



EMSL Analytical, Inc.

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

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

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 05/30/2014 11:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00001
EMSL Sample Number: 041416054-0001
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 960 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 31
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0001	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00001	Grid Box :	0414-Tetra Tech-03: S	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/19/2014
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				
S1	J2	None Detected								
S1	J4	None Detected								
S1	J6	None Detected								
S1	J8	None Detected								
S1	J10	None Detected								
S1	H10	None Detected								
S1	H8	None Detected								
S1	H6	None Detected								
S1	H4	None Detected								
S1	H2	None Detected								
S1	E2	None Detected								
S1	E4	None Detected								
S1	E6	None Detected								
S1	E9	None Detected								
S1	C8	None Detected								
S1	C6	None Detected								
S1	C4	None Detected								
S2	A10	None Detected								
S2	A8	None Detected								
S2	A6	None Detected								
S2	A4	None Detected								
S2	C4	None Detected								
S2	C6	None Detected								
S2	C8	None Detected								
S2	C10	None Detected								
S2	E10	None Detected								
S2	E8	None Detected								
S2	E6	None Detected								
S2	E4	None Detected								
S2	G4	None Detected								
S2	G6	None Detected								



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Report Date: 06/26/14

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-ABS-00002
EMSL Sample Number: 041416054-0002
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 0 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 10
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 7.575758 Structure/ mm^2 Limit of Detection: 22.651515 Structure/ mm^2

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration Str/ mm^2, LCL Str/ mm^2, UCL Str/ mm^2. Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government as asbestos.

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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 0.8um 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:	041416054-0002	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00002	Grid Box :	0414-Tetra Tech-02: O	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/13/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
O4	D5	None Detected								
O5	I5	None Detected								
O5	E9	None Detected								
O5	C9	None Detected								
O6	I7	None Detected								
O6	H5	None Detected								
O6	G3	None Detected								
O6	F10	None Detected								
O6	E7	None Detected								
O6	D9	None Detected								



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Report Date: 06/26/14

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-ABS-00003
EMSL Sample Number: 041416054-0003
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 0 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 10
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 7.575758 Structure/ mm^2 Limit of Detection: 22.651515 Structure/ mm^2

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration Str/ mm^2, LCL Str/ mm^2, UCL Str/ mm^2. Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), Non Asbestos Mineral Structures.

Asbestiform Minerals Present: None Detected

Explanation of Results

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Comment: Sample collected on 0.8um filter.

Robyn Denton

Approved Signatory



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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:	041416054-0003	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00003	Grid Box :	0414-Tetra Tech-02: O	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/13/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
O7	J8	None Detected								
O7	I5	None Detected								
O7	G3	None Detected								
O7	F7	None Detected								
O7	E9	None Detected								
O8	B8	None Detected								
O8	C5	None Detected								
O8	I6	None Detected								
O9	A4	None Detected								
O9	F3	None Detected								



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Report Date: 06/26/14

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

Customer Sample Number: BC-ABS-00004 Air volume: 960 Liters
EMSL Sample Number: 041416054-0004 Grid Opening Area: 0.0132 mm^2
Minimum Level of analysis (chrysotile): CD Grid Openings Analyzed: 31
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385 Analysis Date: 06/09/2014
Result of Chi^2 Test: 26.00 Random Analyst: P. Harrison

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

Asbestiform Minerals Present: Actinolite
Explanation of Results
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Comment: Sample collected on 0.8um filter.

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Approved Signatory



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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:	041416054-0004	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00004	Grid Box :	0414-Tetra Tech-02: T	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	26.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/19/2014
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				
T1	F2	F	1	1	10.7	1.4	ADX	Actinolite	4394	
T1	F4	None Detected								
T1	F6	None Detected								
T1	D9	None Detected								
T1	D7	F	2	2	18.5	1.2	ADX	Actinolite		
T1	D5	None Detected								
T1	D3	None Detected								
T1	D1	None Detected								
T1	B1	None Detected								
T1	B3	F	3	3	7.5	1.2	ADX	Actinolite		
T1	B5	None Detected								
T1	B7	None Detected								
T1	B9	F	4	4	6.8	1.5	ADX	Actinolite		
T2	I1	None Detected								
T2	I3	F	5	5	11.8	0.7	ADX	Actinolite		
T2	I5	None Detected								
T2	I7	None Detected								
T2	I9	None Detected								
T2	G9	None Detected								
T2	G7	None Detected								
T2	G5	None Detected								
T2	G3	None Detected								
T2	E1	None Detected								
T2	E3	None Detected								
T2	E5	None Detected								
T2	E7	None Detected								
T2	E9	None Detected								
T2	C10	None Detected								
T2	C8	None Detected								
T2	C6	None Detected								
T2	C4	None Detected								



ISO 10312
International Standard for the Determination of Asbestos Fibers-Direct
Transfer Transmission Electron Microscopy
Structure Sketch Sheet for Direct Data Entry

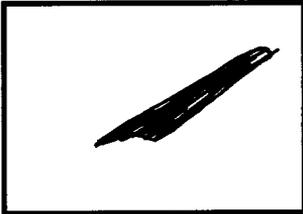
EMSL Order ID: 041416054-0004

Client: Tetra Tech

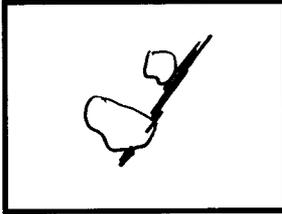
Client Sample: BC-ABS-00004

Page 1 of 1

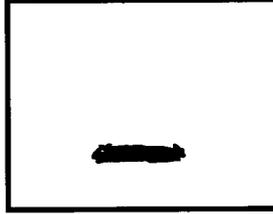
Primary Structure # 1



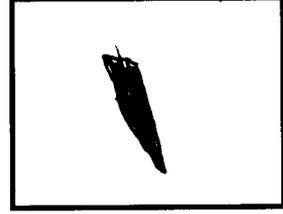
Primary Structure # 2



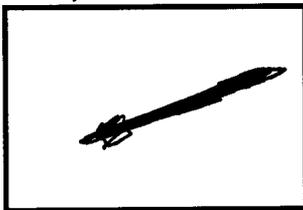
Primary Structure # 3



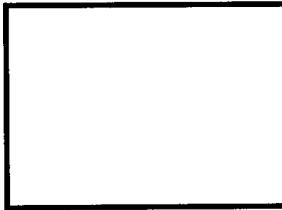
Primary Structure # 4



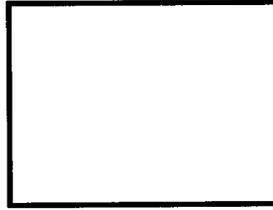
Primary Structure # 5



Primary Structure #



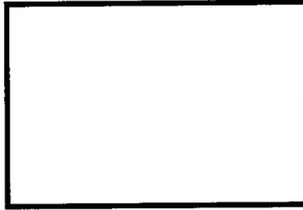
Primary Structure #



Primary Structure #



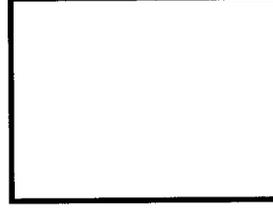
Primary Structure #



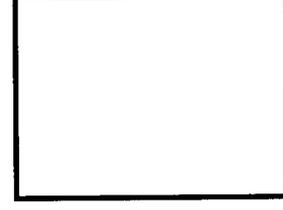
Primary Structure #



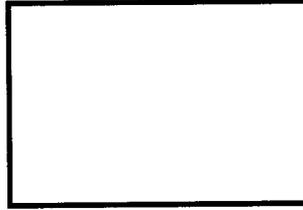
Primary Structure #



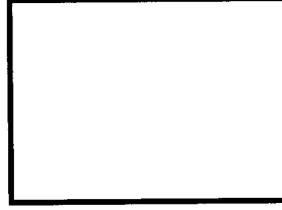
Primary Structure #



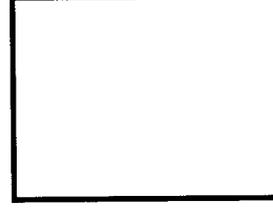
Primary Structure #



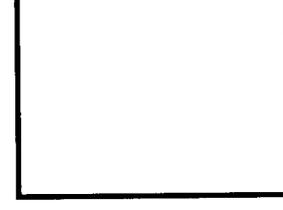
Primary Structure #



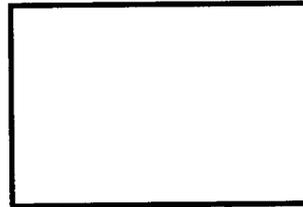
Primary Structure #



Primary Structure #



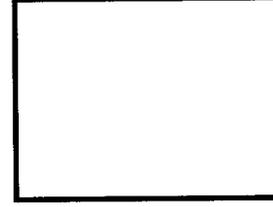
Structure #



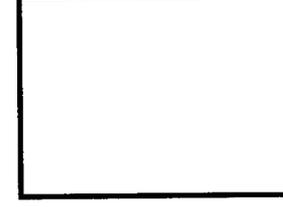
Structure #



Structure #



Structure #



Analyst: [Signature]

Date: 6/19/14

Scope: 04-03



Energy Dispersive X-Ray Analysis

Quantitative Spectra & Data

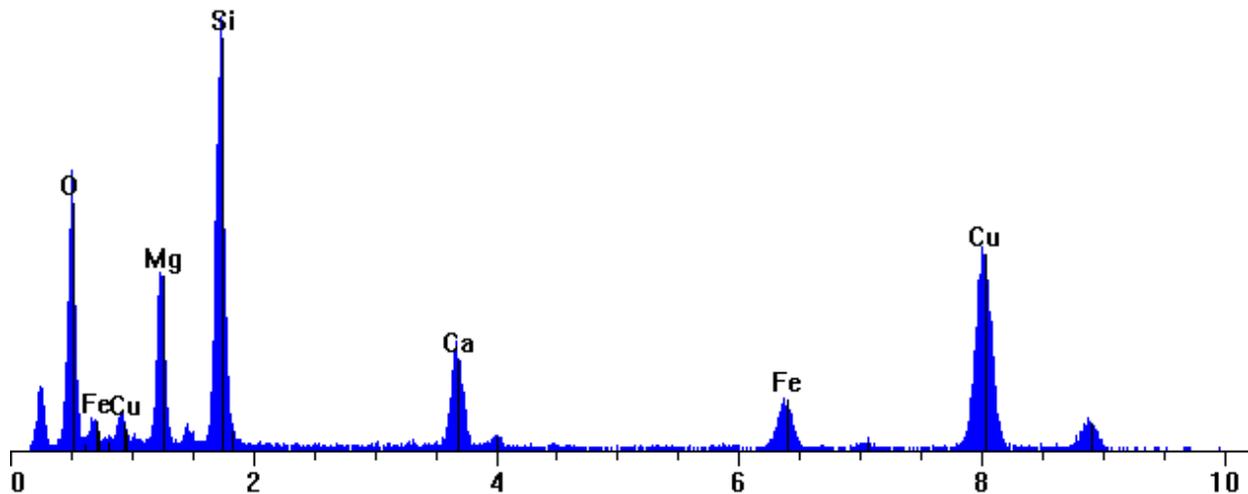
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041416054-0004 T1 F2 1 AC.pgt
 Collected: June 19, 2014 07:51:09

Live Time: 299.67 Count Rate: 275 Dead Time: 2.72 %
 Beam Voltage: 20.00 Beam Current: 2.00 Takeoff Angle: 31.00
 Thickness limit: 27329.97

■ 041416054-0004 T1 F2 1 AC.pgt

FS: 1100



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	17.01	15.97	7.3	MgO	28.19
Si	KA1	1.740	1.0000	31.49	25.61	11.8	SiO	49.43
Ca	KA1	3.691	1.0500	10.39	5.92	2.7	CaO	14.53
Fe	KA1	6.403	0.9900	6.09	2.49	1.1	FeO	7.84
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	35.02	50.00	23.0		
Total			0.0000	100.00	100.00	46.0	Total	100.00

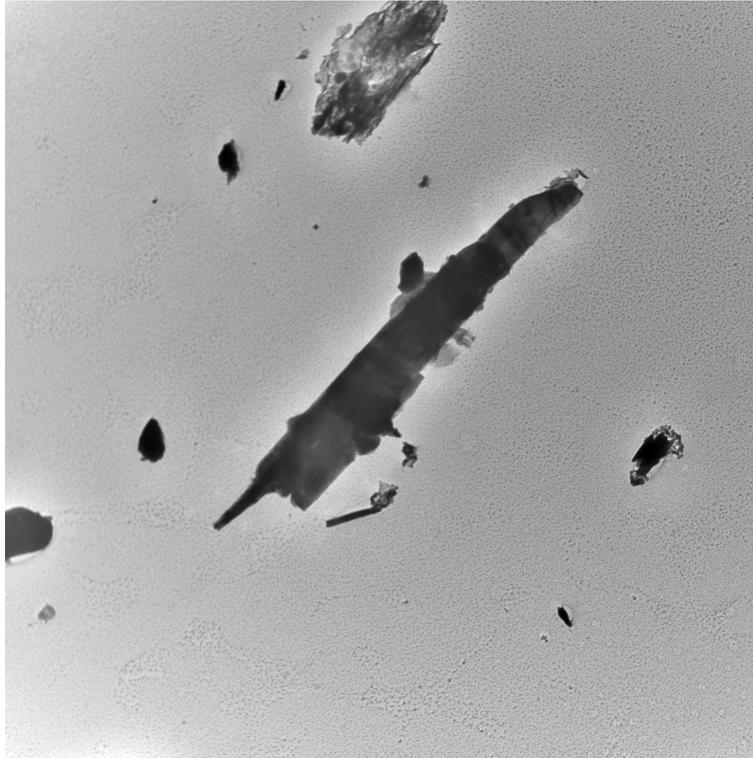
Element	Line	Gross (cps)	BKG (cps)	Net (cps)	P:B Ratio
Mg	KA1	18.8	1.4	17.4	12.1
Si	KA1	46.3	1.2	45.0	37.1
Ca	KA1	15.1	1.0	14.1	14.3
Fe	KA1	9.6	0.7	8.8	11.8
Cu	KA1	40.8	0.8	39.9	48.8
O	KA1	24.2	0.9	23.3	26.0



EMSL ANALYTICAL, INC.

EMSL Analytical, Inc.

Photomicrograph Report



Microscope Camera Length	Magnification	
3	10000 x	—2 μm—

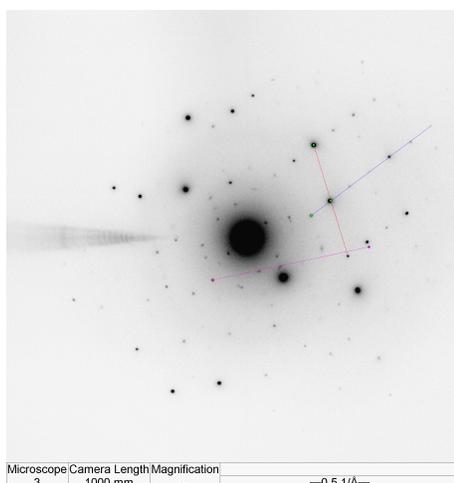
Micrograph Information

Sample ID:	0004
Order ID:	041416054
Image Number:	04393
Mineral Type:	ACTINOLITE
Date:	6/19/2014
Magnification:	10000
Microscope:	3

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	<u>041416054</u>	Date:	<u>Jun 19, 2014</u>
Image Number:	<u>04394</u>		
Reference / Sample Number:	<u>0004</u>		
Preliminary ID:	<u>ACTINOLITE</u>		
Camera Constant:	<u>1.862e-003</u>	1/A Pixels	
Calibration Reference:	<u>061714-04-03-04390_C</u>		

	Measured	Reference	-5%	+5%
Inter-row Spacing: <input type="checkbox"/> <input type="checkbox"/>	5.202	5.278	5.014	5.542
d2 or hk0 (Camera K/zero row dist.):	2.045	2.001	1.901	2.101
d1 or hkl (Camera K/slant vector dist.):	4.759	4.882	4.638	5.126
Ratio of hk0/hkl:	0.430	0.410	0.389	0.430
Vector Angle:	70.32	67.650	64.267	71.033



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

With a Zone Axis of: [**734**]

Preliminary Identification was:

X	CORRECT
	INCORRECT



Energy Dispersive X-Ray Analysis

Quantitative Spectra & Data

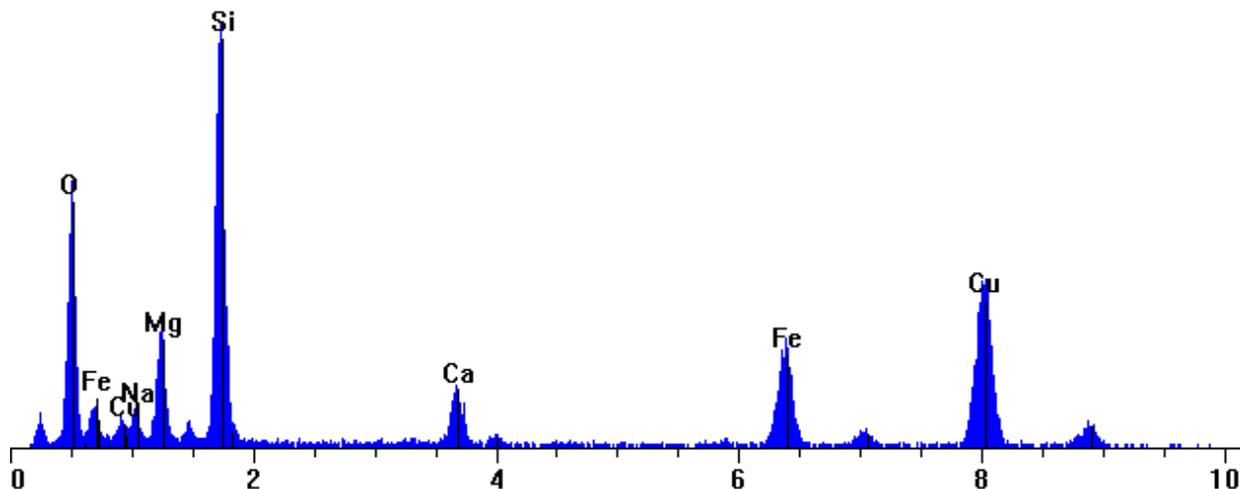
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...pectra\Scope 04-03\2014\041416054-0005 P4 C6 0 NRA.pgt
 Collected: June 13, 2014 10:45:02

Live Time: 151.93 Count Rate: 427 Dead Time: 4.20 %
 Beam Voltage: 20.00 Beam Current: 2.00 Takeoff Angle: 31.00
 Thickness limit: 42860.33

■ 041416054-0005 P4 C6 0 NRA.pgt

FS: 900



Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	9.83	8.84	3.4	MgO	16.30
Si	KA1	1.740	1.0000	27.64	21.52	8.2	SiO2	59.13
Ca	KA1	3.691	1.0500	5.04	2.75	1.1	CaO	7.05
Fe	KA1	6.403	0.9900	10.83	4.24	1.6	FeO	13.93
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
Na	KA1	1.041	1.3800	2.66	2.53	1.0	Na2O	3.59
O	KA1	0.523	0.0000	44.00	60.13	23.0		
Total			0.0000	100.00	100.00	38.3	Total	100.00

Element	Line	Gross (cps)	BKG (cps)	Net (cps)	P:B Ratio
Mg	KA1	21.4	2.3	19.1	8.2
Si	KA1	77.2	2.1	75.1	35.7
Ca	KA1	14.4	1.3	13.0	9.8
Fe	KA1	31.2	1.5	29.7	20.2
Cu	KA1	55.1	1.4	53.7	38.9
Na	KA1	7.9	2.3	5.2	2.3
O	KA1	42.6	1.6	40.9	24.9



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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: 6/9/2014 8:46
Date Sampled: 05/31/2014 10:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00005 Air volume: 960 Liters
EMSL Sample Number: 041416054-0005 Grid Opening Area: 0.0132 mm^2
Minimum Level of analysis (chrysotile): CD Grid Openings Analyzed: 31
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385 Analysis Date: 06/09/2014
Result of Chi^2 Test: 29.00 Random Analyst: P. Harrison

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

Asbestiform Minerals Present: Actinolite, Non-Regulated, Amphibole
Explanation of Results
NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal government 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 0.8um 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:	041416054-0005	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00005	Grid Box :	0414-Tetra Tech-02: P	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	29.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/13/2014
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				
P4	J8	None Detected								
P4	I7	None Detected								
P4	J2	None Detected								
P4	I3	None Detected								
P4	I5	None Detected								
P4	H8	None Detected								
P4	G6	None Detected								
P4	G4	None Detected								
P4	G1	None Detected								
P4	F3	None Detected								
P4	F5	None Detected								
P4	F7	F	1	1	19	1.8	ADX	Actinolite	4384	
P4	D1	None Detected								
P4	D3	None Detected								
P4	C4	None Detected								
P4	C6	MD11	2		13.6	3.4	ADX	Non Reg.Amph.		
P4	C6	MF		2	9.9	1.5	ADX	Non Reg.Amph.	4386	
P4	B5	None Detected								
P4	B3	None Detected								
P4	A7	None Detected								
P6	A8	None Detected								
P6	A6	None Detected								
P6	A2	None Detected								
P6	B3	None Detected								
P6	B5	None Detected								
P6	B7	None Detected								
P6	C8	None Detected								
P6	D9	None Detected								
P6	D7	None Detected								
P6	D3	None Detected								
P6	E2	None Detected								
P6	E4	None Detected								



ISO 10312

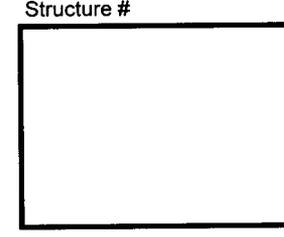
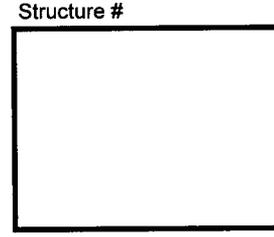
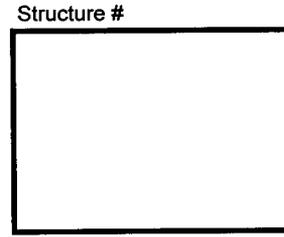
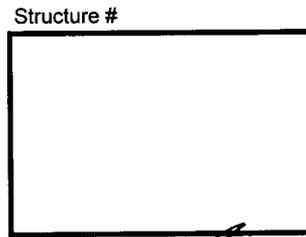
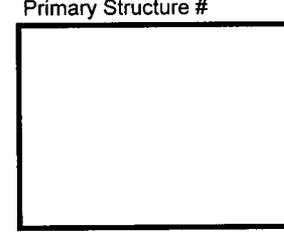
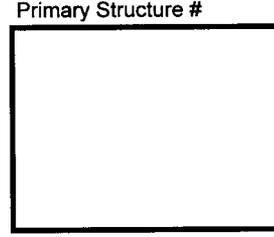
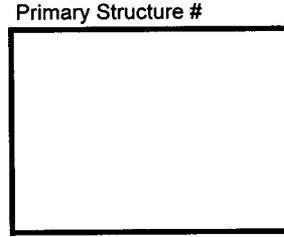
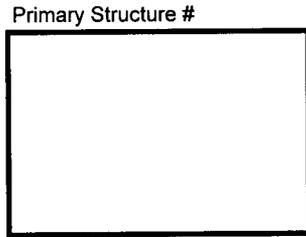
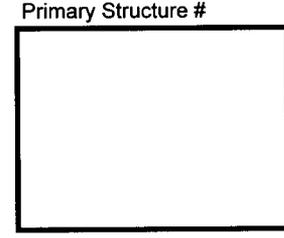
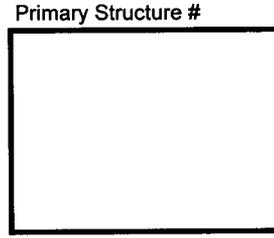
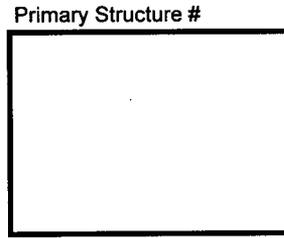
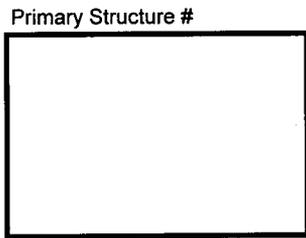
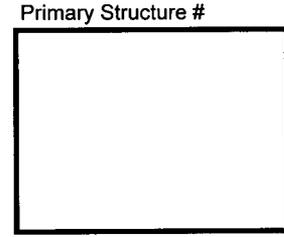
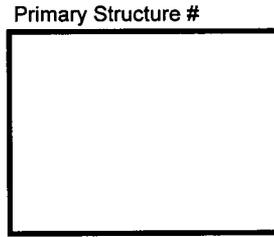
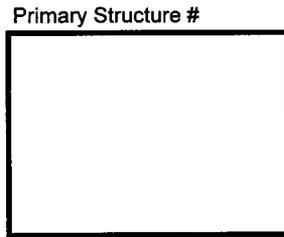
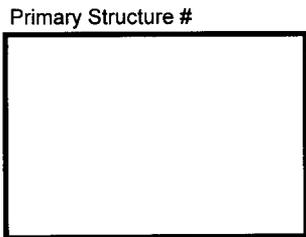
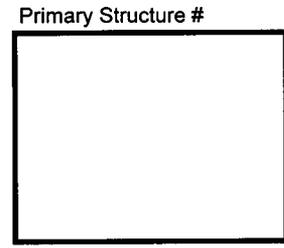
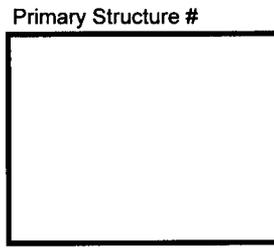
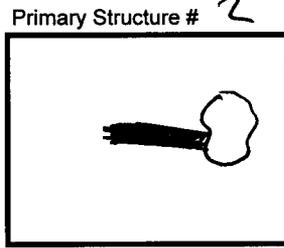
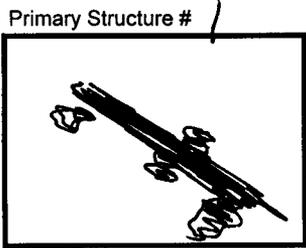
International Standard for the Determination of Asbestos Fibers-Direct
Transfer Transmission Electron Microscopy
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041416054-0005

Client: Tetra Tech

Client Sample: BC-ABS-00005

Page 1 of 1



Analyst: [Signature]

Date: 6/13/14

Scope: 04-03



Energy Dispersive X-Ray Analysis

Quantitative Spectra & Data

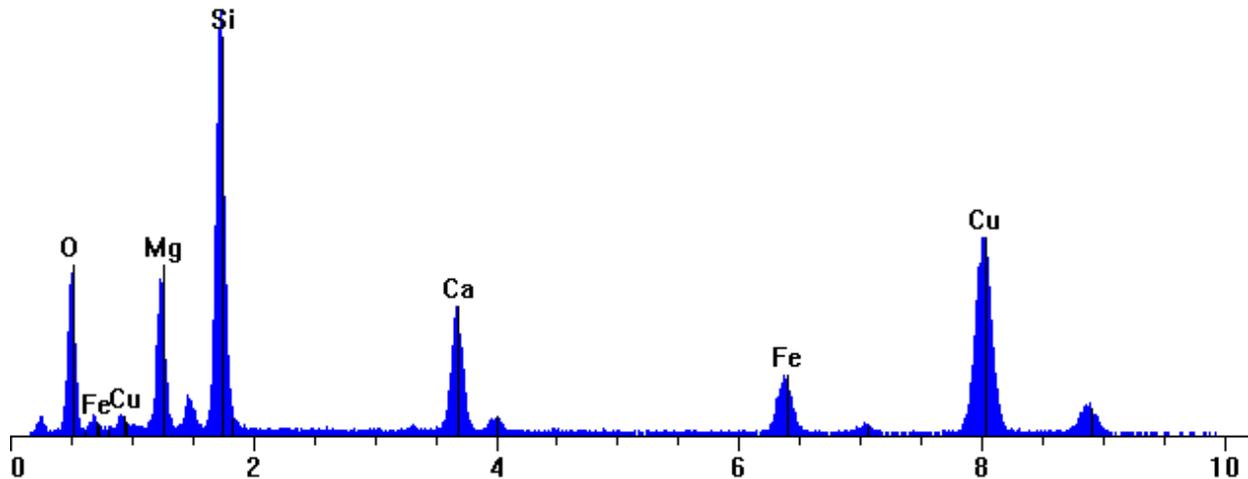
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041416054-0005 P4 F7 1 AC.pgt
 Collected: June 13, 2014 08:07:18

Live Time: 213.71 Count Rate: 767 Dead Time: 7.72 %
 Beam Voltage: 20.00 Beam Current: 2.00 Takeoff Angle: 31.00
 Thickness limit: 31275.67

■ 041416054-0005 P4 F7 1 AC.pgt

FS: 2250



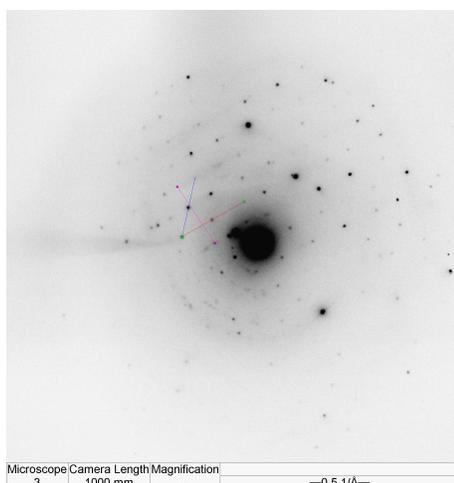
Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	15.37	14.62	6.7	MgO	25.48
Si	KA1	1.740	1.0000	30.73	25.32	11.6	SiO	48.23
Ca	KA1	3.691	1.0500	12.54	7.24	3.3	CaO	17.55
Fe	KA1	6.403	0.9900	6.80	2.82	1.3	FeO	8.74
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	34.57	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	50.2	4.0	46.1	11.5
Si	KA1	133.1	3.9	129.2	33.1
Ca	KA1	53.5	3.3	50.2	15.3
Fe	KA1	31.4	2.5	28.9	11.3
Cu	KA1	119.2	2.8	116.4	41.8
O	KA1	43.7	1.8	42.0	24.0

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	<u>041416054</u>	Date:	<u>Jun 13, 2014</u>
Image Number:	<u>04384</u>		
Reference / Sample Number:	<u>0005</u>		
Preliminary ID:	<u>ACTINOLITE</u>		
Camera Constant:	<u>1.861e-003</u>	1/A Pixels	
Calibration Reference:	<u>060914-04-03-04372_C</u>		

	Measured	Reference	-5%	+5%
Inter-row Spacing: <input type="checkbox"/> <input type="checkbox"/>	5.259	5.278	5.014	5.542
d2 or hk0 (Camera K/zero row dist.):	3.310	3.281	3.117	3.445
d1 or hkl (Camera K/slant vector dist.):	3.929	3.907	3.712	4.102
Ratio of hk0/hkl:	0.842	0.840	0.798	0.882
Vector Angle:	49.61	51.61	49.03	54.91



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

With a Zone Axis of: [**-211**]

Preliminary Identification was:

X	CORRECT
	INCORRECT

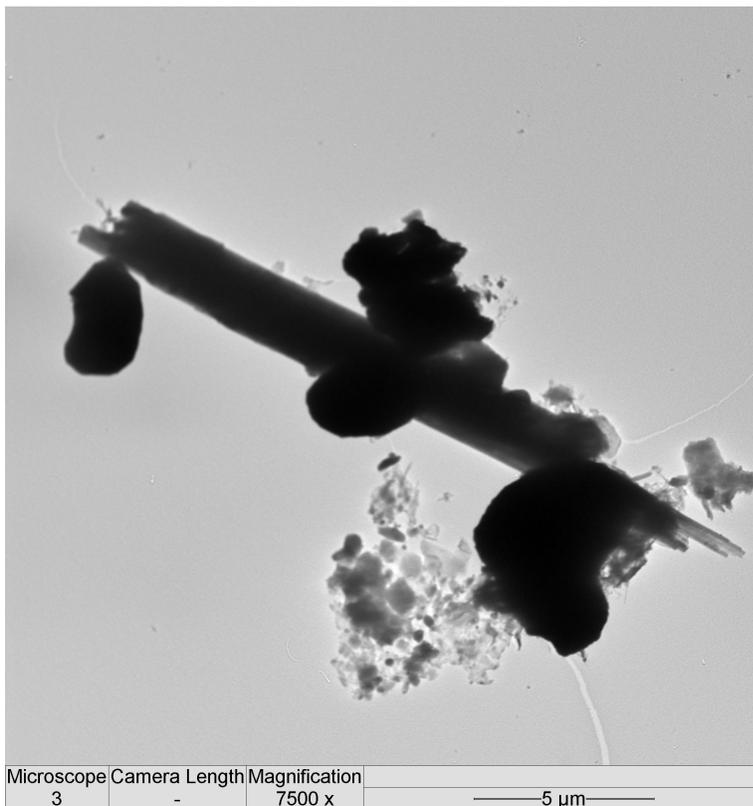
Microscope	Camera Length	Magnification	
3	1000 mm	-	-0.5 1/A-



EMSL ANALYTICAL, INC.

EMSL Analytical, Inc.

Photomicrograph Report



Microscope	Camera Length	Magnification	
3	-	7500 x	—5 μm—

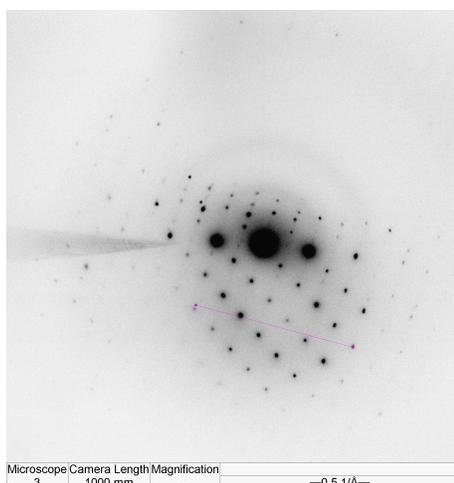
Micrograph Information

Sample ID:	0005
Order ID:	041413252
Image Number:	04385
Mineral Type:	ACTINOLITE
Date:	6/13/2014
Magnification:	7500
Microscope:	3

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416054	Date:	Jun 13, 2014
Image Number:	04386		
Reference / Sample Number:	0005		
Preliminary ID:	NRA		
Camera Constant:	1.861e-003	1/A Pixels	
Calibration Reference:	060914-04-03-04372_C		

	Measured	Reference	-5%	+5%
Inter-row Spacing: <input type="checkbox"/> <input type="checkbox"/>	5.108	5.230	4.969	5.492
d2 or hk0 (Camera K/zero row dist.):	N/A	N/A	-	-
d1 or hkl (Camera K/slant vector dist.):	N/A	N/A	-	-
Ratio of hk0/hkl:	N/A	N/A	-	-
Vector Angle:	N/A	N/A	-	-



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

With a Zone Axis of: [N/A]

Preliminary Identification was:

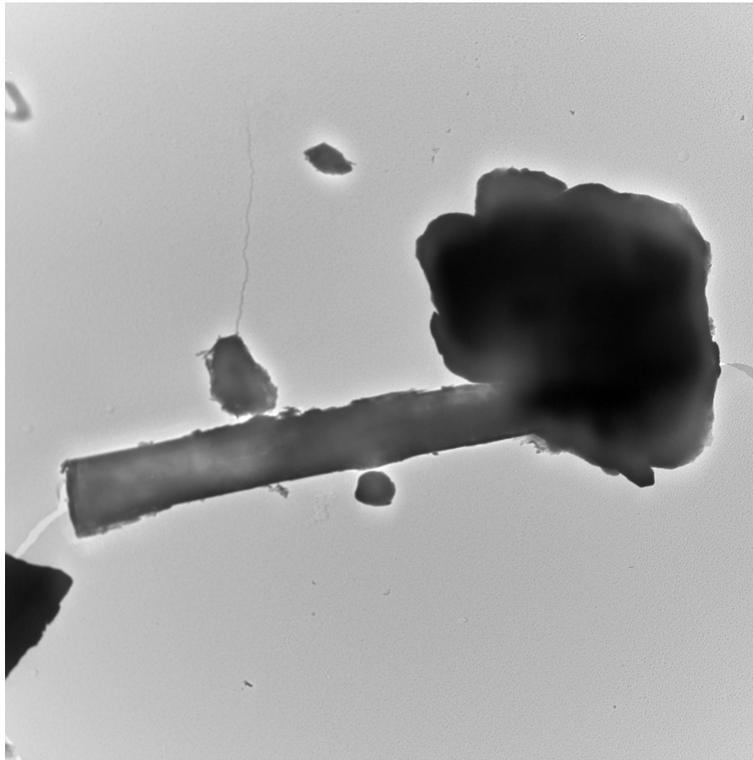
X	CORRECT
	INCORRECT



EMSL ANALYTICAL, INC.

EMSL Analytical, Inc.

Photomicrograph Report



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

Micrograph Information

Sample ID:	0005
Order ID:	041416054
Image Number:	04387
Mineral Type:	NRA
Date:	6/13/2014
Magnification:	10000
Microscope:	3



EMSL Analytical, Inc.

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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: 6/9/2014 8:46
Date Sampled: 05/31/2014 10:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00006
EMSL Sample Number: 041416054-0006
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 0 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 10
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 7.575758 Structure/ mm^2 Limit of Detection: 22.651515 Structure/ mm^2

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration Str/ mm^2, LCL Str/ mm^2, UCL Str/ mm^2. Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0006	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00006	Grid Box :	0414-Tetra Tech-02: P	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/13/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
P6	A8	None Detected								
P6	B5	None Detected								
P6	E5	None Detected								
P6	G4	None Detected								
P6	I6	None Detected								
P7	J5	None Detected								
P7	F3	None Detected								
P7	B7	None Detected								
P8	E7	None Detected								
P8	B5	None Detected								



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: 6/9/2014 8:46
Date Sampled: 06/02/2014 10:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00007 Air volume: 960 Liters
EMSL Sample Number: 041416054-0007 Grid Opening Area: 0.0132 mm^2
Minimum Level of analysis (chrysotile): CD Grid Openings Analyzed: 31
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385 Analysis Date: 06/09/2014
Result of Chi^2 Test: 24.00 Random Analyst: P. Harrison

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0007	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00007	Grid Box :	0414-Tetra Tech-02: Q	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	24.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/13/2014 & 06/17/2014
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				
Q1	A10	MC11	1	1	12.9	4	ADX	Actinolite		
Q1	A8	None Detected								
Q1	A6	F	2	2	7.6	1	ADX	Actinolite	4387	
Q1	A4	None Detected								
Q1	B3	MC11	3	3	11.5	3.3	ADX	Actinolite		
Q1	B5	None Detected								
Q1	B7	None Detected								
Q1	B9	None Detected								
Q1	C10	None Detected								
Q1	C8	None Detected								
Q1	C6	None Detected								
Q1	C4	None Detected								
Q1	C2	None Detected								
Q1	D3	None Detected								
Q1	D5	None Detected								
Q1	D7	None Detected								
Q1	D9	None Detected								
Q2	A10	F	4	4	6	0.8	ADX	Actinolite		
Q2	A8	None Detected								
Q2	A6	None Detected								
Q2	A2	MC11	5	5	30.3	16.8	ADX	Actinolite		
Q2	B3	None Detected								
Q2	B5	None Detected								
Q2	B7	F	6	6	20.2	2	ADX	Actinolite		
Q2	B9	F	7	7	9.9	0.5	ADX	Actinolite		
Q2	C10	None Detected								
Q2	C8	None Detected								
Q2	C6	None Detected								
Q2	C4	None Detected								
Q2	C2	None Detected								
Q2	D3	None Detected								



ISO 10312

International Standard for the Determination of Asbestos Fibers-Direct
Transfer Transmission Electron Microscopy
Structure Sketch Sheet for Direct Data Entry

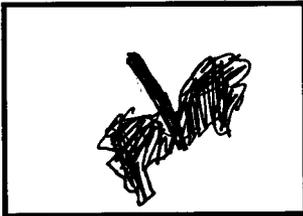
EMSL Order ID: 041416054-0007

Client: Tetra Tech

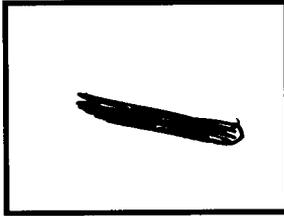
Client Sample: BC-ABS-00007

Page 1 of

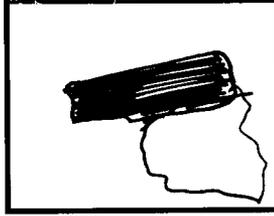
Primary Structure # 1



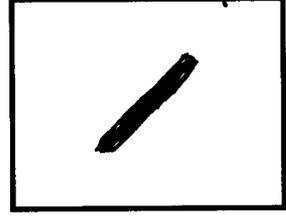
Primary Structure # 2



Primary Structure # 3



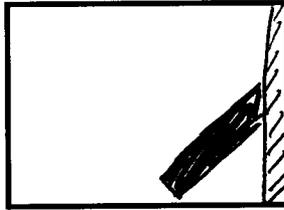
Primary Structure # 4



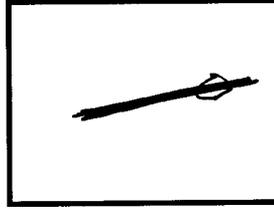
Primary Structure # 5



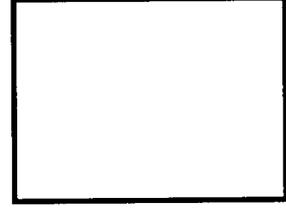
Primary Structure # 6



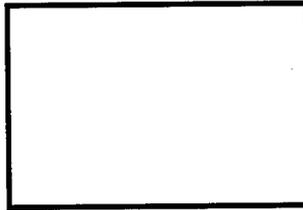
Primary Structure # 7



Primary Structure #



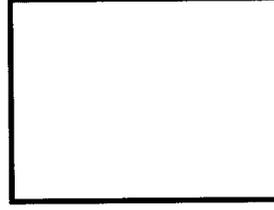
Primary Structure #



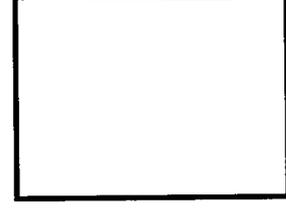
Primary Structure #



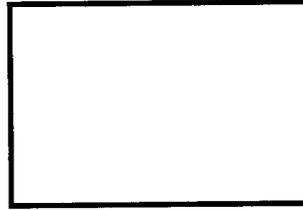
Primary Structure #



Primary Structure #



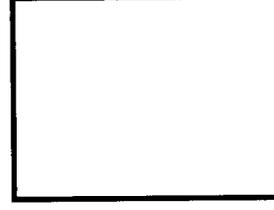
Primary Structure #



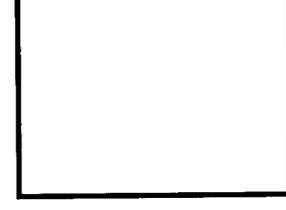
Primary Structure #



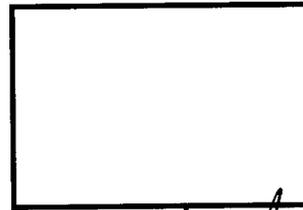
Primary Structure #



Primary Structure #



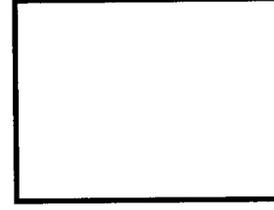
Structure #



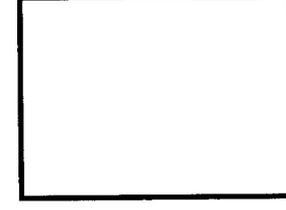
Structure #



Structure #



Structure #



Analyst: [Signature]

Date: 6/13/14

Scope: 04-03



Energy Dispersive X-Ray Analysis

Quantitative Spectra & Data

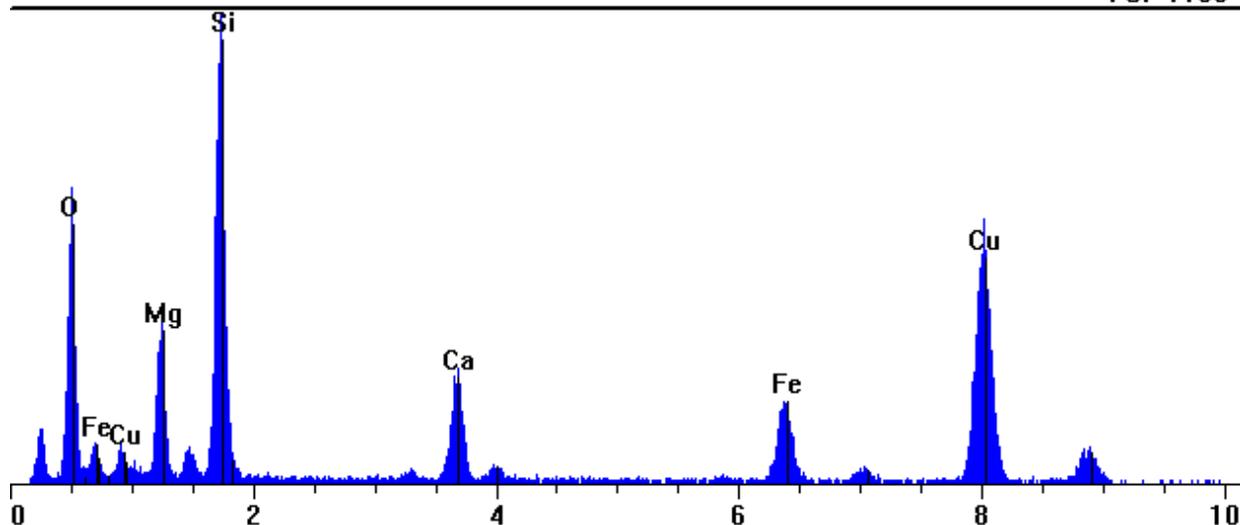
EMSL ANALYTICAL, INC.

File: L:\EDS Spe...Spectra\Scope 04-03\2014\041416054-0007 Q1 A6 2 AC.pgt
 Collected: June 13, 2014 11:56:03

Live Time: 316.35 Count Rate: 294 Dead Time: 2.94 %
 Beam Voltage: 20.00 Beam Current: 2.00 Takeoff Angle: 31.00
 Thickness limit: 27158.98

■ 041416054-0007 Q1 A6 2 AC.pgt

FS: 1100



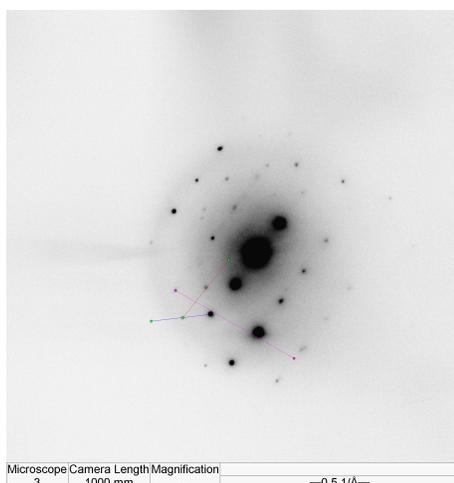
Element	Line	keV	CL Ratio	Wt%	At%	At Prop	Compound	Cmpd Wt%
Mg	KA1	1.254	1.4000	13.35	12.82	5.9	MgO	22.13
Si	KA1	1.740	1.0000	32.74	27.23	12.5	SiO	51.38
Ca	KA1	3.691	1.0500	10.41	6.07	2.8	CaO	14.56
Fe	KA1	6.403	0.9900	9.27	3.88	1.8	FeO	11.93
Cu	KA1	8.046	0.0000	0.00	0.00	0.0		
O	KA1	0.523	0.0000	34.24	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	15.2	1.5	13.7	8.9
Si	KA1	48.4	1.4	47.0	33.8
Ca	KA1	15.3	1.0	14.2	13.6
Fe	KA1	14.3	0.8	13.5	16.3
Cu	KA1	45.6	0.9	44.7	50.5
O	KA1	24.0	0.9	23.1	25.0

AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416054	Date:	Jun 13, 2014
Image Number:	04388		
Reference / Sample Number:	0007		
Preliminary ID:	ACTINOLITE		
Camera Constant:	1.861e-003	1/A Pixels	
Calibration Reference:	060914-04-03-04372_C		

	Measured	Reference	-5%	+5%
Inter-row Spacing: <input type="checkbox"/> <input type="checkbox"/>	5.218	5.278	5.014	5.542
d2 or hk0 (Camera K/zero row dist.):	3.206	3.127	2.971	3.283
d1 or hkl (Camera K/slant vector dist.):	3.954	4.010	3.809	4.210
Ratio of hk0/hkl:	0.811	0.780	0.741	0.819
Vector Angle:	49.7	49.440	46.968	51.912



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

With a Zone Axis of: [**1-32**]

Preliminary Identification was:

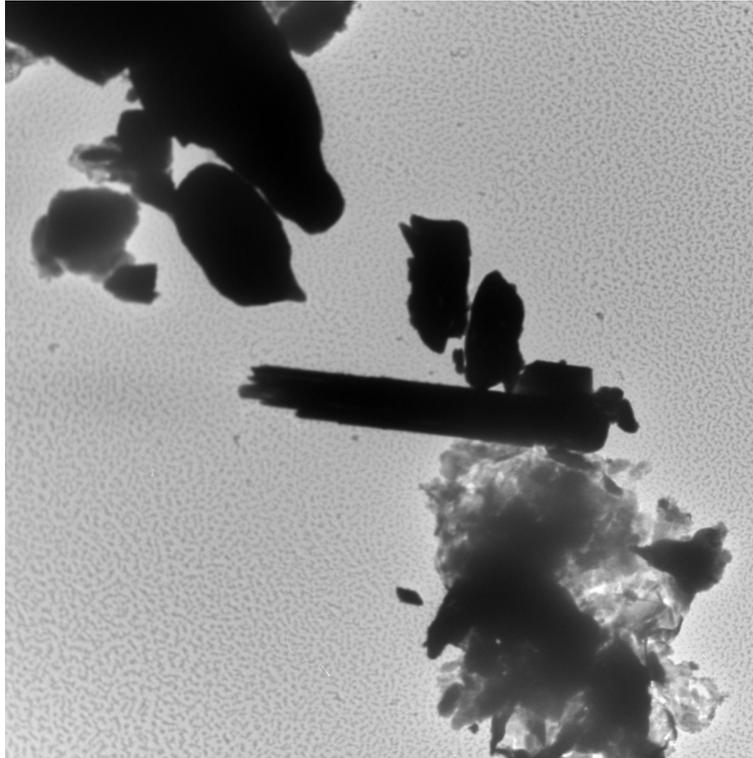
X	CORRECT
	INCORRECT



EMSL ANALYTICAL, INC.

EMSL Analytical, Inc.

Photomicrograph Report



Microscope Camera Length	Magnification	—2 μm—
3	10000 x	

Micrograph Information

Sample ID:	0007
Order ID:	041416054
Image Number:	04389
Mineral Type:	ACTINOLITE
Date:	6/13/2014
Magnification:	10000
Microscope:	3



EMSL Analytical, Inc.

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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: 6/9/2014 8:46
Date Sampled: 06/02/2014 10:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00008
EMSL Sample Number: 041416054-0008
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 0 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 10
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 7.575758 Structure/ mm^2 Limit of Detection: 22.651515 Structure/ mm^2

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration Str/ mm^2, LCL Str/ mm^2, UCL Str/ mm^2. Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0008	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00008	Grid Box :	0414-Tetra Tech-02: Q	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/13/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
Q4	B6	None Detected								
Q4	D8	None Detected								
Q4	E10	None Detected								
Q4	F7	None Detected								
Q4	H5	None Detected								
Q5	B7	None Detected								
Q5	D9	None Detected								
Q5	F10	None Detected								
Q6	B10	None Detected								
Q6	F8	None Detected								



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Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/03/2014 13:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00009 Air volume: 960 Liters
EMSL Sample Number: 041416054-0009 Grid Opening Area: 0.0132 mm^2
Minimum Level of analysis (chrysotile): CD Grid Openings Analyzed: 31
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385 Analysis Date: 06/09/2014
Result of Chi^2 Test: N/A N/A Analyst: P. Harrison

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), Poisson 95 % Confidence Interval LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government 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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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 0.8um 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:	041416054-0009	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00009	Grid Box :	0414-Tetra Tech-02: Q	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/17/2014
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				
Q7	A10	None Detected								
Q7	A8	None Detected								
Q7	A6	None Detected								
Q7	A4	None Detected								
Q7	A2	None Detected								
Q7	B3	None Detected								
Q7	B5	None Detected								
Q7	B7	None Detected								
Q7	B9	None Detected								
Q7	C10	None Detected								
Q7	C8	None Detected								
Q7	C6	None Detected								
Q7	C4	None Detected								
Q7	D3	None Detected								
Q7	D5	None Detected								
Q7	D7	None Detected								
Q7	D9	None Detected								
Q9	J1	None Detected								
Q9	J3	None Detected								
Q9	J5	None Detected								
Q9	J7	None Detected								
Q9	J9	None Detected								
Q9	I10	None Detected								
Q9	I8	None Detected								
Q9	I6	None Detected								
Q9	I4	None Detected								
Q9	I2	None Detected								
Q9	H1	None Detected								
Q9	H3	None Detected								
Q9	H5	None Detected								
Q9	H7	None Detected								



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Phone: 406-442-5588

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/03/2014 14:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00010 Air volume: 960 Liters
EMSL Sample Number: 041416054-0010 Grid Opening Area: 0.0132 mm^2
Minimum Level of analysis (chrysotile): CD Grid Openings Analyzed: 31
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385 Analysis Date: 06/09/2014
Result of Chi^2 Test: 29.00 Random Analyst: F. Craig

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government 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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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 0.8um 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:	041416054-0010	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00010	Grid Box :	0414-TetraTech-02: R	Analyst(s):	F. Craig
Chi ² Test for Uniformity:	29.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/16/2014
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				
R1	I2	None Detected								
R1	H3	None Detected								
R1	G4	None Detected								
R1	F3	MD11	1		25	25	ADX	Actinolite		
R1	F3	MF		1	10	0.72	ADX	Actinolite	010254D	
R1	E4	None Detected								
R1	D5	None Detected								
R1	C6	None Detected								
R1	B7	None Detected								
R1	B4	None Detected								
R1	B2	None Detected								
R1	C1	F	2	2	10.8	2.86	ADX	Actinolite		
R1	C3	None Detected								
R1	F6	None Detected								
R1	I7	None Detected								
R1	I5	None Detected								
R1	J4	None Detected								
R1	J6	None Detected								
R2	B10	None Detected								
R2	B8	None Detected								
R2	B6	None Detected								
R2	C3	None Detected								
R2	C5	None Detected								
R2	C7	MD11	3		28.8	16.63	NAM	Non Asb. Mineral		
R2	C7	MF		3	5	0.48	NAM	Non Asb. Mineral	010256M	
R2	C9	None Detected								
R2	E9	None Detected								
R2	E7	None Detected								
R2	E5	None Detected								
R2	G7	None Detected								
R2	G5	None Detected								
R2	I5	None Detected								
R2	I9	None Detected								



ISO 10312

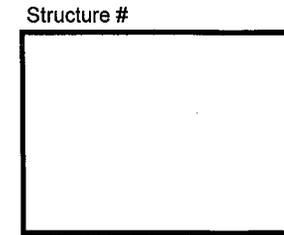
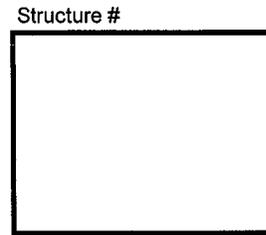
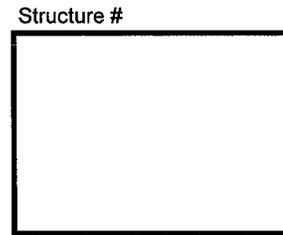
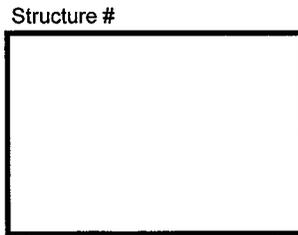
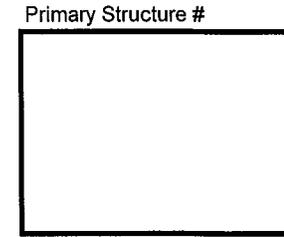
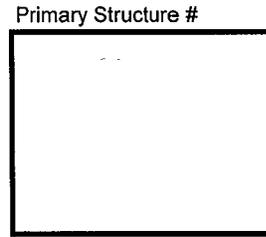
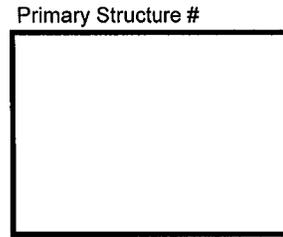
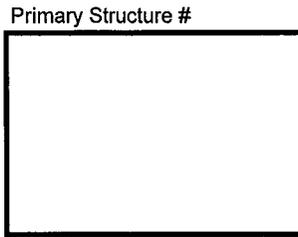
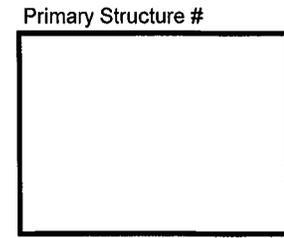
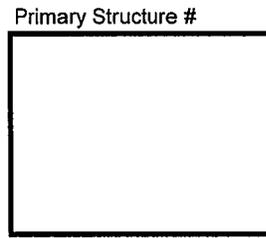
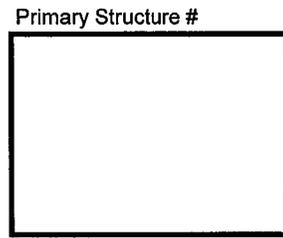
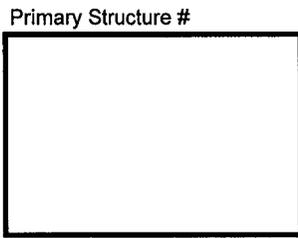
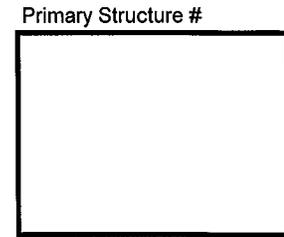
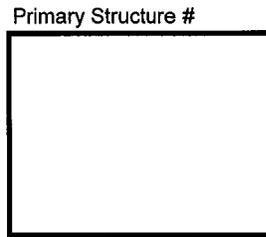
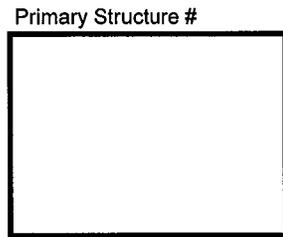
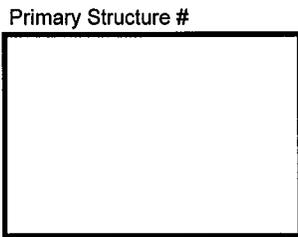
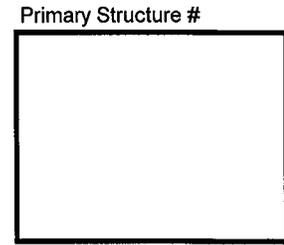
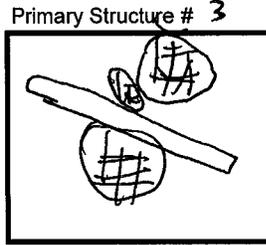
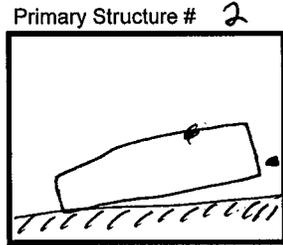
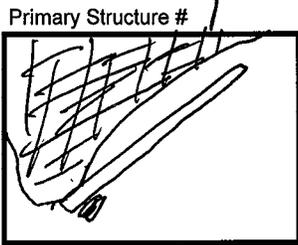
International Standard for the Determination of Asbestos Fibers-Direct
Transfer Transmission Electron Microscopy
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041416054-0010

Client: Tetra Tech

Client Sample: BC-ABS-00010

Page 1 of 1



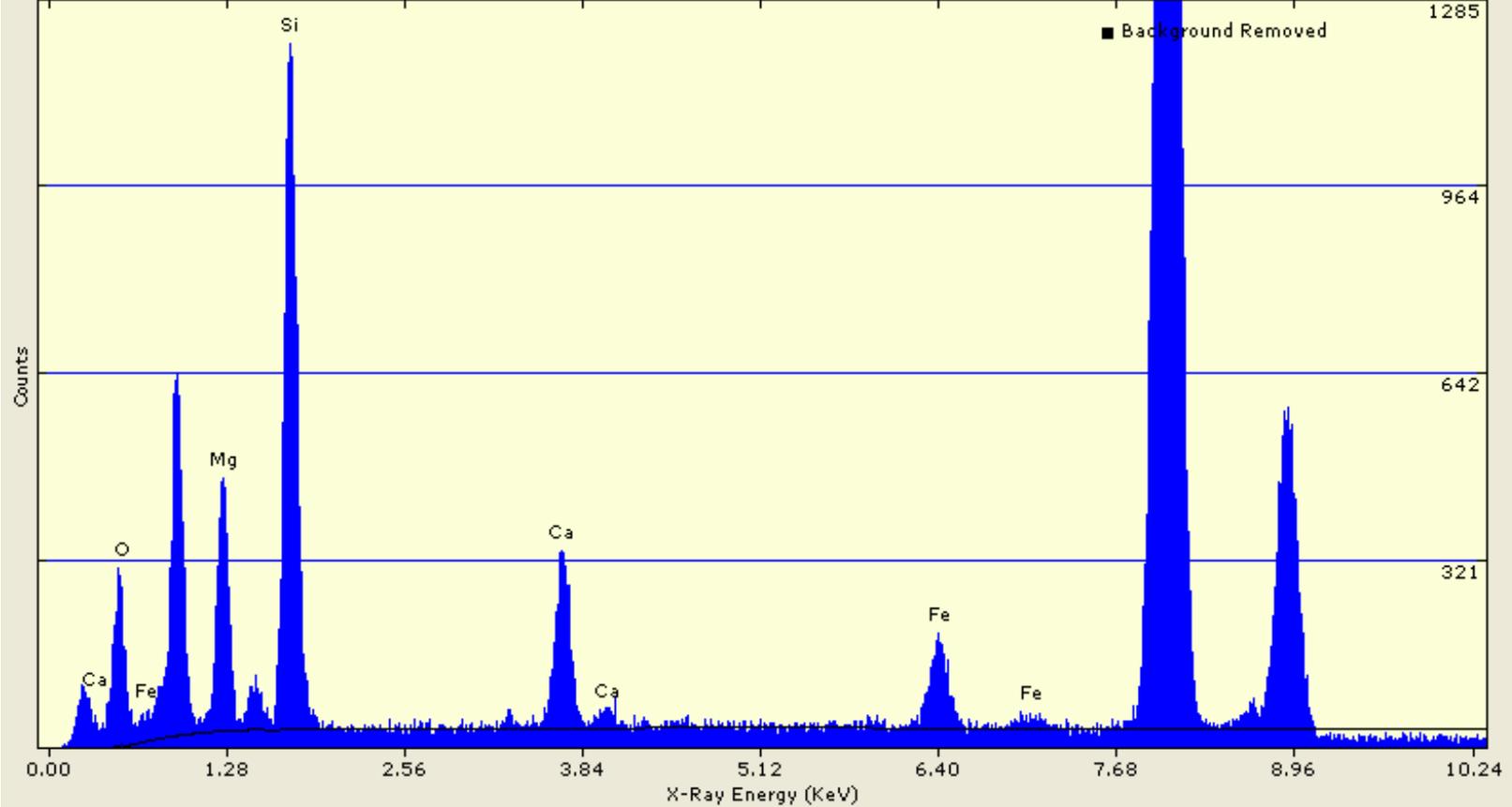
Analyst: FZ

Date: 6/16/14

Scope: 04 01

Realtime: 81.5
 Livetime: 40.4

041416054-0010 BC-ABS-00010 R1 C1 2 Act::Spectrum4

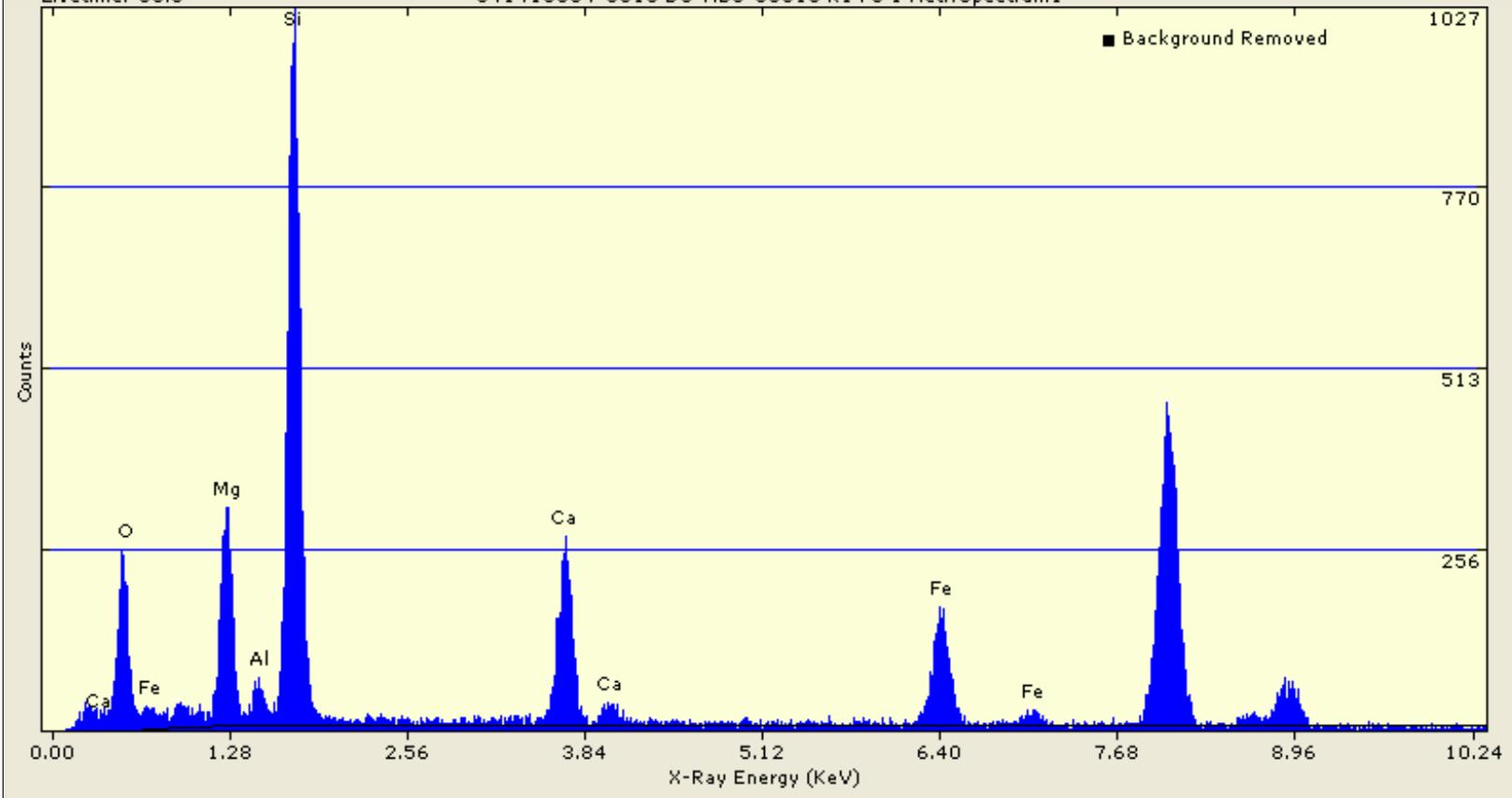


Quantitative Results for Spectrum4
 Analysis: Thin Film Method: Standardless
 Acquired 16-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %	Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	45.64	1.28	61.12	0.00	0.0000	0.0000	0.0	86.1	2249.00
Magnesium	11.58	0.12	10.21	19.21 (MgO)	3.8423	0.2174	3399.3	95.9	3469.95
Silicon	29.16	0.29	22.25	62.38 (SiO2)	8.3707	0.5045	9978.8	101.7	10025.29
Calcium	7.89	0.08	4.22	11.03 (CaO)	1.5863	0.0845	2807.6	122.5	3087.73
Iron	5.74	0.06	2.20	7.38 (FeO)	0.8285	0.0482	1622.7	146.4	1823.17
Total	100.00			100.00	14.6279				

Realtime: 81.0
 Livetime: 63.8

041416054-0010 BC-ABS-00010 R1 F3 1 Act: Spectrum1

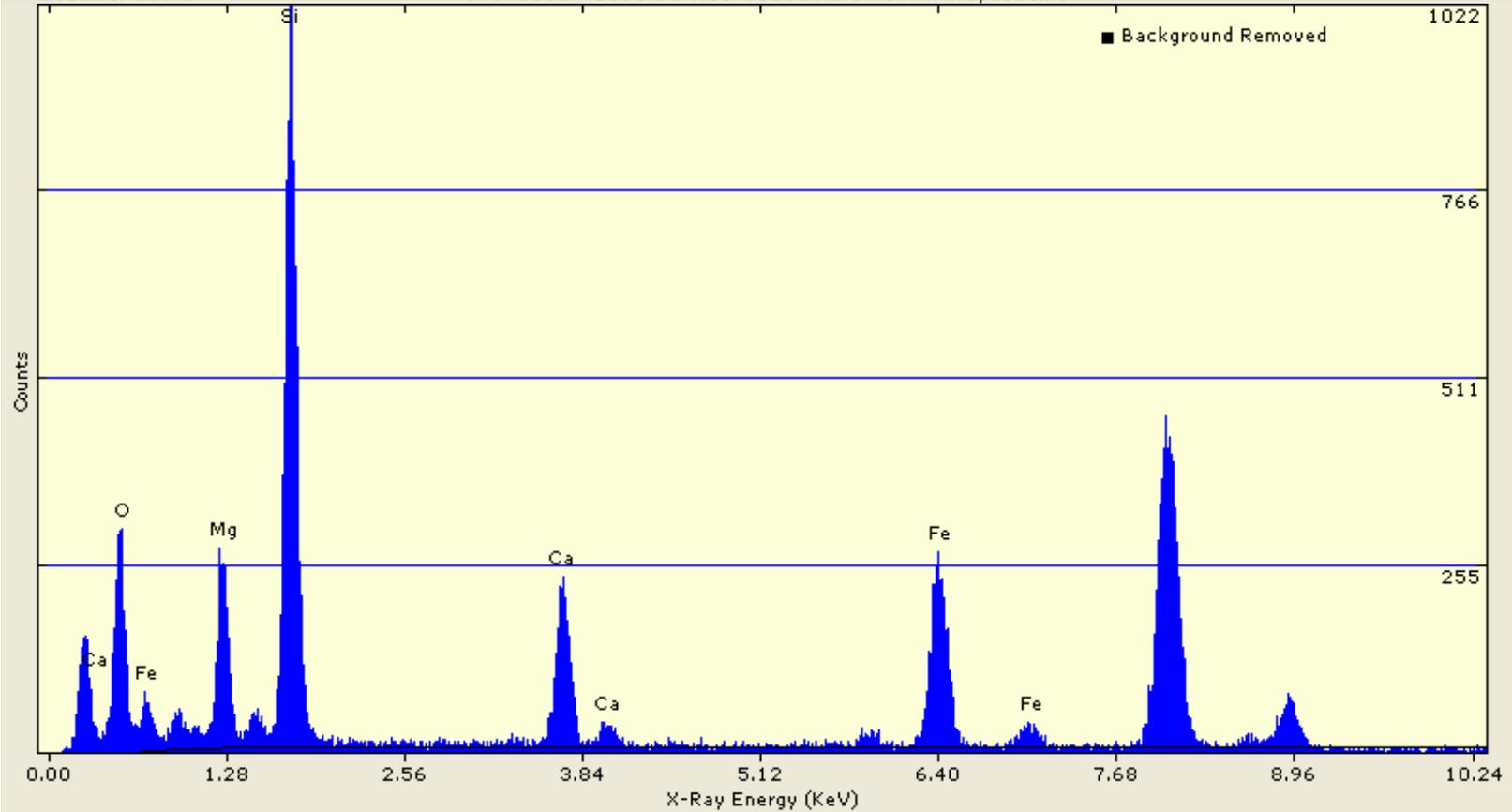


Quantitative Results for Spectrum1
 Analysis: Thin Film Method: Standardless
 Acquired 16-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %	Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	45.47	0.50	61.27	0.00	0.0000	0.0000	0.0	86.2	1882.22
Magnesium	9.82	0.11	8.71	16.28 (MgO)	3.2692	0.1775	2431.9	95.9	2487.46
Aluminum	1.63	0.02	1.30	3.07 (Al2O3)	0.4874	0.0274	444.2	98.7	510.66
Silicon	28.51	0.31	21.88	60.99 (SiO2)	8.2145	0.4696	8252.5	101.8	8401.49
Calcium	8.02	0.09	4.31	11.22 (CaO)	1.6196	0.0770	2410.2	122.5	2543.04
Iron	6.55	0.07	2.53	8.43 (FeO)	0.9497	0.0557	1564.1	146.4	1899.03
Total	100.00			100.00	14.5404				

Realtime: 224.4
 Livetime: 219.1

041416054-0010 BC-ABS-00010 R2 C7 3 NAM::Spectrum6



Quantitative Results for Spectrum6
 Analysis: Thin Film Method: Standardless
 Acquired 16-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %	Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	43.87	0.50	61.13	0.00	0.0000	0.0000	0.0	86.2	2318.45
Magnesium	8.16	0.09	7.48	13.52 (MgO)	2.8144	0.1423	1886.0	95.9	2046.54
Silicon	28.04	0.32	22.26	60.00 (SiO2)	8.3748	0.4556	7579.5	101.8	8032.98
Calcium	7.48	0.09	4.16	10.46 (CaO)	1.5645	0.0704	2097.3	122.5	2232.21
Iron	12.45	0.14	4.97	16.02 (FeO)	1.8700	0.0934	2774.5	146.4	3068.90
Total	100.00			100.00	14.6237				



AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416054	Date:	Jun 16, 2014
Indexing of Image Number:	010254	Scope #:	04 - 01
Reference / Sample No:	0010-04-01	By:	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003	1/A Pixels	
Determined from Reference:	AuCal-061014_10242		

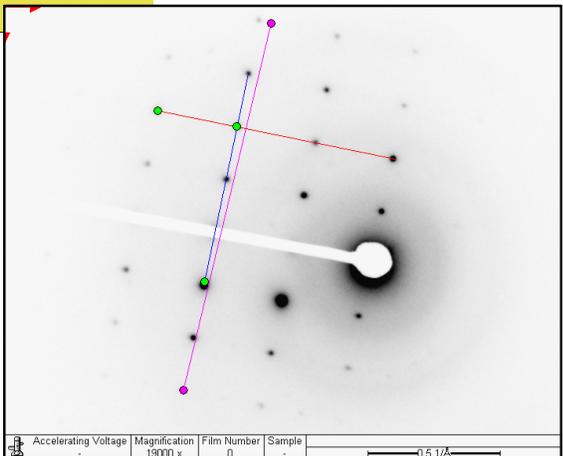
Measured Inter-Row Spacing:	66.47	Pixels
Mean Distance between spots on Center row (d2):	102.35	Pixels
Mean Distance between spots on slant vector (d1):	68.68	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.086	5.278	5.014	5.542
d2 or hk0 (Camera K/zero row dist.):	3.303	3.281	3.117	3.445
d1 or hk1 (Camera K/slant vector dist.):	4.922	4.931	4.684	5.178
Ratio of hk0/hk1:	0.671	0.665	0.632	0.698
Angle of Slant Vector (Measured):	89.4	89.410	84.939	93.880

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

Miller Indices hk0: (**2 4 0**)
 Miller Indices hkl: (**-1 1 1**)
 With a Zone Axis of: [**2 -1 3**]

Preliminary Identification was: CORRECT
 INCORRECT



Accelerating Voltage: 15000 v Magnification: 0 Film Number: 0 Sample: 0.6 1/A

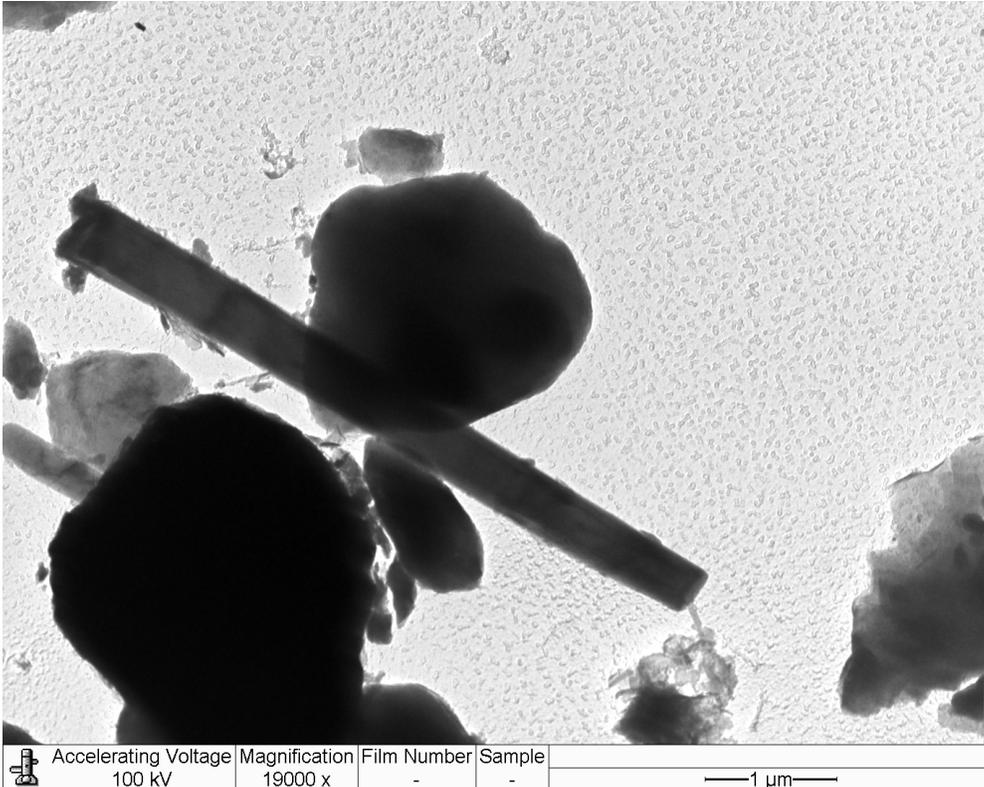
Percent accuracy to date: **100 %**



EMSL ANALYTICAL, INC.

EMSL Analytical, Inc.

Photomicrograph Report



	Accelerating Voltage 100 kV	Magnification 19000 x	Film Number -	Sample -	—1 μ m—
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Micrograph Information

Sample ID:	0012
Order ID:	041416054
Image Number:	010256
Mineral Type:	NAM
Date:	6/16/2014
Magnification:	19000
Microscope:	1



EMSL Analytical, Inc.

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

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

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/03/2014 14:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00011
EMSL Sample Number: 041416054-0011
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 0 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 10
Analysis Date: 06/09/2014
Analyst: F. Craig

Analytical Sensitivity: 7.575758 Structure/ mm^2 Limit of Detection: 22.651515 Structure/ mm^2

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration Str/ mm^2, LCL Str/ mm^2, UCL Str/ mm^2. Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0011	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00011	Grid Box :	0414-TetraTech-02: R	Analyst(s):	F. Craig
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/16/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
R4	H3	None Detected								
R4	I6	None Detected								
R4	F6	None Detected								
R4	D2	None Detected								
R4	B4	None Detected								
R5	C6	None Detected								
R5	E4	None Detected								
R5	G5	None Detected								
R5	F2	None Detected								
R5	I3	None Detected								



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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: 6/9/2014 8:46
Date Sampled: 06/04/2014 11:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00012
EMSL Sample Number: 041416054-0012
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: 26.00 Random
Air volume: 960 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 31
Analysis Date: 06/09/2014
Analyst: F. Craig

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

Asbestiform Minerals Present: Actinolite, Non-Regulated, Amphibole
Explanation of Results
NRA = Non-Regulated Amphibole. A suspected mineral fiber that is a member of the Amphibole group, but is currently not regulated by the Federal government 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.
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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 0.8um 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:	041416054-0012	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00012	Grid Box :	0414-TetraTech-02: R	Analyst(s):	F. Craig
Chi ² Test for Uniformity:	26.00-Random	Pore Size (micron):	0.8	Analysis Date:	06/16/2014
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				
R8	A9	None Detected								
R8	B8	MD11	1		7.7	3.84	ADX	Actinolite		
R8	B8	MF		1	7.2	1.2	ADX	Actinolite	010257D	
R8	C7	None Detected								
R8	D6	None Detected								
R8	E5	MC11	2	2	26.1	19.2	ADX	Actinolite	010259D	
R8	F4	None Detected								
R8	G2	None Detected								
R8	H2	None Detected								
R8	I1	None Detected								
R8	I9	None Detected								
R8	I7	None Detected								
R8	H10	None Detected								
R8	G7	None Detected								
R8	F10	None Detected								
R8	F8	None Detected								
R8	B6	None Detected								
R9	J2	MD11	3		9.4	8.16	ADX	Actinolite		
R9	J2	MF		3	8.3	2.64	ADX	Actinolite	010261D	
R9	I3	None Detected								
R9	H4	None Detected								
R9	G5	None Detected								
R9	F6	None Detected								
R9	E7	MD11	4		21.2	19	ADX	Actinolite		
R9	E7	MF		4	13.1	1.2	ADX	Actinolite	010263D	
R9	D8	None Detected								
R9	C9	None Detected								
R9	B4	MD11	5		34	15.45	ADX	Non Reg.Amph.		
R9	B4	MF		5	27.3	2.16	ADX	Non Reg.Amph.	010265D	
R9	D2	None Detected								
R9	D4	None Detected								
R9	G1	None Detected								
R9	G3	None Detected								
R9	I5	None Detected								
R9	K6	None Detected								



ISO 10312

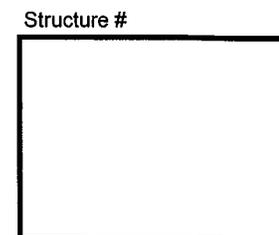
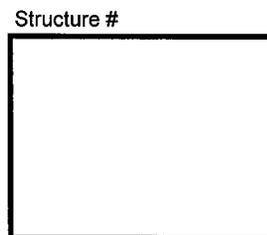
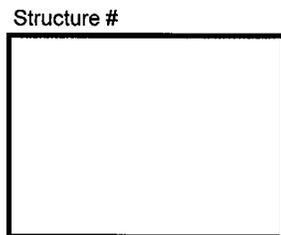
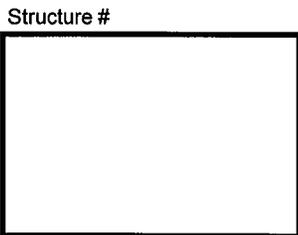
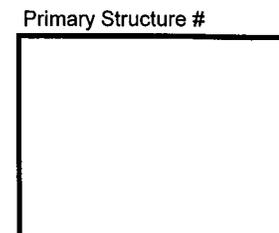
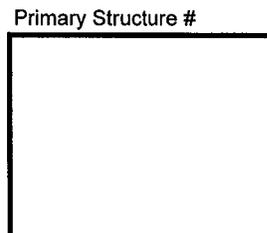
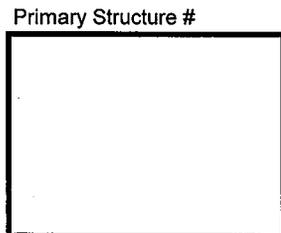
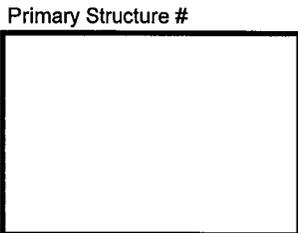
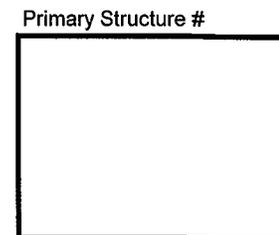
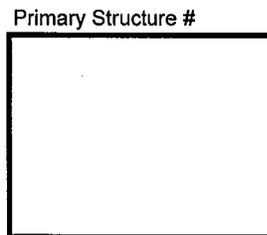
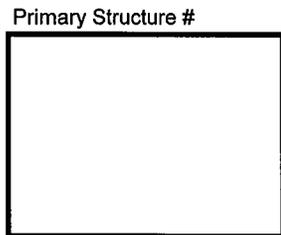
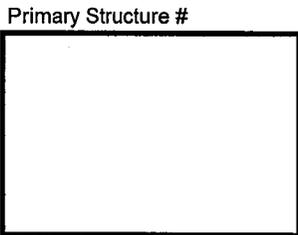
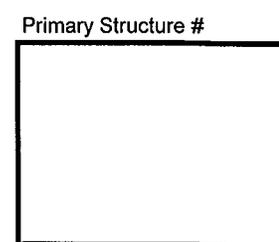
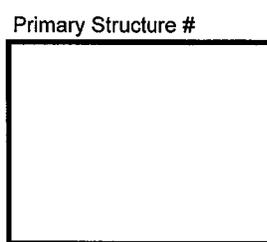
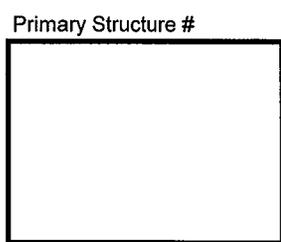
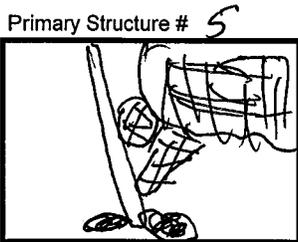
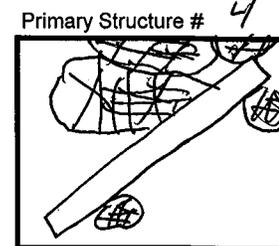
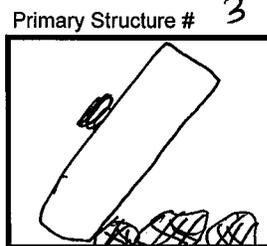
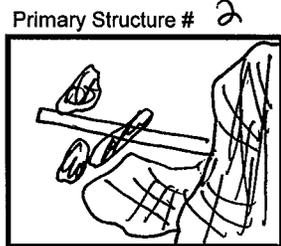
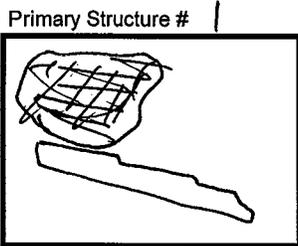
International Standard for the Determination of Asbestos Fibers-Direct
Transfer Transmission Electron Microscopy
Structure Sketch Sheet for Direct Data Entry

EMSL Order ID: 041416054-0012

Client: Tetra Tech

Client Sample: BC-ABS-00012

Page 1 of 1



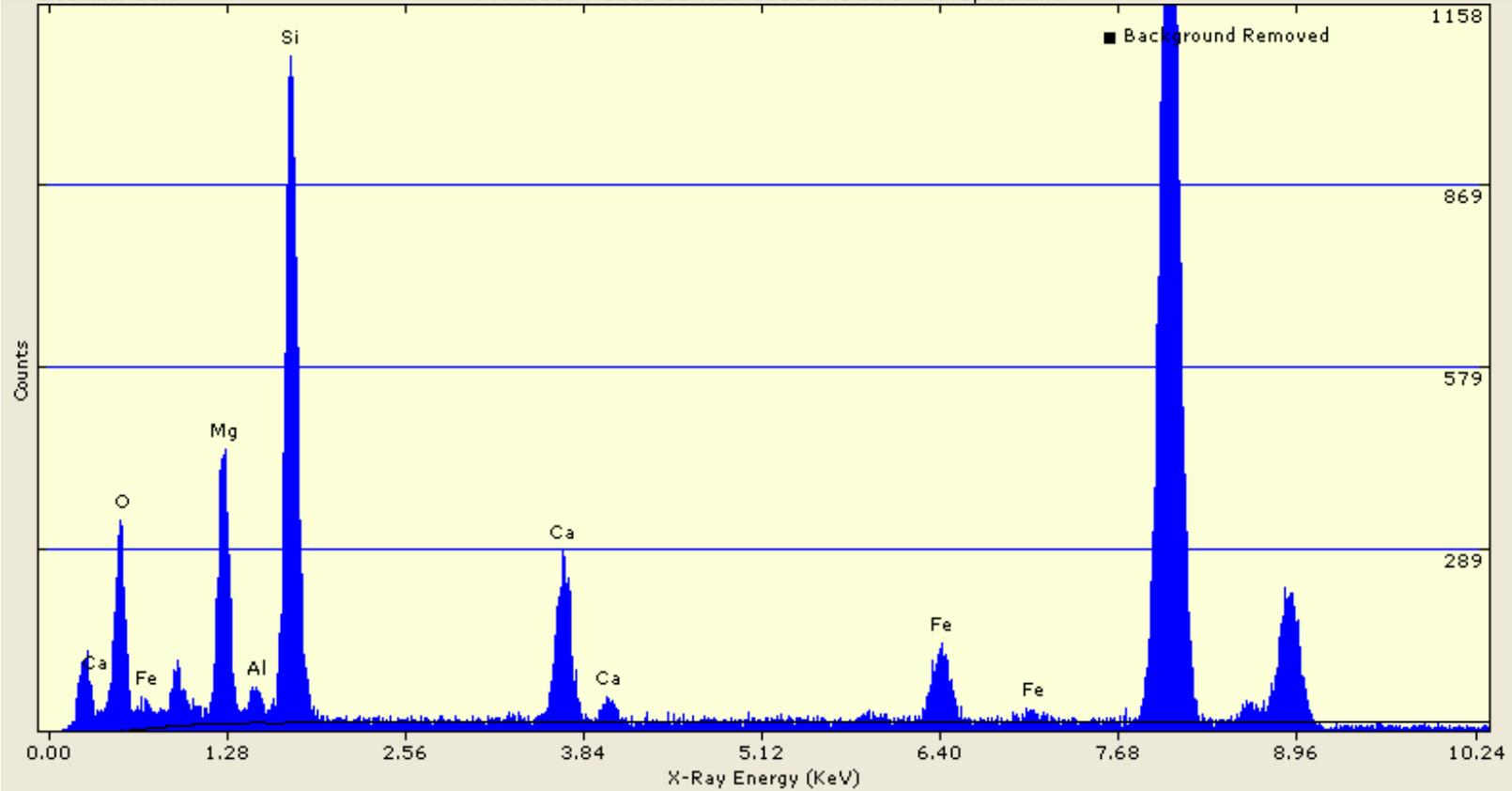
Analyst: Rz

Date: 6/16/14

Scope: 04 01

Realtime: 89.2
 Livetime: 66.0

041416054-0012 BC-ABS-00012 R8 B6 1 Act: Spectrum1



Quantitative Results for Spectrum1

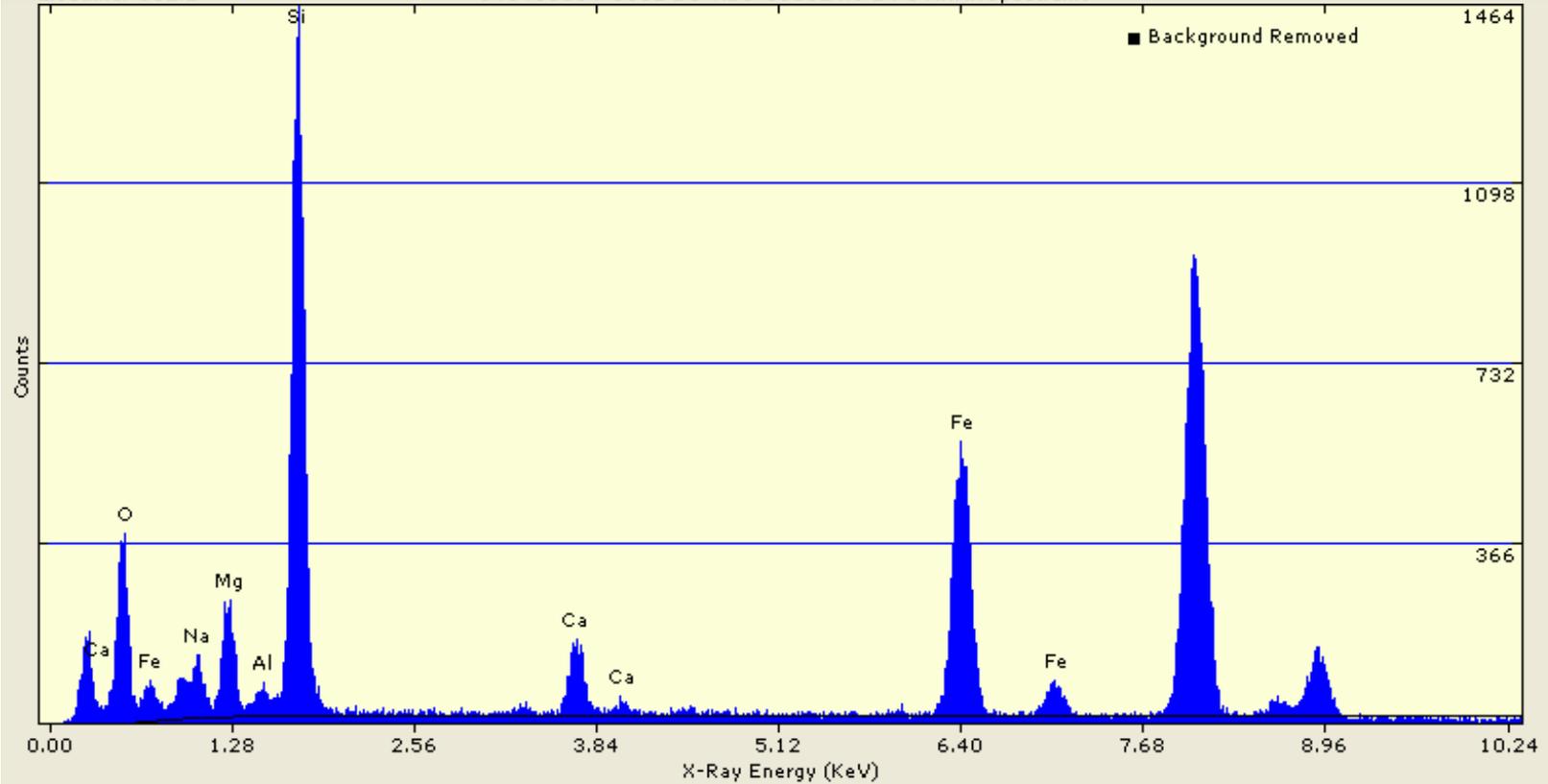
Analysis: Thin Film Method: Standardless

Acquired 16-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %	Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)
Oxygen	45.59	1.05	60.81	0.00	0.0000	0.0000	0.0	86.2	2506.49
Magnesium	12.46	0.13	10.94	20.66 (MgO)	4.1370	0.1284	3289.1	95.9	3420.13
Aluminum	1.32	0.01	1.05	2.50 (Al ₂ O ₃)	0.3955	0.0121	385.2	98.7	485.26
Silicon	27.76	0.30	21.10	59.40 (SiO ₂)	7.9793	0.2028	8567.7	101.8	8902.99
Calcium	7.91	0.09	4.21	11.07 (CaO)	1.5938	0.0514	2534.9	122.5	2663.27
Iron	4.95	0.05	1.89	6.37 (FeO)	0.7160	0.0295	1260.4	146.4	1431.87
Total	100.00			100.00	14.8216				

Realtime: 174.4
 Livetime: 152.2

041416054-0012 BC-ABS-00012 R9 B4 5 NRA::Spectrum9



Quantitative Results for Spectrum9
 Analysis: Thin Film Method: Standardless
 Acquired 16-Jun-2014, 100.0 KeV @10 eV/channel

Element	Weight %	Std. Dev.	Atomic %	Oxide %	Cations	k-Ratio	Intensities	FWHM (eV)	ROI (net)	
Oxygen	42.62	0.90	60.65	0.00	0.0000	0.0000	0.0	86.2	2971.01	
Sodium	2.63	0.03	2.61	3.55	(Na ₂ O)	0.9883	0.0468	718.4	92.9	1007.17
Magnesium	4.67	0.04	4.38	7.75	(MgO)	1.6603	0.0869	1609.7	95.9	1877.78
Aluminum	0.78	0.01	0.65	1.46	(Al ₂ O ₃)	0.2481	0.0147	294.6	98.7	505.09
Silicon	27.47	0.26	22.26	58.76	(SiO ₂)	8.4433	0.4613	11055.2	101.8	11553.79
Calcium	3.45	0.03	1.96	4.83	(CaO)	0.7439	0.0334	1442.9	122.5	1530.61
Iron	18.38	0.17	7.49	23.64	(FeO)	2.8413	0.1422	6098.8	146.4	6712.20
Total	100.00			100.00		14.9253				



AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416054	Date:	Jun 16, 2014
Indexing of Image Number:	010263	Scope #:	04 - 01
Reference / Sample No:	0012-04-01	By:	F Craig
Preliminary ID:	ACTINOLITE		
Using Camera Constant of:	2.958e-003	1/A Pixels	
Determined from Reference:	AuCal-061014_10242		

Measured Inter-Row Spacing:	63.96	Pixels
Mean Distance between spots on Center row (d2):	102.79	Pixels
Mean Distance between spots on slant vector (d1):	69.06	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.286	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.):	4.895	4.931	4.684	5.178
Ratio of hk0/hk1:	0.672	0.665	0.632	0.698
Angle of Slant Vector (Measured):	67.0	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: CORRECT
 INCORRECT

Accelerating Voltage | Magnification | Film Number | Sample | 0.5 1/A

Percent accuracy to date: **100 %**



AMPHIBOLE SAED INDEXING FORM

EMSL Order Number:	041416054	Date:	Jun 17, 2014
Indexing of Image Number:	010265	Scope #:	04 - 01
Reference / Sample No:	0012-04-01	By:	F Craig
Preliminary ID:	NRA		
Using Camera Constant of:	2.958e-003	1/A Pixels	
Determined from Reference:	AuCal-061014_10242		

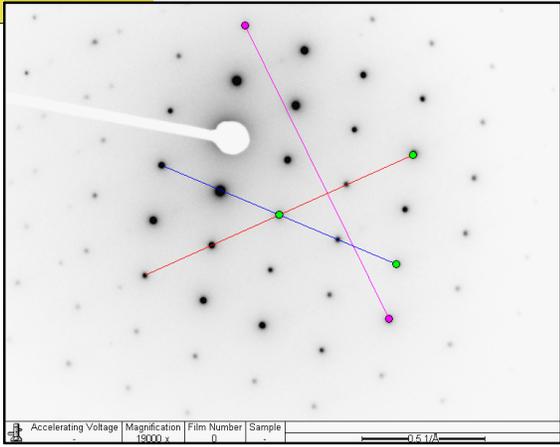
Measured Inter-Row Spacing:	64.15	Pixels
Mean Distance between spots on Center row (d2):	100.83	Pixels
Mean Distance between spots on slant vector (d1):	87.49	Pixels

	Calculated	Ref	-5%	+5%
Inter-row Spacing (Angstroms):	5.270	5.280	5.016	5.544
d2 or hk0 (Camera K/zero row dist.):	3.353	3.356	3.188	3.524
d1 or hk1 (Camera K/slant vector dist.):	3.864	3.863	3.670	4.056
Ratio of hk0/hk1:	0.868	0.869	0.826	0.912
Angle of Slant Vector (Measured):	47.0	46.860	44.517	49.203

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

Miller Indice hk0: (**-1 5 0**)
 Miller Indice hkl: (**-1 3 1**)
 With a Zone Axis of: [**5 1 2**]

Preliminary Identification was: CORRECT
 INCORRECT



Accelerating Voltage: 18000 x Magnification: 0 Film Number: 0 Sample: 0.517A

Percent accuracy to date: 100 %



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856-303-2500
www.EMSL.com

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

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 12:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00013
EMSL Sample Number: 041416054-0013
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 976 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 30
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 0.000996 Structure/cc Limit of Detection: 0.002978 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), Poisson 95 % Confidence Interval LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0013	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00013	Grid Box :	0414-Tetra Tech-02: S	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/18/2014
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				
S1	C9	None Detected								
S1	C7	None Detected								
S1	C5	None Detected								
S1	C3	None Detected								
S1	D2	None Detected								
S1	D4	None Detected								
S1	D6	None Detected								
S1	D8	None Detected								
S1	E9	None Detected								
S1	E7	None Detected								
S1	E5	None Detected								
S1	E3	None Detected								
S1	F2	None Detected								
S1	F4	None Detected								
S1	F6	None Detected								
S1	F8	None Detected								
S1	F10	None Detected								
S2	J1	None Detected								
S2	J3	None Detected								
S2	J5	None Detected								
S2	H1	None Detected								
S2	H3	None Detected								
S2	H5	None Detected								
S2	H7	None Detected								
S2	H9	None Detected								
S2	F3	None Detected								
S2	E5	None Detected								
S2	E7	None Detected								
S2	D8	None Detected								
S2	D6	None Detected								



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856-303-2500
www.EMSL.com

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

Customer ID: MAXI57
Customer PO: NA
Received: 6/9/2014 8:46
Date Sampled: 06/04/2014 12:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00014
EMSL Sample Number: 041416054-0014
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 960 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 31
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 0.000980 Structure/cc Limit of Detection: 0.002930 Structure/cc

Table with 8 columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration (Str/cc), LCL (Str/cc), UCL (Str/cc). Rows include PCMe Structures (Chrys), PCMe Structures (Amph), PCMe Structures (NRA), Total PCMe Structures (Regulated), Total PCMe Structures (All), PCMe Fibers and Bundles (Chrys), PCMe Fibers and Bundles (Amph), PCMe Fibers and Bundles (NRA), Total PCMe Fibers and Bundles (Regulated), Total PCMe Fibers and Bundles (All), and Non Asbestos Mineral Structures.

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 government 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 0.8um 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:	041416054-0014	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00014	Grid Box :	0414-Tetra Tech-03: U	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/19/2014
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				
U1	H4	None Detected								
U1	F2	None Detected								
U1	E3	None Detected								
U1	E5	None Detected								
U1	C1	None Detected								
U1	B3	None Detected								
U1	C5	None Detected								
U2	C5	None Detected								
U2	D4	None Detected								
U2	E5	None Detected								
U2	G4	None Detected								
U2	G6	None Detected								
U2	G8	None Detected								
U2	H3	None Detected								
U2	H5	None Detected								
U2	H7	None Detected								
U2	J7	None Detected								
U4	A4	None Detected								
U4	A6	None Detected								
U4	A8	None Detected								
U4	B3	None Detected								
U4	C8	None Detected								
U4	D6	None Detected								
U4	E5	None Detected								
U4	F6	None Detected								
U4	F4	None Detected								
U4	F2	None Detected								
U4	G3	None Detected								
U4	G5	None Detected								
U4	G7	None Detected								
U4	H2	None Detected								



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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: 6/9/2014 8:46
Date Sampled: 06/04/2014 12:00
EMSL Order: 041416054
Report Date: 06/26/14

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-ABS-00015
EMSL Sample Number: 041416054-0015
Minimum Level of analysis (chrysotile): CD
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 (um): >5 / 0.25-none
Area of collection filter (mm^2): 385
Result of Chi^2 Test: N/A N/A
Air volume: 0 Liters
Grid Opening Area: 0.0132 mm^2
Grid Openings Analyzed: 10
Analysis Date: 06/09/2014
Analyst: P. Harrison

Analytical Sensitivity: 7.575758 Structure/ mm^2 Limit of Detection: 22.651515 Structure/ mm^2

Table with columns: Structure Class, Min ID Level, Primary Str., Total Str., Density Str/mm^2, Concentration Str/ mm^2, Poisson 95 % Confidence Interval (LCL, UCL). Rows include PCMe Structures (Chrys, Amph, NRA), PCMe Fibers and Bundles (Chrys, Amph, NRA), and Non Asbestos Mineral Structures.

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 government as asbestos.

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Comment: Sample collected on 0.8um 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:	041416054-0015	GO area (mm ²):	0.0132	Mag:	10,000
Customer Sample:	BC-ABS-00015	Grid Box :	0414-Tetra Tech-02: S	Analyst(s):	P. Harrison
Chi ² Test for Uniformity:	N/A	Pore Size (micron):	0.8	Analysis Date:	06/18/2014
Project ID:	NDOT NOA / 10353259			Particulate Loading:	<1%

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Length	Width				
S7	A2	None Detected								
S7	C4	None Detected								
S7	D9	None Detected								
S7	F3	None Detected								
S7	H8	None Detected								
S8	A10	None Detected								
S8	C7	None Detected								
S8	E5	None Detected								
S8	F8	None Detected								
S8	H10	None Detected								



EMSL ANALYTICAL, INC.
LABORATORY PRODUCTS TRAINING

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

041416054

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

Company: TETRA TECH		EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different If Bill to is Different note instructions in Comments**	
Street: 7 West 10th AVE. Ste 612		Third Party Billing requires written authorization from third party	
City: Helenia	State/Province: MT	Zip/Postal Code: 59101	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: 10353259		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email <input type="checkbox"/> Mail	
U.S. State Samples Taken: NA		Connecticut Samples: <input type="checkbox"/> Commercial <input type="checkbox"/> 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 <input type="checkbox"/> Check if samples are from NY <input type="checkbox"/> NIOSH 7400 <input type="checkbox"/> w/ OSHA 8hr. TWA	TEM - Air <input type="checkbox"/> 4-4.5hr TAT (AHERA only) <input type="checkbox"/> AHERA 40 CFR, Part 763 <input type="checkbox"/> NIOSH 7402 <input type="checkbox"/> EPA Level II <input checked="" type="checkbox"/> ISO 10312	TEM - Dust <input type="checkbox"/> Microvac - ASTM D 5755 <input type="checkbox"/> Wipe - ASTM D6480 <input type="checkbox"/> Carpet Sonication (EPA 600/J-93/167)
PLM - Bulk (reporting limit) <input type="checkbox"/> PLM EPA 600/R-93/116 (<1%) <input type="checkbox"/> PLM EPA NOB (<1%) Point Count <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%) Point Count w/Gravimetric <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%) <input type="checkbox"/> NYS 198.1 (friable in NY) <input type="checkbox"/> NYS 198.6 NOB (non-friable-NY) <input type="checkbox"/> NIOSH 9002 (<1%)	TEM - Bulk <input type="checkbox"/> TEM EPA NOB <input type="checkbox"/> NYS NOB 198.4 (non-friable-NY) <input type="checkbox"/> Chatfield SOP <input type="checkbox"/> TEM Mass Analysis-EPA 600 sec. 2.5	Soil/Rock/Vermiculite <input type="checkbox"/> PLM CARB 435 - A (0.25% sensitivity) <input type="checkbox"/> PLM CARB 435 - B (0.1% sensitivity) <input type="checkbox"/> TEM CARB 435 - B (0.1% sensitivity) <input type="checkbox"/> TEM CARB 435 - C (0.01% sensitivity) <input type="checkbox"/> TEM Qual. via Filtration Technique <input type="checkbox"/> TEM Qual. via Drop-Mount Technique
TEM - Water: EPA 100.2 Fibers >10µm <input type="checkbox"/> Waste <input type="checkbox"/> Drinking All Fiber Sizes <input type="checkbox"/> Waste <input type="checkbox"/> Drinking		Other: <input type="checkbox"/>

Check For Positive Stop - Clearly Identify Homogenous Group

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

Samplers Name: **BECKIDANS**

Samplers Signature: *[Signature]*

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
BE-ABS-00001	Surface Soil Sampling ABS	960 L	5/30/14 1142
BE-ABS-00002	Field Blank	NA	5/30/14 1142
BE-ABS-00003	Lot Blank	NA	5/30/14 1142
BE-ABS-00004	Surface Soil Sampling ABS	960 L	5/31/14 1055
BE-ABS-00005	Surface Soil Sampling ABS	960 L	5/31/14 1055
BE-ABS-00006	Field Blank	NA	5/31/14 1055
BE-ABS-00007	Surface Soil Sampling ABS	960 L	6/2/14 1050
BE-ABS-00008	Field Blank	NA	6/2/14 1050

Client Sample # (s): - Total # of Samples: **15**

Relinquished (Client): *[Signature]* Date: **06/05/14** Time: **1200**

Received (Lab): *[Signature]* Date: **06/09/14** Time: **8:46am**

Comments/Special Instructions:

15



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody
EMSL Order Number (Lab Use Only):

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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
ABC-ABS-00009	Backhoe operator ABS	9L 6/3/14	6/3/14 1300
ABC-ABS-00010	Test pit Sampling ABS	9L 6/3/14	6/3/14 1400
ABC-ABS-00011	Field Blank	NA	6/3/14 1400
ABC-ABS-00012	Surface Soil Sampling	9L 6/4/14	6/4/14 1101
ABC-ABS-00013	Hollow Stem Drilling - Driller	9L 6/4/14	6/4/14 1237
ABC-ABS-00014	Hollow Stem SPT sampling	9L 6/4/14	6/4/14 1245
ABC-ABS-00015	Field Blank	NA	6/4/14 1245
<p>RECEIVED EMSL CINNAMINSON, N.J. 2014 JUN -9 A 9:22</p>			
*Comments/Special Instructions:			

Smollock, Meghan

From: Surbrugg, Edward <Edward.Surbrugg@tetrattech.com>
Sent: Monday, June 09, 2014 11:51 AM
To: Smollock, Meghan
Cc: Denton, Robyn
Subject: RE: Project 10353259 Samples Received

Meghan and Robyn: You are correct in that the analytical sensitivity for the ABS samples should be 0.001 f/cc so please make that change on the COC. Sorry about that. I will let Becki Dano know so we can get it right the next time. Thanks for your help.

J. Edward Surbrugg, Ph.D. | Soil Scientist/Helena Operations Manager
Direct: 406.441.3269 | Main: 406.442.5588 | Fax: 406.442.7182 | Mobile: 406.459.0881

7 West 6th Avenue, Suite 612 | Helena, Montana 59601

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From: Smollock, Meghan [<mailto:mamollock@EMSL.com>]
Sent: Monday, June 09, 2014 9:47 AM
To: Surbrugg, Edward
Cc: Denton, Robyn
Subject: Project 10353259 Samples Received

Hello Ed,

The attached Chain of Custody was received today. Can you please confirm the analytical sensitivity for this set of samples? They seem to be ABS samples which would have a 0.001 f/cc stopping rule according to the SAP/QAPP for this project, however 0.00004 is recorded on the chain of custody.

Thank you,



EMSL is going green. All invoices and reports will be delivered electronically, unless you tell us otherwise.



Meghan Smollock | Special Projects Data Coordinator

EMSL Analytical, Inc. | 200 Route 130 North | Cinnaminson, NJ 08077

Phone: 856-858-4800 Ext. 2208 | Fax: 856-786-5974 | Toll Free: 800-220-3675

Lab Hours: Mon-Friday 7AM-10PM, Saturday 8AM-5PM, Sunday On-Call

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