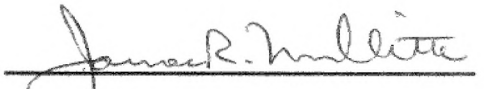
Report of Results: MVA7040

Examination of Ford & Delco Brakes

Prepared for:

The Law Offices of Peter G. Angelos
One Charles Center
100 N. Charles Street
Baltimore, MD 21201

Respectfully Submitted by:



James R. Millette, Ph.D.
Executive Director

MVA Scientific Consultants
3300 Breckinridge Boulevard
Suite 400
Duluth, GA 30096

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Introduction

This report presents the results of an examination of Ford and Delco brake materials. The Ford brake materials were received at MVA Scientific Consultants on 13 May 1996. The Delco brake material was received at MVA Scientific Consultants on 20 September 2001. The brake pads were assigned MVA laboratory sample numbers as shown in Table 1. The samples were analyzed for asbestos. The analyses were done in our laboratory on 13 May 1996, 28 September 2001, and during the period 09 September through 16 September 2008.

Methods

The brake pads were initially examined under an Olympus SZ-40 stereomicroscope at magnifications from 7 to 40X. Portions of the particulate found in the brake were mounted in 1.55 RI Cargille liquid for analysis by polarized light microscopy (PLM) using an Olympus BH-2 polarized light microscope with a magnification range from 100 to 1,000X. The PLM analysis followed the analytical procedures recommended by the U.S. Environmental Protection Agency (1). The PLM results for asbestos are given in terms of percent by volume.

In order to concentrate possible amphibole material for analysis, an acid/base digestion procedure based on earlier work (2) was used to eliminate the soluble fractions. A portion of the sample was ashed and the residue remaining was transferred to a 100 ml round-bottom flask containing 80 ml of acid (2N H_2SO_4) fitted with a reflux condenser. The suspension was boiled for one hour. The residue was collected by centrifugation and the reflux procedure was repeated with sodium hydroxide (4N). The residue was then re-suspended in water and a known aliquot was extracted and filtered through a 0.2 µm pore size polycarbonate filter. The filter was dried and grids prepared following standard direct preparation procedures (AHERA/ISO10312) for analysis by transmission electron microscopy (TEM). A laboratory blank sample following all the procedures except the addition of test material was prepared in a similar way. The TEM results for asbestos are given in terms of percent by weight.

Results

The results of PLM and TEM analyses are shown in Table 1. Amphibole fiber information is shown in Tables 2 and 3. As received, the pads were not friable. However, they produced dust when scratched or rubbed. Asbestos fibers were found protruding from the surface of the brake materials. No asbestos fibers were found in any of the blank samples. Representative photographs and micrographs taken during the studies are shown in Figures 1 through 7.

References

1. U. S. Environmental Protection Agency, "Test Method EPA/600/R-93/116 -- Method for the Determination of Asbestos in Bulk Building Materials."
2. "Analysis of Amphibole Asbestos in Chrysotile and Other Minerals" by J. Addison and L.S.T. Davies. Ann. Occup. Hyg. Vol. 34. No. 2. pp. 159-175, 1990.

Table 1. Sample Information and Asbestos Analysis Results

MVA#	Sample Information	PLM Analysis Results % Chrysotile	TEM Analysis Results % Amphibole
1810 G0922	Brake Ford SEC BX-DU-GF	50%	0.019%
4792 L1472	Brake Delco Drum 18012416 171-440 Lettering on Side of Brake: "DELCO 233 FE".	50%	0.0004%

Table 2. TEM Amphibole Fiber Data
1810-G0922 – Brake

Str. #	Length	Width	AspectRatio	
1	1.68	0.19	8.8	Tremolite
2	2.64	0.14	18.9	Tremolite
3	2.40	0.14	17.1	Tremolite
4	2.88	0.48	6.0	Tremolite
5	3.85	0.34	11.3	Tremolite
6	3.85	0.48	8.0	Tremolite
7	2.40	0.29	8.3	Tremolite
8	2.40	0.14	17.1	Tremolite
9	2.64	0.19	13.9	Tremolite
10	2.88	0.19	15.2	Tremolite

Table 3. TEM Amphibole Fiber Data
4792-L1472 – Brake

Str. #	Length	Width	AspectRatio	
1	1.92	0.14	13.7	Tremolite
2	1.44	0.14	10.3	Tremolite
3	2.16	0.19	11.4	Tremolite
4	1.92	0.19	10.1	Tremolite
5	2.40	0.19	12.6	Tremolite
6	2.64	0.19	13.9	Tremolite
7	2.40	0.14	17.1	Tremolite
8	3.61	0.19	19.0	Tremolite
9	2.88	0.19	15.2	Tremolite
10	1.44	0.14	10.3	Tremolite

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Figure 1. Sample G0922.



Figure 2. Sample G0922.

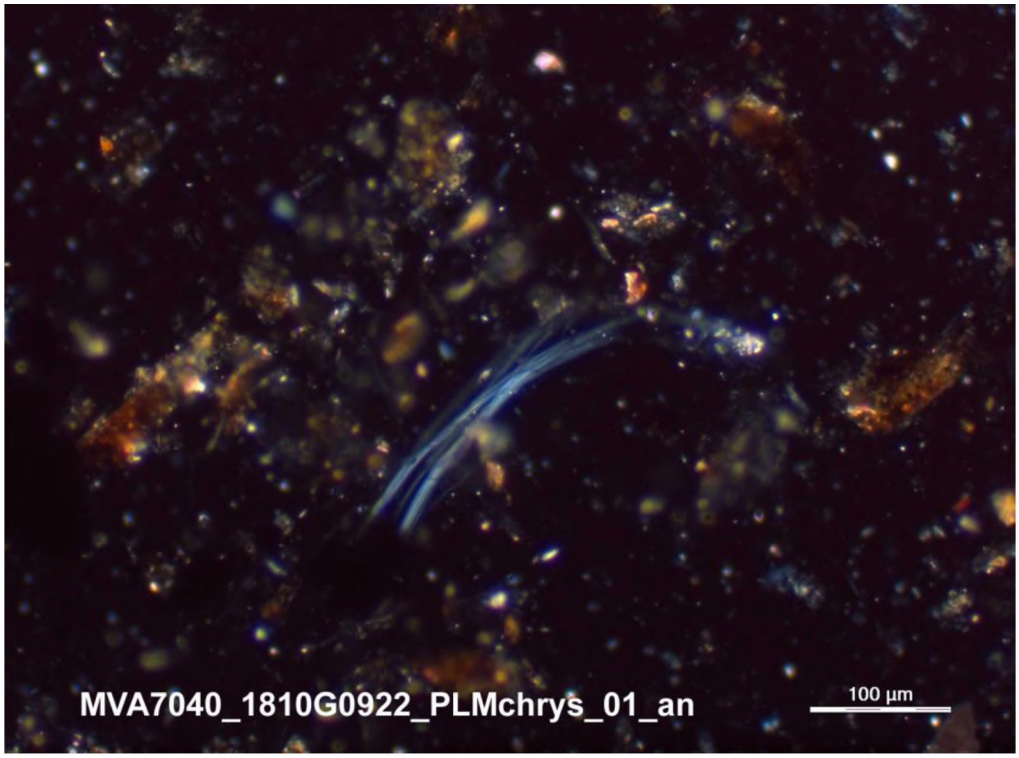


Figure 3. PLM image of chrysotile in Sample G0922.



Figure 4. Brake shoes Sample L1472.



Figure 5. Brake shoe Sample L1472.



Figure 6. Delco box for Sample L1472.

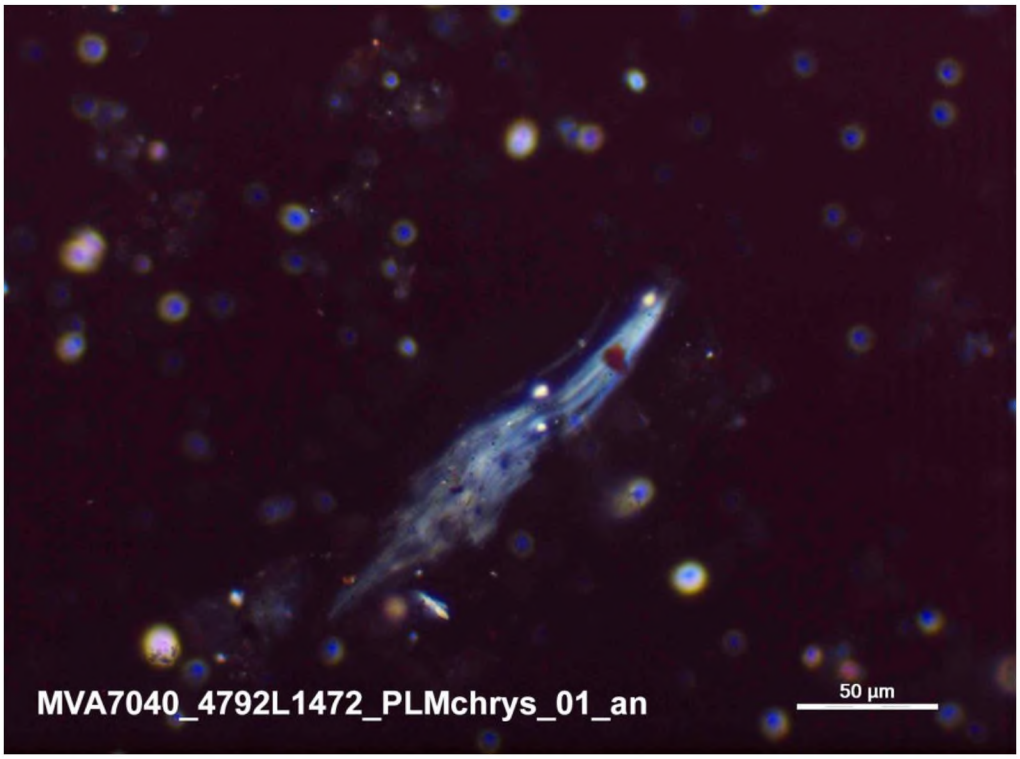


Figure 7. PLM image of chrysotile in Sample L1472.