Research & Engineering Center
September 8, 1970

MEMO FOR FILE:

VISIT TO INLAND DIVISION OF GENERAL MOTORS - AUGUST 31, 1970
Brake Lining Decomposition Products

Dr. Merle Gibson, Medical Director of the Inland Division of General Motors, commented during the J-M Research Center session of the Asbestosis Course held June 15 through 18, 1970, at Mt. Sinai Hospital, that results of work at Inland did not agree with the data presented by Jerry Lynch on the decomposition of brake lining materials. He agreed to set up a meeting with Dr. George Rappaport, head of the Chemical Laboratory at Inland's Dayton laboratory, to review both Inland and J-M research on this project.

After several brush-offs, I was able to arrange a meeting with Dr. Gibson and Dr. Rappaport on August 31. Also present during part of the meeting were Mr. G. W. Beck, Chief Engineer for Inland, and Mr. J. (Joe) H. Overwein, Assistant Chief Engineer.

Summary

Dr. Rappaport doubted the validity of the general data presented by Jerry Lynch on the breakdown of brake linings. After reviewing J-M's data and discussing peripheral information, he is convinced of the validity of our data showing less than 1 per cent chrysotile content. He suggested, as a final test, that the biological effect of the brake lining decomposition products be determined by animal tests. These may be sponsored by General Motors with Dr. Selikoff. Dr. Gibson still believes asbestos to be the main cause of lung cancer, and objects to any additional input to the atmosphere no matter how slight. I doubt if he can be convinced otherwise.

Discussion

Dr. Rappaport was quite frank in his discussion, especially when Dr. Gibson was not present. Inland has done no significant work on capturing and analyzing reaction products from brake wear. They were planning to begin a project in the near future.

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Dr. Rappaport had been asked to comment on the validity of Jerry Lynch's results. He reacted unfavorably to the paper and did not accept any conclusions because the paper:

1. presented only approximate fiber concentrations;

2. gave no detailed experimental techniques;

3. did not define the technique for "quantification" of fiber content; and,

4. did not define the effectiveness of collecting all decomposition products.

He was also concerned about whether the decomposition products, whatever they might be, were in themselves carcinogenic.

The following J-M reference material was used as a basis for discussing our work and answering Dr. Rappaport's questions.

1. Research Report 456-2506 (December 19, 1966) - STUDY OF WEAR DUST FROM BRAKE LINING, written by D. Sinclair.

2. Research Report 456-T-94 (June 13, 1968) - WEAR PRODUCTS FROM BRAKE LINING, written by S. W. Wegrzyn.

3. Research Memo M456-386 (November 8, 1967) - COLLECTION OF WEAR DUST FROM AUTOMOTIVE BRAKE ASSEMBLY DURING INERTIA DYNAMOMETER TEST, written by W. R. Randolph.

4. Research Report 404-67 (August 3, 1970) - METHOD FOR THE QUANTITATIVE DETERMINATION OF CHRYSOTILE FIBER IN SAMPLES FROM VARIOUS SOURCES, written by A. F. Burns, K. L. Jaunarajs, and G. P. Reimschussel.

The discussion included:

1. A review of test apparatus and techniques, with special reference to the millipore system of collecting samples, and its known efficiency in collecting all particulate decomposition products.

2. The techniques for quantifying fiber, including the previous point count method and the more recent radioactive tracer method.

3. The quantitative test data showing that 50 to 80 per cent of the wear products were collected as either airborne or "in the box" samples.

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4. Analytical data on both the airborne material and the composite material illustrating the collection of all residual products from decomposition of asbestos (equal MgO and SiO_2 contents).

5. Pictures of airborne and total composite samples.

6. Discussion of amorphous material vs fosterite in the decomposition products, with different severity of wear as evidenced by average drum temperatures of 175, 330 and 550F, respectively.

7. Actual detailed "chrysotile" contents in the various samples and their relationship to the chrysotile content in the original product.

We also discussed certain subjects which Dr. Rappaport indicated he was particularly interested in. These included:

1. "Asbestos" bodies vs ferruginous bodies.

2. Factors influencing respirability of fibers, including Timbrell's work and recent Battelle work on retention of extremely fine particulate matter.

3. The proposed programs on the effect of fiber diameter, fiber length, and aspect ratio, including J-M programs, Webster's work, and others. Dr. Rappaport was particularly concerned with the effect of particle size and fiber diameter of the decomposition products, and its relation to respirability.

4. Extraction of minerals from lung tissue, including low temperature ashing, and hydroxide of Hyamine treatment.

After a full morning's discussion, Dr. Rappaport indicated to Messrs. Beck, Overwein, and Dr. Gibson that he was satisfied the decomposition products, in fact, contained only very small quantities of chrysotile. He suggested the desirability of conducting tests to show that these decomposition products were not biologically harmful and calculating the actual "net input" of chrysotile to the ambient air from the decomposition of brake linings based on our data and known brake lining statistics.

(We have already recognized the complexity of such an undertaking in our calculations on the fiber contributed by decomposition of asphalt asbestos paving. For example, how much fiber is removed per day from the atmosphere by fall-out, rain, wind, migration, etc., as compared to the input from any source of contamination.)

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General Motors, through Dr. Gibson, is seriously considering funding work at Mt. Sinai, but no specific program has apparently been defined. Inland personnel were invited to visit us at the Research Center at any time to discuss the problem and any of their suggested programs. I will send Dr. Rappaport those portions of the above-mentioned Research reports which can be released without disclosing proprietary information.

Dr. Gibson is still a firm believer that asbestos is the major, positive cause for lung cancer. I think he is overpowered by the Selikoff mystic and that it is worthless to try to convince him otherwise then by direct statements from Dr. Selikoff. However, the others present at the meeting could probably be convinced that no problem exists by a few animal experiments with calcined asbestos, calcined serpentine, and brake lining wear material.

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SS/rs

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