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

Customer ID: TRNX26
 Customer PO: 2027.001
 Received: 6/18/2010 9:56AM
 EMS LAB No: 138491
 Date Prepared: 8/11/2010 12:55PM
 Analysis Date: 8/12/2010 1:00PM

Report Date:

Date Sampled: 6/16/2010 1:30PM

NIOSH 7402/ISO

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

EMS Laboratory Number: 138491	Mass of Respirable Dust on Filter: 184	µg
Customer Sample Number: SSAQ4-03-1.50BPC	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: 84	
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-78.4g	Soil % Moisture	5.8	%
Not Used	Air Flow Rate Through ME Opening of Dust Generator:	1370	
Used in Tumbler	Air Flow Rate Through IST Opening of Dust Generator:	130	
	Estimate Total Air Flow Through Elutriator:	1500	

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)

Structure Class	Min ID Level Required	Counts		Density St/mm ²	Conc. Str/g PM10	Poisson 95% Confidence Interval	
		Primary Str.	Total Str.			Lower Limit Str/g PM10	Upper Limit Str/g PM10
Asbestos Structures >5um, ≤10um	ADX/CD	8	8	10.1	2.12E+07	9.1E+06	4.17E+07
Asbestos Structures >5um, ≤10um (Chrys)	CD	3	3	3.8	7.95E+06	1.6E+06	2.33E+07
Asbestos Structures >5um, ≤10um (Amph)	ADX	5	5	6.3	1.32E+07	4.6E+06	3.09E+07
Asbestos Structure >10um (Long)	ADX/CD	3	3	3.8	7.95E+06	1.6E+06	2.32E+07
Asbestos Structure >10um (Chrys)	CD	1	1	1.3	2.65E+06	6.6E+04	1.48E+07
Asbestos Structure >10um (Amph)	ADX	2	2	2.5	5.30E+06	6.4E+05	1.91E+07
Total Protocol Asbestos Structures	ADX/CD	11	11	14.9	2.91E+07	1.5E+07	5.22E+07
Protocol Asbestos Structures (Chrys)	CD	4	4	5.1	1.06E+07	2.9E+06	2.71E+07
Protocol Asbestos Structures (Amph)	ADX	7	7	8.9	1.85E+07	7.4E+06	3.82E+07
Total Protocol Non Asbestos Structures	NAM	2	2	2.5	5.30E+06	6.4E+05	1.91E+07


 Approved by Technical Director

137866

138491

8-10-10

Moisture Content

50

Sample # 137866 - SSAN5-03-0.33 BPC

Dish wt.

31.47 g

Dish + samp.

131.50 - 31.47 = 100.03g (initial wt.)

9:35 - 10:35

125.33 - 31.47 = 93.86g

11:10 - 12:10

124.28 - 31.47 = 92.81

12:30 - 1:30

124.24 - 31.47 = 92.77g (final wt.)

$$\% \text{ moisture} = 100 \times \frac{100.03 - 92.77}{92.77} = 7.83\%$$

138491 - SSQ4-03-1.50 BPC

Dish wt.

31.44 g

Dish + samp.

132.44 - 31.44 = 101.0g (initial wt.)

9:35 - 10:35

127.48 - 31.44 = 96.04g

11:10 - 12:10

126.92 - 31.44 = 95.48

12:30 - 1:30

126.90 - 31.44 = 95.46 (final wt.)

$$\% \text{ moisture} = 100 \times \frac{101.0 - 95.46}{95.46} = 5.8\%$$

BP

137865 - #SSAL6-02-0.33 BPC

8-12-10

Dish wt.

31.47 g

dish + samp

132.65g - 31.47 = 101.18g (initial wt.)

10:10 - 11:10

125.02g - 31.47 = 93.55g

11:30 - 12:30

124.90g - 31.47 = 93.43g

1:00 - 2:00

124.87g - 31.47 = 93.40g (final wt.)

$$\% \text{ moisture} = 100 \times \frac{101.18g - 93.40}{93.40} = 8.33\%$$

BP

~~Elutriator Data~~ JP

Lab #: 138491

Date: 8/11/10

Client: Northgate

Sample ID: SSA04-03-0.33 PFC Sample weight (g): 78.4

Time air flow started: 8:00

Tumbler rpm: 30

IST Flowmeter (mL/min): 100 / 130 * 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	10:00	175	0.04035	0.02409	16.24	30		
2	10:30		0.02930	0.02414	5.16	15		
3	10:45		0.03711	0.02440	12.71	20		
4	11:05		0.03708	0.02411	12.97	25		
5	11:30		0.02940	0.02435	5.05	15		
6	11:45		0.03028	0.02434	5.94	20		
7	12:05		0.03091	0.02423	6.68	20		
8	12:25		0.03351	0.02450	9.01	20		
Time							Dep. Rate	Estimate
1	10:54	105 7 1/2	4.505	4.476	0.029	3 1/2		
2	11:17	11:24	4.593	4.520	0.073	5		
3	11:37	11:42	4.465	4.374	0.091	5		
4	11:54	12:03	4.585	4.396	0.189	9		
5	12:12	12:17 1/2	4.746	4.508	0.238	8 1/2		
6	12:30	12:36	4.663	4.479	0.184	4		
7	12:50	12:55 1/2	4.563	4.379	0.184	5 1/2		
8								

3% loss
70% loss
35% loss
20% loss
5% loss
2% loss

← PREP

* Pause 1st flow to 130 @ 11:15

COPY

Prep Time: 9⁰⁰ - 11³⁰

Count (Page of) NIOSH 7402/ISO

Report number: 158491
Sample number: SSA04-03-0-99 BPC
1.50 JAP
Site name: Northgate
Sample Description: 184 mg

Filter Type: PC 385 mm²
Date Sample was Run: 8/11/10

Magnification: 9,200 X

Preparation date: 8/12/10
Analysis date: 8-12-10
By JAP
By TJ

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

Grid loading: Moderate
Condition of Grid: good

4 hrs.

Grid	Grid Opening	Number of structures Primary	Number of structures Total	Class	Type of Structure	Width mm	Length mm	Comments
1A	E23							
	E26							
	F23							
	F26							
	F3-1	1			F	1.5	68	EDS actino like
	F3-4	2			F	1.5	100	EDS "
	G3-1							
	H3-4							
	F3-6	3			F	0.5	51	chryso. #3562 EDS
		4			MD11	40	145	
					MF	10	110	EDS actino
	G3-3							
	CU1	5			MD11	12	55	EDS actino #3563
					MF	1.5	55	
	CU4	6			MD11	90	112	chrysotile
					MB	2	80	
	E4-1							
	E4-4							
	F4-3							
	F4-6							
17	E5-1							
1B	C23							
	C26							
	E23							
	E26							
	C3-1							
	C3-4				MD11	28	95	non ash Si
					MF	1.5	70	
	F3-1				MD11	38	70	actinolite EDS
					MF	4.5	52	

TEM Asbestos Structure Count (Page of)

Report number: **135491** SAMPLE NO: **SSA04-03-0-33BPC** X 9,200 **1.50 JAP**

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments	
1B	E3-4								
	E3-3								
	E3-6								
	CU-1								
	CU-4								
	E4-3								
	E4-6								
	C5-1								
	C5-4								
	ES4								
1C	C2-3								
	C2-6				F	1	50	EDS actino.	
	E2-3								
	B3-1								
	B3-4				F	1.5"	60	Non. asb.	
	C3-1								
	C3-4								
	E3-3				K	1	51	EDS Chrys	
	ES-6								
	F3-3								
	F4-1								
	F4-4					MD11	20	105-	EDS actino.
						MB	5.5"	105-	
	F4-6					MD11	70	220	EDS actino
						MI	20	220	
	CU-3								
	ES4								
	ES-1								
	ES-4								
	ES-5								
1D	C2-6								
	E2-6								
	E2-3								

TEM Asbestos Structure Count (Page of)

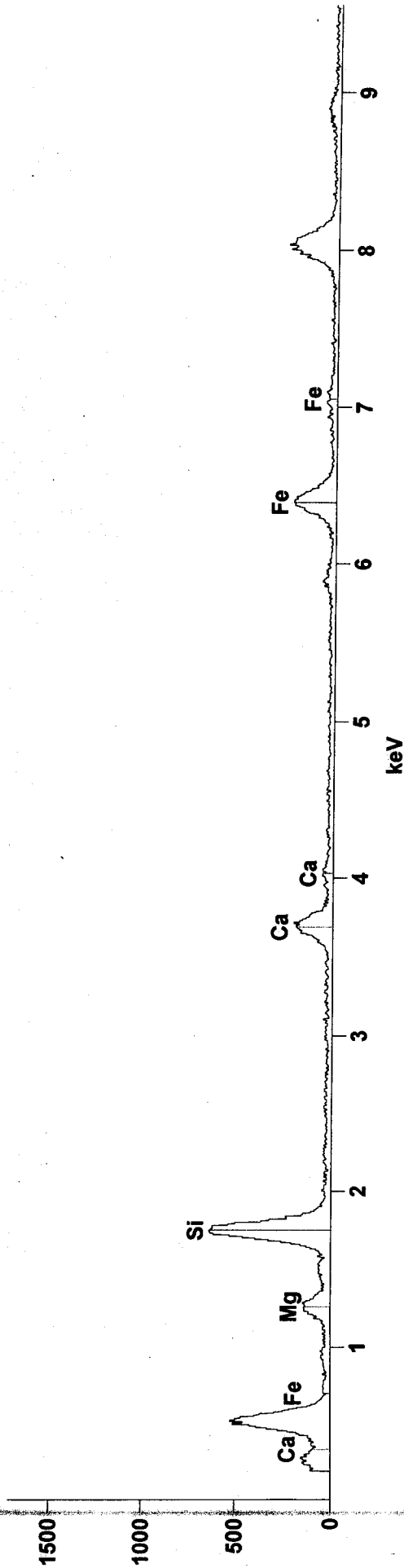
Report number: 138491 SAMPLE NO: SSA04-03-0-33-BPC X 9,200

1.50 JAP

Grid	Grid Opening	Number of structures primary	Number of structures Total	Class	Type of Structure	Width Mm	Length Mm	Comments
D	C3-1							
	C3-4				MD11	35	240	double crisco
	E3-1				MF	25	245	
	E3-4							
	E3-3							
	F3-6				MD11	45	165	EPS achino
					MF	6	165	
	G3-3				MD11	40	115	Non. arb.
					MF	6.5	50	
	H4-1							
	H4-4							
	I4-1							
	I4-4							
	J4-1							
	K6-1							
	F3-1							
I	C2-1							
	C2-2							
	E2-1				E	125	105	EPS achino
					MD11	60	140	achino double
					MF	35	60	
	E2-3							
	E2-6							
	F3-1				MD11	20	100	achino
					MF	6.5	100	
	F3-4							
	G3-1							
	G3-4				F	25	160	achino double
	H4-6							
	H4-3				F	8.5	70	Non. arb.
	G6-6							
	E5-1							
	E5-4				F	8	55	Non arb
	F5-4				F	15	78	Non arb
					MD11	22	80	achino
					MF	1	70	

H5-1

Full scale counts: 1572 139537-468-138491-SSAQ4-03-033-BPC-A-f3-1



Thu Aug 12 13:24:46 2010
 Gaussian Fit With Standards Chi Squared: 6.826
 Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

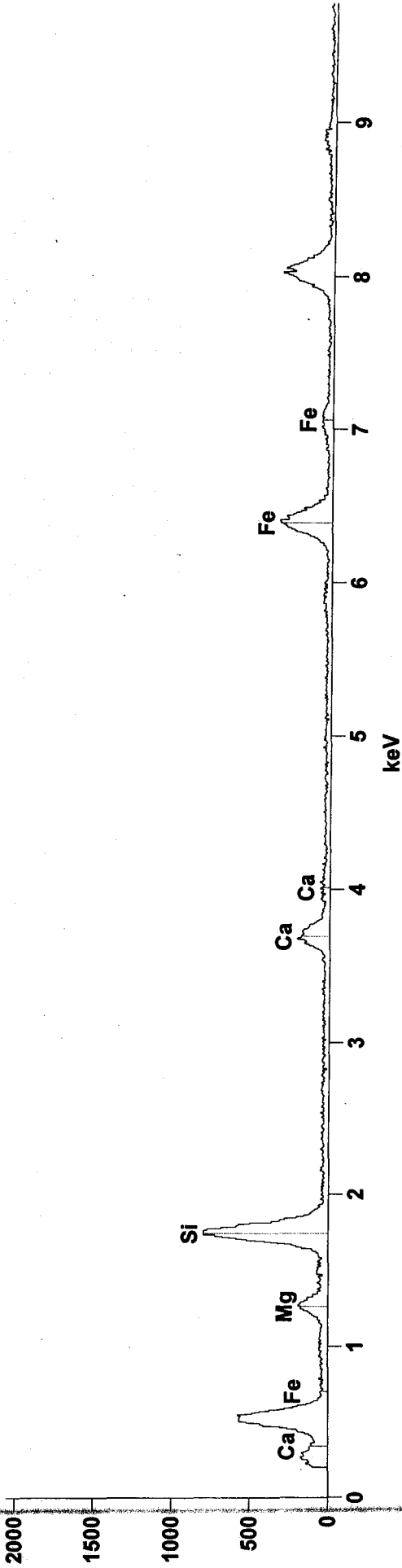
Live Time: 78.0 sec.
 Acc. Voltage: 100.0 kV
 Take Off Angle: 35.0 deg.
 Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-A-f3-1

Element Line	Net Counts	Weight % Error	Atom % Error
Mg K	1510	10.24	+/- 0.44
Si K	8497	44.34	+/- 0.62
Ca K	2644	18.63	+/- 0.36
Fe K	3540	26.79	+/- 0.32
Total		100.00	

Full scale counts: 1885

139537-468-138491-SSAQ4-03-033-BPC-AF3-4



Thu Aug 12 13:34:02 2010

Gaussian Fit With Standards Chi Squared:9.714

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time: 89.9 sec.

Acc.Voltage: 100.0 kV

Take Off Angle: 35.0 deg.

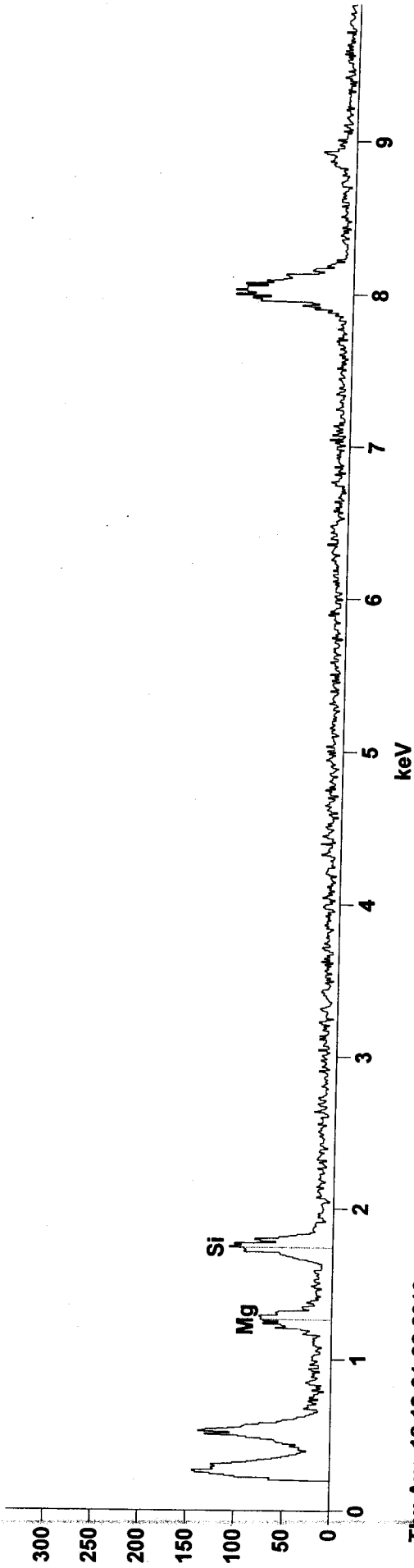
Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-AF3-4

Element Line	Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
Mg K	1696	9.60	--	13.66	+/- 0.40
Si K	10170	44.29	--	54.53	+/- 0.58
Ca K	2282	13.42	--	11.57	+/- 0.30
Fe K	5177	32.69	--	20.24	+/- 0.32
Total		100.00		100.00	

Full scale counts: 312

439537-468-138491-SSAQ4-03-033-BPC-A-F3-6-#03



Thu Aug 12 12:01:38 2010

Filter Fit Chi Squared: 0.919

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time: 62.4 sec.

Acc. Voltage: 100.0 kV

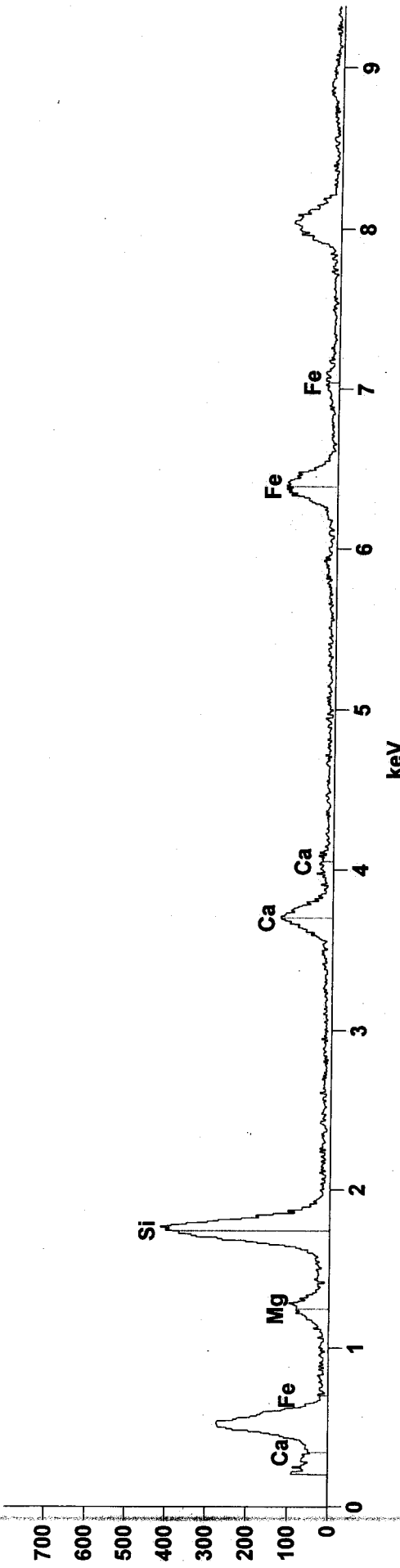
Take Off Angle: 35.0 deg.

Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-A-F3-6-#03

Element Line	Net Counts	Weight % Error	Atom % Error
Mg K	685	46.13 +/- 3.23	49.74 +/- 3.49
Si K	1014	53.87 +/- 2.87	50.26 +/- 2.68
Total		100.00	100.00

Full scale counts: 731



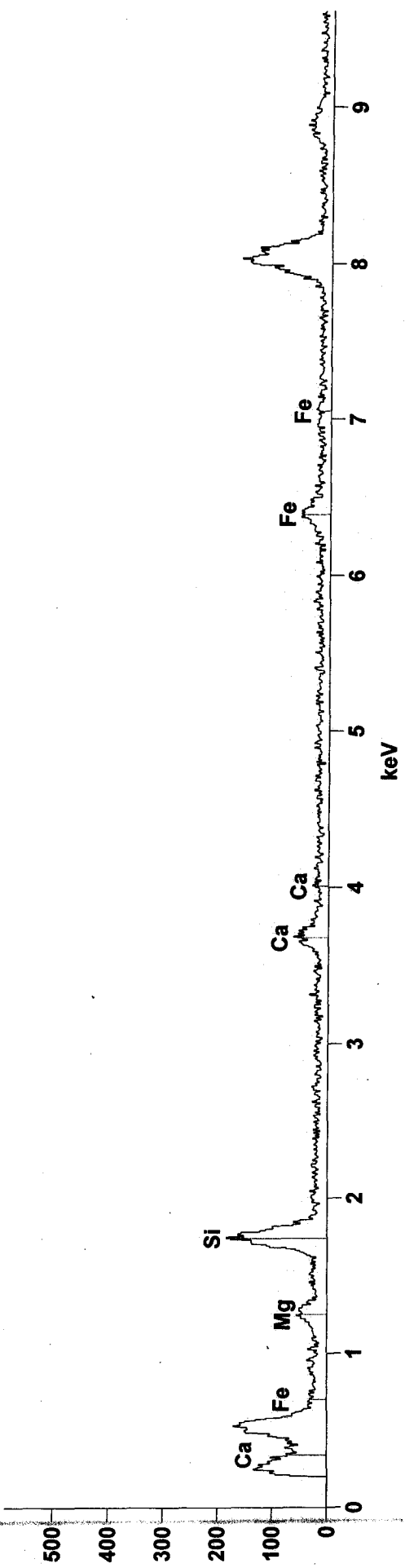
Live Time: 54.9 sec.
 Acc. Voltage: 100.0 kV
 Take Off Angle: 35.0 deg.
 Detector: Det B-Quantum

Thu Aug 12 13:54:25 2010
 Gaussian Fit With Standards Chi Squared: 9.114
 Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-A-f36

Element Line	Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
Mg K	1130	11.05	--	15.25	+/- 0.51
Si K	6011	45.23	--	54.00	+/- 0.74
Ca K	1873	19.03	--	15.92	+/- 0.42
Fe K	2263	24.69	--	14.83	+/- 0.35
Total		100.00		100.00	

Full scale counts: 538 139537-468-138491-SSAQ4-03-033-BPC-A-c4-1#



Live Time: 71.0 sec.
 Acc. Voltage: 100.0 kV
 Take Off Angle: 35.0 deg.
 Detector: Det B- Quantum

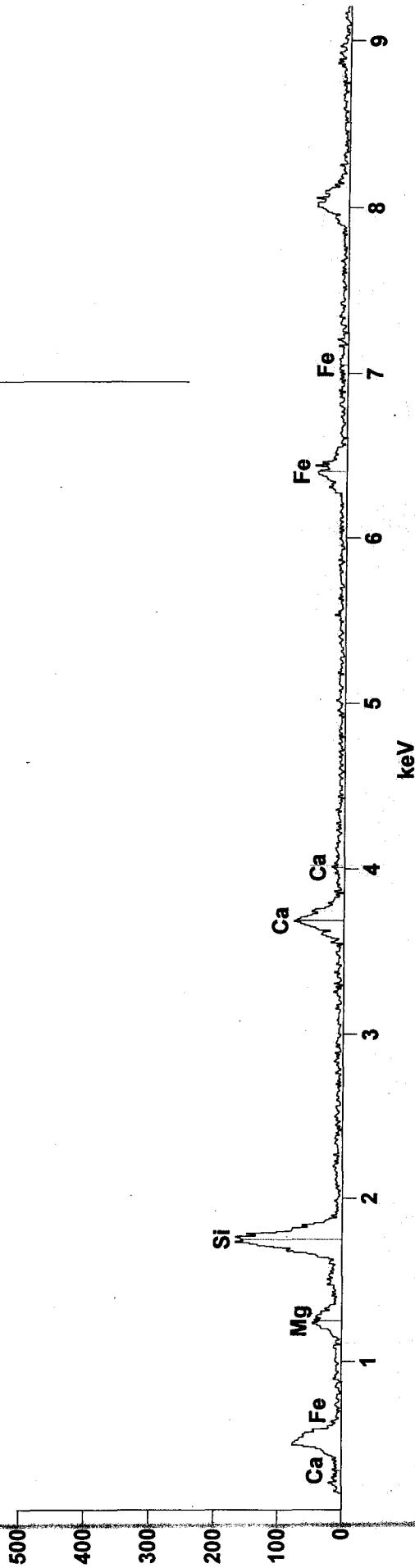
Thu Aug 12 13:38:06 2010
 Gaussian Fit With Standards Chi Squared: 3.661
 Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-A-c4-1#

Element Line	Net Counts	Weight % Error	Atom % Error
Mg K	399	13.84	+/- 1.20
Si K	1845	49.24	+/- 1.44
Ca K	476	17.15	+/- 0.90
Fe K	511	19.77	+/- 0.71
Total		100.00	100.00

Full scale counts: 461

139537-468-138491-SSAQ4-03-033-BPC-B-E3-1



Thu Aug 12 14:21:31 2010

Gaussian Fit With Standards Chi Squared:3.196

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time:44.0 sec.

Acc.Voltage: 100.0 kV

Take Off Angle: 35.0 deg.

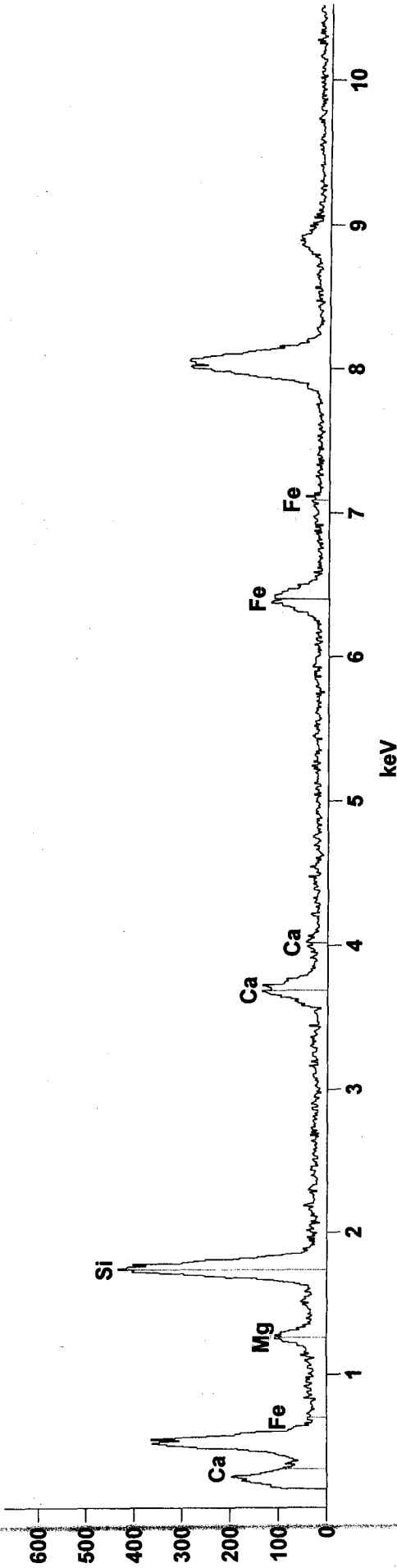
Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-B-E3-1

Element Line	Net Counts	Weight % Error	Atom % Error
Mg K	426	12.96	17.37 +/- 0.94
Si K	1922	44.98	52.16 +/- 1.25
Ca K	819	25.87	21.03 +/- 0.85
Fe K	477	16.19	9.44 +/- 0.55
Total		100.00	

Full scale counts: 616

139537-468-138491-SSAQ4-03-033-BPC-C-C2-6



Fri Aug 13 07:00:18 2010

Gaussian Fit With Standards Chi Squared:6.427

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

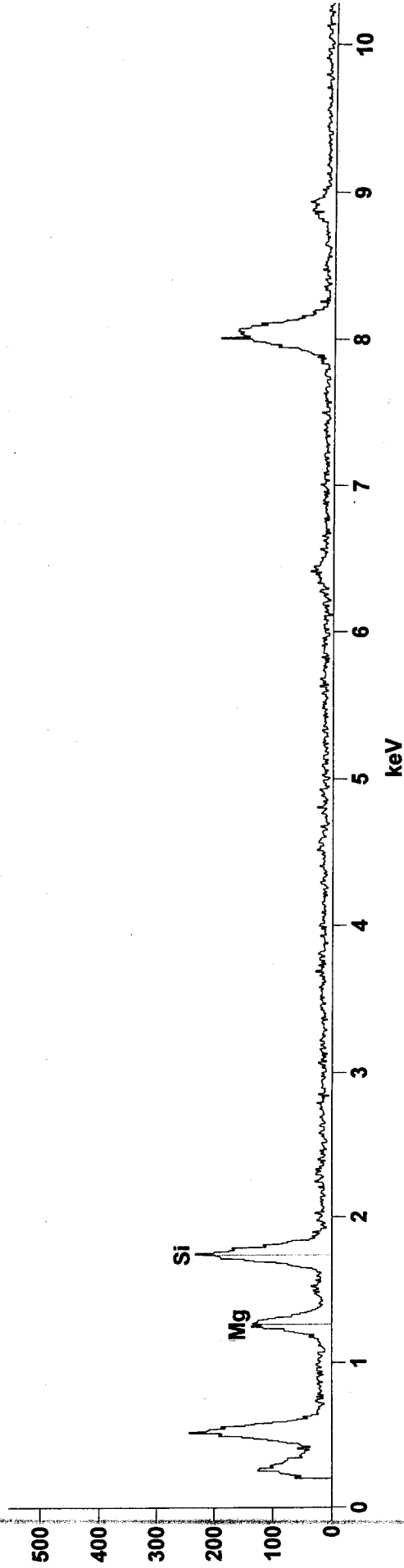
Live Time: 150.8 sec.
 Acc. Voltage: 100.0 kV
 Take Off Angle: 35.0 deg.
 Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-C-C2-6

Element Line	Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
Mg K	832	10.43	---	14.28	+/- 0.64
Si K	4869	46.97	---	55.64	+/- 0.87
Ca K	1539	20.04	---	16.64	+/- 0.53
Fe K	1613	22.56	---	13.44	+/- 0.42
Total		100.00		100.00	

139537-468-138491-SSAQ4-03-033-BPC-C-E3-3

Full scale counts: 508



Fri Aug 13 07:45:10 2010

Gaussian Fit Chi Squared: 1.891

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time: 91.3 sec.

Acc. Voltage: 100.0 kV

Take Off Angle: 35.0 deg.

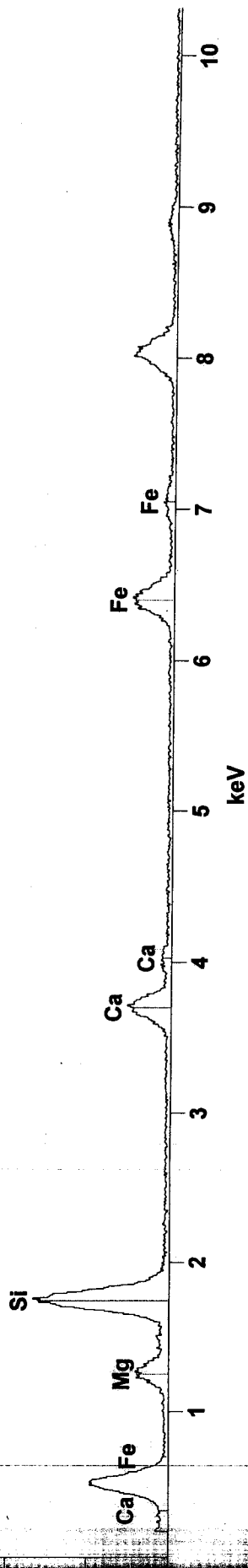
Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-C-E3-3

Element Line	Net Counts	Weight % Error	Atom % Error	Atom % Error
Mg K	1342	42.35 +/- 1.26	45.91 +/- 1.37	
Si K	2316	57.65 +/- 1.27	54.09 +/- 1.19	
Total		100.00	100.00	

Counts: 1866

139537-468-138491-SSAQ4-03-033-BPC-C-E4-4



Aug 13 07:51:43 2010

Gaussian Fit With Standards Chi Squared: 5.399

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

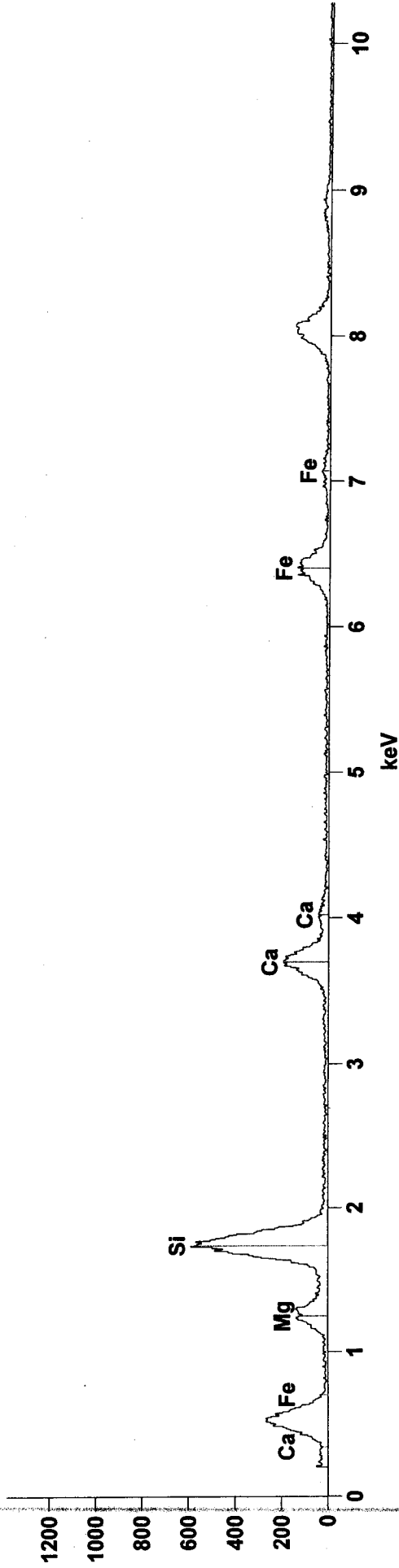
Live Time: 35.1 sec.
 Acc. Voltage: 100.0 kV
 Take Off Angle: 35.0 deg.
 Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-C-E4-4

Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
2506	12.10	--	16.62	+/- 0.37
11970	44.46	--	52.84	+/- 0.52
3879	19.45	--	16.20	+/- 0.30
4454	23.99	--	14.34	+/- 0.24
	100.00		100.00	

139537-468-138491-SSAQ4-03-033-BPC-C-F4-6

Full scale counts: 1273



Fri Aug 13 07:55:13 2010

Gaussian Fit With Standards Chi Squared:3.879

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time:12.5 sec.

Acc.Voltage: 100.0 kV

Take Off Angle: 35.0 deg.

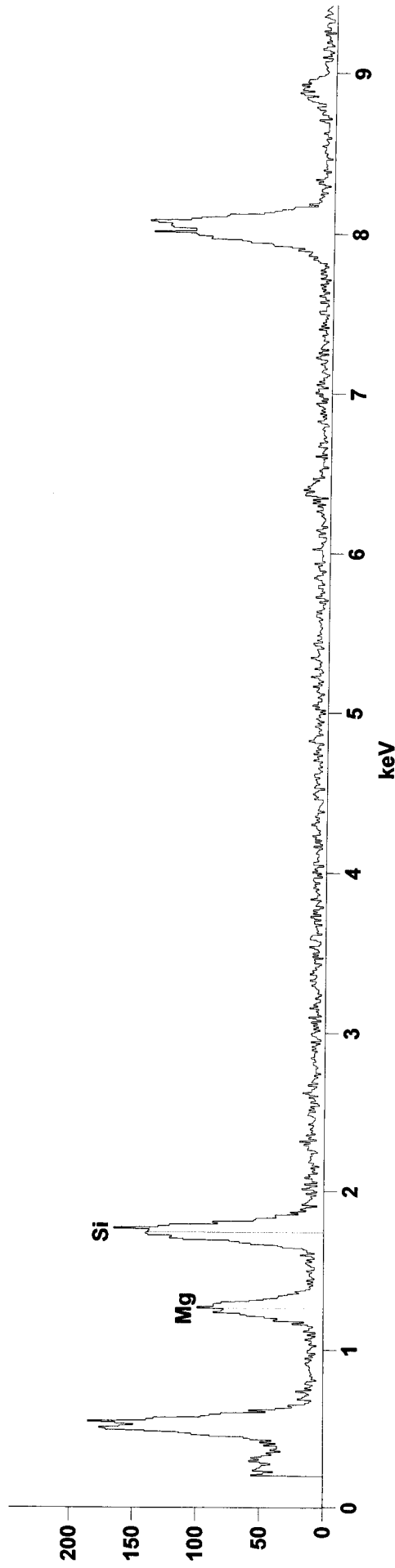
Detector: Det B- Quantum

Quantitative Results 139537-468-138491-SSAQ4-03-033-BPC-C-F4-6

Element Line	Net Counts	Weight % Error	Atom % Error
Mg K	2107	12.65	+/- 0.40
Si K	9983	46.12	+/- 0.56
Ca K	3694	23.04	+/- 0.34
Fe K	2715	18.19	+/- 0.23
Total		100.00	100.00

Full scale counts: 227

EDS CALIBRATIONH600B-8-13-10



Fri Aug 13 14:21:14 2010

Gaussian Fit With Standards Chi Squared:0.879

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

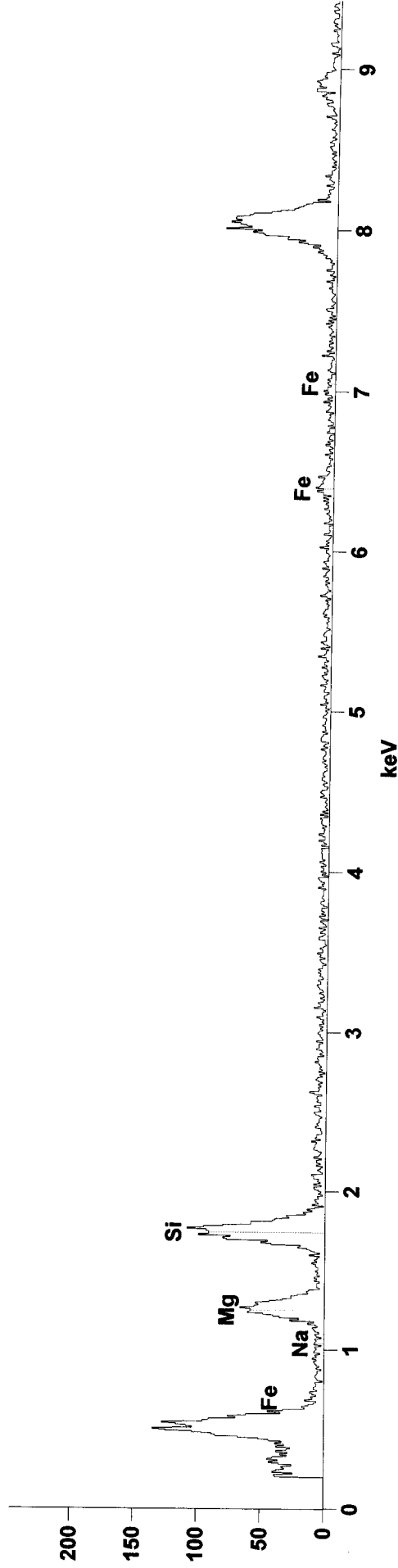
Live Time:100.7 sec.
Acc.Voltage: 100.0 kV
Take Off Angle: 35.0 deg.
Detector: Det B- Quantum

Quantitative Results EDS CALIBRATIONH600B-8-13-10

Element Line	Net Counts	Weight %	Weight % Error	Atom %	Atom % Error
Mg K	954	50.52	---	54.13	+/- 1.93
Si K	1775	49.48	---	45.87	+/- 1.16
Total		100.00		100.00	

Full scale counts: 227

EDS CALIBRATIONH600B-8-13-10



Chi Squared:0.000

Live Time:49.7 sec.
Acc.Voltage: 100.0 kV
Take Off Angle: 35.0 deg.
Detector: Det B- Quantum

Quantitative results are unavailable for EDS CALIBRATIONH600B-8-13-10.

Full scale counts: 1702

EDS CALIBRATION600B 8-13-10 CROCI.



Fri Aug 13 14:51:56 2010

Gaussian Fit With Standards Chi Squared:4.389

Correction Method: Cliff-Lorimer (MBTS) w/o Absorbance

Live Time:124.3 sec.

Acc.Voltage: 100.0 kV

Take Off Angle: 35.0 deg.

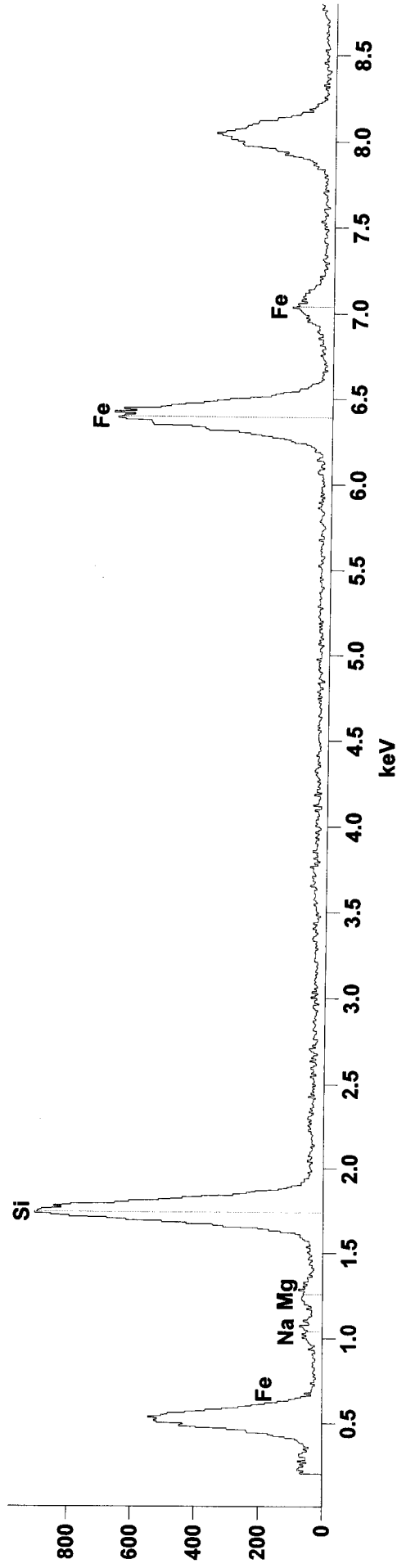
Detector: Det B- Quantum

Quantitative Results EDS CALIBRATION600B 8-13-10 CROCI.

Element Line	Net Counts	Weight % Error	Atom % Error
Mg K	964	3.01	4.74 +/- 0.24
Si K	25798	42.41	57.83 +/- 0.40
Fe K	25534	54.57	37.42 +/- 0.26
Total		100.00	100.00

Full scale counts: 902

EDS CALIBRATION600B 8-13-10 CROCI.



Chi Squared:0.000

Live Time:65.6 sec.
Acc.Voltage: 100.0 kV
Take Off Angle: 35.0 deg.
Detector: Det B- Quantum

Quantitative results are unavailable for EDS CALIBRATION600B 8-13-10 CROCI..