EMS Laboratories Inc.
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Email: akolk@emslabs.com

Attn: Derrick Wills
Tronox-LLC-Henderson
PO Box 55
Henderson, NV 89009

Phone: (947) 375-7004

Project: Tronox LLX Henderson, 560 W. Lake Mead Dr., Henderson, NV/2027.001

Date Sampled: 5/18/2010 9:10

Customer ID: TRNX26
Customer PO: 2027.001
Received: 5/20/2010 9:50AM
EMS LAB No: 137865
Date Prepared: 8/26/2010 8AM
Analysis Date: 8/27/2010 10AM

Report Date:

NIOSH 7402/ISO

DRAFT, MODIFIED ELUTRIATOR METHOD FOR THE DETERMINATION OF ASBESTOS IN SOILS AND BULK MATERIAL METHOD

EMS Laboratory Number:	137865		Mass of Respirable Dust on Filter:	156	µg
Customer Sample Number:	SSAL6-01-0.33BPC		Area of collection filter:	385	mm^2
Minimum Level of Analysis (chrysotile):	CD		Grid openings area:	0.0094	mm^2
Minimum Level of Analysis (amphibole):	ADX		Grid Openings Analyzed:	99	
Magnification used for fiber counting:	9,200	x	Min. Str. Length/Max Str. Diameter:	>5/<0.4	microns
Aspect ratio for fiber definition:	3:1				
			Analyst(s):	Radha Singh	

Dust Generator - Total Dried Sample Weight-75.1g	Soil % Moisture	5.6	%
	Air Flow Rate Through ME Opening of Dust Generator:	1370	
Not Used	Air Flow Rate Through IST Opening of Dust Generator:	100	
Used in Tumbler	Estimate Total Air Flow Through Elutriator:	1470	

Analytical Sensitivity: 2.65E+06 Structure /g PM 10 Limit of Detection: 7.94E+06 Structure /g PM 10

Test For Uniformity (Chi-Square results)

		Counts		Poisson 95% Confidence Interval			
Structure Class	**Min ID Level Required**	**Primary Str.**	**Total Str.**	**Density** St/mm^2	**Conc.** Str/g PM10	**Lower Limit** Str/g PM10	**Upper Limit** Str/g PM10
Asbestos Structures>5um, ≤10um	ADX/CD	2	2	2.14	5.30E+06	6.4E+05	1.91E+07
Asbestos Structures>5um, ≤10um (Chrys)	CD	2	2	2.14	5.30E+06	6.4E+05	1.91E+07
Asbestos Structures>5um, ≤10um (Amph)	ADX	0	0	0	0	0	7.94E+06
Asbestos Structure >10um (Long)	ADX/CD	3	3	3.22	7.96E+06	1.6E+06	2.32E+07
Asbestos Structure >10um (Chrys)	CD	3	3	3.22	7.96E+06	1.6E+06	2.32E+07
Asbestos Structure >10um (Amph)	ADX	0	0	0	0	0	7.94E+06
Total Protocol Asbestos Structures	ADX/CD	5	5	5.37	1.33E+07	4.3E+06	3.10E+07
Protocol Asbestos Structures (Chrys)	CD	5	5	5.37	1.33E+07	4.3E+06	3.10E+07
Protocol Asbestos Structures (Amph)	ADX	0	0	0	0	0	7.94E+06
Total Protocol Non Asbestos Structures	**NAM**	1	1	1.07	2.65E+06	6.7E+04	1.48E+07

Approved by Technical Director

EMS Laboratories

NIOSH 7402/ISO

117 W. Bellevue Drive
Pasadena, CA 91105
626-568-4065

Client:	Derrick Willis, Tronox LLC-Henderson	**Filter Type:**	PC 385 mm²
Report number :	137865	**Magnification:**	9200
Sample number:	SSAL6-01-0.33BPC	**Grid Opening Dimension: mm^2**	0.0094
Project:	2027.001/Tronox LLC Henderson, 560 W. Lake Mead Dr.,	**Grid Loading:**	Moderate

Elutriation Date: 8/26/2010 by Joel Paruli
Preparation Date: 8/27/2010 by Joel Paruli
Analysis Date: 8/27/2010 by Radha Singh

Asbestos Structures>5um, ≤10um (Chrys)	2
Asbestos Structures>5um, ≤10um (Amph)	0
Asbestos Structure >10um (Chrys)	3
Asbestos Structure >10um (Amph)	0
Protocol Asbestos Structures (Chrys)	5
Protocol Asbestos Structures (Amph)	0

Grid Openings	99
Mass - ug	156
Anlytical sensitivity	

Grid ID	Grid Opening	Structure Type	Structure Number		Dimensions - mm		Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total	Width	Length	Width	Length				
1A	C34	None Detected										
1A	E31	F			6.5	152	0.71	16.52		Actinolite		
		F	1	1	1.5	110	0.16	11.96	CD	Chrysolite		
1A	E34	None Detected										
1A	F23	None Detected										
1A	F26	None Detected										
1A	B36	None Detected										
1A	C33	MD11	2		22.5	110	2.45	11.96				
1A	E41	MF		2	1	110	0.11	11.96	CD	Chrysolite		
1A	E44	MD11			70	190	7.61	20.65				Non Asbestos
		MF			1	120	0.11	13.04				Non Asbestos
1A	F41	None Detected										
1A	F44	None Detected										
1A	G43	None Detected										
1A	G46	None Detected										
1A	H43	None Detected										
1A	G51	None Detected										
1A	G54	None Detected										
1A	H53	F	3	3	0.5	50	0.05	5.43	CD	Chrysolite		
1A	H56	None Detected										
1A	F61	None Detected										
1A	F64	None Detected										
1B	C31	None Detected										
1B	C34	None Detected										
1B	E23	None Detected										
1B	E26	None Detected										
1B	E36	None Detected										
1B	F33	None Detected										
1B	C41	None Detected										
1B	C44	None Detected										
1B	E41	None Detected										
1B	E44	MD11			65	115	7.07	12.50				Non Asbestos
		MF			1.5	49	0.16	5.33				Non Asbestos
1B	F41	None Detected										
1B	F44	None Detected										
1B	G43	MD11	4		48	75	5.22	8.15				
		MF		4	1	70	0.11	7.61	CD	Chrysolite		
1B	G46	None Detected										
1B	C51	None Detected										
1B	C54	None Detected										
1B	E51	None Detected										
1B	E54	None Detected										
1B	F53	None Detected										
1B	F54	None Detected										

EMS Laboratories

NIOSH 7402/ISO
117 W. Bellevue Drive
Pasadena, CA 91105
626-568-4065

Report Number:	
Sample number:	

Analyzed by:	
Date of Analysis:	

Grid ID	Grid Opening	Structure Type	Structure Number				Dimensions (µm)		Level of ID	Mineral Type	Image Number	Structure Comments
			Primary	Total			Width	Length				
1C	C23	None Detected										
1C	C26	None Detected										
1C	E31	None Detected										
1C	E34	None Detected										
1C	F31	None Detected										
1C	F34	None Detected										
1C	C33	F			1	82	0.11	8.91				Non Asbestos
1C	C36	None Detected										
1C	E33	None Detected										
1C	C41	None Detected										
1C	C44	None Detected										
1C	E41	None Detected										
1C	E44	None Detected										
1C	F41	None Detected										
1C	E51	None Detected										
1C	E54	None Detected										
1C	F51	None Detected										
1C	C61	None Detected										
1C	C64	None Detected										
1C	E61	None Detected										
1D	B34	None Detected										
1D	C31	None Detected										
1D	C34	None Detected										
1D	E31	None Detected										
1D	E34	None Detected										
1D	F33	None Detected										
1D	F36	None Detected										
1D	G33	None Detected										
1D	G36	None Detected										
1D	H41	None Detected										
1D	H44	None Detected										
1D	K41	None Detected										
1D	F51	None Detected										
1D	F54	None Detected										
1D	G51	None Detected										
1D	G54	None Detected										
1D	E61	None Detected										
1D	E64	None Detected										
1D	F61	None Detected										
1D	F64	None Detected										
1E	C31	None Detected										
1E	C34	None Detected										
1E	E31	None Detected										
1E	E34	None Detected										
1E	E23	None Detected										
1E	E26	F	5	5	1.5	190	0.16	20.65	CD	Chrysolite		
1E	F33	None Detected										
1E	F36	None Detected										
1E	G33	None Detected										
1E	F41	None Detected										
1E	F44	None Detected										
1E	G41	None Detected										
1E	G44	None Detected										
1E	F51	None Detected										
1E	F54	None Detected										
1E	G51	None Detected										
1E	F61	None Detected										
1E	F64	None Detected										
1E	G61	None Detected										

#137865
#137491

MOISTURE CONTENT

8-27-10

#137865 - SSAL6-01-0.33 BPC

dish wt:	31.47 g	
sample + dish	131.72	- 31.47 = 100.25 g (initial wt.)
9:15 - 10:15	126.45	- 31.47 = 94.98
11:00 - 12:00	126.44	- 31.47 = 94.97 (Final wt.)

$$\% \text{ moisture} = 100 \times \frac{100.25 - 94.97}{94.97} = 5.56\ \%$$

#137491 - RSAM7-1.00 BPC

dish wt. C -	31.45 g	
sample + dish -	131.86	- 31.45 = 100.41 g (initial wt.)
9:15 - 10:15 -	129.08	- 31.45 = 97.63
11:00 - 12:00 -	129.04	- 31.45 = 97.59 (Final wt.)

$$\% \text{ moisture} = 100 \times \frac{100.41 - 97.59}{97.59} = 2.9\ \%$$

9-1-10

BP

#139930
#SSAM7-08-000BPC

dish wt.	19.24 g
dish + samp.	119.18 (initial wt. 99.94)
6:30 - 7:30	118.28 (99.04 g)
10 - 11	118.24 (99.00 g final wt)

$$100 \times \frac{99.94 - 99.00}{99.00} = 0.95\ \%$$

#139931 - #SSAQ6-01-0.00BPC

dish wt.	31.44
dish + samp.	131.98 (initial wt. 100.54)
6:30 - 7:30	125.14 (93.7)
10 - 11	124.11 (92.67 - Final

$$100 \times \frac{100.54 - 92.67}{92.67} = 8.49\ \%$$

#139930
#SSAQ5-07-0.00 BPC

dish wt.	31.47
dish + samp.	131.22 (init. wt - 99.75)
	124.34 (92.87)
	124.31 (92.84)

$$100 \times \frac{99.75 - 92.84}{92.84} = 7.44\ \%$$

#139931 - #SSAL5-07-0.00BPC

	35.11
	135.72 (100.61)
	128.38 (93.27)
	128.35 (93.24)

$$100 \times \frac{100.61 - 93.24}{93.24} = 7.90\ \%$$

Elutriator Data

Date: 8/26/10 Client: Northgate

Lab #: 137865

Sample ID: SSAL6-01-0.33 BPC Sample weight (g): 75.1

Time air flow started: 945 Tumbler rpm: 30

IST Flowmeter (mL/min): 100 ME Flowmeter (mL/min): 1370

Filter No.	Start Time	Tested flow rate (mL/min)	Final Filter Wt (mg)	Initial Filter Wt (mg)	Dust Weight (mg)	Time Value (min)	Avg. rate of deposition (ug/min)	Optimal time (min)
1	1145	180	0.03704	0.02455	12.49	30		
2	1215		0.02955	0.02442	5.13	15		
3	1230		0.03391	0.02493	8.98	20		
4	1250		0.02820	0.02428	3.92	20		
5	1310		0.02889	0.02438	4.51	20		
6	1330		0.03070	0.02433	6.37	20		
7	1350							
8								

OK
Loss 20%
Loss 30%
Loss 40%
Loss 30%
Loss 10%

Time							Dep. Rate	Estiimate
1	1238/43	1244/49	4.529	4.408	0.121	4		
2	1300	1307 1/2	4.448	4.309	0.139	7 1/2		
3	1321	1329 3/4	4.518	4.362	0.156	8 3/4		
4	1335	1344 1/4	4.543	4.384	0.159	9 1/4		
5								
6								
7								
8								
9								

COPY 9030

Count (Page of) NIOSH 7402/ISO

Prep Time: 800-1030

Report number: 137865
Sample number: SSAL6-01-0.33 BPC
File name: Northgate
Sample Description: 156 : mg

Filter Type: PC 385 mm2
Date Sample was Run: 8/26/10

Magnification: 9,200 X

Preparation date: 8/27/10 By JAP
Analysis date: 8/27/10 By RS
(A): ADX, ADQ

Grid opening dimension: 0.0094 mm²
Level of Analysis: (C): CD, CDX

Grid loading Moderate
Condition of Grid good

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
1A	C3-4							
	F3-1				F	6.5	152	EDS achnolit
					I—	1.5	110	EDS Chrysot
	F3-4							
	F2-3							
	F2-6							
	B3-6							
	C3-3				MDII	22.5	110	Chrysot
	E4-1				MF	1	110	
	E4-4				MDII	70	190	Nonasb
					MF	1	120	
	F4-1							
	F4-4							
	G4-3							
	G4-6							
	H4-3							
	G5-1							
	G5-4							
	H5-3				I=	0.5	50	Chrysot.
	H5-6							
	F6-1							
	F6-4							
1B	C3-1							
	C3-4							
	F2-3							
	F2-6							
	F3-6							
	F3-3							
	G4-1							
	G4-4							
	F4-1							

TEM-10A (2002)

TEM Asbestos Structure Count (Page of)

Report number: 137865 SAMPLE NO: SSAL6-01-0.33 BPC X 9,200

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
B	B1-4				MD11	65	115	Nanab
					MI	15	46	
	F4-1							
	F4-4							
	G4-3				MD11	48	75	chrysot.
					MF	1	70	
	G4-6							
	C5-1							
	C5-4							
	E5-1							
	E5-4							
	E3-3							
↓	E3-6							
C	C2-3							
	C2-6							
	E3-1							
	E3-4							
	F3-1							
	F3-4							
	C3-3				IF	1	82	Nanab
	C3-6							
	E3-3							
	C4-1							
	C4-4							
	E4-1							
	E4-4							
	F4-1							
	E5-1							
	E5-4							
	F5-1							
	C6-1							
↓	C6-4							
	E6-1							

TEM Asbestos Structure Count (Page of)

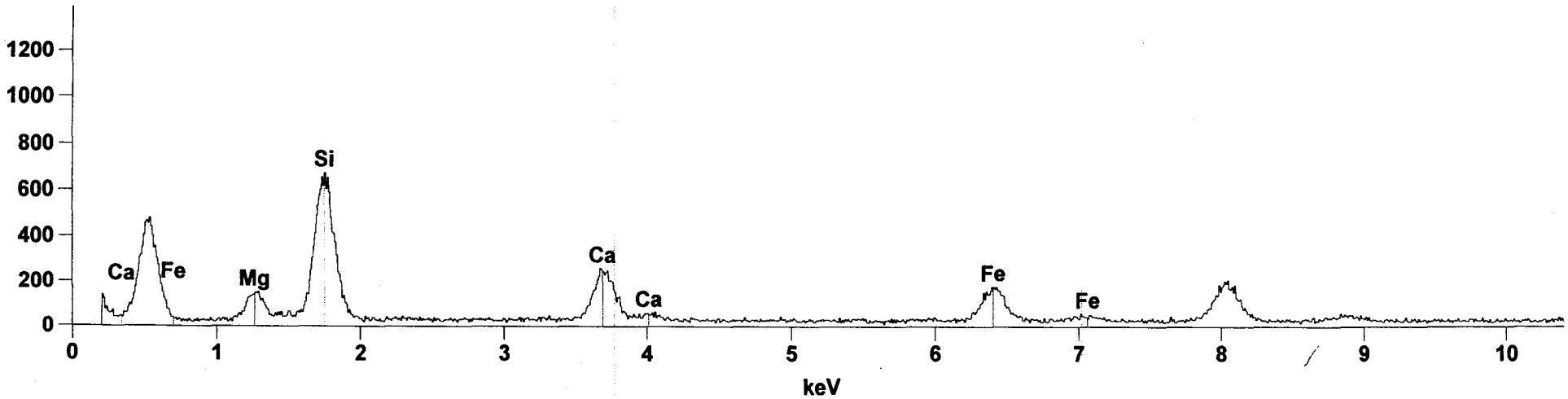
Report number: 137865 SAMPLE NO: SSALG-01-0.33BPCX 9,200

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
1D	B3-4							
	C3-1							
	C3-4							
	E3-1							
	E3-4							
	F3-3							
	F3-6							
	G3-3							
	G3-6							
	H4-1							
	H4-4							
	K4-1							
	E5-1							
	F5-4							
	H5-1							
	G5-4							
	E6-1							
	E6-4							
	F6-1							
2	F6-4							
1D	C3-1							
	C3-4							
	E3-1							
	E3-4							
	F3-3							
	F3-6				F	1.5	190	Chrysotile
	G3-3							
	G3-6							
	H4-1							
	K4-4							
	H4-4							
	G4-4							
	F5-1							
	K5-4							
	G5-1							
	F6-1							
	F6-4							
19	G6-1							

Project: New Project

Full scale counts: 1284

137865-SSAL6-01-0.33-A-E3-1



Fri Aug 27 11:36:41 2010
Gaussian Fit With Standards Chi Squared:11.032
Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time:70.6 sec.
Acc.Voltage: 100.0 kV
Take Off Angle: 35.0 deg.
Detector: Det B- Quantum

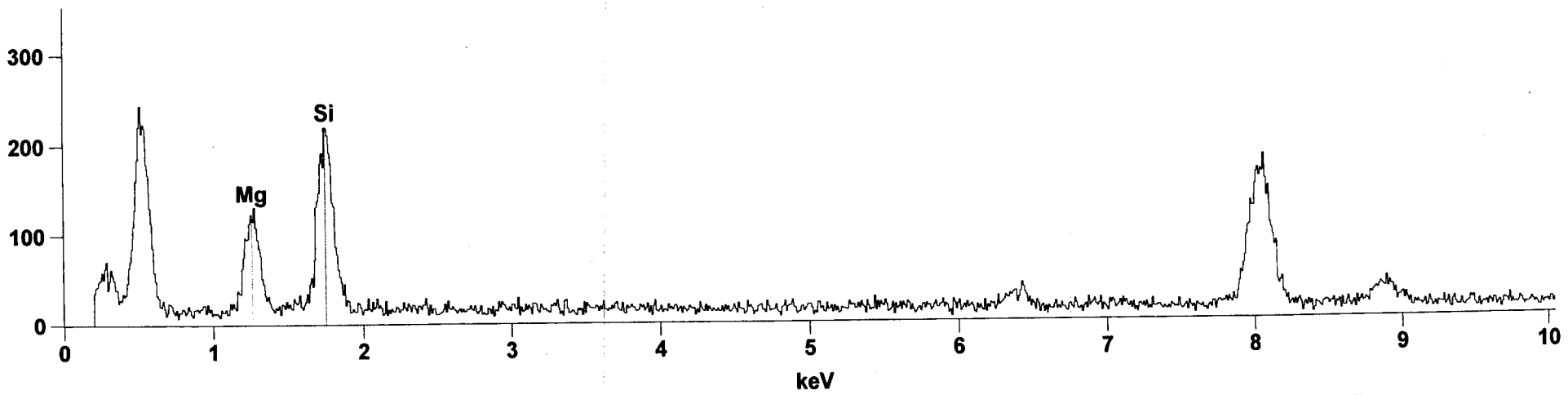
Quantitative Results 137865-SSAL6-01-0.33-A-E3-1

Element Line	Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
Mg K	2032	18.86	---	24.59	+/- 0.57
Si K	8459	43.62	---	49.20	+/- 0.56
Ca K	3289	22.05	---	17.43	+/- 0.37
Fe K	2309	15.48	---	8.78	+/- 0.23
Total		100.00		100.00	

Project: New Project

Full scale counts: 329

137865-SSAL6-01-033A-E3-1



Fri Aug 27 11:46:08 2010
Gaussian Fit With Standards Chi Squared:3.352
Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time:95.7 sec.
Acc.Voltage: 100.0 kV
Take Off Angle: 35.0 deg.
Detector: Det B- Quantum

Quantitative Results 137865-SSAL6-01-033A-E3-1

Element Line	Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
Mg K	1453	50.58	---	54.19	+/- 1.49
Si K	2555	49.42	---	45.81	+/- 0.97
Total		100.00		100.00	

Filter Lot Blank

Count (Page of) NIOSH 7402/ISO

Prep Time: NA

Report number: 137022 Filter Blank 1
Sample number: 0005200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/10 By JAP
Analysis date: 6/9/10 By AC
(A): ADX, ADQ

Grid opening dimension: 0.0094 mm²
Level of Analysis: (C): CD, CDX

Grid loading Very Light Condition of Grid Broke

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
A	C26							
	E23							
	E24							
	E22							
	F26							
	C32							
	C31							
	C04							
	E31							
	E34							
	F31							
	F34							
	G31							
	G34							
	H31							
	B44							
	C41							
	C44							
	E41							
	E44							
	F41							
	F44							
	G41							
	G44							
	H41							
	H44							
	K41							
	K44							
	C51							
30	C54							
	E51							
	E54							

TEM-10A (2002)

Count (Page 1 of) NIOSH 7402/ISO

Report number : 137822 Filter Blank1
Sample number: 00105200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2 Prep Time: NA
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP
Analysis date: By

Grid opening dimension:0.0094 mm^2
Level of Analysis: (C): CD, CDX

(A): ADX, ADQ

Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	F51							
	F54							
	G51							
	G54							
	H51							
	H54							
	K51							
	G61							
B	C26							
	E23							
	E26							
	F22							
	F26							
	G22							
	G26							
	B36							
	C32							
	C36							
	E22							
	E36							
	F33							
	F36							
	H33							
	H36							
	K33							
	K36							
	B46							
	C43							
	C46							
	C43							
	E46							
	F43							

Count (Page 7 of) NIOSH 7402/ISO

Report number :	137822 Filter Blank1	Filter Type: MCE 385 mm2	Prep Time: NA
Sample number:	00105200	Date Sample was Run: NA	
File name:	Northgate		
Sample Description:	NA mg	Magnification: 9,200 X	
Preparation date:	6/8/2010 By JAP	Grid opening dimension:0.0094 mm^2	
Analysis date:	By	Level of Analysis: (C): CD, CDX	
	(A): ADX, ADQ		
Grid loading	Condition of Grid		

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	H6							
	G43							
	G46							
	H43							
	H46							
	K43							
	K46							
	C53							
	C56							
	E53							
	E56							
	F53							
	F56							
	G53							
	G56							
	H53							
C	B34							
	C31							
	C34							
	E31							
	E34							
	F31							
	F34							
	G31							
	G34							
	H31							
	H34							
	B41							
	B44							
	C41							
	C44							
	E41							

Count (Page 4 of) NIOSH 7402/ISO

Report number : 137822 Filter Blank1 Filter Type: MCE 385 mm2 Prep Time: NA
Sample number: 00105200 Date Sample was Run: NA
File name: Northgate
Sample Description: NA mg Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP Grid opening dimension:0.0094 mm^2
Analysis date: By Level of Analysis: (C): CD, CDX
(A): ADX, ADQ
Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	E44							
	F41							
	F44							
	G41							
	G44							
	H41							
	H44							
	K41							
	B51							
	B54							
	C51							
	C54							
	E51							
	E54							
	F51							
	F54							
	G51							
	G54							
	H51							
	H54							
	C61							
	C64							
	E64							
	E61							
B	C23							
	C26							
	E23							
	F26							
	F23							
	G23							
	G26							
	H23							

TEM -10A (2002)

0 grid tears were replaced in grid bag

Count (Page 5 of) NIOSH 7402/ISO

Report number :	137822	Filter Blank1	Filter Type: MCE 385 mm2	Prep Time: NA
Sample number:	00105200		Date Sample was Run: NA	
File name:	Northgate			
Sample Description:	NA	mg	Magnification: 9,200 X	
Preparation date:	6/8/2010	By JAP	Grid opening dimension:0.0094 mm^2	
Analysis date:		By	Level of Analysis: (C): CD, CDX	
		(A): ADX, ADQ		
Grid loading		Condition of Grid		

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	B3b							
	C33							
	C3b							
	E33							
	E3b							
	F33							
	F3b							
	G33							
	G3b							
	H33							
	H3b							
	B4b							
	C43							
	C4b							
	E43							
	E4b							
	F43							
	F4b							
	G43							
	G4b							
	H43							
	H4b							
	K43							
	K4b							
	B5b							
	C53							
	C5b							
	E53							
	E5b							
	F53							
	F5b							
	G53							

Count (Page 6 of 7) **NIOSH 7402/ISO**

Report number : 137822 Filter Blank1

Sample number: 00105200

File name: Northgate

Sample Description: NA mg

Filter Type: MCE 385 mm2

Date Sample was Run: NA

Magnification: 9,200 X

Prep Time: NA

Preparation date: 6/8/2010 By JAP

Analysis date: By

Grid opening dimension:0.0094 mm^2

Level of Analysis: (C): CD, CDX

(A): ADX, ADQ

Grid loading Very Light Condition of Grid Good

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
E	B3 1							
	B3 4							0 org fiber bundle <5u
	C3 1							
	C3 4							
	E3 1							
	E3 4							
	F3 1							
	F3 4							
	G3 1							
	G3 4							
	H3 1							
	H3 4							
	B4 1							
	B4 4							
	C4 1							
	C4 4							
	E4 1							
	E4 4							
	F4 1							
	F4 4							
	G4 1							
	G4 4							
	H4 1							
	H4 4							
	K4 1							
	K4 4							
	B5 4							
	C5 1							
	C5 4							
	E5 1							
	E5 4							
	F5 1							

TEM -10A (2002)

Count (Page 7 of 7) NIOSH 7402/ISO

Report number : 137822 Filter Blank1 Filter Type: MCE 385 mm2 Prep Time: NA
Sample number: 00105200 Date Sample was Run: NA
File name: Northgate
Sample Description: NA mg Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP Grid opening dimension:0.0094 mm^2
Analysis date: By Level of Analysis: (C): CD, CDX
(A): ADX, ADQ
Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	E54							
	G51							
	C54							
	H51							
	H54							
	K51							
	EC1							
	E64							

TEM -10A (2002)

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. 5-12-10

EMS Lab No. _____
Page _____ of _____

RECEIVING

TYPE OF SAMPLE
Air ☐ Water ☐
Soil ☐ Bulk ☐
Other Sand

METHOD OF ANALYSIS
EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS
Chrysotile _____
Amphibole _____

ASPECT RATIO
3:1 ☐ 5:1 ☐

EPA/600/R-94/134 100.1 ☐ 100.2 ☐

LENGTHS
All Sizes (EPA) ☐
(μm) ≥0.5 ☐
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width ≥5.0 μm length)

FILTER TYPE / AREA (mm±)
MCE ☐ 385 ☐
PC ☐ 314 ☐
MCN ☐ 1017 ☐
Other _____

PORE SIZE
0.45 μm ☐ 0.8 μm ☐
0.1 μm ☐ 0.22 μm ☐
Other _____

G.O. Area (mm²) 0.0 094
No. of G.O. to Analyze 200
67/grid

PREP

DIRECT PREP ☐
INDIRECT PREP ☐

Volume _____ liters
Working Volume _____ ml
Weight 50 grams
Ashed Area _____ %

Prepared By JAP
Date 5/12/10

ANALYSIS

MICROSCOPE
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☑
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☑

Grid Address: A
Screen Magnification: 9200 X
Camera Constant: 2.83
Accelerating Voltage: 100KV
Beam Current: 10 μA
K-Factor: 1.4
Analyst Kadh Date 5/13/10

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
C23		NM																							
C26																									
E23																									
E26																									
G23																									
G26																									
H23																									
C31																									
C34		1=	4.5	7.5	✓																	Si			
E31		↓																							
E34		~>M																							
F31																									
F34		↓																							

TEM - 1A (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Condition of the Grid: ☐ Good ☐ Scrappy ☐ Undissolved Filter ☐ Folded ☐

EMS LABORATORIES 117 West Bellevue Drive • Pasadena, California 91105-2548 • (626) 568-4065

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. 5-12-10

EMS Lab No. _____
Page 2 of _____

RECEIVING

ANALYSIS

Grid Address: A
Screen Magnification: _____ X
Camera Constant: _____
Accelerating Voltage: 100KV
Beam Current: _____ µA
K-Factor: _____

Analyst _____ Date _____

MICROSCOPE
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☒
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☒

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
G3-1		NAD																							
G3-4		↓																							
H3-1																									
H3-4																									
C3-3																									
C3-6																									
E3-3																									
E3-6																									
F3-3																									
F3-6																									
G3-3																									
G3-6																									
H3-3																									
H3-6																									
K3-3		↓																							

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Condition of the Grid: ☐ Good ☐ Scrappy ☐ Undissolved Filter ☐ Folded ☐

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. 5-1270

EMS Lab No. _____
Page 3 of _____

RECEIVING

ANALYSIS

Grid Address: A
Screen Magnification: _____ X
Camera Constant: _____
Accelerating Voltage: 100KV
Beam Current: _____ µA
K-Factor: _____
Analyst RdK Date 5-13-10

MICROSCOPE
- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
E4-1		N>4																							
E4-4																									
E4-1																									
E4-4																									
F4-1																									
F4-4																									
G4-1																									
G4-4																									
H4-1																									
H4-4																									
K4-1																									
K4-4																									
E43																									
E 42																									
E43		↓																							

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Condition of the Grid: ☐ Good ☐ Scrappy ☐ Undissolved Filter ☐ Folded ☐

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. 5-12-10

EMS Lab No. _____
Page 4 of _____

RECEIVING

ANALYSIS

Grid Address: A
Screen Magnification: _____ X
Camera Constant: _____
Accelerating Voltage: 100KV
Beam Current: _____ µA
K-Factor: _____
Analyst Radle Date 5-13-10

MICROSCOPE
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☐
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
G43		NM																							
G46																									
H43																									
H46																									
K43																									
K46																									
ES4																									
ES4																									
F54																									
F54																									
G54																									
G54																									
H54		F	6.5	80	✓																	Si			
H54		NM																							
K54																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Condition of the Grid: ☐ Good ☐ Scrappy ☐ Undissolved Filter ☐ Folded ☐

TEM ASBESTOS ANALYSIS

Client: Sand blank
Sample No.: 5-12-10

EMS Lab No. _____
Page 5 of _____

RECEIVING

ANALYSIS

Grid Address: A
Screen Magnification: _____ X
Camera Constant: _____
Accelerating Voltage: 100KV
Beam Current: _____ µA
K-Factor: _____
Analyst: Rude Date: 5-13-10

MICROSCOPE

- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM

- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
C5-3		N10																							
C5-6																									
E5-3																									
E5-6																									
F5-3																									
F5-6																									
H5-3																									
H5-6																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Condition of the Grid: ☐ Good ☐ Scrappy ☐ Undissolved Filter ☐ Folded ☐

TEM ASBESTOS ANALYSIS

Client Sand blank EMS Lab No. _____
Sample No. S-12-10 Page 1 of _____

RECEIVING

ANALYSIS

Grid Address: B
Screen Magnification: 9,200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Radh Date 5/18/10

MICROSCOPE
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☐
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
C23		N/A																							
C26																									
E23																									
E26																									
I23																									
I26																									
M23																									
M26																									
P23																									
C34																									
C3-4																									
E34																									
E3-4																									
F34																									
F34		↓																							

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. S-12-10

EMS Lab No. _____
Page 1 of _____

RECEIVING

ANALYSIS

Grid Address: B
Screen Magnification: 9,200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 14
Analyst Radh Date 5/18/10

MICROSCOPE

H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☐
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM

Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
G3-1		NM																							
G3-4																									
B3-1																									
B3-4																									
G3-3		F	2.5	13.0	V.																				S.
G3-6		NM																							
E33																									
E3-6																									
F33																									
F3-6																									
G33																									
G3-6																									
B33																									
B3-6																									
V3-1																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. S-12-10

EMS Lab No. _____
Page 7 of _____

RECEIVING

ANALYSIS

MICROSCOPE
- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Address: B
Screen Magnification: 9,200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Radh Date 5/18/10

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
CH1		NSD																							
CH4																									
EH1																									
EH4																									
RH1																									
RH4																									
CM1																									
CM4																									
HM1																									
HM4																									
KM1																									
KM4																									
CH3																									
EH3																									
RH6		4																							

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐

Debris: ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐
Gypsum: ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand blank EMS Lab No. _____
Sample No. S-12-10 Page 4 of _____

RECEIVING

ANALYSIS

Grid Address: B
Screen Magnification: 9,200 X
Camera Constant: 28.2
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Radh Date 5/18/10

MICROSCOPE -
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☐
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
E4 3		W>n																							
E4 6																									
G4 3																									
G4 6																									
I 4 3																									
I 4 6																									
K4 3																									
K4 6		F	25	130	✓																				S1
C5-1		F>n																							
E5-4																									
E5-1																									
E5 4																									
F5-1																									
F5-4																									
G5-1		U																							

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand blank
Sample No. S-12-10

EMS Lab No. _____
Page 5 of _____

RECEIVING

ANALYSIS

Grid Address: B
Screen Magnification: 9,200 X
Camera Constant: 28.2
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 14
Analyst Radh Date 5/18/10

MICROSCOPE
- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
C5-4		NAD																							
B5-4																									
H5-4																									
K5-1																									
E6-1																									
E6-4																									
K6-1																									
K6-4																									
C6-1																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand Bank
Sample No. 5-12-10

EMS Lab No. _____
Page 1 of _____

RECEIVING

ANALYSIS

Grid Address: C
Screen Magnification: 9200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Rad Date 5/13/10

MICROSCOPE
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☐
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
E23																									
E26																									
F23																									
F26																									
G23		P	1.5	52	✓																				S1
G26																									
H23																									
H26																									
C34																									
C34																									
TB34																									
TB34																									
F34		F	3.5	55	V																				S1
F54																									
G37																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☒ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Condition of the Grid: ☐ Good ☐ Scrappy ☐ Undissolved Filter ☐ Folded ☐

TEM ASBESTOS ANALYSIS

Client Sand Bank
Sample No. 5-1240

EMS Lab No. _____
Page 2 of _____

RECEIVING

ANALYSIS

Grid Address: C
Screen Magnification: 9200 X
Camera Constant: 283
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Rodu Date 5/13/10

MICROSCOPE
- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
G3-4		NSD																							
H3-1																									
H3-4																									
K3-1																									
K3-4																									
C3-3																									
C3-6																									
E3-3																									
E3-6																									
F3-3																									
F3-6																									
H3-3																									
H3-6																									
K3-3																									
K3-6																									

TEM - 1B (1-06)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand Bank
Sample No. 5-12-10

EMS Lab No. _____
Page 3 of _____

RECEIVING

ANALYSIS

Grid Address: C
Screen Magnification: 4200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Rodu Date 5/13/10

MICROSCOPE
H600A - Serial No. 542-36-01 ☐
H600B - Serial No. 542-05-06 ☐
H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
Kevex - Model No. 3200-0106-0365 ☐
Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
K3-3		NAD																							
K3-6																									
C4-1																									
C4-4																									
E4-1																									
E4-4																									
F4-1																									
F4-4																									
G4-1																									
G4-4																									
H4-1																									
H4-4																									
K4-1																									
K4-4																									
E3-3																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand Bank
Sample No. 5-12-10

EMS Lab No. _____
Page 1 of _____

RECEIVING

ANALYSIS

Grid Address: C
Screen Magnification: 9200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4
Analyst Rad Date 5/13/10

MICROSCOPE
- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

ENERGY DISPERSIVE X-RAY SYSTEM
- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
B4-6		non																							
F4-3																									
F4-6																									
G4-3																									
G4-6																									
H4-3		F	2	6.5	V																				Si
H4-6		non																							
I4-3																									
I4-6																									
J4-3																									
J4-6																									
K4-3																									
K4-6																									
L4-3																									
L4-6																									
G5-1																									

TEM - 1B (1-08)

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Sand Bank
Sample No. 5-12-10

EMS Lab No. _____
Page 5 of _____

RECEIVING

ANALYSIS

MICROSCOPE
- H600A - Serial No. 542-36-01 ☐
- H600B - Serial No. 542-05-06 ☐
- H600C - Serial No. 542-24-03 ☐

Grid Address: C
Screen Magnification: 9200 X
Camera Constant: 28.3
Accelerating Voltage: 100KV
Beam Current: 10 µA
K-Factor: 1.4

ENERGY DISPERSIVE X-RAY SYSTEM
- Kevex - Model No. 3200-0106-0365 ☐
- Kevex - Model No. 3600-0206-0146 Quantum System ☐

Analyst Rodu Date 5/13/10

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
W5-4		NAD																							
H5-7																									
H5-4																									
K5-7																									
C5-3																									
E5-6																									
E5-3																									
R5-6																									
W5-3																									
W5-6																									

TEM - 1B (1-08)

OBSERVATIONS: Clean ☐ Debris: ☐ Gypsum: ☐ Very Light ☐ Very Light ☐ Light ☐ Light ☐ Moderate ☐ Moderate ☐ Heavy ☐ Heavy ☐ Very Heavy ☐ Very Heavy ☐

: **Count (Page 1 of) NIOSH 7402/ISO**

Report number : 137822 Filter Blank2 Filter Type: MCE 385 mm2 Prep Time: NA
Sample number: LOT 00105200 Date Sample was Run: NA
File name: Northgate
Sample Description: NA mg Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP Grid opening dimension:0.0094 mm^2
Analysis date: 7/9/10 By Level of Analysis: (C): CD, CDX
(A): ADX, ADQ
Grid loading Very Light Condition of Grid Good

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
A	C2 3							
	C2 6							
	E2 3							
	E2 6							
	F2 3							
	F2 6							
	G2 3							
	G2 6							
	H2 3							
	H2 6							
	B3 6							
	C3 3							
	C3 6							
	E3 3							
	E3 6							
	F3 3							
	F3 6							
	G3 3							
	G3 6							
	H3 3							
	H3 6							
	K3 3							
	K3 6							
	E4 3							
	E4 6							
	F4 3							
	F4 6							
	G4 3							
	G4 6							
	H4 3							
	H4 6							
	K4 3							

TEM -10A (2002)

: Count (Page 1 of) NIOSH 7402/ISO

Report number : 137822 Filter Blank2
Sample number: 00105200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2 Prep Time: NA
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP
Analysis date: By

Grid opening dimension:0.0094 mm^2
Level of Analysis: (C): CD, CDX

(A): ADX, ADQ

Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	F46							
	B36							
	C53							
	C56							
	E53							
	E56							
	F53							
	F56							
B	C23							
	C26							
	E23							
	E26							
	F23							
	F26							
	C31							Organic
	E34							
	E31							
	F34							
	F31							
	F34							
	B36							
	C33							
	C36							
	E33							
	E36							
	F33							
	F36							
	B44							
	C41							
	C44							
	C41							
	E44							

TEM-10A (2002)

Count (Page 2 of) NIOSH 7402/ISO

Report number : 137822 Filter Blank2
Sample number: 00105200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2 Prep Time: NA
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP
Analysis date: By

Grid opening dimension:0.0094 mm^2
Level of Analysis: (C): CD, CDX
(A): ADX, ADQ

Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	F41							
	F44							
	G41							
	G44							
	H41							
	H44							
	B46							
	C43							
	C46							
	E43							
	E46							
	F43							
	F46							
	G43							
	G46							
	F51							
C	E21							
	E24							
	F21							
	B26							
	C23							
	C26							
	E23							
	E26							
	F23							
	F26							
	G23							
	G26							
	H23							
	B33							
	B36							
	C33							

TEM -10A (2002)

Count (Page 4 of) NIOSH 7402/ISO

Report number : 137822 Filter Blank2
Sample number: 00105200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2 Prep Time: NA
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP
Analysis date: By

Grid opening dimension:0.0094 mm^2
Level of Analysis: (C): CD, CDX

(A): ADX, ADQ

Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	C36							
	E33							
	E36							
	F33							
	F66							
	G33							
	G36							
	H33							
	H36							
	K33							
	B43							Org
	B46							
	C43							
	C46							
	E43							
	E46							
	F43							
	F46							
	G43							
	G46							
	H43							
	H46							
	K43							
	C52							
	C56							
P	E21							
	E24							
	F21							
	B34							
	C31							
	C34							
	E31							

TEM-10A (2002)

Count (Page of) NIOSH 7402/ISO

Report number : 137822 Filter Blank2
Sample number: 00105200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2 Prep Time: NA
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP
Analysis date: By

Grid opening dimension:0.0094 mm^2
Level of Analysis: (C): CD, CDX

(A): ADX, ADQ

Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	E34							
	E31							
	E24							
	G31							
	G24							
	H31							
	H34							
	B44							
	E41							
	E44							
	F41							
	F44							
	G41							
	G44							
	H41							
	H44							
	K41							
	K44							
	B54							
	C51							
	C54							
	E51							
	E54							
	F51							
	F54							
	B56							
	C53							
	C56							
	E53							
	E56							
	F53							
	F56							

TEM -10A (2002)

Count (Page 1 of) NIOSH 7402/ISO

Report number: 137822 Filter Blank1 Filter Type: MCE 385 mm2 Prep Time: NA
Sample number: 00105200 Date Sample was Run: NA
File name: Northgate
Sample Description: NA mg Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP Grid opening dimension:0.0094 mm^2
Analysis date: By Level of Analysis: (C): CD, CDX
(A): ADX, ADQ
Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
6	G23							
	C26							
	E23							
	E26							
	F23							
	F26							
	G23							
	G26							
	H23							
	H26							
	B33							
	C33							
	C36							
	E33							
	E36							
	F33							
	F36							
	G33							
	B41							
K	C46							
	E43							
	E46							
	F43							
	F46							
	G43							
	C46							
	H43							
	H46							
	K43							
	F56							
	F53							
	F56							

TEM-10A (2002)

Count (Page of) NIOSH 7402/ISO

Report number :	137822	Filter Blank2	Filter Type: MCE 385 mm2	Prep Time: NA
Sample number:	00105200		Date Sample was Run: NA	
File name:	Northgate			
Sample Description:	NA	mg	Magnification: 9,200 X	
Preparation date:	6/8/2010	By JAP	Grid opening dimension:0.0094 mm^2	
Analysis date:		By	Level of Analysis: (C): CD, CDX	
		(A): ADX, ADQ		
Grid loading		Condition of Grid		

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	C53							
	G56							
	H53							
	H56							
	K57							
	C64							
	E61							
	E64							
	F61							
	F64							

TEM-10A (2002)

Copy 1

Count (Page of) NIOSH 7402/ISO

INST

Report number : 137822 Filter Blank2 Filter Type: MCE 385 mm2 Prep Time: NA
Sample number: 00105200 Date Sample was Run: NA
File name: Northgate
Sample Description: NA mg Magnification: 9,200 X

Preparation date: 7/8/2010 By JAP Grid opening dimension:0.0094 mm^2
Analysis date: 7/10 By BK, RS. Level of Analysis: (C): CD, CDX
(A): ADX, ADQ

Grid loading Light Condition of Grid Good

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
A	E21							
	E24							
	F21							
	F24							
	G21							
	G24							
	B26							
	C23							
	C26							
	E23							
	E26							
	F23							
	F26							
	G23							
	G26							
	F34							
	G31							
	G34							
	H31							
	H34							
	K34							
	F36							
	G33							
	G36							
	H33							
	H36							
	K33							
	K36							
	B46							
	C42							
	C46							
	E45							

TEM –10A (2002)

Count (Page of) NIOSH 7402/ISO

Report number : 137822 ~~Filter Blank~~ front2
Sample number: 00105200
File name: Northgate
Sample Description: NA mg

Filter Type: MCE 385 mm2 Prep Time: NA
Date Sample was Run: NA

Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP
Analysis date: 9-10 By BK

Grid opening dimension:0.0094 mm^2
Level of Analysis: (C): CD, CDX
(A): ADX, ADQ

Grid loading
Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	E41							
	B5C							
	C53							
	C56							
	E37							
	E56							
	CC61							
	FC4							
10	E26							
	F22							
	F26							
	G23							
	G21							
	C34							
	E31							
	E34							
	F31							
	F34							
	G31							
	G34							
	F33							
	F36							
	G33							
	G36							
	H33							
	F44							
	G41							
	G44							
	H41							
	H44							
	K41							
	K44							

TEM-10A (2002)

Reviewed Feller

Count (Page 3 of) NIOSH 7402/ISO

Report number : 137822 ~~Filter~~ Blank1 Filter Type: MCE 385 mm2 Prep Time: NA
Sample number: 00105200 Date Sample was Run: NA
File name: Northgate
Sample Description: NA mg Magnification: 9,200 X

Preparation date: 6/8/2010 By JAP Grid opening dimension:0.0094 mm^2
Analysis date: By Level of Analysis: (C): CD, CDX
(A): ADX, ADQ
Grid loading Condition of Grid

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
	G4L							
	H4G							
	H4L							
	K43							
	K4G							
	E5L							
	E51							
	G51							
	G5L							
	H51							
	H5L							
	K51							
	K5L							
	E51							
	G53							
	G5L							
C	C2G							
	E23							
	E26							
	E23							
	E2-6							
	G2-3							
	G26							
	H23							
	C3-4							
	C3-4							
	E3-4							
	E3-4							
	E3-4							
	E3-4							

TEM -10A (2002)

137822

00105200
Normajah

4

TEM Asbestos Structure Count (Page of)

5

Report number: SAMPLE NO: X 9,200

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
C	G3-4							
	G3-4							
	ID-1							
	H2-4							
	C3-3							
	C3-6							
	E3-3							
	E3-6							
	F3-3							
	F3-6							
	G3-3							
	G3-6							
	H2-3							
	ID-6							
	C4-1							
	C4-4							
	E4-1							
	E4-4							
	IC4-1							
34	E4-4							
	G4-1							
	G4-4							
	E4-3							
	E4-6							
	IC4-3							
	IC4-6							
	G4-3							
	G4-6							
ID	C2-6							
	E2-3							
	E2-6							
	F2-3							
	F2-6							
	G2-3							
	G2-6							

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137822

00105200

Normgate

TEM Asbestos Structure Count (Page of)

Report number: SAMPLE NO: X 9,200

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
D6b	C3-1							
	C3-4							
	E3-1							
	E3-4							
	F3-1							
	F3-4							
	h3-1							
	h3-4							
	IB-1							
	IB-4							
	C3-3							
	C3-6							
	E3-3							
	E3-6							
	F3-3							
	F3-6							
	h3-3							
	h3-6							
	IB-3							
	IB-6							
	C4-1							
	C4-4							
	E4-1							
	E4-4							
	F4-1							
	F4-4							
	h4-1							
	h4-4							
	H4-1							
	H4-4							
	C4-3							
	C4-6							
	h4-3							
	h4-6							
	H4-3							
	H4-6							
IE	C2-6							

137822

00105200

Norwegate

TEM Asbestos Structure Count (Page of)

Report number: SAMPLE NO: X 9,200

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
E Intd	E23							
	E26							
	F23							
	F26							
	G23							
	G26							
	H23							
	E3-1							
	E3-4							
	F3-1							
	F3-4							
	G3-1							
	G3-4							
	H3-1							
	H3-4							
	C3-3							
	C3-6							
	E3-3							
	E3-6							
	G3-3							
	C4-1							
	C4-4							
	E4-1							
	E4-4							
	F4-1							
	F4-4							
	G4-1							
	G4-4							
	C5-1							
	C5-4							
	E5-1							
	E5-4							
	F5-1							
	F5-4							
	G5-1							
	G5-4							
	H5-4							
	H4-4							

K5-1

137822

00105200
Northgate

TEM Asbestos Structure Count (Page of)

Report number: SAMPLE NO: X 9,200

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
E	E5-3							
	E5-6							
	F5-3							
	F5-6							
	453							

Spot Size Measurements

Scope: H60B

Date: May 2010

Name: RS

Conditions of Measurements

High Voltage: 100K

Beam Current: 10 μA

Magnification: 19,260

Condenser Aperture Size: #2

Measurements from a photo 8.5

Shortest diameter: 8.5 mm

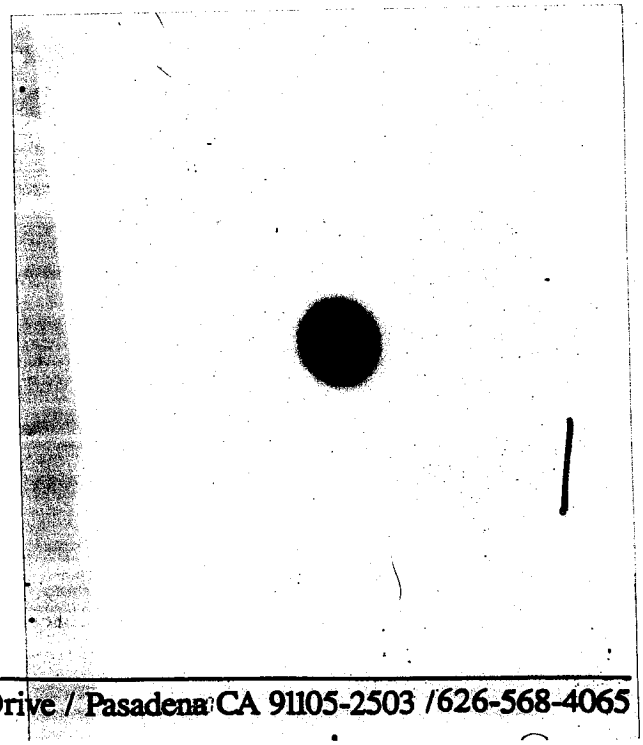
Longest diameter: 9 mm

Average: 8.75 mm

Spot Size Calculation

$$\text{Spot size in } \mu m = \frac{(\text{average spot size in mm}) \times 1000\ \mu m \times 0.4125}{\text{Magnification}}$$ 188

Note: 1.65/4 = 0.4125 (see the Hitachi Fax)



TEM CAMERA CONSTANT DETERMINATION

TEM H6000B

Measured and Calculated by LJ Date May 2010

Camera Constant (mm A) = D (mm) X 1/2 X d (A)

where D (mm) is the diameter of a gold ring and

d (A) is the d-spacing in Angstroms for a particular reflection

CC (1*) = (24.1 mm) X 1/2 x 2.355 = 28.37

CC (2*) = (27.8 mm) X 1/2 x 2.039 = 28.34

CC (3*) = (39.3 mm) X 1/2 x 1.442 = 28.34

CC (4*) = (45.9 mm) X 1/2 x 1.230 = 28.23

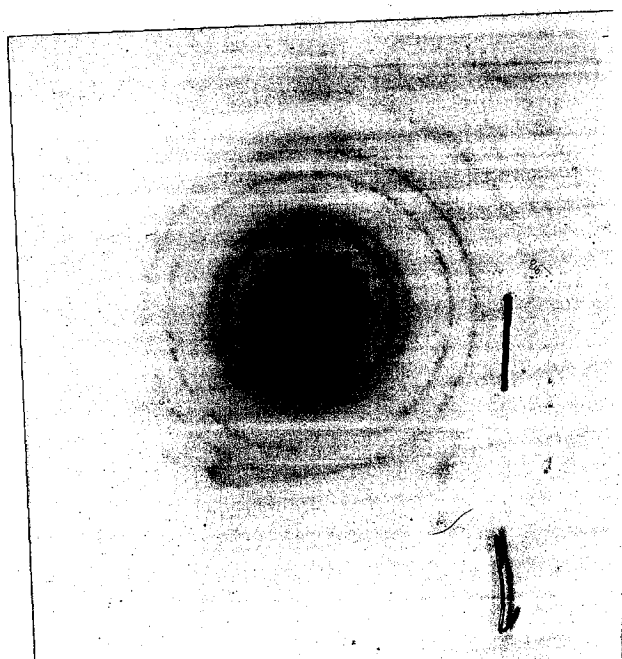
Average Camera Constant = 28.3

* 1 is the first largest diameter ring. 2 the second, etc.

Average Camera Constant = (CC<1> = ...= CC<n>) X 1/n

For gold:

d(A)	nk1
2.355	(111)
2.039	(200)
1.442	(220)
1.230	(311)
1.1774	(222)



08/07/01
csl

DATE: May 2010

A-600/B-600/C-600

WEEKLY CALIBRATION 3mo

MONTHLY CALIBRATION 3mth

AFTER SERVICE CALIBRATION___

BY: R

Measurement	Number of Spacing Flourescent Screen Magnification	Distance (mm)	Number of Spacing Film Magnification
	25,000x	12,000x	
1	3 5/16 – 19,260	5 1/2 –	9,180
2	3 5/16 – 19,260	5 1/16 – 1/2	9,270
3	3 1/16 – 19,080	5 1/16 – 1/2	9,270
4	3 1/16 – 19,080	5 1/2 –	9,180
5	3 5/16 – 19,260	5 1/2 –	9,180
6		5 1/2 –	9,180
7	ave 19,200		
8		ave	9,200
9			
10			
	AVERAGE:		

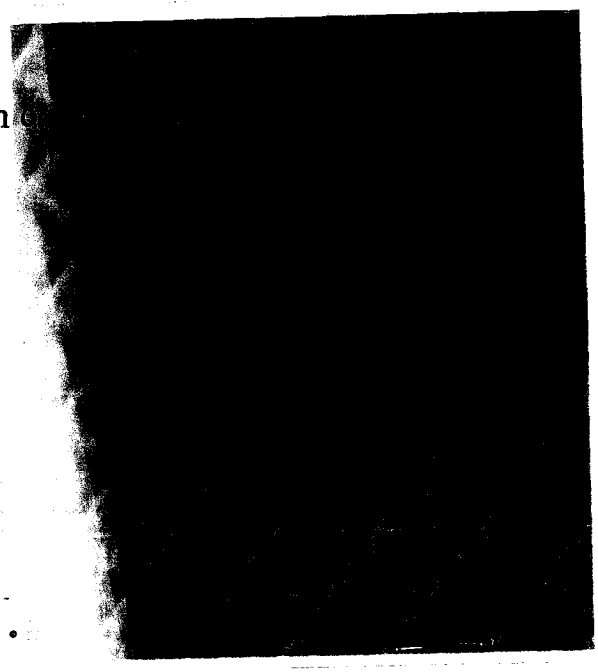
OPERATING VOLTAGE 100 KV

54, 864 lines/inch or 2,160 lines/mm or 0.463µm/line

28, 800 lines/inch or 1,134 lines/mm or 0.882µm/line

15, 240 lines/inch or 600 lines/mm or 1.67µm/line

16.94 µm for one bar and one opening for Ni screen on



EM CALIBRATION 2
992)

K= [Cn/C(Si)] / [In/I(Si)]
C(Si)= 18.74

n	Cn	RUN 1 I(Si)= 22860 In	Kn	RUN 2 I(Si)= 12101 In	Kn	RUN 3 I(Si)= 15953 In	Kn	RUN 4 I(Si)= 16554 In	Kn	RUN 5 I(Si)= 16203 In	Kn	RUN 6 I(Si)= 7464 In	Kn
Na	1.81	1694	1.3034	1095	1.0674	986	1.5627	1133	1.4112	1004	1.5587	395	1.8251
Mg	7.57	6992	1.3207	3738	1.3077	4447	1.4491	4902	1.3641	4714	1.3885	1983	1.5205
Al	6.54	7768	1.027	4152	1.0171	5455	1.0206	5761	1.0028	5708	0.9906	2576	1.0112
Si	18.74	22860	1	12101	1	15953	1	16554	1	16203	1	7464	1
K	0.97	1453	0.8144	827	0.7574	1311	0.6299	1333	0.6428	1195	0.7018	584	0.6615
Ca	8.26	6570	1.5336	3406	1.566	5845	1.203	5222	1.3973	4998	1.4289	2852	1.1535
Ti	3.02	2235	1.6483	1170	1.6668	1821	1.4118	1867	1.4289	1753	1.4895	928	1.2962
Mn	0.14	10	17.078	22	4.1092	12	9.9316	29	4.2645	2	60.523	22	2.5346
Fe	9.51	5898	1.9669	2935	2.0923	4934	1.6408	4856	1.73	4473	1.8383	2351	1.6111
O	43.83			7849	3.6059	7051	5.2917	10526	3.6783	9433	4.0174	3333	5.2377

** NVLAP REQUIREMENTS **
1.0 < K(Na) wrt Si < 4.0
1.0 < K(Mg) & K(Fe) wrt Si < 2.0
1.0 < K(Al) & K(Ca) wrt Si < 1.75

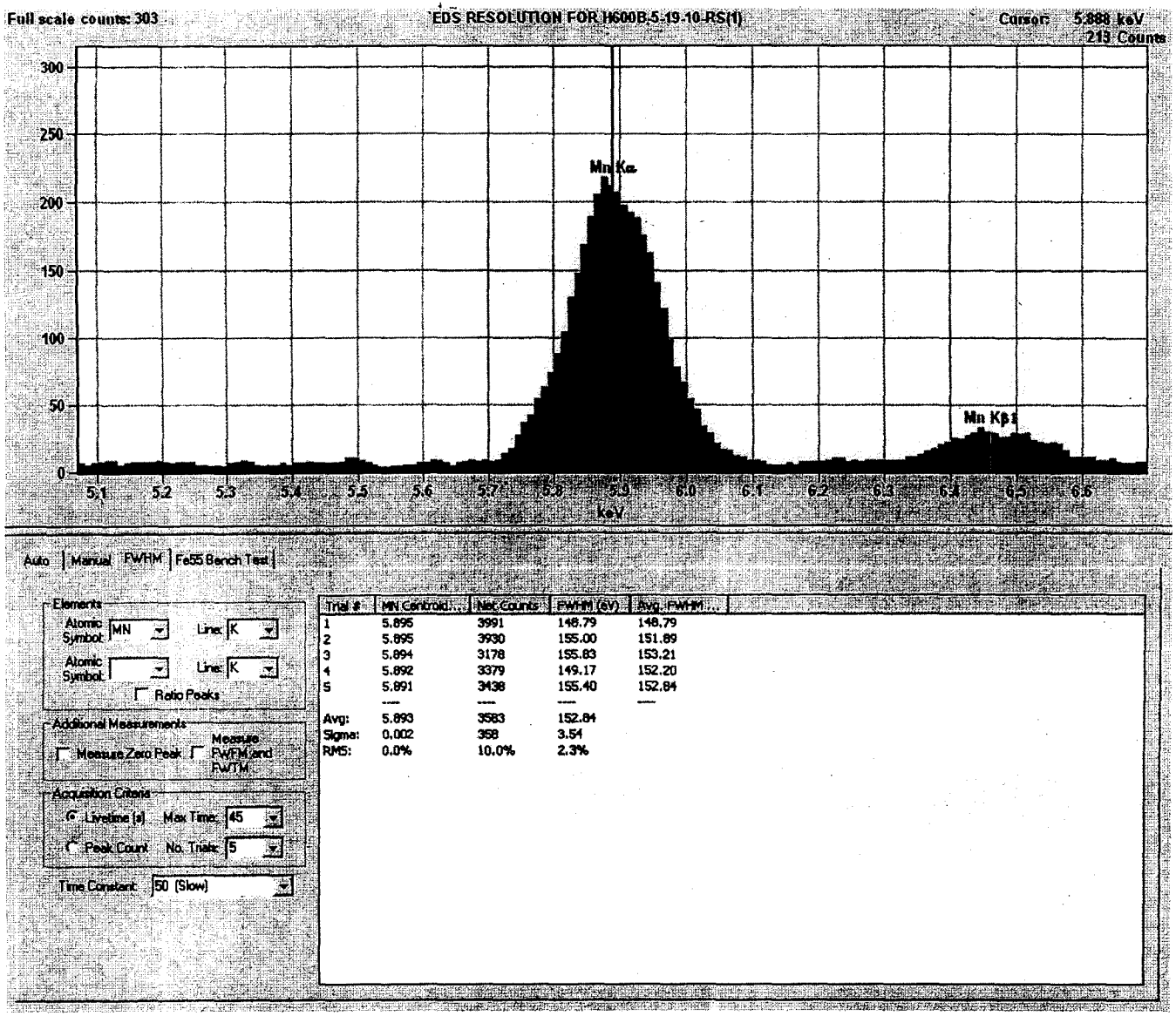
K(Mg)/K(Fe) < 1.5

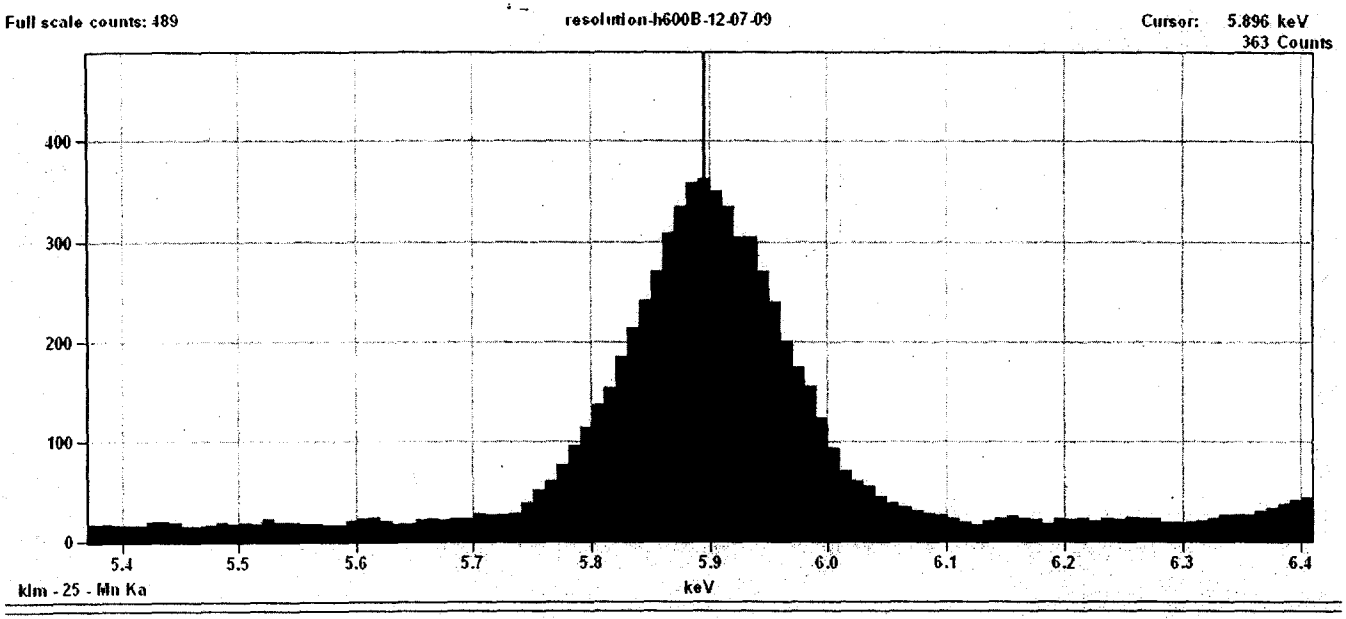
stdev <10% for Mg, Al, Si, Fe
stdev <20% for Na
wrt mean value of k-factor wrt Si

SCOPE B

RUN 7 I(Si)= 12627		RUN 8 I(Si)= 4491		RUN 9 I(Si)= 15830		RUN 10 I(Si)= 14684		RUN 11 I(Si)= 25368		RUN 12 I(Si)= 25374		RUN 13 I(Si)= 4628	
In	Kn	In	Kn	In	Kn	In	Kn	In	Kn	In	Kn	In	Kn
849	1.4365			950	1.6094	982	1.4442	1543	1.5879	1542	1.5893		
3523	1.4478	1332	1.362	4331	1.4765	4325	1.3715	7480	1.37	7479	1.3705	1213	1.5412
4458	0.9885	1569	0.9989	5717	0.9663	5043	1.0162	9260	0.9561	9260	0.9563	1556	1.038
12627	1	4491	1	15830	1	14684	1	25368	1	25374	1	4628	1
1099	0.5947	415	0.5601	1505	0.5444	1185	0.6414	2315	0.5672	2318	0.5666	363	0.6599
4553	1.2224	1818	1.0888	6257	1.1151	4602	1.4064	9813	1.1394	9832	1.1375	1754	1.163
1480	1.3749	563	1.2855	1994	1.2794	1703	1.3895	3188	1.2823	3196	1.2794	510	1.4624
4	23.583	13	2.5808	7	16.894			25	7.5806			6	5.7624
3889	1.6477	1422	1.6027	5899	1.3618	4371	1.7048	8840	1.4563	8884	1.4494	1497	1.5689
6102	4.8398	1894	5.5458	5950	6.2225	9471	3.6262	35609	1.6662	13315	4.4571	2045	5.293

SCOPE B


Full scale counts: 303
EDS RESOLUTION FOR H600B-5-19-10-RS(1)
Cursor: 5.888 keV
213 Counts
300
250
200
150
100
50
0
Mn Kα
Mn Kβ1
5.1
5.2
5.3
5.4
5.5
5.6
5.7
5.8
5.9
6.0
6.1
6.2
6.3
6.4
6.5
6.6
keV
Auto
Manual
FWHM
Fe55 Bench Test
Elements
Atomic Symbol: MN
Line: K
Atomic Symbol:
Line: K
Ratio Peaks
Additional Measurements
Measure Zero Peak
Measure FWFM and FWTM
Acquisition Criteria
Livetime (s)
Max Time: 45
Peak Count
No. Trials: 5
Time Constant: 50 (Slow)
Trial #
MN Centroid
Net Counts
FWHM (eV)
Avg. FWHM
1 5.895 3991 148.79 148.79
2 5.895 3930 155.00 151.89
3 5.894 3178 155.83 153.21
4 5.892 3379 149.17 152.20
5 5.891 3438 155.40 152.84
Avg: 5.893 3583 152.84
Sigma: 0.002 358 3.54
RMS: 0.0% 10.0% 2.3%



Auto | Manual | FWHM | Fe55 Bench Test

Elements

Atomic Symbol: Mn Line: K

Atomic Symbol: Line: K

Ratio Peaks

Additional Measurements

Measure Zero Peak Measure FWFM and FWTM

Acquisition Criteria

Livetime (s) Max Time: 50

Peak Count No. Trials: 5

Time Constant: 50 (Slow)

Trial #	Mn Centroid ...	Net Counts	FWHM (eV)	Avg. FWHM ...
1	5.896	1277	126.16	126.16
2	5.900	5295	151.73	138.95
3	5.897	6460	146.02	141.30
4	5.898	5560	146.26	142.54
5	5.899	5291	133.62	140.76
	---	---	---	---
Avg:	5.898	4776	140.76	
Sigma:	0.001	2014	10.52	
RMS:	0.0%	42.2%	7.5%	