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: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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-05-00002	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0001	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	67.00 Random	Analyst:	F. Craig	

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	1	-	1.11	0.000040	0.000000 -	0.000188
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Structures (All)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	1	1.11	0.000040	0.000000 -	0.000188
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
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: Sample collected on 0.8 um filter.

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:	041420901-0001	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-05-00002	Grid Box :	0414-TetraTech-06: U	Analyst(s):	F. Craig
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/24/2014
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				
U1	I1	None Detected								
U1	I3	None Detected								
U1	I5	None Detected								
U1	I7	None Detected								
U1	I9	None Detected								
U1	H10	None Detected								
U1	H8	None Detected								
U1	H6	None Detected								
U1	H4	None Detected								
U1	H2	None Detected								
U1	G1	None Detected								
U1	G3	None Detected								
U1	G5	None Detected								
U1	G7	None Detected								
U1	G9	None Detected								
U1	F10	None Detected								
U1	F8	None Detected								
U1	F6	None Detected								
U1	F4	None Detected								
U1	F2	None Detected								
U1	E1	None Detected								
U1	E3	None Detected								
U1	E5	None Detected								
U1	E7	None Detected								
U1	E9	None Detected								
U1	D10	None Detected								
U1	D8	None Detected								
U1	D6	None Detected								
U1	D4	None Detected								
U1	D2	None Detected								
U1	C1	None Detected								
U1	C3	None Detected								
U1	C5	None Detected								
U1	C7	None Detected								
U1	B10	None Detected								
U1	B8	None Detected								
U1	B6	None Detected								
U1	B4	None Detected								

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Bench Sheet Data

Client:	Tetra Tech			Scope:	04-01
EMSL Sample ID:	041420901-0001	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-05-00002	Grid Box :	0414-TetraTech-06: U	Analyst(s):	F. Craig
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/24/2014
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				
U1	B2	None Detected								
U2	I9	None Detected								
U2	I7	None Detected								
U2	I5	None Detected								
U2	I3	None Detected								
U2	I1	None Detected								
U2	H2	None Detected								
U2	H4	None Detected								
U2	H6	None Detected								
U2	G7	None Detected								
U2	G5	None Detected								
U2	G3	None Detected								
U2	G1	MD11	1		16.6	8.4	ADX	Actinolite		
U2	G1	MB		1	13.8	2.38	ADX	Actinolite	010386D	
U2	F2	None Detected								
U2	F4	None Detected								
U2	F6	None Detected								
U2	E9	None Detected								
U2	E7	None Detected								
U2	E5	None Detected								
U2	E3	None Detected								
U2	E1	None Detected								
U2	D2	None Detected								
U2	D4	None Detected								
U2	D6	None Detected								
U2	D8	None Detected								
U2	D10	None Detected								
U2	C9	None Detected								
U2	C7	None Detected								
U2	C5	None Detected								
U2	C3	None Detected								

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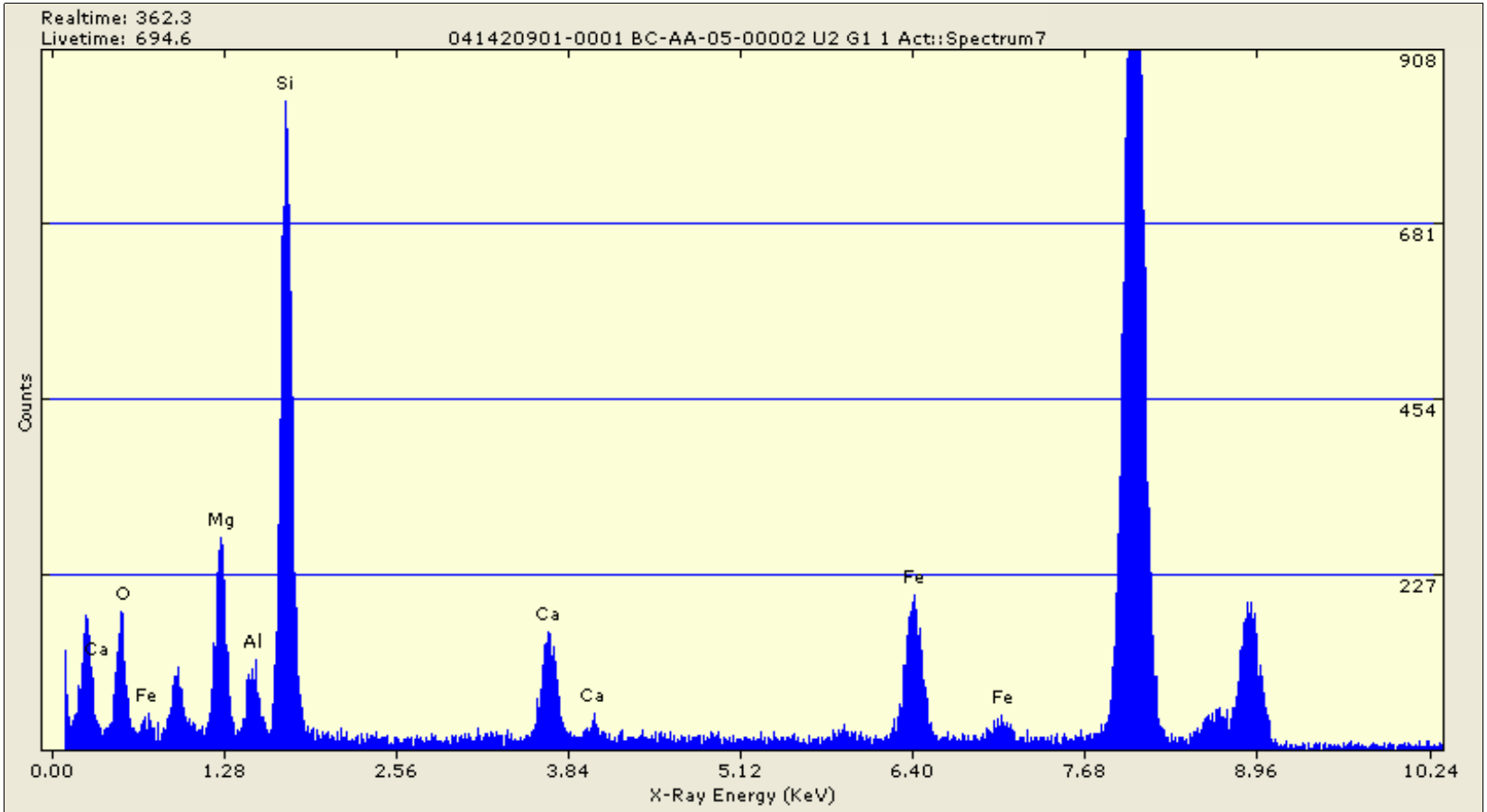
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041420901-0001 **Client:** Tetra Tech

Client Sample: *BC-AA-05-00002* 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: [illegible] Date: 7/24/14 Scope: 0401



Quantitative Results for Spectrum7
Analysis: Thin Film Method: Standardless
Acquired 24-Jul-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	44.70	1.61	60.98	0.00		0.0000	0.0000	0.0	87.0	1273.83
Magnesium	9.75	0.12	8.76	16.17	(MgO)	3.3023	0.1878	1953.4	96.6	2081.56
Aluminum	3.29	0.04	2.66	6.22	(Al2O3)	1.0049	0.0642	728.1	99.4	819.40
Silicon	26.54	0.34	20.62	56.77	(SiO2)	7.7775	0.4726	6213.3	102.4	6607.17
Calcium	5.48	0.07	2.98	7.66	(CaO)	1.1247	0.0575	1330.9	123.0	1424.48
Iron	10.24	0.13	4.00	13.17	(FeO)	1.5094	0.0851	1976.8	146.8	2186.63
Total	100.00			100.00		14.7187				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Jul 24, 2014
Indexing of Image Number:	010386	**Scope #:**	04 - 01
Reference / Sample No:	0001-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072314_10385		

Measured Inter-Row Spacing:	**192.41**	Pixels
Mean Distance between spots on Center row (d2):	**37.48**	Pixels
Mean Distance between spots on slant vector (d1):	**193.73**	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	1.757	**1.759**	*1.671*	*1.847*
d2 or hk0 (Camera K/zero row dist.):	9.020	**9.040**	*8.588*	*9.492*
d1 or hk1 (Camera K/slant vector dist.):	1.745	**1.744**	*1.657*	*1.831*
Ratio of hk0/hkl:	5.169	**5.183**	*4.924*	*5.442*
Angle of Slant Vector (Measured):	84.8	**84.450**	*80.227*	*88.673*

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

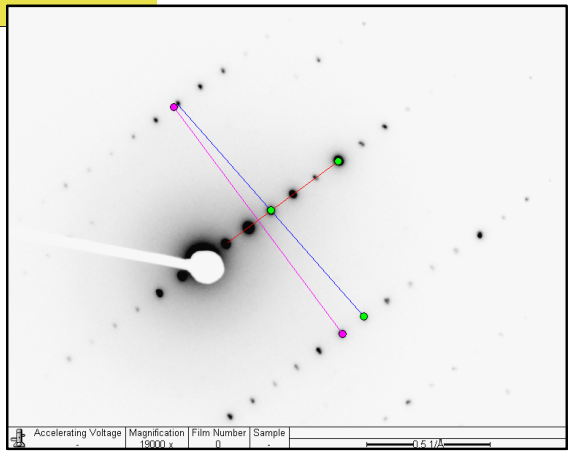
Miller Indice hk0: (0 2 0)

Miller Indice hkl: (-5 1 2)

With a Zone Axis of: [2 0 5]

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

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ISO 10312
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Customer Sample Number:	BC-AA-06-00002	Air volume:	10440	Liters
EMSL Sample Number:	041420901-0002	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	70	
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:	07/22/2014	
Result of Chi² Test:	N/A N/A	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	0	-	0.00	0.000000	0.000000 -	0.000119
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
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.

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Comment: Sample collected on 0.8 um filter.

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:	041420901-0002	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-06-00002	Grid Box :	0414-Tetra Tech-06: N	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/23/2014
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				
N5	J3	None Detected								
N5	I2	None Detected								
N5	I7	None Detected								
N5	H1	None Detected								
N5	H3	None Detected								
N5	H5	None Detected								
N5	G2	None Detected								
N5	G4	None Detected								
N5	H9	None Detected								
N5	F3	None Detected								
N5	F5	None Detected								
N5	F8	None Detected								
N5	E6	None Detected								
N5	D1	None Detected								
N5	D3	None Detected								
N5	D7	None Detected								
N5	C8	None Detected								
N5	C6	None Detected								
N5	C2	None Detected								
N5	B3	None Detected								
N5	B5	None Detected								
N5	B7	None Detected								
N5	B9	None Detected								
N5	A6	None Detected								
N5	A4	None Detected								
N5	A2	None Detected								
N6	A9	None Detected								
N6	A7	None Detected								
N6	A3	None Detected								
N6	A1	None Detected								
N6	B2	None Detected								
N6	B6	None Detected								
N6	B8	None Detected								
N6	B10	None Detected								
N6	C9	None Detected								
N6	C5	None Detected								
N6	D8	None Detected								
N6	D10	None Detected								

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Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
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Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/23/2014
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				
N6	E9	None Detected								
N6	E7	None Detected								
N6	E1	None Detected								
N6	F10	None Detected								
N6	G9	None Detected								
N6	G5	None Detected								
N6	G3	None Detected								
N6	H2	None Detected								
N6	H4	None Detected								
N6	H8	None Detected								
N6	H10	None Detected								
N6	I9	None Detected								
N6	I5	None Detected								
N6	J2	None Detected								
N6	J4	None Detected								
N6	J6	None Detected								
N7	B9	None Detected								
N7	B7	None Detected								
N7	B5	None Detected								
N7	C5	None Detected								
N7	D10	None Detected								
N7	D7	None Detected								
N7	D4	None Detected								
N7	E5	None Detected								
N7	E9	None Detected								
N7	F10	None Detected								
N7	F8	None Detected								
N7	H4	None Detected								
N7	H10	None Detected								
N7	I7	None Detected								
N7	J10	None Detected								
N7	J6	None Detected								

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Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *None Detected*

Explanation of Results

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Bench Sheet Data

Client:	Tetra Tech			Scope:	JEOL-1200-EX (04-03)
EMSL Sample ID:	041420901-0003	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-07-00002	Grid Box :	0414-Tetra Tech-06: O	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/24/2014
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				
O1	A10	None Detected								
O1	A8	None Detected								
O1	A2	None Detected								
O1	B5	None Detected								
O1	B7	None Detected								
O1	C1	None Detected								
O1	C9	None Detected								
O1	D4	None Detected								
O1	E3	None Detected								
O1	F2	None Detected								
O1	J10	None Detected								
O2	A10	None Detected								
O2	B9	None Detected								
O2	D9	None Detected								
O2	E10	None Detected								
O2	E8	None Detected								
O2	E2	None Detected								
O2	F9	None Detected								
O2	G10	None Detected								
O2	G8	None Detected								
O2	G6	None Detected								
O2	H7	None Detected								
O2	H9	None Detected								
O2	I8	None Detected								
O2	I6	None Detected								
O2	I3	None Detected								
O3	A10	None Detected								
O3	A5	None Detected								
O3	B9	None Detected								
O3	B6	None Detected								
O3	C8	None Detected								
O3	C5	None Detected								
O3	C2	None Detected								
O3	D3	None Detected								
O3	D5	None Detected								
O3	D9	None Detected								
O3	E8	None Detected								
O3	E4	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:	041420901-0003	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-07-00002	Grid Box :	0414-Tetra Tech-06: O	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/24/2014
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				
O3	E1	None Detected								
O3	F2	None Detected								
O3	F9	None Detected								
O3	G3	None Detected								
O3	G8	None Detected								
O3	G10	None Detected								
O3	H9	None Detected								
O3	H4	None Detected								
O3	H2	None Detected								
O3	I3	None Detected								
O3	J2	None Detected								
O3	J8	None Detected								
O3	J10	None Detected								
O4	J2	None Detected								
O4	J4	None Detected								
O4	J6	None Detected								
O4	J10	None Detected								
O4	I5	None Detected								
O4	I3	None Detected								
O4	H2	None Detected								
O4	H4	None Detected								
O4	H6	None Detected								
O4	H10	None Detected								
O4	G9	None Detected								
O4	G5	None Detected								
O4	G3	None Detected								
O4	G1	None Detected								
O4	F2	None Detected								
O4	F4	None Detected								
O4	F6	None Detected								
O4	F10	None Detected								
O4	E9	None Detected								

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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: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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-08-00002	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0004	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	67.00 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	1	-	1.11	0.000040	0.000000 -	0.000188
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Structures (All)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	1	1.11	0.000040	0.000000 -	0.000188
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
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: Sample collected on 0.8 um filter.

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:	041420901-0004	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-08-00002	Grid Box :	0414-Tetra Tech-06: O	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/25/2014
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				
O5	A2	None Detected								
O5	A4	None Detected								
O5	A6	None Detected								
O5	A8	None Detected								
O5	B5	None Detected								
O5	B3	None Detected								
O5	B1	None Detected								
O5	C2	None Detected								
O5	C4	None Detected								
O5	C6	None Detected								
O5	C8	None Detected								
O5	D9	None Detected								
O5	D7	None Detected								
O5	D5	None Detected								
O5	D3	None Detected								
O5	D1	None Detected								
O5	E4	None Detected								
O5	E6	None Detected								
O5	E8	None Detected								
O5	F9	None Detected								
O5	F7	None Detected								
O5	F5	None Detected								
O5	F3	None Detected								
O5	G4	None Detected								
O5	G6	None Detected								
O5	H9	None Detected								
O5	H5	None Detected								
O5	I4	None Detected								
O5	I6	None Detected								
O5	I8	F	1	1	7.3	0.9	ADX	Actinolite	4440	
O5	J9	None Detected								
O5	J7	None Detected								
O5	J5	None Detected								
O5	J3	None Detected								
O5	J1	None Detected								
O6	A1	None Detected								
O6	A3	None Detected								
O6	A5	None Detected								

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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:	041420901-0004	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-08-00002	Grid Box :	0414-Tetra Tech-06: O	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/25/2014
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				
O6	A9	None Detected								
O6	B10	None Detected								
O6	B8	None Detected								
O6	B4	None Detected								
O6	B2	None Detected								
O6	C1	None Detected								
O6	C3	None Detected								
O6	D10	None Detected								
O6	E7	None Detected								
O6	E1	None Detected								
O6	F4	None Detected								
O6	F10	None Detected								
O6	G9	None Detected								
O6	G7	None Detected								
O6	G5	None Detected								
O6	G3	None Detected								
O6	G1	None Detected								
O6	H2	None Detected								
O6	H4	None Detected								
O6	H8	None Detected								
O6	H10	None Detected								
O6	I9	None Detected								
O6	I7	None Detected								
O6	I5	None Detected								
O6	I3	None Detected								
O6	I1	None Detected								
O6	J2	None Detected								
O6	J4	None Detected								
O6	J8	None Detected								
O7	A10	None Detected								

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Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041420901-0004 **Client:** Tetra Tech

Client Sample: *BC-AA-08-00002* 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: _____ Date: 7/25/14 Scope: 04-03

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Energy Dispersive X-Ray Analysis
Quantitative Spectra & Data

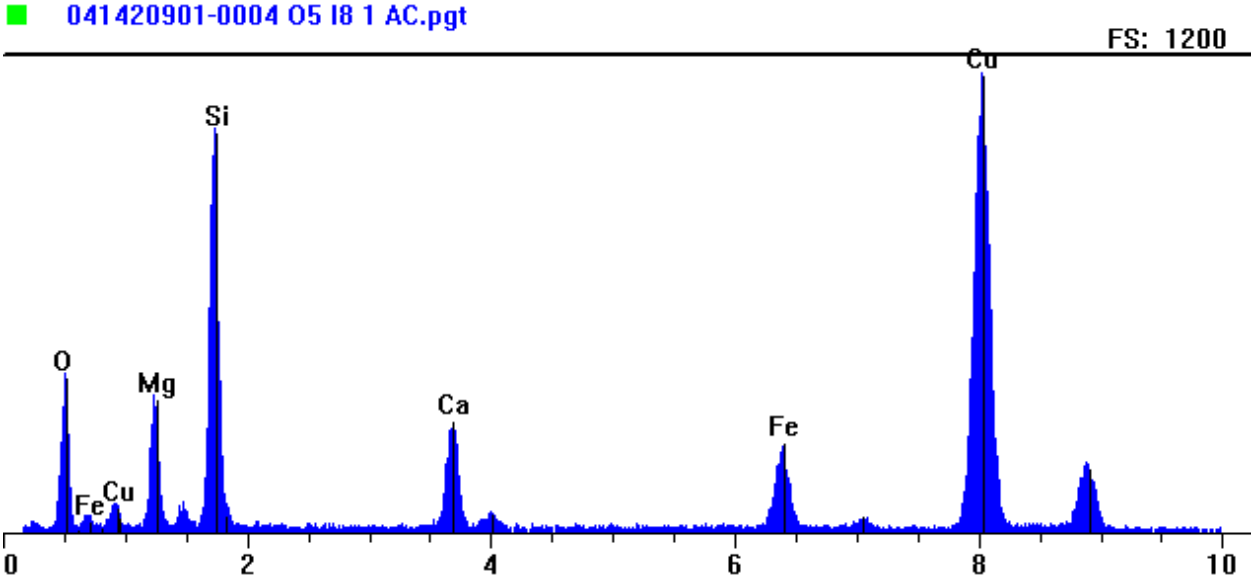
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041420901-0004 O5 I8 1 AC.pgt
Collected: July 25, 2014 08:17:46

Report: Friday, July 25, 2014

Live Time:	91.76	Count Rate:	1232	Dead Time:	12.47 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	31.00
Thickness limit:	26884.70				

041420901-0004 O5 I8 1 AC.pgt



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	12.32	12.10	5.6	MgO	20.42
Si	KA1	1.740	1.0000	30.20	25.70	11.8	SiO	47.41
Ca	KA1	3.691	1.0500	11.40	6.80	3.1	CaO	15.96
Fe	KA1	6.403	1.4100	12.61	5.40	2.5	FeO	16.22
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	33.47	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	52.2	4.5	47.7	10.6
Si	KA1	168.7	5.1	163.7	32.4
Ca	KA1	63.4	4.5	58.9	13.0
Fe	KA1	53.5	5.0	48.5	9.7
Cu	KA1	329.9	5.9	324.0	55.1
O	KA1	50.6	2.1	48.5	22.9

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number: 041420901 **Date:** Jul 25, 2014

Image Number: 04440

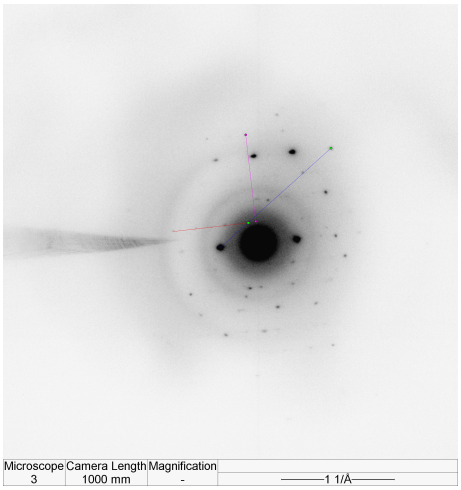
Reference / Sample Number: 0004

Preliminary ID: ACTINOLITE

Camera Constant: 1.962e-003 **1/A Pixels**

Calibration Reference: 072214-04-03-04439_C

	Measured	Reference	-5%	+5%
Inter-row Spacing:	**5.206**	5.278	**5.014**	**5.542**
d2 or hk0 (Camera K/zero row dist.):	**4.480**	4.520	**4.294**	**4.746**
d1 or hkl (Camera K/slant vector dist.):	**3.046**	2.942	**2.795**	**3.089**
Ratio of hk0/hkl:	**1.471**	1.536	**1.459**	**1.613**
Vector Angle:	**35.3**	35.330	**33.563**	**37.096**



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

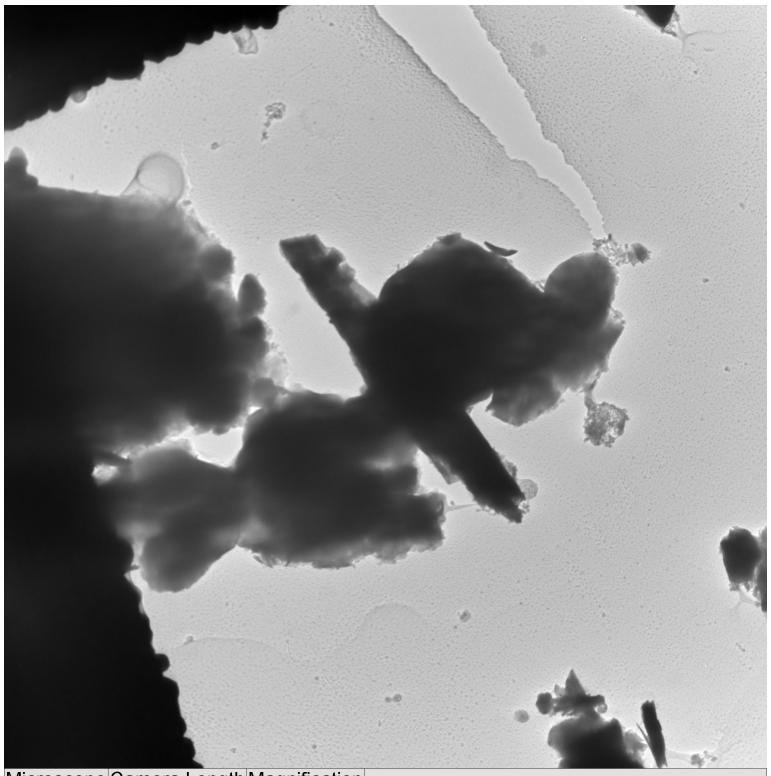
With a Zone Axis of: [**101**]

Preliminary Identification was:

X	CORRECT
	INCORRECT

EMSL Analytical, Inc.

Photomicrograph Report



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

Micrograph Information

Sample ID:	0004
Order ID:	041420901
Image Number:	04441
Mineral Type:	ACTINOLITE
Date:	7/25/2014
Magnification:	10000
Microscope:	3

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
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Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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-09-00002	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0005	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	65.00 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	1	-	1.11	0.000040	0.000000 -	0.000188
PCMe Structures (Amph)	ADX	2	-	2.23	0.000079	0.000000 -	0.000250
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**3**	**-**	**3.34**	**0.000119**	**0.000025 -**	**0.000308**
Total PCMe Structures (All)	**CD/ADX**	**3**	**-**	**3.34**	**0.000119**	**0.000025 -**	**0.000308**
PCMe Fibers and Bundles (Chrys)	CD	-	1	1.11	0.000040	0.000000 -	0.000188
PCMe Fibers and Bundles (Amph)	ADX	-	2	2.23	0.000079	0.000000 -	0.000250
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**3**	**3.34**	**0.000119**	**0.000025 -**	**0.000308**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**3**	**3.34**	**0.000119**	**0.000025 -**	**0.000308**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Chrysotile, 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: Sample collected on 0.8 um filter.

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:	041420901-0005	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-09-00002	Grid Box :	0414-Tetra Tech-07: C	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	65.00-Random	Pore Size (micron):	0.8	Analysis Date:	08/01/2014
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				
C1	A2	None Detected								
C1	A4	None Detected								
C1	A6	None Detected								
C1	A8	None Detected								
C1	A10	None Detected								
C1	B7	None Detected								
C1	B5	None Detected								
C1	B3	None Detected								
C1	B1	None Detected								
C1	C2	F	1	1	13.2	0.7	ADX	Actinolite	4443	
C1	C4	None Detected								
C1	C6	None Detected								
C1	C10	None Detected								
C1	D9	None Detected								
C1	D7	None Detected								
C1	D5	None Detected								
C1	D3	None Detected								
C1	D1	None Detected								
C1	E2	None Detected								
C1	E4	None Detected								
C1	E6	None Detected								
C1	E8	None Detected								
C1	E10	None Detected								
C1	F9	None Detected								
C1	F7	None Detected								
C1	F5	None Detected								
C1	F3	None Detected								
C1	F1	None Detected								
C1	G2	None Detected								
C1	G4	B	2	2	24	1.1	CD	Chrysotile	4445	
C1	G6	None Detected								
C1	G10	None Detected								
C1	H9	None Detected								
C1	H7	None Detected								
C1	H5	None Detected								
C1	H1	None Detected								
C3	A10	None Detected								
C3	A8	None Detected								

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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:	041420901-0005	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-09-00002	Grid Box :	0414-Tetra Tech-07: C	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	65.00-Random	Pore Size (micron):	0.8	Analysis Date:	08/01/2014
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				
C3	A6	None Detected								
C3	A4	None Detected								
C3	A2	None Detected								
C3	B3	None Detected								
C3	B5	None Detected								
C3	B7	None Detected								
C3	B9	None Detected								
C3	C10	None Detected								
C3	C4	None Detected								
C3	C2	F	3	3	9.2	0.8	ADX	Actinolite		
C3	D3	None Detected								
C3	D7	None Detected								
C3	D9	None Detected								
C3	E10	None Detected								
C3	E8	None Detected								
C3	E6	None Detected								
C3	E4	None Detected								
C3	E2	None Detected								
C3	F3	None Detected								
C3	F5	None Detected								
C3	F9	None Detected								
C3	G10	None Detected								
C3	G8	None Detected								
C3	G6	None Detected								
C3	G4	None Detected								
C3	G2	None Detected								
C3	H3	None Detected								
C3	H5	None Detected								
C3	H7	None Detected								
C3	H9	None Detected								

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Cinnaminson, NJ 08077

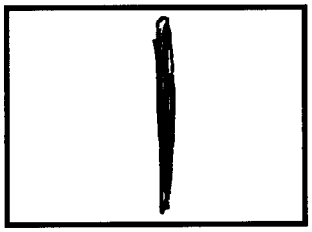
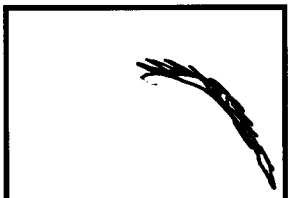
ISO 10312

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

Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041420901-0005 **Client:** Tetra Tech

Client Sample: *BC-AA-09-00002* Page 1 of

Primary Structure # 1 	Primary Structure # 2 	Primary Structure # 3 	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: 4/1/14 Scope: 01-03

200 Route 130 North Cinnaminson, NJ 08077
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Energy Dispersive X-Ray Analysis
Quantitative Spectra & Data

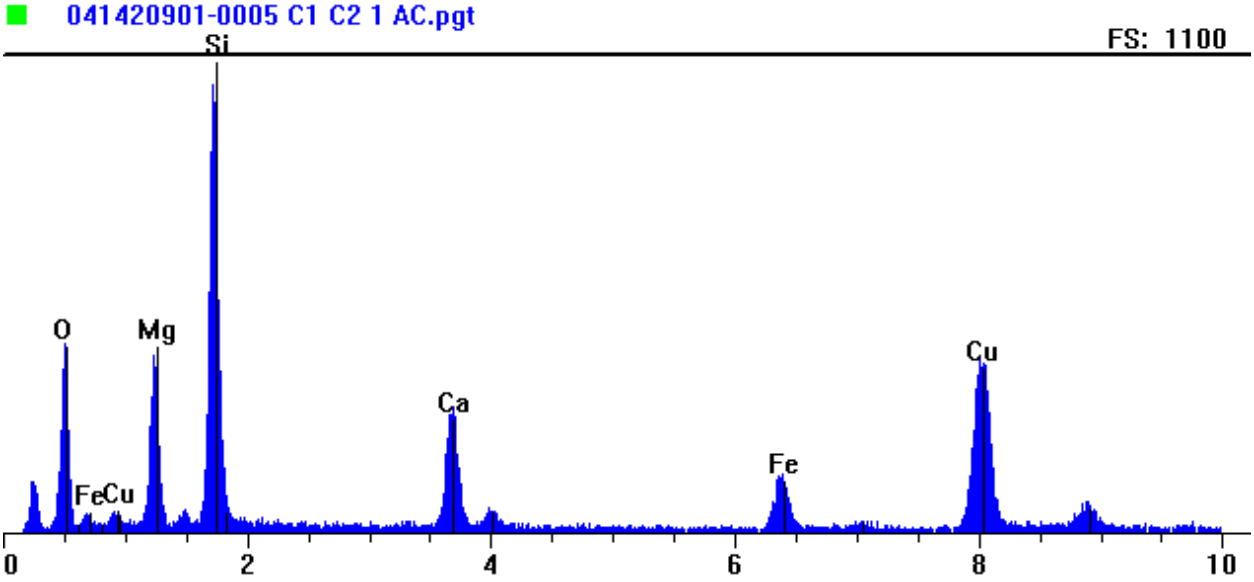
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041420901-0005 C1 C2 1 AC.pgt
Collected: August 01, 2014 08:10:21

Report: Friday, August 01, 2014

Live Time:	14.11	Count Rate:	6213	Dead Time:	44.25 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	31.00
Thickness limit:	26702.22				

041420901-0005 C1 C2 1 AC.pgt



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	15.14	14.46	6.7	MgO	25.11
Si	KA1	1.740	1.0000	30.87	25.53	11.7	SiO	48.46
Ca	KA1	3.691	1.0500	11.45	6.64	3.1	CaO	16.02
Fe	KA1	6.403	1.4100	8.09	3.37	1.5	FeO	10.41
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	34.44	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	401.4	33.7	367.7	10.9
Si	KA1	1087.8	38.3	1049.5	27.4
Ca	KA1	405.8	35.0	370.7	10.6
Fe	KA1	218.5	23.4	195.1	8.3
Cu	KA1	784.6	35.7	748.9	21.0
O	KA1	341.0	16.3	324.6	19.9

Energy Dispersive X-Ray Analysis
Quantitative Spectra & Data

EMSL ANALYTICAL, INC.

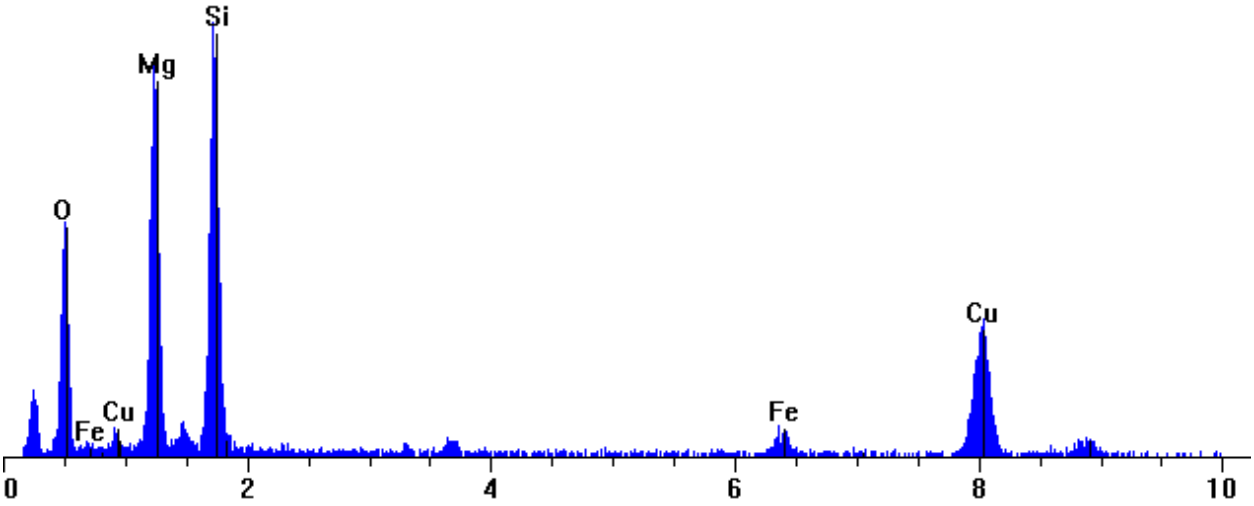
File: L:\EDS Spe...Spectra\Scope 04-03\2014\041420901-0005 C1 G4 2 CH.pgt
Collected: August 01, 2014 08:10:21

Report: Friday, August 01, 2014

Live Time:	83.25	Count Rate:	395	Dead Time:	3.81 %
Beam Voltage:	20.00	Beam Current:	2.00	Takeoff Angle:	31.00
Thickness limit:	38897.06				

■ 041420901-0005 C1 G4 2 CH.pgt

FS: 480



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	32.57	28.52	13.1	MgO	53.99
Si	KA1	1.740	1.0000	26.77	20.30	9.3	SiO	42.02
Fe	KA1	6.403	1.4100	3.10	1.18	0.5	FeO	3.99
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	37.56	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	67.7	2.8	64.9	23.1
Si	KA1	77.3	2.6	74.7	28.8
Fe	KA1	7.3	1.2	6.1	5.2
Cu	KA1	41.9	1.3	40.6	31.3
O	KA1	36.0	1.5	34.4	22.2

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number: 041420901 **Date:** Aug 01, 2014

Image Number: 04443

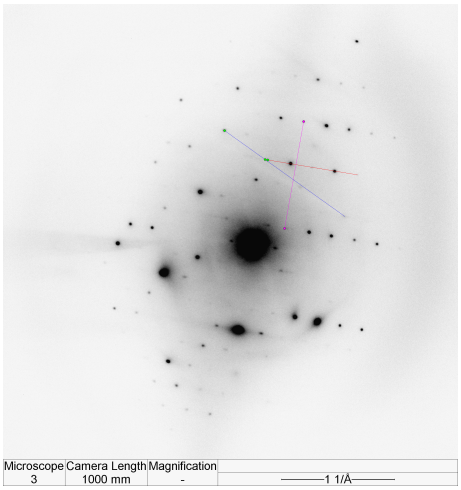
Reference / Sample Number: 0005

Preliminary ID: ACTINOLITE

Camera Constant: 1.957e-003 **1/A Pixels**

Calibration Reference: 072814-04-03-04442_C

	Measured	Reference	-5%	+5%
Inter-row Spacing:	**5.228**	5.278	**5.014**	**5.542**
d2 or hk0 (Camera K/zero row dist.):	**4.990**	5.102	**4.847**	**5.357**
d1 or hkl (Camera K/slant vector dist.):	**2.306**	2.337	**2.220**	**2.454**
Ratio of hk0/hkl:	**2.164**	2.183	**2.074**	**2.292**
Vector Angle:	**27.09**	28.200	**26.790**	**29.610**



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

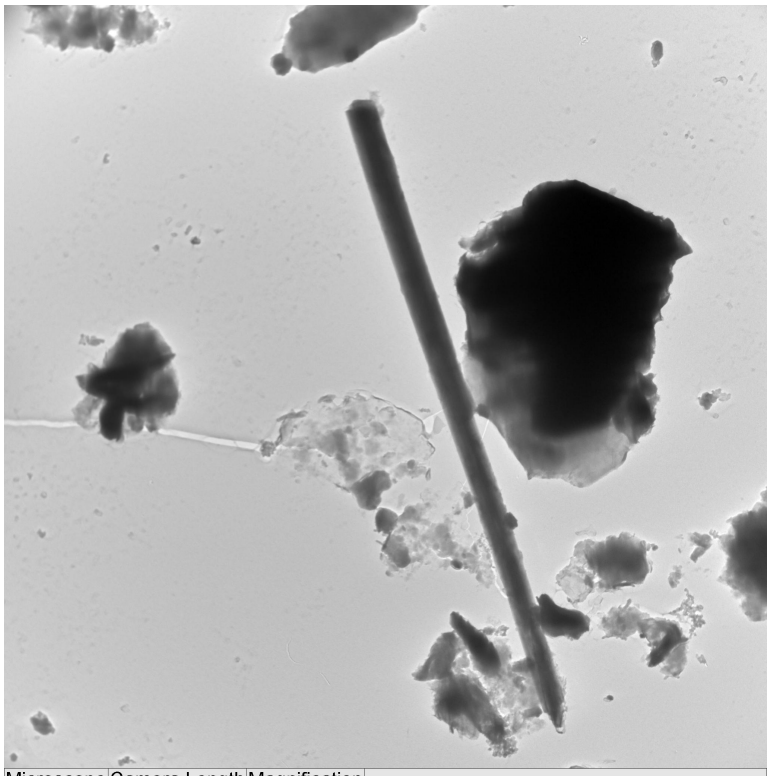
With a Zone Axis of: [**314**]

Preliminary Identification was:

X	CORRECT
	INCORRECT

EMSL Analytical, Inc.

Photomicrograph Report



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

Micrograph Information

Sample ID:	0005
Order ID:	041420901
Image Number:	04444
Mineral Type:	ACTINOLITE
Date:	8/1/2014
Magnification:	10000
Microscope:	3

CHRYSOTILE SAED INDEXING FORM

EMSL Order Number: 041420901 **Date:** Aug 01, 2014

Image Number: 04445

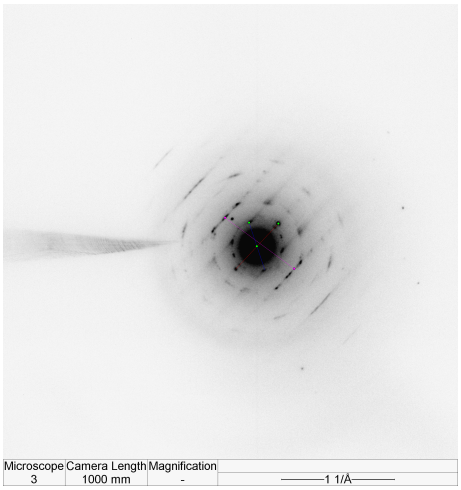
Reference / Sample Number: 0005

Preliminary ID: Chrysotile

Camera Constant: 1.9574188 **1/A Pixels**

Calibration Reference: 072814-04-03-04442_C

	Measured	Reference	-5%	+5%
Inter-row Spacing:	**5.291**	5.3	**5.06**	**5.56**
Vector Angle:	**61.6**	60	**58**	**63**
d2 or hk0 (Camera K/zero row dist.):	**7.276**	7.32	**6.95**	**7.68**
d1 or hkl (Camera K/slant vector dist.):	**4.551**	4.58	**4.35**	**4.81**



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

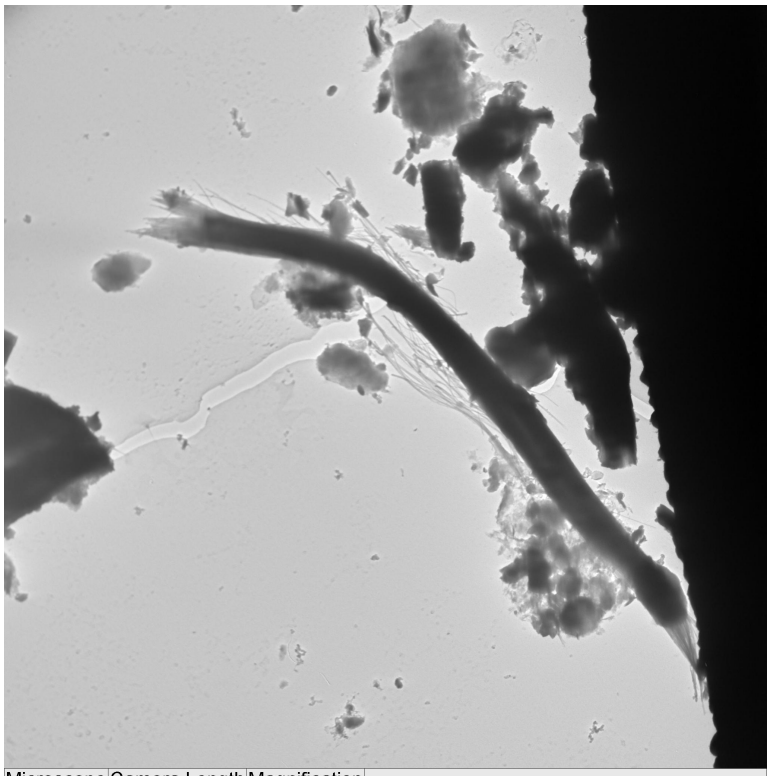
Preliminary Identification was:

[X] CORRECT

[ ] INCORRECT

EMSL Analytical, Inc.

Photomicrograph Report



Microscope	Camera Length	Magnification	
3	-	6000 x	——5 µm——

Micrograph Information

Sample ID:	0005
Order ID:	041420901
Image Number:	04446
Mineral Type:	CHRYSOTILE
Date:	8/1/2014
Magnification:	6000
Microscope:	3

EMSL Analytical, Inc.
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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: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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-10-00002	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0006	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	N/A N/A	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	0	-	0.00	0.000000	0.000000 -	0.000119
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
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: Sample collected on 0.8 um filter.

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:	041420901-0006	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-10-00002	Grid Box :	0414-Tetra Tech-07: A	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/31/2014
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				
A1	A2	None Detected								
A1	A4	None Detected								
A1	A8	None Detected								
A1	A10	None Detected								
A1	C8	None Detected								
A1	C6	None Detected								
A1	C4	None Detected								
A1	C2	None Detected								
A1	F5	None Detected								
A1	G6	None Detected								
A1	I8	None Detected								
A2	A7	None Detected								
A2	A5	None Detected								
A2	A3	None Detected								
A2	A1	None Detected								
A2	B2	None Detected								
A2	B4	None Detected								
A2	B6	None Detected								
A2	C5	None Detected								
A2	C3	None Detected								
A2	C1	None Detected								
A2	D2	None Detected								
A2	D4	None Detected								
A2	E5	None Detected								
A2	E1	None Detected								
A2	F2	None Detected								
A2	F4	None Detected								
A2	G5	None Detected								
A2	G3	None Detected								
A2	G1	None Detected								
A2	H2	None Detected								
A2	H4	None Detected								
A2	I5	None Detected								
A2	I3	None Detected								
A2	I1	None Detected								
A2	J2	None Detected								
A2	J4	None Detected								
A3	A1	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:	041420901-0006	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-10-00002	Grid Box :	0414-Tetra Tech-07: A	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/31/2014
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				
A3	A3	None Detected								
A3	A5	None Detected								
A3	A7	None Detected								
A3	B6	None Detected								
A3	B4	None Detected								
A3	B2	None Detected								
A3	C1	None Detected								
A3	C3	None Detected								
A3	C5	None Detected								
A3	C7	None Detected								
A3	C9	None Detected								
A3	D6	None Detected								
A3	D4	None Detected								
A3	D2	None Detected								
A3	E1	None Detected								
A3	E3	None Detected								
A3	E5	None Detected								
A3	E7	None Detected								
A3	F6	None Detected								
A3	F4	None Detected								
A3	F2	None Detected								
A3	G1	None Detected								
A3	G3	None Detected								
A3	G5	None Detected								
A3	G7	None Detected								
A3	H8	None Detected								
A3	H6	None Detected								
A3	H4	None Detected								
A3	H2	None Detected								
A3	I1	None Detected								

EMSL Analytical, Inc.
200 Route 130 North
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856-303-2500
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Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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-11-00002	Air volume:	10440	Liters
EMSL Sample Number:	041420901-0007	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	70	
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:	07/22/2014	
Result of Chi² Test:	69.00 Random	Analyst:	F. Craig	

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	1	-	1.08	0.000040	0.000000 -	0.000189
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**1**	**-**	**1.08**	**0.000040**	**0.000000 -**	**0.000189**
Total PCMe Structures (All)	**CD/ADX**	**1**	**-**	**1.08**	**0.000040**	**0.000000 -**	**0.000189**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	1	1.08	0.000040	0.000000 -	0.000189
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**1**	**1.08**	**0.000040**	**0.000000 -**	**0.000189**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**1**	**1.08**	**0.000040**	**0.000000 -**	**0.000189**
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.

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Comment: Sample collected on 0.8 um filter.

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:	041420901-0007	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-11-00002	Grid Box :	0414-TetraTech-06: Q	Analyst(s):	F. Craig
Chi² Test for Uniformity:	69.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/27/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	20%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
Q3	H10	None Detected								
Q3	H8	None Detected								
Q3	H6	None Detected								
Q3	G3	None Detected								
Q3	G5	None Detected								
Q3	G7	None Detected								
Q3	F10	None Detected								
Q3	F8	None Detected								
Q3	F6	None Detected								
Q3	F4	None Detected								
Q3	E3	None Detected								
Q3	E5	None Detected								
Q3	E7	None Detected								
Q3	D10	None Detected								
Q3	D8	None Detected								
Q3	D6	None Detected								
Q3	D4	None Detected								
Q3	C3	None Detected								
Q3	C5	None Detected								
Q3	C7	None Detected								
Q3	C9	None Detected								
Q3	B10	None Detected								
Q3	B8	None Detected								
Q3	B6	None Detected								
Q3	B4	None Detected								
Q3	A7	None Detected								
Q3	A9	None Detected								
Q4	J2	None Detected								
Q4	J4	None Detected								
Q4	J6	None Detected								
Q4	J8	None Detected								
Q4	I5	None Detected								
Q4	I3	None Detected								
Q4	I1	None Detected								
Q4	H2	None Detected								
Q4	H4	None Detected								
Q4	H6	None Detected								
Q4	H8	None Detected								

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Cinnaminson, NJ 08077

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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:	041420901-0007	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-11-00002	Grid Box :	0414-TetraTech-06: Q	Analyst(s):	F. Craig
Chi² Test for Uniformity:	69.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/27/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	20%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
Q4	H10	None Detected								
Q4	G7	None Detected								
Q4	G5	None Detected								
Q4	G3	None Detected								
Q4	G1	None Detected								
Q4	F2	None Detected								
Q4	F4	None Detected								
Q4	F6	None Detected								
Q4	F8	None Detected								
Q4	E7	None Detected								
Q4	E5	None Detected								
Q4	E3	None Detected								
Q4	D2	None Detected								
Q4	D4	None Detected								
Q4	D6	None Detected								
Q4	D8	None Detected								
Q4	C9	None Detected								
Q4	C7	None Detected								
Q4	C5	None Detected								
Q4	C3	None Detected								
Q4	C1	None Detected								
Q4	B2	None Detected								
Q4	B4	None Detected								
Q4	B6	MD11	1		19.7	7.2	ADX	Actinolite		
Q4	B6	MF		1	12.4	0.72	ADX	Actinolite	010389D	
Q4	A9	None Detected								
Q4	A5	None Detected								
Q4	A3	None Detected								
Q4	A1	None Detected								
Q2	B4	None Detected								
Q2	B6	None Detected								
Q2	B8	None Detected								
Q2	B10	None Detected								

200 Route 130 North
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ISO 10312

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

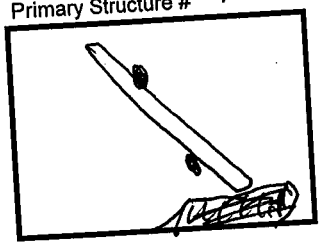
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041420901-0007

Client Sample: BC-AA-11-00002

Client: Tetra Tech

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: FC

Date: 7/27/14

Scope: 04 01

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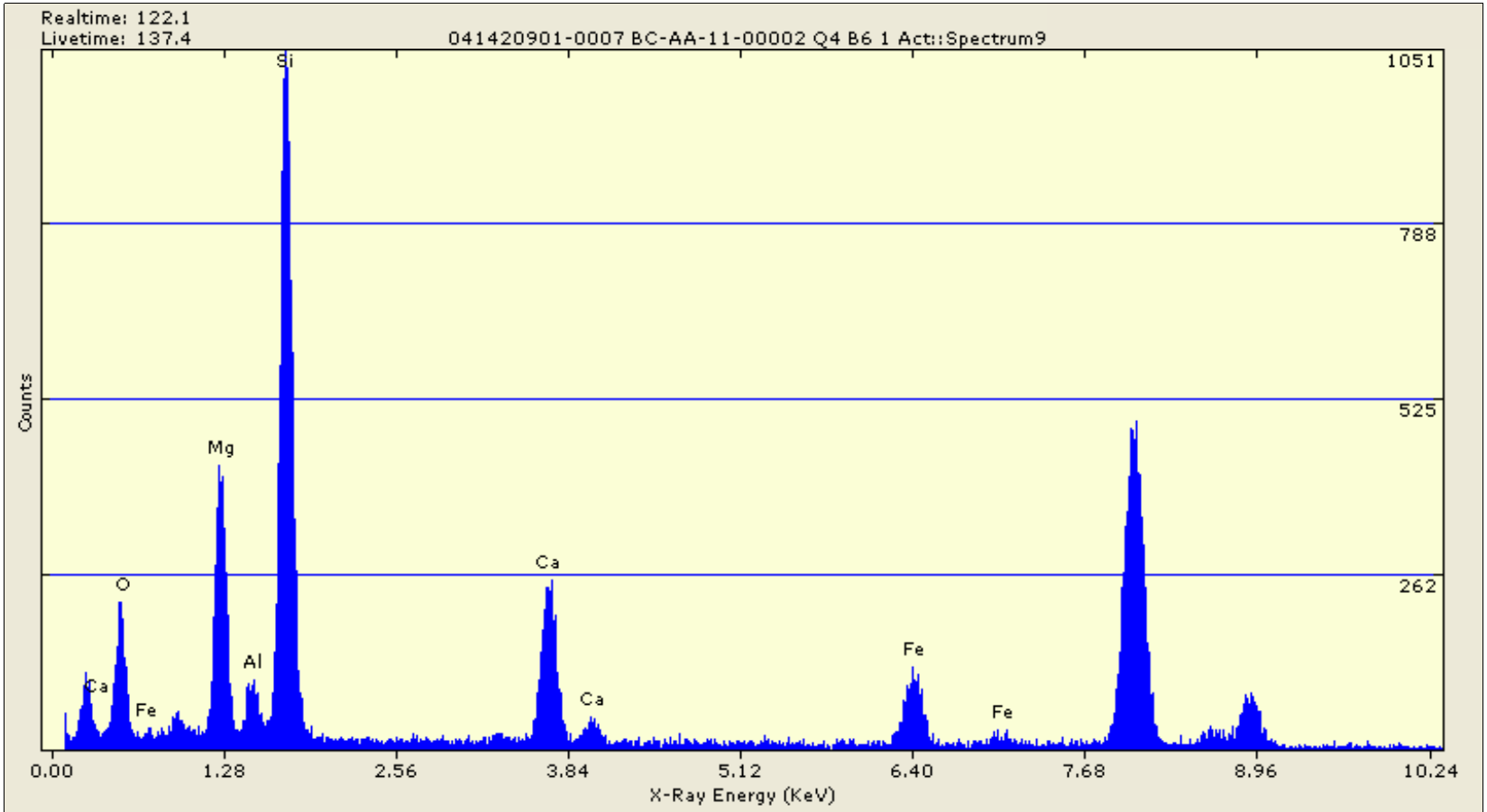


Quantitative Results for Spectrum9
Analysis: Thin Film Method: Standardless
Acquired 27-Jul-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	45.75	0.50	60.87	0.00		0.0000	0.0000	0.0	87.0	1641.86
Magnesium	12.05	0.13	10.56	19.99	(MgO)	3.9890	0.2212	3170.4	96.6	3386.82
Aluminum	2.39	0.03	1.88	4.51	(Al2O3)	0.7112	0.0443	692.4	99.4	843.12
Silicon	27.45	0.30	20.80	58.72	(SiO2)	7.8603	0.4676	8437.5	102.4	8737.96
Calcium	7.81	0.09	4.15	10.92	(CaO)	1.5668	0.0759	2491.3	123.0	2528.76
Iron	4.55	0.05	1.73	5.85	(FeO)	0.6554	0.0386	1153.3	146.9	1350.94
Total	100.00			100.00		14.7826				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Jul 27, 2014
Indexing of Image Number:	010389	**Scope #:**	04 - 01
Reference / Sample No:	0007-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072314_10385		

Measured Inter-Row Spacing:	**64.16**	Pixels
Mean Distance between spots on Center row (d2):	**102.79**	Pixels
Mean Distance between spots on slant vector (d1):	**68.52**	Pixels

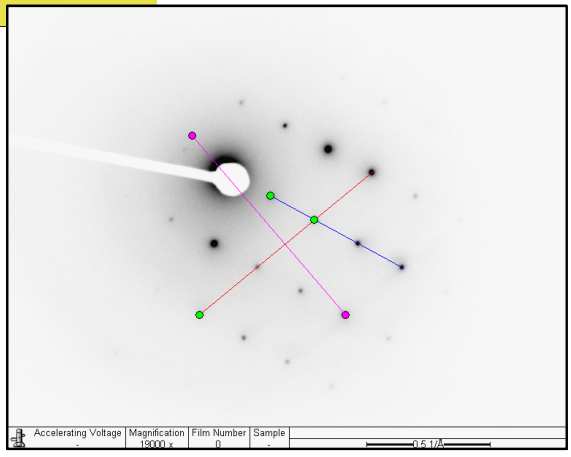
	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.269	**5.278**	*5.014*	*5.542*
d2 or hk0 (Camera K/zero row dist.):	3.289	**3.281**	*3.117*	*3.445*
d1 or hk1 (Camera K/slant vector dist.):	4.934	**4.931**	*4.684*	*5.178*
Ratio of hk0/hkl:	0.667	**0.665**	*0.632*	*0.698*
Angle of Slant Vector (Measured):	67.6	**67.250**	*63.887*	*70.612*

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

Miller Indice hk0: (2 -4 0)

Miller Indice hkl: (1 -1 -1)

With a Zone Axis of: [2 1 1]



Preliminary Identification was: X CORRECT

INCORRECT

Percent accuracy to date: 100 %

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
856-303-2500
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Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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-12-00002	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0008	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	67.00 Random	Analyst:	F. Craig	

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	1	-	1.11	0.000040	0.000000 -	0.000188
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Structures (All)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	1	1.11	0.000040	0.000000 -	0.000188
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Non Asbestos Mineral Structures	NAM	1	1	-	-	- -	-

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: Sample collected on 0.8 um filter.

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:	041420901-0008	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-12-00002	Grid Box :	0414-TetraTech: Q	Analyst(s):	F. Craig
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/27/2014 & 07/28/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	20%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
Q8	A9	MD11	1		7.7	2.88	ADX	Actinolite		
Q8	A9	MF		1	7.7	0.48	ADX	Actinolite	010391D	
Q8	A7	None Detected								
Q8	A5	None Detected								
Q8	A3	None Detected								
Q8	B4	None Detected								
Q8	B6	None Detected								
Q8	B8	None Detected								
Q8	B10	None Detected								
Q8	C9	None Detected								
Q8	C7	None Detected								
Q8	C5	None Detected								
Q8	C3	None Detected								
Q8	D4	None Detected								
Q8	D6	None Detected								
Q8	D8	None Detected								
Q8	D10	None Detected								
Q8	E9	None Detected								
Q8	E7	None Detected								
Q8	E5	None Detected								
Q8	E3	None Detected								
Q8	F4	None Detected								
Q8	F6	None Detected								
Q8	F8	None Detected								
Q8	F10	None Detected								
Q8	G9	None Detected								
Q8	G7	None Detected								
Q8	G5	None Detected								
Q8	G3	None Detected								
Q8	H4	None Detected								
Q8	H6	None Detected								
Q8	H8	None Detected								
Q8	H10	None Detected								
Q8	I9	None Detected								
Q8	I7	None Detected								
Q8	I5	None Detected								
Q8	J4	None Detected								
Q8	J6	None Detected								

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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:	041420901-0008	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-12-00002	Grid Box :	0414-TetraTech: Q	Analyst(s):	F. Craig
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/27/2014 & 07/28/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	20%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
Q8	J8	None Detected								
Q8	J10	None Detected								
Q7	A3	None Detected								
Q7	A5	None Detected								
Q7	A7	None Detected								
Q7	A9	None Detected								
Q7	B8	None Detected								
Q7	B6	None Detected								
Q7	B4	None Detected								
Q7	B2	None Detected								
Q7	C3	None Detected								
Q7	C7	None Detected								
Q7	C9	None Detected								
Q7	D8	None Detected								
Q7	D6	None Detected								
Q7	D4	None Detected								
Q7	D2	None Detected								
Q7	F2	None Detected								
Q7	F4	None Detected								
Q7	F6	None Detected								
Q7	F8	None Detected								
Q7	G9	None Detected								
Q7	G7	None Detected								
Q7	G5	None Detected								
Q7	G3	None Detected								
Q7	G1	None Detected								
Q7	H2	None Detected								
Q7	H4	None Detected								
Q7	H6	MD11	2		5.6	2.04	NAM	Non Asb. Mineral		
Q7	H6	MF		2	5.6	1.44	NAM	Non Asb. Mineral	010393D	
Q7	I5	None Detected								
Q7	I7	None Detected								

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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: 041420901-0008

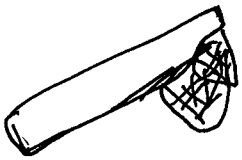
Client Sample: BC-AA-12-00002

Client: Tetra Tech

Page 1 of 1

Primary Structure # 1

Primary Structure # 2



Primary Structure #

Primary Structure #

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Primary Structure #

Primary Structure #

Primary Structure #

Primary Structure #

Structure #

Structure #

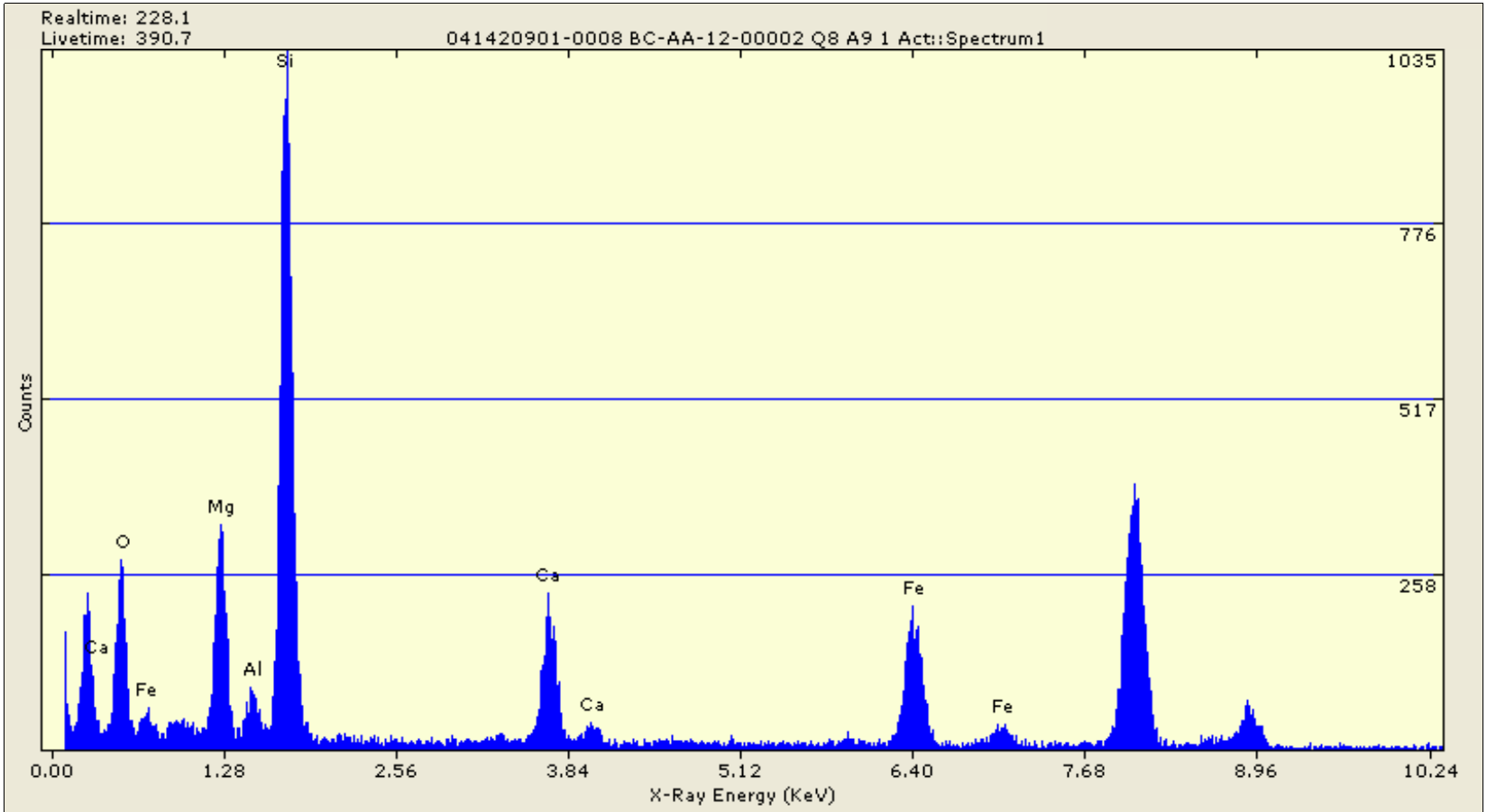
Structure #

Structure #

Analyst: FC

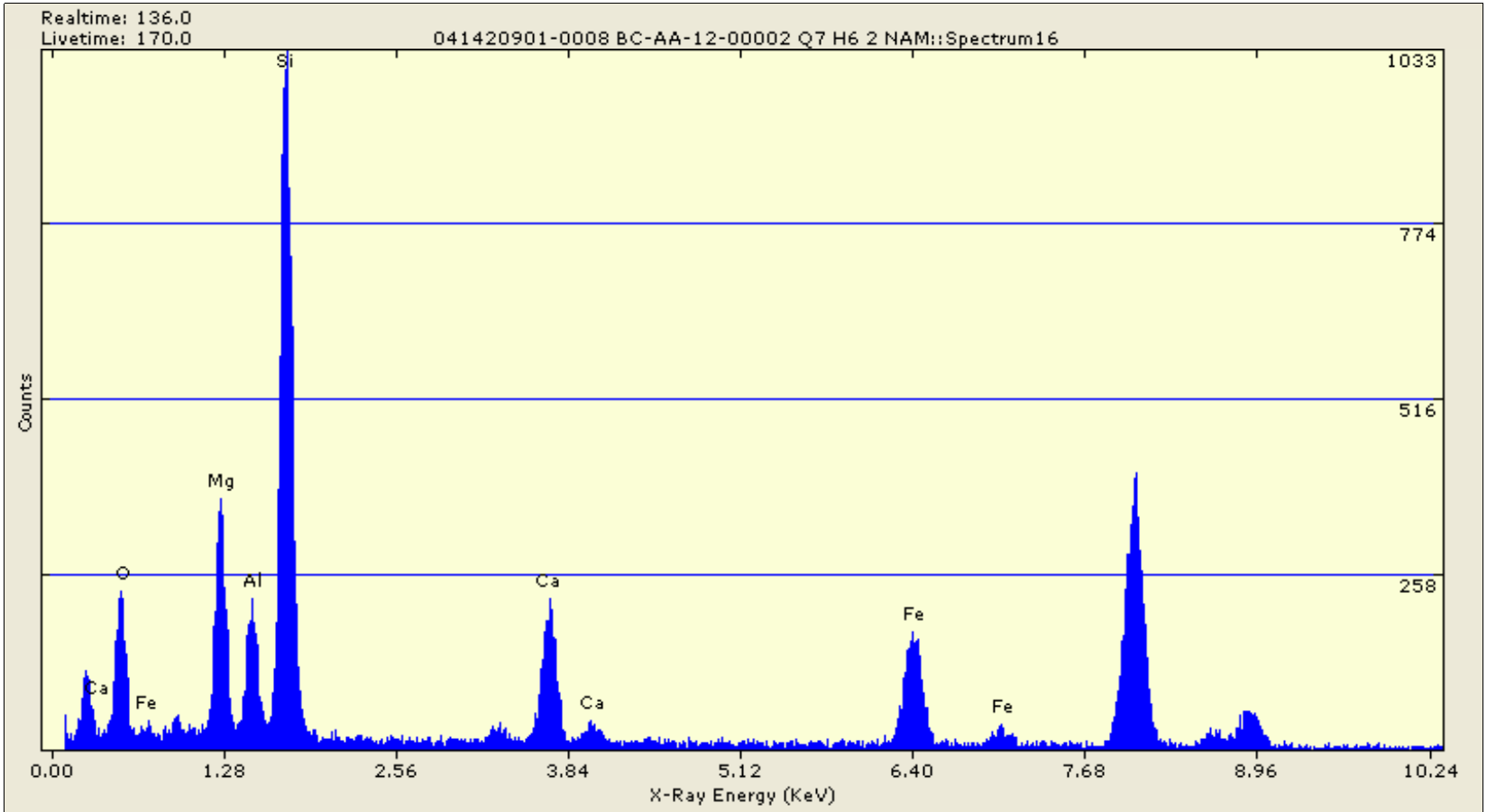
Date: 7/28/14

Scope: 04 01



Quantitative Results for Spectrum1
Analysis: Thin Film Method: Standardless
Acquired 27-Jul-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	45.11	0.50	61.24	0.00		0.0000	0.0000	0.0	87.0	2053.35
Magnesium	9.63	0.11	8.61	15.98	(MgO)	3.2332	0.1751	2378.2	96.6	2578.29
Aluminum	1.94	0.02	1.57	3.67	(Al2O3)	0.5878	0.0353	529.7	99.4	659.44
Silicon	28.04	0.31	21.68	60.00	(SiO2)	8.1447	0.4707	8091.0	102.4	8508.29
Calcium	6.34	0.07	3.44	8.87	(CaO)	1.2904	0.0610	1898.9	123.0	1998.49
Iron	8.93	0.10	3.47	11.48	(FeO)	1.3037	0.0700	2123.1	146.8	2341.69
Total	100.00			100.00		14.5599				



Quantitative Results for Spectrum16
Analysis: Thin Film Method: Standardless
Acquired 28-Jul-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	45.33	0.50	60.99	0.00		0.0000	0.0000	0.0	87.0	1836.87
Magnesium	9.93	0.11	8.79	16.46	(MgO)	3.3156	0.1815	2666.8	96.6	2862.24
Aluminum	5.20	0.06	4.15	9.82	(Al2O3)	1.5637	0.0954	1540.7	99.4	1705.12
Silicon	25.96	0.29	19.90	55.54	(SiO2)	7.5037	0.4399	8151.0	102.4	8639.96
Calcium	6.23	0.07	3.35	8.72	(CaO)	1.2616	0.0603	2030.1	123.0	2115.24
Iron	7.35	0.08	2.83	9.46	(FeO)	1.0684	0.0585	1902.6	146.8	2077.21
Total	100.00			100.00		14.7130				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Jul 27, 2014
Indexing of Image Number:	010391	**Scope #:**	04 - 01
Reference / Sample No:	0008-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072314_10385		

Measured Inter-Row Spacing:	**64.21**	Pixels
Mean Distance between spots on Center row (d2):	**172.13**	Pixels
Mean Distance between spots on slant vector (d1):	**86.77**	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.265	**5.278**	*5.014*	*5.542*
d2 or hk0 (Camera K/zero row dist.):	1.964	**1.965**	*1.867*	*2.063*
d1 or hk1 (Camera K/slant vector dist.):	3.896	**3.880**	*3.686*	*4.074*
Ratio of hk0/hkl:	0.504	**0.506**	*0.481*	*0.531*
Angle of Slant Vector (Measured):	47.8	**47.480**	*45.106*	*49.854*

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

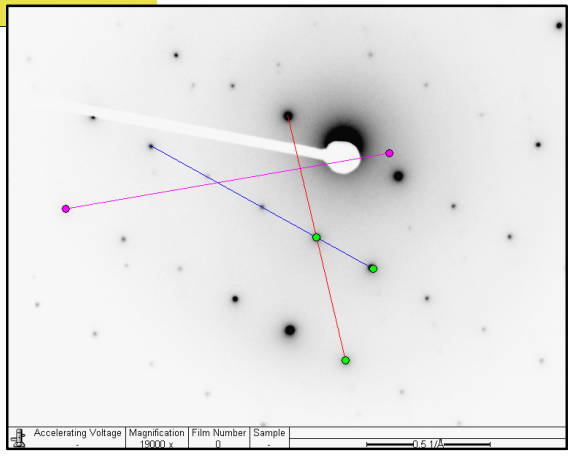
Miller Indice hk0: (**-1 9 0**)

Miller Indice hkl: (**-1 3 1**)

With a Zone Axis of: [**9 1 6**]

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Jul 28, 2014
Indexing of Image Number:	010393	**Scope #:**	04 - 01
Reference / Sample No:	0008-04-01	**By:**	F Craig
Preliminary ID:	NAM		
Using Camera Constant of:	2.958e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072314_10385		

Measured Inter-Row Spacing: **64.64** 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):	5.230	**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

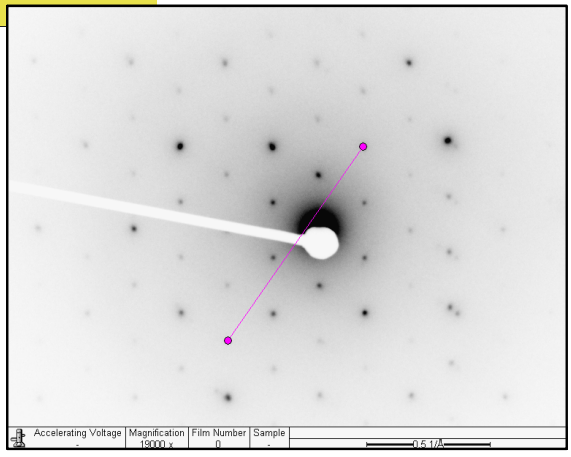
Miller Indice hk0: ( )

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: 7/22/2014 9:55
Date Sampled: 07/19/2014 08:00
EMSL Order: 041420901
Report Date: 08/06/14

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-01-00007	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0009	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	N/A N/A	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	0	-	0.00	0.000000	0.000000 -	0.000119
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Structures (All)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
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

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Comment: Sample collected on 0.8 um filter.

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:	041420901-0009	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-01-00007	Grid Box :	0414-Tetra Tech-06: R	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/28/2014
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				
R3	J2	None Detected								
R3	J4	None Detected								
R3	J6	None Detected								
R3	J8	None Detected								
R3	I9	None Detected								
R3	I7	None Detected								
R3	I5	None Detected								
R3	I3	None Detected								
R3	I1	None Detected								
R3	H4	None Detected								
R3	H6	None Detected								
R3	H8	None Detected								
R3	G9	None Detected								
R3	G7	None Detected								
R3	G5	None Detected								
R3	G3	None Detected								
R3	G1	None Detected								
R3	F2	None Detected								
R3	F4	None Detected								
R3	F6	None Detected								
R3	F8	None Detected								
R3	E7	None Detected								
R3	E5	None Detected								
R3	E3	None Detected								
R3	E1	None Detected								
R3	D2	None Detected								
R3	D4	None Detected								
R3	D6	None Detected								
R3	D8	None Detected								
R3	C9	None Detected								
R3	C7	None Detected								
R3	C5	None Detected								
R3	C3	None Detected								
R3	C1	None Detected								
R3	B2	None Detected								
R3	B4	None Detected								
R3	B6	None Detected								
R3	B8	None Detected								

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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:	041420901-0009	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-01-00007	Grid Box :	0414-Tetra Tech-06: R	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/28/2014
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				
R3	A9	None Detected								
R3	A7	None Detected								
R3	A5	None Detected								
R3	A3	None Detected								
R3	A1	None Detected								
R4	A10	None Detected								
R4	A8	None Detected								
R4	A4	None Detected								
R4	B3	None Detected								
R4	B7	None Detected								
R4	B9	None Detected								
R4	C10	None Detected								
R4	C8	None Detected								
R4	C6	None Detected								
R4	D5	None Detected								
R4	D7	None Detected								
R4	D9	None Detected								
R4	E10	None Detected								
R4	E8	None Detected								
R4	E6	None Detected								
R4	E4	None Detected								
R4	F3	None Detected								
R4	F5	None Detected								
R4	F7	None Detected								
R4	G10	None Detected								
R4	G8	None Detected								
R4	G6	None Detected								
R4	G4	None Detected								
R4	H3	None Detected								
R4	H9	None Detected								

200 Route 130 North
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856-303-2500
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Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 08:00
EMSL Order: 041420901
Report Date: 08/06/14

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-03-00007	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0010	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	N/A N/A	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	0	-	0.00	0.000000	0.000000 -	0.000119
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**0**	**-**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Structures (All)	**CD/ADX**	**0**	-	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**0**	**0.00**	**0.000000**	**0.000000 -**	**0.000119**
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

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Comment: Sample collected on 0.8 um filter.

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:	041420901-0010	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-03-00007	Grid Box :	0414-Tetra Tech-06: R	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	08/01/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	20%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
R5	I3	None Detected								
R5	H2	None Detected								
R5	H4	None Detected								
R5	H8	None Detected								
R5	G7	None Detected								
R5	G5	None Detected								
R5	G3	None Detected								
R5	F4	None Detected								
R5	F6	None Detected								
R5	F8	None Detected								
R5	E7	None Detected								
R5	E5	None Detected								
R5	E3	None Detected								
R5	E1	None Detected								
R5	D2	None Detected								
R5	D4	None Detected								
R5	D6	None Detected								
R5	C7	None Detected								
R5	C1	None Detected								
R5	B6	None Detected								
R5	A3	None Detected								
R6	A8	None Detected								
R6	A6	None Detected								
R6	C4	None Detected								
R6	C6	None Detected								
R6	C8	None Detected								
R6	C10	None Detected								
R6	D9	None Detected								
R6	D7	None Detected								
R6	D5	None Detected								
R6	E2	None Detected								
R6	E4	None Detected								
R6	E6	None Detected								
R6	E8	None Detected								
R6	E10	None Detected								
R6	F9	None Detected								
R6	F7	None Detected								
R6	F5	None Detected								

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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:	041420901-0010	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-03-00007	Grid Box :	0414-Tetra Tech-06: R	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	08/01/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	20%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
R6	F3	None Detected								
R6	G4	None Detected								
R6	G6	None Detected								
R6	G8	None Detected								
R6	G10	None Detected								
R6	H9	None Detected								
R6	H7	None Detected								
R6	H5	None Detected								
R6	H3	None Detected								
R6	I4	None Detected								
R6	I6	None Detected								
R6	I8	None Detected								
R6	J9	None Detected								
R6	J7	None Detected								
R6	J5	None Detected								
R7	A2	None Detected								
R7	A4	None Detected								
R7	A6	None Detected								
R7	A8	None Detected								
R7	A10	None Detected								
R7	B9	None Detected								
R7	B7	None Detected								
R7	B5	None Detected								
R7	B3	None Detected								
R7	C2	None Detected								
R7	C6	None Detected								
R7	C8	None Detected								
R7	C10	None Detected								
R7	D9	None Detected								
R7	D7	None Detected								

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856-303-2500
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Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 08:00
EMSL Order: 041420901
Report Date: 08/06/14

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-04-00007	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0011	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	77.00 Random	Analyst:	F. Craig	

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	8	-	8.91	0.000318	0.000137 -	0.000626
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**8**	**-**	**8.91**	**0.000318**	**0.000137 -**	**0.000626**
Total PCMe Structures (All)	**CD/ADX**	**8**	**-**	**8.91**	**0.000318**	**0.000137 -**	**0.000626**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	8	8.91	0.000318	0.000137 -	0.000626
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**8**	**8.91**	**0.000318**	**0.000137 -**	**0.000626**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**8**	**8.91**	**0.000318**	**0.000137 -**	**0.000626**
Non Asbestos Mineral Structures	NAM	0	0	-	-	- -	-

Asbestiform Minerals Present: *Anthophyllite, 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.

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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.

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Comment: Sample collected on 0.8 um filter.

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:	041420901-0011	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00007	Grid Box :	0414-Tetratech-06: S	Analyst(s):	F. Craig
Chi² Test for Uniformity:	77.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/28/2014 & 07/29/2014
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				
S2	A7	None Detected								
S2	A5	None Detected								
S2	A3	None Detected								
S2	A1	None Detected								
S2	B2	None Detected								
S2	B4	None Detected								
S2	B6	None Detected								
S2	B8	None Detected								
S2	C9	None Detected								
S2	C7	None Detected								
S2	C5	None Detected								
S2	C3	None Detected								
S2	C1	None Detected								
S2	D2	None Detected								
S2	D4	None Detected								
S2	D6	None Detected								
S2	D8	None Detected								
S2	E9	None Detected								
S2	E7	None Detected								
S2	E5	MD11	1		6.7	1.9	ADX	Actinolite		
S2	E5	MF		1	5.2	1.44	ADX	Actinolite	010396D	
S2	E3	None Detected								
S2	E1	None Detected								
S2	F8	None Detected								
S2	F6	None Detected								
S2	F4	None Detected								
S2	F2	None Detected								
S2	G1	None Detected								
S2	G3	None Detected								
S2	G5	None Detected								
S2	G7	MD11	2		21.4	14.25	ADX	Actinolite		
S2	G7	MF		2	16.5	0.72	ADX	Actinolite	010399D	
S2	H10	MD11	3		7.1	1.8	ADX	Anthophyllite		
S2	H10	MF		3	5.9	1.2	ADX	Anthophyllite	010401D	
S2	H10	F	4	4	9.6	0.84	ADX	Actinolite		
S2	H8	None Detected								
S2	H6	None Detected								
S2	H4	None Detected								

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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:	041420901-0011	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-04-00007	Grid Box :	0414-Tetratech-06: S	Analyst(s):	F. Craig
Chi² Test for Uniformity:	77.00-Random	Pore Size (micron):	0.8	Analysis Date:	07/28/2014 & 07/29/2014
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				
S2	H2	None Detected								
S3	I9	None Detected								
S3	I7	None Detected								
S3	I5	None Detected								
S3	I3	None Detected								
S3	H2	None Detected								
S3	H4	None Detected								
S3	H6	None Detected								
S3	H8	None Detected								
S3	H10	None Detected								
S3	G7	None Detected								
S3	G5	None Detected								
S3	G3	MD11	5		22.8	15.2	ADX	Actinolite		
S3	G3	MF		5	11.9	2.86	ADX	Actinolite		
S3	F2	None Detected								
S3	F6	None Detected								
S3	F8	None Detected								
S3	F10	None Detected								
S3	E9	None Detected								
S3	E7	None Detected								
S3	E5	None Detected								
S3	D2	None Detected								
S3	D4	None Detected								
S3	D6	None Detected								
S3	D8	None Detected								
S3	C9	MD11	6		6	2.88	ADX	Actinolite		
S3	C9	MF		6	6	1.44	ADX	Actinolite		
S3	C7	None Detected								
S3	C5	None Detected								
S3	C3	None Detected								
S3	B2	None Detected								
S3	B4	MD11	7		5.3	2.38	ADX	Actinolite		
S3	B4	MF		7	5.3	0.72	ADX	Actinolite	010403D	
S3	B6	MD11	8		7.2	6.24	ADX	Actinolite		
S3	B6	MF		8	6	0.75	ADX	Actinolite		
S3	B8	None Detected								
S3	B10	None Detected								
S3	A7	None Detected								

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

Structure Sketch Sheet for Direct Data Entry

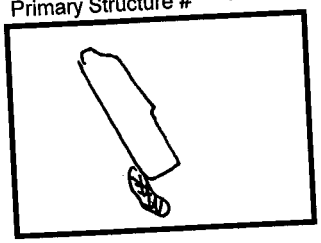
EMSL Order ID: 041420901-0011

Client Sample: BC-AA-04-00007

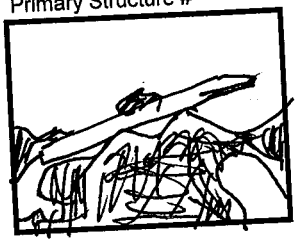
Client: Tetra Tech

Page 1 of 1

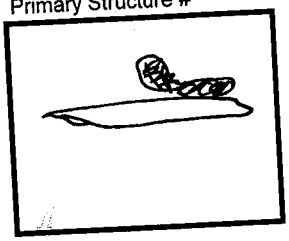
Primary Structure # 1



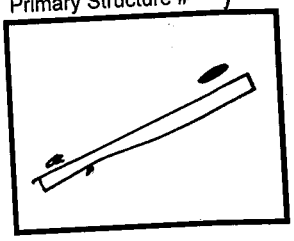
Primary Structure # 2



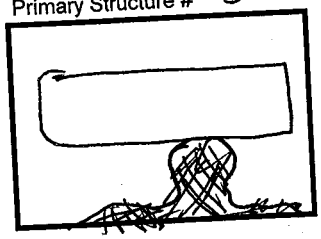
Primary Structure # 3



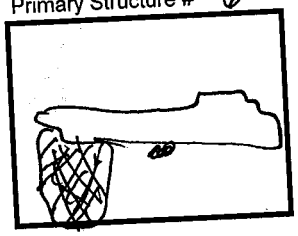
Primary Structure # 4



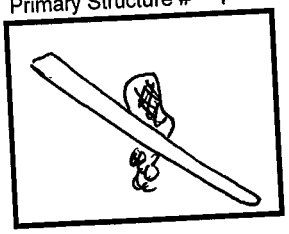
Primary Structure # 5



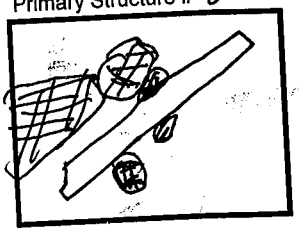
Primary Structure # 6



Primary Structure # 7



Primary Structure # 8



Primary Structure #

Primary Structure #

Primary Structure #

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Primary Structure #

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Structure #

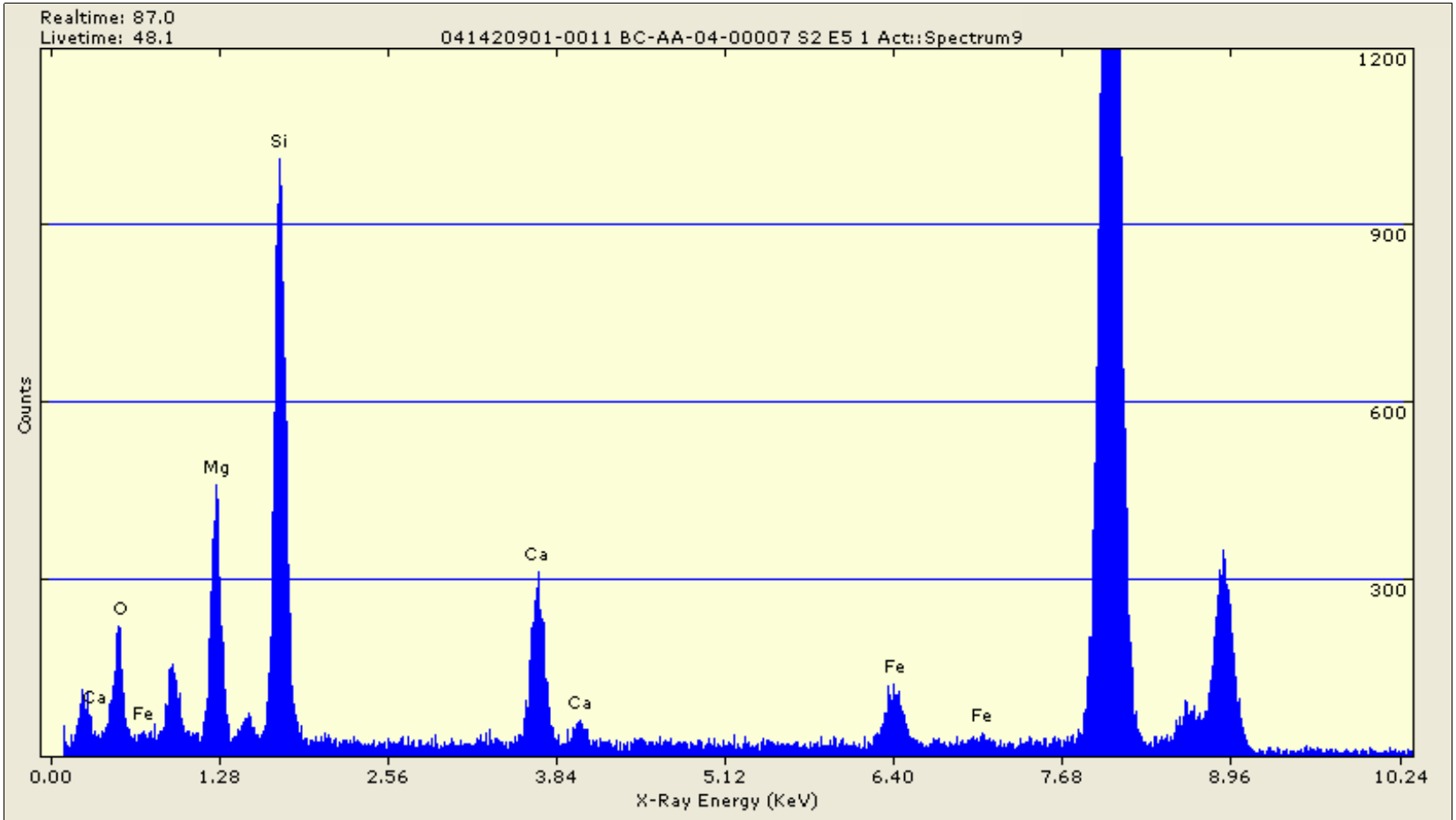
Structure #

Structure #

Analyst: FC

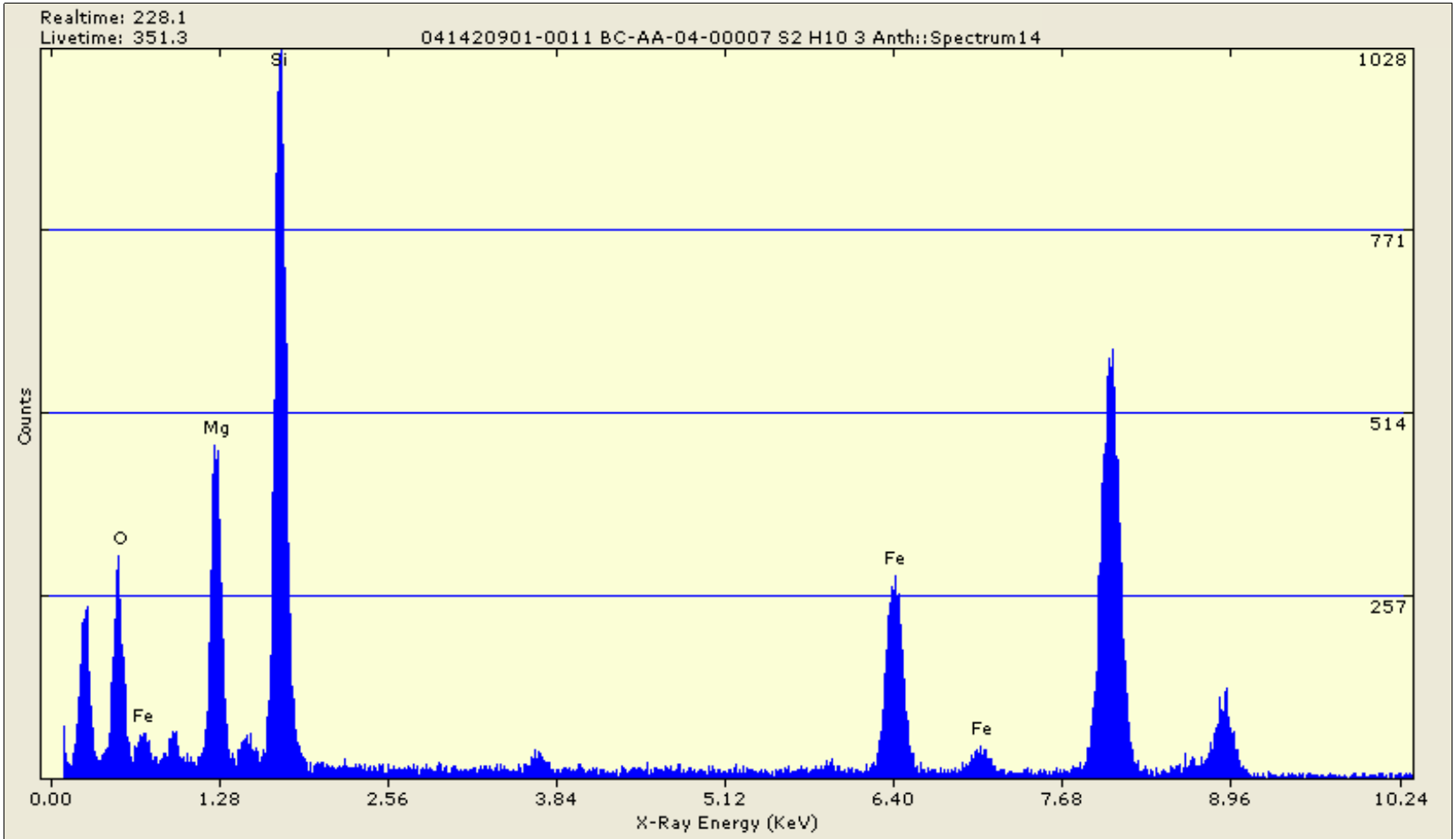
Date: 7/29/14

Scope: 04 01



Quantitative Results for Spectrum9
Analysis: Thin Film Method: Standardless
Acquired 28-Jul-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	45.58	1.48	60.79	0.00		0.0000	0.0000	0.0	86.9	1543.04
Magnesium	12.80	0.14	11.24	21.22	(MgO)	4.2511	0.2415	3131.2	96.6	3327.35
Silicon	28.40	0.32	21.57	60.75	(SiO2)	8.1629	0.4996	8101.7	102.4	8286.22
Calcium	8.96	0.10	4.77	12.54	(CaO)	1.8053	0.0904	2660.2	123.0	2760.85
Iron	4.26	0.05	1.63	5.49	(FeO)	0.6164	0.0368	1005.2	146.8	1177.43
Total	100.00			100.00		14.8357				



Quantitative Results for Spectrum14
Analysis: Thin Film Method: Standardless
Acquired 29-Jul-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (gross)
Oxygen	45.27	0.50	60.96	0.00		0.0000	0.0000	0.0	86.9	2222.75
Magnesium	14.03	0.16	12.43	23.26	(MgO)	4.6911	0.2354	3399.3	96.6	3712.79
Silicon	28.58	0.32	21.93	61.15	(SiO2)	8.2718	0.4467	8095.2	102.4	8592.27
Iron	12.12	0.13	4.68	15.59	(FeO)	1.7638	0.0925	2829.8	146.8	3345.65
Total	100.00			100.00		14.7267				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Jul 28, 2014
Indexing of Image Number:	010396	**Scope #:**	04 - 01
Reference / Sample No:	0011-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072314_10385		

Measured Inter-Row Spacing:	**127.04**	Pixels
Mean Distance between spots on Center row (d2):	**37.48**	Pixels
Mean Distance between spots on slant vector (d1):	**128.06**	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	2.661	**2.639**	*2.507*	*2.771*
d2 or hk0 (Camera K/zero row dist.):	9.019	**9.040**	*8.588*	*9.492*
d1 or hk1 (Camera K/slant vector dist.):	2.640	**2.644**	*2.512*	*2.776*
Ratio of hk0/hkl:	3.416	**3.419**	*3.248*	*3.590*
Angle of Slant Vector (Measured):	81.4	**81.570**	*77.491*	*85.648*

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

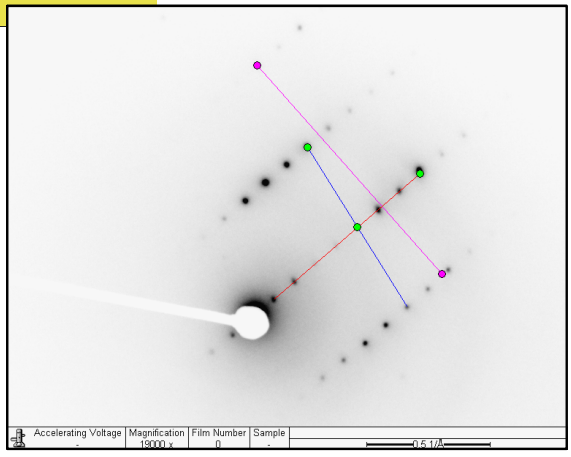
Miller Indice hk0: (**0 2 0**)

Miller Indice hkl: (**-1 1 2**)

With a Zone Axis of: [**2 0 1**]

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Jul 29, 2014
Indexing of Image Number:	010401	**Scope #:**	04 - 01
Reference / Sample No:	0011-04-01	**By:**	F Craig
Preliminary ID:	ANTHOPHYLITE		
Using Camera Constant of:	2.940e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072914_10398		

Measured Inter-Row Spacing:	**64.44**	Pixels
Mean Distance between spots on Center row (d2):	**67.21**	Pixels
Mean Distance between spots on slant vector (d1):	**87.8**	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.278	**5.280**	*5.016*	*5.544*
d2 or hk0 (Camera K/zero row dist.):	5.061	**5.014**	*4.763*	*5.265*
d1 or hk1 (Camera K/slant vector dist.):	3.874	**3.875**	*3.681*	*4.069*
Ratio of hk0/hkl:	1.306	**1.294**	*1.229*	*1.359*
Angle of Slant Vector (Measured):	47.3	**48.760**	*46.322*	*51.198*

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

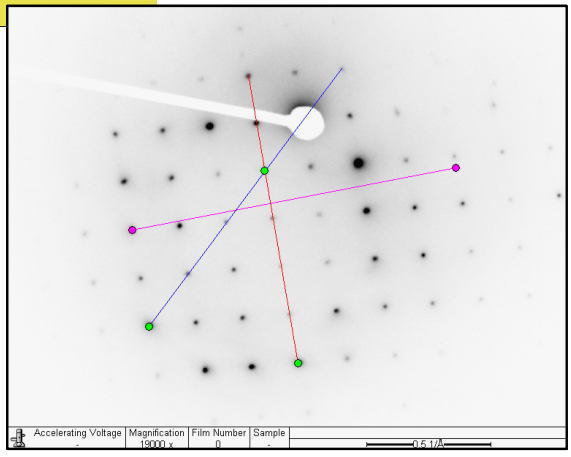
Miller Indice hk0: (**2 3 0**)

Miller Indice hkl: (**1 3 1**)

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

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

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Cinnaminson, NJ 08077
856-303-2500
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Edward Surbrugg
Tetra Tech
303 Irene Street
Helena, MT 59601
Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 10:00
EMSL Order: 041420901
Report Date: 08/06/14

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-02-00007	Air volume:	10800	Liters
EMSL Sample Number:	041420901-0012	Grid Opening Area:	0.0132	mm²
Minimum Level of analysis (chrysotile):	CD	Grid Openings Analyzed:	68	
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:	07/22/2014	
Result of Chi² Test:	67.00 Random	Analyst:	F. Craig	

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	1	-	1.11	0.000040	0.000000 -	0.000188
PCMe Structures (NRA)	ADX	0	-	0.00	0.000000	0.000000 -	0.000119
Total PCMe Structures (Regulated)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Structures (All)	**CD/ADX**	**1**	**-**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
PCMe Fibers and Bundles (Chrys)	CD	-	0	0.00	0.000000	0.000000 -	0.000119
PCMe Fibers and Bundles (Amph)	ADX	-	1	1.11	0.000040	0.000000 -	0.000188
PCMe Fibers and Bundles (NRA)	ADX	-	0	0.00	0.000000	0.000000 -	0.000119
Total PCMe Fibers and Bundles (Regulated)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
Total PCMe Fibers and Bundles (All)	**CD/ADX**	**-**	**1**	**1.11**	**0.000040**	**0.000000 -**	**0.000188**
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: Sample collected on 0.8 um filter.

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:	041420901-0012	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00007	Grid Box :	0414-TetraTech-07: E	Analyst(s):	F. Craig
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	08/04/2014
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				
E1	I1	None Detected								
E1	I5	None Detected								
E1	I9	None Detected								
E1	H10	None Detected								
E1	H4	None Detected								
E1	H2	None Detected								
E1	G1	None Detected								
E1	G3	None Detected								
E1	G7	None Detected								
E1	G9	None Detected								
E1	F10	None Detected								
E1	F8	None Detected								
E1	F6	None Detected								
E1	F4	None Detected								
E1	F2	None Detected								
E1	E1	None Detected								
E1	E3	None Detected								
E1	E5	None Detected								
E1	E7	None Detected								
E1	E9	None Detected								
E1	D10	None Detected								
E1	D8	None Detected								
E1	D6	None Detected								
E1	D4	None Detected								
E1	D2	None Detected								
E1	C1	None Detected								
E1	C3	None Detected								
E1	C5	None Detected								
E1	C9	None Detected								
E1	B8	None Detected								
E1	B2	None Detected								
E2	I9	None Detected								
E2	I7	None Detected								
E2	I5	None Detected								
E2	I3	None Detected								
E2	I1	None Detected								
E2	H2	None Detected								
E2	H4	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:	041420901-0012	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	BC-AA-02-00007	Grid Box :	0414-TetraTech-07: E	Analyst(s):	F. Craig
Chi² Test for Uniformity:	67.00-Random	Pore Size (micron):	0.8	Analysis Date:	08/04/2014
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				
E2	H6	None Detected								
E2	H8	None Detected								
E2	H10	None Detected								
E2	G9	None Detected								
E2	G7	None Detected								
E2	G3	None Detected								
E2	G1	None Detected								
E2	F2	None Detected								
E2	F4	None Detected								
E2	F6	None Detected								
E2	F8	None Detected								
E2	F10	None Detected								
E2	E9	None Detected								
E2	E7	None Detected								
E2	D2	None Detected								
E2	D6	None Detected								
E2	D8	None Detected								
E2	D10	None Detected								
E2	C9	None Detected								
E2	C7	None Detected								
E2	C1	None Detected								
E2	B2	None Detected								
E2	B6	None Detected								
E2	B8	F	1	1	7.6	0.36	ADX	Actinolite	010429D	
E2	B10	None Detected								
E2	A9	None Detected								
E2	A7	None Detected								
E2	A5	None Detected								
E2	A3	None Detected								
E2	A1	None Detected								

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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: 041420901-0012

Client Sample: *BC-AA-02-00007*

Client: Tetra Tech

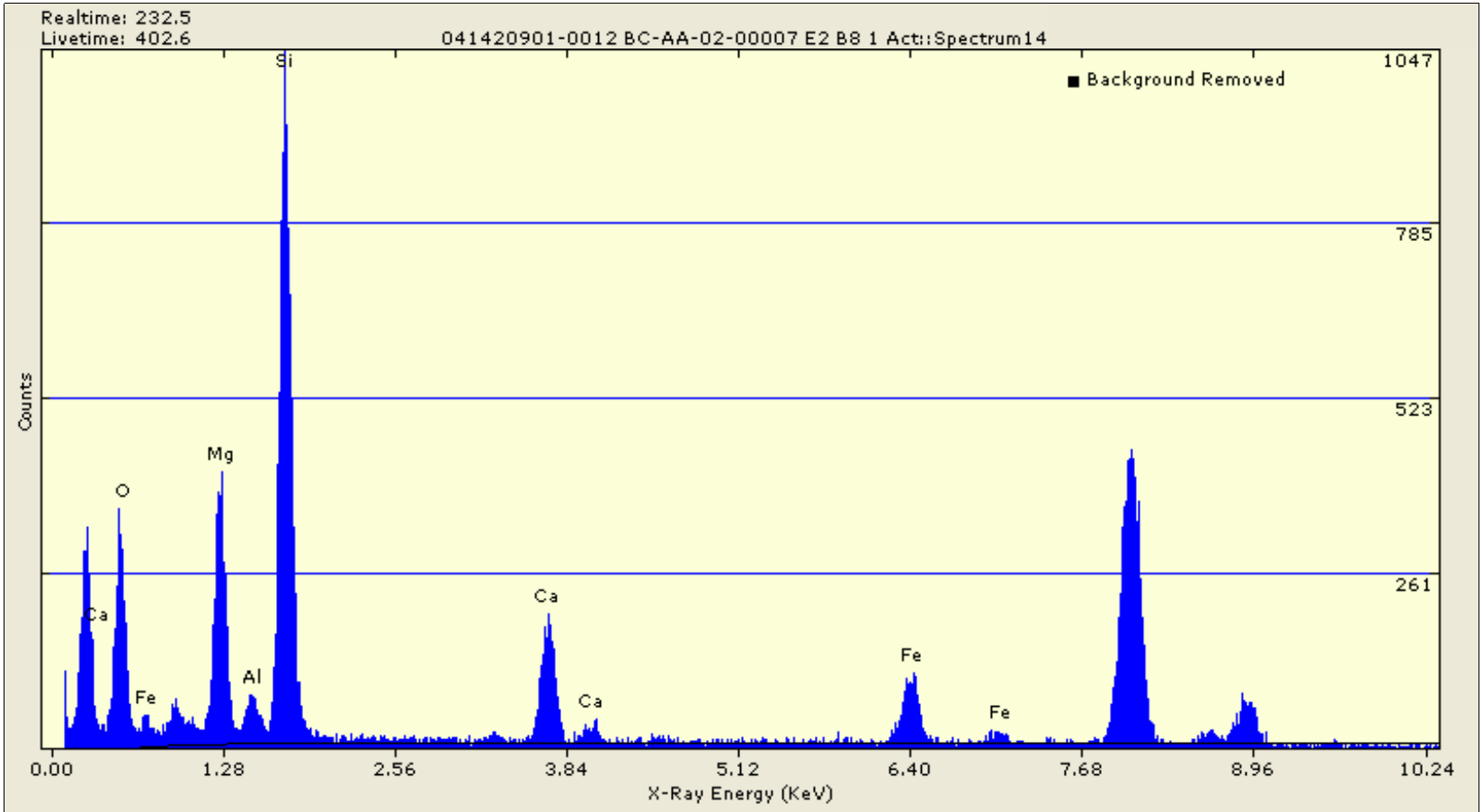
Page 1 of 1

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: FC

Date: 8/4/14

Scope: 04 01



Quantitative Results for Spectrum14
Analysis: Thin Film Method: Standardless
Acquired 04-Aug-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %		Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	46.02	0.53	60.95	0.00		0.0000	0.0000	0.0	87.0	2468.04
Magnesium	12.87	0.15	11.22	21.34	(MgO)	4.2333	0.2126	2951.8	96.6	3152.35
Aluminum	1.89	0.02	1.49	3.58	(Al2O3)	0.5614	0.0320	479.5	99.5	630.33
Silicon	28.05	0.32	21.16	60.00	(SiO2)	7.9845	0.4327	7519.0	102.4	8008.18
Calcium	6.31	0.07	3.34	8.83	(CaO)	1.2595	0.0561	1757.0	123.0	1816.39
Iron	4.85	0.06	1.84	6.24	(FeO)	0.6946	0.0359	1072.3	146.8	1222.98
Total	100.00			100.00		14.7334				

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041420901	**Date:**	Aug 04, 2014
Indexing of Image Number:	010429	**Scope #:**	04 - 01
Reference / Sample No:	0012-04-01	**By:**	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.940e-003 **1/A Pixels**		
Determined from Reference:	AuCal-072914_10398		

Measured Inter-Row Spacing: **64.12** 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):	5.305	**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: Actinolite **By:** F Craig

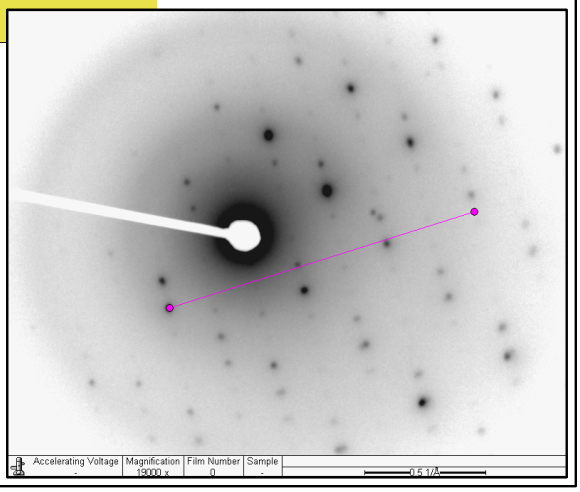
Miller Indice hk0: ( )

Miller Indice hkl: ( )

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

Preliminary Identification was: X CORRECT

INCORRECT



Percent accuracy to date: 100 %

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www.EMSL.com

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

Customer ID: MAXI57
Customer PO: NA
Received: 7/22/2014 9:55
Date Sampled: 07/19/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

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 071914	Air volume:	0	Liters
EMSL Sample Number:	041420901-0013	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:	07/22/2014	
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

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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: Sample collected on 0.8 um filter.

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:	041420901-0013	GO area (mm²):	0.0132	Mag.	10,000
Customer Sample:	FIELD BLANK 071914	Grid Box :	0414-Tetra Tech-06: T	Analyst(s):	P. Harrison
Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/23/2014
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				
T1	J6	None Detected								
T2	F5	None Detected								
T2	H6	None Detected								
T2	J4	None Detected								
T3	D6	None Detected								
T3	E4	None Detected								
T3	F7	None Detected								
T4	J10	None Detected								
T4	I8	None Detected								
T4	J7	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: 7/22/2014 9:55
Date Sampled: 07/22/2014 00:00
EMSL Order: 041420901
Report Date: 08/06/14

Project: NDOT NOA / 10353259

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

Customer Sample Number:	LAB BLANK	Air volume:	0	Liters
EMSL Sample Number:	041420901-0014	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:	07/22/2014	
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.

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Robyn Denton
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ISO 10312

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

Bench Sheet Data

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Chi² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	07/23/2014
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				
T6	A4	None Detected								
T6	C7	None Detected								
T6	E10	None Detected								
T6	G8	None Detected								
T6	I6	None Detected								
T7	A6	None Detected								
T7	F7	None Detected								
T7	G4	None Detected								
T7	I8	None Detected								
T7	J5	None Detected								

200 Route 130 North
Cinnaminson, NJ 08077

OrderID: 041420901

Asbestos Chain of Custody

EMSL Order Number (*Lab Use Only*): 041420901

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** *Third Party Billing requires written authorization from third party*
Street: 7 West 6th Ave Suite 612	
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: 103 S3254	**Please Provide Results:** ☐ Fax ☒ Email ☐ Mail
U.S. State Samples Taken: —	**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 Danu **Samplers Signature:**

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
BC-AA-05-00002	Site 5	10800 L	7-19-14 0000
BC-AA-06-00002	Site 6	10440 L	7-19-14 0000
BC-AA-07-00002	Site 7	10440 L	7-19-14 0000
BC-AA-08-00002	Site 8	~~10800~~ 10800L	7-19-14 0000
BC-AA-09-00002	Site 9	10800L	7-19-14 0000
BC-AA-10-00002	Site 10	10800L	7-19-14 0000
BC-AA-11-00002	Site 11	10440 L	7-19-14 0000
BC-AA-12-00002	Site 12	10800 L	7-19-14 0000

Client Sample # (s): - **Total # of Samples:** 13

Relinquished (Client): **Date:** 7-21-14 **Time:** 1200

Received (Lab): D.H. FX **Date:** 7/22/14 **Time:** 9:55am (13) AM

Comments/Special Instructions:

2014 JUL 22 A 10:40

CINNAMINSON

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only).*

041420901

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

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
PE-AA-01-00007	Site 1	10800 L	7-19-14 0816
PE-AA-03-00007	Site 3	10800 L	7-19-14 0834
PE-AA-04-00007	Site 4	10800 L	7-19-14 0857
PE-AA-02-00007	Site 2	10800 L	7-19-14 1005
FieldBlank071914	Field Blank	—	—

***Comments/Special Instructions:**

Page 2 of 2 pages

2014 JUL 22 A 10:40
CINNAMINSON, N.J.

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