FILE NAME: Ford (FD)

DATE: 1978

DOC#: FD141

DOCUMENT DESCRIPTION: Trade Publication Article, Published Abstract from Conference & Memos

Ford Memorandum

To	At
A.E. Anderson	Scientific Research

cc: G.F. Bolling
W.A. Goering
M. Weiss

Subject: Automobile Brake Drum Dust Characterization

The attached study was recently referenced in a toxic/hazardous newsletter. It illustrates the presence of unaltered chrysotile asbestos fibers in brake drum dust. No indication was given on the usage the sample experienced. The author has requested we participate in supplying adequate and representative samples for future studies. You may wish to discuss with him this possibility. For in-house studies, samples could be obtained from the many fleets that are scheduled each year. We would be happy to assist you in this area. Please advise Vehicle Materials Engineering of any plans and /or developments of this nature.

Signed	Department or location	Date
Carolyn B. Zelek CBZ		May 31, 1978

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Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720
Telephone 415/843-2740

May 19, '78.

C.Belek
Ford Motor Co.
20000 Rotenda Dr.
Rm.1049 Bldg.5
Dearborn
Mich. 48121

Dear C.Belek,

I got the message that you wanted a copy my report on "asbestos brake drums".

I am not sure which paper you were refering to. I wrote one paper on the deformation of asbestos, and used brake drum dust. I assumed you meant this one ?

I am sending you a copy of the Galley. The paper will appear in the June or July issue of Environmental Research. If you are interested, please write to me and I will send you a copy.

Since you are at Ford - I have a question. I hear that you have a dynamometer. Will it be possible for me to have you send some samples of deformed asbestos from this dynamometer ?

My research interest is in the deformation of minerals, and I can think of some very interesting research that can be done, if you were, or anyone else at Ford, were interested in collaborating.

I hope to hear from you,

Sincerely

K.Seshan
Lecturer, UCB
Staff Scientist, LBL

Encl

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CHARACTERIZATION OF CHRYSOTILE ASBESTOS IN AUTOMOBILE BRAKE DRUM DUST BY TRANSMISSION ELECTRON MICROSCOPY (TEM)

Krishna Seshan and Glenn R. Smith*

Department of Materials Science and Mineral Engineering, and Materials and Molecular Research Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720 and *Air and Industrial Hygiene Laboratory, California State Health Department, Berkeley, California 94704.

This study supports other work that automobile brake drum dust is a source of partially altered and unaltered chrysotile asbestos (1-3) and suggests that dark-field electron microscopy could be used to identify the source of the fibres. These results are in contradiction to those who report that high temperatures reached during braking reduce a majority of the chrysotile to forsterite (4,5).

Automobile brake drum dust was directly transferred to formvar coated grids and coated with carbon on both sides. The grids were then examined with a Siemens 1A and a Philips 301 at 100 kV.

Intact chrysotile fibre bundles with some phenolic opaque binder is shown in Fig. 1 displaying partially deformed internal canals, but does not show gross morphological change. Unaltered chrysotile is shown in Fig. 2a and was confirmed by selected area electron diffraction (SAED), see Fig. 2. The calculated d-spacings correlated with those of Yada's (3). As previously reported (1) a variety of chrysotile deformation products are found in brake drum dust shown in Figs. 3 and 4. Fig. 3 shows a fibril fragmented by deformation. Fig. 4 shows single fibrils with canals intact. However, the SAED patterns in Figs. 3a and 4a are atypical of chrysotile and are streaked perpendicular to the a^* direction which may be caused by surface deformation and macroshear. High resolution dark-field microscopy was used to study the deformations in detail as shown in Fig. 5. The bundle is mottled showing surface deformation with grains much larger than those of standard chrysotile. This suggests that dark-field electron microscopy can be used to identify the source of fibres found in air pollution samples. This deformation and grain growth is probably due to mechanical and thermal stresses experienced by the bundle in the brake drum.

Less than one percent chrysotile and no forsterite was found in the drum dust by light optical microscopy (LOM) and x-ray diffractometry (XRD). It has been previously pointed (2) out that the fibre sizes and concentrations are often below the limits of detection of LOM and XRD.

Acknowledgements - Thanks to Dr. J. J. Wesolowski and Professor G. Thomas for use of the TEM facilities and to Drs. A. Langer and A. Rohl for discussion. Financial support is appreciated from the U.S. Energy Research and Development Administration through the Materials and Molecular Research Division of the Lawrence Berkeley Laboratory.

1. A. Rohl, A. Langer, et al., Environmental Research 12, 110 (1976).
2. Ibid., Proceedings of the Royal Soc. of Med., 7D, 32 (1977).
3. J. Alste, et al., Atmospheric Environment 10, 583 (1976).
4. R. J. Lynch, 30th., Ann. Meeting Amer. Conf. of Govt. Hygienists, St. Louis, Mo (1968).
5. G. J. Jacko, et al., Auto Engineering 81, 38 (1973).

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TOXIC MATERIALS NEWS IN BRIEF

Cancer control and prevention has been largely ignored by National Institutes of Health, UCLA Public Health Dean Lester Breslow told a national cancer conference recently, and suggested the government's cancer prevention program be taken out of National Cancer Institute. "Time after time in the past 25 years the National Institutes of Health has relegated cancer control and disease control generally to the back washes of the institutes, failed to seek adequate funding or take leadership, or literally squeezed it out of the budget," Breslow said. "Cancer control needs its own strong advocates."

President Carter, meanwhile, has decreed that April is "Cancer Control Month" -- a designation intended to educate people to "take advantage of available resources to prevent needless suffering and death... Cause and prevention research remains one of our highest priorities," Carter said, "because prevention offers the best hope for ultimate control of cancer."

National Cancer Institute has announced publication of bioassay reports on dye pigment diarylanilide yellow and pesticides methoxychlor, malathion and trifluralin. Only trifluralin was found to be carcinogenic — in the livers of female mice. All four reports will be available next week from Office of Cancer Communications, NCI, Bethesda, Md. 20014.

Asbestos brake drums emit chrysotile fibers which are deformed enough to be especially hazardous, La[redacted]has announced. Seshon said [redacted] the hazard presented, and when these fibers are released in the air, they expose repairmen to heightened threats of lung disease and cancer.

Consumer Product Safety Commission would need additional funding of $5-million to implement pending legislation ordering safety rules for cellulose insulation, CPSC Chairman John Byington told a Senate Appropriations Subcommittee last week. Byington also noted that if the agency is required to deal with various chronic hazards identified in an emerging National Cancer Institute study, an additional $5-million and 50 staff positions will be required. Byington asked that Congress appropriate $3.4-million more for CPSC than the $44.8-million President Carter had recommended in his budget.

Occupational Safety and Health Administration has named 11 members to a new standards advisory committee on skin hazards. Committee was formed to identify the occupational exposures in industry which pose a hazard to the skin and to develop a set of guidelines for OSHA to use in drafting a proposed standards on skin hazards.

Department of Agriculture's nitrosamine panel has recommended the department issue a warning that "the risk of cancer is increased when fried bacon or the rendered fat from it are consumed." The panel called nitrosamines "a potent carcinogen" and said they are consistently found in bacon treated in the home.

New Jersey's Department of Environmental Protection has released preliminary results of a statewide groundwater testing program which is examining 500 wells for selected organic compounds, pesticides and metals. DEP Commissioner Rocco Ricci said early results show that water quality, in most cases, is far better than the Federal drinking water standards, although 20 violations were found out of 250 wells. Almost all of the wells contained traces of some of the chemicals being sampled, with the majority of wells contaminated by organic compounds located in heavily populated industrial areas and those contaminated by pesticides more prevalent in agricultural spots. State will similarly test air and surface water, DEP said.

Justice Department has filed a $20-million suit against Outboard Marine Corp., Waukegan, Mich., charging the firm with discharging 2-million pounds of polychlorinated biphenyls into Waukegan Harbor and Lake Michigan. The government asked the court to order the firm to clean up the accumulated PCBs.

Illinois Attorney General's office has filed suit against Amoco Oil Co., and Amoco Pipeline Co. in an attempt to recover more than $838,000 in penalties and damages from the companies for two spills of xylene last December. The first spill occurred near Danville when a pipeline transporting the petroleum by-product broke, allowing 700,000 gallons of the substance to leak into the Wabash River. The second spill happened near Humrick with only a few hundred gallons escaping, but vapors were so strong in the area of the spill that local residents had to be evacuated.

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Ford Memorandum

To	At
Bill/Fred	

Subject: Characterization of Automobile Brake Drum Dust

ref: Conversation with A.E. Anderson, Scientific Lab, 5/30/78

Samples emitting unaltered chrysotile fibers can result from the following atypical brake usage:

- New Lining- some direct fiber emissions.
- Infrequent Brake Usage- resulting in a layer of rust bonded to the fibers. (Fibers can migrate to the surface under wet conditions and bond with rust. Speeds of 15-20 mph. with resulting temperatures are necessary to change the morphology of chrysotile to forsterite.)
- Abusive Conditions- e.g. driving with the parking brake, weakens the bonding of the fibers to the binder.

Unfortunately, studies documenting unaltered fibers do not elaborate on the methods employed for the selection of samples. Results are readily published in the media and the impact occurs nevertheless.

Signed	Dept. or Location	Date
Carolyn B. Zelek CBZ		May 31, 1978

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