

GEOLOGICAL AND GEOCHEMICAL REPORT

ON THE

ON CLAIM GROUP

WATSON LAKE MINING DISTRICT
WOLF LAKE AREA, YUKON TERRITORY

N.T.S. 105-B/9, 10
(60°35'N; 130°30'W)



FOR

LOGAN JOINT VENTURE

BY

Carl G. Verley, B.Sc.
Geologist

SUPERVISED BY: M. H. Sanguinetti, P.Eng.

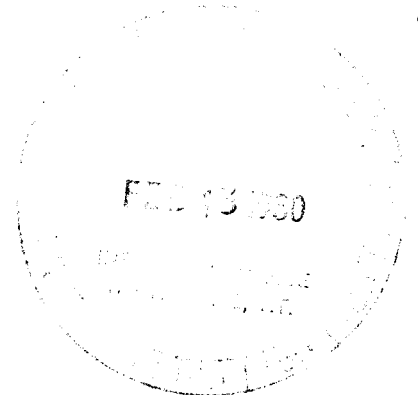
CORDILLERAN ENGINEERING
1418 - 355 Burrard Street
Vancouver, B.C. V6C 2G8

JANUARY, 1980

CLAIMS: ON Numbers 1-50 inclusive.

LOCATION: 72 airmiles NW of Watson Lake, Y.T.

DATE: July 25 to September 18, 1979.



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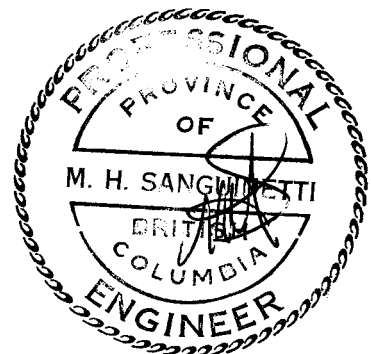


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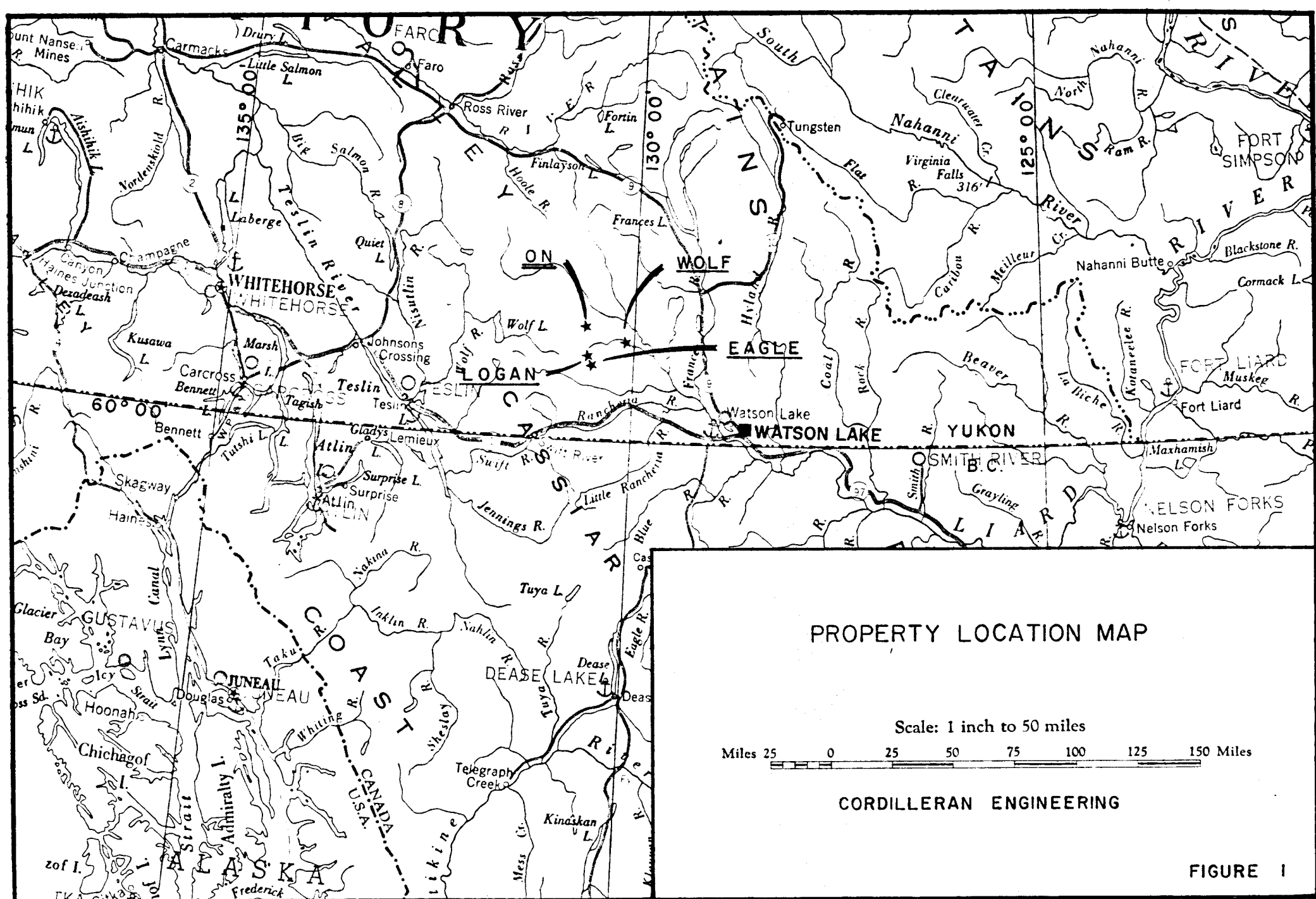
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PROPERTY LOCATION MAP

Scale: 1 inch to 50 miles



CORDILLERAN ENGINEERING

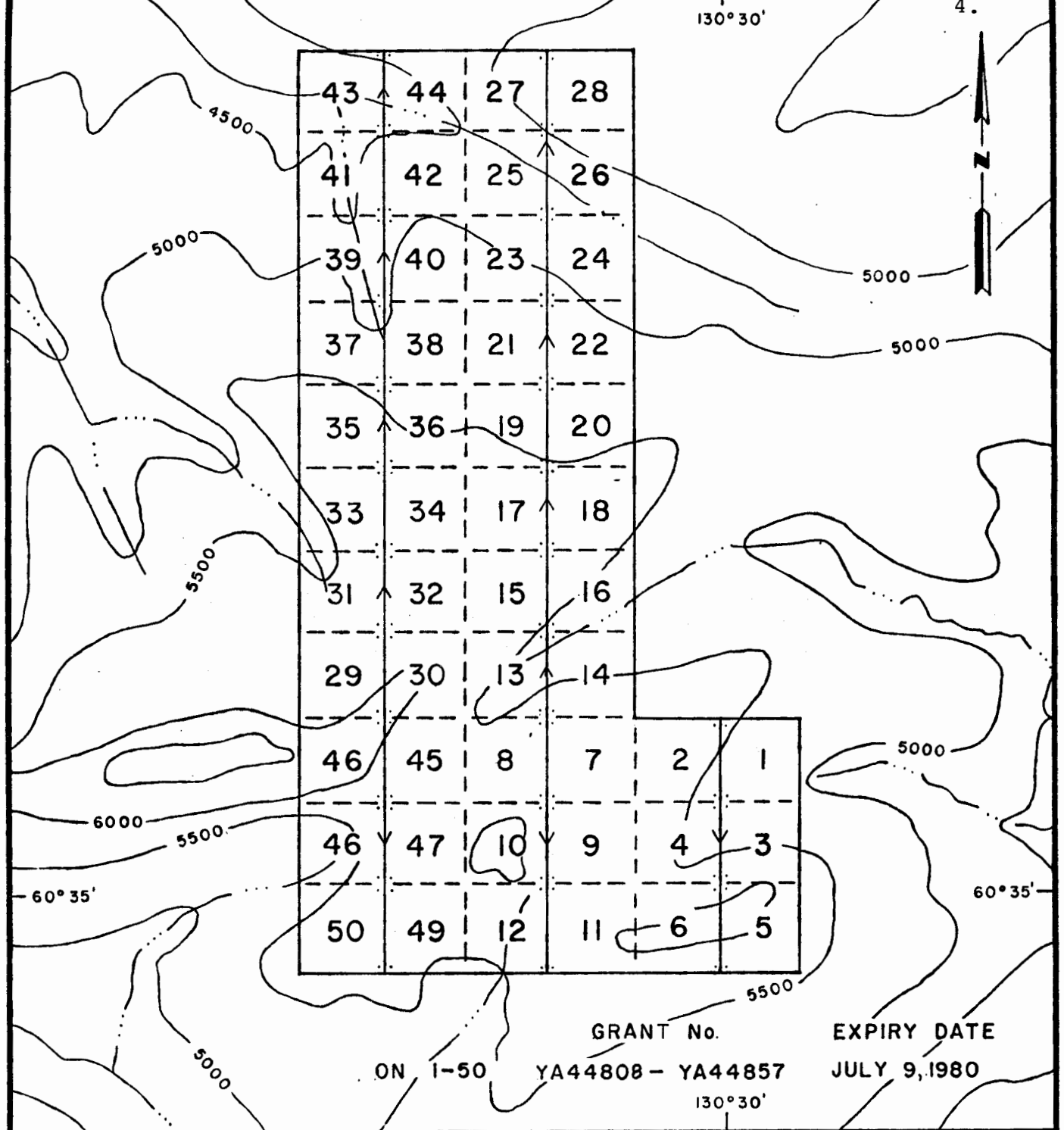


FIGURE 2: ON property: looking west.

I N T R O D U C T I O N

The ON property (50 claims, Figure 3) is located 116 kilometres (72 miles) northwest of Watson Lake, Y.T. in the Watson Lake Mining District. The claims are situated at latitude $60^{\circ}35'N$ and longitude $130^{\circ}30'W$ and lie 51 kilometres (32 miles) north of the Alaska Highway. The ON was acquired by Cordilleran Engineering for the Logan Joint Venture during the 1979 field season.

Tungsten mineralization (mainly scheelite) occurs on the property in skarn, disseminated in pegmatite and in calcareous grits. Talus chip samples of skarn, from a float train approximately 300 metres (1000 feet) in length, assay up to 0.52% WO_3 and 0.01% Mo. The claim group is underlain by a sequence of early Paleozoic or older metasediments which have been intruded by a quartz monzonite body.



CLAIM MAP

ON GROUP

WATSON LAKE MINING DISTRICT, YUKON TERRITORY

N.T.S. 105B-9,10

SCALE: 1 inch = 1/2 mile

CONTOUR INTERVAL = 500 feet



FIGURE 3

The ON was previously staked in 1971 as the TUNG claims by the Wolf Lake-Joint Venture (Rayrock Minerals, Ashland Oil and CIGOL, ref N.C.M.I. occurrence #46, 105-B). Grid soil sampling and mapping were conducted in 1972. Release of regional geochemical data by the Geological Survey on June 15, 1979 led to acquisition of this property.

G E O L O G Y

(Plate 1)

The ON group lies in the Omineca Crystalline belt at the northeastern edge of the Cassiar Mountains. Moderate to steep northeasterly dipping Lower Cambrian or earlier (?) (G.S.C. Map 10-1960) metasediments occur on the property in contact with a porphyritic quartz monzonite. A fine-grained border phase is associated with the quartz monzonite. Pegmatitic dykes are abundant in the metasediments. Contact metamorphic effects in schists are not distinct in handspecimens.

The claims are situated in moderately rugged alpine terrain with elevations ranging from approximately 4,500' to 6,000' (ASL).

GEOLOGY (cont'd)LITHOLOGIES

Preliminary mapping has subdivided the Lower Cambrian into five units. Two mappable phases of intrusive were identified. Brief descriptions of these units follow.

LOWER CAMBRIAN AND EARLIER (?)Unit LE₁: Schist

This unit consists of biotite-muscovite schist and intercalated quartzose schists. In excess of 1000 metres of LE₁ occurs on the southern part of the property. This package is interpreted as having been derived through high grade (upper greenschist/lower amphibolite facies) regional metamorphism from a sequence of fine-to coarse-grained quartzose sandstones and interbedded shales.

Disseminated scheelite and pyrrhotite occur in calc-silicate matrix of metasandstone boulders found in talus. The matrix was derived, through either regional or contact metamorphism, from carbonate.

Unit LE₂: Limestone

Tan weathering, pale coloured, laminated medium crystalline limestone is the dominant lithology in this unit. Rusty weathering siliceous (arenaceous ?) layers are common at the base and top of this sequence. Scheelite and powellite

GEOLOGY (cont'd)

are found in a garnet amphibole and pyroxene rock at the "skarn showing" where a steep, easterly dipping section of this unit, estimated to be 7 metres (23 feet) thick, occurs. Skarn appears to be developed along the upper and lower contacts of this unit and locally may be developed over the full width of the section. Random chip samples of float from this showing over 6 metres (20 feet) across apparent strike assay up to 0.52% WO₃ and 0.01% Mo. Minor molybdenite is found in this skarn.

Unit LE₃: Schist

Quartz-feldspar-biotite-muscovite schists (metagrits) are intercalated with biotite-muscovite schists (metapelites) throughout the bulk of this unit. Skarn is developed in grits having calcareous matrix and is accompanied by disseminated pyrrhotite and scheelite. Unit LE₃ is very similar to LE₁ and is in the order of 600 metres (2000 feet) thick.

Unit LE₄: Limestone

Buff weathering medium crystalline, laminated, pale coloured limestone is the predominant lithology in LE₄. Exposures of this unit occurring on the north sector of the property indicate a thickness of 30 metres (100 feet).

Unit LE₅: Schist

Underlying the northernmost part of the property the base of a sequence of biotite-muscovite schist with intercalated metagrits is exposed. This unit, of unknown thickness, is similar to the other schist units.

GEOLOGY (cont'd)

CRETACEOUS INTRUSIVES:

Unit KQM: Quartz Monzonite

The bulk of this unit consists of a coarse-grained, prophyritic quartz monzonite. Feldspar phenocrysts (up to 3 cm long) occur in a hypidiomorphic-granular groundmass of quartz (35%), feldspar (55%) and biotite (10%). A fine-grained phase, consisting of subhedral intergrown quartz and feldspar with minor biotite, occurs as a border phase but was not differentiated during mapping.

Unit Kp: Pegmatite

Pegmatite occurs as discordant (up to 100 m wide) and concordant (1 m wide) dykes of coarse-to medium-grained, hypidiomorphic-granular quartz (30%), feldspar (60%) and muscovite (10%). Coarse feldspars commonly have graphic intergrowths of quartz. Medium-grained phases show a distinct banding caused by variations in grain size. Tourmaline-bearing quartz veins are common in some of these bodies. At the "Pegmatite Showing" scheelite occurs as relatively coarse disseminations in a pegmatite body.

GEOLOGY (cont'd)STRUCTURE

The metasedimentary package on the ON group appears to be cut by a northeasterly trending fault which is inferred to have offset the metasediments by left-lateral, rotational movement. The sequence on the north half of the property dips steeply to the northeast in contrast to the south where gentle open folds are developed with northwesterly trending axes. The quartz monzonite contact with the Lower Cambrian units trends northwesterly and is assumed to dip at a very shallow angle to the southwest.

MINERALIZATION

Scheelite is the principal tungsten mineral on the ON group. It has two main modes of occurrence: in skarn and disseminated in pegmatite.

A. SKARN OCCURRENCES

At the "Skarn Showing" scheelite is disseminated as fine to coarse grains in a garnet-pyroxene (diopside-hedenbergite) -amphibole (actinolite-tremolite), locally quartz-rich skarn. At this showing molybdoscheelite and powellite are found to a lesser extent, and rarely molybdenite, galena and sphalerite. Assays of samples from the Skarn Showing are tabulated below:

Table I

SKARN SHOWING - ASSAYS

<u>Sample Number</u>	% <u>WO₃</u>	% Mo	<u>Remarks</u>
13511	0.34	-	Grab sample of float across 1 m, west side of ridge.
13512	0.49	0.004	Random chips of skarn float, east side of ridge.
13513	0.13	0.002	Random chips of skarn float, east side of ridge.
13514	0.52	0.01	Random chips of skarn float, over 6 m, east side of ridge.



FIGURE 4: Skarn Showing, looking southeast.

MINERALIZATION (cont'd)

The Sharn Showing is defined by a mineralized, float train that extends for a length of approximately 300 metres along the strike of a steep, northeasterly dipping limestone horizon (Unit LE₄). The limestone unit is estimated to be 7 metres thick; skarn is developed along the upper and lower parts of the horizon leaving a core of recrystallized limestone. Locally skarn has been developed across the full width of the carbonate. Best exposures of mineralized float occur near the ridge top, lateral extensions of this sequence appear to be buried. Potential for improvement in tungsten and, possibly, molybdenum grades exists down dip as the intrusive contact is approached (estimated to be 200 metres from ridge top).

Skarn is also developed in beds of gritty, quartzose metasediments that apparently had a carbonate matrix. The matrix has been altered to calc-silicate minerals, mainly garnet and pyroxene and contains coarse disseminated scheelite, pyrrhotite and rarely chalcopyrite.

B. DISSEMINATED OCCURRENCES

At the "Pegmatite Showing" scheelite is found disseminated as a coarse, rock-forming mineral in quartz-feldspar-muscovite pegmatite. Fracture surface coatings and quartz veinlets containing scheelite are not uncommon in this area in both pegmatite and metasediments. An estimate of the grade of mineralization at this occurrence was not undertaken because exposure in the area is limited and most of the scheelite found was in float. The strong geochemical response of this area suggests the presence of a significant

MINERALIZATION (cont'd)

concentration of tungsten.

A model of intrusion is suggested which explains the distribution of mineralization around the intrusive. During cooling of the quartz monzonite a volatile-rich phase collected at the top of the magma chamber. Breaching of the roof and escape along permeable horizons allowed the volatile-rich solutions to i) intrude the overlying metasediments and crystallize as pegmatites (some with "rock-forming" scheelite), ii) react with carbonate horizons to form tungsten-bearing skarns. A concomitant pressure drop in the magma chamber produced a quenched, finer grained border phase relative to the coarser quartz monzonite. The abundance of volatiles, trapped through quenching, in the border phase may reflect the original enriched composition of the volatile cap relative to its parent magma. Analysis of intrusive phases indicate the fine-grained phase (33 ppm W) is enriched relative to the coarse-grained phase (3 ppm W) partially substantiating the model and indicating a possible igneous source for W in these mineral occurrences.

G E O C H E M I S T R Y

(Plate 1)

The release of geochemical data for the Wolf Lake area by the Geological Survey (G.S.C. Open File 563) on June 15, 1979 indicated a cluster of tungsten anomalies (values of 70, 45, 40 and 25 ppm) in creeks draining the ON property. After acquisition, detailed stream sediment sampling confirmed the anomalies with high values ranging up to 95 ppm in creeks draining the claim group.

Orientation soil lines (9.7 km, 179 samples) were run on the property to determine soil response to mineralization. Samples were taken by grubhoe at 50 metre intervals along three lines spaced 500 metres apart and along contour lines. Each sample site was flagged and labelled.

Soil samples were taken from the B-horizon, where available. Soils are poorly developed, consisting of a rocky alpine profile. The sample depth, soil type, colour, drainage and slope were recorded for each site. Samples were placed in numbered kraft envelopes, dried and sieved (to -80 mesh) at base camp, then delivered to Bondar-Clegg and Company Ltd's laboratory in North Vancouver, B.C. for tungsten analysis.

The analytical method consisted of basic fusion, leaching, reduction with stannous chloride, complexing with ammonium thiocyanate and extraction by carbon tetrachloride. The concentration of tungsten was then measured by colourimetry.

Results of the sampling range from 2 to 220 ppm W. Anomalous values in soils (greater than 21 ppm W) are in most cases related to known scheelite occurrences. A strong (up to 220 ppm) and relatively broad (450 m wide) anomaly is located in the south part of the group. This zone is attributed to scheelite disseminated in pegmatite and quartzose metasediments.

S U M M A R Y A N D C O N C L U S I O N S

In excess of \$10,000 has been expended to conduct preliminary geological and geochemical investigations on the ON #1-50 claim block, Watson Lake Mining District, Y.T.

Geological mapping was completed. The claims cover Lower Cambrian and earlier (?) metasediments which are in contact with a quartz monzonite intrusive of probable Cretaceous age. Tungsten mineralization (scheelite) occurs in skarn and disseminated in pegmatite. Assay results of grab samples from mineralized skarn float range from 0.13 to 0.52% WO₃.

A total of 9.7 kilometres of line were chained and flagged and 179 geochemical soil samples collected at 50 metre intervals. All samples were analysed for tungsten. Results of the sampling indicate anomalous values in soils are in most cases related to known scheelite occurrences.

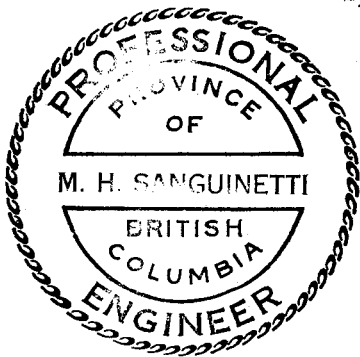
Tungsten mineralization located to date on the ON
claim group, both in place and in float, is significant.
Continued evaluation is warranted.

Respectfully submitted
CORDILLERAN ENGINEERING

Carl G. Verley

Carl G. Verley, B.Sc.
Geologist

M. H. Sanguinetti
M. H. Sanguinetti, P.Eng.



January, 1980
Vancouver, B.C.

APPENDIX "A"

CERTIFICATES

CORDILLERAN ENGINEERING

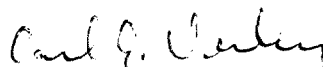
1418 MARINE BUILDING, 355 BURRARD STREET, VANCOUVER, BRITISH COLUMBIA V6C 2G8 TEL: (604) 681-8381

WRITER'S CERTIFICATE

I, Carl G. Verley of Vancouver, British Columbia
hereby certify that:

1. I am a geologist residing at 301 - 1867 West 3rd Avenue, Vancouver, B.C. and employed by Cordilleran Engineering of 1418-355 Burrard Street, Vancouver, B.C., V6C 2G8.
2. I am a graduate of the University of British Columbia, B.Sc., in 1974, and have practiced my profession since that time.
3. I am an engineering pupil with the Association of Professional Engineers of the Province of British Columbia.
4. I am the author of this report which is based on work conducted on the ON #1-50 mineral claims during the period July 25 to September 18, 1979. This work included geological mapping and geochemical sampling undertaken on behalf of the Logan Joint Venture.

CORDILLERAN ENGINEERING



Carl G. Verley, B.Sc.,
Geologist

January, 1980
Vancouver, B.C.

CORDILLERAN ENGINEERING

1418 MARINE BUILDING, 355 BURRARD STREET, VANCOUVER, BRITISH COLUMBIA V6C 2G8 TEL: (604) 681-8381

SUPERVISOR'S CERTIFICATE

I, Michael H. Sanguinetti of Vancouver, British Columbia hereby certify that:

1. I am a geologist residing at 2208 West 35 Avenue, and employed by Cordilleran Engineering of 1418-355 Burrard Street, Vancouver, B.C., V6C 2G8.
2. I am a graduate of the University of British Columbia, B.Sc., in 1965, and have practiced my profession since that time.
3. I am a member of the Association of Professional Engineers of the Province of British Columbia.
4. I supervised the writing of this report which is based on the results of a field program conducted by Cordilleran Engineering during the period July 25 to September 18, 1979.
5. Field work was done under the supervision of Mr. J. W. Stollery, P.Eng.



CORDILLERAN ENGINEERING

Michael H. Sanguinetti, B.Sc., P.Eng.
Geologist

January, 1980
Vancouver, B.C.

APPENDIX "B"

STATUTORY DECLARATION

STATUTORY DECLARATION

CANADA)
) In the matter of a geological and geochemical
) report on behalf of Logan Joint Venture
 TO WIT:)

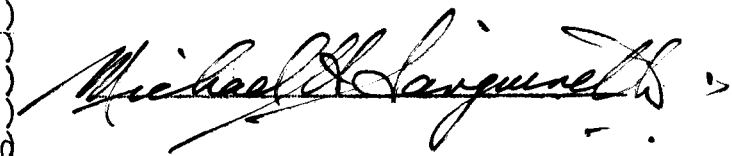
I, Michael H. Sanguinetti, agent for Cordilleran Engineering
of 1418-355 Burrard Street, Vancouver, B.C. V6C 2G8

do solemnly declare, - that geological mapping and geochemical
 sampling were conducted on the ON #1-50 mineral claims (inclusive),
 Watson Lake Mining District, Y.T., during the period July 25 to
 September 18, 1979. Expenditures for this work include:

Salaries, Management Fees, Consulting	.....	\$ 3,480.00
Helicopter and fuel	.....	4,739.00
Assays and analyses	.....	806.62
Vehicle Rental	.....	375.00
Accommodation, food, telephone, freight and supplies	.....	447.50
Report preparation, drafting photocopying and printing	.....	<u>752.00</u>
	TOTAL	<u>\$10,600.12</u>

And I make this solemn declaration conscientiously believing it
 to be true and knowing that it is of the same force and effect as if
 made under oath and by virtue of The Canada Evidence Act.

Declared before me at VANCOUVER)
 in the Province of B.C. this)
31st day of January 1980



U. Olman
 A Commissioner for Oaths for Yukon
 Territory OR Notary Public for

APPENDIX "C"

PERSONNEL

PERSONNEL

Mr. C. G. Verley, B.Sc. 1418-355 Burrard Street Vancouver, B.C.	Geologist
Mr. E. A. Balon 1418-355 Burrard Street Vancouver, B.C.	Prospector
Mr. J. W. Stollery, B.Sc., P.Eng. 1418-355 Burrard Street Vancouver, B.C.	Geological Engineer
Mr. M. H. Sanguinetti, B.Sc., P.Eng. 1418-355 Burrard Street Vancouver, B.C.	Geologist
Mr. T. Turner 1418-355 Burrard Street Vancouver, B.C.	Field Assistant
Mr. B. Goodacre 1418-355 Burrard Street Vancouver, B.C.	Field Assistant
Mr. G. Didier 1418-355 Burrard Street Vancouver, B.C.	Field Assistant

LEGEND

CRETACEOUS (?) INTRUSIVES

- Kp** PEGMATITE: DISCORDANT (up to 100m wide) AND CONCORDANT (1m wide) DYKES OF COARSE TO MEDIUM-GRAINED HYPIDIOMORPHIC-GRANULAR QUARTZ, FELDSPAR AND MUSCOVITE. COARSE FELDSPARS COMMONLY HAVE GRAPHIC INTERGROWTHS OF QUARTZ. MEDIUM-GRAINED PHASES SHOW A DISTINCT BANDING CAUSED BY VARIATIONS IN GRAIN SIZE, TOURMALINE-BEARING QUARTZ VEINS ARE COMMON IN SOME OF THESE BODIES. DISSEMINATED SCHEELITE OCCURS IN PEGMATITE AT THE 'PEGMATITE SHOWING'.
- KQM** QUARTZ MONZONITE: A FINE-GRAINED PHASE CONSISTS OF SUBHEDRAL INTERGROWN QUARTZ AND FELDSPAR WITH MINOR BIOTITE. THE COARSE-GRAINED PHASE IS PORPHYRITIC WITH FELDSPAR PHENOCRYSTS (up to 3cm long) OCCURRING IN A HYPIDIOMORPHIC-GRANULAR GROUNDMASS OF QUARTZ (35%), FELDSPAR (55%), BIOTITE (10%). FINE AND COARSE-GRAINED PHASES WERE NOT DIFFERENTIATED DURING MAPPING. THE COARSE PHASE PREDOMINATES EXCEPT NEAR CONTACTS.

LOWER CAMBRIAN AND EARLIER (?)

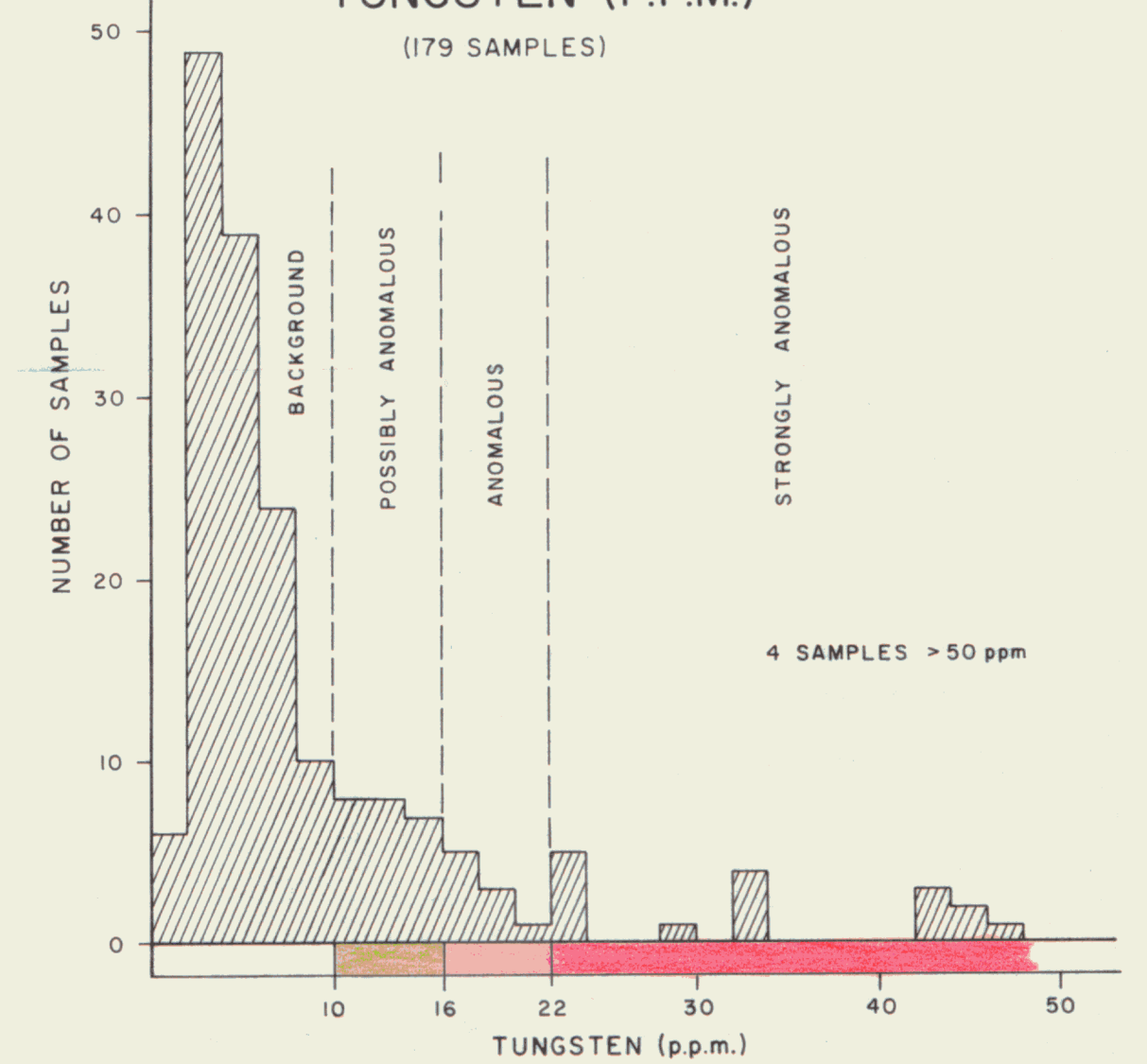
- Le5** SCHIST: BIOTITE - MUSCOVITE - QUARTZ - FELDSPAR SCHISTS WITH INTERCALATED GNEISSIC LAYERS (METAGRITS?). THE BASE OF THIS UNIT IS EXPOSED NORTH OF THE PROPERTY.
- Le4** LIMESTONE: BUFF WEATHERING MEDIUM CRYSTALLINE, LAMINATED, PALE COLOURED LIMESTONE, APPROXIMATELY 30 metres IN THICKNESS.
- Le3** SCHIST: QUARTZ - FELDSPAR - BIOTITE - MUSCOVITE SCHIST (METAGRITS) ARE INTERCALATED WITH BIOTITE - MUSCOVITE SCHISTS. SKARNS ARE DEVELOPED IN CALCAREOUS GRITS AND ARE ACCOMPANIED BY DISSEMINATED SCHEELITE. THIS UNIT IS IN THE ORDER OF 2000 metres THICK.
- Le2** LIMESTONE: TAN WEATHERING, PALE COLOURED, LAMINATED, MEDIUM CRYSTALLINE LIMESTONE. RUSTY WEATHERING SILICEOUS (ARENACEOUS?) LAYERS ARE COMMON AT THE BASE AND TOP OF THIS UNIT. GARNET, AMPHIBOLE AND PYROXENE SKARN IS DEVELOPED IN THE STEEP DIPPING PORTIONS OF THIS UNIT AND IS ASSOCIATED WITH SCHEELITE AND POWELLITE. APPROXIMATE THICKNESS 7 metres.
- Le1** SCHIST: IN EXCESS OF 1000 metres OF BIOTITE - MUSCOVITE SCHIST AND INTERCALATED QUARTZOSE SCHISTS OCCUR ON THE SOUTHERN PART OF THE PROPERTY. THIS UNIT IS SIMILAR IN APPEARANCE TO Le2.

SYMBOLS

- INFERRED LITHOLOGIC CONTACT
- BEDDING PLANE FOLIATION
- TREND AND PLUNGE OF MINOR FOLD AXES
- ANTIFORM
- SYNFORM
- INFERRED FAULT
- SCHEELITE MINERALIZATION, IN PLACE, FLOAT
- APPROXIMATE OUTCROP DISTRIBUTION
- GEOLOGICAL CROSS SECTION
- SOIL SAMPLE SITE, W in ppm
- STREAM SEDIMENT SAMPLE SITE, W in ppm

NOTE:
 TOPOGRAPHY ADAPTED FROM DEPT. OF NORTHERN AFFAIRS AND NATIONAL RESOURCES 1/2 mile to 1 inch CLAIM MAP.
 CONTOUR INTERVAL: 500 FEET
 DECLINATION (1979): 31°30' EAST

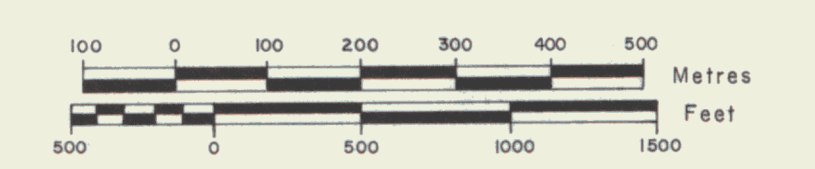
SOIL SAMPLE FREQUENCY DISTRIBUTION TUNGSTEN (P.P.M.) (179 SAMPLES)



LOGAN JOINT VENTURE

GEOLOGY AND GEOCHEMISTRY

ON CLAIM GROUP
 WOLF LAKE MAP SHEET, NTS. 105B-9,10
 WATSON LAKE MINING DISTRICTS, YUKON TERRITORY



BY
 CORDILLERAN ENGINEERING
 1418-355 BARRARD STREET
 VANCOUVER, B.C. V6C 2G8



NOVEMBER 1979



GEOLOGICAL CROSS - SECTION A-B
 LOOKING NW

