FILE NAME: Johns-Manville (JMA)

DATE: 1966-1967

DOC#: JMA391

DOCUMENT DESCRIPTION: Brake Wear Tests & Issues

Brake linings

X

Research and Engineering Center
December 13, 1966

A. C. Smith

Asbestos-environmental Problems
Status Report October-November 1966

1. Packings and Friction Materials Division

Study of wear products from friction materials (J. Dec)

During the period October 1 through November 30, 1966 the wear dust collected from the special dynamometer enclosure was analyzed in detail. The results were unexpected in that asbestos fiber could be detected only by the electron microscope which indicated a maximum of 1.4 per cent by weight fibrous debris. This is in contrast to about 70 per cent by weight chrysotile fiber in the original friction material.

David Sinclair has accounted for the difference in fiber content by suggesting that high surface temperatures and severe abrasion convert the asbestos fiber into an amorphous mineral. He further demonstrates mathematically that the very high temperatures (2000F) required to break down fiber to this extent could be generated at the contact surface of a friction material even during "mild" braking in which the apparent temperature does not exceed 200F. This derives from the fact that the true area of contact in the friction couple is about one per cent of the apparent area.

From this work it would appear that the fear of large quantities of asbestos fiber being introduced into the atmosphere as part of the wear dust of friction materials is unfounded. However, the tests to determine the biological effects of such dust, regardless of its fiber content, are not complete, and we are therefore not in a position to draw final conclusions.

2. Pipe Division

A. An inexpensive inner coating for TRANSITE pipe (J. H. Swensen)

A development program (Project P-22) is under way to develop an "Improved Soft Water Coating for Potable Water Pipe." The present coating, based on asphalt, has become more and more unacceptable due to taste and odor problems. Efforts are being directed toward a clear coating which will not affect water quality. Polyterpene-type coatings have looked promising although their UV resistance now appears to be less than satisfactory. A coating developed within this program will have to be inexpensive and may fill the needs for a general TRANSITE pipe coating. It is hoped that the improved sofr water coating can be commercialized in the first quarter of 1967.

B. Effect of water flow through TRANSITE pipe

A layout of a system for studying the effects of flow and water composition on TRANSITE pipe has been prepared, and an assignment has been placed on the Engineering Department. Probably this system will not be operational until the second quarter of 1967.

PRODUCED
JM - 83

3. Fiber Glass Insulations

Residue from flow of air through fiber glass ducts, etc.(G. J. Hannes)

Initial tests run by the Kettering Institute with Owens-Corning Fiberglas duct indicated no measurable release of fiber into the air stream. Much more extensive tests are under way now in the O-C laboratories under the supervision of the Kettering Institute. Johns-Manville duct liners and duct board are part of these tests, which will include a variety of air flow conditions. Complete data will not be available until about March 1, 1967.

4. Building Products Division

A. Degradation products of asbestos felt built-up roofs (J. Q. Trice)

The Instrument Development Company of Reston, Virginia, a division of Resources Research, Inc., is preparing a preliminary engineering drawing and specifications for equipment which they propose for the actual weathering and collection of materials. Briefly the environmental chamber will consist of four components: (a) the mechanical chamber, (b) the radiation system, (c) the air handling system, and (d) the liquid handling system. Detailed information will be available from the Instrument Development Company by December 15.

We now believe that the actual samples for weathering will have to be prepared outside the environmental chamber because of the high concentration of material thrown from the hot asphalt and from working with the roofing felts. After the samples have been prepared, one will be exposed in the environmental chamber and a second exposed on the roof of the Research laboratory so that at least visual observations can be made comparing the performance of the two samples.

Materials produced or released during the weathering process will fall into three categories:

(a) particulate - which will be collected on membrane filters
(b) water-soluble - which will be picked up by the wash water which must also be put through a membrane filter in order to collect solids which are removed by washing
(c) vaporized materials - which will be collected at the low temperature traps in the air circulating system.

B. Degradation products of asbestos-cement materials

A program for sampling and testing materials has been drawn up. The test program will include an examination of field-exposed material which has been in service for many years as well as laboratory exposure of products. In the case of field-exposed products, since shingles are partially exposed and partially covered in use, it is possible for us to obtain good reference samples and analyze the changes that have occurred to the exposed surface.

A preliminary examination of some vertically exposed normal-cured products after long exposure shows the following.

PRODUCED
JM - 83

Source of Samples	Products	Exposure Period	Thickness decrease during exposure, inches
JM office building, Manville, New Jersey	Dry process shingles	1918-1964	0.003 to 0.020
JM plant, Nashua, New Hampshire	Dry process shingles	pre-1926-1966	0.001
JM plant, Nashua, New Hampshire	Flat TRANSITE	1921-1966	0.006
JM plant, Nashua, New Hampshire	Corrugated TRANSITE	1924-1966	0.012

The small amount of weathering exhibited by these products points up the need for very precise measurements in this test program.

5. Flooring Division

Wear products from flooring materials (J. Q. Trice)

Experimental work has not yet been started in this program.

6. General Company Research

Organic material in asbestos fibers (F. L. Pundsack)

Cape S Blue, packed in paper bags and in jute bags, was obtained from the Manville Pipe Plant, and the organic content extracted. The blue fiber packed in jute bags contained up to sixty (60) times as much organic material as did the fiber packed in paper bags. Jeffrey chrysotile packed in paper bags and in jute bags is being analyzed in the same way, and data will be available soon.

We are working with a company named Analtech to develop methods of identifying all the trace organic substances present in asbestos.

It may be of interest to note that in 1965 in the United States approximately five (5) times as much benz(a)pyrene was released in the form of cigarette smoke as was contained in all the asbestos used in this country for all purposes in the same year. Incidentally, more than one-half the benz(a)pyrene associated with asbestos was contained in the approximately 40,000 tons of imported blue fiber.

F. L. Pundsack

ae

cc: F. J. Solon - GHQ
K. W. Smith,MD -GHQ

PRODUCED
JM - 83

28

SF

A/H Gen. Subject Wrights,
G.W. M.D.

COPY FORM	INITIALS	DATE
	~~8/15~~	8/15

BOX NUMBER	SEGMENT NO.	REQUESTING PARTY
4-1162		Gcastle

NOTES

Oradell test 1966-67

Research and Engineering Center
December 13, 1966

A. C. Smith

Asbestos—environmental Problems
Status Report October-November 1966

1. Packings and Friction Materials Division

Study of wear products from friction materials (J. Dec)

During the period October 1 through November 30, 1966 the wear dust collected from the special dynamometer enclosure was analyzed in detail. The results were unexpected in that asbestos fiber could be detected only by the electron microscope which indicated a maximum of 1.4 per cent by weight fibrous debris. This is in contrast to about 70 per cent by weight chrysotile fiber in the original friction material.

David Sinclair has accounted for the difference in fiber content by suggesting that high surface temperatures and severe abrasion convert the asbestos fiber into an amorphous mineral. He further demonstrates mathematically that the very high temperatures (2000F) required to break down fiber to this extent could be generated at the contact surface of a friction material even during "mild" braking in which the apparent temperature does not exceed 200F. This derives from the fact that the true area of contact in the friction couple is about one per cent of the apparent area.

From this work it would appear that the fear of large quantities of asbestos fiber being introduced into the atmosphere as part of the wear dust of friction materials is unfounded. However, the tests to determine the biological effects of such dust, regardless of its fiber content, are not complete, and we are therefore not in a position to draw final conclusions.

2. Pipe Division

A. An inexpensive inner coating for TRANSITE pipe (J. H. Swensen)

A development program (Project P-22) is under way to develop an "Improved Soft Water Coating for Potable Water Pipe." The present coating, based on asphalt, has become more and more unacceptable due to taste and odor problems. Efforts are being directed toward a clear coating which will not affect water quality. Polyterpene-type coatings have looked promising although their UV resistance now appears to be less than satisfactory. A coating developed within this program will have to be inexpensive and may fill the needs for a general TRANSITE pipe coating. It is hoped that the improved soft water coating can be commercialized in the first quarter of 1967.

B. Effect of water flow through TRANSITE pipe

A layout of a system for studying the effects of flow and water composition on TRANSITE pipe has been prepared, and an assignment has been placed on the Engineering Department. Probably this system will not be operational until the second quarter of 1967.

PRODUCED
JM - 63

3. Fiber Glass Insulations

Residue from flow of air through fiber glass ducts, etc.(G. J. Hannes)

Initial tests run by the Kettering Institute with Owens-Corning Fiberglas duct indicated no measurable release of fiber into the air stream. Much more extensive tests are under way now in the O-C laboratories under the supervision of the Kettering Institute. Johns-Manville duct liners and duct board are part of these tests, which will include a variety of air flow conditions. Complete data will not be available until about March 1, 1967.

4. Building Products Division

A. Degradation products of asbestos felt built-up roofs (J. Q. Trice)

The Instrument Development Company of Reston, Virginia, a division of Resources Research, Inc., is preparing a preliminary engineering drawing and specifications for equipment which they propose for the actual weathering and collection of materials. Briefly the environmental chamber will consist of four components: (a) the mechanical chamber, (b) the radiation system, (c) the air handling system, and (d) the liquid handling system. Detailed information will be available from the Instrument Development Company by December 15.

We now believe that the actual samples for weathering will have to be prepared outside the environmental chamber because of the high concentration of material thrown from the hot asphalt and from working with the roofing felts. After the samples have been prepared, one will be exposed in the environmental chamber and a second exposed on the roof of the Research laboratory so that at least visual observations can be made comparing the performance of the two samples.

Materials produced or released during the weathering process will fall into three categories:

(a) particulate - which will be collected on membrane filters
(b) water-soluble - which will be picked up by the wash water which must also be put through a membrane filter in order to collect solids which are removed by washing
(c) vaporized materials - which will be collected at the low temperature traps in the air circulating system.

B. Degradation products of asbestos-cement materials

A program for sampling and testing materials has been drawn up. The test program will include an examination of field-exposed material which has been in service for many years as well as laboratory exposure of products. In the case of field-exposed products, since shingles are partially exposed and partially covered in use, it is possible for us to obtain good reference samples and analyze the changes that have occurred to the exposed surface.

A preliminary examination of some vertically exposed normal-cured products after long exposure shows the following.

JM - 53

Research & Engineering Center
January 25, 1967

A. C. Smith

ASBESTOS - ENVIRONMENTAL PROBLEMS
STATUS REPORT - JANUARY 24, 1967

1. PACKINGS AND FRICTION MATERIALS DIVISION

A. Study of Wear Products from Friction Materials (Dec)

As indicated in the report dated 12/13, only 1.4% of the wear dust collected was asbestos fiber. No information has yet been received regarding the dust samples submitted by Dr. K. W. Smith for biological testing. No additional sampling of wear dust is planned until information on biological effects is obtained.

2. PIPE DIVISION

A. An Inexpensive Inner Coating for TRANSITE Pipe (Swensen)

A polystyrene coating has been formulated which has shown more than the required resistance to ultra-violet and which meets the AWWA requirements for water-pipe coating. Long-term adhesion has been satisfactory to date (two months exposure). A Commercial Recommendation will be issued on or about February 15.

B. Effect of Water Flow through TRANSITE Pipe (Swensen)

Plant Engineering has estimated the costs of constructing a system to study the effects of flow and water composition on TRANSITE pipe to be approximately $280,000. In view of the high estimated cost, the proposed program and system are being revised.

3. FIBER GLASS INSULATIONS

A. Residue from Flow of Air through Fiber Glass Ducts, etc. (Hannes)

As mentioned in the December 13 report, the extensive test program is continuing. Data will be available about March 1.

4. BUILDING PRODUCTS DIVISION

A. Degradation Products of Asbestos Felt Built-Up Roofs (Trice)

Based on specifications and quotation from Instrument Development Co., Reston, Virginia, an appropriation request in the amount of $25,000 will be submitted by January 27 for an environmental chamber. This appropriation will be accompanied by a detailed program and an estimated total

PRODUCED
JM - 83

cost. Delivery of the chamber is promised for 16 weeks after receipt of order.

B. Degradation Products of Asbestos-Cement Materials (Trice)

Samples of Steam Cured TRANSITE (COLORLITH) showed a decrease in thickness of less than 0.003-in. after at least 12 years vertical exposure on the REC test decks. (Normal Cured products showed a decrease in thickness of 0.001" - 0.020".)

The program of finding and examining exposed samples has been expanded to include wet and dry process as well as normal and steam cured samples.

5. FLOORING DIVISION

A. Wear Products from Flooring Materials (Trice)

A program is being prepared to utilize a modification of the type of environmental chamber being recommended for the asbestos-roofing program (Item 4A above).

6. CORPORATE RESEARCH

A. Organic Material in Asbestos Fibers (Speil)

Research Memorandum #M411-489 (12/29/66) presented a review of the literature concerning the occurrence and properties of benzopyrene in the atmosphere from smoking, exhaust fumes, overheated tar and asphalt, the general burning of rubbish, coffee roasting, etc. The outer layer of a "well done" charcoal-broiled steak was found to contain a substantial quantity of benzopyrene.

Samples of asbestos have been sent to Case Institute of Technology and Mount Sinai Hospital for experimental work they are conducting on their own.

Work has continued with Analteck Inc., on improving methods of identifying trace organic substances present in asbestos. Most recent information shows Jeffrey fiber from a paper bag to contain 19-31 mg organic material/100 gm of fiber, whereas samples from a jute bag showed 4 mg at the center and 16 mg adjacent to the surface of the bag -- the reverse of information obtained with Blue fiber. Additional tests are in progress.

We cooperated with the Veterans Administration Hospital, Hines, Illinois, who are studying the relationship between asbestosis and mesothelioma, where their work with mice showed heat-treated asbestos gave a more toxic reaction than unheated asbestos.

PRODUCED
JM - 83

Hamster lung tissue samples submitted by the Health Service Institute, Fairleigh Dickinson University, examined by electron microscopy, showed the presence of both amosite and chrysotile asbestos.

W. M. MacAlpine

etr

cc-C. B. Burnett, GHQ
F. J. Solon, GHQ
K. W. Smith, GHQ
F. L. Pundsack

PRODUCED
JM - 83