

132

REPORT ON THE  
MAGNETOMETER SURVEY  
of the  
ALPHA - SCOTTI GROUP  
THE CARDIFF MINING CO. LTD.  
HIGHLAND VALLEY, B. C.

F. J. Hensworth

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INTRODUCTION:

This report describes the procedure and results of a magnetometer survey completed on the claims of the Alpha-Scotty group owned by The Cardiff Mining Company Limited. The report is written in compliance with the regulations pertaining to the claiming of geophysical work for assessment purposes for the year 1956-57.

The Alpha-Scotty group of claims is located in the Highland Valley, Kamloops Mining Division, some 35 miles south of Ashcroft, or 40 miles north of Merritt. The geographical position is N 50° 28', E 120° 58'. The original claims, Alpha Nos. 1 to 8, and Scotty Nos. 1 to 8 were staked in January, 1956. This summer a survey of the claims indicated that the Alpha No. 8 and Scotty Nos. 5 to 8 inclusive were staked in error on Beaverlodge property. Consequently these claims are being allowed to lapse. The survey also showed the presence of fractions adjacent to some of the other claims of the company and also some open ground. These fractions and the open ground were staked for the company this summer.

A list of the claims and fractions which this survey covers is given below:

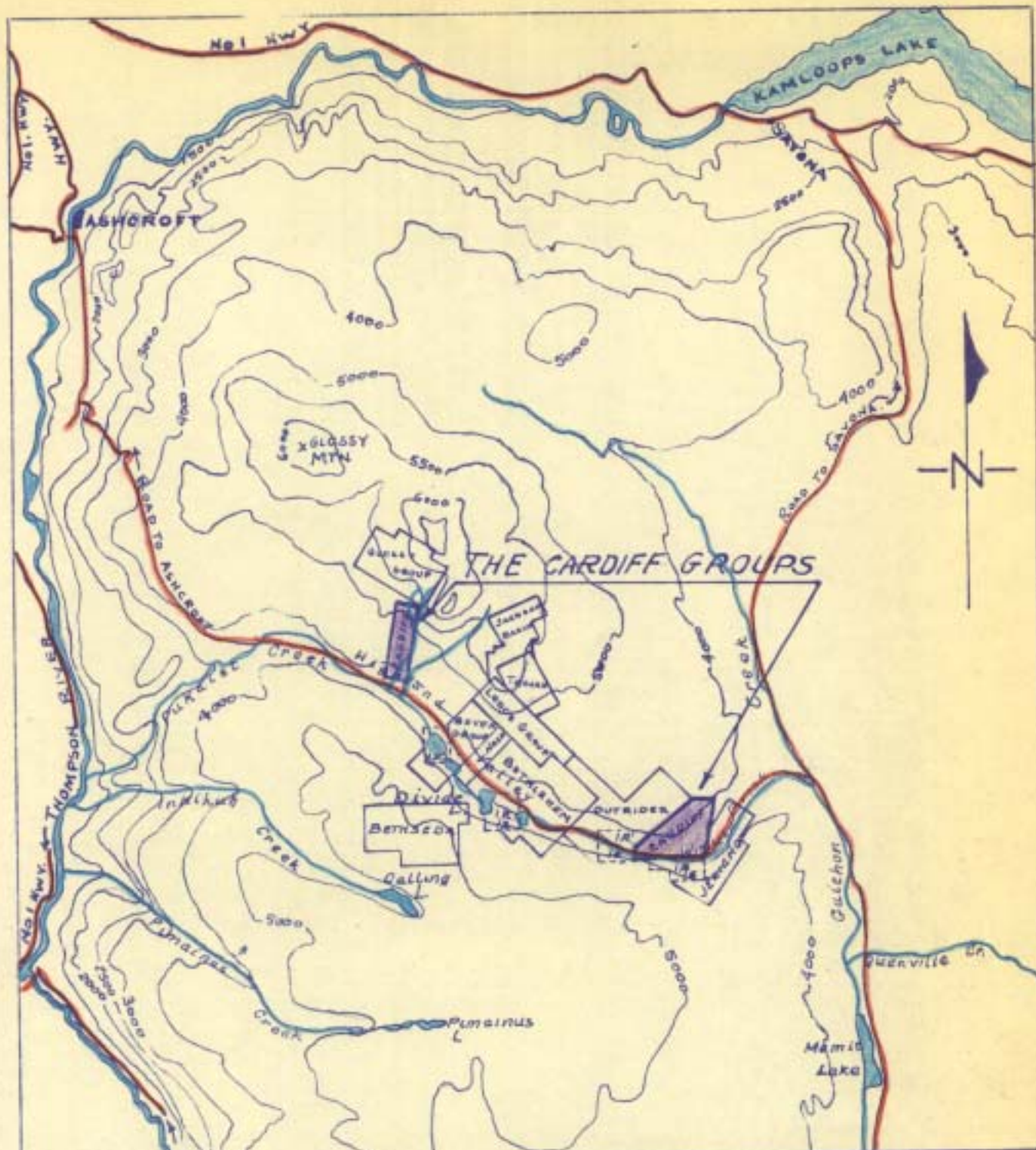
<u>Name</u>	<u>Date Recorded</u>	<u>Record No.</u>
Alpha No. 1 ✓	23 January, 1956	18097
Alpha No. 2	23 January, 1956	18098
Alpha No. 3	23 January, 1956	18099
Alpha No. 4	23 January, 1956	18100
Alpha No. 5 ✓	23 January, 1956	18101
Alpha No. 6 ✓	23 January, 1956	18102
Alpha No. 7 ✓	23 January, 1956	18103
Scotty No. 1 ✓	23 January, 1956	18105
Scotty No. 2 ✓	23 January, 1956	18106
Scotty No. 3	23 January, 1956	18107
Scotty No. 4	23 January, 1956	18108
Scotty No. 9	14 August, 1956	24510
Scotty No. 10	14 August, 1956	24511
Scotty No. 11	14 August, 1956	24512
Scotty No. 12	14 August, 1956	24513
Alpha No. 1 Fr. ✓ 10	September, 1956	24546
Alpha No. 2 Fr. ✓	17 August, 1956	24514
Alpha No. 3 Fr. ✓ 10	September, 1956	24547
Alpha No. 4 Fr. ✓	17 August, 1956	24515
Scotty No. 1 Fr. ✓	17 August, 1956	24516

GENERAL DESCRIPTION OF THE AREA:

The Highland Valley is a generally southeast-trending valley having an average elevation of between four and five thousand feet (see included topographical map). It is drained by two creeks; the southeast half by Witches Brook which joins Guichon Creek, the northwest by Pukaist Creek which flows from Divide Lake northwest to the Thompson River.

The entire valley, except for some of the ridges that surround it, is covered by glacial drift. Near the creek bottom this drift achieves considerable depth. One diamond drill hole, drilled about one half mile southeast of the Cardiff property and next to the creek was reported to have cut over 250 feet of glacial overburden. All companies working in the Highland Valley agree that glacial overburden is the major hindrance to exploration.

The Highland Valley is serviced by a dirt road, maintained by the Department of Public Works, that runs from Ashcroft through the



Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. **132** MAP # **1**

*THE CARDIFF MINING CO. LTD.*  
 TOPOGRAPHICAL MAP OF  
 HIGHLAND VALLEY AREA SHOWING  
 APPROXIMATE LOCATION OF  
 MAJOR CLAIM GROUPS.  
 SCALE 1" = 4 MI.  
*F. J. Hemsworth.*

To ACCOMPANY REPORT BY F. J. HEMSWORTH

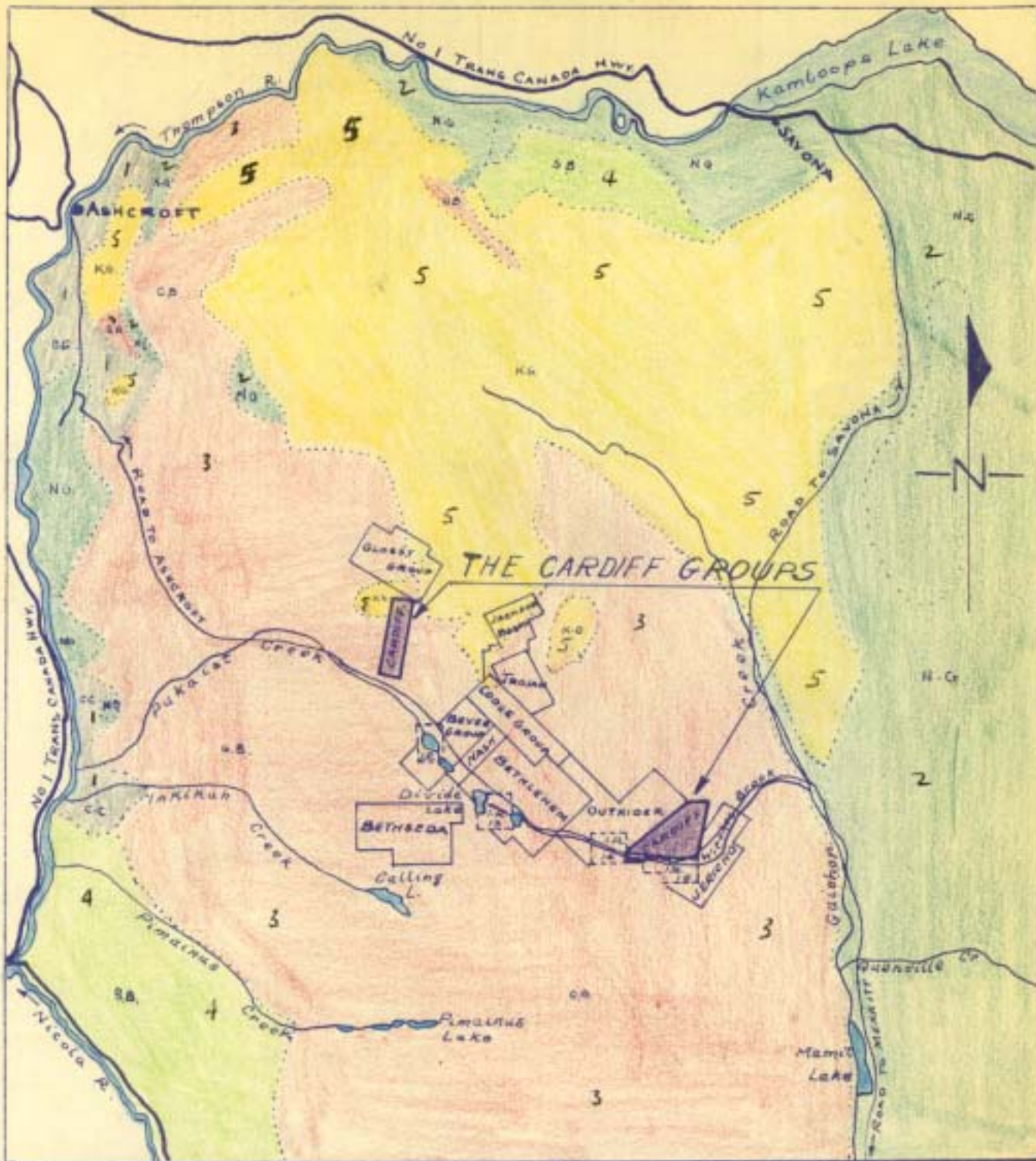
valley to Merritt. Although some work has been done on the road within the last few months that has improved its surface, it is advantageous at all times to travel by four wheel drive vehicle.

DESCRIPTION OF CARDIFF PROPERTY:

The Alpha-Scotty group is bounded on the west by Beaverlodge "Outrider Group", on the south by Indian Reserve No. 14<sup>15</sup>, and on the south and east by the Jericho group. The Ashcroft-Merritt road and Witches Brook traverse a portion of the southern end of the claims. The terrain rises gradually northward from the creek to the north edge of the group. The property is cut here and there by south trending gulleys which might be the result of glaciation or old water courses, but for the most part the surface is very even. The area included by the claims is almost entirely covered with overburden. Only one area of outcrop was observed and this was a granodiorite ridge at the north end of the property. Timber consists of jack pine and poplar at the south end of the claims and fir interspersed with pine at the north. One small creek traverses the property in a north south direction and joins Witches Brook. This creek yields the only good drinking water in the area.

REGIONAL GEOLOGY:

The following report is taken from G. S. C. Memoir 262:  
"The entire Highland Valley is underlain by intrusives of the Guichon batholith, which is considered to be Lower Jurassic in age (see included geological map). Except for a few local gabbroic phases along Guichon Creek the remainder of intrusives are classified as quartz diorite and granodiorite. The rocks are typically grey, with some pink and greenish-grey phases. Biotite mica and hornblende are



**- LEGEND -**

KAMLOOPS GROUP: Recent volcanics; basalt, rhyolite, andesite.	5
SPENCER BRIDGE GROUP: Hard reddish lava.	4
GUICHON CREEK BATHOLITH: Granite granodiorite, quartz diorite.	3
NICOLA GROUP: Greenslates, agglomerates, minor argillites, limestones.	2
CACHE CREEK GROUP: Greenslates chert, minor limestones.	1

**THE CARDIFF MINING CO. LTD**  
**GEOLOGICAL MAP**  
 OF  
**HIGHLAND VALLEY AREA**  
 FROM  
 MAP 1010A, ASHCROFT SHEET  
 SCALE 1" = 4 MILES

To Accompany Report by F. J. HEMSWORTH.  
*F. J. Hemsworth*

abundant, and magnetite, zircon, sphene and apatite are accessory minerals. Near some of the copper bearing quartz veins that occur in this batholith, the rock has taken on a pinkish coloration. Under the microscope, this pink rock is seen to contain clear quartz, but the feldspar, which is mainly plagioclase, is altered. Hornblende is the common ferromagnesian mineral. Near other copper veins the granitic wall-rocks have been largely altered to sericite. In most places the batholith is massive, but it has been subjected to stresses that have caused shears to form in an east-west direction. Faults are common at or near the contacts, though none appear long."

#### LOCAL GEOLOGY:

The depth of overburden on the majority of properties in the Highland Valley area makes structural determination very difficult. The only outcrop on the Cardiff group appears to be granodiorite with a little larger percentage of hornblende than is usual. A jointing system over a east-west distance of some 600 feet has a north-south trend and dips between  $60^{\circ}$  and  $70^{\circ}$  east. A mineralized shear on the south side of the valley on the Jericho property has a similar strike and could possibly line up with this jointing system. Witches Brook might represent a geological feature but there does not seem to be any proof for this.

#### OTHER PROPERTIES:

An investigation of properties in the Highland Valley on which mineralisation has been located indicates a marked similarity of occurrence. It is thus reasonable to assume that if mineralization does occur on the Cardiff group, it should be in geological structures



similar to those on other properties in the area and under similar geophysical anomalies. Consequently a brief study was made of some of the mineral occurrences in the valley as an aid to what to expect on Cardiff.

A. On the Jericho property to the southwest of Cardiff three mineral occurrences have been reported by the owners. Two of these occurrences were viewed by the writer and on one a magnetometer traverse was run. The first one examined was a small outcrop with chalcopyrite and molybdenite disseminated through granodiorite, situated some 200 feet to the south of Witches Brook at the outlet of the valley. The area of mineral outcrop is about 20 by 50 feet, and the grade perhaps  $\frac{1}{2}\%$  copper. There does not appear to be any vein or fracture system associated with this mineralization, unless the course that Witches Brook follows, which here is a narrow gorge, indicates some geological structure. A magnetometer traverse begun at the creek and carried up the hill across the mineral outcrop with readings at 100 foot intervals showed a steady increase in readings from about 200 gammas at the creek to about 900 at a distance of 600 feet from the creek. The reading taken on the outcrop seemed to fit consistently into the gradual increase in readings from the creek up. As the depth of overburden was at no place greater than 5 feet on this traverse the variations in readings were due to some structure of the granite rather than the depth of overburden.

The location of the second outcrop was mentioned earlier, in connection with the Cardiff jointing system. It is a shear zone exposed intermittently over a length of some 600 feet and a width of about 50 feet. Chalcopyrite and molybdenite are disseminated sporadically across the width of the shear. No magnetometer traverse was

run on this zone. The owners did some drilling on this shear and on what they considered to be its extension. However, since they abandoned the operation after three holes it is assumed that the results of drilling were discouraging.

B. The writer visited the old O. K. property and ran a magnetometer survey in the area of the shear. The following geological report is taken from Geological Survey of Canada, Memoir 262 by S. Duffell and K. C. McTaggart. "The O. K. property ..... is situated on the southwest side of Highland Valley about a mile north of Calling Lake. The ore lies along a fracture in the Guichon Creek batholith, and consists of copper sulphide minerals in a gangue of sericitized wall-rock, quartz and fault gouge. Ore minerals are chalcopyrite, chalcocite, bornite and secondary copper minerals ..... The main fracture carries a width of from 2 to 4 feet of gouge which in places contains ore mineral. The shear zone strikes north  $80^{\circ}$  east and dips steeply south."

Since this report was written some diamond drilling and stripping have been done in an endeavour to extend the known mineralization. The overburden, where stripping has been undertaken, is not in excess of 20 feet. The magnetometer survey conducted by the writer covered a distance of about 1000 feet along the shear and about 400 feet on each side of it. The reading away from the shear zone was about 400 gammas but immediately over it the reading dropped to about 200 gammas. This drop in magnetometer readings was quite evident when the reading was taken directly over the shear but when the reading was taken more than forty feet away from the shear the lowering effect of the shear was negligible.

C. The Bethlehem property has probably done more exploration

than any other property in the area. A combined programme of stripping, diamond drilling and geophysical work has been carried out to find the mineralized zones. It has been possible to correlate geophysical readings with ore in place.

The engineers at Bethlehem have found that the magnetometer is the most suitable geophysical instrument for locating mineralization on their claims. The results of diamond drilling have proven that there is a relation between magnetometer low readings and copper mineralization. As elsewhere in the valley the copper mineralization is found in shear zones or fractures in the granodiorite. The low magnetometer readings result from a lack of magnetite, the theory being that, along mineralized fractures in the granodiorite, the magnetite has been converted to hematite.

REASONS FOR THE MAGNETOMETER SURVEY:

There are three reasons for doing a magnetometer survey on the Alpha Scotty group of claims:

1. The depth of overburden made any kind of trenching or surface work as a preliminary phase of exploration impractical;
2. The success encountered by the American Smelting and Refining Company on the Bethlehem property with the magnetometer, and the geological similarity of all potentially economic copper deposits in the area, justified the magnetometer as a logical exploration tool for the job;
3. The magnetometer traverse run by the writer on the O. K. property verified the theory that magnetic lows are general over mineralized shear zones.

TRANSIT SURVEY OF CLAIMS:

The claim posts were surveyed with a transit and chain and tied into a corner post of No. <sup>15</sup> Indian Reserve. The boundaries of the Beaverlodge "Outrider group" were surveyed to determine the Cardiff northwest boundary. The survey indicated the presence of several fairly large open areas between the staked claims and some open area to the northeast. The area between the claims was staked as fractions and some of the open ground as full claims to compensate the company for that ground lost to Beaverlodge and to the Indian Reserve. The road and any topographical features near the survey lines were picked up. Other topographical features were picked up from the magnetometer grid lines.

MAGNETOMETER GRID:

A crew of three men was employed to cut the grid lines and completed some ten miles of line before the magnetometer survey was begun. This grid was laid out in the following manner: A base line was laid out with a Brunton compass in an east-west direction along the southern boundary of the claims. The base line was cut out and pickets set at three hundred foot intervals, the measurements being made with a tape. Numbers were written on each picket to designate the distance in hundreds of feet from the east end of the base line. At each base line picket, lines were cut at right angles in a north direction and pickets placed at 100 foot intervals along these side lines, the distances also being laid off with the tape. The grid thus formed had 300 ft. - 100 ft. dimensions. Stations were designated in this manner 45/30, meaning 4500 ft. west, 3000 ft. north. Ten miles of grid was completed by this crew. The remainder of the lines were cut by the magnetometer survey crew at the time the magnetometer survey was being run.

MAGNETOMETER:

A model B-2 Sharp magnetometer was used for this survey. This is a precision instrument having a sensitivity of 10 gammas, and incorporates the latest design features such as built-in aligning compass and temperature compensating device. The locking device for locking the field piece is of such a design that the machine can be subjected to rugged usage, without being put out of adjustment. As many as 150 readings can be taken a day on prepared grid lines.

FIELD WORK:

Two men made up the magnetometer survey crew. One man carried the instrument, set it up and took readings. His partner recorded the readings and at the same time noted any geological features in the vicinity. Between 100 and 150 setups could be made a day.

On that portion of the property on which the lines had to be cut at the same time as the survey the work was considerably slower. Between 60 and 90 readings could be recorded a day.

This latter portion of the survey was completed as follows: At 1500 foot intervals along the base, lines were cut out parallel to the side lines previously cut. Similarly at 1500 foot intervals along one of the side lines, lines were cut parallel to the base. These two groups of perpendicular lines divided the ground into 1500 foot squares, the accuracy of the dimensions of the square being limited to the accuracy with which the Brunton lines could be run. The magnetometer survey was then run on each square individually in the following manner: Starting at the base line a Brunton line was laid off perpendicular to the base and this line was slashed out until a paced distance of 100 feet was reached. Here a picket was put in, numbered, and a magnetometer

reading taken. The line was then projected for another 100 feet and the procedure repeated. In this way the line was advanced until the cross line was reached at 1500 feet. The fairly even topography permitted a pacing accuracy of about 2% in the distance of 1500 feet.

The distribution of tasks for the two man crew were:  
Instrument man - magnetometer readings, pacing and placement and numbering of pickets; helper - Brunton bearing, most of the slashing and noting of rock outcrops.

#### TAKING READINGS:

The method of taking magnetometer readings was as follows:

- (a) The instrument was first leveled with the circular spirit bubble.
- (b) Leveling was completed by adjusting the three thumb screws.
- (c) The field piece of the instrument was oriented at right angles to the earth's magnetic field by use of the auxiliary compass and locked in that position. The auxiliary compass was then locked.
- (d) One reading was taken with the head in this position. The head was then rotated 180° and another reading taken. These were recorded in the field note book along with the time.

#### CORRECTIONS:

- (a) Diurnal Corrections:

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 Corrections:

A reading was taken at the base station each day before leaving for the field and each day after field work was completed. The variations 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 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 enclosed map was traced from this working plan, but the individual readings were omitted as it was felt that inclusion would complicate rather than clarify the map. The map was coloured in order to emphasize the distribution of readings which might indicate some underlying anomalies.

CONCLUSIONS:

The map shows that high readings are concentrated in the north and lows in the south areas as might be expected considering the distribution of overburden.

Further investigation is warranted on Alpha No. 5 claim in the area of very low readings and on the Scotty No. 11 where low readings are adjacent to extreme high readings.

Respectfully submitted,

  
F. J. Hensworth, P. Eng.



THE CARDIFF MINING CO. LTD  
— MAGNETOMETER SURVEY —  
OF PART OF THE  
ALPHA & SCOTTY GROUPS  
— HIGHLAND VALLEY —  
KAMLOOPS MINING DIVISION  
BRITISH COLUMBIA  
SCALE. 1 INCH = 300 FEET.

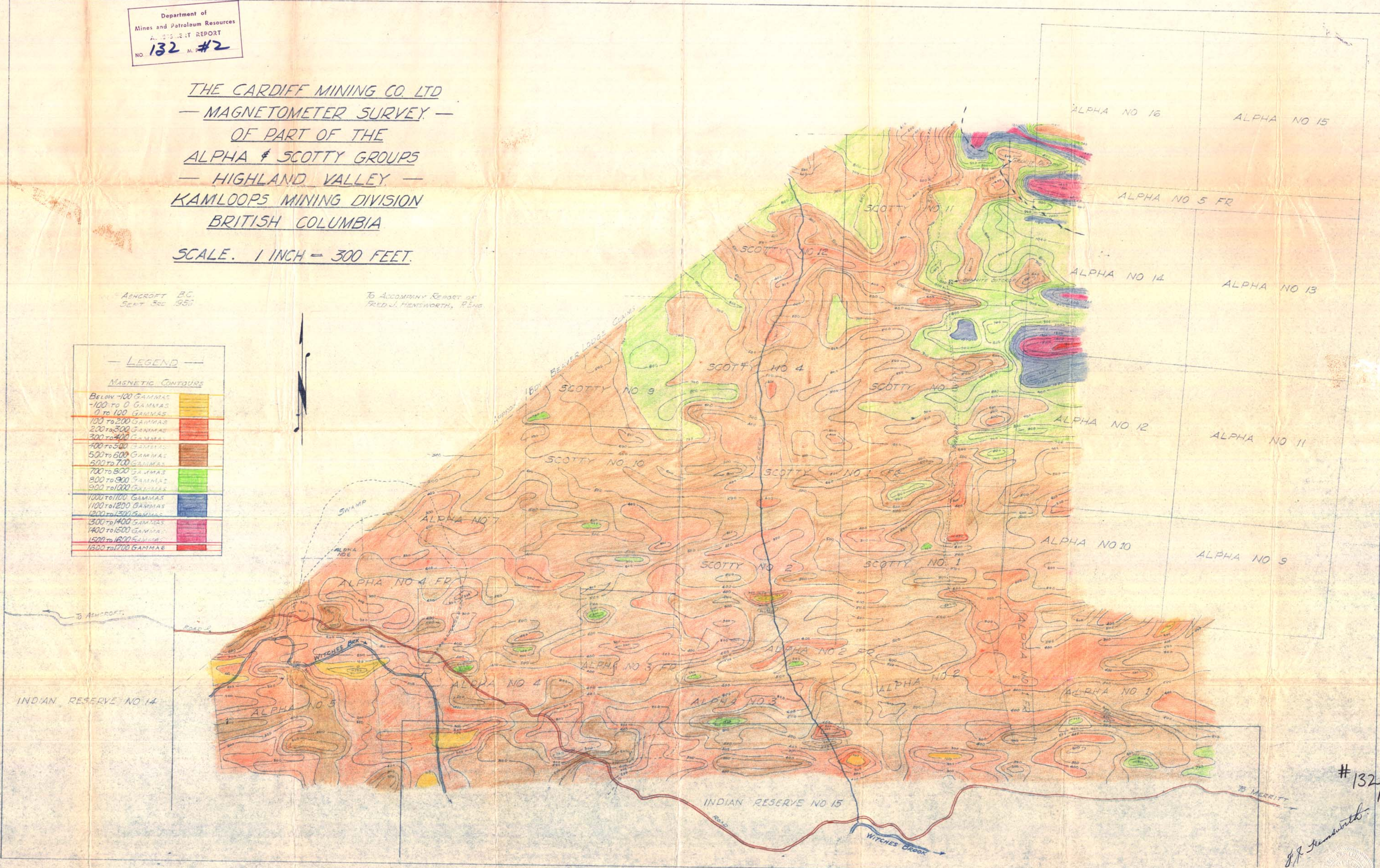
AIRCROFT B.C.  
SEPT 3RD 1950

TO ACCOMPANY REPORT OF  
FRED J. HENSWORTH, P.ENG.

— LEGEND —

MAGNETIC CONTOURS

Below -100 GAMMAS	Yellow
-100 to 0 GAMMAS	Light Yellow
0 to 100 GAMMAS	Orange
100 to 200 GAMMAS	Red-Orange
200 to 300 GAMMAS	Red
300 to 400 GAMMAS	Orange-Red
400 to 500 GAMMAS	Orange
500 to 600 GAMMAS	Light Orange
600 to 700 GAMMAS	Yellow-Orange
700 to 800 GAMMAS	Yellow
800 to 900 GAMMAS	Light Green
900 to 1000 GAMMAS	Green
1000 to 1100 GAMMAS	Light Blue
1100 to 1200 GAMMAS	Blue
1200 to 1300 GAMMAS	Dark Blue
1300 to 1400 GAMMAS	Dark Blue-Black
1400 to 1500 GAMMAS	Black
1500 to 1600 GAMMAS	Black
1600 to 1700 GAMMAS	Black



#132  
MAP #2

*F.J. Hensworth*