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REPORT

on the

MAGNETOMETER SURVEY

of the

TROJAN CONSOLIDATED MINES LIMITED

near

ASHCROFT, B. C.

FRED J. HEMSWORTH

September 15, 1958.

315-850 W Hastings St.,
Vancouver 1, B.C.

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FOREWORD

This report describes the procedure and results of a magnetometer survey completed on part of the copper property owned by the Trojan Consolidated Mines Limited, in the Highland Valley, B.C. The line-cutting and establishment of the survey grid was under the supervision of Mr. Mac Hunt, resident engineer; the magnetometer instrument work, including gamma corrections and calculations was done by the writer, Fred J. Hemsworth, P. Eng. The field work started on June 13, 1958, and was finished on August 26, 1958.

In conjunction with the magnetometer survey, Dr. William H. White, P. Eng., conducted a geological survey and collaborated with the writer in the interpretation of the geophysical data and in the recommendations contained in this report.

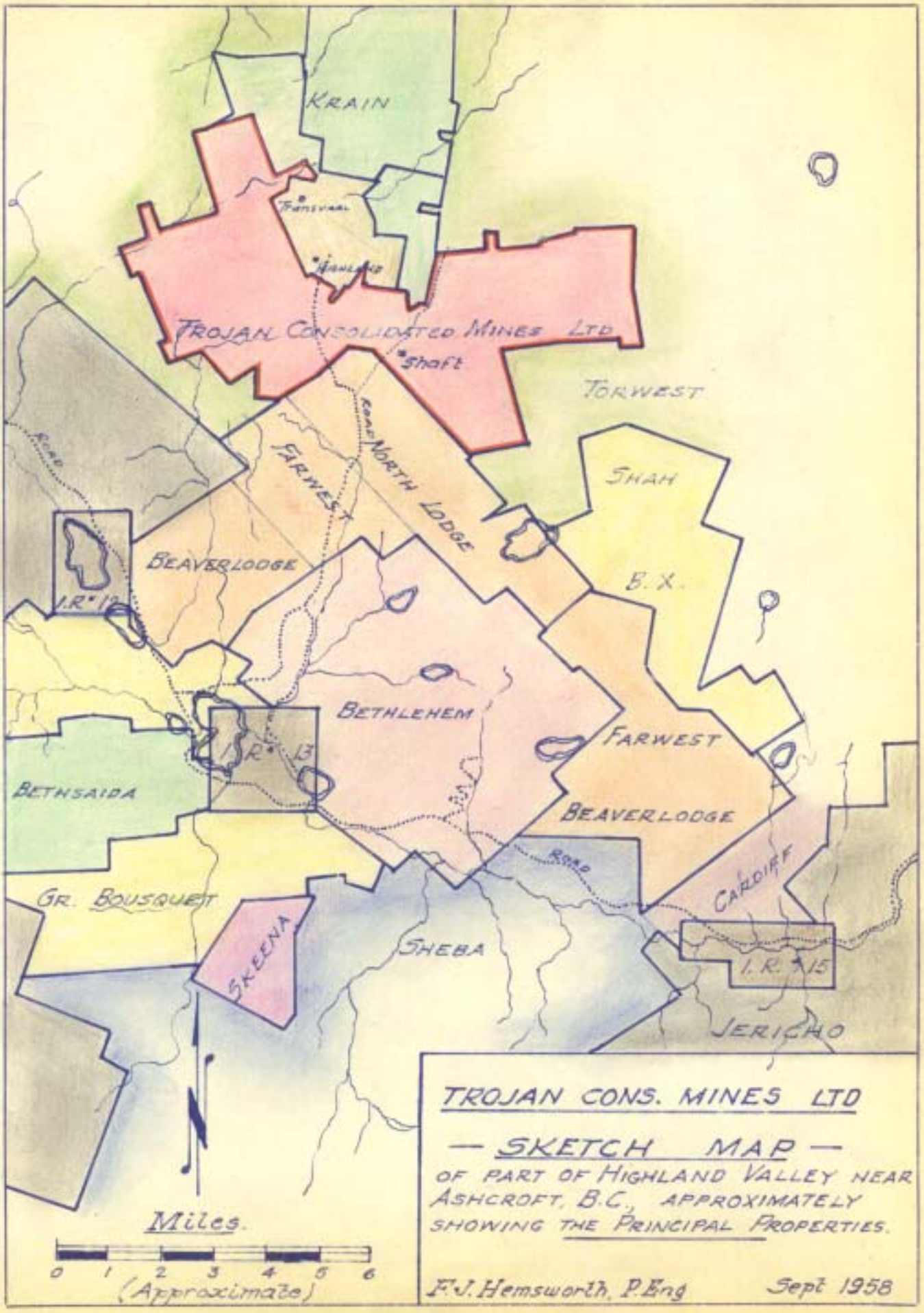
INTRODUCTION

The Trojan Mine is situated on the north side of the Highland Valley, between elevations of 4,800 feet and 6,200 feet above sea level. By road the property is 30 miles south of Ashcroft, and 50 miles north of Merritt, B.C. The position of the Trojan Mine in relation to the principal adjoining properties is shown on the location map of the Highland Valley.

Diamond drilling and underground exploration by shaft sinking and drifting has exposed a large plug of the favorable breccia host rock. On the periphery of the breccia zone two ore bodies, the Main and East have been discovered. In the Main zone a considerable tonnage of copper ore has been proven by underground development. The East zone has not been opened up at this date. The favorable brecciated area has been partly delimited to the south and west but is open to the north and northeast.

Intensive exploration has been confined to the small area adjacent to the shaft and part of the one breccia zone. The balance of the property had received only cursory prospecting.

The present geophysical and geological examination was instigated in an attempt to increase the ore tonnage. It was hoped to expand the known favorable area and to find other areas favorable to copper deposition.


KRAIN
TROJAN CONSOLIDATED MINES LTD
Shaft
TORWEST
FARWEST
NORTH LODGE
SHAH
B. X.
BEAVERLODGE
I.R. 12
BETHLEHEM
I.R. 13
FARWEST
BETHSAIDA
BEAVERLODGE
ROAD
CARDIFF
GR. BOUSQUET
SKEENA
SHEBA
I.R. 15
JERICHO
N
Miles.
0 1 2 3 4 5 6
(Approximate)
TROJAN CONS. MINES LTD
— SKETCH MAP —
OF PART OF HIGHLAND VALLEY NEAR ASHCROFT, B.C., APPROXIMATELY SHOWING THE PRINCIPAL PROPERTIES.
F. J. Hemsworth, P. Eng
Sept 1958

FIELD PROCEDURE

Survey of Grid

A baseline was surveyed by transit and chain. A survey line was run east and west from the north corner of the Bill No. 4 claim Lot 5604. From this point a line was run 4,000 feet east and 6,800 feet west, making a total baseline length of 10,800 feet. Along this baseline, stations were established at 400-foot intervals. These baseline stations were painted white, and affixed with aluminum markers. From each baseline station lines were cut at right angles up to the property boundaries. These north-south lines were surveyed with a Brunton compass and chain. Pickets were placed at 200-foot intervals along these side lines and numbered with crayon and also with permanent aluminum tags. The grid thus formed has 400 foot-200 foot dimensions. The survey covered 44 mineral claims and necessitated cutting lines and establishing stations along about 40 linear miles.

Instrument

Readings were taken at 100-foot intervals with a Sharp magnetometer, Model A2. This instrument is a precision magnetic field balance and measures changes in the vertical component of the earth's magnetic field. It has a sensitivity of 20.2 gammas per scale division and an intensity range from 0 to 15,000 gammas. On the Trojan survey a total of 2,072 readings were recorded.

Corrections

(a) Diurnal

All readings were corrected for diurnal, or variations from time to time during the day. Since only one instrument was available for the job, a base station was set up near camp. One day was spent in taking readings every hour at this base station and a diurnal curve drawn from these readings. Diurnal corrections for readings taken on subsequent days were based on this curve.

(b) Day to Day

A reading was taken at the base station each day before leaving for the field and each day after field work was completed. The variation between the base reading on any particular day and the original base reading (corrected for diurnal variations) was the day to day correction. The diurnal and day to day corrections were added to each field reading to arrive at the corrected magnetometer reading.

Mapping

The result of the magnetometer survey is shown on the gamma contour map contained in the pocket at the back of the report. The magnetometer readings are represented on this map by a series of contour lines indicating the magnetic intensity in gammas. The contour lines were drawn through readings of equal intensity at 100 gamma intervals on a working plan on which the readings were plotted. The map was colored in order to emphasize the distribution of readings and assist in the interpretation.

GEOPHYSICAL METHOD

Before deciding on the magnetometer survey, serious consideration was given to the choice of the best type of geophysical method to be used at Trojan. On the adjoining properties major mining companies were trying every known method to probe the subsurface rock. At the Krain property to the north, the Kennecott Copper Company was running magnetometer followed by induced polarization surveys in selected areas. Noranda Exploration was conducting a magnetometer survey on the Torwest Resources claims to the east, and Northlodge were trying magnetometer, electromagnetic (E.M.) and soil sampling to the south. In addition, the American Smelting & Refining Company had done a great deal of work and experimenting with several geophysical methods on the ore bodies at the Bethlehem Copper property, which is situated about 3 miles south of Trojan. It was concluded that the magnetometer was the most effective geophysical instrument in this particular area.

The main purpose of magnetic surveys is to present a generalised picture of the bed rock geology, and it is only seldom that anomalies as such are directly associated with ore. Nevertheless by means of a magnetic intensity map of an area, geological conditions and formations bearing a relationship to possible ore locations may be traced.

The changes in magnetic intensity between different rock types depend on the kind of rock, the mass of the formation, depth below the surface, the attitude, and the susceptibility to magnetic fields. These changes can be read with the magnetometer, but due to the number of variables, are sometimes difficult to interpret.

Magnetometer results have been analysed at the Bethlehem copper property. It was found that the Bethlehem ore bodies are located in areas of relative low gamma readings, around the flanks of lows, or in an area of a bulge of a relative low.

In interpreting magnetometer results at Bethlehem the relative highs indicate poor exploration bets and in this way some area could be eliminated from further prospecting. The relative lows and on the flanks of moderate lows can be considered as good prospecting areas but did not necessarily represent ore bodies.

One theory is that in an area of mineralized quartz diorite there has been alteration of the accessory magnetite to hematite resulting in low magnetic readings. However, prophyry dykes and more acid types of quartz diorite will also give relative low readings. Consequently the readings must be interpreted in conjunction with known geological and topographical background.

GENERAL GEOLOGY RELATIVE TO MAGNETIC SUSCEPTIBILITY

The main underlying rock on the Trojan is the Guichon quartz diorite. This rock generally carries considerable accessory magnetite which normally results in relative high magnetometer readings.

The breccia plugs containing the ore zones represent a younger complex of granitic intrusives. These rocks have been altered and chloritized and in places mineralized with chalcopyrite, specular hematite, chalcocite, tourmaline and copper carbonates. Due to the small amount of magnetite, the breccia zones give medium to relative low readings on the magnetometer.

The quartz diorites are also cut by several different types of porphyry dykes. The dykes carry very little accessory magnetite and give moderate low readings.

Overlying part of the northern and western section of the surveyed claims are two areas of Tertiary volcanics. These younger rocks cover the quartz diorite to varying thicknesses from a thin layer at the periphery up to a probable maximum thickness of about 300 feet. The volcanics are a troublesome formation as they are not known to host any mineralization but effectively hide possible ore contained in the underlying quartz diorites.

The east, volcanics-quartz diorite contact, comes down in a synclinal curve to the south of the baseline. Two contacts are shown on the plan; the geological contact determined by Dr. White from observation of surface float and outcrop, and a geophysical contact determined from magnetometer readings. The two contacts differ because in areas where the volcanic formation is shallow, the magnetic effect of the underlying quartz diorite predominates.

Magnetometer readings over the Tertiary volcanics are generally low but occasional erratics occur. Several negative poles were encountered. These gave readings as low as minus 4,000 gammas. The average readings are low with an occasional erratic high.

Magnetic Intensity Synopsis

Rock	Normal Gamma Range	Remarks
Quartz Diorite	600 to 1,000 gammas	occasional highs (1,300)
Breccia Zones	300 to 500 gammas	occasional highs (800)
Porphyry Dykes	300 to 600 gammas	too narrow to classify accurately
Tertiary Volcanics	-500 to 600 gammas	erratic lows and highs

From the above table it is readily seen that areas with magnetic intensities between 300 and 500 gammas, intermediate lows, are favorable for ore discovery.

Interpretation of Results

In interpreting the results of the magnetometer survey, certain areas may be immediately eliminated as inconclusive or unfavorable. All areas covered by a varying thickness of Tertiary volcanics come under the category of inconclusive. Magnetic results over this volcanic formation are very erratic and can not be correlated with geologic data. This includes all ground north of the baseline between stations 60 and 100 and for about 2,000 feet south. It also includes the west contact in the southwest corner of the map area and all ground west of this contact. The volcanic formation is being excluded because the geophysical results are not interpretable. It is still possible for bodies of mineral to be contained in the quartz diorite which is hidden by the overlying volcanics. However it is difficult to check such possibilities except by wildcat diamond drilling which is not practical due to the extent of the area.

To the south of the main contact the rock is quartz diorite cut by a few porphyry dykes. The dykes generally represent favorable fractured zones but are too narrow to be outlined by a survey on 400-foot line spacing. Most of the readings in the quartz diorite are relative highs and these areas can be eliminated as unfavorable. However several parallel intermediate low zones are indicated to the south and southeast. These have a general southeast trend and correspond with topographical lows represented by canyons and gullies, and hence must be eliminated.

On the western half of the map area moderate high readings were recorded in the north and northeast sections. These are interpreted as representing unaltered quartz diorite, unfavorable for exploration.

Four favorable zones are outlined on the plan and lettered A, B, C, and D.

Zone A is the area immediately north of the shaft and suggests the probable extension of the favorable breccia zone. This zone lies adjacent to the present known ore bodies and obviously should be investigated in the normal course of future development.

Zone B is adjacent to the baseline between stations 32 and 40 and covers about one-half of the C.N. No. 4 mineral claim. The topography is comparatively flat with a slight rise to the north. Readings are all within the range of relative lows and therefore may represent a breccia zone containing copper mineralization. The investigation of this zone is considered of paramount importance.

Zone C is on the C.N. No. 6 claim adjacent to the Jackson Basin road. Copper mineralization is evident in outcrops along the road for about 400 feet between stations 4 and 8 north on line 24. In addition this zone conforms to the favorable magnetometer readings. It is in an area of relative lows and the mineralization is on a bulge of a relative low. Consequently immediate investigation of this zone is recommended.

Zone D is an enigma. It lies to the west of the road on the C.N. No. 5 claim and C.N. No. 5 fraction, close to the boundary of Northlodge. It appears to represent an island of volcanics carrying a strong negative pole and if so could not be expected to contain ore bodies. However it is sufficiently anomalous to require further investigation. In addition geochemical surveys by Northlodge Copper Mines to the south and southeast of Zone D have shown high positive copper colors. Sufficient exploration to determine the reason for the anomalous conditions is recommended.

RECOMMENDATIONS

Zone A is the extension to the north of the known favorable breccia zone. A survey by the induced polarization method is recommended. This geophysical method is based on detecting the difference between A.C. and D.C. resistivity which sometimes can be attributed to the polarization effects of metallic mineralization. Induced polarization is particularly useful where the mineralization is disseminated. It is a slow detailed method and costly, and is most effective as a follow-up of limited areas outlined by other methods.

Zones B, C, and D should be stripped and trenched by bulldozer. These zones are readily accessible and appear to have only a moderate depth of overburden. Once the bedrock is uncovered the geology could be mapped and a diamond drilling program planned.

Completion of the magnetometer work over the unsurveyed parts of the property is recommended. A map showing areas recommended for survey is included with this report.

CONCLUSION

The effectiveness of the magnetometer and geological surveys can best be evaluated after the recommended development work has been completed. If this development is carried through to completion, I feel confident that it will result in a considerable increase in the reserves of copper ore on the Trojan property.

Respectfully submitted,

F. J. Hemsworth

F.J. Hemsworth, P. Eng.

KRAIN GROUP

Under Option to

KENNECOTT COPPER MINES LTD

NORTHLODGE COPPER MINES LTD

TORWEST RESOURCES LTD

Under Option to:

NORANDA MINES

LEGEND

Over 1000	Gammas
900 to 1000	"
800 to 900	"
700 to 800	"
600 to 700	"
500 to 600	"
400 to 500	"
300 to 400	"
200 to 300	"
100 to 200	"
0 to 100	"
0 to −1000	"
−1000 to −2000	"
Less than −2000	"

TROJAN CONSOLIDATED MINES LTD.

~ PLAN ~

SHOWING MAGNETOMER SURVEY OF PART OF THE PROPERTY AT HIGH-LAND VALLEY, BRITISH COLUMBIA.

By F.J. Hemsworth, P.Eng., August 1958.

Scale. 1 inch = 400 feet

F.J. Hemsworth

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Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 224 MAP #1

TROJAN CONSOLIDATED MINES LTD.

— CLAIM MAP —

HIGHLAND VALLEY. B.C.

SCALE. 1 INCH = 1000 FEET.

F.J. Hemsworth. P.Eng. Sept 1958.

D.D. 10 D.D. 9 D.D. 7 D.D. 8 D.D. 6 D.D. 5 D.D. 4 D.D. 3 D.D. 1 FR D.D. 2 Tertiary Dykes Quartz Diorite

VENUS 2 FR VENUS 1 FR

CALCO 3 CALCO 4 B.C. 4 FR CALCO 2 CALCO 1

E.D. 21 E.D. 22 E.D. 19 E.D. 20 E.D. 17 E.D. 18 E.D. 15 E.D. 16 B.C. 2 FR B.C. 3 FR

A.G. 27 A.G. 28 A.G. 26 A.G. 25 A.G. 24 A.G. 23

WHITE FR

SOX 1 SOX 2

MARS 1 MARS 2 MARS 3 MARS 4 MARS 5

C.N. 7 C.N. 6 FR C.N. 4 FR C.N. 6 C.N. 4 C.N. 2 C.N. 5 C.N. 3 C.N. 1 C.N. 5 FR

BILL 3 BILL 4 BILL 12 BILL 6 BILL 5 BILL 13 BILL 14 BILL 7 BILL 8 BILL 15 BILL 16 BILL 9 BILL 10 BILL 11

A.J. 1 A.J. 2 A.J. 4 A.J. 6 A.J. 8 A.J. 3 A.J. 5 A.J. 7

MOX 1 MOX 2 MOX FR MOX 3

JAN. 1 FR JAN 5 JAN 4 JAN 2 FR JAN 3 JAN 1 JAN 7 JAN 8 JAN 10 JAN 12 JAN 14 JAN 16 JAN 15 JAN 13 JAN 11 JAN 9

Tertiary Volcanics Quartz Diorite

1 2 3

— LEGEND —

Area covered by present magnetometer survey.	3
Area recommended to be covered by magnetometer survey at some future date.	2
Area of Tertiary Volcanics not suitable for magnetometer survey.	1

Geological Contacts :- ----------

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F. J. Hemsworth