

3261

REPORT ON
GEOPHYSICAL, GEOLOGICAL AND GEOCHEMICAL SURVEYS
OF THE
BEN GROUPS OF CLAIMS
Babine Lake Area, B.C.
Omineca Mining Division

Work Done on Behalf of
TORWEST RESOURCES (1962) LIMITED (N.P.L.)

by
A. I. Betmanis

Claims: BEN 1 - 8 Group and BEN 9 - 20 Group.
Location: East shore of Babine Lake, east of Old Fort
Latitude $55^{\circ}04'$ N. Longitude $126^{\circ}13'$ W.
Dates : June 7 - July 11, 1971.

<p>Department of Mines and Petroleum Resources ASSESSMENT REPORT NO. <u>3261</u> MAP.....</p>

July 30, 1971.

Vancouver, B.C.

GEOPHYSICAL ENGINEERING & SURVEYS LIMITED

3261

- 1 -

INTRODUCTION

The following report is based on field work carried out by Geophysical Engineering and Surveys Limited for Torwest Resources (1962) Limited (N.P.L.) during July 1971 on a group of 40 mineral claims in the Babine Lake area of the Omineca Mining Division.

The work was planned to more accurately locate and determine causes for copper anomalies obtained from a geochemical soil survey done by Torwest Resources in 1970, and to further evaluate the mineral potential of the property.

The program was directed by W. R. Bergey and supervised by A. I. Betmanis, both of Geophysical Engineering and Surveys Limited.

LOCATION AND ACCESS

The Ben groups of claims are located on the east shore of Babine Lake, approximately $2\frac{1}{2}$ miles north-east of Old Fort, and 2 miles due north of the northern tip of Hagan Arm of Babine Lake. They cover an area of approximately 3 square miles centred around latitude $55^{\circ}04' N$ and longitude $126^{\circ}13' W$ in the Omineca Mining Division of British Columbia.

The claims are accessible by boat from Topley Landing on the west shore of Babine Lake approximately 17 miles south of Old Fort. Topley Landing may be reached by 27 miles of gravel road from the town of Topley, 57 miles south of Smithers on highway 16. Boats are available for rent at Topley Landing.

CLAIMS

The property consists of 40 mineral claims which are listed in Appendix I. They have been re-grouped into two groups designated as the BEN 1 - 8 Group and the BEN 9 - 20 Group. The BEN 1-8 Group contains 16 claims for which one year of geophysical work is being applied; and the BEN 9-29 Group contains 24 claims

TABLE OF CONTENTS

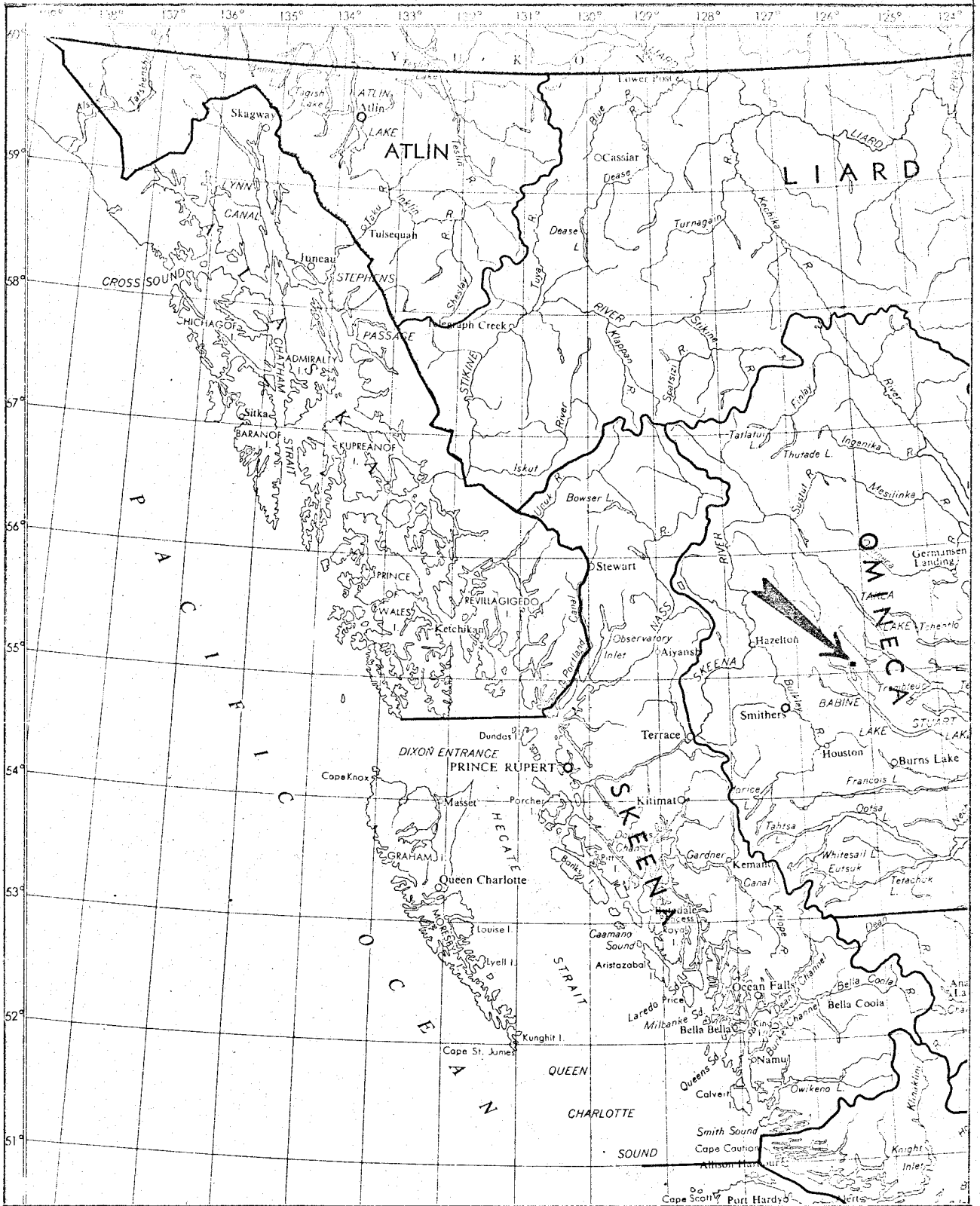
INTRODUCTION
LOCATION AND ACCESS
CLAIMS
PREVIOUS WORK
GEOPHYSICAL SURVEYS
 Electromagnetic Survey
 Magnetic Survey
GEOLOGICAL SURVEY
 General Statement
 Lithology
 Structure
 Alteration and Mineralization
GEOCHEMICAL SURVEY
CONCLUSIONS AND RECOMMENDATIONS

APPENDIX

I Claims
II Analytical Procedures
III Author's Certificate
IV Personnel and Dates
V Cost of Surveys
VI Affidavit re Cost of Surveys

MAPS

# 1	Fig. 1	Location Map	after page 1
2	Fig. 2	Claim Map	after page 2
3	Fig. 3	EM-16 Survey	in pocket
4	Fig. 4	Magnetic Survey	in pocket
5	Fig. 5	Geology	in pocket
6	Fig. 6	Geochemical Survey	in pocket



TORWEST RESOURCES (1962) LTD. (N.P.L.)

LOCATION MAP

BEN GROUPS OF CLAIMS
OMINECA MINING DIVISION

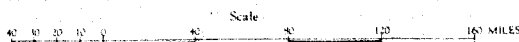
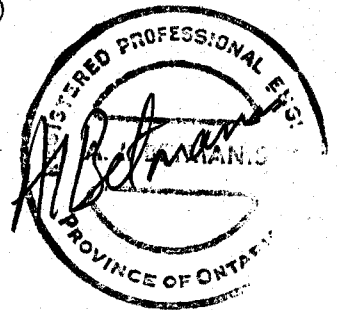


FIG. 1



W.R. Berry

for which two years of geophysical, geological and geochemical work are being applied. Location and configuration of the claims and groups are shown in Fig. 2 following page 2 of this report.

The BEN 1 - 20 and BEN 23 - 38 claims were staked and recorded on July 11, 1969 by W. F. Petrie and W. Hainsworth respectively, who transferred them to Torwest Resources (1962) Limited (N.P.L.) on April 7, 1970. On April 8, 1970, the BEN 1 - 20 and BEN 23 - 38 claims were grouped together as the BEN Group. On June 24, 1970 BEN 39 - 42 claims were staked and recorded by W. F. Petrie for Torwest Resources. Notice to group the BEN 1 - 20 and BEN 23 - 42 claims into the BEN 1 - 8 Group consisting of BEN 1 - 8 and BEN 9 - 20 claims, and the BEN 9 - 20 Group Consisting of BEN 9 - 20 and BEN 31 - 42 claims was filed with the mining recorder in Vancouver on July 11, 1971.

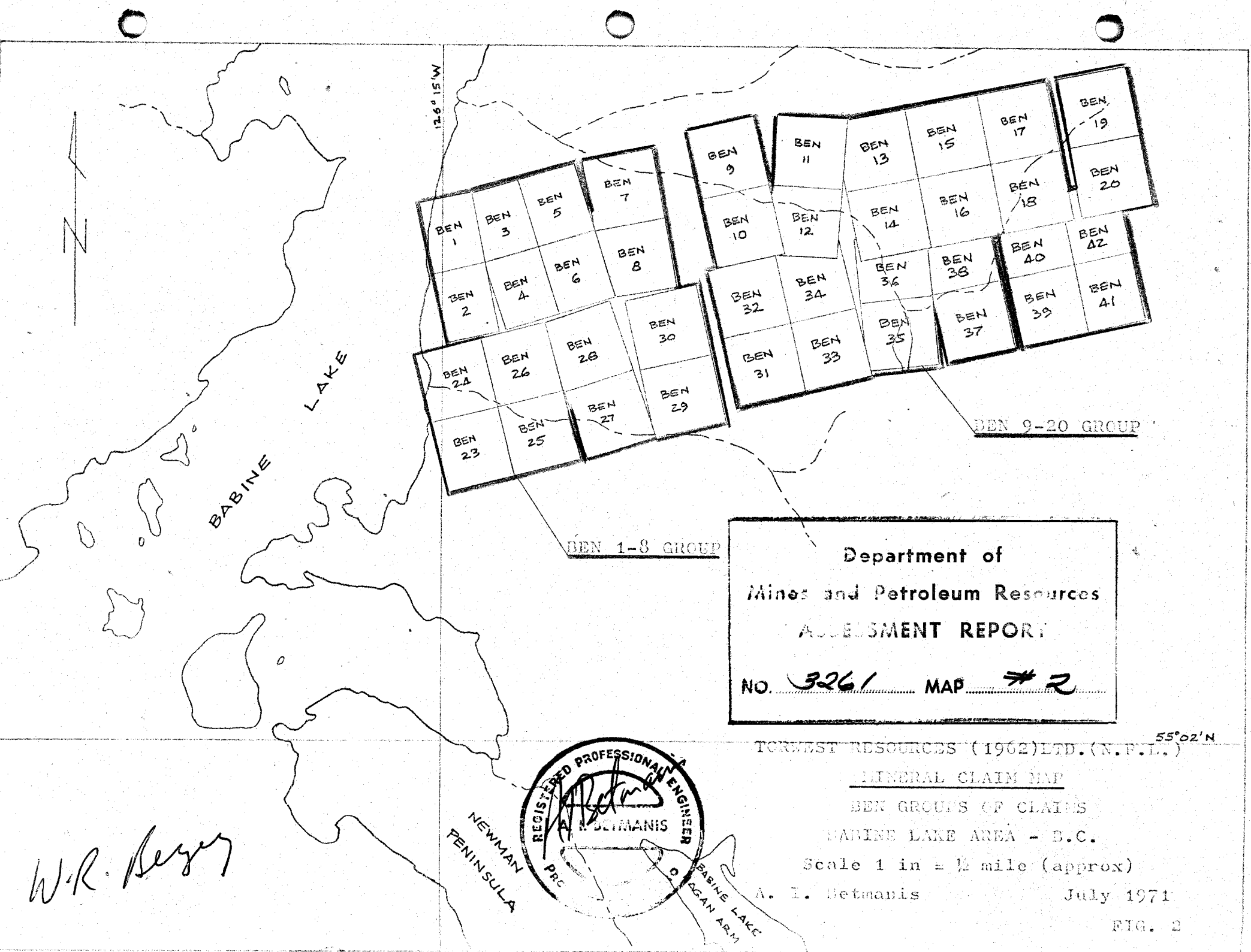
PREVIOUS WORK

Between June 1 and June 30, 1970 a base line was cut from the shoreline of Babine Lake through the centre of the claim block. Perpendicular lines were blazed, flagged, and chained at 800 foot intervals. Soil samples were collected at 200 foot spacings along the lines and analysed for total copper. Several possible copper anomalies striking approximately N 80°W were obtained in the north-eastern section of the claim group. It was decided that more detailed sampling of the anomalous area at a greater depth, and additional technical information, were needed to help evaluate the property.

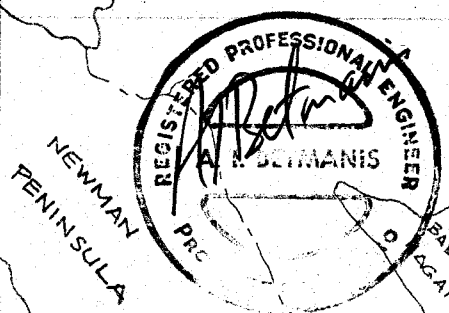
GEOPHYSICAL SURVEYS

Electromagnetic Survey

An EM-16 VLF electromagnetic unit manufactured by Geonics Limited was used for the survey. The method utilizes very low frequency



W.R. Meyer



55°02'N

horizontal fields generated by the U.S. Navy from various points around the world rather than a locally transmitted field on the property. Due to the frequency range of the stations, poor conductors, minor shears, and faults give a response. Faults of appreciable dimensions will give particularly strong anomalous response. However, swampy ground or conductive overburden will often mask underlying conductors.

For efficient use of the VLF-EM method a transmitting station should be chosen which is in a direction on strike with the expected conductors, and the lines of traverse should be parallel to the primary field; that is, perpendicular to the direction to the transmitting station. Due to the narrow range about a conductor in which the primary field will be affected, readings at a maximum interval of 100 feet should be taken.

The survey of the BEN claims was primarily planned to locate east-west trending conductors or structures which may explain the location and direction of the geochemical anomalies, and to locate similar striking structures which may be mineralized but not revealed by soil sampling due to excessive overburden. For this purpose Cutler Maine (NAA) was chosen for the transmitting station, and the blazed lines were used for traversing. A second survey using Seattle, Washington (NPG) for the transmitting station, and traversing along the base line, was made to locate north-south trending faults, which are the predominant structures of the region.

The Cutler field was weak due to the property being very close to the maximum transmitting range, and wide nulls were obtained, especially in conductive overburden areas. For the in-phase signal a null of ± 10 degrees was obtained from the actual angle, and for the quadrature component the null was ± 5 degrees. However, the actual null could be estimated to reasonable accuracy with practice.

West of line 80E, deep conductive overburden masked whatever conductors may exist. In the north-east and central sections of the property several possible conductors were picked up striking west-

south-west, as indicated on the accompanying map. These conductors do not correspond to the geochemical anomalies, but indicate that possible structures do exist in the general area.

Reception from Seattle was good, with nulls for the in-phase signal being obtained over ± 1 degree, and for the quadrature over ± 2 degrees. As in the Cutler survey, west of line 80E conductive overburden of probable appreciable thickness was indicated. Near the shoreline of Babine Lake there are indications of a strong fault just off-shore. A fault is indicated at 85E on the base line, which corresponds to the start of flat swampy ground over the western section of the property. Other faults or conductors are indicated at approximately 110E, 116E and 136E. The indicated fault at 110E agrees with a fault interpreted from aerial photographs. Due to only one traverse being made reading Seattle, the exact strike of the faults or conductors could not be obtained.

Magnetic Survey

A magnetic survey was made of the property using two Scintrex MF-2 magnetometers. A base station was set up at the west end of the property in an area of low magnetic relief, and readings were taken with one of the magnetometers every 10 minutes to obtain a diurnal variation. The other magnetometer was used to take readings along the grid lines at 200 foot spacings. The line magnetometer readings were corrected using the diurnal variation obtained at the base station. To check for drift, which may occur from voltage variations of the magnetometer batteries, the same stations of the grid lines at the base line were occupied at different times whenever it was convenient, and the line magnetometer was compared with the base magnetometer at the start and end of each day.

The purpose of the survey was to delineate structures which may bear magnetic mineralization, to indicate zones of hydrothermal alteration due to the breakdown of magnetite, and to define rock types

due to their different magnetic properties.

Diurnal variations were moderate throughout most of the survey. However, a drift was noted in the line magnetometer during the last three days of the survey, but fortunately sufficient baseline stations had been read to tie into and plot the drift for correction. Drift corrections were applied to readings after diurnal variation corrections.

There was a sharp drop in readings west of approximately line 80E. This corresponds roughly with an interpreted fault, and follows the division between a shallow overburden area and flat swampy ground. Between lines 32E and 40E there is a rise in readings to the west, but due to thick overburden and swampy nature of the ground the cause of the change is unknown. It can only be postulated that it may be caused by a change in lithology between rocks of different magnetic properties.

The maximum magnetic relief which may be of significance to mineralization is in the eastern section of the property. There is some correlation with geochemical copper anomalies obtained from detailed sampling of soils. The magnetic anomaly on line 144E between 10N and 18N is surrounded by anomalous soils, whereas the magnetic high on 160E at the base line corresponds to a geochemical high.

GEOLOGICAL SURVEY

General Statement

The claim area is shown on B. C. Department of Mines and Petroleum Resources Map 69-1 to be underlain on the east side by Lower Jurassic and (?) Middle Jurassic andesitic to rhyolitic tuffs, breccias, and flows. The west side of the property is shown as being drift and alluvium covered. A major fault striking north-north east, but locally north, is assumed to pass through the centre of the property. Several small intermediate intrusives of Upper Cretaceous and Early Tertiary age occur in the general area, but none are shown as underlying the claims.

For purpose of geological mapping, traverses were made along all lines on the property, and rock outcrops were mapped according to lithology, structure, alteration, and mineralization within a range of 100 - 200 feet of the lines. Samples were taken from thirty different outcrops for slabbing with a diamond saw and microscopic examination.

Lithology

Rhyolitic and andesitic tuffs are the predominant rocks outcropping on the property. A diorite dyke approximately 800 feet in width and striking north-south intrudes the rhyolites in the centre of the claim block and close to the western edge of the outcrop area. A brief description of the rock types is given below.

Rhyolitic Tuffs: A fine grained silicious matrix contains approximately 5 - 10% of fine megascopic to microscopic fragments which are commonly angular in form. The fragments are often altered. In general they are more basic than the matrix.

Andesitic Tuffs: The rocks classed as andesitic tuffs may be both andesitic tuffs and fine grained andesite flows. In both cases the matrix is very fine grained and contains fine feldspar phenocrysts with or without fragments. As in the rhyolites, the phenocrysts and fragments are most affected by alteration.

Diorite: The diorite is medium to fine grained, becoming gradually finer grained at and north of the base line. A contact zone between it and the rhyolite was found in only one outcrop, and is gradational over a width of approximately 20 feet.

A highly silicious breccia was found south of the lake at line 112E. The breccia fragments appear to be rhyolitic, and the breccia is assumed to be the result of intense fracturing and a silicious melt being introduced via a nearby fault.

Structure

The andesite is believed to overly the rhyolite and thus be younger than the rhyolite. Interpreting from the outcrop areas and

the topography, the strike of the contact would be approximately north-east with a dip at a fairly low angle to the south-east. The strike of the diorite dyke is north-south, but its dip was not determined.

Major faults were not directly observed in the field, but topographical variations due to suspected faults were noted. Where such evidence was supported by aerial photograph interpretation and electromagnetic data, the suspected faults were indicated on the accompanying geological map. The two main faults on the property occur near line 88E and between 104E and 112E at the base line. The first fault strikes north-south and appears on the ground as a low escarpment. The second fault is indicated on the ground partially by an escarpment at the east shoreline of the lake at 112E and by a narrow straight ravine between 104E and 112E at the base line.

Fracturing was the predominant structural feature observed. As would be expected, strongest fracturing occurs near faults. Most fracturing, especially in the rhyolites, was complex with a fracture density of 4 inches to 1 foot. The andesites were more unidirectionally fractured with a north-south trend.

Alteration and Mineralization

Mild kaolinization affects most of the outcropping rocks. Although it may be partly due to weathering, a large part of it is due to mineralizing solutions which have brought with them traces of pyrite. Silicification is fairly widespread and may not have been identified as alteration in all cases because of the silicious nature of the rhyolites. Chloritization is the most localized alteration, occurring in and near the diorite dyke. Minor chloritization was noted also at the base of the andesites.

Traces of pyrite, or limonite derived from pyrite, were noted

in a large proportion of the outcrops, occurring as a very fine dissemination in matrix material near fragments and mixed with silicious microfracture fillings. Strongest pyrite mineralization noted was on line 104E at 5N and 124E, 9N. Using both pyrite and limonite, an estimate of 2 - 5% sulphide mineralization prior to oxidation was obtained at both locations. Traces of chalcopyrite were noted only in one outcrop on the property, at 124E, 9N. Magnetite occurs at 136E, 11 + 50N, but it was not determined whether it was primary or introduced mineralization.

GEOCHEMICAL SURVEY

A detailed geochemical soil survey was made over the northeastern part of the property. Samples were taken at 100 foot intervals on lines spaced 400 feet apart between 124E and 160E and north of the base line. The samples were taken with a hand auger at an average depth of 3 feet, unless bedrock or a boulder was encountered at shallower depths. After partial drying, the samples were sent to Seymour Laboratories in North Vancouver for total copper and molybdenum analyses by atomic absorption spectrometer. Analytical procedure of the analyses is described in Appendix II of this report.

The purpose of the survey was to more accurately delineate copper anomalies obtained by Torwest Resources from their soil sampling survey of 1970. A depth of 3 feet was used for sampling because of the low geochemical expression of the area.

Somewhat different geochemical anomalies were obtained than from the previous sampling, which may be due to the difference in sampling depth. Values of 60 - 80 ppm copper were taken as being possibly anomalous, and values of over 80 ppm copper were taken as being probably anomalous. Using these values only two areas were obtained that could be classed as probably anomalous and supported by more than three sample locations. The main one extends from 140E to 152E at approximately 18N and curves south between lines 136E and 140E. This anomaly surrounds a magnetic anomaly, and may represent a zoning from magnetite

to pyrite and chalcopyrite. The other main copper anomaly is on lines 144E and 148E between 22N and 27N. It does not correspond to any magnetic anomalies. Another possible anomaly which agrees with magnetic data is between lines 156E and 16E just north of the baseline, and occupies a magnetic high.

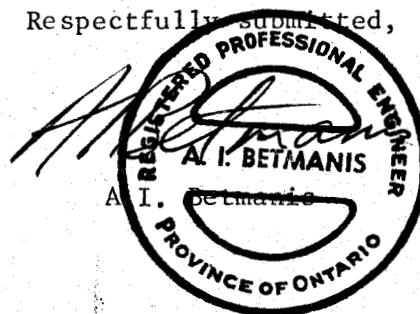
Molybdenum was not detected in the analyses of the samples except for a few values not anomalous, and therefore is not shown on the geochemical map. The only values obtained were 1 ppm at 132E, 18N and 136E, 5N, and 2 ppm at 152E, 25N.

CONCLUSIONS

Magnetic, electromagnetic, geological and geochemical surveys were done over the BEN claim groups to determine whether economic copper mineralization could be expected on the property. Geological mapping revealed fairly widespread minor pyrite mineralization, but no significant copper mineralization. The detailed geochemical sampling gave several possible copper anomalies, but do not correspond to conductors or structures picked up by the electromagnetic survey. West of line 80E, the overburden is too thick for the above surveys to be effective, and thus no conclusions can be made for that section of the property.

It can be concluded that low grade copper mineralization is in some way related to magnetic mineralization in the north-east section of the property. However, it probably is of insufficient concentration to be of any economic significance. Due to the presence of pyrite in the area, it is probable that it accompanies pyrite mineralization in minor quantities.

Respectfully submitted,



I hereby certify that the work was carried out under my supervision.

*W. R. Berger
(Alberta Association of Professional Engineers)*

APPENDIX I

Claims

CLAIMS

<u>Claim</u>	<u>Record Numbers</u>	<u>Expiry Date</u>	<u>Title</u>
BEN 1-8 GROUPING			
Ben 1-8	77163-77170	July 11, 1971	Torwest
Ben 23-30	77183-77190	July 11, 1971	Torwest
BEN 9-20 GROUPING			
Ben 9-20	77171-77182	July 11, 1971	Torwest
Ben 31-38	77191-77198	July 11, 1971	Torwest
Ben 39-42	90658-90661	July 8, 1971	W.F.Petrie

APPENDIX II

ANALYTICAL PROCEDURES

ANALYTICAL PROCEDURES USED TO DETERMINE TOTAL COPPER AND
MOLYBDENUM IN GEOCHEMICAL SAMPLES USING ATOMIC ABSORPTION
SPECTROPHOTOMETER

I Sample Preparation

- (a) Geochemical soil samples were received at Seymour Laboratory in paper bags.
- (b) The wet samples were dried in an oven at 110°C.
- (c) The dried samples were sifted, using an 80 mesh sieve. The plus 80 mesh fraction was rejected, and the minus 80 mesh fraction was transferred into a new bag for analysis.

II Method of Analysis

- (a) 0.5 gm. of the minus 80 mesh samples were weighed out into test tubes.
- (b) 2 ml. of perchloric nitric acid mixture (85% HClO₄ + 15% HNO₃) were added to the samples in test tubes.
- (c) The samples with acid mixture were digested on a sand bath at 160°C for three hours.
- (d) At the end of the digestion period test tubes were removed from the sand bath and cooled for 15 minutes.
- (e) The volume in each test tube was made up to 10 ml. with de-mineralized water. For the samples being analysed for molybdenum, 1 ml. of 1000 ppm aluminium chloride was added in each test tube before adding de-mineralized water.
- (f) The mixture in the test tubes was capped and shaken vigorously, and then allowed to settle.
- (g) The samples were aspirated in atomic absorption spectrophotometer with proper parameters. The concentration of each element was determined by comparing with a set of known standards.

APPENDIX III

AUTHOR'S CERTIFICATE

CERTIFICATE

I, Andris I. Betmanis do hereby certify that:

1. I am a geologist with residence at Suite 512, 1550 Duchess Avenue, West Vancouver, British Columbia.
2. I am a graduate of the University of Toronto with the degree of B.A.Sc. in Applied Geology in 1965.
3. I am a Professional Engineer registered in the Province of Ontario.
4. From graduation to present I have been employed as a geologist with Geophysical Engineering & Surveys Limited.
5. During the period June - July 1971 I supervised the geophysical and geochemical surveys and carried out the geological mapping of the claims covered by this report on behalf of Geophysical Engineering & Surveys Limited.



A. I. Betmanis

July 30, 1971.

APPENDIX IV

PERSONNEL AND DATES

APPENDIX V

COST OF SURVEY

PERSONNEL & DATES

<u>Name and Address</u>	<u>Position</u>	<u>Employed From-To</u>	<u>Days</u>
A. I. Betmanis 141½ Riverside Drive, North Vancouver, B.C.	Geologist	June 7 - July 11, 1971	25½
G.W. Davies 141½ Riverside Drive, North Vancouver, B.C.	Geophysical Instrument Operator	June 7 - 30, 1971	22
C. C. Lee, 141½ Riverside Drive, North Vancouver, B.C.	Geophysical Instrument Operator	June 7 - 30, 1971	22
C. Law, Houston G.D., B.C.	Assistant	June 14 - 26, 1971	13
D. J. Newton, 141½ Riverside Drive, North Vancouver, B.C.	Assistant	June 7 - 14, 1971	8

APPENDIX VI

AFFIDAVIT RE: COST OF SURVEY

COST OF SURVY

The costs below are property related costs charged to Torwest Resources by Geophysical Engineering and Surveys Limited. They do not include preliminary compilation of previous, administrative costs, transportation to and from Vancouver, and other costs not normally applicable for assessment credits. They have been divided for the BEN 1-8 and BEN 9-20 groups according to the line miles of survey applicable to each group.

	<u>BEN 1-8 Group</u>	<u>BEN 9-20 Group</u>
Geology		945.00
Supervision	304.05	542.95
Magnetic survey	117.38	209.62
Electromagnetic survey	252.95	542.05
Geochemical survey		621.00
Assaying		489.00
Boat and vehicle rental, fuel	370.46	661.54
Camp costs and accommodation	283.59	506.41
Perishable supplies	249.49	445.51
Drafting	173.74	310.26
Reports	42.00	75.00
Sundry	104.82	187.18
Total	\$ 1898.48	\$ 5535.52

Declared before me at the *City*
of *Vancouver*, in the
Province of British Columbia, this *6th*
day of *August* 1971, A.D.

Albertman

S. Phillips

A Commissioner for taking Affidavits within British Columbia and
A Notary Public in and for the Province of British Columbia.

Sub-mining Recorder

AFFIDAVIT Re: COST OF SURVEY

I, Andris I. Betmanis, B.A.Sc. of 512 - 1550 Duchess Avenue, in the Municipality of West Vancouver in the Province of British Columbia, DO SOLEMNLY DECLARE that the geophysical, geological and geochemical surveys of 40 located mineral claims owned by Torwest Resources (1962) Limited (N.P.L.) were conducted during the field season of 1971 prior to July 11, are described by this report, and the field data was obtained at a total property related cost of at least \$7,434.00

AND I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act".

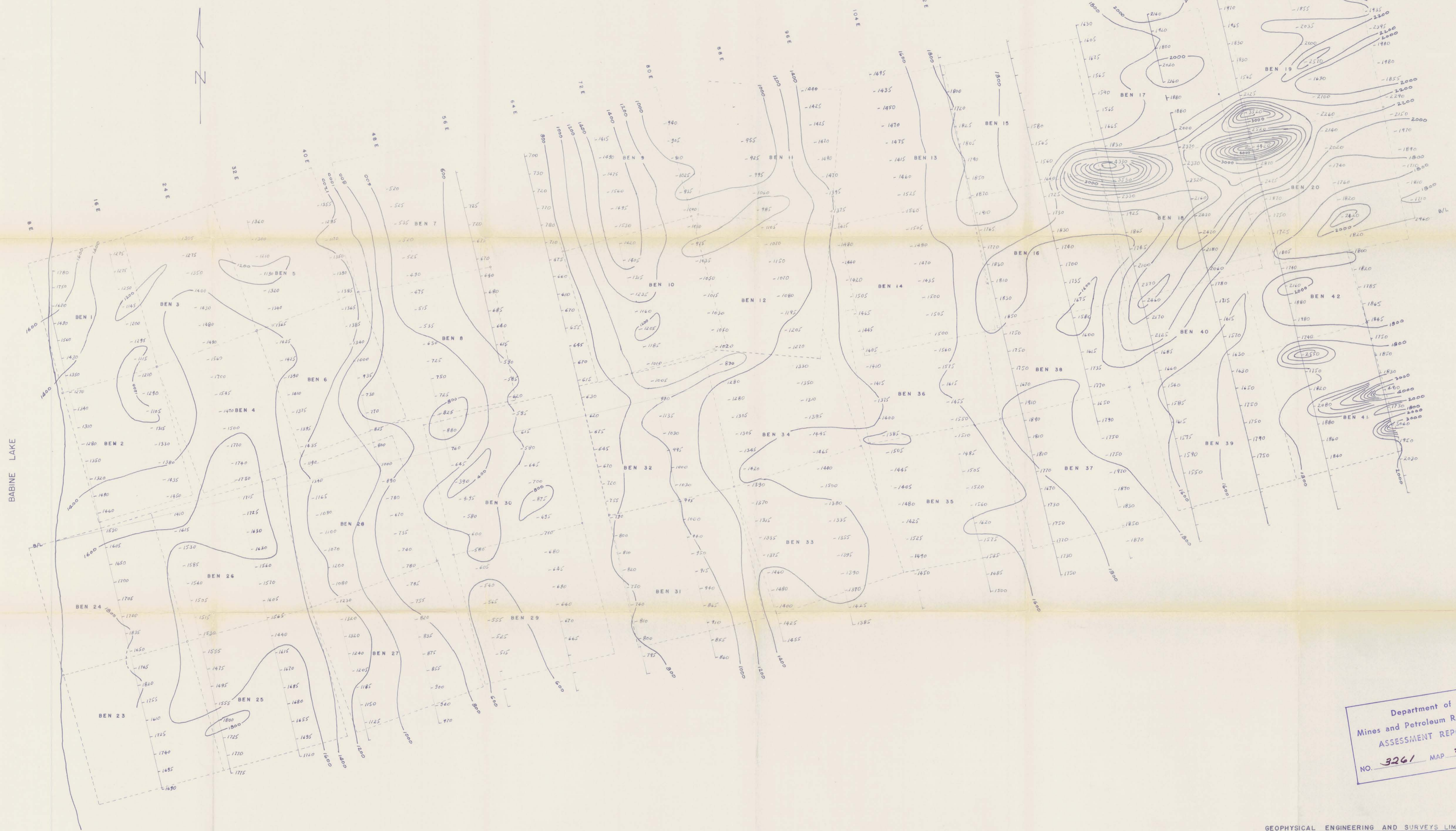
DECLARED before me at the)
City of Vancouver, in the)
Province of British Columbia)
this . 6 day of Aug)
July, A.D. 1971)

SP

G Phillips

Sub - mitting Recorder

A. I. Betmanis
A. I. Betmanis



CONTOUR INTERVAL 200 GAMMAS

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3261 MAP #4

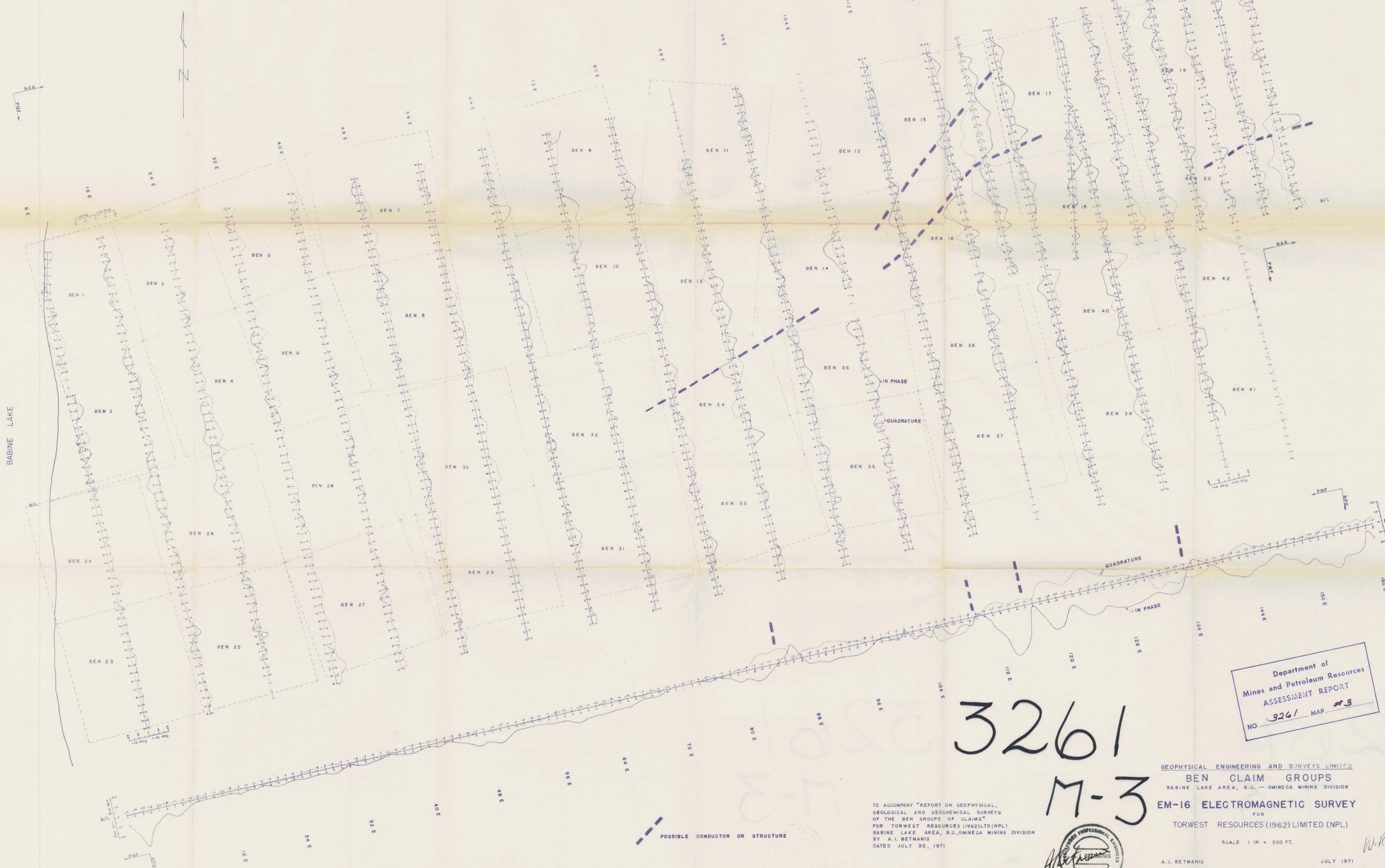
GEOPHYSICAL ENGINEERING AND SURVEYS LIMITED
BEN CLAIM GROUPS
BABINE LAKE AREA, B.C. — OMEGA MINING DIVISION
MAGNETIC SURVEY
FOR
TORWEST RESOURCES (1962) LIMITED (NPL)

TO ACCOMPANY "REPORT ON GEOPHYSICAL,
GEOLOGICAL AND GEOCHEMICAL SURVEYS
OF THE BEN GROUPS OF CLAIMS"
BABINE LAKE AREA, B.C., OMEGA MINING DIVISION
BY A.I. BETMANIS
DATED JULY 30, 1971



SCALE 1 IN = 500 FT.
A.I. BETMANIS
JULY 1971

W.R. Sney



3261
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Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 3261 MAP #3

TO ACCOMPANY "REPORT ON GEOPHYSICAL,
GEOLOGICAL AND GEOCHEMICAL SURVEYS
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FOR TORWEST RESOURCES (1962) LTD (NPL)
BABINE LAKE AREA, B.C., OMEGA MINING DIVISION
BY A. I. BETMANIS
DATED JULY 30, 1971



GEOPHYSICAL ENGINEERING AND SURVEYS LIMITED
BEN CLAIM GROUPS
BABINE LAKE AREA, B.C. — OMEGA MINING DIVISION
EM-16 ELECTROMAGNETIC SURVEY
FOR
TORWEST RESOURCES (1962) LIMITED (NPL)
SCALE 1 IN = 500 FT.
A. I. BETMANIS
JULY 1971

W.R. B...



NOTE: VALUES OF LINE 120E FROM TORWEST SAMPLING IN 1970
 60-80 PPM INTERVAL POSSIBLY ANOMALOUS
 PLUS 80 PPM PROBABLY ANOMALOUS

46 PPM COPPER IN SOIL

TO ACCOMPANY "REPORT ON GEOPHYSICAL, GEOLOGICAL AND GEOCHEMICAL SURVEYS OF THE BEN GROUPS OF CLAIMS" FOR TORWEST RESOURCES (1962) LTD. (NPL) BABINE LAKE AREA, B.C., OMEGA MINING DIVISION BY A. I. BETMANIS DATED JULY 30, 1971



Department of Mines and Petroleum Resources
 ASSESSMENT REPORT
 NO. 3261 MAP #6

GEOCHEMICAL SAMPLING MAP FOR TORWEST RESOURCES (1962) LIMITED (NPL)

SCALE 1 IN = 200 FT.

A. I. BETMANIS

JULY 1971

