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are placed in the hoppers by hand, this can, if too vigorous, produce high counts for a short time. The card room is one of our best departments and for all practical purposes the cards are enclosed.

Splining Room

The splining room has two basic areas (1) ring splining (gung, "2", not ring) and (2) mule splining. The splining room does not have any exhaust system. Humidifiers are available and are used to reduce the dust. Excess moisture gives difficulty in the unwinding of the roving. This is our fastest department, dust in excess of 3 million particles are frequent and over 5 million occasionally. The dust is produced by the high speeds of the yarn in process. A broken end of asbestos yarn can produce a cloud of dust in several seconds and there is a correlation between broken ends and dust concentrations.

The mule splining is not as dusty as ring splining because the action in splining is different.

The splining room has excess fall out of short fibers under all machinery and spinnings for the most part voice the opinion that the accumulation of fibers and lint are much quicker in recent years. This may be attributed to the fibers being different. I think the splining room, and ring splining in particular, needs attention and a program initiated to reduce the dust.

Winding

Reater winding has a down draft exhaust system and humidifiers. Although the yarns are wound quickly the dust controls are adequate to keep the dust concentration down to approximately 1 million. Universal winding does not have dust controls, excess dust does not appear to be a problem except when dryer felt yarns are being wound.

Twisting Room

Some twistars have exhaust systems. Humidifiers are available. The dust concentration is usually less than 2 million. The dust can be attributed to high speeds and broken ends. Since much of the dust is removed during splining, the twisting room has an overall lower dust concentration. One product is twisted damp and it is noted that the frame has no dust hanging from it.

Wet Room

Wet room has a large number of variables which produce interesting results.

- (1) Wet weaving - no dust.
- (2) Dry weaving - exhaust and humidifiers - 2 million.
- (3) Dry weaving - no exhaust - 4 million.

Dust in weaving is produced by abrasion and velocity.

There are auxiliary operations in the weaving department such as barning, filling winding, bobbin stripping, which have dust problems at times. Depending upon the particular loom the dust can be excessive at times. The weave room must be treated as a number of possible dust concentrations.

The move on behalf of several manufacturers to get a program started to offer only wet woven cloth is underway. While for dust hygiene it may be ideal, the end fabric produced by wet weaving is not always acceptable to the customer. It is thought that there are some fabrics which may be wet woven without greatly changing their acceptability and this would help the dust problem in the weave room.

Draper weaving is basically a wet weaving department and little or no dust can be found.

Braiding:

Some braiders have exhaust systems. In general, the dust counts are low, less than 2 million.

Miscellaneous:

Radiant Heat Dryers: The high speed of this drying unit may be producing a dust problem in the creel section.

Packings: No appreciable dust.

Sevellite, Finishing: No dust problem.

Rubber Specialties: No asbestos dust.

Chrysotile, Amosite, Crocidolite:

We do not use any amosite, a very small amount of crocidolite is used in tape weaving and braiding. Our primary fiber is chrysotile.

Fiber Quality:

There is much talk of improved fiber quality, this means that the fiber as received from the mine has a lower dust concentration. This is measured by the percentage of fibers less than 1/200 of an inch in the long direction. The percentage may run from 10 to 15 percent based on present data. I understand that years ago this value was 70 to 75 percent.

on -200 fraction of asbestos fibers as received from the mine. The fibers used since about 1950 are different from those used during the 20's and 30's.

Personal Observations:

I first came to Garcon in 1944, at that time I was not as cognizant of dust as later. I cannot see any drastic change visually since that time. Since 1951 I do not think there has been any appreciable change. The old timers speak of extremely dusty conditions in the 20's and 30's. We have no way of knowing what dust concentrations actually existed. I would suspect concentration in the card room and preparation to have been very high. In all areas we probably ran over 5 million.

Engineering Data:

Mr. R. E. Smith may have information on when exhaust systems were installed and humidifiers. This was done prior to his employment in most departments, however, some records may be available for your use. I do not know when respirators were first introduced. I do not think it would be significant because a count indicated that only 7 people were wearing respirators on my last trip around the plant with Dr. Crailley.

(23)

GARCO
INTER-OFFICE MEMO

Dr. J. L. Goodman

Date Feb. 12, 1968

John Hawkins

Subject: Environmental Dust

Attached are some comments and observations on our environmental dust. We count all particles regardless of size or shape, this would include cotton, rayon, and other dust besides asbestos. Earlier data indicated that approximately 95% of the dust is asbestos.

If you desire specific information about any specific area or a person's job with regards to environmental dust, we can furnish this information. Based on dust counts the departments would be arranged from bad to good as follows: spinning - weave room - twisting - preparation - winding - carding - braiding. Within each department you will find a wide variation, making it necessary to know the exact machine in question.

cc: Ducker

Signed

John Hawkins

JAH:CH

PLAINTIFF'S
EXHIBIT

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Signed

Dust Counting Program:

The Greenberg-Smith method of dust counting was developed in 1927. We set up a program based on this method at Garco in 1957. Since this time we have fairly good records of the dust concentration in all departments. Information prior to 1957 is scanty. The Metropolitan Life Insurance Company (Mr. Fennell) made surveys in the 30's. I do not have this information. Mr. Heinsohn kept this report in the safe in his secretary's office. I have seen this report and it may be of some interest to you. In addition to the Metropolitan Life survey, the U. S. Public Health Department in 1945 made an extensive survey under the direction of Dr. Crailley. I do not know of other information on dust concentrations available. The U. S. Asbestos Division (Manhail) initiated a dust counting program prior to Garco.

Correlation of Data:

If I remember correctly the data obtained by the Metropolitan Life Insurance Company was generally the same as that being obtained today. Their method of collecting the sample was one in which the machine was isolated by curtains in order not to have external dust. Their data could not be directly correlated. The late Mr. Avery Nelson explained to me the method used by Metropolitan, also the collecting impinger turned on and off to simulate inhaling and exhaling.

The U. S. Health Department survey data indicated that our dust concentration was lower than what we had reported. Mr. Jerry Lynch of USPHS and I discussed this, and it can be attributed to the liquid used as the collecting fluid.

In 1961 I was chairman of a sub-committee at the Asbestos Textile Institute to write a procedure that would eliminate some of the variables. Each organization had different opinions as to the collecting fluid.

Johns-Manville	-	Distilled Water
American Asbestos	-	Isopropyl Alcohol
E. K. Porter	-	Ethyl Alcohol
U. S. Public Health	-	Distilled Water
Raybestos-Manhattan	-	Distilled Water

The E. K. Porter Company presented data to indicate that alcohol gave consistently higher dust count values than water. Alcohol will wet asbestos and cotton much quicker than water. I note in the British paper where ethyl alcohol was used. We changed over to ethyl alcohol, our earlier results are a little lower because of distilled water being used. I do not know whether the U. S.

Public Health Department ever changed over to alcohol. This accounts for their survey in 1965 giving lower values than what we had obtained.

Humidity

As the humidity increases there is a tendency for asbestos to gain weight and small particles to clump (theoretically). The heavier and bigger particles will sink to the floor more rapidly. E. L. Purter has a conditioned card room and run a series of test to determine the effects of humidity. Their data indicates that humidity per se had only a slight effect (if any) on the dust concentration.

Humidifiers that spray droplets of water are helpful in that a drop-let of water will hit dust particles, increases the weight considerably, and drop to the floor. Humidifiers are useful and are used in as many locations as possible throughout the plant.

The disadvantages of humidifiers are excess moisture in the summer time (water dripping from pipes and machinery) and the dampening of roving making it difficult to unwind. There is also a tendency for the humidifiers to be turned off due to the discomfort of the moist air on the operators.

Factors in Dust Concentration

- (1) Type and quality of fibers.
- (2) Exhaust system.
- (3) Type of processing involved.
- (4) Humidifiers.
- (5) Housekeeping.

Preparation Department

This department has an exhaust system connected to a wheelabrator. The humidifiers are used because dampness cannot be tolerated in this processing. The dust counts run from under 1 million to over 5 million. In preparation the fibers are removed from the burlap bags, opened, and blended. The high dust concentrations are in the areas where the fibers are being mixed with a pitchfork, or the fibers are being pushed into bales. The dust is produced by the handling of the fibers by the operators. If the machinery is in good mechanical condition, low dust counts are usually obtained except where the loose fibers are being thrown around by the operator.

Card Room

This department has an exhaust system connected to a wheelabrator. Humidifiers are used because dampness cannot be tolerated in this process. The dust counts are exceptionally low in the card room and are usually less than 1.5 million particles. During grinding and clean ups higher results can be obtained. The asbestos fibers