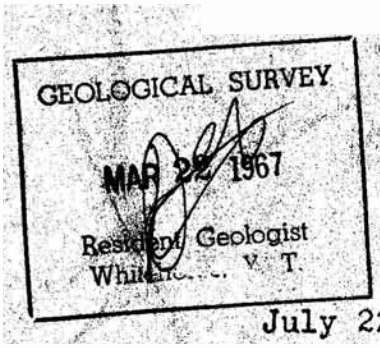
ARCHER, CATHRO & ASSOCIATES LTD.
CONSULTING GEOLOGICAL ENGINEERS
P.O. BOX 1051
WHITEHORSE, YUKON

REPORT ON
AIRBORNE GEOPHYSICAL SURVEY
GEOCHEMICAL SURVEY
AND
GEOLOGICAL SURVEY.

BEA, PAL, SI, POP & ORR CLAIM GROUPS
HOWARD LAKE AREA
ANVIL- VANGORDA DISTRICT
CLAIM SHEET 105-K-2

FOR

CITATION EXPLORATIONS LTD.
890 W. Pender St., Vancouver.



R.J. Cathro, P. Eng.

July 22- August 10 and Sept. 6-25, 1966.

TABLE OF CONTENTS

MAPS

INTRODUCTION

During the 1966 field season, an airborne geophysical survey and combined geochemical and geological survey was conducted on the Bea, Pal, Si, Pop, and Orr claim groups under the supervision of the writer. These five groups comprise one contigous block of 180 claims centered on Howard Lake in claim sheet 105-K-2, and are collectively referred to in this report as the Howard Lake claims. They are owned by Citation Explorations Ltd., and with the exception of linecutting, all work was performed by contractors working for Archer, Cathro and Associates Ltd., or employees of that firm.

The exploration techniques used in this program were patterned after the successful approach developed in this district by Dynasty Explorations Ltd., and were selected to locate any mineralized zones which are present on the property.

AIRBORNE GEOPHYSICAL SURVEY

A combined magnetometer (Mag) and electromagnetometer (EM) survey was conducted under contract by Lockwood Survey Corp. Ltd. on July 22, 1966. The equipment was mounted in a Bell 204 B turbine helicopter on charter from Okanagan Helicopters Ltd.

The survey equipment consisted of a continuous-reading Gulf magnetometer and EM coils with a primary current of

400 cycles per second, which were mounted in a bird which was towed beneath the aircraft by a 100 foot long cable. An air-photo mosaic of the claim group was used for navigation and a continuous strip photo record of the flight path was made. The aircraft was kept as close as possible to a mean terrain clearance of 200 feet by means of a radio altimeter and this was recorded on an APN tape. The mean terrain clearance of the bird was thus about 100 feet. The survey recording equipment and camera were mounted in the cabin of the helicopter and produced graphical tape records of the Mag, EM and elevation profiles. Flight lines were spaced at 1000 foot intervals. A total of 30 line-miles were flown.

A preliminary plot of the Mag and EM data was made in the field, on contract by Explorations Geophysics (Yukon) Ltd., and interpreted by Dr. D.W. Smellie, consulting geophysicist, of that firm. The preliminary plotting and interpretation, which was based on uncorrected data, was made to detect top priority anomalies which required immediate follow-up before the end of the summer. It was anticipated that final data reduction by Lockwood would take some time and, to date, this has still not been received.

The preliminary Mag and EM contours are shown on Figures 2 and 3 and a copy of Dr. Smellie's preliminary

. . 3.

interpretation, in which these claims are referred to as the Orchay group, is included in the appendix.

GEOCHEMICAL AND GEOLOGICAL SURVEY

The Howard Lake claims are centered on Howard Lake and lie mainly along a northeast-trending hanging valley of glacial origin on the north side of Pelly River. Howard Lake has been formed by the damming action of glacial debris deposited on the southwest end of the valley. The northwest end of the lake follows a prominent linear depression. As shown on Figure 3, outcrop is not abundant but enough broken bedrock is present in the glacial till to prepare a rough geologic map.

Granodiorite of the Anvil batholith crosses the northwest side of the claims and is in contact with quartzite and greenstone. The linear depression trending northwest from Howard Lake is thought to contain a major fault related to and parallel to the Tintina Fault. Greenstone on the northeast side is separated by this fault from phyllite, chlorite schist and quartzite on the southwest. This quartzite and phyllite is very similar in appearance to rocks in the vicinity of the Faro and Vangorda deposits.

Geochemical sampling was mostly of a reconnaisance nature, at 400 foot intervals along the claim base lines, with a more detailed pattern over the EM anomaly on line 24 recommended

by Dr. Smellie and another on line 44, northwest of Howard Lake. A total of 222 soil and silt samples were collected and analyzed.

Control for the sampling was provided by aerial photographs, tape, and compass. Sample locations were marked with plastic flagging. Sampling was done with a mattock grub-hoe and wherever possible the B 1 horizon was sampled. In a few cases permafrost prevented the taking of an ideal sample, free from organic matter or volcanic ash. However, since geochemical targets in this district are large and the spacing of the samples was fairly close, it is felt that nothing significant has been missed.

The samples were collected in individual small kraft bags and sent to Atlas Testing Labs, Edmonton, for analysis. Analysis consisted of hot agua regia extraction of heavy metal ions from the screened and dried sample, and metal content determination by atomic absorption. All samples were analyzed for copper, lead, and zinc.

Figures 5, 6, and 7 show the plotted values for copper, lead and zinc respectively. The lead background is lower than normal in this district and no anomalous values were found. Copper background is normal and two anomalous areas were found, a strong one north, and a weaker one immediately south of Howard Lake. The northern anomaly coicides with an aeromag anomaly in greenstone. The zinc background is much higher than normal for the district, with several anomalous values

present. The most interesting anomaly is in the same area as the copper and aeromag anomalies.

CONCLUSIONS AND RECOMMENDATIONS

A number of geologically and geochemically interesting areas have been found by the initial exploration program. Until the final Mag and EM maps are available, the exact priority of targets cannot be decided but the following areas definitely warrant further testing:

1. Si 1-6 and Pop 11-16 claims- a presumably thin north-dipping cover of greenstone covers quartzite which outcrops along the northern edge of the claims. Geochem anomalies in this area might have their source a considerable distance up the hill side. The Mag anomaly may be caused by the greenstone although it is a localized anomaly.
2. Bea 1-8 and 25-32 claims- scattered high geochem values occur in favourable phyllites and quartzite.

A program of linecutting, further detailed soil sampling and gravity surveys is recommended, to be followed by diamond drilling, if warranted.

Respectfully submitted,

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGIST
ENGINEER

R. J. Cathro, P. Eng.
ARCHER, CATHRO & ASSOC. LTD.
agent for
Citation Explorations Ltd.

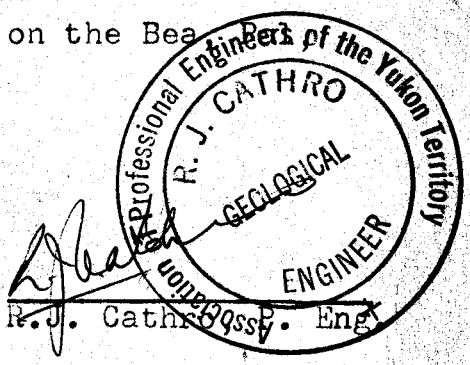
RJC:ps

Appendix 1

AFFIDAVIT

I, Robert J. Cathro, Consulting Geological Engineer, of Whitehorse, agent for Citation Explorations Ltd., have compiled the statement of costs presented in Appendix II of this report, and do hereby make oath and say:

That to the best of my knowledge and belief, the statement of costs as presented is a true and accurate representation of expenditures, to be applied as assessment work on the Bea, Bert, Si, Pop and Orr Claim Groups.



R. J. Cathro, P. Eng.

Sworn and subscribed to at Whitehorse this 20 day of December 1966.

192 claim years

Appendix II

STATEMENT OF COSTS

A. Geophysical Survey- 120 line-miles

1. Helicopter rental		
-share of ferry Whitehorse to Ross River	26 hours	
-share of test flights	38 "	
-flying lines & ferry from Ross River	3:10 "	
Total	4:04 "	
Cost @ $450.00/hr		$1830.00
2. Crew accommodation @ avg. cost of $2.50/line-mile		270.00
3. Preliminary plotting & interpretation @ $2.25/ line-mile plus drafting supplies & blueprinting		292.00
4. Air photos, mosaic preparation, maps		36.00
5. Management fees @ $3.00/claim		360.00
6. Management expenses- travel, office @ $1.40/line-mile		168.00
7. Estimated equipment rental- Lockwood @ $10.00/line-mile		1200.00
8. Estimated data reduction- Lockwood @ ~~$20~~ 15.00/line-mile		~~2400.00~~ 1800
9. Estimated final interpretation- Smellie @ $1.00/line-mile.		120.00
Total		$6676.00
@ 55/claim		6076.00

B. Geological and Geochemical Survey

1. Maps, blueprinting, duplicating 26.40	$30.00
2. Transportation- G.N.A. local traffic	308.00
3. Camp rental, groceries, radio, mobilization- Archer & Cathro	477.00
4. Wages- 75 man days-field, 3 man days- office- " " "	1972.00
5. Analysis- 222 samples @ $1.95, plus freight, Atlas Testing -Labs	445.00
6. Supervision- Archer & Cathro	475.00
7. Office expenses- drafting, typing- Archer & Cathro	100.00
Total	$4807.00

@ 21/sample
w.o. L.C.
4 w. L.C.

C. Linecutting

1. Base line and road repairs- 91.5 hours bulldozing @ -$22.00	$2013.00
2. Linecutting- 51.25 miles @ $80.00	4100.00
3. Transportation	508.00
Total	$6621.00
Sub total	$18,104.00

D. Consulting Engineers Report

A.O. Hall, P. Eng., 2767 Crescentview Drive, N. Vancouver, B.C.

-professional fees	$785.00	
-travel expenses	400.00	
Total		1185.00
Grand Total		$19289.00

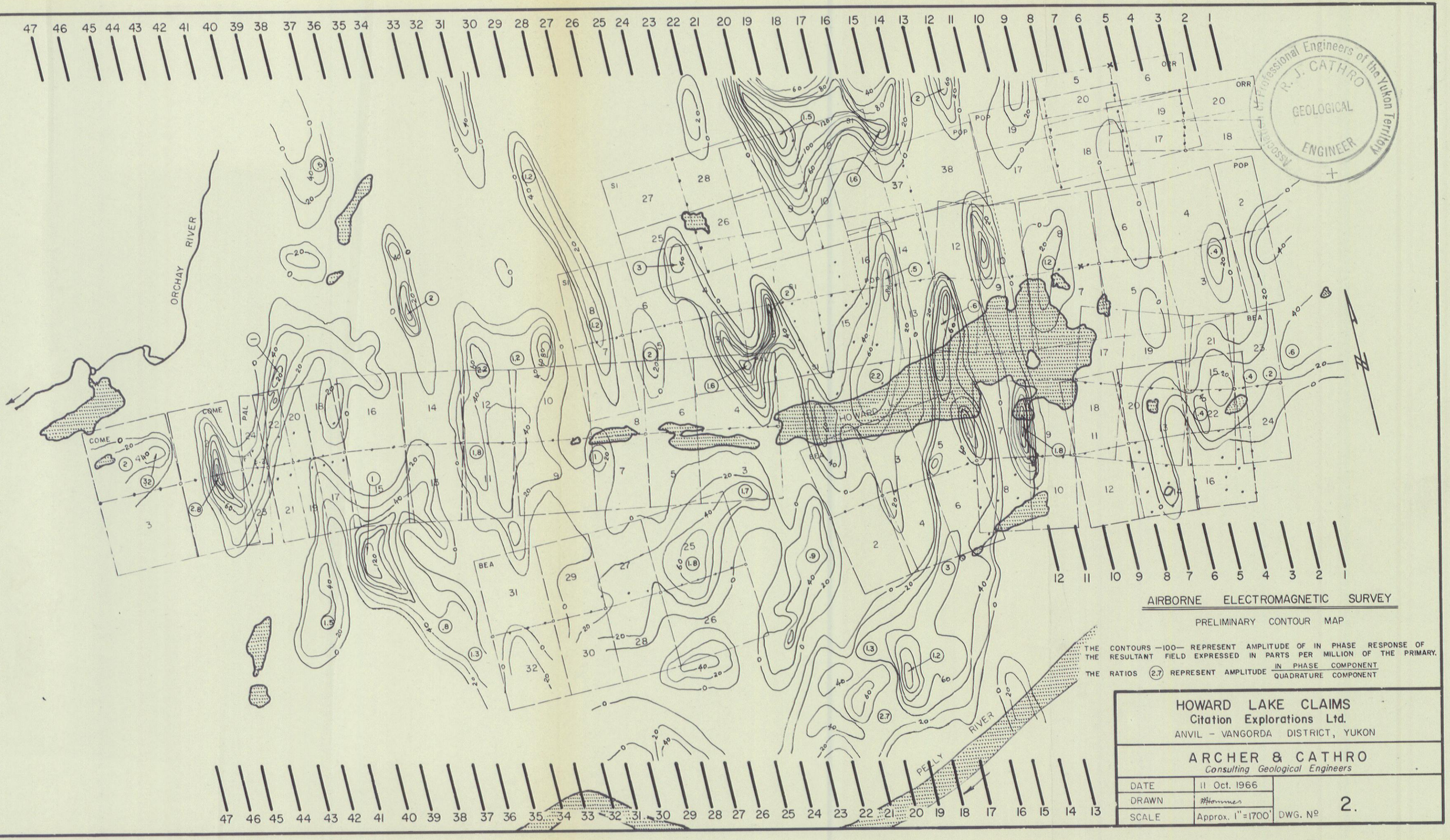
16,696
192

HOWARD LAKE

RELT RIVER

RUM RUM

FIGURE I
Key Map
HOWARD LAKE CLAIMS
CITATION MINES LTD.



Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL ENGINEER

AIRBORNE ELECTROMAGNETIC SURVEY

PRELIMINARY CONTOUR MAP

THE CONTOURS —100— REPRESENT AMPLITUDE OF IN PHASE RESPONSE OF THE RESULTANT FIELD EXPRESSED IN PARTS PER MILLION OF THE PRIMARY.

THE RATIOS (2.7) REPRESENT AMPLITUDE $\frac{\text{IN PHASE COMPONENT}}{\text{QUADRATURE COMPONENT}}$

HOWARD LAKE CLAIMS
Citation Explorations Ltd.
ANVIL – VANGORDA DISTRICT, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	11 Oct. 1966	
DRAWN	Hommes	
SCALE	Approx. 1"=1700'	DWG. Nº 2.


ORCHAY RIVER
HOWARD
PELLY RIVER
COME
PAL
SI
POP
ORR
BEA
AEROMAGNETIC SURVEY
PRELIMINARY CONTOUR MAP
CONTOUR INTERVAL 100 γ
HOWARD LAKE CLAIMS
Citation Explorations Ltd.
ANVIL - VANGORDA DISTRICT, YUKON
ARCHER & CATHRO
Consulting Geological Engineers
DATE 11 Oct. 1966
DRAWN
SCALE Approx. 1"=1700'
DWG. Nº 3.
Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL
ENGINEER

ORCHAY RIVER

HOWARD L.

PELLY RIVER

Legend

- GRANITE
- MAGNETITE BEARING SCHIST
- CHLORITE SCHIST
- PHYLLITE
- QUARTZITE (BANDED)
- GREENSTONE

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL ENGINEER

Geology

HOWARD LAKE CLAIMS
Citation Explorations Ltd.
ANVIL - VANGORDA DISTRICT, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	11 Oct. 1966	
DRAWN	Hommes	
SCALE	Approx. 1"=1700'	DWG. Nº 4.

ORCHAY RIVER

PELLY RIVER

HOWARD

COME

PAL

SI

POP

ORR

BEA

Legend

• – Soil

x – Silt

50 – 99 PPM

100 – 199 PPM

200 + PPM

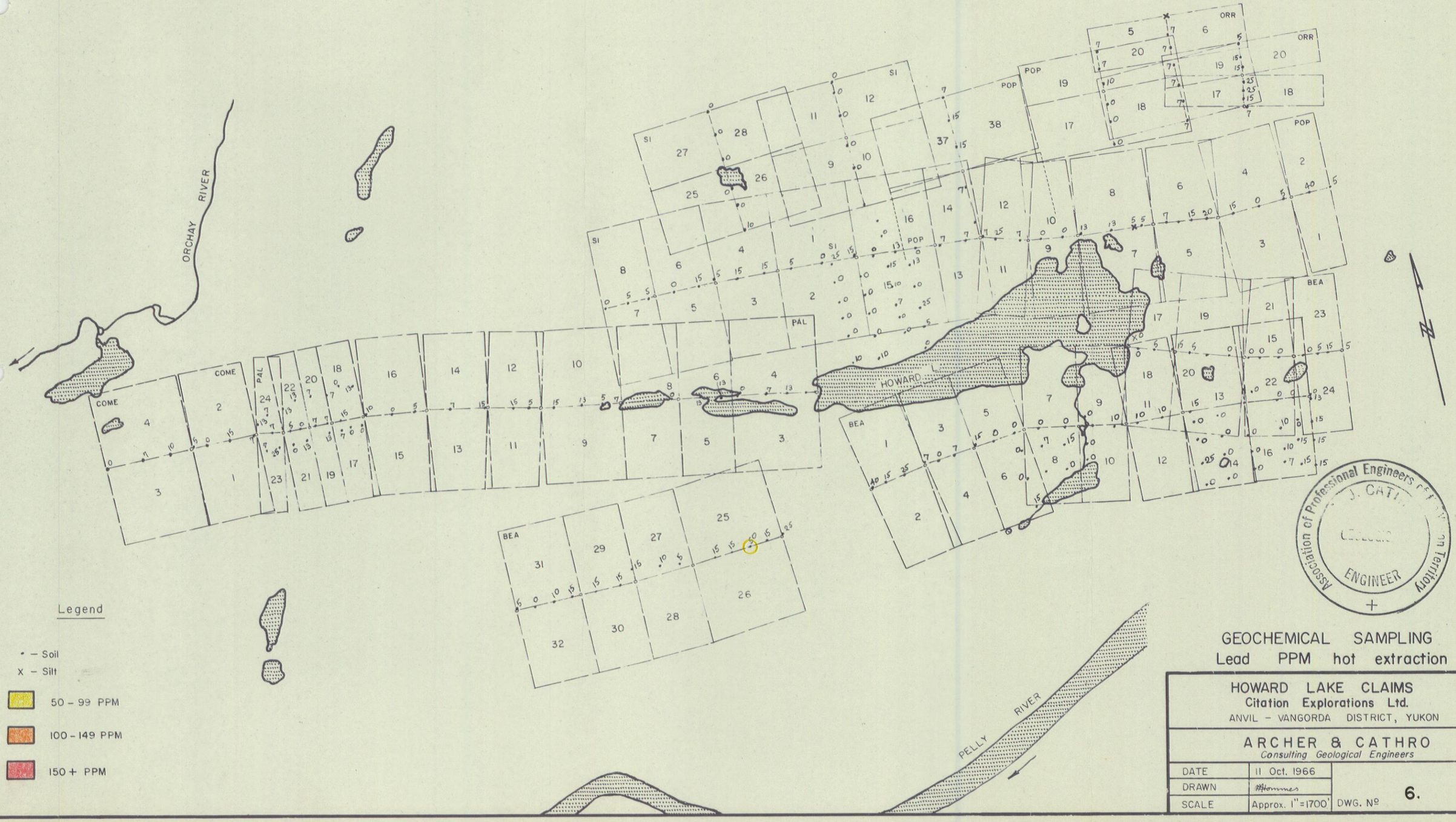
Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL
ENGINEER

GEOCHEMICAL SAMPLING
Copper PPM hot extraction

HOWARD LAKE CLAIMS
Citation Explorations Ltd.
ANVIL – VANGORDA DISTRICT, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	11 Oct. 1966	DWG. №	5.
DRAWN	Hommes		
SCALE	Approx. 1"=1700'		



Association of Professional Engineers of the Yukon Territory
J. CATHRO
ENGINEER

GEOCHEMICAL SAMPLING
Lead PPM hot extraction

HOWARD LAKE CLAIMS
Citation Explorations Ltd.
ANVIL – VANGORDA DISTRICT, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	11 Oct. 1966	
DRAWN	Hommes	DWG. Nº 6.
SCALE	Approx. 1"=1700'	

ORCHAY RIVER

PELLY RIVER

HOWARD

Legend

• – Soil

X – Silt

200 - 299 PPM

300 - 499 PPM

500 + PPM

GEOCHEMICAL SAMPLING
Zinc PPM hot extraction

HOWARD LAKE CLAIMS
Citation Explorations Ltd.
ANVIL – VANGORDA DISTRICT, YUKON

ARCHER & CATHRO
Consulting Geological Engineers

DATE	11 Oct. 1966	
DRAWN	Hommes	
SCALE	Approx. 1"=1700'	DWG. Nº 7.

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL
ENGINEER

REPORT

CITATION EXPLORATIONS LTD

HOWARD LAKE PROPERTY

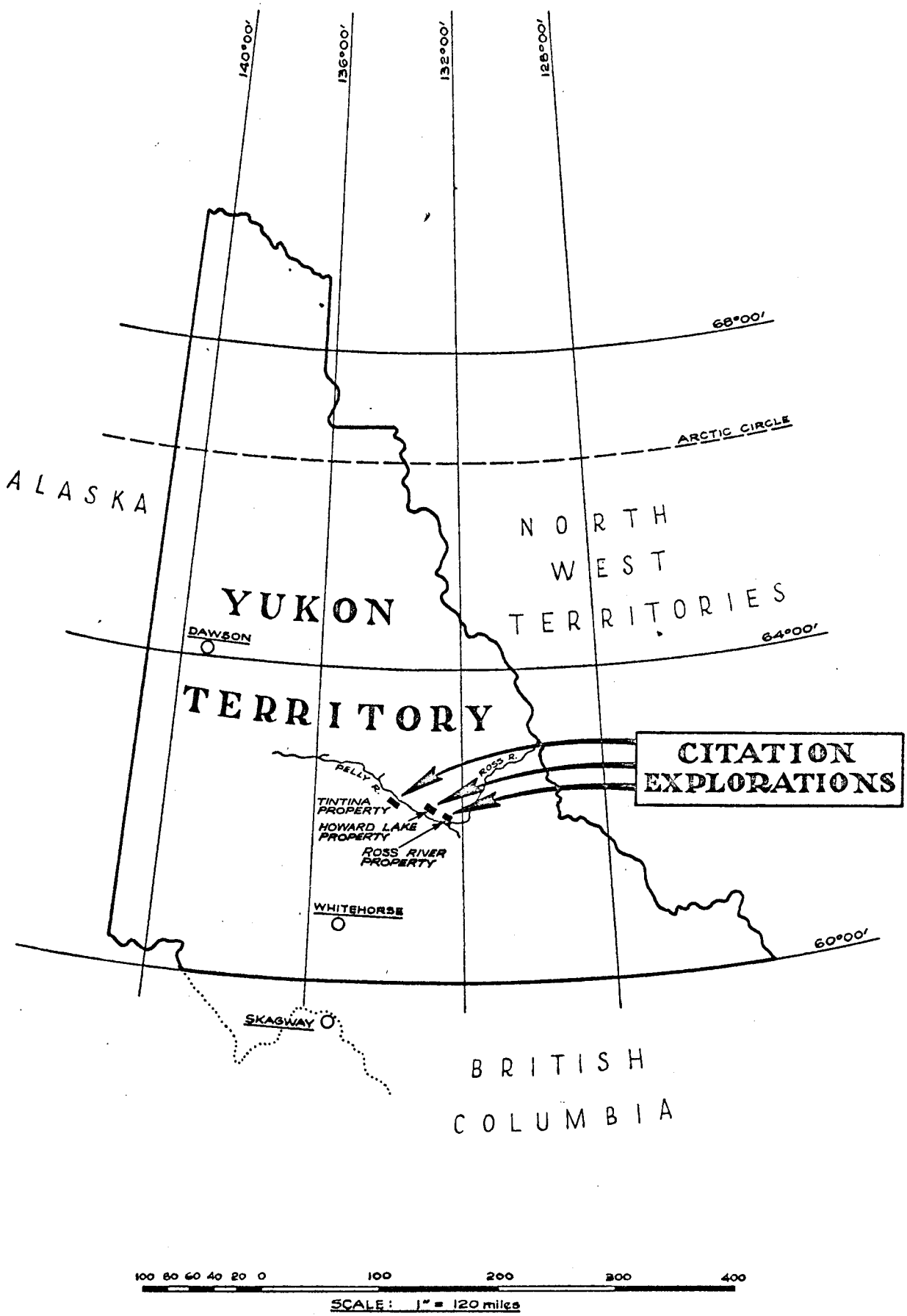
DYNASTY - ROSS RIVER DISTRICT

YUKON TERRITORY

by

Arthur O. Hall, P.Eng.,

Nov 1966



YUKON 8-8929

ARTHUR O. HALL, P.ENG.

MINERAL EXPLORATION - DEVELOPMENT

2767 CRESCENTVIEW DRIVE
NORTH VANCOUVER, B.C.

November 15, 1966

Citation Explorations Ltd.
Room 750 - 890 W. Pender Street
VANCOUVER 1, B.C.

Dear Sirs:

HOWARD LAKE PROPERTY

Attached herewith is a folio of maps illustrating the progress and results of exploration to date. This data includes:

1. Geologic mapping
2. Geochemical survey for zinc in P.P.M.
3. Geochemical survey for copper in P.P.M.
4. Airborne E-M survey showing anomalous distortions

Further and additional data will be added to this folio as it becomes available, however, the principal significant features are indicated in these map sheets.

Unfortunately, due to season end rush and unavailability of adequate help it proved impossible to carry out a complete geochemical sampling program. In some cases the indicated anomaly is represented by two or three high values surrounded by many hundreds of feet of unsampled or untested soil. Under this circumstance it is impossible to intelligently assess the character of the anomaly as to intensity, size and trend.

In summary at this time it seems permissible to state that the Howard Lake property contains a group of Zinc geochemical anomalous areas with a potential of representing flatly inclined mineral masses characteristic of that area.

The fact that evidence such as mineral masses has not been visually observed may be attributed to two factors:

1. The surface has not been thoroughly prospected

2. The attitude of the mineral beds conforms to the flatly inclined schists and could therefore be covered for great distances by a relatively thin layer of such schist and overburden.

Of particular significance and interest is the remarkable co-incidence of location for (a) Zinc anomalies (b) Copper anomalies (c) Air E.M. distortion etc. These fit over each other fairly closely considering the probability that there has likely been a small migration of soil from high to low elevation.

It should be stressed that only a small part of the Howard Lake property has been tested by either geochemical or geophysical methods. Furthermore, when the claims were acquired it was assumed on the basis of Canadian Geological Survey (Map 131941) that the north half of the property was completely underlain with rocks of the Anvil batholith. Reconnaissance mapping under direction of Consulting Geological Engineers, Archer & Cathro reveals that the contact between Anvil granites and the favourable schists and quartzites recedes well to the north at this point and consequently makes available a large area of highly potential formation for exploration.

In spite of the incomplete nature of exploration possible during the 1966 season it is considered remarkable and highly encouraging that such a large extent of anomalous indications were found.

A ground follow-up program is strongly recommended.

With exception of some contract line cutting the consulting firm of Archer & Cathro organized and supervised all geophysical and geochemical surveys. The contents of this report and folio is largely based on reports supplied by them. Detailed sample locations and analysis are available at the office of Citation Explorations.

To avoid congestion of data on the maps it appeared desirable to illustrate only each of the anomalous zones. In certain cases the anomaly may be based on erratics but this can not be determined until further closely spaced testing has been done by ground geophysical and/or geo-chemical methods.

SUMMARY

In order to advance this project as rapidly as possible this report is being submitted at this time without the accompanying maps referred to. These maps which are designed to illustrate the results of geophysical and geochemical work to date are being prepared by the Zodel Drafting and Tracing Service. Unfortunately, due to lack of sufficient service there may be a considerable delay in getting delivery of the maps.

It is hoped that the text of this letter-report plus whatever maps are now available will clearly emphasize and justify the strong recommendations that further exploration be carried out as soon as seasonal conditions will permit.

Alternative techniques of geophysical and geochemical testing of the property is under consideration. While no specific program has been finalized, the estimates for various programs follow.

Arthur O Hall

Arthur O. Hall,
P.Eng

AOH/kcl

PROGRAM AND ESTIMATES

It is essential that Citation Explorations have a representative on the property at all times.

His function would be to get the maximum amount of work done for the minimum amount of money.

It is particularly important to have close liaison between the contractors, or employees and the company. It is equally important for the company to have close contact with their representative on the job. A geologist or engineer with helper would prospect, map geology and a dozen other necessary jobs as time and priority permitted. This job would be extremely important if the program reached the diamond drilling stage.

1 Geologist-Engineer	6 months @ $1000.00	6,000.00
1 Helper	5 months @ $ 600.00	3,000.00
		$9,000.00
Expenses		1,000.00
	Total	$10,000.00

Geochemical Survey

Closely spaced sampling to completely delineal presently indicated anomalies.

Reconnaissance soil sampling of potential structure and formation heretofore untested $12,000.00

Gravrimetric Survey

To test the anomalous areas of first priority, surveys and lines, etc. $24,000.00

Possibly air and ground E.M.

Survey at specific targets only $10,000.00

Diamond Drill or Rotary-Percussion Drilling

At the present time there appears to be several anomalous areas worthy of further testing. It seems probable that the ultimate test to determine the presence and extent of base metal mineralization will be by means of either or both diamond drilling and rotary drilling.

Assuming 4000 feet as an arbitrary figure for minimum drilling
Estimated Cost $80,000.00

Estimate for Stage 1 including supervision, Geochemical Survey, Gravrimetric survey, Air and Ground E.M. survey, 4000 feet drilling $136,000.00

Presumably all of the above steps would not be used and costs would be less. If ore were found drilling costs would be a great deal higher.

Specific steps in Stage 1 have not been decided.

ARTHUR O. HALL, P.ENG.

MINERAL EXPLORATION · DEVELOPMENT

2767 CRESCENTVIEW DRIVE
NORTH VANCOUVER, B.C.

CERTIFICATION

I, Arthur O. Hall, with business and home address in North Vancouver, do hereby certify that

1. I am a consulting Mining Engineer.
2. I am a graduate of Haileybury School of Mines.
3. I am a registered Professional Engineer in the Province of British Columbia.

   Member of A.I.M.E. and C.I.M.M.
4. I have been engaged in the business of mineral exploration for 25 years.
5. I have not received nor do I expect to receive any interest directly or indirectly in the properties or securities of Citation Explorations.
6. I have not made detailed examination of the specific claims listed in this report. I have studied the geology of the general area in and around the properties including the Vangorda deposits in 1953, 1964 and 1965.
7. My home and business address is

   2767 Crescentview Drive
   North Vancouver, B.C.

Arthur O Hall

Arthur O. Hall
P.Eng.,

Anvil Creek

Rose Creek

DYNASTY DEPOSIT (ANVIL)

ROSE MTN

ANVIL RANGE

MOUNT MYE

PELLY RIVER

TINTINA FAULT

VANGORDA CREEK DEPOSIT (KERR ADDISON)

Vangorda Creek

Blind Creek

TAY RIVER

N

W E

S

132°45'

62°15'

Swim Lakes

SWIM LAKE DEPOSIT (KERR ADDISON)

MACUNDY RIVER

ORCHAY RIVER

Orchay Lakes

PELLY RIVER

ROSS RIVER

133°15'

62°00'

132°45'

62°00'

3 2 1 0 3 6

SCALE: Approximately 1 inch to 3 miles.

CITATION EXPLORATIONS

YUKON TERRITORY

DYNASTY & KERR ADDISON AREAS