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ANALYSIS OF MEDICAL SITUATION AT THE
ASBESTON PLANT OF THE U. S. RUBBER COMPANY

January 5, 1954



**INSTITUTE
OF
INDUSTRIAL MEDICINE**

NEW YORK UNIVERSITY-BELLEVUE MEDICAL CENTER

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ANALYSIS OF MEDICAL SITUATION AT THE
ASBESTOS PLANT OF THE U. S. RUBBER COMPANY

by

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January 5, 1954

On November 1, 1953, Drs. Goldstein and Palmes and Mr. Donovan of the Institute of Industrial Medicine, New York University, visited the Stark Mills plants of the U. S. Rubber Company at Hogansville, Georgia. The purpose of the visit was to make an on-the-spot appraisal of the Asbeston plant, a mill producing textiles composed of asbestos and cotton. This appraisal was to include both medical and industrial hygiene aspects of the plant health program.

During the visit, the New York University group met with the following representatives of U. S. Rubber: Messrs. A. C. Link, Manager, Stark Mills, R. B. Fort, Jr., Assistant Manager, Stark Mills, John Alexander, Industrial Relations, Hogansville, James Guy, Safety Superintendent, Hogansville, D. I. Austin, Superintendent of Asbeston, Hogansville, Miss Grace Hipp, R. N., Plant Nurse, Hogansville, Messrs. J. E. Sullivan, Industrial Relations Manager, Textile Division, Winnsboro, K. Ayre, Engineer, Textile Division, Winnsboro, W. W. Watkins, Engineer, Textile Division, Winnsboro, and F. W. Sands, Industrial Hygienist, New York.

On arrival at the plant there was a short meeting with the Stark Mills management for the purpose of orientation. Asbestosis was the subject of discussion at this meeting and for the remainder of the visit. All three of the New York University team were then taken on a tour of the Asbeston plant. Operations were covered from raw materials to finished products. Special emphasis was placed on the methods used for control of asbestos dust in the various operations. In the afternoon, Dr. Goldstein discussed medical problems with Mr. Alexander and Miss Hipp while Mr. Donovan and Dr. Palmes were presented with industrial hygiene and engineering data, chiefly by Mr. Guy and Mr. Ayre. The following morning the group resumed discussion along the same lines and all the personnel mentioned above then assembled for a final conference.

Here the questions posed by management were: 1) How serious is the asbestosis problem at present? 2) What is the likelihood of development of further cases? 3) What can or should be done to obviate development of further cases? 4) How should the matter of asbestosis be treated from a public relations standpoint? and 5) How should the problem be presented to the workers involved?

The facts gathered by the New York University representatives at this point were briefly as follows:

The plant had been in operation since 1942 and had been functioning at near-peak production from the beginning to the present. Three shifts were employed for seven days a week for a considerable portion of the time during the early years of operation of the plant; at present there are three shifts of 40 hours per week. The plant operates entirely on a piece-work basis for all production jobs and there is a high stability in the work force. The present employment is 220. A breakdown of employees by occupation and length of employment was obtained.

Anxiety concerning asbestosis was described as very serious in that the problem extended beyond worker health itself into the relationship between labor and management, the plant and the community, and local physicians and the plant. It was apparent that at least part of the difficulty was due to a division of responsibility in the plant medical program. There are three physicians in Hogenessville responsible for giving physical examinations before employment or before a worker returns to the job after illness requiring absence of one week or more. These physicians also treat the workers as private patients or in cases of occupational injuries; in these cases the worker chooses his own physician.

The plant x-ray program in itself is very thorough. Each worker is routinely x-rayed at 6-month intervals. The films are made at the plant and are sent out to a consultant radiologist who reads them and reports the results to management.

The industrial hygiene program involves sampling of plant air for dust at monthly intervals or less. Accepted techniques for making dust counts are used and the persons making the counts have been trained and examined by the State of Georgia Department of Health. On occasion, independent agencies have been called in to make surveys and their results have been found to be generally in good agreement with those secured by plant personnel.

Thus, it was apparent that most aspects of a good asbestosis control program were operating. The findings, however, existed largely as separate facts and had not been brought together. In other words, neither the results of clinical and radiological examinations nor of industrial hygiene surveys had been assembled in a form where they might be integrated. The chief lack was in the industrial hygiene data, and it was our opinion that there was a real need to get all dust count data assembled so that trends might be seen.

Since the questions to be answered were so interdependent, it was decided that any conclusions reached would have to be contingent on the results of further study of available data.

Thus, it was agreed that all of the dust count results for the plant from the beginning would be made available to the New York University group as soon as possible, and that this group would then undertake the collation and interpretation of these data.

The results of the industrial hygiene surveys were received in New York on November 17. They covered the entire period of the plant's operation. Most of the samples had been taken by plant personnel, but there were surveys by the State of Georgia Department of Health, the Industrial Hygiene Foundation, and the New York office of the U. S. Rubber Company. Samples had been taken by work areas and some areas included more than one operation, e.g., opening and picking. Also, the tabulated data showed a much higher frequency of sampling for some

periods than for others. Six areas (opening and picking, spinning, winding, weaving, east carding) are included in the surveys conducted from 1942 to the present while another (west carding) was added later. The results of these surveys were arranged in chronological order, at our suggestion, with dates, number of samples, sources and sampling methods indicated for each.

On receipt of these data, the New York University group decided that they could best be treated and analyzed as monthly averages for the entire period. When this was completed, all the values were plotted against time in months (figures 1 through 6). Inspection of the resultant curves indicated two things: a) the agreement in results from all sources was sufficiently good to permit including all the data as relevant; further, b) all operations showed a consistent trend downward with time.

In order to get the most meaningful expression of these curves, it was necessary to determine as closely as possible the integrated values by yearly periods. The results are shown graphically in figures 7 through 12. As stated earlier, the sampling frequency varied quite markedly during the plant's history. This variation obviously gives greater weight to samples taken far apart in time than to those where the interval between samples was short. A simple and, we believe, satisfactory method of integration was adopted; this involved consideration of all values as forming a continuous curve. It is realized, of course, that each curve is most accurate in those periods where more samples were taken. Our prime concern was with the relative exposure of workers in different operations. The technique, sampling frequency and personnel making tests were the same with rare exceptions, for each operation.

Table 1 was prepared from the average yearly values for each operation. It shows the yearly average exposures (in millions of particles per cubic foot) of workers in various operations in the first column under each operation. In the next column are shown the cumulative values by years of operation starting with 1953 and extending back to 1942; these values are in million particles per cubic foot years. In these units (obtained by multiplying average yearly concentration by time in years) total exposure can be estimated. We do not believe that there is satisfactory evidence at present for placing any great weight on these numbers as absolute values; in the Asbestos plant, however, the extraneous factors are relatively constant and it is our opinion that dust counts obtained in this plant are comparable on a relative basis. On this basis, individual operations within the plant were classified as representing greater or less exposure than others. The third column under each operation shows the number of present employees joining the work force during each of four periods: less than 5 years, 5, 6 and 7 years, 8 and 9 years and 10 or more years. It should be pointed out that this includes only 175 of the 220 present employees. The exposures of the other 45 workers cannot be satisfactorily estimated either because they were employed in several areas or the area in which they worked was not sampled.

If the operations are arranged in order of increasing totals for the entire plant history (the 1942 cumulative values), they are, according to operations: Winding (52 MPPCF years), Flyer Frames (60), Spinning (78), East Carding (101), Weaving (102), and Opening and Picking (121). We have taken these values as indicative of relative exposures of workers employed in the various operations for 10 years or more. In this group of 10-year employees there have been two confirmed cases of asbestosis. One worker was a spinner and the other a weaver. The association of disease with the intensity of exposure as found here has important implications for this particular plant.

Thus, it should be assumed that there is a real risk involved for all those who have received a greater exposure than the lower of these, the spinner. This group includes 6 additional workers in the spinning area, 1 carder, 3 weavers, and 3 openers and pickers, a total of 13 employees. The other 10-year employees on whom we have definite occupational histories, 6 winders and 7 flyer frame operators, apparently did not receive as great an exposure but the development of new cases, although perhaps considered less likely, cannot be ruled out. There are an additional 12 persons employed 10 years or more on whom the occupational histories are not well defined for reasons stated above. These include 4 sweepers, 5 section men, 1 dry can operator and 2 inspectors. In our opinion, all of these except the dry can operator should be considered at least moderate risks, based simply on length of employment and general plant conditions in the early years of operation.

Among the 8- and 9-year workers the only ones who appear to be near the range where asbestosis has been observed are the 5 employees in weaving who have received an exposure of about 52 to 78 million particles per cubic foot years. Other employees hired in or since 1945 do not appear to be bad risks.

Thus, if the acquisition of asbestosis is a function of dosage, it would appear that of the present work force there are 13 who are serious risks, 29 others may be classified as moderate risks, and the remaining 178 as mild to negligible risks. Variation in individual susceptibility, however, urges great caution in estimating the likelihood of disease from these data.

The validity of the use of a maximum allowable concentration for asbestos merits some discussion. The value of 5 million particles per cubic foot of air, accepted in some circles for a 40-hour work week, should represent a level where no asbestosis would be produced even after a lifetime of exposure. Unfortunately, experience with asbestosis in this country has not been evaluated in such a manner that, in our opinion, it is of appreciable predictive value. Serious exception to the use of this value is taken by some authorities. Among other difficulties, disagreement as to the pathogenicity of the various particle sizes has raised questions as to this value.

The plant inspection indicated several ways in which practices could be improved. The old crushing machine in the opening and picking room was operating during our visit and was producing considerable dust. This machine was not hooded and we think it should be, even though it is not used very frequently. It should be borne in mind that the three 10-year employees in opening and picking have received the highest exposures of any employees. A relatively minor point that could be readily improved involves the door between the large settling chamber and the basement storeroom. It appears to us that this door could be swung from inside the settling chamber. In this way the positive pressure within the chamber would tend to keep the door closed rather than open. There were a number of instances in which the exhaust ventilation systems were not being used in the most efficient manner. There were holes in the hoods probably put there to facilitate oiling of bearings, but these necessarily short-circuited the ventilation to some extent. All of these are relatively minor items, but we feel that it is worthwhile to make existing equipment function as efficiently as possible. The workers themselves should know, of course, that the equipment is there for their protection and that it is to their best interest to see that it functions properly.

There is agreement with the radiologic findings of others that two definite cases of asbestosis exist among Asbeston employees (Todd, Evans). It is Dr. Lanza's opinion that the films of Vera Jackson do not warrant a diagnosis of asbestosis. While this woman will bear watching, it is felt that an incompletely resolved, or perhaps organized pneumonitis of the right lower lobe best explains the changing x-ray shadows. Accordingly, the decision regarding the merits of moving Miss Jackson from her present job can be deferred pending appraisal of future semi-annual chest x-rays. There is also agreement with the decision to maintain Mrs. Todd and Mrs. Evans in employment, but in jobs removed from exposure to asbestos. Dr. Lanza feels that in all probability the prognosis for these two as to life expectancy and capacity to work is favorable.

In reviewing the medical program currently in operation, it was found praiseworthy in all but one respect; there is inadequate integration of periodic medical examinations with the x-ray studies. In short, none of the three examining physicians were allowed the opportunity of correlating the findings of periodic x-ray examinations with clinical findings gained from physical examinations of the worker. While the delicacies presented by the local professional situation are fully appreciated, such a defect in the medical control program warrants remedy.

Relative risks of asbestosis for present employees have been divided into three main groups: 1) Those 13 workers who have received as much or more exposure than those who have developed asbestosis are considered great risks; 2) Those 29 employees whose exposure was nearly as great but where no cases have occurred are considered moderate risks; 3) The remaining 178 employees are considered slight to negligible risks.

The entire plant has been operating for the past three years under conditions acceptable for the industry.

Certain improvements in dust control appear to be possible with little new equipment. Worker education would be a great aid in the accomplishment of this end.

RECOMMENDATIONS

A. It is suggested that if it is not possible to delegate full responsibility for the medical supervision of the asbestos problem to one of the three part-time physicians, then every effort be made to take on another physician who can assume such responsibility. A full-time medical director with no private practice and with previous training in pulmonary diseases would be the ideal solution. The magnitude of the total operation in Hogansville would appear to justify the expense of \$10,000 to \$15,000 necessary to attract the properly qualified physician. Should neither of the above prove feasible, then it is recommended that the services of a qualified physician from Atlanta be engaged on a part-time basis. It would be preferable that this physician have a faculty position at the medical college. His responsibilities at Asbeston would be:

1. To confer with the radiologist on all abnormal findings reported on chest films of asbestos workers.
2. To review the absence records of all asbestos workers preferably in conjunction with the results of a physical examination performed by himself.
3. To carry out annual physical examinations on all asbestos workers and correlate his findings with the x-ray findings.

The minimum time required for these duties would be one full or two half days a week.

B. The recently revised U. S. Rubber Company pre-employment examination forms are quite satisfactory. It is suggested that individuals with pre-existing bronchiectasis, severe chronic bronchitis, or pulmonary tuberculosis, which cannot be noted unequivocally as arrested, be excluded from employment.

C. Chest x-rays should be continued at 6-month intervals.

D. It is recommended that the dust counts be continued at monthly intervals and that these findings be kept in such form that they can be reviewed by all those involved in the medical program. It is further recommended that the State of Georgia Department of Health be requested to survey the plant about once a year.

E. Present dust control procedures should be continued and extended to include hooding of the second crusher. Other minor modifications of present equipment should be made to insure their optimal function.

F. Management should be completely forthright in its relations with labor, press and employees. This is the only approach which will benefit the plant in the long run. No assurance can be given that there will be no further cases of asbestosis, but the possibility of a large proportion of the workers being involved is very small. The asbestosis problem appears to be under control at present and should continue to be. The potential for cases built up in the early years of operation has manifested itself in the two diagnosed cases. However, both are early and the prognosis is good.

1942-1954
 DUST COUNTS ON LBS/TON, BY YEAR IN TPOPS, CUMULATIVE EXPOSURE IN TPOPS* YEARS, AND
 NUMBER OF EMPLOYEES HIRED IN EACH PERIOD

All values derived from dust counts rounded to nearest million after averaging and summation.

Year	Blending			Blow Frames			Scanning			Weaving			East Carding**			Opening & Picking		
	Average Count	Cum. Exposure	New Em- ployees in period	Average Count	Cum. Exposure	New Em- ployees in period	Average Count	Cum. Exposure	New Em- ployees in period	Average Count	Cum. Exposure	New Em- ployees in period	Average Count	Cum. Exposure	New Em- ployees in period	Average Count	Cum. Exposure	New Em- ployees in period
1953	2	2		3	3		4	4		4	4		3	3		4	4	
1952	2	5		3	5		4	9		4	8		3	6		4	7	
1951	2	7	11	3	8	25	4	13	19	5	13	47	3	10	10	4	11	
1950	3	9		3	11		4	17		7	20		3	13		5	16	
1949	4	13		3	13		5	22		7	28		6	18		7	23	
1948	3	16	9	3	17	5	5	25		6	34	7	7	26	3	7	30	2
1947	4	20		5	22		5	31		7	40		8	33		9	40	
1946	4	24		5	26		7	37		11	52		10	43		13	54	
1945	5	30	1	6	32	4	7	44	1	12	63	5	10	53		11	64	
1944	7	37		9	41		12	56		15	78		16	68		10	74	
1943	8	45	6	9	50	7	11	67	6	14	94	3	13	82	1	14	88	
1942	8	52		11	60		11	78		10	102		19	101		35	121	

* Million particles per cubic foot.

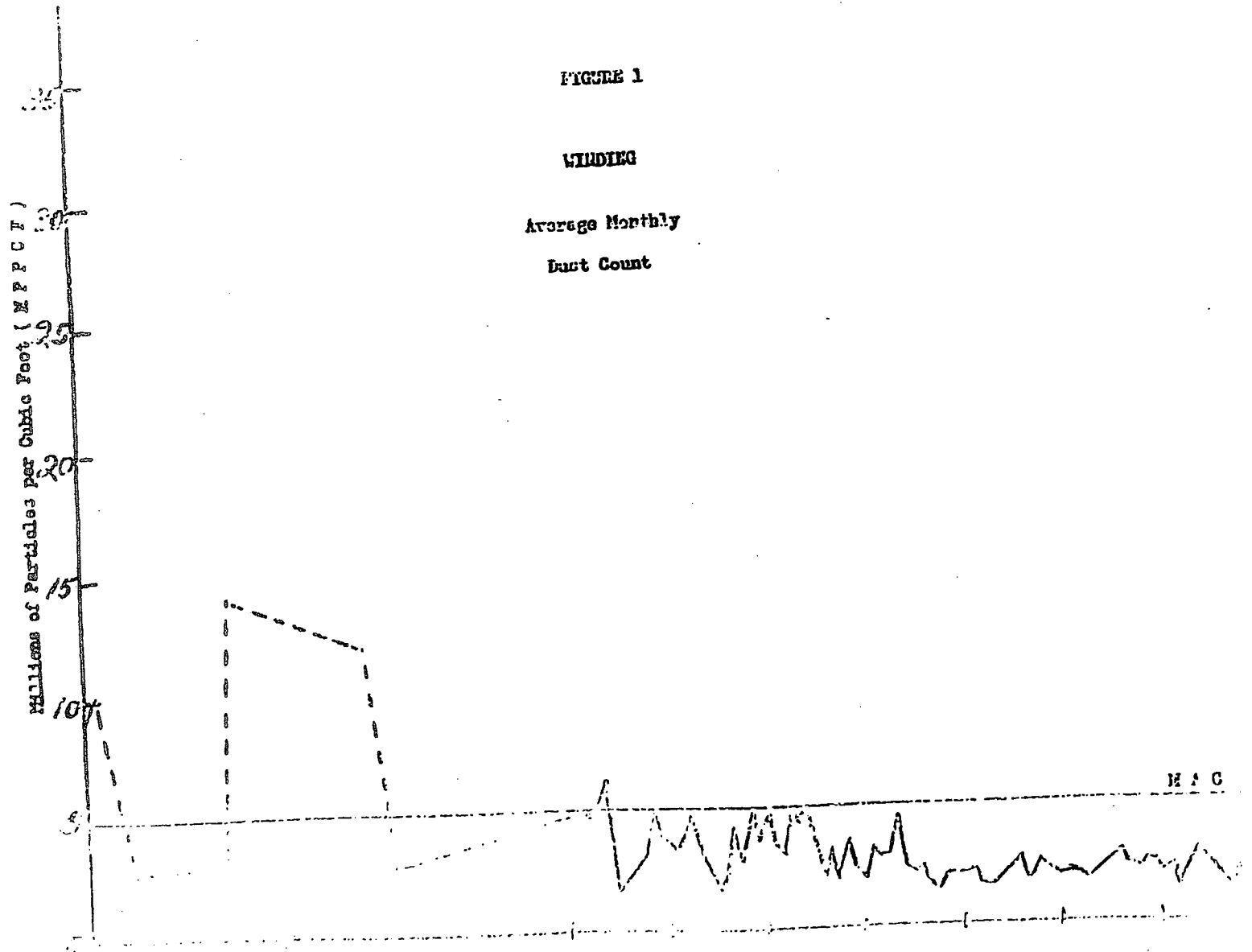
** Includes workers in West Carding.

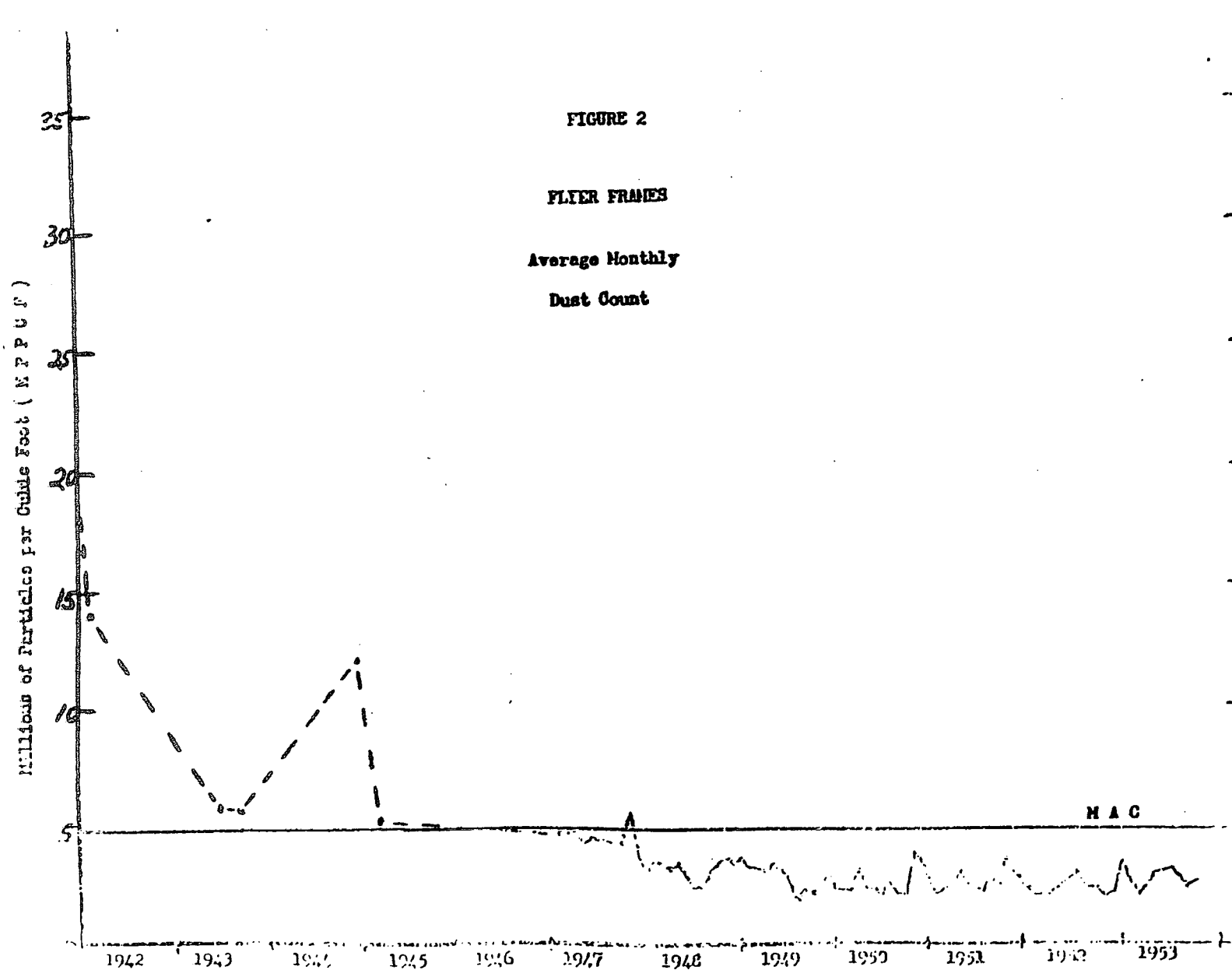
New York University-Bellevue Medical Center
 Institute of Industrial Medicine
 XVII, January 5, 1954

FIGURE 1

WINDING

Average Monthly
Dust Count





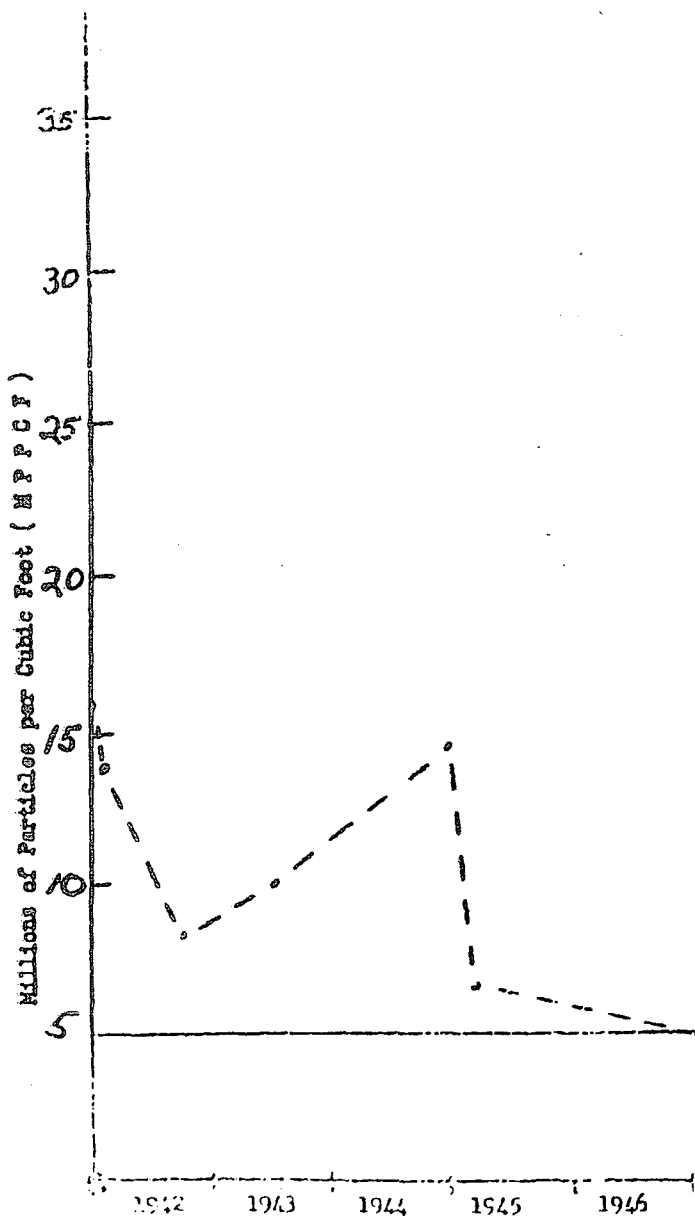
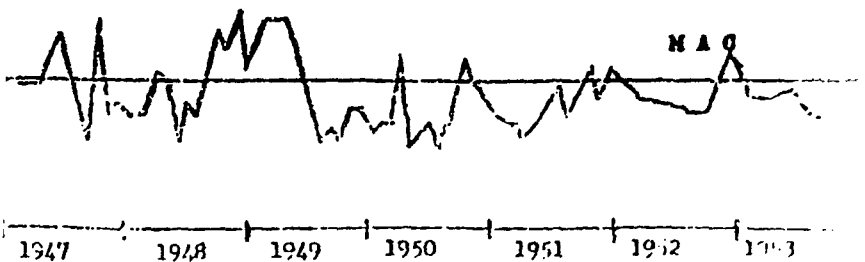


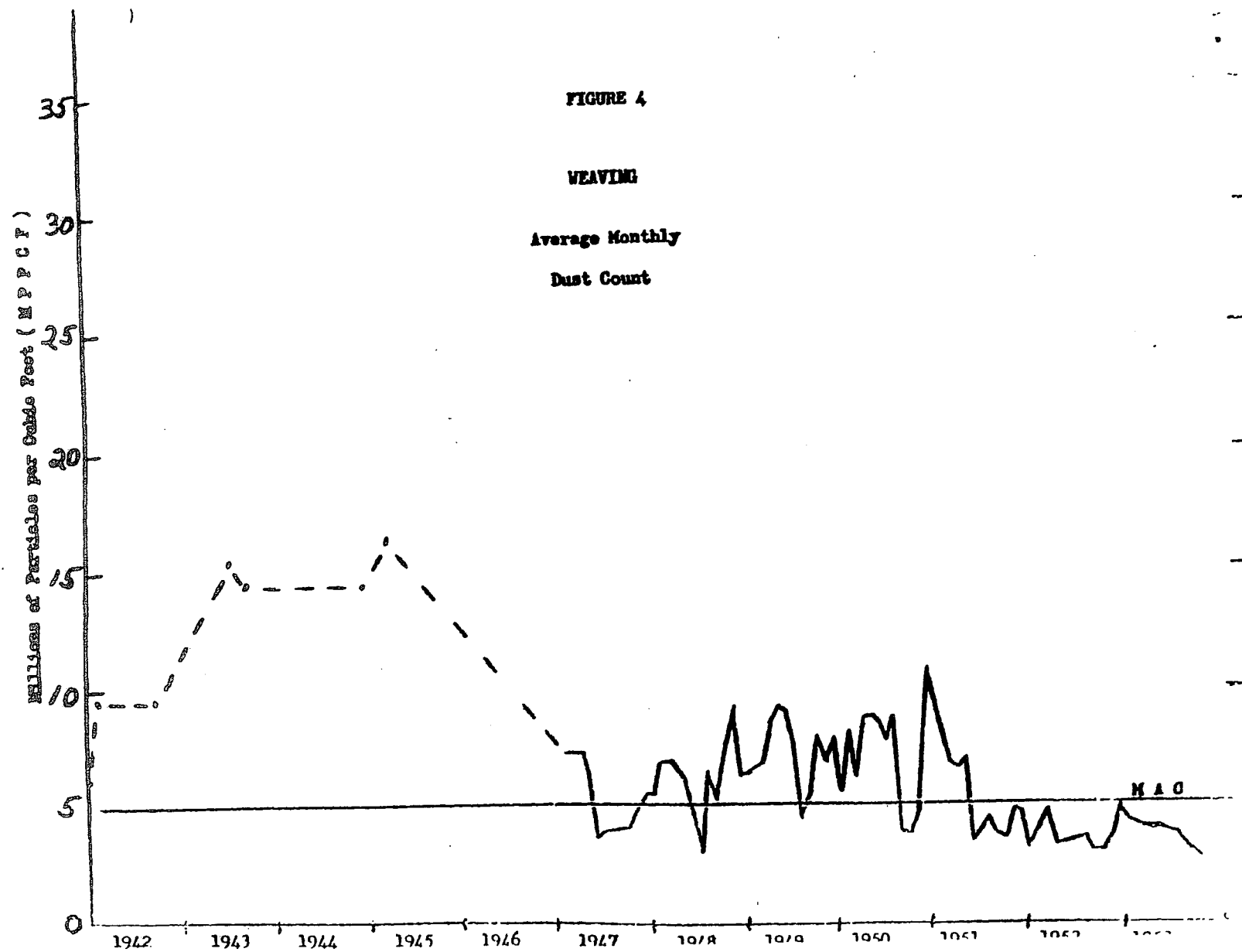
FIGURE 3

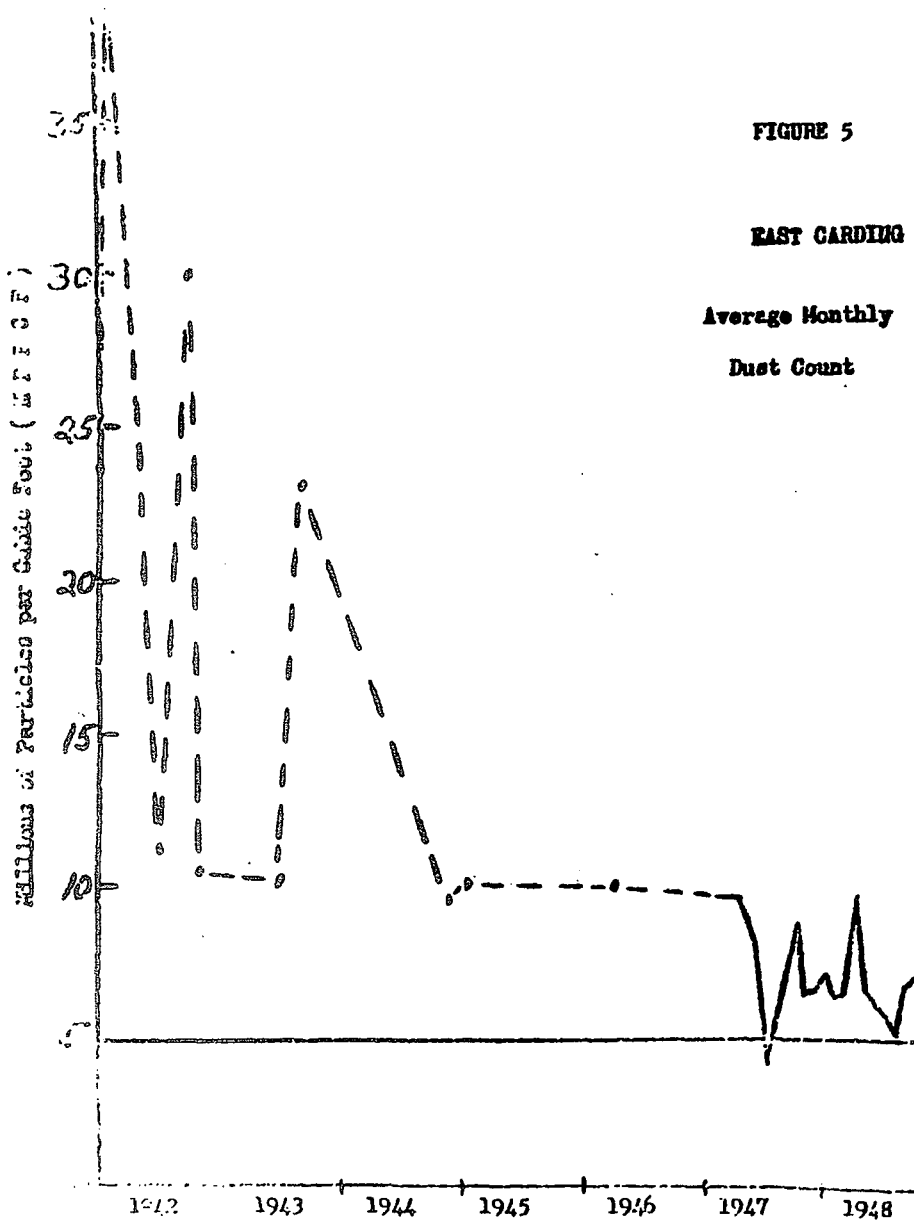
SPINNING

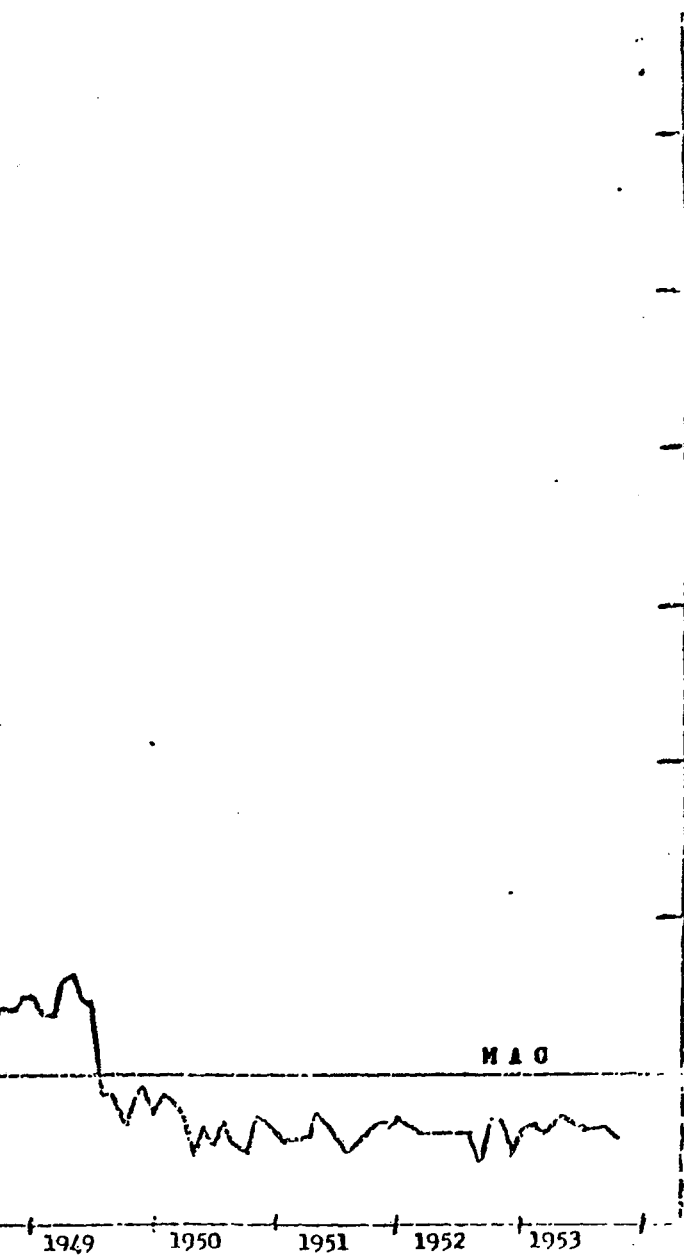
Average Monthly

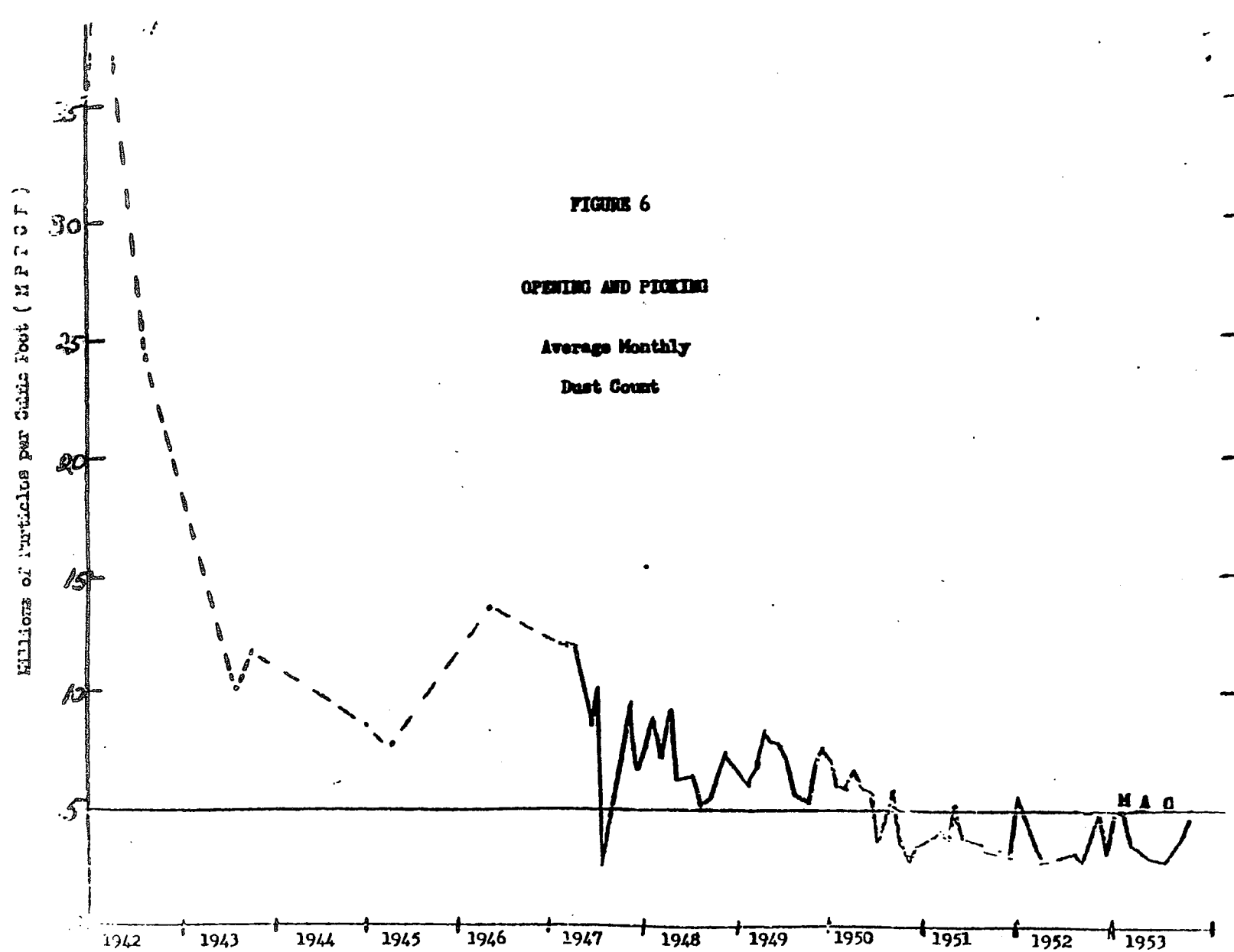
Dust Count

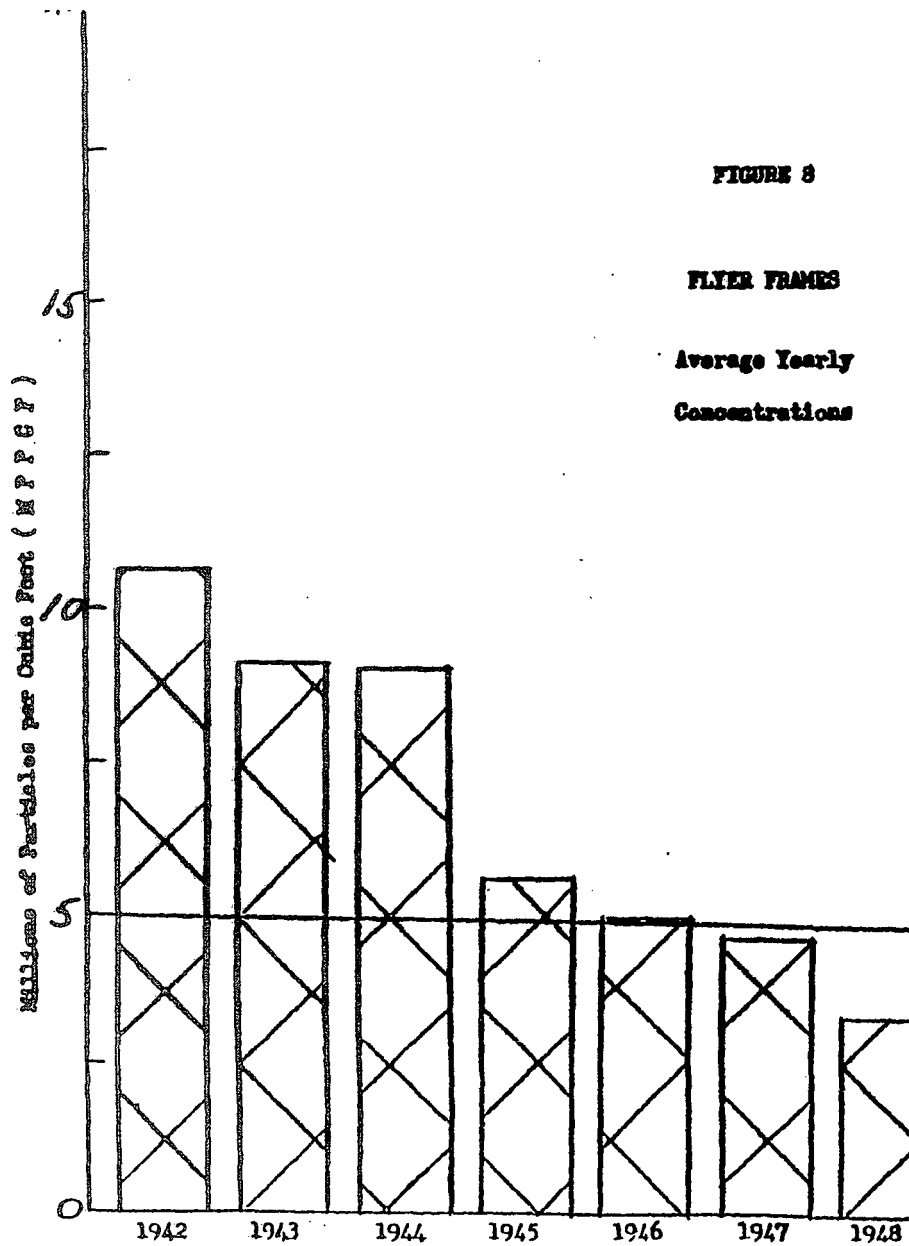






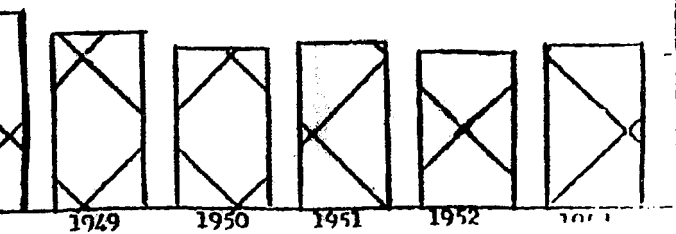


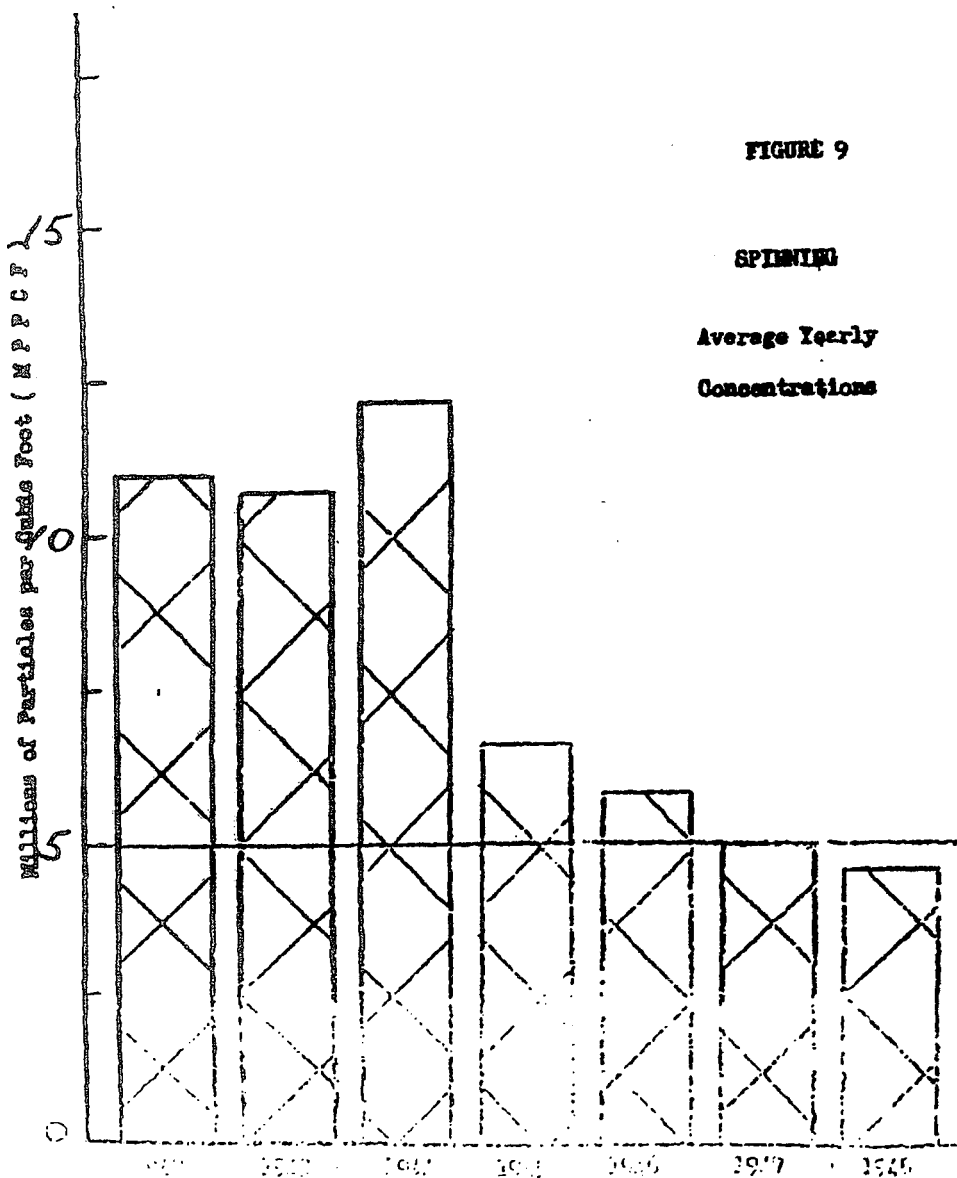


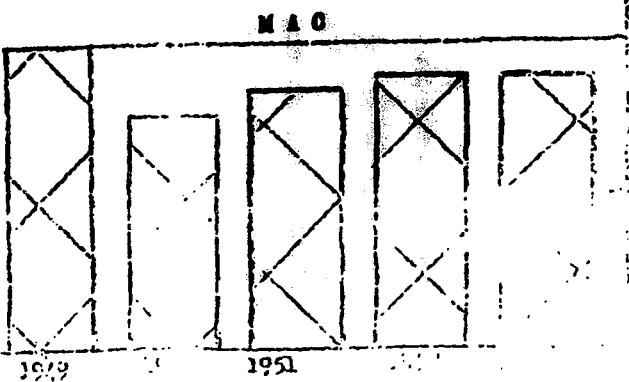




MAO







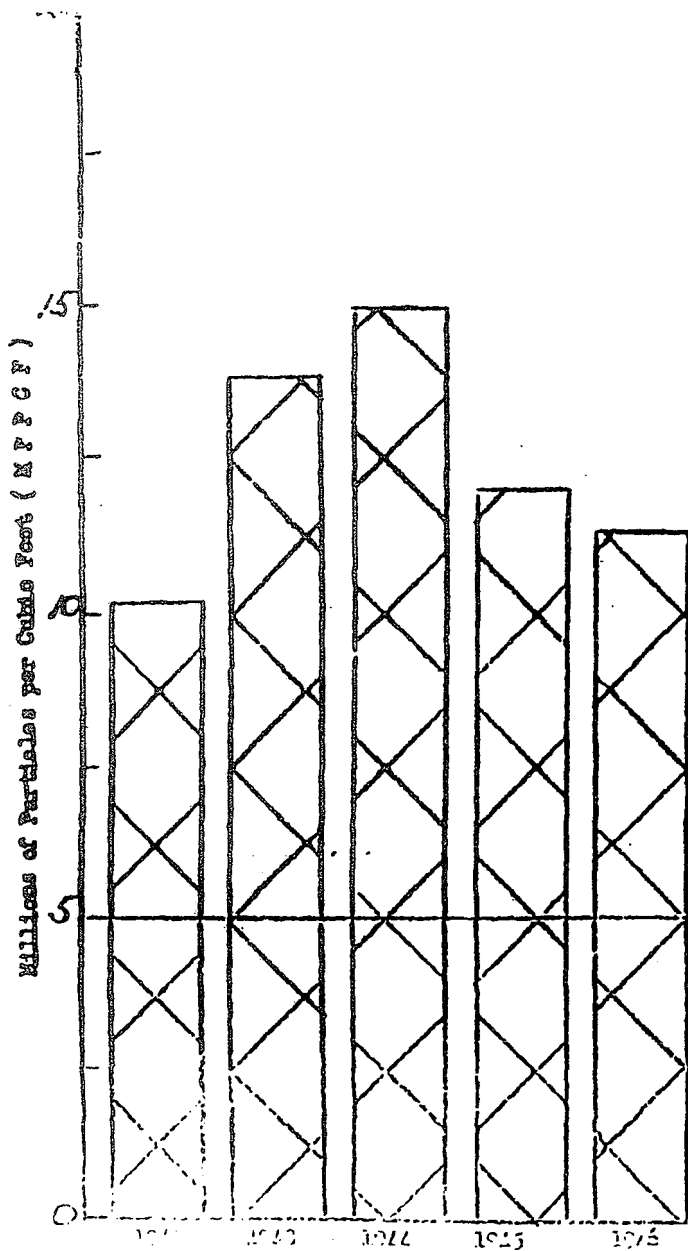


FIGURE 10

WEAVING

**Average Yearly
Concentrations**

