GEOLOGICAL REPORT

SPY CLAIMS 1 - 12 (incl.)

N.T.S. 115 G-2

Lat: 61°09' Long: 138°45'

by

R. F. McLoughlin
J. S. Vincent, P.Eng.

July 16 - 24, 1973.

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of $ 2418.02

D. B. Craig

Resident Geologist or ~~Resident Mining Engineer~~

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

Commissioner of Yukon Territory

Vancouver, B.C. August 15, 1973.

TABLE OF CONTENTS

TEXT

TABLES

ILLUSTRATIONS

INTRODUCTION

The SPY claims cover an area of 0.97 square miles; the longest extent of the claim group being 7500 feet and the shortest width 3000 feet. Access to the claims is by way of helicopter to the locations marked 'H' on the claim sketch. The claims are drained by a creek system which forms the south branch of Nines Creek four miles from the Alaska Highway at Mile 1077. Nearest habitation is Destruction Bay at Mile 1083 on the Alaska Highway. Flight time from Destruction Bay to the claim area is approximately 10 minutes.

Previous geological and geochemical work was done by John S. Vincent Limited in 1972 on a preliminary evaluation basis.

The claim group occupies 7,500 feet of the northeast slope of the mountain chain shown on the claim sketch. This chain forms part of the Kluane Ranges and is the second interior chain to the west of Kluane Lake at this locality. Drainage of the area is to the northeast and joins Nines Creek four miles from the Highway.

Elevation ranges from 4,000 feet to 6,500 A.S.L.; a topographic relief contrast of 1,500 feet.

Exposure of the surface geology is moderate to good with a minimum of surficial cover on the claim area. Rock talus covers the higher reaches of the creeks with an average free slope of 38 degrees. Glacial debris is present up to 100 feet thick in the banks which border the main creeks just off the area to the northeast.

Frost cracking and exfoliation is the predominant weathering agent above 5,000 feet A.S.L.

The geological map submitted is based on aerial photograph A15434-170, NW quadrant, blown up to a scale of 1:30,000. The geology map is enlarged on this to a scale of 1:60,000 at 4,500 feet. This scale is roughly correct at the 4,500 foot elevation.

PROPERTY

The SPY claims are located on Claim Sheet 115-G-2, four miles west of the Alaska Highway at Mile 1077. The claims were recorded in the name of John S. Vincent on August 4, 1972, and their names and record numbers are listed as follows:

Claim Name	Record Number	Expiry Date
SPY 1	Y 66849	August 4, 1973
2	50	"
3	51	"
4	52	"
5	53	"
6	54	"
7	55	"
8	56	"
9	57	"
10	58	"
11	59	"
SPY 12	Y 66860	"

Detailed geological mapping and evaluation was carried out during the period July 16 - 24, 1973 by Messrs. R. F. McLoughlin and M. Macey, under the

direct supervision of John S. Vincent, P.Eng.

The property is accessible by helicopter and during the 1973 field season the closest available aircraft was stationed at Haines Junction; approximately 40 minutes flying time.

GEOLOGY

GENERAL

The claim area covers the northeast limb of a regional syncline in Cache Creek Volcanics and later sediments and tuffs of Permian to Permo-Triassic age. These formations were invaded by gabbro, peridotite and diorite intrusions of early Triassic age and subsequently folded and faulted with a northwest-southeast trend. (See Structure section A-B enclosed and also refer to section C-D, Kluane Lake Geology Map 1177A, after Muller, 1967). Low angle thrust faulting postdates the ultramafic and mafic intrusions and may be responsible for some of the epigenetic sulphide occurrences in the region. The main structural control in the region is the northwest trending regional syncline. The claim group covers the eroded northeast limb which parallels the Shakwak Lineament.

PRIMARY LITHOLOGIC UNITS

Unit No. 1 Andesites:

A coarsely sheared grey-green to purple amygdaloidal lava. The unit

weathers as a coarse blocky to siliceous rock with a poorly defined bedding attitude. It forms a main exposure about 500 feet long and 100 feet high at Creek No. 1. Alteration is mainly limonite and this may be attributed to the disseminated pyrite. Minor calcite-limonite coated shear zones occur up to 6 inches thick with an attitude of 145/70S. Shearing is coarse and irregular. Units 1 - 3 are identified as pre Lr. Permian with reference to Muller, 1967. This unit appears in Creek No. 2 as a cherty grey green unit with prominent jointing at 080/60N with 3 to 12 inch joint frequencies. Some of these joints are filled with ½ to 1 inch calcite and extend only a short distance across the exposure.

Unit No. 2 Sandstones and Conglomerates:

A buff-grey silicified sandstone with 2 to 6 inch bedding units overlain by 300 feet of massive blocky, pyritic, sandstone-conglomerate containing small quartz pebbles. This unit may be traced in Creeks 1 and 5 with some certainty.

Unit No. 3 Shales and Minor Volcanic Tuff:

A grey-black cleaved, thin bedded unit up to 100 feet thick and containing minor volcanic tuff toward the base of the unit. The tuff may be related to volcanic activity responsible for the formation of Unit 1. These shales may be correlated with the block shales in Creek No. 3.

Unit No. 4 Sandstones:

A grey to buff siliceous sandstone with 2 inch bedding units up to 150 feet thick. In Creek 4 the unit is bleached in contact with the gabbro.

The unit is friable due to close fracturing of the beds at 355°/65NE. Exposure is limited to Creek No. 4 where it separates the black shales of Unit No. 3 from the gabbro.

Unit No. 5 Conglomerates:

A light grey cherty conglomerate with bedding units to to 3 feet thick. The unit contains cherty quartz pebbles in a fine grained grey siliceous matrix. This unit may be correlated between Creeks 3 and 5. In Creek 3 the colour changes to orange due to limonitic alteration of minor disseminated pyrite.

Unit No. 6 Shales:

A thin bedded dark grey limonitic unit extensively cleaved over a 200 foot exposure. Minor interbedded siltstones occur with disseminated pyrite. The shales weather easily to 'shards' while the siltstones break in flags. The shales are altered to sericite schists as exposed on the intervening ridge between Creeks 1 and 2.

Unit No. 7 Sandstone:

A buff massive bedded dense unit up to 200 feet thick. Minor pyrite occurs as disseminations. Varieties of the unit are thin bedded and limonitic. This unit may be correlated with the buff grey sandstones and conglomerates found in Creek 4 and that unit found on the ridge between Creeks 1 and 2.

Unit No. 8 Argillite:

A thin bedded extensive unit of 300 feet total thickness composed of grey shales and black cleaved shales with 1 to 3 inch bedding units. Both

varieties are pyritic and in this area are closely associated with the main gabbro-peridotite intrusion.

Unit No. 9 Limestone:

A medium grey massive recrystallized limestone, 10 to 20 feet thick. The unit forms a positive topographic feature standing above the surrounding weathered rock by as much as 50 feet. It is readily discernible on the aerial photographs as an irregular light grey band. This unit is host for a massive magnetite and massive pyrrhotite showings with minor copper and nickel values as shown on the accompanying map.

Unit No. 10 Shales:

An orange brown to grey thin bedded pyritic unit up to 150 feet thick. This unit is well exposed in Creek 3 and is removed elsewhere by subsequent intrusion.

Unit No. 11 Quartzite:

A massive bedded grey cherty quartzite. Maximum thickness is 50 feet. The unit is bleached where it contacts the gabbro in Creek 4. Bedding units range from 2 to 6 feet. No other alteration occurs at the intrusive contact.

Unit No. 12 Shales:

Grey cleaved fine grained thin bedded shales up to 100 feet thick. Siliceous where in contact with gabbro. This unit may be correlated over Creeks 3 to 5.

Unit No. 13 Tuffs, Rhyolites:

A 300 foot thick buff grey to red cleaved pyritic unit. Fine grained equidimensional white feldspar grains are set in a light grey aphanitic groundmass. A dense and hard unit. Gossan stain due to pyrite is pervasive. This unit may be traced between Creeks 1 to 3.

Unit No. 14 Limestone:

A massive, grey, hard, recrystallized limestone. It occurs as a massive thin bedded unit up to 100 feet thick. It is a host rock for massive magnetite and pyrrhotite mineralization which forms a skarn type deposit.

Unit No. 15 Sandstone:

A 100 foot thick, light brown, medium grained sandstone with hematitic staining. The unit is represented in outcrop on the ridge between Creeks 1 and 2.

Unit No. 16 Chert:

A thin banded chert unit 10 feet thick marks the uppermost limit of the ultramafic intrusions in the claim area. The unit is outside the claim group and forms a moderate escarpment with other sedimentary units overlying it.

Unit No. 17 Gabbro:

The gabbro is a medium-green coarse grained hypidiomorphic granular rock, generally altered to serpentinite where olivine is abundant. It weathers easily forming a pale brown soft sand. The fresh gabbro is medium grained equigranular, quite hard and dense. All crystals are individually

discernible. Contained visible sulphides range up to 2% disseminated chalcopyrite and pentlandite-pyrrhotite. Assays range up to 0.5% Cu and 0.5% Ni as found in the showing near Creek 4. The fresh gabbro forms part of the main gabbro-peridotite intrusion and is distinguished by a rusty brown coating on a harder, more blocky gabbro talus compared to a green serpentinitic coating on the more friable altered gabbro. The percentage of economic minerals is higher in the gabbros as a unit compared with the assays of the accompanying peridotite units. In this unit there occurs an en-echelon quartz-carbonate vein system with disseminated galena, sphalerite and trace nickel.

Unit No. 18 Gabbro-Peridotite Differentiate:

A green black feldspathic differentiate with dominant altered olivine and pyroxene. This unit occurs up to 700 feet thick. Economic mineral values are low in this unit, no economic percentages being found. The unit is moderately serpentinized, giving at first glance a gabbroic composition. It extends over the claim area for 6,000 feet variously exposed on ridges.

Unit No. 18A Peridotite:

The unit occurs at the base of the gabbro-peridotite differentiate and does not extend more than 1000 feet. Very minor pentlandite or pyrrhotite is visible as disseminations. No assays for this unit are available at the date of this report. The colour of this unit is dark green-black with an aphanitic groundmass, serpentinized on shear faces with minor antigorite (?) coating. The unit appears to be a final differentiate of unit 18.

Unit No. 19 Diorite:

This is a fine grained equigranular, hypidiomorphic granular, dense unit of irregular occurrence associated with the main gabbro-peridotite units. Predominant minerals are feldspar (sodic?), hornblende, biotite and minor pyroxene. The unit is unaltered, however no contact relationship was found with the surrounding gabbro.

Unit No. 20 Recent Surficial Deposits:

A poorly sorted unit composed of rounded cobbles and pebbles of glacial origin up to 80 feet in thickness in the northeast quadrant just beyond the claim group. This unit grades upward to talus brought down from the weathered rock formations.

VEINING

Quartz-carbonate veins up to 1 foot thick occur in altered gabbro units with attitudes of 150°/80N. Significant galena and sphalerite occur giving assay values of $\leq$ 0.01% Cu, 0.25% Pb, 1.20% Zn and 0.01% Ni. The en-echelon vein system assayed in SPY claim No. 11 may be correlated with the quartz-carbonate vein outcropping in gabbro in Creek 1. The age of the vein system postdates the gabbroic intrusion events and is associated with minor shear planes in the gabbro. Attitude of the vein system is steeper than the enclosing gabbro but the strike is conformable with the regional trend.

A massive pyrrhotite lens occurs in fractures in limestone (Unit 9) with an attitude of 130°/70N and width of 2 to 3 feet. The sulphides do not extend beyond the limestone unit but occur along the strike length of the

latter where traversed by fracture zones. Typical assay results of this zone run 0.02 - 0.06% Cu, $\leq$ 0.01% Ni, with trace amounts of lead and zinc. Part of the limestone unit is brecciated and filled with sulphides for 1 to 2 feet from the fracture zone. The main showing in Creek 3 is 2 to 3 feet wide and 50 feet wide at the massive sulphide showing. The extent of the showing in other directions could not be followed. Gossan staining is pervasive up to 20 feet from the showing. The relationship of the sulphides to the nearby intrusions is indistinct but the occurrence may be due to magmatic segregation of contained sulphides in the gabbros and/or pyritic sediments followed by replacement along prominent fracture and breccia zones in the limestone. Between Creeks 1 and 2 the massive magnetite showing, which also occurs in a limestone, may have the same origin. Values for copper and nickel here are 0.01%, which is at the assay detection limit. Elsewhere, as in claims SPY 2 and 4, limestones contain appreciable massive pyrrhotite with minor (0.01%) copper and nickel values closely associated with enclosing gabbros. This latter limestone occurs in SPY claim 6, with predominant pyrrhotite and trace chalcopyrite.

At SPY 8 claim post #2, there occur values of 0.5% Cu and 0.5% Ni at a gabbro-sedimentary contact as disseminations and blebs. The sulphides occur in a 20 foot basal alteration zone in the gabbro. Visible sulphides are traceable over the entire extent of the base of this unit. Sulphide values in the actual gabbro-peridotite unit itself are low. These occurrences here are possibly later magmatic segregations which sank to the base of the intrusive or were differentiated at depth and later intruded. A petrologic

examination may reveal mineral paragenesis. Chalcopyrite is noticeably higher than the other sulphides in this lower layer.

ALTERATION

The main alteration reactions are described in the order of their importance:

1. Serpentinization.
2. Limonitization.
3. Sericitization.

Serpentinization:

Pervasive serpentinization is associated with altered gabbro and peridotite in the claim group. The alteration varies from smooth antigonite on shear faces to a coarse brittle chrysotile slip fibre of indefinite length up to ¼ inch thick.

Limonitization:

This alteration occurs on coating surfaces of pyritic sediments and associated with the massive sulphide occurrences where the formations are highly cleaved (esp. shales). The alteration is confined to the sandstones and shales in the claim area.

Sericitization:

This alteration is of minor occurrence in the area. A 200 foot sequence of sericite schists occurs on the ridge between Creeks 1 and 2. The unit is pale grey-silver in colour and very finely cleaved.

STRUCTURE

GENERAL STATEMENT

The claim group covers a northwest trending, moderately dipping sedimentary-igneous sequence dipping to the southwest. The formations are part of the northeast limb of a northwest trending syncline as interpreted from Regional Geology (Muller, 1967).

MAJOR STRUCTURES

The major intrusives follow the sedimentary bedding with disconformable contact over 6000 feet in the claim area. A main joint system with attitude 045/60W is responsible for the sharp section and straight plan of Creeks 1, 2 and 3. Some normal faulting is inferred with similar trend in claim SPY 2, although it has no economic significance. The fracture system associated with the best sulphide occurrences has an attitude of 120-130/70N and may be related to regional tectonic faulting shown in section C-D, Kluane Lake Geology Map 1177A, 1967.

The diorite intrusions are fresher than the surrounding gabbro and may be later intrusions which are roughly conformable with regional attitudes.

MINOR STRUCTURES

The prominent joint system 045/60W which postdates the intrusive phase

in the area has already been mentioned.

Minor lineations of shallow inclination follow bedding or shear planes in the altered gabbros. These are not as extensive as the jointing. A more irregular and less extensive joint system strikes 070 with variable steep declination to the north.

MINERALIZATION

GENERAL STATEMENT

Mineralization occurs as massive sulphides with trace economic metal sulphides in isolate pods and replacements in fracture fillings in limestone.

Disseminated and bleb sulphides with significant copper and nickel values occur in fresh gabbro and the basal contact zone of the main gabbro-peridotite member.

NICKEL

The most interesting nickel values occur in the contact zone between the gabbro-peridotite differentiate and the underlying sediments. Values for assays in this environment ran 1.47% nickel and 0.49% copper in quartz xenoliths. These showings are prominent in SPY claims 7, 8 and 10 in the southeast quadrant of the claim block.

Other nickel showings of very minor significance are found in disseminations (0.01% Ni) in massive pyrrhotite, massive magnetite and in limestone skarn mineralization.

COPPER

Maximum copper values of 0.49% and 0.5% are found in association with the high nickel assays already described. In other locations, copper is found in minor disseminations in sediments and occasionally in the peridotites.

ZINC

Values of 1.20% Zn are found in a quart-carbonate vein with steep attitude in altered gabbro in claims SPY 11 and 12. The vein occurs up to 1 foot thick and may extend 2500 feet northwest from Creek No. 1. Attitude is 135-155/60-90 S, variable.

LEAD

Galena occurs associated with sphalerite in the quartz-carbonate vein described. Assay values run up to 0.25% in the showing in SPY 11. The galena occurs as isolate enhedral crystals close to the limonitized margin of the vein.

CONCLUSIONS

Examination of the showings in the claim group and the associated assay results indicate that the economic sulphides, especially nickel and copper, occur at or near basal gabbro-sedimentary contacts and in fresh gabbros as indicated. Massive pyrrhotite and magnetite occur, with minor chalcopyrite and pentlandite, in a skarn type environment in recrystallized and altered limestones. These are not of economic significance. The general tectonic picture is one of folded sediments with disconformable ultramafic intrusives and possible later barren dioritic intrusions.

RECOMMENDATIONS

It is recommended that the SPY claims 1 to 12 inclusive require further work to determine the economic possibilities of the gabbro-sedimentary environment in the light of the known showings. Additional geochemical work and surface geology are required on this claim group.

Respectfully submitted,

R. F. McLoughlin

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J. S. VINCENT

REFERENCES

Muller, J. E. Kluane Lake Map Area, Yukon Territory, G.S.C. Memoir 340, 1967.

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EXPENDITURES

SPY 1 - 12 CLAIM GROUP

The following expenditures were incurred between July 16 - 24, 1973, on the SPY 1 - 12 (incl.) Claim Group, Whitehorse Mining District, Yukon Territory:

R.F. McLoughlin - 9 days @ $35.50	$ 319.50
M. Macey - 9 days @ $19.35	174.15
Employee benefits @ 15%	74.05
J. S. Vincent, P.Eng. - 2 days @ $125.00	250.00
Camp costs and groceries	150.00
Trans-North Helicopter mobilization and demob.	1,300.32
Geochemical and assay (Bondar-Clegg)	75.00
Administration and Report preparation	75.00
Total Expenditures:	$ 2,418.02

I, John S. Vincent, P.Eng., of the City of Vancouver, in the Province of British Columbia, do hereby certify that the above expenditures were incurred on the SPY 1 - 12 (incl.) Claim Group for assessment work purposes.

August 23, 1973.

John S. Vincent, P.Eng.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA J. S. VINCENT

A Notary Public in and for the Province of British Columbia

TABLE OF FORMATIONS

NINES CREEK

ERA	PERIOD	MAP UNIT	LITHOLOGY	
PALAEOZOIC	LOWER PERMIAN	16	CHERTS	PERMO-TRIASSIC INTRUSIVES
		15	SANDSTONE	
		14	LIMESTONE	
			GABBRO	
		13	ACID TUFFS & RHYOLITES	
			GABBRO	
		12	SHALES	
		11	QUARTZITES	
			GABBRO	
		10	SHALES	
			GABBRO	
		9	LIMESTONE	
			GABBRO	
		8	ARGILLITES	
			MAIN GABBRO	
		7	SANDSTONE	
		6	SHALES	
		5	CONGLOMERATE	
			GABBRO & DIORITE	
		4	SANDSTONES	
	PRE? LR. PERMIAN	3	SHALES	
		2	SANDSTONES	
		1	ANDESITES	

(NOTE: Assigned Ages of Units according to Muller, Map 1177A, 1966.)


LEGEND
RECENT
20 Recent surficial deposits
PERMO-TRIASSIC
19 Diorite
18A Peridotite
18 Gabbro-peridotite
17 Gabbro
16 Chert, thin, banded
15 Sandstone, brown
14 Limestone, grey, massive
13 Tuffs rhyolites buff, grey
12 Shales, grey cleaved
11 Quartzites, grey cherty
10 Shales, red-grey, thin bedded, pyritic
LOWER PERMIAN
9 Limestone
8 Argillite, grey, cleaved.
7 Sandstone, buff limonitic
6 Shales, dk grey, thin bedded.
5 Conglomerate, grey, cherty.
4 Sandstone, grey, thin bedded
PALEOZOIC
PRE-LOWER PERMIAN
3 Shales, grey, cleaved, 3a. minor volc. tuff.
2 Sandstone + conglomerate buff, massive.
1 Andesite, purple, green.
Vein, barren, dip + strike
Mineralization dip + strike
Claim post
Claim line
Ridge
Creek + direction of flow
Contact real, apparent / assumed
Fault
Outcrop location + talus
Lineation, azimuth + plunge
Joint dip + strike
Dip + Strike
Steep Cliff
CLAIM SKETCH
Spy Claims
H Helicopter Pads
Miles
61° 09'
138° 45'
SECTION A
CREEK No. 1
CREEK No. 2
CREEK No. 3
CREEK No. 4
CREEK No. 5
Mag Decl. N30°E
N
Geological mapping - July
by R.F. McLoughlin
M. Macey
Supervised by John S. Vincent
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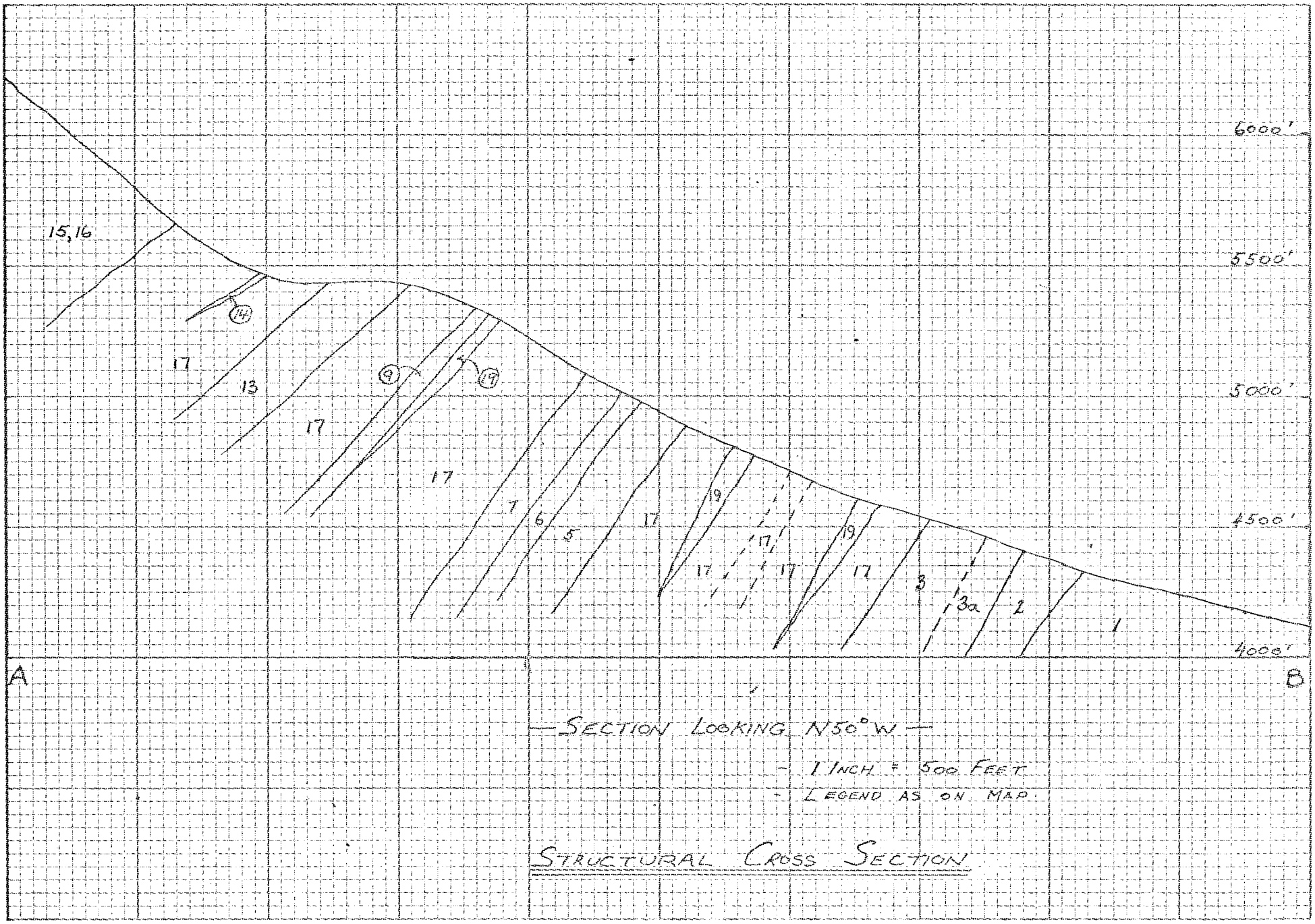
JOHN S. VINCENT LTD.
NICKEL SYNDICATE
NINES CREEK
SURFACE GEOLOGY
CELL 115G 21j
R.F. McLOUGHLIN
500'
JULY 26 1973



—SECTION LOOKING N50°W—

- 1 INCH = 500 FEET
- LEGEND AS ON MAP

STRUCTURAL CROSS SECTION