

# ARCHER, CATHRO

AND ASSOCIATES LTD.

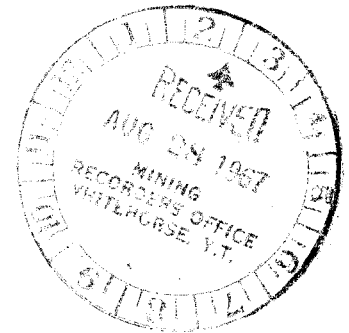
CONSULTING GEOLOGICAL ENGINEERS

BUILDING, WHITEHORSE, Y.T. 667-4113

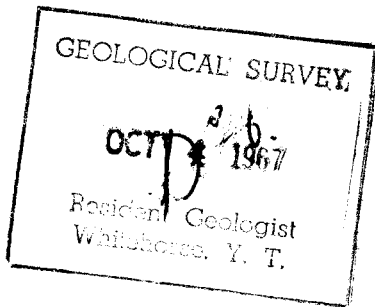
BENTALL CENTRE, VANCOUVER, B.C. 688-3022 OR 522-1562

POST OFFICE BOX 1708  
WHITEHORSE, Y.T.

GEOLOGICAL AND  
GEOCHEMICAL SURVEY  
HILL AND RUST CLAIMS  
ANVIL-VANGORDA DISTRICT,  
YUKON.



HECLA MINING CO. OF CANADA LTD.



R.J. Cathro, P. Eng.

Aug. 7, 1967

This copy has been examined by  
the Geological Evaluation Unit  
and approved as to technical worth by:

*DC Yrills*  
RESIDENT GEOLOGIST

Approved as to cost in the amount of  
\$ 10,401.49

*R.E. Hudson*  
DEPUTY MINING RECORDER

Approved as representation work  
under Section 33(4) Yukon Quartz  
Mining Act.

*[Signature]*  
COMMISSIONER OF YUKON

TABLE OF CONTENTS

SUMMARY -----	page 1.
INTRODUCTION -----	2.
PROPERTY -----	2.
LOCATION AND ACCESS-----	3.
HISTORY-----	4.
GEOLOGY-	
ANVIL-VANGORDA DISTRICT -----	4.
HILL-RUST CLAIMS-----	6.
GEOCHEMICAL SAMPLING -----	8.
CONCLUSIONS AND RECOMMENDATIONS-----	10.
PHOTOGRAPHS 1-5 -----	7A

MAPS

Figure 1-	Location Plan -----	1"=1/2 mile	
Figure 2-	Geology-----	1"=1320')	
Figure 3-	Copper Geochemistry-----	1"=1320')	Pocket A.
Figure 4-	Lead           "-----	1"=1320')	
Figure 5-	Zinc           "-----	1"=1320')	
Figure 6-	Distribution of Geochemical Assays		
Figure 7-	Grid B- geology -----	1"=400' )	
Figure 8-	" B- Copper geochem.-----	1"=400' )	Pocket B.
Figure 9-	" B- Lead           "-----	1"=400' )	
Figure 10-	" B- Zinc           "-----	1"=400' )	
Figure 11-	" A- Copper       "-----	1"=400' )	
Figure 12-	" A- Lead         "-----	1"=400' )	Pocket C.
Figure 13-	" A- Zinc         "-----	1"=400' )	
Figure 14-	Airborne Geophysical Survey-----	1"=1320'	Pocket A.

1.

SUMMARY

Geological mapping and geochemical sampling of the Hill-Rust claims, Anvil district, Yukon has indicated (a) a large part of the property is underlain by rocks that are quite similar to those in the vicinity of the Faro orebody, five miles along strike.

(b) an olivine gabbro dike is the probable cause of one of the better airborne geophysical anomalies.

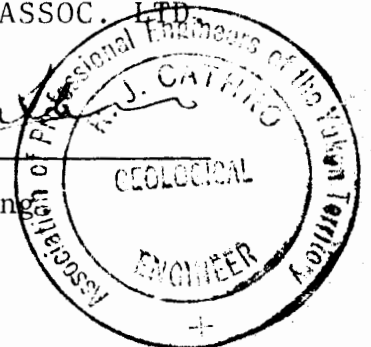
(c) the geochemical response is very low and there is little likelihood that economic amounts of sulfides occur close to surface.

Since mineral deposits in this district appear to be stratigraphically controlled, a reasonable potential exists for finding mineralization at depth. An I.P. Survey, estimated to cost \$25,000.00 is recommended to test this possibility.

ARCHER, CATHRO & ASSOC. LTD.

Aug. 7, 1967

R.J. Cathro, P. Eng



INTRODUCTION

The HILL and RUST claims were staked early in 1966, and were explored by an airborne geophysical survey in July, 1966. During the period July 2 to 19, 1967, the property was geologically mapped and geochemically sampled under the direct supervision of the writer. This report summarizes the results of exploration to date and correlates the geology with a geophysical interpretation made by W.G. Wahl, P. Eng., in March, 1967.

PROPERTY

The original claims are registered in Whitehorse as follows:

<u>CLAIM NAME</u>	<u>GRANT NO.</u>	<u>OWNER</u>	<u>EXPIRY DATE</u>
Hill 1-32	99509-99540	Hecla Oper. Co. Ltd.	Aug. 16, 1967
Rust 1-38	Y3441-Y3478	" " " "	Sept. 21, 1967

The east end of the property was found to lie fairly close to the location as shown on the government claim map. However, the orientation of the entire block of claims was rotated about 30° clockwise, which had the effect of throwing a large part of the property into the Anvil batholith to the north. A small area of open ground at the southeast corner, and a large block of

expired claims on the southwest side were staked as follows:

<u>CLAIM NAME</u>	<u>GRANT NO.</u>	<u>OWNER</u>	<u>EXPIRY DATE</u>
Fubar 1-8	Y20447-Y20454	C. Main	July 28, 1968
9-12	Y20463-Y20466	R. Carpenter	" " "
13-20	Y20455-Y20462	B. Smaill	" " "
21-24	Y20467-Y20470	R. Carpenter	" " "
25-30	Y20471-Y20476	R. McGechaen	" " "
31-34	Y20479-Y20482	W. Randall	" " "
35-36	Y20477-Y20478	R. McGechaen	" " "

#### LOCATION AND ACCESS

The Anvil-Vangorda district lies along the Pelly River, some 125 airmiles northeast of Whitehorse (Figure 1). Ross River settlement, in the southeast corner of the district, is 240 miles by road from Whitehorse via the Alaska Highway and Canol Road. A new resource development road was completed from Watson Lake to Ross River during 1965 and is presently being extended towards Carmacks. At present, some 50 miles have been constructed along the southwest side of the Pelly River. This connects with an all-weather road to the Faro camp of Anvil Mining Corp. Ltd.

The Hill-Rust property is situated five miles northwest of Faro camp and airstrip and is accessible only by helicopter at present.

### HISTORY

The first discovery in this district, the Vangorda deposit, was made in 1953 and acquired by Kerr Addison Mines Ltd. Following several years of inactivity, vigorous exploration programs were started in the district in 1963 by Kerr Addison and Dynasty Explorations. This resulted in the discovery during 1965 of the Swim deposit of Kerr Addison and Faro deposit of Dynasty and Cypress (now Anvil), and the realization of the major potential of the area as a base metal camp. The Faro deposit is scheduled to reach production by 1969.

Prior to the present program, the only exploration work done on the Hill-Rust claims was a helicopter-borne combined Mag-EM survey flown during July 1966 by Lockwood Survey Corp. Ltd.

### GEOLOGY

#### Anvil-Vangorda District

The known mineral deposits found to date occur in a Mississippian (or older) metamorphic sequence, which forms a belt five to ten miles wide and at least fifty miles long, paralleling the northeast side of the Pelly River Valley. The trend of the belt coincides with the axis of a broad anticlinal dome caused by the intrusion of the Anvil Batholith. Erosion and glaciation have

exposed the granodiorite core and formed the Anvil Mountains, leaving the metamorphic rocks as a crude elliptical halo around the margins.

The main structural feature of the district is the Tintina Fault, which follows the Pelly River valley parallel to the trend of the metamorphic rocks and the major anticline. Lateral movement on this fault is thought to exceed 200 miles. Although overburden obscures most of the evidence, an important subsidiary fault system crosses the Anvil district.

Mineralization appears to be confined to structurally deformed siliceous units within the metamorphic sequence. The Iaro, Vangorda, and Swim deposits all average about 3 to 5% lead, 5 to 7% zinc, 0.25% copper, and 1 to 2 ozs/ton silver, and have a gross metal value of about \$25.00 per ton at average metal prices. The ore minerals are disseminated in large flat-lying bodies of pyrite, pyrrhotite and magnetite, many of which are barren or sub-economic in grade. The economic portions of the known deposits vary from under 10 million tons to over 40 million tons, all mineable by open-pit methods.

Hill and Rust Claims (see Figure 2)

The property lies along the southwest contact of the Anvil batholith and underlain by a sequence of northwest trending metamorphic rocks. These rocks dip gently away from the batholith and are intruded by several small granodiorite outliers and an olivine gabbro body. True outcrop is restricted to ridges and the cirque face near the batholith contact and occupies less than 10% of the property.

The main rocks present are gradations between phyllite and quartzite with the occasional thin limy horizon. Argillite and greenstone horizons are present in minor amounts. The entire sequence is strongly foliated and slightly contorted. A weak contact alteration halo, extending up to half a mile from the batholith and a few hundred feet from small outliers, is indicated by quartz-biotite schist in phyllitic areas and pale, dense garnet-actinolite in limy areas. Not enough detailed mapping has been done to subdivide the metamorphics into separate units.

The batholith consists of fine to medium-grained granodiorite. The smaller cupolas range from granodiorite to quartz diorite and quartz monzonite in composition. Disseminated pyrrhotite and an occasional fleck of chalcopyrite were seen in several places. Disseminated

chalcopyrite is also reported from small granitic plugs on the adjoining Flagsone and Midwest properties.

Intrusive contacts are generally sharp although gradations from gneiss to schist are locally present.

A body of altered olivine gabbro, probably Tertiary, forms a separate cluster of outcrops near the southeast corner of the property. The largest of these is a distinctive cone-shaped landmark about 250 feet high (see photographs). The outcrops have a vague alignment in a north-south direction but contacts are overburden covered and there is no evidence to suggest whether the body is a stock, dike or sill. Jointing is well developed and steep. The rock is very fine grained and black with clots of magnetite forming up to 5% of the total. It was examined in thin section by Dr. D.C. Findlay of the G.S.C. and found to be about one-third olivine and two-thirds amphibole. The amphibole is probably an alteration product from the weathering of plagioclase feldspar and pyroxene. The body contains more magnetite on the west side and more feldspar on the east side. A schistose greenstone band within the gabbro strikes N15W and dips 40°W. Gabbro is uncommon in the district and has only been reported once before. It probably represents a feeder dike to a volcanic flow which has since been removed from the area by erosion.

No faults were mapped on the property but numerous strong overburden-covered lineations cross the outcrop area, suggesting that a well-developed fracture system is present.



#1- Looking SE with gabbro dome in left middle distance, Mt. Myo and Faro air-strip-road in left and right distance, respectively.



#2- Looking NW down Rose Creek Valley, showing grassy meadows and rounded topography.



#3- Similar to Photo 2 showing foliated rocks in cirque face near batholith contact.



#4- Closer view of gabbro dome- terraced mud flows are vaguely discernible on slope below dome.



#5- Looking SW to Rose Mtn. from centre of property- note scattered outcrops along ridge in middle distance.

GEOCHEMICAL SAMPLING

Separate grids were laid out over Wahl's geophysical anomalies 1 and 2, using tape and compass. Samples were taken at 200 foot intervals on lines 400 feet apart. Elsewhere on the property samples were spaced at 500 foot intervals along claim location lines (which are about 3000 feet apart) and on compass lines 1000 feet apart between the claim lines. Most of the Fubar claims were sampled along lines cut by the previous owners, Slocan Ottawa Mines Ltd.

Sample pits were dug to the B horizon with grub hoes and all samples were sent to Chemex Labs, North Vancouver, for lead, zinc and copper analysis by hot acid extraction.

Most of the Hill and Rust claims lie above timberline on grassy alpine meadows. A narrow buckbrush zone separates the meadows from timbered, mossy slopes below 4700 feet. Except on the north slope near the granitic contact, which is the steep headwall of an old cirque, topography is rounded and subdued (see photographs). Grassy slopes are terraced by individual soil creeps and small mud flows and solifluction is rapid. The meadow areas are thus ideally suited to geochemical prospecting. The timbered slopes are more stable and soil conditions are obscured by the vegetation cover.

At the time of the survey, ground water seepage was in full circulation. often from the terraces by an artesian effect. No permafrost was encountered at surface although it could be present in patches at depth. Recent volcanic ash was only noted in sheletered and timbered areas, and only as a mixed powder in the clay rather than as a distinct layer. Overburden consists of clay well mixed with local rock fragments and some glacial till. Wherever possible, samples were taken from frost heaves and seepage areas.

The analyses are plotted on Figures 3-5, 8-10, and 11-13. They show a very low background for all metals. The higher values, although not significant in themselves, have been contoured and coloured to determine if a pattern or contrast exists. On Grid A, over geophysical anomaly 1, nothing significant was detected. On Grid B, over geophysical anomaly 2, one very high erratic ~~was~~ was obtained for all metals near the centre of the grid and the overall pattern is indistinct and shows no relationship to the geology or geophysics. A few small shear zones containing pyrite, pyrrhotite and minor chalcopyrite were found in the phyllite and quartzite and could be the cause of the erratic high. Elsewhere on the claims, the pattern is likewise indistinct.

CONCLUSIONS & RECOMMENDATIONS

Considering the low geochemical response, the excellent sampling conditions, and the high mobility of ground water on the property, it seems very unlikely that significant mineralization exists within the upper 100-200 feet. However, geological mapping shows that the metamorphic rocks on the property are quite similar to those in the vicinity of the Faro orebody, five miles along strike. The magnetite-rich olivine gabbro body is the obvious cause of the strong mag response in anomaly 1. From the geophysical interpretation, the gabbro appears to have a north-south alignment suggesting that it is a dike.

The available information indicates that sulfide deposits in this district are stratigraphically controlled. A detailed study of the stratigraphy has recently been started by the Geological Survey of Canada but will not be completed for some time. Although there seems little likelihood that economic amounts of sulfide occur close to surface, this property, by reason of its location along the strike of the favourable stratigraphic horizon, could contain deposits at depth. Since the targets here range up one billion dollars in gross value, a further attempt to locate deeper mineralization is justified before abandoning the property.

Since the significance of the airborne mag and EM anomalies has been weakened by the identification of the gabbro body, some other geophysical technique is recommended which will screen the EM response and provide deeper penetration. Although more expensive to perform, I.P. is probably the most effective tool available. Any significant response should be crosschecked by a gravity survey and/or diamond drilling.

The estimated cost of an I.P. survey of 40 Hill-Rust claims and 30 Fubar claims is as follows:

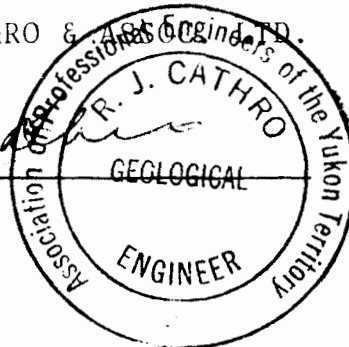
- Assuming (1) initial 800 foot line spacing, with fill in lines over areas of significant response,
- (2) that a helicopter is based at Faro,
- (3) the survey is completed before October 15.

Linecutting &/or picketing . . . . .	\$3,000.00
50 line-miles @ \$300.00 . . . . .	15,000.00
Camp costs . . . . .	3,000.00
Transportation . . . . .	<u>4,000.00</u>
	\$25,000.00

Respectfully submitted,

ARCHER, CATHRO & Associates, Inc.

R.J. Cathro



# ARCHER, CATHRO

AND ASSOCIATES LTD.

CONSULTING GEOLOGICAL ENGINEERS

CASCA BUILDING, WHITEHORSE, Y.T. 667-4113

BENTALL CENTRE, VANCOUVER, B.C. 688-3022 OR 522-1562

POST OFFICE BOX 1708  
WHITEHORSE, Y.T.

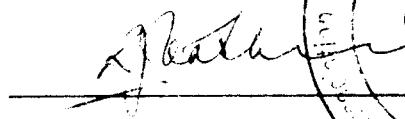
Aug. 7, 1967

## CERTIFICATE

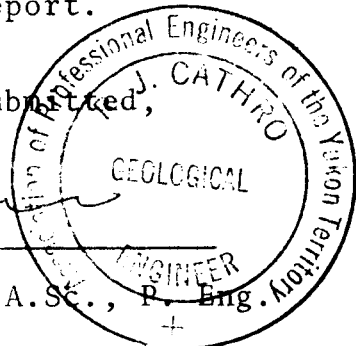
I, Robert J. Cathro, with business and residential address in Whitehorse, Yukon, do hereby declare that:

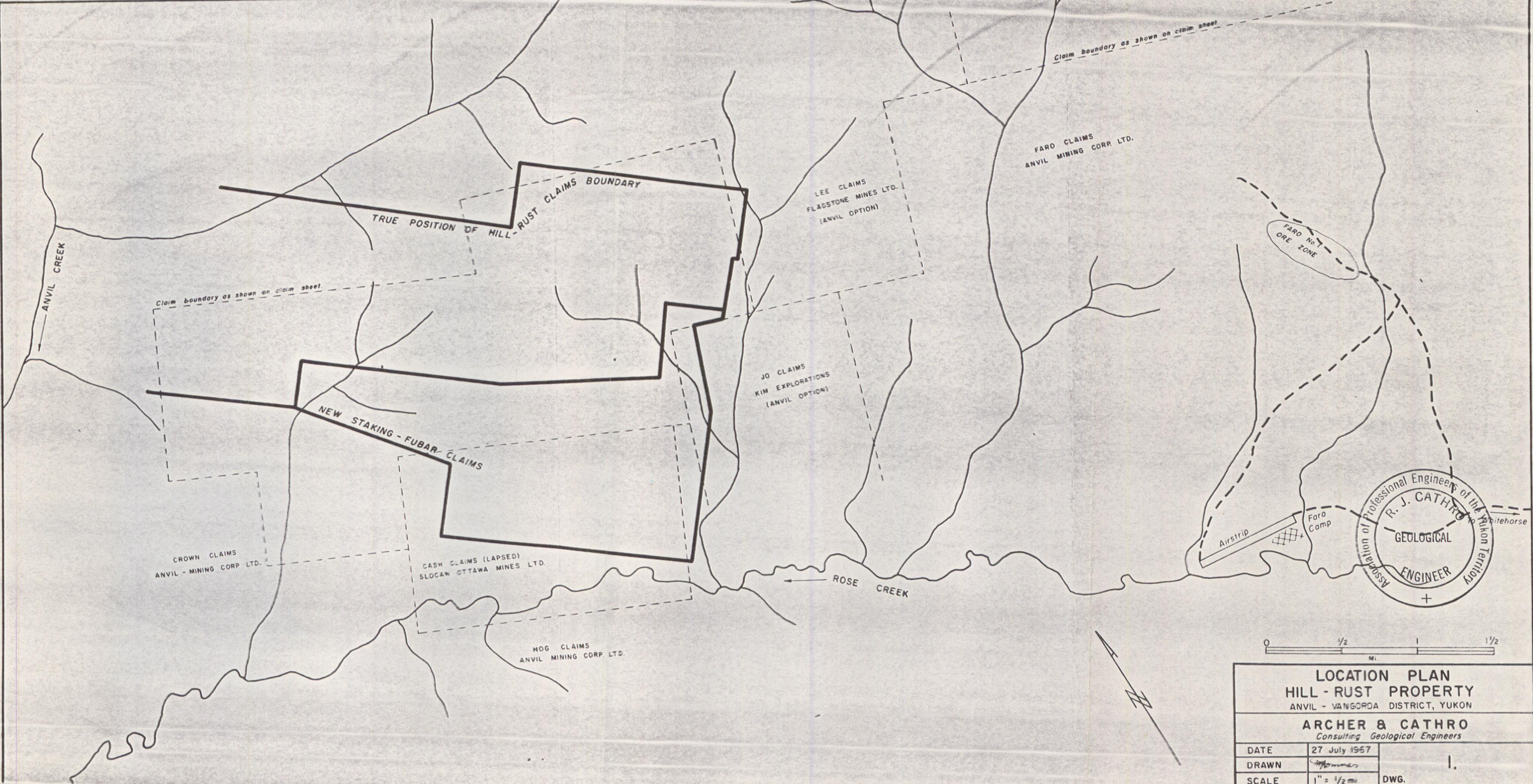
- (1) I am a consulting geological engineer.
- (2) I am a graduate of the University of British Columbia, 1959.
- (3) I am a registered professional engineer in the Yukon and British Columbia.
- (4) From 1959 to 1966 I was engaged in mining and exploration geology and held positions of responsibility with United Keno Hill Mines Ltd., Giant Yellowknife Mines Ltd., and Eldorado Mining and Refining Ltd.
- (5) I have personally supervised the exploration of the Hill-Rust property.
- (6) I have no interest, nor do I expect to receive any interest, direct or indirect, in any properties or companies referred to in this report.

Respectfully submitted,

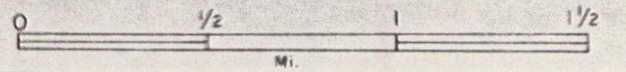


R.J. Cathro, B.A.Sc., P. Eng.

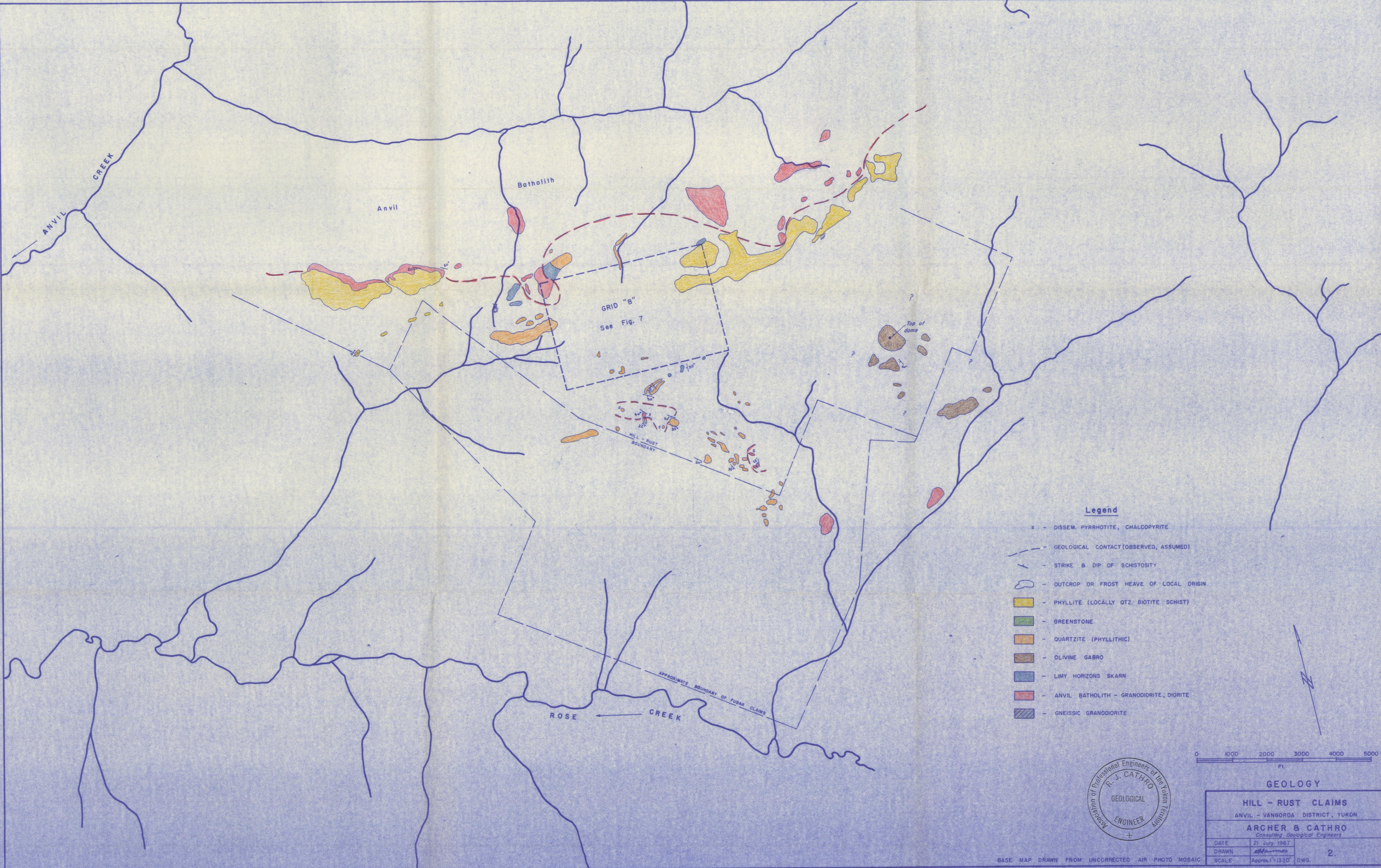




Association of Professional Engineers of the Yukon Territory  
 R. J. CATHRO  
 GEOLOGICAL  
 ENGINEER



<b>LOCATION PLAN</b>		
<b>HILL - RUST PROPERTY</b>		
ANVIL - VANGORDA DISTRICT, YUKON		
<b>ARCHER &amp; CATHRO</b>		
<i>Consulting Geological Engineers</i>		
DATE	27 July 1967	1. DWG.
DRAWN	<i>[Signature]</i>	
SCALE	1" = 1/2 mi.	



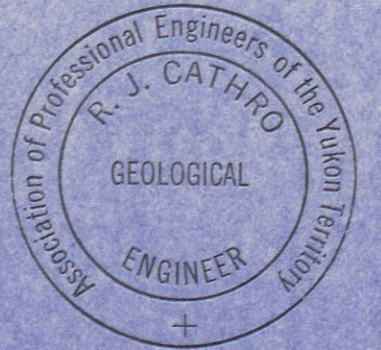
**Legend**

- - DISSEM. PYRRHOTITE, CHALCOPYRITE
- - - - - GEOLOGICAL CONTACT (OBSERVED, ASSUMED)
- - - - - STRIKE & DIP OF SCHISTOSITY
- - OUTCROP OR FROST HEAVE OF LOCAL ORIGIN
- - PHYLLITE (LOCALLY QTZ, BIOTITE SCHIST)
- - GREENSTONE
- - QUARTZITE (PHYLLITHIC)
- - OLIVINE GABRO
- - LIMY HORIZONS SKARN
- - ANVIL BATHOLITH - GRANODIORITE, DIORITE
- - GNEISSIC GRANODIORITE



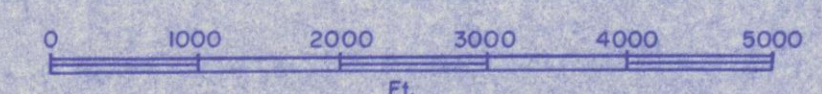
**GEOLOGY**

<b>HILL - RUST CLAIMS</b>	
ANVIL - VANGORDA DISTRICT, YUKON	
<b>ARCHER &amp; CATHRO</b> <i>Consulting Geological Engineers</i>	
DATE	21 July 1967
DRAWN	<i>Archives</i>
SCALE	Approx. 1" = 1320' DWG. 2.





- o - SOIL
- x - SILT
- Hot Acid Extraction
- 50 - 100 PPM
- ⊙ 100 + PPM



Copper Geochemistry

HILL - RUST CLAIMS

ANVIL-VANGORDA DISTRICT, YUKON

ARCHER & CATHRO  
Consulting Geological Engineers

DATE 21 July 1967

DRAWN *[Signature]*

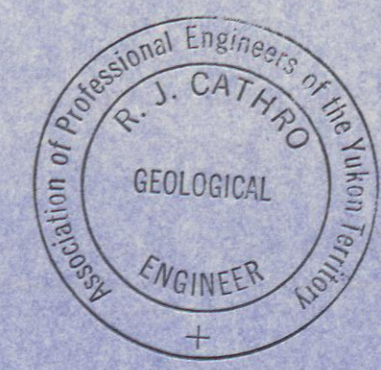
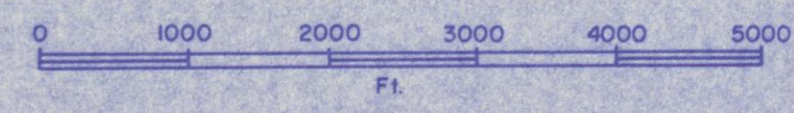
SCALE Approx. 1"=1320 DWG. 3.



BASE MAP DRAWN FROM UNCORRECTED AIR PHOTO MOSAIC



- o - SOIL
  - x - SILT
- Hot Acid Extraction
- (red) 50 - 100 P.P.M.
  - (red with dot) 100 + P.P.M.



**Lead Geochemistry**

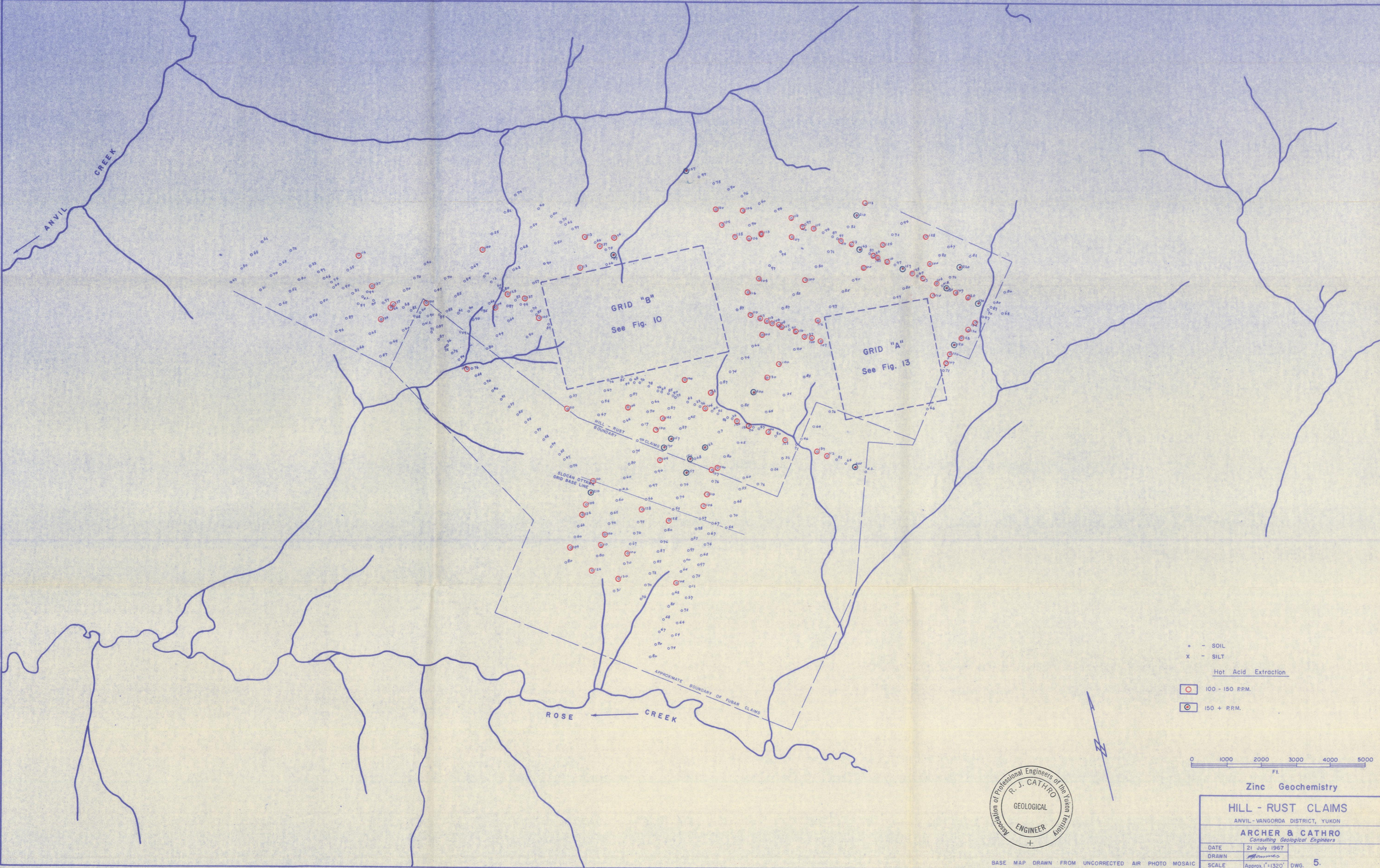
**HILL - RUST CLAIMS**

ANVIL - VANCOUVER DISTRICT, YUKON

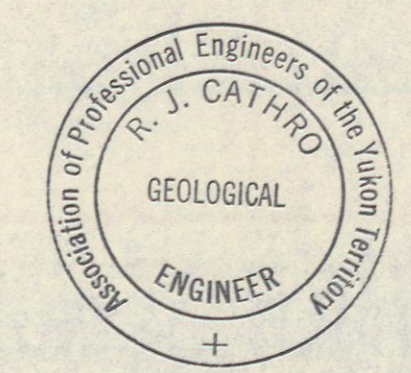
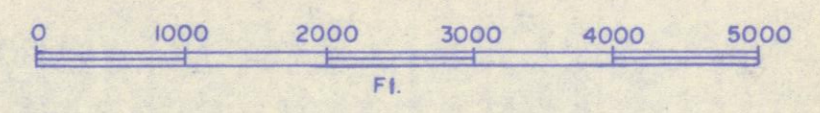
**ARCHER & CATHRO**  
Consulting Geological Engineers

DATE	21 July 1967
DRAWN	<i>Archers</i>
SCALE	Approx. 1:1320
	DWG. 4.

BASE MAP DRAWN FROM UNCORRECTED AIR PHOTO MOSAIC



- - SOIL
- X - SILT
- Hot Acid Extraction
- (with red border) 100 - 150 P.P.M.
- (with black border) 150 + P.P.M.



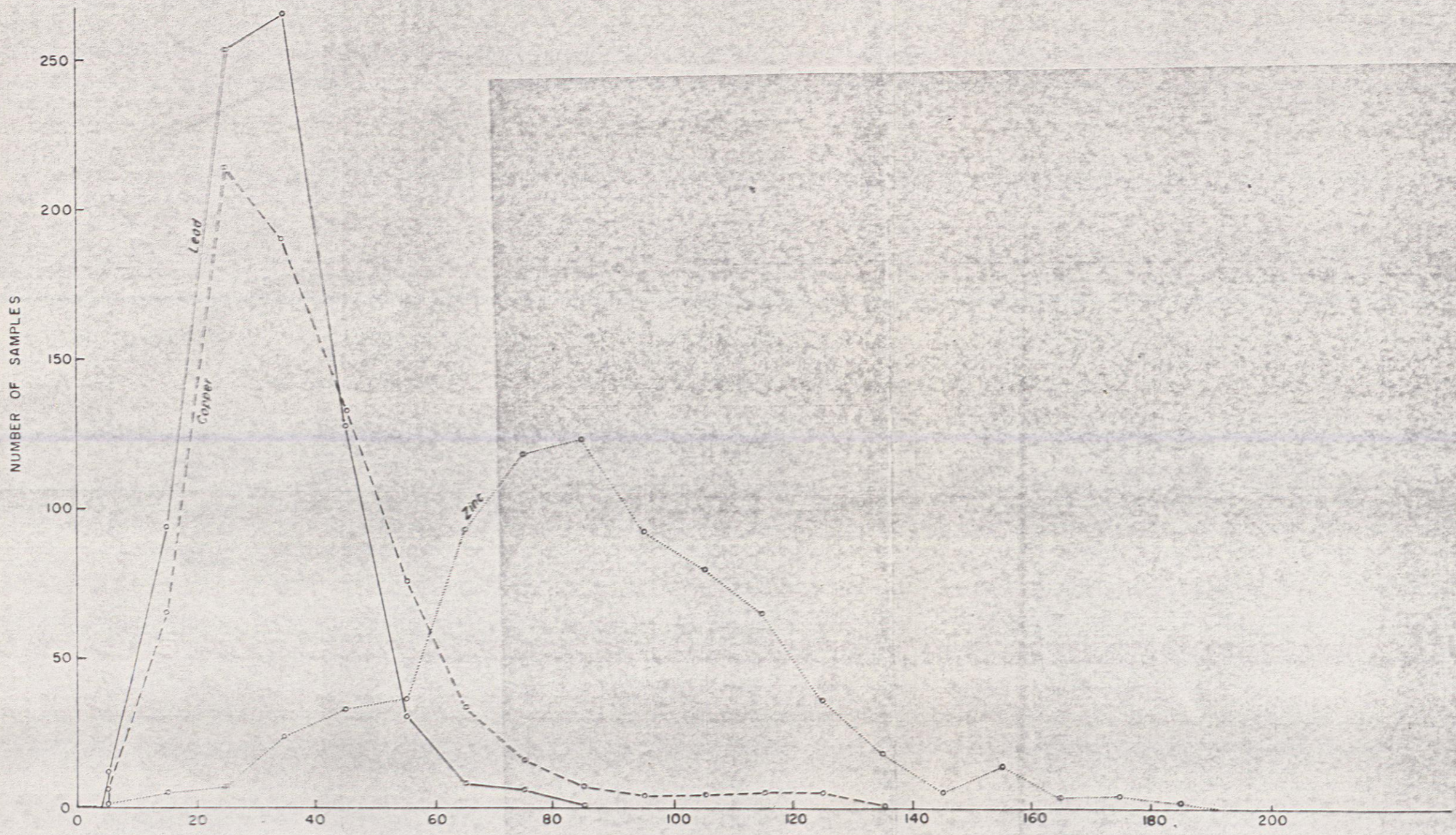
Zinc Geochemistry

HILL - RUST CLAIMS  
ANVIL - VANGORDA DISTRICT, YUKON

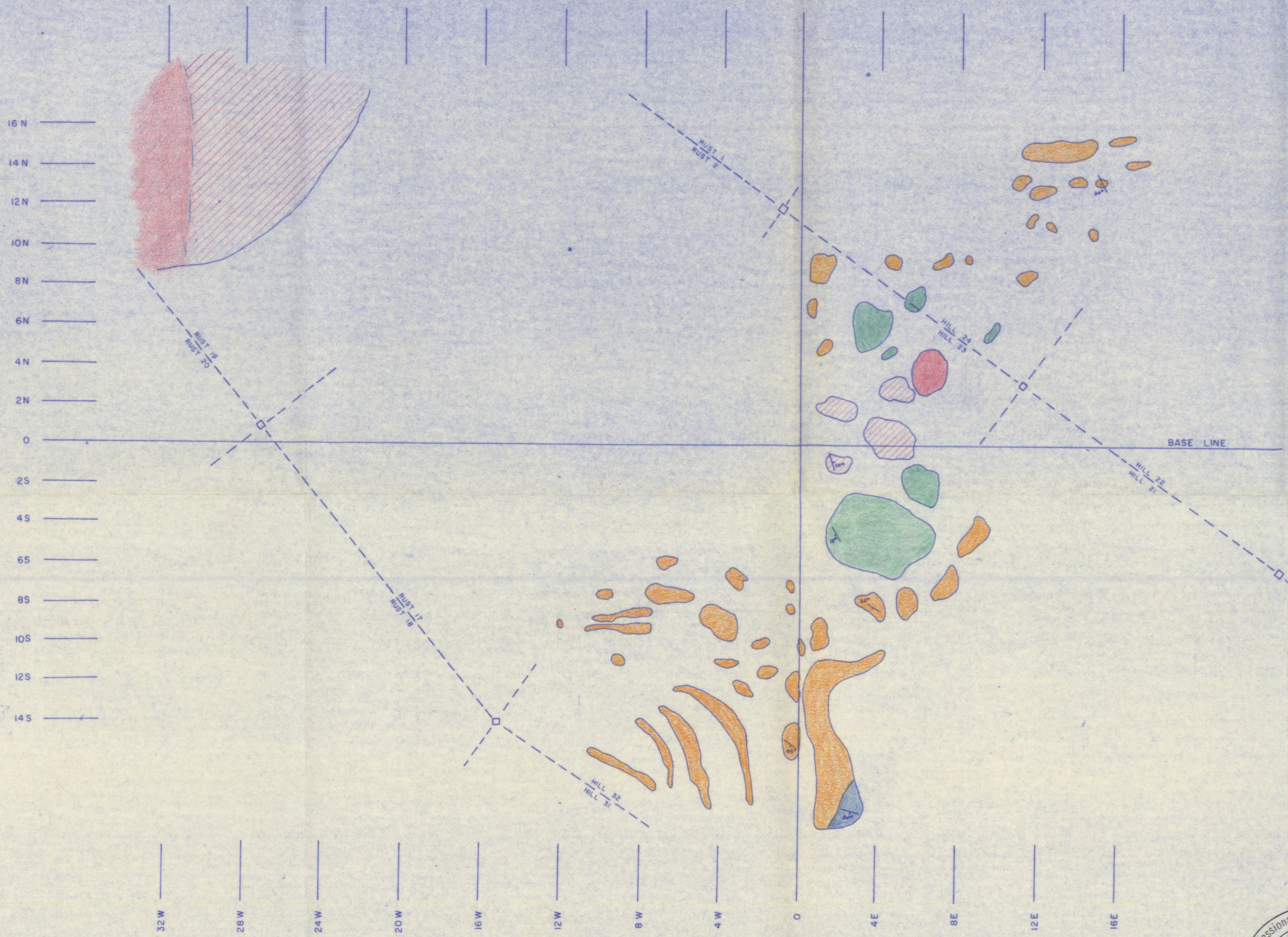
ARCHER & CATHRO  
Consulting Geological Engineers

DATE	21 July 1967
DRAWN	<i>[Signature]</i>
SCALE	Approx. 1" = 1320'

BASE MAP DRAWN FROM UNCORRECTED AIR PHOTO MOSAIC

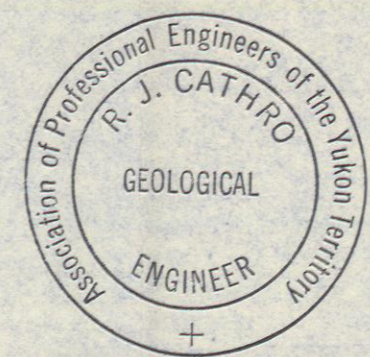


<b>DISTRIBUTION OF GEOCHEMICAL ASSAYS</b>		
<b>HILL - RUST CLAIMS</b>		
<small>ANYIL - VANGORDA DISTRICT, YUKON</small>		
<b>ARCHER &amp; CATHRO</b>		
<small>Consulting Geological Engineers</small>		
DATE	30 July 1967	DWG. No. <b>6.</b>
DRAWN	<i>J. J. ...</i>	
SCALE	—	



**Legend**

- Phyllitic Quartzite
- Siliceous Phyllite & Quartz-Biotite Schist
- Limy Skarn
- Granodiorite
- Granodiorite - Gneissic Texture
- Strike & Dip of Schistosity



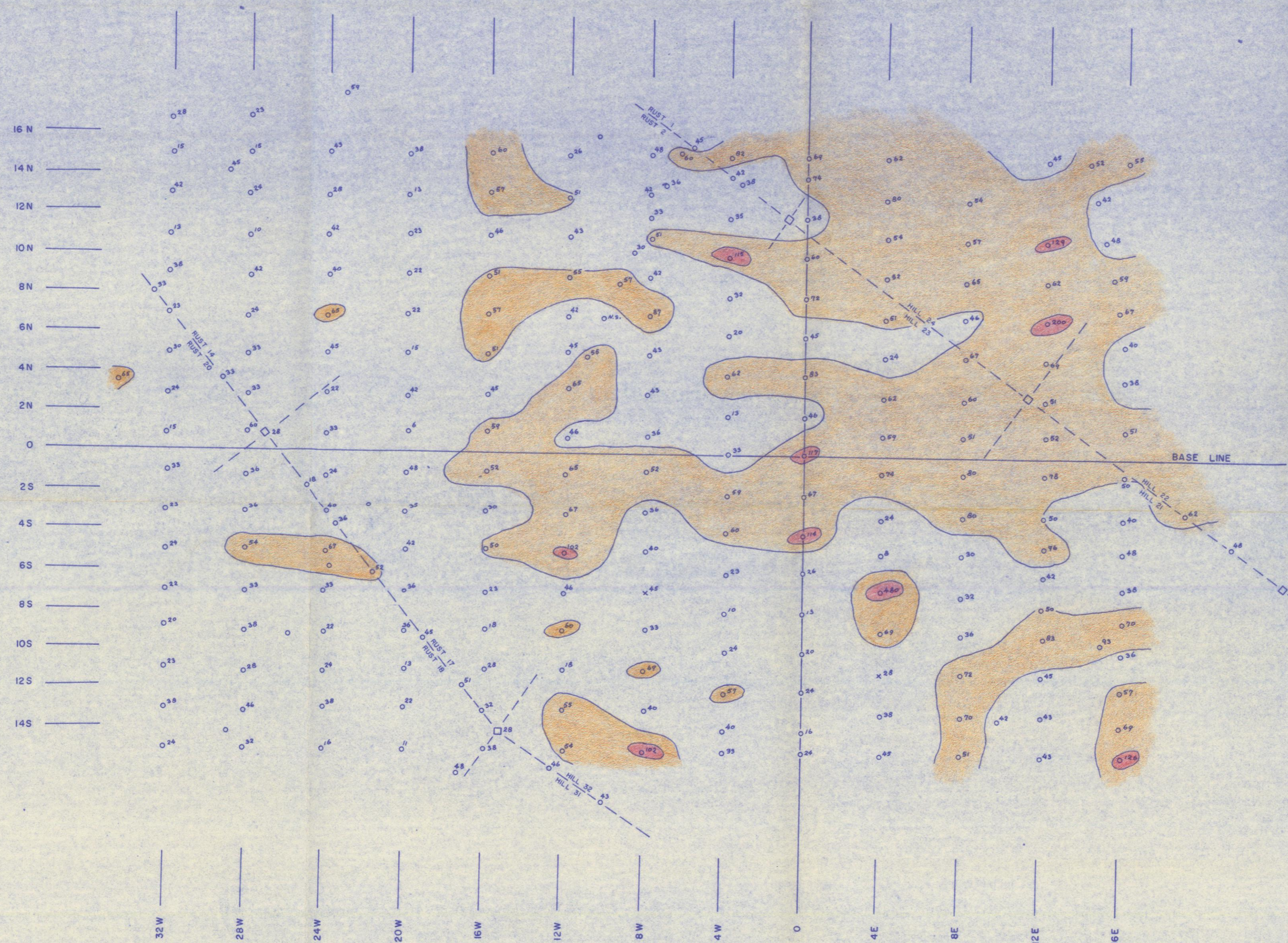
**Geology**

**GRID - B**  
**HILL - RUST CLAIMS**  
 ANVIL - VANGORDA DISTRICT, YUKON

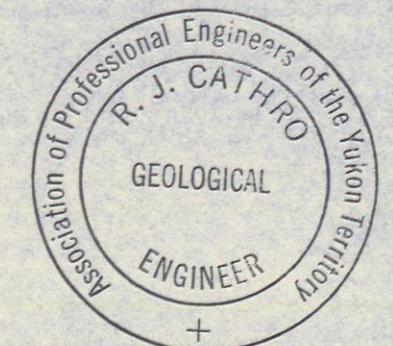
**ARCHER & CATHRO**  
 Consulting Geological Engineers

DATE	26 July 1967	<b>7.</b>
DRAWN	<i>Atkinson</i>	
SCALE	1" = 400'	

DWG.



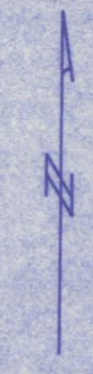
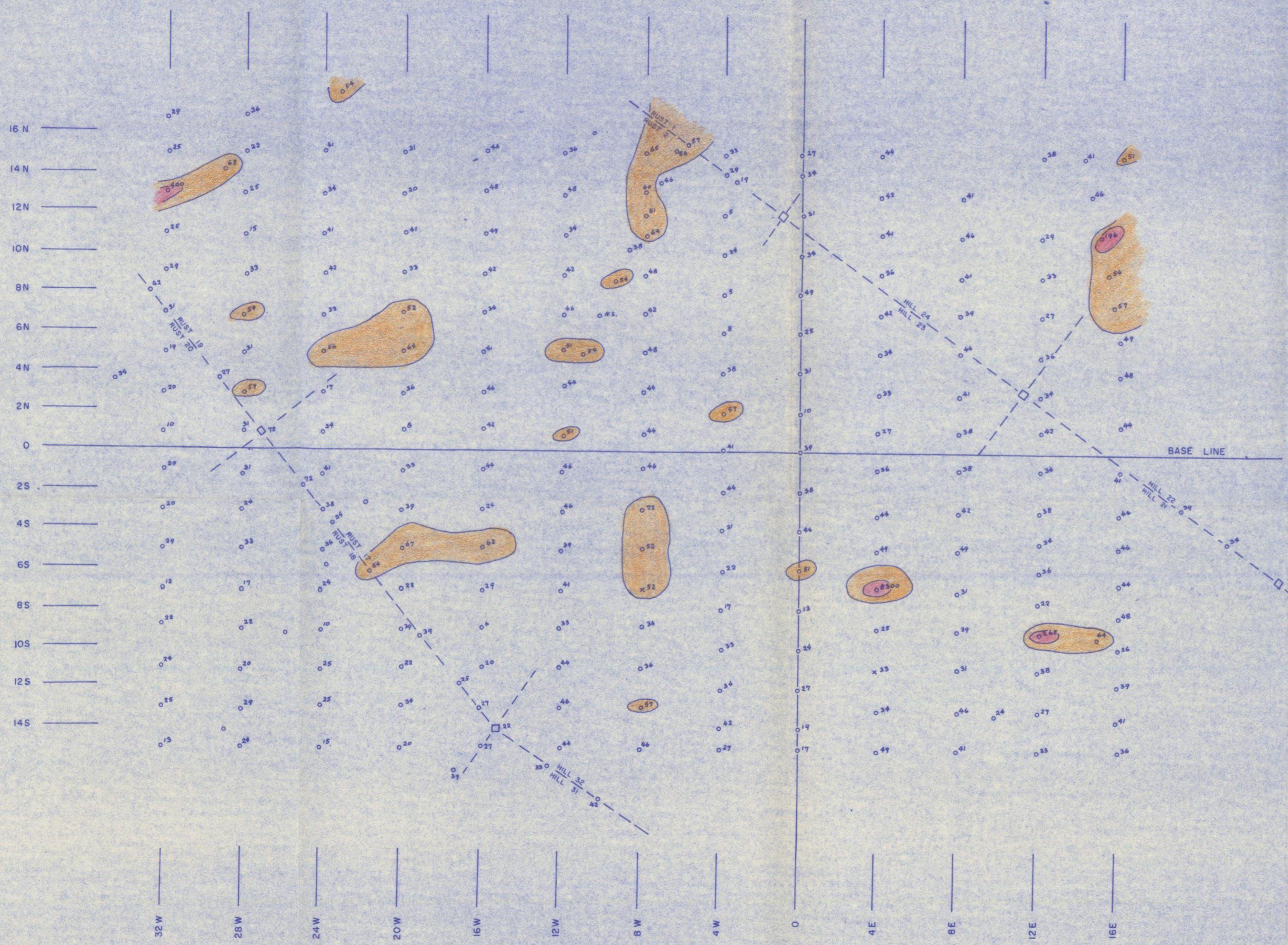
o - SOIL  
 x - SILT  
Hot Acid Extraction  
 50 - 100 PPM.  
 100 + PPM.



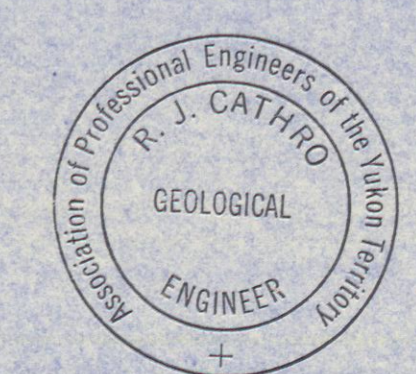
**Copper Geochemistry**

<b>HILL - RUST GRID "B"</b>	
ANVIL - VANGORDA DISTRICT, YUKON	
<b>ARCHER &amp; CATHRO</b> Consulting Geological Engineers	
DATE	26 July 1967
DRAWN	<i>Archives</i>
SCALE	1" = 400'
DWG. 8	

69  
x 2.5



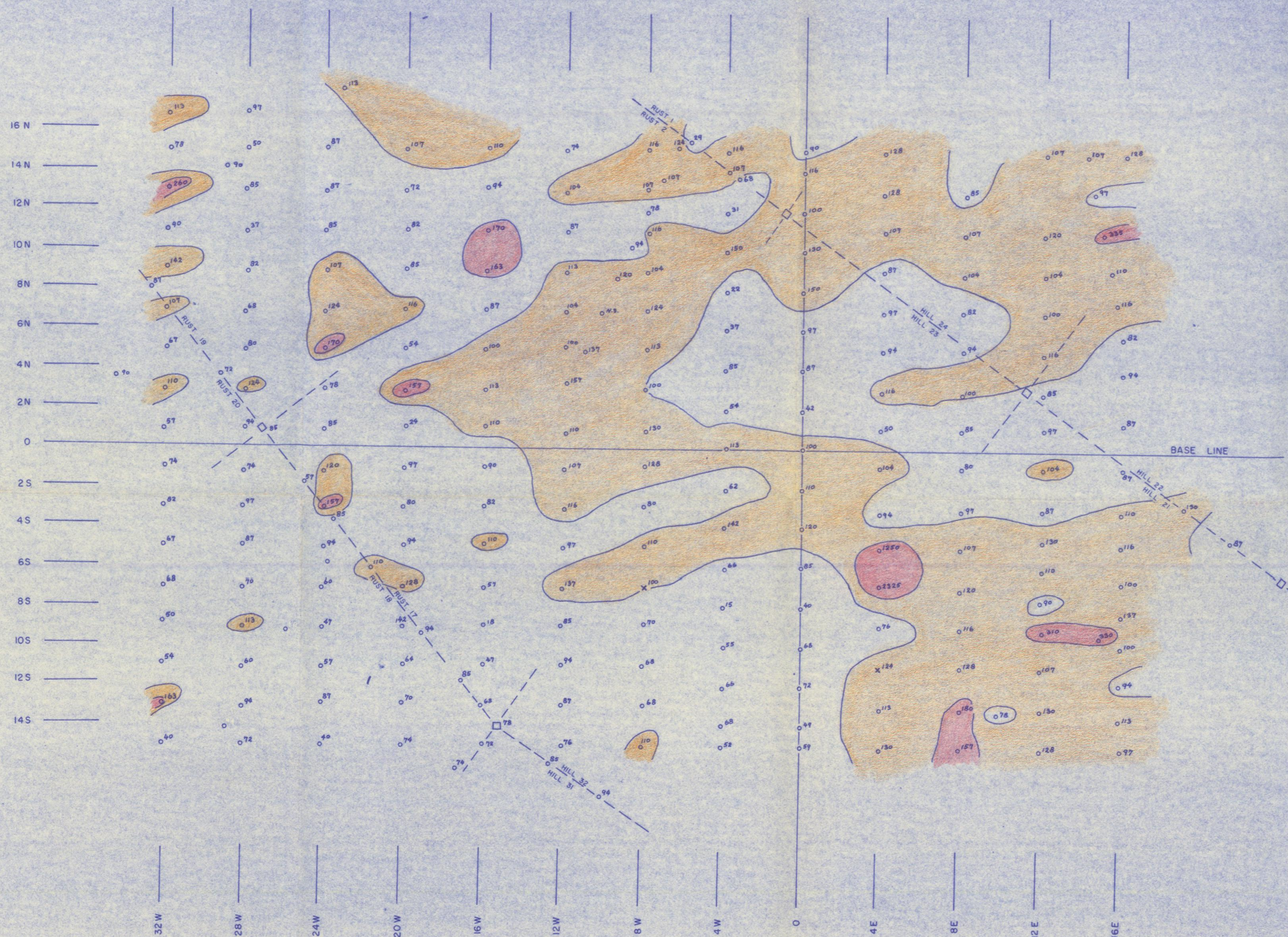
- o - SOIL
  - x - SILT
- Hot Acid Extraction
- 50 - 100 P.P.M.
  - 100 + P.P.M.



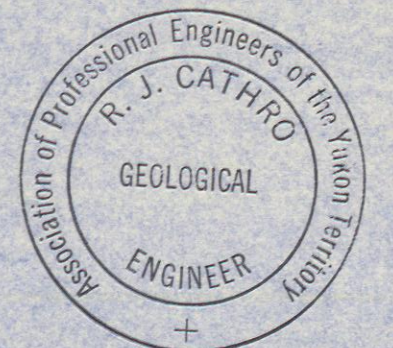
**Lead Geochemistry**

<b>HILL - RUST GRID "B"</b>	
ANVIL - VANGORDA DISTRICT, YUKON	
<b>ARCHER &amp; CATHRO</b> Consulting Geological Engineers	
DATE	26 July 1967
DRAWN	<i>R. Hammer</i>
SCALE	1" = 400' DWG. 9.

X 25  
33



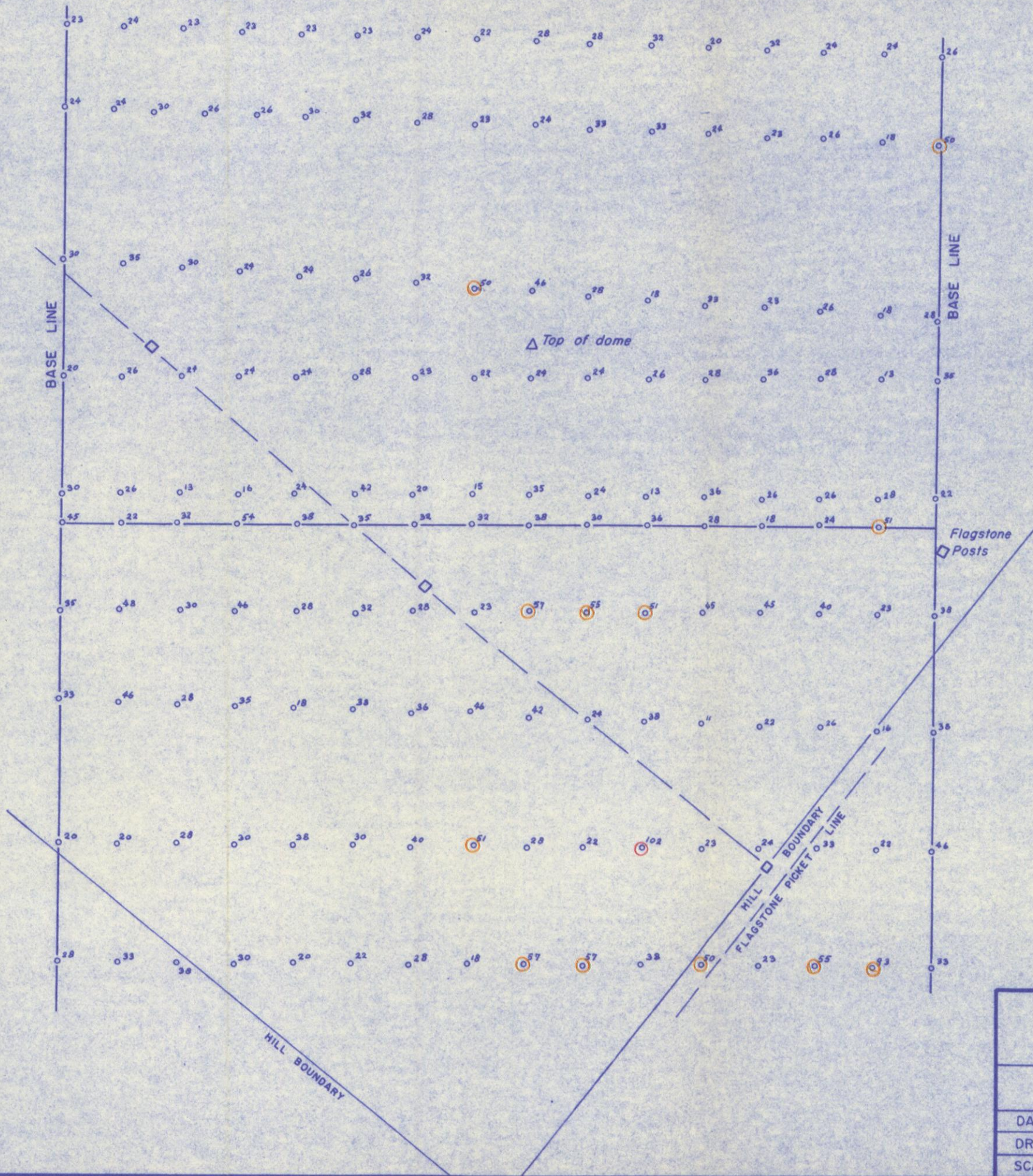
o - SOIL  
 x - SILT  
Hot Acid Extraction  
 [Orange Box] 100 - 150 PPM.  
 [Red Box] 150 + PPM.



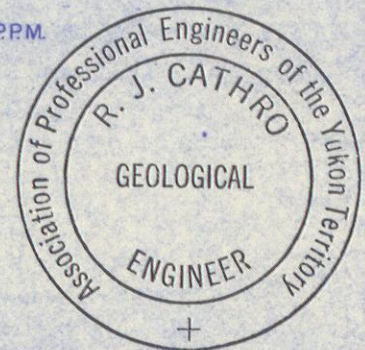
Zinc Geochemistry

<b>HILL - RUST GRID "B"</b>	
<small>ANVIL - VANGORDA DISTRICT, YUKON</small>	
<b>ARCHER &amp; CATHRO</b> <small>Consulting Geological Engineers</small>	
DATE	26 July 1967
DRAWN	<i>[Signature]</i>
SCALE	1" = 400'
DWG.	10.

X/24

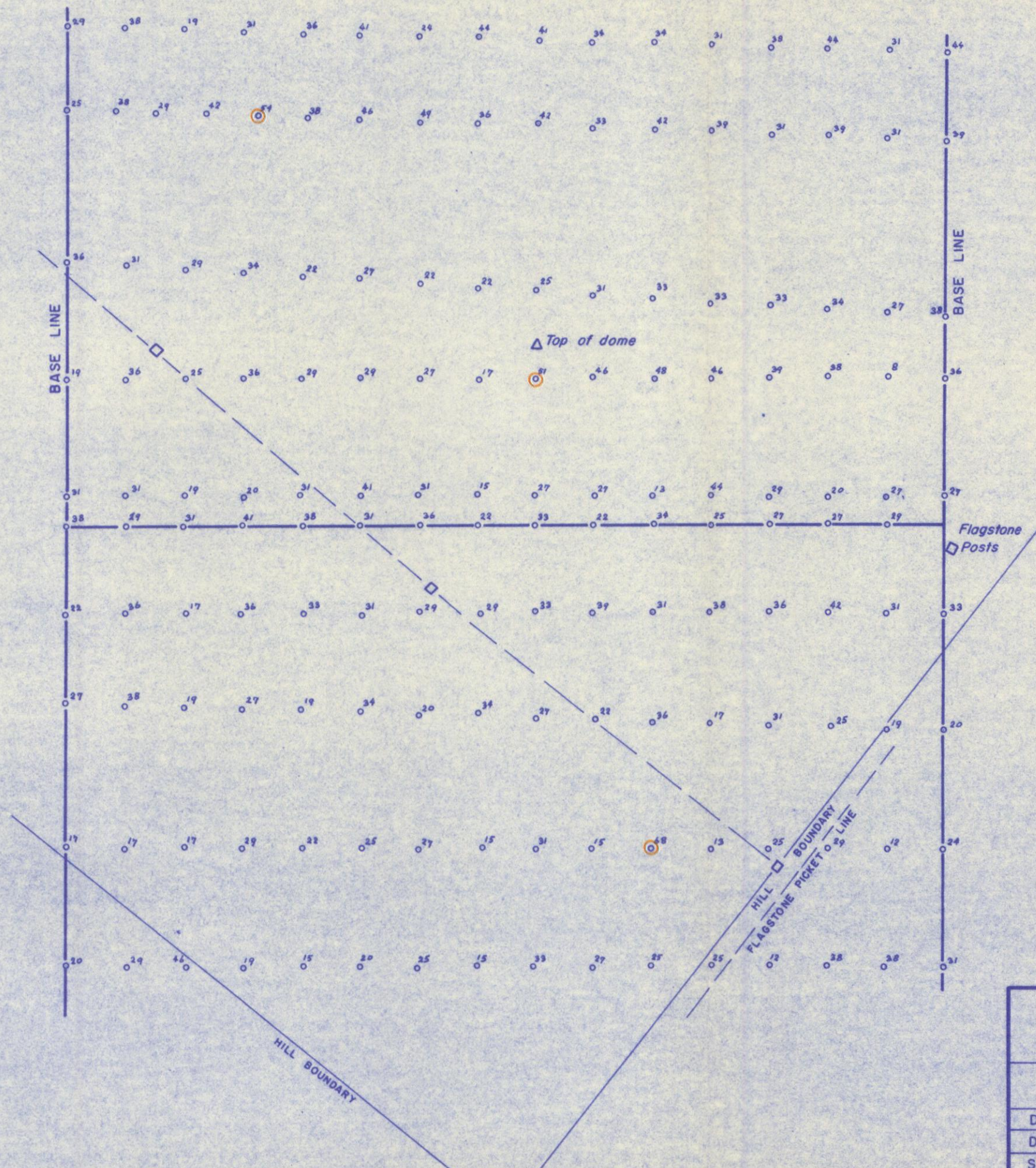


- - SOIL
  - X - SILT
- Hot Acid Extraction
- 50 - 100 P.P.M.
  - 100 + P.P.M.

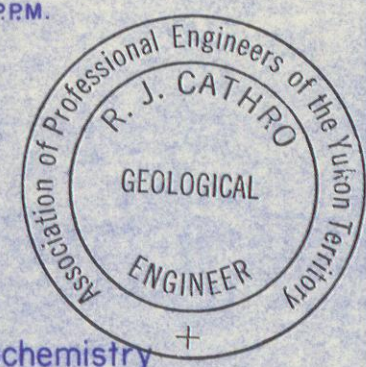


Copper Geochemistry

<b>HILL - RUST GRID "A"</b>		
ANVIL - VANGORDA DISTRICT, YUKON		
<b>ARCHER &amp; CATHRO</b> Consulting Geological Engineers		
DATE	3 Aug. 1967	DWG. No <b>11.</b>
DRAWN	<i>Atkinson</i>	
SCALE	1" = 400'	

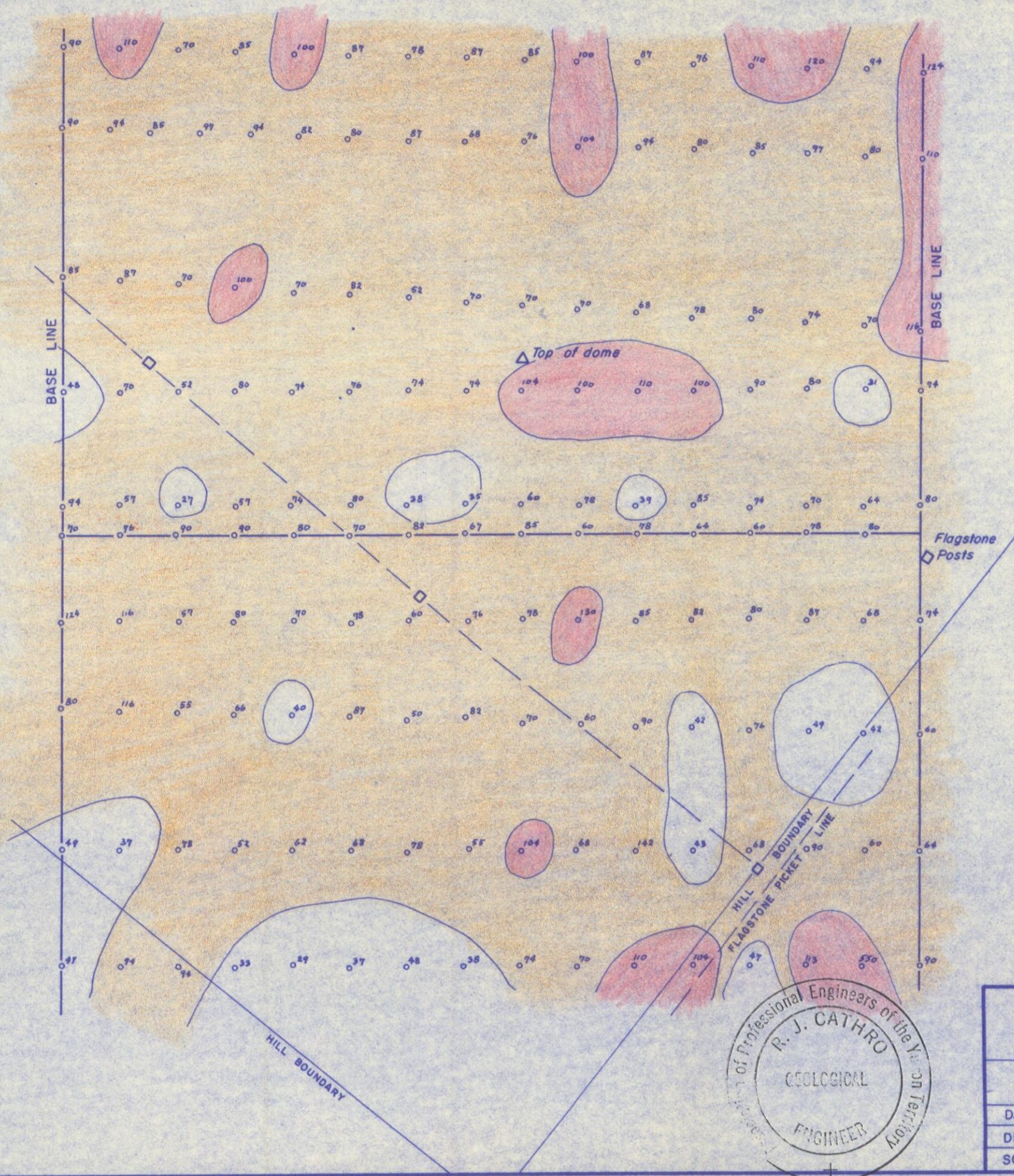


- o - SOIL
  - X - SILT
- Hot Acid Extraction
- 50 - 100 P.P.M.
  - 100 + P.P.M.

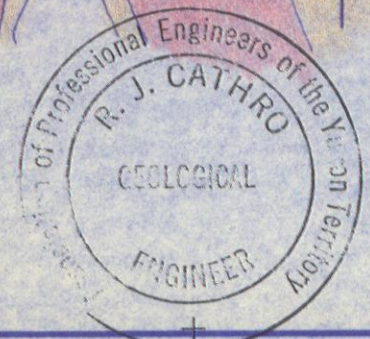


Lead Geochemistry +

<b>HILL - RUST GRID "A"</b>	
ANVIL - VANGORDA DISTRICT, YUKON	
<b>ARCHER &amp; CATHRO</b> Consulting Geological Engineers	
DATE	3 Aug. 1967
DRAWN	<i>Archives</i>
SCALE	1" = 400'
DWG. NO 12.	



- o - SOIL
  - X - SILT
- Hot Acid Extraction
- 50 - 100 PPM.
  - 100 + PPM.



Zinc Geochemistry

**HILL - RUST  
GRID "A"**

ANVIL - VANGORDA DISTRICT, YUKON

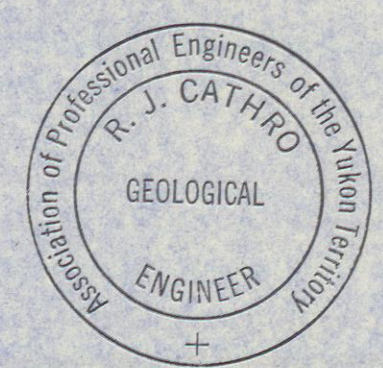
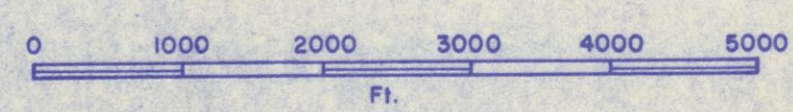
**ARCHER & CATHRO**  
Consulting Geological Engineers

DATE	3 Aug. 1967	DWG. No <b>13.</b>
DRAWN	<i>M. Thomas</i>	
SCALE	1" = 400'	



**LEGEND**

- FLIGHT LINES
- FIDUCIAL POINTS
- MAGNETIC CONTOURS (INTERPRETED BY W.G.WAHL)
- CONDUCTIVE ZONES (INTERPRETED BY W.G.WAHL)



**AIRBORNE GEOPHYSICAL SURVEY**

**HILL - RUST CLAIMS**  
 ANVIL - VANGORDA DISTRICT, YUKON  
 Lockwood Survey Corp., July 1966

**ARCHER & CATHRO**  
 Consulting Geological Engineers

DATE	21 July 1967
DRAWN	<i>[Signature]</i>
SCALE	Approx. 1"=1320' DWG.