# GEOLOGICAL ASSESSMENT REPORT

(Lineament Array Analysis)

(Event Number ID 4134114)

on the

# TUNKWA CLAIM

(Tenure No. 528955)

(Centre at 654365E 5608690N)

**Kamloops Mining Division** 

NTS M092I.066

Vancouver, B.C. Canada

Laurence Sookochoff, PEng

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### SUMMARY

The 512.673 hectare TUNKWA mineral claim located 200 kilometres northeast of Vancouver, British Columbia Canada, and within 10 kilometres of the major productive copper-moly porphyry deposits of the Highland Valley.

The Highland Valley copper porphyry mineral deposits are hosted by the Guichon Creek Batholith with the Afton mine copper-gold mineral deposit hosted by the Iron Mask Batholith. Both Batholiths intrude the Nicola Group of predominant volcanics in a northerly trending volcanic belt some 40 kilometres wide extending from near the United States border in the south to Kamloops Lake in the north. The Nicola Group is united by similar stratigraphy and tectonics, and is noted for its associated copper mines and prospects.

The TUNKWA claim is located some five kilometres east of the eastern edge of the Guichon Creek Batholith, most of which is covered by alluvium, and covers the central volcanic facies of the Nicola volcanics in north northwesterly trending fault contact with Miocene basalt volcanics.

Mineralization on the TUNKWA property is of a reported (MINFILE) carbonate zone is mineralized with disseminated stibnite, tetrahedrite, chalcopyrite, malachite and azurite with cinnabar occurring as thin films and small masses in dolomite and quartz veins.

The results of the Lineament Array Analysis indicated six localized areas of potential mineral controlling structures where potential economic mineral zones may occur. One of these zones is the TUNKWA mineral zone, designated as a past producer (MINFILE) and where surficial mercury and associated minerals may indicate an epithermal system with potentially economic precious metal mineralization at depth.

### **INTRODUCTION**

A lineament array analysis was completed on the TUNKWA claim for the purpose of determining potential structural controls for economic mineral zones on the claim and to fulfill the assessment requirements of Event Number (4134114). Based on historical development and/or production of copper/gold/silver minerals from this area, the geology of the area is conducive to the location of economic structurally controlled mineral zones

### **PROPERTY DESCRIPTION & LOCATION**

The property consists of one claim with an area of 512.673 hectares. Particulars are as follows:

Claim Name	<u>Hectares</u>	Tenure No.	Expiry Date
TUNKWA	512.673	528955	2008/oct/25

The TUNKWA claim is located 200 kilometres northeast of Vancouver, a port city at the southwest corner of the Province of British Columbia and the third largest city in Canada, and 54 kilometres north of Merritt, a city that may provide the necessary infrastructure for a mining operation in the area.

### PROPERTY DESCRIPTION & LOCATION (cont'd)

The Coquihalla 4-lane highway, passing through Merritt, connects Kamloops to the northeast and Vancouver to the southwest. Logan Lake is 40 kilometres north of Merritt. A paved road is taken northerly from Logan Lake for seven kilometres to within one kilometre east of the TUNKWA. A secondary road junctions to the west and is taken for less than two kilometres to the southeast corner of the TUNKWA claim. This road is taken for less than two kilometres to access the TUNKWA mineral showing and to other areas of the TUNKWA claim.

The TUNKWA property is also located within NTS 92I.056, within the Kamloops Mining Division, and with central coordinates of 654365E 5608690N or 120 49' 06"W Long. and 50 36' 35"N Lat. The major copper-moly porphyry deposits of the Highland Valley are within 10 kilometres southwest of the TUNKWA claim. The formerly productive Afton deposit is 30 kilometres to the northeast.

# ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE & PHYSIOGRAPHY

Access to the TUNKWA claim is from Logan Lake northward for 10 kilometres. The paved road passes through the central portion of the TUNKWA claim

The TUNKWA claim occupies an area characterized by gently sloping hills with elevations ranging from 1,105 to 1,245 metres above sea level. The TUNKWA claim is covered with a moderate stand of pine, fir and spruce, with very little or no underbrush. The area, within the B.C. dry belt, has a continental climate characterized by cold winters and hot summers.

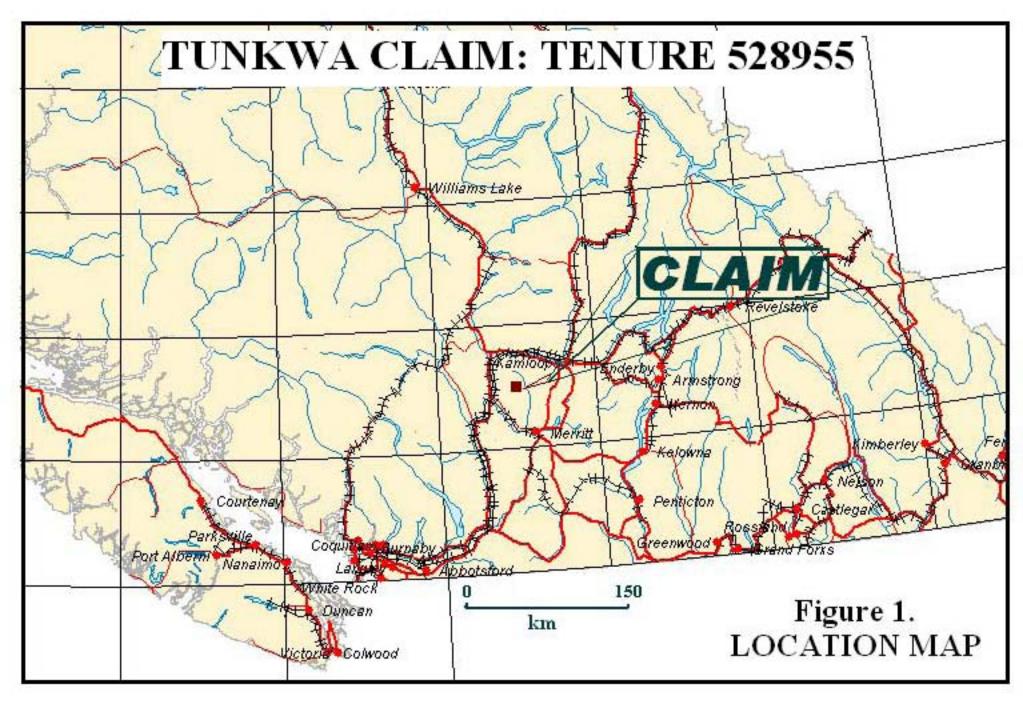
Logan Lake, which provides the infrastructure for the Highland Valley mines, would be a source of experienced and reliable exploration and mining personnel. Kamloops is serviced daily by commercial airline and is a hub for road and rail transportation. Vancouver, a port city on the southwest corner of, and the largest city in the Province of British Columbia, is four hours distant by road and less than one hour by air from Kamloops.

Sufficient water for all phases of the exploration program could be available from steams, ponds, and lakes within the confines of the property.

### HISTORY -Regional

Current and former porphyry copper mining in the Logan Lake area stemmed from the discovery of copper mineralization in the Highland Valley area in 1899. The following historical account is summarized from a publication entitled, "The Discoverers".

From the first discovery of mineralization in the Highland Valley area in 1899, exploration was not revived until 1915. It was not until 1954 that Spud Huestis and associates formed a syndicate, staked about a hundred claims and the Bethlehem Copper Corporation Limited came into being. Subsequently, a partnership was formed with Sumitomo, additional exploration and development followed, and by the end of 1962, the Bethlehem mine was in production.



### HISTORY –Regional (cont'd)

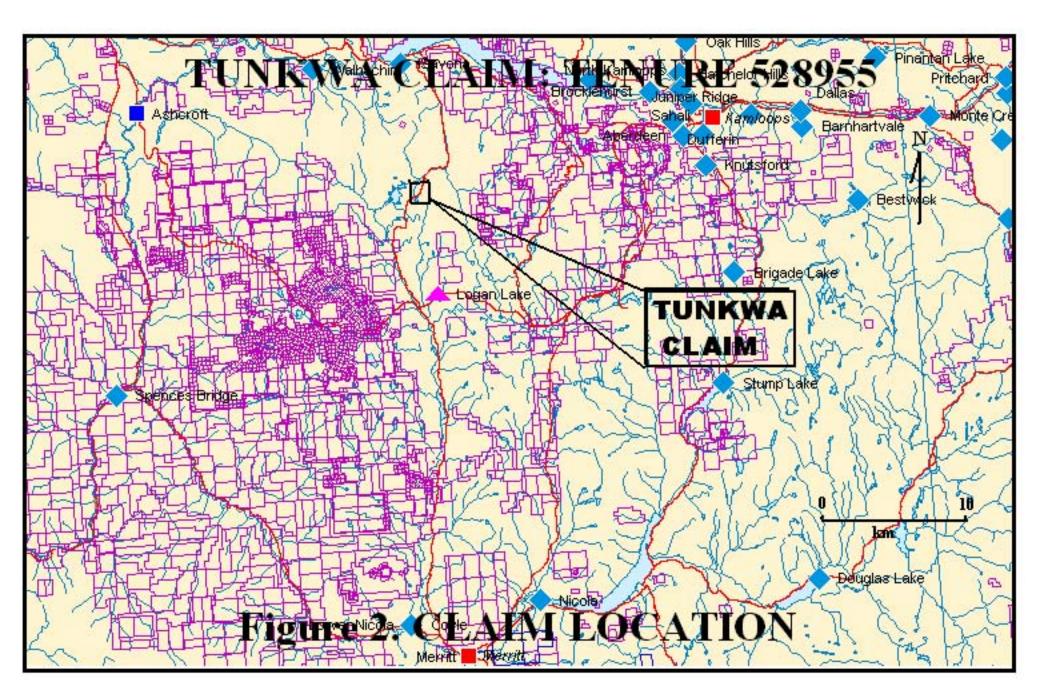
Another "Explorer", Egil Lorntzsen, commenced exploration in the Highland Valley in 1954 "discovered" the Lornex porphyry copper deposit. Lornex was brought into production by Rio Algom Mines in 1972 and at that time was the largest base metal mining operation in Canada, as well as the most modern and efficient. Additional significant porphyry deposits were discovered and put into production. These productive deposits included the Highmont, which mill was the fourth such mill in the Highland Valley, and the Valley Copper deposit, the largest deposit of the Highland Valley. The Highland Valley had now become one of the world's largest and most prolific copper– moly producing areas in the world.

#### HISTORY – TUNKWA Claim

The Toonkwa claim was staked in about 1899 and although its exact location has not been given, it is "believed to have been staked on this showing. A small amount of development work was done from 1899 through 1902. The showing was apparently staked again in about 1913 as the Summit claim by Hardie Cinnabar Mines Ltd. Development work done up to this point consisted of open cuts and a shallow shaft. The 6-metre shaft continues at the bottom as an incline shaft. Toonkwa Quicksilver Mines staked five claims in about 1934 and although their location is indefinite they are believed to have been located on this property. It was reported that two retorts were installed and some samples of mercury produced at this time.

The property was restaked in 1937 as the Ridge and Bull Horn claims, owned by W.A. and Mrs. Jane Ferguson. The claims lapsed in September 1937. Restaked by J.B. and D.J. McDonald as the O.K. and Cinnabar claims, these were allowed to lapse in May 1938. The property was apparently restaked by G.F. Dickson in 1939. Mclelland on a field trip to the property in November 1939 reported two retorts in operation. During 1940, Messrs. Sterritt and Hardie joined Dickson in the operation and about 45 kilograms of mercury were produced by the end of the year. The operation continued into 1941, most of the production coming from a cut driven to the east of the shaft. In 1981, the Model claims were staked to cover the Tunkwa showing which was considered to have potential as an epithermal gold prospect.

The property was subsequently optioned to Placer Development Ltd. (198184), to Lacana Mining Corporation (1984-85) and to Mad River Resources Inc. (1988-89). Work by Placer Development in 1981 consisted of a widely spaced soil (471 samples) geochemical survey yielding inconclusive results. In 1984, Lacana Mining conducted geological and geophysical (VLF-EM and magnetometer) surveys over the immediate mercury showing, and in September of that year drilled 5 diamond-drill holes totalling 405 metres; gold mineralization was not found and the option was terminated. During 1988 and early 1989 expanded geochemical (409 soil samples), geophysical (14.7 kilometres of VLF-EM and magnetometer) and geological surveys were conducted over the Model and Anne claims which covered the showing. In 1989, Mad River Resources Inc. completed 7 percussion-drill holes totalling 733 metres on a highly fractured, carbonate/silica altered fault zone but no significant precious metal values were discovered (MINFILE).



### **GEOLOGY: REGIONAL**

Regionally, the property is situated within the Quesnel Trough, a 30 to 60 km wide belt of Lower Mesozoic volcanic and related strata enclosed between older rocks and much invaded by batholiths and lesser intrusions (Campbell and Tipper, 1970). The southern part is the well-known Nicola belt, continuing nearly 200 km to its termination at the U.S. border. The Nicola belt is enveloped by the Guichon Creek Batholith, host to the major porphyry copper mines of the Highland Valley, to the west, the Wild Horse Batholith to the east, and the Iron Mask Batholith, host to the former Afton Mine, to the north northeast.

The Guichon Batholith is comprised of varying phases of intrusive with the ore-bodies of the Highland Valley not restricted to any one phase. The Bethlehem Copper JA deposit occurs in and adjacent to a quartz plagioclase aplite stock which intruded rocks of the Guichon variety and Bethlehem phase of the Guichon Creek Batholith. The largest deposit of the camp, the Valley Copper deposit, is entirely in quartz monzonite of the Bethsaida phase and is west of the Lornex fault.

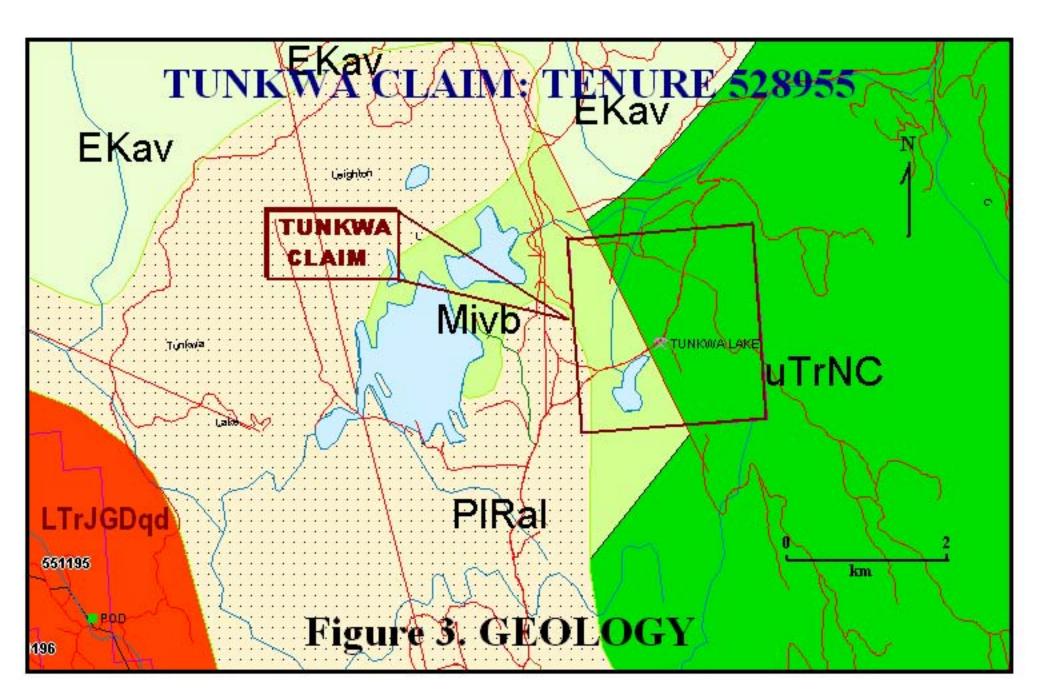
The Lornex and the Valley Copper ore-bodies in the Highland Valley are located at the low edge of an airborne magnetic high. The magnetic high traces the Highland Valley and the Lornex fault systems and clearly indicates the fault pattern of the system and the ore-bodies occurring within a magnetic low due to the supergene and dynamic related destruction of magnetite.

The ore-deposits of the Highland Valley are structurally controlled. Movements on the Lornex and Highland Valley faults occurred simultaneously and alternatively in the final phases of intrusion of the Guichon Batholith. The fault planes provided the openings for the admission and deposition of mineral and igneous matter.

### **GEOLOGY: TUNKWA CLAIM**

The Tunkwa Lake property is underlain by north striking and moderately east dipping Upper Triassic Nicola Group andesitic metavolcanics with intercalated siltstone, sandstone, argillite and occasional limestone units. The volcanics comprise andesitic agglomerates, and amygdaloidal and feldspar porphyry andesite flows. The Nicola rocks are locally cut by diorite dikes and later rhyodacite dikes. Several faults are believed to pass through the property. Wide zones of brecciated rock or gouge, pervasively carbonate and/or silica replaced, mark the trace of the larger faults on surface. Elevated mercury, antimony and arsenic values accompany late ankerite, dolomite and quartz veinlets and pervasive low temperature silica replacement to depths (MINFILE).

The most intense carbonate/silica alteration occurs at the Tunkwa lake showing where the metavolcanics have been highly fractured and brecciated by a fault zone. A banded andesitic tuff is altered to ankerite and veined with dolomite. The carbonate zone is mineralized with disseminated stibnite, tetrahedrite, chalcopyrite, malachite and azurite with cinnabar occurring as thin films and small masses in dolomite and quartz veins. Zones of silica replacement occur up to 5 metres in width with several small silicified breccia zones mended with chalcedony (MINFILE).



# **GEOLOGICAL MAP LEGEND**

# PLEISTOCENE TO RECENT

PlRal	unnamed alluvium till
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**PiRvk** unnamed alkalic volcanic rocks

### EOCENE

## EKav KAMLOOPS GROUP

Undivided volcanic rocks

MIOCENE

MIVB unnamed basaltic rocks

# **UPPER TRIASSIC**

# Nicola Group

uTrNW

### Western Volcanic Facies

unnamed volcanic rocks

# uTrNC

### **Central Volcanic Facies**

andesitic volcanic rocks

# uTrNE

**Eastern Volcanic Facies** 

lower amphibolite/kyanite grade metamorphic rocks

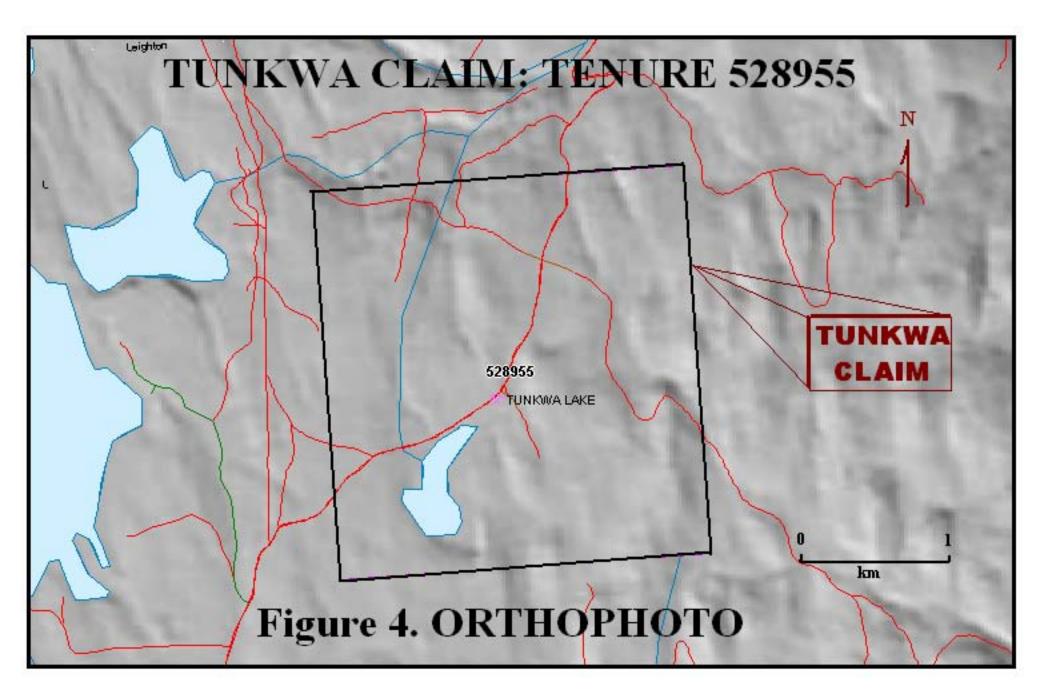
## LATE TRIASSIC TO EARLY JURASSIC

Guichon Creek Batholith

# LTrJGBqd

### **Border Phase**

quartz diorite intrusive rocks



### **MINERALIZATION: REGIONAL**

Highland Valley Copper operates two distinct mines, the Valley mine and the Lornex mine, and between the two has measured and indicated ore reserves of 761 million tonnes of 0.408 per cent copper and 0.0072 molybdenum. The ore reserves of each mine are: Valley mine - 627 million tonnes at 0.418 per cent copper and 0.0056 per cent molybdenum; Lornex mine - 135 million tonnes at 0.364 per cent copper and 0.0144 per cent molybdenum. The individual mine reserves are calculated at an equivalent cutoff grade of 0.25 per cent copper using a molybdenum multiplying factor of 3.5 (CIM Bulletin July/August 1992, pages 73,74).

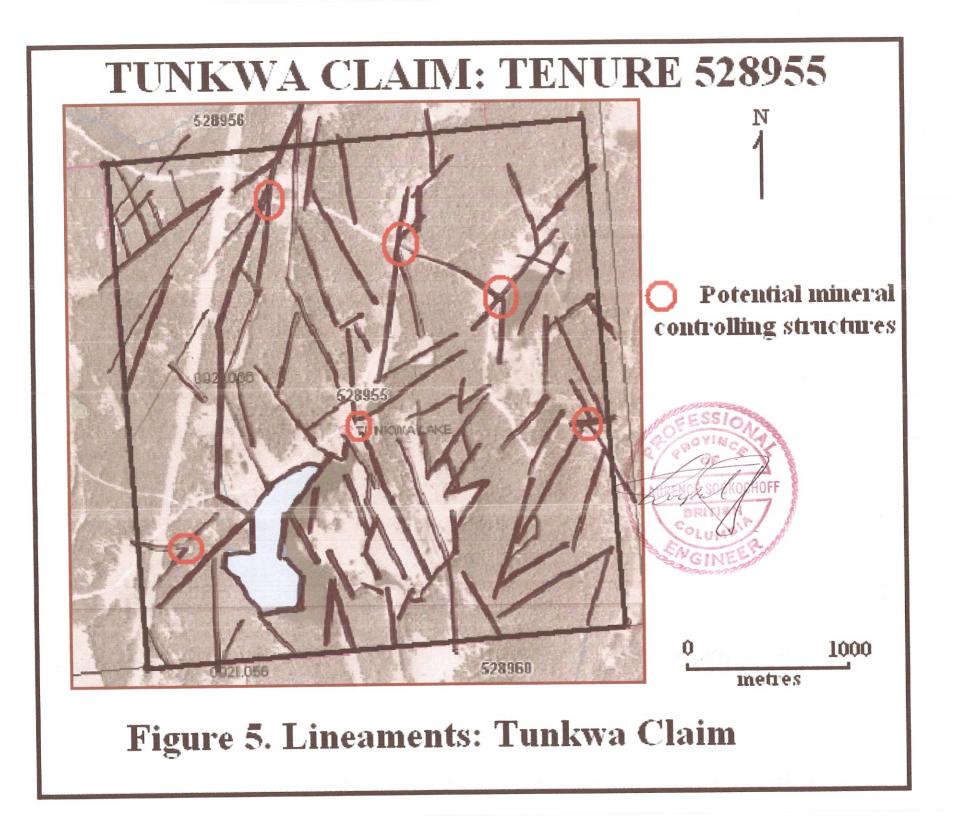
### MINERALIZATION: TUNKWA CLAIM

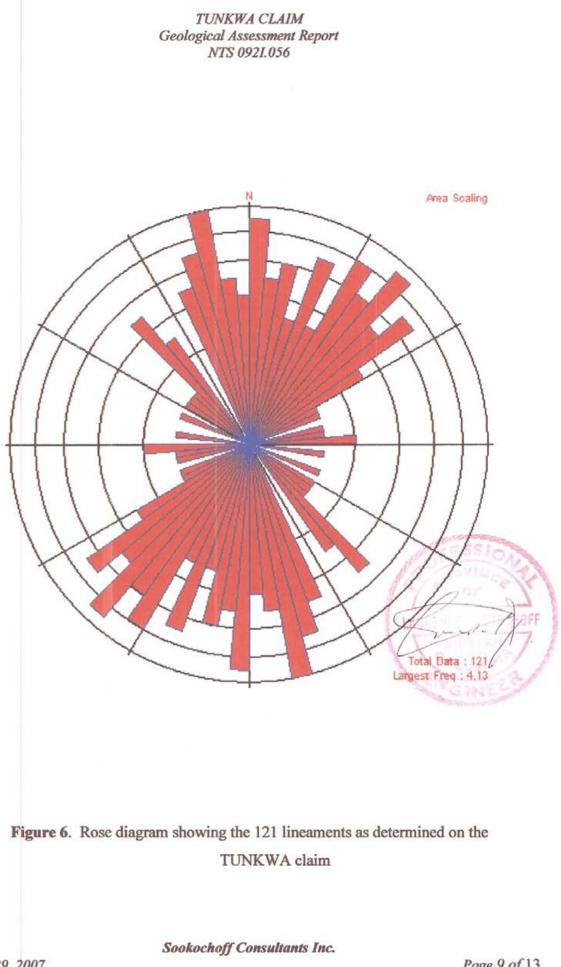
Mercury showings of the Savona Mercury Belt are associated with faulted, carbonate and/or silica altered zones within Triassic or Jurassic metasediments or metavolcanics and are spatially related to Tertiary intrusions. The Tunkwa lake mercury prospect is believed to cap one of these Tertiary bodies and is thought to represent the upper, low temperature horizon of an epithermal system that could carry precious metal values at depth. Most of the recent work on the showing has focused on this potential (MINFILE).

### 2007 LINEAMENT ARRAY ANALYSIS

A lineament array analysis of the TUNKWA claim was completed; the purpose of which was to determine structural controls that may have resulted in the localization of the known mineral prospect on the property and to assess the property for other potential mineral controlling structures.

Ortho topographical maps were downloaded from the BC Government supported MapPlace and were utilized for the lineament array analysis in a stereoscopic analysis which was accomplished using a stereographic projection viewing of the topographical maps. The 121 observed lineaments were marked on an overlay (Figure 5). The lineaments were classified into a 5° interval whereupon a RockWare Stereostat software program was utilized to create a rose diagram of the lineaments as indicated on the accompanying Figure 6. The dominant structural trend was indicated as splayed in a dominant northerly to northeasterly (335-060) direction with very minor complementary lower order northwesterly and east-west structures.





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#### CONCLUSIONS

The results of the Lineament Array Analysis have indicated that the TUNKWA mineral prospect, where a mercury prospect is believed to cap a Tertiary intrusive and is thought to represent the upper, low temperature horizon of an epithermal system that could carry precious metal values at depth, is located at the intersection of three vari-directional lineaments. One of the structures is indicated as paralleling and adjacent to a prominent north northwesterly trending fault contact between Miocene volcanics and Triassic Nicola volcanics. This structure could be the principal structure that provided the surface mercury manifestations of mercury from the epithermal system.

Five other potential mineral controlling structures are indicated as shown on Figure 5. One of these, the northwesternmost, is indicated along the same principal structure as the Tunkwa mineral zone (past producer) and thus would be the primary area for exploration.

> Respectfully submitted Sookochoff Consultants Inc.



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Sookochoff Consultants Inc.

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- **The Discoverers –** Monica R. Hanula–Editor, Pitt Publishing Company Limited, Toronto, Ontario, Canada. 1982.

### **Statement of Costs**

### **Detailed Costs**

Analysis:	
Laurence Sookochoff, PEng.	
Feb 10, 2007 to Feb 12, 2007 ; 1 day @ \$1,000.	\$ 1,000.00
Maps:	
4 @ \$150.	600.00
Xerox, printing & compilation	400.00
Report	750.00
	\$ 2,750.00

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### **CERTIFICATE of AUTHOR**

I, Laurence Sookochoff, P.Eng. do hereby certify that:

1. I am a Consulting Geologist of:

Sookochoff Consultants Inc. 401-850 West Hastings Street Vancouver, BC V6C 1E1.

- I graduated with a degree in Bachelor of Science from the University of British Columbia in 1966.
- 3. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia.
- 4. I have worked as a geologist for a total of 41 years since my graduation from university.
- 5. I am responsible for the preparation of this technical report titled Geological Assessment Report on the TUNKWA Mineral Claim dated June 29, 2007.
- 6. I am the registered owner, and hold 100% of the TUNKWA claim as described herein.



Laurence Sookochoff, P.Eng

June 29, 2007

Sookochoff Consultants Inc.

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