

EXPLORATION REPORT NO. 2

MARN 1 - 62 CLAIMS

GRANT NUMBERS: YA31491-98, 47156-77, 47265-80,
47575-78, 47600-63, 47643-48

NTS 116B7, B10

64°29'N 138°48'W

DAWSON MINING DISTRICT



Author: J. Biczok

Owner: Noranda Mines Limited/
Mattagami Lake Exploration Limited

Date: February, 1980

Work Dates: August 4 - 28, 1979

090 638



This report has been examined by the
Geological Survey Unit and is recom-
mended to be considered
the amount of

16,200

[Handwritten Signature]

Register or
Resident Mining Engineer

Considered as representation work under
Section 53 (4) Yukon Quartz Mining Act.

[Handwritten Signature]
B. R. BAXTER
Supervising Mining Recorder

[Handwritten Signature]

Commissioner of Yukon Territory

SUMMARY

The MARN 1-62 claims are located 55 km NNE of Dawson City, Yukon, in the rugged Tombstone Mountains. The claims cover the contact between the 30 metre thick Permian, Tahkandit limestone, and the Cretaceous Mt. Brenner stock, which consists largely of monzonites.

During the 1979 program, geological mapping and prospecting were carried out over much of the northern and central claims. Several grids were set out over which geophysical (magnetometer and RADEM) and geochemical (soil sampling) surveys were conducted. This work has enabled us to make a more detailed assessment of the area.

The intrusion of the Mt. Brenner stock has metamorphosed the adjacent strata to the hornblende-hornfels facies, and led to widespread skarnification. Metamorphic assemblages present include the following minerals: biotite, actinolite, tremolite, diopside, anthophyllite, idocrase, cordierite, and muscovite.

Most of the observed skarnification is exposed in an area where a sill-like offshoot of the stock intrudes the Jurassic strata immediately overlying the Tahkandit limestone.

TABLE OF CONTENTS

	<u>Page</u>
Summary	i
Table of Contents	ii-iii
Chapter One: Introduction	1
1-1 Location and Access	1
1-2 History of the Claims	1
1-3 Physiography	6
1-4 Procedure	6- 8
Chapter Two: General Geology	9
2-1 Sedimentary Rocks	9-11
2-2 Intrusive Rocks	11-12
2-3 Structural Geology	12
2-4 Contact Metamorphism	13-14
Chapter Three: Geochemistry	15
3-1 Soil Geochemistry	15-24
3-1-1 Grid B	15
3-1-2 Grid C	15-24
3-2 Stream Survey	24
Chapter Four: Geophysics	27
References	28
Appendix One: Petrographic Descriptions	29-41
Appendix Two: Statement of Costs	

LIST OF FIGURES

Figure 1: Claim Location Map	2
2: Location of MARN 1-62 Claims	3
3: Potential Overland Routes to the MARN Claims	5
4: Grid Location Map	7
5a: Grid B - Sample Locations	16
5b: Grid B - Soil Geochemistry - Silver	17
5c-5e: Grid B - Copper, Lead and Zinc in Soils	18
5f-5h: Grid B - Tungsten, Molybdenum and Tin in Soils	19
6a: Grid C - Soil Geochemistry Sample Locations	20
6b-6d: Grid C - Copper, Tungsten and Uranium in Soils	21
6e-6g: Grid C - Zinc, Silver and Molybdenum in Soils	22
6h: Grid C - Lead in Soils	23

LIST OF TABLES

Page

Table	1: MARN Claims Staking History	4
	2: Table of Formations	10
	3: Stream Geochemical Survey, MARN Claims	26

LIST OF MAPS

Map	1: Geology of the MARN Claims	in back pocket
	2: Stream Sample Locations	25

CHAPTER ONE

INTRODUCTION

1-1 Location and Access

The MARN claims are located 55 km NNE of Dawson City, Yukon, in the Tombstone Mountains, part of the Ogilvie Range (Fig. 1). They are located at the head of Fireweed Creek, a tributary of the Chandindu River (Fig. 2).

During the past, access has been by helico-ter from Dawson City or from a debarkation point on the Dempster Highway, 29 km to the east (Fig. 3). In the future, if the property warrants it, equipment could be hauled to the property by one of two routes:

1) Along the Tombstone River valley, from the Dempster Highway to the Chandindu River Valley (35 km), and then up the Chandindu and Fireweed valleys (10 km) to the property.

2) Along the Chandindu River road, a dirt track that crosses relatively flat terrain from Dawson City to the Chandinsu River, roughly 15 km south of property (Fig. 3). Equipment could then be hauled up the Chandindu and Fireweed valleys approximately 16 km to the property.

Both routes should be relatively problem free. However, there may be some official objections to constructing a road along the Tombstone River valley. In the past this area has been considered as a potential site for a national park and disturbances such as road construction may be frowned upon.

1-2 History of the Claims

The original MARN 1-8 claims were staked by Mattagami Lake Mines Ltd. July 29, 1978. Only a brief period of exploration was carried out in 1978.

Following the initial work on the claims in 1979 (June) an additional 54 claims were staked in July-September. The relevant data is summarized below in Table 1.

Figure 1

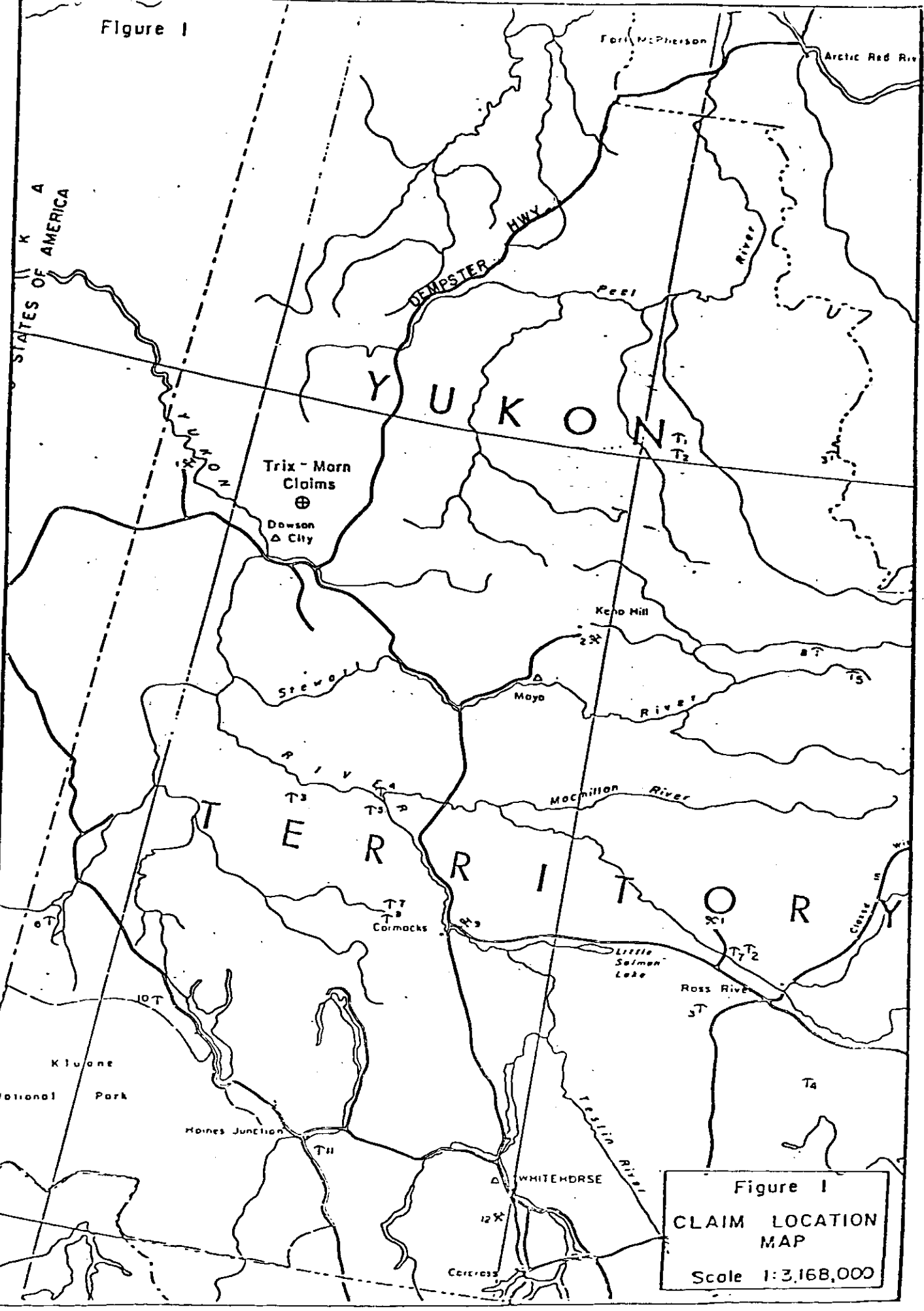


Figure 1
 CLAIM LOCATION
 MAP
 Scale 1:3,168,000



MARN CLAIMS

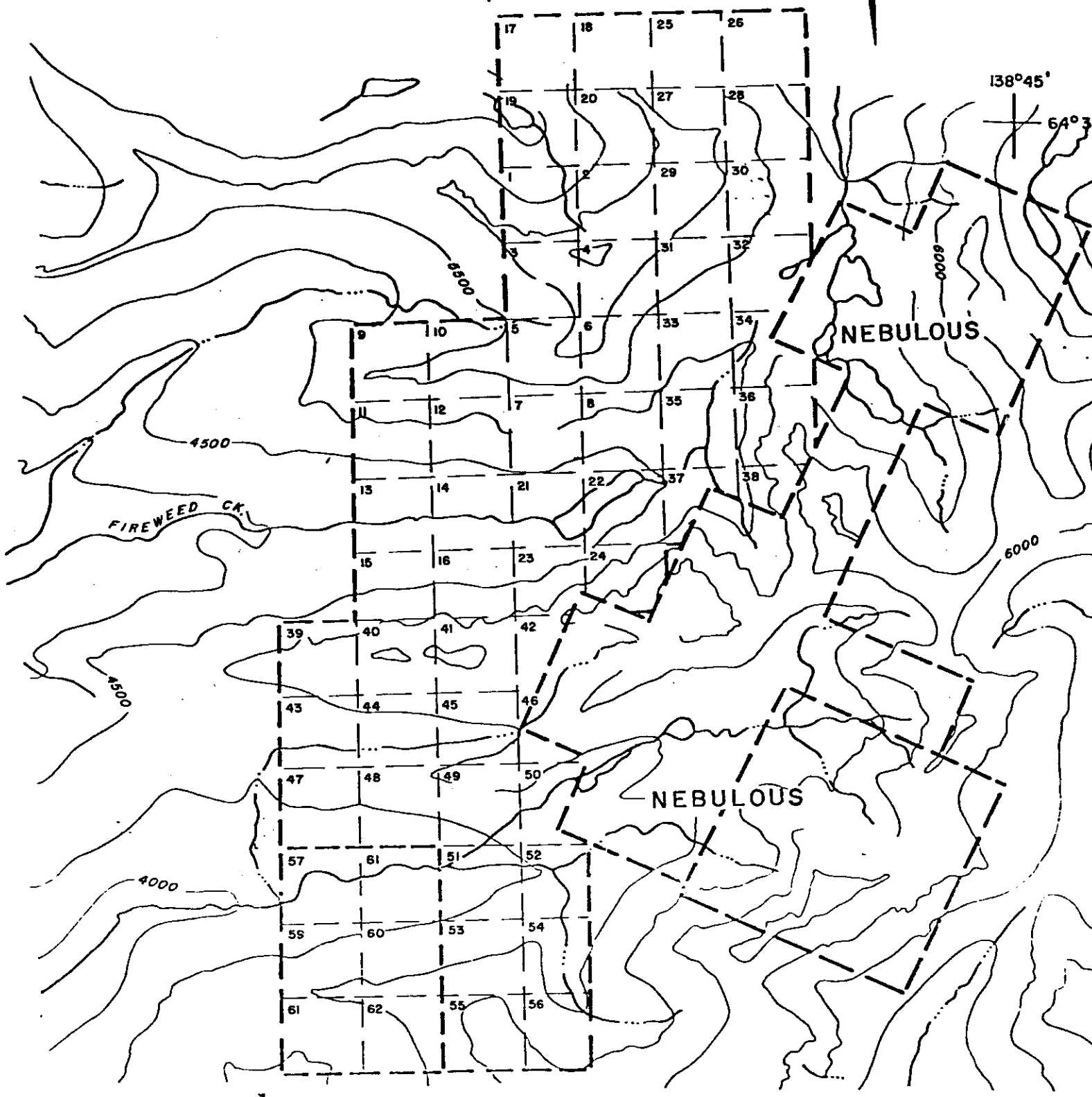


Fig. 2: Location of MARN 1-62 claims

0 500 1000 metres

SCALE 1:35,700

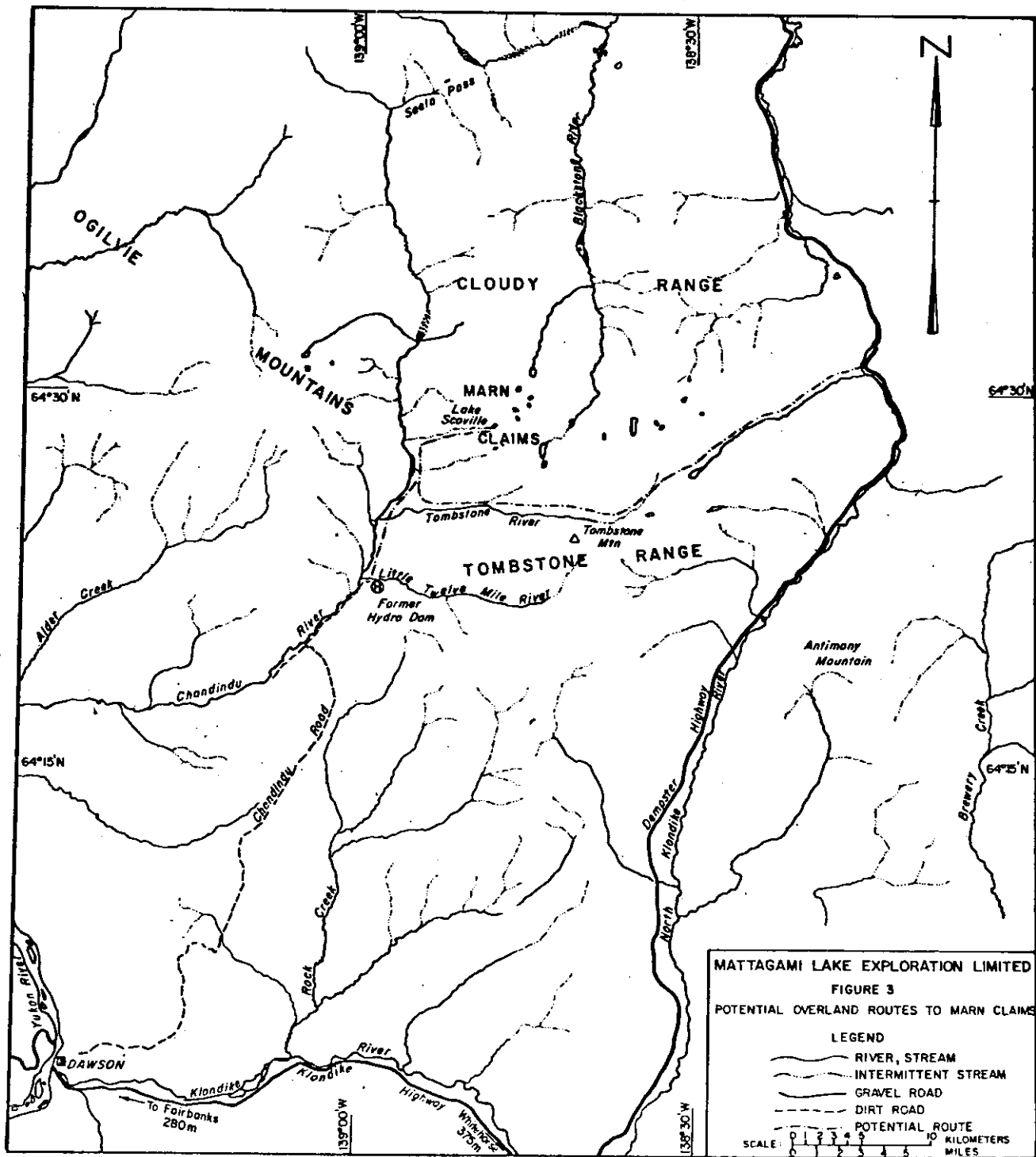
TABLE ONE: MARN Claims' History

** Transferred to Noranda Mines Ltd

Claim	Grant Number	Date of Staking	Recording Date	Transfer State**	Work Expiry Date
1- 8	YA 31491-98	July 29, 1978	August 4, 1978	Completed	August 4, 1985
9-16	YA 47156-63	August 1, 1979	August 14, 1979	In Progress	August 14, 1979
17-20	YA 47164-67	August 1, 1979	August 14, 1979	In Progress	August 14, 1979
21-24	YA 47600-63	September 7/79	September 10/79	Completed	September 10/79
25-28	YA 47168-71	August 1, 1979	August 14, 1979	In Progress	August 14, 1979
31-36	YA 47172-77	July 31, 1979	August 14, 1979	Completed	August 14, 1979
37-38	YA 47575-76	September 7/79	September 10/79	Completed	September 10/79
39-46	YA 47265-72	August 17, 1979	N/A	Completed	August 17, 1979 (approx.)
47-48	YA 47577-78	September 7/79	September 10/79	Completed	September 10/79
49-56	YA 47273-80	August 24, 1979	N/A	Completed	August 24, 1979 (approx.)
57-62	YA 47643-48	September 16/79	September 18/79	Completed	September 18/79




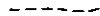
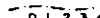
29-30

* The mining recorder in Dawson City maintains these two claims were not recorded. They will have to be restaked



MATTAGAMI LAKE EXPLORATION LIMITED
 FIGURE 3
 POTENTIAL OVERLAND ROUTES TO MARN CLAIMS

LEGEND

-  RIVER, STREAM
 -  INTERMITTENT STREAM
 -  GRAVEL ROAD
 -  DIRT ROAD
 -  POTENTIAL ROUTE
- SCALE: 0 1 2 3 4 5 10 KILOMETERS
 0 1 2 3 4 5 6 MILES

1-3 Physiography

"This rock is strongly jointed vertically and weathers into ruinous wedge-shaped ridges, surmounted by lines of sharp pinnacles and lofty tower-shaped peaks."

(McConnell, 1903, p.63)

The Tombstone Mountains are truly one of the most remarkable areas of the Cordillera. Areas underlain by intrusive rocks feature extremely steep relief averaging 3000 ft. (900 metres) with a maximum of 5,500 ft. (1,700 metres). Shear cliffs, 2,000 ft. (600 metres) high, are not uncommon in this area. The vertical jointing in the rock has led to the development of branching, razorback ridges, large pinnacles resembling hoodoos and large peaks towering above the ridges. Cirques and hanging valleys are common in this terrain. Fortunately, the MARN claims lie along the contact of the syenite with the Paleozoic sediments and here the terrain is not as rough, featuring broader valleys with gentler slopes and in some areas, a plateau type topography.

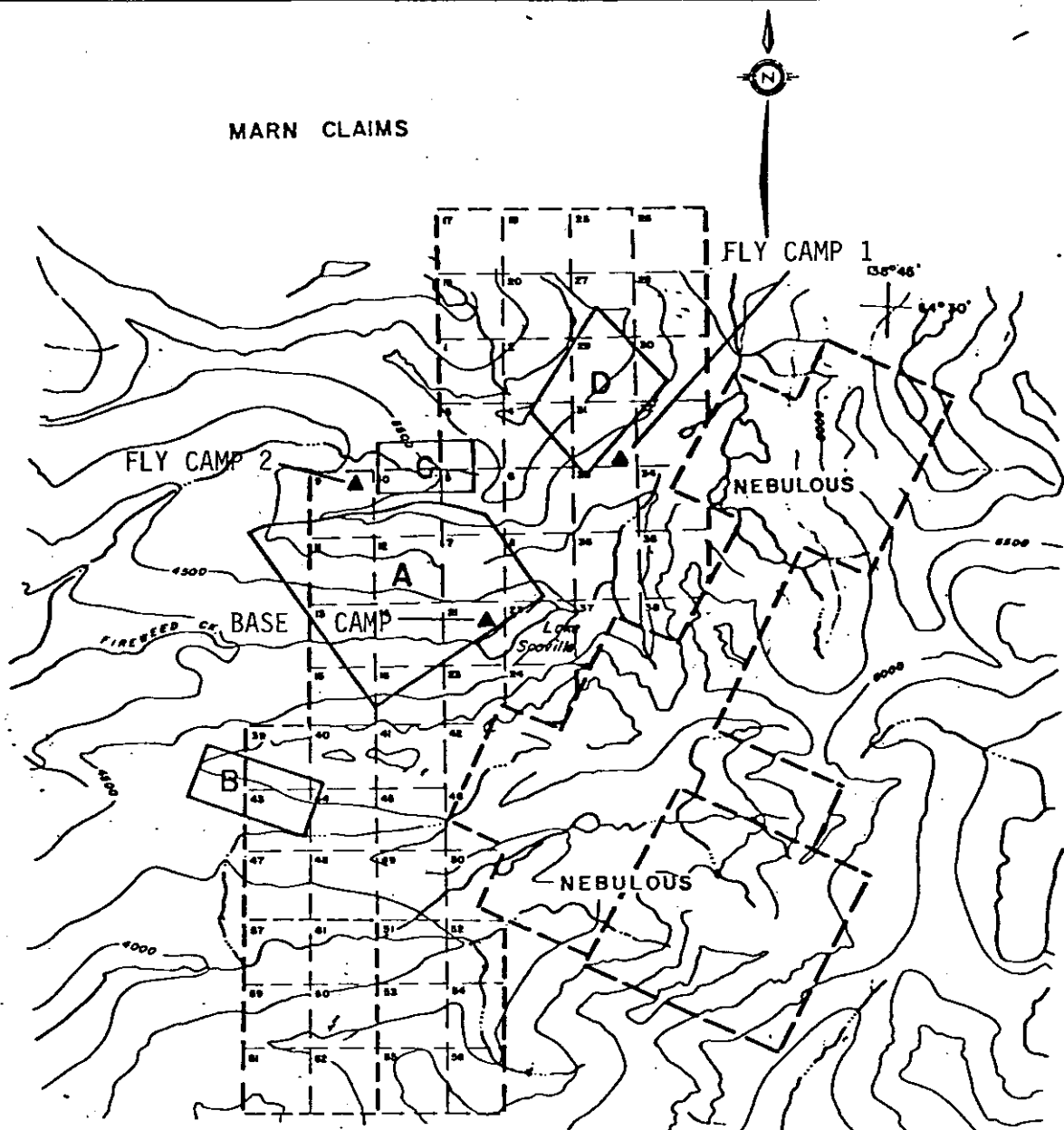
This area was not affected by continental glaciation but was subjected to local alpine glaciation. Glaciers emanating from the Tombstone Mountains travelled down the Chandindu River valley but apparently did not reach the Tintina Trench. Glacial drift mantles the lower slopes in the area up to 3,500 ft. (1,070 metres), however all of the MARN claims are above this elevation, ranging from 4,100 ft. to 6,600 ft. (1,250 metres to 2,000 metres).

1-4 Procedure

Exploration on the MARN claims during 1979 was carried out during two periods; June 12-17 and August 4-28. Exploration activity during June has been detailed in a previous report (Biczok, 1979), therefore this report will primarily describe the work performed during August as well as advancing some overall conclusions. Some reconnaissance work, primarily geochemical sampling around extensions of the Tahkandit limestone and nearby intrusions, was carried out from the MARN camp and will also be described in this report.


On August 4, a base camp was established on the property beside Lake Scoville. From here the main grid (A) was laid out and most of the geophysical surveys (magnetometer and RADEM) carried out (Fig. 4). Additional prospecting on the central claims was also carried out from this location.

MARN CLAIMS



MATTAGAMI LAKE EXPLORATION LIMITED
MARN PROJECT

FIGURE 4
GRID LOCATION MAP

Scale of metres 

In the latter half of August, two fly camps were established on the northern claims (Fig. 4). This was necessitated by the presence of a high (7,000 ft./2,130 metre) mountain ridge between the north and central portions of the claim block. Geological mapping, prospecting, geophysical surveys and soil sampling were carried out on the northern claims from these fly camps.

Brief examinations of the limestone on the southern claims were made by the author with the aid of a helicopter. Although topographically this area is relatively gentle, it is separated from the north and central claims by an impassible 1,000 ft. (300 metre) high cliff.

Work was carried out by the following personnel: -

J. Biczok	-	Party Chief
P. Wagner	-	Senior Assistant
P. Lhotka	-	Junior Assistant
C. Stewart	-	Junior Assistant

CHAPTER TWO

GENERAL GEOLOGY

This area consists of three sedimentary formations intruded by an irregular, circular monzonite pluton, see Map 1 and Table 2.

2-1 Sedimentary Rocks

The oldest formation, which underlies the western margin of the claim block, is the Ordovician-Silurian, Road River Formation (Unit 7 of Tempelman-Kluit, 1970). In this region it consists of 500 feet (150 metres) of chert and argillaceous members, represented by a lower 200 foot (60 metre) member of chert and interbedded black slate, overlain by 300 feet (90 metres) of predominantly argillite (Tempelman-Kluit, 1970).

The chert member is not exposed on the MARN claims but is described as thickly bedded, poorly laminated and ranges from grey and black to pale green in colour. Regionally the argillite member is described as greenish grey, fine grained, somewhat silty and locally calcareous, with several thin interbeds of black, fetid limestone. Exposures of this member within the claim group consist of black fissile shale, siltstone, chert, argillite and argillaceous quartzite, with shale and argillite predominating. Near the top of the succession, a thin limestone pebble breccia with a shaly matrix was observed. Mapping of this unit is incomplete, as well as being difficult due to the rugged relief there it is exposed, therefore its true thickness has not been determined.

Overlying the River Road Formation unconformably is the Permian Tahkandit Formation. On the south side of Fireweed Creek the unconformity is 1 to 2° (Tempelman-Kluit, 1970). The Tahkandit consists of a lower limestone member with abundant detrital chert, a middle limestone with interbedded chert and an upper member of massive, thick bedded limestone (Tempelman-Kluit, 1970) Our mapping is in basic agreement with this interpretation. On the south side of Fireweed Creek the basal member is exposed and consists of limestone with several interbedded, 15 cm thick beds of rounded chert and limestone pebbles, generally less than 2 cm across, in a calcite cement. The middle of the formation is described as limestone containing interbeds and lenses of black chert. A small exposure of thinly bedded, grey chert was discovered

TABLE TWO: Table of Formations

Cretaceous

Mt. Brenner Stock: equigranular to porphyritic, hornblende-augite-biotite monzonites, quartz monzonites, aplite, minor pyroxenite.

"Keno Hill Quartzite": thick bedded, massive orthoquartzite with lesser, interbedded slates.

Jurassic

Jurassic Schist: hornfelsic siltstone, quartzite, shaly phyllite, pyritiferous shale.

Permian

Tahkandit Formation: grey to white, crystalline, bioclastic limestone, minor chert pebble conglomerate and thinly bedded chert.

ord-sil.

Road River Formation: grey to black argillite and shale, with minor quartzite, siltstone, chert, chert pebble breccia with shaly matrix.

within the monzonite "sill" extending from the northwest corner of the Mt. Brenner stock. Soft sediment deformation of the chert beds is well developed. This member is now regarded as belonging to the Tahkandit formation although its upper and lower boundaries are not exposed. The upper 50 ft. (15 m) of the formation consists of white-to-grey-weathering, massive thick bedded limestone. On the MARN claims it tends to be crystalline and fairly friable.

Where the entire formation is exposed, on the southern claims, its true thickness is at least 80 ft. (25 m).

Overlying the Tahkandit are rocks mapped by Tempelman-Kluit as "Jurassic Schist" and described as "black, graphitic slate and phyllitic slate with lesser interbedded chert pebble conglomerate and immature feldspathic subgreywacke". However the rocks on the MARN claims generally do not resemble this description. They consist of hornfelsic, brown-weathering siltstone, quartzite, argillaceous quartzite and lesser interbedded slate and shale. The formation is frequently pyritiferous and exhibits blocky jointing near the contact with the Mt. Brenner stock.

2-2 Intrusive Rocks

Intruding the metasedimentary sequence is the Mt. Brenner stock, a Cretaceous monzonite intrusion which underlies the eastern margin of the claim group (Map 3). It was the subject of a M.Sc. thesis (M. Lambert, U.B.C., 1964) and was also mapped in some detail by Tempelman-Kluit (1970).

The Mt. Brenner stock covers an area of eight square miles and has a K-Ar age of 91 ± 5 million years. It belongs to a group of at least forty similar intrusive bodies occurring north of the Tintina Trench.

Lithologically the stock consists of a series of porphyritic to equigranular, aegerine-augite, biotite and hornblende monzonites, with minor pyroxenite and an aplite core. Zoning of these units indicates a trend from peralkaline, silica deficient monzonite on the margins grading inwards to calcic, silica-saturated monzonites in the centre. This zoning is apparently a gradual transition with no sharp intrusive contacts, and this, along with the presence of a large aplite core, suggest that the zonation was produced by magmatic differentiation in situ.

The stock appears to be epizonial, i.e. was intruded at a relatively shallow level, and to have been intruded forcibly. Contacts are strongly discordant and dip outwards at angles steeper than 60 degrees (Tempelman-Kluit, 1970).

Thin section studies of several samples taken from the western margin of the stock are in general agreement with Lambert's (1964) lithologic descriptions. Two samples of the intrusive (R-13, R-14B) collected from this area are both augite-biotite monzonites (see Appendix 1). A series of parallel lamprophyre dykes extending over 2 m in width was also discovered in this area. Petrographic studies of one sample (R-15A, Appendix 1) reveal that this is an augite-biotite lamprophyre (augite minette) featuring excellent flow alignment of biotite and augite phenocrysts in a fine grained groundmass. A small hematite stained occurrence of an ultramafic rock was located near the lamprophyre dykes. The hematite staining and rugged nature of the outcrop (cliff) made it difficult to determine whether the ultramafic rock was a dyke or xenolith. In the field the rock was mapped as a pyroxenite, however, petrographic studies (R-19A) reveal that it is probably a metamorphosed pyroxenite, now largely converted to hornblendite. Lambert (1964) has mapped a thin hornblende-biotite pyroxenite zone nearby and this sample may represent an offshoot of that zone.

2-3 Structural Geology

The MARN claims lie on the edge of a structurally complex area. To the south and east of the claims, the area is dominated structurally by numerous subparallel thrust faults between which the strata are concentrically folded (Tempelman-Kluit, 1970). To the north of the claims lies a large Proterozoic and Precambrian terrain of metasedimentary and metavolcanic rocks.

Fortunately, within the area of the MARN claims, the structure is not too complex. Sedimentary strata generally strike NNE and dip gently ($10-40^{\circ}$) to the east. Near the contact with the Mt. Brenner stock, dips become steeper ($55-90^{\circ}$) and the strata somewhat distorted. This distortion is most severe north of Lake Scoville, where the strata have been intruded by a large sill/dyke (?) offshoot of the stock. The strata seem to have been rotated into a more east-west trending direction and tilted into a steeper (645°) south facing dip. Confirmation of this will have to await further, more detailed, structural measurements. Accurate mapping in this area is made difficult by the fact that the dip of the strata and the slope of the mountain side are very close. As well, numerous, narrow ravines dissect the strata, making representation difficult at this scale.

Within the Mt. Brenner stock, flow alignment of phenocrysts, parallel to the contact, has been observed in several places. Flow alignment was also observed in the lamprophyre dykes and a porphyritic monzonite dyke.

2-4 Contact Metamorphism

The intrusion of the Mt. Brenner stock has had a profound metamorphic effect on the adjacent strata. Tempelman-Kluit (1970) has indicated that the nearby, larger, Tombstone stock has produced a metamorphic aureole 1 mile beyond its boundary. While we cannot document the aerial extent of the Mt. Brenner contact aureole, our work can give some indication of its intensity.

Petrographic examination of a sample of the "Jurassic schist" (R-505) indicate that the rock was originally an argillaceous sandstone consisting of thin alternating pure and argillaceous beds. The pure sandstone has now been metamorphosed to a clean quartzite of the hornblende-hornfels facies, featuring extensive overgrowths and numerous triple points between the recrystallized quartz grains. Argillaceous beds now feature a high percentage of foliated biotite and muscovite as well as 5-10% medium grained cordierite. In the field this unit is characterized by block jointing and a hornfelsic ring, features produced by the contact metamorphism.

The Tahkandit formation features a wide range of metamorphic textures and minerals. The following assemblages have been observed in sections (Appendix 1) of this unit:

- 1) Biotite-actinolite-calcite
- 2) Chlorite(?) -actinolite-calcite
- 3) Diopside-carbonate
- 4) Diopside-quartz+tremolite
- 5) Biotite-diopside-idocrase-anthophyllite-grunerite

All assemblages belong to the hornblende-hornfels facies of contact metamorphism. The most common assemblage is diopside-carbonate. In one typical specimen (R-508) the limestone is metamorphosed to a fine grained, granular assemblage of more than 90% diopside with minor carbonate and quartz. In the field this rock type occurs mainly in thin, light green beds, interbedded with the relict grey-white limestone. Since no thin sections have been made of the limestone as yet, it is still unknown as to why only certain beds are altered. They may have had a slightly different original composition, perhaps more siliceous and/or argillaceous. The continuity of the skarnified beds is difficult to determine due to the deeply dissected nature of the area.

Alteration to coarse grained actinolite and diopside is a common feature of the limestones found to the north of the sill, and in the exposures of

limestone which project through the overlying sill. No doubt this alteration of the limestone is extensive beneath the sill.

Assemblage 5, Bi-Di-Id-Anth-Grun, is from a rather unique occurrence adjacent to a monzonite sill. The latter three minerals, all hydrous Mg-Fe silicates, have not been identified in any other samples, suggesting that this member had an unusual original composition and may have reached a higher metamorphic temperature (this is suggested by the presence of the orthoamphibole, anthophyllite).

If we assume a pressure of 1-2 Kbar for the formation of these assemblages, then a temperature of at least 525° C, possible extending to 625° C, is indicated. These samples were collected near the large sill/dyke extending NW from the stock, and it is therefore not known what temperatures were reached adjacent to the Mt. Brenner stock itself, or, how wide its metamorphic aureole is. Further petrographic work will be required to determine these factors.

CHAPTER THREE

GEOCHEMISTRY

During this program a variety of geochemical methods were employed. Soil sampling was carried out on grids B and C (Fig. 4, 5, 6) while stream sediment sampling and panning were carried out along the creeks northeast of Lake Scoville (Map 2 in back pocket).

3-1 Soil Geochemistry

3-1-1 Grid B

Grid B is located on a gentle south facing slope, south of Fireweed Creek. Soil development is poor here with very little A-horizon present. Fifty-one samples were collected on this grid, from the B-horizon, and analyzed for the following elements: W, Sn, Mo, Ag, Zn, Pb, Cu (Fig. 5a-5h)

This grid was established to check for possible anomalies over an area underlain by the Tahkandit limestone. Minor skarnification was observed within the Tahkandit limestone outcrops located on the steep slope north of the grid. No geochemical anomalies were detected within the grid. All elements show low levels of concentration and exhibit no obvious trends. We must assume therefore that no major mineralization occurs within the limestone at this distance - greater than 2,000 feet (600 metres) - from the stock.

3-1-2 Grid C

This grid was established north of Lake Scoville at the headwaters of "Falcon Creek". Skarnified outcrops are known to occur to the east and southeast of the grid. In this area, as with grid B, soil development is poor and samples were collected from the B or C-horizons. To the east and south of the grid, much of the area is covered with large boulders and soil sampling was not possible. A total of 50 soil samples were collected here and analyzed for the following elements: Cu, Zn, Pb, Ag, Mo, W, U.

Two distinct trends are evident in the results (Fig. 6a-6h). Tungsten and copper, two elements enriched in the nearby skarn, are anomalously high in the southeast corner of the grid (Fig. 6b, 6c). The tungsten anomaly is restricted to two samples collected below an outcrop of skarnified limestone. This anomaly is presumed to be the result of mechanical weathering of this

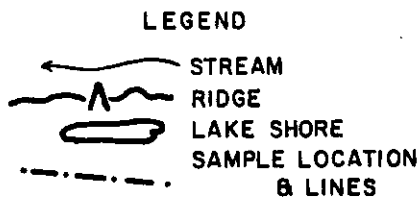
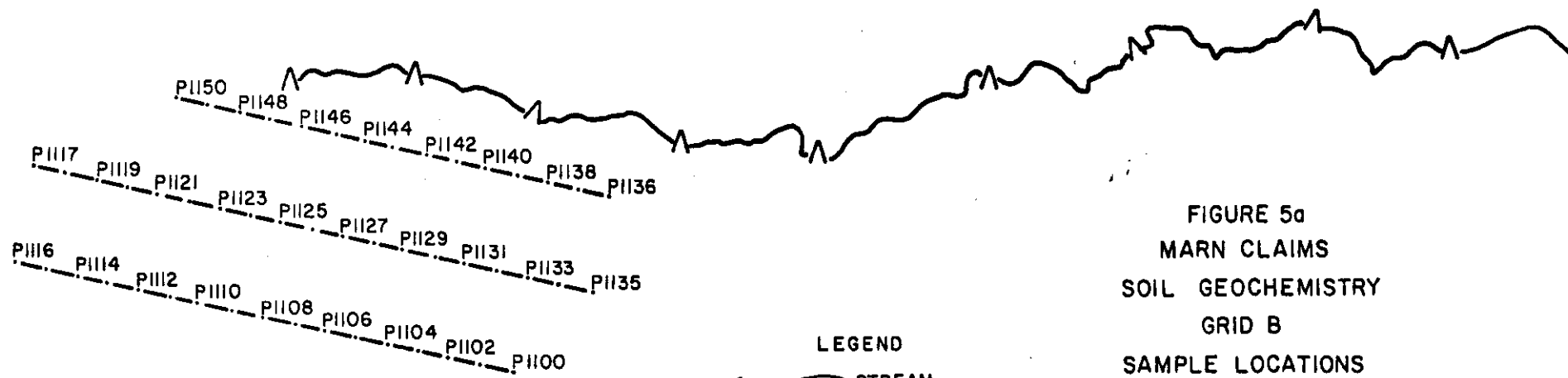
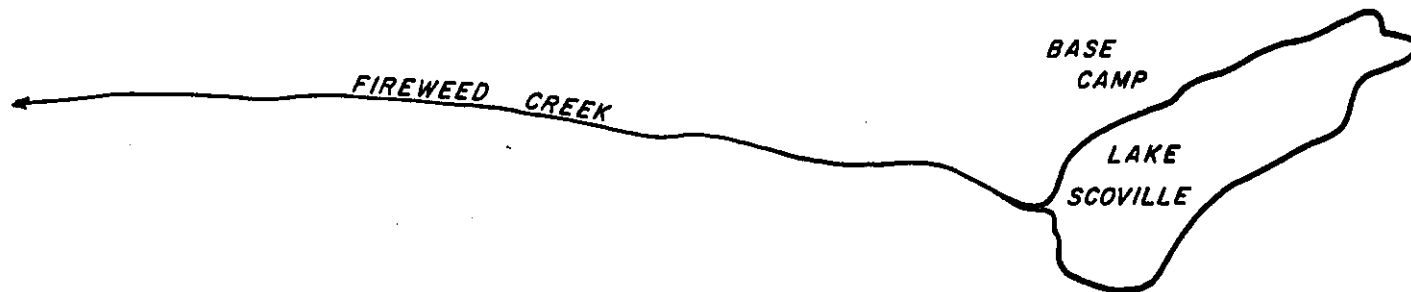


FIGURE 5a
MARN CLAIMS
SOIL GEOCHEMISTRY
GRID B
SAMPLE LOCATIONS
Scale : 1:10,400

EACH SAMPLE HAS A 129-01 PREFIX
COLLECTED BY C. STEWART 8-AUG-79

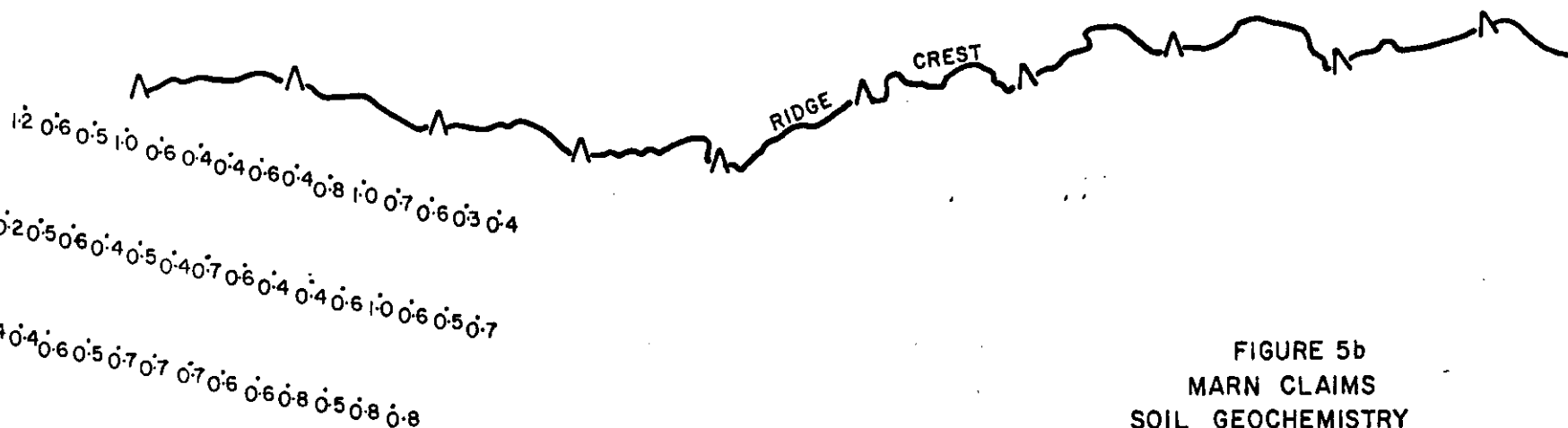
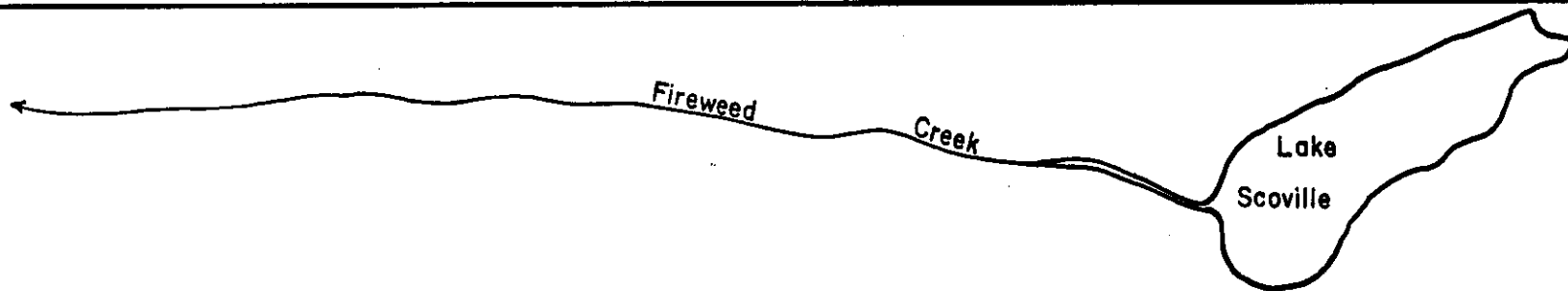


FIGURE 5b
MARN CLAIMS
SOIL GEOCHEMISTRY
GRID B
SILVER (ppm)

Scale: 1:10,400

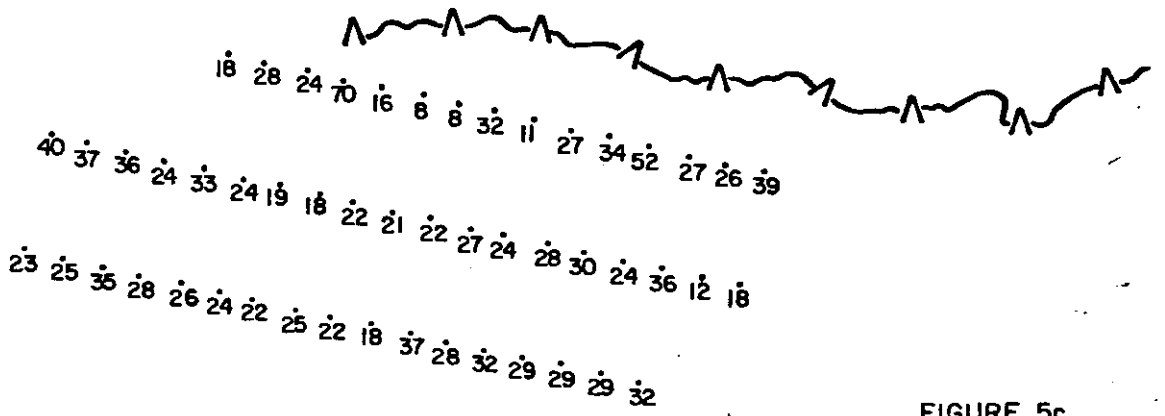


FIGURE 5c
 GRID B
 COPPER (ppm)

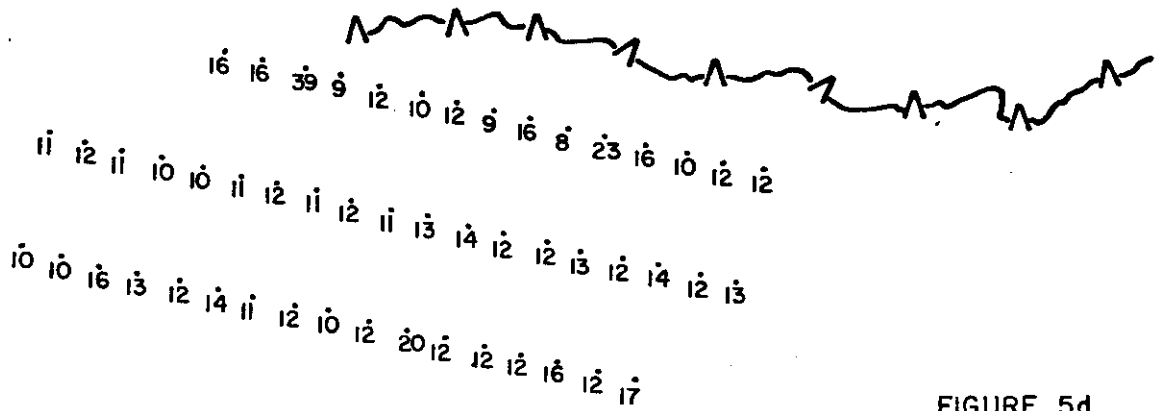


FIGURE 5d
 GRID B
 LEAD (ppm)

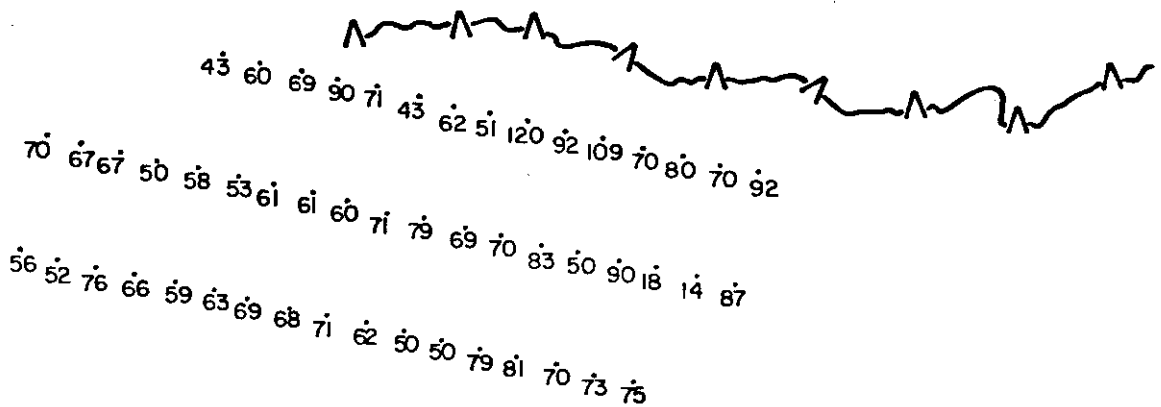


FIGURE 5e
 GRID B
 ZINC (ppm)

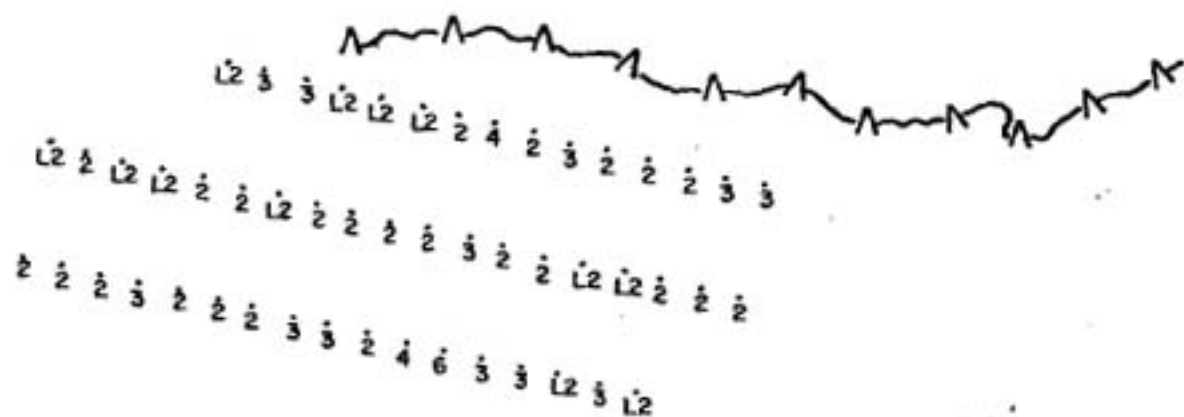


FIGURE 5f
GRID B
TUNGSTEN (ppm)

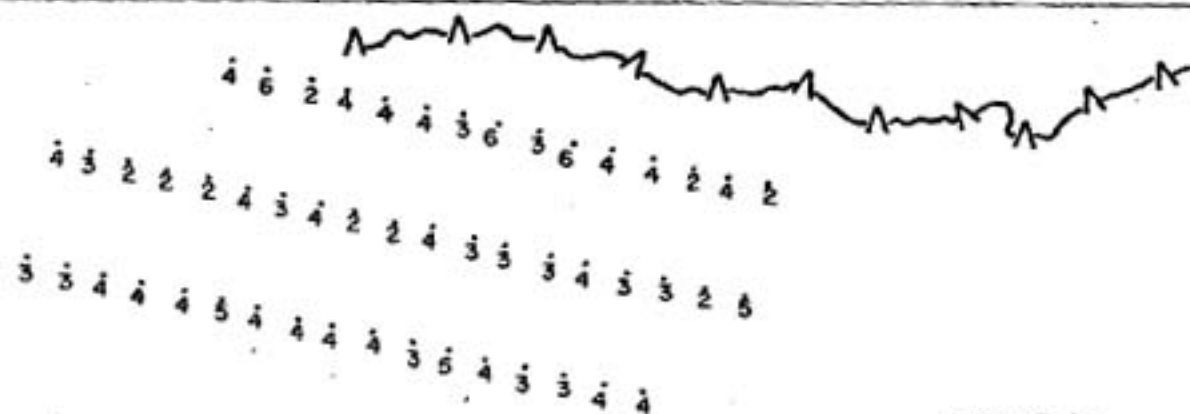


FIGURE 5g
GRID B
MOLYBDENUM (ppm)

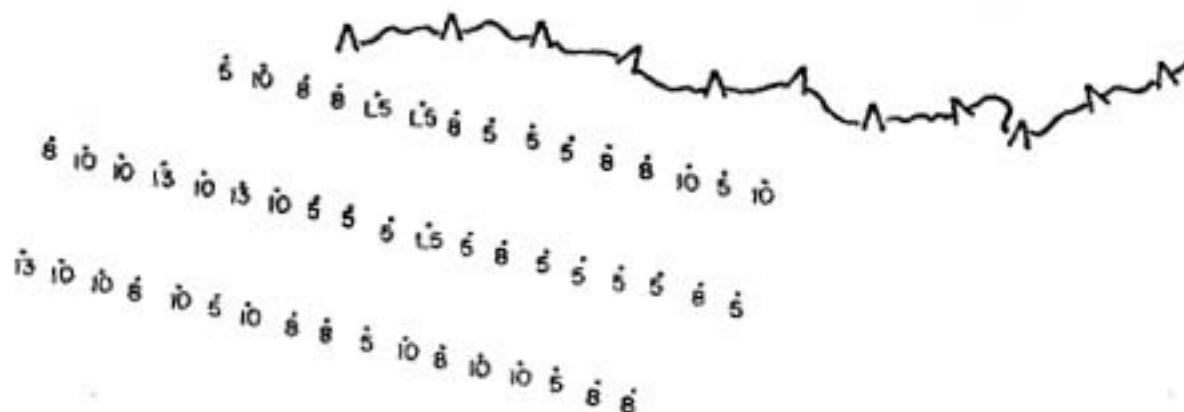
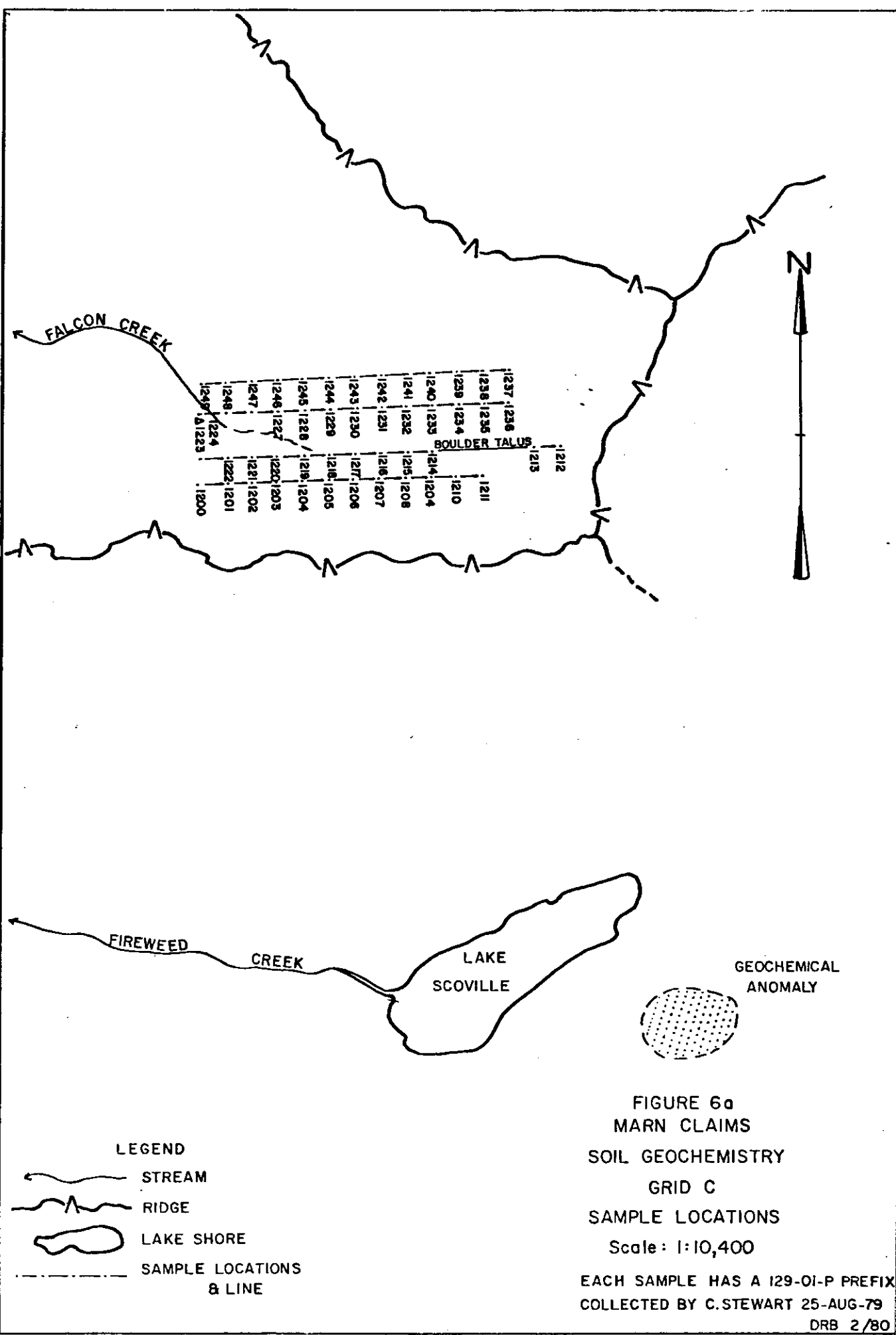


FIGURE 5h
GRID B
TIN (ppm)



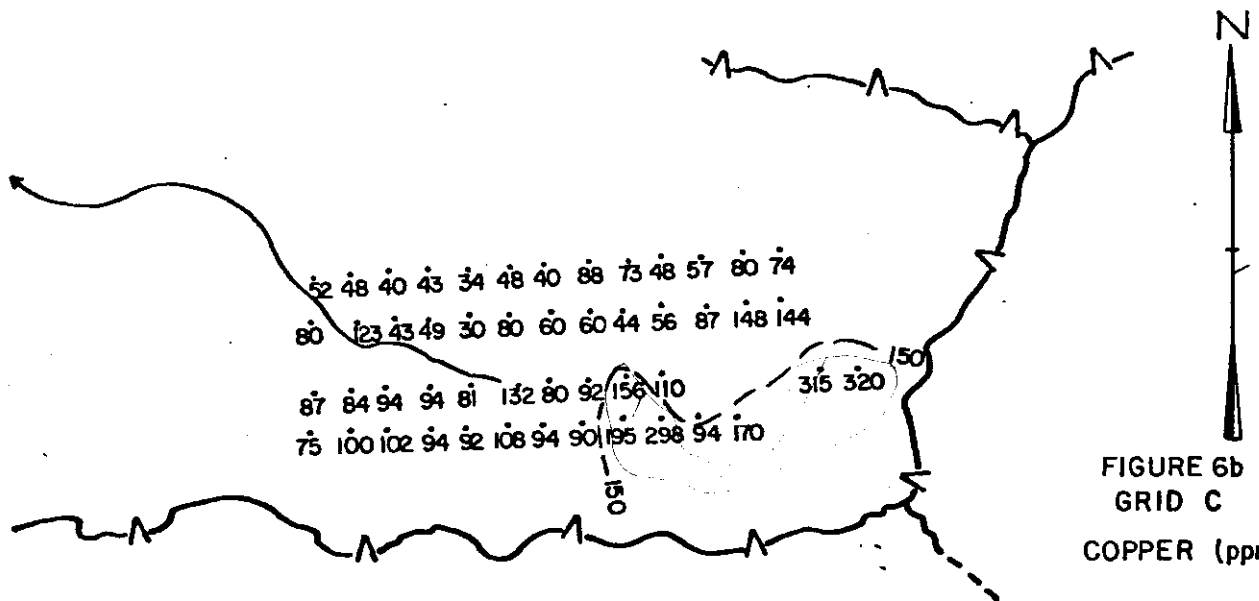


FIGURE 6b
 GRID C
 COPPER (ppm)

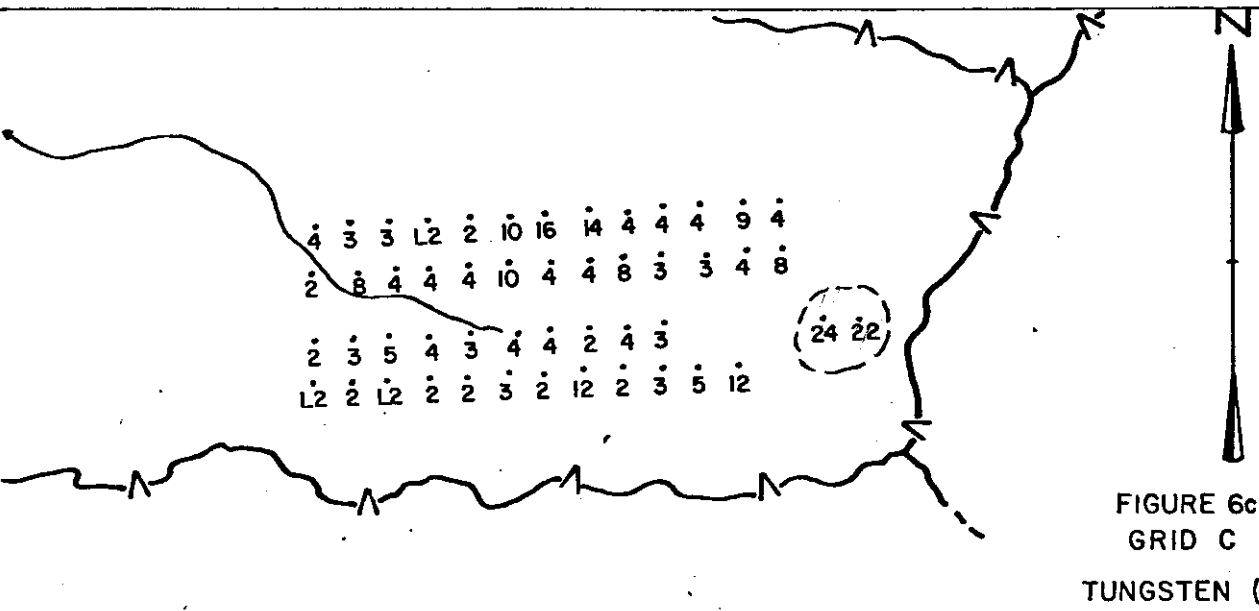


FIGURE 6c
 GRID C
 TUNGSTEN (ppm)

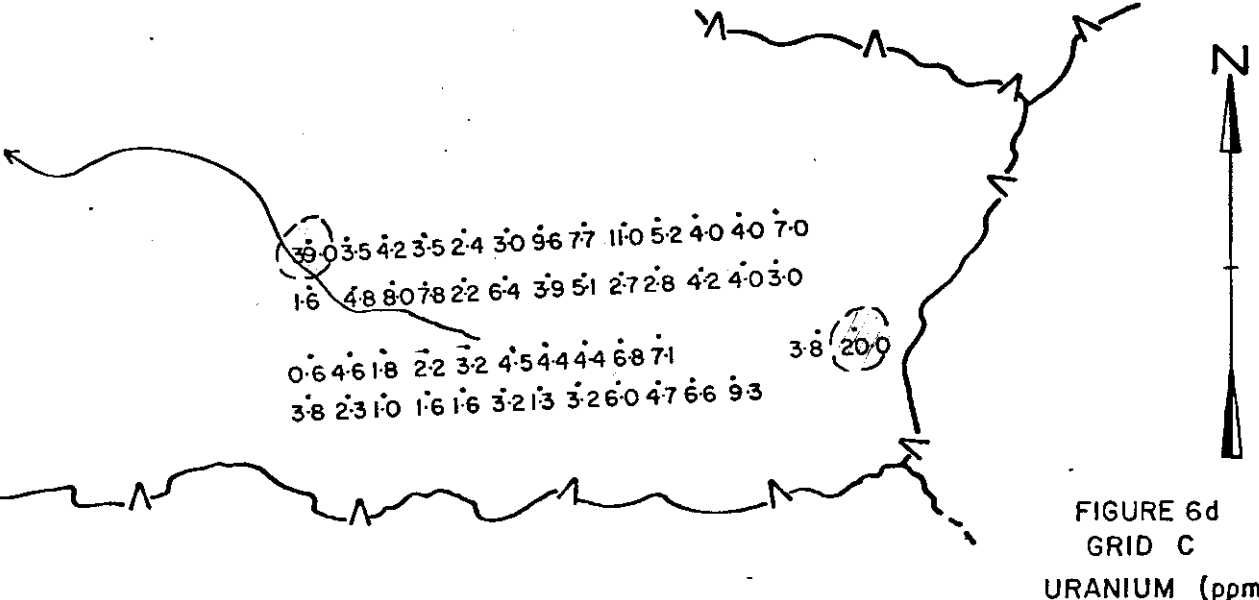
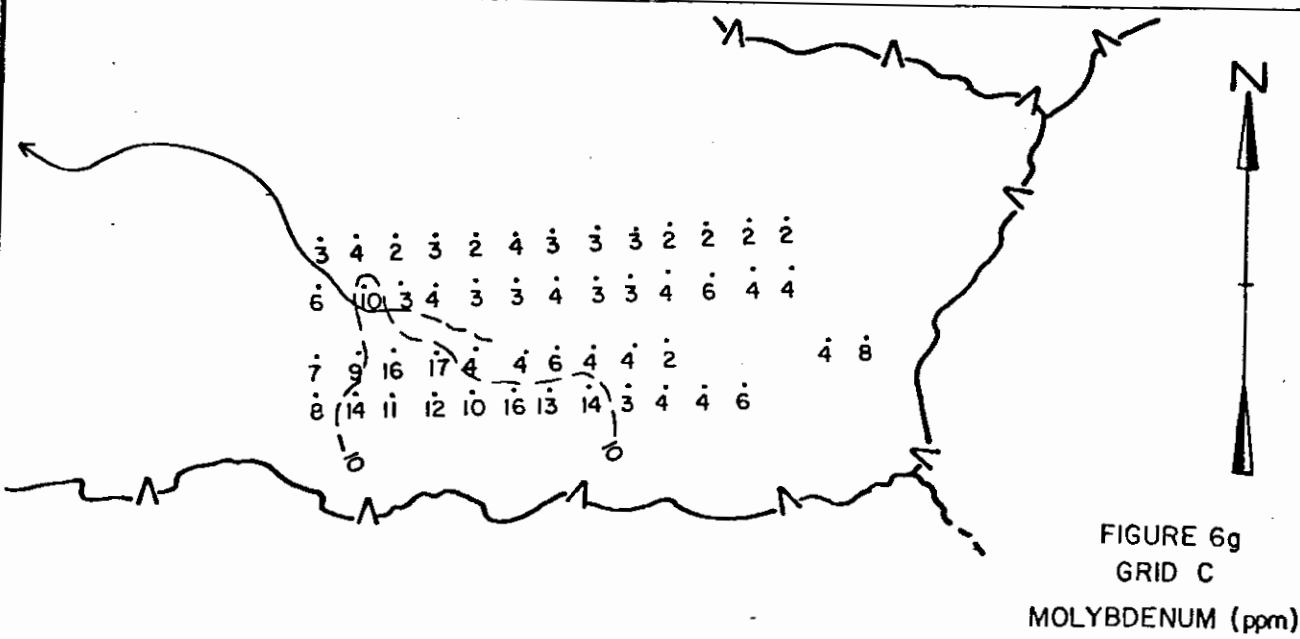
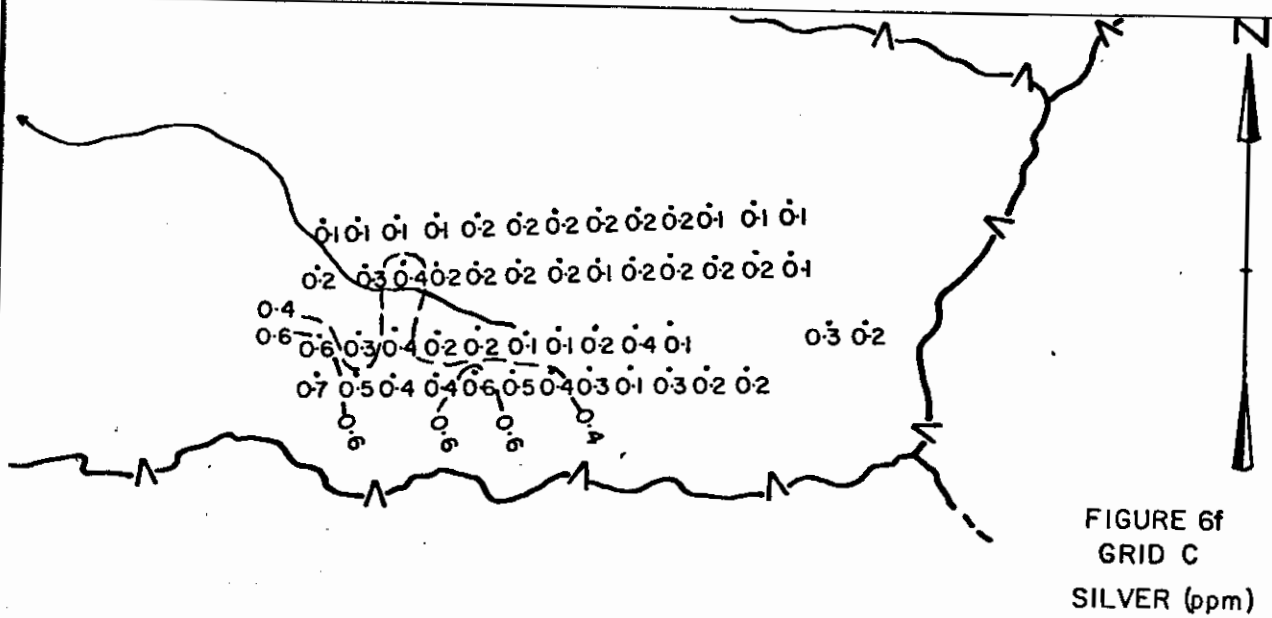
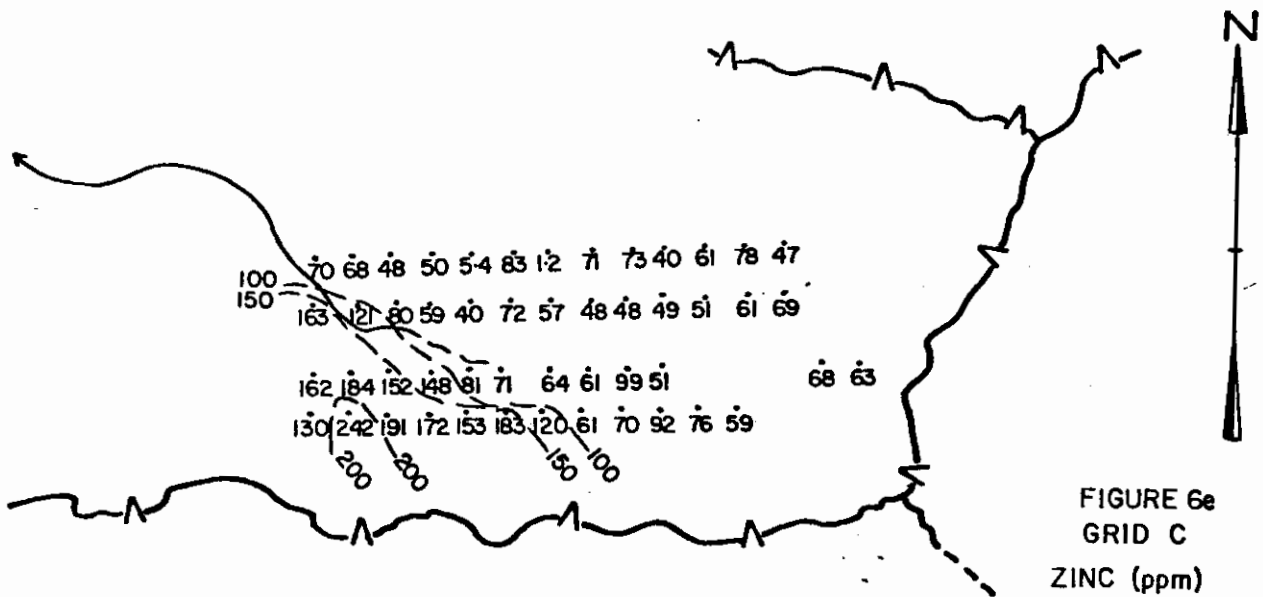


FIGURE 6d
 GRID C
 URANIUM (ppm)



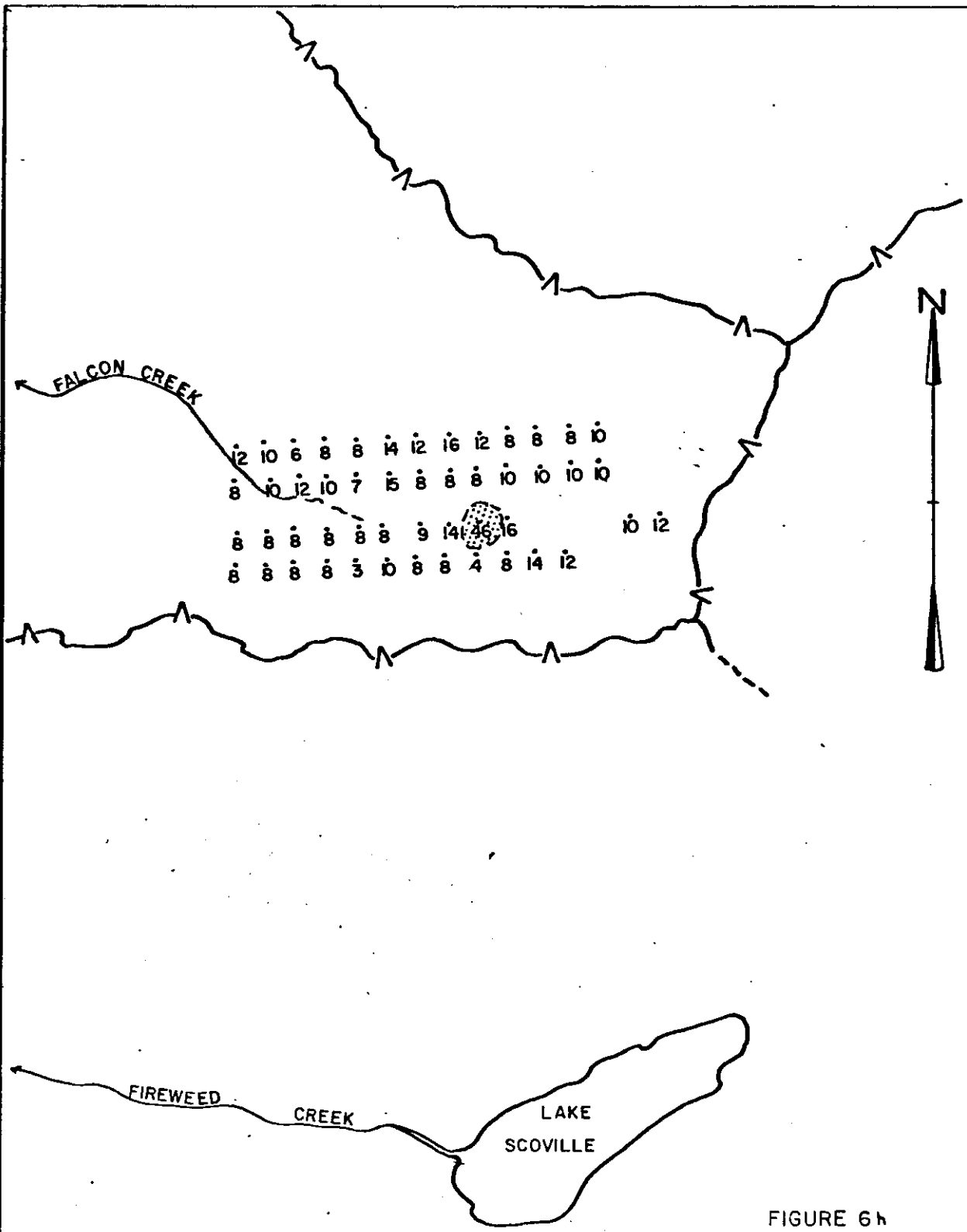


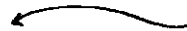



FIGURE 6h
 MARN CLAIMS
 SOIL GEOCHEMISTRY
 GRID C

LEAD (ppm)

Scale: 1:10,400

SAMPLES COLLECTED BY C. STEWART 8-AUG-79

LEGEND

-  STREAM
-  RIDGE
-  LAKE SHORE
-  SAMPLE LOCATIONS

outcrop. Copper forms a much larger anomaly in this area. This is thought to be due to the various forms of copper enrichment present. It occurs not only in the skarnified limestone, but also within the more widespread monzonite, and within monzonite-shale hybrid rocks. These various sources have produced a widespread anomaly, again, probably by mechanical weathering. Uranium exhibits two spot anomalies, one in the NW corner of the grid, the other below the outcrop of skarnified limestone (Fig 6d). The reason for these is unknown since no radioactive occurrences have been found in this area. There is no shale exposed in this area.

Three elements - silver, zinc and molybdenum - all exhibit broad anomalies in the SW corner of the grid (Fig. 6e-6g). These elements are characteristically enriched in shales and this area is believed to be underlain by the Road River shale formation. Zinc and molybdenum are not significantly enriched in the skarn, and silver enrichment is probably too localized to account for the broad anomaly. These anomalies are therefore thought to have been generated by chemical weathering of the Road River formation.

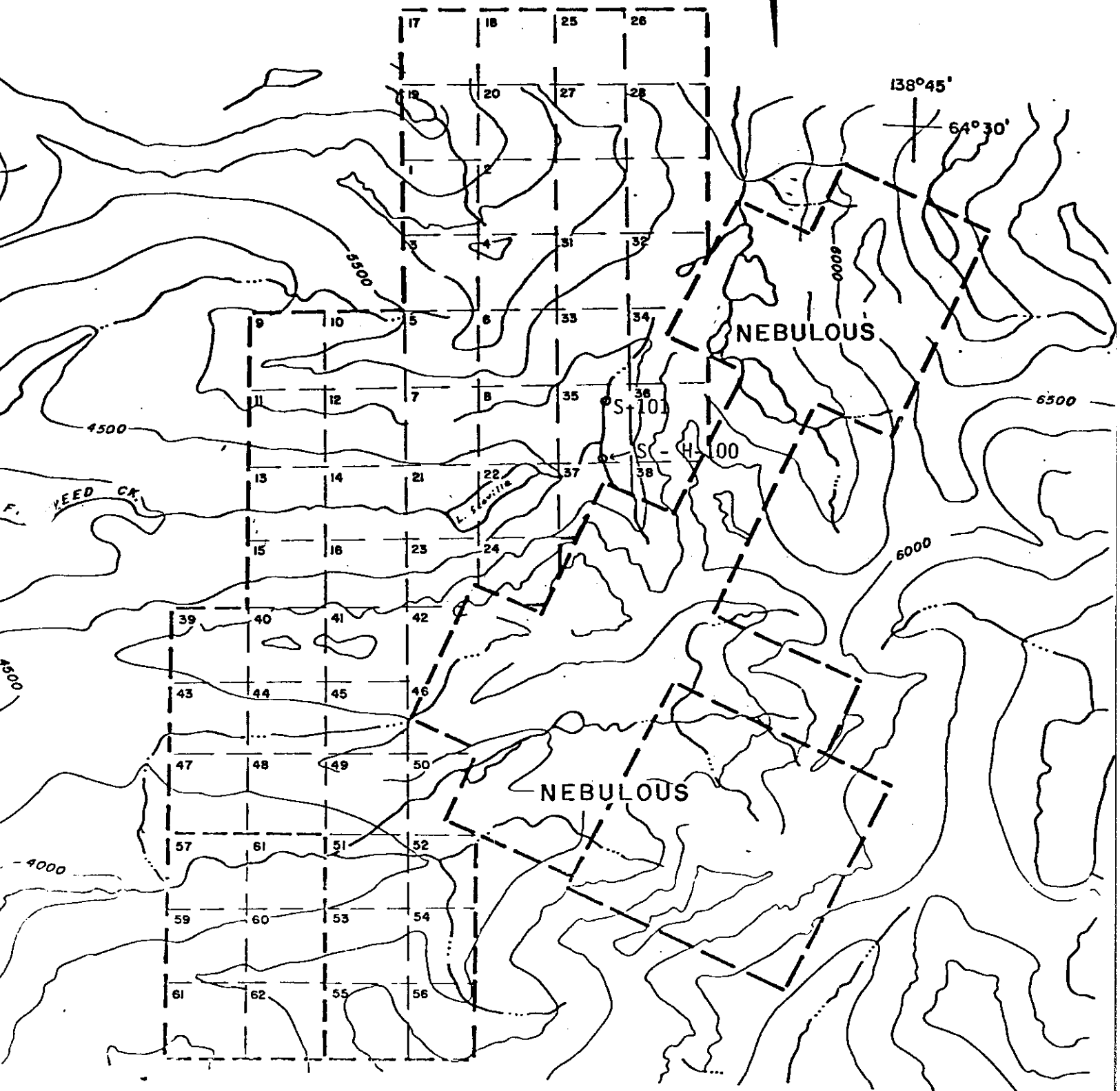
The lead distribution exhibits one spot anomaly of 46 ppm, sample no. 1215 (Fig. 6h). Lead is not generally enriched in either the skarn or the shale formation so the reason for this anomaly is not clear.

3-2 Stream Survey

Only a few stream samples (sediment, water and heavy mineral concentrates) were collected on the MARN claims during this program (Map 2, Table 3). A number of samples were collected during the previous program and indicated anomalous levels of Cu, W, Mo and U in the creeks northeast of Lake Scoville (Biczok, 1979). During the August program one series of samples (S-W-H-100) was collected on a creek draining a cirque east of Lake Scoville. No anomalous levels of metal were detected in this stream. Samples 101 and 102, collected north of this location both contained anomalous levels of copper while 102 is also enriched with zinc.

Very little stream sampling will be required on the MARN claims in the future. There are only a few creeks left to be sampled on the property, these are located south of Lake Scoville. Stream sampling will be a more useful tool in exploration of the Mt. Brenner stock and other nearby Cretaceous intrusions. The usefulness of panning is questionable in this area. Panned samples often have lower metal concentrations than sediment samples in this area (e.g. compare S-100 and H-100). This may be due to the coarse nature of the mineralization, however a detailed analysis of panned and sediment samples would be required to confirm this.

MARN CLAIMS



S - Stream Sample
 H - Panned Sample

Map 2: STREAM SAMPLE LOCATIONS
 MARN CLAIMS

TABLE 3: Stream Geochemical Survey, MARN claims

All values in ppm

Sample Number	Ag	Cu	Pb	Zn	Mo	Sn	W
S*-100	1.0	65	18	45	4	5	4
S -101	1.2	230	22	77	15	L5	3
S -102	1.3	120	20	185	15	5	7
H*-100	0.5	33	18	25	3	5	L2

* S = Stream sediment

H = Heavy mineral concentrate, obtained by panning

CHAPTER FOUR

GEOPHYSICS

During this program, RADEM and magnetometer surveys were conducted on Grids A and C (Fig. 4). The results will be discussed in a forthcoming report by D. Sutherland. While this work was basically of a reconnaissance nature, it did indicate a number of strong magnetic anomalies.

Grid A was established on the steep slope immediately to the north of Lake Scoville. This proved to be quite time consuming due to the very rugged relief of the slope. This relief also generated occasionally erratic magnetic results, however a broad, NE-SW magnetic high is evident in the data. The skarn mineralization observed in this area is very magnetic, containing both magnetite and pyrrhotite and therefore the magnetic anomaly may be an indication of widespread mineralization. Very detailed geological mapping, along with a more detailed magnetic survey should be conducted in this area.

The RADEM survey produced very inconclusive results and appears to be a less useful tool in this area. This may be the result of the steep slopes as well as shallow depth and possible thinness of some showings.

On Grid C, strong magnetic anomalies (up to 9,000 gammas) were located along the edge of the monzonite sill. Much of this area is covered in talus, which is frequently mineralized, and a cupriferous gossan locally crops out. It should be covered with a more detailed, permanent grid and further geological surveys conducted to delineate possible mineralized zones.

No geophysics has yet been conducted on the southern claims, but this work should receive a high priority. There is potential here for a large area of mineralization and it should be tested for by first setting out a large grid along the western margin of the stock and then conducting a variety of geophysical surveys. The techniques utilized should be capable of penetrating to substantial depths, perhaps up to 300 metres, and delineating between skarn mineralization and disseminated pyrite in the overlying Jurassic Schist unit. An airborne magnetometer survey may be of some use here but some difficulties may be encountered because the nearby Mt. Brenner stock is somewhat magnetic.

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APPENDIX 1

PETROGRAPHIC DESCRIPTIONS

R2 DIOPSIDE - IDOCRASE - ANTHOPHYLLITE - GRUNERITE SKARN

This is a rather exotic specimen collected from an exposure adjacent to a monzonite dyke. It may represent skarnified Tahkandit limestone or perhaps a calcareous member of the overlying Jurassic schist.

The sample contains 50-60%, 5-7 mm wide, poikiloblastic Anthophyllite crystals with well developed crystal form and containing numerous inclusions of apatite and diopside. Diopside is the second most common mineral, forming 25-30% of this section. It is generally anhedral to subhedral in form, occasionally forming poikiloblastic grains which include apatite and grunerite. One end of the section (approximately 5% overall) is dominated by subhedral Grunerite crystals up to 2 mm across. These grains are light beige in colour and exhibit well developed polysynthetic twinning. Idocrase grains comprise 5% of the section and form anhedral-subhedral grains up to 2 mm long containing numerous inclusions of anthophyllite, apatite and diopside. Apatite is a fairly common accessory mineral, comprising 3-4% of the section. The grains average 0.5 mm in length and are frequently concentrated in clusters. Minor Biotite, Magnetite and Hematite is present as well as a small percentage of a blue, fibrous mineral, occurring in interstitial radiating aggregates, which may be either a blue chlorite (pennine) or sodic amphibole.

Overall, the section exhibits an excellent metamorphic texture with most minerals intersecting in triple points and many having a poikiloblastic habit.

R3 BIOTITE - AUGITE QUARTZ DIORITE

This sample was collected north of Lake Scoville from what appears to be a sill. It's igneous origin is not particularly evident in thin section however.

This section contains 30-35% prismatic Augite as corroded grains up to 4 mm long (avg. 0.5 mm) with irregular outlines and numerous inclusions of quartz. The Augite grains are moderately well aligned and appear to be concentrated along a pyrite veinlet. These features suggest that the Augite may be secondary. The other major mafic mineral present, Biotite, comprises 15-20% of the section and appears to be primary. The grains are generally anhedral, rarely subhedral, with numerous inclusions of quartz and plagioclase. The biotite has a high titanium content as indicated by it's deep red-brown colour and the amount of exsolved rutile it contains. The mafic minerals are set in a somewhat finer grained groundmass of quartz and feldspar, predominantly plagioclase, with each comprising 45-50% of the total. The plagioclase is moderately well twinned but has an irregular form. The quartz forms equant grains which exhibit evidence of moderate recrystallization. The sample also contains 5-7% pyrite disseminated throughout and concentrated in two narrow (0.3 mm) veinlets.

The origin of this rock is still uncertain. Although in the field it appears to be a sill, in thin section it's major mafic mineral, augite, exhibits a strong alignment (foliation ?)

and appears to be secondary. It may represent an early intrusive phase which was later metamorphosed by the intrusion of the Mt. Brenner stock.

R6 DIOPSIDE - TREMOLITE - QUARTZ SKARN

This sample appears to have originally been a banded metasediment featuring alternating siliceous, argillaceous layers and calcareous, argillaceous layers. The sample has been completely recrystallized and skarnified by the intrusion of the Mr. Brenner stock.

The siliceous bands, averaging 1 cm in width, now consist of 50-60% recrystallized quartz, 0.1 mm across, with extensive overgrowths and triple points developed. The rest of these bands consists predominantly of relatively unaltered, subhedral Diopside grains less than 0.1 mm across along hematite stained fractures.

The rest of the sample is dominated by pelitic (highly argillaceous) beds, locally calcareous, which has been recrystallized into a fine grained, dense aggregate of subhedral-anhedral diopside, carbonate and minor local amounts of a green amphibole, probably Tremolite.

R13 AUGITE - BIOTITE MONZONITE

Biotite is the dominant mafic mineral in this sample comprising 20% of the section. Grains average 1 mm across and are subhedral to anhedral. There appears to be two generations present. The primary biotite is red-brown in colour, contains numerous inclusions of apatite and is largely replaced by carbonate, secondary biotite, etc. The secondary biotite is a much darker red-brown colour (indicating a high Ti content) and fresher in appearance. It frequently replaces Augite along its boundaries and occasionally internally. Augite grains are prismatic with irregular boundaries and minor apatite inclusions and range from 0.5 - 1.0 mm in length.

The silicates present consist of roughly 60% Plagioclase, 40% K-Feldspar and only trace amounts of Quartz. Plagioclase grains range from 0.5 - 1.0 mm in length while K-Feldspar is 1 - 3 mm in length. The K-Feldspar consists predominantly of anhedral-subhedral Orthoclase with lesser amounts of Perthite and Myrmekitic Feldspar.

R14B AUGITE - BIOTITE MONZONITE

The dominant mafic mineral present is Biotite which comprises 10-15% of the section. It is dark red-brown in colour, has an irregular, anhedral form and frequently rims the second most common mafic mineral, Augite. Augite comprises roughly 10% of the section and forms anhedral, elongated grains.

The major silicate present is K-Feldspar, which comprises 40% of the section. It is dominantly Orthoclase which forms large, subhedral, poikilitic crystals up to 7 mm long, with lesser amounts of perthite present. Plagioclase (Andesine, An_{44}) comprises 25% of this section. The grains are generally anhedral, 1 - 2 mm long and frequently enclosed by K-Feldspar. Locally they are largely altered to sericite. Quartz makes up less than 5% of the section.

R15A AUGITE - BIOTITE LAMPROPHYRE (Augite Minette)

This sample is of two parallel mafic dykes intruding the monzonite south of Lake Scoville. The dykes are up to 10 cm wide and feature excellent flow alignment of both the phenocrysts and groundmass minerals.

Euhedral Augite phenocrysts, up to 1.5 mm long, comprise 15% of the section. Anhedral-subhedral, kinked Biotite phenocrysts up to 4.0 mm in length make up 5-10% of the lamprophyre.

The groundmass consists of 30-40% elongate biotite, less than 0.5 mm long, 30-40% subhedral Augite up to 0.5 mm in length, less than 5% carbonate, and 10-20% of a very fine grained, green aggregate, probably largely epidote.

R19A AMPHIBOLITE

In the field this rock was mapped as a pyroxenite, however, thin section study reveals that it is a metamorphosed pyroxenite now converted to an amphibolite.

This section consists of roughly 80% coarse grained, 0.5-1.0 cm, subhedral-anhedral, green amphibole, probably Hornblende. The grains generally have a minor number of quartz and opaque inclusions and exhibit a good metamorphic texture. One area, roughly 1 cm², consists of strongly poikiloblastic hornblende with 60% diopside inclusions. The Diopside grains are 0.05 - 0.1 mm across and comprise less than 5% of the overall section. 15-20% Quartz and Plagioclase occur interstitially to the hornblende. The quartz shows irregular interlocking boundaries indicative of recrystallization while the 1 mm long plagioclase grains show good twinning minor sausseritization and appear to be relicts of the original rock.

R505 HORNfelsic ARGILLACEOUS QUARTZITE (Jurassic Schist)

Originally, this sample appears to have been a fine grained sandstone with alternating clean and argillaceous layers. The rock has now been metamorphosed to the hornblende-hornfels facies.

The clean bands contain 3-4% opaques and 2% Biotite, both occurring as anhedral grains averaging 0.02 mm across, with the remainder being Quartz. The quartz grains average 0.05 mm across and exhibit triple points and extensive overgrowths.

The argillaceous bands have been metamorphosed into a varied assemblage dominated by micas and quartz. Light red-brown, irregular Biotite grains 0.2 mm long make up 25 - 30% of these bands and exhibit a strong metamorphic foliation. Elongate, subhedral Muscovite grains, averaging 0.1 mm in length make up 25 - 30% of these argillaceous bands. The rest consists of 20 - 30% quartz, 0.05 mm across, 10 - 15% opaque grains up to 0.2 mm across and 5 - 10% Cordierite. The cordierite occurs as subhedral-anhedral prismatic crystals, up to 2 mm long, with numerous inclusions of quartz and opaques.

R508 PYROZENITE (Skarnified Limestone)

This sample is of the Tahkandit limestone and has been contact metamorphosed to the hornblende-hornfels facies.

This section consists of 97% fine grained, equant Diopside. The grains are subhedral-anhedral, 0.02 - 0.05 mm across and exhibit numerous triple points and a few overgrowths, 2-3% coarse grained Carbonate, 1-2 mm across, occurs in small veinlets or patches, rarely interstitially. Trace amounts of quartz are also present.

In the field, this rock type occurs as pale green beds, interbedded with the white limestone. Petrographic studies of the relict white limestone have not been made and it is not known why only certain beds within the formation have been altered to diopside.

R609 ACTINOLITE (?) SKARN

This is a section of the Tahkandit limestone which has been subjected to contact metamorphism of the hornblende-hornfels facies.

One half of the section is composed of two large Calcite crystals, one being 2.5 cm in width, the other, greater than 1 cm. The grains show only minor distortion of lamellae and contain scattered amphibole crystals throughout. These amphibole crystals become larger and more numerous towards the massive amphibole zone which dominates the other half of this section. This zone contains 70-80% subhedral, acicular to prismatic amphibole grains up to 1 cm in length, frequently in radiating aggregates. The amphibole is moderately well coloured, exhibiting pleochroism from light brown to green to a deep bluish green. This colour scheme would suggest that the amphibole is a hornblende but the nature of the occurrence and its acicular form suggest that it is more likely a deeply coloured Actinolite. Approximately 10% each of Carbonate and Quartz occurs interstitially to the amphibole, along with 5-10% of a beige to dark brown chlorite (?) which occurs in fibrous interstitial aggregates. Medium grained, subhedral-anhedral Pyrite crystals comprise 3-4% of the section overall. These grains are up to 3 mm across and seem to be concentrated along the boundary between the amphibole and calcite zones. Minor Magnetite and Hematite is also found in the amphibole zone.

12903M2 ACTINOLITE-RICH LAYER

Actinolite (65-70%) forms elongate prisms with ragged end averaging 0.5-1 mm in length; color is pleochroic from pale to light brownish green. Calcite (20-25%) and quartz (5%) form coarse interstitial grains up to 2 mm across; their distribution is very patchy. In one corner of the section is a very coarse grained zone containing calcite and lesser actinolite with minor quartz. Biotite (3-5%) forms irregular grains averaging 0.05-0.15 mm; they occur interstitial to actinolite laths; pleochroism is from light to medium-dark brown. Dusty hematite? occurs with some biotite, and in similar patches interstitial to actinolite. The layer contains a few opaque grains up to 0.5 mm across.

QUARTZ-RICH LAYER

Quartz (90%) forms a regular mosaic of grains averaging 0.05-0.2 mm. Actinolite (5%) forms scattered ragged grains averaging 0.05-0.15 mm in size. Apatite (2%) forms scattered euhedral grains up to 0.15 mm across and a few clusters of anhedral grains of similar size. Zircon? (2%) forms abundant clusters of very fine rounded to euhedral grains averaging 0.02-0.03 mm in size; most clusters occur in the centers of quartz grains. Calcite (1%) forms irregular skeletal grains up to 0.7 mm across. Biotite forms a few grains intergrown with actinolite.

One patch consists of an irregular mosaic of fine grained (0.05-0.1 mm) quartz; it contains scattered actinolite and zircon grains, and skeletal calcite patches.

12903M3 BIOTITE - AUGITE - HORNBLENDE SYENITE/MONZONITE

This section contains 10-15% each of three mafic minerals; Biotite, Augite and Hornblende. Biotite exhibits a red-brown colour and is frequently interleaved with chlorite in subhedral-anhedral grains from 1-4 mm across. Augite grains reach 5 mm in length, are generally subhedral and altered to both a fine grained assemblage, and coarser, discrete grains of biotite and chlorite. Hornblende occurs both as discrete grains, up to 4 mm, and replacing Augite along its borders. Chlorite occurs in minor amounts, 3%, replacing Biotite, Augite and Hornblende.

The silicate fraction is dominated by 30-35% Orthoclase crystals up to 1 cm long with well developed carlsbad twins and numerous inclusions of Augite, Biotite and Plagioclase. Plagioclase, with a composition in the low andesine range, makes up roughly 15% of the section. Grains range from 0.2 - 2.0 mm in length and are subhedral in form. Both the andesine and orthoclase exhibit minor sausseritization. Quartz occurs interstitially in minor amounts, 3%, and minor, fine grained, euhedral Apatite is also found.

STATEMENT OF COSTS - MARN CLAIMS

Geology - 36 mandays

Wages	\$ 1,819.84
Travel	655.95
Vehicle Rental	215.03
Vehicle Operations	126.98
Camp Supplies	428.90
Miscellaneous Supplies	<u>93.87</u>

\$ 3,340.57

Geochemical - 2 mandays

Wages	88.60
Travel	36.44
Vehicle Rental	11.94
Vehicle Operations	7.06
Camp Supplies	23.83
Miscellaneous Supplies	5.22
Assays	<u>1,236.25</u>

1,409.50

Line Cutting - 3 mandays

Wages	144.70
Travel	54.66
Vehicle Rental	17.92
Vehicle Operations	10.58
Camp Supplies	35.74
Miscellaneous Supplies	<u>7.82</u>

271.42

RADEM - 9 mandays

Wages	447.66
Travel	163.99
Vehicle Rental	59.73
Vehicle Operations	35.27
Camp Supplies	119.14
Miscellaneous Supplies	26.07
Equipment Rental	496.96
Equipment Operation	<u>29.00</u>

1,402.74

Telephone	239.40
Postage and Freight	211.63
Helicopters - Trans North Turbo 2.8 hours	1,134.32
- Transwest Helicopters 18.2 hrs	<u>5,617.29</u>
Supervision	104.96
Report Writing - 20½ mandays	1,195.83
Drafting	864.00
Wages	705.55
Contractor Fees	304.51
Miscellaneous Supplies	<u>1,295.06</u>

\$ 16,678.16

WORK PERFORMED IN THE EXPLORATION OF OUR MARN CLAIMS

	Salary	Total Per Day (With Bush Bonus)
J. Biczok	1,586.67/month	74.06
P. Wagner	1,080.00/month	50.42
P. Lhotka	1,010.00/month	47.14
C. Stewart	885.00/month	44.30

August 1 to 31, 1979 - Geology, Geochemical, Line Cutting, Radem, Magnetometer

All above salaries are subject to bush bonus and vacation pay.

LEGEND

ROCK TYPES

CRETACEOUS

5 Mt. Brenner stock: equigranular to porphyritic, hornblende-biotite-augite monzonites, quartz monzonite, minor pyroxenite, aplite. 5a, biotite-augite monzonite; 5b, porphyritic monzonite/syenite, radioactive; 5c, metapyroxenite; 5d, augite-plagioclase porphyritic monzonite; 5e, trachytic, porphyritic syenite/monzonite; 5f, augite-biotite lamprophyre.

4 "Keno Hill Quartzite": thick bedded, massive, orthoquartzite, lesser interbedded slates.

JURASSIC

3 "Jurassic Schist": hornfelsic siltstone, quartzite, shaly phyllite, pyritiferous shale. 3a, red-brown weathering meta-siltstone, quartzite; 3b, black shaly phyllite. 3c, grey-black, pyritiferous shale.

PERMIAN

2 Tahkandit Formation: grey & white, crystalline, bioclastic limestone; chert pebble conglomerate at base; thinly bedded grey chert in middle part.

ORDOVICIAN & SILURIAN

1 Road River Formation: grey & black argillite, thick bedded to thinly laminated black shale, with lesser quartzite, siltstone, chert, chert breccia with shaly matrix.

SYMBOLS

- Geological contact, defined
- Geological contact, assumed
- Primary flow layering, dip unknown, inclined
- Bedding, inclined, tops unknown, tops known
- Joint set, inclined
- Vein, inclined
- Foliation inclined, vertical, dip unknown
- Fault zone

MATTAGAMI LAKE EXPLORATION LIMITED.

WESTERN FIELD OFFICE
EDMONTON, ALBERTA.

MARN PROJECT
DAWSON MINING DISTRICT, YUKON TERRITORY.
MAP 1, GEOLOGY

NTS 116 B/7 & B/10

DRAWN BY: D.R. BULL.

DATE FEBRUARY 1980

SCALE OF METRES
0 100 200 300 400 500 600 700 800 900 1000

