EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 07:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 13794
International Standard for the Determination of Asbestos Fibers - Indirect Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	BC-AA-01-00003		Air volume:	14400	Liters
EMSL Sample Number:	041416050-0001		Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD		Grid Openings Analyzed:	76	
Minimum Level of analysis (amphibole):	ADX		Percent of filter ashed:	50	%
Magnification used for fiber counting:	10,000		Suspension volume:	100	mL
Aspect ratio for fiber definition:	3:1		Volume Filtered:	65	mL
Min Length/ Width to be counted (µm):	>5 / 0.25-none		EFA of second filter:	364.9	mm²
Area of collection filter (mm²):	385		Analysis Date:	06/09/2014	
Result of Chi² Test:	75.00	Random	Analyst:	F. Craig	

Analytical Sensitivity: **0.000078** **Structure/cc** **Limit of Detection:** **0.000232** **Structure/cc**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration (Str/cc)	Poisson 95 % Confidence Interval LCL (Str/cc)	UCL (Str/cc)
PCMe Structures (Chrys)	CD	0	-	0.00	0.000000	0.000000 -	0.000232
PCMe Structures (Amph)	ADX	0	-	0.00	0.000000	0.000000 -	0.000232
PCMe Structures (NRA)	ADX	1	-	1.00	0.000078	0.000000 -	0.000368
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000232**
Total PCMe Structures (All)	**CD/ADX**	**1**	**-**	**1.00**	**0.000078**	**0.000000 -**	**0.000368**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000232
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000232
PCMe Fibers and Bundles (NRA)	ADX	-	1	1.00	0.000078	0.000000 -	0.000368
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000232**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**1**	**1.00**	**0.000078**	**0.000000 -**	**0.000368**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Non-Regulated, Amphibole*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Target Analytical Sensitivity not met. Stopping rule of 1.0 mm² invoked.

Robyn Denton
Approved Signatory

ISO 13794

International Standard for the Determination of Asbestos Fibers-Indirect Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0001	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-01-00003	Grid Box :	0414-TetraTech-04: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	75.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/20/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	25%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J1	J2	None Detected								
J1	J4	None Detected								
J1	J6	None Detected								
J1	J8	None Detected								
J1	J10	None Detected								
J1	I9	None Detected								
J1	I7	None Detected								
J1	I5	None Detected								
J1	I3	None Detected								
J1	H2	None Detected								
J1	H4	None Detected								
J1	H6	None Detected								
J1	H8	None Detected								
J1	H10	None Detected								
J1	G9	None Detected								
J1	G7	None Detected								
J1	G5	None Detected								
J1	G3	None Detected								
J1	G1	MD11	1		9.7	5.75	ADX	Non Reg.Amph.		
J1	G1	MB		1	9.7	0.5	ADX	Non Reg.Amph.		
J1	F2	None Detected								
J1	F4	None Detected								
J1	F6	None Detected								
J1	F8	None Detected								
J1	F10	None Detected								
J2	I9	None Detected								
J2	I7	None Detected								
J2	I5	None Detected								
J2	I3	None Detected								
J2	I1	None Detected								
J2	H2	None Detected								
J2	H4	None Detected								
J2	H6	None Detected								
J2	H8	None Detected								
J2	H10	None Detected								
J2	G9	None Detected								
J2	G7	None Detected								
J2	G5	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 13794

International Standard for the Determination of Asbestos Fibers-Indirect Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0001	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-01-00003	Grid Box :	0414-TetraTech-04: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	75.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/20/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	25%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J2	G3	None Detected								
J2	G1	None Detected								
J2	F4	None Detected								
J2	F6	None Detected								
J2	F8	None Detected								
J2	F10	None Detected								
J2	E9	None Detected								
J2	E7	None Detected								
J2	E5	None Detected								
J2	E3	None Detected								
J2	D4	None Detected								
J2	D6	None Detected								
J2	D8	None Detected								
J2	D10	None Detected								
J2	C9	None Detected								
J2	C7	None Detected								
J2	C5	None Detected								
J2	C3	None Detected								
J2	C1	None Detected								
J2	B2	None Detected								
J2	B4	None Detected								
J2	B6	None Detected								
J2	B8	None Detected								
J2	B10	None Detected								
J3	A9	None Detected								
J3	A7	None Detected								
J3	A5	None Detected								
J3	A3	None Detected								
J3	A1	None Detected								
J3	B2	None Detected								
J3	B4	None Detected								
J3	B6	None Detected								
J3	B8	None Detected								
J3	B10	None Detected								
J3	C9	None Detected								
J3	C7	None Detected								
J3	C5	None Detected								
J3	C3	None Detected								
J3	C1	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

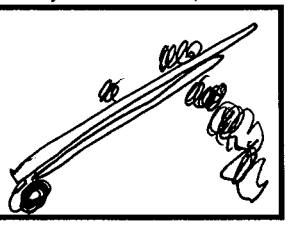
ISO 13794

International Standard for the Determination of Asbestos Fibers-Indirect Transfer Transmission Electron Microscopy

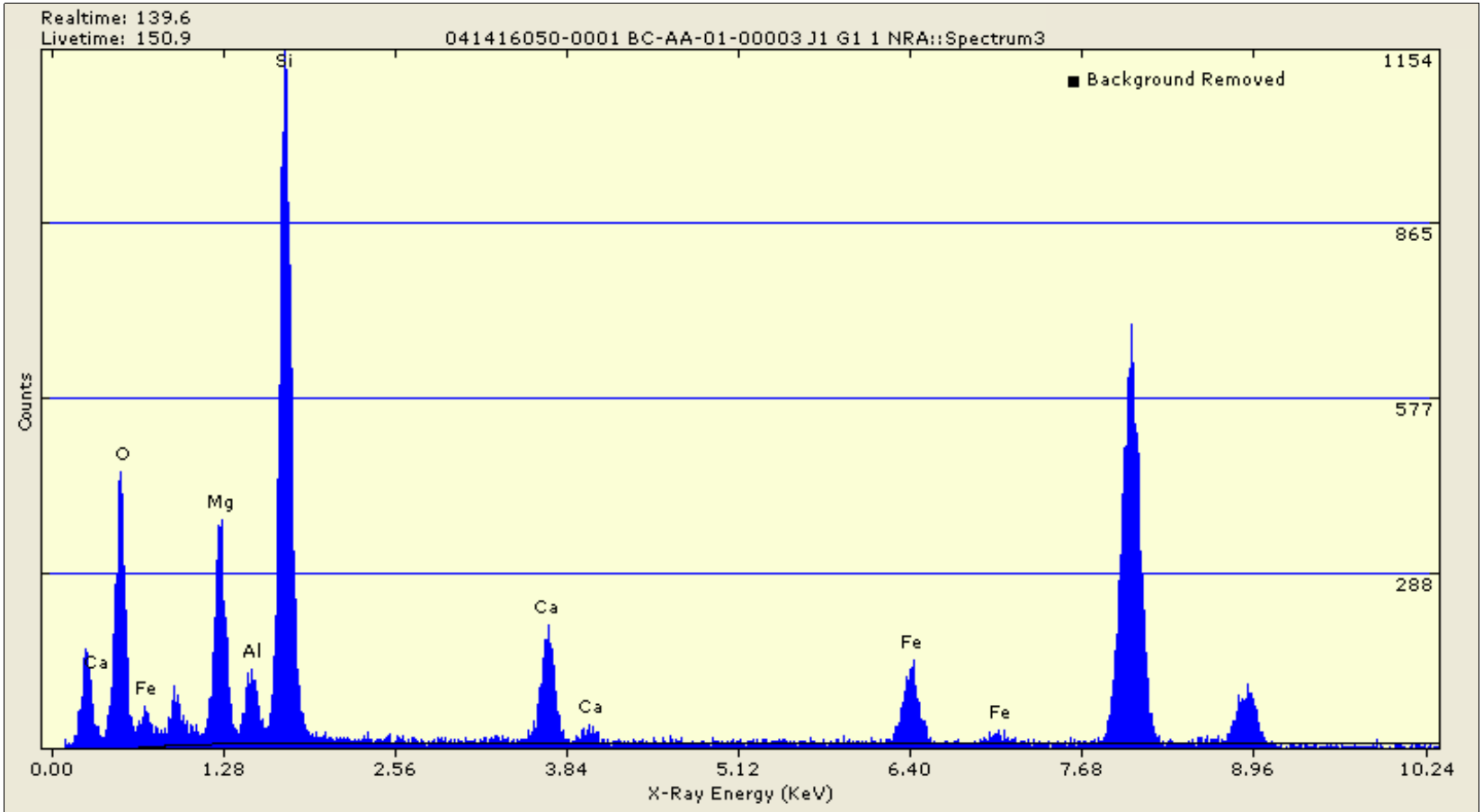
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041416050-0001 **Client:** Tetra Tech

Client Sample: *BC-AA-01-00003* Page 1 of 1

Primary Structure # 1 	Primary Structure #	Primary Structure #	Primary Structure #
Primary Structure #	Primary Structure #	Primary Structure #	Primary Structure #
Primary Structure #	Primary Structure #	Primary Structure #	Primary Structure #
Primary Structure #	Primary Structure #	Primary Structure #	Primary Structure #
Structure #	Structure #	Structure #	Structure #

Analyst: FL Date: 6/20/14 Scope: 04 01



Quantitative Results for Spectrum3
Analysis: Thin Film Method: Standardless
Acquired 20-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	46.73	0.50	61.66	0.00		0.0000	0.0000	0.0	86.2	3308.73
Magnesium	10.54	0.11	9.15	17.47	(MgO)	3.4138	0.1634	2720.5	95.9	2779.84
Aluminum	3.13	0.03	2.45	5.91	(Al2O3)	0.9127	0.0493	891.0	98.8	1053.35
Silicon	29.39	0.31	22.09	62.87	(SiO2)	8.2402	0.4242	8868.7	101.7	9292.17
Calcium	5.29	0.06	2.79	7.40	(CaO)	1.0398	0.0448	1657.7	122.5	1775.97
Iron	4.93	0.05	1.86	6.34	(FeO)	0.6954	0.0343	1227.0	146.4	1365.12
Total	100.00			100.00		14.3020				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416050	**Date:**	Jun 20, 2014
Indexing of Image Number:	010291	**Scope #:**	04 - 01
Reference / Sample No:	0001-04-01	**By:**	F Craig
Preliminary ID:	NAM		
Using Camera Constant of:	2.949e-003	**1/A Pixels**	
Determined from Reference:	AuCal-061714_10267		

Measured Inter-Row Spacing: **63.72** Pixels

Mean Distance between spots on Center row (d2): Pixels

Mean Distance between spots on slant vector (d1): Pixels

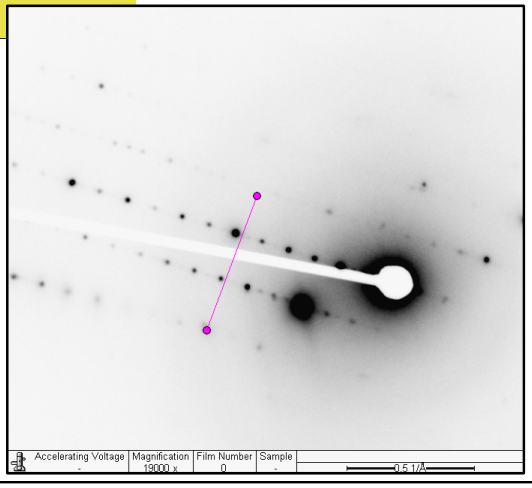
	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.322	**5.300**	*5.035*	*5.565*
d2 or hk0 (Camera K/zero row dist.):	N/A	**N/A**	-	-
d1 or hk1 (Camera K/slant vector dist.):	N/A	**N/A**	-	-
Ratio of hk0/hkl:	N/A	**N/A**	-	-
Angle of Slant Vector (Measured):	N/A	**N/A**	-	-

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: NAM **By:** F Craig

Miller Indice hk0: ( )

Miller Indice hkl: ( )

With a Zone Axis of: [**N/A**]



Preliminary Identification was: X CORRECT

INCORRECT

Percent accuracy to date: 100 %

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/02/2014 11:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	BC-AA-02-00003A	Air volume:	3740	Liters
EMSL Sample Number:	041416050-0002	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	195	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	10,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	N/A N/A	Analyst:	F. Craig	

Analytical Sensitivity: **0.000040** **Structure/cc** **Limit of Detection:** **0.000120** **Structure/cc**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration (Str/cc)	Poisson 95 % Confidence Interval LCL (Str/cc)	UCL (Str/cc)
PCMe Structures (Chrys)	CD	0	-	0.00	0.000000	0.000000 -	0.000120
PCMe Structures (Amph)	ADX	0	-	0.00	0.000000	0.000000 -	0.000120
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000120
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000120**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000120**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000120
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000120
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000120
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000120**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000120**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *None Detected*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Samples collected on 0.8um filters.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0002	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00003A	Grid Box :	0414-TetraTech-02: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J2	J2	None Detected								
J2	J6	None Detected								
J2	J8	None Detected								
J2	I9	None Detected								
J2	I7	None Detected								
J2	I5	None Detected								
J2	I3	None Detected								
J2	I1	None Detected								
J2	H2	None Detected								
J2	H4	None Detected								
J2	H6	None Detected								
J2	H8	None Detected								
J2	G9	None Detected								
J2	G7	None Detected								
J2	G5	None Detected								
J2	G3	None Detected								
J2	G1	None Detected								
J2	F2	None Detected								
J2	F4	None Detected								
J2	F6	None Detected								
J2	F8	None Detected								
J2	E9	None Detected								
J2	E7	None Detected								
J2	E5	None Detected								
J2	E3	None Detected								
J2	E1	None Detected								
J2	D2	None Detected								
J2	D4	None Detected								
J2	D6	None Detected								
J2	D8	None Detected								
J2	C7	None Detected								
J2	C5	None Detected								
J2	C3	None Detected								
J2	C1	None Detected								
J2	B2	None Detected								
J2	B4	None Detected								
J2	B6	None Detected								
J2	B8	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0002	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00003A	Grid Box :	0414-TetraTech-02: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J2	B10	None Detected								
J2	A9	None Detected								
J2	A7	None Detected								
J2	A5	None Detected								
J2	A3	None Detected								
J2	A1	None Detected								
J3	A3	None Detected								
J3	A7	None Detected								
J3	B8	None Detected								
J3	B6	None Detected								
J3	B4	None Detected								
J3	B2	None Detected								
J3	C1	None Detected								
J3	C3	None Detected								
J3	C5	None Detected								
J3	D6	None Detected								
J3	D4	None Detected								
J3	D2	None Detected								
J3	E1	None Detected								
J3	E3	None Detected								
J3	E5	None Detected								
J3	E7	None Detected								
J3	F8	None Detected								
J3	F6	None Detected								
J3	F4	None Detected								
J3	F2	None Detected								
J3	G1	None Detected								
J3	G3	None Detected								
J3	G5	None Detected								
J3	G7	None Detected								
J3	H8	None Detected								
J3	H6	None Detected								
J3	H4	None Detected								
J3	H2	None Detected								
J3	I1	None Detected								
J3	I3	None Detected								
J3	I5	None Detected								
J3	I7	None Detected								
J3	J8	None Detected								
J3	J6	None Detected								

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0002	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00003A	Grid Box :	0414-TetraTech-02: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J3	J4	None Detected								
J3	J2	None Detected								
J4	J2	None Detected								
J4	J4	None Detected								
J4	J6	None Detected								
J4	J8	None Detected								
J4	I9	None Detected								
J4	I7	None Detected								
J4	I5	None Detected								
J4	I3	None Detected								
J4	I1	None Detected								
J4	H2	None Detected								
J4	H4	None Detected								
J4	H6	None Detected								
J4	H8	None Detected								
J4	G9	None Detected								
J4	G7	None Detected								
J4	G5	None Detected								
J4	G3	None Detected								
J4	G1	None Detected								
J4	F2	None Detected								
J4	F4	None Detected								
J4	F6	None Detected								
J4	F8	None Detected								
J4	E9	None Detected								
J4	E7	None Detected								
J4	E5	None Detected								
J4	E3	None Detected								
J4	E1	None Detected								
J4	D2	None Detected								
J4	D4	None Detected								
J4	D5	None Detected								
J4	D8	None Detected								
J4	C9	None Detected								
J4	C5	None Detected								
J4	C3	None Detected								
J4	C1	None Detected								
J4	B2	None Detected								
J4	B4	None Detected								
J4	B6	None Detected								

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0002	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00003A	Grid Box :	0414-TetraTech-02: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J4	B8	None Detected								
J4	A5	None Detected								
J4	A3	None Detected								
J4	A1	None Detected								
J5	A9	None Detected								
J5	A7	None Detected								
J5	A5	None Detected								
J5	A3	None Detected								
J5	B2	None Detected								
J5	B4	None Detected								
J5	B6	None Detected								
J5	B8	None Detected								
J5	B10	None Detected								
J5	C9	None Detected								
J5	C7	None Detected								
J5	C5	None Detected								
J5	C3	None Detected								
J5	D2	None Detected								
J5	D4	None Detected								
J5	D6	None Detected								
J5	D8	None Detected								
J5	D10	None Detected								
J5	E9	None Detected								
J5	E7	None Detected								
J5	E5	None Detected								
J5	E3	None Detected								
J5	F2	None Detected								
J5	F4	None Detected								
J5	F6	None Detected								
J5	F8	None Detected								
J5	G9	None Detected								
J5	G7	None Detected								
J5	G5	None Detected								
J5	G3	None Detected								
J5	G1	None Detected								
J5	H2	None Detected								
J5	H4	None Detected								
J5	H6	None Detected								
J5	H8	None Detected								
J5	I9	None Detected								

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0002	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00003A	Grid Box :	0414-TetraTech-02: J	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
J5	I7	None Detected								
J5	I5	None Detected								
J5	I3	None Detected								
J5	I1	None Detected								
J5	J2	None Detected								
J5	J4	None Detected								
J5	J6	None Detected								
J5	J8	None Detected								
J1	E9	None Detected								
J1	E7	None Detected								
J1	E5	None Detected								
J1	E3	None Detected								
J1	F4	None Detected								
J1	F6	None Detected								
J1	F8	None Detected								
J1	F10	None Detected								
J1	G9	None Detected								
J1	G7	None Detected								
J1	G5	None Detected								
J1	H2	None Detected								
J1	H4	None Detected								
J1	H6	None Detected								
J1	H8	None Detected								
J1	H10	None Detected								
J1	I9	None Detected								
J1	I7	None Detected								
J1	I5	None Detected								
J1	I3	None Detected								
J1	J2	None Detected								
J1	J4	None Detected								
J1	J6	None Detected								
J1	J8	None Detected								
J1	J10	None Detected								
J1	D10	None Detected								
J1	D6	None Detected								
J1	D4	None Detected								
J1	D2	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 08:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	BC-AA-02-00003B	Air volume:	5416	Liters
EMSL Sample Number:	041416050-0003	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	135	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	20,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	133.00 Random	Analyst:	P. Harrison	

Analytical Sensitivity: **0.000040** **Structure/cc** **Limit of Detection:** **0.000119** **Structure/cc**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration (Str/cc)	Poisson 95 % Confidence Interval LCL (Str/cc)	UCL (Str/cc)
PCMe Structures (Chrys)	CD	0	-	0.00	0.000000	0.000000 -	0.000119
PCMe Structures (Amph)	ADX	2	-	1.12	0.000080	0.000000 -	0.000251
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**2**	**-**	**1.12**	**0.000080**	**0.000000 -**	**0.000251**
Total PCMe Structures (All)	**CD/ADX**	**2**	**-**	**1.12**	**0.000080**	**0.000000 -**	**0.000251**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	2	1.12	0.000080	0.000000 -	0.000251
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**2**	**1.12**	**0.000080**	**0.000000 -**	**0.000251**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**2**	**1.12**	**0.000080**	**0.000000 -**	**0.000251**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Actinolite*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Samples collected on 0.8um filters.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0003	GO area (mm²):	0.0132	Mag.	20,000
Customer Sample:	BC-AA-02-00003B	Grid Box :	0414-Tetra Tech-2: K	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	133.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
K1	B8	None Detected								
K1	B6	None Detected								
K1	B4	None Detected								
K1	C3	None Detected								
K1	C5	None Detected								
K1	C7	F	1	1	8.2	1.4	ADX	Actinolite		
K1	C9	None Detected								
K1	D10	None Detected								
K1	D8	None Detected								
K1	D6	None Detected								
K1	D4	None Detected								
K1	E3	None Detected								
K1	E5	None Detected								
K1	E7	None Detected								
K1	E9	None Detected								
K1	F10	None Detected								
K1	F8	None Detected								
K1	F6	None Detected								
K1	F4	None Detected								
K1	G3	None Detected								
K1	G5	None Detected								
K1	G7	None Detected								
K1	G9	None Detected								
K1	H10	None Detected								
K1	H8	None Detected								
K1	H6	None Detected								
K1	H4	None Detected								
K1	H2	None Detected								
K1	I3	None Detected								
K1	I5	None Detected								
K1	I7	None Detected								
K1	I9	None Detected								
K1	J10	None Detected								
K1	J8	None Detected								
K1	J6	None Detected								
K1	J4	None Detected								
K1	J2	None Detected								
K2	J9	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0003	GO area (mm²):	0.0132	Mag.	20,000
Customer Sample:	BC-AA-02-00003B	Grid Box :	0414-Tetra Tech-2: K	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	133.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
K2	J7	None Detected								
K2	J5	None Detected								
K2	J3	None Detected								
K2	J1	None Detected								
K2	I2	None Detected								
K2	I4	None Detected								
K2	I6	None Detected								
K2	I8	None Detected								
K2	H9	None Detected								
K2	H7	None Detected								
K2	H5	None Detected								
K2	H3	None Detected								
K2	H1	None Detected								
K2	G2	None Detected								
K2	G4	None Detected								
K2	G6	None Detected								
K2	F7	None Detected								
K2	F5	None Detected								
K2	F3	None Detected								
K2	F10	None Detected								
K2	E2	None Detected								
K2	E4	None Detected								
K2	E6	None Detected								
K2	E8	None Detected								
K2	D9	None Detected								
K2	D7	None Detected								
K2	D5	None Detected								
K2	D3	None Detected								
K2	D1	None Detected								
K2	C2	MD11	2		10.4	3	ADX	Actinolite		
K2	C2	MF		2	9	0.8	ADX	Actinolite		
K2	C4	None Detected								
K2	C6	None Detected								
K2	C8	None Detected								
K2	B9	None Detected								
K2	B7	None Detected								
K2	B5	None Detected								
K2	B3	None Detected								
K2	A4	None Detected								
K2	A6	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0003	GO area (mm²):	0.0132	Mag.	20,000
Customer Sample:	BC-AA-02-00003B	Grid Box :	0414-Tetra Tech-2: K	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	133.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
K2	A8	None Detected								
K3	A1	None Detected								
K3	A3	None Detected								
K3	A5	None Detected								
K3	A7	None Detected								
K3	A9	None Detected								
K3	B6	None Detected								
K3	B4	None Detected								
K3	B2	None Detected								
K3	C1	None Detected								
K3	C3	None Detected								
K3	C5	None Detected								
K3	C7	None Detected								
K3	D6	None Detected								
K3	D4	None Detected								
K3	E1	None Detected								
K3	E3	None Detected								
K3	E5	None Detected								
K3	F4	None Detected								
K3	F2	None Detected								
K3	I2	None Detected								
K3	I4	None Detected								
K4	A4	None Detected								
K4	A6	None Detected								
K4	B7	None Detected								
K4	B3	None Detected								
K4	C2	None Detected								
K4	C4	None Detected								
K4	D7	None Detected								
K4	D5	None Detected								
K4	D3	None Detected								
K4	D1	None Detected								
K4	E2	None Detected								
K4	E4	None Detected								
K4	E6	None Detected								
K4	F7	None Detected								
K4	F5	None Detected								
K4	F3	None Detected								
K4	F1	None Detected								
K4	G2	None Detected								

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0003	GO area (mm²):	0.0132	Mag.	20,000
Customer Sample:	BC-AA-02-00003B	Grid Box :	0414-Tetra Tech-2: K	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	133.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	10%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
K4	G4	None Detected								
K4	G6	None Detected								
K4	G8	None Detected								
K4	G10	None Detected								
K4	H5	None Detected								
K4	H3	None Detected								
K4	I4	None Detected								
K4	I6	None Detected								
K4	J5	None Detected								
K5	A9	None Detected								
K5	A7	None Detected								
K5	A5	None Detected								
K5	A3	None Detected								
K5	B2	None Detected								
K5	B4	None Detected								
K5	B6	None Detected								
K5	B8	None Detected								
K5	C9	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

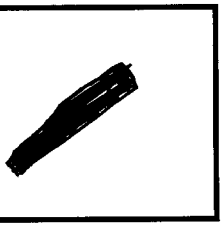
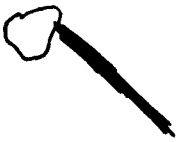
ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041416050-0003 **Client:** Tetra Tech

Client Sample: *BC-AA-02-00003B* Page 1 of _____

Primary Structure # 1 	Primary Structure # 2 	Primary Structure #	Primary Structure #
Primary Structure #	Primary Structure #	Primary Structure #	Primary Structure #
Primary Structure #	Primary Structure #	Primary Structure #	Primary Structure #
Primary Structure #	Primary Structure #	Primary Structure #	Primary Structure #
Structure #	Structure #	Structure #	Structure #

Analyst: _____ Date: 6/12/14 Scope: 04-03

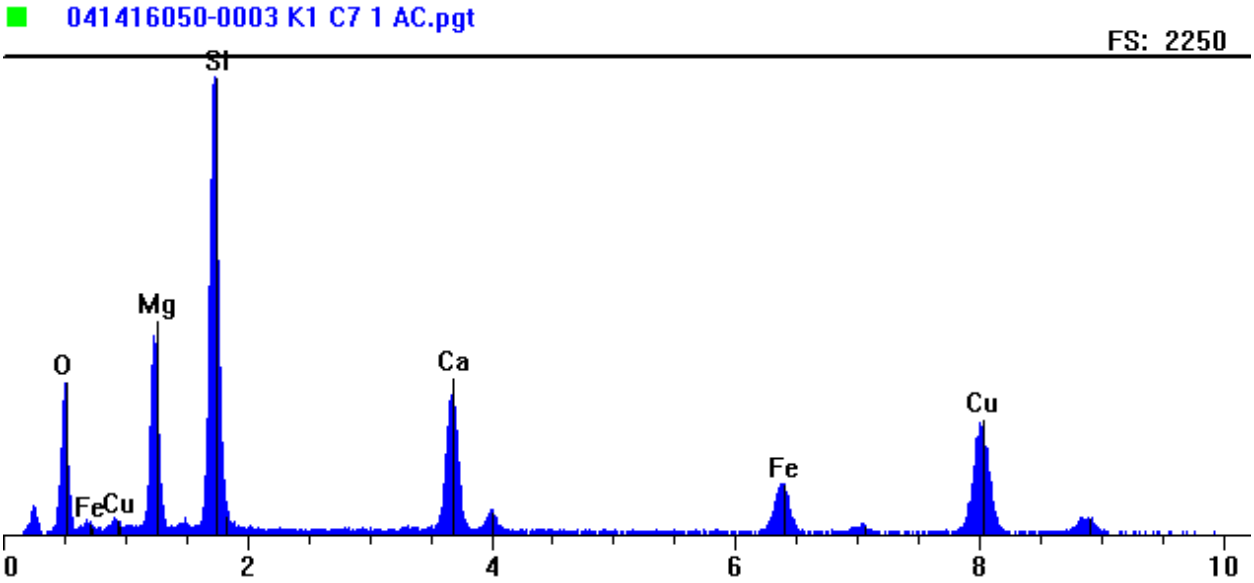
200 Route 130 North Cinnaminson, NJ 08077
www.emsl.com

Energy Dispersive X-Ray Analysis
Quantitative Spectra & Data

EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041416050-0003 K1 C7 1 AC.pgt
Collected: June 12, 2014 07:37:42

Live Time:	348.30	Count Rate:	427	Dead Time:	4.22 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	31.00
Thickness limit:	25629.80				



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	17.00	16.02	7.4	MgO	28.18
Si	KA1	1.740	1.0000	29.82	24.34	11.2	SiO	46.81
Ca	KA1	3.691	1.0500	13.27	7.59	3.5	CaO	18.56
Fe	KA1	6.403	0.9900	5.01	2.06	0.9	FeO	6.44
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	34.90	50.00	23.0		
Total			**0.0000**	**100.00**	**100.00**	**46.0**	**Total**	**100.00**

Element	Line	Gross (cps)	BKG (cps)	Net (cps)	P:B Ratio
Mg	KA1	38.3	1.8	36.5	20.2
Si	KA1	91.5	1.9	89.6	48.1
Ca	KA1	39.6	1.6	38.0	23.6
Fe	KA1	16.5	1.3	15.2	11.8
Cu	KA1	40.0	1.2	38.8	32.2
O	KA1	23.9	0.7	23.1	31.9

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number: 041416050 **Date:** Jun 12, 2014

Image Number: 04384

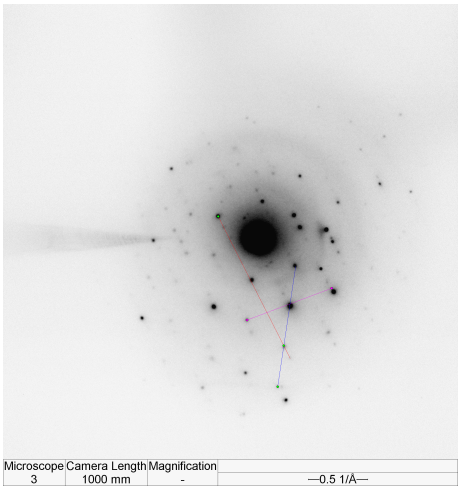
Reference / Sample Number: 0003

Preliminary ID: ACTINOLITE

Camera Constant: 1.861e-003 **1/A Pixels**

Calibration Reference: 060914-04-03-04372_C

	Measured	Reference	-5%	+5%
Inter-row Spacing:	**5.281**	5.278	**5.014**	**5.542**
d2 or hk0 (Camera K/zero row dist.):	**1.502**	1.505	**1.430**	**1.580**
d1 or hkl (Camera K/slant vector dist.):	**2.941**	2.942	**2.795**	**3.089**
Ratio of hk0/hkl:	**0.511**	0.512	**0.486**	**0.538**
Vector Angle:	**35.42**	35.420	**33.649**	**37.191**



From SAED Reference Book, "unknown" diffraction pattern was found to be that of: **ACTINOLITE**

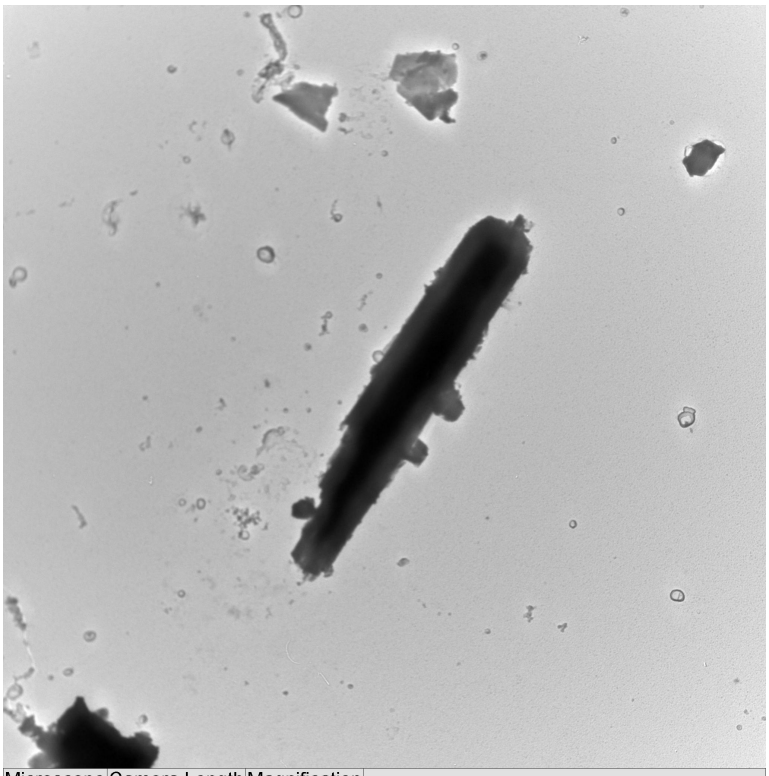
With a Zone Axis of: [**101**]

Preliminary Identification was:

X	CORRECT
	INCORRECT

EMSL Analytical, Inc.

Photomicrograph Report



Microscope	Camera Length	Magnification	
3	-	10000 x	—2 µm—

Micrograph Information

Sample ID:	0003
Order ID:	041416050
Image Number:	04385
Mineral Type:	ACTINOLITE
Date:	6/12/2014
Magnification:	10000
Microscope:	3

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 08:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 13794 International Standard for the Determination of Asbestos Fibers - Indirect Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	BC-AA-03-00003		Air volume:	14400	Liters
EMSL Sample Number:	041416050-0004		Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD		Grid Openings Analyzed:	76	
Minimum Level of analysis (amphibole):	ADX		Percent of filter ashed:	50	%
Magnification used for fiber counting:	10,000		Suspension volume:	100	mL
Aspect ratio for fiber definition:	3:1		Volume Filtered:	25	mL
Min Length/ Width to be counted (µm):	>5 / 0.25-none		EFA of second filter:	364.9	mm²
Area of collection filter (mm²):	385		Analysis Date:	06/09/2014	
Result of Chi² Test:	72.00	Random	Analyst:	F. Craig	

Analytical Sensitivity: **0.000202** **Structure/cc** **Limit of Detection:** **0.000604** **Structure/cc**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration (Str/cc)	Poisson 95 % Confidence Interval LCL (Str/cc)	UCL (Str/cc)
PCMe Structures (Chrys)	CD	0	-	0.00	0.000000	0.000000 -	0.000604
PCMe Structures (Amph)	ADX	3	-	2.99	0.000606	0.000125 -	0.001566
PCMe Structures (NRA)	ADX	1	-	1.00	0.000202	0.000000 -	0.000958
Total PCMe Structures (Regulated)	**CD/ADX**	**3**	**-**	**2.99**	**0.000606**	**0.000125 -**	**0.001566**
Total PCMe Structures (All)	**CD/ADX**	**4**	**-**	**3.99**	**0.000808**	**0.000220 -**	**0.002070**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000604
PCMe Fibers and Bundles (Amph)	ADX	-	3	2.99	0.000606	0.000125 -	0.001566
PCMe Fibers and Bundles (NRA)	ADX	-	1	1.00	0.000202	0.000000 -	0.000958
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**3**	**2.99**	**0.000606**	**0.000125 -**	**0.001566**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**4**	**3.99**	**0.000808**	**0.000220 -**	**0.002070**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Actinolite, Non-Regulated, Amphibole*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Samples collected on 0.8um filters.

Robyn Denton
Approved Signatory

ISO 13794

International Standard for the Determination of Asbestos Fibers-Indirect Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0004	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-03-00003	Grid Box :	0414-TetraTech-03: D	Analyst(s):	F. Craig
Chi² Test for Uniformity:	72.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/17/2014 & 06/18/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	7%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
D3	J2	None Detected								
D3	J4	None Detected								
D3	J6	None Detected								
D3	J8	None Detected								
D3	J10	None Detected								
D3	I9	None Detected								
D3	I7	None Detected								
D3	I5	None Detected								
D3	I3	None Detected								
D3	H2	None Detected								
D3	H4	None Detected								
D3	H6	None Detected								
D3	H8	None Detected								
D3	H10	None Detected								
D3	G9	None Detected								
D3	G7	None Detected								
D3	G5	None Detected								
D3	G3	None Detected								
D3	F2	F	1	1	7.1	1.68	ADX	Non Reg.Amph.	010270D	
D3	F4	None Detected								
D3	F6	None Detected								
D3	F8	None Detected								
D3	F10	None Detected								
D3	E7	None Detected								
D3	E5	None Detected								
D3	E3	None Detected								
D3	E1	None Detected								
D3	D4	None Detected								
D3	D8	None Detected								
D3	D10	None Detected								
D3	C9	None Detected								
D3	C7	None Detected								
D3	C5	None Detected								
D3	C3	None Detected								
D3	C1	None Detected								
D3	B4	None Detected								
D3	B6	None Detected								
D3	B10	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 13794

International Standard for the Determination of Asbestos Fibers-Indirect Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0004	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-03-00003	Grid Box :	0414-TetraTech-03: D	Analyst(s):	F. Craig
Chi² Test for Uniformity:	72.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/17/2014 & 06/18/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	7%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
D3	A9	None Detected								
D3	A3	None Detected								
D4	A3	None Detected								
D4	A5	None Detected								
D4	A7	None Detected								
D4	A9	None Detected								
D4	B8	None Detected								
D4	B6	None Detected								
D4	C5	None Detected								
D4	C7	None Detected								
D4	C9	None Detected								
D4	D10	None Detected								
D4	D8	None Detected								
D4	D6	None Detected								
D4	D4	None Detected								
D4	E1	None Detected								
D4	E5	F	2	2	7.1	1.2	ADX	Actinolite	010272D	
D4	E7	None Detected								
D4	E9	None Detected								
D4	F10	None Detected								
D4	F8	None Detected								
D4	F6	None Detected								
D4	F4	None Detected								
D4	F2	MD11	3		7.1	1.32	ADX	Actinolite		
D4	F2	MF		3	7.1	0.48	ADX	Actinolite		
D4	G1	None Detected								
D4	G3	None Detected								
D4	G5	None Detected								
D4	G7	None Detected								
D2	H6	MD11	4		10	3.58	ADX	Actinolite		
D2	H6	MF		4	9.5	1.56	ADX	Actinolite		
D4	H8	None Detected								
D4	H6	None Detected								
D4	H2	None Detected								
D4	I5	None Detected								
D4	I7	None Detected								
D5	A7	None Detected								
D5	A5	None Detected								
D5	A3	None Detected								
D5	A1	None Detected								

ISO 13794

International Standard for the Determination of Asbestos Fibers-Indirect Transfer Transmission Electron Microscopy

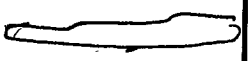
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041416050-0004 **Client:** Tetra Tech

Client Sample: *BC-AA-03-00003* Page 1 of 1

Primary Structure # 1

Primary Structure # 2



Primary Structure # 3

Primary Structure # 4

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Structure #

Structure #

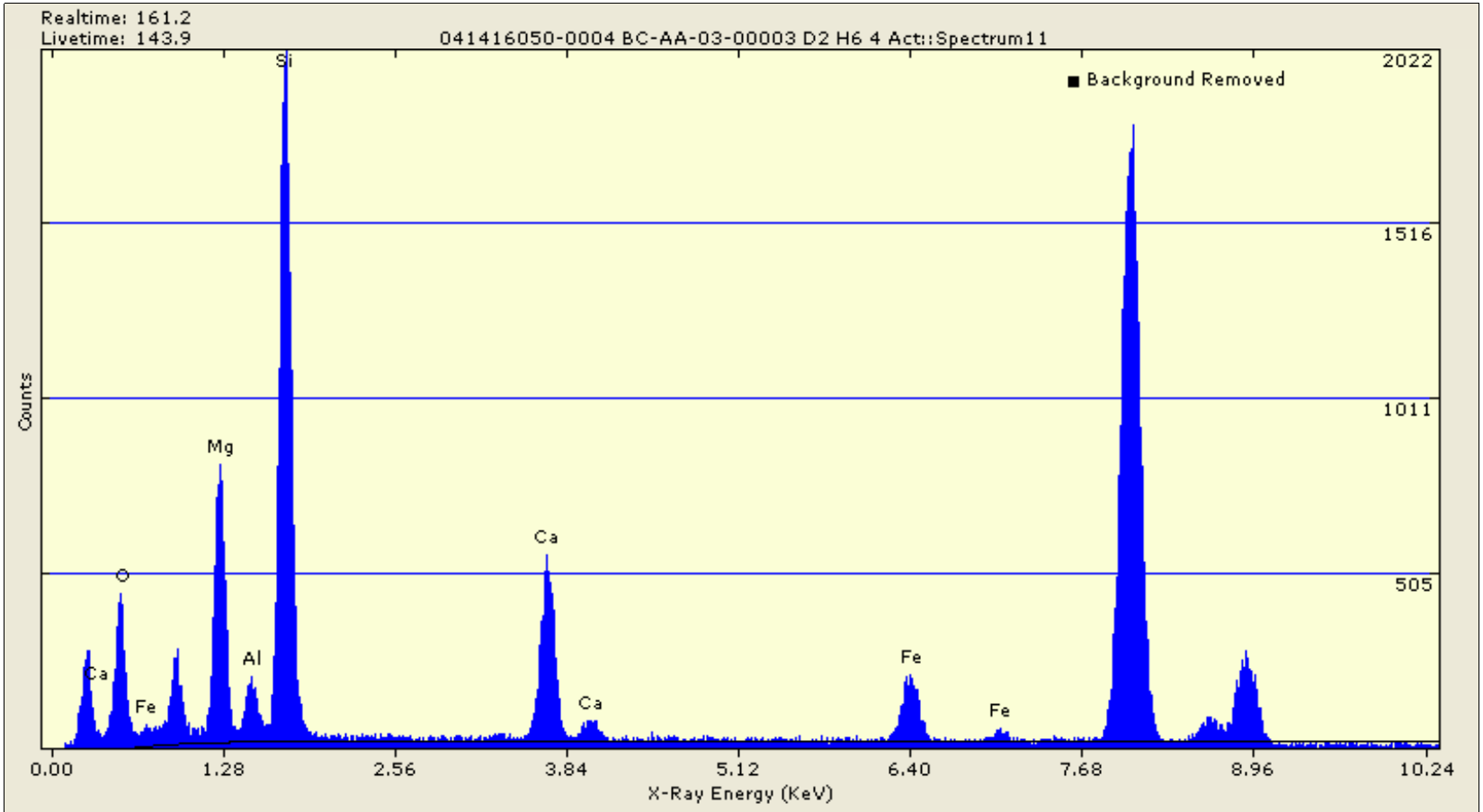
Structure #

Structure #

Analyst: [illegible]

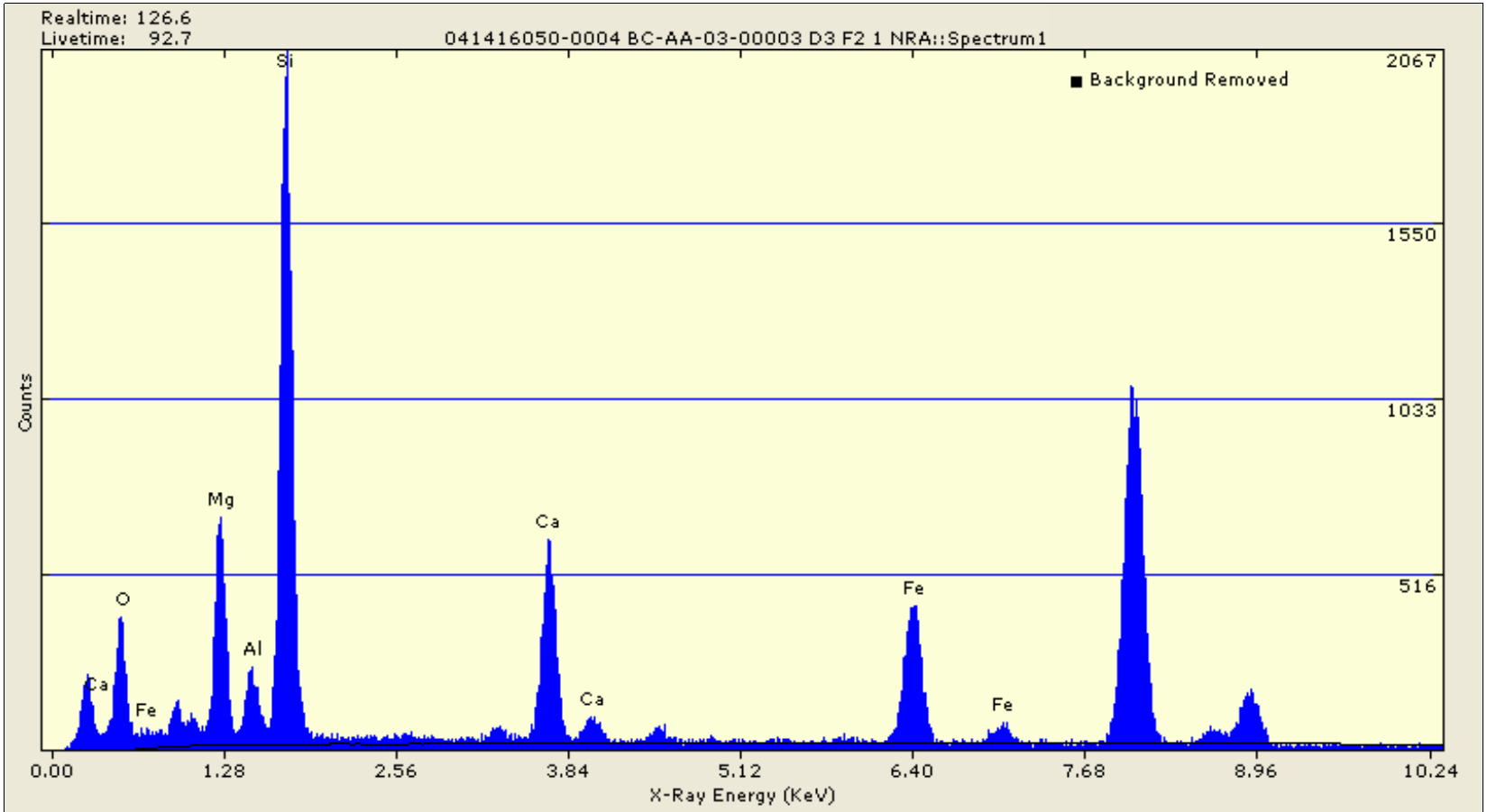
Date: 6/18/14

Scope: 04 01



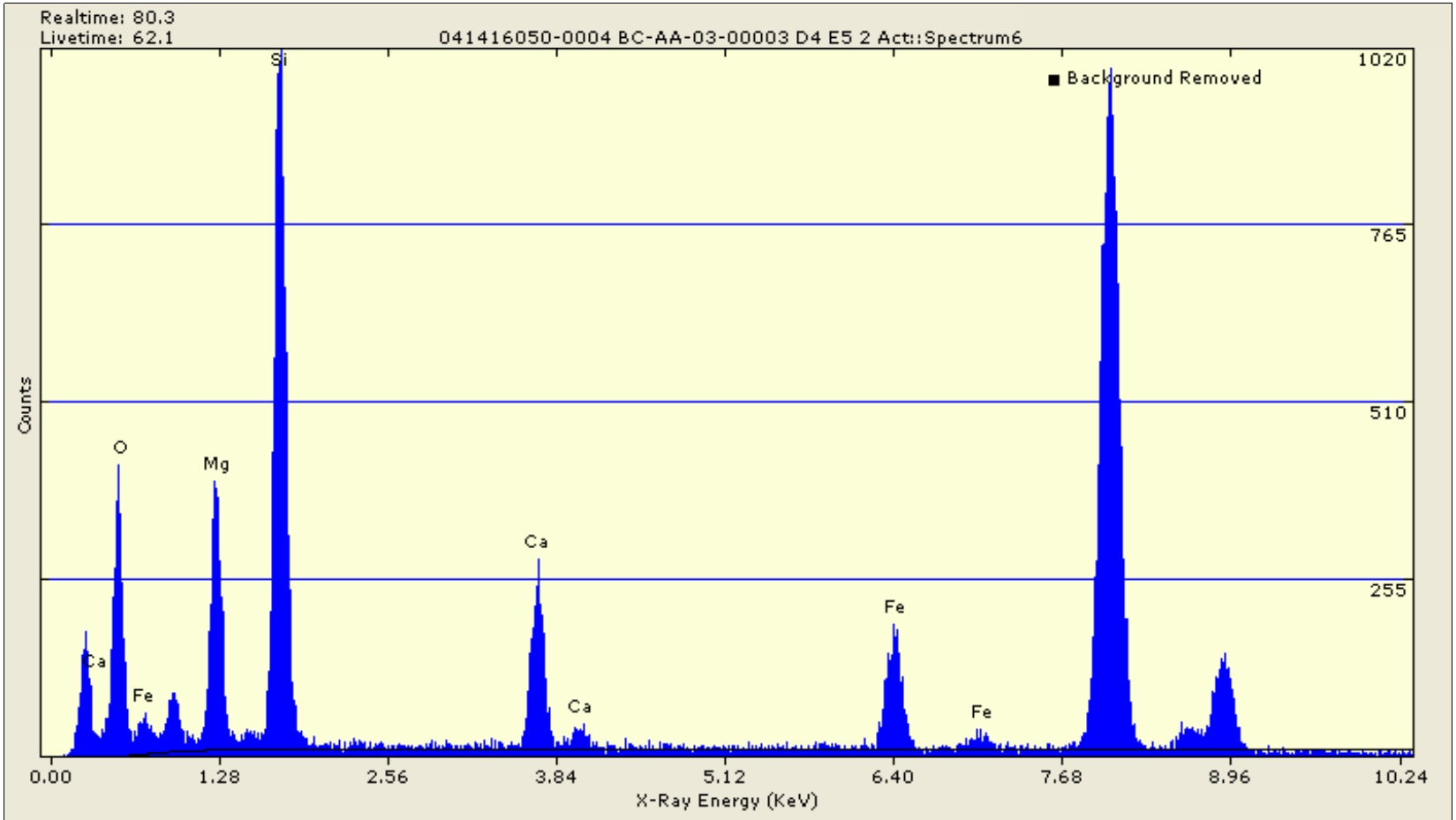
Quantitative Results for Spectrum11
Analysis: Thin Film Method: Standardless
Acquired 18-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	45.73	0.96	60.84	0.00		0.0000	0.0000	0.0	86.2	3274.19
Magnesium	12.05	0.10	10.55	19.98	(MgO)	3.9885	0.2216	5993.0	95.9	6163.89
Aluminum	2.45	0.02	1.93	4.62	(Al2O3)	0.7298	0.0457	1343.3	98.8	1542.41
Silicon	27.33	0.22	20.71	58.47	(SiO2)	7.8289	0.4661	15887.1	101.8	16671.02
Calcium	8.21	0.07	4.36	11.48	(CaO)	1.6475	0.0807	4952.5	122.5	5178.71
Iron	4.23	0.03	1.61	5.45	(FeO)	0.6100	0.0346	2029.2	146.4	2268.64
Total	100.00			100.00		14.8048				



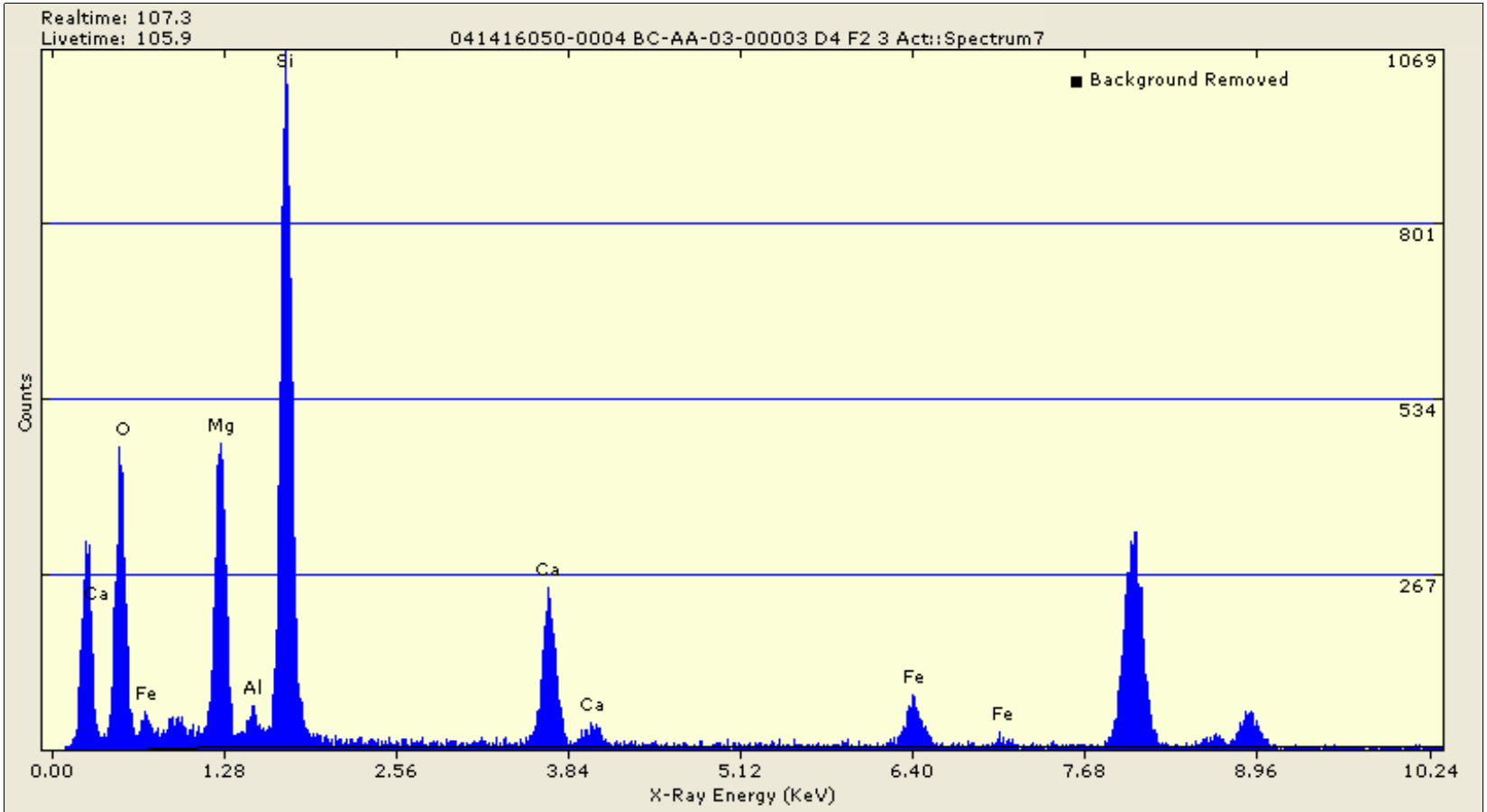
Quantitative Results for Spectrum1
Analysis: Thin Film Method: Standardless
Acquired 17-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	44.08	0.35	60.65	0.00		0.0000	0.0000	0.0	86.2	2980.54
Magnesium	9.30	0.07	8.42	15.42	(MgO)	3.1943	0.1798	4942.2	95.9	5135.07
Aluminum	2.77	0.02	2.26	5.24	(Al2O3)	0.8575	0.0542	1625.2	98.7	1925.06
Silicon	25.72	0.20	20.16	55.02	(SiO2)	7.6449	0.4619	15974.4	101.8	16715.00
Calcium	8.80	0.07	4.83	12.31	(CaO)	1.8325	0.0905	5672.0	122.5	5897.75
Iron	9.34	0.07	3.68	12.01	(FeO)	1.3958	0.0767	4781.2	146.4	5124.49
Total	100.00			100.00		14.9249				



Quantitative Results for Spectrum6
Analysis: Thin Film Method: Standardless
Acquired 17-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	45.29	0.98	60.98	0.00		0.0000	0.0000	0.0	86.2	2858.25
Magnesium	11.70	0.13	10.37	19.39	(MgO)	3.9100	0.1898	2898.6	95.9	2949.48
Silicon	28.63	0.31	21.96	61.25	(SiO2)	8.2834	0.4326	8274.5	101.7	8552.96
Calcium	7.48	0.08	4.02	10.47	(CaO)	1.5171	0.0670	2249.9	122.4	2443.69
Iron	6.91	0.08	2.66	8.88	(FeO)	1.0047	0.0530	1649.0	146.4	1956.62
Total	100.00			100.00		14.7152				



Quantitative Results for Spectrum7
Analysis: Thin Film Method: Standardless
Acquired 17-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	46.16	0.52	60.68	0.00		0.0000	0.0000	0.0	86.2	3341.19
Magnesium	14.53	0.16	12.58	24.10	(MgO)	4.7666	0.2194	3573.8	95.9	3658.43
Aluminum	1.15	0.01	0.90	2.17	(Al2O3)	0.3400	0.0180	312.3	98.8	457.15
Silicon	27.91	0.31	20.90	59.72	(SiO2)	7.9237	0.3935	8023.4	101.8	8568.03
Calcium	7.33	0.08	3.85	10.26	(CaO)	1.4588	0.0583	2188.2	122.5	2278.51
Iron	2.91	0.03	1.10	3.75	(FeO)	0.4158	0.0202	690.2	146.4	792.42
Total	100.00			100.00		14.9049				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416050	**Date:**	Jun 17, 2014
Indexing of Image Number:	010270	**Scope #:**	04 - 01
Reference / Sample No:	0004-04-01	**By:**	F Craig
Preliminary ID:	NRA		
Using Camera Constant of:	2.949e-003 **1/A Pixels**		
Determined from Reference:	AuCal-061714_10267		

Measured Inter-Row Spacing:	**63.74**	Pixels
Mean Distance between spots on Center row (d2):	**39.81**	Pixels
Mean Distance between spots on slant vector (d1):	**68.69**	Pixels

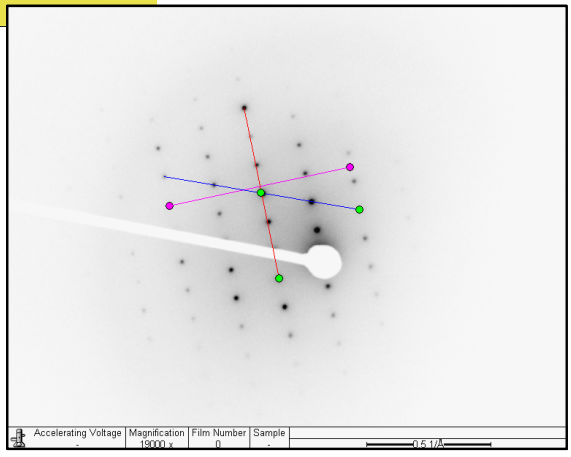
	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.320	**5.320**	*5.054*	*5.586*
d2 or hk0 (Camera K/zero row dist.):	8.518	**8.520**	*8.094*	*8.946*
d1 or hk1 (Camera K/slant vector dist.):	4.937	**4.940**	*4.693*	*5.187*
Ratio of hk0/hkl:	1.725	**1.725**	*1.639*	*1.811*
Angle of Slant Vector (Measured):	68.6	**68.700**	*65.265*	*72.135*

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Ferrohornblende **By:** F Craig

Miller Indice hk0: (**-1 1 0**)

Miller Indice hkl: (**-1 1 1**)

With a Zone Axis of: [**1 1 0**]



Preliminary Identification was: X CORRECT

INCORRECT

Percent accuracy to date: 100 %

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416050	**Date:**	Jun 17, 2014
Indexing of Image Number:	010272	**Scope #:**	04 - 01
Reference / Sample No:	0004-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.949e-003 **1/A Pixels**		
Determined from Reference:	AuCal-061714_10267		

Measured Inter-Row Spacing:	**64.33**	Pixels
Mean Distance between spots on Center row (d2):	**66.52**	Pixels
Mean Distance between spots on slant vector (d1):	**66.26**	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.271	**5.278**	*5.014*	*5.542*
d2 or hk0 (Camera K/zero row dist.):	5.098	**5.102**	*4.847*	*5.357*
d1 or hk1 (Camera K/slant vector dist.):	5.118	**5.102**	*4.847*	*5.357*
Ratio of hk0/hkl:	0.996	**1.000**	*0.950*	*1.050*
Angle of Slant Vector (Measured):	82.5	**82.190**	*78.081*	*86.299*

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite **By:** F Craig

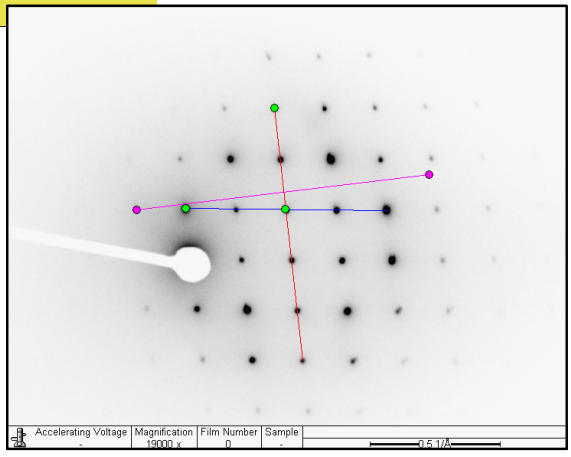
Miller Indice hk0: (**-1 3 0**)

Miller Indice hkl: (**0 0 1**)

With a Zone Axis of: [**3 1 0**]

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/02/2014 10:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	BC-AA-04-00003A	Air volume:	3274	Liters
EMSL Sample Number:	041416050-0005	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	76	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	10,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	68.00 Random	Analyst:	F. Craig	

Analytical Sensitivity: **0.000117** **Structure/cc** **Limit of Detection:** **0.000350** **Structure/cc**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration (Str/cc)	Poisson 95 % Confidence Interval LCL (Str/cc)	UCL (Str/cc)
PCMe Structures (Chrys)	CD	0	-	0.00	0.000000	0.000000 -	0.000350
PCMe Structures (Amph)	ADX	8	-	7.97	0.000938	0.000405 -	0.001848
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000350
Total PCMe Structures (Regulated)	**CD/ADX**	**8**	**-**	**7.97**	**0.000938**	**0.000405 -**	**0.001848**
Total PCMe Structures (All)	**CD/ADX**	**8**	**-**	**7.97**	**0.000938**	**0.000405 -**	**0.001848**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000350
PCMe Fibers and Bundles (Amph)	ADX	-	8	7.97	0.000938	0.000405 -	0.001848
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000350
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**8**	**7.97**	**0.000938**	**0.000405 -**	**0.001848**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**8**	**7.97**	**0.000938**	**0.000405 -**	**0.001848**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Actinolite*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Samples collected on 0.8um filters.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0005	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00003A	Grid Box :	0414-TetraTech-02: L	Analyst(s):	F. Craig
Chi² Test for Uniformity:	68.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/13/2014 & 06/15/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	5%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
L1	A9	None Detected								
L1	A7	None Detected								
L1	A5	None Detected								
L1	A3	None Detected								
L1	A1	None Detected								
L1	B2	None Detected								
L1	B4	None Detected								
L1	B6	None Detected								
L1	B8	None Detected								
L1	B10	None Detected								
L1	C9	None Detected								
L1	C7	None Detected								
L1	C5	None Detected								
L1	C3	None Detected								
L1	C1	None Detected								
L1	D2	None Detected								
L1	D4	None Detected								
L1	D6	None Detected								
L1	D8	None Detected								
L1	D10	None Detected								
L1	E9	None Detected								
L1	E7	None Detected								
L1	E5	None Detected								
L1	E3	None Detected								
L1	E1	None Detected								
L1	F2	None Detected								
L1	F4	None Detected								
L1	F6	None Detected								
L1	F8	None Detected								
L1	F10	MD11	1		54.6	2.88	ADX	Actinolite		
L1	F10	MF		1	54.6	1.2	ADX	Actinolite	010246D	
L1	G9	None Detected								
L1	G7	None Detected								
L1	G5	None Detected								
L1	G3	None Detected								
L1	G1	None Detected								
L1	H2	None Detected								
L1	H6	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0005	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00003A	Grid Box :	0414-TetraTech-02: L	Analyst(s):	F. Craig
Chi² Test for Uniformity:	68.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/13/2014 & 06/15/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	5%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
L1	H8	None Detected								
L1	H10	None Detected								
L1	I9	None Detected								
L1	I7	None Detected								
L1	I3	None Detected								
L1	I1	None Detected								
L1	J2	None Detected								
L1	J4	None Detected								
L1	J6	None Detected								
L1	J8	None Detected								
L1	J10	None Detected								
L2	J10	None Detected								
L2	J8	None Detected								
L2	J6	None Detected								
L2	J4	None Detected								
L2	J2	None Detected								
L2	I1	None Detected								
L2	I3	None Detected								
L2	I5	None Detected								
L2	I7	None Detected								
L2	I9	None Detected								
L2	H10	None Detected								
L2	H8	None Detected								
L2	H6	None Detected								
L2	H4	MD11	2		13.1	11.88	ADX	Actinolite		
L2	H4	MF		2	10.7	1	ADX	Actinolite		
L5	B8	MD11	0		11.7	2.38	ADX	Actinolite		
L5	B8	MB		0	11.7	0.25	ADX	Actinolite		
L5	F4	MD11	3		26.6	2.4	ADX	Actinolite		
L5	F4	MF		3	26.6	1.56	ADX	Actinolite	010250D	
L5	I3	MD11	4		8.3	2.38	ADX	Actinolite		
L5	I3	MF		4	8.3	1.68	ADX	Actinolite		
L6	D10	F	5	5	5.5	1.32	ADX	Actinolite		
L6	F8	MD11	6		6.4	1.68	ADX	Actinolite		
L6	F8	MF		6	6.4	1.2	ADX	Actinolite	10252	
L6	G5	MD11	7		10	1.92	ADX	Actinolite		
L6	G5	MF		7	10	1.2	ADX	Actinolite		
L4	G5	MD11	8		9.5	8.4	ADX	Actinolite		
L4	G5	MF		8	8.4	1.44	ADX	Actinolite		
L2	E7	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0005	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00003A	Grid Box :	0414-TetraTech-02: L	Analyst(s):	F. Craig
Chi² Test for Uniformity:	68.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/13/2014 & 06/15/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	5%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
L2	E9	None Detected								
L2	D10	None Detected								
L2	D8	None Detected								
L2	D6	None Detected								
L2	D4	None Detected								
L2	D2	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

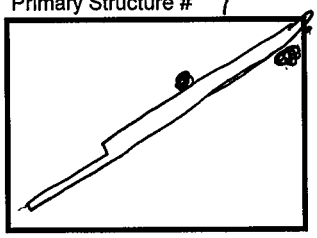
International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Structure Sketch Sheet for Direct Data Entry

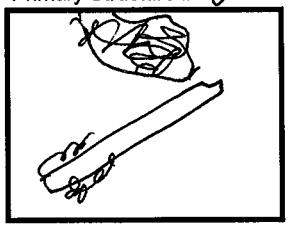
EMSL Order ID: 041416050-0005 **Client:** Tetra Tech

Client Sample: *BC-AA-04-00003A* Page 1 of 1

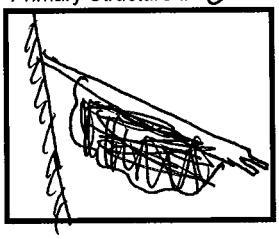
Primary Structure # 1



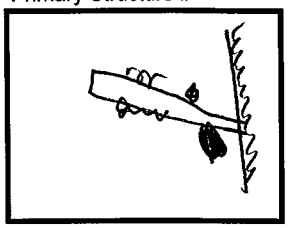
Primary Structure # 2



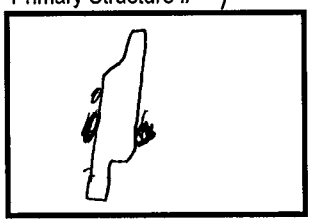
Primary Structure # 0



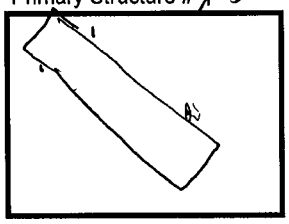
Primary Structure # 3



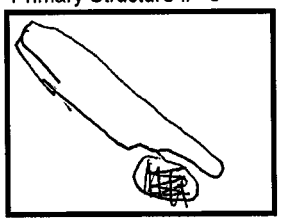
Primary Structure # 4



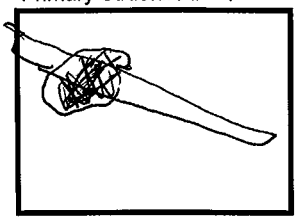
Primary Structure # F5



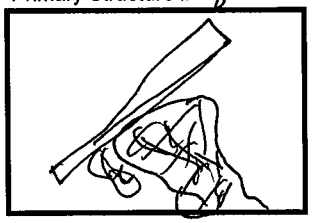
Primary Structure # 6



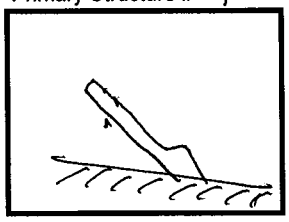
Primary Structure # 7



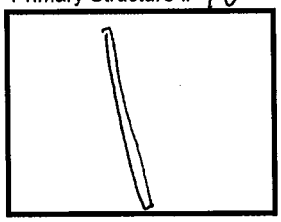
Primary Structure # 8



Primary Structure # 9



Primary Structure # 10



Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

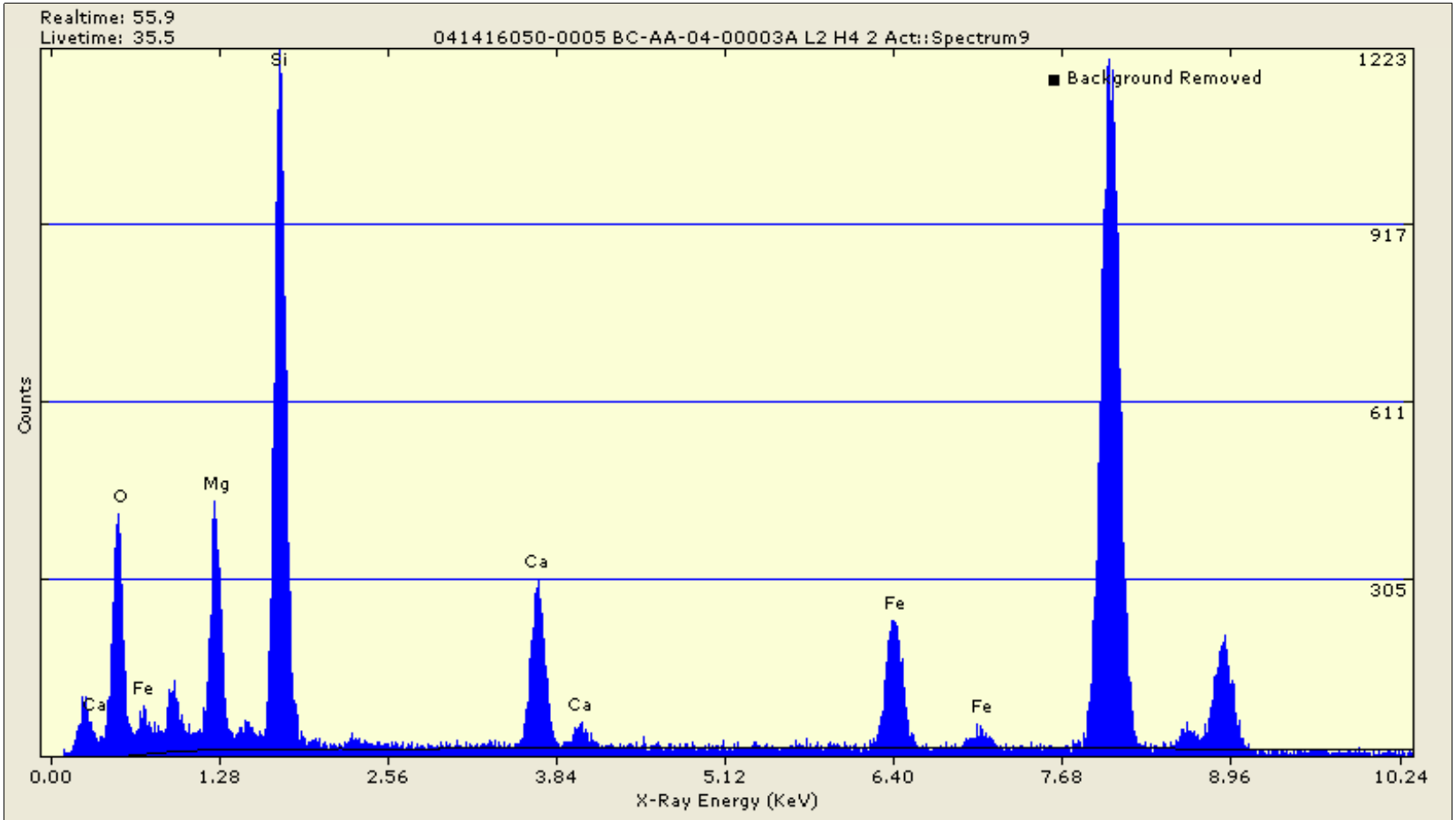
Structure #

Structure #

Structure #

Structure #

Analyst: FL Date: 6/15/14 Scope: 04 01



Quantitative Results for Spectrum9
Analysis: Thin Film Method: Standardless
Acquired 13-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	44.62	0.91	60.97	0.00		0.0000	0.0000	0.0	86.2	3188.46
Magnesium	10.25	0.10	9.22	17.00	(MgO)	3.4791	0.1721	3002.7	95.9	3180.20
Silicon	28.18	0.29	21.94	60.30	(SiO2)	8.2761	0.4399	9646.6	101.7	9864.26
Calcium	8.00	0.08	4.36	11.19	(CaO)	1.6464	0.0720	2842.6	122.5	2871.05
Iron	8.94	0.09	3.50	11.51	(FeO)	1.3209	0.0654	2524.0	146.4	2785.65
Total	100.00			100.00		14.7225				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416050	**Date:**	Jun 13, 2014
Indexing of Image Number:	010250	**Scope #:**	04 - 01
Reference / Sample No:	0005-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003 **1/A Pixels**		
Determined from Reference:	AuCal-061014_10242		

Measured Inter-Row Spacing: **64** Pixels

Mean Distance between spots on Center row (d2): **66.21** Pixels

Mean Distance between spots on slant vector (d1): **68.45** Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.282	**5.278**	*5.014*	*5.542*
d2 or hk0 (Camera K/zero row dist.):	5.106	**5.099**	*4.844*	*5.354*
d1 or hk1 (Camera K/slant vector dist.):	4.939	**4.931**	*4.684*	*5.178*
Ratio of hk0/hkl:	1.034	**1.034**	*0.982*	*1.086*
Angle of Slant Vector (Measured):	67.5	**67.810**	*64.419*	*71.201*

From SAED Reference Book, "unknown" diffraction pattern was found to be that of: Actinolite **By:** F Craig

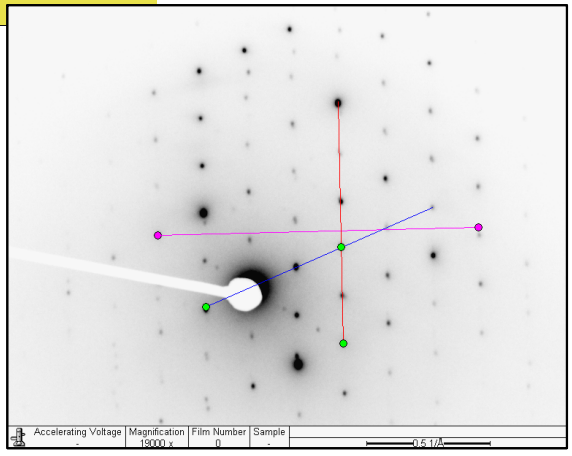
Miller Indice hk0: (**1 -3 0**)

Miller Indice hkl: (**1 -1 -1**)

With a Zone Axis of: [**3 1 2**]

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 08:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	BC-AA-04-00003B	Air volume:	5452	Liters
EMSL Sample Number:	041416050-0006	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	98	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	10,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	96.52 Random	Analyst:	P. Harrison	

Analytical Sensitivity: **0.000055 Structure/cc** **Limit of Detection:** **0.000163 Structure/cc**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration (Str/cc)	Poisson 95 % Confidence Interval LCL (Str/cc)	UCL (Str/cc)
PCMe Structures (Chrys)	CD	0	-	0.00	0.000000	0.000000 -	0.000163
PCMe Structures (Amph)	ADX	25	-	19.33	0.001365	0.000883 -	0.002015
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000163
Total PCMe Structures (Regulated)	**CD/ADX**	**25**	**-**	**19.33**	**0.001365**	**0.000883 -**	**0.002015**
Total PCMe Structures (All)	**CD/ADX**	**25**	**-**	**19.33**	**0.001365**	**0.000883 -**	**0.002015**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000163
PCMe Fibers and Bundles (Amph)	ADX	-	25	19.33	0.001365	0.000883 -	0.002015
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000163
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**25**	**19.33**	**0.001365**	**0.000883 -**	**0.002015**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**25**	**19.33**	**0.001365**	**0.000883 -**	**0.002015**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Actinolite*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Samples collected on 0.8um filters.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0006	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00003B	Grid Box :	0414-Tetra Tech-02: B	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	96.52-Random	Pore Size (micron):	0.8	Analysis Date:	06/11/2014 & 06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	15%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
B1	H5	None Detected								
B1	G4	None Detected								
B1	G6	F	1	1	12	1.8	ADX	Actinolite	4382	
B1	G8	None Detected								
B1	G10	MD11	2		11.5	3.5	ADX	Actinolite		
B1	G10	MF		2	8.9	1.8	ADX	Actinolite		
B1	F9	None Detected								
B1	F7	F	3	3	6.3	0.5	ADX	Actinolite		
B1	E6	F	4	4	14.4	0.8	ADX	Actinolite		
B1	E4	None Detected								
B1	E2	None Detected								
B1	D9	None Detected								
B1	D7	None Detected								
B1	D5	None Detected								
B1	D3	None Detected								
B1	C2	None Detected								
B1	C6	None Detected								
B1	C8	None Detected								
B1	C10	F	5	5	5.8	0.4	ADX	Actinolite		
B1	B7	F	6	6	7.7	0.9	ADX	Actinolite		
B1	B1	None Detected								
B1	A2	None Detected								
B1	A4	None Detected								
B1	A6	None Detected								
B1	A8	None Detected								
B1	A10	None Detected								
B3	J10	None Detected								
B3	I9	None Detected								
B3	I7	None Detected								
B3	H6	MD11	7		18	6	ADX	Actinolite		
B3	H6	MF		7	16.3	2.8	ADX	Actinolite		
B3	H8	None Detected								
B3	H10	None Detected								
B3	G9	None Detected								
B3	G7	None Detected								
B3	G3	None Detected								
B3	G1	MD11	8		7.3	1.5	ADX	Actinolite		
B3	G1	MF		8	6.5	0.7	ADX	Actinolite		

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0006	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00003B	Grid Box :	0414-Tetra Tech-02: B	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	96.52-Random	Pore Size (micron):	0.8	Analysis Date:	06/11/2014 & 06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	15%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
B3	F2	F	9	9	5.3	0.8	ADX	Actinolite		
B3	F4	None Detected								
B3	F6	None Detected								
B3	F8	None Detected								
B3	F10	None Detected								
B3	E9	F	10	10	16.8	0.5	ADX	Actinolite		
B3	E7	None Detected								
B3	E3	None Detected								
B3	E1	None Detected								
B3	D2	None Detected								
B3	D6	None Detected								
B3	D8	None Detected								
B3	D10	None Detected								
B3	C9	None Detected								
B3	C7	F	11	11	6.6	0.7	ADX	Actinolite		
B3	C3	None Detected								
B3	C1	None Detected								
B3	B2	None Detected								
B3	B4	None Detected								
B3	B8	MD11	12		15.7	9.5	ADX	Actinolite		
B3	B8	MB		12	13.2	2.8	ADX	Actinolite		
B3	B10	None Detected								
B3	A9	None Detected								
B3	A7	F	13	13	9	1.1	ADX	Actinolite		
B3	A3	None Detected								
B4	A10	MD11	14		12.3	7.3	ADX	Actinolite		
B4	A10	MF		14	5.5	0.7	ADX	Actinolite		
B4	A10	MD11	15		18.5	7.5	ADX	Actinolite		
B4	A10	MF		15	11.5	0.8	ADX	Actinolite		
B4	A8	None Detected								
B4	A6	None Detected								
B4	A4	None Detected								
B4	A2	None Detected								
B4	B1	None Detected								
B4	B3	None Detected								
B4	B5	None Detected								
B4	B7	None Detected								
B4	B9	None Detected								
B4	C10	F	16	16	8	1	ADX	Actinolite		
B4	C8	F	17	17	6.8	1	ADX	Actinolite		

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0006	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00003B	Grid Box :	0414-Tetra Tech-02: B	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	96.52-Random	Pore Size (micron):	0.8	Analysis Date:	06/11/2014 & 06/12/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	15%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
B4	C6	None Detected								
B4	C4	F	18	18	13.3	2.8	ADX	Actinolite		
B4	D1	None Detected								
B4	D3	None Detected								
B4	D5	None Detected								
B4	D7	None Detected								
B4	D9	None Detected								
B4	E10	None Detected								
B4	E8	None Detected								
B4	E6	None Detected								
B4	E4	None Detected								
B4	E2	MD11	19		13.5	2	ADX	Actinolite		
B4	E2	MF		19	7.5	1	ADX	Actinolite		
B4	E2	F	20	20	8.4	1.7	ADX	Actinolite		
B4	F1	None Detected								
B4	F5	F	21	21	6.4	1.5	ADX	Actinolite		
B4	F7	None Detected								
B4	F9	None Detected								
B4	G10	None Detected								
B4	G6	None Detected								
B4	G4	None Detected								
B4	G2	MD11	22		9.9	1	ADX	Actinolite		
B4	G2	MF		22	6.2	0.7	ADX	Actinolite		
B4	H1	F	23	23	12	0.4	ADX	Actinolite		
B4	H3	None Detected								
B4	H5	None Detected								
B4	H7	None Detected								
B4	H9	None Detected								
B4	I6	None Detected								
B4	I4	F	24	24	7.8	0.6	ADX	Actinolite		
B4	I4	F	25	25	8.4	1.4	ADX	Actinolite		

200 Route 130 North
Cinnaminson, NJ 08077

ISO 10312

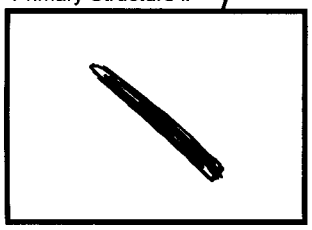
International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Structure Sketch Sheet for Direct Data Entry

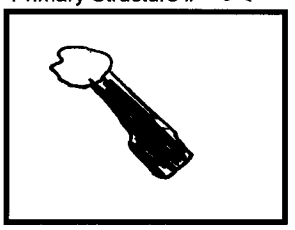
EMSL Order ID: 041416050-0006 **Client:** Tetra Tech

Client Sample: *BC-AA-04-00003B* Page 1 of 2

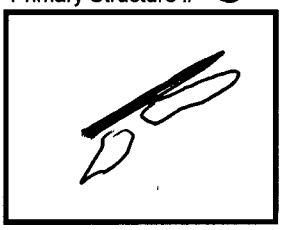
Primary Structure # 1



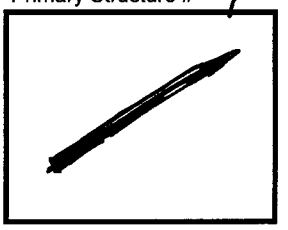
Primary Structure # 2



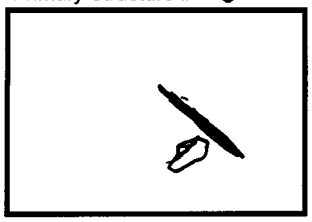
Primary Structure # 3



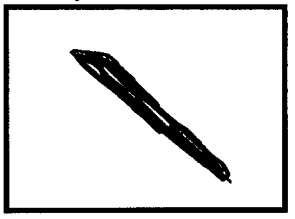
Primary Structure # 4



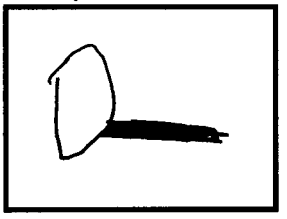
Primary Structure # 5



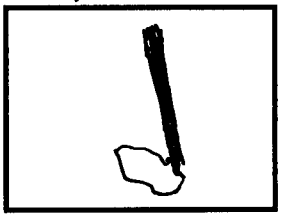
Primary Structure # 6



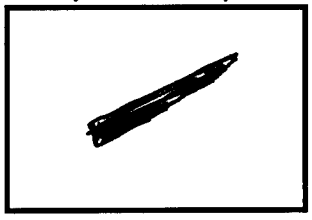
Primary Structure # 7



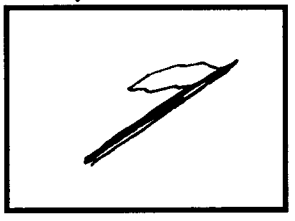
Primary Structure # 8



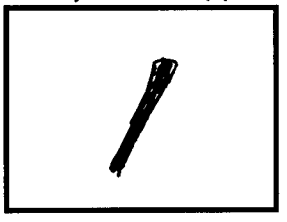
Primary Structure # 9



Primary Structure # 10

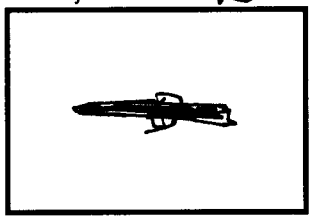


Primary Structure # 11



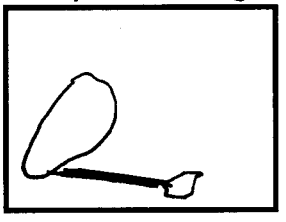
Primary Structure # 12

Primary Structure # 13

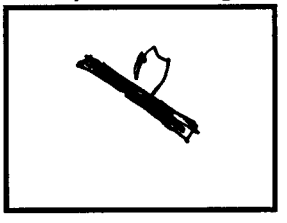


Primary Structure # 14

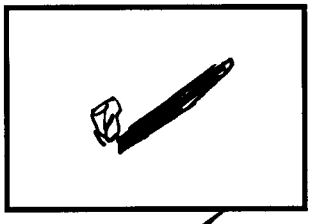
Primary Structure # 15



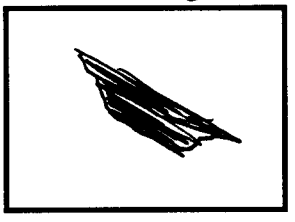
Primary Structure # 16



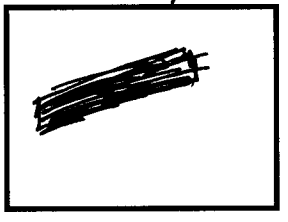
Structure # 17



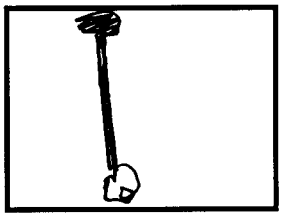
Structure # 18



Structure # 19



Structure # 20



Analyst: Date: 6/11/14 Scope: PM-03

ISO 10312

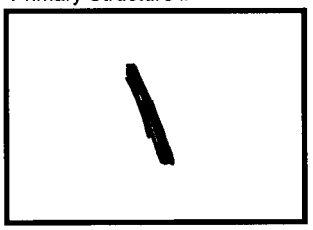
International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Structure Sketch Sheet for Direct Data Entry

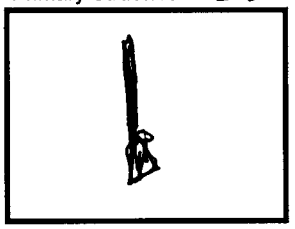
EMSL Order ID: 041416050-0006 **Client:** Tetra Tech

Client Sample: *BC-AA-04-00003B* Page 2 of 2

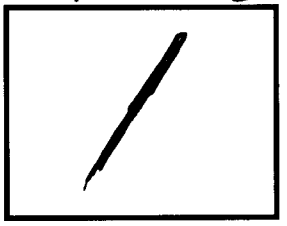
Primary Structure # 21



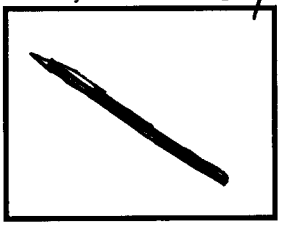
Primary Structure # 22



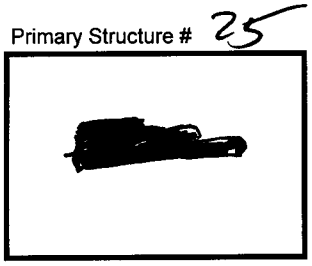
Primary Structure # 23



Primary Structure # 24



Primary Structure # 25



Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Structure #

Structure #

Structure #

Structure #

Analyst: Date: 6/12/14 Scope: 04-05

Energy Dispersive X-Ray Analysis
Quantitative Spectra & Data

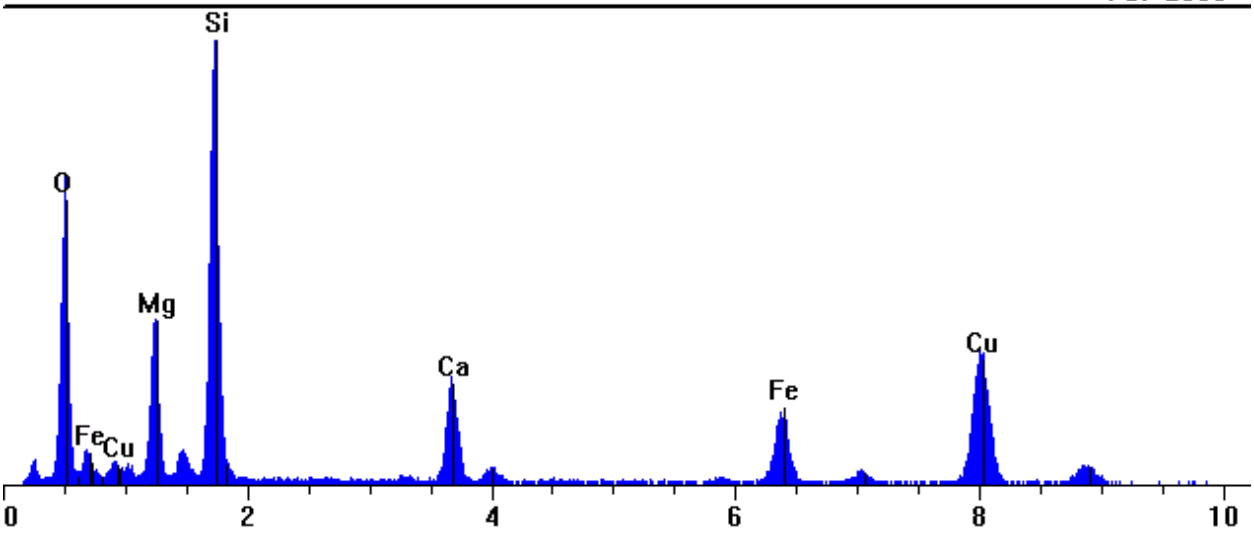
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041416050-0006 B1 G6 1 AC.pgt
Collected: June 11, 2014 07:48:05

Live Time:	471.69	Count Rate:	302	Dead Time:	2.93 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	31.00
Thickness limit:	27365.95				

■ 041416050-0006 B1 G6 1 AC.pgt

FS: 2000



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	14.65	13.97	6.4	MgO	24.28
Si	KA1	1.740	1.0000	32.27	26.65	12.3	SiO	50.65
Ca	KA1	3.691	1.0500	10.20	5.90	2.7	CaO	14.27
Fe	KA1	6.403	0.9900	8.39	3.48	1.6	FeO	10.79
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	34.50	50.00	23.0		
Total			**0.0000**	**100.00**	**100.00**	**46.0**	**Total**	**100.00**

Element	Line	Gross (cps)	BKG (cps)	Net (cps)	P:B Ratio
Mg	KA1	19.7	1.6	18.0	11.0
Si	KA1	57.0	1.5	55.6	37.7
Ca	KA1	17.7	1.0	16.7	16.8
Fe	KA1	15.4	0.8	14.6	17.9
Cu	KA1	31.3	0.8	30.5	39.8
O	KA1	30.4	0.9	29.5	32.9

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number: 041416050 **Date:** Jun 11, 2014

Image Number: 04382

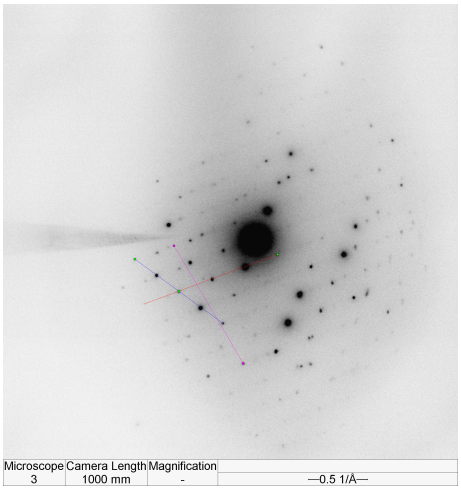
Reference / Sample Number: 0006

Preliminary ID: ACTINOLITE

Camera Constant: 1.861e-003 **1/A Pixels**

Calibration Reference: 060914-04-03-04372_C

	Measured	Reference	-5%	+5%
Inter-row Spacing:	**5.248**	5.278	**5.014**	**5.542**
d2 or hk0 (Camera K/zero row dist.):	**3.369**	3.385	**3.216**	**3.554**
d1 or hkl (Camera K/slant vector dist.):	**4.376**	4.482	**4.258**	**4.706**
Ratio of hk0/hkl:	**0.770**	0.755	**0.717**	**0.793**
Vector Angle:	**56.42**	57.00	**54.15**	**59.85**



From SAED Reference Book, "unknown" diffraction pattern was found to be that of: **ACTINOLITE**

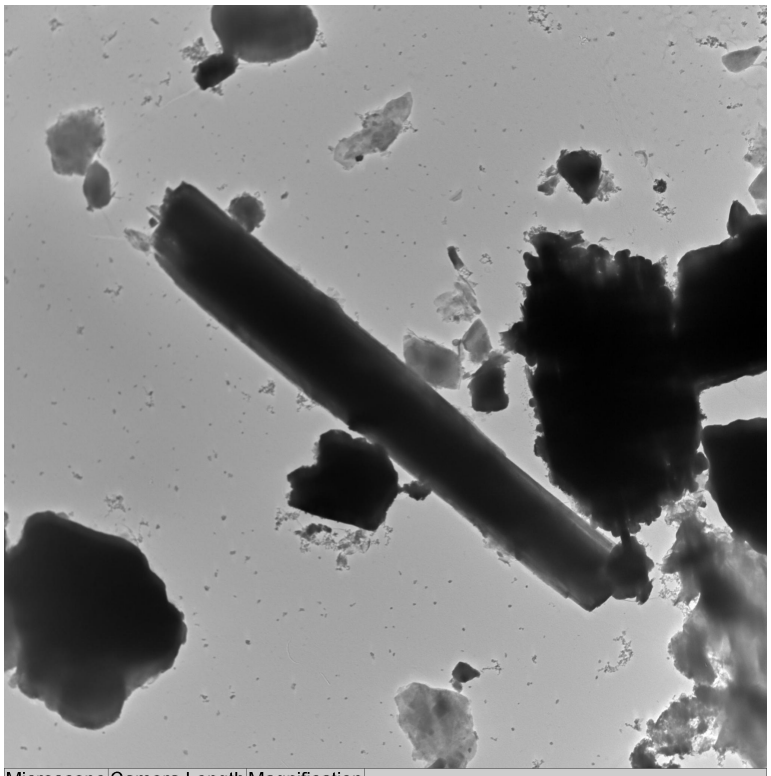
With a Zone Axis of: [**5-12**]

Preliminary Identification was:

X	CORRECT
	INCORRECT

EMSL Analytical, Inc.

Photomicrograph Report



Microscope	Camera Length	Magnification	
3	-	10000 x	—2 µm—

Micrograph Information

Sample ID:	0006
Order ID:	041416050
Image Number:	04383
Mineral Type:	ACTINOLITE
Date:	6/11/2014
Magnification:	10000
Microscope:	3

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 08:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	FIELD BLANK 0604	Air volume:	0	Liters
EMSL Sample Number:	041416050-0007	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	10	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	10,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	N/A N/A	Analyst:	P. Harrison	

Analytical Sensitivity: **7.575758** **Structure/ mm²** **Limit of Detection:** **22.651515** **Structure/ mm²**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration Str/ mm²	Poisson 95 % Confidence Interval LCL Str/ mm²	UCL Str/ mm²
PCMe Structures (Chrys)	CD	0	-	0.00	NA	0.000000 -	22.651515
PCMe Structures (Amph)	ADX	0	-	0.00	NA	0.000000 -	22.651515
PCMe Structures (NRA)	ADX	0	-	0.00	NA	0.000000 -	22.651515
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**NA**	**0.000000 -**	**22.651515**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	NA	0.000000 -	22.651515
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	NA	0.000000 -	22.651515
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	NA	0.000000 -	22.651515
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *None Detected*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Comment: Samples collected on 0.8um filters.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041416050-0007	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	FIELD BLANK 060414	Grid Box :	0414-Tetra Tech-02: B	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/11/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	2%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
B5	J6	None Detected								
B5	H3	None Detected								
B5	F6	None Detected								
B5	C7	None Detected								
B6	J5	None Detected								
B6	I8	None Detected								
B6	G3	None Detected								
B6	E8	None Detected								
B6	C5	None Detected								
B6	B7	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/13/2014 08:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	Ashing Blank	Air volume:	0	Liters
EMSL Sample Number:	041416050-0008	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	10	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	10,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	N/A N/A	Analyst:	F. Craig	

Analytical Sensitivity: **7.575758** **Structure/ mm²** **Limit of Detection:** **22.651515** **Structure/ mm²**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration Str/ mm²	Poisson 95 % Confidence Interval LCL Str/ mm²	UCL Str/ mm²
PCMe Structures (Chrys)	CD	0	-	0.00	NA	0.000000 -	22.651515
PCMe Structures (Amph)	ADX	0	-	0.00	NA	0.000000 -	22.651515
PCMe Structures (NRA)	ADX	0	-	0.00	NA	0.000000 -	22.651515
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**NA**	**0.000000 -**	**22.651515**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	NA	0.000000 -	22.651515
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	NA	0.000000 -	22.651515
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	NA	0.000000 -	22.651515
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *None Detected*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0008	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	Ashing Blank	Grid Box :	0414-TetraTech-03: H	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/18/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
H1	C6	None Detected								
H1	E10	None Detected								
H1	F4	None Detected								
H1	H7	None Detected								
H1	J9	None Detected								
H2	B5	None Detected								
H2	D3	None Detected								
H2	F3	None Detected								
H2	G6	None Detected								
H2	I4	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
www.EMSL.com

Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/13/2014 08:00
EMSL Order: 041416050
Report Date: 06/25/14

Project: NDOT NOA / 10353259

ISO 10312 International Standard for the Determination of Asbestos Fibers - Direct Transfer TEM - Modified for PCMe Analysis

Customer Sample Number:	Filtration Blank	Air volume:	0	Liters
EMSL Sample Number:	041416050-0009	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	10	
Minimum Level of analysis (amphibole):	ADX			
Magnification used for fiber counting:	10,000			
Aspect ratio for fiber definition:	3:1			
Min Length/ Width to be counted (µm):	>5 / 0.25-none			
Area of collection filter (mm²):	385	Analysis Date:	06/09/2014	
Result of Chi² Test:	N/A N/A	Analyst:	F. Craig	

Analytical Sensitivity: **7.575758** **Structure/ mm²** **Limit of Detection:** **22.651515** **Structure/ mm²**

Structure Class	Min ID Level	Primary Str.	Total Str.	Density Str/mm²	Concentration Str/ mm²	Poisson 95 % Confidence Interval LCL Str/ mm²	UCL Str/ mm²
PCMe Structures (Chrys)	CD	0	-	0.00	NA	0.000000 -	22.651515
PCMe Structures (Amph)	ADX	0	-	0.00	NA	0.000000 -	22.651515
PCMe Structures (NRA)	ADX	0	-	0.00	NA	0.000000 -	22.651515
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**NA**	**0.000000 -**	**22.651515**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	NA	0.000000 -	22.651515
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	NA	0.000000 -	22.651515
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	NA	0.000000 -	22.651515
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**NA**	**0.000000 -**	**22.651515**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *None Detected*

Explanation of Results

NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal governement as asbestos.

PCMe structure (modified)= A fibrous structure of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 um with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

PCMe Fiber or Bundle (modified) = A Fiber or Bundle of of aspect ratio > 3:1, longer than 5 um, and which has a diameter ≥ 0.25 microns with no upper width boundary. This definition has been modified from the method to meet the client's project requirements.

Concentration (Reg) = include all federally regulated asbestos types. Currently Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite

Concentration (all) = include all federally regulated asbestos types (Chrysotile, Amosite, Actinolite, Tremolite, Anthophyllite and Crocidolite) and any Non-regulated Amphiboles

Min ID Level = the minimum level of analysis that must have been met to be included in the reportable structure count. If any fibrous structure did not meet the minimum ID level, it would not be included in the concentration.

NAM = Non Asbestos Mineral. A mineral fiber that has been rejected from being either Amphibole or Chrysotile

Concentrations and 95% Confidence Intervals are based on a Poissonian distribution. Structure counts above 31 may be better expressed with a Gaussian distribution. EMSL maintains liability limited to the cost of analysis. This report relates only to the samples reported above and may not be reproduced except in full without written approval of EMSL. EMSL is not responsible for sample collection activities or analytical limitations. Interpretation and use of results are the responsibility of the client.

Robyn Denton
Approved Signatory

ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct Transfer Transmission Electron Microscopy

Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041416050-0009	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	Filtration Blank	Grid Box :	0414-TetraTech-04: I	Analyst(s):	F. Craig
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/19/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
I8	B9	None Detected								
I8	C5	None Detected								
I8	D8	None Detected								
I8	F7	None Detected								
I8	H6	None Detected								
I9	C1	None Detected								
I9	B5	None Detected								
I9	E4	None Detected								
I9	G7	None Detected								
I9	I3	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

OrderID: 041416050

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only): 041416050

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL ANALYTICAL, INC.
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077
PHONE: (800) 220-3675
FAX: (856) 786-5974

Company: TETRA TECH	EMSL-Bill to: ☒ Same ☐ Different If Bill to is Different note instructions in Comments**
Street: 7 West 6th AVE. Ste 612	*Third Party Billing requires written authorization from third party*
City: Helena State/Province: MT	Zip/Postal Code: 59601 Country: USA
Report To (Name): Ed Surbrugg	Telephone #: 406-441-3296
Email Address: Edward.Surbrugg@tetratech.com	Fax #: 406-442-7182 Purchase Order:
Project Name/Number: 103S3259	Please Provide Results: ☐ Fax ☒ Email ☐ Mail
U.S. State Samples Taken: NA	Connecticut Samples: ☐ Commercial ☐ Residential

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☒ 1 Week ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

PCM - Air ☐ Check if samples are from NY
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☐ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ 4-4.5hr TAT (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☒ ISO 10312 Sensitivity to 0.00004

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ TEM Qual. via Filtration Technique
- ☐ TEM Qual. via Drop-Mount Technique

Other:
- ☐

☐ Check For Positive Stop – Clearly Identify Homogenous Group

Filter Pore Size (Air Samples): ☒ 0.8µm ☐ 0.45µm

Samplers Name: BECKI DANO Samplers Signature:

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
BC-AA-01-00003	Site 1	14,400L	6/4/14 0745
BC-AA-02-00003A	Site 2 Cassette 1 ┐	3,740L	6/2/14 1125
BC-AA-02-00003B	Site 2 Cassette 2 ┘ Combine	5,416L	6/4/14 0845
BC-AA-03-00003	Site 3	14,400L	6/4/14 0805
BC-AA-04-00003A	Site 4 Cassette 1 ┐	3,274 L	6/2/14 1042
BC-AA-04-00003B	Site 4 Cassette 2 ┘ Combine	5,452 L	6/4/14 0825
Field Blank 060414	Field Blank	—	6/4/14 0815

Client Sample # (s): - Total # of Samples: 7

Relinquished (Client): Date: 6/5/14 Time: 1200

Received (Lab): Date: 6/9/14 Time: 8:46 AM

Comments/Special Instructions: