

ASBESTOS STUDY
COMMITTEE 1971-72

FMSI 02798

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FMSI-C 4020
8/23/82

FMSI 02799

FRICITION MATERIALS STANDARDS INSTITUTE, INC., E. 210 ROUTE 4, PARAMUS, N.J. 07652

B U L L E T I N

N O. 462

December 6, 1972

*Asbestos
S.C.*

TO: ACTIVE MEMBERS

SUBJECT: SURVEY - OSHA LABELING REQUIREMENTS

On November 6, 1972 we sent out a request for information and interpretation of the OSHA regulations concerning labeling requirements for asbestos type brake lining and clutch facing shipments, where subsequent machining (cutting, grinding, drilling, chamfering, grooving) was likely to be done on these products.

Twenty-five questionnaires were sent out. Eleven replies were received. Replies were received from a reasonable cross-section of the membership. As the replies were confidential, the forms submitted by the members have been destroyed.

The survey will be a tool used at the next Asbestos Study Committee Meeting. It is suggested that members of the Committee attending the next meeting be versed in their own Company's position on labeling.

E. W. Drislane
Executive Director

EWD:llz

cc: Asbestos Study Committee

*C-1
(2)*

ASBESTOS STUDY COMMITTEE - LABELING SURVEY

(25 Requests 11/6/72, 11 replies 12/6/72)

<u>Question</u>	<u>Yes</u>	<u>No</u>	<u>Undecided</u>	<u>Not Applicable</u>	<u>Comment</u>
1.1 Now label replacement shipments	1	10			
1.2 Now label O.E.M. shipments	1	9		1	
2.1 Plan to label replacement shipments?	5	3	3		A,B
2.2 Plan to label O.E.M. shipments?	5	2	3	1	
3.1 Interpret OSHA to require labeling where subsequent machining is expected?	9	2			C

A. Member replying YES, states: "If such practice is required and/or adopted by FMSI."

B. Member replying NO, states: "Our material has been treated with a binder - therefore no raw asbestos is present."

C. Member replying YES, states: "We will label if it is determined that our bonding or binding material does not meet the standard."

November 28, 1972

Mr. J. H. Kelly
Bendix Corporation
1217 S. Walnut Street
South Bend, Indiana 46621

Dear Jack:

This concerns our discussion concerning labeling requirements where brake linings are being shipped to customers.

In attempting to determine what practice one must use, OSHA has stated that if one is meeting the spirit of its regulations it will not be cited for violations. As a result of this, it becomes necessary to interpret some of the OSHA regulations. I am enclosing with this letter copies of letters written by the Executive Secretary for the Asbestos Information Association (AIA/NA). You will note on these reports that Mr. Armstrong, from Bendix corporate headquarters, attended these meetings.

There is absolutely no question concerning the requirements for labeling where loose asbestos is being shipped. The big problem develops where members are shipping what the AIA and OSHA refer to as locked in asbestos products - brake linings, brake blocks, clutch facings, etc. When customers of yours drill linings, chamfer linings, cut linings, or grind linings, they may very well raise the asbestos concentrations in the atmosphere to above the OSHA standard. Some members have indicated that the drilling and grinding operations are problem areas in brake lining factories with existing exhaust systems. Therefore, if a customer of yours started drilling or grinding without having proper dust collectors, he would probably be in violation of the OSHA standard. It therefore becomes your responsibility, as the supplier of the brake lining, to warn the customer of this possibility. The form which the warning takes is still not definite but the best guidance seems to be if you meet the spirit of the regulations you will not be cited for a violation. Therefore, if you would put in every one of your skids, or cartons, or pallets, a warning notice to the effect: "Power tools without dust collectors should not be used for machining, cutting, or sanding this product." If a notice such as this were enclosed with every carton, or stenciled on the outside of the carton, it is likely that you would be meeting the spirit of the regulations. If you were to write your customer and tell him about this with every shipment made, you would probably be also meeting the spirit of the regulations. If you send a one time letter to your customer saying this, it is hard to say whether you would be meeting the spirit of the regulations.

C-2
(2)

FMSI 02802

Mr. J. H. Kelly
Bendix Corporation

-2-

November 28, 1972

I am enclosing a copy of the warning label suggested in the OSHA regulations where loose asbestos fibers are being shipped, and the "Instruction Sheet" suggested where a customer is to do further machining on clutch facings, brake lining, etc.

I hope this is enough information for you. Dave Stone attended our most recent Asbestos Study Committee Meeting where the subject of labeling was brought up. Your Mr. Armstrong is aware of some of the controversy concerning labeling. The current survey indicates that no members are now labeling shipments. A slight majority of those responding to date indicate that they interpret the OSHA regulations to require some kind of a warning where subsequent work is to be done on brake linings. This is controversial item for the Institute in that some members feel that one or two companies are trying to railroad them into labeling. Another group of companies feel that we should comply with the spirit of the law now and it is not fair if they do the proper labeling and their competition does not.

Sincerely,

FRICTION MATERIALS STANDARDS INSTITUTE

E. W. Drislane
Executive Director

EWD:11z
Enc.

FMSI 02803

Asbestos Study Comm

*sh - Johnson
11/3/72*

October 30, 1972

Mr. I. H. Weaver
Raybestos-Manhattan, Inc.
123 E. Stiegel Street
Manheim, Pa. 17545

Dear Ike:

Enclosed are two copies of a survey on OSHA labeling for our members.

Please look this over. I will not distribute till you give me the go-ahead.

Sincerely,

EWD/lmc
Encs.

E. W. Drislane
Executive Director

C-3
(6)

FMSI 02804

October 30, 1972

TO: Delegates & Alternates
Asbestos Study Committee

SUBJECT: Interpretation of OSHA Labeling Requirements

The Chairman of the Asbestos Study Committee is requesting a survey of members on their interpretation of the labeling requirements for asbestos type brake lining and clutch facing shipments.

On June 20, 1972, the Institute distributed to all members a copy of the OSHA Standards for exposure to asbestos dust. A key paragraph in the standards had to do with labeling requirements:

(2) Caution labels--(i) Labeling. Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

The problem, in this case, is the shipment of asbestos containing brake linings or clutch facings where in many cases subsequent operations will be performed--cutting, grooving, drilling, and grinding. The Chairman indicates that these subsequent operations can produce airborne concentrations of asbestos fibers in excess of the current exposure limits (5 fibers/cc TWA, or 10 fibers/cc ceiling).

The questions are:

1. Do you now label asbestos type friction materials with the label as specified in the OSHA Standards?
 - 1.1 For replacement market shipments?
 - 1.2 For original equipment shipments?
2. Do you plan to label asbestos type friction materials with this label?
 - 2.1 For replacement market shipments?
 - 2.1 For original equipment shipments?
3. Do you interpret the OSHA Regulations on labeling to require a manufacturer to label asbestos type friction materials where subsequent operations (drilling, grinding, etc.) are likely to be performed?

Would you please complete this--or have it done by the individual responsible for implementation of the OSHA Standards--and return to me at the Institute Office.

E. W. Drislane
Executive Director

FMSI 02805

OSHA LABELING REQUIREMENTS

	<u>Yes</u>	<u>No</u>
<u>1. Current Labeling Practice</u>		
1.1 For replacement market friction material shipments, we now provide the OSHA caution label.	☐	☐
1.2 For original equipment friction material shipments, we now provide the OSHA caution label.	☐	☐
<u>2. Planned Labeling Practice</u>		
2.1 For replacement market friction material shipments, we plan to use the OSHA caution label.	☐	☐
2.2 For original equipment friction material shipments, we plan to provide the OSHA caution label.	☐	☐
<u>3. Interpretation of OSHA Labeling Regulations</u>		
3.1 We interpret the OSHA labeling regulations to require caution labels on friction material shipments that will have subsequent working (drilling, grinding, etc.).	☐	☐

BY _____

COMPANY _____

DATE _____

FRICTION MATERIALS STANDARDS INSTITUTE, INC., E-210 Route #4, Paramus, N.J. 07652

BULLETIN

NO. 457

October 20, 1972

TO: ACTIVE MEMBERS
ASBESTOS STUDY COMMITTEE
LICENSEES

SUBJECT: Occupational Safety and Health Standards (OSHA)

In the October 18, 1972 issue of the Federal Register, the Department of Labor issued a complete set of Rules and Regulations for the OSHA Standards.

As regards asbestos, the section (1910.93a) pertaining thereto is unchanged from that sent to the membership with our Bulletin 442 of June 20, 1972.

The Department published these to bring in all amendments to the standards through September 22, 1972. The purpose was (1) to publish the OSHA Standards fully and reflect changes made during the year, (2) to correct typographical and clerical errors in the original standards, and (3) to publish an index with the standards.

As these full standards are a bulky 250 page issue, it is suggested that members interested in acquiring up-dated standards request them from:

Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

If interested, order the Federal Register of October 18, 1972, with payment of 20 cents payable to Superintendent of Documents.

E. W. Drislane
Executive Director

November 6, 1972

TO: Delegates & Alternates
Asbestos Study Committee

SUBJECT: Interpretation of OSHA Labeling Requirements

The Chairman of the Asbestos Study Committee is requesting a survey of members on their interpretation of the labeling requirements for asbestos type brake lining and clutch facing shipments.

On June 20, 1972, the Institute distributed to all members a copy of the OSHA Standards for exposure to asbestos dust. A key paragraph in the standards had to do with labeling requirements:

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The problem, in this case, is the shipment of asbestos containing brake linings or clutch facings where in many cases subsequent operations will be performed--cutting, grooving, drilling, and grinding. The Chairman indicates that these subsequent operations can produce airborne concentrations of asbestos fibers in excess of the current exposure limits (5 fibers/cc TWA, or 10 fibers/cc ceiling).

The questions are:

1. Do you now label asbestos type friction materials with the label as specified in the OSHA Standards?
 - 1.1 For replacement market shipments?
 - 1.2 For original equipment shipments?
2. Do you plan to label asbestos type friction materials with this label?
 - 2.1 For replacement market shipments?
 - 2.1 For original equipment shipments?
3. Do you interpret the OSHA Regulations on labeling to require a manufacturer to label asbestos type friction materials where subsequent operations (drilling, grinding, etc.) are likely to be performed?

Would you please complete this--or have it done by the individual responsible for implementation of the OSHA Standards--and return to me at the Institute Office.

E. W. Drislane
Executive Director

OSHA LABELING REQUIREMENTS

	<u>Yes</u>	<u>No</u>
<u>1. Current Labeling Practice</u>		
1.1 For replacement market friction material shipments, we now provide the OSHA caution label.	☐	☐
1.2 For original equipment friction material shipments, we now provide the OSHA caution label.	☐	☐
<u>2. Planned Labeling Practice</u>		
2.1 For replacement market friction material shipments, we plan to use the OSHA caution label.	☐	☐
2.2 For original equipment friction material shipments, we plan to provide the OSHA caution label.	☐	☐
<u>3. Interpretation of OSHA Labeling Regulations</u>		
3.1 We interpret the OSHA labeling regulations to require caution labels on friction material shipments that will have subsequent working (drilling, grinding, etc.).	☐	☐

BY _____

COMPANY _____

DATE _____

FRICION MATERIALS STANDARDS INSTITUTE, INC., E.210 ROUTE 4, PARAMUS, N.J.07652

October 10, 1972

TO: MEMBERS OF THE ASBESTOS STUDY COMMITTEE

SUBJECT: ASBESTOS PUBLICITY - DR. SELIKOFF

Attached is an article from the New York Times of October 5, 1972.

Of particular interest is that paragraph concerned with "wearing away of asbestos brake linings in automobiles and trucks." The reporter says this is a "significant source of airborne asbestos." This paragraph is not directly related to the headline and lead article concerning the incidence of cancer of the stomach, colon and rectum (as well as lung cancer) in workers exposed to asbestos.

Ordinarily, there will be an article of this type in the Times about every month with Dr. Selikoff generally the source.

E. W. Drislane
Executive Director

EWD:llz
Enc.

C-4
(2)

FMSI 02810

Wider Link to Cancer Found in Asbestos Workers

By ROYCE KENNEDY

A team of cancer researchers reported yesterday that asbestos, already implicated as a cause of lung cancer in workers repeatedly exposed to the material, might also have caused a three-fold increase in the incidence of cancer of the stomach, colon and rectum in the same workers.

The finding, which the scientists said confirmed a long-held suspicion, raises the possibility that the low levels of airborne asbestos particles known to exist in urban air may increase the risk of cancer among the public at large.

The researchers also said that their findings might lead to a better understanding of gastrointestinal cancer, the causes of which are not known.

The report was given in Lyon, France, before the International Agency for Research on Cancer, an arm of the World Health Organization, by Dr. Irving J. Selikoff of the Mount Sinai School of Medicine and Dr. E. Cuyler Hammond and Herbert Seidman of the American Cancer Society's Environmental Cancer Research Project.

The findings are based on a study of 632 members of the New York and New Jersey branches of the insulation workers' union who worked with various forms of asbestos, a widely used fireproofing material.

From 1943, when the study began, until the end of 1971, the researchers monitored the health and causes of death of the workers. Several years ago, Dr. Selikoff and Dr. Hammond calculated that insulation workers were dying of lung cancer about eight times as

frequently as men of similar background not exposed to airborne asbestos fibers.

At that time there was a suggestion that other types of cancer might also be more common, but not until now, the scientists said, was there sufficient statistical evidence to confirm the suspicion.

However, now that more time has elapsed since the initial exposure to asbestos, the researchers found that 41 workers had died of cancer of the stomach, colon or rectum—about three times the number that would have been expected under normal circumstances.

Among the same number of men in a similar age group not unusually exposed to asbestos, only 12.5 should have died of the same causes.

Earlier studies have shown that in the process of applying asbestos insulation during the construction of buildings and ships, countless tiny particles of the material become dislodged and float into the air.

In urban areas it has been known that another significant source of airborne asbestos is the wearing away of asbestos brake linings in automobiles and trucks. The act of applying the brakes in such vehicles kicks off a fine asbestos dust that is then kicked into the air by the drafts of moving traffic.

Examination of the lungs of persons and animals exposed to such air has shown that the particles often lodge in the tissue and, apparently, remain embedded for long periods of time.

Last week Dr. Selikoff reported on a study of asbestos exposure among World War II shipbuilders. He warned that such persons should be aware of their increased risk of cancer and should get more frequent check-ups so that the disease can be diagnosed when it is more treatable.

NOTE

N.Y. TIMES OCTOBER 5, 1972

FMSI 02811

FRICTION MATERIALS STANDARDS INSTITUTE, INC. E-210 ROUTE 4, PARAMUS, N.J. #07652

August 30, 1972

To: Asbestos Study Committee

Subject: "Health Hazards of Asbestos", by J. C. Gilson

Enclosed is an article "Health Hazards of Asbestos" by J. C. Gilson.

Mr. I. H. Weaver, Chairman of the Committee, felt this was a good overview of the entire asbestos health situation as it now stands, and suggested that it be distributed to members of the Committee.

EWD/erc
Enclosure

E. W. Drislane
Executive Director

CC: British Council
AIA/NA (Swetonic)
Committee Members

C-5
(4)

FMSI 02812

MEMO

from the desk of

I.H. WEAVER

I think the attached article gives a good overview of the entire asbestos/health situation at it now stands. I suggest you distribute copies to the other members of the Asbestos Study Committee.

Ike

Health hazards of asbestos

J. C. GILSON*

Inhaled fibres of asbestos can cause fibrosis of the lungs and two kinds of cancer. Protection of asbestos workers calls for monitoring and controlling their working environment and linking these records with records of their health

HISTORICAL

Asbestos was the first inorganic fibre to be used in composites. More than 4000 years ago clay pots in Finland were strengthened by adding anthophyllite fibres¹. In classical times asbestos cloth was used to preserve the ashes of the eminent. The oldest known piece of asbestos cloth from the New World, dating from about 1740, is a small purse made of tremolite in the Sir Hans Sloane collection of minerals in the British Museum (Natural History).

The modern asbestos industry is about 100 years old, starting nearly simultaneously in Canada and the USSR, but it was not until 30 years later that the first medical reports appeared in France and England, indicating that there might be a specific type of damage to the lungs following inhalation of the dust. By the late 1920s it was clear from surveys made in this country and in USA^{2,3} that a high proportion of older workers in the asbestos textile industries were becoming severely disabled by a specific type of chest disease due to the dust. This was named asbestosis.

DISEASES CAUSED BY ASBESTOS DUST

Research carried out in the 1930s, supported by the greatly expanded investigations during the last 15 years into the types of disease caused by asbestos, now provides a much clearer picture of the specific hazards and how damage to health can be avoided in the future. Table 1 lists the diseases.

Table 1 Diseases caused by asbestos dust

Asbestosis	Fibrosis of lungs
Cancer	Bronchial (lung) Mesothelioma
Asbestos Corns	Skin

Asbestosis

In asbestosis the dust causes scarring and thickening of the tissues of the lung. The two parts particularly affected are the finest air passages (respiratory bronchioles) where they branch into the terminal air sacs (the alveoli), and the surface of the lung (pleura). The thickening of the tissues induced by the asbestos dust affects the function of the lung in three ways. The volume when fully inflated at the end of a full inspiration is less than normal. The tissues

become stiffer than normal so that the compliance is reduced. The thickening in the alveolar walls, when the disease is extensive, also reduces the gas transfer for oxygen, so that the blood leaving the lung is no longer fully saturated with this gas. The transfer of carbon dioxide from the blood to the air in the lungs is not, however, appreciably affected. The reduced oxygen transfer is partly compensated for by an increase in the frequency of breathing so that the subject notices breathlessness on slight exertion. These alterations of lung function are used to assist in diagnosis of asbestosis and measure the severity of the damage.

Asbestosis takes a number of years to develop, even under very dusty conditions, but once established it is a progressive disease not materially affected by avoiding further dust exposure. The less the dust exposure, the longer the interval before the onset of disease, the less its severity; and the less chance of being affected. This dose response relationship is used to fix the acceptable dust levels - threshold limit values - for those working with asbestos. The article by Holmes in this issue describes how these standards are applied in practice. Prevention by avoiding exposures to a dangerous quantity of dust is an essential step towards the safe use of asbestos.

Asbestos cancers

Some years after the recognition of asbestosis as an important problem in the asbestos textile industry, articles began to appear in the medical journals⁴ suggesting an association between asbestosis and lung cancer. A survey in 1955 firmly established that those who had worked in the asbestos textile industry before the improvements in dust control, introduced in the 1930s, had a 10-fold excess risk of developing lung cancer⁵. The survey, however, also indicated that the improvement in dust control introduced at a particular factory after 1933 had very materially reduced the risk. Later surveys at this factory have confirmed this⁶.

The lung cancers seen in asbestos workers are similar to those caused by cigarette smoking. Recent research indicates that there is likely to be a synergistic effect of cigarette smoking and exposure to asbestos dust⁷. The precise quantitative inter-relationship between asbestos, cigarettes, and other factors is not fully established, but present evidence indicates that those who smoke cigarettes and are exposed to asbestos dust have a risk of developing lung cancer at least fifty times greater than non-smokers who are not exposed to asbestos dust.

In the last 15 years there has been much new information about the link between exposure to asbestos and another previously very rare type of cancer affecting the

* Director, MRC Pneumoconiosis Unit, Huddersfield Hospital, Porth, Glancroft C16 1XW, UK.

surface of the lung and the gut⁸. Reports of these mesotheliomas as they are called have increased steeply over the last 10 years. There is general agreement in most industrialized countries that there has been a real increase of this form of cancer⁹. In about 80% of cases there is a history of exposure to asbestos dust at some time in the past. A feature of these tumours is the long interval between first exposures to asbestos dust and the detection of the cancer. It is rarely less than 20 years and may be up to 50 or more years. In some instances the exposure to the dust has been short, only a few months, but the highest incidence of tumours has occurred in those most heavily exposed to asbestos dust. Cigarette smoking seems to play no part in these tumours, but some research workers think there may be other co-factors present as well as asbestos¹⁰.

The only other specific injury caused is the formation of asbestos corns on the fingers when the fibres lodge in the skin. The removal of the fibre usually cures the corn and no cancers of the skin related to asbestos have been reported.

PRACTICAL IMPLICATIONS OF THE BIOLOGICAL EFFECTS OF ASBESTOS

Inhalation of the fibre

For all practical purposes the risk from asbestos is limited to inhalation of the fibres. Thus control of the airborne dust levels and their monitoring by instruments, which will measure that part of the dust which can gain access to the deeper parts of the lung, is an essential step in the safe use of all types of asbestos. Although asbestos fibres can be ingested in minute amounts in beverages which have been filtered through asbestos, or water supplies¹¹, there is no firm evidence that such tiny traces have any ill-effects. Feeding massive doses of asbestos to animals has so far failed to produce any mesotheliomas or other cancers.

Size and shape of fibres

Recent research has helped to clarify the probable influence of fibre length and diameter in producing asbestosis and the bronchial cancers. The fibrosis is thought to be caused principally by the fibres between about 5 and 100 μm in length. Fibres much larger than this in the environment settle out quickly and are not inhaled. Further size separation occurs in the air passages, the important size parameter being fibre diameter since it is this dimension rather than fibre length that governs the falling speed of the fibres. Thus fibres greater in diameter than about 2 μm (these also tend to be the longest) mostly fall or impact in the upper respiratory tract and are carried away with the sputum. In the narrow airways any long fibres remaining are deposited by interception and fibres longer than about 100 μm seldom reach the finest bronchioles. This means that for the control of asbestosis, and probably bronchial cancers, the dose of fibres between about 5 μm and 100 μm in length and up to about 2 μm in diameter is the fraction of the dust which has to be measured.

For the mesotheliomas the evidence about the biologically important size is much less complete. Using information from many sources, such as the aerodynamic behaviour of fine fibres, the size and shape of fibres which are retained in the lungs of animals and man following exposure to different types of asbestos, and the epi-

demiological studies of the incidence of these tumours in man for different types of fibre, it seems probable that the important fibres are likely to be those which are straight, small in diameter (up to about 1 μm) and perhaps 10 μm in length. It is not yet known whether the ultra-fine fibres only visible under the electron microscope are biologically important. Such fibres are present in large numbers in the lungs of those who have been exposed to asbestos, but their combined mass is extremely small. It is too early yet to use this information to establish with confidence a separate dust standard to prevent the development of these mesotheliomas. This is a field of intensive research at the present.

Some of the new evidence suggests that the size and shape of the fibre are more important than its chemical composition, provided it is relatively insoluble. It may be that extremely fine fibres of many different materials can penetrate cells without immediately killing them, but once inside can damage the mechanisms of cell divisions. An implication of this view is that care should be taken to avoid exposure to dusts of all types of fibre less than 0.5 μm diameter and several micrometres in length.

Types of asbestos and occupations within the industry

The last 10 years have shown the importance to health of the type of asbestos inhaled and the occupation of the workers within the industry. Earlier medical reports did not differentiate between one type of asbestos and another, and most of the surveys were concerned with asbestos textile workers. A full assessment of the risks would ideally be based on studies of workers only exposed to each type of fibre and in all the operations within the industry in which this fibre was used. In practice the information is much less complete than this. Exposures to one type of fibre have usually occurred only in the mining and fibre separating. This work usually takes place in countries where the medical records are scanty and the labour turnover is rapid. A notable exception is in the chrysotile mines in Quebec where a very comprehensive survey has just been completed¹²⁻¹⁴. In the manufacturing countries several types of fibre are often mixed together or have been processed concurrently so that employees have been exposed to several types of fibre in unknown quantities. Past records of dustiness are rarely available for relating to the incidence of the diseases. Thus the current assessment of the relative risks in the past from different types of fibre and occupations is based on information which is far from complete. Use can be made of experiments in animals, especially rats, because most of the diseases seen in man can be produced in these animals. New information is rapidly accumulating which may give a clearer indication of the way in which different types of asbestos produce their biological effects.

There is general agreement that asbestosis and bronchial cancers can be caused by all types of commercially used asbestos (amosite, anthophyllite, chrysotile, and crocidolite) if the dust is inhaled in sufficient quantities, but it now seems likely that the risk from chrysotile may be less than with the other types of fibre. There is also evidence that the risk is lowest in mining and increases along the fibre separating and manufacturing processes. This is thought to be due to the higher proportion of airborne dust consisting of respirable fibres able to penetrate into the deepest part of the lung. In practice this means that the cleaner the fibre and the more completely it is separated into individual

fibres and small bundles, the greater the risk. There is also good evidence of a dose response relationship for asbestosis and bronchial cancers and thus, if the dust levels are kept within the new standards, the risks of asbestosis and bronchial cancers in the future should be very small.

The risk of developing mesotheliomas has a different relation to fibre type. It is probably highest with crocidolite and lowest with chrysotile. No cases clearly related to anthophyllite alone have been reported, despite careful search. The risk with amosite probably lies between crocidolite and chrysotile. The evidence for a dose response relationship is less clear in the case of mesotheliomas and hence the threshold limit value is more difficult to assess. In the Asbestos Regulations 1969¹⁵ the standard for crocidolite is set at one-tenth of that for other types of asbestos.

COMPARISON OF OCCUPATIONAL RISKS

What is the magnitude of the risk of developing ill-health from asbestos? No single index provides a satisfactory measure of injury to health.

Thus the excess risk of death before a specified age may be a useful index for those diseases causing sudden or rapid death, but it is an inappropriate index for diseases causing a long period of disability but little shortening of life. The cancers associated with asbestos exposure fall into the first group and asbestosis the second group. In different occupational groups comparisons of mortality are easier to make than those of illness. But even for mortality the comparisons are not straightforward. For example, the more the selection is limited to a definable group with a high past exposure, the worse the risk will appear. Allowance has also to be made for the effects of age, length of exposure, and how long the occupational group has been followed.

When such allowances are made the excess mortality from 'all causes' in groups of workers heavily exposed to the more damaging types of asbestos dusts in the past is closely comparable to that of coalminers who have developed the severer form of coalworkers' pneumoconiosis or that of deep-sea fishermen who have the highest rates of accidental deaths of any occupation. However, the excess mortality from 'all causes' in these occupational groups is less than that of male smokers of twenty cigarettes and more a day compared with non-smokers.

This is the position for deaths from 'all causes', but deaths from specific causes, such as mesotheliomas, asbestosis, or lung cancers relative to that of the general public, are of course proportionately much more increased. This is because mesotheliomas and asbestosis are extremely rare in those who have not worked with asbestos. Confusion sometimes occurs between the proportion of individuals exposed who develop a disease and the excess risk of a particular disease in exposed individuals compared with the general public. The first may be relatively small and the second extremely high.

THE FUTURE

As in many occupational diseases proof of the efficacy of new preventive measures, including the validity of the current threshold limit values, can only come from linking information of three types: the manufacturing process and the types of fibre and other materials used; the mea-

surements of exposure; the medical records of those exposed. Computers now make it easy to store this information, but we still need the foresight and administration to see that it is achieved. If it is not done we may still in 20 years or so be in no better position to answer important questions which are at present unanswerable because of the paucity of past records.

CONCLUSION

The recent increase in the number of cases of asbestosis and other diseases related to past exposure to asbestos is the result of relatively heavy exposures to the dust, particularly in parts of the asbestos industry not covered by the 1931 Asbestos Regulations.

Much new information about the biological effects of asbestos has been acquired recently. The new Asbestos Regulations 1969 based on this information, if correctly applied, should greatly reduce the risks in the future.

The selection of which types of asbestos to use in new processes should take into account their biological effects if the risk of dust exposure is likely to occur during manufacture or in the use of the products.

When working with extremely fine fibres of any material which may become airborne, caution is needed. An examination of the possible biological effects is required if the product is to be widely used and risks of damage to health are to be avoided in the future.

Proof of the efficacy of present preventive measures depends on much better record keeping than has been the case in the past.

REFERENCES

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Asbestos Information Association/North America

22 East 40th Street
New York, N. Y. 10016
(212) 681-3206
689 3378

July 5, 1972

TO: AIA/NA MEMBER COMPANIES

AIA/NA ENVIRONMENTAL CONTROL SUB-COMMITTEE

AIA/NA LEGAL COUNSEL

James Armstrong	- Bendix Corporation
E. C. Bratt	- H. K. Porter Company, Inc.
G. G. Gabrielson, Jr.	- Nicolet Industries, Inc.
Bernard Gross	- American Bilt Rite Rubber Company
J. Hall	- GAF Corporation
H. M. Jackson	- Johns-Manville Corporation
W. N. Johnson	- Union Carbide Corporation
A. R. Hooker	- The Flintkote Company
C. A. Neumann	- Kentile Floors Incorporated
G. W. Nickel	- Armstrong Cork Company
Clifford Seymour	- The Carborundum Company
J. R. Stetson	- Congoleum Industries, Inc..
Philip Weinstein	- Evertex Incorporated
G. W. Wright, M.D.	- St. Luke's Hospital

Gentlemen:

A meeting was held in Washington last Thursday between the AIA/NA and representatives of the OSHA standards development and compliance sections. Attending on behalf of the AIA were John Marsh, Raybestos-Manhattan; Paul Weiner, GAF; Hugh Jackson, Johns-Manville; Frank Zimmerman, National Gypsum; Bradley Walls, AIA/NA Legal Counsel, and M. M. Swetonic, AIA/NA Executive Secretary. OSHA was represented by John O'Neill and Harry Gilbert of Standards Development; and Ray McClure of Compliance.

The purpose of the meeting, as was discussed at the Association meeting on June 22, was to clarify a number of points with regard to the interpretation and enforcement of the asbestos standards. Because the standards are to go into effect this week, we considered it imperative to provide you with the basic points of interpretation and compliance established at the meeting. A more complete report on the meeting will be forthcoming in the near future.

Sponsored by Atlas Asbestos Co., Cement Asbestos Products Co., Certain-teed Products Corp., Flintkote Co., GAF Corp., Johns-Manville Corp., National Gypsum Co., Panacorp Corp. and Raybestos-Manhattan, Inc.

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The following are the main areas discussed and the decisions reached:

1. LABELING: The AIA/NA is applying for a temporary industry-wide variance on the exact wording of the labeling requirements of the standards, in order that existing supplies of boxes, cartons, bags, etc. containing a label with wording somewhat different than that called for in the standards will be permitted until they are used up. As long as the label currently being used contains basically the same information as the required one, it will be acceptable to OSHA until stocks are used up.

Products to be labeled should follow the listing submitted by Dr. Fred Pundsack of Johns-Manville to OSHA following the March hearings. A copy of Dr. Pundsack's list, with minor alterations, is attached for your information.

No product which requires labeling will be permitted to be used without any label until existing stocks of non-labeled bags, etc. are used up. A stick-on label of some type would be satisfactory.

The size, color, placement, etc. of the label is left to the discretion of the employer, as long as the label is "readily visible and legible." A good rule to follow would be: if you are trying to hide the label, OSHA will probably not accept it.

2. CLOTHES LOCKERS: Separate clothes lockers are required only for employees working at levels in excess of the five fiber TWA.
3. It was the intention of OSHA to require Type "C" supplied-air respirators and protective clothing only for insulation and fireproofing spray applications. AIA/NA will apply for a modification of the law to exclude other types of asbestos-spray applications from these requirements.

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4. RESPIRATORS: There is a mistake in the standards in paragraph (d)(2)(ii) "Powered Air Purifying Respirators." The first sentence of that paragraph now reads:

"A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator etc."

The sentence should read:

"A full facepiece powered air purifying respirator, or a respirator etc."

The phrase "or a powered air purifying respirator" should be deleted.

5. MONITORING AND PHYSICAL EXAMINATIONS: Company monitoring and physical examinations should be conducted on all employees who regularly work with asbestos and are exposed to airborne fiber, as well as on maintenance men, company industrial hygienists and other employees that the company feels require monitoring and physical examination because of the nature of their work or because of their close proximity to dusty asbestos operations. This would exclude office personnel, most people working in non-asbestos using sections of an asbestos manufacturing operation, etc.
6. CITATIONS: A company's own monitoring or other records will not be used as evidence to issue citations, nor will they be used to give a plant a clean bill of health.
7. OSHA INSPECTIONS: OSHA industrial hygienists will take dust samples, if at all possible, for a full eight hours, perhaps divided into two four hour samples. In addition, samples will be taken on more than one day, so that a more accurate count can be produced. Ceiling sampling periods will be at the discretion of the OSHA hygienist. Ceiling samples as short as five minutes may be taken if deemed appropriate. Under some circumstances

-More-

(an obviously very heavy dust concentration), only ceiling samples may be taken, but this would not be normal practice. Employers will be given specific dust counts only if they are in excess of the standard. Counts taken by NIOSH hygienists will be reported to OSHA, but will not be used by OSHA for purposes of issuing citations.

8. EMPLOYEE NOTIFICATION: On the question of notifying employees if they are found to be working in dust concentrations above the limit, neither O'Neill or McClure would make a decision whether the notification clause in the standard would be satisfied by the posting on a plant bulletin board of stations above TWA, or whether a more individualized approach, such as sending the employee a registered letter, would be required. To answer this question, we were asked to write to the solicitors office in OSHA for a ruling. Unfortunately, a prior informal conversation between Paul Weiner of GAF and a member of the legal staff of OSHA indicated that the answer to such a question would be in favor of the registered letter approach. As a result, we have decided not to submit this question for a ruling, but will leave it up to each company in the industry to decide in what manner it wishes to abide by this requirement, and wait to see if bulletin board notification will be challenged by OSHA regional inspectors.

In general, the consensus of the AIA group that attended the Washington meeting was that the industry could expect reasonable treatment from OSHA as long as the industry did not try to circumvent the intent of the regulations. For example, the various requirements in the standard for protective clothing, change rooms, separate lockers, etc. have as their purpose the preventing of excessive amounts of asbestos dust being carried home on an employee's clothes from work. As long as this purpose is achieved, the industry will be given wide latitude as to the types of protective clothing, footwear and headgear required; the location and size of change rooms;

-More-

the distance between separate lockers, etc. In short, the industry is free to interpret many sections of the regulations as it sees fit, as long as the spirit and intent of the law is observed.

Sincerely,



Matthew M. Swetonic
Executive Secretary

NOTE: The following is the new address and telephone number of the AIA/NA effective immediately.

Asbestos Information Association/North America
22 East 40th Street
Suite 1611
New York, New York 10016
212- 689-3378

Asbestos Information Association/North America

22 East 40th Street
New York, N. Y. 10016
(212) 681-0206
689 3378

July 12, 1972

TO: AIA/NA MEMBER COMPANIES

AIA/NA ENVIRONMENTAL CONTROL SUB-COMMITTEE

AIA/NA LEGAL COUNSEL

James Armstrong	- Bendix Corporation
E. C. Bratt	- H. K. Porter Company, Inc.
G. G. Gabrielson, Jr.	- Nicolet Industries, Inc.
Bernard Gross	- American Bilt Rite Rubber Company
J. Hall	- GAF Corporation
H. M. Jackson	- Johns-Manville Corporation
W. N. Johnson	- Union Carbide Corporation
A. R. Hooker	- The Flintkote Company
C. A. Neumann	- Kentile Floors Incorporated
G. W. Nickel	- Armstrong Cork Company
Clifford Seymour	- The Carborundum Company
J. R. Stetson	- Congoleum Industries, Inc.
Philip Weinstein	- Evertex Incorporated
G. W. Wright, M.D.	- St. Luke's Hospital

Gentlemen:

Inadvertently, the list of non-locked-in asbestos containing products which was to have been attached to our July 5 mailing was not included. Attached, therefore, is the list as originally promised.

It has come to our attention that a number of companies still have questions concerning whether certain asbestos-containing products which they manufacture should or should not be labeled. The standard is rather indefinite in that it calls for warning labels on products which "during any reasonably foreseeable use" may create airborne concentrations of asbestos in excess of prescribed limits. The Occupational Safety and Health Act itself states that "any standard promulgated ... shall prescribe the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms and appropriate emergency treatments, and proper conditions and precautions of safe use or exposure." Quite obviously, the rather simple

FMSI 02822

warning label prescribed in the regulations does not meet all of the criteria described in the law, which only adds to the problem.

Each company will have to decide for itself whether a particular product requires a label or not. Obviously, there should be uniformity on this subject, because if one company decides to label a certain product, and another company decides not to label the same product, the latter company would be placed in a most untenable position with OSHA. It is our understanding that OSHA is planning to use the list of non-locked-in products submitted by Dr. Fred Fundsack of J-M at the March hearing as its labeling criteria. If this list is followed, difficulties with OSHA should be few.

Nevertheless, there are always products which do not fit any list, or which may produce levels in excess of the standard at one step in the application or handling process. For example, the field cutting or trimming of asbestos-cement pipe might produce levels in excess of the standard, but only for the man doing the actual cutting and only very intermittently or rarely. Thus, to place a warning label on asbestos-cement pipe would be quite misleading in that it would alarm all those handling the product, when only one man has a potential excess exposure.

Our recommendations to you on labeling would thus be as follows:

1. If the product is included on the list of non-locked-in products, it should be labeled.
2. If a product is not included on the list of non-locked-in products but you consider it to be a border line case, or if the product has an occasional handling or fabrication problem, the following options are open:
 - a. Label it and be on the safe side.
 - b. Do not label it and hope OSHA doesn't question your decision.
 - c. Conduct tests to determine if the use of the product does indeed produce levels in excess of the standard. Chances are that

most product uses of this type will meet the eight hour TWA standard of five fibers, and that most problems will be in meeting the ten fiber ceiling standard. If tests determine that neither standard is exceeded, the product obviously need not be labeled. The test results should be kept in readiness in case an OSHA inspector questions your decision.

- d. If the eight hour time weighted average is above five fibers per cc, then the product should be labeled.
- e. If the ceiling value is above ten fibers per cc, which is the more likely of the two possibilities, then the use of the product should be examined to determine (1) how far above ten fibers per cc is the ceiling value, (2) does this particular work practice or use of the product occur frequently, intermittently, or only rarely, (3) can the product be applied, cut, trimmed, etc. in another fashion such that the ceiling level does not exceed ten fibers per cc. After these questions have been answered, it will be up to the individual company involved to weigh each answer carefully and to arrive at a decision based on the simple proposition: Does this product or its use place the health of workmen in jeopardy? Obviously, if the answer is "yes," the product should be labeled. If, on the other hand, you honestly believe that the answer is "No!" then you should not feel constrained to label the product, nevertheless you must be prepared to defend your position with OSHA should they question it.

There are a number of ways that you can place your company in a better defensive position should OSHA challenge your decision not to label a particular product. The basic idea would be for you to alert the purchasers of this particular product that one or more operations in the handling, application, cutting, etc. of the product might produce levels in excess of the standard and that

precautions should be taken. This could be done through personal contact between industry salesmen and customers, or in the form of an instruction sheet delivered with the order that might specify certain work practices or types of machinery that should be used to keep dust levels low. The instruction sheet, for example, might say nothing more than "Powered bench saws without collectors should not be used in cutting this product. If this is impracticable, operator should be provided with a U.S. Bureau of Mines approved respirator."

An approach of this type, or one somewhat similar, would indicate to OSHA, should the question arise, good faith on your part.

With regard to the coordination of industry labeling practices, if your company has decided to label a product not included on the attached non-locked-in list, I would appreciate being notified of this decision and the rationale behind it as soon as possible, so that a uniform position can be established with other companies in the industry manufacturing the same product.

If you have any questions or problems with regard to labeling, please feel free to contact us at any time. I would not advise your asking OSHA for a decision on whether or not to label a certain product. Almost assuredly they will tell you to label any border line product, and that decision will become binding for the rest of the industry as well.

Very truly yours,



Matthew M. Swetonic
Executive Secretary

Enclosure

NON-LOCKED-IN

ASBESTOS-CONTAINING PRODUCTS REQUIRING A WARNING LABEL

ACOUSTICAL PRODUCTS

Dry spray type
Foamed asbestos

CALCIUM-SILICATE SHEETS

Low density sheets (less than 50#/ft³)

CEMENTS

Dry Gypsum joint cements
Insulating cements

INSULATIONS

Low density calcium silicate binders
Corrugated paper
Low density magnesia binders
High temperature blocks & bricks

PAPERS & FELTS

Commercial grades (unsaturated)
Roofing felts (unsaturated)
Gaskets (unsaturated or not encapsulated)
Millboards (unsaturated or uncoated)

STUCCO & PLASTER

Dry mix cement stucco
Dry mix decorative plaster

TEXTILES (unsaturated or uncoated)

Braided products
Cloth
Lining
Wicks
Yarn

ASBESTOS FIBER BAGS

BULLETIN

NO. 4 4 6

July 11, 1972

TO: ALL MEMBERS

SUBJECT: EQUIPMENT/TRAINING FOR ASBESTOS MEASUREMENTS

At the recent Annual Membership Meeting it was brought to my attention that many members had not received information on equipment for measuring airborne asbestos in the work place. Most of the following information is a re-hash of earlier information - particularly Bulletin #428 of February 18, 1972.

OSHA STANDARDS, OTHER PAPERS RELATIVE TO ASBESTOS IN THE WORK PLACE

1. Occupational Safety & Health Administration (OSHA)
Standards per Williams - Steiger OSHA Act of 1970.
Federal Register, May 29, 1971
2. OSHA Standards for Exposure to Asbestos Dust,
Federal Register, June 7, 1972
3. "Measurement of Airborne Asbestos Fiber by the
Membrane Filter Method".
Asbestos Textile Institute
P.O. Box 239
Pompton Lakes, New Jersey 07442
(Price \$1.00/copy)

The Institute distributed copies of these to the members during the past year. The most pertinent are Item 2 (OSHA Standards for Asbestos) and Item 3 (Measurement of Airborne Asbestos...").

GENERAL METHOD (MEMBRANE FILTER METHOD)

A pick-up is worn by a worker in the area to be measured. A battery operated vacuum pump draws in air over a specified period--say 60 minutes, 90 minutes or four hours. Asbestos fiber is trapped by the filter and then sealed and sent to the laboratory. The sample is examined using an optical microscope where asbestos fibers are counted.

Details on the optical count are given in the book "Measurement of Airborne Asbestos Fiber by the Membrane Filter Method".

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July 11, 1972

EQUIPMENT & SUPPLIES

Depending on the size of operation, at least two pumps costing about \$150 each are required:

- (a) Mine Safety Appliance Co., Pittsburgh, Pa.
15208
- (b) Willson Products Div., Reading, Pa. 19603
- (c) Unico Environmental Instruments, Fall River, Mass.
02720

A battery charger (one for each 2 pumps) is suggested. The charger would cost about \$50.

Pad and filter inserted run about 70¢ a piece, and are available from the Millipore Corporation, Bedford, Mass., 01730.

A binocular microscope with phase contrast illumination set for 400/430X magnification is required. While a Bausch & Lomb microscope costing \$1,200/1,500 is basic, binocular microscopes with additional fixtures should be worth the additional cost. (Seek professional advice on this.)

Most of the above information is verbatim from the book "Measurement of Airborne Asbestos Fiber by the Membrane Filter Method."

OUTSIDE SERVICES AND TRAINING

It may be feasible to have outsiders do the full job - from sampling through examination and reporting. Others will do the analysis work only where the samples are mailed to the laboratories.

Tracerlabs in California will do analysis work for about \$50.-60. per analysis.

Johns-Manville will do the full job for a fee (Contact Mr. W. Reitze, Manager Industrial Hygiene Engineering Service, Johns-Manville Corporation, P.O. Box #5108, Denver, Colorado #80217)

George Clayton Labs, Southfield, Michigan will do the full job for a fee.

There are other labs that may do the entire package or the analysis work only.

Johns-Manville indicated it would be willing to train personnel in the technique in a two day period. They would take one trainee or at most two trainees, to one instructor for \$200. a day. These sessions would be at Phindern (Somerville) New Jersey or Waukegan, Illinois. Again, the contact would be with Mr. Reitze in Denver.

It is most important that those concerned with the OSHA Standards enforcement receive this basic information. Should additional information be required, please advise.

E. W. Drislane
Executive Director

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REPORT ON FMSI ASBESTOS STUDY COMMITTEE ACTIVITIES

The Asbestos Study Committee was formed July 1971 with the assigned purpose to review and comment on rules and regulations promulgated by state and federal governments concerning asbestos and its applications.

The first Committee meeting was held September 15, 1971 and was chaired by Dr. E. P. Stefl of Raybestos-Manhattan, with members from Worldbestos, Abex, Bendix, and Carlisle Corporation and J-M present. The following items were reviewed and/or discussed: (1) Relationship with Asbestos Information Association/North America. (2) Proposed Illinois Regulations. (3) Vehicle friction material emission test program to be conducted by Bendix under EPA contract. (4) Monitoring for airborne asbestos fibre. (5) Distribution and circulation of literature on Asbestos/Health subjects.

The purpose of the Asbestos Study Committee was restated as follows: "to gather and disseminate to its members information about pending regulations concerning asbestos in the work place (occupational exposure) and in the general environment (particulate emissions) and to draft comments relative to proposed regulations in defense of reasonableness."

The following is a list of the actions taken by the FMSI Executive Secretary on behalf of the Asbestos Study Committee during the remainder of 1971:

September 30 - Issued minutes of first Committee meeting with letter commenting on proposed Federal EPA and Illinois emission standards.

October 28 - Issued bulletin and further information on Illinois hearings.

November 10 - Issued information on membrane filter monitoring method.

November 14 - Issued bulletin on revisions to Illinois and Federal EPA proposals.

December 8 - Issued information concerning final draft of proposed Illinois regulation, proposed EPA emission standards, and Federal Department of Labor Regulations on Occupational Exposure.

On January 26, 1972 arrangements were announced for Bill Reitze of J-M to conduct an instruction session on asbestos fibre monitoring at FMSI headquarters February 10. On February 10 this session was presented to nine attendees representing six member companies.

The second Asbestos Study Committee meeting also was held on February 10 with I. H. Weaver, Raybestos-Manhattan, acting as chairman and members representing Worldbestos, J-M, Bendix, and Carlisle attending. The following items were covered:

1. Review of AIA/NA comments regarding OSHA meeting in Washington on January 26.
2. Review of proposed OSHA asbestos standard and comparison with British standards and regulations.
3. Review of British Friction Material Council comments on Illinois standards. It was resolved to forward to BFMC copies of minutes of future FMSI Asbestos Study Committee meetings.
4. Recommendation made that the FMSI Asbestos Study Committee maintain close liaison with AIA/NA.
5. Reviewed background and expected thrust of OSHA and EPA regulations.

6. Reviewed monitoring equipment and methods.

7. Recommended future course for Asbestos Study Committee.

The following is a summary of actions taken by the Executive Secretary during the first half of 1972 in regard to Asbestos Study Committee matters:

February 18 - Circulated Bulletin 427 regarding various standards for asbestos dust exposure and control. This included copies of the January 12 Federal Register announcement of proposed permanent OSHA standard for asbestos control in the work place.

February 18 - Issued Bulletin 428 reporting on February 10 demonstration by Mr. Reitze of membrane filter monitoring method.

June 1 - Circulated announcement of Microscopy Seminar scheduled by McCrone Research Institute in Chicago week of June 26.

June 6 - Circulated supplementary information received from Illinois Institute of Technology Research Institute regarding friction material emissions and issued tentative schedule for third Committee meeting to be held late July or August.

June 12 - Issued announcement of OSHA permanent standards on asbestos dust exposure as published in June 7 Federal Register.

The latter item has been rather intensively studied by your Chairman, by AIA/NA, and no doubt also by concerned individuals in practically all companies represented in FMSI. The consensus appears to be that the new regulation is stricter than need be in respect to the future TLV of 2 fibres per cc, but is more lenient than was expected in regard to many other important matters. Major changes between the new regulation and the earlier emergency standard and earlier proposed permanent regulations are as follows:

1. Automatic reduction of TLV to 2 fibres in four years.
2. Use of protective clothing required above 10 fpcc ceiling limit. Change rooms, dual locker facilities, and special laundering and clothing handling procedures required.
3. Monitoring required at least every six months at operations exceeding allowable TWA concentration.
4. Physical exam and doctor's approval required before assigning employees to jobs requiring use of respirators.
5. Elimination of references to "cancer" and "danger" on signs and labels. Labeling eliminated for products containing locked-in fibre.
6. Specific restrictions on "dry sweeping" and use of compressed air for cleaning eliminated.
7. Medical examinations, including pulmonary function tests, required annually for all employees exposed to dust.
8. Employee access to medical and monitoring records required. Employees exposed to levels above TLV must be notified in writing.
9. Waste containing only locked-in fibre need not be sealed nor labeled.

While many serious difficulties are expected in achieving compliance with the new regulation by miners, textile manufacturers, and insulation fabricators and installers, it appears to me that most friction material manufacturing operations not relying on textile technology should have relatively little trouble, although some dry mold type friction operations may also pose problems.

Perhaps of a more serious nature is the potential threat of banning of asbestos in friction materials, particularly in automotive vehicles, to eliminate emissions from wear debris. It is doubtful that any further action in this direction will be taken until results of the comprehensive study by Bendix Corporation for EPA have been announced. I have been advised that this study, originally to have been completed this month, now is not expected to be finished until late this year.

Most of the difficulties that arose in this study to date have occurred in connection with the gas collection phase of the program. Since the study involves collection and analysis of gaseous emissions as well as particulates, precision rotary seals and gas collection systems had to be developed and evaluated, and this has necessitated extensive and time consuming engineering design efforts.

Another vital EPA program also is running behind schedule. That is promulgation of the permanent regulations and standards for asbestos emissions to the ambient atmosphere. I have been advised by the EPA Hazardous Pollutants Branch that the earliest date these standards are expected to be issued is the beginning of August, and they could be delayed until early September. However, no major changes are expected in the portions of the proposed regulation affecting manufacturing operations. Significant changes are expected in the sections applying to mining and spraying operations. Probably the only significant change between the proposed regulation and the expected final regulation as far as manufacturing operations are concerned is the broadening of specifications on fabric filters and wet dust collectors. This should be helpful to industry in permitting somewhat more flexibility in dust collector selection and application.

Before closing, I should like to recommend a few of my thoughts and suggestions that I have received from others concerning items that should be considered and reviewed by the Asbestos Study Committee during the following year.

1. Uniform interpretation of OSHA standards. Liaison with AIA/NA will be helpful in this.
2. Determination of technological feasibility of achieving both 2 and 5 fibres throughout the industry.
3. Determination of the overall effect on the friction material industry of the OSHA standards.
5. Development of guidelines, aids, and educational programs to help customers comply with the regulations.
6. Investigate a suitable standard method for analysis for asbestos in brake lining wear debris.
7. Develop methods and recommendations for safe disposal or recycling of friction material grinding waste.
8. Follow as closely as possible medical and occupational health research concerning asbestos and asbestos-related diseases and determine whether FMSI or its member companies should help sponsor or otherwise support work of this nature.

All of these subjects probably will be reviewed at the third Asbestos Study Committee meeting to be scheduled within the next month or so. Please advise us of any additional items you or others in your organization may wish to add to our agenda for this upcoming meeting.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'I. H. Weaver', with a stylized flourish at the end.

I. H. Weaver, Chairman

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FRICTION MATERIALS STANDARDS INSTITUTE, INC., E. 210 ROUTE 4, PARAMUS, N.J. 07652

June 20, 1972

TO: MEMBERS OF ASBESTOS STUDY COMMITTEE
SUBJECT: OSHA STANDARD - POSITION OF INDUSTRY, NIOSH
AND ADVISORY COMMITTEE

Mr. I. H. Weaver, Chairman of the Committee, felt the attached tabulation proposed by AIA/NA comparing items in the OSHA Standard against the Industry position and the recommendations of NIOSH and the Advisory Committee on Asbestos Dust would be of interest to all members of this Committee.

Copies of this tabulation are attached for your information.

E. W. Drislane
Executive Secretary

EWD:11z

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FMSI 02833

OSHA REGULATIONS ON ASBESTOS

<u>Subject</u>	<u>Industry Position</u>	<u>NIOSH/Advisory Committee Recommendation</u>	<u>Final OSHA Standard</u>
1. Numerical Standard	Five fibers with <u>no</u> automatic reduction to two fibers.	Five fibers with an automatic reduction to two fibers in <u>two</u> years.	Five fibers with an automatic reduction to two fibers in <u>four</u> years.
2. Labeling	No label on locked-in asbestos containing products. The words "cancer" or "danger" should not be used on labels.	All asbestos-containing products should be labeled. Label should carry words "cancer" and "danger."	No label on locked-in asbestos containing products. Words "cancer" and "danger" will not be used.
3. Monitoring Frequency	Monitoring should be conducted at a frequency necessary to assure compliance with the environmental standards. Management should decide frequency.	NIOSH: Annual monitoring at stations below TMA. Quarterly monitoring at stations above TMA. ADVISORY COMMITTEE: Twice-yearly monitoring at stations below TMA. Monthly monitoring at stations above TMA.	Monitoring every six months at stations above TMA. Monitoring at other stations at a frequency to assure compliance with environmental standards. Management to decide frequency.
4. Protective Clothing	No protective clothing required below 5-10 times TMA.	NIOSH: Protective clothing required in all areas above limit. ADVISORY COMMITTEE: No protective clothing below 10 times TMA.	Protective clothing required only where peak exposures above limit (10 fibers) occur.
5. Waste Disposal	Only wastes that generate dust in excess of limits should be bagged.	All waste should be bagged.	Only wastes that generate dust in excess of limits must be bagged.

<u>Subject</u>	<u>Industry Position</u>	<u>NIOSH/Advisory Committee Recommendation</u>	<u>Mineral OSHA Standard</u>
6. Frequency of Medical Examinations	Exams every two years for workers with less than 10 years exposure. Exams every year for workers with more than 10 years exposure, or with symptoms of disease.	NIOSH: Same as industry position. Advisory Committee: Same as industry position.	Annual exams required of <u>all</u> employees exposed to asbestos dust, regardless of length of employment.
7. Medical Surveillance	Employer should "provide or make available" medical exams as required.	NIOSH: No specific recommendation. Advisory Committee: Employee should select physician to perform exam. Employer to pay cost of exam.	Same as industry position.
8. Medical Records	Employer shall maintain records and have access to them as required to comply with regulations.	NIOSH: No specific recommendation. Advisory Committee: Employer shall <u>not</u> maintain records nor have access to them.	Same as industry position.
9. Wearing of Respirators	No specific recommendations.	NIOSH: No specific recommendation. Advisory Committee: No employee shall be required to wear a respirator if he has any of a long list of symptoms of disease.	Physician selected by employer to conduct medical surveillance program shall decide if employee can or cannot wear respirator.

I. H. WEAVER ■
CORPORATE DIRECTOR
ENVIRONMENTAL CONTROL

123 E. STIEGEL STREET, MANHEIM, PENN. 17545

Raybestos **Manhattan**

June 16, 1972

Mr. E. W. Drislane
Executive Secretary
Friction Materials Standards Institute, Inc.
Bergen Mall Office Center E.210
Route #4
Paramus, N.J. 07652

Dear Ed:

Attached is my report on the past year's activities of the Asbestos Study Committee which I hope will be satisfactory for your presentation the week after next. I regret I won't be on hand at the meeting and certainly appreciate your pinch-hitting for me.

If you have any questions or recommendations concerning revisions or additions or deletions to the attached report, please call me. I expect to be in the office Monday, Tuesday, Wednesday and Friday next week and Monday, the 26th. After that I will be away until July 17.

Also attached is a copy of a tabulation prepared by AIA/NA comparing each major item in the final OSHA standard against the industry position and the recommendations of NIOSH and the Advisory Committee on Asbestos Dust. I think this might be worthwhile copying and forwarding to the other members of the FMSI Asbestos Study Committee.

I am not returning the form you sent me regarding the schedule for the next meeting as all of the dates listed on this schedule still are open as far as I am concerned. Unless you advise otherwise I will wait until I get back from vacation to return this schedule to you, as by that time I expect to know a little more regarding my plans for the last week in July and the month of August.

Best regards,


I. H. Weaver
w e

FMSI 02836

B U L L E T I N

N O. 4 3 9

June 12, 1972

SUBJECT: Occupational Safety & Health Administration -
Standard for Exposure to Asbestos Dust.

On June 7, 1972, OSHA published their standard on exposure to asbestos dust in the work-place.

Exposure Limitations

The standard remains at 5 fibers (a fiber being longer than 5 micrometers) per cc of air as measured by the membrane filter method--for an 8 hour time weighted average. This is effective July 7, 1972.

As of July 1, 1976 the 8 hour time weighted average will be reduced to 2 fibers per cc of air.

There is a ceiling concentration of 10 fibers per cc at any time.

This new standard has details on the use of respirators, ventilation, wetting down of asbestos, clothing, lockers, laundering, caution signs, medical exams, etc. are covered in this standard.

The Institute would be happy to send a copy of this Standard to members on request.

E. W. Drislane
Executive Secretary

Distribution: Active Members

FRICTION MATERIALS STANDARDS INSTITUTE, INC., E-210 ROUTE #4, PARAMUS, N. J. 07652

June 6, 1972

Asbestos SC

TO: Members of Asbestos Study Committee
SUBJECT: Asbestos Fibers Emissions - Friction Materials

A seminar was held at the Illinois Institute of Technology Research Institute back in April of this year. Dr. Colin Harwood of IITRI was one of the advisors to the Illinois Pollution Control Board who was in favor of the proposed 1971 regulations as written--that is to include a ban on the use of asbestos in the brake lining of vehicles manufactured after January 1, 1975 and sold for use in Illinois."

The pages from the IITRI paper are: pages 22, 25, 26, 27, 28, 46, 49, 65, 66, 67, 68, 69, 70, 71, 72, 73.

Your Chairman, Mr. I. H. Weaver, sent this data to me for distribution to the Committee. He commented on the paper: "The main issue I would have with Dr. Harwood's conclusion would have to do with whether or not the free fibers or fibrils released from friction material decomposition are truly hazardous in any way, and I also believe he tends to underestimate the problems in non-asbestos containing braking systems."

Your Chairman believes that a meeting of the Committee should be called. I'm asking for a reply on the attached form, for which weeks not to call a meeting. From this I will try to arrive at a meeting date (perhaps late July or late August).

EWD/lmc

E. W. Drislane
Executive Secretary

*C-12
(18)*

FMSI 02838

MEETING SCHEDULE - ASBESTOS STUDY COMMITTEE

TO: Friction Materials Standards Institute, Inc.
E-210 Route #4
Paramus, N. J. 07652

Gentlemen:

Concerning a proposed meeting of the Asbestos Study Committee, PLEASE DO NOT SCHEDULE IT FOR THE FOLLOWING WEEKS:

July 24-28_____

August 7-11_____

August 14-18_____

August 21-25_____

August 28-31_____

Additional Comments:_____

_____.

By_____

Company_____

Date_____

Asbestos Study Committee

I. H. WEAVER
CORPORATE DIRECTOR
ENVIRONMENTAL CONTROL

123 E. STIEGEL STREET, MANHEIM, PENN. 17545

Raybestos[®] Manhattan

June 1, 1972

Mr. E. W. Drislane, Executive Secretary
Friction Materials Standards Institute, Inc
Bergen Mall Office Center, E.210
Route #4
Paramus, N.J. 07652

Dear Ed:

The attached material concerning automotive emissions of asbestos fibre was received from Illinois Institute of Technology Research Institute yesterday and probably will be of interest to other members of the FMSI Asbestos Study Committee. I suggest that you circulate it to them.

This material was forwarded by Dr. Colin F. Harwood of IITRI as a supplement to information presented at a seminar on asbestos they conducted April 4 through 7. Very little attention was devoted to automotive emission sources during the seminar.

The main issue I would have with Dr. Harwood's conclusion would have to do with whether or not the free fibres or fibrils released from friction material decomposition are truly hazardous in any way, and I also believe he tends to underestimate the problems involved in non-asbestos containing braking systems.

Since it appears unnecessary and probably impossible to schedule an Asbestos Study Committee meeting in June and I will be away the first two weeks in July, I think it might be prudent to tentatively schedule a meeting late in July, preferably during the last week. By that time I expect there will be a number of subjects worthwhile reviewing. If you agree, kindly canvass the other members and pick a date. As far as I know, I will be available anytime during the week of July 24. I am also open the week after that in the event this suits the others better.

Best regards,

IHE
I. H. Weaver
W

FMSI 02840

attachments such that the dust created is arrested at the source and collected in filter bags. Commercial devices are available but normally firms with a sincere interest in pollution control, design and fabricate their own devices. Two examples of such devices are shown in Figures 6 and 7. These control hoods work on the high velocity, low volume principle and can be readily adapted to industrial vacuum cleaner systems.

When arrest-at-the-source systems are not possible, techniques similar to those employed by the asbestos spraying industry may be utilized. Rules which relate more specifically to fabrication of asbestos products may be found in such publications as:

1. "Recommended Practices for Fabricating, Handling and Construction Industries," Health and Safety Council-Asbestos Cement Products Association.
2. "Recommended Health Safety Practices for Handling and Applying Thermal Insulation Products Containing Asbestos," National Insulation Manufacturers Association (NIMA).
3. The Asbestos Research Council - Control and Safety Guides (London, England).
4. "Recommendations for Handling Asbestos," Engineering Equipment Users Association (EEUA), E.E.U.A. Handbook No. 33.

3.3.3 Friction Material Applications

Typical friction materials contain 30 to 50% asbestos and may be up to 70%, and the industry that manufactures these materials is ranked third (1969) in the consumption of asbestos fibers. Crysotile is the preferred variety because it has better frictional properties than amphibol asbestos and does not exert so much wear on the opposing surface.

The major uses of asbestos-containing friction materials include brake linings, brake discs and clutch facings. These products have been applied to a wide variety of industrial and commercial products.

Sources of Emission - Emission of asbestos from friction materials results from normal day-to-day usage. An idea of the scope of this source can be gained from the estimation that the average automobile wears out 3 to 4 sets of brake linings, and 1 to 2 sets of clutch facings during its lifetime and that commercial public transport vehicles wear out many more sets. Data concerning motor vehicle brake linings for the whole of the United States are given in the following:

Vehicle miles during 1968	1,010,000,000,000
Mileage life of brake linings	27,500
Brake lining sets on new vehicles	10,718,000
Pounds of asbestos per set of brake linings	3

Tests performed on brake linings have indicated that under conditions of normal usage, considerable alteration of the asbestos occurs. It is reported that most of the dust collected from brake drums appears non-fibrous and is similar in appearance to thermally degraded asbestos. The suggestion is that high temperatures at the brake lining/drum contact points actually reach degradation levels.

Tests on brake linings, brake discs and clutches have demonstrated that the quantity of fiber emitted is some function of the severity of the braking conditions (see Table 3). However, even at the level of 1%, the total emissions must be considerable when the total tonnage in use is considered. Further, the emissions are likely to occur at places of high density population and restricted ventilation. That is, in busy main streets of towns surrounded by large buildings.

The effect of different braking conditions and different types of friction materials on asbestos emissions is the subject of a study being sponsored by the Environmental Protection Agency. Other studies are being conducted in California and some work on roadsides has been done at Mt. Sinai, New York. The EPA study will establish the extent and nature of the asbestos

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Table 3

ASBESTOS EMISSIONS FROM BRAKE LININGS
(Test Results by Electron Micrograph)

	Product	Brand	Test Method	No. of Samples	Conditions of Test-F	Presence of Free Fibers	% Free Fiber*
1.	Automobile drum brakes	A	Friction	6	300-800	Few	<1
2.	"	B	Friction	6	250-800	None	0
3.	"	C	Friction	5	300-700	Few	<1
4.	"	C	Friction	1	700-900	Numerous	~10
5.	"	D French	Friction	5	300-800	Few	<1
6.	"	E	Friction	5	300-700	Few	<1
7.	"	F German	Friction	5	300-800	Few	<1
8.	"	G	Friction	2	100-500	Few	<1
9.	"	G	Friction	1	600-700	Numerous	~15
10.	"	H	Friction	2	100-600	Few	<1
11.	Automobile clutch	J	Dynamometer	1	normal driving	None	0
12.	Automobile disk brake	K	Dynamometer	1	normal driving	Few	<5
13.	Bus drum brake	L	Dynamometer	1	city driving	None	0
14.		M	Friction	2	450-550	None	0
15.	Truck drum brake (light)	F	Friction	10	300-800	Few	<1

*Weight estimated from fiber volume.

emitted from brake drums, disc brakes and clutches of vehicles operating under real conditions. Hopefully the situation will be more clearly understood at the end of those studies.

Emission Control Techniques

Emission at Overhaul - To avoid blowing the accumulated dust into the atmosphere at the time of overhaul devices have been suggested for extraction of the dust from brake and/or clutch housings by suction. Of the devices tried, a simple hand-held vacuum cleaner has proven to be the most flexible unit. Changes to the original design have been limited to the addition of a disposable paper bag inserted in the original cloth bag. The paper bag may be easily sealed before removal to prevent emission.

Substitution - Beyond the adaptation of better cleaning practices during brake and clutch maintenance, as mentioned above, additional controls seem to be limited to improve design of brake and clutch assemblies and/or substitution of other materials for asbestos.

The high temperature properties and exceptional tensile strength of asbestos have resulted in very compact and economical design. These same unique properties which make asbestos applicable to friction materials also make the application of substitute materials very difficult. The tensile strength and modulus of rigidity of asbestos as compared to several candidate substitute materials follows:

<u>Tensile Strength lb/in.²</u>		<u>Modulus of Rigidity lb/in.²</u>
Asbestos	550,000	30,000,000
Fiber yarns	180,000	3,000,000
Steel wool	50,000	100,000
Mineral wool	25,000	60,000

There is no doubt that substitution of other materials for asbestos is possible, but the design changes required to accommodate the stresses and temperatures involved would result in

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larger, more expensive components.

Brakes - The recent adoption of disc brakes by the automotive industry makes material substitution more plausible. Disc brakes are capable of greater energy dissipation than similar sized drum brakes because the design results in considerably lower heating rates. This is due to the fact that at any one time the friction pad contacts only a section of the disc surface. The lower operating temperatures permit the use of friction materials which do not contain asbestos. Another feature of disc brake design which has reduced the need of asbestos materials is the lower strength requirement of the friction material.

Clutches - The substitution of other material for asbestos in clutch facings of traditional design could only be done by changes in size and design. Two changes in clutch design which have reduced the requirement for asbestos-containing friction materials are the advent of the automatic transmission and the redesign of manual clutch friction surface.

The clutch surface of the automatic transmission is immersed in an oil bath which virtually eliminates airborne pollutants. Further, the cooling affect of the oil bath reduces the requirement for high-temperature capability materials. Automatic transmission clutch facings may be made from either sintered metals or fibrous cellulose materials.

Many manual clutches have redesigned friction surfaces which consist of numerous small circular pads or discs attached to the clutch face as opposed to the standard annular ring friction surface. These small pads act in the same manner as the disc brakes friction pad. Thus, lower stresses and operating temperatures associated with the new design reduce the need for asbestos-containing friction materials.

10. SPECIFIC PROBLEMS

10.1 Emission Levels

In understanding control techniques and their efficiencies, it is important not to be confused with efficiencies quoted on a weight basis and those based on a particle count basis.

Firstly, considering efficiency based on a weight basis, it is relatively easy to get a very high efficiency with particles whose size is in excess of 5μ with a variety of control devices (see Figure 10). However, the efficiency does drop off considerably with decrease of particle size, for example, see Figure 11 for 1μ particles. (It should be noted that these graphs refer to spherical particles - information on fibrous particles is not presently available.)

Now consider what these apparent high efficiencies mean in terms of numbers of fibers. It can be assumed that 10^3 average fibers of asbestos weigh approximately 1 ng.

If 1 g of asbestos material approaches a filter rated at even as high as 99.999% efficiency, then the quantity passing through will be 0.00001 g, or 10^4 ng. And since 1 ng $\approx 10^3$ fibers, then a total of 10^7 fibers will pass through the filter for every 1 g of material impinging upon it.

This is a situation not frequently brought out, but is very significant when exposure levels are monitored in terms of fibers per cubic centimeter.

Thus the quoting of efficiency in terms of mass efficiency is a "red-herring" statement that flatters to deceive. It bears no obvious relation to the number of fibers being emitted.

However, based on tests which actually measure the number of fibers being emitted, it would seem that both fabric filters and high efficiency wet scrubbers are capable of reducing the fiber counts to acceptable levels. British experience is that 0.2 f/cc is routine and Johns Manville finds that 1 f/cc is an acceptable value when the results are averaged over a time period.

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The medical evidence as to the size of fiber responsible for adverse health effects is not positive nor is the question of whether fibrils of fibers are most hazardous. Until the medical questions are fully resolved, it would seem premature to impose inflexible or overly rigid regulations.

This has been the view held by the Federal occupational health authorities in assessing their standards. It would seem that their approach in limiting exposure to that which is possible using good modern technology is sensible. The same may be said for their monitoring techniques.

10.2 Water Pollution

Recycling of waste water is possible and is practiced in certain segments of the industry. The question of the damage done to streams, rivers, and lakes by indiscriminant dumping of asbestos containing waste waters needs careful study. One must remember it is a natural material which will appear in water in any case. On the other hand, there is evidence that asbestos particles ingested into the stomach may cause stomach cancer.

Again, until medical evidence is clear, it would seem sensible to recycle water whenever this can be accomplished.

ASBESTOS AIR POLLUTION RESULTING
FROM THE WEAR OF BRAKE LININGS

By

Colin F. Harwood, Ph.D.

ABSTRACT

Asbestos containing brake linings have been cited as a source of ambient air asbestos pollution. This paper reviews the suggestion and an estimate is presented which indicates that the asbestos emission from brake linings is significant. The ways in which this emission may be reduced or eliminated are briefly reviewed.

IIT RESEARCH INSTITUTE
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Chicago, Illinois 60616

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ASBESTOS AIR POLLUTION RESULTING FROM THE WEAR OF BRAKE LININGS

INTRODUCTION

Recent interest in asbestos and the realization of its health hazard have raised the question of the extent to which people are exposed to asbestos on a non-occupational basis. Measurements have been made on urban background levels and it has been shown that small but definite concentrations are to be found in areas quite remote from any apparent source.

Since virtually every motor vehicles carries several pounds of asbestos contained in its brake linings and since these are worn away to some degree every time the brakes are applied then it is reasonable to expect that they could present a significant emission source. This is especially acceptable when one considers the 100 million or so vehicles on the nations roads.

The paper investigates the possible extent of such emissions and presents an estimate of the contribution to urban asbestos concentrations. Possible means of reducing such emissions by use of an alternative or sealing the system are briefly reviewed.

The Extent of the Emission

The best information available at the present time^{1,2} indicates that the percentage of asbestos contained in the dust normally emitted from brake linings is of the order of 1%. However, under conditions of severe breaking, this may rise to 15%.

The average brake friction material contains of the order of 50% asbestos, thus an explanation is necessary to account for the discrepancy between the measured and theoretical values. The most likely explanation results from the known facts with regard to heat generated at friction surfaces. The work of Bowden and Tabor³ has shown that when two surfaces are placed together the contact area is dramatically less than the apparent area.

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This means that very large energy transfer takes place at these contact points and extremely high temperatures are reached.

In the case of brake linings, some evidence of these temperatures has been generated in unpublished work by the General Motors Company⁴. In this study, a small hole was cut through a brake shoe and the radiation collected from the exposed shoe surface was monitored. The results suggested that under light braking temperatures of the order of 800-900°C were found, while during heavy braking the temperature reached 1700-1800°C.

The significance of this data to the present case is that it is known that asbestos decomposes above 500°C⁵ to give forsterite (Mg_2SiO_4), talc ($\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$) and water vapor.

Acceptance of the value of 1% of asbestos emitted allows an estimate to be made of the effect of this emission on the quality of the atmosphere.

Estimation of Urban Concentrations of Asbestos From Brakes

Assumptions

- a. There are approximately 100 million* motor vehicles.
- b. Motor vehicles have an approximate average weight of 4 lbs of friction material, when new, of which 50% is asbestos.
- c. The average motor vehicle will require replacement of the brakes after three years of use at which time they will have lost 50% of their weight by abrasion.
- d. The dust emitted will contain 1% of asbestos fibers.
- e. Of the wear dust, 80% is emitted and 20% is lodged within the system.

*The AAA claims there are 109,000,000 licenced vehicles including 90,000,000 passenger vehicles and 19,000,000 trucks.

Calculation

The total weight of brake linings in use is

$$\frac{100,000,000 \times 4}{2000} = 200,000 \text{ Tons.}$$

The quantity worn off these linings per year follows from the assumptions made in c.

$$\text{as } 200,000 \times \frac{1}{3} \times \frac{50}{100} = \frac{200,000}{6} \text{ Tons/yr.}$$

This wear dust contains 1% asbestos, hence emission is

$$\frac{200,000}{6} \times \frac{1}{100} = \frac{2000}{6} \text{ Tons/yr.}$$

Allowing for the fact that 20% is not emitted, the total emission is thus

$$\frac{2000}{6} \times \frac{80}{100} = \frac{1600}{6} = 270 \text{ Tons/yr.}$$

Effect on the Atmosphere

There are no facts relating directly to asbestos on which one may judge the effect of these emissions on urban air. However, there has been a considerable amount of study done on the diffusion of other materials from automobiles, particularly lead and carbon monoxide. At a recent ACS Symposium in Minneapolis⁶ evidence was presented which placed the level for lead emission at $0.01 \mu\text{g}/\text{m}^3$ in Thule, Alaska and $2.5 \mu\text{g}/\text{m}^3$ in New York City. Next to busy highways a level in excess of $50 \mu\text{g}/\text{m}^3$ may well be possible. In the light of this data the value of $2 \mu\text{g}/\text{m}^3$ for average urban air conditions, suggested by GM⁴, seems eminently reasonable. Considering that 1.25×10^5 tons of lead are emitted in total from automobiles then the following factor is used.

Avg. Conc. asbestos in city air from automobiles	$\sim$	Quantity of asbestos emitted	$\times \frac{2 \mu\text{g}/\text{m}^3 \text{ city air}}{1.25 \times 10^5 \text{ tons Pb from cars}}$
--	--------	------------------------------------	---

Applying this figure to the present case and assuming that 200 tons are emitted in city areas, then we get that:

$$\text{The avg. conc.} \approx 200 \times \frac{5}{1.25 \times 10^5}$$

$$\approx 3.2 \times 10^{-3} \mu\text{g}/\text{m}^3$$

$$\text{or } \approx 3.2 \times \text{ng}/\text{m}^3$$

A similar result is obtained using the dispersion factor for carbon monoxide. However, the values for lead are preferred since it is a particulate emission rather than a gas.

The Significance of This Value

The question of whether asbestos containing brake linings constitute a significant source of ambient air background, asbestos levels can now be considered.

Firstly, it is pertinent to review the available evidence on asbestos levels in ambient air. Perhaps the most up-to-date information is reported in a recent paper by Thompson and Morgan of the EPA⁷. Their data suggests that values 0.5-15 ng/m³ are appropriate to urban sites, while 0.1 ng/m³ is to be found in nonurban sites. They give a figure of 0.01 ng/m³ for remote sites.

The California State Health Department in collaboration with the School of Public Health, Berkeley, California, have tested ambient air for asbestos. Their results suggest values of 0.06 ng/m³ in remote sites and 3 ng/m³ near a source.

Nicholson and Rohl⁸ of the Mt. Sinai School of Medicine have also been active in the measurement of asbestos in urban ambient air. The analysis of a large number of samples has revealed that 33% of the samples contained 0-0.9 ng/m³, 55% contained 1.0-5.0 ng/m³ and 10% contained 5-20 ng/m³ and a few were in excess of this.

All of the workers have been at pains to point out that the results are to be considered preliminary. Thus they should be regarded not as final definite figures, but rather as good,

IIT RESEARCH INSTITUTE

considered, preliminary findings. The similarity of the figures reported by the various workers does suggest that at least an order of magnitude has been established.

Consider now the estimate of 3.2 ng/m^3 calculated previously as the contribution from asbestos brake linings. Firstly, it should be stated that this figure is a conservative estimate and allowance has been made for the many factors which could reduce this figure. Secondly, although there is no reason to doubt the factor for the diffusion of lead, it should be realized that this figure is an average value for the whole of the city air. Consequently, much higher concentrations are to be expected in certain areas of high brake usage. For example, near inter-sections, tollbooths, etc.

In the light of the evidence here presented, one must conclude that asbestos emitted from brake linings may be a major contributing factor in the overall ambient air concentration.

Further work is necessary to establish more definitely the major contributors to urban asbestos concentration levels. It is not possible to state with assurance how much these low concentrations of asbestos constitute a threat to the health of the general public. Medical evidence and opinion is widely divergent on this issue. However, asbestos has been rated as a hazardous substance by the EPA and as such it should be treated with due respect. Emissions should be reduced or curbed wherever this is possible. To this end it is worth briefly reviewing how this may be achieved.

TECHNOLOGY OF ELIMINATING EMISSIONS

The emission of asbestos to the atmosphere from asbestos containing brakes could be prevented in two ways: its use could be banned altogether, or, the brakes could be sealed. In the former case, an alternate would have to be found.

Alternatives to Asbestos

For a replacement to be as suitable as asbestos, it would have to fulfill a list of desirable features as:

- Resist high temperatures without degradation or loss of frictional properties.
- Combine excellent friction characteristics without severe abrasion.
- Provide great strength - asbestos fibers have a greater tensile strength than steel and yet are more flexible.
- Have relative economy.

Of the materials which have been considered, sintered metal with ceramics and fiberglass have been the most likely candidates thus far.

Sintered Metal - This material has been used and indeed has the desirable quality of being fade-free, for this reason it is still used in some racing cars. However, it has several disadvantages. It tends to be noisy and brake screech is a problem. They suffer from what is known in the trade as "morning sickness", this means that the first stop is very severe, or, that the cold friction is high. Wear is higher than with asbestos and thus the brakes have to be replaced more frequently. Replacing the brakes is more difficult since all brakes are honed to fit the drum. Honing metal is more difficult than asbestos friction material.

Ceramic Metal (Cermets) - A sintered metal and ceramic composition has been developed and tried. Its use at this time seems to be restricted to the clutches on heavy-duty vehicles (tractors, etc.); in these cases it is usual to use buttons of the material rather than a complete annulus. Although to a lesser degree, it suffers from the same complaints as sintered metal with respect to noise, wear and severe first stop, and in addition, it is relatively expensive. However,

its anti-fade characteristics have led to extensive testing. For example, the Ford Motor Company put inserts of ceramic metal at the position of maximum brake wear on their 1958 Thunderbird. The concept was abandoned, reportedly due to uneven braking leading to a directional pull when braking.

Fiberglass - Attempts to use fiberglass instead of asbestos have been attempted since 1938. So far, no design has met the exacting standards required. As with the other materials, the first stop is harsh. Apparently the design is better for disc brakes than drums. A problem is the sensitivity of the brake to moisture.

Owens-Corning are undertaking development research in this area. They are very guarded with regard to the status of their work, but state that they are actively engaged in developing a product. To date, no vehicles are known to employ fiberglass in their brake friction product.

Sealed Systems

Sealed systems have been seriously considered. Normally, cars rely on air cooling and the movement of air round the brake caused by the motion of the car. However with high performance cars, more cooling is required. This is achieved in a simple manner by fabricating a superstructure which scoops up air and directs it inside the brake drum. If a filter were added on the exiting side, this would cause a substantial reduction in emissions.

A more elaborate design which has been used is to liquid cool the brake system. This enables the braking system to be completely sealed and thus no emission are possible. The one problem area with this design is that the oil seals must be extremely reliable. However, with a well designed system problems due to overheating could be largely eliminated.

CONCLUSIONS

An estimate has been made of the asbestos concentrations to be found in urban air resulting from the use of asbestos containing brake materials. The results indicate that brake use may well constitute a major source of asbestos background levels. The quantity in comparison to occupational levels is extremely low. A time weighted average occupational exposure level of 5 f/cc would be of the order of 100,000 times greater than a background level of 3.0 ng/m^3 . The medical significance of these results is not known with any certainty.

At the present time, no alternative to asbestos containing friction products is developed to the stage of finesse required by the industry. It is difficult to believe that modern technology cannot overcome the problems presented by the use of alternates.

The use of sealed brake units is a second possibility. Again there do not seem to be any insurmountable technological problems, but no information is available as to the cost and time factors.

FRICION MATERIALS STANDARDS INSTITUTE, INC., E. 210 ROUTE #4, PARAMUS, N.J.

February 29, 1972

TO: MEMBERS (as listed)

SUBJECT: MEASUREMENT OF AIRBORNE ASBESTOS FIBER BY THE MEMBRANE FILTER METHOD

As indicated in earlier correspondence, we are distributing one copy each of "Measurement of Airborne Asbestos Fiber by the Membrane Filter Membrane Filter Method", to the members for their information. If additional copies are needed, please contact the Asbestos Textile Institute.

E. W. Drislane
Executive Secretary

EWD/lmc

CC: E. Feierabend	- Abex	M. Frazier	- Molded Industrial
S. Comins	- Auto Friction	I. Weaver	- Raybestos
M. Jacko	- Bendix	F. Barton	- Reddaway
W. Simon	- Brassbestos	W. Sleeth	- Royal
J. Graham	- Carlisle	A. Daly	- Scandura
E. Koss	- Chrysler	A. Roentgen	- Silver Line
R. Kick	- Delco-Moraine	J. Allen	- Standco
L. Carreras	- Forcee	W. Richards	- Thiokol
F. Gatke	- Gatke	C. Cawley	- Thermoid
W. Reitze	- Johns-Manville	R. Brigleb	- Wellman
T. Laher	- Lasco	L. Burgess	- Wheeling
J. Greenen	- Grizzly	J. Henning	- World Bestos

C-13
(2)

FMSI 02857

FRICTION MATERIALS STANDARDS INSTITUTE, INC., E. 210 RTE #4, PARAMUS, N.J.

February 25, 1972

TO: MEMBERS (as listed)

SUBJECT: ASBESTOS SEMINAR -- IIT RESEARCH INSTITUTE - CHICAGO

This memorandum is being sent to those in member companies directly associated with the asbestos regulations, and where a member has not indicated such an individual, to the Delegate.

Dr. Harwood of IIT is organizing a seminar in Chicago the week of April 4-7, 1972 on asbestos regulations, etc.

If you, or someone in your firm is interested, I suggest you complete the application for attendance, with the fee, and send to Dr. Harwood.

The Friction Materials Standards Institute has nothing directly to do with this seminar, and is passing the information along to members for their information.

E. W. Drislane
Executive Secretary

EWD:llz

cc: E. Feierabend	- Abex	M. Frazier	- Molded Industrial
S. Comins	- Auto Friction	J. Weaver	- Raybestos
M. Jacko	- Bendix	F. Barton	- Reddaway
W. Simon	- Brassbestos	W. Sleeth	- Royal
J. Graham	- Carlisle	A. Daly	- Scandura
E. Koss	- Chrysler	A. Roentgen	- Silver Line
R. Kick	- Delco-Moraine	J. Allen	- Standco
L. Carreras	- Forcee	W. Richards	- Thiokol
F. Gatke	- Gatke	C. Cawley	- Thermoid
W. Reitze	- Johns-Manville	R. Brigleb	- Wellman
T. Laher	- Lasco	L. Burgess	- Wheeling
J. Greenen	- Grizzly	J. Henning	- World Bestos

FRICION MATERIALS STANDARDS INSTITUTE, INC., E210, ROUTE #4, PARAMUS, NEW JERSEY

BULLETIN

NO. 428

February 18, 1972

To: ALL MEMBERS

SUBJECT: Demonstration - Membrane Filter Method for Airborne Asbestos Measurement
By: W. Reitze, Johns-Manville Corporation.

By earlier bulletins, the membership had been advised that Mr. W. Reitze of Johns-Manville Corporation would give a demonstration on the standard method for measuring airborne asbestos fibers. Mr. Reitze made this presentation on Thursday, February 10, 1972 at the Institute Office in Paramus, New Jersey.

Those Attending:

J. Greenen, President of F.M.S.I.)	
R. Hemmelgarn)	Maremont Corporation
K. Barnhardt)	Grizzly Brake Division
J. Henning)	
J. Graham	World Bestos Company, Division of
	The Firestone Tire & Rubber Company
	Carlisle Corporation
	Molded Materials Division
M. Jacko	Bendix Corporation
	Friction Materials Division
W. Richards	Thiokol Chemical Corporation
W. Reitze	Johns-Manville Corporation
E. W. Drislane	Friction Materials Standards Institute, Inc.

MEASURING AIRBORNE ASBESTOS FIBERS

Mr. Reitze discussed the earlier Impinger Method (no longer accepted) where the air sample is passed through a glass tube bubbler and the fiber is trapped with a subsequent count of fibers.

The currently accepted method calls for measurement of airborne asbestos fiber by the membrane filter method. Briefly, the pick-up is worn by a worker in the area to be measured with a small battery operated vacuum pump taking in air over a specified period - of different times, say 60 minutes, 90 minutes, or four hours. The asbestos fiber is trapped by the membrane filter and then carefully sealed and sent to the laboratory. The sample is examined using an optical microscope where a count of fibers is made.

The details of the test are described in:

"Measurement of Airborne Asbestos Fiber by the Membrane Filter Method" published by the Asbestos Textile Institute.

Asbestos Textile Institute
P. O. Box #239
Pompton Lakes, New Jersey #07442
(Price \$1.00 per copy)

The Institute has ordered copies and will send one to each Delegate. If additional copies are desired, it is suggested that the member order the copies directly from the Asbestos Textile Institute.

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(2)

FMSI 02859

Mr. Reitze's demonstration will not be detailed as the booklet mentioned covers the equipment and procedures in detail.

COMMENTS AND SUGGESTIONS

The cost of pad and filters inserted are 70¢ per piece, from Millipore Corporation, Bedford, Massachusetts #01730.

It is suggested that four to six pumps (costing about \$150. each) be used so that a supervisor can monitor more than one test at a time. A battery charger will cost about \$50. One should have one charger for every two pumps.

Seeding (or sabotage) when a worker throws additional asbestos to the intake may ordinarily be detected when the sample is counted under the microscope, but additional tests may be necessary in the same area with different workers.

A pump could be mounted in a fixed position near the work place but the proper method is to have the pump attached with the intake facing down near where the worker breathes.

A binocular microscope with phase contrast illumination set for 400/430X magnification is required. A Bausch and Lomb microscope costing about \$1,200.-1,500. is the basic instrument. Binocular microscopes with additional features could well be worth the additional cost, but professional advice should be used in the selection of equipment.

OUTSIDE SERVICES AND TRAINING

It may be feasible to have outsiders do the full job - from sampling through examination and reporting. Others will do the analysis work only where the samples are mailed to the laboratories.

Tracerlabs in California will do analysis work for about \$50.-60. per analysis.

Johns-Manville will do the full job for a fee (Contact Mr. W. Reitze, Manager Industrial Hygiene Engineering Service, Johns-Manville Corporation, P. O. Box #5108, Denver, Colorado #80217)

George Clayton Labs, Southfield, Michigan will do the full job for a fee.

There are other labs that may do the entire package or the analysis work only.

Johns-Manville indicated it would be willing to train personnel in the technique in a two day period. They would take one trainee, or at most two trainees, to one instructor for \$200. a day. These sessions would be at Phindern (Somerville) New Jersey or Waukegan, Illinois. Again, the contact would be with Mr. Reitze in Denver.

It is suggested that the members familiarize themselves with OSHA's proposed standards. A copy of these standards, as issued in the Federal Register on January 12, 1972, is enclosed with Bulletin #427.

E. W. DRISLANE
Executive Secretary

Asbestos Study Committee
Delegates & Alternates
British Friction Materials Council
AIA/NA and L. D. Stickles, Counsel

Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE
NEW YORK, N. Y. 10017

January 26, 1972

To: Members of Asbestos Study Committee

Subject: Meeting February 10, 1972

Gentlemen:

In separate correspondence, I have indicated that Mr. W. B. Reitze of Johns-Manville will give a session on monitoring asbestos fibers in the air. This session, at which 8-10 people have indicated that they will attend, has been scheduled at the new Institute Office in Paramus, New Jersey for 1:30 P.M. on Thursday, February 10, 1972.

As some of those planning to attend this 1:30 P.M. session are also members of the Asbestos Study Committee, it is felt that this is an opportune time to schedule a meeting of this Committee in the morning.

While some items on the agenda will be historical - the Illinois Pollution Control Board hearings, Environmental Protection Agency Proposed Emission Standards, and Occupational Safety and Health Act Standards - - the main item for the Committee to consider is the direction it wishes to take. Should it get involved in commenting on proposed regulations concerning asbestos, or should it serve more as a monitor to keep the membership advised?

Our meeting is scheduled for: 9:30 A.M., February 10, 1972 at the new Institute Office in Paramus, New Jersey.

For help in finding the new office, a 7 page "publication" is enclosed concerning our new location.

Sincerely,

EWD/erc
Enclosure:

E. W. Drislane
Executive Secretary

Messrs. : J. H. Weaver
J. C. Henning
E. H. Feierabend
W. B. Reitze
W. Spurgeon
J. B. Graham, Jr.
L. D. Stickles, Counsel

Raybestos-Manhattan, Inc.
Firestone Tire & Rubber Company
Abex Corporation
Johns-Manville Corporation
The Bendix Corporation
Carlisle Corporation
Stickles, Hayden, Kennedy,
Hort & Van Steenburgh

C-15
FMSI 02861

January 14, 1972

To: Members of the Asbestos Study Committee

Subject: Department of Labor - Proposed Standard for Exposure to Asbestos Dust.

I am attaching a copy of the proposed rule making on Standard for the Exposure to Asbestos Dust.

This notice appeared in the Federal Register of January 12, 1972 (466-468).

This is forwarded to the Committee members for their information.

Edward W. Drislane
Executive Secretary

Messrs.: I. H. Weaver
J. C. Henning
E. H. Feierabend
W. B. Reitze
W. Spurgeon
J. B. Graham, Jr.
J. W. Greenen, President
L. D. Stickles, Counsel

Raybestos-Manhattan, Inc.
World Bestos Company
Abex Corporation
Johns-Manville Sales Corporation
The Bendix Corporation
Carlisle Corporation
Maremont Corporation
Stickles, Hayden, Kennedy,
Hort & Van Steenburgh

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(7)

Abex

Asbestos Study Comm
Abex Corporation

American Brakeblok Division

900 WEST MAPLE ROAD, TROY, MICHIGAN 48064

January 14, 1972

British Friction Materials Council
99, Aldwych
London, WC2B 4JY

Gentlemen:

Your letter of December 8, 1971 addressed to the Society of Automotive Engineers regarding your views on the proposed Illinois State Regulations concerning asbestos products, has been forwarded to me. I apologize for the somewhat slow acknowledgment of your letter but wanted to discuss it at our Subcommittee meeting which is held during the SAE Annual Congress in Detroit.

We appreciate very much your comments and some of the attached information was new to us and of considerable interest. There are, however, two things with which you should be aware if you have not already been advised. First, the Illinois Pollution Control Board has withdrawn the proposal covering the banning of asbestos in brake lining. This was due principally to the fact that a number of brake lining manufacturers presented data along the same lines you furnished in that there is insufficient proof that products of wear from asbestos brake lining do cause any harmful levels of pollution.

The second fact that you probably are not aware of, is that the Society of Automotive Engineers do not comment in any way on any proposed legislation. The position of SAE is quite simple in that their task is to develop recommended practices and standards which are for the use of anyone including government agencies. They definitely do not take any stand or any position with regard to any proposed or actual legislation. This very firm policy is the reason why SAE would not forward your comments to the Illinois Pollution Control Board. As it turned out, because that proposal covering the use of asbestos in brake linings after 1975 was dropped, it was not necessary to forward this information.

I am taking the liberty of sending a copy of your attachments to the Friction Materials Standards Institute, Inc., as they were active and instrumental in getting this proposal removed. I am sure they will be interested in this data for their files. In the future when you have

American Brakeblok

FMSI 02863



British Friction Materials Council - 2 -

January 14, 1972

comments regarding legislation dealing with brake linings I would suggest you direct your comments to that organization.

I am also taking the liberty to send a copy of this information to Dr. M. G. Jacko of Bendix Corporation, who is doing work along this line and is the representative from the brake lining subcommittee on the SAE Particulates Committee studying the amounts and the effect of asbestos in the air.

Thank you again for your interest and comments, and if we can be of any further help please do not hesitate to get in touch with us.

Sincerely,

R. E. Nelson
Chairman

SAE Brake Subcommittee 2

REN:nm

cc: Messrs. L.P.Ziegler, Jr. - SAE - Detroit

E.W.Driscane
Friction Materials Standards Institute, Inc.
Bergen Mall Office Center (new address)
E. 210, Route 4, Paramus, New Jersey 07652

Dr. M. G. Jacko
Bendix Corporation - Research Lab.
20800 Civic Center Drive
Southfield, Michigan 48075

FMSI 02864

BRITISH FRICTION MATERIALS COUNCIL

SECRETARIES
BAKER, ROOKE & CO.
CHARTERED ACCOUNTANTS
TELEPHONE: 01-242 0211

AIR MAIL

362/m/BFMC

The Society of Automotive Engineers, Inc.,
2 Pennsylvania Plaza,
New York, N.Y. 10001,
U.S.A.

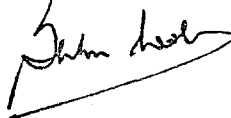
8th December, 1971.

Dear Sirs,

We have been asked by our members in the British friction materials industry in the U.K. to put their views to you on the proposed Illinois State Regulations concerning asbestos and asbestos products. We enclose herewith their comments on the friction material aspect of these draft Regulations.

We have no doubt that the American lining manufacturers will be making strong representations to the Illinois authorities for amendments to the proposals and we shall be grateful if you could make our views known as set out in this enclosure.

Yours faithfully,



Secretaries

Enc.

FMSI 02865

PROPOSED ILLINOIS STATE
BAN ON ASBESTOS-BASED BRAKE LININGS

The British friction materials industry views with deep concern the proposed ban on the use of asbestos in brake linings by the State of Illinois.

It is not aware of any medical evidence that could possibly justify such legislation. On the contrary it would have the effect of withdrawing from the market products that were used to promote road safety, without producing any significant improvement in the levels of urban atmospheric pollution. It would expect any of the known alternatives to asbestos to produce general particulate pollution of a measurable amount.

1. Whatever materials are used for brake linings the current state of the art is such that the action of braking will generate products of wear. The asbestos content of conventional brake linings is almost entirely converted by the action of braking into forsterite or other amorphous, inert materials which are no longer asbestos. On the other hand, if non asbestos alternatives are used (e.g. iron powder, sintered metal, ceramics, steel wool etc.) the resulting wear products will be released unchanged.
2. Measurements have been made of the amount of free asbestos fibre left in brake lining dust. It is an insignificant proportion of what is in any case a minute amount of total dust.

The amount of free asbestos fibre that has been found in brake lining dust from vehicles, is about 1% of the total products of wear. (1). Indeed estimates vary down to 10^{-9} g/g, i.e. for each gramme of wear products only 10^{-9} grammes of free asbestos may remain.

3. We assume that the risk of contracting mesothelioma is the principal cause of environmental concern - there is clearly no possibility whatever as a result of vehicle braking, of a community risk of asbestosis or lung cancer, which are solely occupational risks. For technical reasons only chrysotile asbestos is used in the manufacture of brake linings and disc brake pads. This is not the type of asbestos with which mesothelioma has been mainly associated.
4. Measurements of chrysotile asbestos in the ambient air in an industrial centre in the United Kingdom have shown that the level must be less than 10^{-7} g/m³ because of the limitations of the method used. This means that they must be a thousand times lower than the British Government acceptable level for occupational exposure. Current investigations using a more sensitive method indicate levels of 10^{-9} to 10^{-10} g/m³, i.e. 2 or 3 orders lower still. (2).

Brake lining wear cannot therefore be a serious source of atmospheric pollution.

5. In one of the largest brake testing laboratories in the world, housing many dynamometers engaged 24 hours a day in wearing away friction materials, the average monthly asbestos count is 0.2 fibres/cc, a tenth of the British Government's occupational standard.

Footnotes

1. Hickish D.E. and Knight K.L. (1970) Annals of Occupational Hygiene Vol.13, No.1, page 20.
2. Letter to Nature attached.

British Friction Materials Council
26th November, 1971.

Chrysotile Asbestos in Urban Air

The industrial use of chrysotile asbestos is increasing and the question of whether its concentration in urban air constitutes a hazard has been raised. But measurements of asbestos in air near asbestos factories have proved negative with present analytical methods, so under the sponsorship of the Asbestosis Research Council we are developing a more sensitive technique. This article is a preliminary account of the estimation of chrysotile near a large asbestos textile factory at Rochdale, Lancashire. There are several uncertainties in the technique, so we were expecting to obtain only an order of magnitude estimate. Nevertheless this would have been an important figure to have because of the lack of data on the amount of asbestos in air. As it happened, we were only able to determine an upper limit for the chrysotile concentration which turned out to be three orders of magnitude lower than the threshold value for occupational exposure set by asbestos regulations. Obviously even more sensitive techniques are required and are now being developed.

We used an X-ray diffraction technique based on the measurement of the integrated area under the (002) peak of chrysotile. The equipment, which consisted of a Phillips 1010 generator, a vertical goniometer with a step scanning attachment, and a proportional counter with pulse height discrimination, could be reliably calibrated down to 10 μg of chrysotile compared with the 1 to 10 mg range reported by Crable¹, and was cross-checked by estimating the magnesium content of the calibration samples by atomic absorption spectroscopy. Sampling involved the collection of airborne solids from 1,000 m³ (10⁵ l.) of air by an electrostatic device (H. Litton Systems Inc.) in which up to 10,000 l. min⁻¹ are drawn through a 20 kV corona discharge. Particles in the air are electrostatically precipitated onto a plate and concentrated into ~100 ml. of liquid.

The collection efficiency depends on the size distribution of the particles and the sampling rate, but the size distribution of chrysotile in the atmosphere is not known. Therefore we estimated the collection efficiency indirectly by running the sampler in part of the asbestos factory where a low concentration of asbestos is known to occur (Fig. 1) and we found the collection efficiency to be almost 100% when the air is sampled at about 2,000 l. min⁻¹, dropping to between 25 and 50% at the rate of 10,000 l. min⁻¹, depending on the actual size distribution present. As we were aiming at only an order of magni-

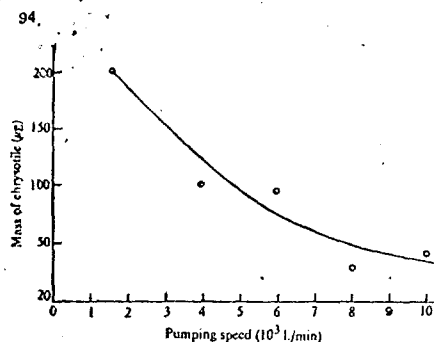


Fig. 1 Observed amounts of chrysotile in 5,000 l. of factory air, sampled at different rates.

the assessment of asbestos in urban air, we were prepared to accept this uncertainty in the collection efficiency.

The map (Fig. 2) and Table 1 show the location of the sampling sites and the conditions in which the samples were obtained. The factory is in a hollow, and sampling site No. 2 is at the same height as the roof of the filter gallery, which is the chief air outlet from the factory. Sampling site No. 1 is about 30 feet higher than site No. 2. Sites 3 and 4 were in the gardens of houses, site 3 being about 5 km upwind of the factory and site 4 being about 300 m downwind.

All the diffraction traces (for example, Fig. 3) contained strong lines of kaolinite and quartz, probably from the local soil, which made the assessment of chrysotile difficult because the broad (001) line of kaolinite (7.18 Å) is close to the major (002) line of chrysotile (7.36 Å). Fortunately chrysotile is easily decomposed by boiling in 1 N hydrochloric acid whereas kaolinite is unaffected, so it should be possible to measure the amount of chrysotile present by subjecting the samples to acid leaching and measuring the corresponding reduction of the intensity of the composite X-ray band. The fact that this process led to no reductions in band intensity for any of the samples indicated that the amount of chrysotile present was below our detection limit.

We ought to have been able to detect 10 µg of chrysotile by itself, but clearly the presence of kaolinite may have reduced

Table 1 Weather Conditions during Sampling

Date (1970)	Site	Wind	Weather
April 22	1	SW moderate	Broken cloud
April 24	1	SW slight	Ground haze
April 27	1	NE moderate	Ground haze
April 29	1	SW moderate	Ground haze
May 6	1	S strong	Ground haze
May 13	1	N fresh	Ground haze
May 28	3	W light	Overcast, dull
May 28	3	W light	Overcast, dull
May 30	4	W light	Overcast, dull
May 30	4	W light	Overcast, dull
June 3	2	SW light	Overcast
June 10	2	SW slight	Heat haze
June 10	2	SW slight	Heat haze
October 23	1	W moderate	Broken cloud
October 23	1	W moderate	Broken cloud
October 23	1	W moderate	Broken cloud
October 28	1	N light	Broken cloud
October 28	1	N light	Broken cloud
October 28	1	N light	Broken cloud

the sensitivity. But the addition of 100 µg of chrysotile to our collected samples could easily be detected, so we can say that our samples collected from 1,000 m³ of air contained less than 100 µg of chrysotile—in other words, there was less than 0.1 µg of chrysotile per m³ of air. The threshold limit for occupational exposure set by the 1969 Asbestos Regulations² is 0.1 mg m⁻³.

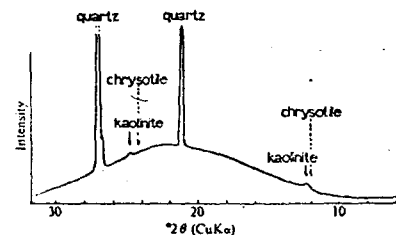


Fig. 3 X-ray diffraction pattern from a typical dust sample near the Rochdale factory.

A more sensitive method for estimating chrysotile is required, and we are developing a technique based on electron microscopy. Preliminary examinations under the electron microscope of samples collected by the Litton sampler indicate that the actual chrysotile level may be a further three orders of magnitude below the X-ray detection limit (that is, about 0.1 ng).

The samples have so far been collected in the close vicinity of the Rochdale factory. It is now proposed to sample air at certain representative urban and rural locations in UK and estimate their chrysotile content.

A. L. RICKARDS
D. V. BADAMI

Turner Brothers Asbestos Co. Ltd,
PO Box 40,
Rochdale, Lancashire

Received April 18; revised September 22, 1971.

¹ Crable, J. V., *Am. Ind. Hyg. Assoc. J.*, 27, 293 (1966).

² *Standards for Asbestos Dust Concentration for Use with the Asbestos Regulations 1969, Technical Data Note 13* (H.M. Factory Inspectorate, 1969).

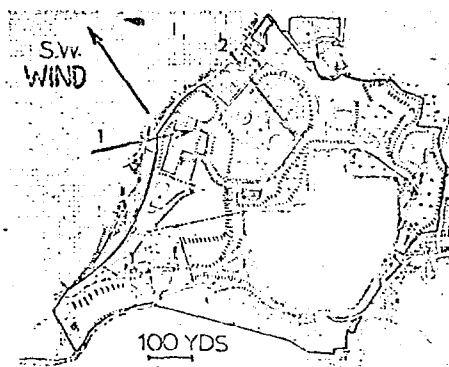


Fig. 2 Plan of T.B.A. factory, Rochdale. The sampling sites are indicated by the arrows 1 and 2. F, Position of the chief filter gallery exhausts.

December 8, 1971

TO: MEMBERS OF ASBESTOS STUDY COMMITTEE

SUBJECT: RECENT ACTIONS BY FEDERAL AND STATE GOVERNMENTS CONCERNING ASBESTOS

There has been considerable output concerning asbestos in recent weeks. We are, therefore, sending to each member of the Asbestos Study Committee the following:

1. Illinois Pollution Control Board Regulations
 - 1.1 Memorandum of December 3, 1971 on "prosed final draft" of regulations on asbestos.
 - 1.1.1 Note that the section banning asbestos containing brake linings after 1975 has been eliminated.
 - 1.2 Chicago Tribune article of December 2, 1971 concerning asbestos.
 - 1.2.1 Nothing specific about brake lining.
2. Environmental Protection Agency Emission Standards
 - 2.1 Federal Register of December 7, 1971 spelled out the proposed standards for Asbestos, Mercury and Beryllium.
 - 2.1.1 The proposed standard for asbestos only is included in our excerpts.
 - 2.2 New York Times article of December 4, 1971 concerning the proposed emission standards.
 - 2.2.1 This can serve as a digest of the proposed standards in the Federal Register.
 - 2.2.2 Note that the asbestos standards were set with control practices (filters and traps) rather than by numerical emission values.
3. Department of Labor - Exposure to Asbestos Dust
 - 3.1 Federal Register of December 7, 1971 - Federal Supply Contracts.
 - 3.1.1 To apply the new Williams - Steiger Act standard on asbestos to Federal Supply Contracts.
 - 3.2 Federal Register of December 7, 1971 - Construction
 - 3.2.1 To apply Williams - Steiger Act standards to construction.

E. W. Drislane
Executive Secretary

Messrs: I. H. Weaver
J. C. Henning
Dr. W. Spurgeon
W. B. Reitze
J. B. Graham
E. H. Feierabend

Raybestos-Manhattan, Inc.
World Bestos Company
Bendix Corporation
Johns-Manville Corporation
Carlisle Corporation
Abex Corporation

C-17

December 8, 1971

TO: MEMBERS OF ASBESTOS STUDY COMMITTEE

SUBJECT: RECENT ACTIONS BY FEDERAL AND STATE GOVERNMENTS CONCERNING ASBESTOS

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E. W. Drislane
Executive Secretary

Messrs: I. H. Weaver
J. C. Henning
Dr. W. Spurgeon
W. B. Reitze
J. B. Graham
E. H. Feierabend

Raybestos-Manhattan, Inc.
World Bestos Company
Bendix Corporation
Johns-Manville Corporation
Carlisle Corporation
Abex Corporation

C-18

GHQ
December 3, 1971

TO: JOHNS-MANVILLE ENVIRONMENTAL HEALTH TASK FORCE
AIA/NA MEMBER COMPANIES
AIA/NA ADMINISTRATIVE SUB-COMMITTEE

CC: Dr. Joseph L. Goodman Frank Zimmerman
Ike Weaver Bradley Walls
Ed Drislane
C. R. Wikel
R. F. Winkworth
H. J. Roesch

ILLINOIS POLLUTION CONTROL BOARD REGULATIONS ON ASBESTOS

Attached is the "Proposed Final Draft" of the State of Illinois Pollution Control Board regulations on asbestos. Substantial changes of a positive nature have been made in nearly every section of the regulations as compared with the draft published last summer.

Among the most important changes are the following:

1. The section banning the use of asbestos-containing brake linings after 1975 has been eliminated. While it might appear from the comments in the "Explanation" section of the regulations on page 10-11 that this question is not completely settled, it is our belief that the Board will take no further action against brake linings unless the Federal Government does first, in which case any action taken by the state would be rather academic.
2. The plant emission standard has been raised from a level of .5 fibers per cc to a more acceptable level of 2 fibers per cc. In addition, the standard of .05 fibers per cc at the boundary line of a plant has been eliminated completely.
3. A "no visible emissions" standard has been included in various sections of the regulations where enforcement of a stricter standard would have been a problem, if not impossible.
4. The segment of the regulations requiring "total enclosure" of a structure under demolition before toppling of walls could begin has been altered to a more-or-less "do the best you can" standard.

5. The section requiring the use of a sealant on all "fibrous" materials used inside ducts or plenums has been changed to "asbestos-containing" materials only.
6. The section prohibiting the discharge of asbestos-containing process waste water into the rivers, streams and sewers of the state has been changed to permit such discharge if the waste water "is given the best available treatment consistent with technological feasibility and economic reasonableness."
7. Under the Proposed Final Draft, only manufacturing plants will be required to obtain a permit from the state. The first draft required permits for any operation or activity involving asbestos.

The vast majority of the above and other positive changes in the regulations reflect specific recommendations and corroborative evidence presented to the Board by Dr. F. L. Pundsack of Johns-Manville and Dr. Joseph L. Goodman of Raybestos-Manhattan on behalf of the AIA/NA at the public hearing on the regulations held October 15 in Chicago, and by Dr. George W. Wright and an industry team at a meeting held with Board staff representatives in September. Also participating in the overall cooperative industry effort were NIMA and the Friction Materials Standards Institute.

Attached is a copy of the specific changes submitted by the AIA/NA at Board request following the Chicago hearing. Because of the many changes in the final draft, the section and sub-section numbers on the AIA/NA recommendations do not correspond to those in the final draft. However, as you can see, the basic changes recommended by the AIA/NA have been adopted by the Board.

It is indeed an encouraging sign to find that, in this era of national environmental panic, a well-documented and well-presented industry case can produce results as fair and reasonable as those obtained in the state of Illinois. Much credit must go to the responsible yet fair attitude of the Illinois Pollution Control Board, and to all those in the industry who worked long and hard on this project.



W. P. Raines

Asbestos Pollution to Be Next Target

The new asbestos regulations proposed by the Illinois Pollution Control Board will, for the first time in Illinois, aim at controlling a pollutant on a person-to-person basis.

The proposed regulations, which probably will be adopted in mid-December, provide for regulating the use of asbestos as it is manufactured, used in construction, and used in demolition procedures. During hearings earlier this year, several doctors linked asbestos with lung diseases, including cancer.

Covers Wide Variety

The regulations will go farther than Chicago's ordinance, which requires only that asbestos spraying be limited to enclosed areas.

Under the board's proposal, manufacturing plants and other facilities that use asbestos will be required to provide facilities where employees can change their work clothes.

Tim Harker, an aid to the board, said the provision was added because testimony indicated that asbestos workers and their wives have a higher incidence of lung diseases because they often come in contact with the substance.

Limit on Emissions

"This is a unique proposal," Harker said, "because it identifies the individual as a polluter."

Under the regulations, asbestos manufacturers would be allowed to emit no more than two fibers of asbestos for each cubic centimeter of air. Plants

also would be required to use the best available technology to limit asbestos discharge into water.

In construction trades, outside spraying of asbestos on buildings would be prohibited after March 31. If the material, in wall boards for example, is used during construction, it must be handled under a cover or in an enclosure. Visible emissions of asbestos would be a violation of regulations.

The regulations will require that buildings with asbestos be wetted and the asbestos stripped by hand during demolition.

tion also has been given to the need to minimize the emission of hazardous pollutants that can accumulate in the environment.

In many cases, information on possible sources of the hazardous pollutants is not available in sufficient detail to determine the need for emission standards. Investigations are underway to fill these gaps in knowledge, and the results of these investigations may require modification of these standards and inclusion of additional source categories for these pollutants.

Beryllium, mercury, and asbestos are very different in the number and type of sources and control options available; therefore, each standard has been written in a different manner to optimize effectiveness and facilitate compliance.

Asbestos—The proposed standards for asbestos are designed to minimize emissions to the atmosphere. Because there is no suitable technique for sampling and analyzing asbestos in the ambient air or in emission gases, the standards are expressed as requirements for the operation of specific control equipment (or other equipment of comparable effectiveness), or in situations where no control system is available as prohibitions on the use of asbestos. When acceptable source sampling and analytical methods are available and it is possible to delineate hazardous levels, these standards may be revised to require compliance with a measured allowable emission.

The sources covered in the asbestos standard are: Mining, milling, spraying, and manufacturing. Specific examples of emission sources which would be subject to the proposed standards applicable to manufacturers of asbestos-containing products include, but are not limited to, manufacturers of the following products when those products contain asbestos: Cement, textiles, paper and board, friction products, plastics, floor tiles, gaskets, packings, roofing felts, and insulation products.

Beryllium—A maximum allowable concentration of beryllium for ambient air has been in use by the Department of Defense and the Atomic Energy Commission for many years. This guideline has been used in the development of the beryllium standards. The proposed standards offer the owner or operator the option of measuring compliance by either emission testing or measurement of ambient concentration levels in the vicinity of the plant. However, it is anticipated that most sources will elect to comply with the given emission limitation. Buildings or other obstructions in the vicinity of the source, or location in highly urbanized areas, may make it impossible to design and locate a sampling network that provides sufficient assurance that areas of maximum concentration are measured.

The known major sources of beryllium are extraction plants, machine shops and foundries handling beryllium or beryllium-containing alloys, ceramic plants using beryllium, rocket propellants containing beryllium, and incinerators burning beryllium-containing waste. These are covered in the proposed standards.

Other possible sources of beryllium are being investigated, and those sources which can potentially cause ambient concentrations to exceed $0.01 \mu\text{g}/\text{m}^3$ will be included in revisions to this standard.

Mercury—Information currently available suggests that an ambient concentration level in the air below one (1) microgram per cubic meter is sufficient to protect the public health from illness due to inhalation of mercury. However, mercury is mobile in the environment, and once released to the atmosphere may cycle between air, land, and water for long periods of time. Natural processes and living organisms can change mercury from one form to another, at times converting mercury into its most hazardous forms. Therefore, when sufficient information and understanding are available, it will be necessary to consider the broader environmental problems caused by mercury emissions to the atmosphere.

The only industries known to be emitting mercury in quantities and in a fashion such that these facilities, assuming a negligible background level, may cause the ambient concentration level to exceed $1 \mu\text{g}/\text{m}^3$ are the facilities producing mercury from ore and the mercury tell chlor-alkali plants. These industries are covered in this standard. Other sources may emit mercury, but present information indicates that these sources alone will not cause the ambient concentration level to exceed $1 \mu\text{g}/\text{m}^3$.

Investigations are underway to identify all mercury sources and to quantify their emissions into the air. As more information becomes available, this subpart will be revised, as necessary, to add additional source categories.

The proposed regulations require application to the Administrator for approval for construction or modification of any stationary source to which a standard prescribed in the regulations is applicable. The Administrator will notify the applicant of approval or disapproval of such application within 60 days of receipt. A fee will be charged to defray part or all the costs of the review. The fee structure will be revised from time to time as experience with the program is developed.

Omitted from the proposed regulations are provisions for delegations of authority to States under section 112(d)(1). Nevertheless, it is the Administrator's intention to encourage States to assume the principal responsibility for enforcement of national emission standards for hazardous air pollutants. Toward this end, procedures for delegating authority will be established early next year, after the States have submitted their plans for implementation of national ambient air quality standards.

In accordance with section 117(f) of the Act, publication of these proposed standards was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies.

Interested persons may participate in this rule making by submitting written comments in triplicate to the Environmental Protection Agency, Office of Air

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 61]

NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

Proposed Standards for Asbestos, Beryllium, Mercury

Pursuant to section 112 of the Clean Air Act, as amended, the Administrator published in the FEDERAL REGISTER of March 31, 1971 [36 CFR Part 62] an initial list of three hazardous air pollutants which in his judgment may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness. Publication of the list constituted an announcement of the Administrator's intention of establishing, under section 112, national emission standards for certain source categories known to emit these hazardous pollutants. These standards are based on information derived from many sources, including health effects levels, meteorology, technical analysis of control capability, and consideration of economic impact. The overriding considerations are health effects. Considera-

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Programs, Division of Compliance, Research Triangle Park, N.C. 27711. The Administrator will welcome comments on all aspects of the proposed regulations, including economic and technological issues and on the proposed test methods. All relevant comments received not later than 90 days after the date of publication of this notice will be considered. Receipt of comments will be acknowledged, but the Office of Air Programs will not provide substantive responses to individual comments.

Public hearings will be held as required by section 112(b)(1)(B) of the Clean Air Act. A notice of time, date, and place for these public hearings will be published in the FEDERAL REGISTER within 30 days of the publication date of these standards. Not later than 180 days after publication of the emission standards set forth below, the Administrator is required to promulgate such emission standards, unless he finds, on the basis of information presented at public hearings, that the pollutants in question clearly are not hazardous. Accordingly, all persons having scientific information pertinent either to the question of whether asbestos, beryllium, and/or mercury are in fact, hazardous within the meaning of section 112 of the Clean Air Act or to the question of the level of the various substances that constitute a risk to public health are urged to present such information either by testifying at the hearings or by submitting the data for the hearings record. In addition, all interested persons are specifically asked to present information on the extent to which promulgation of these emission standards for asbestos, beryllium, and mercury will be of benefit to the public health. In any testimony or written comments on the specific points mentioned herein or on other matters relevant to this proposed rule making, all assertions and claims should be fully substantiated by factual information.

Summaries of the pertinent data used in developing these standards are available free of charge from the Environmental Protection Agency, Office of Air Programs, Research Triangle Park, N.C. 27711.

This notice of proposed rule making is issued under the authority of sections 112 and 114 of the Clean Air Act, Public Law 91-604, 84 Stat. 1713.

WILLIAM D. RUCKELSHAUS,
Administrator,
Environmental Protection Agency.

NOVEMBER 30, 1971.

PART 61—NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

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Subpart A—General Provisions

§ 61.01 Applicability.

The provisions of this part apply to the owner or operator of any source which is operated, or the construction or modification of which is commenced after the date of publication in the FEDERAL REGISTER of proposed emission standards for hazardous air pollutants which are applicable to such source.

§ 61.02 Definitions.

As used in this part, all terms not defined in these subparts shall have the meaning given them in the Act:

(a) "Act" means the Clean Air Act (42 U.S.C. 1857 et seq., as amended by Public Law 91-604, 84 Stat. 1676).

(b) "Administrator" means the Administrator of the Environmental Protection Agency or his authorized representative.

(c) "Commenced" means that an owner or operator and a contractor to, or affiliate of, such owner or operator have entered into a binding agreement or contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.

(d) "Construction" means fabrication, erection, or installation of a stationary source.

(e) "Emission test" means measurement and analysis of emissions or other procedures used for the purpose of determining compliance with a standard for hazardous air pollutants.

(f) "Existing source" means any stationary source which is not a "new source".

(g) "Modification" means any physical change in, or change in the method of operation of, a stationary source which increases the amount of any hazardous air pollutant emitted by such source or which results in the emission of any hazardous air pollutant not previously emitted, except that routine maintenance, repair, and replacement shall not be considered physical changes.

(h) "New source" means any stationary source, the construction or modification of which is commenced after the publication in the FEDERAL REGISTER of proposed national emission standards for hazardous air pollutants which will be applicable to such facility.

(i) "Owner or operator" means any person who owns, leases, operates, controls, or supervises a stationary source.

(j) "Start up of operation" means the beginning of routine operation of a stationary source.

(k) "Stationary source" means any building, structure, facility, or installation which emits or may emit any hazardous air pollutant.

§ 61.03 Abbreviations.

The abbreviations used in this part have the following meanings:

- cfm—Cubic feet per minute.
- ft²—Square feet.
- ft³—Cubic feet.
- °F—Degree Fahrenheit.
- in.—Inch.
- l—Liter.
- mg—Milligram.
- ml—Milliliter.
- M—Molar.
- nm—Nanometer.
- v/v—Volume per volume.
- w.g.—Water gauge.
- W/V—Weight per volume.
- μg/m³—Micrograms per cubic meter.
- %—Percent.

§ 61.04 Address.

All applications, requests, submissions and inquiries under this part shall be addressed to the Environmental Protection Agency, Office of Air Programs, Division of Compliance, Research Triangle Park, N.C. 27711.

§ 61.05 Prohibited activities.

(a) After the effective date of any emission standard prescribed under this part, no person shall construct or modify any stationary source subject to such standards without first obtaining written approval of the Administrator in accordance with this subpart, except under an exemption granted by the President under section 112(c)(2) of the Act.

(b) Ninety days after the effective date of any emission standard prescribed by this part, no person shall operate any stationary source in violation of such standard except under a waiver granted by the Administrator in accordance with this subpart or under any exemption granted by the President under section 112(c)(2) of the Act.

§ 61.06 Determination of construction or modification.

Upon written application therefor by an owner or operator, the Administrator will make a determination of whether actions taken or intended to be taken by such owner or operator constitute construction or modification or the commencement thereof within the meaning of this part.

§ 61.07 Application for approval for construction or modification.

(a) The owner or operator of any stationary source to which a standard prescribed under this part will be or is applicable shall, not less than 60 days prior to the date on which construction or modification is planned to commence, submit to the Administrator an application for approval of such construction or modification.

(b) A separate application shall be submitted for each stationary source.

(c) Each application shall include the following:

(1) Name and address of the applicant.

(2) Location or proposed location of the source.

(3) Technical information describing the proposed nature, size, design, and method of operation of the source, including a description of any equipment to be used for measurement or control of emissions.

§ 61.08 Approval by Administrator.

(a) The Administrator will, within 60 days of receipt of application, notify the owner or operator of approval or disapproval of construction or modification.

(b) If the Administrator determines, based on information included in an application submitted under § 61.06 or other information that a stationary source for which an application pursuant to § 61.06 was submitted will, if properly operated not cause emissions in violation of an applicable standard, he will approve the construction or modification of such source.

(c) Prior to denying any request for approval of construction or modification pursuant to this section, the Administrator will notify the person making such request of the Administrator's intention to issue such, together with:

(1) Notice of the information and findings on which such intended denial is based, and

(2) Notice of opportunity for such person to present additional information or arguments, orally or in writing, to the Administrator prior to final action on such request.

(d) A final determination to deny any request for approval will be in writing and will set forth the specific grounds on which such denial is based.

(e) Neither the submission of an application for approval or the Administrator's granting of approval to construct or modify shall:

(1) Relieve an owner or operator of legal responsibility for compliance with any applicable provisions of this part or of any applicable State or local requirement, or

(2) Prevent the Administrator from implementing or enforcing this part or taking any other action under the Act.

§ 61.09 Source reporting.

(a) The owner or operator of any existing stationary source to which a standard prescribed in this part is applicable shall, within 30 days after the effective date of such standard, provide the Administrator the following information:

(1) Name and address of the owner or operator.

(2) Identification and location of the source.

(3) Brief description of the nature, size, design, and method of operation including description of any equipment used for the measurement or control of emissions.

(b) Changes in the information provided under paragraphs (a) (1) and (3) of this section shall be provided to the Administrator within 90 days of such change.

§ 61.10 Request for waiver of compliance.

(a) The owner or operator of an existing stationary source unable to operate in compliance with a standard or standards prescribed in this part may request a waiver of compliance with any applicable emission standard under this part for a period not exceeding 2 years.

(b) Any such request shall be in writing and shall include:

(1) The owner's or operator's name and address.

(2) Identification and location of the source.

(3) Technical information describing the nature, size, design, and method of operation of the source, including a description of any equipment used for measurement or control of emissions.

(4) Description of the controls necessary for compliance with the applicable standard and plans for installation of such controls.

(5) A time schedule for obtaining, producing, or installing such controls. The schedule should include interim measures to achieve compliance.

(6) Description of the emission control steps or other measures which will be taken by the owner during the waiver

period to assure that the health of persons will be protected from imminent endangerment.

(c) As used in this subpart, "imminent endangerment" means an immediate risk of significant harm to the human body.

§ 61.11 Waiver.

(a) Based on the information provided in any request under § 61.09 and any other information, the Administrator may grant a waiver of compliance with the applicable emission standard for a period not exceeding 2 years.

(b) Any such waiver shall be in writing and shall:

(1) Identify the source covered.

(2) Specify the termination date of the waiver.

(3) Impose such reasonable conditions as the Administrator determines to be necessary to assure installation of the necessary controls within the waiver period and to assure protection of the health of persons from imminent endangerment during the waiver period.

(c) Prior to finally denying any request for a waiver pursuant to this section, the Administrator will notify the person making such request of the Administrator's intention to issue such denial, together with:

(1) Notice of the information and findings on which such intended denial is based, and

(2) Notice of opportunity for such person to present additional information or arguments, orally or in writing, to the Administrator prior to final action on such request.

(d) A final determination to deny any request for a waiver will be in writing and will set forth the specific grounds on which such denial is based.

§ 61.12 Emission tests and monitoring.

(a) Emission tests and monitoring shall be conducted and results reported in accordance with the test methods and reporting requirements set forth in this part.

(b) At the request of the Administrator, the owner or operator of a source subject to this part shall provide, or cause to be provided, emission testing facilities as follows:

(1) Sampling ports adequate for test methods applicable to such source.

(2) Safe sampling platform(s).

(3) Safe access to sampling platform(s).

(4) Utilities for sampling and testing equipment.

§ 61.13 Availability of information.

(a) Emission data provided to, or otherwise obtained by, the Administrator in accordance with the provisions of this part shall be available to the public.

(b) Any records, reports, or information provided to, or otherwise obtained by, the Administrator in accordance with the provisions of this part shall be available to the public, except that upon a showing satisfactory to the Administrator by any person that such records, reports, or information, or particular part thereof (other than emission data), if made public, would divulge methods or processes

entitled to protection as trade secrets of such person, the Administrator shall consider such records, reports, or information, or particular part thereof, confidential in accordance with the purposes of section 1905 of title 18 of the United States Code, except that such records, reports, or information, or particular part thereof, may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out the provisions of the Act or when relevant in any proceeding under the Act.

§ 61.14 State authority.

The provisions of this part shall not be construed in any manner to preclude any State or political subdivision thereof from:

(a) Adopting and enforcing any emission standard or limitation applicable to a stationary source provided that such emission standard or limitation is not less stringent than the national emission standard for hazardous air pollutants applicable to such source.

(b) Requiring the owner or operator of a stationary source to obtain permits, licenses, or approvals prior to initiating construction, modification, or operation of such source.

Subpart B—National Emission Standards for Asbestos

§ 61.20 Applicability.

The provisions of this subpart are applicable to the following sources of atmospheric asbestos:

- Asbestos mines;
- Asbestos mills;
- Buildings, structures, or facilities within which manufacturing or fabricating operations involving the use of commercial asbestos are carried on;
- Buildings or structures which have been or will be constructed or modified using asbestos insulating products;
- Roadway facilities which would be surfaced or resurfaced using asbestos tailings.

§ 61.21 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given in the Act and in Subpart A of this part.

(a) "Asbestos" means any of six naturally occurring, hydrated mineral silicates: Actinolite, amosite, anthophyllite, chrysotile, crocidolite, and tremolite.

(b) "Commercial asbestos" means any variety of asbestos which is produced by the concentration of asbestos ore.

(c) "Asbestos mine" means any facility engaged in the extraction of asbestos ore from the earth for the purpose of recovering commercial asbestos.

(d) "Air flow permeability" means the volumetric rate of air flow in cfm, produced by a pressure decrease of 0.5 in. w.g. across a new, clean filtering fabric, divided by the area of the fabric in ft². The test air stream is maintained at nominal atmospheric pressure and temperature.

(e) "Dry drilling" means the process of drilling holes in the earth in the absence of an applied liquid stream, mist-containing stream or air stream.

(f) "Air-swept drilling" means the process of drilling holes in the earth in the presence of a forced or induced air stream, but not a liquid stream or mist-containing stream.

(g) "Wet drilling" means the process of drilling holes in the earth in the presence of a forced liquid stream or mist-containing stream.

(h) "Particulate matter" means any material, other than uncombined water, which exists in a finely divided form as a liquid or solid.

(i) "Asbestos tailings" means any solid waste product of asbestos mining or milling operations which contains asbestos.

(j) "Visible emission" means, for the purpose of this subpart, any emission which is visually detectable.

(k) "Asbestos mill" means any facility engaged in the conversion of asbestos ore into commercial asbestos.

(l) "Manufacturing operation" means the processing of commercial asbestos or the production of any product containing commercial asbestos.

(m) "Fabricating" means the cutting, shaping, assembly, mixing or other altering of any manufactured product containing commercial asbestos.

§ 61.22 Emission standards for asbestos.

(a) Emissions to the atmosphere from asbestos mines shall be limited as follows:

(1) Emissions of particulate matter from air-swept or dry drilling operations shall not exceed those which would be emitted from an air-swept or dry drill, respectively, equipped with a fabric filter device for collection of dust generated from drilling, as described in § 61.23(a).

(2) Emissions of particulate matter from wet drilling operations shall not exceed those which would be emitted from a wet drill equipped with a cyclone gas cleaning device for collection of dust or mist generated from drilling as described in § 61.23(b).

(3) Visible emissions of particulate matter from any mine road surfaced with asbestos tailings are prohibited.

(b) Emissions to the atmosphere from asbestos mills shall be limited as follows:

(1) Visible emissions of particulate matter from asbestos ore dumps, open storage areas for asbestos-containing materials, external conveyors for asbestos-containing materials, or asbestos-containing tailings dumps are prohibited.

(2) Emissions of particulate matter from asbestos ore dryers shall not exceed those which would be emitted from asbestos ore dryers equipped with fabric filter installations as described in § 61.23(c).

(3) Emissions of particulate matter from air streams used to process asbestos ores or for exhausting particulate matter resulting from milling operations shall not exceed the amounts which would be emitted if such air streams were treated in fabric filter installations as described in § 61.23(d).

(4) Emissions of particulate matter from any milling operation which continuously generates visible emissions shall not exceed the amounts which would be emitted if such air streams

were treated in fabric filter installations as described in § 61.23(d).

(c) Emissions to the atmosphere from buildings, structures, or facilities within which any fabricating or manufacturing operation is carried on shall be limited as follows:

(1) Emissions, in direct forced gas streams, of particulate matter resulting from manufacturing or fabricating operations shall not exceed the amounts which would be emitted if such forced exhausts were treated in fabric filter installations as described in § 61.23(d) or, where approved by the Administrator because of special process conditions, in wet collectors as described in § 61.23(f).

(2) Emissions of particulate matter from any manufacturing or fabricating operation which continuously generates visible emissions shall not exceed the amount which would be emitted if the air containing such emissions were treated in fabric filter installations as described in § 61.23(d) or, where approved by the Administrator because of special process conditions, in wet collectors as described in § 61.23(f).

(3) Visible emissions of particulate matter from any manufacturing or fabricating operations in an area directly open to the atmosphere are prohibited.

(d) Visible emissions to the atmosphere of asbestos particulate matter resulting from the repair or demolition of any building or structure, other than a single-family dwelling are prohibited.

(e) The spraying of asbestos is limited as follows:

(1) The spraying of any product which contains asbestos on any portion of a building or structure is prohibited.

(2) The spraying of any product which contains asbestos in an area directly open to the atmosphere is prohibited.

(3) Emissions of particulate matter from spraying of any product which contains asbestos, if such spraying is not specifically prohibited in subparagraphs (1) or (2) of this paragraph, shall not exceed the amounts which would be emitted if the air containing such emissions were treated in fabric filter installations as described in § 61.23(d) or, where approved by the Administrator because of special process conditions, in wet collectors as described in § 61.23(f).

(f) The surfacing or resurfacing of any roadway with asbestos tailings is prohibited.

§ 61.23 Referenced equipment specifications.

(a) Fabric filters referred to in § 61.22 (a) (1) are equipped with fabrics having airflow permeabilities not exceeding 40 cfm/ft².

(b) Cyclone collectors referred to in § 61.22(a) (2) are operated at not less than 7 in. w.g. pressure decrease as measured from the cyclone inlet to the outlet.

(c) Fabric filters referred to in § 61.22 (b) (2) are equipped with fabrics having airflow permeabilities not exceeding 30 cfm/ft².

(d) Fabric filters referred to in § 61.22 (b) (3) and (4), (c) (1) and (2), and (e) (3) are equipped with woven cotton fabrics having airflow permeabilities not

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exceeding 20 cfm/ft'. No bypass devices are utilized, and provisions are made for emptying the collection hoppers without creating visible emissions of particulate matter.

(e) Fabric filter devices do not meet the descriptions in paragraphs (a), (c), and (d) of this section if any of the following conditions exist:

(1) Leakage of gases, containing particulate matter, from the control system prior to filtration.

(2) Torn or ruptured bags.

(3) Improperly positioned bags.

(4) Badly worn or threadbare bags.

(f) Wet collectors referred to in § 61.22(c) (1) and (2) and (e) (3) are of the high-energy venturi type operated with a minimum gas pressure decrease across the venturi throat of 40 inches w.g.

(g) Wet collectors do not meet the description in paragraph (f) of this section if any of the following conditions exist:

(1) Leakage of gases containing particulate matter from the control system prior to filtration.

(2) Operation at less than 40 inches w.g. pressure decrease.

(3) Operation at a scrubbing medium flow rate less than specified by the manufacturer for optimum collection efficiency.

§ 61.24 Substitute devices for the attainment of equivalent emission control.

(a) Compliance with any applicable standard of this subpart which refers to a control equipment specification in § 61.23 shall be demonstrated in accordance with this section if the referenced control equipment is not used.

(b) The owner or operator of the emission source shall make available to the Administrator sufficient information as may be required to demonstrate that the substitute equipment will provide the degree of control which, in the judgment of the Administrator, is at least as stringent as that which would be achieved by using the equipment specified in the applicable standard. To the maximum extent practicable, the determination of equivalent degree of emission control will be based upon operation at the actual conditions at which the substitute device is or will be operated on the emission source. Factors which will be considered include, but are not limited to, collection efficiency, reliability, and maintenance practices associated with proper operation of the substitute device.

(c) The owner or operator of the emission source shall submit to the Administrator performance data including, but not limited to, total mass collection efficiency of the substitute control device under actual operating conditions or conditions which are representative of those of the existing or planned operating conditions.

(d) In cases for which it is not reasonable, in the judgment of the Administrator, to require an owner or operator to submit performance data which are based upon actual operating conditions or conditions which are representative of

these, the owner or operator shall make available to the Administrator performance data on comparative tests, using suitable standard test aerosols, on the substitute device and the device specified by the applicable standard. The performance data shall include, but not be limited to, the total mass efficiencies of the substitute device and the device specified by the applicable standard.

(e) The total mass efficiency of any substitute device for those specified by § 61.23 (a), (c), or (d) shall not be less than 99.9 percent.

(f) The total mass efficiency of any substitute device for that specified by § 61.23(b) shall not be less than 85 percent.

(g) The total mass efficiency of any substitute device for that specified by § 61.23(f) shall not be less than 99.5 percent.

Industrial Emission Standards For 3 Air Pollutants Proposed

By E. W. KENWORTHY

Special to The New York Times

WASHINGTON, Dec. 3 — Mr. Ruckelshaus, in a news conference today, said the delay had been caused, first, by the "complexity" of the problem, which was not resolved within the E.P.A. until Sept. 26, and, second, by the need thereafter to get the views of other agencies.

Asbestos fibers, which are used in floor tile, brake linings, asbestos paper, textiles, insulating materials and fireproofing, when inhaled over long periods, cause lung cancer.

Beryllium, a highly toxic heavy metal that can cause pneumonia among those occupationally exposed, is used in machine shops, propellant plants, extraction plants and foundries. However, the hazards of beryllium exposure are rigidly controlled by industrial health regulations in force for most operations in which the metal is used.

Chronic exposure to airborne mercury can have a profound effect on the central nervous system, the symptoms of which are tremor, psychological disturbance, insomnia, loss of weight and appetite. The standards announced today are directed mostly at mercury mines and chlor-alkali plants that make chlorine and alkali caustic.

Must Give Warning

Under amendments to the Clean Air Act signed by President Nixon on Dec. 31, 1970, the administrator of the environmental agency is required to publish within 90 days a list of air pollutants that, in his judgment, might increase either mortality, serious irreversible illness or incapacitating illness, and to update this list periodically.

Within 180 days of publishing the list, the administrator is required to publish proposed emissions standards for these pollutants. Within 90 days of publishing these, he must set a time and place for public hearings on them, and then within 180 days issue final standards.

Last March 31, Mr. Ruckelshaus issued an initial list of pollutants that included asbestos, beryllium and mercury. The proposed standards were to be published on Sept.

Control Practices

By way of illustrating the complexity, Mr. Ruckelshaus said there were no "standardized methods" for measuring emission levels of asbestos. Therefore, he said, it has been decided to set the standards "not in terms of numerical emission values" but in "control practices that will limit emissions to an acceptable level."

Consequently, the regulations that will be published in the Federal Register next Tuesday will require the use of filters to trap asbestos fibers in gases from mining, milling, manufacturing and fabrication of asbestos-containing materials.

Further, there will be an absolute prohibition on the spraying of asbestos fireproofing and insulation, except where such spraying is done indoors and the asbestos-laden air cleaned before its release into the surrounding atmosphere. Spraying in the open air has been an issue in many large cities, particularly in New York.

Most emissions of asbestos come from mining and milling, Mr. Ruckelshaus said. The estimated average cost of complying with the standards, he said, would be nine-tenths of 1 per cent of the 1969 selling price.

For beryllium, the emission standard for most plants will be an average of one-hundredth of a microgram per cubic meter of air over a 30-day period, or a short-term exposure of 25 micrograms per cubic meter for a maximum of 30 minutes.

For mercury, the standards are designed to insure that atmospheric concentrations do not exceed one microgram per cubic meter of air averaged over 30 days.

For mercury mines, the cost of meeting the standards will be 2.5 to 3.5 per cent of product worth, and for chlor-alkali plants .5 to .9 per cent of product worth.

F.R. 12-7-71

DEPT OF LABOR - ASBESTOS EXPOSURE

Title 41—PUBLIC CONTRACTS AND PROPERTY MANAGEMENT

Chapter 50—Public Contracts,
Department of Labor

PART 50-204—SAFETY AND HEALTH STANDARDS FOR FEDERAL SUPPLY CONTRACTS

Standard for Exposure to Asbestos Dust

Pursuant to section 4(b)(2) of the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1592, 29 U.S.C. 653), § 50-204.50 of Title 41, Code of Federal Regulations, is hereby amended in the manner indicated below in order to prescribe a new standard limiting the exposure of workers to asbestos dust. The new standard limiting the exposure of employees to asbestos dust is that adopted under section 6(c) of the Williams-Steiger Occupational Safety and Health Act of 1970 and published in the FEDERAL REGISTER on this date. The standard is hereby determined to be more effective than that presently provided under § 50-204.50 to the extent that it prescribes minimum levels of exposure to asbestos dust. Therefore, by operation of section 4(b)(2) of the Act the new standard issued under section 6(c) supersedes the construction safety standard relating to exposure to asbestos dust.

Section 50-204.50 is amended to read as follows in order to apply the new standard limiting the exposure of workers to asbestos dust:

§ 50-204.50 Gases, vapors, fumes, dusts, and mists.

(a) (1) Exposures by inhalation, ingestion, skin absorption, or contact to any material or substance (i) at a concentration above those specified in the "Threshold Limit Values of Airborne Contaminants for 1968" of the American Conference of Governmental Industrial Hygienists, except for the ANSI Standards listed in Table I of this section and except for the values of mineral dusts listed in Table II of this section, and (ii) concentrations above those specified in Tables I and II of this section, shall be avoided, or protective equipment shall be provided and used.

(2) The requirements of this section do not apply to exposures to airborne asbestos dust. Exposures of employees to airborne asbestos dust shall be subject to the requirements of 29 CFR 1910.93a.

(b) To achieve compliance with paragraph (a) of this section, feasible administrative or engineering controls must first be determined and implemented in all cases. In cases where protective equipment in addition to other measures is used as the method of protecting the employee, such protection must be approved for each specific application by a competent industrial hygienist or other technically qualified source.

TABLE II—MINERAL DUSTS

Substance	Mppcf	Mg/M ³
Silica:		
Crystalline:		
Quartz (respirable).....	250	10mg/M ³ =
	%SiO ₂ +5	%SiO ₂ +2
Quartz (total dust).....		30mg/M ³
		%SiO ₂ +2
Cristobalite: Use 1/2 the value calculated from the count or mass formulae for quartz.		
Tridymite: Use 1/2 the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth.....	20	80mg/M ³
		%SiO ₂
Silicates (less than 1% crystalline silica):		
Mica.....	20	
Soapstone.....	20	
Talc.....	20	
Portland cement.....	50	
Graphite (natural).....	15	
Coal dust (respirable fraction less than 5% SiO ₂).....		2.4mg/M ³ or 10mg/M ³
For more than 5% SiO ₂		%SiO ₂ +2
Inert or Nuisance Dust:		
Respirable fraction.....	15	5mg/M ³
Total dust.....	50	15mg/M ³

NOTE: Conversion factors—
mppcf×35.3=million particles per cubic meter
=particles per c.c.

* Millions of particles per cubic foot of air, based on impinger samples counted by light-field technique.

† The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

‡ As determined by the membrane filter method at 450 X phase contrast magnification.

§ Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	80
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 Mg/M³ in the table for coal dust is 4.8 Mg/M³.

Effective date. This amendment shall become effective upon publication in the FEDERAL REGISTER (12-7-71).

(Sec. 4(b)(2), 84 Stat. 1592, 29 U.S.C. 653; Secretary's Order No. 12-71, 36 F.R. 8754)

Signed at Washington, D.C., this 2d day of December 1971.

G. C. GUENTHER,
Assistant Secretary of Labor.

[FR Doc.71-17834 Filed 12-6-71; 8:47 am]

F.R. 12-7-71

DEPT OF LABOR

ASBESTOS- CONSTRUCTION

Title 29—LABOR:

Chapter XIII—Bureau of Labor
Standards, Department of Labor

PART 1518—SAFETY AND HEALTH
REGULATIONS FOR CONSTRUCTION

Standard for Exposure to Asbestos
Dust

Pursuant to section 4(b)(2) of the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1592, 29 U.S.C. 653), § 1518.55 of Title 29, Code of Federal Regulations, is hereby amended in the manner indicated below in order to prescribe a new standard limiting the exposure of workers to asbestos dust. The new standard limiting the exposure of employees to asbestos dust is that adopted under section 6(c) of the Williams-Steiger Occupational Safety and Health Act of 1970 and published in the FEDERAL REGISTER on this date. The standard is hereby determined to be more effective than that presently provided under § 1518.55 to the extent that it prescribes minimum levels of exposure to asbestos dust. Therefore, by operation of section 4(b)(3) of the Act the new standard issued under section 6(c) supersedes the construction safety standard relating to exposure to asbestos dust.

Section 1518.55 is hereby amended by adding a new paragraph (c) thereto. As amended § 1518.55 reads as follows:

§ 1518.55 Gases, vapors, fumes, dusts, and mists.

(c) Paragraphs (a) and (b) of this section do not apply to the exposure of employees to airborne asbestos dust. Whenever any employee is exposed to airborne asbestos dust, the requirements of § 1910.93a of this title shall apply.

Effective date. This amendment shall become effective upon publication in the FEDERAL REGISTER (12-7-71).

(Sec. 4(b)(2), 84 Stat. 1592, 29 U.S.C. 653; Secretary's Order No. 12-71, 36 F.R. 8754)

Signed at Washington, D.C., this 2d day of December 1971.

G. C. GUENTHER,
Assistant Secretary of Labor.

[FR Doc.71-17835 Filed 12-6-71;8:47 am]

Chapter XVII—Occupational Safety
and Health Administration, De-
partment of Labor

PART 1910—OCCUPATIONAL SAFETY
AND HEALTH STANDARDS

Emergency Standard for Exposure to
Asbestos Dust

Pursuant to section 6(c) of the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1596, 29 U.S.C. 655), Part 1910 of Title 29, Code of Federal Regulations (36 F.R. 10466, May 29, 1971) is hereby amended in the manner indicated below in order to provide an emergency standard dealing with the exposure of employees to asbestos dust.

In light of increasing information on the results of exposure of employees to airborne asbestos dust, including recent studies by the National Institute for Occupational Safety and Health and others, and recommendations by the American Conference of Governmental Industrial Hygienists (ACGIH), it is hereby determined that (1) exposure under the present standard for asbestos dust in Table G-3, § 1910.93, of 12 fibers per milliliter greater than 5 microns in length or 2 million particles per cubic foot of air, which is derived from an established Federal standard promulgated under the Walsh-Healey Public Contracts Act on May 20, 1969, constitutes a grave danger to employees exposed to this 8-hour time-weighted average concentration; and that (2) an emergency standard is necessary to protect employees from this excessive exposure. The National Institute for Occupational Safety and Health concurs that the proposed change in the asbestos dust standard recommended by the American Conference of Governmental Industrial Hygienists should be the substantial base for the emergency standard.

Action concerning the standard will be commenced under section 6(b) in the immediate future. Any notice of proposed rulemaking under section 6(b) will give notice of the emergency standard as a proposed rule and also of any appropriate subsidiary proposals which may be required under subparagraphs (5) and (7) of section 6(b) relating to the exposure of employees to toxic substances.

Part 1910 is amended as follows:

1. Table G-3 following § 1910.93 (36 F.R. 15104, Aug. 13, 1971) is hereby amended by deleting the following:

Asbestos—12 fibers per milliliter greater than 5 microns in length or	2 Mppcf.
Tremolite	5 Mppcf.
	20mg./M ³
	% SiO ₂

F.R. 12-7-71

DEPT OF LABOR - ASBESTOS CONSTRUCTION

As amended, Table G-3 reads as follows:

TABLE G-3—MINERAL DUSTS

Substance	Mppcf*	Mg/M ³
Silica:		
Crystalline:		
Quartz (respirable).....	250 ¹	10mg/M ³ =
	%SiO ₂ +5	%SiO ₂ +2
Quartz (total dust).....		30mg/M ³
		%SiO ₂ +2
Cristobalite: Use $\frac{1}{4}$ the value calculated from the count or mass formulae for quartz.		
Tridymite: Use $\frac{1}{4}$ the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth.....	20	80mg/M ³
		%SiO ₂
Silicates (less than 1% crystalline silica):		
Mica.....	20	
Soapstone.....	20	
Talc.....	20	
Portland cement.....	50	
Graphite (natural).....	15	
Coal dust (respirable fraction less than 6% SiO ₂).....		2.4mg/M ³
For more than 6% SiO ₂		10mg/M ³
		%SiO ₂ +2
Inert or Nuisance Dust:		
Respirable fraction.....	15	5mg/M ³
Total dust.....	50	15mg/M ³

NOTE: Conversion factors—
mppcf $\times$ 35.3 = million particles per cubic meter
= particles per c.c.

* Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.
† The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.
‡ As determined by the membrane filter method at 450 $\times$ phase contrast magnification.
§ Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 Mg/M³ in the table for coal dust is 4.5 Mg/M³.

2. A new § 1910.93a is added to Part 1910. The new § 1910.93a reads as follows:

§ 1910.93a Asbestos dust.

(a) The 8-hour time-weighted average airborne concentration of asbestos dust to which employees are exposed shall not exceed 5 fibers per milliliter greater than 5 microns in length, as determined by the membrane filter method at 400-450 $\times$ magnification (4 millimeter objective) phase contrast illumination. Concentrations above 5 fibers per milliliter but, not to exceed 10 fibers per milliliter, may be permitted up to a total of 15 minutes in an hour for up to 5 hours in an 8-hour day.

(b) Engineering methods, such as but not limited to, enclosure, vacuum sweeping, and local exhaust ventilation, shall

be used to meet the exposure limits prescribed in paragraph (a) of this section. Where such engineering methods are not feasible, or do not otherwise reduce the concentrations below those prescribed in paragraph (a) of this section, respiratory protective devices shall be provided and used in accordance with paragraph (c) of this section.

(c) (1) (i) When the limits of exposure to asbestos dust prescribed in paragraph (a) of this section are exceeded and when engineering controls required by paragraph (b) of this section are not feasible or do not otherwise reduce the concentration of asbestos dust below those prescribed in paragraph (a) of this section, the employer shall require the use of respiratory protective devices. The selection of respiratory protective devices shall be limited to those specified in the remaining subparagraphs of this paragraph (c).

(ii) The employer shall require that each employee test his respiratory protective device before each use in order to insure a proper fit according to the manufacturer's instructions. The employer shall further provide for effective training or supervision of employees in the testing of respiratory protective devices for fit before their use.

(2) For an atmosphere containing not more than 25 fibers per milliliter greater than 5 microns in length over an 8-hour average, or more than 50 fibers per milliliter over any period of 15 minutes, a reusable or single-use filter type respirator, operating with negative pressure during the inhalation phase of breathing, approved by the U.S. Bureau of Mines under the provisions of 30 CFR Part 14 (Bureau of Mines Schedule 21B), or a valveless respirator providing equivalent protection, shall be used.

(3) For an atmosphere containing not more than 250 fibers per milliliter greater than 5 microns in length over an 8-hour average, or more than 500 fibers per milliliter over any period of 15 minutes, a powered filter positive pressure respirator approved by the U.S. Bureau of Mines under the provisions of 30 CFR Part 14 (Bureau of Mines Schedule 21B) shall be used.

(4) For an atmosphere containing more than 250 fibers per milliliter greater than 5 microns in length over an 8-hour average a type C positive pressure supplied-air respirator approved by the U.S. Bureau of Mines under the provisions of 30 CFR Part 12 (Bureau of Mines Schedule 19B) shall be used.

(5) The employer shall establish a respirator program in accordance with the requirements of American National Standard Practice for Respiratory Protection Z88.2—1969.

(6) The respirators provided each employee shall be properly inspected, cleaned, repaired and stored.

(d) (1) When an employer has employees who are exposed to asbestos dust exceeding the limits prescribed in paragraph (a) of this section and the exposure results from the operations described in the remaining subparagraphs of this paragraph (d), the employer shall

comply with the requirements of these subparagraphs relating to the operations involved. The requirements of this paragraph are in addition to those prescribed in paragraph (b) of this section.

(2) All hand- or power-operated tools which produce asbestos dust such as, but not limited to, saws, scorers, abrasive wheels, and drills shall be provided with local exhaust ventilation and dust collectors in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems; ANSI Z9.2—1971.

(3) Employees exposed to the spraying of asbestos or the demolition of pipes, structures, or equipment covered or insulated with asbestos shall be provided with respiratory protective devices in accordance with paragraph (c) (4) of this section.

(e) Asbestos cement, mortar, coatings, grout, and plaster shall be mixed in closed bags or other containers.

(f) Asbestos waste and scrap shall be collected and disposed of in sealed bags or other containers.

(g) All cleanup of asbestos dust and blowing shall be performed by vacuum cleaners. No dry sweeping shall be performed.

3. Section 1910.12 is amended by changing paragraph (a) in order to apply the emergency standard prescribed in the new § 1910.93a, which is published in this document, to construction work which is subject to the Act. The amendment is necessary in light of the rule of regulatory construction set forth in § 1910.5(c). As amended, § 1910.12 reads as follows:

§ 1910.12 Construction work.

(a) (1) *Adoption and extension of established safety and health standards for construction.* The standards prescribed by Part 1518 of this title and in effect on April 28, 1971, are adopted as occupational safety or health standards under section 6(a) of the Act and shall apply, according to the provisions thereof, to every employment and place of employment of every employee engaged in construction work. Each employer shall protect the employment and places of employment of each of his employees engaged in construction work by complying with the appropriate standards prescribed by this paragraph.

(2) The standards prescribed in § 1518.55(c) of this title shall apply in the case of the exposure of any employee in construction work to airborne asbestos dust.

Effective date. These amendments shall become effective immediately upon publication in the FEDERAL REGISTER (12-7-71).

(Sec. 6(c), 84 Stat. 1596, 29 U.S.C. 655; Secretary's Order No. 12-71, 36 F.R. 8754)

Signed at Washington, D.C., this 2d day of December 1971.

G. C. GUENTHER,
Assistant Secretary of Labor.

[FR Doc. 71-17833 Filed 12-6-71; 8:47 am]

Friction Materials Standards Institute, Inc.

370 LEXINGTON AVENUE
NEW YORK 17, N. Y.

September 30, 1971

To: Members of Asbestos Study Committee

Subject: Proposed Emission Standard for Asbestos

Gentlemen:

In line with the discussions at the September 15, 1971 meeting of this Committee, Dr. Stefl, Chairman, is forwarding the below listed write-ups to the members of this Committee. We do not intend to distribute this data to the membership at large until the Committee has had the opportunity to review both the Federal Proposal and the draft of the AIA Comments and Suggestions.

(1) Proposed Environmental Protection Agency
Standards for Asbestos Emission.

Comment: Dr. Stefl felt it worthwhile that the Committee see this draft copy, but he is certain that the Federal Standards will be quite different.

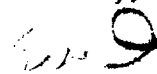
(2) Comments and Suggestions from Asbestos Information Association/North America.

Comment: These are the AIA Comments and Suggestions made regarding the initial draft of the proposed Federal Standards at a meeting held in Atlanta in mid-August.

Dr. Stefl further advised, and this is to be considered confidential, that he and others from the AIA met with members of the Illinois Pollution Control Board on September 17, 1971. At this meeting he was advised that hearings would be held at three locations on different dates in October, and that AIA/NA would give written comments at the October 15 meeting in Chicago. Personnel on the Control Board had received comments from the motor companies on the brake lining ban. They were not aware of the E.P.A. tests on asbestos emission from brake lining that are being run by Bendix Research Laboratories.

Copies of the minutes are enclosed.

Sincerely,



Executive Secretary

EWDrislane/icb

Messrs.: E. P. Stefl
J. C. Henning
E. H. Feierabend
W. B. Reitze
E. Spurgeon
J. B. Graham, Jr.
J. W. Greenen, ex-officio
L. D. Stickles, Counsel

Raybestos-Manhattan, Inc.
Firestone Tire & Rubber Company
Abex Corporation
Johns-Manville Corporation
The Bendix Corporation
Carlisle Corporation
Maremont Corporation
Stickles, Hayden, Kennedy,
Hort & Van Steenburgh

c-19

Asbestos Abatement Comm

November 29, 1971

EWD

Mr. Samuel T. Lawton
State of Illinois Pollution Control Board
189 West Madison Street
Suite 900
Chicago, Illinois 60602

Dear Mr. Lawton:

I realize that by this time the Illinois Pollution Control Board may have already acted on the proposed asbestos regulations. As most of the domestic brake lining and clutch facing manufacturers are members of this Institute, we are particularly concerned with Part VII, Paragraph 702, of your Proposed Regulations on Asbestos:

The use of asbestos in the brake lining of vehicles manufactured after January 1, 1975 and sold for use in Illinois is prohibited.

We were able to alert our domestic members as to the seriousness of these proposed regulations. We are aware that some of them expressed their views directly to you.

In today's mail I received the attached from the British Friction Materials Council, an organization similar to ours in Britain. I think it is a well written, carefully worded and, I believe, well documented presentation.

Having worked in the brake lining industry for over seventeen years with asbestos linings and metallics, I believe their Item #2 is most pertinent. If one measures the amount of free asbestos fiber in brake lining dust, they say it is about 1% of the total products of wear. Were you to go to a brake relining shop and collect the wear remnants, you would not detect fibrous material in the wear products. The dust appears more to be like a talcum powder or flour with no fibrous structure evident.

We trust that this work by the British Council be considered when you are drafting your final regulations.

Sincerely,

EWD/icb
Enc:

E. W. Drislane
Executive Secretary

C-20

FMSI 02884

BULLETIN

N O. 4 1 7

November 10, 1971

MEASUREMENT OF ASBESTOS FIBERS IN THE AIR

Since the organization of the Asbestos Study Committee it has been suggested that all members be advised on monitoring asbestos fiber concentrations in the work place. This should be of interest since the Occupational Safety and Health Act of 1970 was effective on April 28, 1971. Mr. William Reitze of Johns-Manville addressed the June meeting on this Act and subsequently we distributed literature concerning the Act and Threshold Limit Values.

Mr. Reitze advised that there was a guide published by the Asbestos Textile Institute:

"Measurement of Airborne Asbestos Fiber by the Membrane Filter Method."

Source: Asbestos Textile Institute
P.O. Box 239
Pompton Lakes, N. J. 07442
Price: \$1.00

Mr. Reitze cautioned, however, that this document might be misleading if personnel doing the work do not have the proper background or training.

For this reason, Mr. Reitze would be willing to give a talk and demonstration, including a discussion of materials, methods, costs, personnel requirements, and legal aspects. This would not be a training course but would be an information session where those responsible for making decisions could be given enough information to decide which course their firm should follow. There would, of course, be no charge for this presentation.

If there are members of your firm who would be interested in such a session please advise. It generally would be planned to have the session, if interest is sufficient, sometime after mid-January in the New York metropolitan area. As Mr. Reitze now must travel in from Denver, it would be important for those interested to indicate rather positively their intentions as regards attending such a session.

E. W. Drislane
Executive Secretary

C-21

Distribution: Active Members
Asbestos Study Committee

*Members: Rep. ...
to Illinois P.C.B.*

BULLETIN

N O. 416

October 28, 1971

PROPOSED ILLINOIS BAN ON ASBESTOS IN BRAKE LINING

There has been considerable activity by members of the Asbestos Study Committee as regards the proposed Illinois regulations on "Asbestos and Spray Insulation". To quote from Part VII, Section 702 of the regulations proposed by the Illinois Pollution Control Board:

"The use of asbestos in the brake lining of vehicles manufactured after January 1, 1975, and sold for use in Illinois is prohibited."

In the Board's explanation it notes that the prohibition is worded to avoid the necessity of fitting vehicles manufactured prior to 1975 with "non-asbestos" brakes. However, there is no question but that the ban includes original equipment linings, and there can be little doubt but that replacement linings on these vehicles must also be of a "non-asbestos" type. Further, interpretation of the proposed regulations indicates that all vehicles are included: Passenger Cars, Trucks, Off Highway Equipment, Farm Tractors and the like. Also, the Board apparently considers "clutch facings to be the same as brake linings". While the immediate effect would be on those supplying original equipment linings, the secondary effect would be felt by all friction material manufacturers.

In the Board's explanation they state: "These prohibitions have been made with full consideration given to the available alternative materials."

From the Illinois hearings this past month, the Institute has received several articles of interest:

- (1) Johns-Manville memorandum, October 20, 1971, by Mr. Swetonic summarizing the Chicago hearings on October 15, 1971.
- (2) Written presentation by Dr. F. Pundsack of Johns-Manville as given at the Chicago hearings.
- (3) Dr. W. J. Nicholson, Mt. Sinai Hospital, a presentation in support of the Board's regulations, at the Chicago hearings.
- (4) Chicago Sun-Times October 18, 1971 report on the Chicago hearings.
- (5) Waukegan newspaper report of October 20, 1971 concerning the hearings in Waukegan.
- (6) Johns-Manville memorandum, October 20, 1971, by W. Raines summarizing the Waukegan hearings on October 19, 1971.

Attached to the delegates copies only of this Bulletin are excerpts:

- (1) Entire J-M summary of the Chicago Hearings.

- Continued -

*C-22
(14)*

October 28, 1971

(2) Entire J-M summary of the Waukegan Hearings.

(3) Pages 20, 21 of Dr. Pundsack's presentation at the Chicago Hearings.

All those who have appeared at the hearings feel it is most urgent that the brake lining manufacturers advise the Control Board of their position on this proposed ban. It has been learned that the Control Board was surprised over the lack of response to the brake lining ban from friction material manufacturers.

Realizing the unreasonable deadline you must work against, comments should be in the hands of the Pollution Control Board by November 10, 1971. Please write:

Mr. Samuel T. Lawton
State of Illinois Pollution Control Board
189 West Madison Street
Suite 900
Chicago, Illinois 60602

The comments must be your own. We suggest that the primary force of these comments might be the lack of availability of known substitutes at this time. A secondary point might be that the Federal EPA (Environmental Protection Agency) is currently having studies made concerning the extent of emissions in the general environment from brake linings, and these results will not be known till mid 1972. Unless you have specific medical background, we suggest you not question the proposed safety standards on asbestos concentrations. Further, as is the case with most government bureaus, any pleading on cost or economics should be avoided. Please note that the portion of the proposed regulations that we are concerned with at this time is the general environment from brake lining emissions on vehicles in use. While the in-plant environment is also covered in the proposed regulations, we are advising our members primarily on the proposed ban on brake lining on vehicles.

Should you write Mr. Lawton, it would be appreciated if you would send a copy to the Institute. If there are any questions, please give me a call.

E. W. Drislane
Executive Secretary

Distribution: Active

cc: Mr. C. J. Weber
Mr. G. R. Miller
Mr. G. L. Wilson - Plt. I, Akron
✓ Mr. E. W. Drislane - FMSI

Asbestos Study Group

Encl

November 4, 1971

Mr. Samuel T. Lawton
State of Illinois Pollution Control Board
189 West Madison Street
Suite 900
Chicago, Illinois 60602

Dear Mr. Lawton:

As a manufacturer of brake lining, it came as a complete shock to World Bestex Company, Division of The Firestone Tire & Rubber Company, to learn of the proposed 1975 restriction of the use of asbestos in the brake lining of vehicles sold for use in Illinois.

For such a widely affecting regulation to have been proposed must have been based on a substantial amount of damning evidence of an unequivocal nature. We would like to be supplied a list of references or still better copies of all scientific data upon which the proposed regulation was based or used as support so that we can make our own analysis of said data and begin our alternative research program immediately.

If these studies for which the regulations were based upon are indeed scientifically reliable, then a three year waiting period is in question. Can you explain how the three year figure was arrived at and the thinking and reasoning for such a delay and grace period?

FMSI 02888

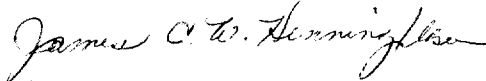
We would also like to have made available that information regarding suitable available alternative materials and the test data clearing these materials. Further, we would like to see the available data which supports the alternative materials in brake lining tests such as Department of Transportation vehicle tests and pertinent indoor Dynamometer tests.

We should like to say that references which we have seen and are aware of do not suggest that brake lining emissions constitute any known health hazard. Therefore, we feel that the proposed regulation will not accomplish in fact its intent (that is, to reduce asbestos levels in ambient air) through such an enactment.

In conclusion our observation at the present time is that the proposed regulation may be based on unsupported and insufficiently comprehensive data to warrant such extensive action by the State of Illinois.

Very truly yours,

WORLD BESTOS COMPANY



James C. W. Henning
Manager, Technical-Research

JCMH:lka
Attachment

MAREMONT

C O R P O R A T I O N

168 NORTH MICHIGAN AVENUE • CHICAGO, ILLINOIS 60601 • TELEPHONE (312) 263-7676

November 5, 1971

Mr. Samuel T. Lawton
State of Illinois Pollution Control Board
189 West Madison Street
Suite 900
Chicago, Illinois 60602

Dear Mr. Lawton:

I am writing you to register concern on the part of Maremont Corporation relative to the proposed Illinois ban on asbestos in brake lining, effective after January 1, 1975.

Maremont currently produces, under the brand name "Grizzly", both passenger car and heavy duty vehicle brake lining for the aftermarket and has been a part of the Friction Material industry for over twenty years.

We are most concerned with this proposed legislation since it is our combined technical opinion that there is not, at the present time, nor will there be in the foreseeable future, a suitable alternative to asbestos in friction material that will yield the performance characteristics required in today's braking systems. Further, proposed federal improvements in braking systems to be effective after 1975 will require those manufacturers now participating in the industry to devote their time and energies to sophisticated improvements within an asbestos based product, making the research for an asbestos substitute a goal beyond the available technical abilities of most manufacturers, should that substitute really exist.

Mr. Lawton, I would appreciate your continued review of the matter and hope that Maremont's concern will be given appropriate consideration.

Sincerely,



Andre A. Laus
Vice President and General Manager
Brake Systems Division

AAL/gjk
bcc: R.B. Black/J.W. Greenen
F.C. Skelton/E. Drislane

FMSI 02890



Asbestos Study Comm

AUTO FRICTION CORP.
MANUFACTURERS OF BRAKE LINING

November 3, 1971

Mr. Samuel T. Lawton
State of Illinois
Pollution Control Board
185 West Madison Street
Suite 900
Chicago, Illinois 60602

Dear Mr. Lawton:

It has come to my attention that the State of Illinois is considering regulations or legislation which would prohibit the use of asbestos in the manufacture of brake lining for use in your State.

I also understand, that there was a certain amount of disappointment expressed by members of your Board that there was a lack of response from the friction material manufacturers.

The reason that we have not responded before this, is that until I read a recent article in Chemical Week Magazine, I was not aware that regulations or legislation was being promulgated.

I may state quite succinctly two basic objections to this proposed regulation or legislation on the part of our Company:

1. There is a complete lack of availability of a known substitute at this time for asbestos in the manufacture of the broadest range of friction material products for safe and accepted use in automotive vehicles.
2. The Environmental Protection Agency of the U.S. Government has presently commissioned studies to be made concerning the extent of emission in the general environment from brake lining. The results of this study will not be reported until mid 1972.

I appreciate this opportunity to inform you of our comments, and remain,

Sincerely,
AUTO FRICTION CORPORATION

Norman Comins
Vice President

bcc: Mr. E. W. Drislane
FMSI, New York



NC/ah
651 ANDOVER ST., LAWRENCE INDUSTRIAL PARK, LAWRENCE, MASS. 01842. TEL. 617/686-3326. CABLE: AUTO FRICTN LAWRENCE

FMSI 02891

CRASSBESTOS

(201) ARMORY 8-6655

MANUFACTURING

45 EAST 5TH STREET

PATERSON, NEW JERSEY 07524

CORPORATION

— QUALITY FRICTION MATERIALS SINCE 1919 —

Nov. 8, 1971

State of Illinois Pollution Control Board
189 West Madison Street
Suite 900
Chicago, Illinois 60602

Att: Mr. Samuel T. Lawton

Gentlemen:

As a brake lining manufacturer whose product contains asbestos we are much concerned over the Illinois Proposed Ban on Asbestos in Brake Lining, particulated by Part VII, Section 702 from the regulations proposed by the Illinois Pollution Control Board.

Our company, and our industry as an entity, is definitely not interested in producing products which will have harmful emission effects in the atmosphere. But we do believe the above cited section of the proposed law does not have evidence to back up its severity---evidence that proves a harmful emission-factor as a result of/or because of the asbestos content in friction materials.

On the basis of reports of testing emissions we believe that although it is within the power of the State of Illinois Pollution Control Board to have asbestos banned from brake linings, we feel that to do so would eliminate an effective and useful brake lining component without justification.

We are certain that many of the emission tests have been forwarded to the Board, and that the Board is aware of the tests of emissions now being made by the Federal Environmental Protection Agency. We believe that this data will be most helpful in determining the effects of asbestos-emissions from use in brake lining, and will establish whether these emissions are of any danger or if they are negligible.

FMSI 02892

BRASSBESTOS

(201) ARMORY 8-6655

MANUFACTURING

CORPORATION

45 EAST 5TH STREET
PATERSON, NEW JERSEY 07524

QUALITY FRICTION MATERIALS SINCE 1919

If the emissions prove to be a harmful pollutant our company will certainly support your Board in eliminating this hazard. But until reliable evidence supports this possibility we are reluctant to accept any unsupported position.

Our company has been producing brake linings since 1919. (The basic company was formed in 1917.) During this span of over 53-years we have produced hundreds of millions of feet of asbestos brake linings. In our process, we deal closely with raw asbestos fiber. Of course, we use protective measures in handling these materials---as well as other fine powders. We have never had, in our history, a case of asbestosis or any other asbestos-induced illness among any of our personnel.

We believe this record is not uncommon among brake lining manufacturers. We are aware of the fact that in other industries who use asbestos there are systems which do not control or contain the material. However, our chief concern is with the brake lining industry, and the effects in the atmosphere of the use of asbestos in brake linings. We believe that the asbestos is locked-into the brake lining material, and that during its normal usage the heat of the friction converts any residue into an inert non-fibrous material which will not be hazardous in nature.

We look to your Board for a full analysis of this matter, and a just decision based upon proved and repeatable data of a factual, non-emotional, nature.

Very truly yours,
BRASSBESTOS MFG. CORPORATION

WILLIAM SIMON
President

S:g

FMSI 02893



Mr. Drustane

Abex Corporation

Research Center

MAHWAH, NEW JERSEY 07430

TEL: 201-529-3450

November 8, 1971

Mr. Samuel T. Lawton
State of Illinois Pollution Control
189 West Madison Street
Suite 900
Chicago, Illinois 60602

Dear Mr. Lawton:

In conjunction with hearings recently held regarding Regulation No. R71-16 "Asbestos and Spray Insulation" proposed by the Illinois Pollution Control Board, we believe it would be helpful to you to have our comments as a major manufacturer of friction material.

The Abex Corporation, through its American Brakeblok Division is one of the major suppliers of friction material for brake and clutch use in the United States. During 1971, our sales of asbestos containing friction material for use in vehicles operating in the United States will be in excess of 20 million dollars.

Our interest is specific to Part VII, Section 702 of the proposed regulations which states "The use of asbestos in the brake lining of vehicles manufactured after January 1, 1975, and sold for use in Illinois is prohibited". Our comments are as follows:

1. Asbestos fiber is an important component of organic friction material used in brake and clutch facings for vehicles manufactured and used in the United States. Of known fibrous material, asbestos imparts unique strength and thermal properties to friction lining, in addition to providing unique performance characteristics essential to safe and reliable braking and clutching of vehicles.
2. We are aware of investigations conducted on the nature of wear products from linings in use, as well as the identification of airborne particles from operating brakes. Air sample analysis conducted by our Medical Department to collect wear product particles during brake operation on our laboratory dynamometers confirms the findings of J. R. Lynch as reported in his study "Brake Lining Decomposition Products" published in the Journal of the Air Pollution Control Association, Vol. 18, No. 12, December, 1968.
3. Abex Corporation, in conjunction with Arthur D. Little, Inc., submitted a technical proposal to the Environmental Protection Agency in response to that agency's request for proposal No. EHSD 71-NEG 102 "Characterization of Emission from Automobile Brake and Clutch Linings". In this way we are well aware of the investigation work now being carried out by the Bendix

(Continued)

FMSI 02894



Mr. Samuel T. Lawton

-2-

November 8, 1971

Corporation under contract to the Environmental Protection Agency. We understand that results from this contract research will not be known until the middle of 1972 at the earliest. It is our opinion that the results of this study will verify again that airborne particulate matter from vehicle brakes and clutches does not constitute a dangerous health factor in Urban air pollution.

We believe that the proposed ban on manufacture and use of asbestos containing friction material is unwarranted and unnecessary. We recommend that Part VII, Section 702 be removed and not made part of regulations proposed by the Illinois Pollution Control Board.

Very truly yours,

A handwritten signature in cursive script, reading "G. R. Graham".

G. R. Graham
Director
Friction Materials
Research

GRG:rmp

BC: Messrs.: N. G. Belury
G. L. Romine
F. B. Herlihy
E. H. Feierabend
E. W. Drislane, FMSI, Inc.
W. P. Raines, AIA/North America

FMSI 02895

Asbestos Standards

BRITISH FRICTION MATERIALS COUNCIL

SECRETARIES:
BAKER, ROOKE & CO.
CHARTERED ACCOUNTANTS
TELEPHONE: 01-242 0211

99, ALDWYCH,

LONDON, WC2B 4JY

362/m/BFMC

26th November, 1971.

The Secretary,
Friction Materials Standards Institute, Inc.,
370 Lexington Avenue,
New York, N.Y. 10017,
U.S.A.

Dear Sir,

We have been asked by our members in the British friction materials industry in the U.K. to put their views to you on the proposed Illinois State Regulations concerning asbestos and asbestos products. We enclose herewith their comments on the friction material aspect of these draft Regulations.

We have no doubt that the American lining manufacturers will be making strong representations to the Illinois authorities for amendments to the proposals and perhaps you could let us know their comments. We shall also be grateful if you could make our views known as set out in this enclosure.

Yours faithfully,



Secretaries

Enc.

PROPOSED ILLINOIS STATE
BAN ON ASBESTOS-BASED BRAKE LININGS

The British friction materials industry views with deep concern the proposed ban on the use of asbestos in brake linings by the State of Illinois.

It is not aware of any medical evidence that could possibly justify such legislation. On the contrary it would have the effect of withdrawing from the market products that were used to promote road safety, without producing any significant improvement in the levels of urban atmospheric pollution. It would expect any of the known alternatives to asbestos to produce general particulate pollution of a measurable amount.

1. Whatever materials are used for brake linings the current state of the art is such that the action of braking will generate products of wear. The asbestos content of conventional brake linings is almost entirely converted by the action of braking into forsterite or other amorphous, inert materials which are no longer asbestos. On the other hand, if non-asbestos alternatives are used (e.g. iron powder, sintered metal, ceramics, steel wool etc.,) the resulting wear products will be released unchanged.
2. Measurements have been made of the amount of free asbestos fibre left in brake lining dust. It is an insignificant proportion of what is in any case a minute amount of total dust.

The amount of free asbestos fibre that has been found in brake lining dust from vehicles, is about 1% of the total products of wear. (1). Indeed estimates vary down to 10^{-9} g/g, i.e. for each gramme of wear products only 10^{-9} grammes of free asbestos may remain.

3. We assume that the risk of contracting mesothelioma is the principal cause of environmental concern - there is clearly no possibility whatever as a result of vehicle braking, of a community risk of asbestosis or lung cancer, which are solely occupational risks. For technical reasons only chrysotile asbestos is used in the manufacture of brake linings and disc brake pads. This is not the type of asbestos with which mesothelioma has been mainly associated.
4. Measurements of chrysotile asbestos in the ambient air in an industrial centre in the United Kingdom have shown that the level must be less than 10^{-7} g/m³ because of the limitations of the method used. This means that they must be a thousand times lower than the British Government acceptable level for occupational exposure. Current investigations using a more sensitive method indicate levels of 10^{-9} to 10^{-10} g/m³, i.e. 2 or 3 orders lower still. (2).

Brake lining wear cannot therefore be a serious source of atmospheric pollution.

5. In one of the largest brake testing laboratories in the world, housing many dynamometers engaged 24 hours a day in wearing away friction materials, the average monthly asbestos count is 0.2 fibres /cc, a tenth of the British Government's occupational standard.

Footnotes

1. Hickish D.E. and Knight K.L. (1970) Annals of Occupational Hygiene Vol.13, No.1, page 20.
2. Letter to Nature attached.

British Friction Materials Council
26th November, 1971.

Chrysotile Asbestos in Urban Air

THE industrial use of chrysotile asbestos is increasing and the question of whether its concentration in urban air constitutes a hazard has been raised. But measurements of asbestos in air near asbestos factories have proved negative with present analytical methods, so under the sponsorship of the Asbestosis Research Council we are developing a more sensitive technique. This article is a preliminary account of the estimation of chrysotile near a large asbestos textile factory at Rochdale, Lancashire. There are several uncertainties in the technique, so we were expecting to obtain only an order of magnitude estimate. Nevertheless this would have been an important figure to have because of the lack of data on the amount of asbestos in air. As it happened, we were only able to determine an upper limit for the chrysotile concentration which turned out to be three orders of magnitude lower than the threshold value for occupational exposure set by asbestos regulations. Obviously even more sensitive techniques are required and are now being developed.

We used an X-ray diffraction technique based on the measurement of the integrated area under the (002) peak of chrysotile. The equipment, which consisted of a Phillips 1010 generator, a vertical goniometer with a step scanning attachment, and a proportional counter with pulse height discrimination, could be reliably calibrated down to $10 \mu\text{g}$ of chrysotile compared with the 1 to 10 mg range reported by Crable¹, and was cross-checked by estimating the magnesium content of the calibration samples by atomic absorption spectroscopy. Sampling involved the collection of airborne solids from $1,000 \text{ m}^3$ (10^6 l.) of air by an electrostatic device (H. Litton Systems Inc.) in which up to $10,000 \text{ l. min}^{-1}$ are drawn through a 20 kV corona discharge. Particles in the air are electrostatically precipitated onto a plate and concentrated into $\sim 100 \text{ ml.}$ of liquid.

The collection efficiency depends on the size distribution of the particles and the sampling rate, but the size distribution of chrysotile in the atmosphere is not known. Therefore we estimated the collection efficiency indirectly by running the sampler in part of the asbestos factory where a low concentration of asbestos is known to occur (Fig. 1) and we found the collection efficiency to be almost 100% when the air is sampled at about $2,000 \text{ l. min}^{-1}$, dropping to between 25 and 50% at the rate of $10,000 \text{ l. min}^{-1}$, depending on the actual size distribution present. As we were aiming at only an order of magni-

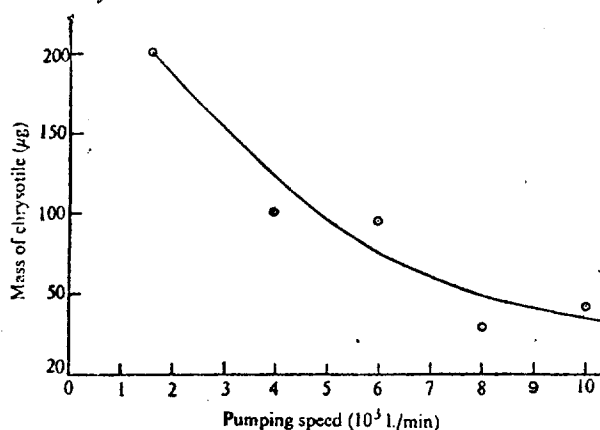


Fig. 1 Observed amounts of chrysotile in 5,000 l. of factory air, sampled at different rates.

tude assessment of asbestos in urban air, we were prepared to accept this uncertainty in the collection efficiency.

The map (Fig. 2) and Table 1 show the location of the sampling sites and the conditions in which the samples were obtained. The factory is in a hollow, and sampling site No. 2 is at the same height as the roof of the filter gallery, which is the chief air outlet from the factory. Sampling site No. 1 is about 30 foot higher than site No. 2. Sites 3 and 4 were in the gardens of houses, site 3 being about 5 km upwind of the factory and site 4 being about 300 m downwind.

All the diffraction traces (for example, Fig. 3) contained strong lines of kaolinite and quartz, probably from the local soil, which made the assessment of chrysotile difficult because the broad (001) line of kaolinite (7.18 Å) is close to the major (002) line of chrysotile (7.36 Å). Fortunately chrysotile is easily decomposed by boiling in 1 N hydrochloric acid whereas kaolinite is unaffected, so it should be possible to measure the amount of chrysotile present by subjecting the samples to acid leaching and measuring the corresponding reduction of the intensity of the composite X-ray band. The fact that this process led to no reductions in band intensity for any of the samples indicated that the amount of chrysotile present was below our detection limit.

We ought to have been able to detect 10 µg of chrysotile by itself, but clearly the presence of kaolinite may have reduced

Table 1 Weather Conditions during Sampling

Date (1970)	Site	Wind	Weather
April 22	1	SW moderate	Broken cloud
April 24	1	SW slight	Ground haze
April 27	1	NE moderate	Ground haze
April 29	1	SW moderate	Ground haze
May 6	1	S strong	Ground haze
May 13	1	N fresh	Ground haze
May 28	3	W light	Overcast, dull
May 28	3	W light	Overcast, dull
May 30	4	W light	Overcast, dull
May 30	4	W light	Overcast, dull
June 3	2	SW light	Overcast
June 10	2	SW slight	Heat haze
June 10	2	SW slight	Heat haze
October 23	1	W moderate	Broken cloud
October 23	1	W moderate	Broken cloud
October 23	1	W moderate	Broken cloud
October 28	1	N light	Broken cloud
October 28	1	N light	Broken cloud
October 28	1	N light	Broken cloud

the sensitivity. But the addition of 100 µg of chrysotile to our collected samples could easily be detected, so we can say that our samples collected from 1,000 m³ of air contained less than 100 µg of chrysotile—in other words, there was less than 0.1 µg of chrysotile per m³ of air. The threshold limit for occupational exposure set by the 1969 Asbestos Regulations² is 0.1 mg m⁻³.

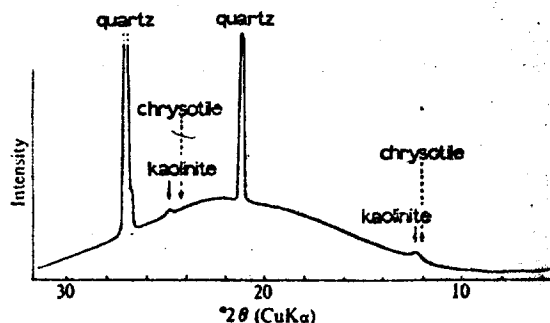


Fig. 3 X-ray diffraction pattern from a typical dust sample near the Rochdale factory.

A more sensitive method for estimating chrysotile is required, and we are developing a technique based on electron microscopy. Preliminary examinations under the electron microscope of samples collected by the Litton sampler indicate that the actual chrysotile level may be a further three orders of magnitude below the X-ray detection limit (that is, about 0.1 ng).

The samples have so far been collected in the close vicinity of the Rochdale factory. It is now proposed to sample air at certain representative urban and rural locations in UK and estimate their chrysotile content.

A. L. RICKARDS
D. V. BADAMI

Turner Brothers Asbestos Co. Ltd,
PO Box 40,
Rochdale, Lancashire

Received April 18; revised September 22, 1971.

¹ Crable, J. V., *Amer. Ind. Hyg. Assoc. J.*, 27, 293 (1966).

² *Standards for Asbestos Dust Concentration for Use with the Asbestos Regulations 1969, Technical Data Note 13* (HM Factory Inspectorate, 1969).

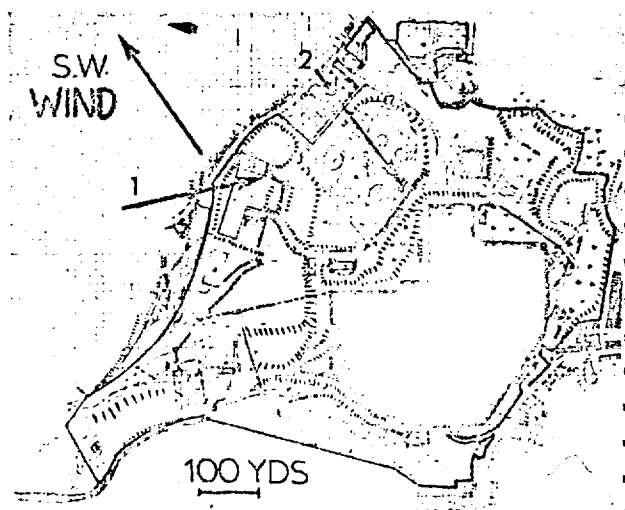


Fig. 2 Plan of T.B.A. factory, Rochdale. The sampling sites are indicated by the arrows 1 and 2. F, Position of the chief filter gallery exhausts.

Asbestos Study Committee

October 22, 1971

Dr. E. P. Stefl
Administrative Assistant to President
Raybestos-Manhattan, Inc.
205 Middle Street
Bridgeport, Conn. 06603

Dear Gene:

I'm writing this as a matter of record. I believe I may have mentioned it on the phone.

On Wednesday September 29, 1971 (4:00 P.M.) I was called by a representative of the Center for Political Research in Washington, D. C.

Miss Susan Simon
Center for Political Research
1790 M. Street N. W.
Washington, D. C. 20036

She had apparently decided (or had been told) to contact the Friction Materials Standards Institute with the impression that we had material or compounding standards. The basic thrust of her question was: "What are the brake lining manufacturers doing about asbestos in the environment?"

I told her we did have a committee studying asbestos in the brake lining industry for (1) general environment emissions, and (2) asbestos in the work place.

I mentioned the Environmental Protection Agency's tests to determine the extent of any asbestos emissions in the general environment from the use of brake lining on vehicles, and the proposed regulations of the Illinois Pollution Control Board.

She brought up fiber glass as a substitute. I believe she is part of the activist anti-everythings, and while our conversation was polite and restrained, I don't believe she had much technical depth - as suggested by the usual "fiber glass substitute" and the apparent pre-judgment that asbestos in brake linings is a serious contaminant from the emission viewpoint in the general environment.

The foregoing is strictly a matter of record.

Sincerely,

EWD/icb

E. W. Drislane
Executive Secretary

0-23

FMSI 02900

CORPORATE HEADQUARTERS ■

DR. E. P. STEFL
VICE PRESIDENT
ADMINISTRATIVE ASSISTANT TO PRESIDENT

205 MIDDLE STREET, BRIDGEPORT, CONN. 06603

Raybestos  **Manhattan**

September 27, 1971

Mr. E. Drislane
Friction Materials Standards Institute, Inc.
370 Lexington Avenue
New York, New York 10017

Dear Ed:

I am returning your draft copy of the minutes of our meeting of the Asbestos Study Committee without change. I think you have covered the matters that were discussed quite well.

As agreed upon at that meeting, I am also enclosing a copy of the Federal proposal for the emission standards for asbestos. You will recall that the members of the committee thought it well to see this draft copy even though we now know that the Federal standards will be quite different. Nonetheless it is being submitted for information purposes. You are to make copies and distribute such to the members of the committee.

In addition I am enclosing a copy of the comments and suggestions that were made regarding this initial draft by the AIA at a recent meeting that was held in Atlanta about mid-August. These comments and suggestions were given to the entire group assembled and we were advised that they would be given consideration in the revised version, which we have yet to see. Again, this is being supplied for information purposes.

Further, I agreed to advise all the Committee members as to what happened at our unofficial meeting with some members of the Illinois Pollution Control Board held in Chicago on September 17. Since that meeting covered matters other than the ban on asbestos in brake lining, I will quote you from portions of the minutes I have received regarding that session. I would urge that you advise our committee members that this information is to be considered extremely confidential at this point, especially since the meeting was held in advance of the public hearings.

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FMSI 02901

Those present in Chicago on September 17 were Timothy Harker, Administrative Assistant to the Illinois Pollution Control Board, and Walter Romanok, also of the Illinois Pollution Control Board on a part time basis. Representing them from a technical standpoint was Dr. Colin Harwood, whom I believe was instrumental in writing a great portion of the proposed regulations. He is from an Illinois Institute of Technical Research, I believe is the proper title. Representing our side was Dr. George Wright of St. Luke's Hospital in Cleveland, E. M. Fenner, W. P. Raines and Dr. S. Speil of J/M, and myself.

The two-hour meeting was quite cordial and useful. Despite Harker's great reluctance to schedule the meeting, and his suggestion on September 13 that it be cancelled, he proved to be quite communicative and certainly did not evidence hostility.

We learned that public hearings will be held in Illinois on Wednesday, October 6, in Granite City at 9:30 A.M. in the court house; on Friday, October 15, in Chicago at the Field Museum at 10:00 A.M.; and Tuesday, October 19, in Waukegan at 10:00 A.M. at the public library.

Harker indicated a preference that the asbestos industry, through the AIA/NA, testify as a unit rather than each asbestos company testifying separately. Harker indicated a strong preference that the industry present its testimony at the Waukegan hearing rather than at the Chicago hearing. They expect the Chicago hearing to be "crowded". It is neither necessary nor desirable to appear at more than one of the hearings.

Testimony should be given verbally and in writing. Ten copies of the written version should be submitted to the Board in advance. We advised Harker that we would let him know which hearing we would present our testimony at, who would testify for the industry, and the amount of time that we would require.

On the matter of the brake lining ban, this subject required surprisingly brief discussion. Harker called it "a weak point in our regulations". He implied--though he did not say so--that it was inserted in order to gain publicity for the proposed regulations and hearings. He said it would "stimulate discussion". Harker did say that one automobile company had told him that their company would be using only asbestos-free disc brakes by 1975 and that the asbestos ban would thus not affect them.

Dr. Harwood said that GM and Chrysler had told him that they saw no way of eliminating asbestos from brake blocks or discs without seriously diminishing the effectiveness of the brakes. Harker seemed impressed by this and commented that the Board didn't want to kill more people than it "saved" by any such ban.

We mentioned the Bendix studies being conducted for the EPA relative to the emissions of moving vehicles. The Illinois people seem to know very little about what the Federal EPA is doing relative to asbestos emission standards and what the Bendix test involvement is.

Harker also mentioned that New York City is testing the air in subways and other closed in areas to see what the asbestos fiber level is there, presumably being produced from vehicles.

I believe that summarizes what transpired to a great extent at that meeting. In view of the time limitations for these hearings, from the standpoint of getting prepared, it would seem that the AIA/NA will carry the ball for the entire group since I do not think that the FMSI Committee can function with any realistic data at this point. This is a personal opinion of mine and I would appreciate any comments anyone might care to make regarding such a position. In the meanwhile, through Johns-Manville, the AIA has testified at various city and state hearings on the ban of asbestos in spray coating and also testified in Washington in a written form regarding the hazardous nature of asbestos so I believe we have a format which can be presented from that group in Illinois and be effective. Some of it will be written and in addition we will probably have people testify on the aspects other than the brake lining ban. I believe the portion on the brake lining ban will be limited to the publications which I submitted to each committee member at our first meeting.

I believe this concludes my report to you and the items that I agreed to take care of. If there are any other areas where I can be of help, please let me know.

Very truly yours,



E. P. Stefl

Attachments

P.S. I have just been advised that the AIA/NA testimony will be presented on Friday, 10/15, in Chicago. Perhaps you would care to be present. The team representing us has not been decided nor has the time of day. I will advise you when I know more.

Asbestos Study Comm

September 23, 1971

Dr. M. G. Jacko
Bendix Research Laboratories
Bendix Center
Southfield, Michigan #48075

Dear Mike:

While you were at the meeting of the Asbestos Study Committee last week, you asked for some information about the Friction Materials Standards Institute. I believe you were trying to understand the basic services that the Institute performs without getting into the detail as spelled out in the Constitution and By-Laws. However to be specific, I am enclosing a copy of the Constitution and By-Laws.

The Friction Materials Standards Institute, is made up of most of the United States manufacturers of brake linings and clutch facings. One of its earliest services was a copyrighted numbering system for the brake linings and clutch facings. In this way if a customer were ordering a set of brake linings to fit a 1963 Chevrolet, he would check our book and select #2065* for the fronts and # 2006* for the rears. Most brake lining manufacturers would provide this lining with the # 2065* and #2006* number. The various brake lining manufacturers make this lining to the dimensions spelled out for original equipment purposes from information we furnished them. We solicit and compile data on all new brake lining and clutch facing releases and we publish a book every other year, with supplements in the in-between year, which keeps the field up to date on the brake linings and clutch facings used on the cars and trucks they will be servicing. Further, we publish bulletins about six or eight times a year to bring the members up to date on any changes that are happening, when they happen.

Because of the multiplicity of brake shoes and the problems in determining which shoe belongs on which vehicles we also prepare a brake shoe identification catalog. The shoe assignments which we give are used by most manufacturers to describe the lining shoe package which they distribute in the after market.

All members of the Institute are allowed to use the F. M. S. I. numbering system which is copyrighted. Further, they can authorize their customers to use the F.M.S.I. numbering system in their catalogs and on their price sheets. As an example of the type of work the F.M.S.I. is doing currently in this area, we are working on a brake block identification book which would allow people in the field to identify the F.M.S.I. number for the block by making certain basic measurements. As you will note, our services are oriented to the replacement market.

Brake Performance Study Committee

Members of the Institute over the past ten years were being deluged with State legislation in the automotive safety area which was then followed by the Federal Government legislation in 1966 setting up under the Department of Transportation, what is now the

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(2)
FMSI 02904

September 23, 1971

National Highway Traffic Safety Administration - N.H.T.S.A. The Friction Materials Standards Institute organized a Committee to help give the various safety administrators guidance so that reasonable regulations would be issued. When regulations establishing brake lining certification tests were set up by such States as New York, Pennsylvania, Massachusetts and others, the Friction Materials Standards Institute worked with the administrators in establishing requirements. During various hearings in Washington for the N.H.T.S.A. on brake system safety regulations, the Friction Materials Standards Institute would review the proposed standards, prepare tests and compile comments on the proposed standards. We still maintain a close watch on Washington and the various States as regards legislation and regulations concerning brake linings. To this date, clutch facings have not been much of an item as regards automotive safety.

Asbestos Study Committee

This particular Committee, as you are aware, is newly formed with its obvious emphasis on asbestos. It may take a somewhat similar posture as the Brake Performance Study Committee and (1) disseminate information to the members, and (2) prepare formal comments to the various environmental agencies where they may be drawing up regulations that concern asbestos in brake linings or clutch facings.

Within the Institute we can take any reasonable steps that will further the friction materials industry in line with the Constitution and By-Laws. Among other things, the Institute has organized the accumulation of information on historical sales by the members of friction articles - brake blocks, disc brake linings, other brake linings and clutch facings. This information is submitted to a Certified Public Accountant who reviews the original input from the members and prepares the summaries of totals. This information in final form is confidential and is returned to the members.

As I do not believe you are interested in the Institute concerning our catalog information,, I am not sending any of this type data. Should you wish a copy of our Data Book and Shoe Catalog, please let me know. When I have received an approved copy of the minutes of our recent meeting, I will send you a copy. Dr. Spurgeon of course will be receiving a copy when the minutes are distributed.

Sincerely,

EWD:rlane/erc
Enc:

Executive Secretary



Johns-Manville

Environmental Control Systems Division

Box 159
Manville, N. J. 08835
(201) 722-9000

August 24, 1971

Mr. Edward Drislane
Executive Secretary
Friction Materials Standards Institute, Inc.
370 Lexington Avenue
New York 17, New York

Dear Ed:

I would be very happy to serve on the newly formed Asbestos Study Committee.

I will plan on attending the proposed first meeting of this committee on Wednesday, September 15, 1971, at 9:30 a.m., at the Friction Materials Standards Institute's offices. I am looking forward to seeing you at that time.

Sincerely yours,

William B. Reitze, Manager
Industrial Hygiene Engineering Services

WBR/vam

C-26
(3)

FMSI 02906

CORPORATE HEADQUARTERS ■
DR. E. P. STEFL
VICE PRESIDENT
ADMINISTRATIVE ASSISTANT TO PRESIDENT

205 MIDDLE STREET, BRIDGEPORT, CONN. 06603

Raybestos  Manhattan

August 24, 1971

Mr. E. Drislane
Friction Material Standards Institute
370 Lexington Avenue
New York, New York

Dear Mr. Drislane:

Thank you very kindly for your letter of August 20
informing me that I have been appointed Chairman of
the newly formed Asbestos Study Committee.

I am delighted to accept and will you please advise
Mr. J. W. Greenen of my acceptance.

Thank you kindly.

Very truly yours,



E. P. Stefl

CARLISLE
HEAVY DUTY
BRAKE BLOCKS
AND SEGMENTS



Molded Materials Division
CARLISLE CORPORATION

P.O. BOX 417, RIDGWAY, PA. 15853

TELEPHONE (814) 773-3187

August 23, 1971

Cond

Friction Materials Standards Institute, Inc.
370 Lexington Avenue
New York 17, New York 10017

Attention: Mr. E. W. Drislane

Dear Mr. Drislane:

In reference to your letter of August 20 concerning the Asbestos Study Committee, please be advised that I will be pleased to accept an appointment to this committee. Also, I plan to attend your initial meeting on September 15th.

Sincerely yours,

MOLDED MATERIALS DIVISION

James B. Graham
Factory Manager

JBG/vb

cc: Mr. E. R. Zacharias

August 2, 1971

JH9W

Mr. F. E. Messier
Friction Materials Division
The Bendix Corporation
P. O. Box #1499
Cleveland, Tennessee #37311

Subject: Asbestos Study Committee
(Friction Materials)

Dear Fran:

This concerns the possible addition of a new committee within F.M.S.I. - an "Asbestos Study Committee" as discussed in Bulletin #406. A copy of Bulletin #406 is enclosed.

While the bulletin covers the essential points, I did want to make a personal contact to see if Bendix could contribute to such a committee.

Our concern is expressed for asbestos in brake linings because of several outside stimuli:

1. A proposed Illinois regulation: "The use of asbestos in brake lining of vehicles manufactured after January 1, 1975 and sold for use in Illinois is prohibited".
2. Possible effects of the new Occupational Health and Safety Act of 1970 as regards asbestos in the work place.
3. Some concern for particulates in the air - particularly asbestos in the air.

Fran, I don't really know what approach you would take. I do know that Bendix Research in Detroit has done some studying on particulates (rubber, asbestos, etc.) in the air. Also, perhaps at Troy or Cleveland someone has been made responsible for monitoring asbestos in the factory area.

If you have someone in either the factory area dealing with asbestos, or in the medical or hygiene area who could contribute, I'd appreciate word.

Let me have your comments on this.

Sincerely

Secretary

EWDrislane/hgd
Enclosure

C-27

FMSI 02909

World Bestos Company

DIVISION OF THE FIRESTONE TIRE & RUBBER COMPANY

HARVEY S. FIRESTONE FOUNDER

NEW CASTLE, INDIANA
47362

July 29, 1971

HHS

Mr. E. W. Drislane, Secretary
Friction Materials Standards Institute, Inc.
370 Lexington Avenue
New York, New York 10017

Dear Mr. Drislane:

Re: Asbestos Study Committee

We do not have an industrial hygienist at our World Bestos Division so do not have anyone to offer that has specific talents that might be used on this committee. If, however, there is difficulty in getting sufficient talent to serve on the committee, we would be happy to offer the services of our Technical Manager, J. C. Henning. Mr. Henning has a Masters Degree in Chemistry and has served in the Research and Development Department of The Firestone Tire & Rubber Company for a period of ten years before joining the World Bestos Division as Technical Manager.

Yours very truly,

C. J. Weber

C. J. Weber
General Manager

CJW:da

Firestone



Your Symbol
of Quality
and Service

C-28

FMSI 02910

BULLETIN

NO. 406

July 16, 1971

EUGENE R.
DE STEFLI

ASBESTOS STUDY COMMITTEE

This notice is being sent to all Active Members concerning the President's intention to form a new committee within F.M.S.I. We are considering the establishment of an "Asbestos Study Committee", to consist of a chairman and probably four members.

BACKGROUND

While the talk delivered by Mr. W. B. Reitze of Johns-Manville at the June meeting dwelt mostly on in-plant environment, there was some discussion relating to asbestos factory environments and brake lining particulates in the air. Well before this talk, there had been concern expressed on an Illinois Law which would eliminate the use of asbestos in brake linings.

ASBESTOS INFORMATION ASSOCIATION OF NORTH AMERICA

This association was recently formed by the asbestos companies of North America. It would be our intention to work with them through our new committee, and essentially speak for the brake lining and clutch facing manufacturers. Obviously, our committee would review and comment on rules and regulations proposed by the State and the Federal Government. There would be no costs to the Institute in any of our work with this association.

STAFFING THE COMMITTEE

We would like to staff this committee with experienced and skilled personnel, preferably from the manufacturing, or Industrial Hygiene areas. Please give this bulletin your careful review. If you feel there is someone in your Company with the background necessary to serve as a member of this Committee, please advise with a brief description of this person's background.

E. W. Drislane
Secretary

Copy to
20-1-11-14
Ohio off date
3-8-71

Distribution: B

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