



REPORT ON  
MACKENZIE-DOW, KEY CLAIMS  
COAL RIVER AREA, YUKON TERRITORY  
FOR  
ATHABASKA COLUMBIA MINING LIMITED

BY

A. C. A. HOWE INTERNATIONAL LIMITED

J. E. TILSLEY, F. G. A. C., P. Eng

This report has been examined by  
the Geological Evaluation Unit.  
Approved as to technical worth by:

*D. C. Bradley*  
RESIDENT GEOLOGIST

Approved as to cost in the amount  
of \$ 2400.00

*R. G. Redden*  
RESIDENT MINING ENGINEER

Accepted as representation work  
under Section 53(4) Yukon Quartz  
Mining Act.

*W. M. Smith*  
COMMISSIONER OF YUKON

REPORT NO. 158  
TORONTO, ONTARIO

NOVEMBER 27, 1968

060566

## CONTENTS

	<u>PAGE NO.</u>
SUMMARY	i
PROPERTY	1
LOCATION AND ACCESS	1
TOPOGRAPHY	2
CLIMATE	2
VEGETATION	3
HISTORY	3
GEOLOGY	3
Cambrian	4
Jurassic (?) or Cretaceous	4
Relation of the Intrusive to host rocks and to mineral- ization	5
Mineralization	5
Showing No. 1	5
Showing No. 2	6
GEOPHYSICAL SURVEYS	
The Magnetic Survey	7
The Electromagnetic Survey	7
GEOCHEMICAL SURVEY	7

CONTENTS (CONTINUED ii)

	<u>PAGE NO.</u>
RESULTS OF SURVEYS	8
CONCLUSIONS	9
RECOMMENDATIONS	10
CERTIFICATE	at rear
ASSAY CERTIFICATE	"
APPENDIX A - Fluxgate Magnetometer MF-1	"
APPENDIX B - Geonics Limited E.M. 16	"
MAPS	
General Geology Map (1" = 350')	"
Detail Geology Map No. 1 (1" = 20')	"
Detail Geology Map No. 2 (1" = 20')	"
Magnetic Map (1" = 200')	"
Electromagnetic Map (1" = 200')	"
Geochemical Map (1" = 200')	"

SUMMARY

Athabaska-Columbia Mines Limited has acquired 24 contiguous unpatented mineral claims situated near the headwaters of the East Coal River 100 air miles NNE of Watson Lake, Yukon Territory.

The claims lie along the contact of a Quartz-Monzonite intrusive with Cambrian Sediments. Contact Metamorphic zones, hornfels and to a lesser extent skarn zones are developed and are noted to contain lead, zinc and silver values.

Geological mapping, magnetic and electromagnetic surveys and a soil geochemistry survey, were carried out during September 1968.

Co-incident geophysical and geochemical anomalies have been located in an area where bedrock is obscured by overburden.

Diamond Drilling to determine the metal content of the anomalous zone is recommended.

Additional geological mapping and prospecting is recommended in the north portion (Claims Key 14 to 24 inclusive) of the property which could not be covered due to snow conditions during September 1968.

The cost of the additional work recommended is estimated at \$18,648.00.

PROPERTY

The property consists of 24 located mineral claims situated near the headwaters of the East Coal River, Yukon Territory.

The claims are more exactly described as Key Group N<sup>o</sup> 1 - 24, Record Numbers Y-22295 to Y-22318 inclusive. All of which have been transferred into the name of Athabaska-Columbia Mining Limited.

LOCATION AND ACCESS

Approximate Co-ordinates:

61° 30' 00" N.  
127° 34' 30" W.

The property lies in the Logan Mountains on the west side of the divide between the Flat River (N.W.T.) and the East Coal River (Yukon).

Access to the property is via helicopter 103 air miles on a bearing of 024° from Watson Lake. The property lies 30 miles south of the Canada Tungsten Mine and 20 miles west of the Cantung road. Men, equipment and supplies can be trucked to a point on the Cantung road about 120 miles north of Watson Lake or to the airstrip at mile 138, and ferried to the property by helicopter. The round trip ferry to the airstrip averages one hour air time for a Bell 47-B2. Time required for round trip from the more southerly point is about 30 minutes. Times are of course dependent on favorable flying weather.

TOPOGRAPHY

The property lies in the Logan Mountains on the south side of the divide which separates the Yukon Territory from the District of MacKenzie. The lower portion of the property lies at approximately 5000' AMSL with mountain peaks rising to a maximum of 7300' AMSL. The south half of the property lies in a 'U' shaped glacial valley about 4000' wide. The northern part of the group crosses a rugged ridge which rises to 7300' AMSL. The extreme northern claims lie adjacent to the divide between the Flat and Coal River Systems.

CLIMATE

The climate is sub-arctic. The elevations in excess of 5000' make frost free months unusual. Glaciers, neither advancing nor retreating exist above 6600'. The nearest station at which regular weather observations are taken is Watson Lake.

Mean annual temperature	27.4° F
Mean summer (max.) July	59.1° F
Mean winter (min.) January	-11.5° F
Highest temperature recorded	93° F (June)
Lowest temperature recorded	-74° F (January)

Average annual precipitation:

Snow	82.50"
Rain	8.73"
Total (in inches H <sub>2</sub> O)	16.98"

### VEGETATION

The major portion of the property is above the tree line. Vegetation in this area consists of mosses, grass, scrub willow, and assorted alpine flowering plants. Below the tree line balsams 10' to 30' in height are predominant.

### HISTORY

The region was mapped by the Geological Survey of Canada and reported in G.S.C. Paper 64-52, Flat River, Glacier Lake and Wrigley Lake, District of Mac Kenzie by H. Gabrielse, J. A. Roddick and S. L. Blusson.

Lead-zinc mineralization was discovered in 1965. During 1966 trenching was done in two areas within the claim group (See attached detail maps). When the original claims lapsed in 1967 and were staked again for Messr's MacKenzie and Dow. Subsequently the claims were transferred to Athabaska-Columbia Mining Limited.

### GEOLOGY

The consolidated rocks of the area are Middle and Upper Cambrian limestones, dolomites, quartzites, argillites and argillaceous limestones. The sediments within the area studied strike between 315° and 355°. Dips are to the west, generally varying from 50° to 80°.

The exposed rocks on the property are interbedded limestones, argillaceous limestones, quartzites and minor argillites.

In general the thinly bedded argillites predominate with occasional beds of fine grained quartzite 5' - 20' thick irregularly spaced through the stratigraphic column. The sediments are cut by Jurassic or Cretaceous quartz monzonite bodies. These rocks are described below:

#### CAMBRIAN

1. Limestones: Usually argillaceous but with variations as noted.
  - (a) Generally thinly bedded, i.e. 1 - 5 cm. thick. tending to be siliceous in part. Sometimes alternating with argillite bands.
  - (b) Thicker beds (20 cm. to 2.5 meters) usually tend to be pure fine grained cream to white limestone. Sometimes massive Xstalline with greenish patches or light brown discolouration.
  - (c) Soft, dirty grey partially Xstalline friable masses, highly argillaceous.
2. Quartzite: Usually very fine grained, white to light grey, grading in some cases to argillaceous quartzite with definable grains 0.5 to 1.0 mm. Ø generally grey to reddish brown in colour.

#### JURASSIC (?) OR CRETACEOUS

3. Hornfels: Dense very fine grained black to reddish brown brown rock. Argillaceous limestones and quartzites where in contact with the quartz-monzonite intrusive have been altered, in some cases quite classically, to Hornfels. The Hornfels generally contain pyrrhotite and pyrite where silicic and Pb. Zn. sulphides where less silica was present in original rocks. Occasionally some skarn minerals are observed in the hornfels where the original rock was high in  $\text{CaCO}_3$ .

4. Quartz Monzonite: White to light grey rock composed of plagioclase feldspars, quartz, biotite and hornblende in the following proportions: -

White to cream feldspars	1 - 2 mm.	45%
Quartz	1 - 2 mm.	30%
Biotite	1 - 2 mm.	20%
Hornblende	1 - 5 mm.	5%

Occasional pegmatitic phases show pink (Orthoclase) feldspars up to 5 cm. long.

#### Relation of the Intrusive to host rocks and to mineralization

The Quartz Monzonite is believed to be Jurassic or Cretaceous age. The intrusive body cuts the Cambrian sediments as a batholithic body and as sills and dykes. In the claim area the contact runs parallel to the strike of the sediments which dip away from the intrusive at 50° to 80°. In the north end of the claim group the contact swings to the east and passes out of the property. Thin sills and dykes (2-3 meters) are observed within the sediments within 1500' of the main monzonite mass.

#### Mineralization

Three zones of mineralization were observed on the property. A fourth zone in the north quarter of the property was inaccessible due to extremely rugged topography and fresh snow.

Two of the showings were mapped in detail. (See detail maps Nos. 1 & 2.)

#### Showing No. 1. (Detail map No. 1)

Lead and zinc sulphides were observed along the creek

which flows southwest through claim Key No. 4. Close inspection of the mineral distribution has shown that the metal values are controlled by small faults which strike 280° and dip 70° north. Galena and sphalerite are observed where the small faults intersect limestone beds amenable to replacement. No one bed seems particularly favorable and the mineralization does not invade the host rock for more than 3 feet from the fault plane. None of the patches of mineralization were large enough to warrant sampling.

Showing No. 2. (See detail map No. 2)

This zone of mineralization shows both a small (15'x10') skarn development and a replacement band (60'x2.5'to3.5') in limestone.

The chief sulphide is pyrrhotite with lesser quantities of galena and sphalerite.

Two channel samples were cut across the replacement band. The results of analysis for lead, zinc and silver are tabulated below.

Sample No.	%		Oz.
	Pb.	Zn	Ag.
1.	Nil	1.36	Nil
2.	2.90	6.96	3.86

This showing is immediately adjacent to a tongue of quartz monzonite or an inclusion of limestones within the monzonite.

The mineralization in this location has not proven to be more extensive than illustrated in Detail Map No. 2.

The Third zone of mineralization lies in claims Key 16 and 18. This a well developed hornfels zone with 10 to 30% pyrrhotite. Traces of ZnS and PbS were noted, but no concentrations warranting closer investigation were located.

### GEOPHYSICAL SURVEYS

Claims Key 1 to Key 14 were covered by magnetic and electromagnetic surveys carried out on cut and chained lines spaced at 400' intervals.

The Magnetic survey was done using a Sharpe Model MF-1 Fluxgate magnetometer. (See Appendix A for details of instrument).

Regular stations were established at 100 foot intervals along the base line and profile lines. Additional magnetic determinations were made in areas in which rapid changes in the vertical magnetic field were observed.

The Electromagnetic survey employed a Geonics Limited EM-16 unit. The survey was run on the grid described above. Details of the instrument and field procedure are given in appendix B.

### GEOCHEMICAL SURVEY

The portion of the claim group covered by the control grid

was soil sampled and the soils collected were tested for contained heavy metals (Cu Pb Zn).

The soils were collected from the incipient 'B' horizon. The soil was dried in Kraft bags at a temperature of between 140° and 160° Farenheit. The - 80 mesh fraction was collected and tested for THM (Total Heavy Metals; Cu Pb Zn) , content by cold ammonium citrate extraction and dithizone indicator methods.

Values of 30PPM and less are indicated on the attached plan 1" = 200' by a small open circle. Values exceeding 30PPM are shown directly on the map and interpreted anomalous areas indicated by cross hatching.

#### RESULTS OF SURVEYS

The magnetic survey indicated two significant anomalies in claims Key 7, 9 and 11.

The electromagnetic survey has shown three conductive zones, two of which have magnetic correlation.

The geochemical survey has indicated one significant area of anomalous metal values in the soils.

The most important anomalous zone is located in claims Key 7 and 9 on profile lines 40, 44 and 48. There is good correlation of all three anomalies centered on a line from Sta. 7+00W,

line 40NW to Sta. 4+00W, line 48NW.

The second significant anomaly lies between Sta. 2+00W line 52NW and Sta. 3+00W, line 68NW. Magnetic and electromagnetic correlation is good. There is no geochemical evidence of base metal concentrations, but this may be due to heavy deposits of glacial debris (lateral moraine) along the axis of the geophysical anomalies.

Geological studies have shown that the best conditions for base metal deposits are along the west of the base line in claims Key 7, 9 & 11, where the quartz monzonite intrusive may be in contact with limestone or argillaceous quartzite beds.

### CONCLUSIONS

The surveys carried out of the key claim group indicate that a section of claims Key 7, 9 and 11 warrants additional investigation.

Diamond drilling will be necessary to properly test the anomalous zone.

The mineralization reported to occur in the north face of the ridge which divides the southern three quarters of the property from the north quarter will require mountaineering equipment and favorable weather. This portion of the property can best be explored during late July or early August.

RECOMMENDATIONS

A program of diamond drilling of the anomalies in claims Key 7 and 9 is recommended.

The most important anomaly should be tested first with a light portable drill. The drilling is basically designed to show the type of mineralization present and show whether an evaluation program using heavier equipment, is warranted, therefore, the location of the holes will be largely dependent on overburden conditions limited by the necessity of accurately sampling the anomaly zone. At the same time that the drilling program is in progress the north quarter of the group should be mapped and prospected.

The recommended work is estimated to have the following cost and time requirements.

Diamond Drilling Program:

Estimated 300' @ \$15/ft (All inclusive)	\$4,500.00
--	------------

Geological Program:

3 men x 10 days @ \$250.00/day	2,500.00
--------------------------------	----------

Helicopter Charter 10 days @ \$420.00	4,200.00
---------------------------------------	----------

Camp - Expendable Equipment	500.00
-----------------------------	--------

Cook wages	500.00
------------	--------

Mountaineering gear	500.00
Food Supplies. 7 men x 10 x \$7.00	490.00
Mobilization & Accommodation	1,200.00
Sampling & Assaying	500.00
Reporting	650.00
Sub-total	<u>15,540.00</u>
Contingency 20%	3,108.00
TOTAL	<u>\$18,648.00</u>

Should the diamond drilling or the additional exploration show a more detailed evaluation to be warranted an expanded program will be advised. At the present time cost estimates for additional work cannot be made.

Respectfully submitted,

A. C. A. HOWE INTERNATIONAL LIMITED,

James E. Tilsley F.G.A.C. ENG.



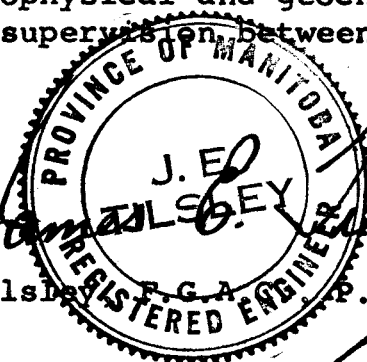
DATED AT TORONTO, ONTARIO THIS 27th DAY OF NOVEMBER, 1968.

CERTIFICATE

I, James E. Tilsley of the Town of Mississauga, in the Township of Toronto, in the County of Peel, in the Province of Ontario, hereby certify that: -

1. I am a Geologist and reside at 3219 Ibbetson Crescent, Mississauga, Ontario.
2. I am a graduate of Acadia University with the degree of B. A., 1959, and have practiced my profession since that time.
3. I am a Fellow of the Geological Association of Canada, and a member of the Association of Professional Engineers of Manitoba.
4. I have not, directly or indirectly received, nor do I expect to receive any interest, direct or indirect in the properties of Athabaska Columbia Mining Limited or any affiliate, and I do not own, directly or indirectly, any securities of Athabaska Columbia Mining Limited or any affiliate.
5. This report is based on study of government maps and reports covering the area, and work program carried out on the property between September 6, and September 13, 1968 by Mr. C. W. Armstrong and myself, as well as on geophysical and geochemical surveys done on the property under my supervision between September 13th and 26th.

James E. Tilsley



DATED AT TORONTO, ONTARIO THIS 27th DAY OF NOVEMBER, 1968.

MAC KENZIE - DOW - KEY GROUP, YUKON

# THOMAS HEYS & SONS

ESTABLISHED 1871

TELEPHONE 364-3574

ANALYTICAL CHEMISTS  
AND ASSAYERS

8 MARKET ST.  
TORONTO

MEMBER OF CANADIAN TESTING ASSOCIATION



## ASSAY CERTIFICATE

REC'D SEP 20 1968

Howe International Ltd.,

159 Bay St., Toronto.

SAMPLES: ore (2)

DATE: Sept. 19/68.

RECEIVED: Sept. 17th. pm.

ORDER No. Key

Samples Marked	Gold Oz.	Value Per Ton	Silver Ozs.	Copper %	Nickel %	Lead %	Zinc %	Iron %
#1. ...			Nil.			Nil.	1.36	
2. ...			3.86			2.90	6.96	

Thomas Heys & Sons  
Per *[Signature]*

THIS REPORT IS SUBMITTED FOR THE EXCLUSIVE USE OF THE PERSON, PARTNERSHIP, OR CORPORATION TO WHOM IT IS ADDRESSED, AND NEITHER THE REPORT NOR THE NAME OF THIS LABORATORY NOR OF ANY MEMBER OF ITS STAFF, MAY BE USED IN CONNECTION WITH THE ADVERTISING OR SALE OF ANY PRODUCT OR PROCESS WITHOUT WRITTEN AUTHORIZATION.

SHARPE VERTICAL INTENSITY FLUXGATE MAGNETOMETER MF-1

S P E C I F I C A T I O N S

MODEL MF-1 Standard surveying and prospecting magnetometer with self-leveling sensor.

<u>Ranges:</u>	Plus or minus --	Sensitivity:
	1,000 gammas f. sc.	20 gammas per div.
	3,000 " "	50 " "
	10,000 " "	200 " "
	30,000 " "	500 " "
	100,000 " "	2,000 " "

Meter: Taut-band suspension. 1,000 gamma scale: 1 7/8" long  
- 50 div. 3,000 " " 1 11/16" long  
- 60 div.

Accuracy: 1,000 to 10,000 gamma ranges  $\pm$  0.5% of full scale  
30,000 to 100,000 " "  $\pm$  1% of full scale

Operating Temperature: - 40° C to 40° C  
- 40° F to 100° F

Temperature Stability: Less than 2 gammas per °C (1 gamma/°F)

Bucking Adjustments: 10,000 to 75,000 gammas by 9 steps of approxi-  
(Latitude) mately 8,000 gammas and fine control by 10-turn potentiometer. Convertible for Southern hemisphere or  $\pm$  30,000 gammas equatorial.

Batteries: 12 X 1.5 V-flashlight batteries ("C" cell type)  
(AC Power supply available)

Consumption: 50 milliamperes

Dimensions: Instrument: 6½" X 3½" X 12½" - 165 X 90 X 320 mm  
Battery pack: 4" X 2" X 7" - 100 X 50 X 180 mm  
Shipping Container: 10" diam. X 16" - 255 mm diam. X 410 mm

Weights: Instrument: 5 lbs. 12 oz. - 1.6 kg.  
Battery Pack: 2 lbs. 4 oz. - 1 kg.  
Shipping Container: 13 lbs.

## TECHNICAL DETAILS

### GEONICS LIMITED E.M. 16

The E.M. 16 Unit acts as a receiver measuring the vertical components of the secondary magnetic fields induced in conductive bodies by an alternating horizontal magnetic field originating from VLF-transmitting stations. The instrument utilizes vertical and horizontal coils to measure the in-phase and quadrature components of the secondary field. Dials on the inclinometer permit the in-phase component to be read in positive or negative percentages and in degrees.

Frequency range: 15 - 25 kHz

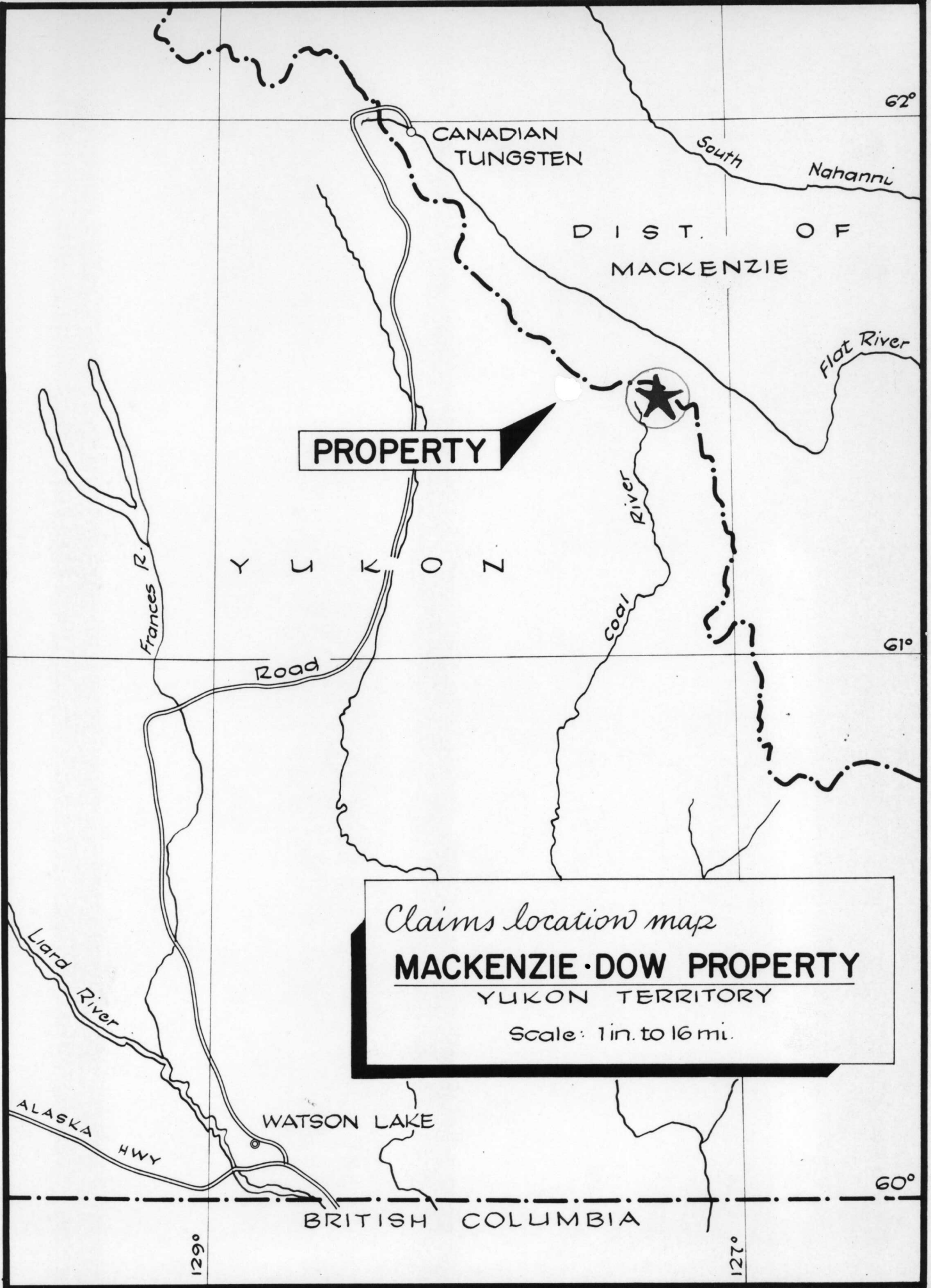
Accuracy of readings:  $\pm 1\%$  resolution

Range of Measurements: In-phase  $\pm 150\%$  or  $\pm 90^\circ$   
Quadrature  $\pm 40\%$

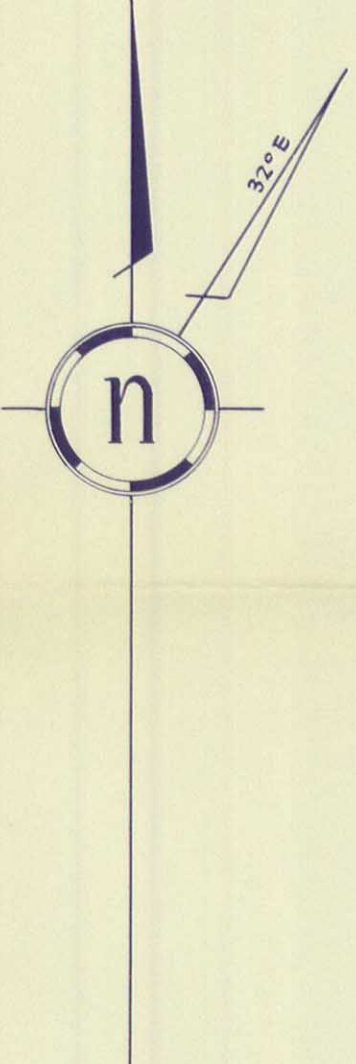
### DESCRIPTION OF METHOD

To use this instrument, survey lines are selected approximately along the lines of the primary magnetic field, (i.e. right angles to the station providing the primary field). Readings of the in-phase and quadrature components are obtained by minimizing the sound intensity in the headphones through swinging the instrument back and forth and by adjustment of the quadrature component dial on the instrument. Readings were taken with the operator facing in the same direction in order not to reverse the polarity of the readings.

Plotting the survey results, conductors are indicated by the amplitude and position of high and low readings.



*Claims location map*  
**MACKENZIE-DOW PROPERTY**  
YUKON TERRITORY  
Scale: 1 in. to 16 mi.



61° 30' N



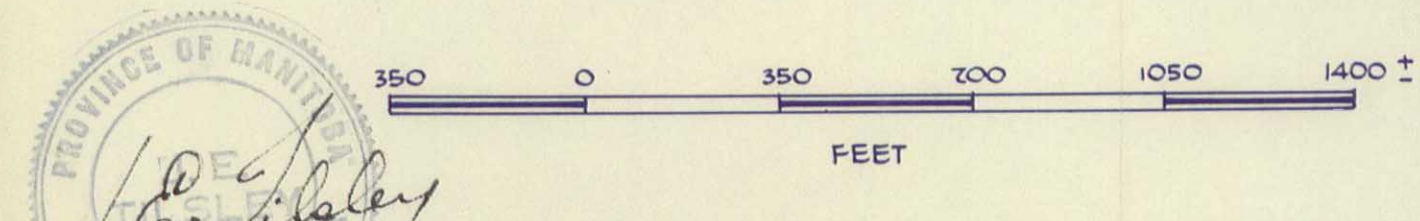
- LEGEND**
- 1 Limestone
  - 2 Quartzite
  - 3 Hornfels
  - 4 Quartz Monzonite

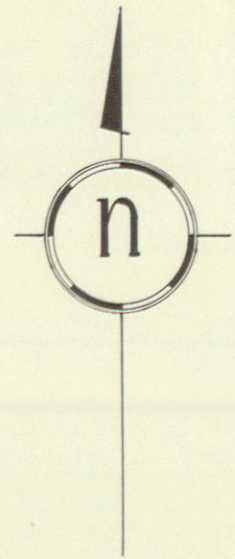
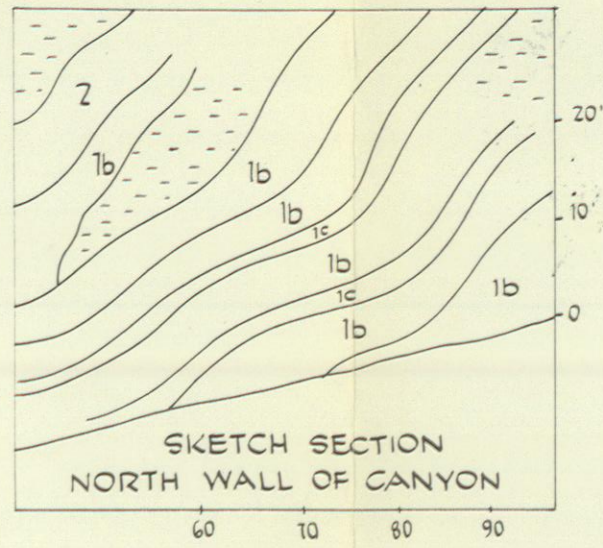
- SYMBOLS**
- Strike and dip of bedding
  - Strike and dip of jointing
  - Contact
  - Fault
  - Outcrop
  - Ridge
  - Stream
  - Talus

**MACKENZIE · DOW PROPERTY**  
COAL RIVER AREA - YUKON TERRITORY

**GEOLOGY OF KEY GROUP**

by  
**A.C.A. HOWE INTERNATIONAL LIMITED**  
TORONTO & VANCOUVER CANADA





**LEGEND**

- 1 Limestone  
 a - white, thinly bedded & arg bands  
 b - massive, cream colored, chrystalline  
 c - soft dirty grey, argillaceous.
- 2 Quartzite
- 3 Hornfels
- 4 Quartz monzonite
- Mineralized area.

400' to Post 1 Claim Key 4  
 " 1 " " 3  
 " 2 " " 2  
 " 2 " " 1

MACKENZIE-DOW PROPERTY  
 COAL RIVER AREA ~ YUKON

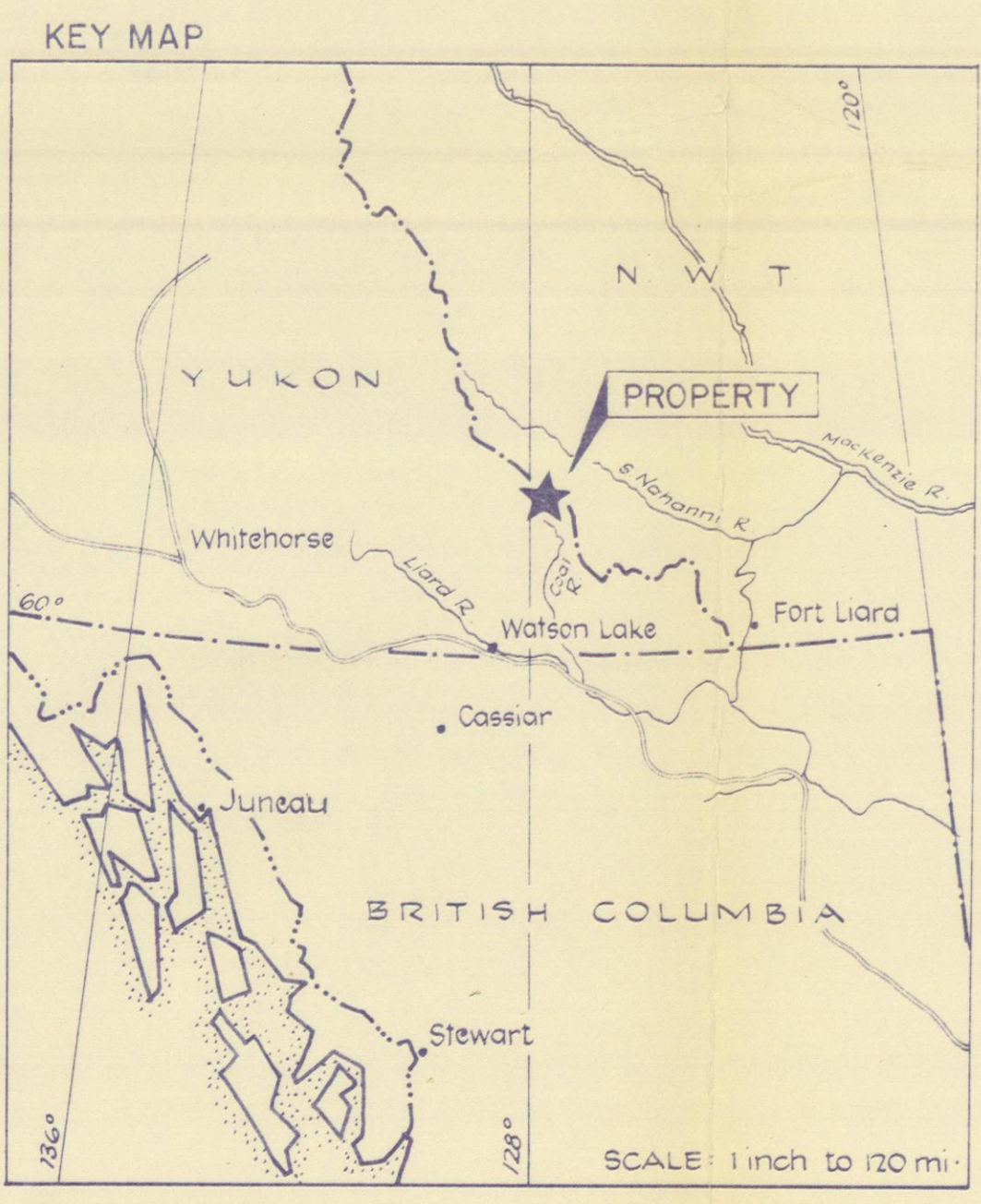
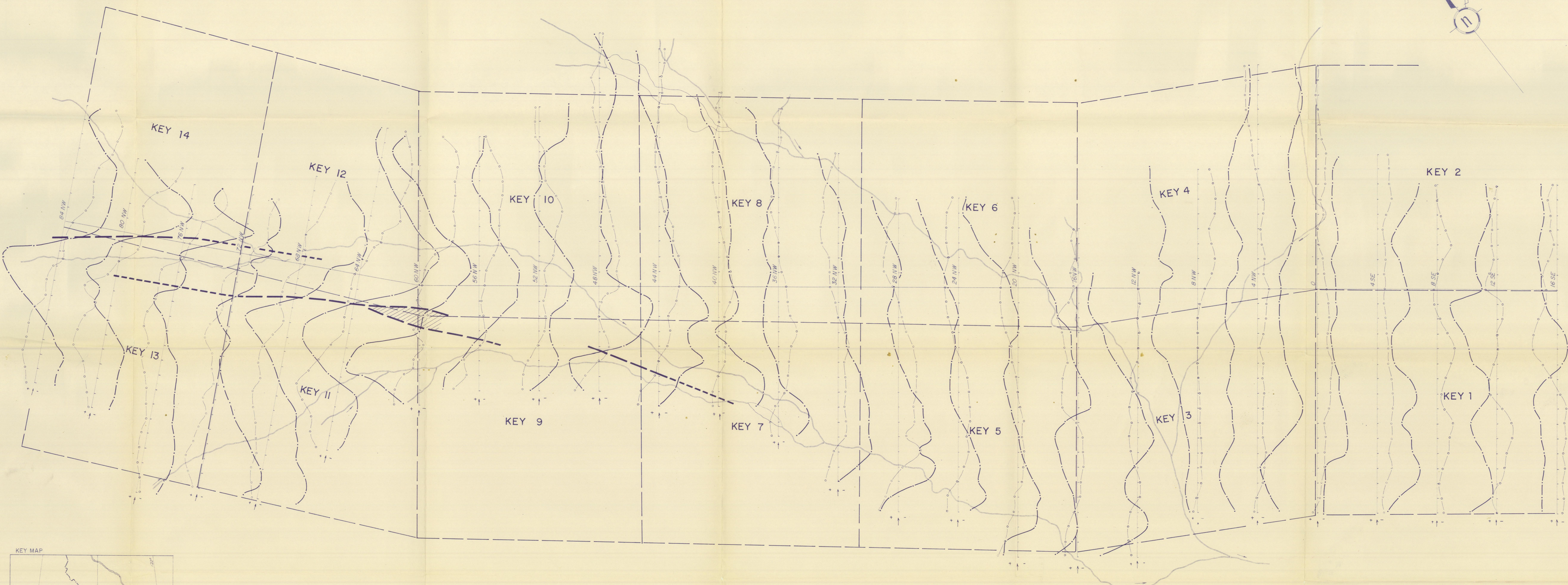
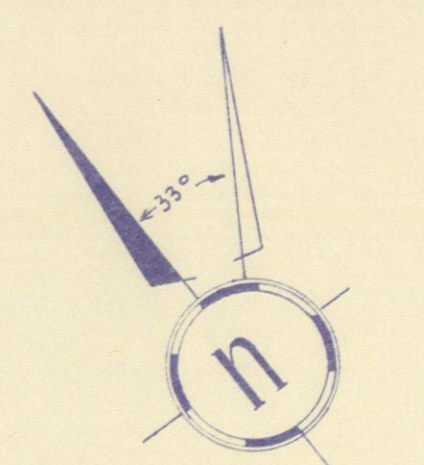
**DETAILED GEOLOGY**  
**No. 1 Showing, Key Group**

by  
 A.C.A. HOWE INTERNATIONAL LTD.

Scale: 1 in. to 20 ft.





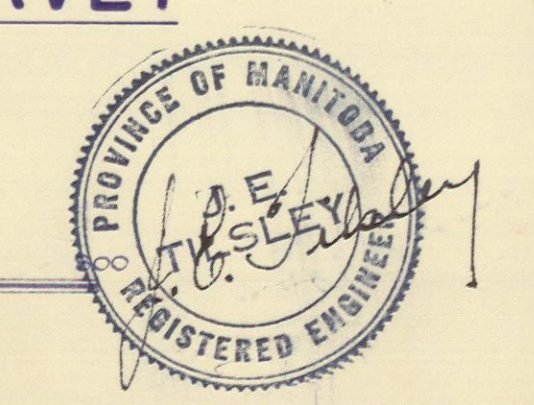
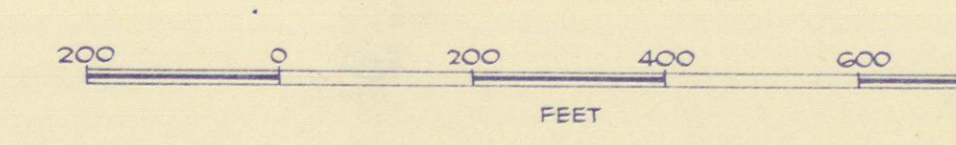


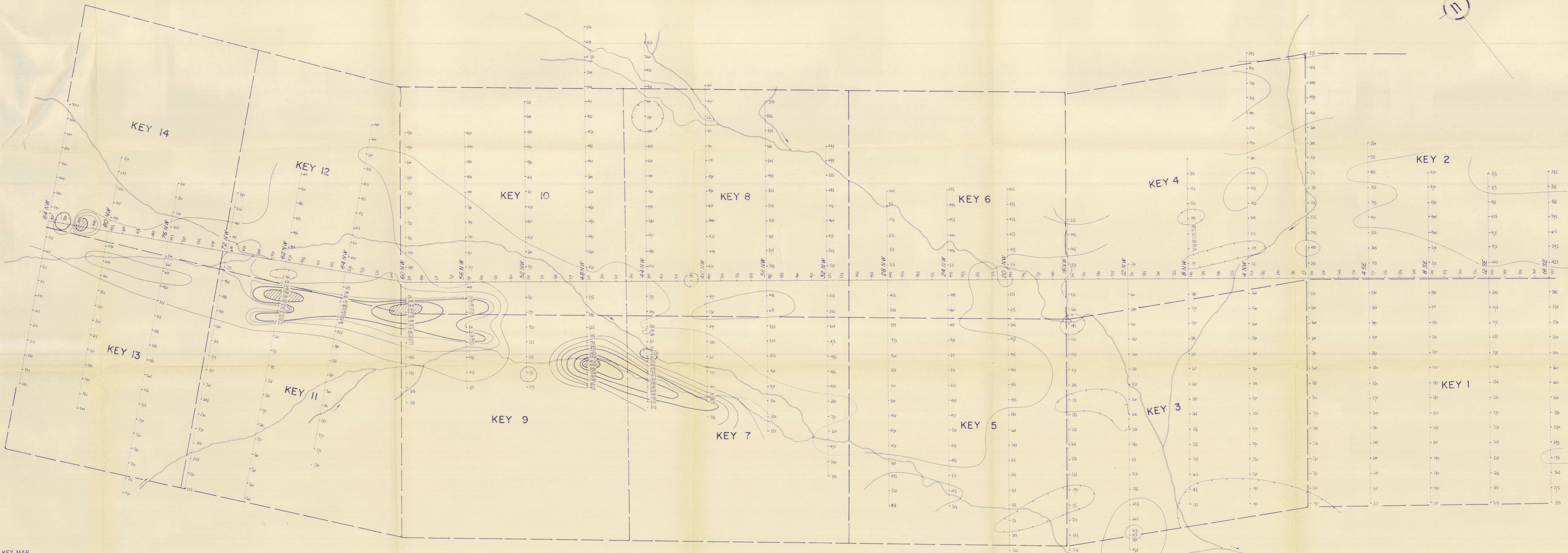
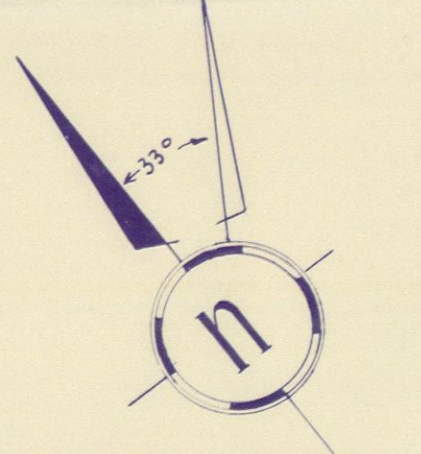
LEGEND

- In-phase profile
- Quadrature profile
- Scale of profiles 1 in - 20%
- Conductors - Major and minor
- Station used N.P.O. Seattle
- Direction of station - South
- Direction of readings - East

MACKENZIE · DOW PROPERTY  
 COAL RIVER AREA - YUKON  
 KEY GROUP  
**ELECTROMAGNETIC SURVEY**

A. C. A. HOWE INTERNATIONAL LIMITED  
 TORONTO & VANCOUVER, CANADA





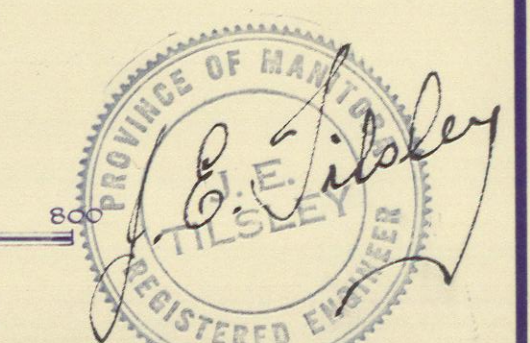
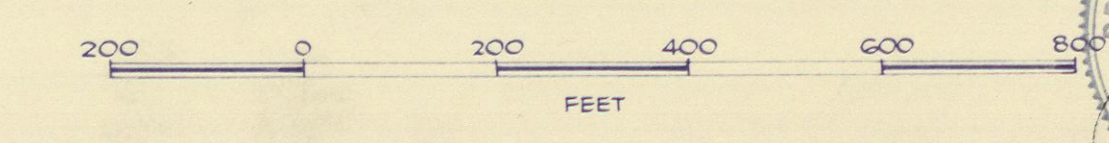
LEGEND

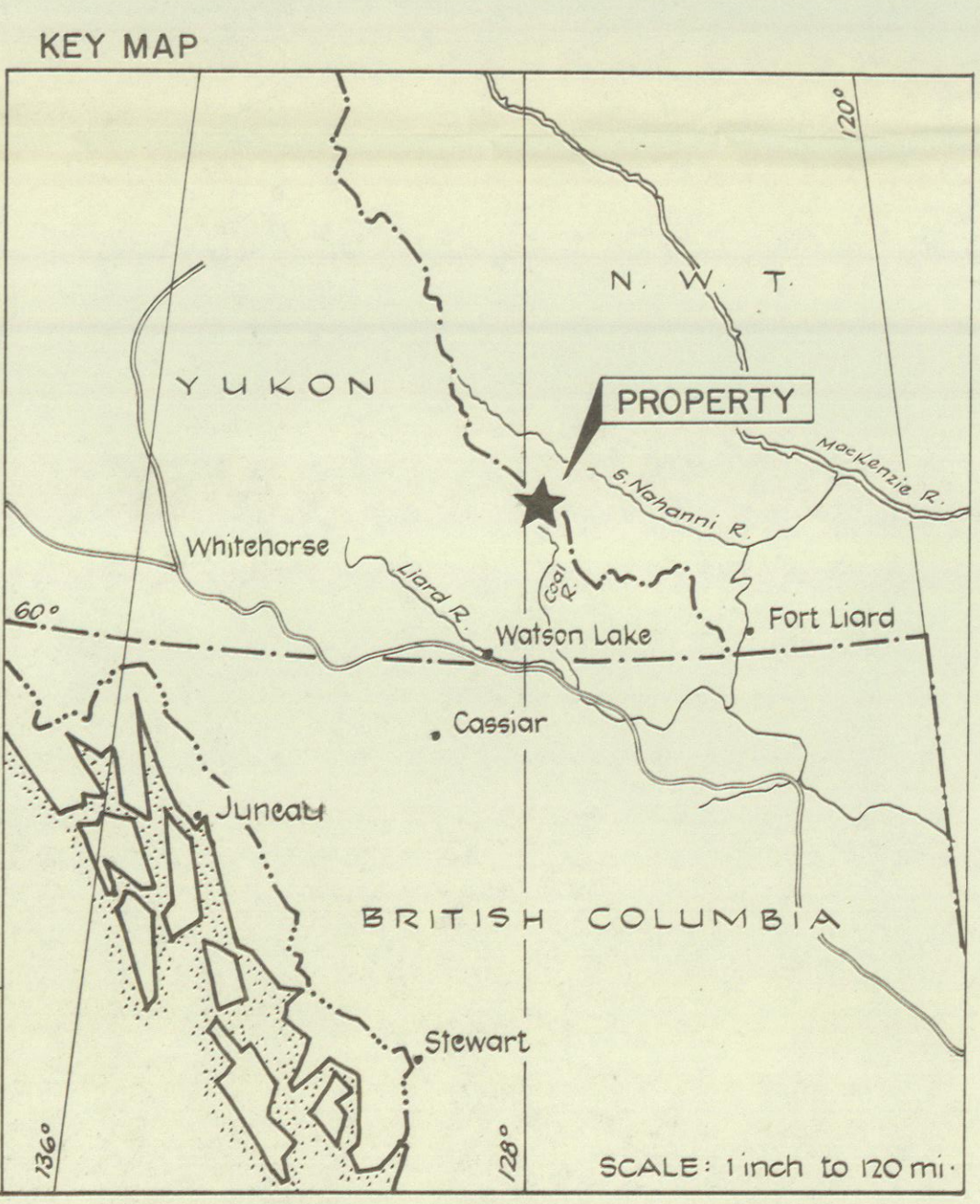
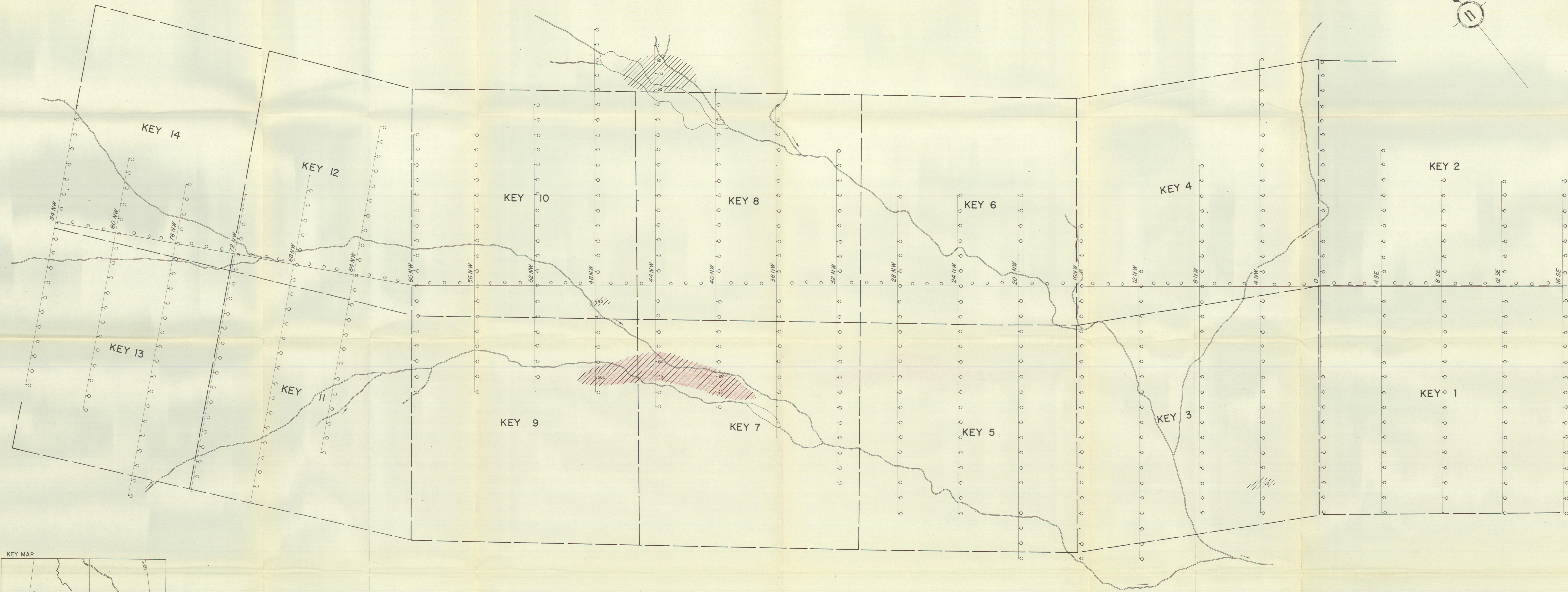
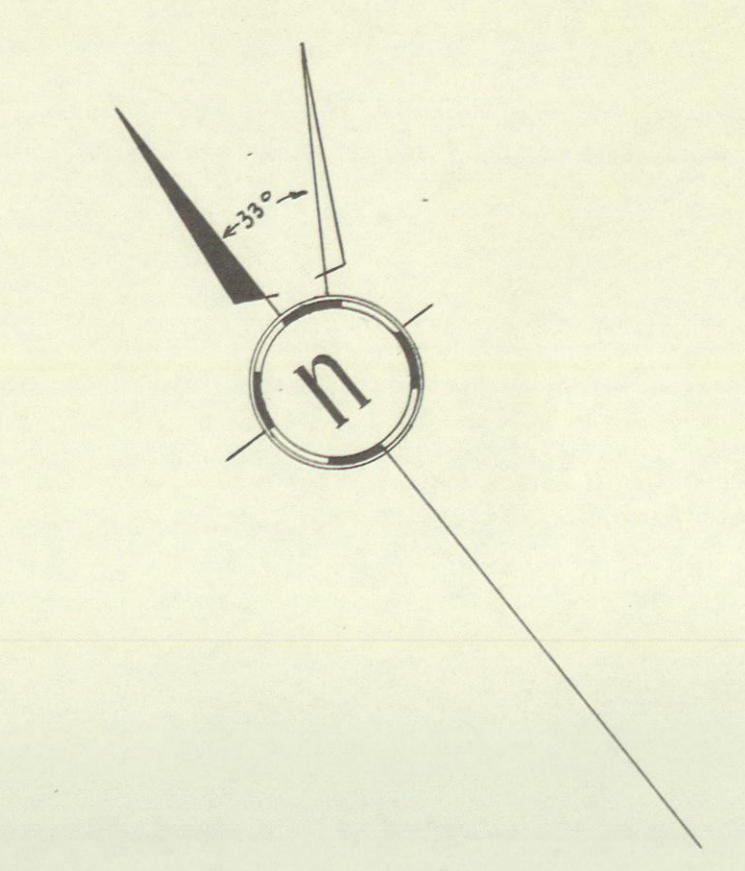
- Measurement station along picket line
- 4170 Relative value of the vertical component of the earth's magnetic field in gammas
- Magnetic contour, interval 200 gammas up to 1000  
1000 gamma contours from 1000 & up
- ▨ Magnetic high
- Magnetic low

INSTRUMENT: SHARPE MF-1 FLUXGATE MAGNETOMETER

MACKENZIE-DOW PROPERTY  
 COAL RIVER AREA - YUKON  
 KEY GROUP  
**MAGNETOMETER SURVEY**

by  
A.C.A. HOWE INTERNATIONAL LIMITED  
TORONTO & VANCOUVER, CANADA





**LEGEND**

- ⊥ Measurement station along picket line
- Sample taken less than 31 parts per million
- /// Anomalous area
- Stream
- - - Claim line

Note: All values TOTAL HEAVY METALS (Cu, Pb, Zn)  
Cold extraction with ammonium citrate buffer  
Metal content indicated by colorimetry, dithizone dissolved in xylene.

**MACKENZIE - DOW PROPERTY**  
COAL RIVER AREA - YUKON  
**KEY GROUP**  
**GEOCHEMICAL SURVEY**

by  
A.C.A. HOWE INTERNATIONAL LIMITED  
TORONTO & VANCOUVER, CANADA

