

160001

**MICROFILMED**

ANNUAL REPORT  
EXPLORATION LICENCES 15/73 AND 2/70  
HATFIELD AND MACKINTOSH  
Tasmania  
For 12 months ending June 1, 1979.

79-1360

**OPEN FILE**

C.H. Young,  
Project Geologist, Tasmania.  
June 1979.

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SUMMARY

This report details exploration and research work conducted over the adjoining Hatfield and Mackintosh Licences during the period June 2, 1978 to June 1, 1979. Reporting for the two licence areas was combined because the boundary between the two virtually bisects a single project area.

The exploration included; completion of two diamond drill holes, computer analysis of soil geochemical data and a UTEM time domain EM system survey.

Research work is being conducted by the Federal Institute for Geosciences and Natural Resources of the Government of the Federal Republic of Germany. The research is part of a world wide programme from which it is hoped to evaluate parameters for a genetic approach to mineral exploration.

INTRODUCTION

Hatfield River Exploration Licence 18<sup>5</sup>/73 covers an area of 65 sq. km and was pegged on May 5, 1973 by Cominco Exploration Pty. Ltd. The E.L. was transferred from Cominco to Abminco N.L. early in 1978. The name Abminco N.L. was changed to Cleveland Tin Limited in early 1979. Work is managed by Aberfoyle Exploration Pty. Ltd.

Licence expiry date is June 26, 1979 and the licence may be renewed at six monthly intervals. E.L. 15/73 is partly over private land owned by Associated Forest Holdings Pty. Ltd. who also have a timber concession covering the entire area of the E.L.

Exploration Licence 2/70 Mackintosh River was granted to Aberfoyle Tin N.L. in January 1970. The licence is now defined to two parts, the western being to the east of the Murchison Highway, the eastern to the immediate north-west of the Cradle Mountain-Lake St. Clair National Park. The western part of the E.L. now incorporates the area previously covered by the Mayday Exploration Licence 5/74. The E.L. now covers an area of 232 sq. km. The E.L. was transferred from Aberfoyle to Abminco N.L. in early 1978. The name Abminco N.L. was changed to Cleveland Tin Limited in early 1979. Work is managed by Aberfoyle Exploration Pty. Ltd. The licence is subject of a joint venture between Aberfoyle Limited and Paringa Mining & Exploration Co. Ltd. Current equities are Paringa 10%, and Aberfoyle Limited 90%. The licence expires on 30/6/79. It may be renewed at six monthly intervals.

During the winter of 1978 two diamond drill holes were completed in the Mt. Charter area. One hole, MC 3 was drilled to a depth of 260.4 m and tested beneath a coincident soil geochemical and I.P. geophysical anomaly on line 4700N, near an exposure of massive pyritic barite. No massive barite was intersected and only minor lead-zinc mineralisation was noted.

The second hole MC 4 was drilled to a depth of 202 m and tested beneath a coincident soil geochemical and I.P. geophysical anomaly on line 5200N. This position is at about the same stratigraphic level as the barite lenses on line 4700N. Altered and pyritic dacite was first intersected becoming increasingly barren with depth. No base metal mineralisation was noted.

Computer analysis of all the C-horizon soil geochemical data for the Hatfield licence and the adjoining Mackintosh licence including the area covered by the Que River mineral leases, 3M, 4M, 5M/75, was completed. The geochemical data for the elements Cu, Pb and Zn was treated as a single group and also split into separate groups for each element for the main recognised rock units. The arithmetic mean, standard deviation and cumulative frequency percent values were calculated for the above groups. Cumulative frequency plots were prepared for each element for the total data and for the separate rock group data.

Statistical threshold values for individual populations show great variation to the thresholds determined by inspection for the whole group of data.

During the 1978-79 summer season an experimental EM technique, the University of Toronto EM (UTEM) survey was conducted over one large loop (1500 m x 1000 m) in the Mt. Charter region. The UTEM technique is able to record 10 channels of data over a wide range of delay times (equivalent to a wide range of frequencies) and accordingly may detect sizeable conductors up to 300 - 400 metres below surface. Three conductors were detected. The best one is attributed to the graphitic Que River Shales. Another is attributed to the known albeit weak pyrite mineralisation in the Mt. Charter area, tested by diamond drill holes MC 1, MC 2 and MC 3. The third anomaly is noted as possibly a cultural feature and is attributed to water saturated gravels in a creek bed.

#### DIAMOND DRILLING

Two diamond drill holes were completed in the Mt. Charter area. Diamond drill logs are presented in Appendix A.

MC 3 of 260.4 m on line 4700N tested beneath a coincident soil geochemical and I.P. geophysical anomaly, near an exposure of massive pyritic barite (Plate HAT 27). Surface geophysical and geochemical anomalies are not of the same magnitude as at Que River. The hole was designed to test for the down plunge extension of the barite rich horizon where lateral zonation to a more Pb-Zn rich phase is possible.

005

The hole passed from andesite into pyritic dacitic at 28.1 m. This contact was previously exposed on surface by trenching and a dip of 55° to the west is established.

At 65.2 m through a gradational contact, the rock becomes more massive pyritic porphyritic dacite. This rock contains minor pyrite veins and stringers with traces of barite, sphalerite and galena.

This rock type continues to the bottom of the hole, apart from an interval of pyritic dacitic pyroclastics between 153.5 m and 172.5 m, the nature of the mineralisation is similar to that in the porphyritic dacite above with a slightly increased pyrite content to an average of 5-8% overall. It is probable that this pyritic fragmental unit is the main source of the I.P. anomaly noted at 4350E.

There is a 7.3 m zone of weak pyrite-base metal stringer mineralisation in pyritic porphyritic dacite between 226.5 m and 233.8 m. Assay results for this interval are not yet available.

This style of mineralisation is similar to the zone of stringer mineralisation intersected in MC 1 on 4800N between 112.3 m and 123 m and in MC 2 on 4600N between 105 m and 109.5 m. This zone of pyrite and weak base metal stringer mineralisation projects to surface at 4400E.

In all three drill holes a stratigraphic correlation may be made with the pyritic fragmental unit situated above the stringer zone, i.e. 38.5 m to 44.5 m in MC 1, 44.5 m to 60 m in MC 2 and 153.5 m to 172.5 m in MC 3 (as described above).

The tenor of pyrite mineralisation within this zone increases southward to MC 1. Fault offset to the south-east occurs immediately south of the drill hole and the stratigraphy is no longer recognised.

The association of a pyrite-base metal stringer zone in pyritic porphyritic dacite, overlain by a pyritic dacite fragmental unit, is similar to the S lens sequence at Que River. Further exploration is warranted in the Mt. Charter area. The lack of major surface geophysical and geochemical anomalies indicates the target zone is at least 100 m below surface.

006

MC 4 of 202 m on line 5200N tested beneath a soil geochemical and I.P. geophysical anomaly situated at about the same stratigraphic position as the barite lens on 4650N (Plate HAT 28).

The hole commenced in grey coloured pyritic porphyritic dacite. The pyrite content decreased with depth until at 91 m passed through a gradational contact into brown coloured barren dacite which continued to the end of hole. The only base metal mineralisation noted in this hole occurs as secondary aggregates of sphalerite and galena in 1.5 cm wide quartz carbonate veins at 181 m and 181.7 m respectively.

GEOCHEMISTRY

The C-horizon soil geochemical data for the Hatfield and Mackintosh E.L.'s and the Que River Mineral leases 3M, 4M, 5M/75 was combined as a single set of data for computer analysis because the two licences and the mineral leases cover a single project area. The data in this report is thus identical to that for the Mackintosh Licence Annual Report.

Sample analysis was for Cu, Pb, Zn by atomic absorption spectroscopy of the -80# fraction. Initially the geochemical data was treated as a single group for each element to allow comparison with the thresholds previously determined by inspection.

Contour levels for all data determined by inspection are as follows:

Copper	100 ppm	200 ppm		
Lead	250 ppm	500 ppm	1000 ppm	2000 ppm
Zinc	200 ppm	400 ppm		

The computer technique relies on the correct match of each geochemical sample to its underlying rock type, therefore the geochemical data was classified according to the major rock types recognised in the area (Plate MAC 53). This reduces the number of populations due to rock type variations. The data is classified according to the following rock groups:-

007

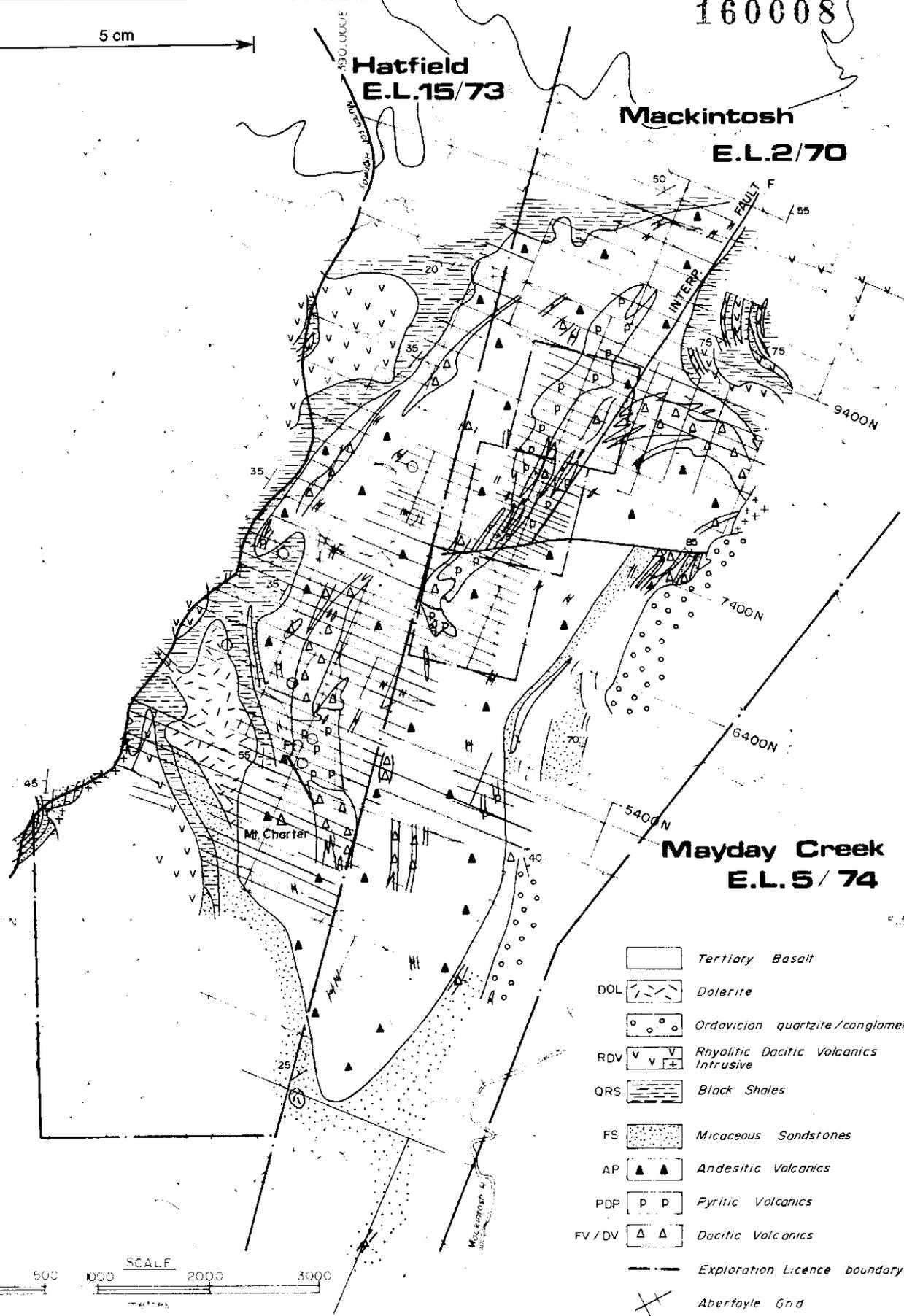
160008

5 cm

Hatfield  
E.L.15/73

Mackintosh  
E.L.2/70

Mayday Creek  
E.L.5/74



○ Diamond drill hole beyond Que River environs.

**Aberfoyle Exploration Pty Ltd**

Drawn: C.H.Y.	NORTH WEST TASMANIA QUE RIVER REGIONAL GEOLOGY SUMMARY MAP	Location code
Checked: R.J.E.		Date: June, 1977
Scale: 1:50,000		
Plate No: Mac.53		

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<u>Name</u>	<u>Code</u>	<u>Rock Number</u>
Andesite	AP	1
Pyritic dacitic volcanics	PDP	2
Que River Beds (Shales and Sandstones)	QRS	3
Upper Rhyolitic-Dacitic Volcanics	RDV	4
Eastern Shales and Sandstones "Farrell Slates"	FS	5
Dolerite (Jurassic?)	DOL	6
Dacitic Volcanics (within Andesite Suite)	DV	7
Eastern Volcanics "Farrell Slate Group"	FV	8
Alluvium		9

The computer presentation of data, Appendix B, includes the arithmetic mean, standard deviation, cumulative frequency percent and frequency histogram plot.

The mean, standard deviation and mean plus 2 times standard deviation for the total data group and for the separate rock groups are tabled below:

TABLE 1

SUMMARY OF COMPUTER DERIVED STATISTICAL DATA

All C-horizon Soil geochemical data from Que River, Hatfield E.L. 15/73 and Mackintosh E.L. 2/70

<u>ROCK GROUP</u>	<u>ELEMENT</u>	<u>ARITHMETIC MEAN</u>	<u>S.D.</u>	<u>MEAN+2xSD</u>
All Data Combined	Cu	38	47.51	133.02
	Pb	143	361.17	865.34
	Zn	80	145.91	371.82
Pyritic Dacitic Volcanics	Cu	46	85.65	217.3
	Pb	328	658.42	1644.84
	Zn	47	169.22	385.44
Dacitic Volcanics	Cu	29	55.19	137.38
	Pb	247	672.29	1591.58
	Zn	58	234.13	526.26
Andesite	Cu	45	41.73	128.46
	Pb	127	276.25	679.5
	Zn	102	139.78	381.56
Que River Beds	Cu	18	20.39	58.78
	Pb	69	131.61	332.22
	Zn	40	98.36	236.72
Eastern Shales and Sandstones	Cu	15	20.17	55.34
	Pb	35	40.82	116.64
	Zn	51	132.51	183.51
Eastern Volcanics	Cu	10	27.29	64.58
	Pb	35	64.81	164.62
	Zn	35	29.87	94.74

Summary of Computer Derived Statistical Data Cont...

<u>ROCK GROUP</u>	<u>ELEMENT</u>	<u>ARITHMETIC MEAN</u>	<u>S.D.</u>	<u>MEAN+2xSD</u>
Upper Rhyolitic- Dacitic Volcanics	Cu	16	23.47	62
	Pb	74	98.32	260.64
	Zn	50	86.13	222.26
Dolerite	Cu	29	18.91	66.82
	Pb	70	106.67	283.34
	Zn	94	101.16	296.32
Alluvium	Cu	7	6.46	19.92
	Pb	33	11.56	56.12
	Zn	14	19.14	52.28

The calculated threshold levels (mean + 2xSD) are higher than those based on a comparison of visual estimates correlated with the known distribution of metal in the bedrock, for example at Que River the ore zone is outlined by the 500 ppm contour, whereas the calculated statistical threshold is 1645 ppm.

It is intended to calculate the thresholds for each element in each rock type using a more accurate method than (mean + 2xSD).

As expected, it is clear from inspection of the frequency histograms that the geochemical data has lognormal distribution patterns, therefore calculation of threshold values needs to be made using normalised data.

Cumulative frequency plots were prepared manually from the computer data, (Appendix B). In many cases the patterns for copper and lead are similar but differ to that of zinc. It may be inferred from this observation that the zinc is more mobile than lead and copper. Hence lead and copper should be better discriminators for underlying mineralisation. In most cases more than one population is noted. Overlap of populations make it difficult to distinguish an accurate threshold by inspection. However, the inflection between populations allows the more significant contours to be picked approximately.

For example, for the total data group and the pyritic dacitic volcanic group, the most significant contours should be:

	<u>Total Group</u>	<u>Pyritic Dacitic Volcanics</u>
Cu	200 and 400 ppm	80 and 300 ppm
Pb	85 and 1180 ppm	500
Zn	130 and 1020	300 and 1010 ppm

At Que River the 500 ppm contour for Pb outlines the ore zone. Thus the threshold of 500 ppm suggested by the cumulative frequency plot appears to be valid.

Real but low magnitude anomalies may be recognised from the cumulative probability plots. The use of metal ratios may aid the classification of low order anomalies particularly when weighted against similar anomalies of known cause. As an example, the ratio  $\frac{Cu \times Pb}{Zn}$  has been calculated from the arithmetic means of all rock groups and is tabled below:

<u>Rock Group</u>	<u><math>\frac{Cu \times Pb}{Zn}</math></u>
All groups combined	68
Pyritic Dacitic Volcanics	321
Dacitic Volcanics	123
Andesites	56
Que River Beds	31
Eastern Shales and Sandstones	10
Eastern Volcanics	10
Upper Rhyolite-Dacitic Volcanics	24
Dolerite	22
Alluvium	16.5

The ratio corresponding to the mineralised rock group is 3 to 30 times larger than the other ratios.

It is proposed to continue evaluation of the geochemical data with the aid of the computer.

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UTEM SURVEY

During the 1978-79 summer season an experimental EM technique, the University of Toronto EM (UTEM) was conducted over one large loop (1500 m x 1000 m). Lines were surveyed at 200 m intervals from 4200 N to 5800 N in the Mt. Charter region. The field work was carried out by Dr. Yves Lamontagne with the assistance of Steve Ranford.

Three conductors were detected by the UTEM survey. (Plate HAT 31).

ANOMALY A is attributed to the graphitic Que River Shales in the south-west corner of the survey grid. This unit has been previously explored with I.P. geochemistry and drilling.

ANOMALY B in the northern part of the survey grid is noted as a possible cultural feature. The area was previously tested with I.P. and geochemistry. In the vicinity of the UTEM anomaly the I.P. data indicate a broad resistivity low and corresponding broad p.f.e. response from background to 4%. This response is not indicative of a strong conductor.

Soil geochemistry in this area is not anomalous.

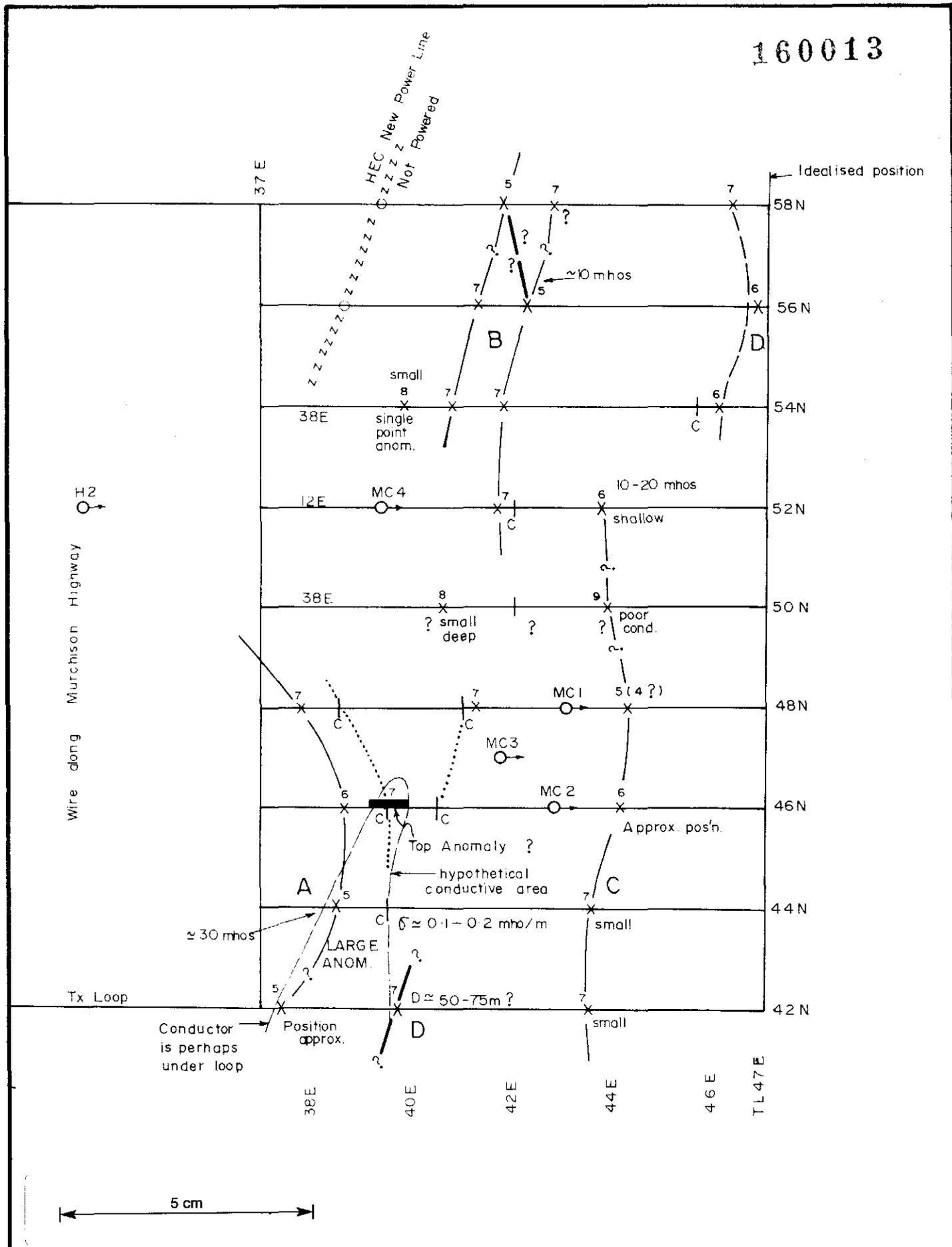
Evaluation of this anomaly was conducted by trenching on line 5800 N. Water saturated gravel in a north draining creek, underlain by andesite, is the apparent source of the UTEM response.

ANOMALY C was adequately checked by previous exploration and diamond drill holes MC 1, MC 2 and MC 3. The source is essentially pyrite mineralisation.

A report of the UTEM survey by Dr. Y. Lamontagne is given in Appendix C.

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160013



**Aberfoyle Exploration Pty Ltd**

Drawn: C.H.Y.	NORTH WEST TASMANIA <b>HATFIELD E.L. 15 / 73</b> Idealised Grid and UTEM Interpretation	Location code
Traced: R.J.E.		Date: June, 1979
Checked:		Scale: 1:10,000
Revised by: Date:		Plate No: Hat 31

RESEARCH PROGRAMME

Research work is being conducted by the Federal Institute for Geosciences and Natural Resources of the Government of the Federal Republic of Germany. The research is part of a world wide programme from which it is hoped to evaluate parameters for a genetic approach to mineral exploration.

The data is not made public by the Institute except to report to the Government of the Federal Republic of Germany.

Two separate reports were presented to Aberfoyle Exploration Pty. Ltd., namely;

1. Geochemical data, Que River, Tasmania, Australia, April 1978.
2. Pattern Recognition Applied to Geochemical Exploration Data in the area of Que River, Tasmania, Australia, January 1979.

The reports contain whole rock XRF analyses, computerised statistical data processing and interpretation of a total of 276 rock samples, made up of 175 from the Que River Mineral Leases, 48 from the Hatfield E.L. and 53 from the Mackintosh E.L.

The Director of Mines has given an understanding that as the bulk of the data contained in the reports pertains to samples from within the Que River Mineral leases the data will remain confidential until further notice.

Accordingly the reports are supplied to the Department of Mines under separate cover.

CONCLUSION AND RECOMMENDATIONS

First derivative exploration of the attractive volcanic stratigraphy within the Hatfield licence, that is detailed surface exploration using the techniques of geological mapping, soil geochemistry and I.P. geophysics, is now complete. No coincident first order soil geochemical and I.P. targets of a magnitude similar to that at Que River were detected.

Soil geochemistry is a reliable technique for the detection of near surface base metal sulphides. The technique is however, relatively indiscriminate in that high order anomalies occur over both ore and trace disseminated mineralisation. Computer processing is being used to aid interpretation of the soil geochemical data; and it is intended to continue these statistical studies.

Two diamond drill holes were completed in the Mt. Charter area. Whilst no significant base metal mineralisation was intersected the drill hole information outlines a pyrite base metal stringer zone in pyritic porphyritic dacite, overlain by a pyritic dacite fragmental unit, similar to the S lens sequence at Que River.

Further exploration for massive base metal sulphides is warranted in the Mt. Charter area. The lack of major surface geophysical and geochemical anomalies indicates the target zone is at least 100 m below surface.

The UTEM time domain EM system survey, conducted in the Mt. Charter area, achieved anomalies over areas previously delineated by I.P. geophysics but also indicated an anomaly in an area of low I.P. response. This UTEM anomaly is considered to result from a near surface - non sulphide - conductor. The ability of UTEM to detect massive sulphide mineralisation at depths greater than 100 m, for example Anomaly C in the Mt. Charter area, may only be evaluated by drill testing.

The whole rock geochemical research work being conducted by the German Federal Institute for Geosciences and Natural Resources is part of a world wide programme from which it is hoped to evaluate parameters for a genetic approach to mineral exploration. In the Hatfield, Mackintosh, Que River environment the programme may aid in the search for blind ore deposits.

FINANCE

HATFIELD

Expenditure for the twelve months ending 2nd July, 1979:

Geology	\$ 9,323
Survey	946
Geophysics	14,976
Geochemistry	3,355
Costeaning	1,522
Diamond Drilling	29,457
Tenure	401
Sundries	1,504
	<hr/>
	\$61,484
	<hr/> <hr/>

MACKINTOSH

Expenditure for the twelve months ending 2nd July, 1979:

Geology	\$ 1,624
Geophysics	360
Geochemistry	1,026
Tenure	4,999
Sundries	13
	<hr/>
	\$ 8,022
	<hr/> <hr/>

Significant expenditure on both Hatfield E.L. 15/73 and Mackintosh E.L. 2/70 was incurred by the German Government Federal Institute for Geosciences and Natural Resources as part of their Case Study Research programme at Que River. As expenditure was accounted for by Research grants an actual expenditure figure cannot be provided.

REFERENCES

WEBSTER S.S.                      Results of UTEM Survey, Tasmania.  
    Webster S.S. 1979.

YOUNG C.H.                         Annual Report.  
    Young C.H.  
    Exploration Licence 15/73  
    Hatfield, Tasmania.  
    For 12 months ending June 1, 1978.

SIGNED: *C.H. Young*  
C.H. Young,  
Project Geologist, Tasmania.

ENDORSED: *K.R. Yates*  
K.R. Yates,  
Manager - Outside Exploration.

APPENDIX A

Diamond Drill Logs MC 3 and MC 4.



# DRILL HOLE RECORD

160019

Location *Mt Charter* Property *Hatfield EL 15/73* District *TASMANIA* Bearing (M) *098°* Hole No. *MC3*  
 Commenced *29.5.78* Completed *28.6.78* % Recovery *98.0* Grid bearing (M) *8.45°* Date *4.7.78*  
 Objective *To test the down dip extension of massive barite - pyrite mineralisation exposed on 4650N and a co-incident soil geochemical and I.P. anomaly on 4700N.* Core size *NQ to 87m, BQ to 260.4m EOH* Logged *C.H. Young*  
 Co-ordinates *4700N 4150E Dip - 48°* Alt./R.L. *+ 792*

018

SURVEY DATA				GRAPH DERIVED DATA			CALCULATED CO-ORDINATES			REMARKS
DEPTH	DIP	BEARING(M)	INSTRUMENT TYPE	DEPTH	DIP	BEARING(M)	NORTHING	EASTING	ALTITUDE	
0	-48	098	Compass and Clinometer.	0	-48	098	4700	4150	792	Drill hole summary:-
12m	48	102	Eastman sight	25	47.75	098	4700.22	4166.77	773.46	
44.5m	47	102	shot camera.	50	47	098.5	4700.37	4183.70	755.06	0 - 28.1 m Andesite
71.5m	47	103	"	73	46	098.5	4700.44	4200.90	736.93	28.1 - 65.2 m Porphyritic dacite / quartz
100.0m	45	101	"	100	43	097.5	4700.67	4218.42	719.10	65.2 - 153.5 m Porphyritic dacite
127.5m	44	100.5	"	125	44.5	097	4701.14	4236.17	701.50	153.5 - 172.5 m Porphyritic dacite
159.5m	44	103	"	150	44	098	4701.53	4254.07	684.05	pyroclastic including 10cm of streaky pyroclastics at * 164.9m
191.5m	44	103	"	175	43.75	098.5	4701.68	4272.10	666.73	172.5 - 260.4m Porphyritic dacite
219.7m	42	102	"	200	43	098.5	4701.76	4290.27	649.56	
251.0m	40	103.5	"	225	41.5	098.75	4701.80	4308.77	632.75	
				250	40	099.0	4701.76	4327.71	616.43	At 114.3, 139.0, 173.6, 212.9, barite veins of 5 to 15cm do not satisfactorily explain the massive barite on 4650N. (The massive barite thus appears to be a fault localised deposit).
				260.4	39	099.0	4701.73	4335.73	609.82	
										The most significant base metal mineralisation was noted in the interval 226.35 - 233.5m and includes a 10cm stringer of massive sulfide.
										NQ casing left in hole 62.5 - 86.5 m in 24m of casing.

THIS PROGRAM COMPUTES PROJECTED DRILL HOLE COORDINATES  
 WITH INPUT DATA AS DERIVED MANUALLY FROM GRAPH OF SURVEY DATA  
 (INITIALLY SET UP FOR QUE RIVER BEARING, BUT CAN BE USED ON ANY AREA)

HOLE NUMBER **MCDR 3** (*Grid Bearing 8-75*)  
 COLLAR COORDS. 4700 NORTH..... 4150 EAST

COLLAR ELEVN. 792 METRES (INPUT MANUALLY DERIVED FROM GRAPH)

DEPTH	DIP	BEARING	NORTHING	EASTING	ALTITUDE
0.0	48.0	98.0	4700.00	4150.00	792.00
25.0	47.8	98.0	4700.22	4166.77	773.46
50.0	47.0	98.5	4700.37	4183.70	755.06
75.0	46.0	98.5	4700.44	4200.90	736.93
100.0	45.0	97.5	4700.67	4218.42	719.10
125.0	44.5	97.0	4701.14	4236.17	701.50
150.0	44.0	98.0	4701.53	4254.07	684.05
175.0	43.8	98.5	4701.68	4272.10	666.73
200.0	43.0	98.5	4701.76	4290.27	649.56
225.0	41.5	98.8	4701.80	4308.77	632.75
250.0	40.0	99.0	4701.76	4327.71	616.43
260.4	39.0	99.0	4701.73	4347.73	600.82



160021

## DIAMOND DRILL LOG

Hole No

MC3

Page No 1.

## Feature :

Bedding



Foliation

Fragment -  
size & shape

Shearing



Fault



Vein

carbonate  
quartz

## Mineralization :

Trace 1-5%

Common 5-15%

Abundant 15-60%

Massive &lt;60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	5	<u>NO CORE</u> <u>DEEPLY WEATHERED ANDESITE.</u>							
1-6	12.0	AP Orange-brown deeply weathered andesitic lava breccia Andesite with an orange-brown coloration due to Fe. Fractures at 30-40° to CA lined with manganese oxide. The rock is relatively massive with occasional breccia fragments. White carbonate spots after foliation is characteristic.	BROKEN CORE						Deeply weathered and ferruginous after ferro-magnesian minerals. No obvious sulphides.
1-9	15		BROKEN CORE						
0-8									
1-6	20								
1-5								21.0	Thin chlorite veins at 40° to C.A. - up to 6cm.
1-1		23.5-25.0 m. Less weathered brown, grey-green in colour - lava breccia. Fragments to 3cm.							
1-0		Foliation 40° C.A.							

021



160022

**DIAMOND DRILL LOG**

Hole No **MC3** Page No **2**

**Feature :** Bedding Shearing   
 Foliation Fault   
 Fragment-size & shape Vein c carbonate  
 q quartz

**Mineralization :** Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
0-5		AP as above.							
0-8		Ferruginous - orange brown deeply weathered.							
	28.1	<b>SHEARED CONTACT</b>							
0-3		PDP Deeply weathered - orange-brown to white feldspar crystal lithic tuff.							Deeply weathered and ferruginous - probably after pyrite. Estimate 3-5% original pyrite.
0-4									
	30	Carbonate alteration is common with white carbonate aggregates to 2mm after feldspar and a general bleached appearance of the rock. Oxidation of pyrite has imparted a rust red coloration to the deeply weathered rock.							
1-3									
1-2									
0-8	35	Occasional lithic fragments to 2cm one of the same composition and texture as the groundmass.							
0-8		Numerous sheared and broken zones as indicated in the visual log may represent shear zones.							
0-8									
0-7	40	There is no obvious foliation in the deeply weathered zone.							
0-3									
0-5									
1-3									
0-5	45								
0-9									
0-6		47.5-50.3m. Relatively fresh, grey carbonated feldspar crystal lithic tuff, as above.							Pyrite 3-5% in relatively fresh core.
0-8									
1-6									



160023



160024

DIAMOND DRILL LOG

Hole No MC 3 Page No 4

Feature : Bedding Shearing   
 Foliation Fault   
 Fragment - size & shape Vein carbonate  
 quartz

Mineralization : Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		P.D. as above.							
3-0		Local stringer veins of pyrite, limonite and carbonate.						76.0	Pyrite 3% - 5% as above.
								77.0	Pyrite 8% as disseminations and stringers with carbonate and barite 10%
3-0	80								Note Barite and carbonate stringer veins.
									Pyrite 3-5% as above.
3-0									
3-0	85								
NQ	0.5								
BQ									
2-3		88.0 - 89.5 m. Barite and carbonate veins to 3 cm. - very minor chlorite veining associated with carbonate.						88.5	6 cm Pyrite 10% as stringers.
								89.5	5 cm Pyrite 15% as stringer
3-0	90								
									92.0 - 95.0. Fe sph, br as aggregates in matrix.
3-0	95								
3-0									
3-0								98.6	15 cm Py 10% as disseminations and stringers.



Feature: Bedding Shearing   
 Foliation Fault   
 Fragment - size & shape Vein <sup>c</sup> carbonate <sup>q</sup> quartz

Mineralization: Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		PD. as above.							Pyrite 3-5% as above
3.0									
3.0	130								
2.9									
2.6	135	135.5 - 137.0 m. Minor barite - carbonate veins to 2cm.							
0.5									
2.8	140	139.8m. 20 cm quartz vein - minor carbonate and chlorite. 50° GA.						139. Barite stringer vein with pyrite to E.W. in aggregate. (to 10 cm).	
2.3								140.5 Pyrite 10% as disseminated aggregate and stringer veins.	
3.0	145							141.9 Py 3-5 as above.	
0.9								145.3 60% Pyrite 40% - stringer vein.	
1.2		148.0 - 150.0 m. Numerous carbonate and barite stringer veins to 3cm.							

026 Combined

160027

DIAMOND DRILL LOG

Hole No MC3 Page No 7

Feature : Bedding  Shearing   
 Foliation  Fault   
 Fragment-size & shape  Vein  c carbonate  
 q quartz

Mineralization : Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
3-1		PD as above.							Pyrite 3% - 5% as above.
3-1	153.5	Foliation 50° CA. CONTACT at 55° CA						152.0 m. Aggregate of Sph to 1 cm in c. vein.	
	155	PDP Grey carbonated locally saccharified lithic tuff agglomerate						153.8 Pyrite 15% as stringers. 154.2	
3-1		Lithic fragments are irregular in outline, grey porphyritic dacite. They occupy about 60% of the rock. Fragment size vary from 0.5 mm to 3 cm.						155.8 10 cm pyrite 30% as stringers	
3-1	160	The matrix is blue grey in color fine grained - buffaceous, of similar composition and texture as the fragments. Minor barite veins are common.						157.8 Pyrite 5% locally 10% as disseminations, aggregates and irregular veins. (Stringers) Minor Barite veins are common, to 0.5 mm	
3-1								161.8 Pyrite 3% - 5% as above	
0.5		164.9 m. 10 cm of strongly pyroclastic SP - grey fiamme at 40° to C.A.						163.5 Pyrite 8% as above	
3-0	165	(This has the appearance of a rock common to the shaly tuff units at Que Pasa)						164.1 Pyrite 3% - 5% as above.	
3-0									
3-0	170								
3-0	172.5	GRADATIONAL CONTACT							Pyrite 3% - 5% as above.
		PD							
		Grey carbonated locally saccharified Porphyritic Dacite see over →						173.6 5 cm vein of barite in brecciated PD.	
	172							174.5 as above	





**Feature:** Bedding Shearing   
 Foliation Fault   
 Fragment-size & shape Vein carbonate  
 quartz

**Mineralization:** Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
0-9		PD as above						225.5	C. vein. 3 cm at 50° CA
1.0		Mina's Carbonate and Barite veins.						226.35	20 cm Pyrite 5%
								226.8	Sph 5% Gr 10% as stringer veins. Py 4.5% as above.
3-0		229.6 - 20 cm barite vein at 50° CA. (Mina's aggregate of Sph, Gr.)						226.8	10 cm massive Sulphide, Sph 30% Gr 20% Py 20% as stringer
	230							230.2	Py 3% 5% Gr Sph, Gr. as above.
3-0									Pyrite 5% - 8% - Sph 3% 5% Gr 2% 3% Fe Crpy.
								227.5	as disseminations, aggregates and stringers
	235								Pyrite 3% 5% Fe Sph, Gr.
3-0									
	240	Foliation 50° CA.							
3-0		242.3. Numerous solution cavities to 0.5 cm.							
3-0									
	245								
2-5									
								247.3	5 cm Pyrite 15% - Fe Crpy.
0-5		248.0 - 248.3 m. Breccia zone.							
3-0									

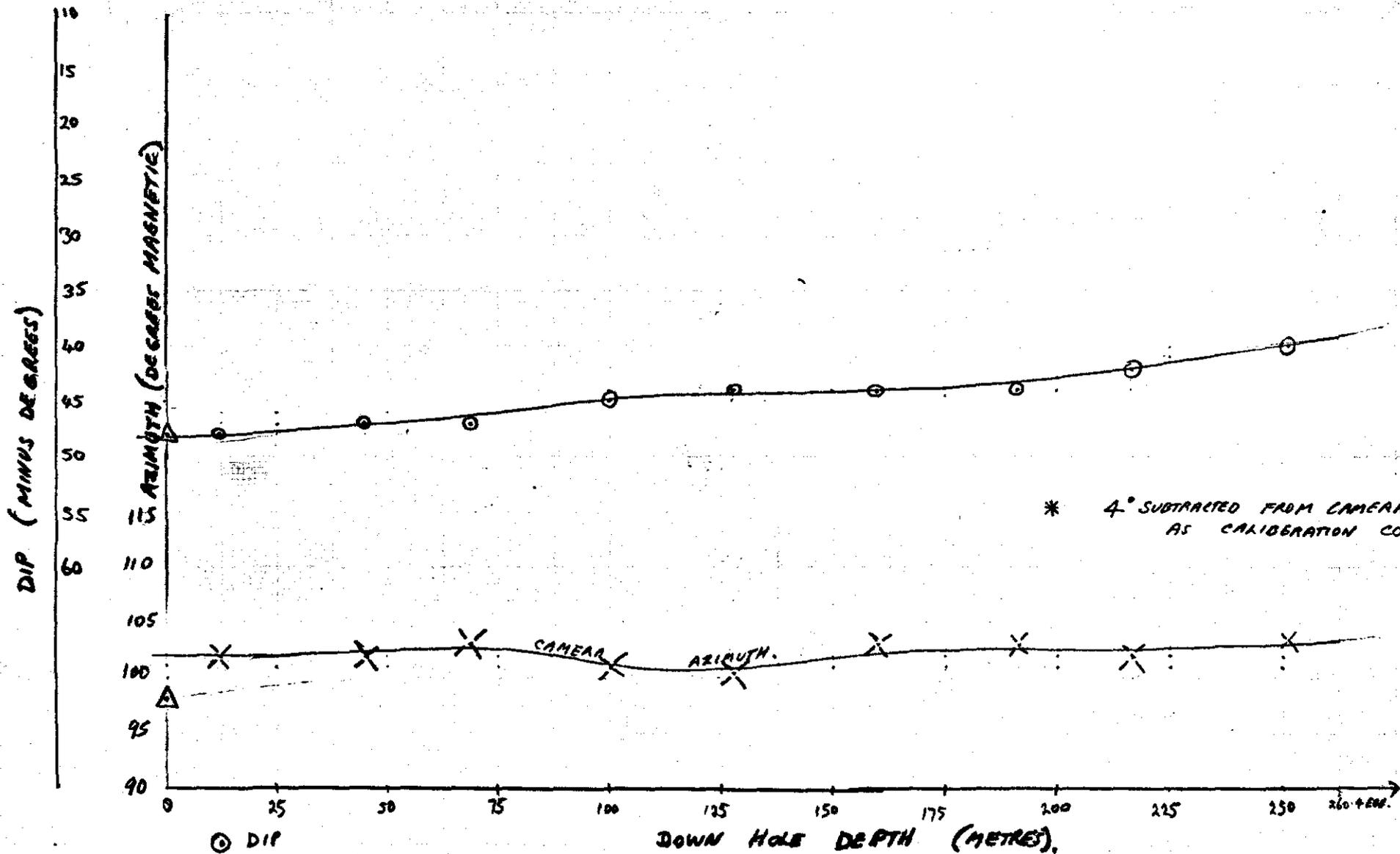
Feature : Bedding Shearing   
 Foliation Fault   
 Fragment-size & shape Vein carbonate  
 quartz

Mineralization : Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		<i>P.D. as above</i>							<i>Pyrite 3/5? To Sp. Gn.</i>
	3.0	<i>Meni Carb - Barite veins to 0.5cm. every 70-40 cm. Grey massive porphyritic dante.</i>							
	259								
	3.0								
	2.9								
	260								
	260.4	<i>4 EOH.</i>							

# MC 3 EASTMAN SINGLE SHOT DOWNHOLE CAMERA SURVEYS.

COMMENCED 29/5/78 COMPLETED 28.6.78. DEPTH. 260.4 m



- DIP
- × AZIMUTH
- △ COMPASS (AZIMUTH) + CLINOMETER (DIP)



# DRILL HOLE RECORD

032

160033

Location MT CHARTER Property HATFIELD EL 15/73 District TASMANIA Bearing (M) 105° Hole No MC4  
 Commenced 2.7.78 Completed 17.7.78 % Recovery 99.0 Grid bearing (M) 8.75° Date 19.7.78  
 Objective To test a weak coincident soil geochemical and I.P. anomaly, on line 5200N, in the area 4000 E to 4100 E, in a sequence of pyritic dacitic rocks. Core size NQ to 72m BQ to 202m E.O.H. Logged C.H. Young  
 Co-ordinates 5200N 3925 E Dip -48° Alt./R.L. ±745

SURVEY DATA				GRAPH DERIVED DATA			CALCULATED CO-ORDINATES			REMARKS
DEPTH	DIP	BEARING(M)	INSTRUMENT TYPE	DEPTH	DIP	BEARING(M)	NORTHING	EASTING	ALTITUDE	
0	48	105	Compass and clinometer	0	48	105	5200	3925.0	745.0	
12	48	111	Eastman single	25	47.5	105.5	5198.1	3941.7	726.49	0 - 58.5m. Pyritic porphyritic dacite to part deeply weathered and hardenised.
30	47	109.5	shot camera	50	46	106	5196.01	3958.7	708.29	
60	45	112	"	75	44.5	107	5193.63	3976.14	690.53	
90	44	111	"	100	44	108	5190.91	3993.84	673.09	58.5m - 91.0m Fresh pyritic porphyritic dacite, becoming increasingly barren with depth.
120.5	43	113	"	125	42.5	109	5187.82	4011.78	655.96	
156.5	41	114	"	150	41	110	5184.34	4030.10	639.32	
192.5	39	115.5	"		40	110.5	5180.55	4048.73	623.08	91.00 - 202m EOH. Barren dacite, with variable amounts of weak chloritic alteration.
				202	38.5	111.5	5176.11	4069.16	606.00	

THIS PROGRAM COMPUTES PROJECTED DRILL HOLE COORDINATES  
 WITH INPUT DATA AS DERIVED MANUALLY FROM GRAPH OF SURVEY DATA  
 INITIALLY SET UP FOR QUE RIVER BEARING, BUT CAN BE USED ON ANY AREA

HOLE NUMBER MC 4

COLLAR COORDS. 5200 NORTH..... 3925 EAST

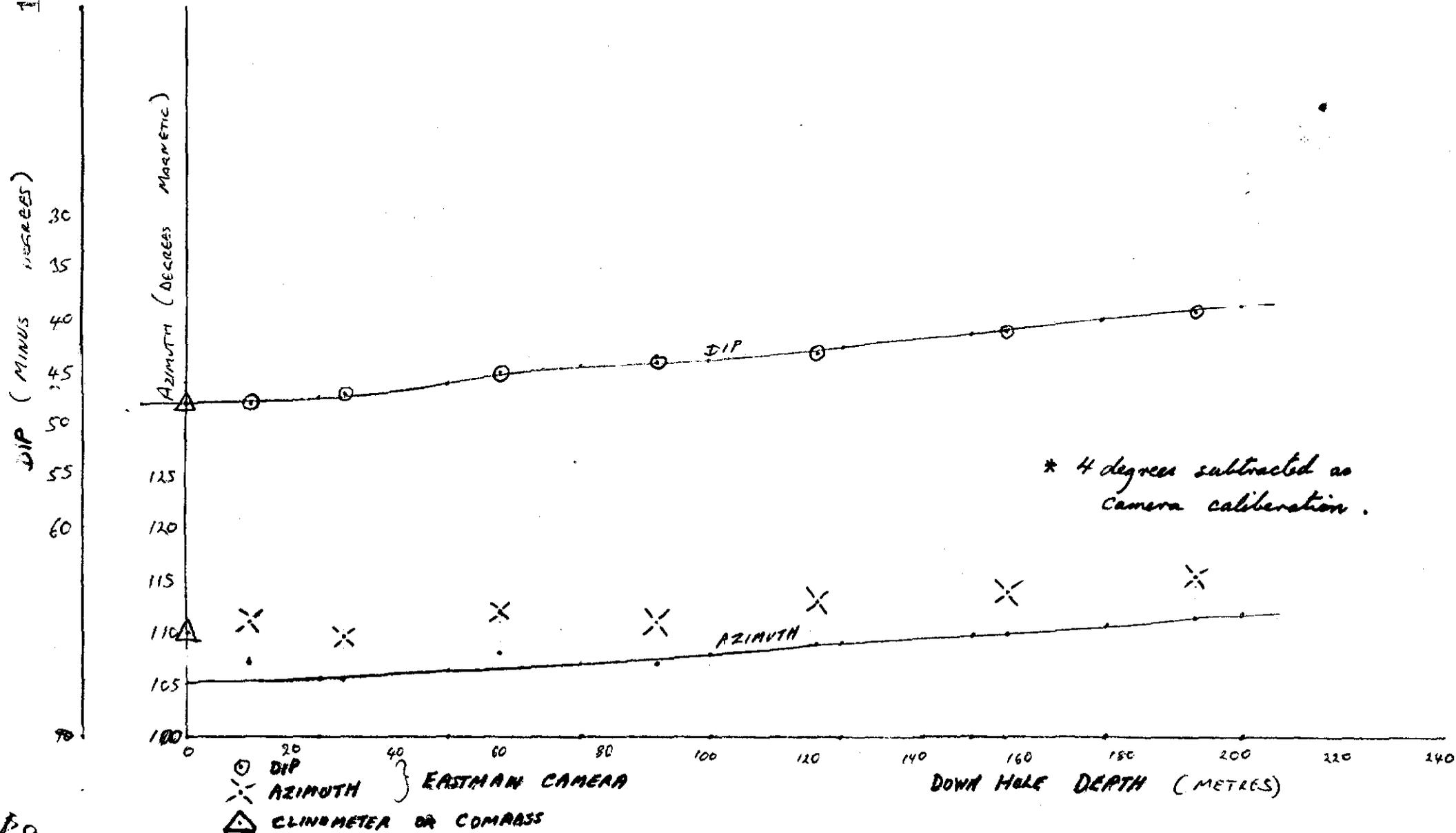
COLLAR ELEVN. 745 METRES (INPUT MANUALLY DERIVED FROM GRAPH)

DEPTH	DIP	BEARING	NORTHING	EASTING	ALTITUDE
0.0	48.0	105.0	5200.00	3925.00	745.00
25.0	47.5	105.5	5198.10	3941.70	726.49
50.0	46.0	106.0	5196.01	3958.70	708.29
75.0	44.5	107.0	5193.63	3976.14	690.53
100.0	44.0	108.0	5190.91	3993.84	673.09
125.0	42.5	109.0	5187.82	4011.78	655.96
150.0	41.0	110.0	5184.34	4030.10	639.32
175.0	40.0	110.5	5180.55	4048.73	623.08
202.0	38.5	111.5	5176.11	4069.16	606.00

160035

M4

EASTMAN SINGLE SHOT DOWNHOLE CAMERA SURVEYS,  
COMMENCED 2/7/78  
COMPLETED 17-7-78  
DEPTH 202 m.



F80















Feature : Bedding  Shearing   
 Foliation  Fault   
 Fragment-size & shape  Vein  c carbonate  
 q quartz

Mineralization : Trace 1-5%  
 Common 5-15%  
 Abundant 15-60%  
 Massive <60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		<i>D as above</i>							<i>Pyrite rare, as above.</i>
	3.0								
	2.0							180	
	3.0	<i>181.0 m. quartz-carbonate-chlorite vein at 25° C.A. with secondary sphalerite. also at 181.7 m.</i>						181.0 m 1.5 cm Sph 15% 181.7 secondary aggregates in qtz, carb, chlor vein	
	3.1							185	<i>181.7. 1.5 cm Sphalerite 20% as aggregates to 1cm in qtz carb vein.</i>
	2.9								
	3.2							190	
	0.8	<i>193.7-199.8 m. buff-pink in colour due to increased cobalt alteration</i>							
	3.7							195	
	3.0	<i>Below 199.8 m. Buff-green in colour due to minor chlorite alteration.</i>							
		<i>Foliation 30-40° to core axis.</i>							



044

160045

APPENDIX B

Soil Geochemistry Computer and  
Statistical Data.

0.45

MACINTOSH/HATFIELD BEDROCK GEOCHEMISTRY  
ZINC

160046

NUMBER OF SAMPLES= 14948  
MAXIMUM VALUE= 6800  
MINIMUM VALUE= 2  
ARITHMETIC MEAN= 80  
VARIANCE= 21298.71  
STANDARD DEVIATION= 145.94  
NUMBER OF SAMPLES BELOW DETECTION LIMIT= 105  
PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.70  
NUMBER OF SAMPLES NOT ANALYSED= 897  
NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
LOGARITHMIC INTERVAL= 0.41

CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
FROM TO (PPM)				
2.0- 2.9	44	0.29	44	0.29
2.9- 4.4	225	1.51	269	1.80
4.4- 6.7	553	3.70	822	5.50
6.7- 10.0	1368	9.15	2190	14.65
10.0- 15.1	1320	8.83	3510	23.48
15.1- 22.7	1367	9.15	4877	32.63
22.7- 34.1	1744	11.67	6621	44.29
34.1- 51.2	1925	12.88	8546	57.17
51.2- 77.0	1985	13.28	10531	70.45
77.0- 115.8	1631	10.91	12162	81.36
115.8- 174.2	1195	7.99	13357	89.36
174.2- 261.9	781	5.22	14138	94.58
261.9- 393.8	447	2.99	14585	97.57
393.8- 592.2	195	1.30	14780	98.88
592.2- 890.4	107	0.72	14887	99.59
890.4- 1338.9	37	0.25	14924	99.84
1338.9- 2013.3	19	0.13	14943	99.97
2013.3- 3027.3	3	0.02	14946	99.99
3027.3- 4552.1	0	0.00	14946	99.99
4552.1- 6844.9	2	0.01	14948	100.00

HISTOGRAM

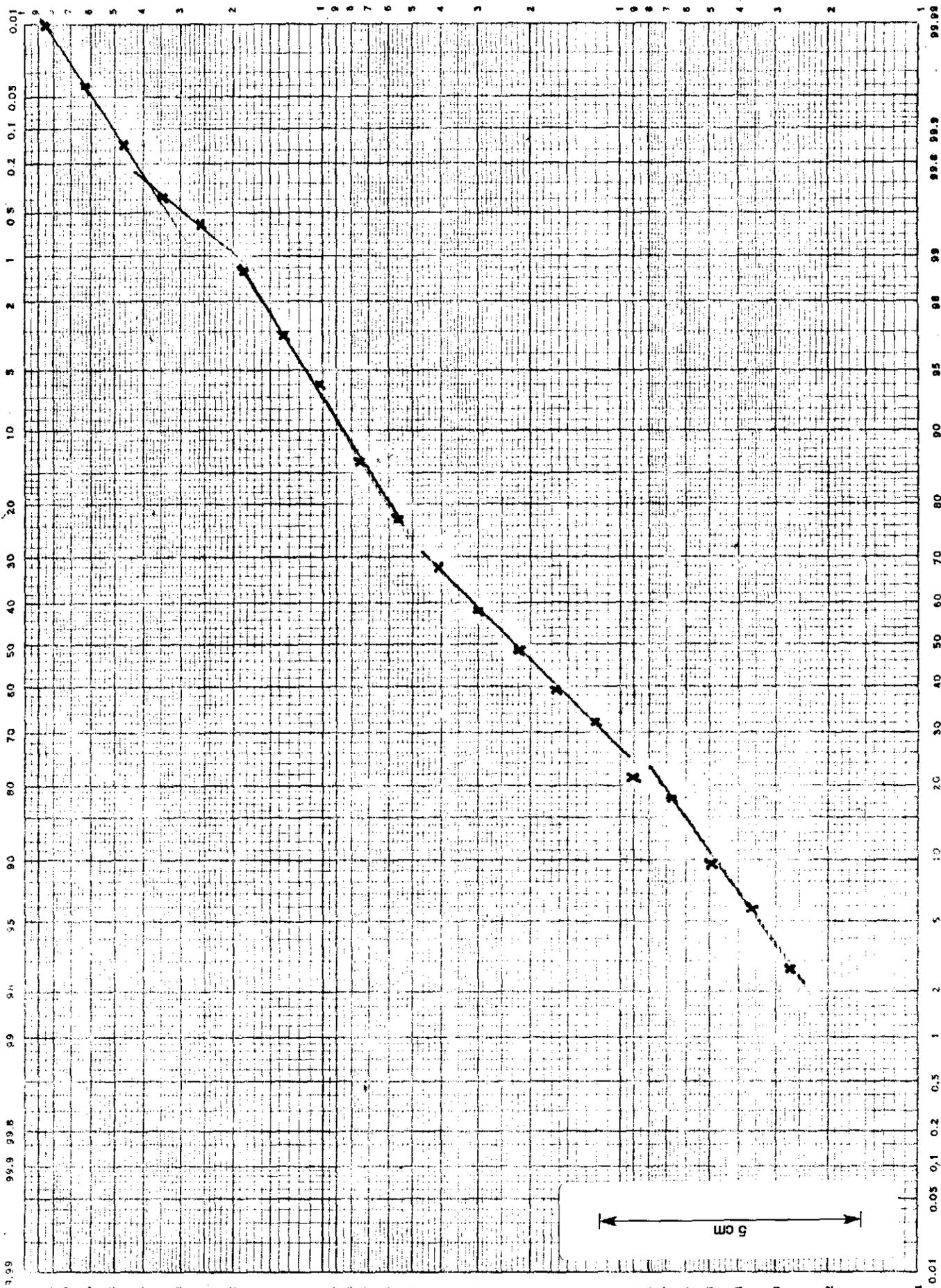
FROM TO (PPM)	HISTOGRAM
2.0- 2.9	X
2.9- 4.4	XXXXXX
4.4- 6.7	XXXXXXXXXXXXXXXXXXXX
6.7- 10.0	XX
10.0- 15.1	XX
15.1- 22.7	XX
22.7- 34.1	XX
34.1- 51.2	XX
51.2- 77.0	XX
77.0- 115.8	XX
115.8- 174.2	XX
174.2- 261.9	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
261.9- 393.8	XXXXXXXXXXXXXXXXXX
393.8- 592.2	XXXXXX
592.2- 890.4	XXX
890.4- 1338.9	X
1338.9- 2013.3	
2013.3- 3027.3	
3027.3- 4552.1	
4552.1- 6844.9	





LOG PROBABILITY PLOT OF CUMULATIVE FREQUENCY FOR COPPER

160049



CUMULATIVE FREQUENCY PERCENT

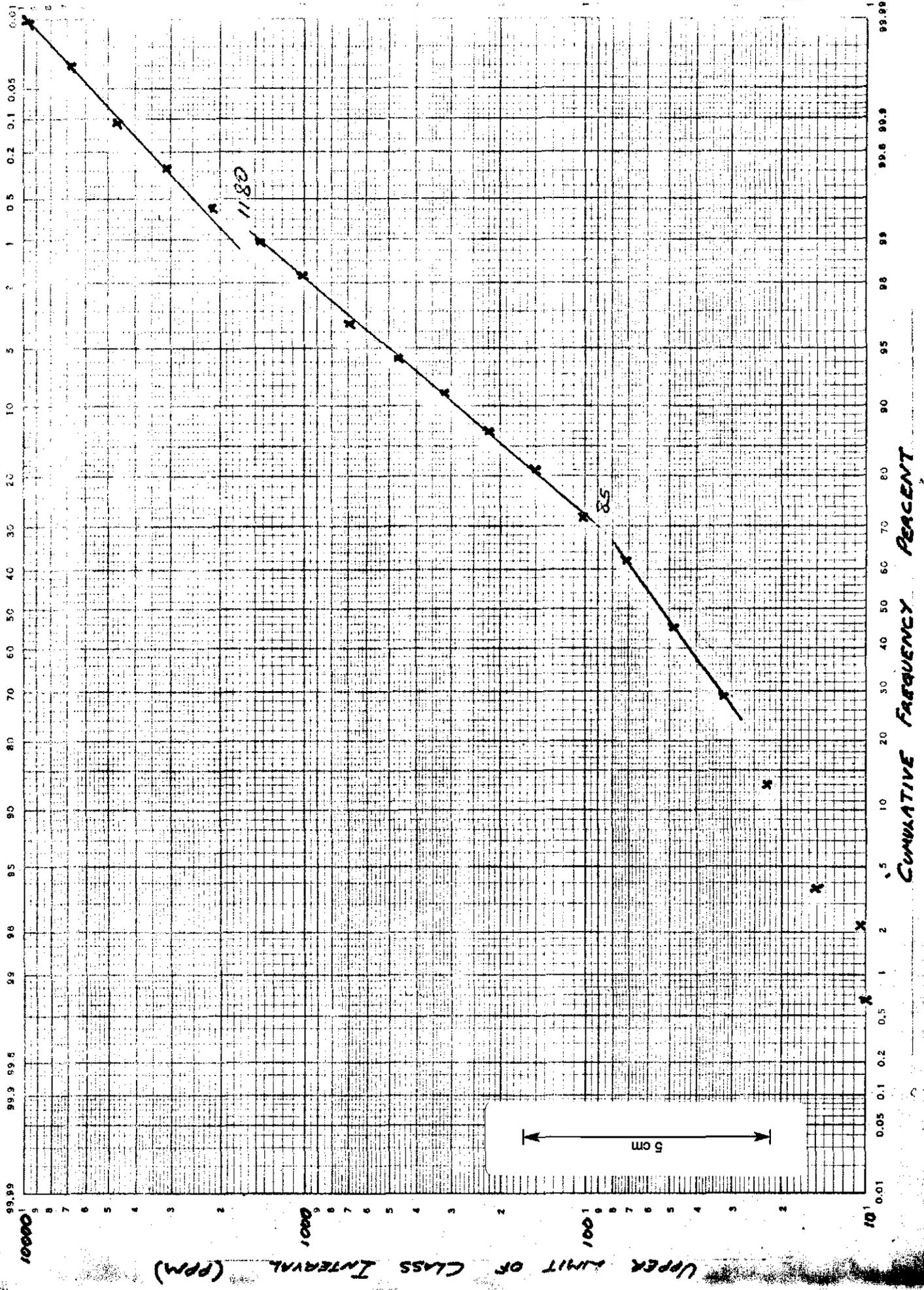
UPPER LIMIT OF CLASS INTERVAL (PPM)

5 cm

049

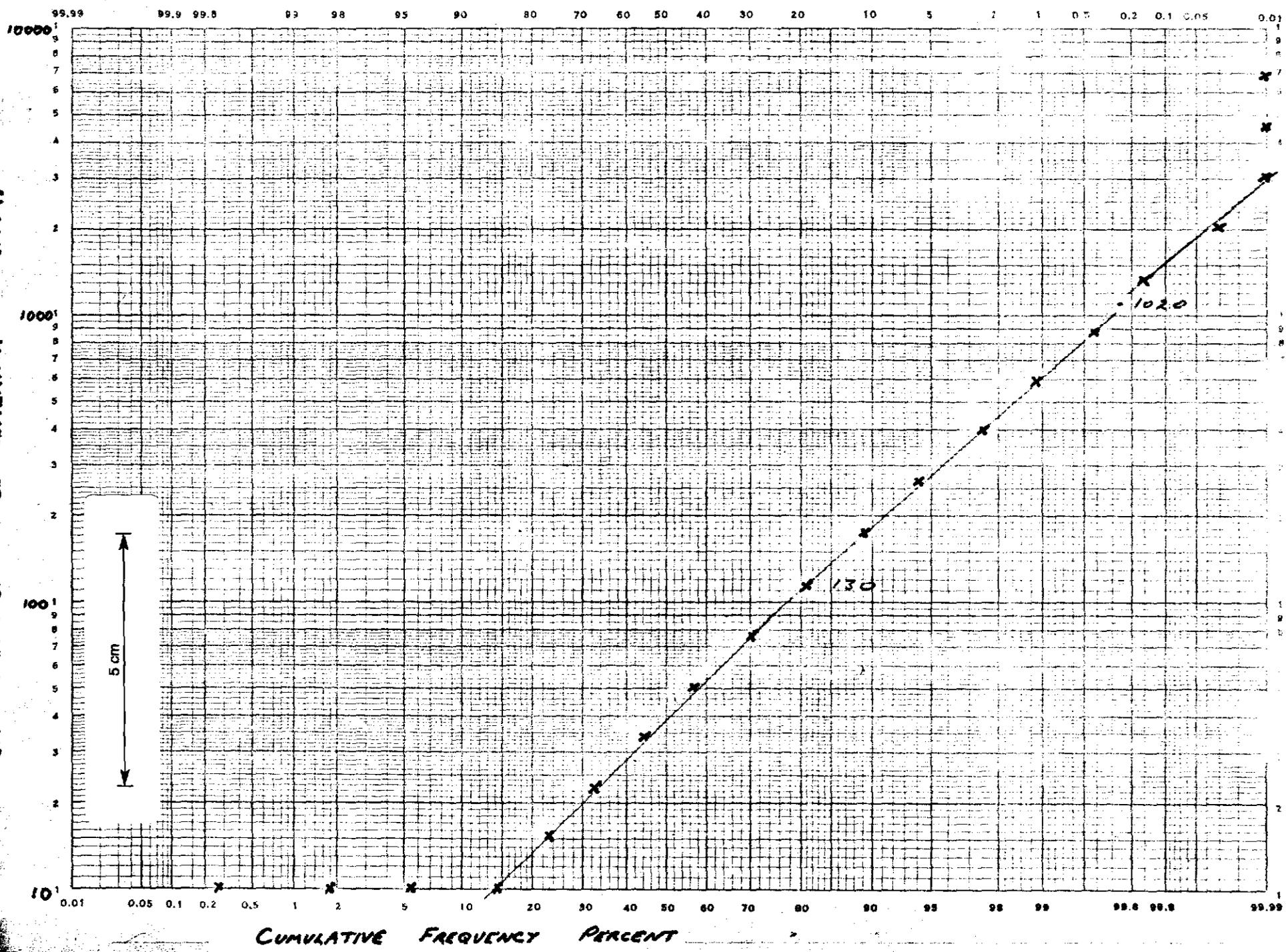
160050

LOG-PROBABILITY PLOT OF CUMULATIVE FREQUENCY FOR LEAD



UPPER LIMIT OF CLASS INTERVAL (ppm)

LOG - PROBABILITY OF CUMULATIVE FREQUENCY FOR ZINC



CUMULATIVE FREQUENCY PERCENT

CU KINTOSH/HATFIELD GEOTHERM: EASTERN VOLCANICS

CU

160052

NUMBER OF SAMPLES= 195  
 MAXIMUM VALUE= 388  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 10  
 VARIANCE= 744.61  
 STANDARD DEVIATION= 27.29  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 67  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 25.57  
 NUMBER OF SAMPLES NOT ANALYSED= 14  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.26

CLASS	INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM	TO				
(PPM)					
2.0-	2.6	21	10.77	21	10.77
2.6-	3.3	9	4.62	30	15.38
3.3-	4.3	5	2.56	35	17.95
4.3-	5.7	80	41.03	115	58.97
5.7-	7.4	5	2.56	120	61.54
7.4-	9.6	2	1.03	122	62.56
9.6-	12.5	42	21.54	164	84.10
12.5-	16.3	19	9.74	183	93.85
16.3-	21.3	5	2.56	188	96.41
21.3-	27.7	2	1.03	190	97.44
27.7-	36.1	3	1.54	193	98.97
36.1-	47.1	1	0.51	194	99.49
47.1-	61.4	0	0.00	194	99.49
61.4-	80.0	0	0.00	194	99.49
80.0-	104.2	0	0.00	194	99.49
104.2-	135.9	0	0.00	194	99.49
135.9-	177.1	0	0.00	194	99.49
177.1-	230.8	0	0.00	194	99.49
230.8-	300.8	0	0.00	194	99.49
300.8-	392.0	1	0.51	195	100.00

HISTOGRAM

FROM	TO	
(PPM)		
2.0-	2.6	XXXXXXXXXXXXXXXXXXXX
2.6-	3.3	XXXXXX
3.3-	4.3	XXX
4.3-	5.7	XX
5.7-	7.4	XXX
7.4-	9.6	X
9.6-	12.5	XX
12.5-	16.3	XXXXXXXXXXXXXXXXXXXX
16.3-	21.3	XXX
21.3-	27.7	X
27.7-	36.1	XX
36.1-	47.1	
47.1-	61.4	
61.4-	80.0	
80.0-	104.2	
104.2-	135.9	
135.9-	177.1	
177.1-	230.8	
230.8-	300.8	
300.8-	392.0	



2

160054

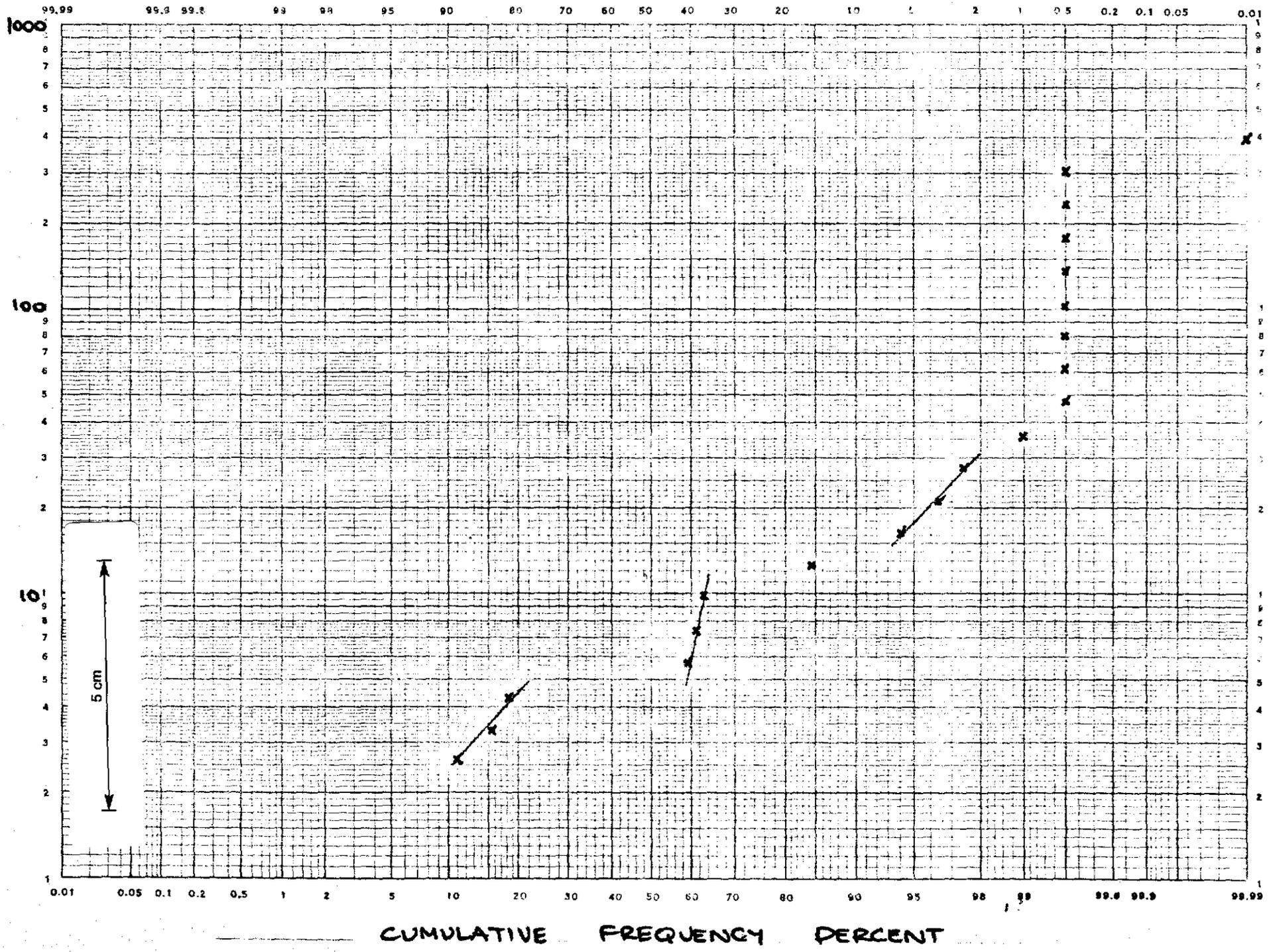
NUMBER OF SAMPLES= 259  
 MAXIMUM VALUE= 280  
 MINIMUM VALUE= 3  
 ARITHMETIC MEAN= 35  
 VARIANCE= 892.04  
 STANDARD DEVIATION= 29.87  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 3  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 1.15  
 NUMBER OF SAMPLES NOT ANALYSED= 14  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.23

CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
2.9- 3.7	3	1.16	3	1.16
3.7- 4.7	4	1.54	7	2.70
4.7- 5.9	5	1.93	12	4.63
5.9- 7.4	10	3.86	22	8.49
7.4- 9.3	5	1.93	27	10.42
9.3- 11.6	22	8.49	49	18.92
11.6- 14.6	6	2.32	55	21.24
14.6- 18.4	20	7.72	75	28.96
18.4- 23.2	33	12.74	108	41.70
23.2- 29.1	19	7.34	127	49.03
29.1- 36.7	44	16.99	171	66.02
36.7- 46.1	29	11.20	200	77.22
46.1- 58.0	19	7.34	219	84.56
58.0- 73.0	17	6.56	236	91.12
73.0- 91.8	15	5.79	251	96.91
91.8- 115.5	4	1.54	255	98.46
115.5- 145.2	0	0.00	255	98.46
145.2- 182.7	3	1.16	258	99.61
182.7- 229.8	0	0.00	258	99.61
229.8- 289.8	1	0.39	259	100.00

HISTOGRAM

FROM (PPM)	TO	HISTOGRAM
2.9	3.7	XXXX
3.7	4.7	XXXXX
4.7	5.9	XXXXXX
5.9	7.4	XXXXXXXXXXXXXXXXXX
7.4	9.3	XXXXXX
9.3	11.6	XX
11.6	14.6	XXXXXXXXXX
14.6	18.4	XX
18.4	23.2	XX
23.2	29.1	XX
29.1	36.7	XX
36.7	46.1	XX
46.1	58.0	XX
58.0	73.0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
73.0	91.8	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
91.8	115.5	XXXXXX
115.5	145.2	
145.2	182.7	XXXX
182.7	229.8	
229.8	289.8	X

UPPER LIMIT OF CLASS INTERVAL (ppm)

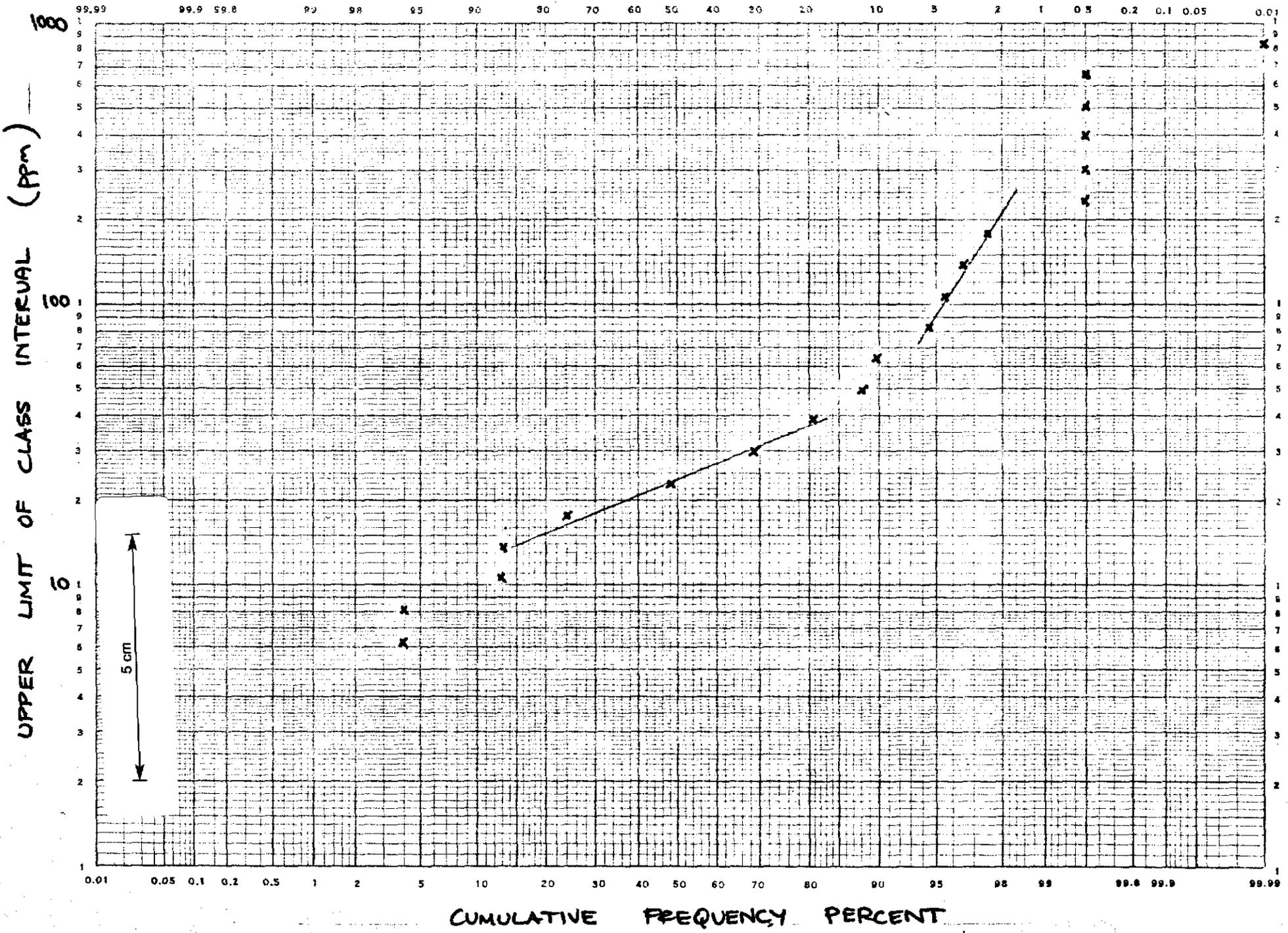


CUMULATIVE FREQUENCY PERCENT

055

LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR LEAD IN EASTERN VOLCANICS

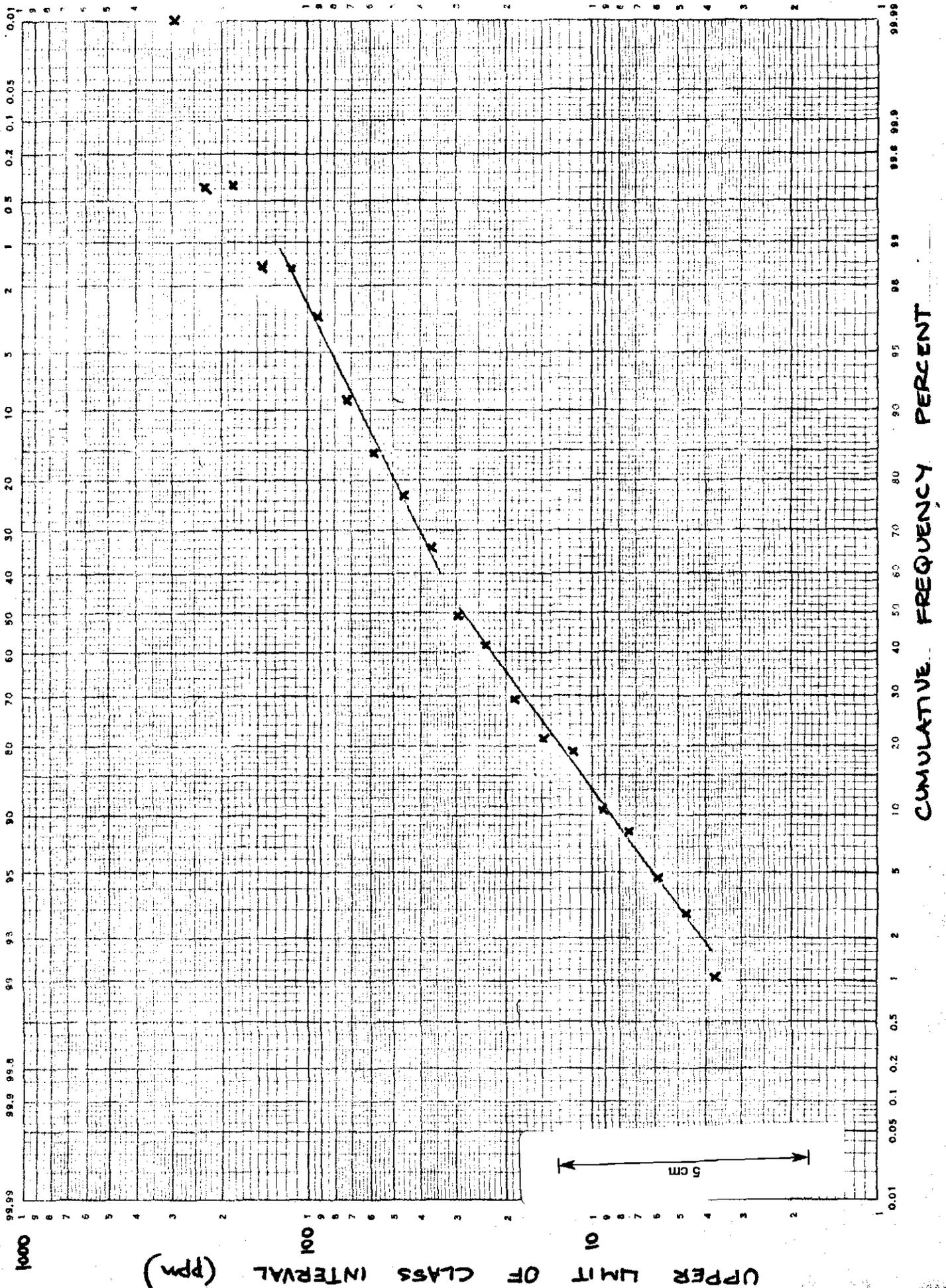
160056



056

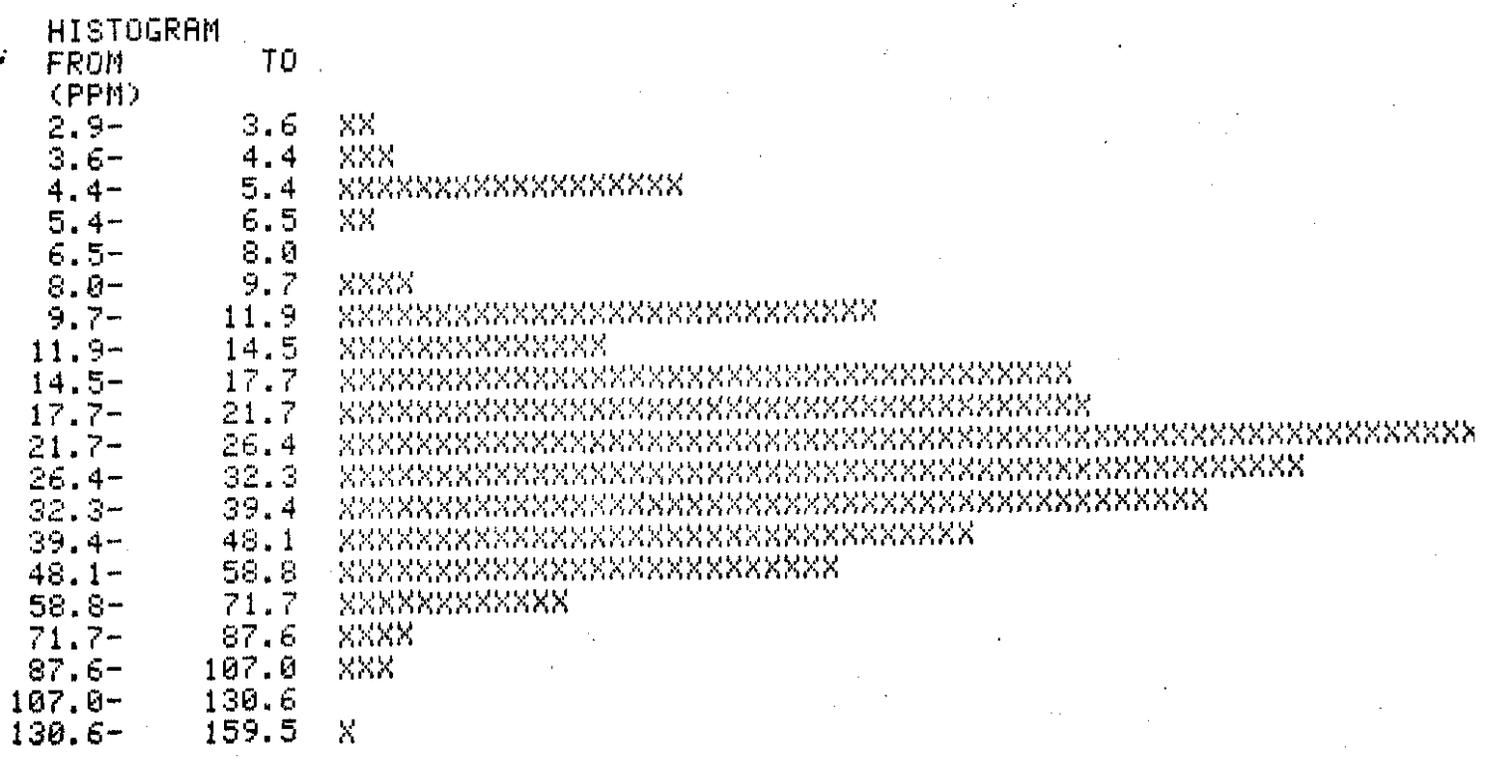
160057

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR ZINC IN EASTERN VOLCANICS



NUMBER OF SAMPLES= 406  
 MAXIMUM VALUE= 150  
 MINIMUM VALUE= 3  
 ARITHMETIC MEAN= 29  
 VARIANCE= 357.44  
 STANDARD DEVIATION= 18.91  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 6  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 1.46  
 NUMBER OF SAMPLES NOT ANALYSED= 9  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.20

CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
2.9- 3.6	3	0.74	3	0.74
3.6- 4.4	4	0.99	7	1.72
4.4- 5.4	19	4.68	26	6.40
5.4- 6.5	3	0.74	29	7.14
6.5- 8.0	0	0.00	29	7.14
8.0- 9.7	5	1.23	34	8.37
9.7- 11.9	29	7.14	63	15.52
11.9- 14.5	15	3.69	78	19.21
14.5- 17.7	40	9.85	118	29.06
17.7- 21.7	41	10.10	159	39.16
21.7- 26.4	62	15.27	221	54.43
26.4- 32.3	52	12.81	273	67.24
32.3- 39.4	47	11.58	320	78.82
39.4- 48.1	35	8.62	355	87.44
48.1- 58.8	27	6.65	382	94.09
58.8- 71.7	13	3.20	395	97.29
71.7- 87.6	5	1.23	400	98.52
87.6- 107.0	4	0.99	404	99.51
107.0- 130.6	0	0.00	404	99.51
130.6- 159.5	2	0.49	406	100.00



ALTFELD MACKINOSH

2n

058

ZINC  
 NUMBER OF SAMPLES= 244  
 MAXIMUM VALUE= 1550  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 51  
 VARIANCE= 17558.29  
 STANDARD DEVIATION= 132.51  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 0  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.00  
 NUMBER OF SAMPLES NOT ANALYSED= 22  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.33

160059

CLASS INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM TO (PPM)				
2.0- 2.7	1	0.41	1	0.41
2.7- 3.8	3	1.23	4	1.64
3.8- 5.3	16	6.56	20	8.20
5.3- 7.5	18	7.38	38	15.57
7.5- 10.4	49	20.08	87	35.66
10.4- 14.6	2	0.82	89	36.48
14.6- 20.3	48	19.67	137	56.15
20.3- 28.4	19	7.79	156	63.93
28.4- 39.7	19	7.79	175	71.72
39.7- 55.4	17	6.97	192	78.69
55.4- 77.4	13	5.33	205	84.02
77.4- 108.2	17	6.97	222	90.98
108.2- 151.1	7	2.87	229	93.85
151.1- 211.1	8	3.28	237	97.13
211.1- 294.8	3	1.23	240	98.36
294.8- 411.8	1	0.41	241	98.77
411.8- 575.3	0	0.00	241	98.77
575.3- 803.6	1	0.41	242	99.18
803.6- 1122.5	1	0.41	243	99.59
1122.5- 1568.0	1	0.41	244	100.00

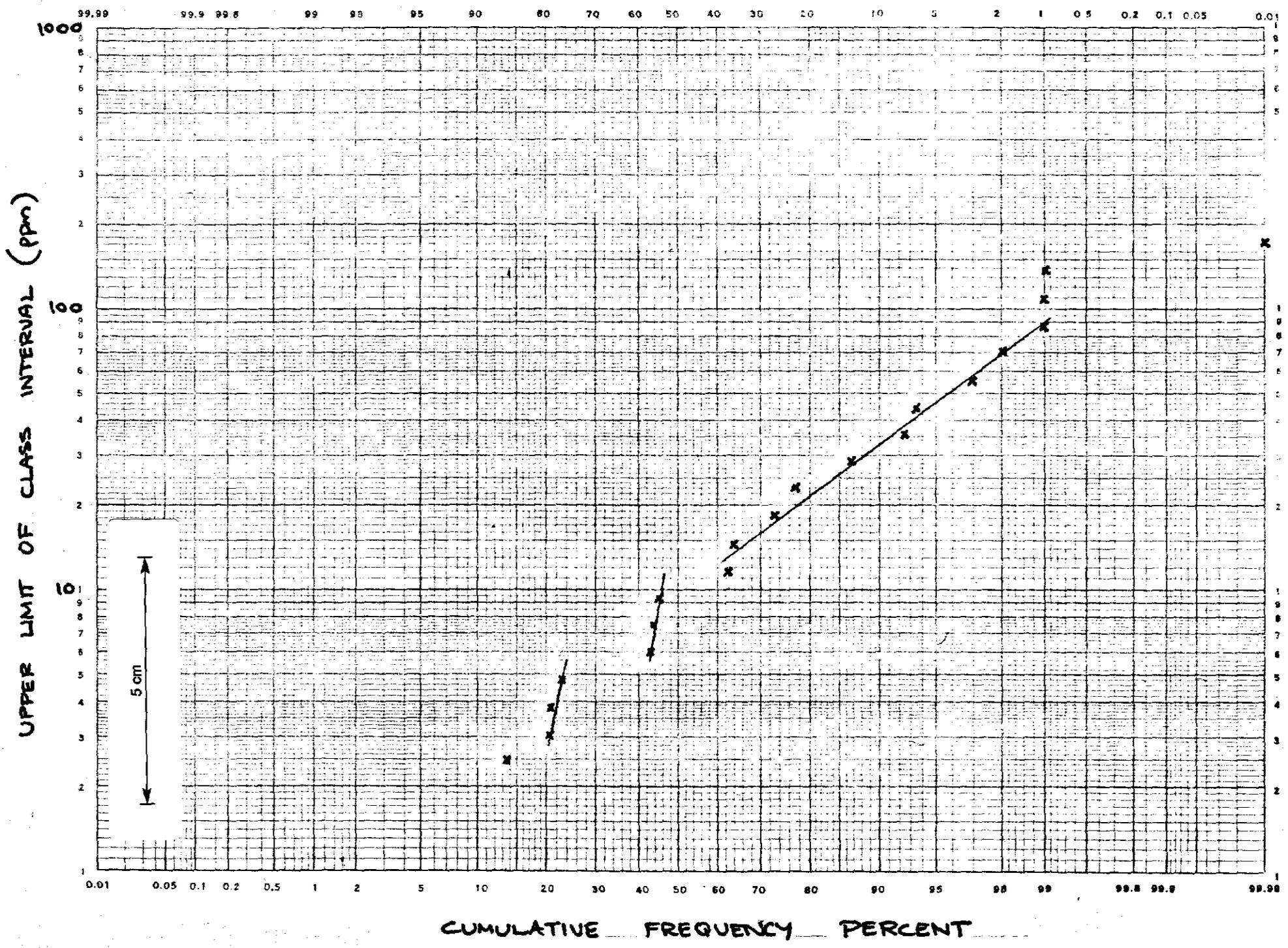
HISTOGRAM

FROM TO (PPM)	
2.0- 2.7	X
2.7- 3.8	XXX
3.8- 5.3	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
5.3- 7.5	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
7.5- 10.4	XX
10.4- 14.6	XX
14.6- 20.3	XX
20.3- 28.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
28.4- 39.7	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
39.7- 55.4	XXXXXXXXXXXXXXXXXXXX
55.4- 77.4	XXXXXXXXXXXXXXXXXXXX
77.4- 108.2	XXXXXXXXXXXXXXXXXXXX
108.2- 151.1	XXXXXXXXXX
151.1- 211.1	XXXXXXXXXX
211.1- 294.8	XXX
294.8- 411.8	X
411.8- 575.3	
575.3- 803.6	X
803.6- 1122.5	X
1122.5- 1568.0	X

059

LOG OF PROBABILITY OF CUMULATIVE FREQUENCY  
FOR COPPER IN EASTERN SHALES

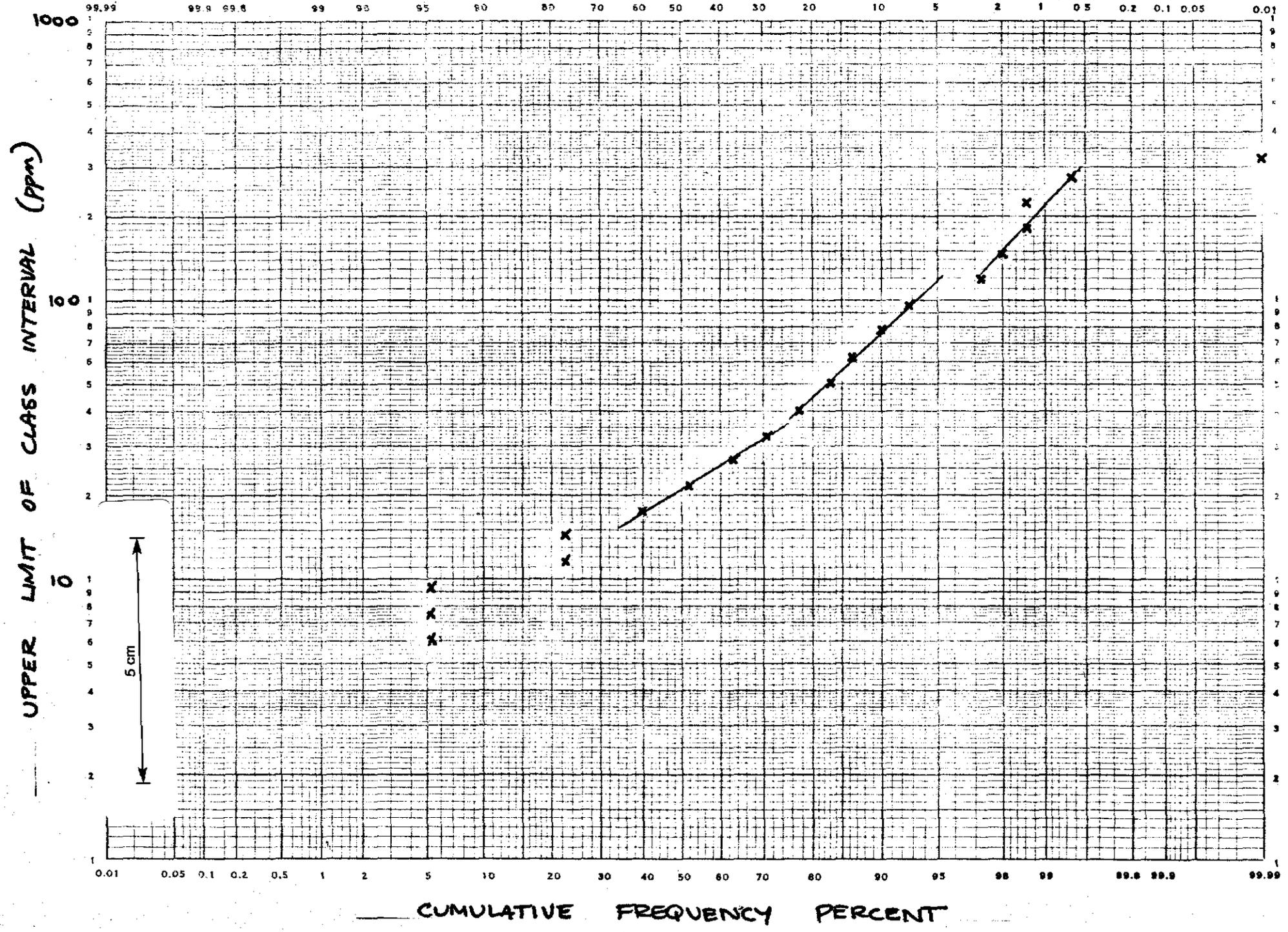
160060



060

LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR LEAD IN EASTERN SHALES

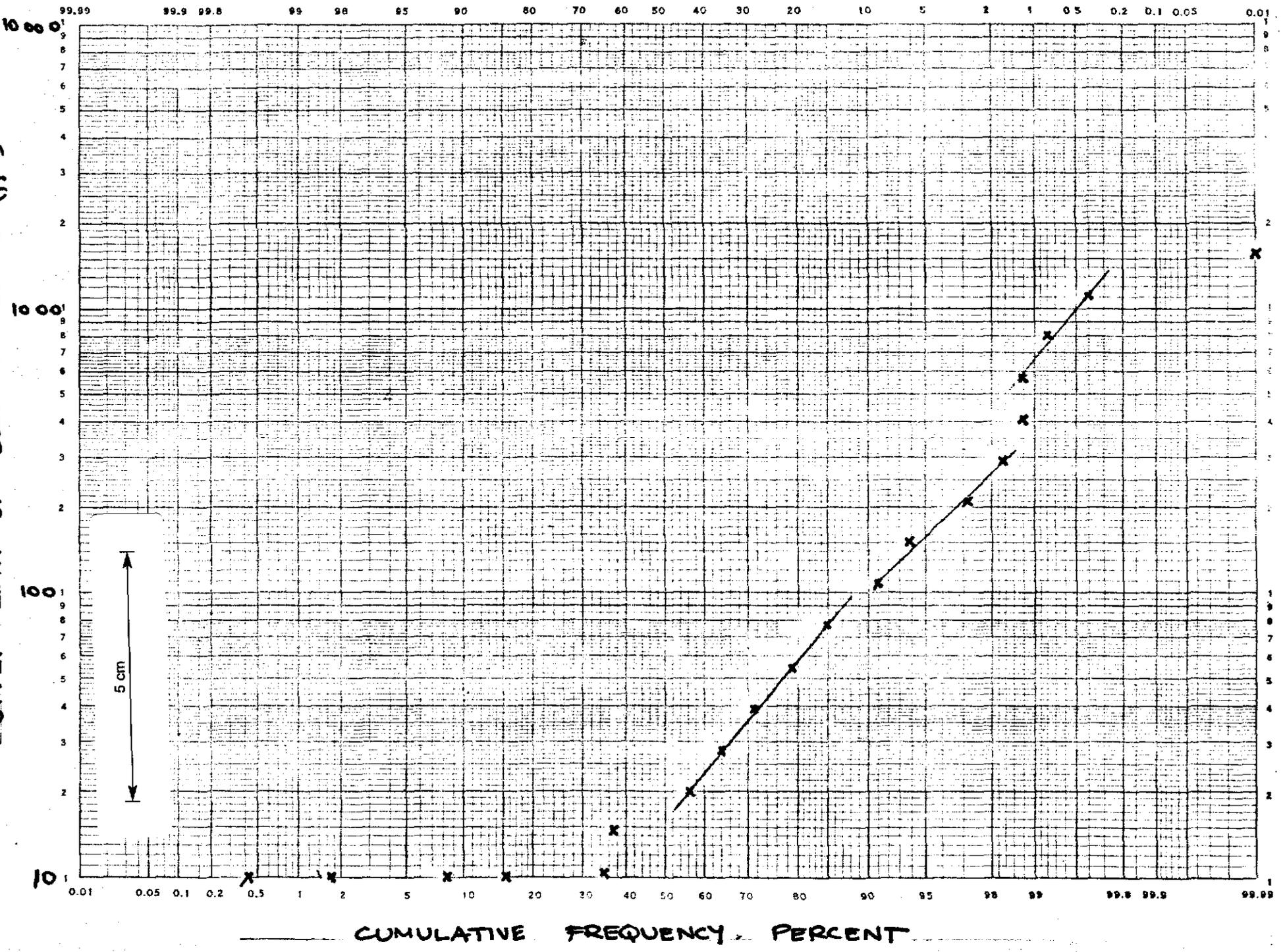
160061



1961

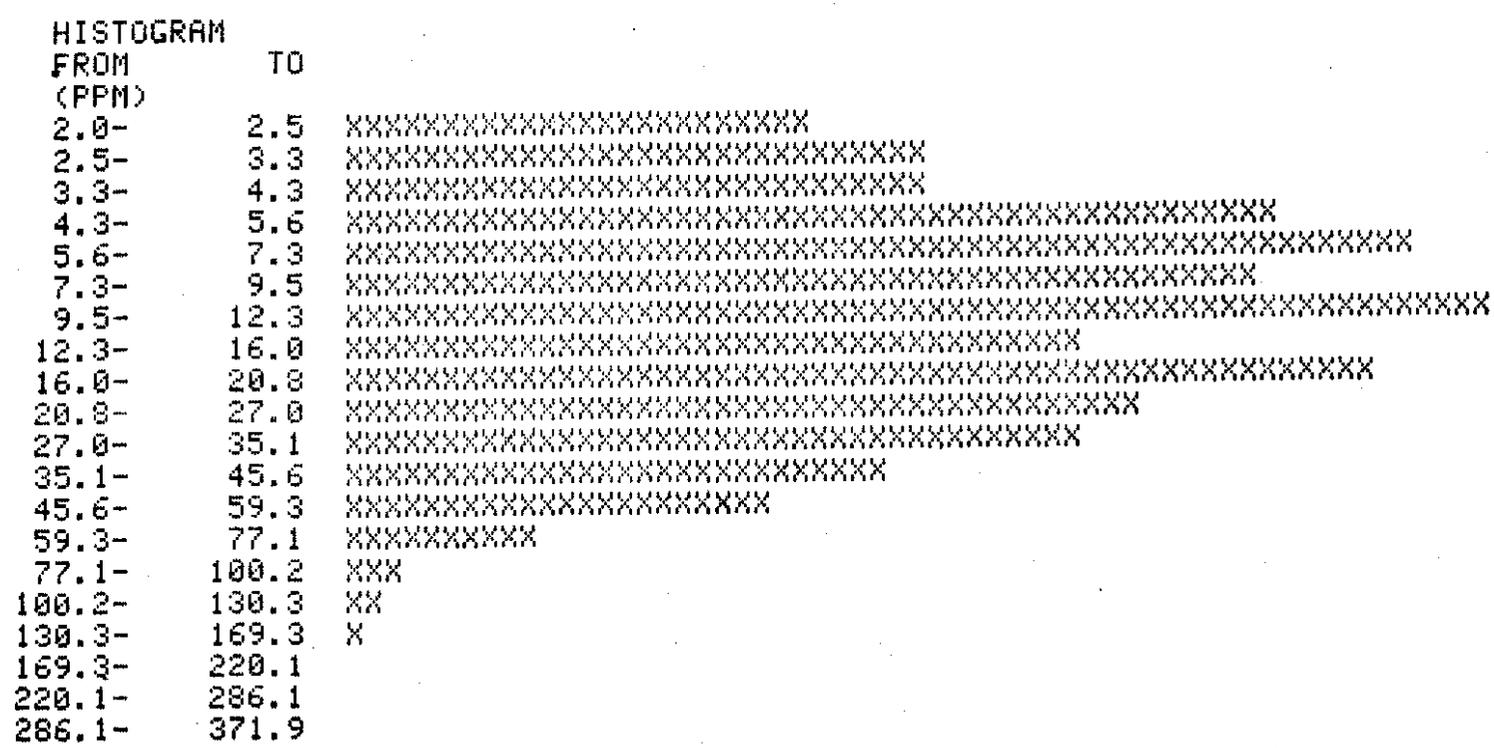
LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR ZINC IN EASTERN SHALES  
160062

UPPER LIMIT OF CLASS INTERVAL (ppm)



NUMBER OF SAMPLES= 1506  
 MAXIMUM VALUE= 360  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 18  
 VARIANCE= 415.70  
 STANDARD DEVIATION= 20.39  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 98  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 6.11  
 NUMBER OF SAMPLES NOT ANALYSED= 151  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.26

CLASS	INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM	TO				
(PPM)					
2.0-	2.5	68	4.52	68	4.52
2.5-	3.3	85	5.64	153	10.16
3.3-	4.3	85	5.64	238	15.80
4.3-	5.6	136	9.03	374	24.83
5.6-	7.3	155	10.29	529	35.13
7.3-	9.5	133	8.83	662	43.96
9.5-	12.3	168	11.16	830	55.11
12.3-	16.0	108	7.17	938	62.28
16.0-	20.8	150	9.96	1088	72.24
20.8-	27.0	116	7.70	1204	79.95
27.0-	35.1	107	7.10	1311	87.05
35.1-	45.6	79	5.25	1390	92.30
45.6-	59.3	64	4.25	1454	96.55
59.3-	77.1	30	1.99	1484	98.54
77.1-	100.2	10	0.66	1494	99.20
100.2-	130.3	8	0.53	1502	99.73
130.3-	169.3	3	0.20	1505	99.93
169.3-	220.1	0	0.00	1505	99.93
220.1-	286.1	0	0.00	1505	99.93
286.1-	371.9	1	0.07	1506	100.00

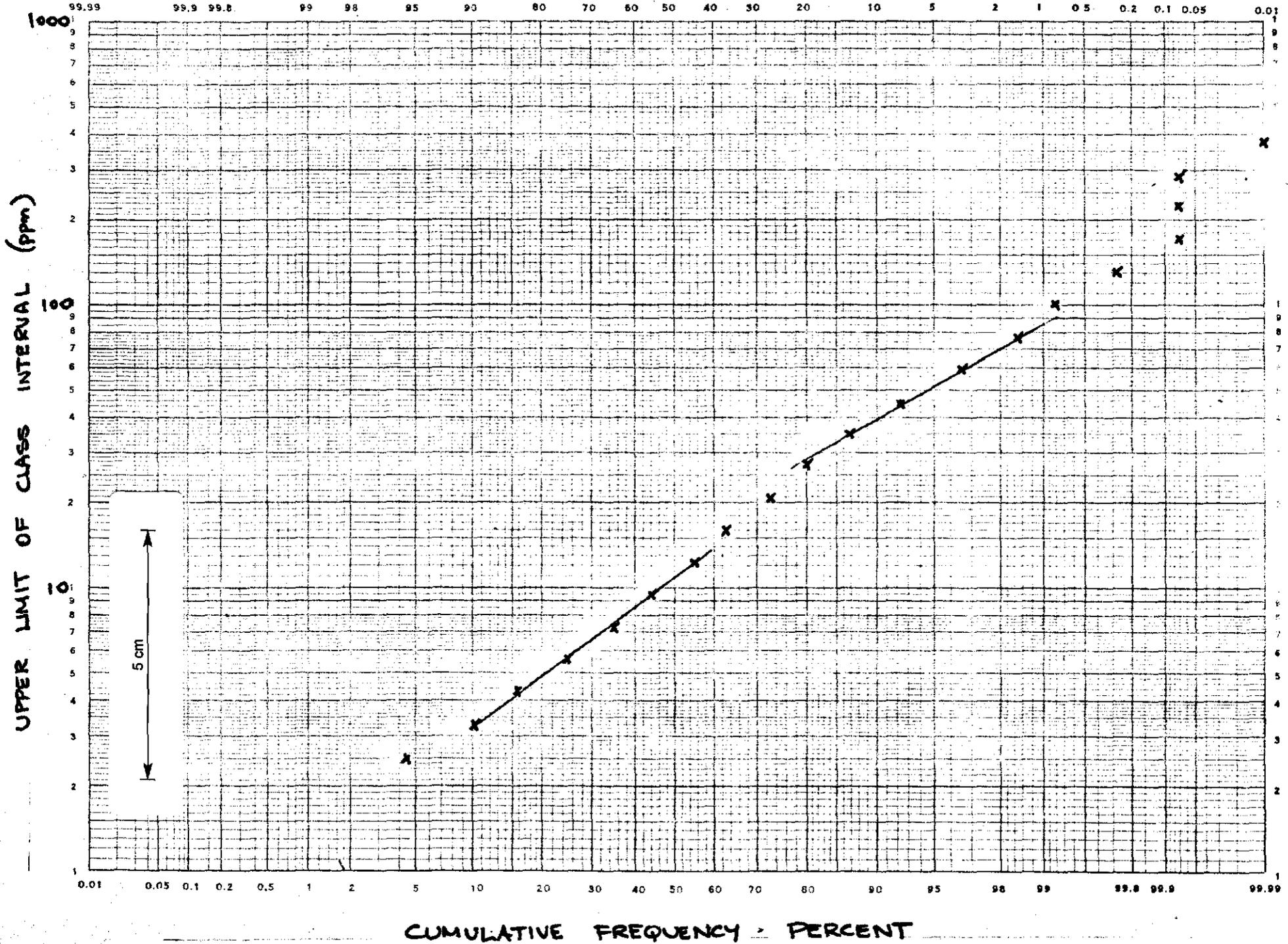






085

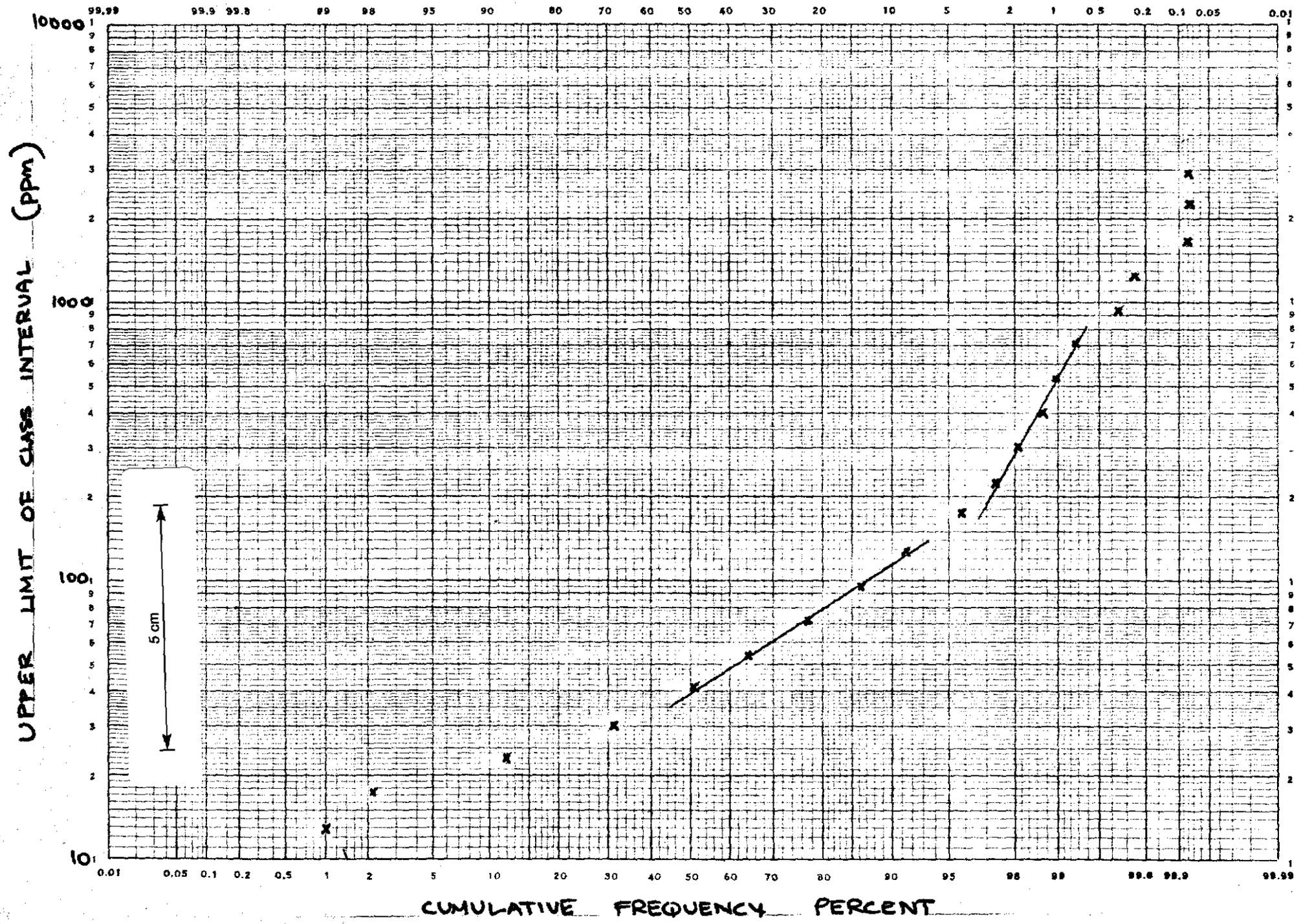
LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR COPPER IN QUE RIVER BEDS 160066



066

LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR LEAD IN QUE RIVER BEDS

160067

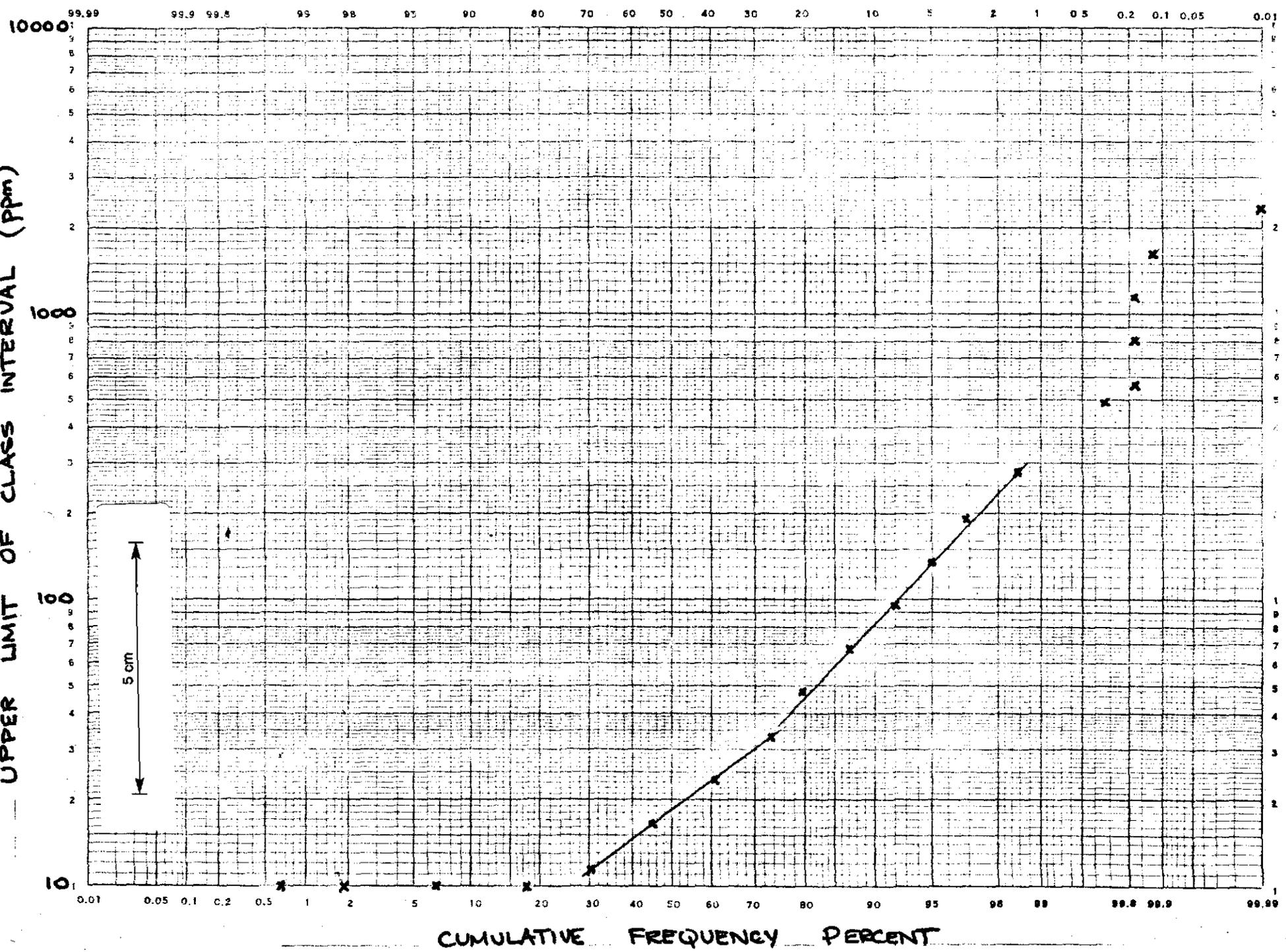


067

LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR ZINC IN QUE RIVER BEDS

160068

UPPER LIMIT OF CLASS INTERVAL (ppm)



CUMULATIVE FREQUENCY PERCENT

C

160069

ACKINTOSH/HATFIELD BEDROCK GEOCHEM Rock H

COPPER

NUMBER OF SAMPLES= 473  
 MAXIMUM VALUE= 375  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 16  
 VARIANCE= 551.03  
 STANDARD DEVIATION= 23.47  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 49  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 9.39  
 NUMBER OF SAMPLES NOT ANALYSED= 76  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.26

CLASS INTERVAL * FROM TO (PPM)	FREQ	FREQ%	CU.FREQ	CU.FREQ%
2.0- 2.6	25	5.29	25	5.29
2.6- 3.3	73	15.43	98	20.72
3.3- 4.3	59	12.47	157	33.19
4.3- 5.6	29	6.13	186	39.32
5.6- 7.3	32	6.77	218	46.09
7.3- 9.6	29	6.13	247	52.22
9.6- 12.5	53	11.21	300	63.42
12.5- 16.2	28	5.92	328	69.34
16.2- 21.1	34	7.19	362	76.53
21.1- 27.5	21	4.44	383	80.97
27.5- 35.9	35	7.40	418	88.37
35.9- 46.7	33	6.98	451	95.35
46.7- 60.9	15	3.17	466	98.52
60.9- 79.3	4	0.85	470	99.37
79.3- 103.2	1	0.21	471	99.58
103.2- 134.5	0	0.00	471	99.58
134.5- 175.1	0	0.00	471	99.58
175.1- 228.1	1	0.21	472	99.79
228.1- 297.1	0	0.00	472	99.79
297.1- 387.0	1	0.21	473	100.00

HISTOGRAM

FROM TO (PPM)	HISTOGRAM
2.0- 2.6	XXXXXXXXXXXXXXXXXXXX
2.6- 3.3	XX
3.3- 4.3	XX
4.3- 5.6	XXXXXXXXXXXXXXXXXXXX
5.6- 7.3	XXXXXXXXXXXXXXXXXXXX
7.3- 9.6	XXXXXXXXXXXXXXXXXXXX
9.6- 12.5	XX
12.5- 16.2	XXXXXXXXXXXXXXXXXXXX
16.2- 21.1	XXXXXXXXXXXXXXXXXXXX
21.1- 27.5	XXXXXXXXXXXXXXXXXXXX
27.5- 35.9	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
35.9- 46.7	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
46.7- 60.9	XXXXXXXXXXXX
60.9- 79.3	XXX
79.3- 103.2	
103.2- 134.5	
134.5- 175.1	
175.1- 228.1	
228.1- 297.1	
297.1- 387.0	



160071

NUMBER OF SAMPLES= 518  
 MAXIMUM VALUE= 1000  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 50  
 VARIANCE= 7417.78  
 STANDARD DEVIATION= 86.13  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 4  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.77  
 NUMBER OF SAMPLES NOT ANALYSED= 76  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.31

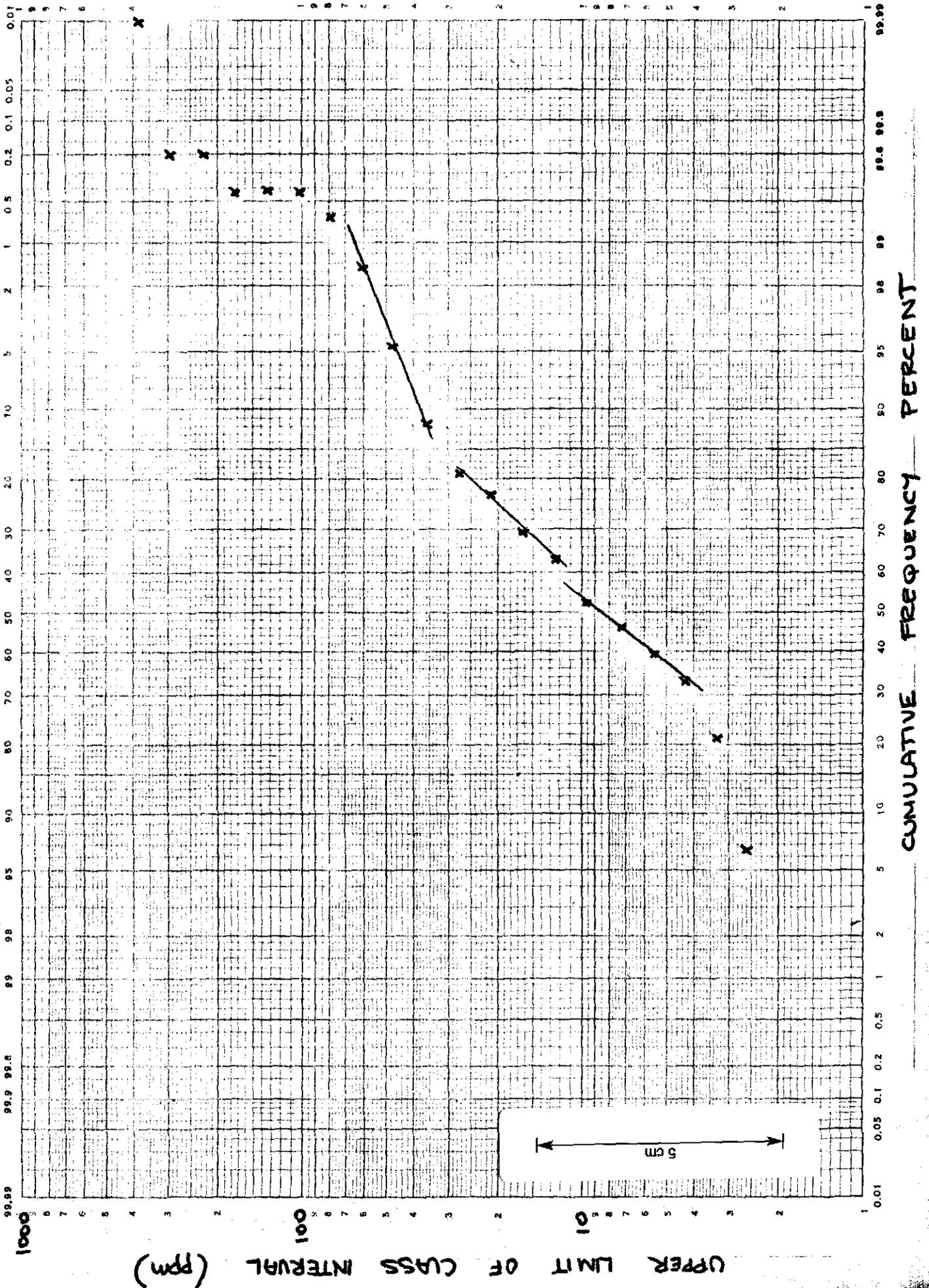
CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
2.0- 2.7	1	0.19	1	0.19
2.7- 3.7	8	1.54	9	1.74
3.7- 5.0	17	3.28	26	5.02
5.0- 6.8	11	2.12	37	7.14
6.8- 9.4	31	5.98	68	13.13
9.4- 12.8	58	11.20	126	24.32
12.8- 17.5	81	15.64	207	39.96
17.5- 23.9	65	12.55	272	52.51
23.9- 32.6	59	11.39	331	63.90
32.6- 44.6	48	9.27	379	73.17
44.6- 61.0	37	7.14	416	80.31
61.0- 83.3	29	5.60	445	85.91
83.3- 113.9	22	4.25	467	90.15
113.9- 155.7	18	3.47	485	93.63
155.7- 212.8	10	1.93	495	95.56
212.8- 290.9	10	1.93	505	97.49
290.9- 397.6	7	1.35	512	98.84
397.6- 543.4	2	0.39	514	99.23
543.4- 742.7	3	0.58	517	99.81
742.7- 1015.2	1	0.19	518	100.00

HISTOGRAM

FROM	TO	(PPM)
2.0-	2.7	
2.7-	3.7	XXXXXX
3.7-	5.0	XXXXXXXXXXXXXX
5.0-	6.8	XXXXXXXXXX
6.8-	9.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
9.4-	12.8	XX
12.8-	17.5	XX
17.5-	23.9	XX
23.9-	32.6	XX
32.6-	44.6	XX
44.6-	61.0	XX
61.0-	83.3	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
83.3-	113.9	XXXXXXXXXXXXXXXXXXXX
113.9-	155.7	XXXXXXXXXXXX
155.7-	212.8	XXXXXXX
212.8-	290.9	XXXXXXX
290.9-	397.6	XXXXXX
397.6-	543.4	X
543.4-	742.7	XX
742.7-	1015.2	

160072

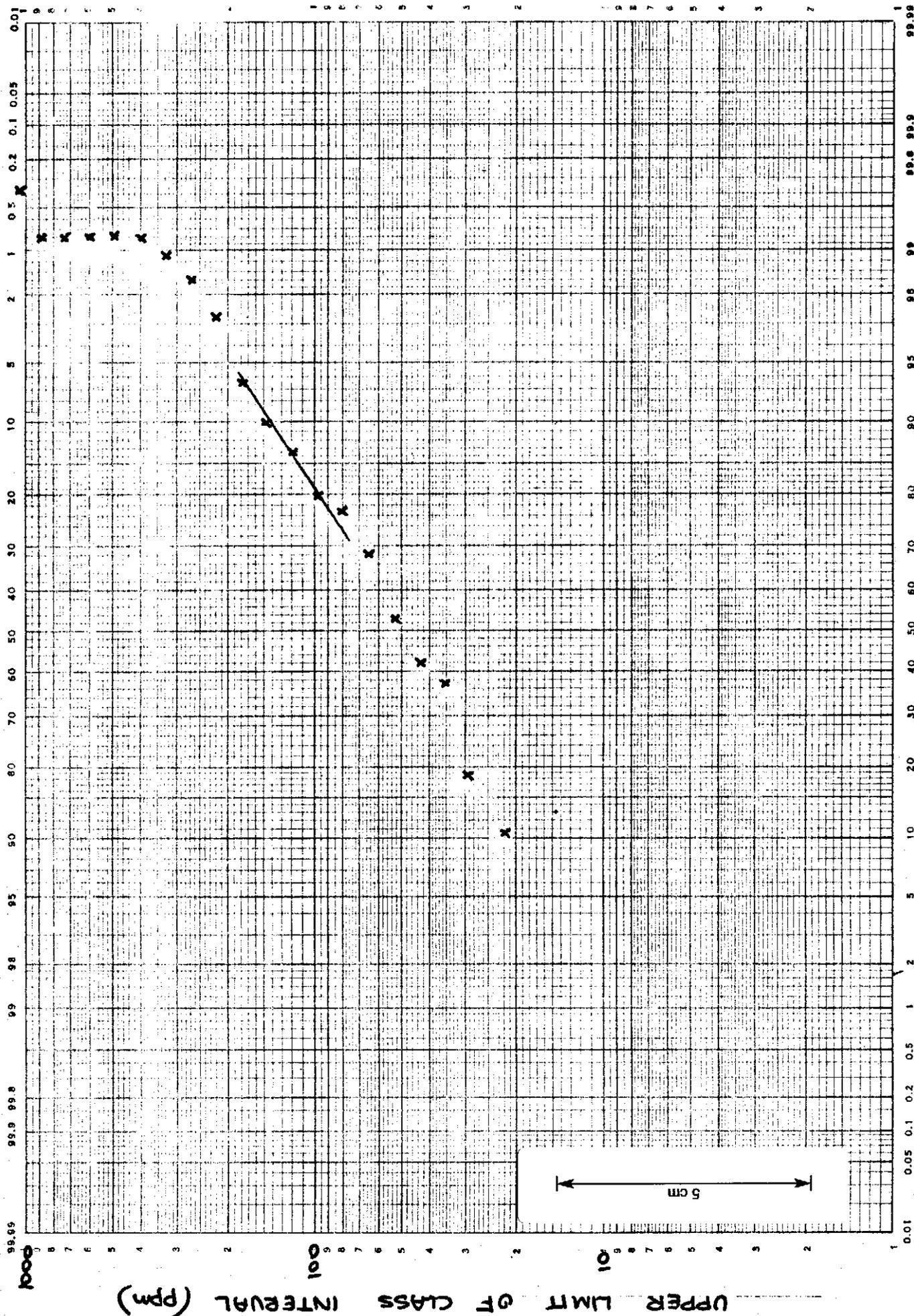
LOG PROBABILITY OF CUMULATIVE FREQUENCY  
FOR COPPER IN UPPER RHYOLITIC / DACITIC VOLCANICS.



072

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR LEAD IN UPPER RHYOLITIC / DACITIC VOLCANICS

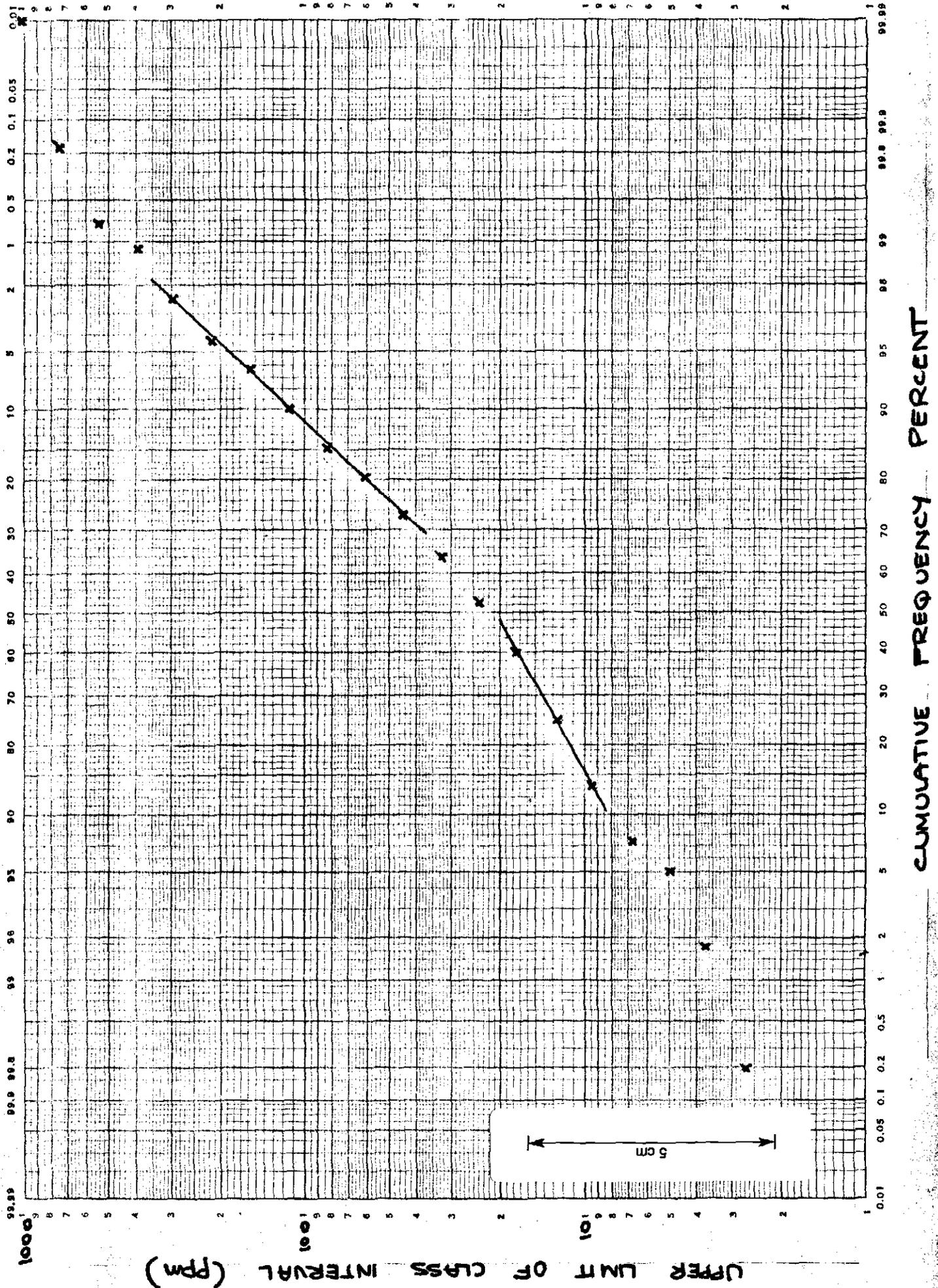
160073



CUMULATIVE FREQUENCY, PERCENT

073

# LOG PROBABILITY OF CUMULATIVE FREQUENCY 160074 FOR ZINC IN UPPER RHYOLITIC / DACIC VOLCANICS





HATFIELD/MACKINTOSH Rock 2

PB  
 NUMBER OF SAMPLES= 1121  
 MAXIMUM VALUE= 10000  
 MINIMUM VALUE= 10  
 ARITHMETIC MEAN= 328  
 VARIANCE= 4.34E+05  
 STANDARD DEVIATION= 658.42  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 358  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 24.21  
 NUMBER OF SAMPLES NOT ANALYSED= 20  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.35

CLASS INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM TO (PPM)				
9.8- 13.8	* 1	* 0.09	* 1	* 0.09
13.8- 19.6	* 2	* 0.18	* 3	* 0.27
19.6- 27.6	* 113	* 10.08	* 116	* 10.35
27.6- 39.1	* 87	* 7.76	* 203	* 18.11
39.1- 55.2	* 133	* 11.86	* 336	* 29.97
55.2- 78.0	* 89	* 7.94	* 425	* 37.91
78.0- 110.2	* 117	* 10.44	* 542	* 48.35
110.2- 155.7	* 87	* 7.76	* 629	* 56.11
155.7- 220.0	* 88	* 7.85	* 717	* 63.96
220.0- 310.8	* 96	* 8.56	* 813	* 72.52
310.8- 439.2	* 80	* 7.14	* 893	* 79.66
439.2- 620.6	* 83	* 7.40	* 976	* 87.07
620.6- 876.8	* 58	* 5.17	* 1034	* 92.24
876.8- 1238.9	* 34	* 3.03	* 1068	* 95.27
1238.9- 1750.6	* 21	* 1.87	* 1089	* 97.15
1750.6- 2473.5	* 15	* 1.34	* 1104	* 98.48
2473.5- 3495.0	* 7	* 0.62	* 1111	* 99.11
3495.0- 4938.3	* 5	* 0.45	* 1116	* 99.55
4938.3- 6977.6	* 3	* 0.27	* 1119	* 99.82
6977.6- 9859.1	* 1	* 0.09	* 1120	* 99.91

HISTOGRAM

FROM TO (PPM)	
9.8- 13.8	
13.8- 19.6	
19.6- 27.6	XX
27.6- 39.1	XX
39.1- 55.2	XX
55.2- 78.0	XX
78.0- 110.2	XX
110.2- 155.7	XX
155.7- 220.0	XX
220.0- 310.8	XX
310.8- 439.2	XX
439.2- 620.6	XX
620.6- 876.8	XX
876.8- 1238.9	XX
1238.9- 1750.6	XX
1750.6- 2473.5	XXXXXXX
2473.5- 3495.0	XXX
3495.0- 4938.3	XX
4938.3- 6977.6	X
6977.6- 9859.1	

HATFIELD/MACKINTOSH  
ZN

Rock 2

2n

076

NUMBER OF SAMPLES= 1462  
 MAXIMUM VALUE= 4800  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 47  
 VARIANCE= 28635.64  
 STANDARD DEVIATION= 169.22  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 17  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 1.15  
 NUMBER OF SAMPLES NOT ANALYSED= 20  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.39

160077

CLASS	INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM	TO				
(PPM)					
2.0-	2.9	* 4	* 0.27	* 4	* 0.27
2.9-	4.3	* 9	* 0.62	* 13	* 0.89
4.3-	6.3	* 67	* 4.58	* 80	* 5.47
6.3-	9.3	* 144	* 9.85	* 224	* 15.32
9.3-	13.8	* 284	* 19.43	* 508	* 34.75
13.8-	20.4	* 325	* 22.23	* 833	* 56.98
20.4-	30.2	* 221	* 15.12	* 1054	* 72.09
30.2-	44.6	* 110	* 7.52	* 1164	* 79.62
44.6-	65.9	* 104	* 7.11	* 1268	* 86.73
65.9-	97.3	* 78	* 5.34	* 1346	* 92.07
97.3-	143.9	* 44	* 3.01	* 1390	* 95.08
143.9-	212.6	* 30	* 2.05	* 1420	* 97.13
212.6-	314.1	* 15	* 1.03	* 1435	* 98.15
314.1-	464.2	* 13	* 0.89	* 1448	* 99.04
464.2-	686.0	* 4	* 0.27	* 1452	* 99.32
686.0-	1013.8	* 4	* 0.27	* 1456	* 99.59
1013.8-	1498.1	* 3	* 0.21	* 1459	* 99.79
1498.1-	2213.9	* 2	* 0.14	* 1461	* 99.93
2213.9-	3271.6	* 0	* 0.00	* 1461	* 99.93
3271.6-	4834.7	* 1	* 0.07	* 1462	* 100.00

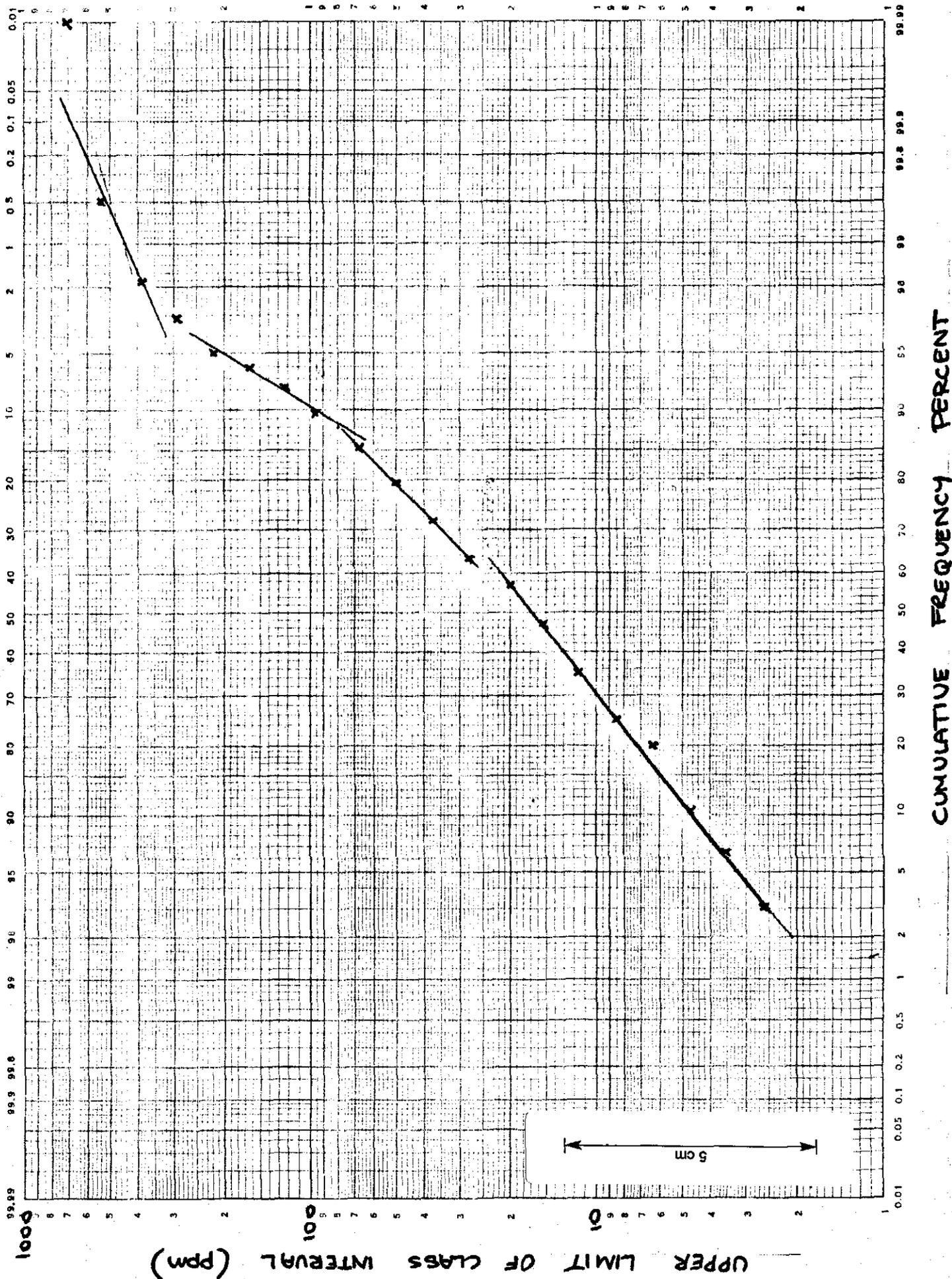
HISTOGRAM

FROM	TO	
(PPM)		
2.0-	2.9	
2.9-	4.3	X
4.3-	6.3	XXXXXXXXXXXXXX
6.3-	9.3	XX
9.3-	13.8	XX
13.8-	20.4	XX
20.4-	30.2	XX
30.2-	44.6	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
44.6-	65.9	XXXXXXXXXXXXXXXXXXXX
65.9-	97.3	XXXXXXXXXXXXXXXXXXXX
97.3-	143.9	XXXXXXXXXX
143.9-	212.6	XXXXXX
212.6-	314.1	XX
314.1-	464.2	XX
464.2-	686.0	
686.0-	1013.8	
1013.8-	1498.1	
1498.1-	2213.9	
2213.9-	3271.6	
3271.6-	4834.7	

077

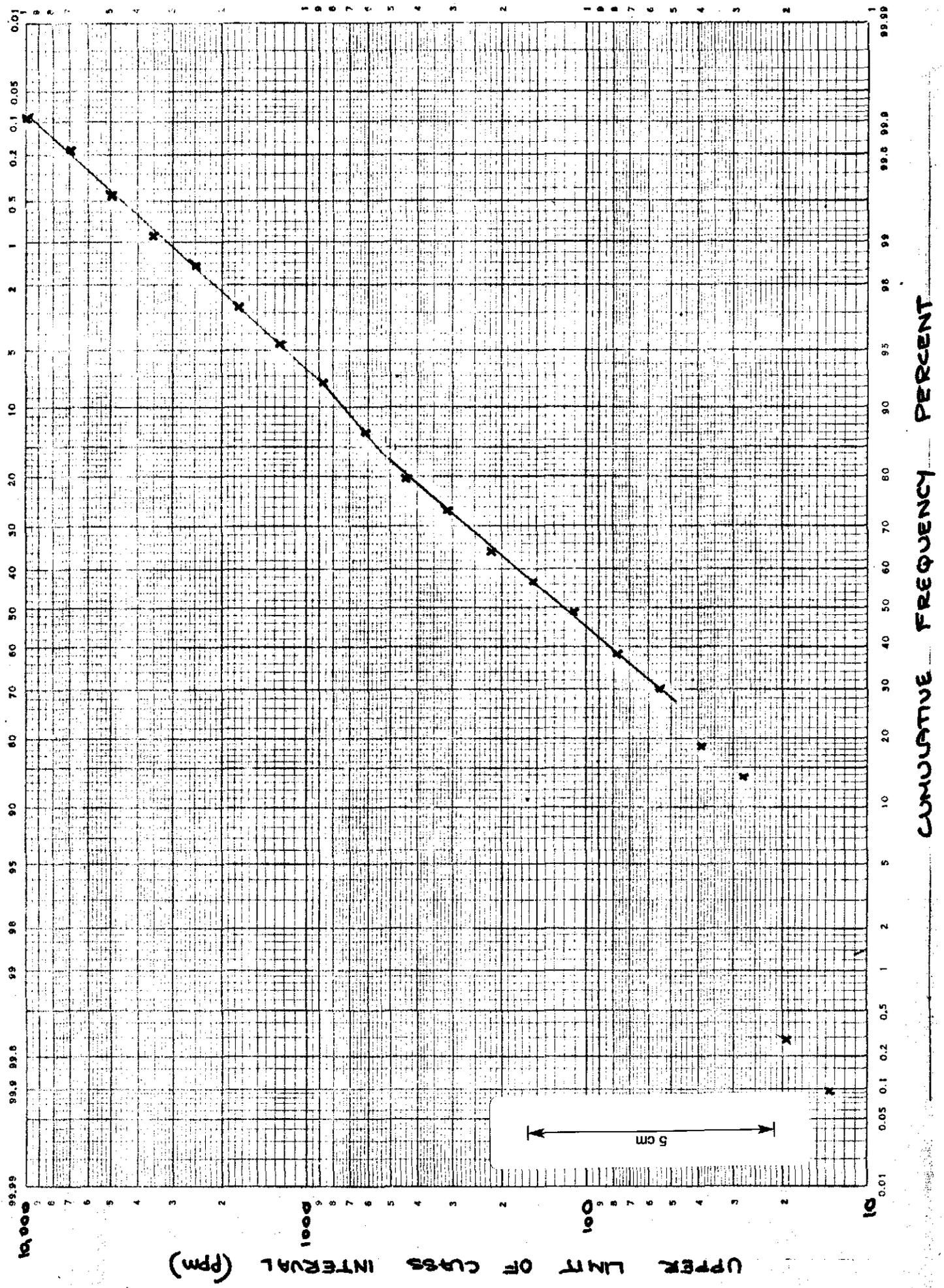
# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR COPPER IN PYRITIC DACITIC VOLCANICS

160078



078

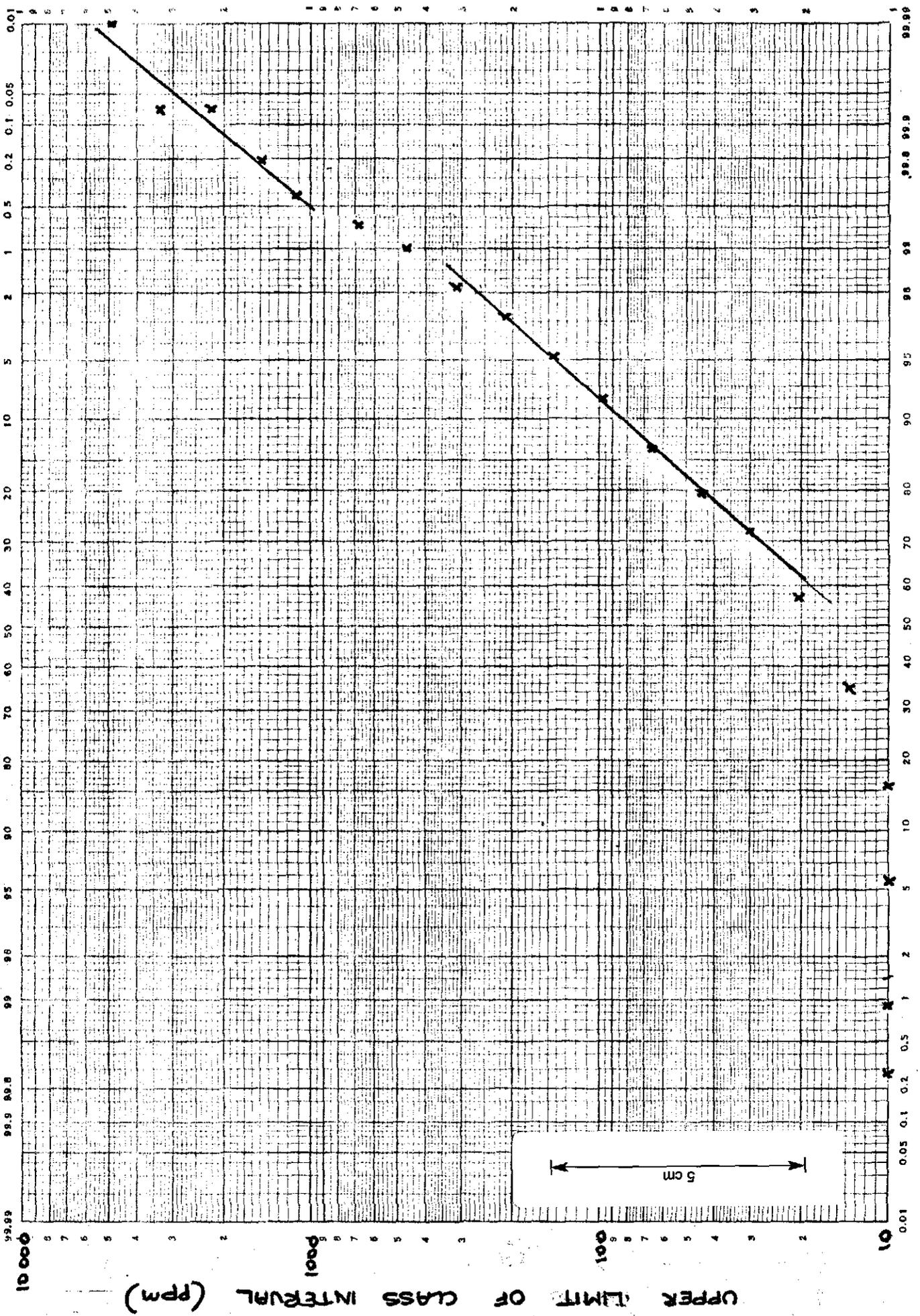
# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR LEAD IN PYRITIC DACITIC VOLCANICS 160079



079

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR ZINC IN PYRITIC DACITIC VOLCANICS

160080







ZN  
 NUMBER OF SAMPLES= 288  
 MAXIMUM VALUE= 250  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 14  
 VARIANCE= 366.38  
 STANDARD DEVIATION= 19.14  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 5  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 1.71  
 NUMBER OF SAMPLES NOT ANALYSED= 57  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.24

160083

CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
FROM TO (PPM)				
2.0- 2.5	5	1.74	5	1.74
2.5- 3.2	24	8.33	29	10.07
3.2- 4.1	27	9.38	56	19.44
4.1- 5.2	31	10.76	87	30.21
5.2- 6.7	29	10.07	116	40.28
6.7- 8.5	24	8.33	140	48.61
8.5- 10.9	34	11.81	174	60.42
10.9- 13.9	30	10.42	204	70.83
13.9- 17.7	20	6.94	224	77.78
17.7- 22.6	18	6.25	242	84.03
22.6- 28.9	17	5.90	259	89.93
28.9- 36.9	11	3.82	270	93.75
36.9- 47.1	7	2.43	277	96.18
47.1- 60.2	6	2.08	283	98.26
60.2- 76.9	2	0.69	285	98.96
76.9- 98.2	2	0.69	287	99.65
98.2- 125.4	0	0.00	287	99.65
125.4- 160.2	0	0.00	287	99.65
160.2- 204.6	0	0.00	287	99.65
204.6- 261.3	1	0.35	288	100.00

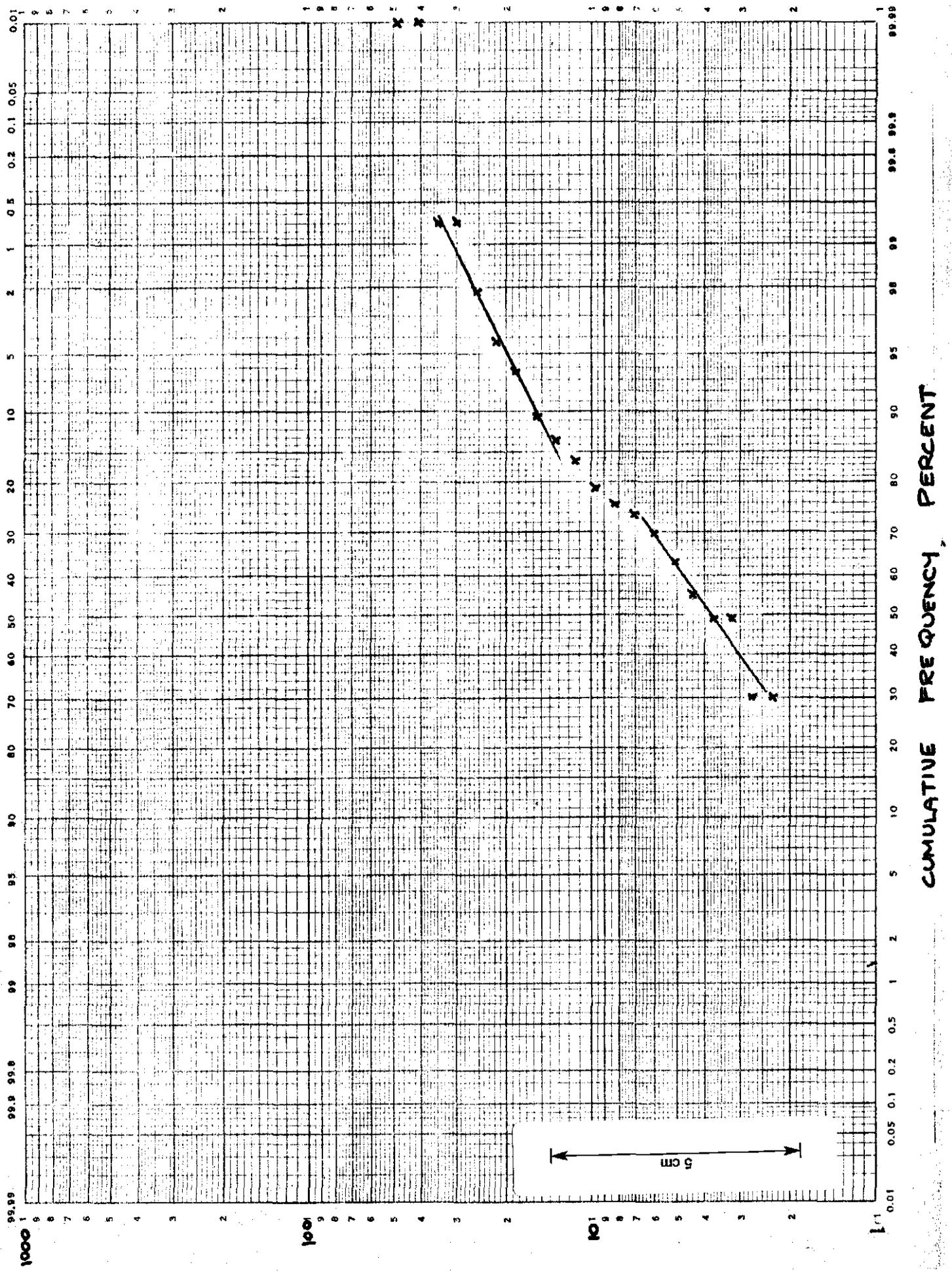
HISTOGRAM

FROM TO (PPM)	HISTOGRAM
2.0- 2.5	XXXXXXXXXX
2.5- 3.2	XX
3.2- 4.1	XX
4.1- 5.2	XX
5.2- 6.7	XX
6.7- 8.5	XX
8.5- 10.9	XX
10.9- 13.9	XX
13.9- 17.7	XX
17.7- 22.6	XX
22.6- 28.9	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
28.9- 36.9	XXXXXXXXXXXXXXXXXXXX
36.9- 47.1	XXXXXXXXXXXX
47.1- 60.2	XXXXXXXXXX
60.2- 76.9	XXX
76.9- 98.2	XXX
98.2- 125.4	
125.4- 160.2	
160.2- 204.6	
204.6- 261.3	X

083

160084

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR COPPER IN ALLUVIUM



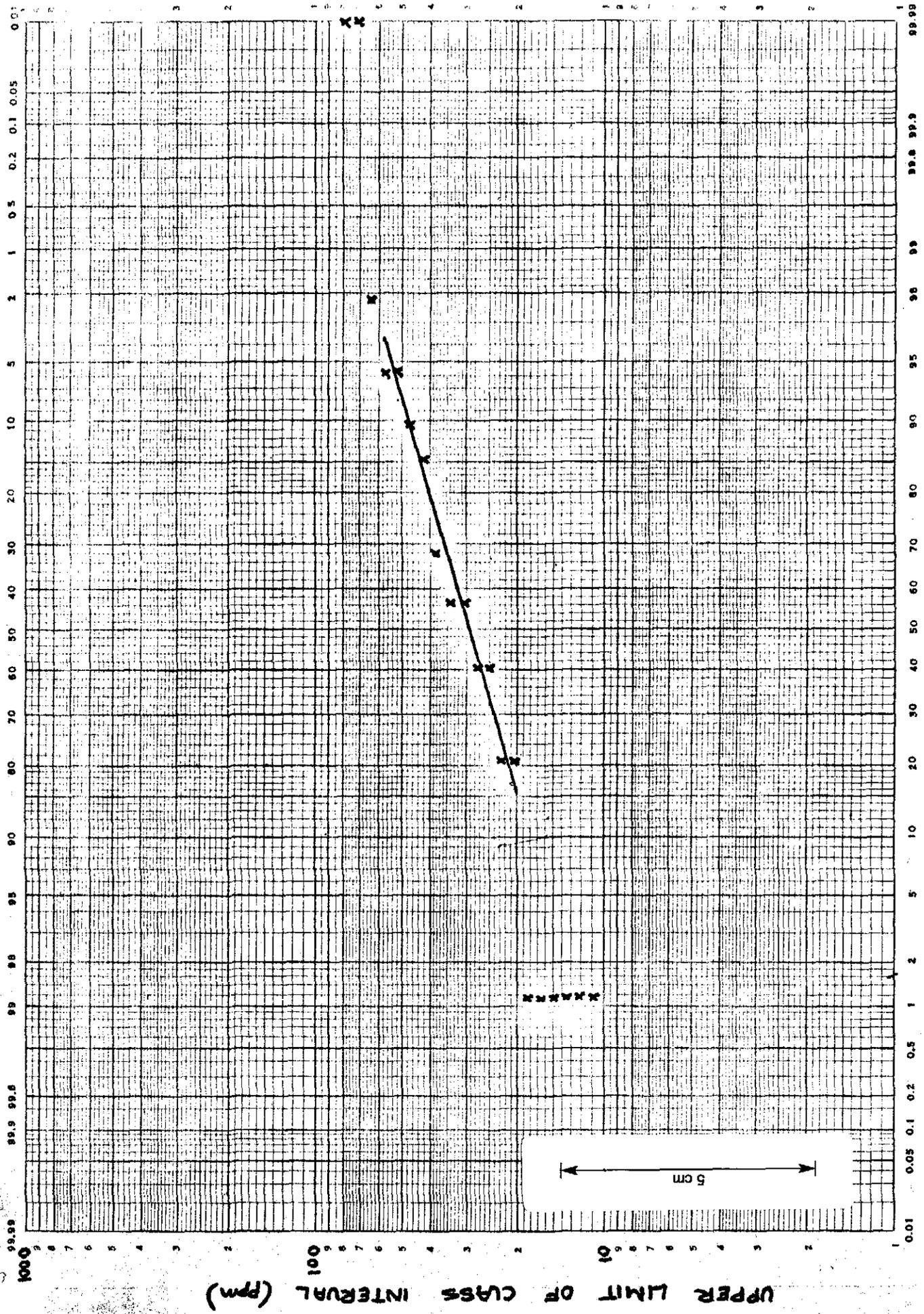
UPPER LIMIT OF CLASS INTERVAL (PPM)

CUMULATIVE FREQUENCY, PERCENT

084

160085

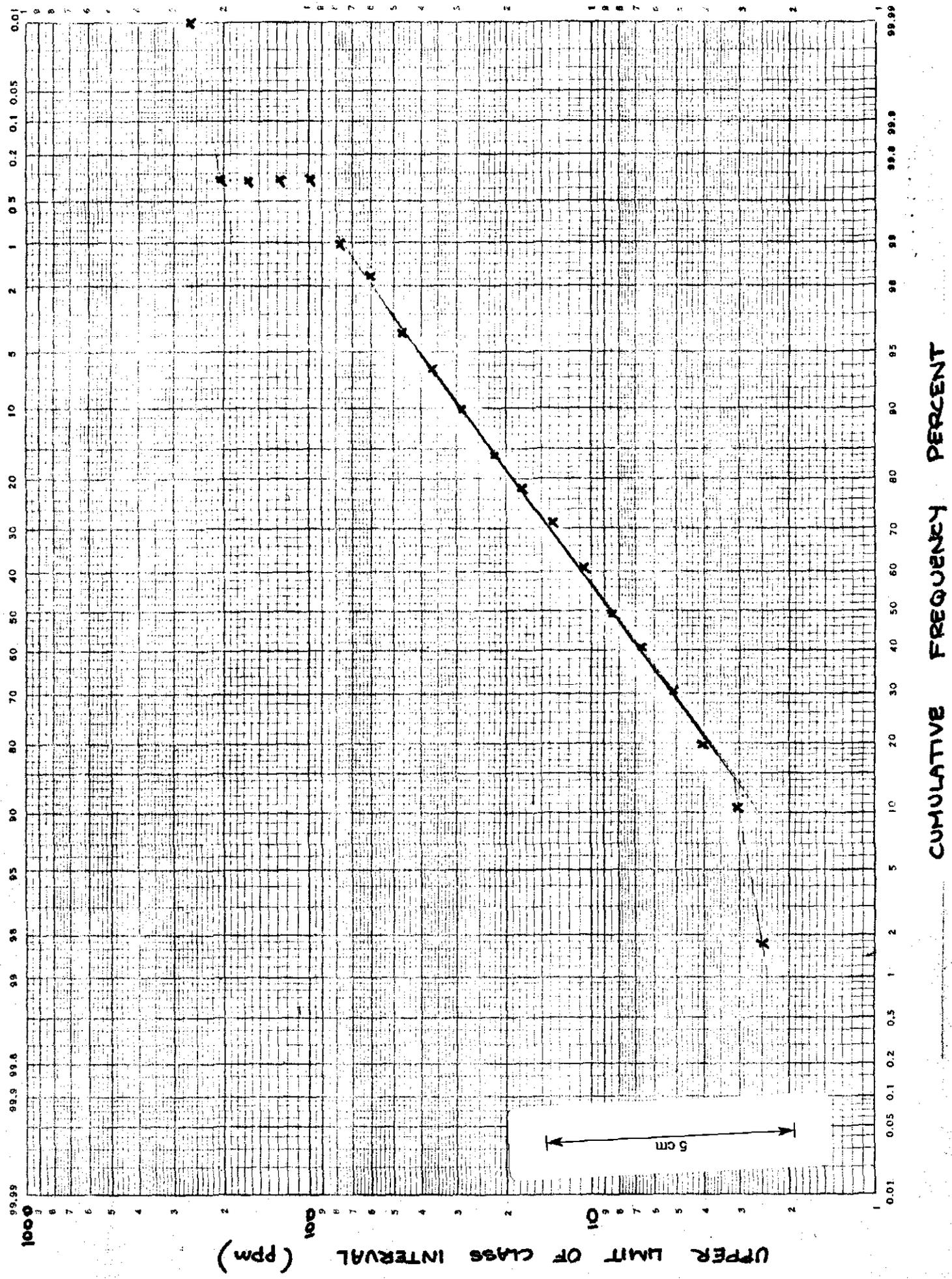
# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR LEAD IN ALLUVIUM



085

160086

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR ZINC IN ALLUVIUM



NUMBER OF SAMPLES= 8791  
 MAXIMUM VALUE= 700  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 45  
 VARIANCE= 1741.09  
 STANDARD DEVIATION= 41.73  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 228  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 2.53  
 NUMBER OF SAMPLES NOT ANALYSED= 292  
 NUMBER OF SAMPLES ABOVE POP'H LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.29

CLASS INTERVAL	FREQ	FREQ%	CU. FREQ	CU. FREQ%
FROM TO (PPM)				
2.0- 2.6	125	1.42	125	1.42
2.6- 3.5	127	1.44	252	2.87
3.5- 4.7	135	1.54	387	4.40
4.7- 6.4	538	6.12	925	10.52
6.4- 8.6	235	2.67	1160	13.20
8.6- 11.5	572	6.51	1732	19.70
11.5- 15.4	591	6.72	2323	26.42
15.4- 20.7	656	7.46	2979	33.89
20.7- 27.8	693	7.88	3672	41.77
27.8- 37.4	984	11.19	4656	52.96
37.4- 50.2	1118	12.72	5774	65.68
50.2- 67.5	979	11.14	6753	76.82
67.5- 90.6	1010	11.49	7763	88.31
90.6- 121.7	615	7.00	8378	95.30
121.7- 163.4	280	3.19	8658	98.49
163.4- 219.4	99	1.13	8757	99.61
219.4- 294.6	22	0.25	8779	99.86
294.6- 395.7	4	0.05	8783	99.91
395.7- 531.4	4	0.05	8787	99.95
531.4- 713.6	4	0.05	8791	100.00

HISTOGRAM

FROM TO (PPM)	HISTOGRAM
2.0- 2.6	XXXXXX
2.6- 3.5	XXXXXX
3.5- 4.7	XXXXXXXX
4.7- 6.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
6.4- 8.6	XXXXXXXXXXXX
8.6- 11.5	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
11.5- 15.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
15.4- 20.7	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
20.7- 27.8	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
27.8- 37.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
37.4- 50.2	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
50.2- 67.5	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
67.5- 90.6	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
90.6- 121.7	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
121.7- 163.4	XXXXXXXXXXXXXXXXXXXX
163.4- 219.4	XXXXX
219.4- 294.6	X
294.6- 395.7	
395.7- 531.4	
531.4- 713.6	



4

FIELD/MACKINTOSH

160089

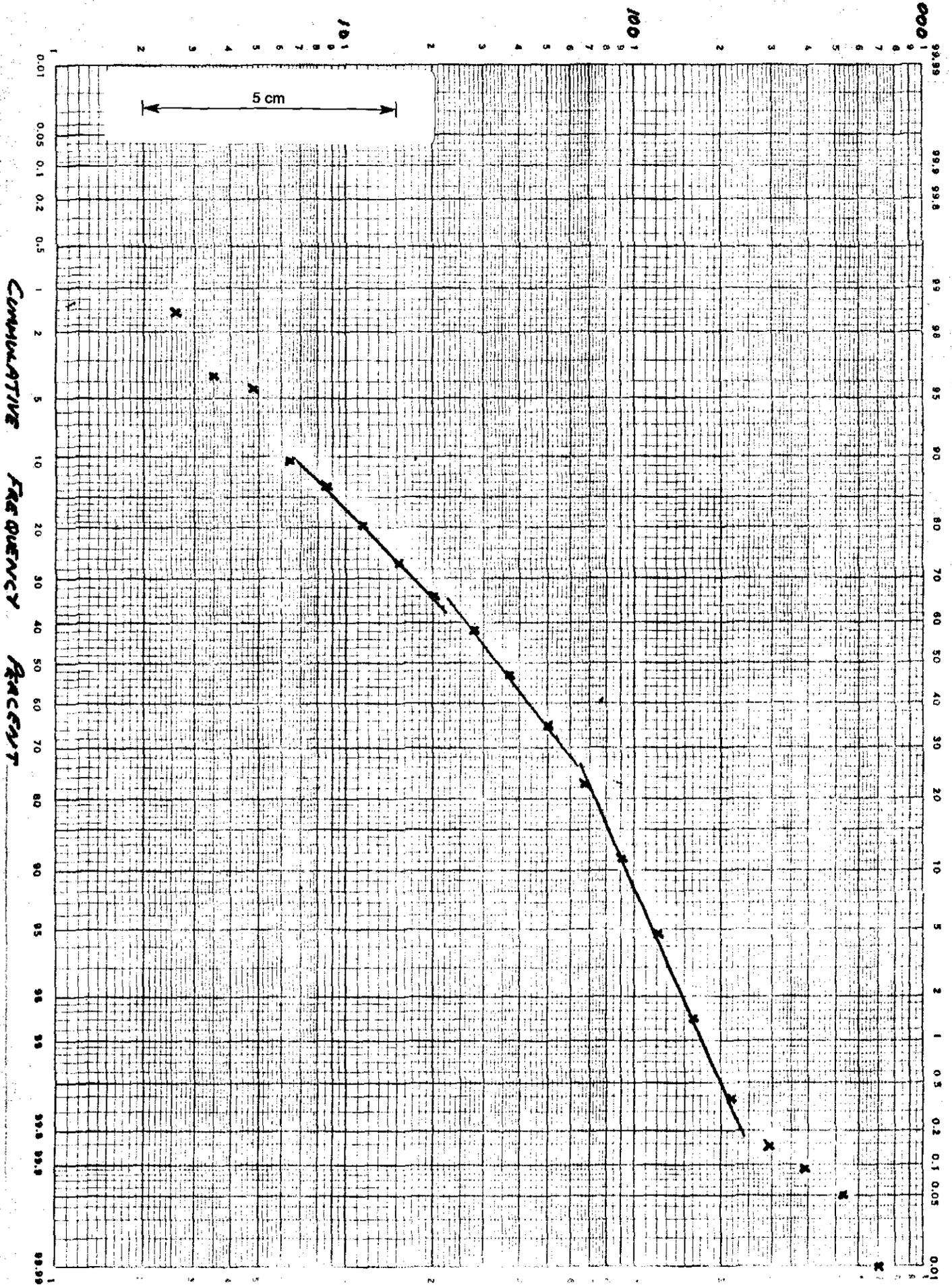
NUMBER OF SAMPLES= 8967  
 MAXIMUM VALUE= 2500  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 102  
 VARIANCE= 19538.56  
 STANDARD DEVIATION= 139.78  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 30  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.33  
 NUMBER OF SAMPLES NOT ANALYSED= 314  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.36

CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
FROM TO (PPM)				
2.0- 2.8	16	0.18	16	0.18
2.8- 4.0	59	0.66	75	0.84
4.0- 5.7	119	1.33	194	2.16
5.7- 8.2	218	2.43	412	4.59
8.2- 11.7	336	3.75	748	8.34
11.7- 16.8	498	5.55	1246	13.90
16.8- 24.0	587	6.55	1833	20.44
24.0- 34.4	788	8.79	2621	29.23
34.4- 49.2	1086	12.11	3707	41.34
49.2- 70.3	1324	14.77	5031	56.11
70.3- 100.6	1335	14.89	6366	70.99
100.6- 143.9	814	9.08	7180	80.07
143.9- 205.8	799	8.91	7979	88.98
205.8- 294.4	443	4.94	8422	93.92
294.4- 421.2	274	3.06	8696	96.98
421.2- 602.5	144	1.61	8840	98.58
602.5- 861.9	77	0.86	8917	99.44
861.9- 1232.9	30	0.33	8947	99.78
1232.9- 1763.7	15	0.17	8962	99.94
1763.7- 2522.9	5	0.06	8967	100.00

HISTOGRAM

FROM TO (PPM)	HISTOGRAM
2.0- 2.8	
2.8- 4.0	XX
4.0- 5.7	XXXXXX
5.7- 8.2	XXXXXXXXXX
8.2- 11.7	XXXXXXXXXXXXXXXXXX
11.7- 16.8	XXXXXXXXXXXXXXXXXXXXXXXXXX
16.8- 24.0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
24.0- 34.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
34.4- 49.2	XX
49.2- 70.3	XX
70.3- 100.6	XX
100.6- 143.9	XX
143.9- 205.8	XX
205.8- 294.4	XX
294.4- 421.2	XX
421.2- 602.5	XX
602.5- 861.9	XXX
861.9- 1232.9	X
1232.9- 1763.7	
1763.7- 2522.9	

UPPER LIMIT OF CLASS INTERVAL (PPM)



CUMULATIVE FREQUENCY PERCENT

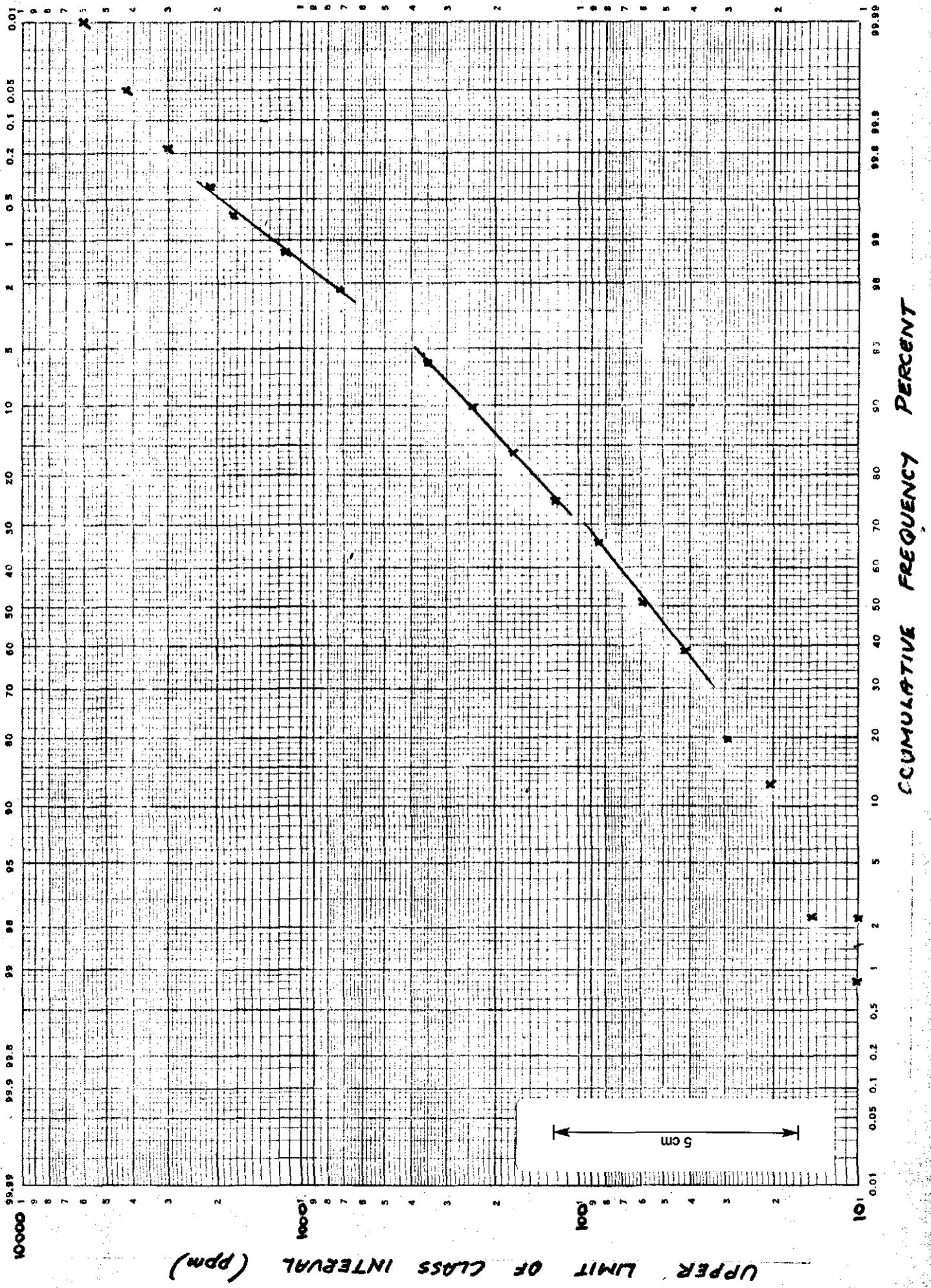
LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR COPPER IN ANDESITE

160090

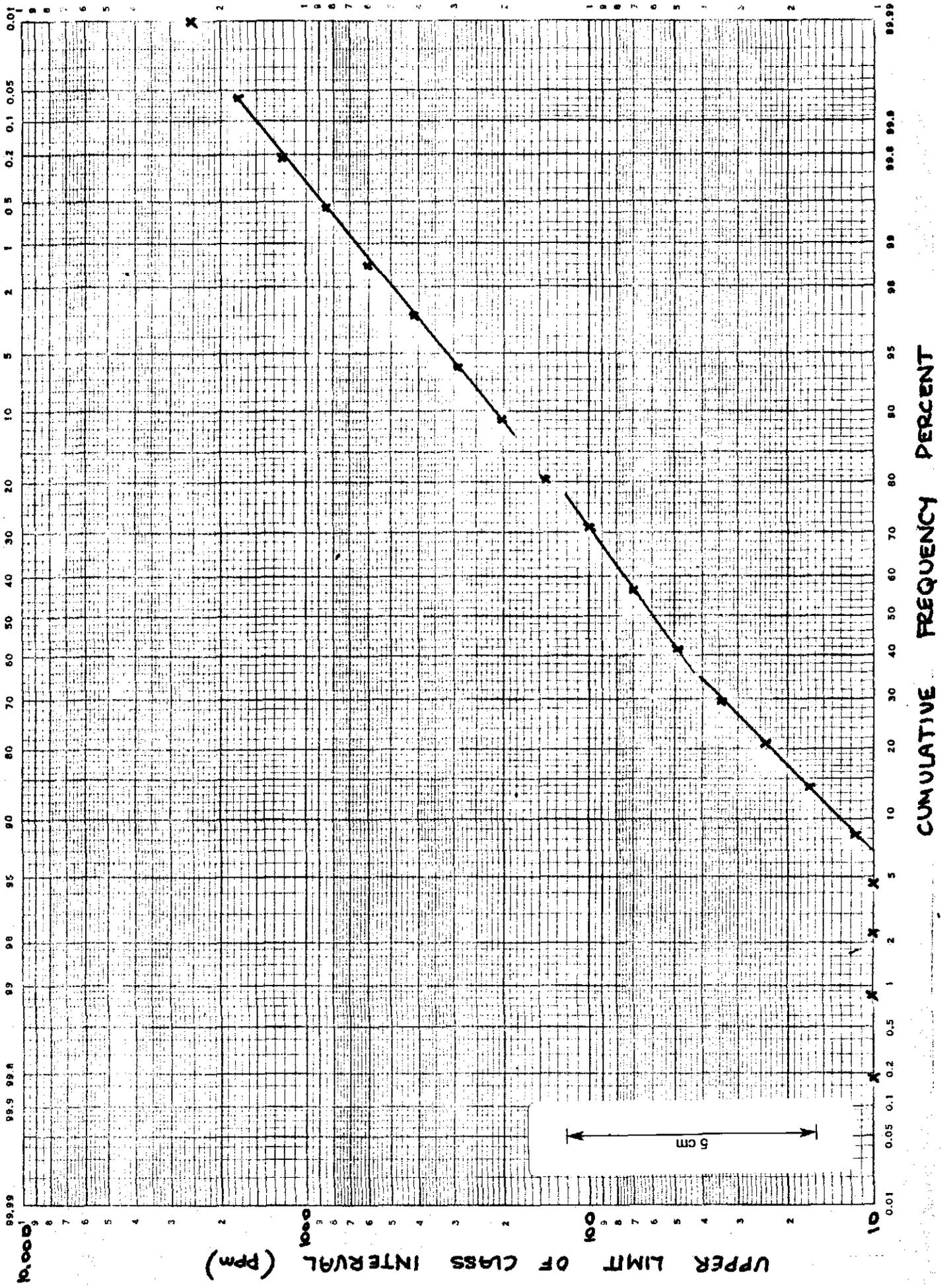
089

LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR LEAD IN ANDESITE

030



LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR ZINC IN ANDESITE



APPENDIX C

Hatfield E.L. 15/73 UTEM Survey  
Report by Dr. Y. Lamontagne,  
January 26, 1979.

The main conductors in the Hatfield grid are labelled A, B and C on the interpretation map. The best one electrically is conductor A located near the transmitter loop in a location where there is a known shale unit containing graphite and sulphides and a dolomite.

Between lines 42N and 44N, it is not clear to which of the two anomalies on line 42N the anomaly of line 44N should be joined. If the interpreted strike direction on the map is correct, the other anomaly labelled D would constitute a parallel conductor with perhaps a short strike length. The largest response is on line 44N, but the longest relative decay is probably a line 42N near the loop where channel 5 turns negative. Taking the decay length at 42N and assuming an effective strike length of 300m, one finds a conductance of about 30 mhos. This is a relatively high conductance matched only by that of the Que River deposits (~50-100 mhos?). Unfortunately the axis of the anomaly appears to be off the west end of the survey line perhaps under the transmitter loop. The main large amplitude anomaly of line 44N is probably caused by something much larger and more poorly conductive, but there is a more slowly decaying component to the anomaly on late channels which would have a decay time similar to that of line 44E. There is a possibility that the response is a "top anomaly" i.e. a negative rather than a cross-over on the later channels. Such a response could be explained by a more conductive region such as sketched by the shading.

As a rough estimate, this regional would need to have

094  
an average conductivity in the range of 0.1 to 0.2 mho/m to explain the late response. Whether this is the correct interpretation depends quite critically on the shape of the anomaly towards the west which could not be measured because of the proximity of the loop.

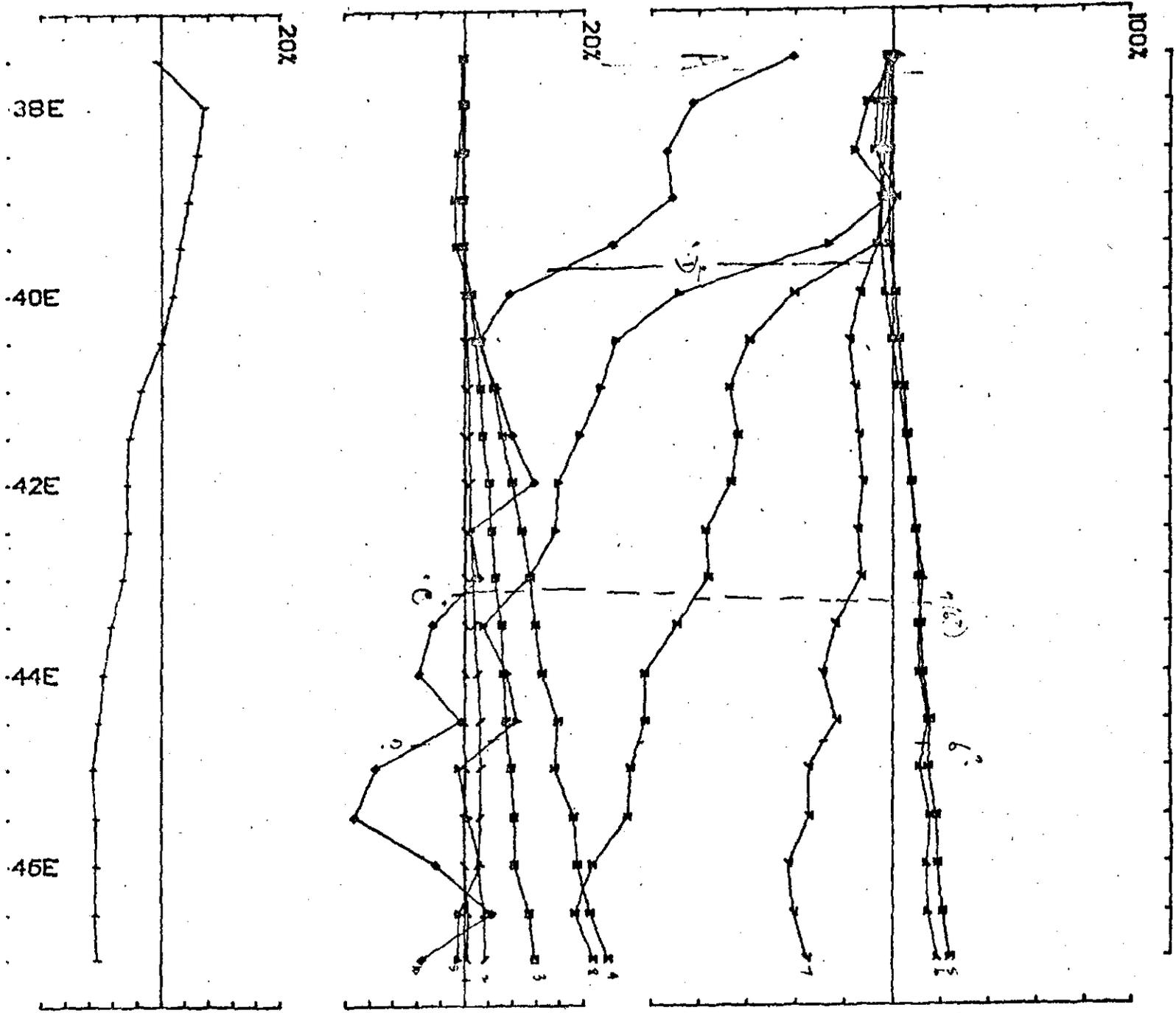
In any case the conductivity range is quite explainable in terms of a graphite shale but from the geological data available, most of the area near the loop is underlain by dolerites. Further work on this anomaly would depend mostly on geological arguments based on a more precise comparison with surface geology. IP and particularly resistivity data if available would help to check the type of model applicable. Since the UTEM survey only partially covered the anomaly, perhaps some detailing with horizontal loop EM would be advisable.

Conductor B consists mostly of sharp parallel cross-overs occurring on the northernmost lines of the survey area. Here again, the manner in which the axes have been joined is subject to doubt; perhaps the two channel 5 cross-over should rather be joined together instead. The responses are interesting, particularly where the decay is longer (channel 5 responses), but the cross-overs are so abrupt that there is some possibility that they have a cultural origin. A preliminary investigation of the ground for wires, metal cables or metal pipes running continuously between lines in their general area is advisable before more serious follow up is contemplated. If the conductors are geological, they should be considered as quite high priority targets since they are not unlike the Que River responses (although smaller in amplitude) and one of

095

the two at least is open to the north. The anomaly appears to line in or near an area mapped as dacite as does the Que River deposit. The conductance of the best anomalies would be in the 10 mho range.

Conductor C is a weak feature of variable time decay length and depth which has been tentatively linked as a single conductor. But the anomaly on line 50N is very poor showing only on channels 9 and 10 and the continuity at this point is arguable. The anomaly at line 52N could then be a single line one indicating a shorter conductor of perhaps 20 mhos. The south part of the zone would be less conductive by a factor of 2 to 4 except perhaps for a small zone near line 48N.



WATFIELD

25 50 Hz

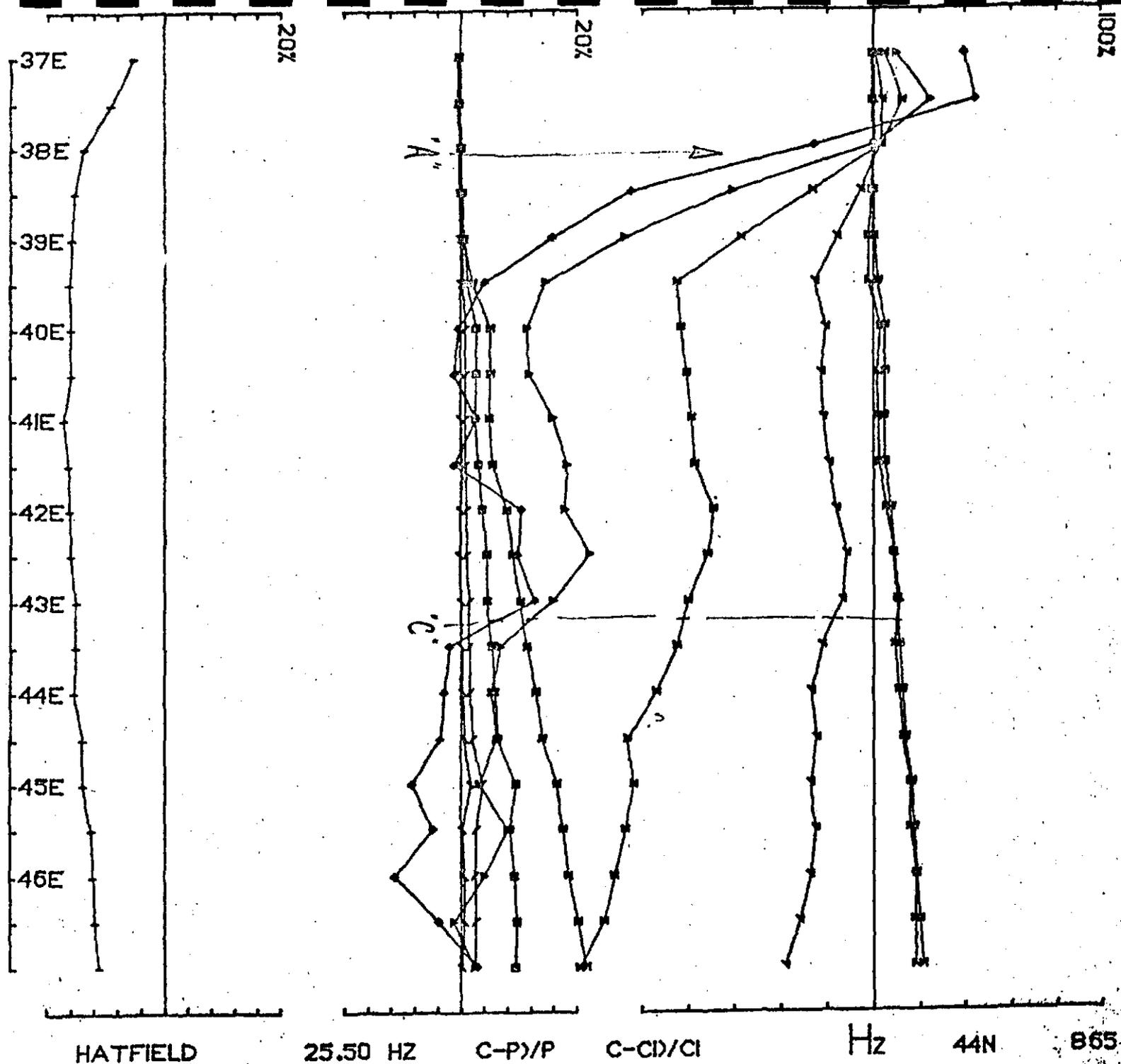
C-P)/P

C-(C)/CI

Hz

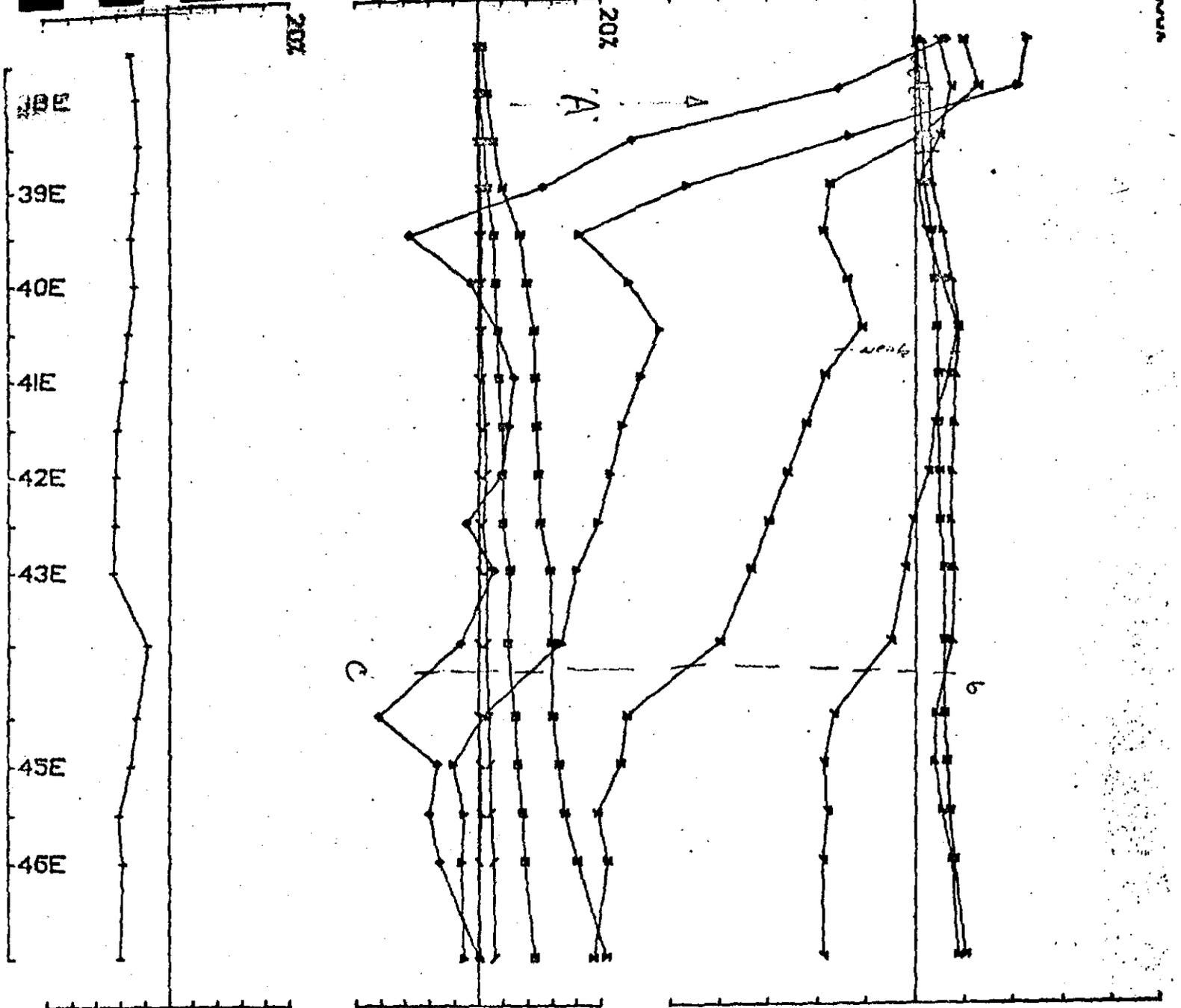
42N

865



097

160098



HATFIELD

25.50 HZ

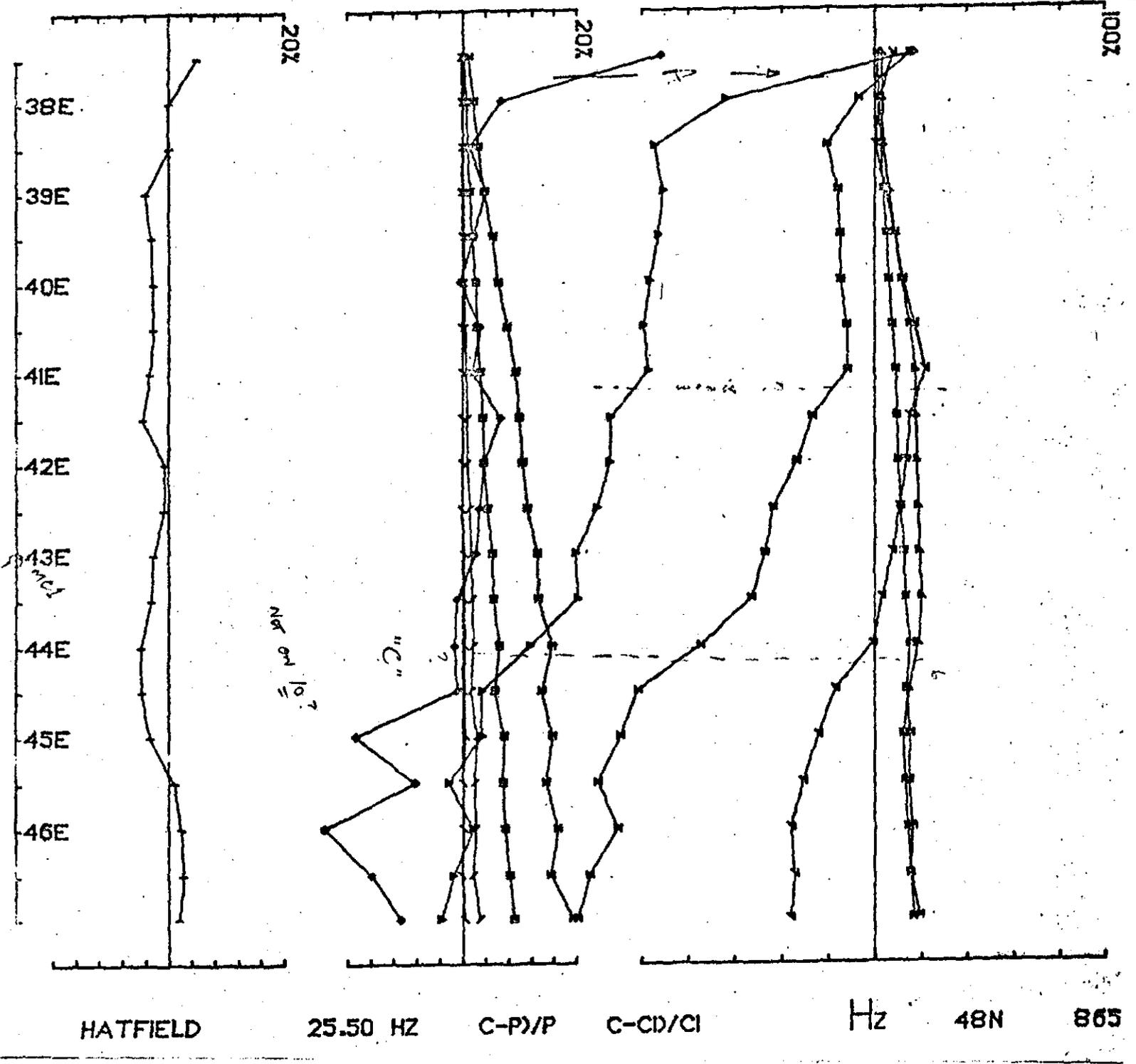
C-P)/P

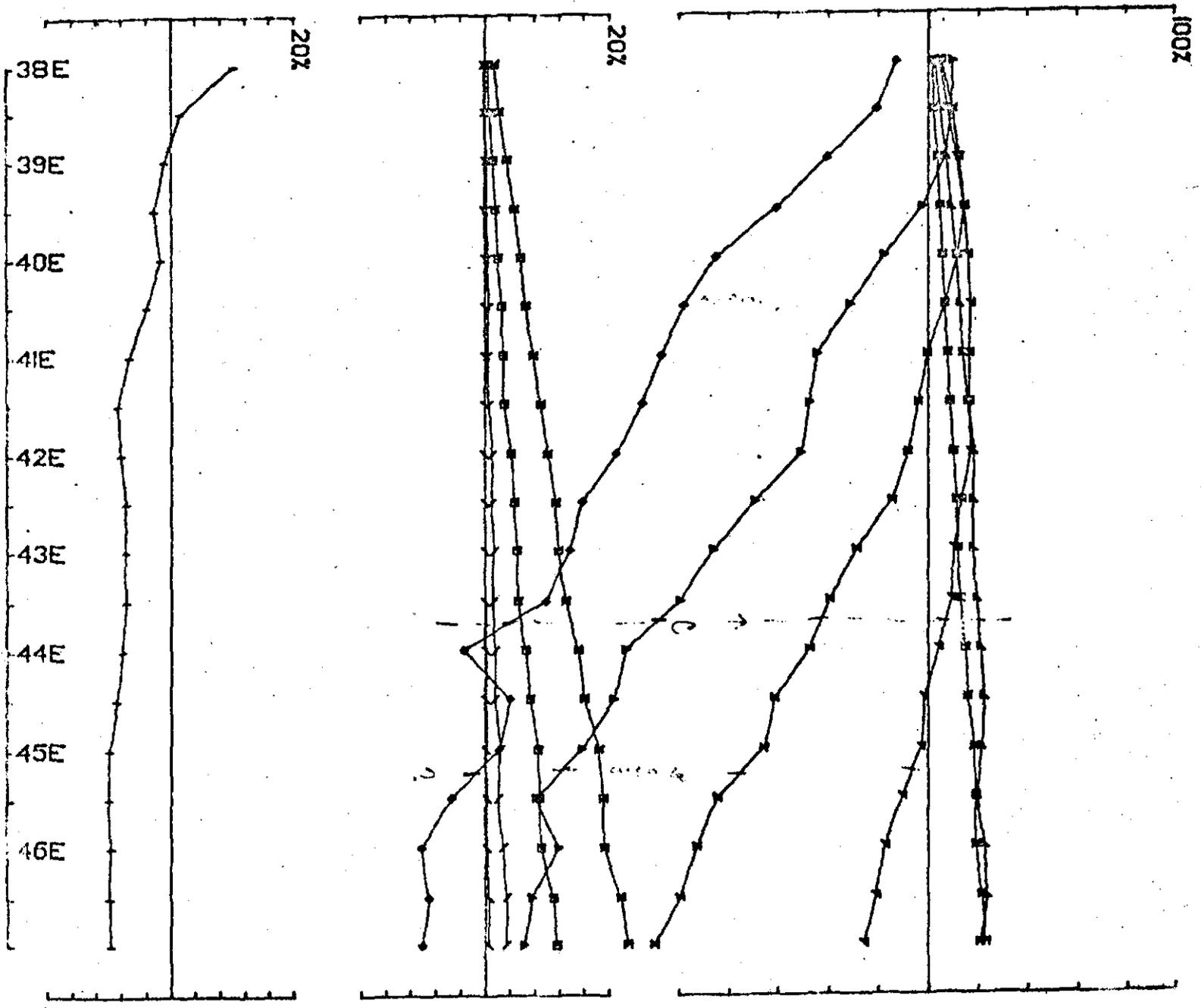
C-CI)/CI

Hz

46N

865





HATFIELD

25.50 HZ

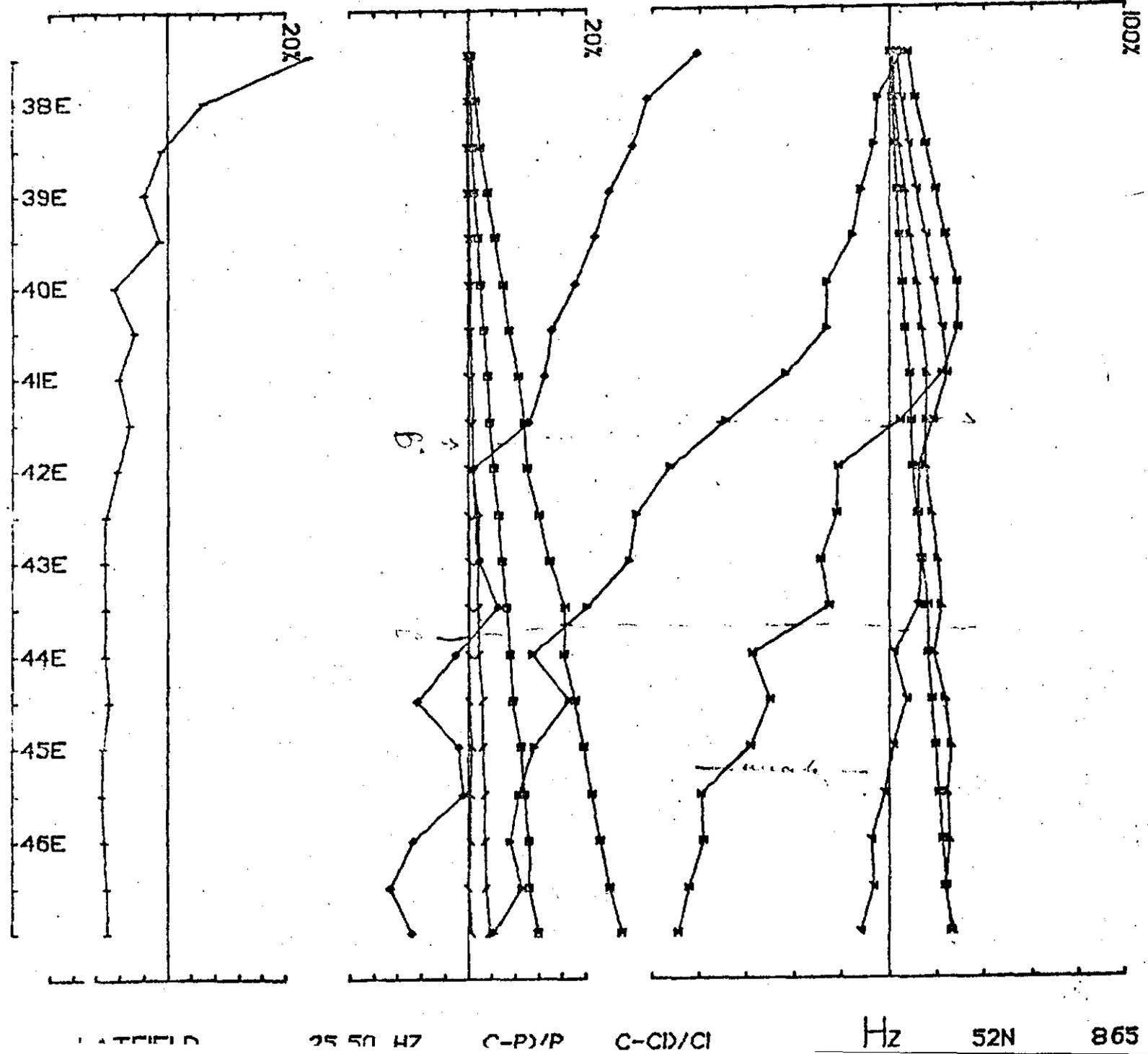
C-P)/P

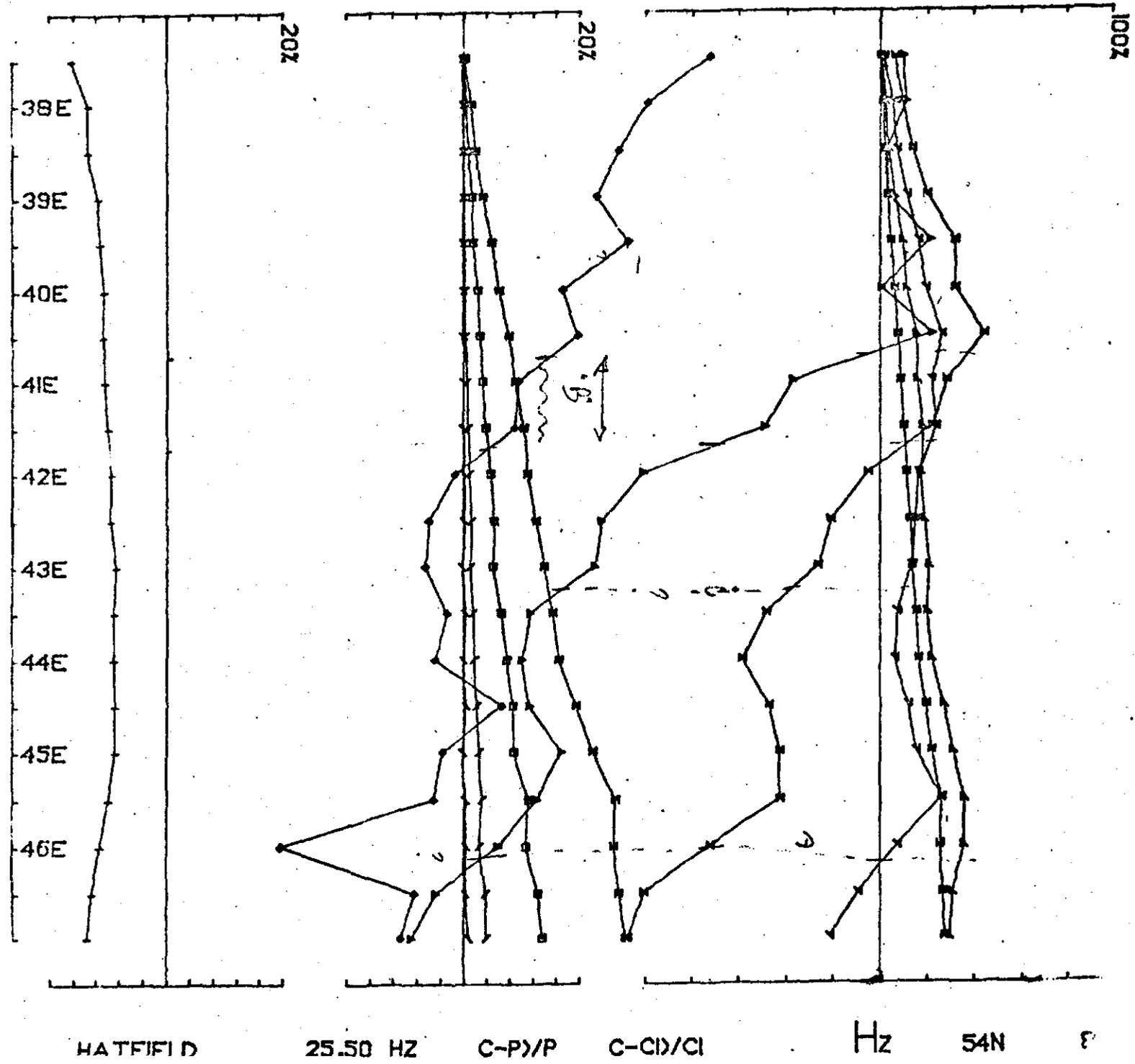
C-CI)/CI

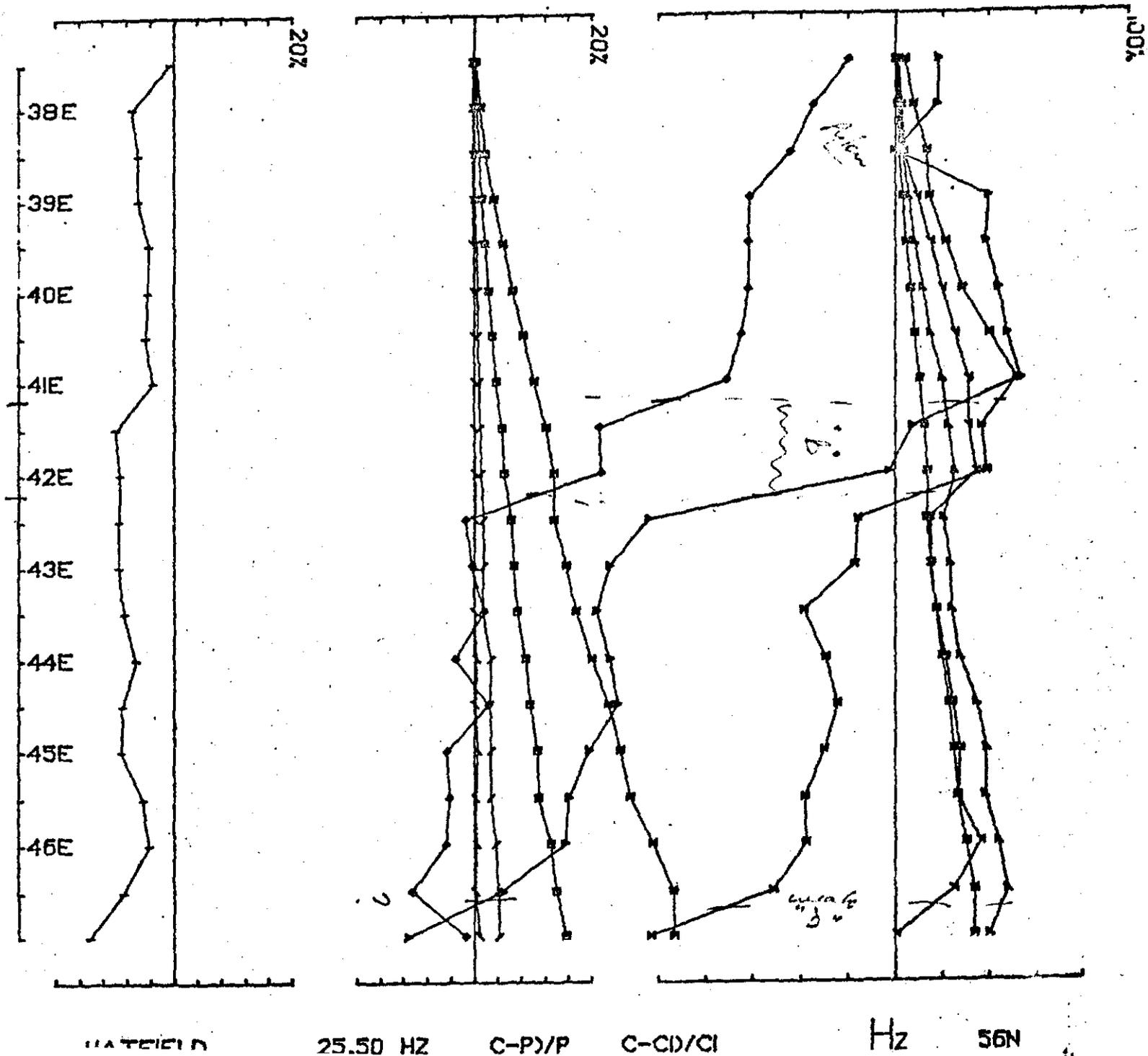
Hz

SON

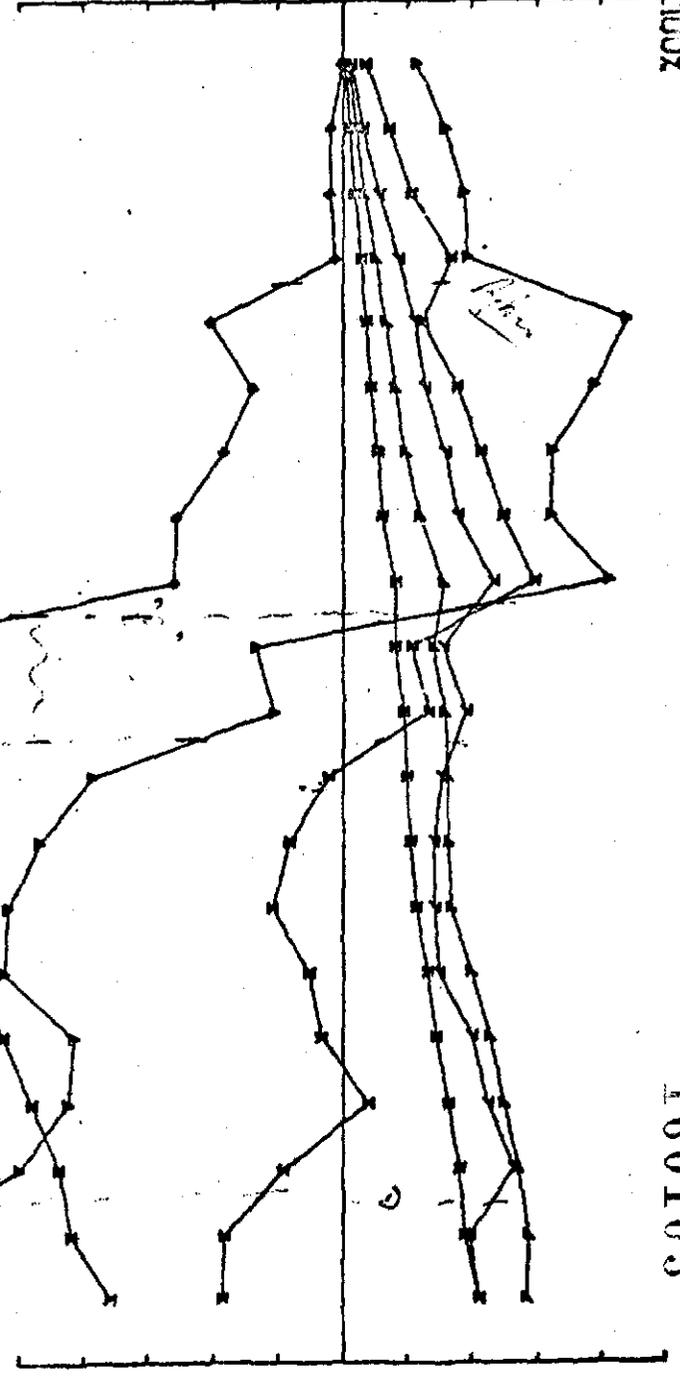
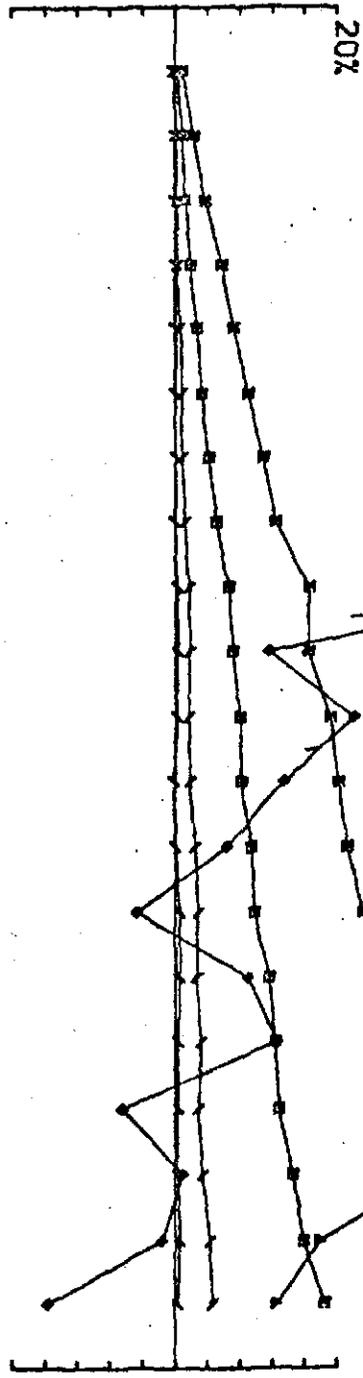
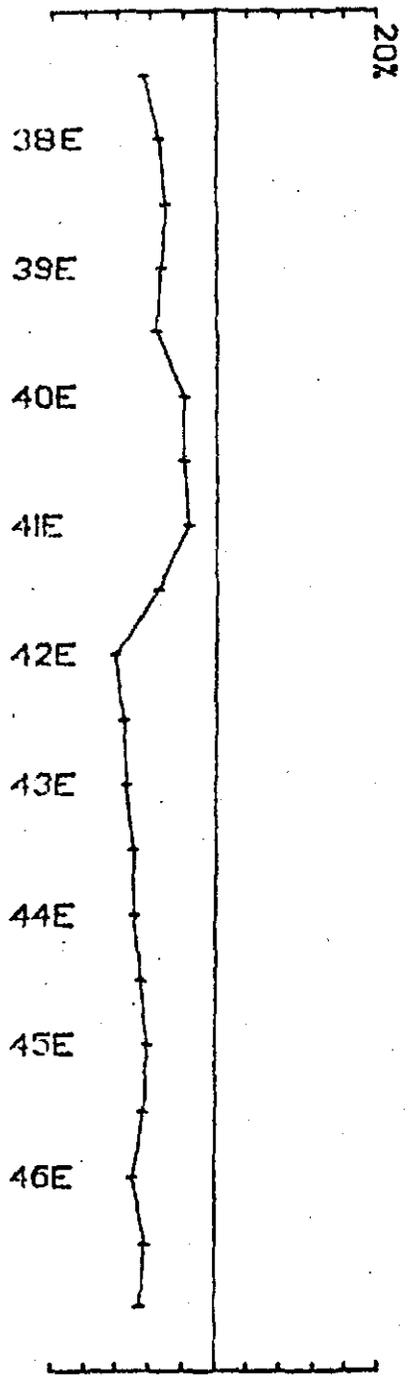
P







104  
F01



47E 48E 49E 50E 51E 52E 53E 54E 55E 56E 57E 58E 59E 60E 61E 62E 63E 64E 65E 66E

160105

Hz 58N 865

NUMBER OF SAMPLES= 412  
 MAXIMUM VALUE= 785  
 MINIMUM VALUE= 5  
 ARITHMETIC MEAN= 94  
 VARIANCE= 10232.73  
 STANDARD DEVIATION= 101.16  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 0  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.00  
 NUMBER OF SAMPLES NOT ANALYSED= 9  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.25

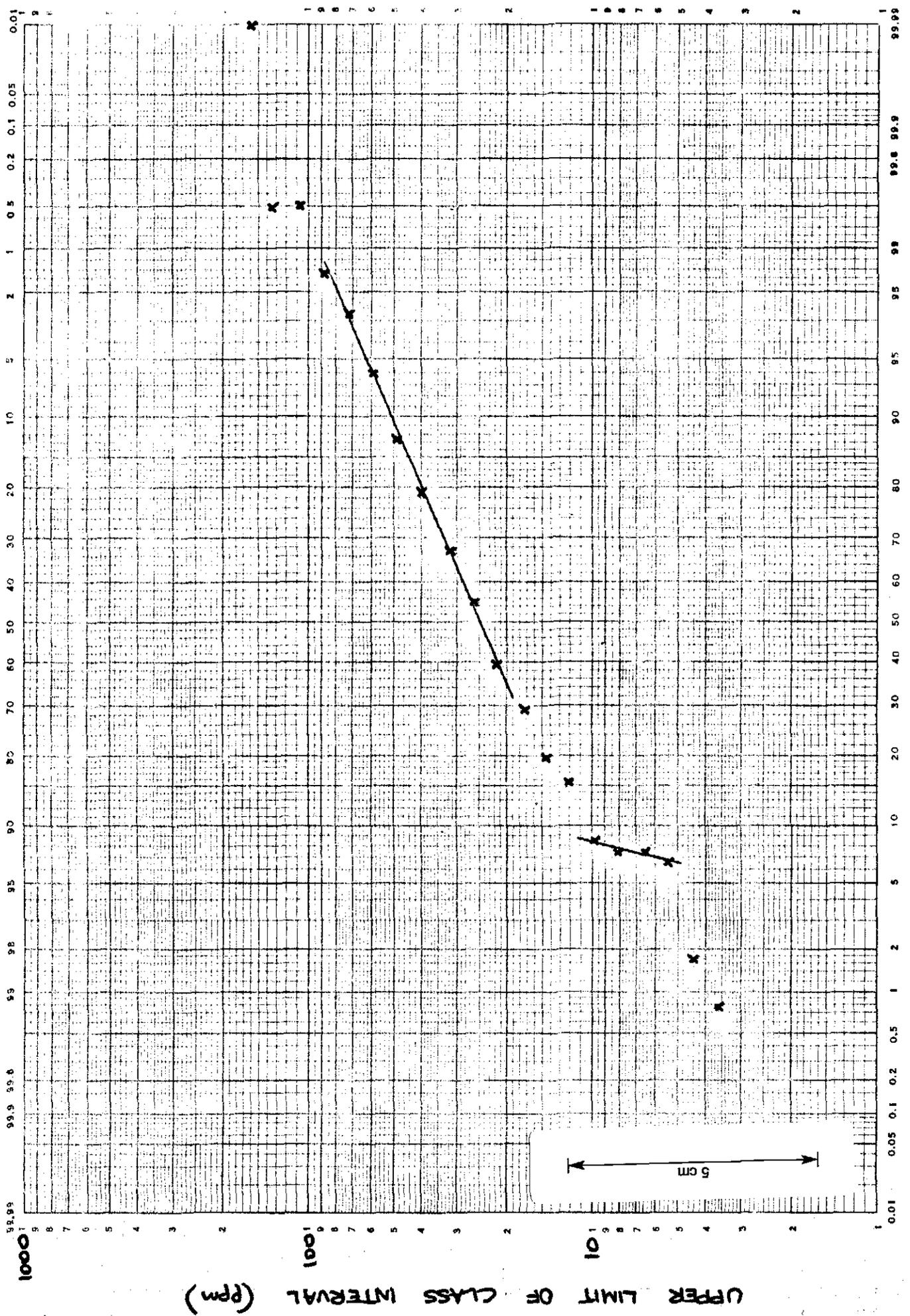
CLASS	INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM	TO				
(PPM)					
4.9-	6.3	2	0.49	2	0.49
6.3-	8.1	3	0.73	5	1.21
8.1-	10.5	10	2.43	15	3.64
10.5-	13.5	9	2.18	24	5.83
13.5-	17.4	11	2.67	35	8.50
17.4-	22.5	18	4.37	53	12.86
22.5-	29.0	19	4.61	72	17.48
29.0-	37.4	32	7.77	104	25.24
37.4-	48.2	41	9.95	145	35.19
48.2-	62.1	60	14.56	205	49.76
62.1-	80.1	60	14.56	265	64.32
80.1-	103.2	45	10.92	310	75.24
103.2-	133.0	26	6.31	336	81.55
133.0-	171.5	23	5.58	359	87.14
171.5-	221.1	17	4.13	376	91.26
221.1-	285.0	10	2.43	386	93.69
285.0-	367.4	16	3.88	402	97.57
367.4-	473.6	5	1.21	407	98.79
473.6-	610.5	3	0.73	410	99.51
610.5-	787.0	2	0.49	412	100.00

HISTOGRAM

FROM	TO	
(PPM)		
4.9-	6.3	XX
6.3-	8.1	XXX
8.1-	10.5	XXXXXXXXXX
10.5-	13.5	XXXXXXXXXX
13.5-	17.4	XXXXXXXXXX
17.4-	22.5	XXXXXXXXXXXXXXXXXXXX
22.5-	29.0	XXXXXXXXXXXXXXXXXXXX
29.0-	37.4	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
37.4-	48.2	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
48.2-	62.1	XX
62.1-	80.1	XX
80.1-	103.2	XX
103.2-	133.0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
133.0-	171.5	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
171.5-	221.1	XXXXXXXXXXXXXXXXXXXX
221.1-	285.0	XXXXXXXXXX
285.0-	367.4	XXXXXXXXXXXX
367.4-	473.6	XXXXX
473.6-	610.5	XXX
610.5-	787.0	XX

106

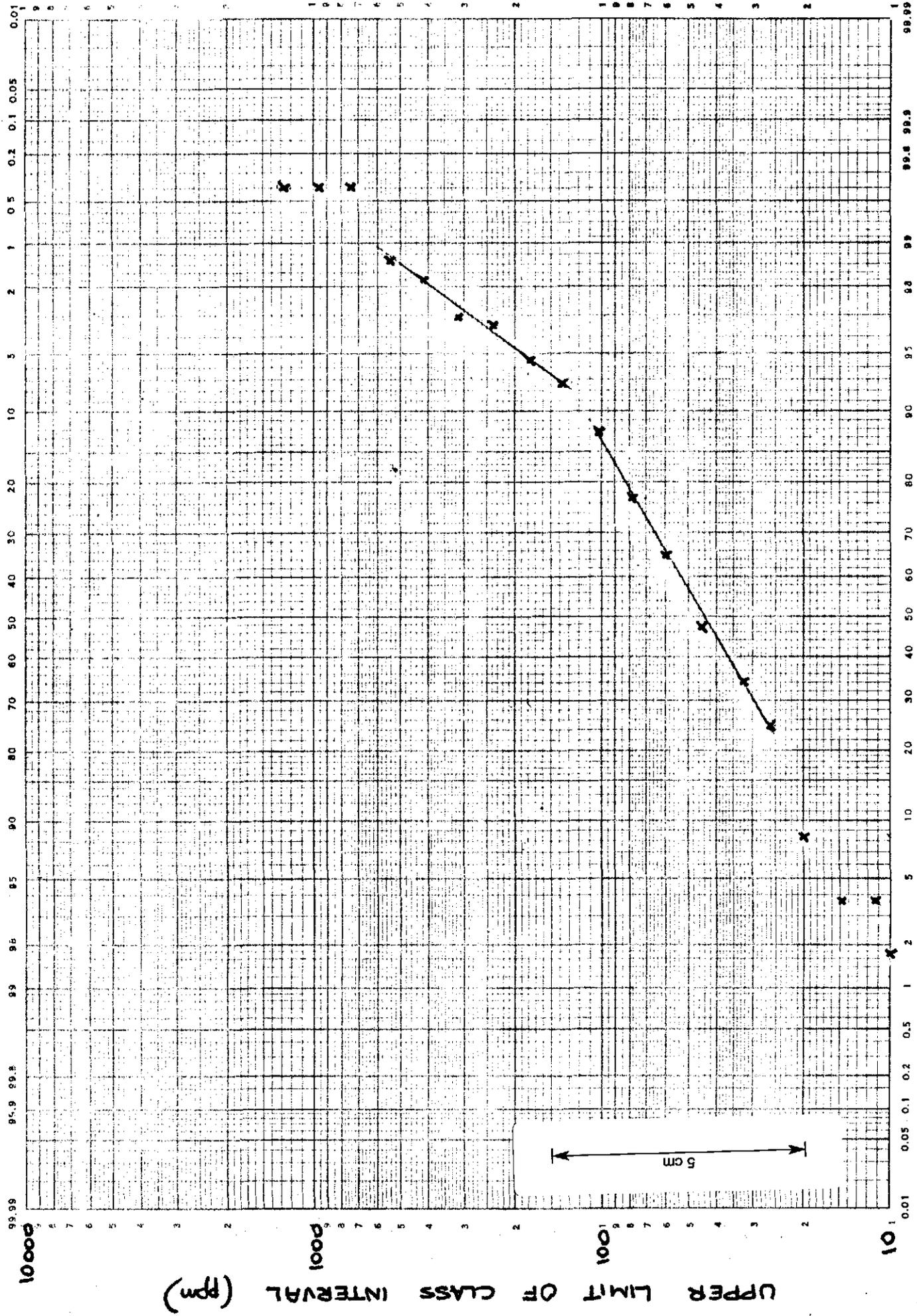
LOG PROBABILITY OF CUMULATIVE FREQUENCY 160107  
FOR COPPER IN DOLERITE



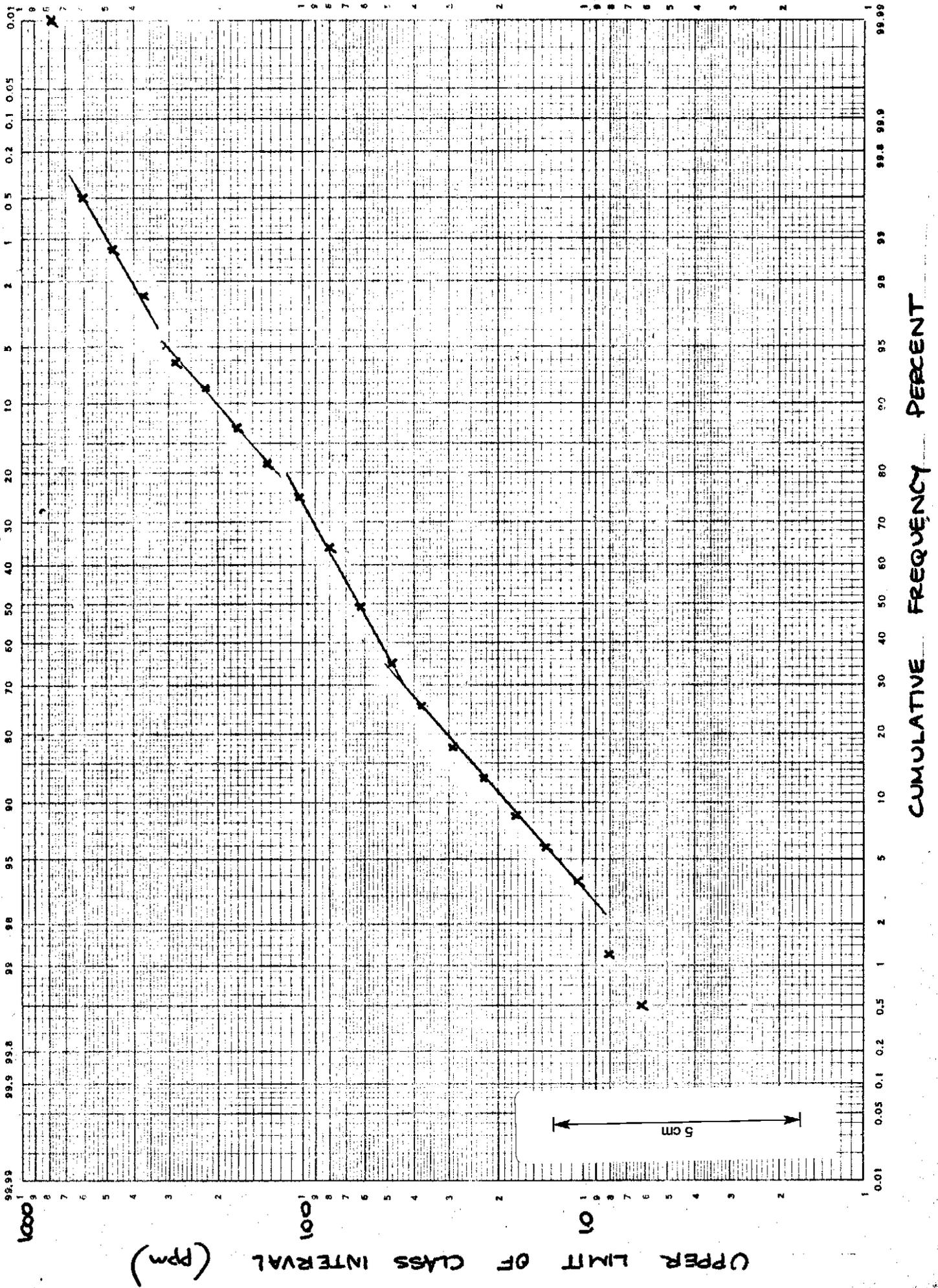
107

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR LEAD IN DOLERITE

160108



LOG PROBABILITY OF CUMULATIVE FREQUENCY 160109  
FOR ZINC IN DOLERITE



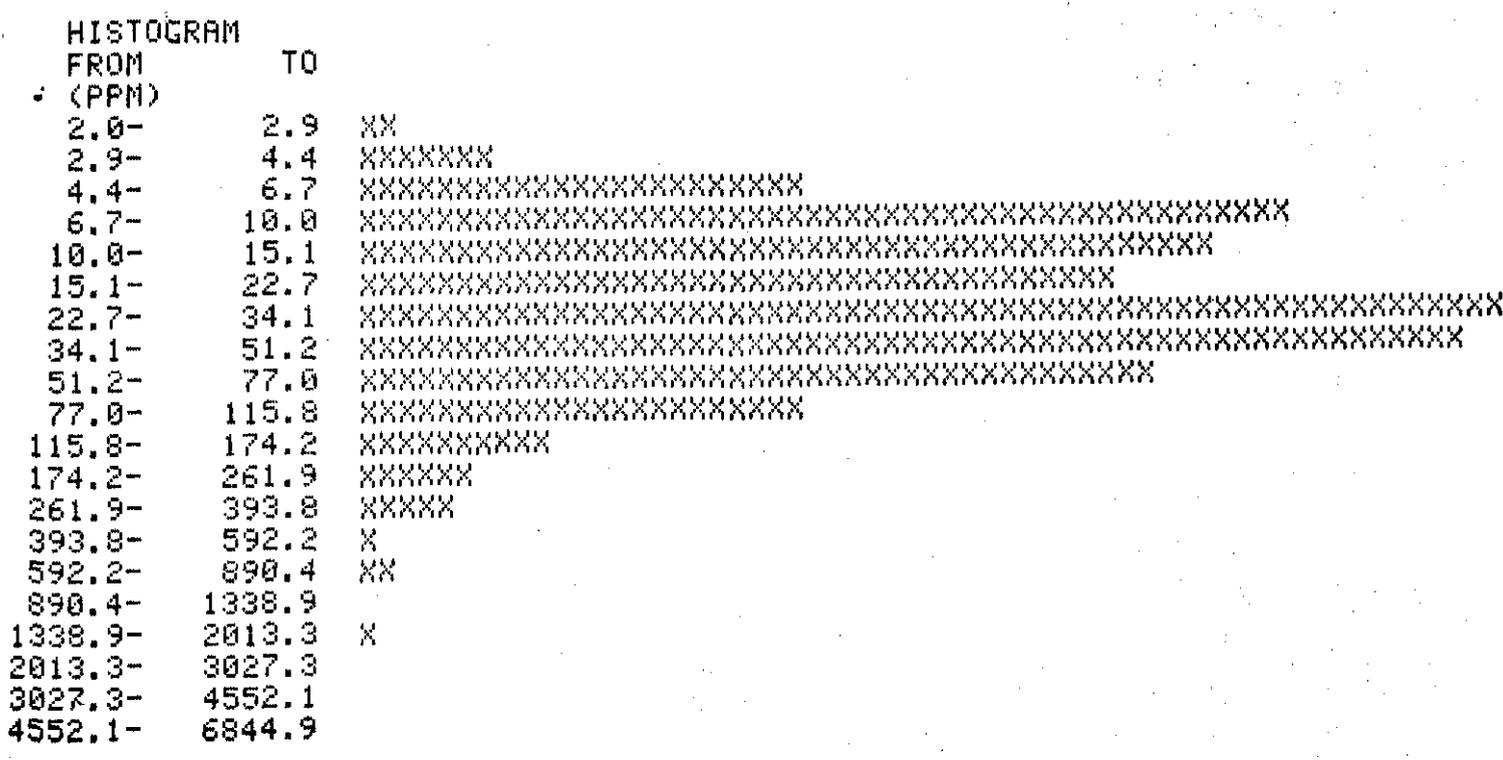




25

NUMBER OF SAMPLES= 1125  
 MAXIMUM VALUE= 6800  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 58  
 VARIANCE= 54814.79  
 STANDARD DEVIATION= 234.13  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 9  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 0.79  
 NUMBER OF SAMPLES NOT ANALYSED= 72  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.41

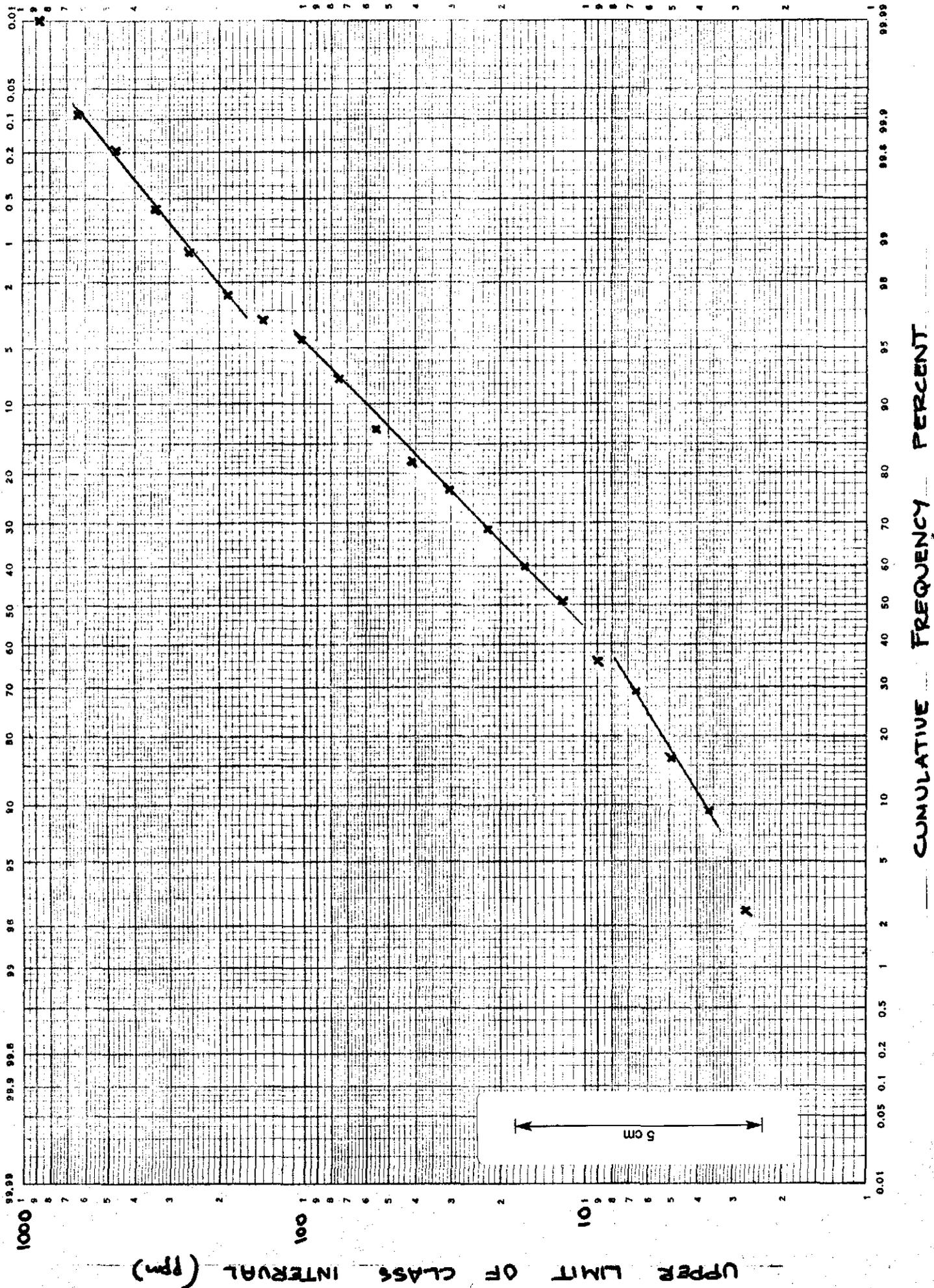
CLASS INTERVAL	FREQ	FREQ%	CU.FREQ	CU.FREQ%
FROM TO (PPM)				
2.0- 2.9	7	0.62	7	0.62
2.9- 4.4	23	2.04	30	2.67
4.4- 6.7	69	6.13	99	8.80
6.7- 10.0	145	12.89	244	21.69
10.0- 15.1	134	11.91	378	33.60
15.1- 22.7	119	10.58	497	44.18
22.7- 34.1	179	15.91	676	60.09
34.1- 51.2	171	15.20	847	75.29
51.2- 77.0	125	11.11	972	86.40
77.0- 115.8	71	6.31	1043	92.71
115.8- 174.2	32	2.84	1075	95.56
174.2- 261.9	20	1.78	1095	97.33
261.9- 393.0	16	1.42	1111	98.76
393.0- 592.2	3	0.27	1114	99.02
592.2- 890.4	6	0.53	1120	99.56
890.4- 1338.9	1	0.09	1121	99.64
1338.9- 2013.3	3	0.27	1124	99.91
2013.3- 3027.3	0	0.00	1124	99.91
3027.3- 4552.1	0	0.00	1124	99.91
4552.1- 6844.9	1	0.09	1125	100.00



112

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR COPPER IN DACITE

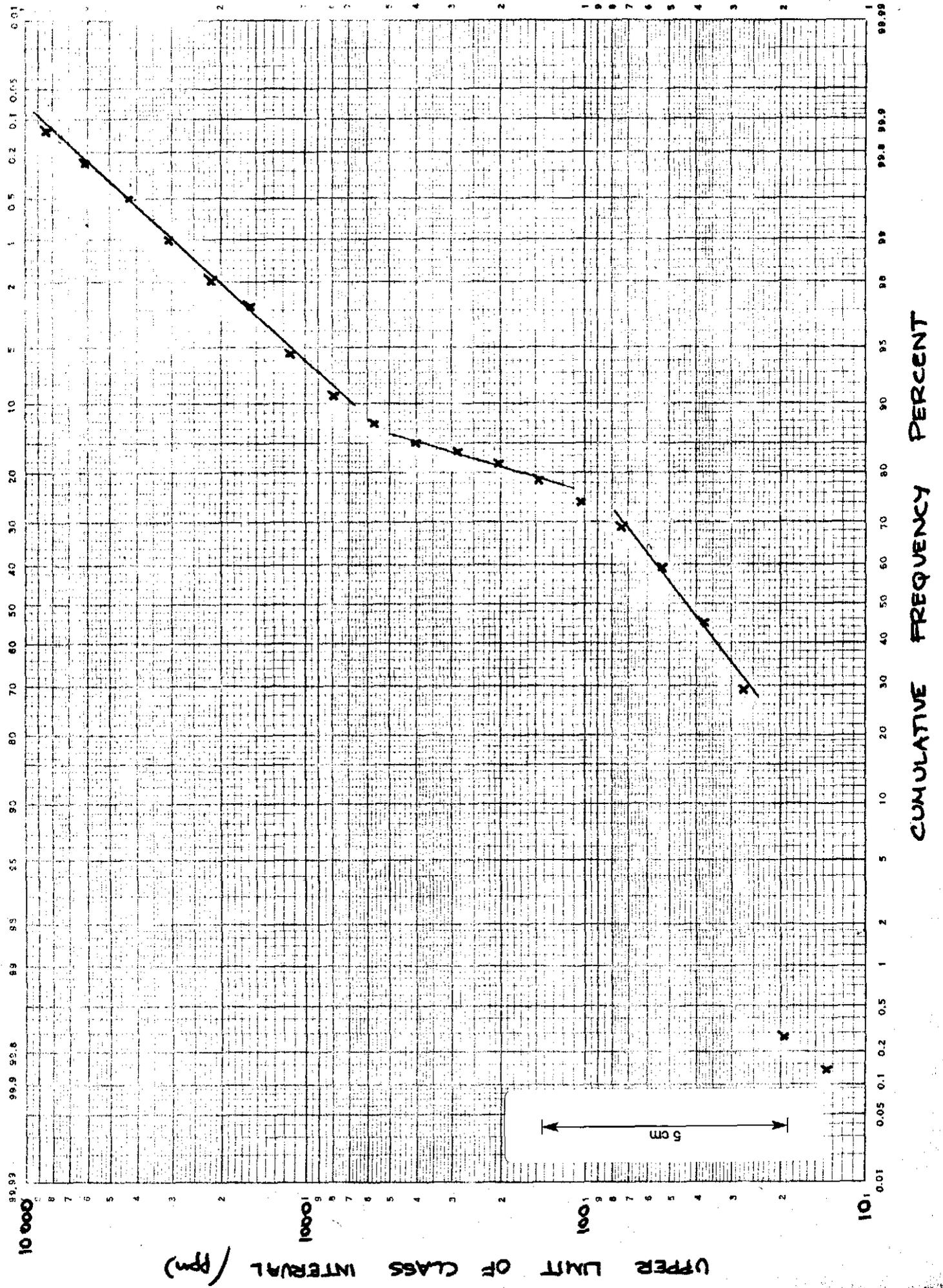
160113



113

# LOG PROBABILITY OF CUMULATIVE FREQUENCY FOR LEAD IN DACITE

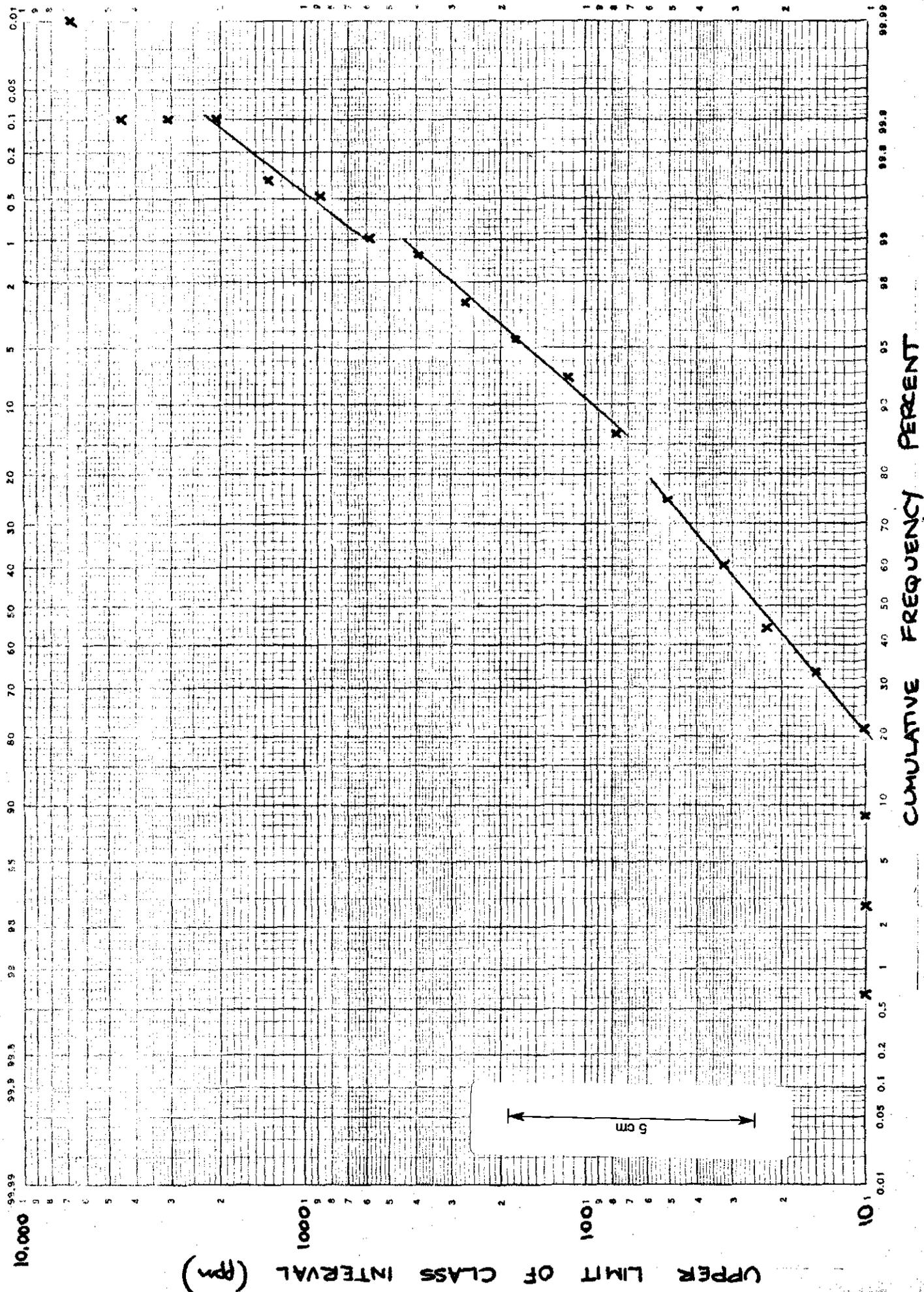
160114



11A

# LOG PROBABILITY OF CUMULATIVE FREQUENCY 160115

## FOR ZINC IN DACITE



NUMBER OF SAMPLES= 288  
 MAXIMUM VALUE= 1250  
 MINIMUM VALUE= 5  
 ARITHMETIC MEAN= 70  
 VARIANCE= 11378.71  
 STANDARD DEVIATION= 106.67  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 124  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 30.10  
 NUMBER OF SAMPLES NOT ANALYSED= 9  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.28

CLASS	INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM	TO				
(PPM)					
4.9-	6.5	5	1.74	5	1.74
6.5-	8.5	0	0.00	5	1.74
8.5-	11.2	6	2.08	11	3.82
11.2-	14.8	0	0.00	11	3.82
14.8-	19.6	14	4.86	25	8.68
19.6-	25.8	45	15.63	70	24.31
25.8-	34.1	28	9.72	98	34.03
34.1-	44.9	37	12.85	135	46.88
44.9-	59.3	51	17.71	186	64.58
59.3-	78.2	35	12.15	221	76.74
78.2-	103.1	32	11.11	253	87.85
103.1-	136.0	13	4.51	266	92.36
136.0-	179.5	6	2.08	272	94.44
179.5-	236.7	6	2.08	278	96.53
236.7-	312.3	1	0.35	279	96.88
312.3-	411.9	4	1.39	283	98.26
411.9-	543.4	1	0.35	284	98.61
543.4-	716.8	3	1.04	287	99.65
716.8-	945.5	0	0.00	287	99.65
945.5-	1247.3	0	0.00	287	99.65

HISTOGRAM

FROM	TO	
(PPM)		
4.9-	6.5	XXXXX
6.5-	8.5	
8.5-	11.2	XXXXXXXX
11.2-	14.8	
14.8-	19.6	XXXXXXXXXXXXXXXXXXXX
19.6-	25.8	XX
25.8-	34.1	XX
34.1-	44.9	XX
44.9-	59.3	XX
59.3-	78.2	XX
78.2-	103.1	XX
103.1-	136.0	XXXXXXXXXXXXXXXXXXXX
136.0-	179.5	XXXXXXX
179.5-	236.7	XXXXXXX
236.7-	312.3	X
312.3-	411.9	XXXX
411.9-	543.4	X
543.4-	716.8	XXX
716.8-	945.5	
945.5-	1247.3	

COPPER

160117

NUMBER OF SAMPLES= 202  
 MAXIMUM VALUE= 160  
 MINIMUM VALUE= 2  
 ARITHMETIC MEAN= 15  
 VARIANCE= 406.99  
 STANDARD DEVIATION= 20.17  
 NUMBER OF SAMPLES BELOW DETECTION LIMIT= 42  
 PERCENTAGE SAMPLES BELOW DETECTION LIMIT= 17.21  
 NUMBER OF SAMPLES NOT ANALYSED= 22  
 NUMBER OF SAMPLES ABOVE POP'N LIMIT= 0  
 LOGARITHMIC INTERVAL= 0.22

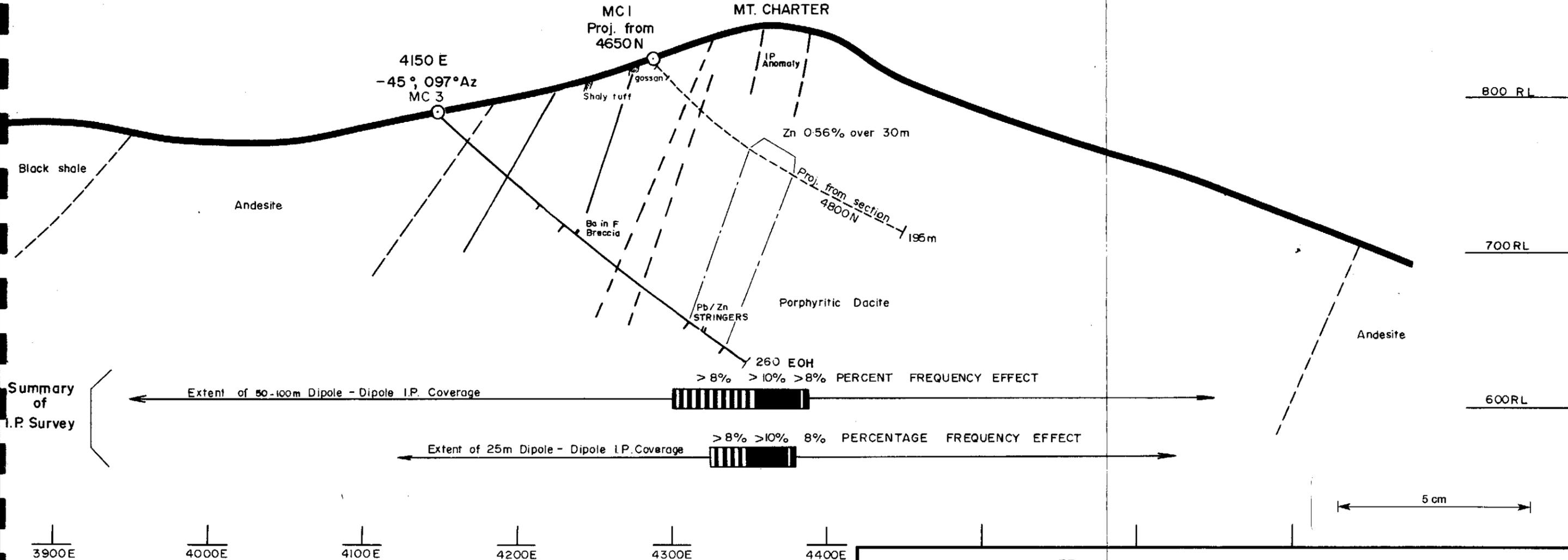
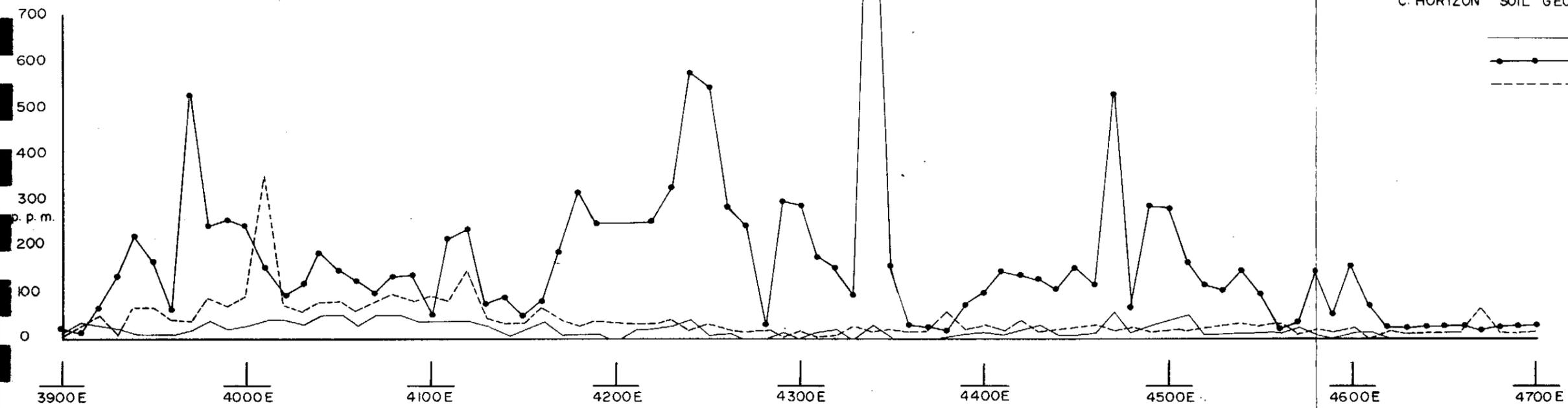
CLASS	INTERVAL	* FREQ	* FREQ%	* CU.FREQ	* CU.FREQ%
FROM	TO				
(PPM)					
2.0-	2.5	* 27	* 13.37	* 27	* 13.37
2.5-	3.1	* 15	* 7.43	* 42	* 20.79
3.1-	3.8	* 0	* 0.00	* 42	* 20.79
3.8-	4.8	* 5	* 2.48	* 47	* 23.27
4.8-	6.0	* 39	* 19.31	* 86	* 42.57
6.0-	7.5	* 2	* 0.99	* 88	* 43.56
7.5-	9.4	* 4	* 1.98	* 92	* 45.54
9.4-	11.7	* 34	* 16.83	* 126	* 62.38
11.7-	14.6	* 3	* 1.49	* 129	* 63.86
14.6-	18.3	* 19	* 9.41	* 148	* 73.27
18.3-	22.9	* 8	* 3.96	* 156	* 77.23
22.9-	28.6	* 19	* 9.41	* 175	* 86.63
28.6-	35.8	* 12	* 5.94	* 187	* 92.57
35.8-	44.7	* 2	* 0.99	* 189	* 93.56
44.7-	55.9	* 7	* 3.47	* 196	* 97.03
55.9-	69.9	* 2	* 0.99	* 198	* 98.02
69.9-	87.4	* 2	* 0.99	* 200	* 99.01
87.4-	109.3	* 0	* 0.00	* 200	* 99.01
109.3-	136.7	* 0	* 0.00	* 200	* 99.01
136.7-	170.9	* 2	* 0.99	* 202	* 100.00

HISTOGRAM

FROM	TO	
(PPM)		
2.0-	2.5	XX
2.5-	3.1	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
3.1-	3.8	
3.8-	4.8	XXXXXXX
4.8-	6.0	XX
6.0-	7.5	XXX
7.5-	9.4	XXXXXXX
9.4-	11.7	XX
11.7-	14.6	XXXXX
14.6-	18.3	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
18.3-	22.9	XXXXXXXXXXXXX
22.9-	28.6	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
28.6-	35.8	XXXXXXXXXXXXXXXXXXXXX
35.8-	44.7	XXX
44.7-	55.9	XXXXXXXXXXXXX
55.9-	69.9	XXX
69.9-	87.4	XXX
87.4-	109.3	
109.3-	136.7	
136.7-	170.9	XXX



— Cu  
 —●— Pb  
 - - - Zn



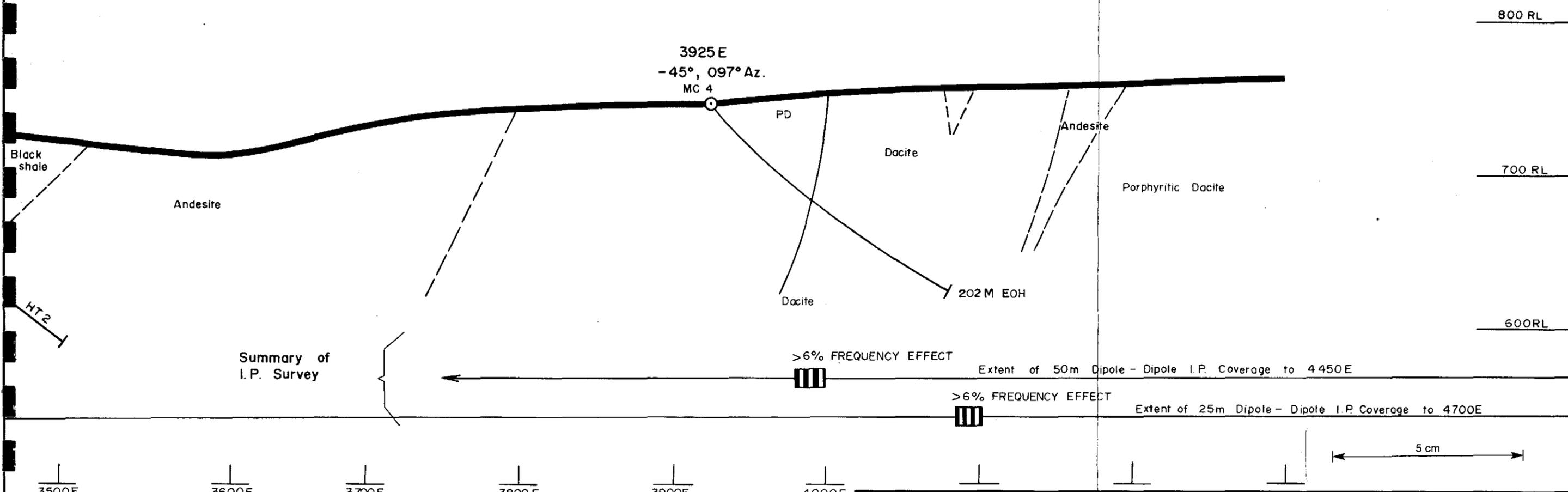
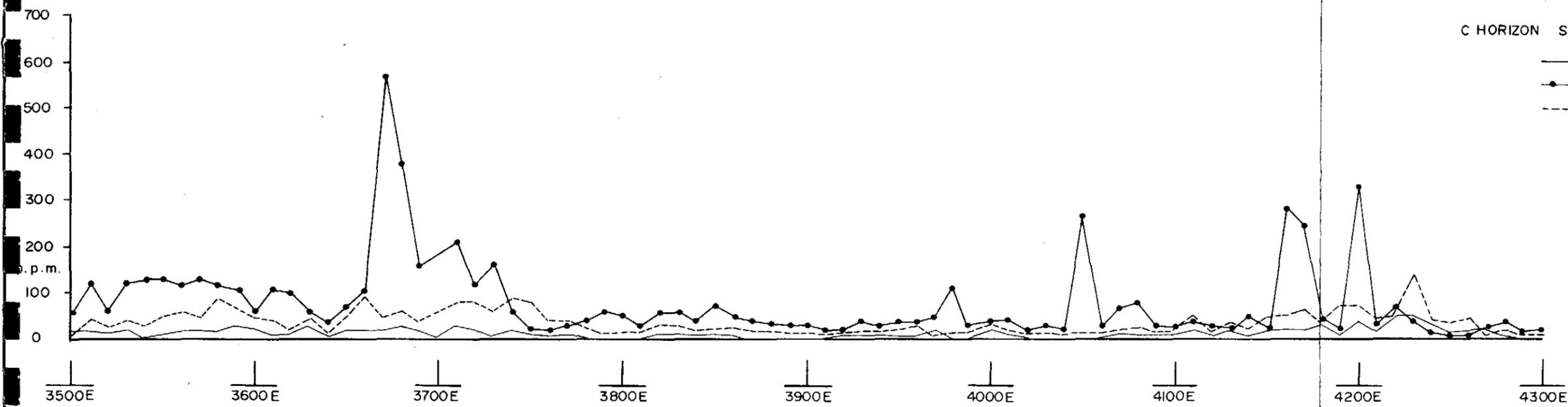
Summary of I.P. Survey

### Aberfoyle Exploration Pty Ltd

Geology: C.H.Y.  
 Drawn: C.H.Y.  
 Traced: R.J.E.  
 Checked:  
 Revised by: Date:

N.W. TASMANIA  
 HATFIELD EL. 15 / 73  
 Mt. Charter - Section 4700 N  
 DRILL HOLE MC 3

Location code:  
 Date: June, 1978  
 Scale: 1:2500  
 Plate No: Hat 27



Summary of I.P. Survey

**Aberfoyle Exploration Pty Ltd**

Geology: C.H.Y.  
 Drawn: C.H.Y.  
 Traced: R.J.E.  
 Checked:  
 Revised by:      Date:

N.W. TASMANIA  
 HATFIELD EL.15/73  
**Mt. Charter - Section 5200N**  
 DRILL HOLE MC 4

Location code:  
 Date: June, 1978  
 Scale: 1:2500  
 Plate No: Hat 28