FILE NAME: Johns-Manville (JMA)

DATE: 1966-1967

DOC#: JMA385

DOCUMENT DESCRIPTION: Urban Air Asbestos Study with Attached Letters

FILE COPY BD

June 14, 1967

C. B. Burnett

Urban Air Asbestos Study
Dr. A. J. Vorwald

Report of Dr. Vorwald's analysis of large volumes of air collected from a Detroit intersection and an analysis of animals exposed to this air consists of few comments and 92 microphotographs.

Because Dr. Vorwald observed frequent fibers in the air samples "which are not unlike pure chrysotile," I am forwarding the complete report, including the microphotographs, to F. L. Pundsack for review and comment.

The fact that there were no fibers or fibrous bodies found in the lung tissue of animals exposed up to 1700 days is encouraging, even though some of the air-borne fibers may prove to have been asbestos.

Copy of the report is attached to Bill Raines' copy of this letter for distribution to the Health Task Force members.

H. M. Jackson

Attachment

cc: W. P. Raines (attachment)

B1

INTRODUCTION

The report pertains to certain studies conducted by the Department, pursuant to the basic letter of July 8, 1966, from Kenneth W. Smith, M. D., Medical Director, Johns-Manville Corporation. Subsequently, the studies were designed and initiated in accordance with a number of personal discussions and telephonic conversations with Dr. Smith and in keeping with letters of October 14, 1966, to Dr. Smith, and of February 8, 1967, to Mr. Hugh Jackson and personal discussions with him.

Briefly, the studies were prompted by published reports concerning the presence of fibers and fibrous bodies in the lungs of a significant number of human subjects of the general population who have had no apparent occupational exposure to the inhalation of asbestos fibers. These findings suggest that those subjects inhaled the fibers from the general atmosphere. This prompted the issues as to whether or not the fibers are indeed present in the general atmosphere, and if so, what are their characteristic features, to wit: could they be asbestos fibers? These issues were discussed at the First Antigua Asbestos Conference held in November of 1965. At that time, the Department was urged to initiate studies utilizing not only the dust samples collected periodically from the street air adjacent to the Department, but also the lungs of animals that had prolonged exposure to the inhalation of that air.

In view of the above, it was deemed pertinent to direct our consideration in an effort to resolve those issues. Accordingly, a variety of interrelated studies were initiated and completed, as detailed in the Table of Contents. That Table evidences involvement with at least four different forms of pure fibrous materials which, for the purposes of the record, may be identified as follows:

Amosite Asbestos
Source: Johns-Manville Corporation
Type: J.M. No. W 3 Fibers
Shipped: July 11, 1966
Received: 10 pounds in plastic bag
Date: July 25, 1966
Occup. Med. Dept. No.: H 173

Chrysotile Asbestos
Source: Johns-Manville Corporation
Type: J.M. No. 3 T Fibers
Shipped: July 11, 1966
Received: 10 pounds in plastic bag
Date: July 25, 1966
Occup. Med. Dept. No.: H 174

Crocidolite Asbestos
Source: Johns-Manville Corporation
Type: J.M. No. S. Blue Fibers
Shipped: July 11, 1966
Received: 10 pounds in plastic bag
Date: July 25, 1966
Occup. Med. Dept. No.: H 175

Fiberglass
New Cambridge M 85 Filter
Occup. Med. Dept. No.: H 178

The report consists essentially of a series of photographs and data, which are organized in two loose-leaf albums or volumes.

With respect to the photographs, they depict microscopic views (conventional light, phase and electronmicroscopic) of various preparations. Each photograph bears a brief description of each sample and its magnification. The magnification is presented in three different forms: the actual magnification; the number of microns per millimeter is stated so that measurements can be made with any metric scale; a segment of line, equal to an even number of microns is drawn so that measurements can be made without use of a scale.

With respect to the series of micrographs, it will be noted that the presentations are numerous in order to depict fibers discovered in various samples. Also, certain fibers are presented as observed under conventional light microscopy and under phase contrast microscopy, at different magnifications for elucidation of fiber structure. In addition, numerous fibrous structures are depicted as discovered in various samples of collected dust, as indicated, either from the air duct ahead of the filter, the Cambridge Absolute Glass Wool filter, or the membrane filter with dust collected directly from the outdoor air ambient to the sidewalk at street level adjacent to the Department.

The micrographs also refer to dust sample preparations that were heated to 1000 degrees centigrade either for two hours or for three hours. The preparations were placed in platinum

crucibles with a cover to prevent possible contamination from fallings off the fire brick lining the muffle furnace. Heating was carried out in order to rid the samples of all organic substance, thus leaving a residue of only the resistant material. Samples of pure fiberglass (see micrograph 46) were similarly heated. They congealed into a molten mass with complete loss of fibrous and/or filamentous structure. Accordingly, a microphotograph of that mass is not presented.

Finally, the report concerns a study of specially prepared sections of lungs of animals that have had prolonged exposure to the inhalation of air, drawn directly from the street adjacent to the Department. The focus of that study was to detect the possible presence of intrapulmonary fibers, curious bodies and/or asbestos bodies. It may be said that this phase of the study involved a detailed microscopic review of a number of specially prepared thick sections (stained and unstained) and of smears from each lung. The preparations were reviewed (under conventional light microscopy and under phase microscopy) by the undersigned and by his associate pathologist.

COMMENTS

The data submitted is subject to a variety of interpretations. The seemingly most important observations which emerge are as follows:

A. The pure forms of fibrous minerals and substances (amosite, chrysotile, crocidolite, fiberglass) have different characteristics when viewed by means of conventional light microscopy, phase contrast microscopy and electron microscopy. In that regard and for purposes of subsequent comparisons, attention is specifically invited to micrographs (13 and 16) which depict the electron micrographic visualization of pure chrysotile and of heated chrysotile.

B. The micrographs of pre-filter dust depict the presence of fibrous materials (micrographs 24-32) which in many instances display structures not unlike chrysotile (micrograph 30). The fibers persist even after heating at 1000 degrees Centigrade for 3 hours (micrographs 33-45).

C. The dust collected from the absolute Cambridge filter also evidences the presence of fibers (micrographs 40-54) which are also resistant to heating at high temperature (micrographs 55-76). Many of those fibers bear features which are not unlike pure chrysotile (for example, compare micrographs 71, 72, and 76, with 13, 16).

D. The membrane (Millipore) filter samples of dust (micrographs 77-92) collected at the sidewall level from the

street adjacent to the Department also depict fibers which in many instances have internal structures not unlike chrysotile. Notable in that regard are micrographs 82 and 92.

E. In view of the above and within the limits of the study, it is seemingly impossible to deny that the general air ambient to the Departmental site which is adjacent to a highly congested street in downtown Detroit does contain fibrous material. Also, the findings suggest that many of the fibers bear structural characteristics which are not unlike chrysotile asbestos. Whether or not other forms of asbestos are also present would require detailed analytical study beyond the scope of this report. Also, the concentration of the fibrous material, and indeed of specific fibers, per unit volume of air would involve a more comprehensive study than contemplated for purposes of this report. Such a study, however, could be designed and undertaken if the evidence thus far presented in the report would warrant the extra effort, time and expense.

F. With respect to the lungs of animals having prolonged exposure to the inhalation of the ambient air (see Table I), the study failed to discover the presence of fibrous material and/or fibrous bodies in specially prepared stained and unstained thick sections of lung and when available in stained and unstained smears of scrapings from the cut surface of the gross lung. In view of the presence of fibers in the air, their pulmonary

absence is indeed difficult to explain. Either the atmospheric fiber concentration was too low to induce a detectable presence in the lung or the fibers were too large to pass the defense mechanisms of the upper respiratory passages and thus did not gain access to the lung, or the fibers were too small to be discovered by means of conventional light microscopy. The limited study did not incorporate a tedious survey of tissue and smears by means of electronmicroscopy. It may be said here that the lung sections did not evidence a histopathology indicative of diffuse fibrosis possibly induced by inhaled fibrous material having biologic activity.

TABLE I

Animals Exposed to the Inhalation of Dirty Air Derived From Street Level Adjacent to Laboratory in Downtown Detroit

Exp. No.	Mouse No.	Days Exposed	Fibers and/or Fibrous Bodies In Sections Of Lung	Fibers and/or Fibrous Bodies In Smears Of Lung
867	37	610	0	0
	61	463	0	0
	24	463	0	0
835	45	572	0	0
	6	957	0	0
	18	892	0	0
	Hamster No.			
833	3	574	0	0
	25	574	0	0
	27	574	0	0
	Rat No.			
629	159	404	0	0
	179	404	0	0
	209	404	0	0
	221	384	0	0
	223	404	0	0
	160	404	0	0
	180	404	0	0
	210	404	0	0
	224	404	0	0
837	99	1012	0	0
	42	1012	0	0
	44	1012	0	0
858	2	957	0	0
	22	957	0	0

TABLE I (con't)

Exp. No.	Guinea Pig No.	Days Exposed	Fibers and/or Fibrous Bodies In Sections Of Lung	Fibers and/or Fibrous Bodies In Smears Of Lung
634	1	1037	0	0
	5	1648	0	0
	7	1648	0	0
	8	1648	0	0
	10	1648	0	0
	19	1648	0	0
	20	1648	0	0
	25	1648	0	0
	35	1037	0	0
	36	1116	0	0
	37	1163	0	0
635	4	1641	0	0
	24	1037	0	0
	36	1037	0	0
771	8	1248	0	0
	15	1248	0	0
	16	1248	0	0
772	2	1248	0	0
	3	1248	0	0
	5	1248	0	0
	7	1248	0	0
	9	1248	0	0
	12	1249	0	0
	15	1248	0	0
	19	1249	0	0
830	1	1221	0	0
	8	1222	0	0
	15	1222	0	0
	24	1222	0	0
	27	1222	0	0

TABLE 1 (con't)

Exp. No.	Guinea Pig No.	Days Exposed	Fibers and/or Fibrous Bodies In Sections Of Lung	Fibers and/or Fibrous Bodies In Smears Of Lung
831	1	1222	0	0
	6	1223	0	0
	10	1223	0	0
	11	1223	0	0
	12	1223	0	0
	14	1223	0	0
	16	1223	0	0
	17	1223	0	0
	18	1223	0	0
	23	1223	0	0
	24	1223	0	0
	32	1223	0	0
	35	1223	0	0
	39	1223	0	0
	Rabbit No.			
643	4	1713	0	0
	11	1105	0	0
	14	1713	0	0
	16	1713	0	0
	17	1713	0	0
	18	1065	0	0
644	3	683	0	0
	4	1582	0	0
	8	1713	0	0
	13	1713	0	0
	15	1713	0	0
	16	1713	0	0
	17	1105	0	0
775	5	1043	0	0
	8	1309	0	0
	16	1309	0	0
776	1	1313	0	0
	8	1313	0	0

JOHNS-MANVILLE RESEARCH AND ENGINEERING CENTER

Date November 14, 1967

File 259

MINUTES: ASBESTOS ENVIRONMENTAL PROGRAM

Meeting with Dr. Arthur Vorwald and Associates
Wayne State University - November 1, 1967

General:

The meeting was arranged by H. M. Jackson for an efficient interchange of information between Johns-Manville and Dr. Vorwald. Attending from Wayne State University were:

Dr. Arthur Vorwald	-	Head, Environmental Medicine Laboratory
Dr. Ralph Smith	-	In charge of chemical and physical techniques for the laboratory
Mr. Ken Mikel	-	Performs all petrographic and electron microscope work

Attending from J-M were:

H. M. Jackson	C. L. Scheckler
F. L. Pundsack	D. Bailey
S. Speil	G. Reimschussel
W. C. Streib	T. Weeks
E. M. Fenner	

The agenda, attached, was followed, except for omission of the facilities tour.

The subject matter presented by J-M personnel was, in general, the same as that presented at the meeting with Drs. Cralley, Keenan, and Gross on July 6, 1967 (see Minutes of July 13, 1967).

Summary:

This meeting fulfilled its main objective of acquainting J-M personnel with the work at Wayne State University and vice versa. It gave J-M people a much more vivid understanding of carcinomas; it gave Wayne State personnel a much better understanding of the differences between different types of asbestos, as well as different types of chrysotile. It was agreed that W. C. Streib would send approximately 1 lb of clean, crude fiber to Dr. Vorwald for use in some of his injection studies. It was suggested that a program should be initiated to observe the chemical behavior of various asbestos fibers in blood serum at room temperature, as well as in pleural fluids and saline solution.

Presentation - General Details:

W. C. Streib - Discussed the types of fiber and major sub-divisions of chrysotile, and reviewed physical properties. He discussed differences in associated impurities of Canadian, Rhodesian, and Arizona fibers, and reviewed the significance of harshness, describing its effect on various processing parameters and uses.

F. L. Pundsack - Reviewed the general formation and geological occurrence of Canadian chrysotile in the serpentine belt.

G. Reimschussel - Reviewed chemical and physical characteristics of chrysotile and described the structure of chrysotile and amphiboles. He also elaborated on the modes of occurrence and contents of nickel, iron and other trace elements. Later in the afternoon, he described the program on identification and determination of benzo(a)pyrene in chrysotile and other asbestos materials.

T. Weeks - Reviewed his study of adsorption of various organic species on chrysotile, both from the liquid and vapor phase.

D. Bailey - Presented and described a series of photomicrographs and electron micrographs of several forms of asbestos, reviewing the differences involved. He described the decomposition of chrysotile in the Spex Mill, and compared the observed results with the dust obtained from brake lining decomposition studies.

Dr. Vorwald was the spokesman for the Wayne State personnel. He gave a lucid explanation of the detection and formation of lung carcinoma, and of pleural mesothelioma. For most of the J-M attendees, the color pictures which he presented enhanced considerably our understanding of the phenomena which we had not fully grasped from verbal and pictorial representations heretofore.

Vorwald started his discussion by pointing out that the ferruginous coating on "asbestos bodies" constituted a protective attempt by the body. He noted that in some cases decomposed tissue or even corpuscles might resemble a so-called body.

He noted the possibility of geographical or other environmental factors having a significant effect on the frequency of carcinoma incidence, e.g., the relatively low incidence in the asbestos area in Quebec.

He then proceeded to show a series of chest X-rays of a case which was diagnosed as carcinoma, clearly pointing out the light spots in the film which were evidence of cancerous growth and showing how sometimes carcinoma could be improperly diagnosed as an abscess. This was followed by a picture of the total cancer and with a series of microscopic sections taken at different magnifications, and finally a section with excellent examples of ferruginous bodies, both dumb bell and segmental. He then showed the structure of the lungs, indicating how the cancer had penetrated, and further explained the diagnosis of emphysema as a fibrotic condition where the alveola walls had become extremely thin or ruptured. He questioned the proof that there is necessarily a causal relationship between the presence of "asbestos bodies" and carcinoma.

Vorwald then showed a second series of pictures describing pleural mesothelioma. In the case of pleural mesothelioma, the pleural cavity around the lung is more or less completely filled with a tumor whose growth may finally be fatal. Usually there are few, if any, fibers found in this area. One of the problems is to explain how fibers in the lung can cause the tumor without contact. Is it possible that extremely fine fibers can find their way through the lining, or that eluted material or ions can penetrate?

Vorwald indicated that there has been no known relation between silicosis or either mesothelioma or carcinoma. He wondered whether the presence of minute amounts of silica with the asbestos might be synergistic in some unknown manner.

Vorwald then went into a detailed explanation and series of pictures describing his laboratory facilities for studying animals by inspiration of fiber or other dust materials. He described the set up wherein for a period of years approximately 14,000 cu ft/minute had been aspirated into a large duct system over the heavily traveled road at St. Antoine Street in Detroit. This air had been ducted into a series of cages in which various animals had been exposed. Despite the dirtiness of the air, both from particulates and fumes, there had been no statistically significant effect on the animals involved.

The laboratory now contained one generating room, and three exposure rooms, each approximately 10 x 13 ft. The generating room was used to feed fibers, as desired, into individual duct systems for each of the three rooms. In a current series of tests, crocidolite, chrysotile, and amosite, respectively, were fed into each of the rooms. In the rooms the air entered from one side wall through a diffusion panel with large holes and exited on the other side. Cages were moved at frequent intervals to insure uniformity of exposure for rabbits, hamsters, rats, and guinea pigs. In addition to the exposure rooms, the laboratory was equipped with a variety of stainless steel exposure chambers. One type of exposure chamber, costing $6,000 each, was used for larger animals, such as monkeys. Another type, less expensive, was rectangular with glove ports and used primarily for exposure to vapors. In many cases, a nose injection system was used to expose a large number of animals. This was preferred to intratracheal injection. Monkeys had been trained to smoke. Dr. Vorwald described a Faraday Cage System for electronic evaluation of breathing at various stages of the exposure using a multi-channel recorder.

The study of exposure to asbestos, sponsored by the U. S. Public Health Service, was furnished fiber by J-M through Hugh Jackson. The fibers included a 3-grade chrysotile, amosite, and crocidolite. These fibers were prepared by Ken Mikel in a variety of ways for different studies. For injection studies, small quantities of fiber were mixed in a Waring Blender in a thick slurry from 1 to 15 minutes. The fiber length of the chrysotile was 20 microns; the other fibers were usually smaller. The materials were then dried at 50C and ground by hand in an agate mortar and pestle for 15 minutes. In interperitonal and interpleural injections, the first experiments utilized 50 mg/cc, later reduced to 20 mg/cc. Intratracheal injections utilized 10 and then finally 5 mg/cc.

In these animals, fibrosis has been noted in many cases after one year (intratracheal) and 8 months (inhalation) studies. No readily identifiable carcinoma has yet been identified from the chrysotile samples. In the case of the rats injected with amosite, there is a single carcinoma evident after one year.

A rather unusual system was devised for preparing fiber for aspiration studies. At first, the material was fed through a hammer mill directly into air lines to the exposure rooms. However, for some reason (unknown to us) the mill lost hammers and, therefore, this method was discontinued. It is our understanding that this method has been, and is now, used by Dr. Gross.

Mr. Mikel then set up a 55-gal steel drum with steel brushes placed inside axially, but not touching the circumference of the drum. Fiber was placed in the drum and the drum was rotated breaking down the fiber. This material was then fed by a small extrusion feeder into a vertical plastic pipe, conveyed upward by compressed air introduced at the bottom of the pipe, and over into the individual exposure rooms. The compressed air came from an oil-free unit. Apparently the vertical pipe acted as a type of air separator, because the coarse material dropped to the bottom of the system and was removed periodically. The average of the material entering the exposure room was as follows.

	Chrysotile	Amosite	Crocidolite
Diameter, microns	0.1	0.3	0.3
Length, microns	8 - 12	3	4

No analytical work has yet been performed on these fibers. We would anticipate considerable pickup of trace metals, and this is surprising since at several points during the discussion Dr. Vorwald had pointed out the possible importance of trace metallic constituents. Within a short period, analytical work will be started on the original fibrous material, the fibrous material in the room, and also on lung sections.

The concentration of fiber in the exposure rooms was 48 to 55 mg/cu meter for an exposure period of 4 hr/day and 4 days/week. This is a very high concentration and leads to questions concerning the concentration effect vs the time effect.

Dr. Vorwald summarized his talk by a series of rhetorical questions indicating the lack of fundamental information on many aspects of the asbestos environment problem.

1. What is the effect of sizes and of concentration of fibers?

2. Do the fibers adsorb some contaminating factor from the air?

3. Once the fiber enters the body, how is it effected by tissue fluids or pleural fluids?

4. Should we perform experimental studies of the leaching effect on fibers by pleural fluids, by distilled water, by saline solution, or blood serum?

5. Should we start tissue culture studies to determine (outside of the body) effects of fiber on tissue?

6. What size fiber can be enclosed by a phagocyte for effective removal?

7. What changes occur in the fiber over a period of time?

8. What is the effect of the type of fiber involved; of the mineralogical species; of sub-species?

9. How does the size of the fiber really control the travel of a fiber as it enters the body?

10. Finally, how can we more exactly identify fibers and particles which are found in the lung and its surroundings?

Although Mr. Mikel had made a vast number of electron micrograph and microscopic observations on the dust and dirt obtained through the outside duct system, it was obvious from our discussion that his understanding of fiber morphology left much to be desired.

I discussed privately with Dr. Vorwald what phase of the J-M information at this meeting was of most value to him, and would be of most benefit to medical people involved in this type of work. He indicated that the discussion of physical and chemical properties of the fiber at ambient temperatures was exceedingly interesting; he was particularly impressed with the explanation of differences of amphiboles and chrysotile, and between different forms of chrysotile from a variety of locations, as well as from adjacent locations. He felt that most medical people did not realize that these differences existed and tended to categorize asbestos minerals as a single group with even many sophisticated experimenters not realizing the physical differences between chrysotile fibers from different areas.

SSpeil

S. Speil

SS/rs

Attachment

cc: Dr. George Wright

H. M. Jackson, DH
K. V. Lindell, Asb
A. C. Smith
F. L. Pundsack
W. C. Streib
E. M. Fenner
J. P. Leineweber

J. M. CONFIDENTIAL

ATTACHMENT

AGENDA FOR DISCUSSION WITH DR. VORWALD AND ASSOCIATES
November 1, 1967

8:30 - 8:45	-	Opening remarks and general statements F. L. Pundsack H. M. Jackson E. M. Fenner
8:45 - 9:25	-	General discussion of types of asbestos, modes of occurrence, mining and milling methods, principle areas of application. W. C. Streib - 40 min.
9:25 - 10:10	-	Introduction to basic studies. S. Speil - 5 min. Chemical composition, physical structure, chemical and physical reactions of asbestos. G. Reimschussel - 40 min.
10:10 - 10:25	-	Coffee break
10:25 - 11:45	-	Discussion of Research. Dr. Vorwald and associates. 80 min.
11:45 - 1:00	-	Tour of facilities - Asbestos Fiber Department and Microscopical Laboratory (if time is available).
1:00 - 1:45	-	Lunch
1:45 - 2:15	-	Fiber identification problems. S. Speil - D. Bailey - 30 min.
2:15 - 2:35	-	Basic Research studies Benzo(a)pyrene in asbestos. G. Reimschussel - 10 min. Adsorption of organics. T. Weeks - 10 min.
2:35 - 5:00	-	Round-table discussion.

S. Speil

rs
10/20/67

6/19/67
Hugh Jackson
Here are some general comments on the Vorwald report.
Jeff

Research and Engineering Center
June 15, 1967

File: 411

F. L. Pundsack

Vorwald Report

The following are some general comments concerning Dr. Vorwald's report on the dust samples collected in downtown Detroit.

1. Obviously, they were able to find many fiber particles in these dust samples. However, the pictures do not allow any estimate of the amount of such fibrous materials present in the dust.

2. The fibers that do appear to be chrysotile all show evidence of some type of degradation. Such degradation could be caused by either mechanical action or by heat.

3. Many of the high magnification optical micrographs have been blown up to a point where the details seen could be artifacts caused by the extreme magnification.

4. The optical micrographs of the pure fibers appear as though some attempt was made to separate a fine fraction from the original sample. In doing so they have isolated a large fraction of non-fibrous material.

5. The heat-treated fibers (2 hrs @ 1000°C) have the appearance of fibers which were heated at a lower temperature.

6. It appears that any fibrous material which had a tubular appearance was considered to be chrysotile regardless of the magnification used.

Specific comments compiled by D. Bailey and G. Reimschussel are attached.

J. P. Leineweber

JPL/mac

Attachment

cc: H. Jackson - DH
S. Speil
D. Bailey
G. Reimschussel

If you please Sid Speil and not contact Vorwald on Detroit trip - I to arrange research discussion.

A T T A C H M E N T

COMMENTS - DONALD BAILEY

FIGURE	TITLE	MICROGRAPH	MAGNIFICATION	COMMENT
1	Amosite	Light	860X	Splinters, 15 microns and less
2	Amosite	Phase	1,376X	Splinters, 15 microns and less
3	Amosite	Electron	33,290X	Splinters, 0.4 micron diameter and less
5	Amosite	Light	860X	Splinters, 20 microns and less
7	Amosite 1000°C	Electron	55,383X	Possible sintering
10	Chrysotile	Light	1,655X	Not well opened
13	Chrysotile	Electron	168,200X	Damaged fibers? Ball Milled?
16	Chrysotile 1000°C	Electron	111,200X	Shows effect of heat
17	Crocidolite	Light	860X	Few fibers!
24	Pre-filter	Light	344X	Air-duct (outside intake). Fly-ash fibers; not definitely chrysotile. Cotton?
30	Pre-filter	Electron	83,100X	Concentration? Looks like chrysotile.
31-32	Pre-filter	Electron	18,400X 33,300X	Perhaps chrysotile; not very well resolved
33	Pre-filter	Light	677X	?
37	Pre-filter	Light	677X	?
38	Pre-filter	Phase	677X	?
39	Pre-filter	Light	1,376X	? Glass fiber?
40	Pre-filter	Phase	2,710X	? Glass fiber?

FIGURE	TITLE	MICROGRAPH	MAGNIFICATION	COMMENT
41	Pre-filter	Phase	1,376X	Possibly some chrysotile
42-45	Pre-filter	Electron	43,300X 168,200X	Chrysotile
50	Filter	Phase	344X	Trace glass?
52	Filter	Electron	14,890X	Animal hair? Trace chrysotile?
53-54	Filter	Electron	7,040X 18,400X	Main fiber probably not chrysotile; though possibly trace present
59	Filter	Light	344X	Glass fiber?
60	Filter	Phase	344X	Glass fiber?
61-70	Filter	Light Phase	677X 1,693X 1,084X	Some glass fiber?
71-76	Filter	Electron	168,200X 111,200X 83,100X	Possibly damaged chrysotile
77-81	Millipore	Light Phase	344X 677X	Possibly chrysotile?
82	Millipore	Electron	83,100X	Possibly damaged chrysotile? Where is other material? How concentrated?
83	Millipore	Electron	111,200X	Perhaps not chrysotile
84-88	Millipore	Phase	1,376X	What fiber?
89-91	Millipore	Electron	10,555X 43,300X 83,100X	Trace chrysotile? Why ash at so high a temperature?
92	Millipore	Electron	300,000X	Ash temperature too high

A T T A C H M E N T

COMMENTS - GEORGE REIMSCHUSSEL

Introduction, Page 2 - Amosite and crocidolite fibers are labelled as though they are Johns-Manville fibers. These were obtained from Johns-Manville but, obviously, not produced by us.

FIGURE	TITLE	MICROGRAPH	MAGNIFICATION	COMMENT
8	Chrysotile	Light	677X	Seems very short for 3 grade fiber
12	Chrysotile	Electron	18,400X	Has same appearance as Waring Blendor treated fiber
16	Chrysotile	Electron	111,200X	Looks more like our chrysotile sample which has been calcined for 1 hr at 700°C
30	Pre-filter	Electron	83,100X	Seems like a lot of fiber
33-35	Pre-filter	Light Phase	677X	Fibers are too large for chrysotile at this magnification
44	Pre-filter	Electron	43,300X	Does look like chrysotile
59-60	Filter	Light	344X	Has chrysotile appearance, but magnification is too low
82	Millipore	Electron	83,100X	Appears more like heat-treated chrysotile
92	Millipore	Electron	300,000X	Does not look like chrysotile

July 8, 1966

Dr. Arthur J. Vorwald
Dept. of Occupational Medicine
School of Medicine
Wayne State University
1400 Chrysler
Detroit, Michigan

Dear Arthur:

This letter will cover several subjects but I would like to review many of the items which we discussed on my recent visit.

I have asked our Manville Plant organization to send you 10 pounds of each of three types of asbestos fiber: chrysotile, amosite and crocidolite. Please let me know if they are not received within a reasonable time.

You indicated that you plan to do a clinical study of asbestos insulation workers in the Detroit area. To gain complete employee participation you might wish to contact the President of the union. His name and address follows: Mr. Carl W. Sickles, General President, International Association of Heat and Frost Insulators and Asbestos Workers, 505 Machinists Bldg., 1300 Connecticut Ave., N.W., Washington, D.C. 20036.

This company is very interested in sponsoring a research program to study the presence or absence of asbestos fibers and/or asbestos bodies which might be present in the dust and animal tissues which you used and obtained as the result of your air pollution experiments. Could you please outline a protocol for this study which we discussed indicating particularly how soon this could be started, how long it would take, the scope of the program, the times of interim and final reports, and the total cost? The subject of asbestos in urban air is receiving considerable attention these days and I feel that such a research program would receive very favorable attention if proposed to the company.

Another subject which we discussed was asbestos bodies in lung tissue. I would be very interested in obtaining your ideas on what materials might cause the so-called asbestos or ferruginous bodies if inhaled or injected into the lungs. In other words what material could stimulate the production of these bodies if inhaled or injected?

Another question which arose is the presence of asbestos and/or asbestos bodies in tissues other than the lung. Is it necessary for the host tissue to have some form of motion such as in lung or muscle to produce asbestos bodies and fibrous tissue? What would be the action of an asbestos fiber in relatively inert tissues such as the brain? Do you think that asbestos fibers migrate by themselves from one tissue to another, from one organ to another, or from one part of the body to another? If they do not migrate per se, are they spread through the lymphatic or blood streams?

While in your office you showed me the x-ray survey which is being initiated in which the films are read by a group of radiologists. I neglected to ask you what classification these men are using to identify any changes they see in the films? I would be very interested in knowing this classification and especially to know if it could be used in our asbestos workers. You will recall that we have been using the old Saranac classification for I have found it much easier and more simple to explain to our part-time doctors than the new WHO classification.

I realize that I have raised many questions but your answers will be very gratefully appreciated. You have a fund of knowledge and I would like to learn more about these several subjects. In addition, I am sure that this company feels that it would like to sponsor some of the work which you have projected.

Sincerely,

Kenneth W. Smith, M.D.
Medical Director

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

September 2, 1966

Kenneth W. Smith, M. D.
Medical Director
Johns-Manville Corporation
Twenty-Two East Fortieth Street
New York, New York 10016

Dear Ken:

We are going forward with our experimental studies concerning asbestos, with a major focus on whether or not one or the other of the three varieties have the biologic capacity to induce primary malignancy, either of the lung or of the pleura. During the past several weeks we have achieved grinding the asbestos for injection purposes. Concurrently, we have finally achieved a methodology which will assure a high atmospheric concentration (50 mg/cubic foot) of fibers of respirable size (85% less than 4 microns in length; their width is still to be determined). Our tooling-up program, involving the modification of our four exposure rooms is on its way and nearing completion.

During all of the above efforts, we have consumed a good portion of each of the different asbestos types which you forwarded to us. Now, we wish to initiate the preparations of fibers which will be needed for the inhalation studies. Accordingly, and if at all possible, at your earliest convenience, we would appreciate having at least 50 pounds of each type, namely: amosite, J.M. No. W3 fibers; chrysotile, J.M. No. 3T fibers; and crocidolite, J.M. No. S.Blue fibers. This supply should last us for approximately 4 months, since we will use it as sparingly as possible, but in amounts necessary

to achieve the objectives of the inhalation study. If necessary, Ken, we do not mind should you ship the amounts in a manner whereby we can pay for the shipping costs.

We are always grateful to you, Ken, and to your company for assisting us toward the resolution of relatively most urgent issues.

Best wishes,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

INTRODUCTION

The report pertains to certain studies conducted by the Department, pursuant to the basic letter of July 3, 1966, from Kenneth W. Smith, M. D., Medical Director, Johns-Manville Corporation. Subsequently, the studies were designed and initiated in accordance with a number of personal discussions and telephonic conversations with Dr. Smith and in keeping with letters of October 14, 1966, to Dr. Smith, and of February 8, 1967, to Mr. Hugh Jackson and personal discussions with him.

Briefly, the studies were prompted by published reports concerning the presence of fibers and fibrous bodies in the lungs of a significant number of human subjects of the general population who have had no apparent occupational exposure to the inhalation of asbestos fibers. These findings suggest that those subjects inhaled the fibers from the general atmosphere. This prompted the issues as to whether or not the fibers are indeed present in the general atmosphere, and if so, what are their characteristic features, to wit: could they be asbestos fibers? These issues were discussed at the First Antigua Asbestos Conference held in November of 1965. At that time, the Department was urged to initiate studies utilizing not only the dust samples collected periodically from the street air adjacent to the Department, but also the lungs of animals that had prolonged exposure to the inhalation of that air.

In view of the above, it was deemed pertinent to direct our consideration in an effort to resolve those issues. Accordingly, a variety of interrelated studies were initiated and completed, as detailed in the Table of Contents. That Table evidences involvement with at least four different forms of pure fibrous materials which, for the purposes of the record, may be identified as follows:

Amosite Asbestos
Source: Johns-Manville Corporation
Type: J.M. No. W 3 Fibers
Shipped: July 11, 1966
Received: 10 pounds in plastic bag
Date: July 25, 1966
Occup. Med. Dept. No.: H 173

Chrysotile Asbestos
Source: Johns-Manville Corporation
Type: J.M. No. 3 T Fibers
Shipped: July 11, 1966
Received: 10 pounds in plastic bag
Date: July 25, 1966
Occup. Med. Dept. No.: H 174

Crocidolite Asbestos
Source: Johns-Manville Corporation
Type: J.M. No. S. Blue Fibers
Shipped: July 11, 1966
Received: 10 pounds in plastic bag
Date: July 25, 1966
Occup. Med. Dept. No.: H 175

Fiberglass
New Cambridge M 85 Filter
Occup. Med. Dept. No.: H 178

The report consists essentially of a series of photographs and data, which are organized in two loose-leaf albums or volumes.

With respect to the photographs, they depict microscopic views (conventional light, phase and electron microscopic) of various preparations. Each photograph bears a brief description of each sample and its magnification. The magnification is presented in three different forms: the actual magnification; the number of microns per millimeter is stated so that measurements can be made with any metric scale; a segment of line, equal to an even number of microns is drawn so that measurements can be made without use of a scale.

With respect to the series of micrographs, it will be noted that the presentations are numerous in order to depict fibers discovered in various samples. Also, certain fibers are presented as observed under conventional light microscopy and under phase contrast microscopy, at different magnifications for elucidation of fiber structure. In addition, numerous fibrous structures are depicted as discovered in various samples of collected dust, as indicated, either from the air duct ahead of the filter, the Cambridge Absolute Glass Wool filter, or the membrane filter with dust collected directly from the outdoor air ambient to the sidewalk at street level adjacent to the Department.

The micrographs also refer to dust sample preparations that were heated to 1000 degrees centigrade either for two hours or for three hours. The preparations were placed in platinum

crucibles with a cover to prevent possible contamination from fallings off the fire brick lining the muffle furnace. Heating was carried out in order to rid the sample of all organic substance, thus leaving a residual of only fire resistant material. Samples of pure fibergiass (see micrograph 46) were similarly heated. They congealed into a molten mass with complete loss of fibrous and/or filamentous structure. Accordingly, a microphotograph of that mass is not presented.

Finally, the report concerns a study of specially prepared sections of lungs of animals that have had prolonged exposure to the inhalation of air, drawn directly from the street adjacent to the Department. The focus of that study was to detect the possible presence of intrapulmonary fibers, curious bodies and/or asbestos bodies. It may be said that this phase of the study involved a detailed microscopic review of a number of specially prepared thick sections (stained and unstained) and of smears from each lung. The preparations were reviewed (under conventional light microscopy and under phase microscopy) by the undersigned and by his associate pathologist.

COMMENTS

The data submitted is subject to a variety of interpretations. The seemingly most important observations which emerge are as follows:

A. The pure forms of fibrous minerals and substances (amosite, chrysotile, crocidolite, fiberglass) have different characteristics when viewed by means of conventional light microscopy, phase contrast microscopy and electron microscopy. In that regard and for purposes of subsequent comparisons, attention is specifically invited to micrographs (13 and 16) which depict the electron micrographic visualization of pure chrysotile and of heated chrysotile.

B. The micrographs of pre-filter dust depict the presence of fibrous materials (micrographs 24-32) which in many instances display structures not unlike chrysotile (micrograph 30). The fibers persist even after heating at 1000 degrees Centigrade for 3 hours (micrographs 33-45).

C. The dust collected from the absolute Cambridge filter also evidences the presence of fibers (micrographs 40-54) which are also resistant to heating at high temperature (micrographs 55-76). Many of those fibers bear features which are not unlike pure chrysotile (for example, compare micrographs 71, 72, and 76, with 13, 16).

D. The membrane (Millipore) filter samples of dust (micrographs 77-93) collected at the sidewall level from the

street adjacent to the Department also depict fibers which in many instances have internal structures not unlike chrysotile. Notable in that regard are micrographs 82 and 92.

E. In view of the above and within the limits of the study, it is seemingly impossible to deny that the general air ambient to the Departmental site which is adjacent to a highly congested street in downtown Detroit does contain fibrous material. Also, the findings suggest that many of the fibers bear structural characteristics which are not unlike chrysotile asbestos. Whether or not other forms of asbestos are also present would require detailed analytical study beyond the scope of this report. Also, the concentration of the fibrous material, and indeed of specific fibers, per unit volume of air would involve a more comprehensive study than contemplated for purposes of this report. Such a study, however, could be designed and undertaken if the evidence thus far presented in the report would warrant the extra effort, time and expense.

F. With respect to the lungs of animals having prolonged exposure to the inhalation of the ambient air (see Table I), the study failed to discover the presence of fibrous material and/or fibrous bodies in specially prepared stained and unstained thick sections of lung and when available in stained and unstained smears of scrapings from the cut surface of the gross lung. In view of the presence of fibers in the air, their pulmonary

absence is indeed difficult to explain. Either the atmospheric fiber concentration was too low to induce a detectable presence in the lung, or the fibers were too large to pass the defence mechanisms of the upper respiratory passages and thus did not gain access to the lung, or the fibers were too small to be discovered by means of conventional light microscopy. The limited study did not incorporate a tedious survey of tissue and smears by means of electronmicroscopy. It may be said here that the lung sections did not evidence a histopathology indicative of diffuse fibrosis possibly induced by inhaled fibrous material having biologic activity.

TABLE I

Animals Exposed to the Inhalation of Dirty Air Drawn From Street Level Adjacent to Laboratory in Downtown Detroit

Exp. No.	Mouse No.	Days Exposed	Fibers and/or Fibrous Bodies In Sections Of Lung	Fibers and/or Fibrous Bodies In Smears Of Lung
867	37	610	0	0
	61	463	0	0
	24	463	0	0
835	45	572	0	0
	6	957	0	0
	18	892	0	0
	Hamster No.			
833	3	574	0	0
	25	574	0	0
	27	574	0	0
	Rat No.			
629	159	404	0	0
	179	404	0	0
	209	404	0	0
	221	384	0	0
	223	404	0	0
	160	404	0	0
	180	404	0	0
	210	404	0	0
	224	404	0	0
837	99	1012	0	0
	42	1012	0	0
	44	1012	0	0
858	2	957	0	0
	22	957	0	0

TABLE I (con't)

Exp. No.	Guinea Pig No.	Days Exposed	Fibers and/or Fibrous Bodies In Sections Of Lung	In Smears Of Lung
634	1	1037	0	0
	5	1648	0	0
	7	1648	0	0
	8	1648	0	0
	10	1648	0	0
	19	1648	0	0
	20	1648	0	0
	25	1648	0	0
	35	1037	0	0
	36	1116	0	0
	37	1163	0	0
635	4	1641	0	0
	24	1037	0	0
	36	1037	0	0
771	8	1248	0	0
	15	1248	0	0
	16	1248	0	0
772	2	1248	0	0
	3	1248	0	0
	5	1248	0	0
	7	1248	0	0
	9	1248	0	0
	12	1249	0	0
	15	1248	0	0
	19	1249	0	0
830	1	1221	0	0
	8	1222	0	0
	15	1222	0	0
	24	1222	0	0
	27	1222	0	0

TABLE I (con't)

Exp. No.	Guinea Pig No.	Days Exposed	Fibers and/or Fibrous Bodies In Sections Of Lung	Fibers and/or Fibrous Bodies In Smears Of Lung
831	4	1222	0	0
	6	1223	0	0
	10	1223	0	0
	11	1223	0	0
	12	1223	0	0
	14	1223	0	0
	16	1223	0	0
	17	1223	0	0
	18	1223	0	0
	23	1223	0	0
	24	1223	0	0
	32	1223	0	0
	35	1223	0	0
	39	1223	0	0
	Rabbit No.			
643	4	1713	0	0
	11	1105	0	0
	14	1713	0	0
	16	1713	0	0
	17	1713	0	0
	18	1065	0	0
644	3	683	0	0
	4	1582	0	0
	8	1713	0	0
	13	1713	0	0
	15	1713	0	0
	16	1713	0	0
	17	1105	0	0
775	5	1043	0	0
	8	1309	0	0
	16	1309	0	0
776	1	1313	0	0
	8	1313	0	0

June 14, 1967

C. B. Burnett

Urban Air Asbestos Study
Dr. A. J. Vorwald

Report of Dr. Vorwald's analysis of large volumes of air collected from a Detroit intersection and an analysis of animals exposed to this air consists of few comments and 92 microphotographs.

Because Dr. Vorwald observed frequent fibers in the air samples "which are not unlike pure chrysotile," I am forwarding the complete report, including the microphotographs, to F. L. Pundsack for review and comment.

The fact that there were no fibers or fibrous bodies found in the lung tissue of animals exposed up to 1700 days is encouraging, even though some of the air-borne fibers may prove to have been asbestos.

Copy of the report is attached to Bill Raines' copy of this letter for distribution to the Health Task Force members.

H. M. Jackson

Attachment

cc: W. P. Raines (attachment)

MW

FILE COPY

April 8, 1970

George W. Wright, M.D.
Head, Medical Research
Saint Luke's Hospital
11311 Shaker Boulevard
Cleveland, Ohio 44104

Dear George:

You may recall that several years ago Dr. A. J. Vorwald conducted a study of collection and analysis of large volumes of air from a Detroit street intersection adjacent to Wayne University.

In 1967, we requested that he review the data he had available from both the air samples and the exposed animals to determine whether there were asbestos fibres in the collected air and what effect exposure to this air had on the experimental animals.

Copy of the report of this review is attached for your reading. The two volumes of microphotographs are in my files.

Recently in connection with our review of asbestos health research, I contacted Mr. Ralph G. Smith at Wayne University to determine whether this material had been published, and he advised that it had not. Ralph indicated that if we were desirous of having a report published, he, as Acting Chairman of the Department of Occupational and Environmental Health, would be glad to undertake it.

Following receipt of the report in 1967, the study was reviewed at our Research Center with Dr. Pundsack, Dr. Speil and others, as well as Dr. Vorwald and Mr. Smith.

A principal deficiency in the study was that there was no quantification of the fibre content of the air. However, there may still be some value in having the study in print.

If you feel the publication would be worth while, I'll determine with Mr. Smith what the attendant costs might be. Ralph will be leaving Wayne University at the end of June to go with the California University School of Public Health. Therefore, if any action is to be taken, it should be done promptly.

Sincerely yours,

H. M. Jackson
Director of Industrial Relations

Enclosure

JOHNS-MANVILLE RESEARCH AND ENGINEERING CENTER

Report No. 404-19

Date February 8, 1967

Title: AIRBORNE DUST SAMPLE, DETROIT - Microscopic Evaluation

Requested by: S. Speil

Sample

A sample of airborne dust collected above a busy street intersection in Detroit by A. J. Vorwald, M.D., of Wayne State University, was sent to our Dr. K. W. Smith for evaluation.

Methods of Examination

The sample as-received and after ashing at 427C was examined petrographically and by X-ray diffraction. A portion of the as-received sample was separated in water into three sized fractions, and electron micrographs of the medium fraction were prepared. The fine fraction was found to consist essentially of water-soluble crystals, and was set aside.

Another portion of the as-received sample was separated in water into three fractions. Electron micrographs of the medium fraction and the fine fraction were prepared, including samples dried at 105C and samples ashed at 400C. In this fractionation, most of the water solubles were removed.

Results

Petrographic on sample as received:

Glass (fly-ash, etc.)	possible major
Quartz	minor
Gypsum	small
Opaque	minor
Carbonates	small
Cellulose fiber	trace

Heat loss on sample as received:

Moisture loss - 5.9%
Ignition loss - 33.0

Petrographic on fine and medium fraction (second fractionation):

Fine fraction, dried at 105C. Consists of fine agglomerates of glass spheroids, mixed with opaque (carbonaceous); plus traces of quartz, carbonates, and gypsum. The aggregates are about 30 microns and below, and individual particles (chiefly spheroidal) are of the order of 5 microns and below, including much below 1 micron. (The fine fraction from the first fractionation, chiefly water-soluble, was identified as gypsum.)

Medium fraction, dried at 105C.

Glass	major
Opaque	large minor
Quartz	minor
Carbonates	small
Gypsum	trace

Notebook 3474, pp 78, 79, 94.

File 359
259

The glass occurs chiefly as spheroids of the order of 8 microns and below, and some irregular masses about 15 microns and below. The quartz particles are about 10 microns and below.

Electron microscopy:

The material examined under the electron microscope was rubbed out as outlined in Research report 412-Int-1825. Briefly, this consists of rubbing a small quantity of the dust in a drop of 1 per cent nitrocellulose in amyl acetate on a glass slide, using a small watch glass as a pestle. The sample is finally rubbed out between two glass slides to form a thin membrane, which is then floated off on water and picked up on carbon-coated electron grids. The rubbing-out technique was used with these samples to break up coarse particles and clumps and to disperse the particles.

Electron micrographs of the medium material from the first fractionation (EMS No. 511, A through C) shows solid, irregular particles (mainly quartz); and spheroids ranging from 0.4 micron on down. The latter when very fine frequently form agglomerates. There is also some fine scaly or micaceous material, and some fine, irregular particles that could be carbon or gypsum. Also noted were a few short fibrils that could be chrysotile. These constitute only a fraction of a per cent of the total (see Fig. 1, Appendix).

Samples prepared for electron microscopy from fine and medium fractions obtained by the second fractionation of the as-received material were less vigorously rubbed-out than the material shown in EMS No. 511. This resulted in a less even distribution of the particles, but it more frequently preserved existing agglomerates of glassy spheroids, and portions of the scaly or micaceous material noted above. The resulting electron micrographs (EMS Nos. 520, 521, 522, and 525) therefore show a greater range in particle size as compared with EMS 511. Aside from coarse material, the second set of pictures shows much fine-grained sintered or agglomerated glassy material, occasional separate spheroids, and some scaly material. Ashing at 400C seemed to reduce the incidence of very fine material, but otherwise had little effect on the appearance of the dust. As in the first set of micrographs (EMS 511A-C) an occasional short fibril that could be chrysotile was noted, but these constitute only a small trace of the total.

X-ray diffractometer diagram 3366-123-1 of the airborne sample as-received contains patterns of gypsum ($CaSO_4 \cdot 2H_2O$) and quartz.

X-ray diagrams of the sample submitted after ignition at 427C and the sample ignited at 1000C contain similar patterns of anhydrite ($CaSO_4$), quartz, iron oxide (Fe_2O_3), a pattern resembling a sodium feldspar, and a trace of cristobalite.

The only similarity in this airborne dust and brake lining dust is the presence of Fe_2O_3 in ignited samples of both. Forsterite, a major component of the ignited brake lining dust, is not identified in this airborne dust.

Reported by: D. Bailey
D. Bailey
Basic Chemistry Research Section

X-ray Diffraction by: J. P. McGourty
J. P. McGourty
Analytical Chemistry Section

ae
(distribution on reverse)

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

October 14, 1966

Dr. K. W. Smith
Medical Director
John Manville Corporation
22 East 40th Street
New York, New York

Dear Doctor Smith:

Confirming our phone conversation I should like to describe the research effort to be carried out by our Department relating to the detection of asbestos bodies in animals not exposed to asbestos. Specifically over the past five years approximately 3,000 animals have been sacrificed and tissue specimens preserved for microscopic study. Approximately half of these animals have breathed outside air somewhat enriched in automotive exhaust products, while the other half have never breathed air containing particulate matter. It appears that it will be necessary to cut thicker sections then have already been cut and accordingly a representative number of animals tissue will be so treated. These thick sections will then be scrutinized to determine whether or not asbestos bodies are present. As a corrolary study particulate matter which was removed from the air by filtration will be examined to determine whether or not asbestos fibers can be identified. We recognize, of course, certain experimental difficulties which may render it nearly impossible to be certain of the presence or absence of fibers and will welcome any technical guidance which your laboratories may offer. In this connection we are sending a sample of atmospheric dust and will be interested in your findings.

Although it is difficult to estimate the expenses, it is the opinion of Dr. Vorwald and myself that approximately $7,000.00 will be required. In the event that the findings are sufficiently interesting, and we mutually agree that even more work is required, it is our understanding that you would favorably consider additional

funds upon request. In order that the work can be done more expeditiously we would suggest that funds be made payable to "Asbestos Study Project" Arthur J. Vorwald, Ph. D., M. D., Agent. A checking account will be opened with this designation and will of course be subject to audit at any time.

We look forward to carrying out this interesting study and hope that the results are informative. Perhaps when you see Arthur in Tokyo next week you may come up with other ideas which will further enhance the scope of the study. Have a good trip.

Very truly yours,

R. G. Smith (glg)

Ralph G. Smith, Ph. D.
Professor
Department of Occupational
and Environmental Health

RGS:glg
CC: Arthur J. Vorwald, Ph. D., M. D.

General Headquarters
December 21, 1966

F. J. Solon

ENVIRONMENTAL HEALTH TASK FORCE
December 21, 1966

1. Survey of Causes of Death of Retirees and Group Life Participants

This study is progressing, and the analysis and summary will be completed by January 15, 1967.

2. Dr. A. J. Vorwald - Wayne University, Detroit

The Wayne University Laboratory is continuing its preliminary examination of the analysis of the large volume air samples, as well as the animal tissue slides. A formal Research Proposal will be developed along the lines suggested by the results of these preliminary studies. Dr. Speil of our Research organization is collaborating with this group in the preliminary investigations.

3. National Insulations Manufacturers Association

The Association, through its Safety and Health Committee, of which Dr. Smith is Chairman, has initiated discussions with Dr. Cralley of the U. S. Public Health Service toward designing and implementing an industry-wide environmental health study.

C. L. Sheckler participated in the initial presentation of environmental control, injury prevention, and Workmen's Compensation to the first of a series of meetings with the Insulations Contractors Association's regional groups.

4. Industrial Hygiene Foundation Prospectus

This four-year study of the biologic effects of fibrous materials is under way.

5. U. S. Public Health Survey

The U.S.P.H.S. environmental study of the Asbestos Textile Industry is in process. Dr. Smith recently attended a meeting called by this group, at which asbestos research currently being conducted by many individuals and groups throughout the country was reviewed. The information from this conference will be summarized and reported on in the February Status Report.

C. W. HITE

ccs: C. E. Burnett
H. M. Jackson
E. W. Smith, M.D.

Material: Samples of particulate matter collected during the Air Erosion Testing of Commercial Duct Systems

Equipment Tested: Glass fiber duct systems produced by Owens-Corning Fiberglas Corporation

Submitted: November, 1966 by C. D. Smith, Product Testing Laboratories, Building 300, Owens-Corning Fiberglas Corporation, Technical Center, P.O. Box 415, Granville, Ohio

Required: Determination of quantity and nature of material eroded from ducts

Analysis Number	Sample Number	Test Number + Location	Duration of Test	M^3 of Air Sampled	Mgs Dust Collected Total	Mgs Dust Collected Per M^3	% Ash in Dust	Mg Loss Due to Treatment With HF	Mgs of Glass Found	Remarks
66A-5737	0-11	#3 Upstream	136 hrs.	945	25.7	0.027	30.7	0	0	No Glass Fibers Identifiable by Microscopic Examination
66A-5738	0-12	#3 Downstream	136 hrs.	905	22.6	0.025	29.0	0	0	
66A-5739	0-16	#4 Upstream	136 hrs.	925	23.7	0.025	16.0	0	0	
66A-5740	0-17	#4 Downstream	136 hrs.	800	17.9	0.020	16.8	0	0	
66A-5877	0-18	#5 Upstream	136 hrs.	945	35.3	0.037	18.4	0	0	
66A-5878	0-19	#5 Downstream	136 hrs.	855	27.9	0.032	22.2	0	0	
66A-5879	0-20	#6 Upstream	136 hrs.	960	25.0	0.026	22.0	0	0	
66A-5880	0-21	#6 Downstream	136 hrs.	865	18.9	0.022	21.0	0	0	
66A-6141	0-22	#7 Upstream	136 hrs.	900	37.5	0.042	17.0	0	0	
66A-6142	0-23	#7 Downstream	136 hrs.	790	27.0	0.034	14.4	0	0	

Attach pages to here

Test 63 - Uncoated 12" diameter duct system tested from 4:30 p.m. 10/11 till 8:30 a.m. 10/17/66

Test 64 - 12" Flexmaster flexible uncoated duct system tested from 4:30 p.m. 10/18 till 8:30 a.m. 10/24/66

Test 65 - 11" x 11" lined sheet metal duct system. Spray coated Fiberglas Aeroflex duct liner, 1" thick, 1.5 PCF, tested from 4:30 p.m. 10/25 till 8:30 a.m. 11/1/66

Test 66 - 11" x 11" lined sheet metal duct system. Spray coated Fiberglas Aeroflex duct liner, 1/2" thick, 1.5 PCF, tested from 4:30 p.m. 11/4 till 8:30 a.m. 11/10/66

Test 67 - 11" x 11" lined sheet metal duct system. Spray coated Fiberglas Aeroflex duct liner, 1" thick, 3.0 PCF, tested from 4:30 p.m. 11/10 till 8:30 a.m. 11/16/66

From the Kettering Laboratory in the Department of Environmental Health, College of Medicine University of Cincinnati, Cincinnati, Ohio

Reported: 12-7-66

Material: Samples of particulate matter collected during the Air Erosion Testing of Commercial Duct Systems

Equipment Tested: Glass fiber duct system produced by Johns-Manville

Submitted: November 30, 1966 by C. D. Smith, Product Testing Laboratories, Building 300, Owens-Corning Fiberglas Corporation, Technical Center, P.O. Box 415, Granville, Ohio

Required: Determination of quantity and nature of material eroded from ducts

Analysis Number	Sample Number	Test Number + Location	Duration of Test	M^3 of Air Sampled	Mgs Dust Collected Total	Mgs Dust Collected Per M^3	% Ash in Dust	Mg Loss Due to Treatment With HF	Mgs of Glass Found	Remarks
6644-6143	C-24	#2 Upstream	136 hrs.	900	38.3	0.043	30.6	0	0	No Glass Fibers Identifiable by Microscopic Examination
6645-6144	C-25	#3 Downstream	136 hrs.	810	26.6	0.033	24.0	0	0	

Test #2 - 11" x 11" Micro-Aire HEPA Duct System, 3 FPC, tested from 4:30 p.m. 11/17 until 3:30 a.m. 11/22/66

From the Kettering Laboratory in the Department of Environmental Health, College of Medicine University of Cincinnati, Cincinnati, Ohio

Reported: 12-7-66

Material: Samples of particulate matter collected during the Air Erosion Testing of Commercial Duct Systems

Equipment Tested: Glass fiber duct systems produced by Owens-Corning Fiberglas Corporation

Submitted: October 6, 1966 by C. D. Smith, Product Testing Laboratories, Building 300, Owens-Corning Fiberglas Corporation, Technical Center, P.O. Box 415, Granville, Ohio

Required: Determination of quantity and nature of material eroded from ducts

Analysis Number	Sample Number	Test Number + Location	Duration of Test	M^3 of Air Sampled	Mgs Dust Collected		% Ash in Dust	Mg Loss Due to Treatment With HF	Mgs of Glass Found	Remarks
					Total	Per M^3				
66A-5167*	0-2	#1 Upstream	136 hrs.	845	39.0	0.046	10.0	0	0	No Glass Fibers Identifiable by Microscopic Examination
66A-5166*	0-1	#1 Downstream	136 hrs.	880	39.5	0.045	8.9	0	0	
66A-5168**	0-6	#2 Upstream	136 hrs.	940	22.5	0.024	10.7	0	0	
66A-5169**	0-7	#2 Downstream	136 hrs.	910	19.4	0.021	10.8	0	0	

* 11"x11" Duct System, uncoated fibers, 3.25 PFC tested from 4:30 pm 8/31 till 8:30 am 9/6/66

** 11"x11" Duct System, uncoated fibers, 5.00 PFC tested from 4:30 pm 9/28 till 8:30 am 10/4/66

From the Kettering Laboratory in the Department of Environmental Health, College of Medicine University of Cincinnati, Cincinnati, Ohio

Reported: 10-18-66

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

July 18, 1966

Kenneth W. Smith, M. D.
Corporate Medical Director
Johns-Manville Corporation
Twenty-Two East 40th Street
New York, New York 10016

Dear Ken:

It was good to have you with us, even though for too short a time. Madge, especially enjoyed your visit, but she was greatly disappointed that your heavy schedule prevented you from staying with us overnight. I endorse her sentiments in that regard.

Your informative letter is deeply appreciated. I will write Mr. Carl W. Sickles in an effort to gain his support for a study of the asbestos insulation workers in the Detroit area. Also, as quickly as time permits, I will work on the protocol for the study which we discussed in the interest of fibers and bodies possibly present in the dust and in the lungs of the experimental animals connected with our air pollution studies during the past several years.

With respect to asbestos bodies, I believe that one of the greatest problems concerns the differentiation of such bodies from those that attend the inhalation and pulmonary retention of non asbestos fibers. In that regard, I am mindful of the so-called "graphite body", the "ferruginous bodies" and the bodies that sometimes attend degenerated elastic tissue fibers. It is my belief that almost any inorganic fiber and possibly certain organic fibers after prolonged residence in the lung can become coated with

endogenous iron and thus simulate the asbestos body. If time permits, I will make an effort to experimentally prove that belief.

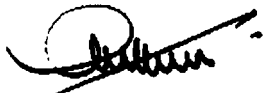
Your second question and/or questions defy an unequivocal answer. I am not sure whether or not physiologic motion of tissue is necessary for the production of an asbestos body. Also whether an asbestos fiber on any part thereof has the ability to migrate, either in the tissues, or only through the blood stream and lymphatics are much debated issues. It is my hope that our current experiments will assist us in resolving them.

With respect to the x-ray classification, it was developed in the interest of our current epidemiologic study concerning a large number of workers in an automobile industry. Currently, the classification is being tested by each of the three radiologists selected for the study. I believe a slight modification would have real application to asbestos workers. More will be known about the classification, however, when each of the three radiologists have finished their test runs on a large number of fibers which are currently being circulated. They should be finished in the very near future and then I will let you know. At that time also, you will receive a copy of the approved classification form.

I am afraid, Ken, that most of the questions which you put to me remain unanswered. Frankly, much work needs to be done and for the present I only know that inhaled asbestos fibers cause asbestosis in certain individuals. I have no desire to make earth-shattering statements without a full measure of real proof.

With all best wishes,

Very truly yours,



Arthur J. Vorwald, Ph. D., M. D.
Professor and Chairman
Department of Occupational
and Environmental Health

AJV:jar

F

Urban Air Research 4/9

February 8, 1967
(Dictated February 7)
File 259

Dr. M. J. Vorwald
Department of Occupational Medicine
Wayne State University
100 Antoinette Street
Detroit 2, Michigan

Dear Dr. Vorwald:

We have completed our examination of the airborne dust sample which you had sent to our Dr. K. W. Smith. This sample was labeled as "air-borne dust collected over a busy street intersection in Detroit". The methods used to examine this sample included X-ray diffraction, petrographic microscopy, and electron microscopy.

X-ray diffraction examination of the "as-received" sample showed the presence of gypsum ($CaSO_4 \cdot 2H_2O$), quartz (SiO_2), and a trace of magnetite (Fe_3O_4). The presence of a considerable amount of non-crystalline material was indicated by the nature of the diffraction patterns. After the sample was heated to 1000°C, the following crystalline phases were detected: anhydrite ($CaSO_4$), quartz (SiO_2), hematite (Fe_2O_3), and traces of feldspar ($Na_2O \cdot Al_2O_3 \cdot 6SiO_2$) and cristobalite ($SiO_2$). The hematite and cristobalite are high-temperature reaction products of the magnetite and quartz, respectively. The feldspar may be the result of a reaction during heating, or it may have been present but not detected in the as-received sample.

Petrographic examination on the as-received sample showed the following materials to be present:

Glass (fly-ash, etc.)	- possible major
Quartz	- minor
Gypsum	- small
Opaque material	- minor
Carbonates	- small
Cellulose fiber	- trace

(rank of amounts: major > minor > small > trace)

The original sample was separated into coarse, medium, and fine fractions by sedimentation in water. More detailed petrographic examination of the medium and fine fractions revealed that the glassy component exists as agglomerates of spheroids with an overall diameter of 30 microns and below. The individual particles in the agglomerates range from 5 microns down, with a considerable fraction below 1 micron. The quartz particles are about 10 microns and below. The fine fraction contained considerable water-soluble material which was identified as gypsum.

For electron microscopic examination the medium and fine fractions, after removal of the water solubles, were "rubbed out" by conventional methods in nitrocellulose. These micrographs, two of which are attached, showed irregular particles (mainly quartz), and spheroids ranging from 0.4 microns down. The latter fine particles frequently form agglomerates. There is also some very fine scaly or micaceous and some fine, irregular particles that could be carbon or gypsum. A few short fibrils which may be chrysotile asbestos were noted, but these constitute only a small fraction of 1 per cent of the total sample. Ashing the sample at 400°C seemed to reduce the incidence of very fine material, but otherwise had little effect on the appearance of the dust.

I hope that this information will be of some value to your research effort.

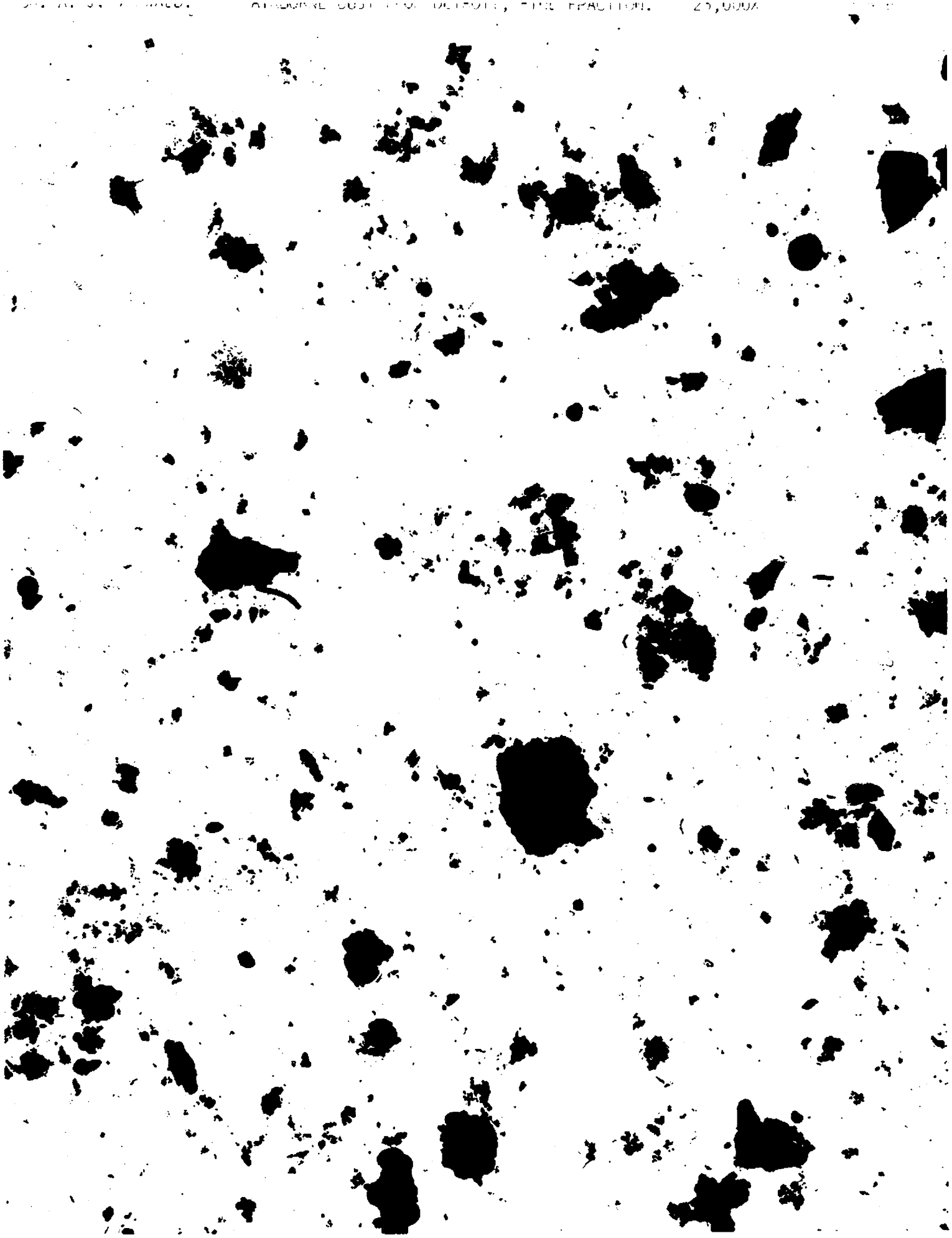
Very truly yours,

J. P. Leineweber
Chief, Basic Chemistry Research Section

se
Enc.

bcc: F. L. Pundsack
S. Spell
W. C. Streib
H. M. Jackson, GHQ
K. V. Lindell, AFD Asbestos

Johns-Manville Research and Engineering Center
P.O. Box 159
Manville, N.J. 08835



APPENDIX

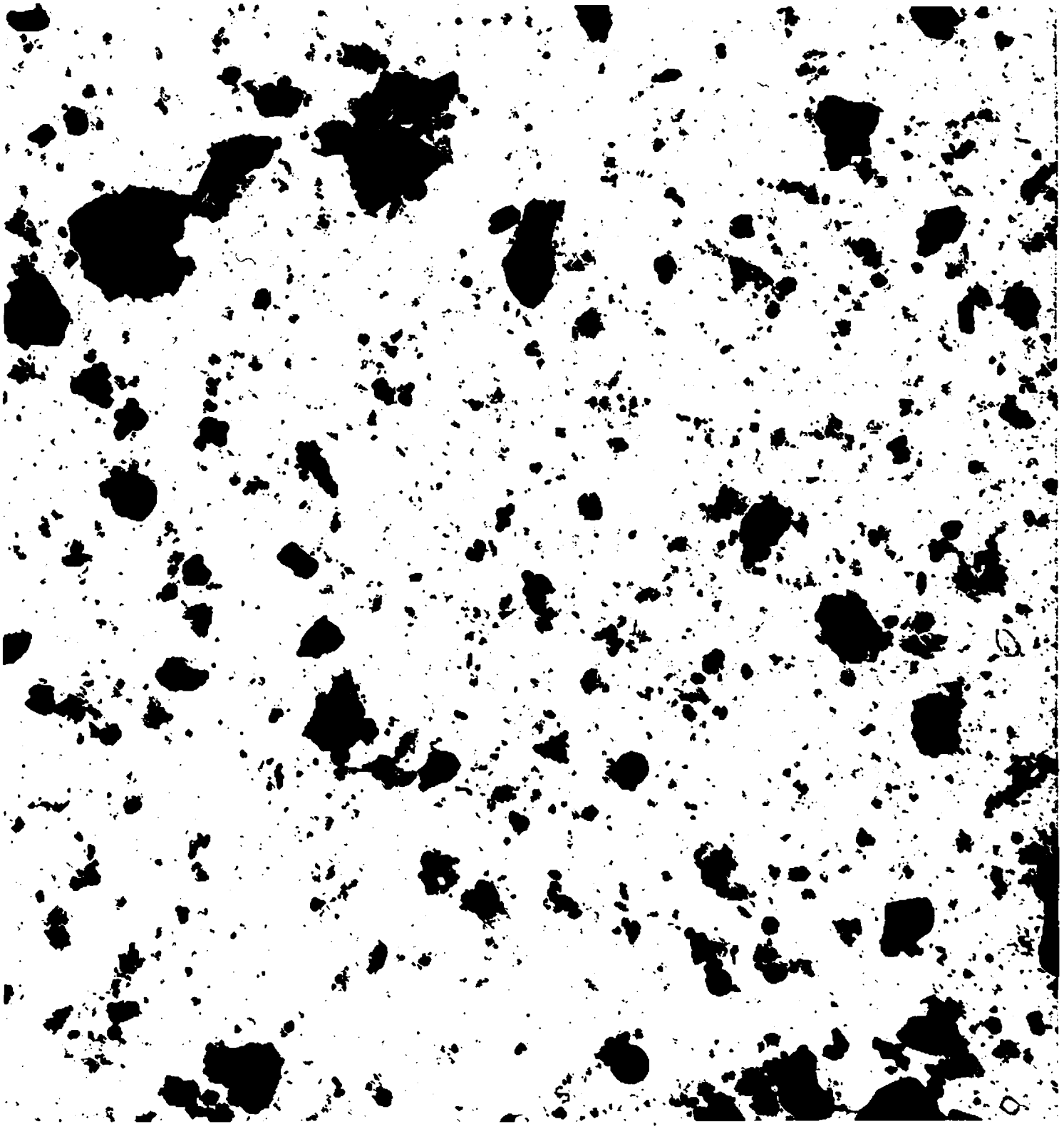
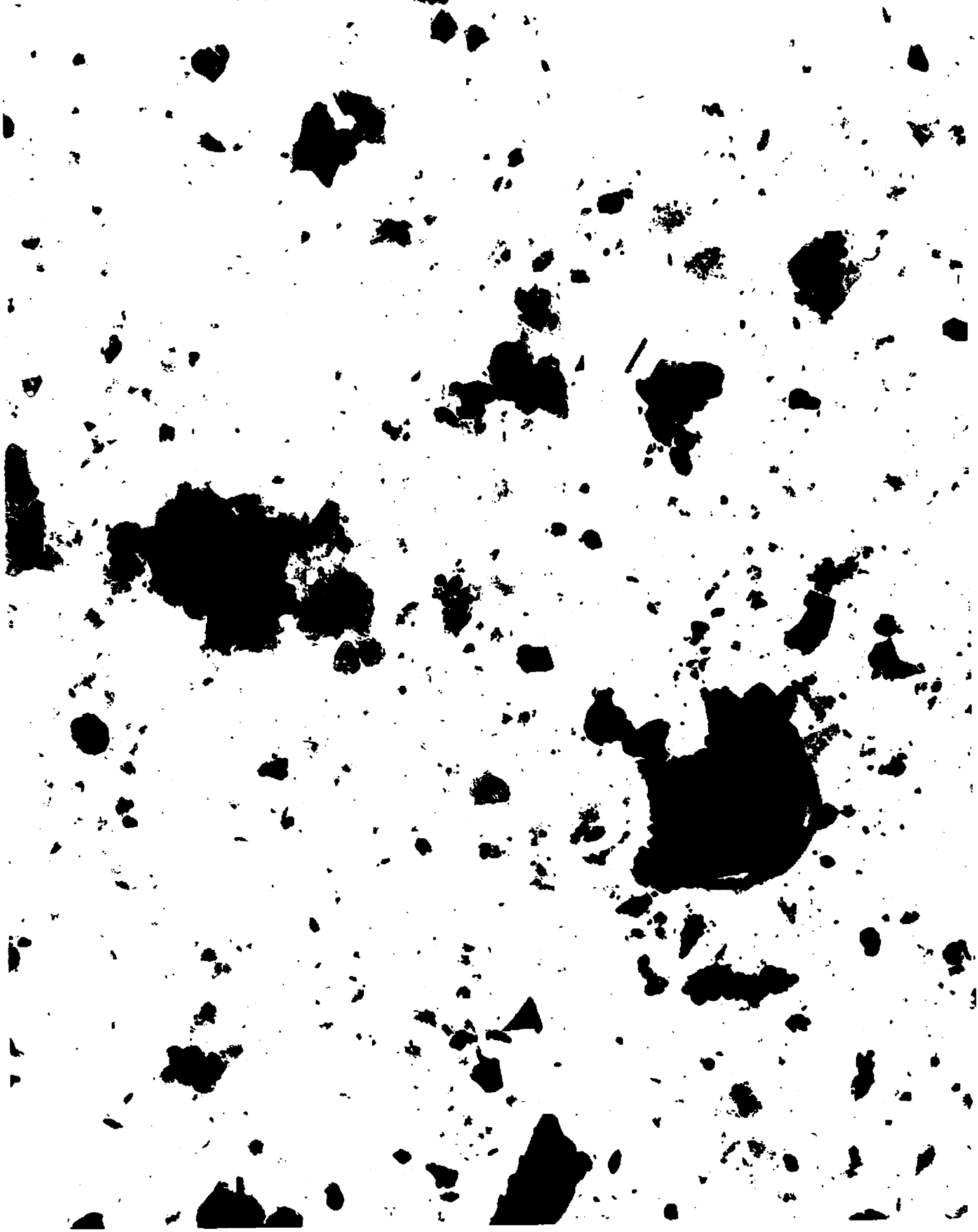


Figure 1. Airborne sample, Detroit; electron micrograph. 23,000X.

DR. A. J. VORWALD. AIRBORNE DUST FROM DETROIT, MEDIUM FRACTION. 23,000X. 2/3/67



Research & Engineering Center
November 9, 1970

W. C. Streib

ANIMAL EXPOSURE TESTS USING ASBESTOS

The Environmental Exposure Laboratory at Wayne State University (previously under the direction of Dr. Arthur Vorwald) is apparently reactivated under the direction of Dr. Andrew L. Reeves, Associate Professor, Department of Occupational and Environmental Health at Wayne State School of Medicine. The address is 1400 Chrysler Freeway, Detroit, Michigan 48207. They intend to continue some of their animal exposure tests using asbestos as an environmental contaminant.

In their previous work, Vorwald used 3T chrysotile, S blue crocidolite, and W3 amosite, all of which were obtained from Manville plant in the last shipment being made in March 1967. They would like to use the same materials in their current studies.

Would you please send Dr. Reeves at the above address 300 lb each of the three asbestos materials noted above. If any of these materials are pressure packed, please willow the material ahead of time as they are unable to use pressure-packed material in their experiments.

Since you probably will have to obtain these materials from sources other than Manville, I would appreciate your advising me when we can anticipate shipment of each of the materials to Dr. Reeves.

S. SPEIL

SS/rs

cc: H. M. Jackson, DH

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

October 18, 1966

Dr. K. W. Smith
Medical Director
Johns Manville Corporation
22 East 40th Street
New York, New York

Dear Doctor Smith:

Enclosed is a sample of particulate matter removed from filters used in our air pollution study during the past several years. This particular sample of dirt was removed from the air during the period January-March 1966. I will be most interested in learning whether or not your laboratories are able to find any asbestos fibers.

Sincerely,

Ralph G. Smith, Ph. D.
Professor
Department of Occupational
and Environmental Health

RGS:glg
Encl.

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

September 2, 1966

Kenneth W. Smith, M.D.
Medical Director
Johns-Manville Corporation
Twenty-Two East Fortieth Street
New York, New York 10016

Dear Ken:

My neglect in failing to write to you has not been because of an unmindfulness on my part. It has stemmed from the fact that the vacation of various staff members has imposed a variety of added burdens. Then, too, my associate pathologist has only recently recovered from a prolonged experience with non-specific lobar pneumonia, and now he, too, is away in an attempt to recapture a full measure of well being.

In view of all of the above, I have not had the opportunity to develop a proposal for you in regard to the occurrence of "bodies" in the lungs of our animals that have had prolonged exposures to dirty urban air and to clean air. We have done a rather superficial pilot review of certain sections. Bodies were not discovered. Nevertheless, we want to proceed with a more detailed study in behalf of your company. Whether or not any bodies will be discovered remains debatable, and whether or not such bodies will have the unequivocal features which are characteristic of the asbestos body, also remains questionable.

In view of the above, and on analyzing the project from the viewpoint of time and effort, I believe the whole study could be accomplished for a sum in the neighborhood of $4,000.00. Please consider this so that I can finalize the arrangements and initiate the project immediately upon my return from the conferences, first in Vienna, and later in Tokyo. Incidentally, I will be chairing a Vienna session

which includes a number of papers on asbestos, pulmonary cancer and pleural mesothelioma. Perhaps you should be attending that session.

Next week I am off for Europe and the Far East. My trip will encompass not only a number of formal lectures, but will also include visits to various centers, some of which are engaged with studies pertaining to inhaled asbestos, cancer and mesothelioma.

With all best wishes,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

February 8, 1967

Mr. Hugh Jackson
Johns-Manville Corporation
22 East 40th Street
New York, New York 10016

Dear Hugh:

You will recall the paramount reason for my visit with you last week was to clarify the status of certain studies which Dr. Ken Smith authorized us to conduct. The authorization was given verbally on a number of occasions, and especially after a letter of October 14, 1966, which was written by Dr. Ralph Smith, my deputy, while I was away in Europe and Tokyo. A copy of that letter is enclosed for your immediate reference. Subsequently, and in view of that letter, Dr. Ken Smith again verbally authorized us to proceed.

The enclosed letter outlines the concept of the study. Currently, we have completed cutting a large number of thick sections, which have been processed through various staining procedures and which have been studied microscopically. Smears of the lung have also been made and studied in order to detect the possible presence of fibers and/or bodies, either asbestotic or otherwise. Also, we have prepared a number of samples of airborne particulates collected by various means from the exposure rooms and from the outdoor air at street level. The preparations have been processed at different temperature levels in order to remove combustible organic material and to leave a residual of temperature-resistant particulates and fibers. These samples have been subjected to conventional light microscopy, phase microscopy and electron microscopy. Currently, enlarged photographs are being made for purposes of detailed visualization and counting. In a few days, all observations will be compiled for

a comprehensive report to you. Incidentally, the studies were undertaken in consequence of views expressed at the Asbestos Conference in Antigua, last year.

In accordance with the enclosed letter of October 14, 1966, a figure of $7,000.00, was given as the estimated budget. Irrespective of our expanded efforts, I will abide by that figure. Up to the present time, however, we have been financially supporting the study with limited funds, but I have verbally agreed to give overtime reimbursement to certain staff members for their efforts in behalf of the study. I did this, believing that such disbursements were proper on the basis that the total sum would be forwarded to me as a fee for consultation. In that regard, and in view of the circumstances, Hugh, I defer to the decision by you and your company. Above all, I do wish to avoid any embarrassment to you and your company. In any event, we will proceed toward completion of the study as originally conceived and authorized.

With all best wishes.

Sincerely yours,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

enclosure

313 - 577 - 1210

Ralph G. Smith

Acting Chmn.

Leave in June

Assoc Advisor in ~~Env~~ Dept.
School Public Health.
California J Professor.
Indust Hygiene

3/5 - Report never published.
- handled as personal contract
thru Ralph, worked on project.

If we want published RGS
come to it - how long if
dept. (til June 70) Would
be glad to look into it.

Research & Engineering Center
November 10, 1970

S. Speil

ANIMAL EXPOSURE TESTS USING ASBESTOS
YOUR LETTER OF NOV. 9 TO W. C. STREIB

We should be able to obtain the required quantities of 3T chrysotile, S Blue crocidolite, and W-3 Amosite at the Manville plant within approximately one week. Shipment to Dr. Reeves at the Wayne State School of Medicine will be made approximately two days after receipt of fiber.

F. M. Bodycomb

FMB/v

cc: H. M. Jackson, DH
W. C. Streib

11/13

November 19, 1970

Dr. Andrew L. Reeves,
Associate Professor
Dept. of Occupational and
Environmental Health
Wayne State University
625 Mullett Avenue
Detroit, Michigan 48207

Wayne State Univ.

Dear Dr. Reeves;

As requested by Mr. H. M. Jackson on November 9, 1970, we have shipped to you 300 pounds each of the following types of asbestos:

3T-12 chrysotile
W-3 amosite
S crocidolite (blue)

Each fiber was processed through a "J.M. Willow" to assure a fluffed, open condition, and repackaged.

If we may be of any further service, please let us know.

Very truly yours,

F. M. Bodycomb
Asbestos Development
and Evaluation

v

bcc: H. M. Jackson, DH
S. Speil
W. C. Streib

General Headquarters
November 9, 1970

S. Speil - R & E Center

Wayne State University
School of Medicine
Dept of Occupational and
Environmental Health

Confirming our phone conversation of November 6, I would appreciate your having 300 pounds each of

3T Chrysotile
S-Blue Crocidolite
W-3 Amosite

shipped to:

Andrew L. Reeves, Ph.D.
Associate Professor
Dept. of Occupational and
Environmental Health
Wayne State University
625 Mullett Avenue
Detroit, Michigan 48207

The 3T Chrysotile Fiber initially shipped in 1966 was of the loose packed variety. That shipped in 1967 was apparently pressure packed and the laboratory had considerable difficulty in preparing it for dissemination. It is therefore requested that the 3T Chrysotile Fiber to be shipped at this time be of the loose packed type.

Will you kindly advise Dr. Reeves directly when and in what manner shipment is made.

H. M. Jackson

Copy to: A. L. Reeves, Ph.D.
Wayne State University

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

October 30, 1970

H. M. Jackson
Director of Industrial Relations
Johns-Manville Corporation
22 East 40th Street
New York, NY 10016

Dear Mr. Jackson:

The files of this Department contain correspondence between yourself and Dr. Arthur J. Vorwald who was our chairman until 1967. I assume that it was through your courtesy that this Department has received shipments of asbestos for our experimental program on asbestosis, and it is in this matter that I am taking the liberty of writing you again.

Dr. Vorwald retired from his position in this Department in November 1967, and the asbestosis research was taken over first by Dr. Ralph G. Smith and then by myself. At the present time we are nearing depletion of our asbestos samples used for dissemination and I wonder whether we could impose on your company once more to send us a shipment in the same way as in the past.

[redacted] we have been using are as follows:

J-M 3T Chrysotile
J-M S-Blue Crocidolite
J-M W-3 Amosite

We would need about 300 pounds each of the above, if possible.

I want to express our sincere gratitude for your help and wish to assure you that due credit will be given to your company for this courtesy in our publications. Also, if you have an interest in a pre-publication copy of our findings, I would be most pleased to send the same.

Sincerely yours,

Andrew L Reeves

Andrew L. Reeves, Ph. D.
Associate Professor

ALR:jp

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

May 10, 1967

Mr. Hugh M. Jackson
Director of Industrial Relations
Johns-Manville Corporation
Twenty-Two East Forteith Street
New York, New York 10016

Dear Hugh:

Thank you kindly for the check in the amount of $7,000.00 for the support of our studies relative to fibers and fibrous material in the air ambient to the Departmental building in downtown Detroit.

The report is completed and will be mailed either today or tomorrow directly to your office. I had planned to send it last week, but could not do so because of most saddening duties. Last Friday night, a member of my staff, Dr. Samir Naguib, and his fiancée were killed instantly in an automobile accident in downtown Detroit. Their little Volkswagon was hit broadside by a stolen car going 70 miles an hour through a red traffic light. Samir was an Associate Professor on the staff and had responsibility for several major teaching and research programs.

Upon reviewing our report, I would deeply appreciate your comments. The findings may lead us to embark on additional series of detailed studies.

With all best wishes,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

Copy given to K. Sullivan 4/3/67

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

#1
4/11

March 31, 1967

Mr. Hugh Jackson
Johns-Manville Corporation
22 East 40th Street
New York, New York 10016

Dear Hugh:

Again, I must bother you. The last shipment of 100 pounds of Chrysotile No. 3T Fibers arrived a few days prior to my letter of March 14, 1967.

The asbestos came to us in a large, solid chunk, which differed from the first batch that was in shredded form. My technician tells me that he is having a most difficult time breaking up the chunk, for purposes of our additional pulverization and grinding into small fibers which can be generated to produce an asbestos cloud. Accordingly, it would ease our problem should the next 300 pound lot be sent to us in shredded form. I imagine that this will necessitate some pre-grinding and/or shredding at your factory, just as was done with the first batch of Chrysotile No. 3T Fibers. We would be grateful, Hugh, should you give instructions in that regard.

We anxiously await the additional shipment of 3[redacted]unds of each asbestos type as per my letter of March 14th.

With all best wishes,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

Copy given to Ray S. 3/17

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

March 14, 1967

Mr. Hugh Jackson
Johns-Manville Corporation
22 East 40th Street
New York, New York 10016

Dear Hugh:

Thank you for the shipment of asbestos which arrived some few days ago. The shipment consisted of 100 pounds of each, namely:

Chrysotile, J.M. No. 3T Fibers
Crocidolite, J.M. No. S. Blue
Amosite, J.M. No. W3 Fibers

In furtherance of my letter of March 6th, we look forward to receiving an additional 300 pounds of each asbestos identified above. That receipt will enable us to prepare enough material for a year's supply.

Incidentally and pursuant to my letter of February 9th, we are nearing the completion of our studies relative to fibrous material in the outdoor air which is ambient to our building in the center of Detroit.

Again, Hugh, we are most grateful, as always, [redacted] assistance in behalf of our studies.

With deepest regards,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

2 L.N 3/21/67

GHQ
March 13, 1967

C. H. Grote, Manville

Asbestos Shipment
to Dr. Arthur Vorwald

In addition to the shipment of asbestos which L. Hemerda advised us was sent to Dr. Arthur J. Vorwald on March 3, 1967, would you kindly arrange to have the following amounts shipped to Dr. Vorwald at the Department of Occupational Medicine, Wayne State University, 625 Mullet Street, Detroit, Michigan 48226.

300 lb. JM 3-T Chrysotile
300 lb. JM S-Blue Crocidolite
300 lb. JM W-3 Amosite

I would appreciate being advised of the date of shipment and the Railway Express number when the shipment has been completed. I presume each bag will have reinforced packaging as the previous ones had.

These amounts will provide enough material for the full year of animal experimentation included in Dr. Vorwald's study.

Should there be a charge for these quantities of material, please advise and we will indicate the appropriate account number.

H. M. Jackson

cc: L. Hemerda, Manville

3/1 A.A. Vorwald

You supply
400# each
additional 300# after
receipt of 100# current

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

February 16, 1967

Kay

Mr. Hugh Jackson
Johns-Manville Corporation
22 East 40th Street
New York, New York 10016

Dear Hugh:

I hate to bother you with so many letters and problems since they impose an added effort in your busy day. The thought occurred to me, however, that you may wish to put in a claim to the REA Express Company for the batches of asbestos that apparently have been lost for good. They have not been found, even though tracers have been put out throughout the country.

The lost batches consist of 50 lbs. of chrysotile, J-M No. 3T Fibers, and 100 lbs. of crocidolite, J-M No. S, Blue Fibers. Our evidence indicates that they were handled by REA Express, Receipt No. 428980, apparently January 9, 1967.

We would be deeply grateful, Hugh, if you would urge the new shipment as per my letter of February 8. Without the asbestos, we cannot go forward.

With personal regards,

Arthur J. Vorwald, Ph. D., M. D.
Professor and Chairman
Department of
Occupational and Environmental Health

Called L. Menendez
2/23/67
L. Menendez-in Court-
Will call tomorrow

AJV:dhs

WT 8-228
2/28 [illegible] in court
Will call back

3/1/67 - L. Menendez
will check &
call back

March 13, 1967

Dr. Arthur J. Vorwald
Dept. of Occupational
and Environmental Health
Wayne State University
Detroit, Michigan

Dear Arthur:

We have been advised by our people at Manville Plant that the shipment of 100 pounds each of J-M 3T Chrysotile, J-M S-Blue Crocidolite and J-M W-3 Amosite was sent prepaid on March 3, 1967, via Railway Express No. 3490.

I have asked Manville to send 300 pounds of each of the above to you in addition to the shipment of March 3. When I am advised of the date and number of this shipment I will forward this information to you.

With personal regards.

Sincerely,

H. M. Jackson
Director of Industrial Relations

February 6, 1967

Dr. Arthur J. Vorwald
Department of Occupational
and Environmental Health
Wayne State University
Detroit, Michigan

Dear Arthur:

Our Manville plant advises that the asbestos fibre shipment which you recently received was made in 100-pound quantities of each of the three types of fibre. If this quantity of material is not sufficient for your purposes, please advise and we will make sure that an additional supply is forwarded.

You raised questions concerning the identification of the fibre and we will be glad to supply any additional information you may desire in this regard.

As I indicated to you, we will take prompt action on the air pollutant research proposal as soon as you forward it to my attention.

As indicated, we will also review with considerable interest the proposal for additional research of asbestos or ferruginous bodies which you described to me briefly.

With personal regards,

Sincerely yours,

E. M. Jackson
Director of Industrial Relations

WAYNE STATE UNIVERSITY

SCHOOL OF MEDICINE

1400 CHRYSLER FREEWAY
DETROIT, MICHIGAN 48207

DEPARTMENT OF OCCUPATIONAL
AND ENVIRONMENTAL HEALTH

February 8, 1967

AIR MAIL

SPECIAL DELIVERY

Mr. Hugh Jackson
Johns-Manville Corporation
22 East 40th Street
New York, New York 10016

Dear Hugh:

It was good being with you last week, even though the news regarding Ken prompted a full measure of personal sorrow.

In furtherance of my telephone call and for purposes of your and my records, the shipment of asbestos which was requested in my letter of September 2, 1966, was misdirected by the Railway Express. Apparently it was under way for a long period of time, irrespective of every effort on our part to find it. Only last Thursday we ultimately traced two packages, namely 100 pounds of amosite in a torn, burlap bag, and 50 pounds of chrysotile in a cardboard box. The remaining 50 pounds of chrysotile and 100 pounds of crocidolite are resting somewhere unknown to man.

In view of the above, Hugh, we would appreciate having the following shipped to:

Arthur J. Vorwald, M. D.
Department of Occupational Health
School of Medicine, Wayne State University
625 Mullett Street
Detroit, Michigan 48226

100 pounds, Crocidolite, J.M. No. S Blue Fibers.

100 pounds, Chrysotile, J.M. No. 3T Fibers.

100 pounds, Amosite, J.M. No. W3 Fibers.

As you may recognize, Hugh, the need for the asbestos has put us way behind in our program supported by the U.S.P.H.S. Anything you can do to expedite the above shipment will be appreciated. Of course, we are deeply grateful to you and your company.

With all best wishes,

Arthur J. Vorwald, Ph.D., M.D.
Professor and Chairman
Department of
Occupational and Environmental Health

AJV:dhs

CONFIDENTIAL

GHQ
July 5, 1966

C. H. Grote, Manville

Samples of Fiber

This will confirm our conversation when I met you in New York this morning. It would be greatly appreciated if you could send Dr. Vorwald three samples of asbestos fiber. He would like to have 10 pounds each of chrysotile, amosite and crocidolite (blue) to use in a pilot study research program which he is developing for our corporate interest. His address is - Dr. Arthur Vorwald, College of Medicine, Wayne State University, Detroit, Michigan. I would assume that you would send a group 3 or group 4 chrysotile similar to those samples sent to Dr. Gross in the past. I understand that amosite and crocidolite fibers do not have a similar grading number and therefore for our record purposes I think it might be wise to try to identify these two fiber samples by lot or purchase number.

As discussed, I anticipate that we may be asked for a few more such samples during the course of the next year. I believe that it would be good company policy to supply these to recognized investigators. However, there may be some cost involved and if so, this should be charged to my budget. I indicated that you might feel it advisable to put aside a quantity of each of the three types of fiber for future use. You felt that the cost of the fiber is negligible but the time of preparing the sample, packaging and sending it involved more cost. If you should decide to gather some samples for future use in addition to the present request, I believe that 10 pound quantities are ample. May I suggest that if you do this, the samples should be sealed in plastic bags so that the fiber will not be contaminated or absorb moisture. Thanks very much for all your help.

Kenneth W. Smith, M.D.

cc: W. L. Ruff, Manville