

30 October 2019

Gary Latsha
PA Department of Environmental Protection
5 Laurel Blvd.
Pottsville, PA 17091

Re: EMSL Order ID: 041922026 (Rockhill Quarry)

Mr. Latsha –

On July 30, 2019 EMSL Analytical, Inc. received ten samples for asbestos analysis via courier. The samples were received without a Chain of Custody (COC) but arrived in good condition. These hand samples were logged in under one EMSL Order ID (041922026) following normal laboratory procedures and assigned a unique laboratory ID. Samples were grinding to a nominal size of 250 microns with a plate grinder and analyzed by TEM EPA/600/R-93/116 section 2.5.5.2 with a reporting limit of 0.01% by mass.

As per our conversation the other day we are providing representative TEM morphological images of the countable and non-countable structures encountered in the samples you submitted for analysis. Please note these images were taken during analysis and are not inclusive of all structures detected. Since the grinding prep is likely to have altered fiber dimensions, all fibers with substantially parallel sides, greater than or equal to 0.5 um in length and having at least a 3:1 aspect ratio (length to width) were included in the concentration. Also included are representative copies of the energy dispersive x-ray spectroscopy (EDS) spectra of the asbestos types and also of a pyroxene found in the samples

The scope of work for this project so far has been limited. Full documentation (morphological images, fiber dimensions, size distributions, EDS and SAED) of all fibers detected can be provided upon request at an additional charge.

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, 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





EMSL ANALYTICAL, INC.

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

PHONE: (800) 220-3675
FAX: (856) 858-4960

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.

If you have any questions please don't hesitate to contact us.

Sincerely,

Ben Ellis

EMSL Analytical, Inc.

200 Route 130 North | Cinnaminson, NJ 08077

Phone: 856-303-2583 | Fax: 856-786-5974 | Toll Free: 800-220-3675

Email: bellis@emsl.com

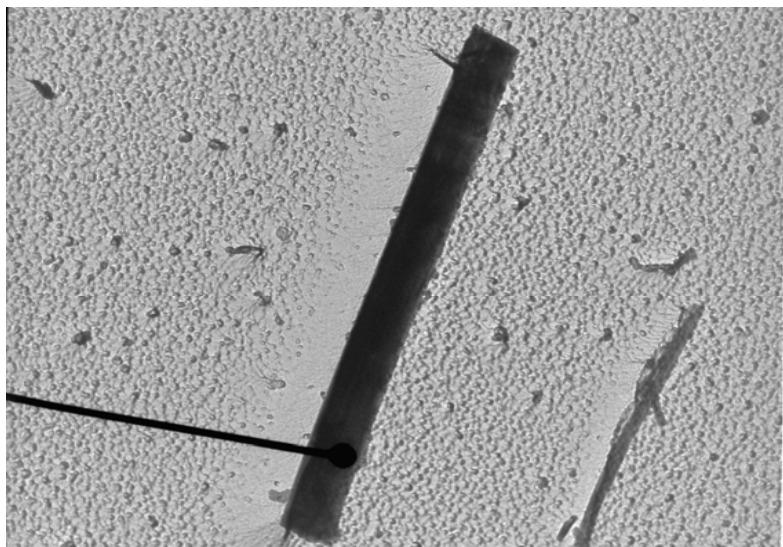




EMSL ANALYTICAL, INC.
LABORATORY-PRODUCTS-TRAINING

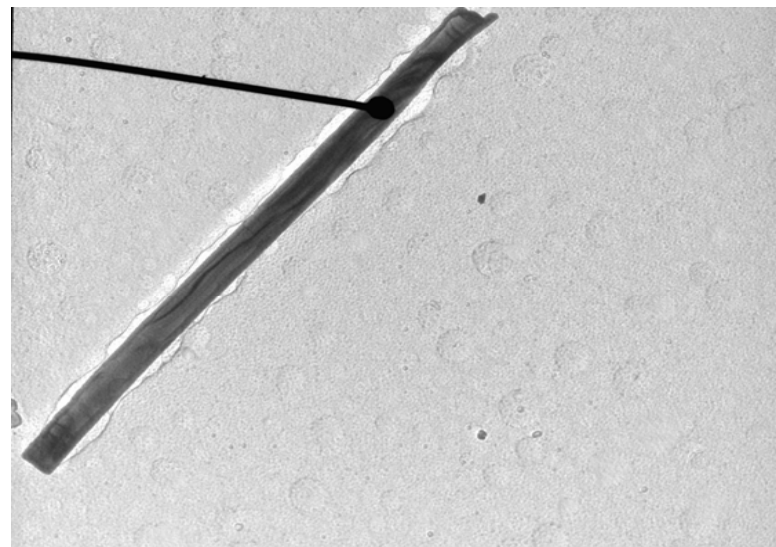
TEM Morphology of Select Fibers

Countable



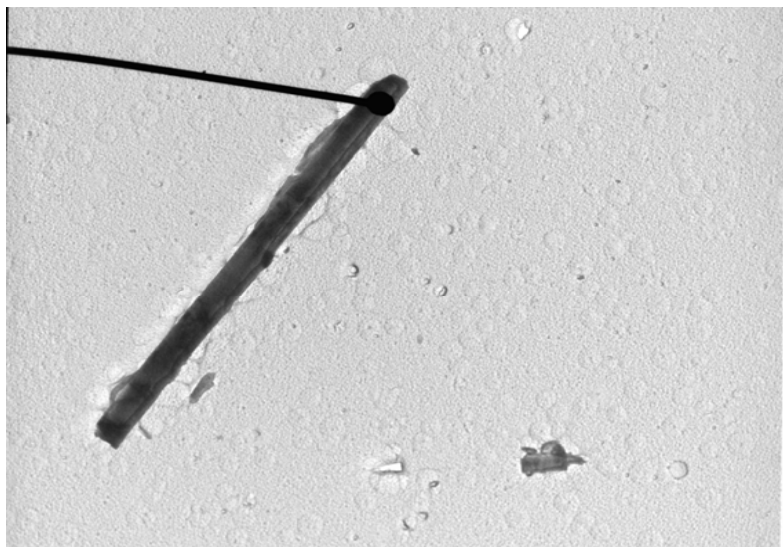
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100 kV	19000 x	-	-

—1 μm—



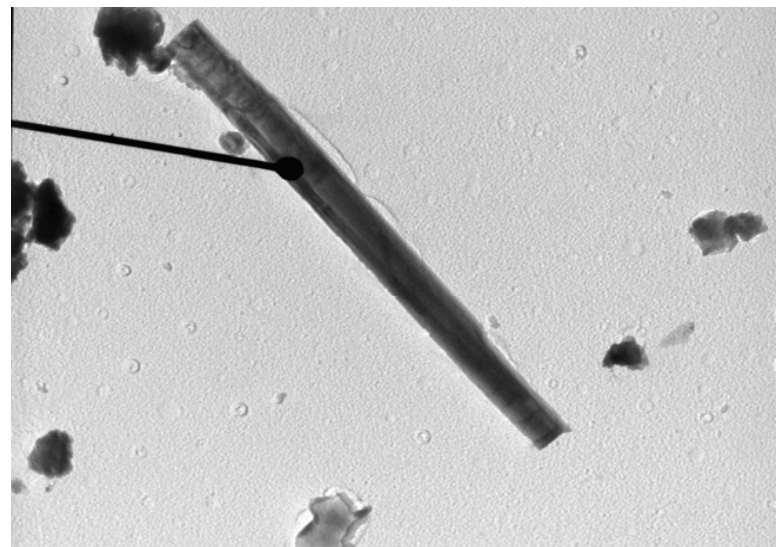
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-	-	-	-

—2 μm—



Accelerating Voltage	Magnification	Film Number	Sample
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—2 μm—



Accelerating Voltage	Magnification	Film Number	Sample
-	-	-	-

—2 μm—

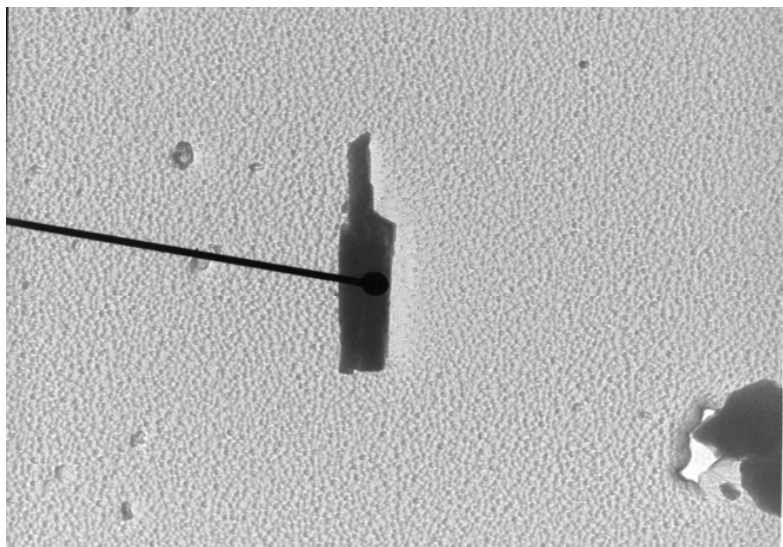




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TEM Morphology of Select Fibers

Non-countable



Accelerating Voltage	Magnification	Film Number	Sample
100 kV	19000 x	-	-

—1 μm—



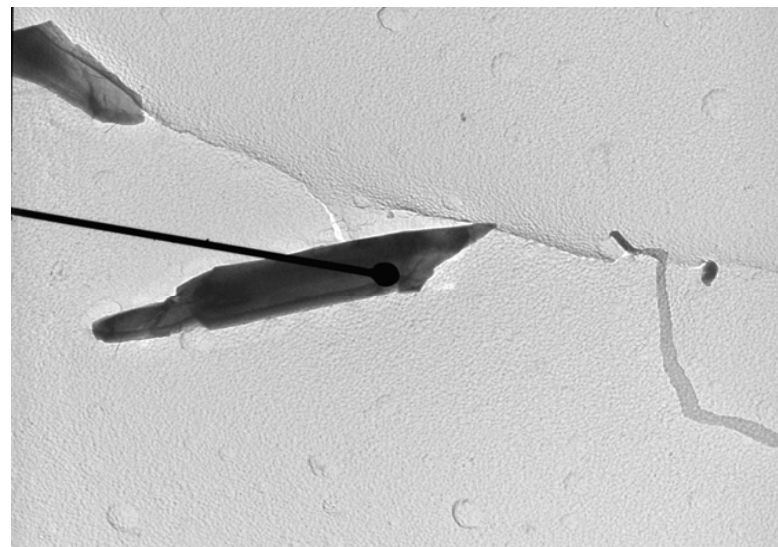
Accelerating Voltage	Magnification	Film Number	Sample
-	-	-	-

—1 μm—



Accelerating Voltage	Magnification	Film Number	Sample
100 kV	19000 x	-	-

—1 μm—



Accelerating Voltage	Magnification	Film Number	Sample
-	-	-	-

—1 μm—

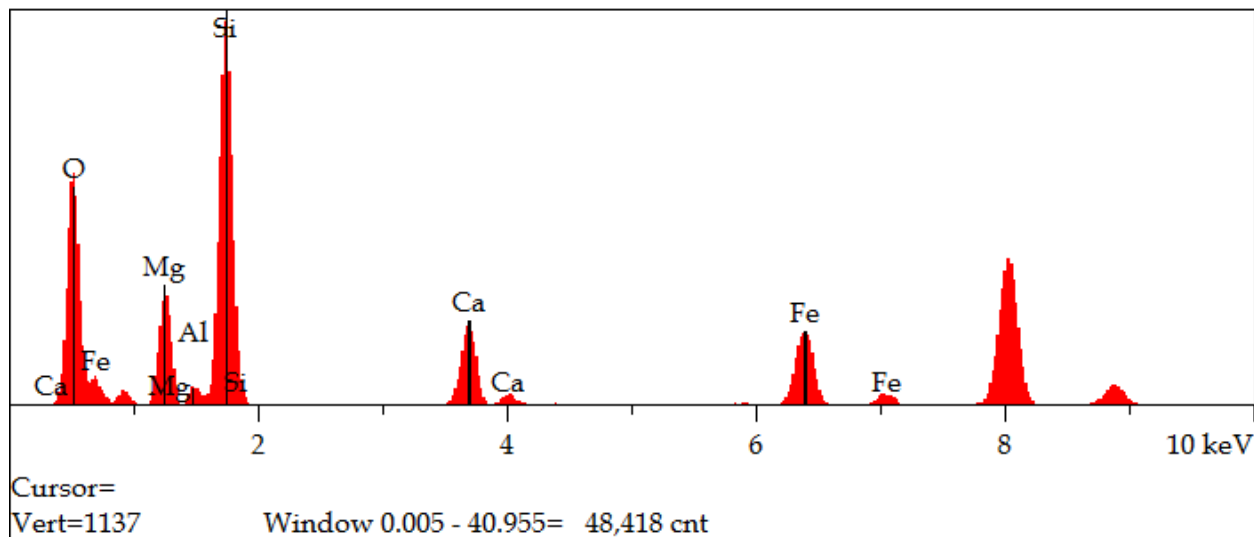




Energy Dispersive X-Ray Analysis via Transmission Electron Microscopy

EMSL ANALYTICAL, INC.

Analysis Report: 2019_04-01_041922026-0001_STR_Act



Spectrum 1

Component	Type	Mole Conc.	Conc.	Units		APFU
FeO	Calc	9.787	12.330	wt.%		1.41
CaO	Calc	10.183	10.013	wt.%		1.47
SiO ₂	Calc	56.131	59.141	wt.%		8.11
Al ₂ O ₃	Calc	1.503	2.686	wt.%		0.43
MgO	Calc	22.396	15.829	wt.%		3.24
		100.000	100.000	Wt.%	Total	O=23.0

Table 1

Elt.	Line	Intensity (c/s)	Quant	Conc.	Units	Calib File	Bkg Int (c/s)	
O	Ka	50.26	Foil	44.647	wt.%	@IXRF-Cal-2019-3.FOIL	1.75	
Mg	Ka	27.24	Foil	9.546	wt.%	@IXRF-Cal-2019-3.FOIL	3.86	
Al	Ka	4.71	Foil	1.422	wt.%	@IXRF-Cal-2019-3.FOIL	4.05	
Si	Ka	96.83	Foil	27.644	wt.%	@IXRF-Cal-2019-3.FOIL	3.28	
Ca	Ka	24.16	Foil	7.156	wt.%	@IXRF-Cal-2019-3.FOIL	1.75	
Fe	Ka	26.46	Foil	9.585	wt.%	@IXRF-Cal-2019-3.FOIL	1.15	
				100.000	Wt.%			Total

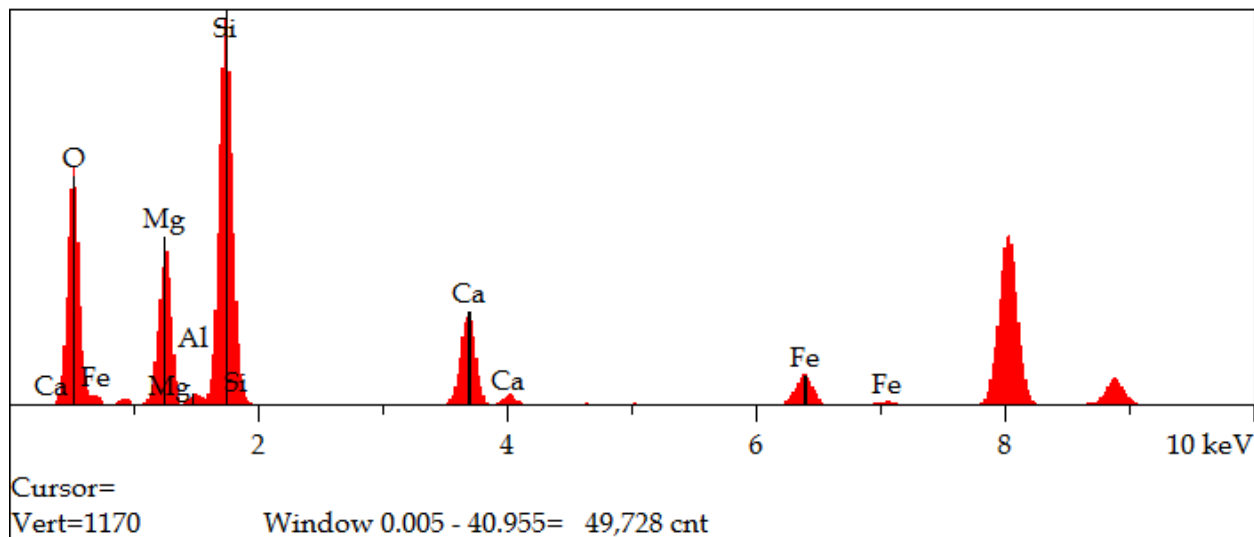
Table 2



Energy Dispersive X-Ray Analysis via Transmission Electron Microscopy

EMSL ANALYTICAL, INC.

Analysis Report: 2019_04-01_041922026-0001_STR_Trem



Spectrum 1

Component	Type	Mole Conc.	Conc.	Units		APFU
FeO	Calc	3.746	4.934	wt.%		0.55
CaO	Calc	10.986	11.296	wt.%		1.62
SiO2	Calc	54.495	60.036	wt.%		8.02
Al2O3	Calc	0.879	1.641	wt.%		0.26
MgO	Calc	29.894	22.094	wt.%		4.40
		100.000	100.000	Wt.%	Total	O=23.0

Table 1

Elt.	Line	Intensity (c/s)	Quant	Conc.	Units	Calib File	Bkg Int (c/s)	
O	Ka	76.82	Foil	45.837	wt.%	@IXRF-Cal-2019-3.FOIL	2.46	
Mg	Ka	57.72	Foil	13.323	wt.%	@IXRF-Cal-2019-3.FOIL	5.47	
Al	Ka	4.37	Foil	0.868	wt.%	@IXRF-Cal-2019-3.FOIL	5.52	
Si	Ka	149.79	Foil	28.063	wt.%	@IXRF-Cal-2019-3.FOIL	4.38	
Ca	Ka	41.29	Foil	8.073	wt.%	@IXRF-Cal-2019-3.FOIL	2.55	
Fe	Ka	16.02	Foil	3.835	wt.%	@IXRF-Cal-2019-3.FOIL	1.89	
				100.000	Wt.%			Total

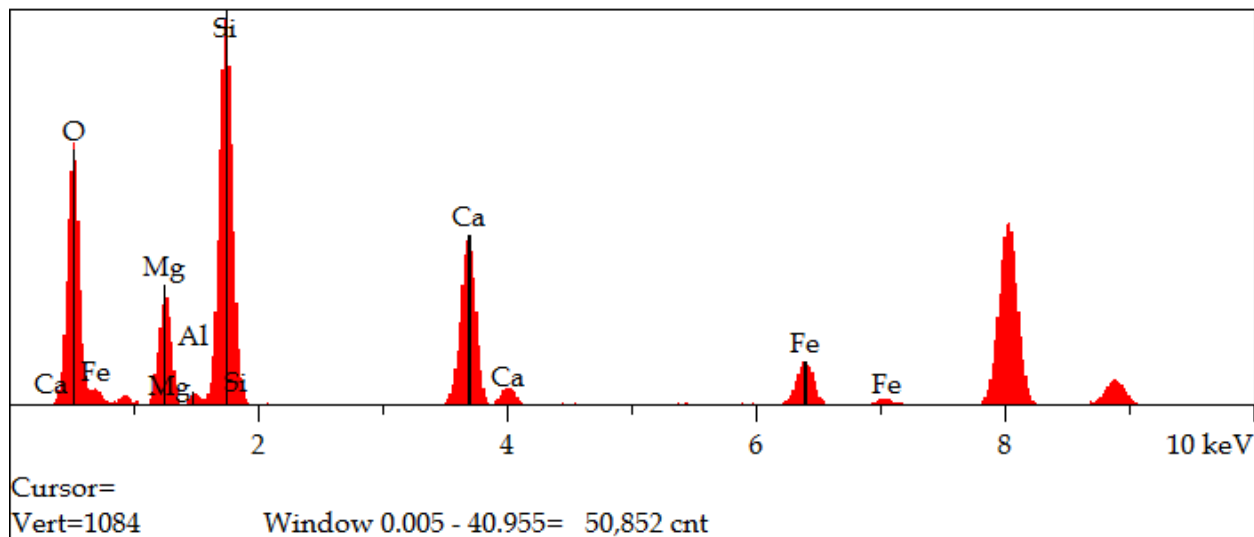
Table 2



Energy Dispersive X-Ray Analysis via Transmission Electron Microscopy

EMSL ANALYTICAL, INC.

Analysis Report: 2019_04-01_041922026-0001_STR_Pyx



Spectrum 1

Component	Type	Mole Conc.	Conc.	Units		APFU
FeO	Calc	5.205	6.654	wt.%		0.20
CaO	Calc	19.428	19.386	wt.%		0.75
SiO ₂	Calc	53.880	57.606	wt.%		2.08
Al ₂ O ₃	Calc	0.859	1.557	wt.%		0.07
MgO	Calc	20.629	14.796	wt.%		0.80
		100.000	100.000	Wt.%	Total	O=6.0

Table 1

Elt.	Line	Intensity (c/s)	Quant	Conc.	Units	Calib File	Bkg Int (c/s)	
O	Ka	78.87	Foil	44.299	wt.%	@IXRF-Cal-2019-3.FOIL	2.17	
Mg	Ka	37.80	Foil	8.923	wt.%	@IXRF-Cal-2019-3.FOIL	5.14	
Al	Ka	4.03	Foil	0.824	wt.%	@IXRF-Cal-2019-3.FOIL	5.16	
Si	Ka	138.46	Foil	26.927	wt.%	@IXRF-Cal-2019-3.FOIL	4.26	
Ca	Ka	69.94	Foil	13.855	wt.%	@IXRF-Cal-2019-3.FOIL	3.36	
Fe	Ka	21.42	Foil	5.172	wt.%	@IXRF-Cal-2019-3.FOIL	1.70	
				100.000	Wt.%			Total

Table 2