2011

GEOLOGICAL SURVEY REPORT

by

C. Coveney, P.Eng. and F. Lee, Geologist

on the

HIGHLAND VALLEY MINES LTD. (N.P.L.)

TAR GROUP OF CLAIMS

near the

SKUHUN CREEK

Kamloops Mining Division, B.C.

Latitude: 50°17'N
Longitude: 121°06'W

Dates: 18th July to 22nd September, 1969

22nd September, 1969

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LIST OF ACCOMPANYING MAPS

INTRODUCTION

The TAR group of claims straddles the top of a 4,000 feet high ridge lying south of the Skuhun Creek approximately 4 miles from the confluence of the Skuhun and the Nicola River. The claim block extends to within 500 feet of the Skuhun Creek where the elevation is 2,200 feet. Most of the claims lie over steep hillsides and some cliffed areas.

The investigation of the group consisted of pace and compass mapping along planned traverses using the claim lines and posts as reference points. Mapping was carried out from 19th July to 25th July 1969 inclusive. The field work and map compilation was done by F. Lee of Western Geological Services Ltd. under the direction of Mr. C. Coveney, P.Eng., the Consulting Geologist for Highland Valley Mines Ltd. (N.P.L.).

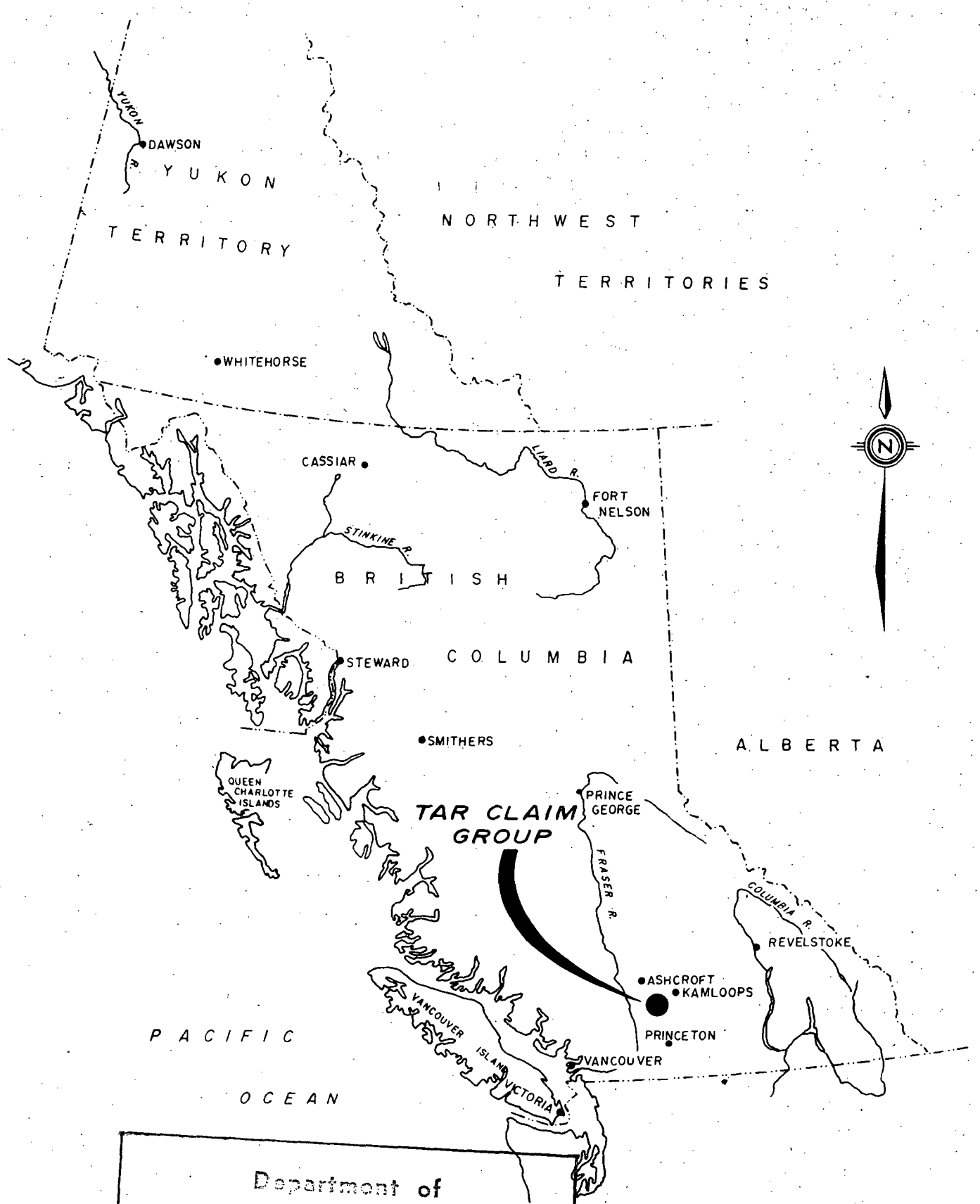
SUMMARY AND CONCLUSIONS

Pace and compass traverses were made over all the TAR claims and the geology of the claims mapped in reasonable detail. The object of the mapping was to determine the detailed geology of the claims and to locate areas of mineralization. Field work was carried out from 19th July to 25th July, 1969 inclusive.

Most of the claims area is covered by a thin veneer of till but sufficient exposures of bedrock occur for a good idea to be gained of the geology of the area. Rocks of three geological ages occur. The oldest rocks are volcanics and mildly metamorphosed sediments of the Nicola Series (Triassic). These rocks have been intruded by a monzonite batholith which is a phase of the Guichon Batholith. There has been fracturing along the batholith edge. Overlying the southern part of the claim group is a thick sheet of Tertiary andesite lavas believed to be part of the Kamloops Volcanics. Dykes probably related to these lavas cut the monzonite and must certainly cut the Nicola rocks although no instances were seen in the field.

A 140° trending zone of orthoclase-epidote alteration occurs in the monzonite 500 feet in from its edge. Copper mineralization accompanies this alteration and is best where orthoclase introduction is greatest.

Insufficient outcrop occurs to determine the extent and strength of mineralization. It is recommended that further work be done on this zone of mineralization to determine its potential.



HIGHLAND VALLEY MINES LTD.

TAR CLAIM GROUP

LOCATION MAP

HIGHLAND VALLEY AREA, B.C.

SCALE 1"=50 miles

W.G.S.

ALTAIR, Aug.-1969

LOCATION AND ACCESS

The TAR group of claims lies just south of the Skuhun Creek approximately 4 miles from its confluence with the Nicola River. The claims lie within the Kamloops Mining Division on and around latitude 50°17'N and longitude 121°06'W.

Access is by paved road from Merritt or Spence's Bridge to the Skuhun Creek turn-off, then by a good-weather dirt road along the Skuhun Creek to within 1,000 feet of the north edge of the claim group.

CLAIMS

The TAR group of claims comprise sixteen full size claims as tabulated below. All claims lie within the Kamloops Mining Division of B.C.

Claim Name	Tag No.	Record No.	Expiry Date
TAR 1	959501	71716	23rd Sept./69
TAR 2	959502	71717	"
TAR 3	959503	71718	"
TAR 4	959504	71719	"
TAR 5	959505	71720	"
TAR 6	959506	71721	"
TAR 7	959507	71722	"
TAR 8	959508	71723	"
TAR 9	959509	71724	"
TAR 10	959510	71725	"
TAR 11	959511	71726	"
TAR 12	959512	71727	"
TAR 13	959513	71728	"
TAR 14	959514	71729	"
TAR 15	959515	71730	"
TAR 16	959516	71731	"

HISTORY

It is believed that little work has been done on or near the area of the claims prior to 1968 when the claims were staked. Except for a little bulldozer trenching known to have been done in the east of the claim area by another company prior to 1968, little interest was shown in the area until photo-geological studies suggested the existence of similar conditions to those of the mineralized areas of the Highland Valley near the Bethlehem Copper mine.

PHYSIOGRAPHY

The claim group lies on steeply sloping ground. North of the ridge summit crossing the claim group, slopes are steepest and are broken in places by a series of cliffs and small flat areas. One cliff exceeds 200 feet in height. The southern ridge slope is flatter and more even. The whole area is generally lightly timbered and thickly grassed but some small isolated areas have fire re-growth or wind-falls.

The large dry-creek valley running northwest across claims TAR 12, 13, 3 and 1 is steep-sided and barren of outcrop. It issues out onto, and cuts across, a well-formed river terrace made by Skuhun Creek.

GEOLOGY

A. Mapping Procedure

All the claims of the group with the exception of TAR 12 were covered by at least three pace and compass traverses. TAR 12 was done in less detail because of the extremely high cliffed area on it but TAR 13 and TAR 14 were done in much more detail. All traverses were tied in to the two claim lines, which were in turn tied into one another by mapping along the access road on the property. Tie-ins were only approximate due to the difficulty of pacing on steep, grass-covered hillsides.

B. Discussion

Till covers much of the claim area. In the Skuhun Creek Valley the blanket is commonly only a few feet thick. The area may be divided geologically into three parts which will be described separately.

a) Nicola Volcanics (Triassic)

Exposures of the Nicola rocks are generally sparse. There is however, sufficient evidence to show that they underlie a large area of the younger flat-lying Kamloops Volcanics which cover much of the claim group. Best exposure of the Nicola is along a portion of the access road where the contact between the Nicola Volcanics and a monzonite intrusion can be seen. Here the Nicola rocks are variously altered to give a patchy distribution of granitized material or chloritised andesite. Further southeast the

Nicola has been altered to a fine schist. No metallic mineralization was seen in the Nicola rocks although some calcite veins were noted.

b) Monzonite Intrusion

The monzonite intrusion is a rather coarse-grained rock and is almost certainly a phase of the Guichon Batholith. The contact between it and the Nicola rocks on the claim group strikes at approximately 140° and the border phase of the intrusion is much shattered. Numerous large "horses" of Nicola rock occur in this part. The monzonite consists of approximately 35% biotite, 35% plagioclase and 30% orthoclase for about 400 feet into the intrusion from its edge, but then progressively alters towards the centre to a composition of approximately 40% hornblende and (minor) biotite, 30% plagioclase and 30% orthoclase. Local patches having 60% hornblende are not uncommon.

Lying within the intrusion and approximately 500 feet from and parallel to its edge is a zone which has undergone orthoclase-epidote alteration. In part this alteration consists of orthoclase-epidote veining with minor orthoclase replacement of the host rock but southwest of the trenched area in the extreme east of the TAR 14 claim the plagioclase of the monzonite has been completely replaced by orthoclase to give a coarse-grained "syenite". This "syenite" occurs as a northwest trending band and is host to copper mineralization. The orthoclase "peters" out to the south and northeast of a plagioclase andesite dyke. Epidote is common but more so at the extremities of feldspar replacement where epidote

and epidote-orthoclase veins are common. Copper mineralization is developed in the coarse-grained syenite, best along the face of the feldspar andesite dyke but also (outward) along thin joints. The whole area is much faulted by what appears to be faults of small displacement. The feldspar andesite dyke may have come up a pre-existing fault.

c) Kamloops Volcanics (Tertiary)

Rocks of this series outcrop along the top and upper sides of the high ridge forming the western and southern edges of the claim group. They erode to form cliffs. The large sheet of volcanic rock consists of several, probably many, lava flows varying slightly in composition from one another. Andesite, porphyritic plagioclase andesite, porphyritic hornblende plagioclase andesite, and possibly augite andesite were noted in the field. Also present in the basal sections of the volcanic sheet, on the TAR 2 and TAR 4 claims, are numerous pebbles, boulders and possibly xenoliths in the lava. In some places there is so much included material that the lava looks almost like a partly granitized conglomerate in which andesite pebbles predominate but in which granite boulders are not uncommon.

Andesite dykes possibly related to the lava sheet outcrop in the northeastern part of the claim group where they cut the monzonite intrusion.

No mineralization was seen in the Kamloops Volcanics.

C. Mineralization

Metallic mineralization seems to be exclusively chalcopyrite. This occurs in small amounts irregularly scattered throughout the orthoclase-epidote veined rock. One crystal of bornite was seen. Mineralization increases appreciably in amount where almost complete syenitization of the monzonite has occurred. Here, however, mineralization has been along joints and fractures with minor introduction of chalcopyrite into the adjacent walls. The chalcopyrite occurs as large irregular patches. In one locality a concentration of chalcopyrite occurs in an 18 inch wide zone along the northeast face of a feldspar andesite dyke, suggesting either that the dyke intruded up a mineralized fault and caused concentration of the chalcopyrite or that the chalcopyrite followed up the face of the dyke. Although the dyke would appear to be post-mineralization based on regional data, some dykes in the vicinity of the mineralization have been epidotized suggesting that the dykes, or at least some of them, are pre-mineral.

CONCLUSIONS AND RECOMMENDATIONS

Copper mineralisation occurs in the monsonite intrusion on TAR 13 and TAR 14 claims, occurring along a zone of orthoclase-epidote alteration. The mineralized zone may extend (along a trend of 140°) from the access road on TAR 13 to the southeast corner of TAR 14. A thin veneer of till covers most of the area so that it is impossible to give the actual extent of the zone.

The mineralized zone warrants further investigation. As the area lies on the side of a steep hill, bulldozing of trenches would be difficult, despite the fact that the till cover is believed to be only a few feet thick.

LIST OF PERSONNEL AND DATES EMPLOYED

Total number of men employed - 1.

Name and Address	Position	Work Performed	Employed
F. Lee 308-540 Burrard St. Vancouver 1, B.C.	Geologist	Geological mapping, map drawing, report preparation.	During period 18th July to 22nd September, 1969.

CERTIFICATION

I, Thomas Frank Lee,

HEREBY STATE THAT:

1. I am an Australian citizen residing in Vancouver, B.C.

2. I received a Diploma of Civil Engineering in Victoria, Australia, in 1954 and a B.Sc. (Ordinary) in geology at the Melbourne University, Australia in 1959.

3. I am a member of the Geological Society of Australia and a graduate member of the Institution of Engineers, Australia.

4. After three years practice as a structural engineer and one as an assistant office geologist, I spent three field seasons in tropical Australia as a Geologist for The Broken Hill Pty. Co. Ltd. being Officer in Charge for the last two years (1960-61). From 1962 to 1966 I was lecturer in charge of geology at the Bendigo Institute of Technology (late Bendigo School of Mines) and during the field season of 1967 was employed by Bethex Explorations Ltd. as geologist at Alice Arm, B.C. From May 1968 to the present I have been employed by Western Geological Services Ltd. of Vancouver, B.C.

Frank Lee

T.F.Lee, B.Sc., Dip. of C.E., TTTC

CERTIFICATION

1. I, CECIL J. COVENEY, certify that I am a Consulting Geologist and that I reside at 4024 Delbrook Avenue, North Vancouver, British Columbia.

2. I am a member of the Association of Professional Engineers for the Province of British Columbia and a graduate of the University of New Brunswick and the University of Toronto and have practised my profession for more than 20 years.

Signed this 26th day of September, A.D. 1969.

C. J. Coveney

CECIL J. COVENEY, P. Eng.

Approx. position of bridge

Approx location SKUHUN CREEK

N

TAR 1 | TAR 2 | TAR 3 | TAR 4 | TAR 5 | TAR 6 | TAR 7 | TAR 8 | TAR 9 | TAR 10 | TAR 11 | TAR 12 | TAR 13 | TAR 14 | TAR 15 | TAR 16

NO OUTCROP | Till | FLAT AREA | barbed wire fence | STEEP SLOPE | CLIFFS | Talus of Z | Not continuous outcrop Epidotised ar Kose or A^T with some calcite veins | Highly epidotized arkose or A^T | Meta d arkose | meta d arkose or A | Z | A^f | A | Flat area | A^T? | outcrops? | A^f with included pebbles | A^f mildly altered in places | mildly chloritised | mildly chloritised here | chloritized | Road covered with overgrowth in creek bed | dry

Frequent large boulder M from up hill | Small areas scree | Lineated M possible A dyke | (Not visited indentified from scree) | Outcrop? Lineated M | 185° | 140° contact | M outcrop here? | Very small outcrop with trace malachite | Highly M-veined, highly thermally meta d A^T | Extremely altered A^T | Till cover | Thin till cover over highly leached decomposed M. | contact 115° | M with "horses" A | contact 130° | Epidote or thoclase veins | Altered A^T | Fault zone? 262°, vert | No outcrop | Kaolin along fractures | Much shattered and partly decomposed M | Soil cover but boulders suggest M under | Mildly altered A^T chloritized A^T granitized A^T | granitized A^T | M dyke, 110° 80° S | weathered A^T | Mildly altered A^T separated from granitized A^T by 2" ash(?) bed striking 270° dip 45° N. | Talus of M and some A | Metad A^T with calcite veins | Highly metad A^T with epidote | Fine schist, A^T & schistose A^T | Lineation 110° | Lineated M | M with epidote | ascicular Ah | 80° contact 275° | A^{fh} Cu on S face | A dyke | A^f dyke flat dipping NW 255° | epidotized A^{fh} | Till | contact M Lineation at 110° Coarsely porphyritic feldspar-hornblende porphyrite | Ascicular Ah dyke | Js 265° | M with ortho/epidote veins epidote-veins | Tree | epid d M | Ascicular Ah dyke-faulted | Epidotised A dyke | contact 125° | Large boulders M | A^T? | CLIFFS TO 200' HIGH

LEGEND

- A^T NICOLA ANDESITE, Etc.
- M MONZONITE
- S SYENITE (ALTERED MONZONITE)
- TERTIARY ANDESITES
  - A andesite
  - A^f feldspar andesite
  - A^{fh} feldspar-hornblende andesite
  - Z andesite with numerous rolled pebbles, xenoliths(?) etc.
- Lithological boundary
- x Cu mineralization
- Trench
- Road (dirt)
- Talus and scree
- Cliff or steep slope
- Creek

Note

Mapped & drawn by F Lee of W.G.S.

Mapping was done by pace and compass on steep ground so that all locations are approximate only. F.L.

To accompany a geological report by C. Coveney, P.Eng. and F. Lee, geologist, dated 22nd. September, 1969.

Frank Lee

2011

HIGHLAND VALLEY MINES LTD.

GEOLOGICAL MAP

TAR CLAIM GROUP

HIGHLAND VALLEY AREA B.C.

SCALE

Feet 400 0 400 Feet

W.G.S. AUG. 1969