

I, MAURO G. BERRETTA, do hereby certify that I have the following qualifications:

006725

ACADEMIC

- 1964 - B.Sc. (Physics) - University of Windsor
- 1965 - M.Sc. (Physics) - University of Windsor
- 1967-69 - Ph.D. Studies (Geophysics) - U.B.C.

PROFESSIONAL and RELATED EXPERIENCE

- 1963-64 - oceanography and marine geophysics research with Great Lakes Institute, University of Toronto
- 1968-69 - lecturer in exploration geophysics (GP400, GP402) with Dept. of Geophysics, U.B.C.
- 1970 - present - Instructor in mining and petroleum geophysics with B.C. Institute of Technology
- 1968 - present - geophysical exploration as an employee, consultant, joint-venture partner with numerous mining companies in B.C., Yukon and U.S.A.
  - experience in all phases of geophysics (i.p., mag, e.m., seismic, gravity) with special concentration on i.p. and e.m. methods (in excess of 500 survey miles)

PROFESSIONAL ASSOCIATIONS

Active Member in British Columbia Geophysical Society 1974-75, President, British Columbia Geophysical Society.



Mauro G. Berretta

LIST OF MEN EMPLOYED FOR THE I.P. SURVEY ON THE WON CLAIM GROUP JULY 10-20, 1976.

1. Doug MacQuarrie  
1862 Westover  
North Vancouver, B.C.
2. Alex Driver  
Whitehorse, Y.T.
3. Alan Watson  
c/o Berretta  
21141 - 117 Avenue  
Maple Ridge, B.C.
4. Howard Moskaluk  
803 Ryan Road  
Richmond, B.C.
5. Werner Breuer  
#306-122 E 17th  
North Vancouver, B.C.

Mauro G. Berretta, B.Sc., M.Sc.

CONSULTING GEOPHYSICIST

21141 - 117TH AVE.  
MAPLE RIDGE, B.C. CANADASUMMARY

An induced polarization survey over part of the WON Claims Group, Minto, Y.T., has outlined the presence of a possible 'pyrite halo' situation with the central region displaying a pfe response indicative of sulphide mineralization of up to 3% by volume. A second region of lower, but possibly anomalous, pfe response has been detected in an area where intrusive rock may be either exposed at bedrock surface, or overlain by shallow volcanic cover. Additional induced polarization is recommended in these areas in order to improve a presently incomplete interpretation. Several strong anomalies have also been outlined, and these are thought to be due to chlorite and sulphide mineralization in unknown relative proportions. The resistivity and pfe behaviour with depth, make two of these anomalies possible drill targets.

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## 1. INTRODUCTION

During the period from September 22 to October 7, 1975, an induced polarization survey was carried out on the WON property, Yukon Territory, on behalf of Kerr Addison Mines Ltd.

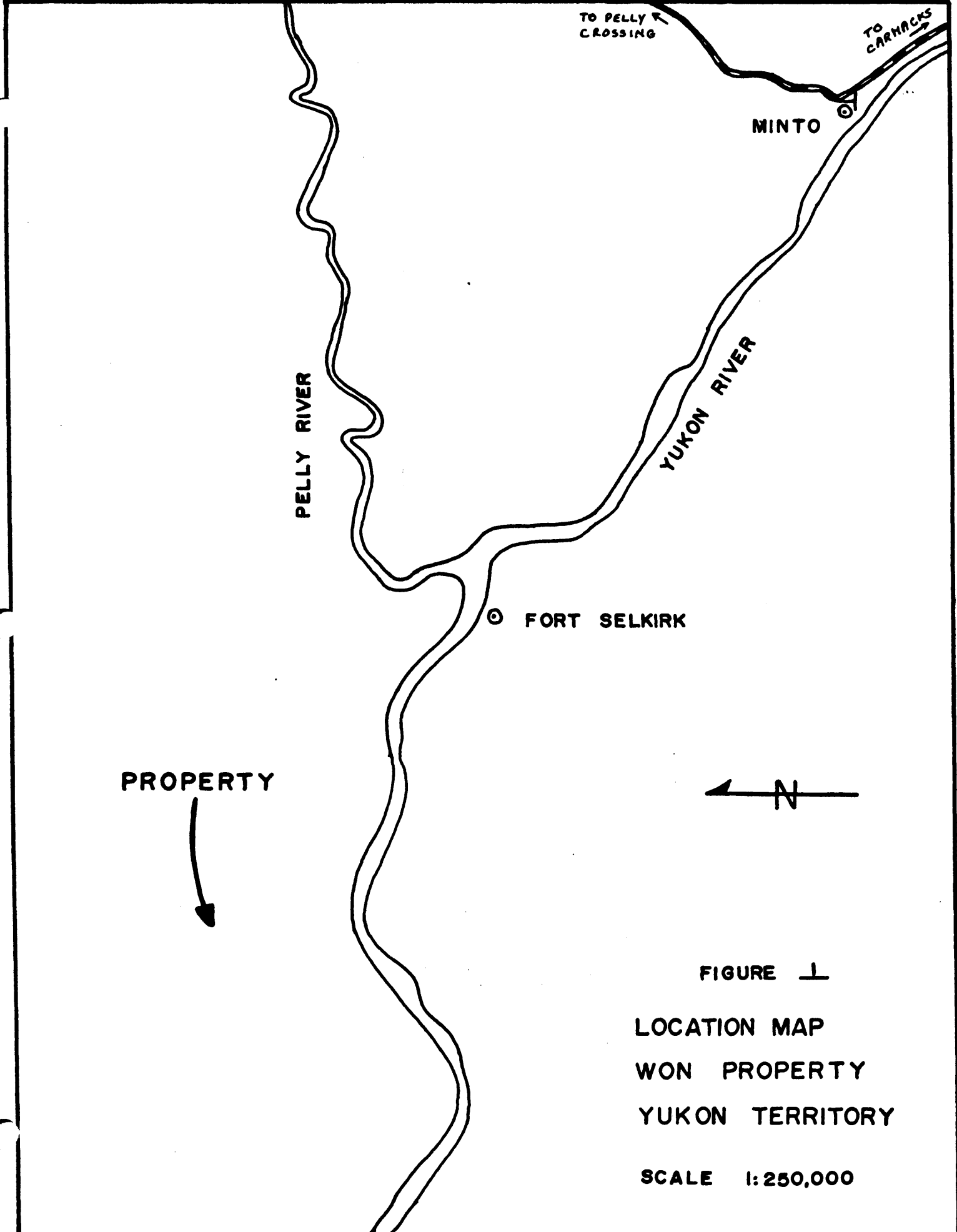
The property is located at an elevation of about 2500', some 30 miles north-west of Minto, Y.T., and is accessible via helicopter from either Minto or Fort Selkirk. (Figure 1).

The field work was carried out by Douglas MacQuarrie, geologist/geophysicist, under the direction of Mauro G. Berretta, geophysicist.

A 450 watt frequency domain i.p. system was employed, using a dipole-dipole array with  $a=400'$ ,  $n=2$  and  $n=3$  (for part of the survey), and a frequency span of 0.3-10 Hz. These parameters give effective depths of penetration of about 400' and 600' respectively. A total of 21.0 line miles of profile length was obtained over six survey lines 800' apart, and with a station interval of 200'. (Figure 2).

## 2. GEOLOGY

Due to extensive overburden cover, very little is known about the geology of the WON claims group. From the very sparse outcrop exposures, it appears that the property is underlain primarily by volcanics that may in turn overlies an intrusive body (or bodies). As a result, the volcanics have been metamorphosed, with chlorite



PROPERTY



TO PELLY R. CROSSING

TO CARNAKS

MINTO

PELLY RIVER

YUKON RIVER

FORT SELKIRK

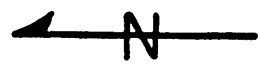


FIGURE 1

LOCATION MAP  
WON PROPERTY  
YUKON TERRITORY

SCALE 1:250,000

and pyrite as the major alteration products. The volcanics also display varying degrees of schistosity. Several diamond drill holes on the property have revealed the presence of sulphides (mostly pyrite) in both volcanic and intrusive rocks, with some copper in intrusive rocks.

It was the intent of the induced polarization survey to locate anomalous i.p. responses within or near to an intrusive rock which may either be overlain by a volcanic cover, or be exposed at bedrock surface beneath the overburden.

### 3. INDUCED POLARIZATION RESULTS and INTERPRETATION

#### RESISTIVITY

The resistivity data (Figure 3) indicates the presence of various resistivity horizons. Within a general background in the range of 200-600 ohm-metres, are a series of pronounced resistivity highs and lows. The most striking high is an east-west trending feature, on and south of BL1, which is about 800' wide and open to the east and west. This may be representative of an intrusive dyke. However, the presence of deeper overburden and extensive permafrost in this area may be responsible for the high. A second resistivity high, found on lines 32W and 24W, strikes roughly northwest and is about 1000' by 4000'. This also may be indicative of intrusive rock such as a dyke, or a small plug, or a window of intrusive exposed at or close to bedrock surface. A third resistivity high is found at about 45S on line 00. Lack of data to the east makes it difficult

to speculate on the geometry of the cause which, nevertheless is most likely intrusive rock.

Four large resistivity lows (less than 200 ohm-metres) occur on the property. The first, found on the extreme north end of the survey area, is open to the east, west and north. The second, at about 24S, strikes roughly east-west, and is about 800' by 3500'. The third is an arcuate feature centred at about 44S on line 16W. The last is a narrow belt 800' wide, which strikes roughly northwest, and which is located in the southwest part of the survey. It is thought that these resistivity lows are representative of highly schistose volcanics and/or zones of fracturing and faulting associated with intrusive contacts at depth. The possible presence of argillites and carbonaceous rock units however, should be kept in mind in view of their mapped presence, although somewhat removed from the survey area.

The remainder of the data displays resistivities in the range of 200-600 ohm-metres. These may represent either more competent volcanic rocks, or a somewhat altered and fractured intrusive rock.

#### PERCENT FREQUENCY EFFECT

The pfe data is shown in Figure 5. Values range from 1% to more than 50%. Such wide distribution could be due to two factors. One is the apparent presence of more than one rock type. The other is the pervasive occurrence of any one or more of the polarizable minerals such as the metallic sulphides, chlorite, sericite, magnetite and graphite.

There are several anomalous regions present. Two that were not completely defined occur at about 16N on line 00, and from 60N to 80N on line 40W. Both are coincident with resistivity lows (Figures 5 and 6). A proper interpretation of these necessitates obtaining further data to the east and west respectively.

A total of five extremely pronounced anomalies were located by the survey. The first at about 20N on lines 00, 08W, 16W; the second at about 44S on line 16W; the third at 58S on lines 08W, and 16W; the fourth at 72S on lines 00, and 08W; and the fifth at about 90S on lines 08W and 16W. Except for anomaly three, which is in a region of medium resistivity (200-600 ohm-metres), all of these occur coincident with resistivity lows (less than 200 ohm metres), (Figures 5 and 6). The amplitudes of all five anomalies are in the range of 40%-50%, within a background of about 20%. If entirely due to sulphides, these could be indicative of contents of up to 10% by volume (within the anomalies), and of up to 4% (within the high background). The presence of non-metallic, polarizable minerals such as chlorite and sericite would of course decrease the above content estimates.

Deep sounding (n=3) data over these regions (Figure 6), indicates that for anomalies two to four inclusive, the response decreases with depth, to values of about 20%. This implies that for these anomalies, there is a decrease in the volume content of sulphides and/or other polarizable mineralization. The resistivities for n=3, for anomalies two to four are quite similar to the n=2 (Fig. 5) resistivities, indicating no major or obvious structural changes.

Deep  $n=3$  pfe data over anomaly one displays a shift to the south on lines 00 and 08W, and an increase with depth on lines 16W and 24W (Figure 6). The corresponding resistivities appear to decrease with depth, possibly due to increased fracturing.

Drill holes on and close to anomaly two have detected the presence of chloritized and pyritized volcanics. Although it may well be that anomalies one to five inclusive are caused by a similar environment, it is thought that anomalies one and three could be of economic interest. First of all, anomaly one displays pfe and resistivity behaviour with depth that is different from the others. Secondly, anomaly three occurs in a resistivity horizon different from the others. Finally, both anomalies are in close proximity to magnetic features.

The rest of the survey area displays pfe's in the medium to low range (less than 15%). A large low centred on BL1 coincides well with a pronounced resistivity high, which has been interpreted to be due to either an intrusive dyke or to substantial permafrost. The pfe's observed would be quite typical of either permafrost or barren acidic intrusive. The second region of lower pfe values is in the southwest part of the grid, and it also coincides well with a region of resistivity high. The i.p. response here (10-20%) is considered high for a barren intrusive (whose presence is indicated by the resistivity). Such response may be caused by a thin cover of chloritic and/or pyritic volcanics. On the other hand, it may be due to a sulphide content, of up to 3% by volume,

within intrusive rock close to or exposed at bedrock surface. Additional n=3 data over this region might eliminate one of these speculations.

Last, but probably most important, is a zone of lower pfe located at about 50S on line 00. Drilling in this area has indicated the presence of sulphide mineralization in intrusive rock. Thus the response here, in the range of 10% to 15% can be considered anomalous and representative of sulphide mineralization of up to 3% by volume. Moreover, n=3 data (Figure 6) indicates an increase in pfe with depth. Another important observation to be made here, is the semi-circular distribution of anomalies (one to five) that ring this region, thus giving it the classical pyrite halo appearance. (A less obvious halo might also be interpreted for the other pfe low region just discussed). Additional i.p. data to the east of line 00 is deemed essential.

#### 4. RECOMMENDATIONS

It is recommended that additional induced polarization be carried out on the following lines:

- a) lines 08E, 16E, 24E, from 0 to 30N, and from 0 to 64S, with n=2,3
- b) lines 40W, 56W, from 0 to 90S, with n=2,3
- c) lines 24W, 32W, from 40S to 90S, with n=3

Moreover, it is tentatively suggested that anomalies one and three be further explored by drilling in order to determine their

economic importance.

Respectfully submitted,

*Mauro G. Berretta*

Mauro G. Berretta  
Geophysicist

Maple Ridge, B.C.  
October 31, 1975

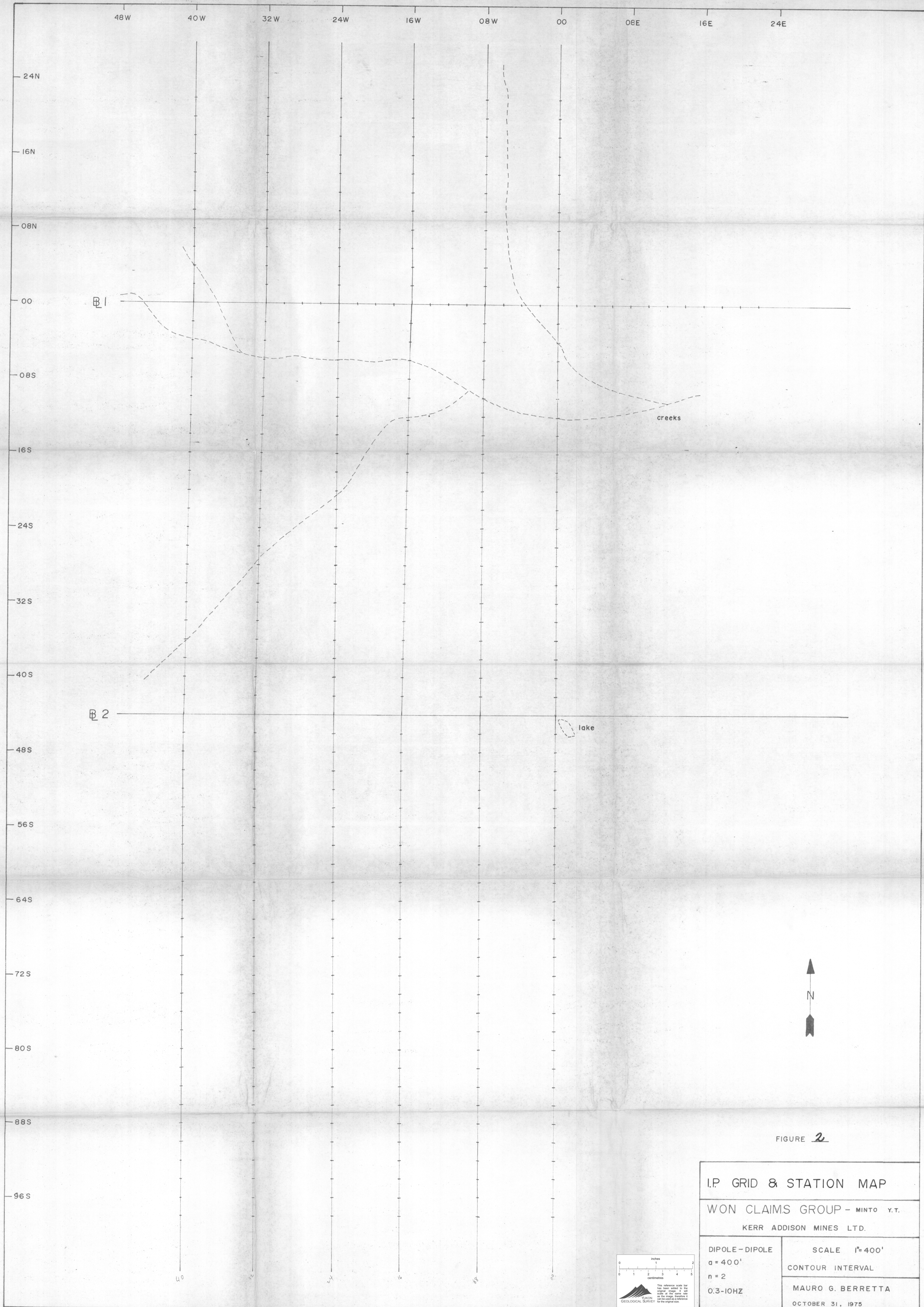
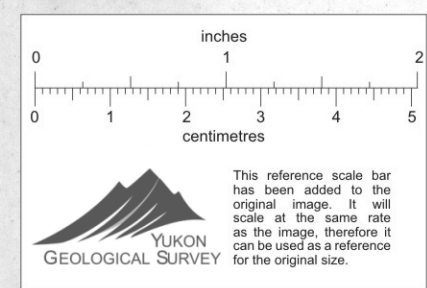


FIGURE 2

I.P. GRID & STATION MAP	
WON CLAIMS GROUP - MINTO Y.T.	
KERR ADDISON MINES LTD.	
DIPOLE-DIPOLE	SCALE 1"=400'
a = 400'	CONTOUR INTERVAL
n = 2	MAURO G. BERRETTA
0.3-10HZ	OCTOBER 31, 1975



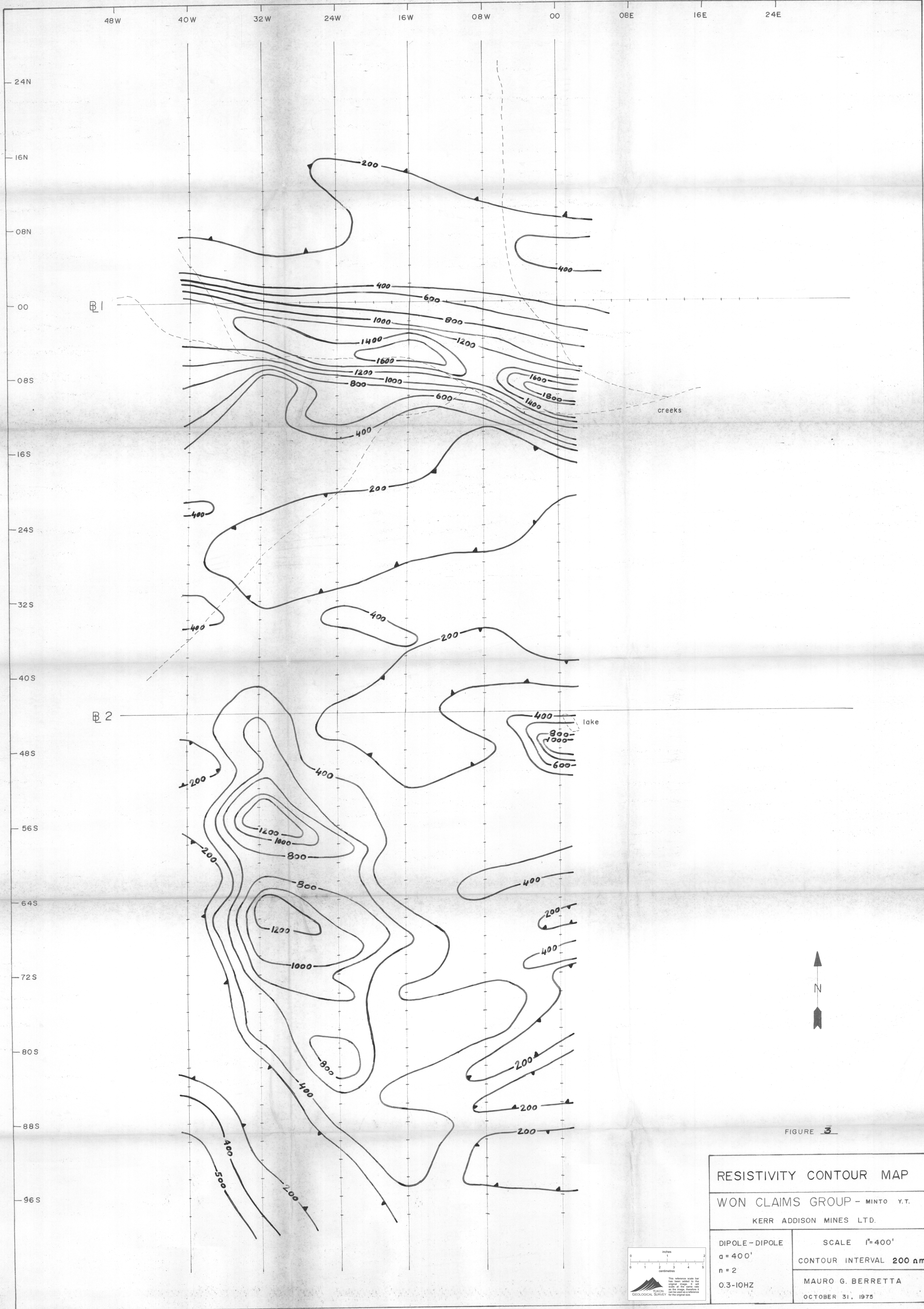
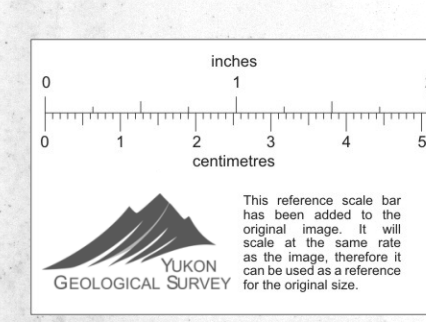


FIGURE 3

RESISTIVITY CONTOUR MAP	
WON CLAIMS GROUP - MINTO Y.T.	
KERR ADDISON MINES LTD.	
DIPOLE - DIPOLE	SCALE 1" = 400'
a = 400'	CONTOUR INTERVAL 200 $\Omega m$
n = 2	MAURO G. BERRETTA
0.3-10HZ	OCTOBER 31, 1975



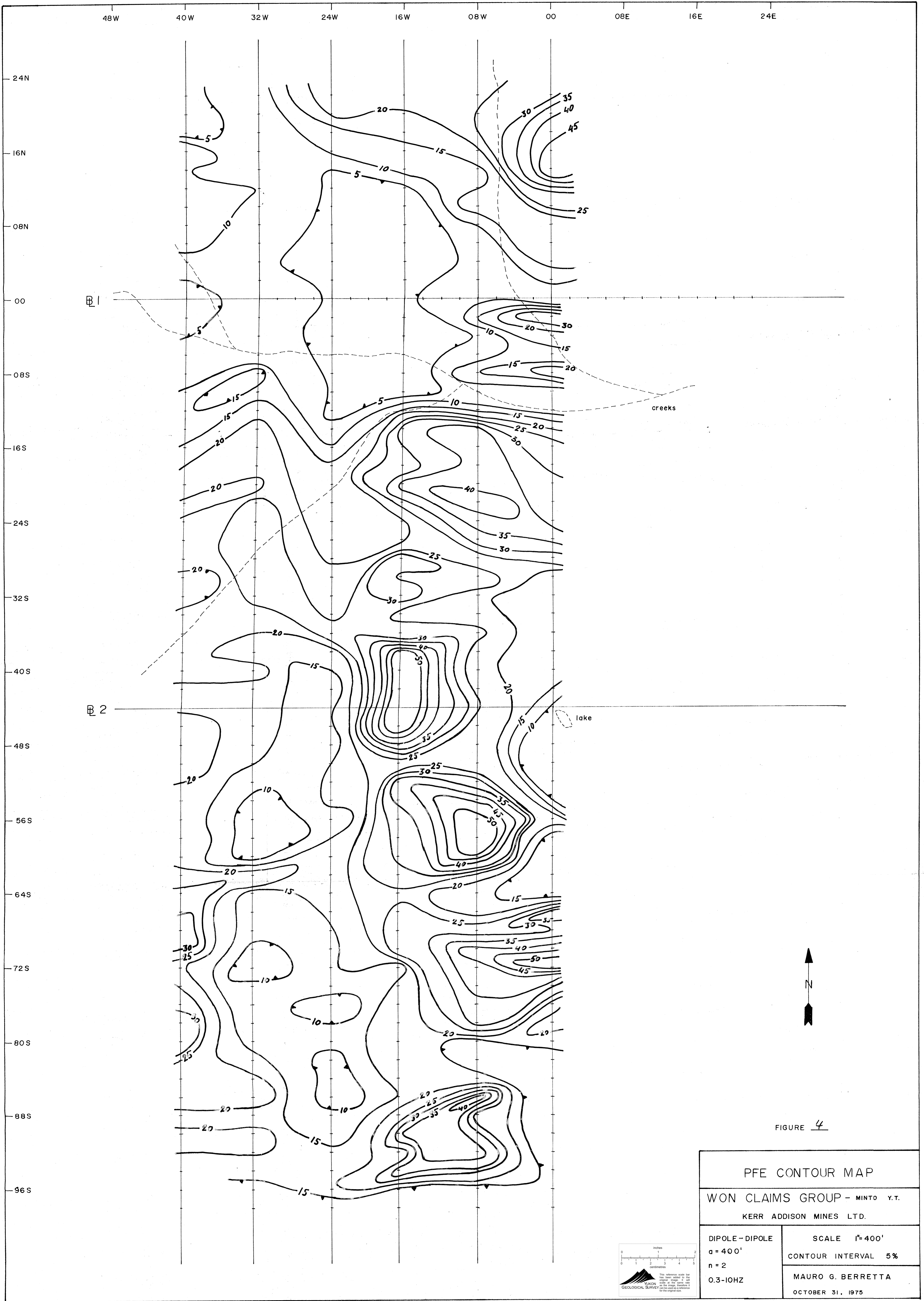
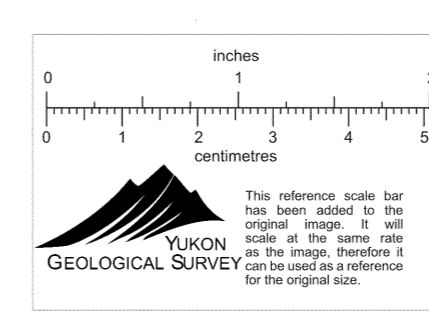
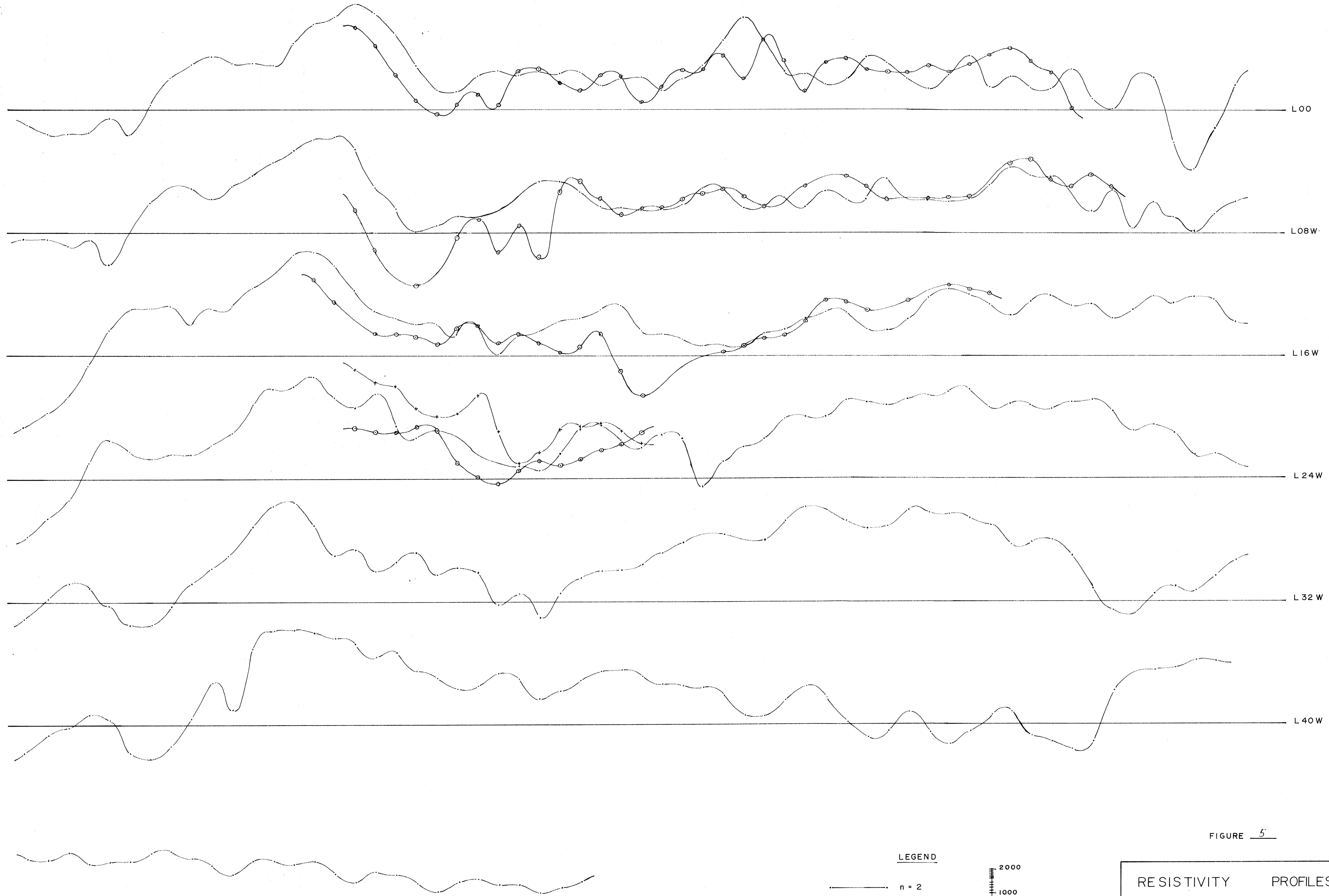


FIGURE 4

PFE CONTOUR MAP	
WON CLAIMS GROUP - MINTO Y.T.	
KERR ADDISON MINES LTD.	
DIPOLE-DIPOLE $a = 400'$ $n = 2$ 0.3-10HZ	SCALE $1" = 400'$ CONTOUR INTERVAL 5% MAURO G. BERRETTA OCTOBER 31, 1975



24N 16N 8N 00 8S 16S 24S 32S 40S 48S 56S 64S 72S 80S 88S 96S



LEGEND

- n = 2
- n = 3
- +—+— n = 1

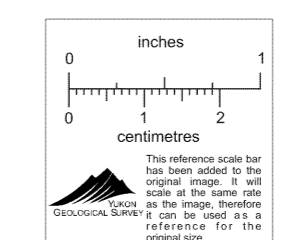
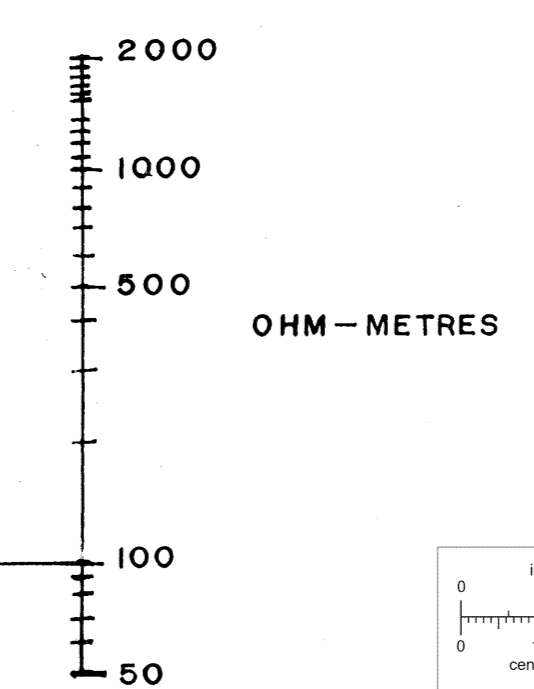


FIGURE 5

RESISTIVITY PROFILES

WON CLAIMS GROUP — MINTO Y.T.  
KERR ADDISON MINES LTD.

DIPOLE-DIPOLE  
a = 400'  
n = 1,2,3  
0.3 - 10 HZ

SCALE 1" = 400'

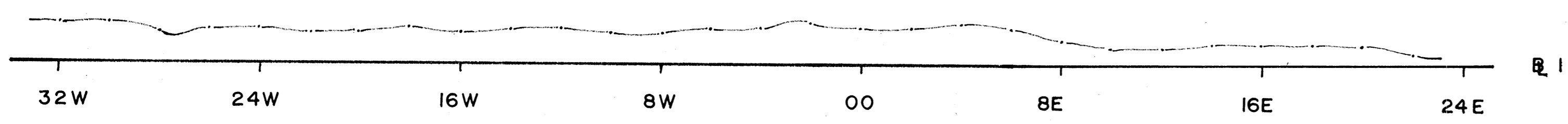
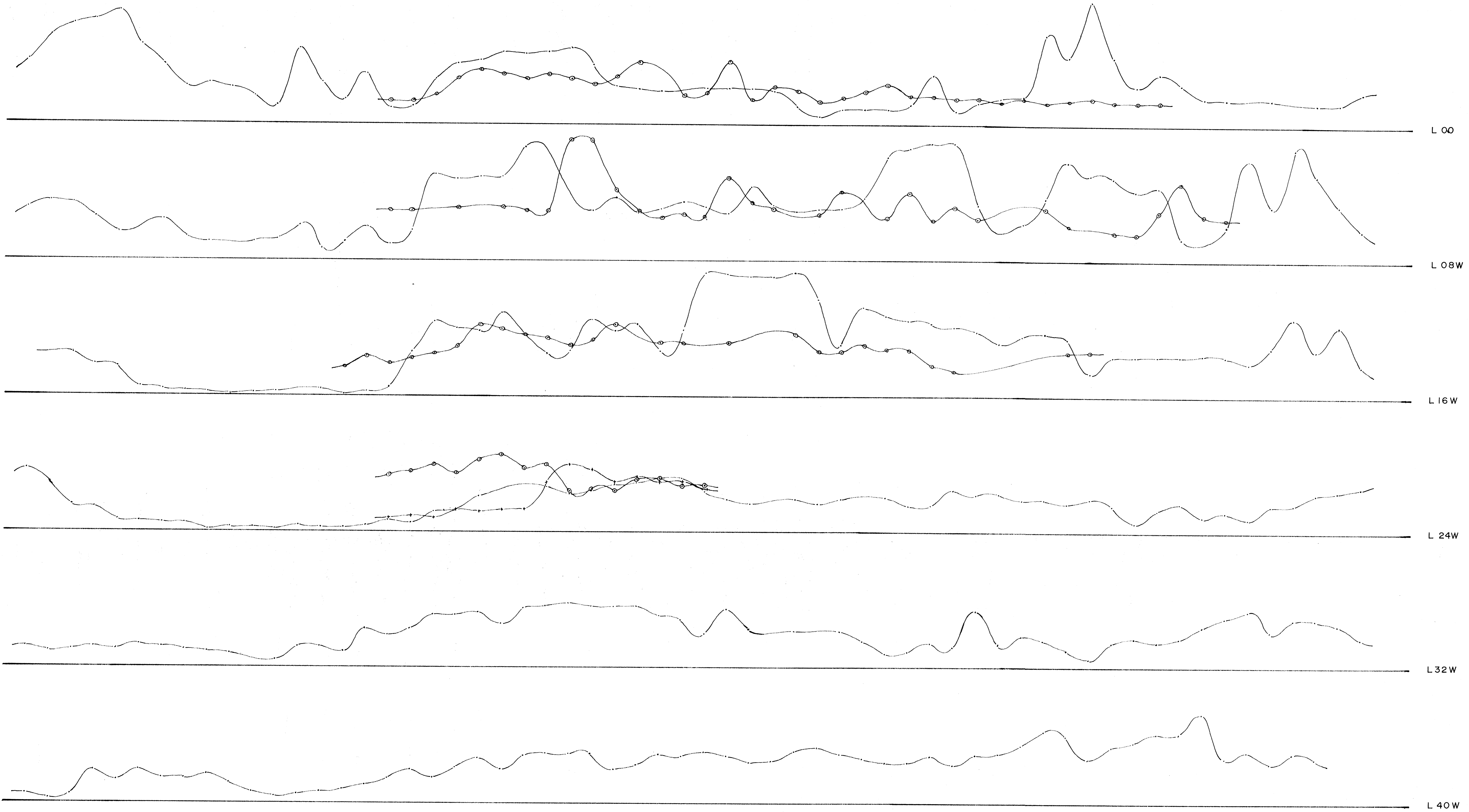
MAURO G. BERRETTA

OCTOBER 31, 1975

32W 24W 16W 8W 00 8E 16E 24E

R 1

24N 16N 8N 00 8S 16S 24S 32S 40S 48S 56S 64S 72S 80S 88S 96S



LEGEND

- n = 2
- n = 3
- +— n = 1

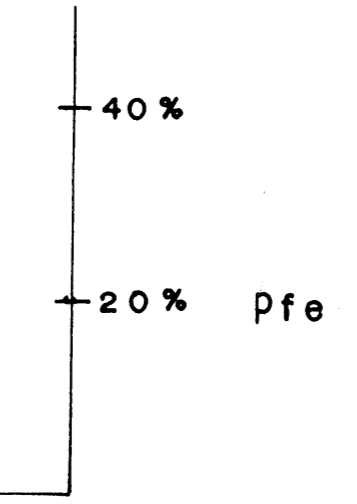
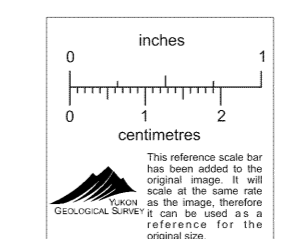
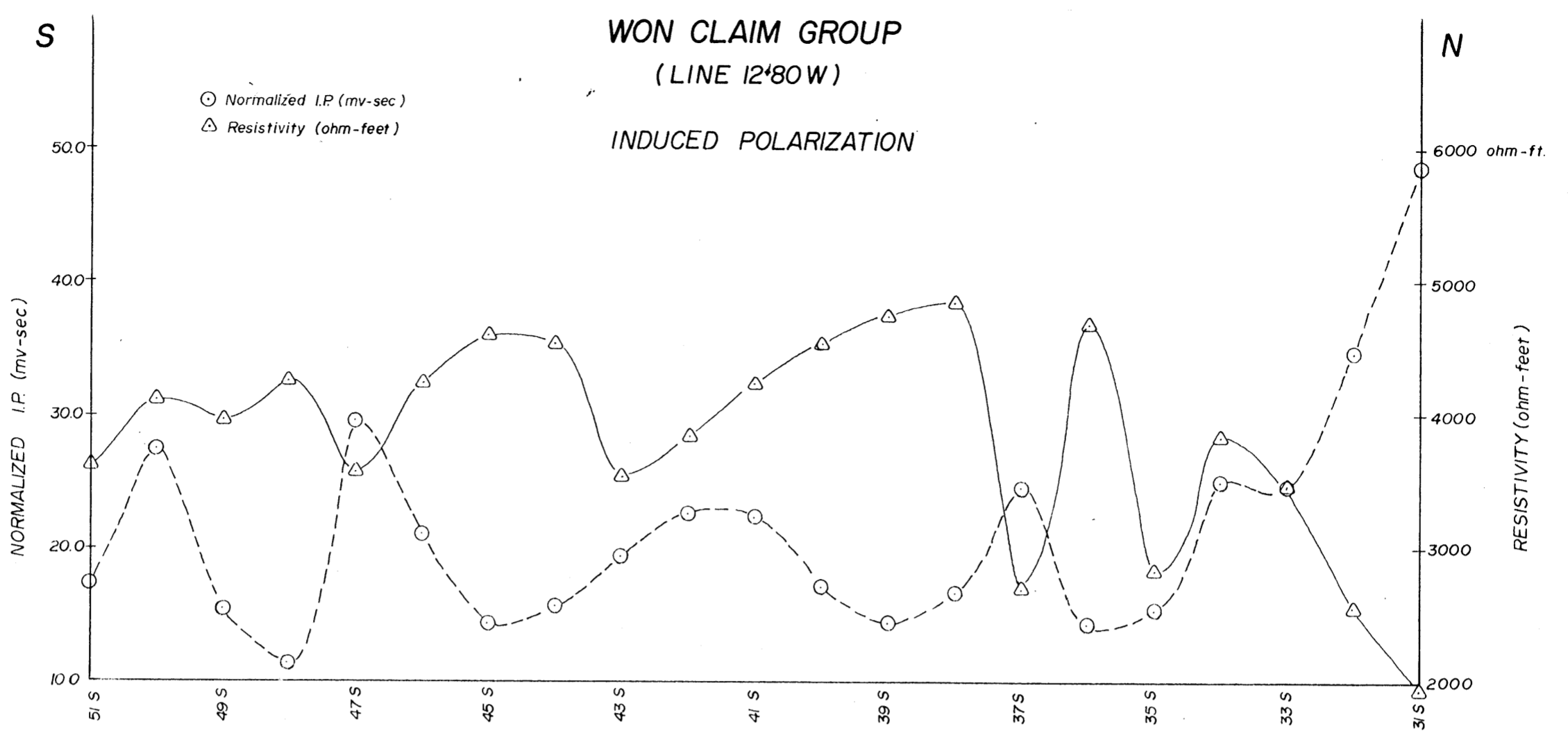


FIGURE 6



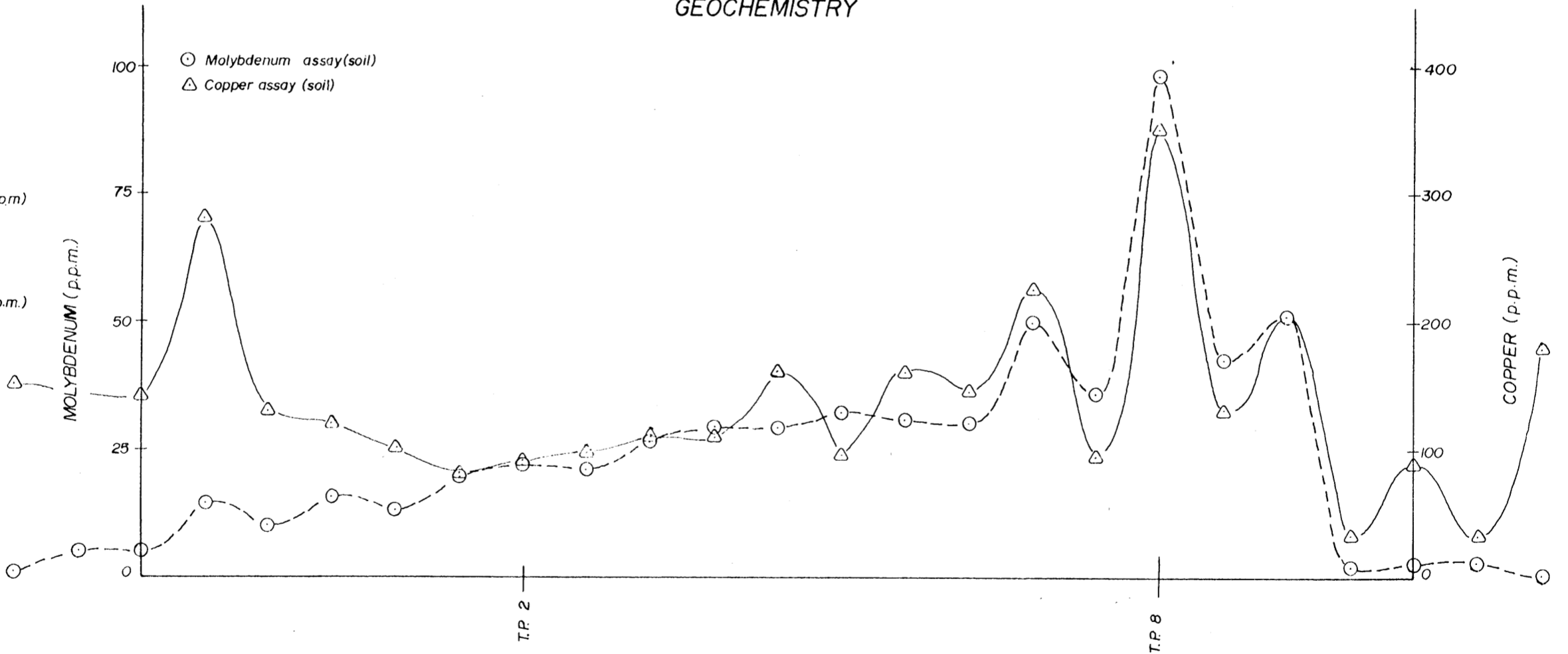
PFE PROFILES	
WON CLAIMS GROUP - MINTO Y.T.	
KERR ADDISON MINES LTD.	
DIPOLE - DIPOLE a = 400' n = 1,2,3 0.3-10HZ	SCALE 1" = 400'  MAURO G. BERRETTA OCTOBER 31, 1975

Van



INSTRUMENT:  
Portable Time Domain Unit  
ARRAY: WENNER  
"A" spacing = 200'

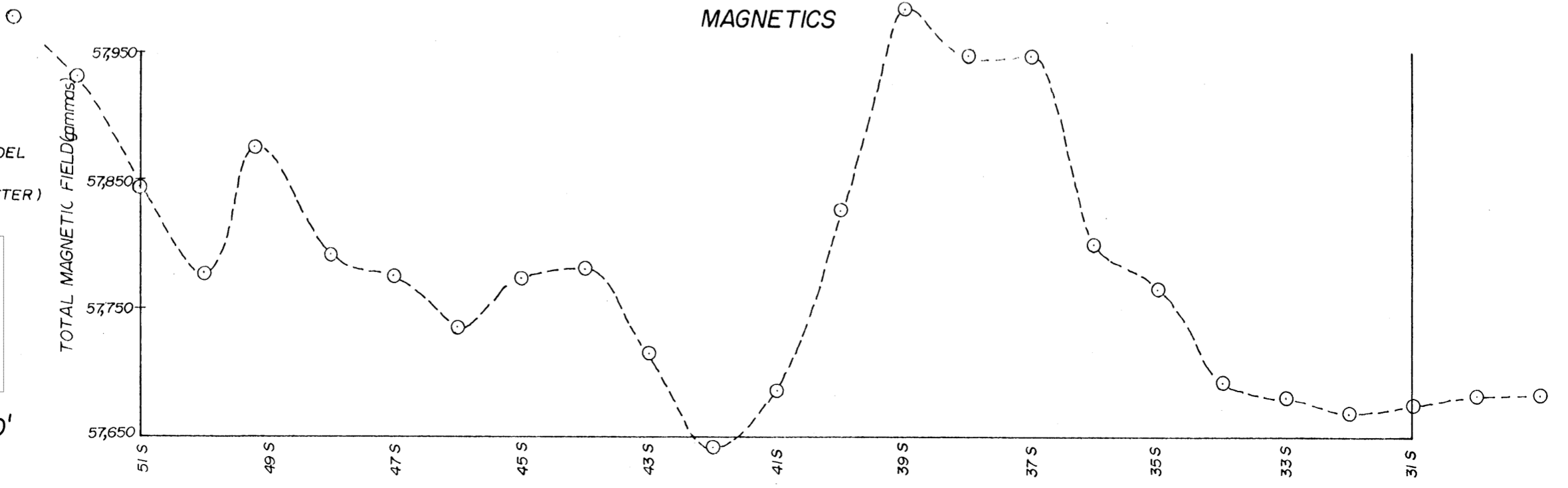
### GEOCHEMISTRY



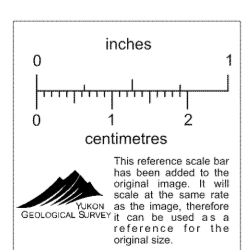
TEST PIT NO. 2  
Cu, Mo (p.p.m.)  
2-1 305, 74

TEST PIT NO. 8  
Cu, Mo (p.p.m.)  
8-1 47, 6  
8-2 200, 79  
8-3 440, 93  
8-4 430, 91  
8(R) 155, 22

### MAGNETICS



INSTRUMENT:  
GEOMETRICS MODEL  
G 816  
(PROTON MAGNETOMETER)



SCALE 1" = 200'

SEPT 10, 1974. *df*