

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**  
GEOLOGICAL  
ASSESSMENT REPORT

15,049 on the

MUSTANG GROUP OF MINERAL CLAIMS  
KAMLOOPS LAKE AREA  
 KAMLOOPS MINING DIVISION

by

MURRAY MORRISON, B.Sc.

FILMED

Claims: Mustang 2 & 3, Sprout 1 - 3 (66 units)

Location: The Mustang Group of claims is situated 1 to 4 km east of Durand Creek and 3 to 7 km south of Kamloops Lake, or 5 km southeast of the Village of Savona, B.C.  
 Lat. 50°44'; Long. 120°45.5'  
 N.T.S. 92-I-10E+W.

{ Owner: } Murray S. Morrison ~~Vault Explorations Inc.~~

{ Operator: } ~~Vault Explorations Inc.~~

Date Started: May 5, 1986

Date Completed: June 14, 1986

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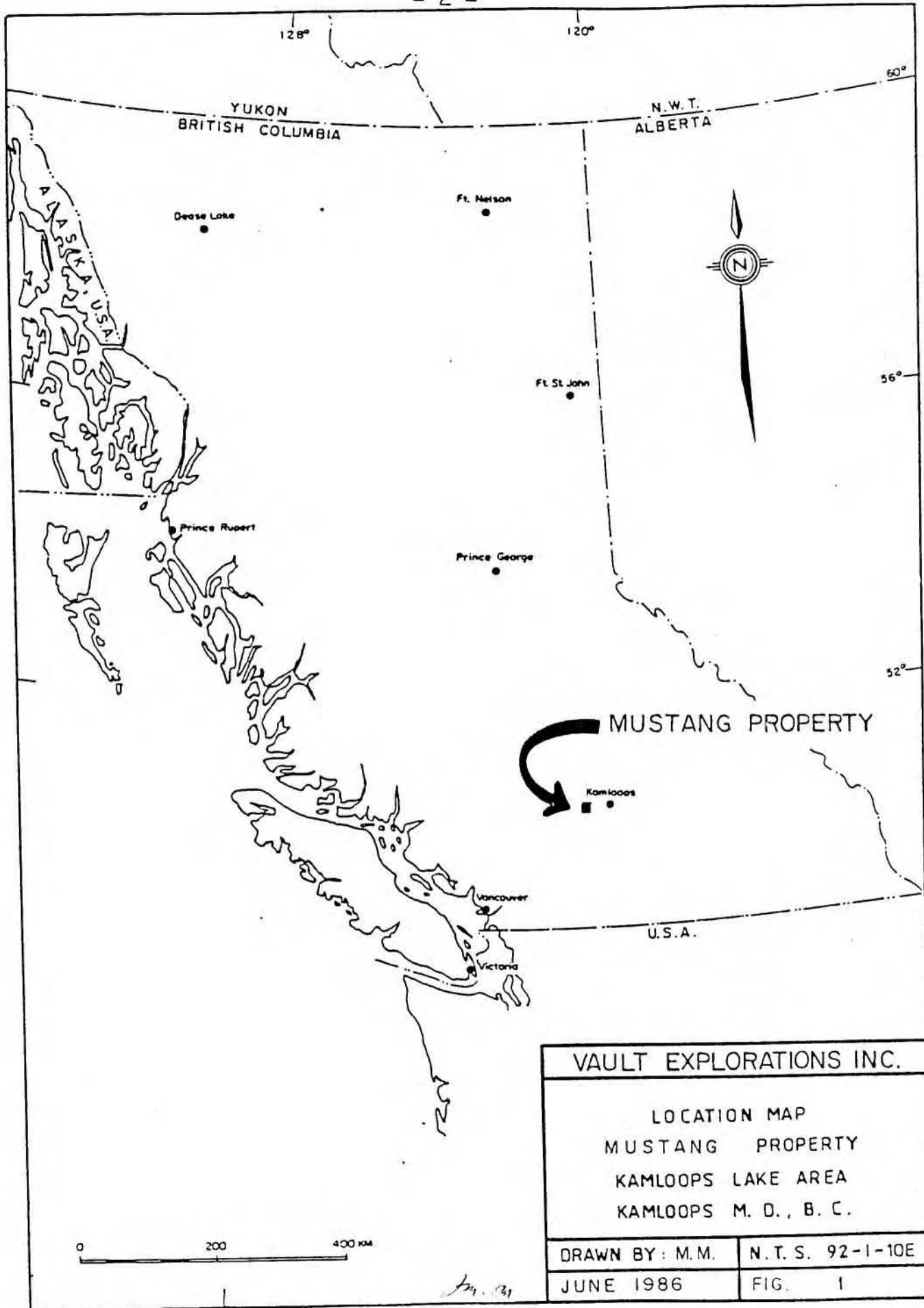
SUMMARY

The Mustang Group of Mineral Claims situated 5 km south of Kamloops Lake, or 29 km west of Kamloops, B.C., lies within the Savona Mercury Belt. The Mercury Belt has received the attention of several large exploration companies in recent years as a potential epithermal gold environment. Companies such as Placer Development, Newmont, Selco, Inco, and Asarco have concentrated exploration efforts on mercury-bearing carbonate alteration zones within Upper Triassic Nicola Group rocks. It is believed that these alteration zones represent the upper levels of epithermal systems that may be gold and silver bearing at depth.

The Mustang Group of Mineral Claims is made up of the Sprout 1-3 mineral claims, formerly owned by Newmont Explorations of Vancouver, B.C., and the Mustang 2 & 3 mineral claims, adjoining the Sprout claims immediately to the west. In 1982, Newmont discovered gold, silver, lead, zinc, and antimony mineralization associated with silica and pyrite near the centre of a carbonate alteration zone on the eastern side of their Sprout 2 mineral claim. The Mustang 2 & 3 mineral claims were staked this year (1986) to cover similar alteration zones associated with the southern extension of the Sabiston Creek Fault.

Exploration work this year was confined to the Mustang 2 & 3 mineral claims where several strong carbonate alteration zones were discovered. Preliminary analyses of samples from two of the alteration zones show slight to moderate concentrations of mercury, antimony and arsenic. These elements are considered "indicator elements" for precious metal-bearing epithermal systems in the Kamloops Lake region.

Further prospecting and sampling of the carbonate alteration zones on the Mustang 2 & 3 mineral claims is recommended. The drilling of carbonate alteration zones on the property should await the proposed drilling by Vault Explorations Inc. on their more advanced targets on neighbouring mineral claims.



## INTRODUCTION

The Mustang Group of Mineral claims, situated 5 km southeast of Savona, B.C., is comprised of the Sprout 1-3 and Mustang 2 & 3, 4-post mineral claims, totalling 66 units. The claim group covers an area underlain by Upper Triassic Nicola Group volcanoclastic sediments that are locally carbonate altered. The Sprout claims were originally staked by Newmont Exploration to cover one such carbonate alteration zone that had yielded anomalous gold and silver values. The Mustang 2 & 3 mineral claims, adjoining the Sprout claims on the west, were staked during April of this year (1986) to cover similar alteration zones found to align with the southern extension of the Sabiston Creek Fault.

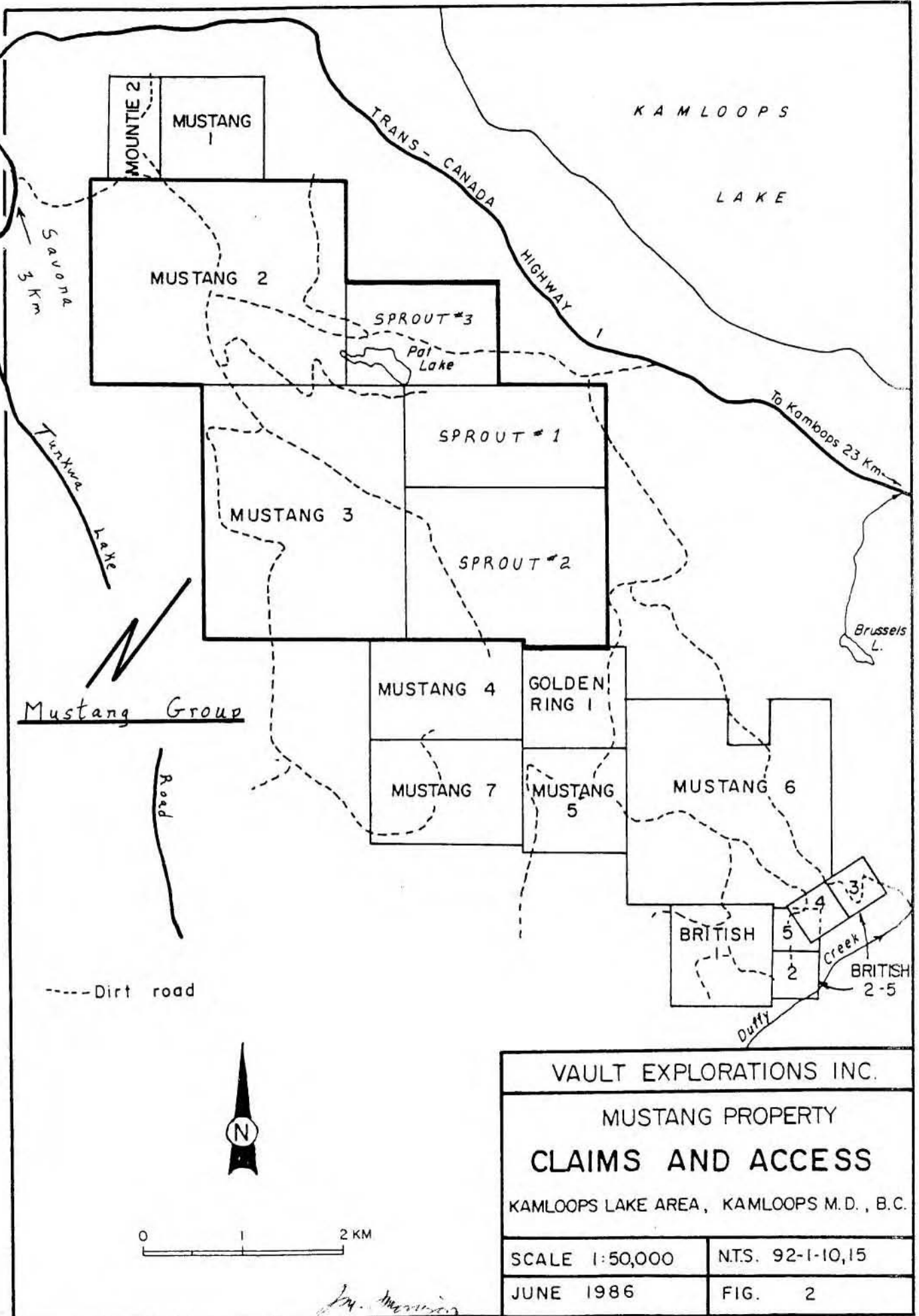
This year's field work (1986) was confined to the new Mustang 2 & 3 mineral claims belonging to Vault Explorations Inc. of Kelowna, B.C. A geological mapping program was conducted over the mineral claims during May and June. A discussion of the results of the mapping program is presented within the text of this report, while the geology is illustrated on Maps M-86-3&4 accompanying this report.

## LOCATION AND ACCESS

The Mustang 2&3 mineral claims are situated on a ridge 1 to 2 km east of Durand Creek, 3 to 7 km south of Kamloops Lake, or 5 km southeast of the Village of Savona, B.C. (Lat. 50°44'; Long. 120°45'; N.T.S. 92-I-10E+W).

Access to the property is via a gravel road leaving the Tunkwa Lake road 1 km from the Trans-Canada Highway (please see Figure # 2). The property can be reached in a 10 minute drive from the highway along the gravel logging road which is in good condition. An alternate route to the Mustang 2 mineral claim is via a dirt road passing by Pat Lake (Six Mile Lake).

Secondary dirt roads give access to scattered regions of the property as shown on the maps accompanying this report.



Savona Lake  
5 Km

Turku Lake

Mustang Group

Road

---Dirt road



0 1 2 KM

*J.M. Morrison*

KAMLOOPS

LAKE

TRANS-CANADA  
HIGHWAY 1

To Kamloops 23 Km

Brussels L.

MUSTANG 4 GOLDEN RING 1

MUSTANG 7 MUSTANG 5

MUSTANG 6

BRITISH

BRITISH 2-5

Creek

Duffy



PHYSICAL FEATURES AND CLIMATE

Elevations range from 600 to 1200 metres on the Mustang 2&3 mineral claims. Both claims feature rocky terrain. The Mustang 2 mineral claim covers a series of low ridges and hummocks with abundant rock outcroppings and a sparse forest of Douglas fir and Ponderosa pine. The Mustang 3 mineral claim covers a ridge rising steeply to the east of Durand Creek to the 1200 metre elevation. The northeastern side of the ridge is precipitous and, in part, inaccessible, dropping into the valley of the southern extension of the Sabiston Creek Fault. The forest cover on the Mustang 3 mineral claim is predominantly Douglas fir.

The Kamloops Lake region is semi-arid at lower elevations with precipitation equalling less than 30 cm per year. An increase in the precipitation from the lake, upwards, into the hills is marked by successive changes in vegetation from sagebrush, to Ponderosa pine, to Douglas fir. The Mustang 2 and 3 mineral claims cover ground ranging through all vegetation types from sagebrush to Douglas fir.

The winter snow is usually light (30 cm or less) on the Mustang 2 mineral claim, but increases with elevation on the Mustang 3 mineral claim, where at 1000 metres the snow can reach a depth of 90 cm. The snow covers the property from November until April each season.

Several lakes provide drinking water for grazing cattle on the property. An irrigation diversion channel from Durand Creek to Pat Lake also passes through the property.



CLAIM STATUS

The Mustang Group is made up of the Sprout 1-3 mineral claims belonging to the writer, M. Morrison, of Kelowna, B.C., and the Mustang 2&3 mineral claims staked by the writer in April, 1986. An option agreement allowing for the exploration and development of the Mustang 2&3 mineral claims by Vault Explorations Inc. of Kelowna, B.C. was signed by the writer on April 8, 1986. The agreement allows for a 100% transfer of interest in the Mustang 2&3 claims to Vault Explorations Inc. subject to certain conditions. Particulars on the Mustang Group of claims are given below:

<u>CLAIM NAME</u>	<u>UNITS</u>	<u>DATE OF RECORDING</u>	<u>RECORD NO.</u>	<u>MINING DIVISION</u>	<u>EXPIRY DATE *</u>
Sprout 1	8	June 25/82	4089	Kamloops	June 25/87
Sprout 2	12	June 25/82	4093	Kamloops	June 25/87
Sprout 3	6	July 30/82	4137	Kamloops	July 30/87
Mustang 2	20	April 23/86	6602	Kamloops	April 23/87
Mustang 3	20	April 23/86	6603	Kamloops	April 23/87

\* The new Expiry Date is based on the acceptance of this report for Assessment Work Credits.

HISTORY

The Mustang Group of mineral claims is located within the Historic Savona Mercury Belt - a 12 km wide belt running 20 km north and south of the west end of Kamloops Lake. Cinnabar occurs within late dolomite veins, filling ankerite-replaced Nicola Group rocks at several points within the Belt. The cinnabar occurrences were first investigated in the 1890's when considerable underground work was carried out on some of the richer prospects, such as those at Carabine Creek, Hardie Mountain, and Tunkwa Lake. During the early part of this decade several large exploration companies re-examined the old Mercury Belt as a potential epithermal gold belt. Companies involved in the area included Asarco, Inco, Newmont, Selco, Placer Development, and others.

Continued . . .

## HISTORY

The Mustang 2&3 mineral claims cover the southern extension of the Sabiston Creek Fault immediately west of the Sprout 1-3 mineral claims. The ground now covered by the Mustang 2&3 mineral claims has never undergone serious exploration. However, during 1982-83 Newmont Explorations of Vancouver did conduct a series of surveys across the Sprout claims including geological mapping, rock and soil geochemical sampling, VLF-EM surveying, and limited induced polarization surveying. Trenching was also conducted in selected areas on the Sprout claims by Newmont in 1982.

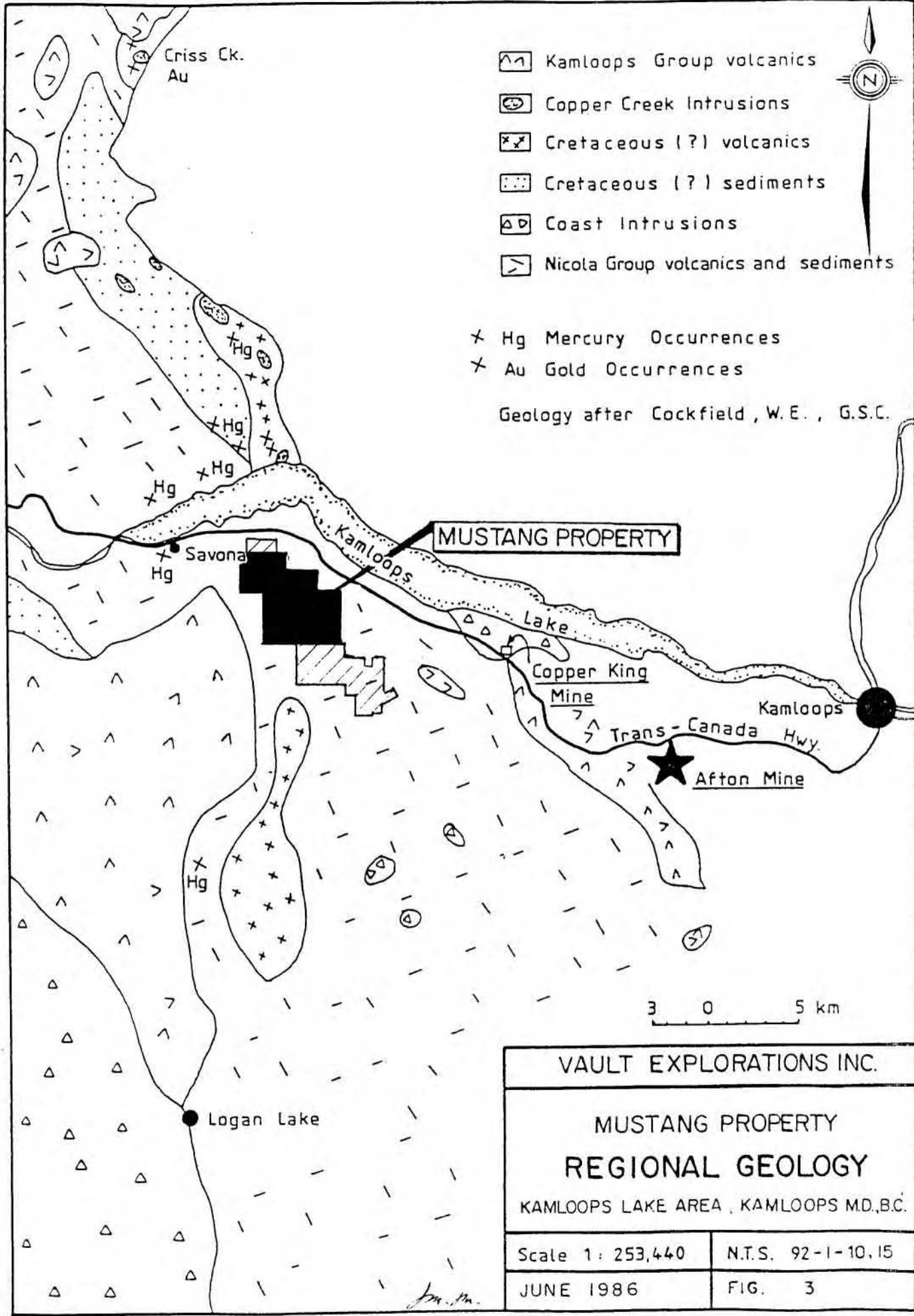
## REGIONAL GEOLOGY

Map 886A, entitled "Nicola", by W.E. Cockfield of the Geological Survey of Canada, illustrates the 12 km wide belt of Upper Triassic Nicola Group rocks that extends for 20 km north and south of Savona, B.C., at the western end of Kamloops Lake. The map shows the location of numerous old mercury prospects that occur within the Nicola Group rocks as well as others that occur within Late Cretaceous sedimentary and volcanic rocks.

The mercury showings at Carabine Creek are believed to be related to Tertiary Copper Creek Intrusions shown on the "Nicola" map. Copper Creek Intrusions have also been mapped near quartz veins bearing gold mineralization at Criss Creek near the north end of the Mercury Belt. It is, therefore, suspected that hydrothermal solutions emanating from high level intrusives related to the Tertiary Copper Creek Intrusions underlie many of the mercury bearing carbonate alteration zones within the Mercury Belt and that these zones may represent the upper levels of potential epithermal gold-bearing systems.

It is believed that the Newmont showing (illustrated on Figure 4) represents a Tertiary epithermal gold-bearing system. The showing

Continued . . .



- Kamloops Group volcanics
- Copper Creek Intrusions
- Cretaceous (?) volcanics
- Cretaceous (?) sediments
- Coast Intrusions
- Nicola Group volcanics and sediments

- Hg Mercury Occurrences
- Au Gold Occurrences

Geology after Cockfield, W.E., G.S.C.

3 0 5 km

VAULT EXPLORATIONS INC.	
MUSTANG PROPERTY REGIONAL GEOLOGY	
KAMLOOPS LAKE AREA, KAMLOOPS MD., B.C.	
Scale 1 : 253,440	N.T.S. 92-1-10, 15
JUNE 1986	FIG. 3

REGIONAL GEOLOGY - Continued

was discovered by Newmont Exploration geologists in 1982. It consists of a brecciated quartz-chalcedony vein that is mineralized with pyrite, galena, sphalerite, stibnite, and tetrahedrite. The vein carried good silver values and some gold. The vein is bordered by carbonate alteration similar to that seen throughout the district.

Another zone of anomalous gold (1775 ppb) and arsenic (400 ppm) mineralization has been discovered (1984) within carbonate altered Nicola Group rocks on the Goldstone Explorations Brussels property 4 km east of the Mustang property.

Regionally, the Mustang property lies 19 km west of the well-known Afton Copper (gold and silver) Mine, and 12 km west of the old Copper Kine Mine (copper, gold, and silver). Late Triassic Cherry Creek Intrusives, thought by some geologists to be coeval with the Nicola Group volcanics, played a role in the mineralization at both copper mines. Although there is a large age difference between the intrusives of the Mercury Belt and the intrusives of the copper mines, the gold and silver production at the mines does at least indicate that the Nicola Group rocks south of Kamloops Lake have an apparent high genetic (?) potential for carrying gold and silver values.

In the Savona district the geology has a distinct northwesterly trend, with probable major faults aligning with Deadman River, Sabiston Creek, Carabine Creek, and Durand Creek. Open File Map 980 of the Ashcroft area by J.W.H. Monger et al. of the Geological Survey of Canada shows the Sabiston Creek fault to continue south of Kamloops Lake, and to extend across the Mustang property (named the Mountie Fault on Figure 4). Several northwest and northeast striking lineaments of lesser order of magnitude also cross the property. Early Tertiary(?) intrusives with related carbonate and siliceous alteration zones appear to align with some of these lesser order lineaments.

## GEOLOGICAL MAPPING - 1986

A Silva Ranger Compass and Topolite Belt Chain were used to establish flagged Baselines and grid lines across the Mustang 2&3 mineral claims. Two Baselines, totalling 6 km, were measured out at 330 degrees, parallel to geology, while flagged grid lines, totalling 19.1 km, were measured at right angles from the Baselines at a spacing of 500 metres. Stations were marked along the grid lines at 25 metre intervals to facilitate geological mapping. A total of six man days were required to lay out the grid.

Eighteen days were spent geologically mapping the Mustang 2&3 mineral claims at a scale of 1:4,000. Mapping along the widely spaced grid lines does not allow for a good interpretation of the geology, therefore, rock unit boundaries have been left off of Maps M-86-3&4 accompanying this report. The main thrust of this year's (1986) work was to define fault zones and the carbonate alteration zones associated with them.

Three lithogeochemical samples were collected from alteration zones during the course of mapping.

## PROPERTY GEOLOGY AND MINERALIZATION

### General

The Mustang property is underlain by volcanic-derived sedimentary rocks of the Upper Triassic Nicola Group that are believed to have been intruded by high level intrusives of Late Cretaceous or Early Tertiary Age.

In most cases the volcanic clasts of the Nicola Group sedimentary rocks are little weathered, and have been deposited quickly in poorly sorted massive conglomerate beds, although some interbedded sandstone and siltstone beds also occur. The clasts have undergone little transportation or mixing, and thick assemblages of predominantly basaltic, andesitic, or trachyandesitic beds occur.

Continued . . .



PROPERTY GEOLOGY AND MINERALIZATION - CONTINUED.

General - Continued

During this year's (1986) mapping it was found convenient to identify and map the rocks according to the predominant clast content, without giving consideration to stratigraphy. Therefore, Unit 1 sediments are identified as those made up of trachyandesitic clasts predominantly; Unit 2 sediments as those made up of basaltic clasts predominantly; and Unit 4 sediments as those made up of andesitic clasts predominantly. Unit 3 rocks include a wide range of sediments that do not fit into the three volcanic-derived categories. Unit 3 sedimentary clasts are of mixed varieties, and they are often more rounded than the pure volcanic clasts. Unit 3 sediments also include limy conglomerates, limy sandstones, and limestones.

The sediments of the Mustang 2&3 mineral claims appear to form a monoclinial sequence striking northwest and dipping steeply northeast. There is some repetition of rock types from southwest to northeast.

Unit 1 - Sedimentary Rocks of Predominantly Trachyandesitic Clasts.

Unit 1, trachyandesite-derived sedimentary rocks occur as a 200-metre wide belt extending through the east-central portion of the Mustang 2 mineral claim, and as an isolated unit underlying the north-central portion of the Mustang 3 mineral claim. The trachyandesite unit is a poorly sorted, coarse cobble to boulder conglomerate. Some boulders measure up to 60 cm. A sandy matrix of 20% is also comprised of trachyandesite clasts. No attitudes were obtained from the conglomerate beds, but they are believed to dip steeply northeast conforming with the stratigraphy of other sedimentary units on the property.

Continued . . .



PROPERTY GEOLOGY AND MINERALIZATION - CONTINUED

Unit 2 - Sedimentary Rocks of Predominantly Basaltic Clasts.

Unit 2 rocks - rocks made up of basalt derived clasts - occur as two major belts crossing the Mustang 2 & 3 mineral claims. One belt 300 to 400 metres wide lies directly west of (and below) the Unit 1 rocks just described, while a second belt occurs along the western side of the Mustang 3 mineral claim directly below andesitic derived sedimentary rocks. The basaltic sediments range from poorly sorted, coarse conglomerates to sandstones and siltstones. Although conglomerates prevail there are thick sequences of interbedded sandstones and siltstones striking northwest and dipping steeply northeast near the centre of the Mustang 2 mineral claim.

Unit 3 - Sedimentary Rocks of Mixed Clasts.

Unit 3 rocks include sedimentary rocks with sub-rounded to rounded clasts of many varieties. Limestones, limy sandstones, and limy conglomerates form thick interbedded sequences on the western side of the Mustang 2 mineral claim, and near the Baseline on the central portion of the claim. Some of the limestone beds are thick and pure. A white rhyolite tuff is interbedded with Unit 3 rocks near the western border of the Mustang 2 mineral claim. The Unit 3 sedimentary rocks appear to form two distinct series. One immediately below the basaltic Unit 2 rocks, and another below a thick sequence of Unit 4 rocks on the western side of the Mustang 2 mineral claim.

Unit 4 - Sedimentary Rocks of Predominantly Andesitic Clasts.

Two 800 metre wide belts of andesitic-derived sedimentary sequences, (Unit 4 rocks) cross the Mustang 2&3 mineral claims from northwest to southeast. One belt runs off of the eastern side of the mineral claims and its full width is unknown. The second belt runs across the west-central portion of both mineral claims. Unit 4 rocks include thick sequences of coarse conglomerates as well as thin

Continued . . .

PROPERTY GEOLOGY AND MINERALIZATION - CONTINUED

Unit 4 - Sedimentary Rocks of Predominantly Andesitic Clasts - Continued.

bedded pebble conglomerates, sandstones and siltstones.

Unit 5 - Quartz-Eye Porphyry Intrusives

No quartz-eye porphyry or felsic intrusives have been mapped within the boundaries of the Mustang 2&3 mineral claims, but they have been mapped on claims immediately to the southeast of the property, and they are believed to underlie some of the carbonate alteration zones on the property at shallow depths.

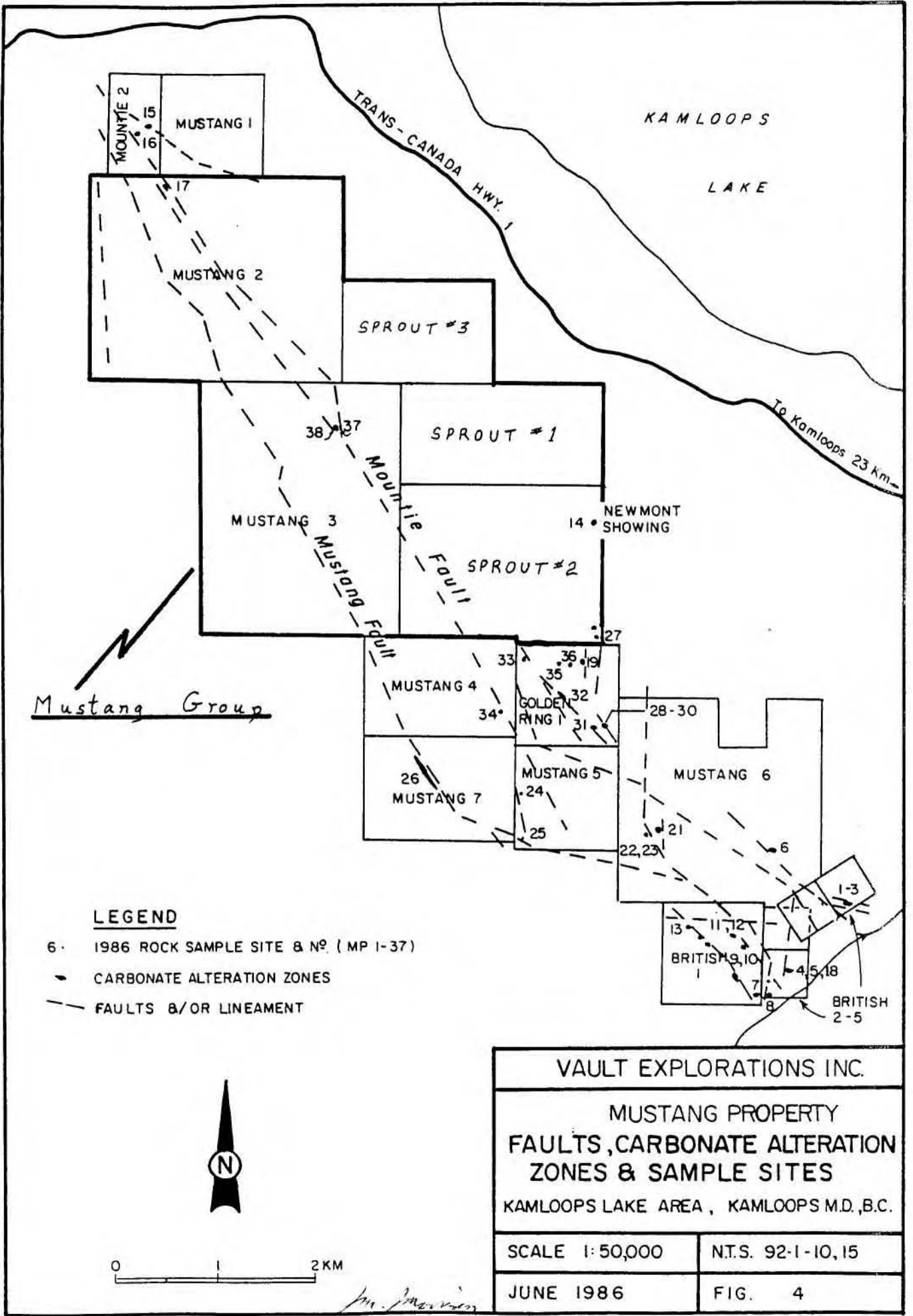
Structural Geology and Faulting

As mentioned earlier, the sedimentary units mapped on the Mustang property appear to be monoclinial, striking northwest (320 to 355 degrees) and dipping steeply northeast (65 to 80 degrees). Major sedimentary units can be traced from one end of the property to the other, but due to the broad scale of the mapping no attempt has been made to trace geological contacts between the units on Maps M-86-3&4.

Faulting is a dominant feature of the geology on the Mustang property, and several faults or air photo lineaments are illustrated on Maps M-86-3&4. Many of the lineaments, first identified on air photographs, were later confirmed as faults during field mapping. Field evidence believed to indicate faulting includes slickenside surfaces on fracture planes noted in areas of intense fracturing.

Two strong faults in terms of both topographic expression and associated carbonate alteration are the Mustang and Mountie Faults identified on Figure 4. Each fault crosses the entire Mustang property at 330 degrees - with some notable late offsetting. The two faults are believed to represent the southern extension

Continued . . .



**LEGEND**

- 6 • 1986 ROCK SAMPLE SITE & NO. (MP 1-37)
- CARBONATE ALTERATION ZONES
- - - FAULTS &/OR LINEAMENT

VAULT EXPLORATIONS INC.	
MUSTANG PROPERTY FAULTS, CARBONATE ALTERATION ZONES & SAMPLE SITES KAMLOOPS LAKE AREA, KAMLOOPS M.D., B.C.	
SCALE 1: 50,000	N.T.S. 92-1-10, 15
JUNE 1986	FIG. 4

PROPERTY GEOLOGY AND MINERALIZATION - CONTINUED

Structural Geology and Faulting - Continued

of the Sabiston Creek Fault mapped to the north of Kamloops Lake by Monger et al..

Dominant fault directions on both Maps M-86-3 & 4 are 310 to 330 degrees (northwest faults) 350 to 10 degrees (north-south faults), and 80 to 120 degrees (east-west faults). Map M-86-4 also shows strong faulting at 60 to 80 degrees (northeast faults).

The north-south and east-west faults appear to be late as they offset the northwest and northeast faults. They also appear to be post-mineral faults. The best carbonate alteration zones on the property are associated with the two major northwest faults named earlier as the Mountie and Mustang Faults.

Alteration and Mineralization

Carbonate alteration is widespread on the Mustang 2 & 3 mineral claims, and it has been designated as weak, moderate or intense on Maps M-86-3&4. Carbonatization on the property involves the replacement of the original rock minerals of the basaltic or andisitic derived sediments by ankerite and dolomite. Weak carbonate alteration is represented by 1-10% replacement and 1-2% veining by ankerite and dolomite; moderate alteration is represented by 10-30% replacement and up to 5% veining; and intense alteration is represented by 30-90% replacement and up to 10% veining. Silica replacement occurs within some zones of intense carbonate alteration and can equal up to 10%. Late quartz or chalcedony veinlets equalling  $\frac{1}{2}$  to 2% also occur within many of carbonate alteration zones as indicated on Maps M-86-3&4. Trace amounts of pyrite or chalcopyrite occur as disseminated grains within the carbonate alteration zones, and there is a distinct increase in the pyrite content with silicification.

Continued . . .

PROPERTY GEOLOGY AND MINERALIZATION - CONTINUED

Alteration and Mineralization - Continued

Limonite is a common weathered product of ankerite and is abundant at all alteration zones. Weak hematite staining is also widespread across the property and is usually associated with the deep weathering of the fault zones.

Mustang 2 MC - Northwest Carbonate Alteration Zone

A zone of moderate carbonate alteration occurs near the edge of the old highway near the north boundary of the Mustang 2 mineral claim. The 20 by 100 metre zone is poorly exposed, being made up mostly of large blocks of angular float. The carbonate altered float is locally cut by up to 1% quartz veinlets. Rock chip sample MP-17 collected from this zone yielded slightly anomalous antimony (5 ppm) and arsenic (59 ppm). The zone occurs near the centre of a drift-filled valley and may be more extensive than the rock exposures would suggest. The zone has significance in that it is coincident with the major Mountie Fault zone.

Mustang 2 MC - Northeast Carbonate Alteration Zone

Carbonate alteration with associated quartz and ankerite veinlets occurs in andesitic pebble conglomerates, sandstones and siltstones over a 500 square metre area 600 metres south of the Legal Corner Post of the Mustang 2 mineral claim. Although no samples have been assayed from this zone, the zone has potential in that it is near the intersection of several major faults.

Mustang 2 MC - Southwest Carbonate Alteration Zone

A zone of intense carbonate alteration occurs within a sandstone bed near the end of grid line 90N. The zone contains disseminated pyrite and lies 70 metres west of a major north-south fault.

Continued . . .



PROPERTY GEOLOGY AND MINERALIZATION - CONTINUED

Mustang 3 MC - North Boundary Carbonate Alteration Zone

Carbonate alteration occurs over an area measuring 200 by 100 metres northeast of a small lake near the north boundary of the Mustang 3 mineral claim. Zones within the alteration halo containing up to 1% quartz veining were noted. The zones are associated with three northwesterly striking faults passing through the area. Altered rocks include pebble conglomerates derived from both andesites and basalts.

Mustang 3 MC - Northeast Carbonate Alteration Zone

A moderate to intense carbonate alteration zone occurs along the Mountie Fault 350 metres south of the zone just described above. Some selected rock chips containing 2% quartz veining and  $\frac{1}{2}$ % pyrite were selected at two sites from this carbonate alteration zone and both (MP-37&38) yielded anomalous mercury (9300 and 13,000 ppb), antimony (21 and 39 ppm), and arsenic (169 and 424 ppm). The altered rock at this site is a pebble conglomerate derived from andesite.

Mustang 3 MC - Baseline 50 West Carbonate Alteration Zones

Sandstones and siltstones derived from andesite are moderately to intensely carbonate altered near Baseline 50 West at grid 65 and 69 north. Similarly altered rocks occur on grid line 60N at 55W. No samples have been assayed from these zones as yet, and they are all worthy of further prospecting.



## DISCUSSION

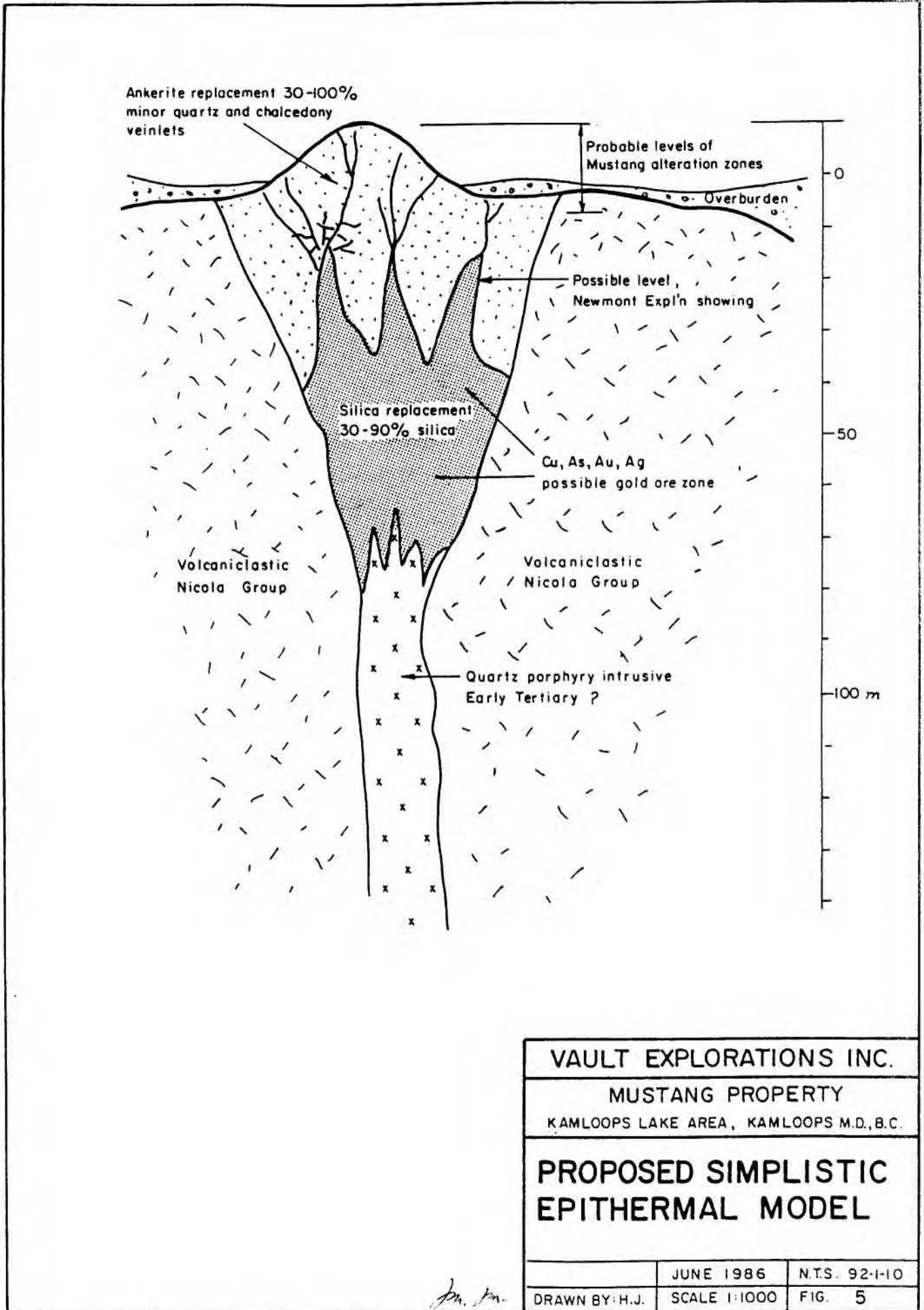
During the past five years the writer has visited or prospected several carbonate alteration zones located between Kamloops Lake and Duffy Creek. Some zones are composed entirely of ankerite and are barren of ore minerals, while others, such as the Newmont showing (described under Regional Geology) are silica rich, and carry ore minerals (galena, sphalerite, stibnite and tetrahedrite) with associated silver and gold values. Although the alteration zones display a variety of types and intensities it is felt that they are all of a single age, and related to Late Cretaceous or Early Tertiary felsic intrusives. Faulting appears to have controlled the emplacement of the intrusions and the channelling of related hydrothermal solutions. These solutions are believed to have brought about the carbonate alteration and the silicification viewed at several localities as well as the epithermal silver and gold mineralization at the Newmont showing.

The difference between the silver and gold-bearing Newmont showing and some of the carbonate alteration zones on the Mustang 2&3 claims may be one of vertical zoning, where the centre of the epithermal system has been exposed by erosion at the Newmont showing, while only the uppermost levels of the epithermal system have been exposed on the Mustang 2&3 claims.

In theory, gold and silver mineralization precipitate from hydrothermal solutions at specific temperatures and pressures. Although the gold and silver "freeze" and become immobile at a certain horizon the hydrothermal solutions continue on, upward, carrying "indicator" elements such as arsenic, antimony and mercury into the overlying alteration zones that are composed of low temperature silica or carbonate. At some point during ascent the indicator elements also precipitate leaving only the low temperature hydrothermal solutions to carry on.

In the Kamloops Lake region there are several different horizons of the epithermal system that have been exposed by erosion and

Continued . . .



DISCUSSION - Continued

the following four distinct levels of a typical epithermal system can be recognized:

- Level 1 is represented by expansive zones of strong carbonate alteration, generally forming erosionally resistant ridges. These zones may or may not contain indicator elements.
- Level 2 is made up of a sub-cap of low temperature silica just 10 to 20 metres below the carbonate zone. This zone may or may not carry indicator elements depending on the amount of late cross-cutting quartz veining.
- Level 3 is made up of a quartz vein stockwork of restricted lateral extent lying somewhere beneath the siliceous sub-cap. The stockwork, as represented by the Newmont showing, may contain ore minerals carrying silver and gold values.
- Level 4 is made up of a high level porphyritic intrusive occurring 50 to 100 metres below Level 1.

Most of the carbonate alteration zones on the Mustang property equate with Level 1 of the model, and it is of great interest to note that the Northeast Carbonate Alteration Zone on the Mustang 3 mineral claim does carry anomalous mercury, antimony and arsenic values.

CONCLUSIONS AND RECOMMENDATIONS

Some of the carbonate alteration zones on the Mustang 2&3 mineral claims are very sizeable, and two of the zones that have been sampled have yielded slight to moderate concentrations of mercury, antimony and arsenic. These elements are considered "indicator elements" in searching for epithermal precious metal deposits and the carbonate alteration zones on the Mustang property should be

Continued . . .

CONCLUSIONS AND RECOMMENDATIONS - CONTINUED

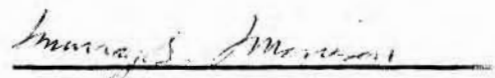
considered exploration targets in view of the Kamloops Lake epithermal model (described under the title "Discussion").

The main carbonate alteration zones occurring on the Mustang 2&3 mineral claims should be further prospected and samples should be collected and analyzed for indicator elements and precious metals.

Vault Explorations Inc. soon plans to drill carbonate alteration zones on their neighbouring claims, and the outcome of this drilling will greatly advance the understanding of the Kamloops Lake epithermal systems.

If the outcome of the recommended prospecting and sampling proves positive, or if the drilling on neighbouring claims meets with encouraging results, then the drilling of some of the carbonate alteration zones on the Mustang 2&3 mineral claims would be an easy matter. Many of the zones are readily accessible for a truck-mounted percussion drill, and drill water could be obtained from any one of the several lakes on the property.

Kelowna, B.C.  
August 15, 1986

  
Murray S. Morrison, B.Sc.

REFERENCES

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- 1947: Map 886A, Nicola, Kamloops and Yale Districts, British Columbia, Geological Survey of Canada.

Jones, H.M.

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APPENDIX "A"

STATEMENT OF QUALIFICATIONS

I, Murray Morrison, of the City of Kelowna, in the Province of British Columbia, do hereby state that:

1. I graduated from the University of British Columbia in 1969 with a B.Sc. Degree in Geology.
2. I have been working in all phases of mining exploration in Canada for the past sixteen years.
3. During the past sixteen years, I have intermittently held responsible positions as a geologist with various mineral exploration companies in Canada.
4. I have examined many mineral properties in Southern British Columbia during the past sixteen years.
5. I supervised the Geological Mapping Program outlined in this report.
6. I am the Optionor of the Mustang 2 & 3 mineral claims, and I retain a conditional interest in these claims.

August 15, 1986  
Kelowna, B.C.

  
Murray Morrison, B.Sc.



APPENDIX "B"

STATEMENT OF EXPENDITURES - ON THE MUSTANG GROUP OF MINERAL CLAIMS.

Statement of Expenditures in connection with the Geological Mapping Program carried out on the Mustang 2 & 3 Mineral Claims, located in the Kamloops Lake region of British Columbia (N.T.S. 92-I-10E+W) for the year 1986.

FIELDWORK - ESTABLISHING FLAGGED GRID LINES (25.1 km).

B. Callaghan, geologist	6 days @ \$80.00/day	\$ 480.
Meals and Lodging	6 days @ \$45.00/day	270.
Truck (4x4 incl. gasoline	6 days @ \$60.00/day	
( $\frac{1}{2}$ of cost allocated to this job)		180.
Flagging, belt chain thread, etc.	6 days @ \$20.00/day	120.
	Sub-total:	\$ 1,050.

FIELDWORK - GEOLOGICAL MAPPING


B. Callaghan, geologist	18 days @ \$170.00/day	\$ 3,060.
Meals and Lodging	18 days @ \$ 45.00/day	810.
Truck (4x4 incl. gasoline)	18 days @ \$ 60.00/day	
( $\frac{1}{2}$ of cost allocated to this job)		540.
	Sub-total:	\$ 4,410.

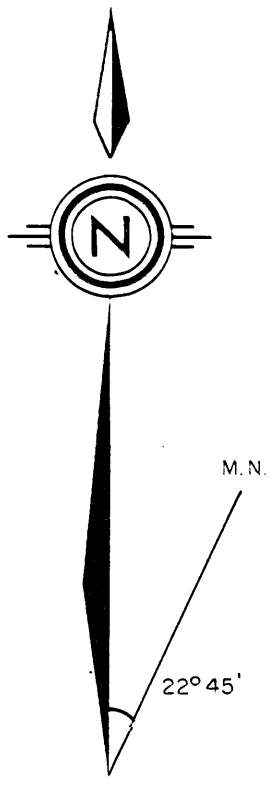
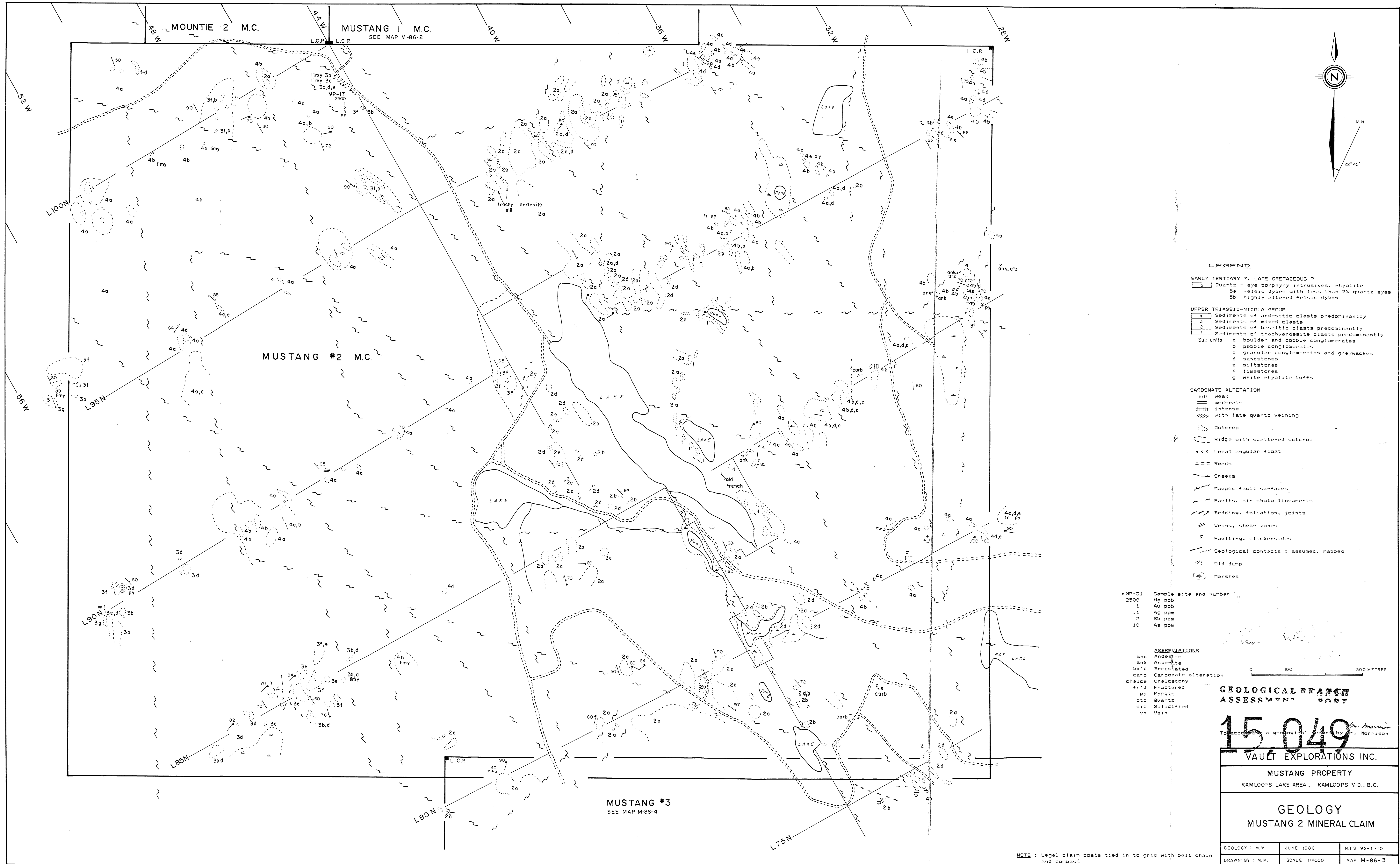
REPORT PREPARATION COSTS

Writing Report	3 days @ \$170.00/day	\$ 510.
Drafting		160.
Typing		50.
Copying		15.
	Sub-total:	\$ 735.
	<u>GRAND TOTAL:</u>	\$ 6,195.

I hereby certify that the preceding statement is a true statement of monies expended in connection with the Geological Mapping Program carried out May 5th to June 14th, 1986.

August 15, 1986

  
Murray Morrison - Geologist.



**LEGEND**

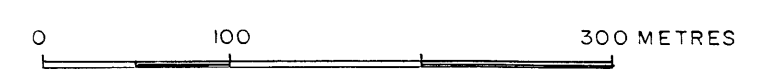
EARLY TERTIARY ?, LATE CRETACEOUS ?  
 5 Quartz-eye porphyry intrusives, rhyolite  
 5a felsic dykes with less than 2% quartz eyes  
 5b highly altered felsic dykes

UPPER TRIASSIC-NICOLA GROUP  
 4 Sediments of andesitic clasts predominantly  
 3 Sediments of mixed clasts  
 2 Sediments of basaltic clasts predominantly  
 1 Sediments of trachyandesite clasts predominantly  
 Subunits: a boulder and cobble conglomerates  
 b pebble conglomerates  
 c granular conglomerates and greywackes  
 d sandstones  
 e siltstones  
 f limestones  
 g white rhyolite tuffs

CARBONATE ALTERATION  
 ||||| weak  
 ||||| moderate  
 ||||| intense  
 ||||| with late quartz veining  
 ○ Outcrop  
 - - - Ridge with scattered outcrop  
 x x x Local angular float  
 = = = Roads  
 ~ ~ ~ Creeks  
 --- Mapped fault surfaces  
 ~ ~ ~ Faults, air photo lineaments  
 / / / Bedding, foliation, joints  
 // // Veins, shear zones  
 F Faulting, slickensides  
 - - - Geological contacts: assumed, mapped  
 ( ) Old dump  
 ( ) Marshes

•MP-31 Sample site and number  
 2500 Mg ppb  
 1 Au ppb  
 .1 Ag ppm  
 3 Sb ppm  
 10 As ppm

ABBREVIATIONS  
 and Andesite  
 ank Ankerite  
 bx'd Brecciated  
 carb Carbonate alteration  
 chalc Chalcedony  
 fr'd Fractured  
 py Pyrite  
 qtz Quartz  
 sil Silicified  
 vn Vein



**GEOLOGICAL FRANCH ASSESSMENT REPORT**

**15,049**  
 To accompany a geological report by Dr. Morrison

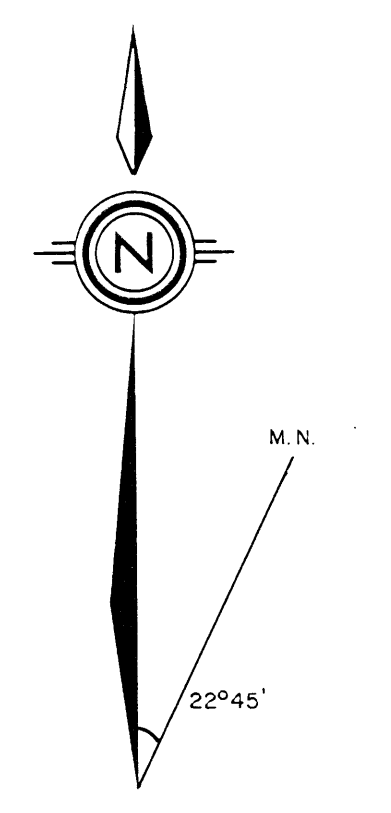
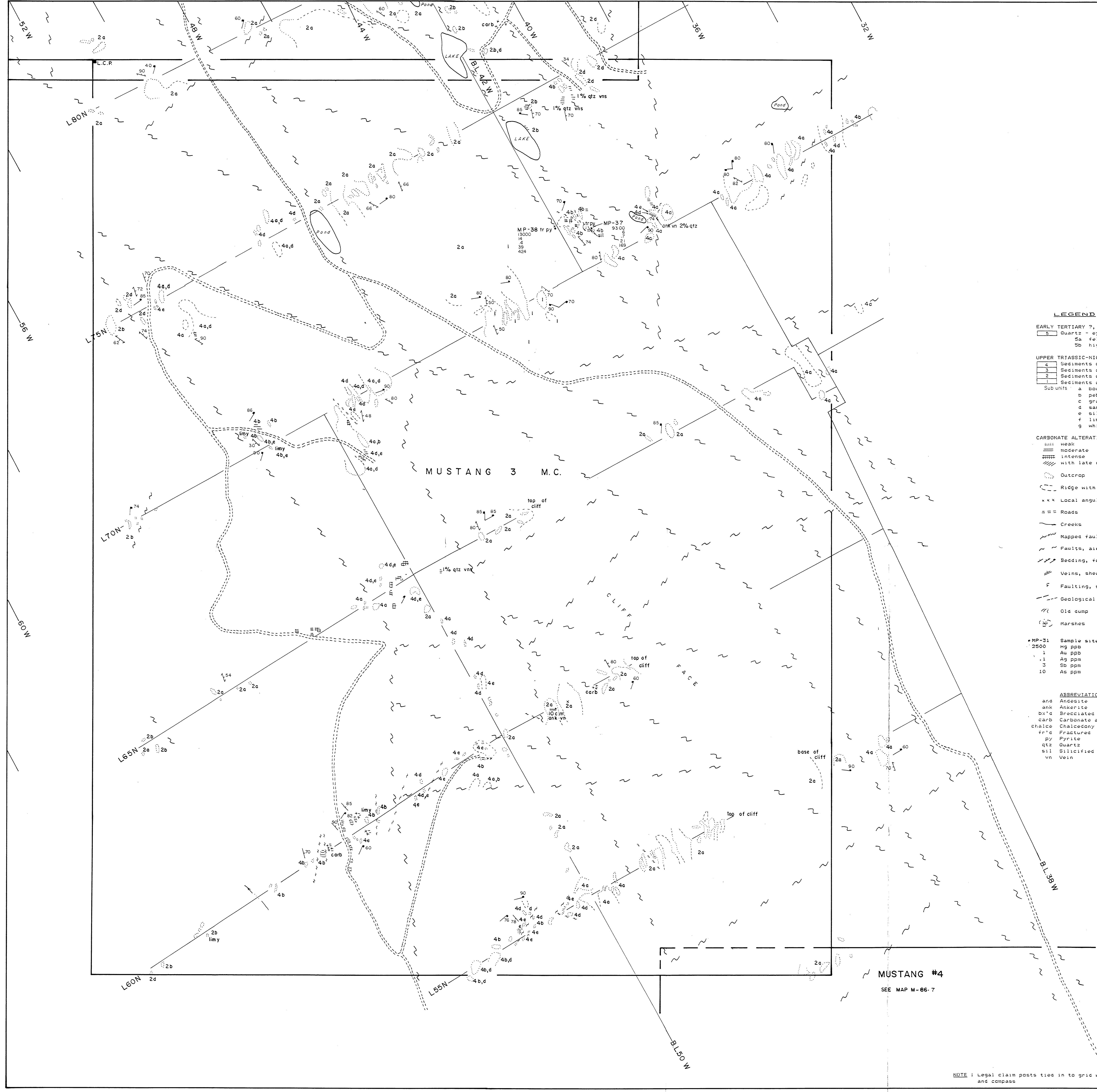
Vault Explorations Inc.

MUSTANG PROPERTY  
 KAMLOOPS LAKE AREA, KAMLOOPS M.D., B.C.

**GEOLOGY  
 MUSTANG 2 MINERAL CLAIM**

GEOLOGY: M.M.	JUNE 1986	N.T.S. 92-1-10
DRAWN BY: M.M.	SCALE 1:4000	MAP M-86-3

NOTE: Legal claim posts tied in to grid with belt chain and compass



**LEGEND**

EARLY TERTIARY ?, LATE CRETACEOUS ?  
 5 Quartz - eye porphyry intrusives, rhyolite  
 5a felsic dykes with less than 2% quartz eyes  
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 Subunits:  
 a boulder and cobble conglomerates  
 b pebble conglomerates  
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 d sandstones  
 e siltstones  
 f limestones  
 g white rhyolite tuffs

CARBONATE ALTERATION  
 [Symbol] weak  
 [Symbol] moderate  
 [Symbol] intense  
 [Symbol] with late quartz veining  
 [Symbol] Outcrop  
 [Symbol] Ridge with scattered outcrop  
 x x x Local angular float  
 = = = Roads  
 ~ ~ ~ Creeks  
 [Symbol] Mapped fault surfaces  
 [Symbol] Faults, air photo lineaments  
 [Symbol] Bedding, foliation, joints  
 [Symbol] Veins, shear zones  
 F Faulting, slickensides  
 - - - Geological contacts : assumed, mapped  
 [Symbol] Old dump  
 [Symbol] Marshes

\*MP-31 Sample site and number  
 2500 Hg ppb  
 .1 Au ppb  
 .1 Ag ppm  
 3 Sb ppm  
 10 As ppm

ABBREVIATIONS  
 ank Andesite  
 ank Ankerite  
 b'd Brachiopod  
 carb Carbonate alteration  
 chalc Chalcedony  
 fr'd Fractured  
 py Pyrite  
 qtz Quartz  
 sil Silicified  
 vn Vein

**GEOLOGICAL BRANCH ASSESSMENT REPORT**

**15,049**

To accompany a geological report by Mr. Morrison

VAULT EXPLORATIONS INC.		
MUSTANG PROPERTY KAMLOOPS LAKE AREA, KAMLOOPS M.D., B.C.		
GEOLOGY MUSTANG 3 MINERAL CLAIM		
GEOLOGY: M.M.	JUNE 1986	N.T.S. 92-1-10
DRAWN BY: M.M.	SCALE 1:4000	MAP M-86-4

MUSTANG #4  
SEE MAP M-86-7

NOTE: Legal claim posts tied in to grid with belt chain and compass