N O R T H W E S T E R N E X P L O R A T I O N S

L I M I T E D.

Canada Tungsten Mining Corporation Ltd.
WO claim

AXEL SHOWING, N. W. T.

1955.

(others CFD)

By: D. A. Barr.

092056

[redacted]

TABLE OF CONTENTS.

NORTHWESTERN EXPLORATIONS LIMITED.

AXEL SHOWING.

INTRODUCTION.

The Axel Showing is one of several discoveries which were made by prospectors working for Northwestern Explorations Limited in the Flat River area during 1954. Following a brief examination in the fall of 1954 recommendations were made to examine the prospect by detailed mapping and sampling. A program was later planned which provided for the examination of three of the discoveries by a geological party which would be transported and maintained by a helicopter, also supporting four prospecting parties in the area 2, 3, 4.

The following report describes the results of the examination of the Axel Showing during 1955:

SCOPE

The mineralized area discovered during 1954 was examined between August 11-27 by a geological party consisting of J. Greenaway, D. Fletcher, E. Freedman, J. Rutherford, and supervised by the author. Valuable guidance was given by J. S. Scott and J. C. Sullivan who visited the property during the early portion of July. Mr. Scott also visited the property during the latter part of August.

During the examination period, the surface showing was sampled in conjunction with detailed mapping on a scale of 50 ft. A belt, 7 miles long by 2 miles wide which contains the Axel claims was geologically mapped on a scale of 1,000 ft.

LOCATION

The Axel claim group is situated on an easterly flowing tributary to Flat River in the N. W. T. Specific location is at Lat. 61° 58'N., Long: 128°15'W. Elevations within the claim group vary from 4200 to 6000 ft. above sea level.

The Axel claim group contains the following mineral claims:

Claim:	Staker	Record No:	Located	Recorded
Axel No.1	A.Berglund	84414	June 24/55	June 25/55
" 2	"	84415	July 22/55	July 23/55
" 3	"	84416	July 22/55	July 23/55
" 4	"	84417	July 22/55	July 23/55

ACCESS

The nearest lake which is accessible by float aircraft lies about 8 walking miles up Flat River from the Axel claims. This lake lies 4 miles S. E. of Flat Lake and approximately 130 airmiles northerly from Watson Lake situated at Mile 635 on the Alaska Highway. A tri-weekly air service from

Watson Lake air base is maintained by C.P.A. between Whitehorse and southern points. Charter service is available through B. C. & Yukon Air Services Ltd. at Watson Lake.

During 1954 a 2-man prospecting team was maintained in the area by a packer with an outfit of six horses. These were moved into the area from Watson Lake by Hyland River and Flat River valleys. Although there are no pack trails in the area numerous game trails provide an adequate substitute along the valleys.

Access during 1955 was provided by fixed wing aircraft to Flat Lake and thence by helicopter to a point near the property.

HISTORY & PREVIOUS WORK

During the past the Flat River area has been of interest primarily to trappers, mountaineers and prospectors seeking placer gold concentrations. Very little lode prospecting had been attempted before 1950 because of access problems.

During 1953 a reconnaissance of the area was undertaken by the Geological Survey of Canada who reported unofficially that favourable lead-zinc-copper mineralization had occurred. Although several companies have made short examinations of reported mineral occurrences, no attempt to prospect the area systematically was undertaken before 1954. Northwestern Explorations Ltd. carried out a prospecting program during 1954 and the two prospectors employed covered 600 sq. miles in the Upper Flat River area which resulted in the discovery of four pyrometasomatic deposits. The Axel showing was one of these discoveries.

In view of the lack of topographic and geologic information for the area the Company prepared a photo-grammetric regional base map showing drainage on a scale of 2 miles, and obtained a more detailed topographic sheet from the Photographic Surveys Corp. Ltd., on a scale of 1,000 ft. which covers the Axel claim group area.

REGIONAL GEOLOGY

Flat River valley has been entrenched along a zone of weakness in underlying rocks which is represented by folding and partly by faulting. The resulting syncline extends from Seaplane Lake northwesterly for a distance of 80 miles.

In the vicinity of the Axel showing, a metamorphic assemblage consisting of limestone, chert, and argillite which strikes N. W. are anticlinally folded over a central granitic core (cf. Plate No. 2) The axial plane of the anticline is inclined to the east and the underlying granitic rocks are well exposed on the east limb by a dip-slope lying on the S. W. side of Flat River. At the mineral deposit, a deviation in the trend of the axial plane to the S. W. from the south occurs with an approximate displacement in plan of about 1,000 ft. Fracturing in a similar direction, i. e. southwest, and the presence of several southwest-trending quartz veins suggest related stresses. Minor subsidiary drag-folding occurs on the anticlines.

MINERAL DEPOSITS

The Axel Showing was discovered during the 1954 season by A. Berglund and W. Cannon.

The deposit occurs on the lip of a cirque basin at an elevation of about 4800 ft. Drainage from the basin flows northeasterly dropping 1400 ft into confluence with Flat River at a distance of approximately one mile (cf. Plate No. 3).

The most continuous sections of mineralization are well exposed on a resistant knoll which protrudes above surrounding talus on the lip of the basin, and on partly precipitous valley slopes which lie to the North and East of the knoll (cf. Photos 1 and 2). Topographic conditions are such as to produce good cross-sections over portions of the tabular deposit, which, as a result of its relatively flat dip, appears in plan as a discontinuous L-shaped body, under present erosional conditions.

Pyrrhotite and chalcopyrite occur in skarn zones as incomplete replacements associated with a relative flat-lying chert-crystalline limestone sequence. The average dip in the vicinity of the mineral deposit is westerly from flat to 20 degrees. Many variations to this attitude exist as a result of proximity to the axial plane of the containing anticline, the lens-like nature of included limestone remnants, and local drag-fold effects. The deposit thus appears to lie on a dome-like flexure on the east limb of an anticline near its apex, and at a point of deviation in regional axial trend.

The sulphide deposits lie at a favourable horizon within altered limestone immediately above a pale-grey ribbon-chert sequence. The pale-grey chert contains a lensy inclusion of garnetite and epidote which are the result of metamorphism or original limestone. The banded appearance of this horizon forms an excellent marker. A similar band which is about 50 ft. thick occurs stratigraphically about 300 ft. above. The lower ribbon-chert horizon probably attains a thickness in excess of 200 ft.

The mineralized sequence is discontinuously exposed as a result of overlying overburden and talus which obscure certain sections. In relating surface exposures to the probable dimensions of the deposit it will be noted that the two arms of the L-shaped plan view indicates the possibility of copper-bearing skarn occurring for lengths of 860 ft. from the "elbow" to the north, and 600 ft. to the east limit. Additional skarn extensions to the east for 600 ft. are very low grade. To the north, extensions are talus-covered.

Mapping indicates that a section of 240 ft. of barren to sparsely mineralized skarn could separate the most northerly mineralized zone from the main mass of the North arm. Similarly the largest portion of the East arm is covered by 525 ft. of talus.

The greatest mineralized section currently exposed occurs on the knoll and constitutes 95 ft. containing a minimum of 12 ft. of mineralized skarn underlain by 25 ft. of crystalline limestone containing minor skarn, and an underlying section about 60 ft. thick consisting essentially of mineralized skarn with minor limestone. Calculations indicate that the mineralized portion constituting 66 ft. averages 0.37% Copper. Below this partly-replaced section a 60 ft. sequence of pale-grey chert overlies 7 ft. of mineralized skarn with the basal limit covered (cf.Section A-B, Plate No. 3).

The most consistently mineralized block consists of a section 300 ft. long on the North arm which averages about 35 ft. in exposed thickness. The upper limit is talus and grass-covered. Assaying indicates an average content of 0.61% Copper.

In general the lower grade mineralization is associated with skarn consisting of garnetite, epidote, pyrrhotite, chalcopyrite and quartz. The more massive sulphide mineralization consists of pyrrhotite, quartz and chalcopyrite with copper content not exceeding 1.5% over sections sampled.

The following assay results were obtained from sampling of the Axel deposit during 1955. Sampling was by chip, and thicknesses sampled have been corrected to allow for topographic effects related to inclination of bedding. Testing for Nickel by dimethyl glyoxine is negative.

Sample No:	Gold oz/ton	Copper %	Section sampled Ft.	True thickness ft.
9650	0.02	0.30	12	12
1	0.01	0.67	4.4	4.4
2	0.01	0.65	2	2
3	0.02	0.58	-	12
4	0.01	0.30	42	30
5	0.03	0.50	8	8
6	0.02	0.45	6/5	4
7	0.02	0.30	Composite	3
8	0.005	0.60	35	12
9	0.03	0.35	43	21
9660	0.02	1.10	15	14
1	0.01	0.45	40	28
2	0.015	0.08		36
3	0.02	0.62	22	17
4	0.02	0.75	33	30
5	0.01	1.22	22	18
6	0.01	0.10	28	20
7	0.02	0.65	50	37
8	0.02	0.70	40	35
9	0.01	0.10	50	40

continued . . .

Sample No.	Gold oz/ton	Copper %	Section sampled ft.	True thickness ft.
9670	0.01	0.60	23	20
1	0.01	1.10	40	25
2	0.005	0.20	10	9
3	0.005	0.15	8	7
4	0.005	0.13	21	10
5	0.005	0.08	33	28
6	Tr	0.25	31	20
7	Tr	0.20	23	20
8	0.005	0.20	16	14
9	0.005	0.10	6	4
9680	Tr	0.08	23	18
1	1.73	0.80	45	40
2	0.04	0.15	39	15
3	0.02	0.45	14	10
4	0.02	0.30	36	20
5	0.02	0.18	16	10

A generalized stratigraphic section of the strata follows in overlying sequence:

Unit	Description	Thickness (feet)
Grey limestone	Crystalline-basal portion contains several weakly mineralized skarn zones with maximum dimension of 100 x 20'	
Calcareous chert	Light grey chert containing ribbonlike inclusions similar to lower chert band	50 ±
Grey limestone	Crystalline containing irregular skarn deposits mineralized with pyrrhotite and chalcopyrite in basal portion. Some replacements are massive. Included are: a) Sec.52 ft.thick containing some mineralized skarn b) Sec. 95 ft. thick containing sparsely mineralized skarn and limestone inclusions (cf.Plate No. 3, Sec. A-B). c) Massive section 25 ft. thick assaying 1.1% Copper with basal limit covered	300 ±
Calcareous chert	Chert with ribbonlike and lensy inclusions of ls. ($\frac{1}{2}$"-1"x6"-1.0')Pale grey in colour becoming green grey with alteration of crystalline limestone to garnetite and epidote.	200 ±

Calcareous argillite - Black to dark green 200 ±

CONCLUSIONS AND RECOMMENDATIONS

The concentration of higher copper values, massive sulphides and greater mineralized thicknesses near and on the knoll suggest that the most favourable structural control for sulphide deposition is a combination of gentle doming (cf. Sect.C-D, Plate No. 3) and southwest stresses associated with the anticlinal flexure.

To the southwest of the deposit the entire area is covered with talus which lies in a cirque basin. It is difficult to determine with any accuracy the position of the surface trace of the axial plane of the anticline in this area. The reasons for this difficulty are (a) the apparent open type of spical folding which has resulted in flat dips on the fold crest, and (b) the distance through which interpretation of the nearest structural data must be carried. However, the southwest extension of the chert-limestone horizon for a distance of from 500 - 1000 ft. should represent a favourable deposital zone and any investigation of the deposit should be carried to the south-west limit of the anticline.

The exposed mineralization could either represent a generous portion of small, low-grade copper occurrence associated with a small trap and as such would warrant no further investigation. Conversely, a good possibility exists that the exposed showings are only fringes of a larger replacement occurring to the southwest. Such a possibility should be investigated and in this regard it has been recommended that a diamond drilling program be carried out during the 1956 season in conjunction with further prospecting in the Logan Mountain area.

"D. A. BARR"

Vancouver, B. C.
January 31, 1956.

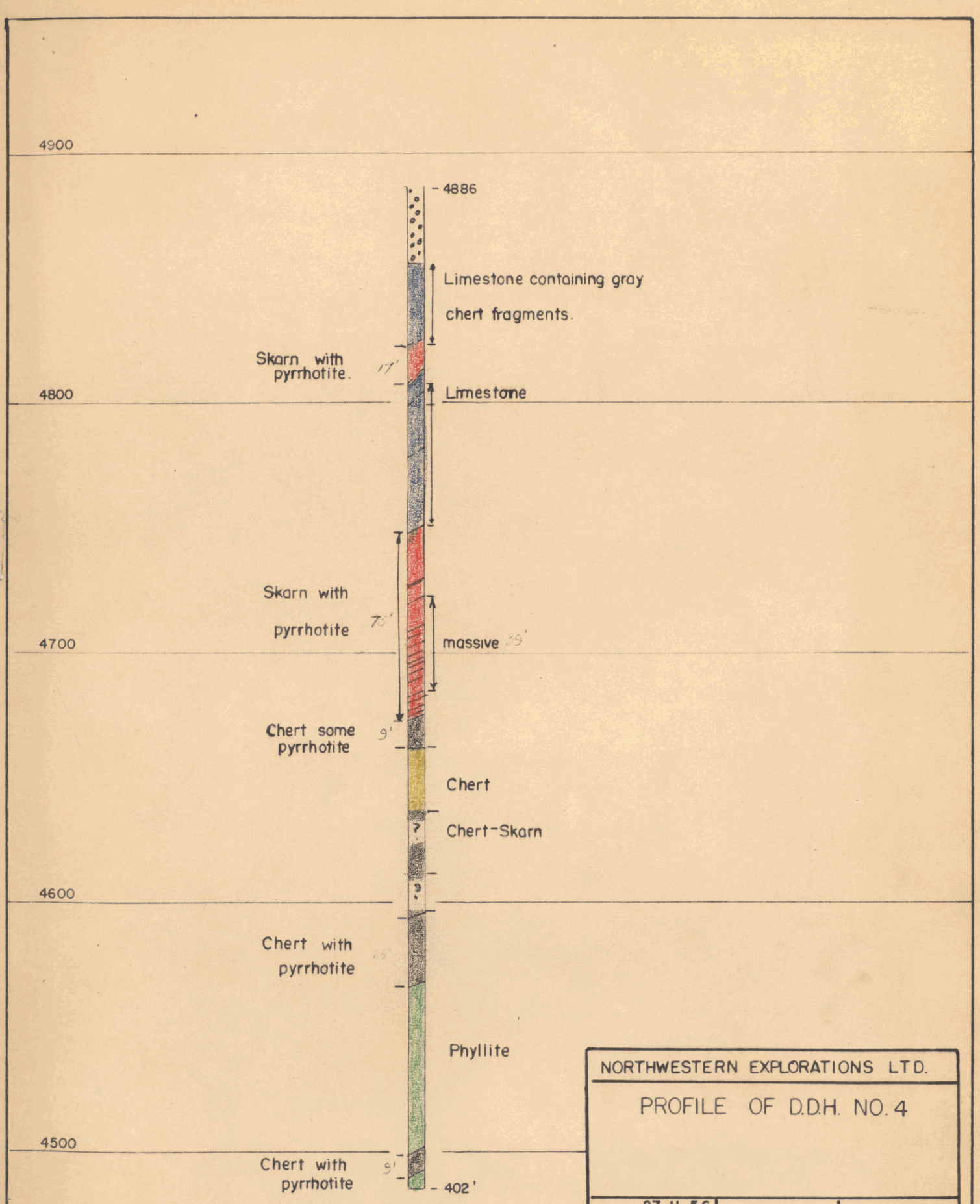
REFERENCES

1. Prospecting in Yukon Territory, 1954
Northwestern Explorations Limited by
G. A. Noel.

2. Flat River Project - Prospecting 1955
Northwestern Explorations Limited by
D. A. Barr.

3. Buster Showing, N. W. T. 1955
Northwestern Explorations Limited
by D. A. Barr

4. Fitzrob Showing, N. W. T. 1955
Northwestern Explorations Limited
by D. A. Barr.



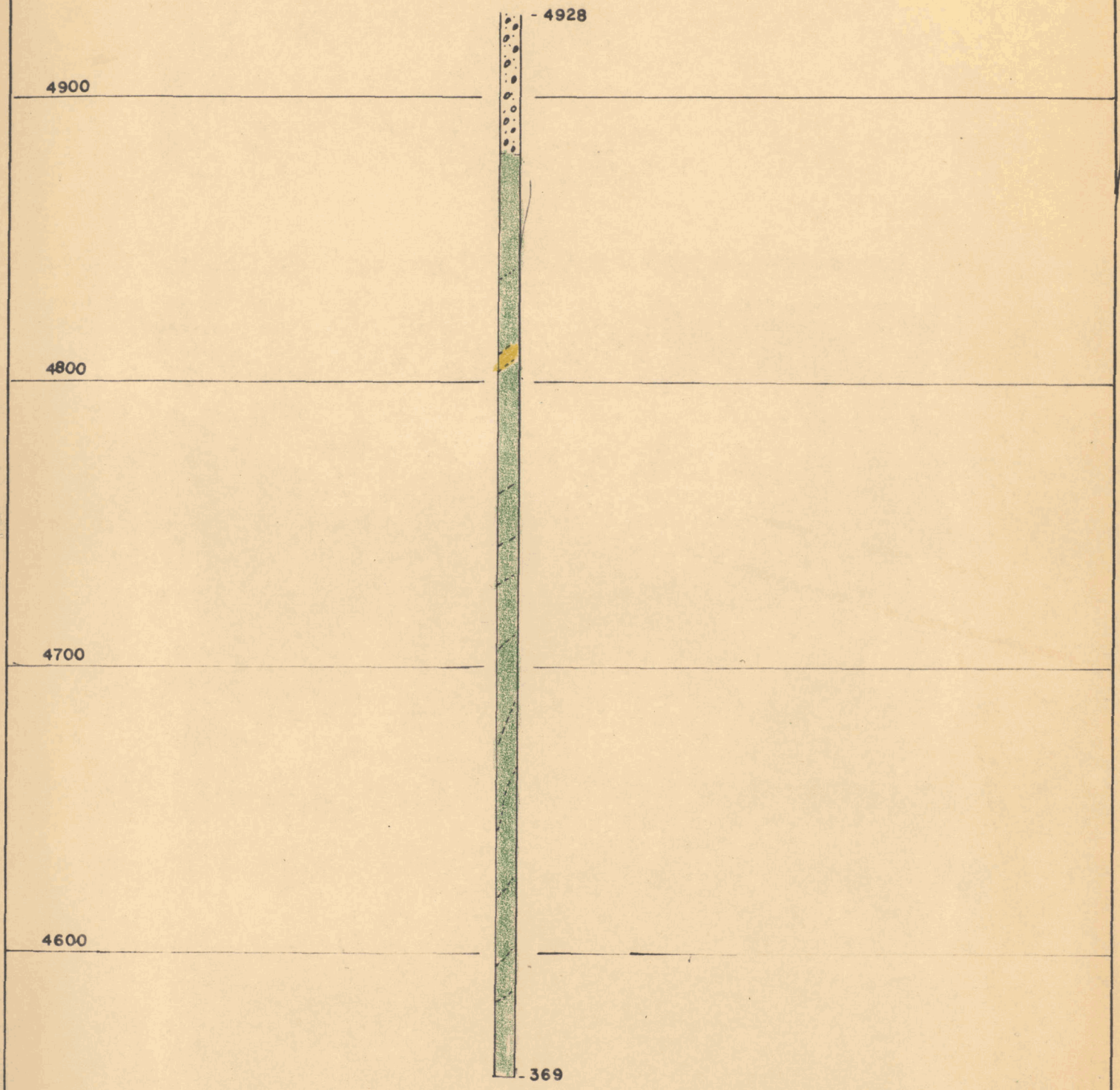
LEGEND ON PLATE NO. 4

NORTHWESTERN EXPLORATIONS LTD.

PROFILE OF D.D.H. NO. 4

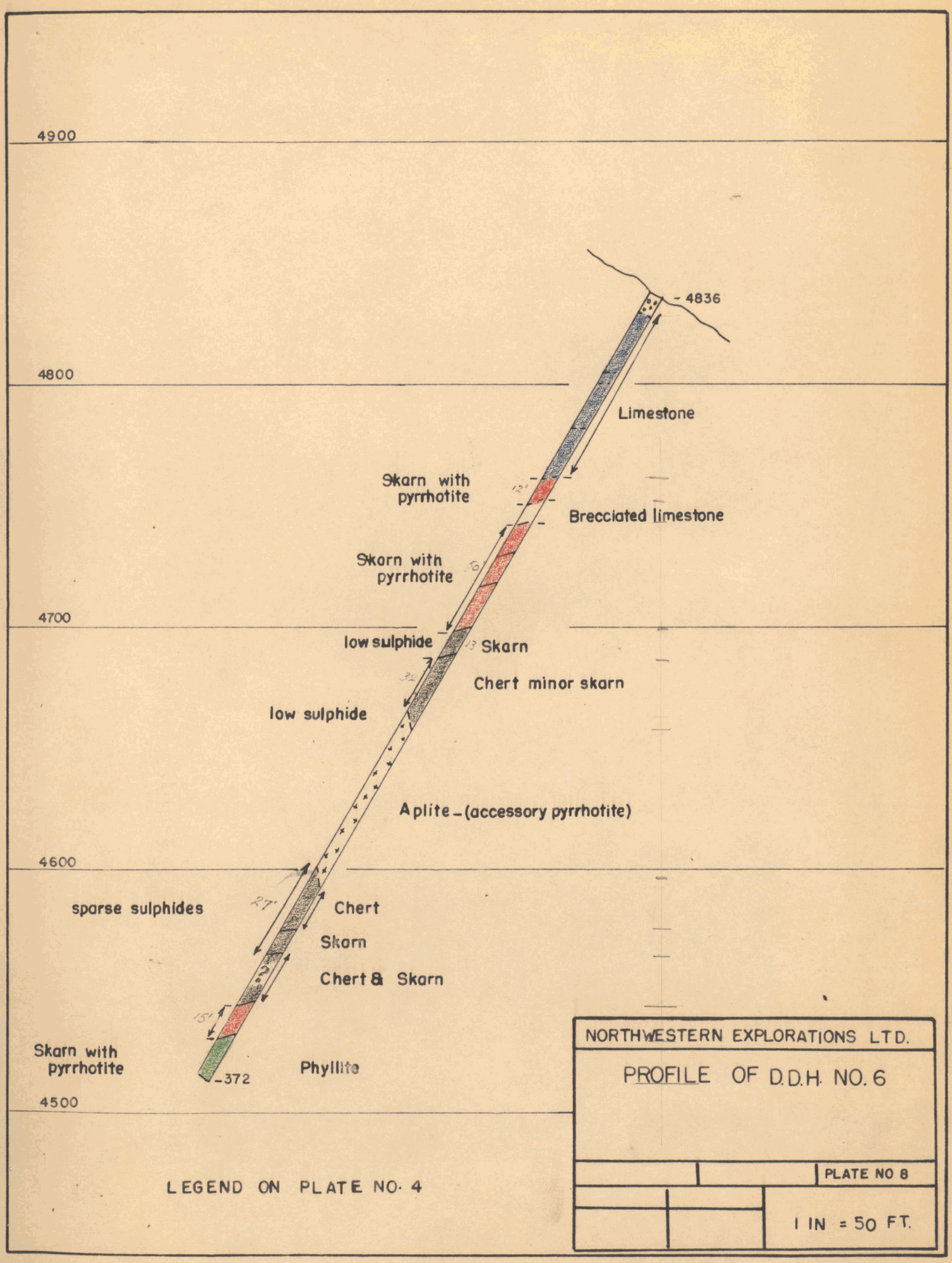
27 11 56 | PLATE NO 6

1 IN. = 50 FT.



LEGEND ON PLATE NO 4

NORTHWESTERN EXPLORATIONS LTD.		
PROFILE OF D.D.H. NO 5		
27/11/56		PLATE NO 7
		1 IN = 50 FT.



NORTHWESTERN EXPLORATIONS LTD.

PROFILE OF D.D.H. NO. 6

PLATE NO 8

1 IN = 50 FT.

LEGEND ON PLATE NO. 4

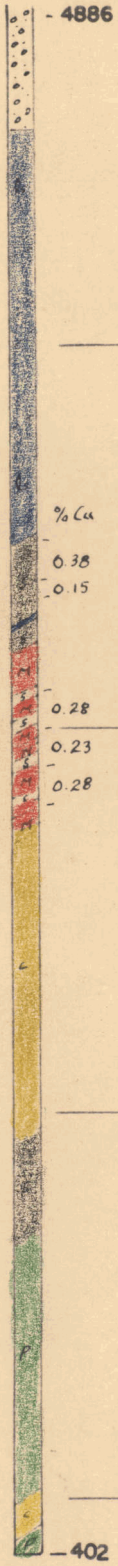
4900

4800

4700

4600

4500



M = massive sulphide

S = skarn

P = phyllite

LEGEND ON PLATE NO.4

NORTHWESTERN EXPLORATIONS LTD.

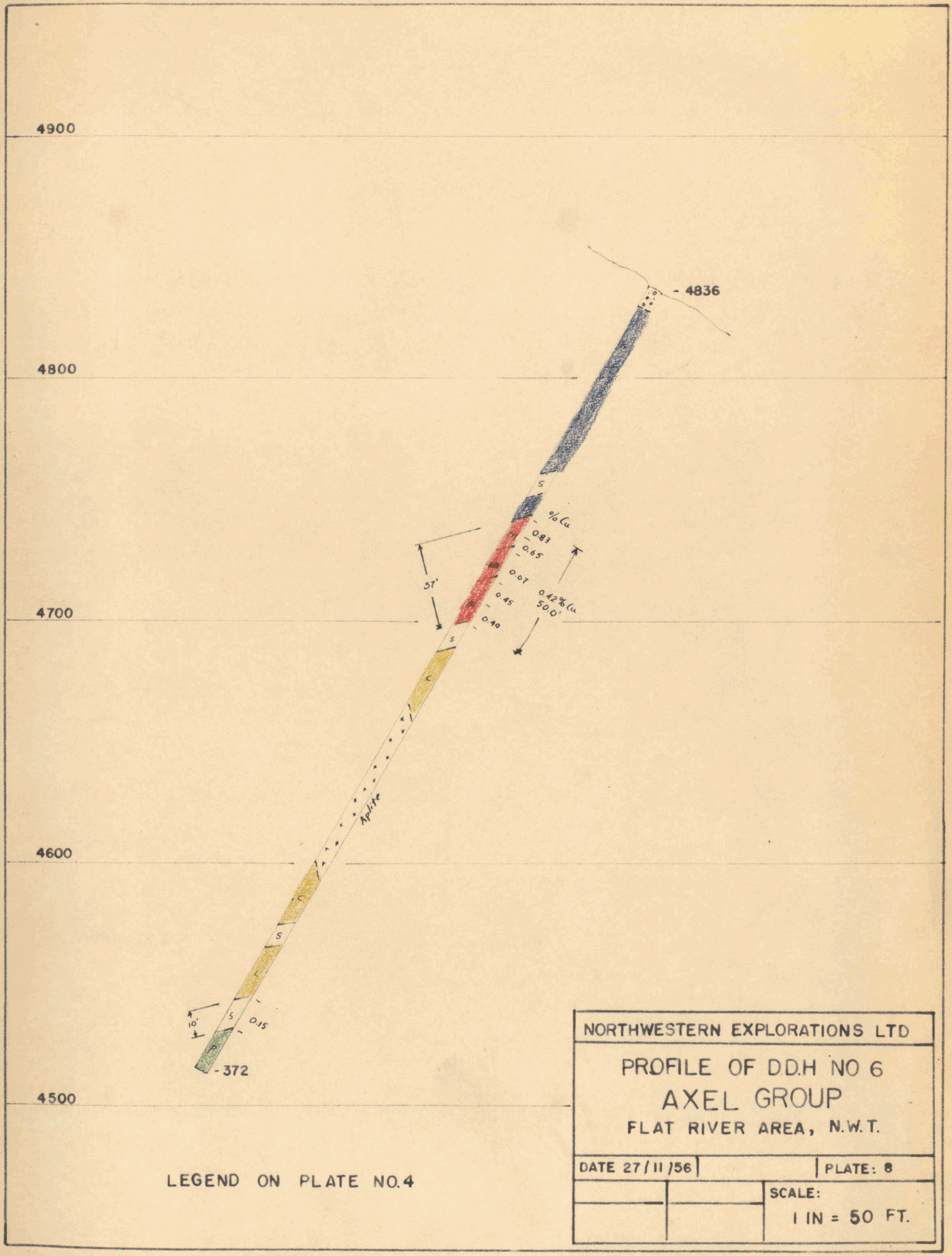
PROFILE OF D.D.H. NO. 4

AXEL GROUP

FLAT RIVER AREA, N.W.T.

DATE 27 11 56 | PLATE NO.6

SCALE:
1 IN. = 50 FT.



LEGEND ON PLATE NO.4

NORTHWESTERN EXPLORATIONS LTD	
PROFILE OF D.D.H NO 6 AXEL GROUP FLAT RIVER AREA, N.W.T.	
DATE 27/11/56	PLATE: 8
	SCALE: 1 IN = 50 FT.

E

F

5100

5000

4900

4800

4700

4600

4500

4400

4300

ARGILLITE

PHYLLITE

LIMESTONE

SKARN & SULPHIDES

CHERT & SKARN

PHYLLITE

1

2

3

4

5

6

CHERT

LIMESTONE

SKARN

SULPHIDES

CHERT

DATUM PLANE PASSES THROUGH D.D.H.-6 DATA LYING WEST OF D.D.H. NOS 2&3 PROJECTED NORTH, AND DATA LYING EAST OF D.D.H. NOS 2&3 PROJECTED SOUTH

NORTHWESTERN EXPLORATIONS LTD.

GENERALIZED N60°W SECTION LOOKING NORTH ON E-F

AXEL GROUP

FLAT RIVER AREA, N.W.T.

DATE 29/11/56 | PLATE NO 9

1 IN.= 100 FT.

D.B.H 3 DDH 2 DDH 1

4827

4800

4700

4600

4500

4400

Skarn with pyrr.

Chert some pyrr.

Skarn - pyrr. Chert

Skarn

Chert

Skarn

216

Skarn with pyrr.

Chert & skarn with pyrr.

262 Skarn

-502

LEGEND. ON PLATE NO 4

NORTHWESTERN EXPLORATIONS LTD.

PROFILE OF D.D.H. NOS. 1, 2, 3

27/11/56 | PLATE NO 5

1 IN. = 50 FT.

DDH NO3 DDH NO2 DDH NO1

4827

4800

4700

4600

4500

4400

%Cu

0.28

0.01

0.10

0.05

0.28

0.15

0.16

262

216

502

LEGEND ON PLATE NO 4

NORTHWESTERN EXPLORATIONS LTD.

PROFILE OF D.D.H. NOS. 1, 2, 3

AXEL GROUP

FLAT RIVER AREA, N.W.T.

DATE 27/11/56 | PLATE NO 5

SCALE 1 IN. = 50 FT.

NORTHWESTERN EXPLORATIONS, LIMITED.

PROPERTY AXEL CLAIMS, N.W.T. DRILL HOLE NO. 1 SHEET 1

BEARING _____ LAT. 1006 DATE COMMENCED June 28, 1956

DIP AT COLLAR -50° DEP. 1002 DATE COMPLETED July 1, 1956

DEPTH OF HOLE _____ ELEV. 482' REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	Recovery ~~XXXX~~ ~~XXXXX~~ ~~XXXX~~
0 - 24	Essentially overburden with large blocks of float material. Massive sulphides consisting of pyrrhotite with minor chalcopyrite at collar 14'-15' fragment of weathered, siliceous limonite breccia consisting of residual fragments of qtz, cemented by limonite and rare pyrrhotite with chalcopyrite. Material similar to that occurring in unweathered state in Axel No. 2 @ 2'.						Rec. 99% - 100% except where indicated.
24 - 47	Coarse skarn composed of diopside with minor garnetite and occasional streaks and patches of massive pyrrhotite and very minor chalcopyrite. 24-29 Coarse skarn. 29' (?) rusty leached phase 37.0-½" veinlet of qtz, with silicified [illegible] containing splashes of Cpy & Pyrr.						

PROPERTY _____ DRILL HOLE NO. 1. SHEET _____

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
	24-37 gradual increase of dissem. pyrr. 42.0 ½" repl. of fairly massive pyrr. w. spse. Cp. 60° to core.							
	43.3 ½" repl. of pyrr. & cp. @ 0°							
	45.0-45.5 4" sect. containing pyrr. & cp. in qtz. veinlet.							
	46.0-470 Fair dessem. pyrr.							
47 - 52	Skarn becomes eas. 30-50% garnetite with qtz. assoc.							
	49.0 minor blebs pyrr. ¼" dia.							
	54.0 1/8" qtz. stringer with pyrr. & Cp.							
	54.4 ½" qtz. strenger with pyrr. & Cp. @ 50°							
	56.0-56.6 50% pyrr. & [illegible] Cp.							
	57.6 ½" stringer with [illegible] & Cp.							
	59.6-60.0 ½" band pyrr [illegible]							
	60.2-60.5 ½" qtz. vein [illegible] Cp.							
	60.7-61.0 silicified							
	63.0-63.6 3 - ½" bands pyrr.							
	66.0-67.0 50% pyrr. with Cp.							

DRILL HOLE NO. 1 SHEET

BEARING LAT. DATE COMMENCED

DIP AT COLLAR DEP. DATE COMPLETED

DEPTH OF HOLE ELEV. REMARKS

PURPOSE OF HOLE

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASS
	74.0 2-1/6" bands pyrr. in ls? skarn 94-94.5 2-¼" bands pyrr & Cp. 98.5-99.0 2" band pyrr.rimmed by cp. in Ls?skarn @ 60° 107.0 1" fair dissem. pyrr. 109.0-109.6 2" band @ 45° pyrr. & cp. 110.5 1" qtz. veins with pyrr 113.0-113.4 Fair dissem. pyrr. 119.0 2" qtz vein with minor cp. on border. 119.2-119.5 dissem.cp. & pyrr in wall 120.0 1" band containing ¼" borders pyrr. 120.5 Pyrr.blebs assoc.with 1"x2" chert fragment (Chert horizon?) 125.0 Cherty phase repl. by green skarn								
129 - 166	Chert with skarn sections & massive sulphides 129.131 fair dissem. pyrr, 1 minor cp. 132.5 fair cp. with pyrr.in ¼" calc.stringer 132.6-137.0 Cherty breccia phase composed of grey-white chert frags. in skarn massively replaced by pyrr. & cp. Cp in knife edge stringers @ 60° 132.5-146.5 fairly massive pyrr. & cp. from 137.0 green skarn with garnetite. 148.0-148.4 massive pyrr. & minor cp. 149.0-166.0 5-20% sulphides mostly pyrr. 156.5-157.2 sparse minels. 160.0-165.0 less than 5% sulphides in med.gr.green skarn.								

PROPERTY _____ DRILL HOLE NO. 1 SHEET _____

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
166 - 183	Cream & green banded chert 172.0 ½" stringer pyrr. 175.0 3" section skarn with minor sulphide								
183 - 252	Richer in lime silicates with patches of chert. In detail highly folded even within the width of core. Rock is green. Narrow stripe of sulphides as follows: 186.5-191.5 12 layers of sulphide, mainly pyrr. none of which exceeds 1", mostly less than ½". There is little if any cp. 193.3-194.3 4 - ¼" layers of pyrr. 197.0 1" layer pyrr. 197.6 ½" layer pyrr. 199 ½" layer pyrr 200.5 ½" layer pyrr. 204.7 - 205 3 - ½" layers pyrr. 205.7 ½" layer pyrr. 209 - 211 3 - 1" layers pyrr. 212 ½" layer pyrr. 217.5 ¼" layer pyrr. 237.6 - 239 6 - ¼" layers pyrr. 244 1/8" stringer cp. 246.5 - 248.5 Spec disseminated cp & a few layers pyrr.								
252 - 262	Light grey lime-silicate rock with grey chert and layers rich in garnetite. Barren								
262	END OF HOLE								

[redacted]

Note The layering of the rock cuts the core at angles varying from 30-45 deg. in general. In detail the layering is complexly folded. Sulphide occurs in layers parallel to the rock layering and also follows fractures. There appears to be nothing in sect. from 186-262 worth assaying.

[illegible] EXPLORATIONS LTD.

PROPERTY [illegible] DRILL HOLE NO. [illegible] SHEET 1

BEARING ______ LAT. 1000 DATE COMMENCED July 1, 1956

DIP AT COLLAR -90° DEP. [illegible] DATE COMPLETED July 4, 1956

DEPTH OF HOLE ______ ELEV. 4827 REMARKS ______

PURPOSE OF HOLE ______

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
				Cu %	Au/oz	Ag/oz.			
0 - 23	Poor recovery - core left at drill camp								
23 - 25	Rusty brown fine grained skarn containing lathes of green amphibole, pink garnet & green pyroxene. Sparsely dissem. pyrr..								
25 - 35	Similar skarn, sparse pyrr.with little if any cp.								
35 - 45	Similar skarn,sparse pyrr.some in thick (¼"-1") layers on fractures,some with calcite; little cp.								
45 - 52	Similar skarn - very sparse pyrr.								
52 - 55	Fewer silicate minerals - richer in carbonates; barren								
55 - 67	Similar skarn,blebby dissem.of pyrr.								
67 - 71	Similar skarn, heavy dissem.pyrr & some stringers of Cp. (Assay K7650) 4 ft.			0.22	0.01	Nil			
71 - 80	Similar skarn - fine dissem.pyrr. little cp.								
80 - 87	Similar skarn - fine dissem.pyrr, little cp.								
87 - 90.5	Dense grey chert containing streaks of darker material and a few narrow zones of calc.silicates. Small streaks of sulphides (mostly pyrr.)								
90.5 - 97	Fine grained green calcium sil. rock with mod.heavy pyrr.dissem with blebs. Little cp. (Assay K7651) 6.5'			0.07	Tr.	Nil			
97 - 100	Cherty rock. Very little sulphide								
100 - 103.5	Cherty rock with heavy pyrr.dissem. & local stringers of cp. up to 1/8" (Assay K7652) 3.5'			0.16	0.005	0.06			
103;5 - 110	Cheert - very little dissem.pyrr. Some stringers								
110 - 120.5	Fine grained green lime silicate rock with cherty layers. Sparse pyrr								
120.5 - 123	Skarn with moderate pyrr. dissem (Assay K7653) 2.5'			0.05	0.01	Nil			
123 - 1255	Barren cheert with patchy lime silicates								
125.5 - 132	Chert with patchy lime silicates & sparse dissem.pyrr. and little cp.								

PROPERTY _____ DRILL HOLE NO. 2 SHEET 2

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY Cu-%	ASSAY Au/oz	ASSAY Ag/oz	ASSAY	ASSAY	ASSAY
132 - 135.5	Fine green lime sil.rock with heavy dissem.pyrr. and some cp. (Assay K7653) 3.5'			0.38	0.01	Nil			
135.5 - 145	Lime silicate rock (v.f.g. and green) with some cherty layers. Sparse pyrr.								
145 - 156.8	Fine lime silicate (green) rock containing at intervals 2"-3" zones of heavy pyrr. otherwise very sparse. No apparent Cp.								
156.8 - 159	Sheared schistose zone containing mod. heavy pyrr. dissem. (Assay K7655) 2.2'			0.15					
159 - 163.2	Essentially barren cherty lime-sil.rock								
163.2 - 172.2	Lime-sil.rock with cherty layers containing intermittent heavy pyrr. dissem. and some obvious Cp. (Assay K7656) 9'			0.16					
172. 2 - 216	Fine lime-sil.rock becoming increasingly cherty with scattered, narrow pyrr. zones. No obvious Cp.								
216	BOTTOM OF HOLE								

NOTE: Layering in the rocks varies considerably in inclination to the hole, but in general, is perpendicular. Only zones of heavy sulphides were sampled.

PROPERTY AXEL CLAIMS, N. M. T. DRILL HOLE NO. 3 SHEET 1

BEARING _____ LAT. 992 DATE COMMENCED July 5, 1956

DIP AT COLLAR -60° DEP. 996 DATE COMPLETED July 11, 1956

DEPTH OF HOLE _____ ELEV. 4827 REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY Cu.%	ASSAY Au/oz	ASSAY Ag/oz.	ASSAY Recovery	ASSAY	ASSAY
0 - 23	Overburden								
23 - 28	23.0-24.5 Siliceous phase composed of rounded and sub-rounded qtz. grains to 2" in dia. Probably pseudo-qtz. breccia. Cemented by massive pyrr. with minor Cp. Cp. also in minute fractures cutting qts.						60%		
	25.0-27.0 Skarn with pyrr.& Cp. in massive sections.								
	27.0-28.0 Skarn with minor pyrr. & Cp.								
	28.0-29.0 Green lime silicate								
	29.0-38.0 Green lime silicate, coarse phase containing pyrr. with minor Cp.								
	29.0-30.0 10-20% sulphide								
	30-33 Less than 5% sulphides								
	33.0-38 Massive sulphides - 10 - 20%								
38 - 39.5	Skarn containing contorted cherty frags. and massive blebs pyrr. with spec. Cp.								
39.5 - 42.5	Cherty or siliceous w.spec sulphides.								
42.5 - 45.5	Dissem.to massive pyrr.with Cp.in skarn								
45.5 - 50.0	Skarn								
	52.0 ½" qtz. veinlet W. pyrr.								
50 - 57	Garnetite-diopside skarn w.minor sulphides								
57.0 - 72.0	Diopside skarn with streaks pyrr. & Cp.								
72.0 - 75.0	Garnetite-diopside skarn								
75.0 - 77.0	Banded white-grey chert								
77 - 83	Light green-grey chert								
83 - 87	Brown chert with 2" sect. pyrr @ 86.5'								
87 - 90	Green skarn								
	88.0-90 Severely dragged phase containing grey chert frags. & replaced pyrr.& Cp.								

092056

[redacted]

PROPERTY _____ DRILL HOLE NO. 9 SHEET 2

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
90 - 93	Cherty phase w. drag repl.pyrr. with very minor Cp.								
93 - 102.5	Mauve-brown,light green -pink chert phase w.v.sparse min.								
	101.0 2" sect. coarse skarn.								
102.5 - 114.5	Banded brown-white chert with skarn								
	112.0 Minor pyrr. w. Cp.								
114.5 - 122.0	Weakly min. w. sulphides								
122.0 - 132.0	Green-brown-white banded chert								
132.0	Massive pyrr. bleb								
132.0 - 140	Weakly min. w. sulphides								
140 - 142	30-50% pyrr. w. minor Cp.								
142 - 147	About 5% massive sulphides								
147 - 150	50% sulphides w. minor Cp.								
150 - 151	Phyllite phase, brown, well parted								
152 - 155.5	Silicified banded phase,contorted with pyrr-pyrite								
155.5 - 157.5	Light green-white cherty phase containing ribbons of SiO_2 and sparse repl. of pyrr. Less than 5% sulph.								
157.5 - 158.5	Qts. veinlets and patches, $\frac{1}{4}$" in chert-phyllite phase.								
158.5 - 502	Phyllite,well parted phases. Light brown-grey contorted and mottled phases, silicified sections with decreasing silicification from 158.5. Speckled phase possibly andalusite phyllite.								
	186 Shale partings								
	188 Siliceous								
	192 Cherty								
	192.5 1" qtz.band w.mica & pyrite. Pyrite rims mica-qtz. phase.								
	213.5 Talc parting								
	269 Pyrite dissem.								
	270-295 Banding @ 40 deg.								

PROPERTY _____ DRILL HOLE NO. 3 SHEET 3

LOCATION _____ LAT. _____ DATE COMMENCED _____

AZIMUTH _____ DEP. _____ DATE COMPLETED _____

DIP OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY Cu-%	ASSAY Au/OZ	ASSAY Ag/OZ	ASSAY RECOVERY	ASSAY	ASSAY
	273 Specimen taken								
	318 Silica								
	346 ½" qts. stringer with pyr. and Cp.								
	351-358 Qts. vein. Barren						30%		
	403 Speckled herisan (403-444)								
	417 1" qts. stringer w. pyrite								
	417.5 ½" qts. stringer w. pyrite								
	425 1" qts. stringer								
	429 2" qts. stringer w. pyrite								
	438 Chloritized and 2" drag folded section								
	443 "								
	444 End speckled phase								
	461-487 Speckled phase								
	488-489 Barren qts.								
	500 Banding @ 40 deg.								
	493-502 Speckled section								
502	HOLE ENDS								

NORTHWESTERN EXPLORATIONS LTD.

PROPERTY AXEL CLAIMS, N. W. T. DRILL HOLE NO. 4 SHEET 1

BEARING _____ LAT. 1115 DATE COMMENCED July 15, 1956

DIP AT COLLAR -90° DEP. 669 DATE COMPLETED July 19, 1956

DEPTH OF HOLE _____ ELEV. 4886 REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
0 - 31	Casing through O. B.								
31 - 56	Limestone-grey banded crystalline containing fragments of grey chert. Selvage rimming of occasional frags. by pyrr. eg. 31'-36'. No dolomitization seen.								
56 - 62	Grey limestone as above.								
62 - 63	6" band of silicified skarn composed of diopside and 1/6" grain-like blebs garnetite containing pyrr. blebs assoc. with qtz. No $CuFeS_4$. Band rimmed by 3" white cryst. ls.								
63 - 64	Cherty frags. in ls. ½"-1" wide carrying finely dissem. pyrr.								
64 - 77	"								
77 - 79	Skarn (epidote) with minor ls. sparse pyrr. contact 45°.								
79 - 87	Cryst. ls. poorly banded								
87 - 87.5	2" @ 45° massive pyrr. containing unreplaced cherty frags. ½" in dia.								
87.5 - 91.0	Banded grey-white cryst. ls.								
91.0	2" band of pyrr. (possibly original qtzite). Specimen taken complete.								
91 - 105	Banded grey-white cryst. ls.								
105 - 130	Grey-white-banded ls. @ 109 arenaceous ls. containing grey ls. frags. Spec. @ 109.								
130 - 139	Continues @ 138 minute specks chalcopyrite in ls. Small patch skarn (1") @ 138½								
139 - 160	Skarn composed essentially of green lime [redacted] silicate minor garnetite, occ. ls. patches. eg. 152½-153 (spec. taken @ 139) pyrr. blebs and massive patches throughout. 141-147 fair chalcopyrite.	K8298 99	139 149	149 154	10' 5'	0.38 0.15			

PROPERTY _____ DRILL HOLE NO. 4 SHEET 2

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
	153 - 154 Fair chalcopyrite								
	(156.5 - 2" representative sln.removed								
	155-160 Fair-good chalco.								
160 - 167	Mostly skarn								
	160-161.5 Mostly cryst. ls.								
	165 Sparse chalco.								
165 - 178	Fairly abundant pyrr.								
	166, 170, 171. Fair chalco.								
	172-176 Over 50% pyrr.								
	Chalco.fair throughout. Chalco. in knife-edge stringers,								
	to pyrr. skarn contact @ 171.7								
	172-178 Fair garnetite.	K7657	178	188	10'	0.28			
178 - 181	Mostly skarn		188	198	10'	0.23			
181 - 184.5	Mostly massive sulphides		198	208	10'	0.28			
184.5 - 189	Mostly skarn								
189 - 191	Mostly massive sulphides								
191 - 192.5	Mostly skarn								
192.5 - 195	Mostly massive sulphides								
195 - 198	Mostly skarn								
198 - 204	Mostly massive sulphides.Frags.of more poorly replaced.								
	204-205 Good banded sulphides								
	198-204 Fair chalco.								
204 - 207	Sparse pyrr. in skarn								
206½ - 210	Mostly skarn								
210 - 214	Mostly massive sulphides becoming cherty at 212.								
	214½ chalco. & pyrr. 2" in light-green cherty phase								
214 - 216	Thin bedded chert containing patches of pyrr.								
216 - 220	Fairly massive pyrr - with cp.								
220 - 225	Light coloured,thin banded (white & green & mauve) chert containing occasional blebs pyrr.& Cp.particularly in darker seams.								

PROPERTY ______ DRILL HOLE NO. 4 SHEET 3

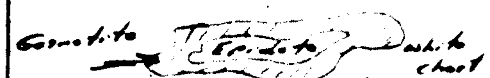
BEARING ______ LAT. ______ DATE COMMENCED ______

DIP AT COLLAR ______ DEP. ______ DATE COMPLETED ______

DEPTH OF HOLE ______ ELEV. ______ REMARKS ______

PURPOSE OF HOLE ______

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
225 - 237	Light white-green thin bedded chert - barren Mottled at 227-228 230-232 Splotches of pyrr. with sparse chalco.								
237 - 249½	White-green banded chert containing sparse lenses of garnetite-epidote. 236, 238½, 240-241. Splotches of pyrr. (Spec. taken at 238½) 245 Chert becomes darker - more to mauve-brown.								
250 - 274.5	Predominantly light cream-green chert containing up to 50% skarn but mineralization confined to rare slips containing pyrr. and chalco.								
274.5 - 276	Pyrr. & chalco. splotches in mauve-brown section of chert.								
276 - 292.5	Predom. light cream-green chert containing up to 50% skarn but barren mineralization.								



vertical pyrite seam @ 293-294

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
292.5 - 320	Greencream mottled chert mineralised with fair pyrr. & chalco. throughout. 312 Specimen taken.								
320 - 387	Grey-brown (hor.banded) phyllite or schist; contains thin platy pyrr. 321.5, 322.5 1" & 2" bands pyrr. chalco. in skarn and qtz. 338 Typ. specimen taken. 340-345 Little pyrr. in bal. of section.								

PROPERTY _____ DRILL HOLE NO. 4 SHEET 4

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
	358-360 Silicified								
	368.6 Silicified w.v.sps. pyrr. & chalco.								
	371 Silicified 6"								
	385 Silicified 6"								
387 - 390	Silicified epidotized chert with pyrr. & chalco.								
390 - 396	Silicified epidotized chert & phyllite								
396 - 402	398 (spec. taken) Phyllite or schist								
402	HOLE ENDS								

Northwestern Explorations Ltd.

PROPERTY AXEL CLAIMS, N.M.D. DRILL HOLE NO. 5 SHEET 1

BEARING _____ LAT. 670 DATE COMMENCED July 21, 1956

DIP AT COLLAR -90° DEP. 450 DATE COMPLETED July 28, 1956

DEPTH OF HOLE _____ ELEV. 4928 REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
0 - 59	Talus								
59 - 85	Phyllitic schist with included light grey chert interbands.								
85 - 90	Light grey chert with minor phyllitic sections.								
90 - 369	Mostly purple-brown phyllite, weakly bedded, settled in sections. Soft with occasional cherty sections.								
	103-104 qtz. sections. Banding @ 0°								
	115.0-115.3 Qtz.								
	116.0-116.2 Qtz. Phyllite cleavage @ 40° qtz. cuts at right angles.								
	121.7 1" qtz. seam, some pyrr. Cleav. @ 60°								
	146.5 3" qtz. seam, v. spse. cp.								
	147.3 1" qtz. seam @ 45° spse. pyrr.								
	148.0 1" qtz. seam								
	148.5 1" qtz. seam								
	154-155.5 qtz.								
	168.0 Cleavage in phyllite 15°								
	185.0 1" qtz. seam w. pyrite. Banding @ 15°								
	191-192 Fract.qtz.with occ.tiny fract.containing cp. w. pyrr.								
	192.5-192.7 qtz. w.spse pyrite								
	198.0 Banding @ 50°								
	210 2" band qtz. @ 45°								
	214-215 80% qtz.with pyrite in irregular fractures.								
	217-220 qtz. Random fracture - slip coated w. pyrr.								
	222 Fract. cleavage @ 50°								
	222.5 1" qtz. seam)								
	235 1" ") @ 15°								

PROPERTY _____ DRILL HOLE NO. 5 SHEET 8

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
	248 Fract. cleavage @ 70° 269 " @ 80° 305 " @ 50° 330 " @ 60° 342 " @ 30°								
358	358 Fract. cleavage @ 80°								
	369 END OF HOLE								

NORTHERN EXPLORATIONS LTD.

PROPERTY **ANNE CLAIMS, N.M.D.** DRILL HOLE NO. **6** SHEET **1**

BEARING _____ LAT. **1993** DATE COMMENCED **August 7, 1956**

DIP AT COLLAR **-45** DEP. **85W** DATE COMPLETED **August 11, 1956**

DEPTH OF HOLE _____ ELEV. **4896** REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	
0 - 10	Casing							
10 - 87.3	Lt.grey,med.grained crystalline ls. containing dark grey inclusions of ls. which are occasionally finer grained and generally banded. Included frags. are ribboned and contained in plane of bedding. Ls. pyritised weakly. 10' banding @ 45°							
	10-15 Minute fractures at rt. angles to bedding. Displacement of 0.1 inch noted at 13'.							
	23-24 Ls. & skarn containing pyrr. & v. spec. Cp. (0.3%) banding at 45°							
	38 Banding at 30°							
	43 " " 25°							
	63 " " 30°							
	70 Ls. frags. slightly dragged @ 45°							
	87.3 - 98 Mostly diopside skarn containing occ. sections massive sulphides, one section ls., some garnetised sections.							
	87.3-90.2 Diopside skarn, garnetised 88.5-90.2 v.spec pyrr & cp. Cp. 0.3%							
	90.2-93.0 Grey white banded ls.							
	93.0-96.0 Massive sections pyrr. v. cp. in skarn.							
	93.5-94.2, 94.8-95.0, 95.2-96.0 Massive 50% sulf.							
	NR. 94-95 Probably 1'.0 lost core.							
	96-98 Ls. skarn lt.grey containing occ. bands sulph. c.f. 96.5, 97.0 ½" bands @ 45°							
98 - 108	Mostly bedd. cryst. ls.							
	100-100.6 Lt.grey green sli.diopside skarn with centrally loc.1" sections of diopside & white ls.vein type repl. containing cp. & pyrr. (Section 100-101 removed)							

PROPERTY _____ DRILL HOLE NO. 6 SHEET 2

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	FROM	TO	ASSAY Cu.%	ASSAY Au. oz	ASSAY Cu.WA	ASSAY
	100.6-108 Le.breccia containing white sub-angular frags.up to 1" in grey cryst ls. matrix								
	102-1025 Same as 100-100.6								
	104.4-105.0 "								
108 - 123	Mostly well replaced sulphide with very massive section 115-123. Balance contains occ.massive sections broken by skarn and qtz.	9807	108	115	7	.83	.04	581	
		8	115	123	8	.65	Tr	520	
		9	123	137	14	.07	.005	98	
		10	137	147	10	.45	.01	450	
	108-110 ls. skarn with sections aggregating 3%-5% Sulph.	11	147	158	11	.40	Tr	440	
					50	0.42		2089	
	110-111 50% S								
	111-112 Mostly SiO_2 with 3" sect. 50% S								
	112-113.5 Mostly 50% S. with SiO_2 at 112.5-112.7;113.1-113.5								
	113.5-115 Mostly diopside-garnetite skarn								
	115-123 Entire section massive sulph. replacing in siliceous gangue which cements frags. of silicified banded to (?) Some phases irregular replacement in SiO_2 with no visible banding e.g. 119-120								
123 - 137	Garnetite-diopside skarn with very occ. ls. Weakly mineralized avg. 2% S. v. sps. Cp.								
	130-131 Sections banded cryst. ls. in diopside garnetite skarn.								
	135.8-136.3 Partly mass. pyrr & cp.								
137 - 158	Banded & irreg.repl.of pyrr. with cp. in drag frags. & bands & bands @ 45° to bedding. Siliceous alteration avg. sulph.content 30%-50%.								

PROPERTY _____ DRILL HOLE NO. 6 SHEET 3

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
	144.0 2" qtz.								
	147.3-147.6 SiO_2 @ 60°								
	153.0-153.3 " " 35°								
158 - 171	Garnetite-diopside skarn containing occ. qtz. repl. with pyrr. & cp. Sulphide content of section v. low.								
	159.3 ½" SiO_2 stringer w. pyrr.& v.spse.cp.								
	166.4 & 167.0 ¼" fract. @ 45° calcite & qtz. with poss. movement.								
	169.5-170.4 Pyrr. & spse cp. banded repl. @ 50° in siliceous diopside skarn & some chert.								
171 - 203	Essentially green-grey-pink-white banded chert with occ.minor skarn & sulphide. Dippside frags. and banding @ 45°								
	171-180 White-green banded chert								
	180-181 Brown-grey chert								
	181-182 Skarn w. minor S.								
	182-185 Dark green chert								
	185-192 White grey mottled chert								
	192-194.5 Greywacke (?)								
	194.5-199 Green white banded chert w. v.spse.skarn bands. min.w. S. e. g.								
	198.0- ½" skarn with 2% S.								
	199-199.8 Garnetite-diopside skarn								

PROPERTY _____ DRILL HOLE NO. 6 SHEET 4

BEARING _____ LAT. _____ DATE COMMENCED _____

DIP AT COLLAR _____ DEP. _____ DATE COMPLETED _____

DEPTH OF HOLE _____ ELEV. _____ REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
	199.8-203 Green grey banded chert becoming altered at 202 to fine grained felspatic and silicic white phase of granite dyke. Flecked with pyrr. specs.								
203 - 276	Fine grained aplitic phase composed of qtz.feldspar (some lath-like frags) sericitized biotite flecks accessory pyrr. v. spse. pyrite								
278 - 280	Contact with cherty phase @ 60° Green-cream mottled chert breccia								
280 - 302	Green-grey banded chert with interbands of garnetite-epidote carrying spse. sulphides 291.0 1" partly replaced with pyrr. 292.0-293.5 4 sections of approx. 1" partly repl. with S. 296 Occ.pyrr. in 2" of garnetite-epidote skarn.								
302 - 305.5	Dark green diopside skarn with v. spse. sulphide								
305.5 - 312	Lt. grey chert & dark green diopside garnetite banded skarn. Unmineralized.								
312 - 336	Green-grey with occ.light pink coloured chert - well banded. avg. 45°. Barren of min.								
336 - 351	Grey-green chert & diopside skarn contained banded repl. of pyrr. generally about 10% S. 351-352 Phyllitic interbedded phase.	9812	336	351	15	.15	.005		
351 - 359	Same as above but phases of phyllitic material occuring as interbands								
359 - 368	Essentially banded phyllite & qtz. Qtz.phyllite schist with very sparse sulphide diss. in siliceous portions - mostly pyrite								
368 - 372	Phyllite schist banded at 50°								

NORTHWESTERN EXPLORATIONS LTD.

PROPERTY AXEL CLAIMS, N. W. T. DRILL HOLE NO. 7 SHEET 1

BEARING _____ LAT. 939 DATE COMMENCED August 4, 1956

DIP AT COLLAR -90° DEP. 538 DATE COMPLETED August 6, 1956

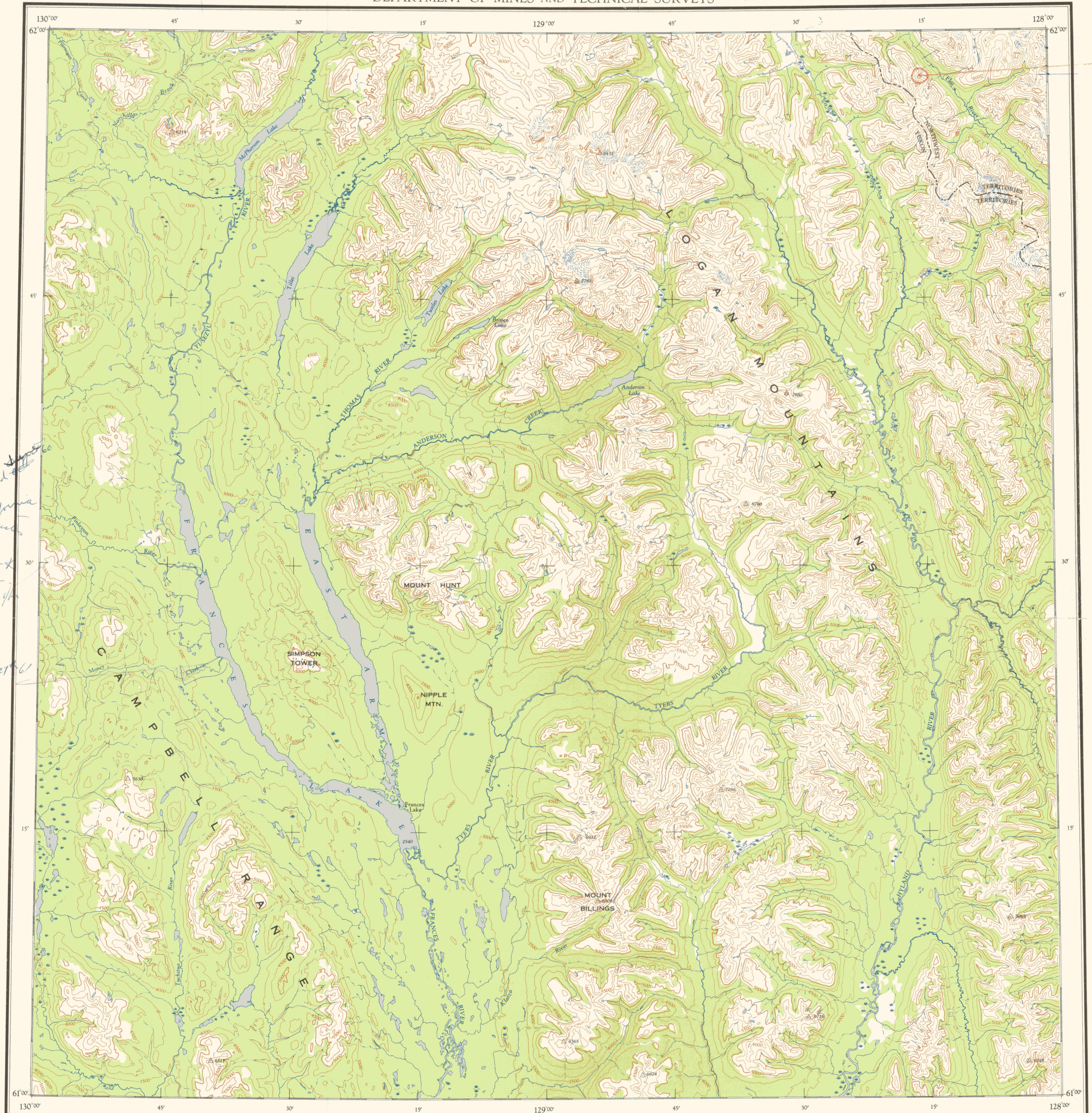
DEPTH OF HOLE _____ ELEV. 4910 REMARKS _____

PURPOSE OF HOLE _____

FOOTAGE	DESCRIPTION	SAMPLE NO.	WIDTH IN FEET	ASSAY	ASSAY	ASSAY	ASSAY	ASSAY
0 - 70	Overburden containing 2'-3' boulders. Hole abandoned at 70' with 14' lost AX casing							

NATIONAL TOPOGRAPHIC SERIES — CANADA — DEPARTMENT OF MINES AND TECHNICAL SURVEYS — *SECOND EDITION* — CANADA, SHEET 105 H

128° 15'



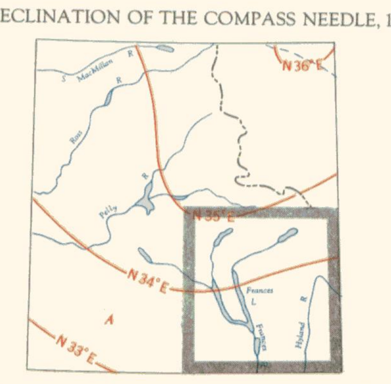
61° 57½

CANADA TUNGSTEN
FLAT RIVER PROPERTY
< 1½ miles from Y.T. – NWT Bdy
1.32 Million Tons 2.51% WO_3

9 placer claims staked ... 60
Charles Sweet & Associates California
Pyrcil Gp.
on Finlayson R.
Report on Finlayson
1945 Min Resources

4 mile placer lease staked & recorded March 61
Geo. F. Stephenson of Watson L.

THE DECLINATION OF THE COMPASS NEEDLE, 1951.



The declination of the compass needle at any place along a red line is the declination given on that red line. At other places the declination is between those given on the neighbouring red line; thus at the place marked A, the declination is between N. 33°E. and N. 34°E. The easterly declinations of the compass needle are decreasing 5 minutes annually.

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT R.C.E., *1949-52*
Aerial photography by R.C.A.F., 1949.

Universal Transverse Mercator Projection.

REFERENCE

Road, Hard Surface, All Weather — More than 2 Lanes — Partially Completed
,, Hard Surface, All Weather — 2 Lanes — Route No. — Less than 2 Lanes
,, Loose Surface, All Weather — More than 2 Lanes — 2 Lanes
,, Loose Surface, Less than 2 Lanes — All Weather — Dry Weather
Railway, Multiple Track
,, Single Track
Boundary, International
,, Province or State
,, County or District
,, Reservations, Indian, Military, Park, etc.

Scale 1 : 250,000
1 Inch to 4 Miles Approximately

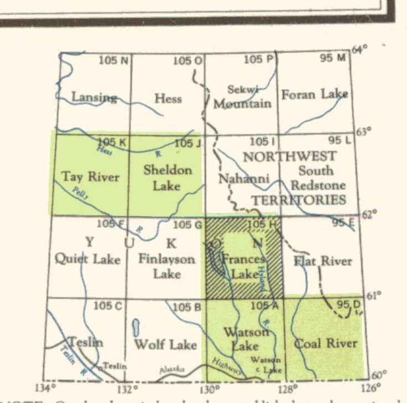
Miles 5 0 5 10 15 20 Miles
Kilometres 5 0 5 10 15 20 25 30 Kilometres

Contour interval 500 Feet.
All Elevations in Feet above Mean Sea Level.

North American Datum 1927

REFERENCE

Triangulation Station
Spot Elevation, in feet 257
Contours, Elevation 1500 2000
,, Depression 2000 1500
,, Approximate
Wooded Areas
Swamp or Marsh
Stream, Intermittent
W.L. 241
Ferry
Mud
Dam
Falls
Navigation Light
Sand
Aerodrome, on Land — Elevation in Feet 250 — on Water
Main Electric Power Line



NOTE: *On the above index the sheets published are shown tinted green*

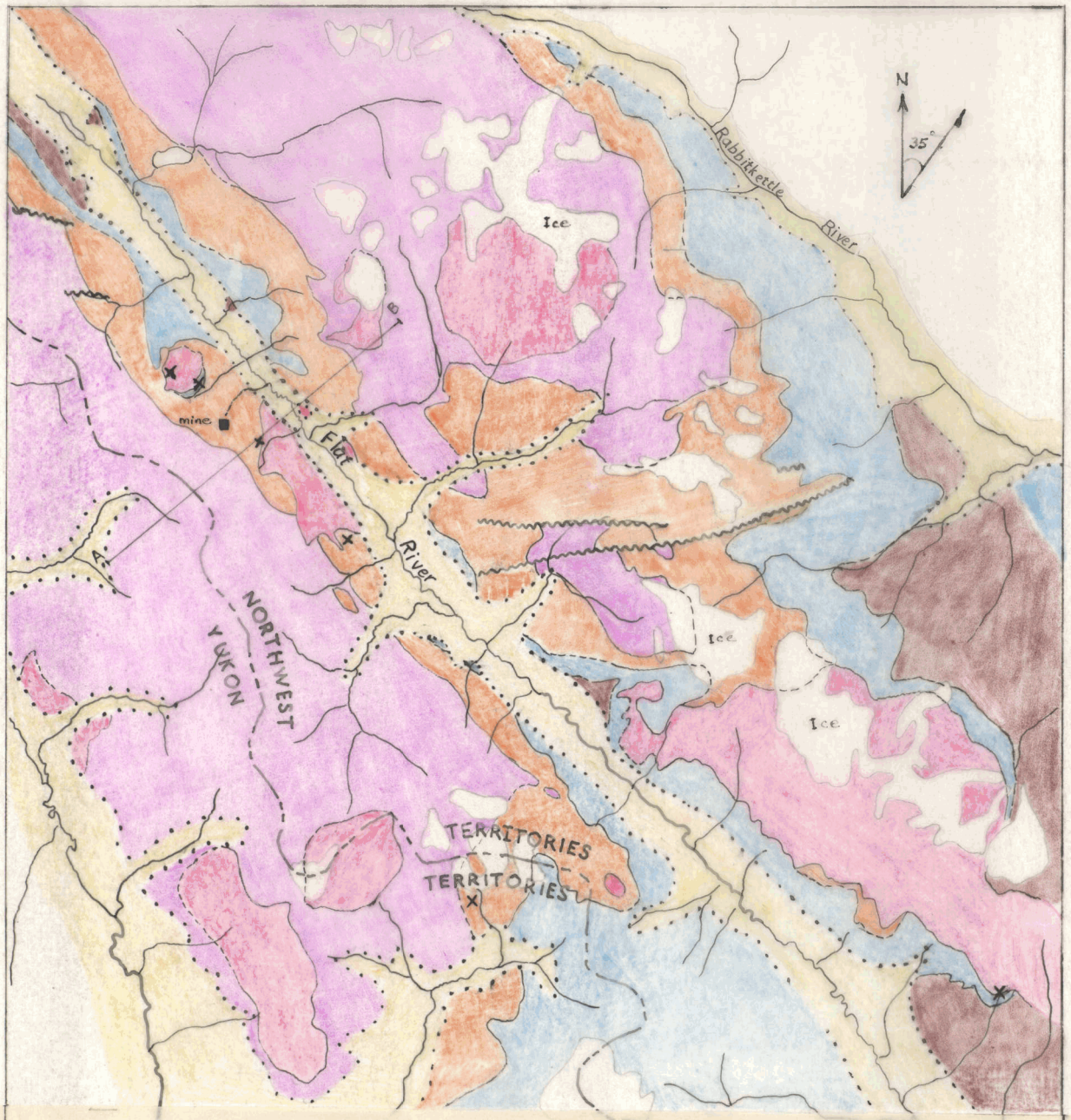
FRANCES LAKE
YUKON TERR.—NORTHWEST TERR.

SHEET 105 H
SECOND EDITION

Copies may be obtained from The Map Distribution Office, Dept. of Mines and Technical Surveys, Ottawa, at 25 cents each.

092056

[redacted]



LEGEND

Quaternary — Drift

Cretaceous (?) — Quartz monzonite

Ordivician — Black shale and chert

M – U Cambrian — Platy limestone, siltstone

L Cambrian — Dolomite, sandstone argillite, limestone

Proterozoic — Phyllite, siltstone quartzite

Geological boundary (defined, assumed)

Limit of geological mapping

Fault (defined, assumed)

Tungsten prospect or occurrence X

Scale

4 2 0 4 miles

Representative structure section


092056
LEGEND
Chert
Limestone
Argillite
Skarn
Skarn containing sulphides
Granite
Bedding attitude
Joint attitude
Fault
Anticlinal axis
Lithologic contact (defined, inferred)
Contour interval (500 feet)
-4500 -
33°
A12270
FLAT RIVER
Meadow
3500
4000
4500
5000
5500
6000
6500
7000
Pyrrhotite float
Glacier
PLATE 2
1"=1000'
A
B
PROFILE AND STRUCTURE SECTIONS
MACKENZIE SYNDICATE
COPPER TUNGSTEN PROPERTY
FLAT RIVER AREA N.W.T.
MAPPING BY NORTHWEST EXPL. LTD. 1955
TRACED C.E.D.

33°

LEGEND

- Cherty limestone
- Argillite
- Crystalline limestone
- Skarn containing massive sulphides
- Skarn containing disseminated sulphides
- Chert, minor skarn
- Phyllite, minor argillite
- Granodiorite
- Quartz vein

- Bedding attitude 20
- Joint attitude 70
- Fracture or shear attitude
- Sample location and assay result (% copper / true feet) 0.70 / 35
- Diamond drill hole location
- Lithologic contact (defined, gradational)
- Outcrop limit

TALUS

C R E E K

D.D.H. NO.6 El. 4836' - 85°

D.D.H. NO.4 El. 4886 - 90°

D.D.H. NO.7 El. 4910' - 90°

D.D.H. NO.5 El. 4928' - 90°

D.D.H. NO.1 - 50°

D.D.H. NO.2 - 90°

D.D.H. NO.3 - 60°

El. 4827' 216'

Camp

5400 5300 5200 5100 5000 4900 4800 4700 4600 4500 4400

NORTHWESTERN EXPLORATIONS LIMITED

GEOLOGIC PLAN
OF PART OF THE
130007 AXEL GROUP
FLAT RIVER AREA, N.W.T.

DATE		PLATE NO 4
		SCALE 1" = 50'

THE CANADA TUNGSTEN PROPERTY

FLAT RIVER AREA

NORTHWEST TERRITORIES.

Vancouver, B.C.
September, 1960

L.G. White
Mine Manager

ABSTRACT

by L.G. White

Prospecting parties working for the Mackenzie Syndicate in the Flat River area of the ~~Mackenzie~~ Logan (part of Selwyn) Mountains, Northwest Territories during 1958 identified tungsten mineralization and located the property now being developed by the Canada Tungsten Mining Corporation Ltd.

Scheelite mineralization associated with pyrrhotite and minor chalcopyrite occurs in lime silicate skarn replacement zones within a limestone, chert, argillite series intruded by granitic dykes originating from the main batholithic mass underlying the sedimentary beds.

Combined results from surface outcrop sampling, and 15,000 feet of grid pattern diamond drilling has outlined an orebody estimated to contain 1.32 million tons grading 2.51% WO_3 after applying a 10% dilution factor for mining purposes.

INTRODUCTION

The property of Canada Tungsten Mining Corporation Ltd., is located in the upper Flat River area of the Mackenzie Mountains, Northwest Territories. Skarn type replacement deposits containing scheelite mineralization are situated between elevations 4500 and 5500 feet above sea level along the east flank of the mountain range forming the boundary between the Yukon Territory and the Northwest Territories. The nearest supply centre for the area is Watson Lake, Yukon Territory, located at Milepost 635 on the Alaska Highway. Airline distance from the Watson Lake airbase to the tungsten property is 135 miles. There are no roads into the area so servicing has been exclusively by aircraft. Early access was made by using float and ski-equipped planes to Flat Lakes, thence by helicopter southeast along the Flat River valley for 12½ miles to the property. More recently, the Company has completed a 3,000 foot airstrip adjacent to the main camp in the Flat River valley for servicing by wheel-equipped planes.

The chronological sequence of exploration and development of the property has been as follows:

Scheelite mineralization identified by lamping and panning the outcrop	August 1958.
Preliminary geological mapping completed and samples taken. Initial claims staked.	September 1958.
Fill-in staking completed.	November 1958.
Detailed sampling of surface outcrop and exploration diamond drilling completed.	June to September 1959.
Winter air-freighting of equipment and supplies to the property.	January to April 1960.
Semi-permanent camp, mine road, and temporary airstrip constructed.	April to June 1960.
12,000 feet of diamond drilling, geological mapping covering approximately 6,000 acres and permanent airstrip constructed.	June to October 1960.

The Mackenzie mountains in which the tungsten claims are located form the northerly extension of the eastern section of the Cordilleran region. The general elevations of mountain peaks in the immediate area of the property range from 6500 to 7500 feet above sea level. The main rivers form NW - SE trending valleys at elevations of 3000 to 3500 feet above seal level. Vegetation is typical sub-arctic. Sparsely scattered clumps of black spruce and hemlock cover the valleys with timberline on the mountains at about the 4000 foot elevation. Arctic birch (commonly known as "buckbrush") together with caribou moss forms the undergrowth in the valleys and low mountain plateaux. Climatic conditions are not severe. Average temperatures during the winter period from November to March range from +20° to -40°F. Blizzard conditions during January and February are frequent but of short duration. Maximum snow depth in the valleys during the winter averages about 50 inches. The snow-free season extends from mid-May to about October 1st. The months of June and July are relatively dry, but precipitation during August and September is normally quite heavy. Although the property is located at 62° North Latitude, the general working conditions are not dissimilar to those experienced in Central or Eastern British Columbia.

HISTORY OF THE REGION

Other than providing a natural overland route for early traders and Indians to travel from the Pelly River to the junction of the South Nahanni and Liard Rivers, the Flat River valley was not thoroughly investigated by early prospectors. There have been no detailed regional geological surveys completed in the area. Dr. Roots of the Geological Survey of Canada, made a reconnaissance traverse through the Flat River valley during 1953 followed by prospecting, and a three-year helicopter-supported exploration programme by Northwestern Explorations from 1954 to 1956.

EARLY EXPLORATION OF THE TUNGSTEN PROPERTY

The general area to be prospected was selected by K.J. Springer who formed the Mackenzie Syndicate and arranged financing for a helicopter-supported programme during 1958. Late in the summer of the same year, Syndicate prospectors identified scheelite mineralization associated with massive pyrrhotite and minor chalcopyrite in skarn zones along chert limestone contacts on the west side of the Flat River valley about 12½ miles southeast of Flat Lakes. The discovery was

made by panning and lamping samples from the mineralized outcrops. In the limited time available before freeze-up the main mineralized showing was spot-sampled and mapped and further prospecting showed the existence of several other tungsten-bearing sulphide-skarn zones along the granite sediment contact for about 2½ miles southeast of the main showing. Sample returns gave exceptionally high and uniform values ranging from 1.5 to 5% WO_3 with the result a winter staking programme was organized immediately after freeze-up and the total claim block rounded out to 57 claims. This was subsequently increased to 115 claims during the summer of 1959 as information was compiled from geological mapping.

Plans were made during the winter of 1958 and '59 to establish a tent camp on the main showing early in June and systematically sample the zone which had been designated as the WO orebody. By July 20th, a total of 144 samples had been cut from 21 samples lines spaced at approximately 40 foot centres along the outcrop. Assay returns fully substantiated early appraisals by lamping that the tungsten values were evenly distributed across average widths of up to 60 feet along the outcrop for at least 650 feet. The present Company was then formed to provide funds for an exploration drilling programme. A drill contract was let to Boyles Bros. during the last week in July and a complete drill outfit flown to Flat Lakes for transfer by helicopter to the property. Drilling commenced on August 1, 1959 and terminated on September 11th. Over a period of 42 days, by working three shifts, it was possible to complete 11 holes and recover 3,085 feet of AX core. The holes were spotted in a fairly wide-spaced pattern to gain as much information as possible on the approximate size and grade of the orebody plus additional structural data to tie in with the detailed geological mapping which had been completed in the vicinity of the main outcrops. By the fall of 1959 it was evident that a major tungsten-bearing occurrence had been outlined estimated at 1.2 million tons containing approximately 2.5 million units*of tungsten trioxide in one deposit.

REGIONAL GEOLOGY

The valley of the Flat River resulted from glaciation along a line of structural weakness caused by folding and faulting of the sedimentary strata forming the main rock types in the area. These consist of chert, limestone, and argillites of Cambrian Age overlain by argillites, slates, grits, and limestone considered to be of Ordovician Age.

* 1 short ton unit = 20 pounds.

Silicate biotite granite occurs as a major intrusion related to the Nahanni-Coal River batholith. The intrusions have caused recrystallization of the limestone beds with sections close to the granite altered to a number of skarn zones containing the scheelite deposits. In the region of the WO orebody, the main structural feature is an anticlinal fold trending in a general S.50°E. direction. North of the orebody the folding is upright, while to the South it becomes progressively more overturned. The intense folding has caused pronounced flowage among all of the sedimentary rock types. It appears as if deformation has been by folding rather than by faulting, with the exception of minor faults within the area of the main orebody.

DESCRIPTION OF THE WO OREBODY

The main ore-bearing zone on the property is roughly tabular in shape having approximate dimensions as outlined by diamond drilling of 650 feet long, 300 feet wide, and 65 feet thick. It is a pyrometasomatic skarn type deposit formed by replacement of a favourable limestone bed. Mineralogical studies have shown the scheelite to be the oldest mineral in the ore with more recent partial replacement and contamination by silicate minerals, chiefly diopside, garnet and quartz. The silicates in turn have been replaced by sulphide minerals consisting of pyrrhotite and chalcopyrite with minor amounts of sphalerite and cubanite.

Structural controls of the WO orebody have been assumed to consist of the following:

(1) A fault trending N.50°E. with a dip of 65° to the South East.

(2) A broad anticlinal flexture and related synclinal trough with the axial planes striking Northerly.

(3) A favourable chert limestone contact contained within the flexture.

The fault zone has both pre and post-mineral movement and is assumed to have provided the main entry for mineral solutions. The fault has an apparent displacement of 30 feet vertically and shows a zone width of up to 25 feet. The main zone of mineralization favours the West limb of the anticlinal flexure

for a horizontal distance of approximately 350 feet with the better grade of mineralization confined to this section and within 350 feet of the fault. The higher grade of mineralization appears also to be localized by the favourable lime-chert contact. The basal sections of the limestone, altered to skarn, tend to be more argillaceous and grades into chert. The chert being the more competent member has been highly fractured and broken during folding to provide small solution ways for mineralizing solutions with sections containing limy argillaceous lenses which have been altered to skarn material containing appreciable tungsten values. The footwall argillite has also been noted to contain mineralized sections which are limy in character. Limited exploration of other tungsten-bearing zones on the property along the main contacts has shown similar structural characteristics to exist for the formation of scheelite-bearing sulphide skarn deposits.

DEVELOPMENT PROGRAMME - 1960

Following the favourable results obtained from the exploration drilling completed during 1959, it was decided to lay plans for a detailed grid pattern drilling programme to substantiate quantity and grade of the main orebody, provide equipment to establish a semi-permanent camp on the property in the Flat River valley, and construct an airstrip to allow access into the area within a reasonable distance of the property. In addition, it was planned to continue detailed regional geological mapping of the entire property and test some of the outlying showings. Estimates were prepared and finances arranged to initiate the above programme starting in January 1960.

Rather than attempt overland delivery of the essential equipment and supplies, it was decided to set up an airlift operation and freight by use of large aircraft.

Diamond Drilling Results:

Grid pattern diamond drilling on approximate 100 foot centres involving a total of 11,737 feet in 41 holes has substantiated previous values and tonnage indicated by the 11 exploratory holes drilled during 1959. In fact, final calculations show a 26% increase in grade on the main WO orebody which is now estimated to contain a reserve of 1.32 million tons grading 2.51 units to the ton, or approximately 3.3 million short ton units of tungsten trioxide, after allowance for a 10% dilution factor.

The above reserve makes allowances only for the enriched skarn-sulphide zone. The underlying chert band contains sizable lenses of lime-silicate material averaging between 0.75% and 1% WO_3 considered uneconomic at the present price of tungsten and the remote location of the property.

Winter Freighting:

To be able to deliver the required quantity of freight, it was first necessary to provide a base of operations at Watson Lake and one at Flat Lakes. No problems existed at the modern airbase facilities available at Watson Lake, but to provide a satisfactory strip on Flat Lakes for landing large wheel-equipped aircraft, such as the Douglas C-46 and the Bristol Flying Boxcar, presented questionable possibilities.

During January and February, a ski-equipped Otter and a Beaver were used to deliver a D-4 caterpillar tractor and enough fuel oil, building materials (pre-cut), insulation, and basic supplies for providing shelters to house an 11 man crew to be used in preparation of a 4,000 foot by 200 foot ice-strip on the Lake. Needless to add, conditions at the time of setting up the first tent shelters prior to getting cookhouse and bunkhouse cabooses constructed were rather arduous with temperatures in the -10° to -40° F. range; however, a satisfactory strip was prepared, and 12½ miles of winter road constructed for transferring the freight by tractor train to the property.

Freighting with two Pacific Western Airlines C-46's and the Wardair Bristol, approximately 400 tons of equipment and supplies were delivered during the period March 11th to April 11th. Enough building supplies for a 35 man camp, fuel oil tanks for 40,000 gallons of storage, a portable sawmill, two D-7 caterpillar tractors complete with hydraulic dozers, a Bombadier, an International 4 x 4 pickup, and 10 sets of winter freighting sleighs comprised the major freight items.

Plant and Camp Facilities:

Comfortable camp facilities were provided for a staff and working force totalling 35 men. The buildings were partially prefabricated at Watson Lake and erected on the cleared site at the property by a six-man contract crew employed by Sentinel Construction Company of West Vancouver. The entire job, including all services such as water supply, heating, and sewage disposal for three buildings totalling approximately 3500 square feet of space, cost $34,500., or a landed figure by adding air freighting charges of $11.40 per square foot.

3500
11.40
140000
3500
3500
38500.00

[redacted]

Power and light for the shop and camp were supplied by a small 10 K.W. diesel electric plant. Enough tools and welding equipment were provided for general mechanical maintenance of the tractors and other mobile equipment.

A small portable sawmill was set up near the camp and operated intermittently throughout the summer for provision of rough timber and lumber required to construct a 20' x 40' storage warehouse and other auxiliary buildings. Clearing for the airport provided sufficient sawlog timber to cut approximately 60,000 f.b.m.

Mine Road Construction:

Three and one-half miles of road were constructed in switchback style to connect the camp and the mine site. No unusual problems were encountered other than surface frost during the early clearing in May. The lower two miles of the road were maintained at a grade ranging from 4 to 6 percent; however, seven switchbacks were necessary at 12 percent grade to reach the drilling site.

Airport Construction:

Fortunately, an area immediately adjacent to the camp was available for relatively easy clearing and grading early in April and May to provide a strip on which steady landings have been made all summer with Cessna and Beaver aircraft.

Recent surveying and layout by Department of Transport engineers has extended the original strip centre line whereby construction can be completed to specifications for provision of a regulation airstrip 5400 feet long. With equipment available on the property 3,000 feet has now been graded and completed to required specifications.

CONCLUSION

No insurmountable problems can be foreseen for mining and treating the ore. Fortunately, the high grade section of the deposit provides a good margin in economic calculations at the present world price per unit for tungsten notwithstanding the remote location of the property and the resultant high cost of transportation.

ACKNOWLEDGMENTS

I wish to thank Mr. K.J. Springer, president of Canada Tungsten Mining Corporation Ltd., for permission to present this paper. Reference has been made to Geological information compiled by the Company's staff, and Mineralogical studies by C. Aird and C. Ball.

Part 1 Ab Olivier
Talk AIME Dinner
May 62

IN 1961 UNDERGROUND DRIFTING AND DIAMOND DRILLING FURTHER EXTENDED THE OREBODY. PUBLISHED ORE RESERVES ARE 1,176/400 TONS OF 2.47 PERCENT TUNGSTEN TRIOXIDE (WO_3).

THE DEVELOPMENT OF THIS OREBODY WAS A CHALLENGE TO MODERN METHODS OF TRANSPORTATION. ALL SUPPLIES UP TO APRIL OF 1960 HAD TO BE FLOWN IN BY FLOAT AIRCRAFT AND HELICOPTER. IN APRIL OF 1960 A BRISTOL AND TWO C-46 AIRCRAFT BROUGHT IN 400 TONS OF SUPPLIES FROM WATSON LAKE, LANDING ON THE ICE AT FLAT LAKE. THE SUPPLIES CONSISTED OF FUEL OIL, CAMP SUPPLIES, DOZER AND OTHER HEAVY EQUIPMENT. THESE SUPPLIES WERE THEN MOVED TWELVE MILES SOUTH OF THE LAKE BY TRACTOR TRAIN TO THE PROPERTY. DURING THE SUMMER OF 1960 TWO AIRSTRIPS WERE STARTED AND COMPLETED, ONE 2,000 FEET LONG AND THE OTHER 3,300 FEET LONG. EVENTUALLY THESE TWO RUNWAYS WERE CONNECTED TO MAKE ONE LARGE AIRSTRIP. THE OPERATION CONTINUED TO BE SUPPLIED AND SERVICED BY LIGHT AIRCRAFT. IN 1961 CANADA TUNGSTEN PURCHASED AN ANSON AIRCRAFT; THIS ANSON AND A CESSNA 185 SERVICED AND SUPPLIED THIS ENTIRE CAMP, EXCEPT FOR 550 TONS OF MINING AND HEAVY EQUIPMENT BROUGHT IN BY A BRISTOL AIRCRAFT DURING JULY OF LAST YEAR. THIS COMING YEAR A DC-3 WILL BE USED IN SUPPLYING THE MINING AND CONSTRUCTION OPERATIONS.

FOR PERMANENT ACCESS TO THE PROPERTY A ROAD IS BEING CONSTRUCTED FROM MILE 67 ON THE ROSS RIVER-WATSON LAKE DEVELOPMENT

ROAD. THE FEDERAL GOVERNMENT AND THE COMPANY HAVE AN AGREEMENT BY WHICH THE FEDERAL GOVERNMENT PAYS THE WHOLE COST OF THE ACCESS ROAD FOR THE FIRST 80 MILES AND TWO-THIRDS OF THE COST OF THE REMAINING MILEAGE TO THE MINE.

CONSTRUCTION OF THIS ROAD STARTED IN 1961 AND 62 MILES WERE FINISHED, 37 MILES FROM THE DEVELOPMENT ROAD AND 25 MILES FROM THE MINE. DURING THE WINTER A WINTER TRAIL WAS MADE AND 4000 - 5000 TONS OF MINING, MILL AND BUILDING SUPPLIES WERE TRANSPORTED BY TRUCK TO THE MINE SITE. IT IS INTERESTING TO NOTE THAT DURING FEBRUARY AND MARCH OF THIS YEAR THE GOVERNMENT CONTRACTOR JUMPED TO MILE 65 OF THE ROAD USING THE WINTER TRAIL FOR TRANSPORT AND CONSTRUCTED 12 MILES OF FINISHED ROAD. THE COMPANY ON THEIR PORTION OF THE ROAD ROUGH/GRADED 7 MILES IN AN AREA WHERE WET CONDITIONS WOULD IMPAIR CONSTRUCTION IN THE SUMMER.

STEEL FOR THE HYLAND RIVER CROSSING AND SMALLER STREAM CROSSINGS WAS BROUGHT IN TO THEIR RESPECTIVE SITES BY MEANS OF THE WINTER ROAD.

AT THE MINE, EXCAVATING FOR THE CRUSHING PLANT AND MILL SITE IS BEING CARRIED ON. THE CREWS ARE BEING ORGANIZED FOR THE BUILDING OF WORKSHOPS AND DWELLINGS, OFFICE BUILDING, SCHOOL AND

...6

CURLING RINK. CONSTRUCTION OF A BUNKHOUSE AND WAREHOUSE IS ALMOST COMPLETED. EXCEPT FOR PLYWOOD, ALL THE LUMBER HAS BEEN CUT WITHIN 15 MILES OF THE MINE. THIS HAS BEEN A GREAT SAVING OF TIME AND MONEY.

MINING WILL BE CONDUCTED DURING THE SUMMER MONTHS AND ORE WILL BE STOCKPILED IN SUFFICIENT QUANTITIES TO KEEP THE MILL RUNNING ALL YEAR. ISBEL CONSTRUCTION, AN AMERICAN FIRM FROM THE STATE OF IDAHO, HAVE CONTRACTED THE OPEN PIT WORK. DEVELOPMENT OF THE OPEN PIT WILL BEGIN THIS SPRING AND PRODUCTION WILL START IN JULY OR AUGUST.

THE MILL WILL HAVE A CAPACITY OF 300 TONS OF ORE A DAY PRODUCING TEN TONS OF TUNGSTEN CONCENTRATE. IT IS REPORTED THAT MINING WILL START IN A HIGHER GRADE SECTION OF THE OPEN PIT AND INITIAL ORE WILL AVERAGE ABOUT 2.75 PERCENT WO_3.

FINANCES ARE PROVIDED BY NORTHWEST AMAX (A SUBSIDIARY OF AMERICAN METAL CLIMAX) DOME MINES AND VENTURES LTD. WORLD SALES OF THE COMPANY'S PRODUCT WILL BE HANDLED BY AMERICAN METAL CLIMAX.

THE CANADIAN FEDERAL GOVERNMENT IS VERY ACTIVE AND INTERESTED IN NORTHERN DEVELOPMENT. THE GOVERNMENT, RECOGNIZING THE PROBLEMS OF COMMERCIAL DEVELOPMENT OF THE NORTHERN RESOURCES, HAS

...7

MUTUAL 4-1274

SUITE 604 — 789 PENDER ST. WEST
VANCOUVER 1. B.C.

Written Flat Lake, N,W.T.
September 10, 1959
Rec'd and typed in Vancouver, B.C.
September 14, 1959

Dr. Ralph Skinner
Resident Geologist
Geological Survey of Canada
Federal Building
WHITEHORSE, Y. T.

Dear Dr. Skinner:

We sincerely appreciated having you visit our property early this past week for an official examination.

To confirm our discussions at that time, we do not wish any of the information given to you to be released to anyone but your principals of the G. S. C. in Ottawa. Our Company has not reported any of the results to anyone beyond participants in our Syndicate and until a complete compilation and appraisal of the drill results have been assembled there will be none issued.

Yours very truly,

CANADA TUNGSTEN MINING CORPORATION LTD.

L.G. White

LGW:c

for "L. G. White, P. Eng." (signed)

09205

MUTUAL 2-4255

CANADA TUNGSTEN MINING CORPORATION LTD.

SUITE 502 — 1200 WEST PENDER STREET
VANCOUVER 1, B.C.

January 4th, 1960.

Mr. Ralph Skinner,
Resident Geologist,
Dept. of Mines & Technical Surveys,
P.O. Box 1029,
Whitehorse, Y.T.

Dear Mr. Skinner:

When you called at the Canada Tungsten camp at Flat River, N.W.T., in September 1960, you requested us to forward to your office a summary of activities for 1960. We hope the attached notes will meet your requirements, but if some additional information is desired, please get in touch with us at this address.

Yours very truly,

CANADA TUNGSTEN MINING CORP. LTD.,

R. W. Burton,
Assistant Manager.

RWB:pk
Att.

NOTES FOR MR. R. SKINNER - Whitehorse, Y.T.

1. CAMP CONSTRUCTION:

Before February 1960, a temporary camp was erected at Flat Lakes, N.W.T., to receive freight transported by aircraft. By the end of March 1960, about 480 tons of freight was flown from Watson Lake, Y.T. to Flat Lakes, N.W.T., then freighted by tractor to the present site of the Flat River Camp (Lat. 61° 58' N - Long 128° 12' W). The air freight included an entire camp for 35 men, three tractors with bulldozer equipment, two surface diamond drill rigs, a small portable sawmill, small motor vehicles and an ample supply of fuel for all equipment. The camp was ready for occupancy during April 1960.

2. AIRSTRIPS:

While the camp at Flat River was under construction, a temporary airstrip with runway 150' X 2,000' was cleared, adjacent to the camp. Throughout the working season of 1960, this airstrip was used for a Cessna 180 and other light aircraft. In the latter part of June, clearing was started for a larger airstrip, and by the end of September, the total cleared area was 400' X 6,500' with a second runway of 155' X 3,300'. Eventually, the first and second airstrips will be joined to give a runway suitable for any commercial aircraft likely to be employed on freighting.

3. ROAD BUILDING:

A tote road was built from the Flat River camp to the outcrop of the principal showing. The road rises from 3,700' elevation at the Flat River Camp to 5,100', and traverses some very rough terrain. Several switchbacks were incorporated in the road to ease the grade. Total length of this road is 16,000', with a 10' wide surface and several turn-outs to allow two or more vehicles to pass. Workmen travelling to and from the camp were carried in a muskeg Bombardier or a light International truck.

4. DIAMOND DRILLING:

Forty holes were drilled from surface sites, for a total of 11,728' of diamond drilling, all of which was at or larger than AX core. In addition, about 150' of diamond drilling was done with a Packsack drill. All of this work was to outline the orebody, and to determine its tonnage and grade.

5. PROSPECTING, MAPPING, ETC.:

An area of 14 square miles was mapped and prospected, the completed maps being on 400 scale. Several mineralized showings were found in the course of this work and on one of the outcrops stripping and trenching resulted in the movement of between 50 and 75 cubic yards of talus and rock-in-place, exposing a skarn deposit containing some scheelite.

6. SAWMILL:

A portable sawmill, cutting timber won from the clearing of the airstrip, produced about 45,000 bfm of rough lumber, of which about 30,000 bfm is now on hand at the camp.

[redacted]

Aug 1960

STRATAGRAPHIC SECTION

CANADA TUNGSTEN FLAT RIVER N.W.T.

Argillite		5000'±	Greyish phillitic argillite. Contains some gritty phases
Boudinage Beds		100'±	Well Bedded 50% cherty argillite and 50% Lime. Contortions very common on minor scale. Boudins common. A good marker horizon.
Grey Limestone Buff Limestone		100'±	At times grade into each other. Grey is thin bedded and gritty in part. Buff phase is dolomitic, has mottled weathered appearance and lacks bedding
Black Argillite		100'	Thin bedded black argillite with narrow black limestone interbeds.
Grey Limestone and Chert		100'±	Grey limestone, fair to poor bedding. At times quartzite and chert at base.
Buff Limestone		500'±	Buff to pink weathering dolomitic limestone No bedding. Tends to form talus slopes. Subject to flowage.
Hangingwall Argillite	Arg	40'	Dark grey thin bedded
	Quartzite	50'	White. Round quartz grains in a partially calcarious matrix.
	Arg	150'	Dark grey, thin bedded. Minor crossbedding. Includes chert beds above base and under quartzite.
Ore Limestone		100'	Blue grey crystalline limestone . Argillite intraformational breccia common at base.
Chert		120-150'	Interbedded chert, argillite and limestone. White to grey-green. Commonly distorted. Boudins common. Often lime sections become skarn.
Footwall Argillite		500 +	Brownish purple, massive, poor bedding. Cleavage.

[redacted]

Flat River valley parallels the structural trend of the region and is eroded in a complex syncline formed of Cambrian to Ordivician strata, flanked to the NE and SW by strongly deformed Proterozoic sedimentary rocks. Between the Flat and Rabbitkettle rivers the Proterozoic rocks occupy the core of a gently S.E. plunging anticlinorium.

Large areas of the deformed ~~sedimentary rocks~~ strata have subsequently been intruded by crosscutting granitic stocks, that have in places deflected the northwest trending structures and caused local doming.

Tungsten deposits are associated with the intrusive and have two principle modes of occurrence:

1. Replacement of a dark green pyroxene skarn within the pure "ore-limestone" member, with associated quartz scheelite veins. The ore body under development and other principal prospects are of this type.
2. Scheelite disseminations in light colored, calc-silicate hornfels at the contact of ~~M-U~~ Middle and Upper Cambrian impure platy limestone and granitic intrusives. Deposits of this type are restricted, low grade and not likely to be of commercial value.

The "ore-limestone" member consists of light grey weathering blue-grey fine-grained limestone, which in the vicinity of the intrusive rocks and mineral deposits, has altered to coarse grained marble. This unit varies rapidly in thickness and is not continuous throughout the map area.

With few exceptions it is known only from the SW side of Flat River valley generally within 5 miles NW and SE of the mine.

A very distinctive unit the "Swiss-cheese" limestone (Green and Roddick 1961), underlies the ore limestone and is traceable throughout the area. It consists of irregularly interbanded calcareous siltstone and impure limestone. The limestone bands generally form pods and lenses several inches long enclosed in siltstone. This unit varies little in thickness and is easily recognized by its characteristic weathering appearance. In all instances, where well exposed, its lower contact is found to be transitional, over several feet, with siltstones of the underlying Proterozoic rocks. (the base of Cambrian has arbitrarily been set at this contact, for the lowest occurrences of the index fossil Olenellus are in the basal beds of the "Swiss-cheese" limestone.)

The lower Cambrian strata above the ore limestone includes a wide variety of rocks for the most part composed of a mixture of dolomite, silt and coarse-grained quartz sand in various proportions. Local facies and minor unconformities appear to be numerous. SW of Flat River the basal member of this varied succession consists of interbedded dark argillite, calcareous argillite and minor dark limestone. This unit locally known as the "hanging wall" argillite (Brown 1961), varies markedly in thickness ~~to over~~ exceeding 1000' in the extreme south central part of the map-area.

A bright yellow and orange weathering silty dolomite member provides a useful marker horizon in the upper part of this varied sequence.

The middle and upper Cambrian strata consists mainly of thinly banded argillaceous limestone and siltstone and occasionally pure limestone beds several feet thick. An unconformity separates this unit from the underlying lower Cambrian sequence and accounts for the omission of much of the latter in some parts of the area.

Graptolitic strata of Ordivician and possibly Silurian age are the youngest consolidated sedimentary rocks in the region. These rocks being especially incompetent, are strongly deformed and in general poorly exposed. Their thickness is not known with any certainty and may greatly exceed 2000 feet.

Intrusive rocks are chiefly biotite quartz monzonite and show little variation in composition and texture. However, the granitic rocks in the mine vicinity generally have rusty weathering surfaces, a feature less pronounced or lacking in other intrusives of the region.

Local Geology of Mine Vicinity.

In the vicinity of the mine the Lower Cambrian sedimentary rocks form as overturned syncline with axial plane dipping moderately to the SW (fig.). This structure is complicated by minor folds on the limbs and sharply truncated by quartz monzonite stocks. The ore body is localized in the lower part of the ore limestone member on the flat lying limb of this structure.

Table of ~~Stratigraphic~~ Units

Era	Period or epoch	Unit and thickness (feet)	Lithology
Mesozoic	Cretaceous (?)	Intrusions	Quartz monzonite, granodiorite; minor granite
Intrusive contact			
Paleozoic	Ordovician and Silurian (?)	2000 +	Black shale, slate; minor chert, siltstone and dark limestone
	Unconformity		
	Middle and Upper Cambrian	4000 +	Intercaleted platy impure limestone, siltstone and limestone
	Unconformity		
	Lower and/or middle Cambrian	1000 ±	Dolomite, silty and sandy dolomite; minor sandstone and shale
		150 ±	Bright yellow and orange weathering silty and sandy dolomite
	Lower Cambrian	2000 ±	Sandstone, sandy and silty dolomite, dolomite, argillite; minor quartzite and impure limestone
		'Ova-limestone' 200 ±	Blue grey fine grained limestone and coarse grained marble
		'Swiss cheese limestone' 200 ±	Irregularly interbanded calcareous siltstone and impure limestone; pods and lenses of limestone
Proterozoic	Probably late Proterozoic	4000 +	Phyllite, slate, siltstone, fine grained quartzite

ORE MORE THAN 1% WO_3

LESS THAN 1% WO_3

LIMESTONE

SKARN

CHERT

PHYLLITE

GRANITE

CANADA TUNGSTEN MINING CORPORATION LTD.

TUNGSTEN ORE RESERVE ESTIMATE AS OF SEPT 5, 1957

The outlines of the ore reserve area are enclosed within an area 600 ft long by 300 ft wide. The northern limit is arbitrarily cut off 50 ft north-east of DDH #4 which is the most northerly drill hole completed to date although mineralization of ore grade is known to exist 150 ft northeast of drill hole No 4. The east boundary is defined by the erosional scarp which contains the prominent gossan ore, assays of which have been taken into account in the estimate. The south boundary is taken along a probable fault (Talus Fault) the strike and attitude having been determined from drill hole intersections. It is a steeply dipping normal fault, the vertical displacement of which may be as much as 200 feet. The west boundary is based on reasonable projection beyond successful drill holes but is nevertheless indefinite. Further diamond drilling will be required along the west boundary to determine ore limits in relation to the granitic dikes.

Basic assumptions have been made as to ore grade & width of ore zone in each cross section. This is essential since the diamond drilling is fairly widely spaced for an ore-body of this nature. Further, complete assay data is not available and no information is available regarding tungsten assays in the drill holes completed by Northwestern Exploration Ltd.

The tonnage estimate presented at this date, Sept 5, 1957 is 1,500,000 tons at 1.10% WO_3. Complete copper assays are not available and no attempt has been made to estimate copper content.

Acknowledgement is hereby made and thanks are given to messrs Lyle Dunn, L. Adie & T.M. Allen for their co-operation and help in compiling this preliminary estimate of ore reserves for Canada.

[redacted]
Chas W. Ball

N.W.T.
Sept. 5, 1957

CANADA TUNGSTEN MINING CORPORATION LIMITED

TONNAGE ESTIMATE AS OF SEPT. 5, 1959

SECT 369 N assumed width = 40' at 1.70% WO_3 L = 212' Area = 8,480 □' at 1.70% WO_3

At SECT 319 N

D.H. #4 52.3', 1.91% WO_3 L = 228 Av. W = 43' Area 9,804 □' at 2.57% WO_3
Scarp 3.5.0' 3.56% " Av goods

SECT 215 N

D.H #6 NW 6.0.0 1.50% WO_3 L = 240' Av W = 62' Area 14,880 □' at 1.74% WO_3
Scarp 60.0' 2.00% "

SECT 123 N

D.H. #1 169.0' 1.55% WO_3 L = 367' Av W 109' Area 49,003 □' at 1.89% WO_3
Scarp 49.5' 2.98% WO_3

SECT 17 N

D.H. #2 197.2', 1.41% WO_3 L = 487 Av W 135' Area 65,745 □' at 1.50% WO_3
NW #1 73.0', 1.75% WO_3

SECT 625

D.H #4 NW Upper horiz 53.0' 1.0% WO_3
D.H. #6 44.8' 0.75% L = 375' Av W 76' Area 28,500 □' at 1.59%
#7 132.5' 2.12%

SECT 169 S

D.H #8 54.3' 2.46% WO_3 L = 190' W = 54 Area 10,260 □' at 2.46%

TONNAGE:-

From 369 N - 319 N Tons $\frac{80}{2}\left(\frac{8,480+9804}{10}\right)$ = 145,710 2.16%
" 319 N - 215 N " $\frac{104}{2}\left(\frac{9,804+14,880}{10}\right)$ = 128,357 2.07%

From 215 N - 123 N " $\frac{92}{2}\left(\frac{14,880+49,003}{10}\right)$ 252,462 1.85%

" 123 N - 17 N " $\frac{106}{2}\left(\frac{49,003+65,745}{10}\right)$ 560,464 1.65%

" 17 N - 625 " $\frac{79}{2}\left(\frac{65,745+28,500}{10}\right)$ 372,267 1.53

" 625 - 169 S " $\frac{107}{2}\left(\frac{28,500+10,260}{10}\right)$ 207,366 1.82

Total 1,566,626 Tons at 1.72% WO_3

or Say 1,500,000 T at 1.70% WO_3

C. W. Ball
Sept 5, 1959

Abt Camp
Flat River Nfld.

[redacted] 092056

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Dr. L. H. Green
Geological survey of Canada
Box 969
Whitehorse Y.T.

J. R. Baldwin

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