EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 858-4960

23 January 2020

Daniel Friedman
Vassar College
Box 419
124 Raymond Ave, Poughkeepsie, NY 12604
danjoefriedman@mgmail.com

Re: EMSL Order ID: 042000629 (PLM and TEM EPA 600/R-93/116)

Daniel:

On 14 January, 2020, twelve (12) bulk samples were received at EMSL Analytical, Inc. in Cinnaminson, NJ. The samples were sent for analysis via PLM EPA 600/R-93/116 (< 1%) & TEM EPA 600/R-93/116 (<0.01%). The samples were logged in following normal lab procedures. The sample was received under Chain of Custody and in good condition. A unique laboratory identification number was assigned to each sample tested. A summary is below with more detailed descriptions.

Sample Number	EMSL Sample ID	Sample Description
001	042000629-0001	Roof Tile
002	042000629-0002	Synthetic Roof Slate
003	042000629-0003	1960 – Floor Tile
004	042000629-0004	1960 – Floor Tile
005	042000629-0005	Resilient Sheet Flooring
008	042000629-0008	Fire-resistant Spray Coating
009	042000629-0009	Corrugated Asbestos Paper Pipe Insulation
010	042000629-0010	Roof Granules and Dust
011	042000629-0011	Fabric and Rubber Electric Wire Insulation
012	042000629-0012	Ceiling Tile

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013	042000629-0012	1960's Ceiling Tile
014	042000629-0014	Insulating Fiberboard

Analytical Approach

These samples were analyzed for asbestos by PLM EPA 600/R-93/116 and TEM EPA 600/R-93/116.

Phase 1- Subsamples was taken from each sample and were then analyzed by PLM EPA 600/R-93/116 for the presence or absence and quantification (if any) of asbestos

Phase 2- If asbestos was not detected by PLM analysis at a level greater than 1%, a subsample was taken from each non-organically bound sample and gravimetrically reduced. This gravimetrically reduced material was analyzed by TEM EPA 600/R-93/116.

For PLM, samples are initially examined under low magnification using stereo microscopy. Initial observations note gross material appearance (homogeneity, fibrous/non-fibrous) and physical characteristics (color, texture, friable/non-friable). Preparation using various techniques, including, but not limited to, pinch mounts which is followed by analysis by polarized light microscopy (PLM) are used for the positive identification of suspect fibers and quantitation. Positive identification of asbestos requires the determination of optical property characteristics of the six types of regulated asbestos: chrysotile, amosite (grunerite), crocidolite (riebeckite), anthophyllite, tremolite and actinolite asbestos.

For TEM, an aliquot of the material is organically reduced. This is performed on the sample by ashing (using a muffle furnace), followed by acid digestion to remove the carbonate mineral. Mass determinations are recorded after each step, determining the percent loss for each type of matrix material. The reduced sample is analyzed for asbestos following TEM analysis by being dropped mounted on a copper grid.

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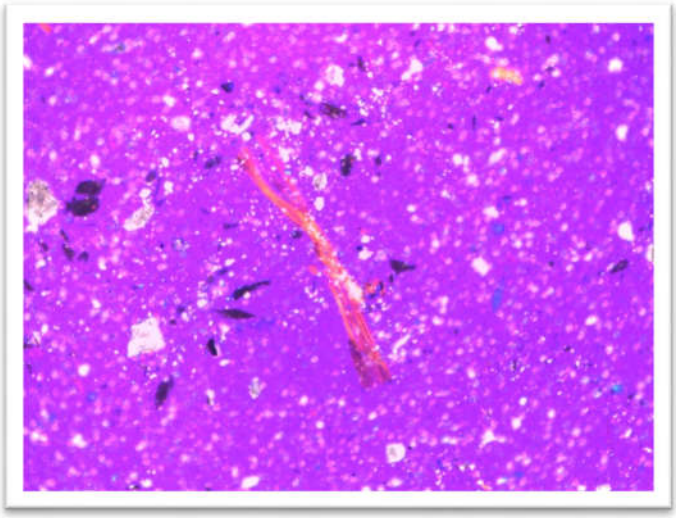
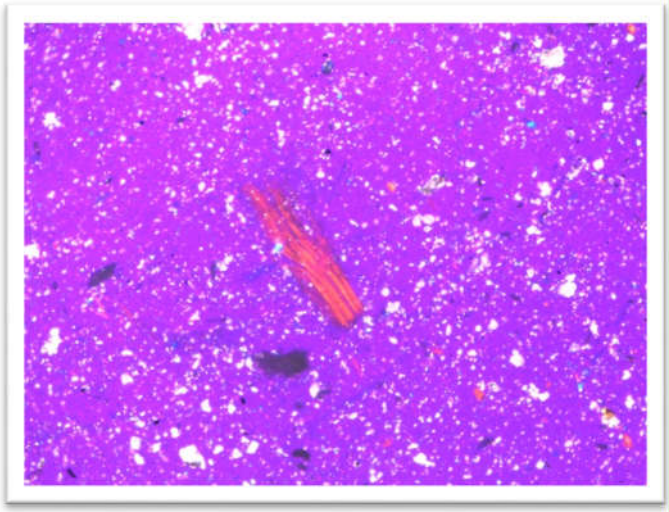
Phase 1 Results (PLM)

During PLM examination asbestos structures were observed on samples three, four, five, and nine. And, no asbestos was detected on samples one, two, eight, ten, eleven, twelve, thirteen, and fourteen as described in EPA/600/R-93/116, Appendix A (Please see attached report).

Phase 1- Polarized Light Microscopy (PLM)



Sample 3



Sample 4

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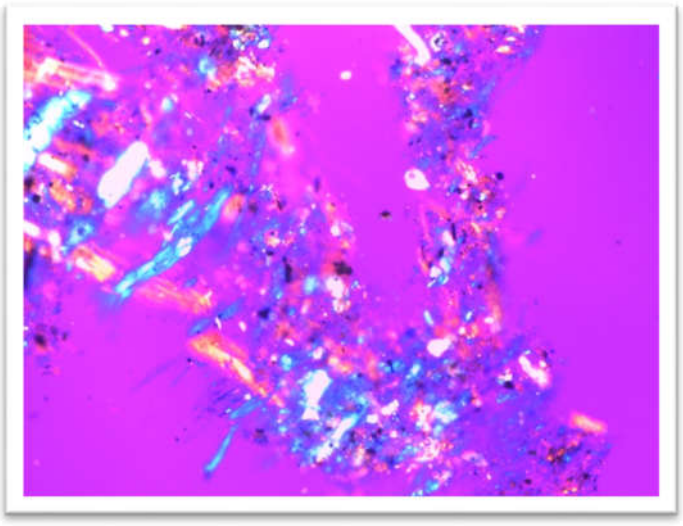
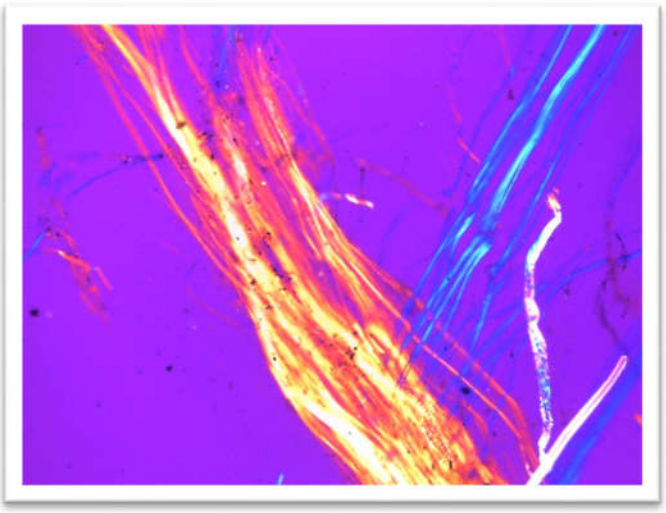


Sample 5



Sample 9

Phase 2 Results (TEM)

The non-organically bound samples were analyzed with a transmission electron microscope (TEM) at approximately 20,000 X magnification. Asbestos structures are identified by a combination of morphology, quantitative elemental chemistry via Energy Dispersive X-Ray Analysis (EDXA), and Selected Area Electron Diffraction (SAED).

042000629-0001

During TEM examination no asbestos was detected. (see attached report).

042000629-0010

During TEM examination no asbestos was detected. (see attached report).

042000518-0011

During TEM examination no asbestos was detected. (see attached report).

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Detection Limit and Interference

This examination is limited to the conditions and practices observed and information provided to EMSL Analytical, Inc. The method used, conclusions and recommendations are based on our experience. They are subject to the limitations and variability inherent to the approach used. This examination is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.

The detection limit for Transmission Electron Microscopy (TEM) via EPA 600/R-93/116 is based on fiber dimensions, the density of the asbestos type(s) detected and the area analyzed. Interferences for this method include but are not limited to: Non-regulated asbestos minerals such as the two polymorphs of chrysotile, lizardite and antigorite; Non-regulated amphiboles such as winchite and richterite, and pyroxenes; cleavage fragments of the regulated asbestos types which may at times have morphologies and aspect ratios similar to the true asbestiform varieties; clay minerals that can have similar morphology to asbestos such as sepiolite and palygorskite; and all non-asbestos particulate, fibrous or not, which can partially or completely obscure asbestos fibers. Samples that were tested for this report are subject to the limitations expressed herein.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. In addition, I certify, that to the best of my knowledge and belief, the data as reported are true and accurate. Release of the data contained in this data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Samantha Rundstrom

Samantha Rundstrom | *Asbestos Supervisor*
EMSL Analytical, Inc. | 200 Route 130 North | Cinnaminson, NJ 08077
Phone: 856-303-2577 | Fax: 856-786-5974 | Toll Free: 800-220-3675
Lab Hours: Mon-Friday 7AM-10PM, Saturday 8AM-5PM, Sunday On-Call