THE MOUNT SINAI MEDICAL CENTER
ONE GUSTAVE L. LEVY PLACE • NEW YORK, N.Y. 10029
Mount Sinai School of Medicine • The Mount Sinai Hospital

April 11, 1979

Environmental Sciences Laboratory
Cummings Basic Sciences Building
10 East 102 Street
New York, New York 10029
(212) 650-6173

Mr. Robert S. Magdelain, President
Nilfisk of America, Inc.
201 King Manor Drive
King of Prussia, Pennsylvania 19406

Dear Mr. Magdelain:

This will report the results of air sampling tests conducted, in October 1978, to determine chrysotile asbestos concentrations during brake repair work.

Our major objective was to determine the efficiency of the Nilfisk Asbestos System utilizing HEPA filters, particularly with regard to submicroscopic asbestos fibers. Studies conducted in our Laboratory and elsewhere have demonstrated that free asbestos fibers present in brake drum dusts are predominantly shorter than 5um in length. In particular, it was found that about 75% of the fibers in such dusts were less than 0.3um in length, as determined by transmission electron microscopy. Thus, the optical microscopic technique used by OSHA for determining asbestos levels in workplaces (in which only fibers 5um or longer are counted) would overlook a large number of asbestos fibers in air samples. That is, the total asbestos exposure in terms of fiber number, mass and surface area would be significantly greater than the levels determined using the OSHA fiber-counting method.

Therefore, it was of considerable interest to us to have an opportunity to test the efficiency of the Nilfisk Asbesto-Clene System. To do this personal air sampling was carried out on the exhaust of a HEPA-filtered vacuum dust collector and, simultaneously, on a garage mechanic cleaning a brake drum with the Nilfisk brake encapsulation cylinder. Three such tests were made. Background air samples, also using personal air pumps, were taken.

For each of the tests, a sample of settled dust was taken from the brake drum. The dusts were analyzed by x-ray diffraction in the step-scan mode to quantitatively determine asbestos contents, using a technique previously published. Asbestos was found in all three samples, ranging from 2.5% to 4.5% by weight.

The membrane filters were analyzed by both transmission electron microscopy (X25,000) and by the standard OSHA fiber-counting technique, employing phase contrast optical microscopy. The results are as follows:

Sample	Description	Nanograms/cu meter (electron microscopy)	Fibers/milliliter (optical microscopy)
	TEST #1		
N-1	Background (70 feet from operator)	400	0
N-2	Operator (breathing zone - 6 ft. from dust collector)	0	0
N-3	Dust collector (HEPA-filtered vacuum)	0	0
	TEST #2		
N-4	Background (70 feet from operator)	615	0.12
N-5	Dust collector (HEPA-filtered vacuum)	0	0
N-6	Operator (breathing zone - 6 ft. from dust collector)	59,000	0.5
	TEST #3		
N-4	Background (same as in Test #2)	615	0.12
N-7	Operator (breathing zone - 6 ft. from dust collector)	0	0
N-8	Dust collector (HEPA-filtered vacuum)	0	0

Remarks and Conclusions:

The tests demonstrate that asbestos levels are virtually eliminated by the use of a system employing brake encapsulation device connected to a HEPA-filtered vacuum dust collector. Without the use of such equipment, fiber concentrations during compressed air jet-blowing of brake drums ranged from 6.6 to 29.8 fibers/milliliter. However, when the Asbesto-Clene System was used, fiber concentrations on both the mechanic and dust collector exhaust were not detected, as verified by transmission electron microscopy. An important exception to this is observed in Test #2, the sample taken on the operator. Prior to this test, this mechanic had worked on brake jobs without using the Asbesto-Clene System and without changing his work clothes. This exposure had resulted in contamination of his clothes, reflected in the high residual asbestos concentration of 59,000 nanograms/cubic meter and 0.5 fibers/milliliter. In contrast, the operator in Test #1 and Test #3 wore clean coveralls. This points up the need to adhere to the OSHA regulations concerning special clothing, change rooms, etc. to minimize contamination.

The background asbestos measurements, of 400 and 615 nanograms/cubic meter, are consistent with other background measurements taken during brake repair work. They are the result of residual contamination of the garage by asbestos.

This study has been unique and fortunate in two respects; first because of the great interest and importance of determining chrysotile asbestos levels in such circumstances. The data indicate that the Asbesto-Clene System represents an outstanding advancement in industrial hygiene procedures to control asbestos exposure. It has also been a pleasure to work with you in preparing and conducting these tests. If there are any questions regarding the results or conclusions in this report, please do not hesitate to contact me.

Sincerely,

Arthur N. Rohl, Ph.D.
Environmental Sciences Laboratory

ANR:jm

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