PLAINTIFF'S EXHIBIT

MET-97

Box 1.

PML-341

F.

4/19/79

Re: Industrial Hygiene Survey

of

Raybestos-Manhattan, Inc.

Stratford, Conn.

A third survey of this plant was conducted on October 17, 18 and 19, 1939 by the Industrial Health Section of the Metropolitan Life Insurance Company. The two previous surveys had been made during March, 1930 and June, 1935.

This plant is engaged in the manufacture of packing, gaskets, and brake linings. Since the previous surveys the woven brake lining processes have been eliminated and new processes have been installed.

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Exhibit F.

Plant Ventilation

The plant is housed in a number of one and two story brick buildings of modern construction. Ample natural illumination and ventilation are provided by numerous side wall windows and skylights. Offices are located in separate buildings apart from the manufacturing departments.

Sheet Packing Mfg.

Bldg. 6, Dept. 13. Sheet Packing

In this building sheet packing is made, from which brake lining, gaskets, and packing are stamped or cut.

Asbestos Room

Asbestos used in sheet packing is prepared for use in a crusher and opener. The asbestos is graded on screens. The asbestos passing through the opener is dumped on the floor and then hand shoveled into the opener. The opened asbestos is then conveyed by air to a hopper on the roof and dropped through pipes into the grading screens or directly into a hand truck. Scrap material is ground in a pulverizer, then conveyed by air to hoppers on the roof and dropped through pipes directly into bags. The lone operator in this room is supplied with an approved dust respirator. This room opens directly into the dry mold mix room and the main mixing and roll room. Since the previous survey, the equipment in this room has been improved. Sample 6 of 1935 survey and sample 3 of the present survey show that good results have been obtained.

Dry Mold Mix Room

Material for the dry mold mix is hand scooped from original containers and dumped into a barrel on a scale. Most of the materials used are

kept in loosely covered or uncovered containers. After the batch is weighed out, the operator carries the barrel up a flight of stairs to a platform and dumps the batch into the mixer. The mixed batch is then dropped from the bottom of the mixer into a truck. The materials used in these batches consist of rubber, bakelite, resin, softeiser (plasticiser) and scrap. Two rubber mills are located in this room. At the time of sampling one of these mills was operating. The rubber is thrown around the floor scattering some particles of dust. Respirators are available to the operator but it was noted that the respirator was not worn. No exhaust equipment is used in this department.

Rubber Compounding Room

This room is located at one end of the building and opens into the mixing and roll room. The operations in this room are intermittent. Batches containing large quantities of litharge (19% free lead) and mica are weighed out from original containers into a pan on a scale. The mica is received in bags. These bags are ripped open down the middle and allowed to lie on the floor. It was noticed that during the weighing considerable quantities of the litharge and mica were spilled upon the scale and floor where they were allowed to remain until close to the end of the shift. The floors and scale were then cleaned by dry sweeping. The complete batch contains liquid bakelite, sulphur, mica, asbestos, litharge, aroclor, scrap and rubber. The percent of litharge in the batch varies from 30 to 35%. The weighed batch is then trucked to the mixers into which it is dumped and mixed with gasoline and softener. The operator working in this department had been at one time supplied with a dust respirator but preferred to work without it, complaining that it interfered with his glasses. He also said it was too hot for comfort. This man stated that he has been engaged at this work for about seven years.

Mixing and Rolling

In this department the batches are mixed with a rolling in sigma mixers. The mixed material is then hand shoveled from the mixer into the rolls. One roll is hot, the other cold. The material adheres to the cold roll. The material is rolled to the desired thickness. From the rolls the material is then run into cutting tables where the sheets are cut to length. The gasoline used is recovered in a condenser located in the mixer room. From the sheets, rings, gaskets and packing are stamped out on power machines.

One end of the building is used for storage of raw material.

Main Building, Bank 20 - Asbestos Board

Asbestos board used in making clutch facing and a special material called LB is made in this department.

Scrap material and new asbestos are hand dumped into paper beaters, mixed with water and starch and worked to the proper consistency. The pulp is then passed through the rolls to the required thickness. The LB material which is composed of asbestos, atomized metallic lead, clay, gilsonite, graphite, and scrap are mixed in a beater and the pulp pumped to storage tanks. The atomized lead is about 200 mesh. The lead is dumped on a piece of cardboard on the floor in front of the beater and is sieved into the pulp by hand shoveling into a sieve resting on the top of the beater. The wet pulp is run from the beaters to storage tanks. From the storage tank the wet pulp is run into troughs (coffins) where the water is drained out, leaving the solid material in the trough. The solid material is then transferred to a heated press where it is pressed to required thickness, removed and cut into strips by hand. It was noted that the operator handling the atomized lead was told on others to clean

proximity did not wear respirators.

Cutting Unit. #21.

Asbestos board is cut to size for the punching machines. Facings are stamped out on machines by men and wiped and stacked on skips by girls. The composition of this board is practically 95% or more asbestos.

Finishing Unit. #24

Facings are cured and then finished. The finishing operations include grinding surfaces and edges on Blanchard, Cincinnati and cylinder grinders; drilling and shot blasting. All machines in this department are equipped with exhaust systems. On the Blanchard grinders and drilling operations these exhaust systems are augmented by the use of compressed air. At the time of this survey, the compressed air line on the grinder, machine #758, sample #19, had been moved out of position, causing puffs of dust to be dispersed into the atmosphere with each revolution of the grinder. This condition was readily remedied after attention had been called to the condition. Considerable dust adhering to the clutch facings is dispersed into the atmosphere when loading the machines and restacking the facings on the skips. No provision is made to entrap the dust at these points.

Dry Mold

This is a new operation. The mixture for this operation is made in building #6. At the time of this survey machines were being installed or renovated, so that tests taken at this operation would not have been representative. Therefore, no tests were made.

Pirmold

The materials used in the pirmold batch are sifted in small sifters

in a partitioned area on the main floor. These materials include asbestos, hardwood pitch, sulphur, lampblack, graphite, ribentine, powdered white lead and index oil. The hardwood pitch is run through a grinder four times to the required mesh. The pitch is hand scooped from the container into the grinder. This grinder is enclosed and exhausted. The powdered white lead, as well as the pitch and index oils, are kept in open barrels just outside the partition on the main floor. The compounded batch is used on the wire-mold machine which is also located in this partition. The men engaged at batch mixing wear dust respirators, but the men at the machine a few feet from the mixer are not so protected. The mixed material is pressed around a wire backing and is used to make brake lining. Information was advanced that plans and appropriations have been made to provide dust control at these operations.

Depts. #22 and 24 - Molded and Rubber Brake

Molded and rubber brake linings are finished in these departments. The operations consist of grinding and drilling. All machines, with the exception of a few small drill presses (machines #150, 277 and 93) are exhausted.

Dept. #28 - L8 Pressing

In this department L8 brake lining is shaped and pressed in mandrels. Soapstone is hand dusted to prevent the linings from sticking. The operator on this job wears an approved dust respirator.

Saturant Room

The dopes used on the brake linings and clutch facings are prepared and stored in a separate brick building. All solvents are kept and prepared in closed tanks. The main solvents used are xylol, formaldehyde, cresylic acid and acetone. The acetone is stored in tanks outside the building. The

prepared saturant is pumped to the saturation room as required. The asphalt used in the saturation is not a coal tar product.

Other operations and departments include inspection, assembly of parts and packing of finished product, also a machine shop and stock section. These operations are located in the east section of the main building. There are no dusts produced by these operations.

PERSONAL FACILITIES AND PLANT HOUSEKEEPING

Ample washing and toilet facilities are provided. Drinking water is supplied from mechanically cooled bubbler fountains. A restaurant is available to all employees. A first aid room under the direction of a full time nurse is maintained.

Housekeeping in general is good. Aisles are well defined and are always kept free from obstructions. Vacuum cleaning is employed on the rafters, walls and floors in the main building. It is planned to extend this to other buildings.

Safety meetings are held once a week, at which time the employees' representatives, as well as the foremen, are present and take an active part in the proceedings.

METHOD OF SAMPLING AND ANALYSIS

Atmospheric dust samples were taken with the impinger[1] and the solvent fumes with the interferometer at the breathing level of the workmen at representative operations. The interferometer is an instrument designed for use in detecting gases and vapors. The impinger, developed by the United States Public Health Service, is the standard method used in this country. Air is drawn in through a glass tube at the rate of one cubic foot per minute.

(1)U.S. Public Health Service, Public Health Bulletin #17, Determination and Control of Industrial Dust, J.J. Bloomfield and J.K. Wellavelle, 1915.

The tube ends in a constricted orifice under the surface of distilled water contained in a flask. The air passes through the orifice and impinges upon a glass plate which breaks up the air stream, allowing the dust particles to be wet and entrapped in the water in the flask.

Alcohol is added to the sample as a preservative to inhibit the solution of the fine particles and also to prevent the formation of agglomerates of the fine particles by clumping.

Suction is supplied for drawing the air sample through the impinger by means of an ejector, or else an electrically driven pump where compressed air is not available to actuate the impinger.

The dust counts were made by the methods and techniques developed and used by the United States Public Health Service.

The following table offers comparison of the results of analysis of samples taken at identical locations for the 1935 and 1939 surveys. As asbestos is involved at practically all operations, dust counts are given as total count in millions of particles per cubic foot of air.

Sample No.	Location	1939 Date of Sampling	Cu. Ft. Air Sampled	Mil. per Cu. Ft.	Handwritten	Milligrams Lead per cu. ft.	Milligrams Lead per 10 cu. m	1935 Sample No.	Date of Sampling	Cu. Ft. Air Sampled	Mil. per Cu. Ft.	Milligrams Lead per cu. ft.	Milligrams Lead per 10 cu. m	Type of Dust	Remarks
1	Bldg. 6, Dept. 19, exhaust room at [illegible]	10/13/39	30.0	11.1	12									Asbestos	[illegible]
2	Pulverizer, waste [illegible]	"	43.9	3.9	13			1	6/15/35	49.2	4.7			"	[illegible]
3	At [illegible]	"	31.0	4.2	19			4	"	8.3	10.5			"	[illegible]
4	Dry [illegible] mix room	"	31.9	20.0	158									Asbestos [illegible]	[illegible]
5	Between mixer #13 and roll #48, working batch #740	"	42.0	3.3	19	0.091	0.153	7	"	49.3	3.1	0.0335	0.136	[illegible]	[illegible]
6	Between mixers #337 and 313	"	35.0	49.0	304									Cortalite	[illegible]
7	Rubber compounding room	"	9.0	58.6	35	0.1795	127.0							[illegible]	[illegible]
14	Check on sample #7	10/13/39	17.9	45.2	210	0.1529	103.0							"	No dust control [illegible]
8	[illegible]	10/13/39	25.9	7.2	13	0	0							"	[illegible]
9	Between [illegible] #46 and mixers #342 and #341	"	42.3	2.5	5	0	0							"	[illegible]
10	[illegible], machine #459	10/13/39	25.9	3.1	1	0	0	7	"	43.7	1.7	0	0	"	
11	[illegible] Bldg. [illegible] Between [illegible]	"	34.0	3.5	21			11	6/16/35	17.3	3.4			Asbestos	[illegible]
12	[illegible]	"	10.5	6.6	30	0.0577	0.7							[illegible]	[illegible]
22	[illegible] job, at [illegible]	"	31.0	2.3	14	6	0							"	[illegible]
13	[illegible]	"	27.0	1.7	9			11	6/17/35	27.9	2.0			Asbestos	
16	[illegible]	"	38.3	2.3	20			1[illegible]	"	45.9	4.4			"	[illegible]
17	[illegible] machine [illegible]	"	26.9	4.4	38			17	6/17/35	19.4	1.6			"	[illegible]
18	[illegible] machines #159 and 27	"	27.2	3.1	19			14	"	45.9	1.9			"	No dust control [illegible]
19	Finishing, Dept. 7.4 [illegible]	10/16/39	46.2	14.9	87	0.0134	4.3	15	"	25.4	6.5	0	0	"	[illegible]
20	[illegible] machines #63, 42, 64, and 43	"	47.9	3.9	18	0.0003	0.105	[illegible]	"	11.5	2.6	0	0	"	[illegible]
21	Between [illegible] grinders, machines #457 and 135	"	41.9	2.9	14	0.0031	0.12	1[illegible]	"	42.1	13.9	0.0329	2.05	"	[illegible]
22	[illegible]	"	[illegible]	1.9	4	0	0							"	[illegible]
23	Steel [illegible] machine #125 and [illegible]	"	38.3	1.6	9	0	0							"	[illegible]
24	[illegible]	"	56.0	3.2	20	0.237	[illegible]							[illegible]	[illegible]
25	At [illegible] grinder	"	18.5	2.4	4									Pitch	[illegible]
25	Dept. 24, [illegible]	"	12.9	1.9	14										
26	Dept. 26, [illegible]	"	43.9	1.2	7	0	0								Only machines [illegible] not exhausted.
27	Rubber brake, drilling and grinding. Machines #174 and 216	"	38.9	1.5	15	0.00037	0.13								Exhaust applied.
28	Dept. [illegible] brake lining [illegible] machines [illegible]	"	47.9	1.1	[illegible]	0.0003	0.105							Asbestos	Exhaust applied.
30	Dept. #72, at internal grinder, machine [illegible]	"	22.0	1.6	1	0	0	25	6/15/35	3.7	14.4			"	Exhaust applied
31	Dept. #7[illegible], external grinder, machine #765	"	49.0	1.4	1	0	0	26	"	11.3	17.0			"	Exhaust applied
32	[illegible], grooving [illegible] brake lining [illegible]	"	47.0	4.1	1[illegible]										[illegible] to dust control [illegible] respirator [illegible]

CONCLUSIONS AND RECOMMENDATIONS

In the asbestos room the count at the crusher is high (sample #1). Apparently the operator was overloading the pans. Crushed asbestos was falling upon the floor, necessitating frequent sweeping and hand shoveling. It is recommended that the amount of material that can be handled without spilling on the floor be ascertained and controlled. Enclosing this crusher would also be of value. Since the other operations in this room are now well controlled, as evidenced by samples #2 and 3, it is not necessary to install an elaborate system for this one machine. The operator is supplied with and wears the proper type of respirator.

The dry mold batch weighing is a dust dispersing operation (sample #4). The operator is exposed to the heavy concentrations because of the close proximity of his face to the containers while scooping out the ingredients and carrying the weighed batch up the stairs to the mixer platform.

It is recommended that all batch weighing operations - dry mold, wire-mold and rubber compounding - be done at one point where effective control by exhaust systems should be installed.

Hand handling of materials should be eliminated as much as possible. The resin (bakelite) used in this batch may produce a dermatitis. Therefore, it will be necessary to provide some protection for the skin if the resin is to be handled by hand. Weighed batches should then be kept in closed containers when transporting to the department where they are to be used. Vacuum system should be used for all cleaning purposes.

The mixing and rolling operations do not present any dusty conditions, with the exception of mixers #312 and 313 (sample #6). At this point consider-

sible cardolite dust is dispersed when dumping and mixing, until the material becomes thoroughly wet. This is for a short time only. The floor around these mixers is slippery due to the spilled material and moisture. These workers could be adequately protected if they were supplied with an approved dust respirator while handling and dumping the cardolite. The floor should be kept free of the dust to eliminate the hazardous slippery condition that exists.

Concentrations of 128 to 160 parts per million of gasoline vapors were detected in department 19, mixing and milling room. This concentration is far below approximately 1,000 parts per million, which is the maximum concentration allowable for prolonged exposure.

The batch weighing operations in the rubber compounding room are definitely hazardous under the present methods of operation. Samples 7 and 14 show concentrations of lead far in excess of the toxic limits, which have been determined to be 1.5 milligrams in a ten-hour day. The dust respirators supplied to the operator are not approved for lead dust. As this operator has not worn the respirator supplied him and has been exposed for a period of seven years, on and off, it is recommended that he be physically examined. Symptoms of lead poisoning are given in the rear of the report for the information of your physician.

Sample #15 does not indicate the need for any further protection for the operators working in the vicinity of #4 heater, other than the proper type of respirator. As this is an intermittent and comparatively short operation, the insistance by the foreman that the respirators be worn should not be a serious hardship for the men.

Sample #19 (in the finishing department between Blanchard grinders 371 and 753) shows a definite hazardous condition. Although this result was

obtained under an abnormal condition due to improper setting of the exhaust system, it serves to demonstrate the need for periodic check-up of these systems by the engineering staff. The lead concentration found at this point is three times greater than the toxic limit. Sample #[illegible], between machines [illegible] and [illegible], indicates the more normal condition at the Blanchard grinders.

Sample #[illegible], department [illegible], shows a lead concentration approaching closely to the toxic limit. This condition could be eliminated by means of one central batch weighing and mixing department, as has already been suggested for other batch weighing operations.

The saturant room did not show any dangerous concentrations of solvents. Sixty-four parts per million of xylol were found. The maximum concentration for prolonged exposure of xylol has been estimated to be less than 100 parts per million.

It is recommended that when new processes are to be installed a study be made of the various ingredients in the material, as to their toxicity, and the proper protection applied at the beginning of the operation and while it is in the experimental stage.

Taking into consideration the amount of grinding and drilling done, the counts found were low, indicating the efficiency of the exhaust systems. The hazards in the plant are confined solely to the batch weighing and mixing operations. Proper control of these operations will eliminate the health hazards in this plant.

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The report of the survey made in June 1935 contains a discussion of health hazards of the toxic substances used. Reference should be made to this report in connection with the findings of the present report.