R-M DOCUMENTS
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THE GENERAL ASBESTOS AND RUBBER DIVISION

of

RAYBESTOS-MANHATTAN, INC.

North Charleston, S.C. 1934

* * *

The dust survey included in this report is supplementary to the survey made in January, 1930 and was conducted to determine the extent of dust removal accomplished by the installation of new exhaust equipment and redesign of old exhaust equipment.

The number of buildings, the processes and arrangement of machinery are the same as at the time of the previous survey.

The exhaust systems of the cards have been redesigned to cover the machines more completely. In an experimental case one card was covered as completely as possible. This machine was enclosed in muslin and an air sample was taken inside the enclosure and two general air samples were taken in the card room proper at the same time. The first set of samples was taken before the conveyors from the preparation room began to bring the fibre to the bins in the card room. A second set of air samples was taken after the conveyors had been carrying fibre to the bins for more than an hour.

An exhaust system and revolving brush are in use for the inspection of woven cloth in the weave room. This work was formerly done by hand brushing. The loose fibre is brushed from the cloth in order that any flaws could be noticed and removed.

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PREPARATION ROOM

Sample No.	Station	Date	Cu. Ft. Air Sampled	Millions of Particles per cu. ft. air sampled	Millions of Particles less than 10 microns per cu.ft. air sampled	Type of Dust	Remarks
1	At chaser #1 near open doors	7/9/34	32.6	1.9	1.8	Asbestos	One man working at two chasers African C & G
2	At chaser #4	"	26.7	8.2	7.9	"	Man uses hands to put asbestos from bag into chaser and from chaser into truck
3	At end of fibre shaker screen	"	48.9	2.6	2.5	"	Separating long fibre from short fibre
4	At feeding end of Garnet machine	"	34.2	1.2	1.1	"	Waste yarn put onto conveyor by one man
5	At fly shaker	7/10/34	29.1	1.5	1.4	"	One man
6	At vertical fibre opener	"	27.2	0.87	0.83	"	Hopper end, one man.
7	Floor mixing of cotton and asbestos	"	39.5	7.8	7.6	Asbestos and cotton	Two men mixing; one forking mixture into picker #2
8	At shaker screen, loading hand trucks with asbestos from opener	"	31.3	8.1	7.7	Asbestos	One man; asbestos drops off end of shaker screen into truck.
9	At feeder end of cotton fibre opener	"	30.1	1.3	1.3	Cotton	One man
10	At conveyor end of picker #2	"	25.9	1.9	1.8	Cotton and asbestos	Material drops from one belt to another, oil mixed in

The average dust count of the Preparation Room is 3.5 million particles, which is identical with the average found in January, 1930.

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CARD ROOM

Sample No.	Station	Date	Cu. Ft. Air Sampled	Millions of Particles per cu. ft. air sampled	Millions of Particles less than 10 microns per cu. ft. air sampled	Type of Dust	Remarks
27	Card room - center aisle between cards #2 and 21	7/11/34	30.7	5.5	5.2	Asbestos	No humidifers
+ 28	General air - card room center aisle, west of bins	"	48.4	15.9	15.2	"	Between cards #10 and #29; belt broken on fan
+ 29	General air - card room, center aisle, east of bins	"	28.8	13.2	12.6	"	Between cards #35 and #16; belt broken on fan
30	General air - wick, rope and twisted card room	"	31.6	2.7	2.6	"	
37	General air - west of bins - card room; conveyors from preparation room not running	7/12/34	35.7	1.8	1.7	"	Same time as #38 and #39.
38	Inside muslin enclosure, one card	"	28.2	1.5	1.4	" Card #37	Windows closed; same time as #37 and #39, one man
39	General air - east of bins - card room	"	32.6	2.8	2.7	"	Same time as #37 and #38
40	General air - west of bins, card room; conveyors from preparation room running	"	30.6	4.5	4.3	"	Same time as #41 and #42
× 41	Inside enclosure - conveyors from preparation room running	"	28.2	5.0	4.6	" Card #37	One man, same time as #40 and #42
42	General air - west of bins, card room	"	30.4	4.1	3.9	"	Same time as #40 and #41

General air samples - average 3.5 on samples 27, 30, 37, 39, 40 and 42. The average for the survey of January 1930 was 2.6 million particles per cubic foot.

× Not included in the average

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SPINNING DEPARTMENT

Sample No.	Station	Date	Cu. Ft. Air Sampled	Millions of Particles per cu. ft. air sampled	Millions of Particles less than 10 microns per cu. ft. air sampled	Type of Dust	Remarks
13	Bldg. #5, general air, braiders	7/10/34	29.4	1.1	1.0	Asbestos and graphite	Two men making stock for ring presses; graphite and fish oil
14	General air, ring frame spinning	"	32.3	0.99	0.94	Asbestos	Two women - 4 men
15	General air - twisters	"	30.0	2.3	2.2	"	Twisting yarn and brass
16	General air - spoolers	"	27.9	0.93	0.89	"	Four women, spooling yarn from ring frames near windows on north side
17	General air - spoolers	"	30.6	8.1	7.7	"	Ten women, spooling yarn from mule spinners at partition wall
18	General air - mule spinning	"	30.3	2.5	2.4	"	In aisle between #3 and #4 - #9 and #10 - mules
19	General air - mule spinning	"	30.4	1.3	1.3	"	In aisle between #9 and #10 - #15 and #16 - mules
11	General air Bldg. #5 braiders	"	33.5	1.6	1.6	"	Two women - two men
12	Bldg. #5 between two ring presses	"	23.4	2.1	2.0	Asbestos and graphite	Two men forming small-sized packing

Average general air samples #14 to 19 inclusive, spinning - 2.68 million particles per cubic foot air, which is higher than average of .6 million found in survey of January 1930. This is accounted for by fact that at time of previous survey more mule spinning and less frame spinning was done, i.e., ring frame spinning and twisting may be greater dust producers than mule spinning. The possibility of dust from the collectors on top of the machine shop and adjacent to this department being blown into the mule spinning should not be overlooked.

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WEAVE ROOM

Sample No.	Station	Date	Cu. Ft. Air Sampled	Millions of Particles per cu. ft. air sampled	Millions of Particles less than 10 microns per cu. ft. air sampled	Type of Dust	Remarks
22	General air - west end of weave room	7/10/34	32.6	6.3	6.1	Asbestos	
24	Same as #22	7/11/34	35.7	0.6	0.5	"	
25	At inspection table woven cloth	"	27.3	2.6	2.5	"	Revolving brush - exhaust hood - two men
26	General air - east end of weave room	"	27.9	5.5	5.3	"	
31	Inspection table enclosed in beaver board two men - sample taken inside enclosure	"	20.2	3.2	3.0	"	Taken with revolving brush and exhaust running, Manhattan cloth G615 and 160
32	Taken just outside enclosure	"	19.0	9.5	9.3	"	Same time as #31
33	Taken inside enclosure	"	20.2	23.2	21.9	"	Revolving brush - no exhaust two men
34	Taken outside enclosure	"	18.8	1.5	1.5	"	Same time as #33
35	Taken inside enclosure	"	20.2	1.5	1.4	"	Hand brushing - three men
36	Taken outside enclosure	"	19.0	2.1	2.0	"	Same time as #35
43	General air - west end of weave room	7/13/34	18.8	9.3	9.2	"	Before work started in morning, shut down from midnight
44	General air - east end of weave room	"	18.6	6.0	5.9	"	" " "

The dust counts of samples #43 and 44 were taken before work started in the morning. These counts are considerably higher than samples taken during operating periods. This may be due to closing of windows, shutting off of humidifiers and floor sweeping.

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WEAVE ROOM (Continued)

Sample No.	Station	Date	Cu. Ft. Air Sampled	Millions of Particles per cu. ft. air sampled	Millions of Particles less than 10 microns per cu. ft. air sampled	Type of Dust	Remarks
45	General air – east end of weave room	7/13/34	27.0	2.6	2.6	Asbestos	Same time as #46 and 47; weave room started at 7 o'clock
46	General air – west end of weave room	"	27.9	2.7	2.7	"	Same time as #45 and 47
47	At inspection table for woven cloth, dry woven cloth 10P225	"	30.3	0.8	0.8	"	Revolving brush and exhaust; two men, same time as #45 and 46
48	Same location as #45	"	27.0	3.0	2.9	"	Same time as #49 and 50
49	Same location as #46	"	27.9	5.1	5.0	"	Same time as #48 and 50
50	Inspection table – hand brushing	"	30.3	0.8	0.8	"	Three men – at same time as #48 and 49
51	Same location as #45	"	18.9	4.9	4.8	"	At same time as #52 and 53
52	Same location as #46	"	20.5	0.9	0.9	"	Same time as #51 and 53
53	Table inspection woven cloth, revolving brush, no exhaust	"	21.2	1.8	1.7	"	Same time as #51 and 52; two men

General air samples, #22, 24 and 26, 45, 46, 48, 49, 51 and 52, averaged

3.5 million particles per cubic foor air, as compared with .6 found in survey of January 1930.

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PACKING DEPARTMENT

Sample No.	Station	Date	Cu. Ft. Air Sampled	Millions of Particles per cu. ft. air sampled	Millions of Particles less than 10 microns per cu. ft. air sampled	Type of Dust	Remarks
20	General air - molded packing department	7/10/34	62.3	0.45	0.43	Asbestos	
23	General air - rubber compounding room	"	28.2	1.4	1.3	Clay lead talc sulphur	

LEAD ANALYSES

Sample No.	Station	Date	Cu. Ft. Air Sampled	Milligrams of lead per cu. ft. air sampled	Type of dust	Remarks
21	Between two rubber compounding mills	7/10/34	33.8	Negative for lead	Clay lead talc sulphur	Exhaust hoods with cloth curtains
23	General air - rubber compounding room	"	28.2	Negative for lead	"	

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CLOTH INSPECTION (HEAVY ROOM)

Table showing the results of special tests run at the cloth inspection table

	Millions of Dust Particles per cu. ft. air sampled	
	Inside enclosure (doors closed)	Normal conditions enclosure removed
Average general air - room room during tests	3.5	3.8
Cloth inspection table - exhaust and revolving brush	3.2	0.8
Cloth inspection table - no exhaust but with revolving brush	23.2	1.6
Cloth inspection table - hand brushing, no exhaust	1.5	0.8

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It was noted that only slight changes had been made in the preparation room since the survey in 1930. The method of oiling and conveying the fibre remains the same. As noted, the average dust count remained constant.

Extensive changes and increased methods of dust entrapping and removal in the card room were noted. The method of conveying the fibre from the preparation to the card room is the same and the fibre is carted from the storage bins to the feed hoppers on the cards in the same manner.

Natural ventilation is supplied by open windows which occupy approximately two thirds of the total wall space.

Samples No. 37 and 39 were taken before the fibre conveyors from the preparation room were running, while samples No. 40 and 42 were taken after the conveyors were put into operation. The increased count is evidently due to dust generated by the fibre conveyors and leakage from the storage bins in the card room.

In the test on the enclosed card, samples 37, 38, and 39 were taken before the fibre conveyors were operating and samples No. 40, 41 and 42 were taken after the conveyors were running. The muslin enclosure is not effective in keeping out the fine dust, as evidenced by the comparison of counts on samples taken simultaneously inside and outside the enclosure. The increased counts after the conveyor was operating should be noted.

The natural ventilation in the weave room is augmented by a forced air supply through the fan and distributing ducts used for heating in the winter months. The chance of dust pollution from this outside air supply is remote, as the dust collectors are located at a distance east of the weave room. Experimental work is in progress on entrapping and exhausting dust generated by the looms.

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Attention is called to the tests run on the cloth inspection table, with the mechanically operated brush, which show that the exhaust system is effective in keeping the dust concentration down to the same count as under the system of hand brushing without exhaust.

The lead pollution at the rubber compounding operations of the packing department has been corrected, as shown by the absence of lead in the air samples taken.

CONCLUSIONS AND RECOMMENDATIONS

An exhaust system is under construction in the card room and experimental work is in progress for entrapping and exhausting dust generated by the looms in the weave room, and until this work is completed and checks run on the efficiency of the exhaust system, no other recommendations can be made.

Tests conducted in the card room show that there is an increase in the general air dust content when the fibre conveyors are in operation. This is due to leakage of dust from the fibre storage bins in the card room and efforts should be made to seal this leakage.

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An air sample was taken at the table and two general air samples were taken in the weave room at the same time - one set was taken with both the revolving brush and exhaust fan running and one set with the revolving brush operating but without the exhaust fan. One set was taken with the workmen brushing the cloth by hand, the method used before the exhaust system and revolving brush were installed.

The inspection table was enclosed with beaver board and a series of samples was taken both inside the enclosure and outside.

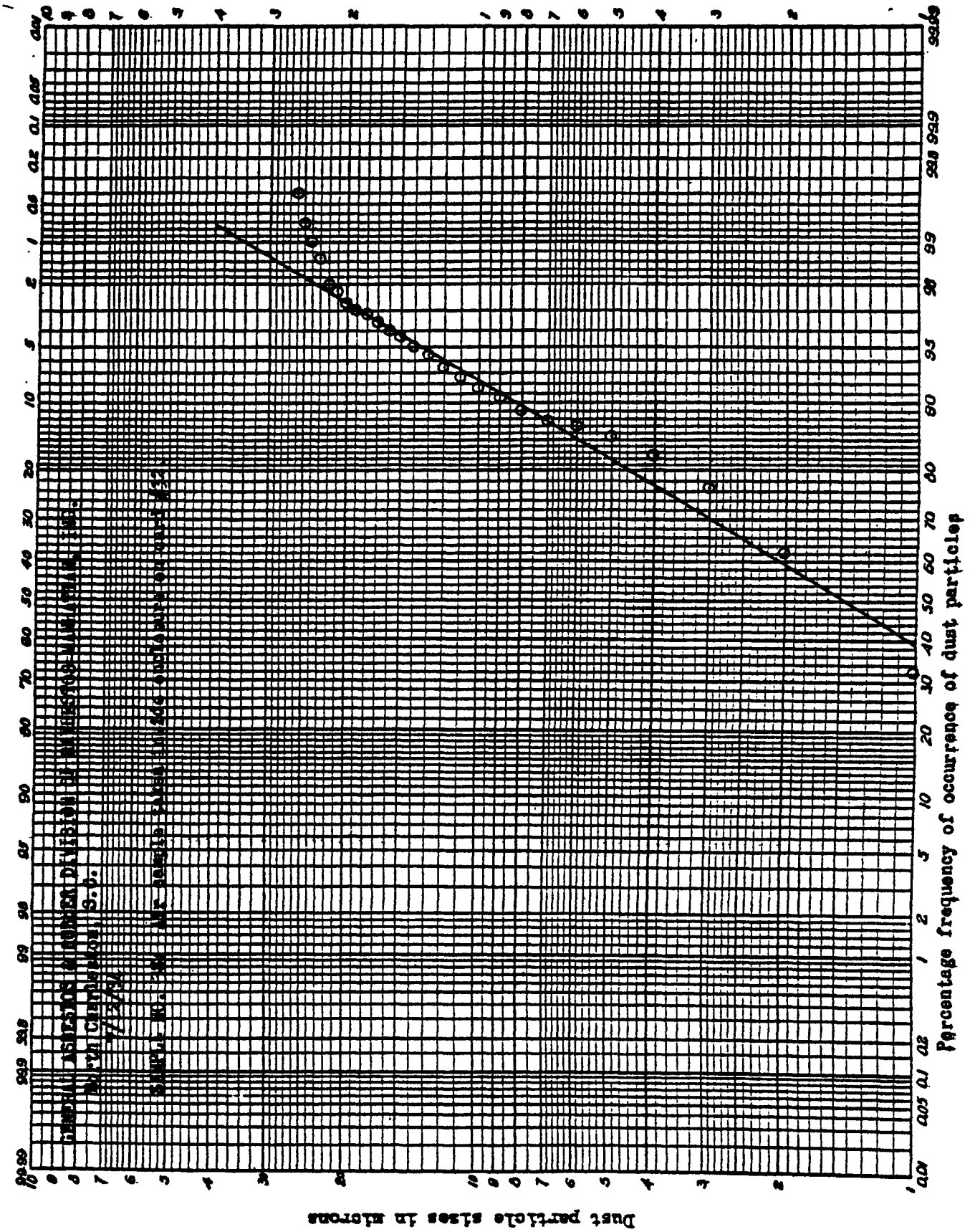
The following tables indicate the analysis of air samples taken at representative points in the different departments. Attention is called to the fact that the previous survey was made in January and this survey in July.

Particle size measurements were made of the dust by a direct projection method. The results are tabulated and appear in the graphs attached at the rear of the report. It will be noted that from 92 to 98.5% of the particles are less than 10 microns in greatest diameter.

A detailed discussion of the disease asbestosis and a correlation of the X-ray findings are reserved for the general report.

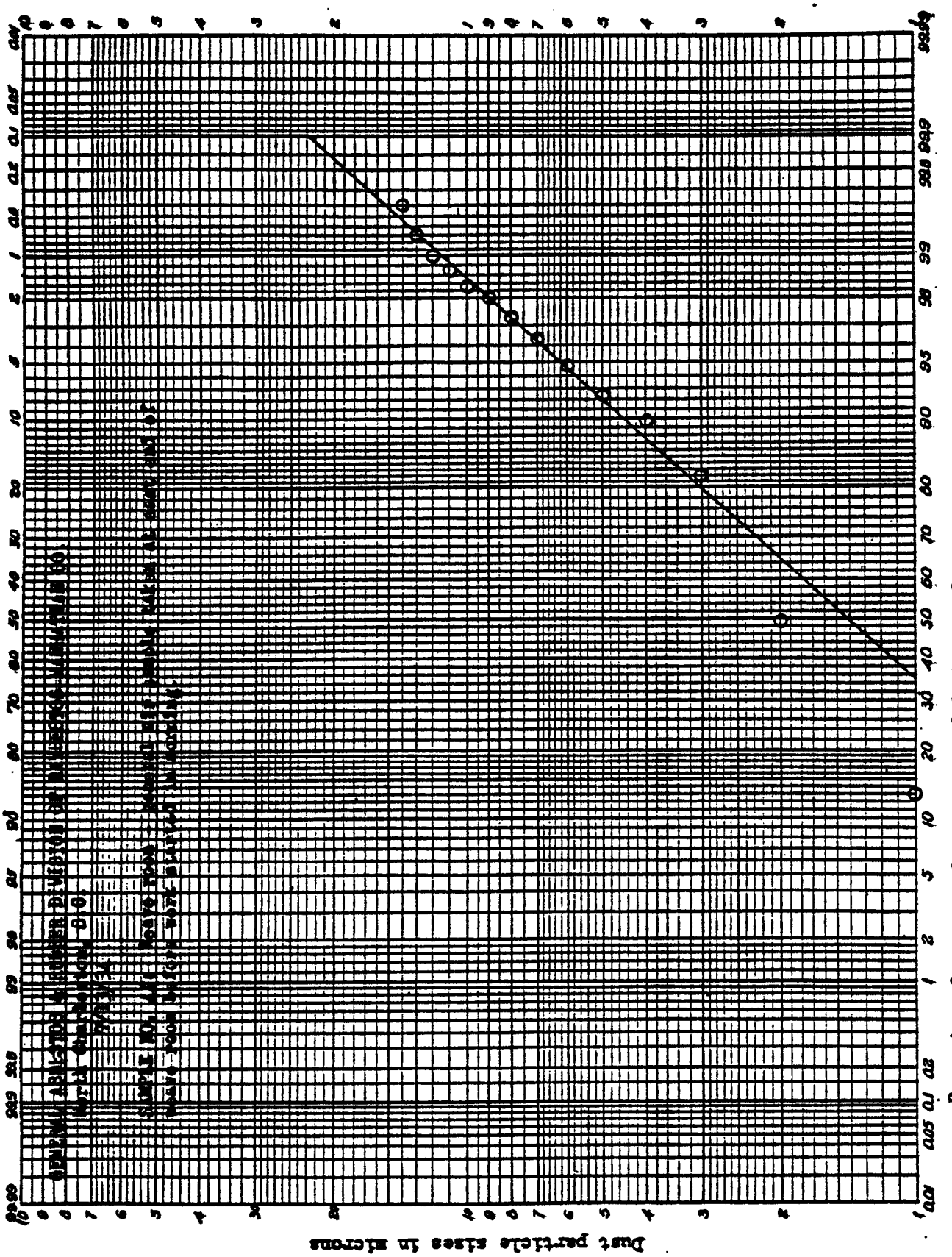
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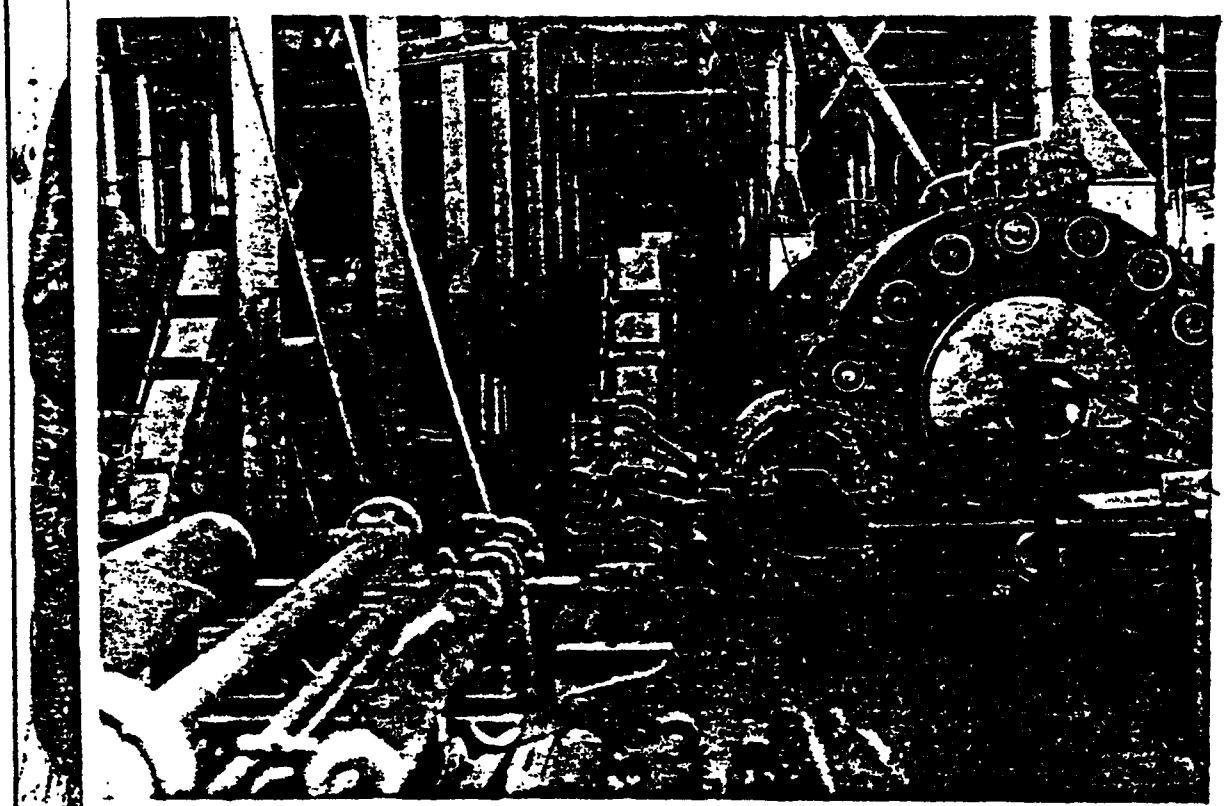


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Card Room.

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SAMPLES NO. 25, 47, 50 and 53

At inspection table - woven cloth

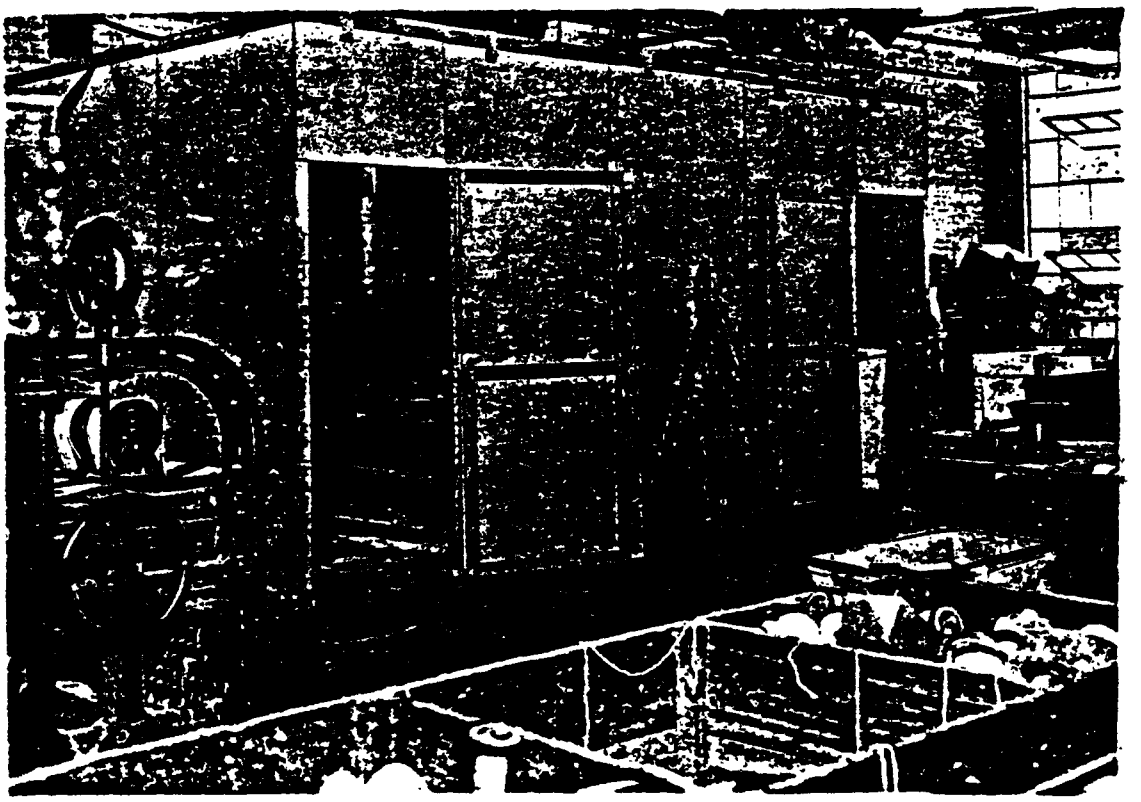
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SAMPLES NO. 31, 32, 33, 34, 35 and 36

Enclosure built around table inspection of woven cloth in weave room

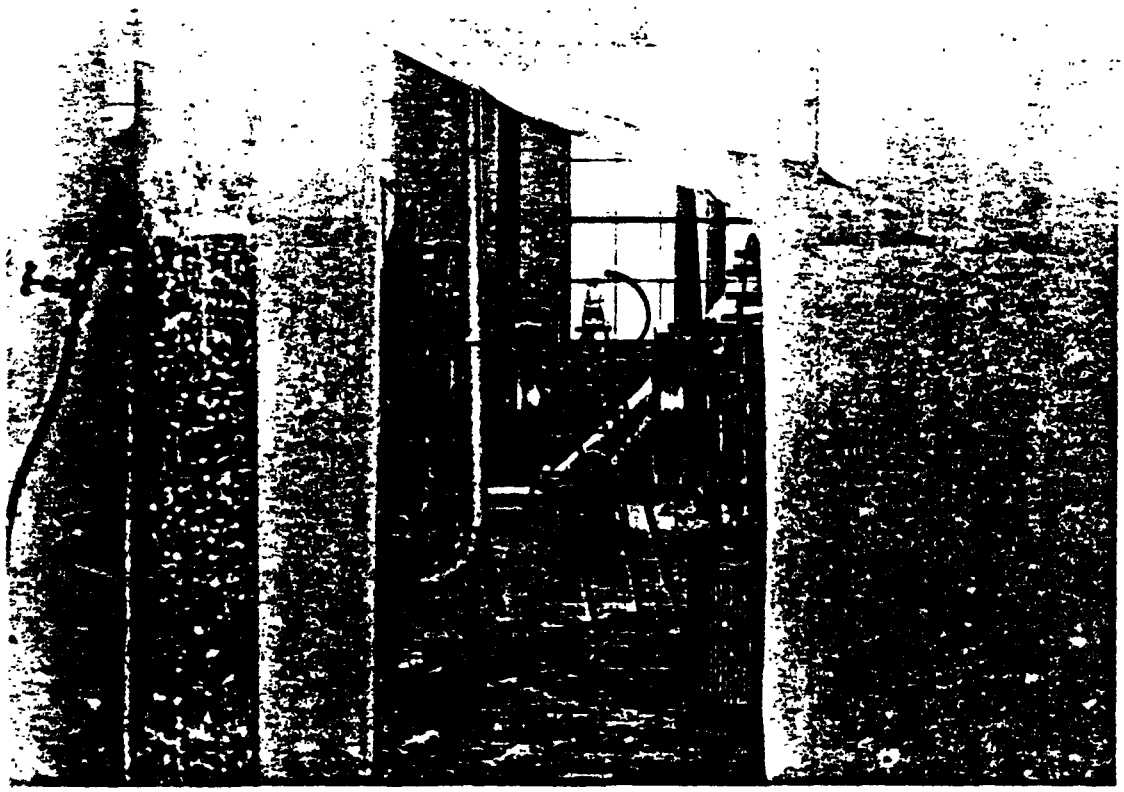
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SAMPLE NO. 38

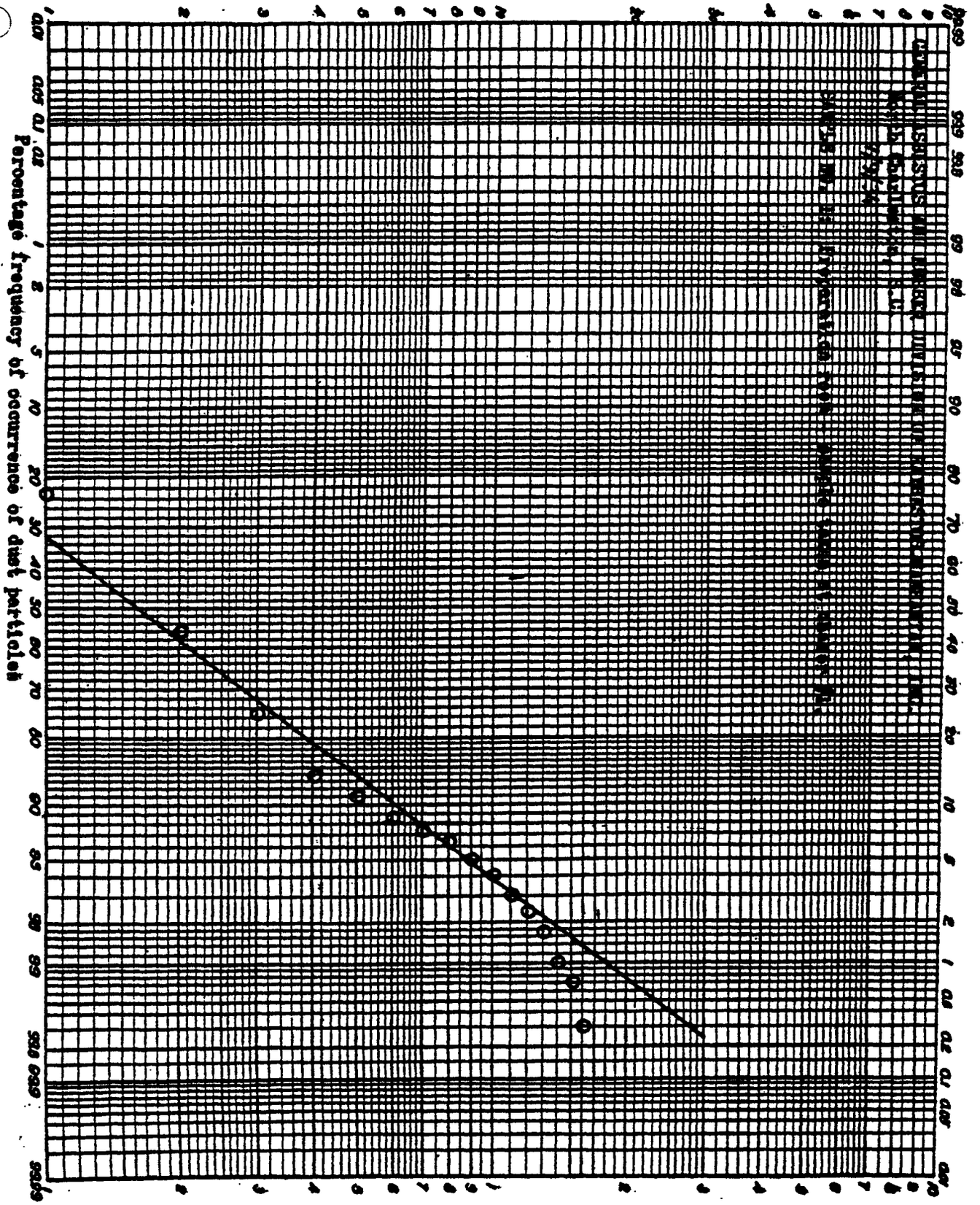
One card inside muslin enclosure

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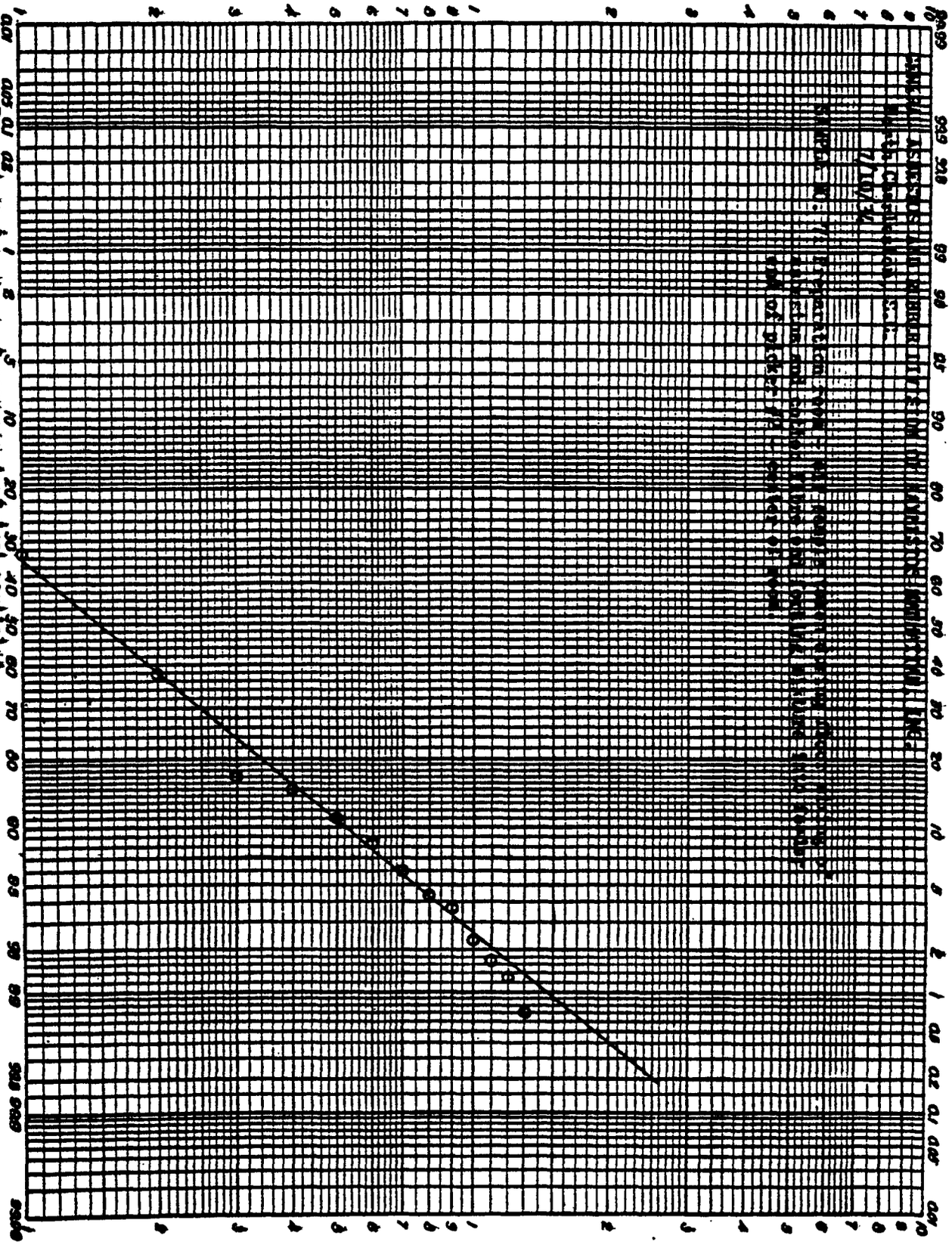
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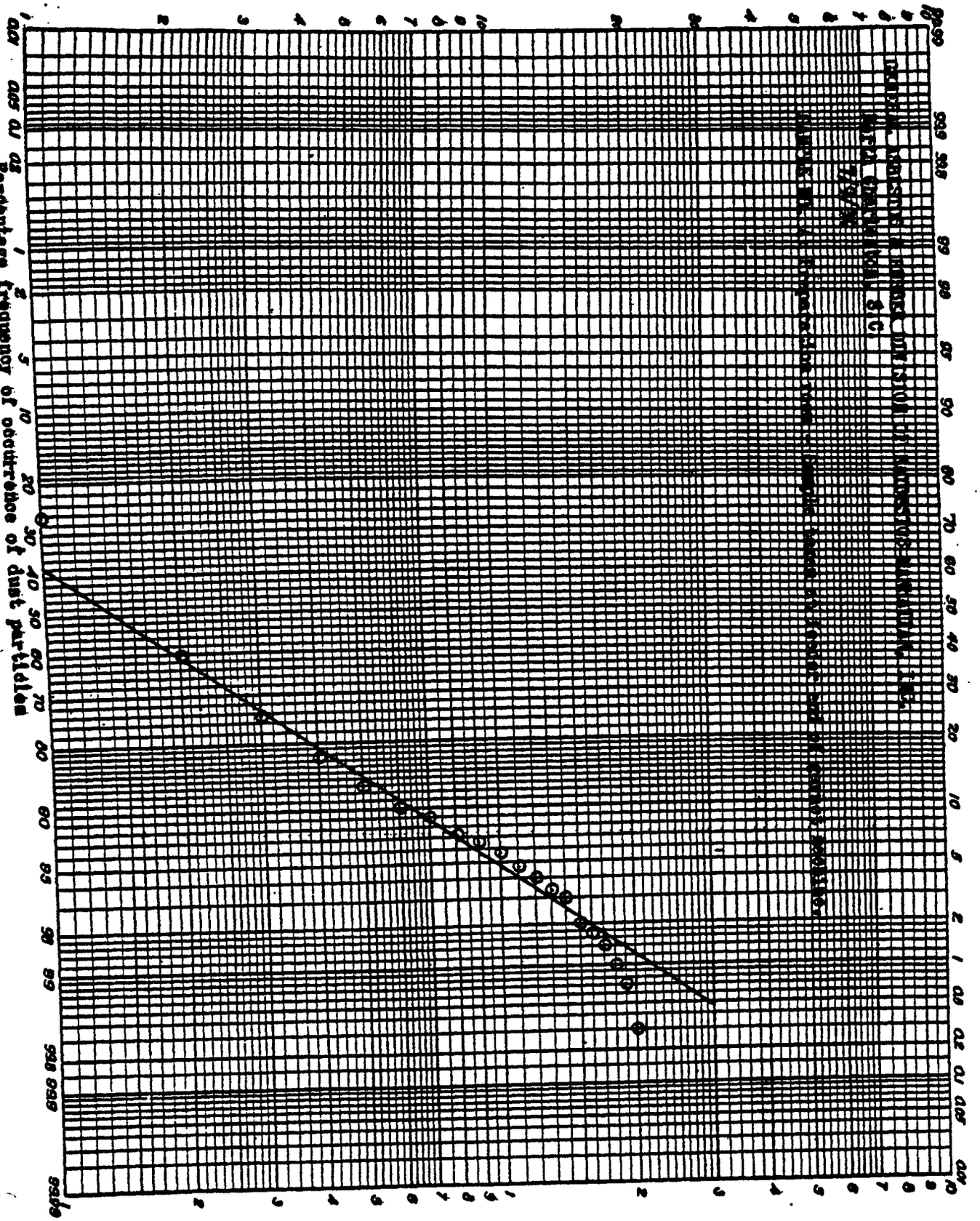
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Dust particle sizes in microns



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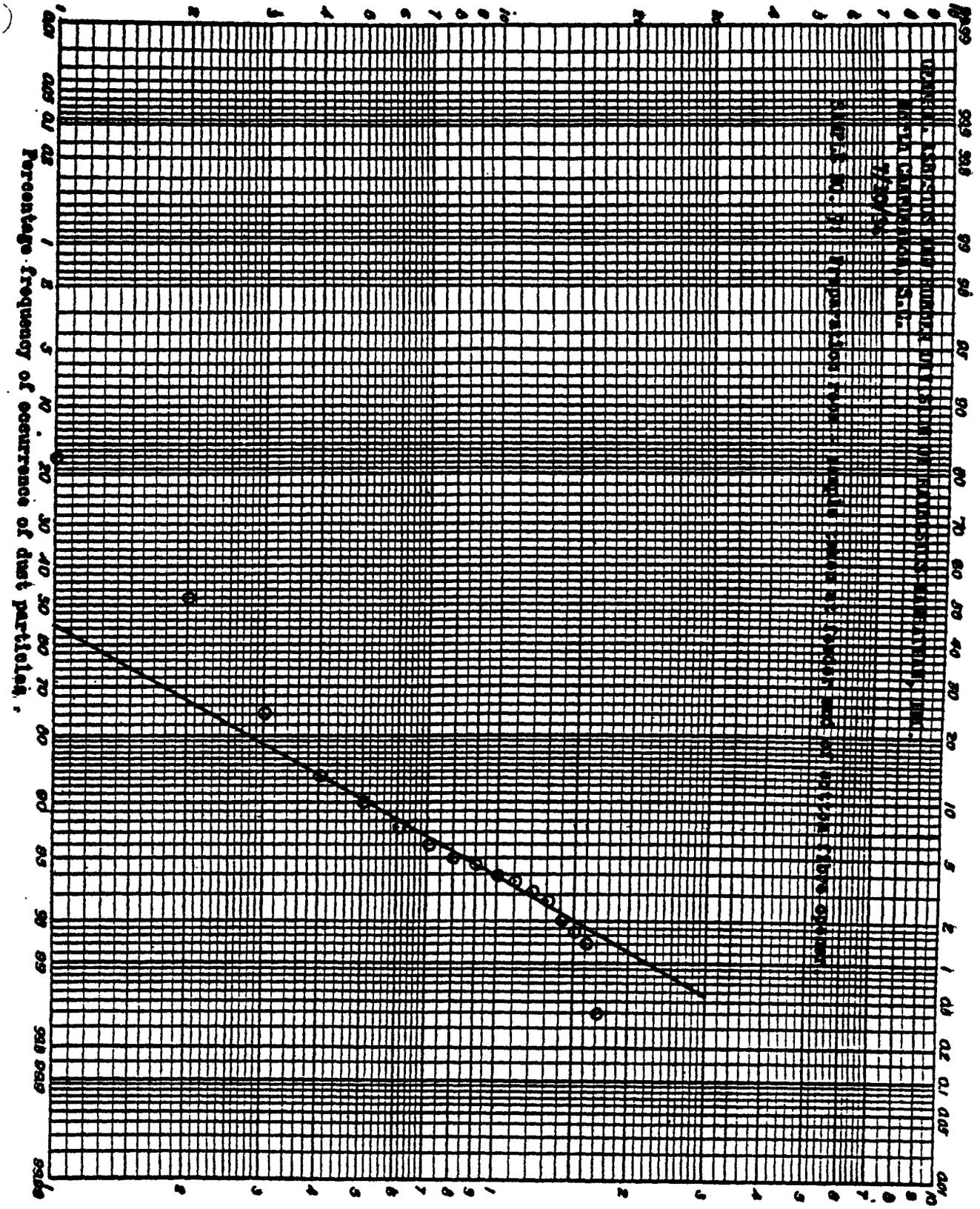
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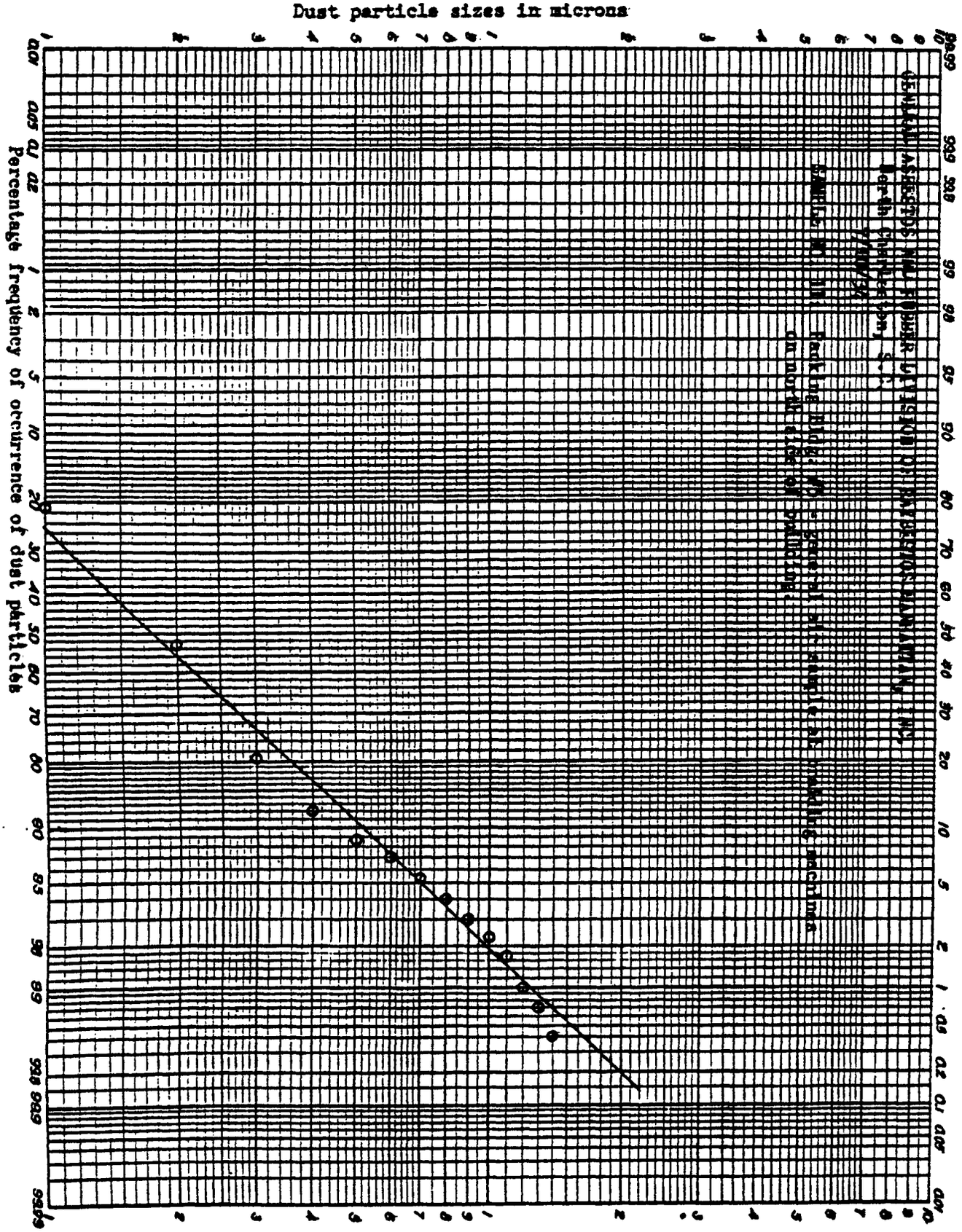
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Dust particle sizes in microns



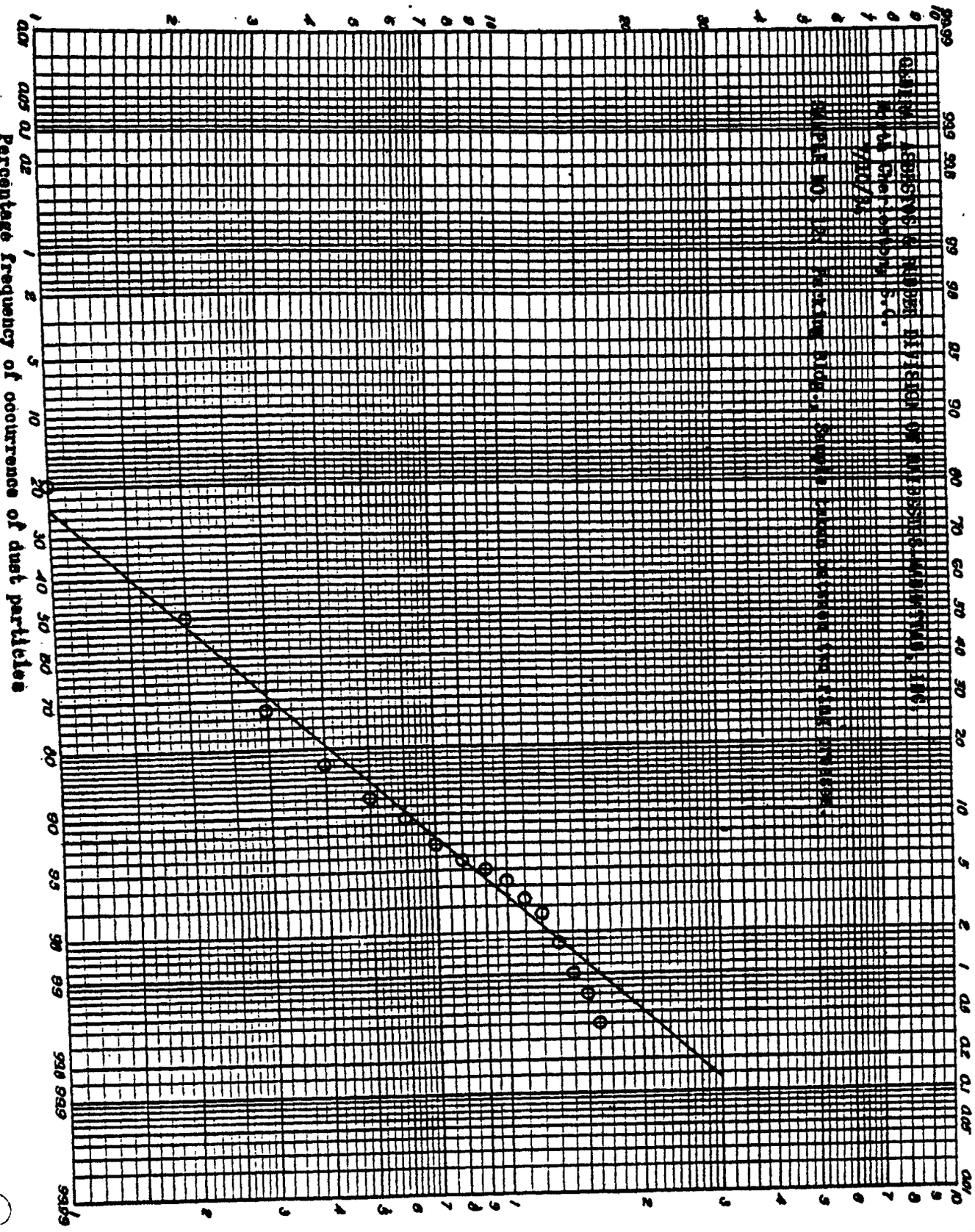
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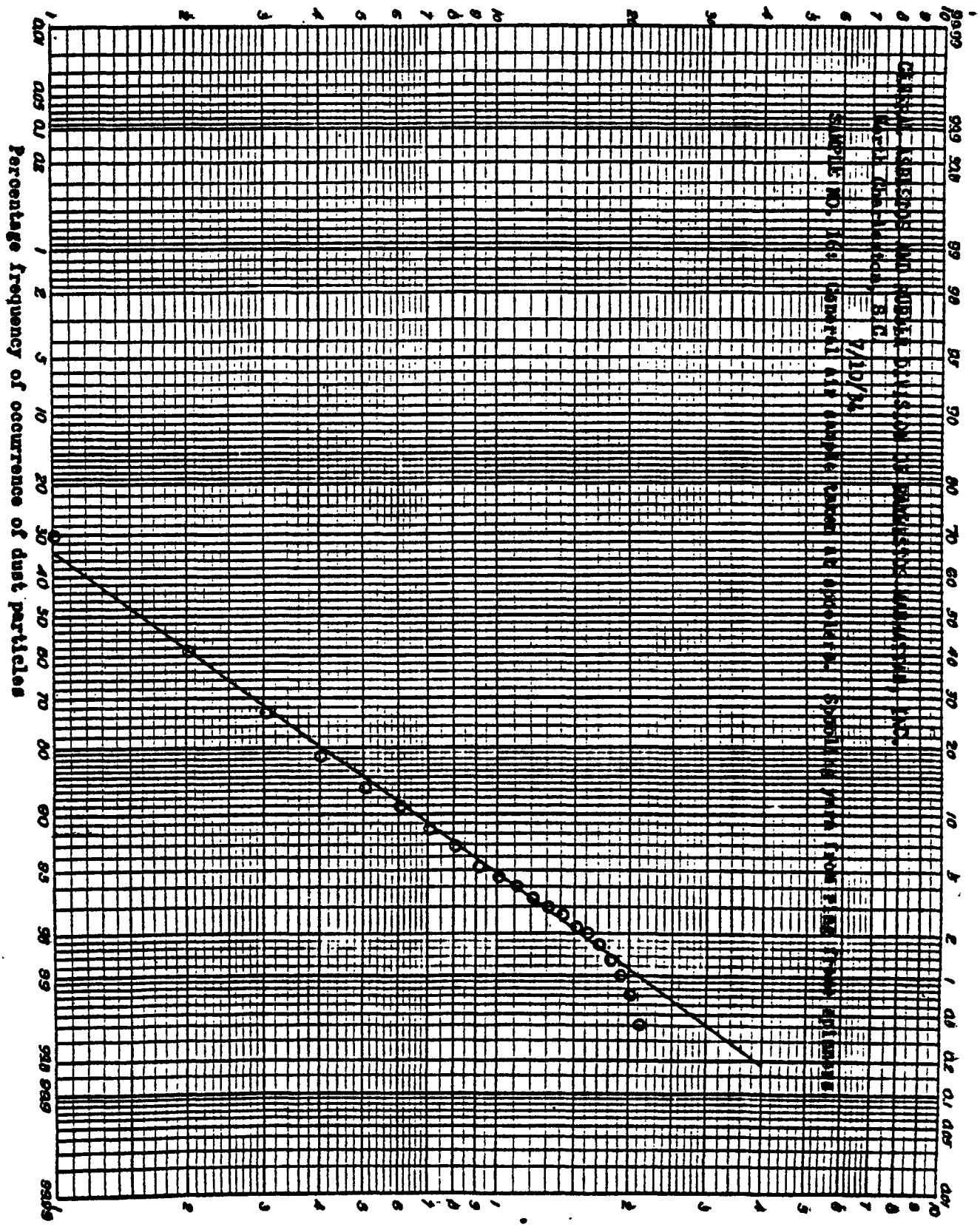
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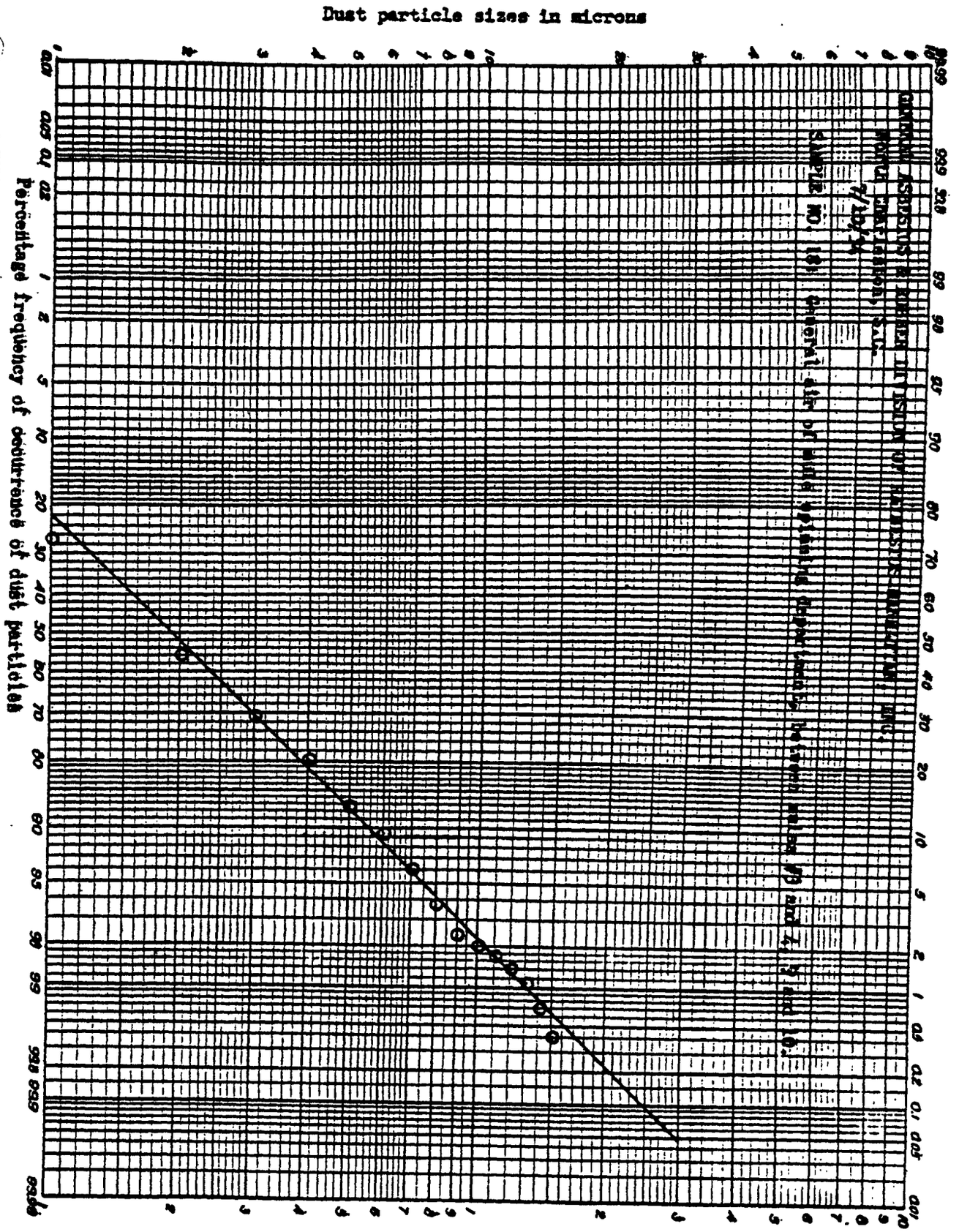
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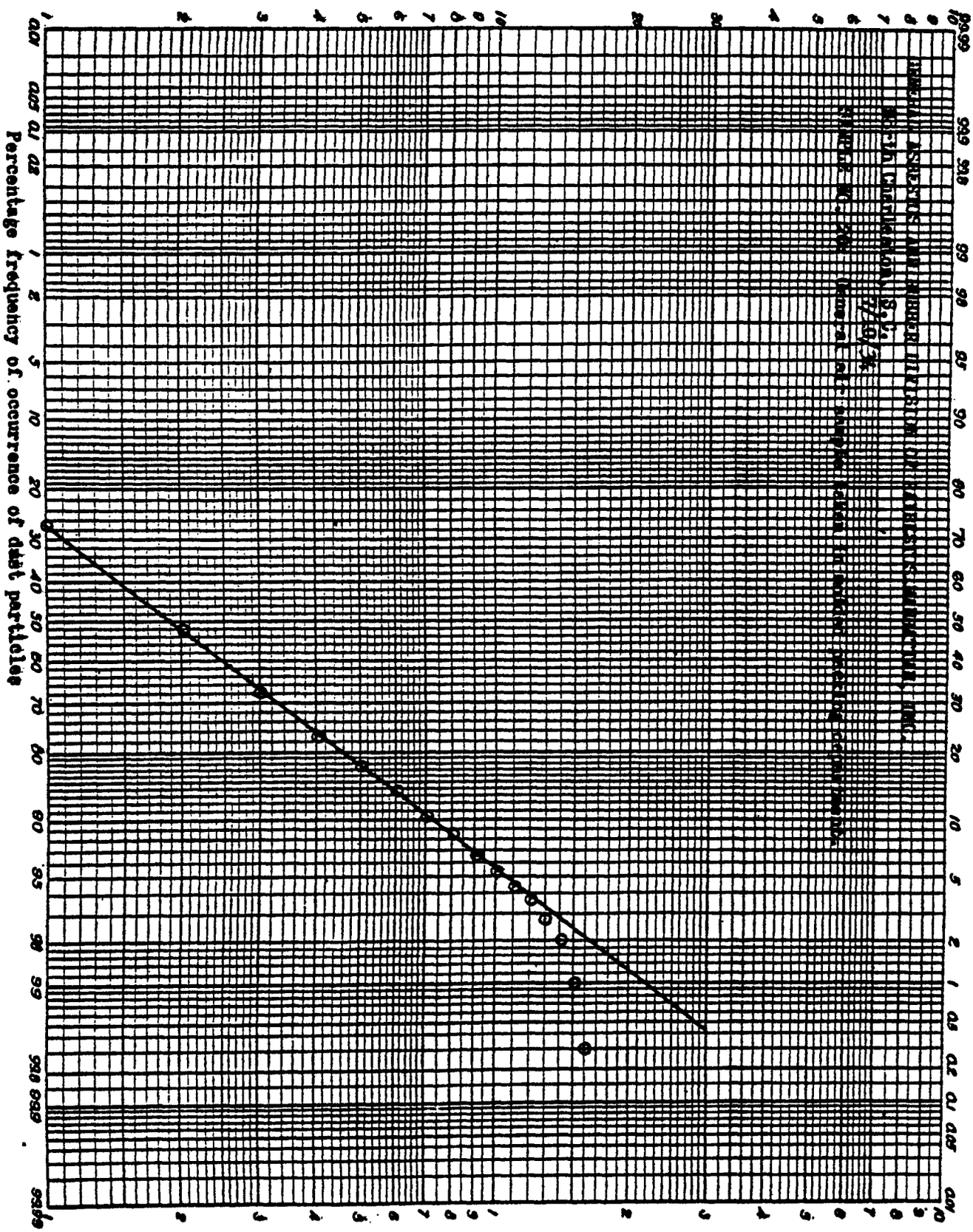
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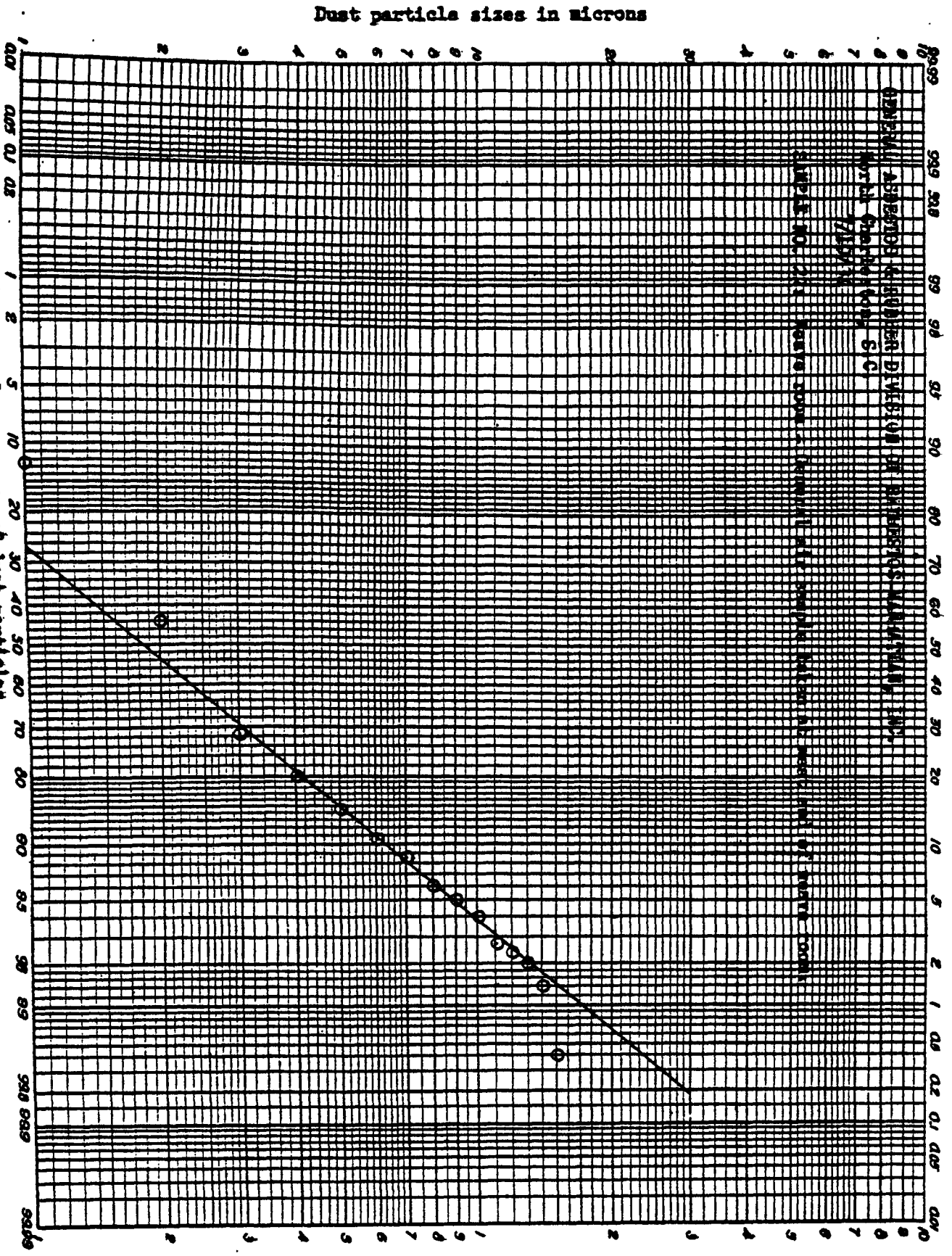
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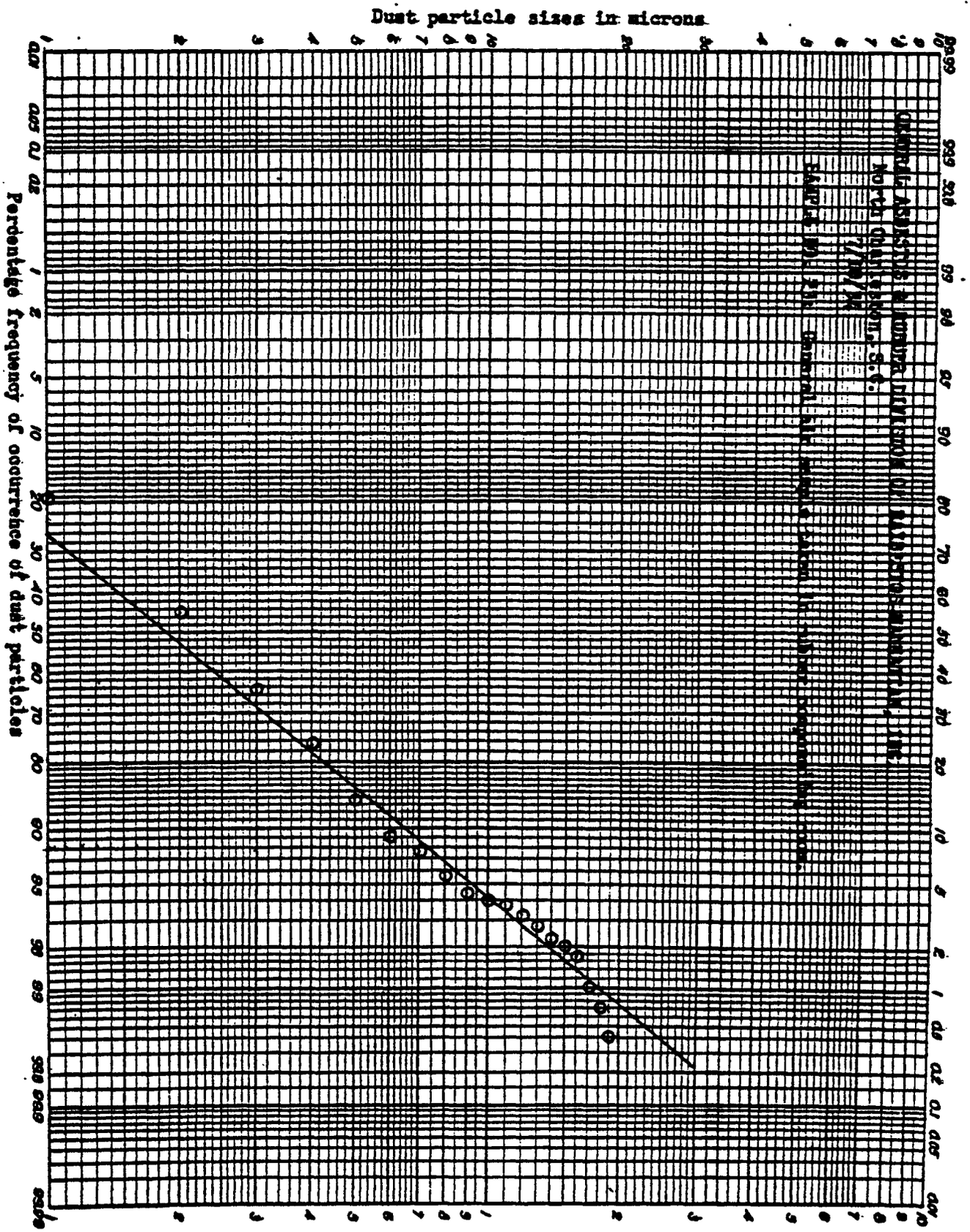
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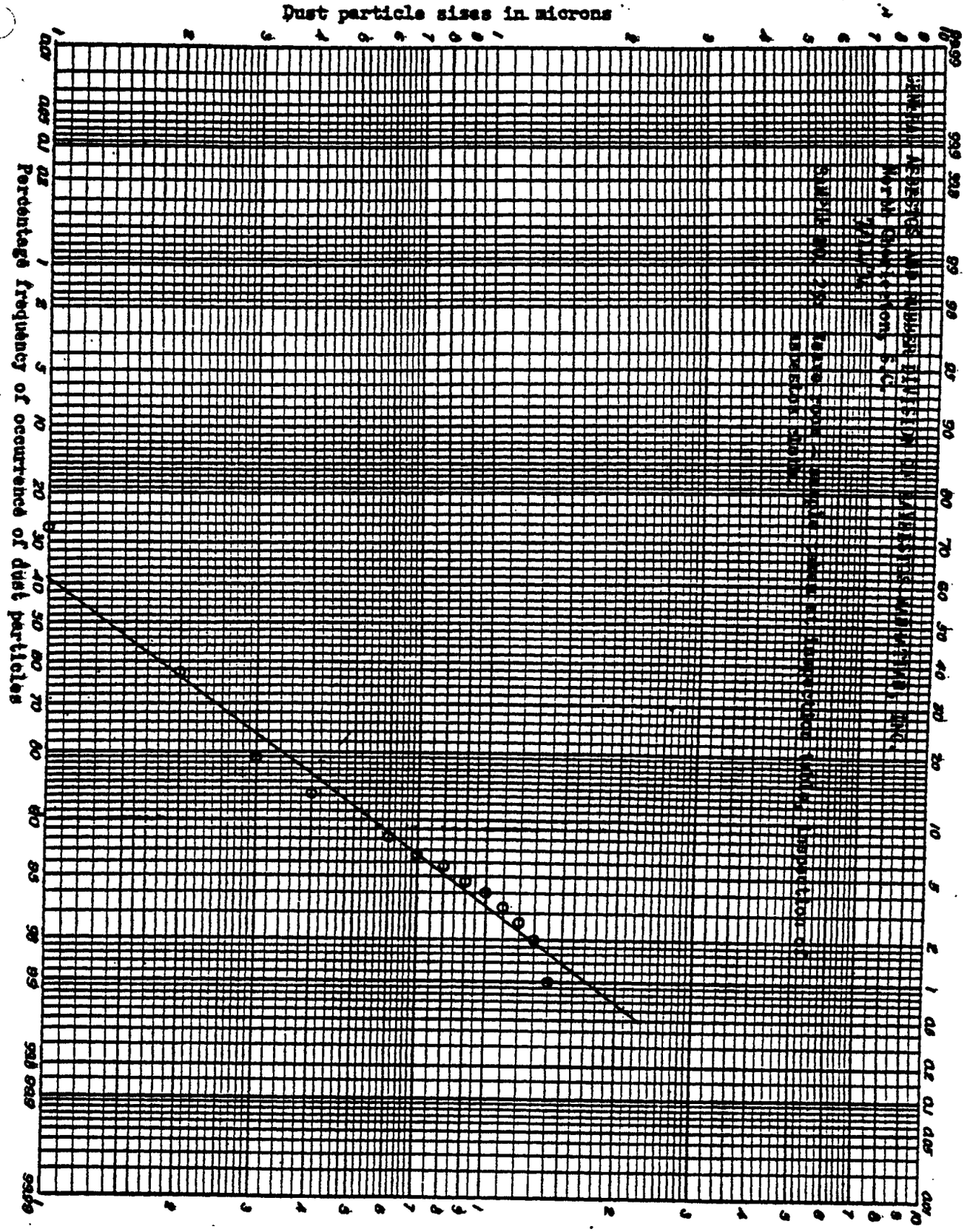


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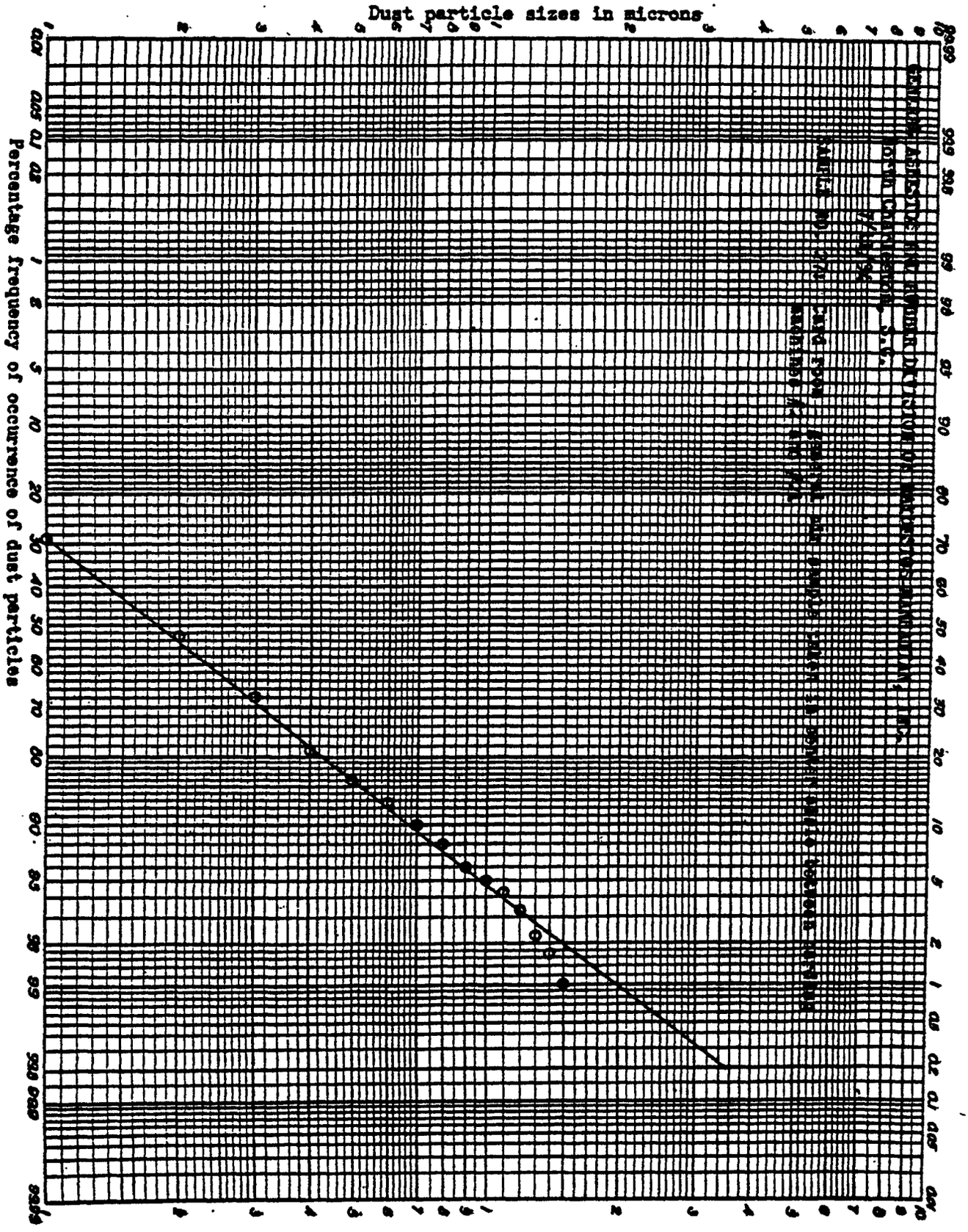
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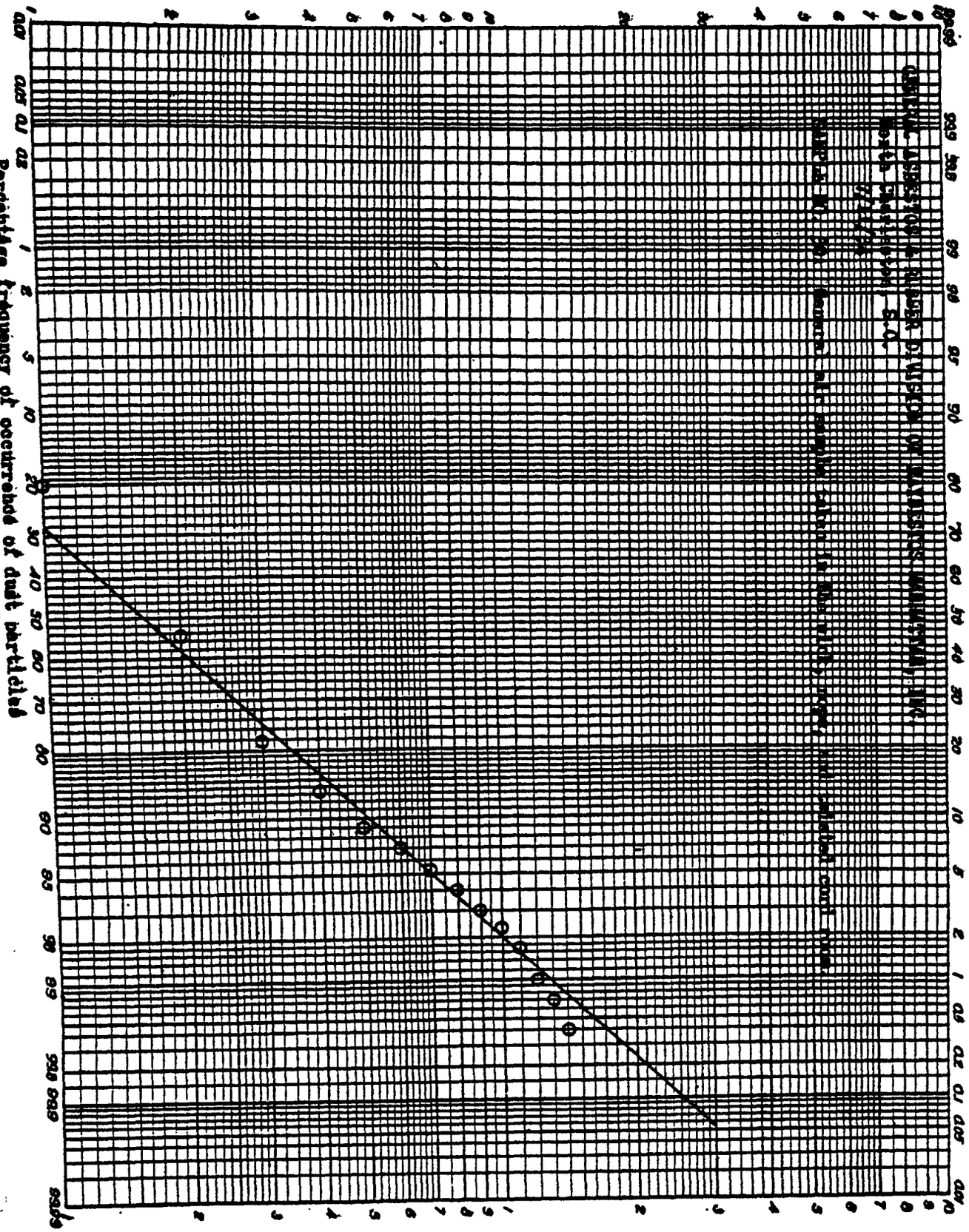
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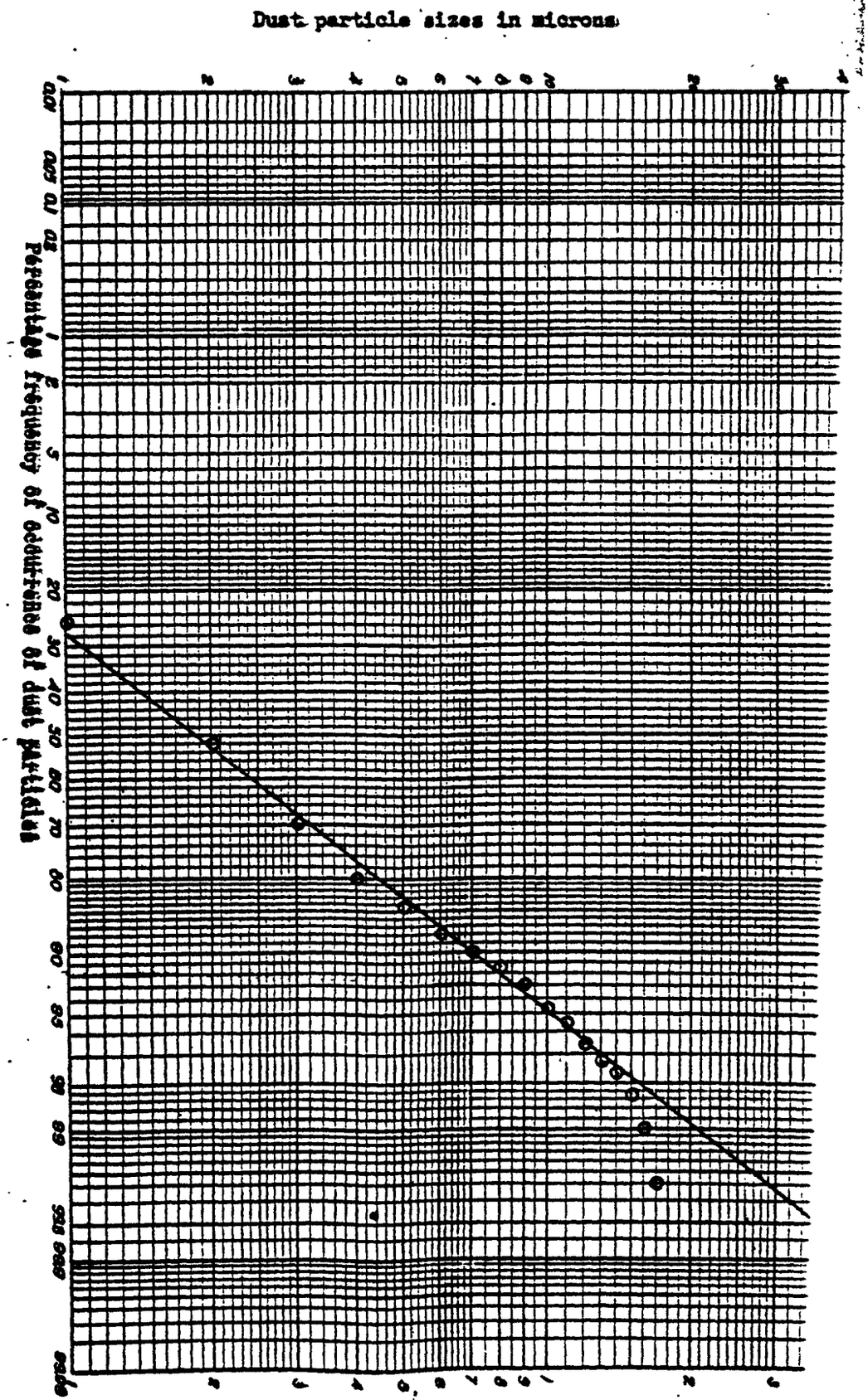
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Dust particle sizes in microns



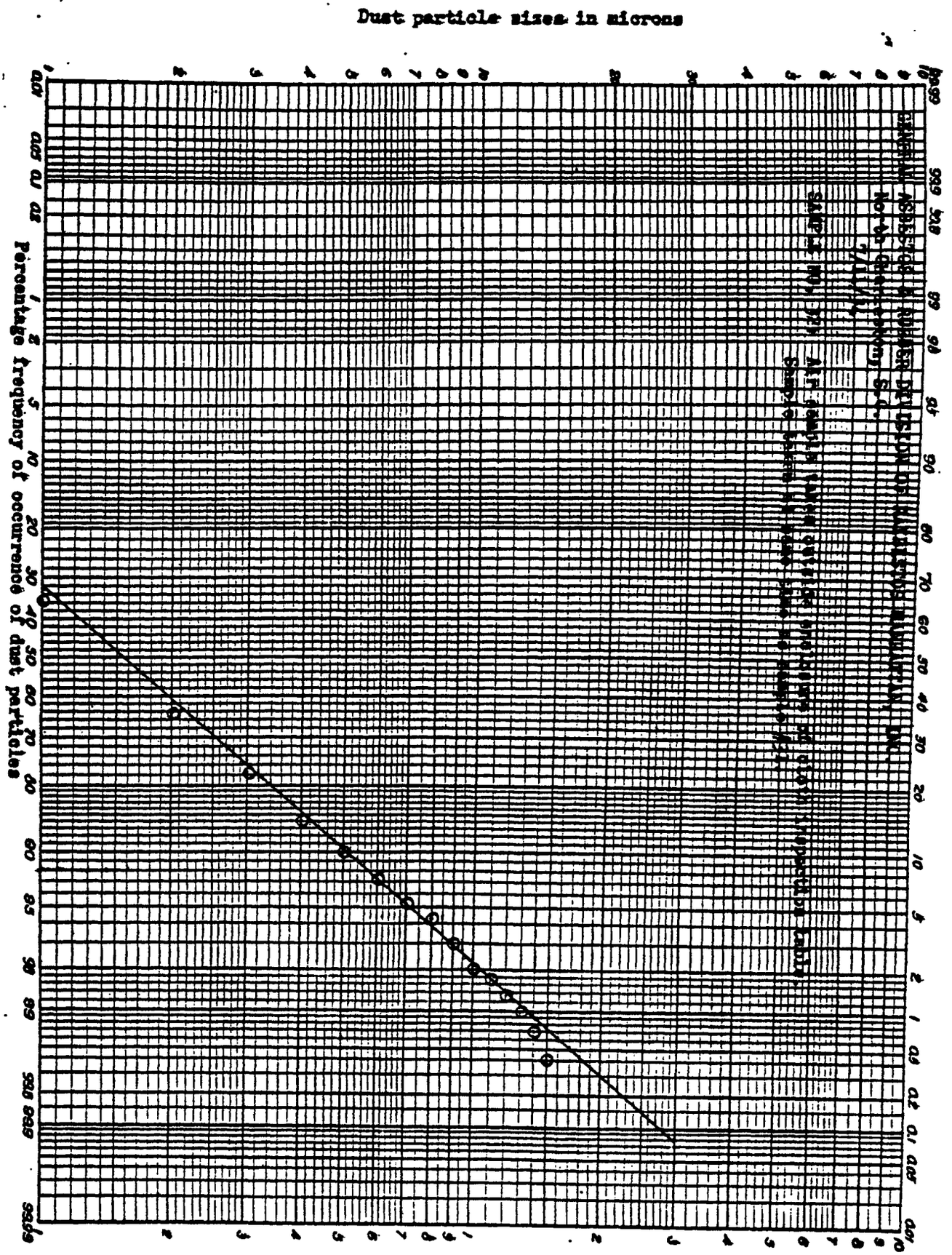
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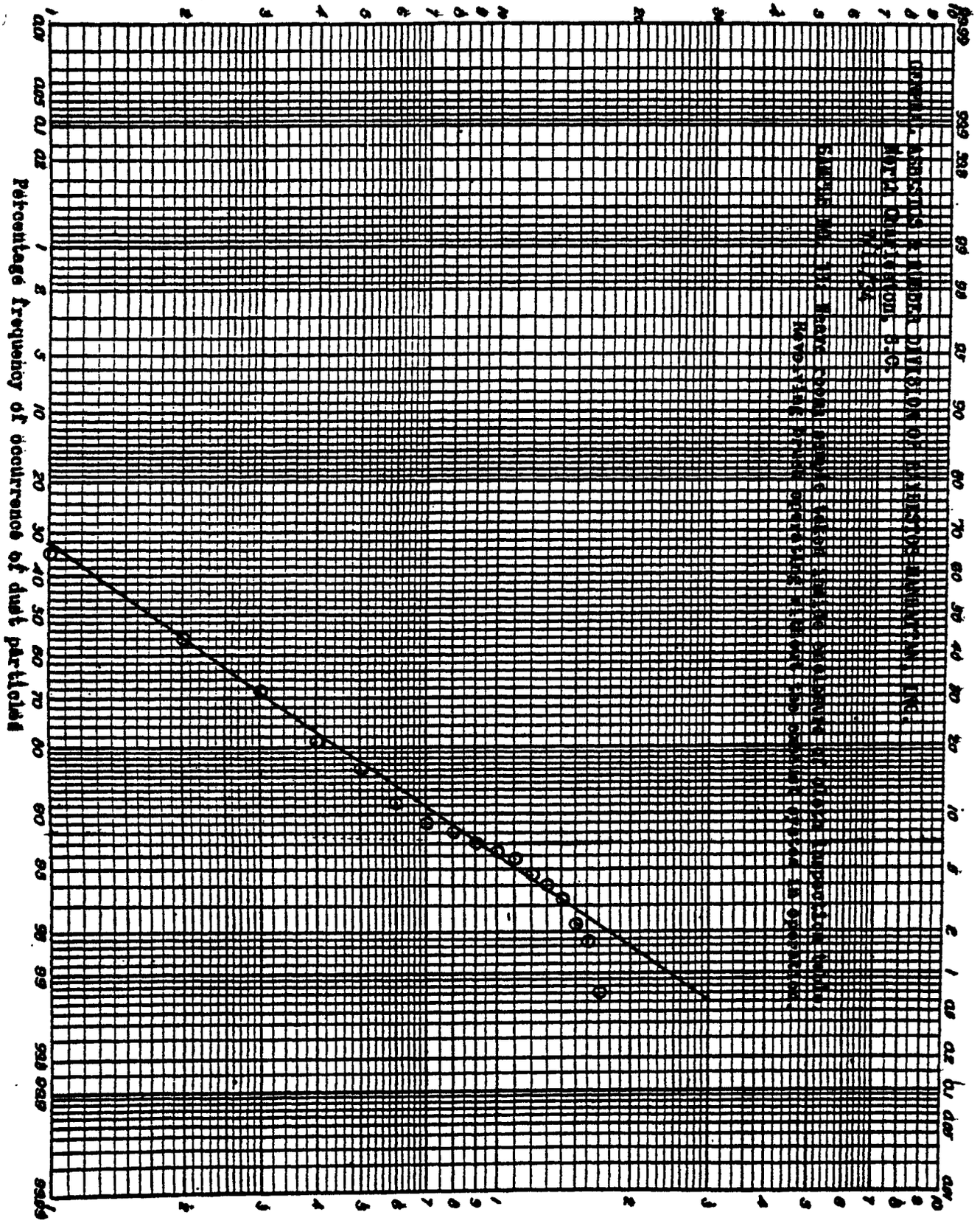
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Dust particle sizes in microns



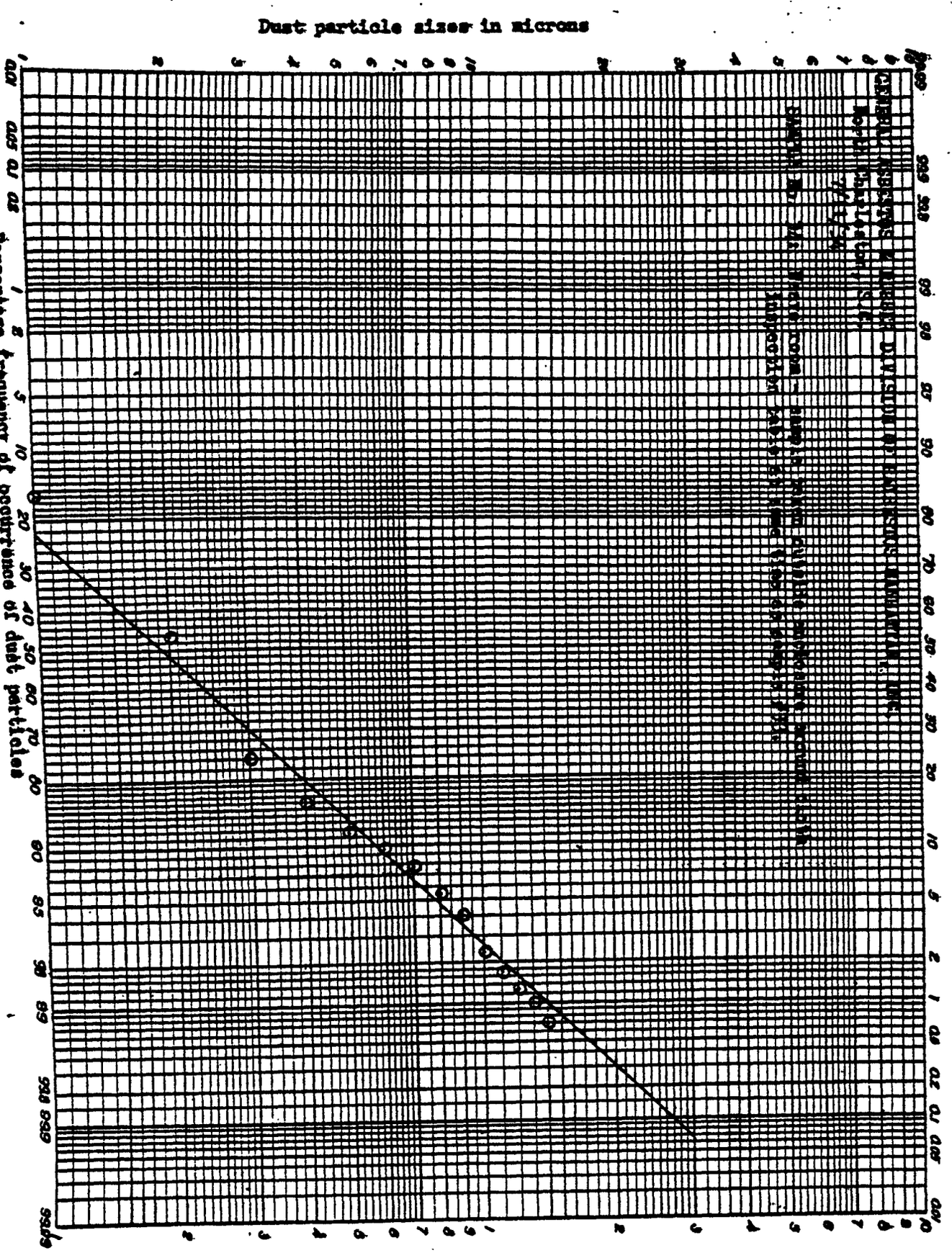
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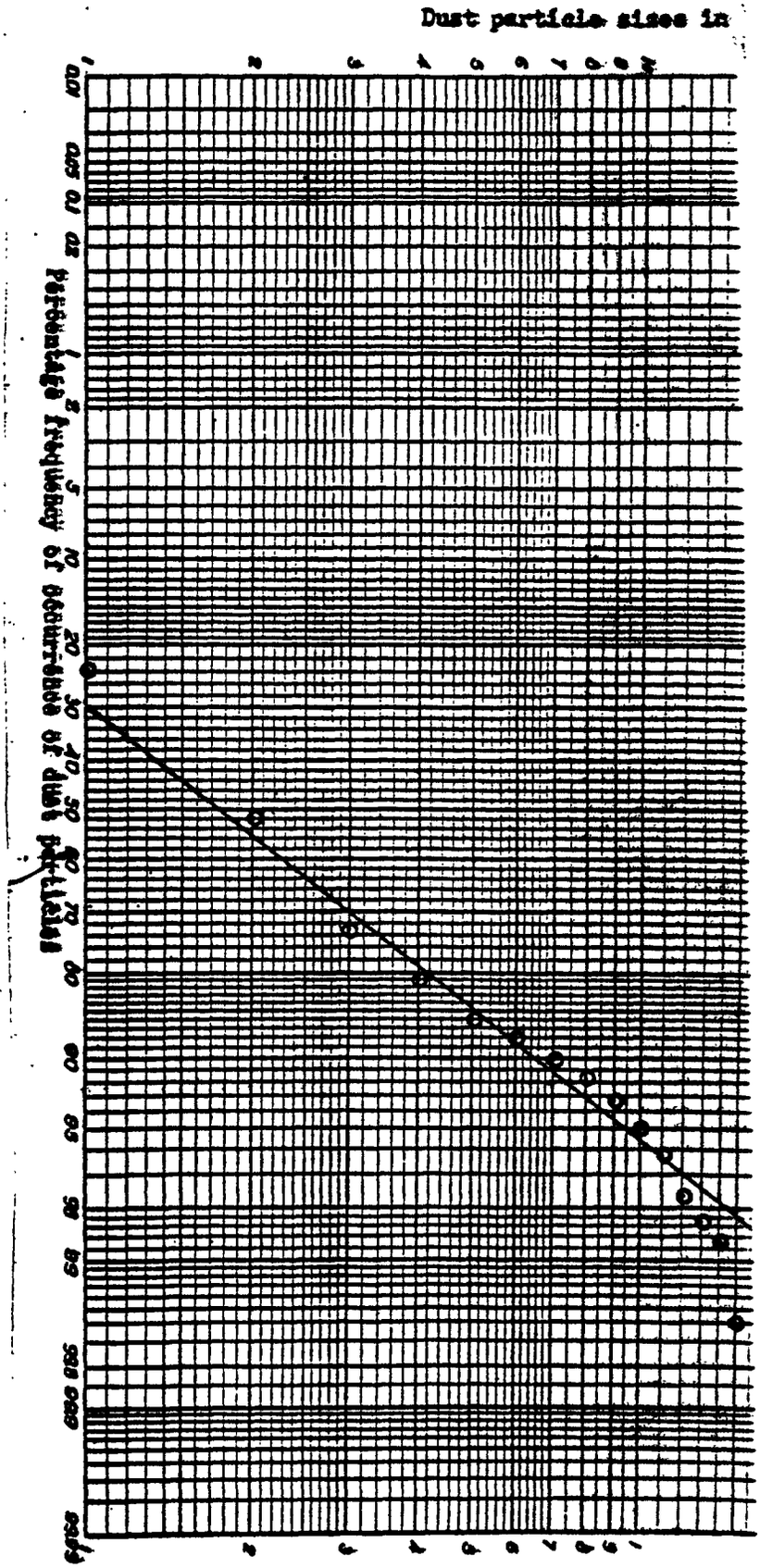
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