86-2523

056001

A REPORT ON

MAGNETIC INDUCED POLARIZATION SURVEYS

AT DIAL RANGE (EL 24/73), ULVERSTONE, TASMANIA

ON BEHALF OF

PENNZOIL OF AUSTRALIA LIMITED

000

056002

PRIVATE AND CONFIDENTIAL

A REPORT ON
MAGNETIC INDUCED POLARIZATION SURVEYS
AT DIAL RANGE (EL 24/73), ULVERSTONE, TASMANIA
ON BEHALF OF
PENNZOIL OF AUSTRALIA LIMITED

BY

A.W. HOWLAND-ROSE
MSc,DIC,AMAusIMM,FGS.
GEOPHYSICIST

SYDNEY, N.S.W.

FEBRUARY, 1977
TAS - 036

001

056003

CONTENTS

002

056004

SCINTREX PTY. LTD.

GEOPHYSICAL CONSULTANTS AND CONTRACTORS

SUMMARY

A magnetic induced polarization survey executed in the Dial Range area has revealed a number of induced polarization responses that are considered to be highly significant and worthy of detailed ground follow-up. The impression at the Dial Mine area is of limited strike length segregations of coarse grained sulphides (or graphite) within a disseminated halo, while at the WD Grid and SG Grids, substantial induced polarization responses require detailed exploration. Other areas surveyed showed anomalies of lesser amplitude.

1031 WELLINGTON STREET, WEST PERTH, W.A. 6005 — TELEPHONE: 21 6934, TELEX: 92353, TELEGRAMS: SCINTREX, PERTH

6 TRAMORE PLACE, KILLARNEY HEIGHTS, N.S.W. 2087 — TELEPHONE: 451 5367, TELEX: 26857, TELEGRAMS: SCINTREX, SYDNEY

A REPORT ON
MAGNETIC INDUCED POLARIZATION SURVEYS
AT DIAL RANGE (EL 24/73), ULVERSTONE, TASMANIA
ON BEHALF OF
PENNZOIL OF AUSTRALIA LIMITED

INTRODUCTION

At the request of Mr. M. Tippett, Exploration Manager for Pennzoil of Australia Limited, Scintrex Pty. Ltd. executed induced polarization surveys in the magnetic mode over some 18 lines within the Dial Range (EL 24/73) prospect, near Ulverstone Tasmania. The work was executed by senior operator Mr. B. Ekstrom assisted by Mr. G. Street, B.Sc., on some 11½ double operator and 2¼ single operator days between the 6th and 21st January, 1977.

On site geological supervison was undertaken variously by Mr. J. Chapman and Mr. T. Scott, while the author provided such additional geophysical supervison as was required.

OBJECTIVES

The objectives of this survey were to locate and define areas of anomalous induced polarization and in particular, carry out MIP surveys over the Dial Range grid over which EIP surveys had been carried out earlier. This latter work is described in Scintrex Report TAS-024.

EQUIPMENT

The equipment consisted of a Scintrex 10/15KW time domain induced polarization transmitter with a Scintrex MFM-3 sensor coupled to a Scintrex IPR-8 induced polarization receiver.

The magnetic induced polarization method as applied in this area is briefly described in previous reports VIC-007 and VIC-009.

DATA PRESENTATION

The data is displayed at a horizontal scale of 1:2500. The vertical scales are as follows...

Chargeability, M_1, M_3, M_5	1 centimetre = 1 milligamma/gamma
Decay Rate, ΔM	1 centimetre = 1 milligamma/gamma
Normalised horizontal magnetic field H_N	1 centimetre = 10%
Secondary magnetic field, H_S	1 centimetre = 1 milligamma/ampere

The data is presented on individual sheets.

DIAL MINE GRID

DISCUSSION OF RESULTS

Line NG-300.....Generally high internal polarization responses of 1 milligamma/gamma were recorded between about 025W and 162W, with a distinct peak of -4 milligamma/gamma at 050W. The latter

is accompanied by a slow decay rate and a very slight increase in H_N. This response is considered to be due to a *coarse* sulphide (or graphite) source whose maximum depth is of the order of 50 metres.

Line NG-200(2600N).....This line does not show any similarity in form to line NG-300 described above.

The H_N data infers rock contacts at 300W and east of, or at about 100W. Centred at about 050W an internal (negative) polarization response of about 1 milligamma/gamma is interpreted as coming from a disseminated chargeable source within a host conductive with respect to the rocks to the west. The normal decay form infers a normal grain size distribution to the causative sulphides (or graphite).

Line 2400N.....Two H_N responses of over 160% of normal were defined centred at 1200E and between 1325E to 1400E. Little correlation if any, can be seen between this line and the lines to the north (NG-200) and south (line 2300N).

The most significant induced polarization response was a 4 to 5 milligamma/gamma internal (negative) polarization response recorded at 1150E which indicates a maximum depth to source of the order of 25 metres. As this response is associated with 120% primary H_N fields, the host to the mineralisation is considered to be conductive (Type 'C').

Line 2300N.....As remarked above, this line cannot be correlated with line 2400N, however, line 2200N does show a similar form in both H_N and chargeability.

West of 1475E, H_N remains above 110%-120% of normal, which indicates a near surface conductive layer to be present. However, to the east, a gradual *increase* in resistivity was noted from west (at 1400E) to east (1700E).

A significant internal (negative) polarization response of 2½ milligamma/gamma was recorded at 1100E which showed a normal decay form. The H_N field shows very little change over this response. This feature is interpreted as being due to disseminated chargeable material within a host having little resistive contrast with the enclosing material, and is at a maximum depth of 50 to 75 metres. This anomaly correlates with a smaller response of similar form on line 2200N at 1125E.

A sharp 2½ milligamma/gamma response at 1025E is considered a significant feature in spite of the single reading *and* the possible exaggeration. H_N shows a slight depression over this response which infers the host to the chargeable material to be slightly more resistive than the enclosing material. The maximum depth is of the order of 20 metres. The slow decay form ($M_5 > M_1$) infers a coarser than normal causative source.

A significant response of the order of 2 to 3 milligamma/gamma *above background* was noted between 1300E and 1400E with two inferred sources, one at 1300E-1312E and a second larger one at 1375E. In the former case no significant change in H_N was noted while in the latter, a small decrease was seen. The maximum depth to these two essentially disseminated sources is estimated to be of the order of 50 to 60 metres. This response is clearly seen to continue across line 2200N at 1370E.

No further significant responses were noted.

COMPARISON WITH EIP DATA.... The MIP response of up to -4 milligamma/gamma above return current flow centred at about 1362E is reflected in the EIP data by a series of small EIP induced polarization responses between 1350E and 1450E. A prominent 7 to 8 millisecond response at 1625E is seen as a much smaller MIP response of about 1 milligamma/gamma at about 1637E. An EIP response of about 7 milliseconds at 1550E is NOT seen on the MIP data. This infers that the source is out of focus, i.e. that the strike length of the chargeable source is "small" compared with the size of the energising electrode. The difference in EIP and MIP conductivities is put down to the former reflecting more distortions close to surface and the latter the sum of current distribution to depth.

*Line 2200N.....*The form of both the H_N and chargeability profiles are similar to the lines to the immediate north and south, inferring a continuity of geological strike to both the north and south.

West of about 1400E, the H_N field remains above 115% of normal for the most part, while to the east of this point, the H_N falls steadily from about 125% of normal to 60% of normal at 1750E, indicating a steady *increase* in resistivity in that direction.

One of the most significant induced polarization anomalies recorded in the area was a substantial internal (negative) polarization response of 6 milligamma/gamma above background. This response was defined centred at 1362E. Overall there is no significant change in H_N, although a local increase in H_N of 20% to 137% of normal was located at 1350E. Therefore, on the whole, the source of the response is considered to be either disseminated, or if massive, electrically discontinuous. The maximum depth to source is considered to be of the order of 80 metres to 100 metres. While M_5 is in fact greater than M_1, the grain size is considered only slightly coarser than average due to the absolute size of the anomaly.

An internal (negative) induced polarization response of about 1½ milligamma/gamma was centred at about 1125E and was not associated with any material H_N. This response is interpreted as being due to disseminated or electrically discontinuous chargeable material within a host which has no resistive contrast with the enclosing material. The maximum depth to source may be as great as 75 metres. This response is clearly correlated to a somewhat more material response centred at 1100E on line 2300N

(also Type 'B') and a similar response on line 2095N at 1125E (Type 'C').

COMPARISON WITH EIP DATA.... The electrical induced polarization data can be compared with the magnetic induced polarization data. Individual EIP peaks can in general be clearly correlated with MIP peaks. However, the emphasis is in fact quite different. The material internal (negative) induced polarization response centred at about 1362E is seen as a broad low amplitude EIP response of 10 to 12 milliseconds superimposed on a high background, whereas a larger 15 to 20 milliseconds EIP anomaly at 1675E is seen on the MIP data as a relatively small -1 milligamma/gamma response at 1662E. These differences are particularly attributed to the FOCUS of the current electrodes and partly to the difference in energising current (MIP ALONG strike with EIP ACROSS strike).

Line 2095N.....Both the chargeability and the primary horizontal field data profiles can clearly be correlated between lines 2200N and 2095N. However, the H_N data shows greater variation in rock type resistivities west of 1400E than seen on previous lines to the north.

While the chargeability response centred at 1125E on line 2200N correlates with no significant change in H_N, on this line the correlative at 1125E is clearly associated with a material 160% increase in H_N. Thus the relatively small 1½ to 2 milligamma/gamma internal (negative) induced polarization response is, in this

case, due to the chargeable material being contained within a host which is *more conductive* than the enclosing rock units. The form of the magnetic induced polarization response itself suggests a conductive near surface layer west of 1275E, while the depth to source is estimated to be of the order of 50 to 65 metres. The normal decay form suggests an "average" grain size to the causative source.

The single substantial MIP response seen at about 1350E on the previous line is here seen to be a much broader response whose source(s) extend from 1275E to 1525E. Although in absolute terms the magnitude of this response never really exceeds -1 milligamma/gamma, the stronger external (positive) polarization responses of +2 to +3 milligamma/gamma to the east and west clearly accentuate the feature. The decay forms within the zone are normal, while the H_N infers this zone to be significantly more conductive than the rock units *to the east* but less conductive than those to the west.

This response is interpreted as coming from disseminated or weakly interconnected chargeable material contained within a host rock which is more conductive than those enclosing it to the east, but less conductive than those flanking it to the west. The maximum depth to source is difficult to ascertain with any degree of certainty, but on the western and eastern flanks, the depth to source *appears* to be of the order of 75 metres to 85 metres.

A current set-up whose centre was situated at 1975E was surveyed in between 1750E and 2250E on line 2095N. This section of the line shows a spectacular change in H_N from just under 400% at 1750E to about 120% at 1950E. This situation shows a major change in rock type centred at 1850E $\pm$ 30 metres. This very significant increase in H_N is not accompanied by any material change in chargeability and is therefore caused by non-chargeable conduction within the rock unit itself.

A small but significant internal magnetic induced polarization response of 2 milligamma/gamma was recorded at 2000E from a source which shows a normal decay form and no material change in H_N. The source is therefore interpreted to be Type 'B', narrow disseminated chargeable material contained within a host which shows no resistive contrast with the enclosing rocks, and which lies at a maximum depth which is estimated as 60 metres.

A second similar response was recorded at 2125E which shows a somewhat slower decay form, a slightly higher amplitude (-2 to -3 milligamma/gamma) and is accompanied by an *increase* in H_N (Type 'C'). The maximum depth to source in this case is considered to be about 50 metres.

Line 2000N.....The very significant change in H_N first noted on line 2095N was again seen on this line centred at about 1850E. However, in detail, the H_N field changes from 130% at 2000E to

360% at 1750E. This substantial change in H_N undoubtedly represents a material change in rock type centred at about 1850E, as it is not associated with any anomalous induced polarization response. However, the more resistive unit *is* somewhat more chargeable overall.

The most significant induced polarization response recorded on this line was a zone between 1400E and 1512E where negative internal polarization responses of up to 4 milligamma/gamma above external (positive) currents were defined. Two main sources are indicated at about 1400E - 1412E, and the second at, or just east of 1475E. The maximum depths to source are estimated as 50 metres and 75 metres respectively. This response clearly correlates with the eastern end of the wide response between 1275E-1505E on line 2095N. As these responses (on line 2000N) are associated with an *increase* in H_N, the chargeable source material is obviously contained within a conductive host.

While chargeabilities remain slightly more negative (i.e. internal) within the resistive eastern rock unit, east of 1750E, these values are not considered to be truly anomalous. The predominantly positive external polarization readings of up to +2 milligamma/gamma noted between 1550E and 1725E are considered to be discharge zones for the more chargeable responses to the east and west described above.

Between about 2025E and 2250E (the end of the Line) the induced polarization response gradually rises to over -3 milligamma/gamma and is associated with extremely slow decay forms. In addition H_N increases sympathetically. This section therefore represents a more conductive zone containing a coarse grained source. Due to the wide non-discrete source, the depth to source cannot be estimated.

Line 1900N.....Between the points surveyed (1750E - 2250E) this line shows similar form in both the chargeability and H_N profiles to the lines surveyed to the north and south.

As on lines to the north, the most prominent feature is the very sharp change in H_N from 300%+ at 1750E to 120% at 1950E. This signifies a major change in rock type, with the more conductive unit being west of 1900E. There is no associated induced polarization response.

The only significant induced polarization responses recorded on this line were noted between about 2050E and the eastern end of the line at 2250E. As with its obvious correlative on line 2000N, the internal induced polarization response is associated with an increase in H_N. Thus the anomaly type is 'C/B'.

A distinct peak of 4 milligamma/gamma (M_1) to 5½ milligamma/gamma (M_5) was noted within this zone at 2125E. The maximum depth to

source of the response is estimated as less than 50 metres. The depth to the source overall, however, is difficult to assess due to the broad nature of the disseminated source.

COMPARISON WITH EIP DATA.... The EIP chargeability data and MIP appear to be complimentary, but the MIP data emphasises particular zones, (e.g. 2125E). The spectacular rise in H_N west of 1900E is accompanied by a fall in apparent resistivity of the order of 70%. However, the magnitude of the increase in conductivity could not have been predicted. This "apparent" paradox is due to the fact that the apparent resistivity data is much influenced by near surface conditions, while the H_N sums information from the whole "half-space". Thus the conductive unit IS NOT a surface feature.

*Line 1800N.....*Again the main feature on this line was the massive change in H_N from just under 400% at 1750E to 110% of normal at 1950E. As with the lines to the north, this change was not associated with any anomalous induced polarization response.

A most significant induced polarization response was recorded from about 2000E to 2250E which has two very definite sources at 2025E and at 2137E, whose maximum depth to source are estimated to be of the order of 75 metres in both cases. (A possible third source *may* be present at 2075E). The magnitude of the responses are 4 and 7-8 milligamma/gamma.

It should be noted that the M_1 values are significantly smaller than M_3 and M_5. This is due to electromagnetic coupling rather than to the decay rate of the

induced polarization effect itself.

As there is no significant change in H_N over these anomalous responses, the source material is considered to be disseminated, or if massive, electrically discontinuous, and contained within a host having little or no resistivity contrast to the enclosing material (Type 'B').

COMPARISON WITH EIP DATA.... The EIP chargeability is similar in FORM to that observed on the MIP profile, however, the MIP data is very much emphasised. The massive increase in H_N west of 1900E is reflected in the apparent resistivity data as a minor decrease in ρa. It is considered that the H_N is a change in rock type at depth, rather than a change in near surface conditions.

GENERAL CONCLUSIONS

1. The magnetic induced polarization data appears to indicate that the method worked reasonably well on all the lines surveyed.

2. The electrical and magnetic induced polarization surveys are complimentary, the difference in emphasis of the induced polarization responses being due to (a) the focussing effect of the current electrodes and (b) the transverse direction of the energising currents.

3. The conductivity picture as seen via the H_N and ρa in the MIP and EIP methods respectively, shows *generally* the same picture, but in detail the *emphasis* is very different. It should be realised that the H_N data represents the effect of the whole half-space, while ρa is subject to much local inhomogeneity. The former is thus a far more reliable overall indicator.

4. Reading speeds in this area were low. This was due to low signal strength, ground settling of the sensors, wet weather and moving ground conditions due to wind in the trees.

DETAILED CONCLUSIONS

1. The data shows a sharp and massive change in the resistivity characteristics of the rocks at about 1850E $\pm$50 metres on lines 1800N to 2095N inclusive. The massive three to four fold increase in H_N from east to west is due to a truly significant change in rock type to depth, and not to surface conductivity changes. While the apparent resistivity data mirrors this change, it is not as significant, indicating that near surface inhomogeneities *are not* the source.

2. This substantial increase in H_N is not associated with any increase in induced polarization response.

3. All the magnetic induced polarization responses recorded in

the area are internal (negative) and of conventional types 'A', 'B' and 'C'. These have been summarised on the accompanying MIP interpretation plan.

4. The *impression* is that although the *form* of the internal polarization response changes, there *is* continuity along strike. Where such is considered likely, such correlation is suggested by fine to coarse lines depending on the degree of certainty of that correlation.

5. A series of responses were located within the more resistive unit between 2200E and 2000E on lines 1800N to 2095N. On line 2095N two maxima at 2000E (Type 'B') and 2125E (Type 'C') were located, while on line 2000N only higher internal polarization (Type 'B') was recorded east of 2025E. Further south on line 1900N east of 2100E, much higher internal polarization was noted, while on line 1800N the most significant responses were recorded east of 2012E to the end of the line. Now this zone is considered *the same unit* with increasing chargeable material to the south. The fact that individual anomalies within the high background cannot be correlated suggests that the strike lengths of the segregated sulphide or graphite source are less than the order of the line spacing, and all are contained within a disseminated sulphide or graphite halo.

Within the zone, the anomaly located at 2137E is the most significant, and the source should be investigated.

6. In very similar fashion to the above, a series of anomalies were located between lines 2400N and 2095N, west of about 1200E. The most significant response was at 1100E on line 2300N (Type 'B'), and this too should be investigated in detail.

7. A further series of induced polarization responses were noted along Revells Creek on all lines between 2000N and 2400N. Again the *form* changes between lines, however, the zone is considered continuous along strike. The most significant response was located at *about* 1375E (Type 'B/C') on line 2200N, and the source at this site should be unambiguously defined.

8. The decay form of the majority of the anomalies located at Dial are inferred either to have a *coarse* or *coarser than average* source. The *impression* is that sulphides are not interconnected, but rather that the host to the mineralisation effects their conductivity.

9. The depths to source indicated, varies from 25 metres to over 120 metres, but on the average they are in the range 60 metres to 85 metres.

LINGS GRID

DISCUSSION OF RESULTS

Two lines 1300E and 1150E were surveyed over this area. The former between 1025N and 800N, and the latter between 1150N and 800N.

On both lines the northern section is characterised by extremely low H_N values which rise to the south to reach a peak of over 80% of normal on line 1300E at 837N and 130% of normal at 850N on line 1150E. This feature on both lines is considered the same geological event.

The most significant induced polarization response in the area was located centred on line 1150E at 962N and is characterised by normal decay rates and low (50% normal) H_N values. The maximum depth to source for this response could be as great as 100 metres. The 3 milligamma/gamma response is considered significant and worthy of further investigation.

Assuming the H_N peak referred to above *IS* the same geological feature, the correlative of the above MIP response on line 1300E is seen as two distinct *relative* internal polarization responses centred at 975N and 925N. Very strong *external* polarization backgrounds over this response infer a *conductive* near surface cover to be present.

A second definite internal (negative) polarization response was recorded on line 1150E at 1075N from a source estimated to lie at a maximum depth of the order of 40 to 45 metres. A slight *increase* in H_N was noted over the overall low 40% of normal H_N values, inferring some weak conduction within the host to the mineralisation.

CONCLUSIONS

1. The only truly significant magnetic induced polarization response was recorded centred at 962N on line 1150E, where the response infers a disseminated or electrically discontinuous chargeable source to be at a depth of the order of 100 metres.

2. Other smaller responses at 1075N on line 1150E and perhaps 925N and 975N on line 1300E may be worthy of further attention *providing* there is other corroborating information.

GRID SOUTH OF DIAL MINE (SG)

DISCUSSION OF RESULTS

Two lines designated SG-500 and SG-700 were surveyed south of the Dial Mine grid. The former between 175W and 050E and the latter between 400W and 050W. It is the author's understanding that these lines form an irregular grid with 700/00 being equivalent to 500/100E.

A highly significant magnetic induced polarization response on SG-700 was recorded from sources interpreted as being between 250W and 100W. The response varies between -4 and -5 milligamma/gamma *above* return external polarization currents. The data infers separate sources centred at 100W, 150W, 200W and 250W. All show a slower than normal decay form inferring a coarse grain size and all show a significant increase in H_N which indicates the host to the mineralisation to be conductive with respect to the enclosing rocks. The maximum depth to source at 250W and 100W are 25 metres to 35 metres.

Although not complete, this response is seen also on line SG-500 between 150W and 025E. The form and characteristics are similar. However, H_N is much reduced in level, although the data *infers* it to be more conductive than the enclosing rocks.

CONCLUSIONS

The significant internal polarization responses of about -4 milligamma/gamma at 100W, 150W, 200W and 250W are due to a coarsely disseminated or weakly electrically continuous source within a host less resistive than the enclosing rocks. The source of this anomaly should be unambiguously defined. The maximum depths are of the order of 25 to 35 metres.

WHISKEY CREEK GRID

DISCUSSION OF RESULTS

Two lines, 900W and 1000W, were surveyed at Whiskey Creek from about 800S to 1100S.

Both lines show a gradual increase in H_N from 80% of normal in the south to about normal in the north. The chargeability data on both lines shows a "depressed" level of about +1 milligamma/gamma which infers a *conductive* near surface zone to be present through which the internal polarization at depth decays. The data is similar to profiles observed in some sections at Ararat and Cobar and also infers (but doesn't prove) that the near surface layer is intensely oxidised.

On line 900W a broad, relatively internal induced polarization response was noted at 875S and at 1025S, the significance of which cannot be judged, while on line 1000W a single 3 milligamma/gamma internal polarization response showing a very slow decay rate and no material change in H_N was defined at 850S. The maximum depth to the source (which is considered to be due to coarsely disseminated chargeable material within a host having no resistive contrast with the enclosing rocks) is considered to be of the order of 40 to 50 metres.

A small minor response of about -1 milligamma/gamma was noted at

975S which is considered of little importance.

CONCLUSIONS

1. The only significant anomaly recorded was situated at 850S on line 1000W where a coarse grained source was defined at a maximum depth of 40 to 50 metres.

2. Near surface conditions are *inferred* to be intensely oxidised and conductive.

AREA BETWEEN DIAL MINE AND WHISKEY CREEK (WD)

DISCUSSION OF RESULTS

Two lines, WD-500 and WD-800, were surveyed between the Dial Mine grid and the Whiskey Creek grid. Each line was surveyed from 050E to about 400W.

The most prominent feature on both lines was the extremely rapid increase in H_N to the east of 00 on each line. This indicates a material change in rock type at, or in close proximity to 00/25E in each case. The geological mapping shows that the eastern rock unit is a porpheritic keratophyre which therefore must be highly conductive *relative* to the units to the west (Cateena 'Mudstone'?). The keratophyre is not seen to be chargeable, however.

To the west of the keratophyre a *resistive* unit was recorded between about 150W and 00/025E with H_N values being as low as 50% of normal at 050W. This zone is seen to have a major zone of induced polarization at 025W on line WD-800 where internal (negative) polarization of up to 9 milligamma/gamma were recorded, and -4 milligamma/gamma on line WD-500, also at 025W.

The response of line WD-800 shows a slow decay form $M_5 > M_1$, while the response on line WD-500 shows a fast decay form $M_1 > M_5$. The maximum depth to source of this significant response is estimated to be not greater than 75 metres in both cases, and the

source is interpreted as being coarse grained chargeable material in the case of WD-800, and fine grained chargeable material in the case of WD-500, both contained within a host *resistive* relative to the enclosing rocks.

A less substantial but still significant internal polarization response was noted on, or close to, the western margin of this resistive zone. On line WD-800 at 100W the magnitude is -4 milligamma/gamma while on WD-500 at 112W the magnitude is about -3 milligamma/gamma. In both cases the decay form is normal. This zone is interpreted as being due to a source whose maximum depth is of the order of 60 metres and which consists of "average grain" size contained within a medium which is resistive relative to the rocks.

A broad zone of internal (negative) induced polarization response of up to -2 milligamma/gamma was recorded between 200W and 350W on line WD500. The H_N is slightly depressed which infers the host rock to be slightly more resistive than the enclosing rocks. The correlative response on line WD-800 shows the same characteristics from 275W to the west, but is "open" at the end of the line (375W). The source is considered to be disseminated chargeable material within a resistive host. (as shown by the depressed H_N values). The normal decay form infers an "average" grain size. The maximum depth to source is assessed to be of the order of 50 to 60 metres.

CONCLUSIONS

1. Highly significant responses of -9 milligamma/gamma and -4 milligamma/gamma were recorded at 025W on both lines WD-800 and WD-500. These warrant careful follow-up.

2. Significant responses of -4 milligamma/gamma and -3 milligamma/gamma were recorded at about 100W and 112W on lines WD-800 and WD-500 respectively. These also require careful ground follow-up.

3. A broad zone of induced polarization was recorded between 200W and 350W on line WD-500 and on line WD-800 from 275W to 375W where the anomaly remains open. The source is considered to be disseminated chargeable material within a resistive host, and it could be formational.

4. The correlation between lines is considered good.

Respectfully submitted on behalf of:

SCINTREX PTY. LTD.

A.W. HOWLAND-ROSE, MSc,DIC,AMAusIMM,FGS.

GEOPHYSICIST

028

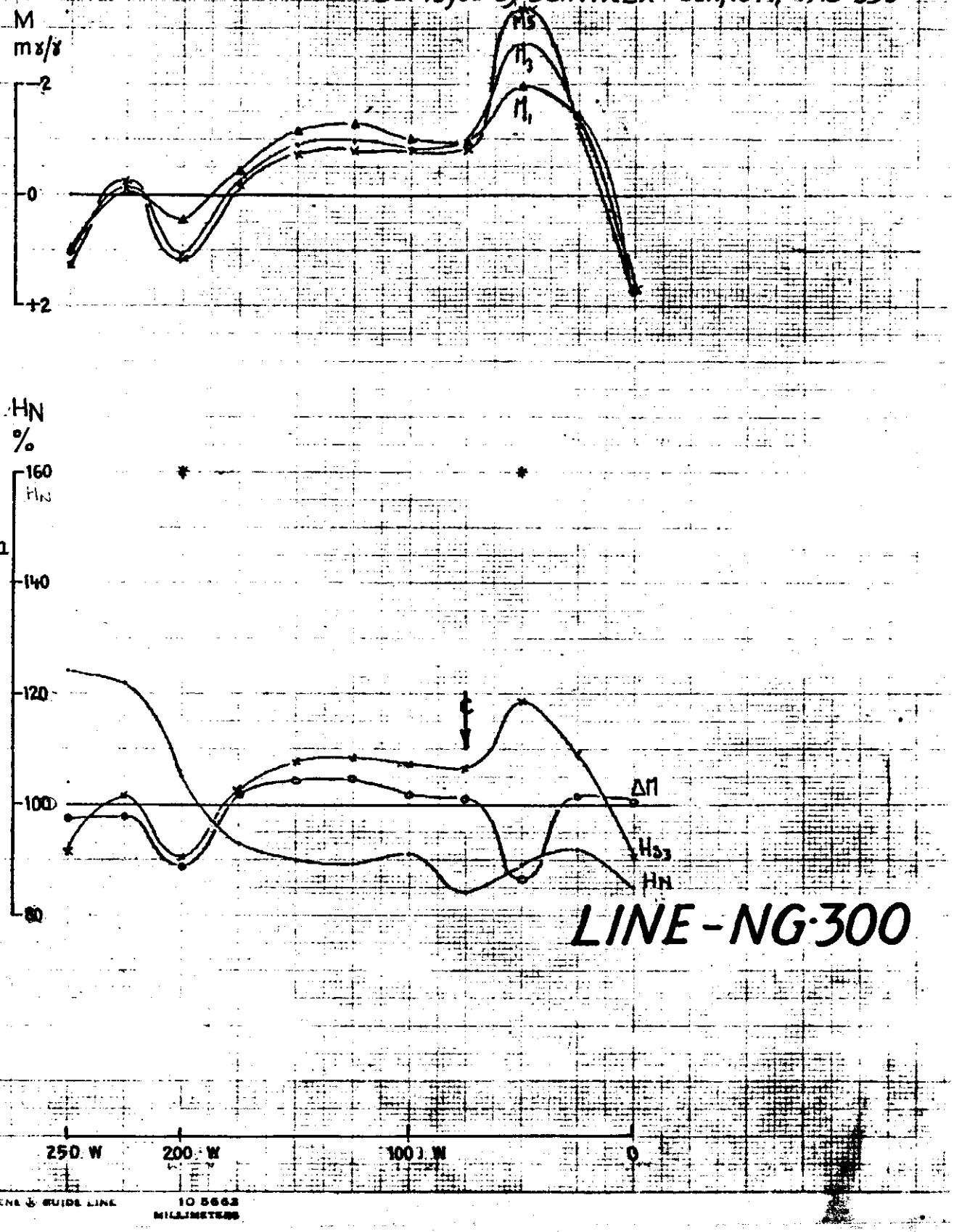
056030

PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977, TAS-036



LINE-NG·300

10 5663
MILLIMETERS

029

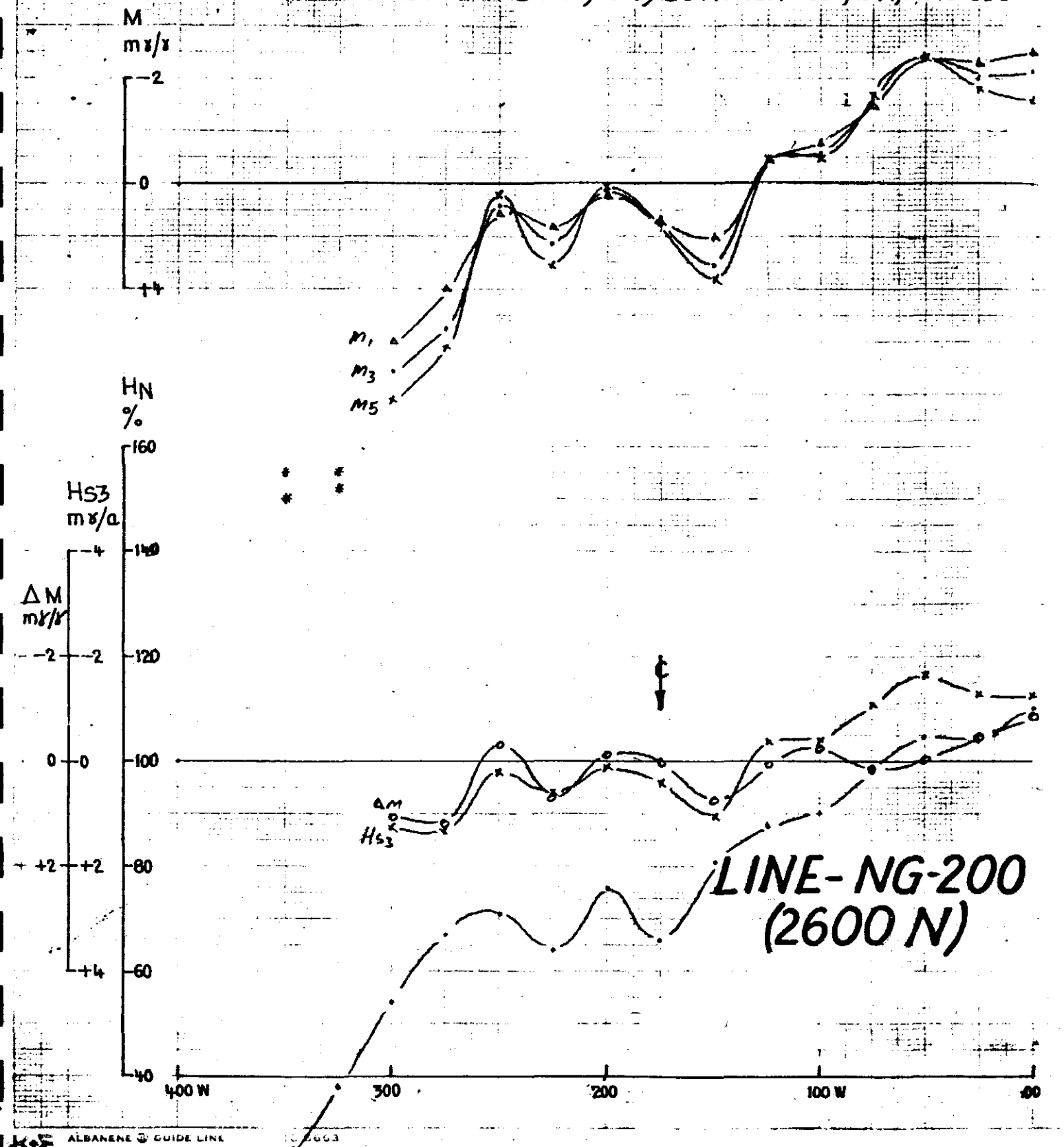
056031

PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977, TAS-036



LINE-NG-200
(2600 N)

K+E ALBANENE GUIDE LINE 10 X 10 CM 2003 MILLIMETERS

030

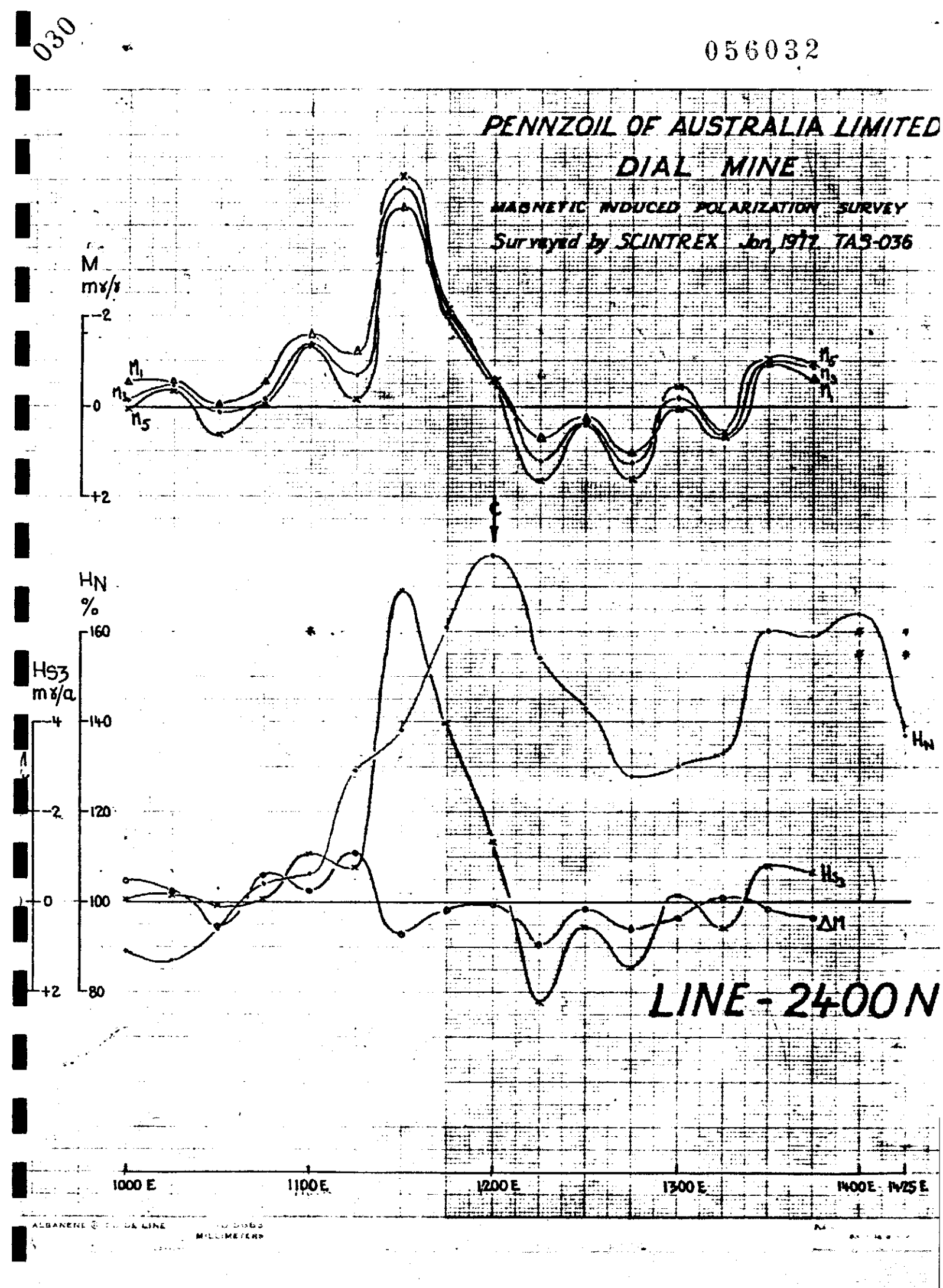
056032

PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1972 TAS-036

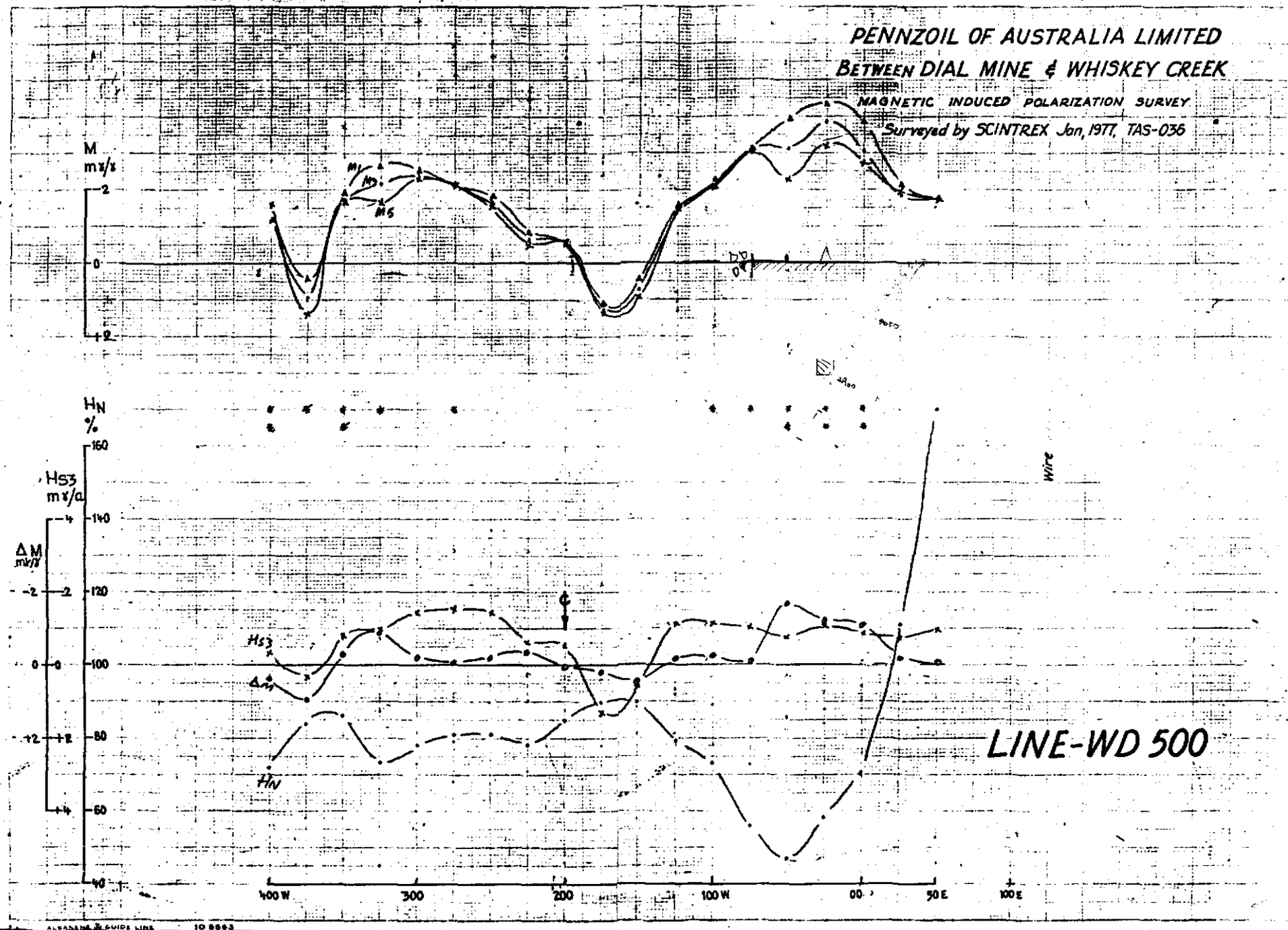


PENNZOIL OF AUSTRALIA LIMITED

BETWEEN DIAL MINE & WHISKEY CREEK

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977, TAS-036

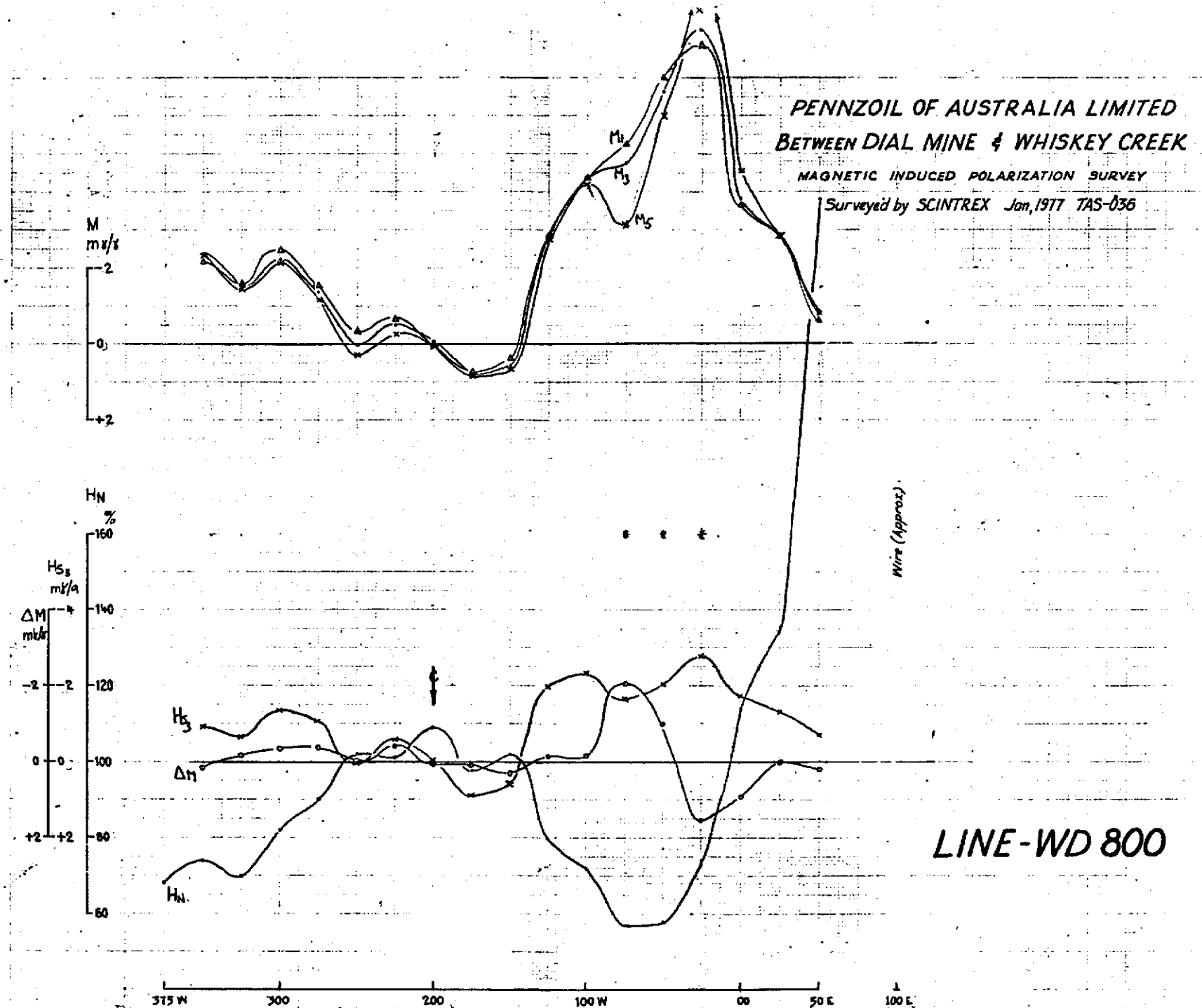


PENNZOIL OF AUSTRALIA LIMITED

BETWEEN DIAL MINE & WHISKEY CREEK

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977 TAS-036



LINE-WD 800

033

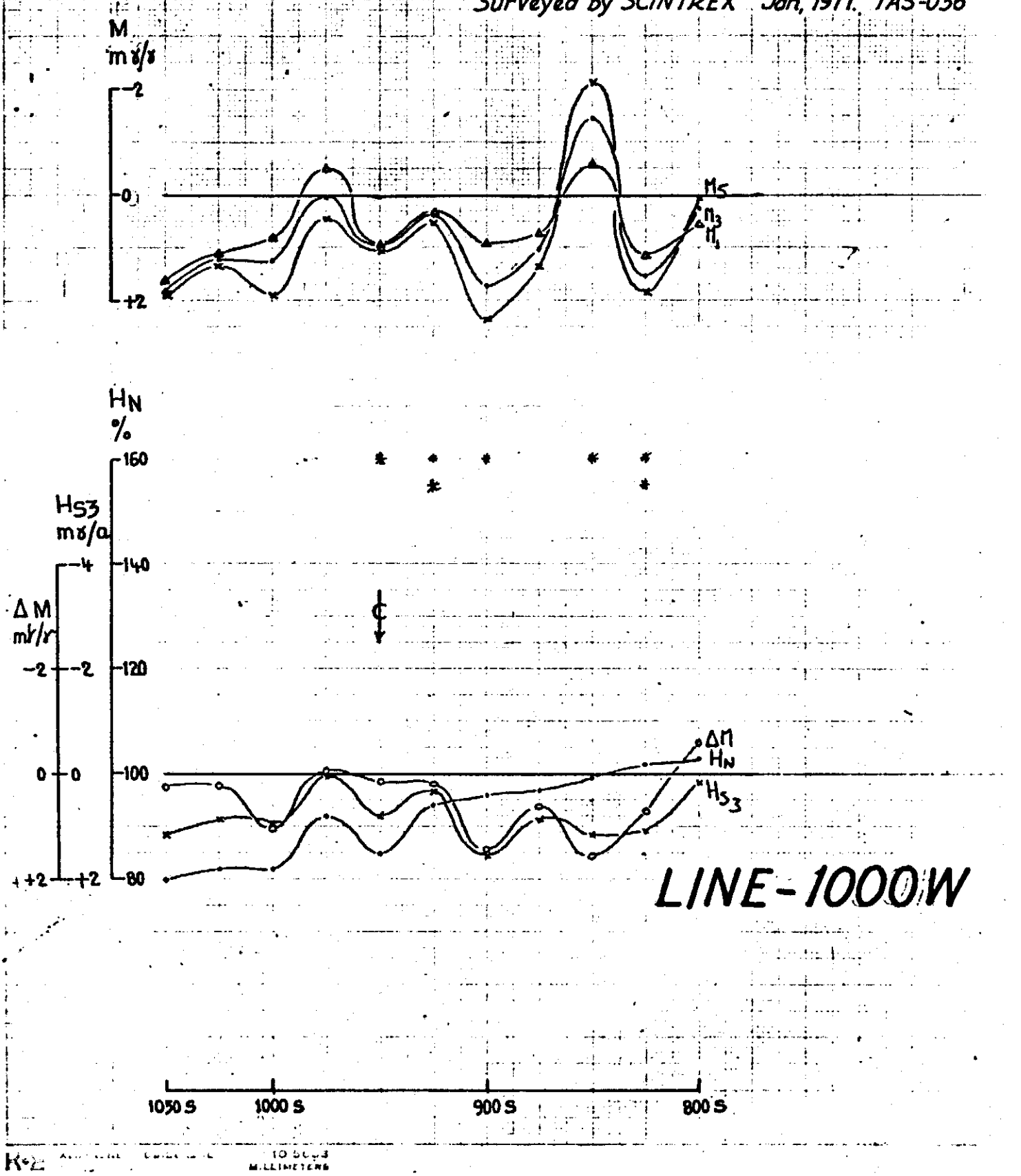
056035

PENNZOIL OF AUSTRALIA LIMITED

WHISKEY CREEK

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977. TAS-036



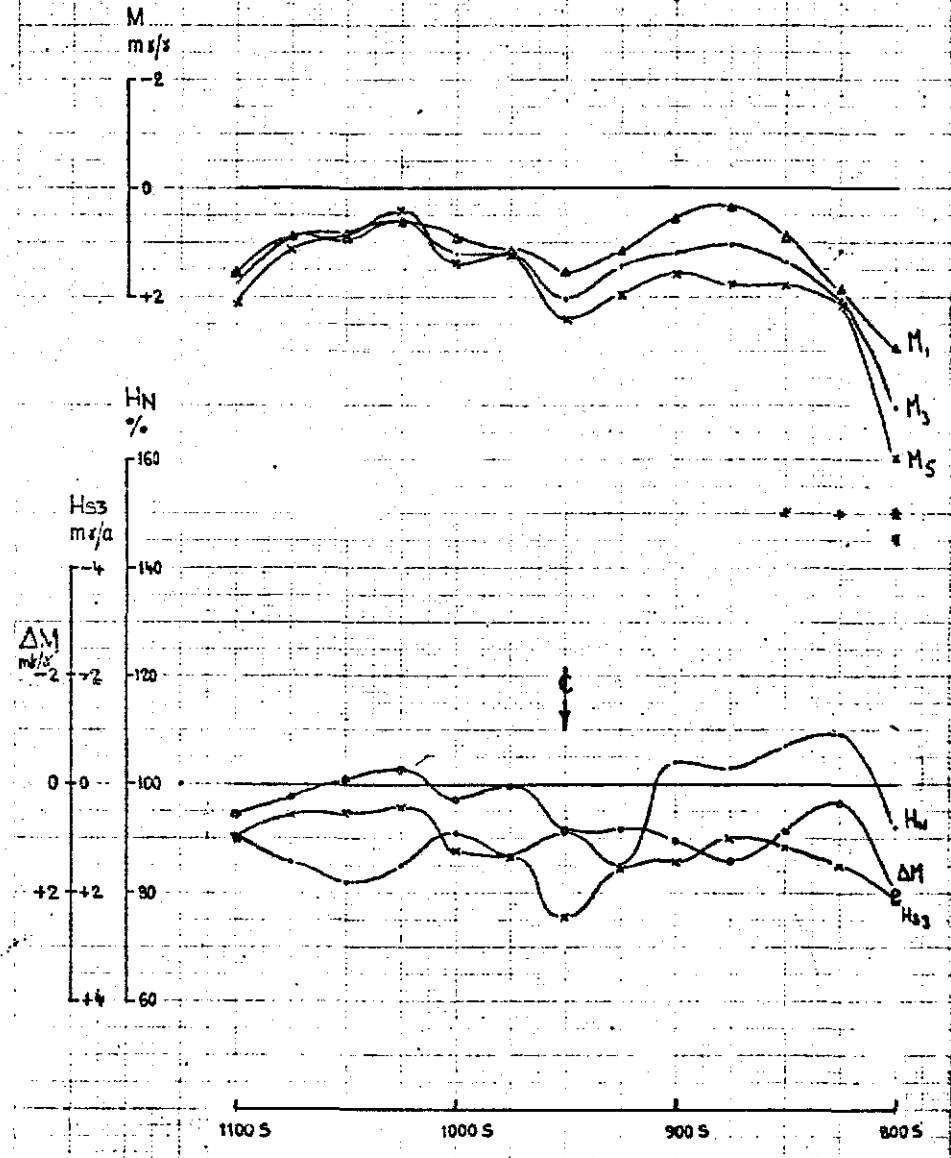
LINE-1000W

PENNZOIL OF AUSTRALIA LIMITED

WHISKEY CREEK

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977. TAS-036



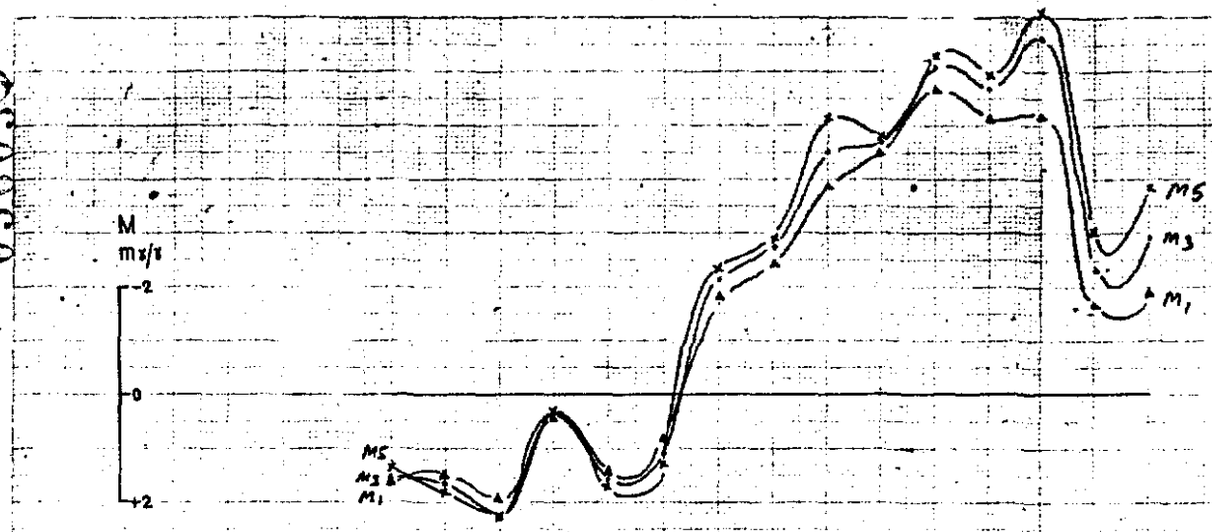
LINE - 900W

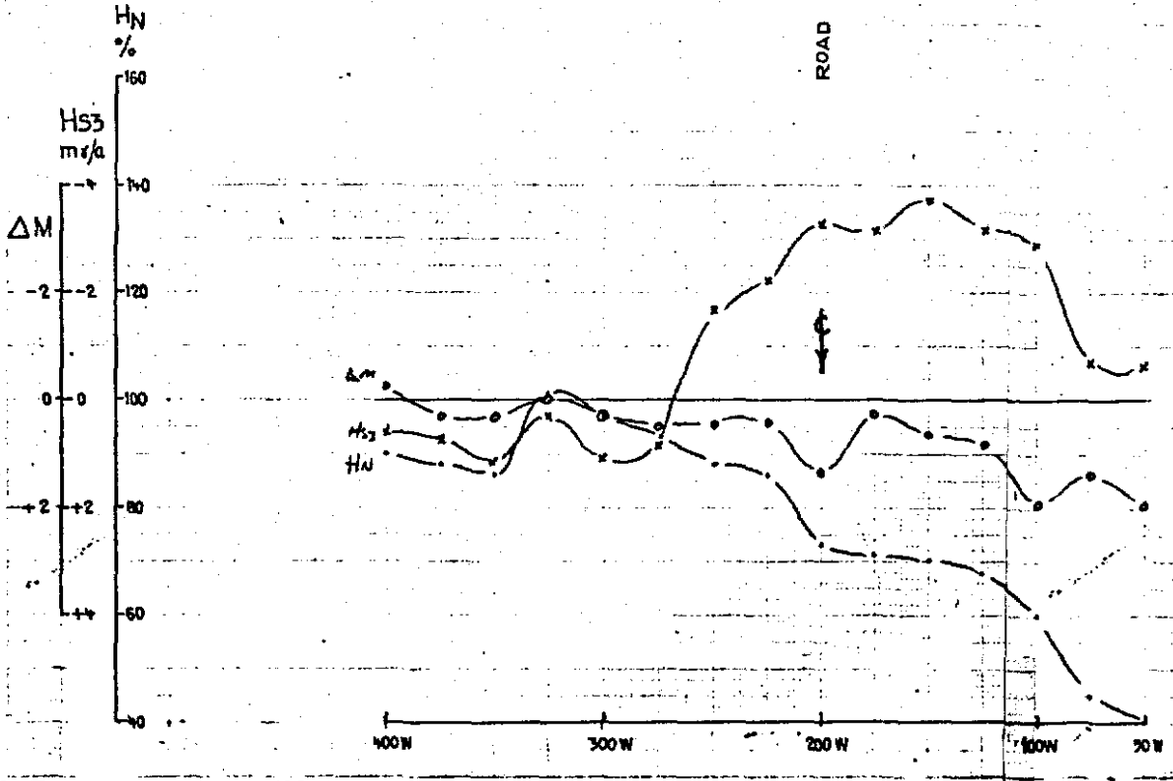
PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977, TAS-036





Note: Grid Irregular

700/00 ≅ 500/100 E

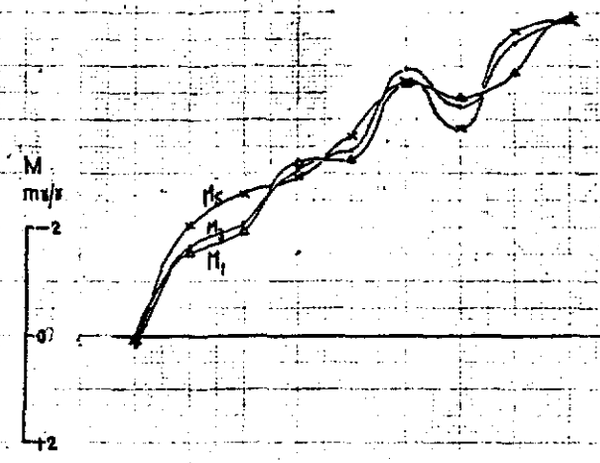
LINE-SG·700

PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

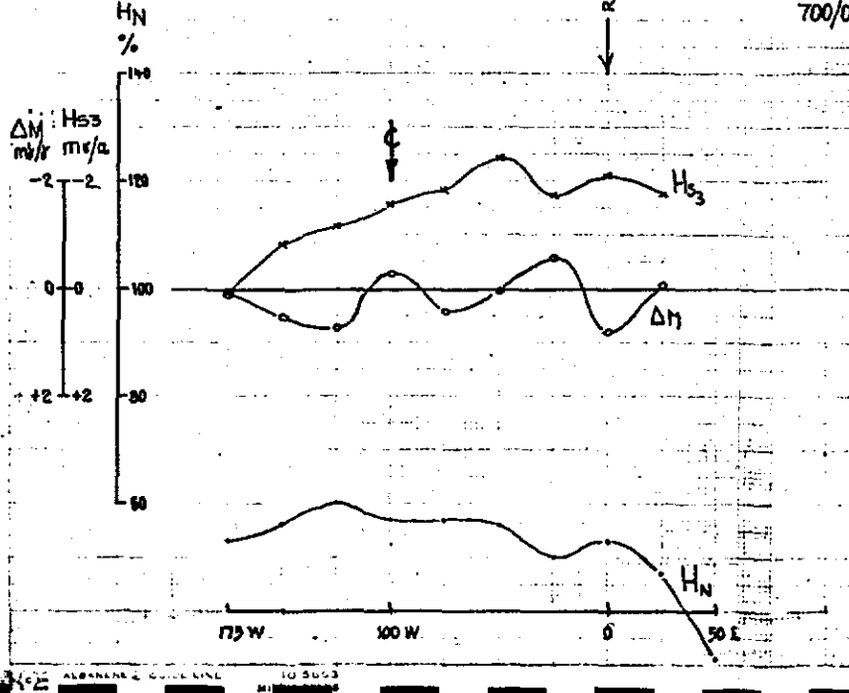
MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977, TAS-036



Note: Grid Irregular

700/00 ≡ 500/100 E



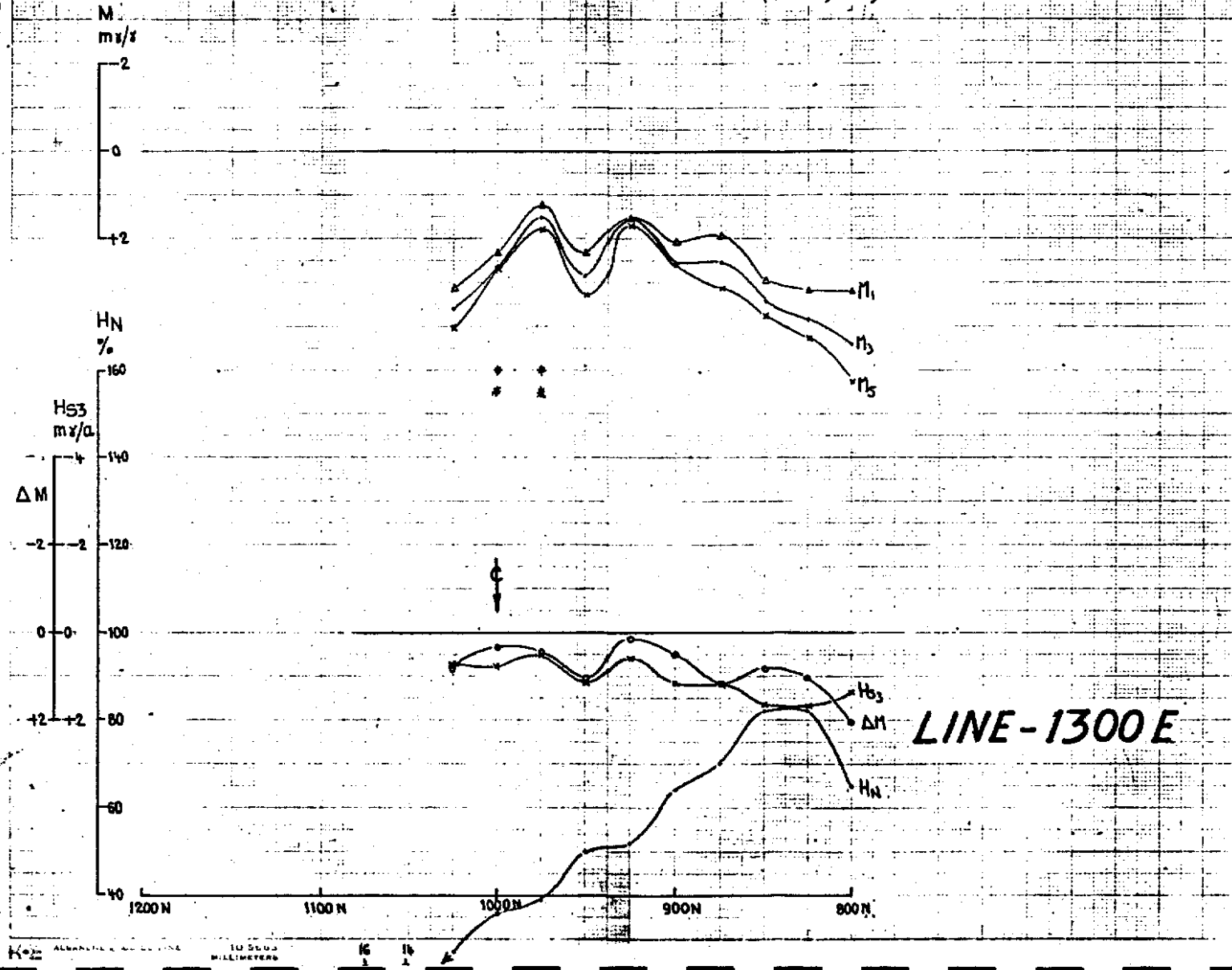
LINE - SG·500

PENNZOIL OF AUSTRALIA LIMITED

LINGS GRID

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977. TAS-036

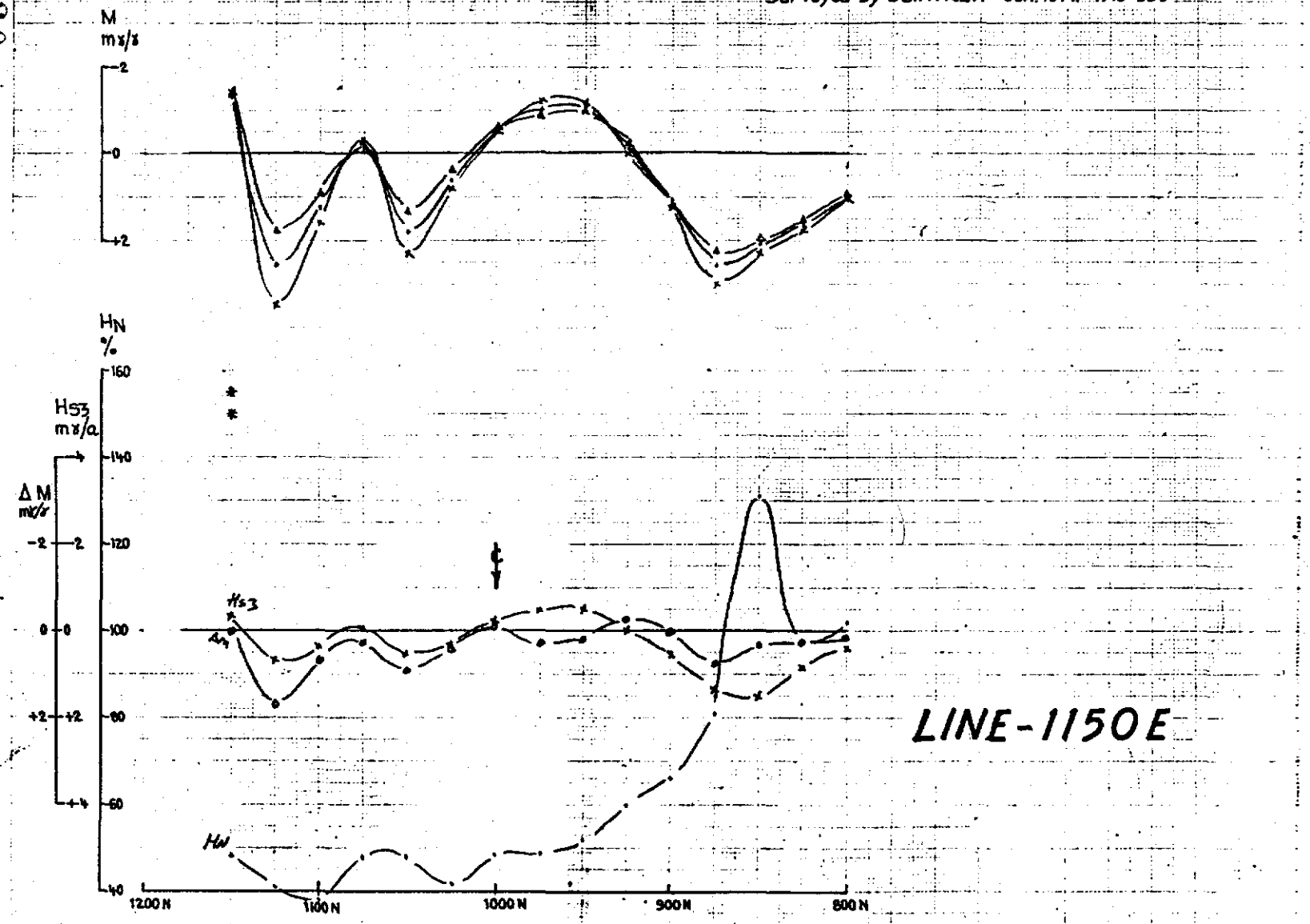


PENNZOIL OF AUSTRALIA LIMITED

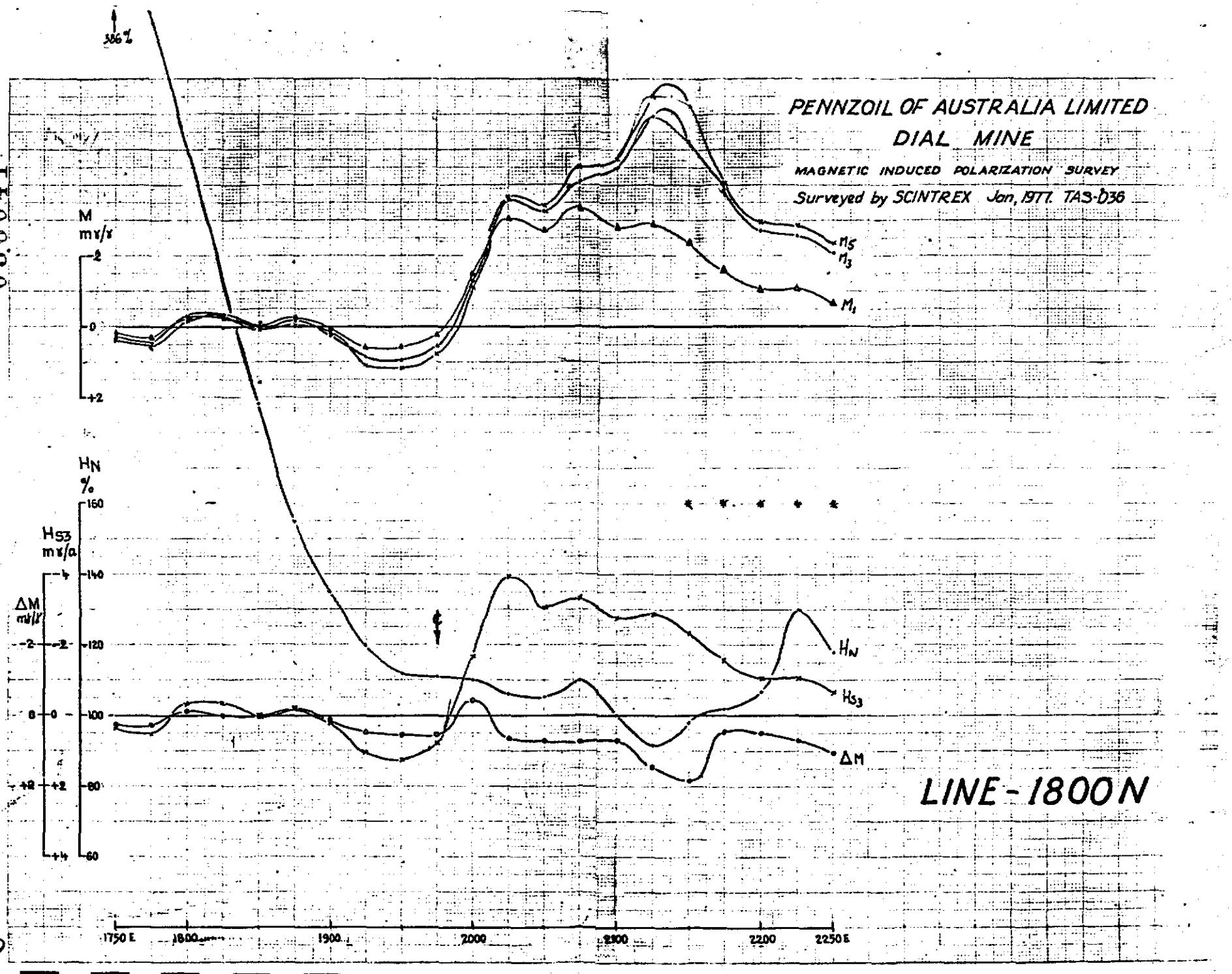
LINGS GRID

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan. 1977. TAS-036



LINE-1150E

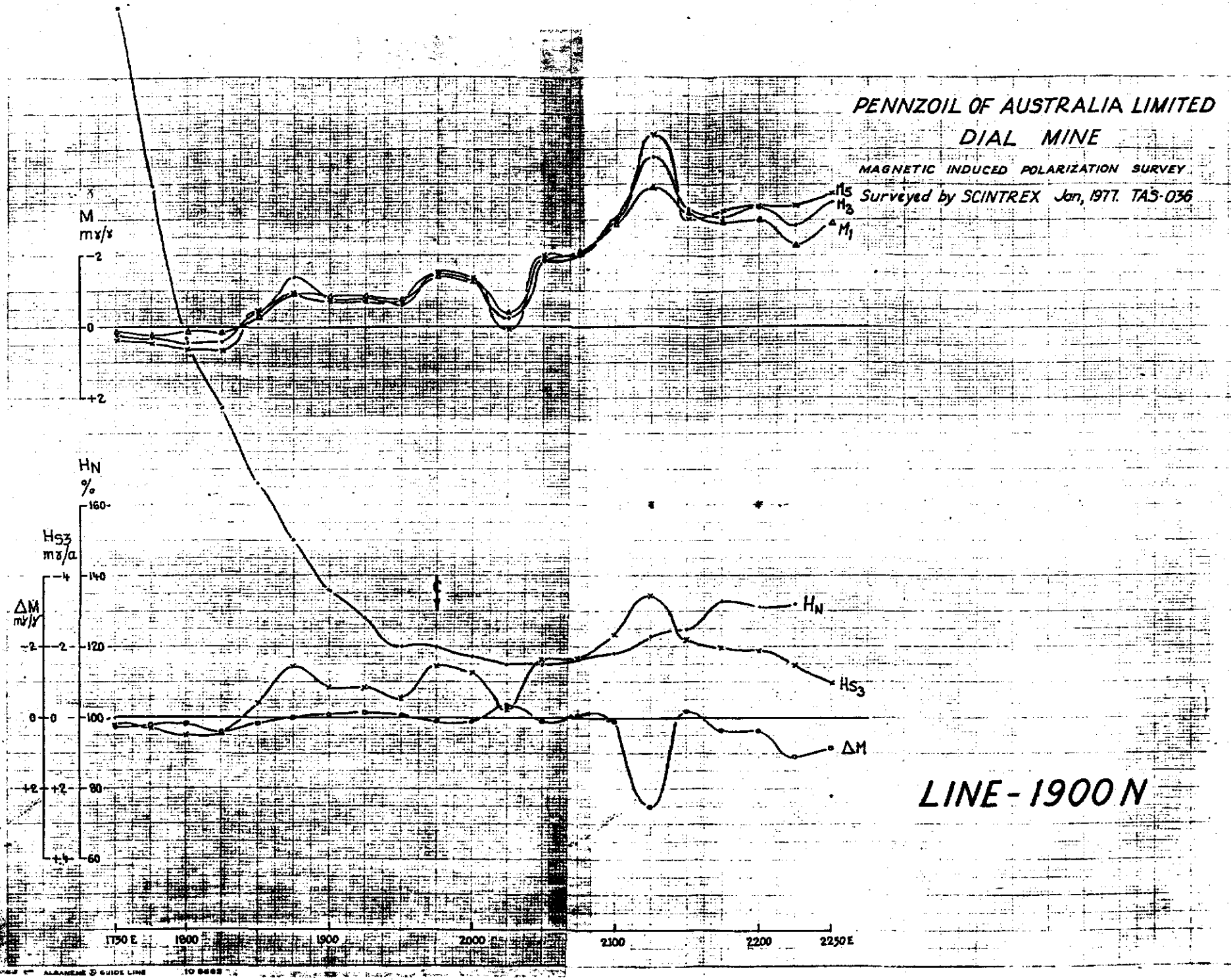

386%
PENNZOIL OF AUSTRALIA LIMITED
DIAL MINE
MAGNETIC INDUCED POLARIZATION SURVEY
Surveyed by SCINTREX Jan, 1977. TAS-D36
M
m%/%
-2
0
+2
M5
M3
M1
HN
%
150
140
120
100
80
60
HS3
m%/a
-4
-2
0
+2
+4
ΔM
m%/%
HN
HS3
ΔM
1750 E
1800
1900
2000
2100
2200
2250 E
LINE - 1800 N

PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977. TAS-036



LINE - 1900 N

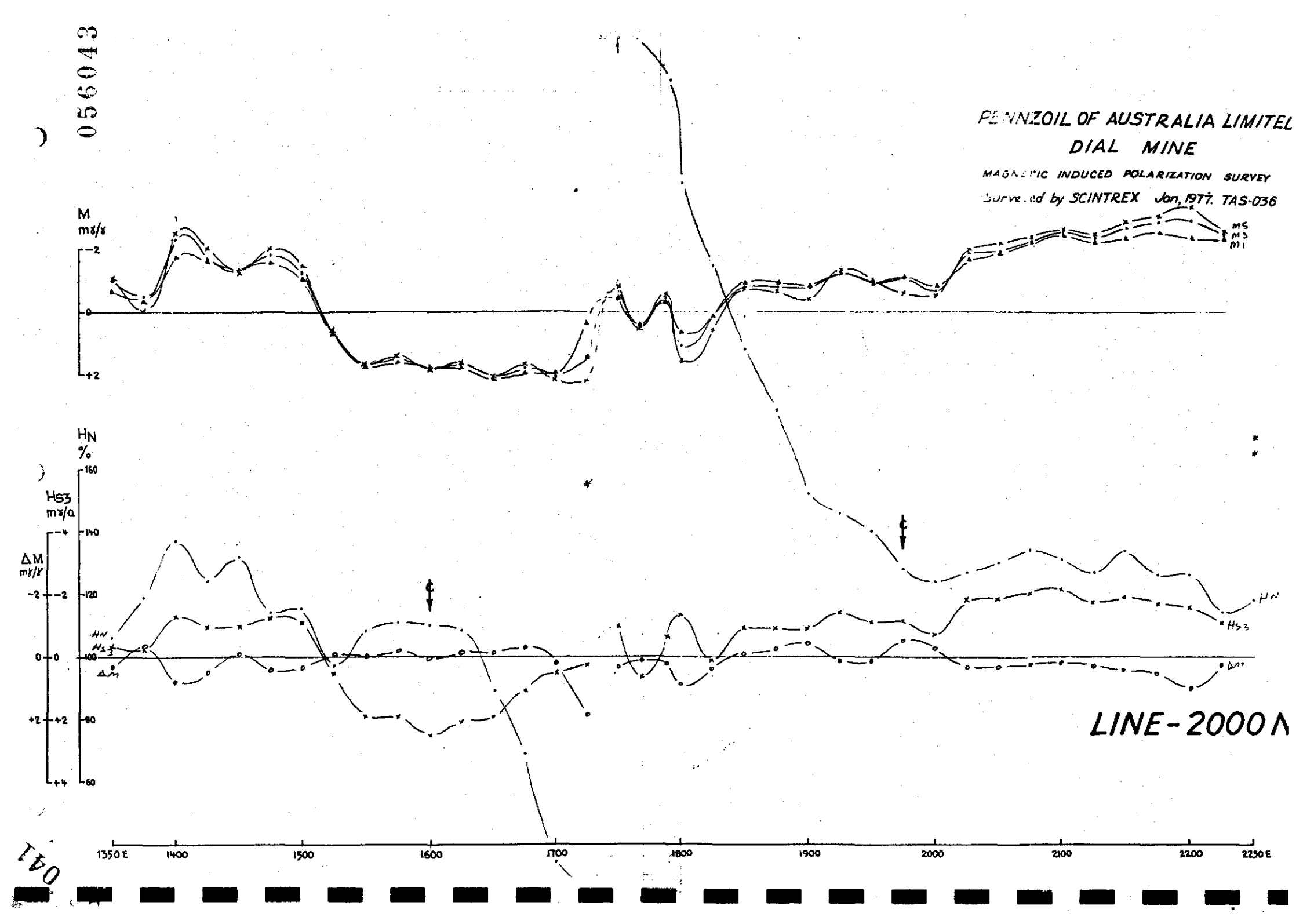
0560 43

PENNZOIL OF AUSTRALIA LIMITED

DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan, 1977. TAS-036



LINE-2000 N

042

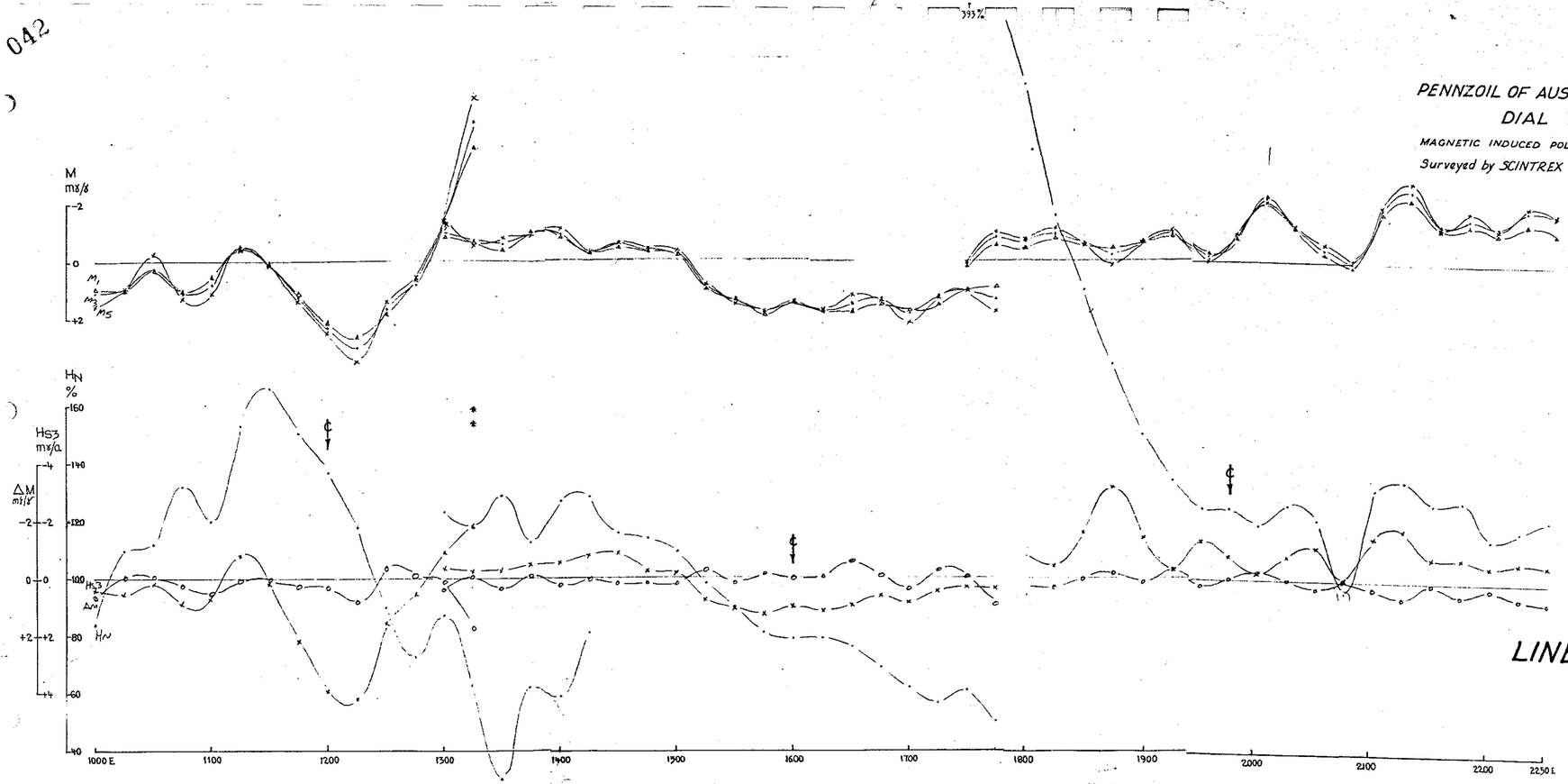
056044

PENNZOIL OF AUSTRALIA LIMITED

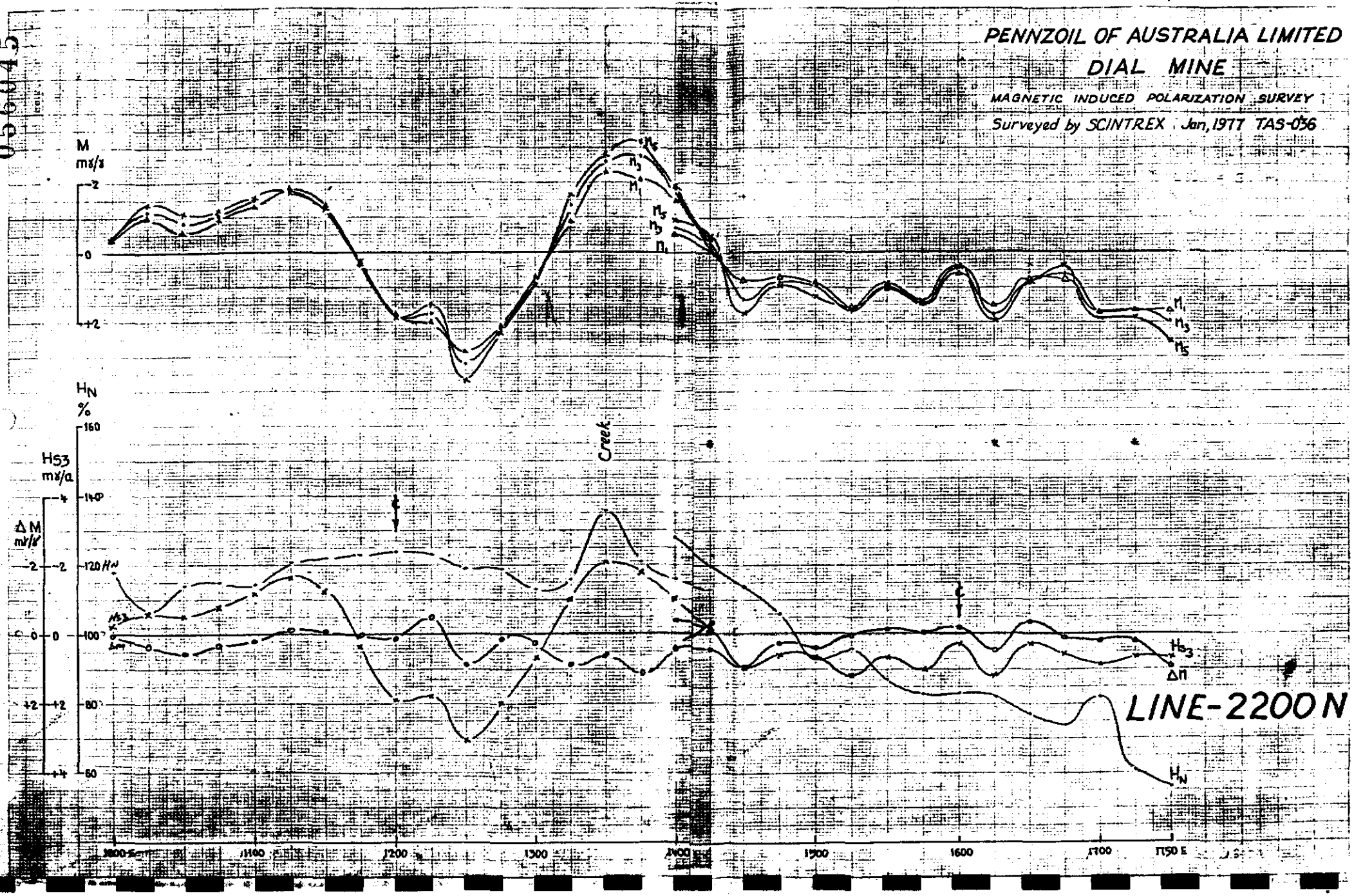
DIAL MINE

MAGNETIC INDUCED POLARIZATION SURVEY

Surveyed by SCINTREX Jan 1977 TAS-036

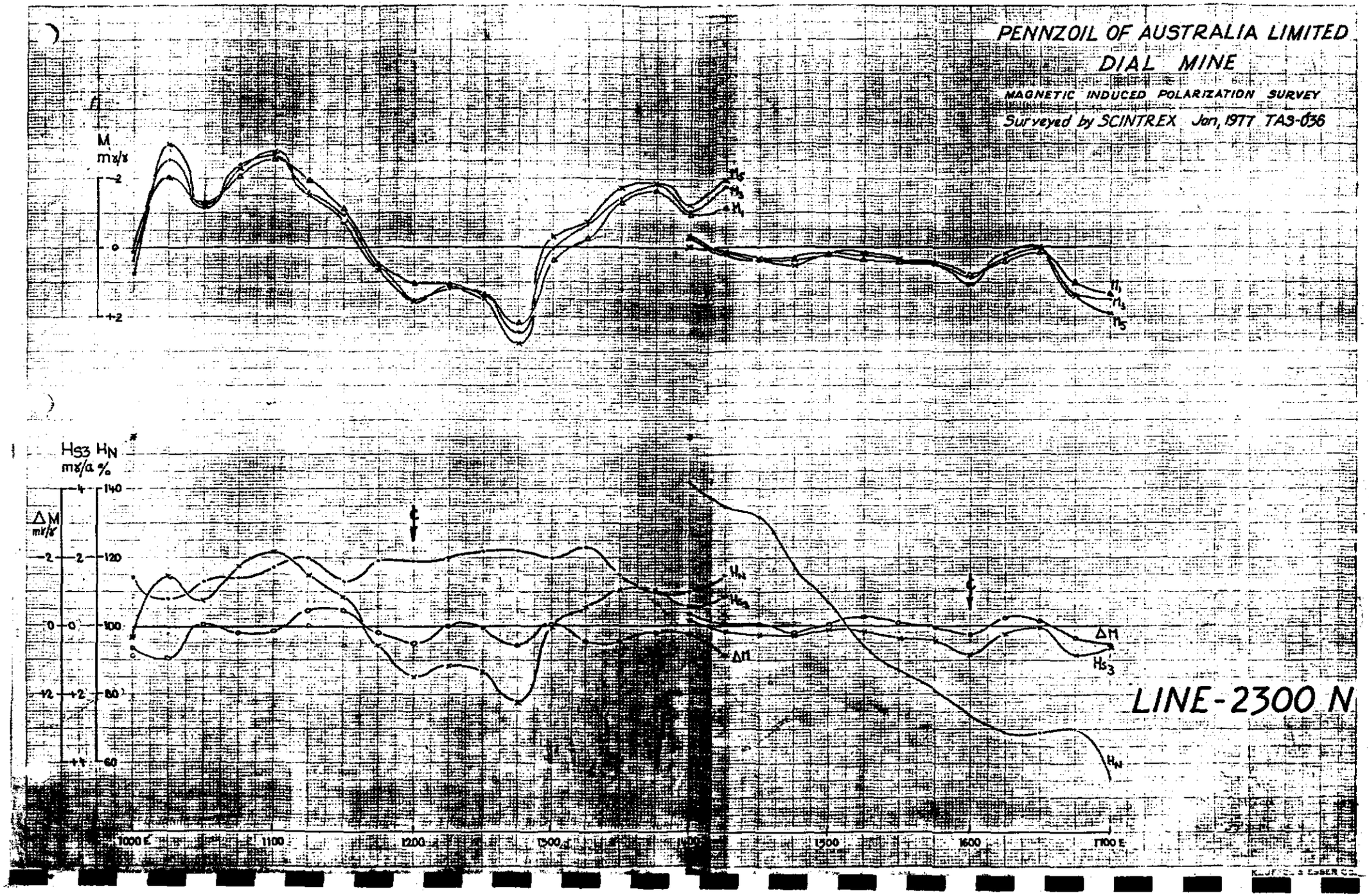


LINE-2095 N


PENNZOIL OF AUSTRALIA LIMITED
DIAL MINE
MAGNETIC INDUCED POLARIZATION SURVEY
Surveyed by SCINTREX Jan, 1977 TAS-036
M
ms/s
-2
0
+2
n_5
n_3
n_1
H_N
%
160
140
120
100
80
60
H_{S3}
ms/a
ΔM
ms/s
Creek
H_{S3}
ΔM
H_N
LINE-2200 N
1100
1200
1300
1400
1500
1600
1700
1750 E

044

056046


PENNZOIL OF AUSTRALIA LIMITED
DIAL MINE
MAGNETIC INDUCED POLARIZATION SURVEY
Surveyed by SCINTREX Jan, 1977 TAS-036
M
mx/x
-2
0
+2
Hs3 HN
mx/a %
ΔM
mx/x
140
120
100
80
60
ΔM
Hs3
HN
1000 E
1100
1200
1300
1400
1500
1600
1700 E
LINE-2300 N