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KLUANE NICKEL MINES LTD.  
ARCH CREEK AREA  
TIPPY\_JIFFY\_LEGACY & SUE M.C.  
115-G-5/12Whitehorse M.D., Y.T.  
Lat.  $61^{\circ} 00'$  N., Long.  $139^{\circ} 40'$  W.

PRELIMINARY EVALUATION  
REPORT by  
V. Cukor, P.Eng.  
PETER H. SEVENSMA CONSULTANTS LTD.

April 28, 1970

KLUANE NICKEL MINES LTD.

ARCH CREEK AREA

TIPPY - JIFFY - LEGACY & SUE N.C.

115-G-5/12, Whitehorse N.D., Y.T.  
Lat. 51° 00' N., Long. 139° 40' W.

PRELIMINARY EVALUATION REPORT

by

M. CLARK, P.Eng.

ARTHUR H. SPENCER CONSULTANTS LTD.

April 23, 1970.

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REFERENCES

- Campbell, F.A., 1953 - Operational Report on Quill Creek Property.
- Wilken, R.G., 1967 - Geological mapping, magnetometer and electromagnetic survey, Arch Creek area - Klusna Mountains.
- Mullen, J.E., 1967 - Klusna Lake map area, Yukon Territory (115-G, 115-F E $\frac{1}{2}$ ) G.S.C. memoir 343.

KLUANE NICKEL MINES LTD.

ARCH CREEK AREA

TIPPY - JIFFY - LEGACY & SUE M.D.

115-G-5/12, Whitehorse M.D., Y.T.  
Lat. 61° 00' N., Long. 139° 40' W.

PRELIMINARY EVALUATION REPORT

1. INTRODUCTION, LOCATION, ACCESS

The total of 72 Tippy - Jiffy - Legacy - Sue claims are located near the headwaters of Arch Creek in Kluane Mountains, about 160 air miles West of Whitehorse. The claim location is approximately latitude 61° 00' N. and Long. 139° 40' W. at an elevation of 4,000' - 5,000' and shown on N.T.S. sheet 115-G-5 and 115-G-12.

The property consists of the following mineral claims:

<u>Name</u>	<u>Receipt No.</u>	<u>Expiry Date</u>
Tippy 1 - 6	Y 18060 - 18065	June 1, 1971
Tippy 9 - 15	Y 18066 - 18073	June 1, 1971
Jiffy 1 - 8	Y 12791 - 12798	June 1, 1971
Legacy 1 - 24	Y 12572 - 12595	June 1, 1971
Sue 1 - 20	Y 25361 - 25380	Oct. 11, 1971
Sue 21 - 25	Y 35142 - 35147	June 6, 1970

Access is by a 10 mile truck road from Mile 1111 on the Alaska Highway, shortly to be improved to service the Hudson-Yukon Mine.

Timber and water for drilling and camp use are available on the property.

All claims with the exception of the Sue group are recorded in the name of C.A. Gibbons. The Sue claims are recorded in the name of R.G. Hilker.

The writer has not examined the property which is the subject of this report and has relied extensively on previous reports provided by the present owners and on published information. The assistance of P.H. Sevenans, P.Eng., who has wide personal knowledge of the locality is acknowledged and this report is prepared under his supervision.

## 2. HISTORY and ECONOMIC GEOLOGY

Nickel was discovered in the Klwane Lake area in the early nineteen fifties. The first published information reported 67,000 tons of drill indicated ore containing 1.96% Ni and 1.33% Cu on the property now held by Hudson-Yukon Mining Co. Ltd., a subsidiary of Hudsons Bay Mining & Smelting Co.

In January 1956, reserves were estimated at 728,000 tons of ore averaging 2.05% Ni, 1.42% Cu, 0.073% Co, 0.005 <sup>oz</sup>/t. Ag, and 0.038 <sup>oz</sup>/t. Au. The ore, consisting of massive to disseminated pyrrhotite carrying pentlandite and chalcocyanite, appears as a series of shoots along the S.W. contact of peridotite sill.

During the period 1965 and 1967, the area now covered by the Tippy - Jiffy - Legacy group of claims was prospected and restaked, covering the most important earlier discoveries and another peridotite sill mineralized with the same type of sulphide mineralization as on the Hudson-Yukon property. Here the mineralized zone is situated

along the N.E. contact of the sill. Samples of the massive pyrrhotite taken by the prospectors have assayed as high as 3.76% Ni and 2.56% Cu. A sample taken across the showing assayed 2.03% Ni and 1.79% Cu for a length of 38' and average width of 3.5' (Mr. J. Garvin, August, 1953). The ground magnetometer work conducted over the property pinpointed a very strong high magnetic anomaly about 1,800' North of the main peridotite intrusion. This anomaly could possibly correspond to the unknown ultrabasic intrusive body but no bedrock is exposed in the area. The group of 16 Sue claims was lately staked to cover a new zone and the extension of the magnetic trend revealed by the magnetometer survey.

During the above period the ground now held by Kluans Nickel Mines Ltd. was explored by Prospector's Airways Ltd., Teck Exploration Co. Ltd., Conwest Exploration Co. Ltd. and Canalaska Nickel Mines Ltd. Some mineral showings were located and geological mapping was carried out. Reportedly adverse metallurgy on the Hudson-Yukon property and general economic conditions during this period resulted in the termination of further work planned for the area.

### 3. GEOLOGY

The geology of the area is quite complex. The property is underlain by a Triassic and Permian sedimentary volcanic complex intruded by ultrabasic and acidic sills, stocks and dykes.

The oldest rocks present in the area are Permian volcanics

consisting of andesitic lava, tuffs, pyroclastic breccia, interbedded with minor graywacke, argillite and limestone, on G.S.C. map 1477A marked as Unit 10. This complex is overlain by the younger Permian sediments, mostly argillite, sandstone and limestone and in places chert (Unit 11). The youngest series are Triassic volcanics - amygdaloidal basalt and andesite, agglomerate and tuffs with minor interbedded sediments (Unit 13).

During Permian or Triassic time the older volcanic complex (Unit 10) was intruded by peridotite-gabro and diorite sills. The youngest intrusive rocks are quartz feldspar porphyry dikes crosscutting earlier formations.

The structure is complicated. The area is situated between two very strong, more or less parallel faults; the Shakwak trench to the N.E. and a well defined thrust fault to the S.W., both trending N.W. - S.E. Between these two lineaments, the sequences described above, form a regular syncline on the N.E., and an overturned anticline on the S.W. part of the area with axial zones following the general lineament trend. Peridotite sills, up to several hundred feet thick, were intruded along the anticlinal axis.

The sulphide mineralization appears as solid or nearly solid bodies as well as disseminated sulphides along the contact of the peridotite sills and siliceous tuffs. Main mineral is nickelferous pyrrhotite containing stringers of chalcopyrite.

#### 4. EXPLORATION WORK DONE BY PRESENT OWNERS

Geological and geophysical work was conducted over part of the property during 1967. A detailed 1" = 200' scale geological map was prepared, and ground magnetometer and electro-magnetic surveys were carried out along grid lines totalling 20 miles in length. A strong magnetic high anomaly ranging from 4,000 - 5,000 gammas, about 5,600' long, corresponds to the peridotite sill outlined by geological mapping. The electro-magnetic survey showed a weak anomaly about 1,500' long, situated along the N.E. contact of peridotite and connecting two showings where sulphide mineralization is exposed on the surface in the creeks.

A second magnetic and electromagnetic anomaly starts at the N.E. corner of the grid and may indicate another peridotite sill.

A narrow and weak electromagnetic anomaly, without magnetic response, corresponds to the area with float containing copper mineralization.

Figures 2 to 4 inclusive summarize results of the above program of work.

5. MINERAL SHOWINGS

Massive and nearly massive sulphide mineralization is exposed North of Arch Creek on what is known as the main showing. Pyrrhotite lenses up to 5' wide surrounded by a zone of disseminated nickeliferous sulphides follow the peridotite contact. R.G. Hilker, P.Eng. reports the zone to be about 200' long and 50' wide.

The assay results are as follows:

1. Massive pyrrhotite (R.G. Hilker)
 

3.78% Ni    2.56% Cu
2. Composite samples across the showing (J. Ganvin)
 

2.03% Ni    1.79% Cu (for width of 3.5' and length of 38')
3. Composite samples across the zone (R.G. Hilker)
 

0.32% Cu    (52' width)
4. Chip samples across (?) the main showing on Arch Creek (W. Green and C.A. Gibbons, 1966)
 

Certificate 3377-1, 0.53% Ni <sup>+ 0.12% Cu</sup> (width of 120' is given)

Large blocks of massive sulphides up to 3' diameter are reported in Arch Creek near line 104 N. A prospector's grab sample is reported as follows:

Certificate No. 5725-13

Assay coupon 2716    3.90% Ni    2.50% Cu    Tr. Pt.    .11% Co

A grab sample by P. Verslucce from an outcrop just west of the No. 1 post of Sue 25 M.C. returned the following assay:

Certificate 5725-13, No. 2715    0.27% Ni    0.83% Cu

While the above samples give an impression of the grade potential it will be necessary to conduct a systematic sampling program to evaluate these occurrences and the surrounding wall rock.

6. SUMMARY

On the Hudson-Yukon Mining Co. Ltd. property, 728,000 tons of Ni - Cu ore has been outlined about two and one-half miles East of the Kluane Nickel Mines Ltd. showings.

The pyrrhotite mineralization is intimately associated with a peridotite intrusive.

The same association, peridotite - pyrrhotite, is present on the Kluane Nickel property. A magnetometer survey outlined the contact of the peridotite body, confirmed by outcrop mapping, and a narrow, 1,500' long E.M. anomaly in the showing area could indicate an extension of the mineralized zone.

Another high magnetic anomaly on the N.E. corner of the grid infers the presence of another ultrabasic intrusive, and further exploration work is warranted to outline extensions of that anomaly and determine the nature of the causative body.

Float with Ni - Cu or Cu mineralization of commercial grade has been found in different parts of the property remote from any known source.

All these facts make this area attractive and further exploration work is recommended.

- to outline the extent and potential of the known mineralized zone.
- to explain sources of magnetometer and E.M. anomalies as well as of high grade mineralized float that could possibly outline new mineralized zones.

This property offers a potential for the discovery of small to moderate size deposits of nickel - copper ore carrying precious metal values.

7. RECOMMENDED PROGRAM

The close spatial relationship between Ni - Cu mineral occurrences and the Peurian ultrabasics which exhibit strong magnetic susceptibility, suggests the merit of detailed ground magnetic surveys to delineate further areas of possible interest. Extension of the existing grid in a N.W. direction is indicated.

Soil geochemical sampling with analysis for both nickel and copper will assist in the definition of targets.

Detailed geological mapping and sampling conducted in conjunction with a program of selective bulldozer trenching is recommended as a follow-up on targets defined by preliminary work.

Due to the close proximity of a commercial nickel - copper deposit, an extensive diamond drilling program would be warranted on any mineral occurrence located or defined by the above program. Specific recommendations on the stage would however be dependent on the results of the initial work program outlined as follows:

Stage 1. Estimated Cost

Camp construction and operation	\$6,000.00
Transportation & travelling, incl. 4 wheel drive rental	3,000.00
Map preparation, Photogeological studies	1,000.00
Geological mapping & supervision	3,000.00
Linecutting, $\pm$ 15 line miles @ \$125. per mile	2,000.00
Geochemical surveys, 1,000 samples @ \$6. per sample	6,000.00
Geophysical surveys, magnetometer	<u>1,000.00</u>
Carried forward	\$22,000.00

Brought forward	\$22,000.00
Bulldozer trenching, 150 hours @ \$40. per hour	6,000.00
Boundary surveys, additional staking	2,000.00
Sampling and Assaying	2,000.00
Consulting fees and expenses	3,000.00
Contingency allowance, 20%	<u>7,000.00</u>
Recommended Field Program, this stage -	<u><u>\$42,000.00</u></u>

Respectfully submitted,



V. Cukor, P.Eng.  
PETER H. SEVENSMA CONSULTANTS LTD.

April 28, 1970.

SUMMARY OF APPRAISAL

KLUANE NICKEL MINES LTD., ARCH CREEK PROPERTY

The Arch Creek claims of Kluane Nickel Mines Ltd. cover an area underlain by the same lithology and structure as that present on the adjacent Hudson-Yukon Mining Company claims.

On the latter, a production decision has recently been announced at a rate of 600 tpd of their nickel - copper ore body of 730,000 tons uncut of 2.04% Ni and 1.42% Cu.

On the Kluane Nickel Mines Ltd. claims, a 3.5' wide showing, 30' long, of 2.03% Ni and 1.79% Cu, is present, according to reliable sample data lying with a mineralized zone exposed for a length of about 200' and a width of about 50'.

Both low grade and high grade float are present elsewhere on this property.

In view of the similarity of both the geological environment and the mineralization, the Arch Creek claims are considered excellent exploration terrain along the extension of a commercially mineralized structure, with a good probability of discovering one or more ore-bodies comparable to the one now being prepared for production by Hudson-Yukon.

An aggressive exploration program is recommended to assess what other drill-targets may be present on the Kluane Nickel Mines Ltd. claims besides the original discovery.

Respectfully submitted,



P.H. Sevensma, Ph.D., P.Eng.  
PETER H. SEVENSMA CONSULTANTS LTD.

May 1, 1970.

CERTIFICATE

I, PIETER H. SEVENSMA, of 900, 1280 Haro Street, in the City of Vancouver, in the Province of British Columbia, DO HEREBY CERTIFY:

1. THAT I am a Consulting Geologist, with a business address at 715 - 350 West Hastings Street, in the City of Vancouver, in the Province of British Columbia.
2. THAT I am a graduate of the University of Geneva, Switzerland (Physics and Chemistry, 1937; Geology and Mineralogy, 1937) where I obtained my Ph.D., in Geological and Mineralogical Sciences in 1941.
3. THAT I am a Registered Professional Engineer in the Geological Section of the Association of Professional Engineers of the Province of British Columbia and of the Association of Professional Engineers of Yukon Territory.
4. THAT I have practiced my profession as a Geologist for the past 30 years.
5. THAT I am well acquainted by personal examination with a number of nickel-showings in the Kluane Ranges. I have examined the Hudson-Yukon property on September 28, 1959, the White River occurrences a number of times between September 1959 and the summer of 1967, and the Dickson Creek nickel-showings on June 27, 1968.

I have not personally examined the Arch Creek showing, and the report by V. Cukor, P.Eng., is based on a study of all available documentation.

6. THAT neither Mr. V. Cukor, P.Eng., nor myself, have a direct or indirect interest in any of the properties or securities of Kluane Nickel Mines Ltd., nor do we expect to acquire or receive any.

Dated this 4th day of May, 1970.



P.H. Sevensma, Ph.D., P.Eng.

1969. notes on Arch Creek Claim

High grade float up to 3" in diameter found  
in main creek gravel wash of Arch Creek  
on line 104. Claim.

Heavy result on this float No 2716, Ni. 3.90, Co 2.50

at line 104. 300' upstream above

Tent Camp on a tributary - left limit

of Arch Creek main mineral area float found in creek  
not a sample

Exposure exposed on left limit of creek

200' down stream from No 1 Past Legacy 16+17 +  
No 2 " " 14+15

Strike NE Magn.

600' ~~up~~ upstream from this exposure found  
a 200' wide shear zone crossing creek  
intersect with dikes - altered tuffs

Old mine workings in small creek at  
contact with dike in contact with  
unmineralized. Very difficult to  
obtain good sample

Cross profile 2715, Ni. 0.27 Co. 0.83.

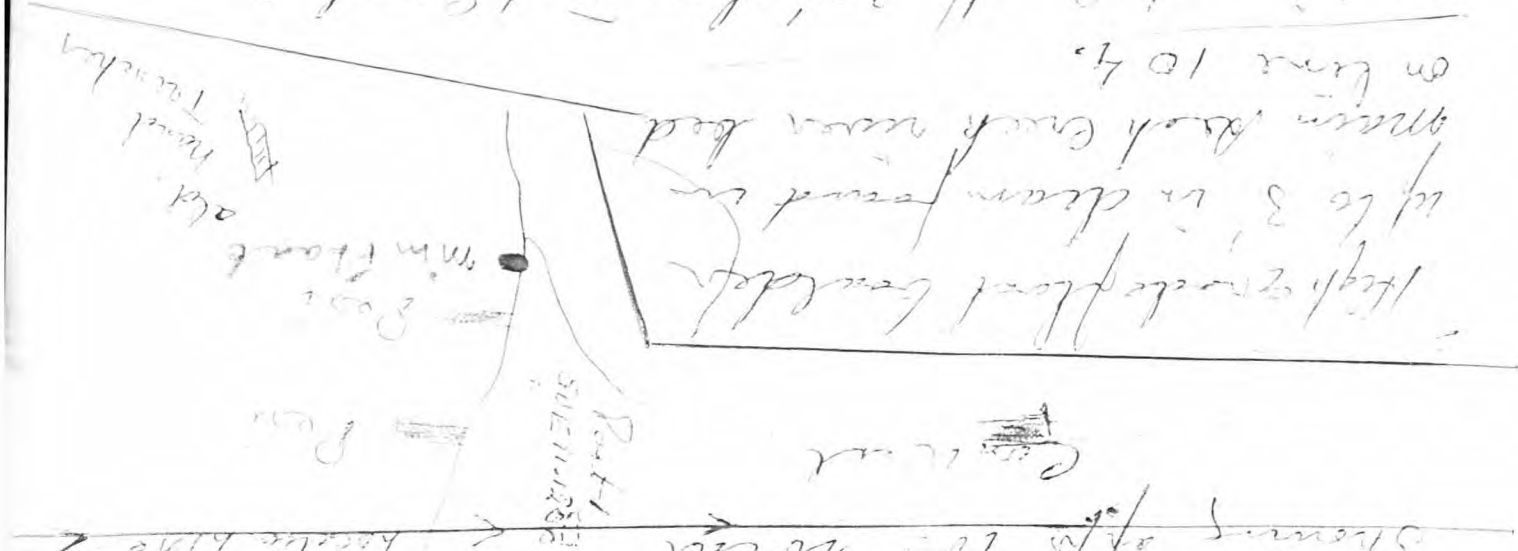
Sample 2716. N. 27. Co. 83

Convent showing on

~~showing is in contact~~ in Pseudotaxa  
in contact with Dickinson

Showing off to 'middle'

Convent



Highly indurated boulders  
up to 3' in diam found in  
matrix Ash Creek near bed  
on line 104.

on line 408, off 300' above that camp on  
Trenching - left limit Ash Creek,  
well over boulders found on float

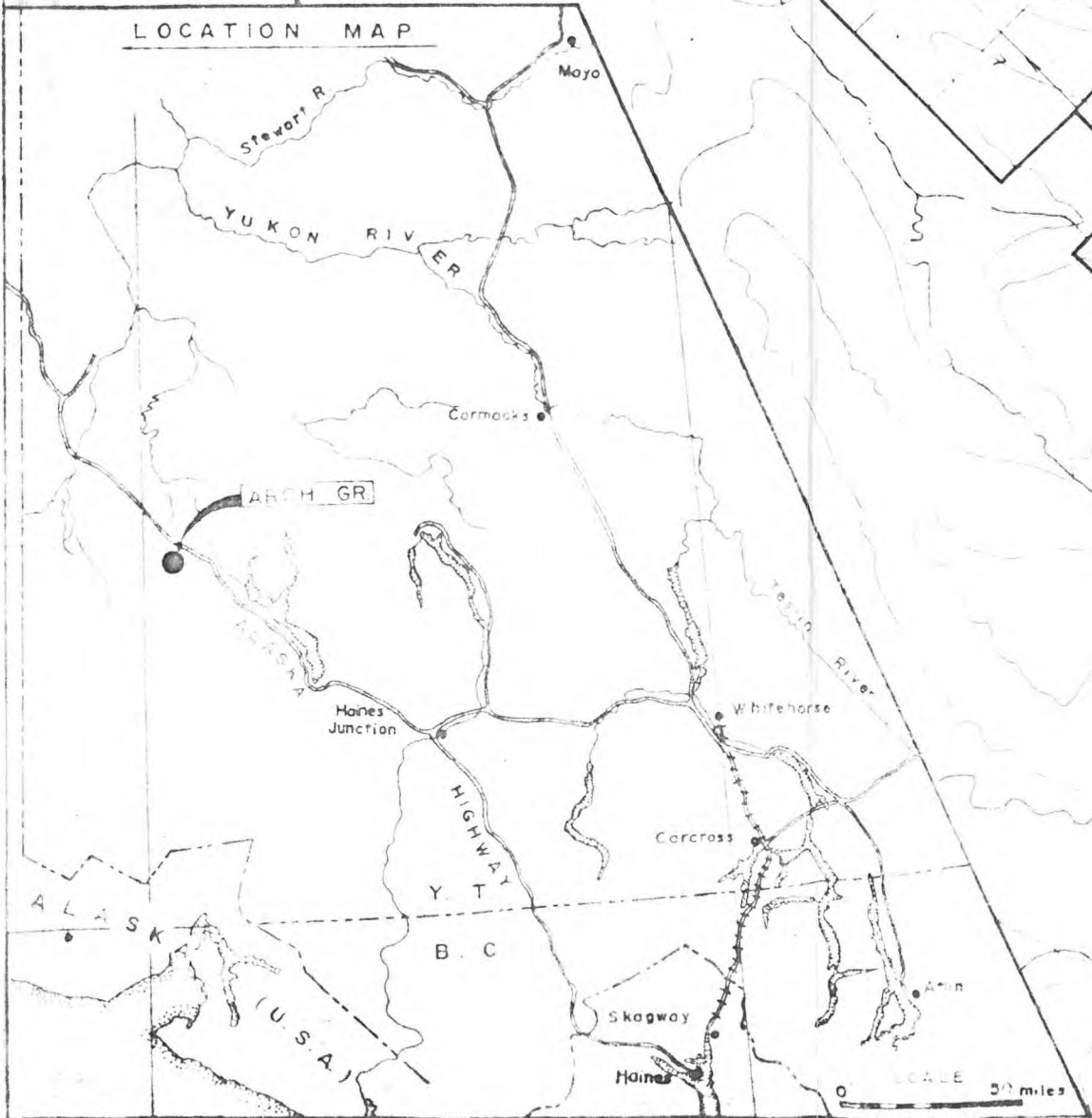
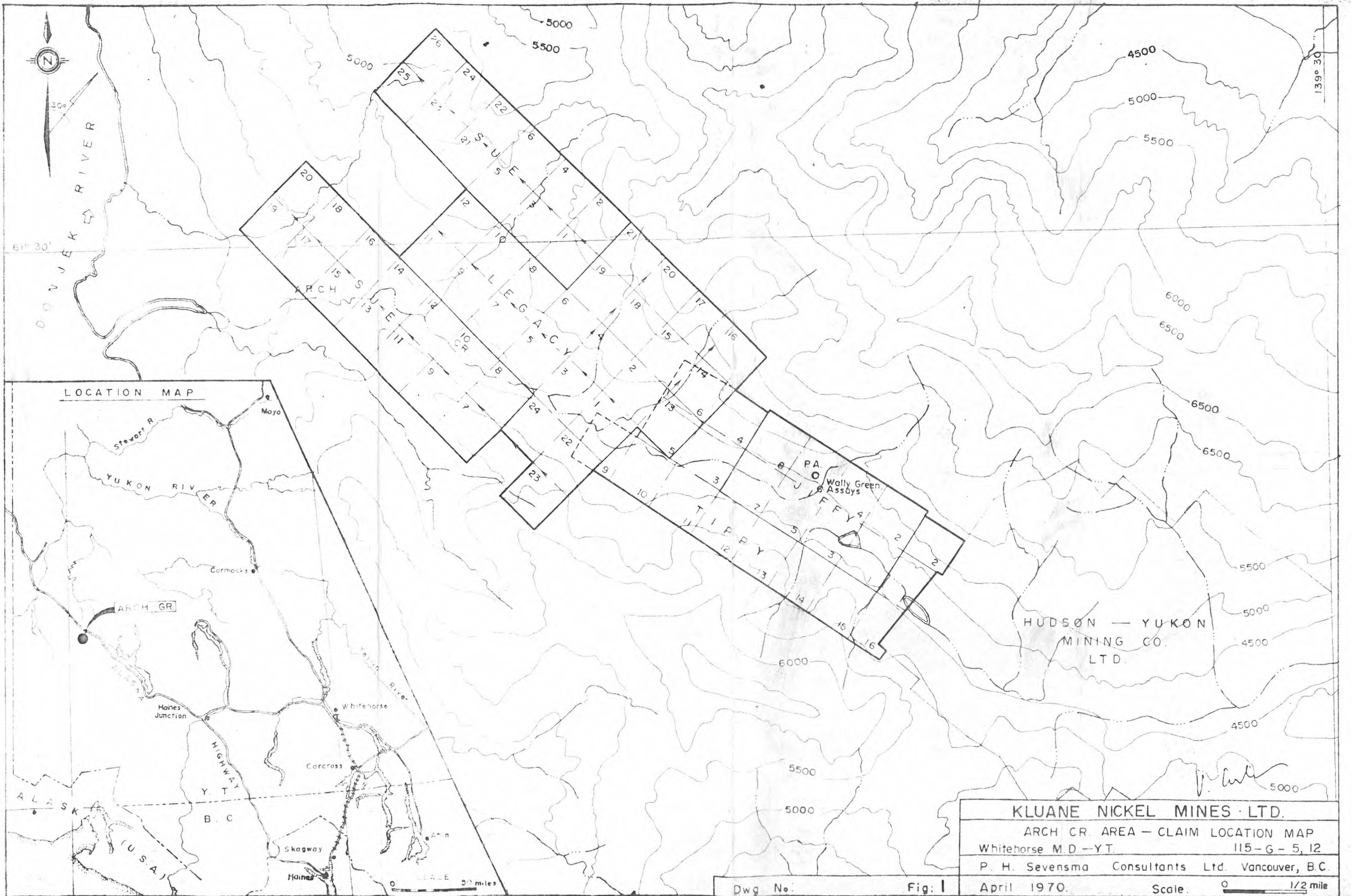
Pseudotaxite exposure on left limit of Creek

200' down stream from East No. 1 Logway 16+17  
Stacks NE Morgan  
No. 2 on 14+15

400' above East No. 1 Logway 16+17

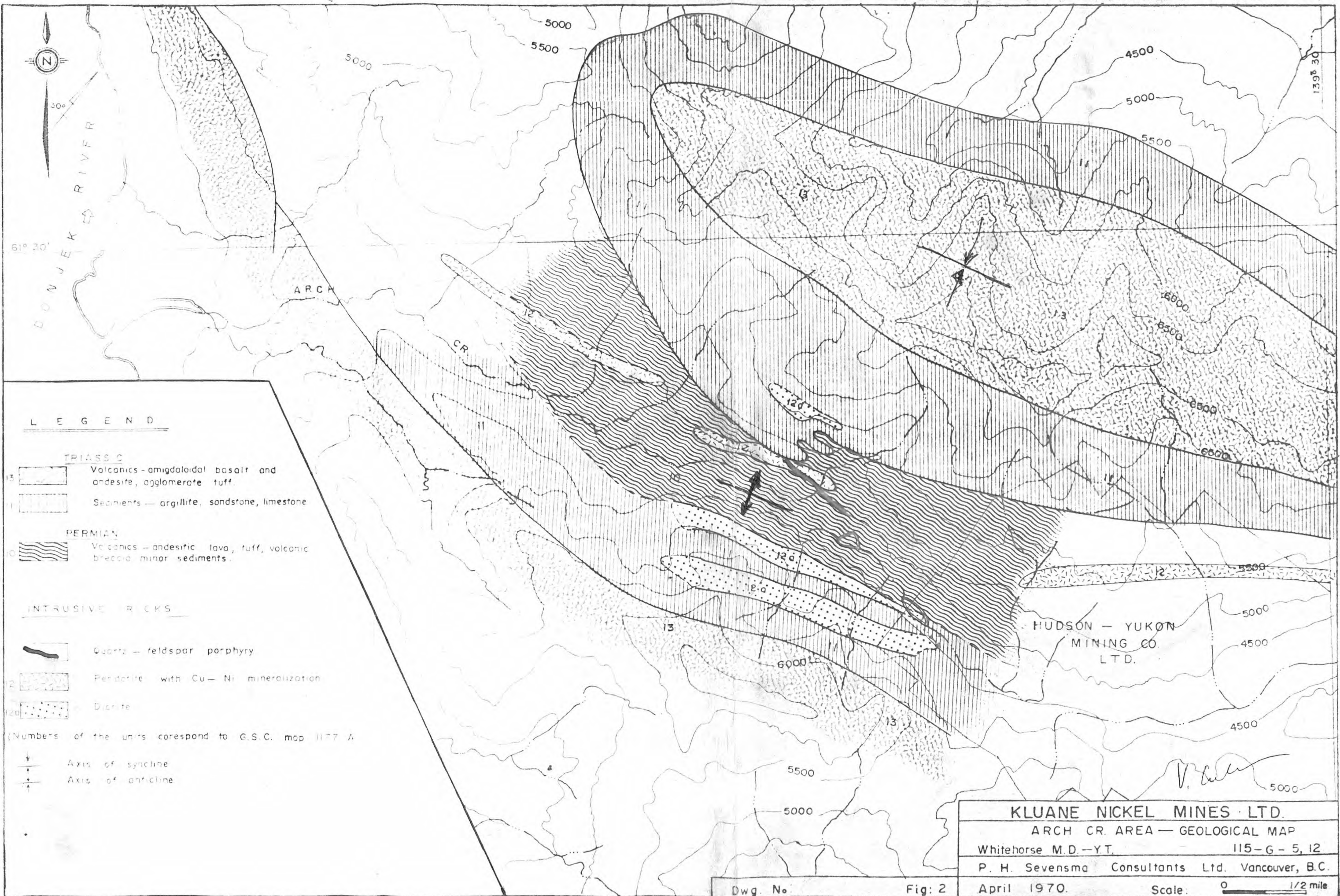
200' north then zone with indurated

stacks + about 100' at right angle to Creek



**KLUANE NICKEL MINES LTD.**  
 ARCH CR AREA - CLAIM LOCATION MAP  
 Whitehorse M.D - Y.T. 115-G-5, 12  
 P. H. Sevensma Consultants Ltd. Vancouver, B.C.  
 April 1970. Scale 0 1/2 mile

Dwg No. Fig. 1



**LEGEND**

- TRIASSIC**
- 13 Volcanics - amigdoloidal basalt and andesite, agglomerate tuff
  - 11 Sediments - argillite, sandstone, limestone
- PERMIAN**
- 0 Volcanics - andesitic lava, tuff, volcanic breccia, minor sediments

**INTRUSIVE ROCKS**

- 1 Quartz - feldspar porphyry
- 2 Peridotite with Cu - Ni mineralization
- 2a Diorite

(Numbers of the units correspond to G.S.C. map 1177 A)

- Axis of syncline
- Axis of anticline

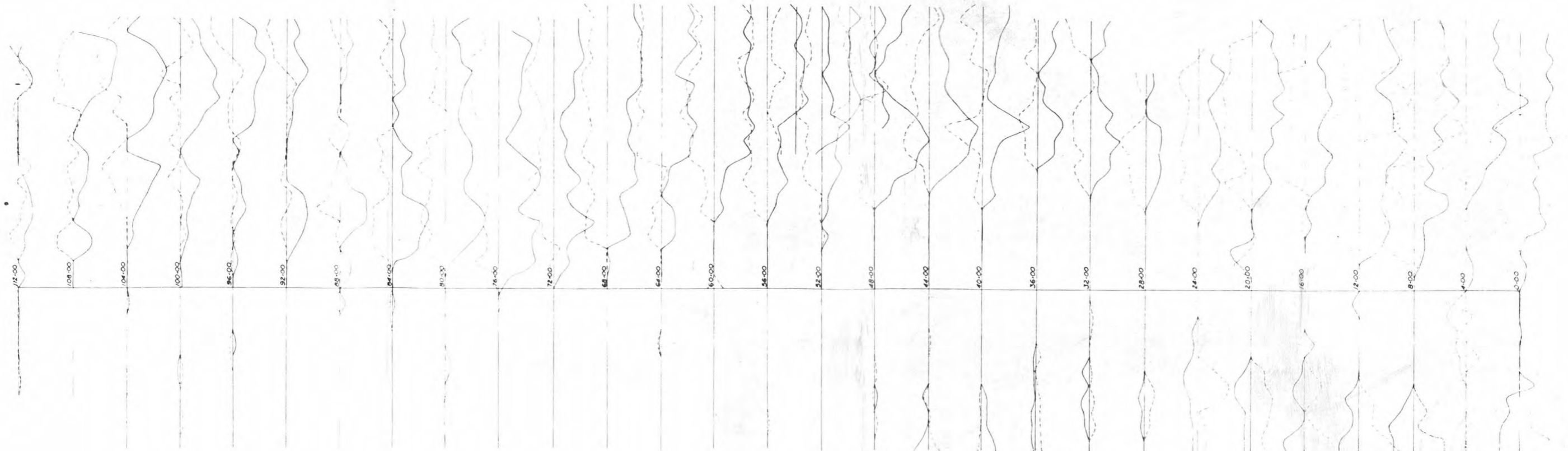
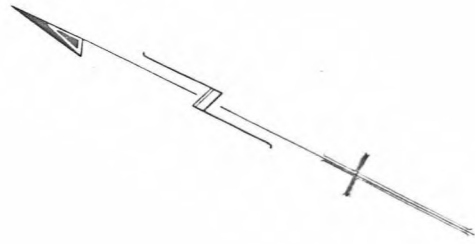
<b>KLUANE NICKEL MINES LTD.</b>	
ARCH CR. AREA - GEOLOGICAL MAP	
Whitehorse M.D. - Y.T.	115-G-5, 12
P. H. Sevensma Consultants Ltd. Vancouver, B.C.	
Dwg. No.	April 1970.
Fig: 2	Scale: 0 1/2 mile

Note: Local magnetic attraction renders  
direction of meridian uncertain.

KLUANE NICKEL MINES LTD.  
Arch Cr. Property - Ronka Survey  
Whitehorse M.D. 115-G-5 & 12

Prepared from survey supervised by R.G. Hilker  
VLF Station . NPG Seattle, Washington.

Scale 1"=800' approx.



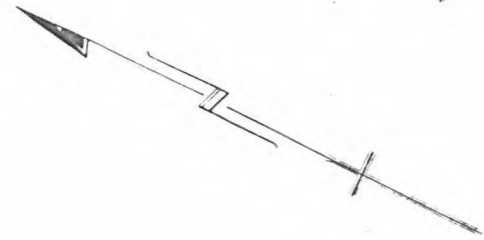
Station 1171 - 1172 - 1173

*V. Cukor*

Included in Evaluation Report by V. Cukor as FIG. 5

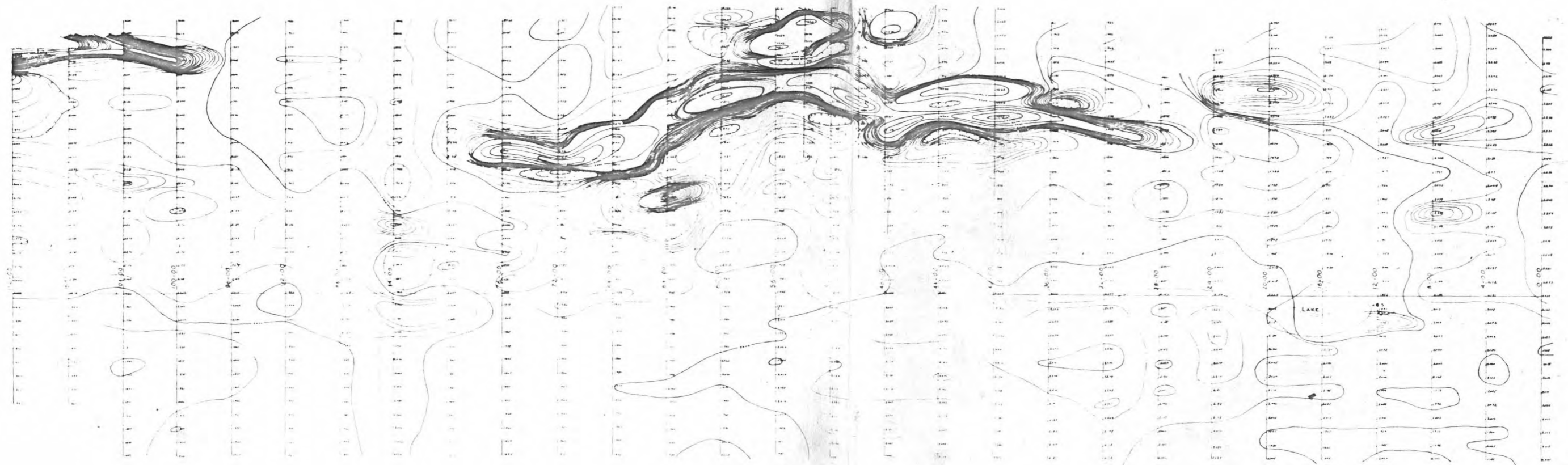
WHITEHORSE, Y.T.		
ARCH CREEK EM 16 SURVEY		
BY R.G. HILKER	APP'D BY R. HILKER	REVISIONS
DATE SEPT 6/67		
SP. No.	DWG. No.	

Note: Local magnetic attraction renders  
direction of meridian uncertain.



KLUANE NICKEL MINES LTD.  
Arch Cr. Property - Magnetometer Survey  
Whitehorse M.D. 115-G-5 & 12

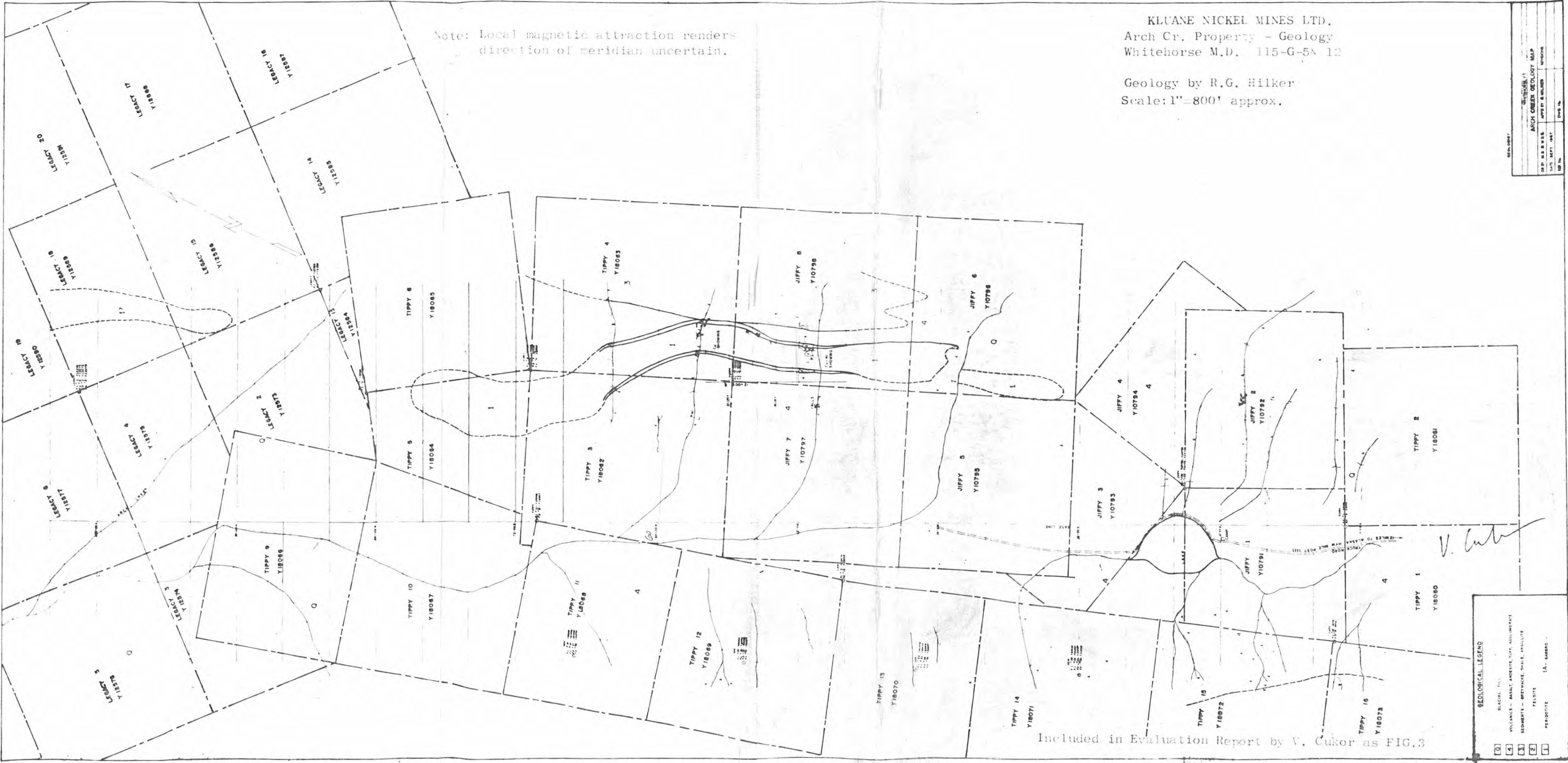
Prepared from survey supervised by R.G. Hilker  
Scale: 1"=800' approx.



*V. Cukor*

Included in Evaluation Report by V. Cukor as FIG. 4

ARCH CREEK MAGNETOMETER SURVEY		
DEPT. OF MINES	ARCH CREEK	WHITEHORSE, Y.T.
DATE: SEPT 6/57	BY: R.G. HILKER	REVISED:
DRAWN BY:	DATE:	



Note: Local magnetic attraction renders direction of meridian uncertain.

KLUANE NICKEL MINES LTD.  
Arch Cr. Property - Geology  
Whitehorse M.D. 115-G-5N 12

Geology by R.G. Hilker  
Scale: 1" = 800' approx.

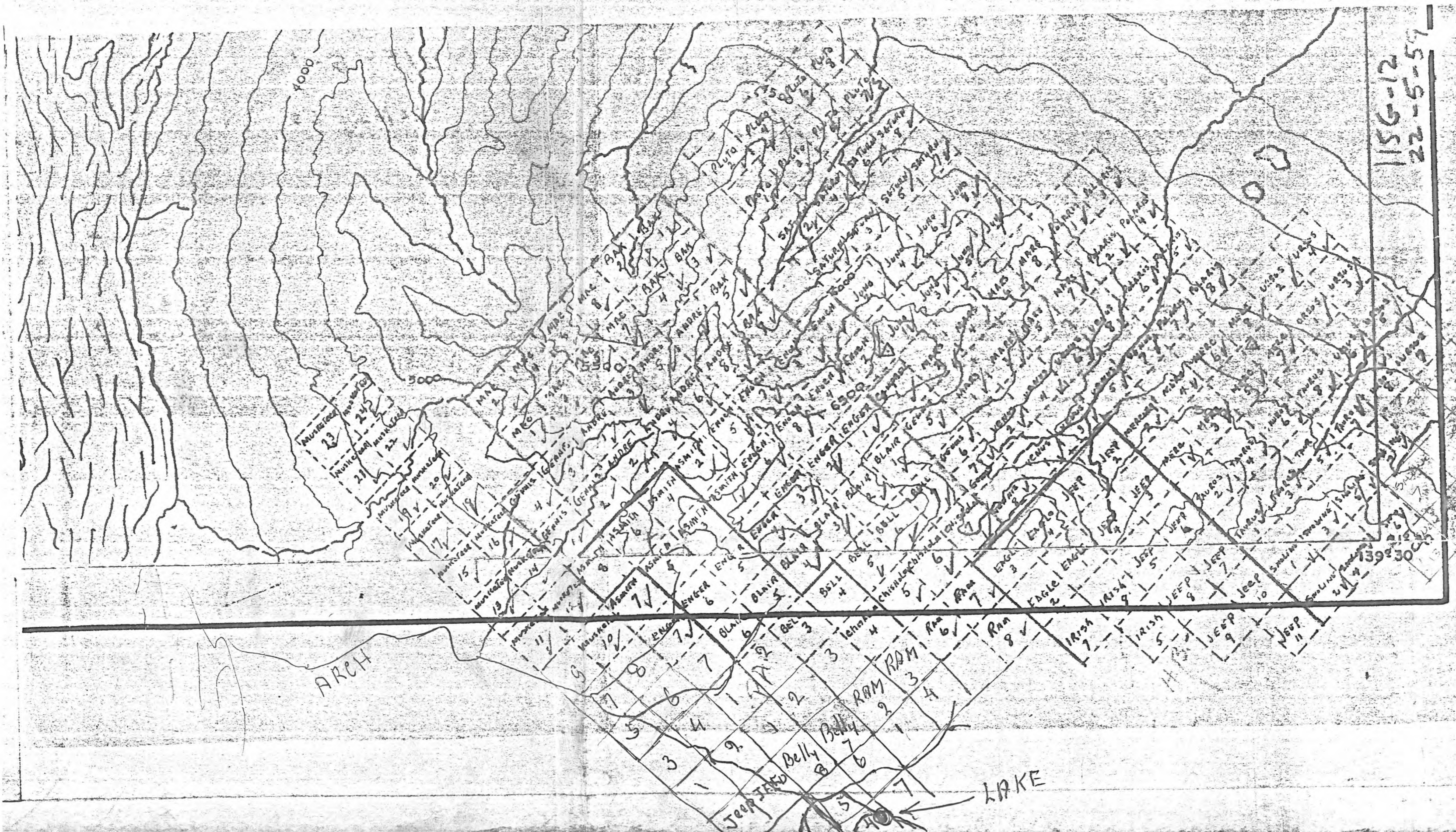
Included in Evaluation Report by V. Cukor as FIG.3

**GEOLOGICAL LEGEND**

□	SUBSTRATE
□	VOLCANICS - BASALT, ANDESITE, DIOB, ANDALUSITE
□	SEDIMENT - GREYWACK, SHALE, ARGILLITE
□	FELSITE
□	PERIDOTITE
□	1A - Gabbro

REVISION

DATE	BY	REVISION
1987	R.G. HILKER	1
1987	R.G. HILKER	2
1987	R.G. HILKER	3
1987	R.G. HILKER	4
1987	R.G. HILKER	5
1987	R.G. HILKER	6
1987	R.G. HILKER	7
1987	R.G. HILKER	8
1987	R.G. HILKER	9
1987	R.G. HILKER	10
1987	R.G. HILKER	11
1987	R.G. HILKER	12
1987	R.G. HILKER	13
1987	R.G. HILKER	14
1987	R.G. HILKER	15
1987	R.G. HILKER	16
1987	R.G. HILKER	17
1987	R.G. HILKER	18
1987	R.G. HILKER	19
1987	R.G. HILKER	20



15-5-22  
22-5-57

ARCH

LAKE

139°30'