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8/85

REPORT ON  
GEOLOGICAL AND STREAM  
SEDIMENT GEOCHEMICAL SURVEYS

JULY AND AUGUST, 1984

ON THE  
INDEPENDENCE CLAIM GROUP

NEAR STEWART, B.C.

Skeena Mining Division  
NTS Map-Area 104A/4  
Lat. 56° 04'N, Long. 129° 56'W

Owned and Operated by:  
TOURNIGAN MINING EXPLORATIONS LTD.

Prepared By:  
W.G. SMITHERINGALE, Ph.D., P. Eng.  
W.G. SMITHERINGALE & ASSOCIATES LTD.

Submitted September 28, 1984

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

12,973

## TABLE OF CONTENTS

	<b>Page</b>
SUMMARY	i
INTRODUCTION	1
Location and Access	1
Property Description	1
Property History	3
Summary of Work Done in 1984	6
GEOLOGY	7
Regional Geology	7
Property Geology	8
Metamorphism	8
Stratigraphy and Lithology	9
Structure	11
Mineralization	12
Interpretation	13
STREAM SEDIMENT GEOCHEMISTRY	14
Sampling Method	14
Interpretation	14
RECOMMENDATIONS	15
ITEMIZED COST STATEMENT	16
LIST OF REFERENCES	18
CERTIFICATION	19
APPENDIX: CERTIFICATES OF ANALYSES	

### **Figures**

Figure 1	Location Map	2
Figure 2	Claim Map	4
Figure 3	Geology and Stream Silt Geochemistry	in pocket

## SUMMARY

In 1984 a program of geological mapping and stream silt geochemistry was carried out on the Independence claim group.

The Independence group consists of 5 reverted Crown-granted claims and 7 metric grid claims comprising a total of 95 units. The group straddles Bear River Ridge about 14 km north of Stewart. It includes the old Independence showings, which were extensively developed during the 1920's, the A and T showings and the Palmey showings.

The Independence group is underlain by 2,000 m or more of Hazelton Group metavolcanics of andesite, dacite, latite, quartz latite and rhyolite composition.

The contacts with which the volcanogenic, iron-precious metal horizon (or horizons) hosting the Dalhousie showings is associated were traced into the Independence group by the 1984 mapping. A jasper horizon containing bedded pyrite is located in a position that appears to be approximately along strike from the upper Dalhousie showing.

Only a small portion of the Independence group has been mapped. The unmapped area contains the A and T and the Palmey showings. On the basis of their published descriptions the Palmey showings are interesting from the viewpoint of volcanogenic mineralization.

The stream silt geochemistry survey indicated one anomalous drainage basin in which mineralization has not been previously reported.

The Independence group warrants further exploration. It is recommended that this consist of reconnaissance geological mapping and prospecting followed, if results are encouraging, by an airborne electromagnetic survey.

## INTRODUCTION

### Location and Access (Figure 1)

The Independence claim group is located about 1050 km (655 miles) north of Vancouver and 14 km (9 miles) north of the coastal town of Stewart, B.C., as follows:

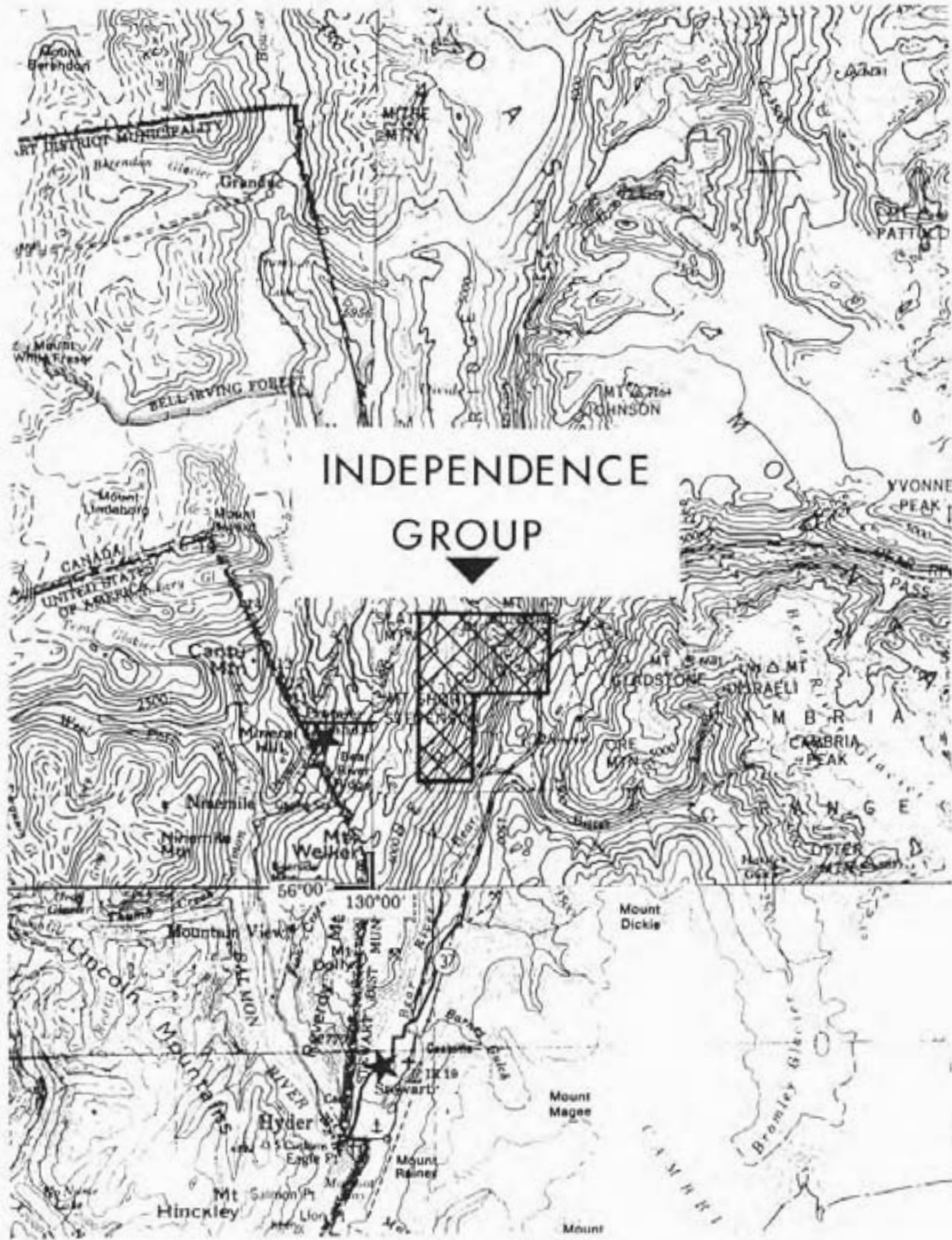
Lat. 56° 04'W, Long. 129° 56'W  
NTS Map-Area 104A/4  
Skeena Mining Division

Access is by helicopter from Stewart, a trip of about 15 minutes.

The claim group straddles Bear River Ridge. Elevations range from 120 m in Bear River Valley to over 1850 m in the higher parts of the ridge top. A permanent snow field covers much of the area above 1600 m. The eastern slope of Bear River is steep (average 37°) and is interrupted by numerous cliffs. Many small streams, some in deeply incised gulleys, are fed from the snowfields above. Vegetation cover consists of poplar, cottonwood and various species of bushes on the flats of Bear River Valley, spruce, fir, slide alder and devil's club below timberline (about 900 m) and slide alder and alpine meadow above. Suitable spots for helicopter landing on this eastern slope are present, but they are few. The slopes near the top, and on the west side, of Bear River Ridge are more gentle.

### Property Description (Figure 2)

The Independence group consists of 5 reverted Crown-granted claims comprising 3 units (3 partial claims are combined into 1 unit) and 7 metric grid claims comprising 92 units, for a total of 95 units.



**INDEPENDENCE  
GROUP**

FIGURE 1



<p>MAP AREA</p>	
<p>TOURNIGAN MINING EXPLORATION LTD.</p>	
<p><u>INDEPENDENCE GROUP</u></p>	
<p><b>LOCATION MAP</b></p>	
<p>KILOMETRES 0 0.5 1 KILOMETRES</p>	
<p>W.G. SMITHERINGALE &amp; ASSOCIATES LTD.</p>	

<u>Name of Claim</u>	<u>No. of Units</u>	<u>Record Number</u>	<u>Expiry Date</u>
Independence	6	1146	Feb. 19, 1985
Independence No. 1	16	2023	Feb. 6, 1985
Independence No. 2	8	2024	Feb. 6, 1985
Banana	10	1626	Aug. 20, 1984
Ben Lomond	1	990	Feb. 8, 1985
Rock of Ages No. 2	1	1030	"
Rock of Ages No. 3	1	1031	"
Rock of Ages No. 4			"
Rock of Ages No. 5			"
Premonition	20	1627	Aug. 20, 1984
Premonition #1	20	1628	"
Premonition #2	12	1629	"

The Notice to Group was filed August 16, 1984.

The claims are owned and operated by Tournigan Mining Explorations Ltd. of Vancouver, B.C.

### Property History

The main showings of the old Independence group are located between the 840 m and 1070 m elevations on the northerly trending hogsback that lies about 700 m east of Fitzgerald Creek. They were developed during the 1920's. No work is reported in the B.C. Minister of Mines Reports (B.C. MMR) after 1929.

In 1920 an open cut at el. 960 m exposed a 14 ft. wide vein assaying \$12 per ton Ag.\* The vein consists of quartz, calcite and jasper mineralized with pyrite, sphalerite and galena. Over the next few years open cuts revealed either similar veins or the same vein at several different locations. At el. 1070 m an 8 foot wide vein was uncovered assaying \$10 a ton. Two more showings, one assaying 80¢ per ton Au and 28 oz/t Ag, were discovered at el. 1090 m. Another 6 ft. wide vein was found at el. 960 m, 15 m south of the original find.

\* At the time these assays were reported the price of gold was \$20 per oz. and silver 65¢ per oz.



FIGURE 2

TOURNIGAN MINING EXPLORATION LTD.

INDEPENDENCE GROUP

CLAIM MAP

KILOMETRES 0 1 2 KILOMETRES

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Between 1925 and 1929 two 700 ft. tunnels were driven at el. 900 m (No. 1 tunnel) and el. 840 m (No. 2 tunnel). The No. 1 tunnel is described as being in low grade mineralization from 300 feet to the face. A series of crosscuts, however, revealed a more promising picture. At 600 feet a crosscut intersected 16 ft. of \$12 per ton rock, the main values being in native silver, and at 700 feet a crosscut intersected 15 ft. of 1.8 oz/t Ag and 3.8% Zn. At 400 feet a crosscut showed the zone to be 12 ft. wide, but no values are reported. The No. 2 tunnel is said to be in low grade mineralization for its entire length. A crosscut at 700 feet cut a 5 ft. zone of 1.6 oz/t Ag and 4% Zn.

In 1979 Tournigan Mining Explorations Ltd. staked the Premonition, Premonition 1 and Premonition 2 claims. In 1980 the company purchased the Independence claim and staked the Independence 1 and 2 claims.

A program of geological mapping and sampling was carried out by Tournigan in the vicinity of the main showings in 1980 (DeLeen and Klepacki, 1980). The mineralization is described by DeLeen and Klepacki as occurring in zones of banded jasper-silica that contain barite, pyrite, pyrrhotite, chalcopyrite, galena and sphalerite. The mineralized zones are adjacent to and cut by the Portland Canal dike rocks. Their trend is parallel to that of the dykes. The mineralization is interpreted as vein type, associated with the intrusion of the dykes. DeLeen and Klepacki conclude that the results of their sampling warrant a further program of mapping, prospecting and trenching.

The old A and T showings lie on what is now the Banana claim, reportedly between the 700 m and 1000 m elevations about 200 m north of the Rock of Ages 5 claim. They were located prior to 1928, and in 1929 Consolidated Mining and Smelting Co. conducted a 1543 ft. drill program on the property (B.C. MMR 1928 and 1929). No work after 1930 is reported. Assays reported from these showings included 0.18 oz/ton Au, 1.3 oz/ton Ag and 2.7% Cu over 3 ft., and 0.02 oz/ton Au, 8.6 oz/ton Ag and 4.6% Cu over 5.5 ft. A showing at about el. 900 m is described as "irregular chalcopyrite mineralization in several places in the cross-structure over a zone width of about 70 feet".



The Palmeley group adjoined the Dalhousie on the southwest (B.C. MMR 1931) on what is now the Premonition 1 and/or Premonition 2 claims. The mineralization is described in the 1936 B.C. MMR as occurring in three quartz replacement zones 2 ft. to 15 ft. wide that are approximately conformable to the enclosing tuff and slate. The following assays were reported:

<u>Elevation</u>	<u>Width</u> <u>ft</u>	<u>Au</u> <u>oz/t</u>	<u>Ag</u> <u>oz/t</u>	<u>Pb</u> <u>%</u>	<u>Zn</u> <u>%</u>
1245 m	14	0.03	2.03	13.3	6
1432 m	8	tr	0.4	0.6	2.2
1700 m	2	0.2	9.0	20.8	22.1
1725 m	7	0.04	15.0	5	12.7

If this mineralization is conformable, it could be volcanic exhalative in origin.

Near the mouth of Fitzgerald Creek a 140 ft. adit is reported to have been driven on two small veins 5 inches and 10 inches wide that assayed 20 oz/t Ag and 70% Pb. It is not clear to the writer whether this occurrence is on the Independence 1 claim or on the Dalhousie Fraction.

#### Summary of Work Done in 1984

- a) Geological mapping on a scale of 1:5000

Ben Lomond, Rock of Ages 2 and 5, Premonition 1 and 2, Banana and Independence 1 and 2: total area 0.6 sq. km. (60 hectares).

- b) Collection of stream silt samples

Independence 1 and 2: three samples.

Eleven and one-half days were spent on this work.

A single program of geological mapping and stream silt geochemistry was conducted on the Dalhousie and Independence claim groups in areas north and south of the area covered by the 1979 Dalhousie program (Keyte and DeLeen, 1979) and along the base of the cliffs at the foot of the slope on which the two claim groups lie. For the purposes of recording assessment work the time and cost of the program are divided between the two claim groups. However, for the sake of clarity and continuity, the two groups are treated as one map-area in the description of the geology that follows.

## GEOLOGY

The purpose of the geological mapping was to define lithologic units, trace their contacts, identify units favourable for hosting volcanic exhalative mineralization and to correlate the units with those in the area mapped by P.G. Read (Read, 1979) during the 1979 Dalhousie program.

### Regional Geology

The Independence and Dalhousie claim groups are underlain by volcanic rocks belonging to the Hazelton Group of the Lower to Middle Jurassic system.

In the Bear River Ridge area the general trend of the Hazelton strata is northerly, and beneath the ridge they appear to be involved in major northerly trending fold structures (Grove, 1971). A major regional dyke swarm of granite to quartz dioritic composition cuts northwesterly across the northern half of the Independence claim group. The Hazelton Group in the Stewart area is host to numerous gold-silver prospects and former mines. The most important of these, the Premier mine, which was a major Au-Ag-Pb-Zn producer from 1920 to 1967, lies on the west side of Bear River Ridge, about 3 km west of the Premonition 1 claim.

Small satellite bodies of the Texas Creek granodiorite batholith, which lies just west of the Premier mine, intrude the southern parts of the claim group (Grove, op. cit.)

## Property Geology

The 1984 map-area covered only a small portion of the Independence group. Most of the group remains unmapped. The Bowser assemblage (Middle to Upper Jurassic) occurs in the upper parts of Bear River Ridge (Grove, op. cit.; DeLeen and Klepacki, 1980). A large stratigraphic section of Hazelton volcanics probably exists between the rocks described in this report and the Bowser rocks.

The area mapped during the 1984 program on the Independence and Dalhousie claim groups is underlain mainly by green and grey volcanic tuffs and agglomerates. Some flows and a few dykes are present. The rocks commonly consist of an aphanitic matrix and small phenocrysts of feldspar, usually plagioclase. The dominant compositional rock types are andesite and dacite, with lesser latite and quartz latite and some rhyolite.

### Metamorphism

The rocks have undergone regional metamorphism to the greenschist facies. In a few places the rocks have a hornfelsic texture that overprints the regional metamorphic texture, e.g. at coordinates 6,212,820 N - 442,480 E and 6,123,600 N - 442,900 E. This could be due to the presence of an unrecognized or unexposed stock or large dyke.

The original intermediate plagioclase of the andesites and dacites has been transformed during regional metamorphism to albite and disseminated epidote. The green and grey rocks are characterized by very fine-grained chlorite in their matrix. Sericite is present in all rock types as a component of the matrix and as an alteration of feldspar. Ferromagnesian minerals other than chlorite are not common. Sparse amphibole and biotite phenocrysts have been altered to chlorite and magnetite. In the latites, quartz latites and rhyolites K-spar phenocrysts may be present. They are commonly sanidine rather than orthoclase.

The regional metamorphism has imparted a penetrative schistosity to the rocks. It is noticeable in outcrop mainly in the more tuffaceous members.

Pyritization is wide spread and produces rusty weathering zones. This is especially noticeable in unit D, described below.

Stratigraphy and Lithology

Stratigraphic 'tops' was not recognized. The sequence is assumed to be right side up. Starting with the uppermost unit the succession is as follows:

<u>Rock Unit</u>	<u>Thickness</u>	<u>Description</u>
G	greater than 100 m (top not located)	Maroon and dark greenish-grey agglomerate; volcanic bombs up to 30 cm long; some interbeds of tuff; andesite.
F	between 300 m and 400 m	Maroon and medium to dark green, aphanitic, porphyritic (plagioclase) flows and ash and lapilli tuff; some flows only 1 m or 2 m thick; vesicles and flow top breccia present in places; andesite.
E	between 500 m and 600 m	Medium green (locally grey), aphanitic, porphyritic (plagioclase) ash and lapilli tuff; some beds are small fragmental agglomerate; andesite.
D	varies 0 m to 150 m	White weathering, light grey felsite; in places it contains volcanic breccia. In the adjacent area previously mapped by Read this unit is described as consisting of rhyolite to rhyodacite flows.
C	greater than 425 m including C1 (top not located)	Mainly dark green (locally dark grey), aphanitic, porphyritic (feldspar) ash and lapilli tuff; andesite.
sub unit C1	(greater than 125 m)	Medium grey and green feldspar porphyry and minor bedded, cherty and pyritic tuff and jasper; dacite, quartz latite, rhyolite and minor andesite.
B	greater than 75 m (bottom not located)	White to mottled light and dark grey weathering, light to dark grey coloured, aphanitic, generally porphyritic (feldspar) ash and lapilli tuff; local agglomerate. Dacite, latite and cherty tuff.

<u>Rock Unit</u>	<u>Thickness</u>	<u>Description</u>
A	greater than 600 m including A1 (top and bottom not located)	Light, medium and dark grey and green, aphanitic, variably porphyritic (feldspar) tuff and agglomerate; massively to thinly interbedded; andesite and latite.
sub unit A1 recognized only on the Dalhousie Fraction	(greater than 150 m; top not located)	Interbedded 1 m to 30 m thick beds of massive light grey porphyritic (feldspar) tuff, brownish black argillaceous tuff, black quartz-eye tuff and thinly interbedded black limestone, black tuffaceous argillite and black quartz-eye tuff.

The top part of the stratigraphic section presented above (units C to G) and the bottom part (units A and B) were mapped in widely separated areas of the claim groups. These two sections can be stratigraphically combined because they are linked through the stratigraphy in the intervening area mapped by Read. The contact between units B and C in the central part of the map-area projects very closely to the contact between Read's units 1 and 2. The contact between units C and D in the southern part of the map area was traced, through binoculars, into Read's map-area, where it corresponds to the contact between Read's units 3 and 4. The correlation of sections mapped in these different areas is as follows:

<u>1984 Map-Area Southern Part</u>	<u>Read's Map-Area</u>	<u>1984 Map-Area Central Part</u>
Units	Units	Units
G		
F		
E . . . . .	4	
D . . . . .	3	
C . . . . .	2 . . . . .	C
B(?)	1 . . . . .	B
A		A

Unit A is poorly defined by this report because it was examined only in widely spaced creek beds at the foot of the steep cliffs west of Bear River. More detailed mapping would probably recognize several subdivisions. The outcrops near coordinates 6,215,350 N - 443,750 E and 6,216,100 N - 444,000 E, which are far from other

outcrops examined, are included in unit one as a matter of convenience. Sub unit A thins rapidly to the south. It is at least 150 m thick in the creek at coordinates 6,213,300 N - 442,600 E, but only a few metres thick in the creek 500 m to the south, where a single bed of black quartz-eye lapilli tuff is present.

The presence of unit B in the southern part of the Dalhousie group is uncertain, because its recognition there is based on examination of only two outcrops (at coordinates 6,212,150 N - 442,000 E and 6,211,750 N - 442,100 E), one rhyolite and the other dacite. These outcrops could reasonably be assigned to one of the silicic tuff units within unit C. If this were the case, unit B, which is the same as Read's unit 1, would thin or pinch out south of the area mapped by Read.

At coordinates 6,214,150 N - 442,250 E (on Rock of Ages #5 of the Independence group) rhyolite, quartz latite and dacite members form continuous sequence 125 m thick which is designated C1. It is possible that this sequence is the equivalent of Read's unit 3, rather than simply a sub unit within unit C. Lower in unit C beds of similar rocks only a few metres thick are present.

In the vicinity of coordinates 6,212,350 N - 441,750 E, and southward along the contact between units D and E, the top 20 m or so of unit D contains intercalated beds up to 4 m thick of dark greenish grey tuff similar to unit E.

Unit D, which is distinctively white weathering, was not found south of coordinates 6,212,000 N - 441,850 E, nor was any fault or fold that could explain its absence found. The unit must pinch out in this vicinity.

### Structure

In most places bedding strikes between northwest and northeast and dips 25° to 50° westward. One exception is in the vicinity of coordinates 6,212,800 N - 441,200 E, where northerly striking andesite flows dip steeply eastward.

All units display a northwesterly to northeasterly striking, westward dipping schistosity that varies considerably in its intensity from outcrop to outcrop. In most places the schistosity is parallel or subparallel to bedding. This relationship is

emphasized by the orientation of flattened lapilli or bombs in the plane of the schistosity. The schistosity is not, however, a primary feature since in thin-section it is seen to cut and transpose bedding lamellae. This schistosity developed during regional metamorphism. Another schistosity, generally in the form of a fracture cleavage that strikes from ENE to SE and dips  $25^{\circ}$  to  $80^{\circ}$  SE to SW, is inconsistently developed in units E, F and G in the southern part of the map-area. A lineation pitches  $40^{\circ}$  westward in the plane of this schistosity in several localities. The few dykes in the map-area strike  $115^{\circ}$  to  $140^{\circ}$  and dip  $50^{\circ}$  to  $85^{\circ}$  SW, which corresponds to the attitude of the fracture cleavage.

No folds of any magnitude were observed. However, local departures of bedding attitude from the average, as noted above, and the intense development of the fracture cleavage in a few places suggest the presence of folding.

Only a few faults, of no apparent significance, were observed. The strike of these is about E-W and the dip is steep S.

### **Mineralization**

A 1 metre thick bed of grey and red chert and cherty argillite containing laminae of massive pyrite is present at elevation 1025 m and coordinates 6,214,150 N - 442,250 E (Rock of Ages 5 claim). This bed occurs in and near the bottom of sub unit C1. An old prospect pit is located here. A continuous chip sample across 0.9 m true width of this chert-sulfide bed contained 30 ppb (0.03 gm/tonne) Au (sample 1954, Appendix). The old 'A and T' showing lies about 300 m to the northeast, approximately along strike from this site. Assays of 0.02 oz/t Au, 8.6 oz/t Ag, and 4.6% Cu over  $5\frac{1}{2}$  ft. and 0.18 oz/t Au, 1.3 oz/t Ag and 2.7% Cu over 3 ft. are reported from this showing (B.C. M.M.R. 1928 and 1930).

A 30 cm thick fissure vein containing quartz, pyrite, chalcopyrite and malachite occurs at el. 330 m at 6,216,180 N - 443,930 E (Independence 2 claim). Its attitude is  $080^{\circ}/85S$ . An old prospect pit is located here. A chip sample across 30 cm contained 4400 ppb (0.13 oz/ton) Au, 54 ppm (1.57 oz/ton) Ag and 12,750 ppm (1.27%) Cu (sample 1955, Appendix).

A number of angular boulders of silicified tuff that has been brecciated and impregnated with quartz carrying heavily disseminated pyrite occur at el. 880 m and coordinates 6,212,120 N - 441,560 E (Ben Lomond claim). A grab sample contained an insignificant amount of Au (sample 1953, Appendix).

### Interpretation

The area mapped is underlain by dominantly pyroclastic rocks with a lesser quantity of flow rocks. Their composition ranges from andesite through dacite to rhyolite. The thickness of this sequence appears to be at least 2000 m. Many of these rocks were deposited sub-aerially, witness the generally nonsorted nature of the pyroclastic units. Some, such as the bedded sequences in A1 and C1, are waterlain.

The sequence may be stratigraphically complicated. It is probably characterized by laterally discontinuous units, abrupt changes in thickness of units and interfingering of individual members. Some indication of this is given by sub unit A1, by the southward termination of unit D and by beds of unit E lithology intercalated near the top of unit D.

The sequence appears to be structurally uncomplicated. It is probable, but not proven, that the sequence is right side up. Bedding generally strikes northerly and dips moderately to the west. However, local folding and broad warping are undoubtedly present. Faulting is not significant within the area mapped, but this does not rule out the possibility of major faults nearby, e.g. in Fitzgerald Creek. In spite of the apparent structural simplicity, the widespread development of the main schistosity suggests that plastic deformation of some magnitude has occurred. Structural complications should therefore be anticipated.

The contacts with which the Dalhousie showings are associated, namely between units B and C (Read's units 1 and 2) and between units C and D (Read's units 2 and 3) extend into the Independence group. These contacts warrant further mapping and prospecting. In particular, the relationship between the Dalhousie #3 showing ("quartz, galena, sphalerite and pyrite in jasper, chert and tuff beds"; Read and Keyte, 1979), the pyritic jasper bed at el. 1025 m on the Rock of Ages 5 claim described above and the old A and T showings north of Rock of Ages 5 should be investigated.



Judging from the description of the Palmey showing the Hazelton section east of the area mapped warrants exploration for volcanic exhalative mineralization.

### **STREAM SILT GEOCHEMISTRY**

Silt samples were collected from three localities along the foot of the steep slope on the Independence 1 and 2 claims. The sample sites were on alluvial fans built at the foot of the slope. Stream gradients were generally steep and the stream bed was composed almost entirely of coarse gravel and boulders, with only patches of finer material.

#### **Sampling Method**

Sufficient material from the active part of a stream bed was sieved through a 20 mesh sieve to yield 0.5 kg of -20 mesh silt. This sample was placed in a wet strength kraft envelope and submitted to Min-En Laboratories Ltd. of North Vancouver, B.C., for analysis of the heavy mineral fraction. The low specific gravity minerals (less than 3.1) were removed using heavy liquid flotation and the resulting heavy mineral concentrate was analyzed for Cu, Zn, Ag, As and Au by atomic absorption.

#### **Interpretation**

The sample sites are shown in Figure 3 and a copy of the analysis certificate appears in the Appendix.

Sample 110 was collected from the stream draining the area containing the main Independence showings. Sample 109 was collected downstream from the vein from which rock sample 1955 was obtained. The analyses of these samples can therefore be taken as roughly representative of streams draining areas containing mineralization. Sample 107 was collected from a stream draining an area in which no mineralization has been reported, yet it contains amounts of Zn, As, and Au that are comparable to samples 109 and 110.

This data indicates that the drainage basin of the stream from which sample 107 was collected should be prospected.

## RECOMMENDATIONS

The Independence group warrants further exploration. The target is primarily volcanogenic, precious metal and/or base metal mineralization, but the exploration philosophy should be open to the possibility of economic vein type mineralization being present. It is recommended that the exploration take the form of:

- 1) Examination of the A and T and the Palmey showings, followed by geological mapping and sampling if warranted. Of special interest is the possibility that the #3 Dalhousie showing, the pyritic jasper bed at el. 1025 m on the Rock of Ages 5 claim and the A and T showings define a mineralized volcanic exhalative horizon.
- 2) Reconnaissance mapping and prospecting of the unmapped portion of the claim group.
- 3) Trial stream sediment geochemistry and reconnaissance soil geochemistry on the western slope of Bear River Ridge.
- 4) An airborne electromagnetic survey over areas of interest indicated by the preceding work.

### ITEMIZED COST STATEMENT

The following expenses were incurred by exploration of the Independence claim group between July 14 and August 7, 1984.

#### Wages (field and travel)

Bill Smitheringale, labourer 14 days @ \$80/day	\$ 1,120.00	
W.G. Smitheringale, consultant 15.5 days @ \$350/day	<u>5,425.00</u>	\$ 6,545.00

#### Food and Accommodation

Field: 21 man days @ \$16.80/day	337.68	
Commercial: 8 man days @ \$65.40/day	<u>523.20</u>	<u>860.88</u>

#### Transportation

Vehicle rental (\$693.85/mo plus 12¢/km over 2000 km plus gas = 38.48/day) 17.25 days @ 38.48/day	663.78	
Ferry charges to Prince Rupert passenger and vehicle	313.92	
Helicopter charter 4.2 hr @ \$652/hr.	<u>2,738.40</u>	3,716.10

#### Analysis Charges

Silt samples (H.M. flotation, \$20 each; analysis for Cu, Zn, Ag, As, Au \$11.55 ea.) 3 @ 31.55 each	94.65	
3 rock analyses for Au, Ag and Cu	<u>26.15</u>	<u>120.80</u>

Sub-Total \$11,242.78

Report	
(including typing, drafting, photo reproduction, xeroxing and supplies)	<u>3,520.00</u>
TOTAL	<u>\$14,762.78</u>

Respectfully submitted,



September 28, 1984

W.G. Smitheringale, Ph.D., P. Eng.  
W.G. SMITHERINGALE & ASSOCIATES LTD.

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Vincent, John S., June 22, 1983: A Report on the Premier Extension Project Area, Stewart, British Columbia; unpublished report prepared for Rich Lode Gold Corp.

## CERTIFICATION

I, William G. Smitheringale, certify that:

I am a practising Professional Geological Engineer, resident at 4611 Hoskins Road, North Vancouver, B.C.

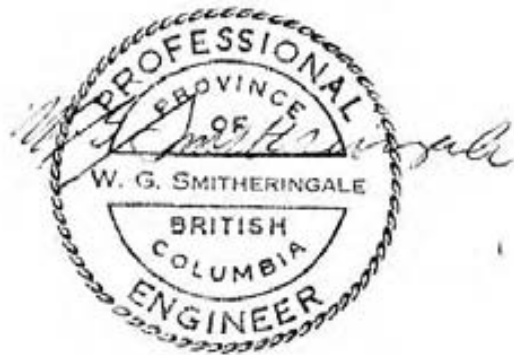
I am a graduate of the University of British Columbia with a degree in Geological Engineering (B.Ap.Sc., 1955) and of the Massachusetts Institute of Technology with the degree of Doctor of Philosophy in Geology (Ph.D., 1962).

I have practised my profession continuously for twenty-two years as Geologist with the Geological Survey of Canada, as Assistant and Associate Professor, Department of Geology, Memorial University of Newfoundland and, since 1974, as a Consulting Geologist.

I am a member in good standing of the Association of Professional Engineers of the Province of British Columbia (Registration No. 10,802).

This report is based on field work conducted by me between July 14 and August 7, 1984.

I have no interest, directly or indirectly, in the Independence claim group or in Tournigan Mining Explorations Ltd.



W.G. SMITHERINGALE, Ph.D., P. Eng.

September 28, 1984

**APPENDIX**

**CERTIFICATES OF ANALYSES**

# MIN-EN Laboratories Ltd.

705 WEST 15th STREET,  
NORTH VANCOUVER, B.C., CANADA V7M 1T2  
TELEPHONE (604) 980-5814

## ANALYTICAL REPORT

Project ..... Dal-Ind. .... Date of report ..... August 16/84.  
File No. .... 4-786 ..... Date samples received ..... August 13/84.  
Samples submitted by: .....  
Company: ..... W.G. Smitheringale .....  
Report on: ..... 3 rocks (assay prep) 10 HM ..... Geochem samples  
.....  
..... Assay samples

### Copies sent to:

1. .... W.G. Smitheringale, Vancouver, B.C. ....
2. ....
3. ....

Samples: Sieved to mesh ..... Ground to mesh ..... -100

Prepared samples stored  discarded

rejects stored  discarded

Methods of analysis: ..... Geochem Cu, Ag-nitric, perchloric digestion. A.A.,

Au-aqua regia, A.A., HM-specific gravity flotation and routine geochem analysis.

Remarks: .....

SPECIALISTS IN MINERAL ENVIRONMENTS



**MIN-EN Laboratories Ltd.**

*Specialists in Mineral Environments*

705 WEST 15th STREET NORTH VANCOUVER, B.C. CANADA V7M 1T2

PHONE: (604) 980-5814 OR (604) 988-4524

TELEX: 04-35282

GEOCHEMICAL ANALYSIS CERTIFICATE

COMPANY: W.G. SMITHERINGALE  
PROJECT: DAL-IND  
ATTENTION: W.G. SMITHERINGALE

FILE: 4-786  
DATE: AUGUST 16/84  
TYPE: ROCK GEOCHEM

*We hereby certify that the following are the results of the geochemical analysis made on 3 samples submitted.*

SAMPLE NUMBER	CU PPM	AG PPM	AU PEB
1953			5
1954			30
1955	12750	54.0	4400

Certified by



MIN-EN Laboratories Ltd.  
Specialists in Mineral Environments  
705 WEST 15th STREET NORTH VANCOUVER, B.C. CANADA V7M 1T2

PHONE: (604) 980-5814 OR (604) 988-4524

TELEX: 04-35

GEOCHEMICAL ANALYSIS CERTIFICATE

COMPANY: W.G. SMITHERINGALE  
PROJECT: DAL-IND  
ATTENTION: W.G. SMITHERINGALE

FILE: 4-786  
DATE: AUGUST 16/84  
TYPE: HEAVY MINERAL

We hereby certify that the following are the results of the geochemical analysis made on 10 samples submitted.

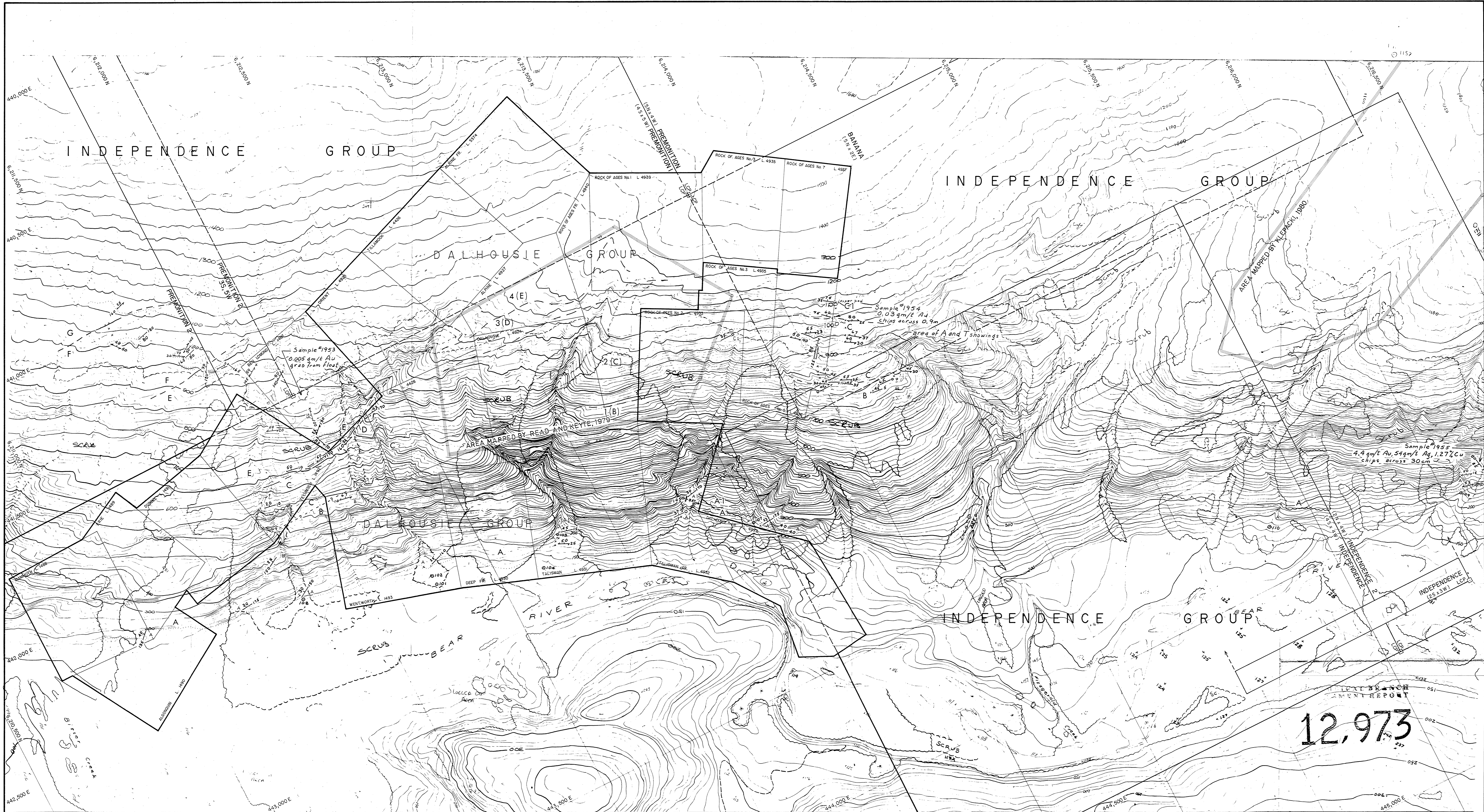
SAMPLE NUMBER	CU PPM	ZN PPM	AG PPM	AS PPM	AU PPB	HM %
101	383	4200	11.2	78	135	3.32
102	395	4060	10.3	79	420	2.38
103	815	430	5.6	290	170	5.82
104	637	462	4.0	240	90	5.28
105	241	222	3.0	345	95	3.84
106	123	410	2.0	50	25	4.66
107	563	5460	9.8	355	240	3.45
108	642	5100	28.8	117	375	2.00
109	661	480	21.9	63	120	1.91
110	1330	2600	32.0	108	1300	2.87

Dalhousie Group: Samples 101, 102, 103, 104, 105, 106 and 108.

Independence Group: Samples 107, 109 and 110.

Certified by





**STREAM SILT ANALYSES**

SAMPLE NUMBER	Cu ppm	Zn ppm	Ag ppm	As ppm	Au ppb	Hg %
<b>DALHOUSIE GROUP</b>						
101	383	4200	11.2	78	135	3.32
102	395	4060	10.3	79	420	2.38
103	815	430	5.6	290	170	5.82
104	637	462	4.0	240	90	5.28
105	241	222	3.0	345	95	3.84
106	123	410	2.0	50	25	4.66
108	642	5100	28.8	117	375	2.00
<b>INDEPENDENCE GROUP</b>						
107	563	5460	9.8	355	240	3.45
109	661	480	21.9	63	120	1.91
110	1330	2600	32.0	108	1300	2.87

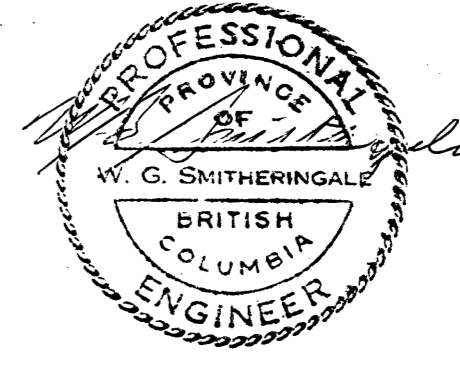
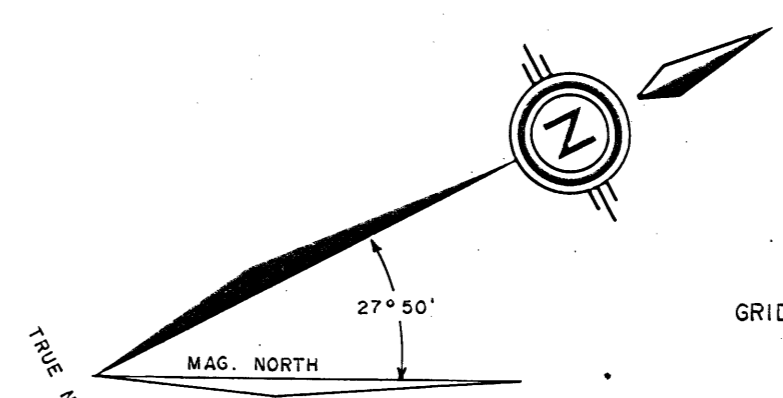
**SYMBOLS**

- x Single outcrop or outcrop point
- Area of outcrop
- Edge of outcrop area, usually a cliff bottom or top.
- Geological contact; located, located approximately, assumed.
- Bedding
- Scissosity
- Fracture cleavage
- Vein
- 101 o Stream silt sample site.

**LITHOLOGY**

- G Maroon and dark greenish-grey andesite agglomerate.
- F Maroon and medium to dark green porphyritic (plagioclase) andesite flows and tuff.
- E Medium green (locally grey), porphyritic (plagioclase) andesite tuff.
- D White weathering, light grey felsite.
- C Dark green (locally grey) porphyritic (felspar) andesite tuff.
- C1 Medium grey and green felspar porphyry; minor bedded, cherty and pyritic tuff and Jasper.
- B White to mottled light and dark grey weathering, light to dark generally porphyritic (felspar) dacite, latite and cherty tuff; local agglomerate.
- A Massive to thin interbeds of light, medium and dark grey and green, variably porphyritic (felspar) andesite and latite tuff and agglomerate.
- A1 Interbedded (1 m to 30 m thick) massive light grey porphyritic (felspar) tuff, brownish black argillaceous tuff, black quartz-eye tuff and thin bedded black limestone, black tuffaceous argillite and black quartz-eye tuff.

METAMORPHISM: All units have been modified by green solar metamorphism



GRID NORTH IS 0° 57' WEST OF TRUE NORTH

TOPOGRAPHY COMPILED FROM 1977 AERIAL PHOTOGRAPHY BY MELHANEY SURVEYING & ENGINEERING LTD. JOB No. 06604-0

12,973

FIGURE 3  
**TOURNIGAN MINING EXPLORATIONS LTD.**  
**INDEPENDENCE CLAIM GROUP**  
**GEOLOGY AND STREAM SILT**  
**GEOCHEMISTRY-1984 PROGRAMME**

Metres 0 100 200 300 400 500 Metres

W.G. SMITHERINGALE & ASSOCIATES LTD.  
 SEPT. 28, 1984