Bergvesenet
Postboks 3021, 7002 Trondheim

Rapportarkivet

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Tittel

Till geochemistry investigations in the Pasvik area, 1974.

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Sør-Varanger	Finnmark	Finnmark	23331 24334	Kirkenes

Fagområde	Dokument type	Forekomster
Geokjemi	Rapport	Oksfjell Fagermo
Råstofftype	**Emneord**	
Malm/metall	Ni Cu Cr Co	

Sammendrag

Morenegeokjemisk prøvetaking i stikningsnettene (grid): Fagermo øst, Fagermo vest, Oksfjell øst og Oksfjell vest.

Log - propability plot og vurdering av ultramafiske indikasjoner.

Sammenfattningskart.

Denne har vi to eksemplarer av

FOR FALCONBRIDGE NIKKELVERK A/S

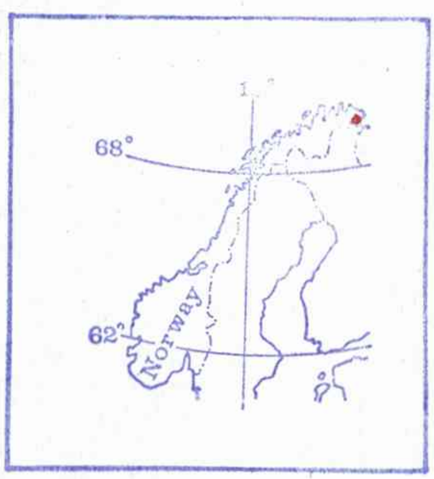
A/S SULFIDMALM

PROJECT 905-23

TILL GEOCHEMISTRY INVESTIGATIONS IN THE PASVIK AREA, 1974.

BY

R. B. BAND



Report Nr. 340/74/23

1. Introduction:

An orientation study carried out in 1973 (Report 299/73/23) indicated the feasability of till geochemistry as a method of locating buried serpentinite bodies within the Petsamo Formation. Subsequent geophysical surveys showed that while some known serpentinite bodies were strongly magnetic (e.g. the DDH 1 intersection) others, including the Fagermo serpentinite, the largest so far discovered in the Skogfoss Arch, have essentially no magnetic expression. The major till geochemistry programme undertaken in 1974 therefore had the following objectives:

a) to help filter the 1974 ground geophysical survey data, and particularly to aid identification of magnetic anomalies related to buried ultrabasic bodies;

b) to identify areas possibly underlain by non-magnetic ultrabasic bodies;

c) to aid in establishing a priority list of geophysical anomalies for drill testing in 1975.

2. Method:

Samples were collected at intervals of 100 m along pre-existing geophysical grid lines, giving a 100 m x 100 m sampling net. The samples were collected from an average depth of 70 cms, using a post-hole spade. At the majority of sample-sites the C-soil horizon was sampled. Where this was not possible, samplers were instucted to collect B-Horizon or organic material and record this on field data cards, in preference to leaving gaps in the sampling net. The four man sampling crew collected 2480 samples during the four week survey.

The samples were shipped to Falconbridge's lab. in Vancouver for analysis for Ni, Cu, Co, Zn (10% HNO_3 digestion) and Cr (50% HNO_3 digestion).

3. Results:

Data are plotted on figs. 1 to 4 for Ni, Cr, Cu and Co. On inspection Zn values were uniformly low and are not treated further here.

In interpreting the data log-probability plots were used to select critical levels for contouring (figs. 5-8)

The probability plots for both Ni and Cr show marked breaks in slope, indicating the presence of two distinct populations in the data. Following a method described by Sinclair (Journ. Geochem. Exploration May 1974, Vol 3, No. 2, p. 129-150), probability plots were used to estimate distribution parameters for the two sub-populations in the Ni and Cr data. These sub-populations are assumed to represent background distribution for (1) the sedimentary and the tuffaceous material of the "ore phyllite" unit and (II) the "basic - ultrabasic" intrusive association. The estimated percentage of the "basic - ultrabasic" population present in the total sample population is respectively 15% and 17% based on the Ni and Cr data plots. This incidentally agrees very closely with Govbonov's figure for the percentage of the total area of the "ore phyllite" unit occupied by "nickeliferous basic and ultrabasic intrusives" in the Russian portion of the Petsaamo formation.

The following contour intervals were selected for the Ni and Cr maps:

a) Ni

40 ppm:	includes 80% of all "basic-ultrabasic" derived samples, but will also include ca. 15% of the lower, non target "tuff-sediment" background population.
65 ppm:	should include only "basic-ultrabasic" derived samples (98% certainty) but will exclude 45% of this upper population.
150 ppm:	outlines upper 15% of "basic - ultrabasic" derived samples
300 ppm:	"anomalous" upper 2% of "basic-ultrabasic" derived samples. These could be related to Ni - mineralization

b) Cr

45 ppm:	includes 90% of all "basic - ultrabasic" derived samples, but will also include 40% of the "non-target" lower population
60 ppm:	includes 80% of all "basic - ultrabasic" derived samples, but will also include 18% of the "non-target" population.
100 ppm:	should include only "basic - ultrabasic" derived samples (98% certainty), but will exclude 40% of this upper population.
250 ppm:	outlines upper 20% of the "basic - ultrabasic" population

Cu and Co probability plots reveal single log-normal populations, with no significant break in slope, indicating that the two major rock types (i.e. "tuff-sediments" and "basic - ultrabasic intrusives") cannot be differentiated on the basis of Cu or Co values in the till. This probably reflects high Cu and Co contents in the sulphide-bearing graphitic schists and phyllites present in the tuff-sediment unit. The following contour intervals were used for Cu and Co:

	Cu	Co
High background (80%)	90 ppm	-
Possibly anomalous (90%)	120 ppm	30 ppm
Probably anomalous (95%)	150 ppm	35 ppm
Anomalous (98%)	200 ppm	45 ppm
Highly anomalous	>500 ppm	60 ppm

4. Interpretation:

Fig. 9 presents an interpretive summary of the Ni, Cr, Cu and Co data, reduced to "ultrabasic indications" and possible "indications of mineralization".

a) Ultrabasic indications:

According to the statistical interpretation, proximity to a "basic - ultrabasic" source is indicated with a high degree of certainty (98% probability) by till contents of >65 ppm Ni and/or >100 ppm Cr. There are therefore two classes of geochemically indicated "basic - ultrabasic" targets, i.e.

Class I: indicated by both the Ni and Cr criteria

Class II: indicated by either the Ni or Cr criterion

The existence of class II indications reflects the different dispersion mechanisms active in the formation of till anomalies for Cr (dominantly glaciogenic - mechanical) and Ni (glaciogenic - mechanical modified and supplemented by groundwater saline dispersion).

This classification procedure excludes a significant proportion of the lower range of the "basic - ultrabasic - source" populations for both Ni (45% excluded) and Cr (40% excluded).

(See section 3a, 3b and figs 5 and 6). The majority of these lower-range samples will represent the diluted, distal portions of strong anomalous dispersion patterns. There is a clear risk however that under unfavourable conditions, such as deeper than normal overburden, a weak till anomaly may be the only geochemical indication of a buried "basic - ultrabasic" bedrock - source. Such a source would not be identified on the summary map fig.9.

Gorbonov states that in the Petsaamo formation the "nickeliferous basic - ultrabasic" intrusives occur in rows alignedparallel to the strike of the enclosing "ore-phyllite" unit. He notes that there are up to six such rows and that the main producing ore bodies occur where the number of rows of basic - ultrabasic intrusions is high.

The Ni and Cr maps (figs. 1 and 2) suggest a crude stratigraphically controlled zoning. This is lost to some extent on the summary map, but individual "geochemically indicated basic - ultrabasic bodies" do appear to occur in distinct zones, parallel to the general form of the Skogfoss Arch. Exceptions to this occur on the Fagermo East (1000E-2500E) and Oksfjell East (1000E-1500E) grids.

These much larger indications may well represent coalesced anomalies derived from several ultrabasic bodies arranged in closely spaced rows.

b) Indications of mineralization:

Gorbonov states that the average Ni:Cu:Co ratio of the Petsaamo ores is 42:22:1. Cu is thus the main geochemical indicator for mineralization, followed by Ni with Co being much less significant.

Due to the differing mobilities of Cu, Ni and Cr in the superque environment, and the modifying effects of groundwater dispersion on pre-existing glaciogenic anomalies, markedly different final patterns can be expected for Cu, Ni and Cr anomalies derived from the same mineralised ultrabasic source. Any known or geochemically indicated ultrabasic body with even a loosely associated till-Cu anomaly is therefore a prime exploration target (fig.9.).

Highly anomalous Ni values may also be indicative of mineralization, but their evaluation is not so clear-cut as in the case of copper.

Locations of the main geochemically indicated mineralization targets are listed in table 1 below.

Table 1.

a) FAGERMO EAST GRID:

1. The entire grid north of 200S is a prime geochemically indicated target. It is the highest priority target in the Skogfoss Arch.

2. 800E/500S

b) FAGERMO WEST GRID:

1. 0-900S/200S-600N: Continuation of the east Fagermo target.

2. 1300W-2600W/600N-1200N

3. 3500W-4000W/600N-1000N

c) <u>OKSFJELL EAST GRID</u>:

1. 4500E/500N
2. 3400E-4000E/300N
3. 1900E-2200E/500N-800N: PRIME Target, possibly related to faulted section of DDH 1 serpentinite
4. 2000E/1000N
5. 1000E-1700E/400S-200N: PRIME Target
6. 500E/300N
7. 100E/1000N

d) <u>OKSFJELL WEST</u>:

1. 0/300N
2. 500W/600N
3. 1200-1600W/300-800N
4. 2800W/200S
5. 1200W-1600W/1700S

The geochemical indications in themselves cannot be regarded as drill targets. In selecting targets for drilling emphasis must be placed on the available geophysical and geological information.

5. <u>Summary conclusions</u>.

a) The geochemical data has been reduced to outline areas potentially underlain by basic-ultrabasic bedrock (fig.9).

b) Potentially mineralised locations have been identified from the geochemical data (fig. 9 and table 1).

c) Further evaluation of the geochemical results and the selection of drill targets must incorporate the available geophysical and geological information.

Encl.

Fig.	1	Oksfjell	and	Fagermo	grids	-	Ni
	2	"	"	"	"	-	Cr
	3	"	"	"	"	-	Cu
	4	"	"	"	"	-	Co
	5	Log	probability	plot		-	Ni
	6	"	"	"		-	Cr
	7	"	"	"		-	Cu
	8	"	"	"		-	Co
	9	Interpretive summary map					

Fig 6: Log probability plot, Ni

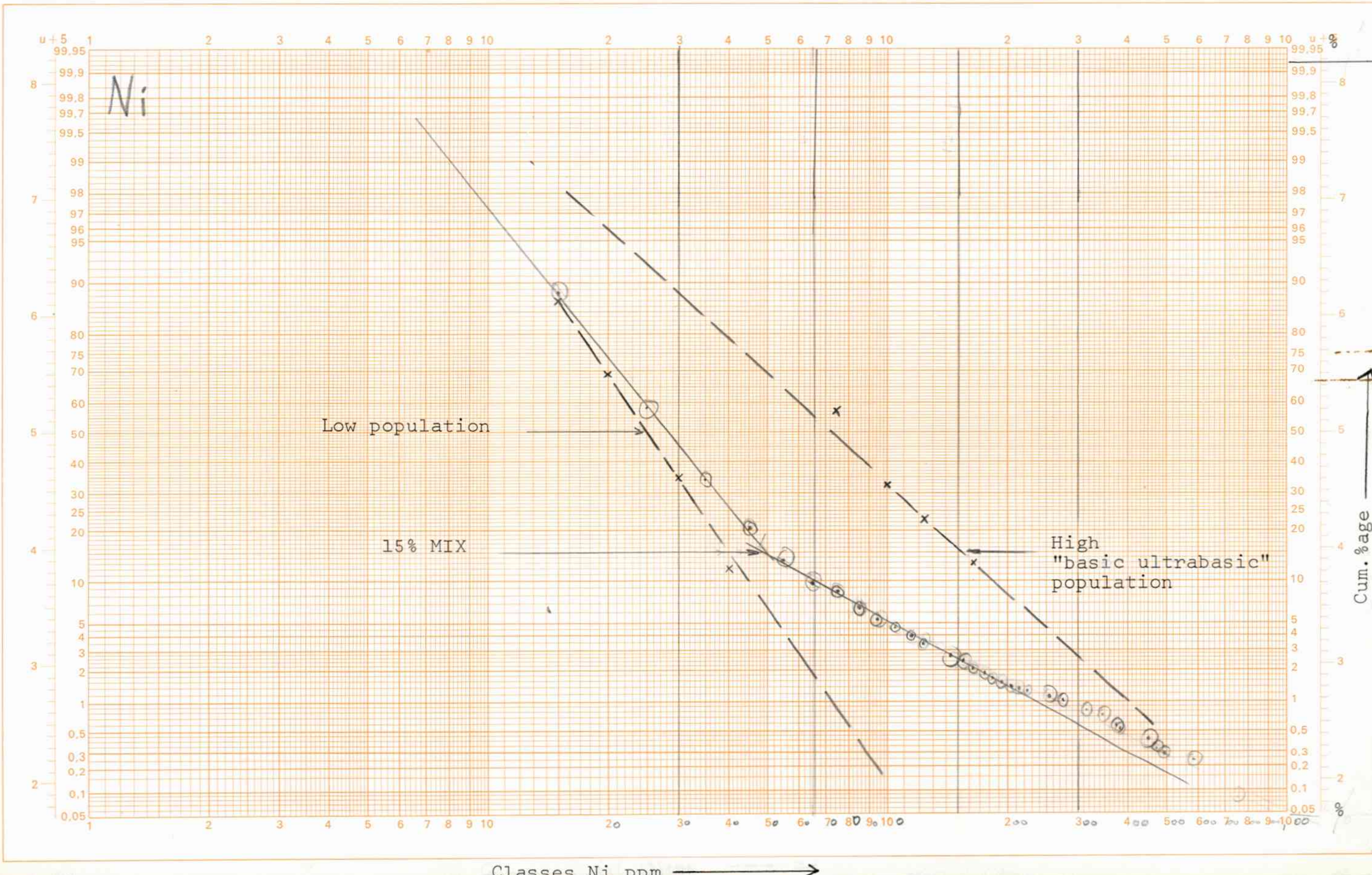


Fig. 7: Log probability Plot Cr

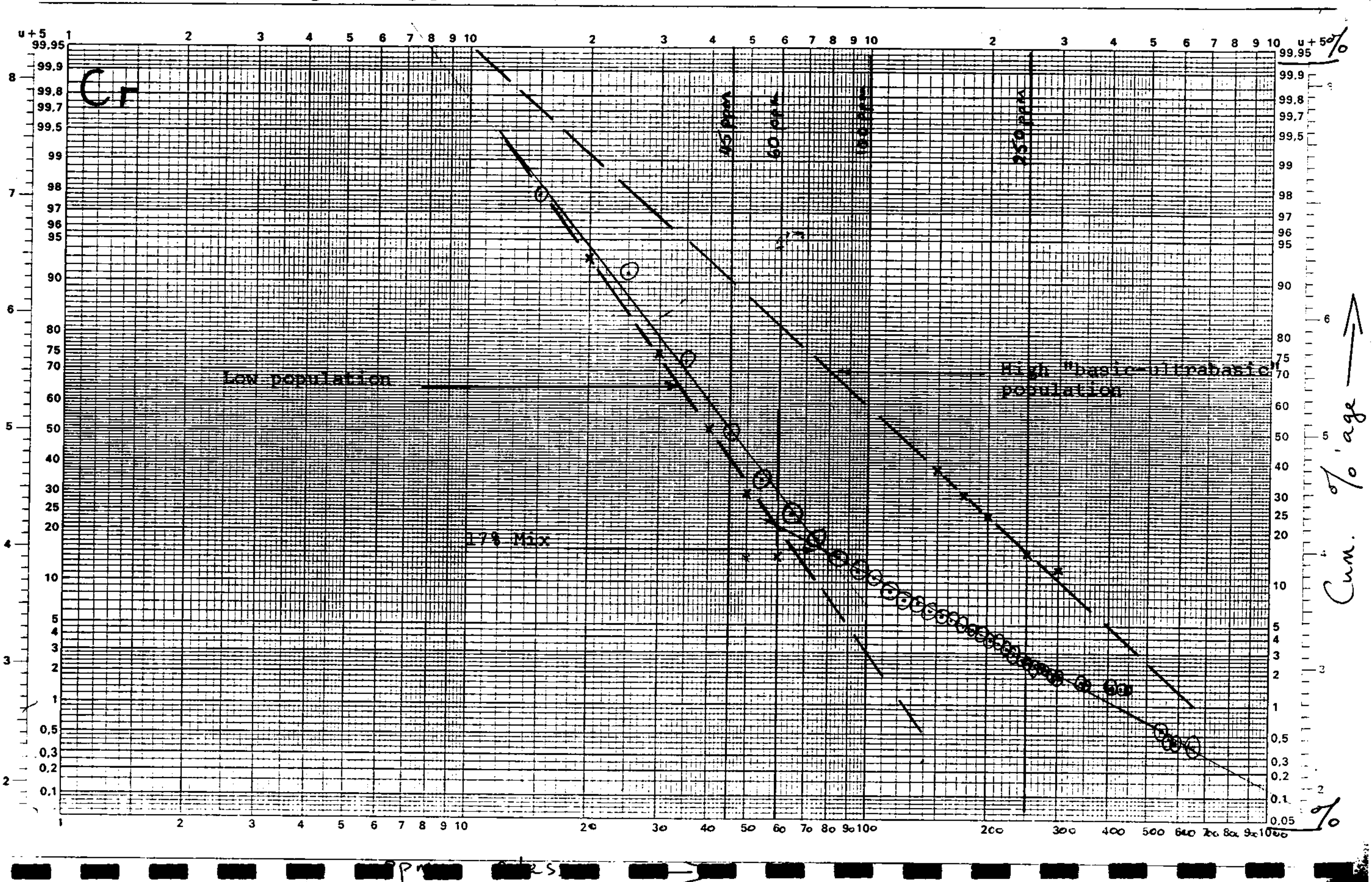


Fig. 8: Log probability plot Cu

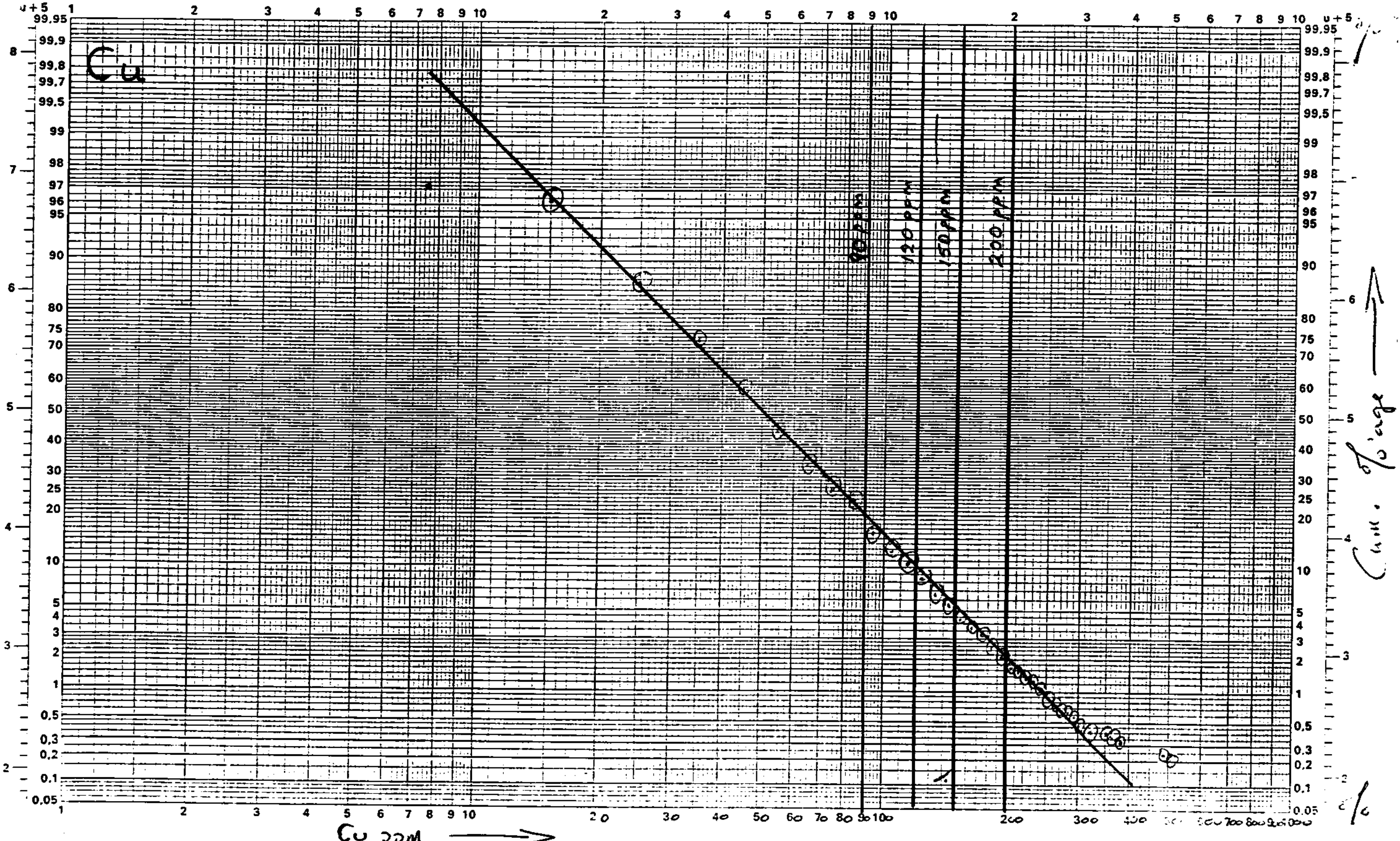


Fig. 9: Log probability plot Co

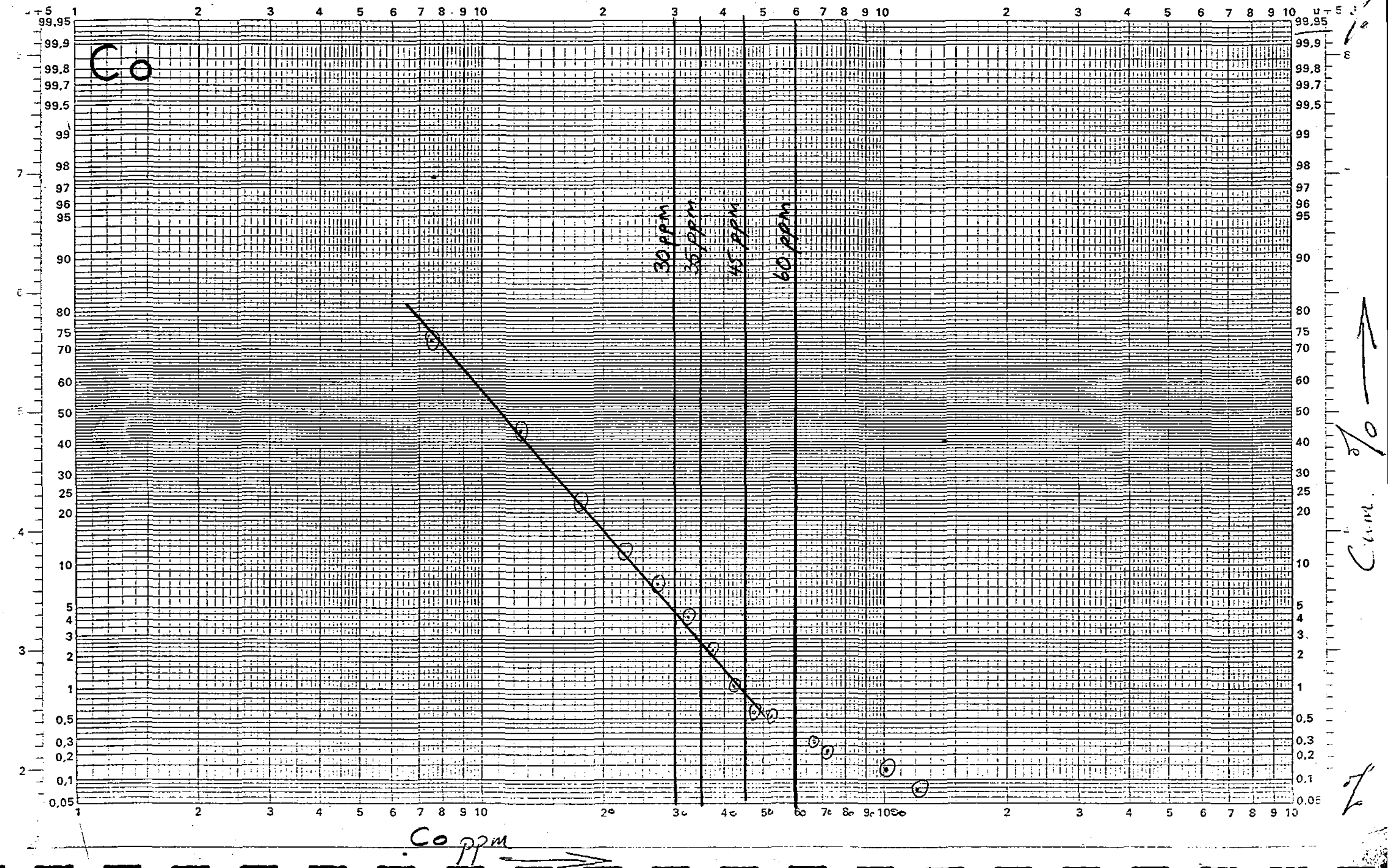
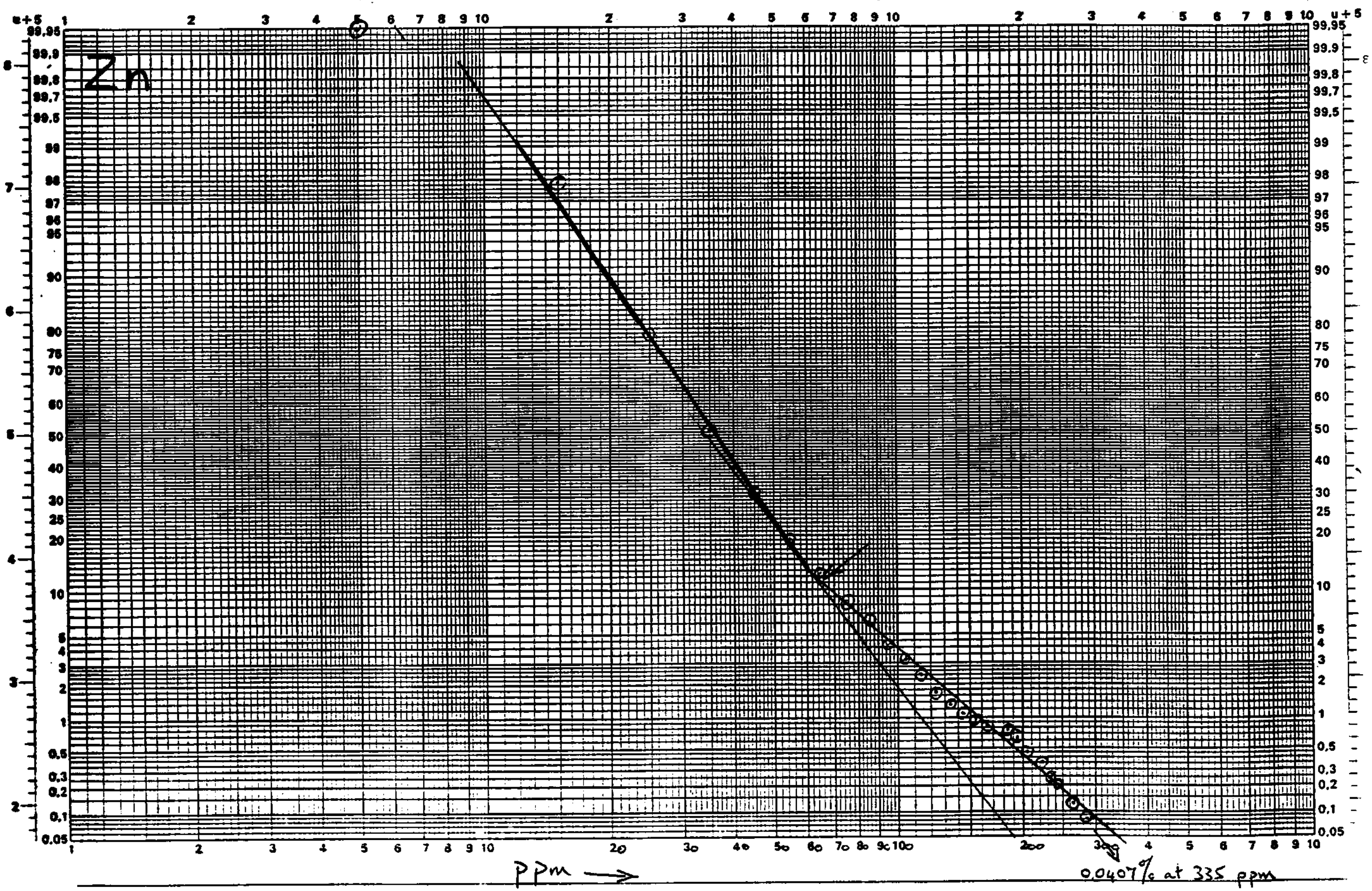


Fig. 10: Log probability plot Zn




0
500
1000
1500
PASVIK: OKSFJELL & FAGERMO
grids
fig 1.
TILL GEOCHEMISTRY - NI
A/S SULFIDMALM
BL 8-74
MS 1-75
BL

0 500 1000 1500

PASVIK: OKSFJELL & FAGERMO grids fig. 2	SCALE	OBS. BL	8-74
		DRAW "	"
		TRAC MS	1-75
TILL GEOCHEMISTRY – CR	a 1:10500	CHK BL	"
% SULFIDMALM	MAP NO.		
	MAP		

MN
0
PASVIK: OKSFJELL & FAGERMO
grids
fig 3
TILL GEOCHEMISTRY - CU
SULFIDMALM
8-74
MS
1-75


MN
ice direction
0
500
1000
1500
PASVIK OKSFJELL & FAGERMO
grids
fig 4
TILL GEOCHEMISTRY - CO
A/S SULFIDMALM
SCALE
ca 1:10500
OBS. BL 8-74
DRAW. " "
TRAC. MS 1-75
CHK. BL "
MAP NO.