

INTERPRETATION OF COLOR AERIAL PHOTOGRAPHY

FOR THE

HART SILVER PROPERTY

MAY 3 - JUNE 17, 1987

RANCHERIA AREA, YUKON

This study covers a 1200 km<sup>2</sup> area centered on 60° 20' N 130° 44' W on mineral claims CMC 1-104, SH 1-196, BEA 1-102, SABI 1-272 and CAR 1-1181 within N.T.S. Sheets 105B 1,2,7 and 8

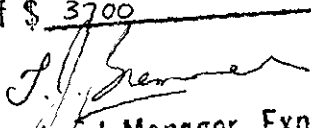
by

Paul A. Hawkins, B.Sc., P.Eng.  
Paul A. Hawkins & Associates Ltd.,  
Calgary, Alberta  
Report #116-1A



081990

This report has been examined by  
the Geological Evaluation Unit  
under Section 53 (4) Yukon Quartz  
Mining Act and is allowed as  
representation work in the amount  
of \$ 3700.

*for*   
Regional Manager, Exploration and  
Geological Services for Commissioner  
of Yukon Territory.

## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
1.1 Physiography	1
1.2 Previous Work	4
1.3 General Geology	4
2.0 FRACTURE ANALYSIS	7
2.1 Preliminary Examination of Landsat Scene	8
2.2 Summary and Conclusions	8
2.3 Recommended Future Work	9
CERTIFICATION	11
EXPENDITURE STATEMENT	12
TABLE OF CLAIMS WORK APPLIED TO	13
REFERENCES	14

091990

LIST OF MAPS

Property Location	A86-116-1
Airphoto Index	A86-116-2
Regional Airphoto Lineament Compilation	E86-116-3A

## 1.0 INTRODUCTION

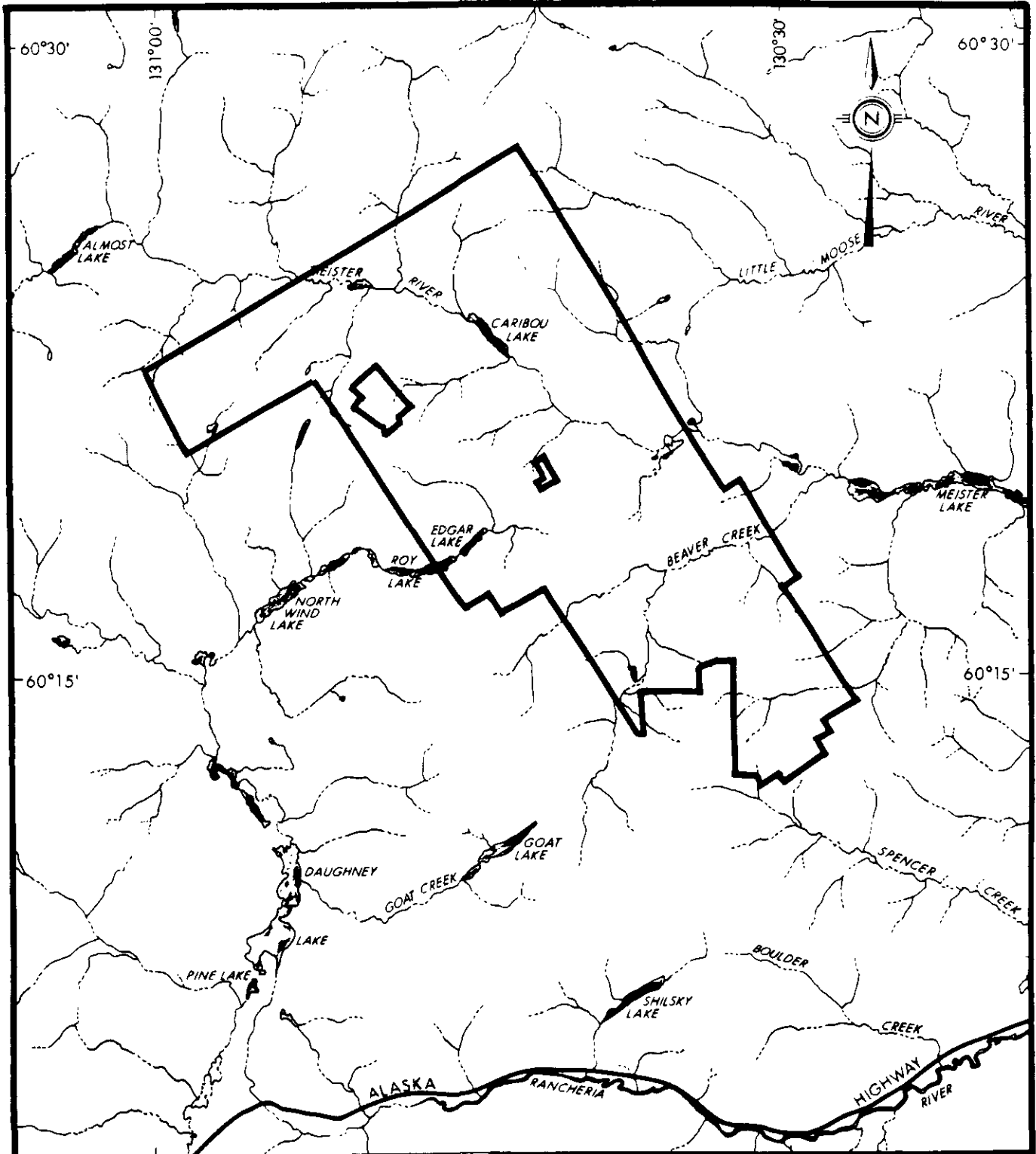
The Rancheria area is located about 110 km WSW of Watson Lake, Yukon in the Watson Lake Mining District. Within this area a mineralized belt about 100 km long by 50 km wide occurs in the SE corner of the Yukon. Over 50 prospects and deposits are reported to occur in the area. Mineralization occurs in Paleozoic sediments and Cretaceous Plutonic rocks as veins and replacements. Mineralization is similar to deposits like Keno Hill and Galena Hill.

The Hart Silver property is located just north of Edgar Lake in N.T.S 105B/7 as shown on Drawing A86-116-1. The color airphotos used for this study were flown on September 7, 1985 by North West Survey Corporation (Yukon) Ltd. Airphoto Index is shown on Drawing A86-116-2.

The property is accessible via the Alaska Highway. A secondary access road has been developed from near Mile Post 720 on the Alaska Highway. A 6800 ft airstrip also exists near Pine Lake as shown on Drawing E86-116-3A.

### 1.1 Physiography

The study area lies within the Interior System of the Canadian Cordilleran in the Cassiar Mountains and the Liard Plain. The area is rugged and has undergone alpine glaciation. Elevation range over the study area is about 1000 m. The Dease Plateau occurs to the east with a belt of low rounded mountains. The Dease Plateau to the NE is flat and drift-covered and forms part of the Liard Plain. The tree line varies from near the 1400 to 1500 m level. Airphoto linears are pronounced above the tree line.



Paul A. Hawkins & Associates Ltd.

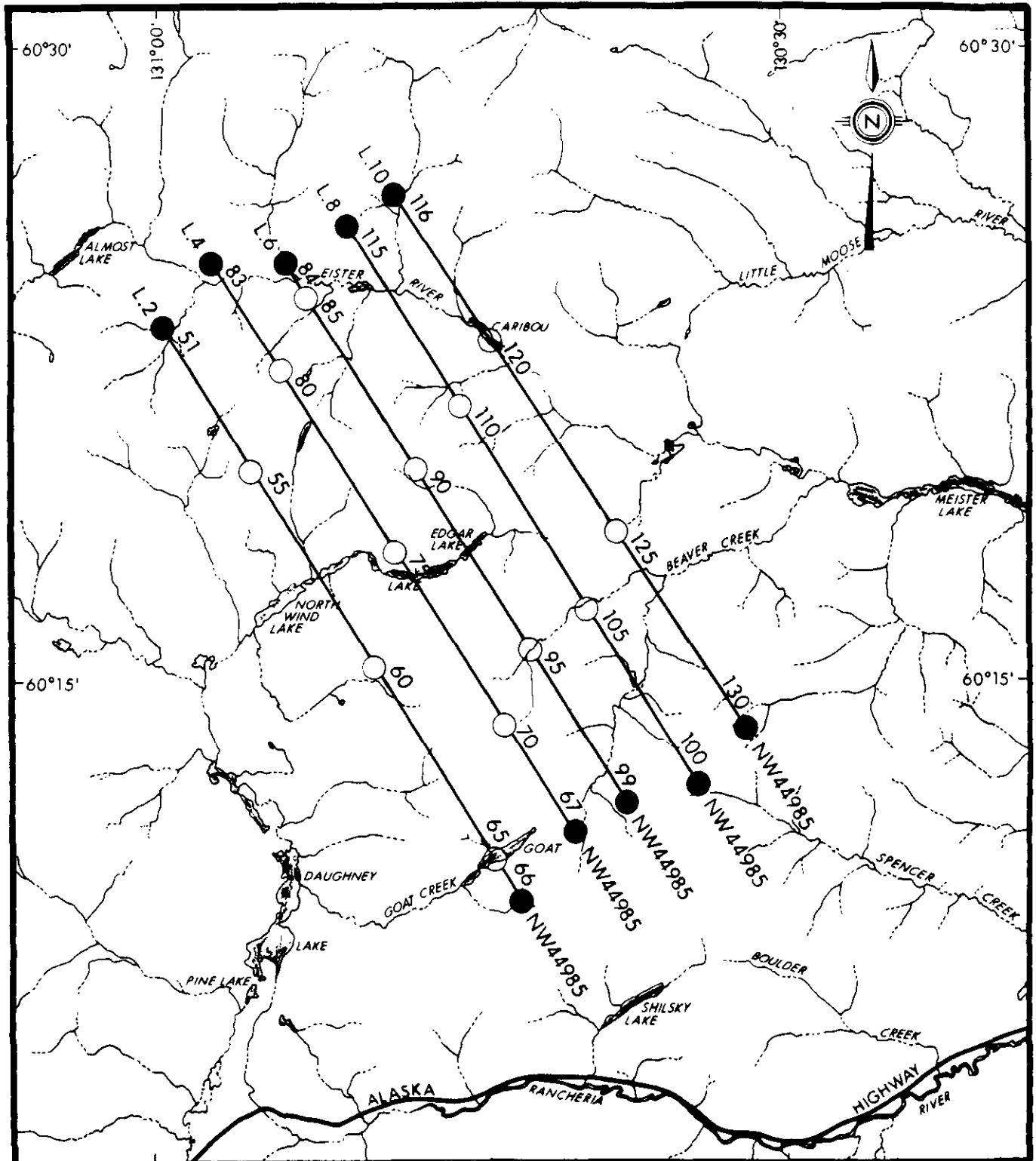
HART SILVER PROPERTY  
PROPERTY LOCATION  
RANCHERIA AREA  
WATSON LAKE MINING DISTRICT, YUKON

MAY, 1987

1:250,000

105 B

A86-116-1



PHOTOGRAPHY FLOWN BY:  
 NORTH WEST SURVEY CORPORATION  
 (YUKON) LTD.  
 JOB NO. : 85-748  
 PHOTO SCALE: 1:20,000  
 DATE: 07 SEPT. 1985  
 CAMERA: RC 10  
 LENS: UAG 6007  
 F.L.: 152.935 mm

Paul A. Hawkins & Associates Ltd.

HART SILVER PROPERTY  
 1:20,000 AIRPHOTO INDEX

RANCHERIA AREA  
 WATSON LAKE MINING DISTRICT, YUKON

MAY, 1987

1:250,000

105 B

A86-116-2

## 1.2 Previous Work

This area was first systemically mapped in 1960 (Poole, W.H., et al., 1960) and recent mapping at 1:50,000 (Lowey, G.W., Lowey, J.F., 1986) has updated this early mapping. The mineral deposits of the area have been summarized (Abbott, J.G., 1984) and it has been suggested that the mineralization present in the Rancheria area was younger than the Cassiar Batholith and indirectly related to large scale, Late Cretaceous-Early Tertiary transcurrent faulting. Other workers (Gabrielse, H., 1969; Mulligan, R., 1969 & 1975) suggested that mineralization was genetically related to Lower Cretaceous Cassiar Batholith.

The Hart Silver Property was first staked in 1947. In 1971 the property was restaked and mapping soil sampling and some pitting undertaken. The property was again restaked in 1980-81 with further pitting, soil sampling and trenching being undertaken. In 1984 a new high grade silver deposit was discovered and an adit started on the property. Further drilling and trenching was carried out in 1984-86.

The property is said to contain 207,000 tons containing 14,545,543 ounces of silver in three zones. Additional claims were staked late in the 1986 field season and this study will evaluate some of this new ground.

## 1.3 General Geology

The region in which the study is located consists of two tectonic elements which are the Cassiar Platform and the Yukon Cataclastic Complex. The Cassiar Platform consists of Paleozoic siliciclastic and rocks deposited in a shallow marine divergent ocean margin basin. Yukon Cataclastic Complex is made up of carboniferous Lower Mesozoic sediments and volcanic rocks which are highly sheared and metamorphosed. These rocks were deposited in a divergent ocean margin forearc or backarc type environment.



The various tectonic elements have been dismembered due to Late Cretaceous to Early Tertiary dextral movement transcurrent faults such as the Tintina, Denali, Kechika and Cassiar.

Four belts of rocks occur in the Rancheria area: Paleozoic sedimentary rocks deposited in a shallow marine basin of the Cassiar Platform like quartzite, siltstone, phyllite, limestone and dolostone; Metamorphosed carboniferous volcanic and sedimentary rocks of the Yukon Calaclastic Zone Terrain such as andesite, intercalated chert, mylonite, quartzite and dolostone; Cretaceous plutonic rocks of the Cassiar Batholith such as granite and diorite; Tertiary dikes and veins.

The regional structural trend of the area is NW as with most of the Cordillera. The dominant structure recognized (Poole, W.H., et al., 1960) was an anticlinal area occupied by the Cassiar Batholith flanked on either side by major NW trending synclines. The following structures are apparent in the area based on three stages of deformation.

#### 1st Phase (F<sub>1</sub> Structures)

- S<sub>0</sub> - bedding at 033° @ 15°
- S<sub>1</sub> - slaty cleavage which parallel bedding

#### 2nd Phase (F<sub>2</sub> - NW Trending Structures)

- S<sub>2</sub> - crenulation cleavage
  - cuts bedding and slaty cleavage
  - 335° @ 40°
- L<sub>2</sub> - associated lineations
  - S<sub>0</sub>/S<sub>1</sub> = L<sub>2</sub>
  - 155° @ 20° SE

- F<sub>2</sub> - folds
- small and inclined to overfolded
- axes at 155° @ 20° SE

3rd Phase (F<sub>3</sub> - structures)

- S<sub>3</sub> - jointing at 240° @ 85°
- L<sub>3</sub> - associated lineation S<sub>3</sub>/S<sub>2</sub> - L<sub>3</sub>
- F<sub>3</sub> - folds at 070° @ 50°

Late Dikes and Veins (at S<sub>3</sub> orientation)

- at 255° @ 85°

Mineralization on the Hart Silver Property occurs in NE trending quartz veins and silicified zones where manganiferous gossans occupy NE striking fault zones, these zones also replace limestone beds in a Lower Cambrian schist and carbonates at the margins of Cretaceous Cassiar Batholith. Mineralization appears controlled by NE structures and to a lesser extent by lithological limestone-phyllite contacts. Iron-manganese gossans serve as a guide for mineralization. Mineralization consists of galena, sphalerite, pyrite, chalcopyrite, arsenopyrite, freibergite, tetrahedrite, pyrrhotite, wolframite, cassiterite, stannite, fluorite and lepidolite with quartz, siderite, iron and manganese oxides as gauge.

## 2.0 FRACTURE ANALYSIS

A fracture analysis of the Hart Silver Property area in the Yukon Territory was accomplished by stereoscopic examination of the 1:23,000 scale color air photographs furnished by the client. Each stereo pair was examined with the aid of a magnifying stereoscope to delineate fracture trends. The alternate photos were annotated with red and blue ink pens (Stabilo-OH-PEN 96P-Fine-Permanent). The annotation can be removed from the photos with a non-abrasive drafting eraser such as the Faber Castell Magic Rub 1954 without harm to the photos. However, since only alternate photos were utilized for annotation of the fracture data, the remaining unannotated photos can be utilized for additional data sets, such as field geologic observations, drill-site locations, access routes, etc.

Two types of linear features are shown on the accompanying maps and photos:

1. Those considered to be fractures or joints with no relative displacement discerned.
2. Those linear features along which displacement is thought to have taken place.

In some instances the relative movement has been interpreted and the downthrown side of the faults has been indicated with an arrow or dot. It should be noted that in all cases where relative movement has been indicated it is based mainly on relative topographic relationships and not on a knowledge of the relative age of the outcrops on either side of the fault and should be viewed with that information in mind.

The information delineated on the air photos was then transferred to the 1:50,000 scale topographic map of the area. Attention should be called to an unusual looking circular feature noted on Photo #127 associated with a northwesterly trending fault and a minor

orthogonal fracture pattern. On the 1:50,000 scale map it falls near the intersection of coordinates 6684000m N. and 413000m E. and is the only circular feature noted in the study area.

## 2.1 Preliminary Examination of Landsat Scene

As an accessory part of this study a Landsat scene of the area was reviewed briefly. The scene used was from the Landsat V satellite which was acquired on September 17, 1986. The scene I.D. is 056-18-50930-191420. A color composite of MSS Bands 4, 5 and 7 was used for analysis. Data was bulk corrected and no further processing was carried out. One copy of a sample image was provided at a scale of 1:600,000.

The scene exhibits a number of strong and lesser lineaments. Three major orientations of lineaments are evident: NW, NE and N-S. Several weaker NE lineaments are present in the vicinity of the Hart Silver Property and these may relate to mineralized trends. Further detailed examinations of Landsat Imagery is beyond the scope of this study.

## 2.2 Summary and Conclusions

Numerous airphoto lineaments have been defined which are a representation of the fracturing present in the rocks of the area. Four main groups of lineaments have been defined and appear to represent the structural framework of the area.

The NE lineaments show some arching which may indicate dips in some cases given the elevation change along strike. This set appears to be the most important given the orientation of mineralization in the area.

Major N-S lineaments appear to in some cases define the limits and extent of the NE lineaments. These N-S lineaments may be the key to

defining structures in forested areas. Also present were NW and E-W lineaments. In general the lineaments became weaker in expression below the tree line and distortion hampered analysis in some areas.

Unfortunately complete coverage of 1:23,000 photography was not available for the complete property. The eastern edge and the southern portion of the property were not covered.

In conclusion this study has defined a preliminary framework for the structure on the property on a regional basis given the scope of the study. The occurrence of NE lineaments may serve as an important guide and area selection criteria for future exploration. Examination of the southern area and eastern margin not covered is warranted. Consideration should also be given to examination of the CMC area on a smaller scale with the available 1:10,000 aerial photography. Such an examination could be combined with a field visit.

### 2.3 Recommended Program

The fracture analysis documented in this report should be used as a guide for exploration. No field examination was carried out as part of this report. It is presumed that follow-up will be conducted by Silver Hart Mines Limited's own exploration staff. Further airphoto analysis is recommended for the areas not covered by this report. The main CMC area could also benefit from a closer examination of 1:10,000 color aerial photography.

A limited field program by our staff (P.A. Hawkins and C.W. Hammond) in preparation for this examination is recommended. A five to seven day property visit would accomplish a number of things. It would enable ground truthing of selected airphoto lineaments, onsite review of 1:10,000 photos and a technology transfer to Silver Hart Mines Limited staff of the use of aerial photographs in the mineral exploration. A cost estimate is provided.

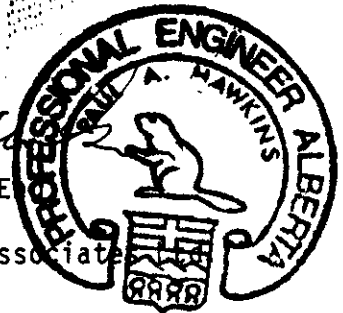
PROPOSED PROPERTY VISIT AND  
FURTHER AIRPHOTO EXAMINATION

Staff: P.A. Hawkins, P.Eng.      Principal (Geological Engineer)  
C.W. Hammond, B.Sc.      Associate (Photo Geologist)

1.	Mob-Demob Watson Lake	\$2000.00
2.	Field Examination 2 men x 7 days x \$325.00	4550.00
3.	Report Preparation and Trip Report	1300.00
4.	Other Expenses between Watson Lake and property at cost plus 15%	<u>150.00</u>

ESTIMATED TOTAL:      \$8000.00

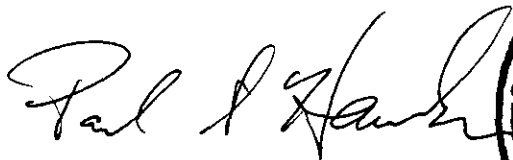
*Paul A. Hawkins*  
Paul A. Hawkins, P.E.  
Principal  
Paul A. Hawkins & Associates



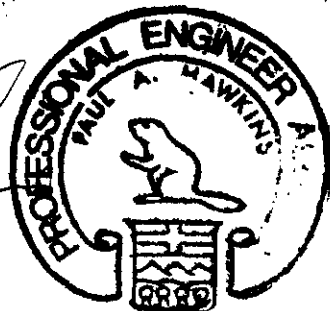
CERTIFICATION

I hereby certify:

1. That I am a member of both the Association of Professional Engineers, Geologists and Geophysicists of Alberta and the N.W.T.
2. That I am the Principal of the firm Paul A. Hawkins & Associates Ltd. which holds Permit #P4521 to practise Engineering in Alberta.
3. That I am a graduate of Queen's University with a Bachelor of Science degree in Geological Engineering.
4. That I have worked continuously as a practising geological engineer for the past 10 years.
5. That I have no interest in the Hart Silver Property, nor do I hold any shares of Silver Hart Mines Ltd.
6. That I have not visited the property but I am familiar with the area geology and mineral potential.
7. That I hereby consent to the publication of this report or parts thereof in a statement of mineral facts or to raise funds to finance my recommendations.



Paul A. Hawkins, P.Eng.



29/09/87

EXPENDITURE STATEMENT

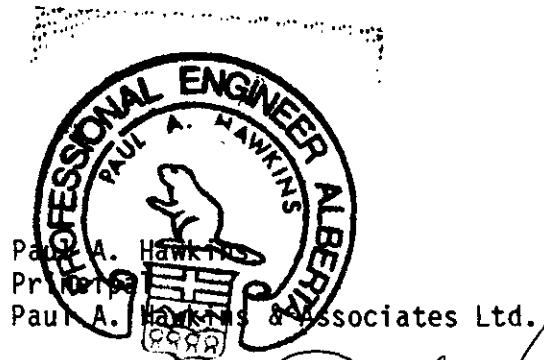
This Report was completed for : Silver Hart Mines Ltd.  
5710 - 17th Street S.W.  
Edmonton, Alberta  
T6P 1S4

This Report was completed by: Paul A. Hawkins, P.Eng.  
R. Laing, B.Sc.  
S.W. Hammond, B.S.  
C.H. Broadbent, B.Sc.  
Paul A. Hawkins & Associates Ltd.  
72 Strathlorne Cr. S.W.  
Calgary, Alberta  
T3H 1M8

Work was conducted between: May 3 to June 17, 1987

Expenditure Breakdown:

1. Professional Services	\$2,442.00
2. Drafting	605.00
3. Computer Processing and Reproduction	400.00
3. Reproduction	<u>303.25</u>
Total Invoice Amount	\$3,750.25





HART SILVER PROPERTY  
TABLE OF CLAIMS WORK APPLIED TO

<u>Claim Name</u>	<u>TAG #</u>	<u>Work Credit Requested</u>
CAR 15	YA 91589	2 years
CAR 16	YA 91590	2 years
CAR 17	YA 91591	2 years
CAR 18	YA 91592	2 years
CAR 19	YA 91593	2 years
CAR 20	YA 91594	2 years
CAR 21	YA 98677	2 years
CAR 22	YA 98678	2 years
CAR 23	YA 98679	2 years
CAR 24	YA 98680	2 years
CAR 25	YA 98681	2 years
CAR 26	YA 98682	2 years
CAR 27	YA 98683	2 years
CAR 28	YA 98684	2 years
CAR 29	YA 98685	2 years
CAR 30	YA 98686	2 years
CAR 1006	YA 99246	3 years

REFERENCES

- Abbott, J.G., 1984 Silver-bearing veins and replacement deposits of the Rancheria District: In: Yukon Exploration and Geology 1983, DIAND
- Gabrielse, H., 1969 Geology of Jennings River Map-Area, British Columbia; GSC Paper 68-55
- Lowey, G.H., Lowey, J.F., 1986 Geology of Spencer Creek (105 B-1) and Daughney Lake (105 B-2) Maps Areas I.N.A. Open File 1986-1
- Mulligan, R.H., 1969 Metallogeny of the Region Adjacent to the Northern Part of the Cassiar Batholith, Yukon Territory and B.C. GSC Paper 70-1A
- Mulligan, R.H. 1975 Geology of Canadian Tin Occurrences GSC Report No. 28
- Poole, W.H., Roddick, J.A., and Green, L.H., 1960 Wolf Lake GSC Map 10-1960

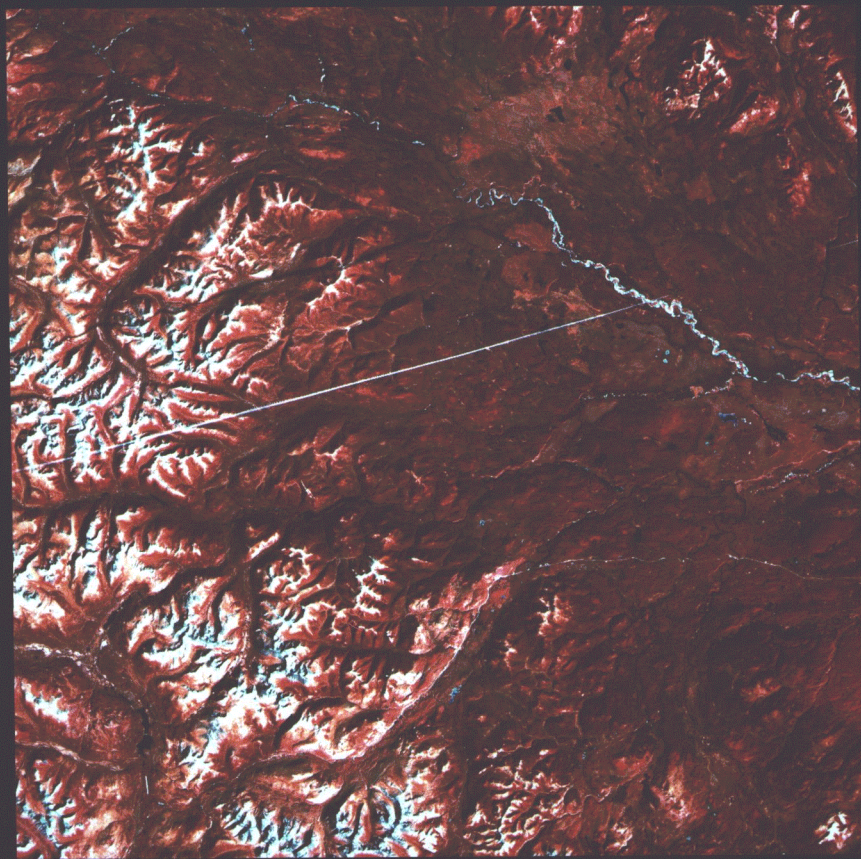
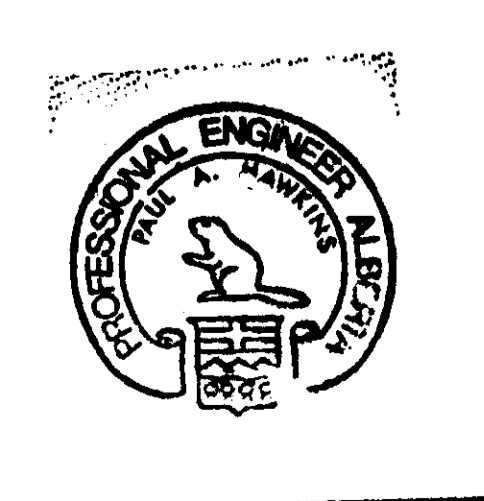
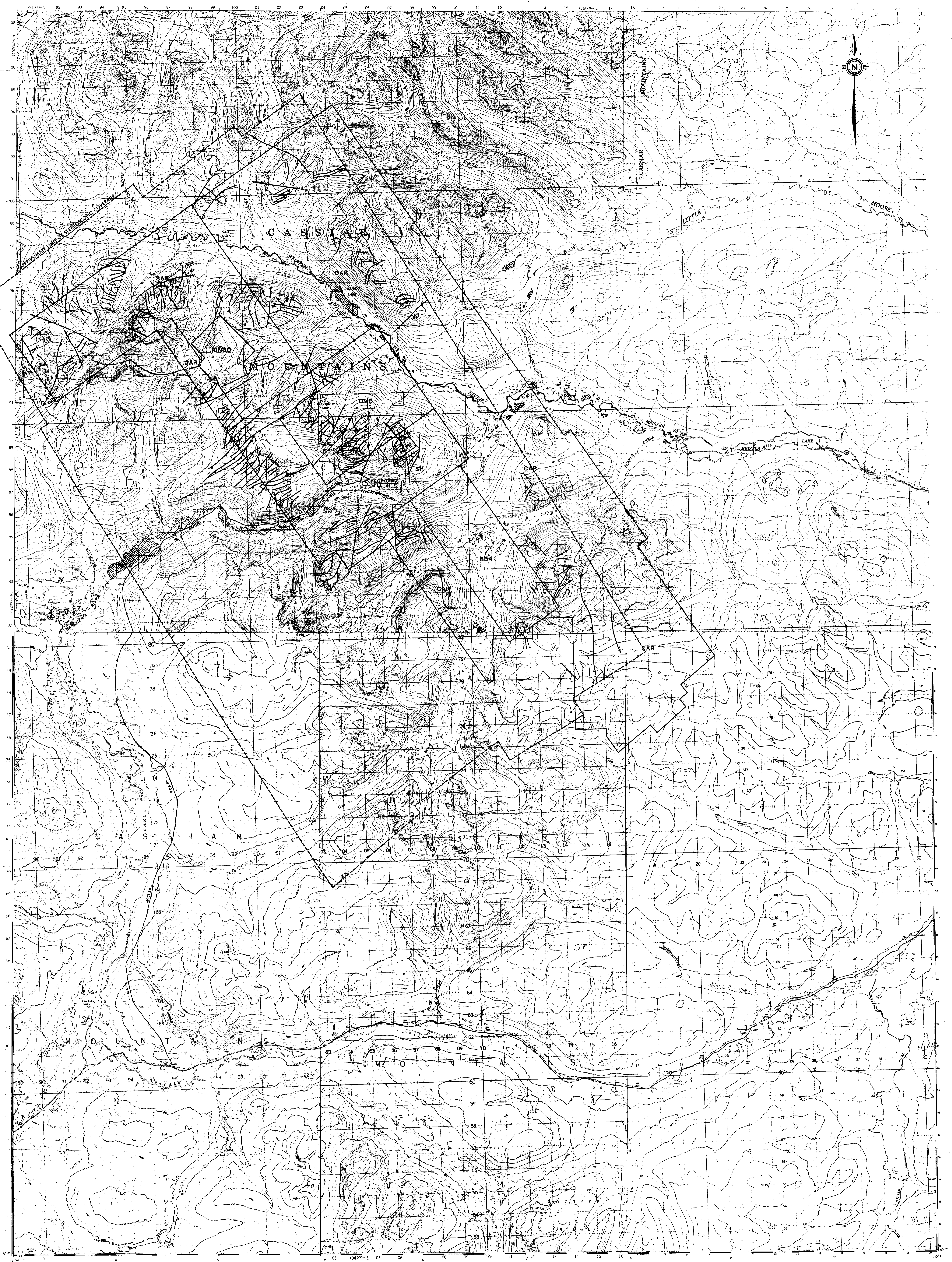


PHOTO 1.



**PERMIT TO PRACTICE**  
 PAUL A. HAWKINS & ASSOCIATES LTD.  
 Signature: *Paul A. Hawkins*  
 Date: *SEP 1 1987*  
**PERMIT NUMBER: 4521**  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

**LEGEND**  
 LINEAR FEATURES WITH APPARENT MOVEMENT  
 (DOT DENOTES DOWNSIDE)  
 FRACTURES OR JOINTS WITH NO RELATIVE  
 DISPLACEMENT

**Paul A. Hawkins & Associates Ltd.**  
 HART SILVER PROPERTY  
 REGIONAL AIRPHOTO LINEAMENT COMPILATION  
 RANCHERIA AREA 091900  
 WATSON LAKE MINING DISTRICT, YUKON  
 JUNE, 1987 1:50,000 1058/SE E86-116-3A