PLAINTIFF'S EXHIBIT
SWB-267

Bell Laboratories

subject: Asbestos Exposures
from Brake Drum Work
Case: 48106-3

date: September 24, 1976

from: G. D. Kenney

MEMORANDUM FOR FILE

Summary:

Samples were taken at two different garages in the Illinois Bell Telephone Company to try and estimate the exposures of employees changing brakes to asbestos fibers. The concentrations found ranged from 0.07 to 0.22 fibers/cc. The present OSHA standard is 2 fibers/cc. The samples were analyzed using the procedure of phase contrast microscopy.

Standards:

The present standard for asbestos promulgated by OSHA is 2 fibers per cubic centimeter greater than five micrometers in length (f/cc.). This two fiber limit refers to an eight hour time weighted average standard. This standard also included a ten fiber/cc ceiling concentration which is not to be exceeded.

Procedures:

Air samples for asbestos fibers were taken using the NIOSH recommended procedures.*

The fibers were collected by pulling air through small filters using a battery powered pump. The filters used were 37 millimeter cellulose ester membrane filters having a 0.8 micrometer nominal pore diameter. The sampling pumps used were Mine Safety Appliance Model G sampling pumps. The air was pulled through the filters at a rate of 1.8 liters per minute.

The filters were sent to the Kettering Laboratory for analysis. The procedure used for analysis was to count the fibers collected on the filter using a phase contrast microscope at a magnification of 400 to 450 X.

* NIOSH Manual of Analytical Methods HEW Publication No. 75-121, 1975.

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Both personal and general room air samples were collected for these operations.

Results:

The results of these samples are presented in Table I appended to the end of this report.

At garage number 1 the employee was only engaged in inspecting the brake drums for wear. The total time it took to complete the inspection was twenty five minutes. In inspecting the drums the dust accumulated on the shoes and mechanical parts was cleaned off using a whisk broom. The vehicle inspected was a light duty van.

At garage number 2 the employee was changing the brakes on the front of a light duty van and inspecting the rear brakes for wear. This particular employee cleaned the drums by blowing out the dust using compressed air. This operation of using compressed air took about thirty seconds per wheel. During this time the employee was actually encompassed in a cloud of the dust.

The total time taken to complete this job was 45 minutes.

Discussion of Results:

From the Table 1 it is seen that the exposure levels do not vary greatly between garages.

The levels reported here agree tolerably well with those reported by Hickish and Knight.* They reported exposures ranging from 0.03 to 1.12 fibers/cc in changing brakes on lightweight cars. The average exposure level was 0.38 fibers/cc.

The levels however are much lower than those reported by NIOSH.† Samples taken during the blowout of automobile drum brake assemblies, beveling of new truck brake linings and the grinding of used truck linings gave results of 10.5, 37.3, and 3.75 fibers per cubic centimeter respectively. These measurements were taken to try and get the peak levels during exposure.

* Hickish, D. E. and Knight, K. L.: Exposure to Asbestos during brake maintenace. Ann. Occup. Hyg. 13: 17-21, 1970.

† NIOSH Issues Asbestos Dust Alert for Workers Exposed Servicing Brakes; Occ. Safety and Health Reporter, BNA, 5:348-49, 1975.

The most probable explanation for the discrepancy between the results reported here and those by NIOSH is a difference in sampling times. The sampling periods were not reported in the article. If it is assumed that the samples reported by NIOSH were taken only for the time that the actual job, such as blowing out the drum assemblies took place then the sampling period would only last for 2 to 3 minutes. Performing some calculations assuming a 3 minute sampling time and a 1.8 liter per minute flow rate only 17 fibers counted out of 100 fields would be necessary to get a concentration of 10 f/cc. The numbers of fibers counted in the samples taken here ranged from 3 to 16 fibers per 100 fields.

The most difficult result to explain is the value obtained for the ambient sample. The value for this sample is 0.25. The 0.25 value is the highest concentration found for any of the results.

One possible explanation would be contamination of the filters. However, blank filters, handled in the same way as the samples but through which no air was passed, did not give high values. This would eliminate the possibility of gross contamination of the filters.

Another possible explanation for these results is that the ambient sampling sites were situated so as to be in the path of the dust laden air from the garage. Both ambient sampling sites, however, were at least 75 feet from the nearest opening to the garages and located upwind of the openings.

A third possible explanation is that a mistake was made in the counting of these samples. A recount of the ambient sample at garage #3 by two different persons gave results of 0.38 and 0.9 fibers/cc. Although a relatively widespread exists between the numbers, such ranges are not uncommon in asbestos counting. The recounts seem to confirm that the first count is relatively accurate.

The question then is what is the significance of these ambient results. If the values are true than an argument can be made that the exposures to asbestos during a brake changing operation is no greater or even less than the employees ambient exposure. The problem is that with the present method of phase contrast microscopy it is impossible to qualify whether the fiber being counted is in fact an asbestos fiber. With the present method any particle with an aspect ratio (length of fiber to width of fiber) of 3 to 1 or greater and having a length greater than five micrometers is to be counted. Therefore it is possible that the fibers in the ambient samples and for that matter the personal and general air samples are not of the asbestosform type. With the present samples and analysis it is impossible to state whether this is true.

Bulk samples of brake drum dust were taken to try and determine if the dust contained asbestos. According to the analytical laboratories the amount of asbestos, if present in the samples, was below the analytical sensitivity of the method used. The sensitivity limit for the method as reported by the lab is 5%.

In a report by Jacko and Du Charme they reported the asbestos concentration in brake dust as about one percent.* This would explain the negative results found in the bulk samples taken here.

The final question is how do these results compare with the present OSHA standard for asbestos. The present eight hour time weighted average standard for asbestos is two (2) fibers/cc. The sample values are well below this level of 2 fibers/cc. Perhaps a more important question is does an exposure to asbestos exist, if so then medical examinations of the exposed employees must be initiated. With the present results an interpretation that an exposure does exist must be made.

GD Kenney

MH-7885-GDK-jm G. D. Kenney

Copy to
W. J. Schreibeis
G. M. Wilkening

* Jacko, M. G., Du Charme, R. J.; Brake Emmissions: Emission Measurements from Brake and Clutch Linings from Selected Mobile Sources. EPA Report No. 68-04-0020, 1973

Table I

Sample Ident.	Sample pd. Minutes	Concentration f/cc
Garage #1		
Personal Sample	30	0.15
Gen. Air	30	0.22
Ambient	32	0.25
Garage #2		
Personal Sample	45	0.13
Gen. Air	41	0.07