

000 **LEAMAN GEOPHYSICS**

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REPORT ON TRIAL SURVEY  
PORTLAND MINE  
  
for  
PLACECO AUSTRALIA PTY LTD  
  
by  
Dr. D.E. Leaman

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## SUMMARY

A trial survey around the Portland Mine north of Gladstone in NE Tasmania using magnetic, self potential and resistivity methods has suggested that all three techniques respond to changes in lithology and perhaps quartz-related mineralisation. It is not yet clear how substantive the correlation may be.

The magnetic survey, supported by susceptibility measurements, has demonstrated that the Mathinna Beds host unit is slightly and variably magnetic. The variation is sufficient to map gross unit or structural changes. Spike anomalies appear to be related to localised iron oxide concentrations in the soil or upper weathered zone and perhaps reflect significant fracture circulation. A direct relationship between such zones and quartz venation is inferred. In the region immediately west of the mine there is an unambiguous correlation between magnetic spikes and quartz-bearing zones. Definition depends on high density observation coverage.

Self potential anomalies are small but tend to correlate with magnetically spiky zones suggesting an association with abrupt rock mass changes involving silica.

Magnetic and self potential results imply a northwest strike for structures and fracture systems (probably including quartz) and this may be contrasted against an apparent regional north-south trend for the host rocks.

Resistivity profiles are more ambiguous and the issues raised are unresolved. There is a broad inverse correlation with the magnetics enabling suggestions to be made concerning lithology. Sandy siltstones are less magnetic and more resistive than the dark mudstones. It is less certain whether the local induration of some fine sandstones about the mineralised veins has been resolved.

Further use of these methods is certainly justified - especially magnetics and self potential - on the basis of these trials, but only the magnetics is likely to prove a stand alone tool in this environment. The supporting value of self potential is evident but the value of resistivity or other electrical methods has yet to be established. It is conceivable that such methods may permit separation of indurated or altered rock volumes and allow some rating of vein systems which may be prove to be ubiquitous upon detailed magnetic survey.

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## INTRODUCTION

The Portland Mine is located 7 kilometres NE of Gladstone at approximately 588 800 mE, 5470 300 mN. It is situated in flat-lying country which has been partly developed for agriculture. The evidence of mining in the early part of this century and the latter part of the last century remains; several trenches, a tailings dump, several sand slurry piles, some timber frame foundations and, until recently, a shaft.

The mine was worked for gold. It appears that free gold in quartz was recovered but gold combined in sulphides (galena, sphalerite and arsenopyrite) was not. These minerals can be seen in quartz fragments.

Placeco Australia Pty Ltd is exploring the region around Gladstone and assessing its gold potential. The critical exploration problem for gold seekers in NE Tasmania is how to do this effectively. Geophysics has been little applied to this problem and structural understanding of the host rocks is made virtually impossible by their poor outcrop. Leaman (1974) trialled several methods on the Lefroy goldfield and showed that it was possible to trace vein systems with thermal and piezoelectric methods in some situations. Self potential methods also appeared useful but resistivity results were inconclusive. The overall results were encouraging but have never been tested with more extensive surveys either by explorers or researchers.

The absence of topographic, vegetation and cultural problems about the Portland Mine, and its ease of access, led to its selection for a geophysical test survey. The survey was organised with two objectives; to evaluate several methods and obtain either some indication of response from a mineralised locality or a structural outline. Success with the latter would mean that general structural evaluation might be possible irrespective of the exposure of the host rocks.

Simple, direct and inexpensive methods were chosen since there was little point in attempting sophisticated approaches in the absence of adequate tests of any methods. Self potential and resistivity methods had been shown previously to yield results (Leaman, 1974) but magnetics had not. This was ascribed to use of fluxgate rather than proton magnetometry. Magnetism was added to the programme in order to evaluate variations in Mathinna Beds and assess its value in airborne use.

A grid was laid out with a N-S base line and E-W grid lines in order to facilitate a soil sampling programme. Various lines were used for the geophysical tests but a large scale systematic coverage was not attempted. The grid and its relationship to the Portland Mine is shown in Figure 1.

## SURVEY RESULTS

## MAGNETICS

Observations were made with a proton magnetometer at 2.5 m intervals along the base line and lines 150, 200, 225, 250, 275, 300 and 350N. Loops were closed and adjusted. Since work was spread over several days diurnal ties and corrections were also made. The data, as presented in Table 1, is fully corrected for these factors. Observations were found reproducible within 2 nT.

Profiles for the lines, or part lines, observed are presented in Figures 2, 5, 8, 11, 13, 15, 17 and 19. These are summarised in Figure 22. The profiles illustrate several important features; the Mathinna Beds are not blandly non magnetic, there are both local and regional anomalies, and there are extremely spiky local responses. Profiles along the base line and 250N (Figures 2 and 13) show that there are features with wavelengths in excess of 150 m while line 350N (Figure 19) demonstrates features with a wavelength of 50 to 100m. All lines show isolated or grouped spike anomalies with wavelengths of 5 to 20 m and very high amplitude compared to the other features. The observational noise, or surface noise, envelope is about 3 nT wide and easily removed.

Profile 225N (Figure 11) is exceptional and some of the response can be directly related to iron objects near the old shaft. This is not the case elsewhere and even on this line most of the effect is geological.

The slightly subdued spikes on line 250N (at 108E in Figure 13) were tested by excavation. Susceptibility measurements showed that iron oxide concentrations at the base of the grey top soil horizon at about 200 mm were distinctly magnetic and could well account for part of the responses. No quartz was found at this location although the excavation was limited. Near the intersection of lines 225N and 250N and the base line quartz is evident in the soil and in weathered rock at depths of less than 200 mm. Stronger spikes may be observed on these lines at this location (Figures 2, 11, 13) and the association seems definitive even though the quartz itself does not contribute to the response.

A contoured map of the magnetic field has been produced by smoothing the noise evident in the profiles and removing the spikes (see Figure 25). The subtlety of the gross responses is evident in this plot since the contour interval is only double the noise envelope. A distinct NW trend is evident. The locations of the various spike anomalies have also been shown in this diagram. They have been given some NW extension, partly as a reflection of gross trends and partly because this trend can be demonstrated in several places where the grid is adequately confined. Comparison of Figures 1 and 25 show that there is a marked correlation with old trenches, and their alignment, and the features of the magnetic field. Many sourcing features may

have been more obvious in 1890.

Susceptibility measurements were made of more than 100 samples from the mine dump, various soil profiles and isolated rock fragments within the soil.

These measurements confirmed a range of magnetic properties for the Mathinna Beds host units. White/buff micaceous siltstones and fine sandstones generally yielded values less than 0.0001 SI while the indurated grey quartzites were even less magnetic. The blue grey mudstones and shales contrasted significantly with a range of values up to 0.0006 SI with typical values of 0.0003 or 0.0004 SI. It should be noted that there is considerable overlap within the lower ranges, probably as a function of weathering. Some extreme contrasts may also exist within the soil profile. Where reddish iron-stained B horizons are present values of 0.0004 SI were observed. These effects tend to be localised and restricted to thin bands within the soil profile.

Note that all magnetic profiles have been plotted using a base level of 61535 nT and this value should be added to the diagrams. The edges of real data are marked by near vertical lines to this base level.

## SELF POTENTIAL

The profiles shown in Figures 3, 4, 6, 9, 14, 18 and 20 and summarised in Figure 21 were derived from observations at 10 m intervals along various grid lines. The coverage is not exhaustive. All values were referred to a fixed base point at 250N, 100E in the centre of the grid a little east of the mine. Few obvious patterns are recognisable in Figure 21, although Figure 3 is more suggestive, perhaps reflecting the orientation of the traverses.

All responses are subtle with a total range of 40 mV. This may reflect the saturation conditions at the site during the survey. All results were reproducible within 2 to 4 mV and were corrected by loop closure tests between sessions. The results tabulated in Table 2 are corrected for day and loop variations.

An attempt to contour the potentials (Figure 26) does, however, show a NW trend pattern with positive responses offset from the more positive magnetic responses (see Figure 25). The strong point anomalies, major negative gradients and comparable features correlate with many magnetically spiky zones. It will also be noted that the pattern and overall character in the region of the Portland Mines is distinctive. It is not clear how much this change from the regional character evident in the east of the surveyed area reflects the geology and how much the development of the mine.

The horizontal line segment on the left side of some plots represents the zero level for the particular data set.

## RESISTIVITY

Four lines were traversed in ideal electrical conditions; 175N, 200N, 225N and 275N. The results are presented in Figures 7, 10, 12 and 16 with a summation in Figure 23. A Schlumberger sounding was also observed along the base line with centre point at 200N (Figure 24). A gradient array was used for the traverses with a current electrode separation of 400 m and a potential electrode separation of 20 m.

The profiles do not extend the full length of some lines and the negative tail on the left end of several plots represents no data.

The profile along 275N is exceptional, as comparison shows in Figure 23. Other lines show peak responses in the vicinity of the mine. The abrupt spike on line 200N may reflect geological conditions - i.e., induration, or electrode placement in the tailings dump, and should not be stressed in any interpretation at this stage. No other electrode problems were experienced or suspected within the survey.

Typical resistivity values were of the order of 170 ohm-m and represent a Schlumberger penetration of 150 m or a depth equivalent of perhaps 40 m. The array was designed to ensure an effective penetration of at least 25 m in order to assess rock conditions at the depth mined.

The sounding (Figure 24) was used to check that the array size would prove adequate for the objective stated. It has also been interpreted to suggest a surface resistivity of 300 ohm-m and a relatively thin weathering profile. The water table was high at the time of survey and does not appear to greatly affect the sounding. A change in resistivity to lower values is inferred at about 300 mm and this is probably the water table. Resistivities of 40 and 25 ohm-m are evident to depths of 600 mm and 3 m respectively. From 3 to 30 m the resistivity is of the order of 140 ohm-m, as evident on much of profile 275N, and probably reflects either extended weathering or a change in lithology. Below 30 m the resistivity exceeds 280 ohm-m. These results show that the traverses have tested only the upper 30 m of section. Further soundings east of the base line would be required to confirm the apparent abnormality of lines 175, 200 and 225 N.

The plots of traverse resistivities should be adjusted by a base value of 110 ohm-m. Peak values on line 200N are thus of the order of 200 ohm-m. The base shift was applied to allow expansion of the profile scale.

## DISCUSSION

Several possible associations have been alluded to in the presentation of the results. These include the clear implication that magnetic spikes can be correlated with quartz-bearing zones and the relationship between potential cells and such features. There is also a possibility that increased resistivity reflects induration, mineralisation or pronounced quartz veining although the resistivity association is less obvious and certainly more ambiguous (below).

Although records describing the Portland Mine are sparse and not detailed Twelvetrees (1915<sup>6</sup>) notes that drives headed at 320 degrees. This is consistent with shaft position, tailings pile, probable location of original outcrops on a small rise west of the shaft, and long trenches (see Figure 1). Mineralised quartz can be observed in the soil and weathered rock of this area near the shaft and the spikiness of the magnetics is unambiguously associated with it (see line 250N, Figure 13). In the region immediately west of the shaft the NW trend can be confirmed from these observations since many grid positions are close together. The gross and fine trends observable in the present, rather limited magnetic data are wholly consistent with about 320 degrees magnetic and it must be presumed that the magnetics has resolved the grain of mineralisation, quartz or fracture system controlling these. This trend has been marked on the direction arrows of Figure 25.

One profile was modelled in order to assess the contribution of lithology to the observed magnetic field. The result is shown in Figure 28. The small broad scale variations in the magnetic field can be wholly accounted for using the observed susceptibilities and it is clear that only very small parts of the section are wholly non magnetic and that these are restricted to the western end - an extension of the siliceous zone in the mine, using 320 degrees. The other lithologies alternate with thicknesses of 50 to 100 metres at least and establish the broad trend along this profile. The profile has been modified and may be compared with Figure 17. The reference profile used in the structural model was derived from the observed profile by continuation to a height of 5 m above ground level. This was done to remove some of the extreme spikiness and provide some integration of the spiky zone. The process does not modify in any significant way the general background character of the profile.

The continued spiky zone has also been modelled using contrast values implied by measurements from the soil zone around quartz veins. It is clear that these very local concentrations of iron oxides can, in association with the gross lithologic changes, account for all observed features. The quartz itself does not contribute to the result other, perhaps, that to aid fracturing and water passage. If this is the case then the magnetic method is able not only to suggest general litho-structure texture within the Mathinna Beds as a whole but also to identify those narrow zones in which quartz or intense fracturing is present.

There are few definitive correlations between magnetic features and SP anomalies when seen in profile form but the plan relationship is persuasive. The voltage cells can be related to the fracture systems implied in the magnetic data based on the anchoring correlation near the mine. Additionally the SP voltage cells are dominant near the mine. The voltage cells can be related to the quartz-bearing fracture systems and this correlation is suggested on lines 200N and 250N but not unambiguously. Leaman (1974) noted the same problems and the ghosted association and also recorded that low self potentials are associated with veins. This would appear to be the case at Portland Mine presuming the magnetic spikes do indeed reflect these features universally.

As at Lefroy (Leaman, 1974), the resistivity method is less conclusive and more ambiguous. The array used here has permitted a deeper view and there is a crude inverse relationship with the magnetic data in gross terms. There is no certain detailed relationship which could reflect vein systems although, as noted above, the increase in resistivity near the mine may reflect the local induration or increase in quartz content. The pattern is confused by the change in overall lithology eastward and no specific conclusions can be drawn on the basis of the present data.

The overall pattern of results indicates that the more magnetic blue-grey mudstones are more conductive than the silty or sandy units but as magnetic spikes and some voltage cells are to be found independently of gross lithologic change this information does not appear particularly useful in an exploration sense. Comparison of Figures 22 and 23 does suggest, however, that most fracture/vein systems are in the more competent sandy or indurated units. It is not clear whether this association is incidental, controlling or generic.

Several diagrams have been included where the profiles have been superimposed; magnetics (Figure 22), SP (21), resistivity (23). This style of presentation stresses any abnormalities. Inspection shows that lines 250 and 350 are distinctive if the distracting effects of the spikes is ignored. Other major vein systems are implied. 275N also has unusual resistivity responses. SP anomalies are much less systematic when seen in E-W profiles but the distinctiveness of the mine area is evident in the N-S profiles observed (Figure 4). A comparable feature can be seen at 100E on 150N and this turns out to be the spiky anomalous region magnetically.

The magnetic data have also been assessed for regional resolution given the range of properties now established within the Mathinna Beds. The results of continuation tests are shown in Figure 27. Line 300N was selected for this test. The data was continued to heights of 5, 20 and 60 m above ground. The Figure allows some comparative estimation of the depth of anomalies observed on other lines and shows how spikes may integrate into a single feature at depths of 5 or 10 m. The test also shows that only broad scale unit changes will be mapped at a height of 60 m as might be used in an aerial survey. This line does not include these.

## CONCLUSIONS

This test survey essentially supports the early work of Leaman (1974) in respect of self potential and resistivity applications to gold or quartz exploration in NE Tasmania. It significantly extends it in respect of magnetics. This is important since the magnetic method is perhaps the simplest, cheapest, most reliable and most reproducible of all geophysical methods.

Although the test surveys were of limited scope several important conclusions can be drawn. The implication of the association and result may be the subject of argument but the evidence of direct correlation cannot be ignored.

The materials of the region are subtly and variably magnetic and it is possible to map units and trends by magnetic methods. Although the precise origin of the association is unclear the method is also able to locate quartz-bearing zones. These induce some weathering transfer changes and sizeable spike anomalies. Continuation tests show that changes induced by lithologic changes could be mapped by aerial methods at a height of approximately 60 m. No evidence of vein accumulations would be retained at this height and aerial methods must be used to identify abnormal trends.

Self potential methods are less valuable but do offer good supporting evidence for any magnetically derived inference. Voltage cells appear to be generated along major fracture or vein systems.

The results of resistivity traversing are not conclusive but it may be that this method has also integrated the effect of an accumulation of quartz veins or induration about some of them.

No method has responded, or appeared to respond, to the mineralisation directly. Responses are structurally or lithologically controlled.

The present test survey has demonstrated a need for data redundancy in any future survey. SP and ground magnetics should be based on a 10 to 15 m grid with observations at 5 and 2 m respectively wherever first order traversing at separation not greater than the 25 to 50 m grid or 2 and 10 m spacings used here.

The results are encouraging and consistent with earlier work and there is no reason why the Mathinna Beds should not be usefully explored with these very simple methods.

## RECOMMENDATIONS

1. Some of the conclusions of this study can be tested and reviewed by trenching. This should be done. It may then be possible to appraise the relative merit of the resistivity results and the origin of the SF and magnetic responses.

2. Should the results be supported by trenching, and a particular method coupling then seen to be viable, then extensive surveys within areas of known mineralisation or beyond them can be considered. They should be specified with redundancy of observation as suggested in Conclusions.

3. Detailed surveys should emphasize magnetics since it is clear that this method might well stand alone for both structural-stratigraphic and direct vein exploration applications. It can clearly function in the first mentioned application although the latter should be established after test trenching.

4. Aeromagnetic surveys are feasible in these rock types and should be considered for regional exploration.

## REFERENCES

- Leaman, D.E., 1974. Geophysics of the Lefroy Goldfield.  
Tech. Rep. Dep. Mines Tasm., 17, p. 79
- Twelvetrees, W.H., 191<sup>6</sup>5. The Gladstone Mineral District.  
Bull. geol. Surv. Tasm., 25.

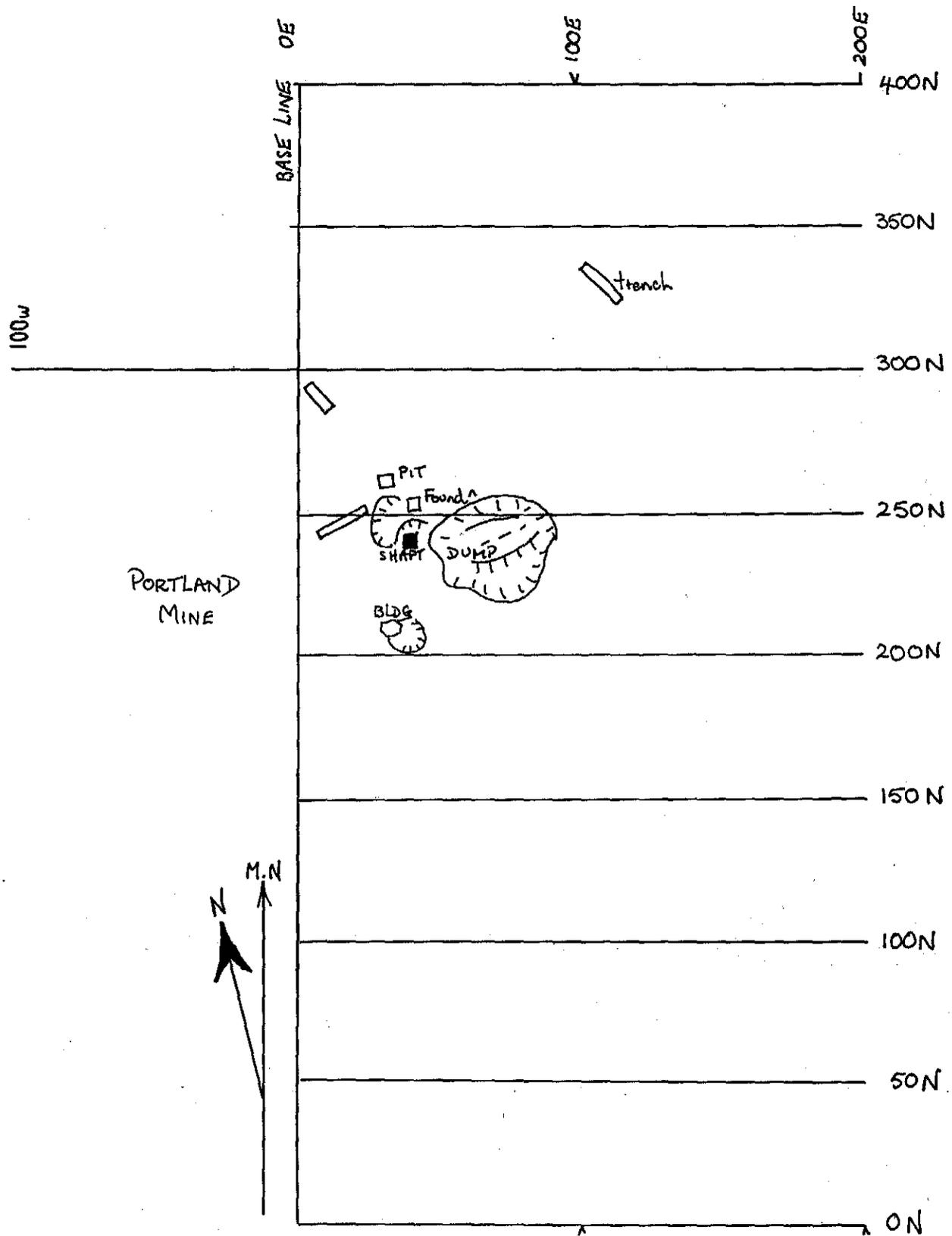


FIGURE 1

GRID AND LOCATION MAP

1 B:PLMG00E PORTLAND MINE MAGNETICS BASE LINE  
ZERO SHIFT : 0

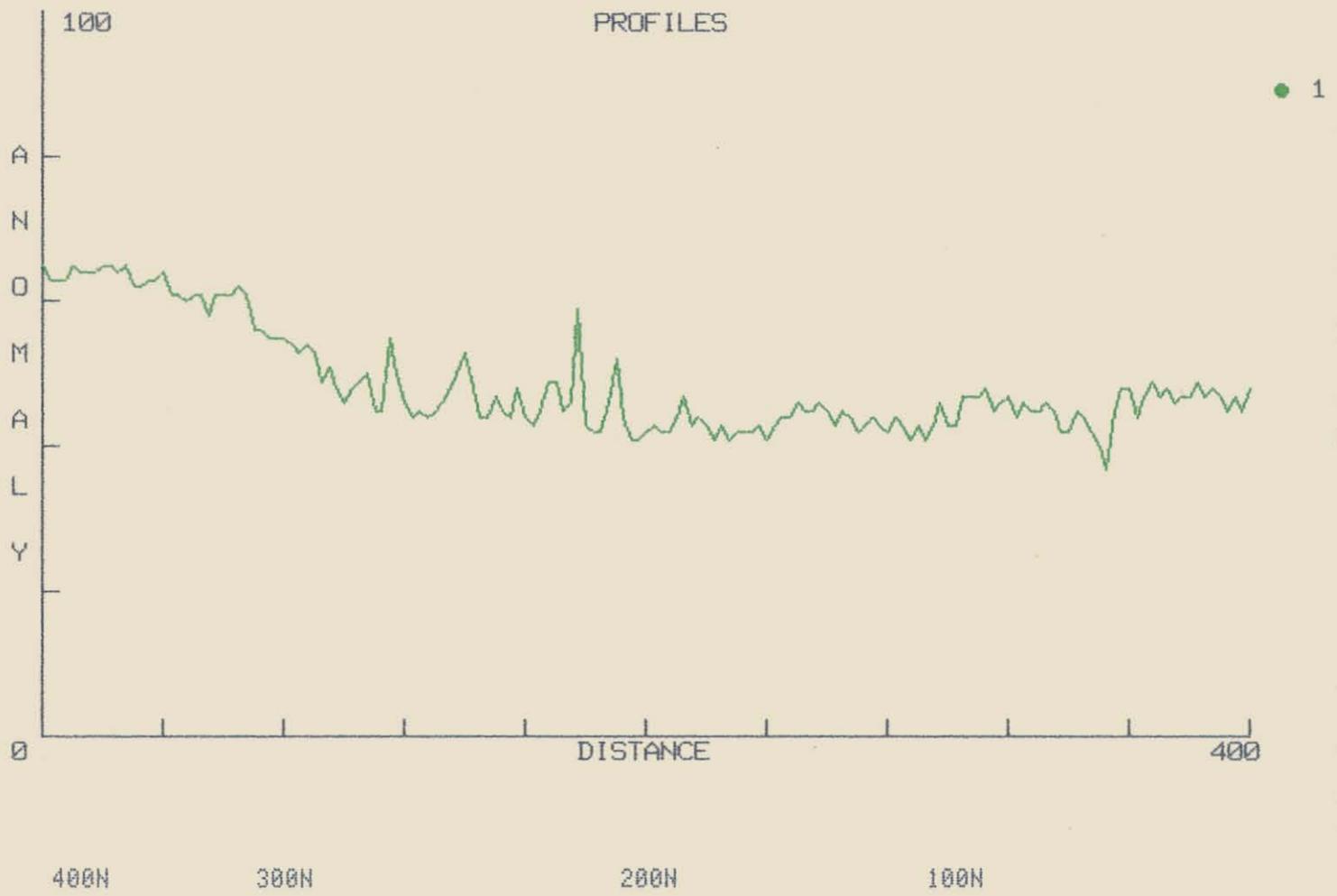


FIGURE : 2

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE BASE LINE

1 B:PLSP00E PORTLAND MINE SP BASELINE 100-400N

ZERO SHIFT : 19

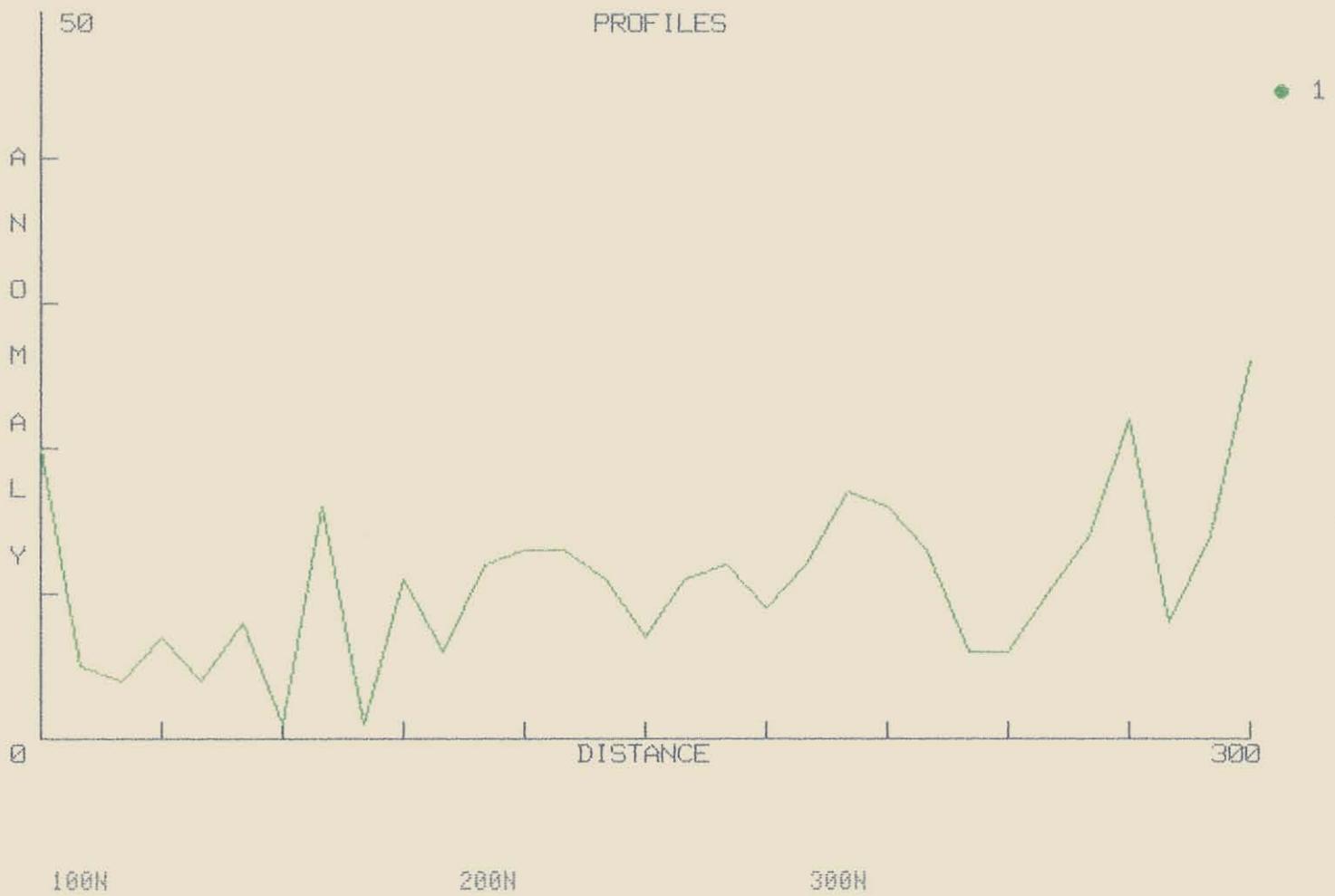


FIGURE : 3

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILE BASE LINE

1 B:PLSP00E PORTLAND MINE SP BASELINE 100-400N  
2 B:PLSP50E PORTLAND MINE SP 50E 100-400N  
3 B:PLSP100E PORTLAND MINE SP 100E 100-400N

ZERO SHIFT : 24

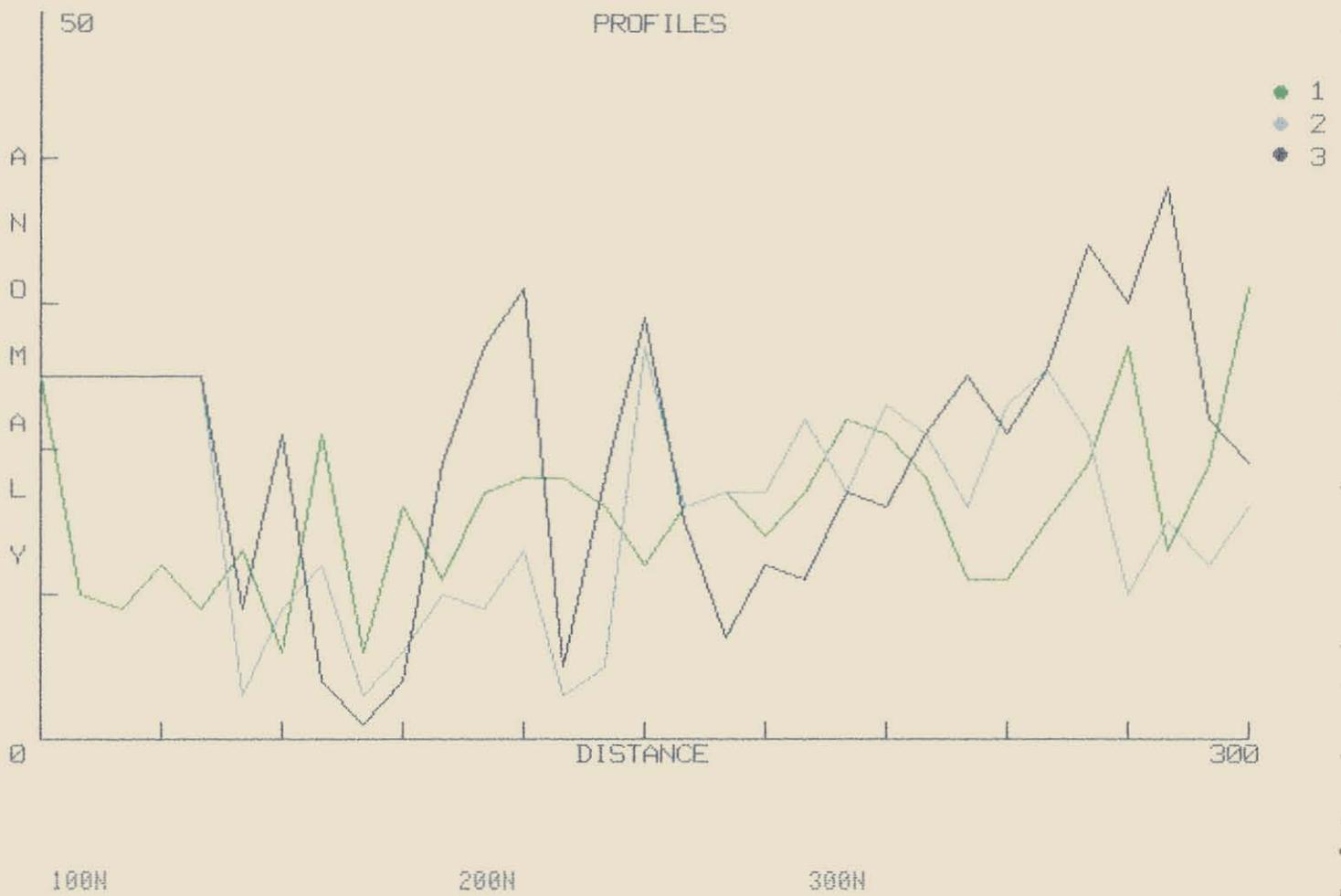


FIGURE : 4

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILES 0 50 100 E

1 B:PLMG150N PORTLAND MINE MAGNETICS 150N  
ZERO SHIFT : 0



FIGURE : 5

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE LINE 150N

1 B:PLSP150N PORTLAND MINE SP LINE 150N

ZERO SHIFT : 22



FIGURE : 6

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILE 150N

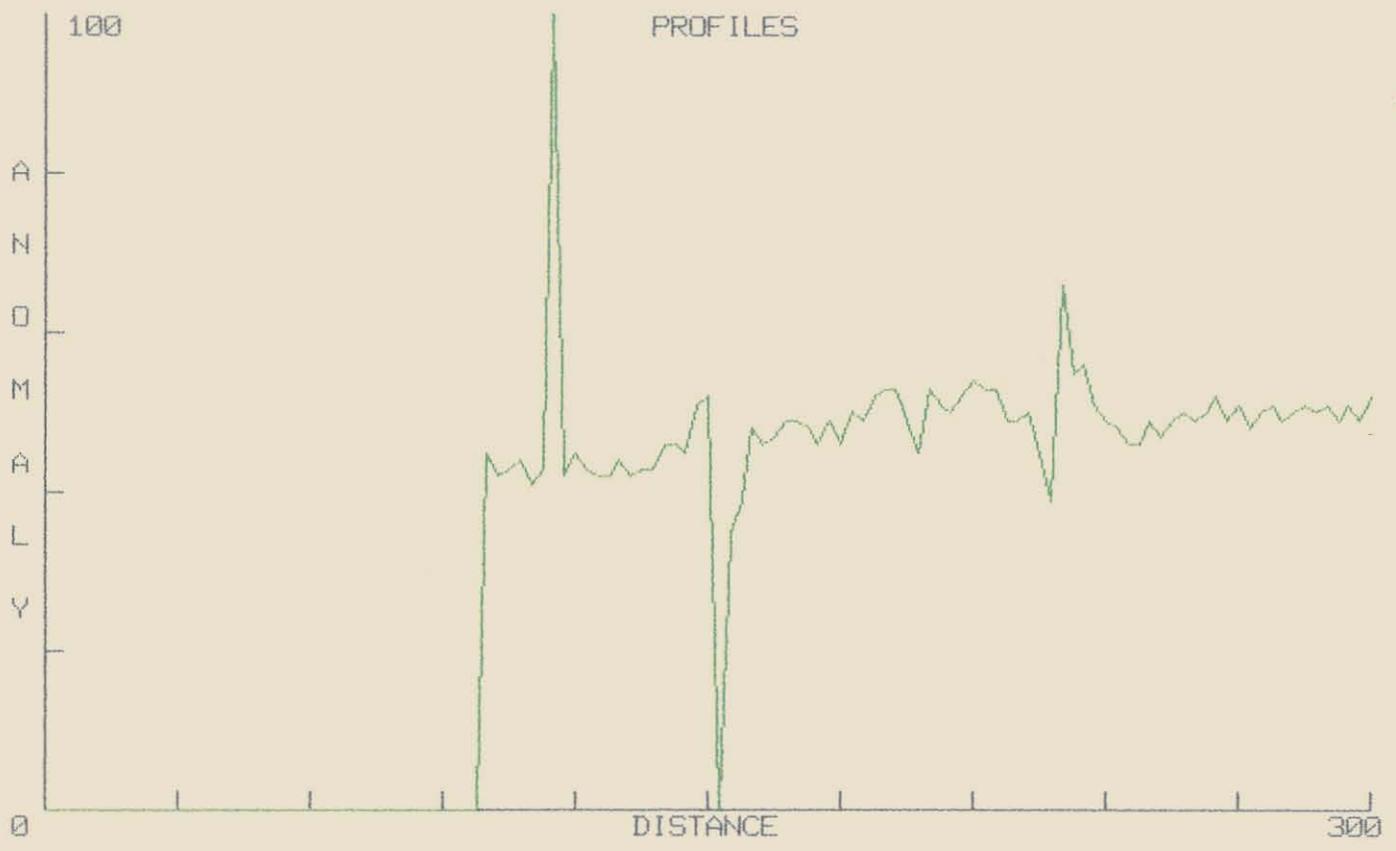
1 B:PLRE175M PORTLAND MINE RESISTIVITY 175N  
ZERO SHIFT : 0



FIGURE : 7

PORTLAND MINE TEST SURVEY  
RESISTIVITY PROFILE GRADIENT ARRAY 175N

1 B:PLMG200N PORTLAND MINE MAGNETICS 200N  
ZERO SHIFT : 0



100W                      0E                      100E

FIGURE : 8

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE 200N

1 B:PLSP200N PORTLAND MINE SP LINE 200N

ZERO SHIFT : 16

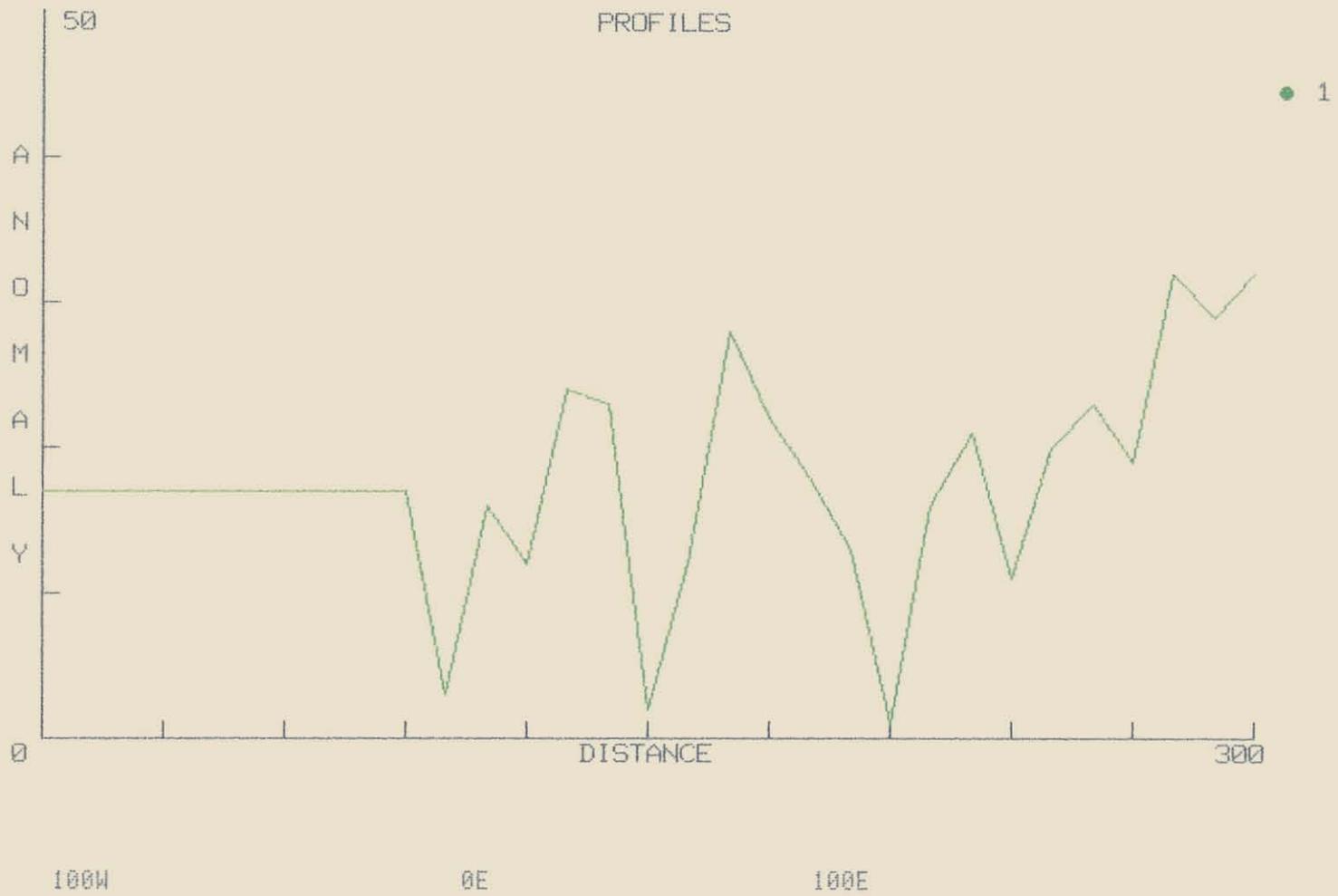


FIGURE : 9

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILE 200N

1 B:PLRE200H PORTLAND MINE RESISTIVITY 200N

ZERO SHIFT : 0



FIGURE : 10

PORTLAND MINE TEST SURVEY  
RESISTIVITY PROFILE 200N

1 B:PLMG225N PORTLAND MINE MAGNETICS LINE 225N

ZERO SHIFT : 0

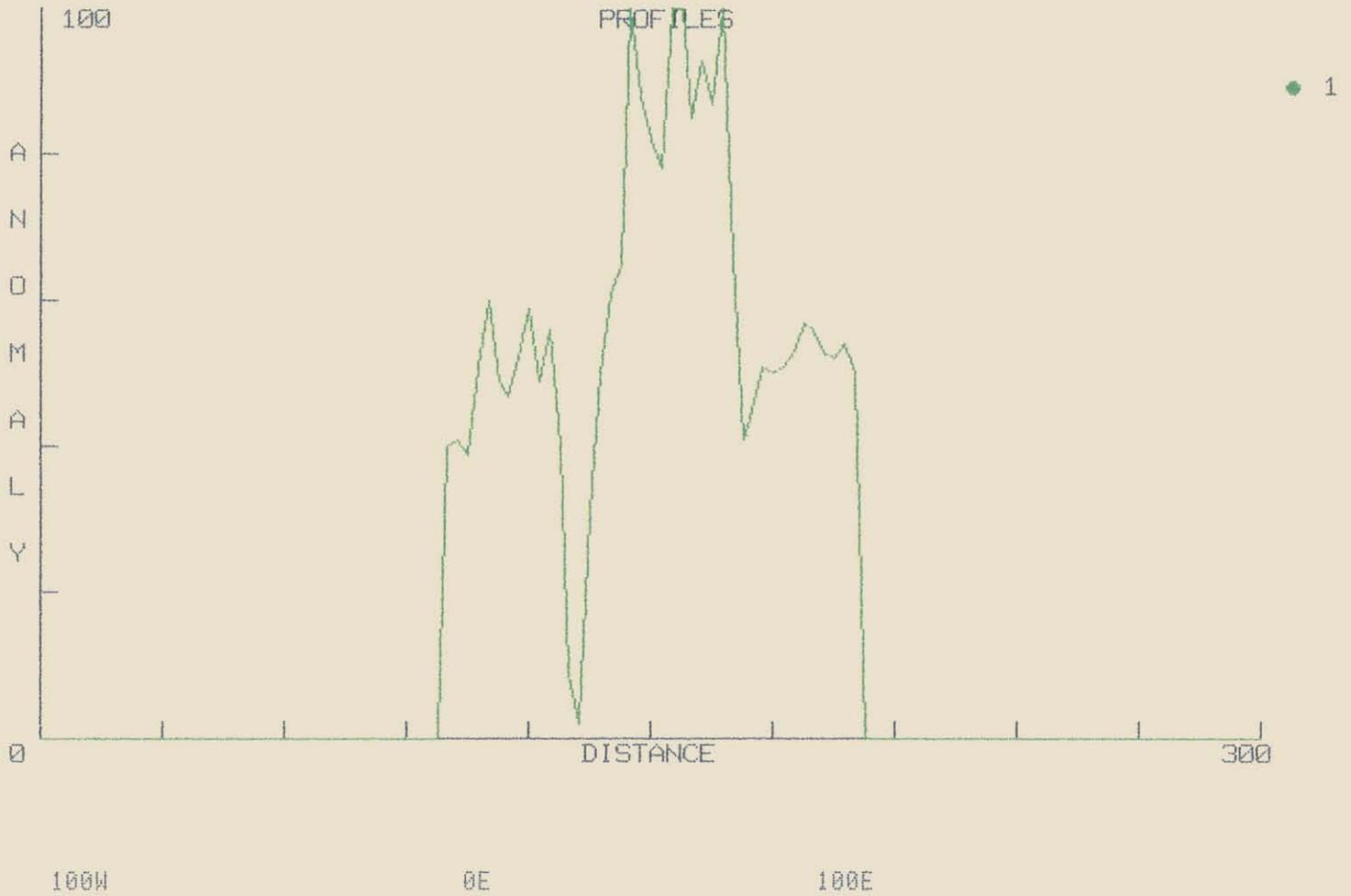


FIGURE : 11

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE 225N

1 B:PLRE225N PORTLAND MINE RESISTIVITY 225N

ZERO SHIFT : 0

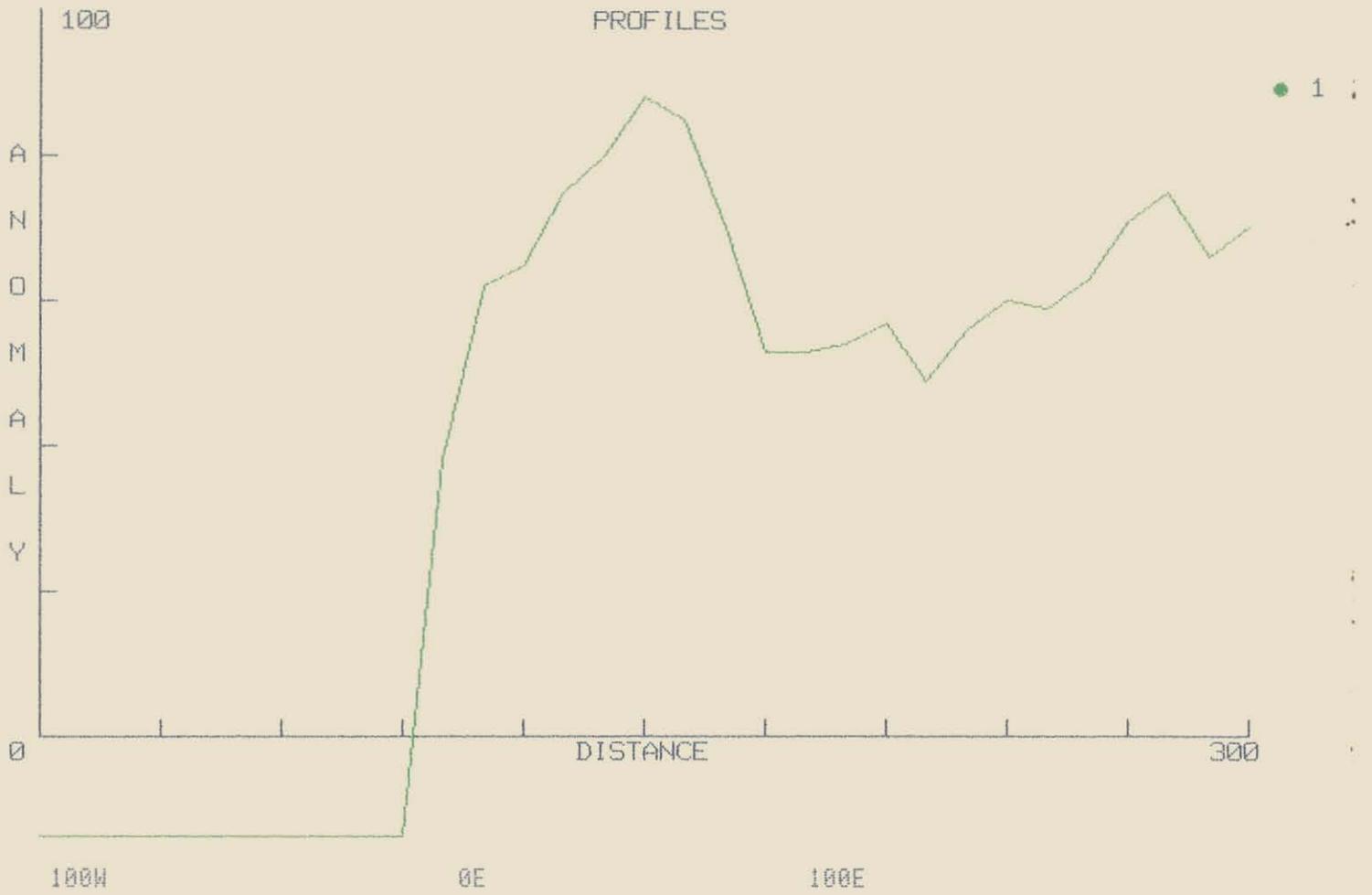


FIGURE : 12

PORTLAND MINE TEST SURVEY  
RESISTIVITY PROFILE 225N

1 B:PLMG250N PORTLAND MINE MAGNETICS 250N

ZERO SHIFT : 0

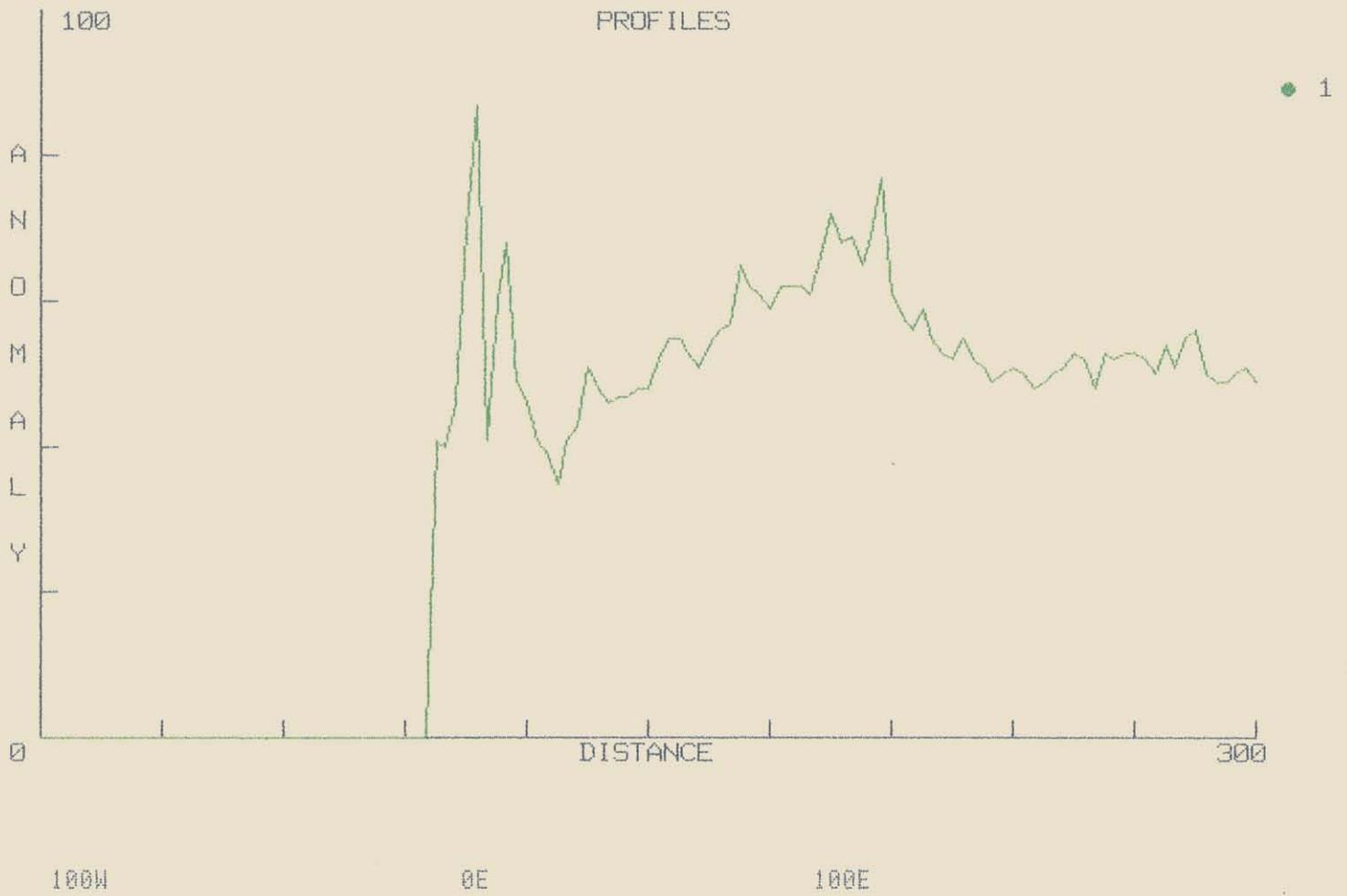


FIGURE : 13

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE 250N

1 B:PLSP250N PORTLAND MINE SP LINE 250N

ZERO SHIFT : 15



FIGURE : 14

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILE 250N

1 B:PLMG275N PORTLAND MINE MAGNETICS LINE 275N

ZERO SHIFT : 0

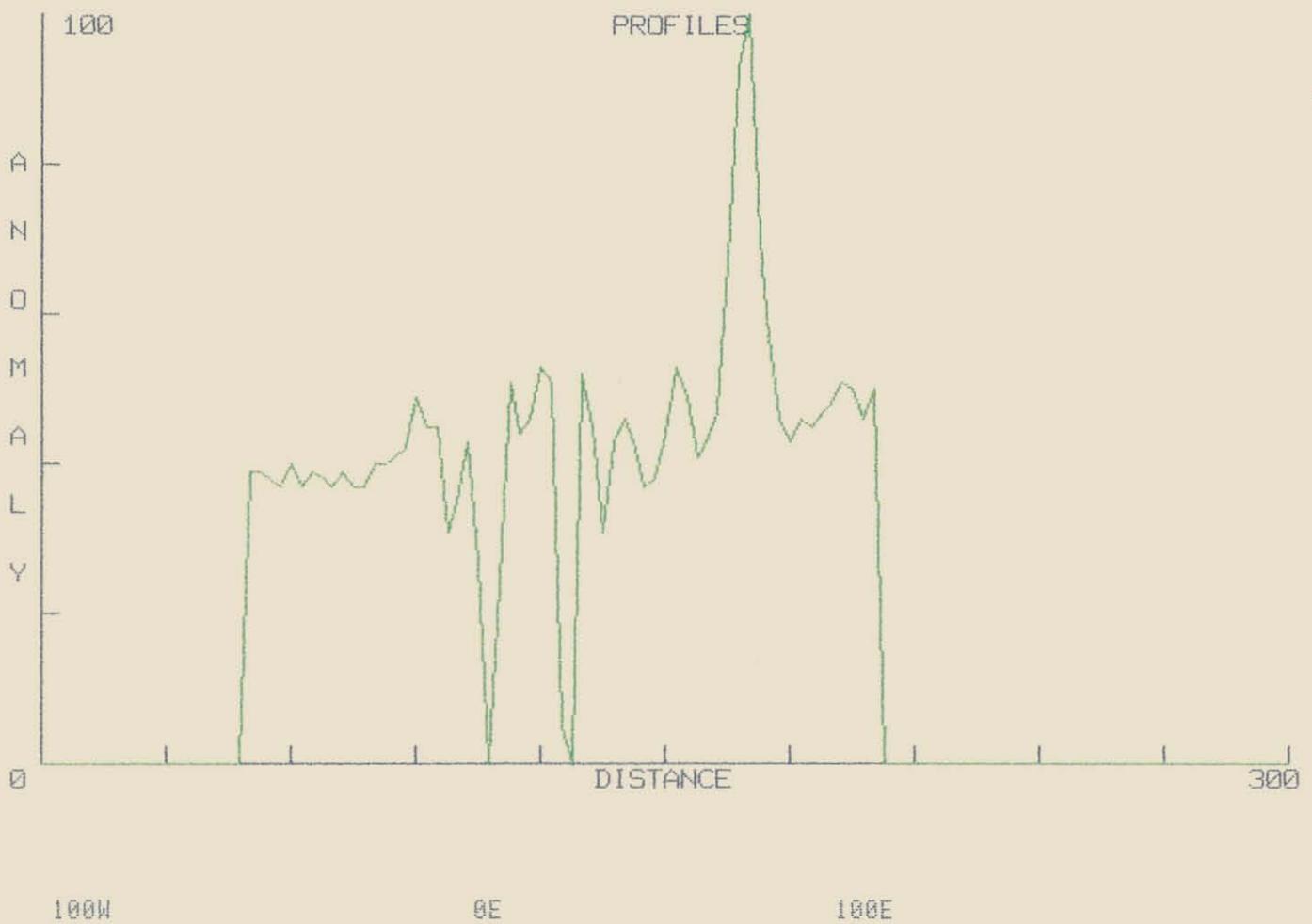


FIGURE : 15

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE 275N

1 B:PLRE275N PORTLAND MINE RESISTIVITY 275N  
ZERO SHIFT : 0



FIGURE : 16

PORTLAND MINE TEST SURVEY  
RESISTIVITY PROFILE 275N

1 B:PLMG300N PORTLAND MINE MAGNETICS LINE 300N

ZERO SHIFT : 0



FIGURE : 17

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE 300N

1 B:PLSP300N PORTLAND MINE SP LINE 300N  
ZERO SHIFT : 25



FIGURE : 18

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILE 300N

1 B:PLMG350N PORTLAND MINE MAGNETICS LINE 350N

ZERO SHIFT : 0



FIGURE : 19

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILE 350N

1 B:PLSP400N PORTLAND MINE SP LINE 400N

ZERO SHIFT : 21

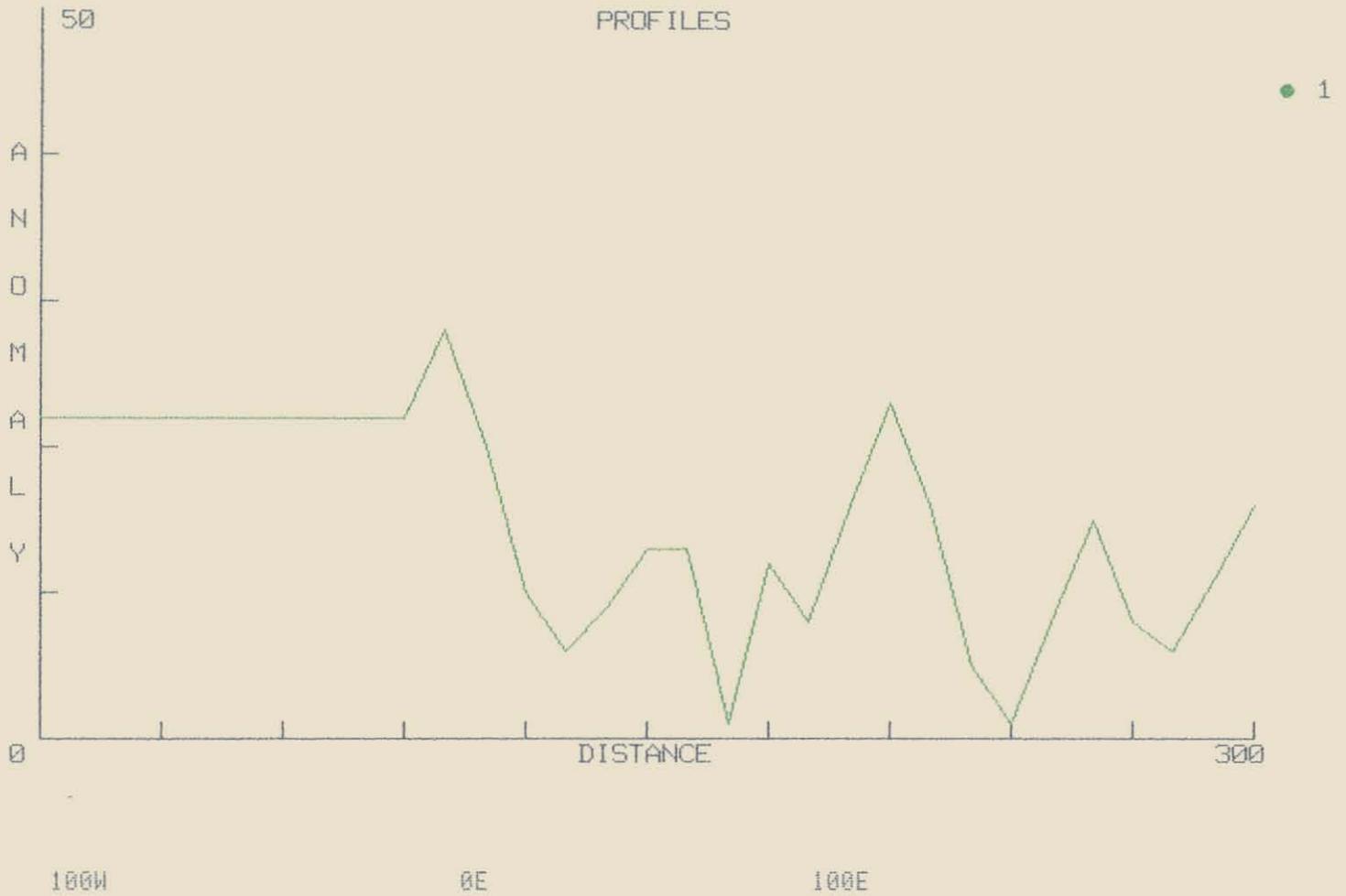


FIGURE : 20

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILE 400N

1	B:PLSP150N	PORTLAND MINE SP LINE 150N
2	B:PLSP200N	PORTLAND MINE SP LINE 200N
3	B:PLSP250N	PORTLAND MINE SP LINE 250N
4	B:PLSP300N	PORTLAND MINE SP LINE 300N
5	B:PLSP350N	PORTLAND MINE SP LINE 350N
6	B:PLSP400N	PORTLAND MINE SP LINE 400N

ZERO SHIFT : 25

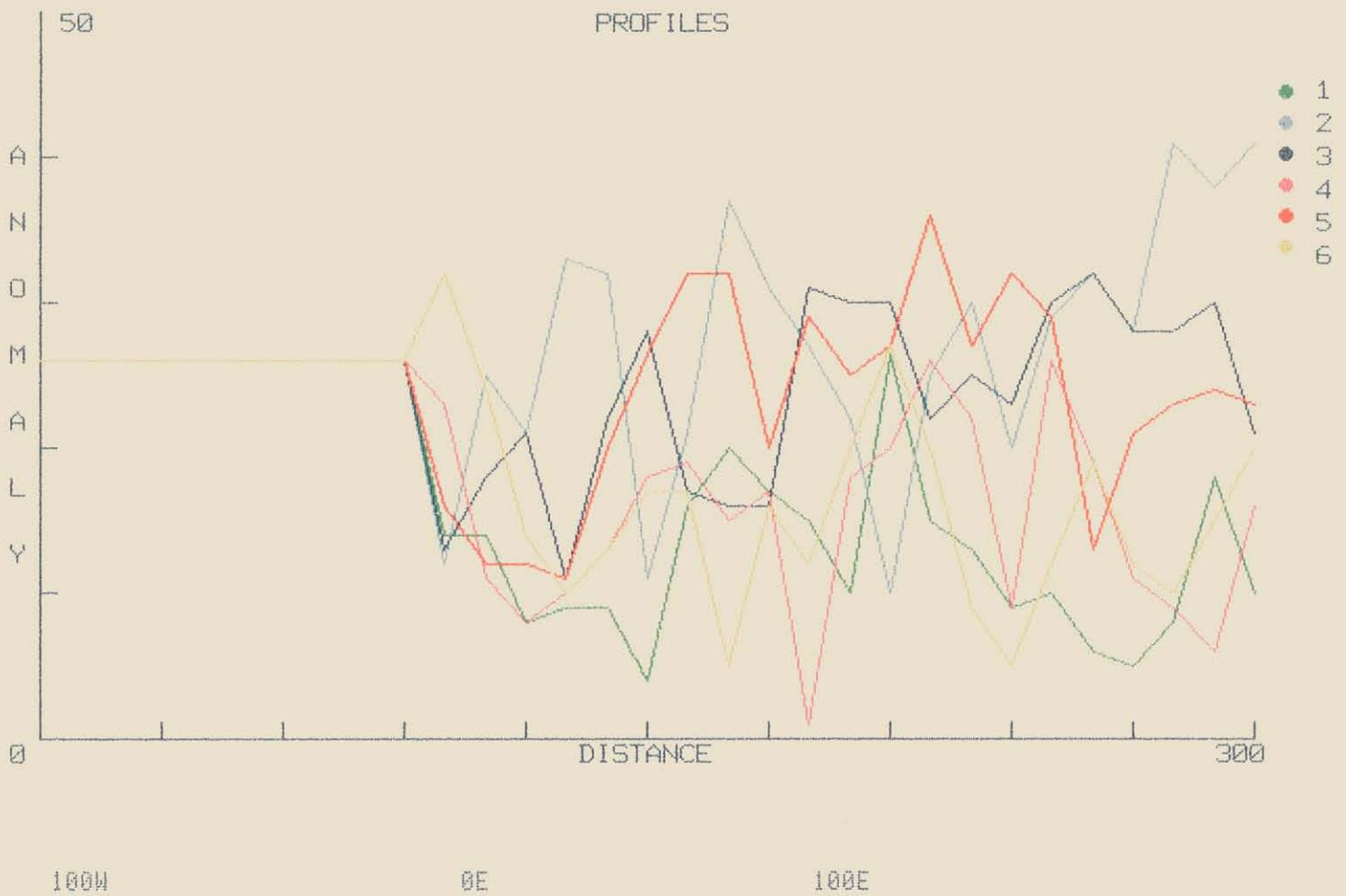


FIGURE : 21

PORTLAND MINE TEST SURVEY  
SELF POTENTIAL PROFILES SUMMARY

1	B:PLMG150N	PORTLAND MINE MAGNETICS	150N
2	B:PLMG200N	PORTLAND MINE MAGNETICS	200N
3	B:PLMG250N	PORTLAND MINE MAGNETICS	250N
4	B:PLMG275N	PORTLAND MINE MAGNETICS	LINE 275N
5	B:PLMG300N	PORTLAND MINE MAGNETICS	LINE 300N
6	B:PLMG350N	PORTLAND MINE MAGNETICS	LINE 350N

ZERO SHIFT : 0

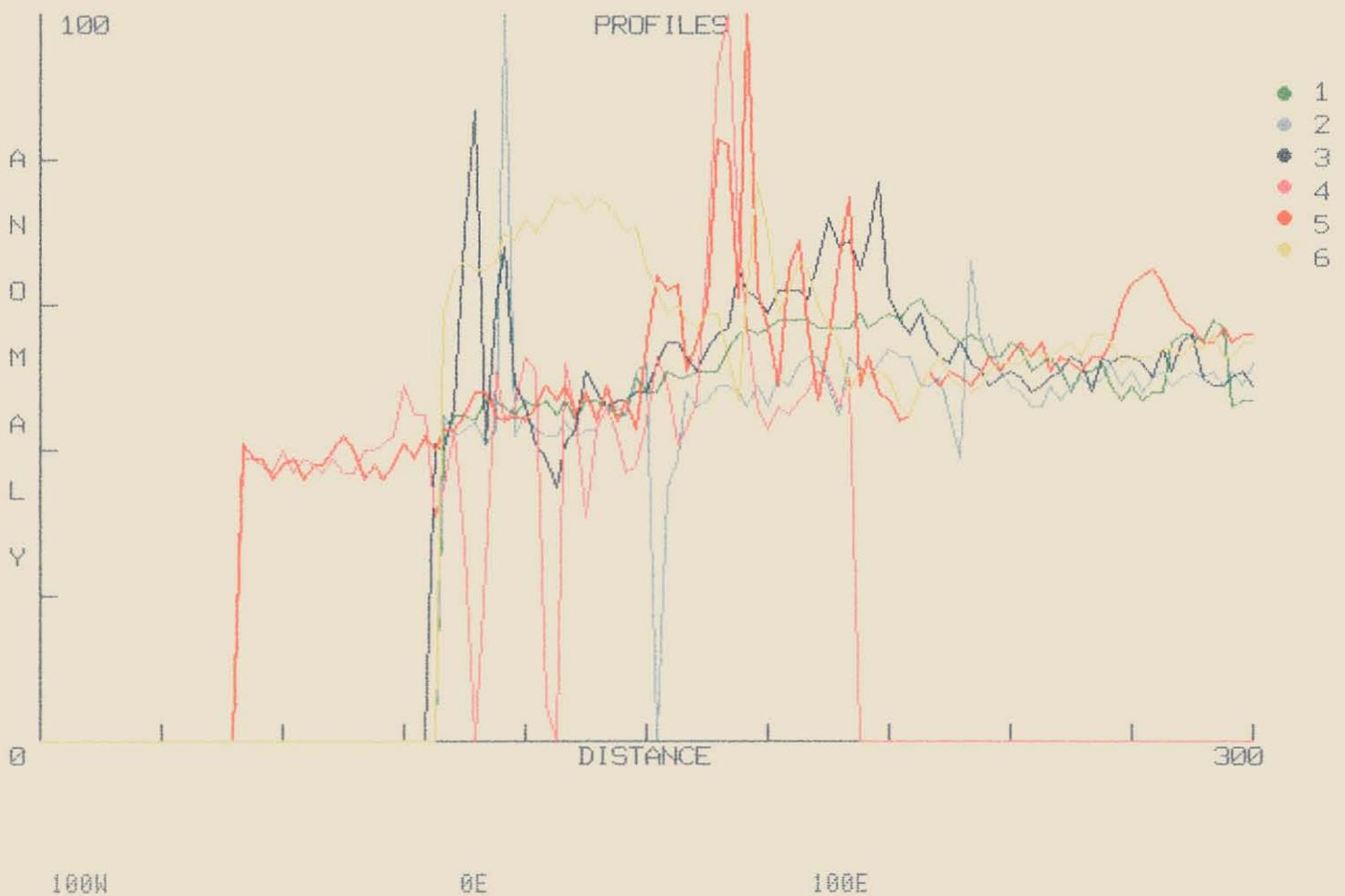


FIGURE : 22

PORTLAND MINE TEST SURVEY  
MAGNETIC PROFILES SUMMARY

1	B:PLRE175N	PORTLAND MINE RESISTIVITY 175N
2	B:PLRE200N	PORTLAND MINE RESISTIVITY 200N
3	B:PLRE225N	PORTLAND MINE RESISTIVITY 225N
4	B:PLRE275N	PORTLAND MINE RESISTIVITY 275N

ZERO SHIFT : 0

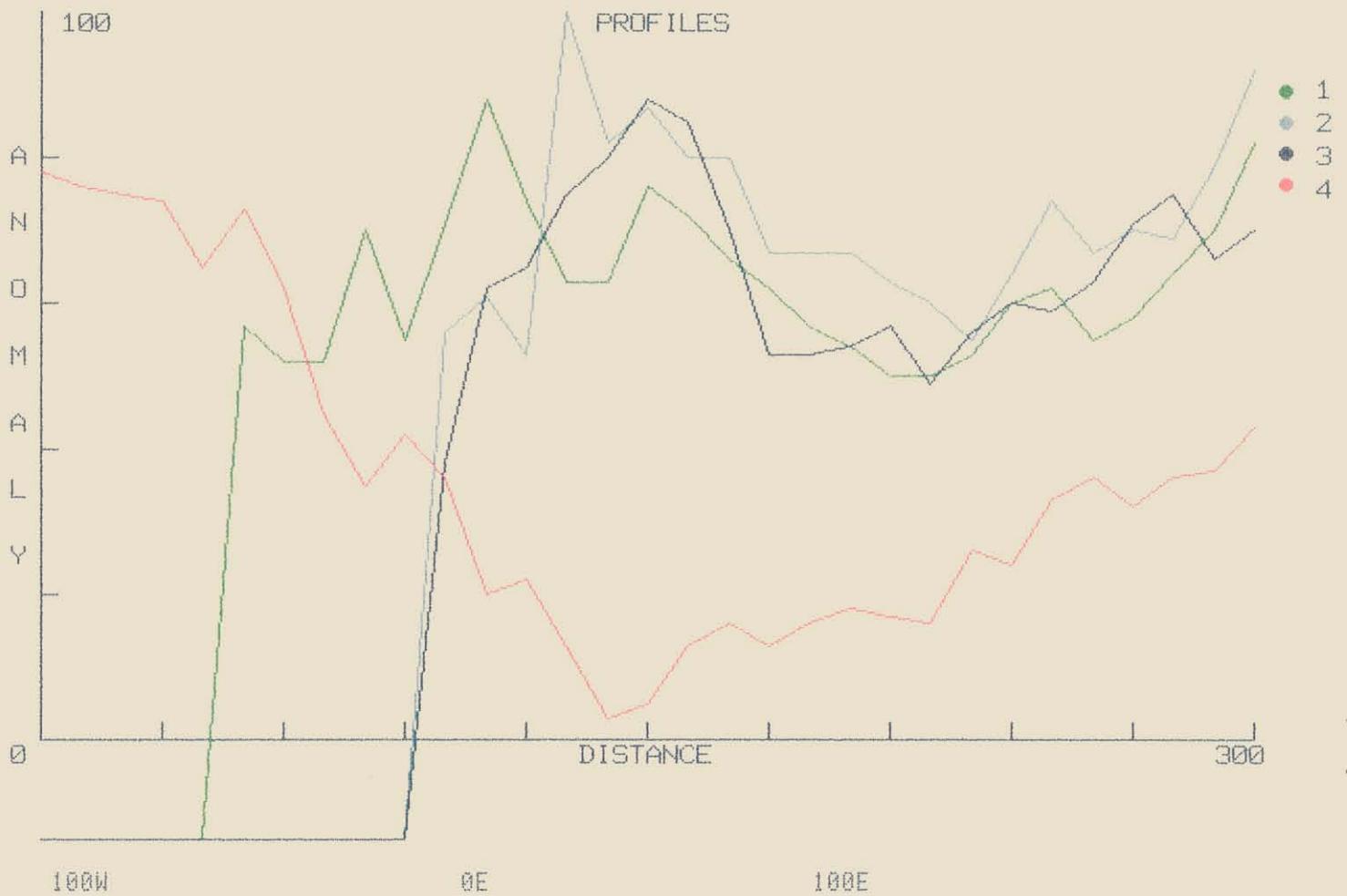


FIGURE : 23

PORTLAND MINE TEST SURVEY  
RESISTIVITY PROFILES SUMMARY

086 LEAMAN GEOPHYSICS

Survey Review, Specification, Reduction, Interpretation  
Wide Experience Most Methods  
Specialties:- Gravity, Magnetics, Seismic Methods

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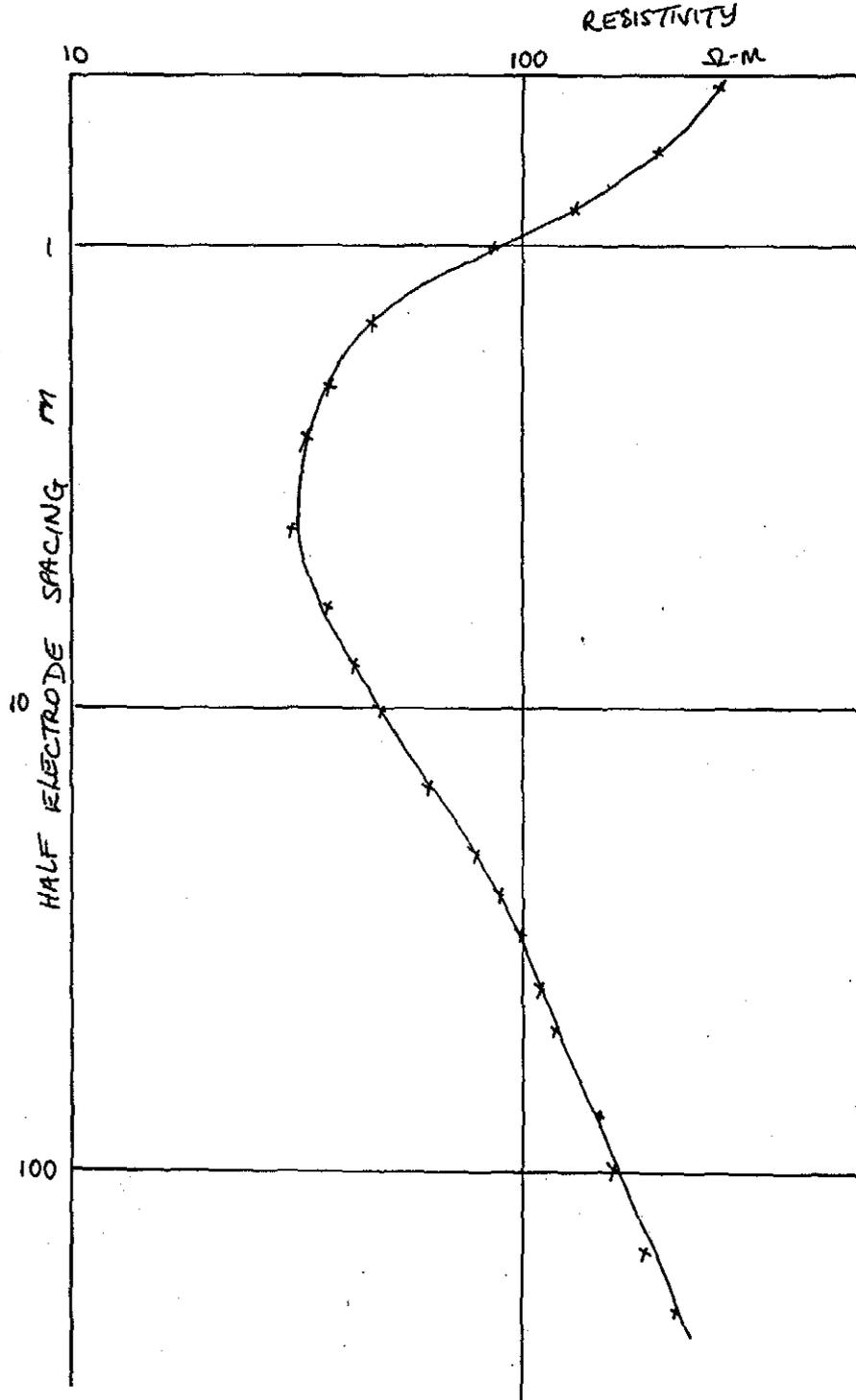


FIGURE 24

SCHLUMBERGER RESISTIVITY SOUNDING

BASELINE

CENTRE AT 200N

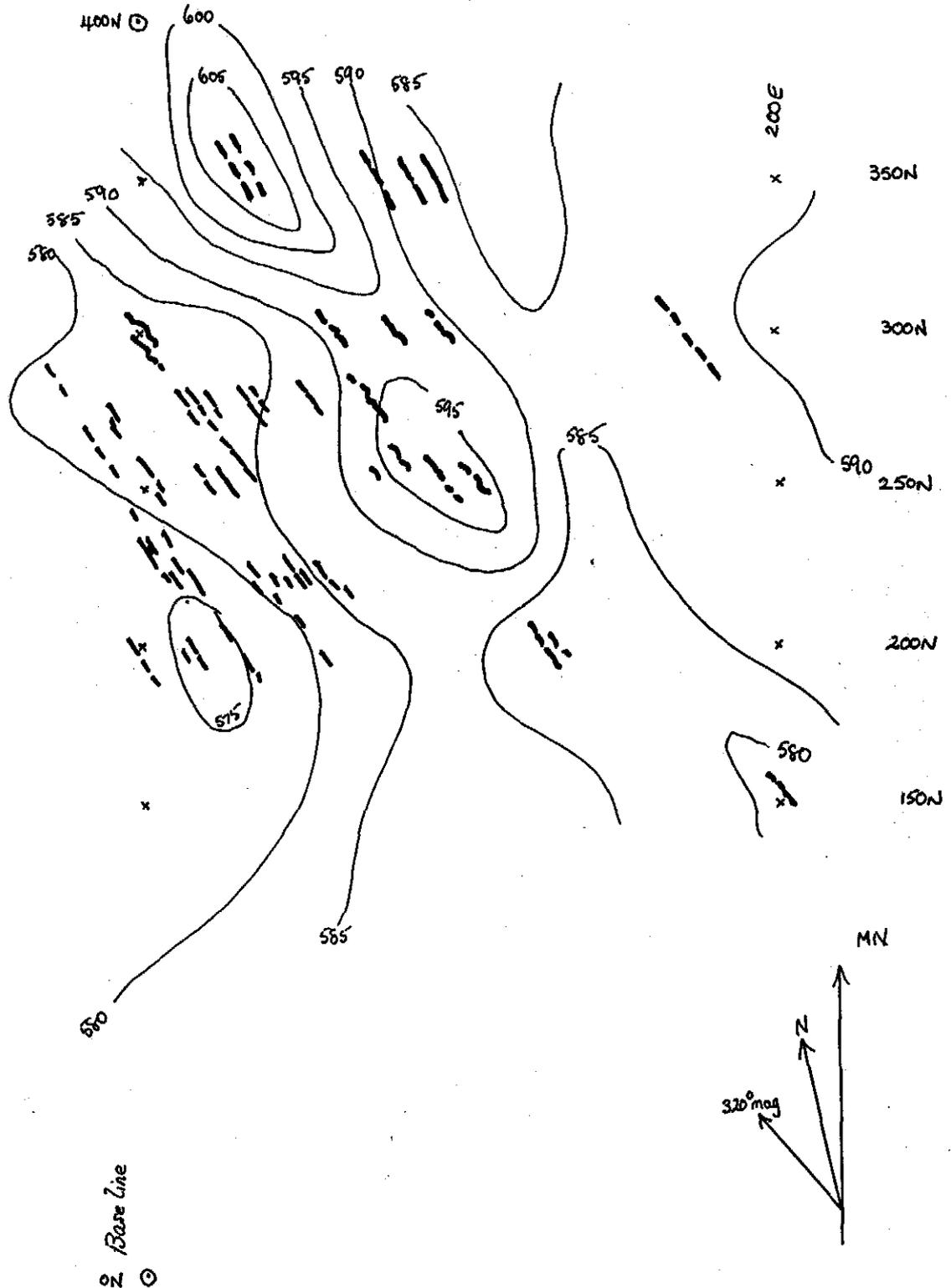


FIGURE 25

CONTOURS OF MAGNETIC FIELD SHOWING LOCATION OF SPIKE FEATURES.  
Interval 5 nT, based on noise smoothed profiles.

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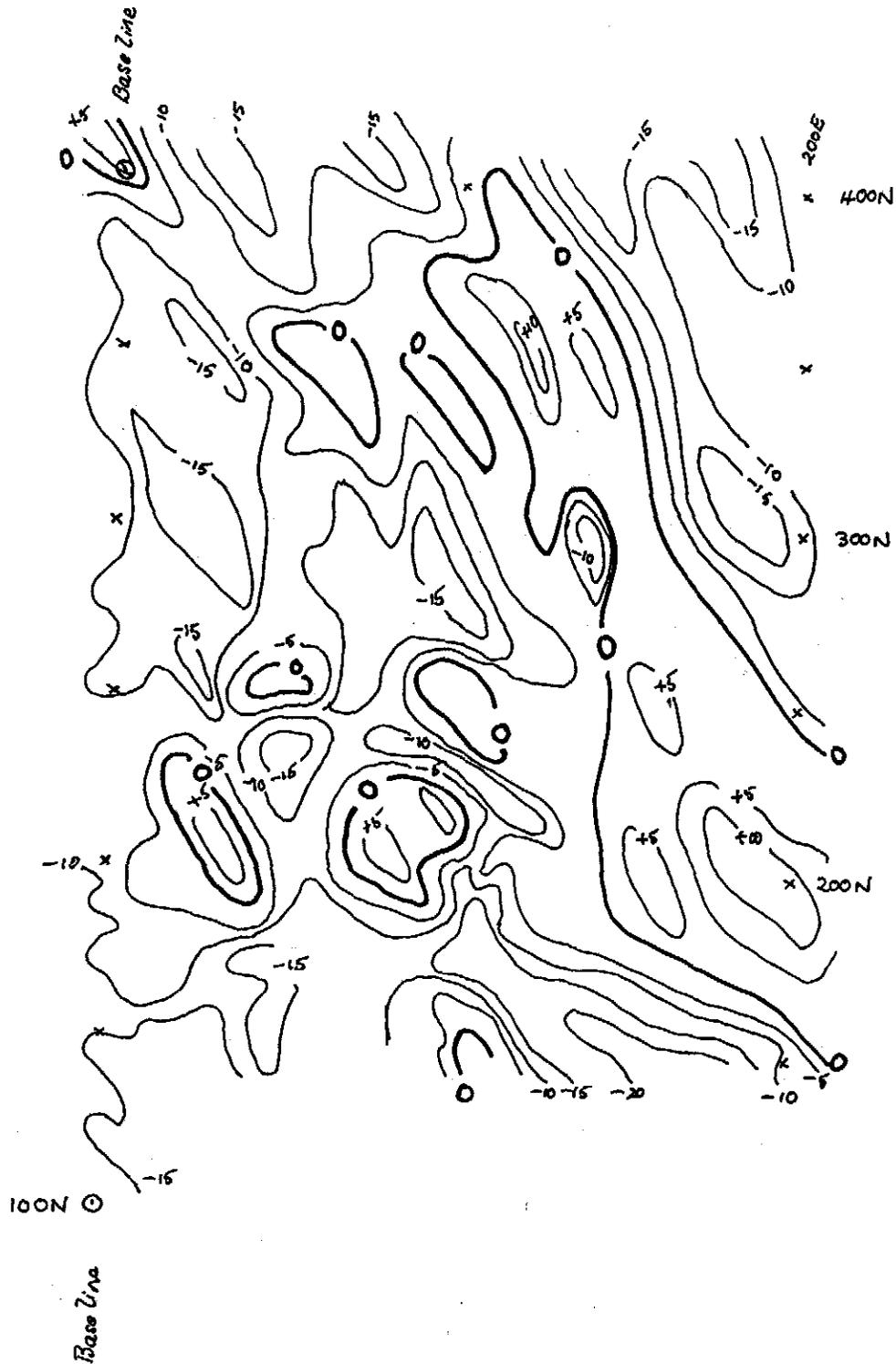


FIGURE 26

CONTOURS OF SELF POTENTIAL VOLTAGES  
Interval 5 mV.

1	B:PLN300NE	PORTLAND MINE MAGNETICS LINE 300N
2	B:PLUC300C	CONTINUATION 20M PORTLAND 300N
3	B:PLUC300D	CONTINUATION 60M PORTLAND 300N
4	B:PLUC300E	CONTINUATION 5M PORTLAND 300N

ZERO SHIFT :-3.483481

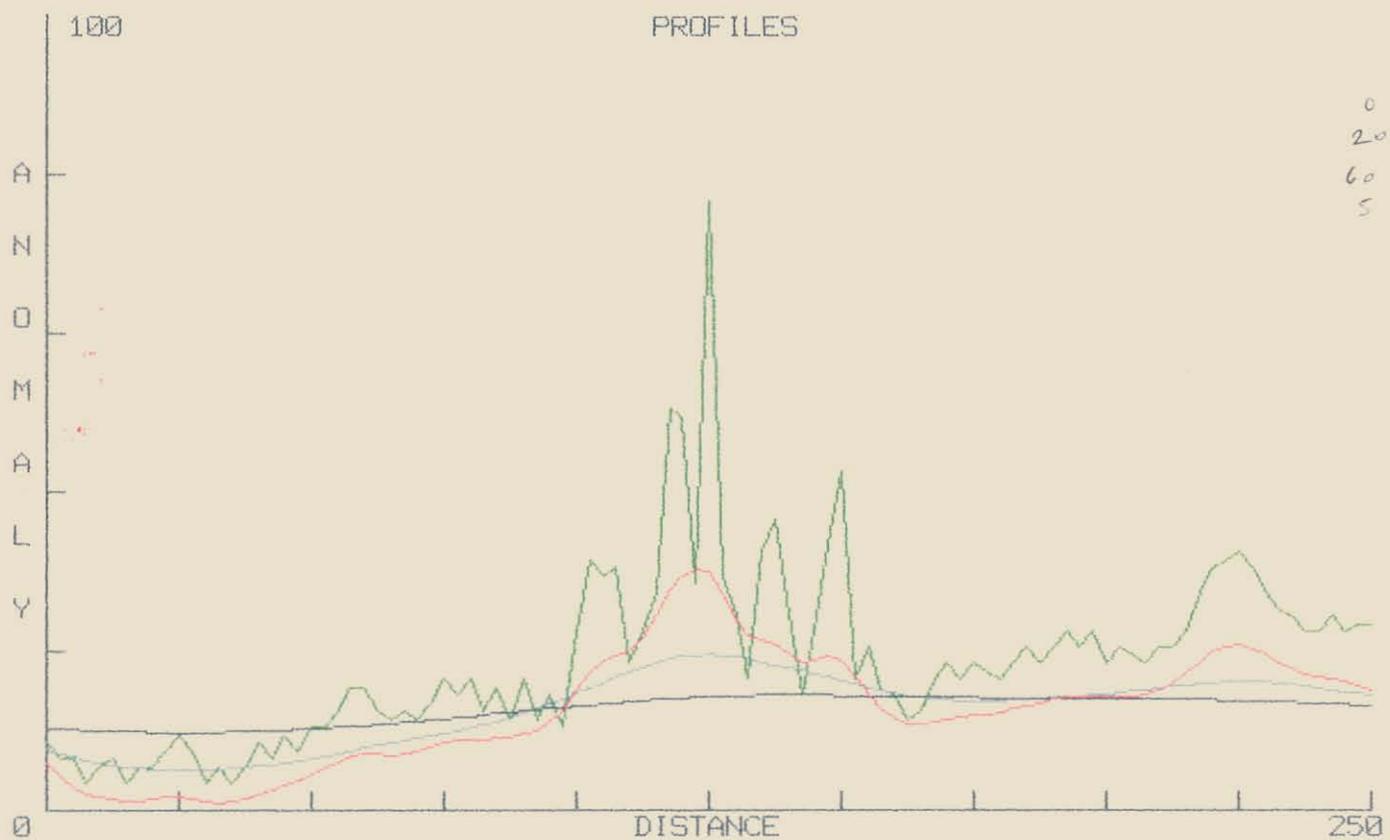


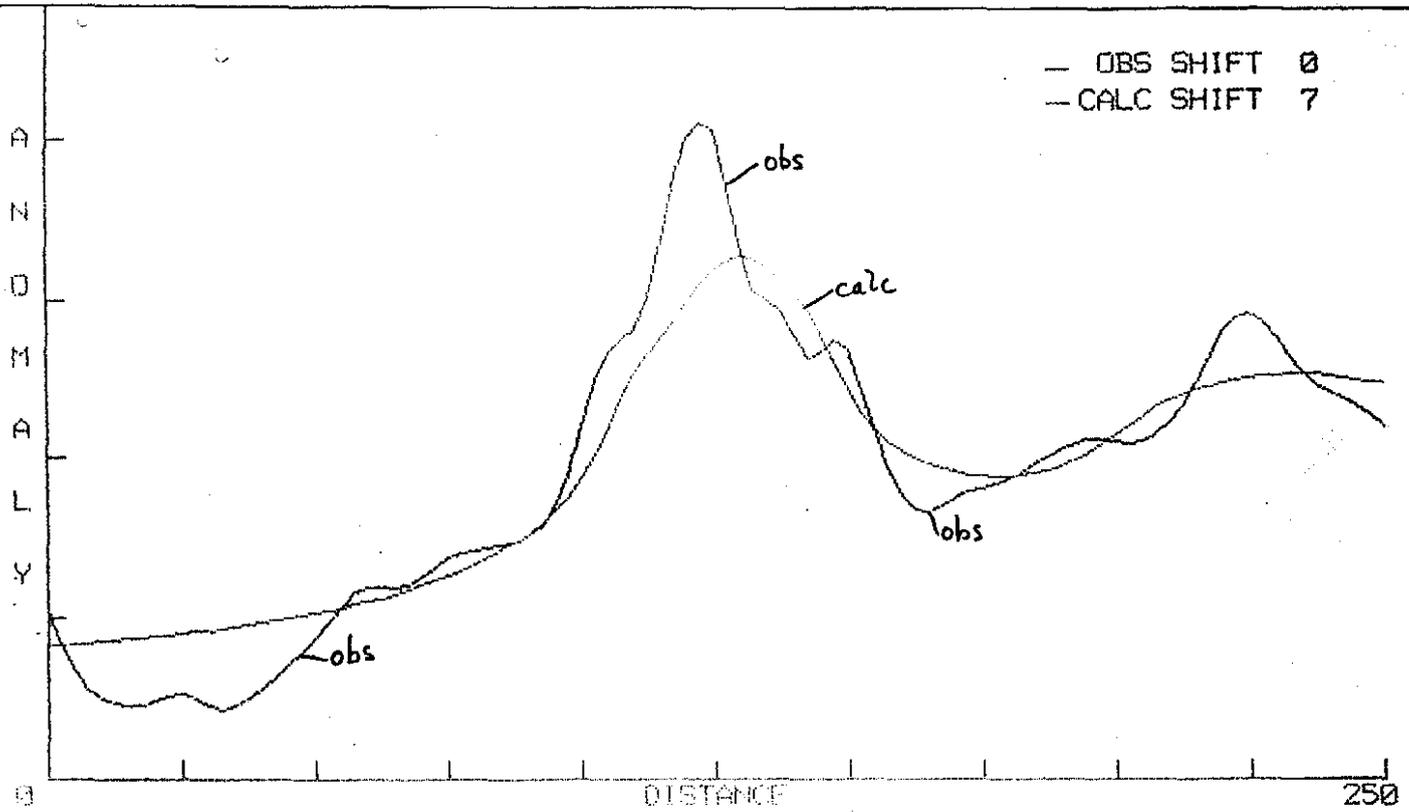
FIGURE : 27

PORTLAND MINE TEST SURVEY  
MAGNETICS PROFILE 300N TEST OF SOURCE DEPTH EFFECTS

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PORTLAND MINE TEST SURVEY 300N  
 K7=00005

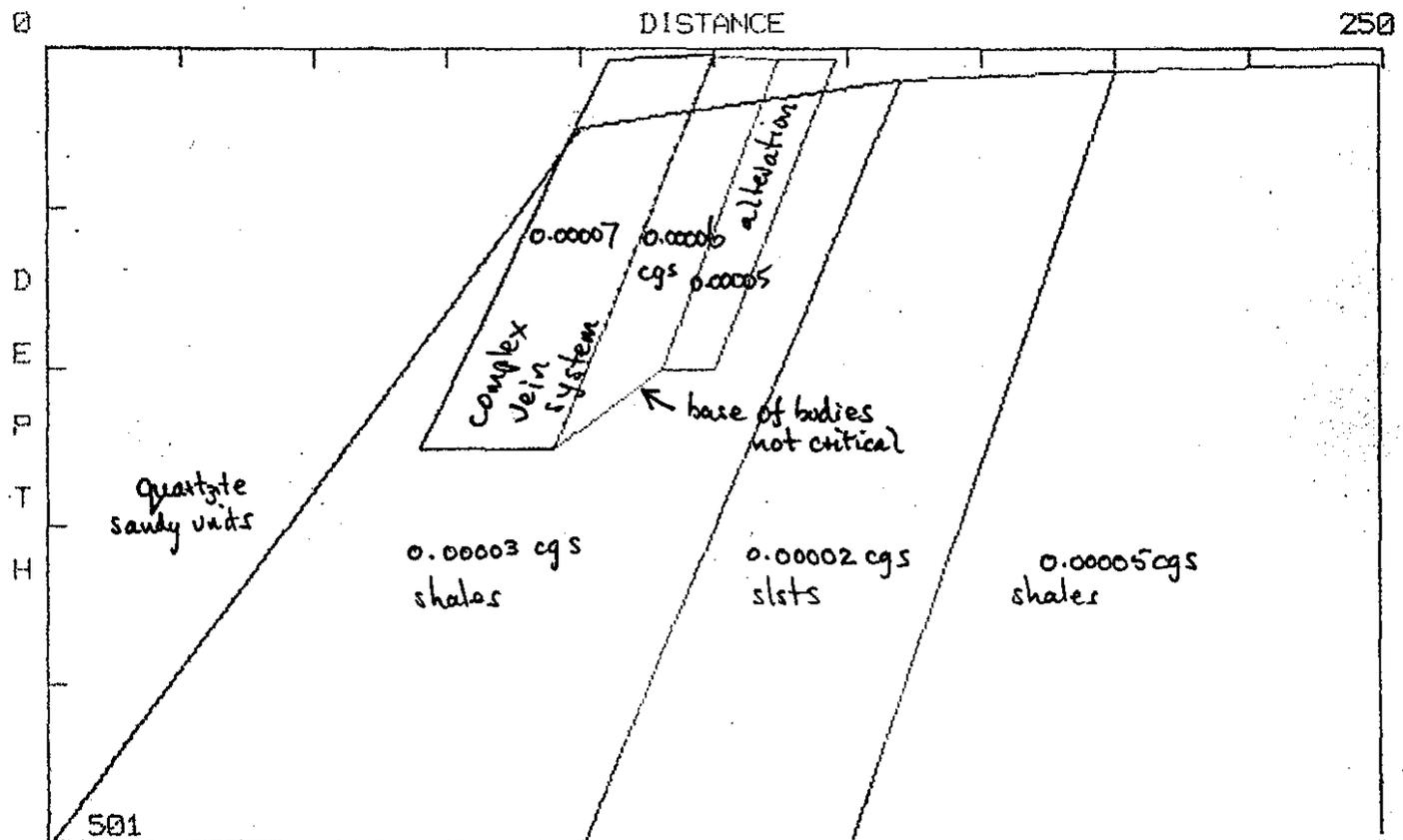


FIGURE 28

PROVISIONAL TRIAL SOLUTION OF MAGNETIC DATA ON LINE 300N  
 Observed profile is continuation of observed data at 5m

Report submitted on behalf of  
Leaman Geophysics  
by

*D. Leaman*

Dr. D.E. Leaman, B.Sc., Ph.D  
M.Aus.I.M.M., M.M.I.C.A

*Aug 12, 1987*

TABLE 1  
MAGNETIC DATA

---

B&gt;B:PLM600E

PORTLAND MINE MAGNETICS BASE LINE

2.5

161

600.0	598.0	598.0	598.0	600.0	599.0	599.0
599.0	600.0	600.0	599.0	600.0	597.0	597.0
598.0	598.0	599.0	596.0	596.0	595.0	596.0
596.0	593.0	596.0	596.0	596.0	597.0	596.0
591.0	591.0	590.0	590.0	590.0	589.0	588.0
589.0	588.0	584.0	586.0	583.0	581.0	583.0
584.0	585.0	580.0	580.0	590.0	585.0	581.0
579.0	580.0	579.0	580.0	581.0	583.0	585.0
588.0	583.0	579.0	579.0	582.0	580.0	579.0
583.0	579.0	578.0	580.0	584.0	584.0	580.0
581.0	594.0	578.0	577.0	577.0	581.0	587.0
579.0	576.0	576.0	577.0	578.0	577.0	577.0
579.0	582.0	578.0	579.0	578.0	576.0	578.0
576.0	577.0	577.0	577.0	578.0	576.0	578.0
579.0	579.0	581.0	580.0	580.0	581.0	580.0
578.0	580.0	579.0	577.0	578.0	579.0	578.0
577.0	579.0	578.0	576.0	578.0	576.0	578.0
581.0	578.0	578.0	582.0	582.0	582.0	583.0
580.0	581.0	582.0	579.0	581.0	580.0	580.0
581.0	580.0	577.0	577.0	580.0	579.0	577.0
575.0	572.0	580.0	583.0	583.0	579.0	582.0
584.0	582.0	583.0	581.0	582.0	582.0	584.0
582.0	583.0	582.0	580.0	582.0	580.0	583.0
582.0						

B:PLMG200N

PORTLAND MINE MAGNETICS 200N

2.5

121

535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	580.0	577.0
578.0	579.0	576.0	578.0	578.0	578.0	580.0
578.0	577.0	577.0	579.0	577.0	577.0	578.0
581.0	581.0	580.0	586.0	587.0	535.0	570.0
574.0	583.0	581.0	582.0	584.0	584.0	583.0
581.0	584.0	581.0	585.0	584.0	587.0	588.0
588.0	584.0	580.0	588.0	586.0	585.0	587.0
589.0	588.0	588.0	584.0	584.0	585.0	580.0
574.0	601.0	590.0	591.0	586.0	584.0	583.0
581.0	581.0	584.0	582.0	584.0	585.0	584.0
585.0	587.0	584.0	586.0	583.0	585.0	586.0
584.0	585.0	586.0	585.0	586.0	584.0	586.0
584.0	587.0					

## B:PLMG250N

## PORTLAND MINE MAGNETICS 250N

2.5	121						
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	576.0	575.0	581.0
605.0	622.0	576.0	595.0	603.0	584.0	584.0	581.0
576.0	574.0	570.0	576.0	578.0	586.0	586.0	583.0
581.0	582.0	582.0	583.0	583.0	587.0	587.0	590.0
590.0	588.0	586.0	589.0	591.0	592.0	592.0	600.0
597.0	596.0	594.0	597.0	597.0	597.0	597.0	596.0
601.0	607.0	603.0	604.0	600.0	604.0	604.0	612.0
596.0	593.0	591.0	594.0	590.0	588.0	588.0	587.0
590.0	587.0	586.0	584.0	585.0	586.0	586.0	585.0
583.0	584.0	585.0	586.0	588.0	587.0	587.0	583.0
588.0	587.0	588.0	588.0	587.0	585.0	585.0	589.0
586.0	590.0	591.0	585.0	584.0	584.0	584.0	585.0
586.0	584.0						

## B:PLMG150N

## PORTLAND MINE MAGNETICS 150N

2.5	121						
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	576.0	576.0	580.0
580.0	579.0	582.0	582.0	581.0	580.0	580.0	582.0
581.0	582.0	580.0	582.0	579.0	582.0	582.0	582.0
581.0	580.0	580.0	585.0	583.0	583.0	583.0	586.0
585.0	585.0	586.0	586.0	586.0	589.0	589.0	591.0
592.0	591.0	592.0	593.0	593.0	593.0	593.0	593.0
592.0	592.0	592.0	592.0	594.0	592.0	592.0	593.0
594.0	593.0	595.0	596.0	594.0	593.0	593.0	591.0
590.0	591.0	590.0	588.0	588.0	590.0	590.0	589.0
586.0	587.0	588.0	586.0	583.0	586.0	586.0	586.0
587.0	584.0	582.0	584.0	582.0	583.0	583.0	583.0
590.0	591.0	591.0	590.0	593.0	592.0	592.0	581.0
582.0	582.0						

## B:PLMG300N

## PORTLAND MINE MAGNETICS LINE 300N

2.5	121						
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0	576.0
574.0	574.0	571.0	573.0	574.0	571.0	571.0	573.0
573.0	575.0	577.0	575.0	571.0	573.0	573.0	571.0
573.0	576.0	574.0	577.0	575.0	578.0	578.0	578.0
580.0	583.0	583.0	580.0	579.0	580.0	580.0	579.0
581.0	584.0	582.0	584.0	580.0	583.0	583.0	579.0
584.0	579.0	582.0	578.0	590.0	599.0	599.0	597.0
598.0	586.0	590.0	595.0	618.0	617.0	617.0	596.0
644.0	597.0	592.0	584.0	600.0	604.0	604.0	592.0
582.0	590.0	601.0	610.0	584.0	588.0	588.0	583.0
582.0	579.0	580.0	584.0	586.0	584.0	584.0	586.0
585.0	584.0	586.0	588.0	586.0	588.0	588.0	590.0
588.0	590.0	586.0	588.0	587.0	586.0	586.0	588.0
588.0	590.0	595.0	598.0	599.0	600.0	600.0	598.0
595.0	593.0	592.0	590.0	590.0	592.0	592.0	590.0
591.0	591.0						

B:PLMG225N  
PORTLAND MINE MAGNETICS LINE 225N

2.5	121					
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
574.0	586.0	595.0	584.0	582.0	587.0	594.0
584.0	591.0	575.0	544.0	537.0	566.0	585.0
596.0	600.0	641.0	623.0	617.0	613.0	680.0
638.0	620.0	628.0	622.0	651.0	601.0	576.0
580.0	586.0	585.0	586.0	588.0	592.0	591.0
588.0	587.0	589.0	585.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0

B:PLMG275N  
PORTLAND MINE MAGNETICS LINE 275N

2.5	121					
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	574.0
574.0	573.0	572.0	575.0	572.0	574.0	573.0
572.0	574.0	572.0	572.0	575.0	575.0	576.0
577.0	584.0	580.0	580.0	566.0	570.0	578.0
562.0	535.0	559.0	586.0	579.0	581.0	588.0
586.0	540.0	535.0	587.0	580.0	566.0	578.0
581.0	577.0	572.0	573.0	579.0	588.0	584.0
576.0	578.0	582.0	602.0	628.0	635.0	605.0
592.0	581.0	578.0	581.0	580.0	582.0	583.0
586.0	585.0	581.0	585.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0

B:PLMG350N  
PORTLAND MINE MAGNETICS LINE 350N

2.5	121					
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
535.0	535.0	535.0	535.0	535.0	535.0	535.0
601.0	600.0	600.0	601.0	605.0	604.0	607.0
605.0	607.0	610.0	609.0	610.0	608.0	610.0
609.0	607.0	605.0	606.0	600.0	597.0	594.0
595.0	593.0	592.0	594.0	594.0	588.0	582.0
597.0	612.0	605.0	594.0	597.0	601.0	600.0
595.0	592.0	590.0	583.0	586.0	585.0	586.0
585.0	581.0	580.0	584.0	586.0	588.0	585.0
584.0	583.0	584.0	586.0	587.0	587.0	587.0
589.0	588.0	588.0	589.0	590.0	588.0	591.0
591.0	590.0	587.0	588.0	588.0	588.0	589.0
589.0	588.0	590.0	589.0	591.0	588.0	588.0
590.0	590.0					

TABLE 2  
SELF POTENTIAL DATA

---

## B:PLSP150N

PORTLAND MINE SP LINE 150N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	-12.0	-12.0	-18.0	-17.0
-17.0	-22.0	-10.0	-6.0	-9.0	-11.0	-16.0	-16.0
0.5	-11.0	-13.0	-17.0	-16.0	-20.0	-21.0	-21.0
-18.0	-8.0	-16.0					

## B:PLSP200N

PORTLAND MINE SP LINE 200N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	-14.0	-1.0	-5.0	7.0
6.0	-15.0	-5.0	11.0	5.0	1.0	-4.0	-4.0
-16.0	-1.0	4.0	-6.0	3.0	6.0	2.0	2.0
15.0	12.0	15.0					

## B:PLSP250N

PORTLAND MINE SP LINE 250N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	-13.0	-8.0	-5.0	-15.0
-4.0	2.0	-9.0	-10.0	-10.0	5.0	4.0	4.0
4.0	-4.0	-1.0	-3.0	4.0	6.0	2.0	2.0
2.0	4.0	-5.0					

## B:PLSP300N

PORTLAND MINE SP LINE 300N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	-3.0	-15.0	-18.0	-16.0
-13.0	-8.0	-7.0	-11.0	-9.0	-25.0	-8.0	-8.0
-6.0	0.0	-4.0	-17.0	0.0	-7.0	-15.0	-15.0
-17.0	-20.0	-10.0					

## B:PLSP350N

PORTLAND MINE SP LINE 350N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	-10.0	-14.0	-14.0	-15.0
-6.0	0.5	6.0	6.0	-6.0	3.0	-1.0	-1.0
1.0	10.0	1.0	6.0	3.0	-13.0	-5.0	-5.0
-3.0	-2.0	-3.0					

## B:PLSP400N

PORTLAND MINE SP LINE 400N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	6.0	-2.0	-12.0	-16.0
-13.0	-9.0	-9.0	-21.0	-10.0	-14.0	-6.0	-6.0
1.0	-6.0	-17.0	-21.0	-14.0	-7.0	-14.0	-14.0
-16.0	-11.0	-6.0					

## B:PLSPOOE

PORTLAND MINE SP BASELINE 100-400N

10	31						
0.0	-15.0	-16.0	-13.0	-16.0	-12.0	-19.0	
-4.0	-19.0	-9.0	-14.0	-8.0	-7.0	-7.0	
-9.0	-13.0	-9.0	-8.0	-11.0	-8.0	-3.0	
-4.0	-7.0	-14.0	-14.0	-10.0	-6.0	2.0	
-12.0	-6.0	6.0					

## B:PLSP50E

PORTLAND MINE SP 50E 100-400N

10	31						
0.0	0.0	0.0	0.0	0.0	-22.0	-16.0	
-13.0	-22.0	-19.0	-15.0	-16.0	-12.0	-22.0	
-20.0	2.0	-9.0	-8.0	-8.0	-3.0	-8.0	
-2.0	-4.0	-9.0	-2.0	0.5	-4.0	-15.0	
-10.0	-13.0	-9.0					

## B:PLSP100E

PORTLAND MINE SP 100E 100-400N

10	31						
0.0	0.0	0.0	0.0	0.0	-16.0	-4.0	
-21.0	-24.0	-21.0	-6.0	2.0	6.0	-20.0	
-7.0	4.0	-10.0	-18.0	-13.0	-14.0	-8.0	
-9.0	-4.0	0.0	-4.0	0.5	9.0	5.0	
13.0	-3.0	-6.0					

TABLE 3  
RESISTIVITY DATA

---

## B:PLRE175N

## PORTLAND MINE RESISTIVITY 175N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	167.0	162.0
162.0	180.0	165.0	181.0	198.0	184.0	173.0	173.0
173.0	186.0	182.0	176.0	172.0	167.0	164.0	164.0
160.0	160.0	163.0	170.0	172.0	165.0	168.0	168.0
174.0	180.0	192.0					

## B:PLRE200N

## PORTLAND MINE RESISTIVITY 200N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	166.0	171.0	163.0	217.0	217.0
192.0	197.0	190.0	190.0	177.0	177.0	177.0	177.0
173.0	170.0	165.0	174.0	184.0	177.0	180.0	180.0
179.0	189.0	202.0					

## B:PLRE225N

## PORTLAND MINE RESISTIVITY 225N

10	31						
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	148.0	172.0	175.0	185.0	185.0
190.0	198.0	195.0	180.0	163.0	163.0	164.0	164.0
167.0	159.0	166.0	170.0	169.0	173.0	181.0	181.0
185.0	176.0	180.0					

## B:PLRE275N

## PORTLAND MINE RESISTIVITY 275N

10	31						
188.0	186.0	185.0	184.0	175.0	183.0	172.0	172.0
155.0	145.0	152.0	146.0	130.0	132.0	123.0	123.0
113.0	115.0	123.0	126.0	123.0	126.0	128.0	128.0
127.0	126.0	136.0	134.0	143.0	146.0	142.0	142.0
146.0	147.0	153.0					