

PRELIMINARY ECONOMIC GEOLOGY REPORT

on the

TANZILLA PROPERTY

Mineral Claims Hu No. 1 to No. 62 inclusive
Centered 9 air miles southwest of the
Settlement of Dease Lake
Northern British Columbia

LIARD MINING DIVISION

Latitude $58^{\circ}20'N$; Longitude $130^{\circ}10'W$
N.T.S. 104 j/8

and owned by TOURNIGAN MINING EXPLORATIONS LTD.,
of Vancouver, B.C.

(Copper & Molybdenum)

Report by:

"D. R. Cochrane"

D. R. Cochrane, P. Eng.,
July 15, 1971
Delta, B.C.

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PART A

A-1 PREAMBLE:

On July 3, the author examined portions of the Hu claims owned by Tournigan Mining Explorations Ltd., and situated 9 air miles southwest of the settlement of Dease Lake, B.C. The 62 located mineral claims cover copper occurrences close to the contact of syenite stocks and Triassic volcanics. The purpose of the visit was to examine the showings exposed in creek valleys, and in trenches excavated in the summer of 1969, and assess their economic potential. This report describes the exploration history, local and economic geology, and contains recommendations and a cost estimate for additional exploration work. It is based on a personal visit to the property and a review of all available data on the Hu claims.

A-2 SUMMARY AND CONCLUSIONS:

1. The Hu No. 1 to 62 located mineral claims are accessible by a nine-mile long 4 x 4 road which leaves the Dease Lake Telegraph Road a few miles west of the settlement of Dease Lake. The road, 7,970 feet of trenching and approximately 20 line miles of a soil sampling survey was completed while the property was under option to Silver Standard Mines Ltd. in 1969 and early in 1970. The option was terminated in September of 1970.

Most of the bedrock is covered by glacial till and the majority of natural outcrops occur in three small stream valleys spaced about one mile apart.

2. Claims straddle contacts between stocks of syenite and Triassic metavolcanics. Pyrite, chalcopyrite and traces of molybdenite occur at and close to the contacts, and mineralization appears to be related to fracturing, brecciation, and to the syenite intrusives.

3. In the Stikine district syenite-monzonite stocks, particularly when in contact with Triassic volcanics, are important geological features, and host much of the copper occurrences in the area. This includes the Galore and Shaft Creeks and the Gnat Lake Deposits. (references 1, 2 and 3 respectively)*

4. The geochemical soil sampling survey conducted on about 26 of the 62 claims by Silver Standard Mines showed the Hu claims soils are enriched in copper, molybdenum and silver. (reference 5)* The average copper content is close to 50 p.p.m. and one sample contained a high of 583 p.p.m. There is very little cross line correlation of "above average" copper in soil samples, but

* see Appendix II, Bibliography

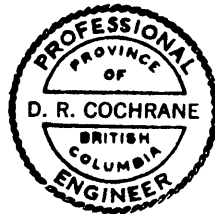
the overburden conditions are not particularly ideal for soil sampling. Nevertheless, there are very few economic exploration alternatives.

5. Further exploration work is recommended and is designed to (a) explore the remainder of the claims by geo-chemical methods compatible with that already completed; and (b) attempt to locate and test areas characterized by geophysical anomalies and coincident high geochemical response.

6. The recommended program consists of:

- (a) extending the present ground control grid;
- (b) a soil sampling survey over the proposed new grid;
- (c) a magnetometer survey,
- (d) an induced polarization survey;
- (e) an allowance for testing by trenching and drilling coincident geochemical and geophysical anomalies if such are found.

7. The estimated cost of the recommended program is \$70,000.00.



Respectfully submitted,

"D. R. Cochrane"

D. R. Cochrane, P. Eng.,
July 15, 1971,
Delta, B.C.

PART B

B-1 LOCATION AND ACCESS:

Tournigan's Tanzilla property is located 9 air miles southwest of the Settlement of Dease Lake in Northern B.C., and 135 air miles south of Watson Lake (the local servicing center). Dease Lake may be reached by road via the Cassiar-Dease Lake-Telegraph Creek gravel road which proceeds south and west from the Alaska Highway just west of the town of Watson Lake in the Yukon Territories. Nine miles of a 4 x 4 access road was constructed to the Hu claims in 1969 by Silver Standard Mines and joins the Dease Lake road just west of the settlement of Dease Lake. A helicopter pad

has been constructed on the east side of the property at the head of Stain Creek and helicopter service is available during the summer months at a Dease Lake base. Float equipped fixed wing service and year-round helicopter service is available in Watson Lake, (in 1971), and an airstrip near the D.O.T. weather station at the south end of Dease Lake accommodates small aircraft. The latitude and longitude of the claims area is 58°20'N and 130°10'W respectively. (see Figure 1) The Pacific Great Eastern railway extension through to the south end of Dease Lake has been surveyed and clearing of the right-of-way will presumably commence in 1971. (reference 7)

B-2 CLAIMS AND OWNERSHIP:

The Hu full sized located mineral claims form a contiguous block as shown in Figure 2. They are located in the Liard Mining Division and are shown on B.C. Department of Mines Mineral Claims Map No. 73M. Hu No. 1 to 62 inclusive are owned outright by Tournigan Mining Explorations Ltd., registered office 1177 West Hastings Street, Vancouver, B.C.

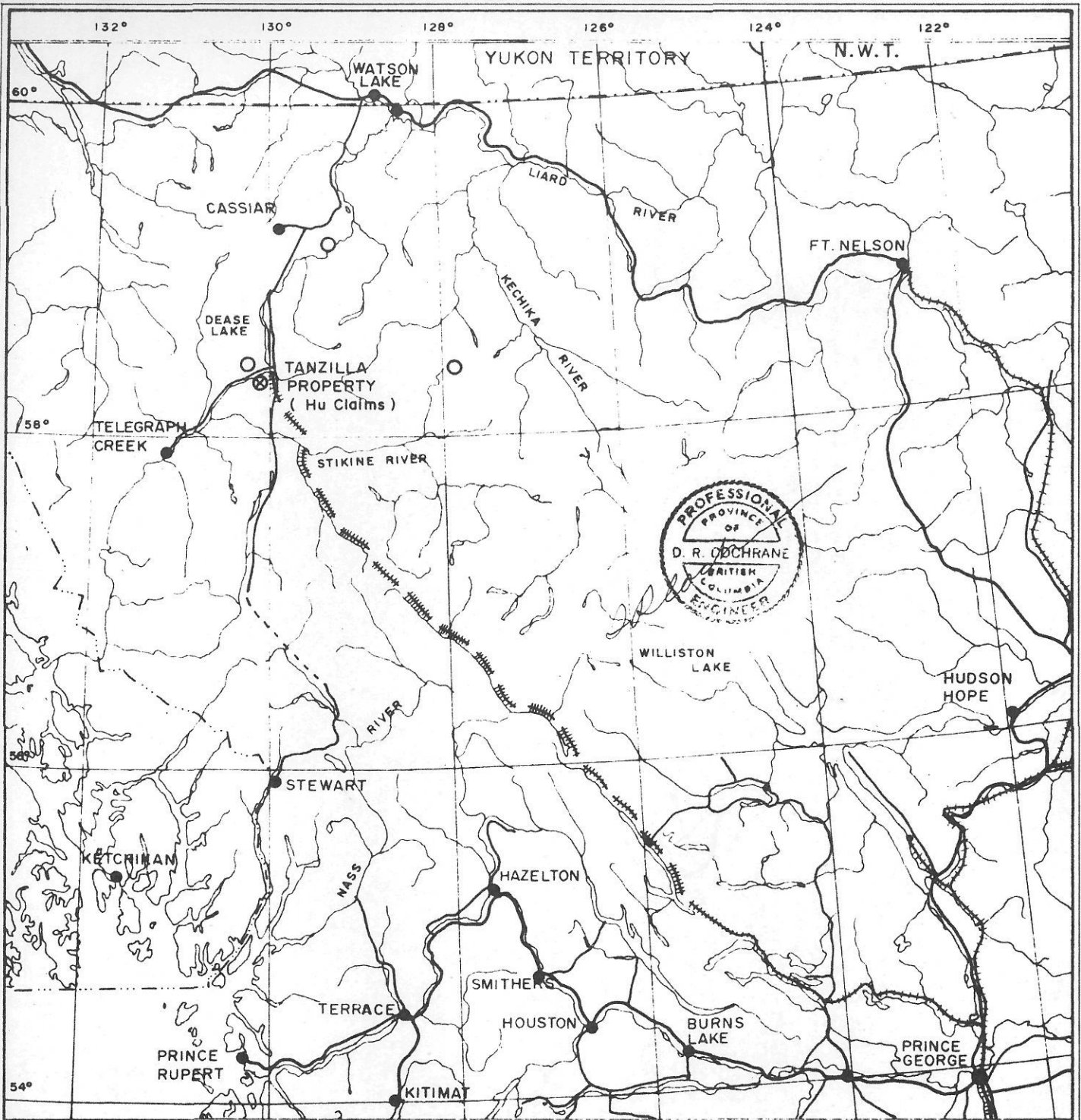
The following table lists pertinent claims data:

<u>Claim Name(s)</u>	<u>Record Number(s)</u>	<u>Anniversary Date</u>
Hu No. 1 to 32 incl.	38127 - 38158 incl.	September
Hu No. 33 to 62 incl.	39336 - 39365 incl.	August

The author inspected claim posts on the east property half and claims appear to be staked in accordance with the regulations set out in the Mineral Act of the Province of British Columbia.

B-3 HISTORY:

To the author's knowledge no claims or exploration work was ever conducted on the property prior to 1969. In June, 1969, Hu No. 1 to 32 were staked on behalf of Tournigan Mining Explorations Ltd., after the investigation of a gossan zone at the head of Stain Creek. Later in the summer of 1969, the first 32 Hu claims were optioned to Silver Standard Mines Ltd., and an additional 30 claims were added to the group. During that field season, Silver Standard built nine miles of road to the property and excavated 22 trenches totalling 7,970 feet in length. (Reference, Geology, Exploration and Mining in British Columbia, 1969, page 44, and Reference 5). In August and September, geologic mapping was completed by W. Dunn of Silver Standard and R. H. Seraphim of Seraphim Engineering Limited. In the summer of 1970, Silver Standard



LEGEND

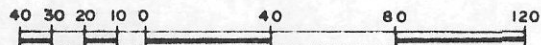
- ##### P.G.E. Riwy.
- ## ## P.G.E. (proposed)
- Highways
- ▷ Cities and Towns
- ⊗ Properties

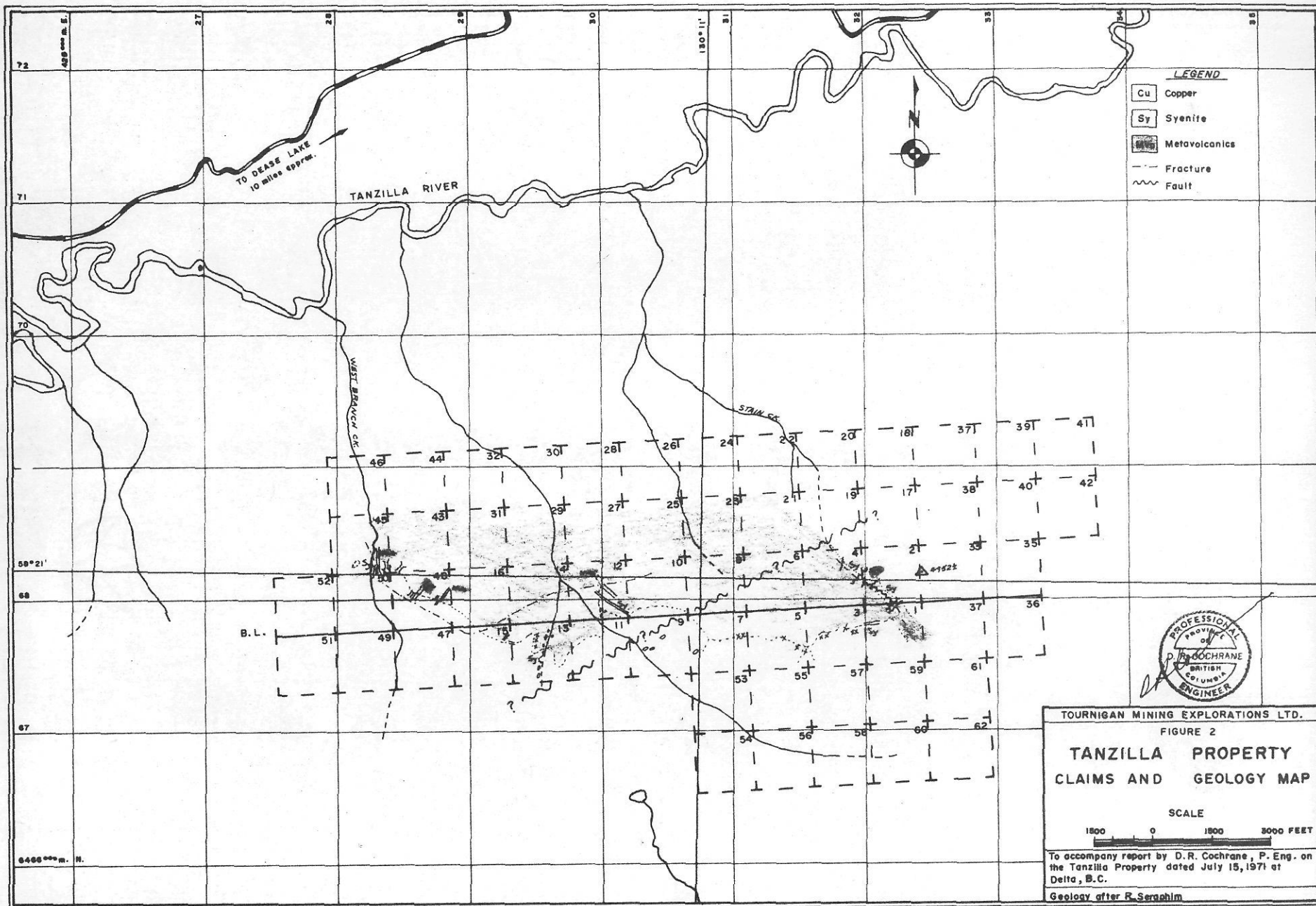
FIGURE 1

**TOURNIGAN MINING EXPLORATIONS LTD.
LOCATION MAP
TANZILLA PROPERTY**

To accompany report by
D.R. Cochrane, P.Eng.
on the Tanzilla
Property in the Liard M.D.
located 10 miles S.S.W.
from Dease Lake, B.C.
Dated July 15, 1971 at
Delta, B.C.

Scale of miles





LEGEND

- Cu Copper
- Sy Syenite
- Metavolcanics
- Fracture
- Fault

PROFESSIONAL
ENGINEER
D. R. COCHRANE
BRITISH COLUMBIA

TOURNIGAN MINING EXPLORATIONS LTD.
FIGURE 2
**TANZILLA PROPERTY
CLAIMS AND GEOLOGY MAP**

SCALE
1800 0 1800 3000 FEET

To accompany report by D.R. Cochrane, P. Eng. on
the Tanzilla Property dated July 15, 1971 at
Delta, B.C.
Geology after R. Seraphim

Mines cut, flagged and chained nearly 20 line miles of ground control grid, and completed a geochemical soil sampling survey on the grid area. The option was allowed to terminate in September, 1970, and no further work has been initiated to date.

B-4 GENERAL SETTING:

Tournigan's Tanzilla property is situated in the Hotailuh Range of the Tanzilla Plateau, a physiographic subdivision of northern British Columbia. It is a relatively gentle upland surface, ranging from just below 2,500 feet above sea level, in the broad "U" shaped Tanzilla River valley, to just over 6,000 feet in the Hotailuh Range. The Hu claims lie on the north flank of the range between Hluey Lakes (elev. approximately 4,500 feet) and the Tanzilla River. Gabrielse, Souther and Roots (6) show the Hu claims group as lying entirely within an Upper Triassic sequence, composed chiefly of volcanics, with numerous intercalated sedimentary members. This sequence is characterized by the presence of many small stocks, sills and dikes of porphyritic andesite. Small intrusive Triassic (and later) syenitic stocks are shown on Map 21-1962 several miles south of the claims, and intrude the volcanic sedimentary sequence. The syenite and monzonite intrusives of the area are particularly geologically interesting, since, especially near the contacts with Triassic volcanics, they are the host rocks in many of the major copper occurrences now being developed in that district. These include the occurrences at Gnat Lake, Shaft Creek and Galore Creek. (references 3, 2, 1)

Pleistocene and recent glacial till, alpine moraines, and glacial outwash cover much of the bedrock. The claims area is quite well forested with spruce and pine, and in more open places there is a thick undergrowth of buck brush.

PART C

C-1 LOCAL AND ECONOMIC GEOLOGY:

Bedrock is exposed in two main areas (1), on the east sector of the property in the upper reaches of Stain Creek (on the west property half), and (2) in trenches on the Hu No. 48 and No. 50 claims, close to West Branch Creek. These two areas are approximately two miles apart with only a few scattered outcrops in between.

1. Stain Creek Area (east side of property)

The valley of Stain Creek exposes badly broken metavolcanic rocks which are in contact with a very rusty, pyritic, medium

grained syenite. The syenite is brecciated and well fractured near the volcanic contact, and contains pyrite and scattered chalcopyrite along fractures and in small shear zones. The volcanic rocks are highly altered and fractured, and pyrite is quite abundant in shears and joints. Disseminated magnetite is common in both the intrusive and volcanic rocks, at the contact, and therefore magnetometer surveying may certainly guide exploration in overburdened areas. Copper stain and scattered chalcopyrite is present and is especially noticeable close to the contact. Previous assays collected by Silver Standard Mines personnel have shown this area to be sub-economic; however, one six-foot wide section near the contact ran 0.1 oz Au and 0.56 percent Cu.

2. West Branch Creek (west side of property)

The bedrock geological conditions are very similar to that at Stain Creek in the Silver Standard trenches immediately east of West Branch Creek. In the trenches, fingers and lenses of a fine grained, grey syenite intrude altered blocky metavolcanics. Fine grained chalcopyrite and pyrite is present in the syenite, and the metamorphosed altered volcanics. A few specks of molybdenite were also observed in the trenches.

C-2 GEOCHEMISTRY:

Silver Standard Mines Ltd., in an effort to assess the contact zone, conducted a soil geochemical survey on grid lines spaced 400 feet apart, and at 100 foot sample intervals. All samples were tested for copper, and a few samples for molybdenum and silver. Conditions are not ideal for geochemical prospecting since swamps and boggy alpine meadows exist on the upper claims at higher elevations, and patches of permafrost exist on north slopes on claims at lower elevation. The copper results ranged from a low of 8 to a high of 583 p.p.m. The arithmetic mean of a random sample of 22 copper results is 47 p.p.m. and the standard deviation is 53 p.p.m. A total of 35 soil results contained in excess of 100 p.p.m. Cu, the largest number occurring rather sporadically spaced but within one-half mile to the east and one-half mile to the west of Stain Creek. The molybdenum content of the soils ranged from a low of 0.5 to a high of 58 p.p.m., and the silver content between less than 0.5 and 3 p.p.m. The average content of these metals in soils reported by Hawkes and Webb (reference 4) is: Cu, 20; Mo, 2; and Ag, 0.1 p.p.m. Thus the Tanzilla soils may be generally categorized as Cu, Mo and Ag rich.

C-3 RECOMMENDATIONS:

The Hu claims are largely drift covered but a few natural outcrops and trenches to bedrock expose subeconomic but fairly widespread copper mineralization. Only about 26 of the 62 claims have been explored to date.

The following exploration program is recommended on the Hu No. 1 to No. 62 claim group:

- A. Rechain and mark old lines (if necessary), and extend the grid lines to the outer boundaries of claim group. The new lines should be spaced 800 feet apart.
- B. Conduct a magnetometer survey over the entire grid area. This will require approximately 40 line miles of surveying.
- C. Conduct a geochemical soil sampling survey over the new grid, and collect samples at 200 feet intervals. The samples should be analyzed for Cu and Mo.
- D. Conduct an induced polarization survey over the grid lines, on cross lines spaced 800 feet apart, and at an "a" spacing equal to, or in excess of 400 feet (estimate 32 line miles).
- E. Trench coincident geochemically and geophysically anomalous areas (if possible) and prepare drill sites in areas of deep or frozen overburden.
- F. Geologically map the claims, with emphasis on the "new" grid section.
- G. Diamond drill anomalous areas where trenching is impossible.

C-4 COST ESTIMATE:

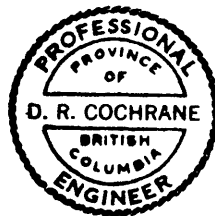
The estimated cost of the above recommended program is as follows:

1.	Linecutting: 20 line miles @ \$100/line mile	\$ 2,000.00
2.	Magnetometer Survey: 40 line miles @ \$100/line mile	4,000.00
3.	Geochemical Soil Sampling survey or proposed "new" grid, sample interval 200 feet and analysis for Cu and Mo: 20 line miles @ \$125/line mile	2,500.00
4.	Induced polarization survey on cross lines spaced 800 feet apart: 32 line miles @ \$450/line mile	14,400.00
5.	Trenching, road building to drill sites	4,500.00
6.	2000 feet of diamond drilling at \$13/foot	26,000.00
7.	Geological mapping, core logging	2,500.00
8.	Camp and supplies	2,500.00
9.	Supervision	2,000.00
10.	Transportation and communications	2,250.00
11.	Assays	750.00
	SUB-TOTAL	\$ <u>63,400.00</u>
12.	Contingencies @ 10 percent	<u>6,340.00</u>
	TOTAL	\$ 69,740.00
	SAY	\$ <u><u>70,000.00</u></u>

If, on completion of the above-described program, commercial grades of mineralization have been intersected, additional funds will be required to prove tonnage and further develop the property.

Respectfully submitted,

" D. R. Cochrane "



D. R. Cochrane, P. Eng.,
July 15, 1971,
Delta, B.C.

APPENDIX I

Certificate

I, D. R. Cochrane, of the Municipality of Delta, Province of British Columbia, hereby certify that:

1. I am a geological engineer with an office at 4952 8A Avenue, Delta, B.C.
2. I am a graduate of the University of Toronto (B.A.Sc.) in 1962, and a graduate of Queen's University (M.Sc. Eng.) in 1964.
3. I have practiced my profession since 1962 while employed with U. S. Steel, Noranda Explorations and Meridian Syndicate.
4. I am a member of the Association of Professional Engineers of British Columbia and also the Association of Professional Engineers of Ontario and Saskatchewan.
5. I have no interest, direct or indirect, in the property or securities of Tournigan Mining Explorations Ltd., nor do I expect to receive any such interest.
6. The foregoing report is based on my personal examination of the Tanzilla property on July 3, 1971, and a review of available data on the claims and the region in general.
7. I hereby consent to have the information contained herein published in a Prospectus of Tournigan Mining Explorations Ltd., or in any official or unofficial communications of Tournigan Mining Explorations Ltd.

"D. R. Cochrane"

D. R. Cochrane, P. Eng.

4952 8A Avenue,
Delta, B.C.
July 15, 1971.

APPENDIX II

Bibliography

- (1) Annual Report, Minister of Mines and Petroleum Resources, Province of B.C., 1965, page 19
- (2) Annual Report, Minister of Mines and Petroleum Resources, Province of B.C., 1966, pages 26-29
- (3) Annual Report, Minister of Mines and Petroleum Resources, Province of B.C., 1966, pages 19 and 20
- (4) HAWKES, H.E., and WEBB, J.S. (1962), Geochemistry in Mineral Exploration, Harper and Row, N.Y.
- (5) Silver Standard Mines Ltd., Geological Sketch, Geochemical Map, and Report on Exploration Work by R. Seraphim on the Tanzilla Project (Private Reports and Maps)
- (6) GABRIELSE, H., SOUTHER, J.G., and ROOTS, E.F., Geological Survey of Canada, Geological Map 21-1962, the Dease Lake Sheet
- (7) B. C. Financial and Economic Review, 30th Edition, July, 1970, Chapter 2