GEOLOGICAL & GEOCHEMICAL EVALUATION REPORT on the STAR 1-40 CLAIM GROUP

62°25' N LATITUDE
137°50' W LONGITUDE

WHITEHORSE MINING DIVISION, Y.T.
NTS SHEET 115-I-5

for
STARBIRD MINES LTD. (NPL)
VANCOUVER, B.C.

by

G.G. CARLSON, P.ENG.
R.G. HILKER LTD.
WHITEHORSE, YUKON TERRITORY

AUGUST 31, 1973

TABLE OF CONTENTS

INTRODUCTION

The STAR 1-40 claim group was staked in February of 1970 on the south side of Prospector Mountain in the Dawson Range in the central Yukon Territory. The claims were staked over a geological contact between granitic rocks of the Cretaceous Coast Intrusives and volcanic rocks of the earlier Mesozoic Mount Nansen Group.

The Cretaceous intrusive rocks within the Dawson Range have associated with them several copper-molybdenum porphyry-type mineral deposits. The earliest discovery, and to date the largest, is the Casino Silver Mines prospect. The staking rush following the announcement of this discovery, during the latter part of 1969, was one of the largest in the history of the Yukon and resulted in the staking of the STAR claims.

At the present, further exploration work is about to commence on the Casino property and a new discovery has been made by drilling on the property of United Keno Hill Mines Ltd., approximately 20 miles northeast of the STAR claims, and adjacent to the Silver Standard property which is also under continuing investigation.

The present work was commenced on July 24, 1973. The crew and equipment were brought by truck from Whitehorse to Minto, on the Yukon River, and were flown from there to the STAR claim group, a distance of 31 miles, by Trans North Turbo Air Bell 206 Jet Ranger helicopter. Initial personnel included G. Carlson, geologist, and D. Buckler and T. Howell, geochemical samplers. The camp was set up, claim posts located, a baseline begun, and by July 27 the

.....2

geochemical sampling was commenced. Two additional samplers, K. Rich and G. Hillson, arrived on August 1 and August 6, respectively. G. Carlson left the property on August 16 and the remaining crew and camp were demobilized to Whitehorse on August 24.

Camp was located at an elevation of over 4000 feet on a ridge leading up to Prospector Mountain. Due to relatively abundant precipitation, a minimal water supply was maintained. This camp was the best location for the present work program. However, if any future work of a more localized nature is undertaken, a campsite on or near a creek would perhaps be better suited. Larger scale programs might be based at the junction of the two main creeks south of the grid or on Big Creek, but helicopter support would be required from these locations.

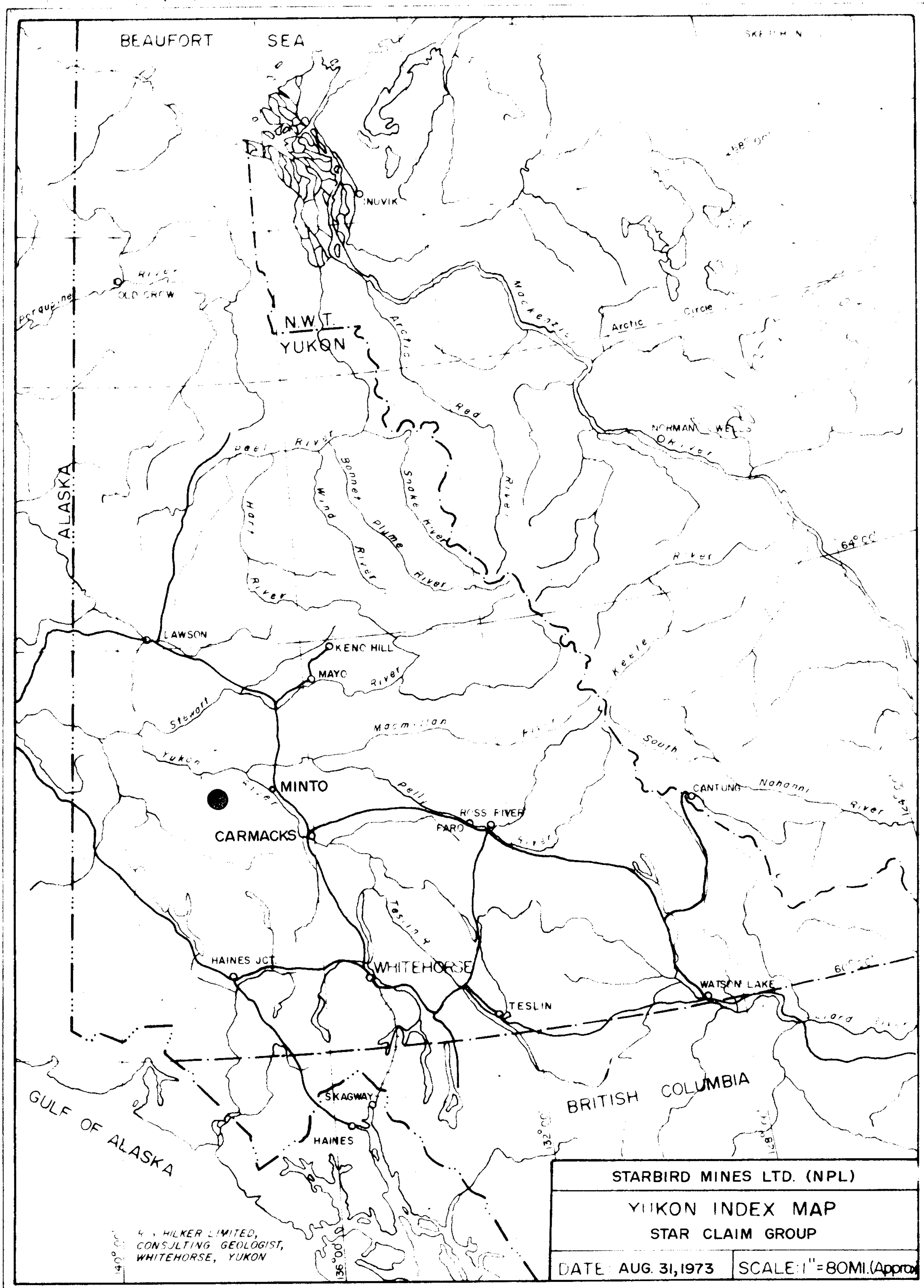
LOCATION AND ACCESS

The Dawson Range is located in the west central portion of the Yukon Territory on the southwest side of the Yukon River, between latitudes 62°00' and 62°45' and longitudes 137°00' and 140°00'. The Dawson Range trends northwest-southeast and is approximately 110 miles long by 20 miles wide. The Dawson Range is physiographically bounded by the Klondike Plateau to the northeast and by the Lewes Plateau to the southwest. The White River truncates the Dawson Range to the northwest and the Yukon River forms the southeastern limit in the Carmacks area.

The STAR 1-40 claim group is located within the Dawson Range at latitude 62°25' and longitude 137°50'. The claims were staked on the south flank of Prospector Mountain, about one mile from the summit, at elevations between 4,000 and 5,000 feet. The claims are located on the Carmacks sheet 115-I (G.S.C. Map 340-A; 1" = 4 miles) and on Claim Sheet 115-I-5 (1" = ½ mile) of the Whitehorse Mining Division.

Access to the claim group is by helicopter only. Trans North Turbo Air has a variety of helicopters based in Whitehorse and Dawson, but the best access is from Minto, 31 miles to the east, or Carmacks, 55 miles to the southeast. A Yukon Air Hiller 12-E is presently available for charter from one of these locations or from the United Keno Hill Mines campsite.

....4



STARBIRD MINES LTD. (NPL)

YUKON INDEX MAP

STAR CLAIM GROUP

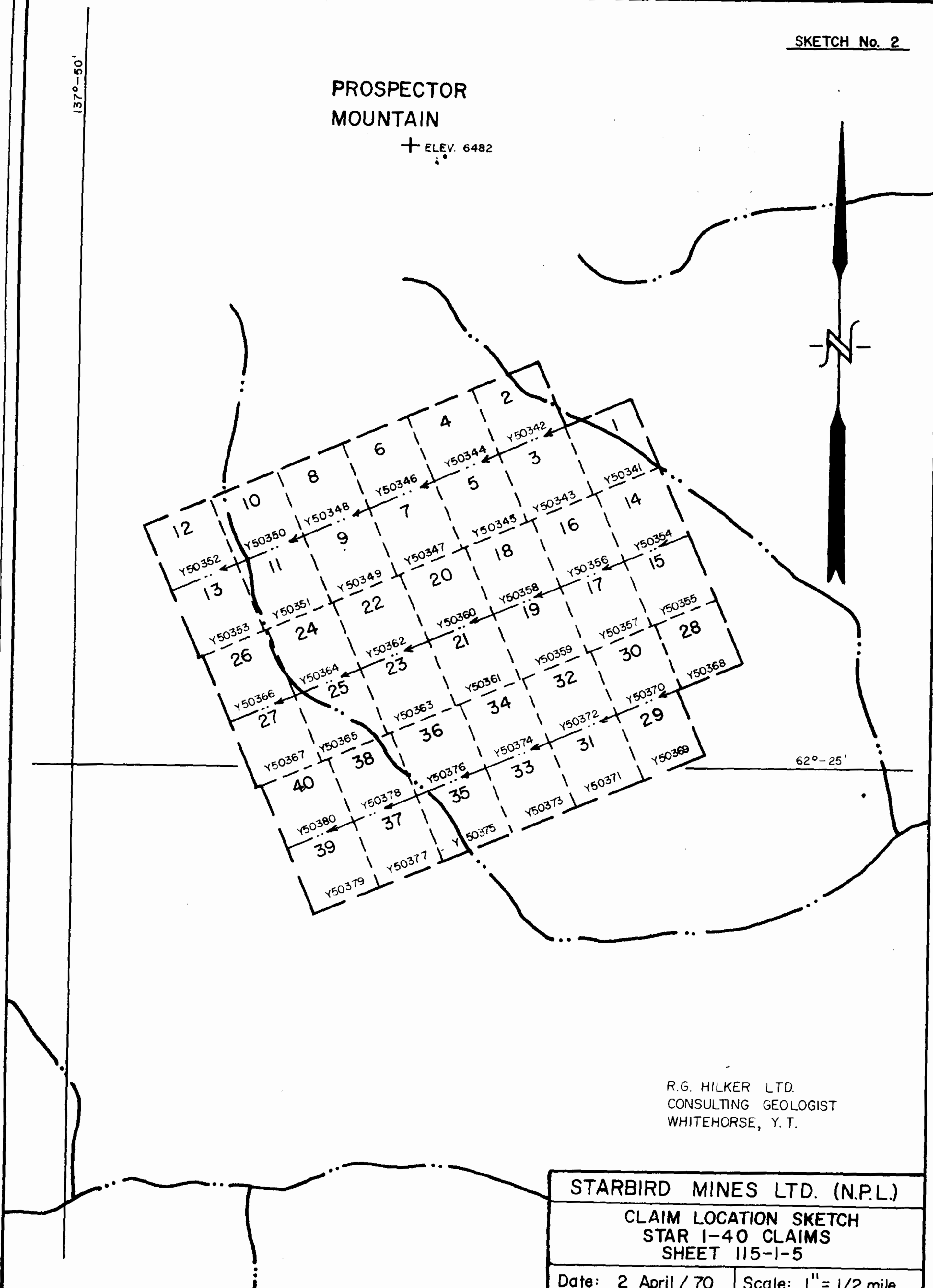
DATE: AUG. 31, 1973 | SCALE: 1" = 80MI. (Approx)

CLAIMS

The following information on the STAR claims was acquired by the writer through a search of the records held in the office of the Whitehorse Mining Recorder on August 22, 1973. The claims were transferred to Starbird Mines Ltd. (NPL) by the original stakers on the afternoon of April 2nd, 1970 and Starbird now holds a 100 percent interest in the property. The claims are located on Claim Sheet 115-I-5 in the Whitehorse Mining District.

Claim Name	Grant No.	Owner	Anniversary Date
STAR 1-40	Y50341 - Y50380	Starbird Mines Ltd. (NPL)	November 13, 1974

...5



R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

STARBIRD MINES LTD. (N.P.L.)

CLAIM LOCATION SKETCH
STAR 1-40 CLAIMS
SHEET 115-1-5

Date: 2 April / 70 | Scale: 1" = 1/2 mile

PERSONNEL

The following is a list of employees of R.G. Hilker Limited directly involved in the geological and geochemical program conducted over the STAR claim group between July 24 and August 24, 1973:

Name	Address	Position and Dates
R.G. Hilker, P.Eng.	Box 4008 Whitehorse, Y.T.	Supervisor
G.G. Carlson, P.Eng.	Box 4008 Whitehorse, Y.T.	Geologist, field supervisor, report preparation
G. Hillson	306 - 1 Teslin Rd. Whitehorse, Y.T.	Geochemical sampler
D. Buckler	68 Klondike Rd. Whitehorse, Y.T.	Geochemical sampler
T. Howell	6-12th Ave, Porter Creek Whitehorse, Y.T.	Geochemical sampler
K. Rich	600 Drury St. Whitehorse, Y.T.	Geochemical sampler
M. Smith	658 Mayflower Rd. Richmond, B.C.	Draftsman, typist

LINEGRID

A baseline of 10,000 feet was surveyed with chain and transit using four foot painted pickets to mark 100 foot stations. The bearing of the baseline is N68°E, parallel to the claim lines. A 2,000 foot offset was made at the west end to avoid thick undergrowth.

The grid was laid out using 400 foot spaced lines at right angles to the baseline to cover the central part of the claim group. Since the claims are actually spaced more widely than is indicated on the claim sketch, the outer edges of the claim group have been covered by 800 foot spaced lines. The total length of grid lines, not including the baseline, is 207,000 feet, or 39.2 miles.

The grid lines are marked with flagging at 100 foot stations and have been located using chain and compass bearing. A tieline was chained across the north end of the grid, with targets placed in prominent locations to aid in the correct location of the lines.

The grid stations were used for geochemical soil sample locations, and the grid was used also for survey control in mapping the geology and locating claim posts.

GEOLOGY

REGIONAL GEOLOGY - DAWSON RANGE

The Dawson Range occurs in the physiographic Yukon Plateau Province. It is a mountainous terrain, with peaks rising more than 2,000 feet from the level of the plateau, and elevations within the range varying from 3,000 feet to 6,600 feet. Almost all of the area has been left completely untouched by recent glaciation. Accordingly, the outcrops, which predominate on the mountain tops and ridges, are quite irregular. Exposed rocks are highly jointed, fractured and weathered due to frost action and wind erosion. Overburden may reach thicknesses greater than 50 feet in the lower areas, restricting outcrop occurrences to the steeper valley slopes.

The rocks of the area include a basement of Paleozoic or Precambrian metamorphic rocks (Yukon Group) and minor early intrusive. The basement is overlain by areas of Mesozoic volcanics (Mt. Nansen volcanics) which have been intruded by Cretaceous rocks of generally granitic composition (Coast Intrusions). Large areas of these rocks were later covered by Tertiary volcanics (Carmacks Volcanics).

The Mesozoic and older rocks exhibit a general northwest-southeast trend which has been disrupted by the intrusive bodies and partially obscurred by the flat-lying Carmacks volcanics.

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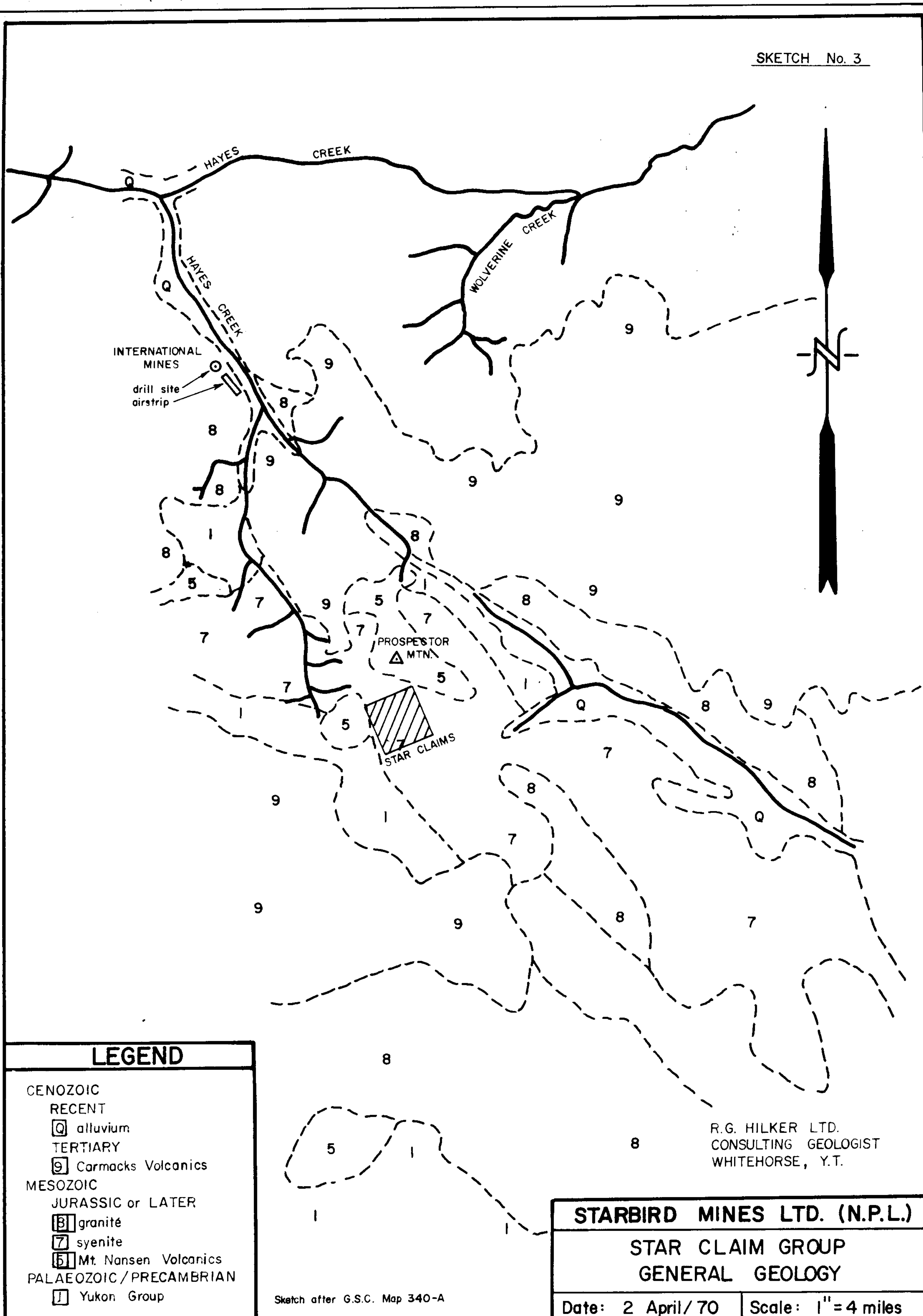

SKETCH No. 3
HAYES CREEK
WOLVERINE CREEK
INTERNATIONAL MINES
drill site
airstrip
PROSPECTOR MTN.
STAR CLAIMS
LEGEND
CENOZOIC
RECENT
Q alluvium
TERTIARY
9 Carmacks Volcanics
MESOZOIC
JURASSIC or LATER
8 granite
7 syenite
5 Mt. Nansen Volcanics
PALAEOZOIC / PRECAMBRIAN
1 Yukon Group
Sketch after G.S.C. Map 340-A
R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.
STARBIRD MINES LTD. (N.P.L.)
STAR CLAIM GROUP
GENERAL GEOLOGY
Date: 2 April/70
Scale: 1" = 4 miles

TABLE OF FORMATIONS

CENOZOIC

Quaternary

Q - Alluvium, volcanic ash, ground ice.

Tertiary

Carmacks Volcanics

9 - Thick flows, basalt, amygdaloidal flows, top of flows breccia, local brecciation and porphyritic flows.

MESOZOIC

Jurassic - Upper Cretaceous

Coastal Intrusives

8 - Granite, granodiorite, quartz monzonite, porphyry and breccia, altered (ore host rock).

7 - Syenite and monzonite

6 - Diorite and gabbro

Mount Nansen Group

5 - Basalt, andesites, and dacite flows, breccias and tuffs. Green-black colour, contains sedimentary rocks consisting of sandstone, siltstone, pyritic arkose and argillites. Bands and bedding distinct.

Tantalus Formation

4 - Conglomerate, sandstone, shale and coal seams.

Jurassic

3 - Labarge Group

Triassic

2 - Granite, monzonite

PALEOZOIC - PRECAMBRIAN

Yukon Group

1 - Limestone, shale, mica-quartz schist, chlorite schist, quartzite.

After Bostock G.S.C. Memoir 189

...9

REFERENCE TO PUBLISHED GEOLOGY

The following listed publications and geological maps contain geological information in select areas of the Dawson Range, and reference was made to the information in preparation of this report.

1. D.D. Cairns 1916 - Klotassin Yukon Territory No. 1702, Geology Map, scale 1" = 2 miles. Canada Department of Mines Geological Survey, 1918.

2. H.S. Bostock 1944 - Paper 44-34 Preliminary Map, Selwyn River, Yukon. Canada Department of Mines and Technical Surveys.

3. H.S. Bostock 1936 - Memoir 189 - Carmacks District, Yukon. Geological Survey of Canada, Department of Mines and Technical Surveys.

4. J.R. Johnston 1937 - Memoir 214 - Geology and Mineral Deposits of Freegold Mountain, Carmacks District, Yukon. Geological Survey of Canada, Department of Mines and Technical Surveys.

CLAIM GEOLOGY

The STAR claims are underlain on the southern three-quarters by the Jurassic Mount Nansen volcanics and sediments and on the northern quarter by a Cretaceous intrusive body. True outcrop within the claim group is only one or two percent of total surface area. However, since soil is residual and very thin, and little lateral movement of boulders has apparently occurred on the upper slopes, mapping of boulders is expected to give a fairly accurate picture of the bedrock geology. Contact relations, though, remain rather vague. Actual outcrops observed at locations on the Geology Plan (see pocket) are indicated by strike and dip symbols.

The Mount Nansen volcanics and sediments have been divided into four units as they occur on the property. These include a basal basaltic layer which is overlain successively by a band of fine sediments and tuffs and then by a thick series of intermediate fragmental rocks. These three units have been intruded by closely associated feeder dikes of mafic to intermediate rocks. The above stratigraphic succession assumes that the rocks have not been overturned.

The basal mafic unit consists of massive flows of pyroxene and olivine-pyroxene porphyries, fragmental flows and volcanic breccias. These rocks exhibit no flow textures and are indistinguishable from intrusive rocks except for the fragmental portions. Fragments are 2 to 5 mm in diameter, subangular, very fine grained and a purple or dark grey colour in a greenish matrix. Fresh biotite flakes, to 1 mm in diameter, are frequently visible through-

...11

out the rocks.

The porphyry is a very dense, heavy, fine grained rock with stubby, euhedral crystals of pyroxene, between 1 and 4 mm in length. Also present locally are subrounded crystals or aggregates of olivine. Feldspar laths are also observed in the rock. Epidote is present as an accessory mineral, although in some samples it may exceed 10 percent, occurring disseminated throughout the groundmass. Metallic minerals are not usually evident in hand specimen, but a highly magnetic zone adjacent to the intrusive contact probably occurs within this unit and appears to be caused by very finely disseminated magnetite.

A dacitic quartz-feldspar porphyry, rich in pyrite, occurs in the northeast corner of the grid, just south of the main volcanic-intrusive contact. This rock at first glance appears to be intrusive, but its stratigraphic position suggests that it is a flow within the basal volcanic unit. It contains from 1 to over 10 percent disseminated pyrite cubes, and this pyrite may be primary but is probably recrystallized from the intrusive contact effects.

The basaltic volcanic flows grade upwards into a sequence of fine grained, thinly banded sediments and interbedded tuffs. These appear to have been deposited in a relatively quiet, but shallow, marine environment. Poorly formed ripple marks may have been observed locally on a few samples. Soft sediment deformation is rarely observed where very thin flows have moved over the surface.

The rocks of this unit consist of mudstones and siltstone, often very cherty, with interbanded fine volcaniclastic layers. Individual bands range from less than 1 mm to over 10 cm in thickness, with an average thickness of 2 or 3 mm. The entire thickness of this unit is probably less than 30 meters. It is also probable that small thicknesses of sediments of a similar nature occur within the volcanic rocks at other stratigraphic horizons. These would accumulate during any short lull in the volcanic activity.

The end of sedimentation was marked by a period of explosive volcanic activity, with the accumulation of a thick pile of lapilli tuff (fragments 4 - 32 mm), with lesser amounts of volcanic breccia and ash tuff (fragments less than 4 mm). These rocks are more or less of an intermediate composition, and are composed of a variety of fragments, with very little matrix material. The fragments include the basic volcanics and the sediments plus some which are more siliceous and may be in part crystal fragments. Epidote is again a common accessory mineral, and locally exceeds 5 percent of the rock. Specular hematite is evident in most samples, and occurs in crystals up to 2 mm in diameter.

This rock type is characterized by a very prominent 'slabby' appearance which is the result of a strong, near horizontal jointing or coarse foliation. Individual layers vary between 5 mm and 10 cm in thickness. No graded bedding or other features were observed which might indicate if this represents a bedding plane.

Apparently intruding all of the above rocks is a second mafic unit. These rocks are distinguishable from the basal mafic unit only by the fact that they appear to cross the stratigraphic succession. They are rarely massive; usually phenocrysts of pyroxene and sometimes feldspar are present. Associated with this unit locally is a distinctive breccia which does not appear to be bedded but rather a pipe feature. Fragments range in size from 1 mm or less to one half meter. They are usually subangular, show no preferred orientation or sorting, and are composed of mafic rock similar in nature to the host. Matrix forms less than 10 percent of the rock.

The northern portion of the grid area is underlain by a granitic intrusive, part of the Cretaceous Klotassin Batholith complex. This rock is a relatively uniform medium to coarse grained porphyritic syenite. It is quite fresh and a light pinkish grey colour. In composition it consists of 50 percent or more orthoclase, mainly as pinkish phenocrysts to 5mm in lenth, 10 or 15 percent plagioclase, 10 percent quartz and 25 percent hornblende. Chlorite and epidote were also observed. Disseminated pyrite was observed in a few isolated zones. A small amount of pyritic volcanic rock was observed included within the intrusive at the north end of line 8+00E.

Contact effects are not strong. No metamorphic aureole could be distinguished within the volcanic rocks, with the possible exception of the magnetic high which appears to follow the contact. A few boulders containing aplitic stringers were observed near the contact. The granitic rock shows very little, if any grain size gradation towards the contact. The contact itself dips steeply to the south, with a strike of roughly 75°, except near the top of the main ridge, in the vicinity of line 48+00W, where the dip becomes as shallow as 20 or 30° to the south.

All rocks are strongly jointed and, as a result, very little solid outcrop is observed on surface. Joint plane measurements on the outcrop available indicate prominent north-northwest, north-northeast and east-west fracture orientations, all steeply dipping. The attitude of the basal flows and sediments was measured definitely in only one location and found to be northeast with a shallow dip to the south-east. This roughly conforms with the attitude of the slabby foliation or jointing in the intermediate fragmental unit. The younger feeder dikes appear to follow the north-east fracture orientation, although this cannot be confirmed due to the vague contact definition.

...15

CLAIM GEOLOGY - TABLE OF FORMATIONS

MESOZOIC

Jurassic - Upper Cretaceous

Coastal Intrusives - Klotassin Batholith

G	Granitic Intrusives - Porphyritic syenite, medium to coarse grained, with abundant pinkish feldspar phenocrysts in a grey hornblende-rich matrix.

Mount Nansen Volcanics

B/D	Late stage intrusive basalt/dacite mainly porphyritic dikes. Often associated breccias. Usually indistinguishable from flow material.
Vi	Intermediate flows, mainly fragmental, some tuff units.
S	Sedimentary rocks, tuff. Mainly very fine, thin-bedded, dark coloured and often cherty mudstone and siltstone with interbanded tuff.
Vb	Basic volcanic flows, mainly porphyritic, massive, sometimes fragmental. May be in part intrusive.

...16

GEOCHEMICAL SURVEY

INTRODUCTION

Soil geochemistry prospecting techniques have been successfully applied in the search for a variety of types of mineral deposit within the Western Cordillera. This is particularly true of copper and copper-molybdenum mineralization within the unglaciated Dawson Range area of the central Yukon. Porphyry copper deposts such as that of Casino Silver Mines show a strong, well-dispersed soil and silt anomaly due to the abundance of pyrite in the deposit which has oxidized to produce very acidic soil conditions. The copper mineralization associated with the intrusive - Mount Nansen volcanics contacts, on the other hand, are relatively lean in pyrite, metal mobilities are low, and a strong soil geochemical anomaly is restricted to areas directly overlying bedrock surface mineralization, with residual soil material cover.

The execution of a soil sampling survey to obtain the greatest amount of information and maximum accuracy of interpretation requires rigid survey controls. These include the sampling of, as near as possible, a homogeneous medium. This material should give the most accurate and the strongest possible anomaly contrast and yet be practical to collect. Analysis must be carried out by a reputable lab which can provide accurate, repeatable results. And finally, the more abstract components of the geochemical environment - factors which will affect the secondary dispersion of metal ions in the soil - must be carefully studied and applied to the interpretation of results.

....17

In addition to the grid sampling programme, a short reconnaissance silt sampling programme was conducted along the two main creeks below the claim group in order to observe a more regional geochemical pattern in the area. Samples were collected very 1000 feet in the main creeks plus in any side drainages, and a total of 29 samples was collected. Results are described at the end of INTERPRETATION.

METHODS

The soil sampling was carried out by samplers using chains and silva compasses to locate themselves on the grid lines. Sample material was taken, whenever possible, from the upper 'C' soil horizon, or the upper portion of the residual soil, at least a few inches below the upper humus layer, or from surface material or rock grit in the non-vegetated rock talus areas where no soil profile development has taken place. The samples were dug using a 2½ pound grub hoe. Material was collected in a pre-numbered Kraft paper sample bag, while notes on location, soil colour and type, slope and grade direction, vegetation and any other pertinent data, were taken at each station. The samples were strung on wire, with approximately 30 samples per string, and hung at camp for partial drying.

In addition the pH of some of the samples was tested using a LaMotte-Morgan Soil pH Testing Kit. Values are measured color-metrically to the nearest 0.2 pH Unit, with an estimated accuracy of plus or minus 0.2 pH units.

...19

SAMPLE HANDLING, ASSAYS AND TREATMENT OF DATA

After collection, samples were wired in strings of 30 to 40 samples, partially dried, and then packed in burlap sacks for shipment to Whitehorse. At Whitehorse, the samples were transferred to the offices of Barringer Research Ltd., where they were analyzed for copper, molybdenum and silver.

The analytical procedure at Barringer consists of drying and sieving the samples, saving the -80 mesh fraction. One half gram of this fraction is hot digested using perchloric acid for 4 hours. This solution is brought to a volume of 5 ml for final analysis. The solution is run for all three elements on a Techtron 5 atomic absorption unit.

Geochemical Laboratory Reports for all soil samples tested, from Barringer Research Ltd., are on file at the office of R.G.Hilker Limited, #8 Northern Metalic Bldg., Whitehorse, Yukon Territory.

The interpretation of geochemical data is often aided by the calculation of a few simple statistics. The arithmetic mean and standard deviation have been calculated for all assay values, using the following formulae:

$$\bar{x} = \frac{\Sigma\,\text{ppm}}{n}$$

$$s = ((n\,\Sigma\,\text{ppm}^2 - (\Sigma\,\text{ppm})^2)/(n(n-1)))^{1/2}$$

where: n = total number of values

Σ ppm = sum of values

$\bar{x}$ = arithmetic mean

Σ ppm^2 = sum of squares of values

s = standard deviation

....20

For the present survey, extremely high values for each of the metals have been reduced to a common maximum value for the calculations. This is done to avoid the misleading influence these values have on the overall characteristics of the distribution of metal values. The figures used for each metal are shown in Table 1 (page 21) as well as the calculated statistical values.

The statistics, mean and standard deviation, are useful in the definition of statistical anomalies which may or may not be relevant in the survey area. Experiment and field experience have indicated that, assuming a lognormal distribution of values, a value greater than $\bar{x}$ + 1s is statistically "possibly anomalous" and a value greater than $\bar{x}$ + 2s is "probably anomalous".

The assumed lognormal distribution is monomodal. That is, there is ideally one set of values with it's arithmetic mean substantially greater than it's geometric mean (mode). However, field experience has shown that a true lognormal distribution rarely occurs, and that most trace metal distributions are a combination of two or more distinct sets of values which reflect various bedrock and soil conditions.

A histogram on normal graph paper and a cumulative frequency plot on logarithmic probability paper have been constructed for each element. On the histogram, each separate set of values is indicated by a divergence from a typical lognormal curve.

When the cumulative frequency is plotted versus the metal concentration on logarithmic probability paper, each lognormal set of values gives a straight line segment. A graph of this type will

STARBIRD PROJECT

GEOCHEMISTRY STATISTICS

TABLE 1

ELEMENT	n	$\bar{x}$	s	$\bar{x}$ + 1s	$\bar{x}$ + 2s	$\bar{x}$ + 3s
Cu[1]	2166	38	23	61	84	107
Mo[2]	2166	2.75	1.1	3.85	4.95	6.05
Ag[3]	2166	1.15	0.4	1.55	1.95	2.35

Note: All values are in parts per million.

1. Any value greater than 200 ppm Cu was reduced to 200 ppm for use in the calculations.
2. Any value greater than 9 ppm Mo was reduced to 9 ppm Mo for use in the calculations.
3. Any value greater than 2.4 ppm Ag was reduced to 2.4 ppm Ag for use in the calculations.

generally provide more detailed information about the overall behaviour of the metal distribution than the normal histogram.

The statistical values calculated for each of the five elements are displayed in Table 1 (previous page) and the histograms and logarithmic probability plots are shown in Sketches 4 through 9 under the INTERPRETATION section of this report.

....23

TOPOGRAPHY, VEGETATION AND SOILS

The Dawson Range area has not been glaciated and as a result most soils in the area are of a residual nature, except where down-slope movement or alluvial transport and deposition have occurred. Lack of glaciation has resulted in a distinctive topography. Mountains and ridges are usually rounded and cut by V-shaped valleys. More resistant rocks stand out along summits and are strongly jointed and fractured by frost action. South facing slopes undergo greater weathering activity and are relatively steep, while north-facing slopes have become permanently frozen at a very shallow depth and at surface consist mainly of coarse talus covered with thick moss growth and black humic material.

Stunted black spruce also grows in this poorly drained north slope environment. The soils on the south-facing slopes are more decomposed, are better drained, and usually show at least a primitive soil profile development. Vegetation here consists of grass and poplar over the steepest and best drained areas, grading into spruce with moss and buckbrush as the soils become more moist and slopes gentler. Permafrost is either quite deep or non-existent in poplar areas, and is patchy near surface in the spruce areas.

The STAR 1-40 claim group is located between 4000 and 5500 feet elevation over a prominent north-south ridge on the south flank of Prospector Mountain. Except for the lower portions of the two main creeks and the southern edge of the claim group, the grid area lies above treeline. The upper limit of buckbrush growth is between 4500 and 5000 feet and above this, on the upper slopes and gently sloping ridge tops, vegetation is restricted to minor amounts of moss, grass and lichen growing among the boulders. Soil, or fine rock grit is usually present in at least small amounts on or near surface. In a few local flat areas on the ridge tops and on the upper north-east facing slopes, drainage is poor due to a combination of the gentle slope and permafrost. Vegetation in these areas consists of grass and moss, often with visible surface water. The steep north-east facing slope northeast of camp is also of this nature due to a lack of southern exposure.

The pH of soils within the grid area is weakly acidic, averaging approximately 6.0, with very little variation. There are no obvious differences between the pH of the soils within the various environments or over the variety of rock types within the grid area. The observed scarcity of pyrite over most of the grid is confirmed by the lack of more strongly acidic soils.

The recent near surface volcanic ash layer which is prevalent throughout much of the southern Yukon was observed in only a few locations and is not expected to have any effect on the geochemistry survey results. Samples were collected from below any ash material present at the sample site.

...25

INTERPRETATION

The soil sampling survey over the STAR claims has outlined one broad, low contrast anomaly which is described below. The results of the survey have been plotted and contoured on the Geochemistry Survey plans (see Plans 3 and 4 - Pocket).

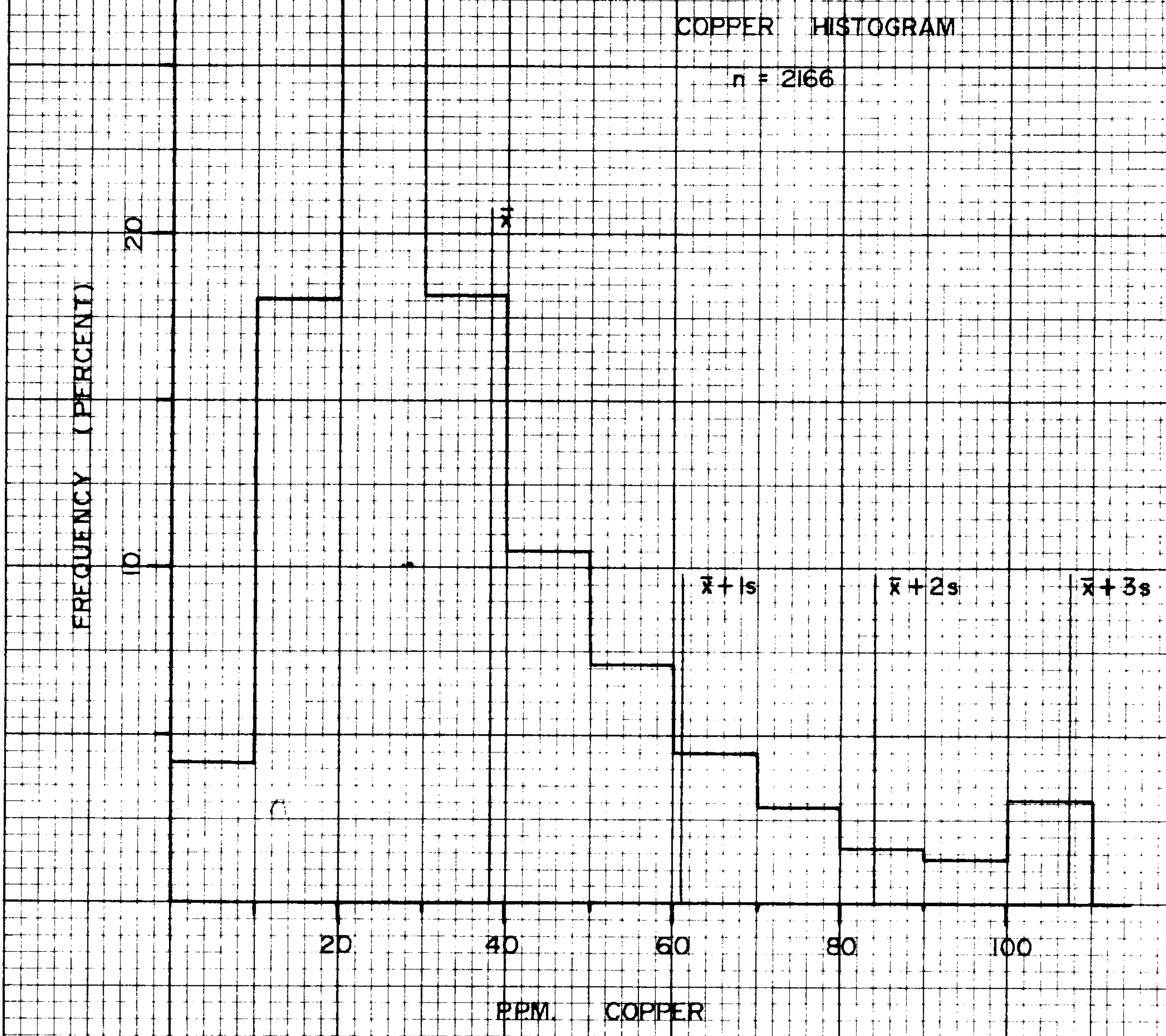
Contouring is biased somewhat in an east-west direction due to the sampling pattern.

BEHAVIOUR OF THE METALS

Copper is the most significant of the three metals determined in the survey. A single relatively smooth lognormally distributed set of values is indicated by the log-probability plot (see Sketches 4 and 5). The threshold value ($\bar{x}$ + 2s) of 84 ppm Cu is rather low and in fact even the highest copper values encountered within the survey are not strongly anomalous. Background values, mainly in the range of 10 to 30 ppm Cu, show little variation between the granitic intrusive bedrock and the Mount Nansen volcanics. Anomalous values appear to be associated with the contact, as described below. Both background and the anomalous values are more or less continuous through the various soil environments, with no obvious correlations.

The molybdenum values also appear to belong to a single, rather rough lognormal set of values (see Sketches 6 and 7) with very strong kurtosis. That is, most of the values are clustered very close to the mode, or geometric mean, with a very small number of anomalous values above the threshold of 5 ppm Mo. A comparison with the geology map indicates that two distinct sets of background values exist, those over the granitic intrusive rocks being higher than those over the volcanics. Anomalous values are found isolated

SKETCH NO. 4

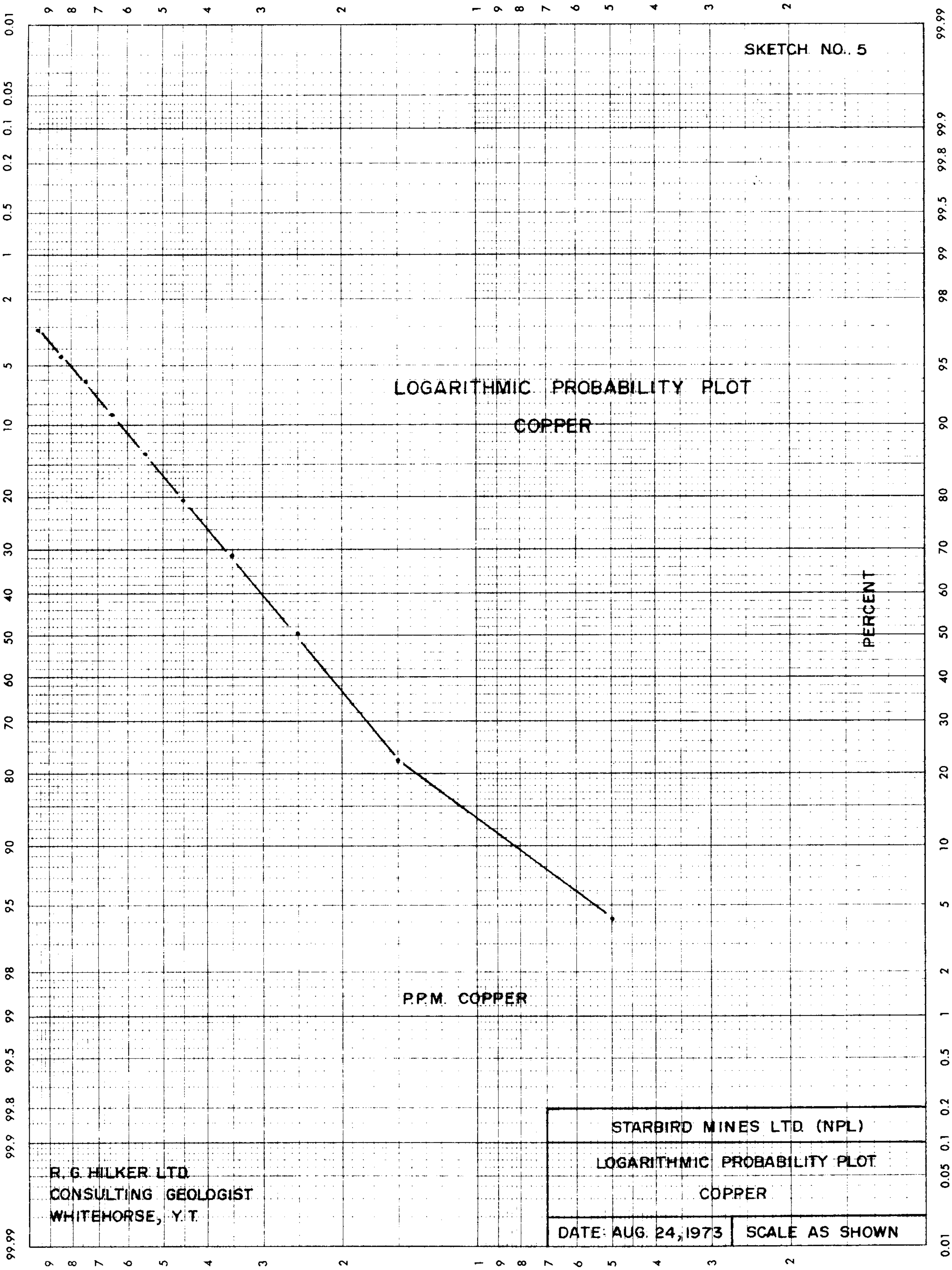


STARBIRD MINES LTD (NPL)

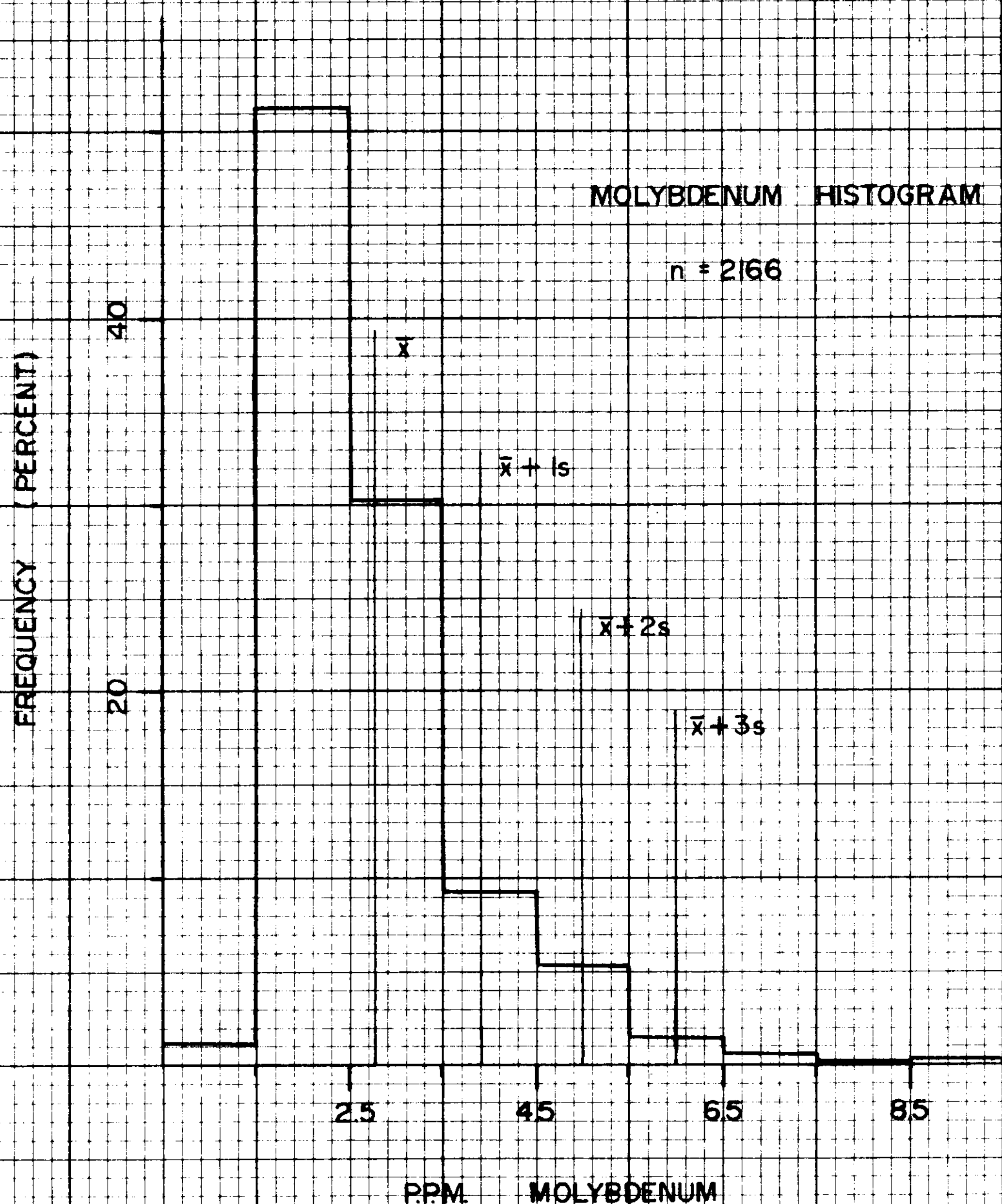
COPPER HISTOGRAM

DATE AUG. 24, 1973 | SCALE AS SHOWN

R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.


SKETCH NO. 5
LOGARITHMIC PROBABILITY PLOT
COPPER
PERCENT
P.P.M. COPPER
STARBIRD MINES LTD. (NPL)
LOGARITHMIC PROBABILITY PLOT
COPPER
DATE: AUG. 24, 1973
SCALE AS SHOWN
R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

SKETCH NO. 6

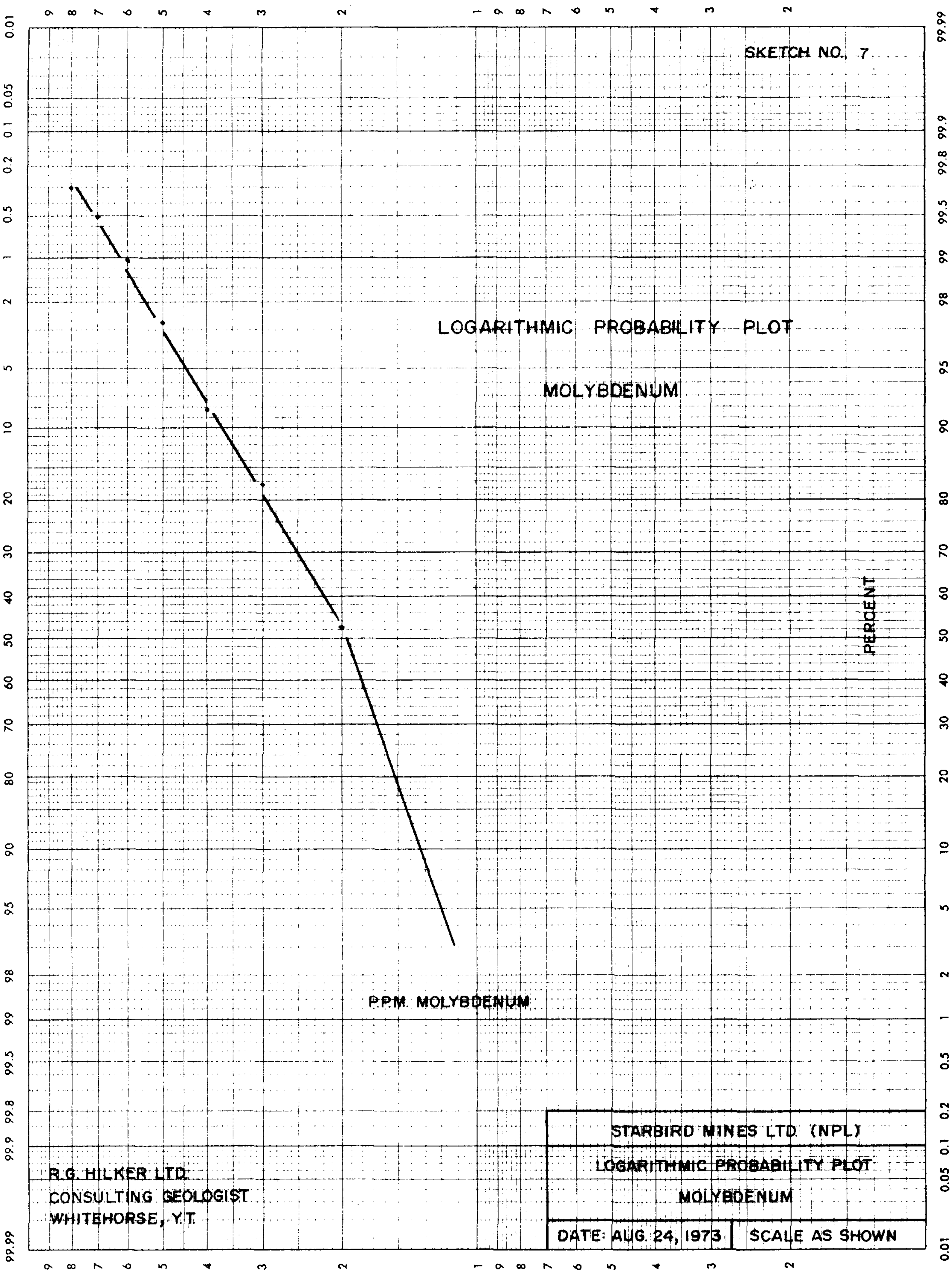


STARBIRD MINES LTD (NPL)

MOLYBDENUM HISTOGRAM

DATE AUG 24, 1973 | SCALE AS SHOWN

R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

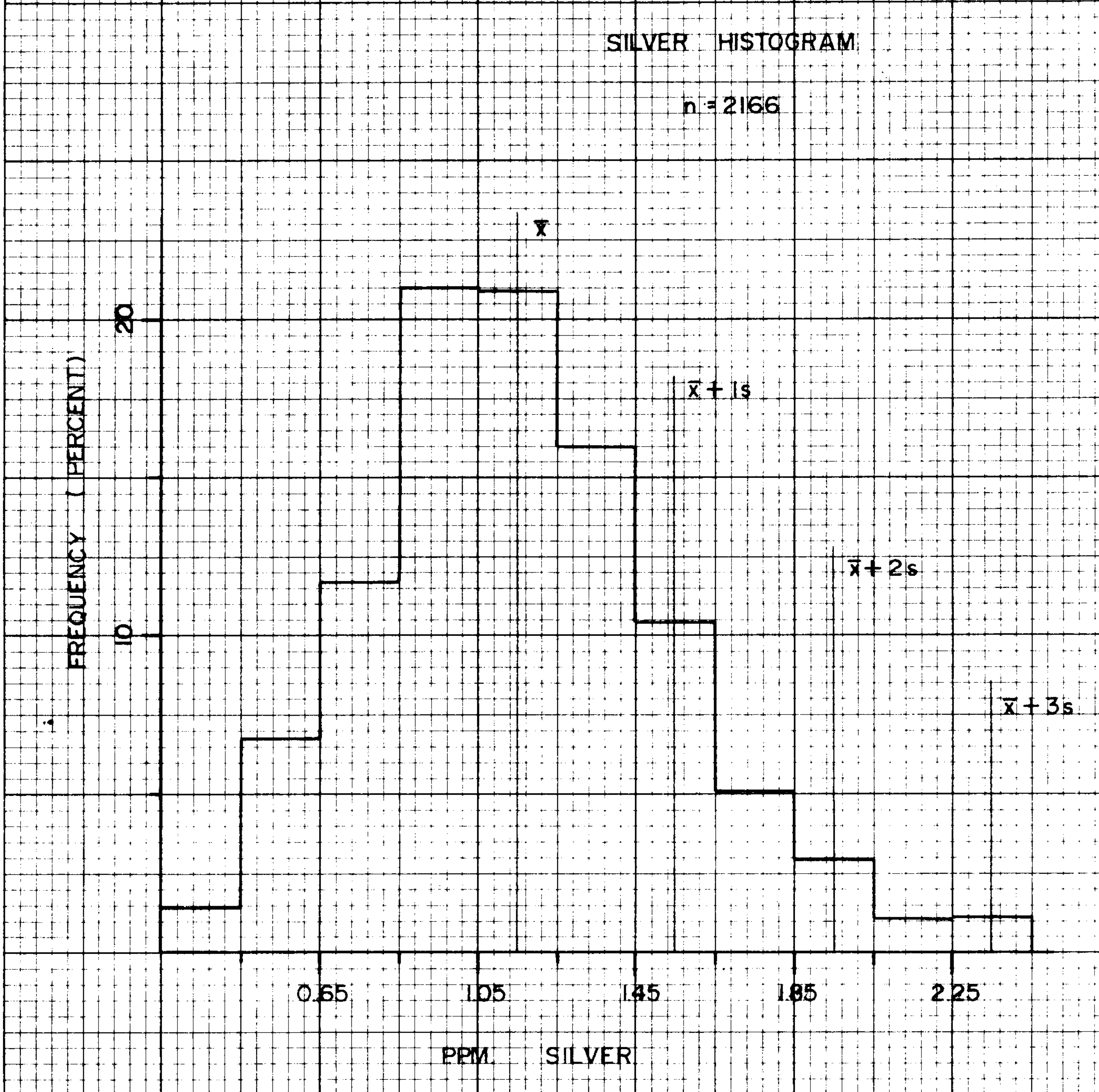


R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

STARBIRD MINES LTD. (NPL)
LOGARITHMIC PROBABILITY PLOT
MOLYBDENUM

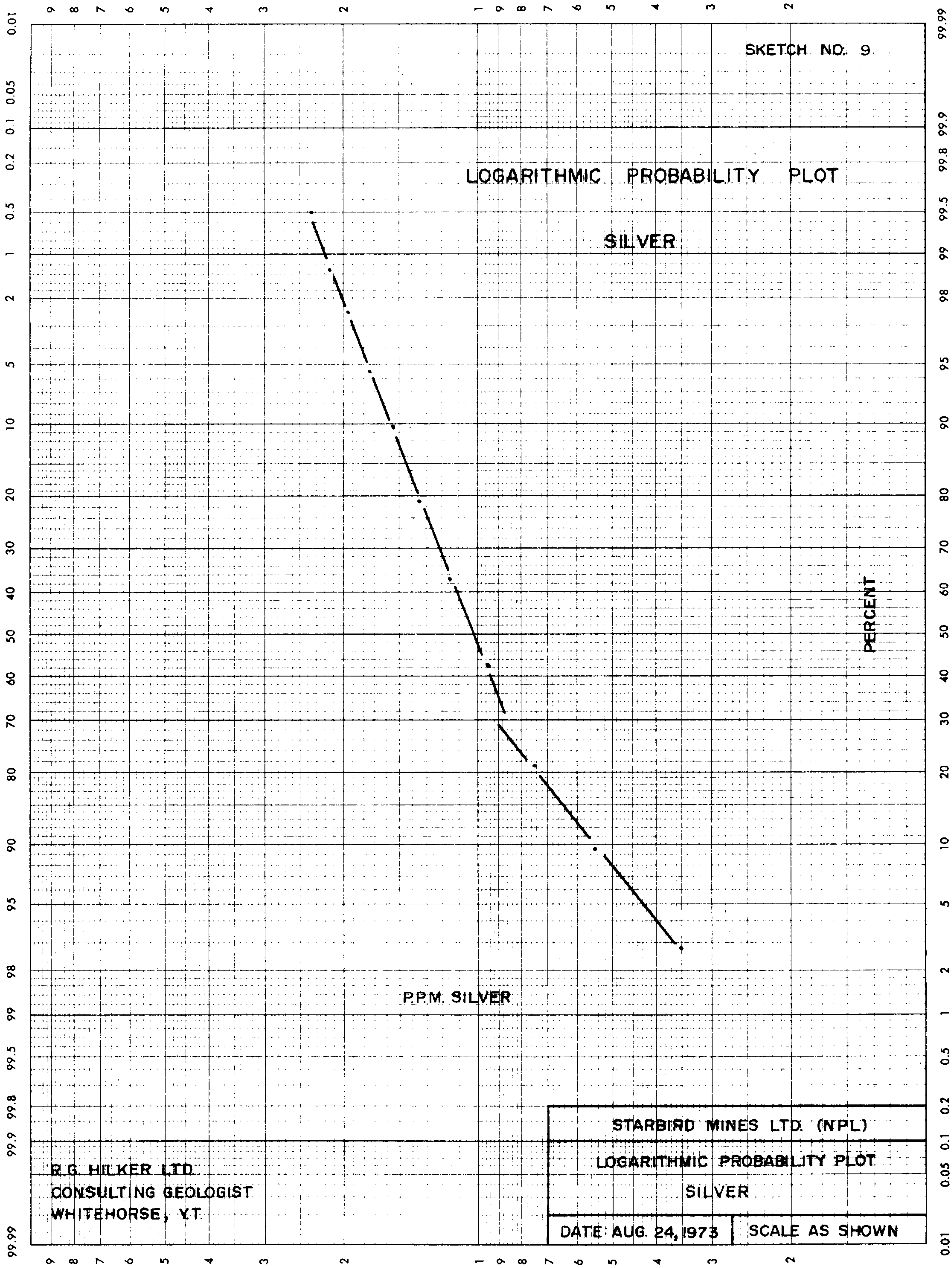
DATE: AUG. 24, 1973 | SCALE AS SHOWN

SKETCH NO. 8



R.G HILKER LTD
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

STARBIRD MINES LTD (NPL)	
SILVER HISTOGRAM	
DATE AUG. 24, 1973	SCALE AS SHOWN


SKETCH NO. 9
LOGARITHMIC PROBABILITY PLOT
SILVER
PERCENT
P.P.M. SILVER
STARBIRD MINES LTD. (NPL)
LOGARITHMIC PROBABILITY PLOT
SILVER
DATE: AUG. 24, 1973
SCALE AS SHOWN
R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

throughout the grid but mainly they correlate with the anomalous copper values. Aside from this reinforcement of the anomalous copper zone, the molybdenum values are too low to be considered significant in other areas.

The silver values provide the least information in the survey. Most values are in the background range, below 2.0 ppm Ag, with only a very few widely scattered strongly anomalous values. In addition, and mainly within the background range of values, there is a strong bias along the grid lines. This is very unlikely to represent a natural field condition and must be ascribed either to the type of sample material collected or to the laboratory analysis. Variations in the soil material could possibly be very subtle, as this same trend is not observed in the other elements analyzed. The variation is not extreme and could be the result of either field method or laboratory method fluctuations. The range of values involved is not great enough to influence the delineation of significant anomalies.

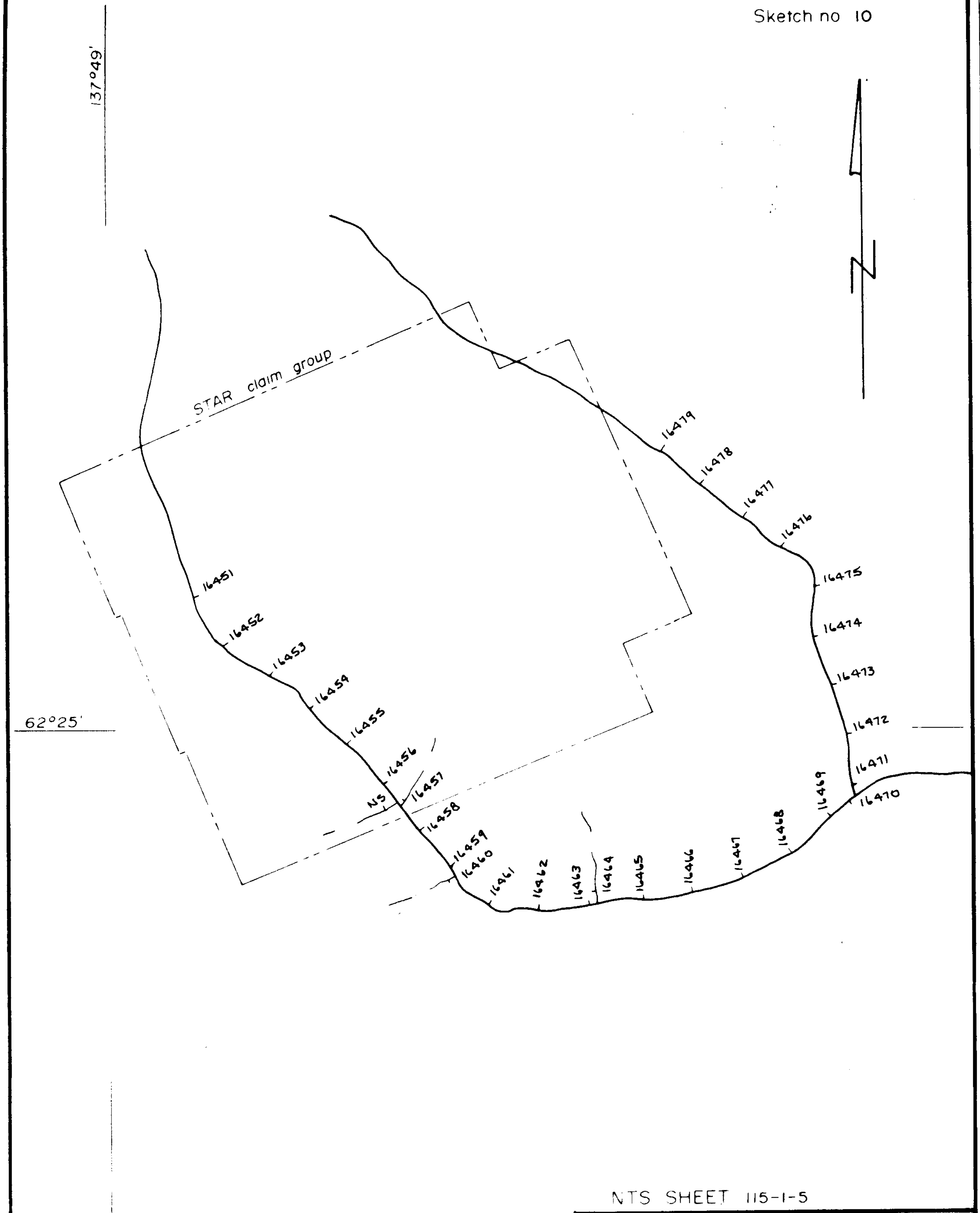
ANOMALY DESCRIPTION

The contact anomaly is more or less continuous across the entire grid except in the area of the top of the ridge between lines 40+00 W and 44+00W and across line 12+00 E, and it is very weak in the western part of the grid. It is strongest on the east-facing slope between the ridge and the eastern creek. It's dimensions in this area are approximately 3000 x 3000 feet. Here, it is at least partially a downslope anomaly, in particular in it's central part where it is underlain by a zone of permafrost with poor groundwater circulation, and largely secondary soils derived from upslope.

The anomaly is broad, discontinuous and of relatively low order as the anomalous copper values rarely exceed 200 ppm. It overlaps for some distance both into the granitic intrusive and into the volcanics. It is obvious that the anomaly is associated with the contact zone, and it may also be associated with the magnetic anomaly, although the strongest magnetic effects observed with the compasses was in the area of the top of the ridge, where the anomalous values fade out. No mineralization, except for local minor pyrite, was observed which would account for this anomaly. If mineralization of economic importance is indicated, it must be masked by at least some bedrock cover, and the dispersion pattern noted is reflecting a secondary and weak halo zone.

RECONNAISSANCE SILT TRAVERSE

A total of 29 silt samples were collected from the two streams which drain the claim group area. Results of this traverse have been plotted on Sketches 11 and 12. The values are mainly quite uniform and low, except for two spot high copper values on the western creek. Also, the eastern creek, which drains the area of the strongest grid anomaly, is slightly enriched in copper and molybdenum. Results are consistent with those obtained in the grid soils, and no strong anomalies are indicated.



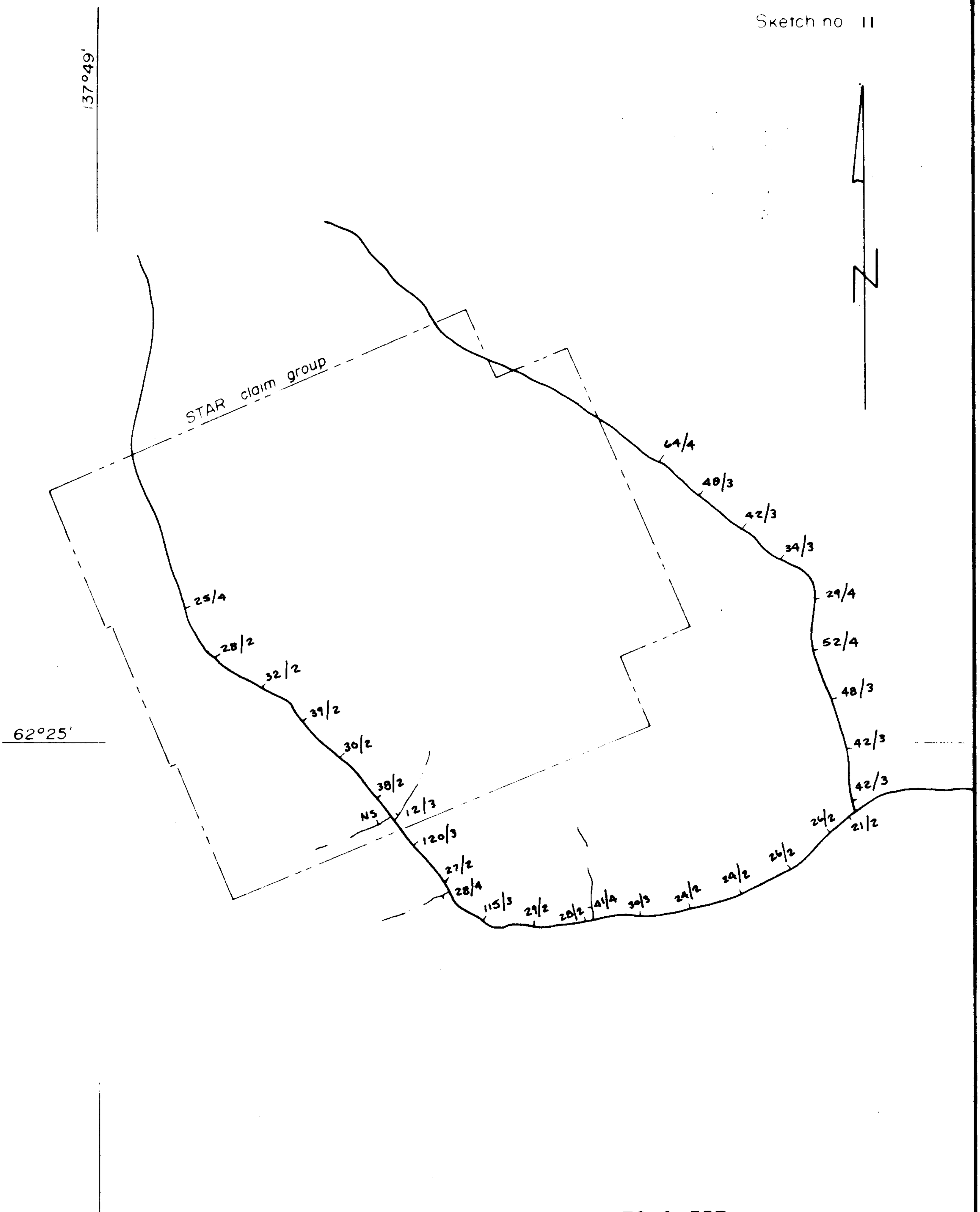
STARBIRD MINES LTD (NPL)

GEOCHEMISTRY TRAVERSE
SAMPLE NUMBERS

DATE AUG 31, 1973 | SCALE 1" = 1/2 mile

R G HILKER LTD
CONSULTING GEOLOGIST
WHITEHORSE, YT

Sketch no 11



NTS SHEET 115-I-5

STARBIRD MINES LTD (NPL)

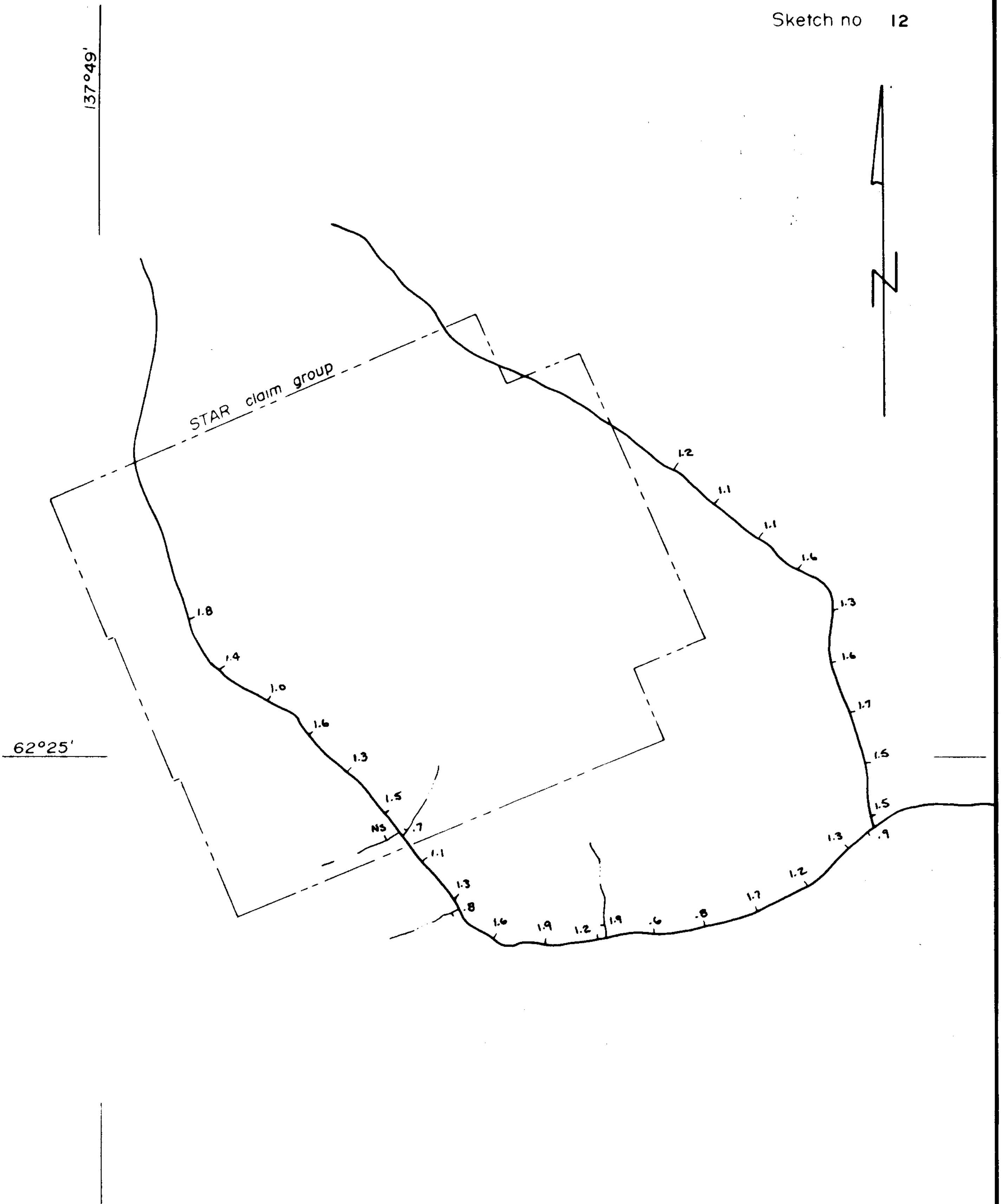
GEOCHEMISTRY TRAVERSE

COPPER ppm / MOLYBDENUM ppm

DATE AUG 31, 1973 | SCALE 1" = 1/2 mile

R G HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

Sketch no 12



NTS SHEET 115-I-5

STARBIRD MINES LTD (NPL)

GEOCHEMISTRY TRAVERSE

SILVER ppm

DATE AUG. 31, 1973 | SCALE 1" = 1/2 mile

R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

CONCLUSIONS

A surface geological and geochemical exploration program was conducted over the STAR 1-40 claim group during July and August, 1973, in order to evaluate the potential of the ground for copper or copper-molybdenum mineralization.

The southern two-thirds of the claim group is underlain by rocks of the Mount Nansen group, which forms locally a series of volcanic flows, tuffs and breccias with associated intrusives and a minor amount of sediments. These rocks were apparently deposited at or very close to a volcanic center, possibly in a subaqueous environment. They have been intruded in the northern third of the survey area by a fresh, medium to coarse grained porphyritic syenite, of the Cretaceous Coast Intrusive rocks.

With the exception of a trace of malachite observed in one location in the volcanic rocks, no copper or molybdenum minerals were observed during the survey. Pyrite is present locally within the intrusive rocks and rarely within the volcanics, except in the northeast corner of the grid where it sometimes exceeds 10 percent in a localized siliceous volcanic porphyry. Specular hematite was observed in quantities less than 1 percent disseminated throughout much of the intermediate fragmental volcanic rocks. Magnetite, very finely disseminated, occurs within at least some of the mafic volcanic rocks adjacent to the granitic intrusive contact, and this is probably responsible for the aeromagnetic anomaly over the claim group.

Soil samples collected over the grid were analyzed for copper,

...29

molybdenum and silver. A single anomaly, which follows the main granitic intrusive - volcanic contact, is defined by the copper values. This copper anomaly is supported by anomalous molybdenum values with lesser anomalous silver. It is a rather weak and widely dispersed anomaly of uncertain significance. Since it does correlate with the main contact zone, it could represent weak peripheral mineralization adjacent to more intensive sulfide mineralization at depth. Geophysical surveys, including magnetics, induced polarization and possibly electromagnetics, would be required to determine if significant amounts of metallic minerals are present at depth along the contact.

...30

RECOMMENDATIONS

The following surface exploration program would be required to evaluate the mineralization potential of the porphyritic syenite - Mount Nansen volcanic contact zone within the STAR 1-40 claim group, Dawson Range, Yukon Territory. The contact is defined as anomalous by a low order, widely dispersed copper and molybdenum soil anomaly, which may be indicative of contact-associated copper mineralization at depth.

1. Surface sampling: A small number of representative rock samples should be collected for assay to determine the relationship between the metal content of the rocks and of the overlying soils.

2. Ground Magnetics: A ground magnetics survey would determine the extent of contact associated magnetite and also to aid in contact definition. Approximately 20 line miles would be involved to cover the entire contact zone.

3. Induced Polarization: An I.P. survey, of approximately 8 line miles, should cover the most favourable contact zone. This survey, utilizing various electrode spacings, would indicate the presence of conductive minerals at various depths below bedrock surface.

4. Electromagnetics: A test survey of one or two profiles using EM-16 and horizontal loop electromagnetic surveys might be carried out to determine their effectiveness.

This program could be conducted from a small camp located in the extreme northeast corner of the present grid area. If encouraging results are obtained, some staking should be carried out to fill the existing fractions before further exploration is commenced.

ESTIMATED COST OF PROGRAMME

The following expenditures would be warranted to further outline the potential of the porphyritic syenite and the Mount Nansen volcanics contact. Should a high order induced polarization anomaly correspond with the aforementioned contact and geochemical anomaly, a second stage of diamond drilling would be a logical follow-up stage of exploration.

Surface Sampling & Geology		$ 1,800.00
Assaying --------------------	$ 300.00	
Detail Geology & Sampling ---	1,500.00	
Ground Magnetics - 20 linemiles		2,000.00
Test Electro-Magnetics		1,000.00
Induced Polarization - 8 linemiles @ $600.00		4,800.00
Helicopter Flying		2,000.00
Transportation - Mobilization & Demobilization		750.00
Camp Supplies & Groceries		1,500.00
Radio Rental		150.00
Consulting Fees & Report		1,500.00
Total Programme		$15,500.00

CERTIFICATION

I, GERALD G. CARLSON, residing in the City of Whitehorse, in the Yukon Territory, DO HEREBY CERTIFY:

1. THAT I am a Geologist, employed by the Geological Consulting firm of R.G. Hilker Limited, with an office located at #8 Northern Metalic Building, and postal address P.O. Box 4008, in the City of Whitehorse, in the Yukon Territory.

2. THAT I am a graduate of the University of Toronto located in Toronto, Ontario, where I obtained a Bachelor of Applied Science degree in 1969.

3. THAT I am a registered member in good standing of The Association of Professional Engineers of the Yukon Territory and of the Geological Association of Canada.

4. THAT I have practised my profession as an engineer and geologist for the past 5 years.

5. THAT I have personally supervised the geological and geochemical sampling program on the DOG claims and was on the property from July 24 to August 16, 1973.

6. THAT I have no direct or indirect interest in the property or securities of Starbird Mines Ltd. (NPL), nor do I expect to receive any.

DATED this 31st day of August, A.D. 1973

G.G. Carlson, P.Eng.

THAT I concur with the interpretation of Mr. G.G.Carlson, an employee of R.G.Hilker Limited, and that I have personally supervised the Starbird Mines Ltd. (N.P.L.) field programme and report preparation.

R.G.Hilker, P.Eng.

CERTIFICATION

I, GERALD G. CARLSON, residing in the City of Whitehorse, in the Yukon Territory, DO HEREBY CERTIFY:

1. THAT I am a Geologist, employed by the Geological Consulting firm of R.G. Hilker Limited, with an office located at #8 Northern Metalic Building, and postal address P.O. Box 4008, in the City of Whitehorse, in the Yukon Territory.

2. THAT I am a graduate of the University of Toronto located in Toronto, Ontario, where I obtained a Bachelor of Applied Science degree in 1969.

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DATED this 31st day of August, A.D. 1973

G.G. Carlson, P.Eng.

Association of Professional Engineers of the Yukon Territory
G. G. CARLSON
GEOLOGICAL
ENGINEER

FIELD PROGRAMME INVOICES

R.G. Hilker Limited

PHONE: OFFICE 667-2819
RES. 668-2822
AREA CODE 403

R. G. HILKER
LIMITED
CONSULTING GEOLOGIST . . . PROFESSIONAL ENGINEER
P.O. Box 4008, WHITEHORSE
YUKON TERRITORY, CANADA
"LAND OF THE MIDNIGHT SUN"

Starbird Mines Ltd. (NPL)
427 - 510 West Hastings St.
Vancouver, B.C.

September 1, 1973 Re: STAR 1-40 Exploration

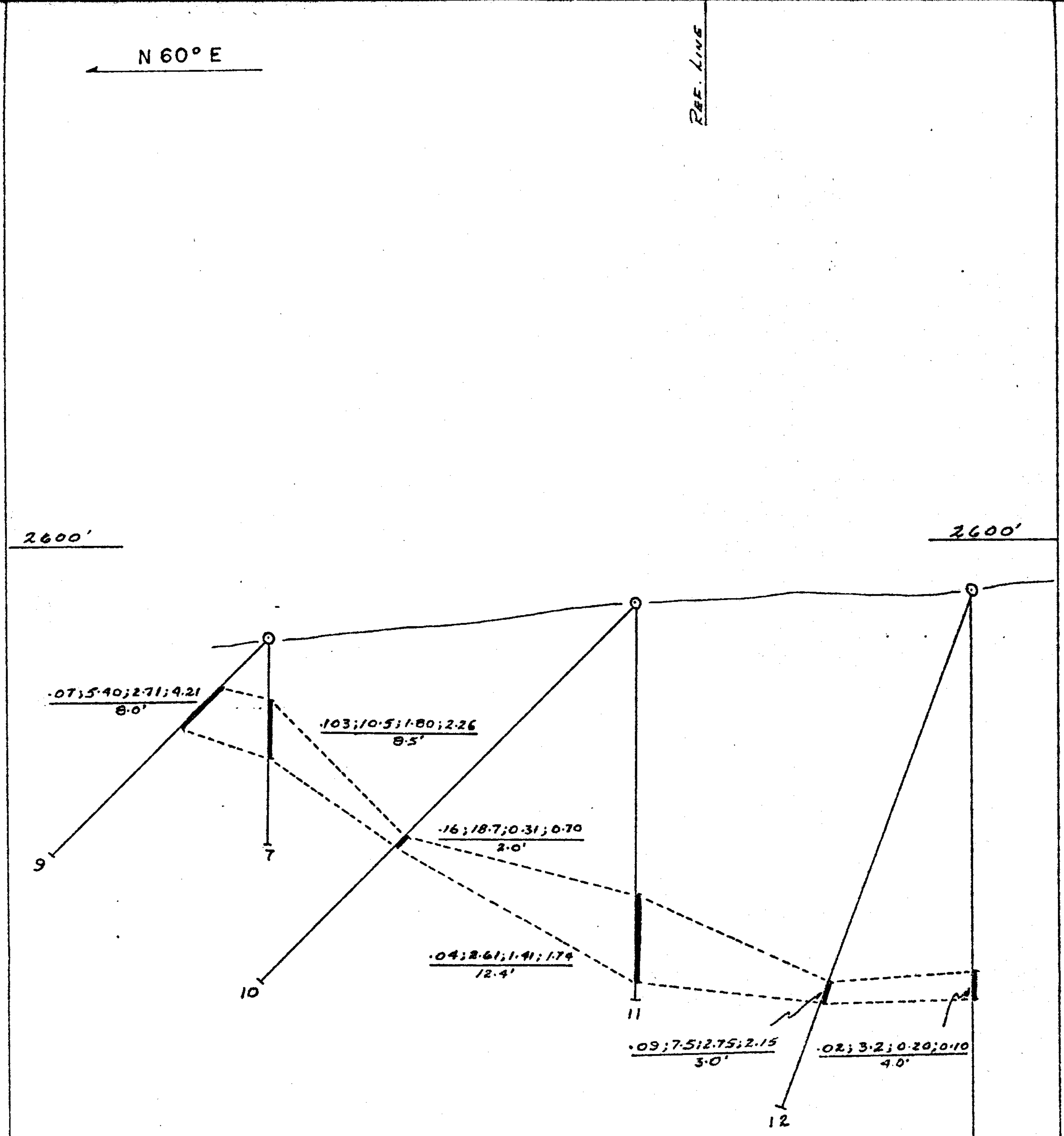
INVOICE #2181

Prospector Mountain - STAR 1-40 claim group

Disbursements - Linegrid		$135.36 ✓
Yukon Explosives #13670	100.80	
Northern Metalic	11.56	
Receiver General of Canada	1.50	
General Enterprises	21.50	
	135.36	
Camp Supplies Disbursements		520.42 ✓
Rexall Drugs	20.79	
The Bay	30.46	
Taylor & Drury	5.25	
Nelson's Ltd.	11.54	
Canadian Propane	5.50	
Whitehorse Star	2.28	
Gulf Oil	7.60	
R.G. Hilker Ltd.	367.50	
R.G. Hilker Ltd.	69.50	
	520.42	
Transportation - R.G. Hilker Ltd.		928.52 ✓
July 24, 1973	277.97	
August 1	239.15	
August 16	119.10	
August 24	257.65	
Travel Expenses - August 24	34.65	
	928.52	
Transportation - Helicopter		2,849.90
Trans North Turbo Air	1,313.90	
C.E. Ford - August 1	192.00	
- August 6	208.00	
- August 16	272.00	
- August 24	864.00	
	2,849.90	

... 2

Disbursements - Camp Groceries		1,227.32
Burns - July 20	181.49	
Burns - July 31	177.32	
Burns - August 6	194.25	
Riverside Grocery	674.26	
	1,227.32	
Disbursements - Barringer Research		3,683.90
Geochemical determinations on 2167 samples	3,683.90	
R. G. Hilker Limited		9,623.70
Geological sampling and geologist	3,850.00	
Soil sampling 2167 samples & linegrid 39.2 miles	3,850.00	
Geological consulting	500.00	
Drafting and data processing	700.00	
Report preparation and duplicating	700.00	
Telephone	23.70	
	9,623.70	
Total Invoice		$18,969.12



DRILL SECTION # 1

STARBIRD MINES LTD.

STEWART, B.C.

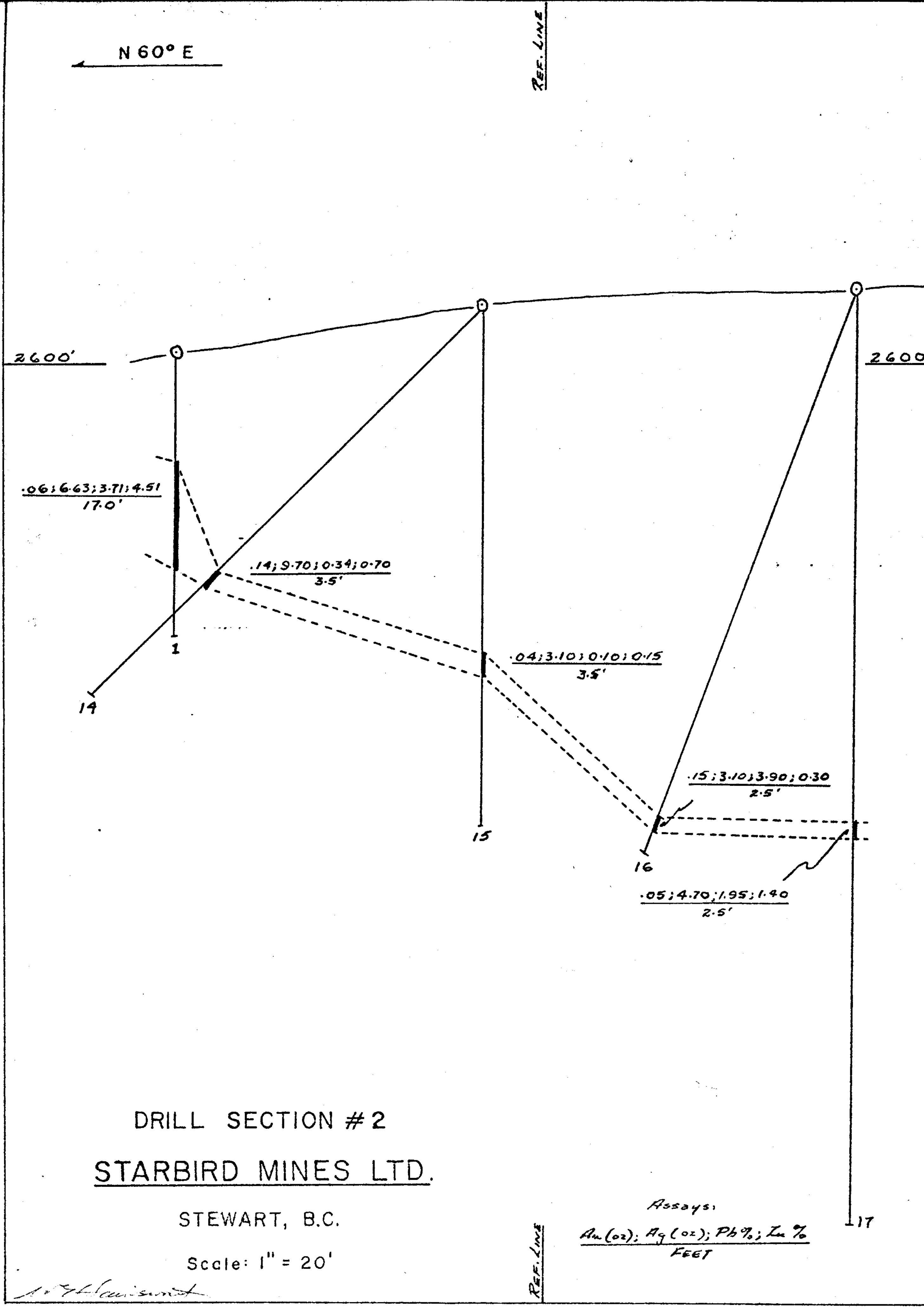
Scale: 1" = 20'

REF. LINE

Assays:
Au (oz); Ag (oz); Pb %; Zn %
FEET

To 139'
13

[signature]

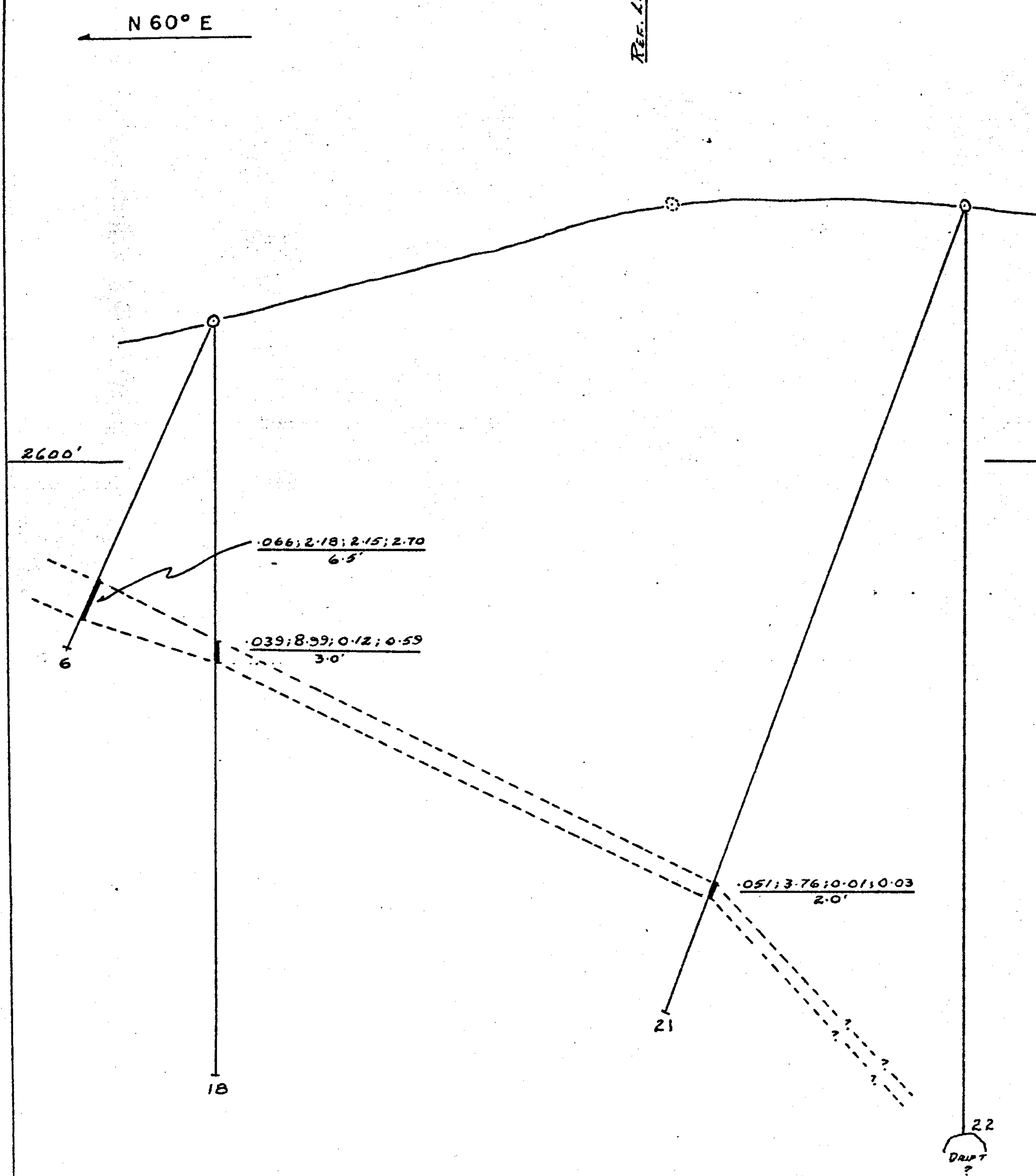


DRILL SECTION # 2

STARBIRD MINES LTD.

STEWART, B.C.

Scale: 1" = 20'



DRILL SECTION # 3

STARBIRD MINES LTD.

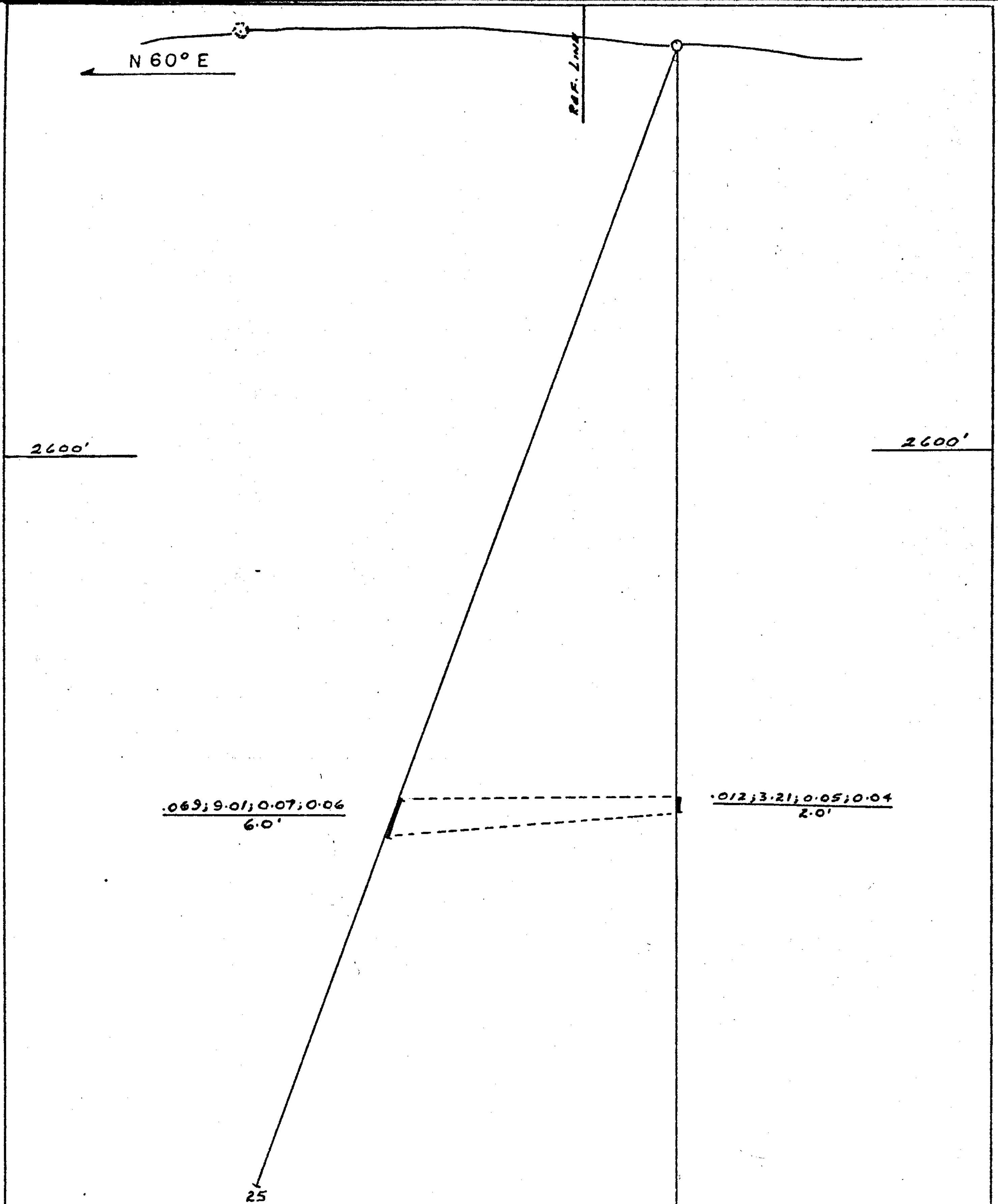
STEWART, B.C.

Scale: 1" = 20'

REF. LINE

Assays:

Au (oz); Ag (oz); Pb %; Zn %
Feet



DRILL SECTION # 5

STARBIRD MINES LTD.

STEWART, B.C.

Scale: 1" = 20'

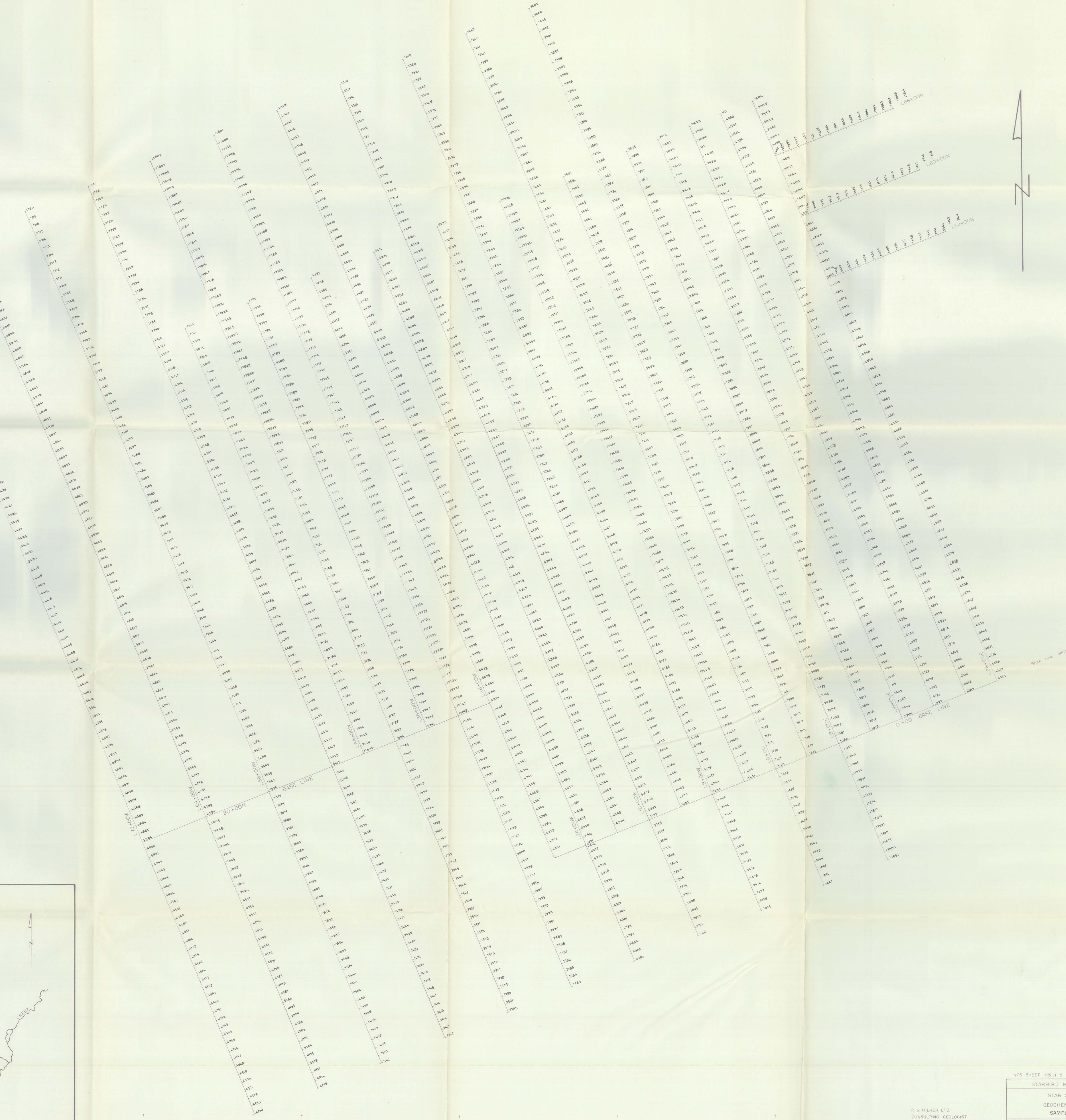
REF. LINE

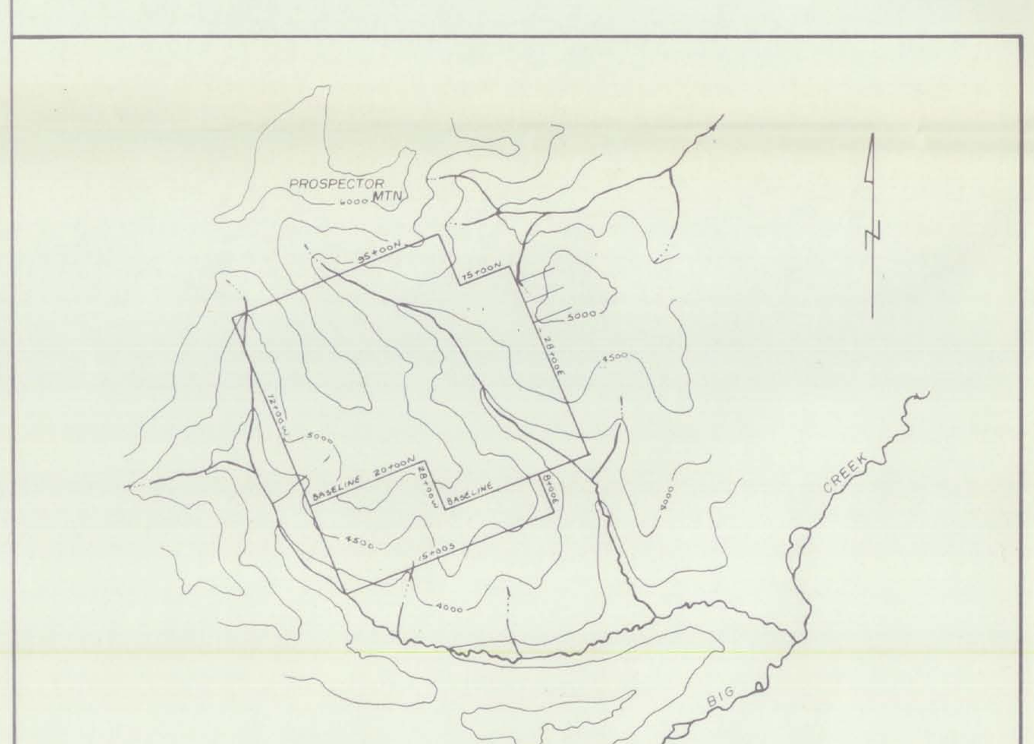
26

Assays:
Au (oz); Ag (oz); Pb %; Zn %
FEET


PLAN NO. 1
STAR 4
STAR 5
STAR 6
STAR 7
STAR 8
STAR 9
STAR 10
STAR 11
STAR 14
STAR 15
STAR 16
STAR 17
STAR 29
STAR 30
STAR 31
STAR 32
STAR 33
STAR 34
STAR 35
STAR 36
BASE LINE
20+00N
0+00 BASE LINE
CAMP SITE
GEOLOGICAL LEGEND
MESOZOIC
Jurassic - Upper Cretaceous
Coastal Intrusives
G Granitic intrusive
Mount Nansen Group
B/D Basaltic/dacitic dikes
Vi Intermediate fragmental volcanics
S Fine grained sediments, tuff
Vb Basic flows
LEGEND
Outcrop or boulder zone
Inferred geological contact
Strike and dip of joints
Strike and dip of bedding, foliation
Volcanic breccia
Claim post (located)
Claim post (assumed location)
Claim line
Drainage
R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.
NTS SHEET 115-I-5
PLAN NO. 1
STARBIRD MINES LTD. (NPL)
STAR CLAIM GROUP
GEOLOGY PLAN
DATE: AUGUST 20, 1973
SCALE: 1" = 400 feet
96168

PLAN NO. 2





GRID LOCATION WITH TOPOGRAPHY
SCALE 1:50,000

R G HILKER LTD
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

NTS SHEET 115-I-5 PLAN NO. 2

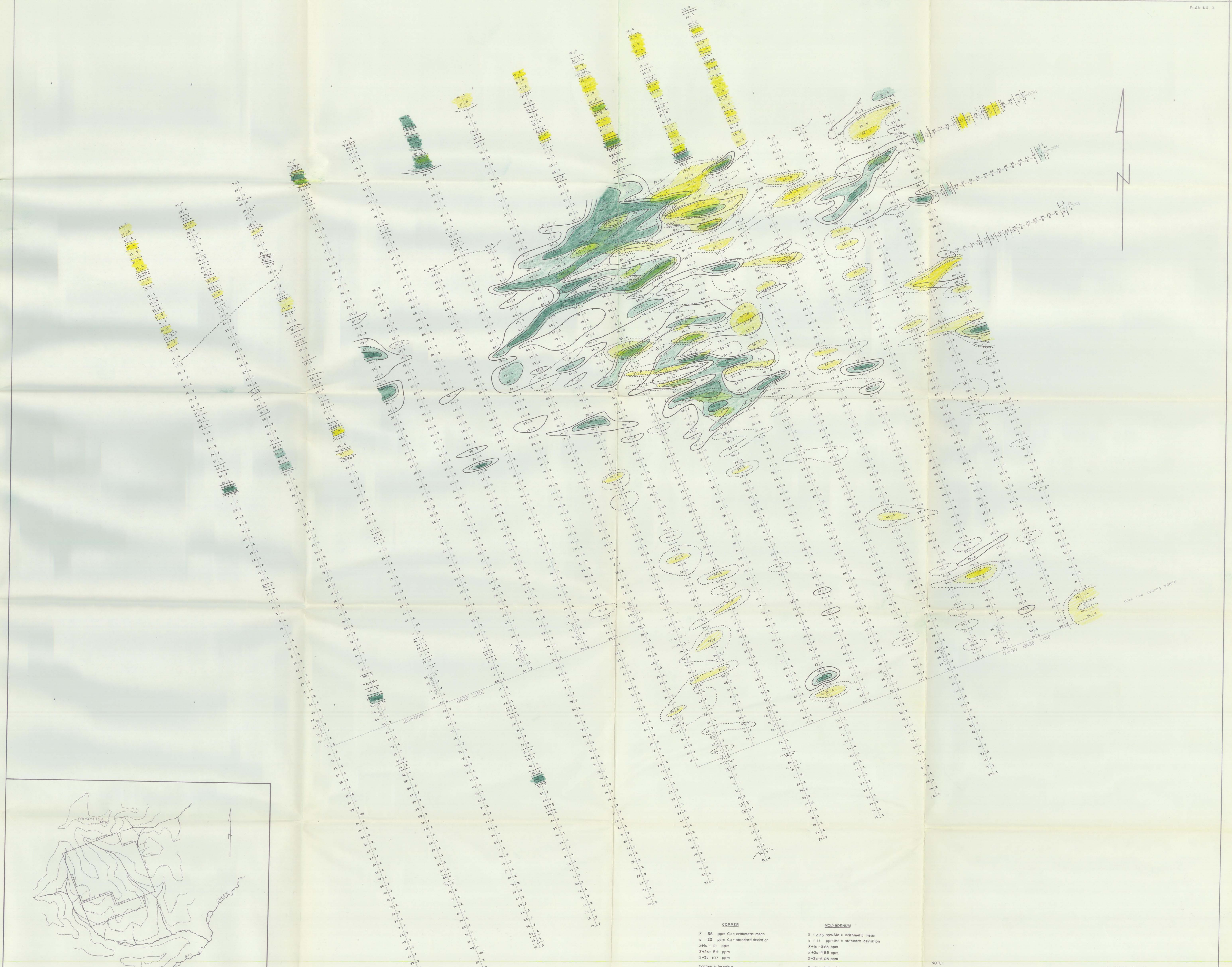
STARBIRD MINES LTD. (NPL)

STAR CLAIM GROUP

GEOCHEMISTRY SURVEY

SAMPLE NUMBERS

DATE AUGUST 20, 1973 SCALE 1":400 feet



GRID LOCATION WITH TOPOGRAPHY
SCALE 1:50,000

COPPER

$\bar{x}$ = 38 ppm Cu = arithmetic mean
s = 23 ppm Cu = standard deviation
$\bar{x}$+1s = 61 ppm
$\bar{x}$+2s = 84 ppm
$\bar{x}$+3s = 107 ppm

Contour intervals –

107
85
62

MOLYBDENUM

$\bar{x}$ = 2.75 ppm Mo = arithmetic mean
s = 1.1 ppm Mo = standard deviation
$\bar{x}$+1s = 3.85 ppm
$\bar{x}$+2s = 4.95 ppm
$\bar{x}$+3s = 6.05 ppm

Contour intervals –

5.5
4.5
3.5

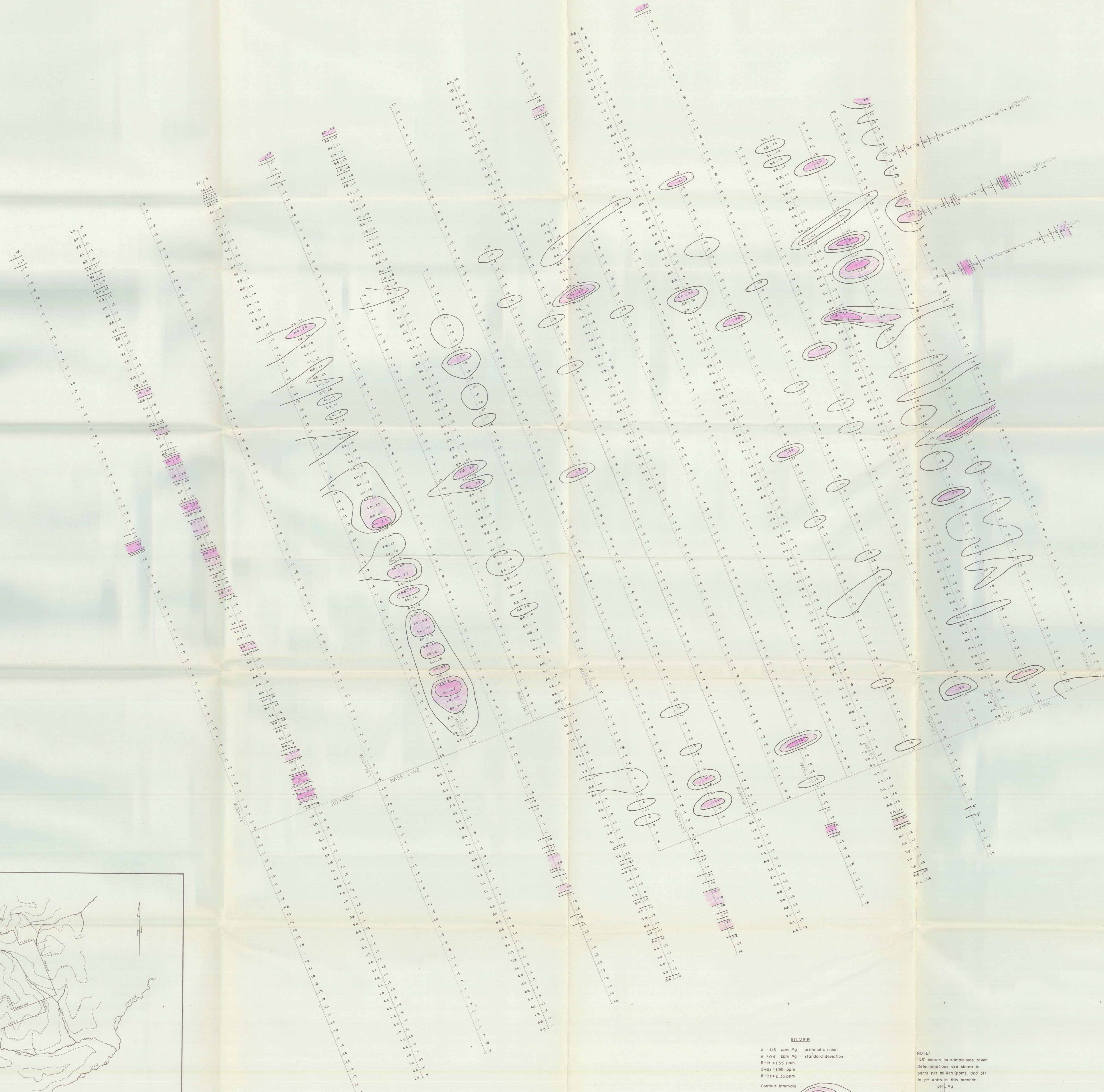
NOTE:
'NS' means no sample was taken.
Determinations are shown in parts per million (ppm) in this manner:

Cu ∟ Mo
Cu ∟ Mo
Cu
Mo

R G HILKER LTD
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

NTS SHEET 115-I-5	PLAN NO. 3
STARBIRD MINES LTD (NPL)	
STAR CLAIM GROUP GEOCHEMISTRY SURVEY COPPER ppm/MOLYBDENUM ppm	
DATE AUGUST 20, 1973	SCALE 1" = 400 feet

PLAN NO. 4



GRID LOCATION WITH TOPOGRAPHY
SCALE 1:50,000

SILVER

$\bar{x}$ = 1.15 ppm Ag = arithmetic mean
s = 0.4 ppm Ag = standard deviation
$\bar{x}$+1s = 1.55 ppm
$\bar{x}$+2s = 1.95 ppm
$\bar{x}$+3s = 2.35 ppm

Contour intervals – 2.35, 1.95, 1.55

NOTE:
'NS' means no sample was taken.
Determinations are shown in parts per million (ppm), and pH in pH units in this manner:

pH | Ag
pH | Ag
Ag

R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

NTS SHEET 115-I-5	PLAN NO. 4
STARBIRD MINES LTD. (NPL)	
STAR CLAIM GROUP	
GEOCHEMISTRY SURVEY	
pH/SILVER ppm	
DATE AUGUST 20, 1973	SCALE 1" = 400 feet