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Environment from Cobra Shoes

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INTERNAL CORRESPONDENCE WESTINGHOUSE AIR BRAKE DIVISION

DATE: December 21, 1971

TO: J. A. CAMPBELL
K. CHRISSINGER
D. F. MCCONNELL

R. A. MITCHELL
J. W. MORRIS
H. R. ODELL

FROM: G. M. Cabbie

SUBJECT: ASBESTOS EMISSIONS TO THE ENVIRONMENT FROM COBRA SHOES

The Federal Government as well as some State and Local Governments have become interested in pollution caused by many things, one of which is asbestos. We have been questioned by various groups and individuals concerning the amount of asbestos fiber released by COBRA Shoes during braking action. In order to be able to answer these questions, COBRA Shoe Engineering and Johns-Manville Research combined to run an elaborate series of dynamometer tests during which all the wear dust from various types of braking cycles was collected and analyzed.

The results of these tests show that almost all of the asbestos fiber is decomposed during brake applications. Less than one percent of the original asbestos fiber in the shoe remains as fiber in the wear dust and less than one tenth of that becomes airborne. Since each stop wears only a very small amount of material from each shoe and since each shoe contains only a very small percentage of asbestos fiber, it can be seen that the amount of asbestos fiber that becomes airborne with each stop is minute.

Attached is a copy of a letter from Dr. F. L. Pundsack, Vice President/Research and Development, Johns-Manville, to Dr. W. J. Harris, Vice President/Research and Test, Association of American Railroads, and a copy of the reply. The first letter describes the tests and the results, while the reply transmits the AAR's reaction to this information. If any more detailed information regarding the tests is necessary, contact COBRA Shoe Sales.

GMC/mbs
Attach.

cc: Atlanta
Houston
Philadelphia
St. Paul
H. M. Linhart

G. E. Carothers
D. T. Kerr
E. B. Brenneman
J. C. Janke
F. J. Grejda
W. I. Graham (J-M)

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Johns-Manville

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W. I. Graham - GHQ

Copy to FJG

November 1, 1971
(written 10/29/71)

Mr. William J. Harris, Jr
Vice President, Association of American Railroads
Research & Test Department
American Railroads Building
1920 L Street, N.W.
Washington, DC 20036

Dear Mr. Harris:

In my letter to you of June 25, 1971, I had pointed out that wear tests would be performed on COBRA brake shoes to determine the extent to which chrysotile fiber is released during service. These tests have been conducted at the Westinghouse Air Brake Division under the supervision of JM Research personnel, and I would like to take this opportunity to inform you of the results.

The Westinghouse Air Brake Division railroad dynamometer in Wilmerding, PA was used to simulate various service conditions for these tests. In order to collect wear dust samples, the wheel and braking assembly of the dynamometer were completely enclosed by a sheet metal chamber. The chamber was equipped with inlet and outlet filters and a vacuum system to draw air through the enclosure. Air entered the chamber through a Flanders type AA absolute fiber glass filter to assure that it was "clean". Air was drawn out of the chamber through two 8-in. x 10-in. Millipore membrane filters of 1.2- μ pore size. Provision was also made to measure the air flow through the chamber, the temperature in the chamber, and the temperature of the wheel tread.

Prior to each phase of testing, the interior of the chamber was washed thoroughly with mineral spirits and then wiped down with clean, dry rags. The brake head, lever arm, and bolts had been shot-blasted prior to the start of testing. These were also cleaned carefully before each test phase. All rivets were covered with metalized tape, and all welds were inspected for smoothness and integrity. The brake shoe was thoroughly brushed before weighing, and the backer plate was wire-brushed.

Four different test phases were run:

1. Passenger car simulation
2. Commuter run simulation
3. Grade simulation
4. Heavy freight simulation



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At the completion of each phase all the dust in the chamber and on the Millipore exit filters was collected, combined, and submitted for chemical and electron microscopic analysis. The electron microscope was used to determine the amount of asbestos fiber in the dust.

After analysis of the composite sample for each phase, the sample was separated into airborne and non-airborne fractions by air elutriation. The results of the analysis are given below:

Results of COBRA Dust Sample Analysis

Phase	Per Cent of Sample Airborne	Per Cent Asbestos Fiber	
		Airborne Fraction	Total Sample
1	20%	0.012%	0.03%
2	20	0.008	0.02
3	7	0.001	0.03
4	12	0.003	0.05

Finally, calculations were made to determine the amounts and percentages of recognizable asbestos fiber actually liberated during the various phases. The results are as follows:

Phase	Wt. of Fiber Liberated in Entire Phase	No. of Stops in Entire Phase
1	0.006 grams	10 stops from 80 mph
2	0.003	18 stops from various speeds
3	0.016	Continuous 45-minute drag
4	0.007	20 stops from 40 mph

In general, our conclusions can be stated as follows:

1. In almost all cases less than 1.0 per cent of the original fiber in the formula remains as recognizable chrysotile fiber in the wear dust.
2. In every instance less than 0.05 per cent of the original fiber remains as recognizable in the fraction of the dust which is potentially airborne.



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These results are in good agreement with the previous work on automotive brake linings. Furthermore, they substantiate the hypothesis that the extreme heat and mechanical action of the braking process is sufficient to destroy almost all the fiber as it is exposed at the wearing surface.

Please feel free to contact me if you have any questions regarding the test procedures, results, or conclusions.

Sincerely yours,

F. L. Pundsack
Vice President, Research & Development