



DYNASTY EXPLORATIONS LTD.

SELWYN PROJECT - 1973

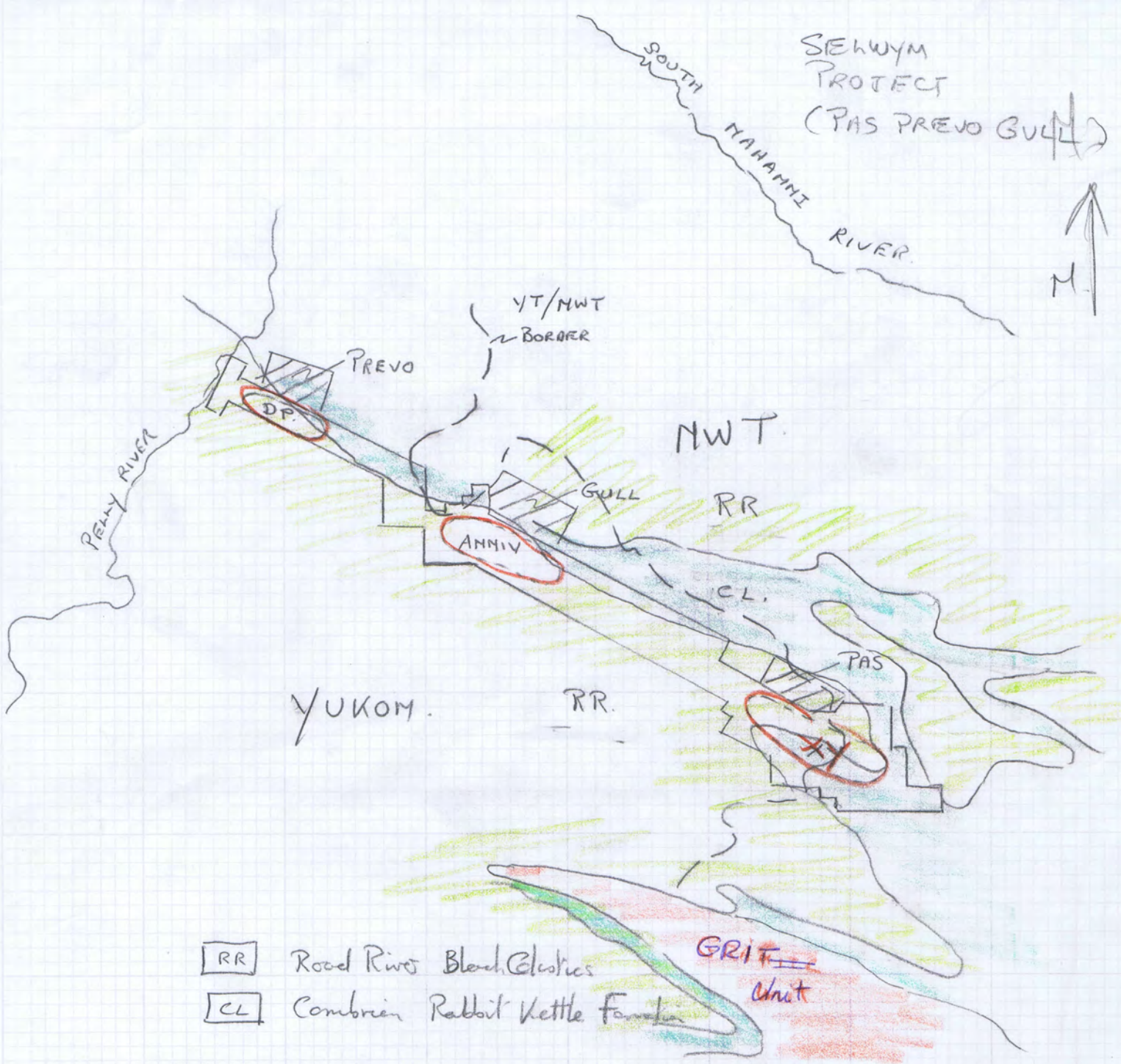
COMPILATION MAP LEGEND

for

N.T.S. MAPS: 105 I, 105 J, 105 O, 105 P

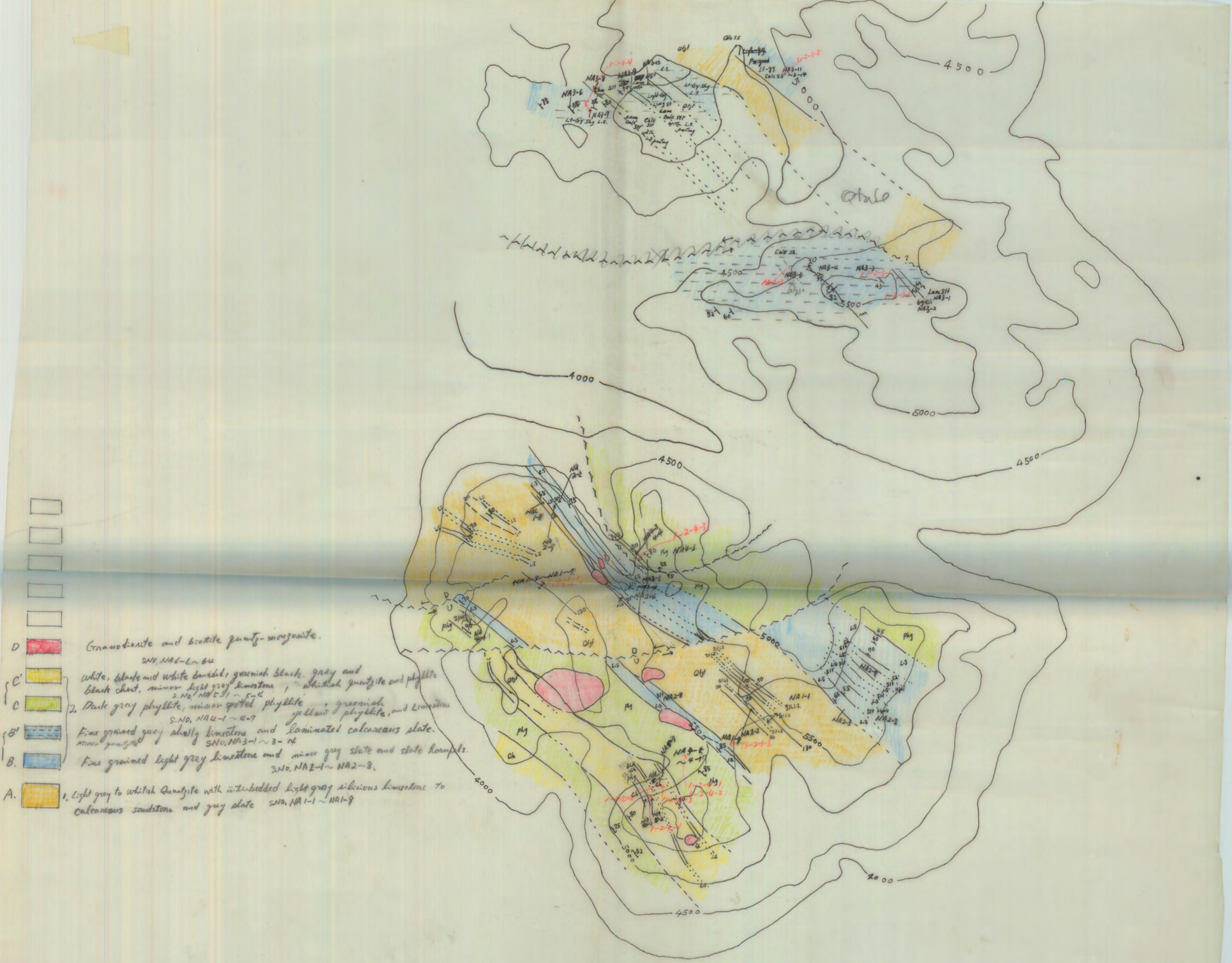
BASE CAMP	▲
FLY CAMP	▲
MINERAL SHOWING	■
GOSSAN ZONE	Ⓞ
RUST ZONE	Ⓜ
INTEGRATED VALUES	
HIGH ANOMALY (value ≥ 18)	○
INTERMEDIATE ANOMALY ($12 \leq$ value ≤ 16)	◦
METAL CHARACTERS	
COPPER	C
LEAD	P
ZINC	Z
AEROMAGNETIC ANOMALIES	
LOW	
HIGH	

105-I



- RR Road River Bleed/Ghosties
- CL Combrin Rabbit Kettle Family

SCALE 1" = 4 mls

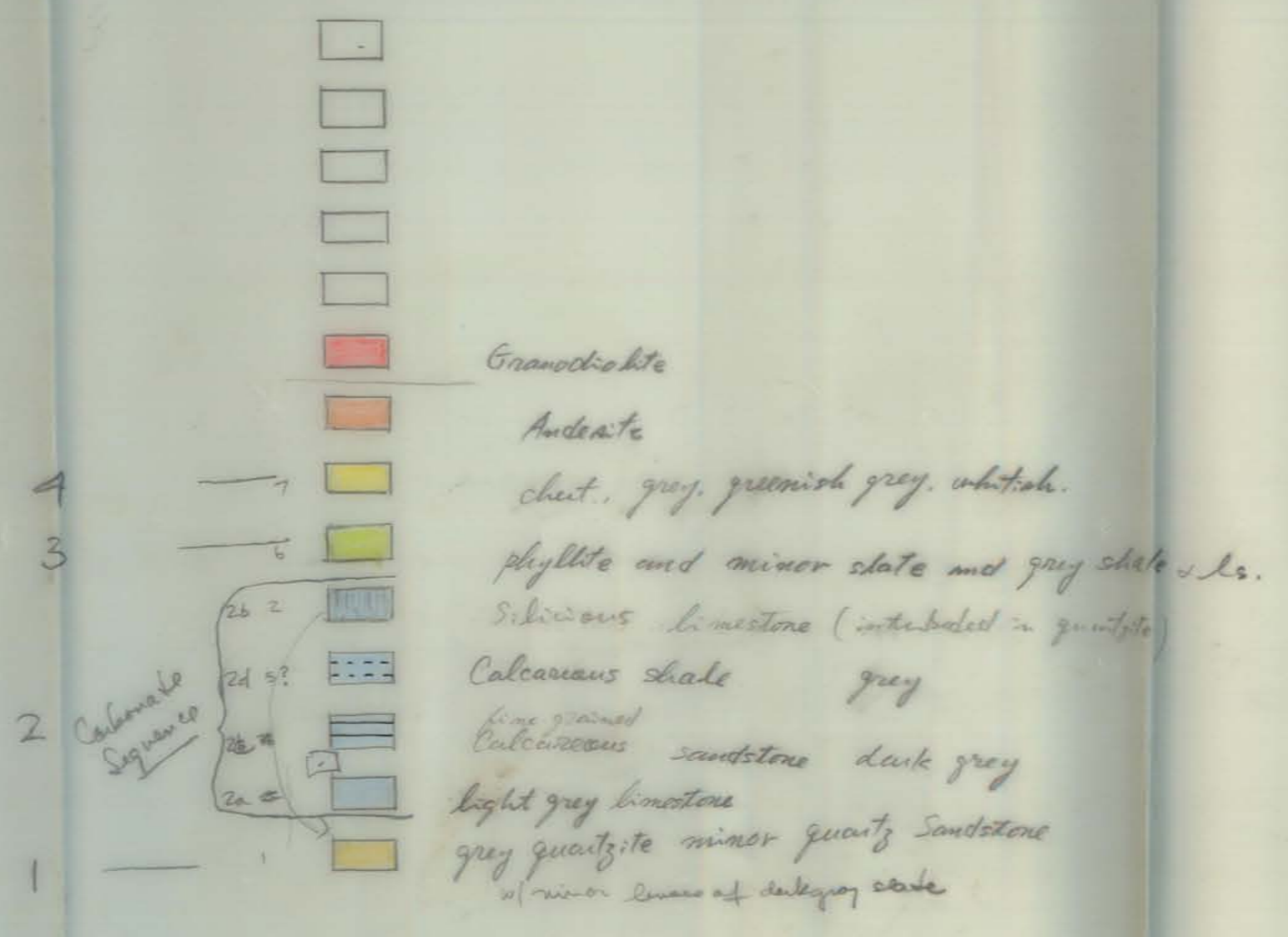


- D Granodiorite and biotite quartz-monzonite.
S.No. NA6-L-64
- C' White, black and white banded, greenish black, gray and black chert, minor light gray limestone, whitish quartzite and phyllite
S.No. NA5-1 ~ 5-4
- C 1. Dark gray phyllite, minor spotted phyllite, greenish yellow phyllite, and limestone
S.No. NA4-1 ~ 4-7
- B' Fine grained grey shaly limestone and laminated calcareous slate.
minor quartzite
S.No. NA3-1 ~ 3-14
- B Fine grained light grey limestone and minor grey slate and slate conglts.
S.No. NA2-1 ~ NA2-8.
- A 1. Light grey to whitish Quartzite with interbedded light grey silicious limestone to calcareous sandstone and grey slate
S.No. NA1-1 ~ NA1-9

leaves

South Nar.

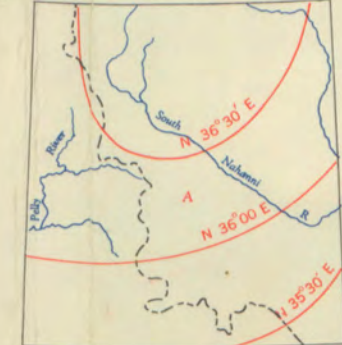
[Handwritten scribble]





67° 28' 30"

THE DECLINATION OF THE COMPASS NEEDLE, 1954

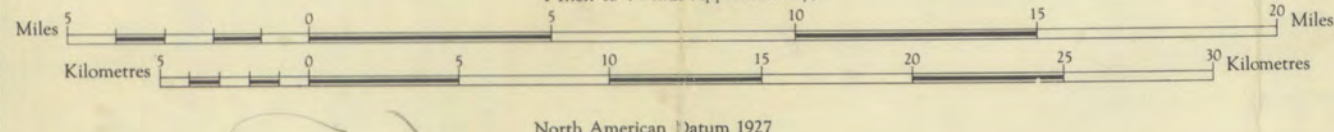


The declination of the compass needle at any place along a red line is the declination given on that red line. At other places the declination is between those given on the neighbouring red lines; that at the place marked A, the declination is between N. 10° E. and N. 20° E. The annual declinations of the compass needle are decreasing 35 minutes annually.

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT R.C.E., 1949-54
Aerial photography by the R.C.A.F., 1949
Universal Transverse Mercator Projection.

REFERENCE

Road, Hard Surface, All Weather	More than 2 Lanes	Blue No. 2 Lines
— Lane Surface, All Weather	2 Lanes	Wide or More
— Less than 2 Lanes	All Weather	On Weather
Cart Track, Trail	Cart Track	Trail
Railways, Multiple Track	Single Track	
Boundary, International	Province or State	Marker
— County or District		
— Reservation, Indian, Military, etc.		



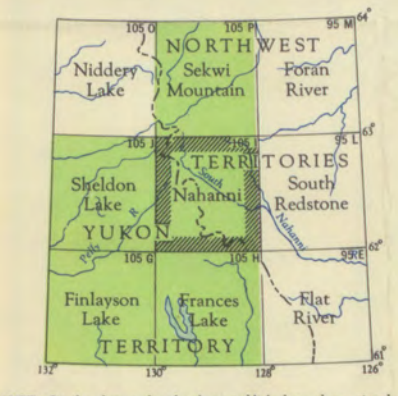
129° 12' W

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

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

REFERENCE

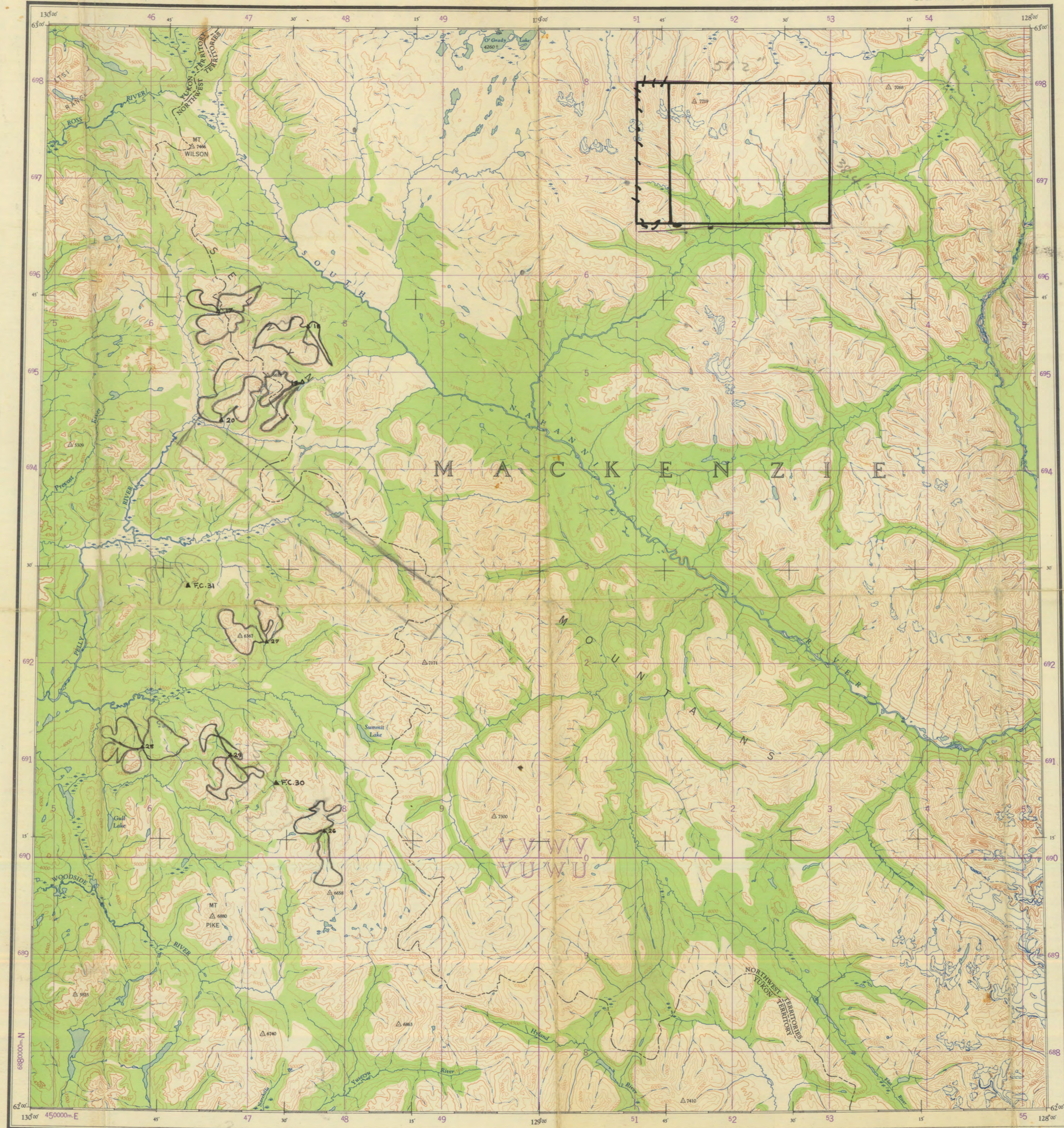
Horizontal Control Point	Spot Elevation, in feet
Contour, Elevation	Washed Area
— Depression	Sump or Marsh
— Approximate	
Glacier or Snowfield	Ferry
Stream, Intermittent	Landing Ground
Dam	Anchorages
— Fall	
Airfield, on land	Water
Power Transmission Line	



NOTE: On the above index the sheets published are shown in red.

Sheldon Project

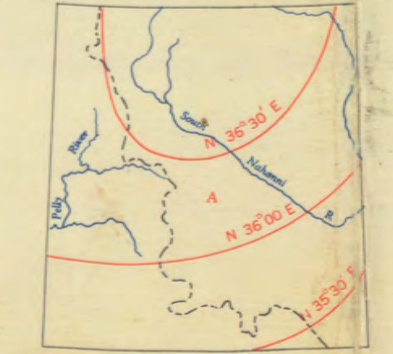




GRID ZONE DESIGNATION	TO OBTAIN A STANDARD REFERENCE ON THIS SHEET TO NEAREST 1000 METRES
9V	HORIZONTAL CONTROL POINT
100,000 M SQUARE IDENTIFICATION	SAMPLE POINT
VV WV 690	1. Read letters identifying 100,000 metre square in which the point lies.
VU WU 50	2. Locate first VERTICAL grid line to LEFT of point and read LARGE figure labeling the line either in the top or bottom margin, or on the line itself.
	3. Estimate tenths from grid line to point.
	4. Locate first HORIZONTAL grid line BELOW point and read LARGE figure labeling the line either in the left or right margin, or on the line itself.
	5. Estimate tenths from grid line to point.
	6. Square formed by 4 lines is 1000 metres on each side.
	7. Estimate hundredths of any dimension from grid lines to point.
	8. Example: 450000
	SAMPLE REFERENCE: VV8820
	9VV8820

TEN THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 9

THE DECLINATION OF THE COMPASS NEEDLE, 1954



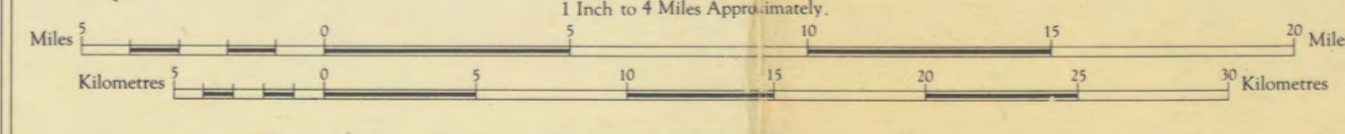
The declination of the compass needle at any place along a red line is the declination given on that red line. At other places the declination is between those given on the neighbouring red lines; thus at the place marked A, the declination is between N. 10° E. and N. 5° E. The yearly declination of the compass needle are decreasing 35 minutes annually.

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT R.C.E., 1949-54
Aerial photography by the R.C.A.F., 1949
Universal Transverse Mercator Projection.

NAHANNI

YUKON TERRITORY - NORTHWEST TERRITORIES

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



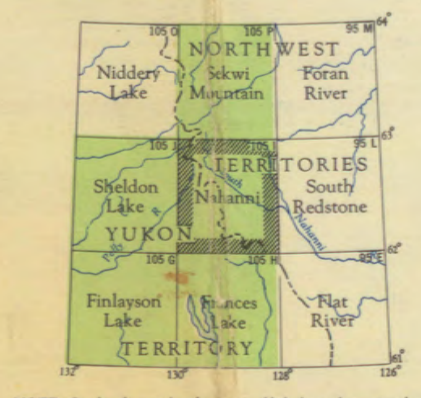
North American Datum 1927

REFERENCE

Road, Hard Surface, All Weather	More than 2 Lanes	Open
Less than 2 Lanes	All Weather	Open
Less than 2 Lanes	Open	Open
Clear Track, Trail	Clear Track	Trail
Railway, Multiple Track	Single Track	Boundary, International
Province or State	County or District	Reserve, Indian, Military, etc.

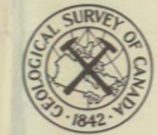
REFERENCE

Horizontal Control Point	Spot Elevation, in feet
Contours, Elevation	Woods Area
Depression	Swamp or Marsh
Approximation	W. L. 125
Glacier or Snowfield	Ferry
Stream, Permanent	Lighthouse
Dam	Falls
Airfield, on Land	Well
Power Transmission Line	Landing Ground
	Anchor



NOTE: On the above index the areas published are shown in red green.

LEGEND



GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

105-1

DESCRIPTIVE NOTES

- 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 18, 18a and minor 10
- 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 argillaceous 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; rough hematite-rich bands and laminations common; 15a, includes much light and medium grey dolomite, mainly correlative with the Arnica 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 ARNICA 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 graptolitic 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 dolomitic 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 dolomitic 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) ————
- Lamination (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 ———— x W
- Location of measured section ————

MINERALS

- Arsenic As Tungsten W
Copper Cu Zinc Zn
Gold Au

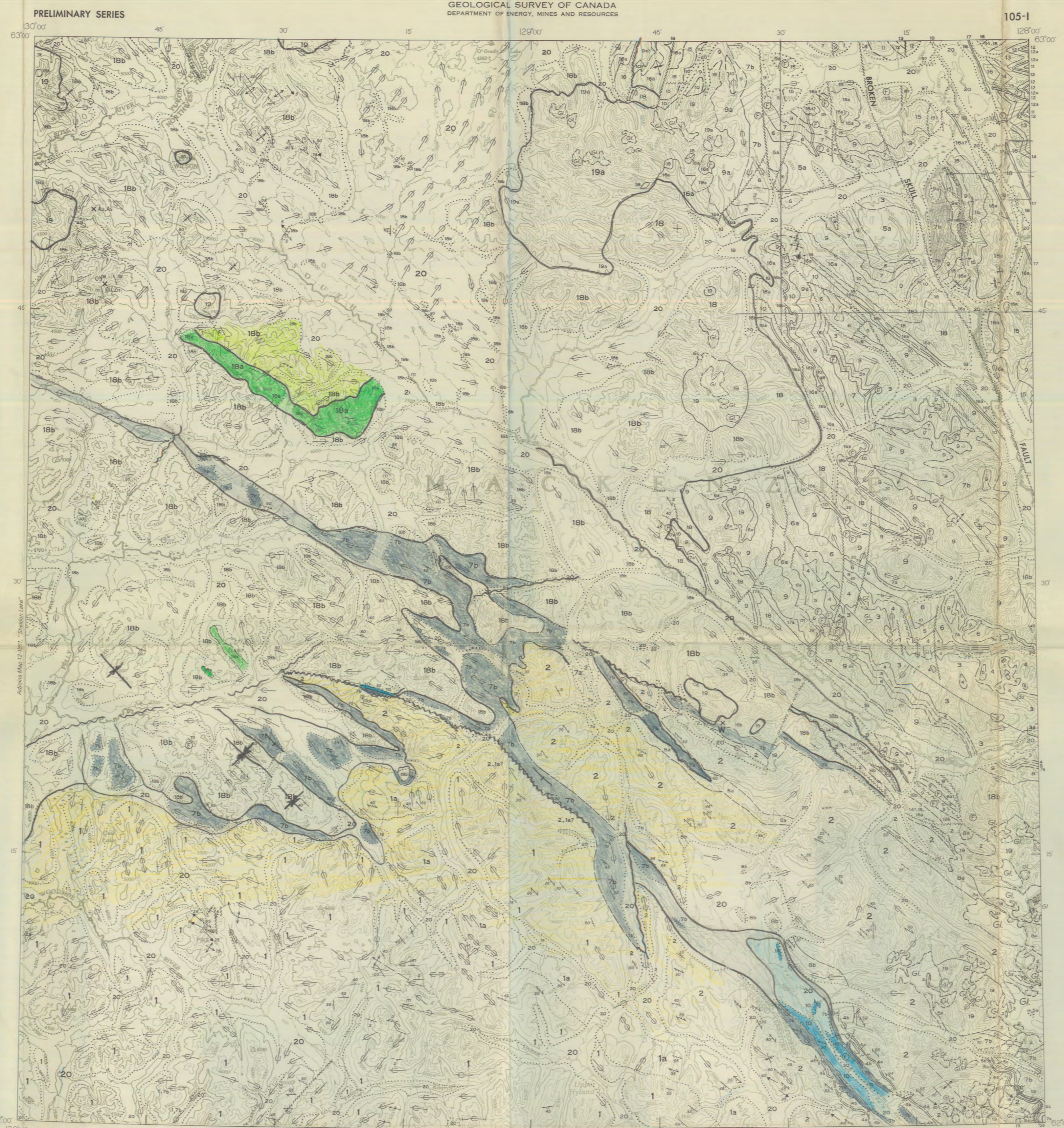
Geology by L. H. Green and J. A. Roddick, 1960, S. L. Blusson, 1962, 1966

Geological cartography by the Geological Survey of Canada, 1967

Base-map prepared by the Army Survey Establishment, R. C. E., 1949-1954 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° 36' easterly at centre of east edge. Mean annual change, decreasing 5.4'

Elevations in feet above mean sea-level

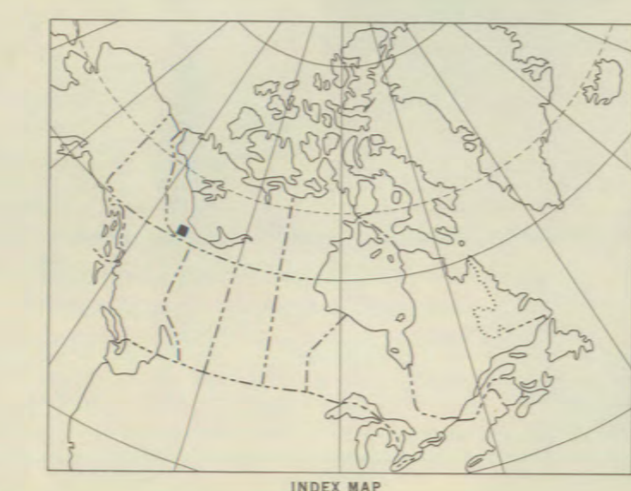
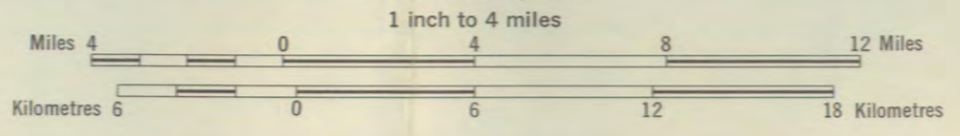


Published 1967
Copies of this map may be obtained from the Director, Geological Survey of Canada, Ottawa

MAP 8-1967
(SUPERSEDES PART OF MAP 14-1961)

NAHANNI
DISTRICT OF MACKENZIE AND YUKON TERRITORY

Scale 1:253,440



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 southwest of the drainage divide, 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 maroon 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 beds 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 (3a) 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, crossbedding, and abrupt local facies changes are abundant. The top is marked by a conspicuous member of buff-orange and yellow-weathering, finely crystalline, in part silty, dolomite. *Olenellus gibber*, 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 unobtrusive. Numerous fossil collections throughout the unit have been assigned to one Late Middle Cambrian zone that of the *Bathyrisicus-Erathina* 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-Franconian.

Unit 8 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 pisolitic 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 2,600 feet of strata are present on the southwest limb of Nahanni anticline and as much as 5,000 feet on the north-east limb. Unit 8 is mainly equivalent to the Sandbrook Formation described previously in adjacent regions to the east, 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 limestone, interbedded in the middle part with black chert and minor black dolomite. The uppermost beds weather light to medium brown, buff-weathering, finely crystalline, in part silty, dolomite. Unit 9 is mainly equivalent to the Sandbrook Formation described previously in adjacent regions to the east, but locally, at the top, includes some dark grey dolomite of Silurian age that is probably correlative with 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. 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 Arnica 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 lithologic similarity 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 graptolitic 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.

Granitic 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 north-west and northern parts. Metamorphism and deformation of the wall-rock is conspicuously limited.

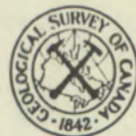
Regional fold axes trend dominantly northwest and intensity of folding increases generally from northeast to south. Folds are open and upright in the area of well stratified units to the northeast, tightly compressed and vertical to slightly overturned in the area of dominantly pelitic rocks southwest of South Nahanni River, and subisoclinal, 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, slaty 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 distinctness of major fold trends.

Most intrusive bodies in the area have some indications of mineralization adjacent to them especially in associated carbonate rocks.

¹Green, L. H., and Roddick, J. S.: Nahanni map-area; Geol. Surv. Can., Map 14-1961 (1961).

²Douglas, R. J. W., and Norris, D. K.: Virginia Falls and Sibbeston Lake map-areas, Northwest Territories; Geol. Surv. Can., Paper 60-19 (1960).

³Gabrielse, H., Roddick, J. A., and Blusson, S. L.: Flat River, Glacier Lake, and Wrigley Lake, District of Mackenzie and Yukon Territory; Geol. Surv. Can., Paper 64-52 (1965).



GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

PRELIMINARY SERIES

105-1



Adjoins Map 12-1967, "Chelidon Lake"

Adjoins Map 6-1966, "Frances Lake"

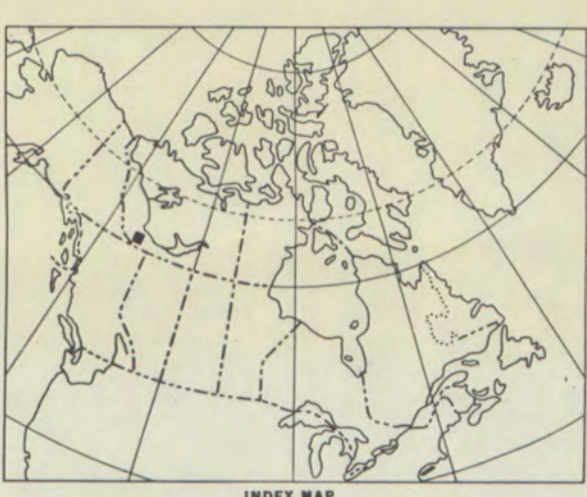
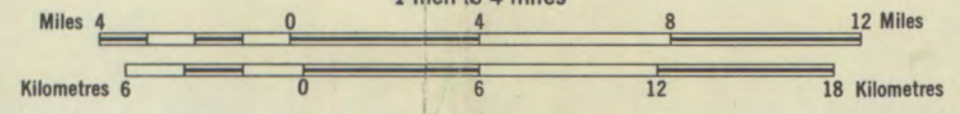
Published 1968
Copies of this map may be obtained from the
Director, Geological Survey of Canada, Ottawa

Printed by the Surveys and Mapping Branch

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



GEOL-105 I

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 18, 18a and minor 10
- 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 Funeral 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; rough hematite-rich bands and laminations common; 15a, includes much light and medium grey dolomite, mainly correlative with the Arnica and Landry Formations but includes rocks as old as Upper Ordovician
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- 13 ARNICA 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 graptolitic 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 dolomitic 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 dolomitic 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) / / /
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- Syncline (defined, approximate; arrow indicates plunge) ~ ~ ~ ~ ~
- Glacial striae (direction of ice movement known, unknown) / / /
- Fossil locality ⊕
- Mineral prospect or occurrence x W
- Location of measured section = = = = =

MINERALS

Arsenic As	Tungsten W
Copper Cu	Zinc Zn
Gold Au	

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., 1949-1954 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° 36' easterly at centre of east edge. Mean annual change, decreasing 5.4'

Elevations in feet above mean sea-level

PRELIMINARY SERIES



GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

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 4 8 12
Kilometres 6 0 6 12 18

Goodwin

105 I 105-1

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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 and minor 10

- 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 Funeral 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; roose hematite-rich bands and laminations common; 15a, includes much light and medium grey dolomite, mainly correlative with the Arnica 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 ARNICA 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 DELOIRME FORMATION: buff, orange, light grey-weathering dolomite and limestone

- ORDOVICIAN AND SILURIAN**
- UPPER ORDOVICIAN AND SILURIAN**
- 10 Black graptolitic 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**
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- 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

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- 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

- Arsenic As Tungsten W
- Copper Cu Zinc Zn
- Gold Au

Geology by L. H. Green and J. A. Roddick, 1960, S. L. Blusson, 1962, 1966

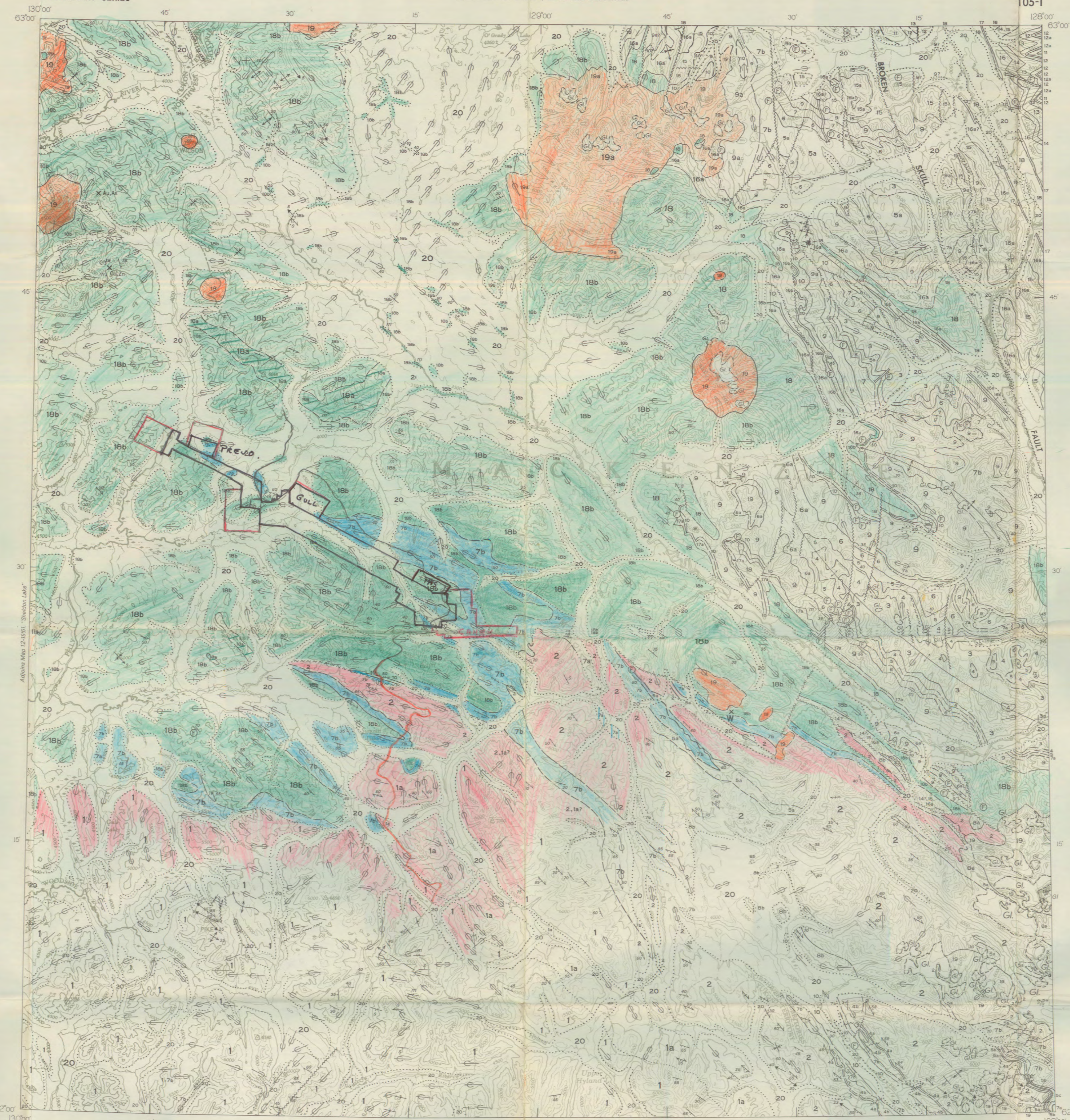
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Elevations in feet above mean sea-level

PRELIMINARY SERIES

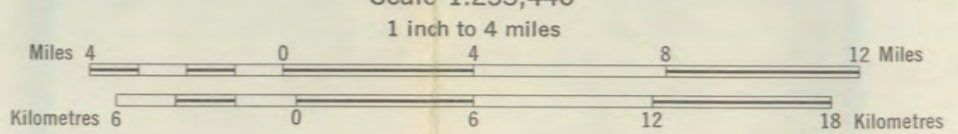


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MAP 8-1967
(SUPERSEDES PART OF MAP 14-1961)

NAHANNI
DISTRICT OF MACKENZIE AND YUKON TERRITORY

Scale 1:253,440
1 inch to 4 miles



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 southwest of the drainage divide, away from which ice at the higher levels moved to the northeast, 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 maroon 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 (3a) 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, crossbedding, 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-Franconian.

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 pisolitic 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 2,600 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 Sumbold Formation described previously in adjacent regions to the east 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 limestone, 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 granitic 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. 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 Funeral Formation, a lateral equivalent of the Arnica 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 lithologic similarity 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 graptolitic 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.

Granitic 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 subisoclinal, 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-persistent or non-penetrative structural style. No evidence of superposed folding was observed. Near Flat River, a well developed, axial plane, slaty cleavage associated with the regional folding clearly predates granitic intrusions 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.

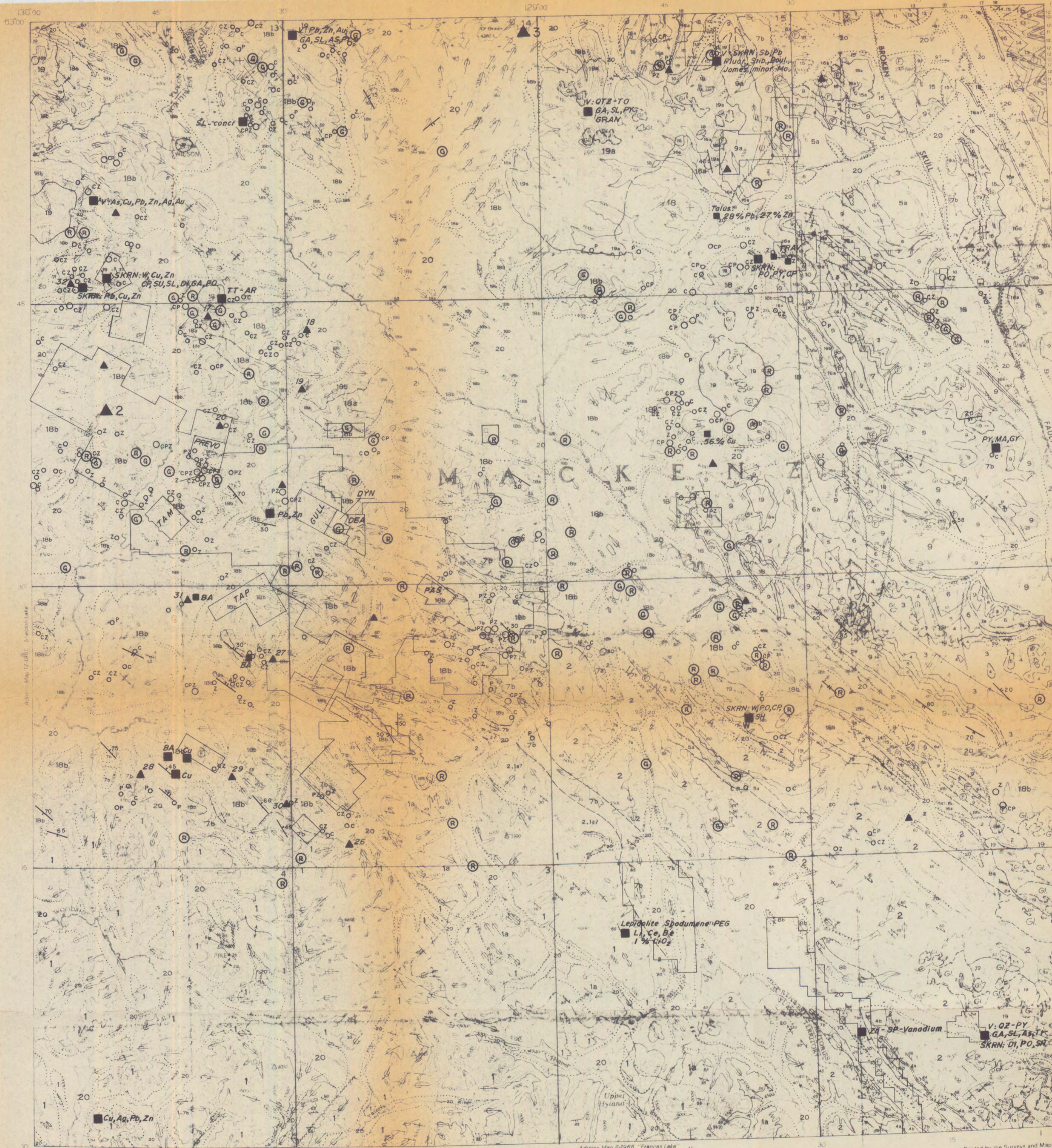
¹Green, L. H., and Roddick, J. S.: Nahanni map-area; Geol. Surv. Can., Map 14-1961 (1961).

²Douglas, R. J. W., and Norris, D. K.: Virginia Falls and Sibbeston Lake map-areas, Northwest Territories; Geol. Surv. Can., Paper 60-19 (1960).

³Gabrielse, H., Roddick, J. A., and Blusson, S. L.: Flat River, Glacier Lake, and Wrigley Lake, District of Mackenzie and Yukon Territory; Geol. Surv. Can., Paper 64-52 (1965).

MAP 8-1967
NAHANNI
DISTRICT OF MACKENZIE
AND YUKON TERRITORY

105-1



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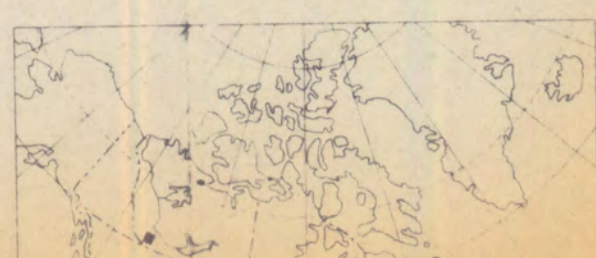
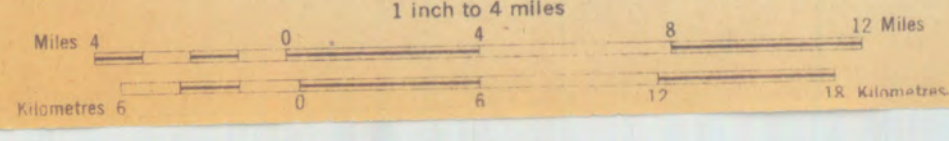
MAP 8-1967
 (SUPERSEDES PART OF MAP 14-1961)

GEOLOGY
NAHANNI
 DISTRICT OF MACKENZIE AND YUKON TERRITORY

105 I

105-I-GEOL

Scale 1:253,440
 1 inch to 4 miles



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