

014313

PELLY PROJECT SUMMARY REPORT: 1978

WATSON LAKE MINING DISTRICT

YUKON TERRITORY

N.T.S. 105 - F, 105 - G

BY

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AND

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CYPRUS ANVIL MINING CORPORATION

DECEMBER 20, 1978.

FIELD WORK DONE DURING THE PERIOD: JUNE 12 - AUGUST 30, 1978.

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PELLY PROJECT SUMMARY REPORT: 1978

1.0 INTRODUCTION

The Pelly Project was initiated in 1976 to carry out exploration for synsedimentary base metal deposits in the Pelly Mountains of central Yukon. During the 1976 and 1977 field seasons a program of regional geochemical sampling and geologic prospecting was carried out which resulted in the discovery of a number of new showings, many of which were acquired through staking. Preliminary geological, geochemical and geophysical investigations were carried out on most of these claim groups during 1977. During 1978, detailed regional geologic mapping was carried out over about 100 square miles (250 square kilometers) of terrain between and around the claim groups, and many of the properties were mapped or re-mapped at a more detailed scale. The modest budget allotted to the project during 1978 precluded any expansion of the regional geochemical coverage and eliminated any possibility of drill testing existing targets on the claim groups.

No further regional work is proposed for the Pelly Mountains within the joint venture area. Drill targets exist on the MM/JJ/DD, the BNOB, and the EROS claim groups, and geophysical investigations using an advanced type of I.P. equipment is recommended on the ANISE and HOWRU claim groups. This new I.P. technique, called "Spectral I.P.", is expected to become available at some time during the 1979 field season.

2.0 GEOLOGY

2.1 TABLE OF FORMATIONS

<u>AGE</u>	<u>UNIT</u>	<u>LITHOLOGIC DESCRIPTION</u>
UPPER TRIASSIC	UR	buff to grey silty and bioturbated limestone.
CARBONIFEROUS ?	Cs1	brownish grey siltstone and shale.
UPPER DEVONIAN	Mt	tan to pale greenish-grey bedded chert.
to	Mvt	tuffaceous cherts, acid to intermediate volcanics, and minor intercalated dark brown to black shales.
MISSISSIPPIAN	uDMs	black to dark brown and grey, generally siliceous shales with minor intercalated volcanics.
SILURIAN	SDd	sandy and silty, buff to pale grey weathering dolomite.
to		
DEVONIAN	SDq	buff to grey weathering dolomitic sandstone.
ORDOVICIAN to SILURIAN	OSs1	black, incompetent shales, variably silty and calcareous.
UPPER CAMBRIAN	u60s1	dominantly buff to silvery-grey weathering limy phyllites.
	u60v	dominantly basic to intermediate volcanic flows and tuffs, variably sheared and phyllitic.
to	u60vb	basic, chloritized volcanic flows.
ORDOVICIAN	u60slv	volcanic and sedimentary components about equally abundant or undivided.
LOWER CAMBRIAN	16d, c, c1	carbonates and clastics.

2.2 DISCUSSION OF FORMATIONS

2.2.1 16d, 16c1, 16c

These formations, Lower Cambrian and older in age, consist of various types of carbonates and clastics which have not been mapped in any detail. The contact between these formations and the Upper Cambrian Kechika Formation is presumed to be an unconformity, but our mapping coverage in the area of the contact is too sketchy to confirm this.

2.2.2 u60s1, u60v, u60vb, and u60slv

The internal stratigraphy within the Kechika Formation is complex and we have not attempted to unravel it in detail. Nevertheless, the formation can be subdivided into two or three major subunits based on gross lithologic characteristics.

Subunit u601 consists of limy phyllites and silty limestones, usually buff weathering but often forming silvery-grey talus slopes. This lithology makes up the bulk of the Kechika Formation in the area we have mapped.

The volcanic subunits, u60v and u60vb, consist of a variety of basic to intermediate flows and tuffs, all of which are foliated and more or less chloritized. The designation u60vb refers to a thick sequence of amygdaloidal basalts which can be recognized over a substantial regional area, beginning just south of the HOWRU and extending to the southeast out of our mapped area. Subunit u60v is best exposed in the Porcupine Thrust Plate which is thrust on top of the Mississippian shales and volcanics throughout most of the area.

Where limy phyllites and foliated tuffaceous lithologies are both about equally abundant, the designation u60slv is used.

The total thickness of the Kechika Formation is impossible to determine because of the internal deformation, but is probably well over 100 meters.

2.2.3 OSs1

This formation consists of pale grey-brown to black calcareous and silty shale, usually soft and incompetent and often pyritic. In the southeast corner of the mapped area the unit includes substantial thicknesses of intermediate lapilli tuffs and other volcanic debris. Bedded cherts which overlies the Kechika Formation in the headwaters of the McConnell River have been included in this unit because of their stratigraphic position, but do not resemble the lithologies that occur elsewhere in the Pelly Mountains. The thickness of this formation is between 100 and 300 meters.

2.2.4 SDd and SDq

These units represent end members of a probably continuous sequence of shelf type shallow water rocks ranging from sandy dolomite to dolomitic sandstone. Weathering colours vary from pale grey to buff, with the buff colour being typical of the sandier sections. This formation overlies OSs1 conformably and with no structural break, but very frequently these formations are thrust on top of the Mississippian or younger strata, with only a thin film of Ordovician shales preserved as a lubricating horizon at the base of the carbonates. Thicknesses of units SDq and SDd vary widely and rapidly from place to place, as one would expect for rock formation of this type. The maximum observed thickness in the areas we mapped would be about 300 meters.

2.2.5 Mt, Mvt, and uDMs

The sandstone-carbonate formation is overlain abruptly and possibly unconformably by a sequence of shales and volcanics, indicating

subsidence and marine transgression. The shale and volcanic members in this Upper Devonian to Mississippian age package are intimately interbedded and are not always readily divided into the various subunits. Generally, however, where the units Mt and Mvt can be mapped at the 1":1320' scale, they appear to be high in the Devonian-Mississippian section. Unit Mt consists of tan to pale grey, occasionally dark grey, bedded chert. These cherts are probably at least partly tuffaceous, and no doubt the silica is volcanic in origin. Unit Mvt consists dominantly of pale grey, brown or greenish, often pyritic, pyroclastics ranging in clast size from fine tuffs to coarse agglomerates. These volcanics are often modified by a strong penetrative foliation.

The shale member of the formation, uDMs, consists of black, dark brown, or grey coloured siliceous shales and argillites, with minor interbedded greywackes, tuffs, and chert sandstones. Bedded pyrite occurs at some locations in this unit and it often weathers rusty as a result.

Unit My consists of trachyte and syenite stocks which occur near Seagull Creek and in drill holes on the MM property. These intrusive stocks are presumed to be subvolcanic equivalents of the felsic pyroclastics.

The total Upper Devonian to Mississippian package reaches thicknesses of at least several hundred meters close to volcanic centers but often is much less where volcanic material makes up a smaller component of the formation.

2.2.6 Cs1

The volcanic and chert units Mvt and Mt are overlain with apparent conformity by a relatively thin formation consisting of buff and brownish coloured, bioturbated siltstones and shales. The thickness of this formation is probably less than 100 meters, and it and the

overlying formation are only seen in the southeast corner of the mapped area.

2.2.7 UR

Overlying unit Csl, again with apparent conformity, are brown and grey weathering, bioturbated, silty limestones. The top of this formation is always in thrust or steep fault contact with other rock types, so the total thickness is not known. The stratigraphic thicknesses exposed near the HOWRU claim group exceed 200 meters.

2.3 STRUCTURE

2.3.1 Regional Relationships

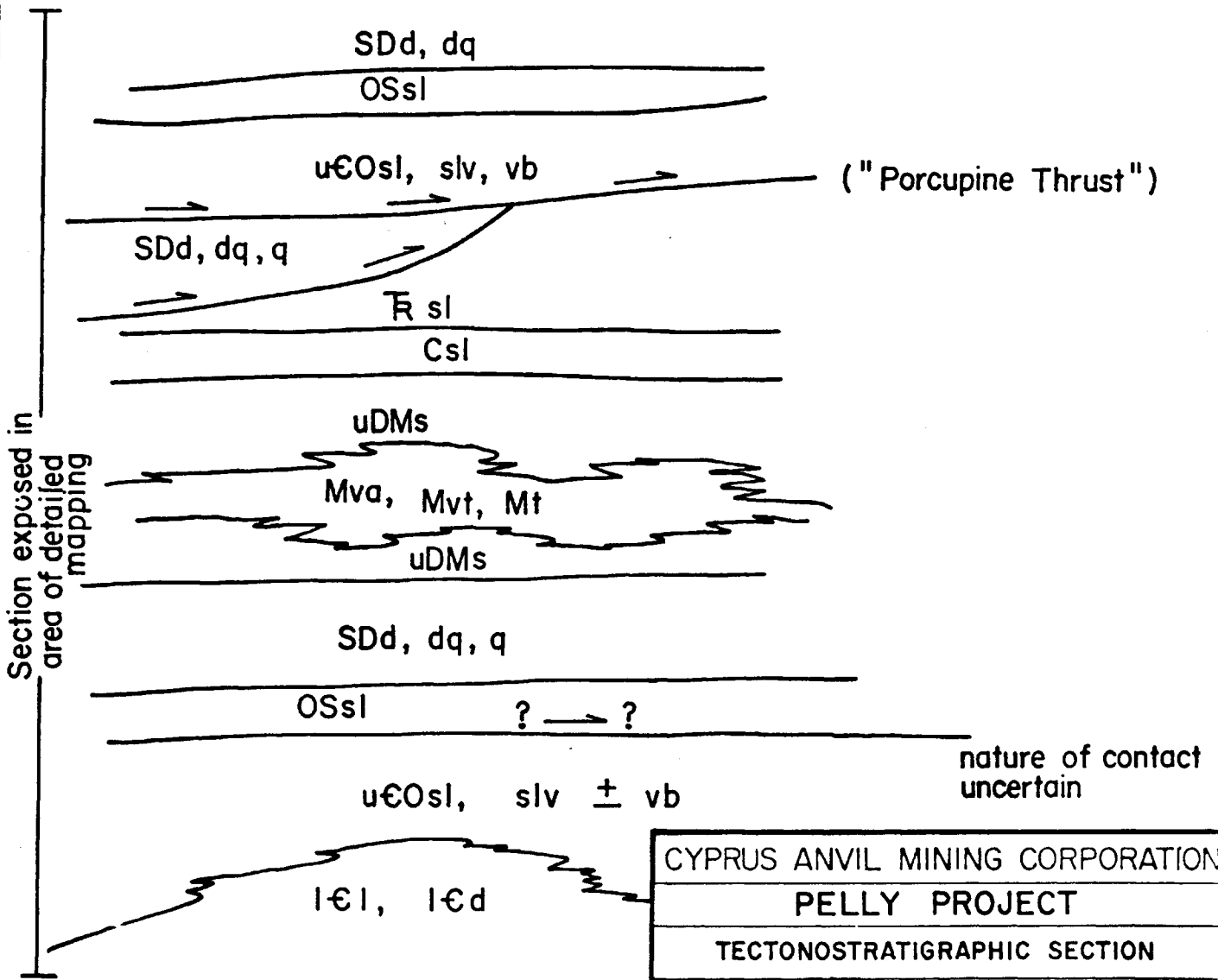
The structural geology of the eastern Pelly Mountains can be summarized as consisting of a series of thrust slices of variable thickness, which have been folded, and cut by later steep faults. Although this structural style had been recognized by previous workers (Wheeler, Green, and Roddick, 1960; Tempelman-Kluit, 1977), what had not been recognized was that individual thrust panels are continuous throughout the area, and that the thrust faults represent not small-scale imbrications of only local significance, but rather major regional detachment surfaces along each of which substantial displacements must have occurred. A southwest-to-northeast tectonostratigraphic section through the map-area has been constructed (Figure 1), showing the general order of structural stacking of the various thrust sheets prior to past thrusting deformation and steep faulting. The section begins at the MM property southeast of Seagull Creek and extends in a roughly east-northeast direction, although it is valid for most of the map-area.

As discussed earlier, mapping during the 1978 field season was directed towards determining the stratigraphic and structural position of economically interesting sections of Devono-Mississippian volcanics and shales. The regional geology maps (Maps 2-1 to 2-5), show that throughout most of the map-area, these units are contained within a single thrust panel that is bounded both above and below by Cambro-Ordovician volcanics and phyllites. In the southwestern portion of the map-area (on the MM/JJ/DD claim groups), and in two other areas (BNOB property, and near the headwaters of McConnell River) an additional thrust sheet consisting of Siluro-Devor:ian carbonates and quartzites, and possibly also minor Ordovician black shales lies between the Devono-Mississippian section and the upper Cambro-Ordovician section. This slice

TECTONOSTRATIGRAPHIC SECTION: PELLY Mtns.

SW ANVIL - CAMPBELL ALLOCHTHON greenstones, peridotites (CPaub), and cherts NE

↑
X 100 (?) metres
↓



CYPRUS ANVIL MINING CORPORATION	
PELLY PROJECT	
TECTONOSTRATIGRAPHIC SECTION	
PELLY MTN'S.	
(Not To Scale)	
NTS 105-F-6 SURVEY BY J.M. DRAWN BY C.L.C.	DATE: MARCH 8, 1979 Figure 1

evidently wedges out to the northeast. Confusion is further compounded by the presence of thin structural slices of serpentinized ultramafics between the Siluro-Devonian rocks and the underlying Devono-Mississippian package on the MM/JJ/DD claim groups (and possibly on the BNOB claim group as well).

The nature of the contact between the Devono-Mississippian strata and the underlying phyllites is not entirely clear. West of the Ketz River (between the IGLE and HOWRU claim groups) it has been interpreted as an erosional unconformity (Tempelman-Kluit et al, 1976), rather than a thrust surface. There are several lines of evidence that argue strongly against this, as follows:-

- a) nowhere in the map-area has a basal conglomerate been noted beneath the overlying package;
- b) one phase of isoclinal folding seen in the Devono-Mississippian slice does not carry through into the underlying units, indicating that at least locally the two sequences have been deformed separately;
- c) tight to isoclinal anticlines occur in the Devono-Mississippian package, locally with Siluro-Devonian carbonates and quartzites in their cores, in an apparently conformable relationship. These platform strata typically form continuous units of regional extent, yet they are only locally present beneath the Devono-Mississippian package. There are three possible explanations for this problem:-

- either
 - i) a regional unconformity is present between the Devono-Mississippian and older, underlying rocks, but is post Siluro-Devonian in age:
 - ii) the Siluro-Devonian strata are not everywhere continuous, but locally form narrow lenses of very limited areal extent (perhaps in topographic highs on an erosional surface),
- or
 - iii) the contact between the Devono-Mississippian and

Cambro-Ordovician rocks is a thrust fault, which has formed at a high level through an isoclinally-folded sequence of Silurian through Mississippian strata, and which only locally cuts down into the older rocks. This latter explanation appears to be the most likely.

A middle ground between the thrust fault/unconformity theories can also be argued: the contact may be an unconformity along which local detachment has taken place during deformation. There is little or no field evidence, however, to support this possibility.

Evidence presented here is insufficient to conclusively state that the lower contact of the Devono-Mississippian section is a thrust fault. The problem could probably be resolved by a detailed examination of specific parts of the map-area. In particular, the nature of the contact where it outcrops immediately southwest of the CHZERPNOUGH claim group should be studied. Isoolines in black shales with carbonates and quartzites in their cores are best exposed immediately northwest of the HOWRU property; these should be examined to determine whether the carbonates and quartzites are continuous around synformal noses, or whether they are cut-off against limy phyllites. In addition, the contact should be mapped in greater detail both north and south of Cloutier Creek, where it outcrops over a considerable distance.

The only importance of the argument, however, is that if the contact is a thrust fault, some of the lower portions of the Devono-Mississippian slice may locally be missing, where the noses of synforms have been cut-off. If the contact is an unconformity, the sequence should be complete throughout the map-area. Since all of the economically interesting sections of shales and volcanics appear to be in the middle or upper parts of the package, they would not be affected by the absence of stratigraphically lower units.

The simplified tectonostratigraphic section shown in Figure 1 does not accurately portray the high degree of structural complexity that is evident in parts of the map-area. The importance of small-scale imbrications and splay faults rooted in major thrust zones (seen in portions of the HOWRU claim group and near the headwaters of the McConnell River), for example, are not included. These complexities are only of local importance, however, and do not significantly affect the validity of the section as a whole.

Individual thrust panels are quite variable in thickness, but generally do not exceed 500 meters. This variability probably results from the formation of the thrust faults during deformation, such that a single thrust slice might be emplaced, deformed with the underlying strata, and then cut by a later, roughly planar thrust surface, producing a thrust-bounded panel whose thickness at any point depended on the position of the early folds. Boudinage may also locally contribute to the thickness variations.

2.3.2 Structures in the Devonian-Mississippian Sequence

Most of the mapping carried out was concentrated on the Upper Devonian and Mississippian units (Units uDMs, Mv, Mt, and My). Structures within this package are locally highly complex, and mapping is not everywhere of sufficient detail to permit a complete interpretation. Deformation (and metamorphism) is most intense on the MM/JJ/DD claim group, where it has been studied in considerable detail for the past five field seasons. A complete discussion of this study is presented elsewhere (Mortensen, 1978) and will only be briefly summarized here. For the remainder of the map-area, either outcrop area or development of structural fabrics is too limited to allow a confident correlation of particular phases of deformation throughout the belt.

On the MM, JJ, and DD properties, metamorphism reaches lower amphibolite facies, and drops off rapidly to the northeast. The

cause of this high metamorphic grade and steep metamorphic gradient has been attributed to a narrow locus of relatively high heat flow immediately west of the MM and JJ properties which culminated in the intrusion of granitic batholiths in Mid-Cretaceous time (the Nisutlin Batholith borders the JJ property on the west). The result of this high heat flow was an increased ductility in the various rock types, hence deformation was more intense, and metamorphic fabrics were better developed on the MM and JJ properties than elsewhere in the map-area.

Two phases of regional dynamothermal metamorphism have occurred on the MM and JJ properties resulting in two superimposed sets of folds. The first metamorphic event was of lower amphibolite facies (as defined by mineral assemblages in schists on the MM property), and produced upright, northwesterly-trending isoclinal folds that affect the Devonian-Mississippian strata, but evidently not the overlying thrust sheets. The second phase event was of upper greenschist facies, and was roughly coaxial with the first. F_2 structures are megascopic, tight-to-isoclinal, recumbent folds that, on the MM and JJ properties, deform the Devonian-Mississippian package as well as all overlying structural slices. A third phase of deformation, with no associated metamorphic recrystallization, produced regional-scale warps that are upright or slightly overturned to the northeast. It has been suggested that F_3 folds are "relaxation structures" related to the emplacement of the Nisutlin Batholith (Tempelman-Kluit, pers. comm., 1978).

Evidence for polyphase deformation is also present elsewhere in the map-area. Some of these events can be correlated with folding phases defined on the MM/JJ/DD claim groups. For example, tight upright folds that are very similar in style and orientation to the F_1 phase as defined above have been mapped in the northwest and southeast portions of the HQWRU and on parts of the IGLE claim groups. Similarly, in the vicinity of Peak 7001 on the CHZERENOUGH claim group, a megascopic, recumbent, northwesterly-trending fold nose is

present, closing to the southwest, with a well-developed, pervasive, axial-planar cleavage. This cleavage has been later deformed by an upright, northwesterly-trending set of warps with a poorly developed axial planar crenulation cleavage. These two phases are highly reminiscent of F₂ and F₃ structures on the MM and JJ properties.

Some of the structures seen in the area cannot be related to particular folding events. For example, a large east-west trending antiform mapped on the BNOB claim group does not appear to correspond with any of the deformation events on the MM and JJ properties.

The nature of the deformation within the Devono-Mississippian package appears to have been largely controlled by the abundance and competency of contained volcanic units. Deformation in the belt (with the exception of the high-grade zones on the MM and JJ properties) is most intense where the volcanics are either scarce, or are dominantly pyroclastics, rather than massive flows and intrusives. The rhyolite/trachyte domes, and syenite stocks between Seagull Creek and McConnell River, and the massive flows (or sills) on the EROS claims have apparently been particularly resistant to deformation.

3.0 PROPOSED EXPLORATION

No further exploration of a regional nature is recommended for the Pelly Project. Five claim groups require further investigation during 1979; these are discussed briefly here and in more detail in separate property reports.

3.1 MM/JJ/DD

The extended mapping of the MM block succeeded in tracing the baritic-sulphide mineral horizon to the northeast nearly to the DD claim boundary. Two relatively short drill holes are recommended to test this mineralized horizon where it outcrops in the valley bottom of MM Creek. One additional deep hole is proposed to test for northwest extensions of the main massive sulphide lens intersected in DDH 77-MM-03. These three holes require about 2500' of drilling.

3.2 BNOB

One drill hole has been proposed on the BNOB claim group to test the westward extensions of the baritic-sulphide bed which occurs on the claim group. Zoning within the barite and within the host volcanics suggest that the baritic-sulphides may grade into massive sulphides in this direction. One drill hole of about 500' depth would test this possibility.

3.3 EROS

Prominent gossans geochemically anomalous in lead and zinc occur downslope from a major EM conductor in uDMs black shales. The mineralized zone does not outcrop and must be tested by drilling. Probably two drill holes with a total footage of 1000' would be enough to test this geophysical-geochemical target.

3.4 ANISE

Numerous electromagnetic conductors occur on the ANISE property, associated with widespread but erratic lead-zinc geochemical anomalies and sulphide float. The problem here is to evaluate the conductors in some manner which will enhance some and eliminate others as potential drill targets. This seems to be a classical situation in which to test the Spectral I.P. method when it becomes available. If this equipment is ready for field use early in the season, then drill targets may be identified in time for drilling in the fall.

3.5 HOWRU

A few loose ends remain on the HOWRU claim group, most of which can be tied up by using the Spectral I.P. technique over two or three limited parts of the property. In particular, this type of geophysics should be carried out over an unexplained geochemical anomaly in the overburden covered southeast part of the claim group, and the method should be used to test the extent of the sandstone hosted mineralization at the main showing. The abundance and variety of mineral showings that occur on the claim group suggests that we should not be too hasty about writing it off, even though the 1978 geologic mapping did not locate ore-grade mineralization over any significant width.

In summary, about 4000' of diamond drilling remains to be done on existing targets on the MM, BNOB, and EROS claim groups, and additional drill requirements may develop from the Spectral I. P. surveys which are recommended for the ANISE and HOWRU properties. The 4000' of drilling and the geophysics will require a budget of \$150,000.

It should be noted that all the claim groups are in good standing until 1980 or 1981, and therefore, there is no requirement to carry out the proposed exploration during 1979.

Respectfully submitted,

P. M. DEAN

J. MORTENSEN

December 20, 1978.

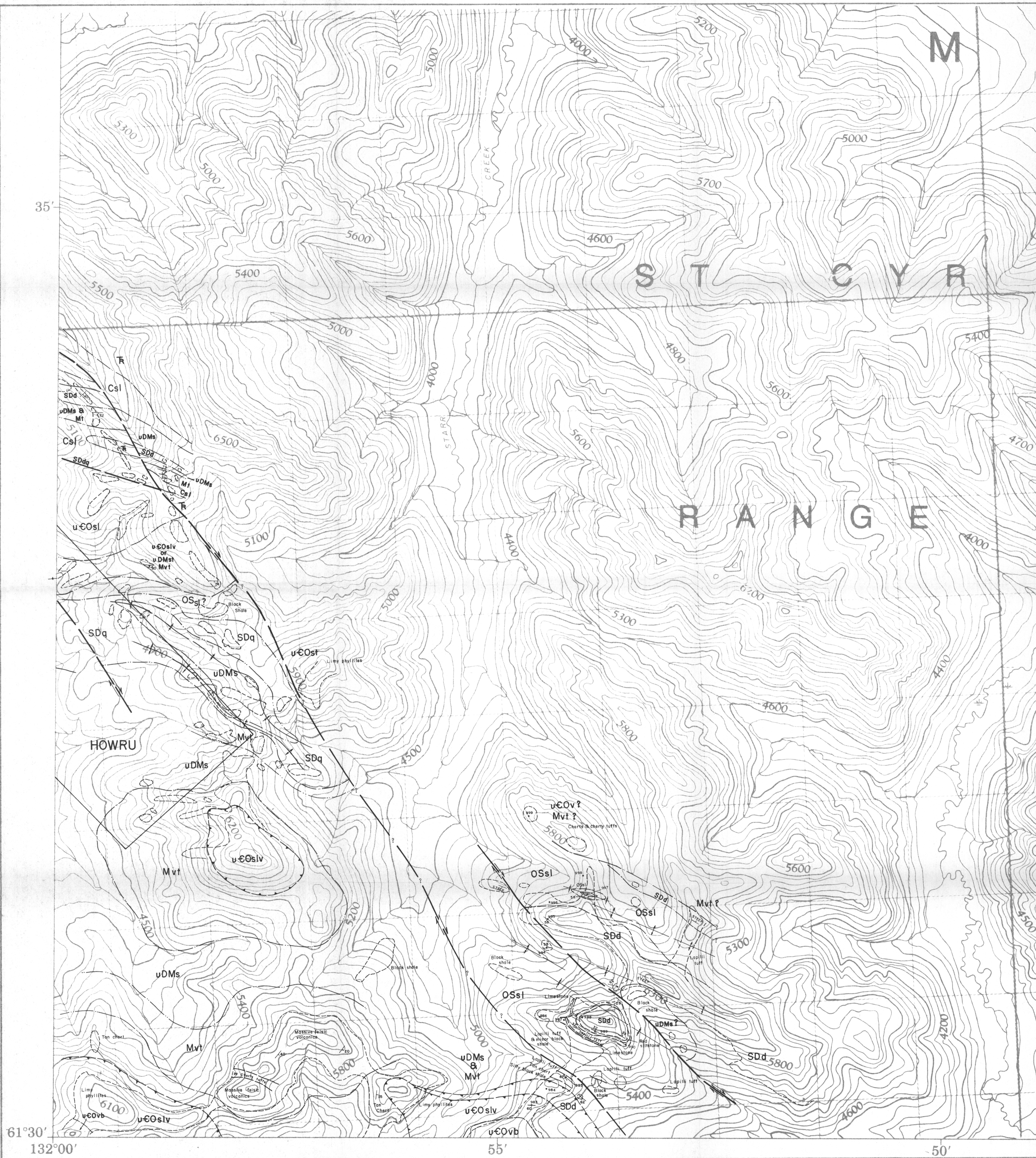
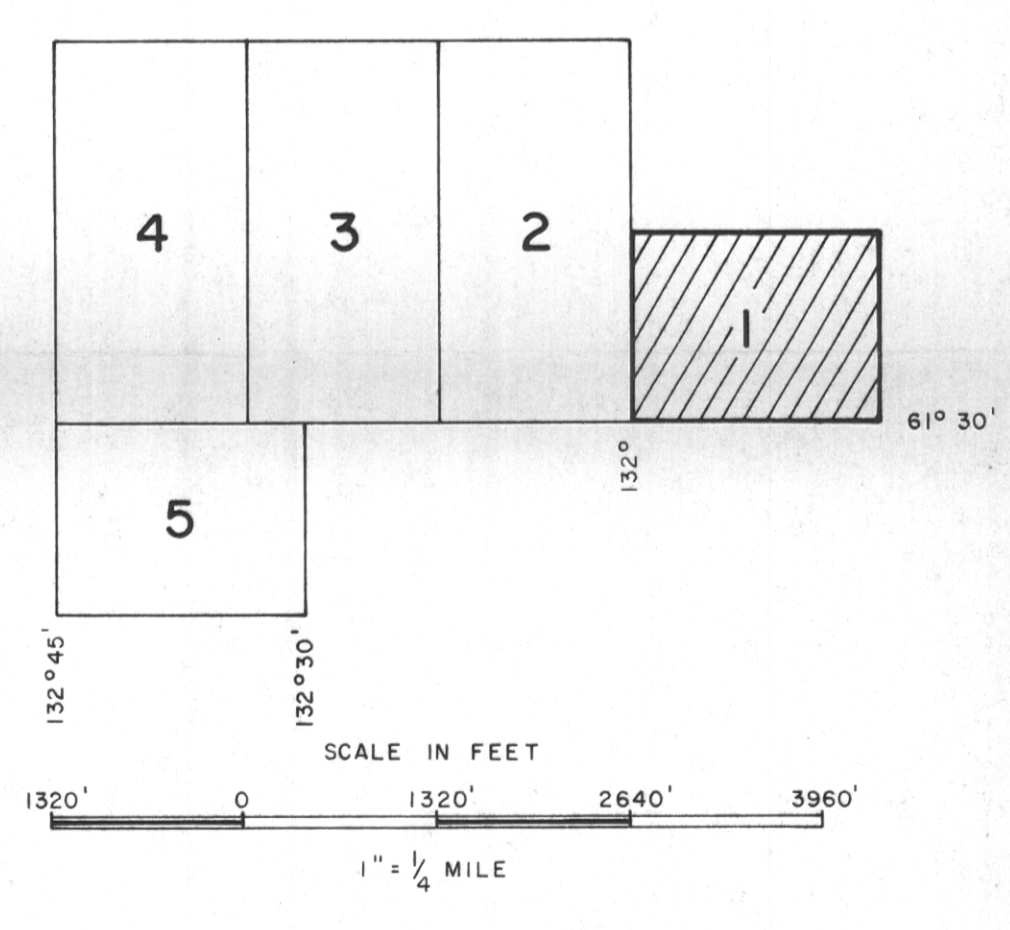


TABLE OF FORMATIONS

AGE	UNIT	LITHOLOGIC DESCRIPTION
UPPER TRIASSIC	uDR	BUFF TO GREY SILTY AND BIOTURBATED LIMESTONE.
CARBONIFEROUS ?	Csl	BROWNISH GREY SILTSTONE AND SHALE.
UPPER DEVONIAN	Mf	TAN TO PALE GREENISH - GREY BEDDED CHERT.
to	Mvt	TUFFACEOUS CHERTS, ACID TO INTERMEDIATE VOLCANICS, AND, MINOR INTERCALATED DARK BROWN TO BLACK SHALES.
MISSISSIPPIAN	uDMs	BLACK TO DARK BROWN AND GREY, GENERALLY SILICEOUS SHALES WITH MINOR INTERCALATED VOLCANICS.
SILURIAN	SDd	SANDY AND SILTY, BUFF TO PALE GREY WEATHERING DOLOMITE.
to	SDq	BUFF TO GREY WEATHERING DOLOMITIC SANDSTONE.
ORDOVICIAN to SILURIAN	OSsl	BLACK, INCOMPETENT SHALES, VARIABLY SILTY AND CALCAREOUS.
UPPER CAMBRIAN	uCOsl	DOMINANTLY BUFF TO SILVERY - GREY WEATHERING LIMY PHYLLITES.
to	uCOv	DOMINANTLY BASIC TO INTERMEDIATE VOLCANIC FLOWS AND TUFF, VARIABLY SHEARED AND PHYLLITIC.
to	uCOvb	BASIC, CHLORITIZED VOLCANIC FLOWS.
ORDOVICIAN	uCOslv	VOLCANIC AND SEDIMENTARY COMPONENTS ABOUT EQUALLY ABUNDANT OR UNDIVIDED.
LOWER CAMBRIAN	iCd, c, cl	CARBONATES AND CLASTICS.



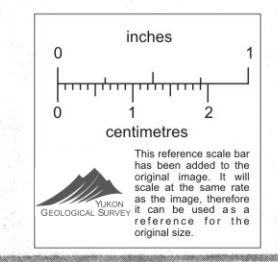
MAP 2-1

CYPRUS ANVIL MINING CORPORATION

GEOLOGICAL MAP

REVISED: _____

NTS: I05-G-5 W 1/2
 DRAWN BY: R.W.R.
 DATE: OCT. 1978





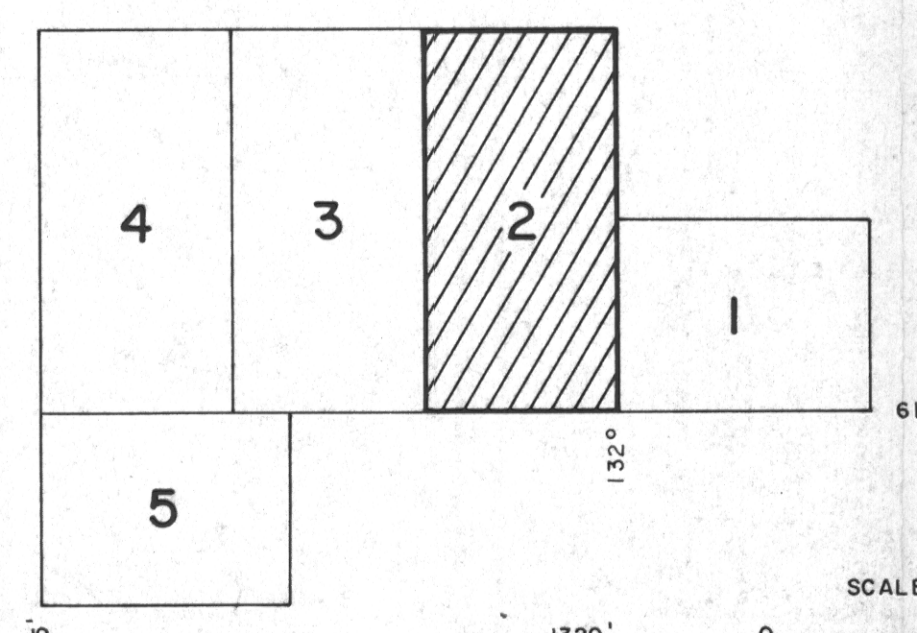
Johns 105 G 1/2

35

61° 30'

15' 10' 05' 132° 00'

NOTE: SEE SHEET 1 FOR LEGEND



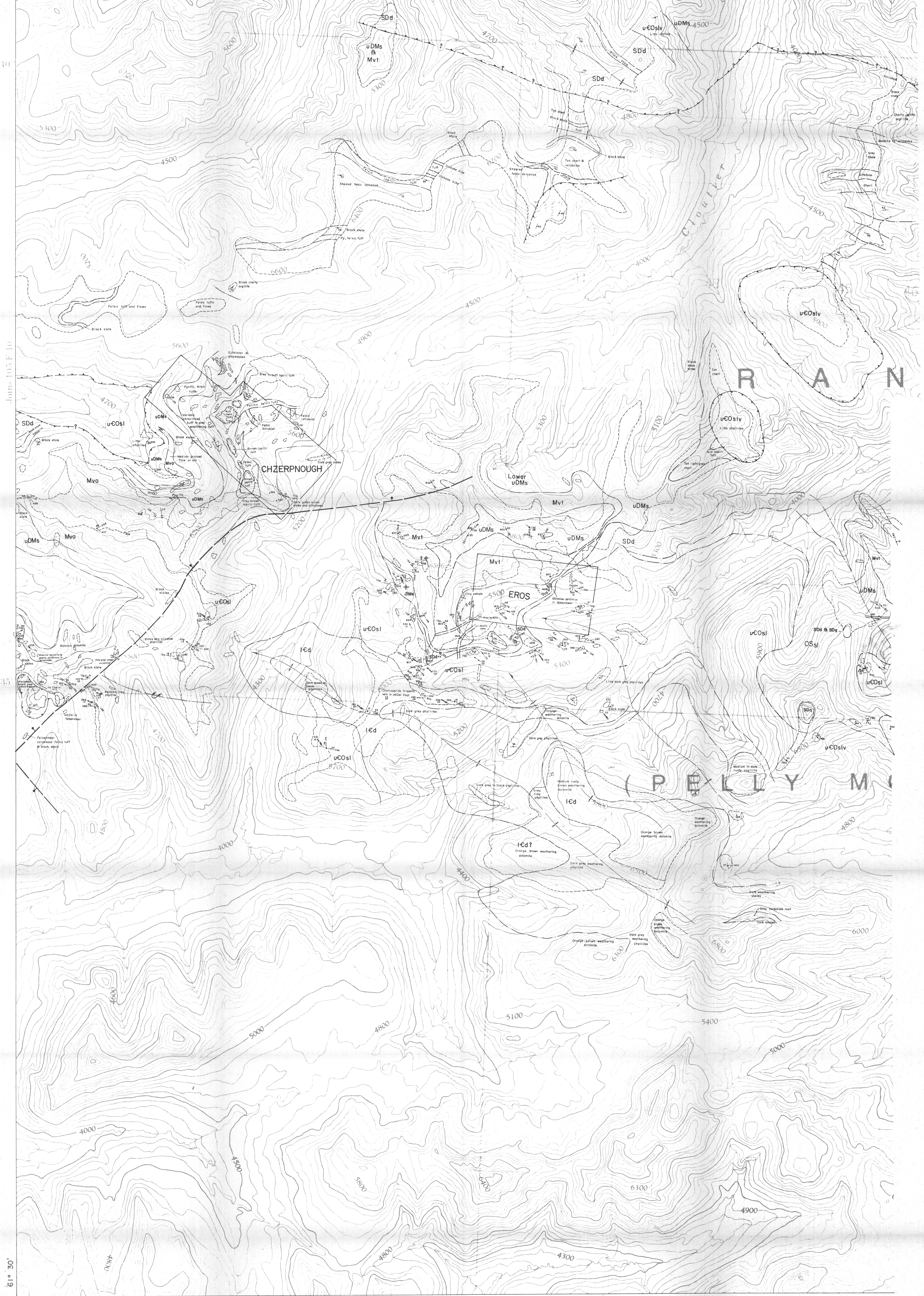
MAP 2-2

CYPRUS ANVIL MINING CORPORATION
PELLY PROJECT

GEOLOGICAL MAP

DATE: NOV. 1978

UPWVN BY: R.W.R.



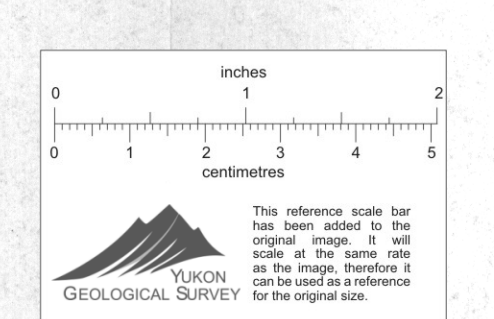
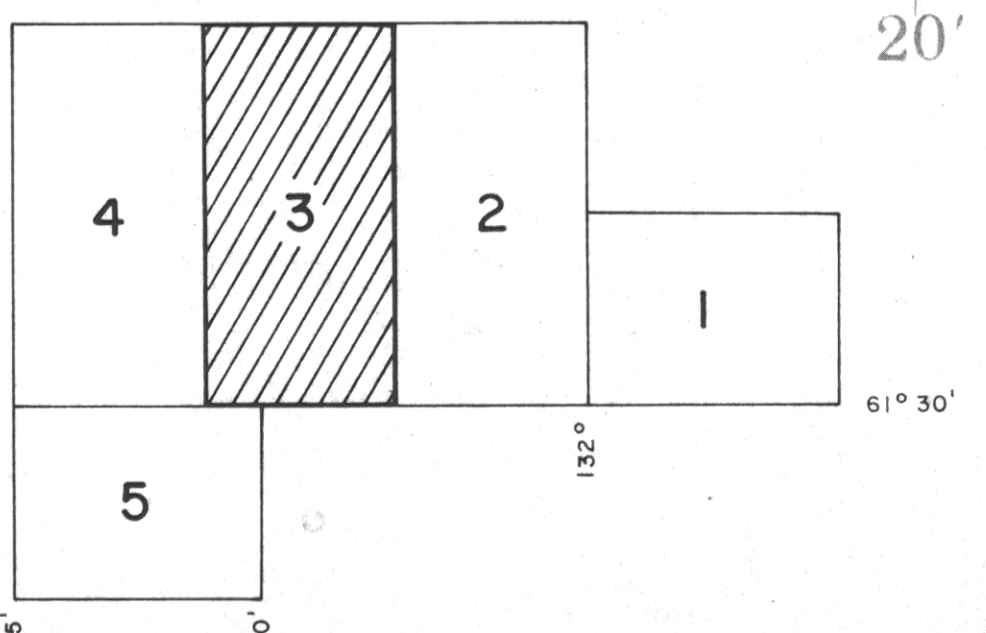
Joins 105 F 10

35

61° 30'

102 30 25 20 1

NOTE: SEE SHEET 1 FOR LEGEND



CYPRUS ANVIL MINING CORPORATION
PELLY PROJECT
GEOLOGICAL MAP
SCALE IN FEET: 1" = 1/4 MILE
DATE: NOV 1978



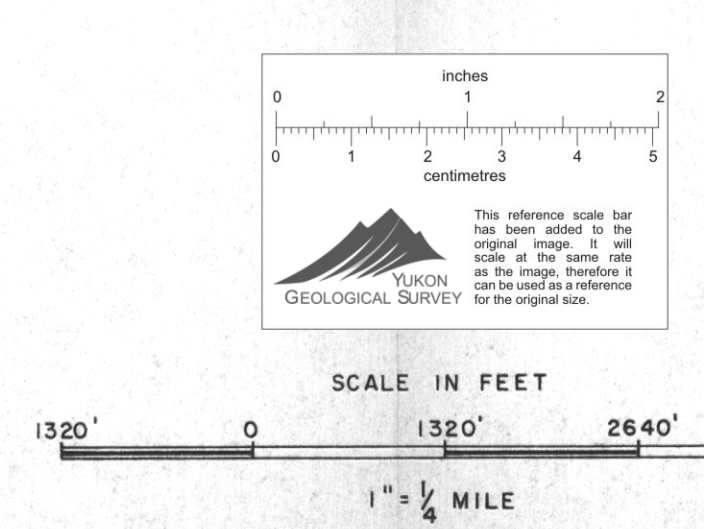
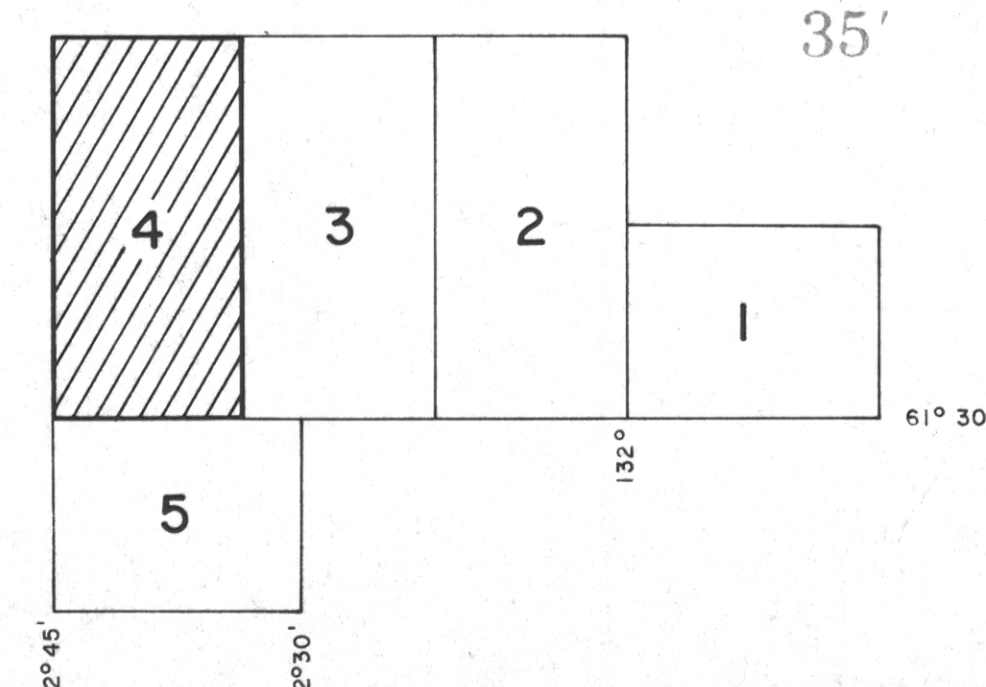
15' 105 F/7

40'

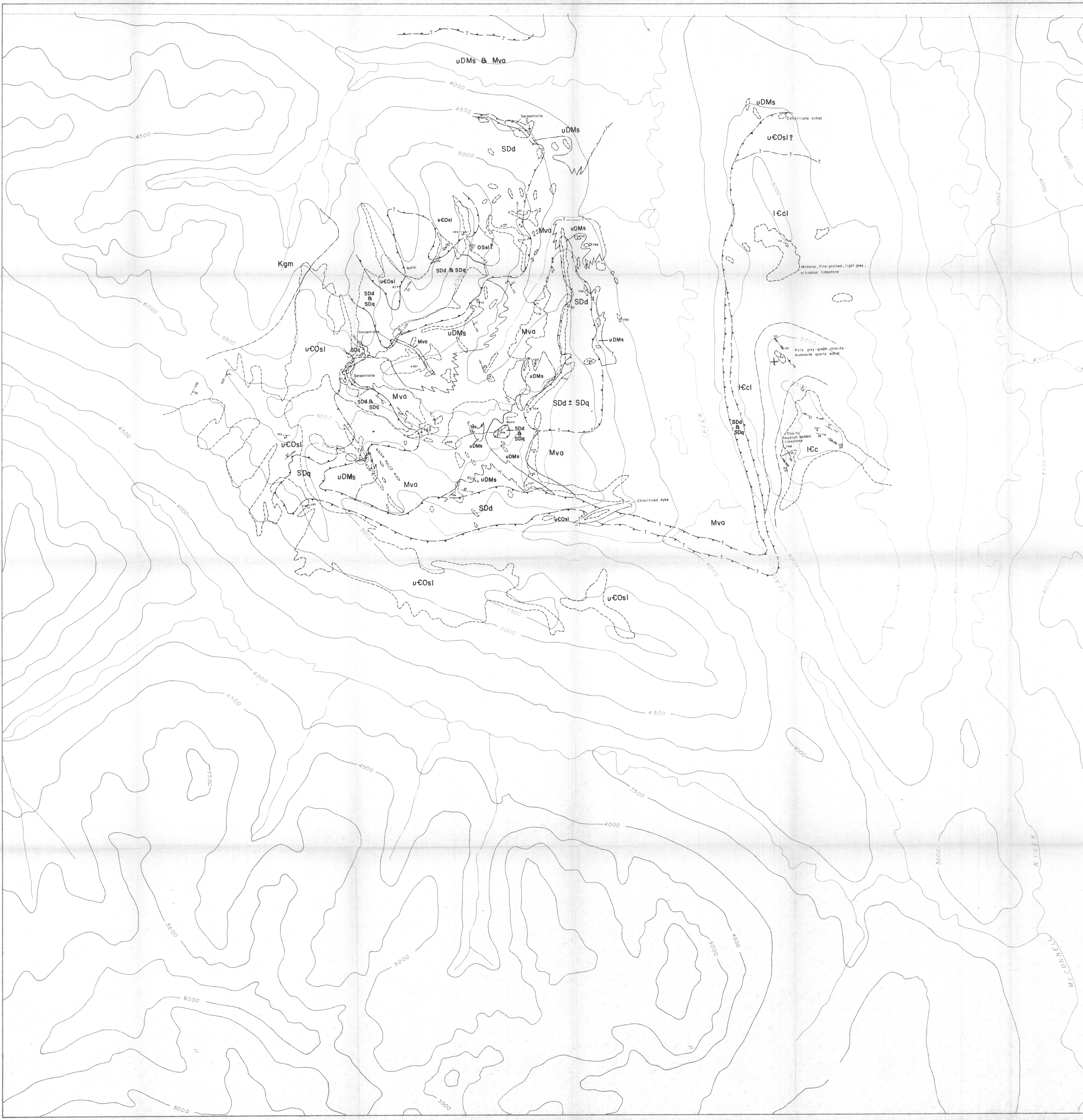
35'

132 30 MAP 2-4

NOTE: SEE SHEET 1 FOR LEGEND



CYPRUS ANVIL MINING CORPORATION
 PELLY PROJECT
GEOLOGICAL MAP
 N.T.S. 105-F-7 E 1/2
 DRAWN BY R.W.R.
 DATE OCT. 1978



61° 30'

132° 30'

WHITE RIVER

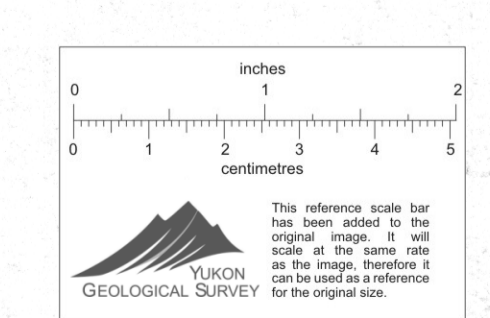
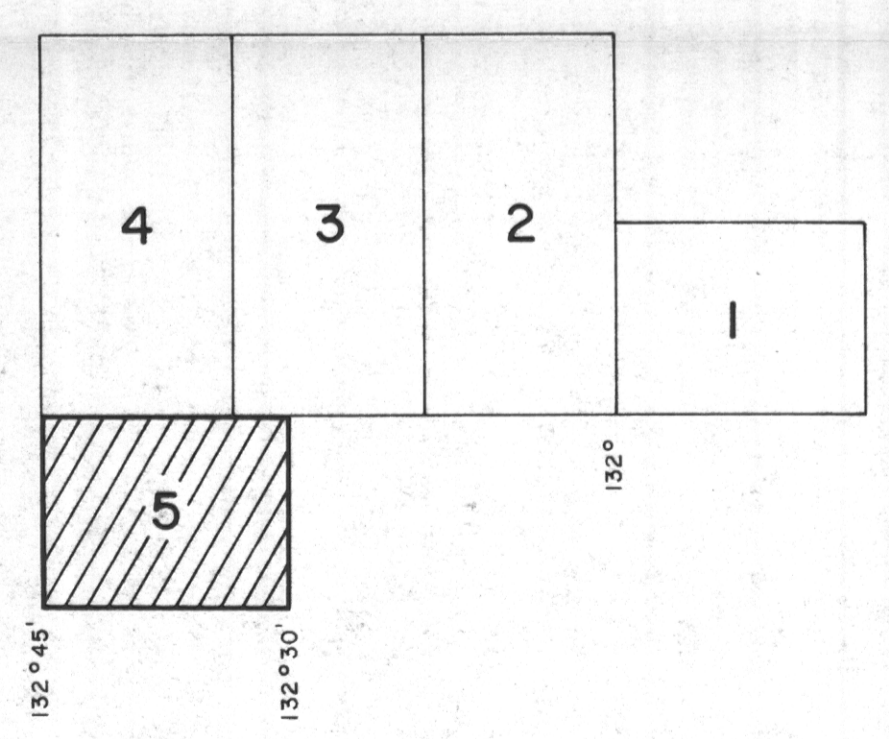
CREEK

61° 30'

132° 30'

MAP 2-5

NOTE: SEE SHEET 1 FOR LEGEND



CYPRUS ANVIL MINING CORPORATION
 PELYLY PROJECT
GEOLOGICAL MAP
 N.T.S. 105-F-2
 DRAWN BY R.W.R.
 DATE OCT. 1978