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UNITED STATES GYPSUM COMPANY

CHICAGO
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KANSAS CITY
OMAHA
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DALLAS
LOS ANGELES
SAN FRANCISCO

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US

SCOTT, MAC LEISH & FALK,

August 17, 1936

RECEIVED
AUG 18 1936
Referred to _____
Answered _____

Scott, MacLeish & Falk,
134 South La Salle Street,
Chicago, Illinois.

Attention: Mr. C. M. Price

SUBJECT: Dust Survey - Jersey City

Gentlemen:

We are attaching for your information a copy of Dr. Gardner's report, giving the results of his dust survey at Jersey City, and also a report in connection with the examination of the X-rays of about 200 men at the Jersey City plant.

It appears that we have a very hazardous dust condition at Jersey City, and also have a problem with a number of men who now have asbestosis and tuberculosis.

We are taking the necessary steps to provide dust collecting and ventilating equipment, and in the meantime will provide respirators to minimize the dust hazard.

The real problem we have for consideration is that of deciding what to do about the men who now have an occupational disease. If some of those men who have asbestosis should make claim against the company and receive an award, would the United States Gypsum Company have to stand the entire expense or could part of it be prorated to the former owners of the Jersey City plant?

I am attaching a copy of my letter of August 13th to Mr. Keady, summarizing some of the more important points in the report. We realize, of course, that the management of our company must make the final decision as to what action we shall take on notifying the men who have been examined and who have been found to have asbestosis, tuberculosis, or some other disease. We shall also have to come to some decision in connection with the continuation of the employment of our men who have an occupational or other disease, but we would appreciate your advice in this connection since you will, of course, have in mind the legal consideration.

Yours very truly,

UNITED STATES GYPSUM COMPANY

T. R. Parrish

General Service Manager

DEP. EX. NO. 7
7-29-86

TRP:LW

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

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 15 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 #3 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.

Mixing 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.

Miscellaneous

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.

Summary and Conclusions

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. Blinn; 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 28 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	14.1
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.Czermanski	38 "	1 "	F_1	✗	Slate and coating mixer
390	P.Majewski	45 "	1 "	0	✗	Mixes slate granules
280	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.Huatyk	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.DiToria	34 "	10 "	F_1	0	Saturates felt roofing paper
272	E.Gerhardt	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	G. Gress	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 HELPERS (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.Bligen	31 "	11 "	F_1	0	"

SHINGLE PACKERS AND SHINGLE STACKERS

(General Dust)

No.	Name	Age	Time	X-Ray Findings	Physical Chest Findings
337	R. Campien	18 yrs.	1 mo.	0	0
344	W. Witkewski	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	G. McCullough	23 yrs	1 mo.	0	✓
355	P. Pello	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. Wasko	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	0	0
21	V. DiChirice	23	1 "	0	0
15	P. DeFelice	21	20 mo.	F_1	✓
23	T. Critelli	22	2 yrs.	0	0
29	J. Clkiewicz	28	2 "	0	0
17	F. Rovite	19	2½ "	F_1	0
7	P. Esposito	26	3 "	F_1	0
27	G. Guastillo	49	3 "	0	0
4	A. Adomirok	28	5 "	F_1	0
8	A. Nitto	38	7 "	F_2	0
12	A. [illegible]. Mastrolia	35	7 "	F_1	0
50	N. Trione	43	7½ "	A_1?	0
13	P. Malizire	38	8 "	F_1	0
25	J. Peretti	32	9 "	0	0
6	A. Perrone	49	10 "	A_1?	0
2	J. Kall	29	13 "	0	0
9	V. Giannone	47	13 "	F_1	✓
20	F. Tartarete	28	13 "	0	0
3	P. Messina	45	14 "	F_1	0
10	S. Wander	41	19 "	F_1	0
5	T. Carmella	44	21 "	F_1	0
24	J. Miglino	56	24 "	A_1?	✓
16	M. De Vite	50	27 "	F_1	0

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. Horboski	39	15 yrs	F_1	0
48	R. Milteer	36	15 "	0	0
46	M. Gentile	39	18 "	0	✓
45	G. Damiano	48	24 "	F_1	0

CORRUGATED ROLLING MACHINE

(Make corrugated asbestos paper - very heavy asbestos)

41	D. Mussillo	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. Hambsch	26	1 "	F_1	0
90	A. Tavernise	21	2 "	0	0
79	W. 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. Kleht	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	W. Bugg	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	Physcial 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. Ksenick	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)

69	Miss F.DiGievanne	18	6 mos.	0	0	Rolling canvas on asbestos pipe.
73	Miss F. Conte	19	6 mos.	0	0	"
66	" R.Lombarde	20	1 yr.	F_1	✓	"
70	" S.Ciasulli	18	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 H. Weztewica	28	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. Sininsky	21	1 yr	0	✓
365	J. Malast	27	1 "	0	✓
361	A. Mestler	33	2 "	0	✓
364	E. Sweeney	27	2 "	0	✓
366	J. Furka	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
218	G. Hallan	23	2 "	F_1	0	Wheels ashes
331	F. Sephton	42	2 "	0(Cong. Cyst)	✓?	Chief Inspector
308	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
151	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 (M.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 (Witkowski) 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		F_1		F_2		F_3		$?A_1$		A_1		Adult TB	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
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	42.8	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				Cement Workers	
		O		F_1		O	F_1
		No.	%	No.	%		
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	Other
263	6 yrs.Oiler Roofing Machine(mica and soapstone)	Worked 37 yrs without other dust.	47	Fine râles both bases.Prolonged expiration.	Chr.tonsil
273	18 yrs. Looper man. (Roofing machine) (mica,soapstone,slate)	Worked 34 yrs. without other dust.	42	Fine râles left base.	Chr.tonsil
105	12 yrs.Gen'l laborer. (extremely dusty asbestos.)	Worked 26 yrs. No other dust except wood.	40	Fine râles left base.	Chr.tonsil
42	29 yrs.Corrugated paper machine	Worked 41 yrs. 12 yrs.wool factory.	58	Fine râles left base.	Chr. tonsil
242	1 yr.Gen'l laborer	Worked 32 yrs. Remembers only 4 yrs.None dusty	46	Fine râles right base	Chr.tonsil

Five Cases A_1?

246	2 yrs.Rag Beater's Helper and Cutter.	Worked 25 yrs. Dust? 1 yr. foundry.	49	Rough breathing right base.	Head colds-Chr.tonsils
41	17 yrs. Corrugated paper machine	Worked 31 yrs. 3 yr coal dust.	51	0	Sl.hypertension
6	11 yrs. Pipe maker	Worked 26 yrs. 3 yrs.Johns-Manville. 9 yrs. mason.	49	0	Hypertension
24	24 yrs. Pipe maker	Worked 41 yrs. 12 yrs.Johns-Manville.	56	Fine râles both bases.	Mild chronic tonsils
50	7 1/2 yrs. Sawing asbestos	Worked 25 1/2 yrs. elsewhere	43	0	Mild chronic 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 Wasserman 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 ?A1 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.

C o m m e n t

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.

Saving asbestos gave a light field dust concentration of 83 million per cubic foot. Four men were reported to have worked more or less steadily at this occupation but none developed signi-

ficant 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 exposures 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 "	0
#271	2 "	F_1

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

Shaking out asbestos bags 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."

Packing asbestos cement 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 "	0
#67	3 "	0
#70	2 "	0
#66	1 "	F_1
#69	1 "	F_1
#73	1 "	0

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
84	Salvatore Maggio	18	Laborer 1 yr.	F_1	0
19	C. Prosprinti	42	Pipe maker 6 yrs. (5 yrs. Connell Asbestos Co.)	0	Mild tonsilitis
14	John Provenza	30	Pipemaker 10 yrs. (3 yrs. Muiseman Asbestos Co.)	F_1	" "
65	Beatrice Muroski	?	Pipe wrapper 6 yrs.	0	" " and one bad tooth

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Particles per cu.ft.or air (in millions)		
						Light Field		Dark Field
						above 10u	below 10u	(Plankton Condenser)
1	..orking inside .1 bin.(Italian fiber asbestos)	Sample taken at breathing level inside bins, close to to man who shovels and pushes Italian fiber asbestos into chutes leading to screw conveyors.	May 26,1936 F 4:45 p.m. S 4:35 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(20'x20'x10') completely enclosed except for two 2'x2' openings in ceiling and in one wall and two 1' holes in floor. No ventilation.	1.99	296.5	671.8
2	Working inside #3 bin (asbestos, clay)	Sample taken inside bin near man who opens bags of asbestos and pushes contents into chutes.	May 26,1936 F 2:55 p.m. S 2:45 10 min.	"	Same as above, except that man complains that respirator becomes clogged easily.	0.50	22.4	92.2
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.) in chamber below.	May 26, 1936 F 3:25 p.m. S 3:15 10 min.	"	Soapstone in room below. Occasionally (5 min.per hr.) man goes down into room to scrape down dust. He wears respirator when working over opening or in room; says it is satisfactory.	3.90	79.0	154.0
4	Sawing asbestos boards	Flask held at breathing level and 1' - 2' 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 excessively with breathing. Some ventilation from open window 10' away.	0.16	8.3	33.7
5	Loading bags with asbestos cement. (asbestos, about 60%;diat. earth; clay; limestone 5-8%)	Flask held at breathing level and 1' from man loading 100 lb. bag with asbestos cement #5.	May 25,1936 F 3:25 p.m. S 3:15 10 min.	"	Bag is tied to 12" pipe,filled,transferred to scales,weighed,weight made correct,bag tied and trucked away in lots of 5. No exhaust system on machine. Poor ventilation; open window 10' away, open door 40' away. Men (2) wear respirators.	0.44	261.3	794.0

Sample No.	Operation Represented	Location	Date and Sampling Time	Collecting Fluid	Remarks	Particles per cu.ft. of air (in millions)		
						Light Field		Dark Field
						above 10u	below 10u	(Plankton Condenser)
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 25,1936 F. 3:50 p.m. S. 3:40 10 min.	95% Alcohol	Room (100' wide) extends length of building and used principally for storage and bagging asbestos cement; sample about 40' from men loading asbestos cement and shoveling saw dust of asbestos and felt from dust house. Little ventilation; doors and most of windows closed.	0.08	42.3	149.3
7	Shoveling waste felt and asbestos from dust house into bags.	Flask held at breathing level; 1'-2' from man inside dust house who shovels waste into bag held by helper outside.	May 25,1936 F 3:10 p.m. S 3:00 10 min.	"	Dust chamber(8'x8'x6') receives waste felt and asbestos from saws 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 40' away.	3.35	72.2	365.5
8	Mixing liquid roofing (asbestos, asphalt)	Sample taken at breathing level on platform next to man mixing liquid roofing (asbestos dust from saws, asbestos fiber, roofing asphalt).	May 28,1936 F 9:10 a.m. S 9:00 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 4 1/2 hrs.per day. Air pressure for sampling was 29-25 lbs.	0.63	165.0	358.7
9	Working at feed end of corrugator machine	Sample taken at breathing level next to man tending feed end of corrugator machine.	May 26,1936 F 9:35 a.m. S 9:15 10 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 26,1936 F 10:30 a.m. S 10:20 10 min.	"	Same as above.	0.00	0.8	6.6