69-558.

081001

McINTYRE

MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT.

JOB NO: 118

REPORT ON PROSPECTING IN S. P. L. NO. 46.

NOV. 1968 TO MARCH, 1969

BY: Michael Sharwood.

DATE: 30th May, 1969

Associated National House
8-12 Bridge Street
Sydney, N.S.W.
Australia

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ZEEHAN BASE METAL PROSPECT - JOB NO. 118
REPORT ON PROSPECTING IN S. P. L. 46 - NOV. 1968 TO MARCH, 1969

The Zeehan Base Metal Prospect encompasses Special Prospecting Licence 46 of 18.7 square miles southeast of Zeehan, on the "West Coast" of Tasmania. Within the area of the licence, there occurs a belt of lower Cambrian rocks, similar to those containing the major ore-bodies at Mt. Lyell (Copper), Renison (Tin) and Roseberry (Lead, Zinc, Silver). Fig. 1 shows the location of the area and Fig. 2 is a generalised geological map.

The licence area is topographically rugged and inaccessible varying from button grass swamps in the southwest to densely forested steep mountain ranges in the northeast. The maximum relief is in excess of 2400 feet. Rainfall is of the order of 100 inches per annum.

Selecting a tool for regional saturation exploration, is difficult under these conditions. Stream sediment geochemistry is not well regarded in Tasmania owing to high rainfall and steep stream gradients. The volume of water in the streams and the fast flow rate are considered by many to preclude meaningful dispersion of metals from mineralised sources.

However, based on successful experience gained by this company under virtually identical conditions in New Zealand, it was decided to proceed with stream sediment sampling using an intense sample density. The size fraction and elements to be chosen for analysis would depend on the results of an orientation survey.

As preliminary follow up to the stream sediment sampling, some soil geochemical sampling and ground magnetometer surveying was carried out.

A total of approximately $23,000 has been expended on the prospect to-date.

ORIENTATION SURVEY.

The orientation survey was designed to provide information on the following:

(i) Optimum sampling density.

(ii) Best size fraction for analysis.

(iii) The most suitable elements for analysis.

The survey was conducted in two parts:

(i) On the old Mariposa Mine situated in the northwest corner of the licence area. This mine, which occurs in the Gordon Limestone of

Ordivician age, has limited reserves of silver-lead-zinc ore.

(ii) On the Nubena and South Nubena mines. These small old workings are situated west of Zeehan beyond the licence boundary. They occur in pre-Cambrian Oonah Quartzite. The survey was extended to these mines in an attempt to assess as closely as possible the sampling characteristics of the areas within the licence covered by Cambrian rocks. They present the most similar environment available.

Fifty five samples were taken from the first area and only twenty two from the second. Sample spacing in both cases was 200 feet. All samples were submitted to Minex Analytical Laboratories in Melbourne and were screened to the following sizes; British Standard Mesh:

+ 20
- 20 + 80
- 80 + 120
- 120

Each fraction was then analysed for Cu, Pb, Zn, Ag, Mo, Cd, Sn, Co.

Assessment of the results indicated three things:

(i) There was often insufficient sample for analysis in the minus 80 and smaller mesh fractions.

(ii) In any event, the greatest metal concentration occurs in the minus 20 plus 80 fraction.

(iii) Dispersion patterns are well developed for the metals copper, lead and zinc. Therefore, although similar patterns were noted for silver, cadmium and cobalt, there is no need to use these as pathfinders.

On the basis of the above, it was decided to analyse the minus 20 fraction for copper, lead and zinc as well as for tin, in view of the proximity of the Renison ore body and the possibility of similar occurrences within the sampled area. The pattern of results obtained in both areas indicates that contamination from the old workings is extensive. This is particularly so in the case of the Mariposa mine which drains into a button grass swamp. Here the drainage is sluggish and variable, providing ideal conditions for widespread chemical dispersion.

However, it is evident that high analyses are not always reflected downstream beyond three or four sample locations based on the 200 foot sample interval. The New Zealand experience had suggested this would be the case. Accordingly, the sample interval was maintained at 200 feet for the whole survey.

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SAMPLING AND ANALYSIS.

Sampling was carried out at 200' intervals over most of the licence area. The distance was measured by pacing, which proved sufficiently accurate. The southwestern portion of the lease area was not sampled, for two reasons.

(i) The area includes mainly unprospective rocks of Devonian age.

(ii) The area is covered by button grass swamp in which the streams are not well defined, flow is sluggish and water is ubiquitous.

These conditions are not suitable for stream geochemistry.

Samples were dried in Zeehan at between 105° C and 110° C. They were then airfreighted to Minex Analytical Laboratories in Melbourne for analysis. When Minex proved inefficient the remaining samples were sent to McPhar Geophysics in Adelaide. Each laboratory uses a slightly different analytical technique as follows:

1. Minex: Digestion in HNO_3 with added $KClO_3$ as oxidiser then A. A. S. for Cu, Pb, Zn, Sn.

2. McPhar: Digestion in Perchloric acid for Cu, Pb, Zn then A. A. S. Tin by the gallein colorimetric method.

To assess the accuracy of the analytical laboratories, 112 samples were selected and treated as follows:

1. The samples were re-numbered.

2. Half were sent for repeat analysis to the laboratory where they were originally analysed (Minex).

3. Half were sent to a different laboratory (McPhar).

The results obtained in both 2 and 3 were widely different from the original figures.

As a further check, the samples from above were submitted to a third laboratory. The results again have no relationship to either of the two sets obtained so it was necessary to submit the samples to a fourth laboratory, whose results were more or less compatible with those from the first check laboratory (McPhar). In the meanwhile 50 samples originally analysed by McPhar were re-submitted to them. The results were identical with those originally obtained. Accordingly all figures from that laboratory have been accepted.

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On the basis of the above, Minex agreed to re-analyse their samples at their own expense. The results of the re-analysis have been accepted as correct.

Despite the varying analytical results there has been a consistency amongst all laboratories in reporting anomalously high values. This lends a high degree of confidence to the validity of the following interpretation.

TREATMENT OF RESULTS.

The analysis obtained for lead, zinc and copper display wide variation and require detailed interpretation. The tin values were all negative and no treatment of these results is necessary.

The calculation of background, threshold and hence anomalous values for each of the elements copper, lead and zinc was complicated by several factors.

(i) Two analytical laboratories were used. The checks and replicate analyses carried out have removed any discrepancies introduced by this factor.

(ii) The samples were collected over a 3 month period from the end of an exceptionally wet season, through a dry season. The stream flow thus progressively diminished except for occasional days marked by heavy thunderstorms. The effect of this variation in flow on metal values cannot be assessed.

(iii) Samples were collected from a wide variety of geological conditions providing several "sample populations". Thus what is background in say the Ordivician rocks may be anomalous in (say) the lower Cambrian. This problem was attacked by plotting the statistical distribution of the results.

Frequency Distribution Curves: The curves display the "bell" shape typical of normal statistical distribution and this suggests that despite the large variety of rock types and ages sampled, the results can be interpreted as being derived from a simple "population" of samples.

From all three curves constructed Figs. 3, 4, 5 one definite common feature is evident. There is a distinct break in each at a point which varies between 1% and 2% of the total number of sample values. The figure of $2\frac{1}{2}$% has therefore been taken as probable threshold and 1% as definite threshold, providing the following actual values derived from the curves for all samples:

	Mean Background (Arithmetic)	Probable Threshold	Definite Threshold
Copper (ppm)	15	32	35
Lead (ppm)	50	100	150
Zinc (ppm)	80	160	240

As a confirmatory exercise curves were constructed for copper results.

(i) From samples in areas of Crimson Creek Formation only.
(ii) From samples in areas of Dundas Group only.

The curves were less smooth than the curve for all values providing confirmation that all samples constitute a simple "population".

INTERPRETATION OF RESULTS.

All results were plotted on maps and coloured according to individual metal contents. See Figs. 6, 7, 8 for copper, lead and zinc respectively. Based on the above derived values it is apparent that there are several anomalous areas of which two in particular are outstanding. These are respectively called Anomaly 1 and Anomaly 2, details as follows:

Anomaly 1.

This anomaly lies in the north central part of the area. It occurs within interbedded black slates and tuffs of lower Cambrian age which strike N-S and dip steeply both East and West. A major E-W fault is shown on the existing geological map (scale 1" = 1 mile) passing through the southern limits of the anomalous area. The existence of this fault is confirmed in the field by the presence of a series of waterfalls on adjacent streams.

The anomaly is best developed for the metal lead with minor silver variations. The stream sediment values for copper and zinc do show some above background variation but the distribution of anomalous samples is erratic. For all elements however, the general distribution of anomalous values has a north south lineation which corresponds with the known strike of the sediments in the area.

Since this anomaly lies in an area which has the following three points favourable for mineral concentration it was selected for the first stage of follow up work.

(i) Favourable rock types (tuff and black slate) for syngenetic type mineralisation. Further, these rock types form the general host to the ore bodies at Roseberry.

(ii) Favourable rock ages. All the major mineral occurrences in Tasmania occur in lower Cambrian Rocks.

(iii) Favourable structure. The anomaly lies adjacent to a definite fault zone.

In the interpretation of this anomaly one point must always be borne in mind. The background lead, zinc and copper content of the rock types present (black slate and tuff) often lies in a range sufficiently high to account for the stream values recorded. However this is a possibility that can only be tested by further work. Some samples of rock were taken from stream boulders in the region of the anomaly and found to have an average content of only 40 ppm lead and 100 ppm zinc.

Anomaly 2.

The second major anomaly present lies in the southeastern portion of the lease area. The anomalous zinc values are particularly widespread and the zone they define is confirmed by both the copper and the lead values. This area is one containing upper Cambrian (Dundas Group) rocks, covered in part by an unknown thickness of Pleistocene Moraine. The source of the anomalous values could thus be either in the Dundas Group or in the Moraine, or both. No geological information is as yet available regarding the nature of either.

Other Anomalies.

No other significant anomalies are present. There is a zone of anomalism in the northwest corner of the lease area but this reflects contamination from the old Mariposa Mine. Other high values are scattered, usually singly, throughout the area but these bear no further study until the significance of the larger anomalies has been fully assessed.

It will be noticed that there is a tendency for high zinc values to accumulate in some areas downstream from R. J. Howard's Private Road. This reflects the composition of the road which has been built in part from rock taken from old mine dumps. In particular, there are visible sphalerite specimen at numerous locations along the road.

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FOLLOW UP WORK.

General.

All follow up work to date has been confined to Anomaly 1. The area of the anomaly lies at an approximate elevation of 2100 feet close to the top of a spur which leads to Mt. Dundas, the highest point in the immediate vicinity. Access is limited, being by way of a narrow cut foot track, the journey taking about 90 minutes. Apart from the steep hill slopes, the area is covered by dense forest vegetation which necessitates the cutting of lines for any systematic surveying on a grid system. Rock outcrop is sparse being virtually confined to scattered exposures along the banks of creeks.

It was planned to cut a north-south (true) base line and 15 east-west grid lines each 2000 feet in length. Labour being scarce and time limited, it proved impossible to complete the planned grid. The line cutting was carried out by local labourers on a contract basis. On checking the lines after completion of the contract there was found to be considerable deviation from the desired bearings. The true positions of the lines have been ascertained however, and all samples plotted in their correct positions.

Soil Sampling.

Soil samples were collected at 100 foot intervals on each grid line at a depth as close to bedrock as possible. Soils were screened to remove organic matter and pebbles, then pulverised for analysis. The actual soil horizon sampled could not be ascertained but in an attempt at orientation about 20 sampled were duplicated, 2 being taken at each location but from different depths. No significant variation was recorded though there was a slight and consistent decrease in value with increasing depth.

From frequency distribution curves (figs. 11, 12) the following figures were derived.

	Background	Threshold
Zn	30 ppm	85 ppm
Pb	50 ppm	110 ppm

Threshold was taken as that value exceeded by no more than $2\frac{1}{2}\%$ of all values. To check the validity of this assumption the standard deviation was calculated for the lead values. The value is 20 ppm and taking Threshold = Mean Background plus 3 x Standard Deviation, the value of 110 is again obtained.

Accordingly contours were drawn at multiples of the threshold values (see Figs. 9, 10).

A very definite lead anomaly is noted in the northeast of the sampled area. The anomaly appears to extend beyond the limits of sampling and further work is warranted to fully define the zone, especially in view of the extension of the stream anomaly in the same direction.

It is interesting to note the north-south linearity of the lead anomaly, reflecting the strike of the underlying bedrock. Again the possibility is real that the anomaly reflects high background in bedrock, but this is unlikely.

The zinc results show a series of isolated and limited highs stretching in an east-west linear pattern, probably coincident with the known fault.

Magnetometer Survey.

A ground magnetometer survey using a McPhar M-700 instrument was carried out at 100 foot intervals over the area covered by soil sampling (See Fig. 13) The results are largely negative although one north-south-elongated high zone has been recorded. This zone is interpreted as reflecting the strike of the underlying sediments. In any event, it does not coincide with the soil anomalies.

SUMMARY & CONCLUSIONS.

The results of the exploration programme to date have been encouraging. Although it is clear that there is no tin mineralisation in the area at least two other anomalies of significant areal extent have been defined and follow up work on the more prospective of these two has commenced The preliminary follow up has indicated that the stream anomaly is reflected in soil samples and is definitely worthy of further work.

The second stream anomaly lies in an area of less prospective rocks (Dundas Group) and glacial moraine. Its source is therefore very unlikely to lie in a mineralised occurrence but it is nevertheless essential that this source be located.

It may be generally concluded that further work on the prospect is desirable. The nature of this work and the costs are outlined below.

...9

RECOMMENDATIONS

The following detailed recommendations are made with regard to follow up work on the prospect.

A. Anomaly 1.

1. Line cutting should proceed over the total area defined by the stream anomaly. Initially a line spacing of 200' will be adequate.

2. Soil samples should be collected on all lines.

3. A ground magnetometer survey should be completed.

4. Detailed geological mapping within the limits imposed by scarcity of outcrop should be carried out at the earliest possible time. Rock geochemical samples should be collected to assess the background values of the rock types present.

5. An access track should be bulldozed into the area of the anomaly and a camp set up at that location.

Anomaly 2.

Detailed geological reconnaissance must be completed over the total area contained within this anomaly to ascertain whether the source lies in the Cambrian sediments or the Pleistocene Moraine

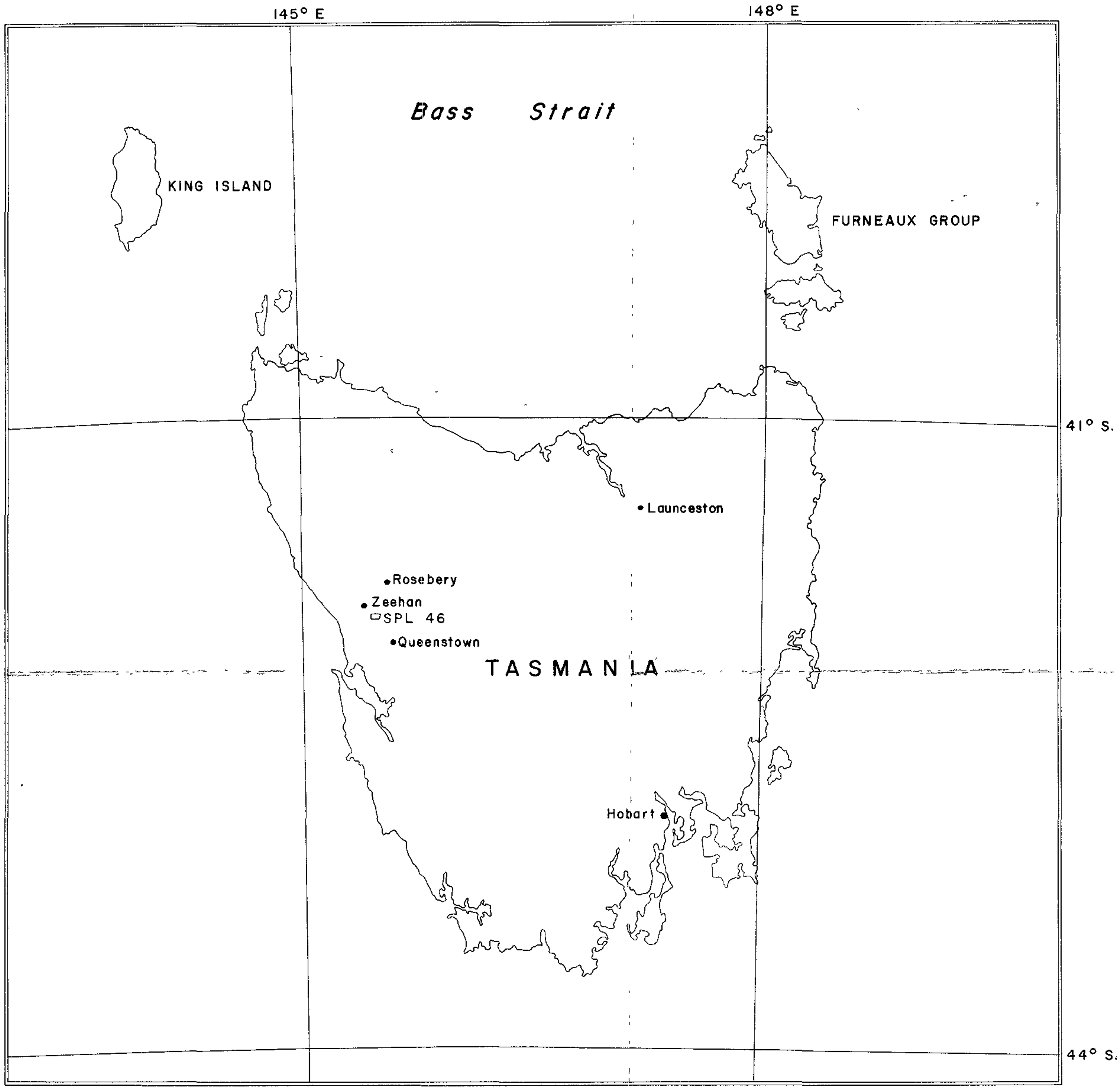
BUDGET.

Track and Campsite construction with bulldozer 50 hours @ $16	$800.00
Setting up camp	500.00
Line cutting. Estimate 150,000 feet @ $25 per thousand, say:	4000.00
Soil sample analyses - estimate 1500 samples @ $1.25	1875.00
Messing. 10 men for 150 days @ $3/man day	4500.00
Geologist @ $700/month for 5 months	3500.00
3 Field Assistants $350 each/month for 5 months	5250.00

Cook's Wages for 5 months	1800.00
Transport - including purchase 4 wheel drive vehicle	3000.00
Equipment and supplies	500.00
Head office overheads, including supervision, telephones, report writing etc.	1000.00
Contingencies - 10%	2673.00
	$29408.00
say	$30,000.00

Michael Sharwood.

Encl.



081014

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

LOCATION MAP

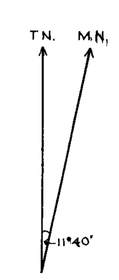
69/558 Q50/45

DRAWN BY: S. Summergreene	DATE: May 1969
JOB NO: 118	SCALE: 1" = 40 miles

FIGURE 1

3394

Alluvium	Geological boundary – accurate
Pleistocene Moraine	Geological boundary – approximate
Devonian Undifferentiated	Established fault showing relative movements
Ordovician Undifferentiated	Fault – position approximate
Silurian Undifferentiated	Fault – inferred
Dundas Group	Fault – inferred, concealed
Crimson Creek Formation	Syncline showing plunge
Oonah Quartzite	
Gabbro, Norite, Dolerite.	



Enlarged from Zeehan Sheet 50
Geological Survey of Tasmania
Department of Mines – Hobart

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

081015

ZEEHAN BASE METAL PROSPECT

GEOLOGICAL OVERLAY

5 cm

Geologist: M Sharwood	Scale: 1" = ⅛ mile approx.
Drawn by. S. Ford	Date. March '69
Job no: 118	Revision

FIGURE 2

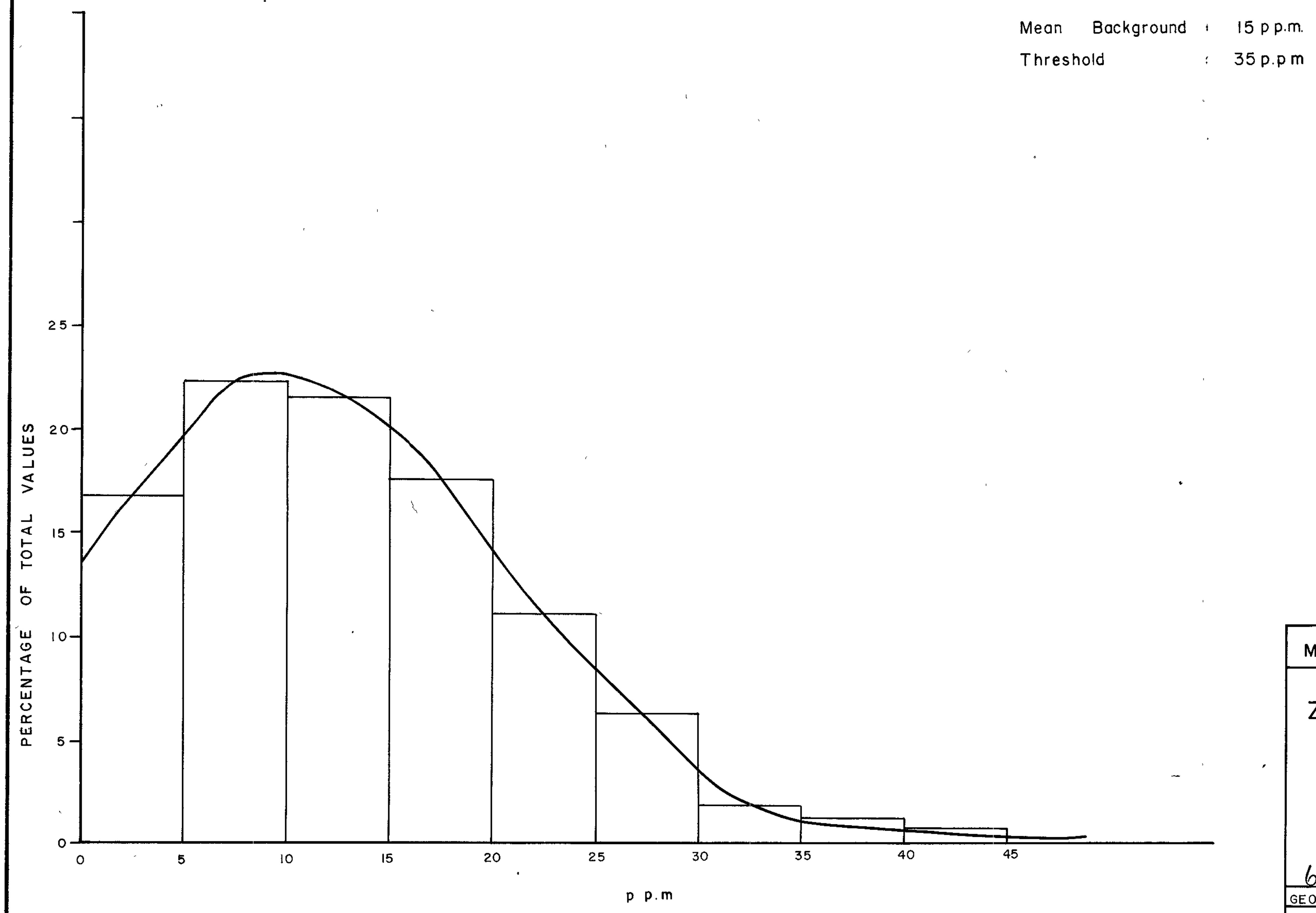


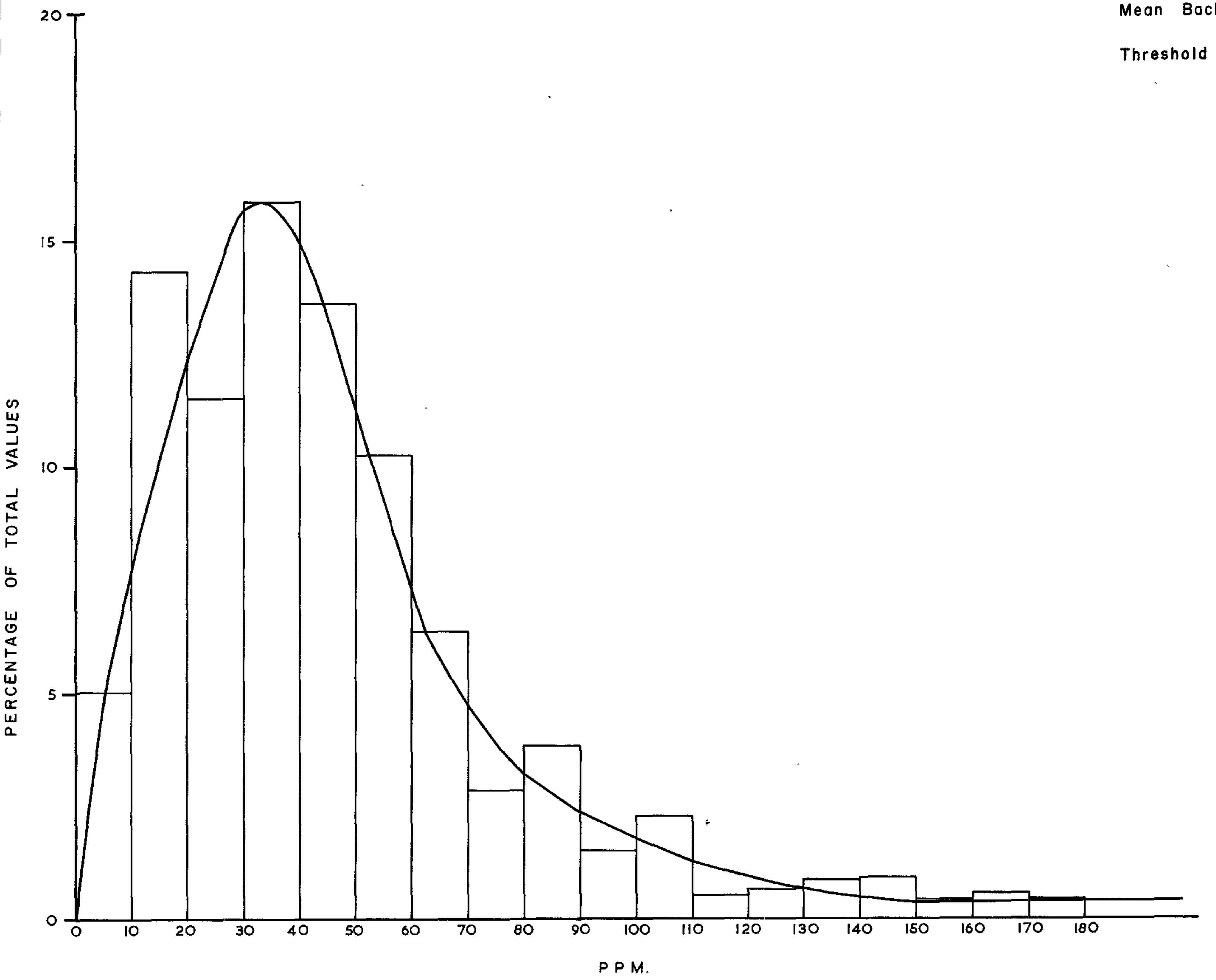
FIG. 3

081016 3396

MCINTYRE MINES (AUSTRALIA) PTY. LTD.	
ZEEHAN BASE METAL PROSPECT STREAM SEDIMENT COPPER VALUES FREQUENCY DISTRIBUTION 69·558 Φ50/45	
GEOLOGIST M SHARWOOD	SCALE
DRAWN BY Geodrafting Services	DATE APRIL, 1969
JOB NO. 118	REVISION:

Mean Background : 50 p.p.m. - By calculation

Threshold : 100 p.p.m. Probable
150 p.p.m. Definite



081017 3397 69-558

MCINTYRE MINES (AUSTRALIA) PTY. LTD.	
ZEEHAN BASE METAL PROSPECT STREAM SEDIMENT LEAD VALUES FREQUENCY DISTRIBUTION Ø50/45	
GEOLOGIST: M. Sharwood	SCALE:
DRAWN BY: S. Summergreene	DATE: May 1969
JOB No: 118	REVISION:

FIGURE 4

Mean Background :	80 p.p.m. -	By calculation
Threshold :	160 p.p m	Probable
	240 p.p.m.	Definite

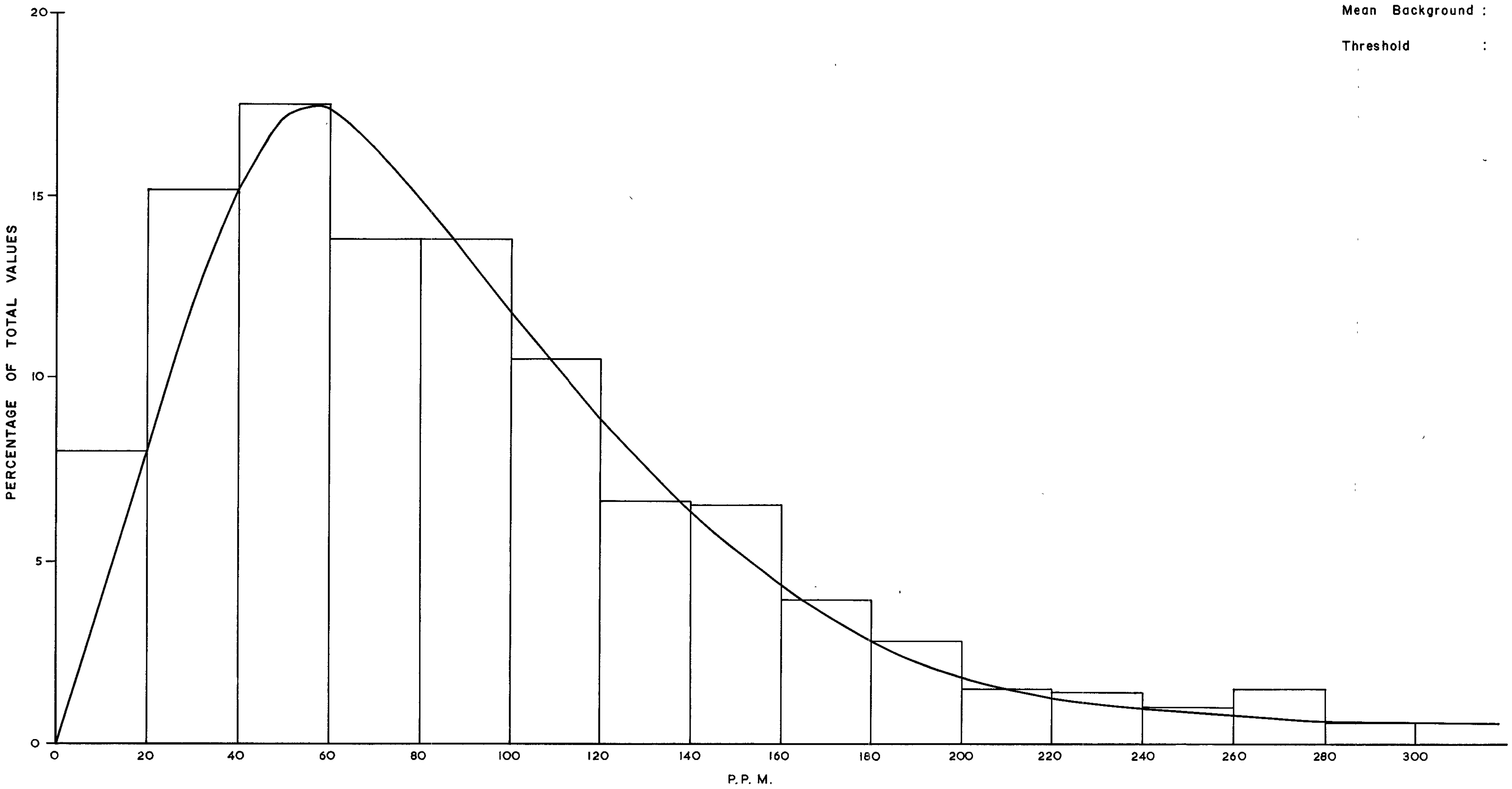


FIGURE 5

081018 3398

MCINTYRE MINES (AUSTRALIA) PTY. LTD

ZEEHAN BASE METAL PROSPECT

STREAM SEDIMENT

ZINC VALUES φ50/45

FREQUENCY DISTRIBUTION

GEOLOGIST: M. Sharwood	SCALE:
DRAWN BY: S. Summergreene	DATE: May 1969
JOB No: 118	REVISION:

Roads
Tracks
Tramway
Rivers
—400— Contours interval at 400'
Sample location (Stream sediment)
Rock sample location
Red ferruginous seepage

0 – 31 p.p.m.
32 – 35 p.p.m.
36 – 40 p.p.m.
>40 p.p.m.

T.N. M.N.
11° 40'

SCALE

5 cm

081019 3399

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

BASE MAP FOR
STREAM SEDIMENT GEOCHEMISTRY
Cu p.p.m.

Geologist:	Scale: 1" = 1/8 mile approx.
Drafted by: S.E. Ford	Date: December 1968
Job no: 118	Revision: April '69

FIG. 6

3399

69-558

φ50/45

3400

- Roads
- Tracks
- Tramway
- Rivers
- 400 Contours interval at 400′
- Sample location (Stream sediment)
- Rock sample location
- Red ferruginous seepage

- 0 — 100 p.p.m.
- 101 — 150 p.p.m.
- 151 — 300 p.p.m.
- >300 p.p.m.

T.N. M.N. 11° 40′

SCALE

081020

5 cm

FIGURE 7

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

BASE MAP FOR STREAM SEDIMENT GEOCHEMISTRY

Pb p.p.m.

Geologist:	Scale: 1″= 1/8 mile approx.
Drafted by: S.E. Ford	Date: December 1968
Job no: 118	Revision: May 1969

69-558 Φ50/45

3400


AREA OF ANOMALY I GRID
Mariposa Falls
Berry Cr.
Roads
Tracks
Tramway
Rivers
Contours interval at 400'
Sample location (Stream sediment)
Rock sample location
Red ferruginous seepage
0 — 160 p.p.m.
161 — 240 p.p.m.
241 — 480 p.p.m.
> 480 p.p.m.
T.N.
M.N.
SCALE
081021
5 cm
MCINTYRE MINES (AUSTRALIA) PTY. LTD.
ZEEHAN BASE METAL PROSPECT
BASE MAP FOR
STREAM SEDIMENT GEOCHEMISTRY
Zn p.p.m.
Geologist:
Drafted by: S.E. Ford
Job no: 118
Scale: 1" = 1/8 mile approx.
Date: December 1968
Revision: May 1969
FIGURE 8
69-558
3401

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

STREAM ANOMALY NO.1
FOLLOW UP GRID
LEAD SOIL SAMPLES

GEOLOGIST : M.SHARWOOD	SCALE : 1" = 100'
DRAWN BY: Geodrafting Services	DATE : APRIL '69
JOB NO : 118	REVISION :

FIG. 9

3402

Ø50/45

3402

FIG. 10

3403

3403 Φ50/45

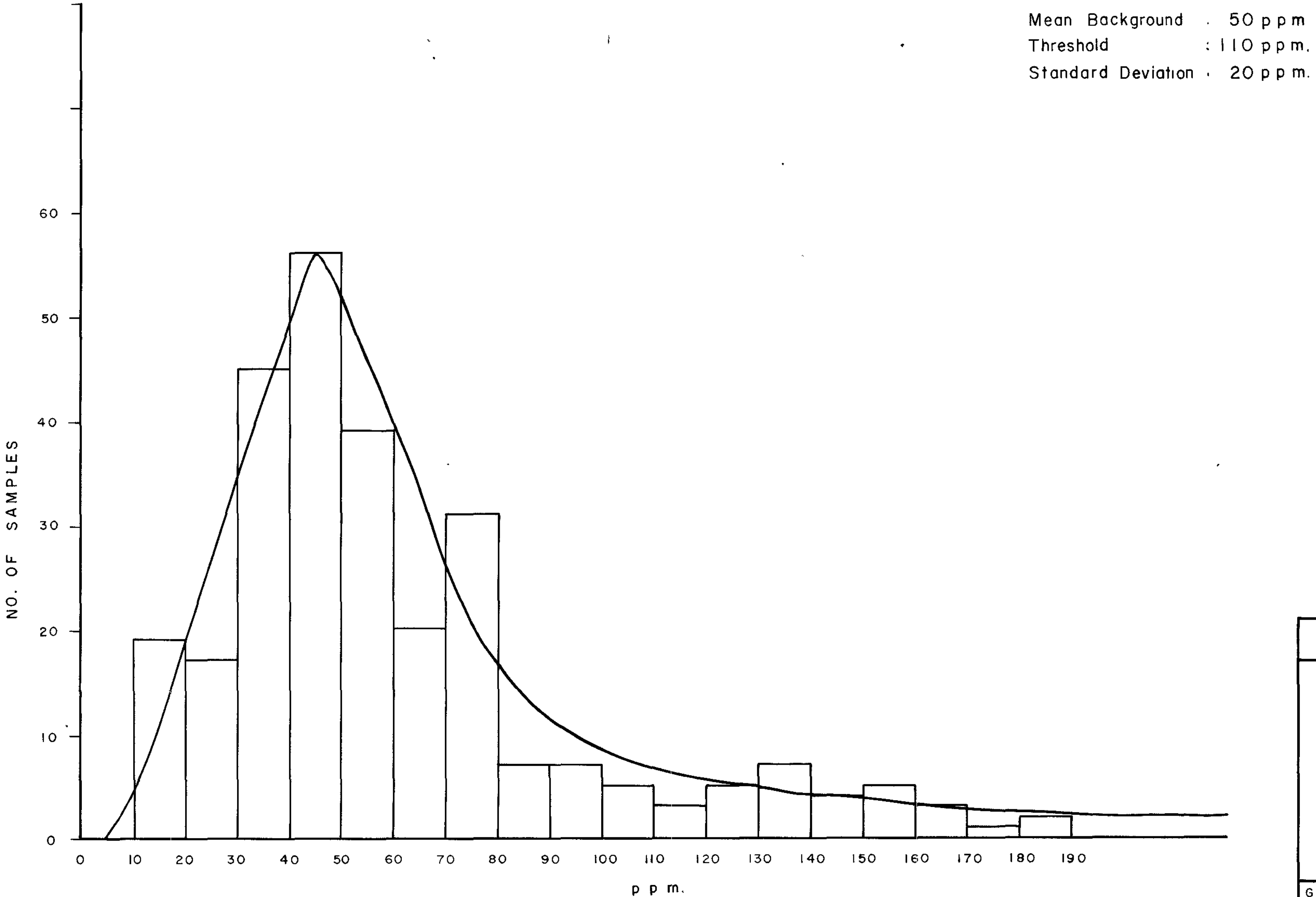


FIG. 11

081024 3404

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

ANOMALY 1 SOIL SURVEY

FREQUENCY DISTRIBUTION FOR LEAD VALUES

φ50/45

GEOLOGIST M SHARWOOD	SCALE
DRAWN BY Geodrafting Services	DATE : APRIL, 1969
JOB NO 118	REVISION

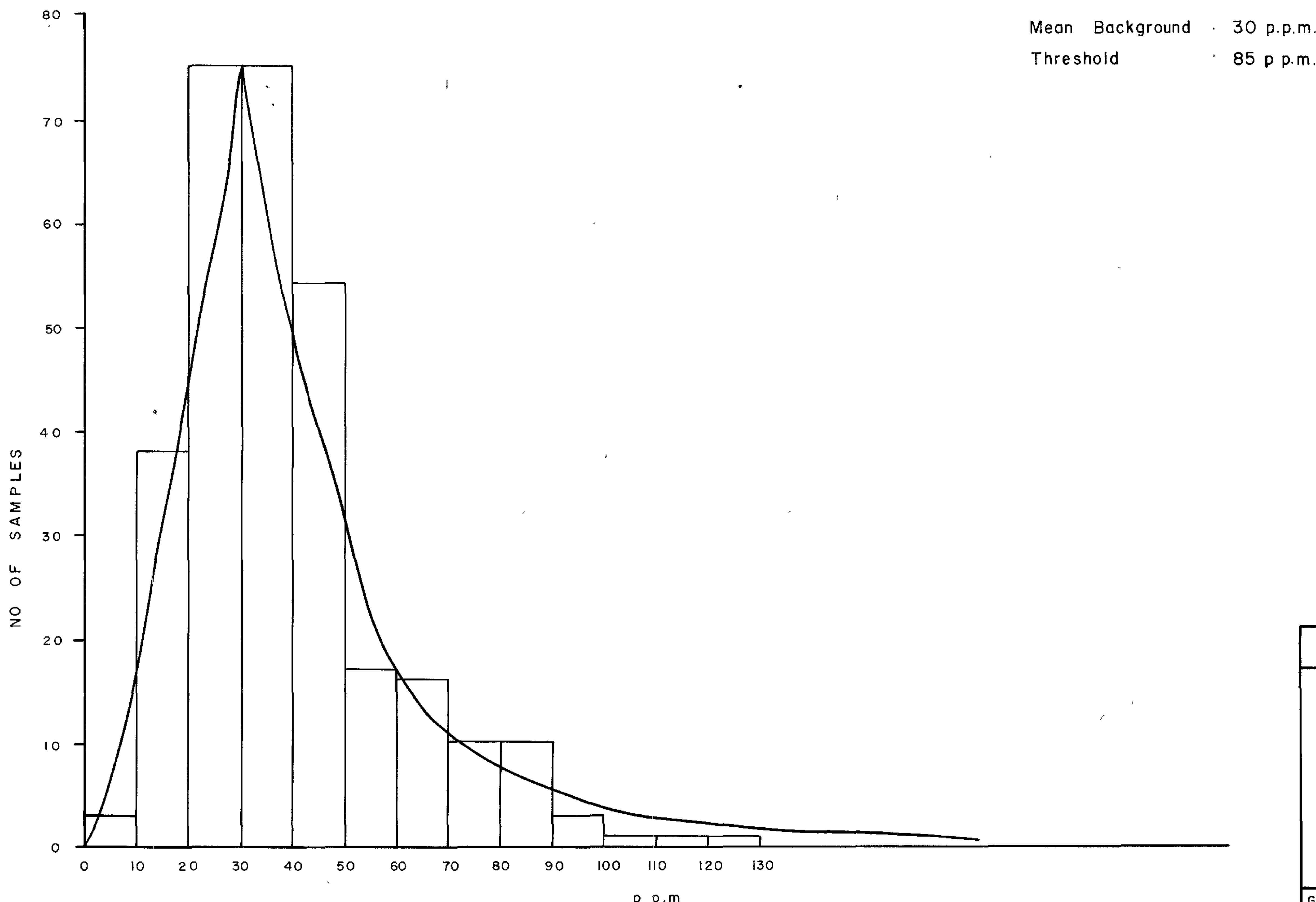
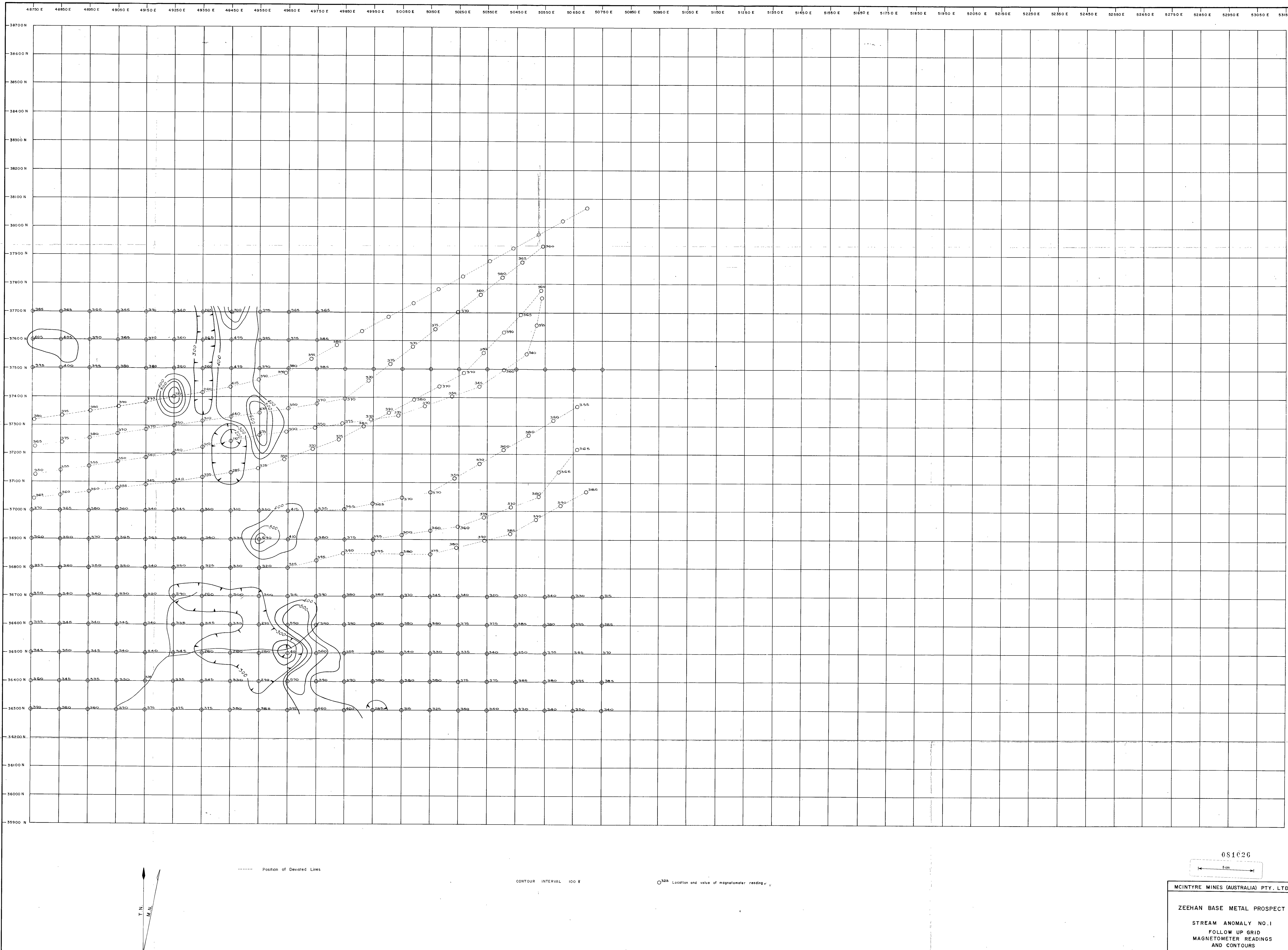


FIG. 12

081025 3405

MCINTYRE MINES (AUSTRALIA) PTY.LTD.	
ZEEHAN BASE METAL PROSPECT ANOMALY I SOIL SURVEY FREQUENCY DISTRIBUTION FOR ZINC VALUES 050/45	
GEOLOGIST · M SHARWOOD	SCALE
DRAWN BY · Geodrafting Services	DATE APRIL, 1969
JOB NO 118	REVISION·



081026

5 cm

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

STREAM ANOMALY NO. 1

FOLLOW UP GRID MAGNETOMETER READINGS AND CONTOURS

GEOLOGIST M SHARWOOD	SCALE 1" = 100'
DRAWN BY Geodrafting Services	DATE APRIL '69
JOB NO 118	REVISION

FIG 13

3406

3406 φ50/45

T.N. M.N.

11° 40'

SCALE

Roads	
Tracks	
Tramway	
Rivers	
—400—	Contours interval at 400'
O 267	Sample location (Stream sediment)
⊗ 381	Rock sample location
∇	Red ferruginous seepage

69-0558 Pg 27

5 cm

MCINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

BASE MAP FOR
STREAM SEDIMENT GEOCHEMISTRY

Φ50/45

Geologist:	Scale: 1" = 1/8 mile approx.
Drafted by: S.E. Ford	Date: December 1968
Job no: 118	Revision: April 1969

69-558

CONTOUR INTERVAL
0 - 110
110 - 220
220 - 330
330 - 440
>440
Soil sample location and value in p.p.m.
BASELINE
69-0558 Pg 28
5 cm
MCINTYRE MINES (AUSTRALIA) PTY. LTD.
ZEEHAN BASE METAL PROSPECT
STREAM ANOMALY NO. 1
SOIL FOLLOW UP Pb.
GEOLOGIST: M. SHARWOOD
SCALE: 1" = 100'
DRAWN BY: S. FORD
DATE: MARCH '69
JOB NO: 118
REVISION:
Φ50/45 69-558

CONTOUR INTERVAL

- 0 – 85
- 85 – 170
- 170 – 255
- 255 – 340
- >340

○60 Soil sample location and value in p.p.m.

69-0558 Pg 29

5 cm

McINTYRE MINES (AUSTRALIA) PTY. LTD.

ZEEHAN BASE METAL PROSPECT

STREAM ANOMALY NO. 1
SOIL FOLLOW UP Zn

950/45

GEOLOGIST: M. SHARWOOD	SCALE: 1" = 100'
DRAWN BY: S. FORD	DATE: MARCH '69
JOB NO: 118	REVISION:

69-558