REGIONAL GEOLOGY

Pelly Mountains

Watson Lake Mining District
Yukon Territory

N.T.S. 105-F-7
F-9
F-10
G-12

Pelmac Project

By:

L. C. Pigage

Field Work Completed from July - September, 1980

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INTRODUCTION

The main purpose of the PELMAC program during the 1980 field season was to evaluate the economic potential of the ANISE, BNOB, EROS, and HOWRU claim groups. A drill program was completed on the ANISE, BNOB, and EROS claims, and a grid geochemical soil survey was completed on the HOWRU claims. Individual reports on 1980 results have been prepared for each of the above properties.

Concurrently with the property program, a regional geologic mapping program was undertaken to relate the detailed geology of the different claim groups to the regional reconnaissance geologic framework. At the same time problem areas revealed during the previous reconnaissance mapping were looked at again in greater detail to try to resolve some of the geologic inconsistencies.

Most of the 1980 mapping was completed along the Seagull and McConnell River valleys (N.T.S. 105-F-10). This area contained several unresolved problems. In addition it was hoped that detailed mapping in this area would help relate previous mapping on the MM claims (105-F-7) to the rest of the PELMAC area. A brief interval of time was spent reviewing the geology in the vicinity of Mount Misery (east of EROS claim group) (105-F-9).

TABLE I — STRATIGRAPHIC COLUMN

LATE TRIASSIC

$u\bar{R}_1$	BUFF TO GREY SILTY LIMESTONES. UNIT OCCURS ONLY IN THE VICINITY OF THE HOWRU CLAIMS.

PALEOZOIC

Pzu	SERPENTINITES, ULTRAMAFICS, CHLORITIC PHYLLITES OF PALEOZOIC (?) AGE.

CARBONIFEROUS (?)

C_{sl}	BUFF TO BROWN SILTSTONE AND SHALE. UNIT OCCURS ONLY IN THE VICINITY OF THE HOWRU CLAIMS.

MISSISSIPPIAN

My	FINE TO COARSE-GRAINED HORNEBLENDE SYENITE.
Mt	TAN TO PALE GREY BEDDED CHERTS. MINOR DARK GREY CHERT, BLACK SHALE AND LIMESTONE.
Mvt	PALE GREY, BROWN OR GREENISH FELSIC TO INTERMEDIATE TUFFS AND LAPILLI TUFFS. COMMONLY WEATHERS BROWN TO ORANGE BECAUSE OF DISSEMINATED PYRITE. MINOR DYKES, SILLS AND FLOWS. THIN INTERBANDS OF CHERT AND BLACK SHALE.

LATE DEVONIAN - MISSISSIPPIAN

	'BLACK CLASTIC UNIT'
uDM_s	BLACK SHALE WITH CHERT GRANULE GRIT INTERBANDS. TYPICALLY SHALE CONTAINS THIN INTERBANDS OF MEDIUM GREY, SLIGHTLY PYRITIC SILTSTONE. MINOR INTERCALATED CHERT (Mt) AND FELSIC TO INTERMEDIATE TUFFS (Mvt).

SILURIAN - DEVONIAN

	ASKIN GROUP
SDa	PALE GREY TO BUFF SANDY DOLOMITE TO DOLOMITIC OR CALCAREOUS ORTHOQUARTZITE. MINOR INTERBANDS OF DARK BROWN TO BLACK SHALE.

ORDOVICIAN - SILURIAN

	ROAD RIVER FORMATION
OS_{rr}	BROWN TO BLACK SILTSTONE AND SHALE. LOCALLY UNIT IS SLIGHTLY TO MODERATELY CALCAREOUS. TYPICALLY PYRITIC.

LATE CAMBRIAN - ORDOVICIAN

	KECHIKA FORMATION - VOLCANICS
ϵO_{kv}	FOLIATED BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFFS WITH MINOR INTERCALATED CALCAREOUS, SILVERY PHYLLITES. SOME FLOWS ARE HIGHLY AMYGDALOIDAL.
	KECHIKA FORMATION
ϵO_k	CALCAREOUS PHYLLITE AND SILTY LIMESTONE WITH MINOR BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFFS. UNIT TYPICALLY WEATHERS TO A BUFF OR SILVERY COLOUR.

TABLE I (CONT.)

HADRYNIAN - CAMBRIAN

$H\epsilon_a$	ATAN GROUP INTERLAYERED LIMESTONE, DOLOMITE, ORTHOQUARTZITE, AND PHYLLITE. NOT MAPPED IN DETAIL.

The 1980 field season has clarified some of the problems inherited from the earlier reconnaissance mapping program. This report presents a brief summary of the major revisions to the tectonic and stratigraphic framework of the Pelly Mountains. The report is accompanied by the revised PELMAC geology maps. The geology has been compiled at scales of 1:15,840 and 1:50,000. The small scale maps (1:15,840) contain station locations, outcrop patterns, and detailed geology. The large scale maps (1:50,000) are designed to be compatible with the ANMAC series maps.

STRATIGRAPHY

Road River Formation (OS_{rr})

Previous reconnaissance geology in the vicinity of Mount Misery (east of EROS claims; N.T.S. 105-F-9) indicated the presence of an extremely thick section of black phyllites and siltstones belonging to the Road River Formation (OS_{rr}). This occurrence of a thick Ordovician-Silurian section in the Pelly Mountains was unique; elsewhere in the PELMAC area the Road River Formation was thin (<30 meters thick) or absent. The possibility of a thick Road River sequence presented major difficulties in interpretation of the regional patterns because thick black phyllite packages could then be either Ordovician-Silurian (OS_{rr}) or Devonian-Mississippian (uDM_s).

1980 remapping of the Mount Misery area has shown that the Road River Formation (OS_{rr}) occurs as a thin package of black phyllites (<30 meters thick) within a conformable sequence from the underlying Kechika Formation volcaniclastics (CO_{kv}) through the overlying Askin Group orthoquartzites (SD_a). This occurence of the Road River Formation is therefore consistent with the other Ordovician-Silurian sequences in the PELMAC area.

Interpretation of the regional map pattern has been simplified by this revision. All thick black phyllite sequences are now considered to belong to the Devonian-Mississippian Black Clastic Unit (uDM_s). The Road River Formation is recognized as a mappable unit only if it occurs as part of a conformable sequence from the Kechika Formation (CO_k) through the Askin Group (SD_a). As a result most black phyllite units can be considered Devonian-Mississippian (uDM_s).

Hornblende Syenite (My)

Syenite (My) is much more extensive than previously recognized in the area between Seagull and McConnell River valleys (105-F-10). Locally the syenite is extensively sheared. As a result it is often difficult to distinguish from the overlying felsic volcanics (Mvt).

Detailed mapping in Seagull Valley indicates that syenite underlies much of the ANISE claims. Both drillhole information and minor outcrop occurrences show that the syenite contains a mafic phase consisting dominantly of hornblende and plagioclase.

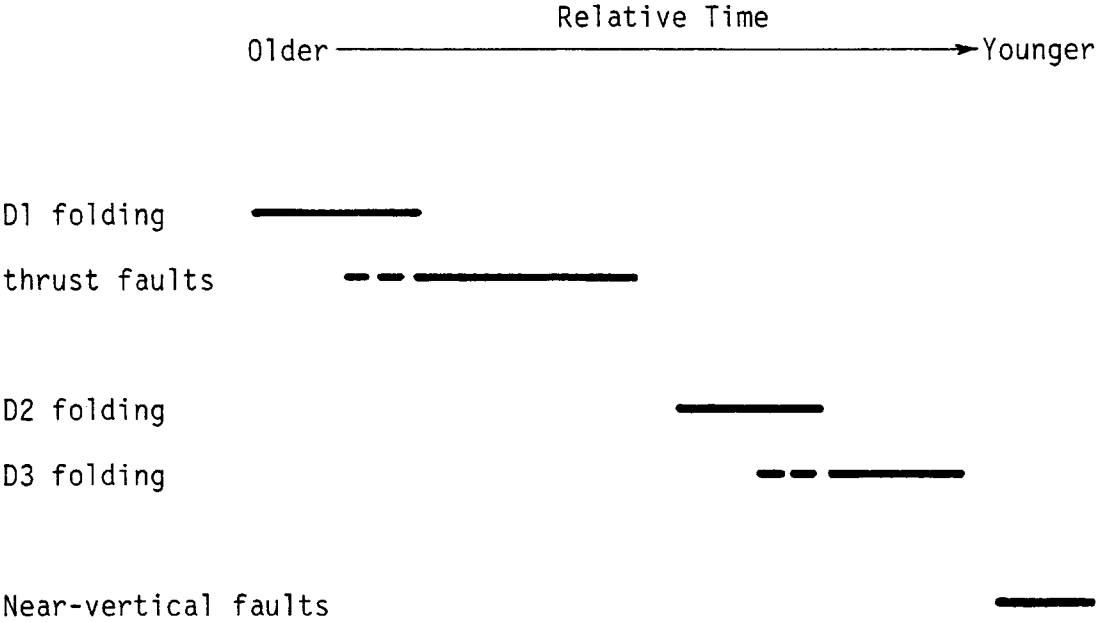
TECTONICS

The Pelmac area has undergone polyphase deformation. Regionally three phases of folding and two main periods of faulting have been recognized. Relative timing of these deformation events is presented in Table II. The following section contains a brief discussion of the different deformations.

The earliest D1 deformation is characterized regionally by the development of a pervasive S1 axial plane schistosity. Macroscopic D1 folds have been mapped on both the HOWRU (east) and MM (southwest) claim groups. In both cases the D1 folds are upright, tight to isoclinal structures. Macroscopic D1 folds have not been recognized in the rest of the PELMAC area.

Development of the thrust faults appears to be a late-D1 to post-D1 event. On the HOWRU claims unfolded thrust klippe of Askin Group (SD_a) overlie autochthonous units containing well developed D1 macroscopic folds. East of the ANISE the

TABLE II


Relative Time
Older
Younger
D1 folding
thrust faults
D2 folding
D3 folding
Near-vertical faults

thrust surface is parallel to the pervasive S1 schistosity and cuts across the hinge zone of a D1 minor fold. The thrust fault surfaces on the MM claims have been folded by the D2 and D3 deformation phases.

These different relations suggests that thrusting post-dates most (if not all) of the D1 deformation. Formation of the thrust surfaces may be related to extreme tightening of large scale D1 structures. It is uncertain whether the different mapped thrust plates represent locally developed thrusts or isolated klippe of a few large regionally developed thrust plates.

D2 and D3 deformation phases are only locally developed. Typically minor structures consist of open to tight minor folds with an associated axial planar crenulation cleavage. Both D2 and D3 folds are strongly developed on the MM claim group.

The latest structural features in the PELMAC area are numerous north-to northwest-trending near-vertical faults. Recognition of these faults is important because they are responsible for repetition of the stratigraphy. In some cases this repetition was previously interpreted as resulting from the stacking of several thrust plates.

Near ANISE these faults have largely normal displacement. In most cases the east side is the downthrown block. The normal faults crosscut and displace all other structures.

To the east near HOWRU these late faults contain both normal and strike-slip components of movement. Strike-slip displacement is right lateral; the largest recognized horizontal separation is 7.6 kilometers. As on ANISE, these faults crosscut and displace the earlier formed structures.

These faults are subparallel to the Tintina Fault which is located just northeast of HOWRU. Right-lateral displacement (HOWRU) is also consistent with displacement on the Tintina. Development of these faults must be related to the stress system imposed by movement on the Tintina Fault System.

Deformation in the PELMAC area postdates late Triassic since Triassic metasediments are involved in all of the deformation. Movement on the Tintina system is considered to be late Cretaceous to Eocene. Therefore deformation D1-D3 in the PELMAC area is confined to the time interval between early Jurassic and late Cretaceous.

SUMMARY

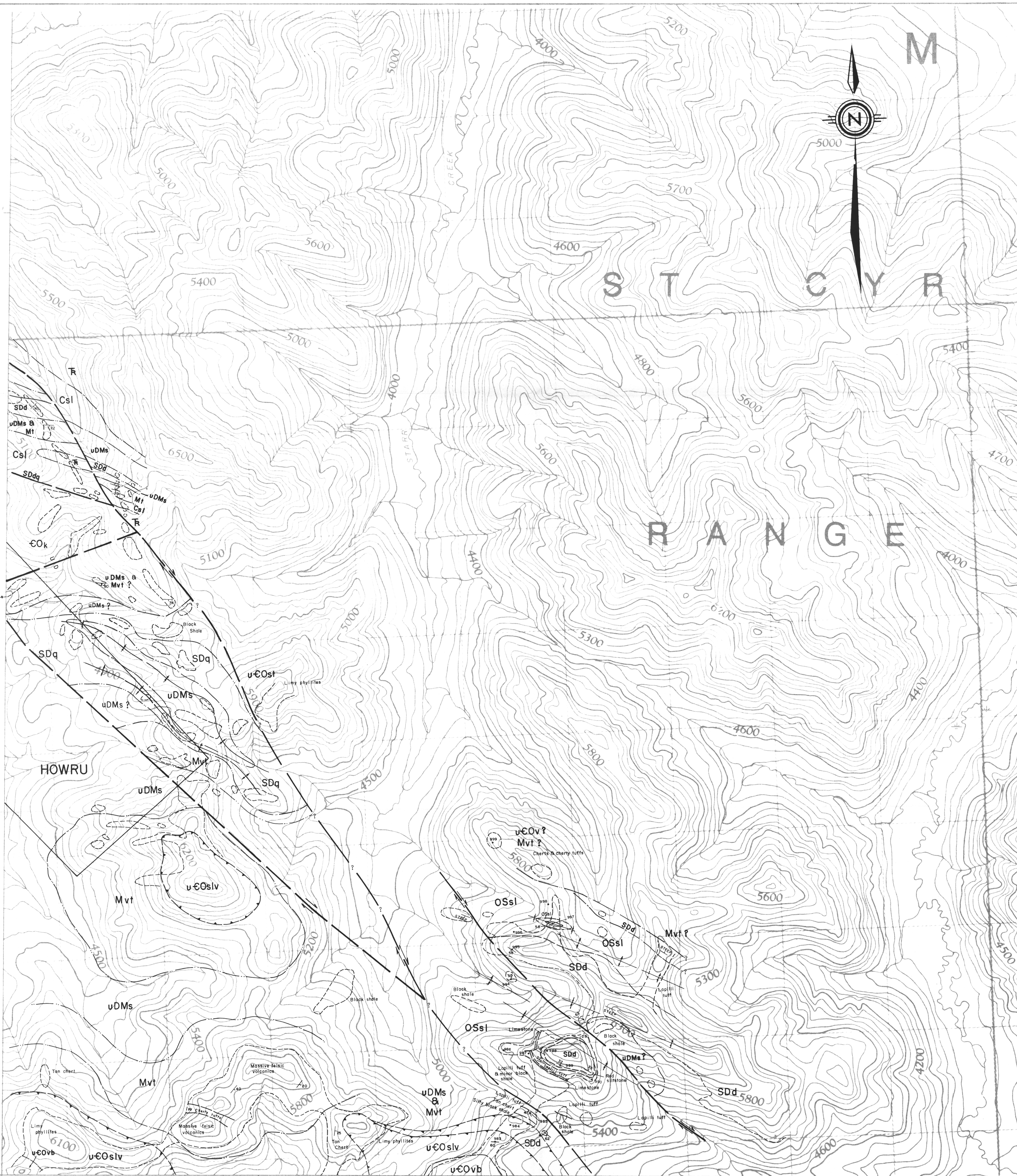
The main feature to emerge from the 1980 PELMAC regional program are as follows:

1) The Road River Formation (OS_{rr}) is thin to absent in the PELMAC area. Thick sequences of black phyllite belong to the Black Clastic unit (uDM_s).

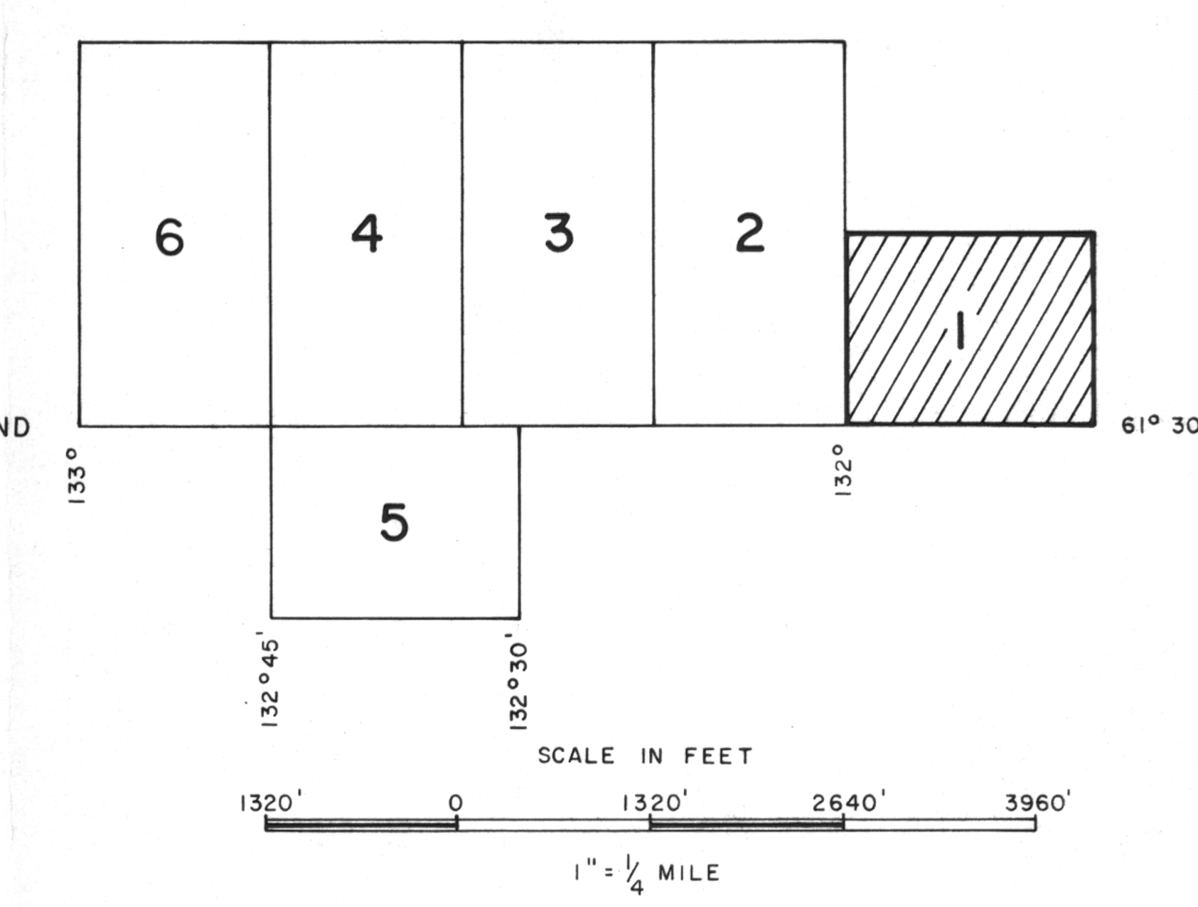
2) The region between Seagull and McConnell River valleys consist of syenite (My) with a thin veneer of black phyllites (uDM_s) and felsic metavolcanics (Mvt).

3) The thrust panels mapped in the PELMAC area formed between the D1 and D2 deformation phases. It is uncertain whether the thrust surfaces are locally developed or represent large scale regional features.

4) Late, near-vertical, north-to northwest-trending faults crosscut all other structural features. Near ANISE displacement is largely vertical. Near HOWRU these faults also contain a substantial right-lateral strike-slip component of movement. Recognition of these faults is important because they cause repetition of the stratigraphic units.



NOTE: SEE SHEET 1 FOR LEGEND



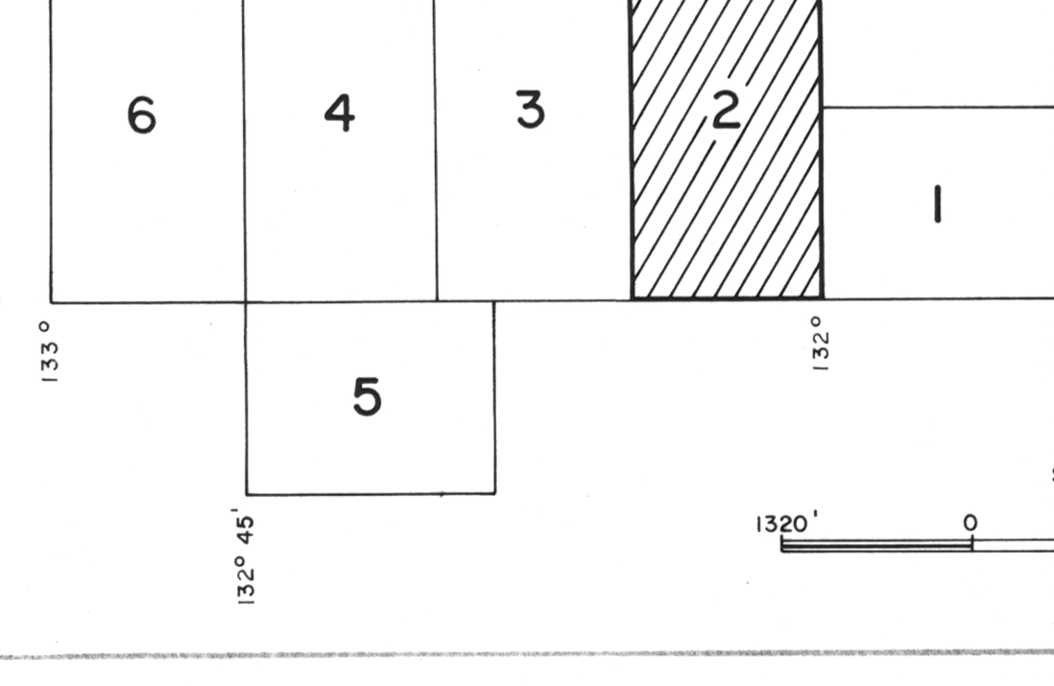
MAP 2-1

CYPRUS ANVIL MINING CORPORATION

GEOLOGICAL MAP

REVISED:

NTS: 105-G-12 W 1/2
DRAWN BY: R.W.R.
DATE: FEB. 22, 1981



NOTE: SEE SHEET 1 FOR LEGEND

SCALE IN FEET

1320' 0 1320' 2640' 3960'

1" = 1/4 MILE

inches

centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

MAP 2-2

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

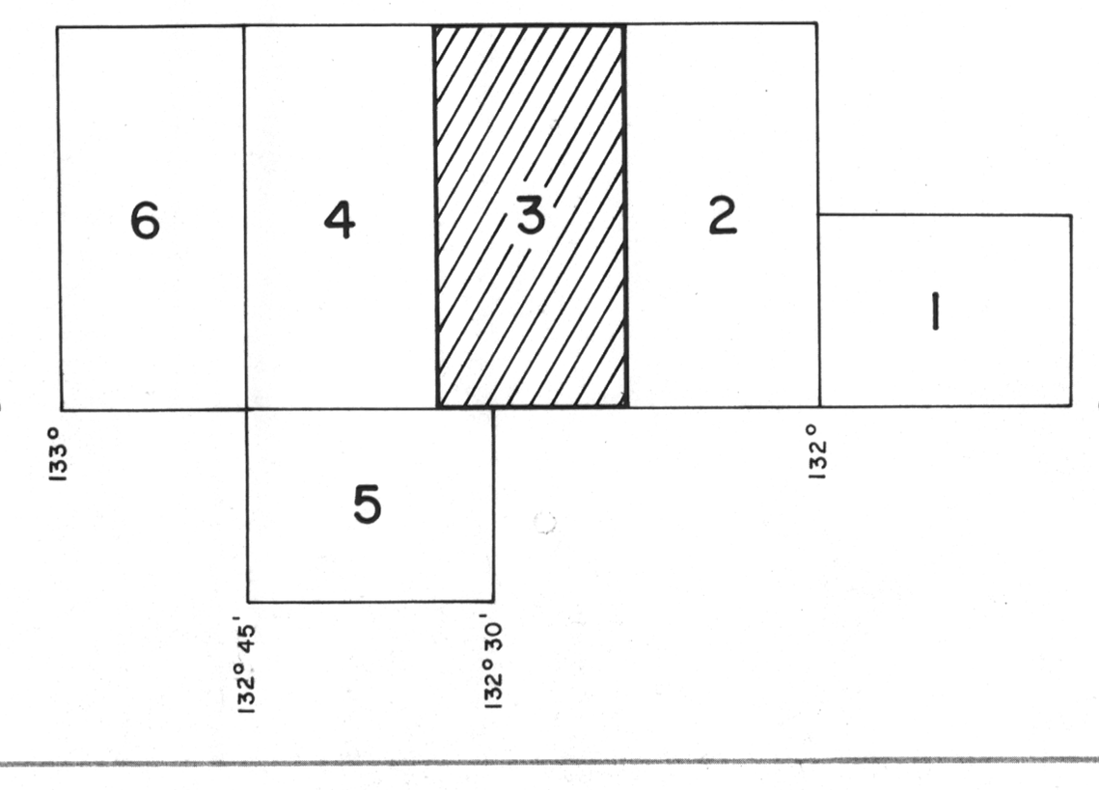
GEOLOGICAL MAP

N.T.S. 105-F-9 E 1/2

DRAWN BY: R.W.R.

DATE: FEBRUARY 27, 1981

MAP 2-3



NOTE: SEE SHEET 1 FOR LEGEND

SCALE IN FEET

1320' 0 1320' 2640' 3960'

1" = 1/4 MILE

CYPRUS ANVIL MINING CORPORATION

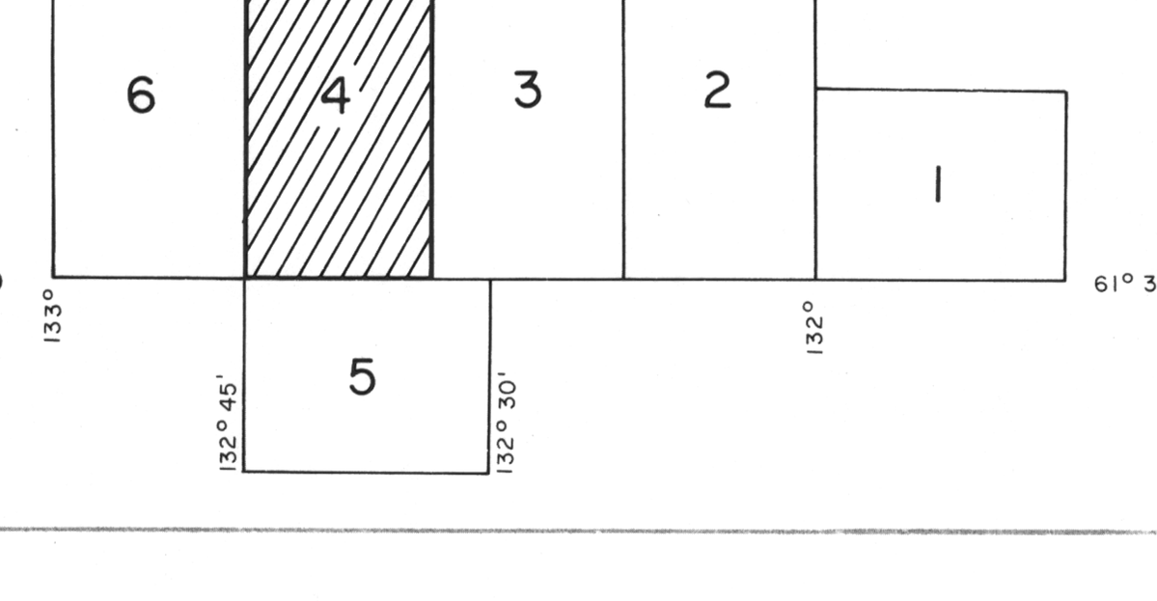
PELLY PROJECT

GEOLOGICAL MAP

N.T.S. 105 - F - 9 W 1/2

DRAWN BY R. W. R.

DATE: FEBRUARY 24, 1981



NOTE: SEE SHEET I FOR LEGEND

SCALE IN FEET

1320' 0 1320' 2640' 3960'

1" = 1/4 MILE

MAP 2 - 4

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

GEOLOGICAL MAP

N.T.S. 105 F - 10 E

DRAWN BY: C. L. C.

DATE: FEBRUARY 18, 1981

uDMs & Mva
SDa
€Ok
Kgm
uDMs
Mva
OSrr
Mva
SDa
DU
HЄa
Massive, fine-grained, light grey, siliceous limestone
coarse - grained ultramafic
Pale grey-green chlorite muscovite quartz schist
massive to thick bedded limestone
Thin to medium bedded limestone
massive to thick bedded CO_3
massive CO_3
Chloritized dyke
Pau Serpentinite
NOTE: SEE SHEET 1 FOR LEGEND
6
4
3
2
1
5
61°30'
133°
132°45'
132°30'
132°
MAP 2-5
CYPRUS ANVIL MINING CORPORATION
PELLY PROJECT
GEOLOGICAL MAP
N.T.S. 105-F-7
DRAWN BY R.W.R.
DATE OCT. 1978
REVISED: JAN 1981 C.L.C.
SCALE IN FEET
1320' 0 1320' 2640' 3960'
1" = 1/4 MILE
inches
centimetres
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.
YUKON GEOLOGICAL SURVEY

PELLY

Joins 105 F/11

Joins 10

NOTE: SEE SHEET 1 FOR LEGEND

MAP 2 - 6

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

GEOLOGICAL MAP

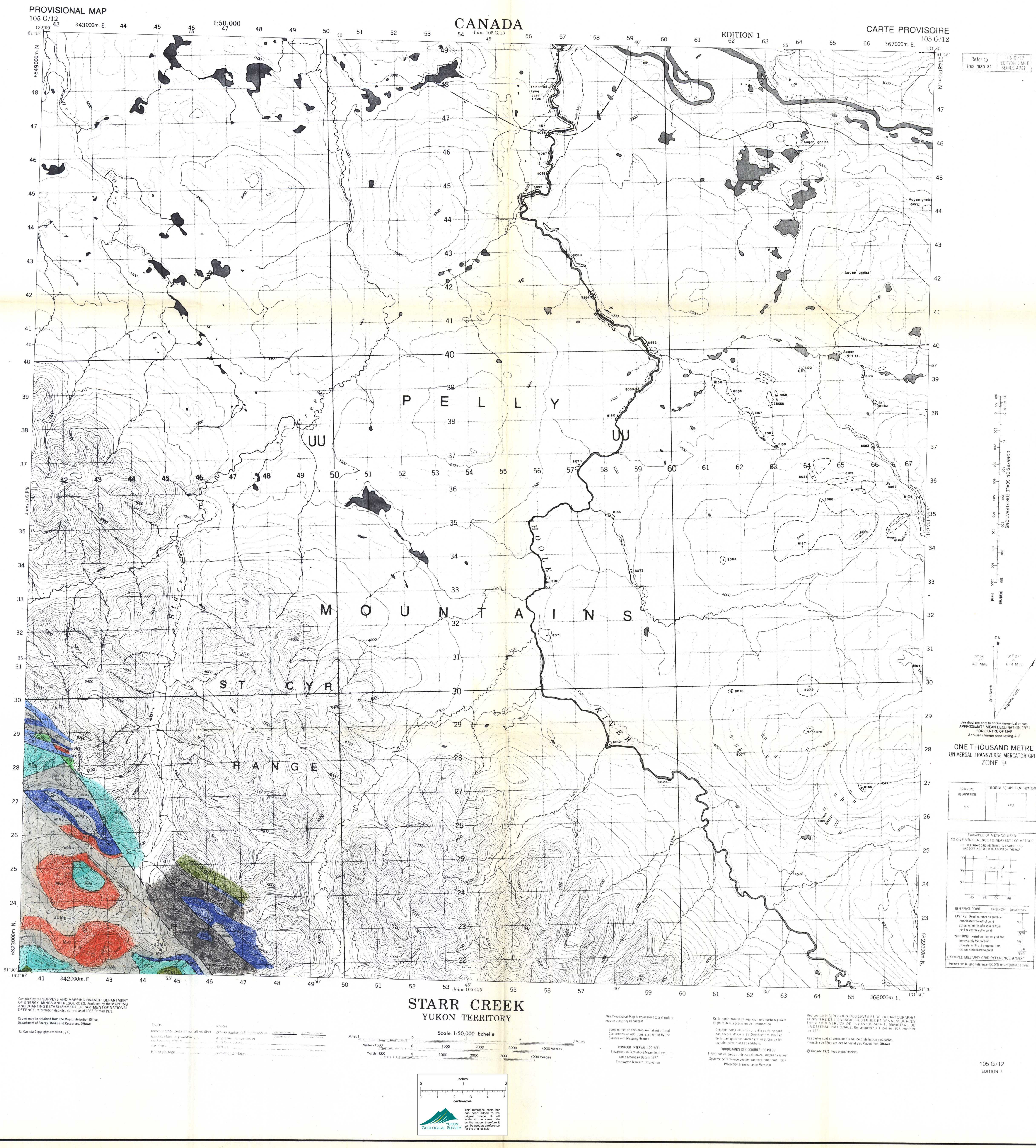
N.T.S. 105 F - 10 W

DRAWN BY: C. L. C.

DATE FEBRUARY 16, 1981

SCALE IN FEET

1 MILE



<u>STRATIGRAPHIC COLUMN</u>

LATE TRIASSIC

uTR1 — BUFF TO GREY SILTY LIMESTONES. UNIT OCCURS ONLY IN THE VICINITY OF THE HOWRU CLAIMS.

PALEOZOIC

Pzu — SERPENTINITES, ULTRAMAFICS, CHLORITIC PHYLLITES OF PALEOZOIC (?) AGE.

CARBONIFEROUS (?)

C_{sl} — BUFF TO BROWN SILTSTONE AND SHALE. UNIT OCCURS ONLY IN THE VICINITY OF THE HOWRU CLAIMS.

MISSISSIPPIAN

My — FINE TO COARSE-GRAINED HORNEBLENDE SYENITE.

Mt — TAN TO PALE GREY BEDDED CHERTS. MINOR DARK GREY CHERT, BLACK SHALE AND LIMESTONE.

Mvt — PALE GREY, BROWN OR GREENISH FELSIC TO INTERMEDIATE TUFFS AND LAPILLI TUFFS. COMMONLY WEATHERS BROWN TO ORANGE BECAUSE OF DISSEMINATED PYRITE. MINOR DYKES, SILLS AND FLOWS. THIN INTERBANDS OF CHERT AND BLACK SHALE.

LATE DEVONIAN - MISSISSIPPIAN

uDM_s — 'BLACK CLASTIC UNIT' BLACK SHALE WITH CHERT GRANULE GRIT INTERBANDS. TYPICALLY SHALE CONTAINS THIN INTERBANDS OF MEDIUM GREY, SLIGHTLY PYRITIC SILTSTONE. MINOR INTERCALATED CHERT (MT) AND FELSIC TO INTERMEDIATE TUFFS (MVT).

SILURIAN - DEVONIAN

ASKIN GROUP

SDa — PALE GREY TO BUFF SANDY DOLOMITE TO DOLOMITIC OR CALCAREOUS ORTHOQUARTZITE. MINOR INTERBANDS OF DARK BROWN TO BLACK SHALE.

ORDOVICIAN - SILURIAN

OS_{rr} — ROAD RIVER FORMATION BROWN TO BLACK SILTSTONE AND SHALE. LOCALLY UNIT IS SLIGHTLY TO MODERATELY CALCAREOUS. TYPICALLY PYRITIC.

LATE CAMBRIAN - ORDOVICIAN

$€O_{kv}$ — KECHIKA FORMATION - VOLCANICS FOLIATED BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFFS WITH MINOR INTERCALATED CALCAREOUS, SILVERY PHYLLITES. SOME FLOWS ARE HIGHLY AMYGDALOIDAL.

$€O_k$ — KECHIKA FORMATION CALCAREOUS PHYLLITE AND SILTY LIMESTONE WITH MINOR BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFFS. UNIT TYPICALLY WEATHERS TO A BUFF OR SILVERY COLOUR.

HADRYNIAN - CAMBRIAN

$H€_a$ — ATAN GROUP INTERLAYERED LIMESTONE, DOLOMITE, ORTHOQUARTZITE, AND PHYLLITE. NOT MAPPED IN DETAIL.

Outcrop

× Small outcrop

Geological contact; defined, approximate

Normal fault

Thrust fault

Anticline

Syncline

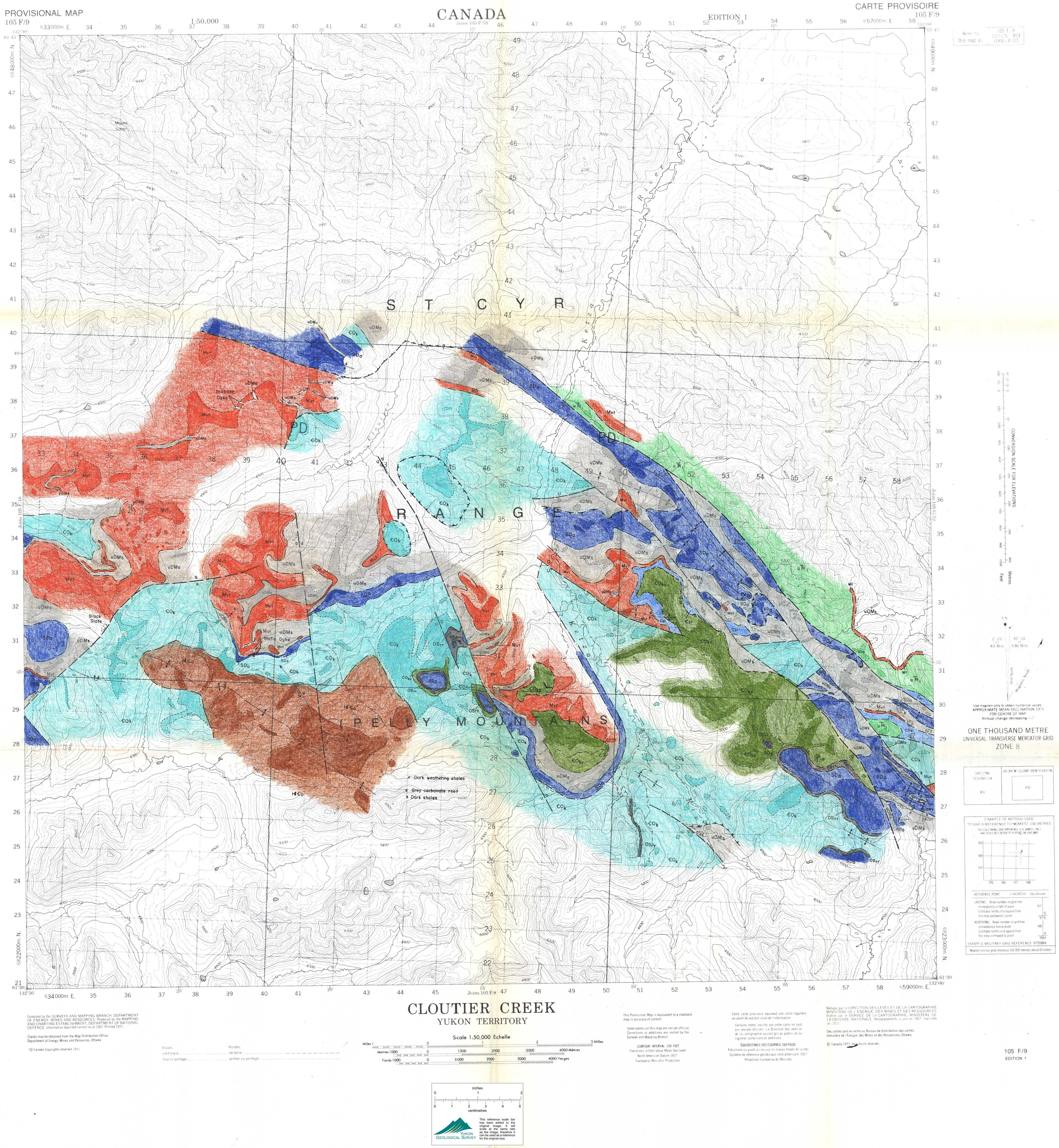
⊙ Diamond drill hole location

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

GEOLOGY

REVISED:	NTS: 105-G-12
	DRAWN BY: clc / rwr
	DATE: APRIL 30, 1981 FIG 4-1



Stratigraphic Column

LATE TRIASSIC

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Pzu — SERPENTINITES, ULTRAMAFICS, CHLORITIC PHYLLITES OF PALEOZOIC (?) AGE.

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SILURIAN - DEVONIAN

SDa — ASKIN GROUP. PALE GREY TO BUFF SANDY DOLOMITE TO DOLOMITIC OR CALCAREOUS ORTHOQUARTZITE. MINOR INTERBANDS OF DARK BROWN TO BLACK SHALE.

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Outcrop
Small outcrop
Geological contact; defined, approximate
Normal fault
Thrust fault
Anticline
Syncline
Diamond drill hole location

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

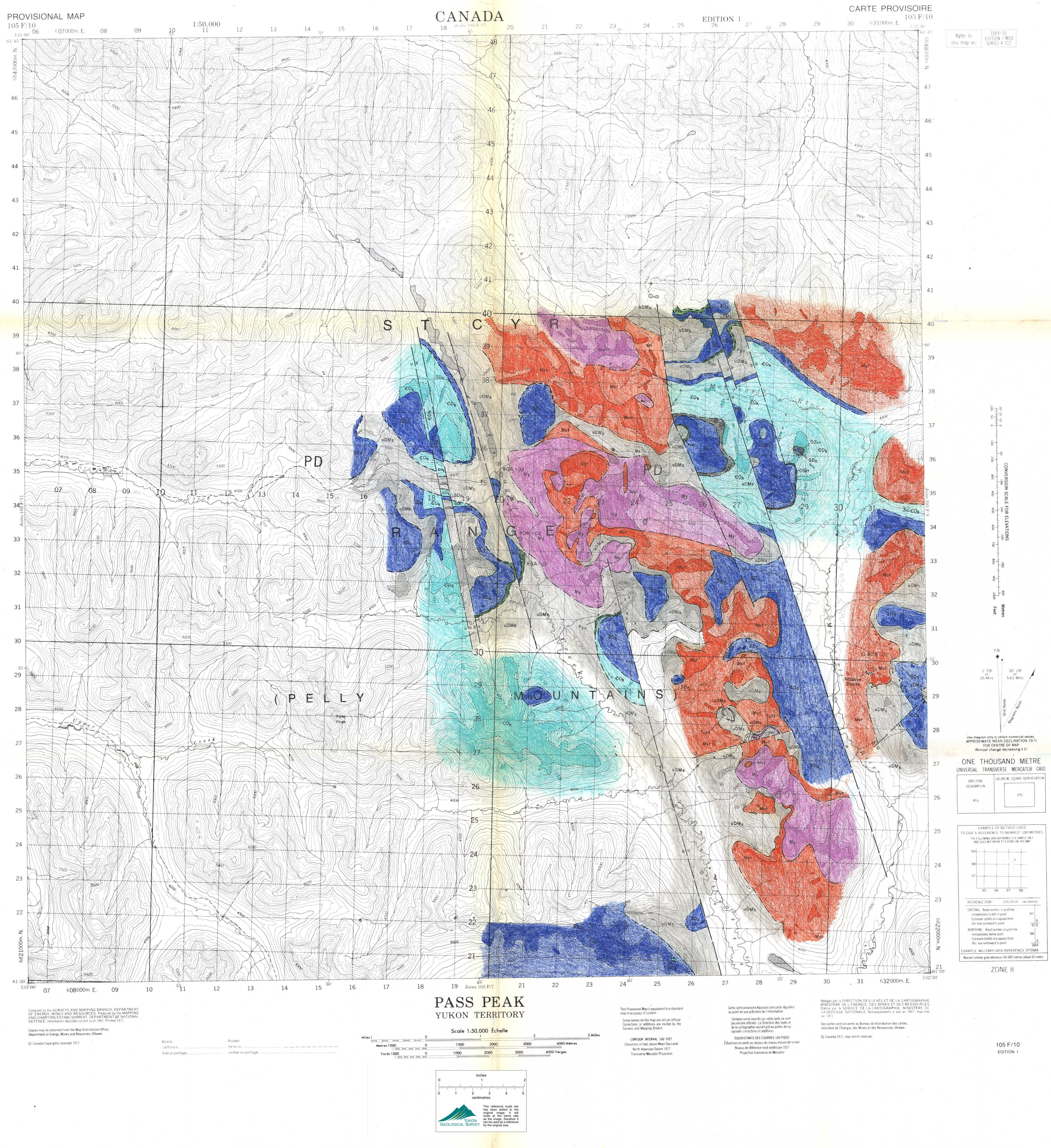
YUKON TERRITORY

GEOLOGY

N.T.S. 105 F/9
SURVEY BY: L.C.P
DRAWN BY: C.L.C.

DATE: MARCH 31, 1981

FIG. 4-2



STRATIGRAPHIC COLUMN

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Geological contact; defined, approximate
Normal fault
Thrust fault
Anticline
Syncline
Diamond drill hole location

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

YUKON TERRITORY

GEOLOGY

NTS. 105 F/10 SURVEY BY: L.C.P. DRAWN BY: C.L.C.	DATE: MARCH 25, 1981 FIG. 4-3

133°00'
61°30'
45'
132°30'
61°15'

SHEEP CREEK
SHEEP CREEK
BIG CREEK
NISUTLIN RIVER
NISUTLIN RIVER
Pzu Serpentine
Limestone
Chloritized dykes

Stratigraphic Column

LATE TRIASSIC

- uR_3 — BUFF TO GREY SILTY LIMESTONES. UNIT OCCURS ONLY IN THE VICINITY OF THE HOWRO CLAIMS.

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LATE DEVONIAN - MISSISSIPPIAN

"BLACK CLASTIC UNIT"

- uDM_5 — BLACK SHALE WITH CHERT GRANULE GRIT INTERBANDS. TYPICALLY SHALE CONTAINS THIN INTERBANDS OF MEDIUM GREY TO LIGHTLY PYRITIC SILTSTONE. MINOR INTERCALATED CHERT (Mc) AND FELSIC TO INTERMEDIATE TUFFS (Mvc).

SILURIAN - DEVONIAN

KATIN GROUP

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LATE CAMBRIAN - ORDOVICIAN

- CO_{kv} — KECHIKA FORMATION - VOLCANICS
  FOLIATED BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFFS WITH MINOR INTERCALATED CALCAREOUS, SILVERY PHYLLITES. SOME FLOWS ARE HIGHLY AMYGDALOIDAL.
- CO_k — KECHIKA FORMATION
  CALCAREOUS PHYLLITE AND SILTY LIMESTONE WITH MINOR BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFFS. UNIT TYPICALLY WEATHERS TO A BUFF OR SILVERY COLOUR.

HADRYNIAN - CAMBRIAN

- HC_a — ATAN GROUP
  INTERLAYERED LIMESTONE, DOLOMITE, ORTHOQUARTZITE, AND PHYLLITE. NOT MAPPED IN DETAIL.

- Outcrop
- Small outcrop
- Geological contact; defined, approximate
- Normal fault
- Thrust fault
- Anticline
- Syncline
- Diamond drill hole location

inches 0 1 2
centimetres 0 1 2 3 4 5

This reference scale bar has been added to the original figure. It is to scale at the same size as the image, therefore it can be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

CYPRUS ANVIL MINING CORPORATION

PELLY PROJECT

YUKON TERRITORY

GEOLOGY

Scale 1:50,000 Échelle

Miles 1 0 1 2 3 Miles
Metres 1000 0 1000 2000 3000 4000 Mètres

NTS 105-F-7
SURVEY BY L.C.P.
DRAWN BY C.L.C.

DATE MARCH 18, 1981
FIG. 4-4