600225

SCHEELITE and MOLYBDENITE

at

VICTORY TUNGSTEN

An essay submitted during the third year of the course in Geological Engineering of the Faculty of Applied Science at the University of British Columbia.

HUGH JOHN GREENWOOD

Essay completed 10.11.52

Meeker 25 = 20?
Pres 35 = 30 but 30 if Syncrude not counted
(Eng 40).

390 East Kings Rd.,
North Vancouver, B. C.

November 15, 1952.

Dr. H. J. MacLeod,
Dean of the Faculty of Applied Science,
University of British Columbia,
Vancouver.

Dear Sir:

I submit this essay in compliance with the Calendar regulations for third year engineering students. The object of the essay is to report on the occurrence of tungsten and molybdenum in the form of scheelite and molybdenite on the Victory Tungsten property, (which is located) near the village of Salmo, B. C.

I hope that you will find the material and the style of presentation acceptable.

Sincerely yours,

Hugh Greenwood

PREFACE

The following is a geological report on the structure and ore mineralization of the Victory Tungsten property.

The property, which is divided into the Victory and Udiville groups, is situated on Sheep Creek in the Salmo area about one mile from the Consolidated Mining and Smelting Company's Hudson's Bay mine.

The Victory Tungsten property is being explored by the Pacific Explorations Company Limited.

The exploration to date has been restricted to surface mapping of the Victory group and diamond drilling on the lower workings.

Assistance in interpretation of structures was received throughout the summer of 1952 from Dr. Victor Dolmage, the chief geologist.

The reader is requested to regard all information contained in this essay as strictly confidential.

10.11.52

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MAPS

The accompanying maps have been prepared from the writer's observations and from surveys personally completed in the field. All co-ordinates given in the text refer to the co-ordinates on the accompanying maps.

Control surveys for the maps were completed by the writer and consist of an open transit traverse; "C-line"; a closed transit traverse; the "F-line"; and several closed compass traverses.

The symbol used for the limestone and garnetite outcrops is a brick-like pattern in which the continuous lines generalize the observed strikes of the strata. Since no horizon bed was located the structure implied by this symbol is merely a suggestion.

Map B shows a suggested shape of the granite body underlying the lower workings.

Map C consists of section views through the drill holes and through the ridge along the Victory group of claims.

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Purpose and Scope of this Essay

The purpose and scope of this essay is to supply the reader with specific information concerning mode of occurrence, associated minerals and structural formation in and around the scheelite and molybdenite deposits of the Victory Tungsten property.

Access

The Victory Tungsten property is located in British Columbia's Nelson Mining District at a distance of seven miles from the village of Salmo.

Transportation to the property from the Great Northern railhead at Salmo is entirely by road. There are four miles of pavement on the Salmo-Nelway highway and three miles of good gravel surface up the Sheep Creek Road to the "foot" of the property. Both these thoroughfares are kept open all winter by government crews and thus the property may be reached at all times.

The claims extend about one mile south from the Sheep Creek road and are divided into two groups, the Victory and the Udiville.

Access to the interior of these groups is gained by two bull-dozed roads. The shorter road, about a quarter of a mile in length, is located on the west side of Bear (Bennet) Creek, which runs north through the property into Sheep Creek. This road serves the lower workings which were extensively drilled during the summer of 1952.

The longer road, about one and a half miles in length, runs south for three-quarters of a mile along the east bank of Bear Creek. It then crosses the stream bed and switch-backs up the ridge on the west side of the creek. This road gives access to the drill operations currently in progress on the Upper Workings.

Mill Possibilities

At this early stage in the development of the Victory Tungsten property the problems attendant on establishing a mill site have been only discussed. Some of the requisites for a mill are available within the boundaries of the property. These are water, power and timber.

Water might be supplied by Bear Creek which provides one and a half cubic feet per second during the dry season and, barring freeze-up, probably more during the balance of the year. The advantage of using Bear Creek is the possibility of employing gravity feed.

Power could almost certainly be supplied by the West Kootenay Power and Light Company from their power line which carries 60,000 volts and passes through the Victory Mineral Claim.

Concerning timber, most of the property is wooded with a growth of tamarack, hemlock, spruce and cedar which would probably prove adequate for mine purposes.

As for the economic advantages of building a mill this writer feels that until more ore is proven it may be more advisable to truck the Victory Tungsten ore 5 miles to the Emerald concentrator, a distance of five miles.

General Geology

Generally, the sediments of the Victory map-area are of Lower Cambrian Period (1, p.1), and may be divided into two formations: the Reno quartzites, and the Laib limestones and argillites of the Lower Cambrian Period. These sediments are sometimes collectively referred to as the Pend d'Oreille schists. They form a much folded roof rock to the Nelson intrusives, a stock of which is exposed as an erosion surface over most of the eastern part of the map-area.

The mineralization is of two kinds, contact metamorphic deposit and a hydrothermal(?) replacement in the Laib limestones. The former, the metamorphic deposits of tungsten and molybdenum, will be discussed here in detail. The lead-zinc replacement will be only briefly mentioned.

Reno Quartzite

The Reno quartzites (1, p.13) do not outcrop on the Victory map-area, but from H.W. Little's map and report 50 - 19A, are presumed to underlie the sediments of the Laib group into which group all the Victory sedimentary outcrops fall.

Laib Group

The lower part of the Laib formation (1, p.15)

is predominantly composed of limestones and calcareous argillites grading in layers through argillaceous limestone to black argillites. These argillites form most of the outcrops on the Victory map-area and appear to overlie the limestones and altered limestones conformably.

The limestone bands underlying the black argillites are the most interesting rock types from an economic point of view. Here the ore mineralization occurs as replacements of sphalerite in the unaltered limestone and as scheelite in the skarn where the limestone has been altered to garnetite.

This report will deal in detail only with the scheelite and molybdenite deposits.

Nelson Intrusives

The granite intrusions of the Victory map-area are presumed by Little (1, p.30) to be directly related to the Nelson batholith and will be so considered in this report.

The Nelson batholith has been tentatively assigned to the Cretaceous age and in this location is exposed as an erosion surface over much of the map-area. It intrudes through the Reno quartzites and the Laib limestones and appears to have stopped before having penetrated the Laib argillite. This statement is based on the observation that the granite is exposed everywhere as an erosion surface and has not been observed by the

yet you show contacts between argillite and granite in several places, and granite bodies in the argillite.

writer to penetrate the argillite rock roof. The mineralization appears to be a direct result of the intrusion since the metalliferous deposits occur close to the granite body.

The scheelite on the property is definitely a contact metamorphic deposit associated with a crumbly iron-rich garnetite.

place under economic geology?

The molybdenite is possibly a result of magmatic segregation and appears to be limited to small pockets. The whole showing does not extend over more than 3,000 square feet, nor is this area wholly mineralized.

Structure

Generally the attitudes of the argillite seems to follow the surface topography rather closely, suggesting an overall anticlinal structure for the ridge of Map A.

Discuss This - it is not very apparent on map 'A'

While this explanation is the most obvious it is almost certainly over-simplified. Isoclinal folding was observed in several places and suggests more intense deformation than the simple anticlinal theory.

The granite body could be either a stock, perhaps following the trend of the strata, or it could be a sill, perhaps two hundred to five hundred feet thick.

This last explanation would best account for the fact that it is not seen on the west side of the ridge.

No faults were observed within the map-area.

Economic Geology

The Laib limestones in this map-area seem to be the chief repositories of metalliferous mineralization. This applies both to altered and unaltered limestones.

At the granite-limestone contact molybdenite occurs as disseminations in the granite.

Scheelite, the tungsten mineral, occurs where the limestone has been altered to garnetite, and sphalerite is found in the unaltered limestone immediately to the east of the map-area in the Udiville group of claims.

Molybdenite

The molybdenite showing in the Victory property has been described by B.N. Murphy, June, 1951, in his report on Boleen Mines, now known as Victory Tungsten.

In this report, which appears substantially correct, Murphy describes the metamorphic deposit as occurring in the contact zone in the form of disseminations in the granite and in the overlying limestones and schists of the Pend d'Oreille series.

Murphy felt that one thousand tons of molybdenite ore were exposed in the several open cuts and that more might be found by stripping off the overburden with a bulldozer.

This writer feels, however, that in view of the discontinuous disseminated nature of the deposit and the chiefly negative drill information from Victory's holes One, Two, Three and Four - (May, June 1952) - that the estimate of one thousand tons is far in excess of the actual amount present.

It follows that unless considerably more molybdenite ore is proven by the future drill holes in search of scheelite, the molybdenum potentialities of the property are rather slight.

Scheelite

The scheelite-enriched garnetite outcrops on the surface at (N 8200, E 10,400) and (N 5400, E 10,200) on the enclosed Map A. The general nature of the lower deposit may be seen, from the sectional views, to be lenses of enriched material roughly paralleling the undulations of the granite floor.

The surface exposures of the scheelite-bearing rock are described by Murphy in his report on the molybdenite showing in the former Boleen Mines and he there recommends that diamond drill exploration work be undertaken to examine the deposit at depth.

With this in mind, and following the instructions of Dr. Victor Dolmage, nineteen drill holes were put down during the summer of 1952 under the supervision of the writer.

The accompanying sectional views of the drill holes, on Map C, show the general structure, the occurrence of ore, and an attempted analysis of the stratigraphy. This analysis may be subject to several interpretations due to the intensely folded and deformed nature of the rock.

The general stratigraphy is composed of the Laib limestones, phyllites and argillites. A part of the Nelson batholith intrudes into the limestones but was not observed to penetrate the overlying black argillites.

The scheelite appears to follow the eccentricities of the granite floor, keeping entirely to the immediate contact zone and chiefly to the depressions or trough-like formations in the surface of the granite.

The possible existence of these troughs was suggested by the ore-bearing structures of the nearby Emerald Tungsten Mine in which the scheelite occurs in troughs in a relatively impervious layer of argillite associated with a skarn of garnetite. This skarn has been altered from limestone by the nearby granite.

Upon further examination of the Victory Tungsten deposit this same structural feature was observed from the examination of diamond drill cores. Here, however, the impervious layer which retained the ore-bearing solution was found to be the surface of the intrusive granite.

The granite body is exposed as an erosion surface at (N 8639, E 10,170) and (N 6000, E 10,200) on Map A and

as a rule it outcrops near the exposed scheelite mineralization wherever this occurs in the area.

Following up the granite contact we come to an important exposure of possible ore in the form of an extensive skarn at the south end of the group of claims. Insufficient diamond drilling has been done at this stage for any conclusions to be drawn as to its worth. Suffice it to say that, from the mapped trace of the granite contact on the surface, there appears to be a good-sized trough at (N 6000, E 10,000) on Map A plunging at a shallow angle in a southerly direction.

This indication has seemed good enough to Dr. Dolmage to warrant a diamond drilling program on the upper showings. This program is now underway.

The lower showings have already had a summer's drilling done on them and the balance of this report will be mainly concerned with them with this area.

Map B shows the shape of the underlying granite with respect to the surface topography. Here the granite seems to take the form of a synclinal trough plunging 30° S40°E with a "saddle" formation at (N 8290, E 10,095) on Maps A and B.

The structural contours of the granite are based wholly on data obtained from the diamond drill holes and may possibly be open to other interpretations. However, this writer feels that the interpretation as given here is probably the most likely to be correct.

Examination of drill cores has definitely established the shape of the south end of the trough and has shown that it contains fairly good values of scheelite. While the actual assay values are not yet ready for publication the sections do show the occurrence of the ore.

The north-western end of the trough has been defined only by extrapolation of the contours based on experience with topographic forms. A drilling program is being carried on at present which should prove whether or not the north-western extension of the trough carries scheelite values. There is evidence both for and against the possibility of an ore zone in the predicted north-west extension.

Favourable indications of an ore zone are: the similarity in shape between this predicted extension and the definitely promising south-eastern end of the trough, and also the possibility of an eastern extension of the limestone beds which outcrop at the north-west edge of the map area.

On the other hand the granite has not been observed to outcrop at the 3050 foot elevation to the west of the lower workings in spite of the steep bluffs at that point which might be expected to expose the granite - unless it had plunged to great depths. The extrapolation of the contours of the granite also indicate that the

trough, if any, might be of shallow relief, plunging steeply to the north-west. This extreme steepness would, if present, render the trough less likely to retain an ore deposit than if it dipped at a more shallow angle.

The value of these conflicting indications will be shown by the results of the diamond drilling.

Exploration of this part of the trough will be done by drilling flat and shallow angle holes, first by extending hole Three and then by drilling from A6 (see Map B.).

These latter holes will probably extend about 600 feet into the hill.

Conclusions

In concluding this report there are three observations made earlier which seem to be worth repeating.

First: the property has an ideal location for the transportation of men and equipment, and either ore or concentrates, or both.

Second: it seems advisable on the basis of present knowledge of the deposit to consider strongly the possibility of shipping ore to the Emerald concentrator rather than building a mill.

Third: that until more drilling is done the

scheelite value of the property should be considered to be more important, economically, than the molybdenite.

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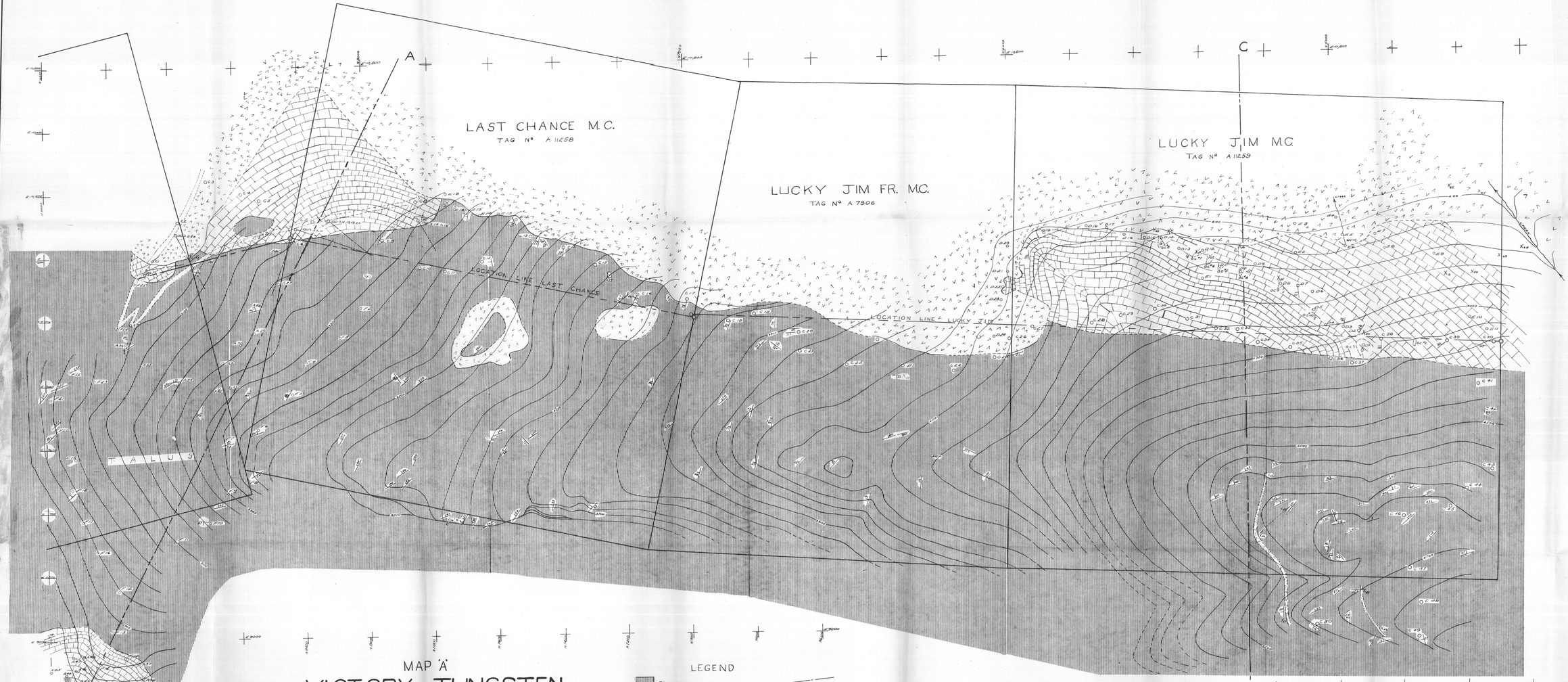
Bibliography

1. H.W.Little,
Geological Survey of Canada,
Department of Mines and Technical Surveys.

Paper 50-19 on the Salmo Map-Area, 1950.

2. B.N.Murphy,
Report on Boleen Mines,
May, 1951,
(Private Report)



MAP 'A'

VICTORY TUNGSTEN

VICTORY GROUP

SCALE = 1" = 100'

Contour Interval = 40'

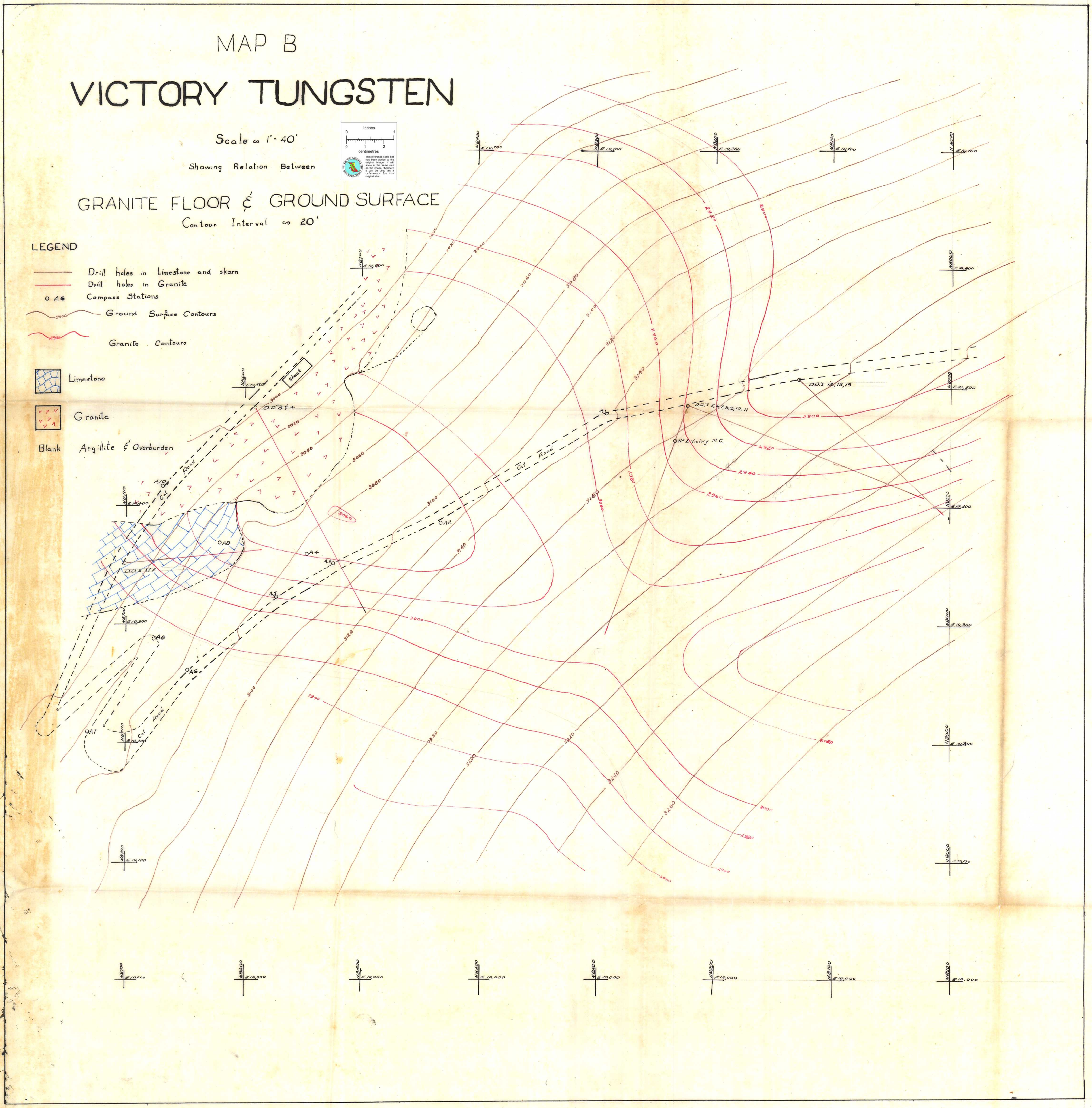
Per H.J. Greenwood
Field Superintendant
Summer 1952
Drawn Nov. 10, 1952.

LEGEND

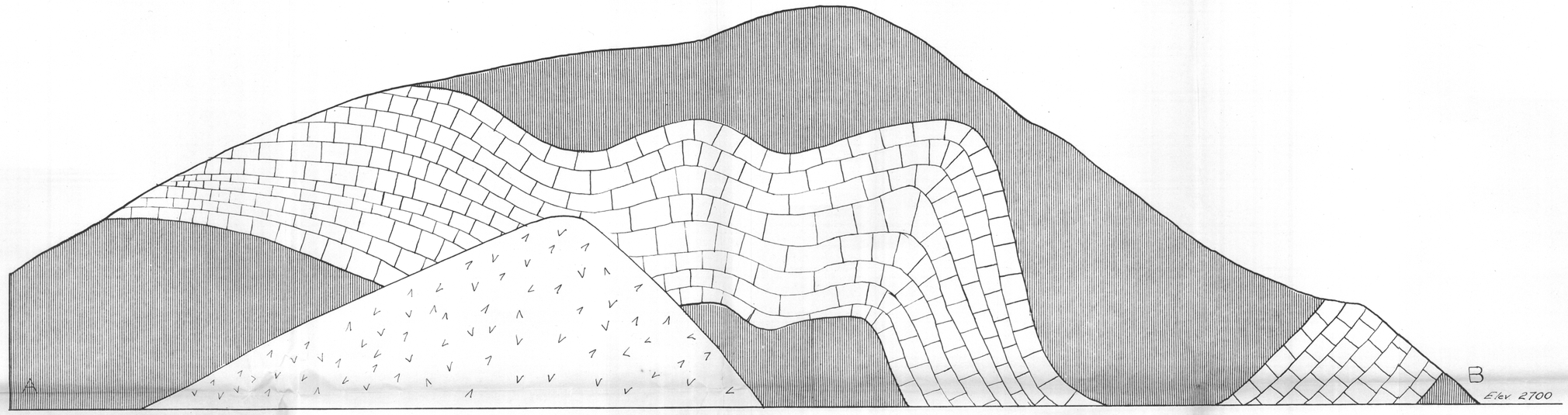
- Black Argillite, Limestone — Laib Group
- Nelson Intrusives
- Observed contact
- Inferred contact
- A——B Section plane
- Dykes & Sills
- Diamond drill holes

All contours are surface contours

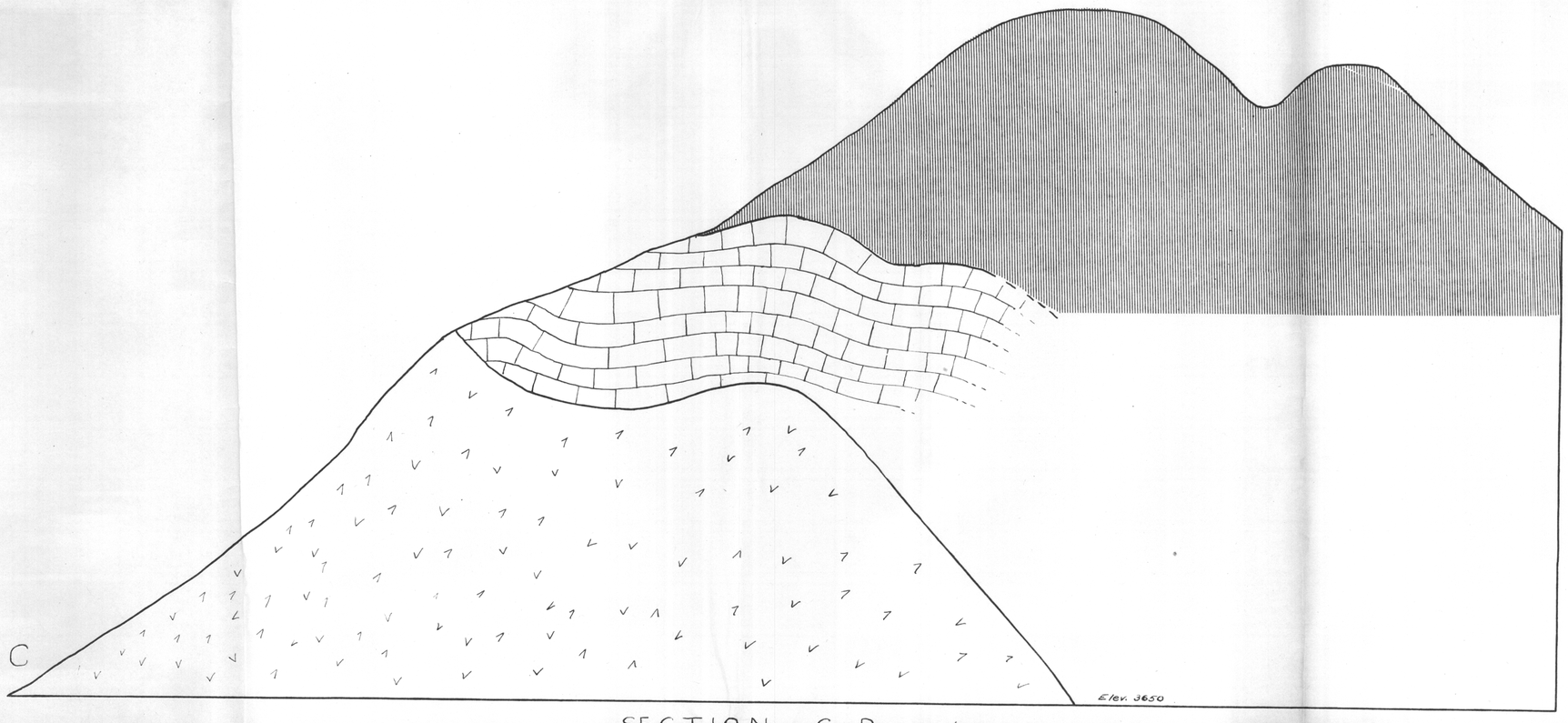
The map is based on an open transit traverse, closed compass traverses, & plane tabling


MAP B
VICTORY TUNGSTEN
Scale = 1" = 40'
Showing Relation Between
GRANITE FLOOR & GROUND SURFACE
Contour Interval = 20'
LEGEND
Drill holes in Limestone and skarn
Drill holes in Granite
O A6 Compass Stations
Ground Surface Contours
Granite Contours
Limestone
Granite
Blank Argillite & Overburden
Shack
Cat Road
D.D.'s 3 & 4
D.D.'s 1 & 2
D.D.'s 5,6,7,8,9,10,11
D.D.'s 12,13,19
No 2 Victory M.C.

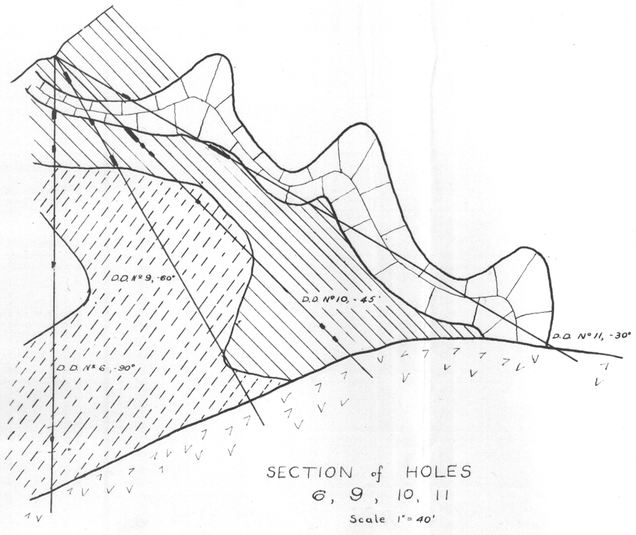
VICTORY TUNGSTEN



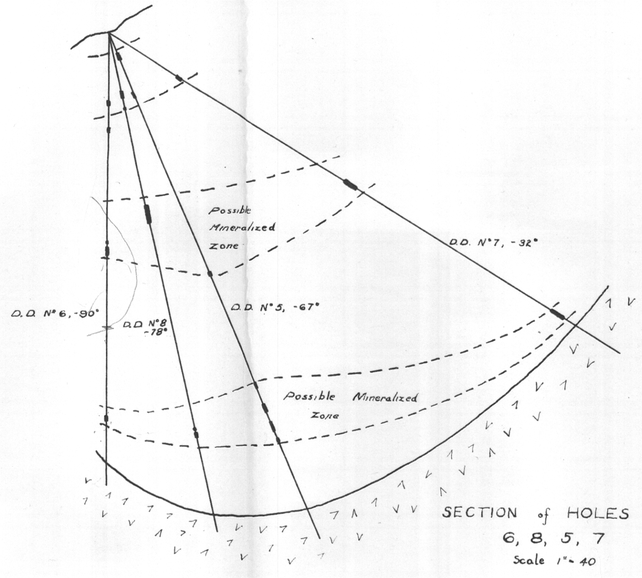
SECTION A-B Scale is 1" = 100'



SECTION C-D Scale is 1" = 100



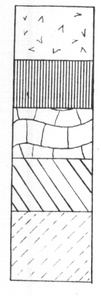
SECTION of HOLES
6, 9, 10, 11
Scale 1" = 40'



SECTION of HOLES
6, 8, 5, 7
Scale 1" = 40

MAP C

SECTION SHEET



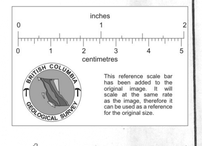
Granite

Argillite

Limestone

Garnetite in holes 6, 9, 10, 11

Biolite Schist



Per H.J. Greenwood 12/11/56