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REPORT ON THE
MAGNETOMETER SURVEY
ON THE SHUSWAP GROUP
SEYMOUR RIVER AREA, B. C.
FOR
GREAT NORTHERN PETROLEUMS & MINES LTD.

by

B. I. NESBITT

NAME AND LOCATION OF PROPERTY:

SHUSWAP CLAIM GROUP, SEYMOUR RIVER AREA, $51^{\circ} 118^{\circ}$ S. ^{W.} ~~Z.~~

DATE STARTED: September 10, 1966

DATE COMPLETED: October 17, 1966

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REPORT ON THE
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INTRODUCTION

This report is written to describe results of a magnetometer survey conducted in September to October, 1966 on the Shuswap Group of Mineral Claims (Shuswap #1 to #30, inclusive), located 42 miles northwest of Revelstoke in the Kamloops Mining Division.

The claims cover the north-westerly portions and projections of the McLeod, Copper King and Cottonbelt Zones, which are described in several of the Annual Reports of the Minister of Mines for British Columbia. They lie east of the Seymour River on the southern valley slopes of Blair Creek and Deep Creek, north of Rochford Creek.

'West longitude $118^{\circ}50'$ and North latitude $51^{\circ}28'$ intersect on the Shuswap Group.

DESCRIPTION OF THE METALLIC DEPOSITS

The metallic deposits are replacement deposits in beds of limestone that are interbedded with schists and gneisses of the Shuswap Series. They trend northwesterly and dip at 40° to 50° to the southwest, conforming with the trend and attitude of the Shuswap Series. Three separate replacement Zones have been explored on the property, and the presence of at least three others is indicated by magnetic anomalies.

The McLeod Zone and the Cottonbelt Zone consist of lead and zinc sulphides plus lesser chalcopyrite and appreciable silver values, accompanied by magnetite and in some cases pyrrhotite, is a gangue of quartz, skarn minerals, and carbonate. They are strongly magnetic and can be detected readily though overburden by magnetometer. The Copper King Zone consists mainly of chalcopyrite in quartz, but some magnetite or pyrrhotite is indicated by a detectable magnetic effect.

The McLeod Zone is exposed for a length of 2,000 feet and is open for extension at both ends. The Cottonbelt Zone is exposed for over 12,000 feet and is open for extension at both ends. The Copper King was exposed in 1913 for a length of 7,500 feet by intermittent trenches and is open for extension.

Mineralization is strong and continuous over great lengths in the McLeod and Cottonbelt Zones and lenses swell to as much as 12 feet in thickness. While it is possible that orebodies sufficiently large to support an underground mining operation might be developed by tunnelling or diamond-drilling along the exposed lengths of these zones, generally the mineralization is too narrow to be economic at existing metal prices and today's costs for underground mining. Therefore, an attempt must be made to trace the Zones, either down-dip or along strike, to where the sulphide occurrences are sufficiently large to be mined either by open-pit methods or by large scale underground methods.

Reports indicate that the Copper King Zone, in which the values are almost entirely in copper, may be 35 to 100 feet thick. It is possible that orebodies of substantial size will be found even within the 7,500 foot length already established.

Because these metallic deposits are replacement deposits in limestone, it is probable that a great increase in thickness will be found in areas of drag-folding or in areas of cross-faulting. The most extensive drag-folding should be found at the crest of an anticline or the bottom of a syncline, where inter-bed slippage has its maximum effect.

The Shuswap Series, while its individual beds can be traced for miles along strike without substantial deviation, has been tightly folded and hence should exhibit extensive drag-folding if they can be traced to the surface-expression of either the bottom of a syncline or crest of an anticline.

Bralorne Mines and associates have been attempting to find such an area by deep-diamond-drilling on the Jordan River lead-zinc prospect, which is in a similar geological setting 28 miles southeast of the Cottonbelt. Falconbridge Mines have worked on a similar project at Ruddock Creek, 22 miles north of the Cottonbelt, and in a similar geological setting. They were able to trace the two sulphide zones by soil sampling, to the drag-folded surface expression of the base of a syncline, proving

that what had appeared to be two replacement zones were actually two limbs of a single bed that had been folded into a syncline. Subsequent diamond-drilling of the drag-folded area disclosed substantial increase in the thickness of mineralization and the probability of the discovery of an orebody that will be mined by open-pit methods.

PURPOSE OF THE SURVEY

It is suspected that the sulphide replacement zones known to exist on the Shuswap Group occupy the limbs of a tightly folded assymmetric synclinal fold whose axial plane dips south-westerly, and that if six replacement zones exist on the Shuswap Group they actually represent the surface trace of the truncated limbs of three limestone beds. Substantial thickening of the sulphide zones may be found if the beds are traced to the drag-folded area at the bottom of the syncline, either by diamond-drilling to find it at depth, or by tracing it along surface to the surface trace of the syncline. Since it is preferable to find ore near surface, and more economical to trace the zones laterally, it was decided to attempt to trace the sulphide zones to the northwest in search of the surface expression of the trace of the base of the syncline.

In 1963, Falconbridge attempted to do so, utilizing geochemical prospecting but not a magnetometer survey. They

obtained anomalies indicating substantial extensions to the northwest but were unable to reach the desired target-area using this method - possibly because of depth of overburden.

In 1966, we conducted a magnetometer survey for this purpose.

METHOD OF SURVEY

The most northwesterly exposure of the Cottonbelt Zone is in the Bass Shaft at an elevation of 4,800 feet above sea-level. About 4,500 feet northwest of the Bass Shaft at 2,700 feet above sea-level and along the trend at the Cottonbelt Zone, is the Ken Outcrop - the only known out-cropping of lead-zinc-magnetite mineralization northwest of the Cottonbelt and McLeod Zones.

It was desired to establish if the Cottonbelt Zone is continuous over the 4,500 feet to the Ken Occurrence, and if it retains its magnetic properties over this vertical and horizontal distance.

Starting at the Bass Shaft and trending northwesterly, close-spaced magnetic readings were taken along a zig-zag traverse to the Ken Occurrence. It was found that the Cottonbelt Zone, and enechelon zones, are continuous to and beyond the Ken Occurrence, and that the magnetic strength of the zones is maintained over this vertical and horizontal distance. Therefore, it may be possible to trace the sulphide zones to the anticipated surface trace of the base of the syncline by means of a magnetometer.

A base-line was surveyed, cut out, and picketed at 4,000 foot intervals at the anticipated trend of the zones, 39° west of True North. Fifty-six cross-lines, approximately 3,000 feet long, were then cut out at right angles to the base-line and 400 feet apart, with pickets at 50 foot intervals. In addition, pickets were placed at 50 foot intervals along a 2,400 foot length of pack trail that crosses the zones and leads to Shuswap Lake.

Suitable base-control stations were established and the survey was started, using a Sharpe Model MF-1 Fluxgate magnetometer, Serial No. 609235. On the grid-lines readings were generally taken at 50 foot intervals, this interval being considered sufficiently close to detect the trend of the sulphide replacement zones. However, many readings spaced only a few feet apart, were taken in tracing the individual replacement zones along their trends.

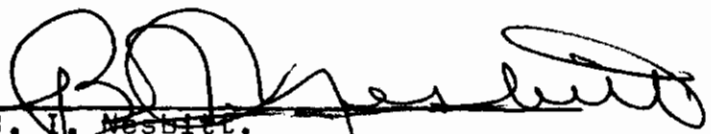
INTERPRETATION OF RESULTS

As can be seen from the accompanying map, the replacement zones have been traced by the magnetic survey down into the valley of Blair Creek. There, their trace swings more westerly and they extend westerly beyond the area covered by the grid. Therefore, in order to trace the replacement zone to the expected bottom of the syncline, it will be necessary to extend south-easterly, grid-lines 16 W. to 42 W. inclusive, and to continue the magnetometer survey along them.

The weakening of the anomaly that approaches and crosses Blair Creek at 17 S. on line 38 W. does not necessarily indicate decreasing mineralization. It probably is caused by a great increase in depth of overburden in the creek valley.

CONCLUSION AND RECOMMENDATIONS

The sulphide replacement beds have been traced by magnetometer to the valley of Blair Creek to where they trend westerly off of the survey-grid before reaching the expected base of the syncline where drag-folding and substantial thickening of the sulphide mineralization may occur. Grid lines 16 W. to 40 W. should be extended to 3,000 feet south of the Base Line and the magnetometer survey should be continued at 50 foot intervals over the extended lines. There is a possibility, however, that the base of the syncline may be traced to an area where the overburden is sufficiently deep that the magnetic effect may be masked. Should this be the case, the probable local of the base of the syncline should be sufficiently closely established so that an induced polarization survey can be used.


B. J. Nesbitt,
Consulting Geological Engineer.

BIN/gc
April 18, 1967

SUPERVISION AND COSTS - September 10, 1966 to October 17, 1966

This magnetometer survey was laid out and supervised by B. I. Nesbitt, Consulting Geological Engineer. Mr. M. Currie supervised the line-cutting, surveyed the lines by chain and compass, and took the magnetometer readings. Edin Sandmark, P. Gomien, Jean LeBlanc, and R. Davey served as axemen. C. Stephenson assisted in surveying and line-cutting.

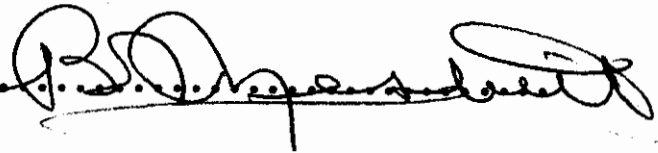
M. Currie, 1½ mo. @ \$800.00	\$1,000.00
E. Sandmark, 1½ mo. @ \$500.00	625.00
P. Gomien, 5 days @ \$20.00	100.00
J. LeBlanc, 24 days @ \$20.00	480.00
R. Davey, 24 days @ \$20.00	480.00
C. Stephenson, ¾ mo. @ \$800.00	600.00
B. I. Nesbitt, 4 days @ \$100.00	<u>400.00</u>

Sub Total \$3,685.00

Groceries and Supplies	757.20
Helicopter Transport	2,158.00
Maps	69.16
Rental of Magnetometer, 1½ months	<u>330.00</u>

GRAND TOTAL \$6,999.36

Certified Correct



QUALIFICATIONS OF MYRL CURRIE

Mr. Myrl Currie was party chief. His experience follows:

1956 - 1960: Worked for Algoma Steel on geophysical exploration work including magnetometer surveys and vertical loop E. M. surveys. Three years as helper and two years as party leader.

1960 - 1965: Worked for International Nickel as party leader on geophysical exploration work including magnetometer and E. M. surveys in northern Manitoba, Quebec, and Ontario.

1965 - 1966: Working for Huntec as party leader on geophysical surveys in Dynasty Area, Yukon Territory. Started working for B. I. Nesbitt in September, 1966.

CERTIFICATE

I, Bertram I. Nesbitt, Certify as follows:

1. THAT I am a Consulting Engineer, residing at 1869 Comox Street, Vancouver, British Columbia, and with offices at 809-525 Seymour Street, Vancouver, British Columbia.
2. I am a member of the Association of Professional Engineers of British Columbia. I have worked as a geologist since June of 1935 and have practiced as a Consulting Geological Engineer since 1946. My practice has been divided between mining, petroleum and non-metallics.

My experience includes six seasons with the Geological Survey of Canada; one season as exploration geologist for Canadian Explorations Ltd.; three and one-half years on underground mining work at the Nickel Plate Mine, Hedley, B. C. in various capacities including Chief Engineer and Resident Geologist; three years in charge of exploration in Western Canada for Granby Consolidated Mining, Smelting and Power Co. Ltd.; and consulting work on mining, petroleum and non-metallics exploration projects in several parts of Canada, the U.S.A. and Mexico.

3. I hold a degree of Bachelor of Applied Science in geological engineering from the University of British Columbia (1939), Master of Science in Geology from Queen's University (1941).

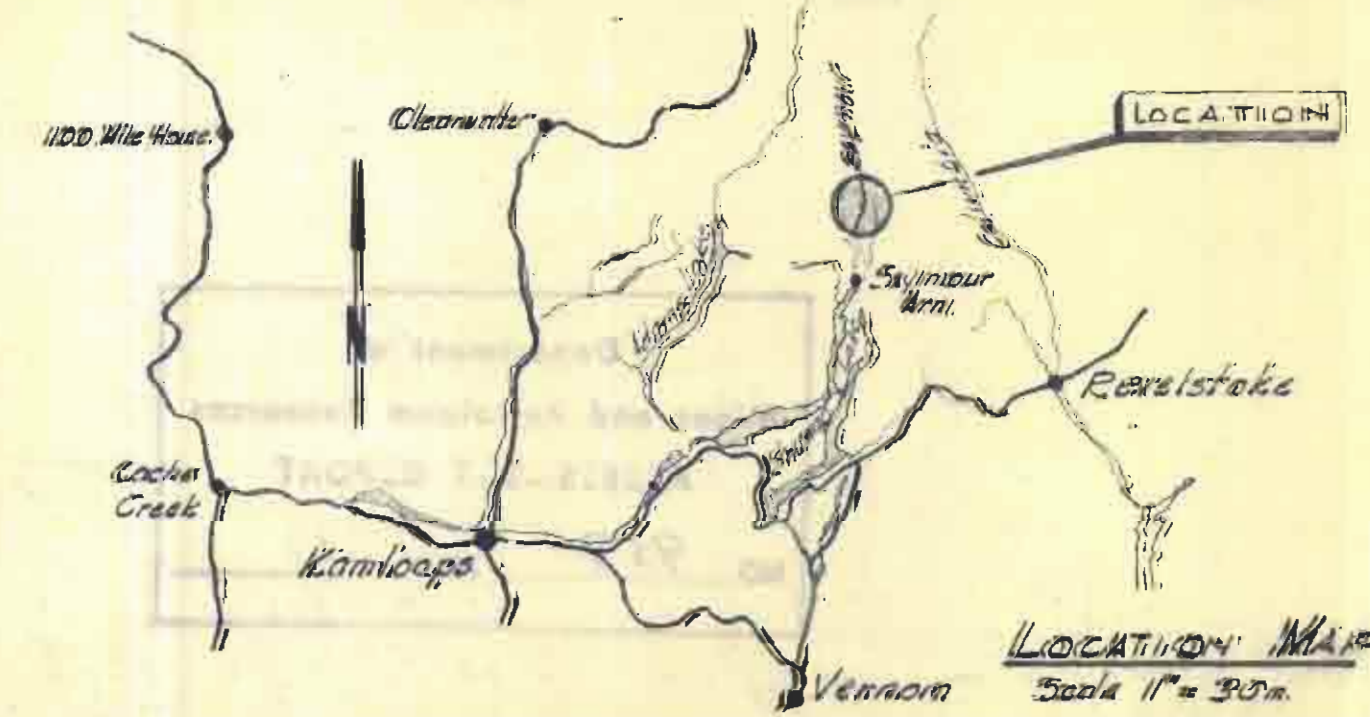
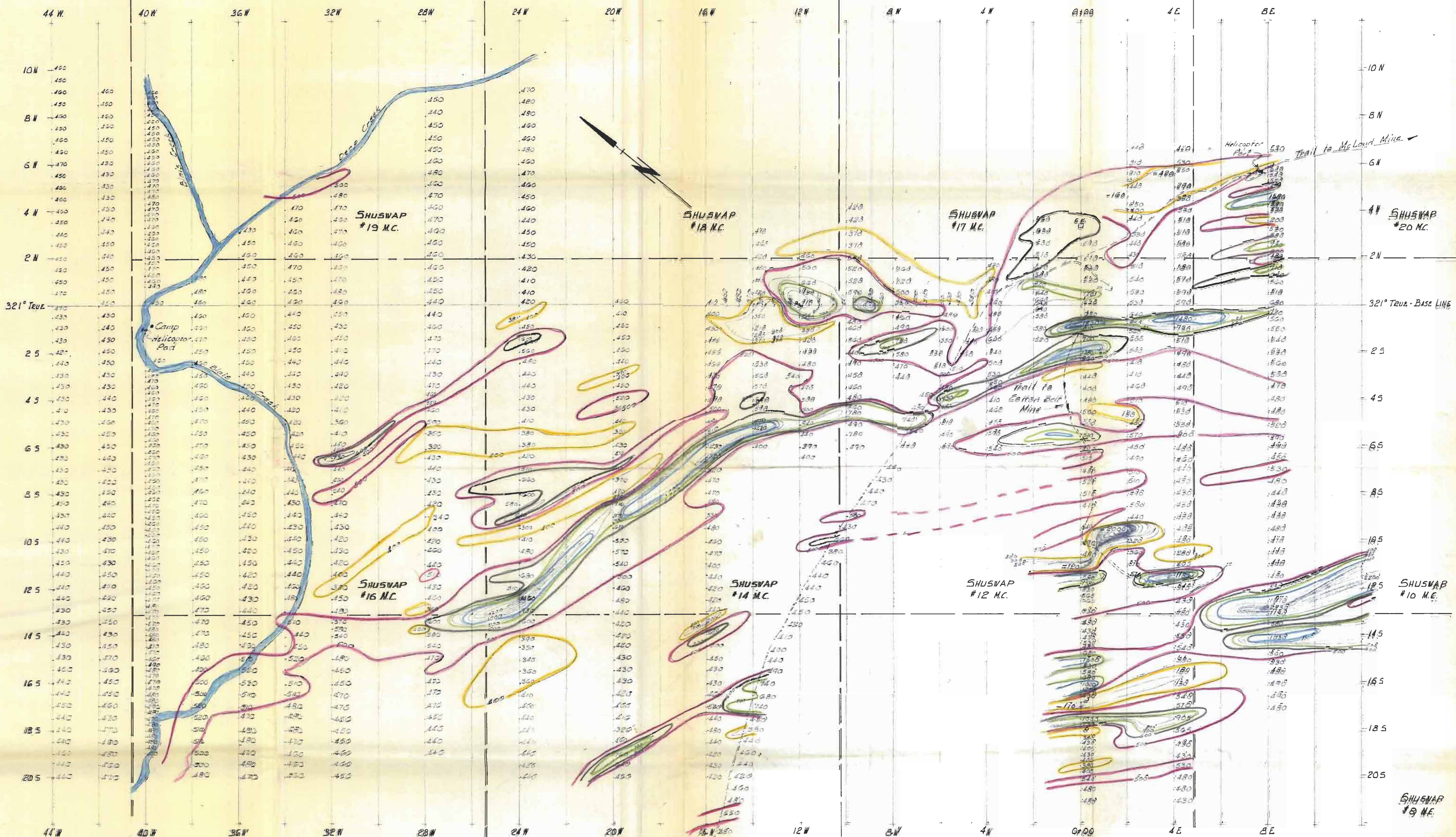
I am also a member in good standing of the following professional organizations:

The Canadian Institute of Mining & Metallurgy
 The American Institute of Mining & Metallurgy
 The Society of Economic Geologists
 The Geophysical Society
 The Association of Professional Engineers of the Province of British Columbia

4. I am the holder of 150,000 free shares and 600,000 escrowed shares of the capital stock of Great Northern Petroleum & Mines Ltd.
5. This report is based on personal visits made to the claims in 1965 and 1966; on the study of old reports and maps by other geologists; on studies of governmental maps and reports on the area; and on results of magnetometer surveys done under my direction.

CERTIFIED this 18th day of April, A.D. 1967


BERTRAM I. NESBITT, P. Eng.
 Consulting Geological Engineer



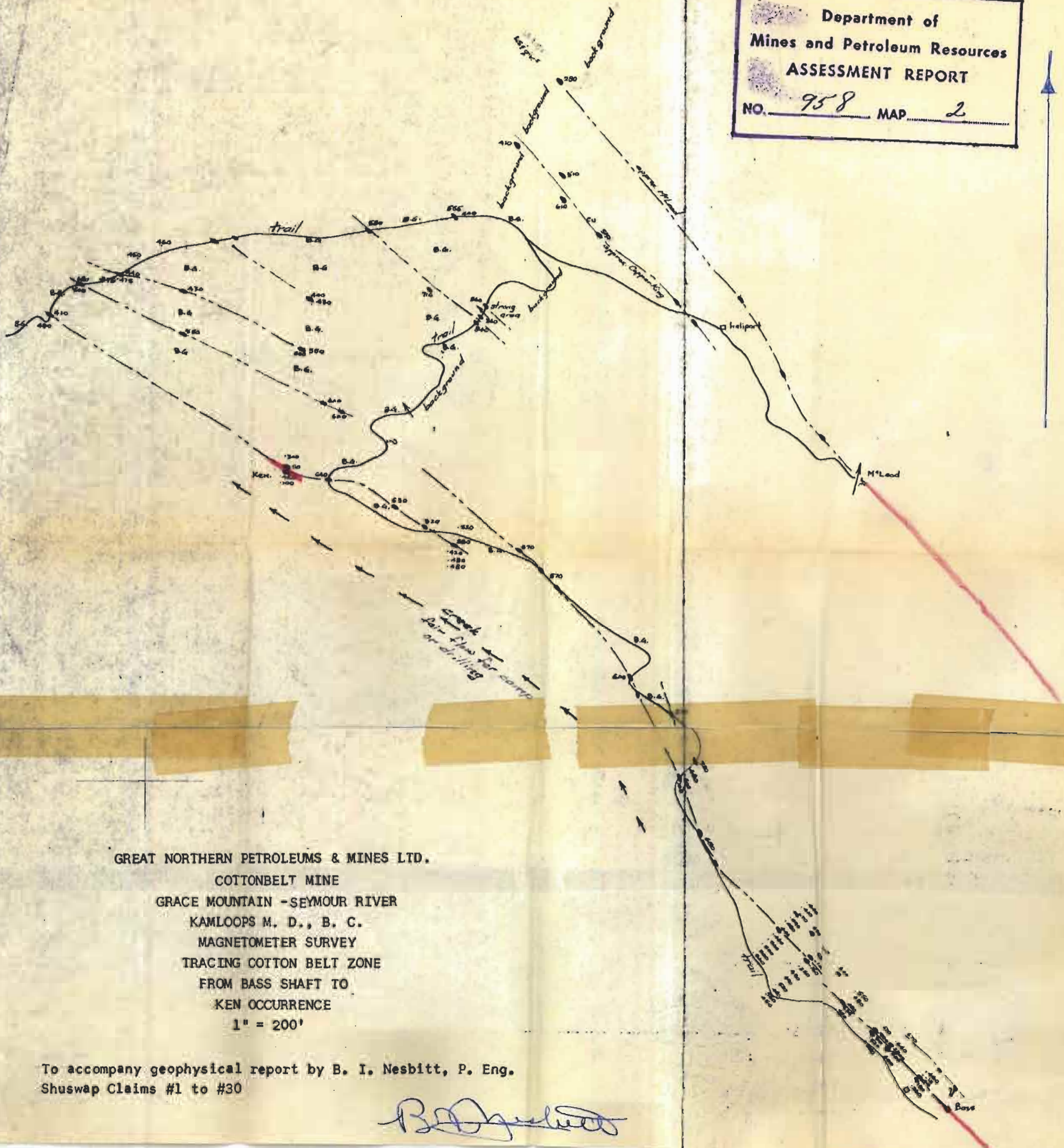
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GREAT NORTHERN PETROLEUMS & MINES LTD.
 COTTON BELT MINE
 GRACE MOUNTAIN - SEYMOUR RIVER
 KAMLOOPS M.D. B.C.
 CONTOUR INTERVAL - 100 GAMMAS
 SCALE 1" = 200 FEET
 MAGNETIC SURVEY

The accompanying Geophysical report by W.L. Nesbitt & Co. Shuswap Claims #1 to #20

Sept. 1958



GREAT NORTHERN PETROLEUMS & MINES LTD.
COTTONBELT MINE
GRACE MOUNTAIN - SEYMOUR RIVER
KAMLOOPS M. D., B. C.
MAGNETOMETER SURVEY
TRACING COTTON BELT ZONE
FROM BASS SHAFT TO
KEN OCCURRENCE
1" = 200'

To accompany geophysical report by B. I. Nesbitt, P. Eng.
Shuswap Claims #1 to #30

B. I. Nesbitt