The occurrence of magnetite in the Groundhog River area has been known for many years. Willet G. Miller first examined the deposits in 1902 for the Ontario Department of Mines. The area was mapped in 1924 by E. W. Todd and in 1937 by W. D. Harding, both of whom show the iron band on their maps.

Not until the development of efficient methods of concentrating low grade siliceous magnetites and the increasing popularity in steel making of the high-grade pellets produced from them in recent years, did the Groundhog River deposits become of economic importance.

Within the past year, by drilling and dip needle work, Kukatush Mining Corporation had indicated a large extent of magnetite-bearing material. It was then considered that more exact vertical magnetic data would be of assistance both in prospecting for new occurrences and in helping to determine, with drilling information, the configuration and size of known magnetite deposits.

The following report discusses the magnetic survey of the Radio Hill Group and the results obtained from it.

PROPERTY, LOCATION, ACCESS

The portion of the Radio Hill Group surveyed consists of 90 unpatented claims as follows:

S 107967 to 107992 inclusive
S 107996 to 108024 "
S 109497 to 109509 "

S 109674 to 109689 inclusive
S 109717 to 109718 "
S 109731 to 109734 "

These are located in the northwestern portion of Penhorwood Township, Ontario stretching in a block about one and one-half miles in width extending eastward from the west boundary of the township for about five miles. The magnetite zones lie within two miles north of the main line of the Canadian National Railway at the station of Kukatush.

Timmins, the nearest large town, lies about forty-five miles to the northeast and is connected to the property by highway 101, an excellent asphalt and gravel highway and six miles of good all-weather gravel road belonging to the Spruce Falls Pulp and Paper Company Limited.

SURVEY PROCEDURE

Magnetometer work consisted of semi-reconnaissance magnetic prospecting on north-south lines spaced at 500-foot intervals.

Significant anomaly zones indicated by the reconnaissance were then covered in detail on 100-foot lines with magnetic readings at 50-foot intervals.

A Sharpe Model A3 magnetometer was employed in this work as it is particularly well adapted for use in areas of iron formation, having a range of over 150,000 gammas.

Readings were converted to gammas and plotted at a scale of 200 feet to the inch for the reconnaissance work on

three sheets numbered from west to east R200-1, R200-2, R200-3. Detail work on anomaly zones was plotted at 100 feet to the inch on two sheets R100-1 and R100-2. Profiles at a scale of 10,000 gammas to the inch were drawn in anomalous areas.

GEOLOGY

Iron formation in the Groundhog area occurs within a wide belt of volcanic rocks which extends in an east-west direction across Kenogaming, Penhorwood, Keith and Ivanhoe townships. Individual iron formation members range from a few feet to several hundred feet in width. The changes in width are probably due both to original differences in thickness during deposition and to folding and crumpling.

Rock exposures in the area are rare; only in claim S 107977 are the rocks exposed to any extent. Examination of the outcrops in this area showed that rhyolite and rhyolite breccia predominate in the immediate vicinity of the iron band with some talc-carbonate schist and, to the north, black graphitic schist. A much greater variety of rocks has been found in drilling including chlorite and hornblende schists, diorite, graphitic slate et cetera.

The "iron formation" of the area is not a definite uniform rock type. Banded siliceous magnetite is the most abundant and most important constituent but there are also occurrences of massive magnetite and magnetite breccia with pyrite and a little chalcopyrite which indicate the introduction of magnetite or the reworking of the original banded magnetite.

The situation is further complicated by the occurrence of banded cherty carbonates in which the siderite weathers to reddish-brown oxide and gives the appearance of a banded siliceous hematite iron formation. This material, of course, is magnetically inert and not detected by magnetic methods unless some magnetite also occurs in it.

To the north of the true iron formation lies barren banded cherty quartz which superficially resembles the iron formation but contains no magnetite. One or two small outcrops of this material contained a few narrow magnetite bands and there are probably gradations between this material and the real magnetite formation which contains 30% magnetite or more.

As the banded magnetite is in sharp contact with massive rhyolite on the south, it is to be expected, if this condition persists, that the south contact will be more definitely indicated by the magnetic results than the north contact. The profiles on sheet R100-2 would seem to confirm this assumption and according to Mr. H. S. Gerson, drilling along the north contact has encountered some magnetite not specifically indicated by the magnetic results.

As a result of observations in this outcrop area and experience with similar banded magnetites in other areas, interpreted contacts were drawn which are intended to represent the boundaries of magnetite mineralization of economic significance. No doubt occasional narrow bands and low-grade material will be found outside these boundaries. The iron carbonates, of course, cannot be indicated.

RESULTS OF THE GEOMAGNETIC SURVEY

As shown on sheets R200-1 and R200-2, R100-1 and R100-2, anomalies indicative of magnetite of economic significance occur in an area some 6,500 feet long and some 2,000 feet wide in claims S 107978, 107979, 108002, 107980, 108003, 107985, 107986, 108004 and 107987.

Within this general area, two major anomaly zones are present. These appear to converge at the eastern end of the area forming a large and irregular "fishhook" with the shank lying to the south and trending N70°W. The two zones are obviously limbs of an isoclinal fold structure dipping to the north. The magnetic data in the axial area between the two limbs suggest that the structure is probably a syncline plunging to the northwest. The "nose" of the fold appears to have been much crumpled and deformed by complicated minor cross-folding.

The South Zone consists of two anomalies separated by a north-trending hiatus about 200 feet wide along lines 9W and 10W (Sheet R100-2). The zone extends from 24E to 20W, a strike length of 4,400 feet and ranges in width from about 100 feet to a maximum of 500 feet. Between line 20E and 7W the width of the zone is relatively uniform ranging from 200 to 500 feet.

The North Zone is a good deal more irregular than the south zone consisting of one major anomaly and seven smaller anomalies. The zone trends about N70°E between lines 49E and 8E, where it terminates rather abruptly, a total distance of

4,100 feet. It should be remembered that the interpreted contact of the magnetite zones was rather arbitrarily defined. There could therefore prove to be low-grade material (magnetic or sideritic) between some of the zones shown which it might be found profitable to extract.

The major individual anomaly in this zone extends from line 37E to line 8E a length of 3,300 feet. Like the South Zone it is divided, or almost divided, by a north-trending hiatus along line 25E. Widths range up to 700 feet and there is apparently a greater potential tonnage in this zone than in the South Zone.

The small satellite zones off the eastern end of the major anomaly and along the northern margin are too small to be individually important. It may be possible to include them in a large tonnage open-pit operation however, especially if, as suggested above, low-grade material is found between them.

CONCLUSIONS AND RECOMMENDATIONS

Detailed magnetic surveying of the Radio Hill Group has defined the extent and configuration of the magnetite zones already known to occur on the property. These are shown to occur in a folded structure with the shape, roughly, of a fish-hook with the shank lying to the south. It is suggested that the fold is isoclinal with the limbs both dipping to the north and that it may be a syncline plunging to the northwest.

As much detailed drilling has already been done, no specific recommendations are made for further investigation

of the magnetic results.

Where two or more holes have been drilled in section and the dip of contacts thus determined, it should be possible to arrive at quite an exact location for the contacts. Using this information, the detailed magnetic data should be most useful in estimating tonnage.

Respectfully submitted,

Low and Morrow

Consulting Geologists

John H. Low, Ph.D., P.Eng.

Toronto, Ontario
November 6, 1959

APPENDIX

Property: Portion of the property of:

Kukatush Mining Corporation Limited
80 Richmond Street West
Toronto, Ontario

consisting of 90 unsurveyed claims as follows:

S 107967 to 107992 inclusive
S 107996 to 108024 "
S 109497 to 109509 "
S 109674 to 109689 "
S 109717 to 109718 "
S 109731 to 109736 "

located in Penhorwood Township, Sudbury Mining District, Ontario

Miles of line: ~~126.7~~ 99.6

Number of magnetometer observations: 7,063

Instrument: Sharpe A3 magnetometer - Scale constant is a laboratory calibrated curve peculiar to each instrument.

Man-days:

Line-cutting and chaining:

Edgar Anglehart, Timmins, Ontario
Jacques Touzin, Timmins, Ontario
Ronald Hart, Timmins, Ontario
Robert Bergeron, Timmins, Ontario
Claude Berger, Timmins, Ontario

June 8 to September 5, 1959 5 x 90 = 450

Magnetometer survey and minor geological work:

R. A. Watt, Toronto, Ontario
Dan Ibbitson, Restoule, Ontario
J. H. Low, Toronto, Ontario
Gilbert Legauffe, Timmins, Ontario

June 30 to September 5, 1959 4 x 68 = 272

Appendix (Continued)

Calculations, Map, Report et cetera:

J. H. Low, Toronto, Ontario
G. E. Low, Toronto, Ontario
F. Love, Toronto, Ontario

September 6 to November 6, 1959	3 x 60 =	180
Total		902

902 x 4 = 3,608

John H. Low

John H. Low, Ph.D., P.Eng.

I note that the dates worked, [illegible] added up to the total maximum allowed and also permits for 20 days per claim — however all other respects of report are satisfactory and it is duly signed.

[illegible signature]
July 25/63

SHEET R100-1

Geomagnetic Profile Map

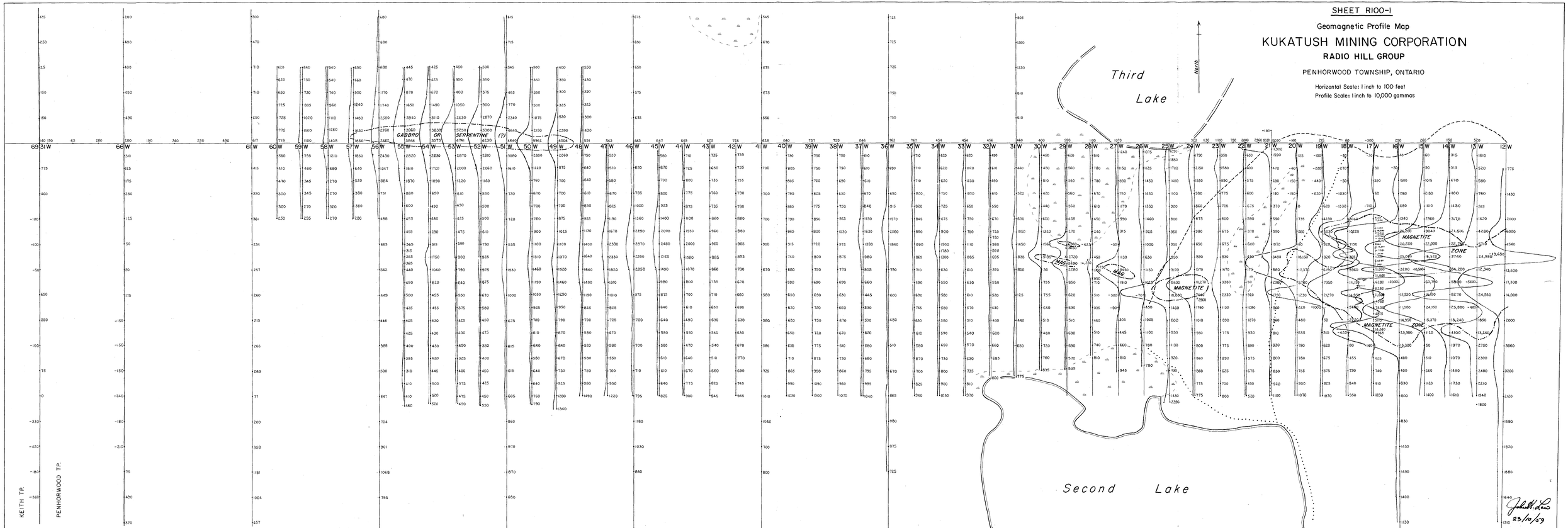
KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 100 feet

Profile Scale: 1 inch to 10,000 gammas



23/10/59

SHEET R100-2

Geomagnetic Profile Map

KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 100 feet
Profile Scale: 1 inch to 10,000 gammas

John H. Low
23/10/59

SHEET R200-1

Geomagnetic Profile Map

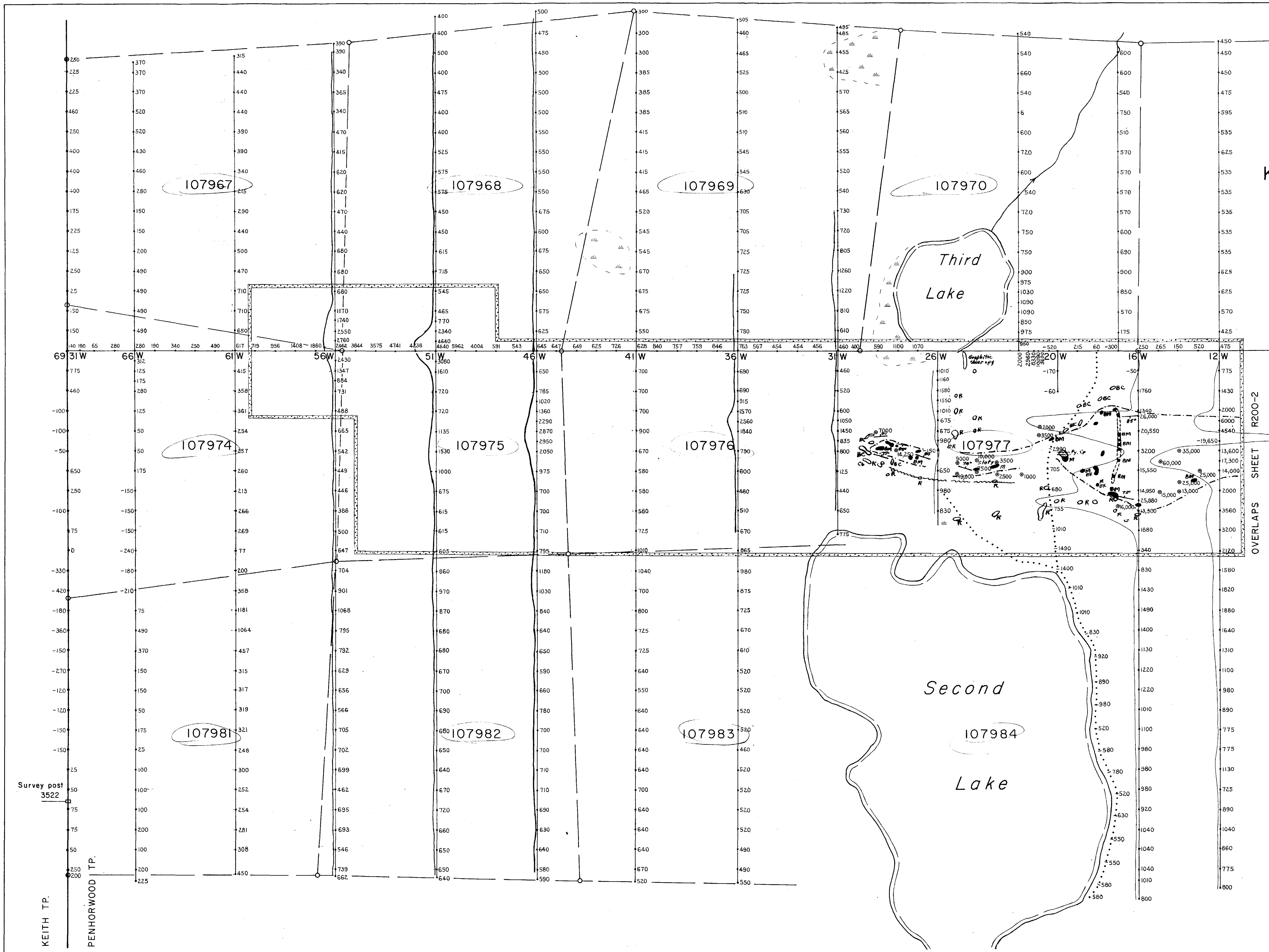
KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 200 feet
Profile Scale: 1 inch to 10,000 gammas

Only portions of profiles possibly indicative of magnetite shown

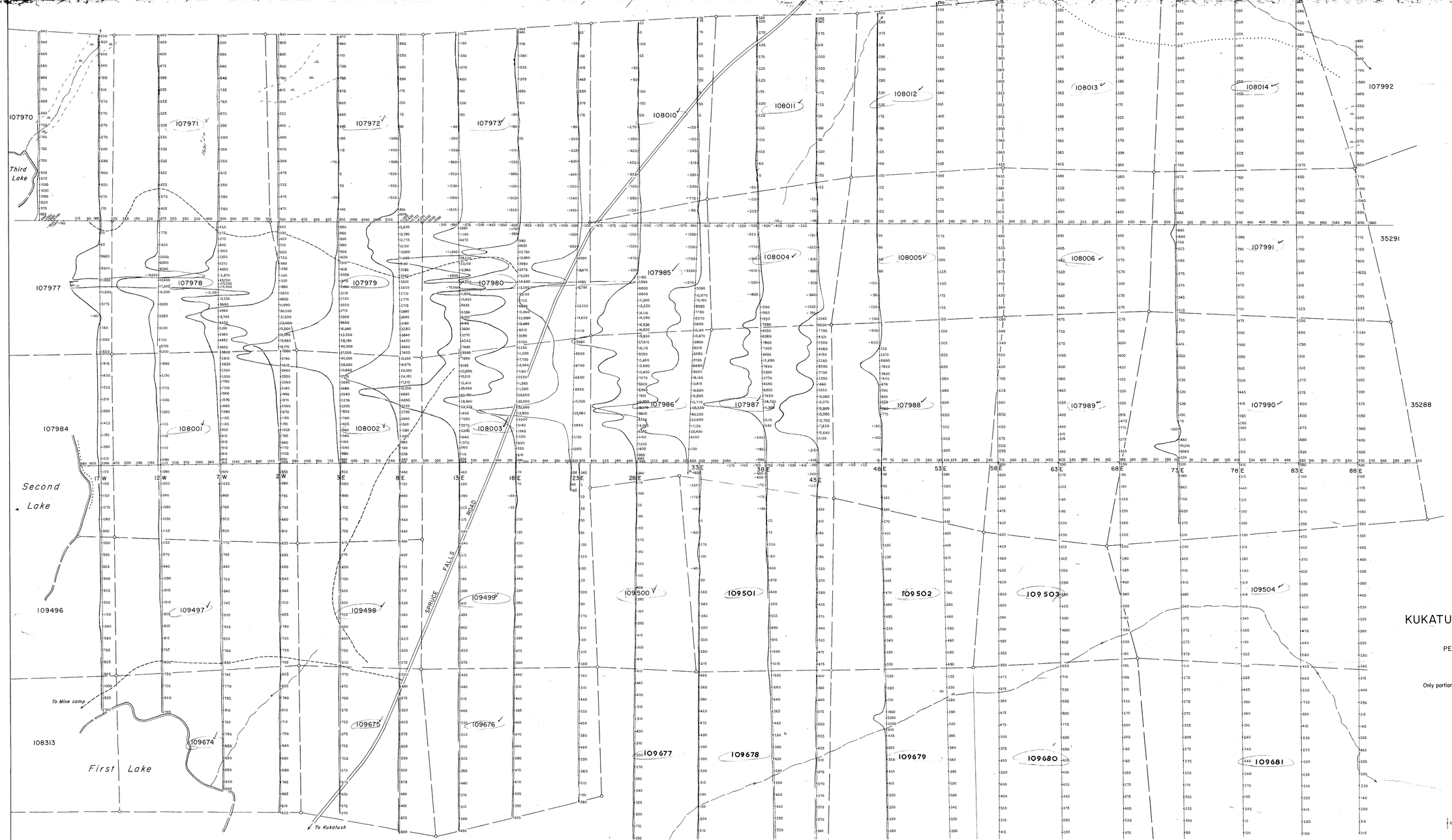


LEGEND

- 10,240 Magnetometer station, reading in gammas
- 6750 / 4760 Magnetic profile
- 85° Strike and dip of banding
- Rock outcrop
- Outcrop, magnetite
- Approximate boundary of magnetite
- Shear
- BC Banded chert
- BM ~~Massive~~ magnetite rock
- R Rhyolite
- Cb Carbonate
- Py Pyrite
- Cp Chalcopyrite
- Bx Breccia

John H. Law
23/10/59

220



SHEET R200-2

Geomagnetic Profile Map

KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 200 feet
Profile Scale: 1 inch to 10,000 gammas

Only portions of profiles possibly indicative of magnetite shown

North

LEGEND

10,240 *Picket line, magnetometer station, reading in gammas*

SHEET R200-3

Geomagnetic Profile Map

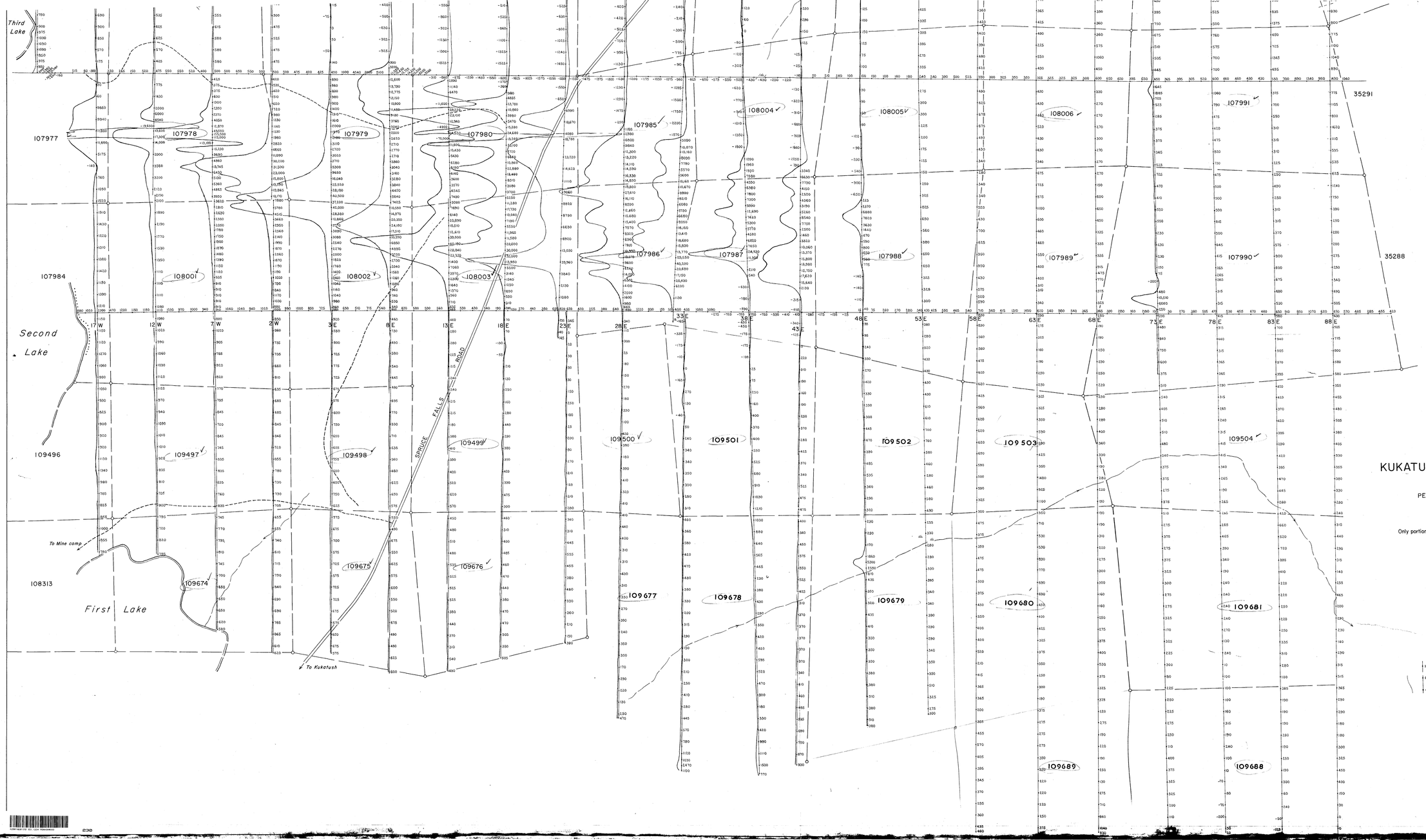
KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 200 feet
Profile Scale: 1 inch to 10,000 gammas

Only portions of profiles possibly indicative of magnetite shown



SHEET R200-2

Geomagnetic Profile Map

KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 200 feet

Profile Scale: 1 inch to 10,000 gammas

Only portions of profiles possibly indicative of magnetite shown

North

LEGEND

10,240 *Picket line, magnetometer station, reading in gammas*

6750 / 4760 *Magnetic profile*

John A. Lees
23/10/59

SHEET R200-3

Geomagnetic Profile Map

KUKATUSH MINING CORPORATION

RADIO HILL GROUP

PENHORWOOD TOWNSHIP, ONTARIO

Horizontal Scale: 1 inch to 200 feet
Profile Scale: 1 inch to 10,000 gammas

Only portions of profiles possibly indicative of magnetite shown

North

LEGEND

10,240 — Magnetometer station, reading in gammas

6750
4760 — Magnetic profile

Oct 23/1963