COPY

CAUSE NO. 2000-05-1962-C

ROBERT HENRY VILLARREAL, Individually and as Personal Representative of the Heirs and Estate of JOHN HENRY VILLARREAL	§	**IN THE DISTRICT COURT OF**
Plaintiffs,	§	
vs.	§	**CAMERON COUNTY, TEXAS**
GAF CORPORATION HOLDINGS, INC.), ET AL.	§	
Defendants.	§	**197TH JUDICIAL DISTRICT**

MEMORANDUM IN SUPPORT OF MOTION *IN LIMINE* OF DEFENDANT UNITED STATES GYPSUM COMPANY TO EXCLUDE EVIDENCE REGARDING JERSEY CITY PLANT AND BOOKKEEPER

Defendant **United States Gypsum Company** ("U.S. Gypsum") respectfully moves this Court *in limine* for an order prohibiting the introduction by plaintiffs of any and all evidence of and references to a manufacturing plant located in Jersey City, New Jersey.

I. BACKGROUND

U.S. Gypsum acquired the Jersey City plant from National Asbestos Manufacturing Co. ("National Asbestos") in 1936. A few months after acquiring the plant, U.S. Gypsum retained Dr. Leroy Gardner of Saranac Lake, a leading researcher in the field of dust-related diseases, to survey conditions and examine workers in the plant.

Dr. Gardner's 1936 report documented extraordinarily dusty plant conditions, consistent with the prevailing conditions in industry generally at the time. *See* Report of Dust Survey at National Asbestos Co. Plant of United States Gypsum Co. at Jersey City, N.J., July 31, 1936 (attached as Exhibit A).[1] According to the report, dust levels in the plant U.S. Gypsum acquired were as high as hundreds of millions of particles per cubic foot of air. Workers were handling large amounts of raw asbestos on a continuous basis in an industrial setting common at the time. The report made recommendations regarding use of respiratory protection, ventilation and medical examinations for plant workers. The report also recommended target levels for asbestos and other dusts in the plant. After receiving Dr. Gardner's report, U.S. Gypsum took steps to implement the recommendations in the report. In addition, within a few years of acquiring the facility, U.S. Gypsum discontinued production of most of the National Asbestos product lines associated with dusty conditions at the Jersey City plant.

Plaintiffs have listed as trial exhibits documents relating to the Jersey City plant and the 1930s, including Dr. Gardner's report on the condition of the plant and documents referring to that report, and documents relating to the existence of an alleged claim of a former National Asbestos bookkeeper who worked in the Jersey City plant. The bookkeeper never worked for U.S. Gypsum, nor did he work at the Jersey City plant after U.S. Gypsum acquired it. These documents, and all other evidence relating to the Jersey City facility or the bookkeeper's claim should be excluded.

II. ARGUMENT

A. The Evidence is Irrelevant.

1. The Jersey City Facility

The condition of the former National Asbestos plant, and of the workers there, is irrelevant to U.S. Gypsum's knowledge of the health effects, if any, of exposure to asbestos in the circumstances and conditions alleged by plaintiffs in this action. Plaintiffs never worked in any U.S. Gypsum facility that processed or handled raw asbestos or made asbestos-containing products. There is absolutely no evidence suggesting that plaintiffs were ever exposed to

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[1] U.S. Gypsum has attached copies of certain documents to this memorandum for the Court's convenience. By so doing, U.S. Gypsum does not waive its objections to the admissibility of those documents.

airborne asbestos levels from U.S. Gypsum products that were anything like those that existed at the Jersey City plant when U.S. Gypsum acquired it. None of the U.S. Gypsum products to which plaintiff allegedly was exposed were the type of products made at the Jersey City facility in the 1930s.

Plaintiffs have also listed as trial exhibits documents containing commentary by U.S. Gypsum employees regarding Dr. Gardner's report on the Jersey City plant. Among those documents is a memorandum that reads, in part, as follows:

> Dr. Gardner points out that various authorities have tentatively suggested a concentration of five million particles of free silica per cubic foot of air as limits above which a silicosis hazard might exist, and this value has met with some recognition. *There is no standard for safe concentration of asbestos dust comparable to the value just given free silica dust.*

Memorandum to W.L. Keady, Aug. 13, 1936 (emphasis supplied) (attached as Exhibit B). Plaintiffs' lawyers have attempted in numerous cases to argue that the italicized language above represents a recognition by U.S. Gypsum in 1936 that exposure to asbestos at any level posed a health hazard.

As an initial matter, any suggestion that U.S. Gypsum knew in 1936 that any level of asbestos exposure posed a health hazard is absurd in the context of later developments in the 1930s and 1940s. In a 1938 report, the United States Public Health Service, based upon extensive study of the issue, recommended an allowable exposure concentration for asbestos of five million particles per cubic foot of air -- the same level recommended by Dr. Gardner in the Jersey City report. The Public Health Service wrote that "[b]ecause clean-cut cases of asbestosis were found only in dust concentrations exceeding 5 million particles per cubic foot, and because they were not found at lower dust concentrations, *5 million particles per cubic foot may be regarded tentatively as the threshold value for asbestos-dust exposure.*" W. Dreessen, *et al.*, "A Study of Asbestosis in the Asbestos Textile Industry," Pub. Health Bulletin No. 241, at 91 (U.S.P.H.S. Aug. 1938) (emphasis supplied) (attached as Exhibit C). A few years later, the

American Conference of Government Industrial Hygienists set its "threshold limit value," or "TLV," at the same level, where it remained until 1970.

Courts reviewing plaintiffs' characterizations of Dr. Gardner's findings at the Jersey City plant, and U.S. Gypsum discussions regarding those finding, have rejected plaintiffs' interpretation of the document. For example, the District of Columbia Circuit explained that plaintiff:

> seeks to treat as a smoking gun the letter's observation that "[t]here is no safe standard for safe concentration of asbestos dust comparable to the value just given for free silica dust." In context, however, this is simply a statement that, due to the absence of enough research, no one could yet identify the safe level for occupational exposure.

Wesley Theological Seminary of the United Methodist Church v. United States Gypsum Co., 876 F.2d 119, 123 (D.C. Cir. 1989), *cert. denied*, 494 U.S. 1003 (1990). The court affirmed the trial court's exclusion of the document as being "of remote relevance at best" and duplicative of other evidence regarding the health effects of prolonged, high-level exposure to asbestos. *Id.*; *see also Sealover v. Carey Canada*, 793 F. Supp. 569, 576-77 (M.D. Pa. 1992) (citing *Wesley* in rejecting plaintiff's interpretation).[2]

2. The National Asbestos Bookkeeper

Similarly, evidence regarding the personal injury claim of the former National Asbestos bookkeeper is irrelevant to any issue in this case. That claim was not asserted against U.S. Gypsum, and in fact was only filed against National Asbestos after U.S. Gypsum acquired the facility. Given the conditions documented by Dr. Gardner, it is apparent that the bookkeeper, who claimed to have worked in an office inside the plant, was exposed to extremely high levels of airborne dust. Dr. Gardner described the following conditions at the plant:

> . . . Asbestos, clay and other minerals are dumped through chutes into enclosed rooms, or bins, located at the south end of the third floor, from which screw conveyors carry the material to the first floor where it is bagged as asbestos

[2] In implicit recognition of the validity of this characterization of the document, plaintiffs' lawyers frequently attempt to present to the jury a heavily edited version of the document which omits the comparison between the asbestos and silica issues. U.S Gypsum requests that the Court preclude plaintiffs from presenting to the jury any incomplete or otherwise misleading copy of the document or its text.

> cement. Also on the third floor are machines for corrugating paper and for making asbestos pipes, a canvas room in which asbestos paper is cut into strips, and saws for cutting asbestos boards. Waste from the saws is discharged through a pipe into a "dust house" on the first floor. *The office occupies part of the second floor. . . .*

(Emphasis supplied). Thus, the office where the bookkeeper worked was located below a number of operations involving the handling, dumping, cutting and sawing of dry asbestos or asbestos-containing products, and through which such materials passed on conveyors and through a pipe. The floor below the office contained a "dust house." Plaintiff's own exhibits suggest that the bookkeeper alleged in his claim against National Asbestos that "[o]n occasions he had to enter the factory where actual manufacturing took place," and that "he was caused to inhale asbestos dust which circulated about the office" due to "improper ventilation that failed to remove such dust from the air."

As a result of conditions at the facility before U.S. Gypsum acquired it, the bookkeeper's alleged exposure to raw asbestos in an asbestos-processing plant cannot be analogized to the type of exposure alleged by plaintiff. Moreover, the contention of plaintiffs' lawyers that the bookkeeper's claim, which was not asserted against U.S. Gypsum, constituted notice to U.S. Gypsum of disease from a "non-occupational" or "bystander" exposure, is simply inaccurate. On the contrary, a review of the Jersey City materials demonstrates that the bookkeeper's exposure was almost certainly very similar to that of persons working in the actual production areas of the Jersey City plant. Courts have recognized that documents relating to the bookkeeper do not demonstrate knowledge by U.S. Gypsum of "risks" to construction workers who were on-site when asbestos-containing products were installed. For instance, the *Sealover* court stressed that:

> asbestos-plant workers were exposed to far greater quantities of asbestos dust than the average construction worker, because their work environments differed. The manufacturing process generated enormous quantities of dust. Day after day, each worker labored in the same location and was exposed to the same, extremely dusty conditions. Ventilation was ofttimes non-existent during the early manufacturing days, and the workers had no reprieve from the repetitive accumulation of asbestos dust. Knowledge that workers laboring under

> suchconditions suffered from a cumulative exposure to asbestos cannot be equated with knowledge that construction workers, presumably laboring under less disagreeable conditions and less dusty conditions would suffer the same ill-effects to the same degree. . . . Clearly, then, evidence that U.S. Gypsum was on notice that a bookkeeper in one of its manufacturing plants contracted asbestosis does not equate to knowledge that construction bystanders, such as [plaintiff], were equally at risk.

793 F. Supp. at 578-79; *cf. School District of the City of Independence, Missouri, No. 30 v. United States Gypsum Co.*, 750 S.W.2d 442, 448 (Mo. App. 1988) (trial court did not err in excluding documents regarding bookkeeper because they related only to U.S. Gypsum's "general knowledge of the hazards of asbestos exposure").

B. Evidence Relating to the Jersey City Plant and the National Asbestos <u>Bookkeeper Presents the Risk of Unfair Prejudice, Delay and Confusion.</u>

Any remote probative value of evidence relating to the Jersey City plant and the National Asbestos bookkeeper is outweighed by the danger of unfair prejudice to U.S. Gypsum. The documents listed by plaintiffs in this case bear at most only the slightest relevance to any of the issues in this case. This case does not involve the type of high-level, prolonged exposure to asbestos reflected in the Jersey City and bookkeeper documents, and the introduction of those documents threatens to mislead the jury into believing that conditions such as those at the Jersey City plant bear some resemblance to the facts of this case.

In addition, plaintiffs would like to use the documents to argue to the jury that U.S. Gypsum was a "bad company" because, decades before any alleged exposure of plaintiff to any U.S. Gypsum product, U.S. Gypsum owned a plant that briefly operated under the conditions described in the Jersey City report until U.S. Gypsum took steps to improve conditions at the plant. Any such misuse of the documents would prejudice U.S. Gypsum by allowing plaintiffs to suggest to the jury an improper basis upon which to render a verdict against U.S. Gypsum. *See Wesley*, 876 F.2d at 123 (affirming exclusion of Jersey City document as unduly prejudicial).

Admission of evidence relating to Jersey City and the National Asbestos bookkeeper would also create the risk of delay and confusion of the issues in this case. The documents expressly relate to exposure scenarios dissimilar from and unrelated to the exposures in this case. Moreover, in order to respond to the documents, U.S. Gypsum would be required to introduce additional documents to present the complete background relating to its acquisition of the Jersey City plant from National Asbestos, conditions at the plant at the time of its acquisition, the purported exposure of the bookkeeper, and the steps taken by U.S. Gypsum to address the conditions. Presentation of evidence on these collateral issues would consume additional time and further complicate what will already be a lengthy and complex trial. These risks outweigh the extremely marginal relevance and duplicative nature of the evidence.

C. Evidence Relating to the National Asbestos Bookkeeper Lacks Foundation and Constitutes Inadmissible Hearsay.

The evidence pertaining to the National Asbestos bookkeeper consists of multiple layers of hearsay and unsubstantiated allegations. There is simply no reliable information regarding the allegations allegedly made by the bookkeeper. There is no way to verify the facts alleged or, more importantly, to explore whether the bookkeeper had any asbestos-related health condition or any prior asbestos exposure. None of the documents was authored by him or anyone purporting to act on his behalf, and none provides any explanation of or means of confirming the existence or nature of his purported medical condition. Details such as his age and prior medical and employment histories are completely unknown. There is no means by which U.S. Gypsum may, more than 60 years after the events in question, explore these issues, or even verify that the bookkeeper worked at the plant. Accordingly, the documents should be excluded because they lack foundation and constitute inadmissible hearsay.

III. CONCLUSION

For the foregoing reasons. U.S. Gypsum requests that all evidence regarding the Jersey City plant and the National Asbestos bookkeeper be excluded.

Respectfully submitted.

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CERTIFICATE OF SERVICE

This is to certify that a true and correct copy of the foregoing document has been sent to counsel for Plaintiffs, by certified mail, return-receipt-requested, on this the 12th day of January, 2001.

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Exhibits for:

Memorandum in Support of Motion *In Limine* of Defendant United States Gypsum Company to Exclude Evidence Regarding Jersey City Plant and Bookkeeper

EXHIBIT "A"

3035

Report of Dust Survey at National Asbestos Co.

Plant of United States Gypsum Co. at Jersey City, N. J.

Made by the Saranac Laboratory

May 25 - June 2, 1936

Received July 31, 1936

The National Asbestos Co. plant of the U. S. Gypsum Co. was investigated in a survey made on May 25-June 2, 1936, and the nature and extent of dust exposure encountered there by workers are reported herewith. At this plant are manufactured various asbestos products such as asbestos paper, pipe coverings, cement and liquid roofing, and asphalt composition roofing and shingles. Paper for the composition roofing also is made here. The plant was formerly owned by the National Asbestos Co. and has been operated by the U. S. Gypsum Co. for only a few months.

Plant Layout

The manufacture of asbestos cement and pipe coverings is carried on in #1 building. Asbestos, clay and other minerals are dumped through chutes into enclosed rooms or bins, located at the south end of the third floor, from which screw conveyors carry the material to the first floor where it is bagged as asbestos cement. Also on the third floor are machines for corrugating paper and for making asbestos pipes, a canvas room in which asbestos paper is cut into strips and saws for cutting asbestos

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1057

boards. Waste from the saws is discharged through a pipe into a "dust house" on the first floor. The office occupies part of the second floor. Most of the first, second and fourth floors are for storage.

The roofing and paper machines are arranged along parallel lines in #2 building. In making roofing heavy paper is unwound from a large roll and passed through a vat of liquid asphalt. Farther on a heavy layer of coarse granules is added to one side of the sheet, and a light coating of mica or soapstone to the other side. Finally the long sheets are wound into rolls or cut off to make shingles. The roofing and paper machines are parallel, of approximately the same length and about 15 feet apart. At the end of the paper machine in this building and also in #5 building are the beaters into which the base material (asbestos, rags, scrap paper) is dumped. Water is added to make a semi-fluid mass and the mixture then passes through the rolls of the machine until it emerges as paper. In #5 building, on the fifth floor, rags for making paper stock are shredded in the rag cutters. After dropping to the second floor they are weighed and are then fed to the beaters on the first floor.

Liquid roofing is manufactured in a moderately-sized room in the warehouse building. Bags of asbestos dust and asbestos fiber are dumped into a small tank, asphalt is added, the mixture is stirred thoroughly, and the liquid mass is then drawn off and transferred to cans.

Much of the plant floor space is for storage. There is a large warehouse for roofing rolls and another for shingles.

besides considerable space for storing other material.

Permissible Standards of Dustiness

The development of any form of pneumoconiosis depends upon the breathing of air containing mineral particles which must be sufficiently high in concentration, fine in size and hazardous in nature to cause permanent injury to the lungs. Thus far only free silica minerals, such as quartz, flint and chalcedony, and fibrous minerals described as a group by the term "asbestos", have been proved to be the cause of a definite pathologic fibrosis. While it cannot safely be said that other minerals containing silica are without danger, it is generally recognized that the extent to which a possible dust hazard exists is indicated principally by the concentration in the industrial atmosphere of free silica or asbestos particles of respirable size.

Various authorities have tentatively suggested a concentration of 5 million particles of free silica per cubic foot of air as a limit above which a silicosis hazard might exist, and this value has met with some recognition. The figure just given refers to dust samples collected with the Greenburg-Smith impinger apparatus and counted by the standard technique of the Public Health Service.

There is no standard for the safe concentration of asbestos dust comparable to the value just given for free silica dust. However, the results of a survey made in four asbestos fabricating plants and reported in 1935 in Bulletin #42, Dept. of Labor and Industry of Pennsylvania, give pertinent data on the subject and are summarized below.

No one in a group (10 persons) with less than 5 years exposure had asbestosis (with the exception that one person was classed as doubtful).

30 per cent in a group (14 out of 46 persons) with more than 5 years exposure had asbestosis.

The incidence of asbestosis was directly related to the concentration of asbestos dust to which workers were exposed, as brought out in the following table. (Petrographic analyses failed to disclose the presence of free silica in dust from the plants studied).

Incidence of asbestosis among workers with more than 5 years exposure:

Average Dust Concentration for Each Group Studied	Percentage of Each Group Having Asbestosis
Particles per cu.ft.of air.	
44 million	73 %(8 out of 11 persons)
17 "	27 "(4 " " 15 ")
5 "	10 "(2 " " 20 ")

The authors of the report conclude that it is not possible from their findings to establish the maximum safe concentration of asbestos dust in the air.

In another study on asbestosis (U. S. Public Health Service Reprint #1665, 1935) Lanza, McConnell and Fehnel report that 43 per cent of a group with less than 5 years exposure had asbestosis and that the proportion had increased to 87 per cent in a group with more than 13 years exposure. They also state that "it is not practicable as yet to establish standards for the asbestos dust content of air".

While asbestosis may be a milder type of fibrosis than is silicosis, it does not appear from the studies mentioned above that a standard for a safe concentration of asbestos dust would permit a greater concentration than the value already given for free silica dust. It is quite possible that the safe limit might be even lower for asbestos than for silica. For the present it would seem best to attempt to keep the concentration of asbestos dust less than 5 million particles per cubic foot of air counted by light field examination.

Dusts Encountered in Plant

A great variety of minerals which go to form air-borne dust is used in the plant. Among them are asbestos, infusorial earth, slate, clay, soapstone, mica and limestone. Some of these minerals are definitely hazardous; others are probably not very dangerous although conclusive proof is lacking; and still others have been shown to be practically harmless.

Asbestos can be classed as hazardous and diatomaceous or infusorial earth, which is a hydrated form of free silica, may perhaps fall in the same category. Asbestos has been shown by both clinical and experimental evidence to be capable of giving rise to pulmonary fibrosis. Uncompleted experiments indicate that diatomaceous earth is like other kinds of free silica minerals in causing pathologic reaction in animals. Clinical proof of its harmfulness is still lacking. Slate, clay, soapstone and mica are all silicate minerals. Most authorities agree that the silicates, except asbestos, cannot be regarded as distinctly dangerous as are quartz and other varieties of free silica, but it should be noted that frequently some free silica accompanies silicate minerals and may present a hazard. Limestone is a calcium carbonate mineral and extensive experiments carried on with marble dust, another variety of the same mineral, failed to reveal any hazard associated with the inhalation of dust of that composition.

Rags and scrap paper used in making paper are also sources of dust. Nearly all this dust is undoubtedly either organic particles, such as lint fibers or pieces of paper or cloth, or else non-hazardous mineral particles. There is little likelihood that appreciable quantities of dangerous minerals are present in this dust, although the possibility that the rags and scrap paper may carry pathogenic bacteria must be considered. Fumes arising from the asphalt vat simulate dust, and although very undesirable from a hygienic standpoint they do not appear to increase greatly the amount of dust in suspension.

Dust Concentrations in Plant

Dust samples were collected with the same Greenburg-Smith impinger apparatus used in other dust surveys for the U.S.Gypsum Co. and the particles were counted with both light field and dark field illumination. The former method of illumination is the standard of the U. S. Public Health Service; the latter is a technique employed by many investigators to detect the smaller particles not revealed by the light field method. Dust counts for both methods are tabulated at the end of this report. The collecting fluid for all samples was 95 per cent ethyl alcohol.

#1 Building (and liquid roofing room)

On the third floor of #1 building are the rooms or bins in which asbestos, soapstone, infusorial earth, etc. are fed into the screw conveyors. These are small rooms about 20 ft.

square, completely enclosed and having no ventilation, and men working in them are exposed continuously to a high concentration of dust. Thus inside #1 bin in which a man was shoveling Italian fiber (asbestos) the concentration was 296 million particles per cu. ft. of air; inside #2 bin, where bags of asbestos, clay, etc. were opened and the contents pushed into the screw conveyors, the count was much lower, being only 22 million. This indicates that considerably more dust is stirred up by shoveling the material than by emptying it from bags. Over the opening on the fourth floor through which the bins are supplied asbestos and other material the dust concentration was found to be 79 million particles per cu.ft.of air. All men working in or over the bins wore respirators and the high dust counts emphasize the necessity of their continuing to do so.

Also on the third floor is the machine at which asbestos boards are sawed. The dust concentration there was not very high, being only 8 million particles per cu.ft. of air, but that value is somewhat above safe limits. It would appear desirable to equip the machine with an exhaust system; also, if feasible, to arrange the rotation of the saw so that the dust is thrown away from the man instead of toward him.

Several dusty operations are conducted on the first floor. Loading bags with asbestos cement was responsible for a concentration of 261 million particles per cu.ft. of air. As the cement is about 60 per cent asbestos besides containing diatomaceous earth, the dust is highly hazardous. There was no provision for removing dust set up by this operation. Even though the men wear respirators, the installation of an efficient system of exhaust ventilation would seem to be a necessity, not only to protect the men loading the bags but also to prevent the diffusion of dust into the general atmosphere. That there was much dust suspended in the air was shown by sample #6, taken about 40 ft. away, for which the count was 42 million. Men trucking asbestos cement and paper in that vicinity are thus exposed to a high concentration of dust. Another dusty operation is shoveling waste felt and asbestos from the dust house into bags, for which the count was 72 million. The helper assisting in this operation wore no respirator. All men who work in such high concentrations of dangerous dust should be compelled to wear respirators; but a determined effort should be made to eliminate most of the dust by installing an exhaust system of ventilation, by arranging to fill bags without creating so much dust, by improving the dust house to reduce leakage and permit the removal of waste felt and asbestos with less exposure to the man, and by providing better ventilation in general.

Fixing liquid roofing involves the exposure to considerable dust as the concentration next to the vat was found to be 165 million particles per cu.ft.of air. Most of this was asbestos because the ingredients of liquid roofing are asbestos saw dust, asbestos fiber and asphalt. The high count shows how important it is that the man continue to wear his respirator. An exhaust system of ventilation over the vat is very desirable not only to get rid of dust but also to remove fumes arising from the asphalt. Also, the vat should be covered.

Corrugating Machine

There was little dust near the corrugating machine. Samples taken at the feed end and at the discharge end both showed the dust concentration to be less than 1 million particles per cu.ft. of air. The concentration in the canvas room where asbestos paper is cut off in strips for making pipes was about 2 million.

Roofing Machine

With one exception dust counts for samples collected near the roofing machine, although slightly higher than for the survey of the North Tonawanda roofing plant, were not excessive. Comparative light field counts are tabulated below.

	Light Field Count (in millions)	
	Jersey City	North Tonawanda
At saturator	3.3	2.1
Coater tender	5.3	3.3
Backing man	5.4	1.9
Feeding slate flour	1712.9	-
Shoveling granules	3.2	-
Shingle machine	3.0	0.8

From a hygienic standpoint the condition of the atmosphere at the roofing machine was quite unsatisfactory. Fumes from the open asphalt vats diffuse through the air and there is little or no ventilation to carry them away. Plans have been made to enclose the asphalt vats at the North Tonawanda plant more fully; such a change is even more desirable for the Jersey City plant because there ventilation is poorer and men at both the roofing and the paper machine are exposed to the fumes.

The sample taken on the platform above the roofing machine, where slate flour is dumped into a tank, shows that the man working there is exposed to an exceedingly high concentration of dust. For even a harmless dust the concentration would be excessive, but since slate flour contains some free silica there would appear to be a possible silicosis hazard. This very dusty condition should be eliminated, possibly by covering the tank and arranging an exhaust removal of dust. In the meantime the man should wear a respirator. Provision should also be made for improving the ventilation.

Paper Machine

The dustiest operation associated with the manufacture of paper is the handling and cutting of rags. Unfortunately no dust sample could be obtained, since no rag paper was being made. At the Skaneateles Falls plant the dust concentration near the rag cutter was 58 million particles per cu.ft. of air; it was undoubtedly much higher in the Jersey City plant because additional dust was released when the rags dropped from the fifth to the second floor. As noted in the survey report for the Skaneateles Falls Mill it would appear desirable to furnish respirators to men working in such a dusty atmosphere and also to provide better ventilation.

The dust concentration near men filling the beater machines was 8 million particles per cu.ft. of air when paper stock was used and 10 million when the material was asbestos.

Since the latter count is somewhat higher than a safe value, the men should wear respirators when filling the beaters with asbestos.

Much dangerous dust is set free when empty asbestos bags are shaken out so that the man doing this work is exposed to 35 million particles per cu.ft. of air, a concentration well above safe limits. It is suggested that this operation be eliminated, possibly by shaking out the bags in a bag wheel as is done with empty cement sacks. In the meantime the man should wear a respirator.

In the passageway along the paper machine the concentration of dust was about the same as near the roofing machine, being 5 million particles per cu. ft. of air. Most of this dust probably comes from the roofing machine.

<u>Miscellaneous</u>

For samples taken in the roll warehouse and shingle warehouse, representing the average dust condition in those buildings, the counts were less than 2 million particles per cu. ft. of air; for a sample collected in the machine shop it was less than 1 million.

<u>Summary and Conclusions</u>

1. It is recommended that the concentration of free silica or asbestos dust to which men are exposed be kept less than 5 million particles per cu.ft. of air by light field examination. Men exposed to greater concentrations should wear respirators.

2. It is suggested that until the dust condition be brought within safe limits respirators be worn by the following men (in addition to those already supplied with them):

(a) All men on the first floor of #1 building especially those working at the dust house and loading asbestos cement.

(b) The man feeding slate flour above the roofing machine.

(c) Men working near the rag cutter.

(d) Men at the beaters when dumping asbestos into the vat.

(e) The man who shakes out asbestos bags.

3. An exhaust system of dust removal would be very desirable for the following operations:

(a) Sawing asbestos boards.

(b) Loading bags with asbestos cement.

(c) Mixing liquid roofing.

(d) Feeding slate flour.

4. The ventilation should be improved in several localities:

(a) On the first floor of #1 building.

(b) At the roofing machine, especially around the asphalt vat and on the platform where slate flour is added.

(c) Near the rag cutter.

5. The diffusion of dust, especially dangerous dust, into the atmosphere should be reduced as much as possible. Special attention should be given to preventing leakage from the dust house and asbestos cement loader on the first floor, and from the slate flour and liquid roofing mixing vats (possibly by covering them).

6. The present method of feeding slate flour filler over the roofing machine should be changed to reduce the dust hazard.

7. Empty asbestos bags should be shaken in some way which does not allow the asbestos dust to diffuse into the atmosphere.

8. Men inside the bins on the third floor of #1 building work in a high concentration of dangerous dust. It would be desirable to develop a method of supplying material to the screw conveyors without requiring the continuous exposure of men to the dust.

Summary of Medical Findings

The majority of the physical examinations were made by Dr. Arthur B. Bliss; a few were reported by Dr. Hill. The x-ray films of the chest taken by Dr. Perlberg were interpreted by Dr. H. L. Sampson. Occupational histories were taken by Mr. Fred H. Sephton.

To date there have been 206 employees examined of whom 160 had worked more than 1 year and could be properly considered as old employees. Eight of the entire group were young women under 23 years of age. The age distribution of all employees, shown in Table I, indicates that practically all of them are under 50 years of age. We have no information as to whether there were older individuals who quit work because of disability; but the lack of complaints in the history of those still employed suggests that this was not the case.

Table I

Age Distribution in 206 Employees

Age Periods	Number of Employees	% of Total Group
15-20	26	12.6
21-25	40	19.5
26-30	29	14./
31-35	27	13.1
36-40	30	15.5
41-45	20	9.7
46-50	30	15.5
51-60	4	1.8

These individuals were apparently in good physical condition and made no complaint. Aside from incidental findings, that have been noted on the examination blanks and will undoubtedly receive the attention of the plant physician, the only common abnormalities were chronic tonsillitis and bad teeth and gums. In view of the prevalence of these conditions in the general population they can hardly be attributed to occupation.

In Table II are tabulated all of the employees, grouped according to the major occupations in which they were employed at the time of the survey. This arrangement is of doubtful value owing to the fact that the factory superintendent usually assigned each man to a job for the day; on the following one he might work in another place with a different dust exposure. However, as it is necessary to tabulate all of cases in some form the one adopted seems as useful as any.

ROOFING MACHINE ATTENDANTS

(Some mica, soapstone or slate flour)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
283	J. Skiba	19 yrs.	3 mos.	0	0	Moving rolls of roofing material
264	S. Gluhan	18 "	1 yr.	0	0	Moving rolls
281	S. Marinki	21 "	1 "	0	0	Moving roofing material
285	M. Wanot	19 "	1 "	F_1	✓	Mixing granules brick and stone
286	W. Buska	26 "	1 "	F_1	0	"
301	J. Czerwanski	38 "	1 "	F_1	✓	Slate and coating [illegible]
390	P. Majewski	45 "	1 "	0	✓	Mixes slate granules
230	I. Kwityn	43 "	18 mos.	F_1	✓	Moving roofing material
269	J. Stefanowsky	40 "	2 yrs.	F_1	✓	Mixes slate
271	A. Tchis	46 "	2 "	F_1	0	" slate flour in coating tank.
279	S. Sparks	21 "	2 "	F_1	0	Cutting shingles
300	L. Niedz	24 "	2 "	F_1	✓	Coats roofing with asphalt
260	S. Tobias	27 "	3 "	0 P.C.	✓	Dumps wheel-barrows
267	H. Farmer	32 "	4 "	0	0	Saturates felt roofing paper
268	N. Wanot	52 "	4 "	F_1	0	Mixes slate
284	J. Hustyk	22 "	4 "	0 P.C.	0	Mixing granules, brick/stone
277	F. Baltazuk	23 "	5 "	0	0	Cutting shingles
263	L. Panasuit	47 "	6 "	A_1	✓	Oiler
278	J. Yosey	39 "	6 "	F_1	0	Cutting shingles
265	A. Dennis	36 "	8 "	0	0	Rolls felt
262	D. Collins	34 "	9 "	F_1	0	Keeps fire in asphalt still
266	D. DiTorta	34 "	10 "	F_1	0	Saturates felt roofing paper
272	E. Gernardt	46 "	11 "	F_1	✓	Rubs soapstone on rollers

ROOFING MACHINE ATTENDANTS (continued)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
275	E.Howard	26 yrs	11✓ yr.	0	0	Cutting shingles
274	S.Schemchuk	41 "	12 "	0 P.C.	0	Cutting shingles
270	N.Tarby	46 "	18 "	F_1 Chr. Active TB	✓	Mixes slate flour in coating tank
273	F. Kowal	42 "	18 "	A_1	✓	Rubs soapstone on rollers

RAG BEATER HELPERS

(very heavy lint and fuzz)

All men in this department at some time or other are engaged in shaking bags of asbestos into a feeder - making asbestos paper. Fairly heavy asbestos exposure at time.

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
251	C. Cress	31 yrs	1 mo.	F_1	0	Cutting rags in bales
247	T. Marinki	45 "	5 "	F_1	0	"
250	P. Marcenkus	46 "	5 "	F_1	0	"
240	J. Clow	46 "	1 yr.	0(Heart)	0	"
242	S. Skiba	46 "	1 "	A_1(Inf.)	✓	"
249	P. Homick	39 "	1 "	F_1	✓	"
253	C. Hurtuk	47 "	1 "	0	0	"
236	J. Bojar	46 "	1 "	F_1	0	"
239	V.Twardusky	49 "	2 "	F_1	0	"
246	J. Sokel	49 "	2 "	A_1?	✓	"
233	D. Rodgers	32 "	3 "	0	0	"

RAG BEATER [illegible] (Continued)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
243	H.Stanford	35 yrs	5 yrs.	0 P.C.	+	Cutting rags in bales
248	J.Buda	37 "	5 "	F_1	0	"
244	J.Liszkiewicz	45 "	8 "	F_3	+	"
245	T.Smith	35 "	9 "	0	0	"
235	W.Wandowski	48 "	9 "	F_1 (Healed TB)	+	"
234	M.Gluhan	46 "	10 "	F_1	0	"
237	J.Britt	37 "	10 "	0	0	"
241	H.Sligen	31 "	11 "	F_1	0	"

SHINGLE PACKERS AND SHINGLE STACKERS

(General Dust)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
337	R. Campion	18 yrs.	1 mo.	0	0
344	W. Witkowski	19 "	1 "	TB?active	0
334	W. Jankowski	23 "	2 yrs.	0	0
293	W. Patterson	31 "	2 "	0	0
335	J. Evans	38 "	4 "	0	0
340	J. Carter	34 "	2 "	0	0
342	R. Ellis	33 "	4 "	0	0
333	J. English	23 "	5 "	0	0
338	F. English	24 "	5 "	0	0
343	J. Parker	33 "	7 "	0	0
336	F. Ellis	30 "	9 "	0	+
341	C. Johnson	37 "	14 "	F_1	+

TRUCKING IN WAREHOUSE

(Loading trucks with shingles and rolled roofing)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
357	C. McCullough	23 yrs	1 mo.	0	+
355	P. Pelle	18 "	3 "	0	+
359	V. Zazula	20 "	4 "	0	0
351	John O'Connell	44 "	2 "	F_1	+
356	J. Czerapaka	23 "	2 "	0	0
352	J. Nieland	29 "	4 "	F_1	0
353	I. Cook	30 "	4 "	0	0
177	C. Watkins	29 "	5 "	F_1	0
176	A. Watkins	44 "	10 "	F_1	0

UNLOADING CARS MIXING ASBESTOS CEMENT

(Very heavy asbestos dust.)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
106	J. Wojnaski	41	4 yrs.	F_1	0
107	F. Wazko	35	5½ "	0	+
104	J. Craig	40	11 "	F_1	0
105	R. Mackey	40	12 "	A_1	+

PIPE MAKING DEPARTMENT

(Small amount asbestos dust)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
18	V. Horosz	39	1 yr	O	O
21	V. DiChirico	23	1 "	O	O
15	P. DeFelice	21	20 mo.	F_1	/
23	T. Critelli	22	2 yrs.	O	O
29	J. Olxiewicz	28	2 "	O	O
17	F. Rovito	19	2½ "	F_1	O
7	P. Esposito	26	3 "	F_1	O
27	G. Guastillo	49	3 "	O	O
4	A. Adomirek	28	5 "	F_1	O
8	A. Nitto	38	7 "	F_2	O
12	A. W. Mastrolia	35	7 "	F_1	O
50	N. Trione	43	7½ "	A_1?	O
13	P. Malzire	28	8 "	F_1	O
25	J. Peretti	32	9 "	O	O
6	A. Perrone	49	10 "	A_1?	O
2	J. Kall	29	13 "	O	O
9	V. Giannone	47	13 "	F_1	/
20	F. Tartarete	28	13 "	O	O
3	P. Messina	45	14 "	F_1	O
10	S. Fander	41	19 "	F_1	O
5	T. Carmella	44	21 "	F_1	O
24	J. Miglino	56	24 "	A_1?	/
16	M. De Vito	50	27 "	F_1	O

GENERAL UTILITY MEN

(General dust, asbestos and slate flour)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
348	T. Ervin	19	1 day	Healed non-TB	0
258	J. Kaityn	20	2 "	F_1	0
289	M. Rawlinks	18	3 wks.	F_1	0
392	W. Ostrowski	18	1 mo.	F_1	0
256	H. Breanock	20	2 "	0	0
381	F. Delvecchio	21	2 "	0	0
292	S. Bialicki	22	5 "	F_1	0
302	A. Plust	22	6 "	0	0
294	S. Pevelko	27	7 mos.	0	0
368	M. Oras	22	8 "	0	0
389	J. Chambers	21	1 yr	F_1	0
395	P. Besink	21	2 "	0	0
153	S. Russo	44	22 "	Healed TB	0
339	A. Carlucci	19	71 "	F_1	✓

FIREMEN AND COAL PASSERS

(Soft coal and ashes)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
215	J. Jacoby	43	3 yrs	F_1	✓
216	S. Graczik	48	3 "	Healed TB	0
219	W. Kazmieski	47	3 "	0	✓
214	W. Gardner	36	4 "	0	0
213	A. Baltazuk	48	10 "	F_1	✓

SAW DEPARTMENT

(Sawing asbestos pipes - very heavy asbestos)

49	F. Horbaski	39	15 yrs	F_1	0
48	E. Milteer	36	15 "	0	0
46	N. Gentile	39	18 "	0	✓
45	G. Damiano	48	24 "	F_1	0

CORRUGATED ROLLING MACHINE

(Make corrugated asbestos paper - very heavy asbestos)

41	D. Nussillo	51	17 yrs.	A_1?	0
42	F. Romanowsky	56	29 "	A_1	✓

WAREHOUSE

(Putting canvas tops on rolls of roofing)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
378	M. Patson	25	3 mos	0	0
376	G. Bigart	22	1 yr	0	0
372	M. Michalkowsky	24	2 "	0	0
373	J. Halupka	29	2½ "	0	0
371	M. Bresky	29	3 "	0	0
374	W. Liszkiewicz	22	4 "	0	✓

PACKING DEPARTMENT

(Packing pipes for shipping - floor dust)

89	A. Bevacqua	19	4 mo.	F_2	0
96	J. Bordasone	48	4 "	F_2	0
85	M. Ferrara	18	5 "	0	0
76	A. Cacaci	22	1 "	F_1	✓
91	F. Hambach	26	1 "	F_1	0
90	A. Tavernise	21	2 "	0	0
79	[illegible]. White	45	11 "	0	0
81	J. McGuirl	38	12 "	0	✓

MACHINISTS AND ENGINEERS

(Small amount mica, soapstone)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
207	G. Wolf	35	6 mos.	0 P.C.	/
204	H. Karl	35	1 yr	0	/
205	E. Klent	34	2½ "	0 P.C.	0
202	W. Wolf	37	3 "	0 P.C.	/
206	A. Englehardt	43	4 "	F_1	0
201	A. Herholz	39	9 "	F_1	0
212	A. Gaginzki	49	15 "	F_1	/
211	A. Kozloski	46	17 "	F_1	/

SMALL SATURATOR ROOFING MACHINE

Saturating felt with asphalt.

(Very little mica, soapstone and slate flour)

325	F. Miner	35	2 yrs.	F_1	/
323	E. Jones	39	6 "	0	0
324	J. Bugs	37	7 "	0	0
322	W. Hart	43	9 "	0	0
238	C. Wright	30	9 "	F_1	/
321	H. Wright	28	10 "	0	0

PAPER MILL

(Small amount mica, soapstone)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
391	T. Adamski	24	6 mos.	0 P.C.	0	Cutting rags
230	A. Restek	24	1 yr.	0	0	Winder
225	J. Gazdwicz	21	5 "	F_1	0	Back tender
224	J. Kaenick	27	6 "	0	0	Press man
231	H. Jobel	36	7 "	F_1	0	Oiler
229	A. Rolle	27	7 "	0	0	Winder
222	P. Koblansky	48	8 "	0 P.C.	✓	Machine tender
227	F. Ramsey	29	8 "	0	✓	Winder
221	F. Sandusky	44	9 "	F_1	✓	Machine tender
223	W. Schloss	32	9 "	0 P.C.	0	Press man
228	J. Ramsey	34	16 "	0	✓	Winder
232	F. Boninsky	45	16 "	0	✓	Millwright
226	T. Rashard	48	17 "	0	0	Back tender
252	A. Dzindzie	47	17 "	0	✓	Machine tender

PIPE WRAPPERS

(Small amount asbestos)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
69	Miss F. DiGiovanne	18	6 mos.	0	0	Rolling canvas on asbestos pipe.
73	Miss F. Conte	19	6 mos.	0	0	"
66	" R. Lombardo	20	1 yr.	F_1	✓	"
70	" S. Ciasulli	13	1½ "	0	0	"
1	Mr. E. J. Cacaci	38	2 "	F_1	✓	Supt.
61	Mrs. D. O'Keefe	23	5 "	F_1 P.C.	0	Rolling canvas on asbestos pipe.
62	Miss M. Weztewica	23	9 "	F_1	0	"

LIQUID ROOFING DEPARTMENT

(Plaster mixer, labelling, stencilling, coating, closing containers.)
. 50% of time in heavy asbestos, slate flour.

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
369	F. Russell	19	2 mos.	0	✓
367	F. Slniasky	21	1 yr	0	✓
365	J. Malast	27	1 "	0	✓
361	A. Mestler	33	2 "	0	✓
364	E. Sweeney	27	2 "	0	✓
366	J. Purka	20	2 "	0	0
326	J. Ostrowski	24	2 "	F_1	✓
363	P. Bober	24	3 "	0	0
362	J. Sinchak	38	8 "	F_1	0

MISCELLANEOUS JOBS

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings	Occupation
386	L. Mack	28	1 mo.	0	0	Sample maker
396	E. Kaprelian	29	1 mo..	0	0	Inspector
398	R. Kerr	35	5 mos	F_1	0	Inspector
102	J. VanAlstyne	34	2 yrs	0	✓	Night watchman
216	C. Hallan	23	2 "	F_1	0	Wheels ashes
331	F. Sephton	42	2 "	0 (Cong. Cyst)	✓?	Chief Inspector
338	S. Kostinowski	19	2 "	0	✓	Coal wheeler
101	C. Major	37	4 "	F_1	0	Shipping clerk
332	W. Ellis	36	10 "	0	✓	Repairs shingles
306	J. Hudak	50	10 "	F_2	✓	Porter
131	J. Huatyk	47	12 "	0	0	Mason
47	M. Santoli	46	31 "	F_1 Healed TB	✓	Canvass cutter

Chest Findings

The physical examination revealed only one case with well-defined disease but the x-ray picked up a variety of conditions some of which were probably due to inhaled dust and others to infection. Among the latter there were 4 that were of non-tuberculous origin. There were 4 more with healed apical foci of adult type tuberculosis whose occurrence has no clinical significance. (Its incidence is only about one-half that to be expected in an urban population.) Two cases showed more active manifestation of tuberculosis. Case #270 (N.Tarby) had a unilateral chronic tuberculosis of considerable extent with a probable cavity at the base. This finding was substantiated by physical examination. The possibility of sanatorium treatment for this man should be considered. Another case, #344 (Zitkowski) had shadows possibly indicative of active tuberculosis. In view of the fact that this individual was only 19 years of age, his condition should be investigated further to determine whether treatment is required. Only 5.8 per cent of the group showed evidence of healed childhood tuberculous infection, a very low incidence for an urban group. They are marked "P.C." (primary complex) in the table.

Of the conditions that might be due to the inhalation of dust several forms were discovered. They are designated and defined as follows:

F_1 - A moderate degree of exaggeration of the linear markings in the lung fields. This may be due to inhaled dust of any type, to heart or arterial disease or to non-tuberculous infection. Its incidence increases with advancing age. Unless it can be shown to progress to more advanced conditions in a given industrial exposure its significance is negligible.

F_2 - A more advanced stage of linear exaggeration. This is more frequently a result of inhaled dust but, of course, the finding must be correlated with the history of exposure in the particular industry.

F_3 - An extreme stage of linear exaggeration that may be due to chronic bronchitis.

A_1 - indicates a possible asbestosis. Two groups are noted- "A_1" where the condition seems quite definite and "?A_1" where there is some doubt of its significance.

The designations P.C and healed or chronic TB have already been mentioned.

In table III the incidence of these various conditions have been tabulated in relation to the duration of employment. The percentages are based upon the number of men employed for each five year period of time. Men working for one year or less are new employees whose chest films could hardly be influenced by their present occupations.

Table III

Years Employed	Total Number	X-Ray Findings: 0 No.	0 %	F_1 No.	F_1 %	F_2 No.	F_2 %	F_3 No.	F_3 %	?A_1 No.	?A_1 %	A_1 No.	A_1 %	Adult TB No.	Adult TB %
Less than 1 year	34	21	61.7	2	5.8	2	5.8	0	-	0	-	0	-	0	-
1 to 3	64	38	59.3	24	37.5	0	-	0	-	1	1.5	1	1.5	0	-
4 to 5	21	10	47.6	9	42.5	0	-	0	-	0	-	0	-	0	-
6 to 10	36	16	44.4	15	41.6	2	5.5	1	2.5	1	2.5	1	2.5	1	2.5
11 to 15	17	8	47%	8	47%	0	-	0	-	0	-	1	5.8	0	-
16 to 20	10	5	50	3	30	0	-	0	-	1	10	1	10	1	10
21 to 25	4	1	25	2	50	0	-	0	-	1	25	0	-	0	-
26 to 31	3	1	33.3	1	33.3	0	-	0	-	0	-	1	33.3	1	33.3

Considering the x-ray changes that might be due to dust there is first the group classified as F_1, which occurs in 35.4% of all the employees. It increases more or less irregularly with the duration of employment but tabulations not included in this report indicate that it is not particularly common in any occupational group. The increase is much more regular when it is tabulated in relation to the age of the men as shown in table IV. For comparison a similar tabulation of 200 cement workers is included in the table. Since the incidence of this type of reaction is higher in the roofing plant under consideration it is believed that more than the mere age factor may be responsible in this case. Probably the various different dusts may play some part in producing it. But in any event the change has no clinical significance and it is not indicative of a serious dust hazard. This is further emphasized by the lack of more advanced cases of

F_2, a change which was found in only 3 men.

Table IV

Age Period	Total Number	X-Ray Findings 0 No.	0 %	F_1 No.	F_1 %	Cement Workers 0	Cement Workers F_1
Under 21	25	16	64.	7	26	87.5%	12.5%
21-30	70	48	68.	22	31.4	97.6	2.5
31-40	57	31	54.3	24	42.1	87.5	14.3
41-50	50	16	32.	25	50.	66.6	22.2
51-60	4	0	-	1	(25%)	75.5	20.0

Evidence of the nodular reaction produced by silica is entirely lacking in this group of cases. There seems to be no suggestion of a silicosis hazard.

As already mentioned, the x-ray diagnosis of asbestosis is difficult and unless substantiated by a definite history of exposure and by clinical findings it cannot be accepted as final. The change consists of a diffuse haziness, particularly marked in the lower half of the lung fields, which may be associated with some accentuation of the normal linear markings. Usually the reaction does not become apparent until persons have worked in asbestos dust for 5 to 10 years. Whether any of the other silicate dusts can produce pictures simulating early asbestosis has not been definitely established.

In the National Asbestos plant the exact duration of the occupational exposure to asbestos dust could not be determined owing to the practice of shifting the men from job to job. The presence of mica, soapstone and slate dusts tends to make the analysis more difficult. Physical examination was not helpful because although fine marginal râles were detected in all cases whose films had been read as A_1 and in 2 of the 5 read as $?A_1$, the same type of râle was reported in 23 other individuals whose films did not show the same changes. None had the persistent râles which one might expect with a true fine fibrosis of the lung.

Of the entire group there were 5 cases whose films were consistent with a diagnosis of asbestosis and 5 more which were considered suggestive though doubtful. All but 2 of the 10 men had been working for this company for more than 6 years. The exceptions will be discussed first. Case #242 was 46 years old and had worked in various places over a period of 32 years. He had worked for the National Asbestos Co. for only 1 year and he could account for only 3 more years of his industrial life, which were not dusty jobs. During the other 28 years his dust exposure might have been most anything. His film was read as A_1 but if the condition was due to asbestos dust it could not have been inhaled only in this plant. The other case, #246, was a man aged 49 who could account for all his jobs over a period of 35 years. He had spent the last 2 years as a rag beater's helper and cutter in the National Asbestos Company. His films were diagnosed as "$?A_1$". This exposure seemed too short to have produced this effect but his only other job with a suspicion of dust exposure was 1 year which he spent in a foundry. Whether this man acquired his roentgenological changes in his last employment or elsewhere is undetermined.

The details of the occupational and medical histories of the other cases with evidence of asbestosis are given in table V. It should be remembered that the occupation in the National Asbestos Company merely represents the individual's last job and that his previous types of work in the same company could not be determined. Since all of these men are over 40 years of age and have worked for this company for at least 6 years and generally more, it seems a safe assumption that the dust in this plant was responsible for the condition in their lungs. But even if these are cases of pneumoconiosis due to the inhalation of asbestos or of some of the other dusts in the plant the condition has not apparently advanced to the stage where it is noticeable clinically or causes any disability. Only by following these men over a period of several years could the seriousness of the pneumoconiosis be evaluated.

Table V

Five Cases A_1

Study No.	Occupational History in National Asbestos Co.	Other Dusty Work	Age	Clinical Findings: Lungs	Clinical Findings: Other
263	6 yrs.Oiler Roofing Machine(mica and soapstone)	Worked 37 yrs without other dust.	47	Fine râles both bases.Prolonged expiration.	Chr.ton
273	18 yrs. Looper man. (Roofing machine) (mica,soapstone,slate)	Worked 34 yrs. without other dust.	42	Fine râles left base.	Chr.ton
105	12 yrs.Gen'l laborer. (extremely dusty asbestos.)	Worked 26 yrs. No other dust except wood.	40	Fine râles left base.	Chr.ton
42	29 yrs.Corrugated paper machine	Worked 41 yrs. 12 yrs.wool factory.	58	Fine râles left base.	Chr. to:
242	1 yr.Gen'l laborer	Worked 32 yrs. Remembers only 4 yrs.None dusty	46	Fine râles right base	Chr.ton

Five Cases A_1?

Study No.	Occupational History in National Asbestos Co.	Other Dusty Work	Age	Clinical Findings: Lungs	Clinical Findings: Other
246	2 yrs.Rag Beater's Helper and Cutter.	Worked 25 yrs. Dust? 1 yr. foundry.	49	Rough breathing right base.	Head co Chr.tons
41	17 yrs. Corrugated paper machine	Worked 31 yrs. 3 yr coal dust.	51	0	Sl.hyper tensi
6	11 yrs. Pipe maker	Worked 26 yrs. 3 yrs.Johns-Manville. 9 yrs. mason.	49	0	Hyperten
24	24 yrs. Pipe maker	Worked 41 yrs. 12 yrs.Johns-Manville.	56	Fine râles both bases.	Mild chrc tonsils
50	7 1/2 yrs. Sawing asbestos	Worked 25 1/2 yrs. elsewhere	43	0	Mild chrc tonsils

The other medical findings do not seem particularly alarming. There seems to be no complaint of excessive upper respiratory infection and no evidence of it was brought out in the physical examination. Boils and other skin affections are infrequent. Five men had positive Wassermann and Kahn reactions, 10 more had doubtful blood tests many of which were negative on re-examination. None of these occurred in cases whose films were read as A_1 or $?A_1$ so that syphilis could be excluded as a cause of the pulmonary abnormalities.

It seems probable that the dust in this plant has affected the lungs of a considerable proportion of the workers but it is doubtful whether any case of disabling pulmonary fibrosis has developed. There is a higher incidence of F_1, or linear exaggeration x-ray readings than in a group of cement workers but approximately the same frequency as was discovered in the gypsum workers at Batavia. (In the latter location there were also about 28% of the films in the more advanced stage designated as F_2. The type of diffuse reaction described as P_1 or P_2 in the gypsum study was not found in this study). The higher incidence of the F_1 readings suggests some accumulation of non-irritating dust in the lungs.

The occurrence of 5 cases whose roentgenograms were interpreted as consistent with a diagnosis of asbestosis and of 5 more in which the films were questionable is suggestive in view of the fact that asbestos was being fabricated in this plant. The lack of advanced and definite cases is probably due to the practice of rotating the men from one job to another so that no person was exposed to high concentrations of asbestos dust for prolonged periods. It is significant that most of the cases so designated were old employees of the company and only one case (#246) gave a satisfactory history that would not admit of an explanation of his chest findings.

But granting that these are cases of asbestosis, the condition has apparently failed to reach a disabling stage with manifest symptoms, secondary changes in the circulatory system and complicating pulmonary infections.

Comment

After the dust concentrations had been computed it was logical to determine whether the persons working in the highest concentrations of asbestos dust were the ones whose films had been interpreted as consistent with a diagnosis of asbestosis. The occupational histories did not permit such correlation but Mr. Edward Rembert, manager of the plant, has supplied additional information on certain employees which is appended to this report together with their x-ray readings.

The men who worked inside and on top of the bins, where dust concentrations of 22, 79 and 296 million particles per cubic foot of air were discovered, were either pipe makers or other persons who might have had spare time. The following cases had worked inside the bins and in the dust house off and on over the period of years that follows their names. In the last column is the symbol designating the x-ray finding in the individual's chest.

#105	12 years	A_1
#104	11 "	F_1
#107	6 "	0
#106	4 "	F_1

Thus the man with the longest exposure in the bins apparently developed asbestosis but the others escaped.

Sawing asbestos gave a light field dust concentration of 82 million per cubic foot. Four men were reported to have worked more or less steadily at this occupation but none developed significant reaction.

#45	24 years	F_1	
#46	18	"	0
#48	15	"	0
#49	14	"	F_1

It is to be noted that case 50, who worked only 7 1/2 years at this job developed a questionable asbestosis reaction as mentioned in the medical report.

Loading asbestos cement was an extremely dusty process, the count was 261 million per cubic foot of air. "Various men were used in this work and it is safe to say that at one time or another the majority of the employees were utilized for this purpose." The men listed below were employed more steadily than any of the others.

#176	12 years	F_1	
#177	6	"	F_1

Shoveling waste felt and asbestos from dust house into bags produced a count of 72 million per cubic foot of air. "Any available man was utilized in this work".

Mixing liquid roofing was responsible for a count of 165 million. The following cases had exposures here

#362	12 years	F_1	
#363	3	"	0

Feeding slate flour on platform above roofing machine produced 1712 million particles per cubic foot of air. Long exposure seemed to have little effect upon the lungs. While most of the men on the roofing machine had done this work at one time or another the following were regularly assigned to this dusty occupation:

#270	18 years	F_1
#267	4 "	O
#271	2 "	F_1

Even 18 years intermittent exposure to this high concentration of slate dust apparently does not produce a dangerous pulmonary reaction.

<u>Shaking out asbestos bags</u> is a dusty job that produces about 35 million particles per cubic foot of air. "This task was performed most frequently by men working inside of bins and men on the beaters."

<u>Packing asbestos cement</u> in bags and boxes was responsible for a count of 261 million. "All the female employees listed below have at some time in the past" engaged in this occupation:

#61	9 years	F_1
#62	9 "	F_1
#65	6 "	O
#67	3 "	O
#70	2 "	O
#66	1 "	F_1
#69	1 "	F_1
#73	1 "	O

The inconsistency of these findings emphasizes the futility of attempting to correlate the occupational history with the medical diagnosis. The data indicate that the combination of various exposures which may have been responsible for the production of a few cases of apparent asbestosis were likewise responsible for protecting the majority of the employees from serious consequences.

But it is felt that this fortunate circumstance should not prevent every effort to reduce the concentration of dust in the plant, particularly at those points stressed in the engineering section. Many of the old employees have already had long exposures to excessive quantities of asbestos dust; if they continue to inhale it, it is inconceivable that more of them will not develop manifest disease.

Whether all of the conditions diagnosed as asbestosis or questionable asbestosis are actually such or whether they may be an effect of the other silicate dusts in this plant cannot be definitely determined for no standards of their effects have been established. It is even possible that the silicates have modified the reaction to asbestos dust but this is mere conjecture as no investigation of the action of such mixtures has yet been reported. In the light of present knowledge one must assume that there were 10 cases of asbestosis in this plant. None has reached a stage that produces clinical symptoms and disability either because of the intermittency of the exposure or because of a modifying influence of other dusts inhaled with the asbestos.

No evidence has been discovered to suggest that the prolonged inhalation of the mica, soapstone, slate and organic dusts in this plant has produced any significant reaction in the respiratory tract.

(s) Leroy U. Gardner
Leroy U. Gardner, Director
Saranac Laboratory

ADDENDUM

After completing the report four more histories and examination blanks were received. Since the x-ray films of none of these cases shows any significant finding they are added in supplement. To insert them now in their respective occupational groups and to change the various tabulations and figures on incidence would delay the issuance of the report.

Study No.	Name	Age	Occupation	X-Ray Findings	Other Medical Findings
64	Salvatore Maggio	18	Laborer 1 yr.	F_1	O
19	C. Prospriati	42	Pipe maker 6 yrs. (5 yrs. Connell Asbestos Co.)	O	Mild tonsil- itis
14	John Provenza	30	Pipemaker 10 yrs. (3 yrs. Guiseman Asbestos Co.)	F_1	" "
65	Beatrice Muroski	?	Pipe wrapper 6 yrs.	O	" " and one bad tooth

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Count Field Short Fibs	Total Fibs	Asbestos Content
[illegible]	Working inside [illegible] bin (Cotton fiber asbestos)	Sample taken at breathing level inside bins, close to [illegible] who shovels and pushes [illegible] fiber asbestos into chutes leading to screw conveyors.	[illegible] 10 min.	95% Alcohol	Man works in bin half of day, rest of day on pipe machine, wears respirator when in bin; says respirator makes breathing difficult but can be worn. Bin [illegible] completely enclosed except for two [illegible] openings in ceiling and in one wall and two [illegible] below in floor. No ventilation.	[illegible]	[illegible]	[illegible]
[illegible]	Working inside [illegible] bin (asbestos, etc.)	Sample taken inside bin near man who opens bags of asbestos and pushes contents into chutes.	[illegible] 10 min.	"	Same as above, except that man complains that respirator becomes clogged easily.	[illegible]	[illegible]	[illegible]
[illegible]	Working over opening in top of bin, [illegible]	Flask held at breathing level over openings where man works most of time, putting asbestos etc. into bins or pushing down material [illegible] in chamber below.	[illegible] 10 min.	"	[illegible] Occasionally [illegible] goes down into room to scrape down dust. No respirator when working over opening or in room; says it is satisfactory.	[illegible]	[illegible]	[illegible]
[illegible]	Sawing asbestos boards	Flask held at breathing level and [illegible] from man sawing asbestos boards.		"	Asbestos dust is thrown toward man by rotation of saw; no exhaust system on machine. Man wears respirator most of time; says it does not interfere [illegible] with breathing. Some ventilation from open window [illegible] away.	[illegible]	[illegible]	[illegible]
[illegible]	Loading bags with asbestos cement. [illegible]	Flask held at breathing level and [illegible] from man loading 100 lb. bag with asbestos cement [illegible]	[illegible] 10 min.	"	Bag is tied to [illegible] pipe, filled, transferred to scales, [illegible] weight made correct, bag tied and trucked away in lots of [illegible]. No exhaust system on machine, some ventilation; open window [illegible] away, open door [illegible] away. Men [illegible] wear respirators.	[illegible]	[illegible]	[illegible]

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Field	Remarks	Above 10μ	Below 10μ	Fixation Condensed
6	Trucking on 1st floor.	Sample taken at breathing level in middle of room to represent average concentration to which men trucking asbestos cement, paper, etc. are exposed.	May [illegible], 1938 [illegible] p.m. [illegible] min.	95% Alcohol	Room (100' wide) extends length of building and used principally for storage and bagging asbestos cement; sample about 40' from man loading asbestos cement and shoveling out dust of asbestos and felt from dust house. Little ventilation; doors and most of windows closed.	0.00	12.3	109.3
7	Shoveling waste felt and asbestos from dust house into bags.	Flask held at breathing level; 1'-0" from man inside dust house who shovels waste into bag held by helper outside.	May [illegible], 1938 [illegible] p.m. [illegible] min.	"	Dust chamber (8'x8'x8') receives waste felt and asbestos from room on 3rd floor. Dust shoveled out 2 or 3 hrs. per day. Man shoveling waste was wearing respirator; helper was not. Little ventilation; open window 10' away.	0.33	72.0	265.3
8	Mixing liquid roofing (asbestos, asphalt)	Sample taken at breathing level on platform next to man mixing liquid roofing (asbestos dust from sack, asbestos fiber, roofing asphalt).	May [illegible], 1938 [illegible] a.m. [illegible] min.	"	No protection for removing fumes from vat. Man wears respirator, says it is satisfactory. He is mixing on platform from 1 1/2 to 4 1/2 hrs. per day. Air pressure for sampling was 17-18 lbs.	0.13	15.0	130.1
9	Working at feed end of corrugator machine	Sample taken at breathing level next to man tending feed end of corrugator machine.	May [illegible], 1938 [illegible] a.m. [illegible] min.	"	Asbestos paper is passed over rolls wet with silicate solution, then through corrugator and dryer. Little ventilation; windows open 30' away. Sample rejected because air pressure dropped to 10 lbs.	"	"	"
10	Same as above	Same as above.	May [illegible], 1938 10:30 a.m. [illegible] min.	"	Same as above.	0.00	0.0	0.0

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Particles per cu. ft. of air (in millions) Light Field: Above 10μ	Light Field: Below 10μ	Dark Field ([illegible] Condenser)
11	Working at discharge end of corrugator machine.	Flush held 3" from man tending roll at discharge end of corrugator machine.	[illegible], 1936 [illegible] a.m. 10 min.	1% Alcohol	This sample represents general air condition for north end of 3rd floor. Little ventilation	0.00	0.1	3.6
12	Cutting asbestos paper to source (feeder pipes)	Sample taken 3" from man cutting off asbestos paper.	[illegible], 1936 [illegible] a.m. 10 min.	"	Paper is unwound from several rolls and cut off in strips about [illegible]; stack of strips used to make a pipe.	0.02	4.1	10.9
13	At saturator (roofing machine)	Sample taken along front of asphalt vat corresponding to position of man.	[illegible], 1936 [illegible] a.m. 10 min.	"	Vat is not enclosed, large amount of steam and fumes in air.	0.01	3.3	11.6
14	Cooler tender (roofing machine)	Sample taken at position occupied by man who regulates asphalt and slate coating on roofing.	[illegible], 1936 [illegible] a.m. [illegible] min.	"	Roofing sheet was stopped for about 1 min. during test. Little ventilation.	0.13	1.3	19.7
15	Rolling man (roofing machine)	Sample taken near man who controls looping of [illegible].	[illegible], 1936 [illegible] p.m. 10 min.	"	No ventilation; hot and close.	0.17	1.0	46.0
16	Feeding slate flour (roofing machine)	Sample taken next to man who works on platform 10' above roofing machine handling slate flour, used as a "filler" in the asphalt.	[illegible], 1936 [illegible] 1/2 p.m. [illegible] 1/2 min.	"	Man carries bag across platform, opens it, dumps it through opening into tank; about 1 bag per min. Very bottom ventilation; roof 4 ft overhead. Man does not have respirator. Slate flour used as filler for asphalt.	16.0	1118.0	6104.1
17	Shoveling granules (roofing machine)	Sample taken close to man shoveling red granules in basement underneath roofing machine.	June [illegible], 1936 [illegible] a.m. 10 min.	"	Man sifting about half of time; loading, shoveling and dumping about half of time. Green and gray granules are finer than red and create more dust. Some movement of air through passageway; hot.	0.01	3.3	9.1
18	Working at shingle machine	Sample taken next to man operating machine making asphalt shingles.	[illegible], 1936 [illegible] p.m. 10 min.	"	Shingle machine on floor [illegible] was not operating for about one-fourth of duration of sample.	0.06	2.6	11.5

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	[illegible]	[illegible]	[illegible]
						[illegible]	Below 10μ	[illegible] (Millions?)
[illegible]	At beater machines (scrap paper)	Sample taken next to beater being filled with scrap paper.	May 27,1938 [illegible] a.m. [illegible] min.	10% Alcohol	Good ventilation through open doors in both side walls. Sample collected—air pressure dropped to 10 lbs.			
[illegible]	At beater machines (waste paper)	Sample taken close to beater being filled with waste paper.	June 2,1938 [illegible] a.m. [illegible] min.	"	Some dirt attached to paper; about 10% of paper was clean, [illegible]. Good ventilation—open door 30' away. Counts were increased 25% to allow for low air pressure.	0.04	7.9	17.0
[illegible]	At beater machines (asbestos)	Sample taken between two men dumping asbestos from bags into vat.	May 27,1938 [illegible] p.m. 10 min.	"	Men are dumping bags about 10-15% of time. Strong draft of air past men.	0.07	10.7	12.4
[illegible]	Shaking out empty asbestos bags	Flask held 1-3' from man who shakes out empty asbestos bags and beats them against wall.	May 26,1938 [illegible] p.m. 10 min.	"	Man works on this job 25% of time; rest of time mixing starch solution for paper. No ventilation—man stands inside doorway of enclosed room 10' from open outside door.	1.35	39.0	181.3
[illegible]	Working at paper machine	Sample taken in passageway next to paper machine and opposite cooling rolls of roofing machine.	June 2,1938 [illegible] a.m. [illegible] min.	"	Paper machine making red paper. Poor ventilation—fumes and dust drift over from roofing machine.	0.08	3.4	10.7
[illegible]	In roll warehouse	Sample taken near dock, 10' from open door.	May 26,1938 [illegible] a.m. [illegible] min.	"	Sample represents an average for roll warehouse. Men trucking rolls nearby. Good ventilation.	0.03	3.0	6.0
[illegible]	In shingle warehouse	Sample taken 10' from open door leading to roofing and paper machine building.	May 26,1938 [illegible] a.m. 15 min.	"	Sample represents an average for shingle warehouse. Good ventilation.	0.10	1.3	5.0
[illegible]	In machine shop	Sample taken near lathe and drill and close to door in partition leading to engine room.	May 26, 1938 [illegible] p.m. 11 min.	"	Good circulation of air; open door 30' away.	0.00	0.0	10.4

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	[illegible]	[illegible]	[illegible]
1	Working inside of bin (Italian fiber asbestos)	Sample taken at breathing level inside bins, close to man who shovels and pushes Italian fiber asbestos into chutes leading to dress conveyors.	Nov [illegible], 1936 [illegible] p.m. [illegible] min.	95% Alcohol	Man works in bin half of day, rest of day on pipe machine, wears respirator when in bin; says respirator makes breathing difficult but can be worn. Bins [illegible] completely enclosed except for two [illegible] openings in ceiling and in one wall and two [illegible] holes in floor. No ventilation.	[illegible]	[illegible]	[illegible]
2	Working inside of bin (asbestos, [illegible])	Sample taken inside bin near man who opens bags of asbestos and pushes contents into chutes.	Nov [illegible], 1936 [illegible] p.m. [illegible] min.	"	Same as above, except that man complains that respirator becomes clogged easily.	0.30	[illegible]	[illegible]
3	Working over opening in top of bin (soapstone, infusorial earth etc)	Flask held at breathing level over openings where man works most of time, putting asbestos etc. into bins or pushing down material (soapstone, infusorial earth, etc.) to chamber below	Nov [illegible], 1936 [illegible] p.m. [illegible] min.	"	Soapstone in open boxes. Occasionally ([illegible] min. per hr.) man goes down into room to scrape down dust. [illegible] respirator when working over opening or in room; says it is satisfactory.	[illegible]	[illegible]	[illegible]
4	Sawing asbestos boards	Flask held at breathing level and [illegible] from man sawing asbestos boards.		"	Asbestos dust is thrown toward man by rotation of saw or exhaust system on machine. Man wears respirator most of time; says it does not interfere excessively with breathing. Some ventilation from open window 10' away.	[illegible]	[illegible]	[illegible]
5	Loading bags with asbestos cement (asbestos, short [illegible] fibers, [illegible] limestone [illegible])	Flask held at breathing level and [illegible] from man loading 100 lb. bag with asbestos cement ([illegible]	Nov [illegible], 1936 [illegible] p.m. [illegible] min.	"	Bag is tied to [illegible] pipe, filled, transferred to scales, weighed, excess removed, bag tied and dumped over in [illegible]. No exhaust system on machine. Poor ventilation; open window 10' away, open door [illegible] away. Man [illegible] wear respirators.	[illegible]	[illegible]	[illegible]

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Particles per cu.ft. of air (in millions) [illegible]	[illegible]	[illegible]
						[illegible]	[illegible]	[illegible]
						[illegible]	[illegible]	[illegible]
6	Working on 3rd floor.	Sample taken at breathing level in middle of room to represent average concentration to which men handling asbestos cement, paper, etc. are exposed.	Mar 11, 1938 [illegible] p.m. [illegible] 10 min.	95% Alcohol	Room (100' [illegible]) extends length of building and used principally for storage and bagging asbestos cement; sample about 10' from men feeding asbestos cement and shoveling up dust of asbestos and felt from dust house. Little ventilation; doors and most of windows closed.	7.00	12.3	143.3
7	Shoveling waste felt and asbestos from dust house into bags.	Flask held at breathing level; 3'-4' from man inside dust house who shovels waste into bag held by helper outside.	Mar 11, 1938 [illegible] p.m. [illegible] 10 min.	"	Dust chamber (8'x8'x8') receives waste felt and asbestos from room on 3rd floor. Dust shoveled out 2 or 3 hrs. per day. Man shoveling waste not wearing respirator; helper was not. Little ventilation; open window 10' away.	2.35	14.7	143.1
8	Mixing liquid roofing (asbestos, asphalt)	Sample taken at breathing level on platform next to man mixing liquid roofing (asbestos dust from bags, asbestos fiber, roofing asphalt).	Mar 11, 1938 [illegible] [illegible] 10 min.	"	No provision for removing fumes from vat. Man wears respirator, says it is satisfactory. He is mixing on platform from 1 1/2 to 2 1/2 hrs. per day. Air pressure for sampling was 27-28 lbs.	[illegible]	33.0	330.1
9	Working at feed end of corrugator machine	Sample taken at breathing level next to man feeding feed end of corrugator machine.	Mar 11, 1938 [illegible] a.m. [illegible] 10 min.	"	Asbestos paper is passed over rolls wet with silicate solution, then through corrugator and dryer. Little ventilation; windows open 20' away. Sample rejected because air pressure dropped to 10 lbs.	-	-	-
10	Same as above	Same as above.	Mar 11, 1938 [illegible] a.m. [illegible] 10 min.	"	Same as above.	[illegible].00	0.0	0.1

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Particles per cu.ft. of air (in millions)		
						[illegible]	[illegible]	[illegible]
11	Working at discharge end of aggregator machine.	Flask held 5' from man tending roll at discharge end of aggregator machine.	May [illegible], 1936 [illegible] a.m. [illegible] 10 min.	95 alcohol	This sample represents general air condition for north end of 3rd floor. Little ventilation	0.00	0.9	3.4
12	Cutting asbestos paper in coarse form (for pipes)	Sample taken 5' from man cutting off asbestos paper.	May [illegible], 1936 [illegible] a.m. [illegible] 10 min.	"	Paper is removed from several rolls and cut off in strips about [illegible]; stack of strips used to make a pipe.	0.03	3.0	10.0
13	At saturator (roofing machine)	Sample taken along front of asphalt vat corresponding to position of man.	May [illegible], 1936 [illegible] a.m. [illegible] 10 min.	"	Vat is not enclosed. Large amount of steam and fumes in air.	0.01	3.3	13.4
14	Cooler tender (roofing machine)	Sample taken at position occupied by man who regulates asphalt and slate coating on roofing.	May [illegible], 1936 [illegible] a.m. [illegible] min.	"	Roofing sheet was stopped for about [illegible] min. during test. Little ventilation.	0.13	3.3	10.3
15	Backing man (roofing machine)	Sample taken near man who controls backing of mica or soapstone.	May [illegible], 1936 [illegible] p.m. [illegible] 10 min.	"	No ventilation; hot and steam.	0.13	3.4	16.0
16	Feeding slate flour (roofing machine)	Sample taken next to man who works on platform 10' above roofing machine handling slate flour, used as a "filler" in the asphalt.	May [illegible], 1936 [illegible] 1/2 p.m. [illegible] 1/2 min.	"	Man carries bag across platform, opens it, dumps it through opening into tank; about 1 bag per min. Very [illegible] ventilation; roof [illegible] overhead. Man does not have respirator. Slate flour used as filler for asphalt.	14.0	[illegible]	[illegible]
17	Breaking granules (roofing machine)	Sample taken close to man mixing red granules in basement underneath roofing machine.	June [illegible], 1936 [illegible] a.m. [illegible] 10 min.	"	Man mixing about half of time; loading, shoveling and dumping about half of time. Green and gray granules are finer than red and create more dust. Some movement of air through [illegible], hot.	0.01	3.0	9.1
18	Working at shingle	Sample taken next to man operating machine making asphalt shingles.	May [illegible], 1936 [illegible] p.m. [illegible] min.	"	Shingle machine on floor [illegible] above main floor; was not operating for about one-fourth of duration of sample.	[illegible]	[illegible]	[illegible]

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Particles per cu. ft. of air (in millions)		
						[illegible] above 10μ	[illegible] below 10μ	[illegible] (Flotation Condensed)
19	At beater machines (scrap paper)	Sample taken next to beater being filled with scrap paper.	May 27, 1936 [illegible] a.m. [illegible] min.	95% Alcohol	Good ventilation through open doors in both side walls. Sample collected [illegible] pressure dropped to 10 lbs.			
20	At beater machines (waste paper)	Sample taken close to beater being filled with waste paper.	June 8, 1936 [illegible] a.m. [illegible] min.	"	Some dirt attached to paper; about 50% of paper was clean, 50% dirty. Good ventilation; open door 30' away. Counts were increased 25% to allow for low air pressure.	0.04	3.0	41.0
21	At beater machines (asbestos)	Sample taken between two men dumping asbestos from bags into vats.	May 28, 1936 [illegible] p.m. [illegible] min.	"	Men are dumping bags about 10-15% of time. Strong draft of air past men.	0.11	10.4	33.1
22	Shaking out empty asbestos bags.	Flask held 1-2' from man who shakes out empty asbestos bags and beats them against wall.	May 28, 1936 [illegible] p.m. [illegible] min.	"	Man works on this job 25% of time; rest of time mixing [illegible] solution for paper. No ventilation; man stands inside doorway of enclosed room 10' from open outside door.	1.33	36.0	111.1
23	Working at paper machine	Sample taken in passageway next to paper machine and opposite cooling rolls of roofing machine.	June 8, 1936 [illegible] a.m. [illegible] min.	"	Paper machine making red paper. Fair ventilation; fumes and dust drift over from roofing machine.	0.06	5.1	14.3
24	In roll warehouse 1	Sample taken near dock, 10' from open door.	May 28, 1936 [illegible] a.m. [illegible] min.	"	Sample represents an average for roll warehouse. Man trucking rolls nearby. Good ventilation.	0.01	1.6	4.6
25	In shingle warehouse.	Sample taken 15' from open door leading to roofing and paper machine building.	May 28, 1936 [illegible] a.m. [illegible] min.	"	Sample represents an average for shingle warehouse. Good ventilation.	0.10	1.5	6.0
26	In machine shop	Sample taken near lathe and drill and close to door in partition leading to engine room.	May 28, 1936 [illegible] p.m. [illegible] min.	"	Good circulation of air; open door 30' away.	0.00	0.8	10.6

EXHIBIT "B"

DUST SURVEY - JERSEY CITY

CHICAGO - August 13, 1934

Mr. W. L. Keady,
Vice President,
Office.

We have a comprehensive report of dust conditions in our Jersey City plant and a report on the X-rays of the employees examined at that plant by Dr. Gardner's organization.

In brief the findings are:

1. Diagnosis of asbestosis for five men.
2. Possibly five additional men have asbestosis but necessary to confirm by clinical correlation.
3. Serious asbestos dust hazard under present operations.

WHAT CONSTITUTES DUST HAZARD:

Dr. Gardner points out that various authorities have tentatively suggested a concentration of five million particles of free silica per cubic foot of air as limits above which a silicosis hazard might exist, and this value has met with some recognition.

There is no standard for safe concentration of asbestos dust comparable to the value just given for free silica dust. However, Dr. Gardner quotes the results of a survey made in four asbestos fabricating plants and reported in 1933 in Bulletin #42, Department of Labor and Industry of Pennsylvania. The incidence of asbestosis among workers with more than five years exposure:

Average Dust Concentration For Each Group Studied	Percentage of Each Group Having Asbestosis
44 million particles per cu. ft. air	73% (8 out of 11 persons)
17 " " " " " "	31% (4 " " 13 ")
5 " " " " " "	10% (2 " " 20 ")

The authors of the report conclude that it is not possible from their findings to establish the maximum safe condition of asbestos in the air.

DUST ENCOUNTERED IN PLANT

Among them are asbestos, infusorial earth, slate, clay, soapstone, mica and limestone. Dr. Gardner advises some of these minerals are definitely tracted this disease as a result of their occupation.

RECOMMENDATIONS

1. That immediate steps be taken to provide respirators for those men covered by Dr. Gardner's recommendation. I am suggesting to Mr. Rende and Mr. Lambert that this be done.

2. That prompt action be taken to install necessary dust prevention and ventilation equipment. I am also suggesting to Mr. Rende and Mr. Lambert that this be done.

COMPENSATION FOR OCCUPATIONAL DISEASE

Certain named diseases such as mercury poisoning, lead poisoning, etc. come under the Compensation Act of New Jersey. However, silicosis and asbestosis are not named and any claims arising out of these diseases might be under common law.

INSURANCE PROTECTION

For diseases listed under the Compensation Act, we have unlimited insurance protection. Our insurance for occupational disease claims which might be made under common law is placed with the Continental Casualty Company for the primary coverage of $5,000 for one person or aggregate claims of $15,000 in one year. Our excess coverage of $45,000 for one person and $185,000 aggregate for one year is insured with Lloyds. If claims are filed both of the companies may cancel the occupational disease coverage.

FOR CONSIDERATION

1. What action shall we take on notifying the men who have been examined of the various diseases which they have?

2. What action shall we take in connection with the continuation of the employment of our men who have occupational and other diseases?

3. What action shall we take on the tubercular cases?

TRF:EGC General Service Manager

EXHIBIT "C"

U. S. TREASURY DEPARTMENT
PUBLIC HEALTH SERVICE

Public Health Bulletin No. 241
August 1938

A STUDY OF ASBESTOSIS IN THE ASBESTOS TEXTILE INDUSTRY

By

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From the Division of Industrial Hygiene
National Institute of Health

PREPARED BY DIRECTION OF THE SURGEON GENERAL

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : [illegible]

For sale by the Superintendent of Documents, Washington, D. C. . . . . [illegible]

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CONTENTS

Figure

ABSTRACT

Asbestosis, a lung disease caused by long-continued inhalation of asbestos dust, was the principal physical defect found on medical examination of 541 men and women employed (or recently employed) in three asbestos textile factories. The primary effect of asbestos dust seems to be initiation of fine, interstitial, pulmonary fibrosis which was not observed to progress as far as the nodular stage. This fibrosis was observed in post-mortem examinations of three former asbestos workers. During life, lung fibrosis can be detected by X-ray examination. The more important symptoms of asbestosis are progressive dyspnoea, variable cough which sometimes raises blood-streaked sputum, and loss of weight. The processes that produce dust in asbestos textile factories were studied and recommendations for dust control are incorporated in this report. Enough dust counts (242) were made in all parts of these factories so that the dust exposure of each worker can be estimated. The percentage of persons in different occupational groups who were affected by asbestosis or any of its symptoms varied with the average dust concentration to which they were subjected and with their length of employment. The only cases of asbestosis, three in number, found below 5 million particles per cubic foot were diagnosed as doubtful; well-established cases occurred at higher concentrations. It appears from these data that if asbestos dust concentrations in the air breathed are kept below this limit new cases of asbestosis would not appear.

SUMMARY OF MEDICAL FINDINGS

A medical examination was made of each employee in three sa textile plants employing 423 men and 115 women. These pe were much younger than the average industrial employee and had been employed in this industry for relatively short lengt time. Almost half of these workers had been previously empl in cotton or woolen textile mills. Only 22 persons had been ployed in a trade in which workers are known to be exposed to i. ganic dust, and only 1 of these 22 persons had pneumoconiosis. this reason, it is believed, asbestos-dust exposure can be held resp sible for the cases of pneumoconiosis that were found in these th factories.

Asbestosis is a form of pneumoconiosis caused by long-contin inhalation of asbestos dust. The primary effect of asbestos dust the body is to set up an interstitial, pulmonary fibrosis. This m be seen at autopsy, and reports on three cases appear in the path logical section of this bulletin. This type of fibrosis may also detected by X-ray examination of the chest. On the X-ray film t. shadows cast by this type of fibrosis resemble ground glass in appea ance and usually extend over the lower portions of the lung fiel frequently being heavier on the right side. Unlike silicosis, nodul fibrosis has not been detected in asbestos workers.

As in silicosis, the chief symptoms of asbestosis are progressiv dyspnoea, variable cough, substernal chest pain, decreased ches expansion, emaciation, weakness, clubbed finger tips, and curve finger nails. Most of these symptoms seem to be the result of the pulmonary fibrosis set up by inhaled asbestos dust, and the con comitant pathologic changes, such as emphysema, bronchiectasis and bronchiolectasis, which can be demonstrated at autopsy.

The percentage of persons affected by asbestosis or by any one of these symptoms depends upon the dust exposure. In all cases the percentage of persons affected by any given sign or symptom of asbes tosis is greater than in control groups of industrial workers who were not exposed to inorganic dust.

A characteristic of asbestosis is the finding of asbestosis bodies in the lungs and in the sputum. Although it does not appear from these data that a finding of asbestosis bodies can be used to establish a diagnosis of asbestosis, nevertheless it is evidence of asbestos exposure.

Only three cases of asbestosis, all of them diagnosed as doubtful or borderline cases, were found to be exposed to dust concentrations of less than 5 million particles per cubic foot. (These three individuals had dust exposures of about 4 million particles per cubic foot.) Above 5 million particles per cubic foot, numerous cases of well-marked asbestosis were found. It would seem that if the dust concentration in asbestos factories could be kept below 5 million particles (the engineering section of this report has shown how this may be accomplished), new cases of asbestosis probably would not appear.