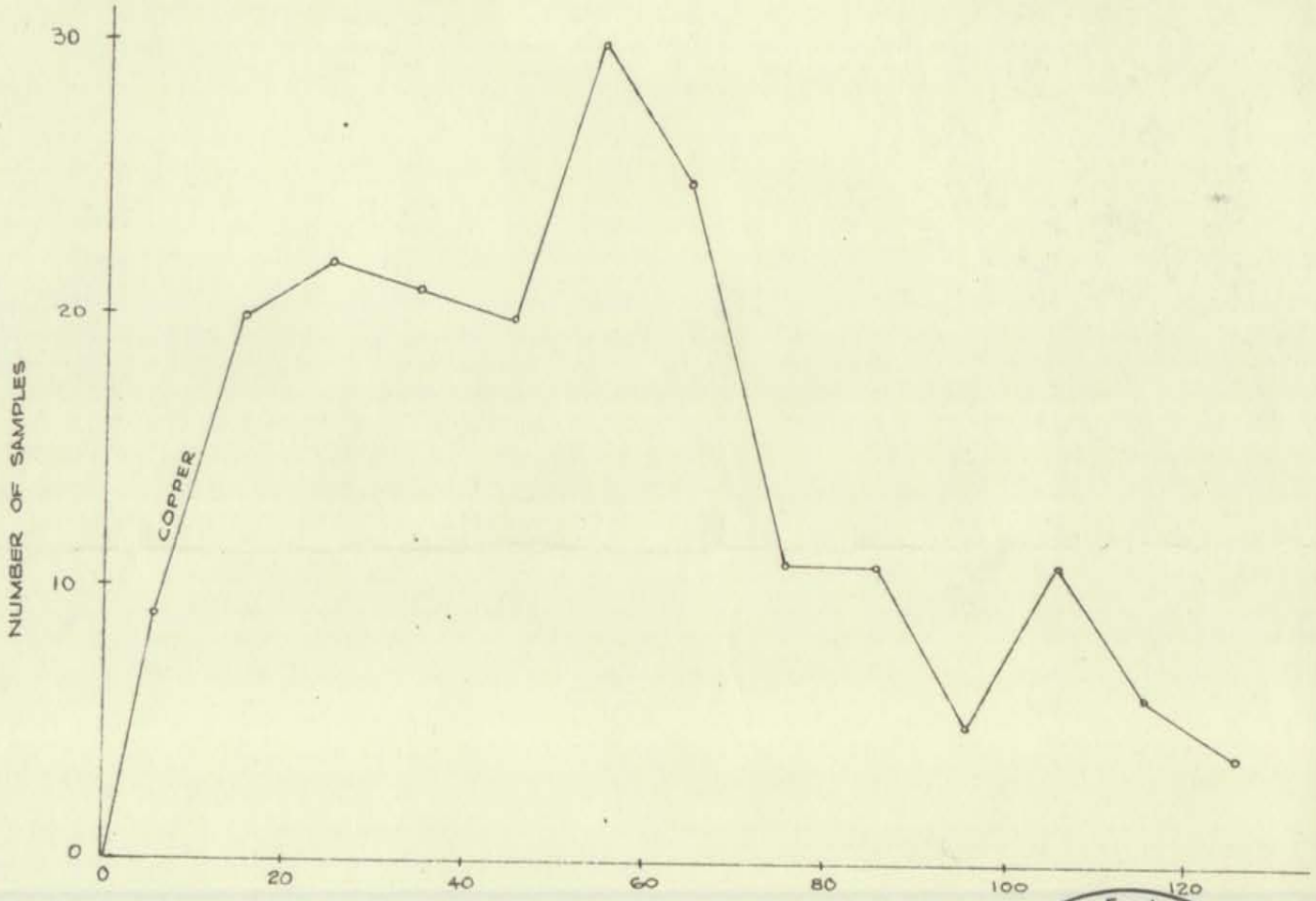
GRID A - MAMMOTH CLAIMS

SOIL SAMPLING

BONNET PLUME RIVER MINES LTD.

ARCHER & CATHRO
Consulting Geological Engineers

DATE	14 Sept. 1967	
DRAWN		
SCALE	1" = 400'	DWG. 6



Association of Professional Engineers of the Yukon Territory
A. R. ARCHER
GEOLOGICAL
ENGINEER

HOT ACID EXTRACTION BY CHEMEX LABS. LTD., NORTH VANCOUVER. CURVE BASED ON 212 SAMPLES.

DISTRIBUTION OF GEOCHEMICAL ASSAYS
GRID A
MAMMOTH CLAIMS, BONNET PLUME RIVER MINES

ARCHER & CATHRO
Consulting Geological Engineers

DATE	OCT 14 1967
DRAWN	F. J. BUCKLEY
SCALE	

DWG. No. 7

GEOPHYSICAL SURVEY AND

PROPERTY EXAMINATION

BONNET PLUME RIVER MINES LTD.

DOLORES CREEK

BONNET PLUME RIVER AREA

YUKON TERRITORY

Prepared by S. S. SZETU, Ph. D.
Consulting Geologist

October 26, 1967.

CANA EXPLORATION CONSULTANTS LIMITED

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Introduction.....	1
Notes on Mineralization.....	1
Magnetometer Survey.....	5
Conclusions and Recommendations.....	6

* * * * * * * * * * *

Plan: Magnetometer Survey Data
BONNET PLUME RIVER MINES LTD.
South Part of Property
Bonnet Plume River Area
Yukon Territory

Scale: 1 inch = 200 feet. September, 1967.

The President and Directors,
Bonnet Plume River Mines Ltd.,
P.O. Box 827,
Whitehorse, Y. T.

Gentlemen:

This report describes the results of a magnetometer survey carried out at the south part of your copper property located at Bonnet Plume River Area, Yukon Territory, and the observations made by the writer during his visit to the property on September 11 and 12, 1967. You are referred to a report by Alan R. Archer, dated October 14, 1967, and a report by C. D. N. Taylor, dated August 15, 1967, for the Property, Location and Access, History, Topography and Geomorphology, Geological Setting, Mineralization, Mineral Showings, Silt and Soil Sampling.

NOTES ON MINERALIZATION -

(1) Copper mineralization is apparently widespread on the property and has better economic possibilities as compared with cobalt, etc., and is, therefore, the prime object for exploration and development.

(2) Replacement type of copper mineralization in dolomite is clearly demonstrated at the Discovery Showing where an 8.01 foot wide chip sample taken by C. D. N. Taylor, P. Eng., assayed 14.7% copper and 0.40 oz/ton silver.

(3) The most impressive mineralized zone is the copper showings at Cobalt Cirque. Here, within a widespread mineralized zone, there are two somewhat parallel, massive to more or less massive lenses of chalcopyrite of about 2 1/2 foot thickness each and apparently marking the upper and lower boundaries of an approximately 50 foot thick zone with noticeable copper mineralization. The bottom of the lower lens is unknown. Character samples of the more massive chalcopyrite reported assay 17.9% copper, 0.12 ounces silver per ton, and .005 ounces gold per ton. The mineralized zone is occurring on the sheer face of the cirque and proper sampling is impossible. The zone apparently strikes northeasterly, and the upper lens of more or less massive chalcopyrite dips at 35° southerly toward the direction of a sill of diorite. Although the intrusive appears to be lying on top of the sediments, the lower contact has not been observed by F. M. Smith, geologist, who did the mapping there (personal communication). Smith is of the opinion that the south and lower extension of the rock formations and mineralized zone are steeper than that exposed, and

can be tested by diamond drilling from the bottom of the cirque at a point to the south and west of the mineralized zone.

(4) A sample of mineralized "syenite porphyry" collected by the writer from L. 12E, SN (Sample A), was examined by Professor Peter A. Peach under the microscope. Professor Peach's description of the specimen is quoted as follows:

"The rock consists of a medium-grained network of oligoclase-andesine crystals with some interstitial quartz and a little orthoclase. There are no recognizable ferro-magnesian minerals present. The entire rock has been crushed or sheared bending some of the plagioclase grains and developing zones of cataclastic texture. These have some fine-grained magnetite developed in them and a lot of carbonate and rutile. The chalcopyrite-pyrite-pyrrhotite mineralization is confined to isolated patches and is not related to the zones of crushing. The rock is a diorite or quartz-diorite, sheared and partly altered."

A sample (Sample B) of a strongly altered intrusive rock mapped as diorite at the junction of Dolores Creek and Camp Creek is described by Dr. Peach as follows:

> "This consists of medium to fine grained network of oligoclase-andesine lath shaped crystals, strongly saussuritized and much replaced by carbonate with some zones of crushing replaced by quartz. Throughout this there is uniformly scattered euhedral to subhedral grains of magnetite sometimes accompanied by leucoxene. The rock is very highly altered and looks as if it is a phase of 'A'. It is probably a fine grained diorite or gabbro-diorite."

Widespread chalcopyrite was observed by F. M. Smith at the outcrop of this diorite.

In addition to the microscopic studies, the magnetometer survey to be described indicated that the two occurrences of mineralized igneous rocks are apparently a similar kind of intrusive. A bulk sample taken across the talus below the outcrop of Sample "A" by Catlo and Archer said to assay 0.23% to 0.305% copper.

(5) A rock sample "C", collected by Mr. C. D. N. Taylor from an outcrop at the 6,000 foot elevation at Discovery Creek, turns out to be a highly altered basaltic rock. It would be interesting to map this area to find out the extent of this flow and its relationship to the mineral occurrences.

MAGNETOMETER SURVEY -

The magnetometer survey was carried out along north-south picket lines, laid out at 400 foot and 800 foot intervals, to cover a small portion of the south part of the property on the north slope of Dolores Creek. A Sharpe A-2 magnetometer was used for the survey, with stations established at 100 foot intervals. The results are depicted on the plan accompanying this report, plotted to a scale 1" = 200'.

The survey outlined several narrow elongated anomalies. These anomalies have high readings in the order of 1,000 gammas to 2,000 gammas, against background readings in the order of 500 gammas. One, and the strongest anomaly, is outlined over the mineralized "syenite porphyry" of Archer and Cathro, and later classified as diorite or quartz-diorite by Dr. Peach. The anomaly

is apparently widened toward east, with an indicated length of about 800 feet. A small anomaly is located at about 300 feet to the north of this intrusive rock, indicating the occurrence of a parallel sill or dike to the north.

Along Dolores Creek, at Line 4E, 500 feet south and Line 12W, 1,300 feet south to Line 16W, 1,500 feet to 1,800 feet south, there are similar anomalies. Rock sample "B", classified as diorite and described by Dr. Peach, was collected near L12W, 1,300 feet south.

One may conclude that the magnetic anomalies outlined by the survey are apparently indications of diorite, which is mineralized with magnetite and some chalcopyrite. The choice location for the testing of their economic possibilities is apparently the anomalous area outlined at the south parts of L12W and L16W where the topography is less rugged and has plenty of water.

CONCLUSIONS AND RECOMMENDATIONS -

The property covers a large rugged mountainous area where copper mineralization is widespread but hard to investigate. The known geological setting is good but the data is sketchy. The limited geological and geophysical surveys carried out to date indicate

the occurrence of several small but interesting copper-bearing slightly magnetic dioritic intrusives and, within the sediments, there is definite replacement type chalcopyrite mineralization with ore-grade concentrations and unknown dimensions. There are possibilities of finding economic deposits on or outside the property.

For the possibilities on and outside of the property, a combined helicopter magnetic and electromagnetic survey, to be followed by a photo-interpretation, should be carried out to cover an area, say, in the order of 50 some square miles surrounding the property, to guide further exploration. The results may also help the development work recommended by others to be conducted on the property. The writer has checked the feasibility of the recommended airborne survey and found that Lockwood Survey Corporation Limited has a program for various small companies in Yukon to conduct similar surveys in the coming spring. To join in with their program, the total cost for your program amounts to about $15,000.00. The flying time is estimated to be one week.

The follow-up work and development to be conducted on and outside of the property may involve large expenditures and definitely require the support of major mining companies. However, the airborne survey, with limited amount of follow-up work,

such as checking and staking of anomalies, may provide sufficient additional data for major companies to commit themselves.

The writer, therefore, recommends you to prepare to conduct the helicopter magnetic and electromagnetic survey in the coming spring and to allocate about $30,000.00 for the survey and limited follow-up work.

Respectfully submitted,

CANA EXPLORATION CONSULTANTS LIMITED

S. S. Szetu

SSS:rk
Encl.

S. S. Szetu, Ph. D.
Consulting Geologist

CANA EXPLORATION CONSULTANTS LIMITED PRIVATE COMPANY ONTARIO

Toronto, Ontario
October 28, 1967.

CERTIFICATE

I, S. S. SZETU, of Willowdale, in the Province of Ontario, hereby certify:

1. THAT I reside at 38 Whittaker Crescent, Willowdale, Ontario, and am a Consulting Geologist. My office is located at Suite 427, 12 Richmond Street, East, Toronto 1, Ontario.

2. THAT I hold a Degree of B. Sc. in Geology, 1941, from National Sun Yat Sen University, China, and a Degree of Ph. D. in Geology, 1954, University of Toronto, and that I have been practising my profession in geological and geophysical explorations since graduation.

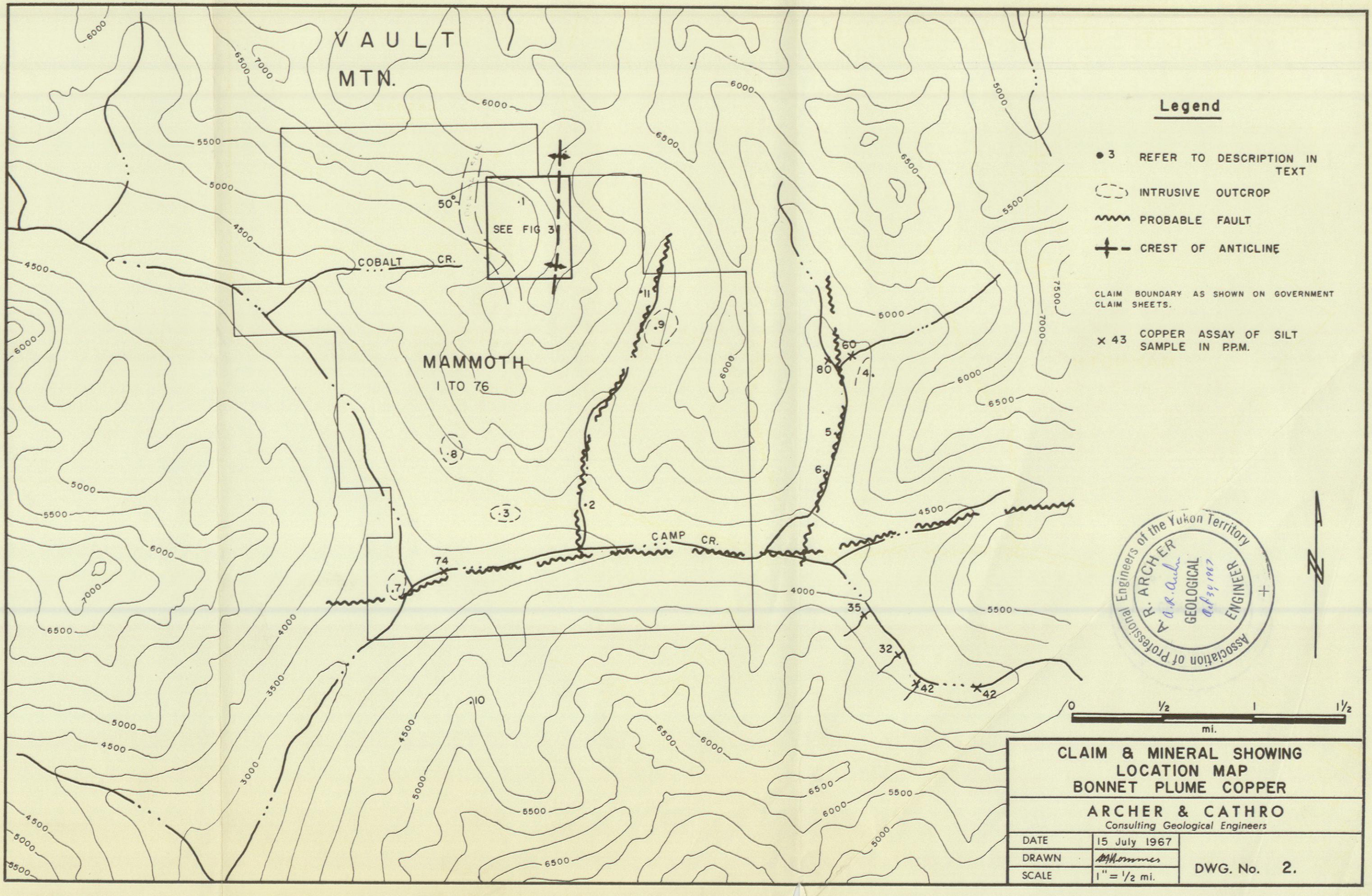
3. THAT I am a Fellow of the Geological Association of Canada, Member of the Mineralogical Association of Canada, the American Geophysical Union and The Canadian Institute of Mining and Metallurgy.

4. THAT I have no interest directly or indirectly, nor do I expect to receive any interest directly or indirectly in any securities issued by Bonnet Plume River Mines Limited or Nordex Exploration Limited, or in the property described in this report, located in the Bonnet Plume River Area of Yukon.

5. THAT the accompanying report is based on a study of the reports and magnetic data referred to in the accompanying report and a visit to the property on September 11 and 12, 1967.

S. S. SZETU, Ph. D.
Consulting Geologist

Dated at Toronto, Ontario
this 26th day of October, 1967.



CLAIM & MINERAL SHOWING LOCATION MAP BONNET PLUME COPPER

ARCHER & CATHRO
Consulting Geological Engineers

DATE	15 July 1967	DWG. No. 2.
DRAWN	DMHommes	
SCALE	1" = ½ mi.	

MAGNETOMETER SURVEY DATA ON SOUTH PART OF PROPERTY

BONNET PLUME RIVER MINES LTD.

BONNET PLUME RIVER AREA

YUKON TERRITORY

SCALE: 1" = 200' SEPTEMBER 1967

CANA EXPLORATION CONSULTANTS LIMITED

133°30′
65°00′

133°00′
65°00′

VAULT MTN.

MAMMOTH

SNAKE RIVER

CREEK

DOLORES

64°60′

64°60′

MAGNETIC NORTH
N 35° 15E

PROPERTY PLAN
MAMMOTH · CLAIM · GROUP
BONNET PLUME RIVER AREA-YUKON
MAYO MINING DISTRICT
CLAIM SHEET 106C-14

SCALE: 1 IN. = 2640 FT. TO DATE 1-11-1968

TRACED BY: C.H. Smith CHECKED BY C.D.N. TAYLOR

Association of Professional Engineers of the Yukon Territory
C. D. N. TAYLOR
MINING
ENGINEER