



WELCOME NORTH MINES LTD. (N.P.L.)

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GEOLOGICAL AND GEOCHEMICAL INVESTIGATION

OF THE

KATE MINERAL CLAIMS

MAY 1 - JULY 14, 1975

AND

AUGUST 16 - AUGUST 22, 1975

Latitude 62°15'N

Longitude 130°41'W

N.T.S. 105J2-7

WATSON LAKE MINING DISTRICT

YUKON TERRITORY

CANADA

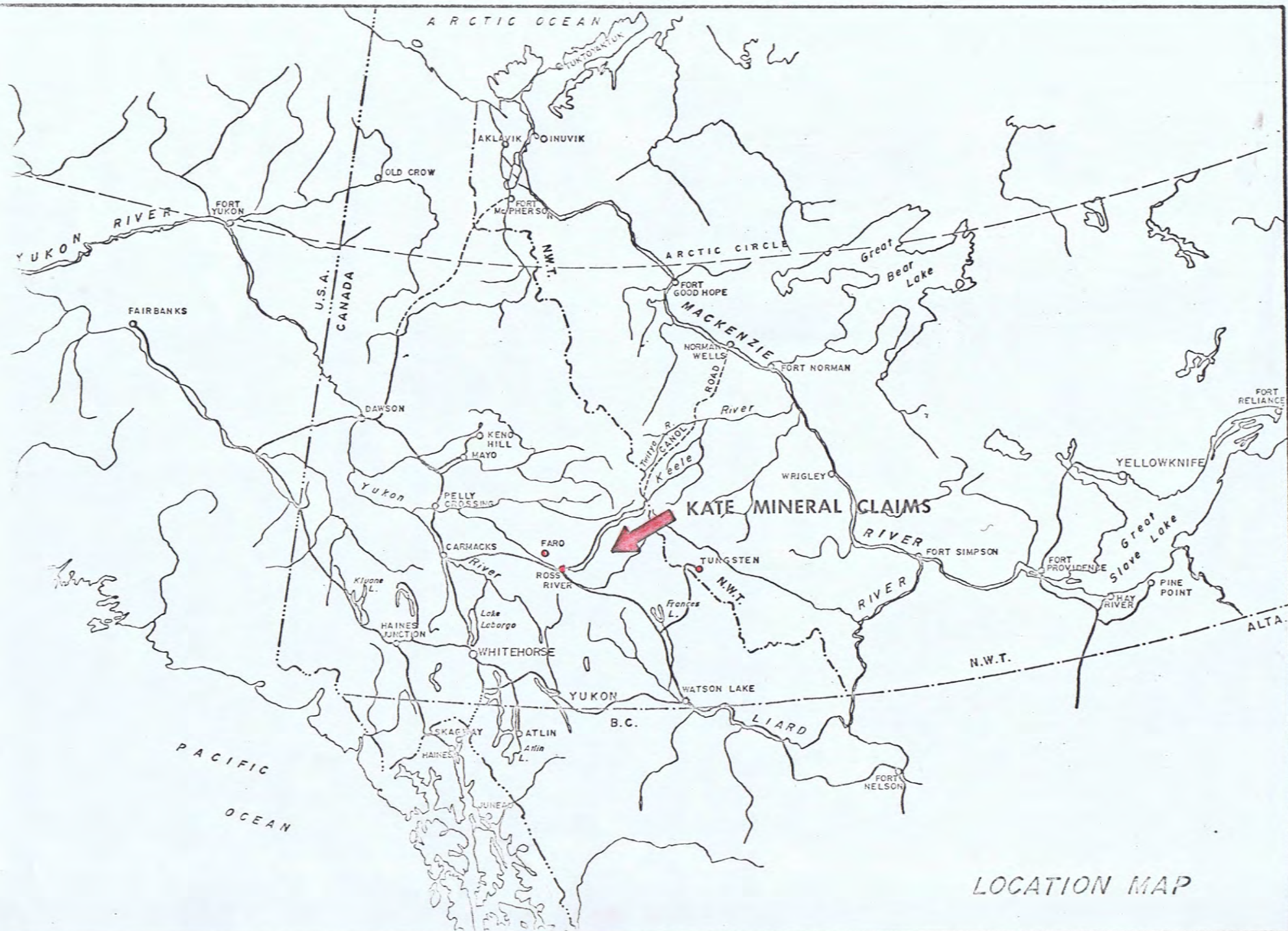
by

J.S. Brock

and

R. Reid

November 30, 1975



LOCATION MAP

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LIST OF CLAIMS

<u>CLAIMS</u>	<u>GRANT/TAG NO.</u>	<u>RECORDED</u>	<u>MINING DISTRICT</u>
KATE 1-96	Y83857-Y83952	Feb. 3, 1975	Watson Lake, Y.T.

INTRODUCTION

The KATE Group, comprised of 96 mineral claims, was staked by Welcome North Mines in January, 1975. The property covers known occurrences of copper, lead and zinc mineralization within a thick assemblage of Ordovician and Silurian shales and cherts.

The 'KATE' area has been previously explored by various mining companies and individuals. The copper occurrences were originally discovered in 1956 by Kennco (Northwestern Explorations Ltd.), who subsequently staked the OKE claims. After a brief examination the property was dropped and restaked as the NORKEN and FOOL claims by Yukon Canadian Mining Company in 1959. Yukon Canadian carried out a three-year program of trenching, EM and magnetic surveys and diamond drill testing. In 1966 the property was re-staked as the EM and EMU claims and optioned to Atlas Explorations, who carried out a limited program of soil sampling. Between 1970 and 1973, prior to acquisition by Welcome North, the property was staked and allowed to lapse several times by individuals.

Based on the following points, Welcome North was prompted to carry out further exploration of the claims during the 1975 field season:

- reports of high-grade shale hosted lead-zinc float of a

nature similar to the Howard's Pass deposit were never followed up during the course of previous exploration programs.

- the electromagnetic and magnetic anomalies drilled by Yukon Canadian were not coincident with surface occurrence of copper mineralization, therefore drill testing of the anomalies was inconclusive.

Welcome North carried out a program of grid controlled geochemical soil sampling to further delineate areas of known mineralization. Broad scale geologic mapping and prospecting were also completed to aid in defining specific mineralized zones and their relationship to geochemical anomalies.

SUMMARY AND CONCLUSIONS

Two target areas warranting further exploration have been developed on the KATE Claims.

1) Copper Zone (Copter and Peak Showings)

Chalcopyrite associated with pyrrhotite and minor sphalerite occurs in selected beds and cross-cutting fractures within limy cherts. The copper mineralization occurs in float and outcrop over a strike length of 10,000 feet. The copper zone of immediate interest is well defined by a 5000 foot long anomalous copper geochemical anomaly.

2) Lead-Zinc Zone

High-grade shale hosted lead-zinc float was found in one of the formerly established exploration camps in the KATE area. Subsequent discussion with the geologist in charge of the Yukon Canadian program revealed that the lead-zinc float was from the KATE property. Although no further float occurrences of a similar nature were found, several zones of anomalous lead-zinc geochemistry were outlined over Road River shale formations.

Bulldozer trenching of known showings and related geochemical anomalies is recommended as the next phase of exploration. Diamond drilling would be contingent on establishing the continuity of potentially economic mineralization in outcrop exposed through trenching.

In view of the fact that other significant occurrences of zinc-lead have recently been discovered within Ordovician-Silurian shales of the Selwyn Basin, a thorough and complete evaluation of the geochemical anomalies of the KATE property is warranted.

LOCATION AND ACCESS

The KATE Group is situated 60 miles northeast of Ross River, Yukon, N.T.S. 105J-2 and J-7 at 62°15' north latitude and 130°42' west longitude.

Access to the property may be gained from Ross River by float-equipped aircraft to Stall Lake, a 2000 foot long lake located at the northeast corner of the claim group. A base camp has been established at Stall Lake, from which point a two mile long trail provides access to the central portion of the claim group.

REGIONAL GEOLOGY

The KATE property lies within the central region of the Selwyn Basin, a geologic province consisting principally of shallow to deep water 'clastic' stratigraphy. The Selwyn Basin shale succession is underlain by Lower Cambrian phyllite which is in turn underlain by Proterozoic (Windermere) grits.

The Windermere basement, composed of grits, green and maroon shales and quartz-pebble conglomerate, has been uplifted and exposed by Pleistocene erosion throughout the central Selwyn Basin. The Windermere uplift occurs within a few tens of miles east of the KATE.

The 'grit unit' is unconformably overlain by Cambrian phyllites, locally described as 'wavy-banded limestone'. The lower sections of this unit are commonly comprised of Lower Cambrian thickly banded limestone, the upper sections are commonly rich in calcite, while interstitial quartz grains are generally found in lenticular zones parallel to original bedding. The 'wavy-banded' limestone is often isoclinally folded, an apparent product of regional tectonism.

Ordovician-Silurian Road River shales unconformably overlie the 'wavy-banded limestone'. Within the central Selwyn Basin, the Road River shales appear to rarely exceed a thickness of several hundred feet and are an apparent product of a starved basin environment. Overlying the shale is a thick

succession of chert and cherty shale units. The chert units weather differentially and due to greater outcrop exposure are easy to prospect, whereas the Road River is a recessive unit and is somewhat more difficult to trace on a regional basis. Ordovician volcanic rocks, greenstones and diabase, occur in lenses up to several tens of feet thick within the chert units.

Cretaceous plutonism is common throughout the western and central Selwyn Basin. A granodiorite batholith has been mapped within five miles of the property. A minor amount of quartz-monzonite float, probably representing associated intrusive activity, has been found on the claims.

PROPERTY GEOLOGY

The KATE property was mapped to a scale of 1 inch to 1000 feet. With the exception of chert formations found at higher elevations, outcrop is generally sparse due to the recessive nature of the shales and glacial drift cover.

The area of interest is underlain by wavy banded limestone which strikes 100 degrees and generally dips steeply, 65 degrees to the south. Local structure is complicated by tight isoclinal folding sympathetic to a postulated isoclinal syncline (Kate Syncline) that strikes northwesterly through the central part of the property.

The Road River shale has been mapped, where widely scattered outcrops occur, in low recessive areas on the property.

The shale is mainly black, fine grained, well bedded and graphitic. Calcite filled cross-cutting fractures are common. Mono and diplograptids have been identified within this unit. The shale unit generally strikes 120 to 145 degrees, beds on the northern limb of the 'Kate Syncline' have an average dip of 18 degrees south, beds on the south limb have an average dip of 60 degrees north.

The Ordovician chert unit consists of white, green, purple and brown interbands and contains limy sections. The cherts strike from 105 to 120 degrees and dip steeply 70 degrees north and south to vertical. Local isoclinal folding has also complicated the structural setting of the chert horizons, making correlation of individual beds difficult.

The central region of the 'Kate Syncline' lies within a northwest trending valley bottom, 'Kate Creek', a dominant topographic feature on the property. Vertical faulting in this area has apparently down-dropped the northern section of wavy-banded limestone and Road River. A pronounced northeasterly trending fault lies along the Stall Creek valley, apparent right-lateral displacement of several hundreds of feet has occurred locally.

ECONOMIC GEOLOGY

The principal mineralization at all of the copper

showings (Peak, Copter and Nipple) occurs in fractured siliceous chert and cherty shale. Sulphides occur as fine disseminations and small blebs as well as coatings and seams along fractures. Sulphides identified to date are pyrite, pyrrhotite, chalcopyrite, sphalerite and galena. Patches of secondary copper mineralization, malachite and azurite occur widely, indicating heavy leaching of outcrop. All exposed mineralization is somewhat gossanous, fresh sulphides are not evident until exposed by breaking rock.

Nipple Showing

The Nipple occurrence, located at Line 0 - Baseline on the Kate Grid, is confined to an isolated knob of chert at an approximate elevation of 4200 feet. Mineralized outcrop is exposed over an area of about 8000 square feet. The host is a light grey coloured siliceous chert, thinly bedded and cut by lenses, pods and veinlets of quartz-sericite. The chert contains interbands of crystalline limestone and is similar, lithologically, to the Copter host rocks.

Local strikes vary from 057 to 115 degrees, dips are from 80 degrees south to vertical. A strong system of fractures trend 020/65 northwest, a secondary fracture set trends 130/35 northeast. The showing is open at both ends, the lateral and longitudinal limits are overburden covered.

Showings of more heavily oxidized mineralization were blasted to a depth of four feet by Yukon Canadian, fresh sulphides were not exposed.

Mineralization is exposed over a width of 60 feet where chalcopyrite and pyrrhotite occur as disseminations, fracture fillings and fine bands conformable to original bedding. In places sulphides are preferentially associated with silica-rich zones.

The showing was not sampled due to the leached condition of the mineralized outcrops, grab samples of 'typical' mineralized talus assayed as follows:

	<u>Copper</u>	<u>Gold</u>	<u>Silver</u>	<u>Lead</u>	<u>Zinc</u>
Sample A	0.45	Tr	0.60	Nil	0.2
Sample B	0.53	Tr	0.36	0.1	0.2
Sample C	2.68	Tr	3.62	Nil	0.9

In addition to copper mineralization found on the 'Nipple', minor amounts of galena and sphalerite were also noted. The lead and zinc sulphide mineralization appears to be discontinuous in setting and occurs as fine grained disseminations and blebs.

Copter Showing

The Copter showing occurs in a low saddle, at an elevation of 4500 feet at Line 40E, 8N on the Kate Grid. Sparsely disseminated copper, lead and zinc sulphides are

found with siliceous dark grey cherts, and argillite, limestone and shale interbeds. Mineralization has been traced over an exposed width of approximately 60 feet. Minor amounts of galena and sphalerite occur as fracture fillings.

Attitudes of the host rocks are variable due to local, intense, folding. The chert and shale units in the vicinity of the showing generally strike 110 degrees and dip 80 degrees south. Local folding plunges to the southeast.

Assays from chip sampling over the Copter gave the following results:

<u>Sample</u>	<u>Section Feet</u>	<u>Gold</u> oz/T	<u>Silver</u> oz/T	<u>Lead</u> %	<u>Zinc</u> %	<u>Copper</u> %
D	30	Tr	0.04	Nil	Tr	0.06
E	30	Tr	0.02	Nil	Tr	0.13
F	20	Tr	0.24	Nil	Tr	0.13
G	20	Tr	Nil	Nil	Tr	Nil

Peak Showing

The Peak Showing is located on the Kate Grid at Line 64E, 8S, on the top section of a high ridge at an elevation of 5500 feet. Outcrop exposure is poor, however abundant felsensmere, derived from frost heaved action, has exposed significant amounts of mineralized float. Several small trenches have been blasted to bedrock, thus exposing mineralization in place.

The central portion of the 'Peak' is underlain by a limy chert horizon. Principal copper mineralization consists

of floats of malachite and azurite, fresh sulphides, where found, consist of disseminated chalcopyrite, pyrite and pyrrhotite. Mineralized float has been traced over an approximate width of 100 feet and along strike for approximately 1000 feet.

Grab samples of 'in-place' and float material were taken across strike and gave the following results:

<u>Sample No.</u>	<u>Width in Feet</u>	<u>Copper %</u>	<u>Gold oz/T</u>
H	29	0.30	Tr
I	42	0.07	Tr
J	6	0.75	.005
K	29	0.75	.05
L	42	0.17	Tr

Approximately 300 feet southwest of the main Peak Showing, 30 feet of mineralized limy chert is exposed. Mineralization consists of chalcopyrite and pyrrhotite which occurs as disseminations and stringers conformable to bedding as well as fracture fillings. Sampling of this outcrop gave the following assays:

<u>Sample No.</u>	<u>Width in Feet</u>	<u>Copper %</u>	<u>Gold oz/T</u>
M) continuous	9	0.21	Tr
N) chip	11	0.18	Tr
O) chip	0	0.38	Tr
P Grab, best seen		0.83	Tr

Northeast of the main Peak Showing at Station 66E on the Kate Baseline, a 300 foot long zone of mineralized

rubble has been hand trenched at three locations. Boulders of massive pyrrhotite mineralization assayed:

0.3 Cu, 0.6 Pb, 0.4 Zn, 1.6 oz/Ton Ag

Scattered float occurrences of copper mineralization have been found within a 2000 foot radius south and west of the Peak.

Lead-Zinc Zone

Specimens of shale-hosted lead-zinc mineralization were found at the KATE camp. Subsequent discussion with L.K. Lyttle, former exploration geologist with Yukon Canadian, revealed that the lead-zinc specimens were found on the property. To the best of his recollection several large boulders of bedded sphalerite and galena in black shales were located by prospectors within an area east of the Nipple Showing.

It has been assumed that the lead-zinc float occurrences are from the Road River shale, which stratigraphy weathers recessively and is largely overburden covered. Prospecting of the area failed to reveal further similarly mineralized float. In this regard soil sampling was determined to be the best follow-up method to further define lead-zinc target areas.

The table following (TABLE 1) describes typical lead-zinc specimens found and assayed.

TABLE 1.

ASSAYS, LEAD-ZINC FLOAT OCCURRENCE

<u>SAMPLE NO.</u>	<u>HAND SPECIMEN DESCRIPTION</u>	<u>Pb%</u>	<u>Zn%</u>	<u>Ag oz./ton</u>
13041	Deformed layers of siliceous argillite, (1 mm) galena and sphalerite; barren argillite with euhedral pyrite	11.47	8.87	4.45
13042	Massive fine grained pale brown sphalerite appears to have replaced original argillite, shows minor remnant textures, small quartz vein	2.09	39.80	2.03
13043	Deformed layers of galena, sphalerite quartz and siliceous argillite layers 1 mm or less	.74	1.61	.38
13044	1 mm layers of siliceous argillite, galena and sphalerite, shows minor deformation	12.03	6.98	4.42
13045	Fine banded argillite (1 mm) with interlayered sphalerite, galena and pyrite	6.32	11.20	2.63
13046	Greenish black thin bedded argillite with fractures parallel to bedding; visible pyrite and sphalerite along en echelon type fractures	.16	.27	.04

TABLE 2.

12 BROOKSBANK AVE.
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CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604



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CERTIFICATE OF ANALYSIS

TO: Welcome North Mines Ltd.
Suite 8 - 1161 Melville Street
Vancouver, B.C.

CERTIFICATE NO. SP 223

INVOICE NO. 14178

RECEIVED June 25/75

ANALYSED July 8/75

ATTN:

SAMPLE NO. :	Lower Concen- tration Limit (PPM)	Anvil	Kate #1	Kate #2	Howards Pass #1
Antimony	50	200	200	100	bcl
Arsenic	50	bcl	50	200	bcl
Barium	5	100	> 5000	> 5000	100
Beryllium	5	bcl	bcl	bcl	bcl
Bismuth	5	bcl	bcl	bcl	bcl
Boron	20	bcl	bcl	bcl	bcl
Cadmium	20	100	5000	500	2000
Calcium	0.05%	0.2%	0.05%	0.05%	5%
Chromium	10	100	200	500	20
Cobalt	10	20	50	20	bcl
Copper	1	5000	1000	100	100
Gallium	2	20	10	10	bcl
Germanium	20	bcl	bcl	bcl	bcl
Iron	0.05%	20%	1%	1%	0.05%
Lead	5	> 5000	> 5000	> 5000	> 5000
Magnesium	0.02%	0.2%	bcl	bcl	bcl
Manganese	5	2000	5000	200	200
Molybdenum	10	20	bcl	10	bcl
Nickel	5	50	20	100	50
Niobium	50	bcl	bcl	bcl	bcl
Silver	1	50	100	50	20
Strontium	20	bcl	bcl	20	50
Tantalum	200	bcl	bcl	bcl	500
Tellurium	200	bcl	bcl	bcl	bcl
Thorium	100	bcl	bcl	bcl	bcl
Tin	10	10	100	10	bcl
Titanium	5	200	500	1000	20
Vanadium	10	20	50	100	200
Zinc	50	> 5000	> 5000	> 5000	> 5000
Zirconium	20	50	bcl	50	bcl

Concentration Range

>5000 ppm =>5000 ppm 50 ppm = 25-100 ppm
 5000 ppm = 2500-10000 ppm 20 ppm = 10-50 ppm
 2000 ppm = 1000-4000 ppm 10 ppm = 5-20 ppm
 1000 ppm = 500-2000 ppm 5 ppm = 2-10 ppm

500 ppm = 250-1000 ppm 2 ppm = 1-4 ppm
 200 ppm = 100-400 ppm 1 ppm = 0.5-2 ppm
 100 ppm = 50-200 ppm bcl = below concentration limit
 Ranges for Iron, Calcium & Magnesium are reported in %

W. M. L.

TABLE 2.

212 BROOKSBANK AVE.
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 TELEPHONE: 985-0648
 AREA CODE: 604



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CERTIFICATE OF ANALYSIS

TO: Welcome North Mines Ltd.
 Suite 8 - 1161 Melville Street
 Vancouver, B.C.

ATTN:

CERTIFICATE NO. SP 223

INVOICE NO. 14178

RECEIVED June 25/75

ANALYSED July 8/75

SAMPLE NO. :	Lower Concen- tration Limit (PPM)	Howards Pass #2	Tom #1	Tom #2
Antimony	50	bcl	200	100
Arsenic	50	bcl	50	50
Barium	5	100	2000	> 5000
Beryllium	5	bcl	bcl	bcl
Bismuth	5	bcl	bcl	bcl
Boron	20	bcl	bcl	bcl
Cadmium	20	2000	100	50
Calcium	0.05%	5%	2%	0.2%
Chromium	10	50	50	100
Cobalt	10	10	20	bcl
Copper	1	100	50	50
Gallium	2	bcl	5	bcl
Germanium	20	bcl	bcl	bcl
Iron	0.05%	0.05%	2%	0.1%
Lead	5	> 5000	> 5000	> 5000
Magnesium	0.02%	bcl	2%	bcl
Manganese	5	200	2000	100
Molybdenum	10	bcl	bcl	bcl
Nickel	5	50	50	10
Niobium	50	bcl	bcl	bcl
Silver	1	20	200	100
Strontium	20	50	200	200
Tantalum	200	500	bcl	bcl
Tellurium	200	bcl	bcl	bcl
Thorium	100	bcl	bcl	bcl
Tin	10	bcl	50	bcl
Titanium	5	50	100	100
Vanadium	10	200	100	10
Zinc	50	> 5000	> 5000	> 5000
Zirconium	20	bcl	20	bcl

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Ranges for Iron, Calcium & Magnesium are reported in %

11011

An attempt was made to geochemically 'finger-print' the lead-zinc mineralization by running comparative analysis with specimens from Howard's Pass, ~~Tam~~^{TOM} Group and Anvil, TABLE 2 summarizes these results.

GEOCHEMICAL SURVEY

The most effective method of delineating the copper and lead-zinc target areas appeared to be through geochemical methods. Several geochemical anomalies of possible significance were outlined by Atlas Explorations in 1966. The first had coincident copper and zinc values occurring over the southern portion of an aeromagnetic high. The anomaly is about 5,000 feet long and 1,500 feet in width, and can be correlated with the Peak Showing area. It strikes in an easterly direction and does not appear influenced or distorted by drainage or topographic slopes. A second major copper-zinc anomalous area north of Kate Creek was coincident with a well defined aeromagnetic high. The geophysical and geochemical responses here strike for approximately 3,000 feet east and are 1,500 feet in width. Zinc reaches peak values in excess of 1,400 ppm and copper over 360 ppm.

Two 'topofil' chain and compass grids were established over the KATE Claims. Grid "K" as shown on the accompanying maps was established with a 14,400 foot long base line,

cross lines were established at 800 foot intervals, a 200 foot station interval was flagged on each cross line. Grid 'A' was established in the same manner over the southern half of the property. Base line control was referenced to the original base line established by Yukon Canadian.

Soil samples were collected at 200 foot station intervals on all cross lines of the 'A' and 'K' grids, approximately 700 samples were submitted for analysis for copper, lead and zinc. Actual sampling was done with a prospector's grub hoe. An attempt was made to gather 'B' type soil, however permafrost conditions did not permit penetration of the organic horizon for approximately 50 percent of the area sampled.

Analytical work was performed by Acme Analytical Laboratories located at Ross River, Yukon. All determinations were made using a standard hot acid attack and atomic absorption methods.

Soil sample results have been plotted and contoured on the maps accompanying this report. Anomalous results are considered to be in excess of twice the standard deviation which for copper is in excess of 200 ppm, lead in excess of 100 ppm and zinc in excess of 400 ppm.

Along strike discontinuing of geochemical anomalies is attributed to poor sampling conditions brought about by permafrost problems.

TABLE 3

GEOCHEMICAL CHECK

O N

GEOCHEMICAL RESULTS

Sample No.	<u>PPM Cu</u>		<u>PPM Pb</u>		<u>PPM Zn</u>	
	<u>Chemex Geochem</u>	<u>Acme Analytical</u>	<u>Chemex Geochem</u>	<u>Acme Analytical</u>	<u>Chemex Geochem</u>	<u>Acme Analytical</u>
1600-1500	126	140	90	118	344	350
5600E-500	42	34	350	340	375	330
5600E-2300	235	230	195	200	164	144
6400E-00	74	64	390	375	275	220
6400E 400	7	8	1000	950	24	12
6400E 500	20	14	100	98	52	36
7200E 100	44	40	400	380	295	270
7200E 2700	94	86	240	220	184	160
7200E 2800	34	32	174	180	77	62

Key target areas of interest are:

Peak Zone - coincident copper, lead and zinc, found over a strike length of 5,000 feet. Of interest is a pronounced lead anomaly indicating, because of its lack of mobility, persistent along-strike continuance of mineralization to the southeast.

Line 104E, 10S ('A' Grid) - the strongest coincident geochemical response obtained is located around a point 3,800 feet east of the Peak. The anomaly is on-strike with the Peak host rocks and deserves further attention.

Nipple Zone - geochemical response in the vicinity of the Nipple, appears to be limited in areal extent. However, it is felt that depth of overburden and permafrost conditions in this area prevented adequate sampling techniques. DDH 8, which is along strike from the Nipple attests to the continuity and extent of the showing, whereas, based on current geochemical results, the Nipple mineralization appears to be rather locally confined.

Lead-Zinc Zone - the lead-zinc target areas within the Road River shale appear to be well defined geochemically within the central and eastern region of Grid 'K'.

Target areas of immediate interest are:

Line 8W - Baseline - 2 3200 foot long lead anomaly with values in excess of 100 ppm. The sinuous nature of the anomaly is suspected to reflect correlation with a narrow band of Road River shales.

East Grid 'K' - discontinuous lead anomalies occur in an en echelon fashion east of Line 40E on Grid 'K'. This area is of prime interest as the anomalies are in excess of 100 ppm lead, and probably reflect sub-outcrops of tightly isoclinally folded metal-rich Road River shale.

REGIONAL PROGRAM

During the period May 1 - July 16 a regional prospecting program was carried out over 4 claim sheets (105J-1, 2, 7, 8) surrounding the KATE property. The program was considered an integral part of follow-up work required outside the present KATE claims boundaries in order to prospect Road River shales for lead-zinc occurrences.

The main emphasis of the helicopter-supported program, based from the KATE camp, was to locate Road River formation, and prospect such areas by rock breaking and geochemical surveys. The program was not successful in discovering any new lead-zinc occurrences.

RECOMMENDATIONS

It is reasonable to postulate that most lead-zinc sulphide occurrences found to date in the Selwyn Basin have a proximal to distal volcanogenic origin. A sedimentogenic exhalitive origin may also provide a feasible working model for these shale-hosted zinc-rich sulphide deposits.

Widespread mineralization found on the KATE property suggests a distal volcanogenic to basinal facies depositional environment. Based on such a model, chemical precipitation as evidenced by chert and carbonate zones within the shale formation coupled with copper to lead-zinc

zonation indicate that the KATE occurrences could have economic large tonnage potential.

Copper Zone

The Peak showings and related eastward trending geochemical anomalies warrant further exploration. Diamond drilling of geophysical targets performed by Yukon Canadian did not adequately test the zone as the electromagnetic and magnetic anomalies were not reflecting typical copper mineralization. It is important to note that drill holes 4 and 5 did intersect some sulphides of sub-economic grade in spite of the fact they did not adequately test the continuity of known surface occurrences and geochemical anomalies.

DDH 4 Grid Location 65E, 8S
 Depth 252 ft.
 Drilled Angle -45°/NE

	<u>Width</u>	<u>Ag</u>	<u>Cu</u>	<u>Zn</u>
155.0 - 157.4	2.4'	.26	.97	.35
157.4 - 160.3	2.9	.06	.17	--
160.3 - 164.7	4.4	.06	.18	.30
164.7 - 167.1	2.4	1.22	1.95	2.70
167.1 - 173.7	6.6	.22	.60	.90
AVERAGE GRADE	18.7'	.29	.66	.78
221.0 - 227.0	6.0'	.10	.22	.50
227.0 - 231.8	4.8	.30	.60	.60
231.8 - 236.9	4.2	.30	.52	.80
AVERAGE GRADE	15.0'	.22	.43	.62

DDH 5 Grid Location 69E, 4S
 Depth 405 ft.
 Drilled Angle -45°/NE

	<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Cu</u>
282.2 - 284.4	2.2'	Tr	.40	.52
284.4 - 288.3	3.9	Tr	.10	.18
288.3 - 291.1	2.8	.01	.42	.33
291.1 - 295.6	4.5	.005	Tr	.03
295.6 - 301.3	5.7	Tr	.24	.18
AVERAGE GRADE	19.1'	.003	.20	.21

Bulldozer trenching of the Peak geochemical anomalies is recommended to expose mineralized shallow sub-outcrop. Assaying of fresh mineralization exposed by trenching should help to determine the continuity of higher grade zones.

The Nipple showing is considered to be of lower priority, although mineralization intersected in DDH 9 suggests that some on-strike potential may exist in spite of the fact that it is not represented geochemically.

DDH 9 Grid Location 12E, 2N
 Depth 351 ft.
 Drilled Angle -45°/NE

	<u>Width</u>	<u>Au</u>	<u>Ag</u>	<u>Cu</u>	<u>Zn</u>
41 - 47	6'	.01	.20	.81	.20
314 - 317	3	.01	1.10	1.14	.50
319.3 - 321.4	1.6	.01	1.74	4.52	--

Limited bulldozer trenching, across the prospected zone in the vicinity of Line 8E is recommended.

Lead-Zinc Zone

Trenching of lead geochemical anomalies on Grid 'K' is recommended with priority being given to those zones east of Line 48E.

Extension of soil sampling is required to the east of Grids 'A' and 'K' in order to fully complete coverage of 'open' geochemically anomalous areas.

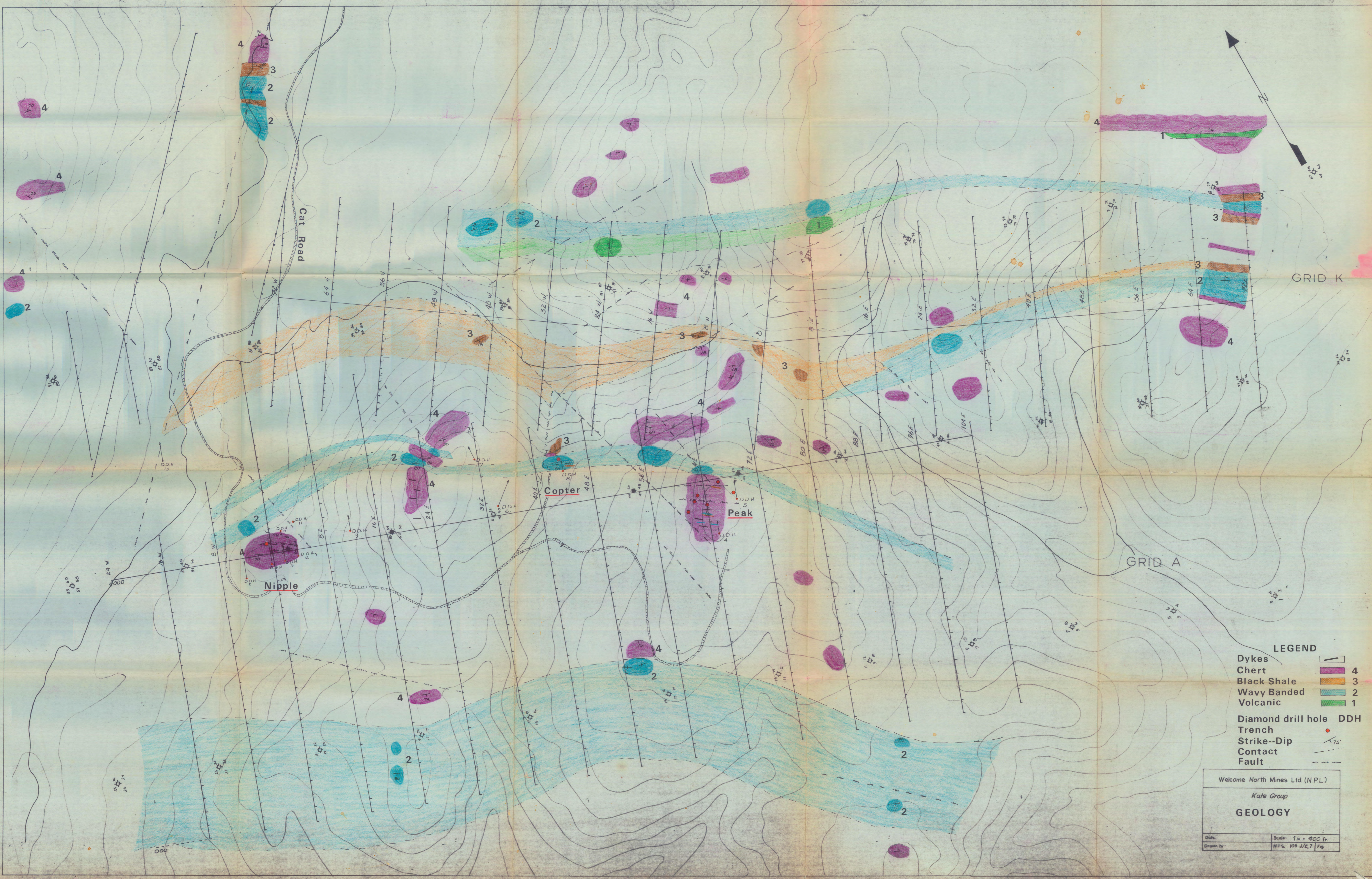
Respectfully submitted

John S. Brock

November 25, 1975.

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(Private report Atlas Exploration Ltd.) J.S. Brock



LEGEND

- Dykes
- Chert 4
- Black Shale 3
- Wavy Banded 2
- Volcanic 1
- Diamond drill hole DDH
- Trench
- Strike-Dip
- Contact
- Fault

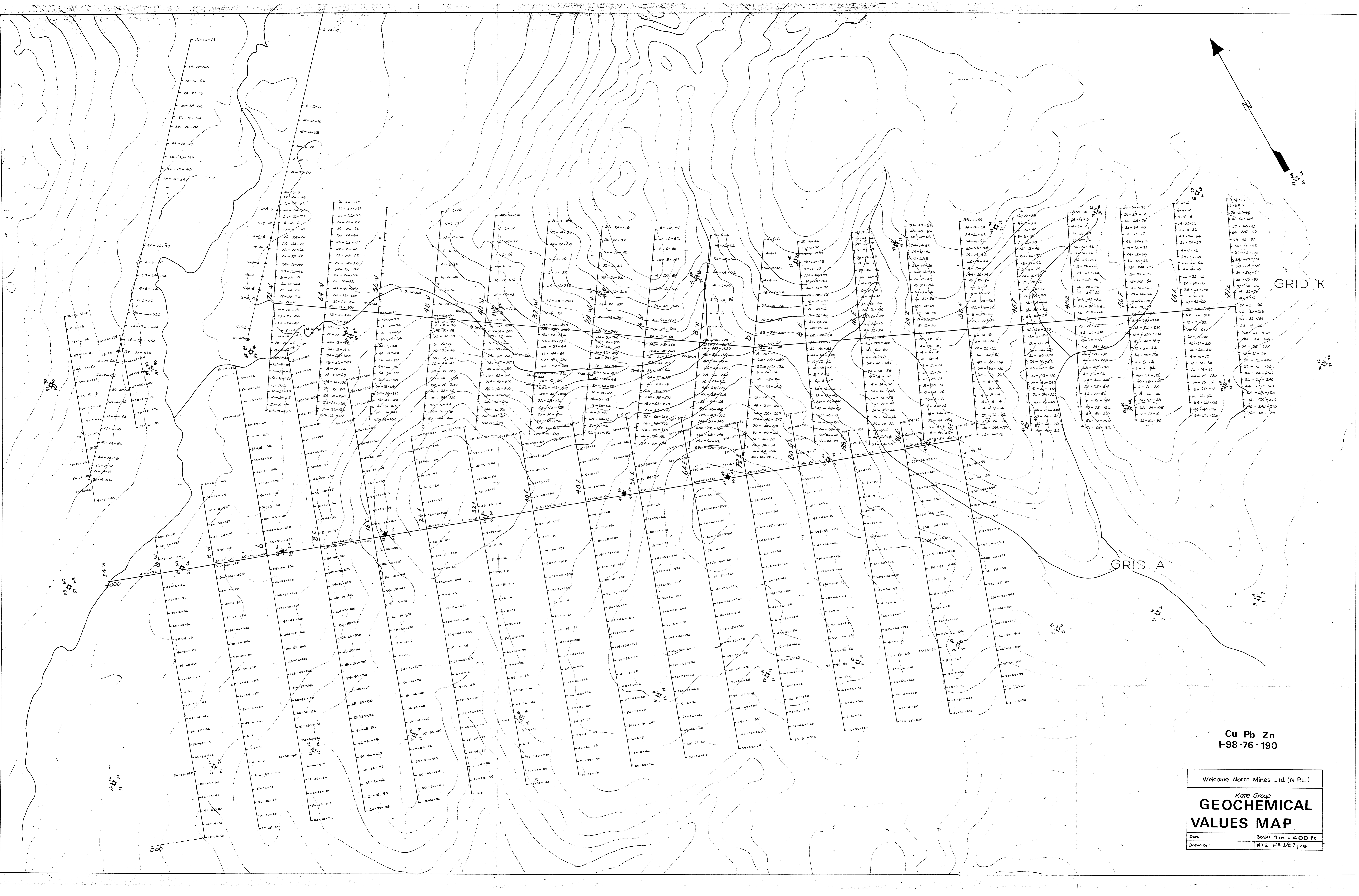
Welcome North Mines Ltd (N.P.L.)

Kate Group

GEOLOGY

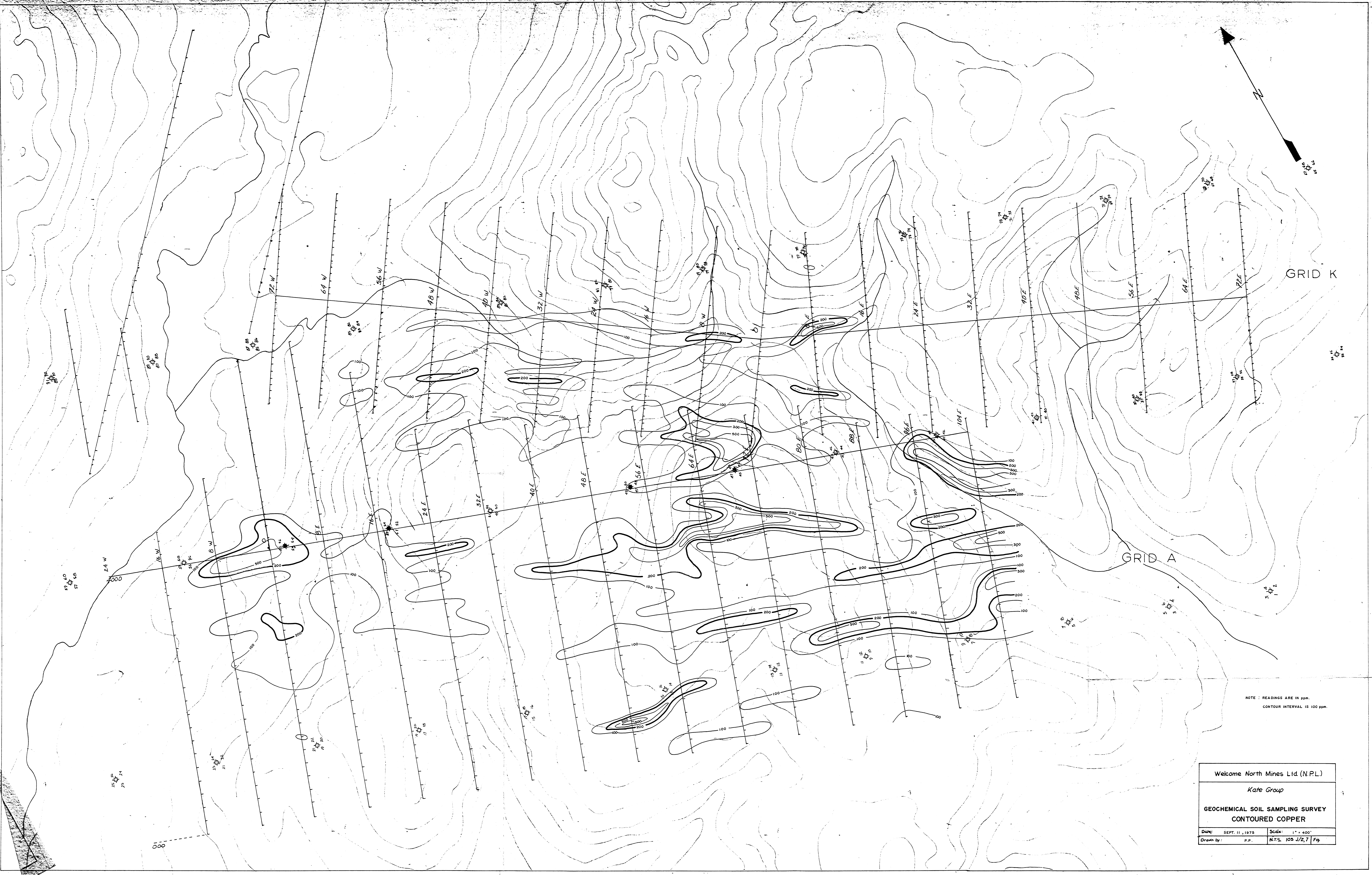
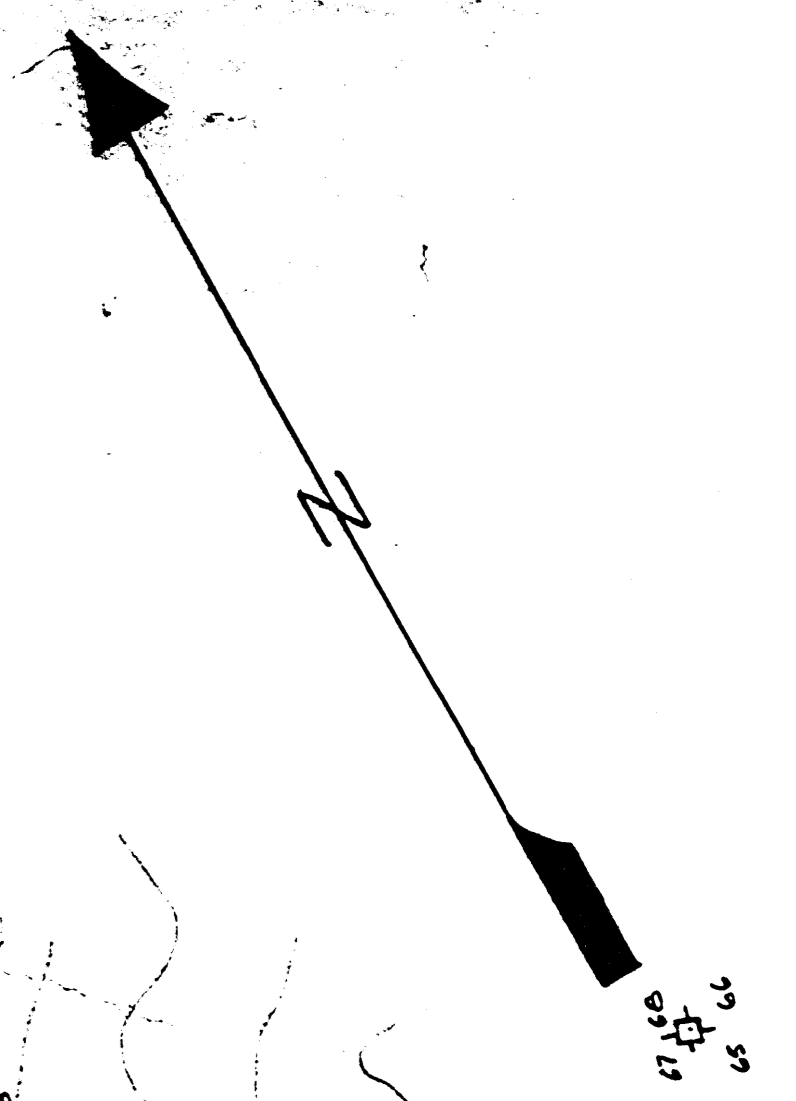
Date: _____ Scale: 1 in = 400 ft.

Drawn by: _____ N.P.L. 105 J/E, 7 Fig



Cu Pb Zn
I-98-76-190

Welcome North Mines Ltd. (N.P.L.)	
Kate Group	
GEOCHEMICAL	
VALUES MAP	
Date:	Scale: 1 in = 400 ft
Drawn by:	N.T.S. 105 J/2,7 Fg

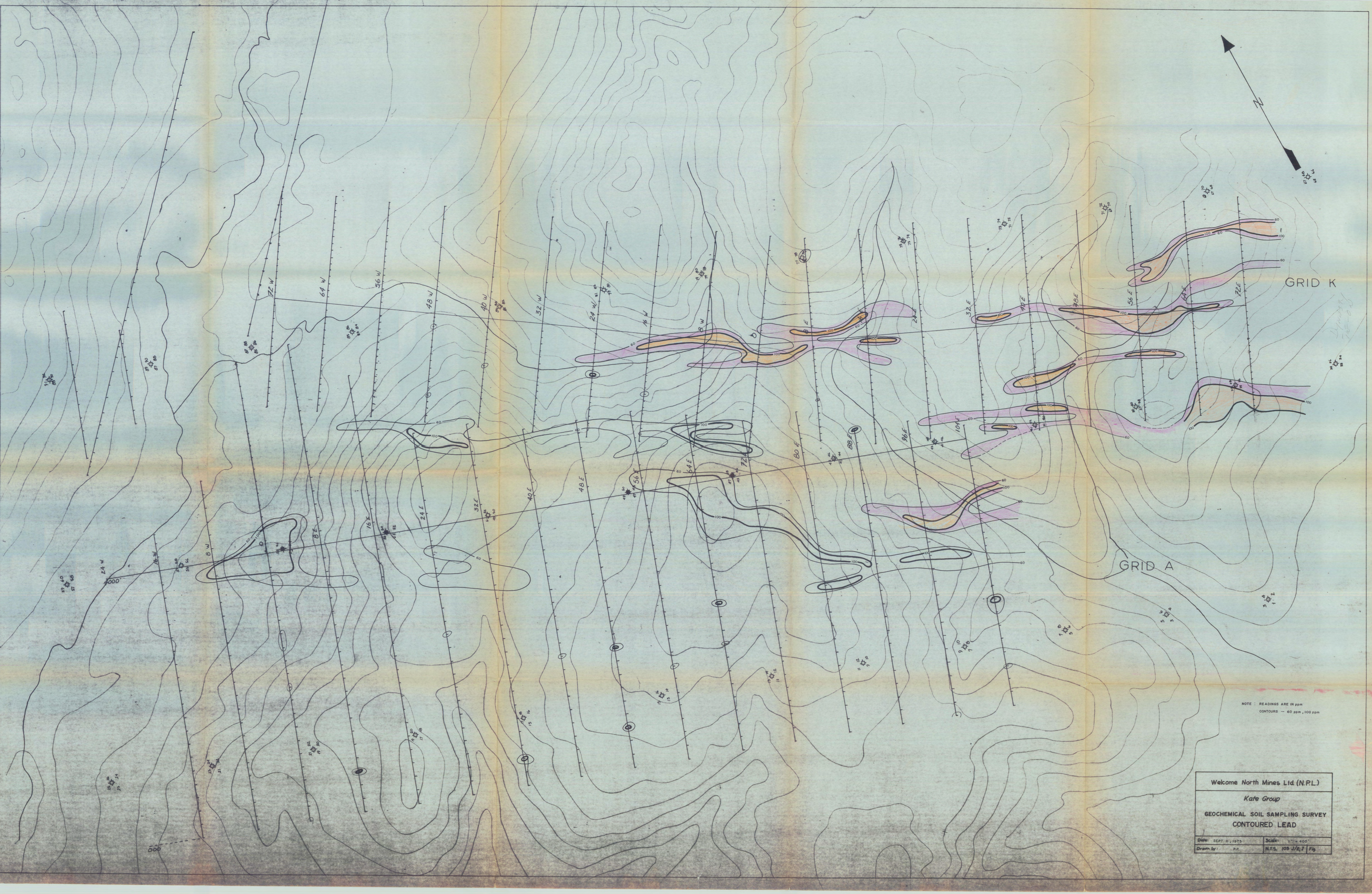
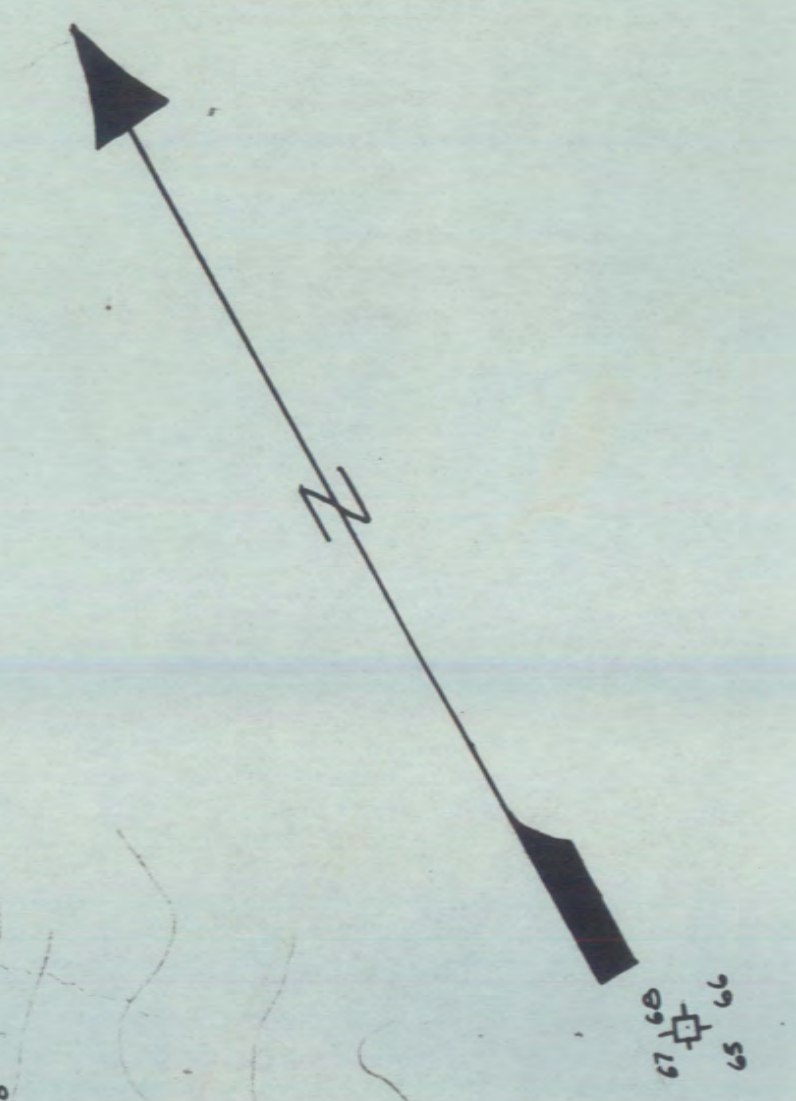


GRID K

GRID A

NOTE: READINGS ARE IN ppm.
CONTOUR INTERVAL IS 100 ppm.

Welcome North Mines Ltd. (N.P.L.)	
Kate Group	
GEOCHEMICAL SOIL SAMPLING SURVEY	
CONTOURED COPPER	
Date: SEPT. 11, 1975	Scale: 1" = 400'
Drawn by: P.P.	N.T.S. 105 J/2,7 Fig

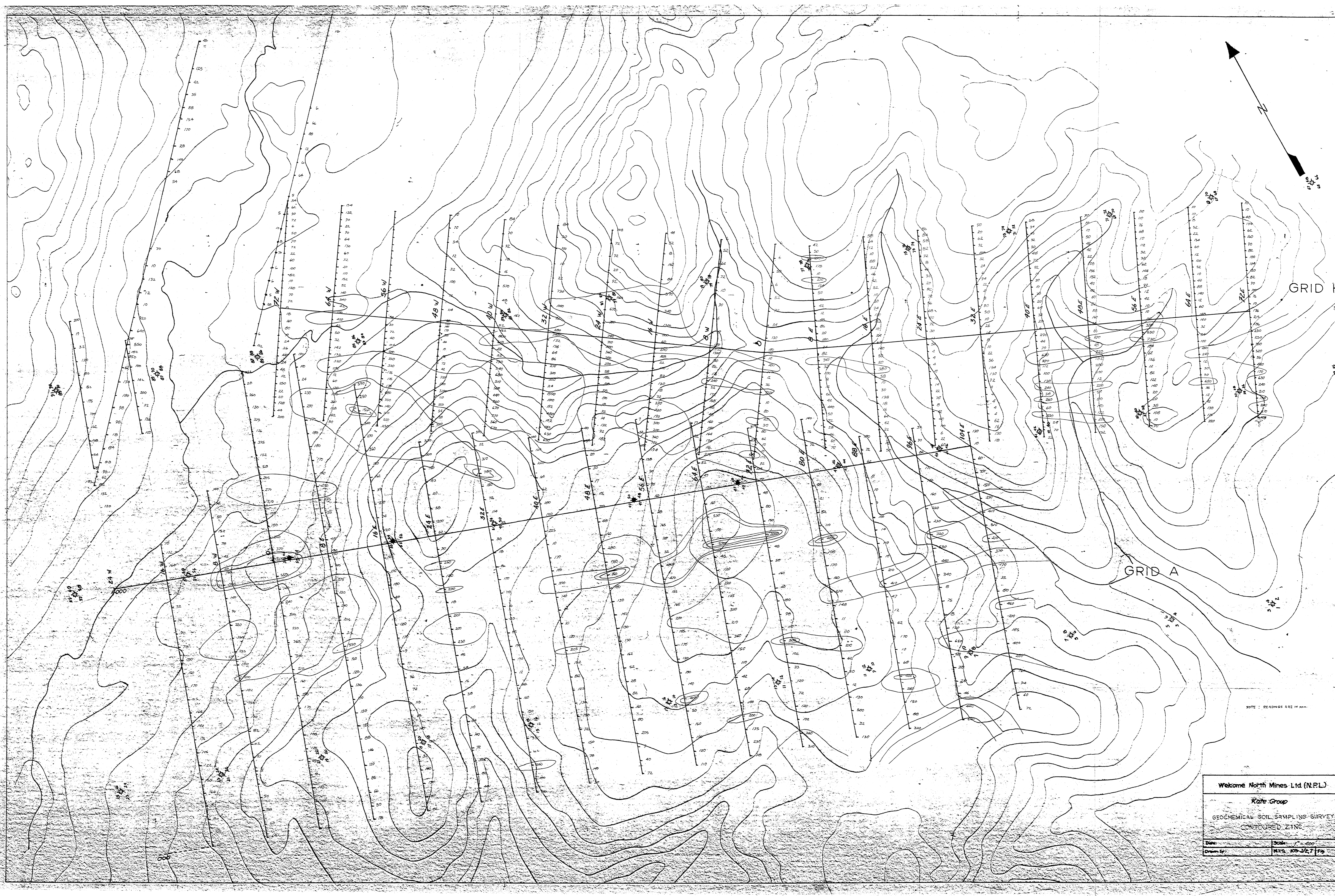


GRID K

GRID A

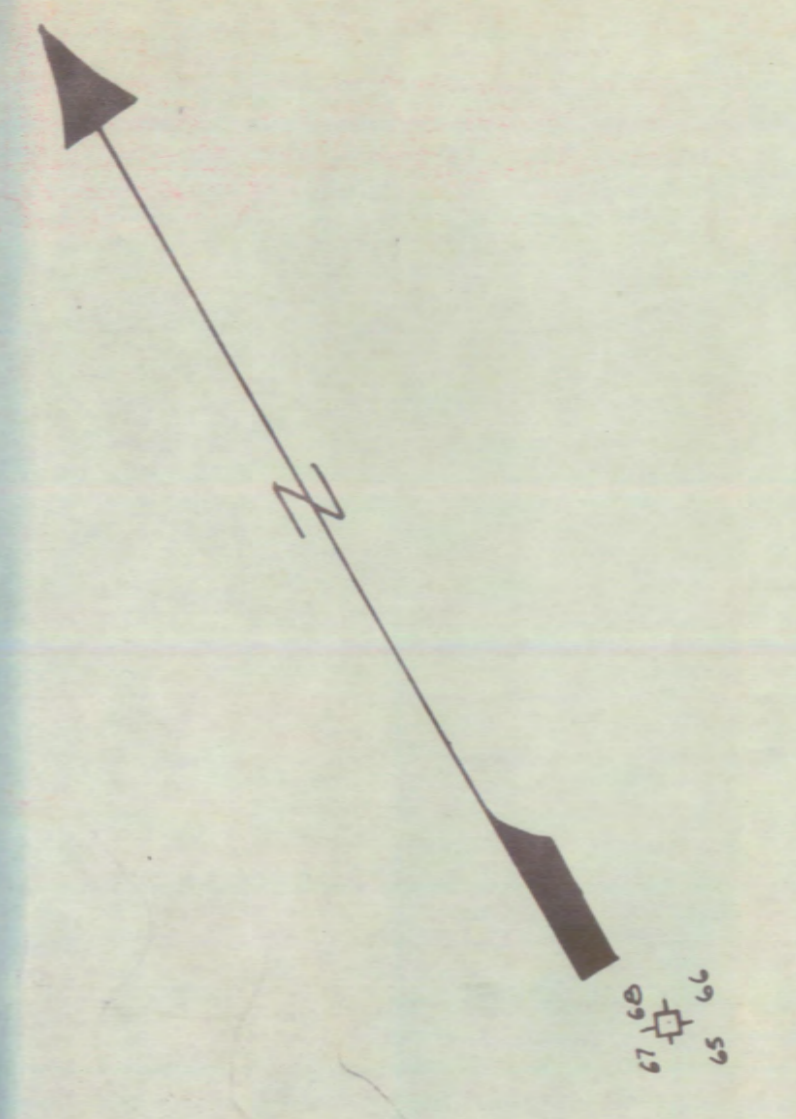
NOTE: READINGS ARE IN ppm
CONTOURS - 60 ppm, 100 ppm

Welcome North Mines Ltd (N.P.L.)	
Kate Group	
GEOCHEMICAL SOIL SAMPLING SURVEY	
CONTOURED LEAD	
Date: SEPT. 11, 1975	Scale: 1" = 400'
Drawn by: P.P.	M.R.S. 108 J/2, 7 Fig.



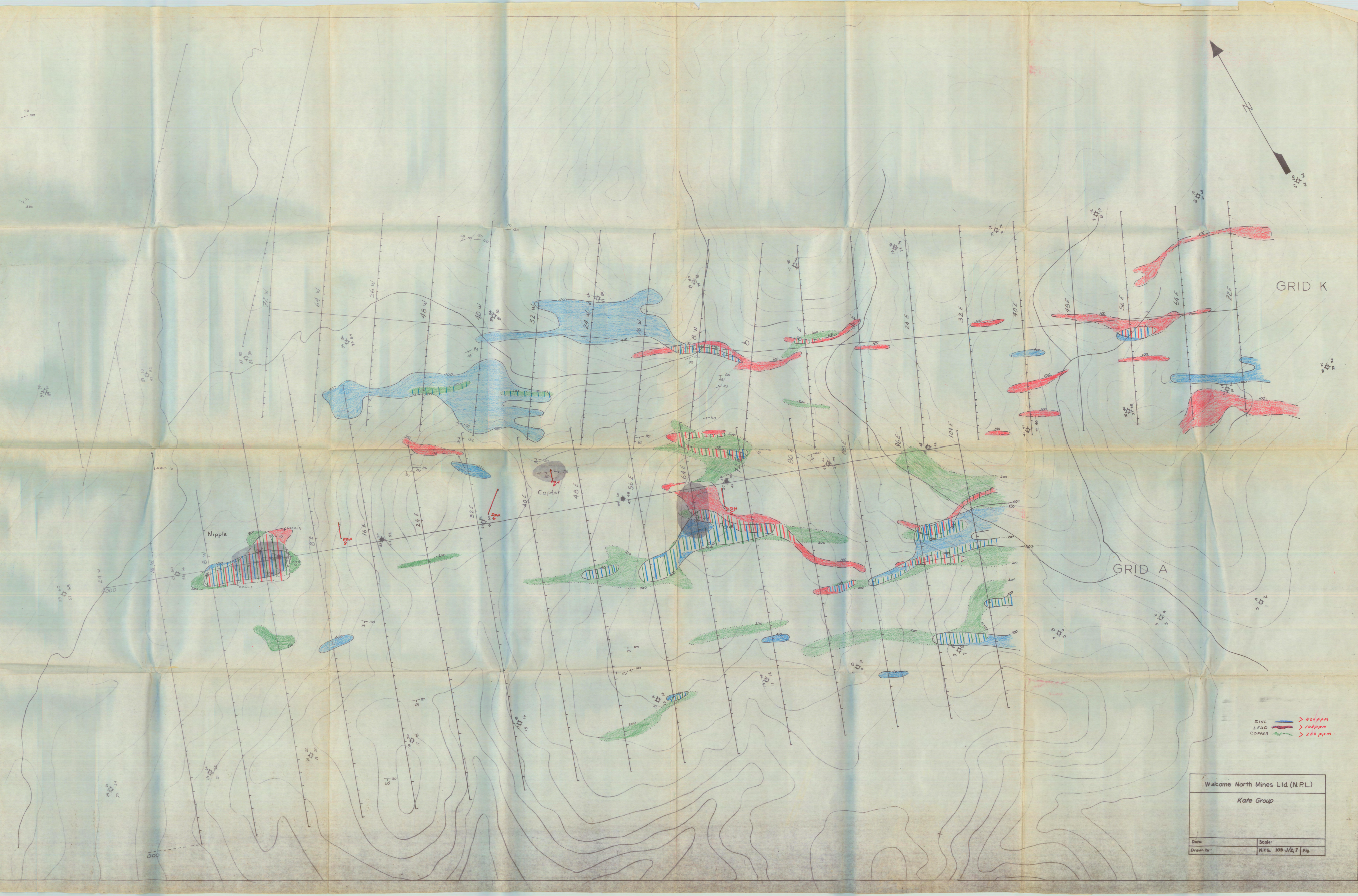
NOTE: READINGS ARE IN FEET

Welcome North Mines Ltd (NPL)	
Kate Group	
GEOCHEMICAL SOIL SAMPLING SURVEY	
CONTOURED ZINC	
Date:	Scale: 1" = 500'
Drawn by:	MRS. J. J. 7/79



GRID K

GRID A



ZINC > 400 ppm
LEAD > 100 ppm
COPPER > 200 ppm

Welcome North Mines Ltd (N.P.L.)	
Kate Group	
Date:	Scale:
Drawn by:	N.F.S. 105-1/2, 7/Fg

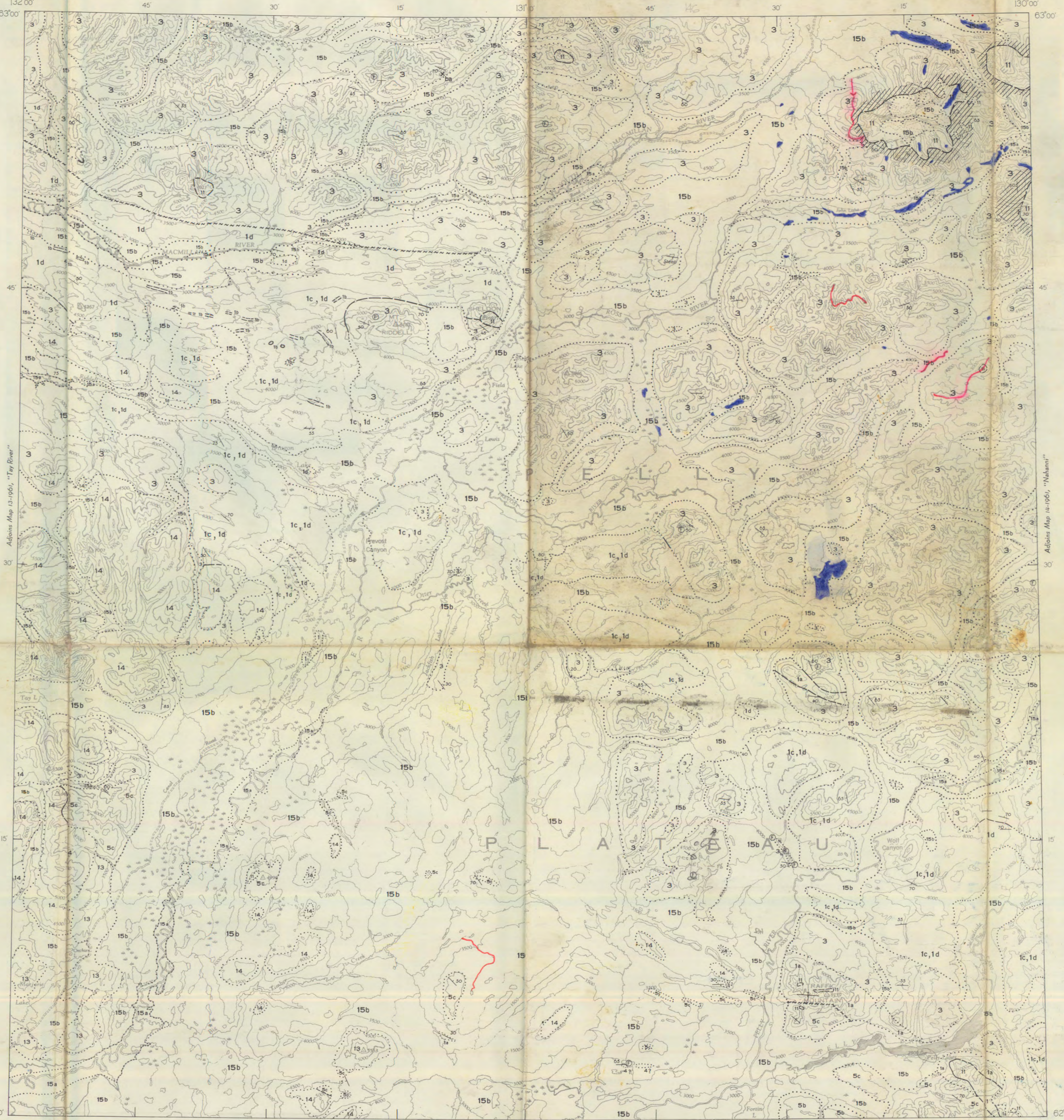
- LEGEND**
Map-units A, 2, 6, 7, 8, 9, 10, and 12 appear on Map 13-1961, "Tay River" only
- QUATERNARY**
15a, modern unconsolidated alluvial deposits;
15b, unconsolidated glacial and alluvial deposits
- TERTIARY**
14 Grey and dark grey andesite, dacite, and basalt, commonly massive and porphyritic; minor pyroclastic material
- 13** Granodioritic quartz and feldspar porphyry, probably plutonic equivalent of 14
- PALEOCENE**
12 Brown-weathering, brown, impure sandstone with plant remains, grey and brown conglomerate, and brown shale; 12a, rusty weathering conglomerate; minor sandstone and shale, may be equivalent to 12 but age not established, locally interbedded with part of 14
- CRETACEOUS (?)**
11 Medium-to coarse-grained quartz monzonite and granodiorite, commonly porphyritic; minor diorite and gneiss
- TRIASSIC**
10 Interbedded, dark grey to black, friable, micaceous sandstone, and shale; minor conglomerate and concretionary shale
- MISSISSIPPIAN (?) AND/OR LATER (?)**
9a, greenish grey quartzite, commonly thin-bedded; micaceous and silvery graphitic schists; minor dark grey siliceous slate, silty limestone, and grey micaceous quartzite; 9b, conglomerate with pebbles of chert, andesite, quartzite, chlorite schist, and limestone
- 8 Altered, dark green andesite and basalt flows and tuffs, commonly schistose, rarely porphyritic; minor phyllite, dark argillite, and light grey quartzite
- 7 Banded quartzose granulite, green and purplish banded skarn, quartz-sericite schist, hornfels and phyllite; chlorite schist and thin altered andesite (8) common in upper part; minor crystalline limestone
- MISSISSIPPIAN**
6 Dark grey massive limestone
- DEVONIAN AND MISSISSIPPIAN**
UPPER DEVONIAN AND LOWER (?) MISSISSIPPIAN
5a, chert-pebble conglomerate; 5b, black and grey chert, shale, quartzite; minor conglomerate and limestone; 5c, black slate, black and brown siliceous shales, sandstone, greywacke, phyllite; minor conglomerate
- SILURIAN AND DEVONIAN**
4 Grey and buff-weathering, thick-bedded dolomite, buff to reddish weathering, sandy and silty, dolomite and siltstone; buff, grey, and white quartzites
- ORDOVICIAN AND SILURIAN**
3 Black and varicoloured cherts, black, grey, and greenish grey shales; minor chert-pebble conglomerate, quartzite, limestone, and phyllite; 3a, massive chert-pebble conglomerate
- CAMBRIAN (?)**
MIDDLE AND UPPER CAMBRIAN (?)
2 Buff and grey-weathering, grey, green, and black shales, slates, and phyllites; silty limestone and siltstone
- 1 1a, light grey and whitish quartzite, banded hornfels and granulite, grey quartzite, skarn; minor chert and crystalline limestone; 1b, crystalline limestone; 1c, green and maroon shale, slate, phyllite, quartzite; minor andesite; 1d, gritty massive, quartz-pebble quartzite, medium-grained, grey quartzite, and dark slate
- A Quartz-biotite schist, micaceous quartzite, banded, altered, sedimentary and volcanic rocks, hornfels; minor gneiss and crystalline limestone

- Geological boundary (defined, approximate, assumed)
- Bedding (horizontal, inclined, vertical)
- Foliation (inclined)
- Fault (assumed)
- Syncline
- Fossil locality
- Mineral occurrence or prospect (barite, ba)
- Rock altered to hornfels

Geology by J.A. Roddick, 1958, 1960, and L.H. Green, 1960
Cartography by the Geological Survey of Canada, 1961

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured



DESCRIPTIVE NOTES

During the summer the map-area is accessible by small boats using Pelly, Ross, and South Macmillan Rivers. Many scattered lakes, suitable for float-equipped aircraft, lie within the map-area. In summer the Canol Road is passable for motor vehicles, from the Alaska Highway to Pelly River, opposite Ross River trading post, about 15 miles southeast of the map-area. No bridge suitable for motor vehicles, or no ferry is available for crossing Pelly River. Within the map-area the Canol Road has been abandoned, and is unusable owing to numerous washouts.

During the Pleistocene, most if not all of the map-area was covered with ice, which moved west and northwest along the major valleys.

The lower part of unit 1 (1d) consists mainly of thick-bedded, gritty, quartz-pebble quartzite and interbedded dark shale and slate. In places the quartzite is somewhat micaceous and commonly flecked with rusty ankerite. The fine-grained matrix of some of the quartzite beds is partly limy. Where exceptionally coarse-grained and massive, the outcrops of quartzite and the huge, angular, talus blocks derived from it, resemble granite from a distance. The sequence of green, maroon, and dark shales (1c), which mark a conspicuous and consistent horizon in the region, appear to overlie the quartzites (1d) on the ridge northwest of Wolf Canyon on Pelly River. Intense crumpling in many of the individual outcrops, and numerous repetitions of the green and maroon shales both north and south of Dragon Lake, indicate complex structure in the Proterozoic rocks. Between Pelly and Woodside Rivers, near the eastern edge of the map-area, the green and maroon shales appear to be overlain by phyllite and an interbedded sequence of thin-bedded limy shale and silty limestone. These have been included in unit 1c although they resemble parts of the Cambrian strata in Nahanni map-area.

From Mount Sheldon to Mount Selous (in Tay River map-area), the crystalline limestone (1b) forms conspicuous, but discontinuous, white-weathering outcrops. The limestone is grey to dark grey, and mottled with white patches, wherein the carbonate is coarsely crystalline. It is commonly massive to thick bedded, and in places contains thin bands of thin laminated, pale greenish grey and dark grey chert. Outcroppings at several places, but best exposed on Traffic Mountain, is a sequence (1a) of light-coloured siliceous rocks consisting chiefly of light grey to whitish quartzite, grey quartzite, and light-coloured chert, together with minor hornfels, skarn, and limestone. These rocks appear to comprise the upper part of unit 1 and are commonly closely associated with, and apparently underlie, Ordovician strata.

The Proterozoic rocks are unconformably overlain by a very thick assemblage of Ordovician and Silurian rocks (3), consisting chiefly of chert and shale. Most of the cherts are grey or black, but greyish green, apple-green, white, pink and red varieties were also noted. A particularly bright, apple-green chert bed, outcropping in the northwest corner of the map-area, is believed to have contributed the rare but distinctive fragments to the Devonian conglomerate more than 100 miles to the south. Some of the black chert weathers white along the bedding planes, and produces, locally, spectacular black and white banding. Most of the shales associated with the cherts are black or dark grey, but some are greenish, and a few are red. The shales are interbedded with the cherts, but the proportions vary. The lower part of the section—probably several thousand feet of strata—is dominantly shaly; the upper part is dominantly cherty. Mixtures of the chert and shale are represented in the siliceous shales found throughout the unit. Although other sediments were noted, such as thin-bedded platy limestone, grey quartzite, and conglomerate, they are rare. In the lack of both thick beds of limestone and volcanic rocks, the cherts of Sheldon Lake map-area differ from most other thick, extensive chert deposits. Near the granitic bodies, especially in the Itsi Range, the argillaceous rocks have been silicified and altered to hornfels, forming deep, rusty-red aureoles around the stocks.

The structure in unit 3 is similar to that in the older rocks. Intense folding and crumpling is characteristic of the shales, and pervasive fracturing is common in the cherts. In places the fractures have been healed by later silicification. Unit 3 is in fault contact with the Proterozoic rocks on South Macmillan River, and apparently unconformably overlies them north of Mount Riddell. The total thickness is not known, but is thought to be about 10,000 feet. Graptolites collected from the unit (partly from outside the map-area), range in age from Lower Ordovician to Silurian.

A dark grey, sandy limestone (4?) outcrops in mostly drift covered Pelly Plateau, near the southern edge of the map-area. It is more or less on strike with beds north of the Pelly Plateau in Finlayson Lake map-area, that contain Middle Devonian fossils, it may be of Devonian age. On the other hand the Middle Devonian rocks are commonly dolomitic, so that unit 4? may not be correlative, but rather belongs to the Devon-Mississippian unit 5. Shert fragments and crinoid stems collected from unit 4? were not identifiable.

Unit 5c is exposed south of Traffic Mountain and west of the Canol Road. It consists mainly of black silty shale and sandstone, but includes considerable quantities of chert-pebble conglomerate, chert, limestone, limy phyllite, phyllitic limestone, siliceous shale, and quartzite. It is at least 7,000 feet thick in the Pelly Lakes area. High on Traffic Mountain it is in fault contact with unit 1c. No fossils were found in unit 5c in Sheldon Lake map-area, and it is placed in the Devon-Mississippian because of its similarities to strata of that age in Tay River map-area. Some older rocks may be included.

Granitic rocks (11) form stocks in the Itsi Range and south of Pelly Lakes, and minor intrusive bodies elsewhere in the map-area. They are commonly biotite granodioritic, but vary in texture and composition. Locally, they contain large crystals of potassium feldspar and in places, significant amounts of hornblende. Xenoliths are not common. In the Itsi Range, the granodiorite exhibits a gently wavy, nearly vertical jointing; the contacts with the country rock are normally sharp, crosscutting, and dip steeply outward. Silicified rocks, hornfels, and minor pyrite are found near the contacts, but rarely beyond a few tens of feet. The granitic rocks are clearly intrusive. The University of Alberta determined the age of a granodiorite specimen (potassium-argon method on biotite) from the Itsi Range to be about 96 m.y. (Middle Cretaceous).

Quartz and feldspar porphyries (13) of granodioritic composition and commonly of plutonic appearance, outcrop in the southwest corner of the map-area, where they are closely associated with Tertiary volcanic rocks (14). These bodies possibly were feeders to, or intrusive equivalents of the volcanic sequence.

Massive, dark, andesite, dacite, and basalt flows (14) unconformably overlie deformed Palaeozoic strata west of Canol Road. The aggregate thickness exceeds 2,000 feet. Individual flows, although rarely well-defined, appear to be from 10 to 300 feet thick. Pyroclastic rocks and interbedded sediments are very rare in the assemblage. The lower part is mainly andesitic and basaltic, commonly containing feldspar phenocrysts. The upper part is characterized by dark dacites with phenocrysts of quartz and biotite. Only gentle deformation, with maximum dips of about 30°, was noted. The elevation of the unconformity at the base of the volcanic sequence varies through about 2,000 feet. This may be accounted for by faulting and deformation, but probably, the flows were extruded onto a surface of at least moderate relief.

No mineral deposits of economic significance are known in the area. Barite was noted at several places in the cherts and shales (3) north of South Macmillan River. It was found north of the small stock north of the river, in a dark grey massive bed of unknown thickness, and, above this bed, in concretionary nodules in chert. The laminae in the chert bend around the nodules, which are commonly about an inch in diameter. Barite and several rare barium silicates are known to exist in the cirque southeast of Wilson Lake on the east edge of the map-area.

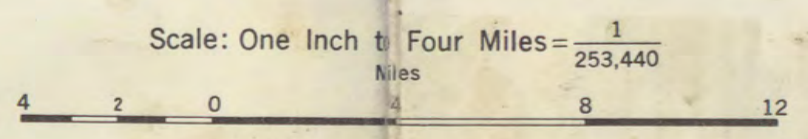
PUBLISHED 1961
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

30 Adjoins Map 8-1960, "Finlayson Lake"

PRINTED BY THE SURVEYS AND MAPPING BRANCH



MAP 2-1961
GEOLOGY
SHELDON LAKE
YUKON TERRITORY



- LEGEND**
- Road (abandoned)
- Horizontal control point
- Intermittent stream
- Marsh
- Contours (interval 500 feet)
- Height in feet above mean sea-level

Base-map prepared by the Army Survey Establishment, R.C.E., Department of National Defence 1949-1951

Approximate magnetic declination, 34° 36' East

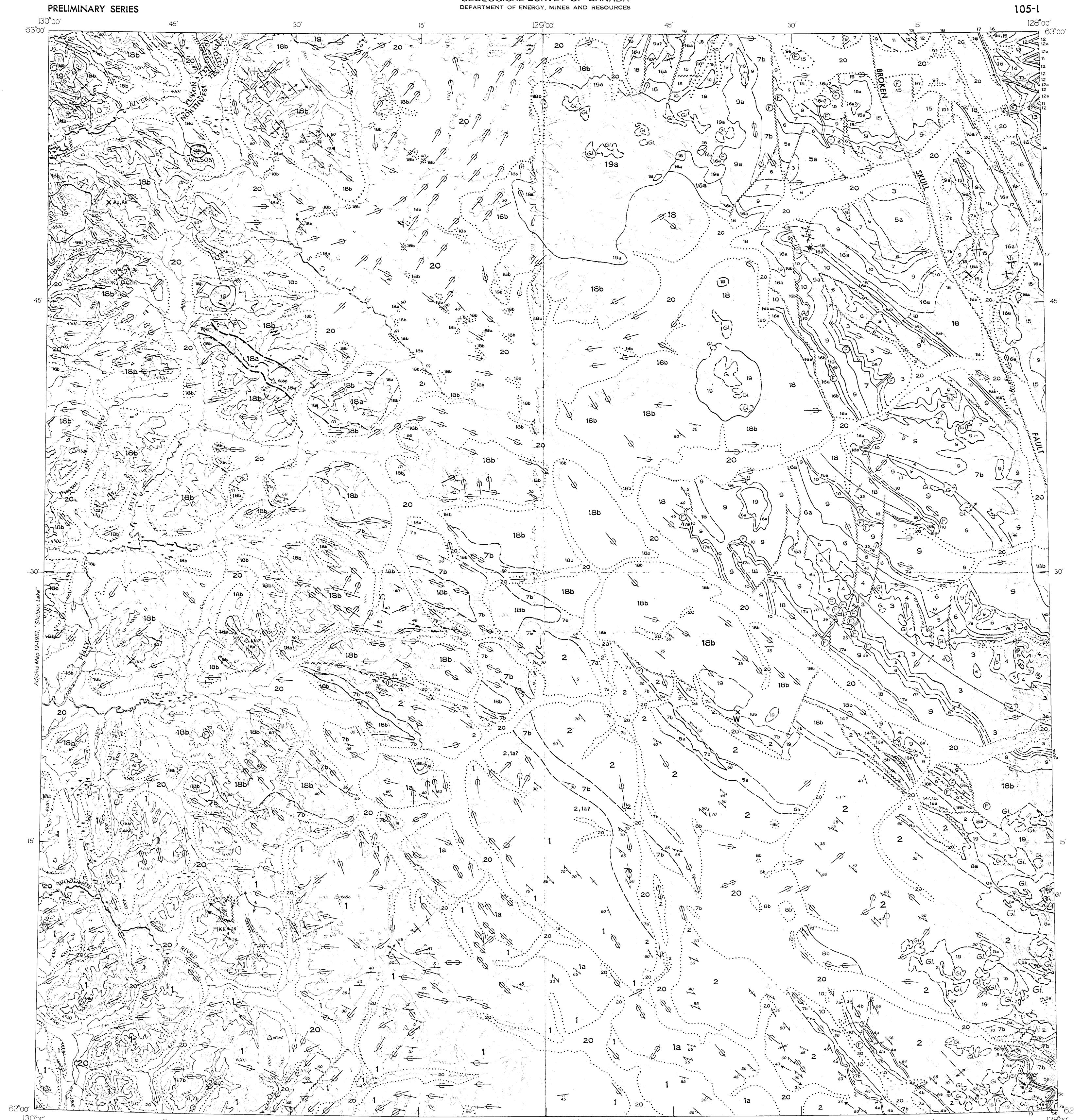
LEGEND

- PLEISTOCENE AND RECENT
20 Unconsolidated glacial and alluvial deposits
CRETACEOUS
19 Medium-grained biotite, biotite-hornblende and hornblende-quartz monzonite, granodiorite and minor granite; commonly porphyritic; 19a, biotite-bearing hornblende granite; 19b, quartz latite porphyry
DEVONIAN AND (?) MISSISSIPPIAN
18 Black shale and argillite, in part light grey-weathering, minor brown sandstone, siltstone and light to dark grey-weathering banded chert; 18a, dark grey to brown chert pebble conglomerate, chert sandstone and siltstone; 18b, undivided 18a, 18a and minor 18
MIDDLE DEVONIAN
17 NAHANNI FORMATION: resistant, fine- to medium-grained light grey-weathering limestone; 17a, fine- to coarse-grained light grey limestone, in part bioclastic and dolomitic; correlation uncertain
16 HEADLESS FORMATION: buff-brown-weathering argillaceous and silty fine-grained limestone, platy to thin-bedded; minor calcareous shale and resistant light grey-weathering massive limestone; 16a, probably includes Fumeral Formation; 16b, resistant light grey-to white-weathering crinoidal limestone and grey dolomite, massive and thick bedded
15 Dark grey to black-weathering very fine- to crypto-grained platy limestone, in part flaggy and thin-bedded; minor black chert; rouge hematite-rich bands and laminations common; 15a, includes much light and medium grey dolomite, mainly correlative with the Arctica and Landry Formations but includes rocks as old as Upper Ordovician
14 LANDRY FORMATION: light silvery grey-weathering fine-grained dark grey limestone, thin- to thick-bedded; in part crinoidal and massive
13 ARCTICA FORMATION: dark grey, well-bedded dolomite; in part interbedded light and dark grey
LOWER DEVONIAN
12 SOMBRE FORMATION: light and medium grey banded dolomite; 12a, dark grey dolomite
SILURIAN AND DEVONIAN
11 DELORME FORMATION: buff, orange, light grey-weathering dolomite and limestone
ORDOVICIAN AND SILURIAN
UPPER ORDOVICIAN AND SILURIAN
10 Black graptolite shale, dark grey to black, fissile to flaggy, argillaceous limestone; minor black chert, cherty argillite and dolomite
MIDDLE ORDOVICIAN TO SILURIAN
9 Light and medium grey, thick-bedded, medium-grained dolomite and massive, light to medium grey-weathering, dark grey, fine-grained limestone, in part argillaceous, silty and dolomitic, platy and buff- or pink-weathering; 9a, mainly limestone
CAMBRIAN AND (?) ORDOVICIAN
8 Undifferentiated units 4, 5, 6 and 7; 8a, mainly 6 or 7; 8b, mainly 4 or 5
UPPER CAMBRIAN AND (?) ORDOVICIAN
7 Irregularly banded blue-grey-weathering, dark grey, fine-grained limestone; buff- to orange-weathering dolomite siltstone; minor flaggy and thin-bedded orange-weathering silty dolomite; locally includes sandy dolomite and quartzite at base; 7a, red, orange, and brown-weathering sandstone, sandy dolomite and quartzite locally includes 7; 7b, correlation uncertain, possibly includes 6
CAMBRIAN
MIDDLE CAMBRIAN
6 Grey and brown siltstone, limestone and orange-weathering silty dolomite; platy to thin-bedded; 6a, possibly includes 7
LOWER AND (?) MIDDLE CAMBRIAN
5 Brown- to orange-weathering thin-bedded quartzite, siltstone dolomite and shale; minor green and purple, probably tuffaceous shale and argillite in upper part; 5a, undivided 4 and 5; 5b, bright yellow- and orange-weathering silty and sandy dolomite; 5c, buff-weathering dolomite, silty and sandy dolomite, minor sandstone and shale
LOWER CAMBRIAN
4 Light grey- to buff-weathering, massive dolomite, interbedded buff and orange-weathering dolomite siltstone and grey silty limestone; 4a, "swiss-cheese" limestone; 4b, in part equivalent to 5
CAMBRIAN AND EARLIER
3 Brown weathering, grey to green interbedded siltstone, fine-grained quartzite and slate; 3a, buff-weathering light grey dolomite
2 Brown to red-brown-weathering vari-coloured slates and phyllites; minor siltstone and fine-grained quartzite; in part equivalent to 3
1 Grey- and buff-weathering gritty feldspathic quartzite, quartz and feldspar pebble conglomerate, sandstone, grey, green and maroon shale and phyllite; minor limestone; 1a, mainly grey and green shale and phyllite

- Geological boundary (defined, approximate, assumed)
Bedding, tops known (horizontal, inclined, vertical)
Bedding, tops unknown (inclined)
Bedding (estimated attitudes, may include foliation; dip, g, gentle; m, medium; s, steep)
Foliation (inclined, vertical)
Lineation (inclined)
Fault (defined, approximate, assumed)
Anticline (defined, approximate; arrow indicates plunge)
Syncline (defined, approximate; arrow indicates plunge)
Glacial striae (direction of ice movement known, unknown)
Fossil locality
Mineral prospect or occurrence
Location of measured section

MINERALS
ArsenicAs TungstenW
CopperCu ZincZn
GoldAu

Geology by L. H. Green and J. A. Roddick, 1960, S. L. Blusson, 1962, 1966
Geological cartography by the Geological Survey of Canada, 1967
Base-map prepared by the Army Survey Establishment, R. C. E., 1940-1954 with minor revisions by the Geological Survey of Canada, 1961
Magnetic declination 1967 varies from 34° 27' easterly at centre of west edge to 34° 05' easterly at centre of east edge. Mean annual change, decreasing 5.4'
Elevations in foot above mean sea-level



MAP 8-1967 (SUPERSEDES PART OF MAP 14-1961)
GEOLOGY
NAHANNI
DISTRICT OF MACKENZIE AND YUKON TERRITORY
Scale 1:253,440
1 inch to 4 miles
Miles 4 0 8 12
Kilometres 6 0 6 12 18
Published 1968
Copies of this map may be obtained from the Director, Geological Survey of Canada, Ottawa
Printed by the Surveys and Mapping Branch

Access to the southeast corner of the area is provided by a 200 mile, all-weather gravel road linking Watson Lake on the Alaska Highway with Canada Tungsten mine, and lakes suitable for float-equipped light aircraft at the head of Flat River valley.
The area has been extensively glaciated to at least 6,500 feet elevation. During one stage of glaciation an ice centre probably formed in the western part of the area, mostly southeast of the Flat River valley, away from which ice at the higher levels moved to the north-east, west and southwest. At lower levels ice principally followed the present stream drainage.
Two broad divisions of unit 1 are recognized; a lower heterogeneous succession of argillaceous to pebbly rocks at least 9,000 feet thick and an upper persistent argillaceous sequence of dominantly massive and green shale totalling perhaps 3,000 feet. Where best exposed in the vicinity of Mount Pike the lower division consists about equally of calcareous, gritty, feldspathic sandstone ranging to pebble conglomerate and greenish grey commonly silty argillite and slate. These rocks form separate members as much as 1,000 feet thick or are interbedded in varying proportions. Rarely they include thin beds of dark grey, fine-grained, impure limestone. Lowermost exposed strata, totalling almost 3,000 feet, consist of medium- to thick-bedded, coarse, gritty, feldspathic sandstones with thin interbeds of fine-grained sandstone and siltstone.
Owing to complex structure and lack of stratigraphic divisions, the thickness of unit 2 is uncertain but is a minimum of 8,000 feet in the southeast corner of the map-area. The unit consists dominantly of brown to red-brown-weathering, grey, greenish, and brownish grey slates and phyllite but becomes progressively richer in siltstone and fine-grained quartzite northeast of Flat River and near South Nahanni River probably passes laterally into unit 3.
Unit 3 is best exposed in an open anticline northeast of South Nahanni River where it consists of about 4,000 feet of red-brown-weathering interbedded siltstone, fine-grained quartzite and slate underlain by several hundred feet of buff-weathering massive dolomite (9a) exposed in the core of the anticline. Unit 3 is unfossiliferous but is conformable with overlying silty carbonates of Early Cambrian age.
Unit 4 is divisible into two lower silty carbonate members and an upper member of coarsely crystalline buff-weathering dolomite totalling about 700 feet. The descriptive term "swiss-cheese" has been informally applied to the lowermost division by Green and Roddick (1961) on account of the distinctive weathered appearance which is produced by solution of discontinuous limestone layers, lenses and pods from within massive, more resistant siltstone. This member grades upward through a more regularly bedded transitional unit at least 200 feet thick into an upper member of massive grey to pinkish buff-weathering crystalline dolomite. Early Cambrian trilobites were found in the lowermost beds.
Unit 5 is an extremely varied thin-bedded sequence of brownish and orangish brown-weathering arenaceous, dolomitic, and argillaceous rocks. The lower part consists predominantly of thick- to thin-bedded quartzite, silty dolomite and dolomitic sandstone with minor dolomite and fossiliferous silty shale. The upper part is largely thin-bedded to laminated purple siltstone, silty argillite, green and brown, possibly tuffaceous, silty argillite and purple shale. Features indicative of shallow water deposition, such as mud-cracks, ripple-marks, cross-bedding, and abrupt local facies changes are abundant. The top is marked by a conspicuous member of bright buff-orange and yellow-weathering, finely crystalline, in part silty, dolomite. Olenellus gilberti, present in the lower beds, indicates an Early Cambrian age for at least the greater part of unit 5.
Unit 6 is mainly thin-bedded to platy and recessive-weathering silty carbonate with some resistant limestone beds in the middle and upper parts. Rhythmic layering of limestones and silty dolomites is typically irregular and undulatory. Numerous fossil collections throughout the unit have been assigned to one Late Middle Cambrian zone, that of the Bathyriscus-Elrathina fauna. As three major faunas representing the lower half of Middle Cambrian time are missing between this zone and that of Olenellus in unit 5, a disconformity is suspected beneath unit 6.
Throughout much of South Nahanni anticline unit 7 contains a basal red-bed sequence (7a), as much as 500 feet thick that unconformably overlies unit 6 and in large part probably represents recycled Lower Cambrian arenites. The unconformity is markedly angular near the anticline but farther north becomes disconformable and the basal sandstone is much thinner, uncoloured and locally absent. Fossils collected in the adjoining map-area to the east date the unconformity as pre-Franciscan.
Unit 9 consists mainly of uniform, generally light grey-weathering thick-bedded, light and dark grey dolomite, but includes abundant, thinner-bedded commonly impure limestone in the northeast part of the area. Oolitic and psalitic beds are common in the lower part and minor sandy dolomite, dolomitic bioclastic limestone and locally quartzite occurs near the base. Nodules and irregular, discontinuous bands of black chert are fairly common in dark grey dolomite beds within the middle part of the unit. At least 2,000 feet of strata are present on the southwest limb of Nahanni anticline and as much as 5,000 feet on the northeast limb. Unit 9 is mainly equivalent to the Sunblood Formation described previously in adjacent regions to the east. 3 but locally, at the top, includes some dark grey dolomite of Silurian age that is probably correlative with the Whittaker Formation.
Near Broken Skull River unit 10 consists of dark grey to black, fissile to flaggy, argillaceous limestones, interbedded in the middle part with black chert and minor black dolomite. The uppermost beds weather light to medium brown. Southwestward the middle, then the upper and lower parts of the unit change facies into silvery grey-weathering dark brown to black graptolite shale that comprises almost the entire unit near the east limb of Nahanni anticline. Maximum thickness is less than 1,000 feet. This unit appears to be a shale facies equivalent to the Whittaker Formation.
The Devonian formations, units 11, 12, 13 and 14, which are present only in the northeast corner of the area, have been previously described by Gabrielse et al. 3 in the adjoining map-area to the east. Unit 15 includes black platy limestone equivalents of these carbonate units 11 to 14 and possibly shales of unit 10. As much as 3,000 feet of strata are exposed east of Broken Skull fault.
Unit 16a is a maximum of about 2,000 feet thick. Near Broken Skull River it contains fossiliferous platy limestone typical of the Headless Formation (16) at the top, but is largely unfossiliferous, light brown-weathering, impure, platy limestone similar to the Fumeral Formation, a lateral equivalent of the Arctica and Landry Formations in Mackenzie Mountains to the east.
Unit 17a forms prominent light grey-weathering bluffs northeast of South Nahanni River. The rock is chiefly massive, bioclastic limestone with abundant crinoid, algal and coral forms, locally much altered to medium-grained dolomite. Fossils from the unit are assigned an age of Lower or Middle Devonian. The stratigraphic position and lithology similarly suggests correlation with the Nahanni Formation (17) to the northeast.
Black shales, argillite and chert principally of Devon-Mississippian age (18b) total several thousand feet west of South Nahanni River. Minor amounts of graptolite rocks (unit 10) known to be present are not differentiated due to similar lithology, lack of definitive marker beds, and intense deformation. A combined thickness is unknown but at least 3,000 feet and probably much more of Devon-Mississippian strata (18) occur.
Granite intrusions (19) are typically discordant, non-foliated, essentially free of inclusions, and have well defined, steeply dipping contacts. All contain, in part, abundant megacrysts of potash feldspar. Proportion of mafic minerals vary appreciably from dominantly biotite in the southeast corner of the area to dominantly hornblende in the northwest and northern parts. Metamorphism and deformation of the wall-rock is conspicuously limited.
Regional fold axes trend dominantly northwest and intensity of folding increases generally from northeast to southwest and south. Folds are open and upright in the area of well stratified units to the northeast, tightly compressed and vertical to slightly overturned in the area of dominantly pelitic rocks southwest of South Nahanni River, and subhorizontal, strongly overturned to the northeast near the south border of the map-area. Local structural complexity, involving variations in trend, plunge and sense of overturning of folds, as at Mount Pike, is attributed to original inhomogeneities of the strata combined with a non-pervasive or non-penetrative structural style. No evidence of superposed folding was observed. Near Flat River, a well developed, axial plane, silty cleavage associated with the regional folding clearly predates granitic intrusion suggesting a post Devon-Mississippian - pre-middle Cretaceous age for the deformation. The two prominent reverse faults in the northeast part of the area, that intersect on Broken Skull River, appear to have appreciable left-lateral components to account for offset of facies and deflection of major fold trends.
Most intrusive bodies in the area have some indications of mineralization adjacent to them especially in associated carbonate rocks.

1 Green, L. H., and Roddick, J. S.: Nahanni map-area; Geol. Surv. Can., Map 14-1961 (1961).
2 Douglas, R. J. W., and Norris, D. K.: Virginia Falls and Sibbeston Lake map-areas, Northwest Territories; Geol. Surv. Can., Paper 60-19 (1960).
3 Gabrielse, H., Roddick, J. A., and Blusson, S. L.: Flat River, Glacier Lake, and Wrighley Lake, District of Mackenzie and Yukon Territory; Geol. Surv. Can., Paper 64-52 (1965).