ATLANTA
Corporate Headquarters
3945 Lakefield Court
Suwanee, GA 30024
(770) 866-3200 FAX (770) 866-3259

MAS.
MATERIALS ANALYTICAL SERVICES, INC.

LOS ANGELES
3020 Old Ranch Parkway
Suite 300
Seal Beach, CA 90740
(562) 799-5530
FAX (562) 799-5531

PHOENIX
903 South Rural Road
#101-388
Tempe, AZ 85281
(480) 239-0602
FAX (602) 470-2655

RALEIGH
616 Hutton Street
Suite 101
Raleigh, NC 27606
(919) 829-7041
FAX (919) 829-5518

SANTA CLARA
2255 Martin Avenue
Suite D
Santa Clara, CA 95050-2709
(408) 855-9801
FAX (408) 855-9806

www.mastest.com

Gasket Fabrication II

A Work Practice Study

William E. Longo, Ph.D.
Richard L. Hatfield
Mike Mount, C.I.H.

September, 2006

Gasket Fabrication II:
A Work Practice Study

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a. M-40480

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MAS Gasket Fabrication I Report

AVERY 600023

SECTION 1

Gasket Fabrication II:
A Work Practice Study

September 18, 2006

William E. Longo, Ph.D., Richard Hatfield, and Mike Mount, CIH

Protocol

I. ECL SET-UP

A. Study is to be performed in the exposure characterization lab (ECL) constructed using negative airflow asbestos abatement technology. The size of the ECL is approximately 15' x 20' x 8'. The ECL will be decontaminated before the study.

B. Air exchange inside the ECL will be approximately 200 cubic feet per minute as measured at 10' (in middle of 12' ID duct) from the air exhaust of the HEPA filter negative air machine.

C. Tyndall lighting setup in general accordance with the methods described in D.T. Chambers, "Asbestos", John Wiley & Sons, 6, 193, 1983 and the Environmental Protection Agency SOP, EPA-Libby-02, Revision #1, March 2001. The lighting source consisted of three high intensity light (750 watts ellipsoidal pyrex lens, 219K candle power, 8 degree beam angle) located on each side of the worktable at a height of approximately 5.5 feet from the floor and 7 feet from the work activity.

D. Two video cameras (Sony Handcam, Model TRV99) will be used in this study.

II. BACKGROUND AIR SAMPLES

A. Adjust and calibrate high volume area pumps to approximately 10.0 liters per minute.
B. Setup five area air samples inside the ECL. Use 25mm air cassettes containing 0.8 micron pore size mixed cellulose ester (MCE) filters with a 5.0 micron backing pad.

C. Locate the background air samples in each quadrant of the ECL at a height of 5.5 feet from the floor and a distance of approximately six feet from the work activity.

III. WORK PRACTICE STUDY

For this study Garlock style 900 (1/16" thick) will be used. One 11" flange (outside diameter, 6" inside diameter) with eight bolt holes will also be utilized in this study. This is the same flange used in MAS Gasket Fabrication Study I as well as MVA's study. The flange was returned to MAS from MVA prior to the study. The investigator will use a ball peen hammer to fabricate six gaskets from approximately one foot square sheets. After the first four gaskets are fabricated, the investigator will exchange both the area and personal air samples. The investigator will then fabricate two additional gaskets. After the fabrication of the last gasket, the investigator will use a hand file to smooth out the inside surfaces of all six fabricated gaskets. Before the study, the flange will be decontaminated by HEPA vacuum then wet wiping. After this procedure is completed, the flange will then be washed with distilled water and soap.

A. Before the study is started, dust samples will be collected from both the flange and pipe surface for contamination measurements.

B. During this study, the four area samples located in each quadrant will be calibrated and run at a rate of approximately ten liters /minute.

C. Two additional area air samples will be collected during this work practice. Approximately 2' to 3' from the work activity and at a height of 5.5' a 0.8 micron MCE air sample cassette will be run during the entire study at a rate of 15 liters/minute for an Addison & Davies analysis. A second area sample containing a 0.4 micron PC filter will be run during the first part of the study only at a rate of 2.5 liters/minute. This sample will be analyzed by FE-SEM.

D. The investigator will be fitted with four personal air pumps and air cassettes located in his breathing zone and calibrated at a flow rate of approximately 2.5 to 3.5 liters/minute.

E. The investigator will wear appropriate protective clothing, work apparel and appropriate respiratory protection equipment.

F. The work practice will be performed under both ambient and Tyndall lighting.

G. The entire procedure will be videotaped with two separate cameras. During filming, the Tyndall lighting will be turned off and overhead lights turned on several times during the study.

H. Both the four area and four personal air samples will be exchanged after the first four gaskets are fabricated.

I. The field blanks will be opened inside the ECL for 30 seconds after the study has been completed.

IV. LABORATORY ANALYSIS

A. The air sample cassettes will be analyzed by the NIOSH 7400 PCM method using A counting rules and selected air samples will be analyzed by the NIOSH 7402 TEM method.

B. Fabric samples from the work clothing will be analyzed by the recommended EPA method.

C. The area air sample collected on the PC filter will be analyzed by FE-SEM.

D. The additional area sample collected on a MCE filter will be analyzed by the Addison & Davies method.

E. Dust samples will be analyzed by the recommended ASTM method.

SECTION 2

Gasket Fabrication II

September 18, 2006

Background Air Samples

Sample No.	Sample Description	PCME Fibers/cc	NIOSH 7402	PCM Fibers/cc
A-0-A	IWA Background	0.003	0%	0.003
A-0-B	IWA Background	<0.001	---	---
A-0-C	IWA Background	0.002	---	---
A-0-D	IWA Background	0.002	0%	0.002

Fabrication No Hand Filing

Personal Air Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
P-1-A	Personal	1.46	97.1%	1.42
P-1-B	Personal	1.14	97.1%	1.11
P-1-C	Personal	1.40	---	---
P-1-D	Personal	1.10	99.0%	1.10

Area Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
A-1-A	Area	0.33	99.0%	0.33
A-1-B	Area	0.28	---	---
A-1-C	Area	0.24	---	---
A-1-D	Area	0.40	98.0%	0.39

Gasket Fabrication II

Fabrication and Hand Filing

Personal Air Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
P-2-A	Personal	3.4	100.0%	3.4
P-2-B	Personal	2.7	97.1%	2.6
P-2-C	Personal	Void	---	---
P-2-D	Personal	2.3	---	---

Area Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
A-2-A	Area	0.57	97.0%	0.55
A-2-B	Area	0.51	---	---
A-2-C	Area	0.53	---	---
A-2-D	Area	0.33	100.0%	0.33

Field Blanks

Sample No.	Sample Description	PCM Fibers/mm^2	NIOSH 7402
FB-1	Area	< 7	0%
FB-2	Area	< 7	0%
FB-3	Area	<7	0%

Fabric Samples

Sample No.	Type	Asbestos Structures/ft^2	Asbestos Structures/cm^2
FAB – 0	Lab Blank	NAD*	NAD*
FAB – 1	Before	1.8 million	1.9 thousand
FAB – 2	After	725.7 million	780 thousand

Dust Samples

Sample No.	Type	Asbestos Structures/ft^2	Asbestos Structures/cm^2
MV – 1	Side of Pipe	NAD*	NAD*
MV – 2	Flange Surface	NAD*	NAD*

*NAD: No Asbestos Detected

	MAS **Gasket Fabrication I**	**MAS** **Gasket Fabrication II**	**MVA** **Study**
	Fabrication No Hand Filing	Fabrication No Hand Filing	Fabrication No Hand Filing
Area	0.57 f/cc	0.30 f/cc	0.8 f/cc
Personal	1.55 f/cc	1.29 f/cc	2.25 f/cc

	Fabrication And Hand Filing	Fabrication And Hand Filing	N/A
Area	1.08 f/cc	0.49 f/cc	
Personal	3.23 f/cc	2.80 f/cc	

SECTION 3

MATERIALS ANALYTICAL SERVICES
PROJECT COC

MAS ID:	M40480	**Client Job No:**	
Client Name:	Lipsitz & Ponterio	**Client PO:**	
Project Name:	Gasket	**Date In:**	9/11/2006
Logged By:	Nancy Sears	**Client Code:**	LIPSITZ

TRANSPORT INFORMATION:

Submitted By:		**Documents:**	COC
Delivery By:	FedEx		
Received By:	Nancy Sears	**Comments for COC:**	
Condition:	OK		

CONTACT INFORMATION:

Contact:	John Comerford			**Work Phone:** (716) 849-0701	**Ext:**
Title:	**First Name**	**Last Name:**	**Suffix**	**Other Phone**	**Ext:**
Mr.	John	Comerford		**Fax:** (716) 849-0708	

SAMPLE INFORMATION:

#	Client ID	Volume	#	Client ID	Volume
001	1	0			

SIGNATURES

RECEIVED BY:		**ANALYZED BY:**	
REVIEWED BY:		**REPORTED BY:**	
PREPARED BY:		**DEPOSED BY:**	

MATERIALS ANALYTICAL SERVICES, INC.
PLM ANALYSIS

Proj#-Spl#: M40480 - 001 **Analyst** Paul Hess **Date:** 9/14/2006

ClientName: Lipsitz & Ponterio **ClientSpl:** 1

Location:

Type_Mat: Garlock 900 Gasket

Gross Visual: Light grayish white compressed sheet of wavy fibers/bundles

OPTICAL DATA FOR ASBESTOS IDENTIFICATION

Morphology	wavy		
Pleochroism	none		
Refract Index	1.550/1.545		
Sign	positive		
Extinction	parallel		
Birefringence	low		
Melt	no		
Fiber Name	Chrysotile		

ASBESTOS MINERALS	**EST. VOL. %**
Chrysotile	80
Amosite	
Crocidolite	
Tremolite/Actinolite	
Anthophyllite	

OTHER FIBROUS COMPONENTS

NON FIBROUS COMPONENTS

Binder	20

Effervescence: None.

Binder Description: Fine-grained aggregate and opaques

Comments: Blue ink lines and letter G observed on sample piece.

From: Origin ID: (212)681-1575
Lebralee Feliciano
BELLUCK & FOX L.L.P
295 MADISON AVENUE, 37TH FLOOR

NEW YORK, NY 10017

FedEx Express

CLS052506/17/22

Ship Date: 08SEP06
ActWgt: 1 LB
System#: 1702440/INET2500
Account#: S *********

REF:

Delivery Address Bar Code

SHIP TO: (000)000-0000 **BILL SENDER**

Richard Hatfield
MAS
3945 Lakefield Court

Suwanee, GA 30024

PRIORITY OVERNIGHT **MON**

Deliver By:
11SEP06

TRK# 7915 4688 7275 FORM 0201

ATL A2

30024 -GA-US

NB AYSA

John Comerford
Lipsitz & Ponterio

Shipping Label: Your shipment is complete

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From: Joseph Belluck [mailto:jbelluck@belluckfox.com]
Sent: Monday, September 11, 2006 8:08 PM
To: John P. Comerford
Subject: Here is the transaction -- see below for sellers email

Transaction Details

Auction Payment Sent (ID # 5EW02571GP3271132)

Total Amount: -$17.99 USD
Date: Mar. 31, 2003
Time: 19:20:20 PST
Status: Completed

Item #	Item Title	Qty	Price	Subtotal
2518245658	Garlock 900 Gasket Material	0	$9.99 USD	$0.00 USD
			Shipping & Handling (includes any seller handling fees):	$8.00 USD
			Shipping Insurance :	--
			Total:	$17.99 USD

Shipping Address: Joseph Belluck
295 Madison
37th Floor
New York, NY 10017
United States

Unconfirmed

Payment To: Robert Cope (The recipient of this payment is Verified)
Seller's ID: dronebeebobby
Seller's Email: bob_the_bee_man@yahoo.com

Funding Type: Credit Card
Funding Source: $17.99 USD - American Express Card XXXX-XXXXXX-X1016
This credit card transaction will appear on your bill as "PAYPAL *BOBTHEBEEMA".

Original Transaction

Date	Type	Status	Details	Amount
Mar. 31, 2003	Payment To Robert Cope	Completed	...	-$17.99 USD

Related Transaction

Date	Type	Status	Details	Amount
Mar. 31, 2003	Charge From Credit Card	Completed	Details	$17.99 USD

Description: Garlock 900 Gasket Material

TEM Weight Determinations

Project No.	M40548		Analyst: Kevin Simpson			Grid Box #	7202
Sample No.	009				Length	Width	Area
Sample Description	Addison Davies 1mg	Date	11/6/2005	G. O. in microns =	104	106	11024
					103	104	10712
COMMENTS:	Air sample prepped using Addison Davies method.				Average G.O.s	G. O. Area Counted	10868 20

Str. #	Grid Opening	Asbestos Type	Length Microns	Width Microns	Volume um3	Weight Picograms	Ratio L/W
	E5-D10	NSD					
	D8	NSD					
	D6	NSD					
	D4	NSD					
	D2	NSD					
	F2	NSD					
	F4	NSD					
	F6	NSD					
	F8	NSD					
	F10	NSD					
	E4-E10	NSD					
	E8	NSD					
	E6	NSD					
	E4	NSD					
	E2	NSD					
	C2	NSD					
	C4	NSD					
	C6	NSD					
	C8	NSD					
	C10	NSD					

Total Wt. = ***0.000000*** **pg**

SECTION 4

MATERIALS ANALYTICAL SERVICES
PROJECT COC

MAS ID:	M40548	**Client Job No:**	
Client Name:	Materials Analytical Services Atlanta	**Client PO:**	
Project Name:	ECL Gasket Fabrication II	**Date In:**	9/19/2006
Logged By:	Nancy Sears	**Client Code:**	MASCORP

TRANSPORT INFORMATION:

Submitted By:	Mike Mount	**Documents:**	COC
Delivery By:	Hand Delivery		
Received By:	Nancy Sears	**Comments for COC:**	
Condition:	OK		

CONTACT INFORMATION:

Contact:	Bill Longo		**Work Phone:**	(770) 866-3200	**Ext:**
Title:	**First Name**	**Last Name:** **Suffix**	**Other Phone**		**Ext:**
Mr.	William	Longo	**Fax:**	(770) 866-3259	

SAMPLE INFORMATION:

#	Client ID	Volume	#	Client ID	Volume
001	A-O-A	1800	017	A-2-B	181.8
002	A-O-B	1800	018	A-2-C	180
003	A-O-C	1800	019	A-2-D	180
004	A-O-D	1800	020	P-2-A	46.8
005	A-1-A	202	021	P-2-B	44.6
006	A-1-B	202	022	P-2-C	63.4
007	A-1-C	200	023	P-2-D	63.7
008	A-1-D	200	024	FB-1	0
009	A-1-E	630	025	FB-2	0
010	A-1-F	50	026	FB-3	0
011	A-1-G	11280			
012	P-1-A	52			
013	P-1-B	49.6			
014	P-1-C	50.4			
015	P-1-D	70.8			
016	A-2-A	181.8			

SIGNATURES

RECEIVED BY: dmagaziner **ANALYZED BY:** _____

REVIEWED BY: _____ **REPORTED BY:** _____

PREPARED BY: _____ **DEPOSED BY:** _____

010 Relinquished 9/19/06 by dmagaziner
Sent to MAS Raleigh & Don Porterfield
as per Bill Longo 9/19/06 fedex

M40548 Page 1 of 2

75°F 40%rH 235 CFM

INDUSTRIAL HYGIENE AIR SAMPLING CHAIN OF CUSTODY

MAS.

3945 Lakefield Court
Suwanee, GA 30024
Phone: 770-866-3200
Fax: 770-866-3259

COMPANY NAME: Dept 14
ADDRESS:
PHONE:
FAX:

PROJECT NUMBER:
PROJECT NAME: Gasket Fabrication II
WORK AREA DESCRIPTION: ECL
PROJECT REPRESENTATIVE: M. Mount
SAMPLING DATE: 9/18/06

TURNAROUND TIMES: _____ 1 DAY _____ 3 DAYS _____ STANDARD 5 –7 DAYS

DATE	SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE MEDIA	ANALYSIS DESIRED	START TIME	STOP TIME	TOTAL TIME MINUTES	AVERAGE FLOW RATE LPM	AIR VOLUME (LITERS)
9/18/06	A-0-A	Background - NE	MCE	7400, 7402	9:00	12:00	180	10.0	1800.0
	B	SE							
	C	SW							
	D	NW		7402					
	A-1-A	Area, NE, During fabrications		7402	2:08	2:28	20	10.1	202.0
	B	SE						10.1	202.0
	C	SW						10.0	200.0
	D	NW		7402				10.0	200.0
	E	Northside		for Addison Davies Rep		2:50	10.2	15.0	153.0
	F	Northside	PolyCarb.	for SEM TC Raleigh		2:28	20	2.5	50.0
	G	Outside ECL	MCE	7400		12:00	180	10.0	1128.0
	A-1-A	Personal, Right		7400 + 7402				2.6	52.0
	B	Left		7402				2.48	49.6
	C	Right						3.52	50.4
	D	Left						3.54	70.8
	A-2-A	Area, NE, During Fab + File		7402	2:33	2:51	18	10.1	181.8
	B	SE						10.1	181.8
	C	SW						10.0	180
	D	NW		7402				10.0	180

CHAIN OF CUSTODY	NAME	COMPANY	MODE OF TRANSFER	LOG IN DATE	RECEIVED BY	COMPANY
First Transfer by:	Michael D Mount	MAS 9/18/06	Hand	9/19/06	Dan Sears	MAS
Second Transfer by:						
Third Transfer by:						

M40548 Page 2 of 2

INDUSTRIAL HYGIENE AIR SAMPLING CHAIN OF CUSTODY

MAS.

3945 Lakefield Court
Suwanee, GA 30024
Phone: 770-866-3200
Fax: 770-866-3259

COMPANY NAME: Dept 14
ADDRESS:
PHONE:
FAX:

PROJECT NUMBER:
PROJECT NAME: Gasket Fabrication II
WORK AREA DESCRIPTION: ECL
PROJECT REPRESENTATIVE: M. Mount
SAMPLING DATE: 9/18/06

TURNAROUND TIMES: _____ 1 DAY _____ 3 DAYS _____ STANDARD 5 –7 DAYS

DATE	SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE MEDIA	ANALYSIS DESIRED	START TIME	STOP TIME	TOTAL TIME MINUTES	AVERAGE FLOW RATE LPM	AIR VOLUME (LITERS)
9/18/06	P-2-A	Regnal, Right, During Fabr File	MCE	7400, 7402	2:33	2:51	18	3.6	46.8
	B	Left		7402	↓	↓	↓	2.48	44.6
	C	Right,						3.52	63.4
	D	Left						3.54	63.7
	FB-1	Field Blank		7402	—	—	—	—	0
	FB-2				—	—	—	—	0
	FB-3				—	—	—	—	0
M40549									
	FAB-1	Shirt Before		EPA Fabric Method	—	—	—	—	
	FAB-2	Shirt After			—	—	—	—	
									CM²
	MV-1	Dust from side of pipe	.45MCE	ASTM 5557	—	—	—	—	100
M40550	MV-2	↓ ↓ Flange face	↓	↓ ↓	—	—	—	—	400

CHAIN OF CUSTODY	NAME	COMPANY	MODE OF TRANSFER	LOG IN DATE	RECEIVED BY	COMPANY
First Transfer by:	Michael D Mount	MAS 9/18/06	Hand	9/19/06	Nancy Sears	MAS
Second Transfer by:						
Third Transfer by:						

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # M40548-001

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

–	–	1	–	–	
1	–	–	–	–	10
–	–	–	–	–	
–	–	–	–	–	20
–	–	1	–	–	
–	–	–	–	–	30
–	–	–	–	–	
–	–	1	–		40
–	–	–	–	–	
½	–	–	1	2	50
–	–	–	–	–	
–	1	–	–	–	60
–	–	1	–	–	
–	½	–	–	–	70
–	–	–	–	–	
–	–	–	–	–	80
–	–	–	–	–	
–	–	–	–	–	90
1	½	–	–	–	
–	½	–	–	–	100

Sample ID: A-0-A

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	1800
Total Fibers Counted, Sample (FCS)	12
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 15.3 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.003 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. D. Hall Date: 10/16/06

Reviewed By: Date: 10/17/06

Materials Analytical Services
3945 Lakefield Court
Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: BASKET FABRICATION II Sample # M40548-002

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

					10
					20
			1		30
		1			40
					50
					60
		½			
					70
					80
	1				
	1				90
					100

Sample ID: A-0-13

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	1800
Total Fibers Counted, Sample (FCS)	4½
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = ND, 47 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = <0.001 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. Sh Date: 10/16/06

Reviewed By: Date: 10/17/06

Materials Analytical Services
3945 Lakefield Court
Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # MY0548-003

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

–	–	–	–	–	
–	–	–	–	–	10
–	1	–	–	–	
1	–	–	–	–	20
–	–	–	–	–	
–	–	–	–	–	30
–	–	–	–	–	
–	–	–	–	–	40
–	–	–	–	–	
½	–	–	–	1	50
–	–	–	–	–	
–	–	–	–	–	60
–	–	–	–	–	
–	–	½	–	½	70
–	–	–	–	–	
–	–	–	–	–	80
–	–	–	–	–	
–	1	–	½	1	90
–		–	1	–	
–	–	–	1	–	100

Sample ID:	A-0-C
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	1800
Total Fibers Counted, Sample (FCS)	9
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 11.5 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.002 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: L. B. Eyler Date: 10/16/06

Reviewed By: Date: 10/17/06

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Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION Sample # M40548-004

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

–	–	–	–	–	
1	–	–	–	–	10
–	–	–	–	–	
–	–	–	–	–	20
–	–	–	–	–	
–	–	1	–	½	30
–	–	–	–	–	
–	–	–	–	–	40
–	–	–	–	–	
–	–	–	1	–	50
–	–	–	1	–	
–	–	–	–	1	60
–	–	–	–	–	
–	–	–	–	–	70
–	–	–	–	–	
–	–	–	–	–	80
–	–	–	½	–	
–	–	–	–	–	90
–	–	–	–	–	
–	–	–	–	–	100

Sample ID:	A-0-0
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	1800
Total Fibers Counted, Sample (FCS)	6
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 7.6 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.002 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. England Date: 10/16/06

Reviewed By: Date: 10/17/06

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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION Sample #: M40548-005

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

—	~	5	2	1
2½	2	2	1	2
—	3	—	3	½
2½	-	2½	1½	1
2	1	1	½	1½
—	1	1½	2½	1½
—	1	1½	2½	1½
2	2	½	—	1½
1	½	1	2½	3
1½	1	2	1	1
2	—	1	2½	—
1½	2	1	½	—
1	2½	½	—	—
½	1	2½	½	½
1½	2½	2	8	—
1	—	1		

Sample ID: A-1-A

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	202
Total Fibers Counted, Sample (FCS)	100
Total Fields Counted, Sample (FLS)	73
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 174.5 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.333 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. B. [signature] Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

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Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-006

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

–	–	1	1	1½	
–	2	–	1	1	10
–	1	1	–	2	
3½	2	1	–	1	20
1	3	1	2	1	
2	1	3½	–	–	30
–	1½	–	1	½	
½	1½	–	1½	1	40
½	½	3	2	½	
–	½	1	1	1½	50
–	2	1	–	1	
–	1½	3	–	–	60
1½	2	–	3	–	
2	2	1½	–	1	70
½	2½	3	–	½	
1½	½	–	2	4½	80
1½	–	2	2	3	
2	2½				90
					100

Sample ID: A-1-B

Pump Flow Rate, Liters/minute (FR)

Sample Time, minutes (T)

Sample Volume, Liters (V): 202

Total Fibers Counted, Sample (FCS): 101

Total Fields Counted, Sample (FLS): 87

Total Fibers Counted, Blank (FCB): 0

Total Fields Counted, Blank (FLB): 100

Area of Filter, mm^2 (AF): 385

Graticule Field Area, mm^2 (GFA): 0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 147.9 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.282 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. Eyl Date: 10/16/06

Reviewed By: Date: 10/17/06

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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION Sample #: M40548-007

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

1	1	—	1	2
—	—	1	—	½
2	3	—	1	2
1½	½	—	—	1
—	1½	—	1	1
—	1	—	½	1
—	2	—	1	1½
1	1	—	2½	2½
1	—	3	1	1
½	1½	—	—	—
½	1	2	1	—
½	1	1	2	—
1	2	—	1	2
—	1	4½	2	—
2	½	1	1½	4
—	2	3	—	1
1	—	—	—	—
—	1½	—	1	—
—	3½	1	2	2
2	—	2	—	—

Sample ID:	A-1-C
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	200
Total Fibers Counted, Sample (FCS)	96½
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 122.9 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.237 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: L. B. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # M40548-008

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

1	—	—	2½	2
4½	1	1	1½	2
3½	1	—	2½	6½
—	½	3	½	2
½	—	—	—	1
1½	2	2	2	1
1	1	1	½	½
1½	1½	—	2	5
½	1½	3	2	3½
—	3½	3	2	2
3	1	1	3	—
—	2	2	2½	—
3½	2	2½	1	4½

Sample ID:	A-1-D
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	200
Total Fibers Counted, Sample (FCS)	100
Total Fields Counted, Sample (FLS)	62
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 205.5 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.396 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. S. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-011

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

–	–	–	–	½	
½	1	–	½	–	10
–	–	–	–	–	
–	–	–	2	–	20
–	–	1	–	–	
–	–	–	–	–	30
–	½	1	–	–	
–	½	–	–	–	40
–	–	–	–	–	
–	–	–	–	½	50
1	–	–	–	–	
–	–	–	–	–	60
–	–	–	–	–	
–	–	–	–	–	70
1	–	–	–	–	
–	–	–	–	–	80
½	–	1	1	–	
–	–	–	–	–	90
–	–	–	–	–	
–	1	–	–	–	100

Sample ID: A-1-G

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	11280
Total Fibers Counted, Sample (FCS)	13
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 16.6 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.0006 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: L. B. Hall Date: 10/16/06

Reviewed By: Date: 10/17/06

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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-012

Analysis Date: 10/16/06 Media Type: 25 mm MCE Filter

2	½	2½	4½	1	
½	—	1	1	1½	10
2	2	1	3	1	
1½	1	—	2½	4	20
4	—	3	2½	—	
½	—	2	—	1½	30
—	1½	1½	—	3	
1	6	—	—	1	40
1	2	2	—	2	
3½	2½	1	1½	1	50
2	2	1	4	1	
1½	—	2	3	1	60
1	—	2	1	2½	
2½	4½	1½	1	3	70
1	1	1	2	3	
2½	1	2	—	4½	80
1	½	1	1	1½	
2	3½	1	½	½	90
2	1	—	1	1	
1½	1	1	1½	½	100

Sample ID: P-1-A

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	52
Total Fibers Counted, Sample (FCS)	100½ ~~197~~
Total Fields Counted, Sample (FLS)	65 ~~100~~
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

E = ((FCS/FLS)-(FCB/FLB))/GFA

E = 198.0 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 1.458 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: [signature] Date:

Reviewed By: [signature] Date: 10/17/06

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Suwanee, GA 30024
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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION Sample #: M40548-013

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

~	1½	1½	1	½	
—	—	—	1	5	10
2	1		1	1	
2½	3	2	1		20
1½		2	1	2	
2½	½			1	30
1½	1	2	6	1	
—	—	—	½	1½	40
1	1	1	½	[illegible]	
2½	1	—	—	2	50
—	—	1	2	1	
—	2	2½		1	60
½	3	1½		1	
1	2½	2½	1		70
1	3	3	—	1	
—	½	2½		1½	80
	1	2½	½	2	
1	1	½	1	1	90
1		1	1	1	
1½	—	1	1½	1½	100

Notes: _____

Sample ID:	P-1-B
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	49.6
Total Fibers Counted, Sample (FCS)	100
Total Fields Counted, Sample (FLS)	87
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = ~~63.2~~ 146.4 fibers/mm2
W.B.E.

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = ~~0.490~~ 1.137 fibers/cubic centimeter
W.B.E.

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. B. E. Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # M40 548-014

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

2	2 1/2	1		1/2
3 1/2		1		1
2	2	1	2	2
2 1/2	2 1/2	1	1/2	2
2	2 1/2		1	2
1	2	1 1/2		1
1/2	1/2	4	2	1 1/2
1	2	1	1	—
—	1/2	2 1/2	1	3
—	1	2	—	3
2 1/2	1/2	3	—	2
2	1 1/2	1 1/2	1/2	3 1/2
3	1	—	—	
1	—	2 1/2		1 1/2
1 1/2	3 1/2	3	—	1/2
1	—	2	2	1/2
2	—	—		1
3	1/2	1	2	2
1 1/2	—	2 1/2	2 1/2	1/2
1	2	1/2	1 1/2	—

Sample ID:	P-1-C
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	50.4
Total Fibers Counted, Sample (FCS)	102 1/2
Total Fields Counted, Sample (FLS)	73
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 178.4 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 1.366 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. B. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # MC10548-015

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

	1½	2	2	2	
1½	½	2	2	1	10
1	2½	1	—	5½	
—	2	3	1½	—	20
—	3	1½	3½	2	
—	1½	1	1	—	30
6	2½	—	1	2	
4	1	3	1½	—	40
—	—	½	—	3½	
1	2	3½	½	—	50
½	—	2½	1	1	
5	—	½	1	2½	60
—	2	2½	3	1	
1½	½	½	1	½	70
½	½	—	1	5	
1	1	1	—	1	80
—	1	2½	—	3	
1	1	1½	2	½	90
1	½	1	1	1	
1	1	1	2	—	100

Sample ID: P-1-D

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	70.8
Total Fibers Counted, Sample (FCS)	100½
Total Fields Counted, Sample (FLS)	66
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 1940 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 1.055 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W.B. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET Sample # M40548-016

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

3½	4½	½	2½	1
3	3½	2½	—	½
1	5½	2½	2	1
1½	4½	5½	2	—
2	5	1	1	1
2½	½	1	3½	1
—	3	3½	2	1
3	1	1	2	3½
5½	1	1	1	2½
1½	2	2	—	1

Sample ID:	A-2-A	
Pump Flow Rate, Liters/minute (FR)		
Sample Time, minutes (T)		
Sample Volume, Liters (V)	181.8	
Total Fibers Counted, Sample (FCS)	100	
Total Fields Counted, Sample (FLS)	47	
Total Fibers Counted, Blank (FCB)	0	
Total Fields Counted, Blank (FLB)	100	
Area of Filter, mm² (AF)	385	
Graticule Field Area, mm² (GFA)	0.00785	

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 271.0 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.574 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. D. Eyler Date: 10/16/06

Reviewed By: Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # M40548-017

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

1	1½	1	—	½
5	—	—	1	1
1½	1½	1	2	1
3	1	2	6	2
2½	1	3½	2	—
2	1	4½	—	2
6	3	½	1½	2½
3½	2	4½	1½	2½
1½	3½	1½	—	1
3½	—	1	—	4
1½	—	½	—	7

Sample ID:	A-2-B	
Pump Flow Rate, Liters/minute (FR)		
Sample Time, minutes (T)		
Sample Volume, Liters (V)	181.8	
Total Fibers Counted, Sample (FCS)	103	
Total Fields Counted, Sample (FLS)	55	
Total Fibers Counted, Blank (FCB)	0	
Total Fields Counted, Blank (FLB)	100	
Area of Filter, mm^2 (AF)	385	
Graticule Field Area, mm^2 (GFA)	0.00785	

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 238.6 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.505 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-018

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

6½	5	2	1	1½
1	4	2½	1	1
1½	—	4	3½	2
4	1	2	2	1
3½	1	3	—	2½
—	2	1	1	1½
2	1	3	1	1
½	3	2½	—	2
—	2	1½	7	1
—	2	5	2	½
1	2	4½	3	1½
1	2	1	1	3½
5	—	3	2	—

Sample ID: A-2-C

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	180
Total Fibers Counted, Sample (FCS)	100
Total Fields Counted, Sample (FLS)	51
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 249.8 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.534 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. B. Shl Date: 10/16/06

Reviewed By: Date: 10/17/06

Materials Analytical Services
3945 Lakefield Court
Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-019

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

3½	½	2½	2	1½
1	1½	—	1	—
2½	1	—	1	1
—	1	—	2½	½
1	1	—	1	—
1	1	1	2	—
—	2	2½	2	2
—	—	—	—	1
—	1	1	3	1
1	1	2	2	2
1½	—	2½	—	1
1½	2½	½	2	4
—	2	1½	2	—
1½	3	—	1	½
2	1	2	—	5
1½	1	—	2½	½
1½	1	1	1½	

Sample ID:	A-2-D
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	180
Total Fibers Counted, Sample (FCS)	101
Total Fields Counted, Sample (FLS)	84
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 153.2 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 0.328 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. B. [signature] Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-020

Analysis Date: 10/16/06 Media Type: 25 mm MCE Filter

3½	2	3	5½	2½
2	4	3	3	5½
3½	3½	2	2½	3½
2	4	3½	3	4
3	2½	1½	1½	5½
3	4½	3	1½	4
2½	5½	3½	2	2
4½				

Sample ID:	P-2-A
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	46.8
Total Fibers Counted, Sample (FCS)	103½
Total Fields Counted, Sample (FLS)	32
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 412.0 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 3,389 fibers/cubic centimeter

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. [signature] Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample #: M40548-021

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

2½	2	2½	2	4½
1	1	3½	2½	2
1	½	1½	5	2½
4	2½	2	—	2½
1½	3½	3	3	2½
2	2	½	3	2
3½	1	2	4	4
5½	3	½	2	3
3½	2	1½	2	1
½	1½	2½	3½	1½
2	½	2	4	1
2	5	1½	½	2½
3	1½	—	4	1
4	1½	1	3	2½
1	1½	1½	1	2½
—	4	1½	4½	5½
3½	2	1	3½	—
1	3	3	1½	2½
3				

Sample ID:	P-2-B
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	44.6
Total Fibers Counted, Sample (FCS)	100
Total Fields Counted, Sample (FLS)	41
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 310.7 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 2.682 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: W. B. [signature] Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # I740548-022

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

—	—	—	—	—
				—

10	Sample ID:	P-2-C
	Pump Flow Rate, Liters/minute (FR)	
20	Sample Time, minutes (T)	
	Sample Volume, Liters (V)	63.4
30		
	Total Fibers Counted, Sample (FCS)	0
40	Total Fields Counted, Sample (FLS)	100
	Total Fibers Counted, Blank (FCB)	0
50	Total Fields Counted, Blank (FLB)	100
	Area of Filter, mm^2 (AF)	385
60	Graticule Field Area, mm^2 (GFA)	0.00785

70 **Calculation of Fiber density (E) in Fibers/square millimeter**

80 $E = ((FCS/FLS)-(FCB/FLB))/GFA$

90 E = NA, LT fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = < 0.043 fibers/cubic centimeter

100

Notes: VOID
PUMP FAILURE

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. [signature] Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION Sample #: M40548-023

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

4	3	5½	2	6
2	1½	2½	1½	4
4½	3	2	4	3½
2½	2½	4	7	—
1½	6	3	1½	2½
3	4½	2	5	1
1½	½	1½	4	2

	Sample ID:	P-2-D
10		
	Pump Flow Rate, Liters/minute (FR)	
20	Sample Time, minutes (T)	
	Sample Volume, Liters (V)	63.7
30		
	Total Fibers Counted, Sample (FCS)	102½
40	Total Fields Counted, Sample (FLS)	34
	Total Fibers Counted, Blank (FCB)	0
50	Total Fields Counted, Blank (FLB)	100
	Area of Filter, mm^2 (AF)	385
60	Graticule Field Area, mm^2 (GFA)	0.00785

70 **Calculation of Fiber density (E) in Fibers/square millimeter**

80 $E = ((FCS/FLS)-(FCB/FLB))/GFA$

90 E = 384.0 **fibers/mm2**

100 **Calculation of Fiber Concentration (C) in Fibers/cubic centimeter**

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = 2.321 **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W.B. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: GASKET FABRICATION II Sample # M40548-024

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

					10
					20
					30
					40
					50
					60
					70
					80
					90
					100

Sample ID:	FB-1
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	0
Total Fibers Counted, Sample (FCS)	0
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = ND, <7 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = N/A **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W.B. Date: 10/16/06

Reviewed By: Date: 10/17/06

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Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: ~~A40~~ GASKET FABRICATION Sample # M40548-025

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

–	–	–	–	–	
–	–	–	–	–	10
–	½	–	–	–	
–	–	–	–	–	20
–	–	–	–	–	
–	–	–	–	–	30
–	–	–	–	–	
–	–	–	–	–	40
–	–	–	–	–	
–	–	–	–	–	50
–	–	–	–	–	
–	–	–	–	–	60
–	–	–	–	–	
–	–	–	–	–	70
–	–	–	–	–	
–	–	–	–	–	80
–	–	–	–	–	
–	–	–	–	–	90
–	–	–	–	–	
–	–	–	–	–	100

Sample ID:	FB-2
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	0
Total Fibers Counted, Sample (FCS)	½
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	
Total Fields Counted, Blank (FLB)	
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = ND, < 7 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = N/A **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. Eyl Date: 10/16/06

Reviewed By: Date: 10/17/06

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Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: CASKET FABRICATION II Sample # M40548-026

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

			1	

Sample ID:	FB-3
Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	0
Total Fibers Counted, Sample (FCS)	1
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	
Total Fields Counted, Blank (FLB)	
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = NO, 47 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = N/A **fibers/cubic centimeter**

Notes:

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: [signature] Date: 10/16/06

Reviewed By: [signature] Date: 10/17/06

Materials Analytical Services
3945 Lakefield Court
Suwanee, GA 30024
Phone (770) 866-3200

PCM Duplicate Counts QC Spreadsheet

Analyst:	W.B. Egeland	
Date:	10/16/2006	
Project No.:	M40548	
Client/Project Name:	Gasket Fabrication	

Sample No.	Fibers 1st Count	Fields 1st Count	Fibers 2nd Count	Fields 2nd Count	Fibers/mm^2 1st Count	Fibers/mm^2 2nd Count	CV for this range(fib/100 fld)	Absolute Difference	Maximum Permissible Difference	Pass/Fail
M40548-007	96.5	100	95.5	100	122.9	121.7	0.1586	0.06	3.65	Pass
M40548-014	102.5	73	101.5	75	178.9	172.4	0.1586	0.24	4.38	Pass
M40548-018	100.0	51	102.0	52	249.8	249.9	0.1586	0.00	5.21	Pass

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: _____ Sample # _____

Analysis Date: 10/16/06 Media Type: 25 mm MCE Filter

2	—	½	—	2
1	1	½	2	1½
—	—	3	—	1½
—	-	2	1	—
1½	1	1	1	1
—	½	1½	—	½
1	1	—	—	1
2	—	—	1½	—
—	1	½	½	½
2	1	4	—	½
2	—	—	1	2
½	½	1½	3	—
—	—	—	—	2
3	—	—	1	1
1½	—	1	2	—
—	—	2	2	1
2	2	2	1	½
—	3	1½	2	—
—	1½	1	1	2
2	3	—	1	½

Sample ID: REPLICATE M40548-007

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	
Total Fibers Counted, Sample (FCS)	95½
Total Fields Counted, Sample (FLS)	100
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm² (AF)	385
Graticule Field Area, mm² (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 121.7 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = _____ fibers/cubic centimeter

Notes: _____

Limit of Quantitation (LOQ) = 7 fibers/mm²

Fiber counts outside the 100-1300 fibers/mm² range have greater than optimal variability and are probably biased.

Analyst: _____ Date: 10/16/06

Reviewed By: _____ Date: 10/17/06

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Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: _____ Sample # _____

Analysis Date: 10/16/06 Media Type: 25 mm MCE Filter

2 1/2	3	—	1	2
1 1/2	2	2	2	—
2 1/2	1	—	1	2
2	2	1	1	1 1/2
2 1/2	—	2	1	1
1 1/2	1/2	2	1	3
2	2	1/2	—	2 1/2
1 1/2	1 1/2	1 1/2	1 1/2	—
2	2 1/2	1	1	1/2
2	2	2	—	1
—	—	2 1/2	1 1/2	1 1/2
2 1/2	2	1	1/2	1/2
1/2	1/2	1	2	1
1	—	—	—	1
2 1/2	1 1/2	3	—	2

Sample ID: REPLICATE 040548-014

Pump Flow Rate, Liters/minute (FR) _____

Sample Time, minutes (T) _____

Sample Volume, Liters (V) _____

Total Fibers Counted, Sample (FCS) 101 1/2

Total Fields Counted, Sample (FLS) 75

Total Fibers Counted, Blank (FCB) 0

Total Fields Counted, Blank (FLB) 100

Area of Filter, mm^2 (AF) 385

Graticule Field Area, mm^2 (GFA) 0.01785

Calculation of Fiber density (E) in Fibers/square millimeter

E = ((FCS/FLS)-(FCB/FLB))/GFA

E = 172.4 fibers/mm2

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = _____ fibers/cubic centimeter

Notes: _____

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: W. B. Jr Date: 10/16/06

Reviewed By: Date: 10/17/06

Materials Analytical Services
3945 Lakefield Court
Suwanee, GA 30024
Phone (770) 866-3200

Materials Analytical Services Airborne Fiber Analysis
NIOSH 7400 Issue 2; Phase Contrast Microscopy

Project Name: _____ Sample #: _____

Analysis Date: 10/16/06 Media Type: **25 mm MCE Filter**

3 1/2	1	2 1/2	1 1/2	1 1/2
4	2	2	1 1/2	2 1/2
3	—	2 1/2	1 1/2	2
3 1/2	2	1	1	4
2 1/2	1 1/2	2 1/2	1/2	—
—	2 1/2	3	2 1/2	3
1 1/2	2	2	3	1 1/2
2 1/2	4	1	2	1/2
2	1	—	1 1/2	5
1	1/2	2	2 1/2	—
2 1/2	2 1/2			

Sample ID: REPLICATE M40548-018

Pump Flow Rate, Liters/minute (FR)	
Sample Time, minutes (T)	
Sample Volume, Liters (V)	
Total Fibers Counted, Sample (FCS)	102
Total Fields Counted, Sample (FLS)	52
Total Fibers Counted, Blank (FCB)	0
Total Fields Counted, Blank (FLB)	100
Area of Filter, mm^2 (AF)	385
Graticule Field Area, mm^2 (GFA)	0.00785

Calculation of Fiber density (E) in Fibers/square millimeter

$$E = ((FCS/FLS)-(FCB/FLB))/GFA$$

E = 249.9 **fibers/mm2**

Calculation of Fiber Concentration (C) in Fibers/cubic centimeter

$$C = \frac{(E)*(AF)}{1000 * V}$$

C = _____ **fibers/cubic centimeter**

Notes: _____

Limit of Quantitation (LOQ) = 7 fibers/mm^2

Fiber counts outside the 100-1300 fibers/mm^2 range have greater than optimal variability and are probably biased.

Analyst: L.B. Date: 10/16/06

Reviewed By: Date: 10/17/06

Materials Analytical Services
3945 Lakefield Court
Suwanee, GA 30024
Phone (770) 866-3200

SECTION 5

MATERIALS ANALYTICAL SERVICES
PROJECT COC

MAS ID:	M40548	**Client Job No:**	
Client Name:	Materials Analytical Services Atlanta	**Client PO:**	
Project Name:	ECL Gasket Fabrication II	**Date In:**	9/19/2006
Logged By:	Nancy Sears	**Client Code:**	MASCORP

TRANSPORT INFORMATION:

Submitted By:	Mike Mount	**Documents:**	COC
Delivery By:	Hand Delivery		
Received By:	Nancy Sears	**Comments for COC:**	
Condition:	OK		

CONTACT INFORMATION:

Contact:	Bill Longo			**Work Phone:** (770) 866-3200	**Ext:**
Title:	**First Name**	**Last Name:**	**Suffix**	**Other Phone**	**Ext:**
Mr.	William	Longo		**Fax:** (770) 866-3259	

SAMPLE INFORMATION:

#	Client ID	Volume	#	Client ID	Volume
001	A-O-A	1800	017	A-2-B	181.8
002	A-O-B	1800	018	A-2-C	180
003	A-O-C	1800	019	A-2-D	180
004	A-O-D	1800	020	P-2-A	46.8
005	A-1-A	202	021	P-2-B	44.6
006	A-1-B	202	022	P-2-C	63.4
007	A-1-C	200	023	P-2-D	63.7
008	A-1-D	200	024	FB-1	0
009	A-1-E	630	025	FB-2	0
010	A-1-F	50	026	FB-3	0
011	A-1-G	11280			
012	P-1-A	52			
013	P-1-B	49.6			
014	P-1-C	50.4			
015	P-1-D	70.8			
016	A-2-A	181.8			

SIGNATURES

RECEIVED BY: Amaggiano **ANALYZED BY:** _____

REVIEWED BY: _____ **REPORTED BY:** _____

PREPARED BY: _____ **DEPOSED BY:** _____

010 Relinquished 9/19/06 by Amaggiano
Sent to MAS Raleigh & Don Porterfield
as per Bill Longo 9/19/06 fedex

M40548 Page 1 of 2

75°F 40%rH 235 CFM

INDUSTRIAL HYGIENE AIR SAMPLING CHAIN OF CUSTODY

MAS

3945 Lakefield Court
Suwanee, GA 30024
Phone: 770-866-3200
Fax: 770-866-3259

COMPANY NAME: Dept 14
ADDRESS:
PHONE:
FAX:

PROJECT NUMBER:
PROJECT NAME: Gasket Fabrication II
WORK AREA DESCRIPTION: ECL
PROJECT REPRESENTATIVE: M. Mount
SAMPLING DATE: 9/18/06

TURNAROUND TIMES: _____ 1 DAY _____ 3 DAYS _____ STANDARD 5 –7 DAYS

DATE	SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE MEDIA	ANALYSIS DESIRED	START TIME	STOP TIME	TOTAL TIME MINUTES	AVERAGE FLOW RATE LPM	AIR VOLUME (LITERS)
9/18/06	A-0-A	Background - NE	MCE	7400, 7402	9:00	12:00	180	10.0	1800.0
2	B	SE							
3	C	SW							
4	D	NW							
5	A-1-A	Area, NE, During fabrication		7402, 7402	2:08	2:28	20	10.1	202.0
6	B	SE						10.1	202.0
7	C	SW						10.0	200.0
8	D	NW		7402				10.0	200.0
9	E	Northside		for Addison Davies Rep		2:50	102	15.0	1530.0
10	F	Northside	Poly Carb.	for SEM to Raleigh		2:28	20	2.5	50.0
11	G	Outside ECL	MCE	7400		1000	1000	10.0	11280.
12	P-1-A	Personal, Right		7400 + 7402				2.6	52.0
13	B	Left		7402				2.48	49.6
14	C	Right						3.52	50.4
15	D	Left						3.54	70.8
16	A-2-A	Area, NE, During Fab + File		7402	2:335	2:51	18	10.1	181.8
17	B	SE						10.1	181.8
18	C	SW						10.0	180
19	D	NW		7402				10.0	180

CHAIN OF CUSTODY	NAME	COMPANY	MODE OF TRANSFER	LOG IN DATE	RECEIVED BY	COMPANY
First Transfer by:	Michael D. Mount	MAS 9/18/06	Hand	9/19/06	Dan Sears	MAS
Second Transfer by:						
Third Transfer by:						

M40548 Page 2 of 2

INDUSTRIAL HYGIENE AIR SAMPLING CHAIN OF CUSTODY

MAS

3945 Lakefield Court
Suwanee, GA 30024
Phone: 770-866-3200
Fax: 770-866-3259

COMPANY NAME: Dept 14
ADDRESS:
PHONE:
FAX:

PROJECT NUMBER:
PROJECT NAME: Gasket Fabrication II
WORK AREA DESCRIPTION: ECL
PROJECT REPRESENTATIVE: M. Mount
SAMPLING DATE: 9/18/06

TURNAROUND TIMES: _____ 1 DAY _____ 3 DAYS _____ STANDARD 5 –7 DAYS

DATE	SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE MEDIA	ANALYSIS DESIRED	START TIME	STOP TIME	TOTAL TIME MINUTES	AVERAGE FLOW RATE LPM	AIR VOLUME (LITERS)
9/18/06	P-2-A	Regional, Right, During Fab+File	MCE	7400, 7402	2:33	2:51	18	2.6	46.8
	B	Left,		7402				2.48	44.6
	C	Right,						3.52	63.4
	D	Left)						3.54	63.7
	FB-1	Field Blank		7402	—	—	—	—	0
	FB-2				—	—	—	—	0
M40549	FB-3				—	—	—	—	0
	FAB-1	Shirt Before		EPA Fabric Method	—	—	—	—	
	FAB-2	Shirt After			—	—	—	—	
									CM²
	MV-1	Dust from side of pipe	.45 MCE	ASTM 5557	—	—	—	—	100
M40550	MV-2	Flange face			—	—	—	—	400

CHAIN OF CUSTODY	NAME	COMPANY	MODE OF TRANSFER	LOG IN DATE	RECEIVED BY	COMPANY
First Transfer by:	Michael D Mount	MAS 9/18/06	Hand	9/19/06	Rangsaeo	MAS
Second Transfer by:						
Third Transfer by:						

MAS TEM ANALYSIS M40548-001

CLIENT NAME: Materials Analytical Services Atlanta CLIENT SAMPLE ID: A-O-A

7402 ANALYSIS

Sample Area/ Volume:	1800 Liters		Date Analyzed:	10/3/2006	
Filter Type:	MCE 25mm		Analyst:	Kevin Simpson	
Pore size:	0.8		Scope Number:	3	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	Yes	4 %	Grid_box:	7179	

Number of grids: 2 #1: 106 #3: 104
Number of openings: 40 #2: 103 #4: 105

Asbestos 0
Non-asbestos 1

Average Grid Size: 0.010919 Total Area Analyzed: 0.437

% Asbestos 0

Str#:	SquareID:	Fiber Type:		Size		Morph.	SAED	EDS
NSD	A4-D8							
NSD	D7							
NSD	D6							
NSD	D5							
NSD	D4							
NSD	D3							
NSD	D2							
NSD	D1							
NSD	E7							
NSD	E6							
NSD	E5							
NSD	E4							
NSD	E3							
NSD	E2							
NSD	E1							
NSD	F5							
NSD	F4							
NSD	F3							
1	F2	NA		6	1.5	Ambiguous	Ambiguous	✓
NSD	F1							
NSD	A3-C2							
NSD	C3							
NSD	C4							
NSD	C5							
NSD	C6							
NSD	C7							
NSD	C8							
NSD	C9							

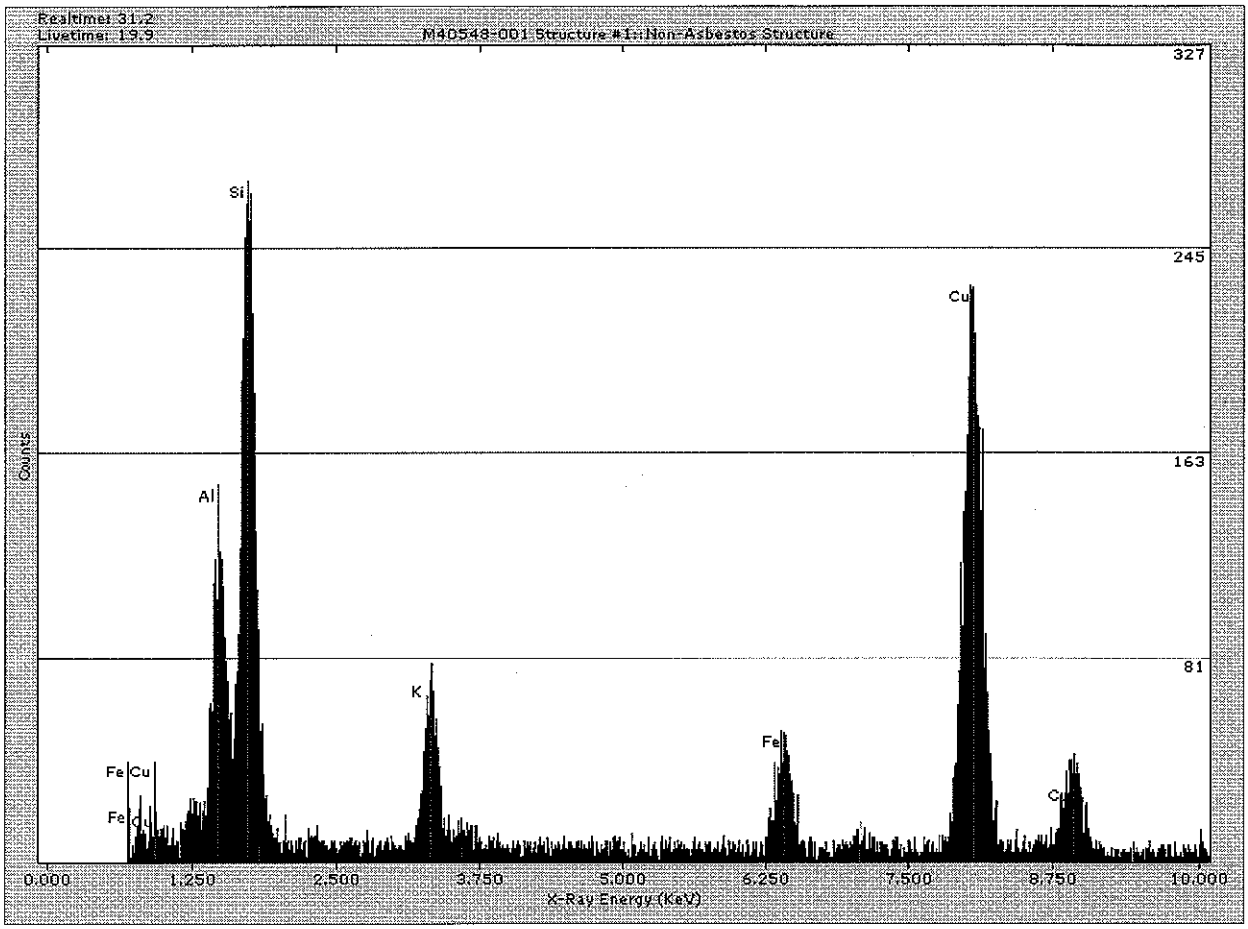
NSD	C10		
NSD	D2		
NSD	D3		
NSD	D4		
NSD	D5		
NSD	D6		
NSD	D7		
NSD	D8		
NSD	D9		
NSD	D10		
NSD	E7		
NSD	E8		

Grid Op

40

M40548 001 Sample Comments:

NE background


Realtime: 31.2
Livetime: 19.9
M40548-001 Structure #1: Non-Asbestos Structure
327
245
163
81
Counts
Si
Al
K
Fe
Cu
Fe
Cu
Fe
Cu
Cl
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-004

CLIENT NAME: Materials Analytical Services Atlanta **CLIENT SAMPLE ID:** A-O-D

7402 ANALYSIS

Sample Area/ Volume:	1800 Liters		**Date Analyzed:**	11/7/2006	
Filter Type:	MCE 25mm		**Analyst:**	K. Simpson	
Pore size:	0.8		**Scope Number:**	3	
Effective Filter Area:	385		**Accelerating Voltage:**	100	KV
Sample type:	Air		**Indicated Mag:**	25	KX
Analysis type:	7402		**Screen Mag:**	20	KX
Grid Acceptance	Yes	3 %	**Grid_box:**	7179	

Number of grids: 2 **#1:** 101 **#3:** 103
Number of openings: 40 **#2:** 102 **#4:** 104

Asbestos 0
Non-asbestos 0

Average Grid Size: 0.010507 **Total Area Analyzed:** 0.420

% Asbestos 0

Str#:	SquareID:	Fiber Type:	Size	Morph:	SAED:	EDS:
NSD	C1-J8					
NSD	I8					
NSD	H8					
NSD	G8					
NSD	F8					
NSD	E8					
NSD	D8					
NSD	C8					
NSD	B8					
NSD	A8					
NSD	J10					
NSD	I10					
NSD	H10					
NSD	G10					
NSD	F10					
NSD	E10					
NSD	D10					
NSD	C10					
NSD	B10					
NSD	A10					
NSD	E1-C10					
NSD	C9					
NSD	C8					
NSD	C7					
NSD	C6					
NSD	C5					
NSD	C4					
NSD	C3					

NSD	C2		
NSD	C1		
NSD	E10		
NSD	E9		
NSD	E8		
NSD	E7		
NSD	E6		
NSD	E5		
NSD	E4		
NSD	E3		
NSD	E2		
NSD	E1		

Grid Op

40

M40548 004 Sample Comments:

NW background

MAS TEM ANALYSIS M40548-005

CLIENT NAME: Materials Analytical Services Atlanta **CLIENT SAMPLE ID:** A-1-A

7402 ANALYSIS

Sample Area/ Volume:	202 Liters		**Date Analyzed:**	11/7/2006	
Filter Type:	MCE 25mm		**Analyst:**	K. Simpson	
Pore size:	0.8		**Scope Number:**	3	
Effective Filter Area:	385		**Accelerating Voltage:**	100	KV
Sample type:	Air		**Indicated Mag:**	25	KX
Analysis type:	7402		**Screen Mag:**	20	KX
Grid Acceptance	Yes	8 %	**Grid_box:**	7179	

Number of grids: 2 **#1:** 103 **#3:** 101
Number of openings: 23 **#2:** 102 **#4:** 104

Average Grid Size: 0.010505 **Total Area Analyzed:** 0.242

Asbestos 99
Non-asbestos 1

% Asbestos **99**

Str#:	SquareID:	Fiber Type:		Size		Morph:	SAED:	EDS:
1	A8-G2		Chrysotile	8	0.6	M36405	M36404	☑
2			Chrysotile	11	0.3	Chrysotile	Chrysotile	☑
3			Chrysotile	8	0.3	Chrysotile	Chrysotile	☑
4	G3		Chrysotile	48	3	Chrysotile	Chrysotile	☑
5			Chrysotile	8	0.8	Chrysotile	Chrysotile	☑
6			Chrysotile	10	0.8	Chrysotile	Chrysotile	☑
7	G4		Chrysotile	7	0.3	Chrysotile	Chrysotile	☑
8			Chrysotile	6	1	Chrysotile	Chrysotile	☑
9			Chrysotile	7.2	0.3	Chrysotile	Chrysotile	☑
10	I1		Chrysotile	14	0.4	Chrysotile	Chrysotile	☑
11			Chrysotile	14	0.8			☐
12			Chrysotile	10	0.4			☐
13			Chrysotile	8	0.6			☐
14			Chrysotile	24	5			☐
15			Chrysotile	9	4			☐
16			Chrysotile	5.2	0.3			☐
17	I2		Chrysotile	28	1.5	M36406	Chrysotile	☐
18			Chrysotile	35	4	M36406	Chrysotile	☐
19			Chrysotile	40	8	M36406	Chrysotile	☐
20			Chrysotile	24	6	M36406	Chrysotile	☑
21			Chrysotile	30	4	M36406	Chrysotile	☐
22			Chrysotile	32	1.5	M36406	Chrysotile	☐
23			Chrysotile	8	0.3	M36406	Chrysotile	☐
24			Chrysotile	20	5	M36406	Chrysotile	☐
25			Chrysotile	8	0.4	M36406	Chrysotile	☐
26			Chrysotile	16	3	M36406	Chrysotile	☐
27			Chrysotile	14	0.5	M36406	Chrysotile	☐
28			Chrysotile	8	0.6			☐

29	I3		Chrysotile	14	2.5			☐
30			Chrysotile	5.8	0.3	Chrysotile	Chrysotile	☑
31			Chrysotile	5.1	0.3			☐
32			Chrysotile	8	0.6			☐
33			Chrysotile	7.5	0.3			☐
34	I4		Chrysotile	5.3	0.3			☐
35	I5		Chrysotile	8	0.3			☐
36		NA		7	2	Ambiguous	Ambiguous	☑
37	I6		Chrysotile	8	0.3			☐
38	G1		Chrysotile	6.6	0.3			☐
39			Chrysotile	8	0.5			☐
40			Chrysotile	10	0.5	Chrysotile	Chrysotile	☑
41			Chrysotile	6	0.3			☐
42			Chrysotile	18	4			☐
43			Chrysotile	24	8			☐
44	D1		Chrysotile	20	5			☐
45	D2		Chrysotile	6	0.3			☐
46			Chrysotile	24	0.4			☐
47			Chrysotile	6.5	0.3			☐
48			Chrysotile	6.7	0.3			☐
49			Chrysotile	8	1			☐
50			Chrysotile	6	0.4	Chrysotile	Chrysotile	☑
51			Chrysotile	15	0.6			☐
52	A6-A6		Chrysotile	6	0.3			☐
53			Chrysotile	8	0.3			☐
54	B6		Chrysotile	32	0.3			☐
55			Chrysotile	8	0.3			☐
56			Chrysotile	11	0.3			☐
57			Chrysotile	24	4			☐
58	C6		Chrysotile	8	0.3			☐
59			Chrysotile	12	0.4			☐
60			Chrysotile	13	1	Chrysotile	Chrysotile	☑
61	D6		Chrysotile	32	4			☐
62			Chrysotile	8	2			☐
63			Chrysotile	8.5	0.4			☐
64			Chrysotile	5.2	0.3			☐
65			Chrysotile	8	0.6			☐
66	E6		Chrysotile	5.3	0.4			☐
67			Chrysotile	6.8	1			☐
68	F6		Chrysotile	17	0.3			☐
69			Chrysotile	8.5	0.45			☐
70			Chrysotile	8	0.6	Chrysotile	Chrysotile	☑
71	G6		Chrysotile	11	1.5			☐
72			Chrysotile	12	1.5			☐
73			Chrysotile	23	1.5			☐
74			Chrysotile	8	2			☐
75			Chrysotile	10	3			☐
76			Chrysotile	8	0.3			☐
77			Chrysotile	6	0.3			☐
78			Chrysotile	7.5	0.28			☐
79	H6		Chrysotile	8	0.6			☐
80			Chrysotile	9	2	Chrysotile	Chrysotile	☑
81			Chrysotile	6.5	0.3			☐
82			Chrysotile	8	2			☐

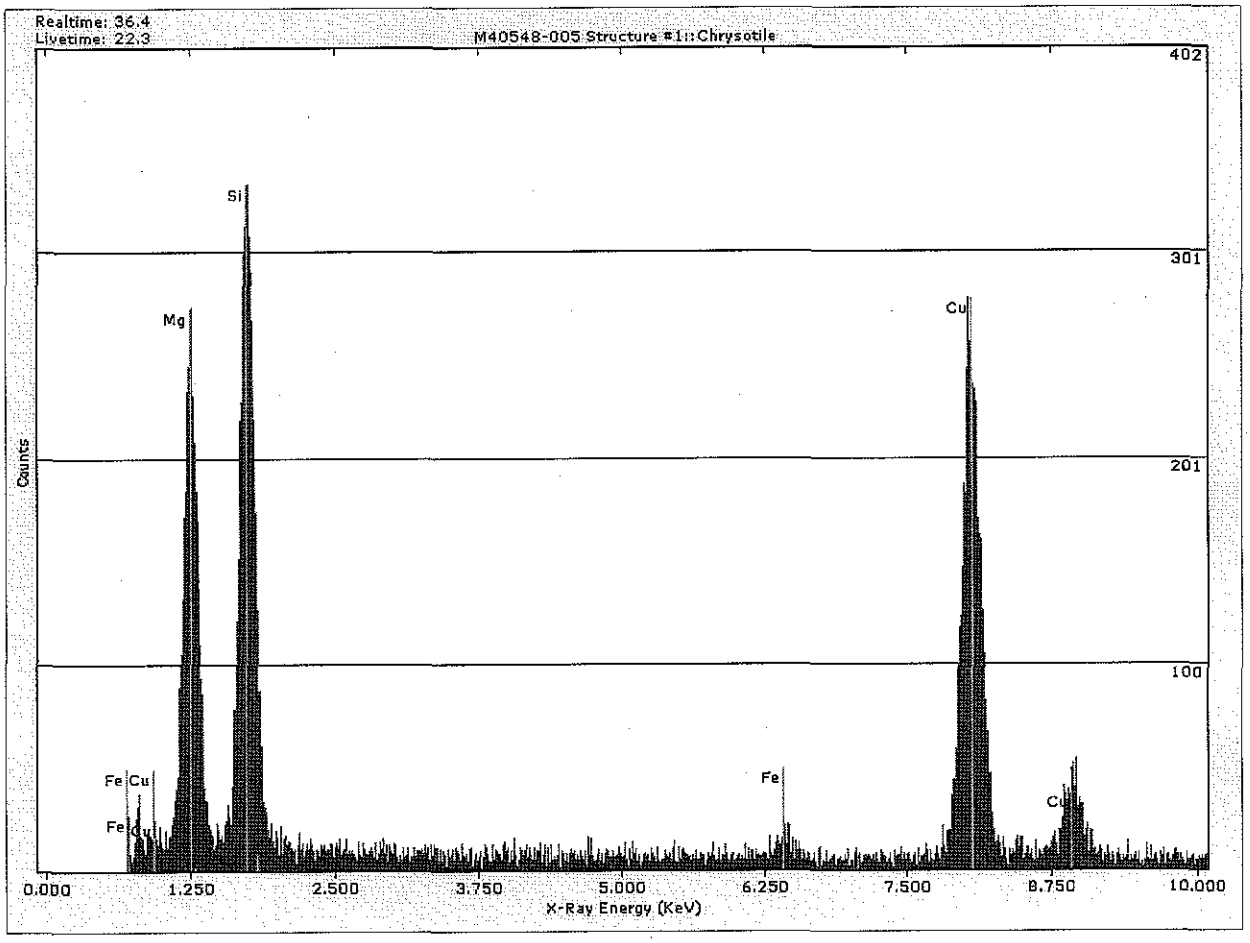
83			Chrysotile	6	0.6			
84			Chrysotile	5.5	0.4			
85			Chrysotile	12	0.28			
86			Chrysotile	24	0.6			
87			Chrysotile	22	1			
88			Chrysotile	14	1.5			
89			Chrysotile	8	0.3			
90	I6		Chrysotile	18	2.5	Chrysotile	Chrysotile	☑
91			Chrysotile	16	1.2			
92			Chrysotile	6.5	0.28			
93			Chrysotile	8	0.28			
94	C4		Chrysotile	12	0.5			
95			Chrysotile	6.5	0.4			
96			Chrysotile	6.3	0.7			
97			Chrysotile	5.5	0.27			
98			Chrysotile	6	0.28			
99	D4		Chrysotile	10	0.6			
100			Chrysotile	6	0.4	Chrysotile	Chrysotile	☑

Grid Op

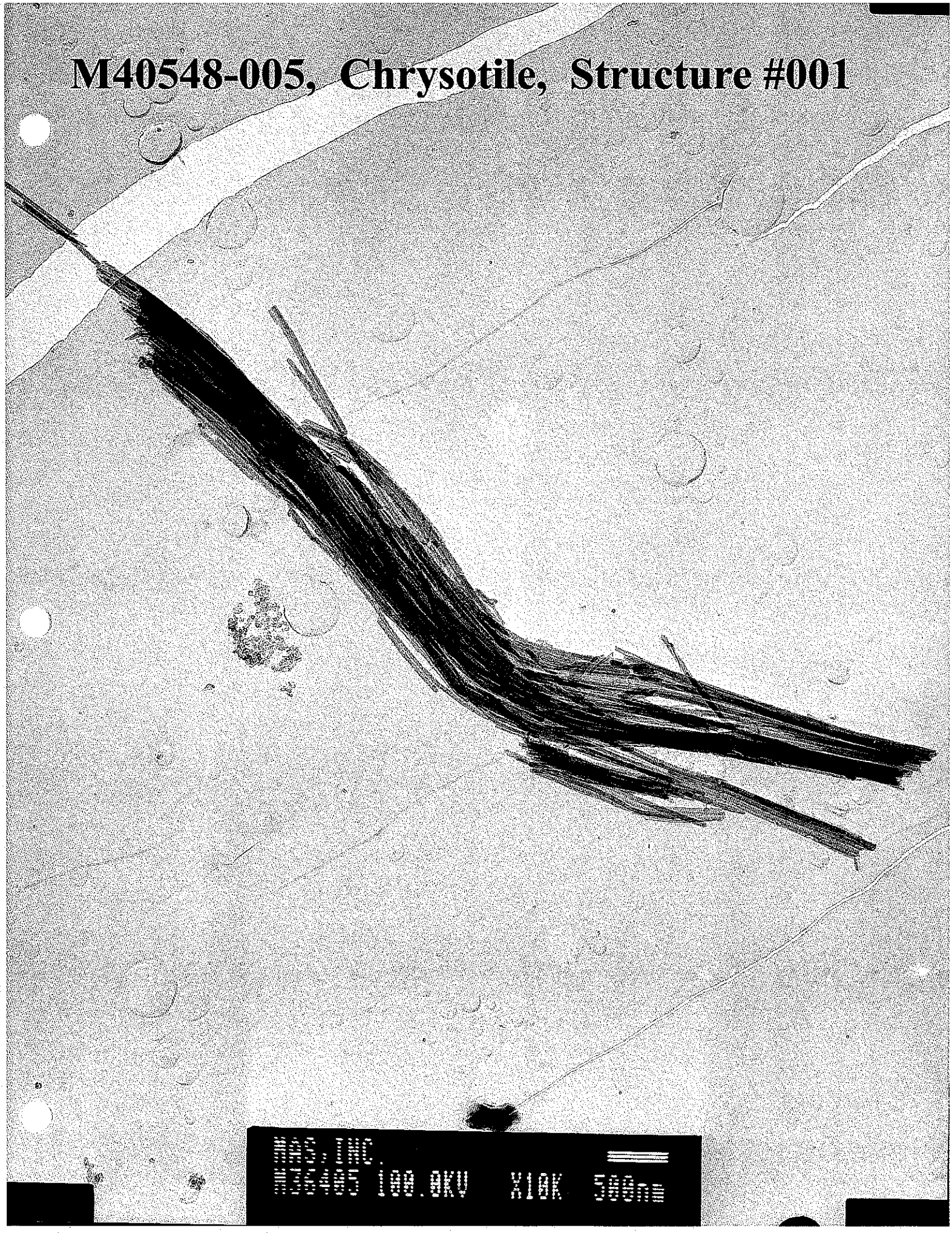
23

M40548 005 Sample Comments:

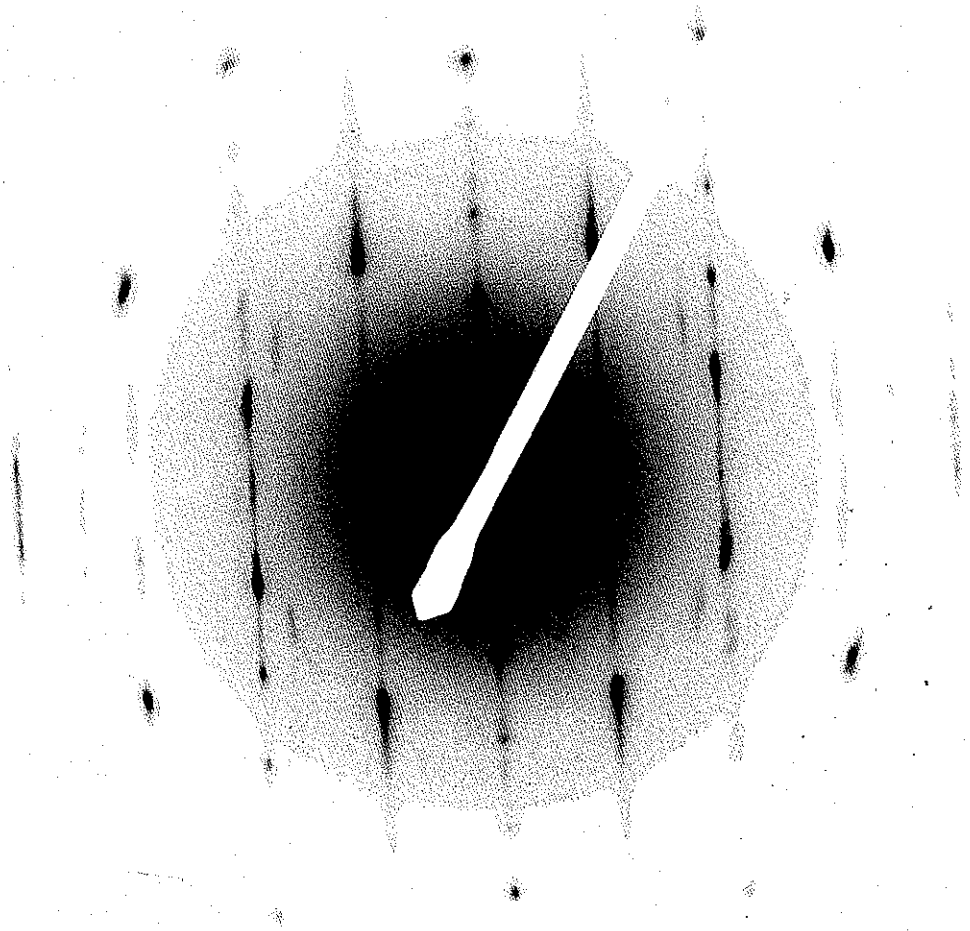
NE area during fabrication


Realtime: 36.4
Livetime: 22.3
M40548-005 Structure #1::Chrysotile
402
301
201
100
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

M40548-005, Chrysotile, Structure #001



M40548-005, Chrysotile Diffraction, Str. #001



MAS, INC.
M36484 100.0KV 80.0cm

VERIFICATION OF CHRYSOTILE DIFFRACTION PATTERNS

1) Measure three spots and/or the interrow spacing on the diffraction pattern (in mm).

2) Use the formula:

$$\frac{\text{CAMERA CONSTANT (mmA)}}{\text{MEASURED DISTANCE (mm)}} = \text{SPACING (in Angstroms, A)}$$

3) The calculated spacings should be within +/- 5% tolerance of the d-spacings listed in the chart.

4) The following chart shows the chrysotile d-spacing values from the Mineral Powder Diffraction File Data Book from file card #31-808 on page 228.

hkl	d Spacing (in A)	Range +/- 5%
002	7.31	6.94 - 7.68
004	3.65	3.47 - 3.83
202	2.45	2.33 - 2.57
200	2.65	2.52 - 2.78
110	4.59	4.36 - 4.82
330	1.53	1.45 - 1.61
Interrow	5.31	5.04 - 5.58

$\frac{28.8\,mmA}{5.25mm} = 5.49\,A$

by 5.25

Reflection Spot 004: (camera K) 28.8 mmA / (measured distance) 8.0 mm = 3.60 A (calculated spacing) ✓

Reflection Spot 110: (camera K) 28.8 mmA / (measured distance) 6.0 mm = 4.80 A (calculated spacing) ✓

Reflection Spot 202: (camera K) 28.8 mmA / (measured distance) 11.5 mm = 2.50 A (calculated spacing) ✓

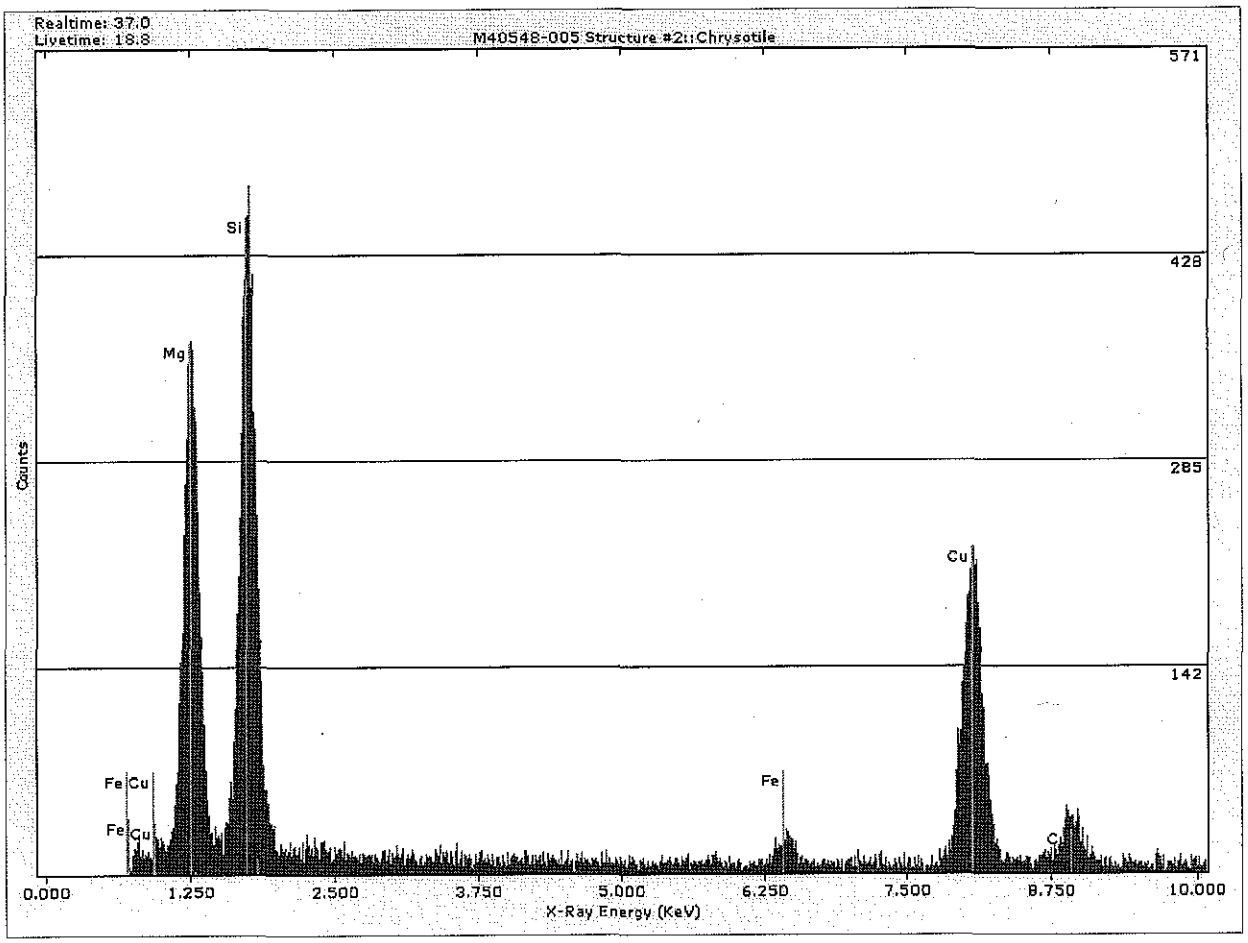
MAS Job #: M40548-005 Film #: M 36404

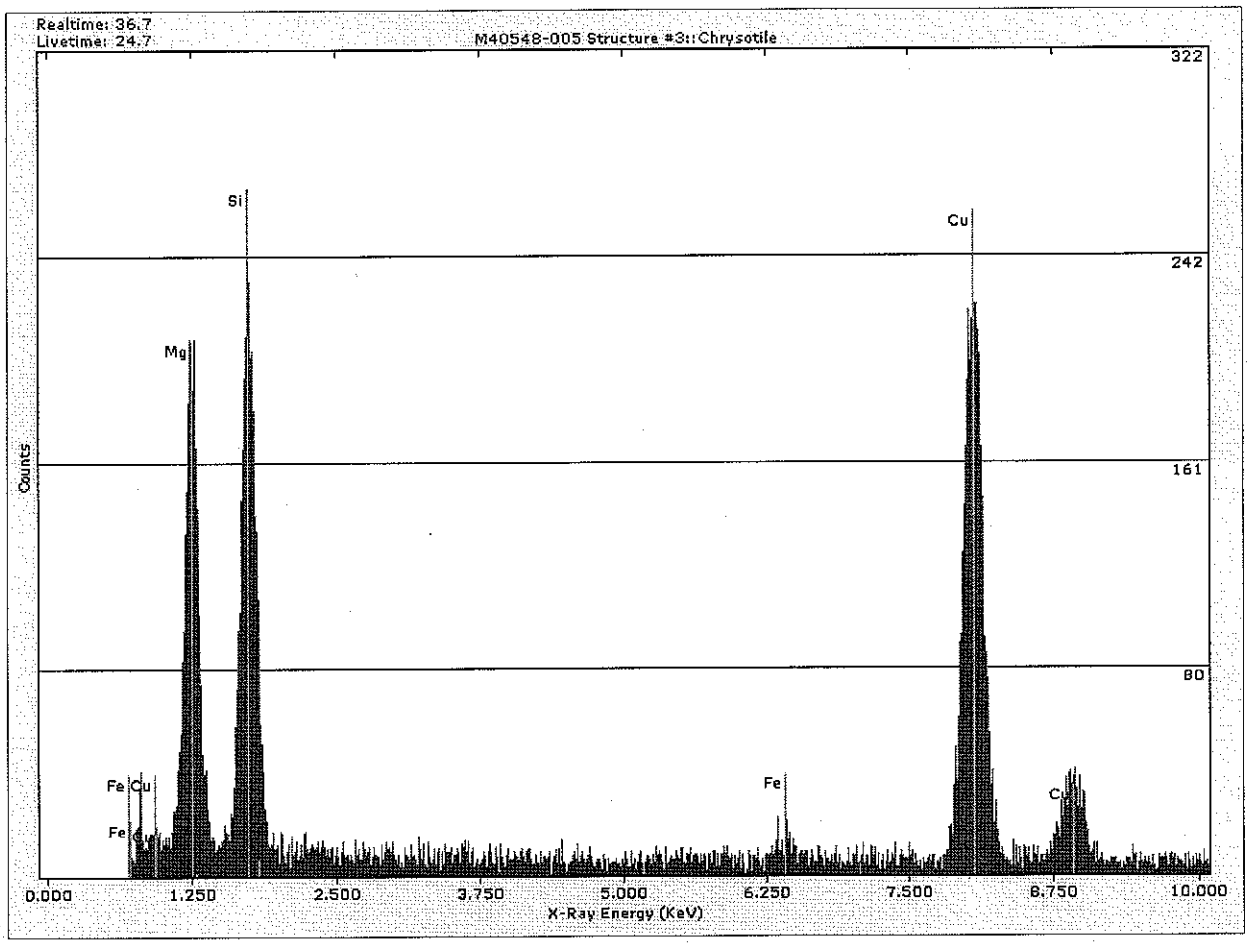
Analyst: KJ / KJ Date Photo was taken: 11/07/06

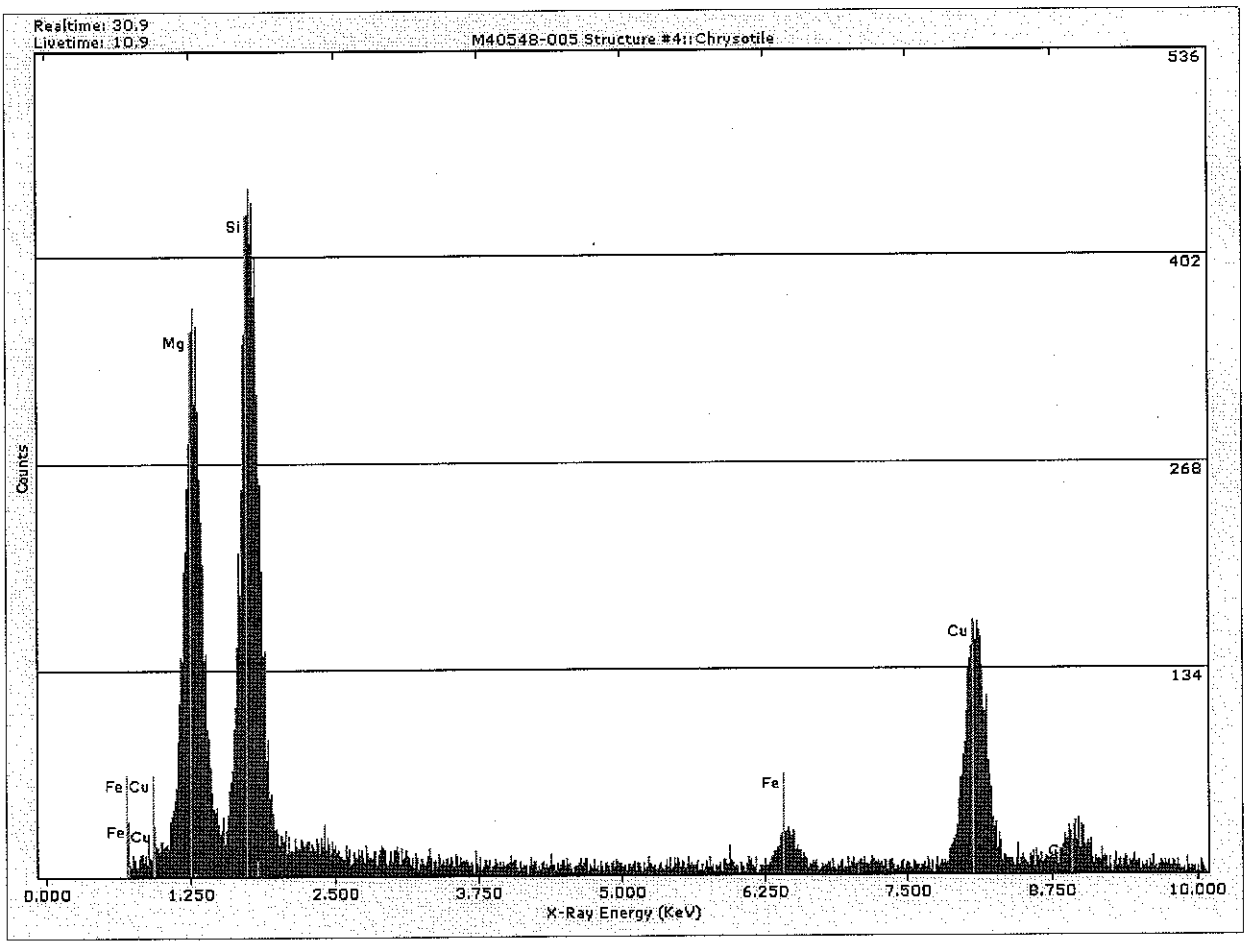
Date Verified: 11/10/06 EDS Verified: (YES) NO

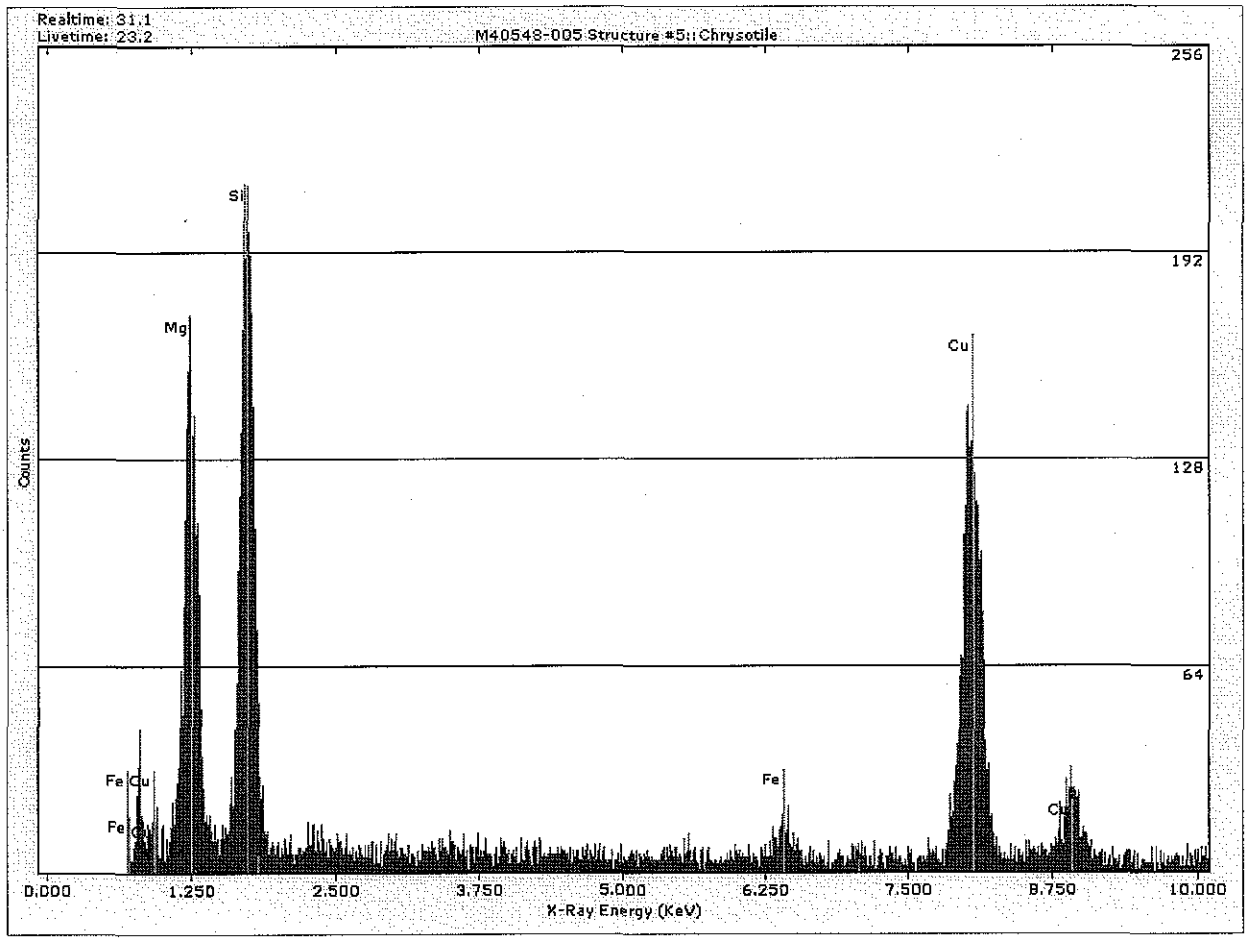
Unable to verify pattern _____ Explanation: _____

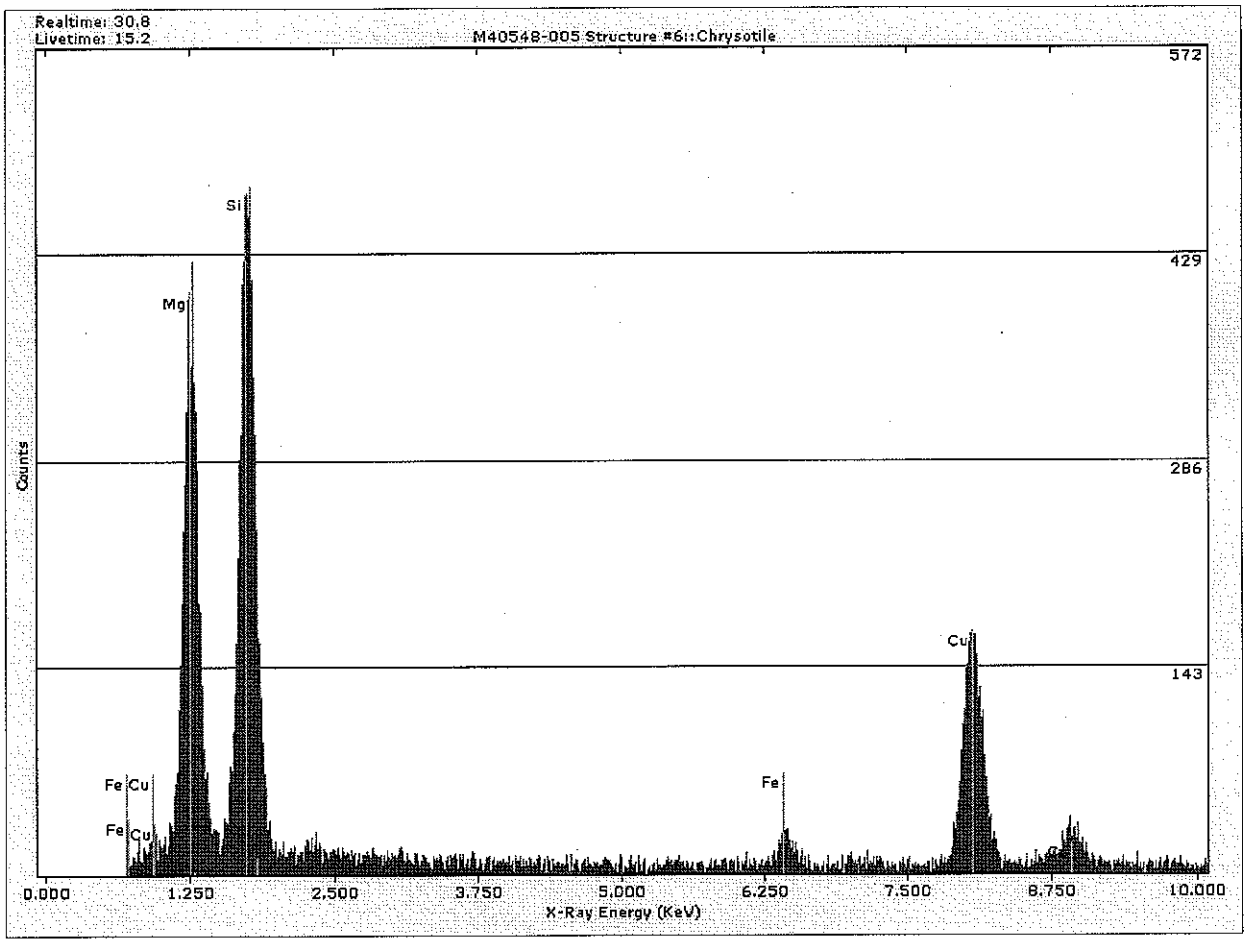
STR#4

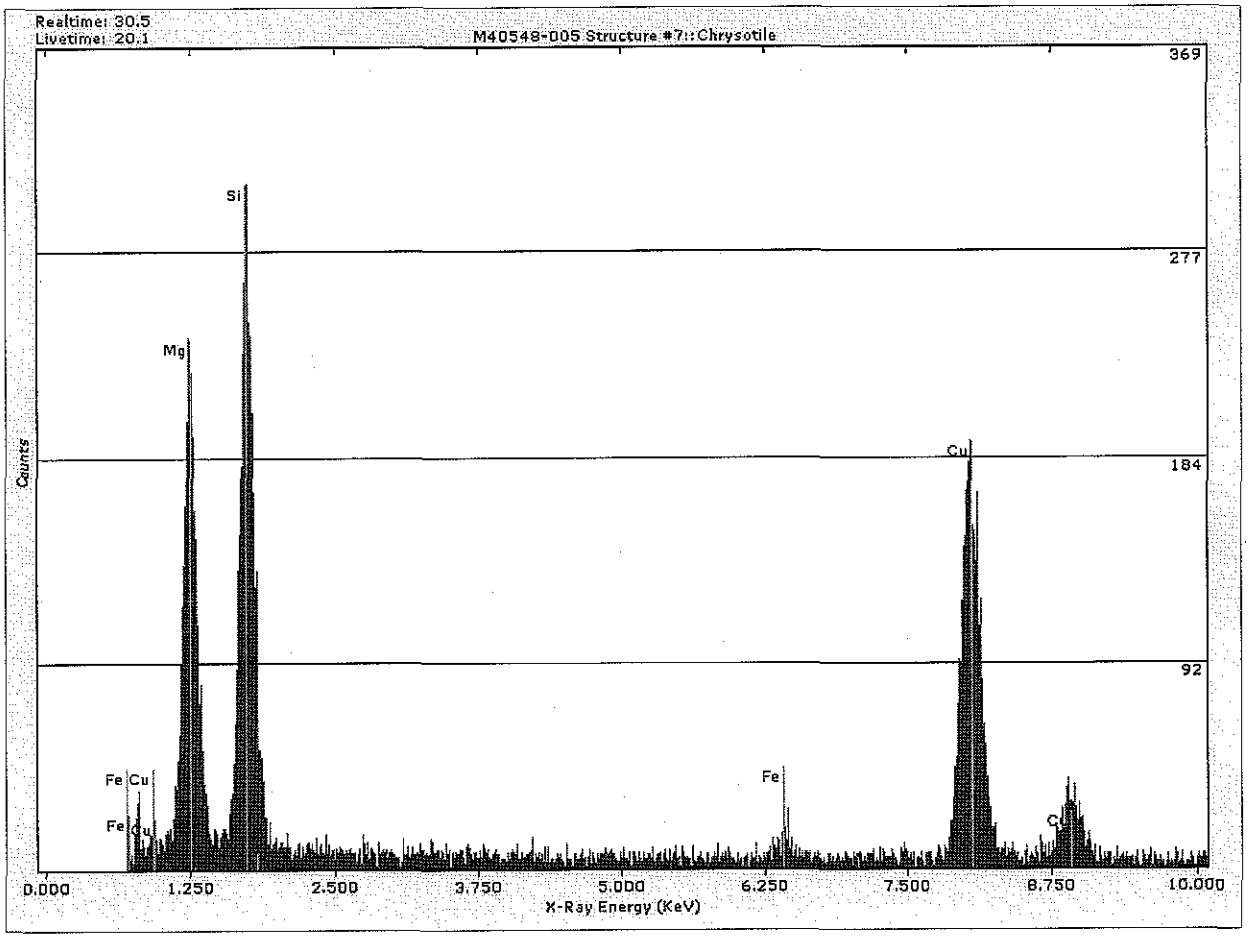

Realtime: 37.0
Livetime: 18.8
M40548-005 Structure #2::Chrysotile
571
428
285
142
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

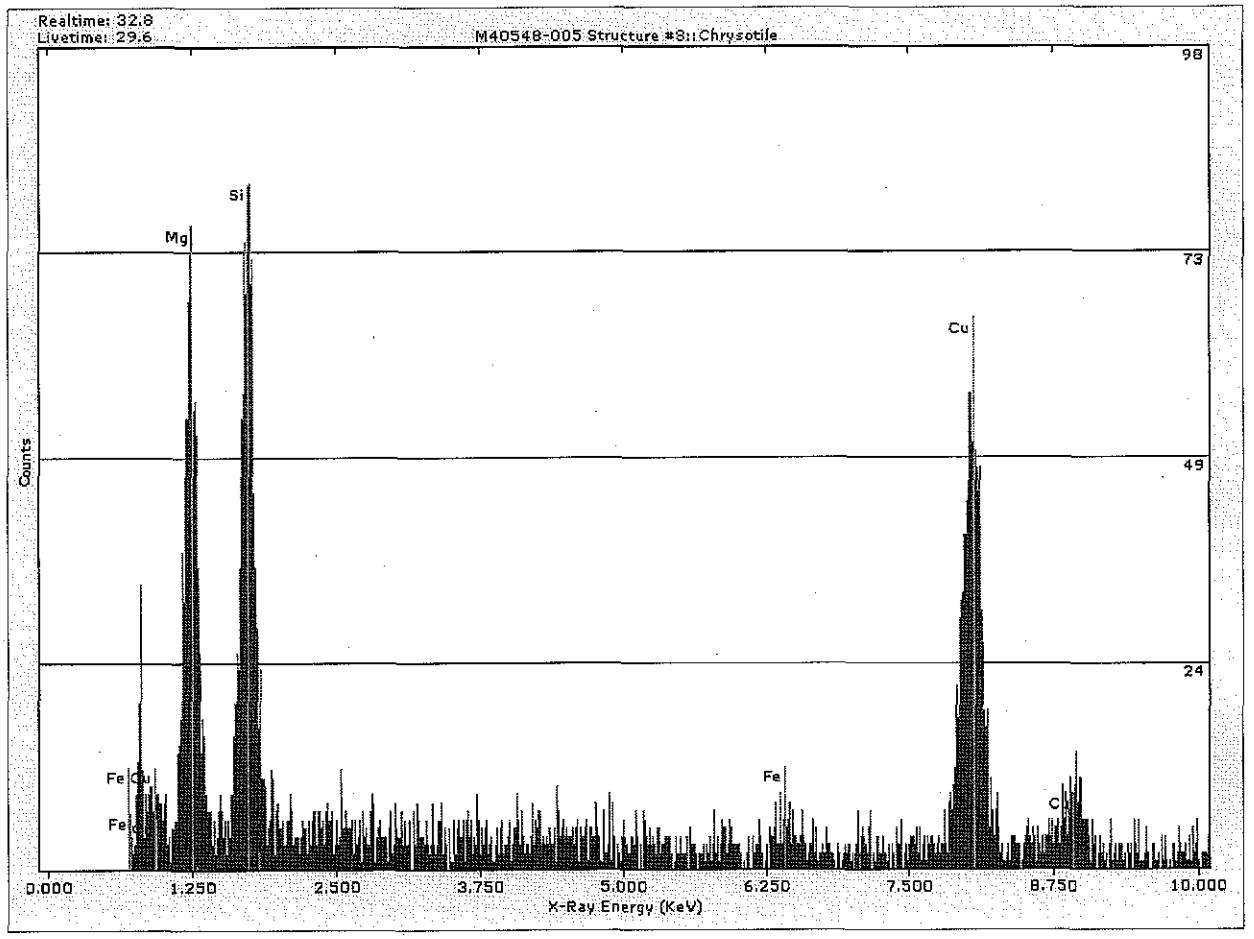

Realtime: 36.7
Livetime: 24.7
M40548-005 Structure #3:: Chrysotile
322
242
161
80
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

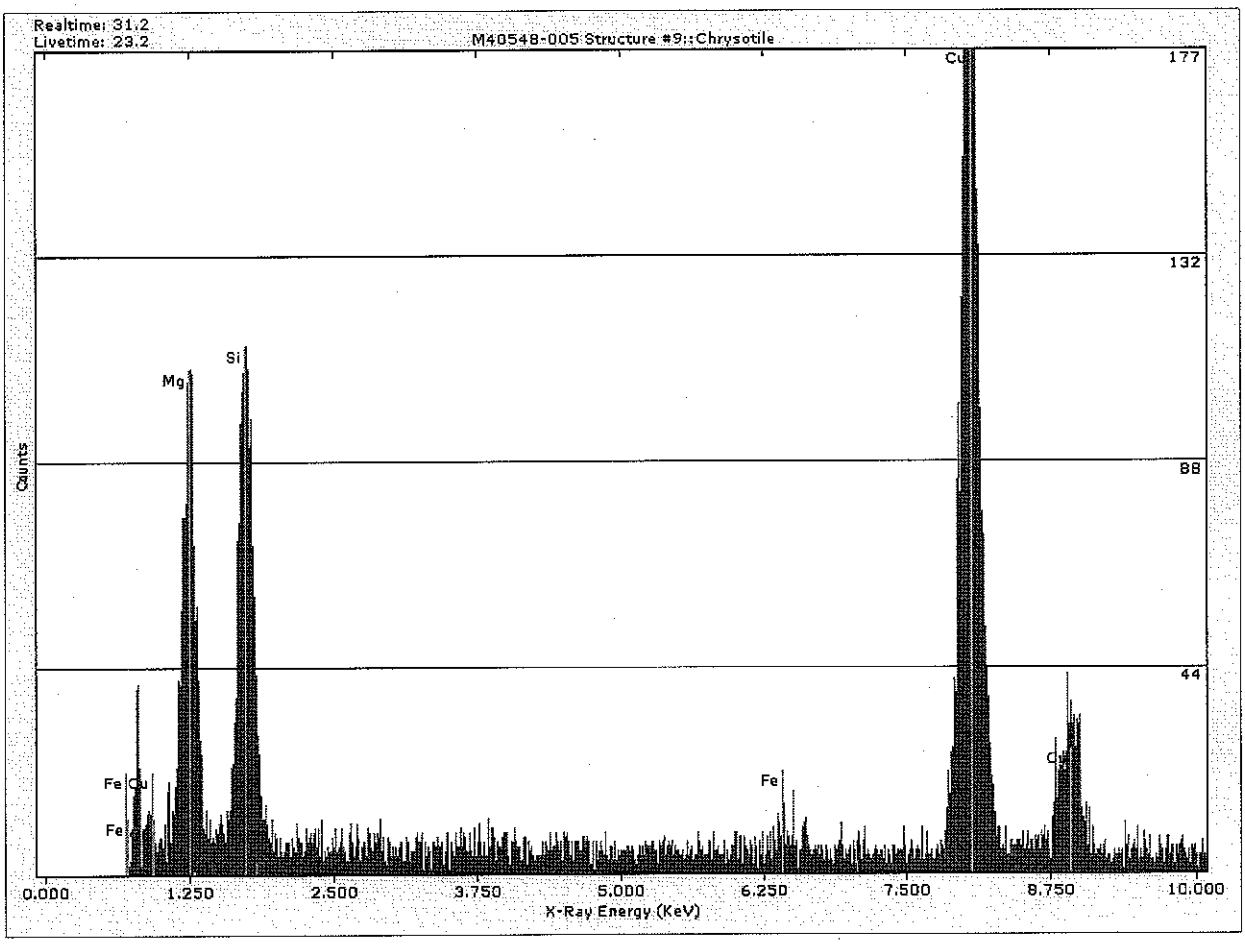

Realtime: 30.9
Livetime: 10.9
M40548-005 Structure #4:: Chrysotile
536
402
268
134
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

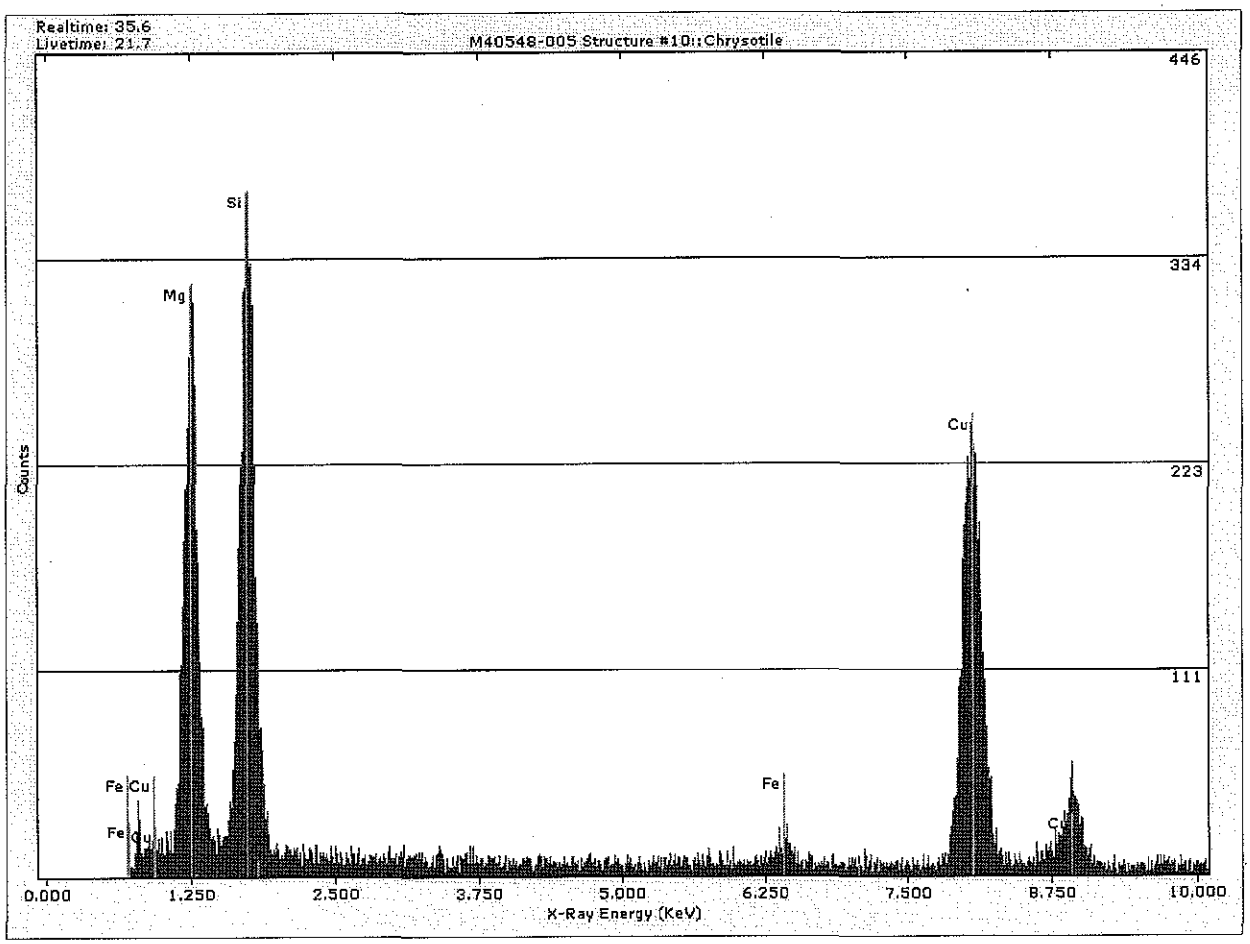

Realtime: 31.1
Livetime: 23.2
M40548-005 Structure #5:: Chrysotile
256
192
128
64
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

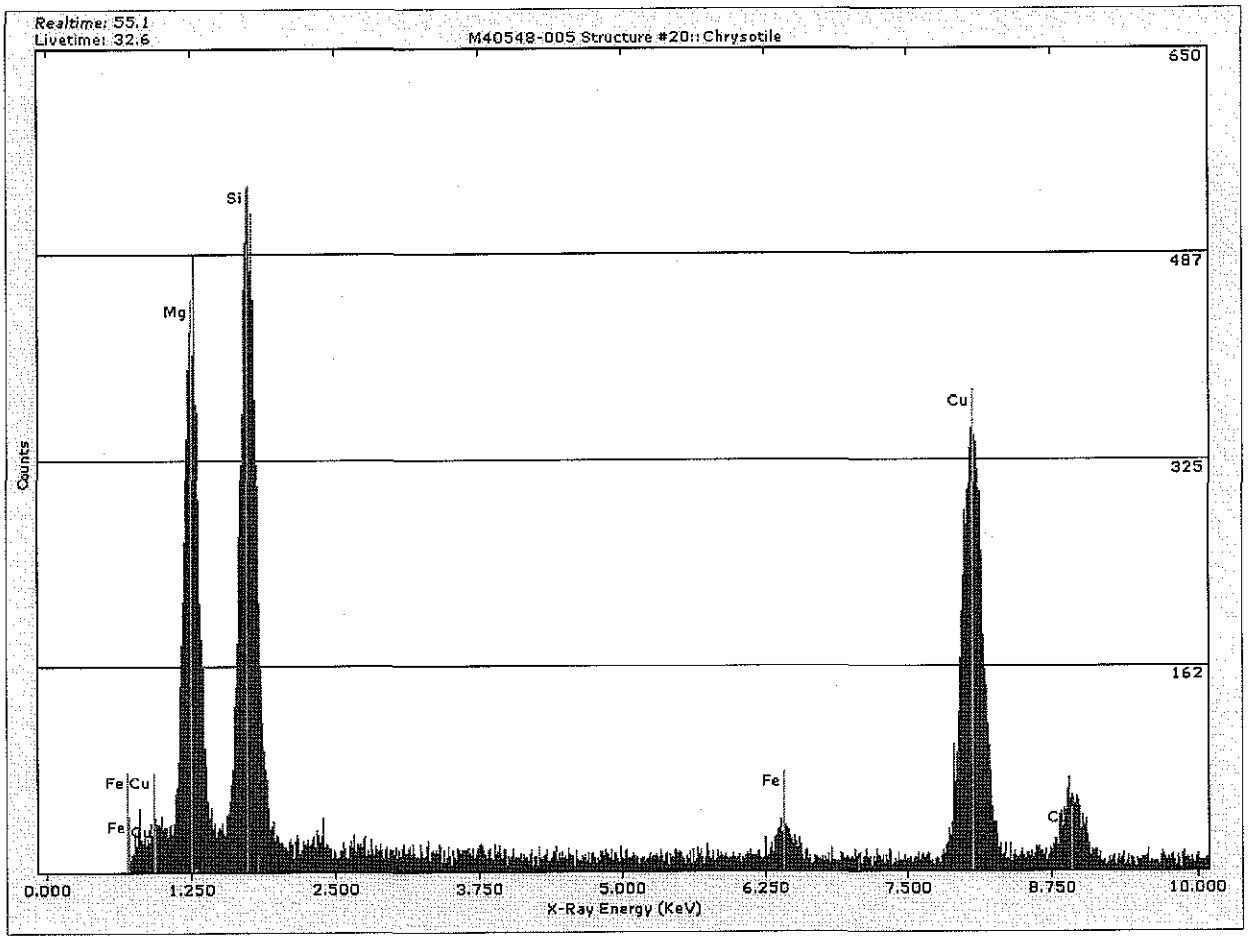

Realtime: 30.8
Livetime: 15.2
M40548-005 Structure #6::Chrysotile
572
429
286
143
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 30.5
Livetime: 20.1
M40548-005 Structure #7:: Chrysotile
369
277
184
92
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

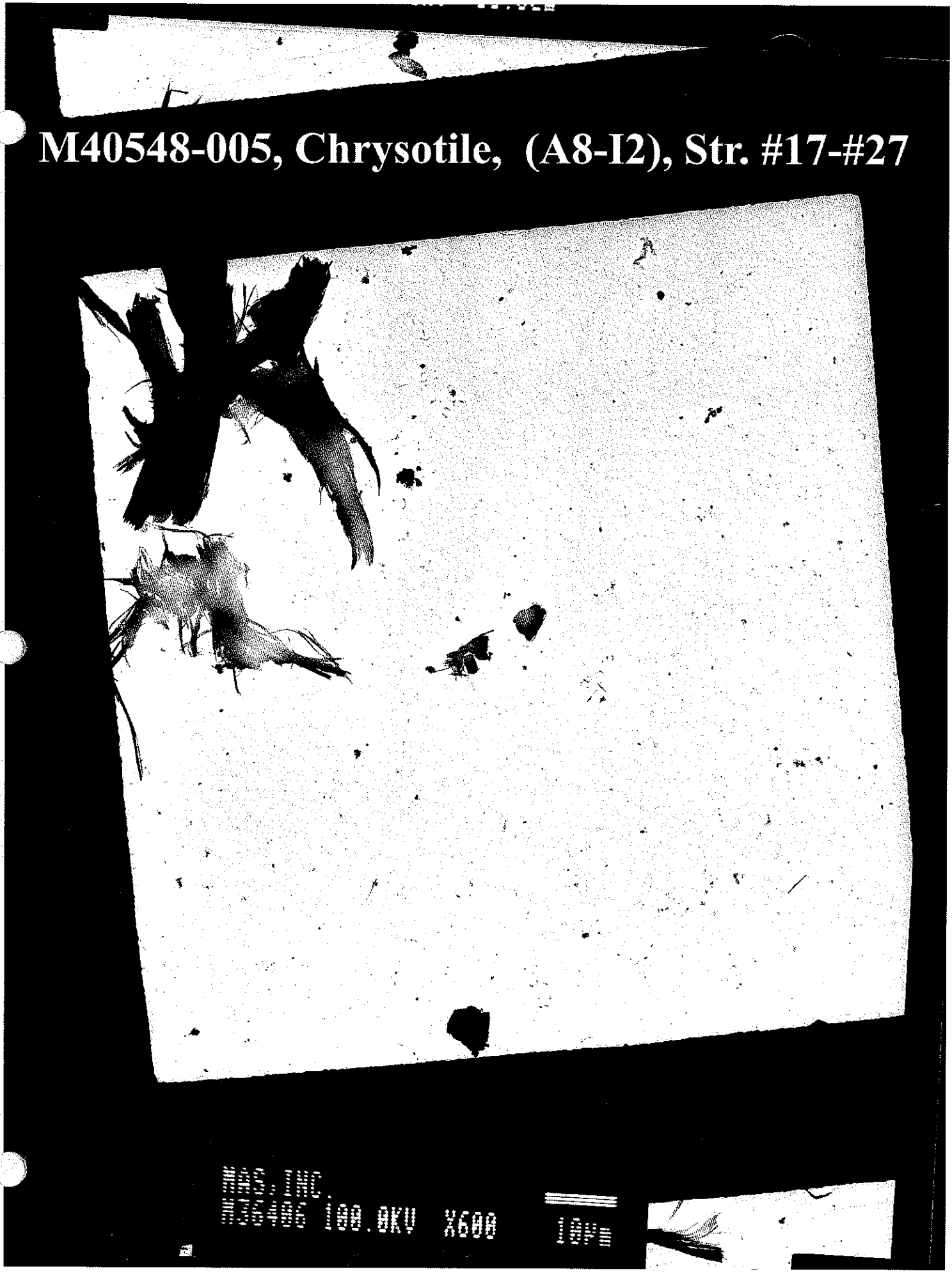

Realtime: 32.8
Livetime: 29.6
M40548-005 Structure #8:: Chrysotile
98
73
49
24
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
C
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

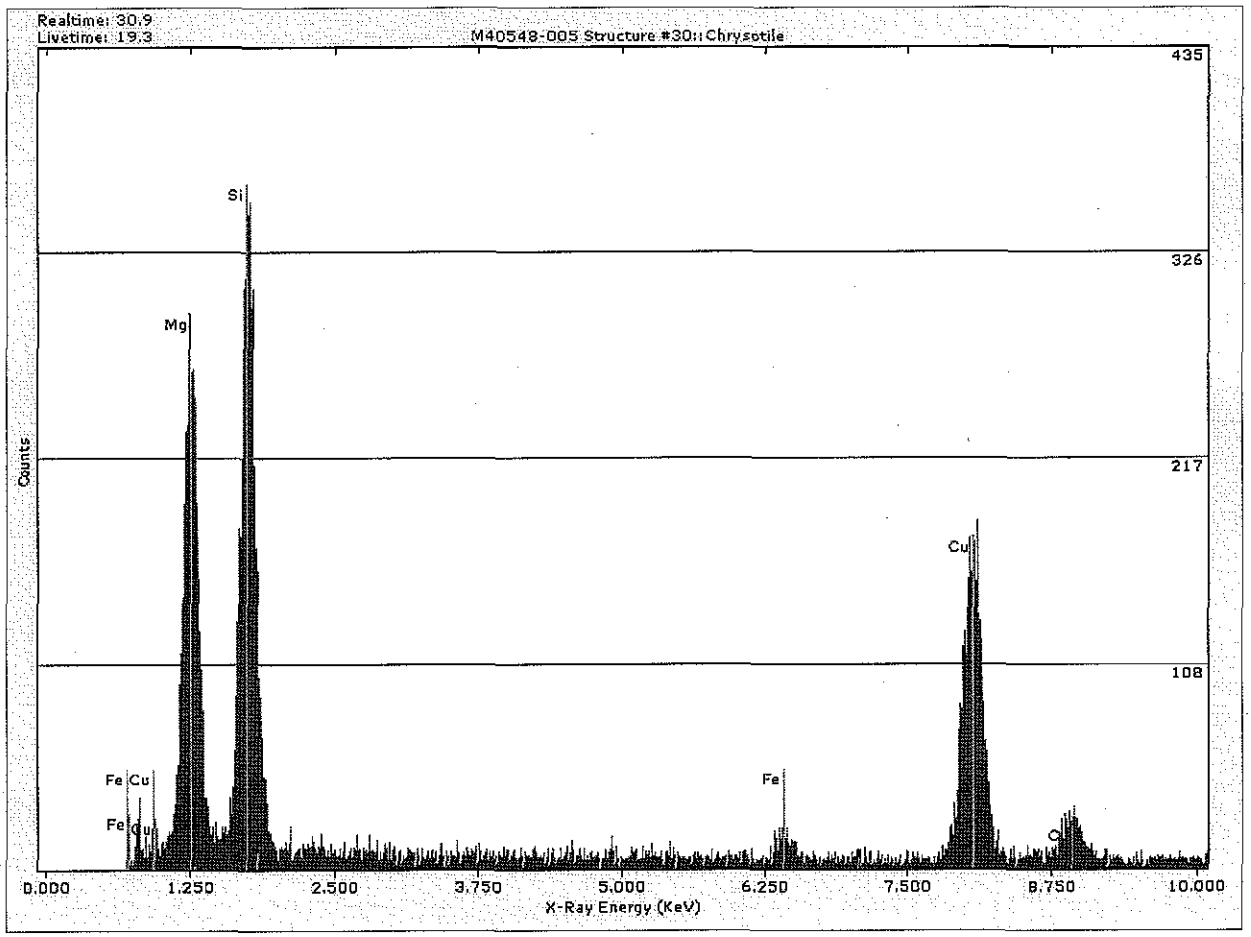

Realtime: 31.2
Livetime: 23.2
M40548-005 Structure #9::Chrysotile
177
132
88
44
Counts
Mg
Si
Fe
Cu
Fe
Fe
Cl
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

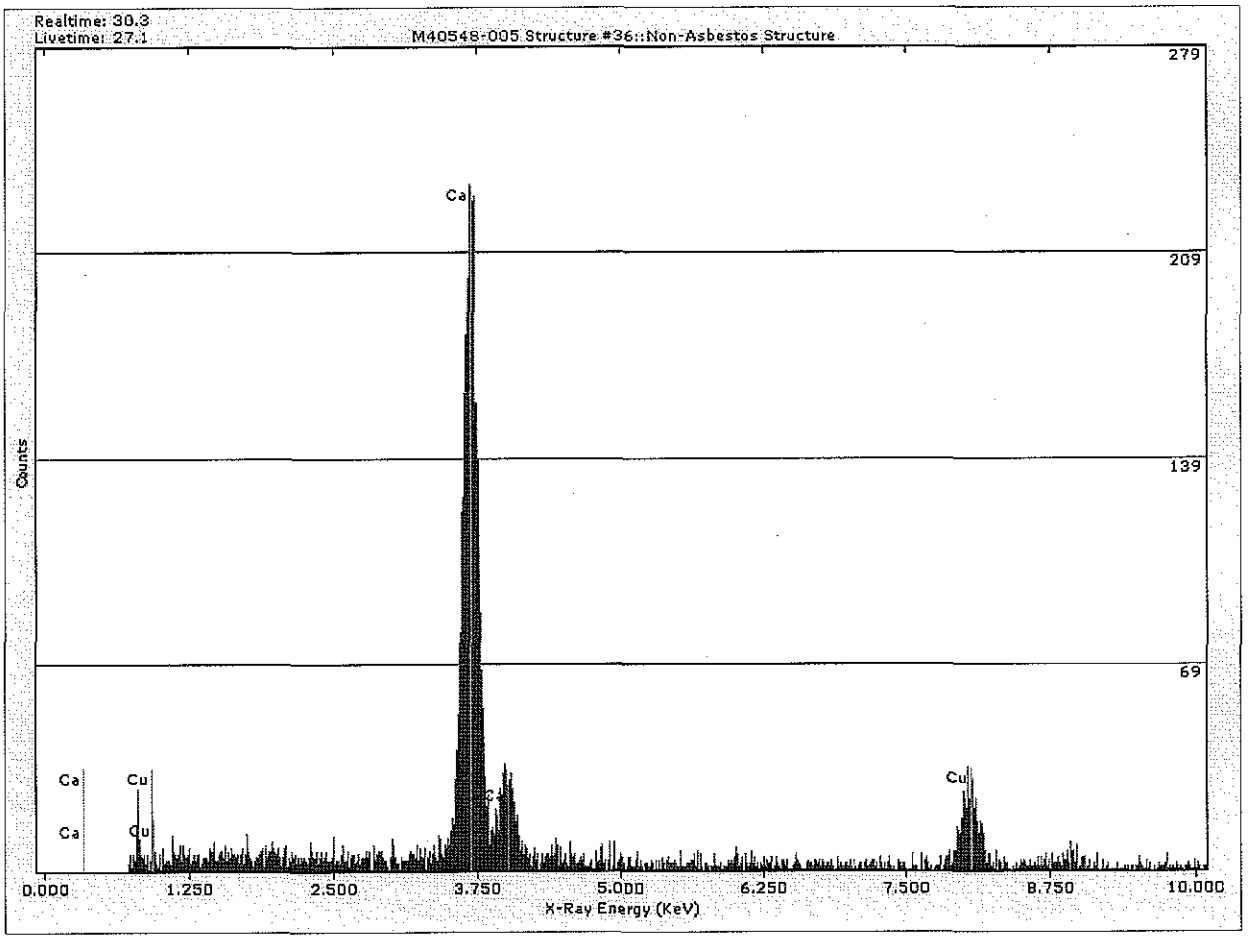

Realtime: 35.6
Livetime: 21.7
M40548-005 Structure #10:Chrysotile
446
334
223
111
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

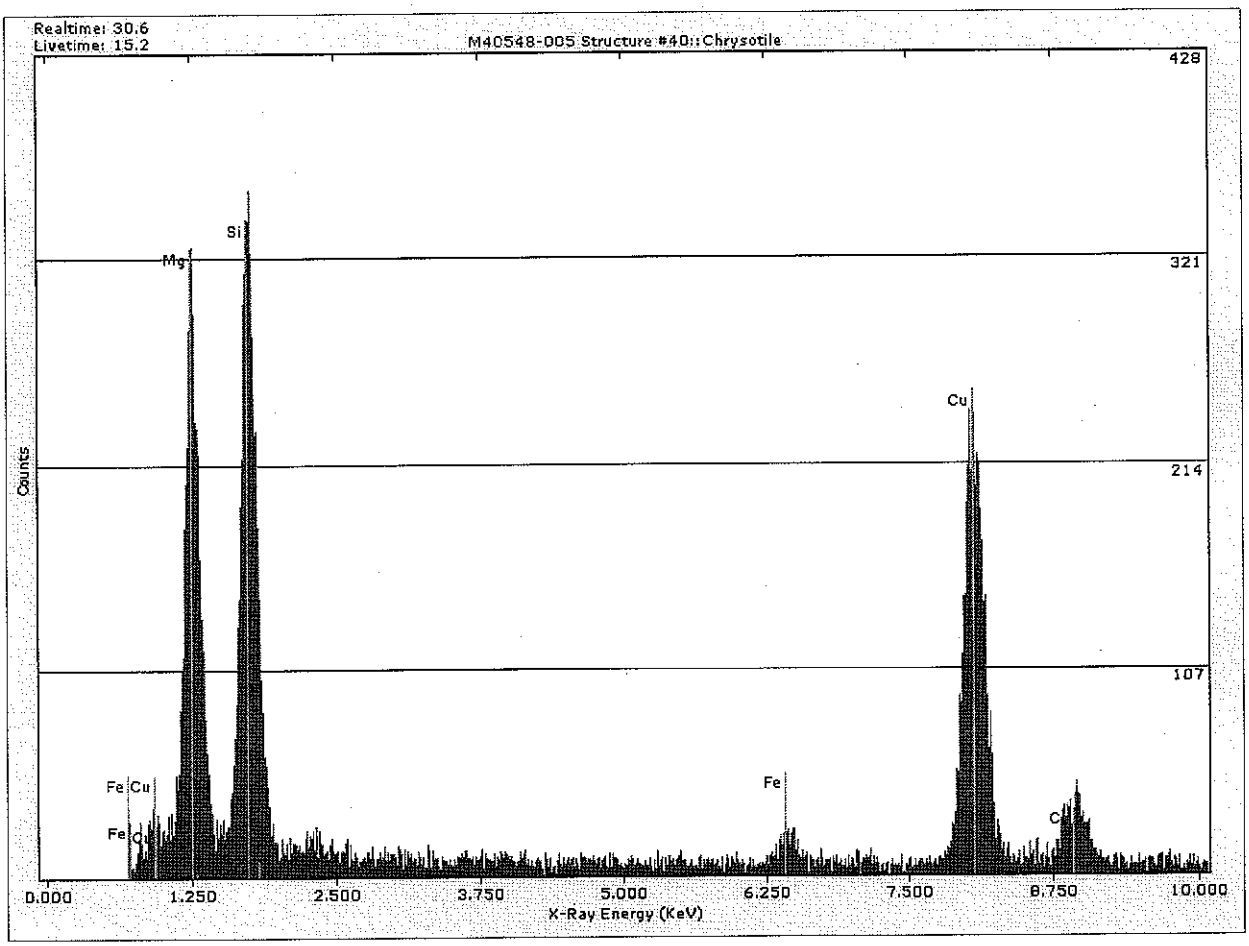

Realtime: 55.1
Livetime: 32.6
M40548-005 Structure #20::Chrysotile
650
487
325
162
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cl
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

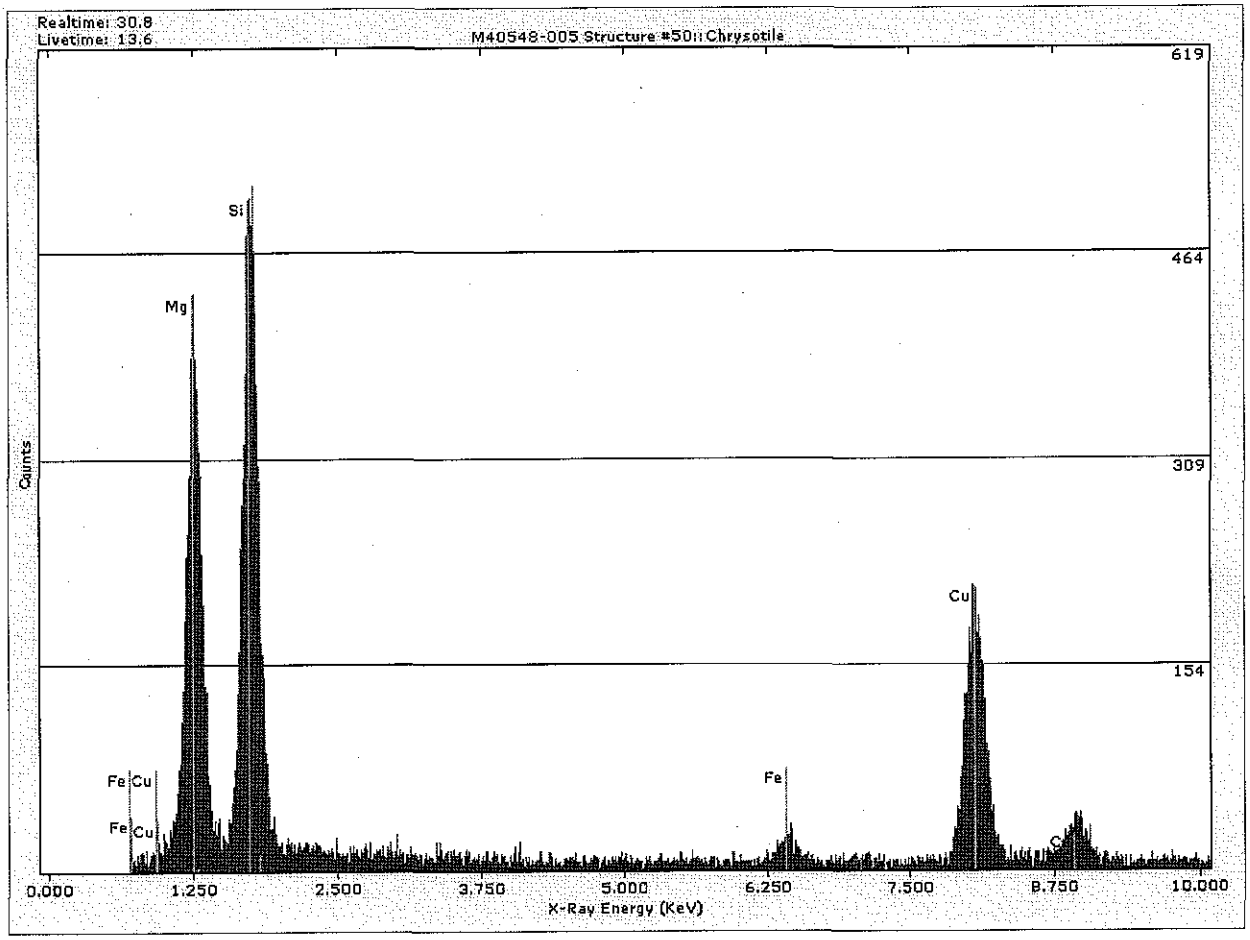
M40548-005, Chrysotile, (A8-I2), Str. #17-#27

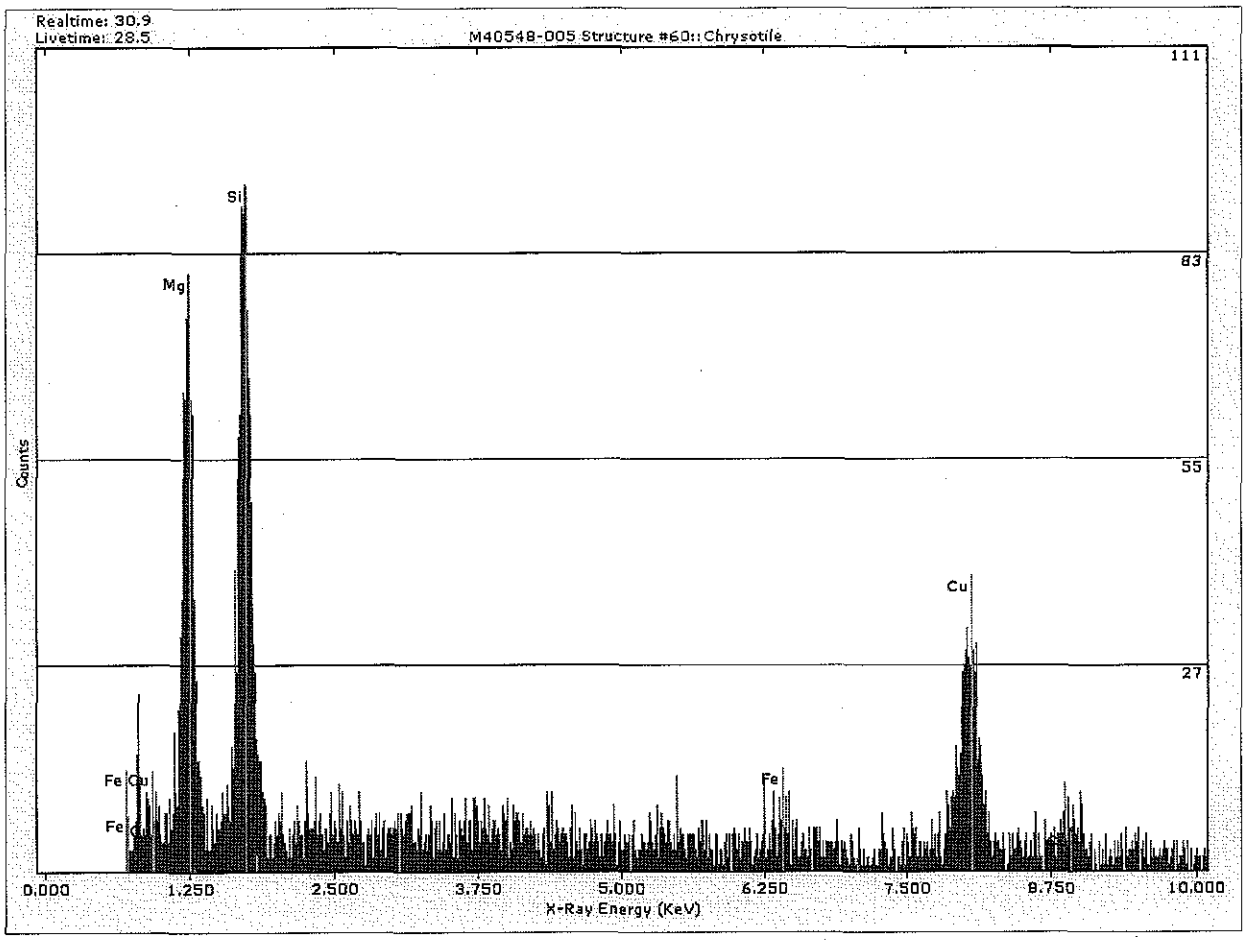


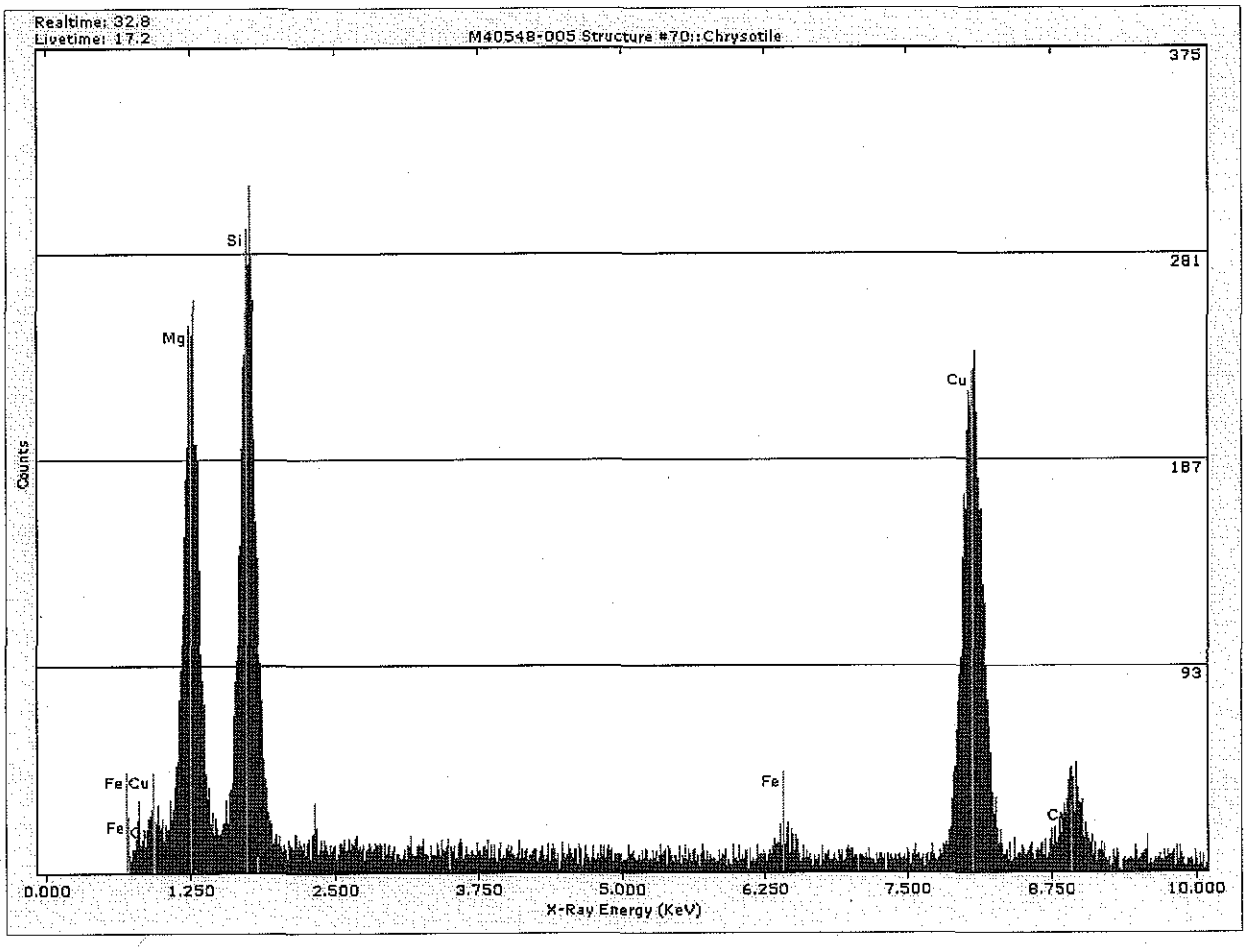

Realtime: 30.9
Livetime: 19.3
M40548-005 Structure #30: Chrysotile
435
326
217
108
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cl
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

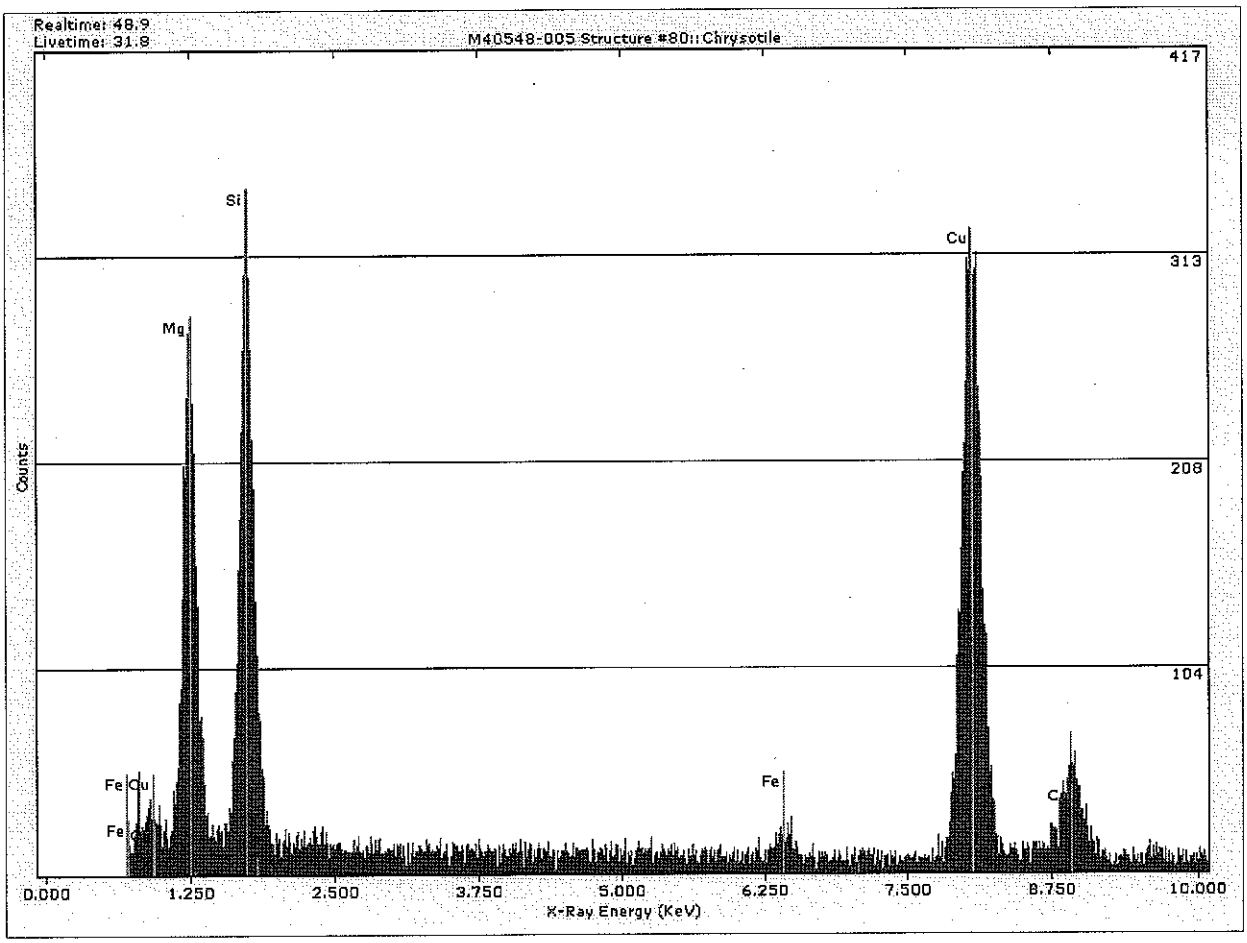

Realtime: 30.3
Livetime: 27.1
M40548-005 Structure #36::Non-Asbestos Structure
279
209
139
69
Counts
Ca
Ca
Cu
Cu
Ca
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

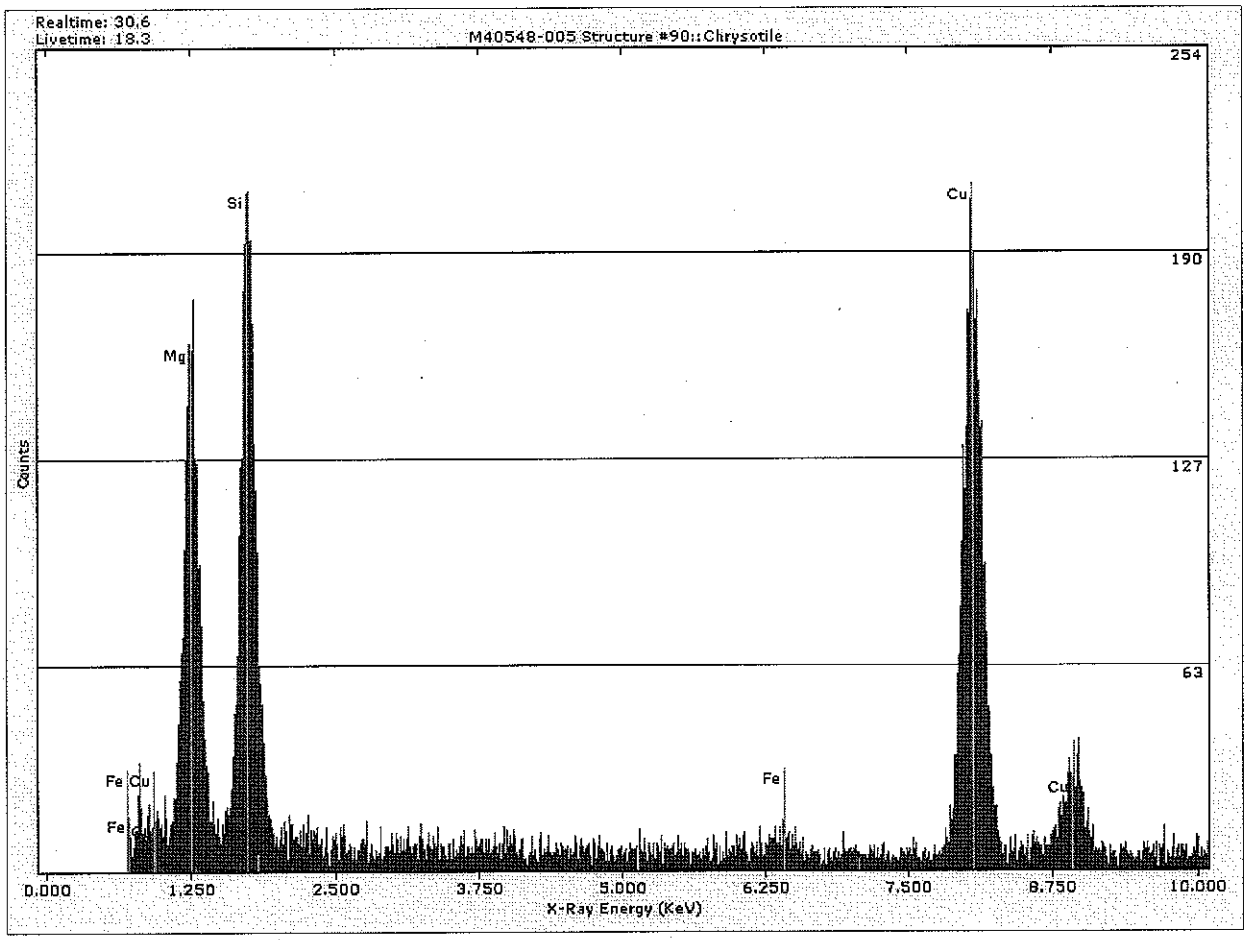

Realtime: 30.6
Livetime: 15.2
M40548-005 Structure #40::Chrysotile
428
321
214
107
Counts
Mg
Si
Cu
Fe
Cu
Fe
Cu
Fe
Cl
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

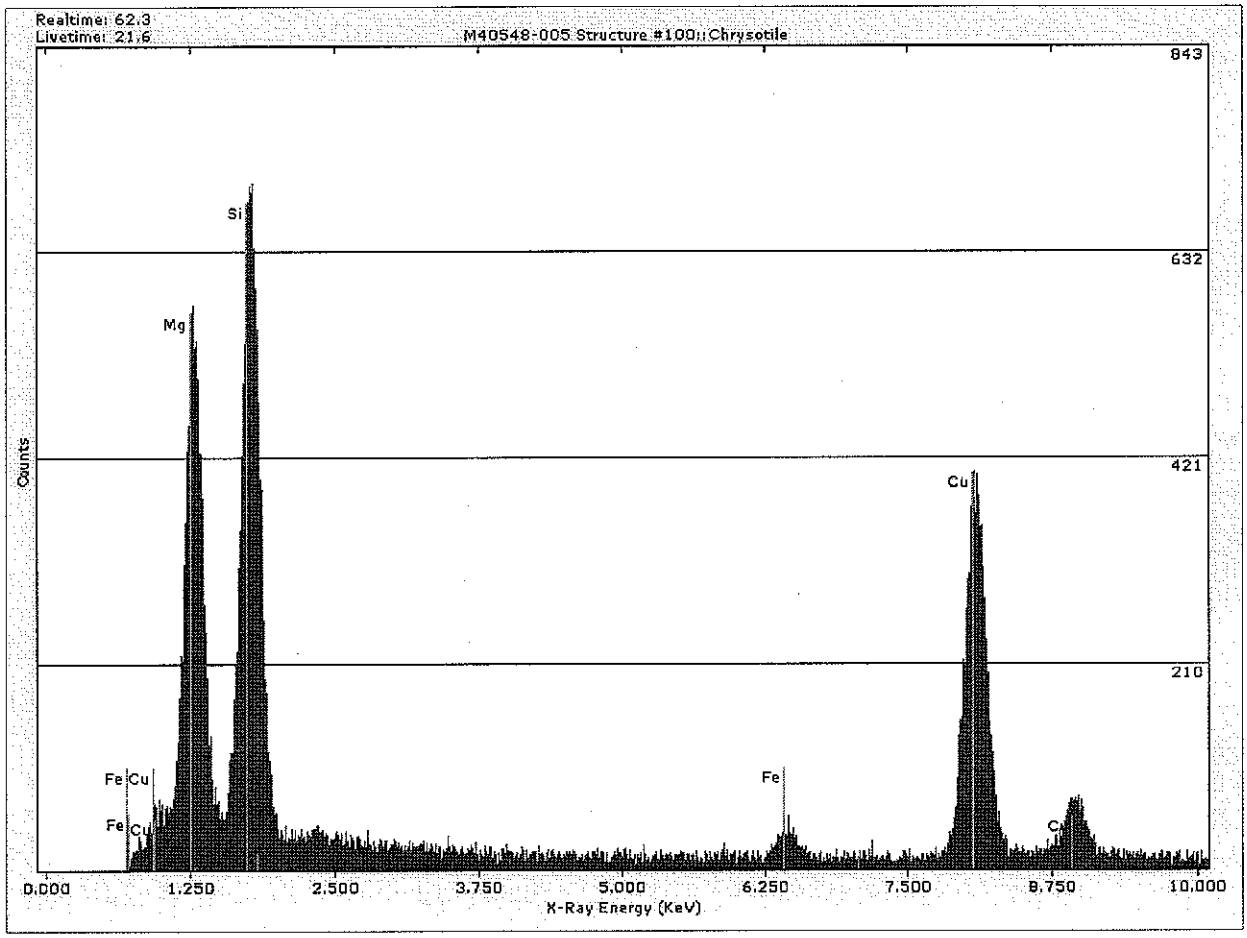

Realtime: 30.8
Livetime: 13.6
M40548-005 Structure #50: Chrysotile
619
464
309
154
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 30.9
Livetime: 28.5
M40548-005 Structure #60:: Chrysotile
111
83
55
27
Counts
Si
Mg
Cu
Fe Cu
Fe
Fe
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 32.8
Livetime: 17.2
M40548-005 Structure #70:Chrysotile
375
281
187
93
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 48.9
Livetime: 31.8
M40548-005 Structure #80::Chrysotile
417
313
208
104
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Ca
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 30.6
Livetime: 18.3
M40548-005 Structure #90::Chrysotile
254
190
127
63
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 62.3
Livetime: 21.6
M40548-005 Structure #100::Chrysotile
843
632
421
210
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-008

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	A-1-D

7402 ANALYSIS

Sample Area/ Volume:	200	Liters	Date Analyzed:	11/8/2006	
Filter Type:	MCE 25mm		Analyst:	K. Simpson	
Pore size:	0.8		Scope Number:	3	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	Yes	5 %	Grid_box:	7179	

Number of grids:	2	#1:	101	#3:	104	Asbestos	100
Number of openings:	27	#2:	103	#4:	102	Non-asbestos	2

Average Grid Size: 0.010506 Total Area Analyzed: 0.284

% Asbestos 98.04

Str#:	SquareID:	Fiber Type:	Size		Morph:	SAED:	EDS:
1	B6-A3	Chrysotile	12	1	M36408	M36407	✓
2		Chrysotile	32	0.6	M36408	Chrysotile	✓
3		Chrysotile	8	0.8	M36408	Chrysotile	✓
4		Chrysotile	9	0.7	Chrysotile	Chrysotile	✓
5	C3	Chrysotile	12	0.5	Chrysotile	Chrysotile	✓
6		Chrysotile	20	5	Chrysotile	Chrysotile	✓
7	E3	Chrysotile	7	0.27	Chrysotile	Chrysotile	✓
8	G3	Chrysotile	9	1	Chrysotile	Chrysotile	✓
9	I3	Chrysotile	14	0.5	M36409	Chrysotile	✓
10	A8	Chrysotile	48	2	Chrysotile	Chrysotile	✓
11		Chrysotile	40	4			
12		Chrysotile	24	1			
13		Chrysotile	8.8	0.3			
14	C8	Chrysotile	11	0.4			
15		Chrysotile	19	1			
16		Chrysotile	18	1.3			
17		Chrysotile	24	2			
18		Chrysotile	10	0.4			
19	E8	Chrysotile	14	0.5			
20		Chrysotile	11.5	0.7	Chrysotile	Chrysotile	✓
21		Chrysotile	12.5	0.7			
22		Chrysotile	12	0.5			
23		Chrysotile	22	4			
24	G8	Chrysotile	5.1	0.3			
25		Chrysotile	6.5	0.27			
26		Chrysotile	8	0.28			
27		Chrysotile	6.8	1			
28		Chrysotile	12	0.3			

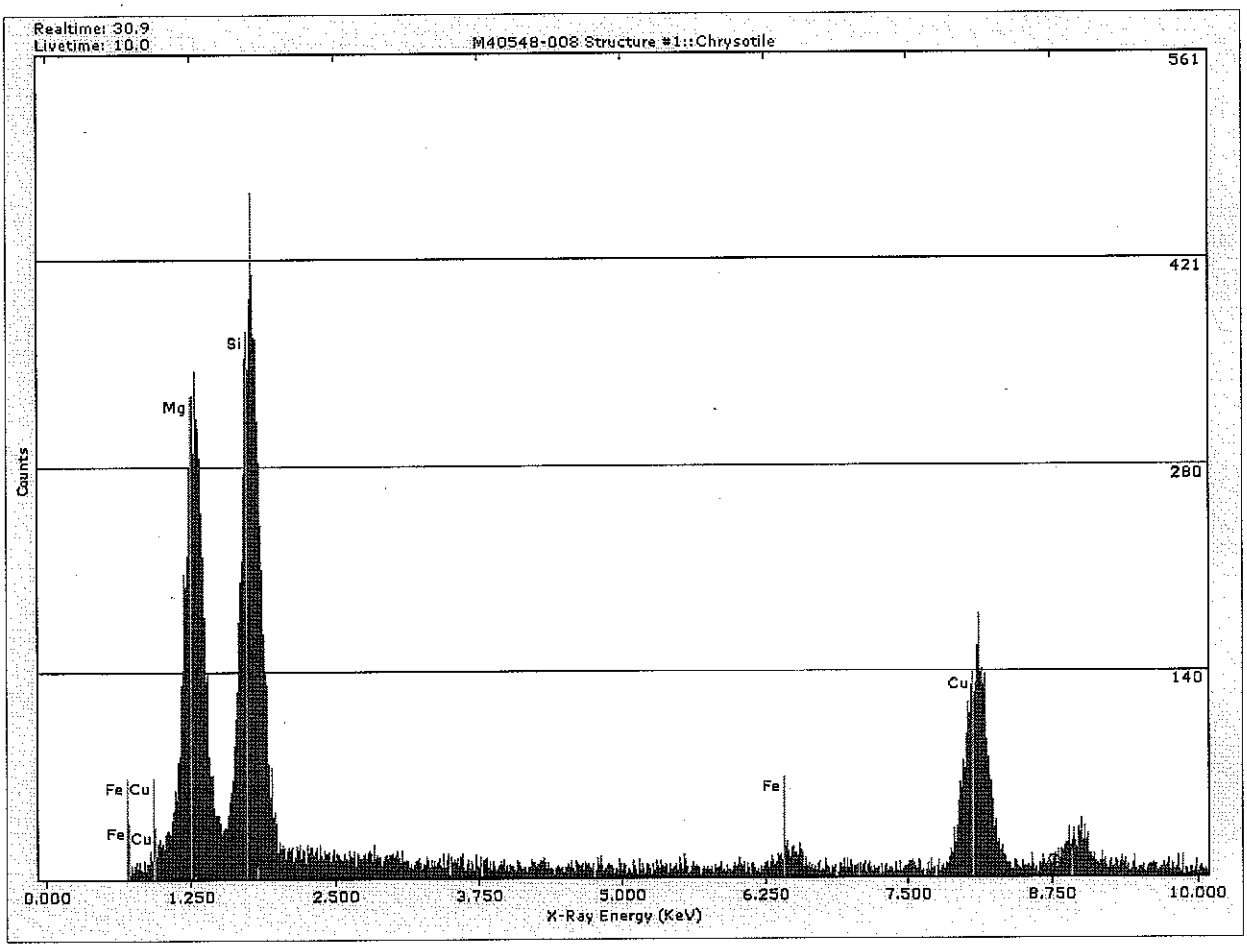
NSD	I8	NA						
29	A7-C10		Chrysotile	10	2			
30	C8		Chrysotile	8	0.5	Chrysotile	Chrysotile	☑
31			Chrysotile	8	0.28			
32			Chrysotile	8	0.28			
33			Chrysotile	10	0.3			
34			Chrysotile	12	1			
35			Chrysotile	8	0.5			
36			Chrysotile	10	1			
37	C6		Chrysotile	7	0.5			
38			Chrysotile	6	2			
39	C4		Chrysotile	9.5	0.4			
40			Chrysotile	6.5	0.6	Chrysotile	Chrysotile	☑
41			Chrysotile	7.8	0.8			
42			Chrysotile	8	1			
43			Chrysotile	8	0.5			
44			Chrysotile	5.8	0.5			
45			Chrysotile	6	0.5			
46			Chrysotile	5.3	0.3			
47			Chrysotile	8	0.28			
48			Chrysotile	8	0.3			
49			Chrysotile	7.4	0.5			
50			Chrysotile	5.1	0.4	Chrysotile	Chrysotile	☑
51			Chrysotile	14	1			
52			Chrysotile	9	0.3			
53	C2		Chrysotile	8	1			
54			Chrysotile	8	1.2			
55			Chrysotile	8	0.5			
56	E10		Chrysotile	34	0.3			
57			Chrysotile	22	0.6			
58			Chrysotile	16.5	0.4			
59			Chrysotile	12	0.3			
60			Chrysotile	14	1	Chrysotile	Chrysotile	☑
61			Chrysotile	6	0.6			
62			Chrysotile	10	2.8			
63	E8		Chrysotile	6.5	0.3			
64			Chrysotile	15	1.5			
65			Chrysotile	8	0.5			
66			Chrysotile	16	1.5			
67			Chrysotile	6	0.3			
68			Chrysotile	7	0.28			
69			Chrysotile	6.6	0.6			
70	E6		Chrysotile	25	0.8	Chrysotile	Chrysotile	☑
71	E4		Chrysotile	22	0.3			
72			Chrysotile	12	1.2			
73			Chrysotile	18	0.3			
74			Chrysotile	8	0.27			
75			Chrysotile	33	5			
76	E2		Chrysotile	9	2			
77			Chrysotile	7.5	0.3			
78			Chrysotile	8	0.3			
79	G7		Chrysotile	8	0.3			
80			Chrysotile	12	0.28	Chrysotile	Chrysotile	☑
81			Chrysotile	8	0.28			

82			Chrysotile	8	0.5			
83			Chrysotile	5.5	0.5			
84	G5		Chrysotile	12	0.3			
NSD	G9	NA						
85	G3		Chrysotile	6	0.28			
86			Chrysotile	18	1			
87			Chrysotile	16	1.2			
88			Chrysotile	8	0.5			
89			Chrysotile	7	1			
90			Chrysotile	15	0.6	Chrysotile	Chrysotile	☑
91	G1		Chrysotile	6	0.5			
92			Chrysotile	10	0.3			
93			Chrysotile	8	0.3			
94			Chrysotile	14	0.5			
95			Chrysotile	40	0.5			
96	I7		Chrysotile	8	1.2			
97			Chrysotile	10	1.5			
98			Chrysotile	5.5	0.5			
99	I5		Chrysotile	18	4			
100			Chrysotile	5.1	1	Chrysotile	Chrysotile	☑

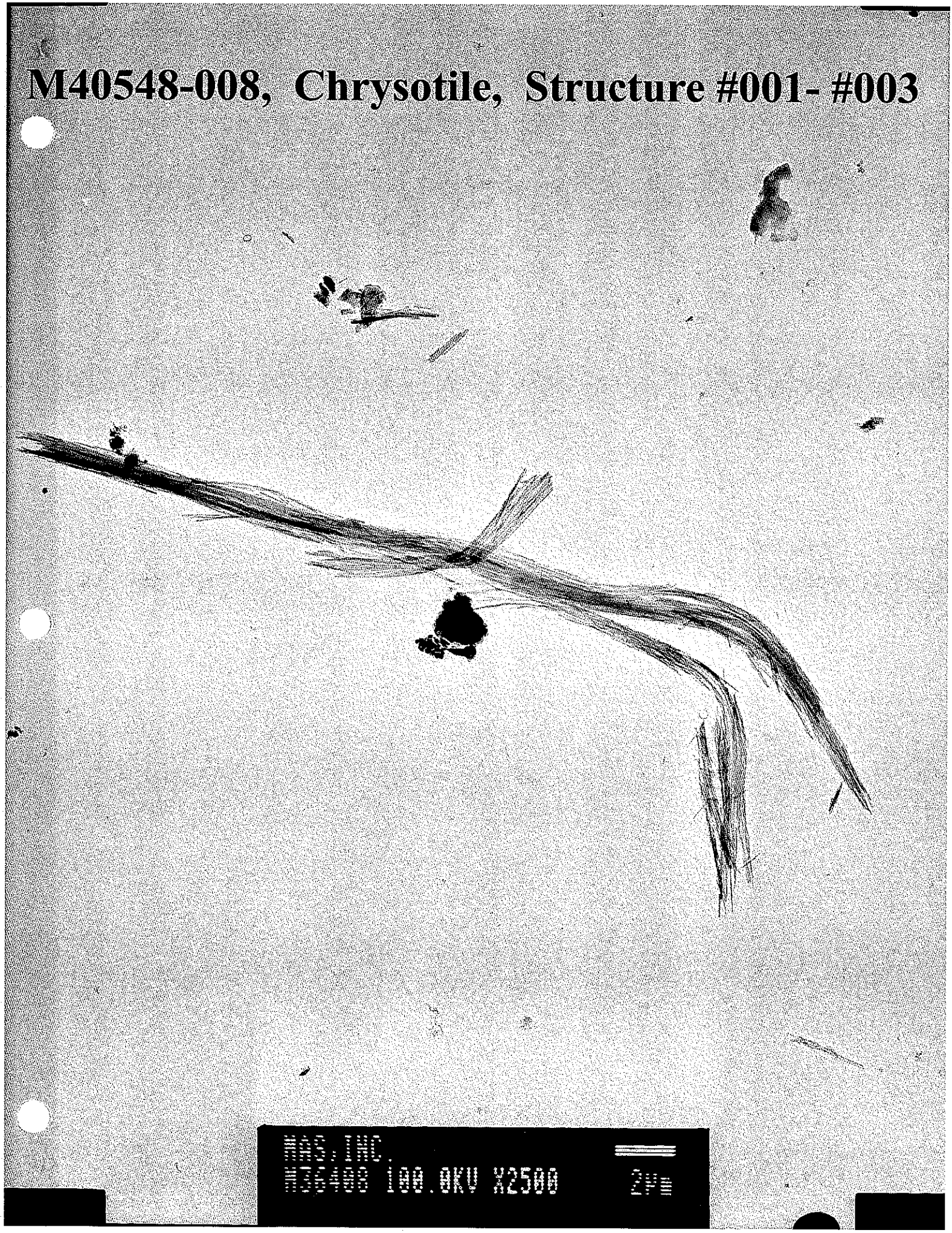
Grid Op
27

M40548 008 Sample Comments:

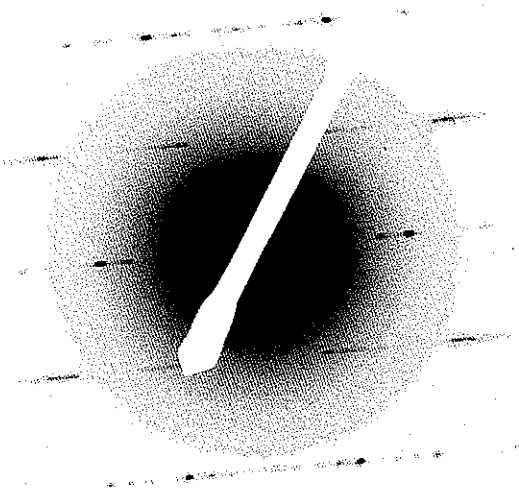
NW area during fabrication


Realtime: 30.9
Livetime: 10.0
M40548-008 Structure #1::Chrysotile
561
421
280
140
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

M40548-008, Chrysotile, Structure #001- #003



M40548-008, Chrysotile Diffraction, Str. #001



MAS, INC.
MT6487 100 APR 00 0--

VERIFICATION OF CHRYSOTILE DIFFRACTION PATTERNS

1) Measure three spots and/or the interrow spacing on the diffraction pattern (in mm).

2) Use the formula:

$$\frac{\text{CAMERA CONSTANT (mmA)}}{\text{MEASURED DISTANCE (mm)}} = \text{SPACING (in Angstroms, A)}$$

3) The calculated spacings should be within +/- 5% tolerance of the d-spacings listed in the chart.

4) The following chart shows the chrysotile d-spacing values from the Mineral Powder Diffraction File Data Book from file card #31-808 on page 228.

hkl	d Spacing (in A)	Range +/- 5%
002	7.31	6.94 - 7.68
004	3.65	3.47 - 3.83
202	2.45	2.33 - 2.57
200	2.65	2.52 - 2.78
110	4.59	4.36 - 4.82
330	1.53	1.45 - 1.61
Interrow	5.31	5.04 - 5.58

$\frac{28.8\text{mmA}}{5.5\text{mm}} = 5.24\text{A}$

Ld 5.5mm

Reflection Spot 004 — (camera K) 28.8 mmA / (measured distance) 7.75 mm = 3.72 A (calculated spacing) ✓

Reflection Spot 110 — (camera K) 28.8 mmA / (measured distance) 6.25 mm = 4.61 A (calculated spacing) ✓

Reflection Spot 202 — (camera K) 28.8 mmA / (measured distance) 12.10 mm = 2.40 A (calculated spacing) ✓

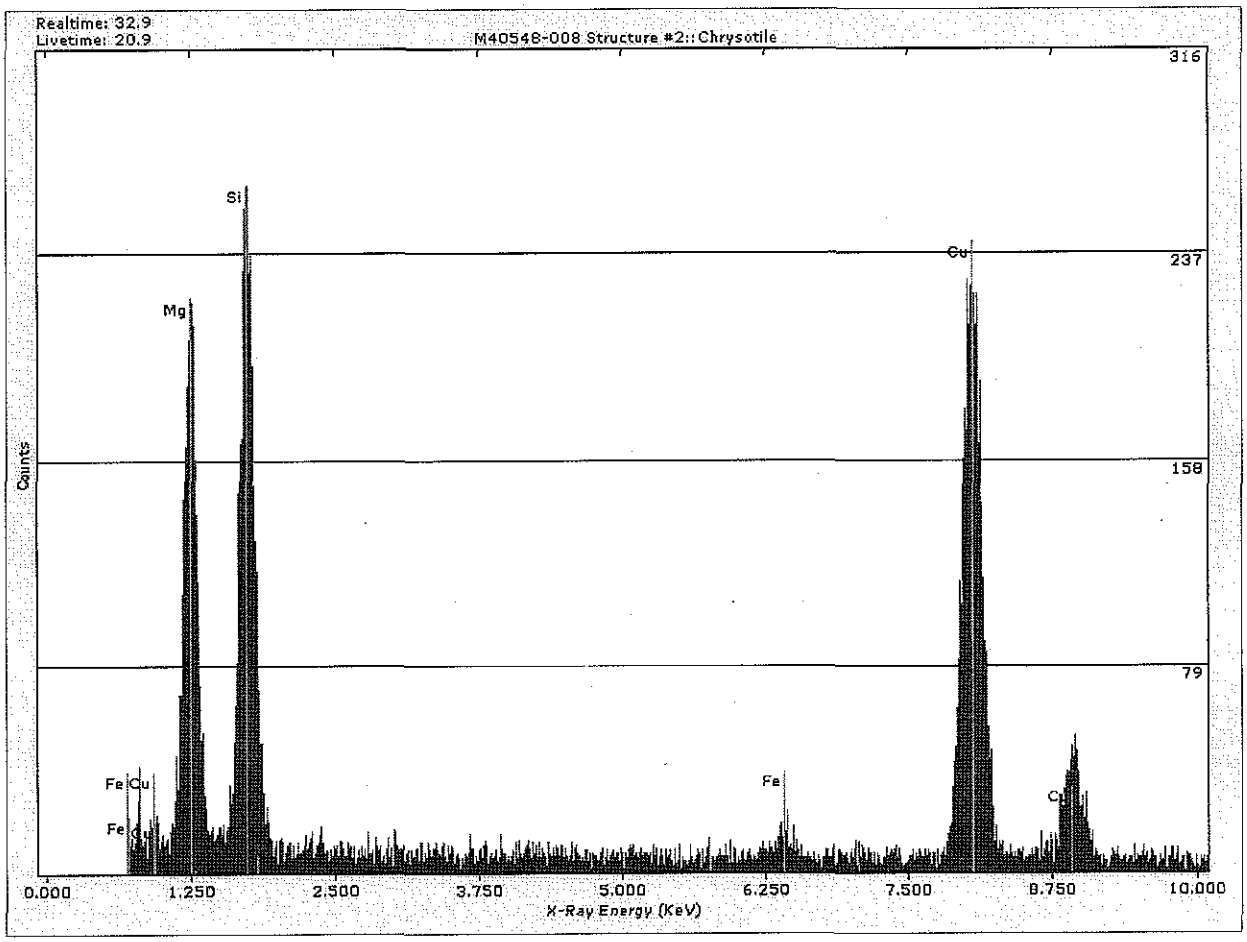
MAS Job #: M40548-008 Film #: M 36407

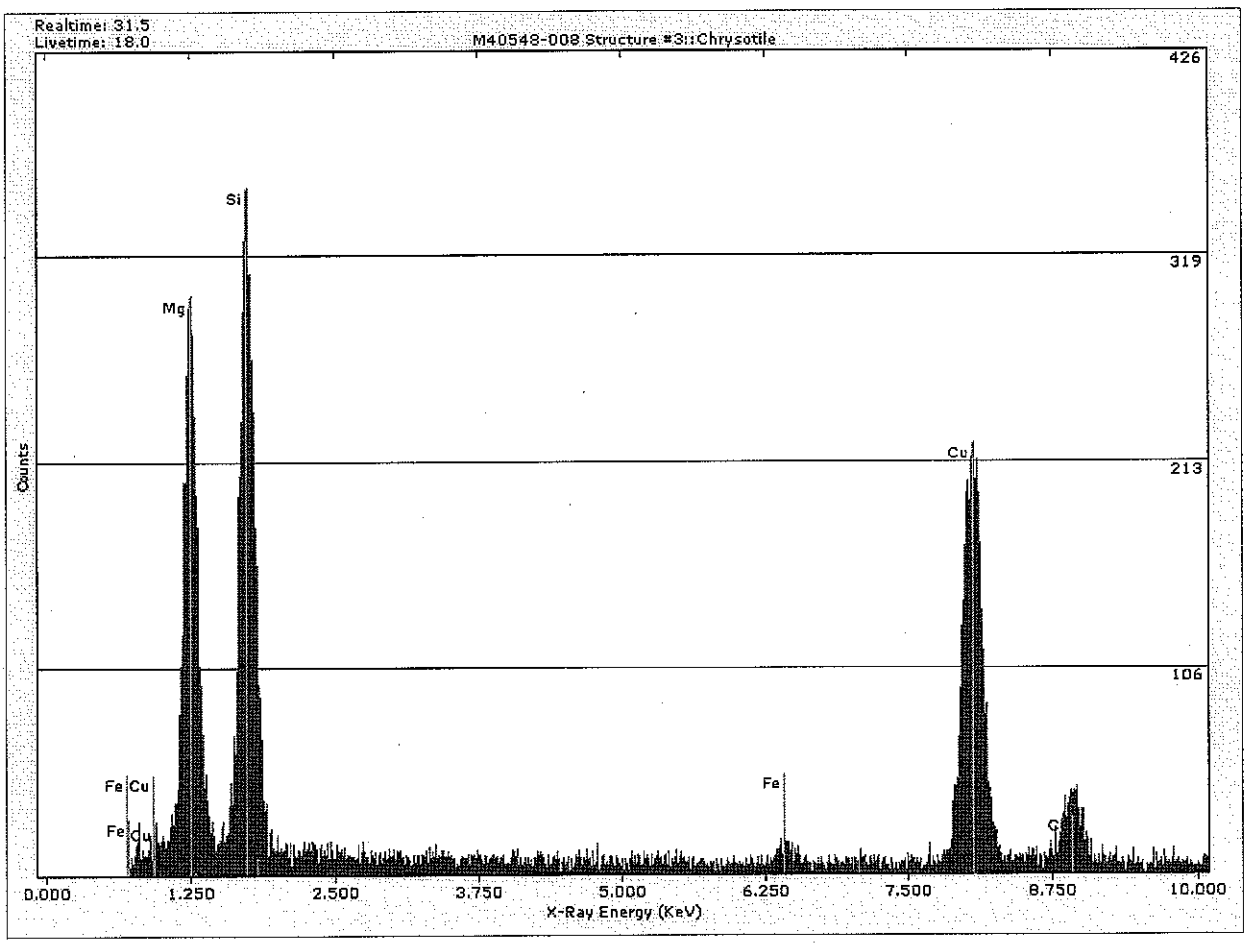
Analyst: KS / KS Date Photo was taken: 11/08/06

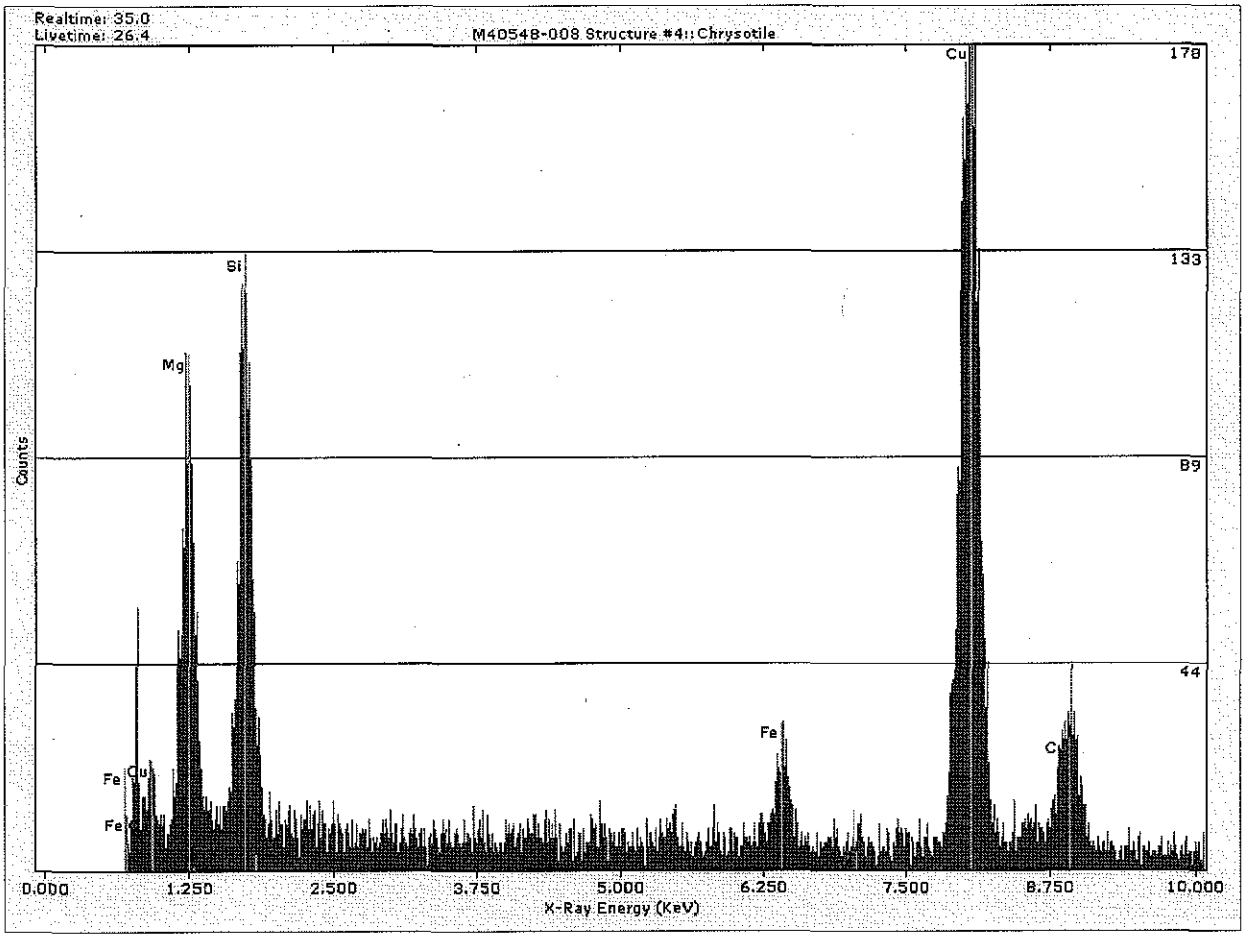
Date Verified: 11/10/06 EDS Verified: (YES) NO

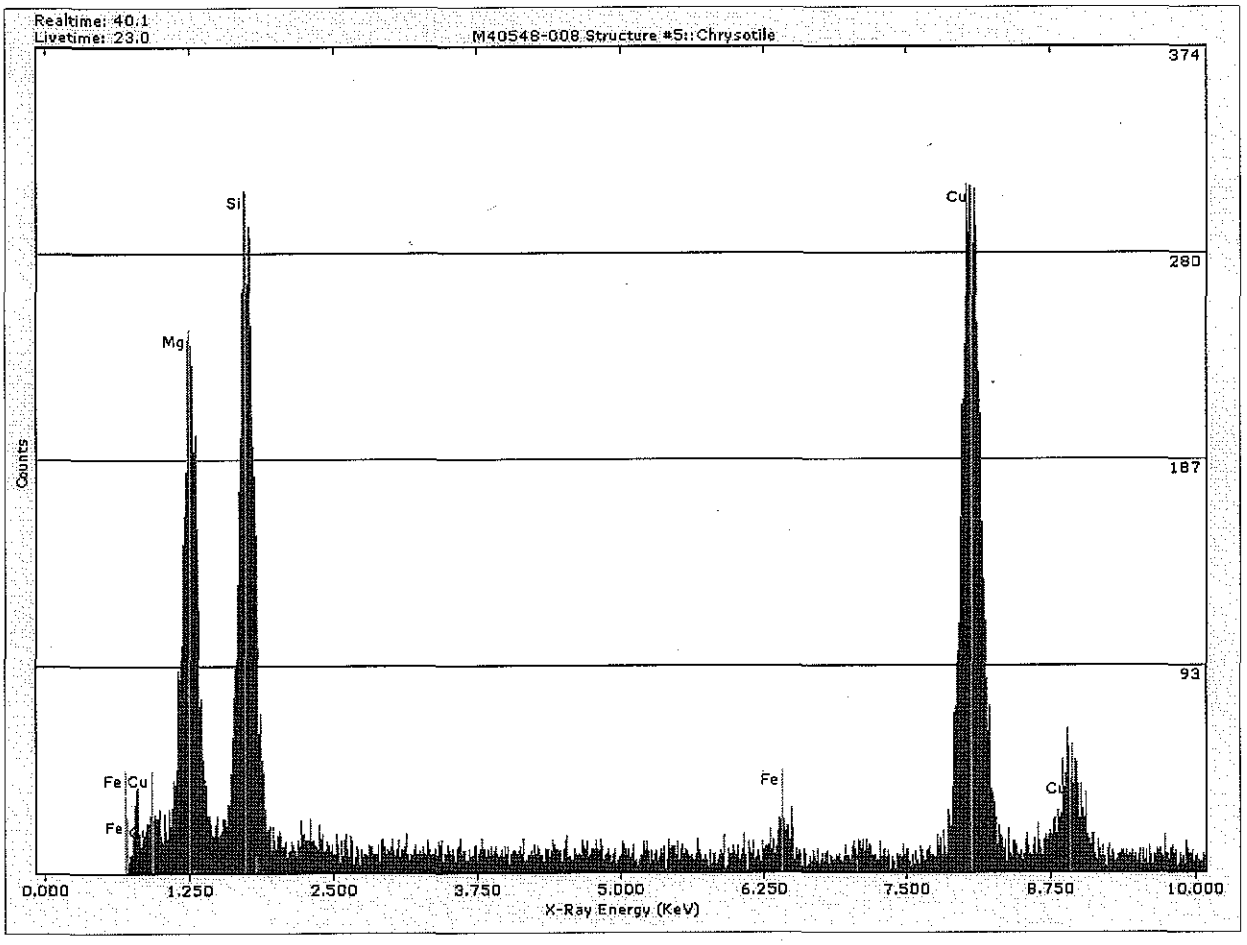
Unable to verify pattern_____ Explanation:_____

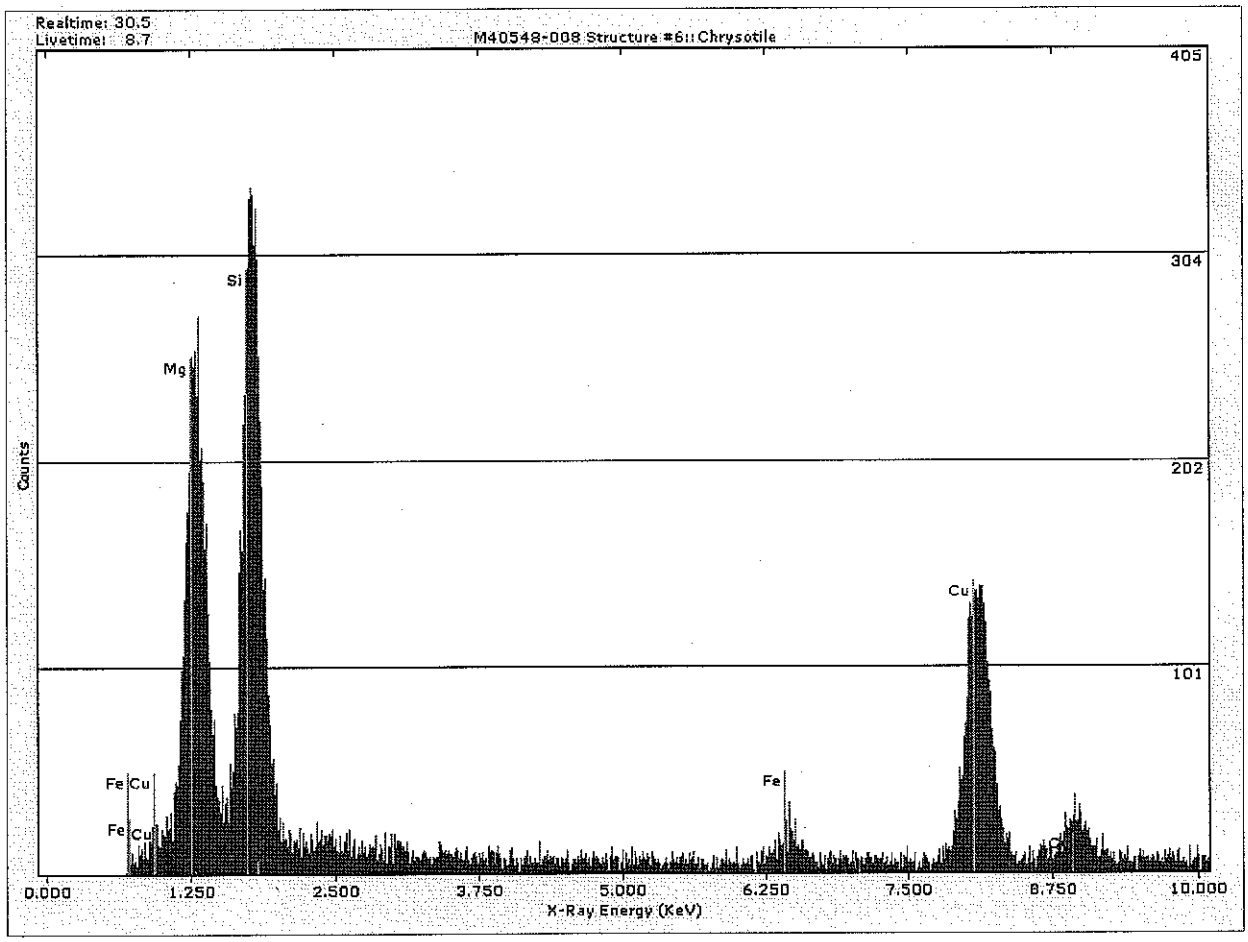
STR #1

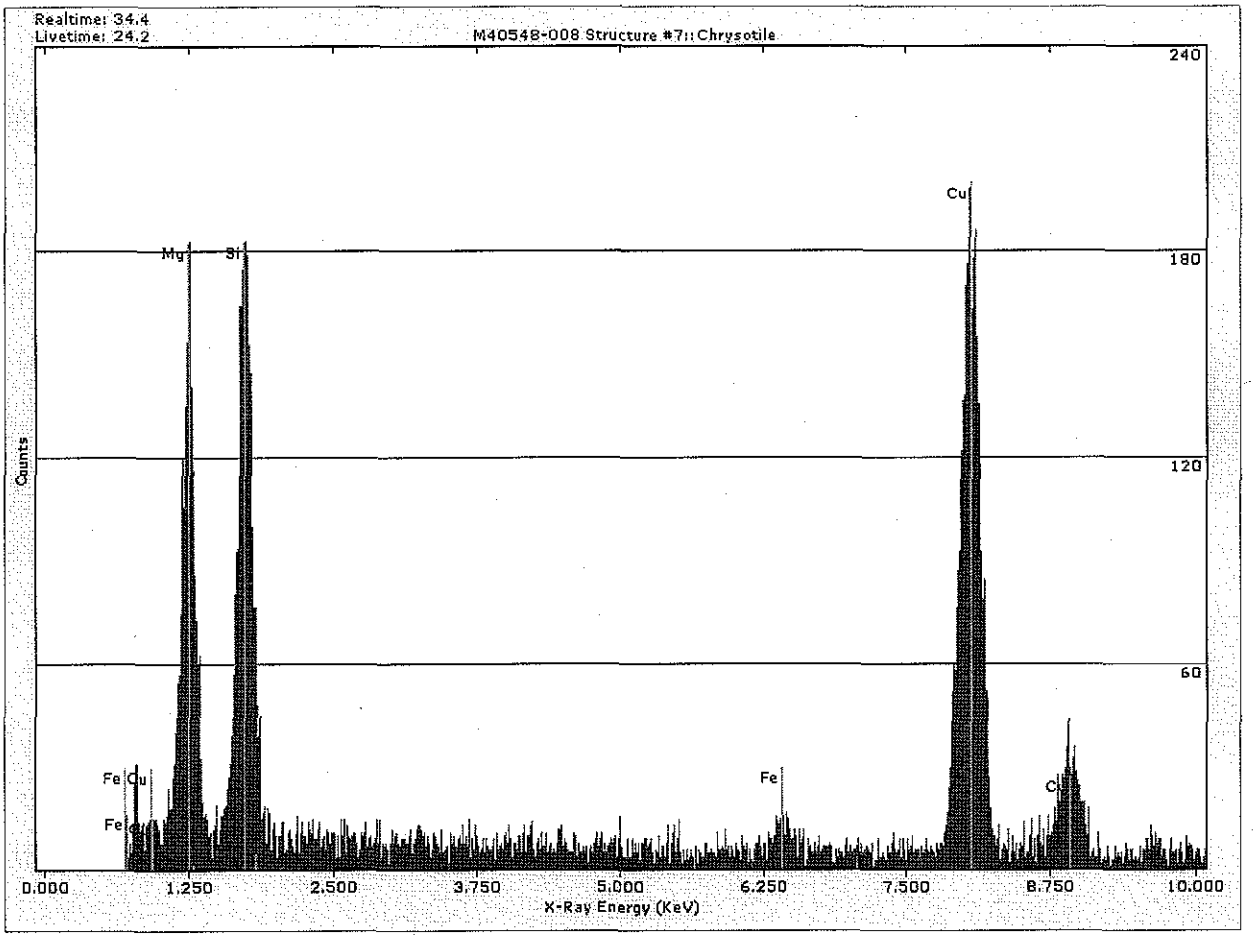

Realtime: 32.9
Livetime: 20.9
M40548-008 Structure #2:: Chrysotile
316
237
158
79
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

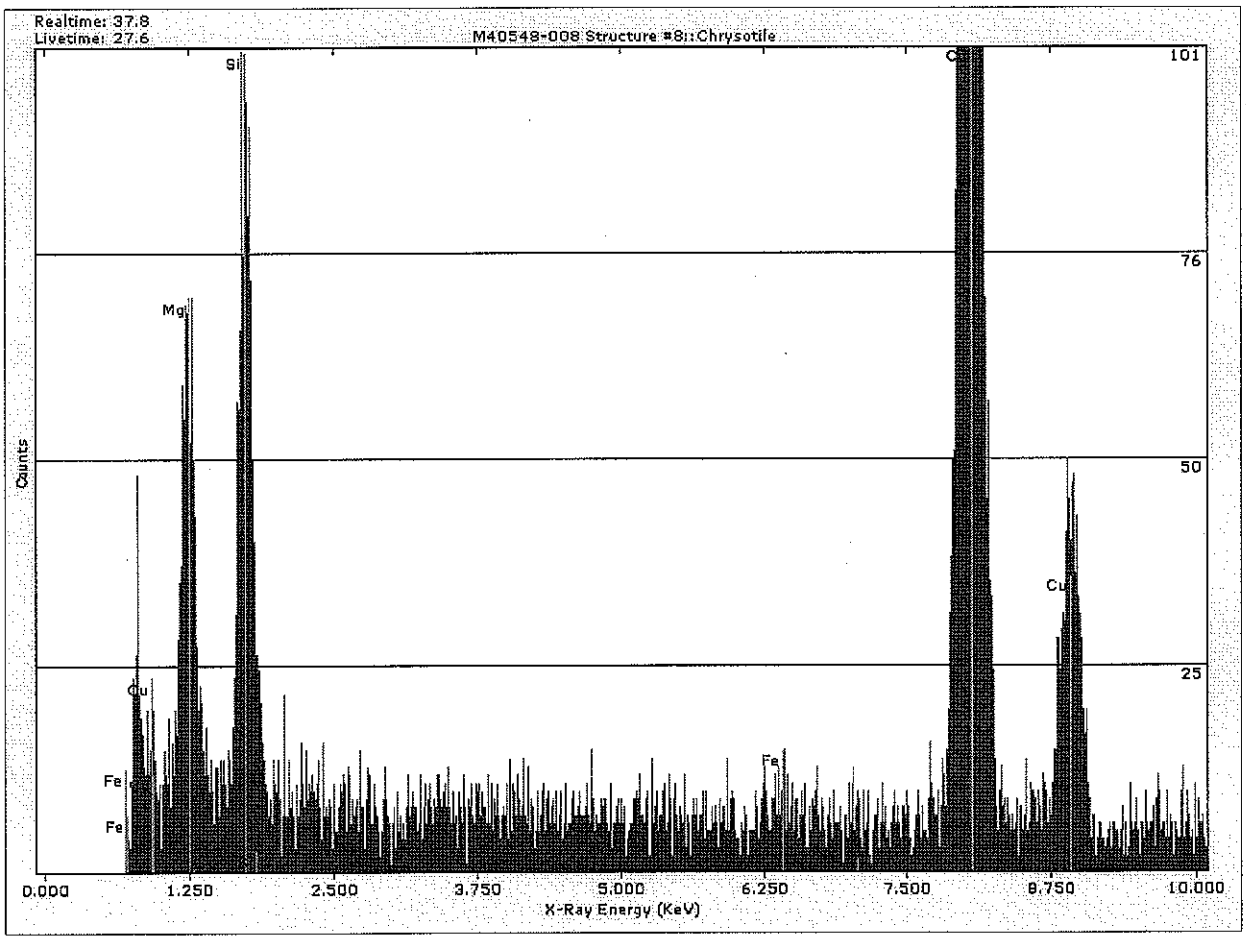

Realtime: 31.5
Livetime: 18.0
M40548-008 Structure #3::Chrysotile
426
319
213
106
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 35.0
Livetime: 26.4
M40548-008 Structure #4:: Chrysotile
Cu
178
Si
133
Mg
89
Counts
44
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

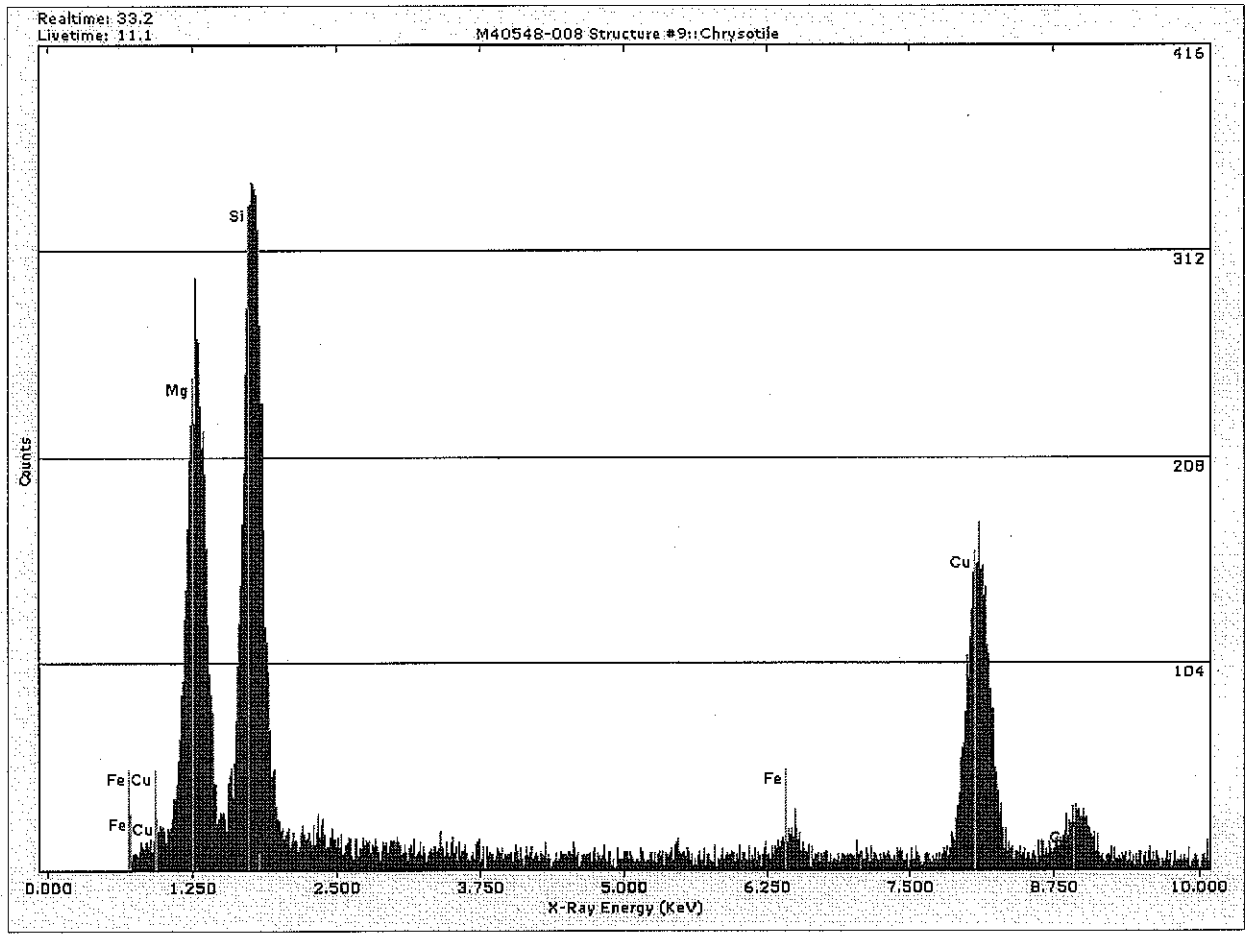

Realtime: 40.1
Livetime: 23.0
M40548-008 Structure #5: Chrysotile
374
280
187
93
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

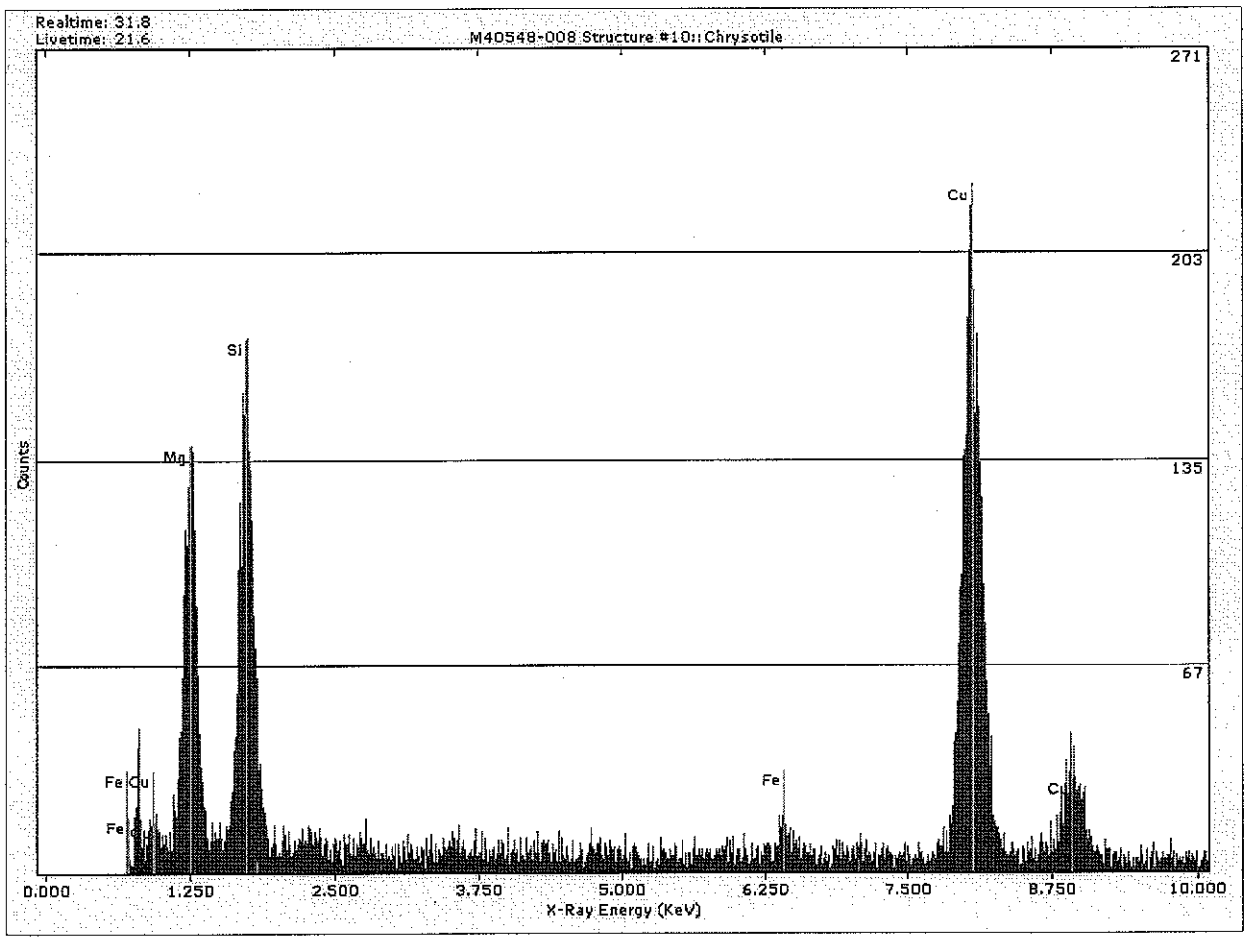

Realtime: 30.5
Livetime: 8.7
M40548-008 Structure #6:: Chrysotile
405
304
202
101
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

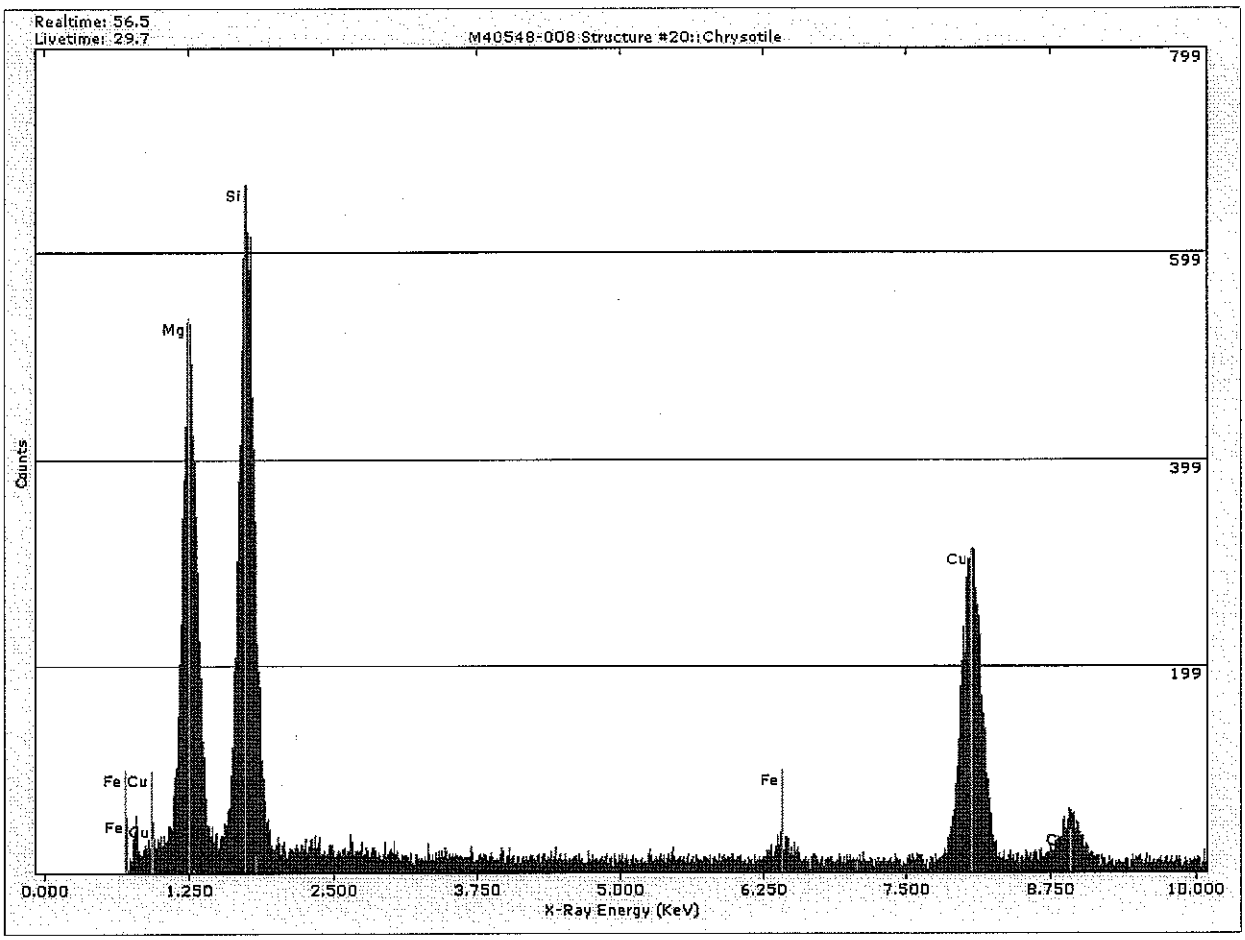

Realtime: 34.4
Livetime: 24.2
M40548-008 Structure #7:: Chrysotile
240
180
120
60
Counts
Mg
Si
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

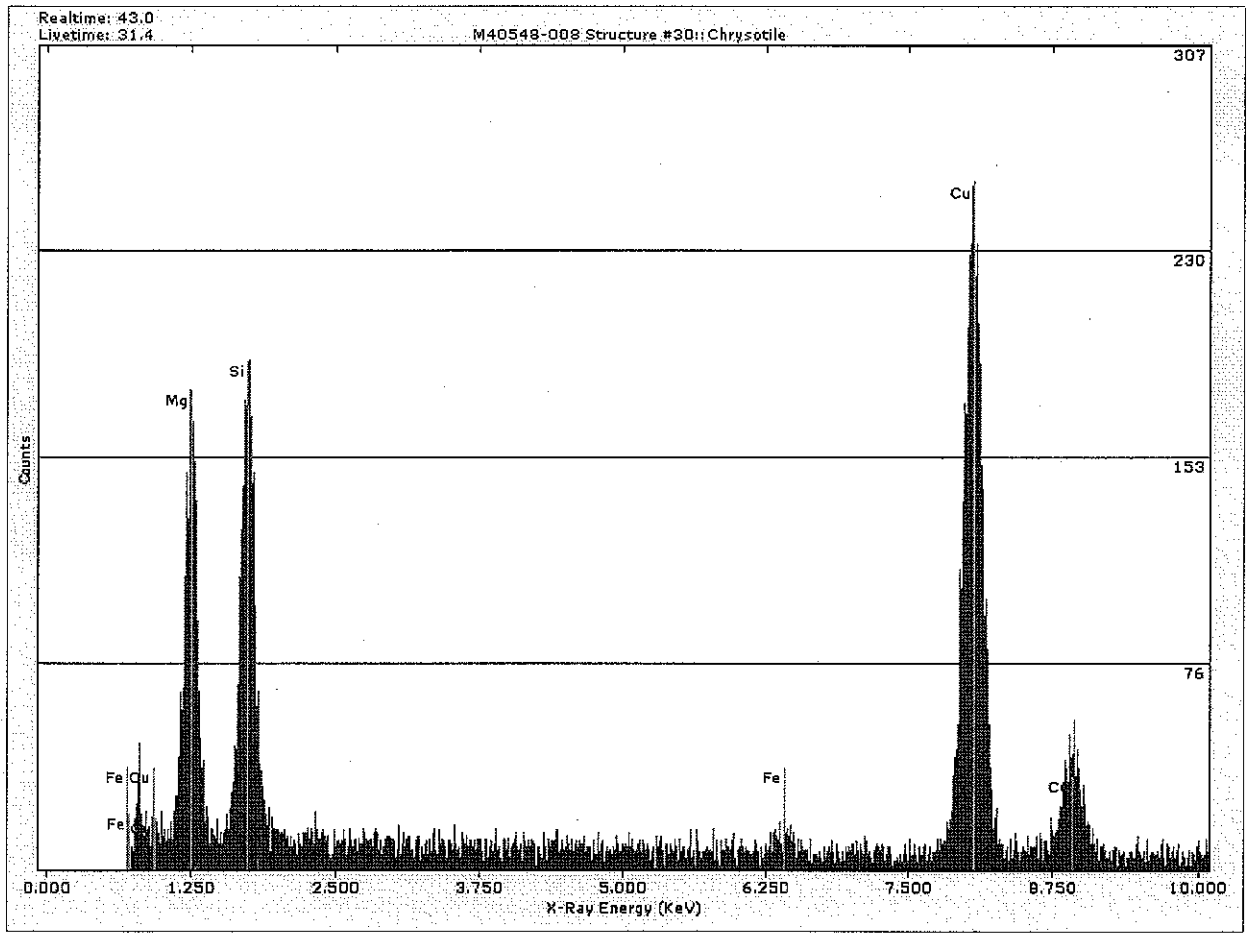

Realtime: 37.8
Livetime: 27.6
M40548-008 Structure #8::Chrysotile
Counts
101
76
50
25
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

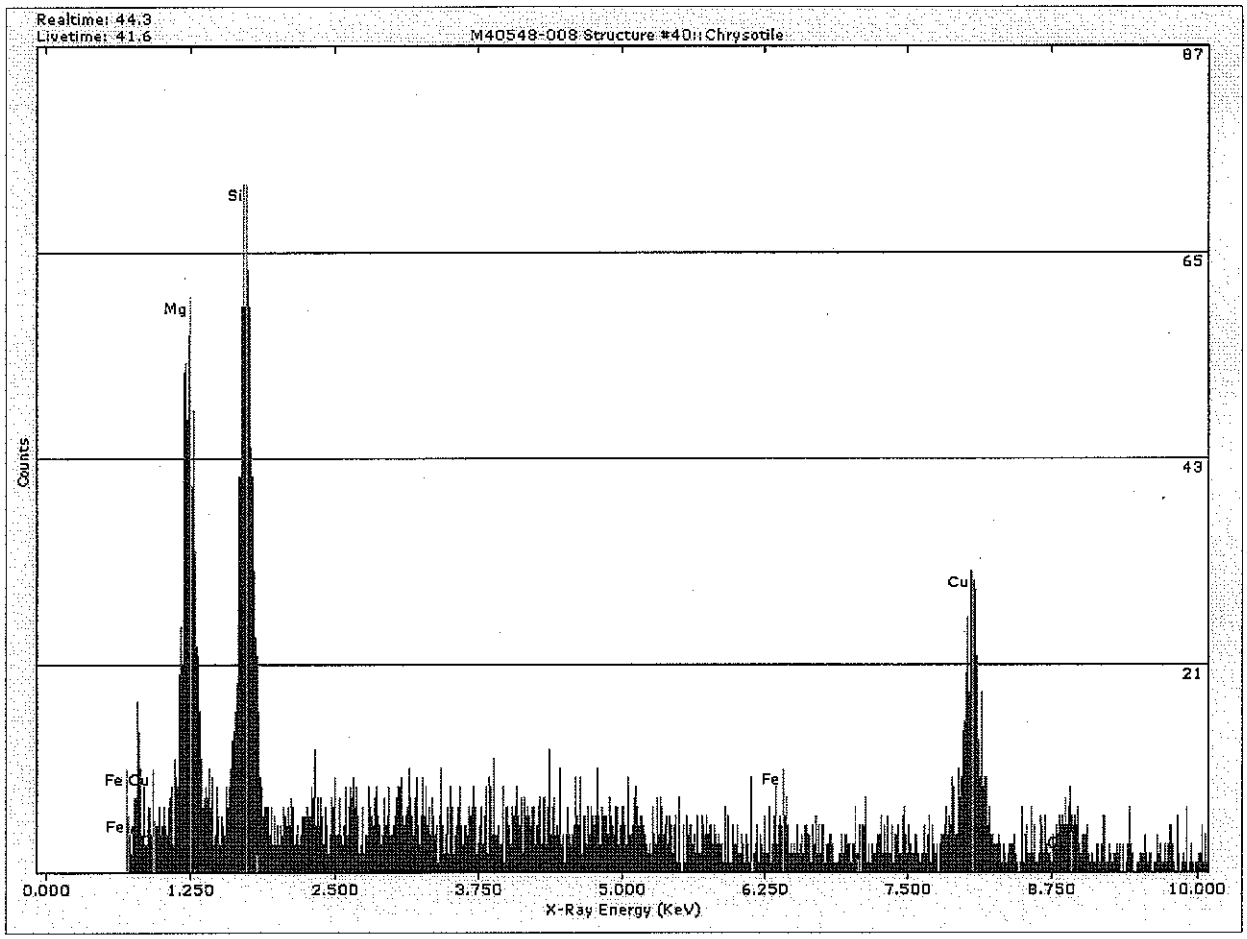
M40548-008, Chrysotile, Structure #009

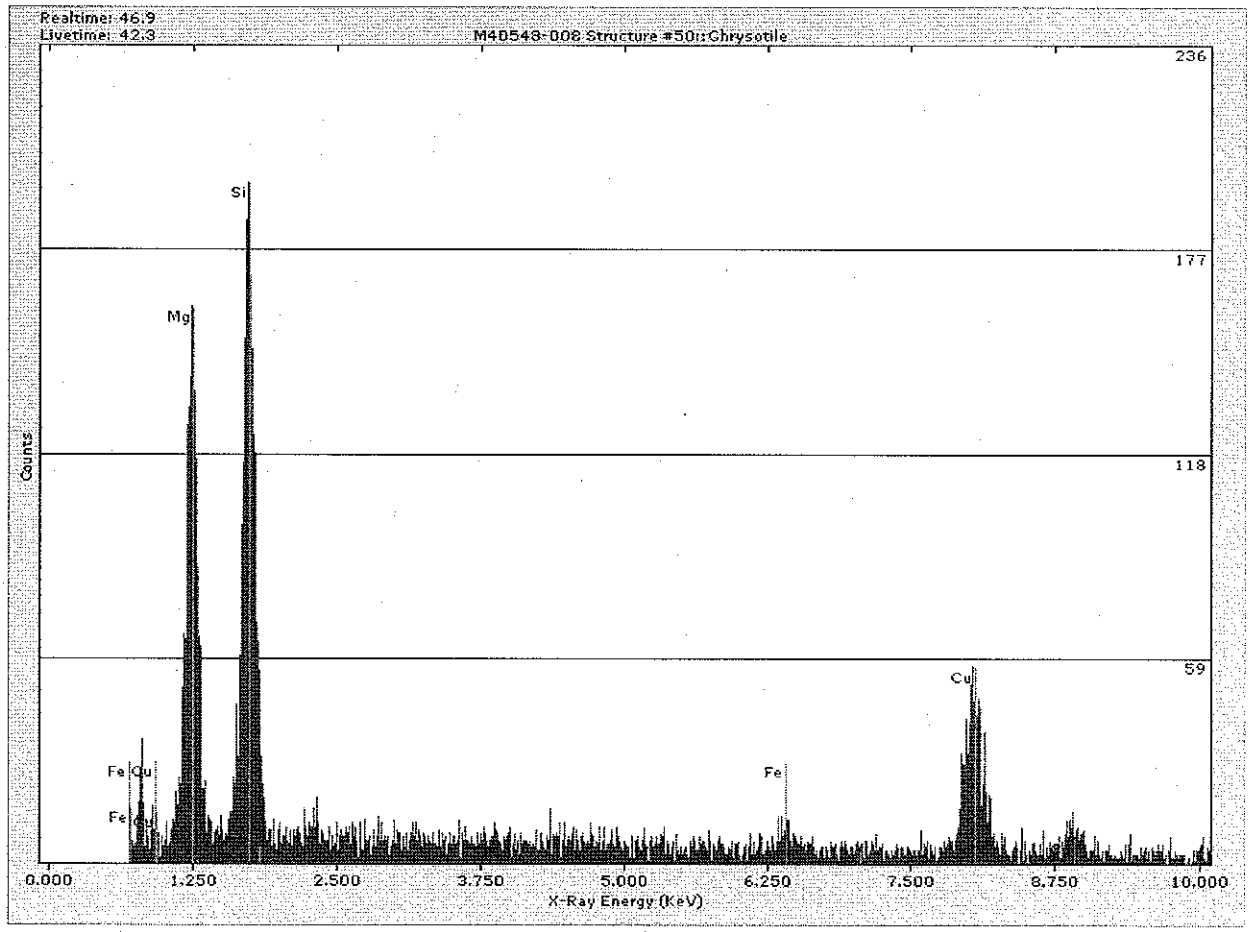

Realtime: 33.2
Livetime: 11.1
M40548-008 Structure #9::Chrysotile
416
312
208
104
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

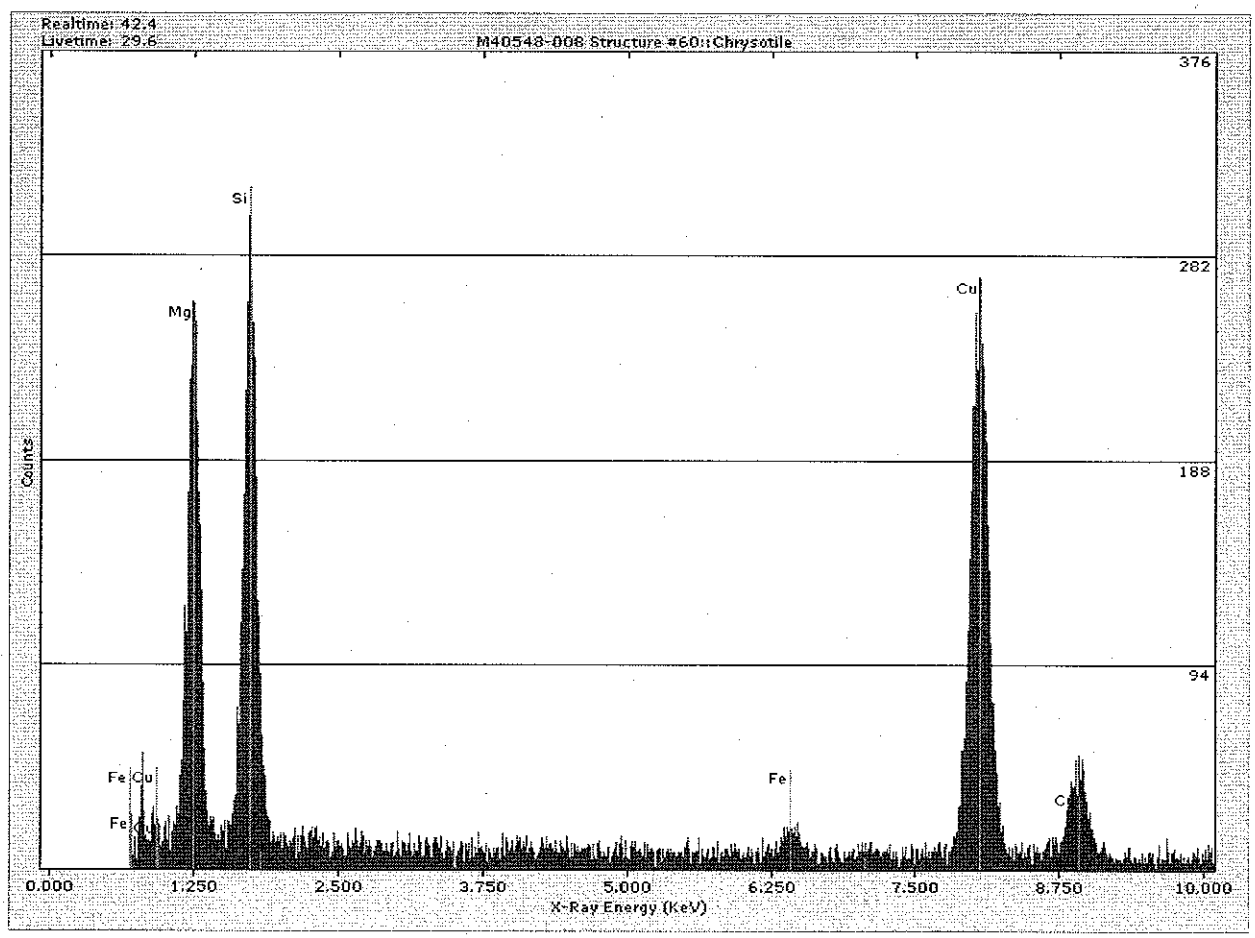

Realtime: 31.8
Livetime: 21.6
M40548-008 Structure #10::Chrysotile
271
203
135
67
Counts
Cu
Si
Mg
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

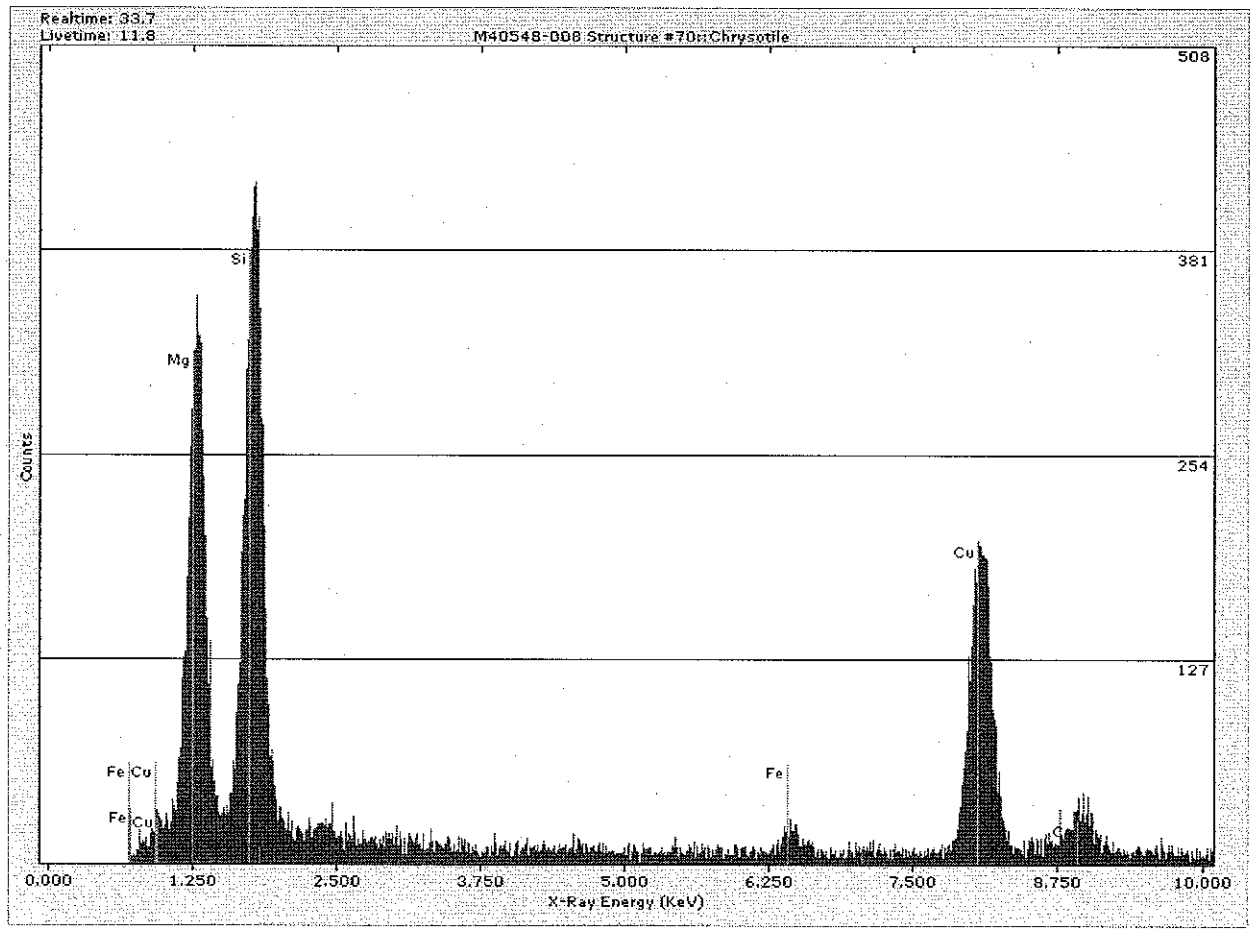

Realtime: 56.5
Livetime: 29.7
M40548-008 Structure #20:1Chrysotile
799
599
399
199
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

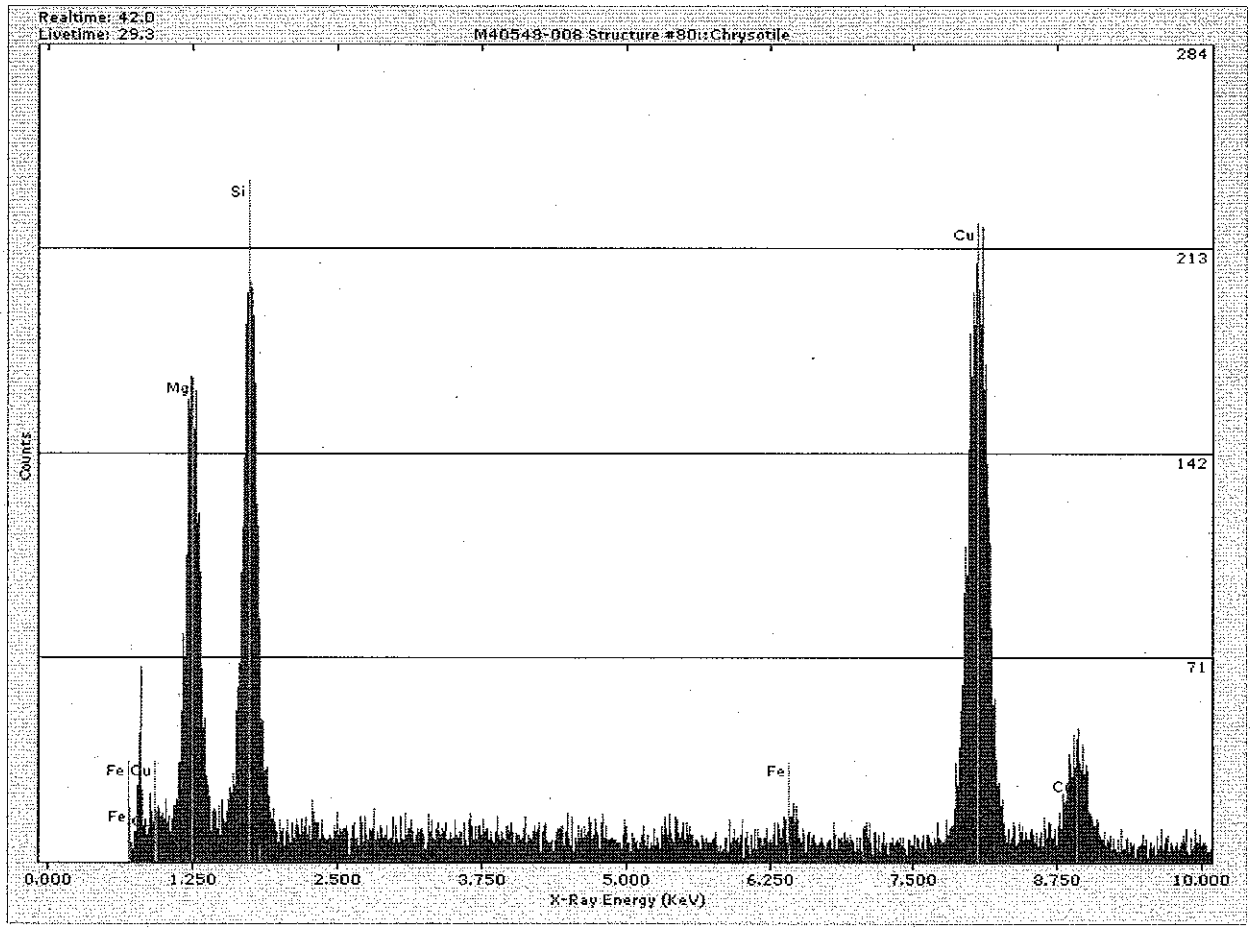

Realtime: 43.0
Livetime: 31.4
M40548-008 Structure #30:: Chrysotile
307
230
153
76
Counts
Cu
Si
Mg
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

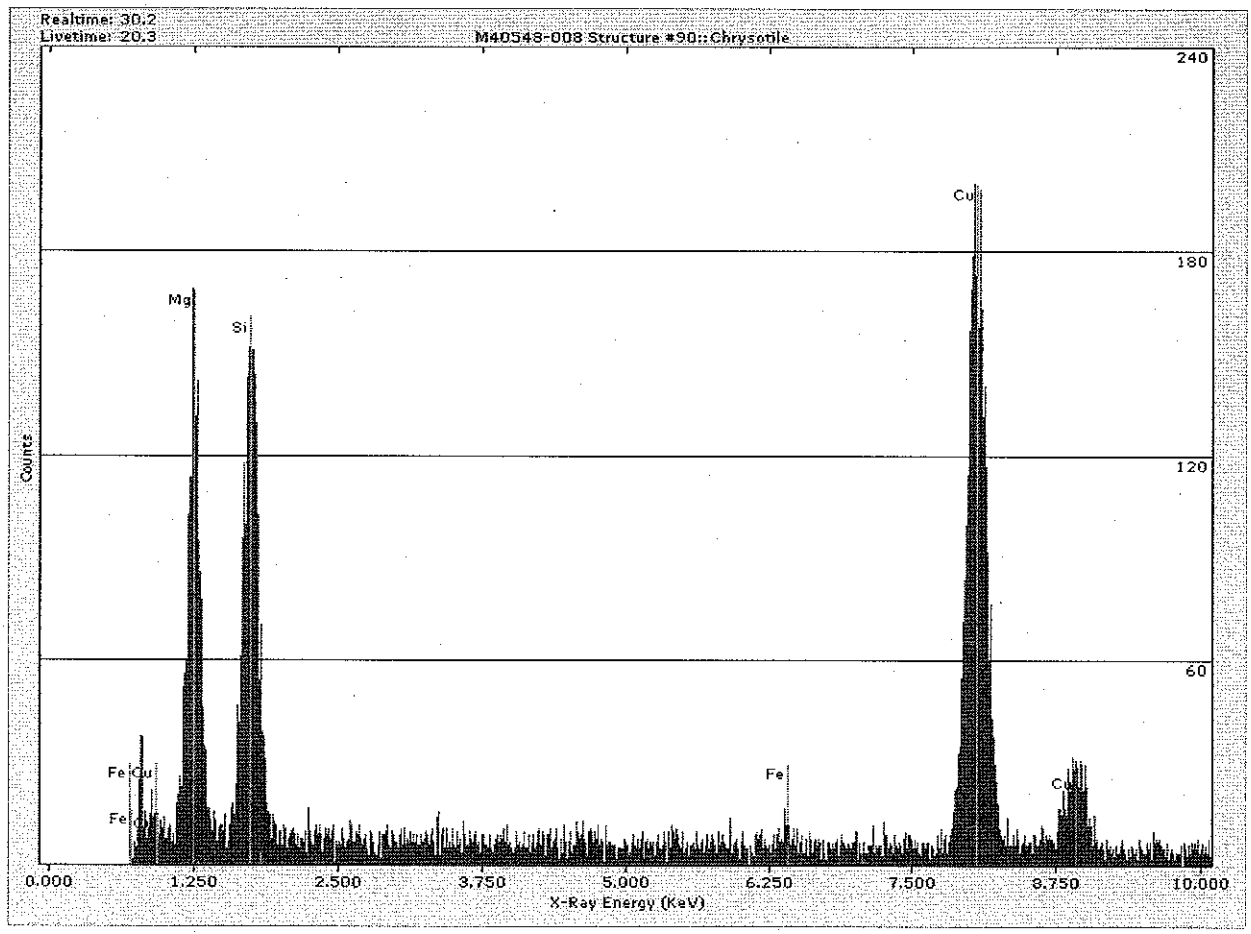

Realtime: 44.3
Livetime: 41.6
M40548-008 Structure #40:: Chrysotile
87
65
43
21
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

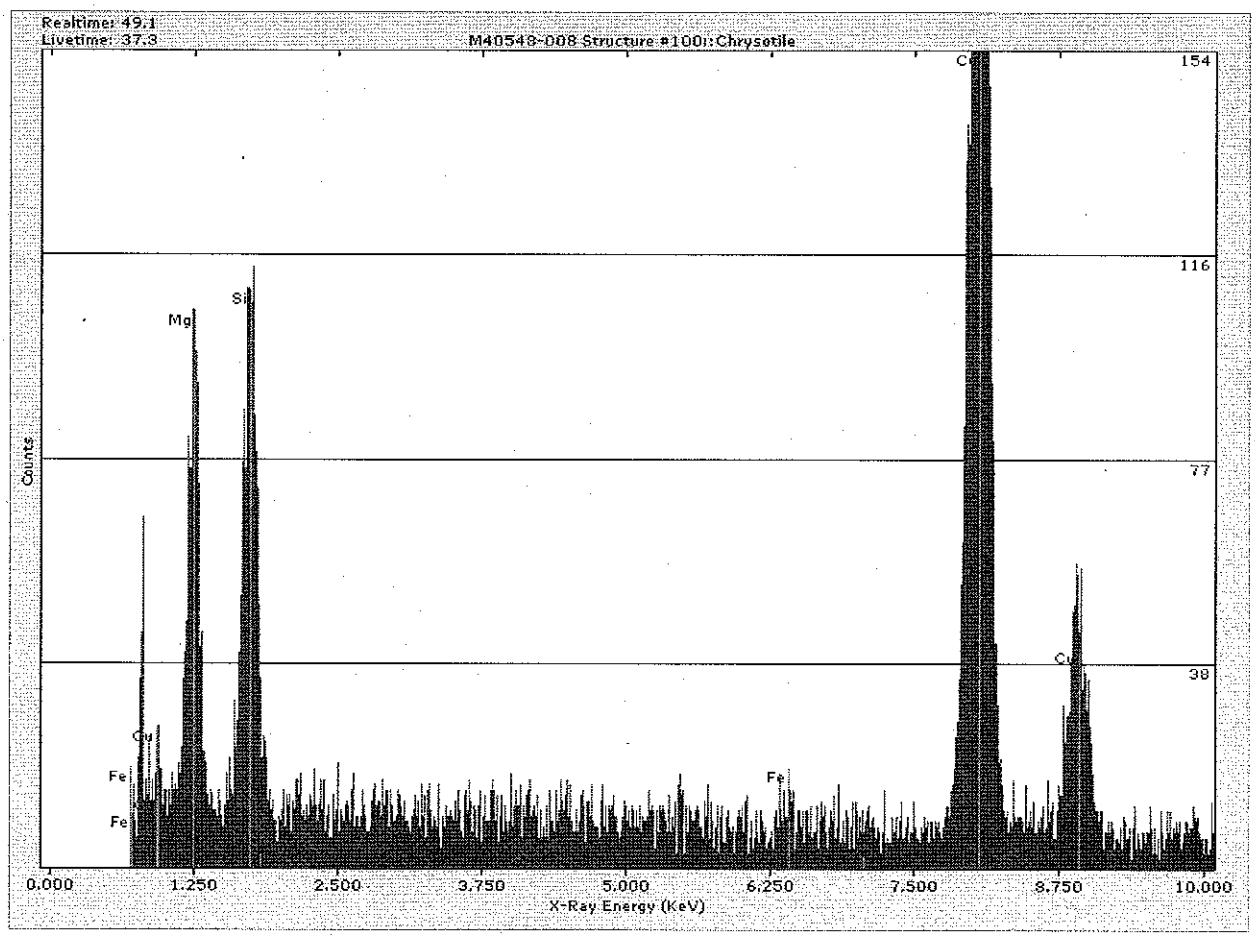

Realtime: 46.9
Livetime: 42.3
M4D548-008 Structure #50: Chrysotile
236
177
118
59
Counts
Si
Mg
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 42.4
Livetime: 29.6
M40548-008 Structure #60::Chrysotile
376
282
188
94
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (keV)


Realtime: 33.7
Livetime: 11.8
M40548-008 Structure #70::Chrysotile
508
381
254
127
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 42.0
Livetime: 29.3
M40543-008 Structure #80::Chrysotile
284
213
142
71
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
C
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 30.2
Livetime: 20.3
M40548-008 Structure #90::Chrysotile
240
180
120
60
Counts
Cu
Mg
Si
Fe
Cu
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)


Realtime: 49.1
Livetime: 37.3
M40548-008 Structure #100i: Chrysotile
154
116
77
38
Counts
Mg
Si
Cu
Fe
Fe
Fe
Cu
0.000
1.250
2.500
3.750
5.000
6.250
7.500
8.750
10.000
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-012

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	P-1-A

7402 ANALYSIS

Sample Area/ Volume:	52	Liters	Date Analyzed:	11/15/2006	
Filter Type:	MCE 25mm		Analyst:	Mehrdad Motamedi	
Pore size:	0.8		Scope Number:	4	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	YES	7 %	Grid_box:	7179	

Number of grids:	2	#1:	101	#3:	100	Asbestos	66
Number of openings:	40	#2:	103	#4:	102	Non-asbestos	2

Average Grid Size: 0.010302 Total Area Analyzed: 0.412

% Asbestos 97.06

Str#:	SquareID:	Fiber Type:	Size		Morph:	SAED:	EDS:
1	C6-C1	Chrysotile	8	0.3	Chrysotile	Chrysotile	✔
2		Chrysotile	19	1	Chrysotile	Chrysotile	✔
3		Chrysotile	7	0.5	Chrysotile	Chrysotile	✔
4	C2	Chrysotile	5.7	0.9	Chrysotile	Chrysotile	✔
5		Chrysotile	6	0.4	Chrysotile	Chrysotile	✔
6	C3	Chrysotile	56	2	Chrysotile	Chrysotile	✔
7	C4	Chrysotile	90	7	Chrysotile	Chrysotile	✔
8		Chrysotile	14.6	0.4	Chrysotile	Chrysotile	✔
9		Chrysotile	8	0.3	Chrysotile	Chrysotile	✔
10		Chrysotile	8	0.6	Chrysotile	Chrysotile	✔
11	C5	Chrysotile	12	0.7	Chrysotile		
12		Chrysotile	24	0.6	Chrysotile		
13	C6	Chrysotile	24	2	Chrysotile		
14		Chrysotile	6.5	0.3	Chrysotile		
15	C7	Chrysotile	16	0.7	Chrysotile		
16		Chrysotile	7	0.3	Chrysotile		
17	C8	Chrysotile	7.3	0.3	Chrysotile		
18	C9	Chrysotile	7	0.7	Chrysotile		
19	C10	NA	8	0.2	Ambiguous	Ambiguous	✔
20	D10	Chrysotile	8	1	Chrysotile	Chrysotile	✔
21	D9	Chrysotile	15	2	Chrysotile		
22		Chrysotile	7	1	Chrysotile		
23		Chrysotile	16	4	Chrysotile		
24	D8	Chrysotile	17	0.4	Chrysotile		
25		Chrysotile	6	1.5	Chrysotile		
26	D7	Chrysotile	17	1.3	Chrysotile		
27	D6	Chrysotile	7.5	0.3	Chrysotile		
28		Chrysotile	40	6	Chrysotile		

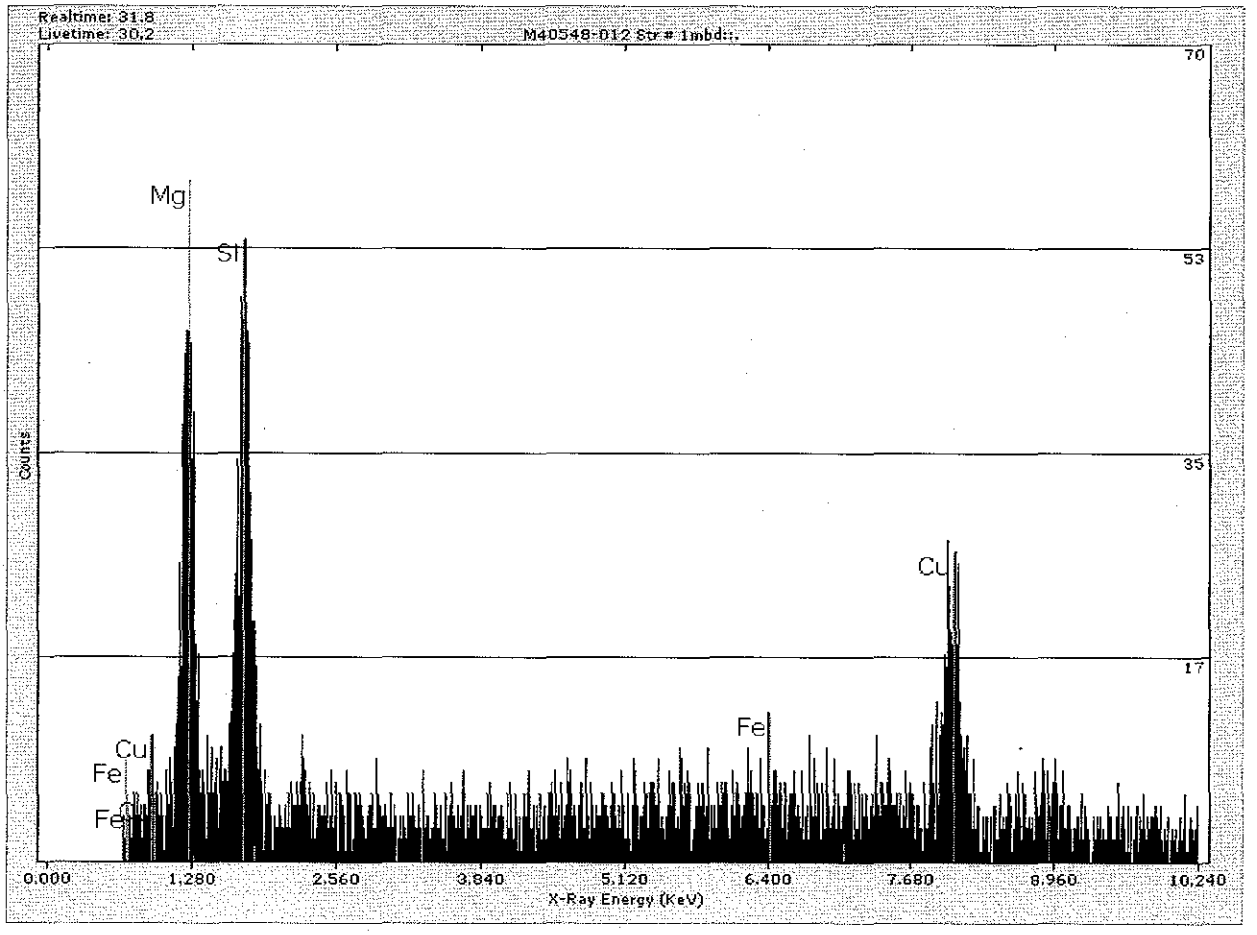
29	D5		Chrysotile	26	2	Chrysotile		
NSD	D4							
30	D3		Chrysotile	52	0.5	Chrysotile	Chrysotile	✔
31	D2		Chrysotile	8	0.5	Chrysotile		
32	D1		Chrysotile	6.6	0.5	Chrysotile		
33	C7-A6		Chrysotile	22	0.4	Chrysotile		
34			Chrysotile	12	0.6	Chrysotile		
NSD	A7							
NSD	A8							
35	A9		Chrysotile	12	1.6	Chrysotile		
36	A10		Chrysotile	22	1	Chrysotile		
37	B10		Chrysotile	11	2	Chrysotile		
38			Chrysotile	62	0.7	Chrysotile		
39	B7		Chrysotile	6	0.4	Chrysotile		
40			Chrysotile	8	0.3	Chrysotile	Chrysotile	✔
41			Chrysotile	12	0.3	Chrysotile		
42			Chrysotile	10	0.8	Chrysotile		
43			Chrysotile	44	0.3	Chrysotile		
NSD	B4							
44	C5		Chrysotile	6	0.3	Chrysotile		
45		NA		8	2	Ambiguous	Ambiguous	✔
46	C6		Chrysotile	14	1.5	Chrysotile		
47			Chrysotile	33	4	Chrysotile		
48			Chrysotile	12	1.6	Chrysotile		
49	C9		Chrysotile	5.5	0.3	Chrysotile		
50	C10		Chrysotile	15	0.6	Chrysotile	Chrysotile	✔
51			Chrysotile	9	1.4	Chrysotile		
NSD	D10							
52	D9		Chrysotile	6	0.3	Chrysotile		
53	D3		Chrysotile	10	0.3	Chrysotile		
54			Chrysotile	14	0.4	Chrysotile		
55			Chrysotile	8	0.8	Chrysotile		
56	E5		Chrysotile	7.5	0.3	Chrysotile		
57	G7		Chrysotile	14	0.6	Chrysotile		
58	H8		Chrysotile	6	0.3	Chrysotile		
59			Chrysotile	26	0.8	Chrysotile		
60			Chrysotile	12	0.7	Chrysotile	Chrysotile	✔
61			Chrysotile	13	0.3	Chrysotile		
62	I1		Chrysotile	10	0.4	Chrysotile		
63			Chrysotile	6.3	0.5	Chrysotile		
64			Chrysotile	8	0.3	Chrysotile		
65	J1		Chrysotile	7	0.7	Chrysotile		
66			Chrysotile	6.6	0.3	Chrysotile		
67			Chrysotile	18	0.3	Chrysotile		
68			Chrysotile	7	0.3	Chrysotile		

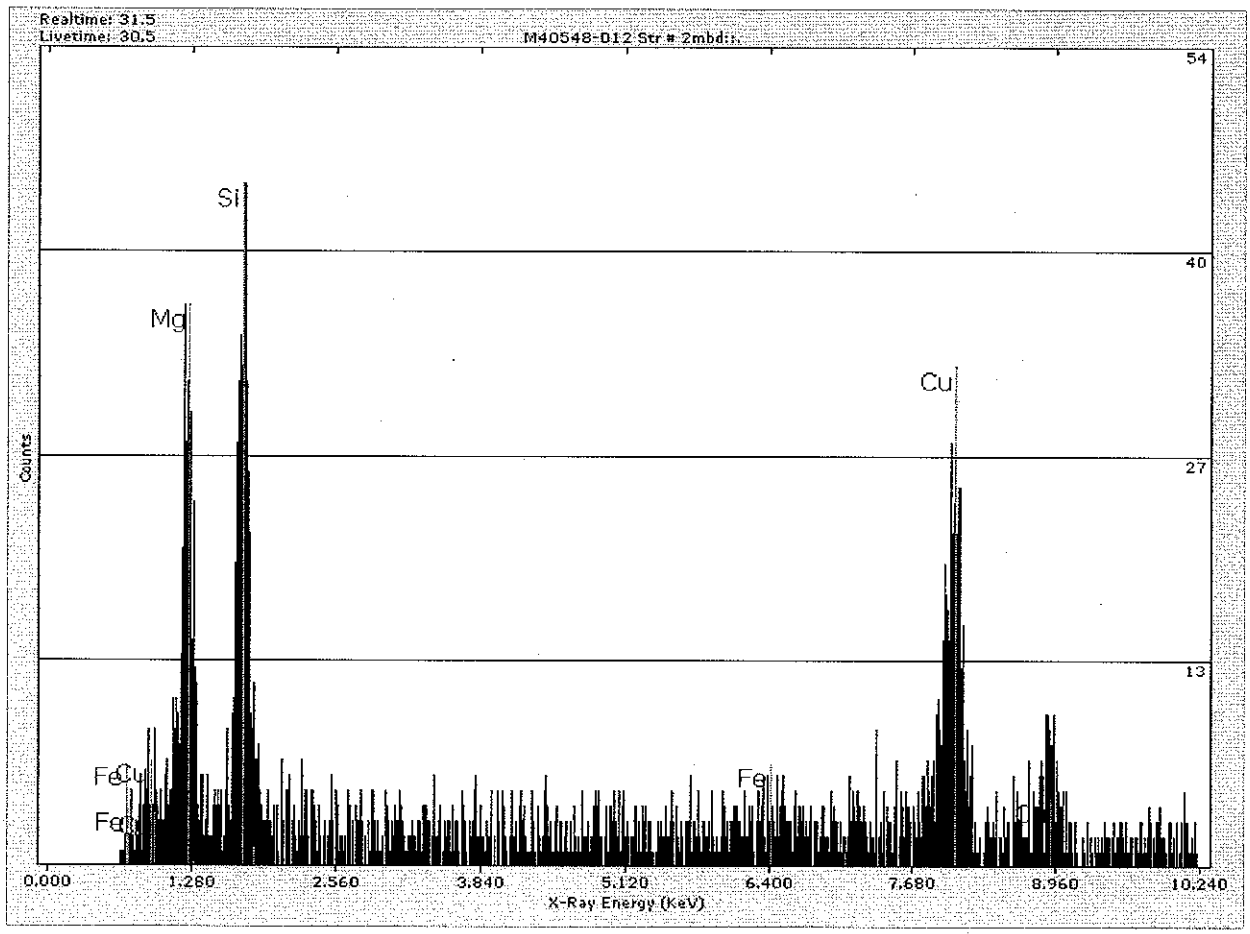
Grid Op

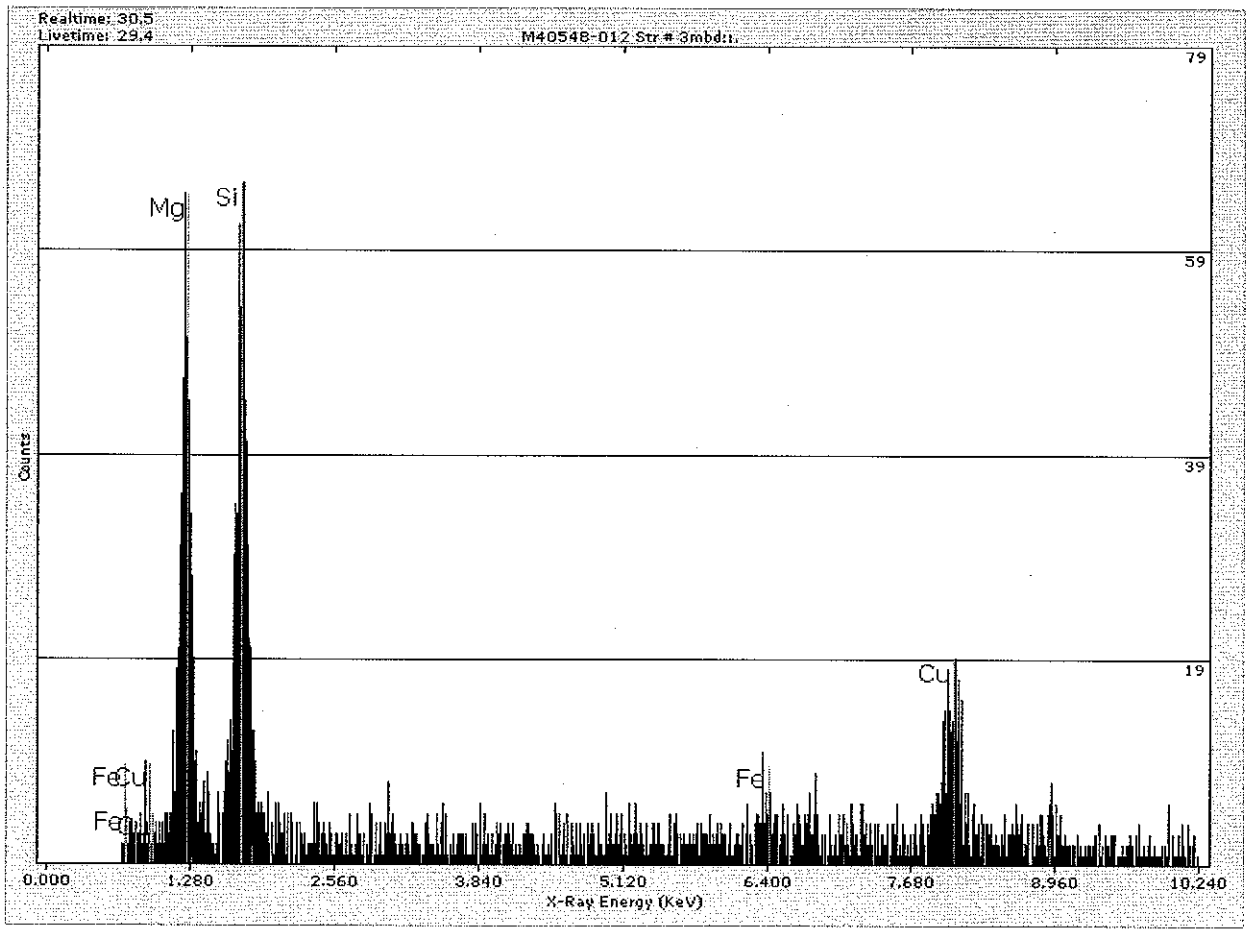
40

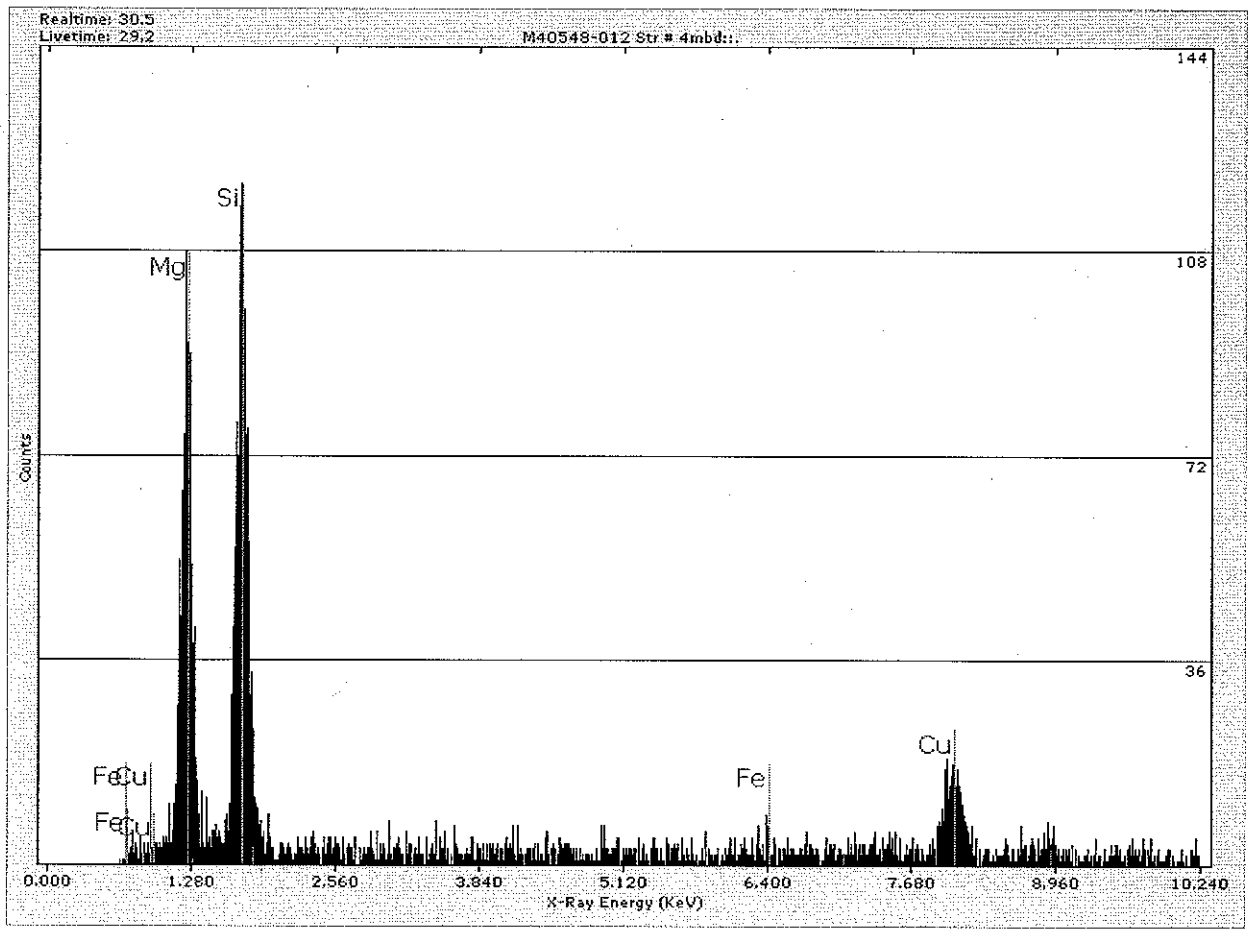
M40548 012 Sample Comments:

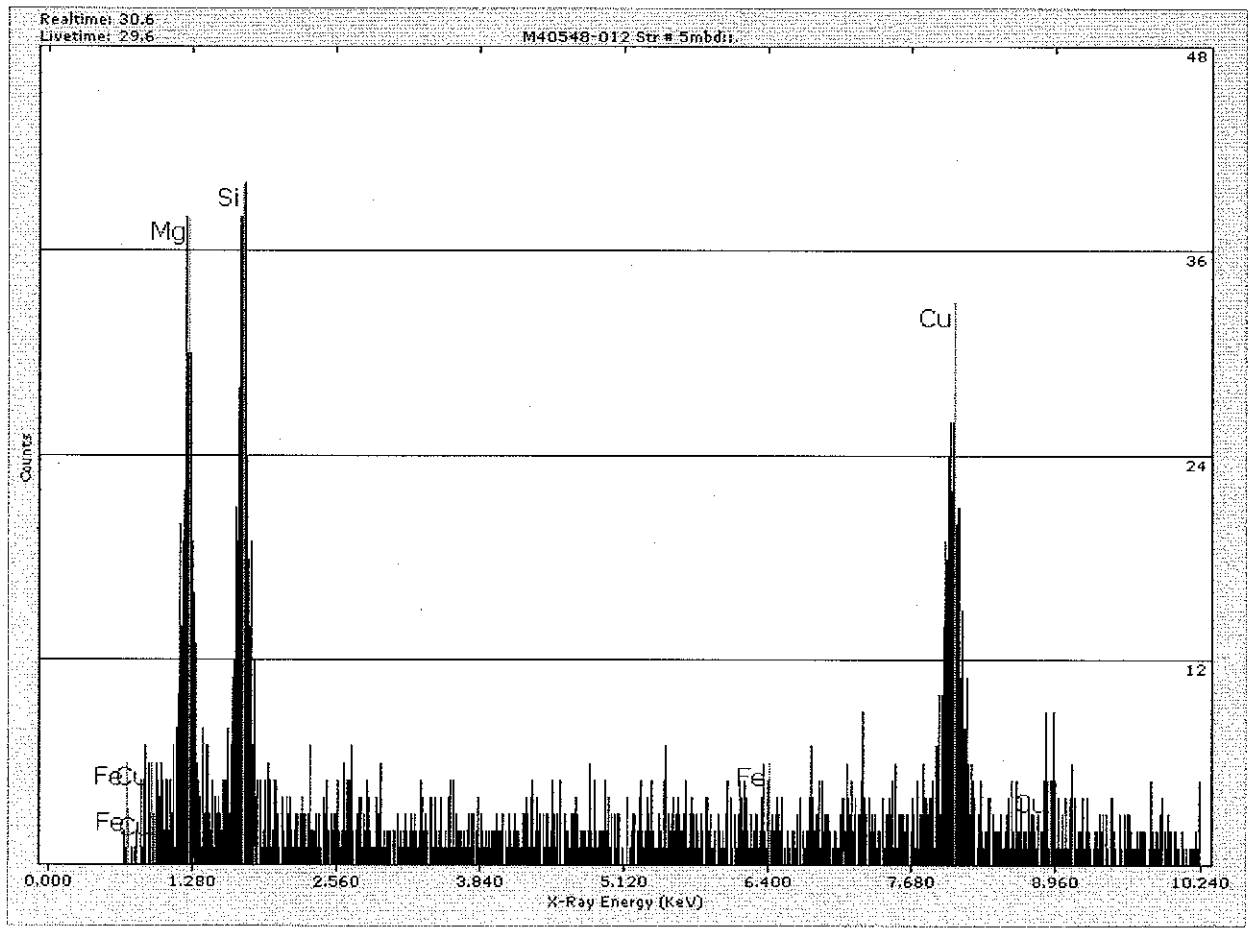
personal right

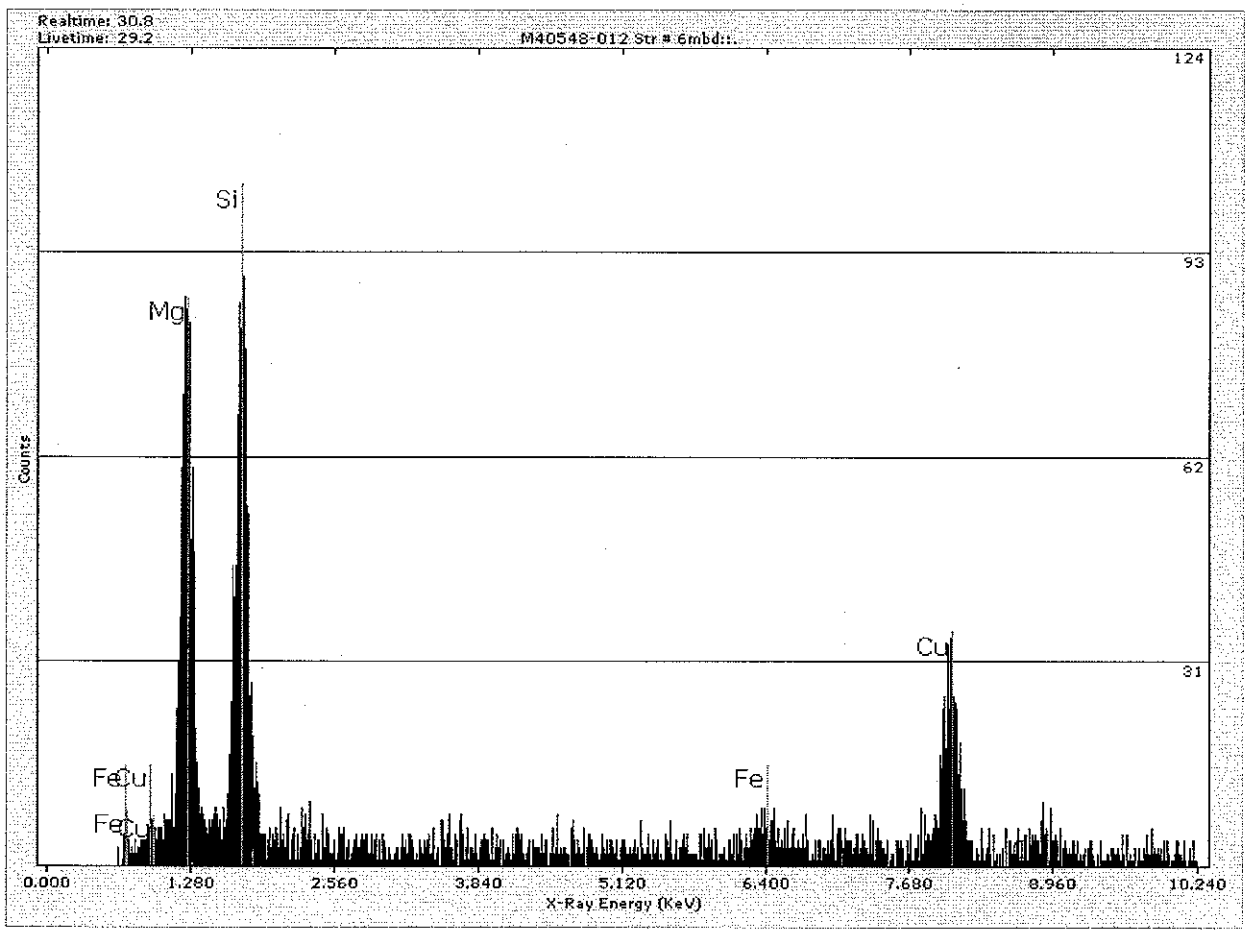

Realtime: 31.8
Livetime: 30.2
M40548-012 Str # 1mbd:.
70
53
35
17
Counts
Mg
Si
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

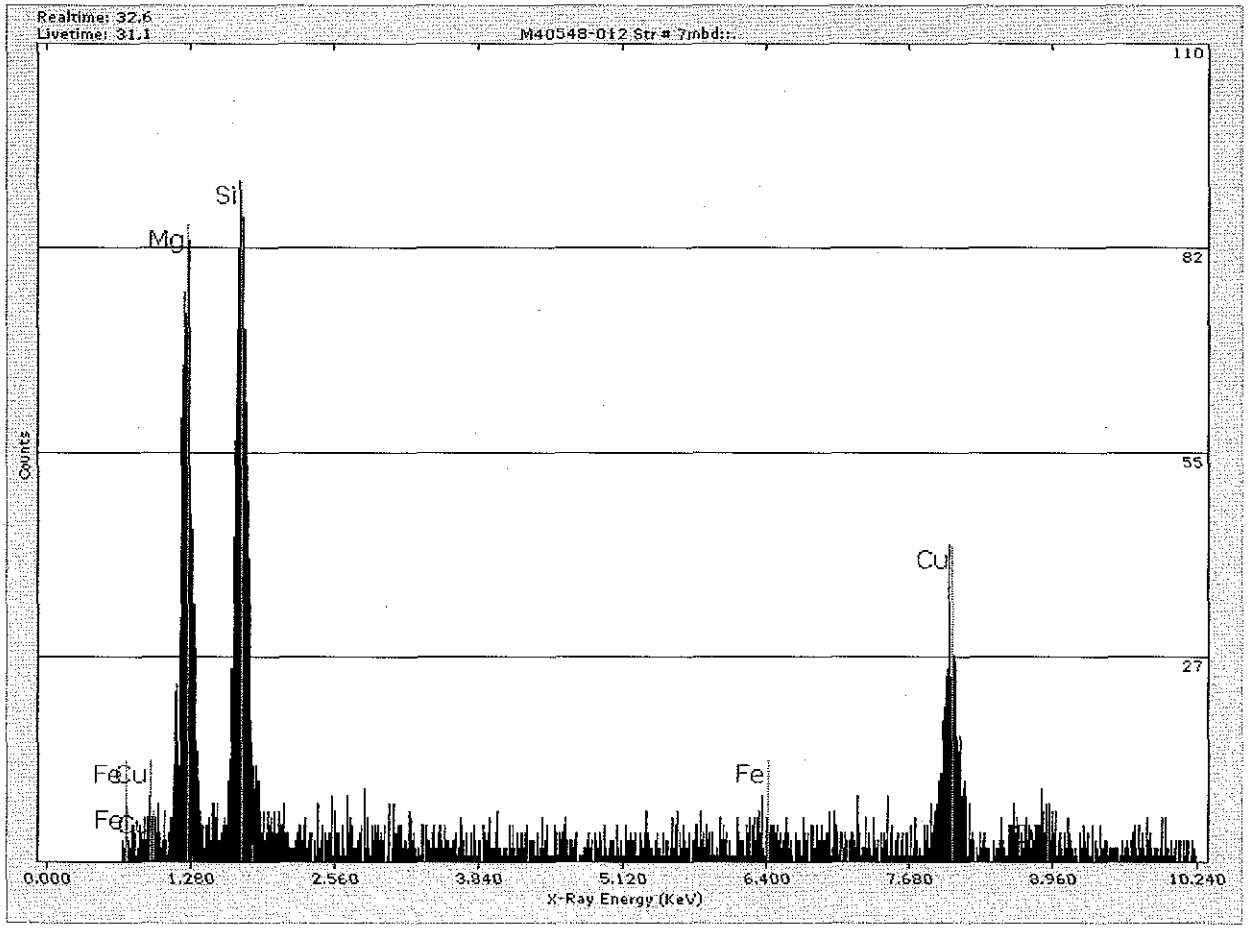

Realtime: 31.5
Livetime: 30.5
M40548-012 Str # 2mbd:..
54
40
27
13
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

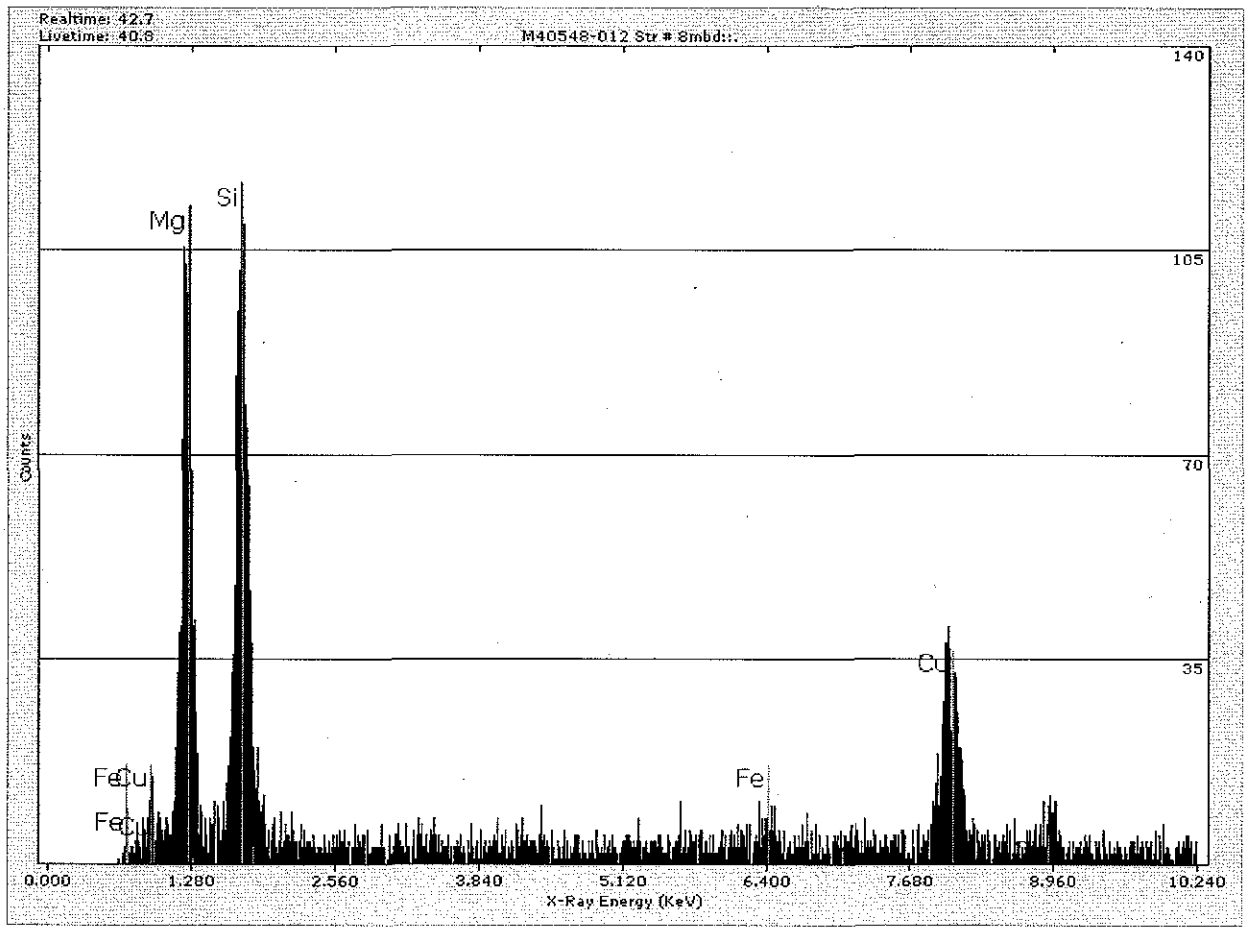

Realtime: 30.5
Livetime: 29.4
M40548-012 Str # 3mbd:1,
79
59
39
19
Counts
Mg
Si
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

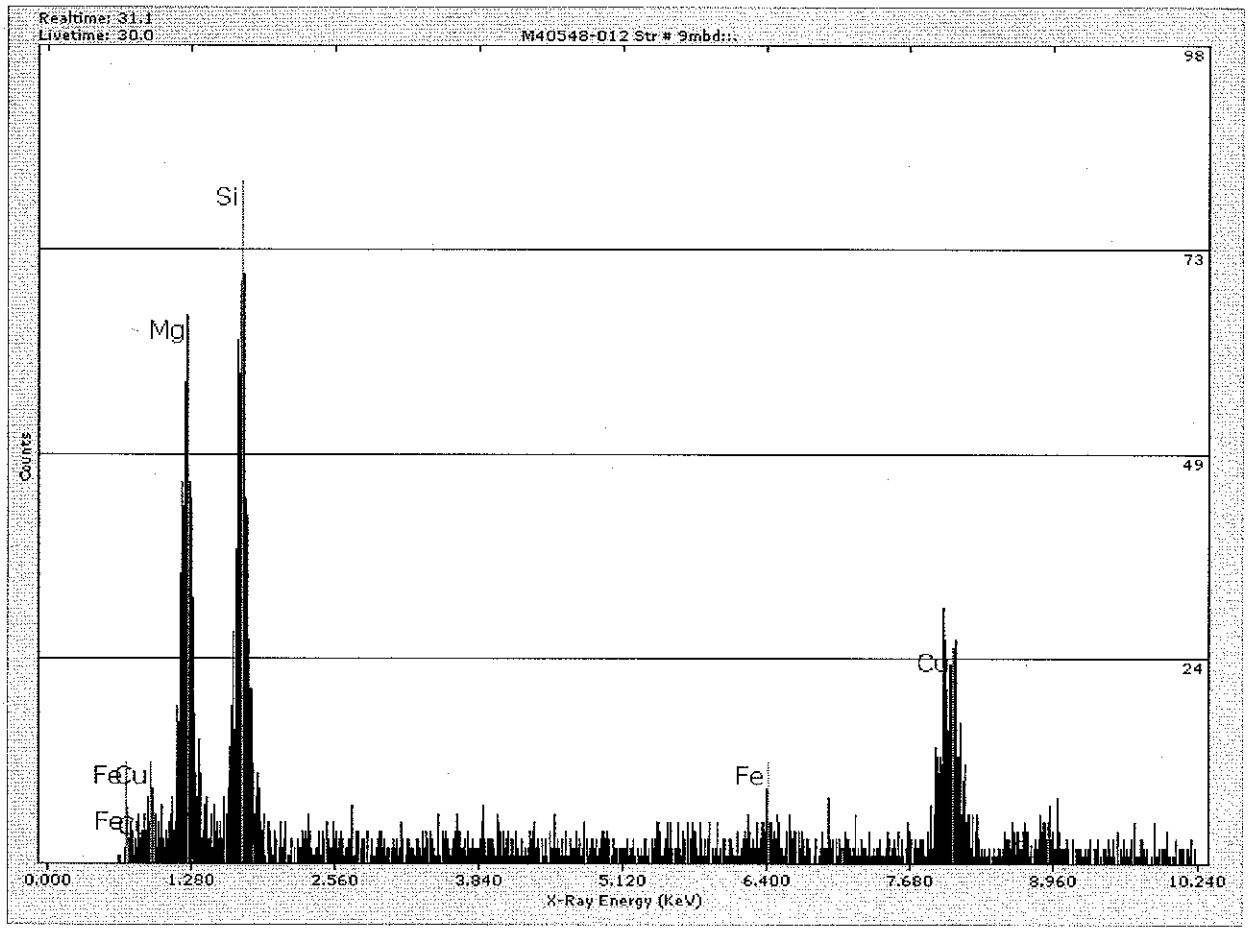

Realtime: 30.5
Livetime: 29.2
M40548-012 Str # 4mbd:..
144
108
72
36
Counts
Si
Mg
Fe Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

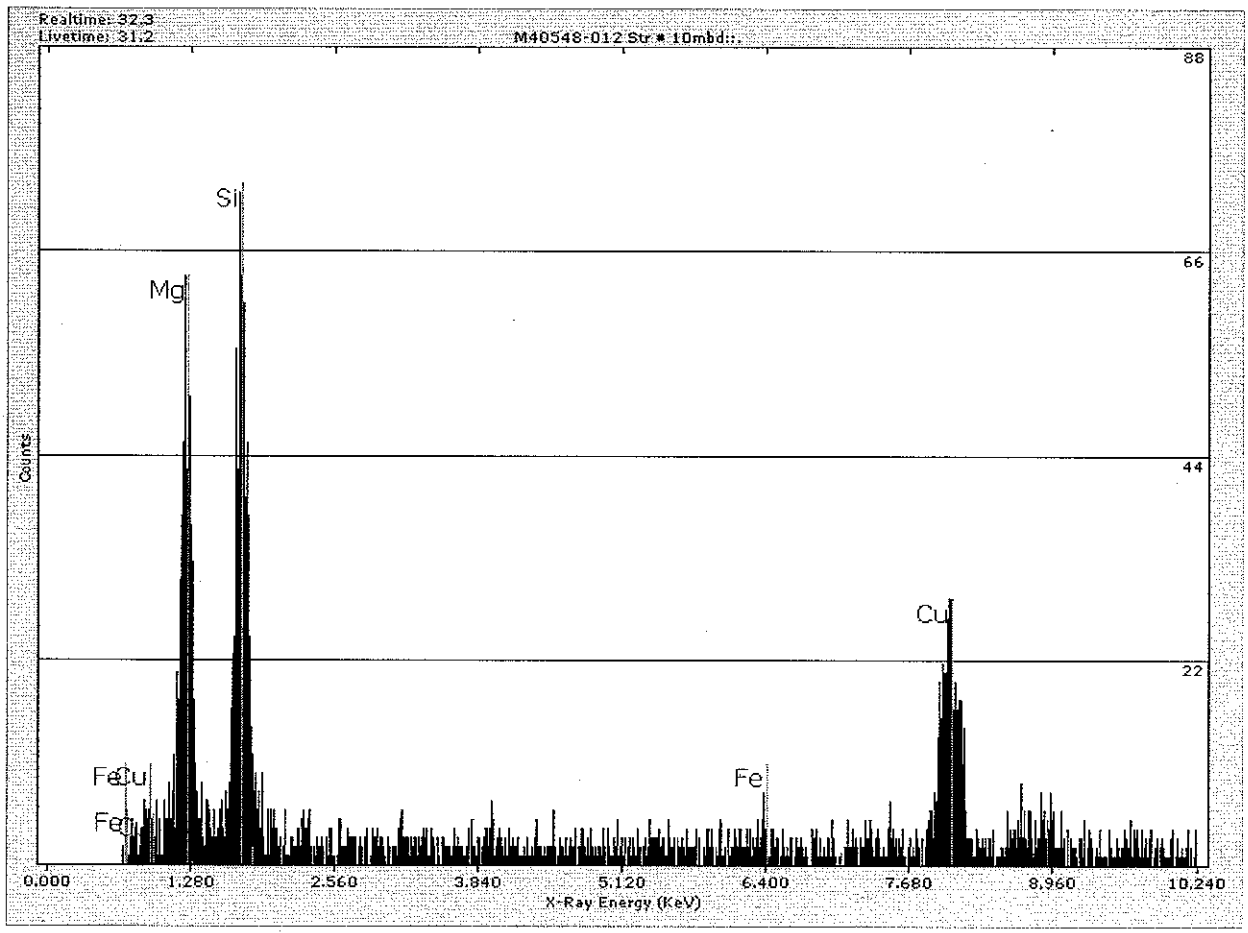

Realtime: 30.6
Livetime: 29.6
M40548-012 Str # 5mbd:.
48
36
24
12
Counts
Mg
Si
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

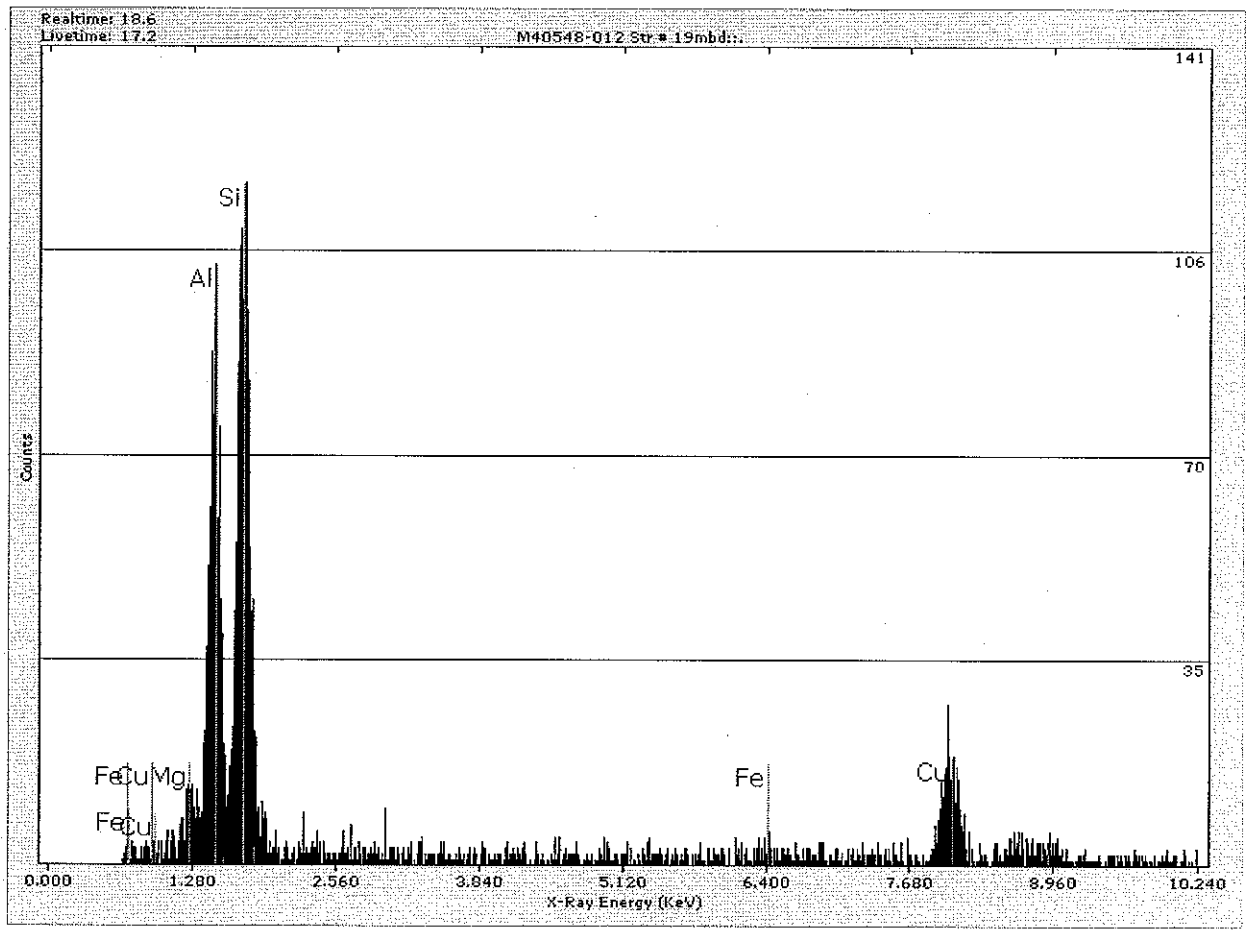

Realtime: 30.8
Livetime: 29.2
M40548-012 Str # 6mbd::.
124
93
62
31
Counts
Si
Mg
Cu
Fe
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

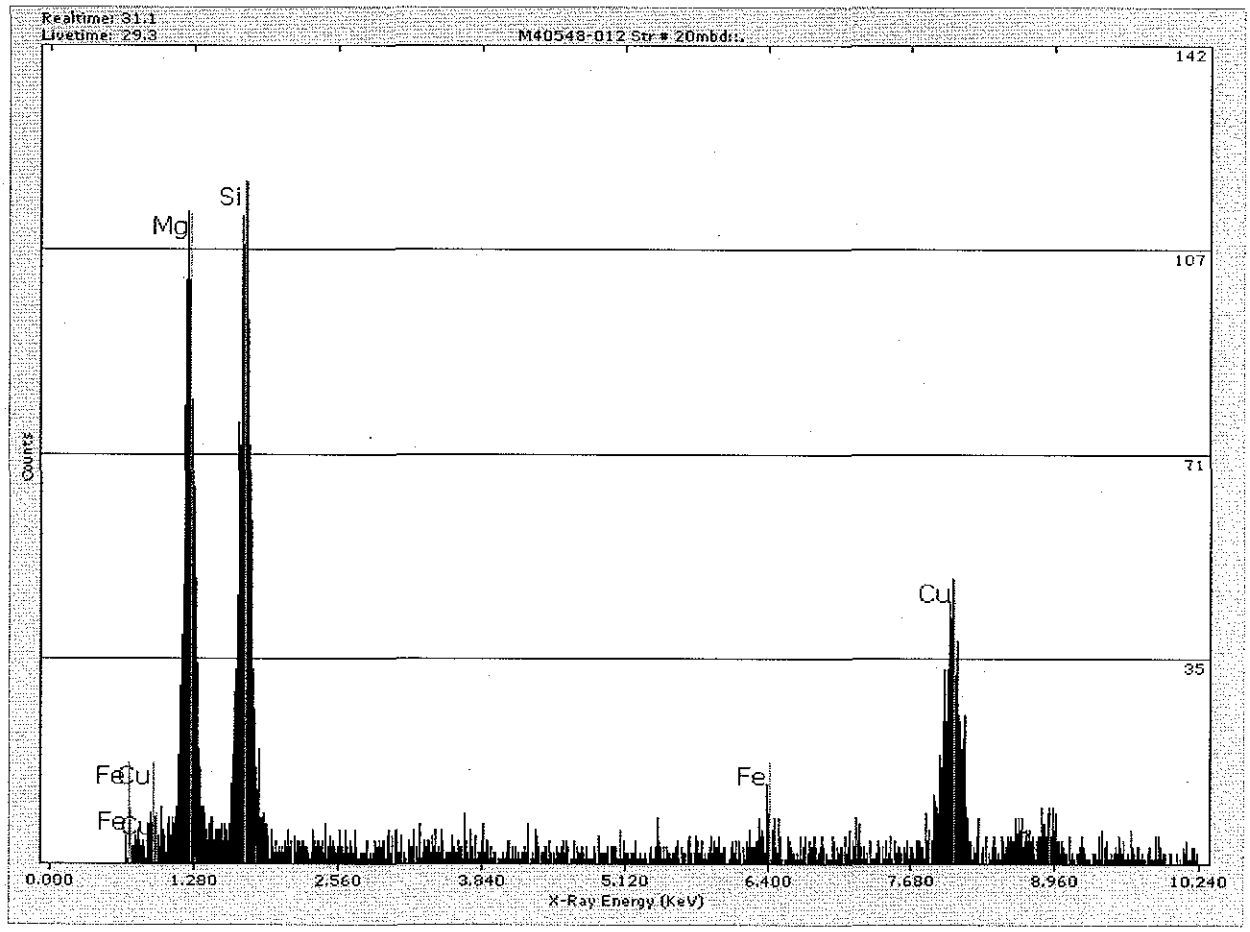

Realtime: 32.6
Livetime: 31.1
M40548-012 Str # 7mbd:..
110
82
55
27
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

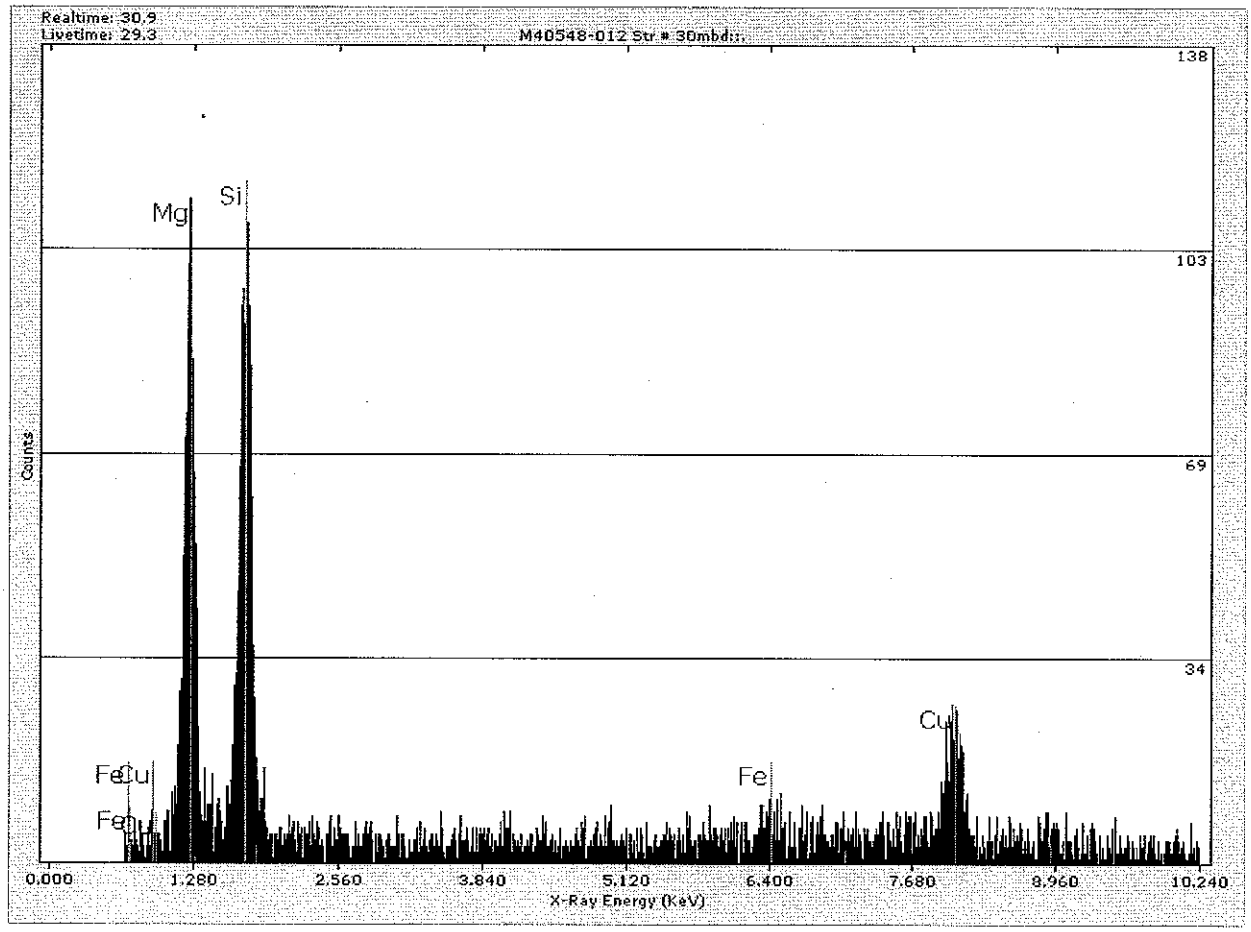

Realtime: 42.7
Livetime: 40.8
M40548-012 Str # 8mbd:::
140
105
70
35
Counts
Mg
Si
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

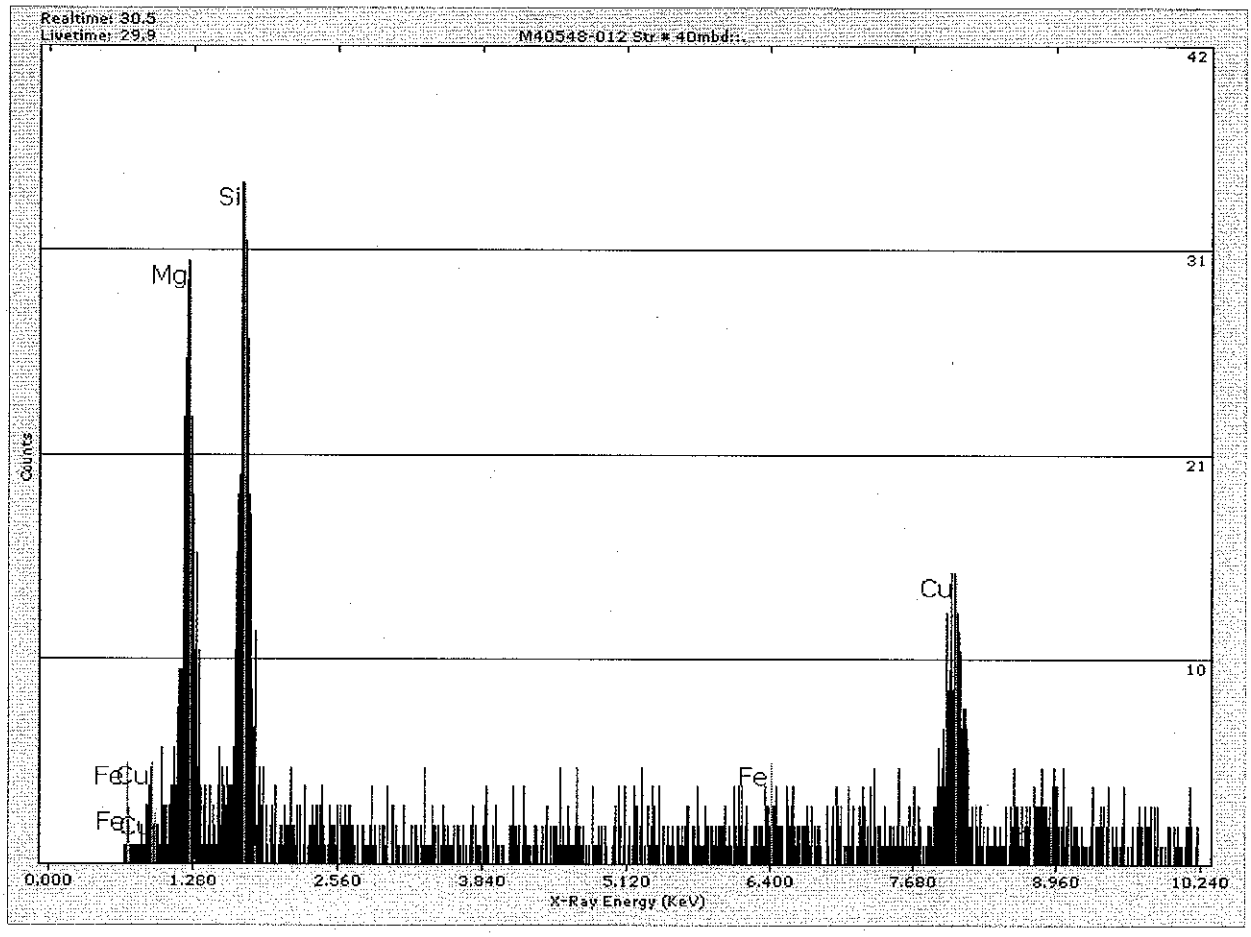

Realtime: 31.1
Livetime: 30.0
M40548-012 Str # 9mbd::
98
73
49
24
Si
Mg
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

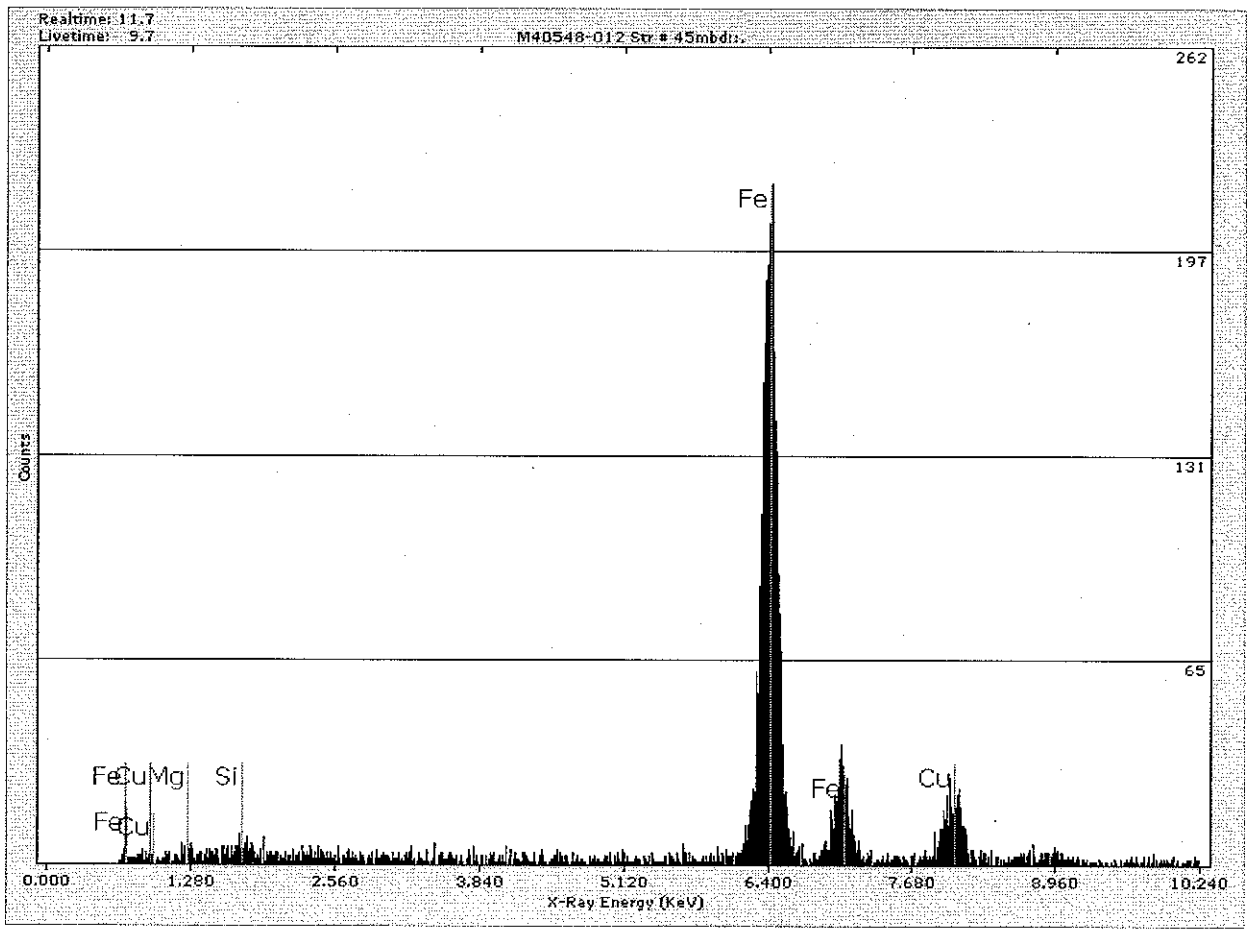

Realtime: 32.3
Livetime: 31.2
M40548-012 Sr * 10mbd:..
88
66
44
22
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

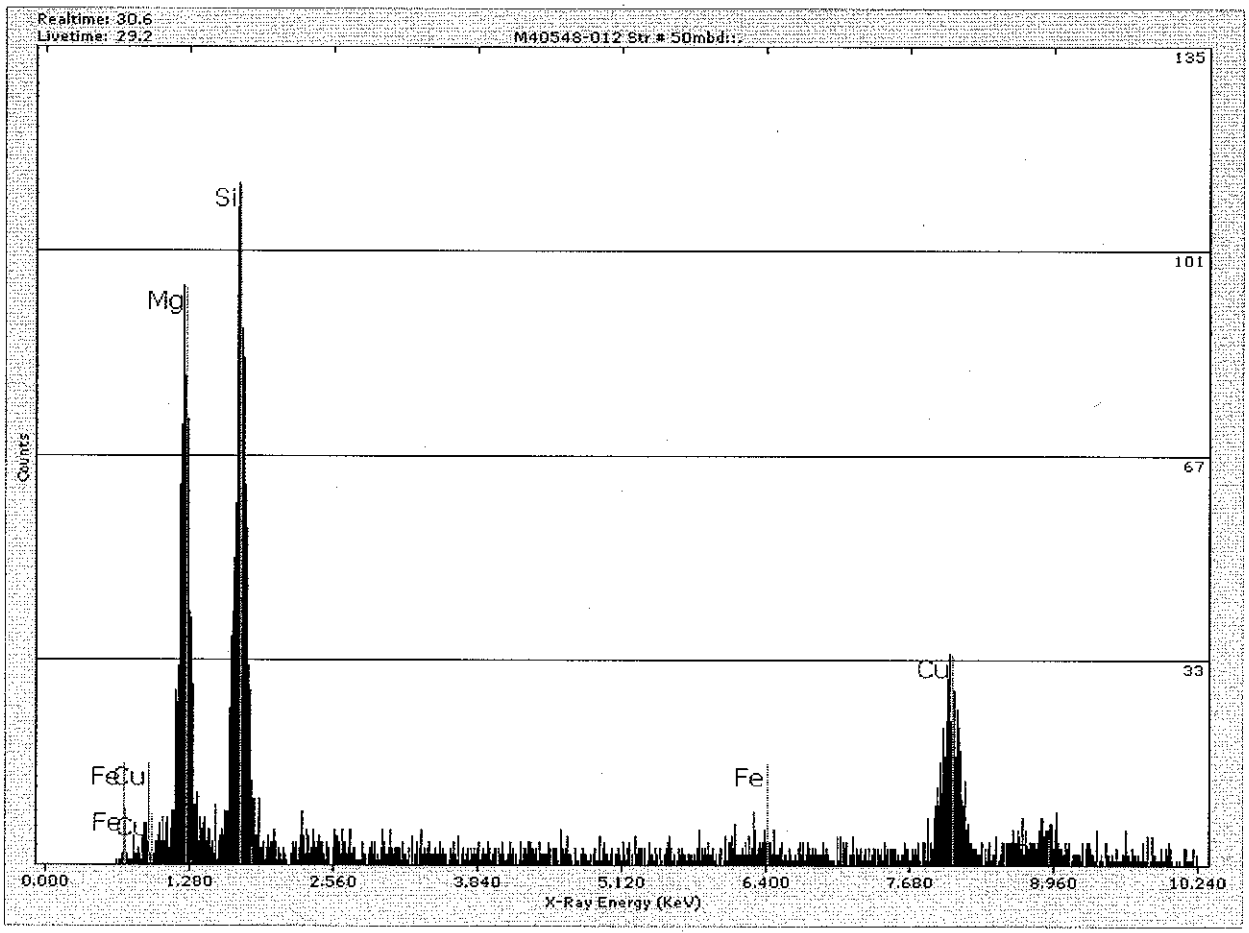

Realtime: 18.6
Livetime: 17.2
M40548-012 Str • 19mbd...
141
106
70
35
Counts
Si
Al
Mg
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

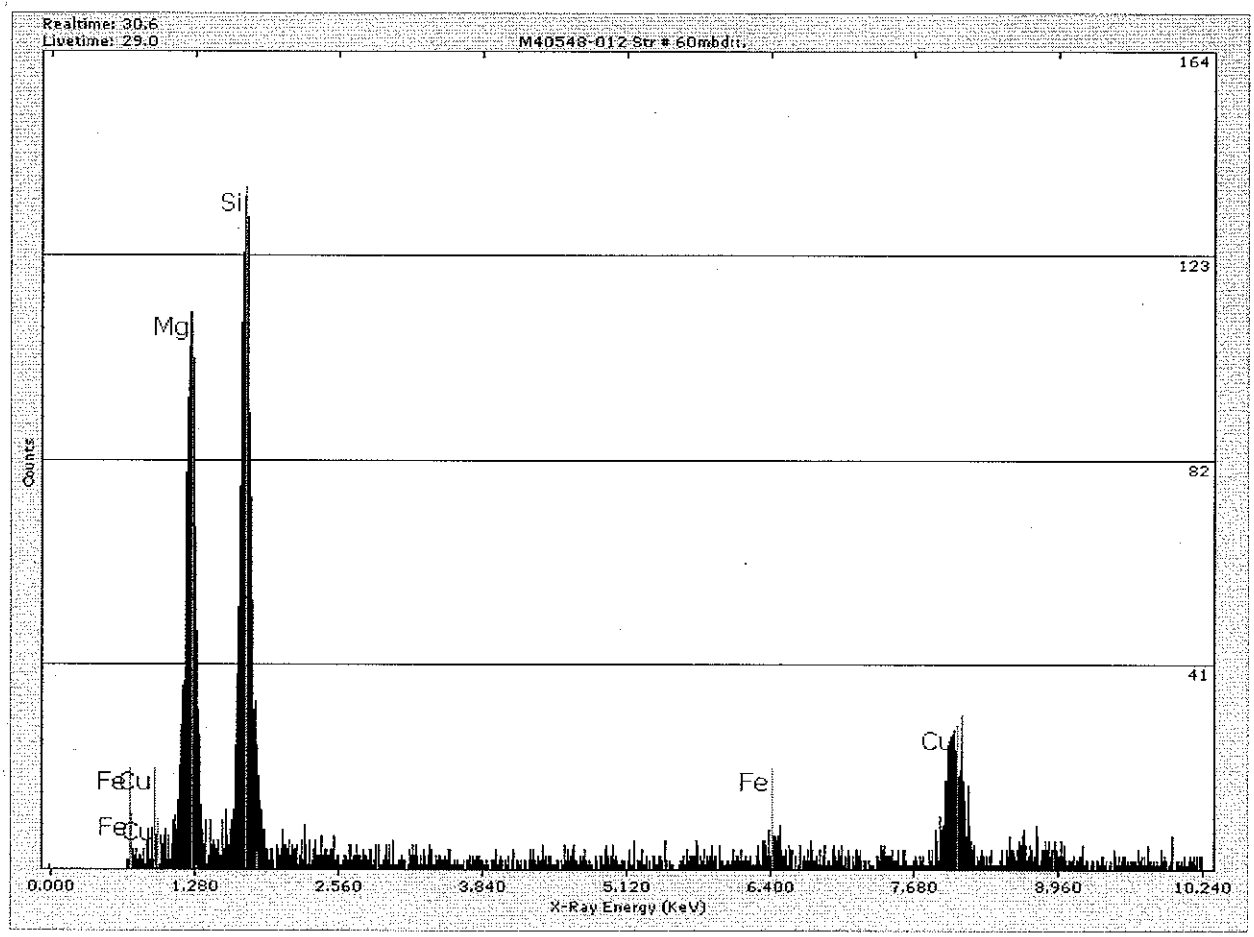

Realtime: 31.1
Livetime: 29.3
M40548-012 Str # 20mbd:..
142
107
71
35
Counts
Mg
Si
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (keV)


Realtime: 30.9
Livetime: 29.3
M40548-012 Str # 30mbd:,
138
103
69
34
Counts
Mg
Si
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.5
Livetime: 29.9
M40548-012 Str * 40mbd...
42
31
21
10
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 11.7
Livetime: 9.7
M40548-012 Str # 45mbdl..
262
197
131
65
Counts
Fe
Fe
Cu
Mg
Si
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.6
Livetime: 29.2
M40548-012 Str # 50mbd::
135
101
67
33
Counts
Si
Mg
Cu
Fe
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.6
Livetime: 29.0
M40548-012 Str # 60mbdr.
164
123
82
41
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-013

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	P-1-B

7402 ANALYSIS

Sample Area/ Volume:	49.6	Liters	Date Analyzed:	11/15/2006	
Filter Type:	MCE 25mm		Analyst:	Mehrdad Motamedi	
Pore size:	0.8		Scope Number:	4	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	YES	7 %	Grid_box:	7179	

Number of grids:	2	#1:	102	#3:	102	Asbestos	68
Number of openings:	40	#2:	102	#4:	102	Non-asbestos	2
Average Grid Size:	0.010404	Total Area Analyzed:	0.416				

% Asbestos 97.14

Str#:	SquareID:	Fiber Type:	Size		Morph:	SAED:	EDS:
1	D6-I8	Chrysotile	32	1.6	Chrysotile	Chrysotile	✔
2		Chrysotile	11	0.9	Chrysotile	Chrysotile	✔
3		Chrysotile	9	0.3	Chrysotile	Chrysotile	✔
4		Chrysotile	10	0.9	Chrysotile	Chrysotile	✔
5		Chrysotile	11.3	1	Chrysotile	Chrysotile	✔
6		Actinolite	8	0.5	Chrysotile	Chrysotile	✔
7	I7	Chrysotile	16	1.6	Chrysotile	Chrysotile	✔
8		Chrysotile	28	3.6	Chrysotile	Chrysotile	✔
9		Chrysotile	5.7	1.5	Chrysotile	Chrysotile	✔
10	I6	Chrysotile	6	0.3	Chrysotile	Chrysotile	✔
11		Chrysotile	7	0.3	Chrysotile		
12	I5	Chrysotile	14	0.5	Chrysotile		
13		Chrysotile	22	0.5	Chrysotile		
14	I4	Chrysotile	10	1	Chrysotile		
15		Chrysotile	28	1	Chrysotile		
16		Chrysotile	8	0.6	Chrysotile		
17	I3	Chrysotile	7	0.3	Chrysotile		
18		Chrysotile	18	0.7	Chrysotile		
NSD	I2						
19	I1	Chrysotile	12.6	0.3	Chrysotile		
20	H1	Chrysotile	6	0.5	Chrysotile	Chrysotile	✔
21	H2	Chrysotile	5.7	0.3	Chrysotile		
22	H3	Chrysotile	12	0.7	Chrysotile		
23		Chrysotile	28.7	0.6	Chrysotile		
24		Chrysotile	16	4	Chrysotile		
25		Chrysotile	15	2	Chrysotile		
26	H4	Chrysotile	12	1.5	Chrysotile		
27		Chrysotile	12	0.6	Chrysotile		

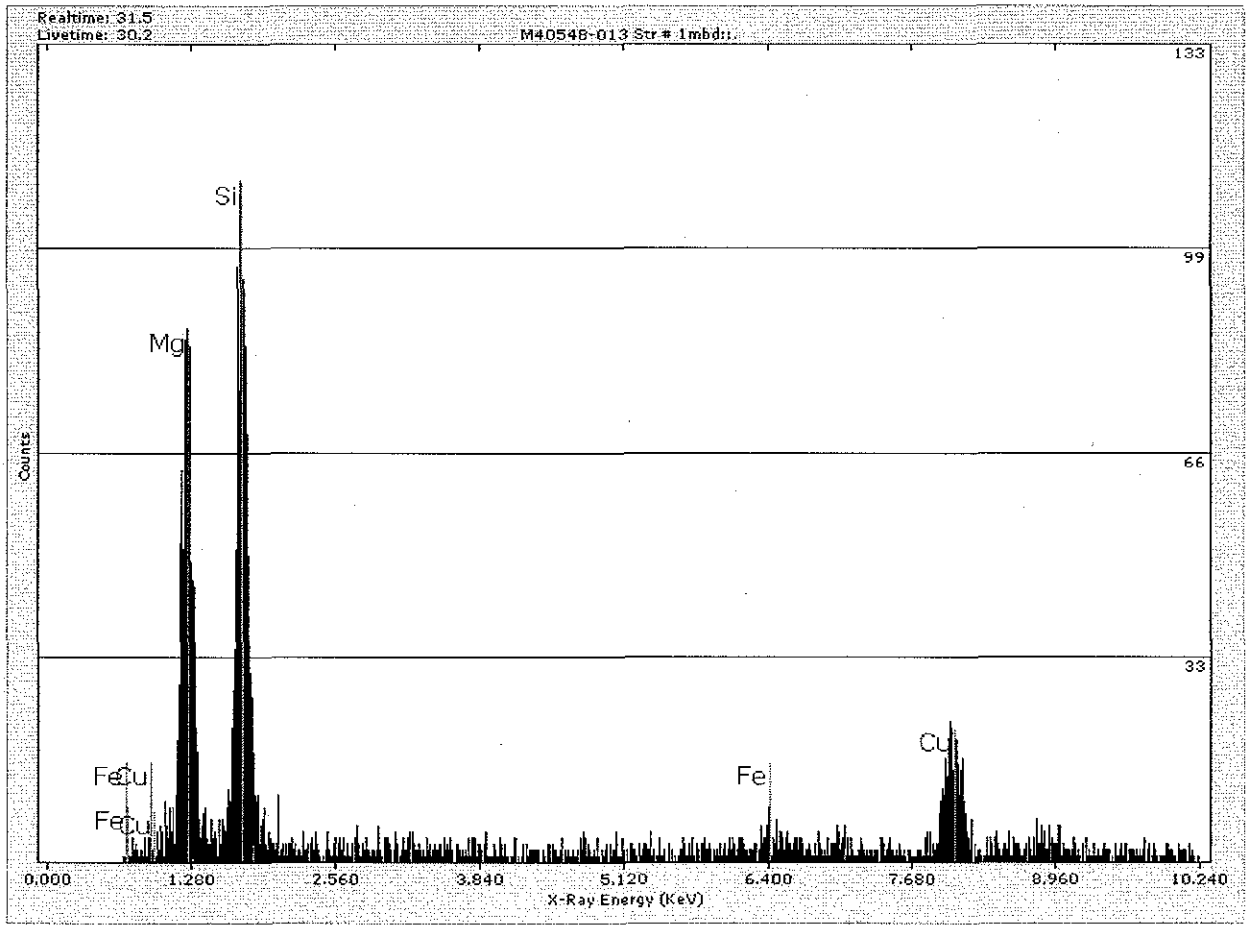
28	H5		Chrysotile	13	1	Chrysotile		
29			Chrysotile	5.7	0.3	Chrysotile		
30			Chrysotile	16	0.7	Chrysotile		
31	H6		Chrysotile	14	0.5	Chrysotile		
32			Chrysotile	24	1.6	Chrysotile		
NSD	H7							
33	H8		Chrysotile	6	0.9	Chrysotile		
34	H9		Chrysotile	32	0.5	Chrysotile		
35	G9		Chrysotile	13	0.4	Chrysotile		
36	G8		Chrysotile	5.5	0.3	Chrysotile		
37			Chrysotile	18	0.5	Chrysotile		
38			Chrysotile	7	0.9	Chrysotile		
39	G7		Chrysotile	6	0.5	Chrysotile		
40	D7-C1		Chrysotile	15	1.3	Chrysotile	Chrysotile	☑
41	C2		Chrysotile	6.6	0.3	Chrysotile		
42			Chrysotile	7	0.3	Chrysotile		
43			Chrysotile	5.5	0.3	Chrysotile		
44	C3	NA		6.3	1	Ambiguous	Ambiguous	☑
45			Chrysotile	23.5	0.7	Chrysotile		
46			Chrysotile	14	0.4	Chrysotile		
47			Chrysotile	24	0.4	Chrysotile		
48	C4		Chrysotile	5.5	0.4	Chrysotile		
49		NA		6	0.6	Ambiguous	Ambiguous	
50	C5		Chrysotile	8	0.3	Chrysotile		☑
51	C6		Chrysotile	16	0.8	Chrysotile		
52	C7		Chrysotile	10	0.5	Chrysotile		
53			Chrysotile	8	0.3	Chrysotile		
54			Chrysotile	7	0.6	Chrysotile		
NSD	D6							
55	D5		Chrysotile	7.6	0.7	Chrysotile		
56			Chrysotile	30	2	Chrysotile		
57	D4		Chrysotile	7.8	0.6	Chrysotile		
58			Chrysotile	9	0.4	Chrysotile		
NSD	D3							
59	D2		Chrysotile	9	0.7	Chrysotile		
60	D1		Chrysotile	8.5	0.3	Chrysotile	Chrysotile	☑
NSD	E1							
NSD	E2							
61	E3		Chrysotile	6	0.3	Chrysotile		
62			Chrysotile	16	0.5	Chrysotile		
63			Chrysotile	21	5	Chrysotile		
64	E4		Chrysotile	9	1	Chrysotile		
65			Chrysotile	10	2	Chrysotile		
66	E7		Chrysotile	24	0.6	Chrysotile		
67			Chrysotile	14	0.5	Chrysotile		
68	E8		Chrysotile	8	0.8	Chrysotile		
69	E9		Chrysotile	9	1	Chrysotile		
70			Chrysotile	12	0.5	Chrysotile	Chrysotile	☑

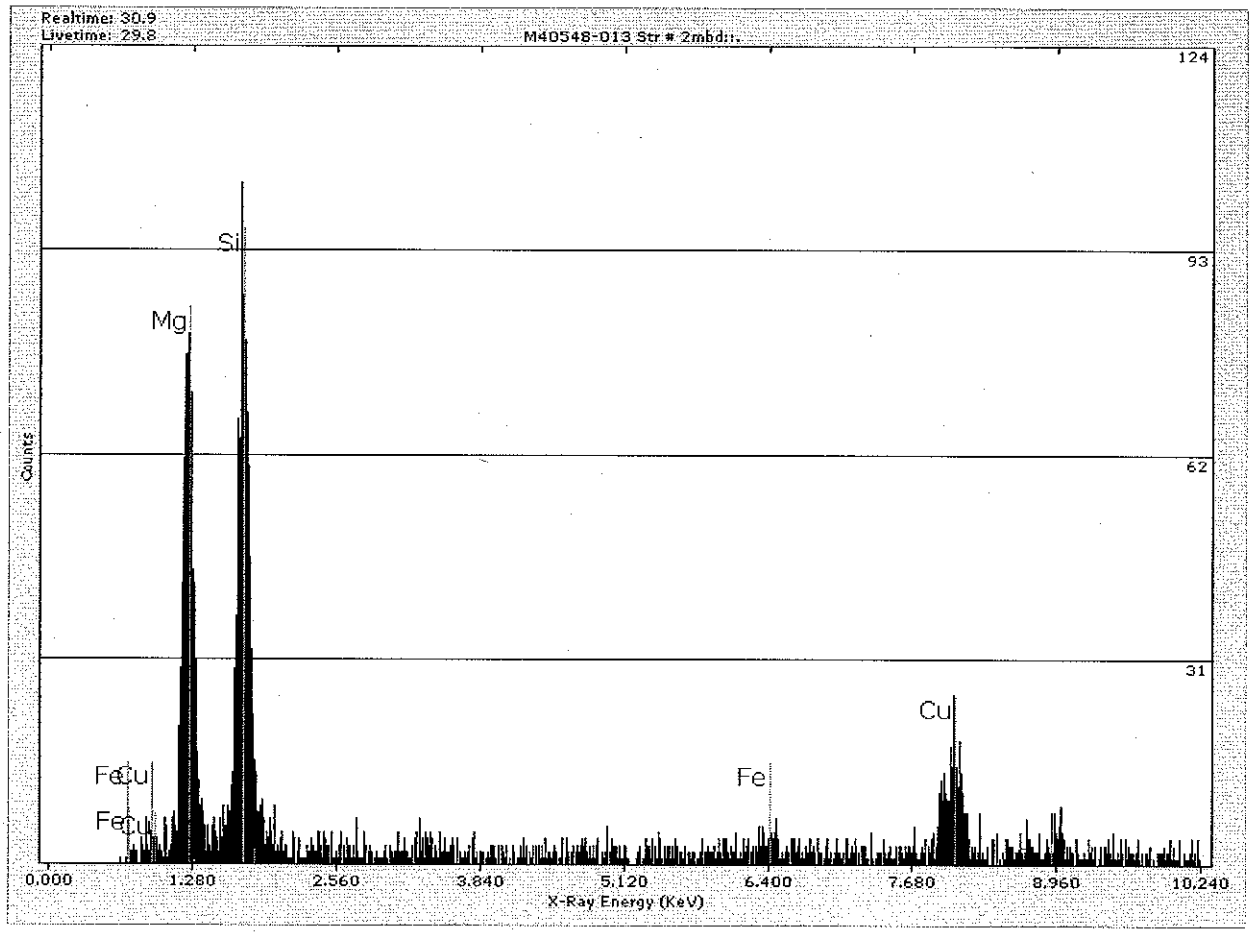
Grid Op

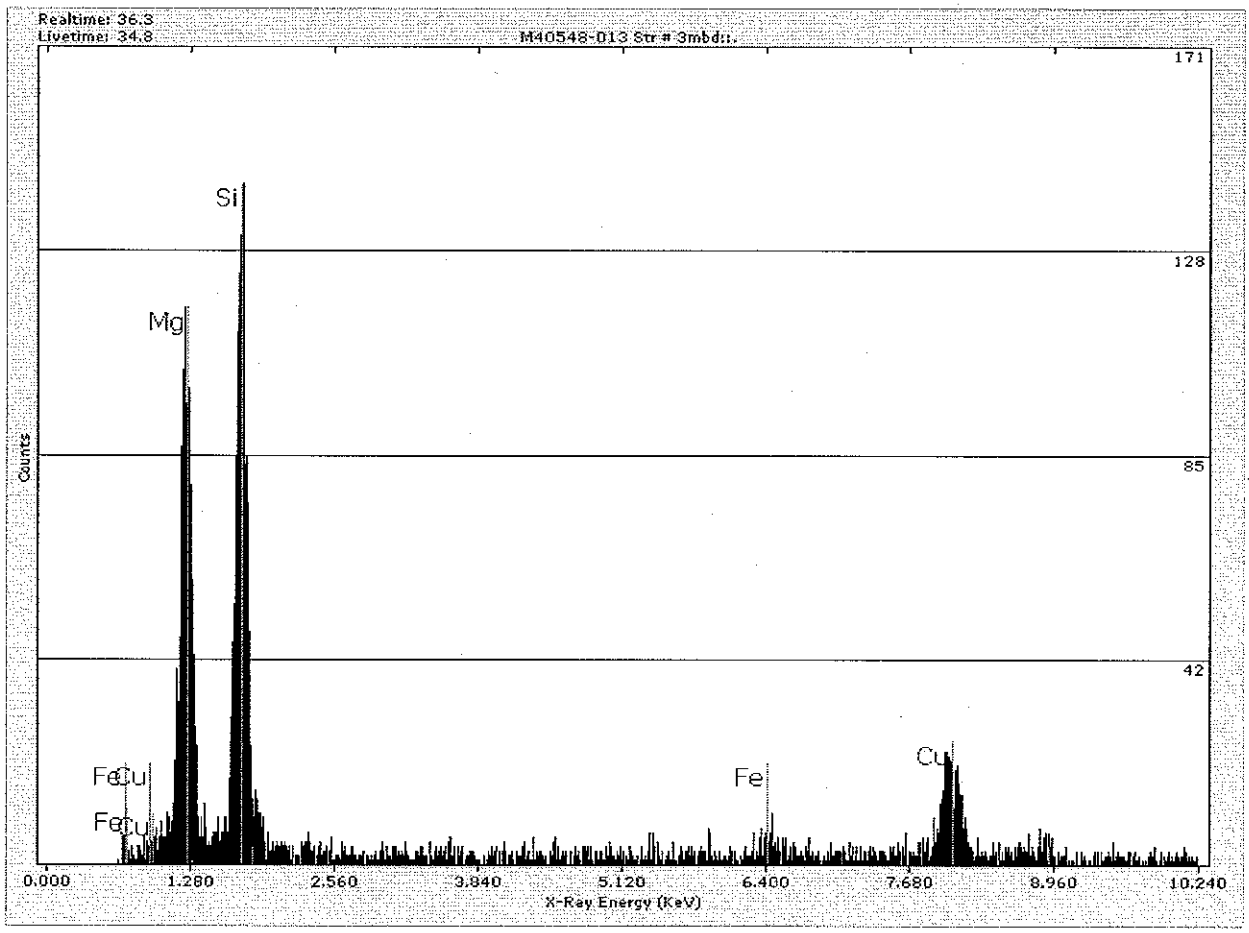
40

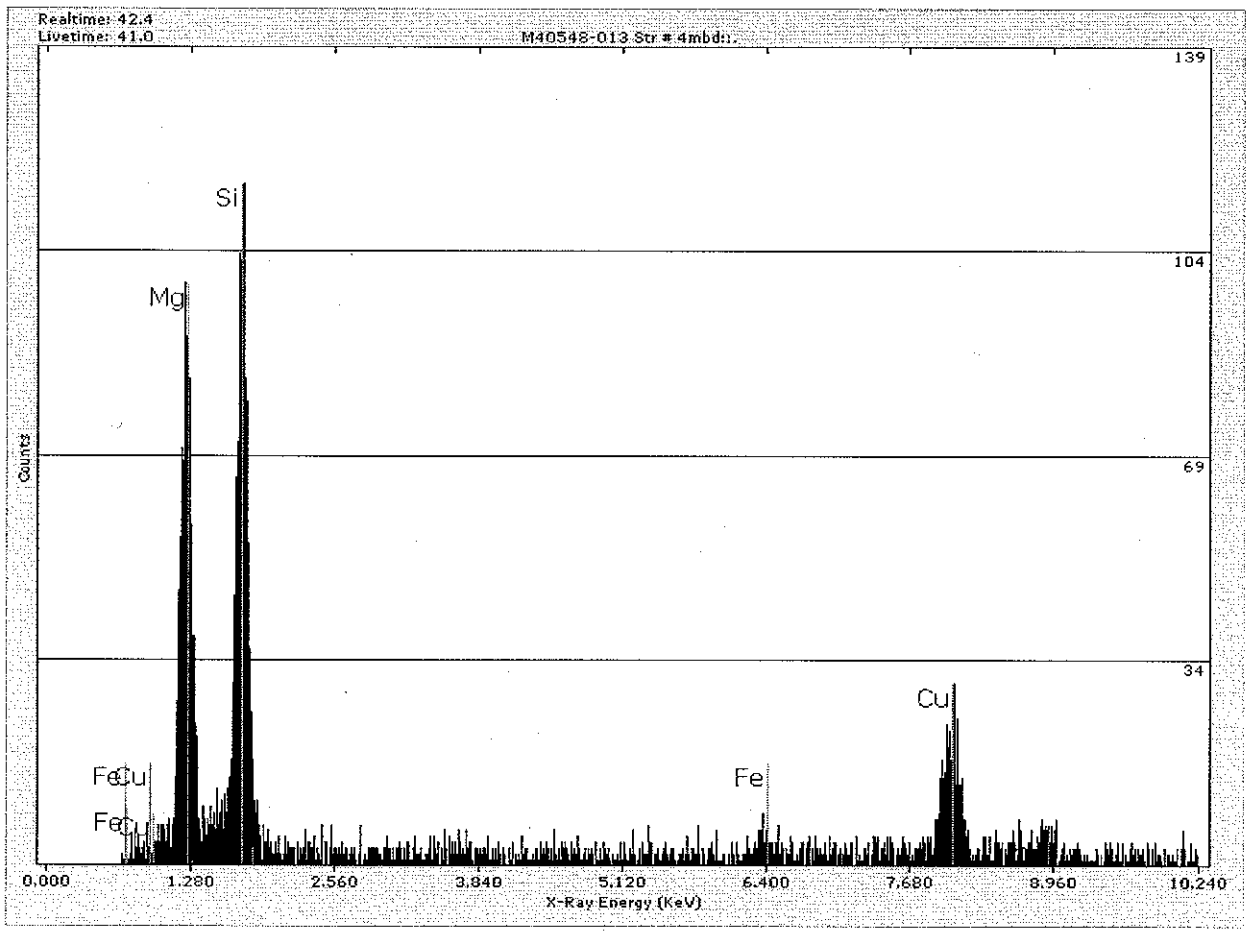
M40548 013 Sample Comments:

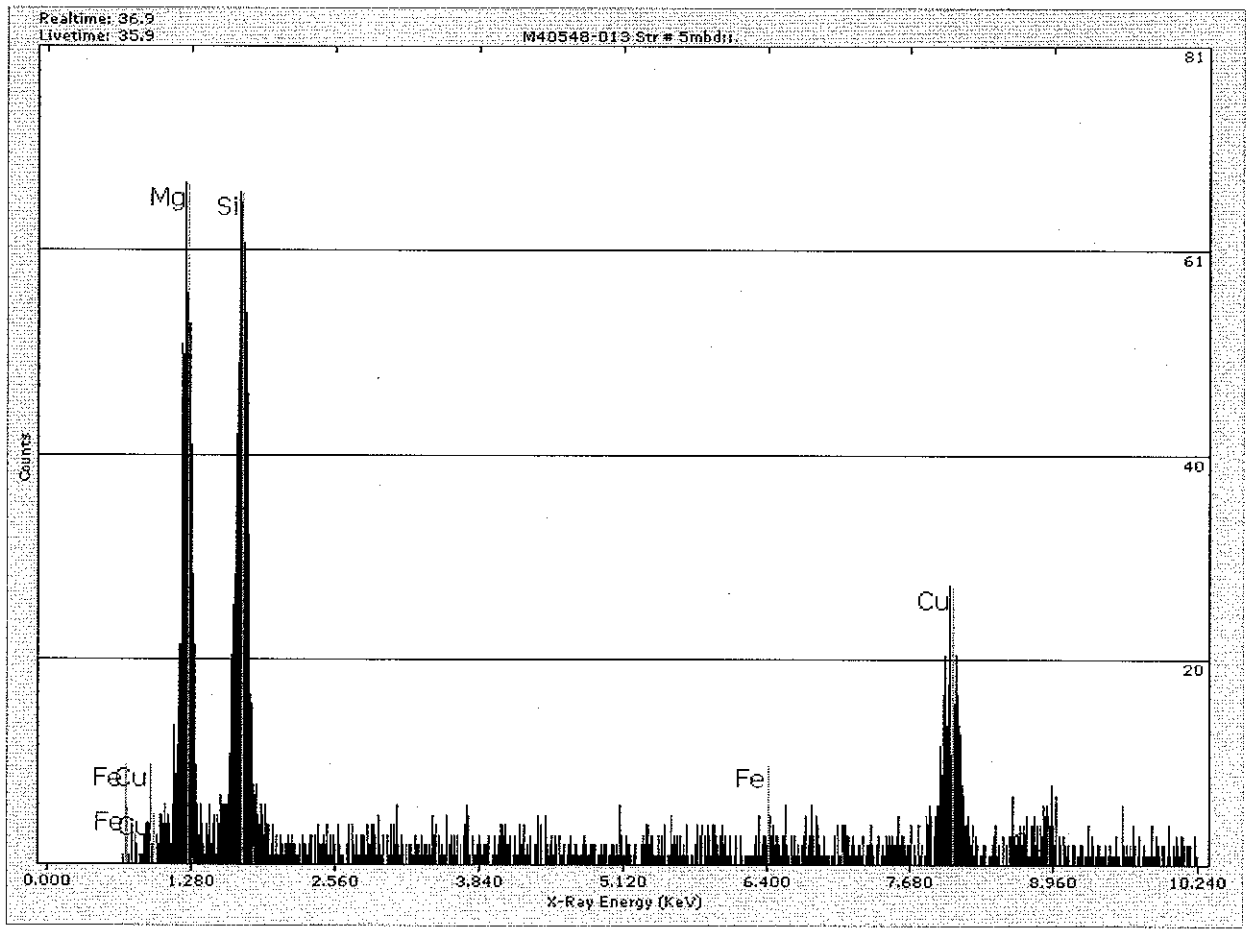
personal left

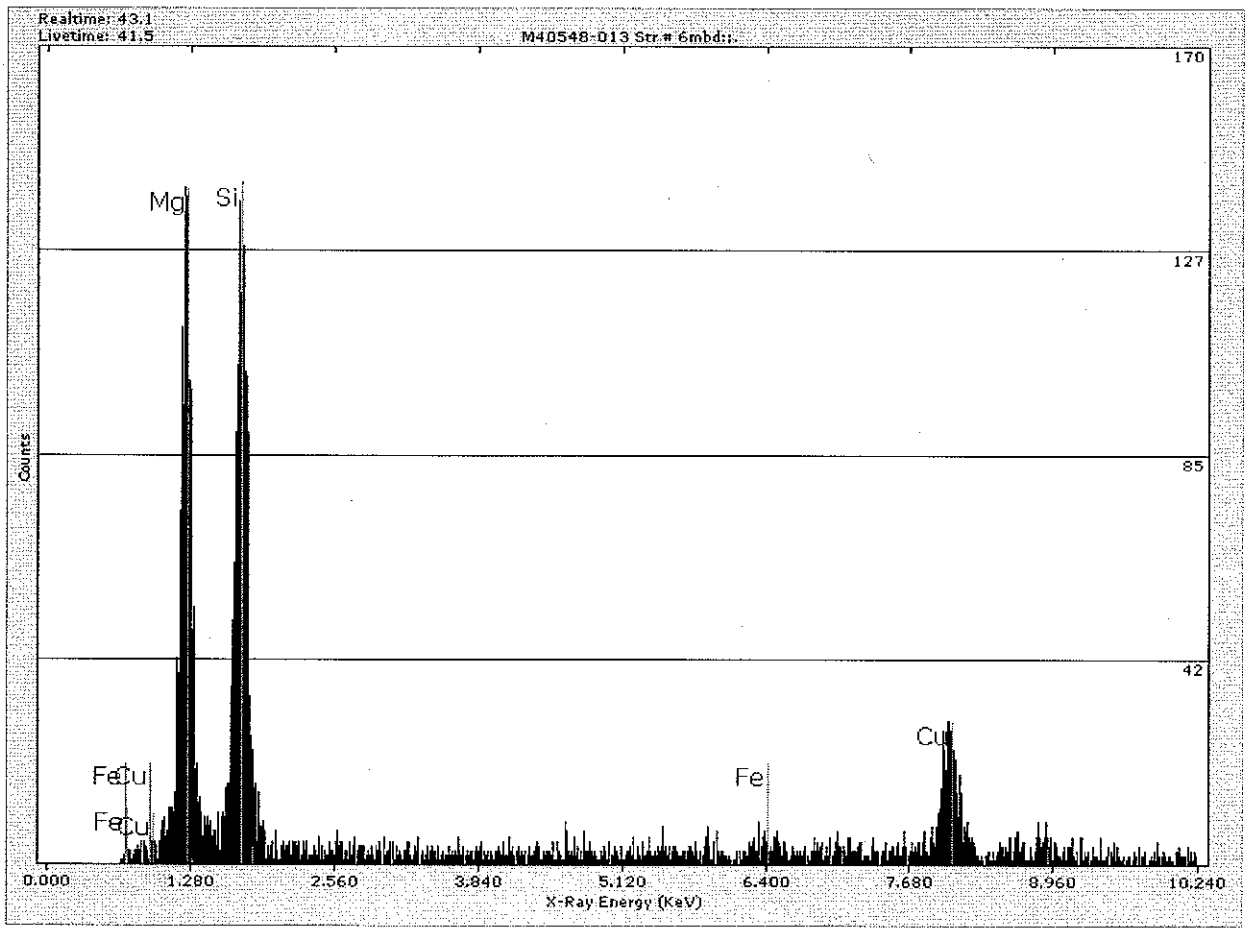

Realtime: 31.5
Livetime: 30.2
M40548-013 Str # 1mbd:.
133
99
66
33
Counts
Si
Mg
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

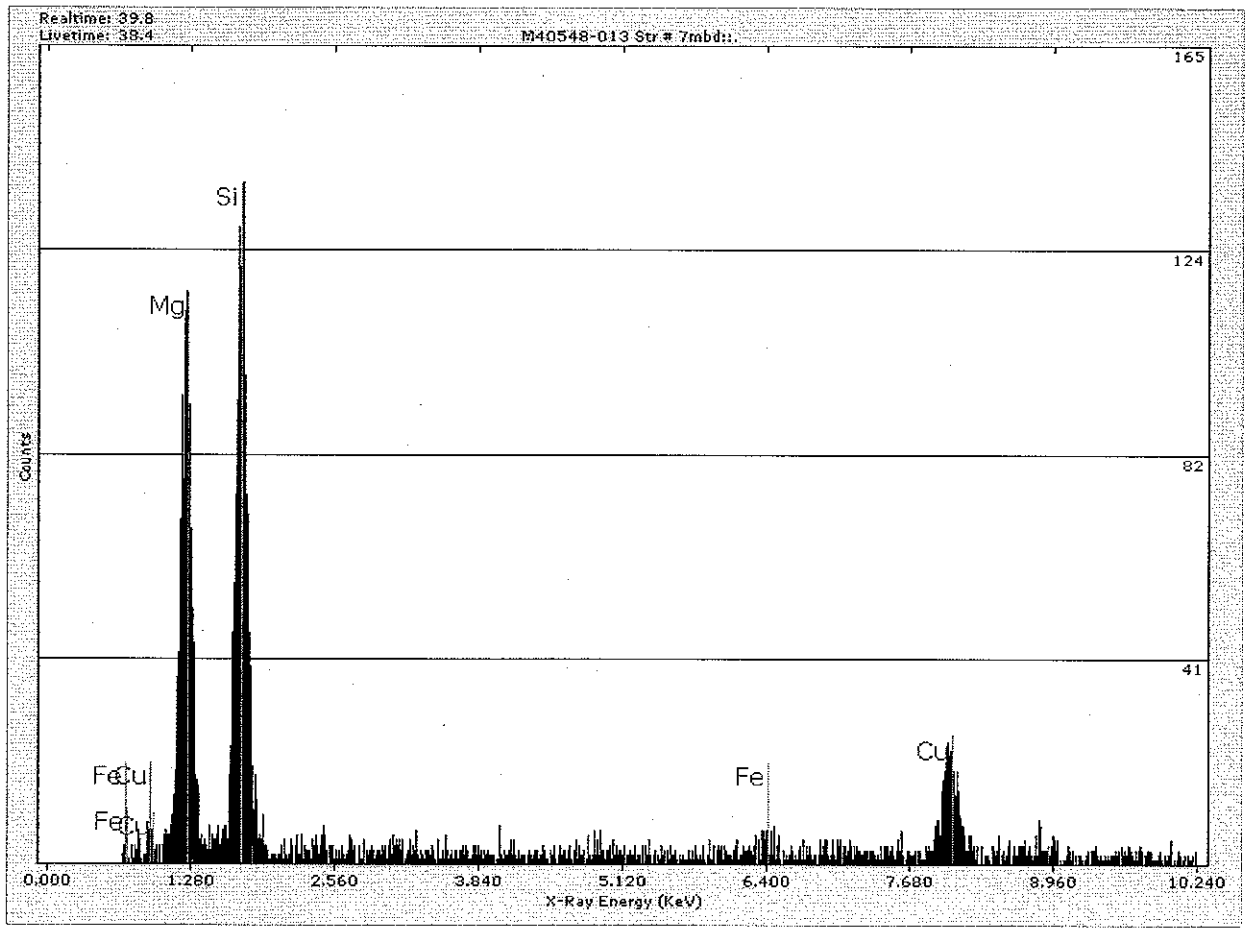

Realtime: 30.9
Livetime: 29.8
M40548-013 Str # 2mbd:..
124
93
62
31
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

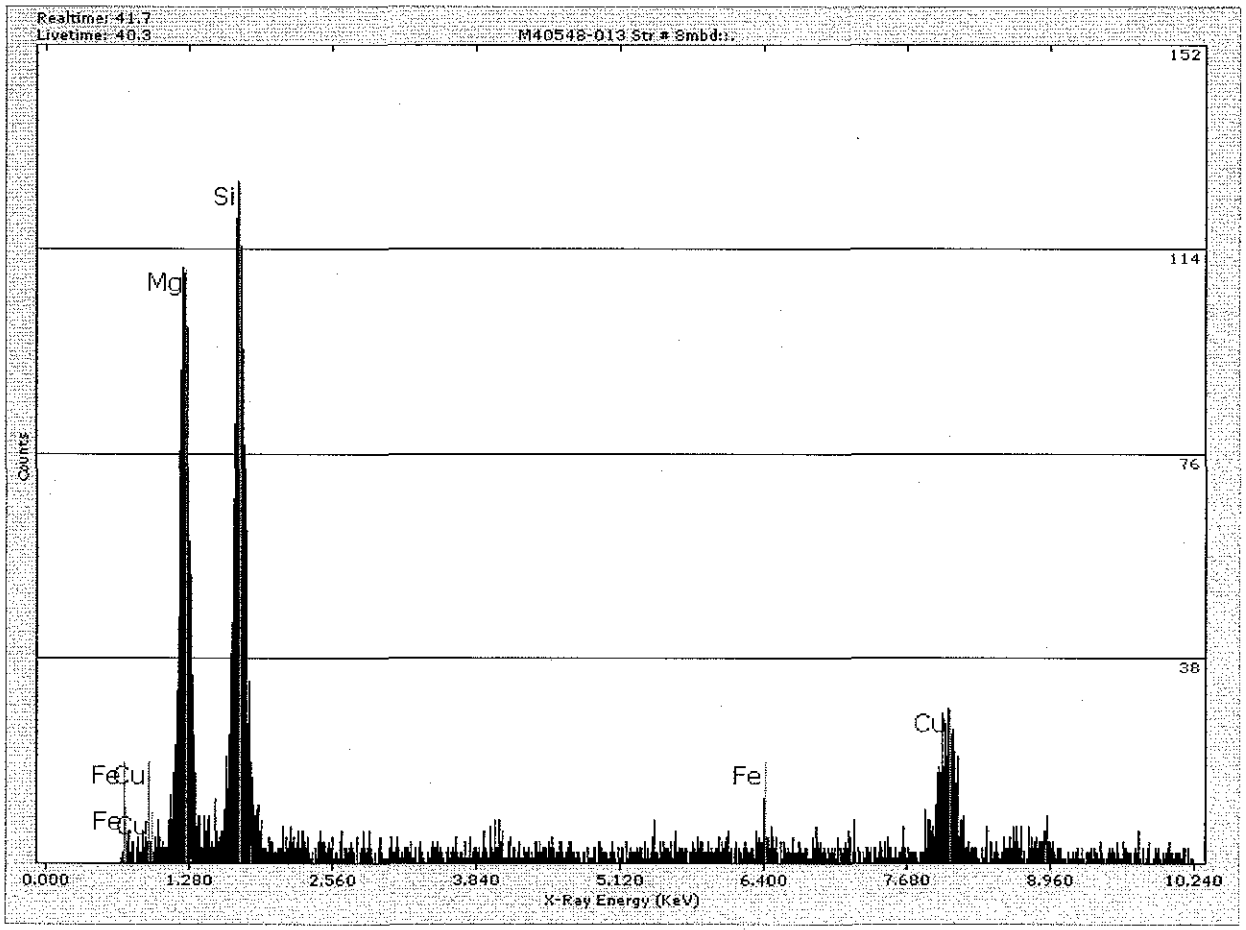

Realtime: 36.3
Livetime: 34.8
M40548-013 Str # 3mbd::.
171
128
85
42
Counts
Si
Mg
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

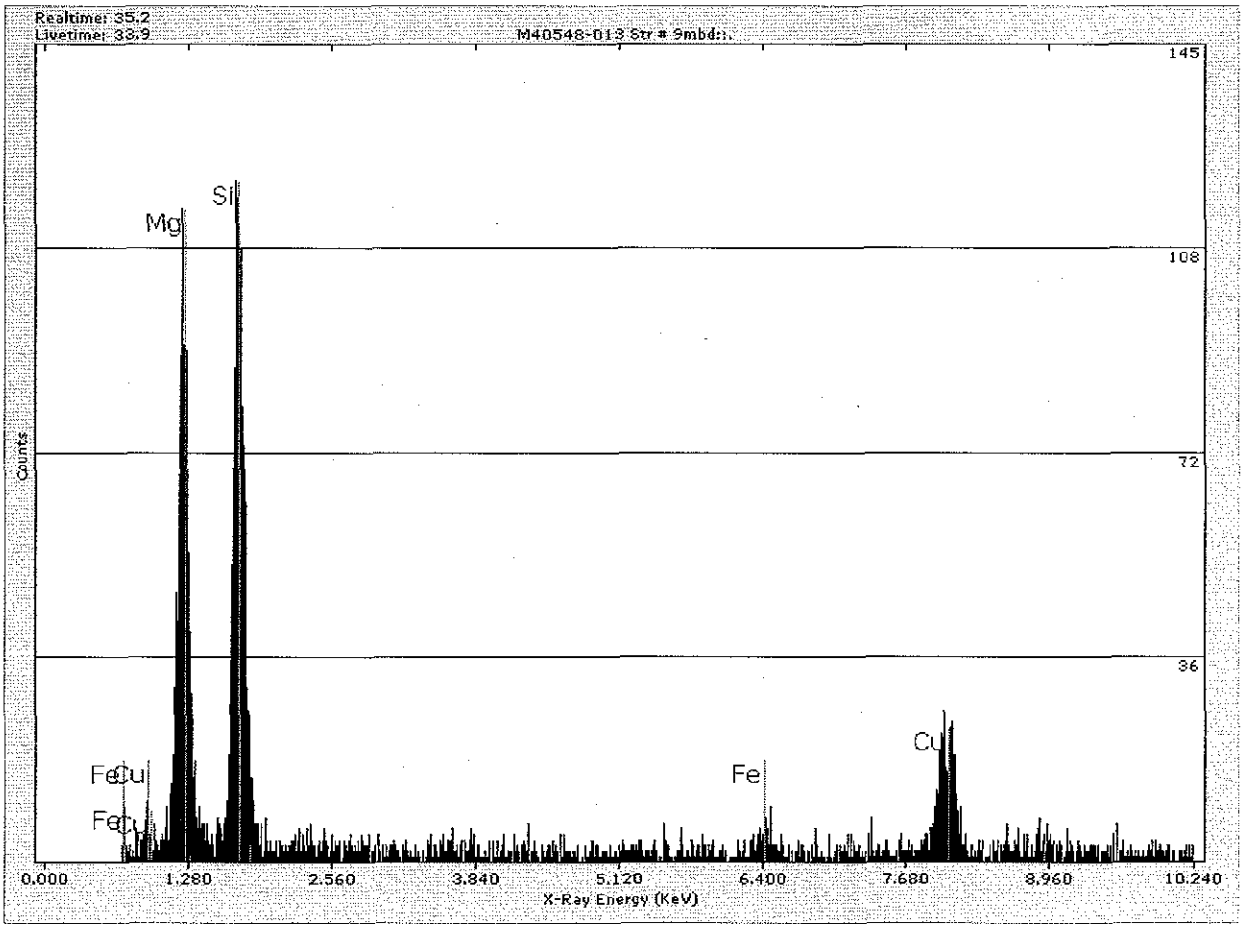

Realtime: 42.4
Livetime: 41.0
M40548-013 Str # 4mbd:
139
104
69
34
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

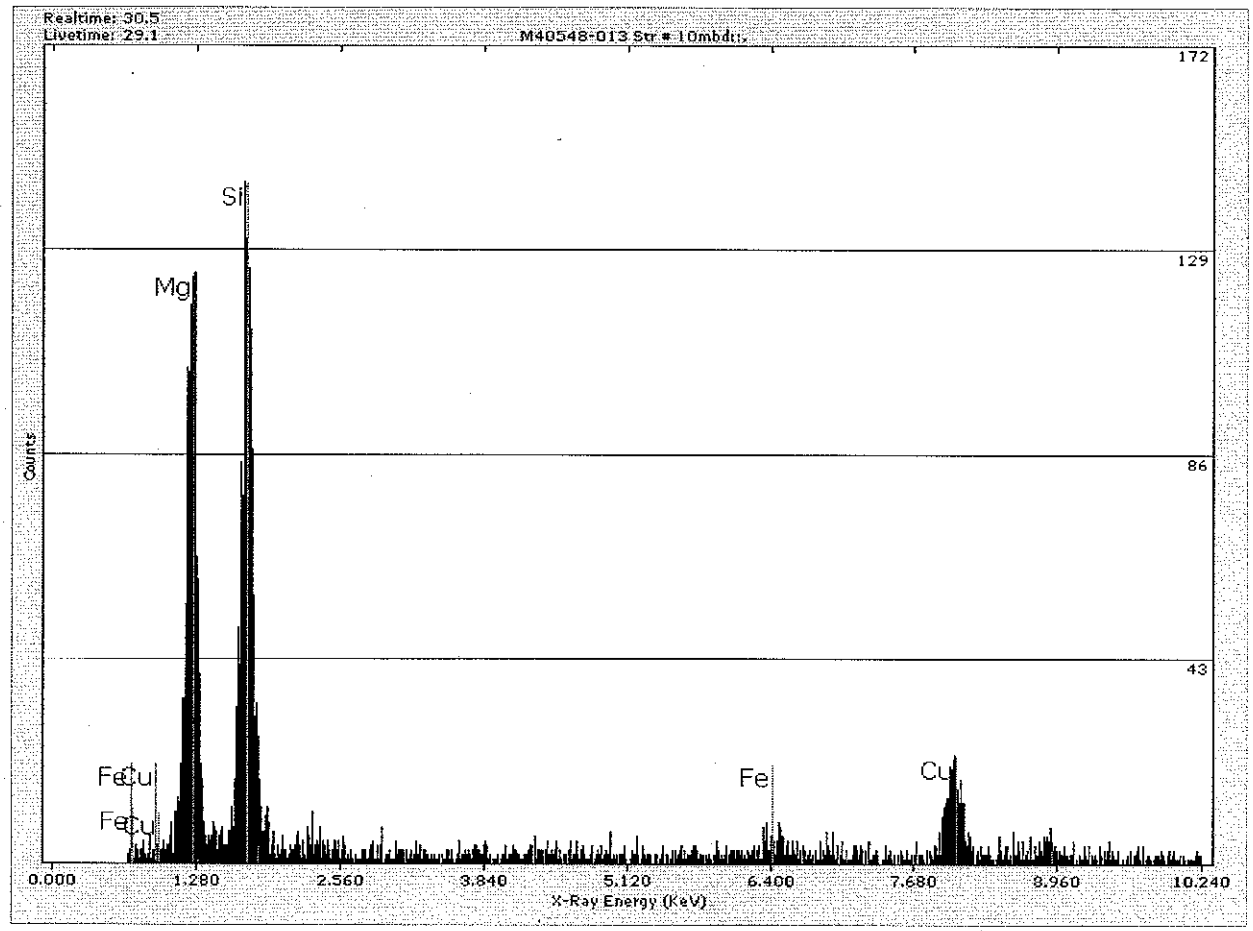

Realtime: 36.9
Livetime: 35.9
M40548-013 Str # 5mbd;;.
81
61
40
20
Counts
Mg
Si
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

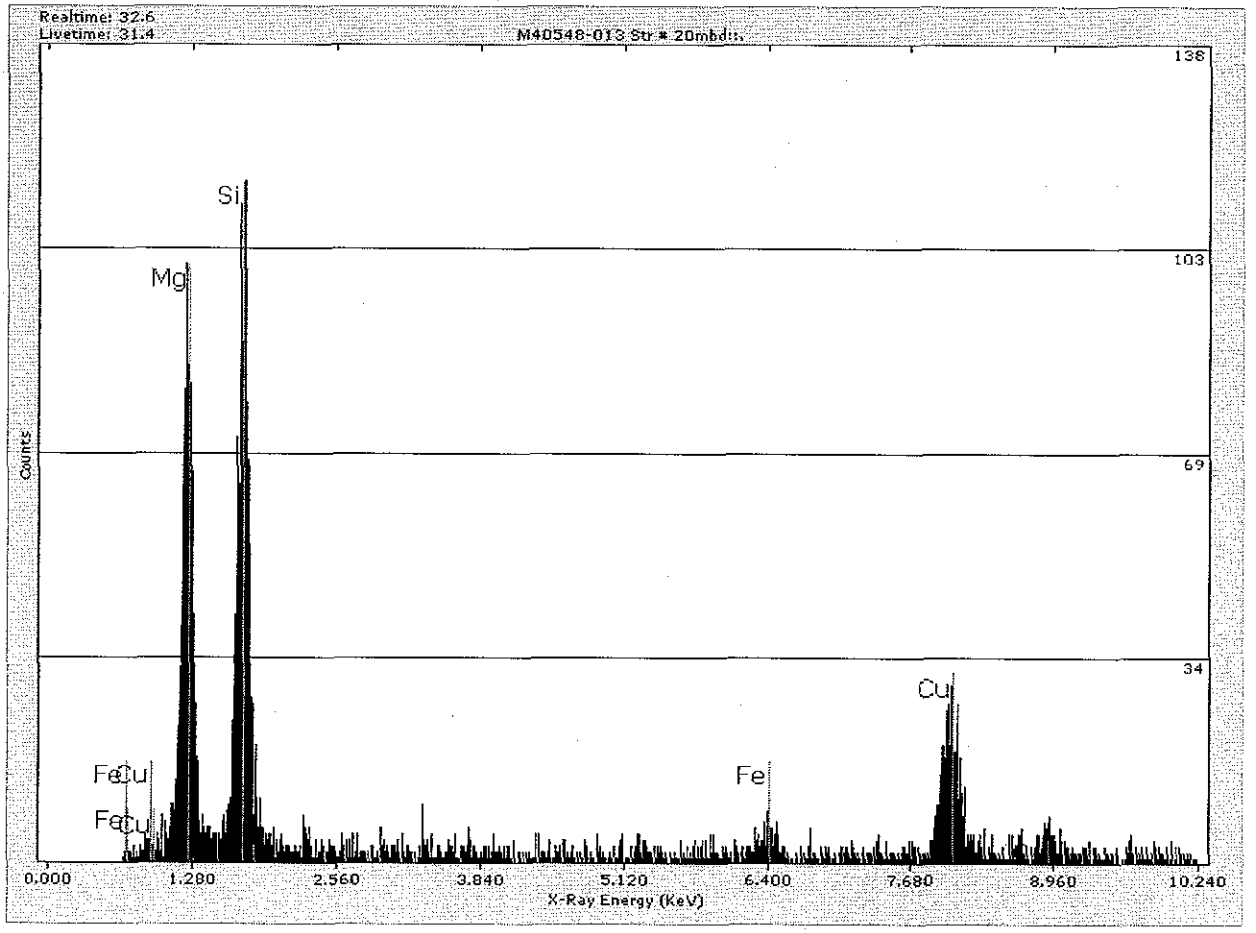

Realtime: 43.1
Livetime: 41.5
M40548-013 Str # 6mbd:;.
170
127
85
42
Counts
Mg
Si
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

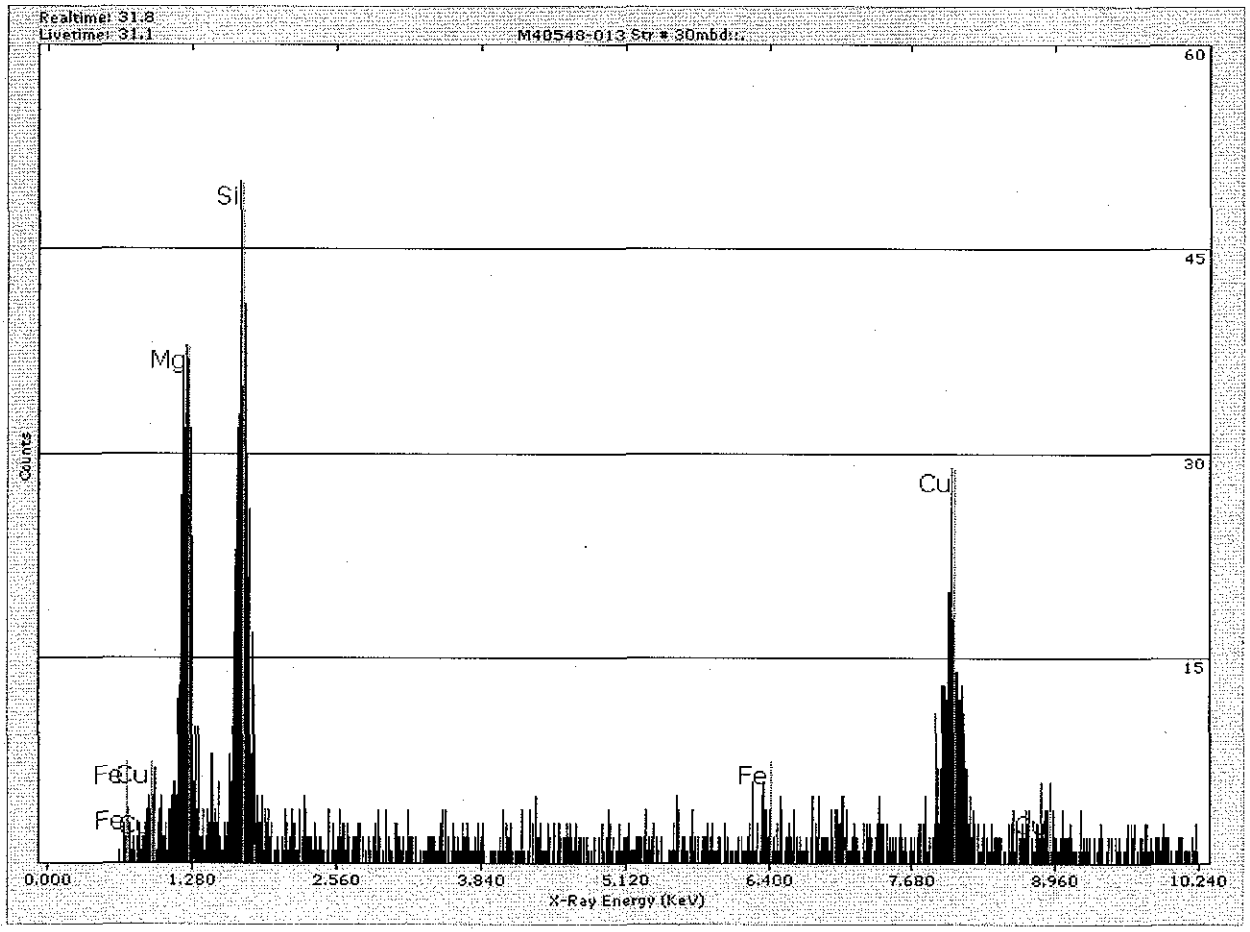

Realtime: 39.8
Livetime: 38.4
M40548-013 Str # 7mbd:..
165
124
82
41
Counts
Si
Mg
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

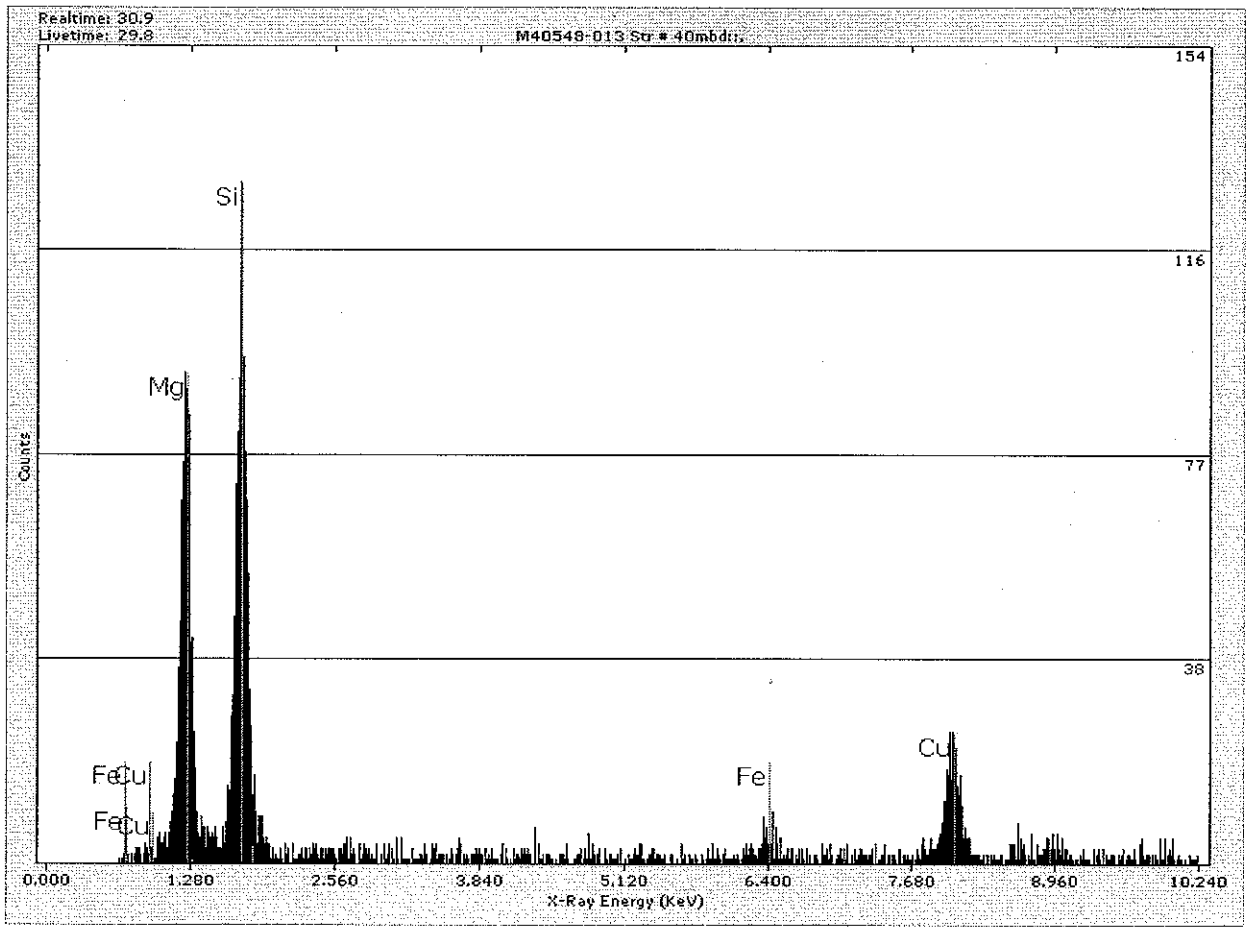

Realtime: 41.7
Livetime: 40.3
M40548-013 Str # Smbd:1.
152
114
76
38
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

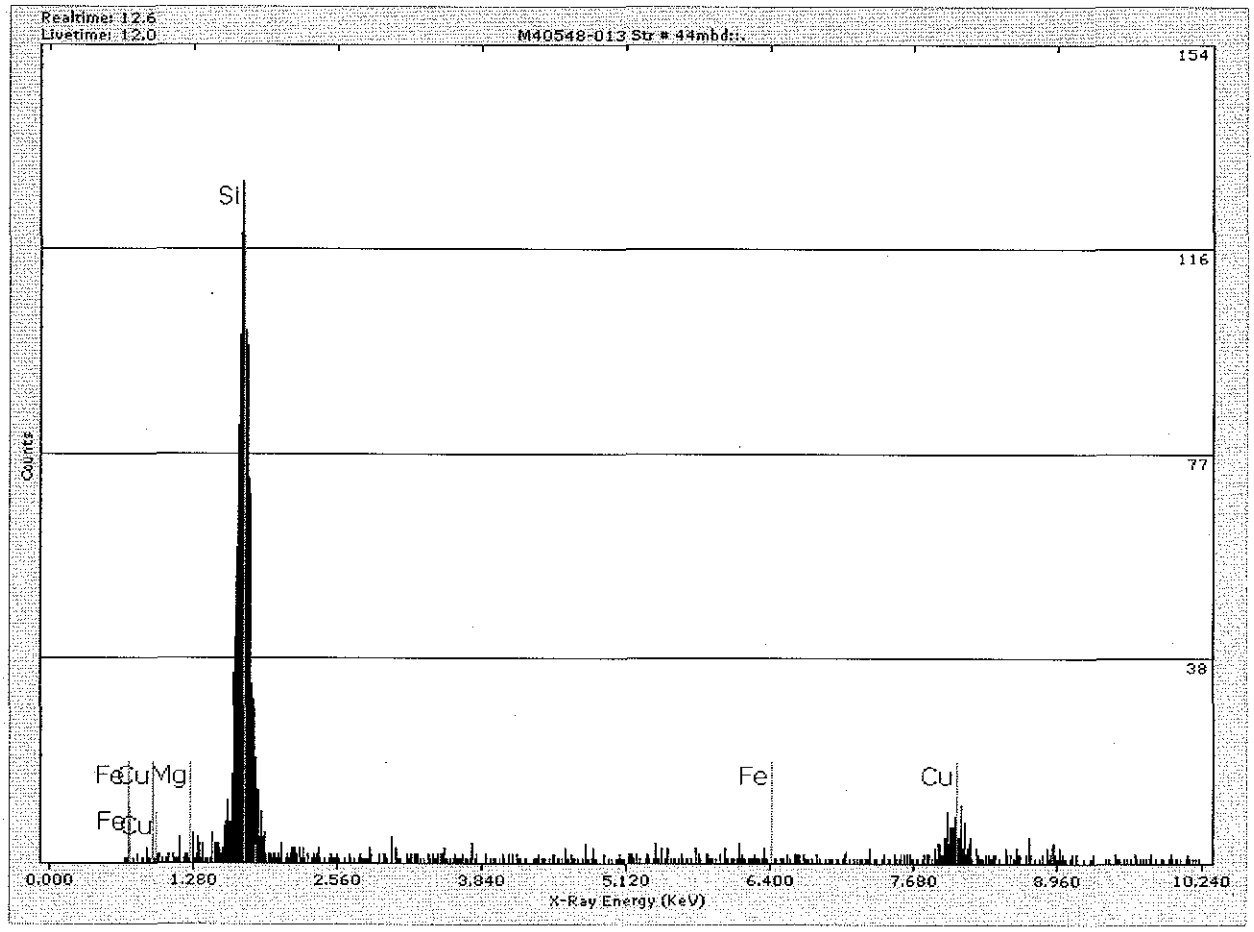

Realtime: 35.2
Livetime: 33.9
M40548-013 Str # 9mbd:.
145
108
72
36
Counts
Mg
Si
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

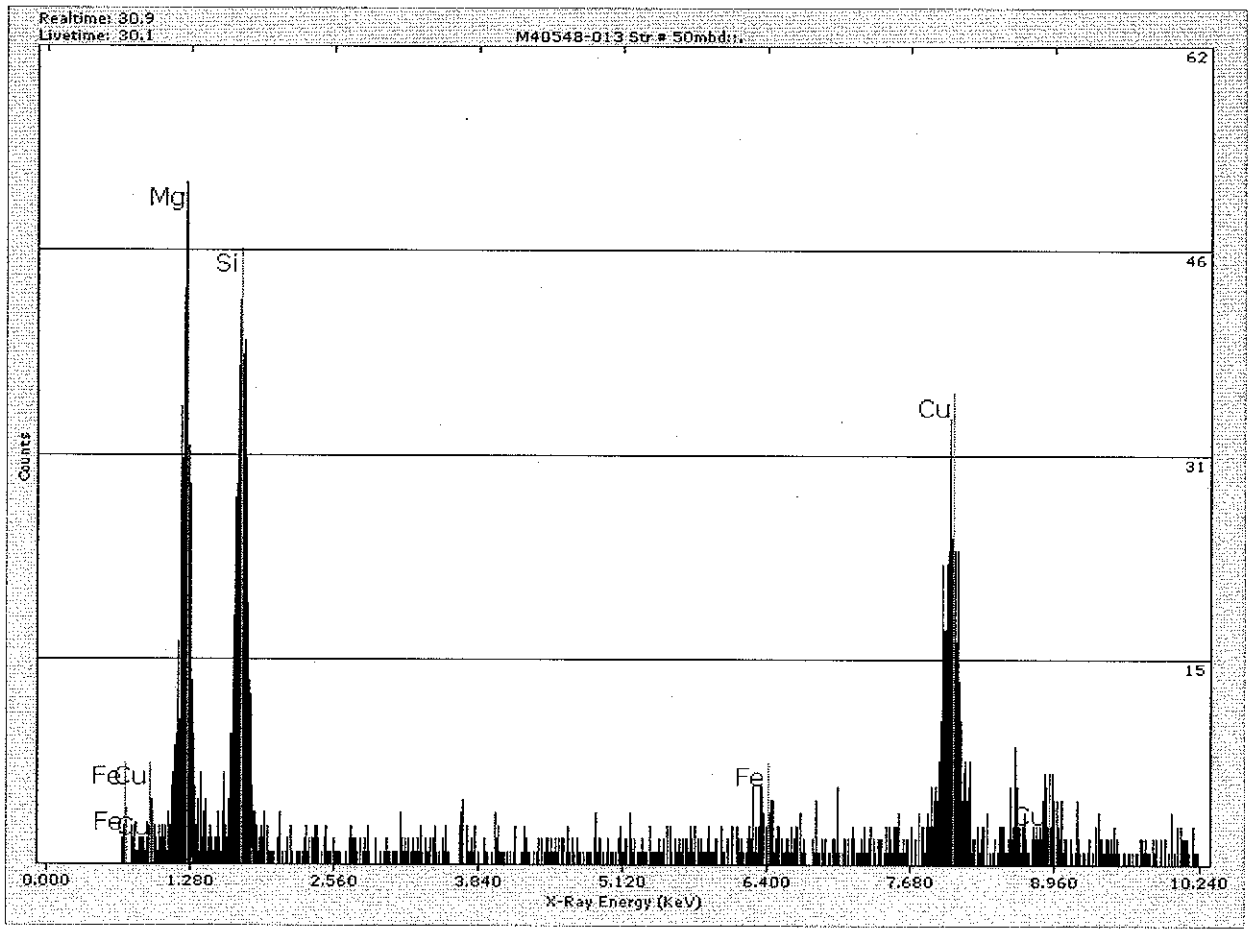

Realtime: 30.5
Livetime: 29.1
M40548-013 Str # 10mbdtl
172
129
86
43
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

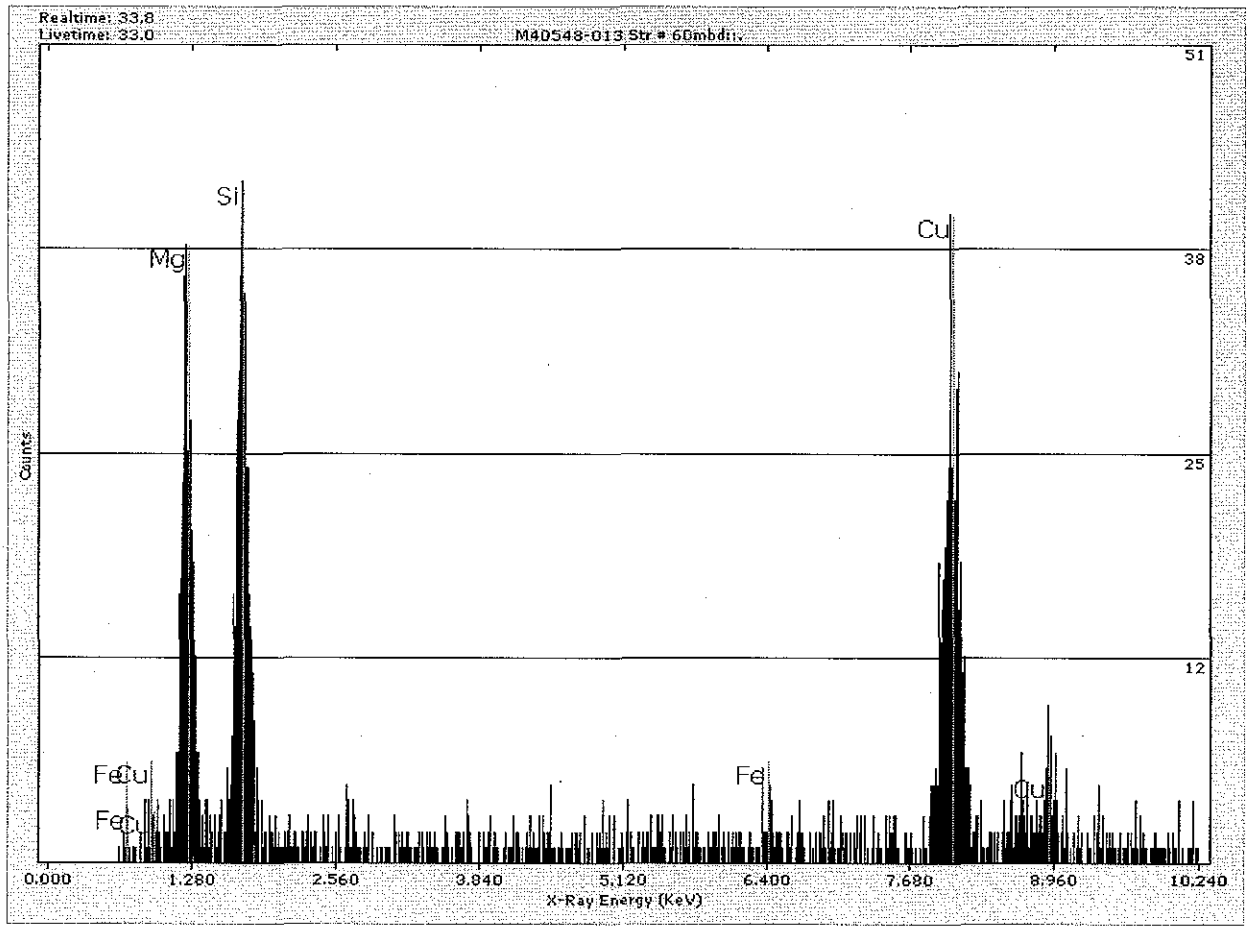

Realtime: 32.6
Livetime: 31.4
M40548-013 Str * 20mbd...
138
103
69
34
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

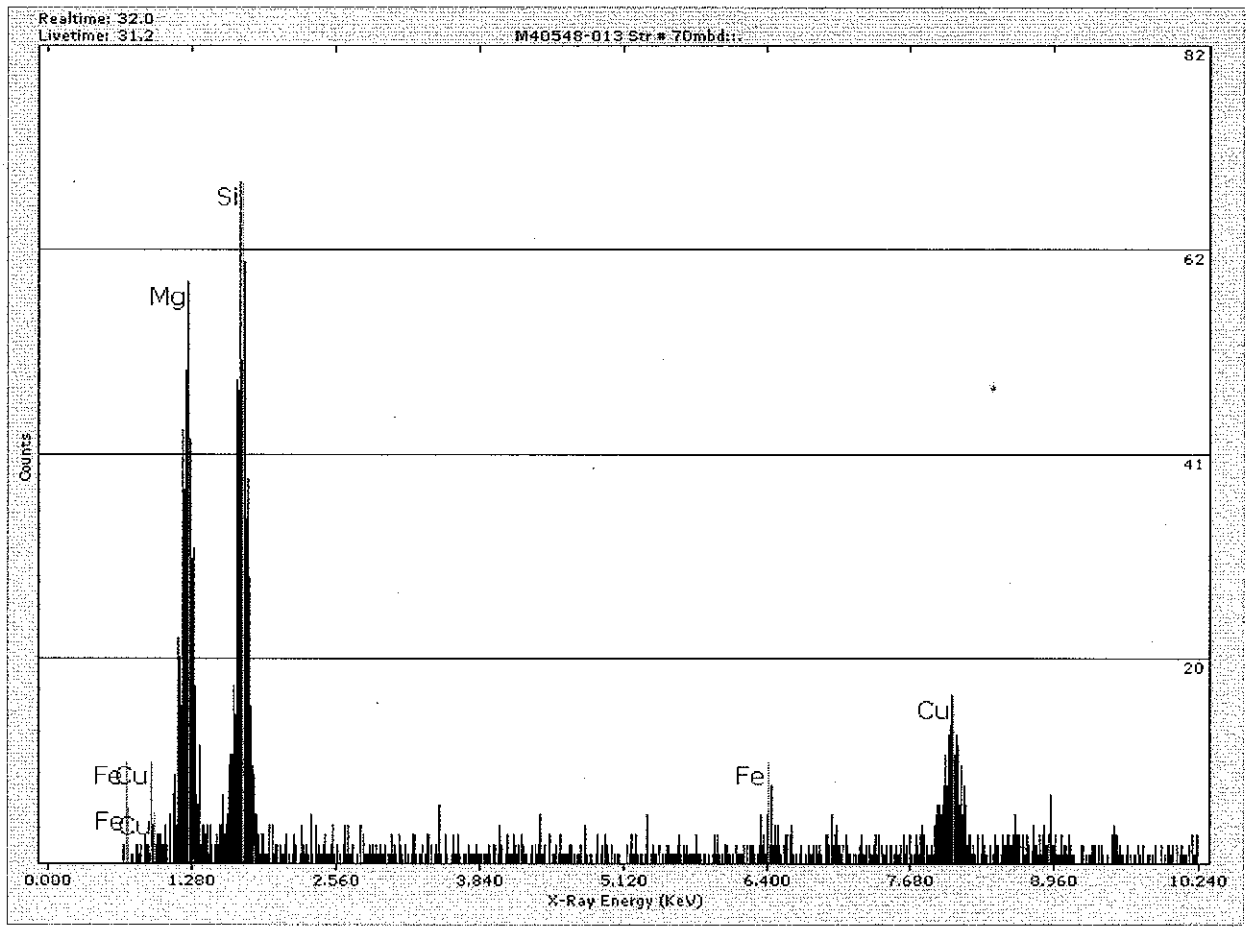

Realtime: 31.8
Livetime: 31.1
M40548-013 Str • 30mbd...
Counts
60
45
30
15
Si
Mg
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.9
Livetime: 29.8
M40548-013 Std # 40mbdn
154
116
77
38
Counts
Si
Mg
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 12.6
Livetime: 12.0
M40548-013 Str * 44mbd:..
154
116
77
38
Counts
Si
Fe
Cu
Mg
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.9
Livetime: 30.1
M40548-013 Str # 50mbd:..
62
46
31
15
Counts
Mg
Si
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 33,8
Livetime: 33.0
M40548-013 Str # 60mbd...
51
38
25
12
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 32.0
Livetime: 31.2
M40548-013 Str * 70mbd:..
82
62
41
20
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-016

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	A-2-A

7402 ANALYSIS

Sample Area/ Volume:	181.8 Liters		Date Analyzed:	11/15/2006	
Filter Type:	MCE 25mm		Analyst:	Kevin Simpson	
Pore size:	0.8		Scope Number:	3	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	Yes	8 %	Grid_box:	7179	

Number of grids:	2	#1:	102	#3:	104	Asbestos	97
Number of openings:	13	#2:	103	#4:	101	Non-asbestos	3

Average Grid Size: 0.010505 Total Area Analyzed: 0.137

% Asbestos 97

Str#:	SquareID:	Fiber Type:	Size		Morph:	SAED:	EDS:
1	E6-H1	Chrysotile	6	0.5	Chrysotile	Chrysotile	✔
2		Chrysotile	5.7	0.3	M36438	M36437	✔
3	H3	Chrysotile	14	0.5	Chrysotile	Chrysotile	✔
4		Chrysotile	18.5	0.5	Chrysotile	Chrysotile	✔
5		Chrysotile	16	2	Chrysotile	Chrysotile	✔
6		Chrysotile	8	1	Chrysotile	Chrysotile	✔
7		Chrysotile	5.3	1	Chrysotile	Chrysotile	✔
8		Chrysotile	5.1	0.6	Chrysotile	Chrysotile	✔
9		Chrysotile	5.3	0.3	Chrysotile	Chrysotile	✔
10		Chrysotile	25	0.4	M36440	M36439	✔
11		Chrysotile	15.5	0.5	M36440	Chrysotile	
12		Chrysotile	5.5	0.3	M36440	Chrysotile	
13	H5	NA	6	0.5	Ambiguous	Ambiguous	✔
14		Chrysotile	5.2	0.4			
15		Chrysotile	6	0.4			
16		Chrysotile	6.5	0.6			
17		Chrysotile	6	0.3			
18		Chrysotile	6	0.3			
19		Chrysotile	7	1.5			
20		Chrysotile	5.2	0.6	Chrysotile	Chrysotile	✔
21		Chrysotile	15	0.6			
22		Chrysotile	7.5	0.5			
23		Chrysotile	5.8	0.6			
24	H7	Chrysotile	5.2	0.8			
25		Chrysotile	8	0.27			
26		Chrysotile	14	1			
27		Chrysotile	5.5	1			
28	H9	Chrysotile	7.5	0.3			

29			Chrysotile	136	1			
30			Chrysotile	6.5	0.4	Chrysotile	Chrysotile	☑
31			Chrysotile	16	0.3			
32			Chrysotile	7	0.5			
33			Chrysotile	10	0.4			
34			Chrysotile	6	0.3			
35	F1		Chrysotile	6	0.3			
36			Chrysotile	18	0.4			
37			Chrysotile	5.5	0.35			
38	F3		Chrysotile	35	6			
39			Chrysotile	40	5			
40			Chrysotile	7	0.3	Chrysotile	Chrysotile	☑
41			Chrysotile	32	5			
42			Chrysotile	24	1.5			
43			Chrysotile	6	0.5			
44			Chrysotile	20	1			
45			Chrysotile	6	0.3			
46			Chrysotile	7	2			
47			Chrysotile	7	0.5			
48			Chrysotile	6	1			
49	F5		Chrysotile	5.1	0.27			
50			Chrysotile	8.5	0.8	Chrysotile	Chrysotile	☑
51			Chrysotile	8	0.5			
52			Chrysotile	9.5	0.8			
53			Chrysotile	8	0.27			
54			Chrysotile	5.2	0.6			
55			Chrysotile	14	0.6			
56			Chrysotile	8	1			
57	E7-B2		Chrysotile	8	0.3			
58			Chrysotile	40	0.3			
59			Chrysotile	5.2	0.3			
60			Chrysotile	6.5	0.28	Chrysotile	Chrysotile	☑
61	B4		Chrysotile	7.5	0.5			
62			Chrysotile	9	0.8			
63			Chrysotile	6	1			
64			Chrysotile	8	1			
65			Chrysotile	5.2	0.3			
66	B6		Chrysotile	14	0.7			
67			Chrysotile	6	0.3			
68			Chrysotile	24	0.8			
69			Chrysotile	8	0.4			
70			Chrysotile	14	0.7	Chrysotile	Chrysotile	☑
71			Chrysotile	8	2			
72			Chrysotile	7	0.5			
73			Chrysotile	10	0.3			
74	B8		Chrysotile	60	1.3			
75			Chrysotile	53	1.3			
76			Chrysotile	16	0.5			
77			Chrysotile	5.5	0.3			
78			Chrysotile	15	0.3			
79			Chrysotile	6	0.6			
80			Chrysotile	6.6	0.3	Chrysotile	Chrysotile	☑
81			Chrysotile	8.5	1.5			
82			Chrysotile	40	0.27			

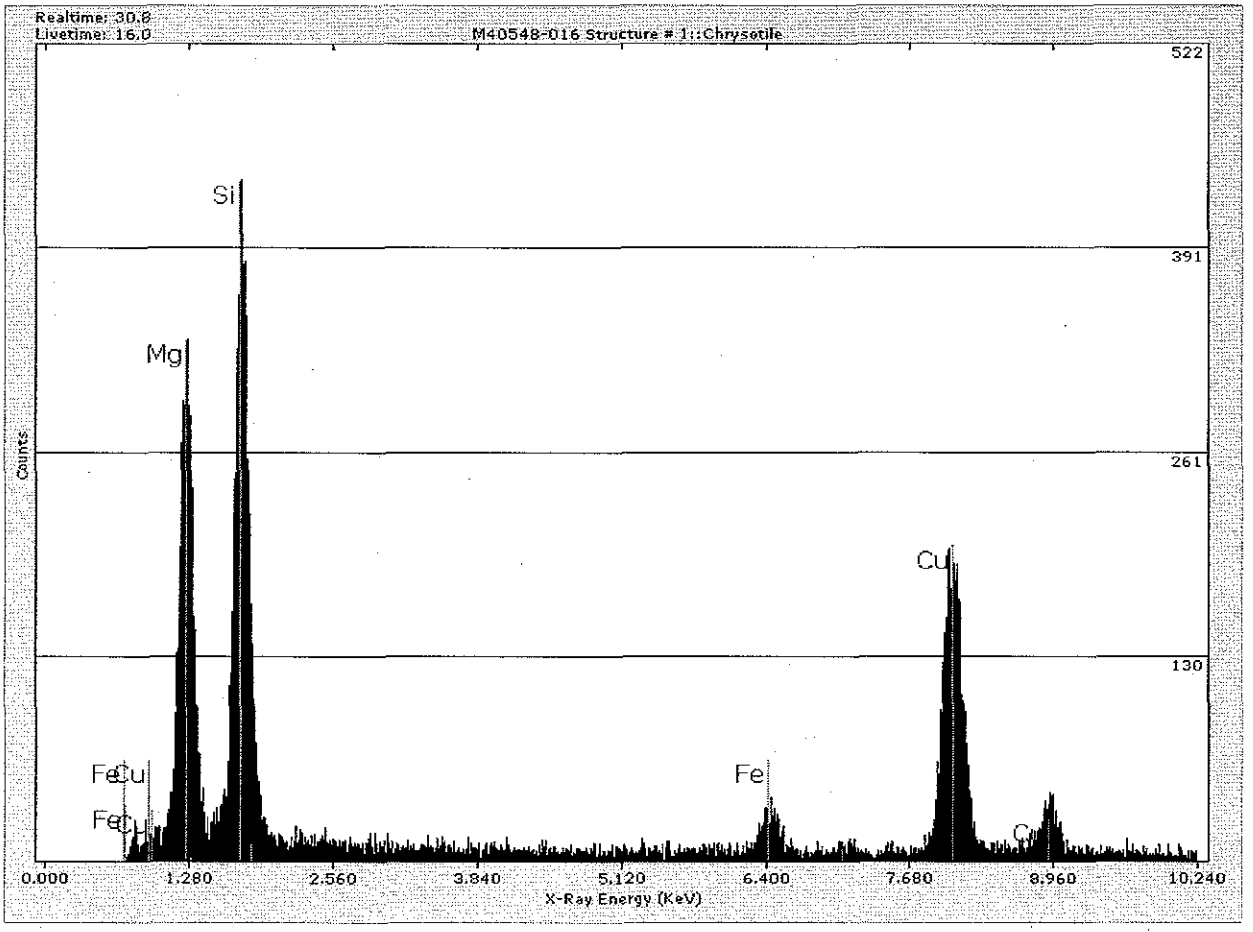
83			Chrysotile	8	0.3			☐
84			Chrysotile	8	2			☐
85			Chrysotile	8.5	1.5			☐
86			Chrysotile	7.2	0.3			☐
87			Chrysotile	7.5	0.3			☐
88			Chrysotile	6	0.4			☐
89			Chrysotile	8	0.28			☐
90			Chrysotile	5.5	0.3	Chrysotile	Chrysotile	☑
91	B10		Chrysotile	5.2	0.6			☐
92			Chrysotile	7.5	0.5			☐
93			Chrysotile	6	1			☐
94			Chrysotile	24	4			☐
95		NA		6	1	Ambiguous	Ambiguous	☑
96			Chrysotile	8	0.4			☐
97			Chrysotile	8	0.5			☐
98			Chrysotile	16	0.4			☐
99			Chrysotile	16	0.6			☐
100		NA		5.5	0.5	Ambiguous	Ambiguous	☑

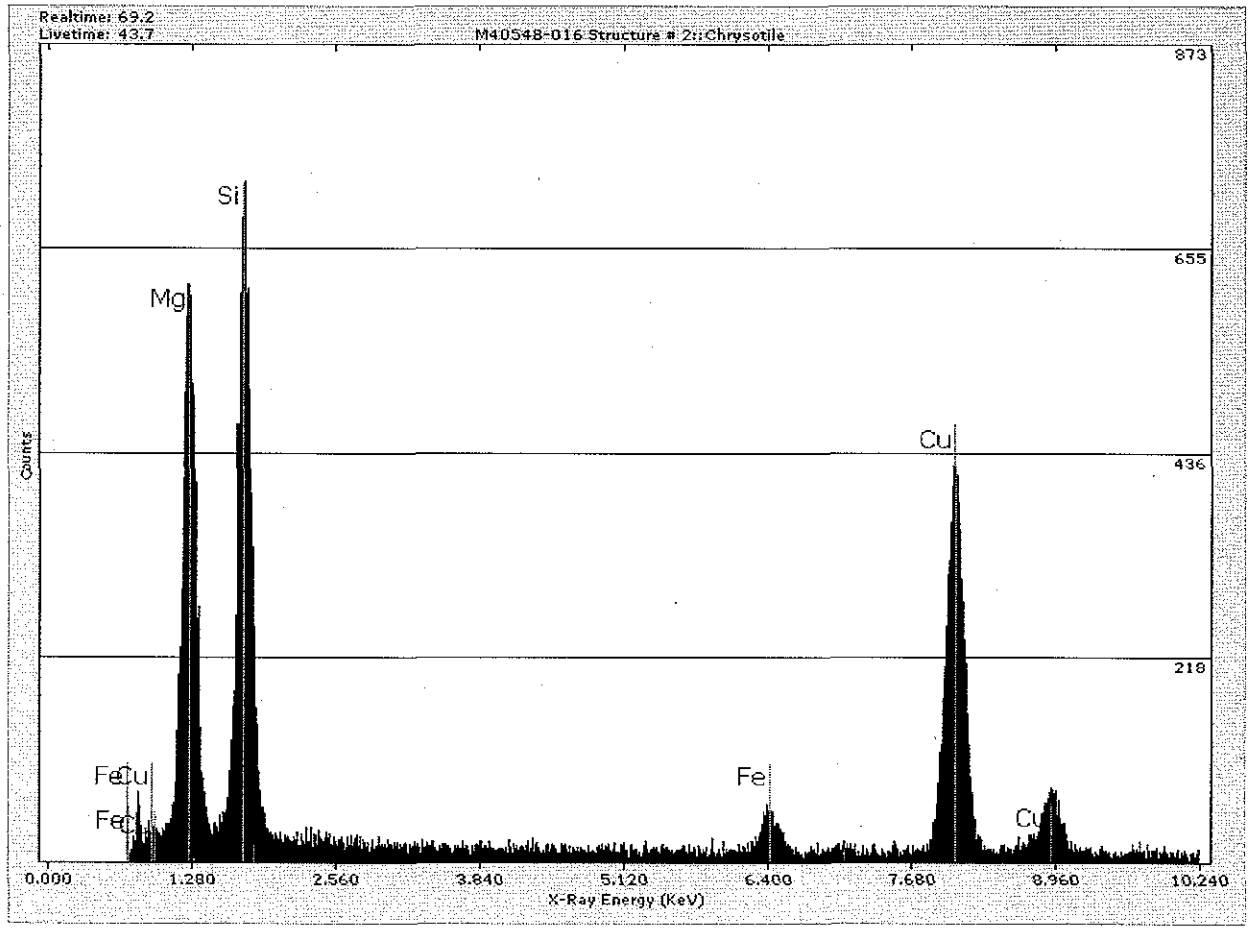
Grid Op

13

M40548 016 Sample Comments:

NE area during fab and file

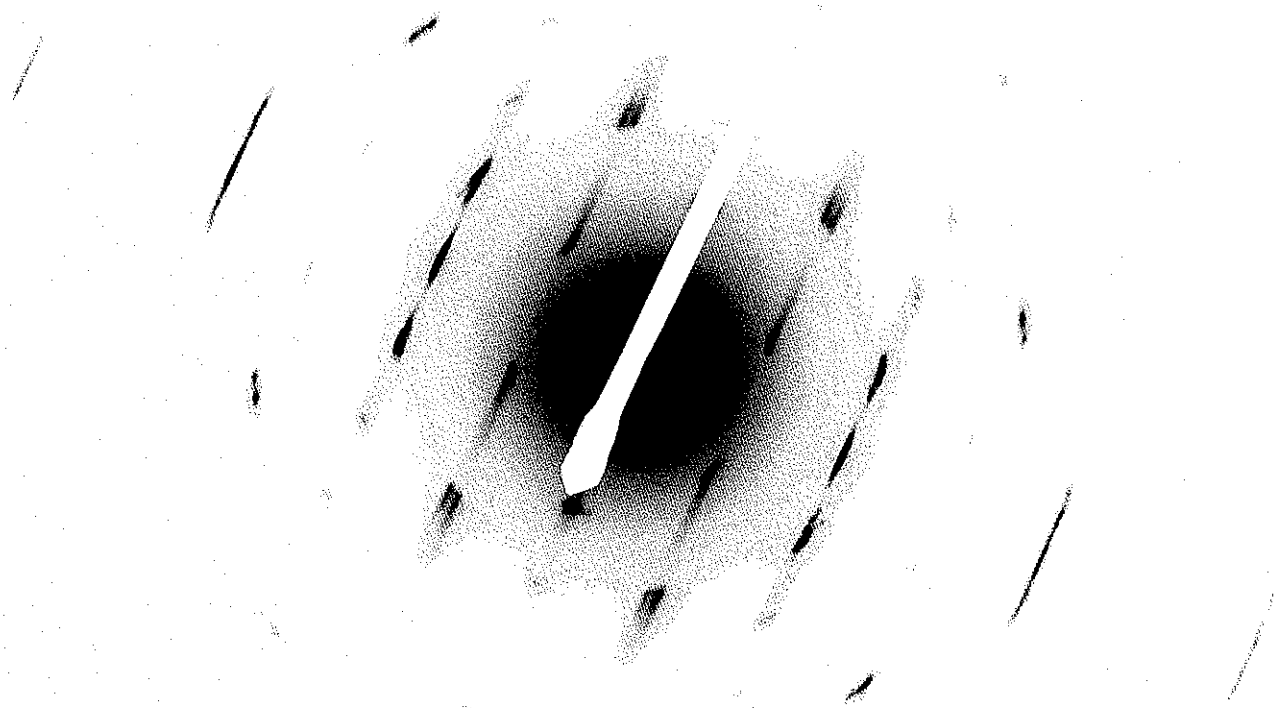

Realtime: 30.0
Livetime: 16.0
M40548-016 Structure # 1::Chrysotile
522
391
261
130
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 69.2
Livetime: 43.7
M40548-016 Structure # 2::Chrysotile
873
655
436
218
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

M40548-016, Chrysotile, Structure #002

MAS,INC.
M36438 100.0KV X15K 500nm

M40548-016, Chrysotile Diffraction, Str. #002



MAS,INC.
M36437 100.0KV 80.0CM

VERIFICATION OF CHRYSOTILE DIFFRACTION PATTERNS

1) Measure three spots and/or the interrow spacing on the diffraction pattern (in mm).

2) Use the formula:

CAMERA CONSTANT (mmA) = SPACING (in Angstroms, A)
MEASURED DISTANCE (mm)

3) The calculated spacings should be within +/- 5% tolerance of the d-spacings listed in the chart.

4) The following chart shows the chrysotile d-spacing values from the Mineral Powder Diffraction File Data Book from file card #31-808 on page 228.

hkl	d Spacing (in A)	Range +/- 5%
002	7.31	6.94 - 7.68
004	3.65	3.47 - 3.83
202	2.45	2.33 - 2.57
200	2.65	2.52 - 2.78
110	4.59	4.36 - 4.82
330	1.53	1.45 - 1.61
Interrow	5.31	5.04 - 5.58

28.8 mmA / 5.4 mm = 5.3 A ✓

Reflection Spot 004 — (camera K) 28.8 mmA / (measured distance) 7.8 mm = 3.69 A (calculated spacing) ✓

Reflection Spot 110 — (camera K) 28.8 mmA / (measured distance) 6.25 mm = 4.61 A (calculated spacing) ✓

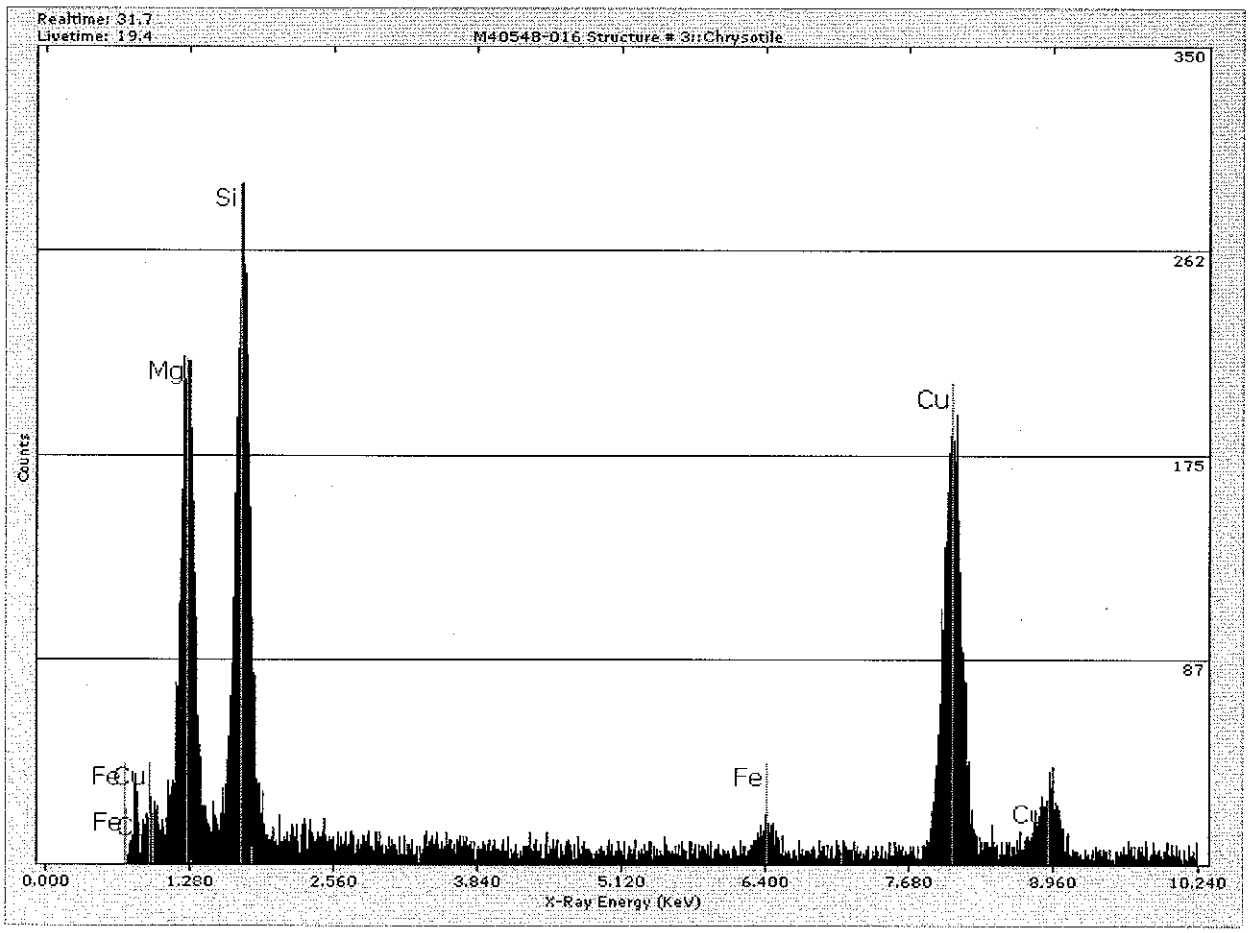
Reflection Spot 202 — (camera K) 28.8 mmA / (measured distance) 11.75 mm = 2.45 A (calculated spacing) ✓

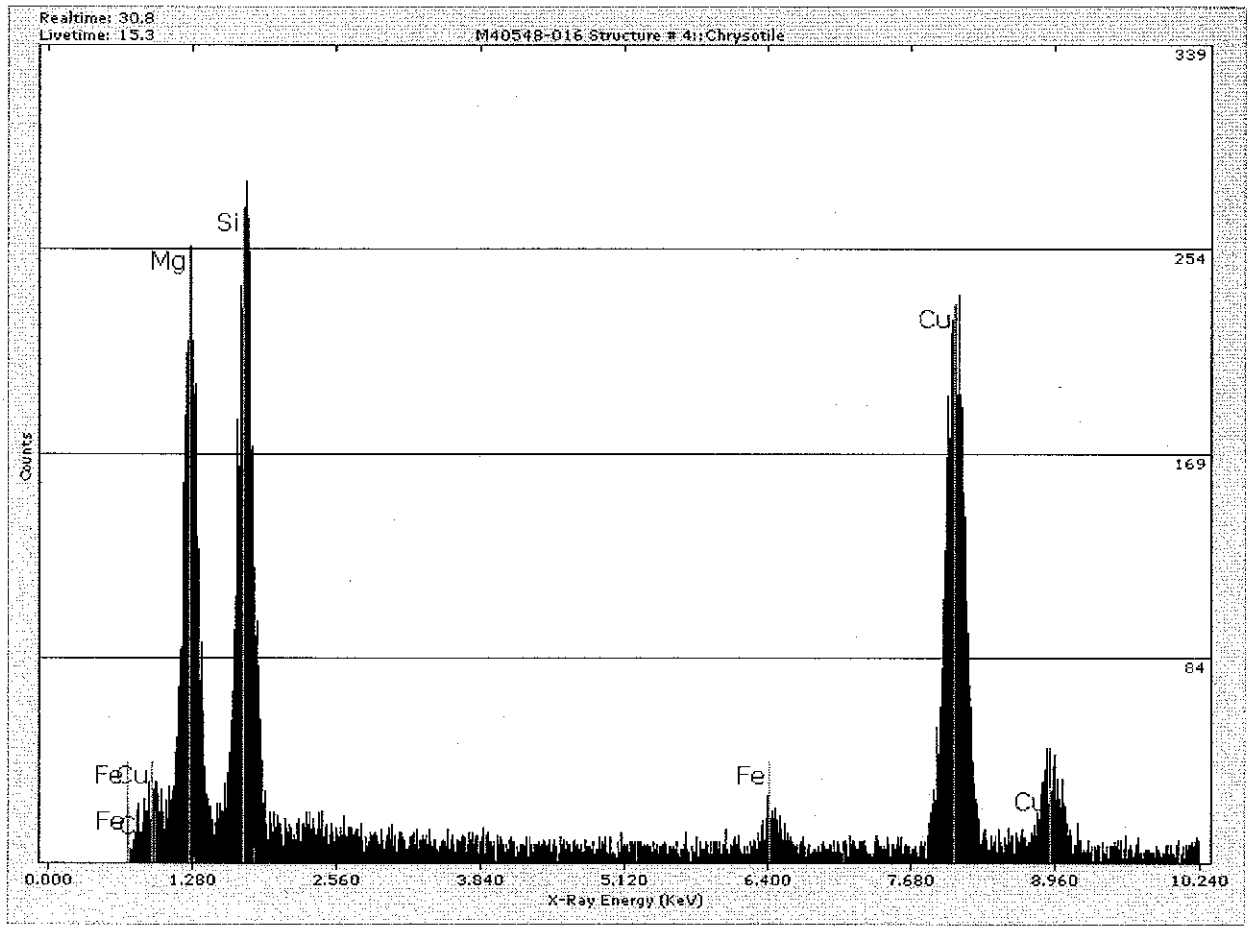
MAS Job #: M40548-016 Film #: M 36437

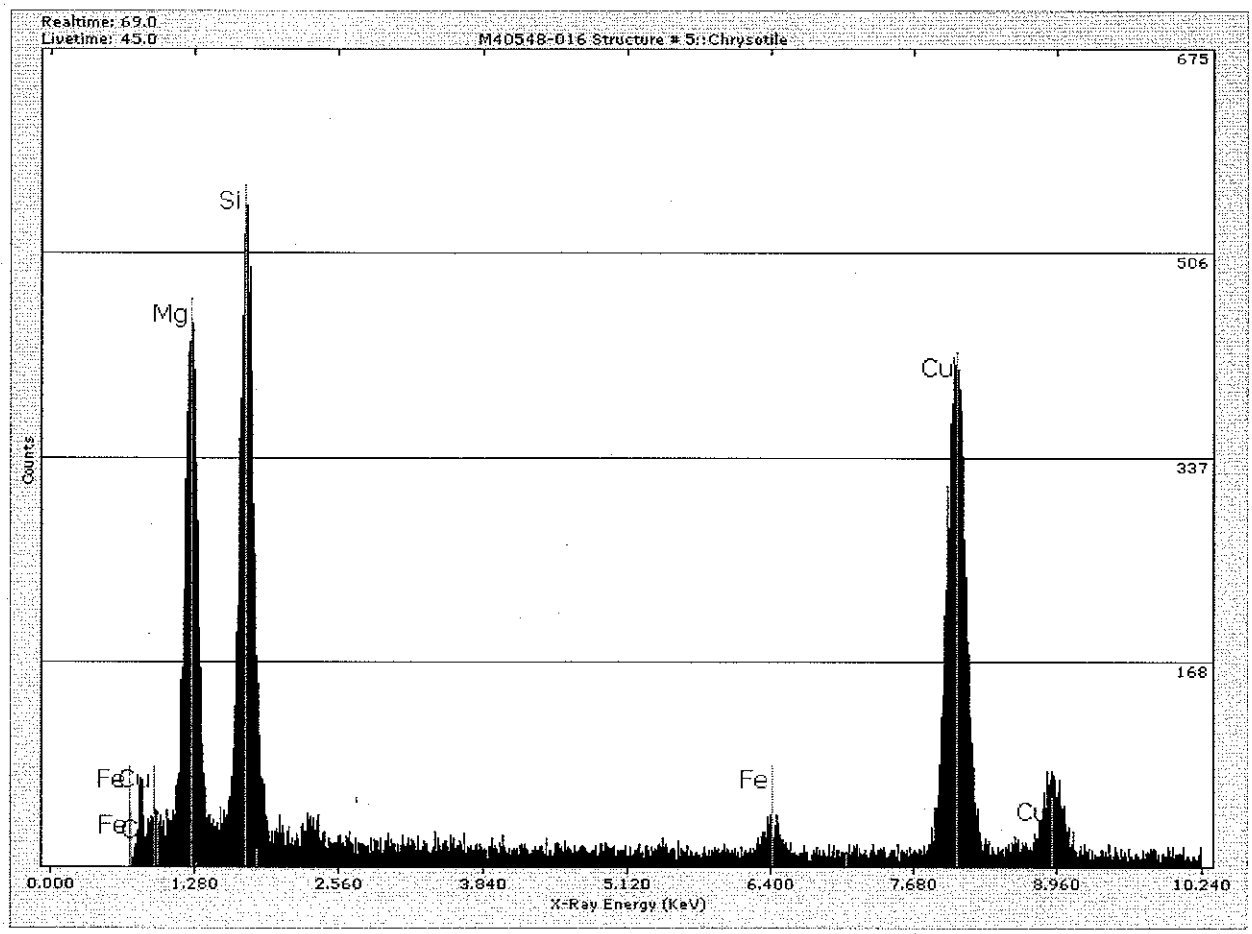
Analyst: KS / KS Date Photo was taken: 11/15/06

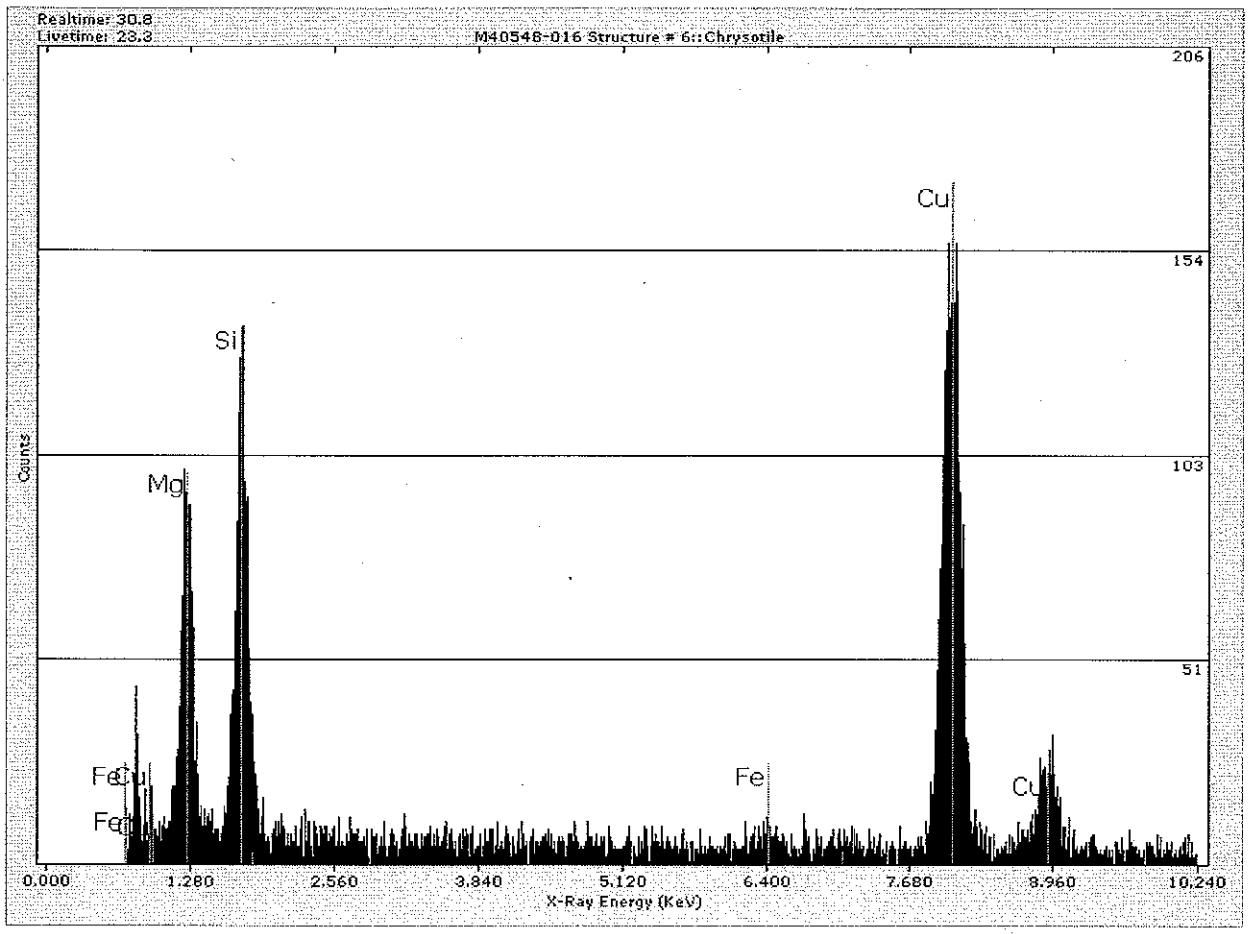
Date Verified: 11/16/06 EDS Verified: (YES) NO

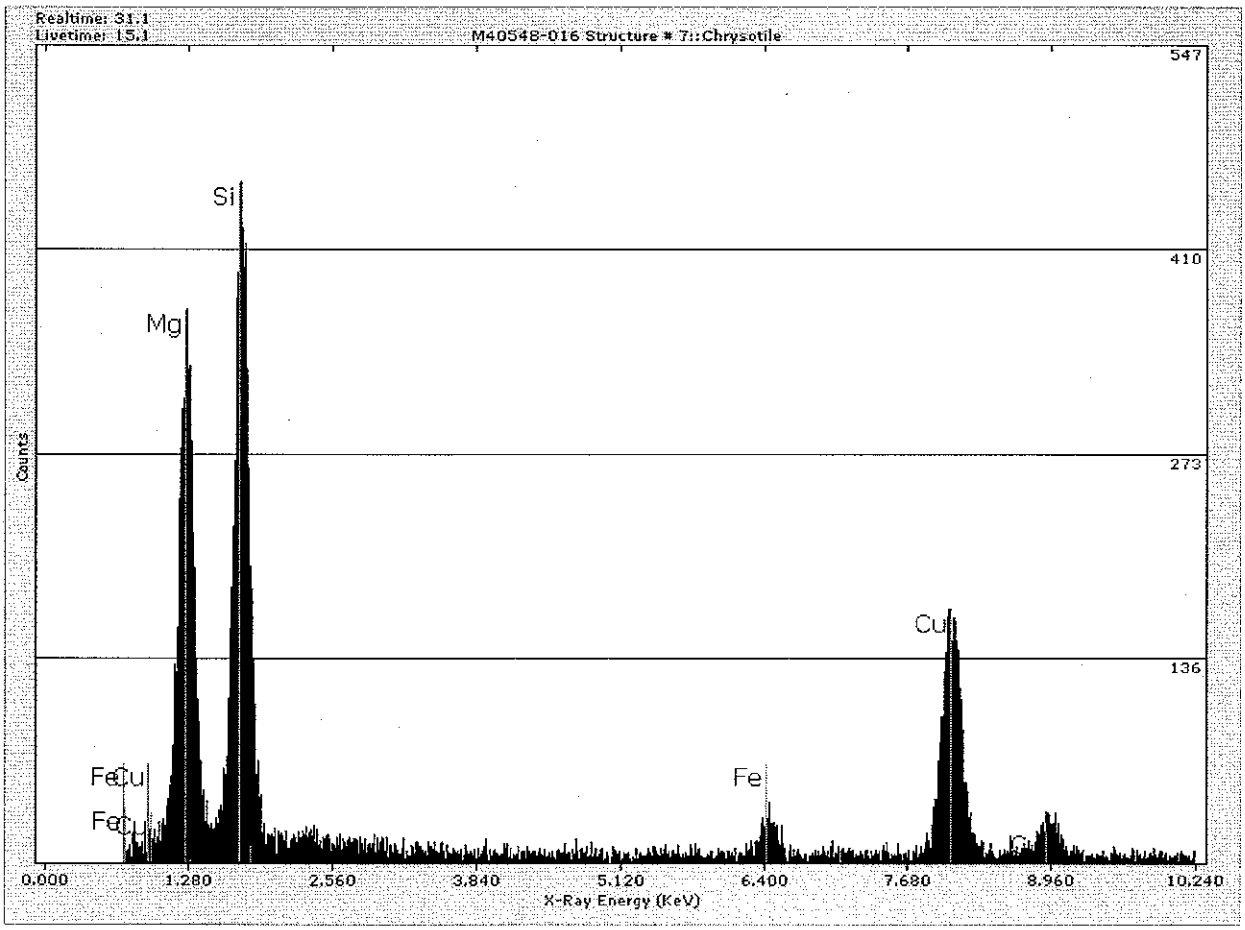
Unable to verify pattern _____ Explanation: STR #2

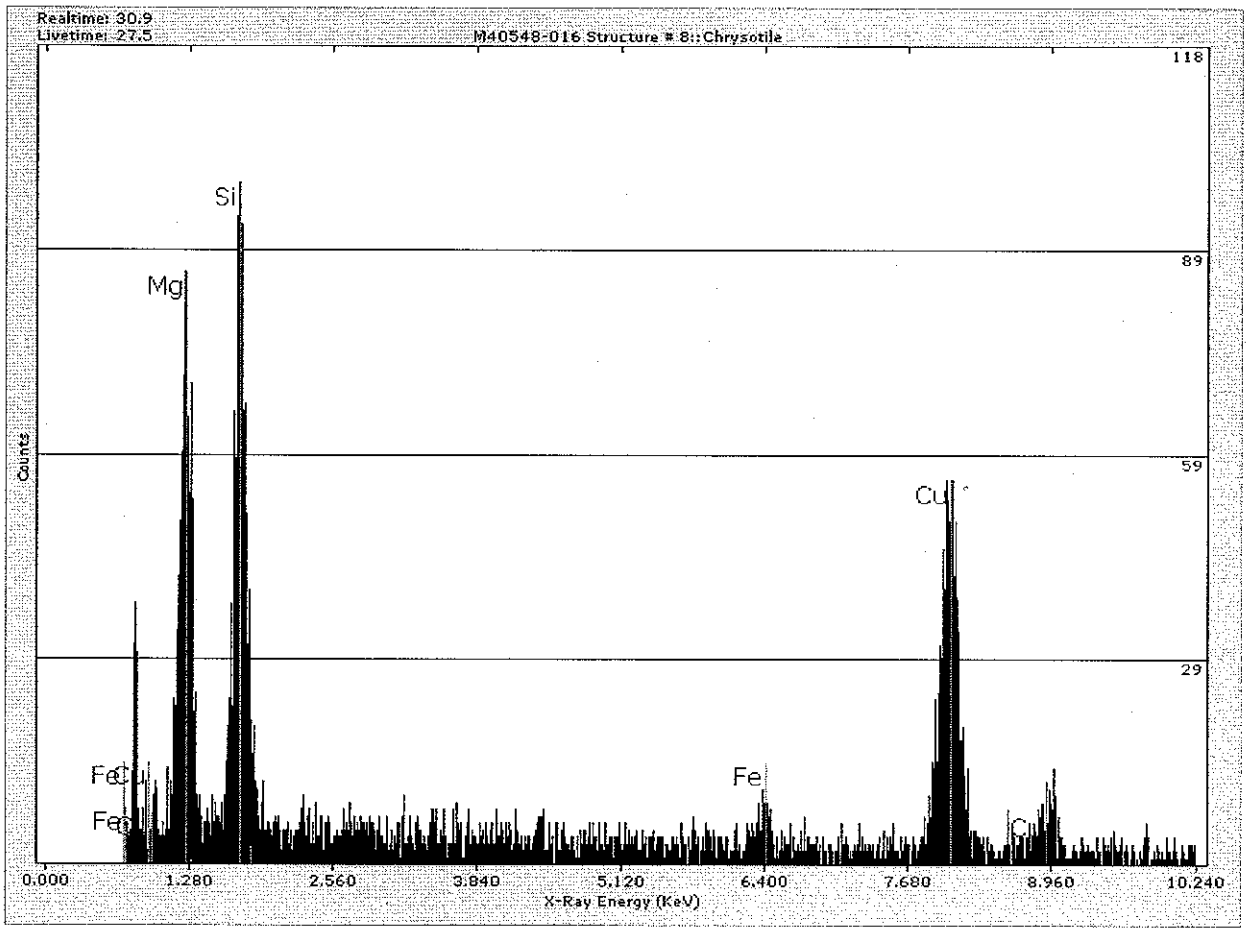

Realtime: 31.7
Livetime: 19.4
M4054B-016 Structure # 3:Chrysotile
350
262
175
87
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

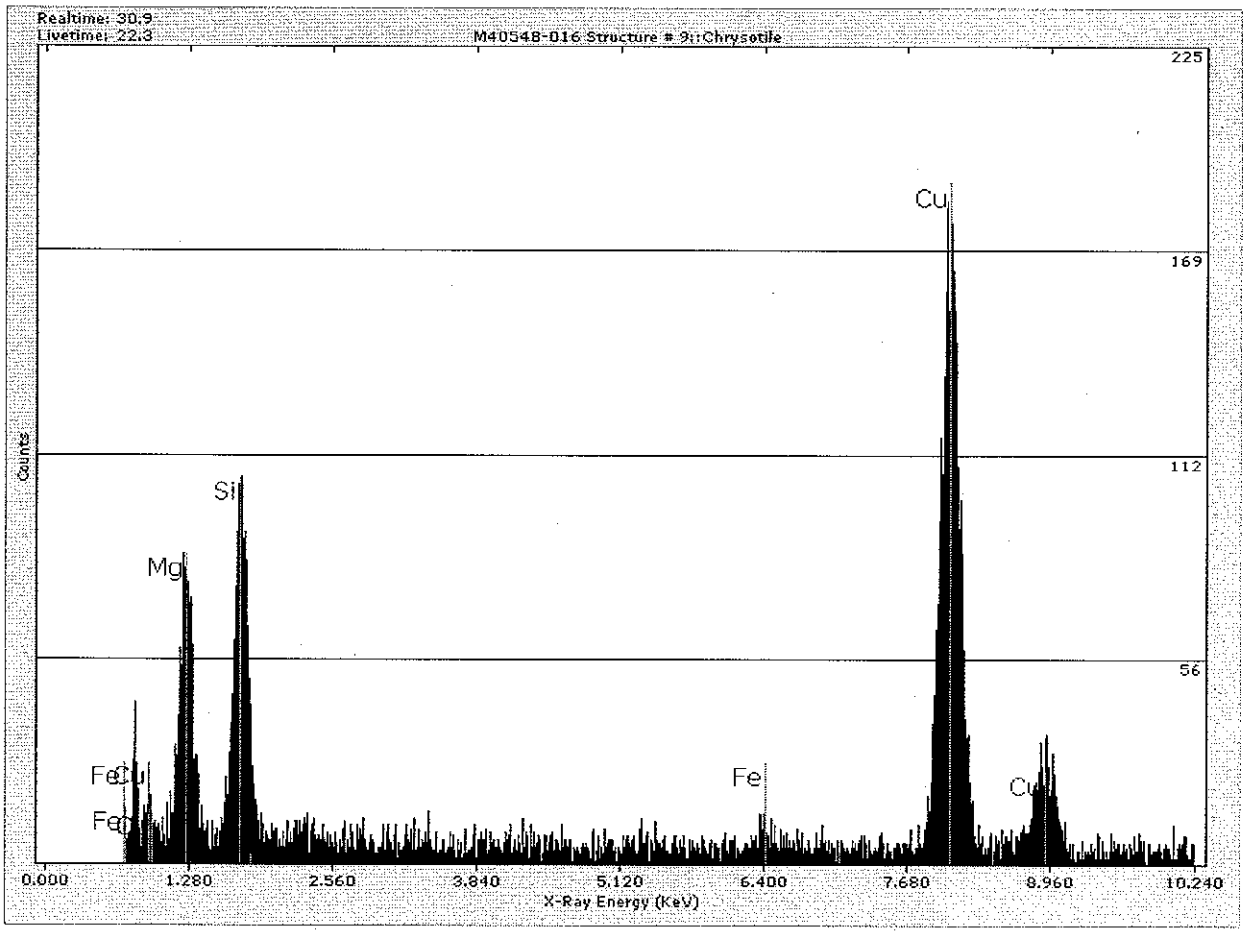

Realtime: 30.8
Livetime: 15.3
M40548-016 Structure # 4:Chrysotile
339
254
169
84
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

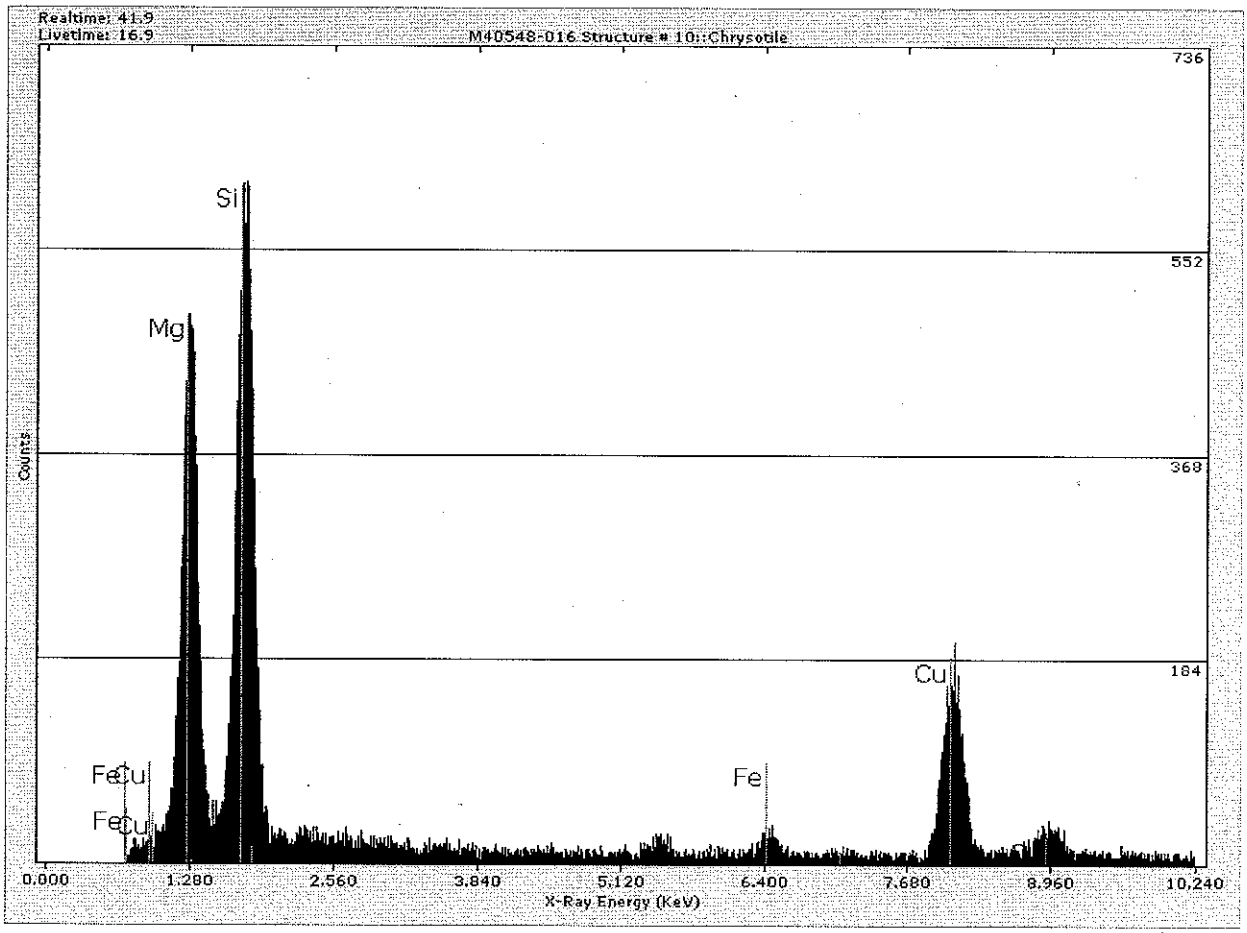

Realtime: 69.0
Livetime: 45.0
M40548-016 Structure # 5::Chrysotile
675
506
337
168
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.8
Livetime: 23.3
M40548-016 Structure # 6::Chrysotile
206
154
103
51
Counts
Cu
Si
Mg
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

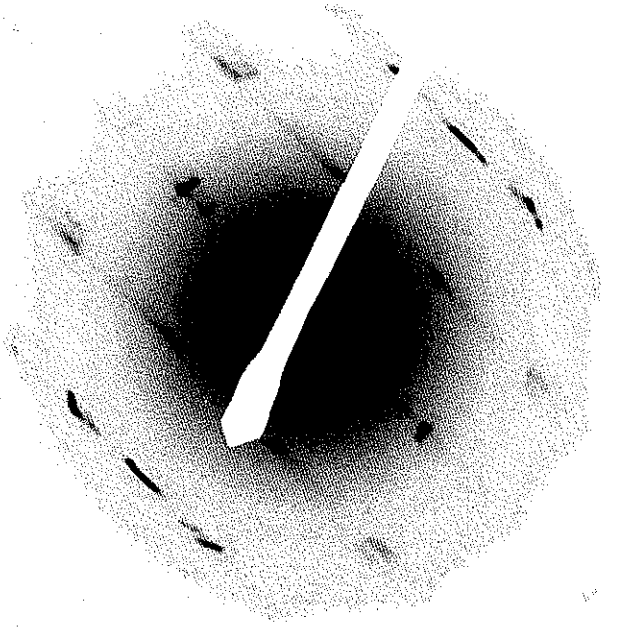

Realtime: 31.1
Livetime: 15.1
M40548-016 Structure * 7::Chrysotile
547
410
273
136
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.9
Livetime: 27.5
M40548-016 Structure # 8::Chrysotile
118
89
59
29
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.9
Livetime: 22.3
M40548-016 Structure # 9::Chrysotile
225
169
112
56
Counts
Cu
Si
Mg
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 41.9
Livetime: 16.9
M40548-016 Structure # 10: Chrysotile
736
552
368
184
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

M40548-016, Chrysotile Diffraction, Str. #010



[illegible]
[illegible] 100.0KV 80.0cm

VERIFICATION OF CHRYSOTILE DIFFRACTION PATTERNS

1) Measure three spots and/or the interrow spacing on the diffraction pattern (in mm).

2) Use the formula:

$$\frac{\text{CAMERA CONSTANT (mmA)}}{\text{MEASURED DISTANCE (mm)}} = \text{SPACING (in Angstroms, A)}$$

3) The calculated spacings should be within +/- 5% tolerance of the d-spacings listed in the chart.

4) The following chart shows the chrysotile d-spacing values from the Mineral Powder Diffraction File Data Book from file card #31-808 on page 228.

hkl	d Spacing (in A)	Range +/- 5%
002	7.31	6.94 - 7.68
004	3.65	3.47 - 3.83
202	2.45	2.33 - 2.57
200	2.65	2.52 - 2.78
110	4.59	4.36 - 4.82
330	1.53	1.45 - 1.61
Interrow	5.31	5.04 - 5.58

$\frac{28.8\ mmA}{5.4mm} = 5.3A$

↳ 5.4mm

Reflection Spot 004: (camera K) 28.8 mmA / (measured distance) 7.9 mm = 3.65 A (calculated spacing) ✓

Reflection Spot 110: (camera K) 28.8 mmA / (measured distance) 6.25 mm = 4.61 A (calculated spacing) ✓

Reflection Spot 202: (camera K) 28.8 mmA / (measured distance) 11.8 mm = 2.44 A (calculated spacing) ✓

MAS Job #: M40548-016 Film #: M 36439

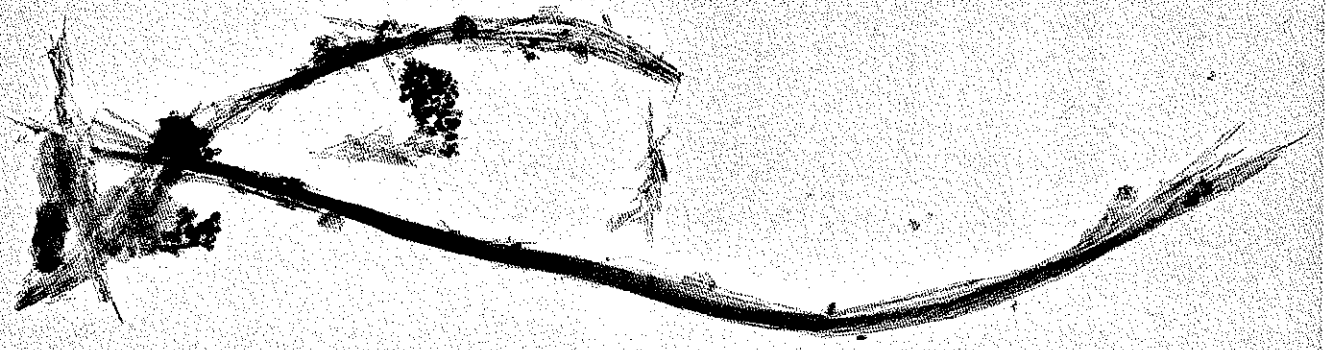
Analyst: KS / KS Date Photo was taken: 11/15/06

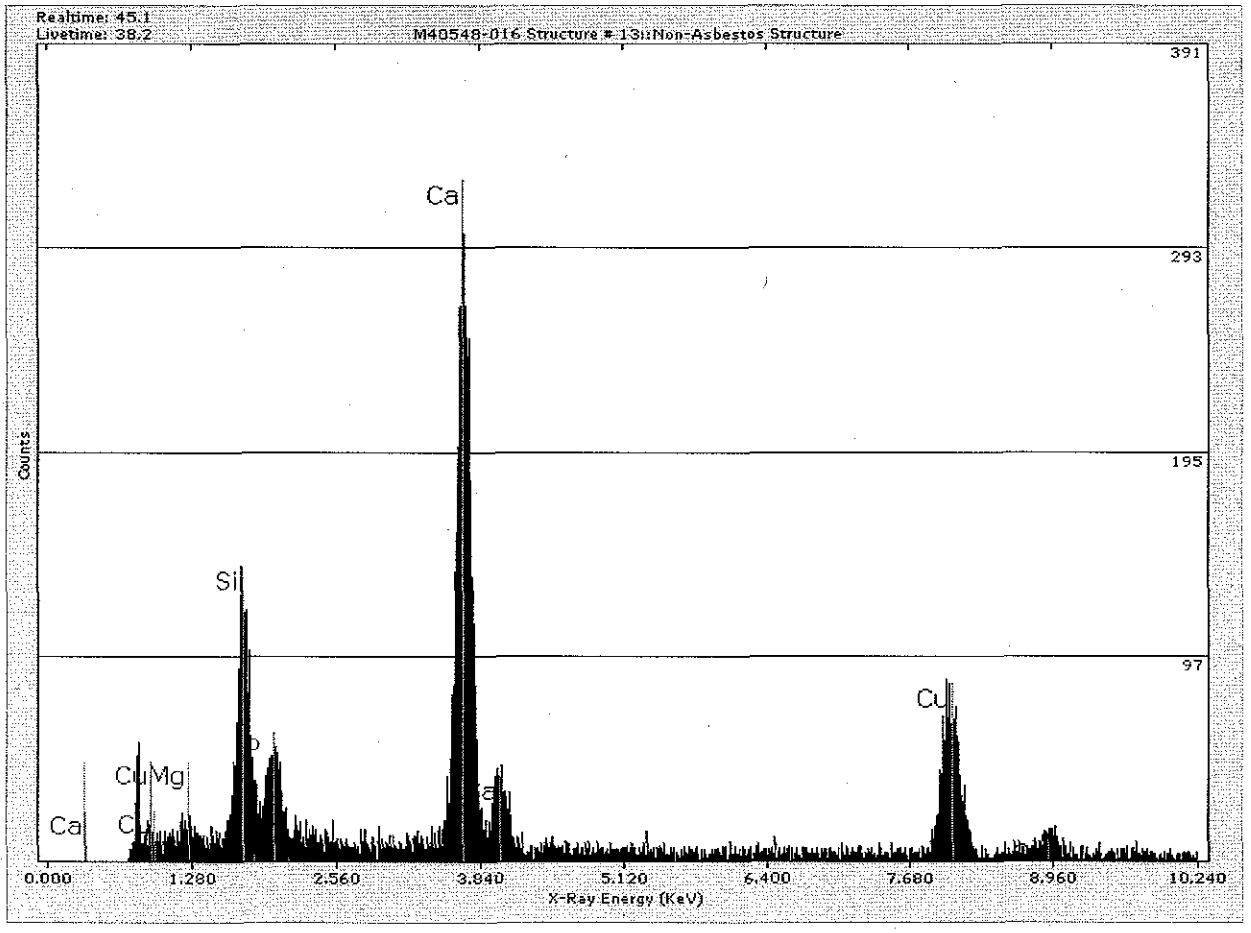
Date Verified: 11/16/06 EDS Verified: (YES) NO

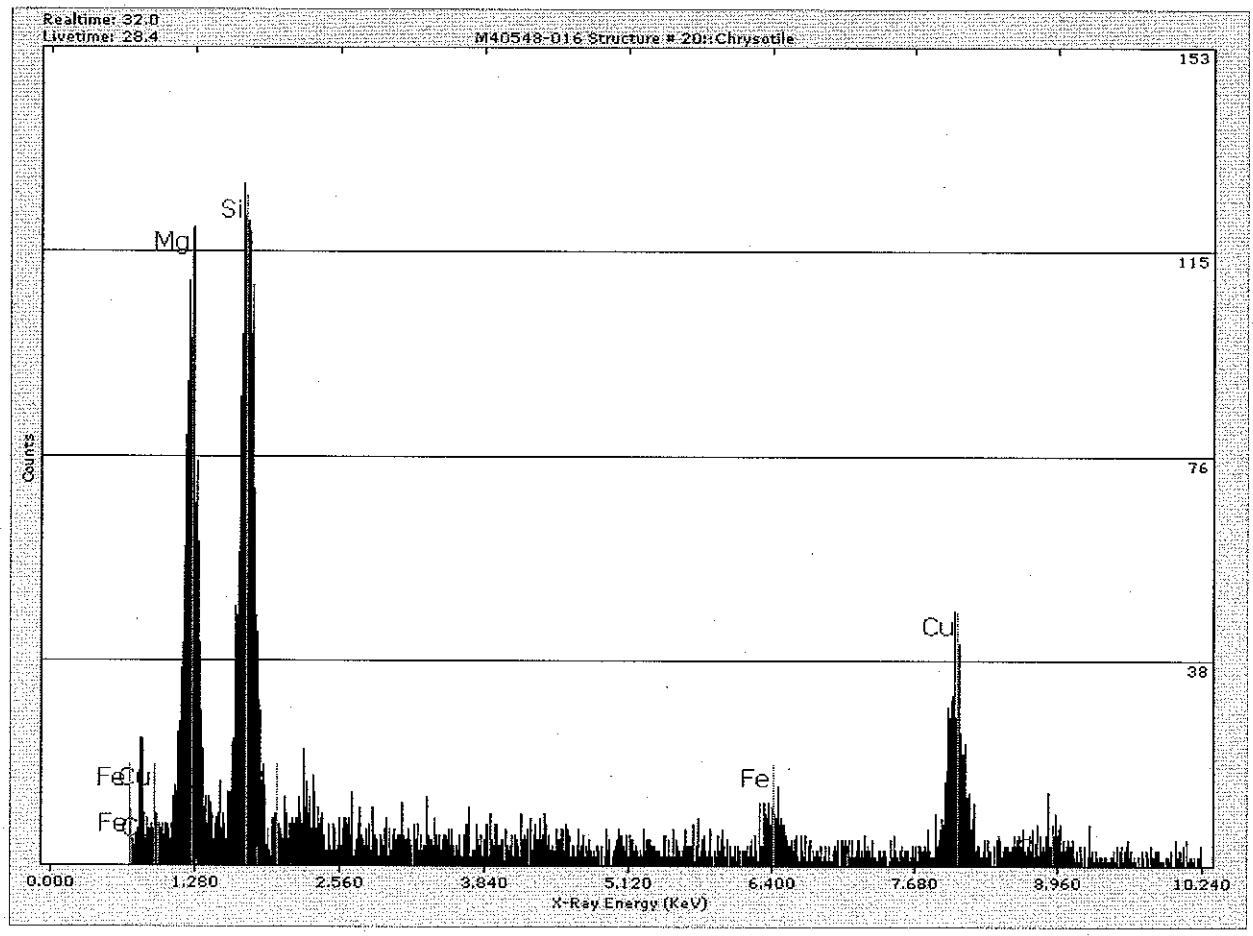
Unable to verify pattern _____ Explanation: _____

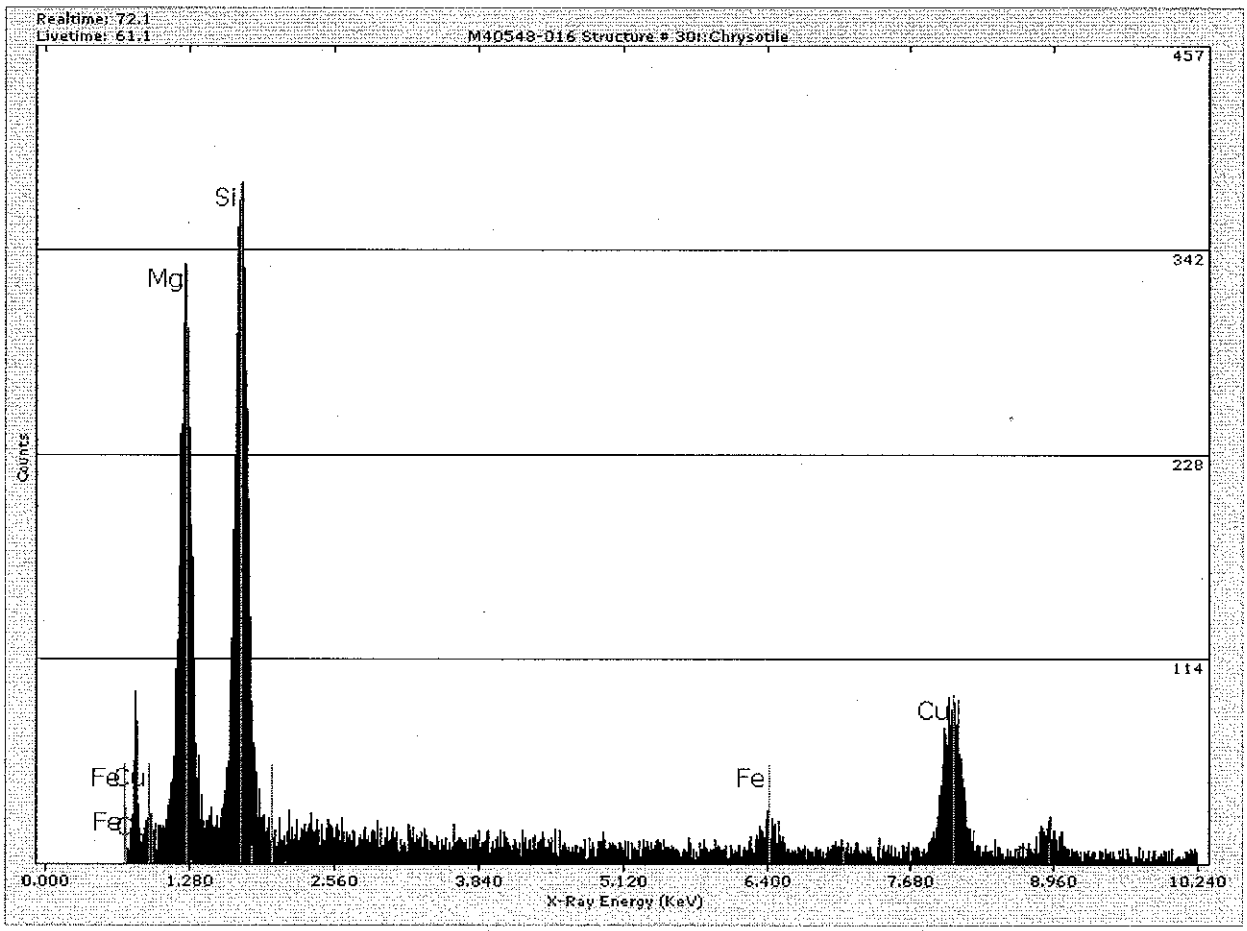
STR #10

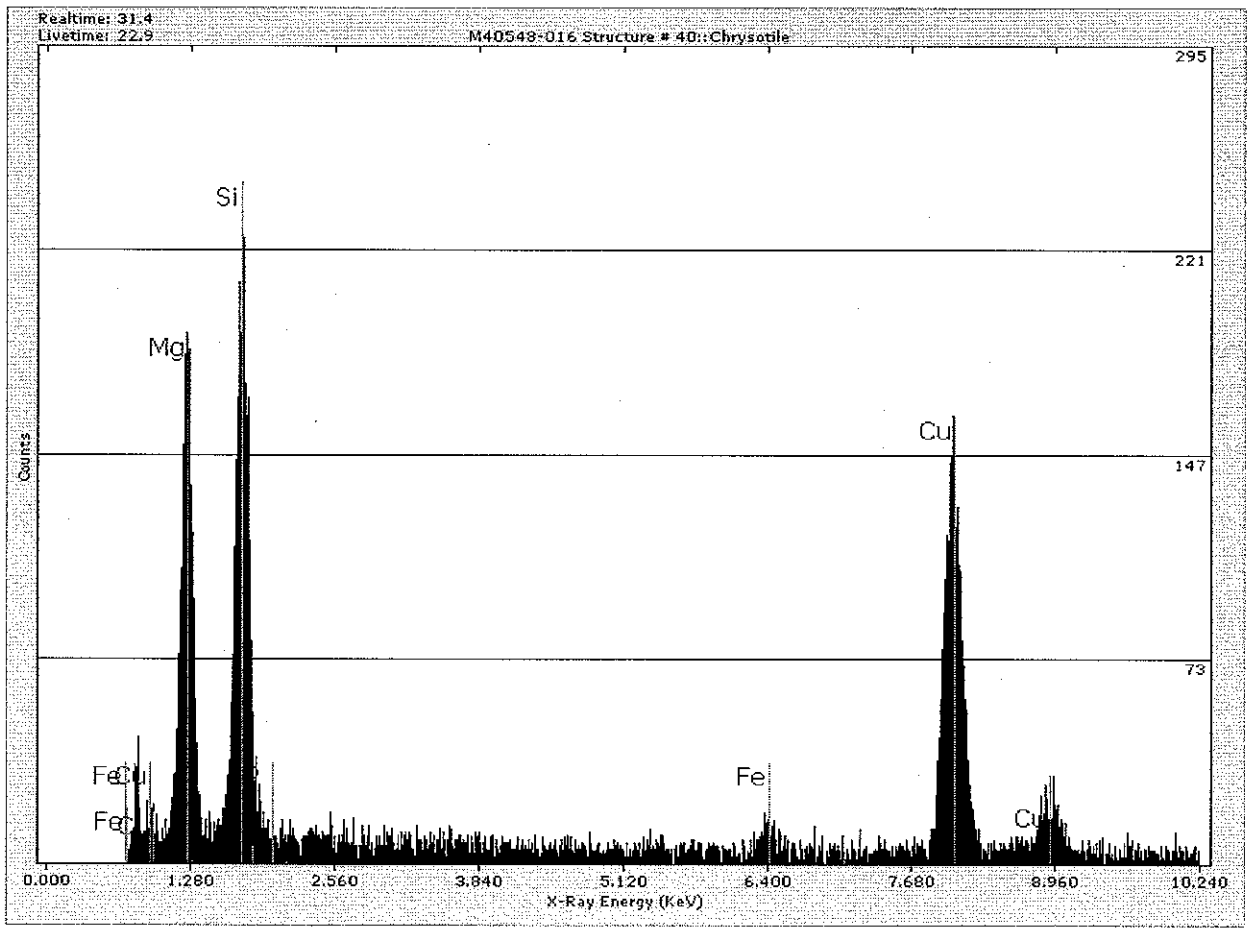
M40548-016, Chrysotile, Structure #010- #013

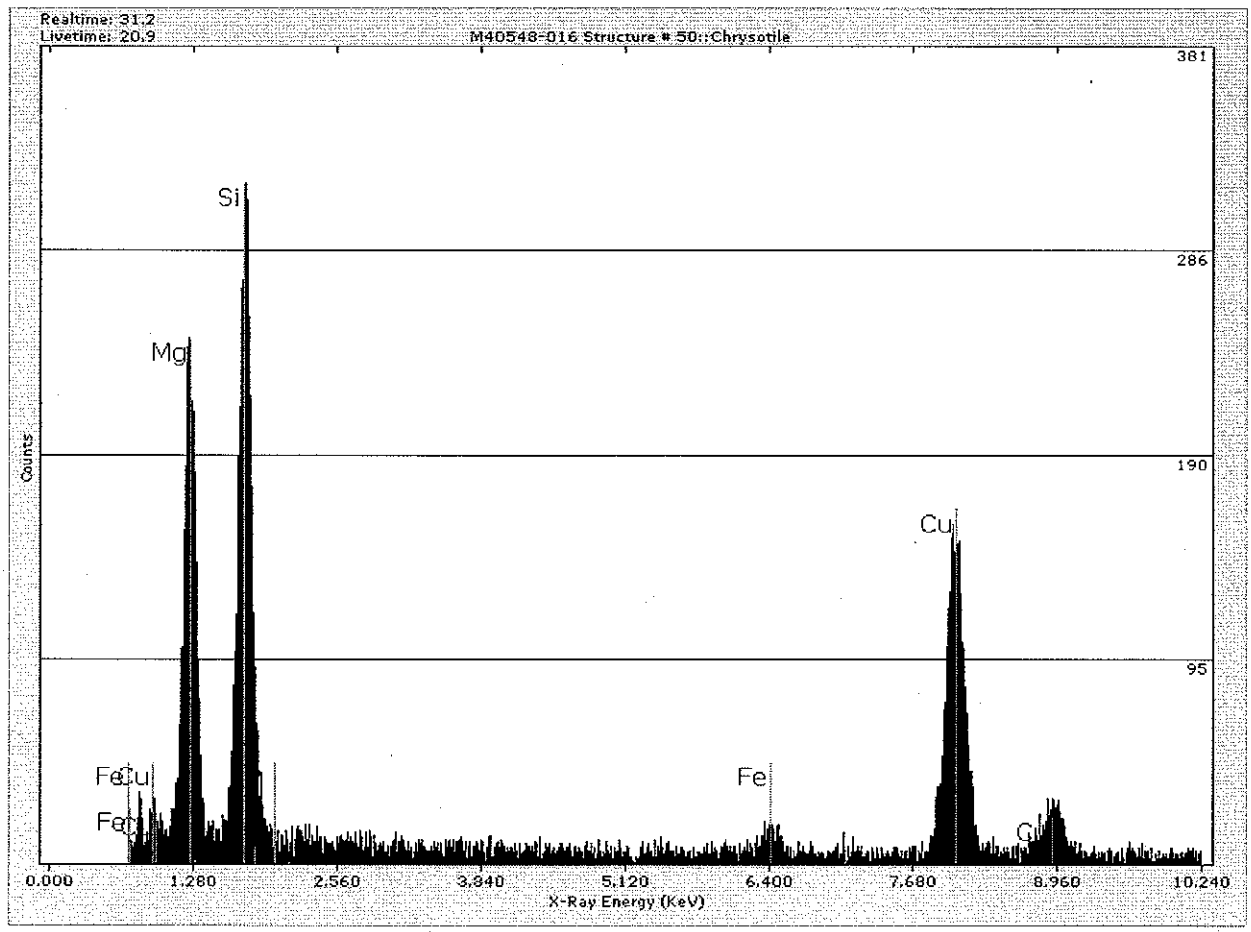


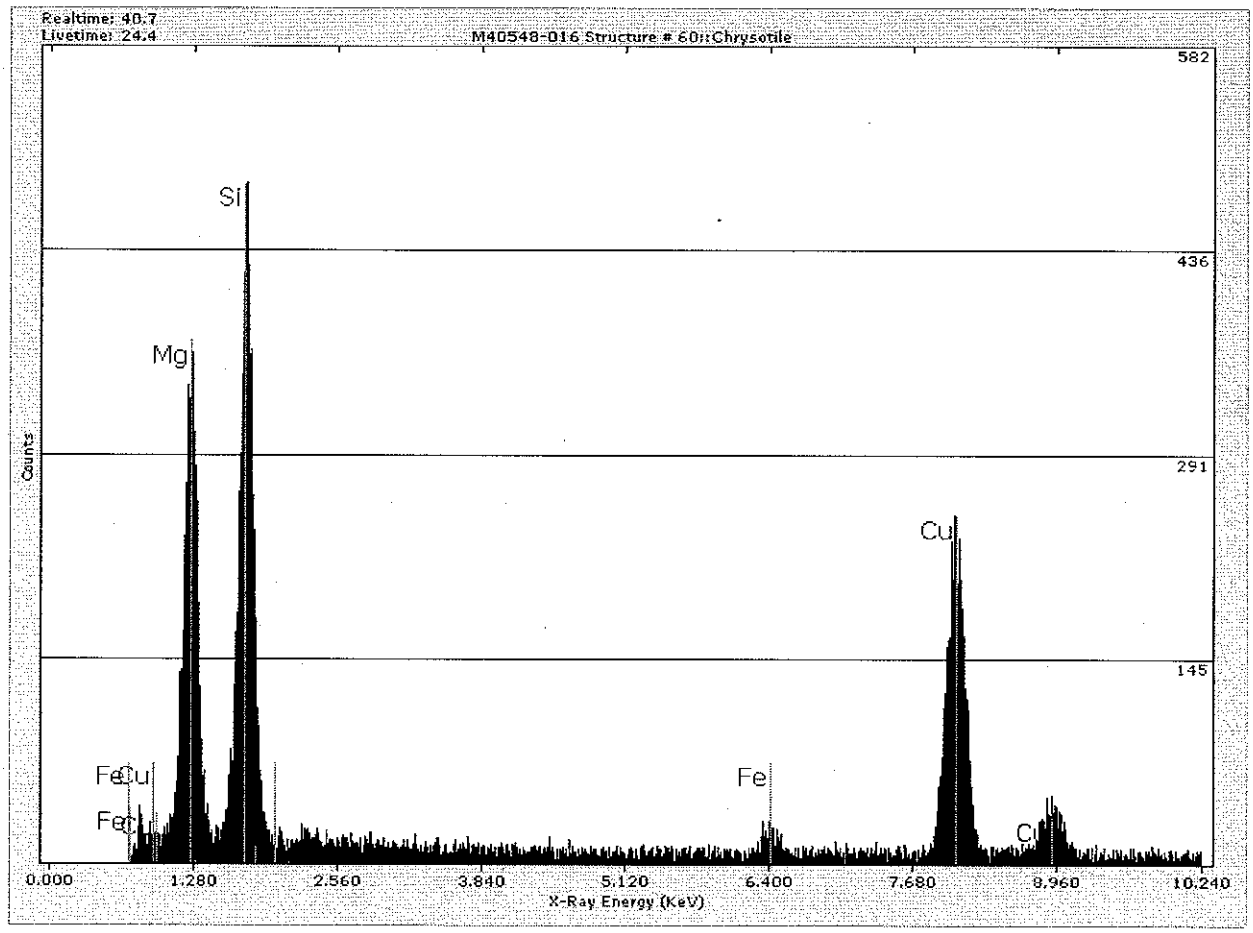

Realtime: 45.1
Livetime: 38.2
M40548-016 Structure # 13:Non-Asbestos Structure
391
293
195
97
Counts
Ca
Si
Cu
Mg
Ca
C
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

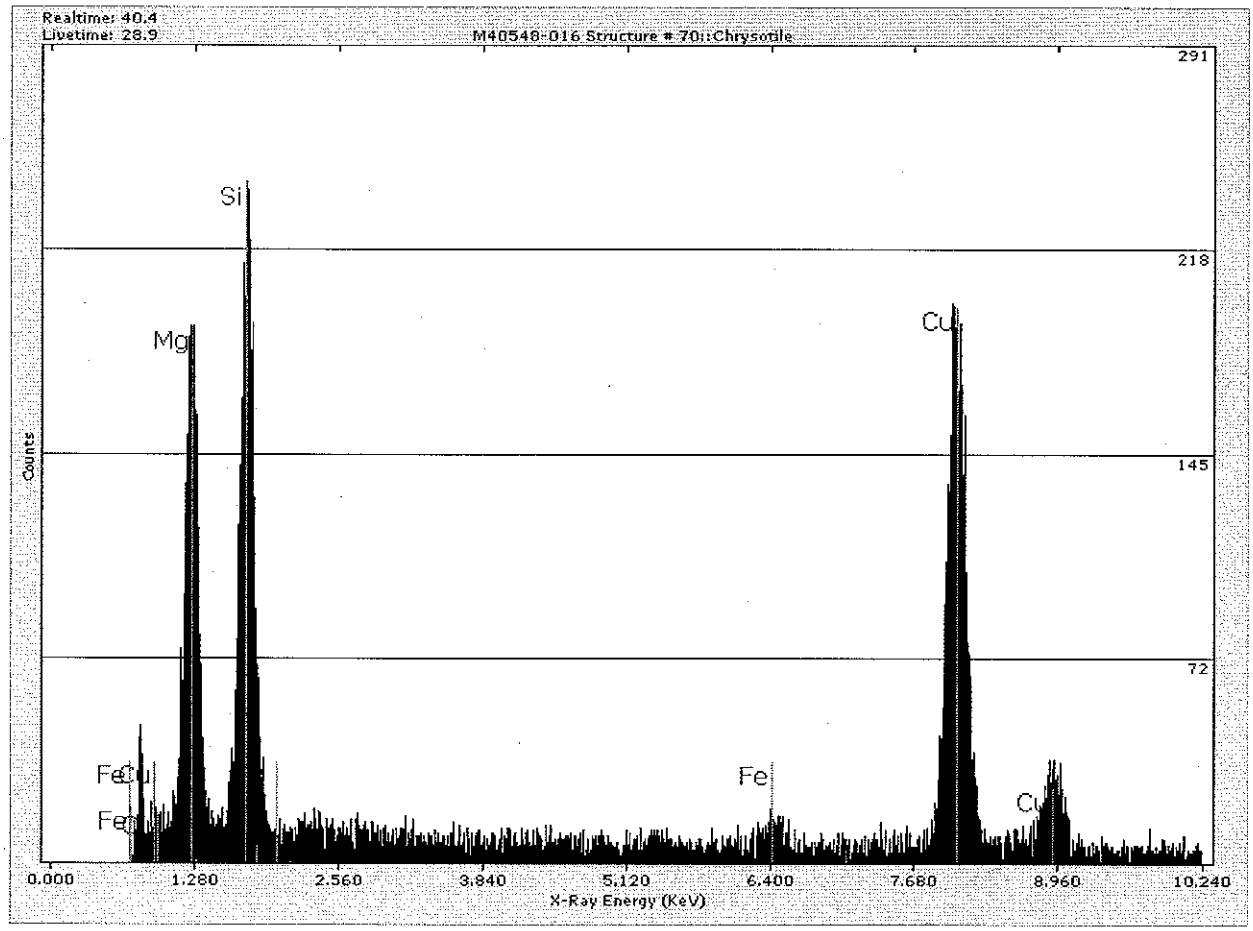

Realtime: 32.0
Livetime: 28.4
M40548-016 Structure # 20: Chrysotile
153
115
76
38
Counts
Mg
Si
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

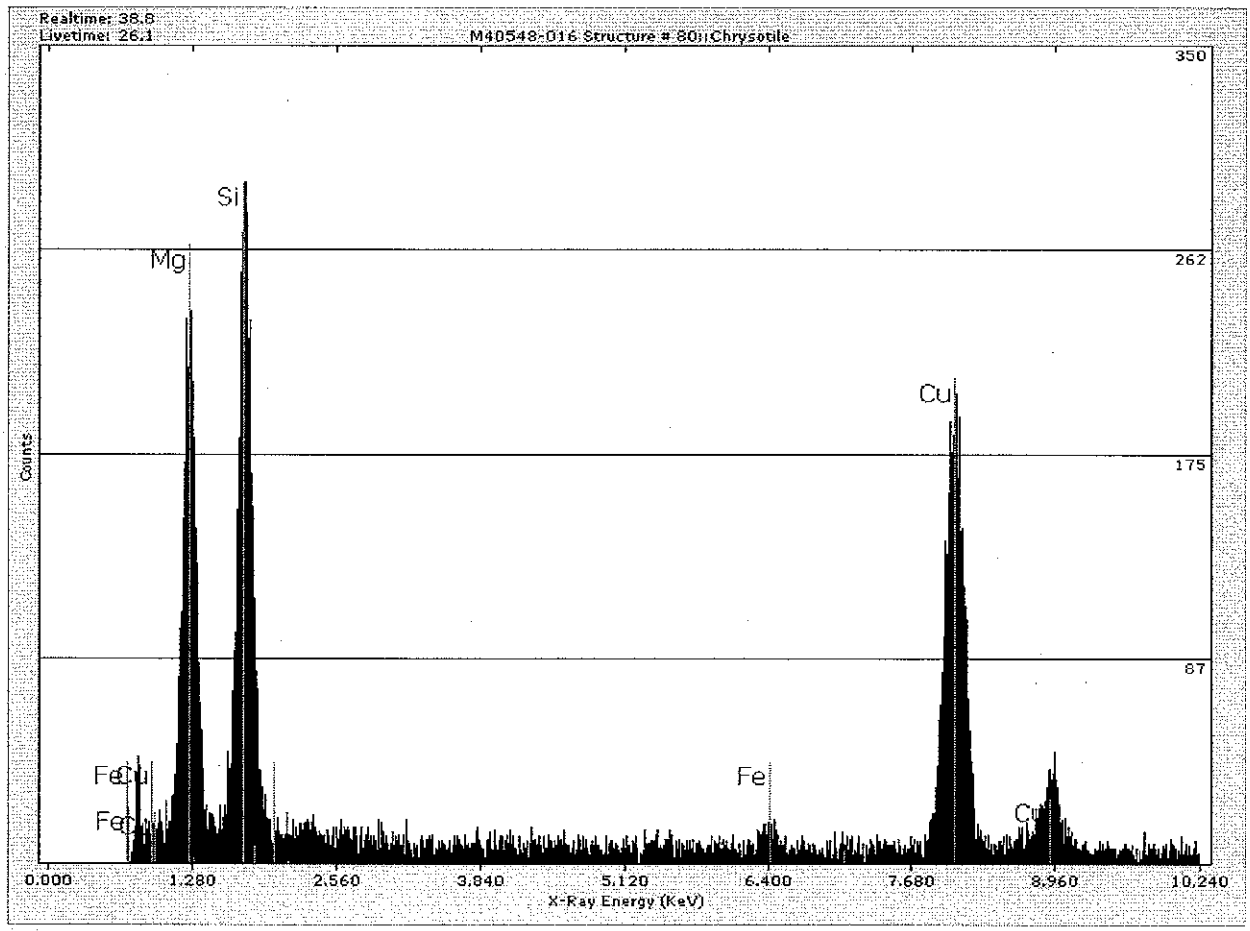

Realtime: 72.1
Livetime: 61.1
M40548-016 Structure # 30: Chrysotile
457
342
228
114
Counts
Si
Mg
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

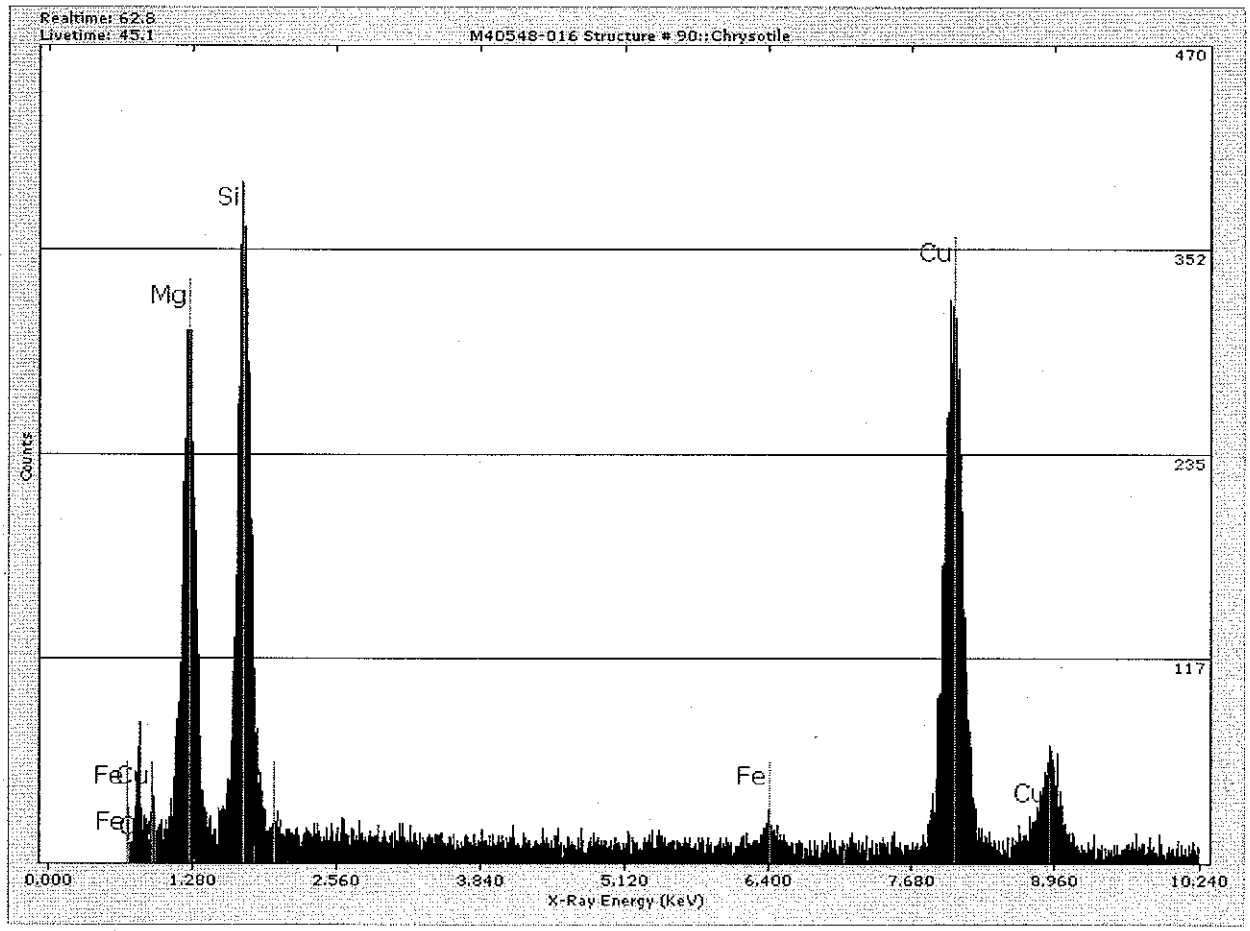

Realtime: 31.4
Livetime: 22.9
M40548-016 Structure # 40::Chrysotile
295
221
147
73
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

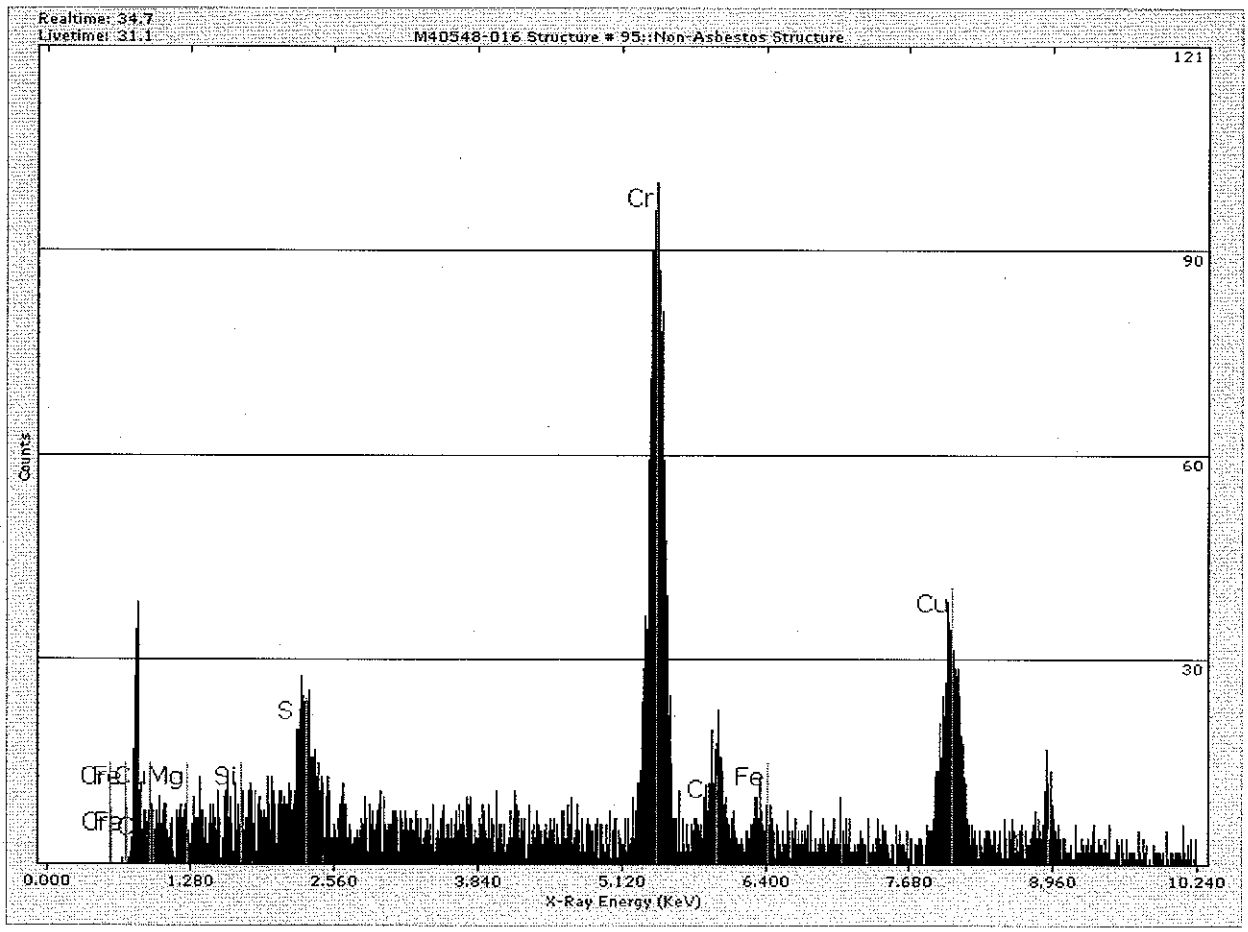

Realtime: 31.2
Livetime: 20.9
M40548-016 Structure # 50::Chrysotile
381
286
190
95
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

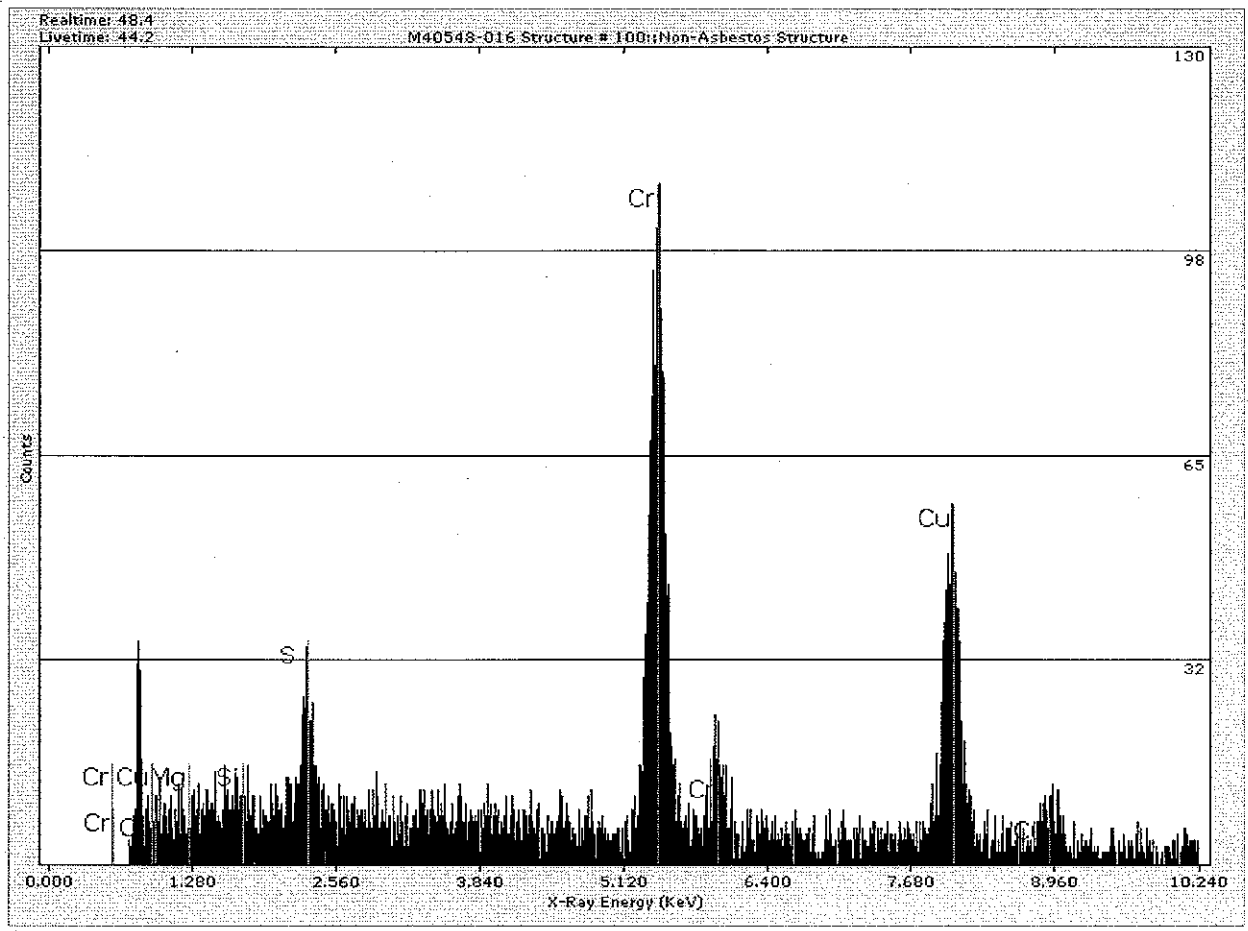

Realtime: 40.7
Livetime: 24.4
M40548-016 Structure # 60::Chrysotile
582
436
291
145
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 40.4
Livetime: 28.9
M40548-016 Structure # 70::Chrysotile
291
218
145
72
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 38.8
Livetime: 26.1
M40548-016 Structure # 80: Chrysotile
350
262
175
87
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 62.8
Livetime: 45.1
M40548-016 Structure # 90::Chrysotile
470
352
235
117
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 34.7
Livetime: 31.1
M40548-016 Structure # 95::Non-Asbestos Structure
121
90
60
30
Counts
Cr
Cu
S
Mg
Si
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 48.4
Livetime: 44.2
M40548-016 Structure # 100::Non-Asbestos Structure
130
98
65
32
Counts
Cr
Cu
S
Cr Cu Mg Si
Cr Cl
Cl
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-019

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	A-2-D

7402 ANALYSIS

Sample Area/ Volume:	180	Liters		Date Analyzed:	11/15/2006	
Filter Type:	MCE 25mm			Analyst:	Kevin Simpson	
Pore size:	0.8			Scope Number:	3	
Effective Filter Area:	385			Accelerating Voltage:	100	KV
Sample type:	Air			Indicated Mag:	25	KX
Analysis type:	7402			Screen Mag:	20	KX
Grid Acceptance	Yes	8	%	Grid_box:	7179	

Number of grids:	2	#1:	103	#3:	105	Asbestos	100
Number of openings:	24	#2:	101	#4:	102	Non-asbestos	0
Average Grid Size:	0.010557	Total Area Analyzed:	0.253				

% Asbestos 100

Str#:	SquareID:	Fiber Type:	Size		Morph:	SAED:	EDS:
1	C10-B2	Chrysotile	6	0.3	Chrysotile	Chrysotile	✓
2		Chrysotile	5.2	0.28	Chrysotile	Chrysotile	✓
3	B4	Chrysotile	6.5	0.3	Chrysotile	Chrysotile	✓
4		Chrysotile	5.2	0.28	Chrysotile	Chrysotile	✓
5	B6	Chrysotile	6	0.4	Chrysotile	Chrysotile	✓
6		Chrysotile	31	1	Chrysotile	Chrysotile	✓
7		Chrysotile	5.5	0.5	Chrysotile	Chrysotile	✓
8		Chrysotile	5.1	0.5	Chrysotile	Chrysotile	✓
9		Chrysotile	30	0.4	Chrysotile	Chrysotile	✓
10		Chrysotile	6	0.3	Chrysotile	Chrysotile	✓
11		Chrysotile	8	0.6			
12	B8	Chrysotile	10	1			
13		Chrysotile	5.1	0.28			
14		Chrysotile	28	1.5			
15		Chrysotile	13	0.3	M36442	M36441	✓
16	D4	Chrysotile	6	0.3			
17		Chrysotile	7	0.5			
NSD	D6						
18	D8	Chrysotile	5.5	0.8			
19	D10	Chrysotile	32	1			
20		Chrysotile	8	0.3	Chrysotile	Chrysotile	✓
21		Chrysotile	10	0.4			
22		Chrysotile	8	0.6			
23		Chrysotile	6	2			
24	C2	Chrysotile	5.5	0.28			
25		Chrysotile	11	2			
26		Chrysotile	6	2			
27	C3	Chrysotile	26	1			

28			Chrysotile	7	0.4			
29			Chrysotile	14	0.5			
30			Chrysotile	40	0.5	Chrysotile	Chrysotile	✔
31	A10-D1		Chrysotile	10	2			
32			Chrysotile	16	1			
33			Chrysotile	5.5	0.28			
34			Chrysotile	35	4			
35			Chrysotile	8	1			
36			Chrysotile	9	0.4	M36444	M36443	✔
37			Chrysotile	6	0.4			
38			Chrysotile	6	0.3			
39			Chrysotile	7.5	0.3			
40	D3		Chrysotile	15	0.8	Chrysotile	Chrysotile	✔
41			Chrysotile	8	2			
42			Chrysotile	60	0.8			
43			Chrysotile	20	0.5			
44			Chrysotile	20	2			
45			Chrysotile	32	8			
46	D5		Chrysotile	16	0.8			
47			Chrysotile	7.8	0.3			
48			Chrysotile	8	0.5			
49			Chrysotile	14	0.6			
50	D7		Chrysotile	6	0.3	Chrysotile	Chrysotile	✔
51			Chrysotile	5.1	0.3			
52	D9		Chrysotile	6	0.7			
53			Chrysotile	18	0.28			
54			Chrysotile	40	0.6			
55	D10		Chrysotile	9	0.3			
56			Chrysotile	8	2			
57			Chrysotile	45	2.5			
58			Chrysotile	5.2	0.3			
59			Chrysotile	8	0.3			
60			Chrysotile	8	0.8	Chrysotile	Chrysotile	✔
61			Chrysotile	17	2			
62			Chrysotile	5.5	0.4			
NSD	E1							
63	E3		Chrysotile	32	2			
64			Chrysotile	8	2			
65			Chrysotile	6.5	0.7			
66	E5		Chrysotile	10	2			
67	E7		Chrysotile	9	0.8			
68			Chrysotile	8	0.3			
69			Chrysotile	5.7	0.3			
70			Chrysotile	5.5	0.28	Chrysotile	Chrysotile	✔
71			Chrysotile	6	0.28			
72			Chrysotile	10	1			
73	E8		Chrysotile	5.2	0.28			
74			Chrysotile	30	1			
75			Chrysotile	22	0.8			
76			Chrysotile	20	0.7			
77			Chrysotile	12	0.4			
78			Chrysotile	18	1.5			
79			Chrysotile	7	0.3			
80			Chrysotile	64	2	Chrysotile	Chrysotile	✔

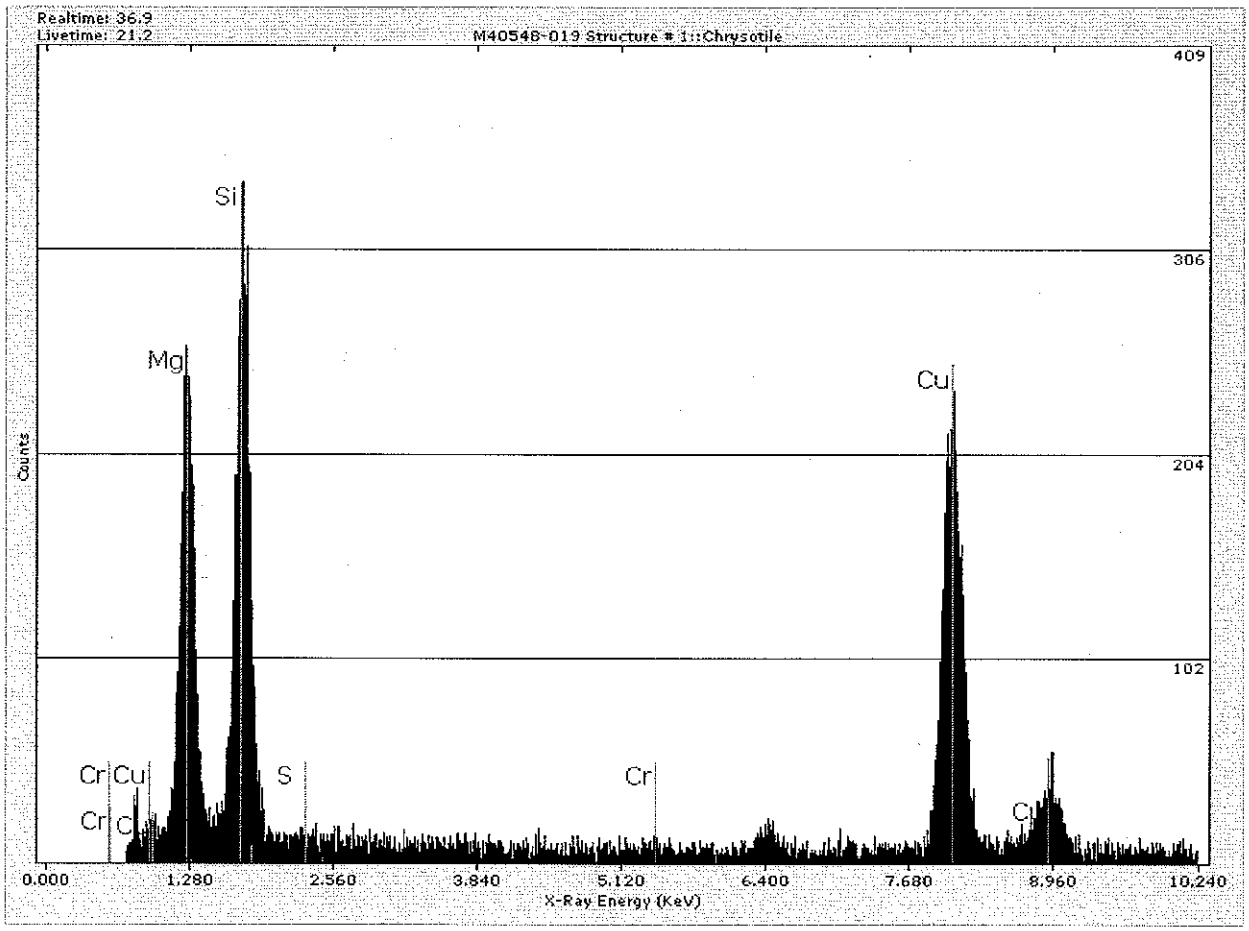
81			Chrysotile	11	0.5			☑
82			Chrysotile	8	1			☑
83	E9		Chrysotile	12	0.3			☑
84			Chrysotile	20	0.7			☑
85			Chrysotile	30	5			☑
86			Chrysotile	9	0.3			☑
87			Chrysotile	16	2			☑
88			Chrysotile	8	0.6			☑
89	E10		Chrysotile	6	0.3			☐
90			Chrysotile	15	0.5	Chrysotile	Chrysotile	☑
91			Chrysotile	8	0.4			☑
92			Chrysotile	5.5	1			☑
93	G2		Chrysotile	5.5	0.3			☑
94			Chrysotile	5.1	0.28			☑
95			Chrysotile	6	0.4			☑
96			Chrysotile	6	0.3			☑
97			Chrysotile	6.5	1			☑
98			Chrysotile	9	1			☑
99			Chrysotile	9	0.3			☐
100			Chrysotile	5.5	1	Chrysotile	Chrysotile	☑

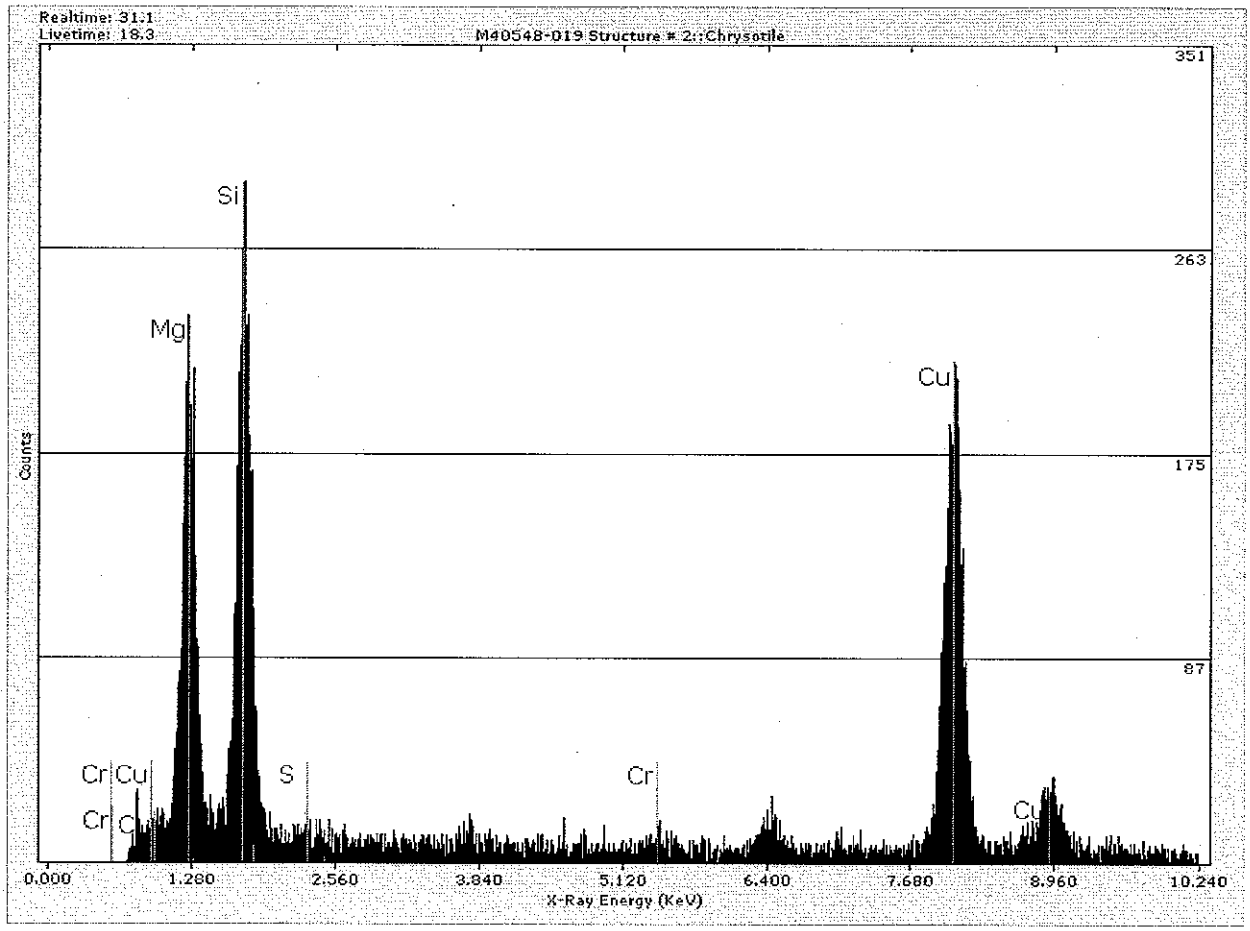
Grid Op

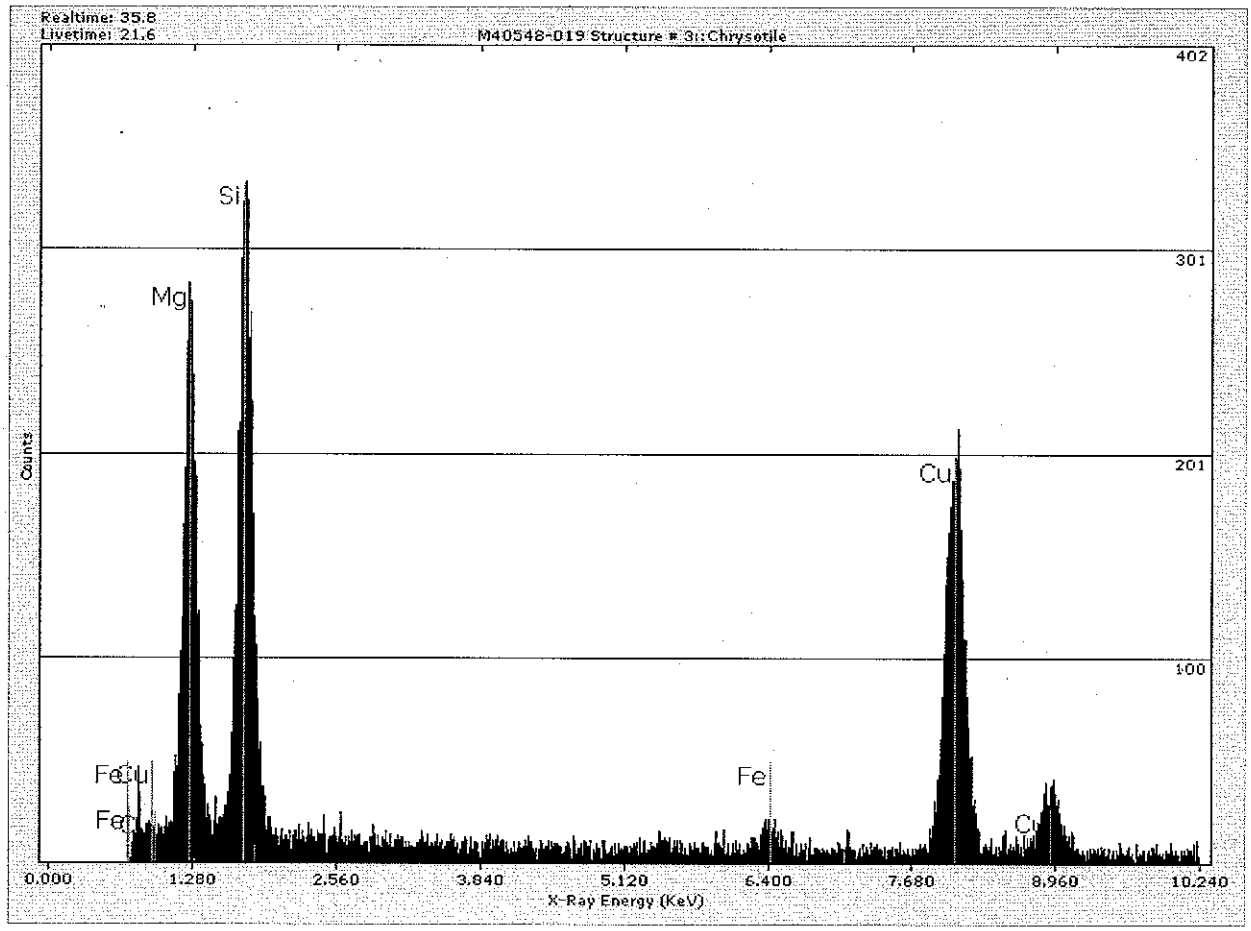
24

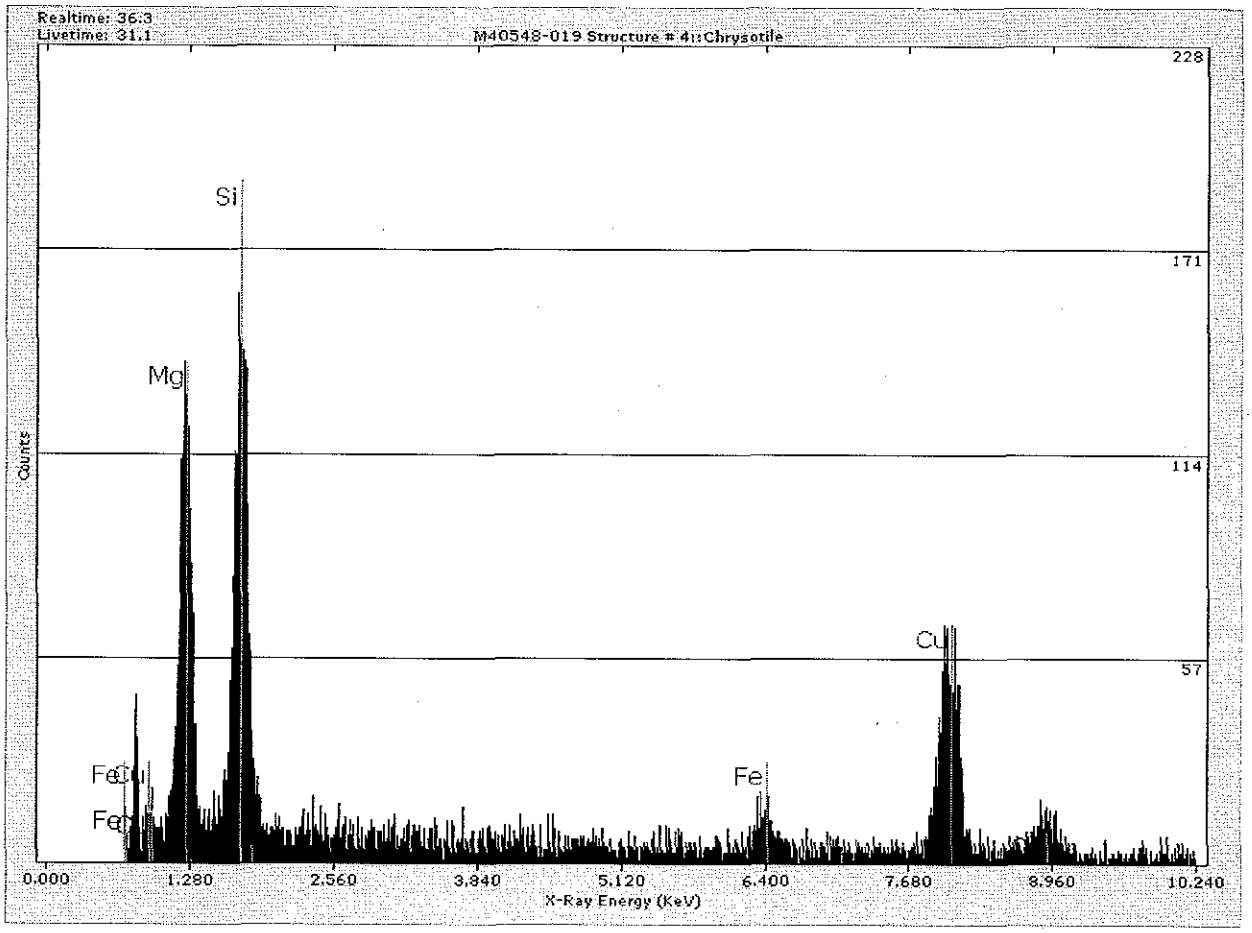
M40548 019 Sample Comments:

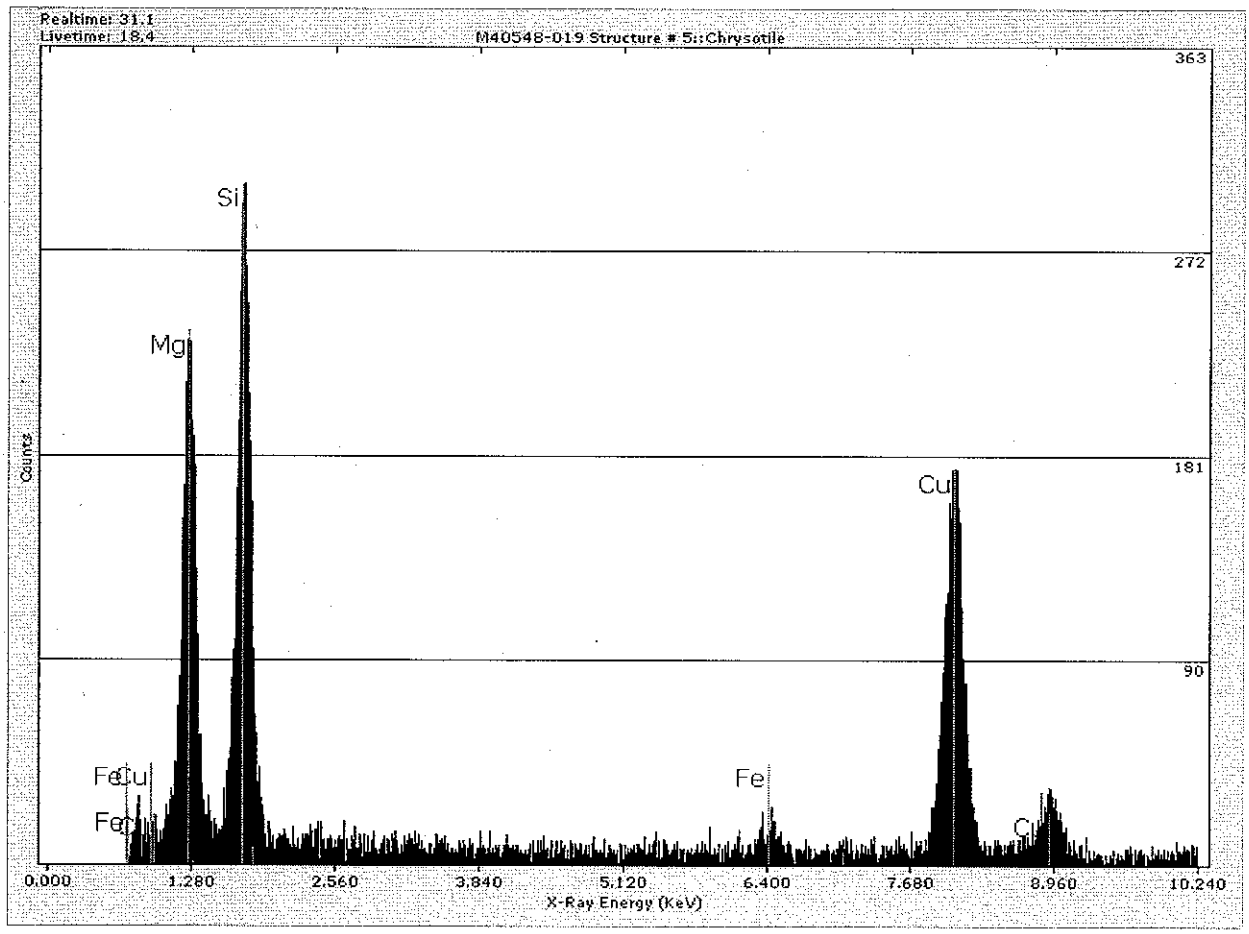
NW area during fab and file

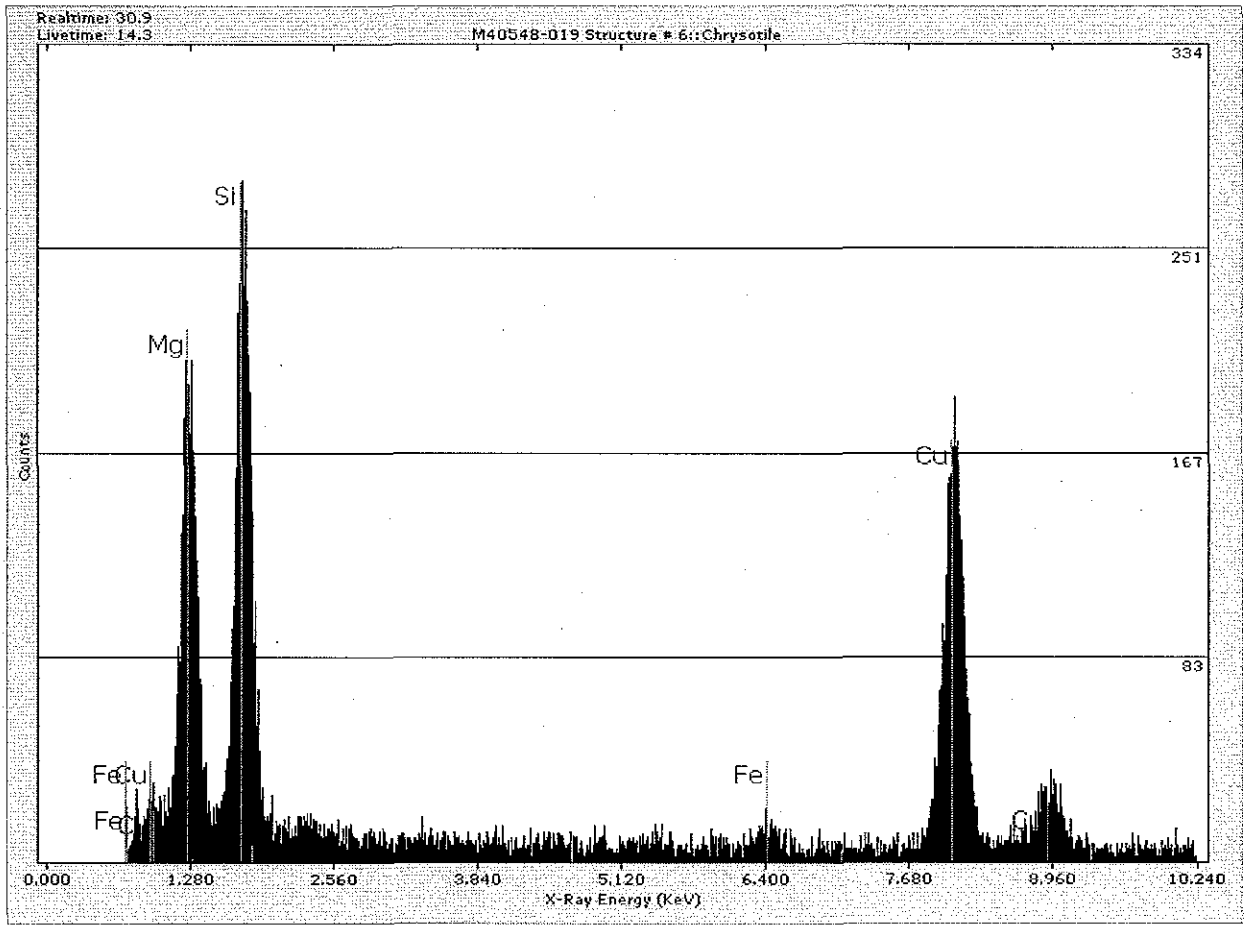

Realtime: 36.9
Livetime: 21.2
M40548-019 Structure # 1::Chrysotile
409
306
204
102
Counts
Si
Mg
Cu
Cr
Cu
Cr
C
S
Cr
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

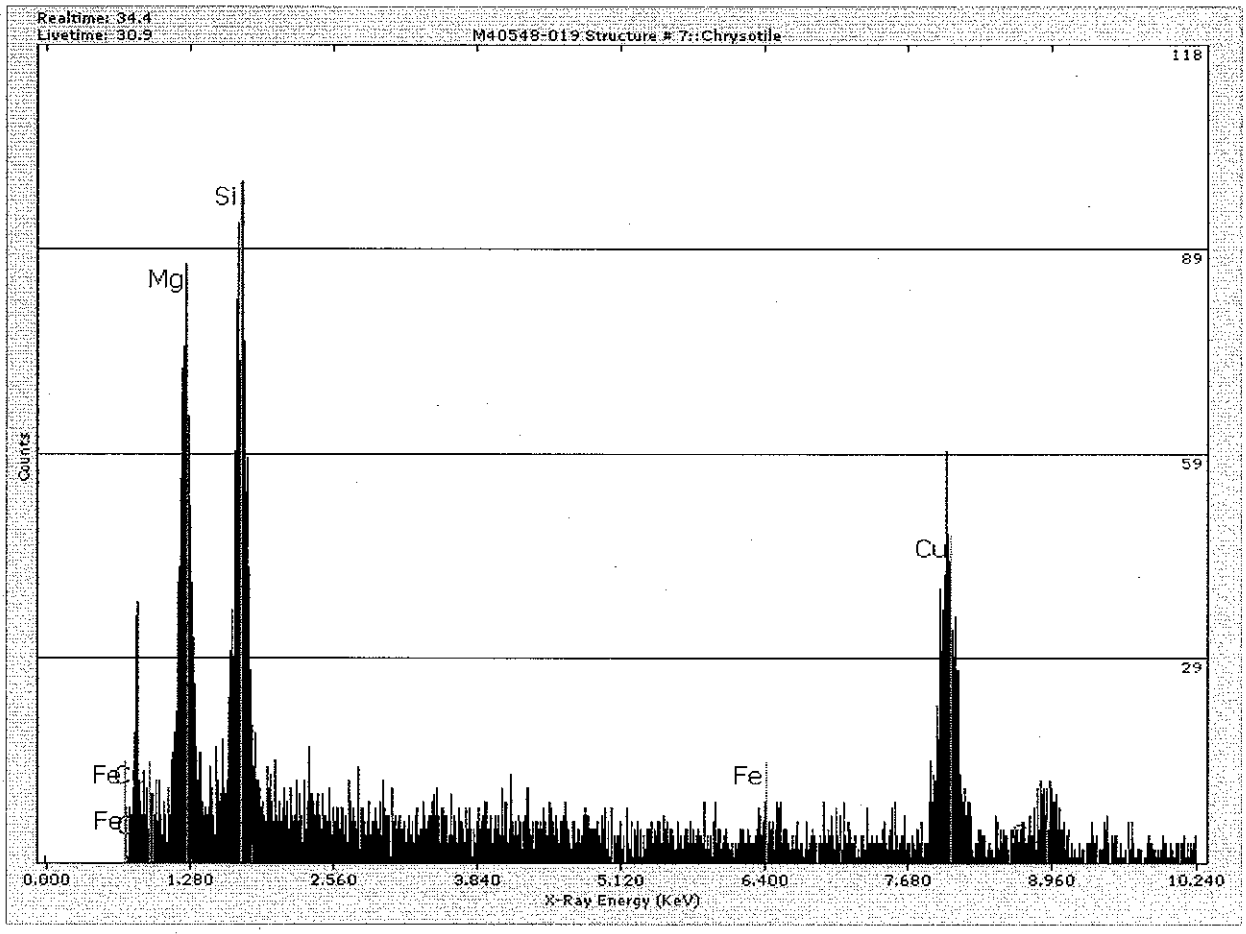

Realtime: 31.1
Livetime: 18.3
M40548-019 Structure # 2::Chrysotile
351
263
175
87
Counts
Si
Mg
Cu
Cr
Cu
Cr
Cl
S
Cr
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

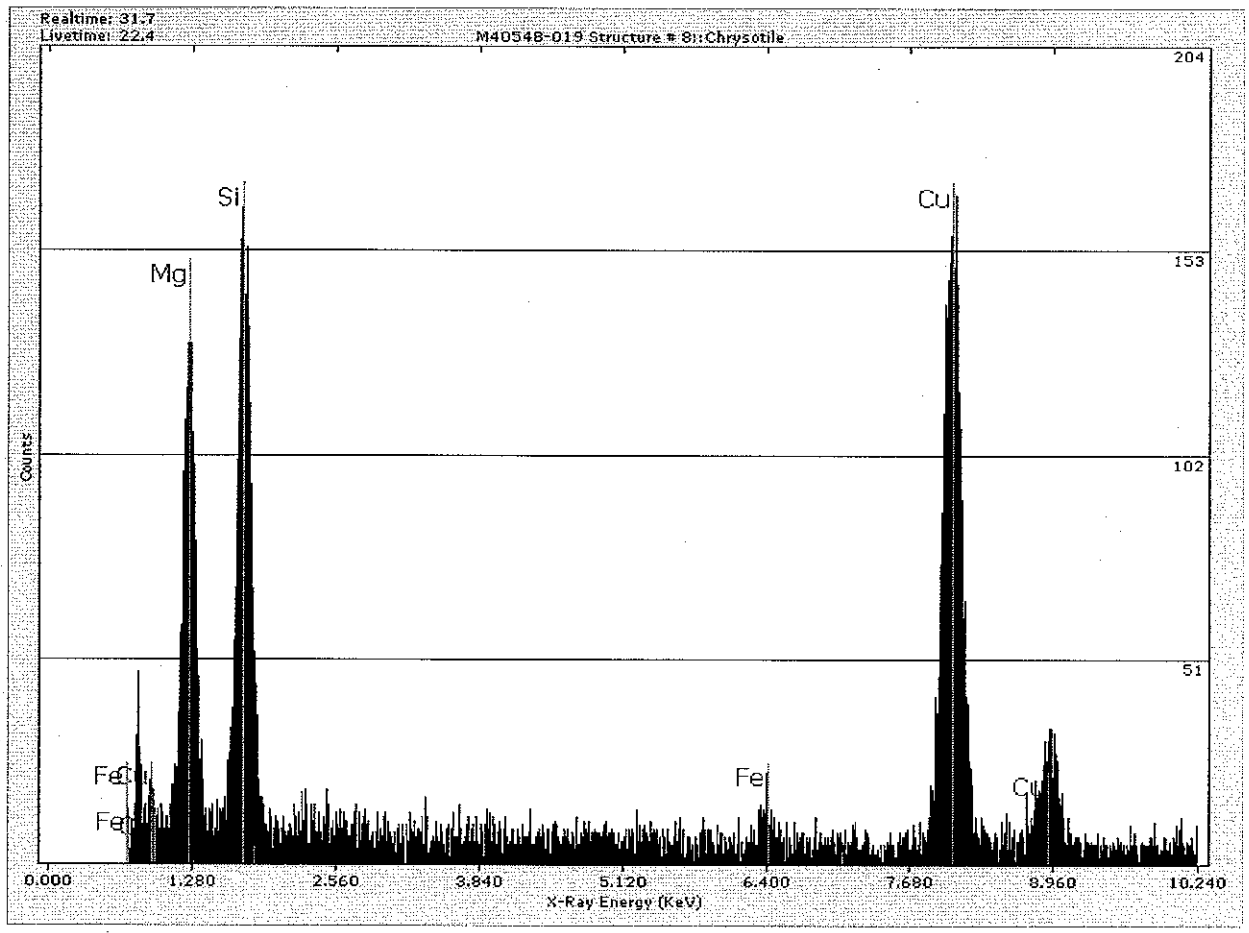

Realtime: 35.8
Livetime: 21.6
M40548-019 Structure # 3::Chrysotile
402
301
201
100
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

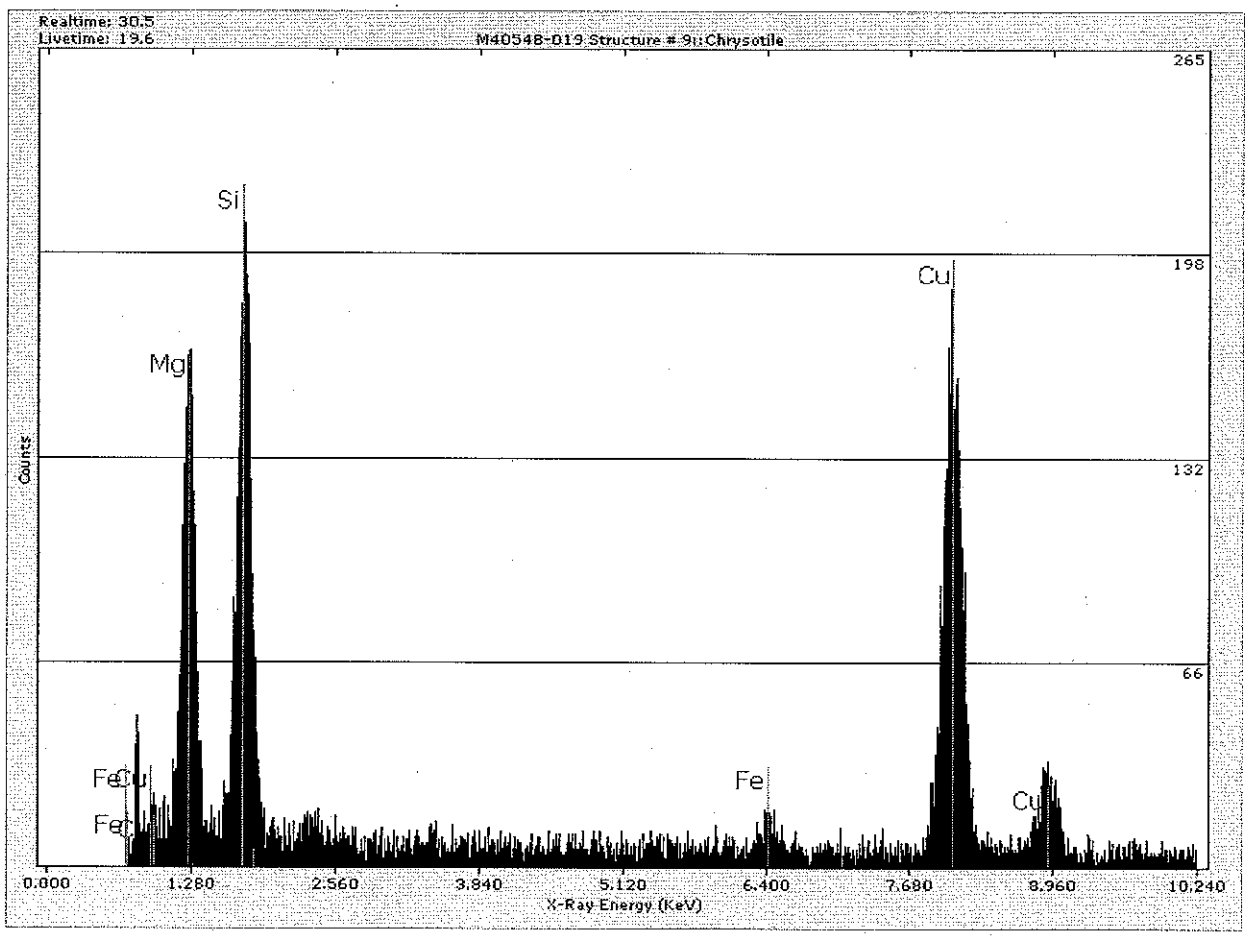

Realtime: 36.3
Livetime: 31.1
M40548-019 Structure # 4::Chrysotile
228
171
114
57
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

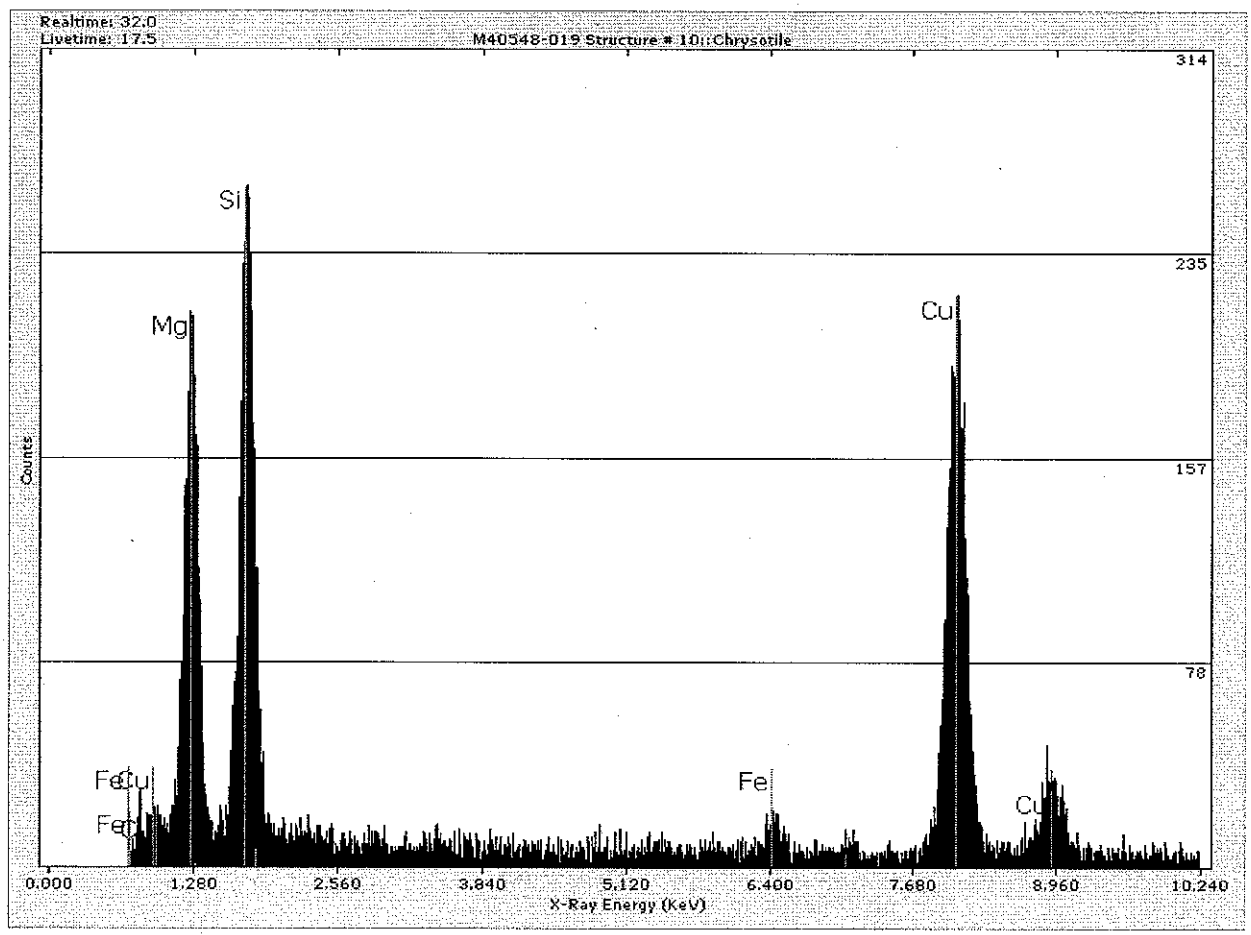

Realtime: 31.1
Livetime: 18.4
M40548-019 Structure # 5::Chrysotile
363
272
181
90
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

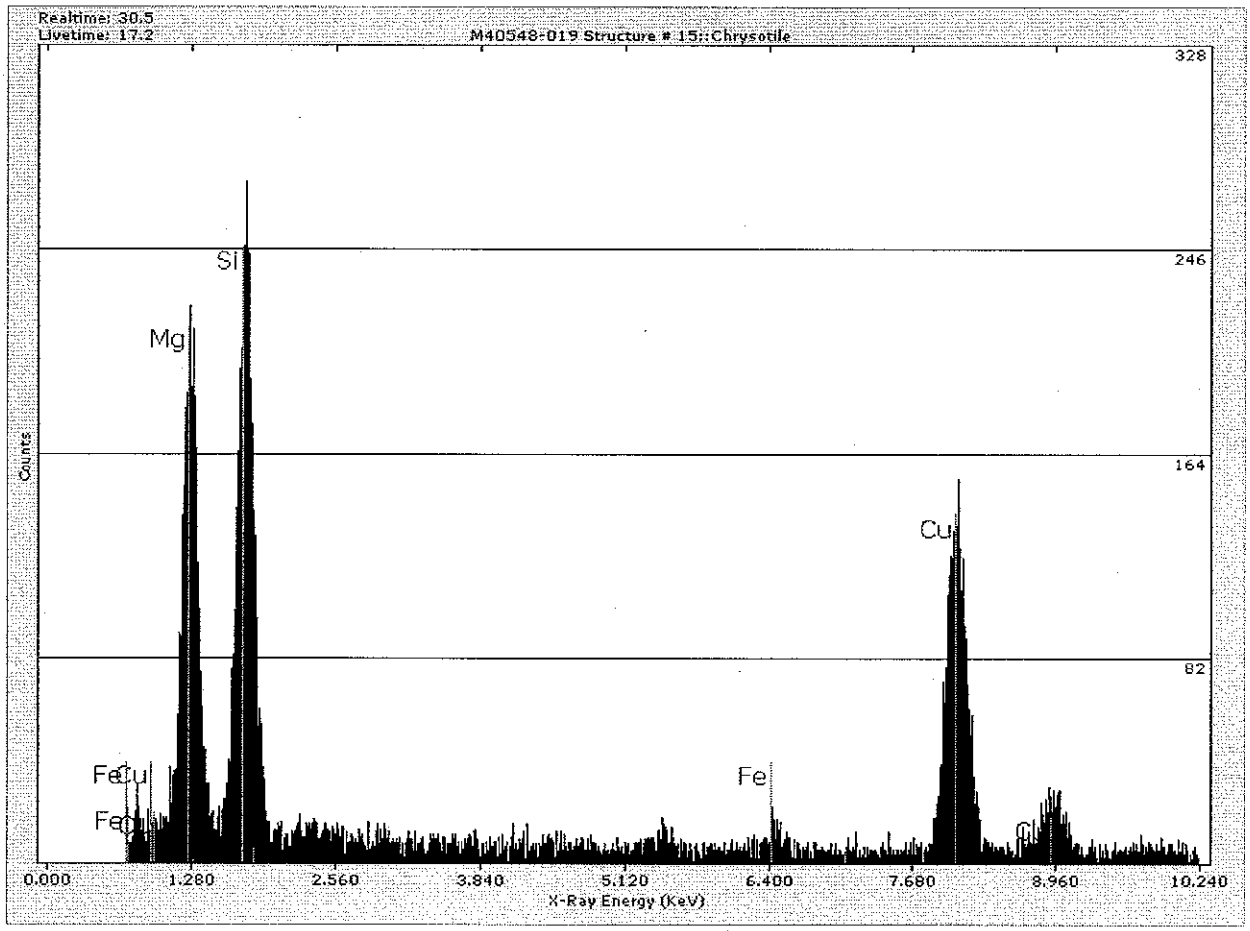

Realtime: 30.9
Livetime: 14.3
M40548-019 Structure # 6::Chrysotile
334
251
167
83
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 34.4
Livetime: 30.9
M40548-019 Structure # 7::Chrysotile
118
89
59
29
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

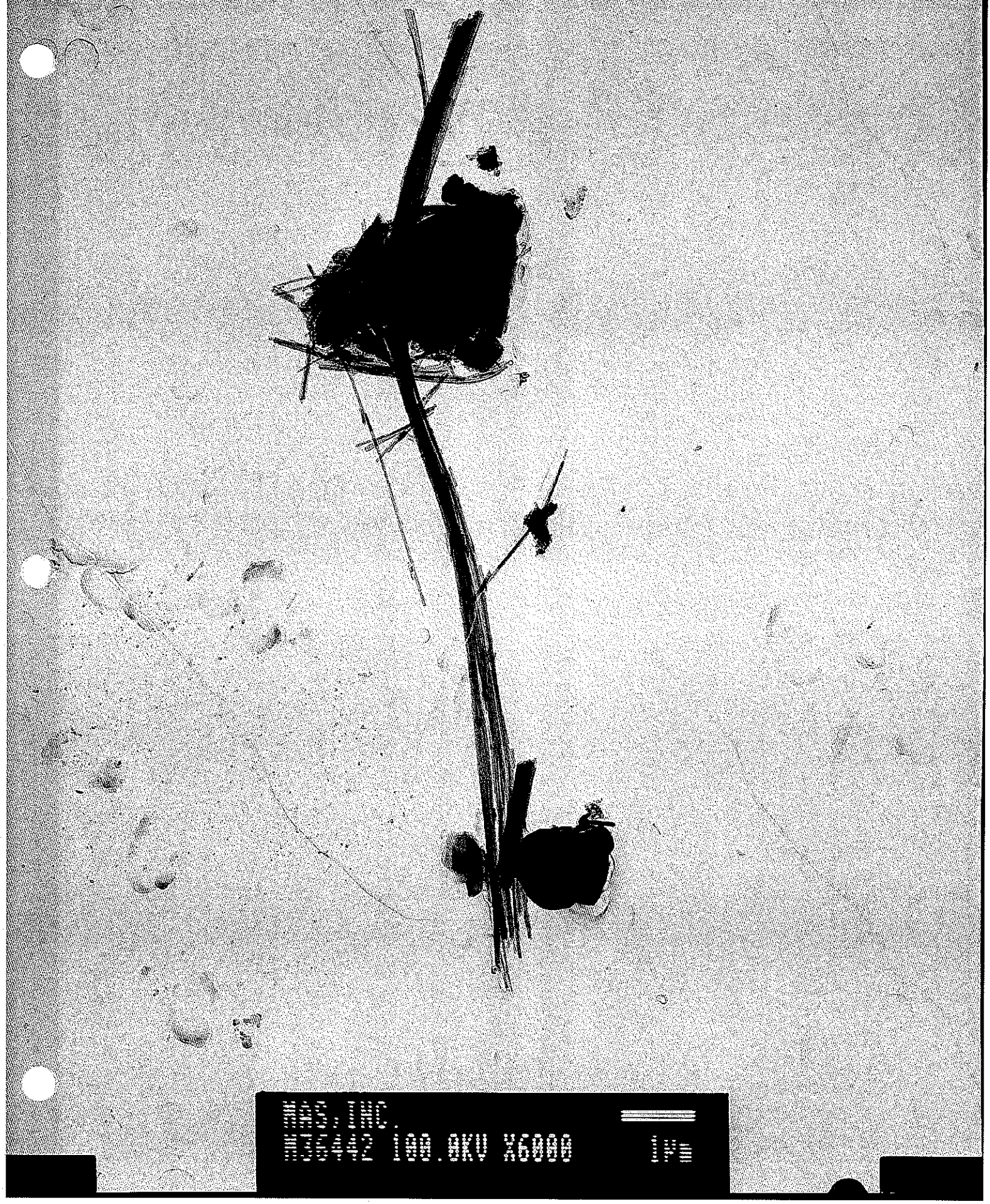

Realtime: 31.7
Livetime: 22.4
M4054B-019 Structure # 8::Chrysotile
204
153
102
51
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.5
Livetime: 19.6
M4054B-D19 Structure # 9:Chrysotile
265
198
132
66
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

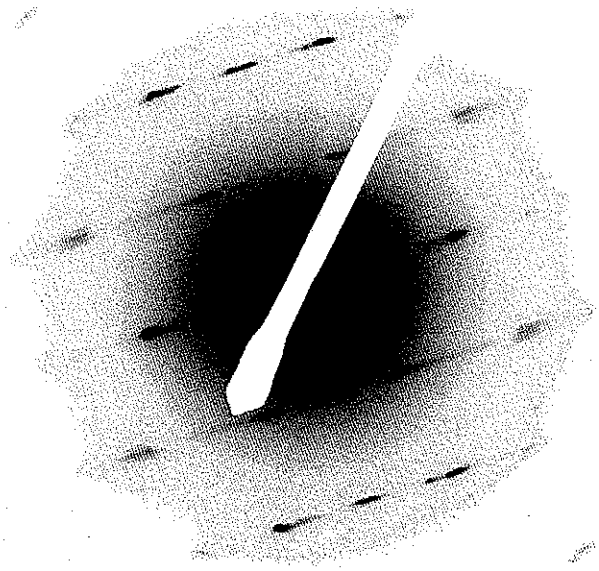

Realtime: 32.0
Livetime: 17.5
M40548-019 Structure # 10.: Chrysotile
314
235
157
78
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.5
Livetime: 17.2
M40548-019 Structure # 15: Chrysotile
328
246
164
82
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

M40548-019, Chrysotile, Structure #015



M40548-019, Chrysotile Diffraction, Str. #015



MAS, INC.
M36441 100.0KV 80.0CM

VERIFICATION OF CHRYSOTILE DIFFRACTION PATTERNS

1) Measure three spots and/or the interrow spacing on the diffraction pattern (in mm).

2) Use the formula:

$$\frac{\text{CAMERA CONSTANT (mmA)}}{\text{MEASURED DISTANCE (mm)}} = \text{SPACING (in Angstroms, A)}$$

3) The calculated spacings should be within +/- 5% tolerance of the d-spacings listed in the chart.

4) The following chart shows the chrysotile d-spacing values from the Mineral Powder Diffraction File Data Book from file card #31-808 on page 228.

hkl	d Spacing (in A)	Range +/- 5%
002	7.31	6.94 - 7.68
004	3.65	3.47 - 3.83
202	2.45	2.33 - 2.57
200	2.65	2.52 - 2.78
110	4.59	4.36 - 4.82
330	1.53	1.45 - 1.61
Interrow	5.31	5.04 - 5.58

28.8mmK / 5.5mm = 5.24Å ✓

↳ 5.5mm

Reflection Spot 004 — (camera K) 28.8 mmA / (measured distance) 7.75 mm = 3.72 A (calculated spacing) ✓

Reflection Spot 110 — (camera K) 28.8 mmA / (measured distance) 6.25 mm = 4.61 A (calculated spacing) ✓

Reflection Spot 202 — (camera K) 28.8 mmA / (measured distance) 12.0 mm = 2.40 A (calculated spacing) ✓

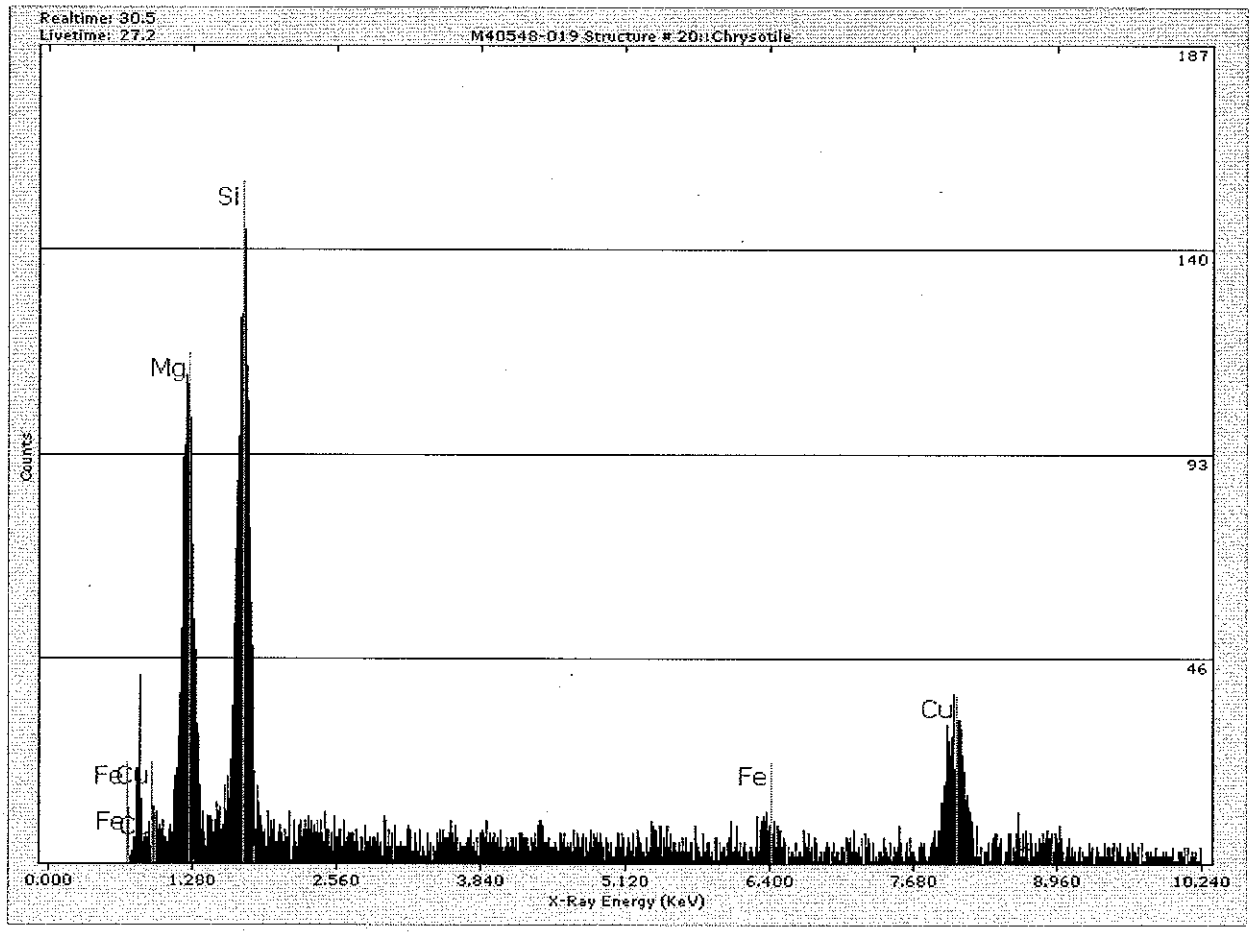
MAS Job #: M40548-019 Film #: M 36441

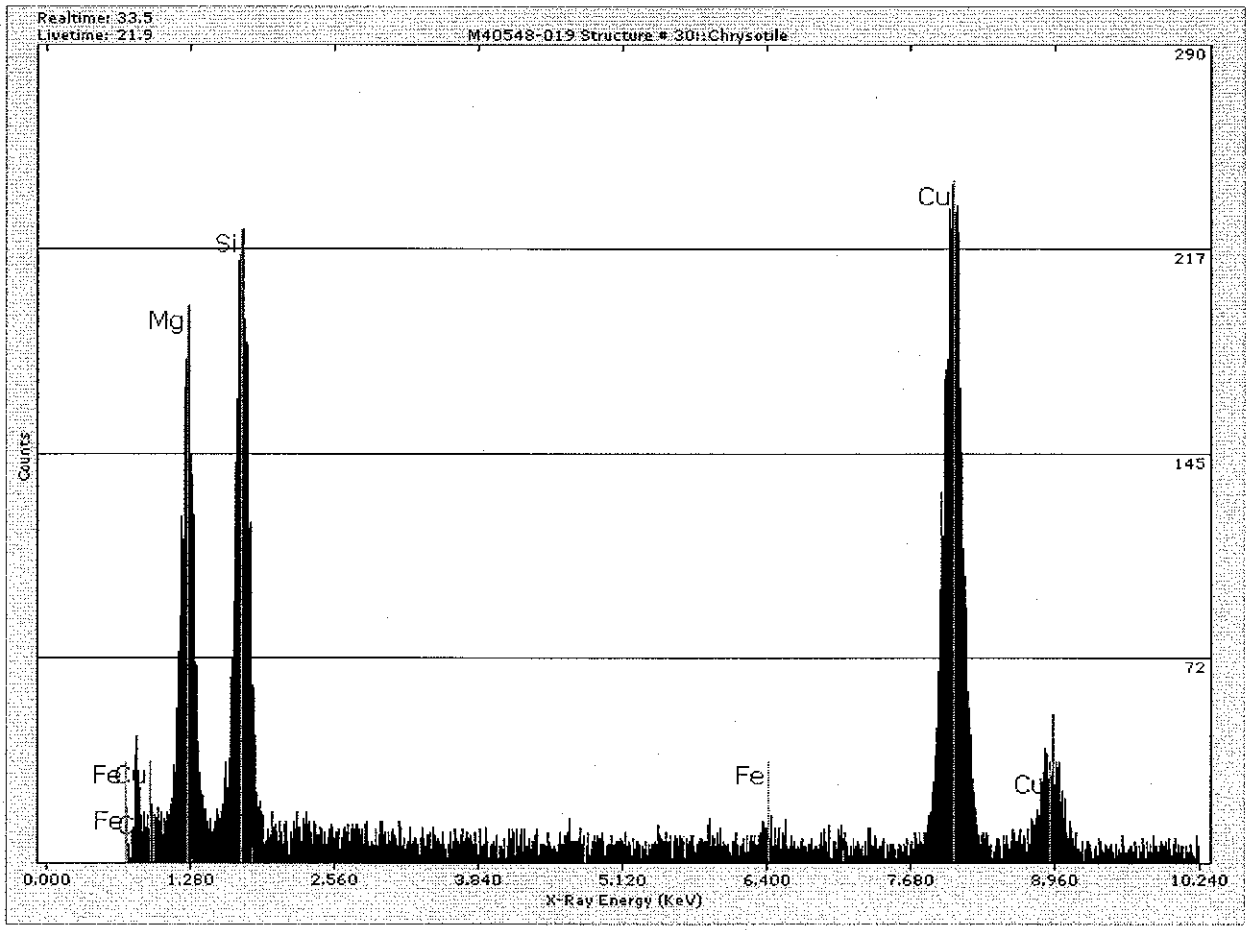
Analyst: KS / KJ Date Photo was taken: 11/15/06

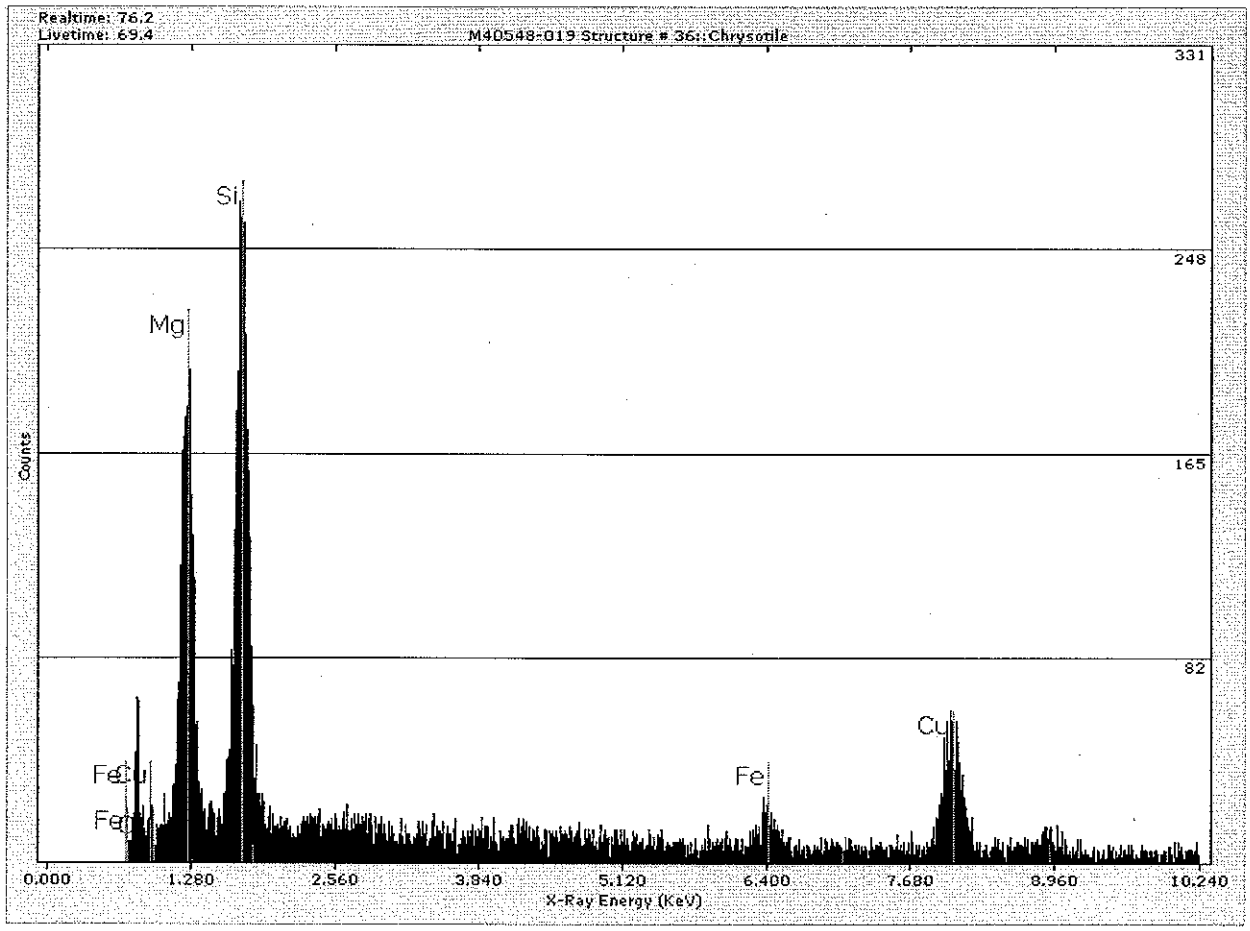
Date Verified: 11/16/06 EDS Verified: (YES) NO

Unable to verify pattern _____ Explanation: _____

STR #15

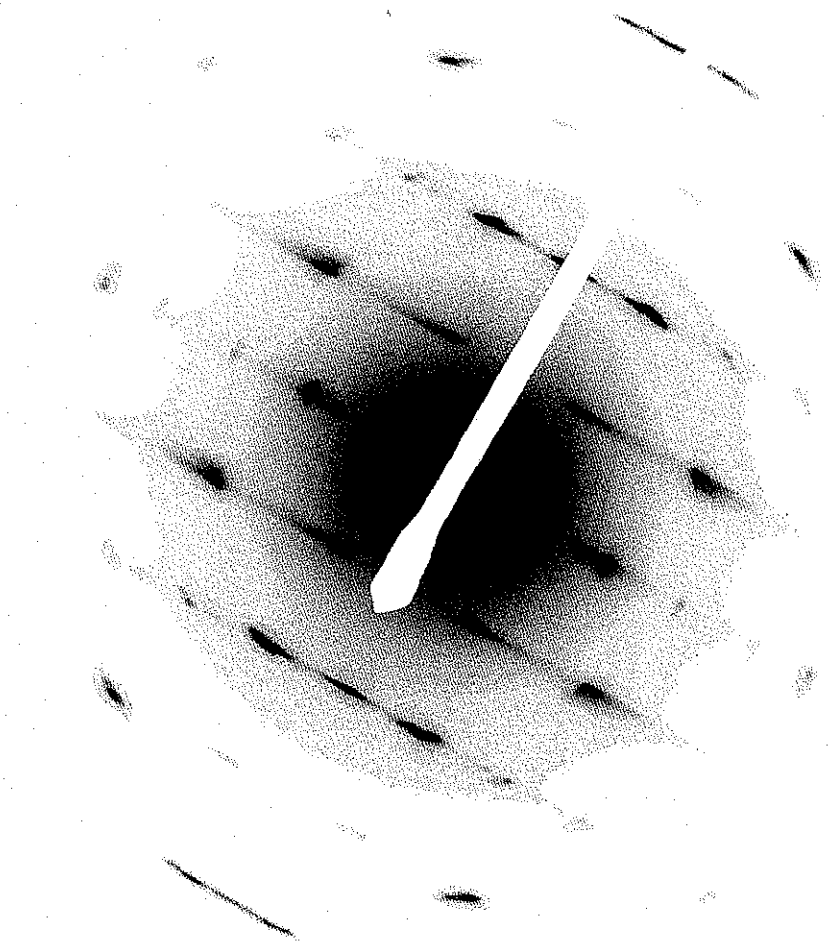

Realtime: 30.5
Livetime: 27.2
M40548-019 Structure # 20:: Chrysotile
187
140
93
46
Counts
Si
Mg
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 33.5
Livetime: 21.9
M40548-019 Structure # 30::Chrysotile
290
217
145
72
Counts
Cu
Si
Mg
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 76.2
Livetime: 69.4
M40548-019 Structure # 36:: Chrysotile
331
248
165
82
Counts
Si
Mg
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

M40548-019, Chrysotile, Structure #036

M40548-019, Chrysotile Diffraction, Str. #036



MAS, INC.
M40548 100.0KV 80.0CM

VERIFICATION OF CHRYSOTILE DIFFRACTION PATTERNS

1) Measure three spots and/or the interrow spacing on the diffraction pattern (in mm).

2) Use the formula:

$$\frac{\text{CAMERA CONSTANT (mmA)}}{\text{MEASURED DISTANCE (mm)}} = \text{SPACING (in Angstroms, A)}$$

3) The calculated spacings should be within +/- 5% tolerance of the d-spacings listed in the chart.

4) The following chart shows the chrysotile d-spacing values from the Mineral Powder Diffraction File Data Book from file card #31-808 on page 228.

hkl	d Spacing (in A)	Range +/- 5%
002	7.31	6.94 - 7.68
004	3.65	3.47 - 3.83
202	2.45	2.33 - 2.57
200	2.65	2.52 - 2.78
110	4.59	4.36 - 4.82
330	1.53	1.45 - 1.61
Interrow	5.31	5.04 - 5.58

$\frac{28.8\text{mmA}}{5.5\text{mm}} = 5.24\text{A}$ ✓

↳ 5.5mm

Reflection Spot 004 ✓

(camera K) 28.8 mmA / (measured distance) ~~7.75~~ mm = 3.72 A (calculated spacing) ✓

Reflection Spot 110 ✓

(camera K) 28.8 mmA / (measured distance) 6.25 mm = 4.61 A (calculated spacing) ✓

Reflection Spot 202 ✓

(camera K) 28.8 mmA / (measured distance) 12.0 mm = 2.40 A (calculated spacing) ✓

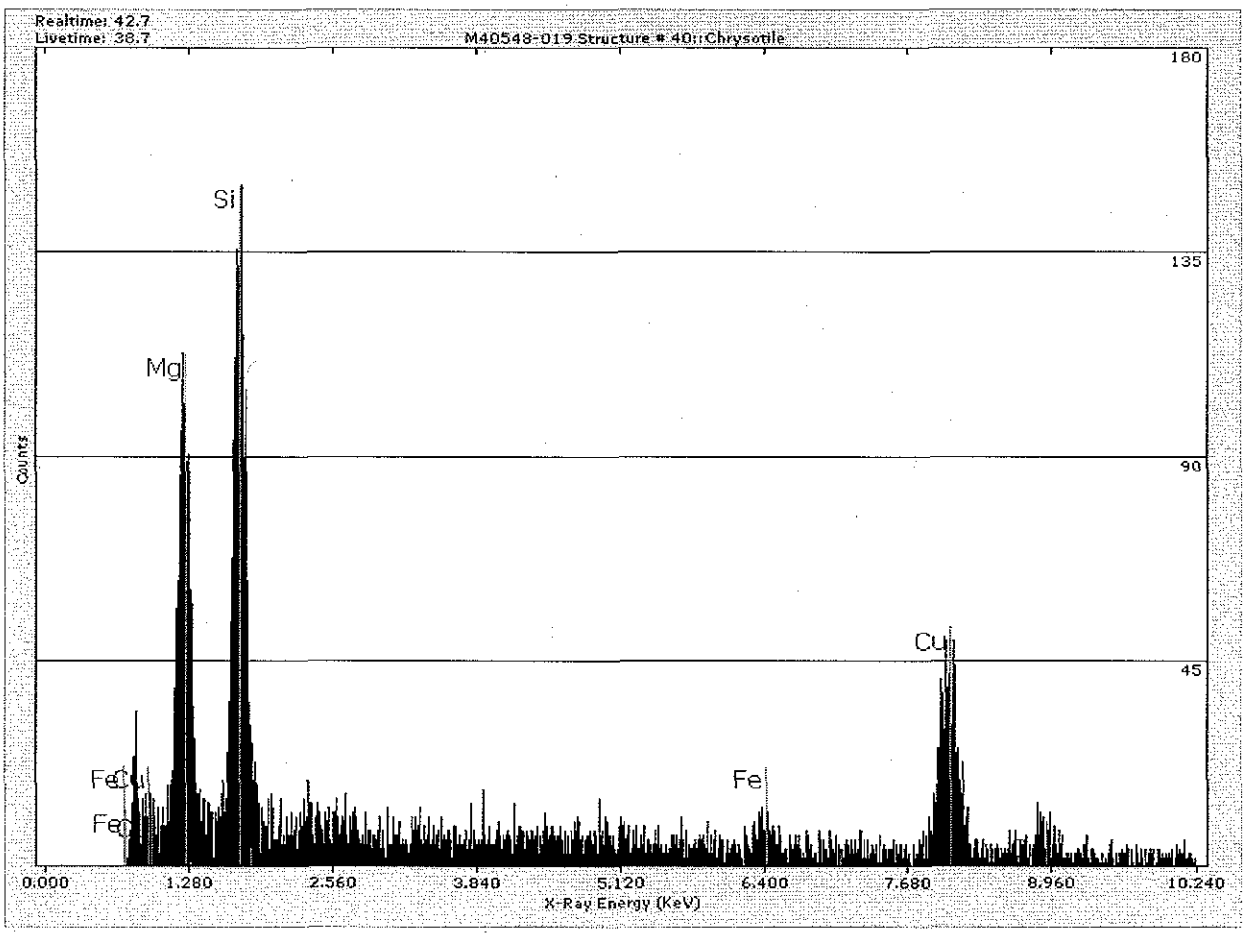
MAS Job #: M40548-019 Film #: M 36443

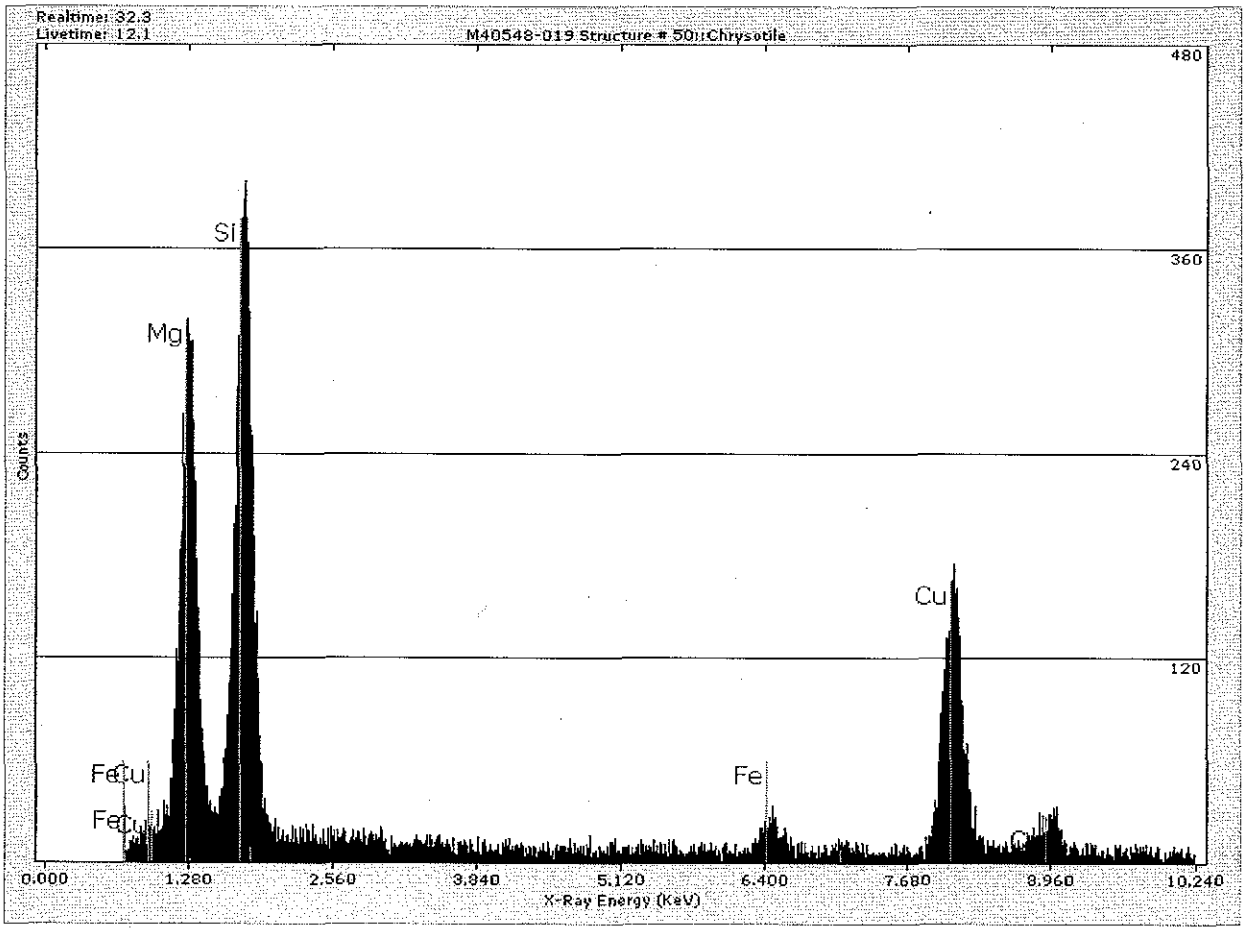
Analyst: KS / KS Date Photo was taken: 11/15/06

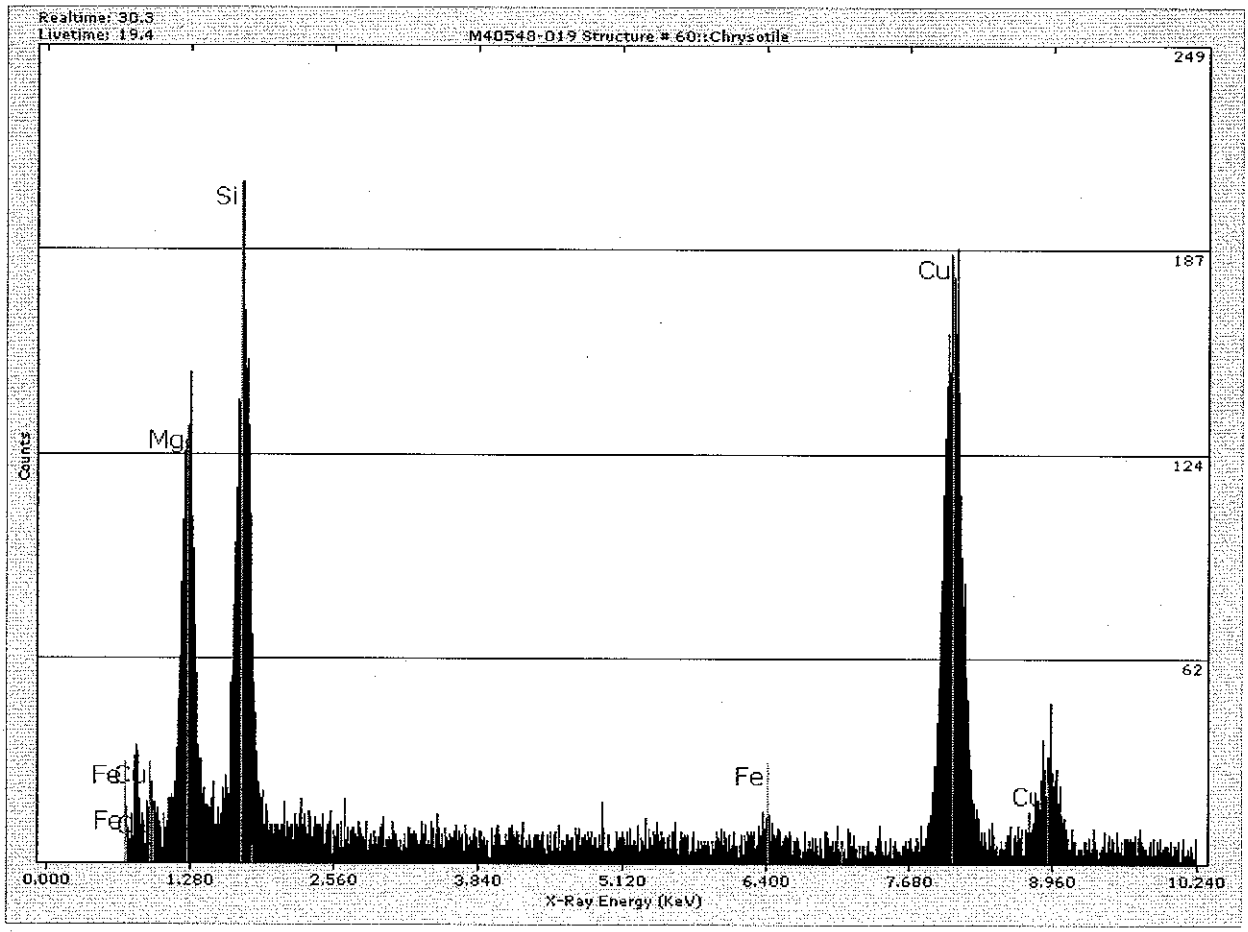
Date Verified: 11/16/06 EDS Verified: (YES) NO

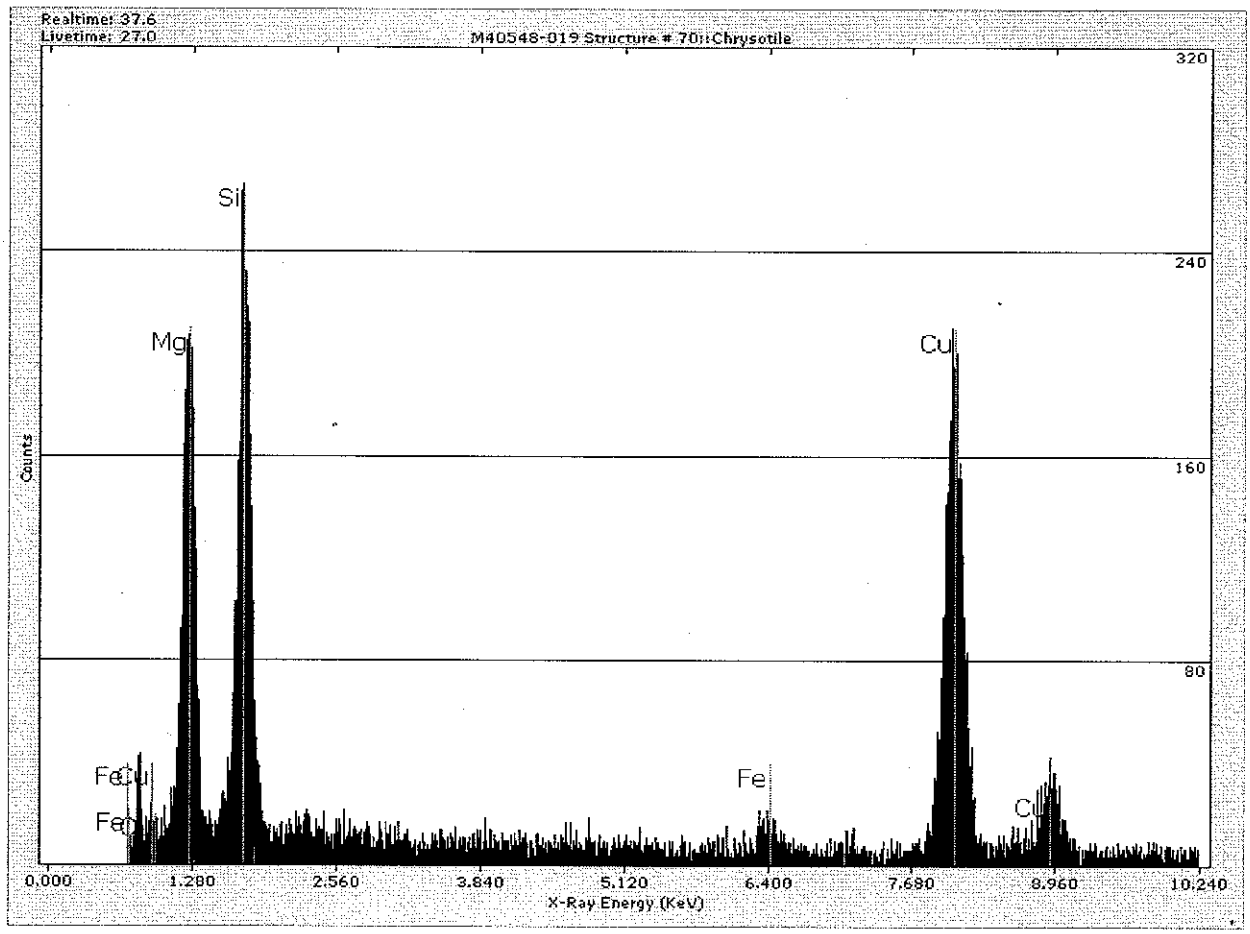
Unable to verify pattern _____ Explanation: _____

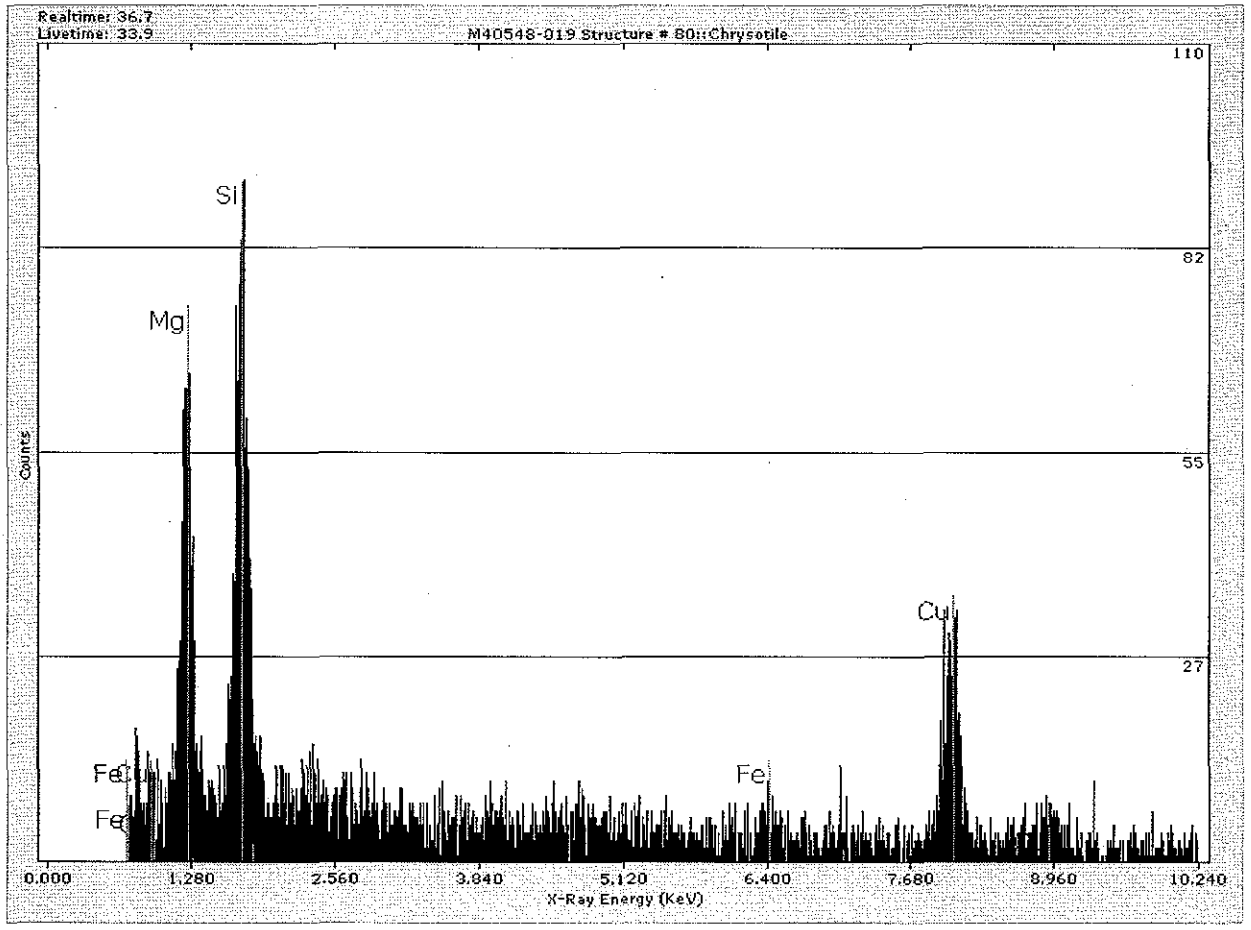
STR #36

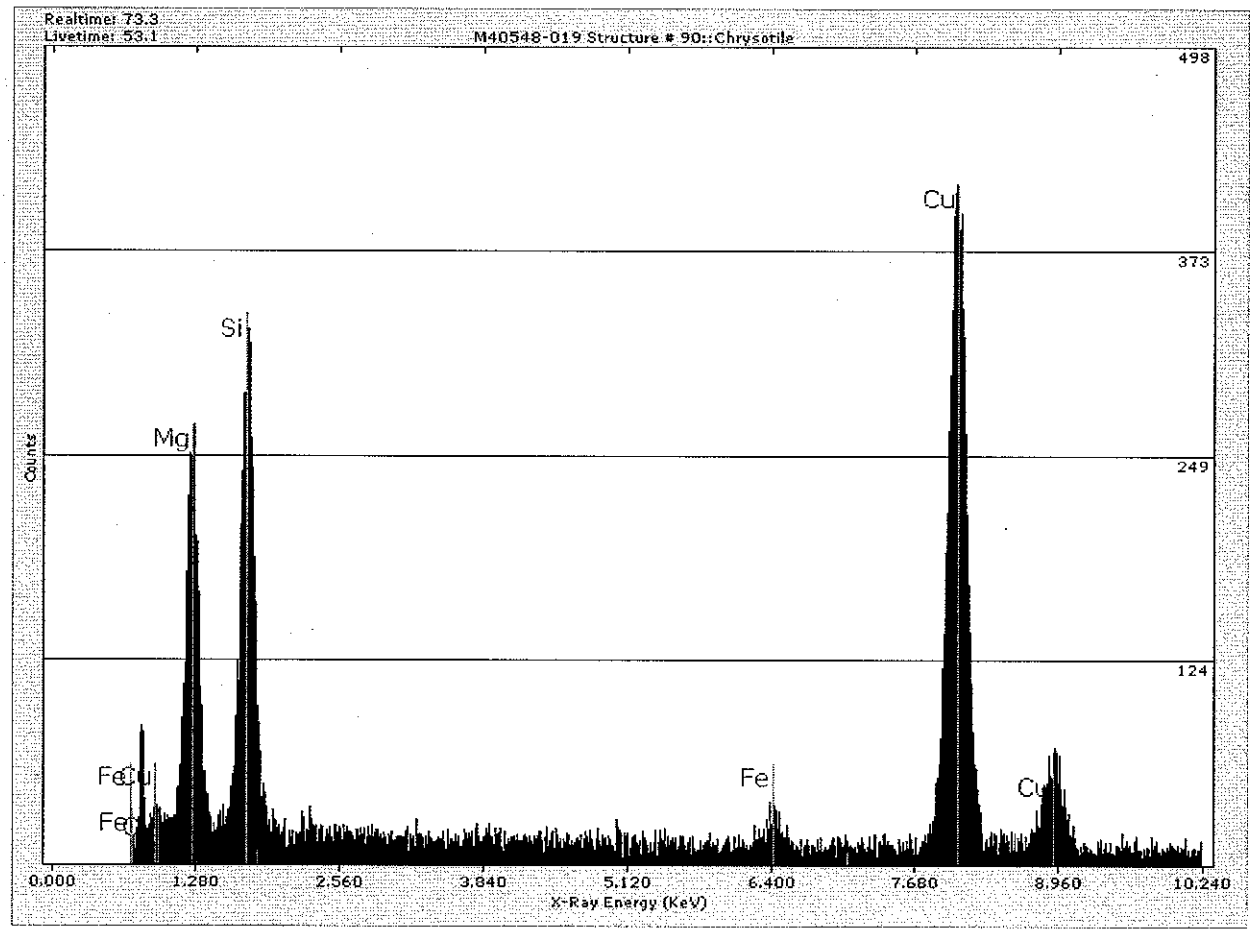

Realtime: 42.7
Livetime: 38.7
M40548-019 Structure # 40: Chrysotile
180
135
90
45
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

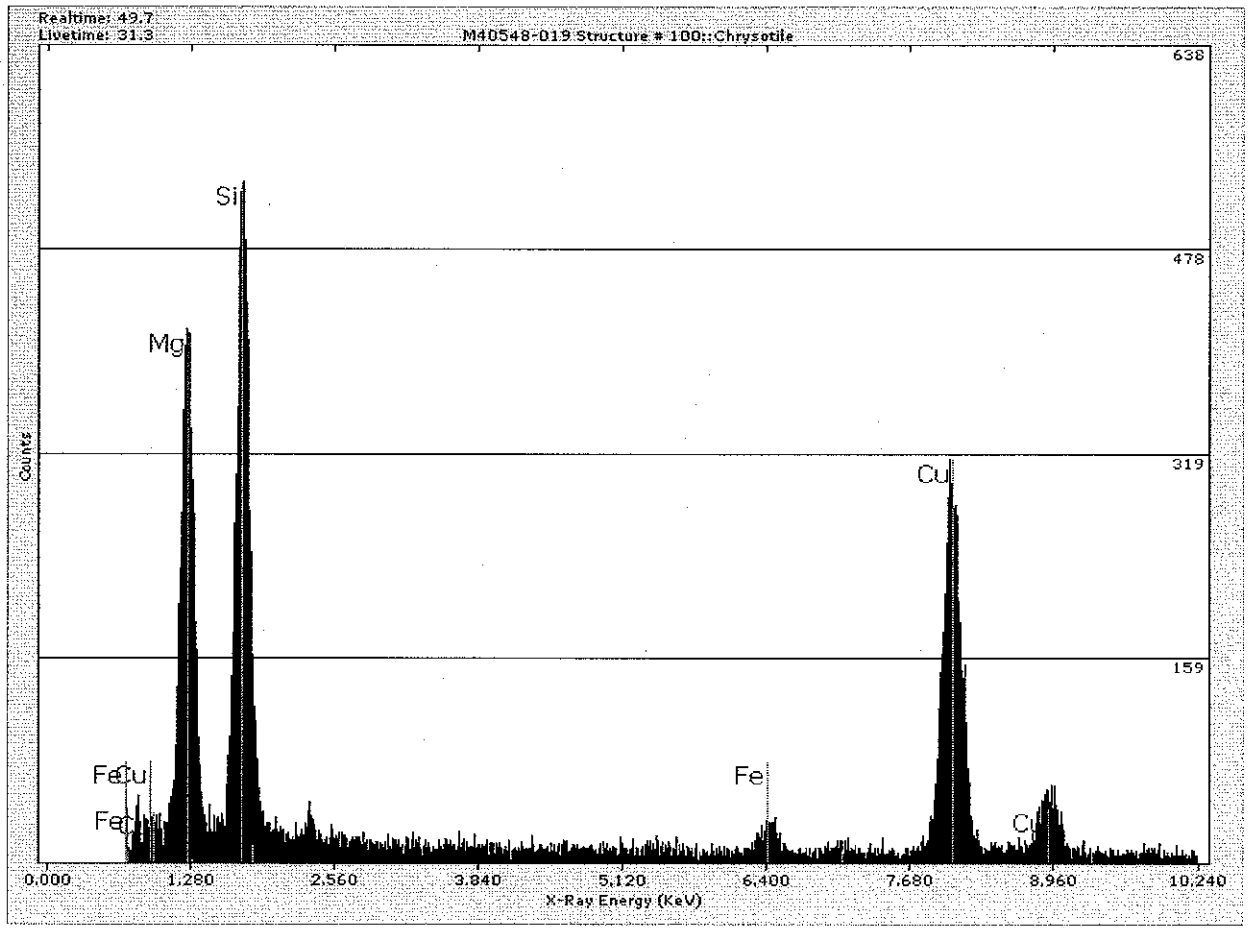

Realtime: 32.3
Livetime: 12.1
M40548-019 Structure # 50::Chrysotile
480
360
240
120
Counts
Si
Mg
Cu
Fe
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.3
Livetime: 19.4
M40548-019 Structure # 60::Chrysotile
249
187
124
62
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 37.6
Livetime: 27.0
M40548-019 Structure # 70: Chrysotile
320
240
160
80
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 36.7
Livetime: 33.9
M40548-019 Structure # 80::Chrysotile
110
82
55
27
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 73.3
Livetime: 53.1
M40548-019 Structure # 90::Chrysotile
498
373
249
124
Counts
Cu
Si
Mg
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 49.7
Livetime: 31.3
M40548-019 Structure # 100::Chrysotile
638
478
319
159
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-020

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	P-2-A

7402 ANALYSIS

Sample Area/ Volume:	46.8	Liters	Date Analyzed:	11/16/2006	
Filter Type:	MCE 25mm		Analyst:	Mehrdad Motamedi	
Pore size:	0.8		Scope Number:	4	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	0	KX
Analysis type:	7402		Screen Mag:	0	KX
Grid Acceptance	YES	8 %	Grid_box:	7179	

Number of grids:	2	#1:	101	#3:	103	Asbestos	102
Number of openings:	34	#2:	102	#4:	100	Non-asbestos	0

Average Grid Size: 0.010301 Total Area Analyzed: 0.350

% Asbestos 100

Str#:	SquareID:	Fiber Type:		Size		Morph:	SAED:	EDS:
1	B1-H1		Chrysotile	5.8	0.3	Chrysotile	Chrysotile	☑
2			Chrysotile	8	0.6	Chrysotile	Chrysotile	☑
3			Chrysotile	5.5	0.8	Chrysotile	Chrysotile	☑
4	H2		Chrysotile	41	3	Chrysotile	Chrysotile	☑
5			Chrysotile	8	0.8	Chrysotile	Chrysotile	☑
6			Chrysotile	5.6	0.8	Chrysotile	Chrysotile	☑
7			Chrysotile	24	0.5	Chrysotile	Chrysotile	☑
8			Chrysotile	9	0.3	Chrysotile	Chrysotile	☑
NSD	H3							▩
9	H4		Chrysotile	8	0.4	Chrysotile	Chrysotile	☑
10			Chrysotile	38	8	Chrysotile	Chrysotile	☑
11			Chrysotile	12	0.5	Chrysotile		▩
12	H5		Chrysotile	8.5	0.9	Chrysotile		▩
13			Chrysotile	7	0.8	Chrysotile		▩
14	H6		Chrysotile	12	1	Chrysotile		▩
15			Chrysotile	6.5	0.3	Chrysotile		▩
16			Chrysotile	5.7	0.3	Chrysotile		▩
17	H7		Chrysotile	8	0.9	Chrysotile		☐
18			Chrysotile	7	8	Chrysotile		▩
19			Chrysotile	8.5	0.3	Chrysotile		▩
20			Chrysotile	12	0.5	Chrysotile	Chrysotile	☑
21	H8		Chrysotile	36	3	Chrysotile		▩
22			Chrysotile	8	2	Chrysotile		▩
23	G9		Chrysotile	6.6	0.8	Chrysotile		▩
24			Chrysotile	14	3	Chrysotile		▩
25			Chrysotile	15	0.7	Chrysotile		▩
26			Chrysotile	14	0.5	Chrysotile		▩
27	G8		Chrysotile	7.5	0.9	Chrysotile		▩

28			Chrysotile	5.5	0.8	Chrysotile		☐
29	G7		Chrysotile	12	2	Chrysotile		☐
30			Chrysotile	6	0.6	Chrysotile	Chrysotile	☑
31			Chrysotile	20	0.4	Chrysotile		☐
32	G6		Chrysotile	8	0.3	Chrysotile		☐
33			Chrysotile	7.7	0.3	Chrysotile		☐
34			Chrysotile	8	2	Chrysotile		☐
35	G5		Chrysotile	5.5	0.6	Chrysotile		☐
36			Chrysotile	20	4	Chrysotile		☐
37	G4		Chrysotile	8	1	Chrysotile		☐
38			Chrysotile	9	0.3	Chrysotile		☐
39			Chrysotile	8	0.8	Chrysotile		☐
40	G3		Chrysotile	16	1	Chrysotile	Chrysotile	☑
41			Chrysotile	8.3	1.5	Chrysotile		☐
42			Chrysotile	6.5	0.6	Chrysotile		☐
43			Chrysotile	11	0.3	Chrysotile		☐
44			Chrysotile	8	0.8	Chrysotile		☐
45	G2		Chrysotile	14	3	Chrysotile		☐
46			Chrysotile	7.5	0.6	Chrysotile		☐
47			Chrysotile	8	0.3	Chrysotile		☐
48			Chrysotile	20	4	Chrysotile		☐
49	G1		Chrysotile	6	0.5	Chrysotile		☐
50			Chrysotile	13	0.8	Chrysotile	Chrysotile	☑
51			Chrysotile	9.5	0.6	Chrysotile		☐
52			Chrysotile	12	1.7	Chrysotile		☐
53	F1		Chrysotile	14	0.8	Chrysotile		☐
54			Chrysotile	18	0.8	Chrysotile		☐
55			Chrysotile	6	0.5	Chrysotile		☐
56	F2		Chrysotile	32	3	Chrysotile		☐
57			Chrysotile	5.5	1	Chrysotile		☐
58			Chrysotile	8	0.4	Chrysotile		☐
59			Chrysotile	8	2	Chrysotile		☐
60	F3		Chrysotile	22	2	Chrysotile	Chrysotile	☑
61			Chrysotile	50	5	Chrysotile		☐
62			Chrysotile	9	1	Chrysotile		☐
63			Chrysotile	13	0.6	Chrysotile		☐
64	B2-D1		Chrysotile	7	0.5	Chrysotile		☐
65			Chrysotile	12	2	Chrysotile		☐
66			Chrysotile	6	0.5	Chrysotile		☐
67	D2		Chrysotile	13	2	Chrysotile		☐
NSD	D3							☐
68	D4		Chrysotile	7	0.9	Chrysotile		☐
69			Chrysotile	10	0.6	Chrysotile		☐
70			Chrysotile	5.5	0.5	Chrysotile	Chrysotile	☑
71	D5		Chrysotile	8	0.6	Chrysotile		☐
72			Chrysotile	9	0.4	Chrysotile		☐
73			Chrysotile	14	0.7	Chrysotile		☐
74			Chrysotile	12	0.3	Chrysotile		☐
75			Chrysotile	17	5	Chrysotile		☐
76	D6		Chrysotile	6	0.5	Chrysotile		☐
NSD	E9							☐
77	E4		Chrysotile	14	0.7	Chrysotile		☐
78			Chrysotile	6	0.8	Chrysotile		☐
79			Chrysotile	6	0.5	Chrysotile		☐

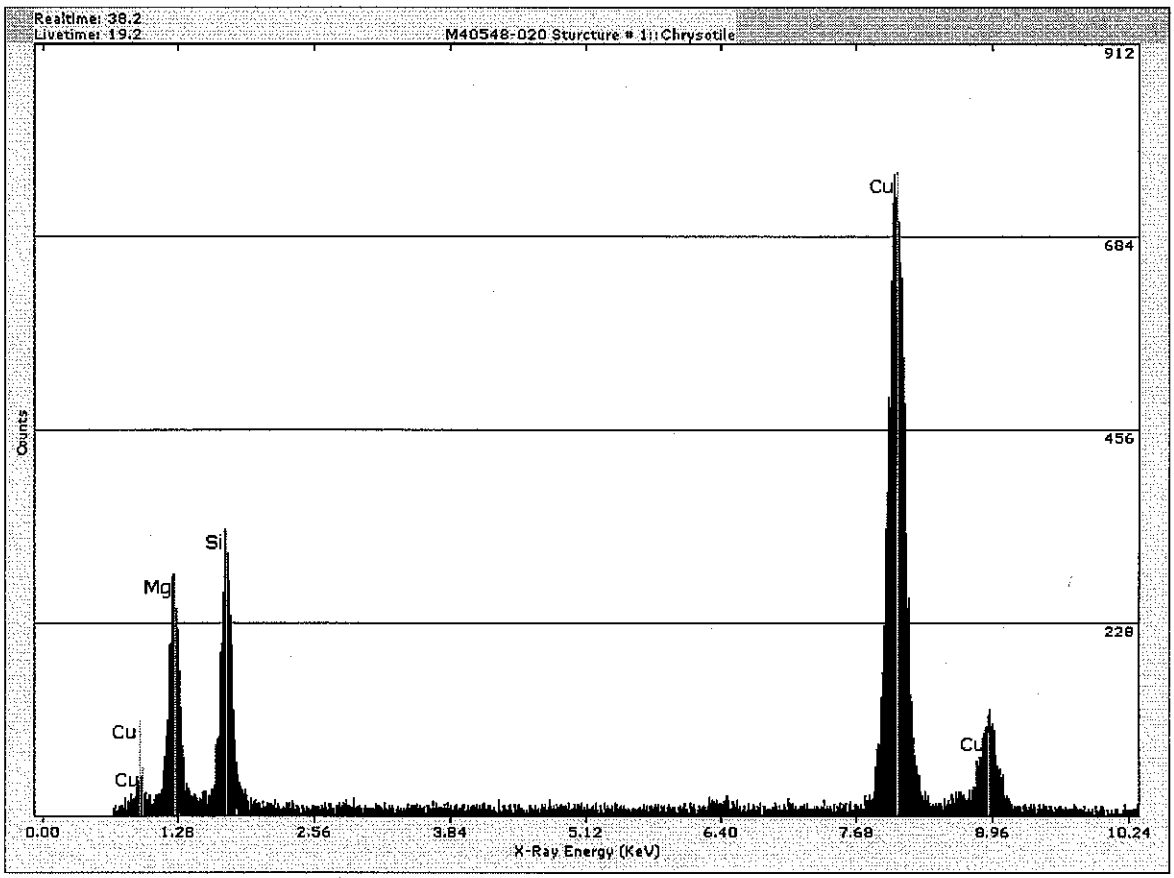
80	E3		Chrysotile	8	0.6	Chrysotile	Chrysotile	☑
81			Chrysotile	11	2	Chrysotile		☐
82			Chrysotile	6	0.3	Chrysotile		☐
83			Chrysotile	15	0.3	Chrysotile		☐
84			Chrysotile	12	0.4	Chrysotile		☐
85			Chrysotile	10.5	1.3	Chrysotile		☐
86	E2		Chrysotile	24	4	Chrysotile		☐
87	E1		Chrysotile	35	0.8	Chrysotile		☐
88			Chrysotile	8	1	Chrysotile		☐
89			Chrysotile	5.3	0.3	Chrysotile		☐
90			Chrysotile	5.5	0.3	Chrysotile	Chrysotile	☑
91			Chrysotile	17	5	Chrysotile		☐
92	F1		Chrysotile	7.5	0.3	Chrysotile		☐
93			Chrysotile	10	0.4	Chrysotile		☐
94			Chrysotile	22	5	Chrysotile		☐
95	F2		Chrysotile	11.5	0.3	Chrysotile		☐
96			Chrysotile	11.5	0.5	Chrysotile		☐
97	F4		Chrysotile	8	0.3	Chrysotile		☐
98			Chrysotile	7.8	1	Chrysotile		☐
99			Chrysotile	6.5	0.3	Chrysotile		☐
100			Chrysotile	32	0.4	Chrysotile	Chrysotile	☑
101			Chrysotile	21	0.5	Chrysotile		☐
102			Chrysotile	8.5	0.7	Chrysotile		☐

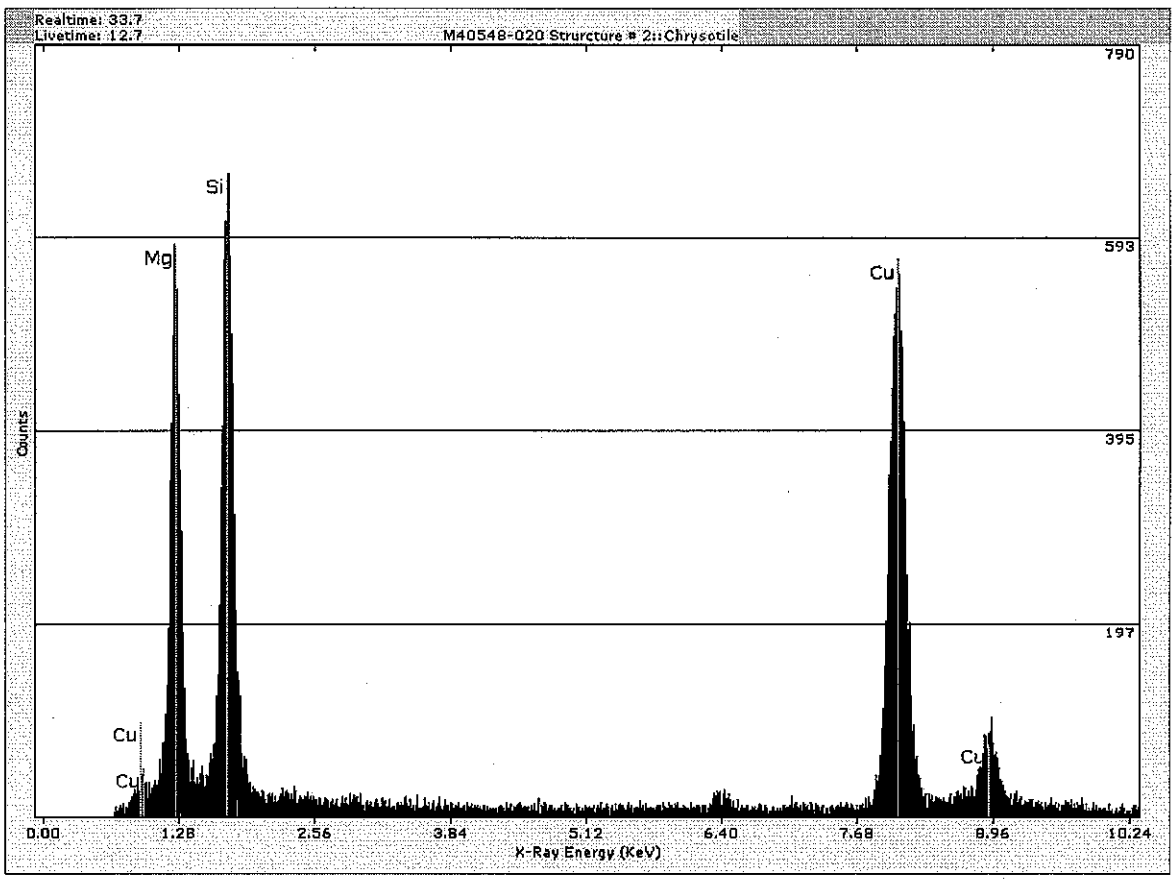
Grid Op

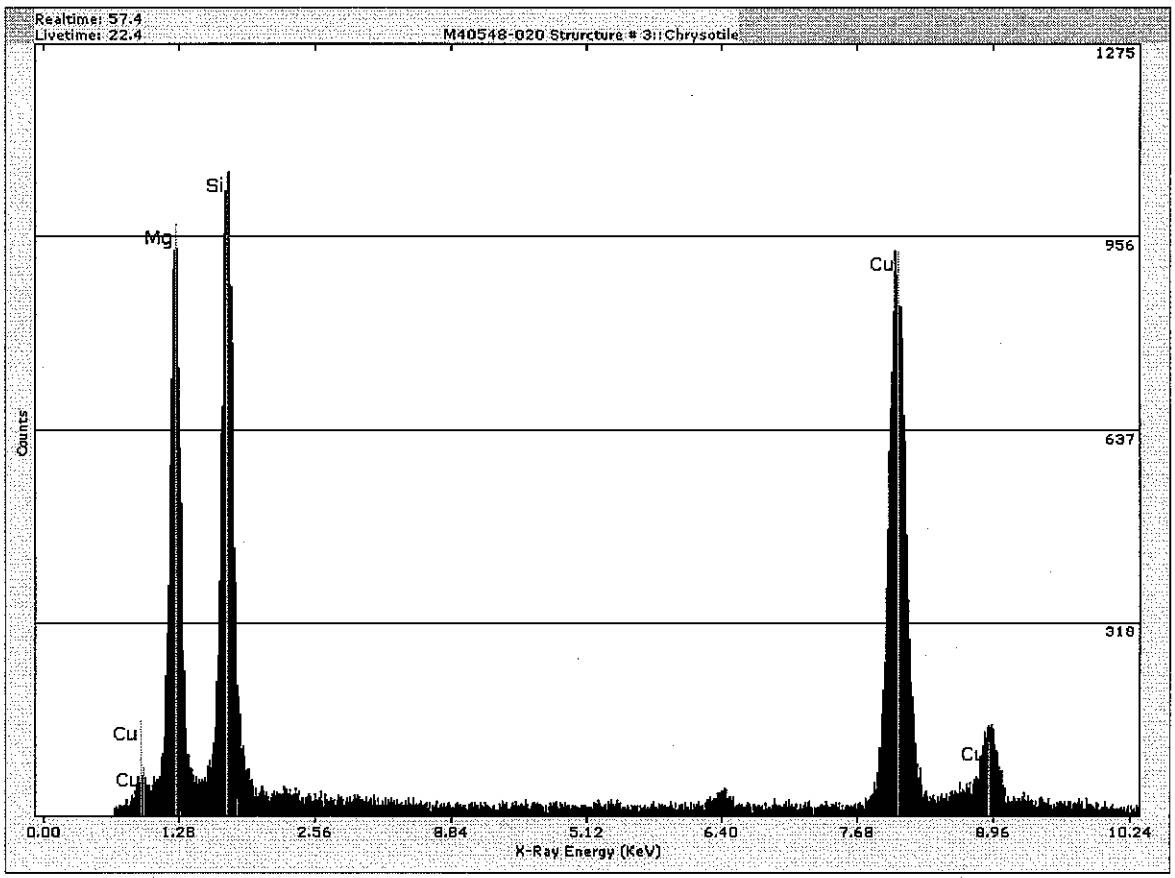
34

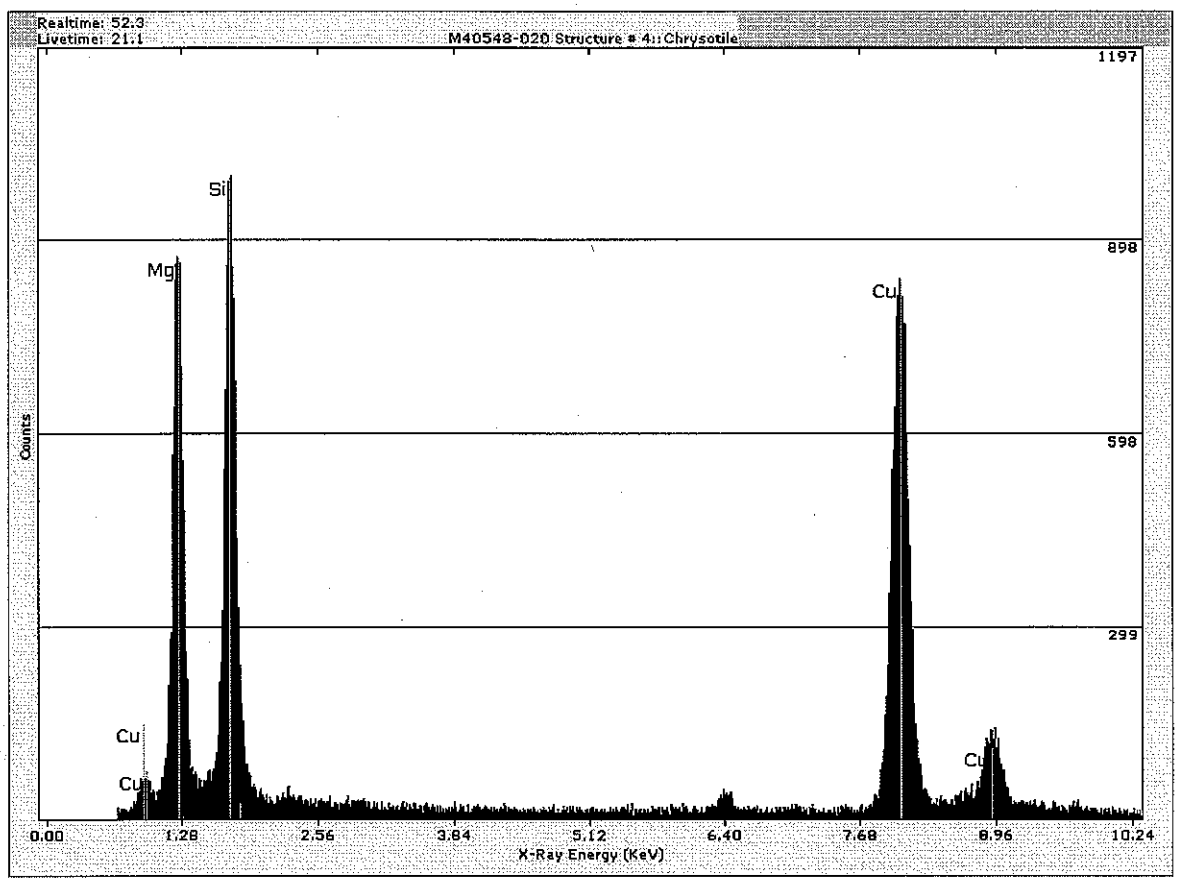
M40548 020 Sample Comments:

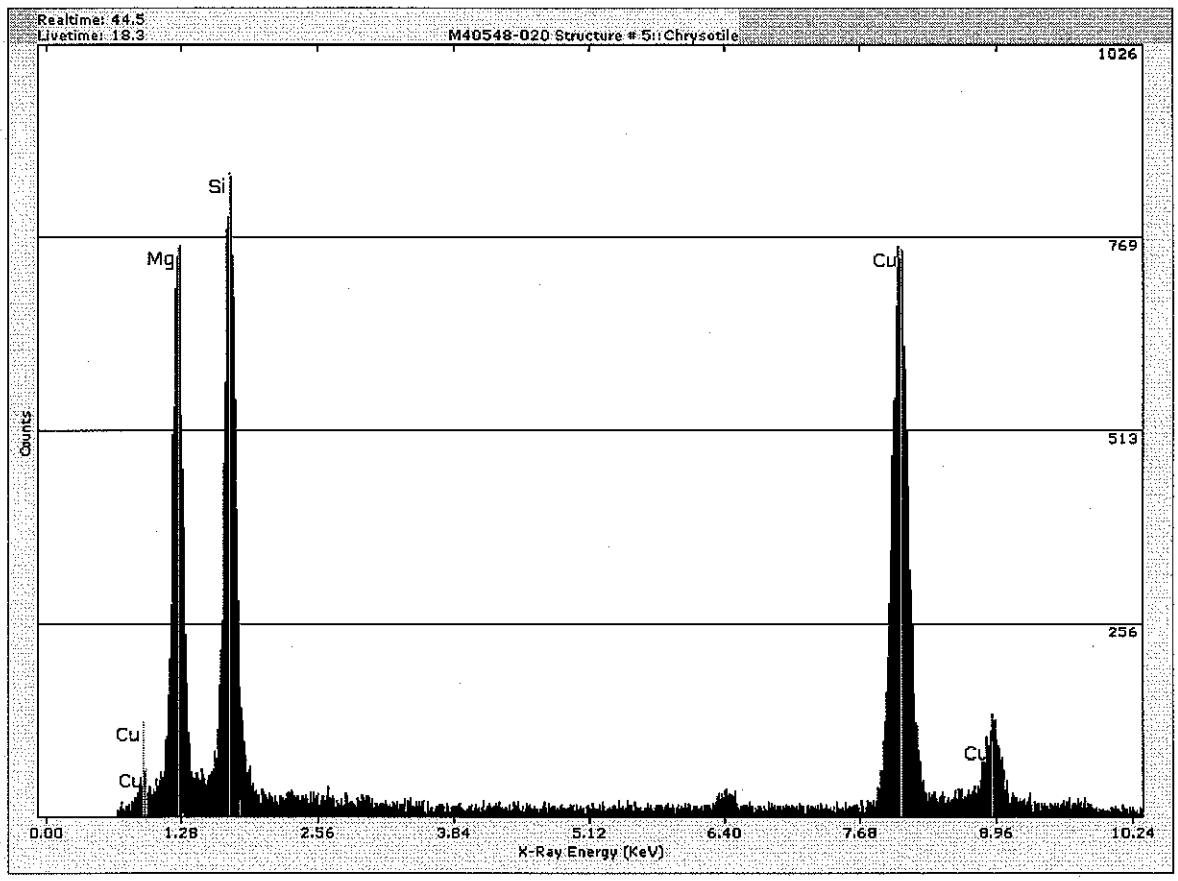
personal right during fab and file

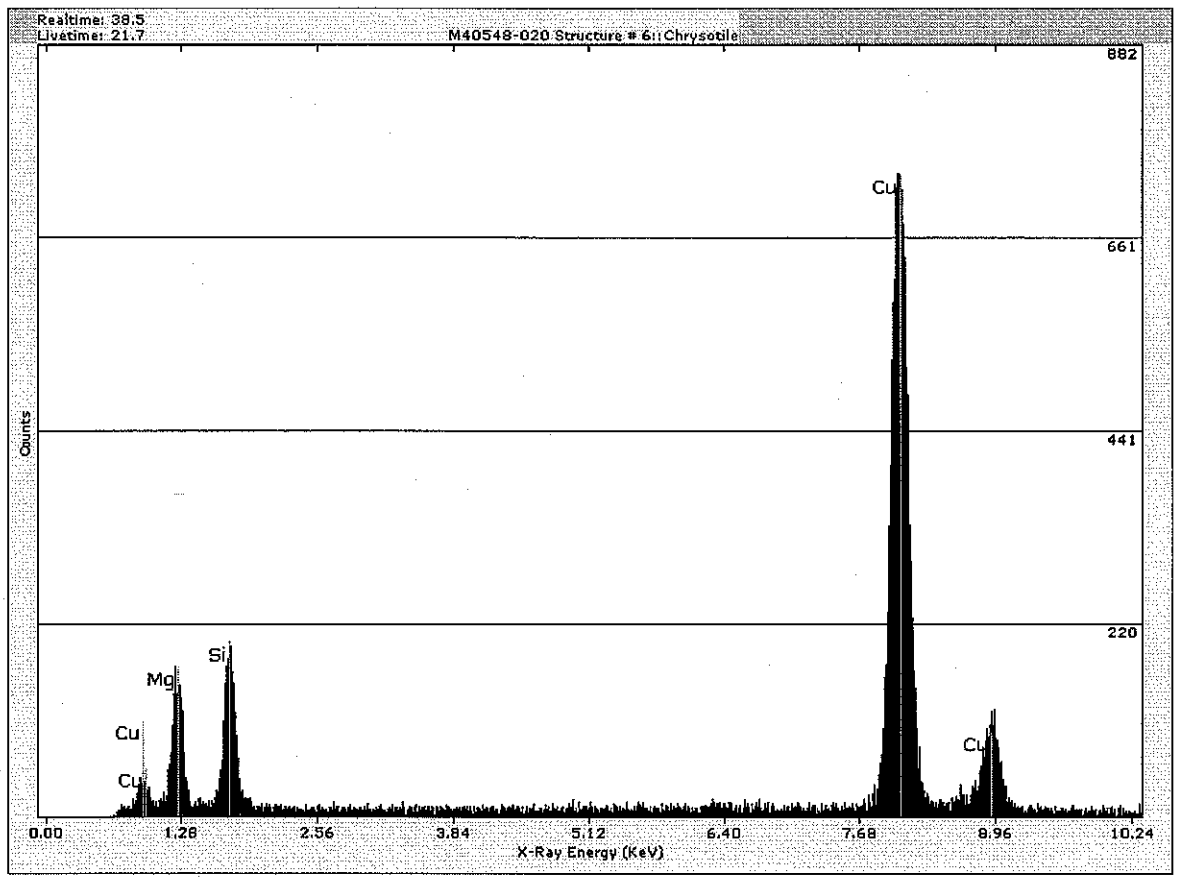

Realtime: 38.2
Livetime: 19.2
M40548-020 Sturcture # 1: Chrysotile
912
684
456
228
Counts
Cu
Mg
Si
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

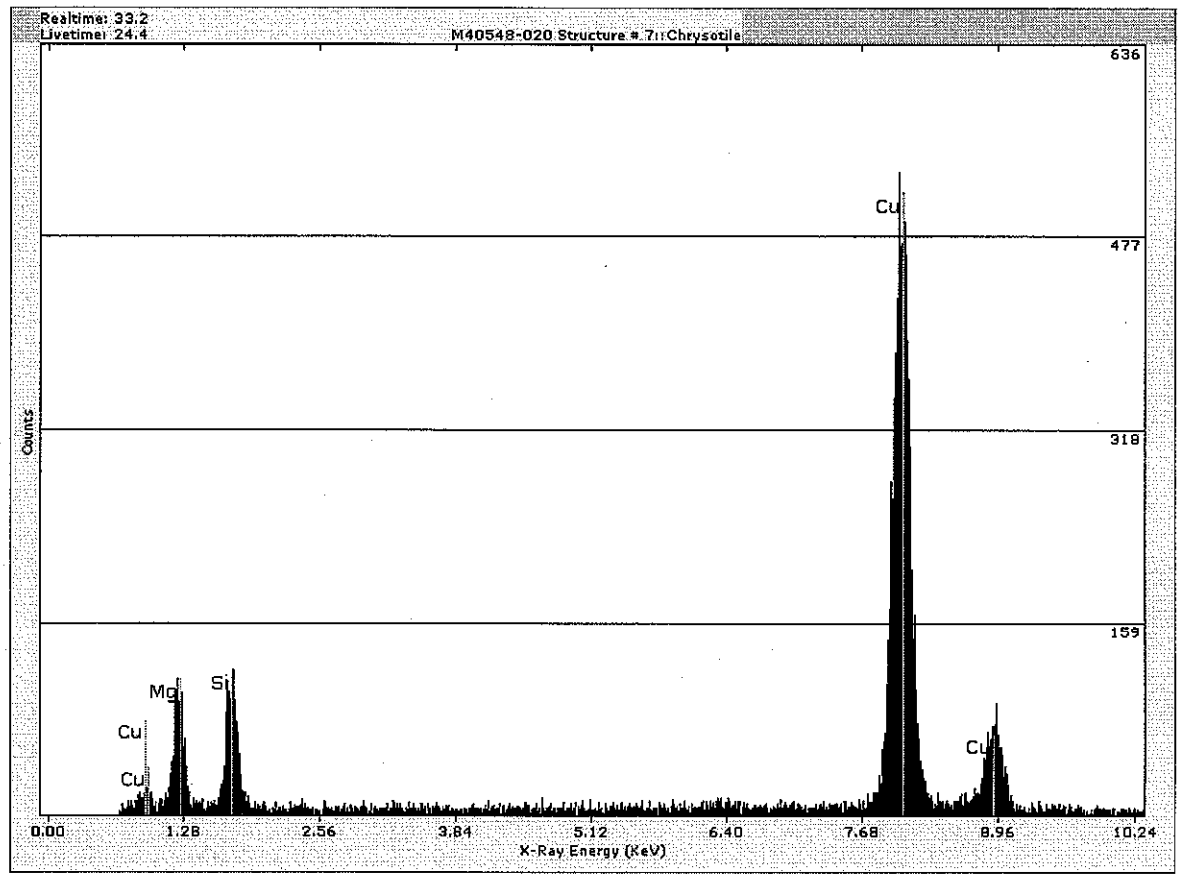

Realtime: 33.7
Livetime: 12.7
M40548-020 Strurcture # 2::Chrysotile
790
593
395
197
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

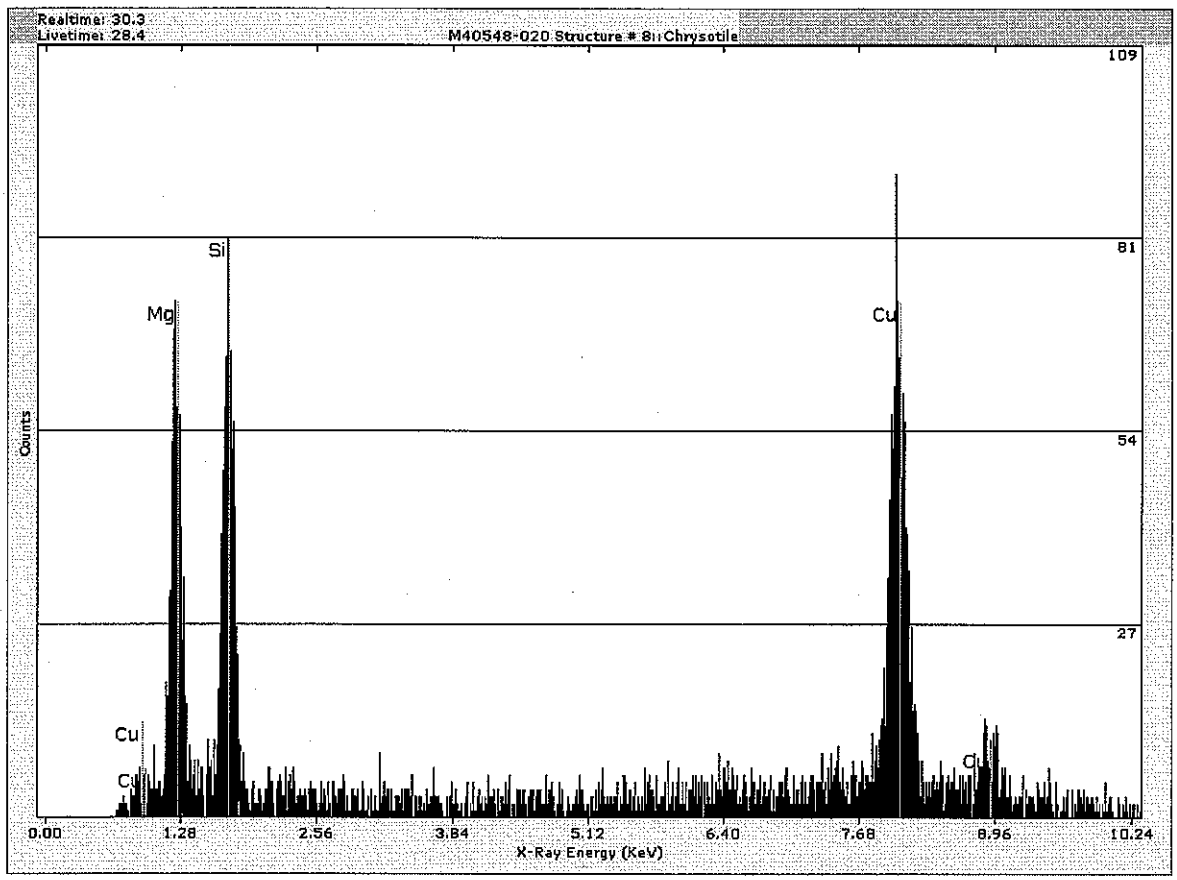

Realtime: 57.4
Livetime: 22.4
M40548-020 Strurcture # 3:Chrysotile
1275
956
637
318
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

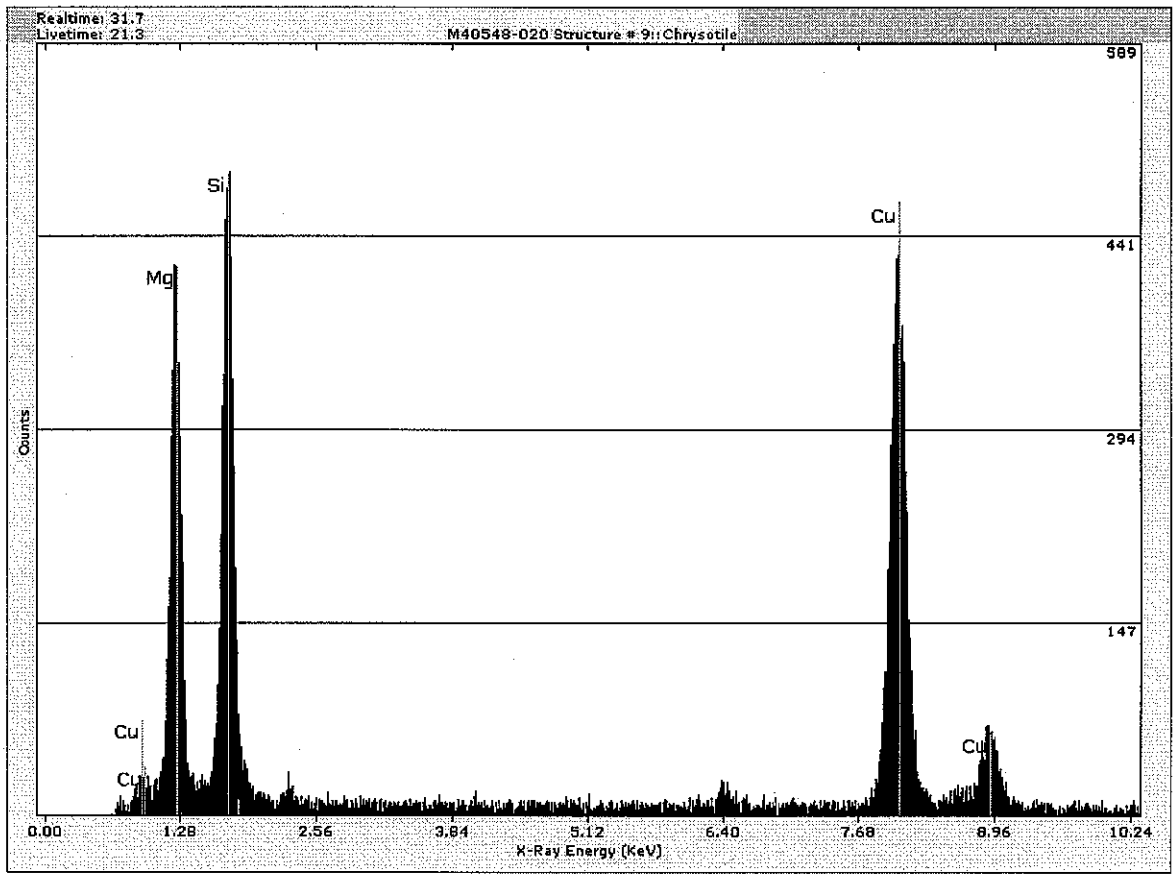

Realtime: 52.3
Livetime: 21.1
M40548-020 Structure # 4::Chrysotile
1197
898
598
299
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

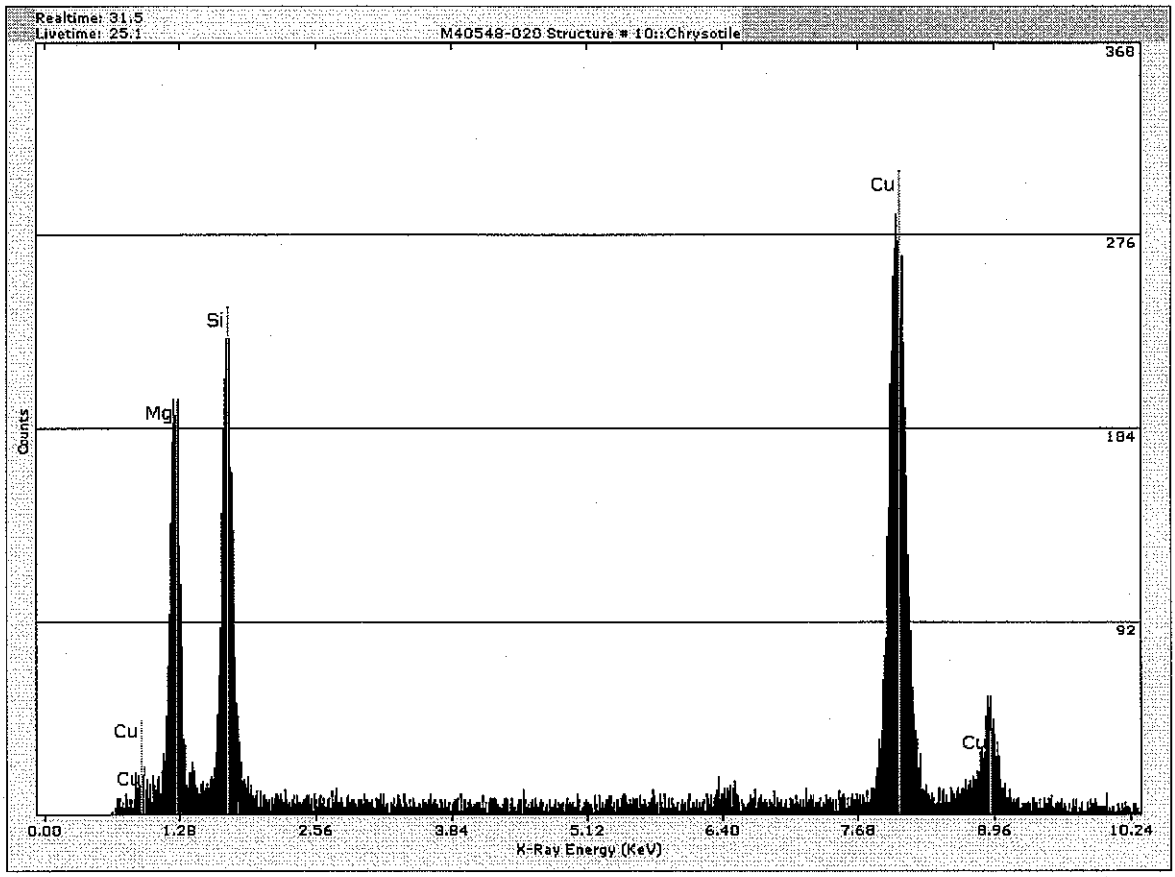

Realtime: 44.5
Livetime: 18.3
M40548-020 Structure # 5::Chrysotile
1026
769
513
256
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

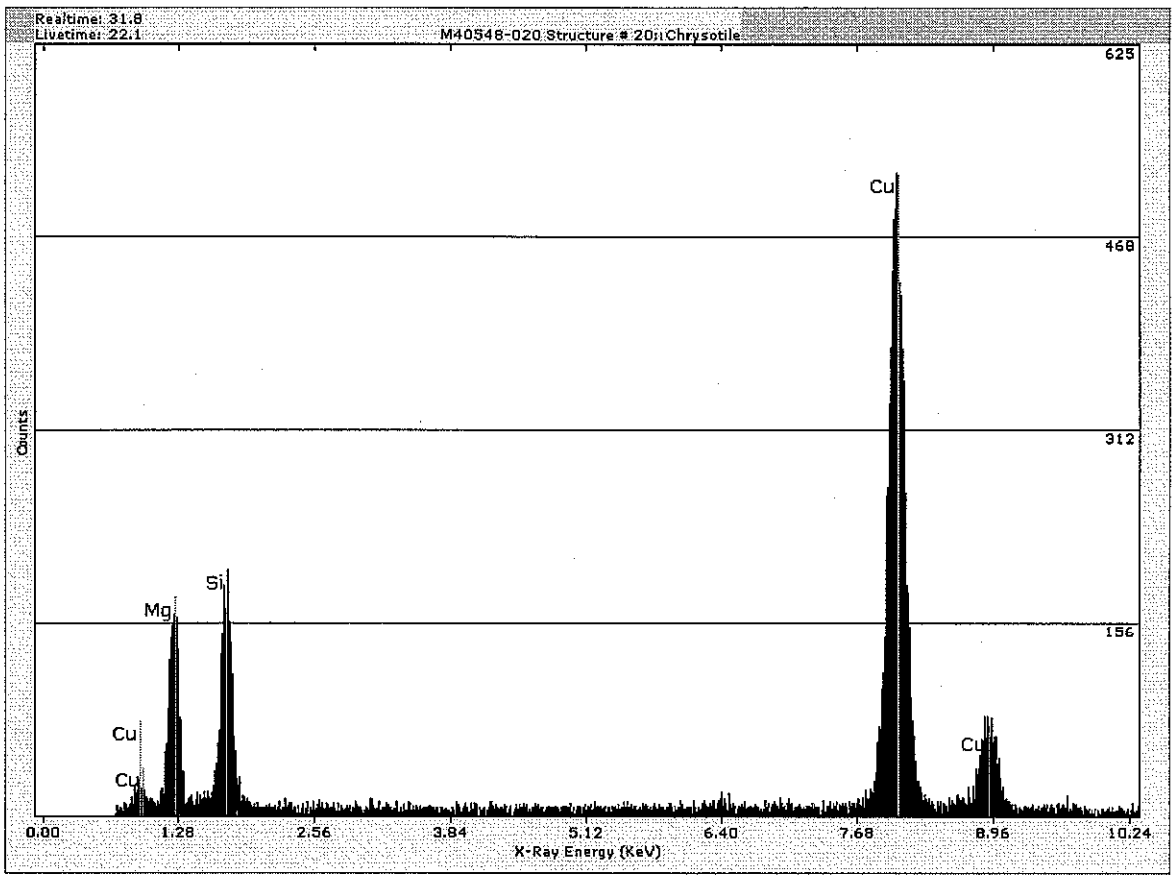

Realtime: 38.5
Livetime: 21.7
M40548-020 Structure # 6::Chrysotile
882
661
441
220
Counts
Cu
Mg
Si
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

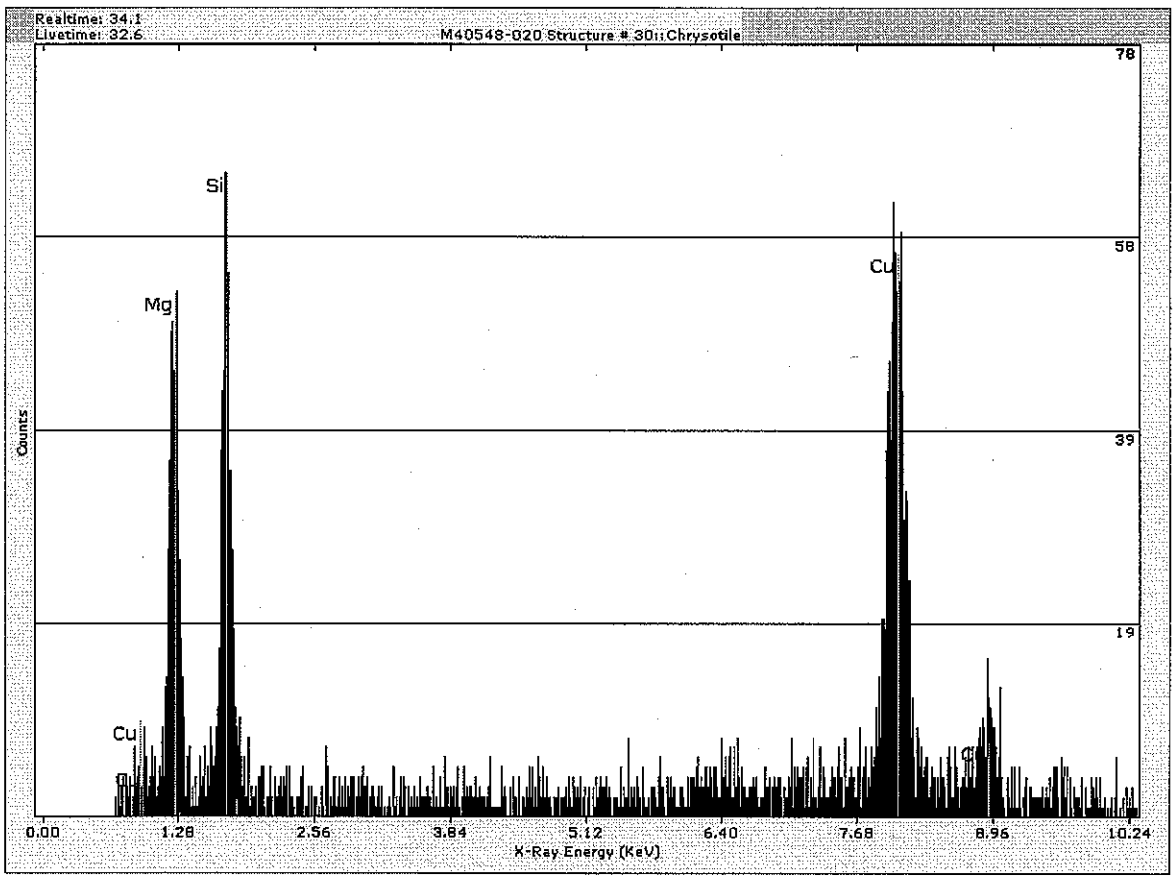

Realtime: 33.2
Livetime: 24.4
M40548-020 Structure # 7::Chrysotile
636
477
318
159
Counts
Cu
Mg
Si
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

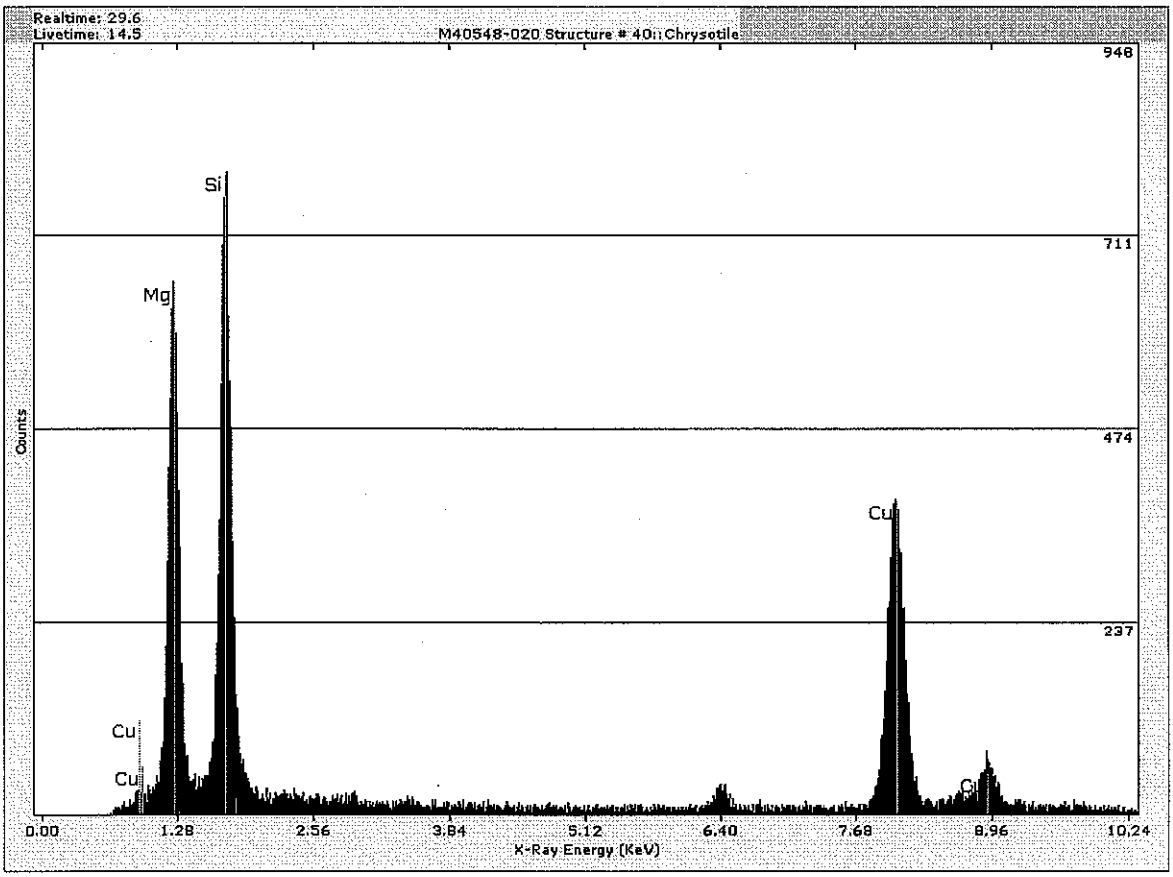

Realtime: 30.3
Livetime: 28.4
M40548-020 Structure # 8 : Chrysotile
109
81
54
27
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

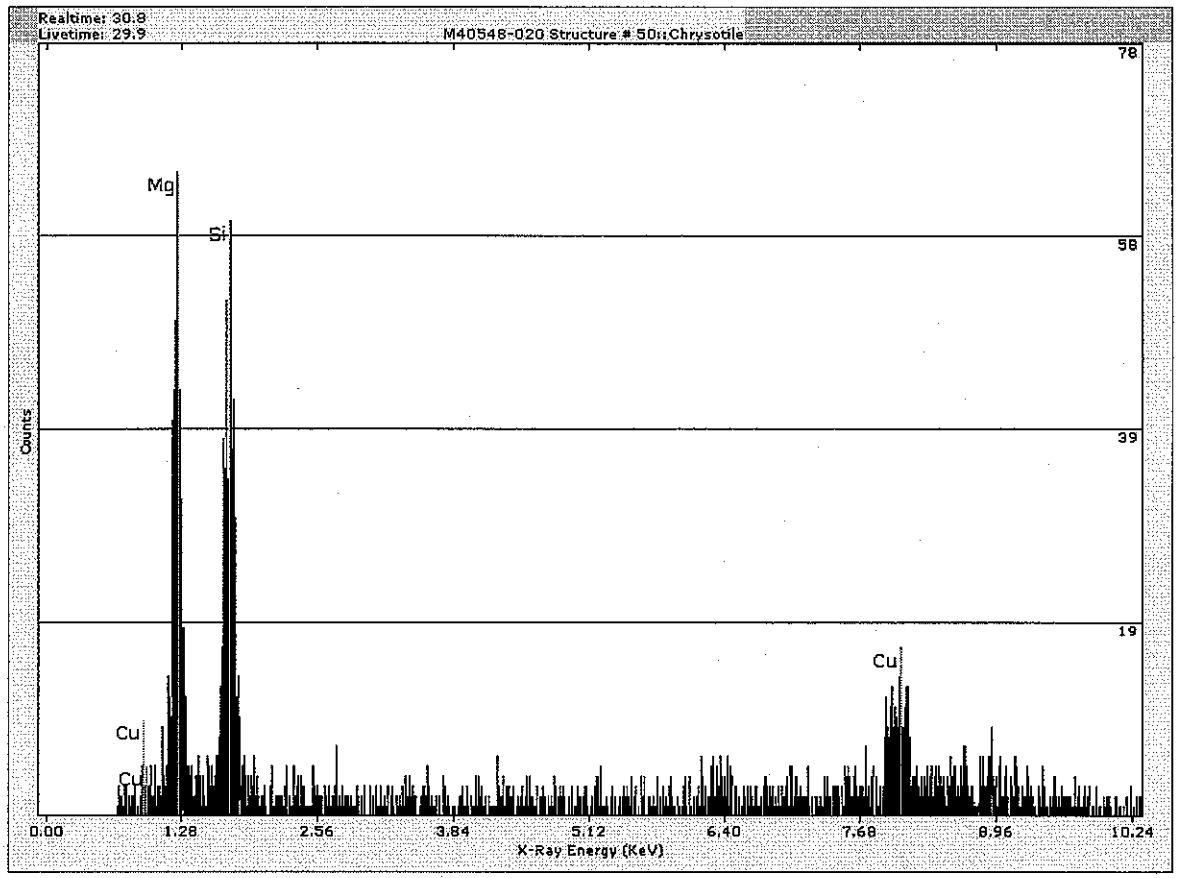

Realtime: 31.7
Livetime: 21.3
M40548-020 Structure # 9:: Chrysotile
989
441
294
147
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

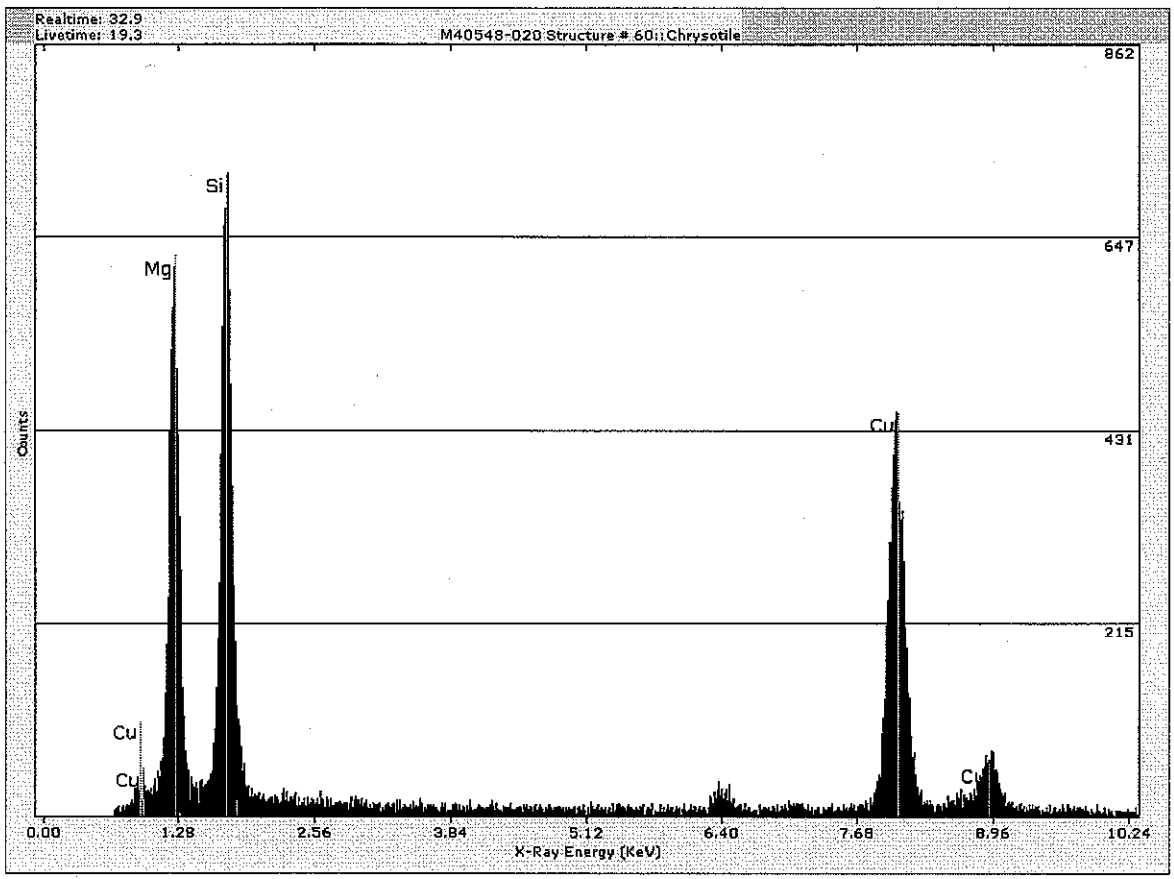

Realtime: 31.5
Livetime: 25.1
M40548-020 Structure # 10::Chrysotile
368
276
184
92
Counts
Cu
Si
Mg
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
K-Ray Energy (KeV)

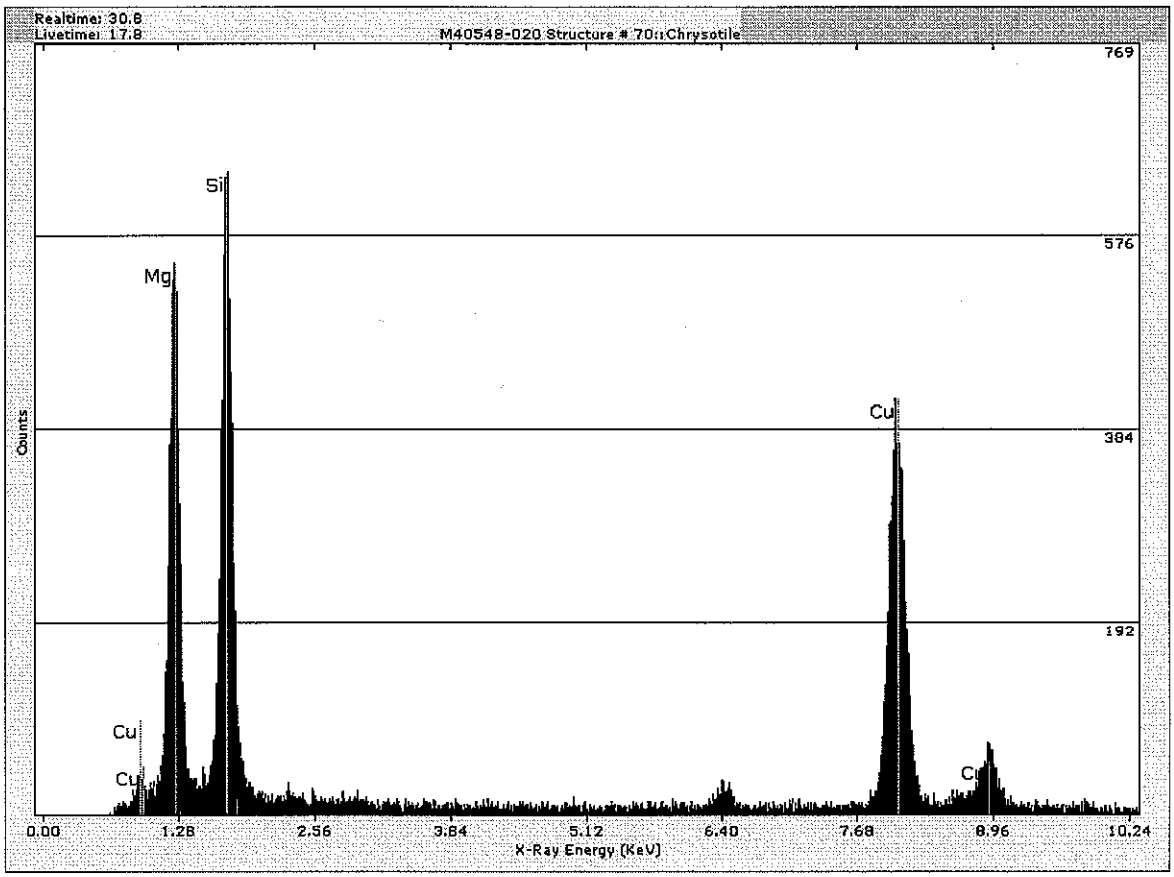

Realtime: 31.8
Livetime: 22.1
M40548-020 Structure # 20: Chrysotile
625
468
312
156
Counts
Cu
Mg
Si
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

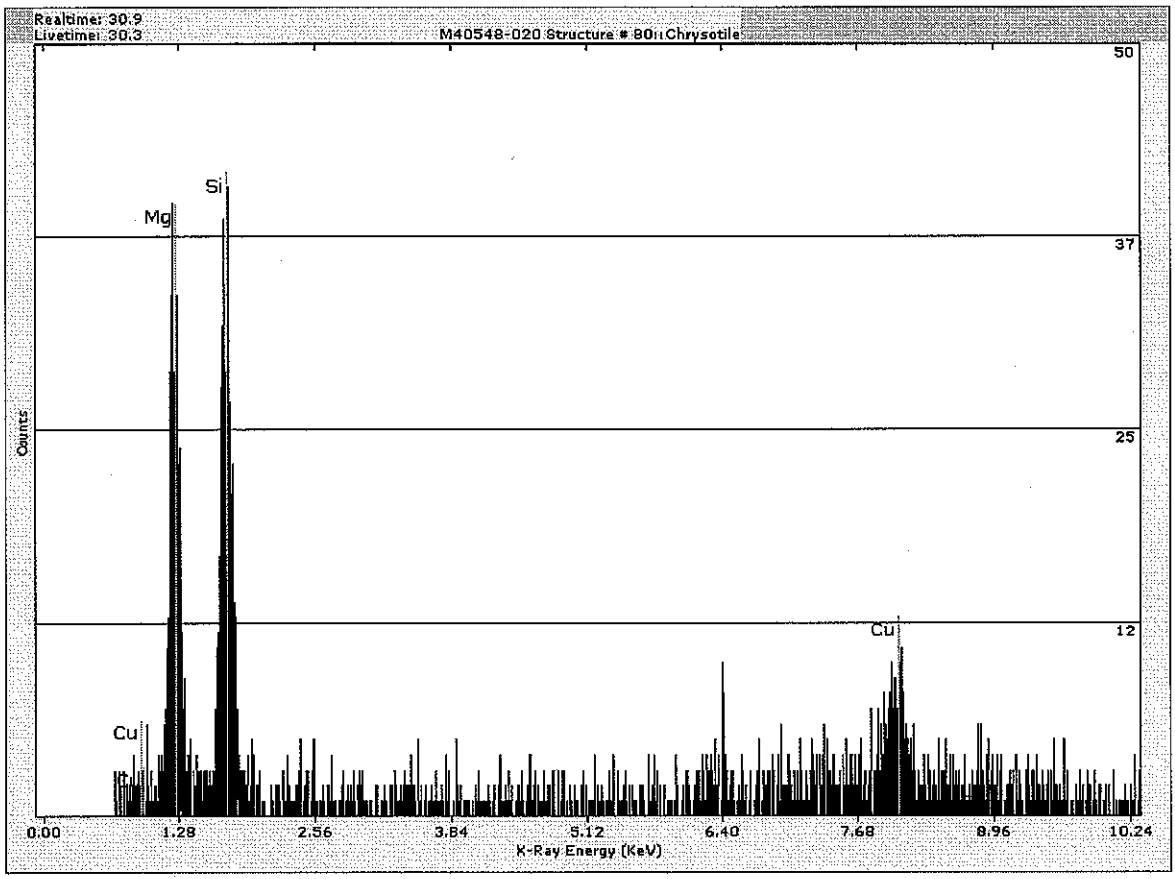

Realtime: 34.1
Livetime: 32.6
M40548-020 Structure # 30 :: Chrysotile
78
58
39
19
Counts
Si
Mg
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

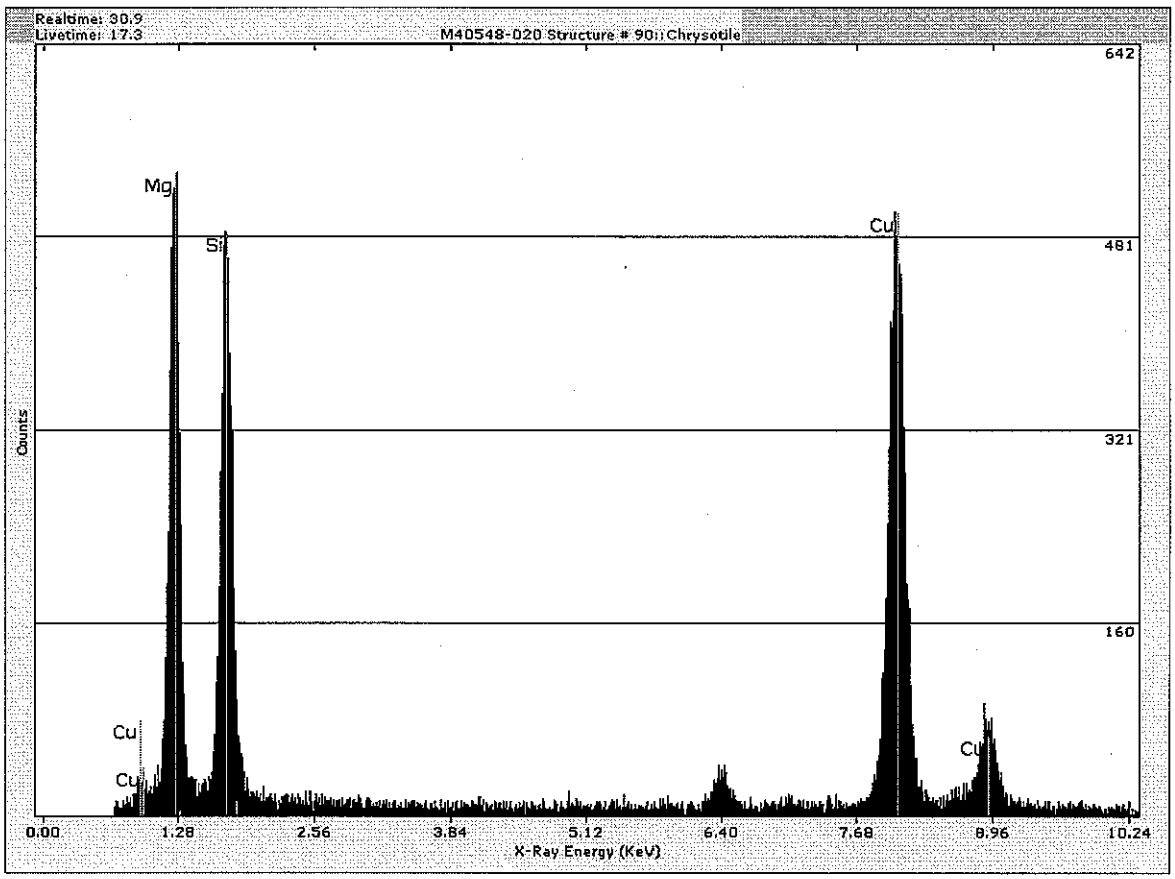

Realtime: 29.6
Livetime: 14.5
M40548-020 Structure # 40: Chrysotile
948
711
474
237
Counts
Si
Mg
Cu
Cu
Cu
Cl
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

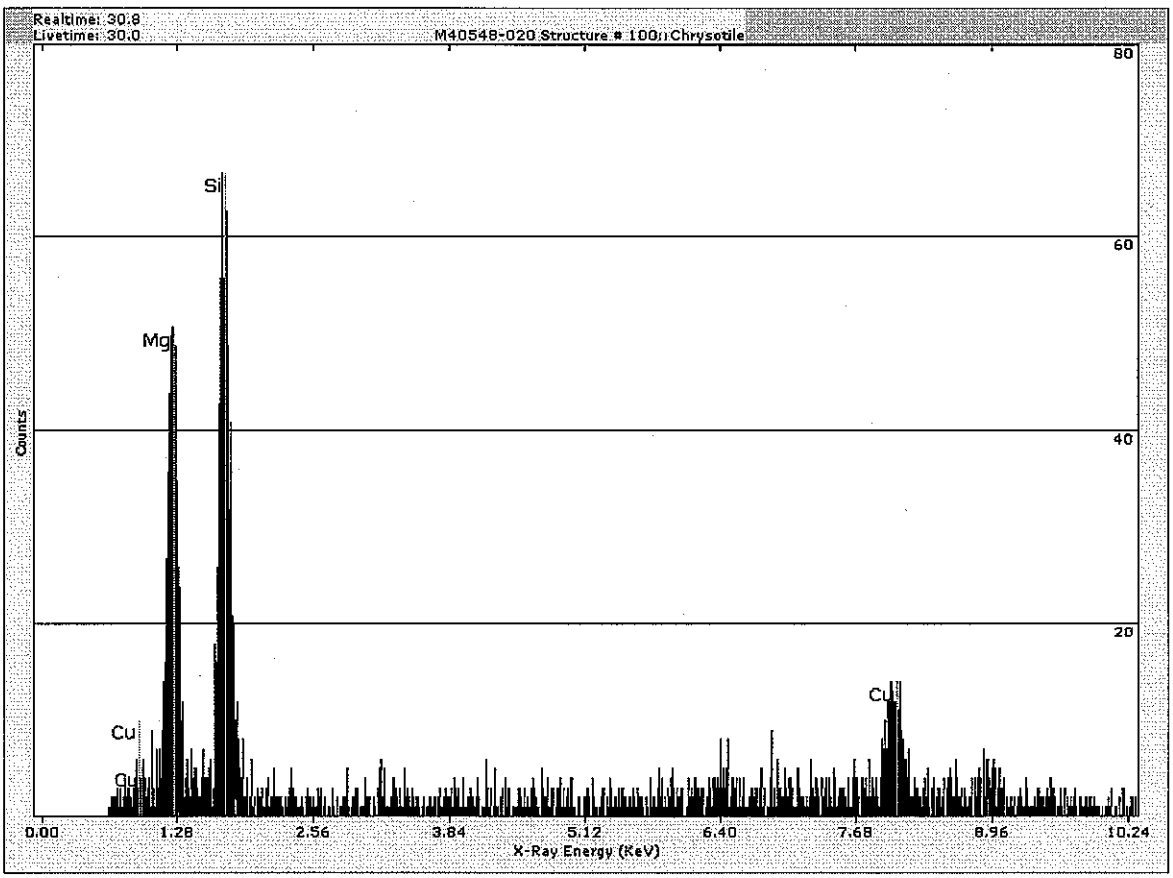

Realtime: 30.8
Livetime: 29.9
M40548-020 Structure # 50: Chrysotile
78
58
39
19
Counts
Mg
Si
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)


Realtime: 32.9
Livetime: 19.3
M40548-020 Structure # 60i Chrysotile
862
647
431
215
Counts
Si
Mg
Cu
Cu
Cu
Cl
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)


Realtime: 30.8
Livetime: 17.8
M40548-020 Structure # 70::Chrysotile
769
576
384
192
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy [KeV]


Realtime: 30.9
Livetime: 30.3
M40548-020 Structure # 80 Chrysotile
50
37
25
12
Counts
Si
Mg
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
K-Ray Energy (KeV)


Realtime: 30.9
Livetime: 17.3
M40548-020 Structure # 90: Chrysotile
642
481
321
160
Counts
Mg
Si
Cu
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)


Realtime: 30.8
Livetime: 30.0
M40548-020 Structure # 100 Chrysotile
Counts
80
60
40
20
Si
Mg
Cu
Cu
Cu
0.00
1.28
2.56
3.84
5.12
6.40
7.68
8.96
10.24
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-021

CLIENT NAME: Materials Analytical Services Atlanta **CLIENT SAMPLE ID:** P-2-B

7402 ANALYSIS

Sample Area/ Volume:	44.6	Liters	**Date Analyzed:**	11/16/2006	
Filter Type:	MCE 25mm		**Analyst:**	Kevin Simpson	
Pore size:	0.8		**Scope Number:**	3	
Effective Filter Area:	385		**Accelerating Voltage:**	100	KV
Sample type:	Air		**Indicated Mag:**	25	KX
Analysis type:	7402		**Screen Mag:**	20	KX
Grid Acceptance	Yes	8 %	**Grid_box:**	7179	

Number of grids: 2 **#1:** 103 **#3:** 105
Number of openings: 18 **#2:** 101 **#4:** 102

Average Grid Size: 0.010557 **Total Area Analyzed:** 0.190

Asbestos 101
Non-asbestos 3

% Asbestos 97.12

Str#:	SquareID:	Fiber Type:		Size		Morph:	SAED:	EDS:
1	A2-H1		Chrysotile	9	0.5	Chrysotile	Chrysotile	☑
2			Chrysotile	6	0.4	Chrysotile	Chrysotile	☑
3			Chrysotile	15	3	Chrysotile	Chrysotile	☑
4			Chrysotile	12	0.4	Chrysotile	Chrysotile	☑
5			Chrysotile	28	0.5	Chrysotile	Chrysotile	☑
6			Chrysotile	16	1.3	Chrysotile	Chrysotile	☑
7			Chrysotile	25	2.5	Chrysotile	Chrysotile	☑
8			Chrysotile	40	1	Chrysotile	Chrysotile	☑
9			Chrysotile	20	4	Chrysotile	Chrysotile	☑
10			Chrysotile	16	0.7	Chrysotile	Chrysotile	☑
11	H3		Chrysotile	7	0.9			☐
12			Chrysotile	10	0.3			☐
13			Chrysotile	15	2			☐
14			Chrysotile	56	8			☐
15			Chrysotile	7.5	2			☐
16			Chrysotile	31	5			☐
17			Chrysotile	8	0.5			☐
18			Chrysotile	46	2			☐
19			Chrysotile	8	0.3			☐
20	H5		Chrysotile	16	0.8	Chrysotile	Chrysotile	☑
21			Chrysotile	16	0.4			☐
22			Chrysotile	6	0.28			☐
23			Chrysotile	8	0.5			☐
24			Chrysotile	5.2	0.9			☐
25	H7		Chrysotile	6	0.3			☐
26			Chrysotile	34	0.5			☐
27			Chrysotile	11	0.5			☐
28	H9		Chrysotile	23	0.6			☐

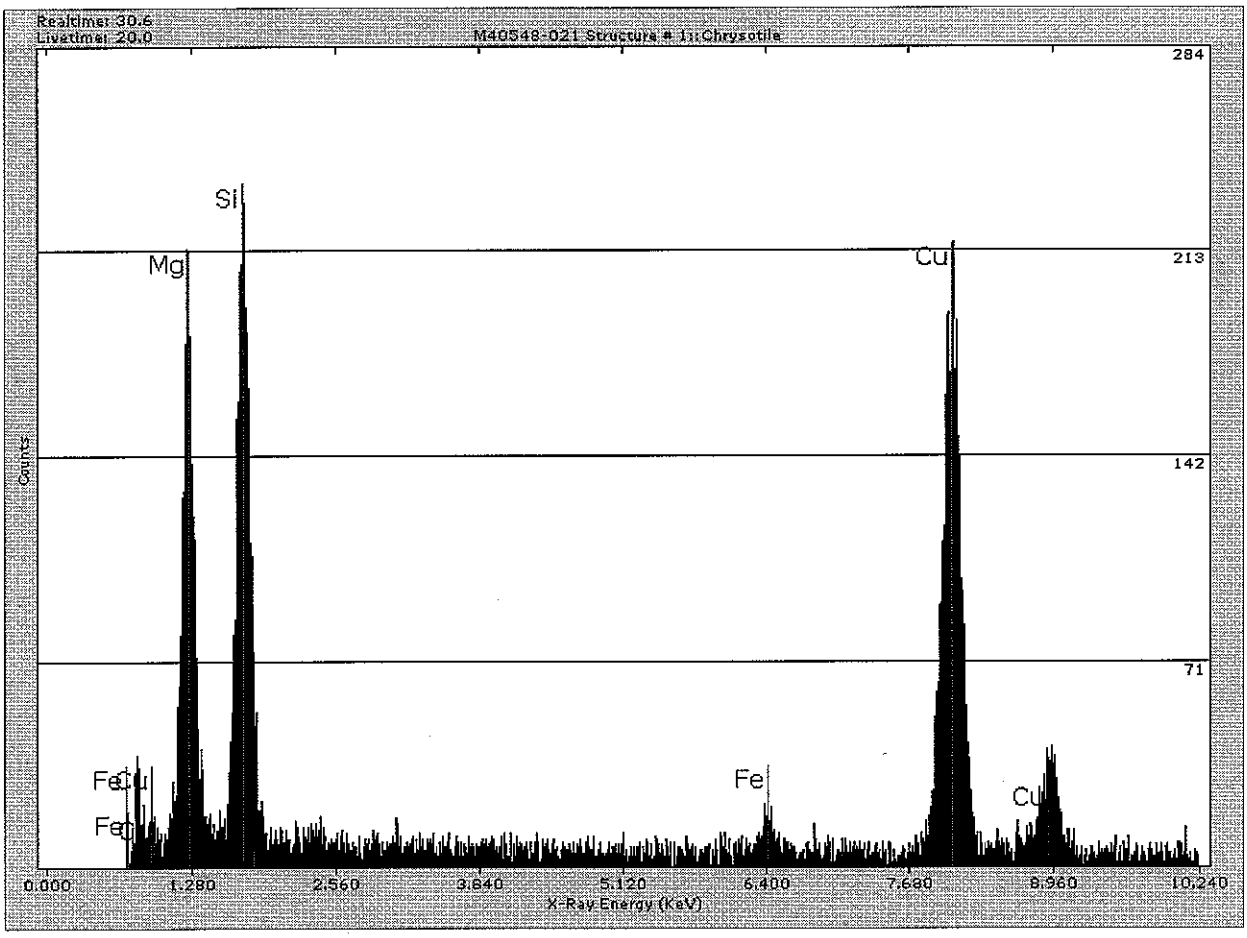
29			Chrysotile	7	0.5			☐
30			Chrysotile	12	0.6	Chrysotile	Chrysotile	☑
31			Chrysotile	6	7			☐
32			Chrysotile	12	0.6			☐
33			Chrysotile	5.7	0.3			☐
34			Chrysotile	15	0.6	Chrysotile	Chrysotile	☑
35			Chrysotile	8	0.3			☐
36			Chrysotile	14.5	2			☐
37	E1		Chrysotile	10	2			☐
38			Chrysotile	10	3			☐
39			Chrysotile	7	3			☐
40			Chrysotile	8	0.8	Chrysotile	Chrysotile	☑
41			Chrysotile	5.5	0.28			☐
42	E3		Chrysotile	8	2			☐
43			Chrysotile	26	6			☐
44			Chrysotile	8	0.4			☐
45			Chrysotile	30	8			☐
46			Chrysotile	24	6			☐
47			Chrysotile	6	0.3			☐
48			Chrysotile	6.5	0.3			☐
49			Chrysotile	10	2.5			☐
50	E6-I7		Chrysotile	6	0.6	Chrysotile	Chrysotile	☑
51			Chrysotile	16	0.6			☐
52			Chrysotile	25	0.5			☐
53			Chrysotile	36	8			☐
54			Chrysotile	8	0.6			☐
55			Chrysotile	9	0.4			☐
56	G7		Chrysotile	5.5	0.3			☐
57			Chrysotile	18	0.3			☐
58	E7		Chrysotile	16	0.6			☐
59			Chrysotile	8	0.6			☐
60			Chrysotile	13	0.7	Chrysotile	Chrysotile	☑
61			Chrysotile	5.7	0.3			☐
62	C7		Chrysotile	21	1			☐
63			Chrysotile	7	2			☐
64			Chrysotile	8	2			☐
65			Chrysotile	8	2			☐
66			Chrysotile	7	1.5			☐
67		NA		15	0.3	Ambiguous	Ambiguous	☑
68		NA		32	0.28	Ambiguous	Ambiguous	☑
69			Chrysotile	24	3			☐
70			Chrysotile	8	0.4	Chrysotile	Chrysotile	☑
71	J4	NA		24	6	Ambiguous	Ambiguous	☑
72			Chrysotile	7	0.8			☐
73			Chrysotile	16	0.5			☐
74			Chrysotile	5.7	0.6			☐
75			Chrysotile	10	0.3			☐
76			Chrysotile	6.5	0.8			☐
77			Chrysotile	12	0.5			☐
78			Chrysotile	10	1			☐
79	G4		Chrysotile	10	1			☐
80	E4		Chrysotile	7.5	0.5	Chrysotile	Chrysotile	☑
81			Chrysotile	9	1.3			☐
82			Chrysotile	6	1.5			☐

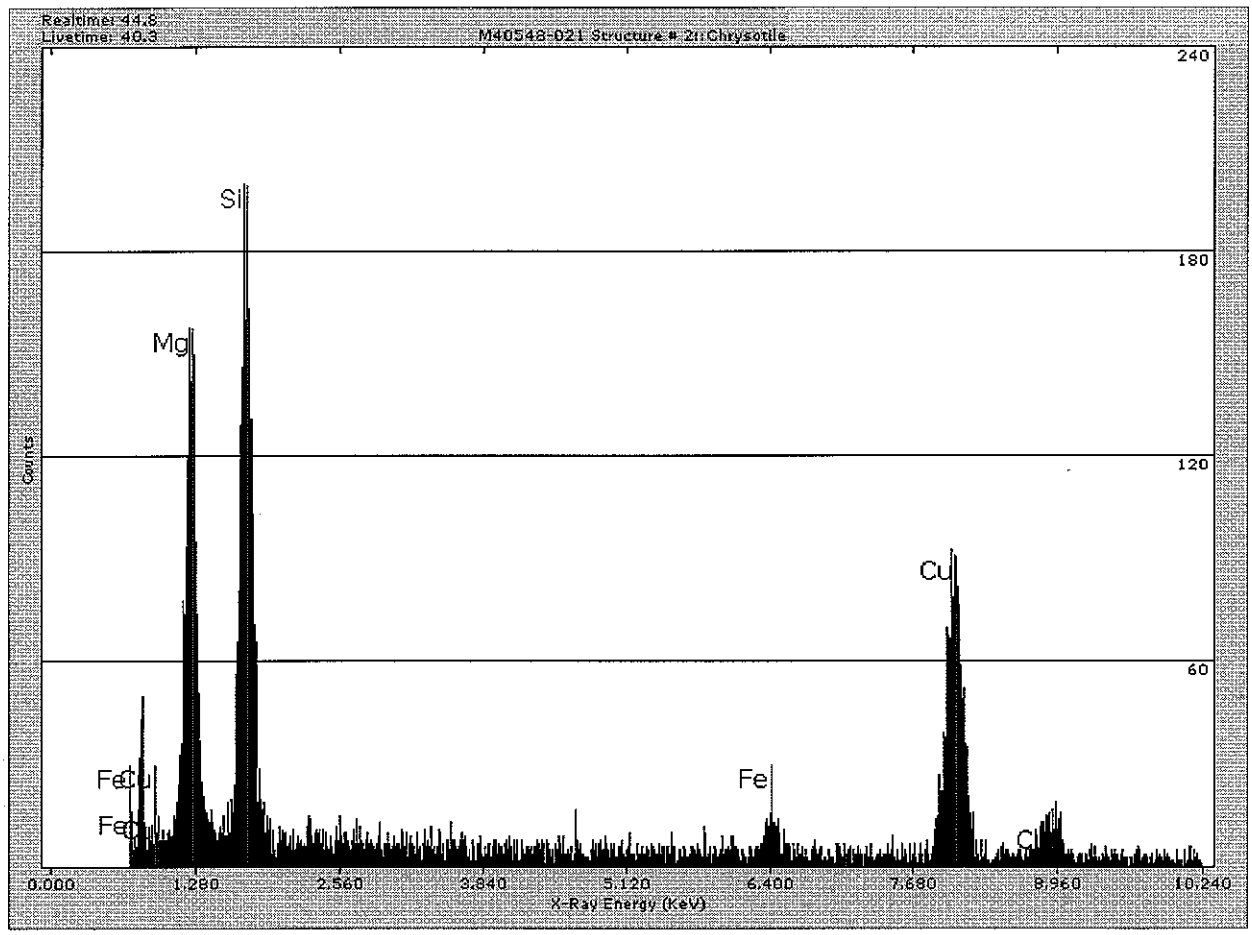
83			Chrysotile	8	0.8			
84			Chrysotile	5.7	0.3			
85			Chrysotile	5.2	0.4			
86			Chrysotile	5.8	1			
87	C4		Chrysotile	7	1			
88			Chrysotile	9	1.2			
89			Chrysotile	7	0.7			
90			Chrysotile	5.5	0.28			
91			Chrysotile	6	0.28			
92	A4		Chrysotile	20	0.5			
93			Chrysotile	6	2			
94			Chrysotile	10	2			
95			Chrysotile	6	0.3			
96			Chrysotile	12	0.5			
97	F3		Chrysotile	20	0.6			
98			Chrysotile	8	0.5			
99	D3		Chrysotile	20	0.3			
100			Chrysotile	9	0.7	Chrysotile	Chrysotile	☑
101			Chrysotile	24	0.3			
102			Chrysotile	24	0.5			
103			Chrysotile	6	0.4			
104			Chrysotile	7.5	0.28			

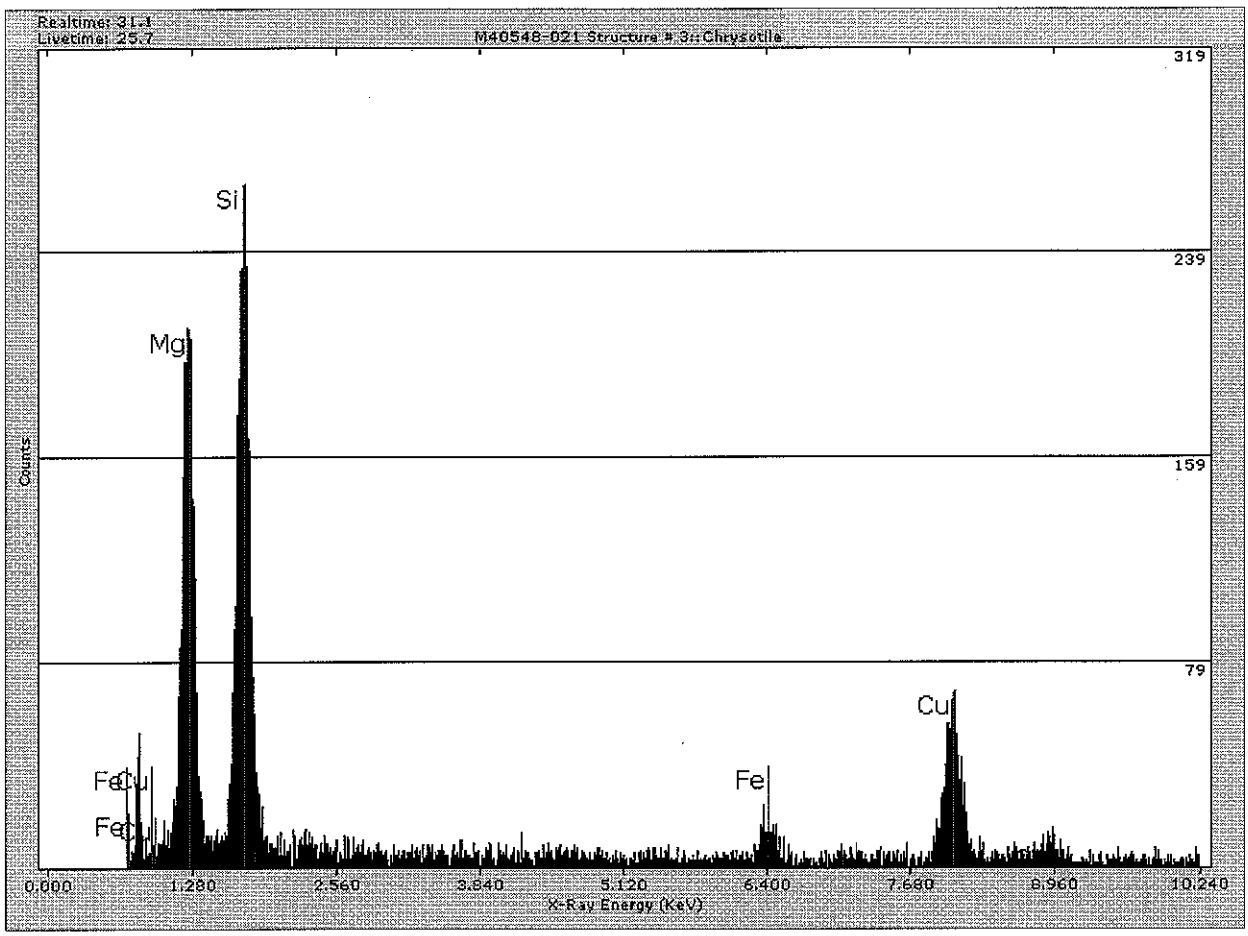
Grid Op
18

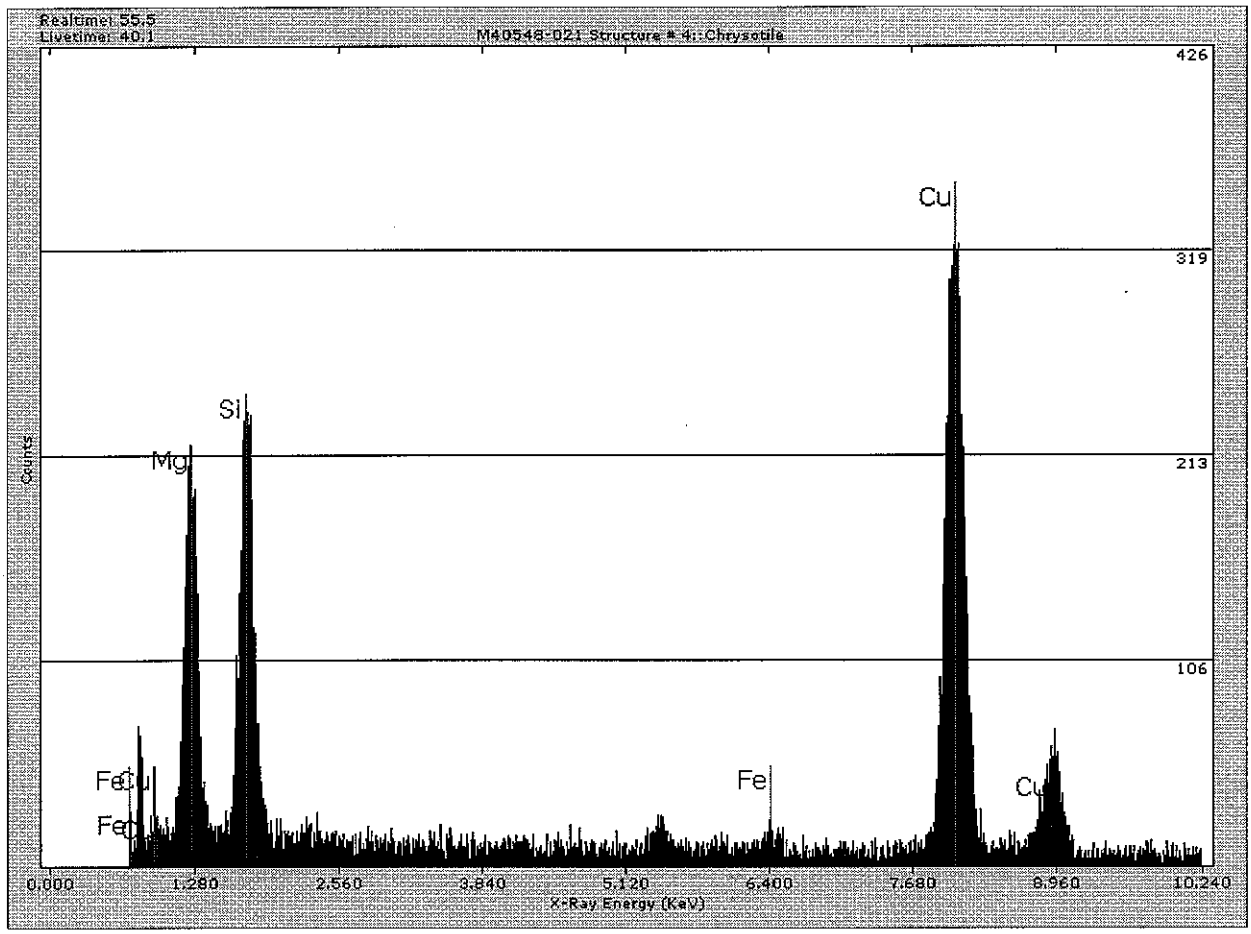
M40548 021 Sample Comments:

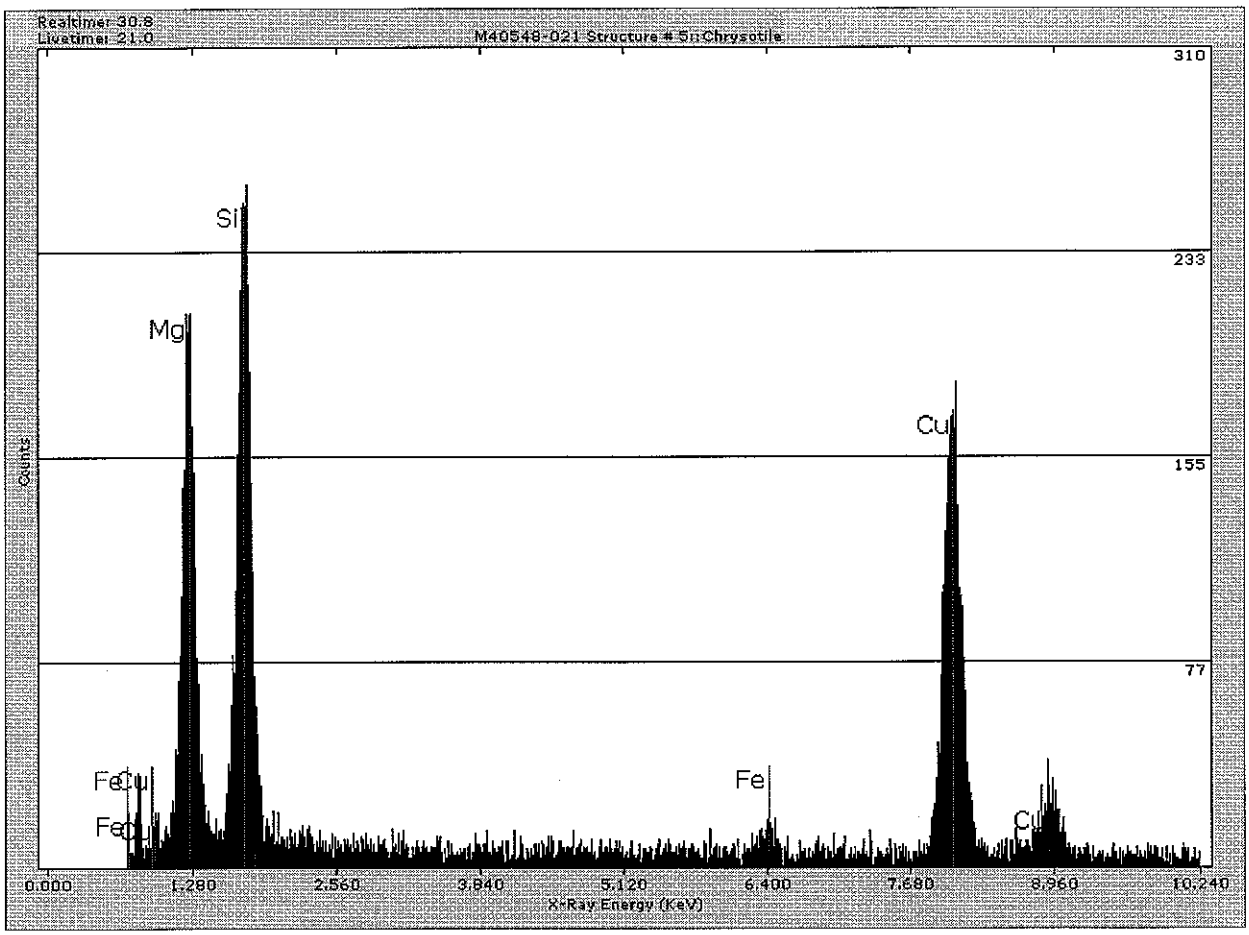
personal left during fab and file

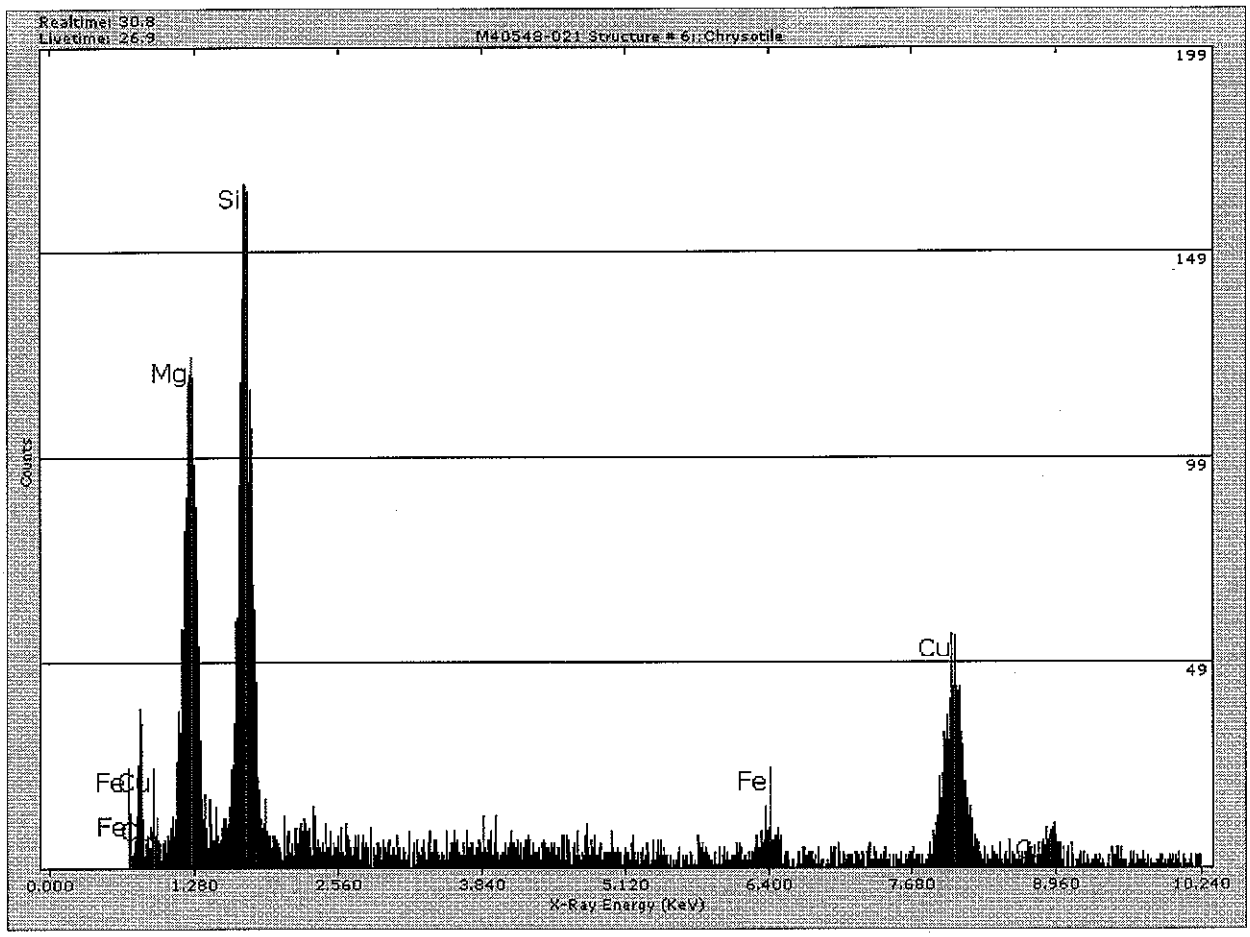

Realtime: 30.6
Livetime: 20.0
M40548-021 Structure # 1: Chrysotile
284
213
142
71
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

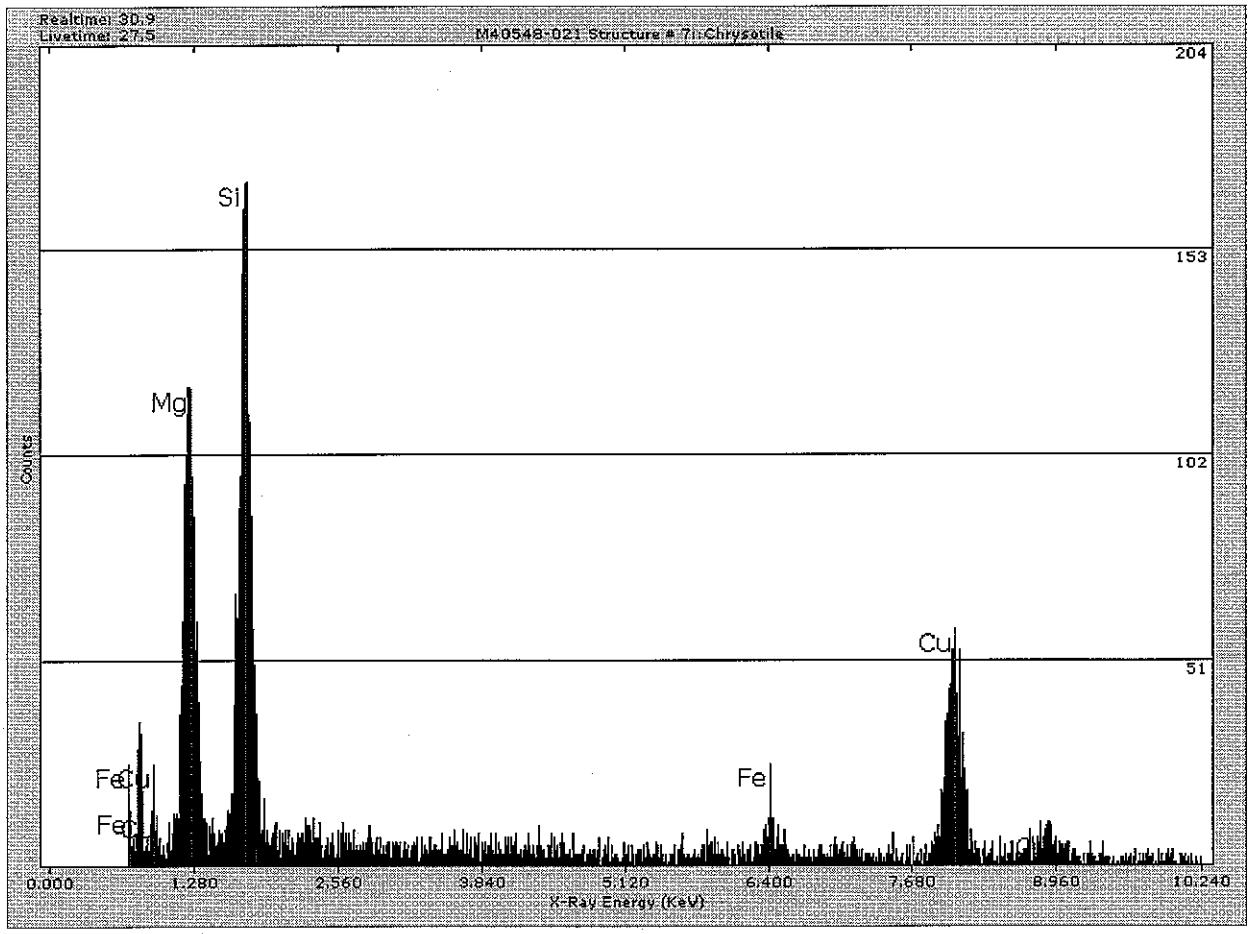

Realtime: 44.8
Livetime: 40.3
M40548-021 Structure # 2: Chrysotile
240
180
120
60
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

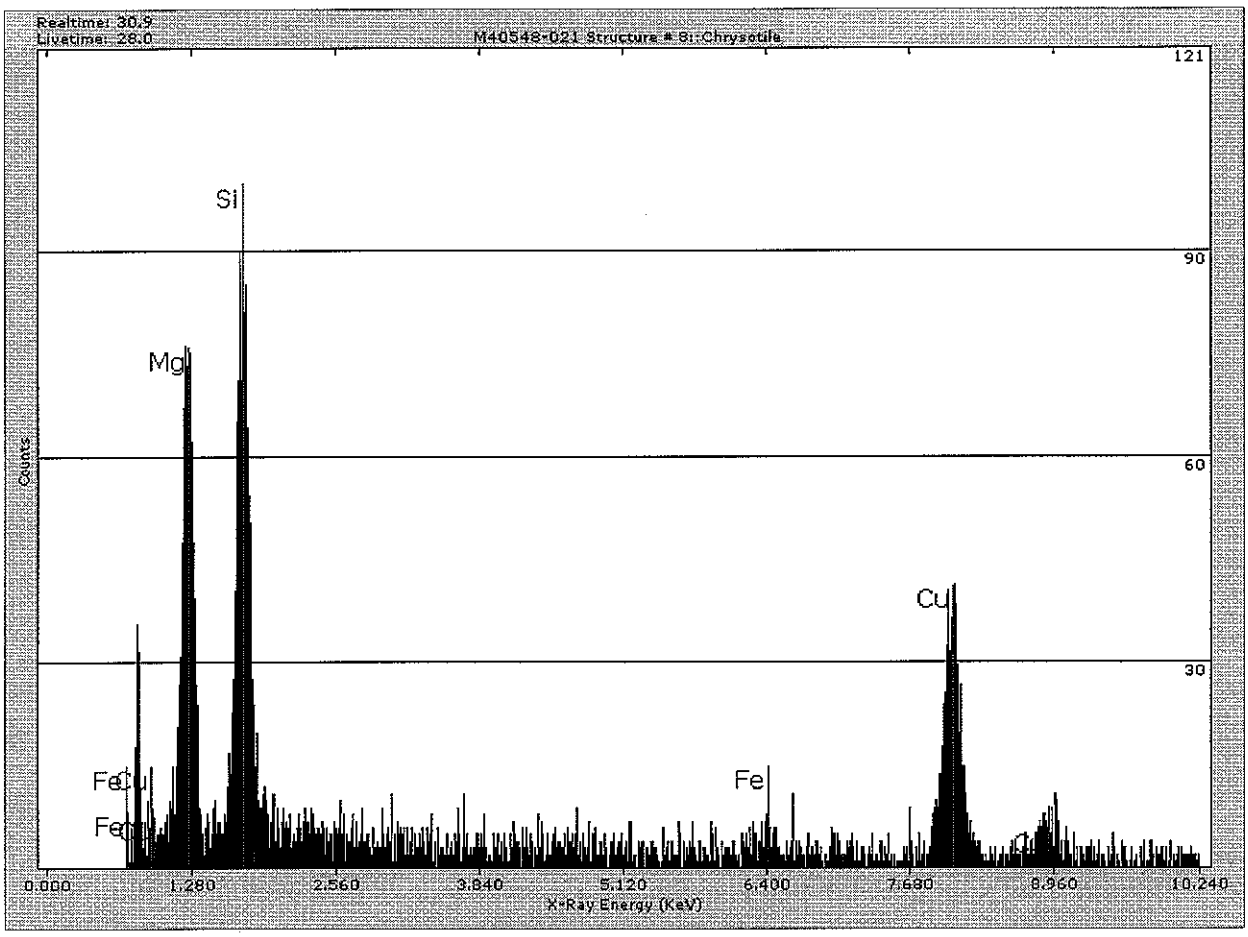

Realtime: 31.1
Livetime: 25.7
M40548-021 Structure # 3: Chrysotile
319
239
159
79
Counts
Si
Mg
Fe
Cu
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

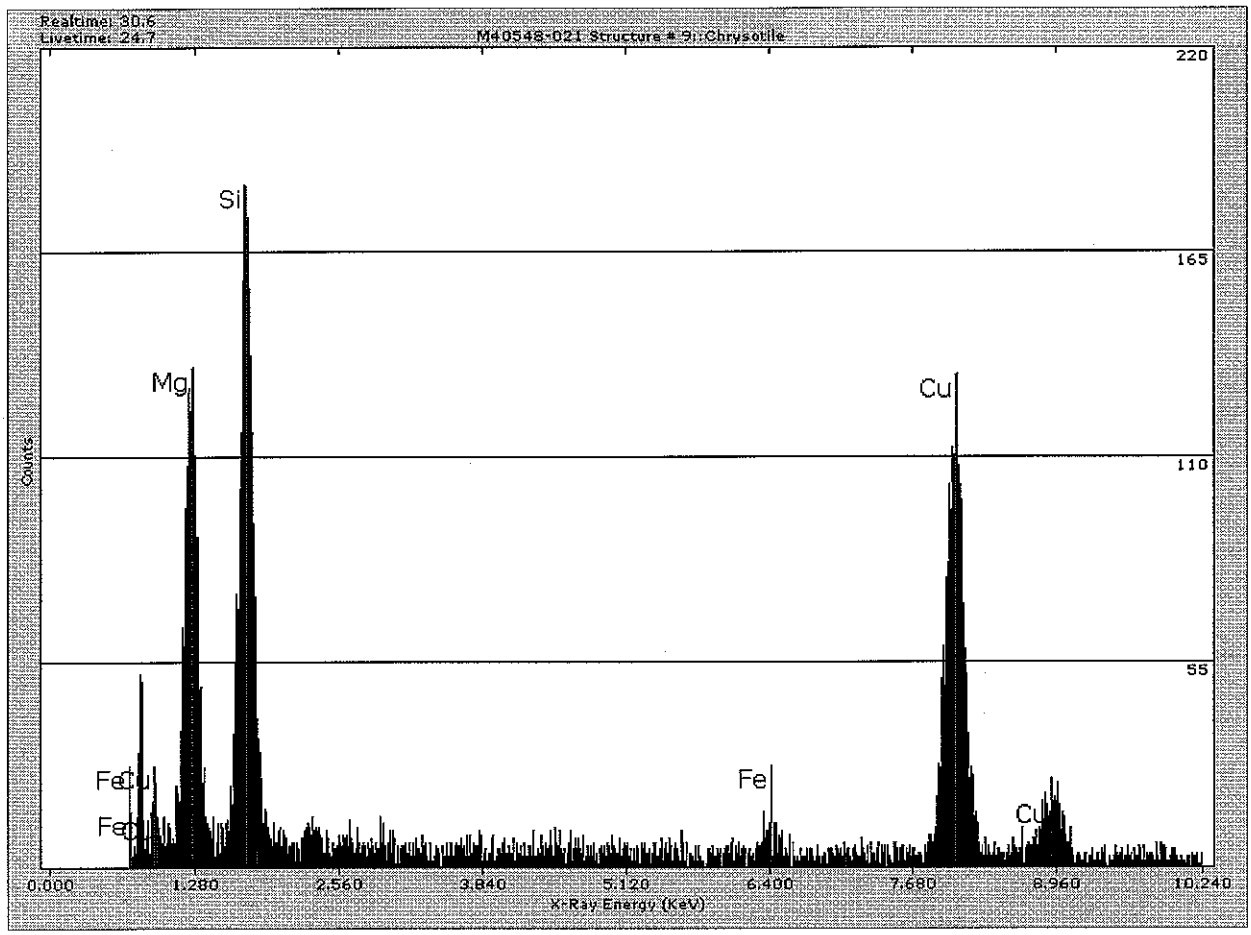

Realtime: 55.5
Livetime: 40.1
M40548-021 Structure # 4: Chrysotile
426
319
213
106
Counts
Cu
Si
Mg
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

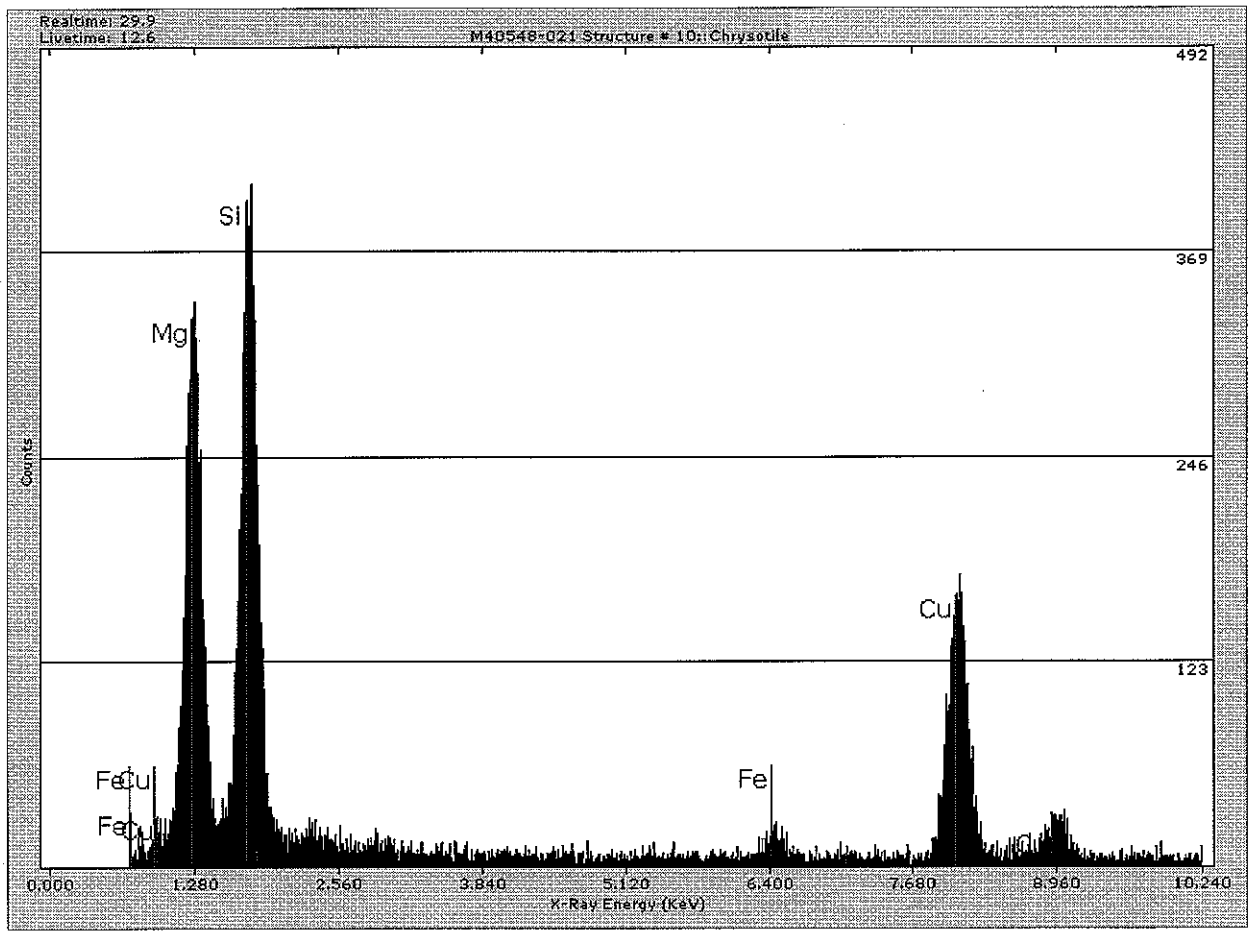

Realtime: 30.8
Livetime: 21.0
M40548-021 Structure # 5: Chrysotile
310
233
155
77
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

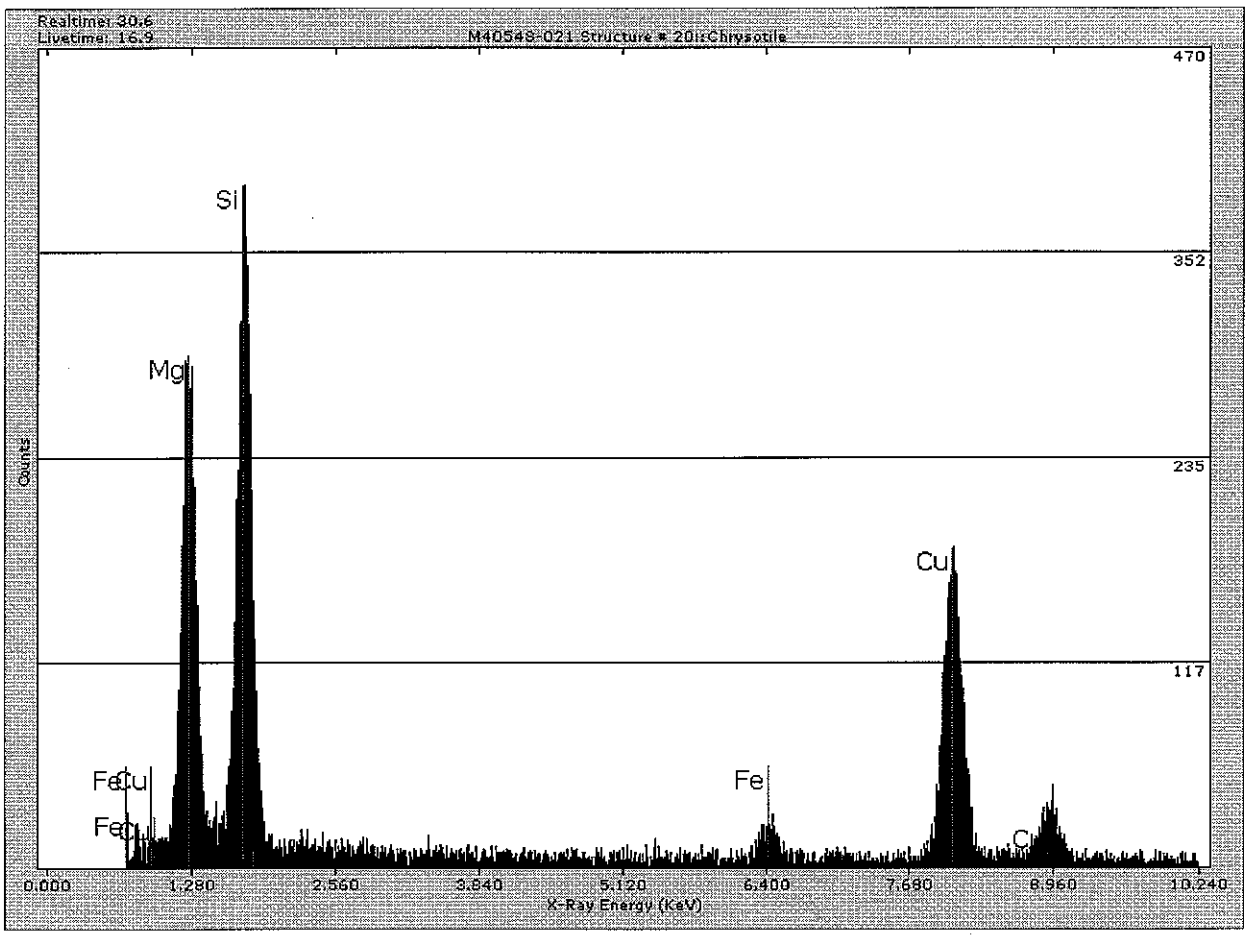

Realtime: 30.8
Livetime: 26.9
M40548-021 Structure # 6: Chrysotile
199
149
99
49
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

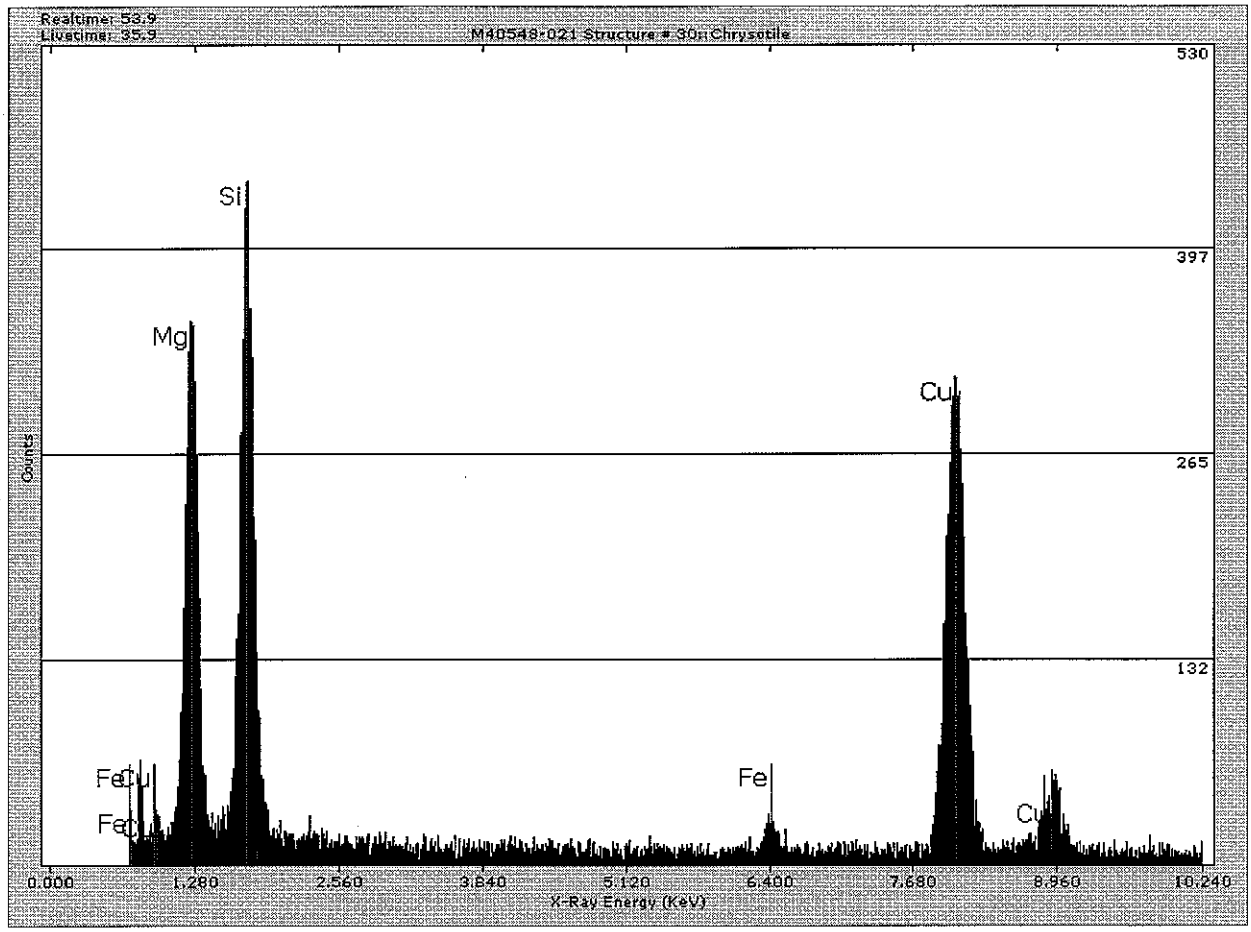

Realtime: 30.9
Livetime: 27.5
M40548-021 Structure # 7: Chrysotile
204
153
102
51
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

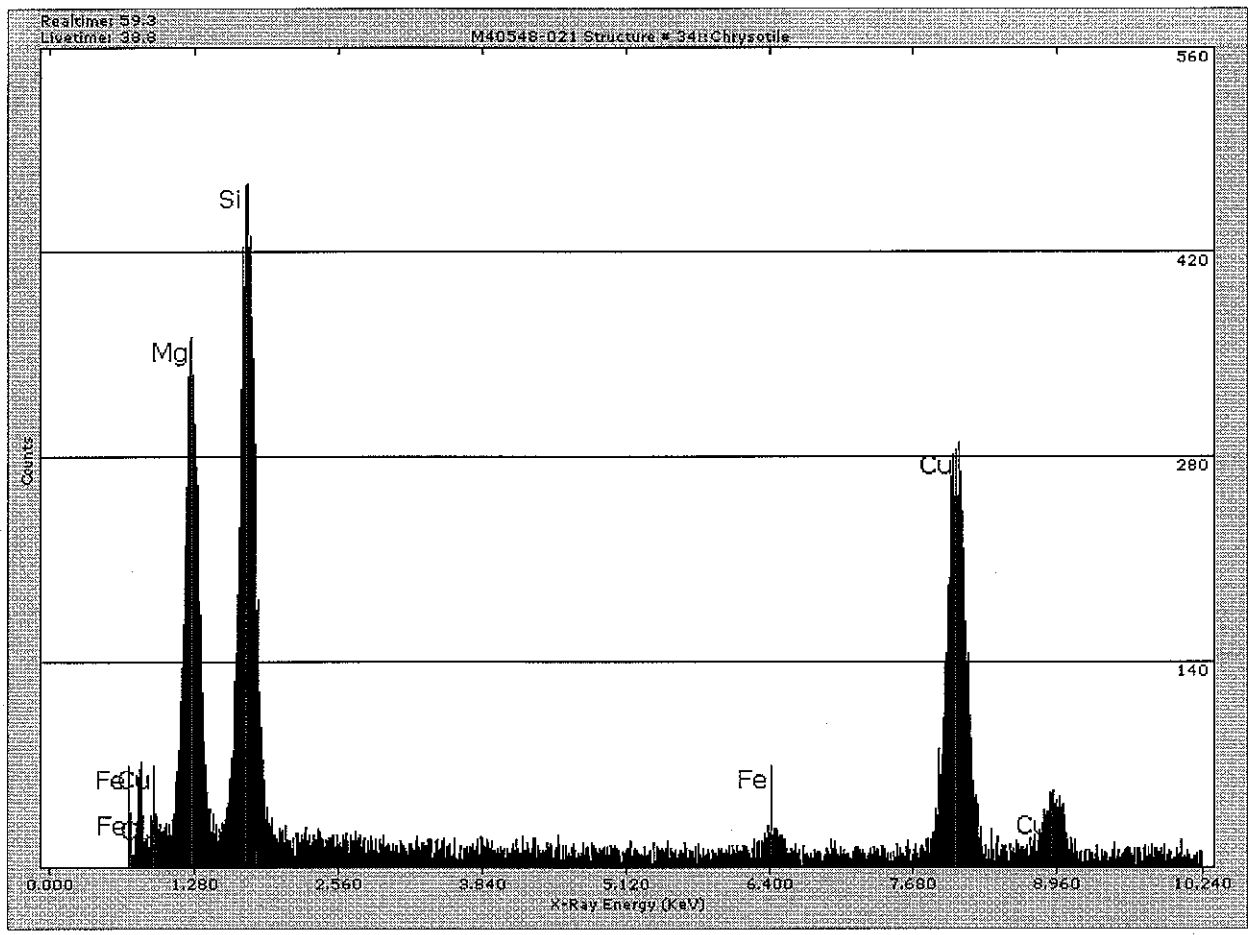

Realtime: 30.9
Livetime: 28.0
M40548-021 Structure # 9: Chrysotile
121
90
60
30
Counts
Si
Mg
Cu
Fe
Fe
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

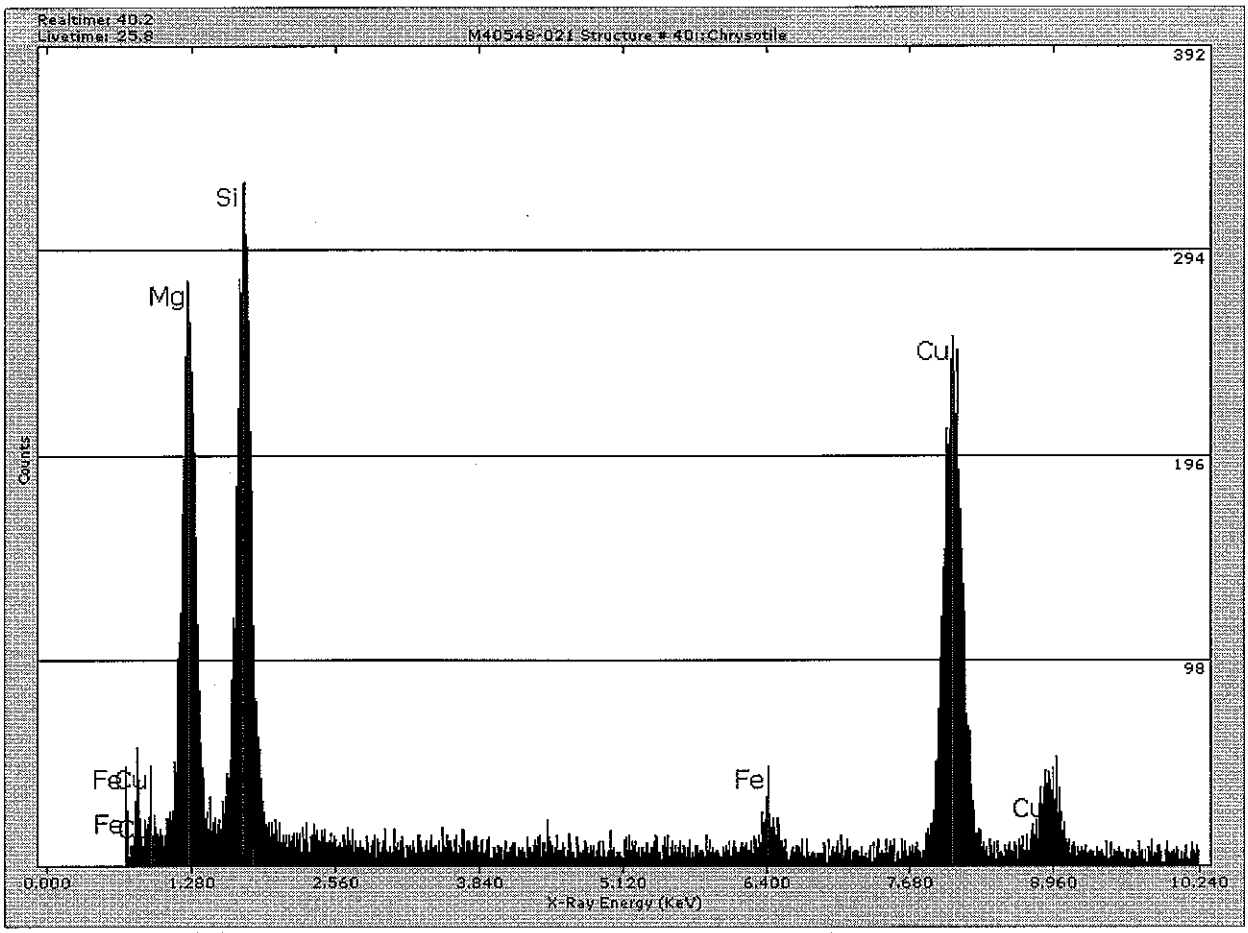

Realtime: 30.6
Livetime: 24.7
M40548-021 Structure # 9: Chrysotile
220
165
110
55
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

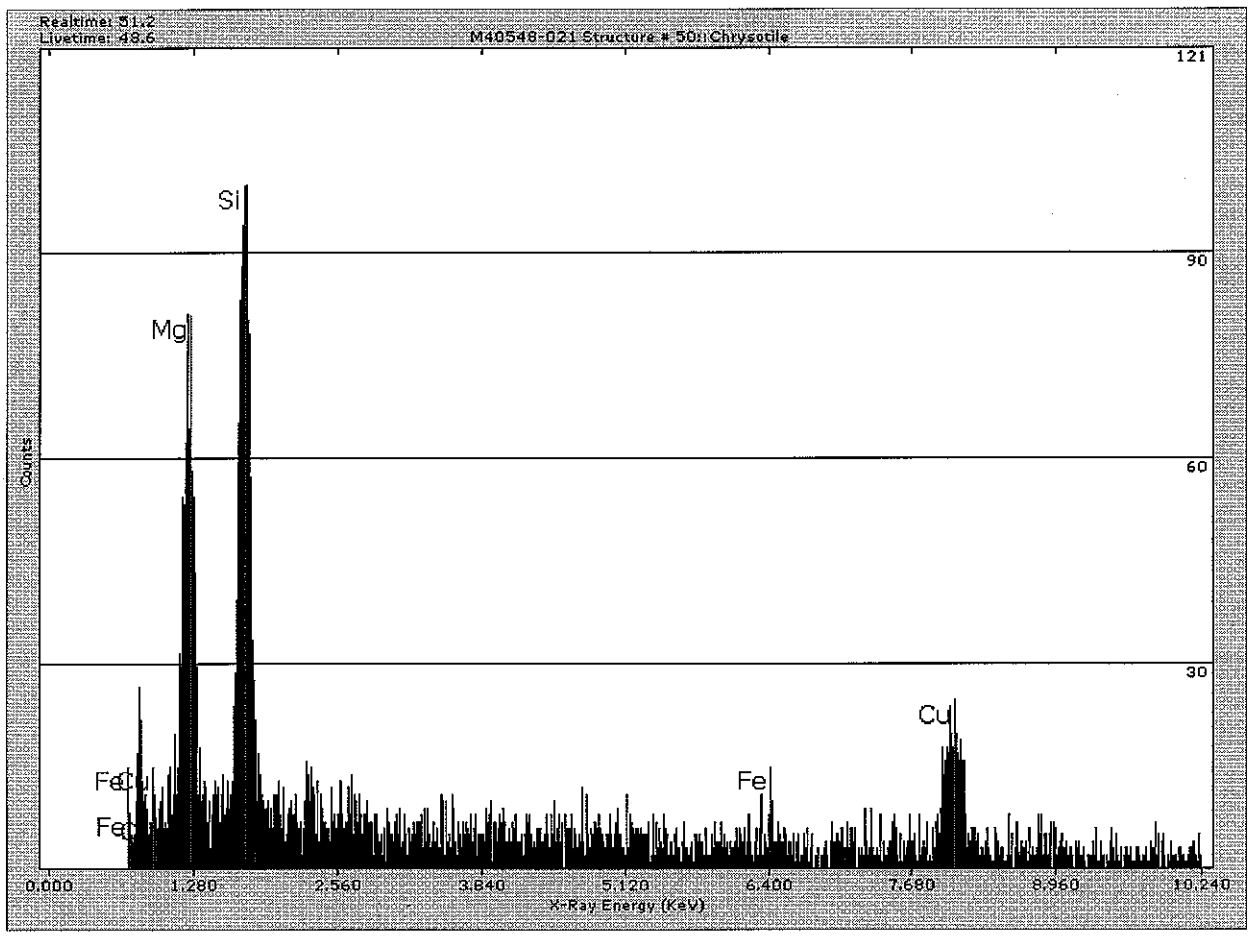

Realtime: 29.9
Livetime: 12.6
M40548-021 Structure # 10: Chrysotile
492
369
246
123
Counts
Si
Mg
Fe
Cu
Fe
Cu
Fe
Cu
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

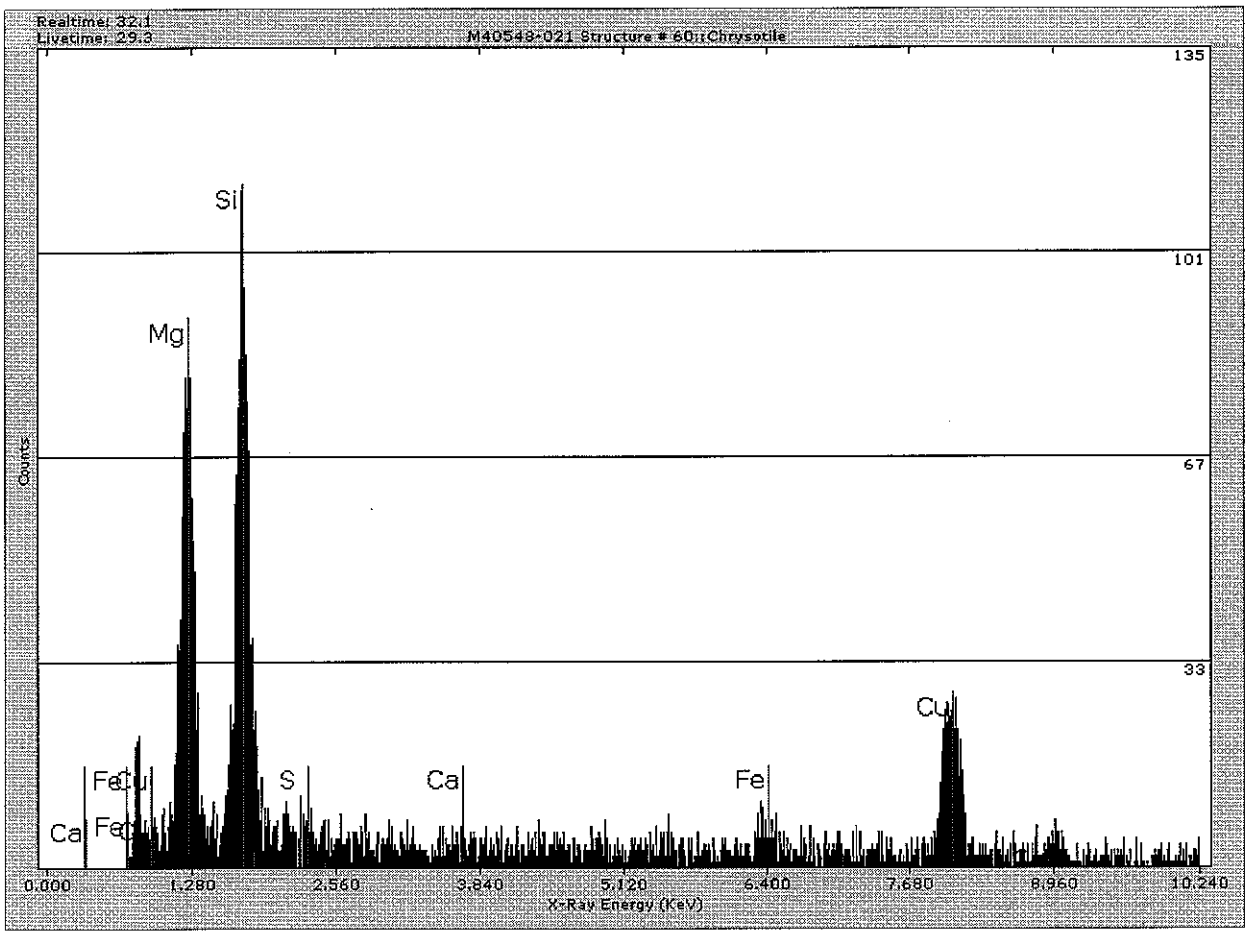

Realtime: 30.6
Livetime: 16.9
M40548-021 Structure * 20it:Chrysotile
470
352
235
117
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
C
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

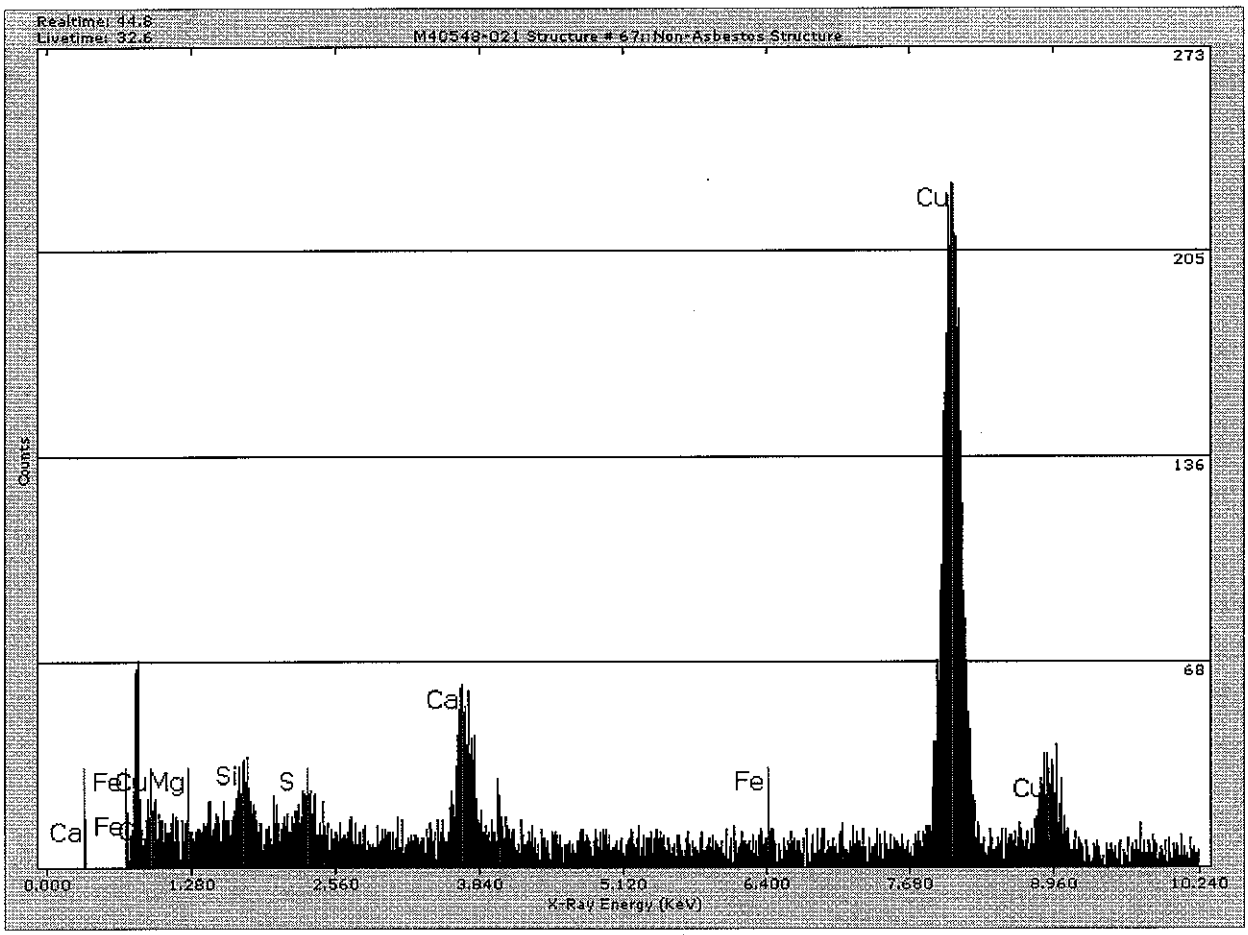

Realtime: 53.9
Livetime: 35.9
M40548-021 Structure # 30 Chrysotile
530
397
265
132
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

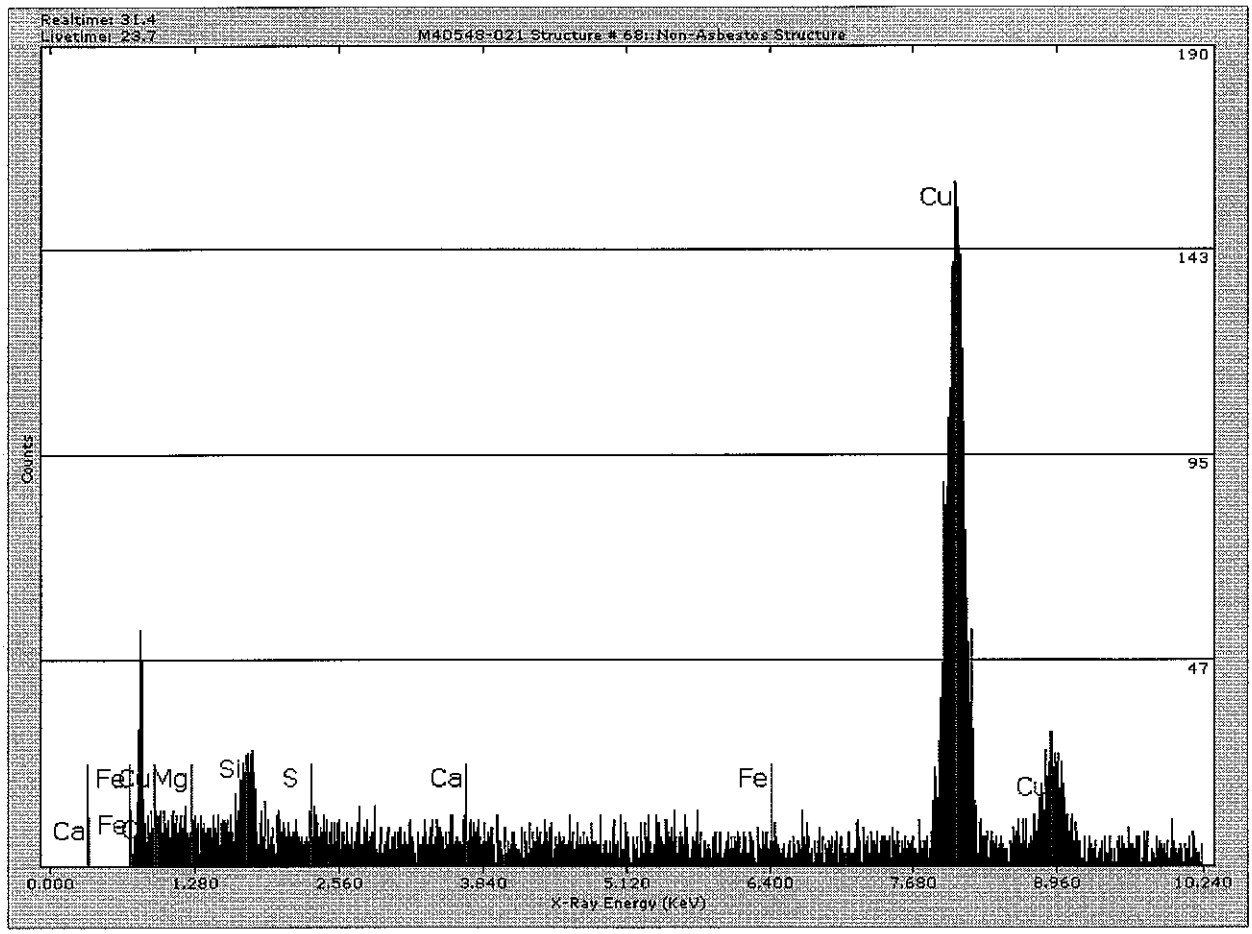

Realtime: 59.3
Livetime: 38.3
M40548-021 Structure # 34B Chrysotile
560
420
280
140
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

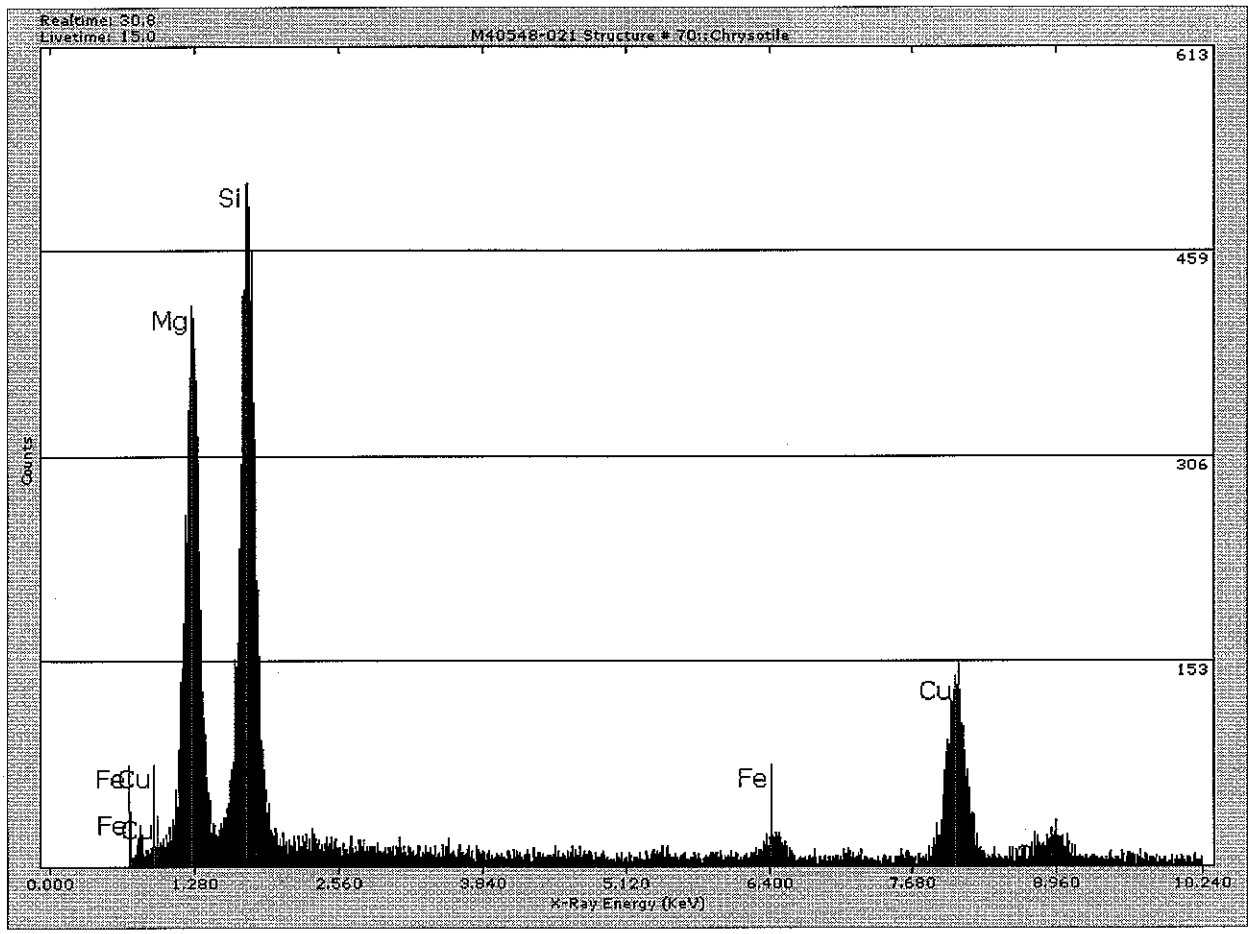

Realtime: 40.2
Livetime: 25.8
M40548-021 Structure # 40: Chrysotile
392
294
196
98
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

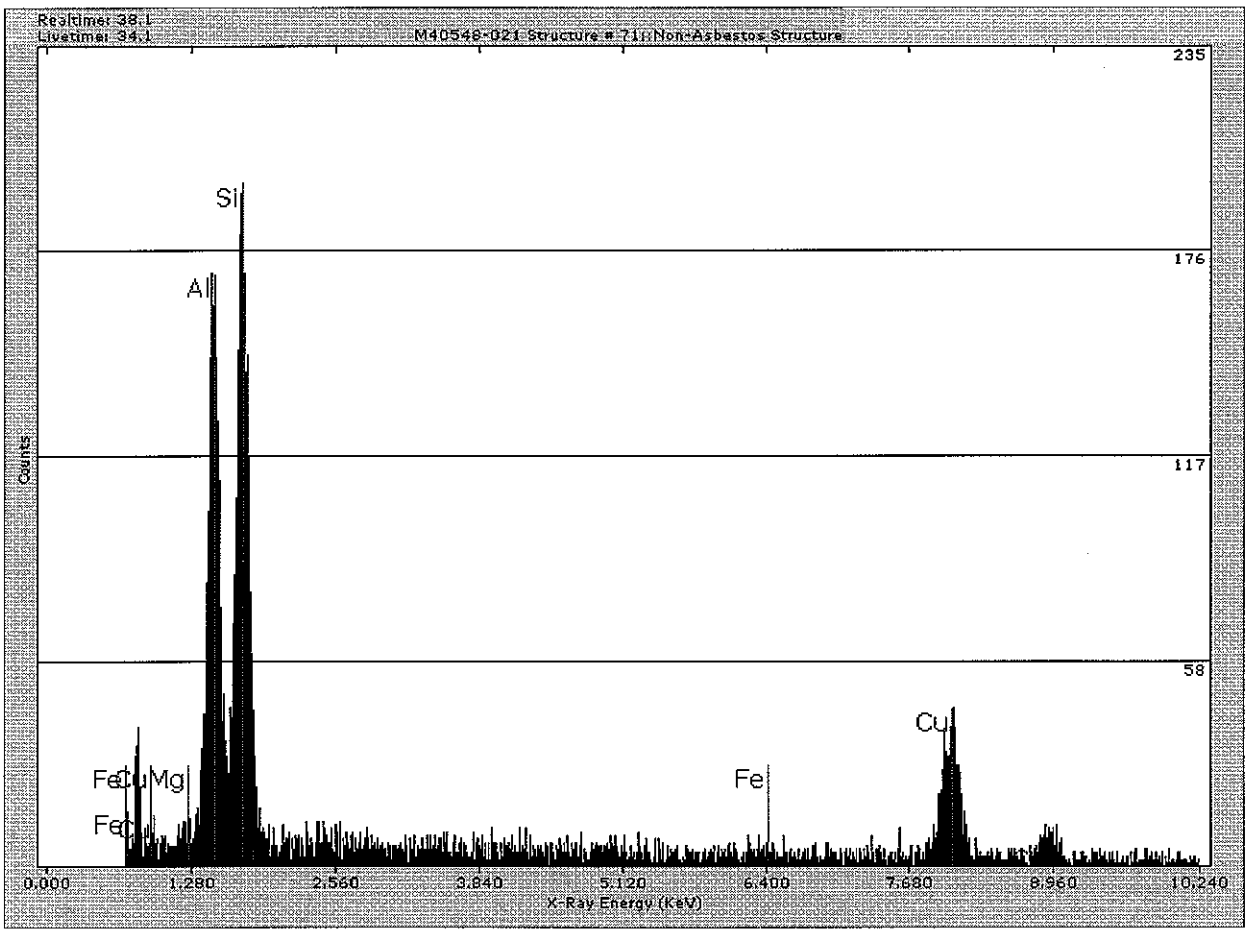

Realtime: 51.2
Livetime: 48.6
M40548-021 Structure + 50::Chrysotile
121
90
60
30
Counts
Si
Mg
Fe
Fe
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

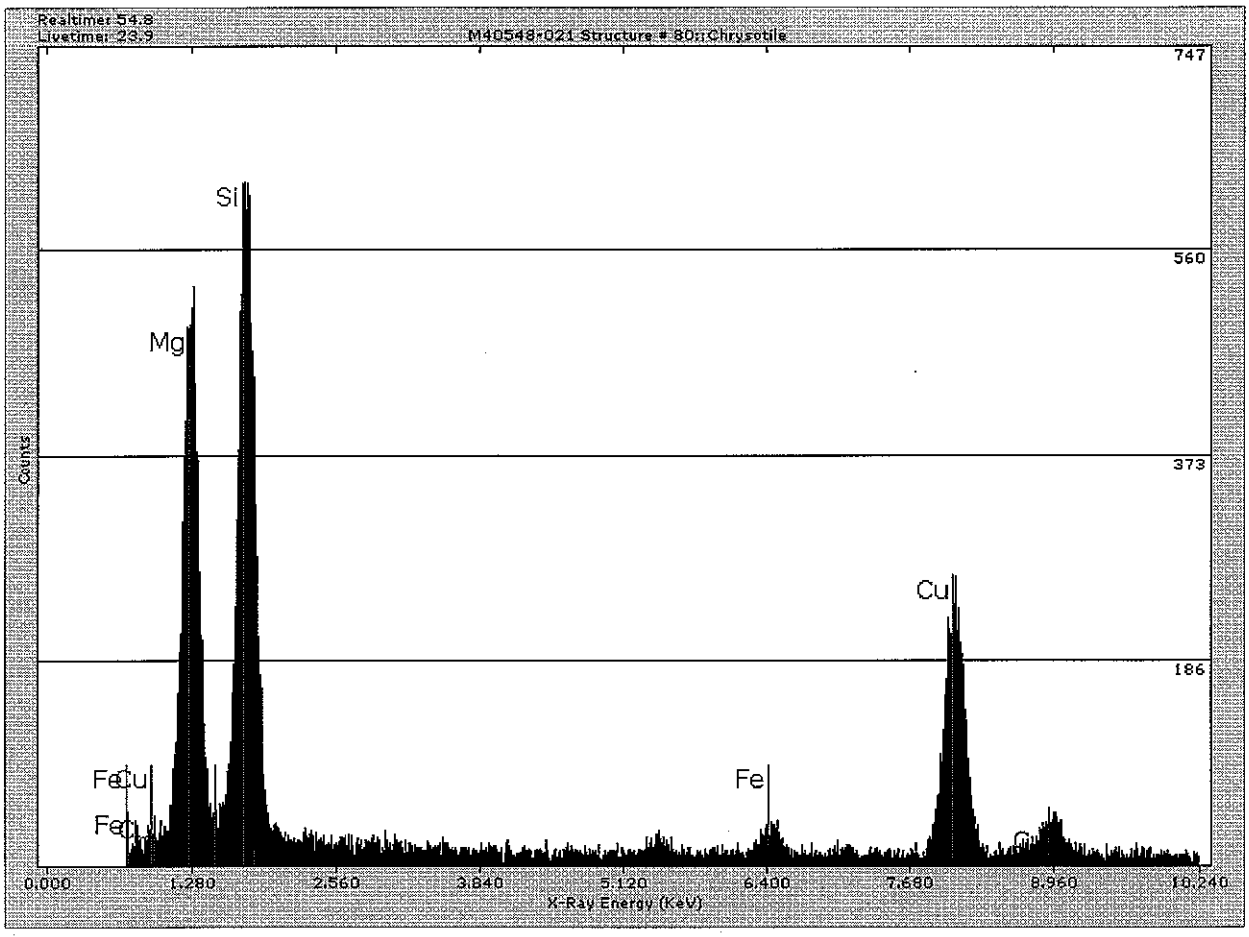

Realtime: 32.1
Livetime: 29.3
M40548-021 Structure # 60::Chrysotile
135
101
67
33
Counts
Si
Mg
Fe
Cu
Ca
Fe
S
Ca
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

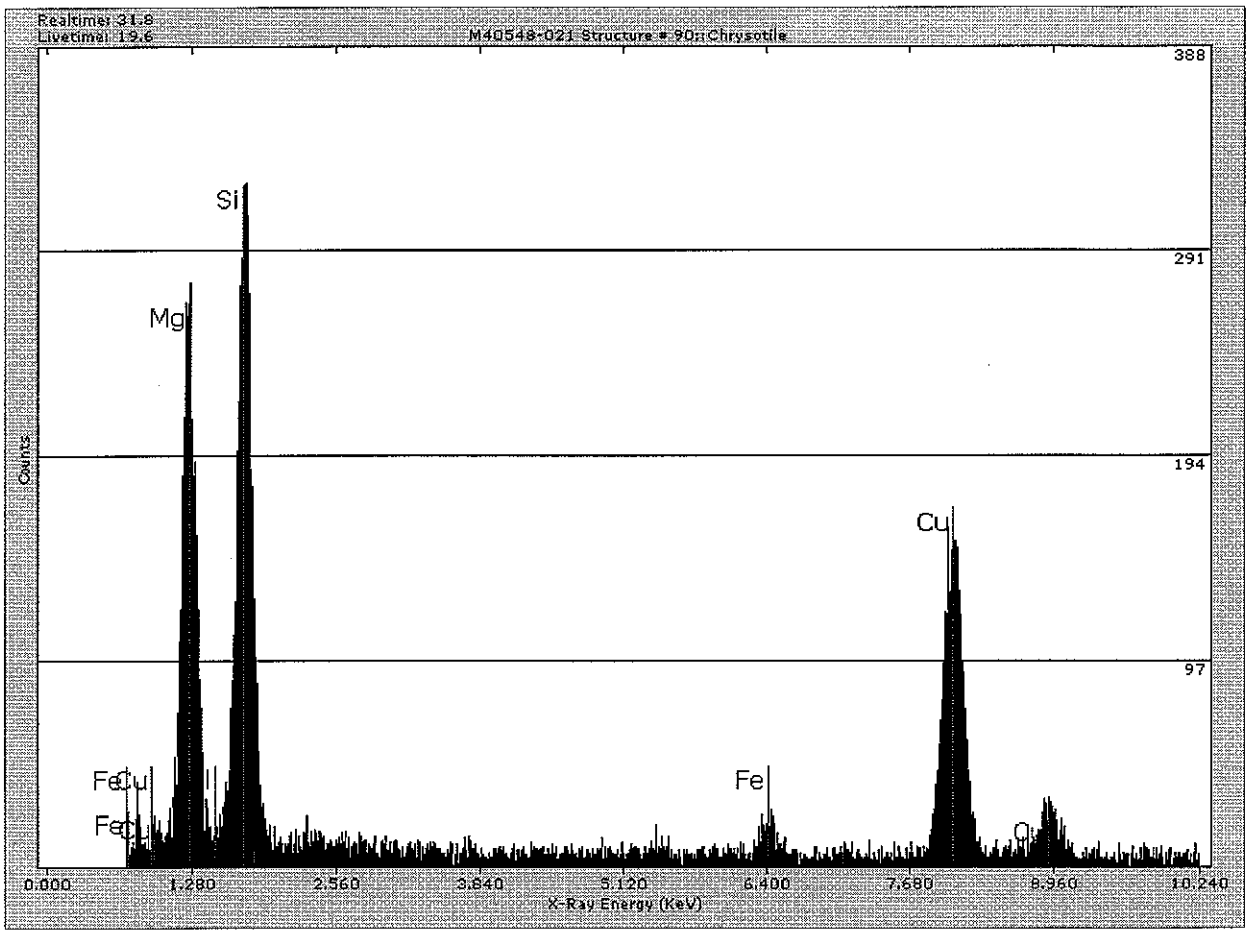

Realtime: 44.8
Livetime: 32.6
M40548-021 Structure # 67: Non-Asbestos Structure
273
205
136
68
Counts
Cu
Ca
Fe
Cu
Mg
Si
S
Ca
Fe
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

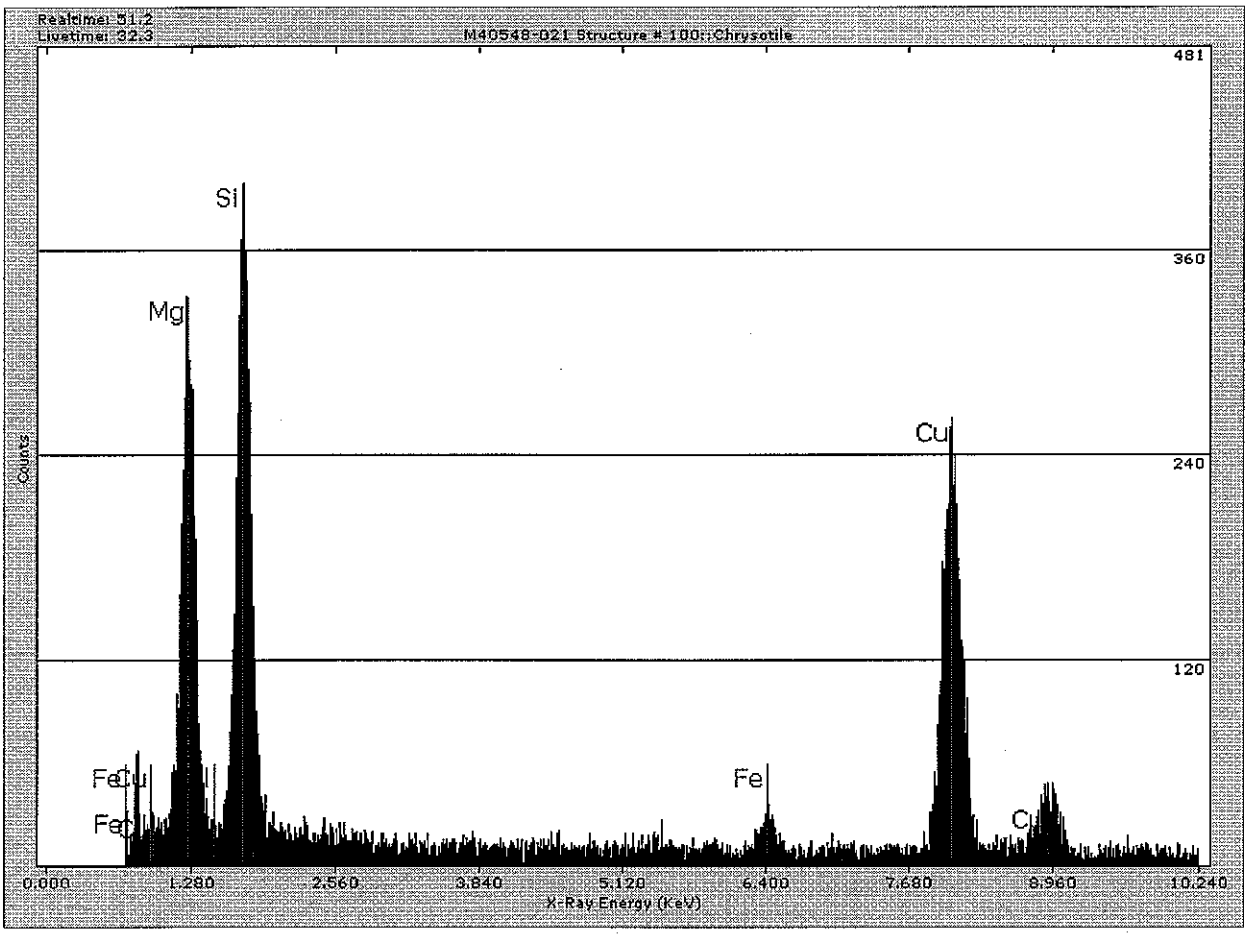

Realtime: 31.4
Livetime: 23.7
M40548-021 Structure # 68: Non-Asbestos Structure
190
143
95
47
Counts
Cu
Fe
Cu
Mg
Si
S
Ca
Fe
Cu
Ca
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 30.8
Livetime: 15.0
M40548-021 Structure # 70: Chrysotile
613
459
306
153
Counts
Si
Mg
Cu
Fe
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 38.1
Livetime: 34.1
M40548-021 Structure # 71: Non-Asbestos Structure
235
176
117
58
Counts
Si
Al
Mg
Fe
Fe
Fe
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtimer 54.8
Livetimer 23.9
M40548r021 Structure # 80::Chrysotile
747
560
373
186
Counts
Si
Mg
Cu
Fe
Cu
Fe
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 31.8
Livetime: 19.6
M40548-021 Structure # 90: Chrysotile
388
291
194
97
Counts
Si
Mg
Cu
Fe
Fe
Fe
Cu
O
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 51.2
Livetime: 32.3
M40548-021 Structure # 100: Chrysotile
481
360
240
120
Counts
Si
Mg
Cu
Fe
Cu
Fe
Fe
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

MAS TEM ANALYSIS M40548-024

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	FB-1

7402 ANALYSIS

Sample Area/ Volume:	0	Liters	Date Analyzed:	10/2/2006	
Filter Type:	MCE 25mm		Analyst:	Kevin Simpson	
Pore size:	0.8		Scope Number:	3	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	Yes	1 %	Grid_box:	7179	

Number of grids:	2	#1:	103	#3:	105	Asbestos	0
Number of openings:	40	#2:	106	#4:	104	Non-asbestos	0

Average Grid Size: 0.010919 Total Area Analyzed: 0.437

% Asbestos 0

Str#:	SquareID:	Fiber Type:		Size	Morph:	SAED:	EDS:
NSD	D3-I10						
NSD	I9						
NSD	I8						
NSD	I7						
NSD	I6						
NSD	I5						
NSD	I4						
NSD	I3						
NSD	I2						
NSD	I1						
NSD	H1						
NSD	H2						
NSD	H3						
NSD	H4						
NSD	H5						
NSD	H6						
NSD	H7						
NSD	H8						
NSD	H9						
NSD	H10						
NSD	D4-G1						
NSD	G2						
NSD	G3						
NSD	G4						
NSD	G5						
NSD	G6						
NSD	G7						
NSD	G8						

NSD	G9			
NSD	G10			
NSD	H10			
NSD	H9			
NSD	H8			
NSD	H7			
NSD	H6			
NSD	H5			
NSD	H4			
NSD	H3			
NSD	H2			
NSD	H1			

Grid Op

40

M40548 024 Sample Comments:

field blank

MAS TEM ANALYSIS M40548-025

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	FB-2

7402 ANALYSIS

Sample Area/ Volume:	0	Liters	Date Analyzed:	10/2/2006	
Filter Type:	MCE 25mm		Analyst:	Kevin Simpson	
Pore size:	0.8		Scope Number:	3	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	Yes	1 %	Grid_box:	7179	

Number of grids:	2	#1:	105	#3:	104	Asbestos	0
Number of openings:	40	#2:	103	#4:	106	Non-asbestos	0

Average Grid Size: 0.010920 Total Area Analyzed: 0.437

% Asbestos 0

Str#:	SquareID:	Fiber Type:	Size	Morph:	SAED:	EDS:
NSD	C4-I10					
NSD	I9					
NSD	I8					
NSD	I7					
NSD	I6					
NSD	I4					
NSD	I3					
NSD	I2					
NSD	I1					
NSD	G1					
NSD	H1					
NSD	H2					
NSD	H3					
NSD	H4					
NSD	H6					
NSD	H7					
NSD	H8					
NSD	H9					
NSD	H10					
NSD	G2					
NSD	C3-G10					
NSD	G9					
NSD	G8					
NSD	G7					
NSD	G6					
NSD	G5					
NSD	G4					
NSD	G3					

NSD	G2			
NSD	G1			
NSD	H1			
NSD	H2			
NSD	H3			
NSD	H4			
NSD	H5			
NSD	H6			
NSD	H7			
NSD	H8			
NSD	H9			
NSD	H10			

Grid Op

40

M40548 025 Sample Comments:

field blank

MAS TEM ANALYSIS M40548-026

CLIENT NAME:	Materials Analytical Services Atlanta	CLIENT SAMPLE ID:	FB-3

7402 ANALYSIS

Sample Area/ Volume:	0	Liters	Date Analyzed:	10/3/2006	
Filter Type:	MCE 25mm		Analyst:	Kevin Simpson	
Pore size:	0.8		Scope Number:	3	
Effective Filter Area:	385		Accelerating Voltage:	100	KV
Sample type:	Air		Indicated Mag:	25	KX
Analysis type:	7402		Screen Mag:	20	KX
Grid Acceptance	Yes	1 %	Grid_box:	7179	

Number of grids:	2	#1:	105	#3:	103	Asbestos	0
Number of openings:	40	#2:	104	#4:	106	*Non-asbestos*	0

Average Grid Size: 0.010919 Total Area Analyzed: 0.437

% Asbestos 0

Str#:	SquareID:	Fiber Type:		Size	Morph:	SAED:	EDS:
NSD	B3-F1						
NSD	F2						
NSD	F3						
NSD	F4						
NSD	F5						
NSD	F6						
NSD	F7						
NSD	F8						
NSD	F9						
NSD	F10						
NSD	H10						
NSD	H9						
NSD	H8						
NSD	H7						
NSD	H6						
NSD	H5						
NSD	H4						
NSD	H3						
NSD	H2						
NSD	H1						
NSD	B4-D10						
NSD	D9						
NSD	D8						
NSD	D7						
NSD	D6						
NSD	D5						
NSD	D4						
NSD	D3						

NSD	D2			
NSD	D1			
NSD	C1			
NSD	C2			
NSD	C3			
NSD	C4			
NSD	C5			
NSD	C6			
NSD	C7			
NSD	C8			
NSD	C9			
NSD	C10			

Grid Op

40

M40548 026 Sample Comments:

field blank

SECTION 6

MATERIALS ANALYTICAL SERVICES
PROJECT COC

MAS ID:	M40549	**Client Job No:**	
Client Name:	Materials Analytical Services Atlanta	**Client PO:**	
Project Name:	ECL Gasket Fabrication II	**Date In:**	9/19/2006
Logged By:	dmazzaferro	**Client Code:**	MASCORP

TRANSPORT INFORMATION:

Submitted By:	Michael D. Mount	**Documents:**	COC
Delivery By:	Hand Delivery		
Received By:	Nancy Sears	**Comments for COC:**	
Condition:	good		

CONTACT INFORMATION:

Contact:	Bill Longo			**Work Phone:** (770) 866-3200	**Ext:**
Title:	**First Name**	**Last Name:**	**Suffix**	**Other Phone**	**Ext:**
Mr.	William	Longo		**Fax:** (770) 866-3259	

SAMPLE INFORMATION:

#	Client ID	Volume	#	Client ID	Volume
001	FAB-1	33			
002	FAB-2	81			

SIGNATURES

RECEIVED BY:		**ANALYZED BY:**	
REVIEWED BY:		**REPORTED BY:**	
PREPARED BY:		**DEPOSED BY:**	

INDUSTRIAL HYGIENE AIR SAMPLING CHAIN OF CUSTODY

MAS.
3945 Lakefield Court
Suwanee, GA 30024
Phone: 770-866-3200
Fax: 770-866-3259

COMPANY NAME: Dept 14
ADDRESS:
PHONE:
FAX:

PROJECT NUMBER:
PROJECT NAME: Gasket Fabrication II
WORK AREA DESCRIPTION: ECL
PROJECT REPRESENTATIVE: M. Mount
SAMPLING DATE: 9/18/06

TURNAROUND TIMES: _____ 1 DAY _____ 3 DAYS _____ STANDARD 5 –7 DAYS

DATE	SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE MEDIA	ANALYSIS DESIRED	START TIME	STOP TIME	TOTAL TIME MINUTES	AVERAGE FLOW RATE LPM	AIR VOLUME (LITERS)
9/18/06	P-2-A	Reactor, Right, During Fab of File	MCE	7400, 7402	2:33	2:51	18	2.6	46.8
	B	Left,		7402	↓	↓	↓	2.48	44.6
	C	Right,						3.52	63.4
	D	Left						3.54	63.7
	FB-1	Field Blank		7402	—	—	—	—	0
	FB-2	↓		↓	—	—	—	—	0
M40649	FB-3	↓	↓	↓	—	—	—	—	0
	FAB-1	Shirt Before		EPA Fabric Method	—	—	—	—	
	FAB-2	Shirt After		↓	—	—	—	—	
									CM²
	MV-1	Dust from side of pipe	.45 MCE	ASTM 5557	—	—	—	—	100
M40650	MV-2	↓ ↓ Flange face	↓	↓ ↓	—	—	—	—	400

CHAIN OF CUSTODY	NAME	COMPANY	MODE OF TRANSFER	LOG IN DATE	RECEIVED BY	COMPANY
First Transfer by:	Michael D Mount	MAS 9/18/06	Hand	9/19/06	Rangsean	MAS
Second Transfer by:						
Third Transfer by:						

TEM DUST ANALYSIS M40549 000

Materials Analytical Services Atlanta
ECL Gasket Fabrication II

Client Sample ID: lab blank

Sample Area/ Volume:	0 cm2	**Date Analyzed:**	12/13/2006
Filter Type:	MCE 47mm	**Analyst:**	Mehrdad Motamedi
Pore size:	0.45	**Scope Number:**	4
Effective Filter Area:	1297	**Accelerating Voltage:**	100 KV
Sample type:	Fabric	**Indicated Mag:**	25 KX
Analysis type:	Dust	**Screen Mag:**	20 KX
Grid Acceptance	YES 2 %	**Grid_box:**	7178

Str < 5um:	0	**Number of grids:**	2	#1: 101	#3: 101	**Average Grid Size:**	0.010201
Str ≥5um:	0	**Number of openings:**	10	#2: 101	#4: 101	**Total Area Analyzed:**	0.102
Total Str:	0						

Volume Filtered 100 ml
Dilution Factor 2

Str / sqr ft	#Error	**Str / cm2**	#Error
Str / sqr ft >=5	0.000E+00	**Str / cm2 >=5**	0.000E+00

Str#	Grid ID	Serp	Other	Structure	Length	Width	Morph	SAED	EDS	Photo	Sketch
	E2-I6			NSD					☐	☐	☐
	H7			NSD					☐	☐	☐
	G8			NSD					☐	☐	☐
	F9			NSD					☐	☐	☐
	C9			NSD					☐	☐	☐
	D2-I5			NSD					☐	☐	☐
	G8			NSD					☐	☐	☐
	D7			NSD					☐	☐	☐
	E4			NSD					☐	☐	☐
	H4			NSD					☐	☐	☐

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

TEM DUST ANALYSIS M40549 001

Materials Analytical Services Atlanta
ECL Gasket Fabrication II

Client Sample ID: FAB-1

Sample Area/ Volume:	33 cm2	**Date Analyzed:**	12/13/2006
Filter Type:	MCE 47mm	**Analyst:**	Mehrdad Motamedi
Pore size:	0.45	**Scope Number:**	4
Effective Filter Area:	1297	**Accelerating Voltage:**	100 KV
Sample type:	Fabric	**Indicated Mag:**	25 KX
Analysis type:	Dust	**Screen Mag:**	20 KX
Grid Acceptance	YES 5 %	**Grid_box:**	7223

Str < 5um:	2	**Number of grids:**	2	**#1:** 103	**#3:** 102	**Average Grid Size:**	0.010352
Str ≥5um:	0	**Number of openings:**	10	**#2:** 100	**#4:** 102	**Total Area Analyzed:**	0.104
Total Str:	2						

Volume Filtered	100 ml	**Str / sqr ft**	1.764E+06
Dilution Factor	2.5	**Str / sqr ft >=5**	0.000E+00

Str / cm2	1.898E+03		
Str / cm2 >=5	0.000E+00		

Str#	SquareID: Grid ID	Type: Serp	Other	Structure: Structure	Length Length	Width Width	Morph: Morph	SAED: SAED	EDS: EDS	Photo: Photo	Sketch: Sketch
	A9-B5			NSD					☐	☐	☐
	D7			NSD					☐	☐	☐
	G6			NSD					☐	☐	☐
	H3			NSD					☐	☐	☐
1	E4	C		F	3.50	0.06	X	X	☑	☐	☐
	B9-E8			NSD					☐	☐	☐
	C6			NSD					☐	☐	☐
	E4			NSD					☐	☐	☐
	G5			NSD					☐	☐	☐
2	H7	C		F	2.20	0.10	X	X	☑	☐	☐

M40549 001

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

TEM DUST ANALYSIS M40549 002

Materials Analytical Services Atlanta
ECL Gasket Fabrication II

Client Sample ID: FAB-2

Sample Area/ Volume:	81 cm2	**Date Analyzed:**	12/13/2006
Filter Type:	MCE 47mm	**Analyst:**	Mehrdad Motamedi
Pore size:	0.45	**Scope Number:**	4
Effective Filter Area:	1297	**Accelerating Voltage:**	100 KV
Sample type:	Fabric	**Indicated Mag:**	25 KX
Analysis type:	Dust	**Screen Mag:**	20 KX
Grid Acceptance	YES 4 %	**Grid_box:**	7178

Str < 5um:	88	**Number of grids:**	2	#1: 103	#3: 103	**Average Grid Size:**	0.010455
Str ≥5um:	14	**Number of openings:**	5	#2: 101	#4: 102	**Total Area Analyzed:**	0.052
Total Str:	102						

Volume Filtered 10 ml
Dilution Factor 25

Str / sqr ft	7.257E+08	**Str / cm2**	7.812E+05
Str / sqr ft >=5	9.960E+07	**Str / cm2 >=5**	1.072E+05

Str#	Grid ID	Serp	Other	Structure	Length	Width	Morph	SAED	EDS	Photo	Sketch
1	A6-H9	C		F	2.40	0.10	X	X	☑	☐	☐
2		C		B	3.50	0.80	X	X	☑	☐	☐
3		C		F	2.00	0.10	X	X	☑	☐	☐
4		C		F	2.00	0.10	X	X	☑	☐	☐
5		C		F	1.30	0.10	X	X	☑	☐	☐
6		C		F	1.70	0.10	X	X	☑	☐	☐
7		C		B	5.40	0.60	X	X	☑	☐	☐
8		C		F	2.00	0.20	X	X	☑	☐	☐
9		C		F	0.80	0.05	X	X	☑	☐	☐
10		C		F	2.20	0.05	X	X	☑	☐	☐
11	F8	C		F	12.00	0.10	X		☐	☐	☐
12		C		F	4.00	0.05	X		☐	☐	☐

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

Str#:	SquareID:	Type:	Structure:	Length	Width	Morph:	SAED:	EDS:	Photo:	Sketch:
13		C	F	2.40	0.05	X		☐	☐	☐
14		C	F	4.20	0.05	X		☐	☐	☐
15		C	F	2.00	0.10	X		☐	☐	☐
16		C	M-F	2.00	0.05	X		☐	☐	☐
17		C	C-F	2.80	0.10	X		☐	☐	☐
18		C	C-B	2.00	0.60	X		☐	☐	☐
19		C	C-B	4.00	0.50	X		☐	☐	☐
20		C	F	2.00	0.10	X	X	☑	☐	☐
21		C	F	1.00	0.10	X		☐	☐	☐
22		C	C-B	2.30	0.30	X		☐	☐	☐
23		C	F	1.50	0.05	X		☐	☐	☐
24		C	F	1.30	0.05	X		☐	☐	☐
25		C	C-B	7.00	1.00	X		☐	☐	☐
26		C	F	0.60	0.02	X		☐	☐	☐
27		C	F	1.80	0.05	X		☐	☐	☐
28		C	M-F	0.80	0.05	X		☐	☐	☐
29		C	F	6.60	0.05	X		☐	☐	☐
30		C	F	3.70	0.10	X	X	☑	☐	☐
31		C	M-F	6.00	0.20	X		☐	☐	☐
32		C	M-F	2.70	0.05	X		☐	☐	☐
33		C	B	6.80	0.40	X		☐	☐	☐
34		C	M-F	0.60	0.05	X		☐	☐	☐

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

Str#:	SquareID:	Type:	Structure:	Length	Width	Morph:	SAED:	EDS:	Photo:	Sketch:
35		C	F	7.20	0.05	X		☐	☐	☐
36		C	F	0.60	0.02	X		☐	☐	☐
37	C6	C	M-B	1.20	0.20	X		☐	☐	☐
38		C	F	0.60	0.03	X		☐	☐	☐
39		C	M-F	0.70	0.05	X		☐	☐	☐
40		C	C-B	1.80	0.30	X	X	☑	☐	☐
41		C	B	5.60	0.30	X		☐	☐	☐
42		C	F	1.70	0.03	X		☐	☐	☐
43		C	F	3.80	0.20	X		☐	☐	☐
44		C	F	2.80	0.10	X		☐	☐	☐
45		C	F	3.30	0.10	X		☐	☐	☐
46		C	F	13.70	0.05	X		☐	☐	☐
47	D4	C	F	5.70	0.03	X		☐	☐	☐
48		C	F	10.40	0.20	X		☐	☐	☐
49		C	C-F	1.50	0.05	X		☐	☐	☐
50		C	F	0.70	0.05	X	X	☑	☐	☐
51		C	F	1.30	0.10	X		☐	☐	☐
52		C	F	2.50	0.10	X		☐	☐	☐
53		C	F	1.80	0.10	X		☐	☐	☐
54		C	F	2.00	0.10	X		☐	☐	☐
55		C	F	0.90	0.05	X		☐	☐	☐
56		C	F	1.00	0.10	X		☐	☐	☐

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

Str#:	SquareID:	Type:	Structure:	Length	Width	Morph:	SAED:	EDS:	Photo:	Sketch:
57		C	F	3.50	0.50	X		☐	☐	☐
58		C	F	0.90	0.05	X		☐	☐	☐
59		C	F	0.60	0.03	X		☐	☐	☐
60		C	F	1.50	0.10	X	X	☑	☐	☐
61		C	M-F	1.40	0.10	X		☐	☐	☐
62		C	F	4.00	0.10	X		☐	☐	☐
63		C	M-F	1.20	0.05	X		☐	☐	☐
64		C	F	1.70	0.10	X		☐	☐	☐
65		C	F	2.30	0.02	X		☐	☐	☐
66		C	F	1.80	0.10	X		☐	☐	☐
67		C	B	1.80	0.20	X		☐	☐	☐
68		C	F	2.40	0.10	X		☐	☐	☐
69		C	F	4.00	0.10	X		☐	☐	☐
70		C	F	2.20	0.05	X	X	☑	☐	☐
71		C	F	1.50	0.05	X		☐	☐	☐
72		C	F	7.60	0.10	X		☐	☐	☑
73		C	F	0.70	0.10	X		☐	☐	☐
74		C	B	22.00	0.50	X		☐	☐	☐
75	B6-I6	C	F	1.80	0.10	X		☐	☐	☐
76		C	F	1.50	0.05	X		☐	☐	☐
77		C	F	4.00	0.10	X		☐	☐	☐
78		C	F	2.30	0.05	X		☐	☐	☐

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NSD - No Structure Detected
F - Fiber
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M - Matrix
C - Cluster

Str#:	SquareID:	Type:	Structure:	Length	Width	Morph:	SAED:	EDS:	Photo:	Sketch:
79		C	M-F	2.00	0.10	X		☐	☐	☐
80		C	F	0.70	0.10	X	X	☑	☐	☐
81		C	F	3.60	0.05	X		☐	☐	☐
82		C	F	1.30	0.10	X		☐	☐	☐
83		C	F	0.60	0.05	X		☐	☐	☐
84		C	M-F	0.60	0.10	X		☐	☐	☐
85		C	F	1.00	0.10	X		☐	☐	☐
86		C	B	12.30	0.40	X		☐	☐	☐
87		C	F	2.20	0.10	X		☐	☐	☐
88		C	F	0.90	0.10	X		☐	☐	☐
89		C	M-F	1.40	0.05	X		☐	☐	☐
90		C	M-F	0.70	0.05	X	X	☑	☐	☐
91		C	F	0.70	0.05	X		☐	☐	☐
92		C	F	2.50	0.10	X		☐	☐	☐
93		C	F	0.70	0.05	X		☐	☐	☐
94		C	F	0.60	0.10	X		☐	☐	☐
95		C	C-B	3.70	0.20	X		☐	☐	☐
96		C	F	0.60	0.02	X		☐	☐	☐
97		C	F	0.70	0.03	X		☐	☐	☐
98		C	F	0.80	0.03	X		☐	☐	☐
99		C	F	1.00	0.02	X		☐	☐	☐
100		C	F	0.70	0.10	X	X	☑	☐	☐

C - Chrysotile
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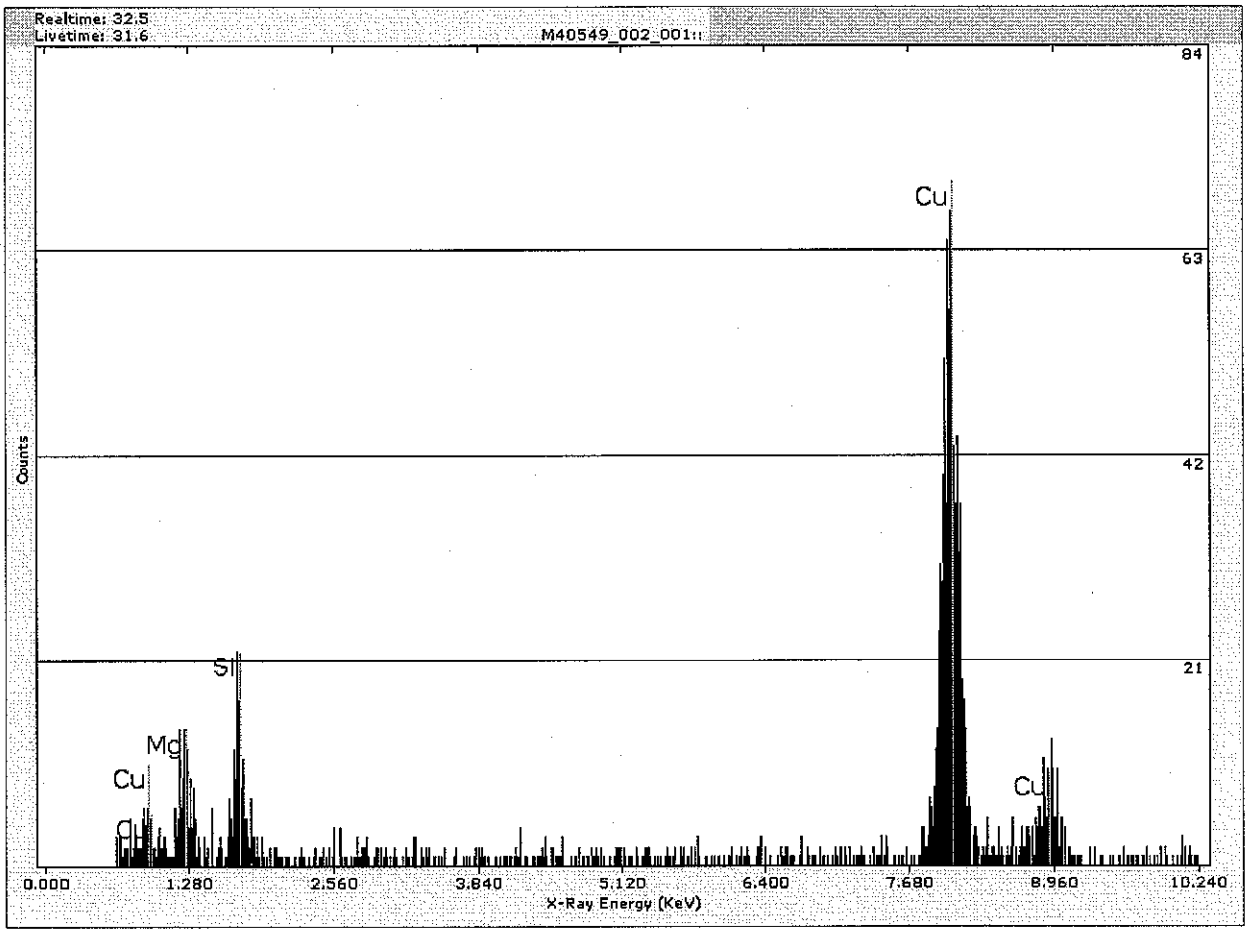
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

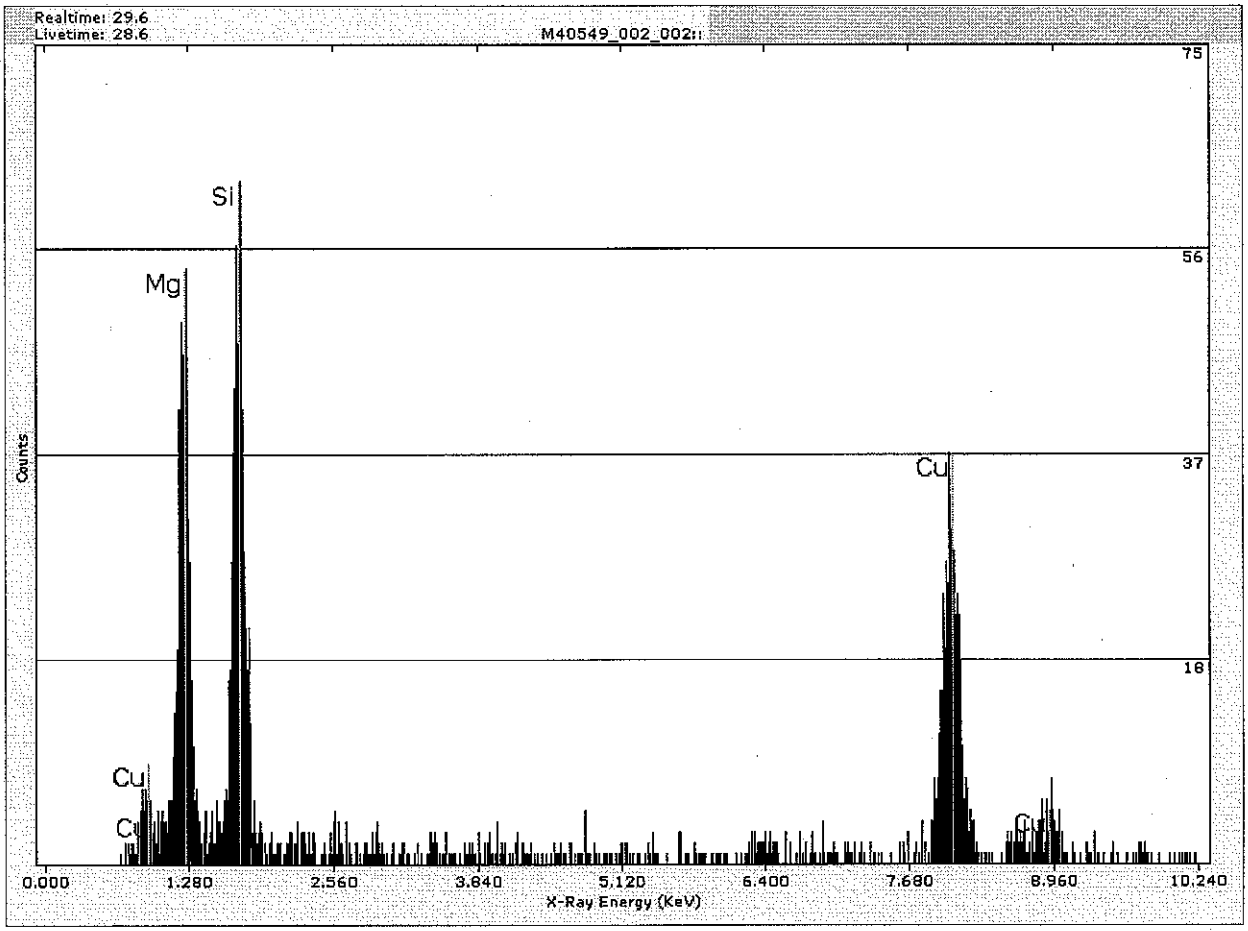
NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

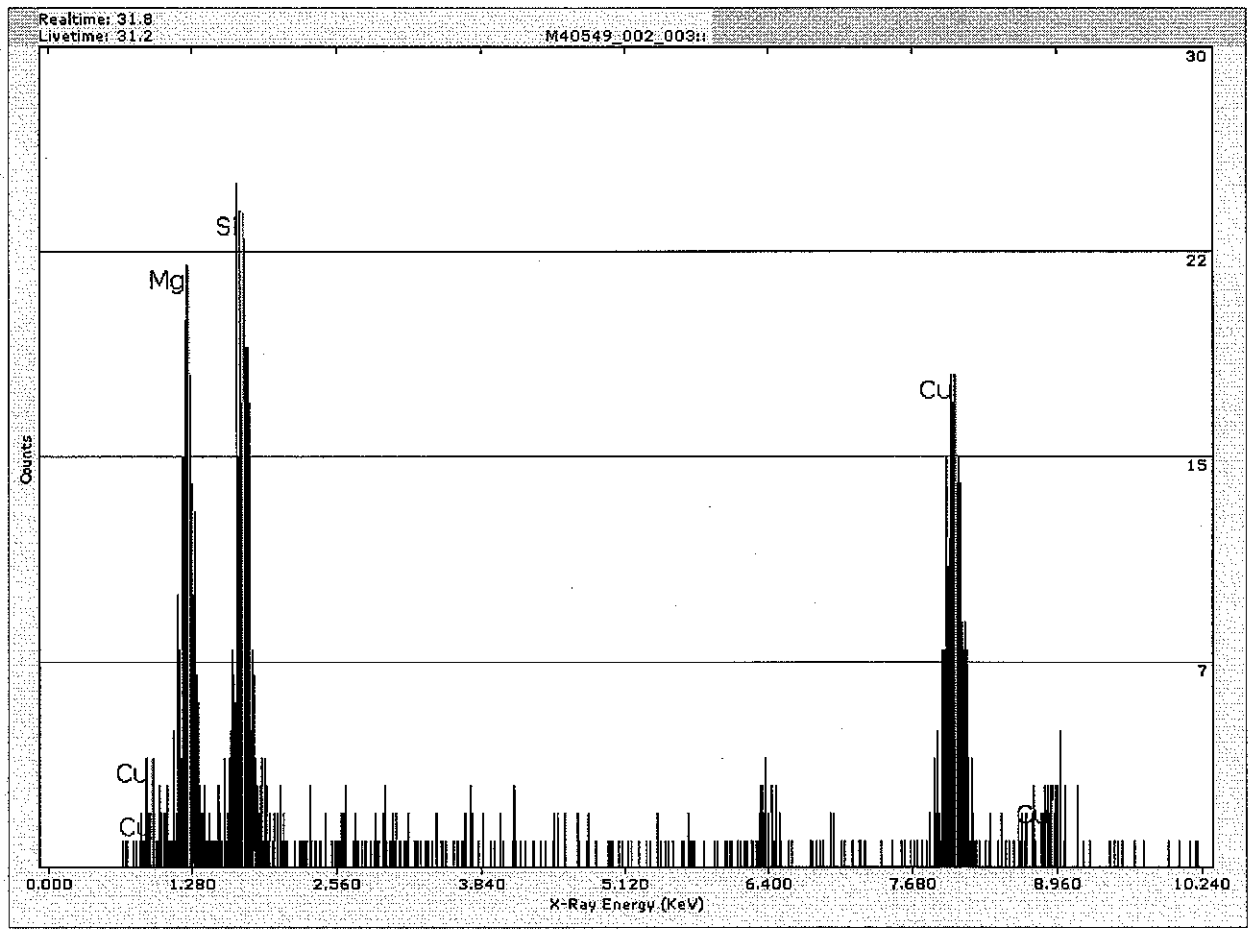
Str#:	SquareID:	Type:	Structure:	Length	Width	Morph:	SAED:	EDS:	Photo:	Sketch:
101		C	F	0.60	0.05	X		☐	☐	☐
102		C	F	0.70	0.02	X		☐	☐	☐
								☐	☐	☐
									M40549	002

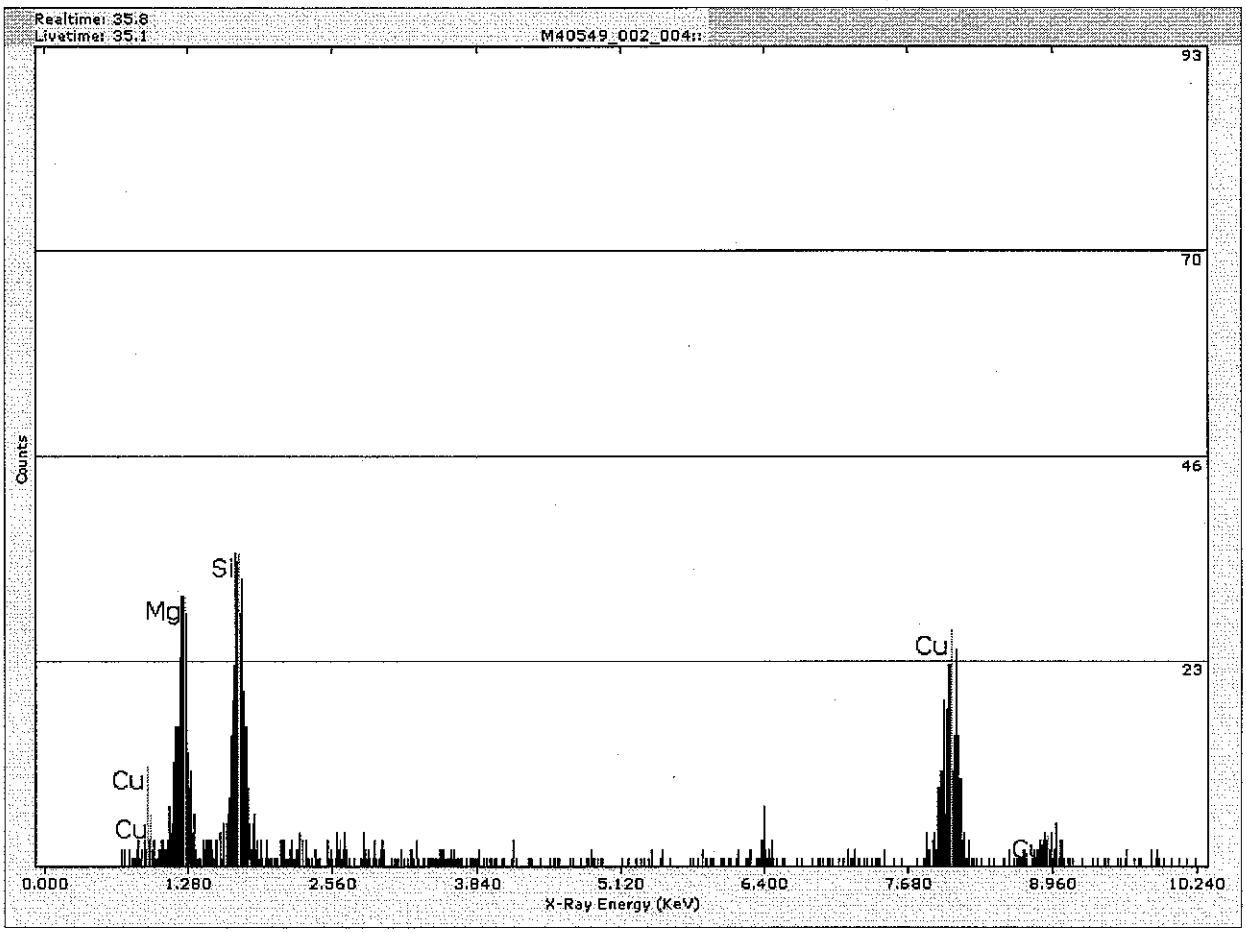
C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

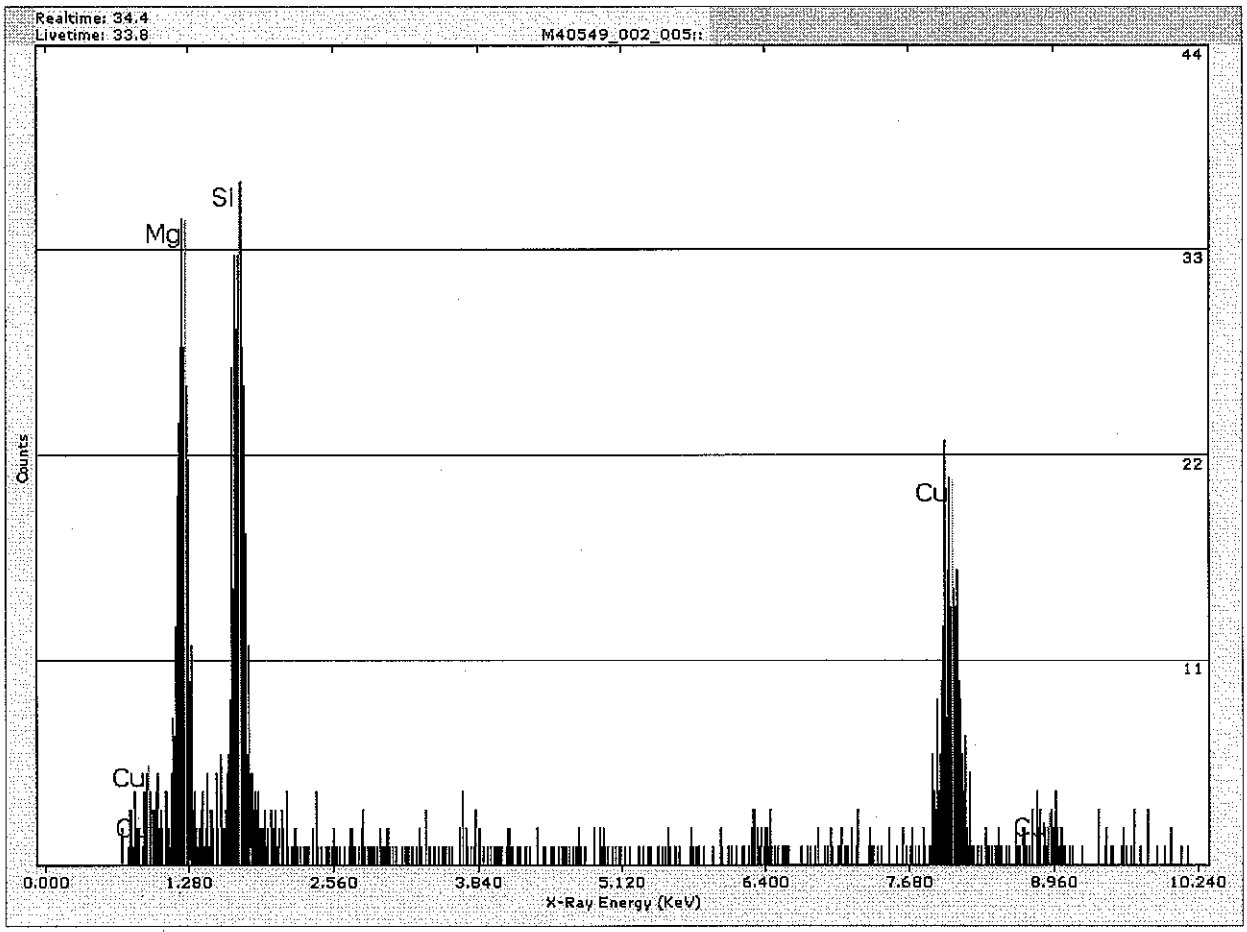
NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

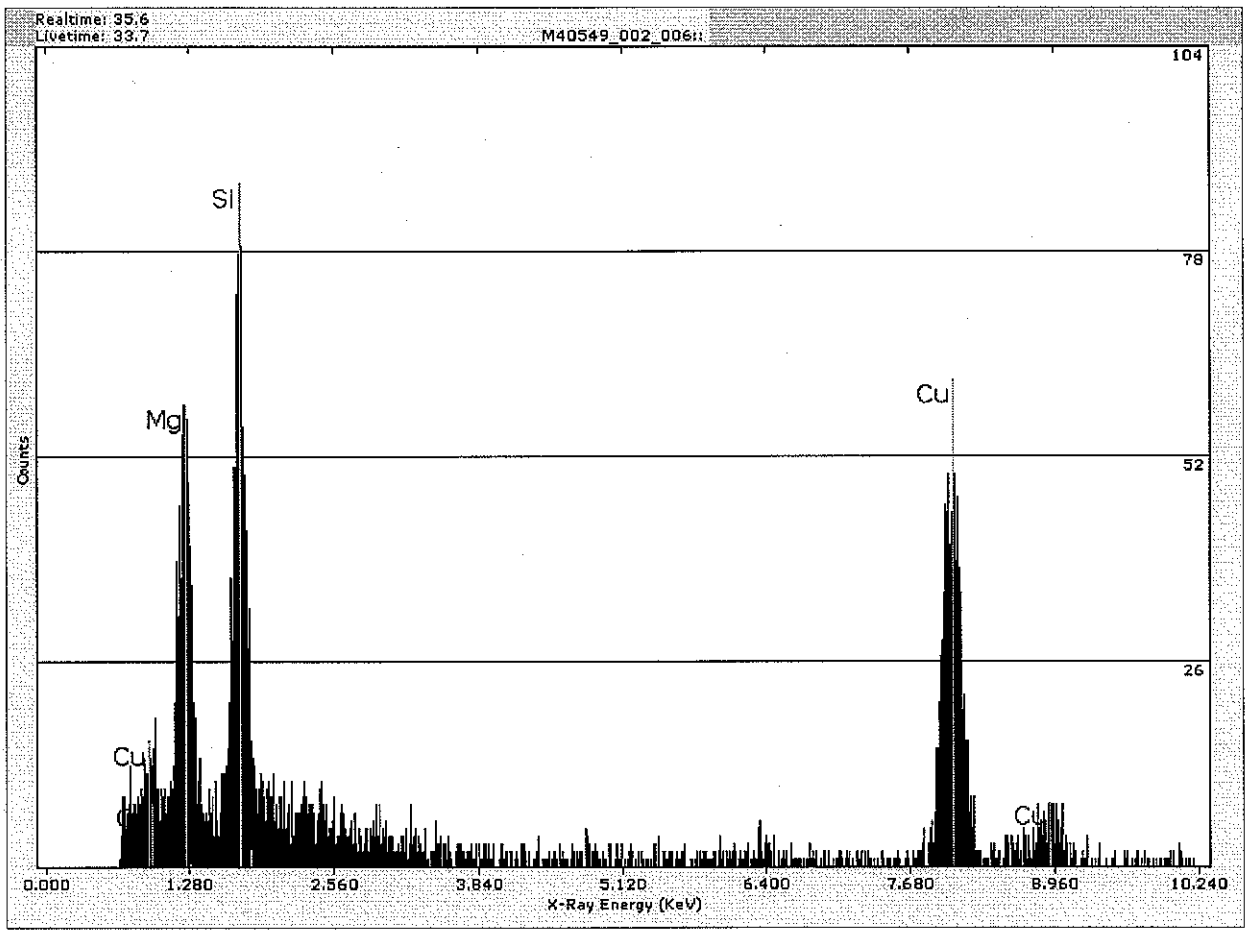

Realtime: 32.5
Livetime: 31.6
M40549_002_001::
84
63
42
21
Counts
Cu
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

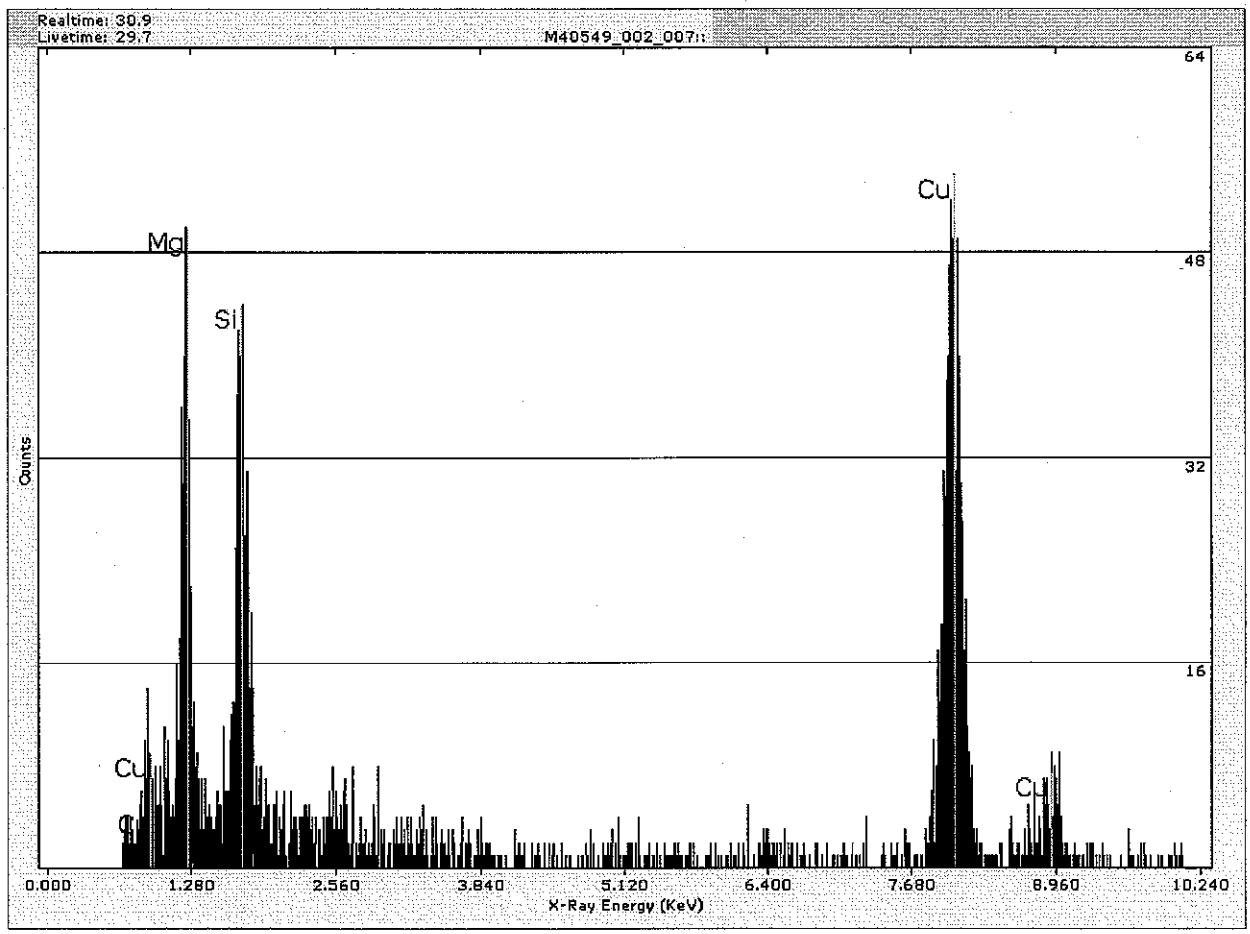

Realtime: 29.6
Livetime: 28.6
M40549_002_002.:
75
56
37
18
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

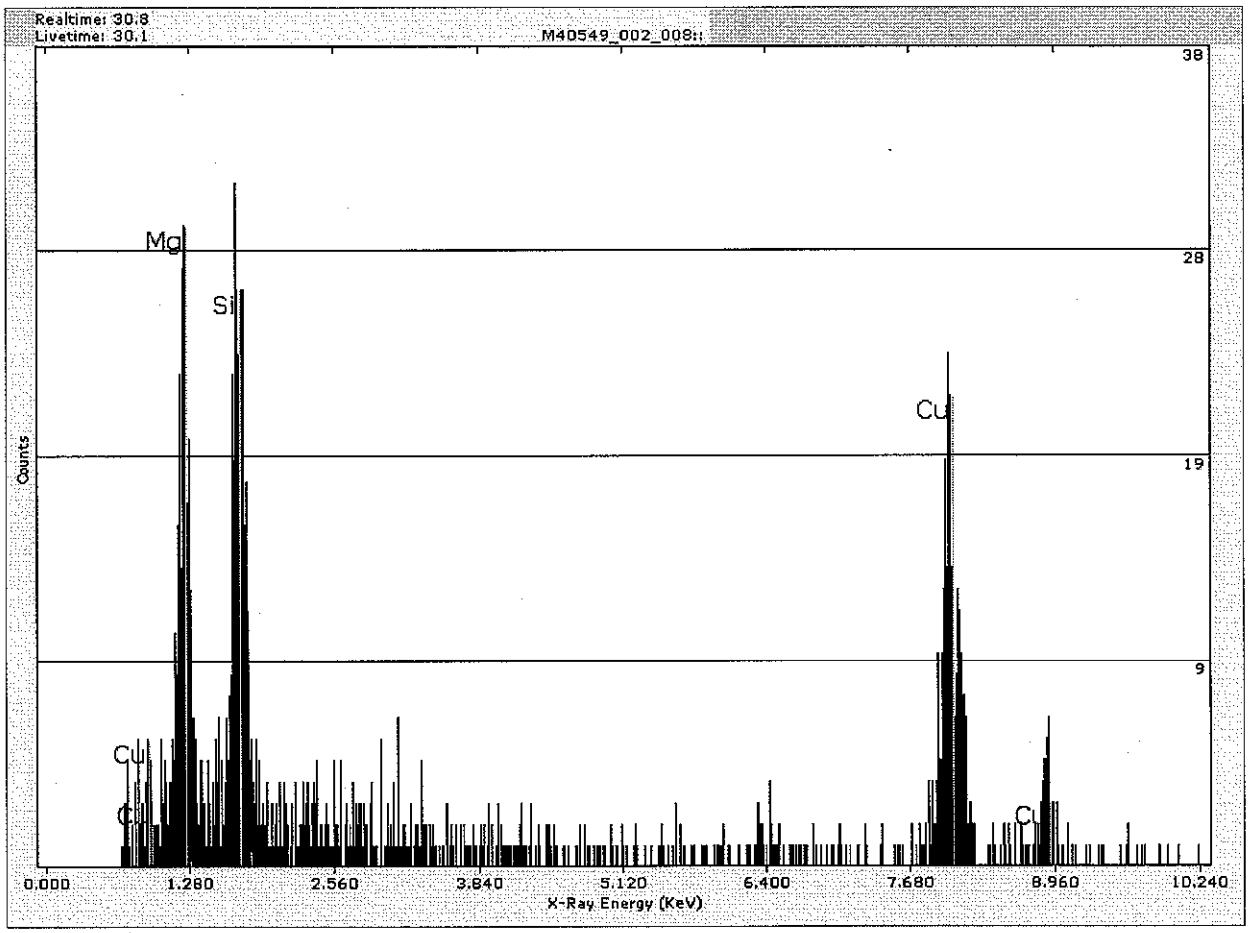

Realtime: 31.8
Livetime: 31.2
M40549_002_003::
30
22
15
7
Counts
Si
Mg
Cu
Cu
Cu
Cr
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

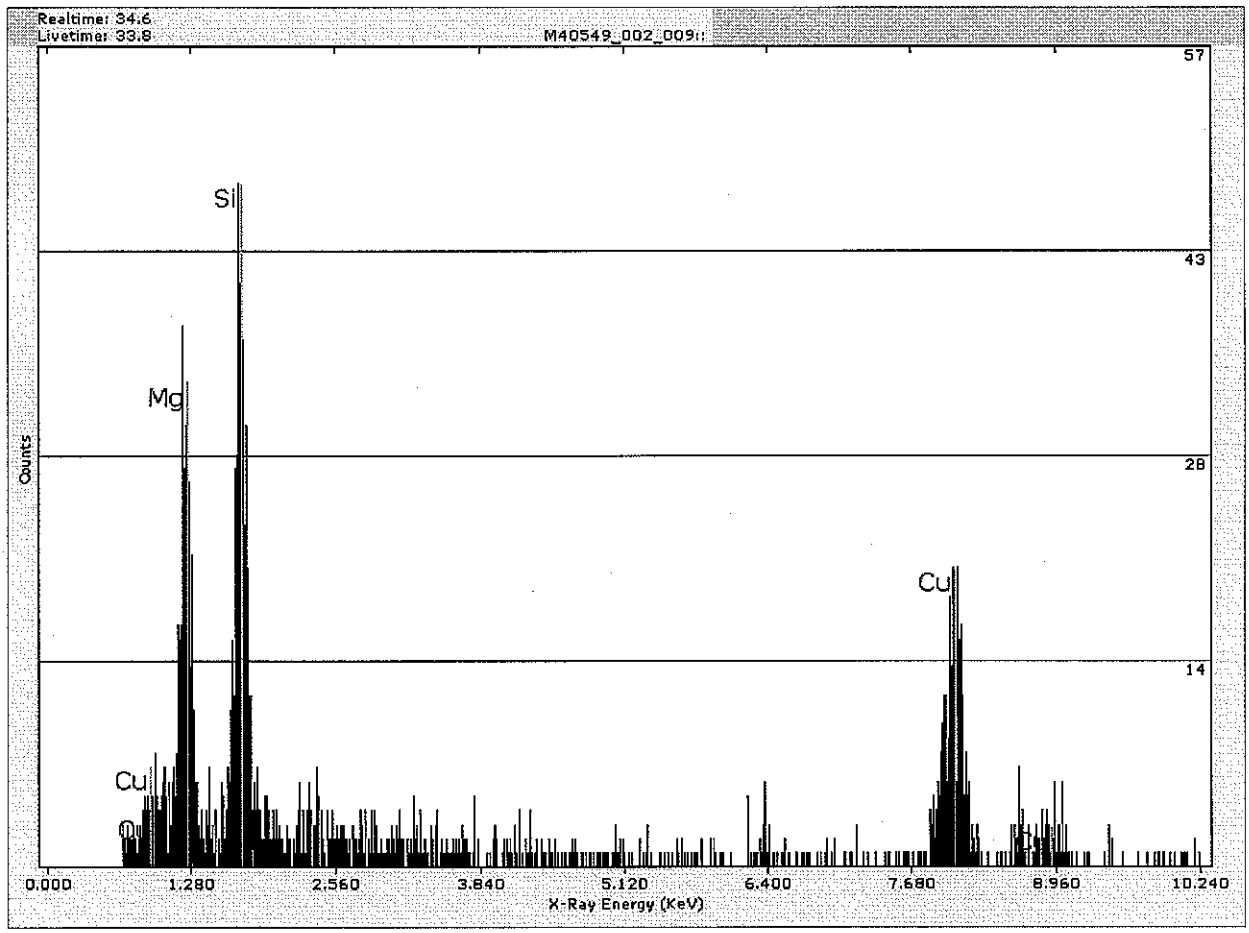

Realtime: 35.8
Livetime: 35.1
M40549_002_004::
93
70
46
23
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

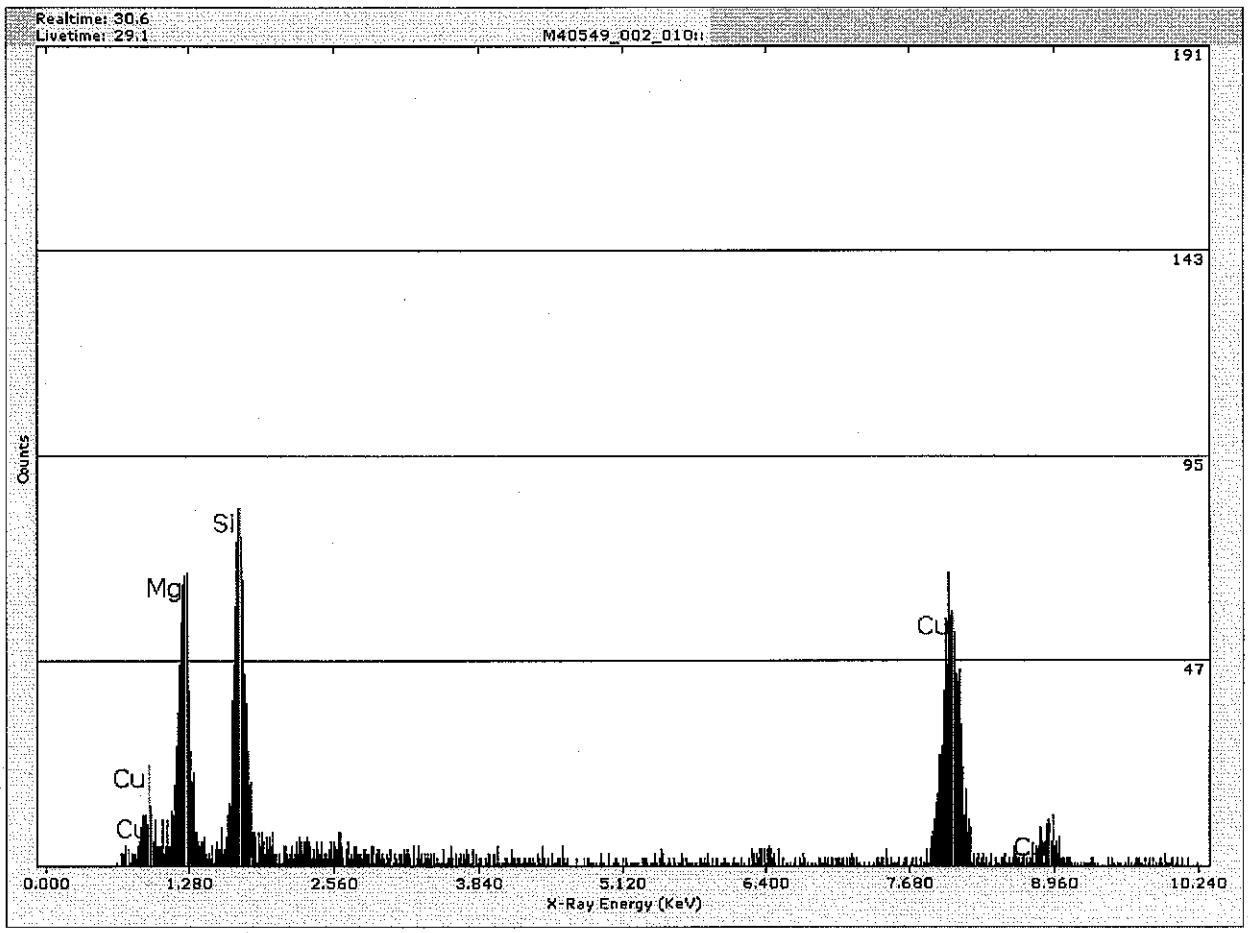

Realtime: 34.4
Livetime: 33.8
M40549_002_005
Counts
44
33
22
11
Mg
Si
Cu
Cu
Cl
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

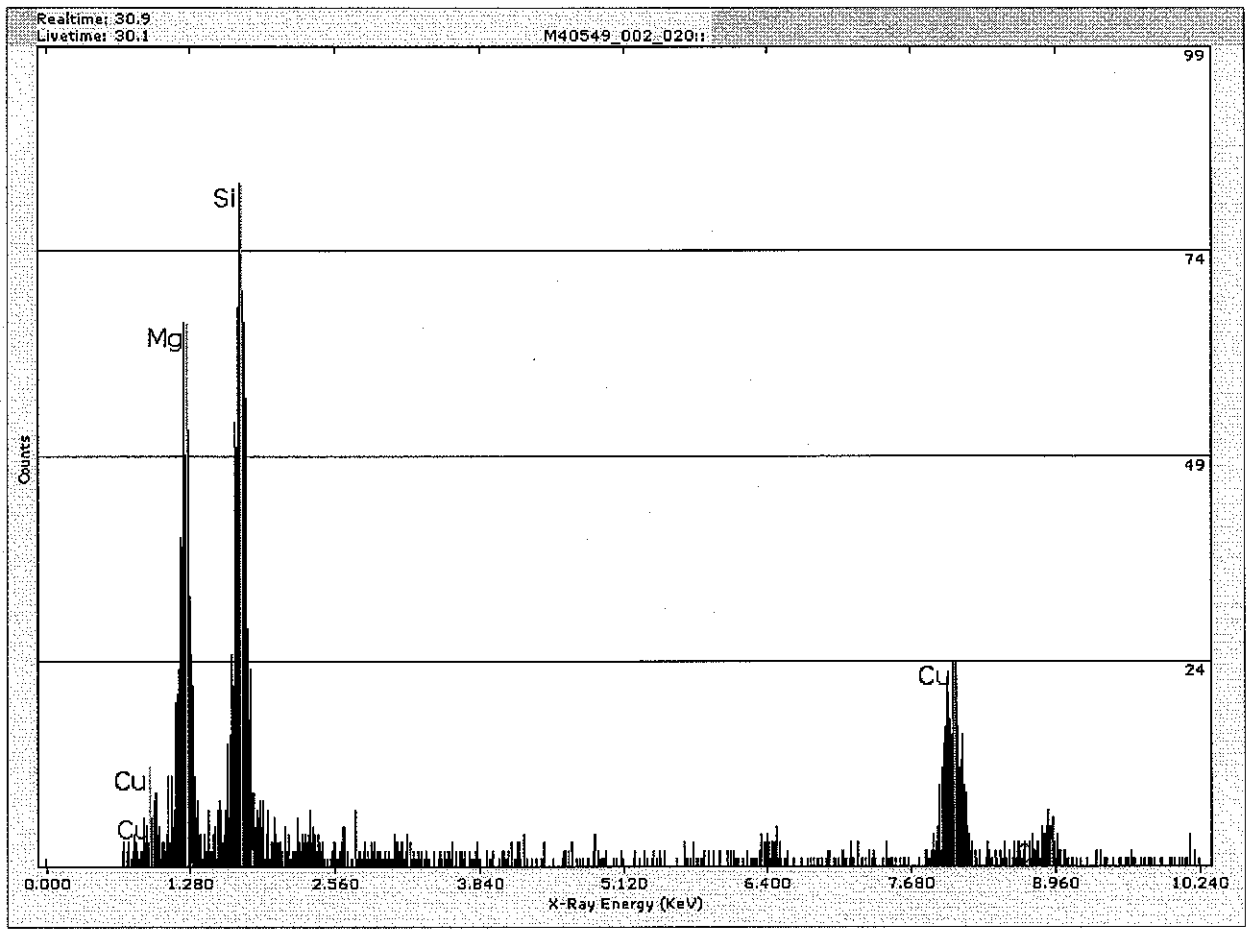

Realtime: 35.6
Livetime: 33.7
M40549_002_006::
104
78
52
26
Counts
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

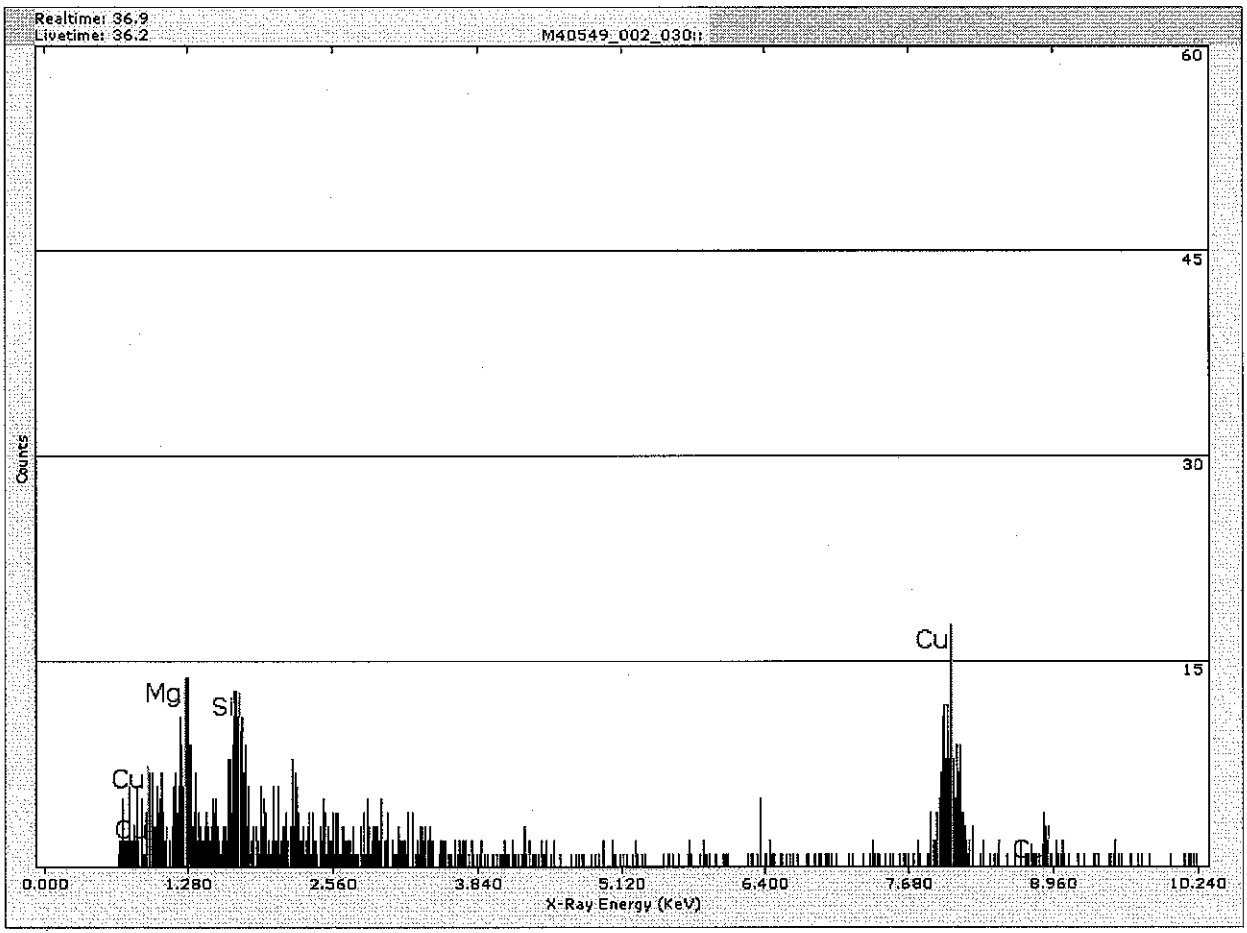

Realtime: 30.9
Livetime: 29.7
M40549_002_007::
64
48
32
16
Counts
Mg
Si
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

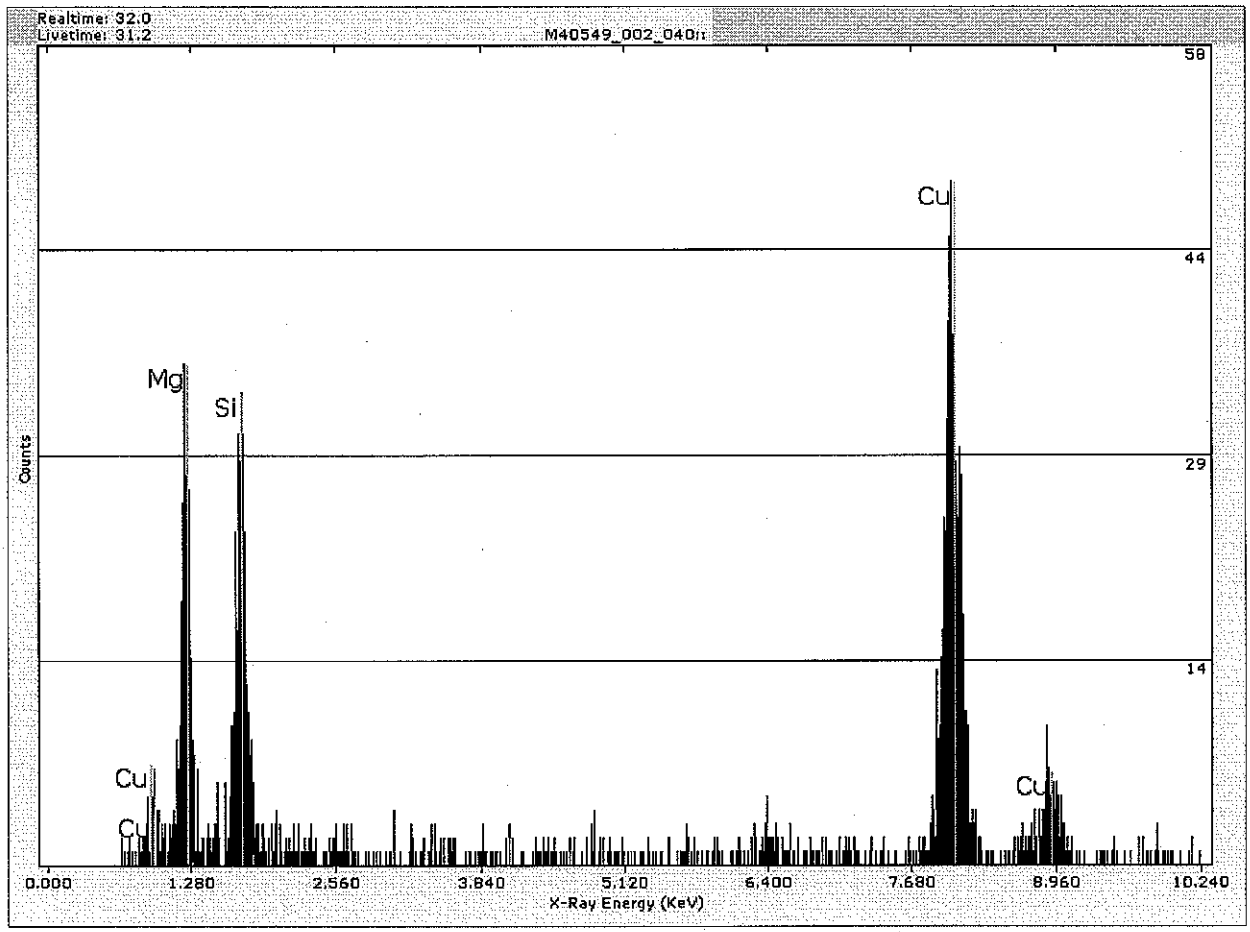

Realtime: 30.8
Livetime: 30.1
M40549_002_008::
38
28
19
9
Counts
Mg
Si
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

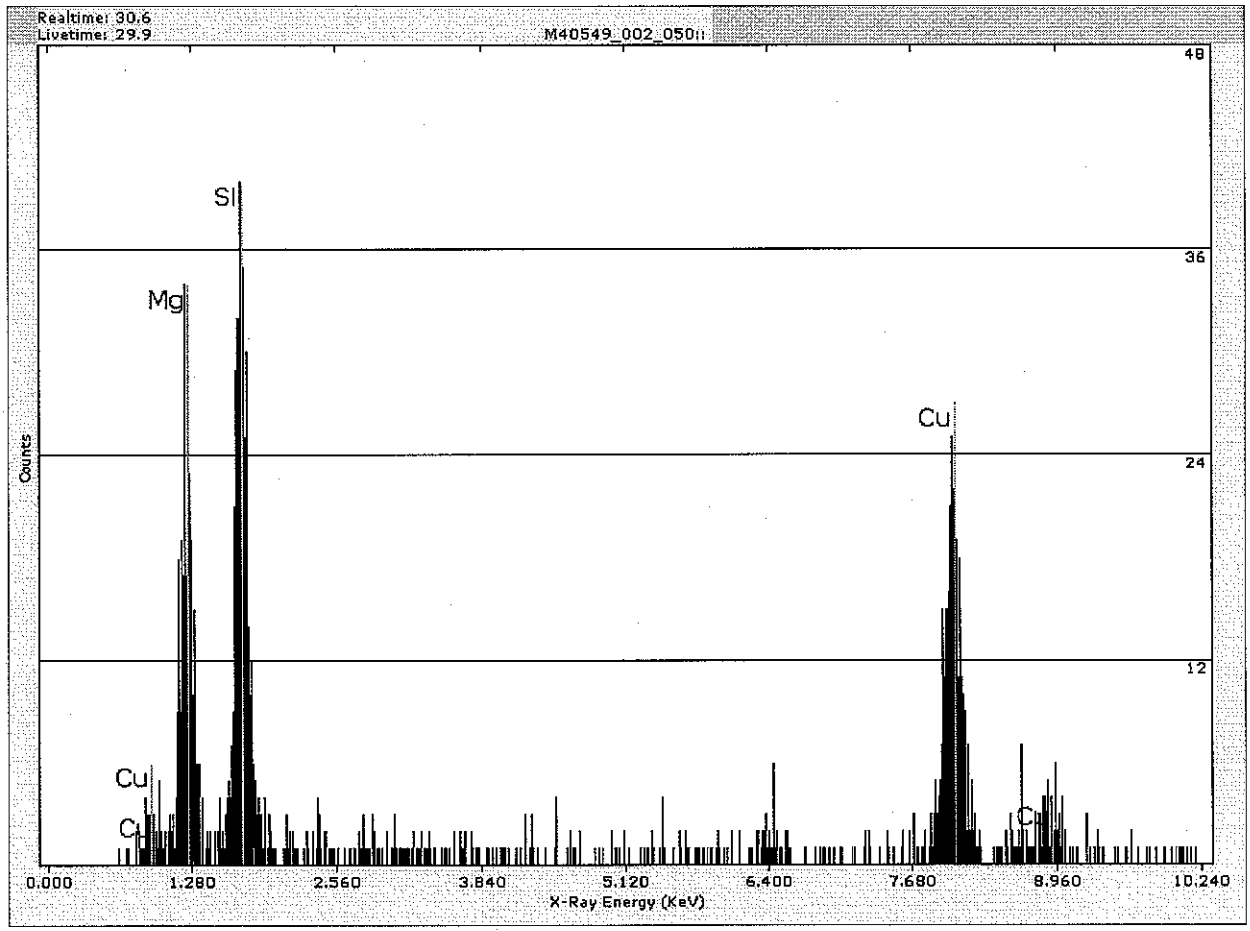

Realtime: 34.6
Livetime: 33.8
M40549_002_009
57
43
28
14
Counts
Si
Mg
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

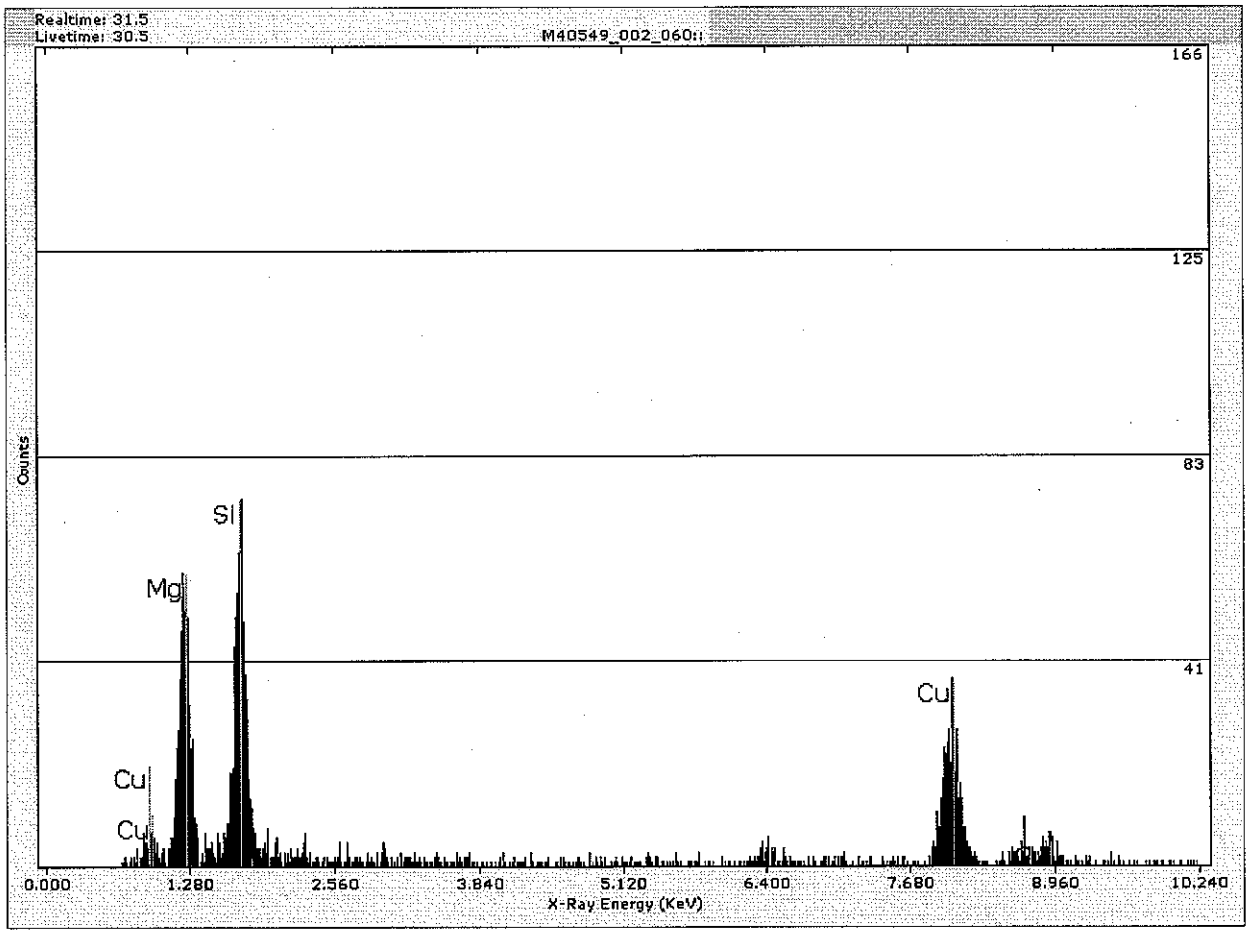

Realtime: 30.6
Livetime: 29.1
M40549_002_010:
191
143
95
47
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

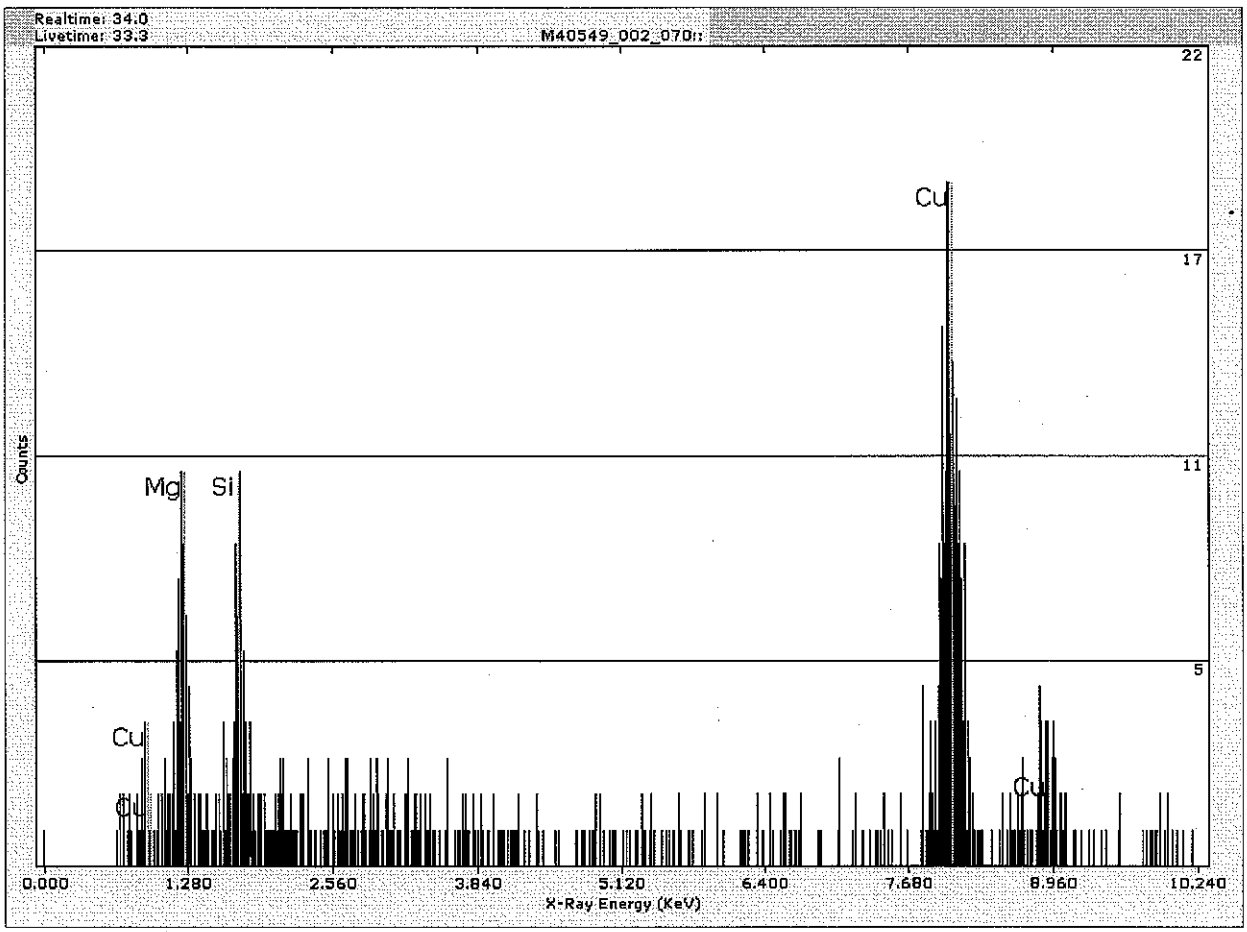

Realtime: 30.9
Livetime: 30.1
M40549_002_020i1
99
74
49
24
Counts
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

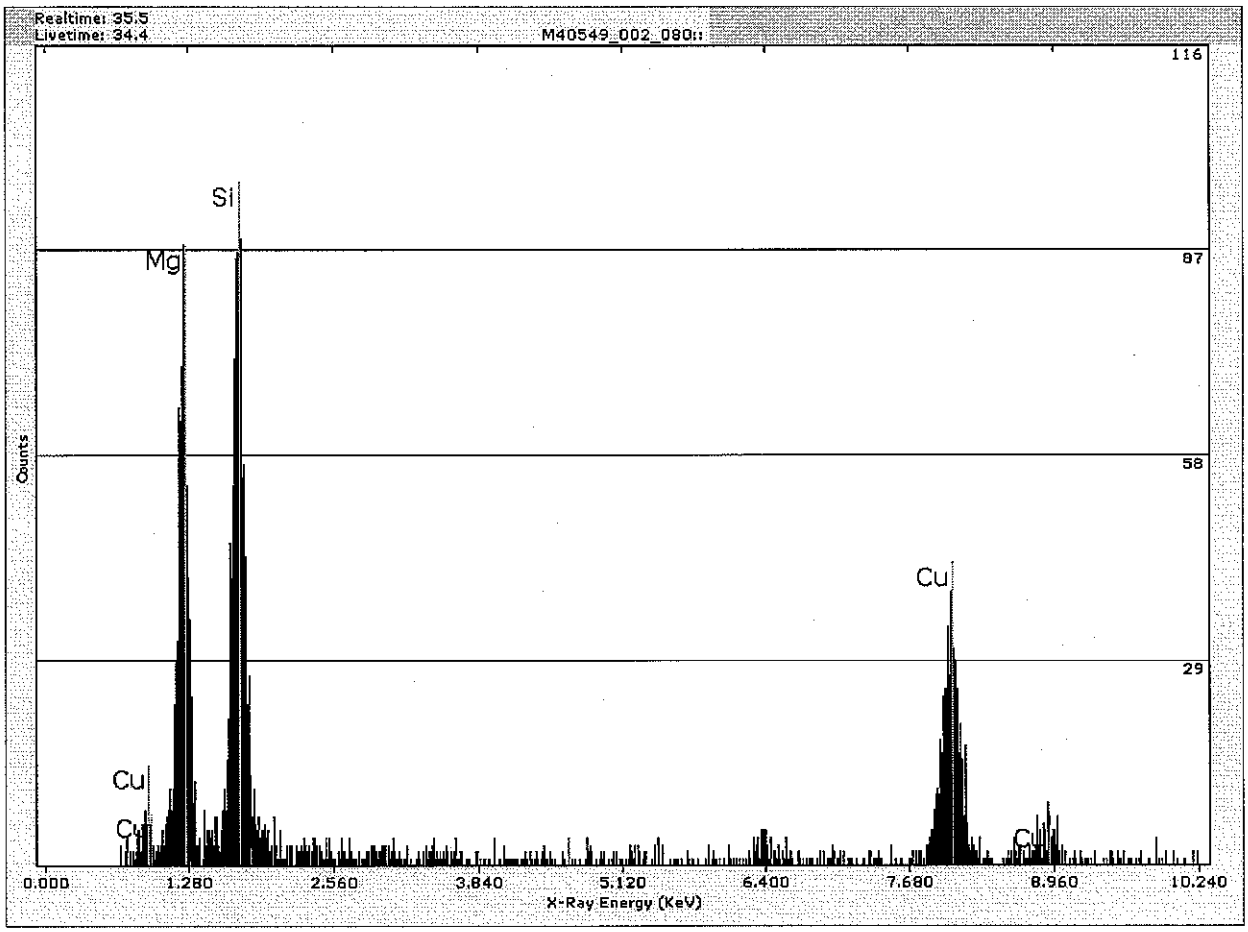

Realtime: 36.9
Livetime: 36.2
M40549_002_030
60
45
30
15
Counts
Cu
Mg
Si
Cu
Cl
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

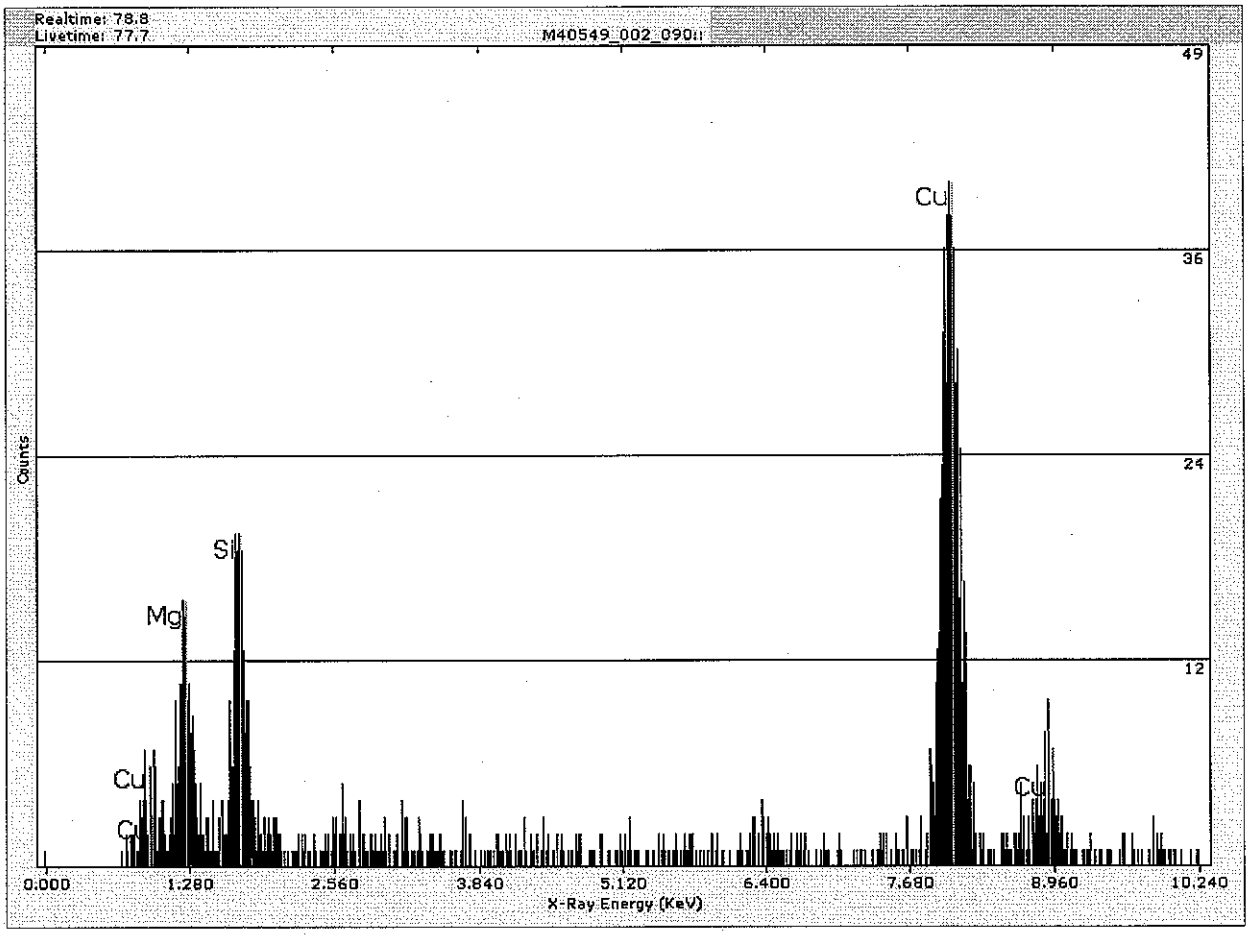

Realtime: 32.0
Livetime: 31.2
M40549_002_040
58
44
29
14
Counts
Cu
Mg
Si
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

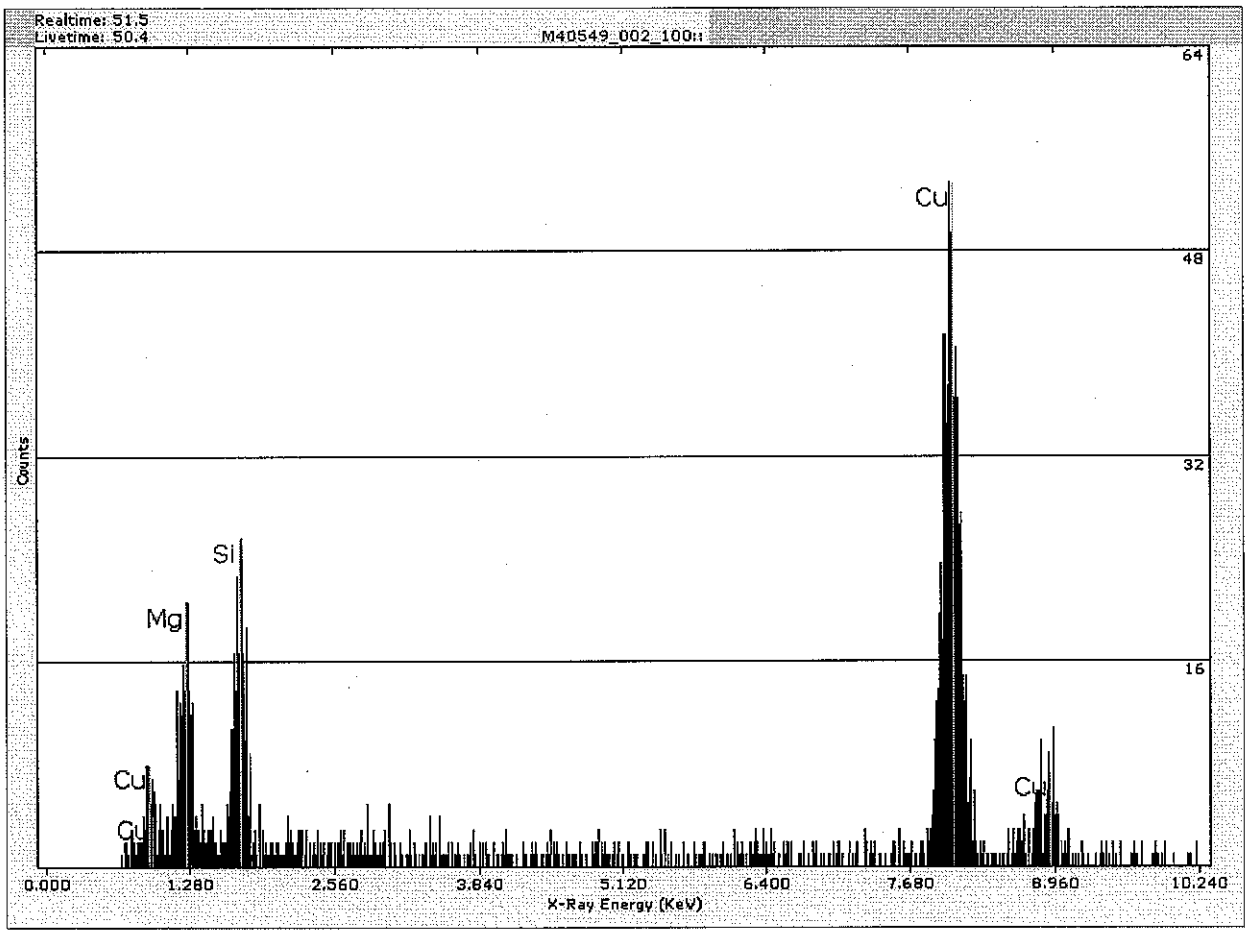

Realtime: 30.6
Livetime: 29.9
M40549_002_050
48
36
24
12
Counts
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 31.5
Livetime: 30.5
M40549_002_060::
166
125
83
41
Counts
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 34.0
Livetime: 33.3
M40549_002_070:
22
17
11
5
Counts
Cu
Mg
Si
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 35.5
Livetime: 34.4
M40549_002_090::
116
87
58
29
Counts
Si
Mg
Cu
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)


Realtime: 78.8
Livetime: 77.7
M40549_002_090
Counts
49
36
24
12
Cu
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

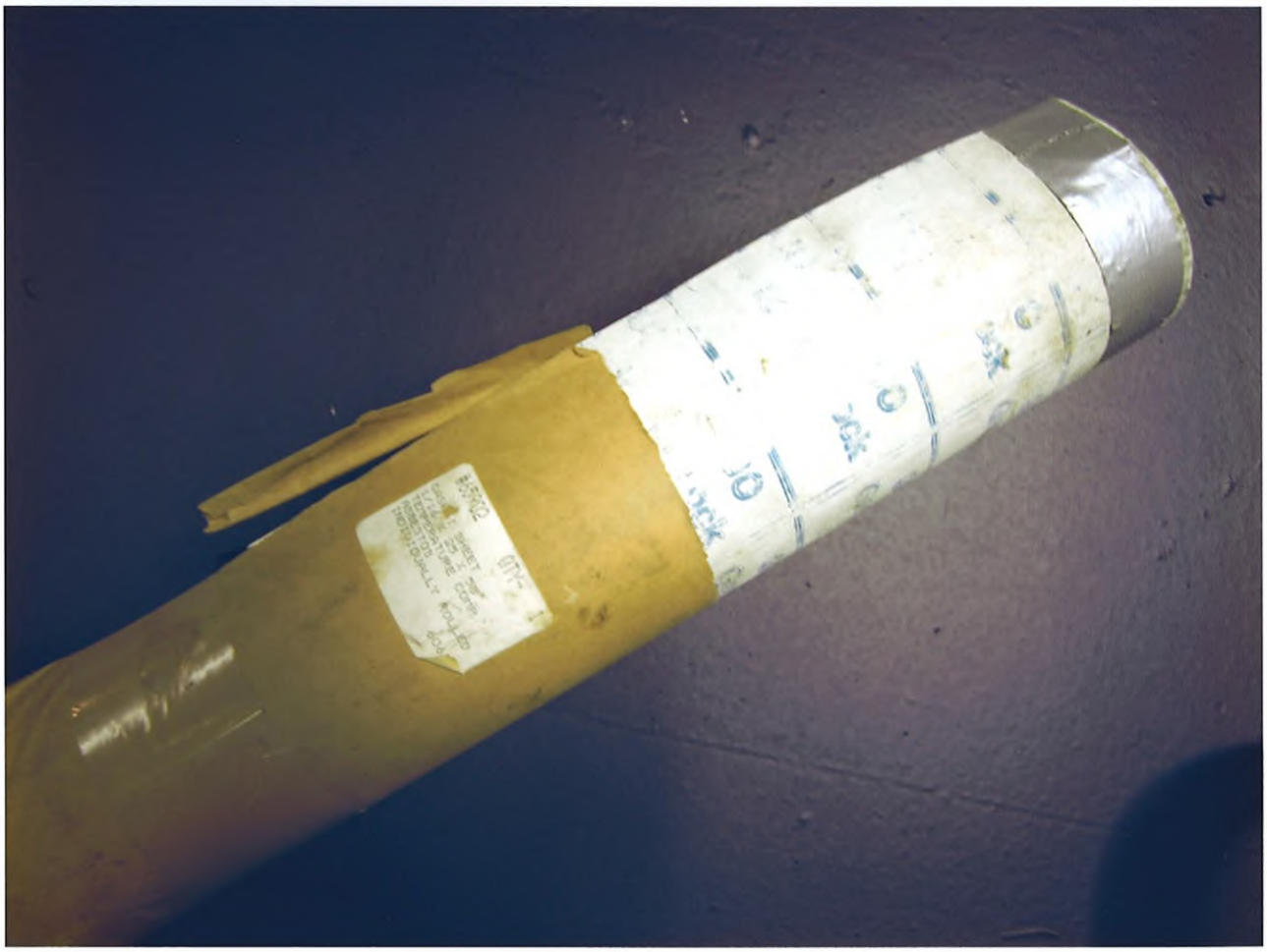

Realtime: 51.5
Livetime: 50.4
M40549_002_100
64
48
32
16
Counts
Cu
Si
Mg
Cu
Cu
Cu
0.000
1.280
2.560
3.840
5.120
6.400
7.680
8.960
10.240
X-Ray Energy (KeV)

SECTION 7

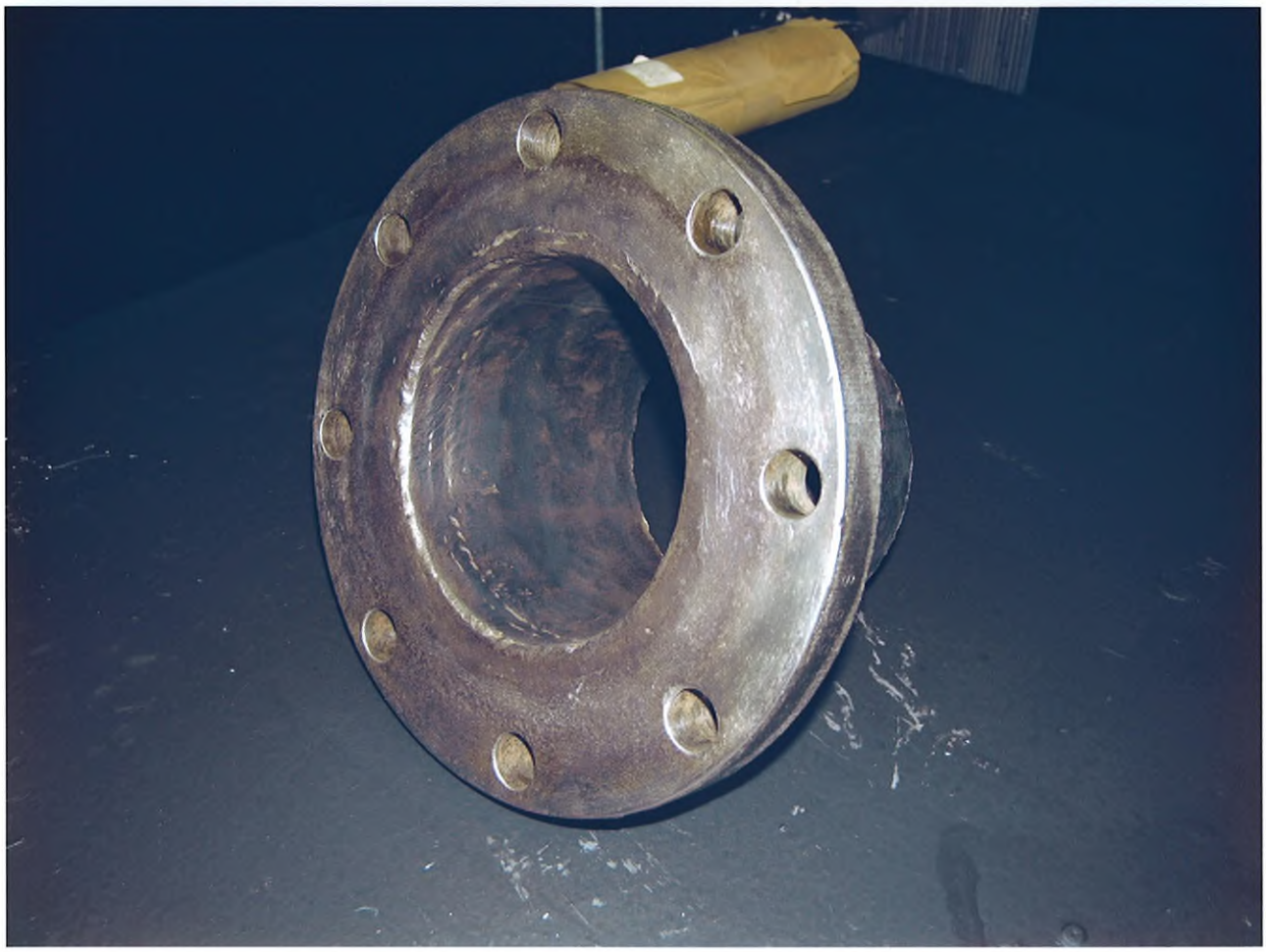
900
Garlock
900
Garlock
900

900
Garlock
900
Garlock
900
Garlock
900
Garlock
900

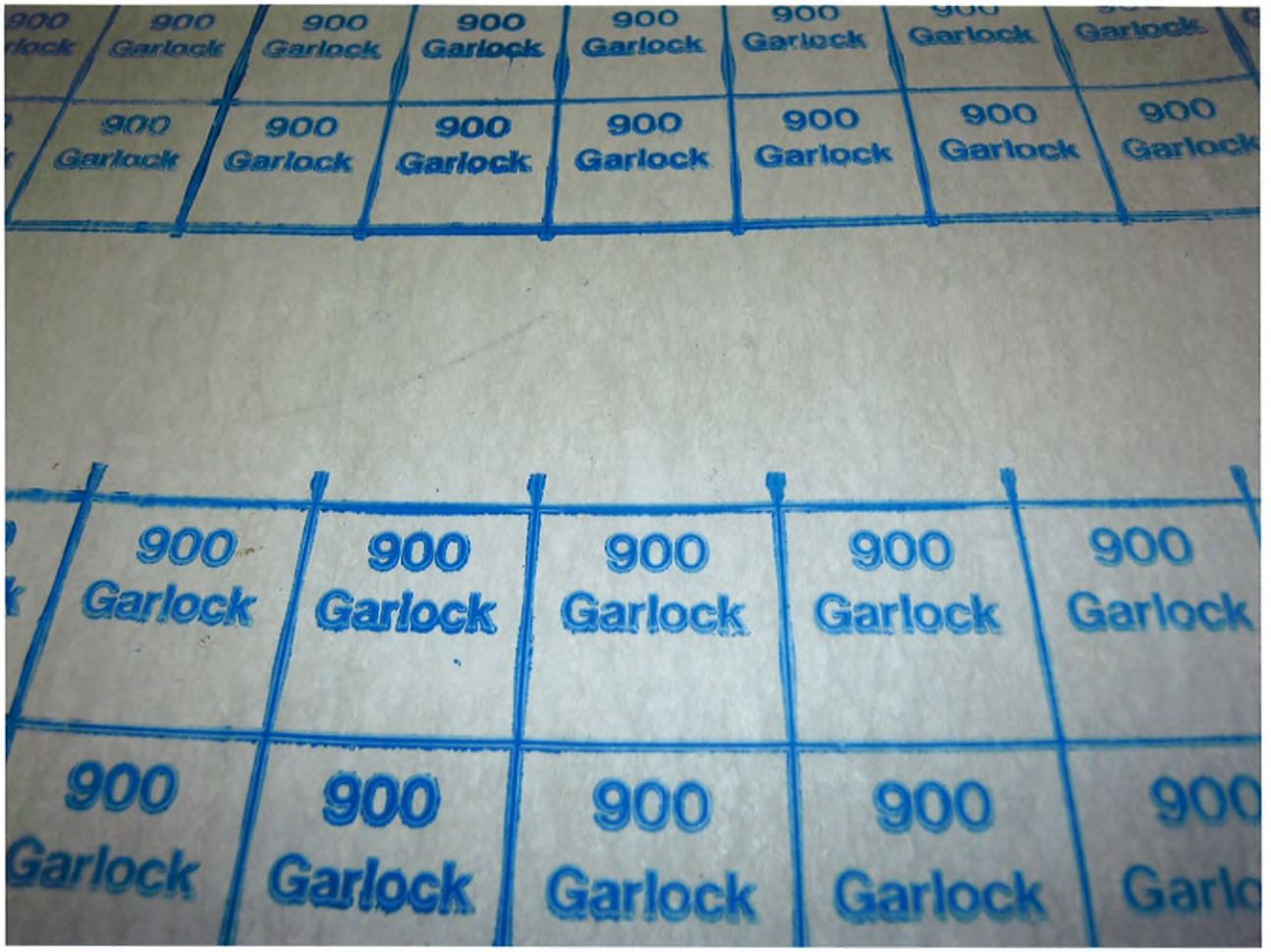
#65902
QTY-

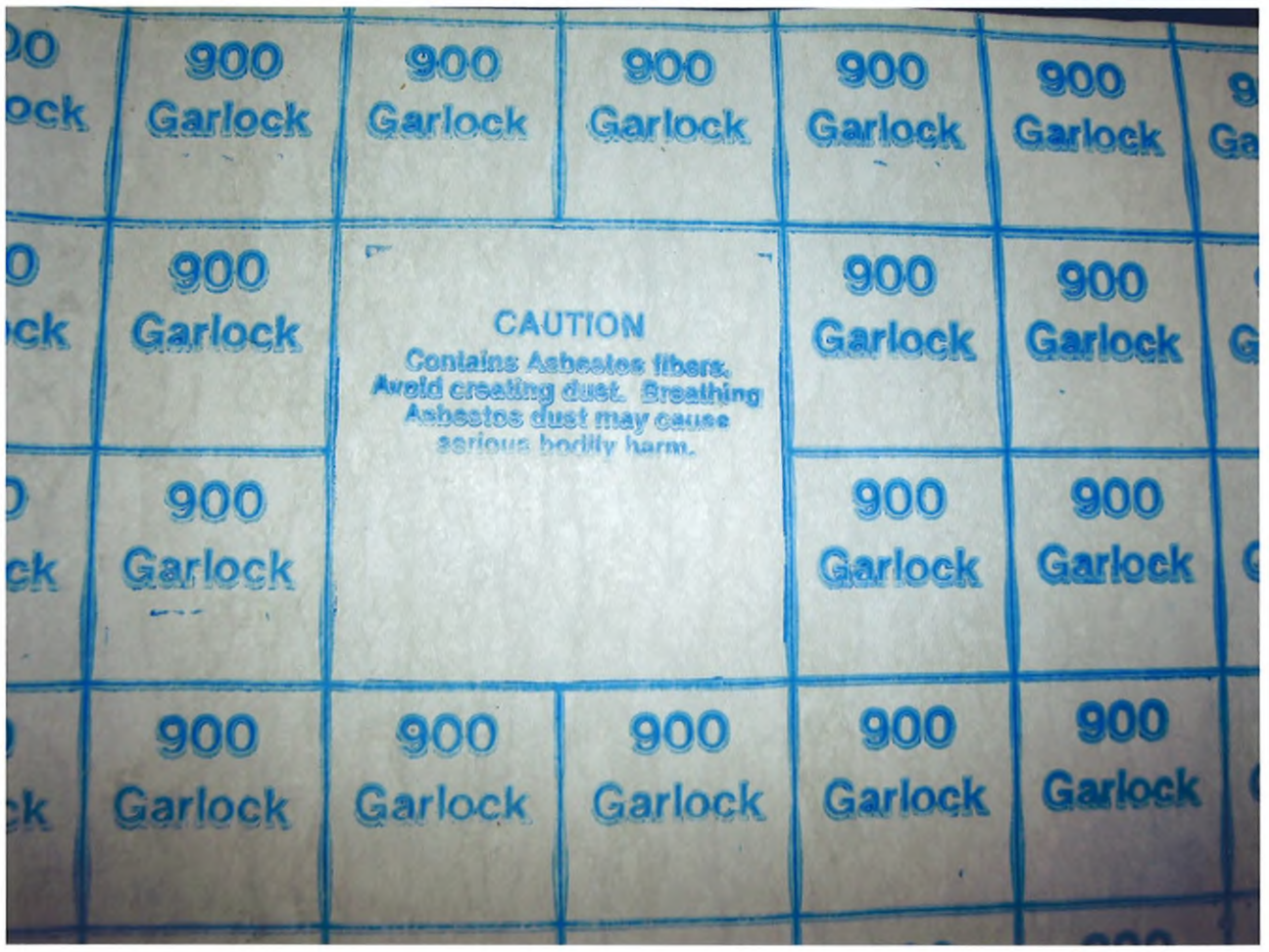


#65902
SHEET
TEMPERATURE COMP.
ASBESTOS
INDIVIDUALLY ROLLED



900 Garlock


900 Garlock


900 Garlock
CAUTION
Contains Asbestos fibers. Avoid creating dust. Breathing Asbestos dust may cause serious bodily harm.

900 Garlock

900 Garlock

Garlock
900
TASK FORCE
12 OZ. BALL PEEN HAMMER
GENUINE HICKORY
Nicholson
8"
4-In-Hand
Rasp Cut
Double Cut
Wood
Plastics
Combinaison de 4 limes
4 en 1
USA
21860
BLACK DIAMOND
COOPER Tools

SECTION 8

MATERIALS ANALYTICAL SERVICES
PROJECT COC

MAS ID:	M40548	**Client Job No:**	
Client Name:	Materials Analytical Services Atlanta	**Client PO:**	
Project Name:	ECL Gasket Fabrication II	**Date In:**	9/19/2006
Logged By:	Nancy Sears	**Client Code:**	MASCORP

TRANSPORT INFORMATION:

Submitted By:	Mike Mount	**Documents:**	COC
Delivery By:	Hand Delivery		
Received By:	Nancy Sears	**Comments for COC:**	
Condition:	OK		

CONTACT INFORMATION:

Contact:	Bill Longo			**Work Phone:** (770) 866-3200	**Ext:**
Title:	**First Name**	**Last Name:**	**Suffix**	**Other Phone**	**Ext:**
Mr.	William	Longo		**Fax:** (770) 866-3259	

SAMPLE INFORMATION:

#	Client ID	Volume	#	Client ID	Volume
001	A-O-A	1800	017	A-2-B	181.8
002	A-O-B	1800	018	A-2-C	180
003	A-O-C	1800	019	A-2-D	180
004	A-O-D	1800	020	P-2-A	46.8
005	A-1-A	202	021	P-2-B	44.6
006	A-1-B	202	022	P-2-C	63.4
007	A-1-C	200	023	P-2-D	63.7
008	A-1-D	200	024	FB-1	0
009	A-1-E	630	025	FB-2	0
010	A-1-F	50	026	FB-3	0
011	A-1-G	11280			
012	P-1-A	52			
013	P-1-B	49.6			
014	P-1-C	50.4			
015	P-1-D	70.8			
016	A-2-A	181.8			

SIGNATURES

RECEIVED BY: Amazaleno **ANALYZED BY:** _____

REVIEWED BY: _____ **REPORTED BY:** _____

PREPARED BY: _____ **DEPOSED BY:** _____

010 Relinquished 9/19/06 by Amazaleno
Sent to MAS Raleigh & Don Porterfield
as per Bill Longo 9/19/06 Fedex

CHAIN-OF-CUSTODY

OCT 11 2006

Return date: _____

MAS/Raleigh Job #: RNC14158

Returned to: Bill Longo
Materials Analytical Services, Inc. - Suwanee, GA
3945 Lakefield Court

Suwanee, GA 30024
USA
770-866-3200

Purchase Order:

Returned by: Materials Analytical Services, Inc.
616 Hutton Street, Suite 101
Raleigh, NC 27606
Phone: 919-829-7041 Fax: 919-829-5518
masral@mas-raleigh.com
www.mastest.com

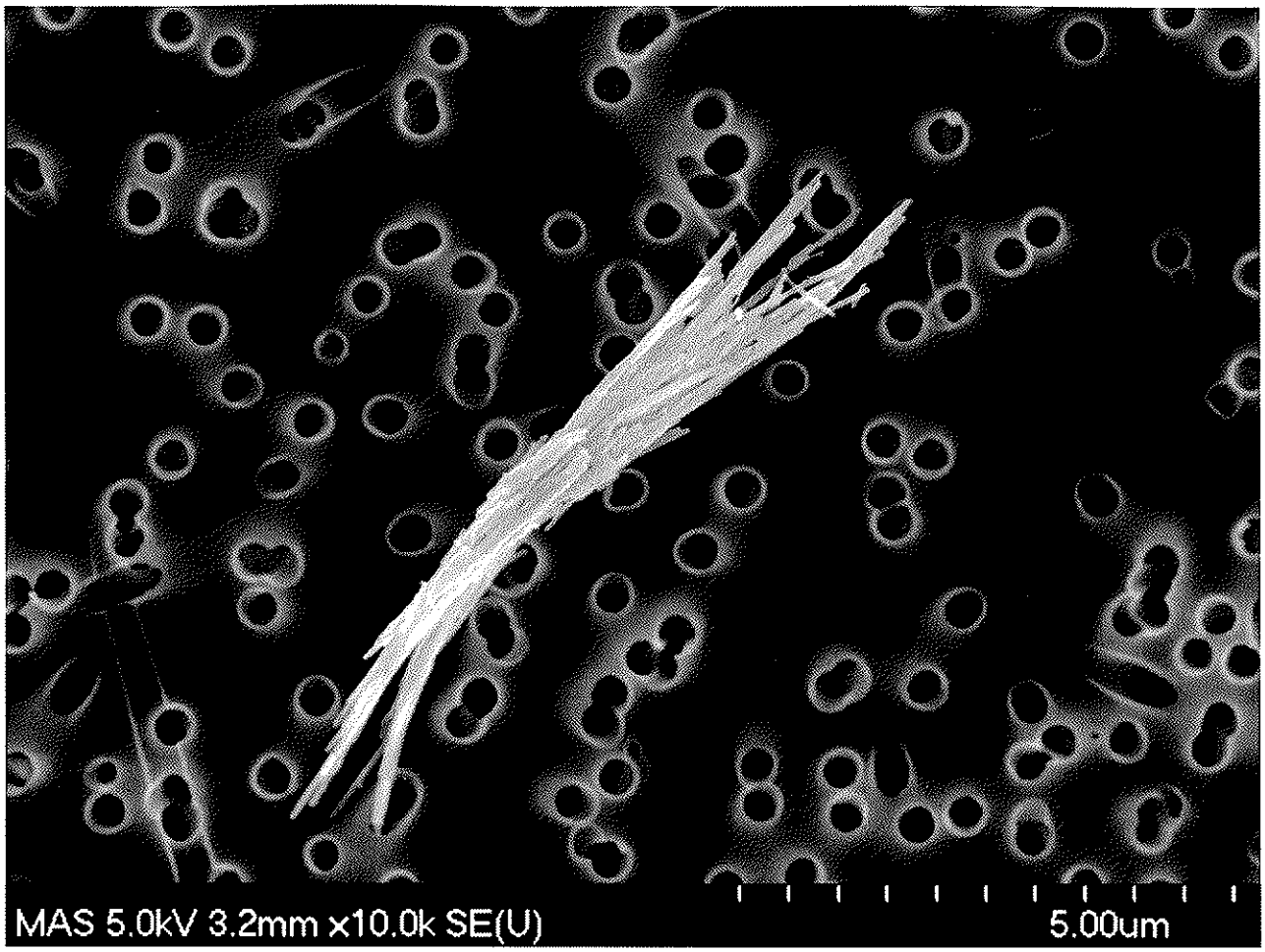
Samples

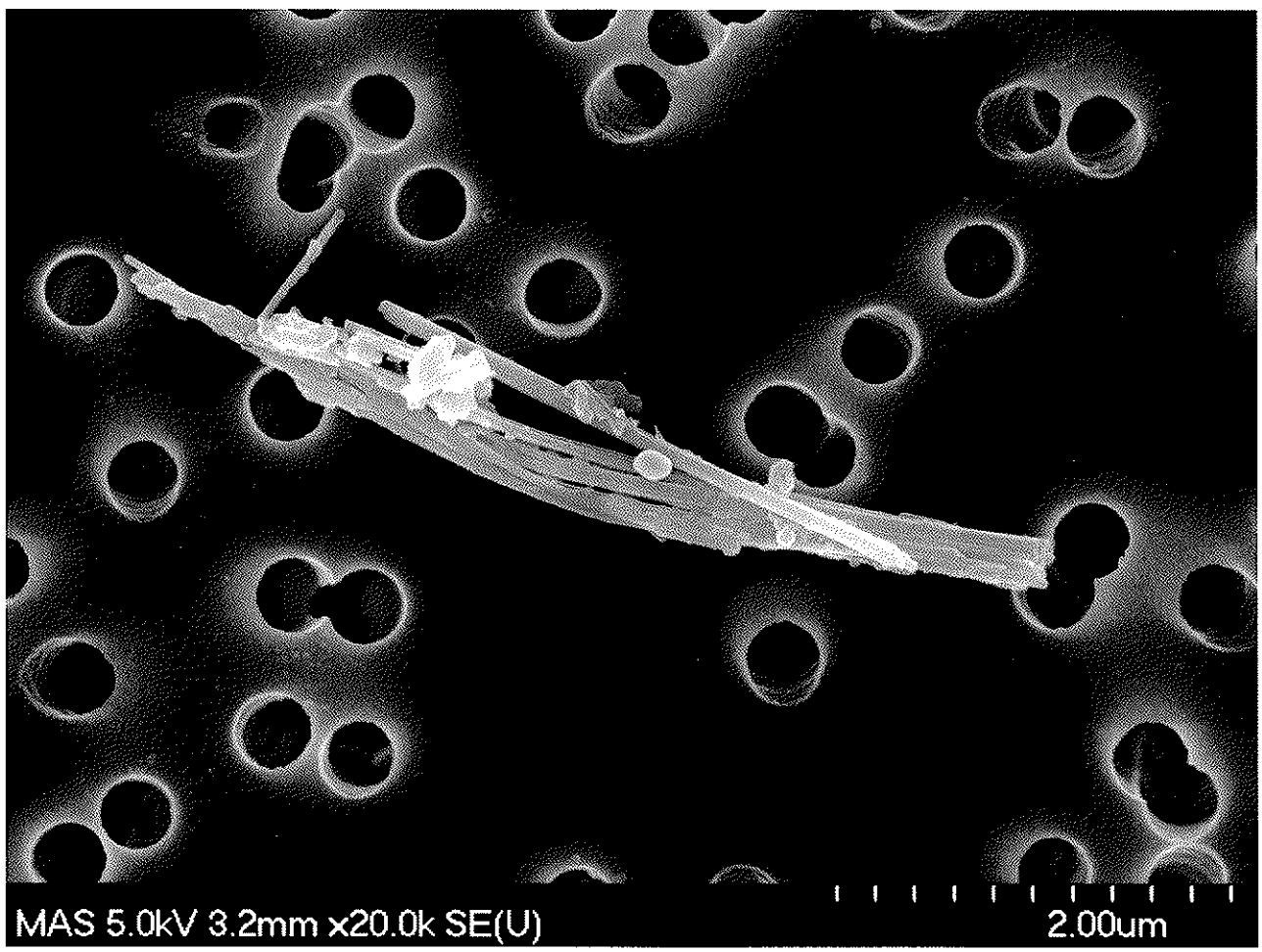
RNC14158-1	1 ECL Gasket Fabrication II/#010 A-1-F Volume 50

Samples Received by: _____ Date: _____

Condition of Samples: _____

Please sign copy of chain of custody form and return to MAS/Raleigh.


MAS 5.0kV 3.2mm x10.0k SE(U)
5.00um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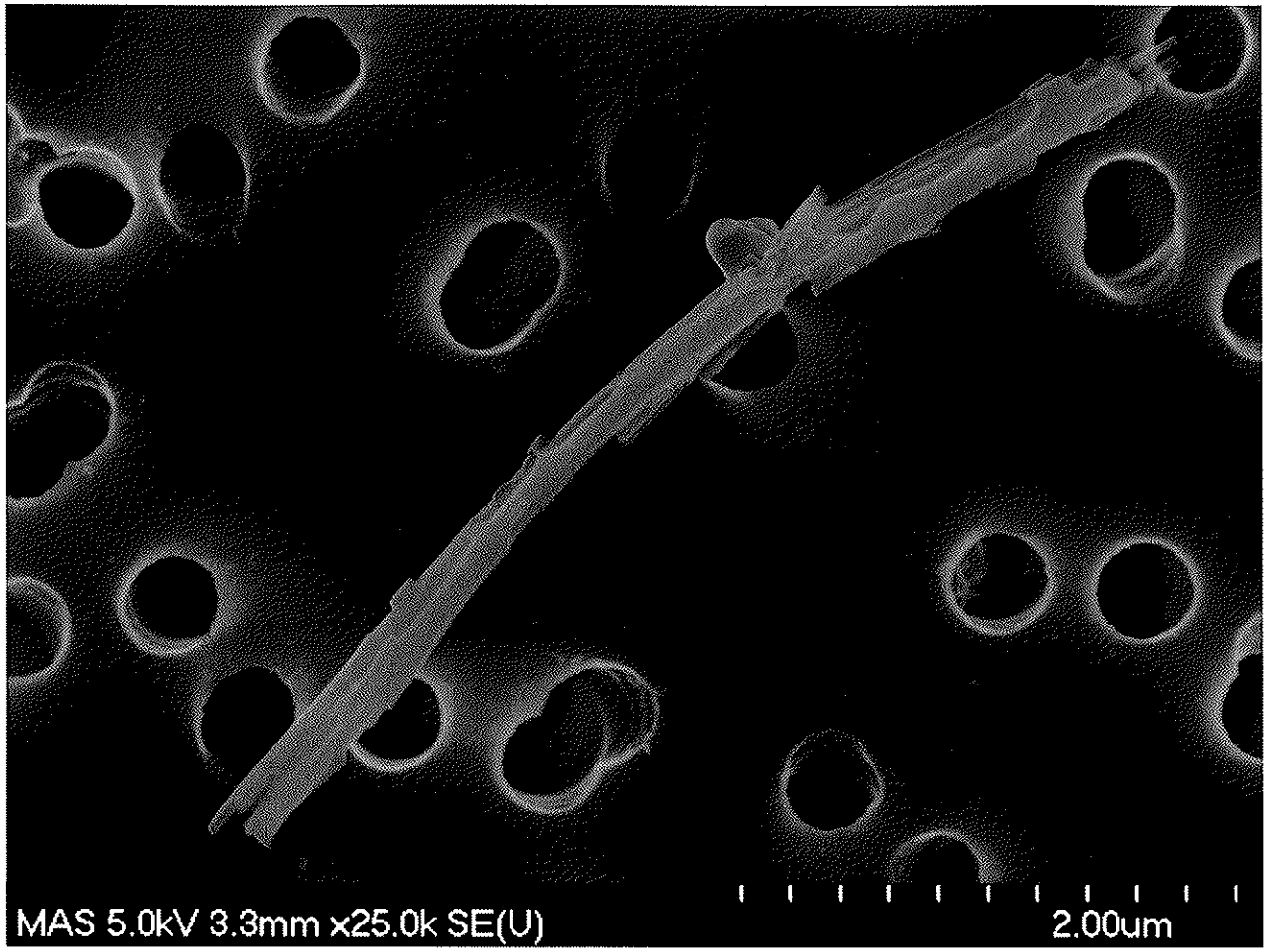
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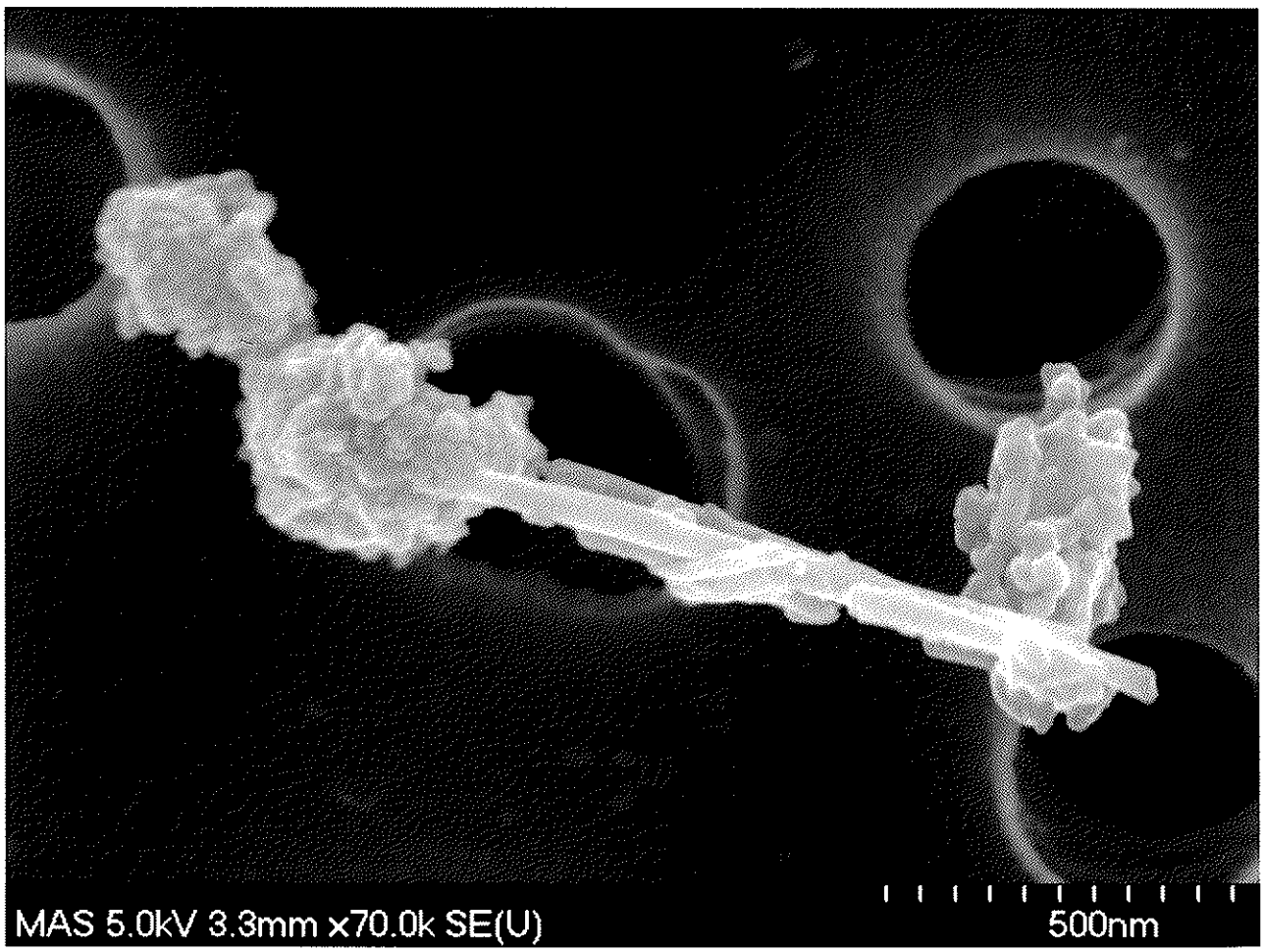
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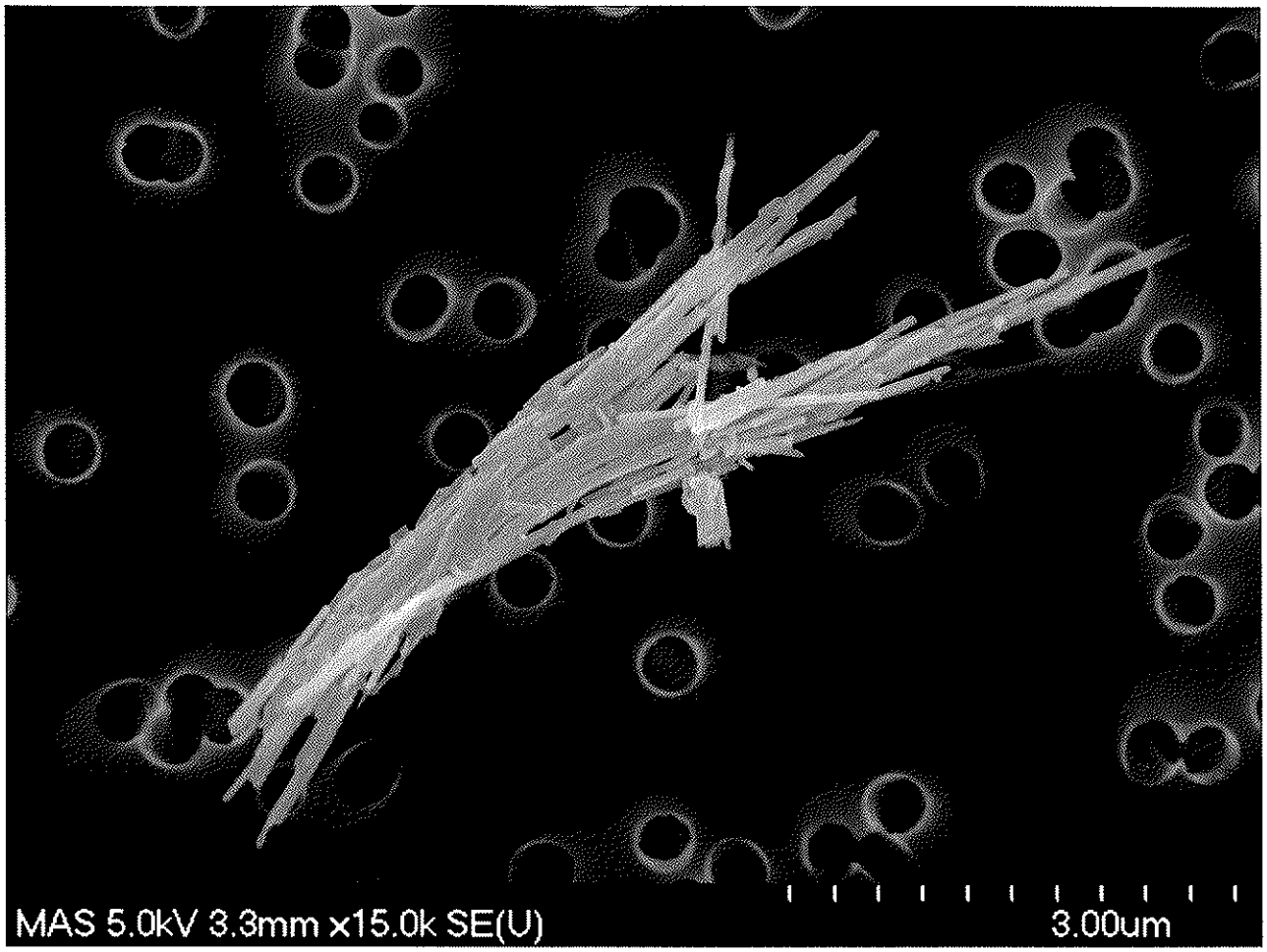
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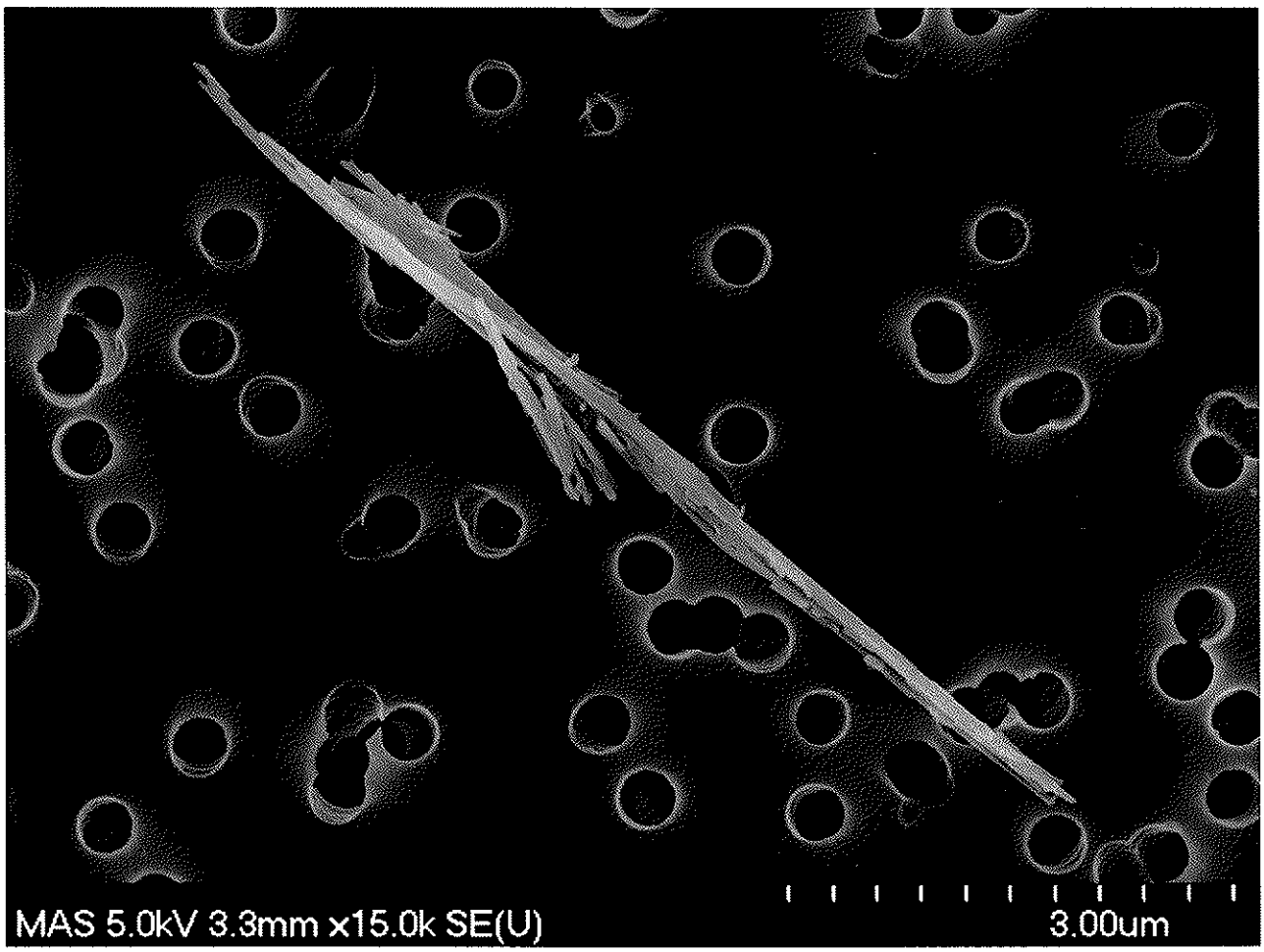
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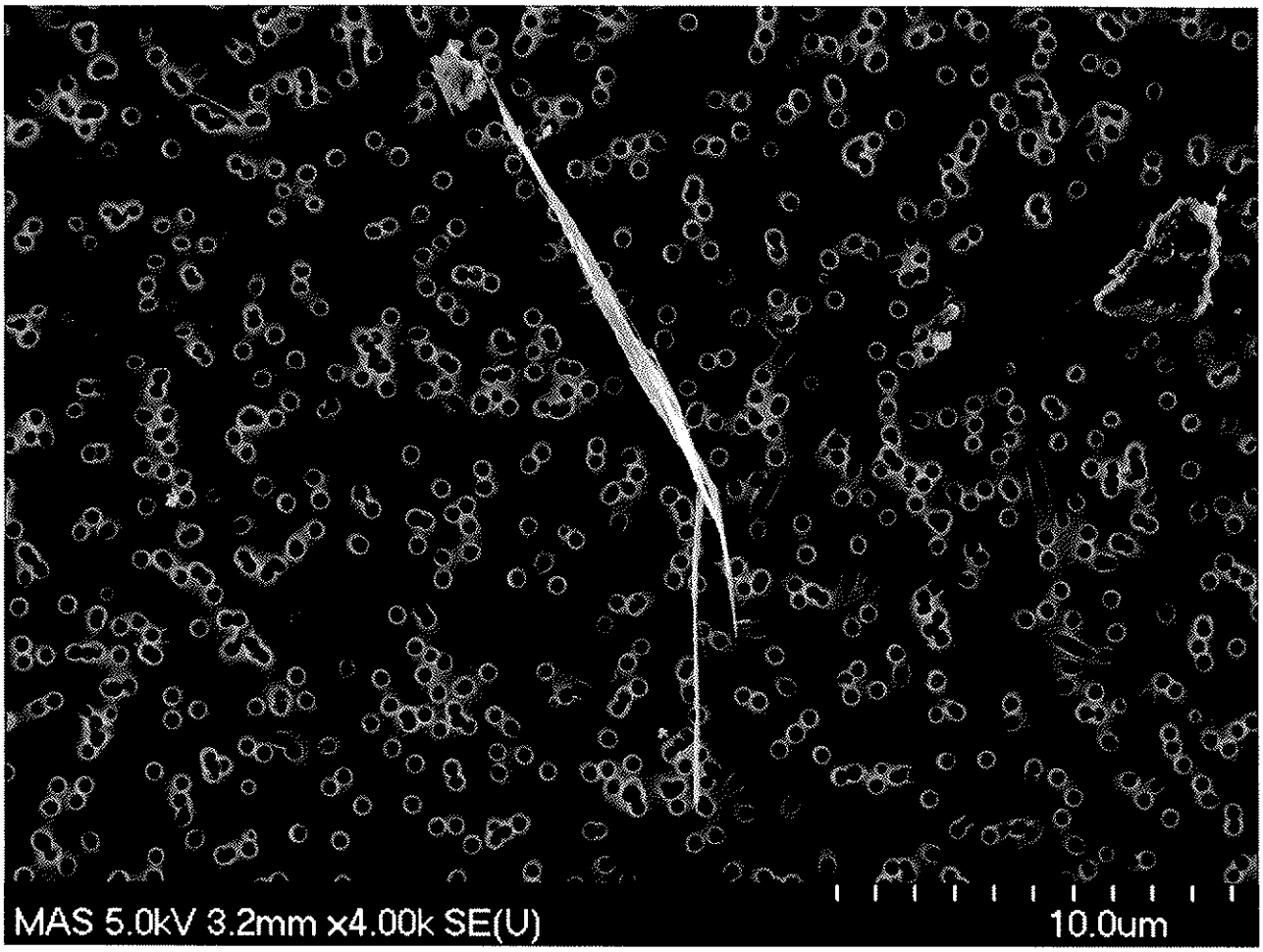
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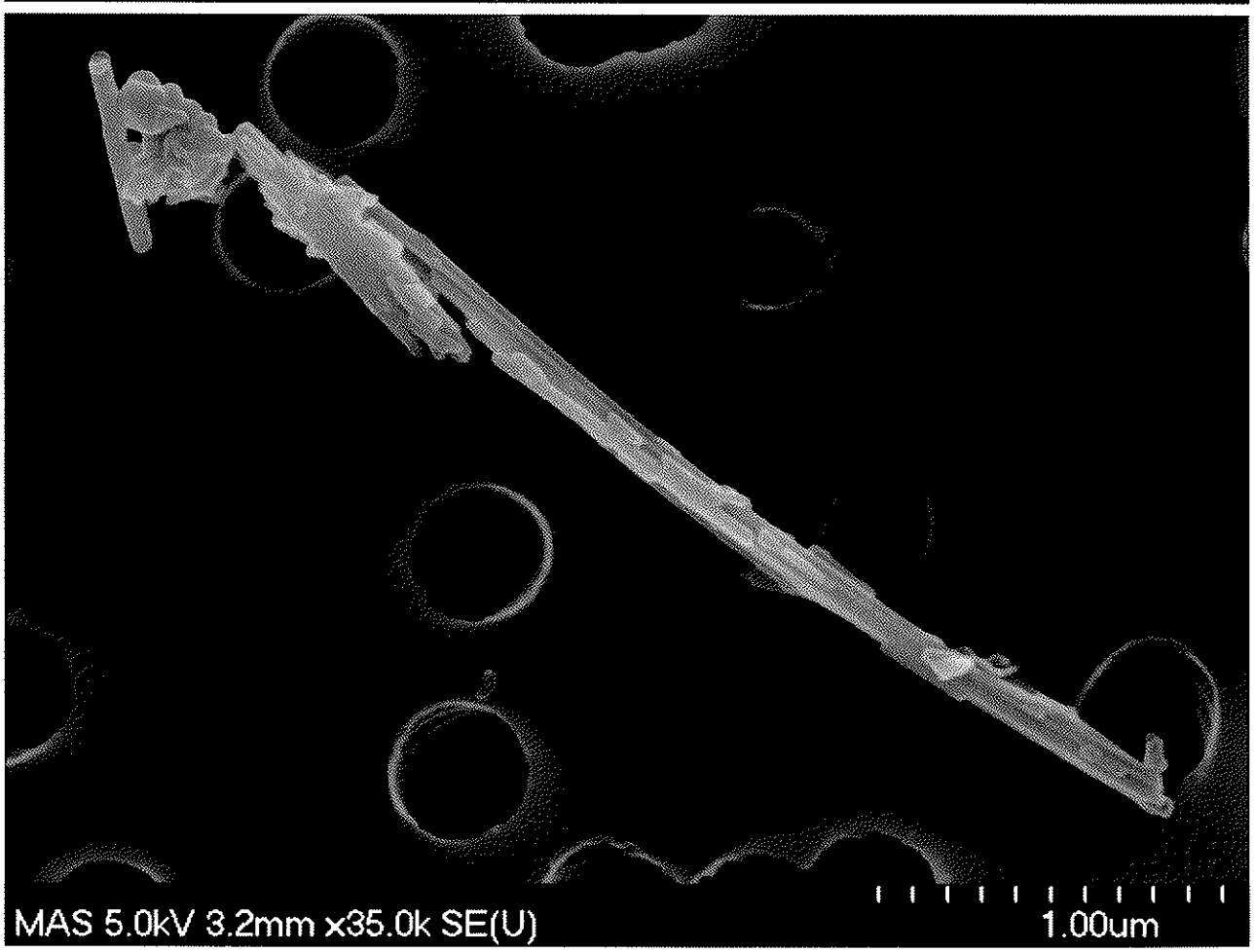
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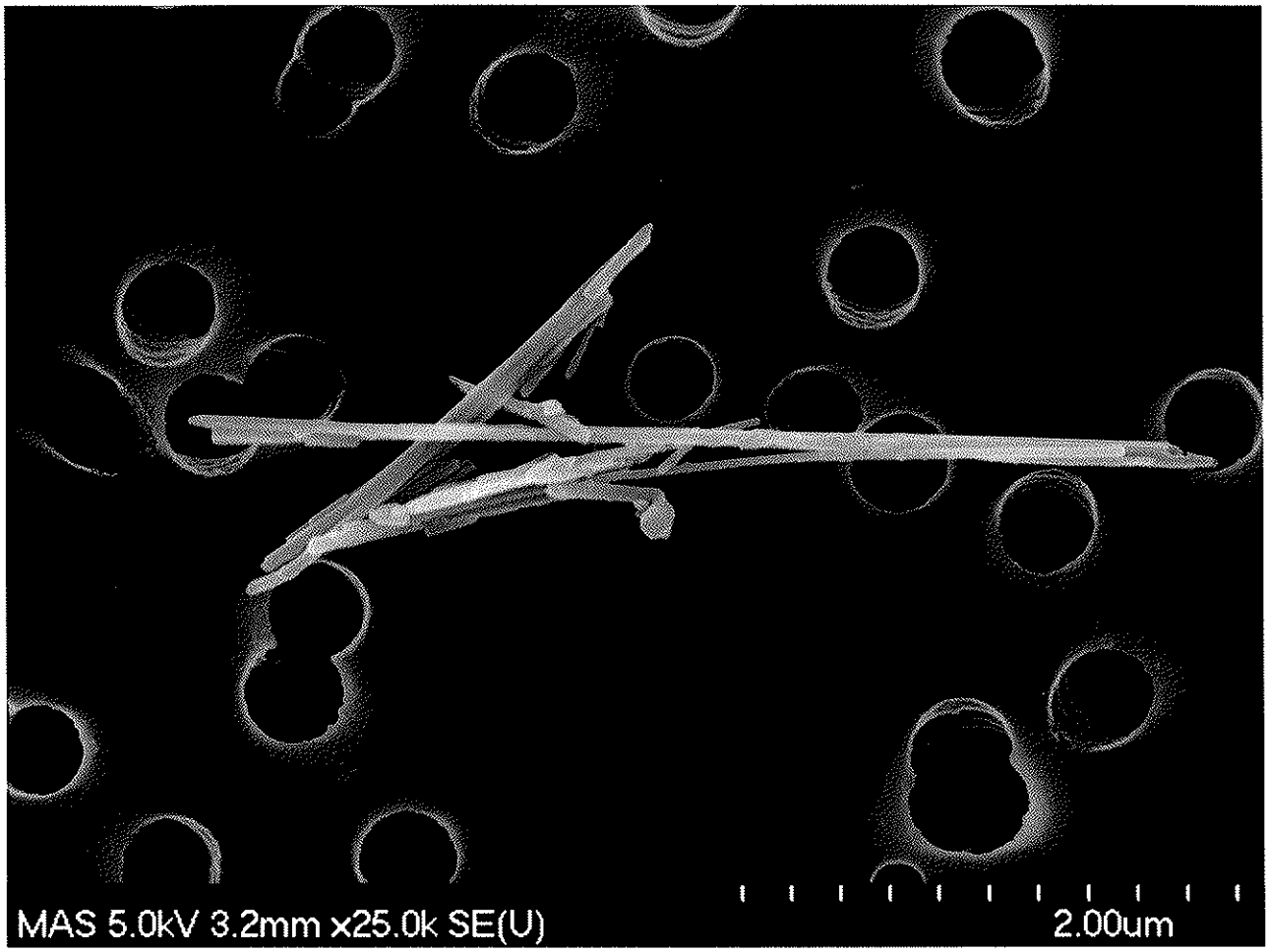
1.00um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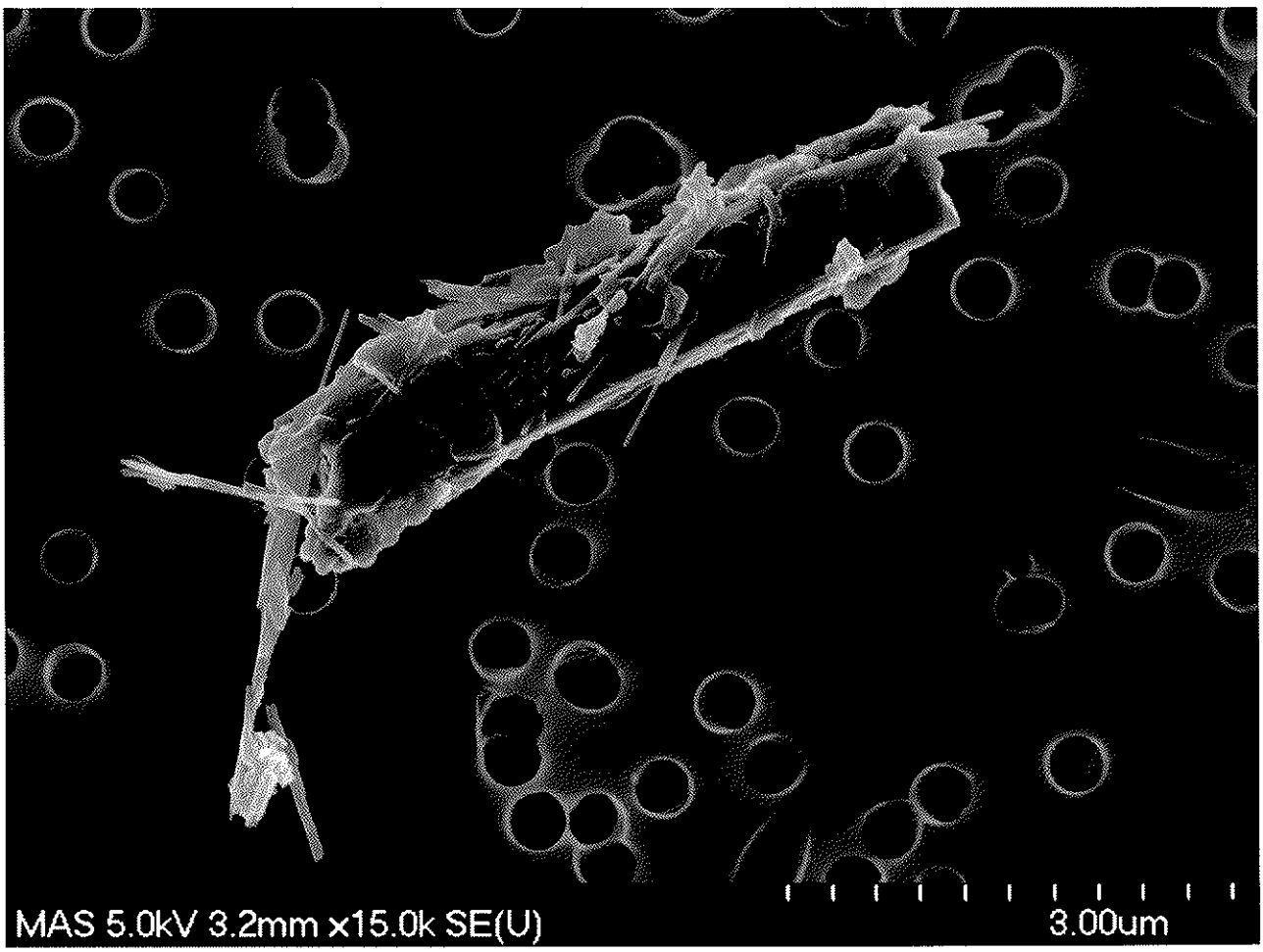
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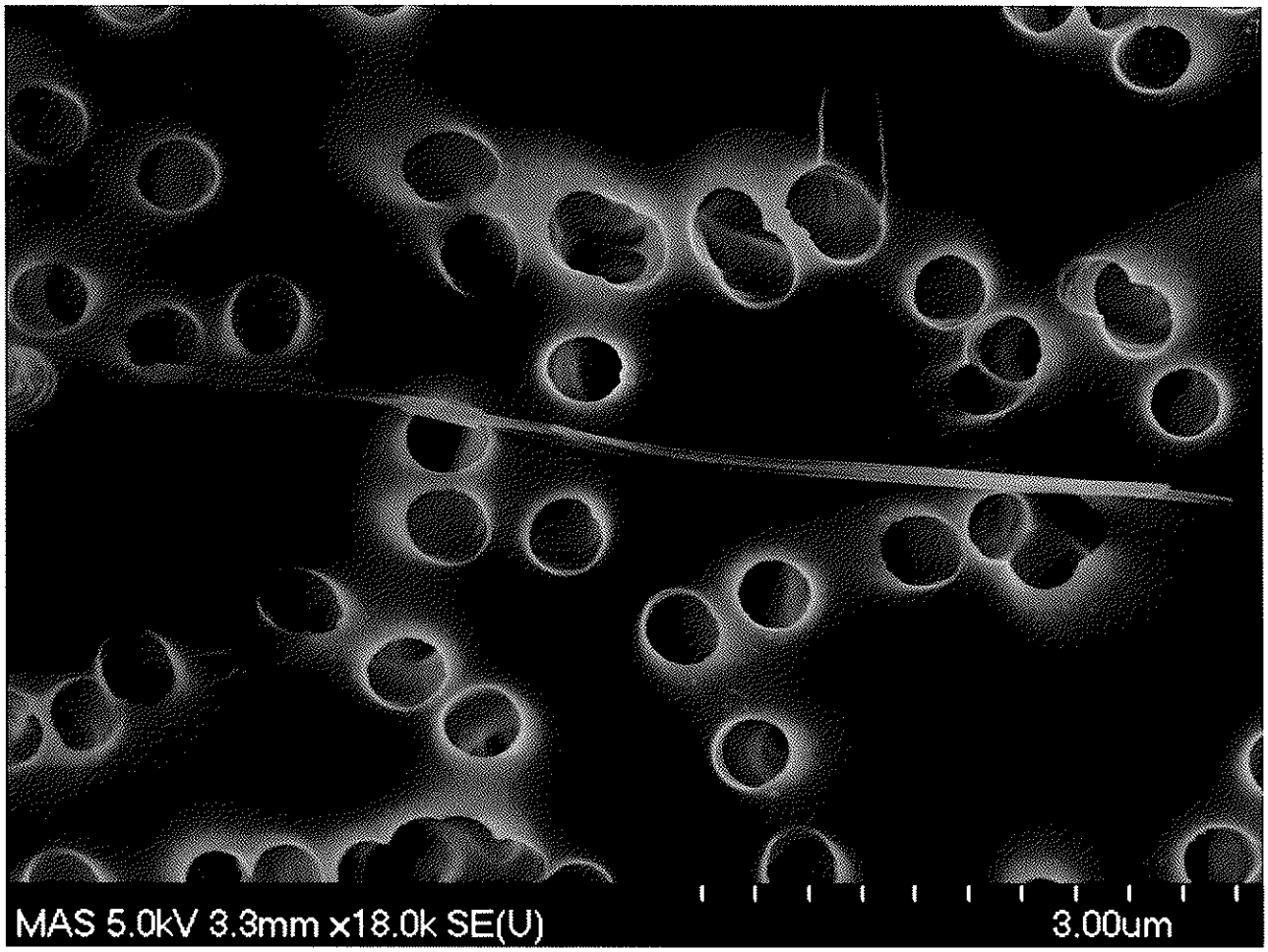
3.00um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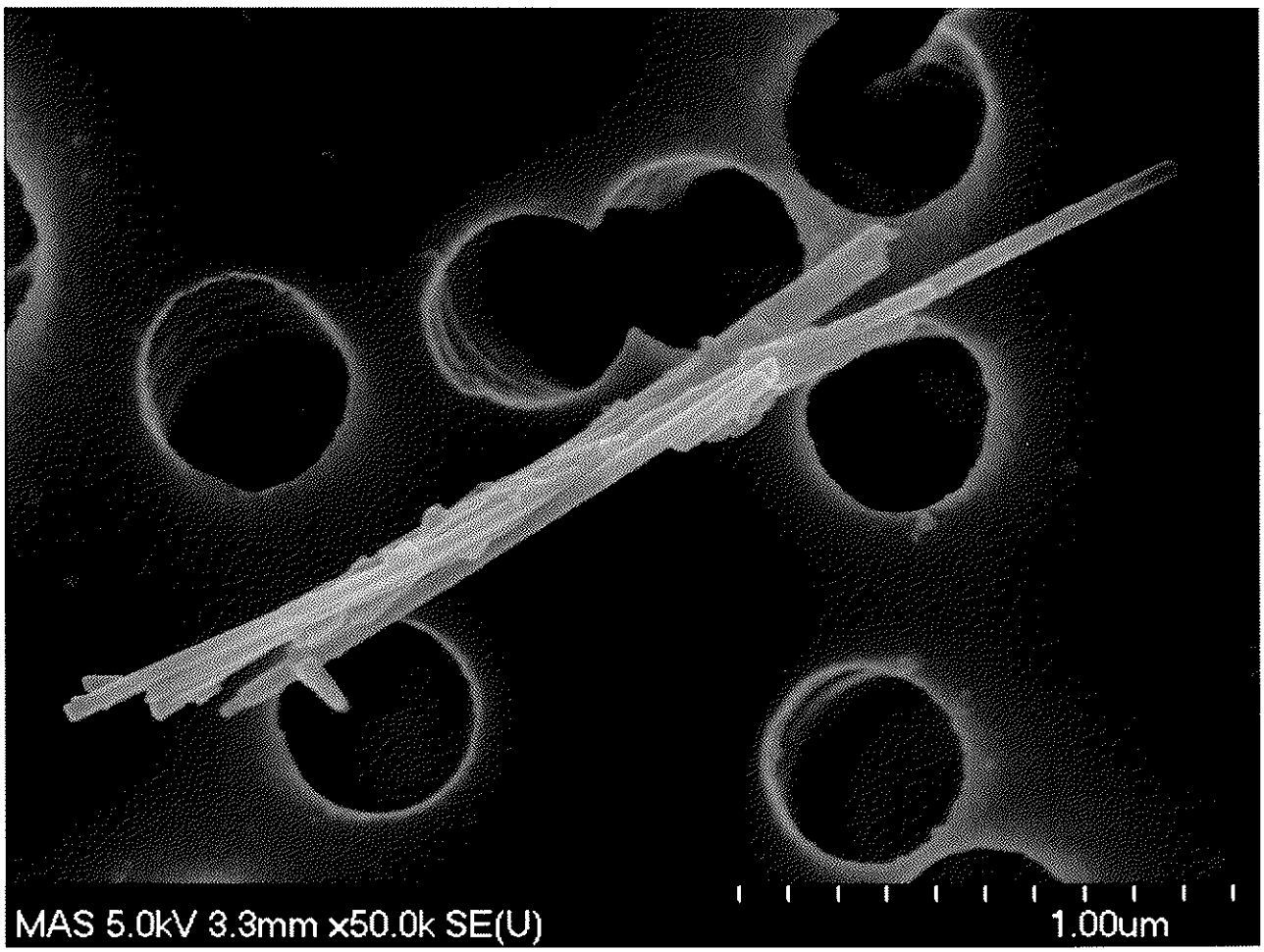
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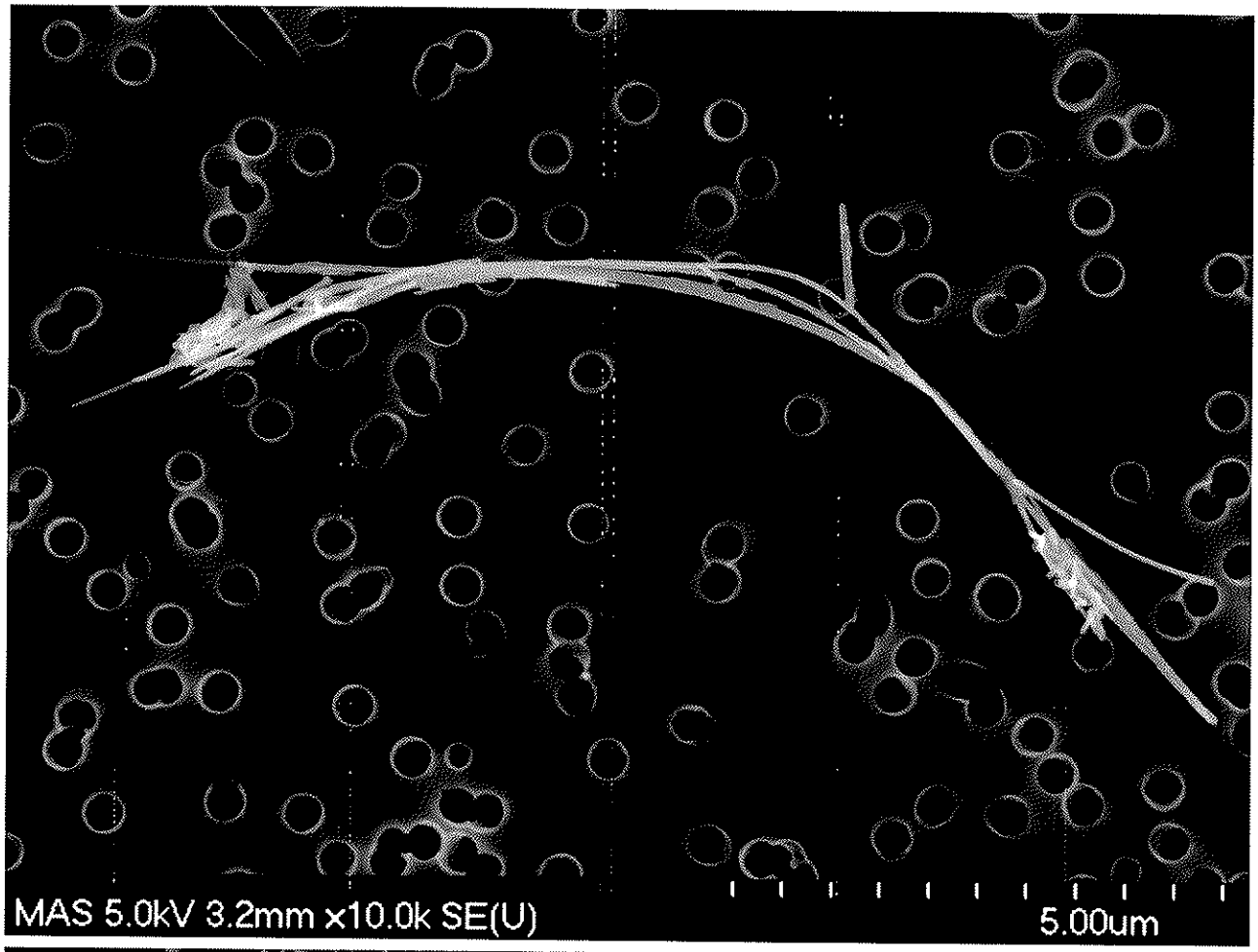
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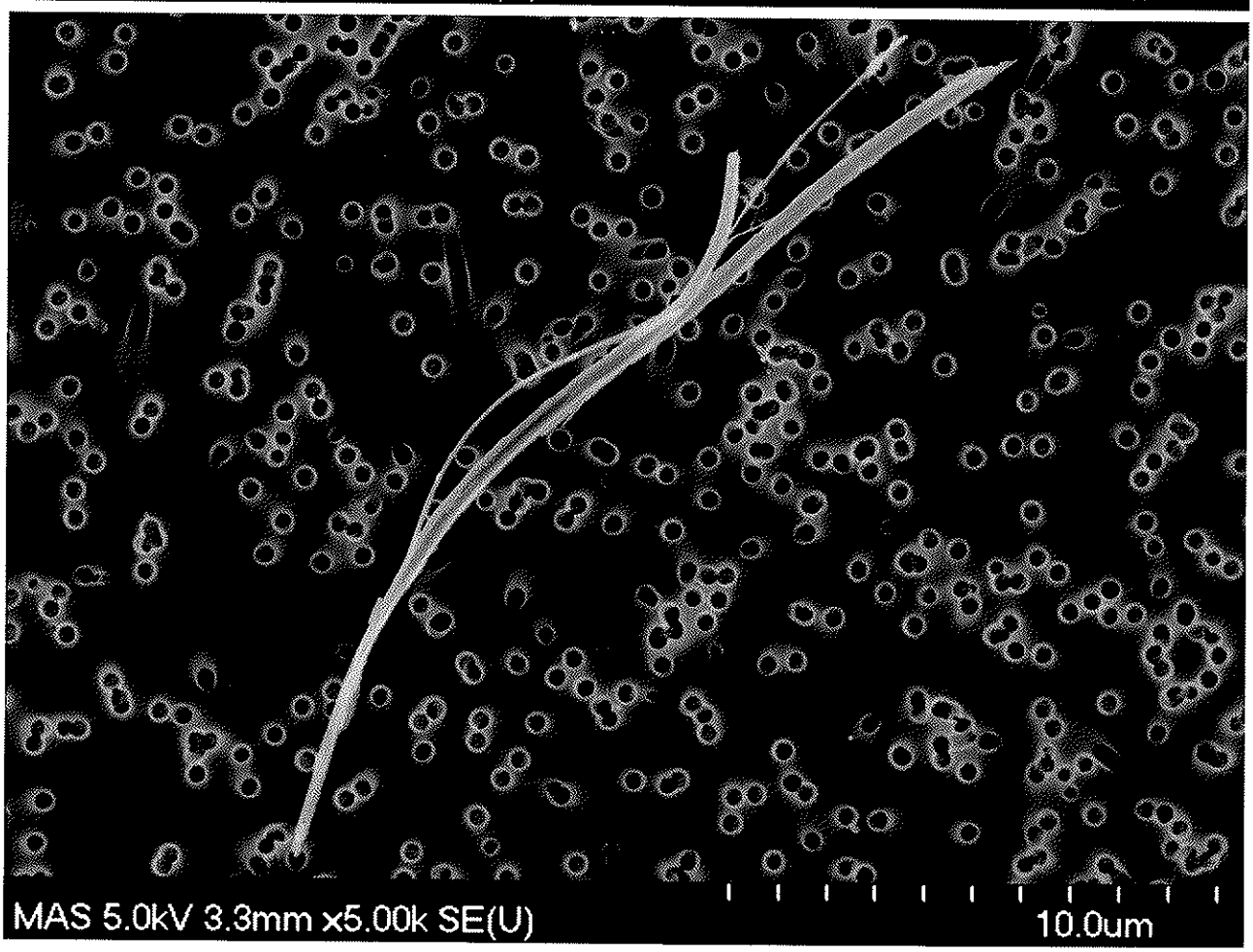
5.00um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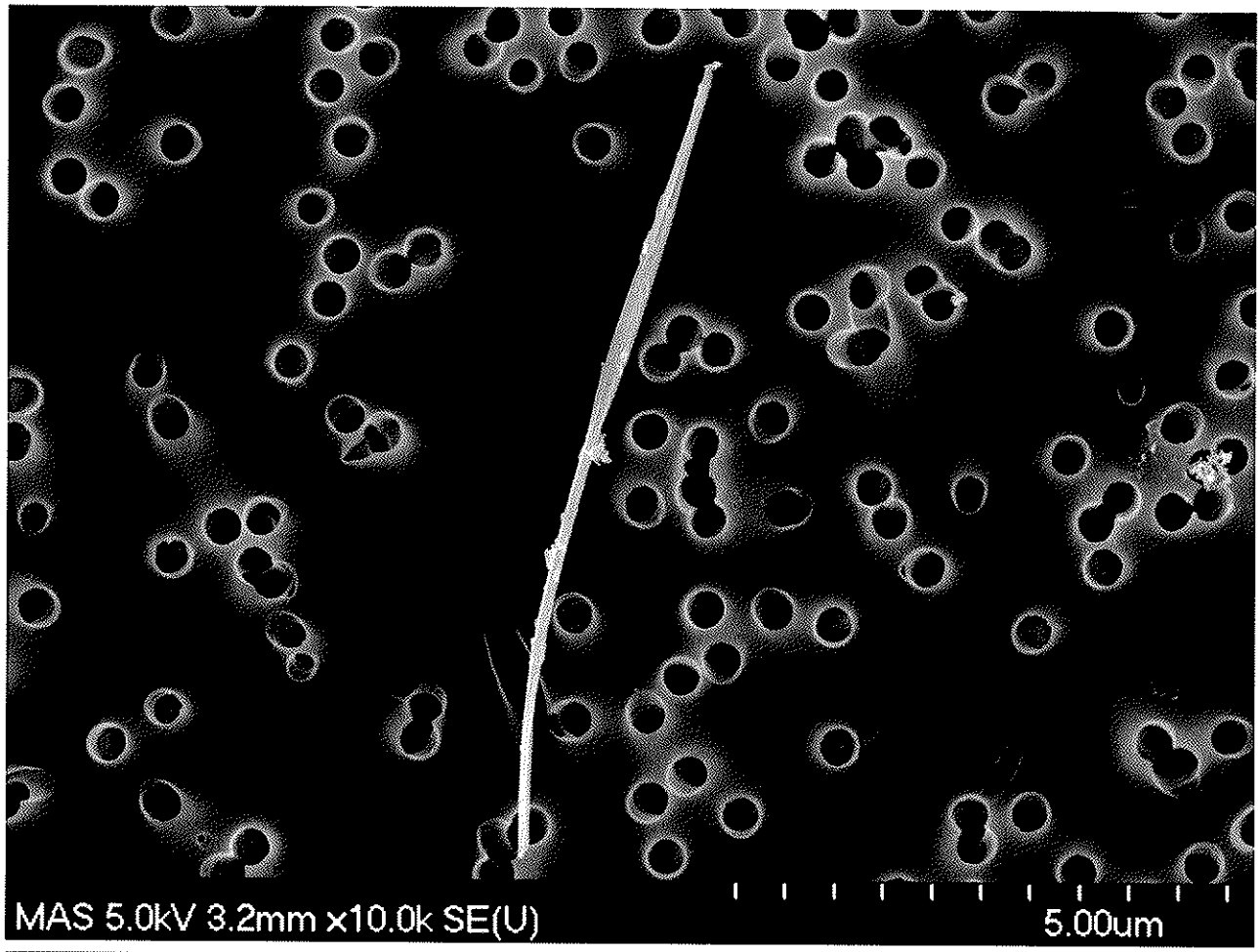
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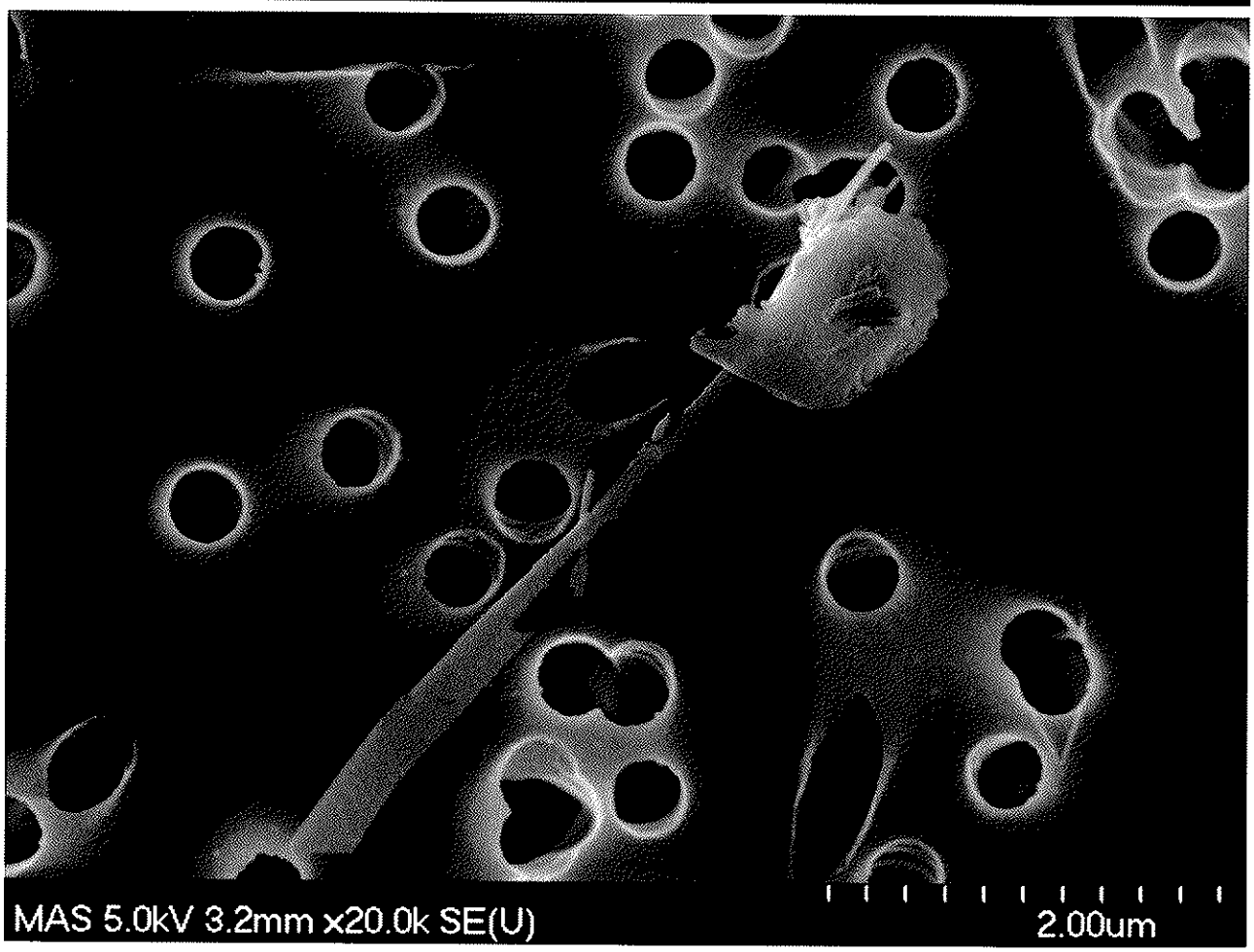
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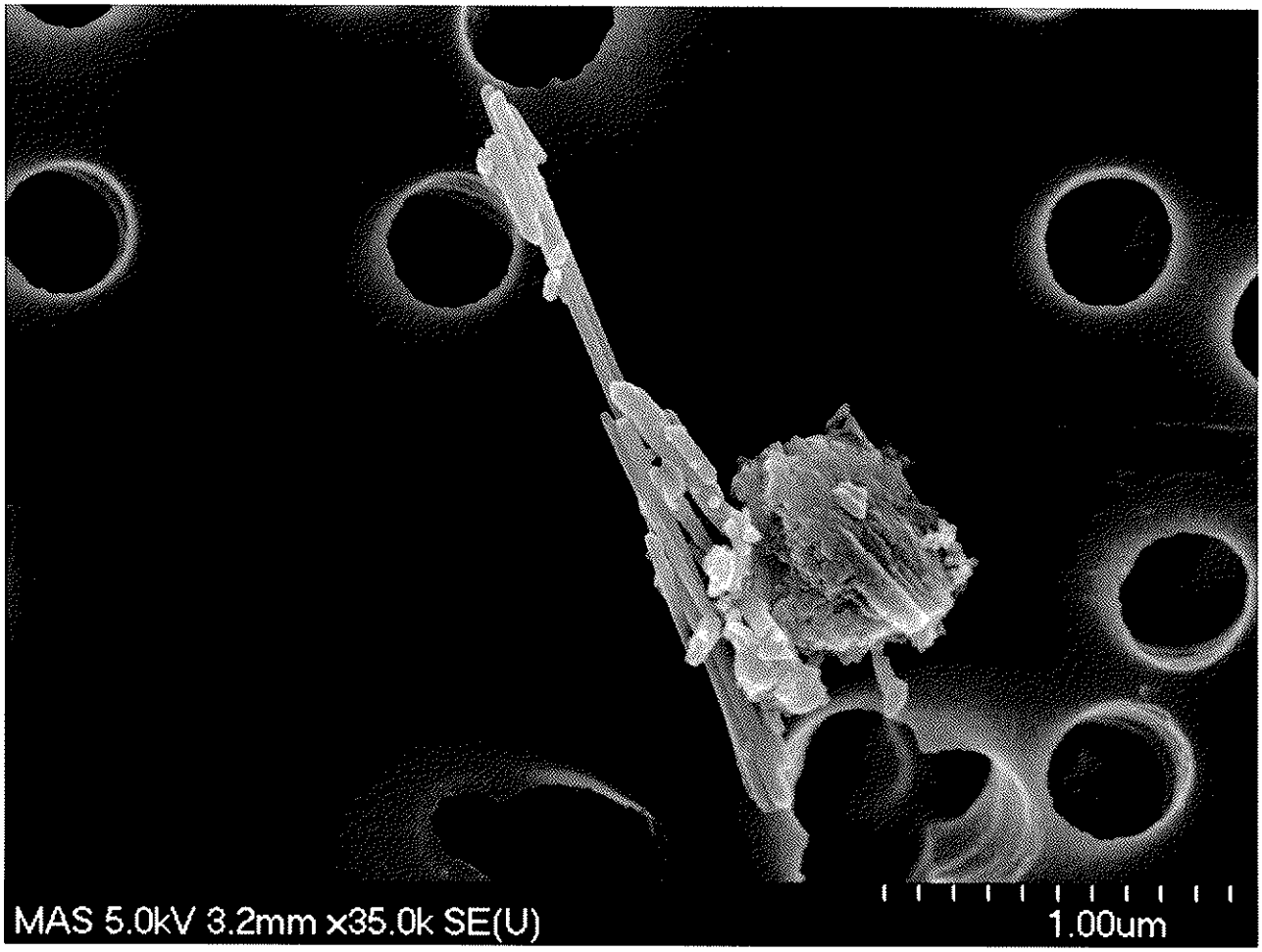
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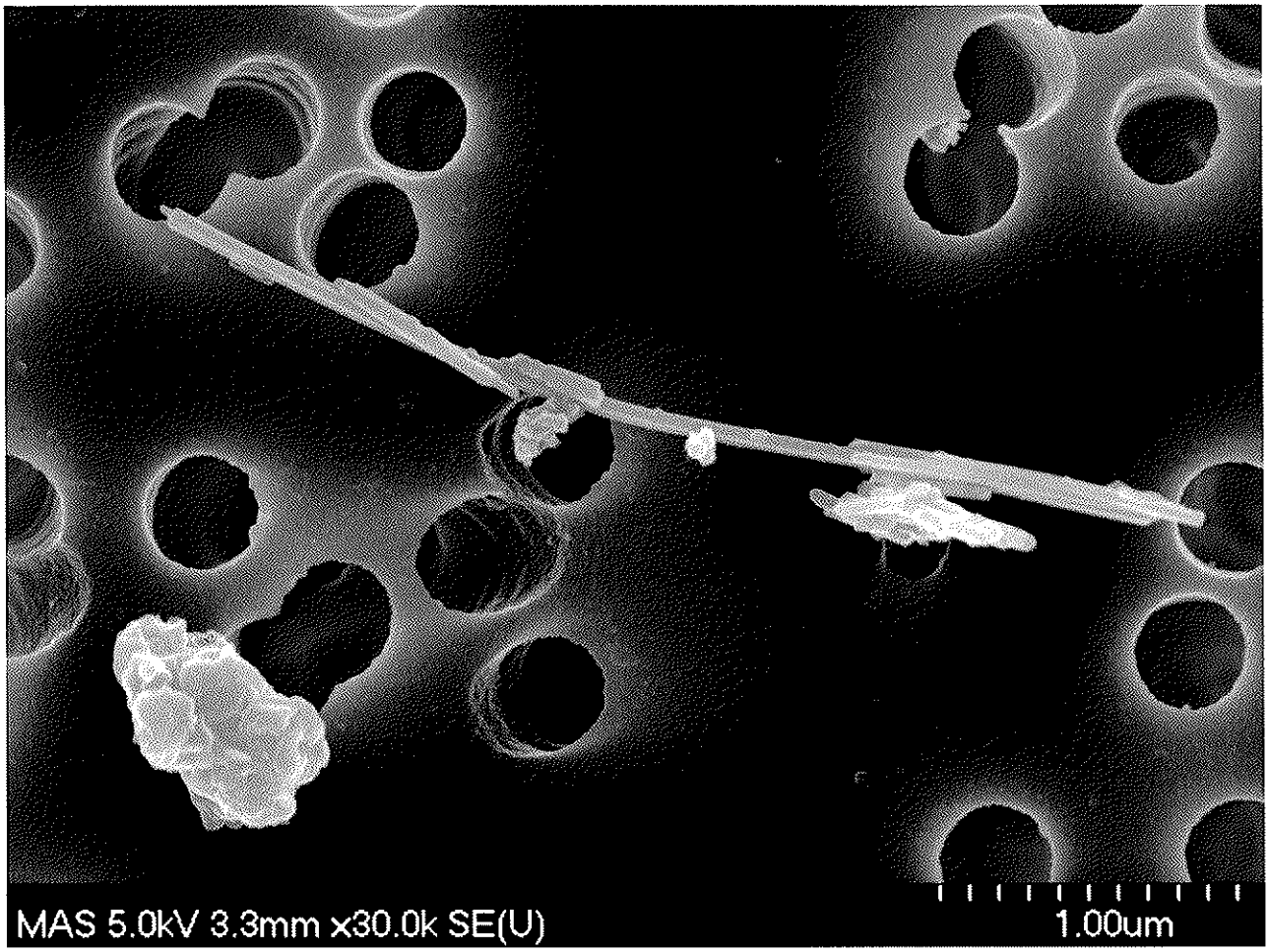
5.00um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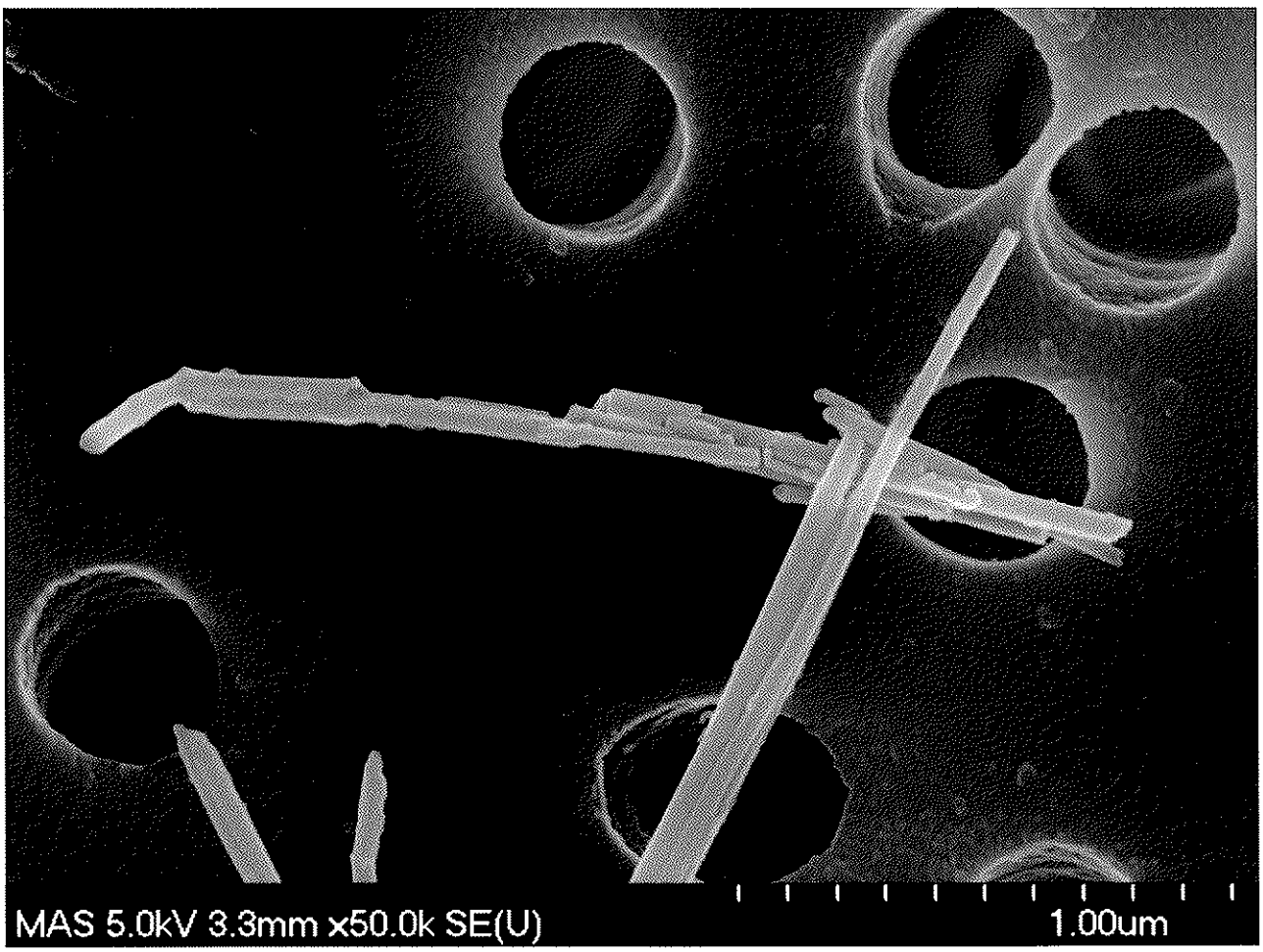
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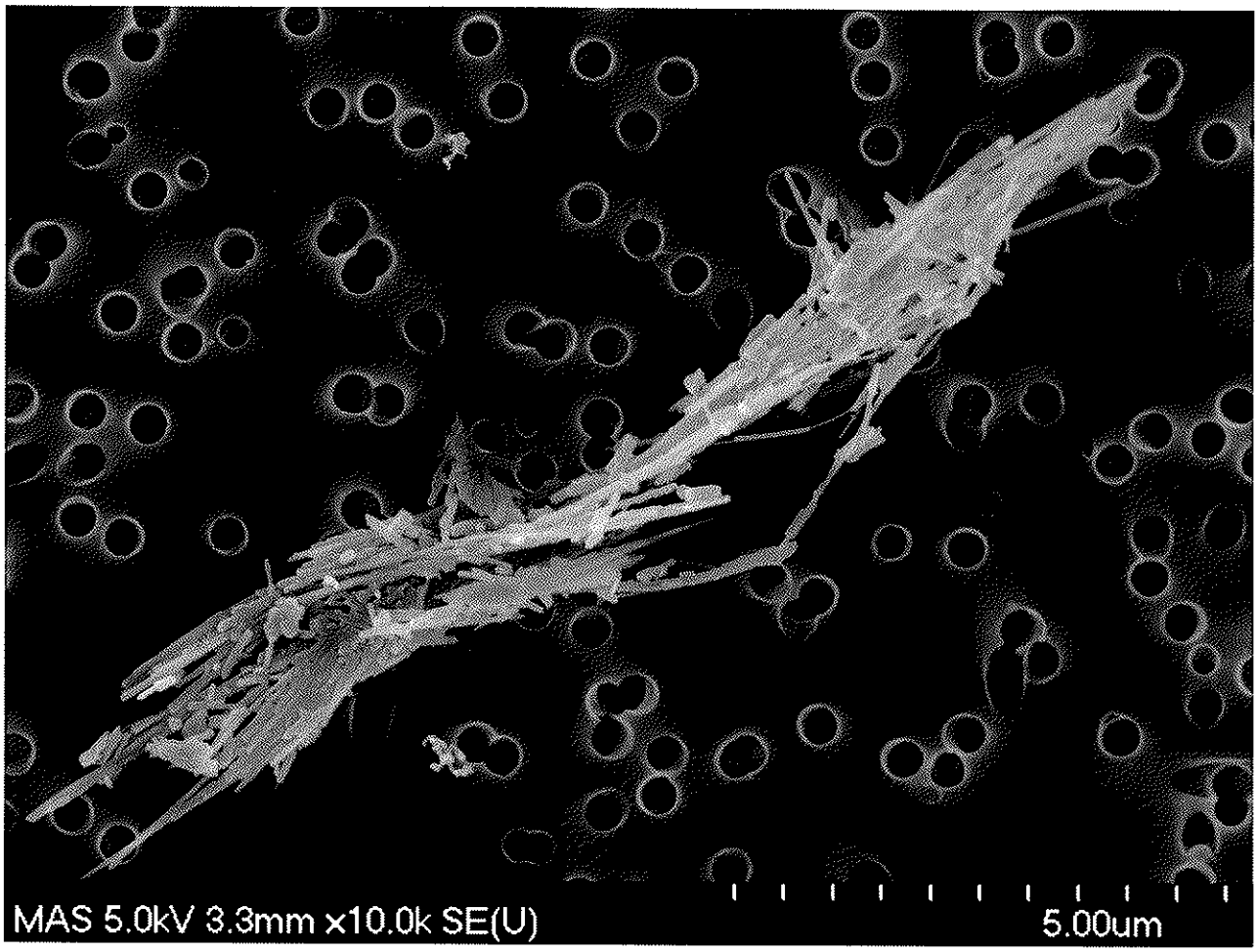
1.00um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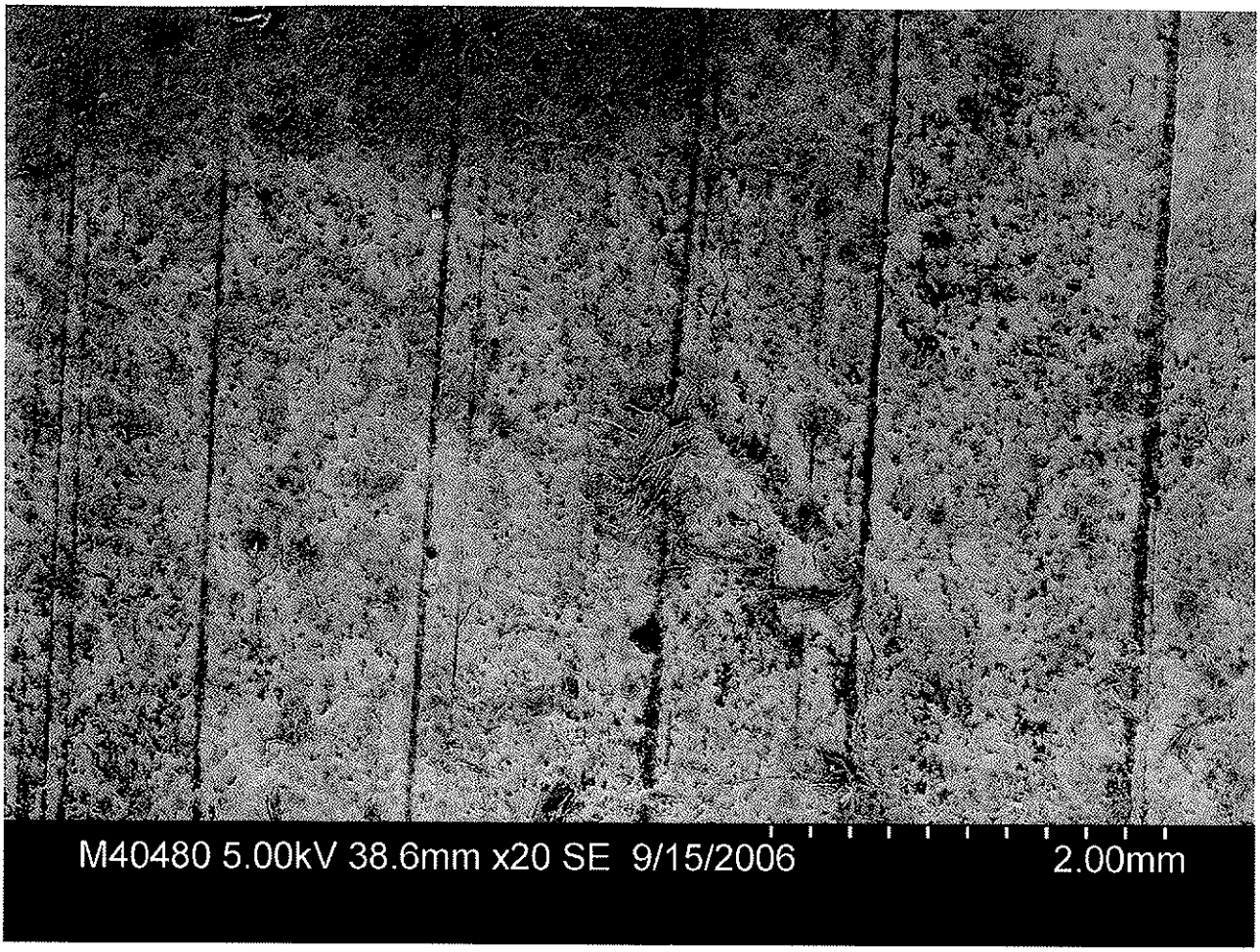
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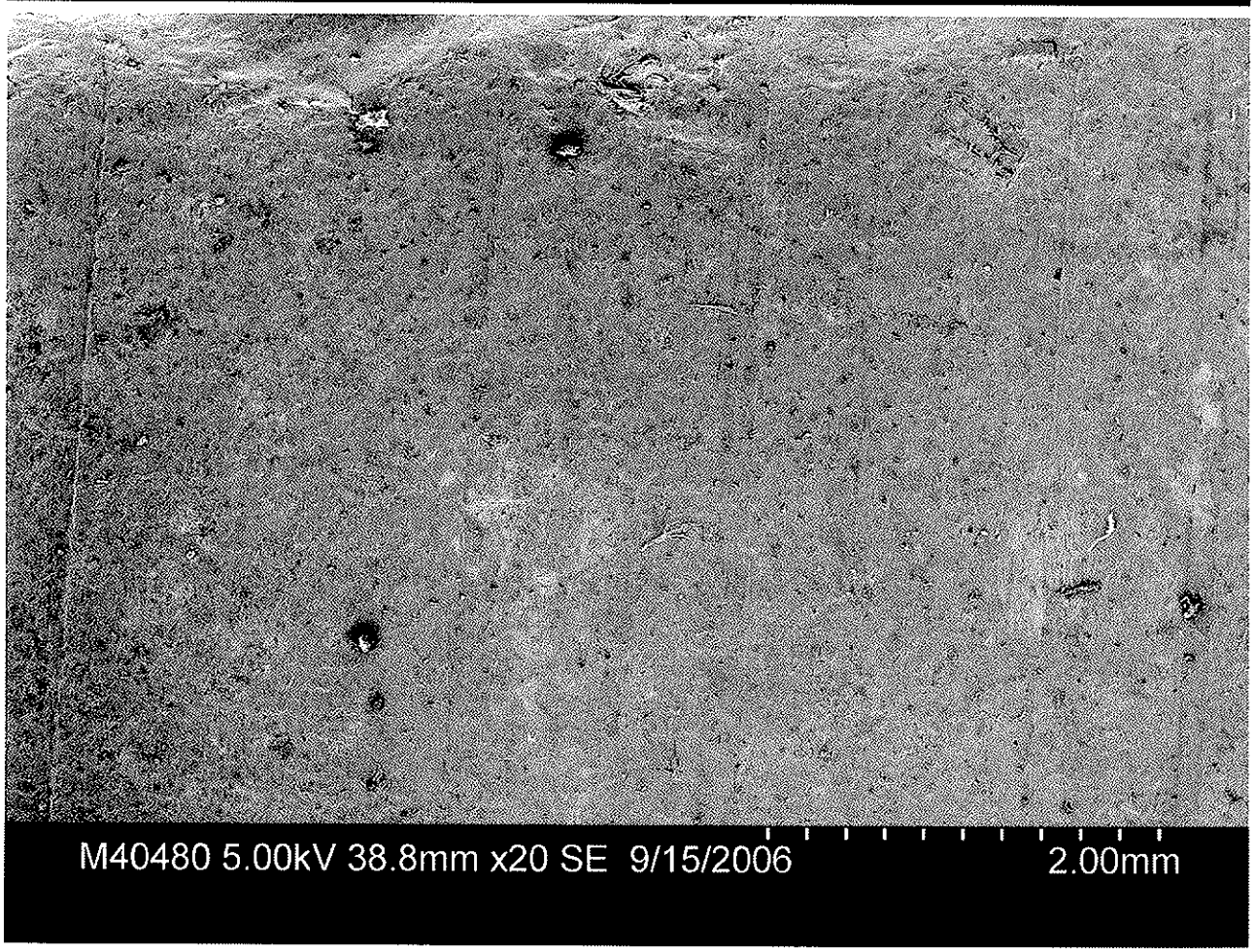
2.00mm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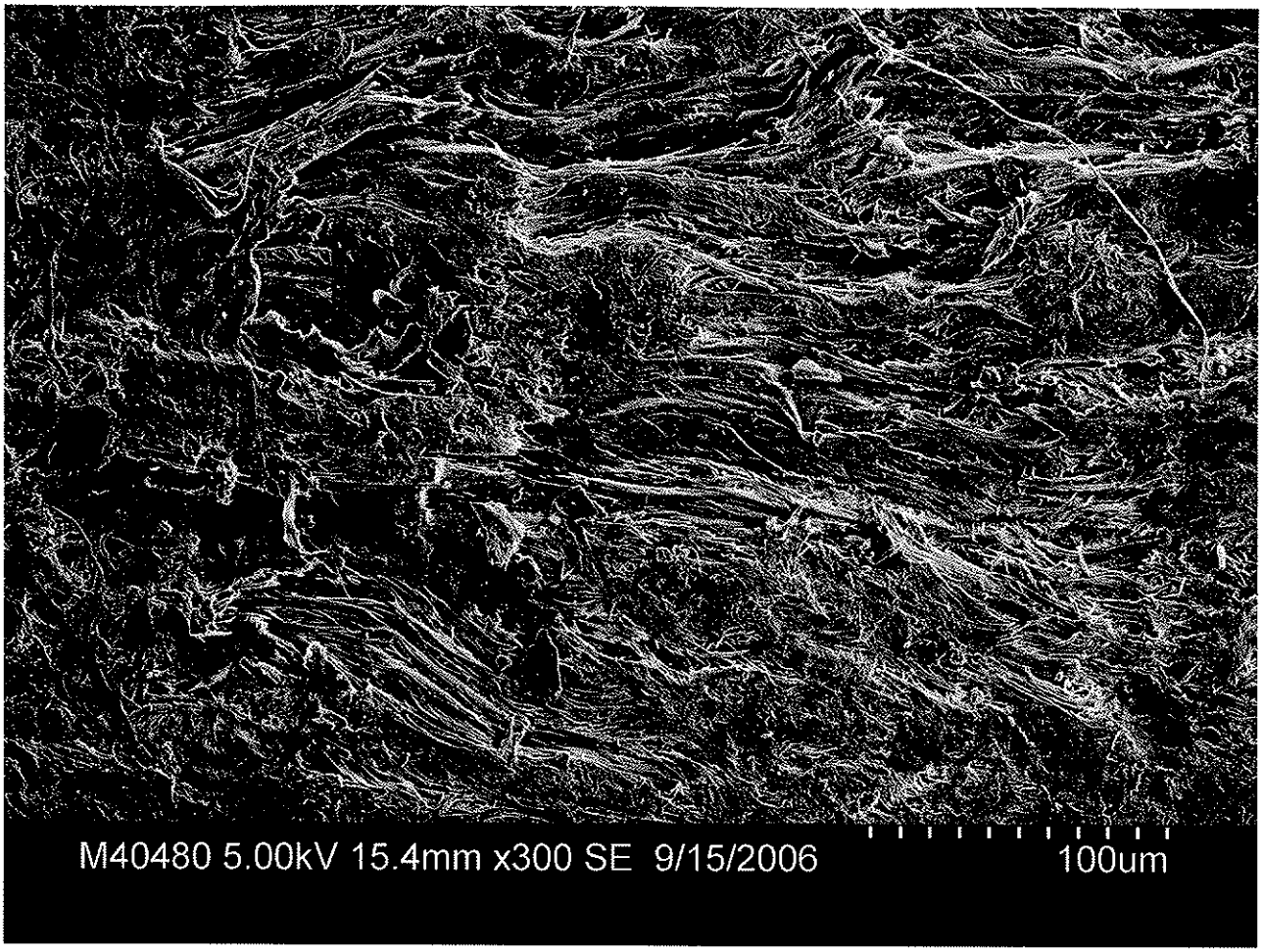
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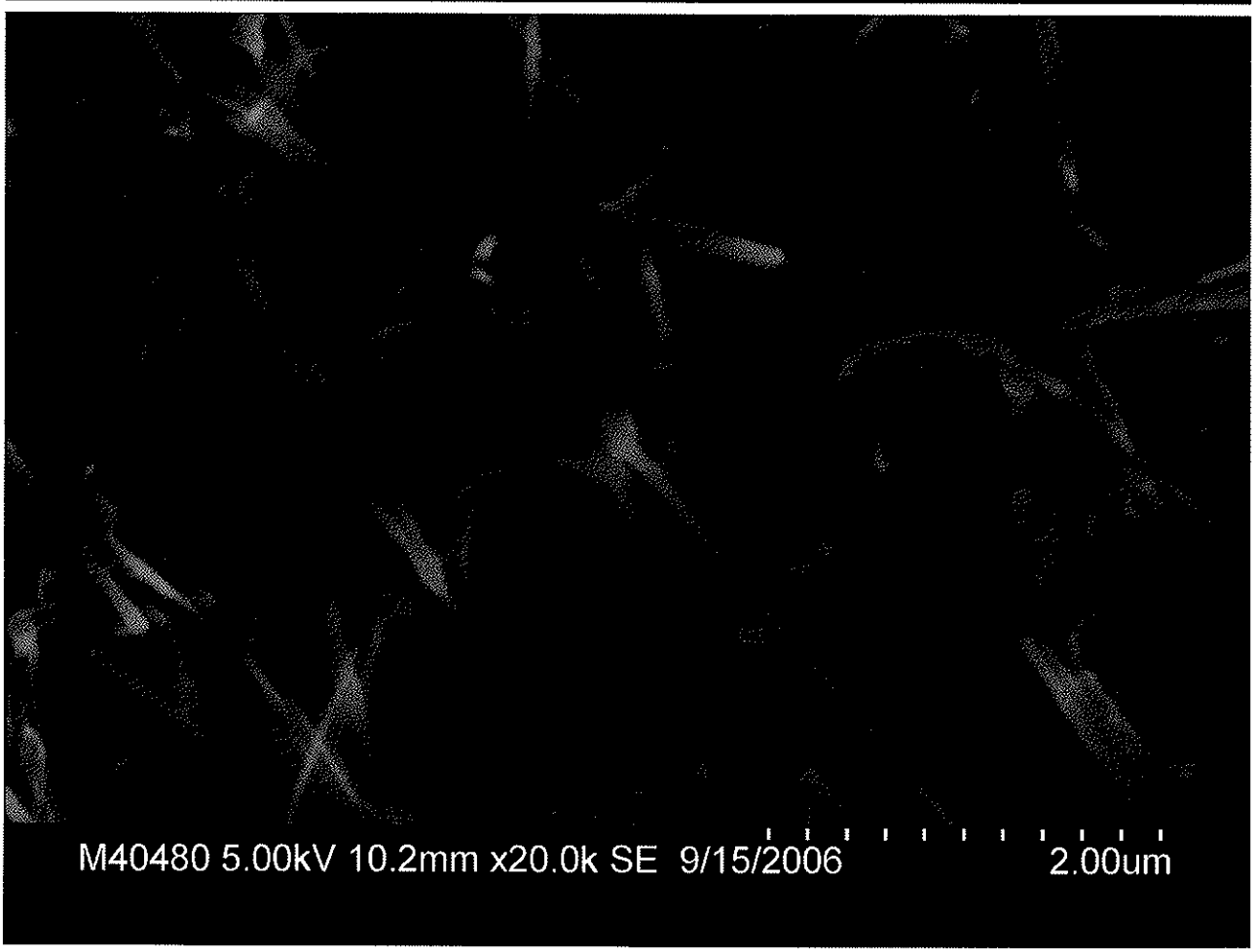
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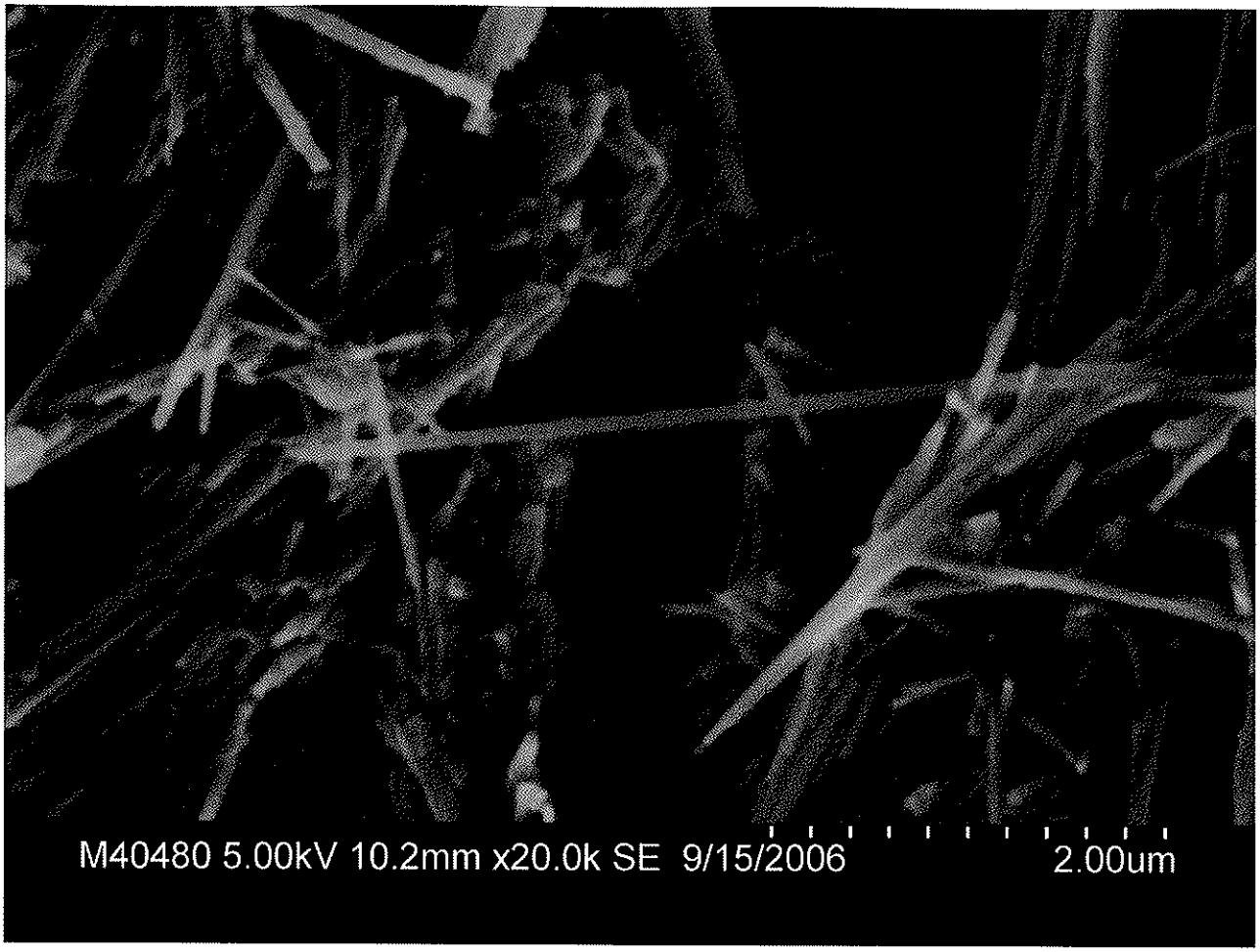
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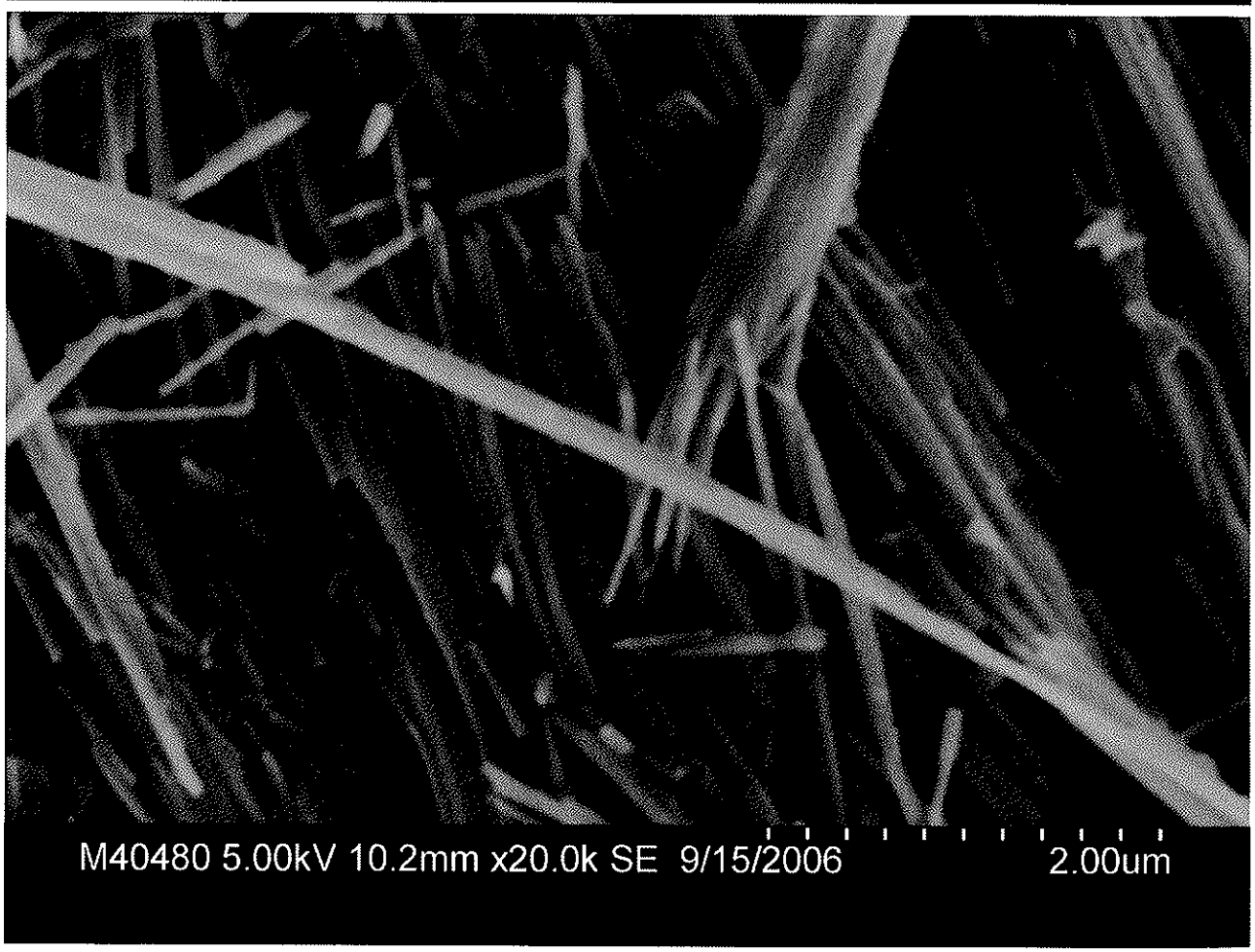
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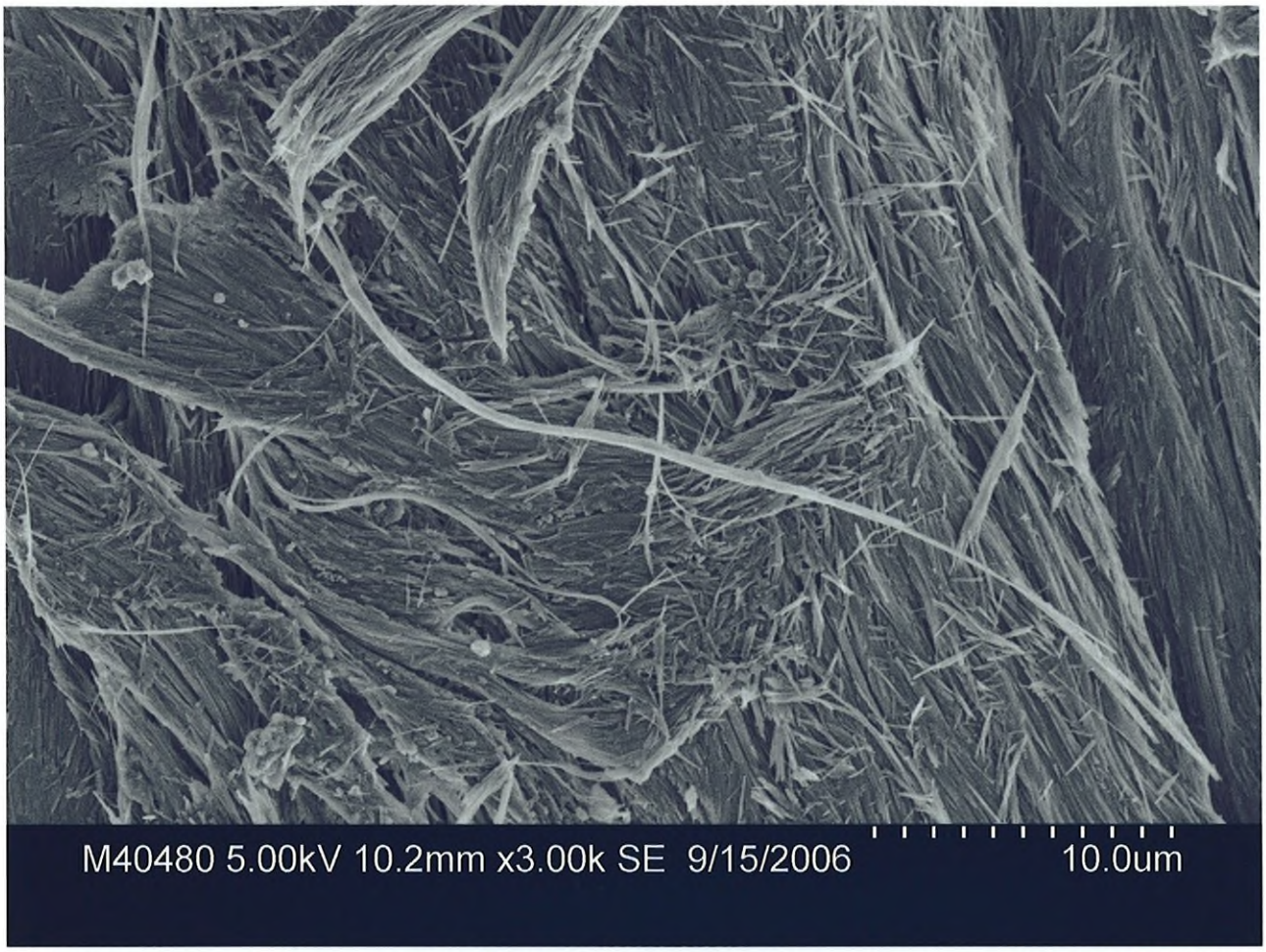
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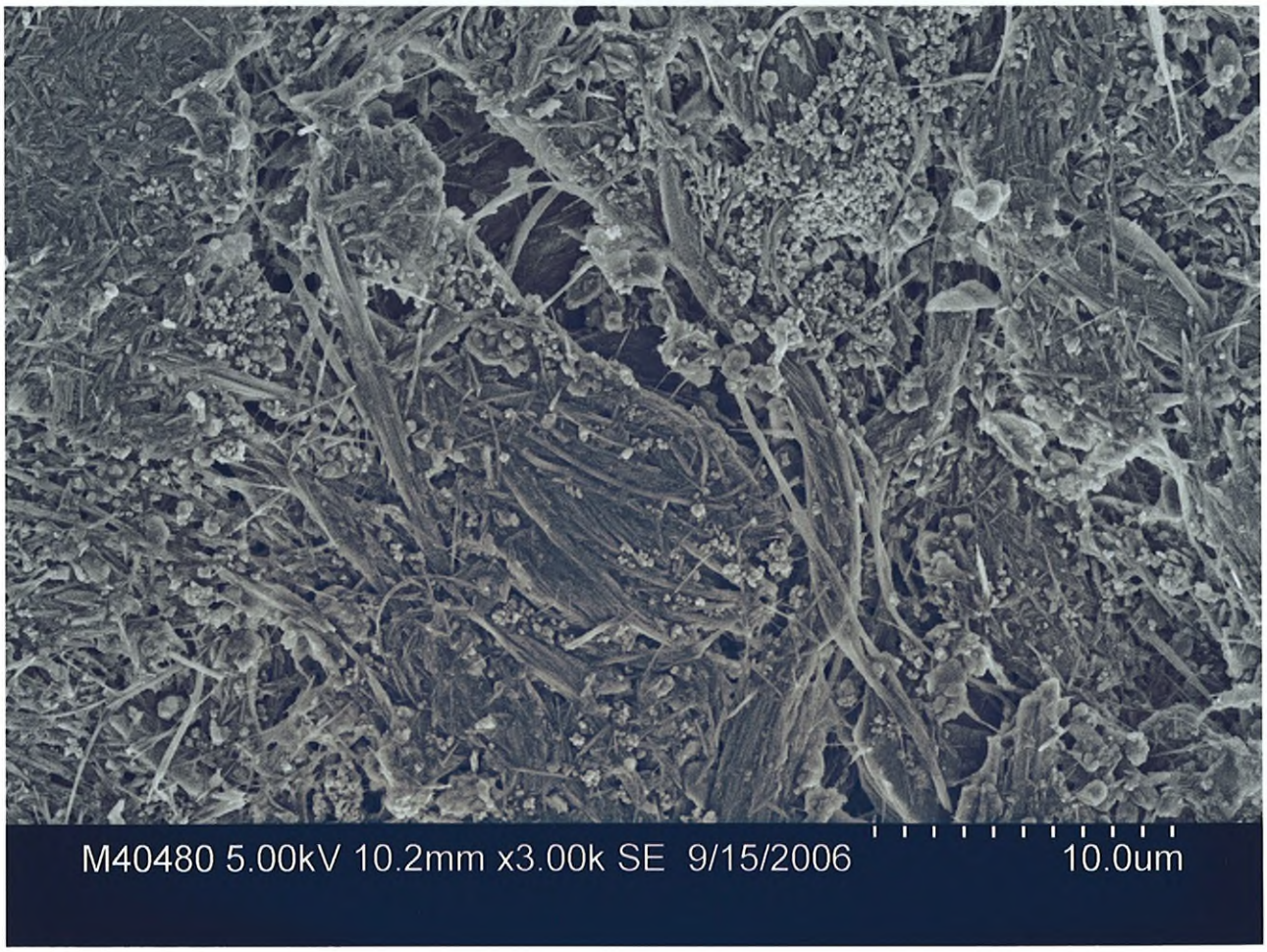
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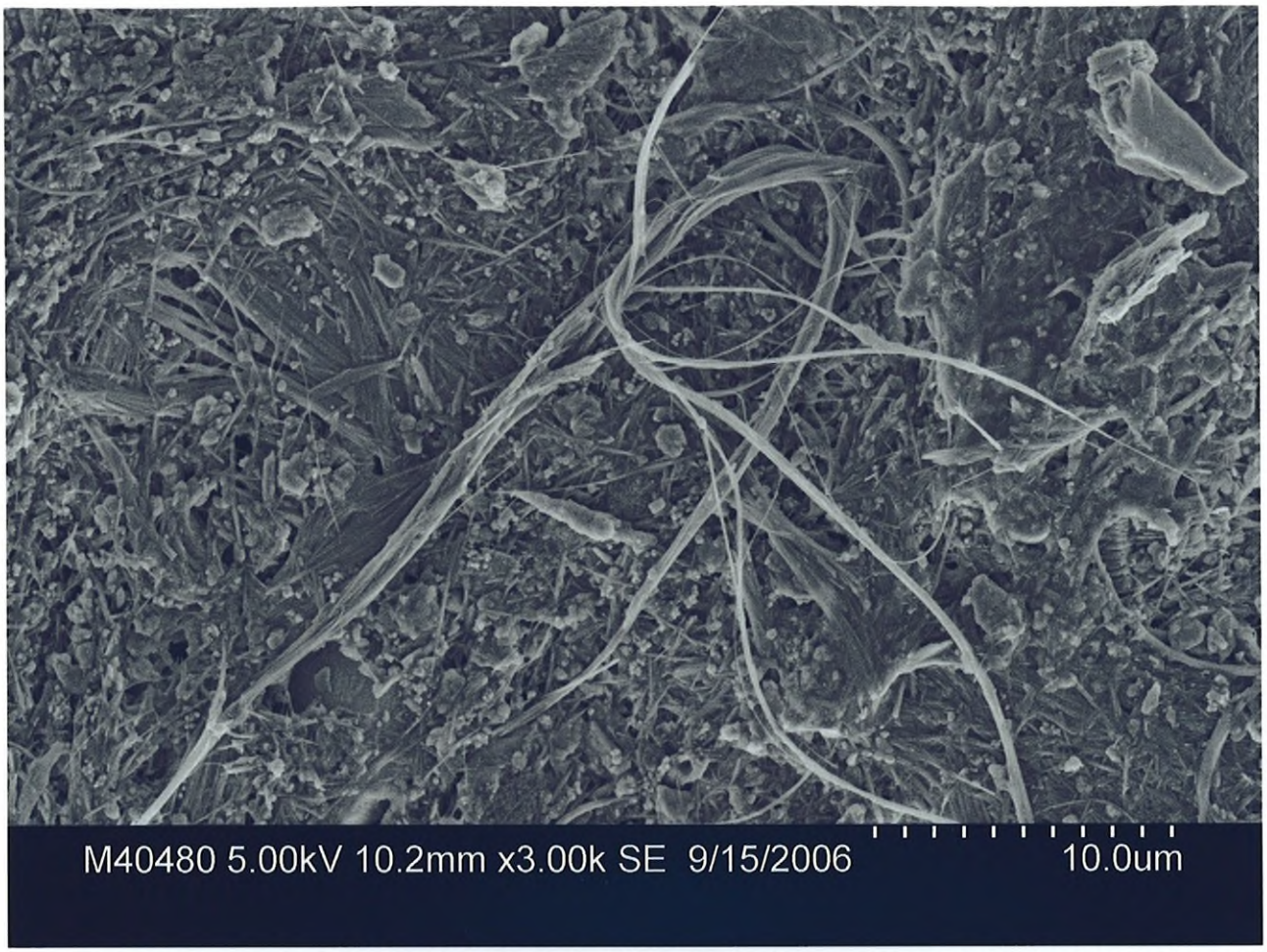
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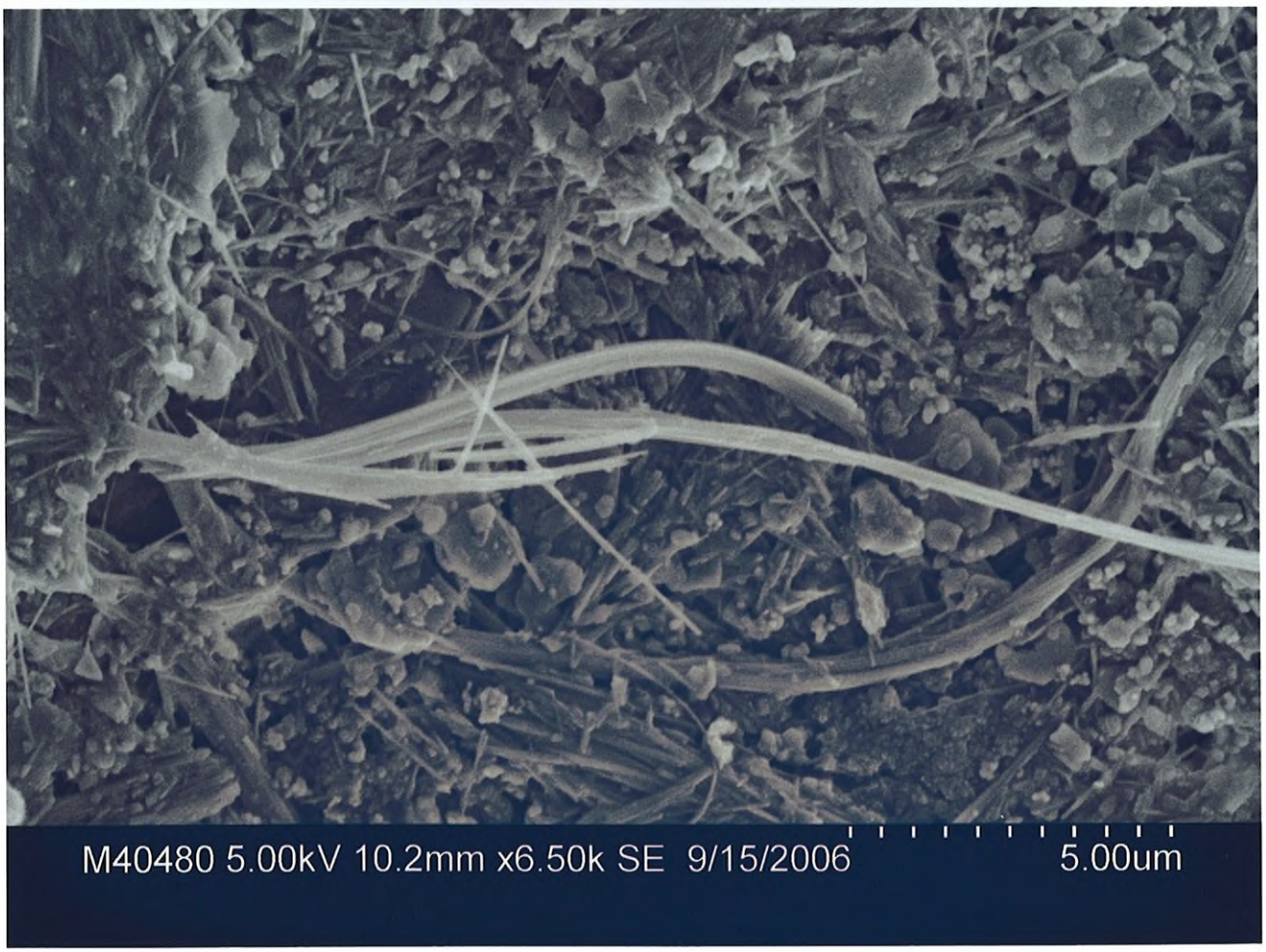
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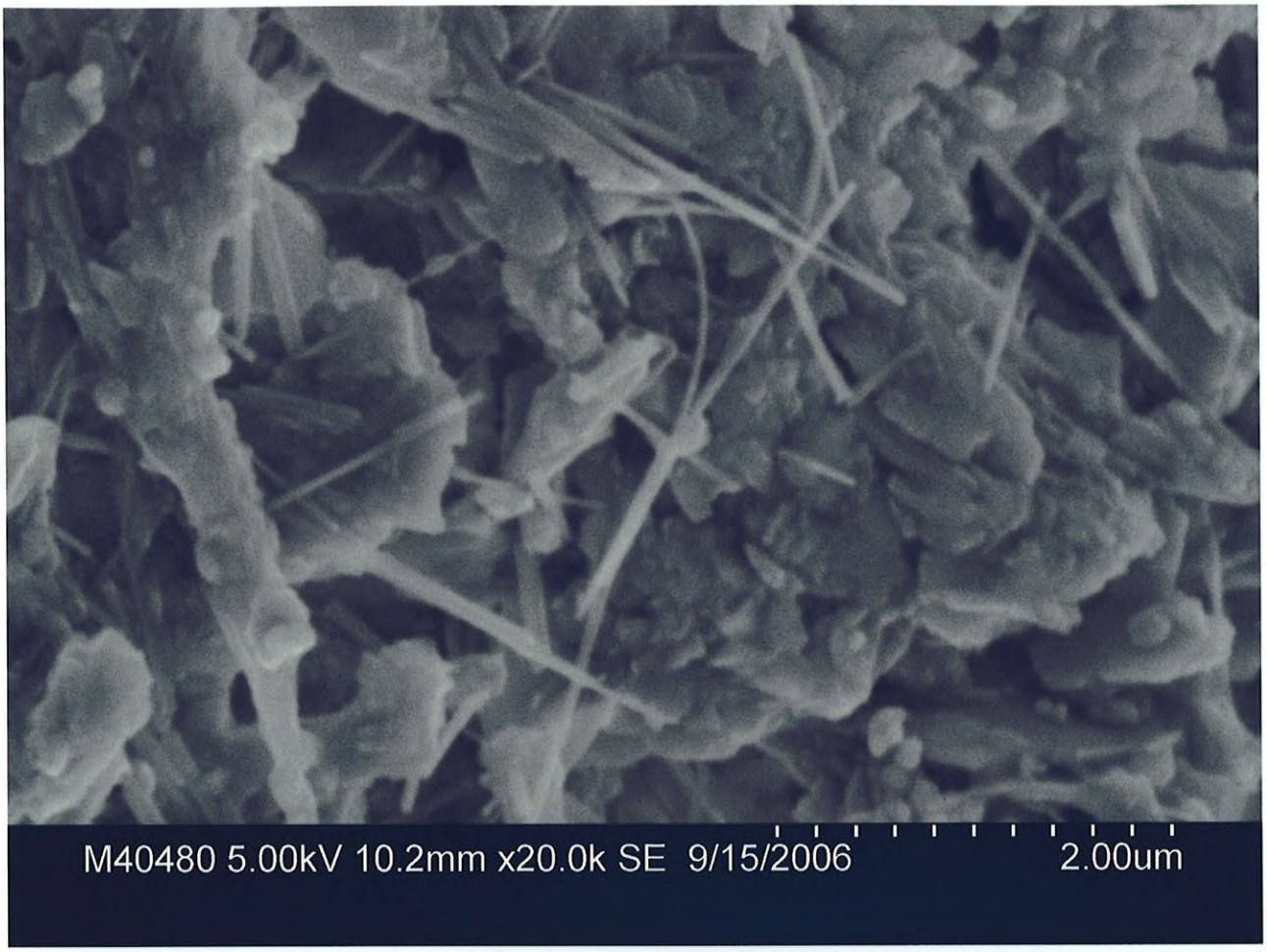
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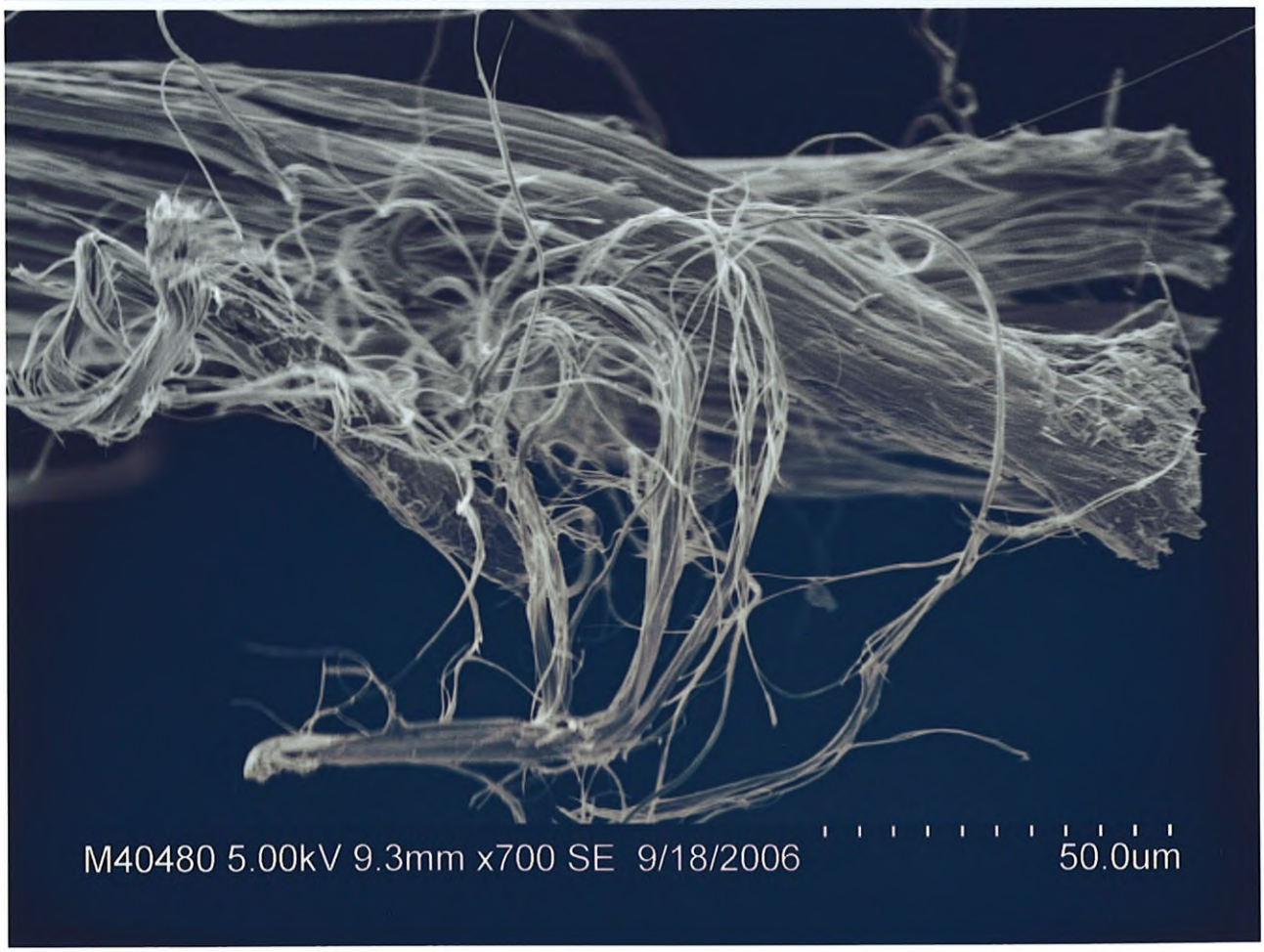
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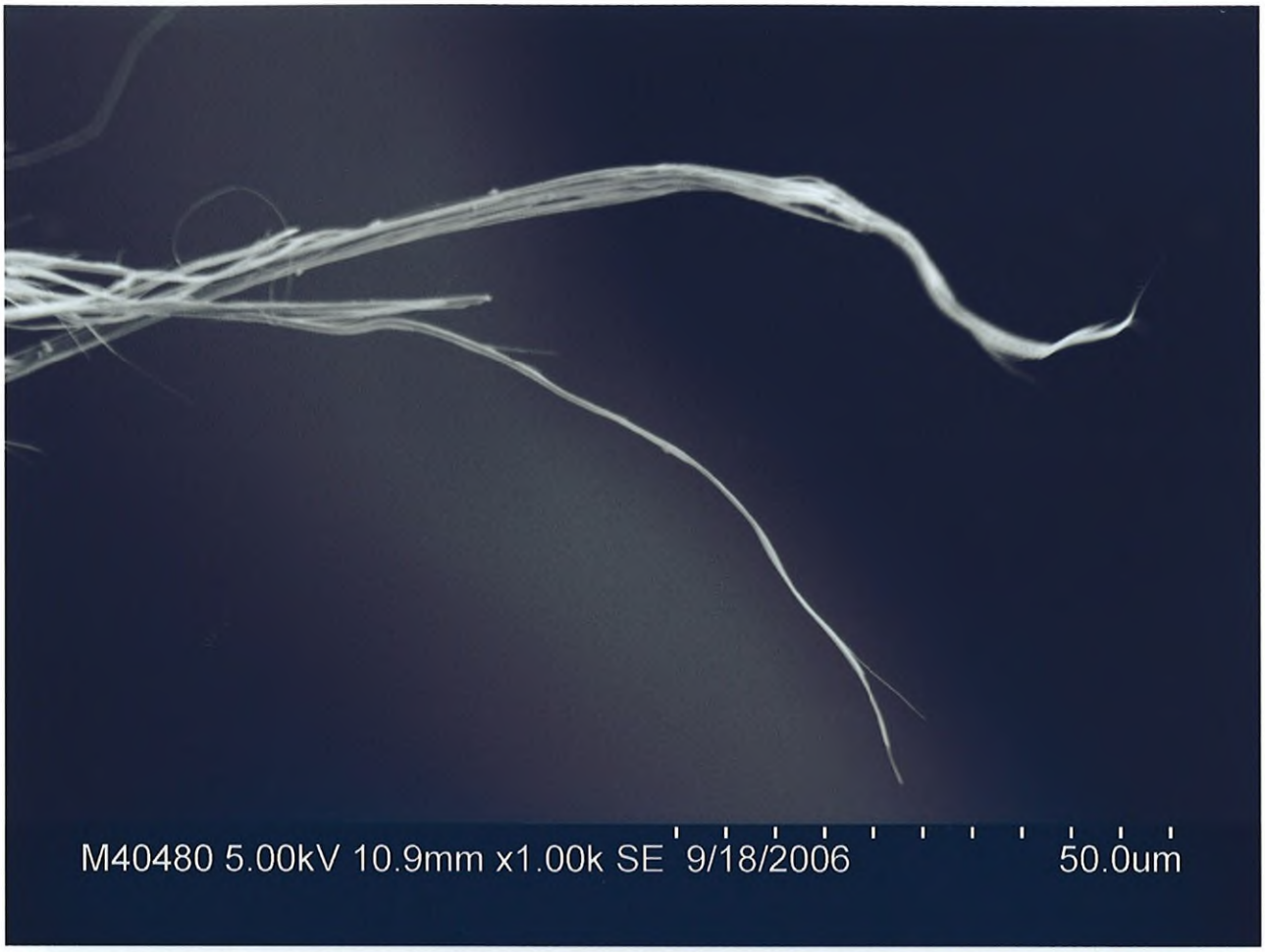
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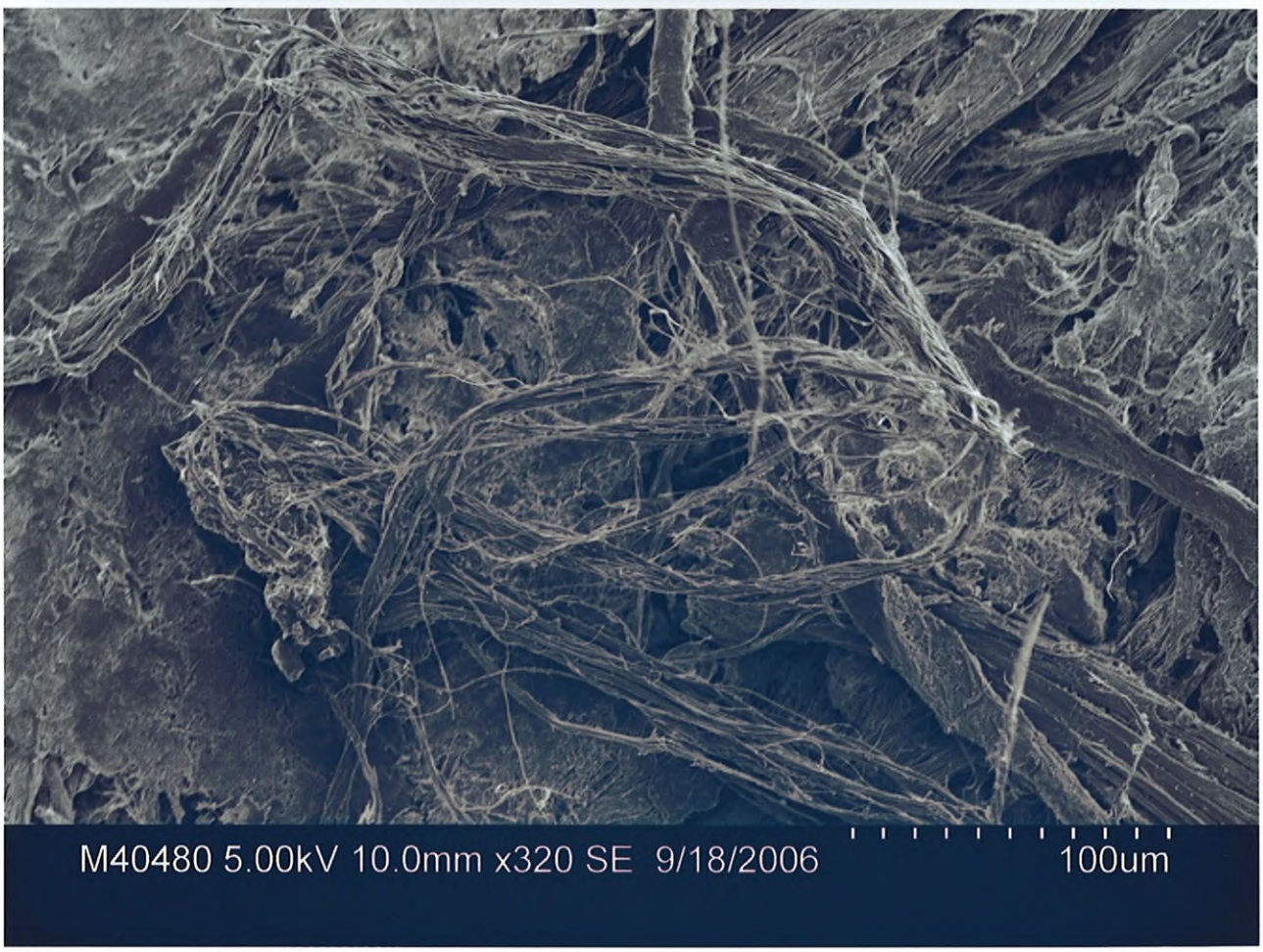
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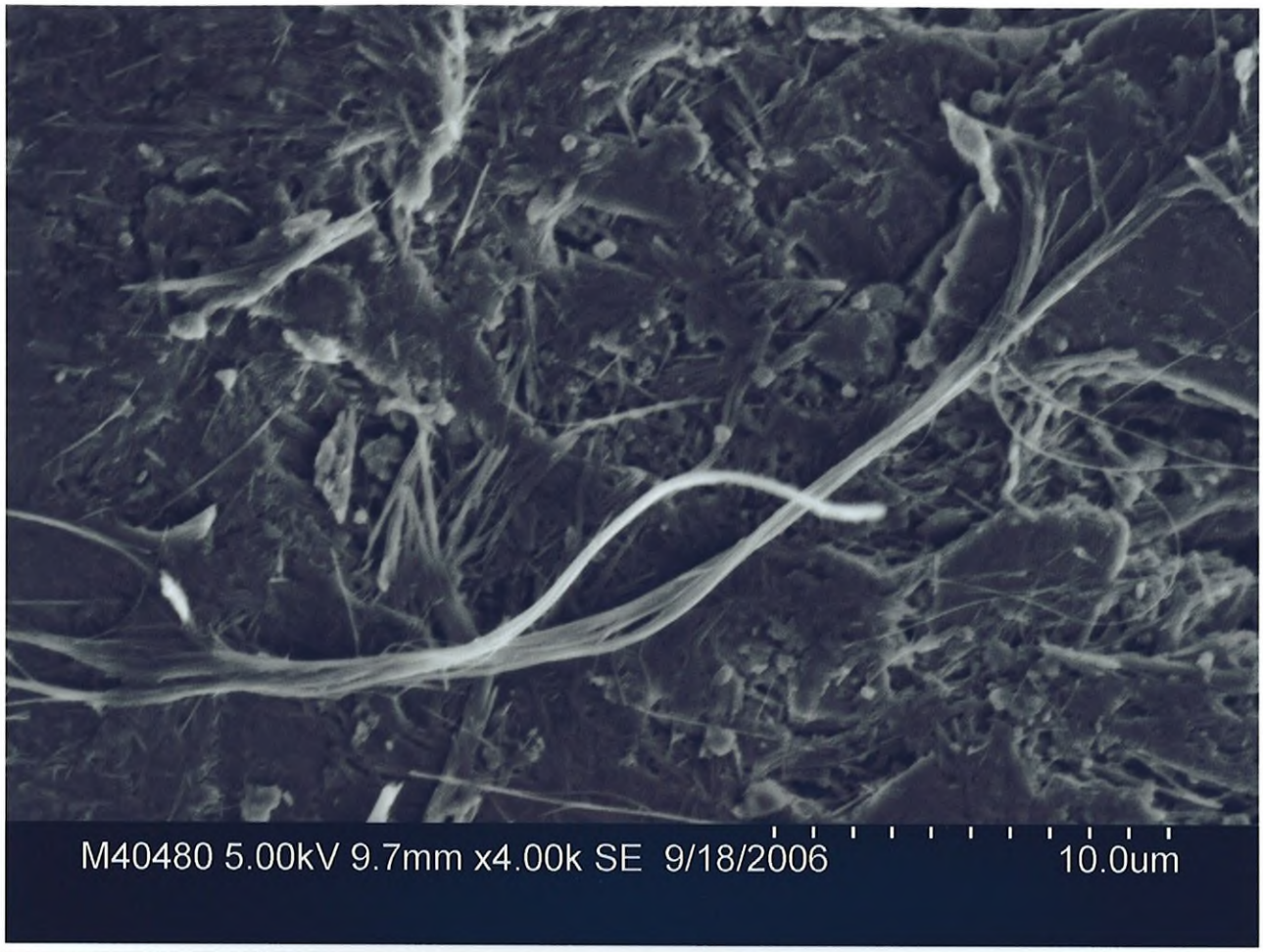
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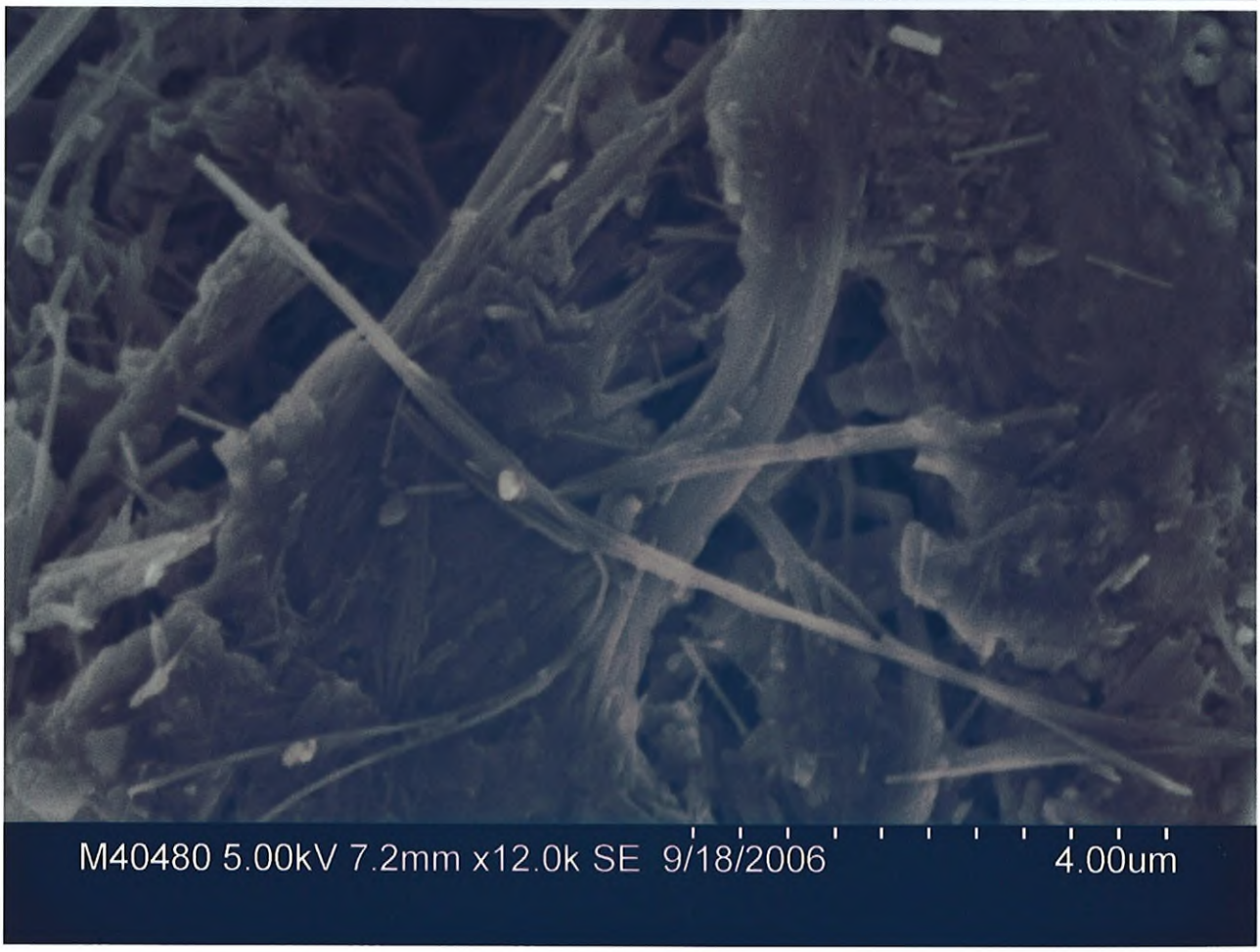
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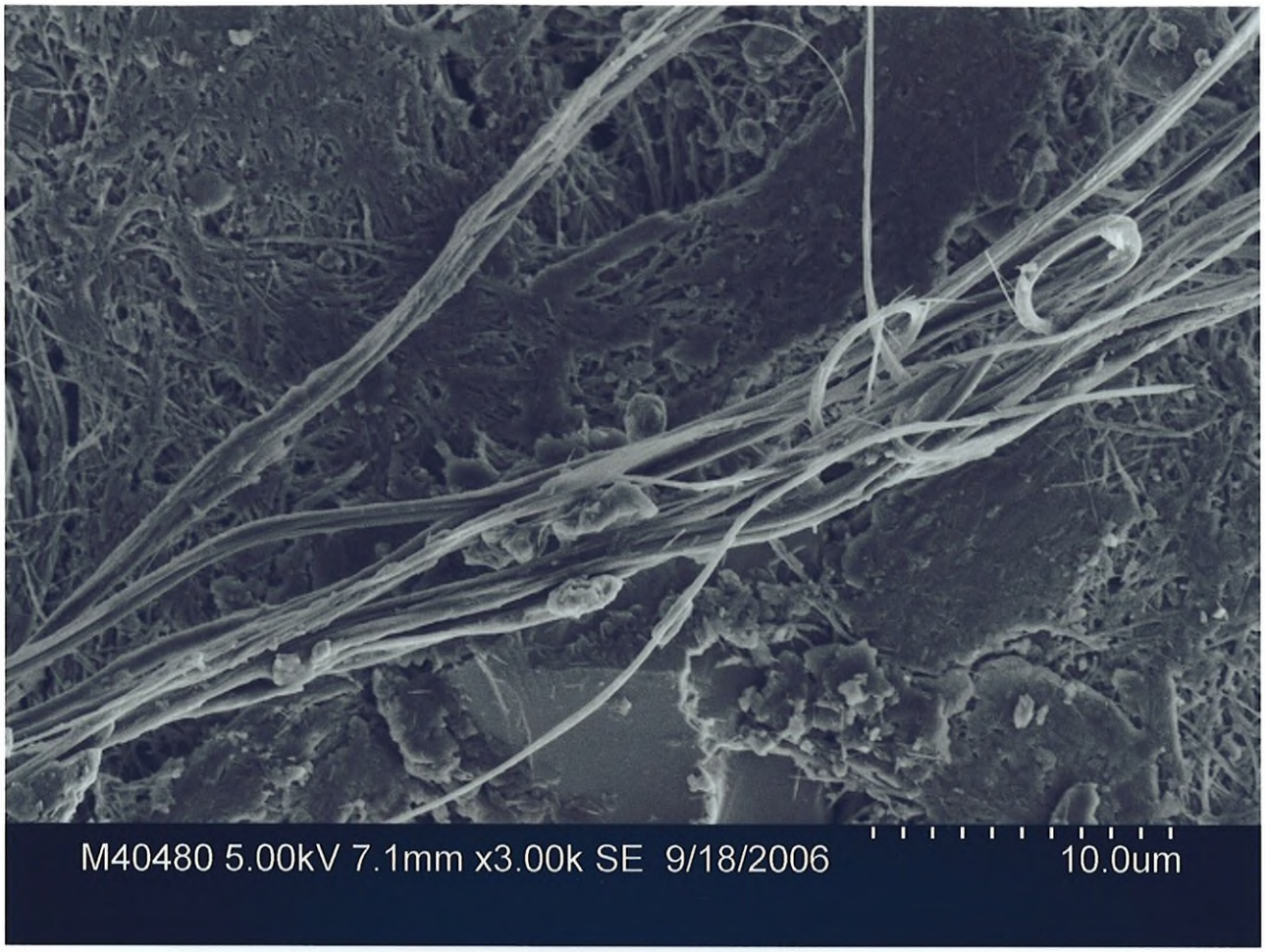
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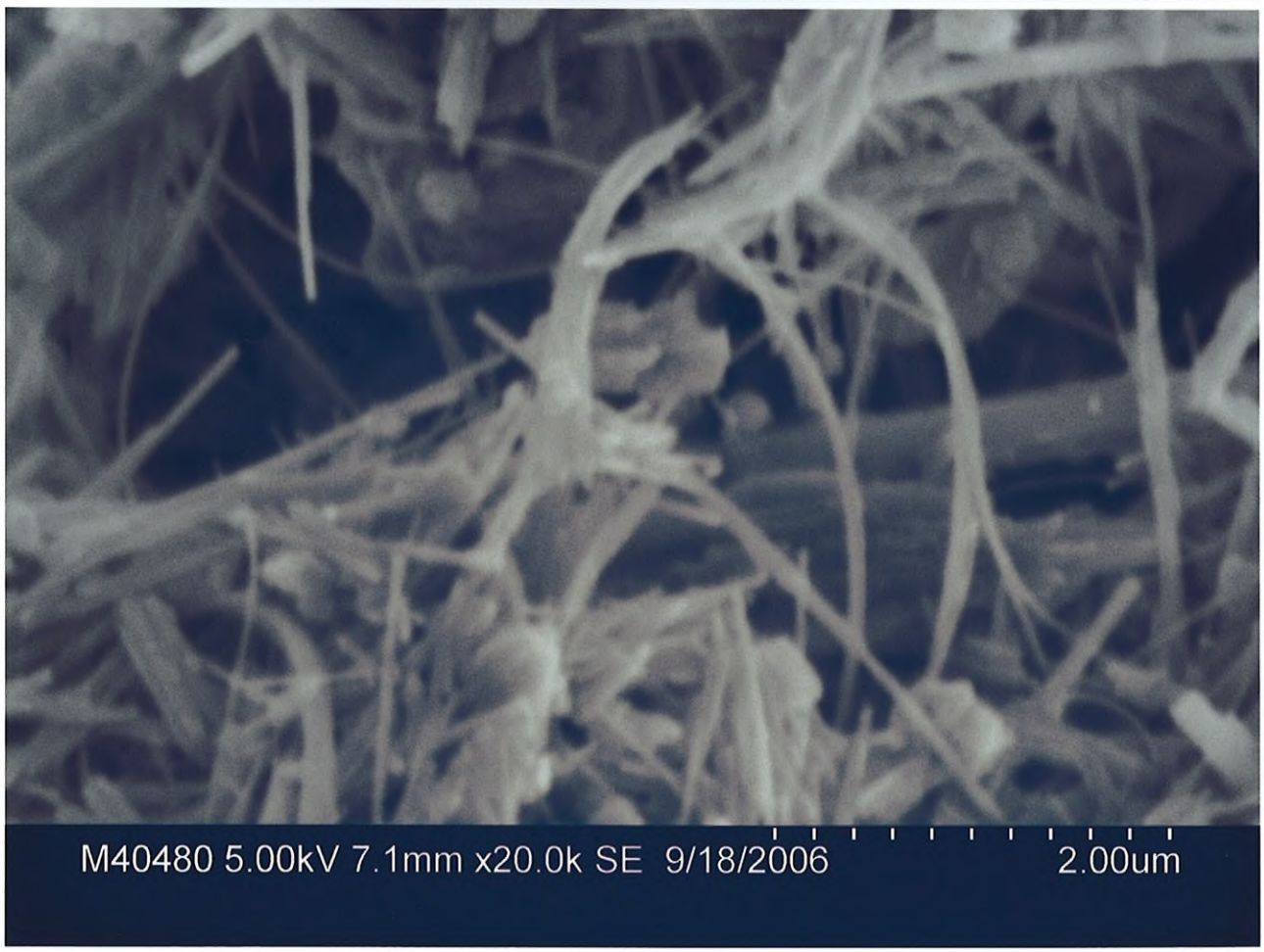
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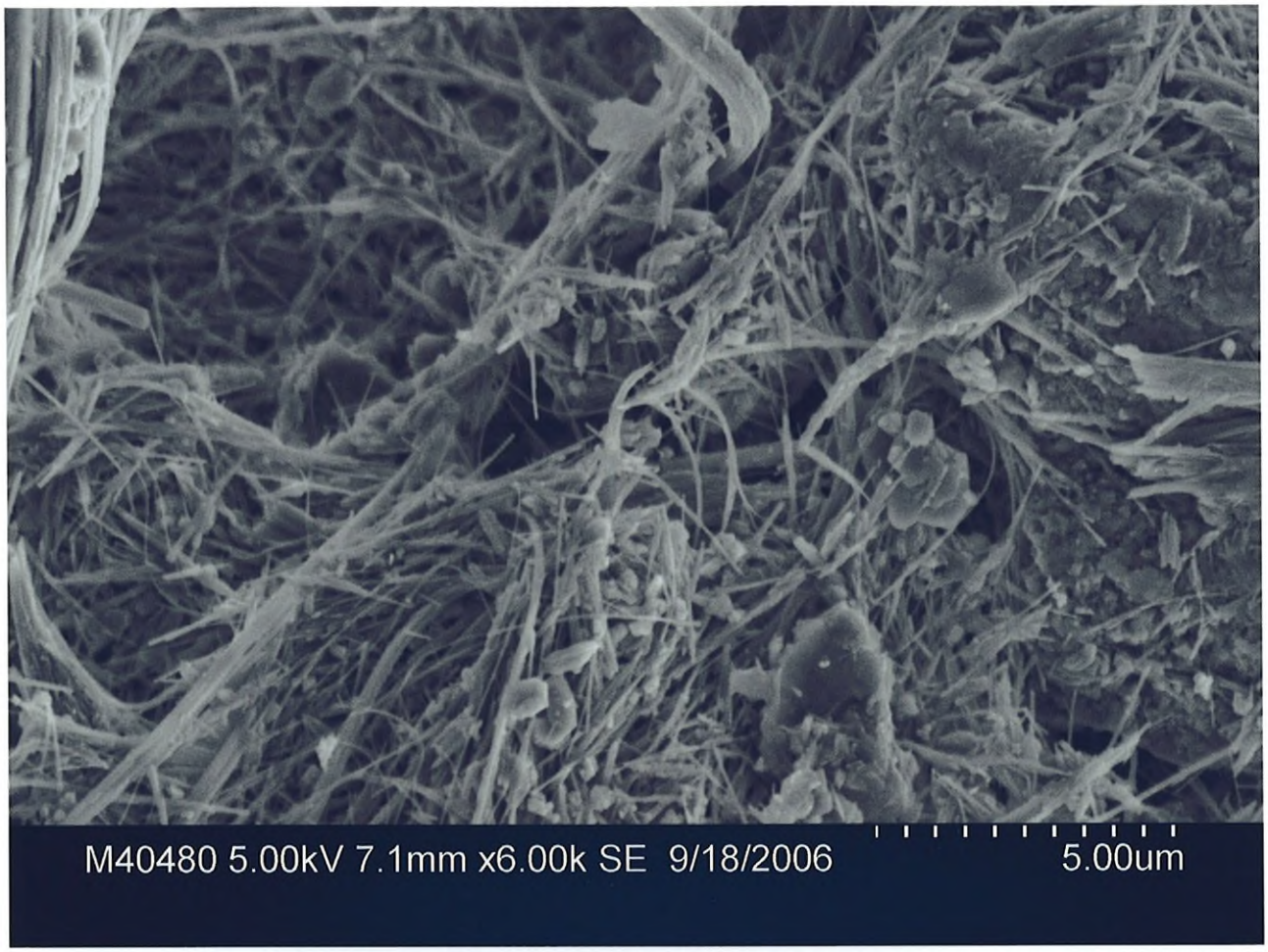
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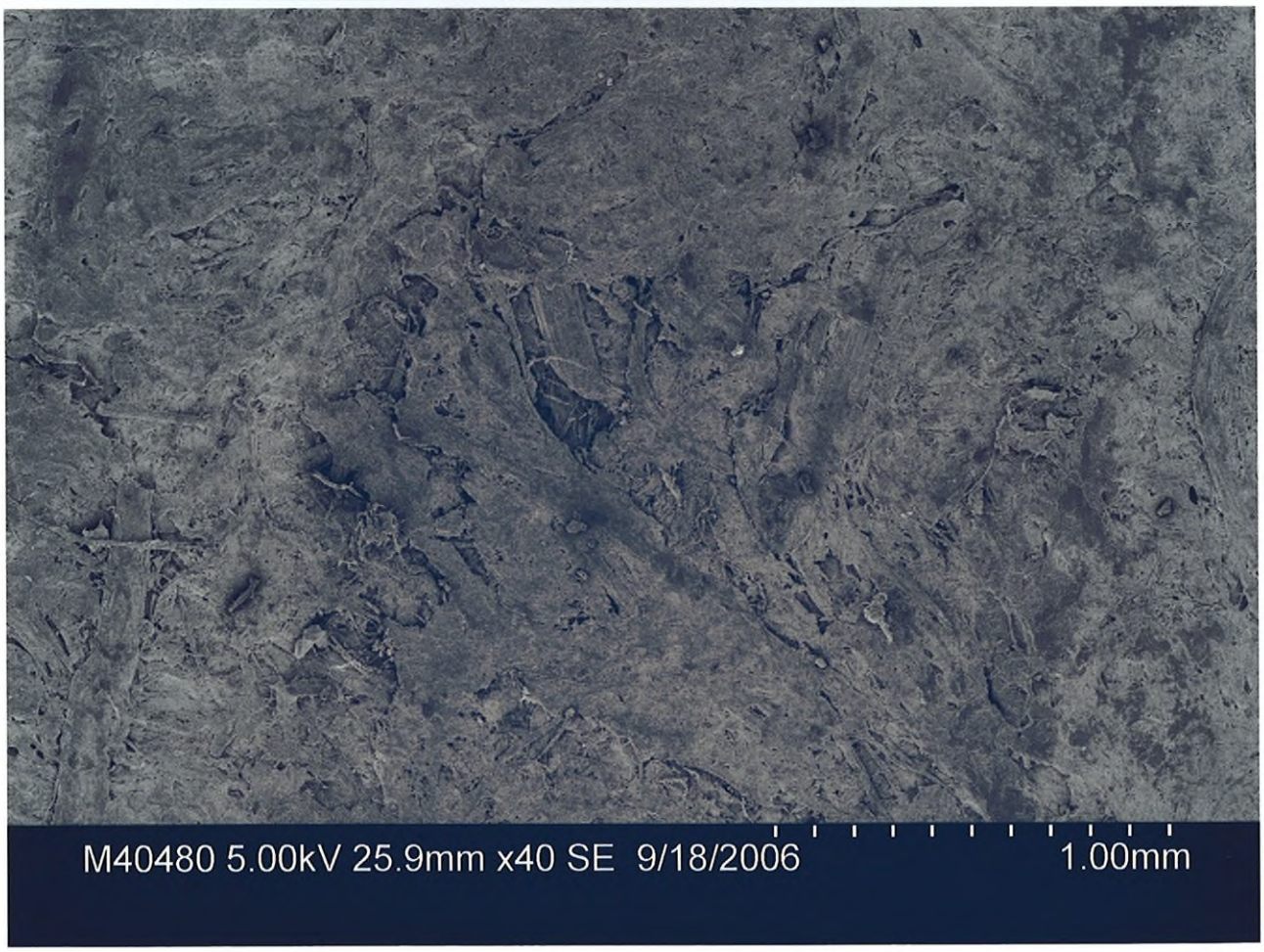
5.00um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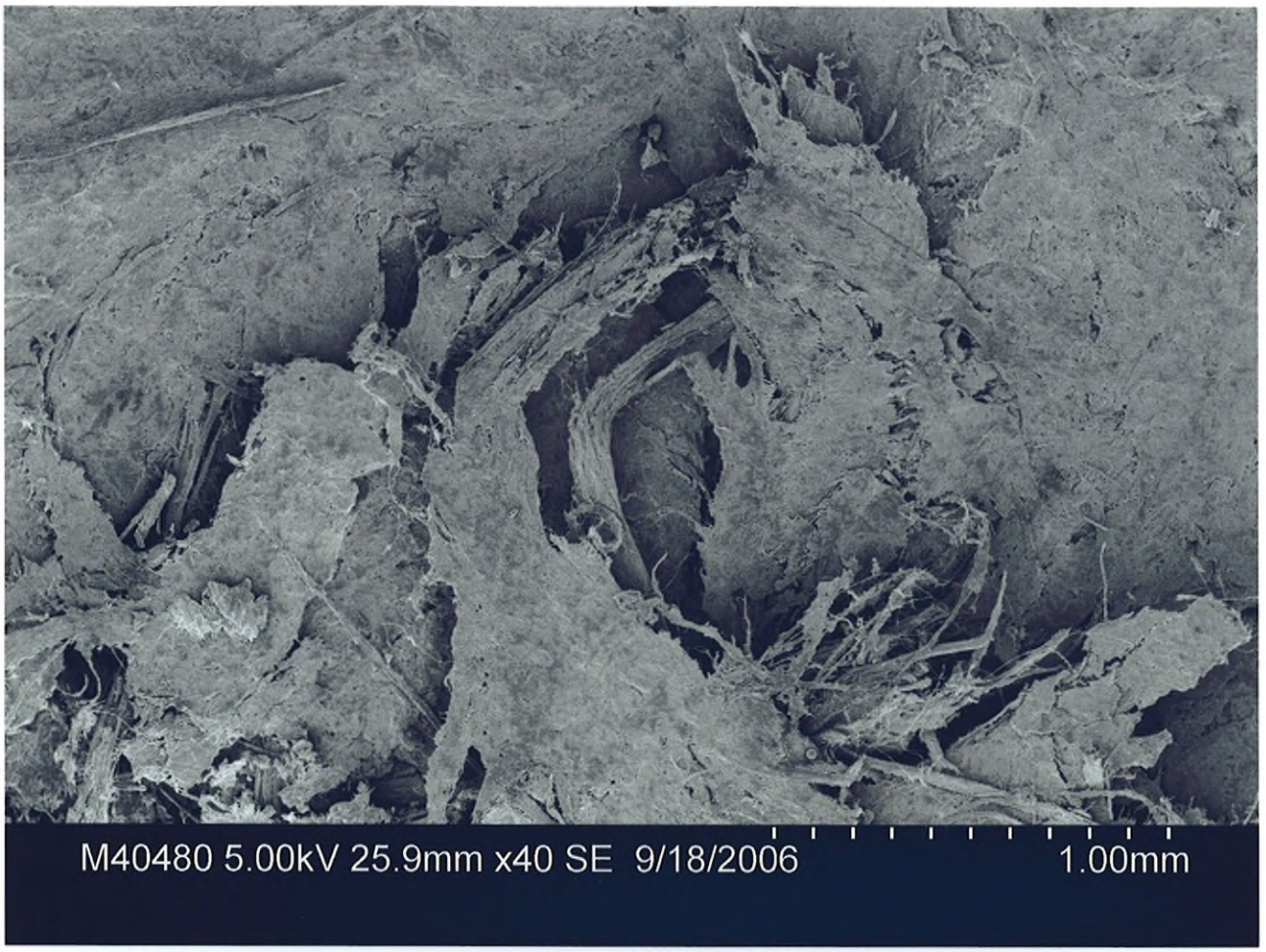
1.00mm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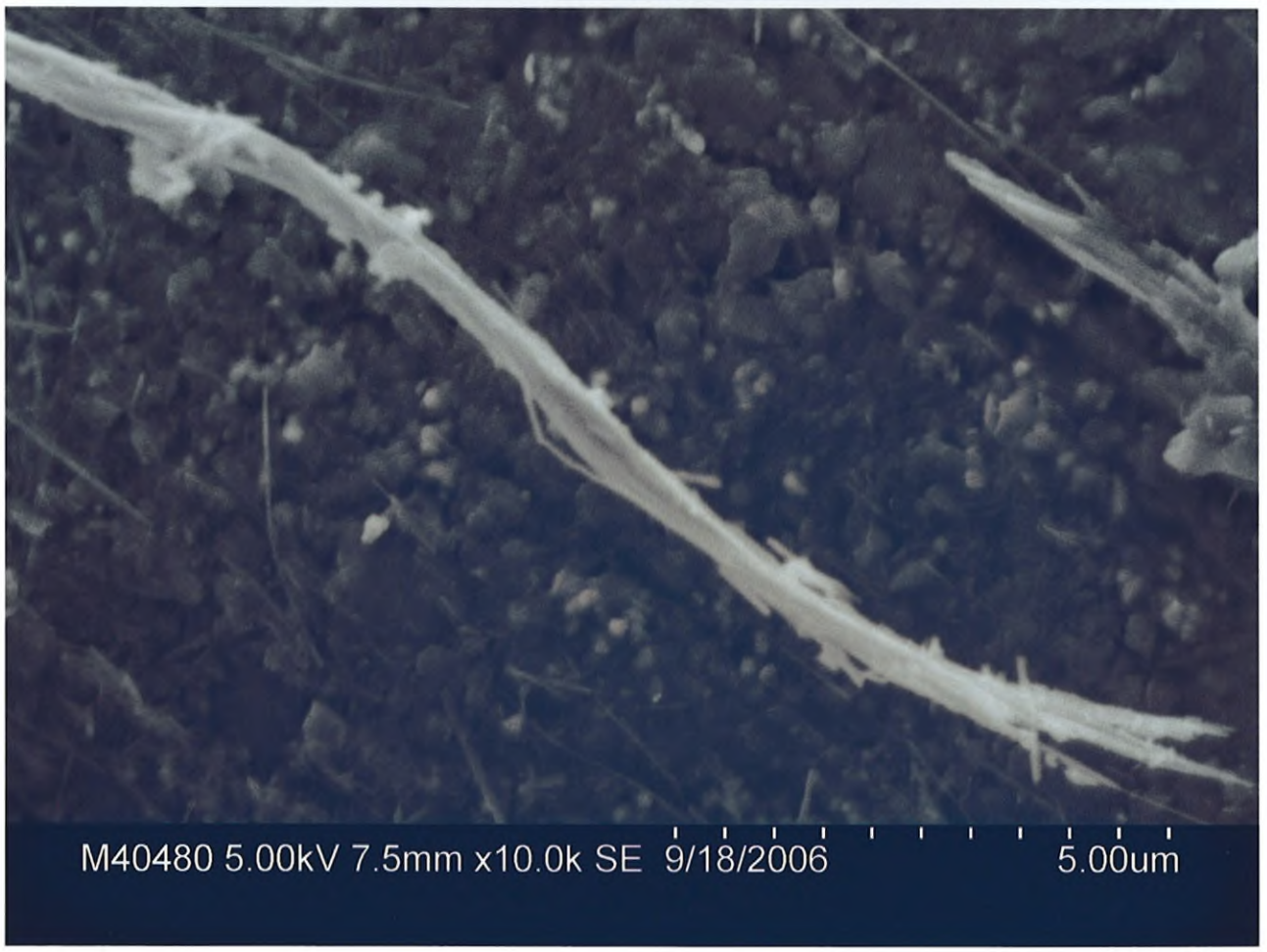
1.00mm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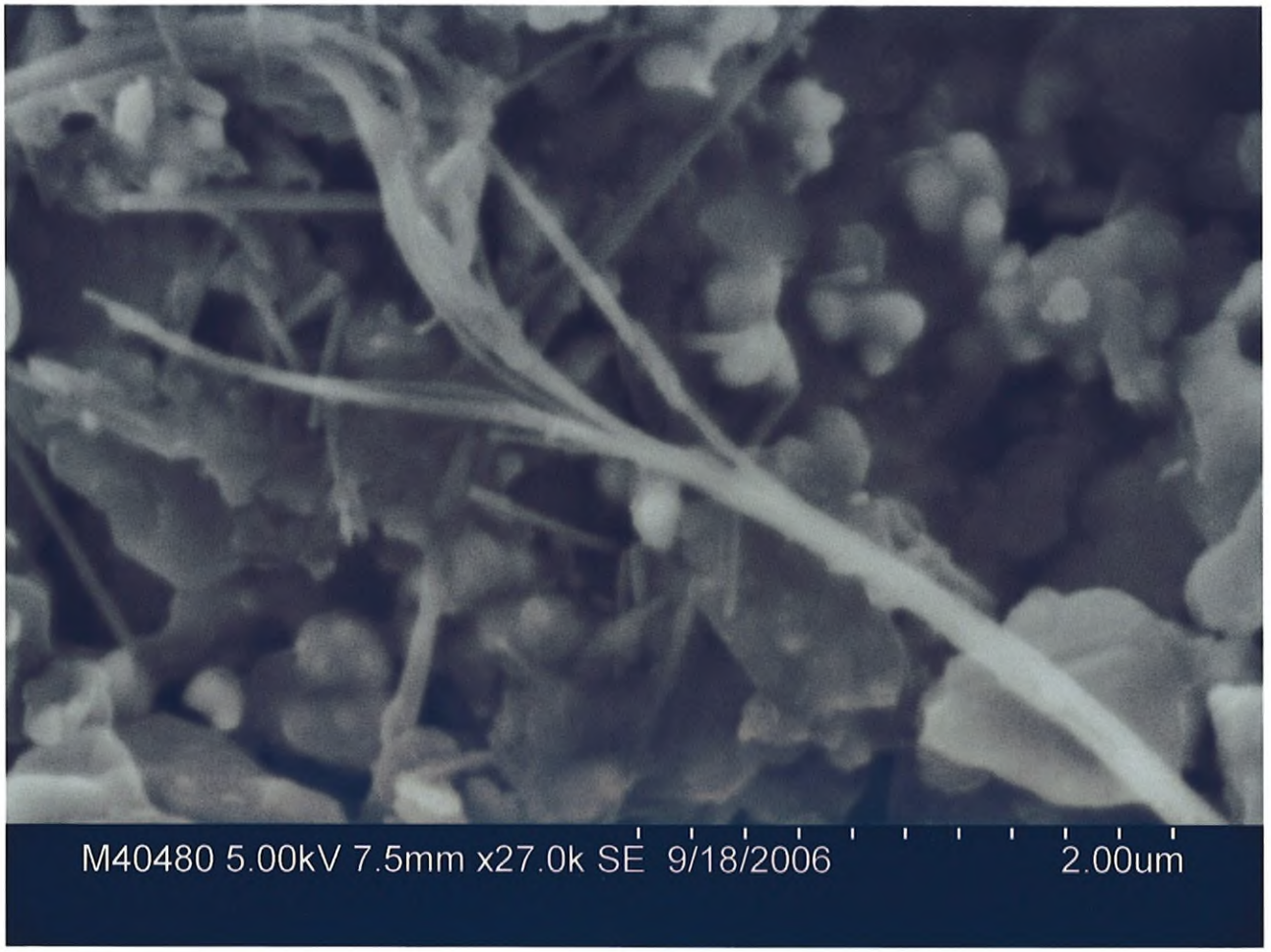
5.00um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2.00um

SECTION 9

MATERIALS ANALYTICAL SERVICES
PROJECT COC

MAS ID:	M40550	**Client Job No:**	
Client Name:	Materials Analytical Services Atlanta	**Client PO:**	
Project Name:	ECL Gasket Fabrication II	**Date In:**	9/19/2006
Logged By:	dmazzaferro	**Client Code:**	MASCORP

TRANSPORT INFORMATION:

Submitted By:	Michael D. Mount	**Documents:**	COC
Delivery By:	Hand Delivery		
Received By:	Nancy Sears	**Comments for COC:**	
Condition:	good		

CONTACT INFORMATION:

Contact:	Bill Longo			**Work Phone:** (770) 866-3200	**Ext:**
Title:	**First Name**	**Last Name:**	**Suffix**	**Other Phone**	**Ext:**
Mr.	William	Longo		**Fax:** (770) 866-3259	

SAMPLE INFORMATION:

#	Client ID	Volume	#	Client ID	Volume
001	MV-1	100			
002	MV-2	400			

SIGNATURES

RECEIVED BY:		**ANALYZED BY:**	
REVIEWED BY:		**REPORTED BY:**	
PREPARED BY:		**DEPOSED BY:**	

M40[illegible] Page 2 of 2

INDUSTRIAL HYGIENE AIR SAMPLING CHAIN OF CUSTODY

MAS.
3945 Lakefield Court
Suwanee, GA 30024
Phone: 770-866-3200
Fax: 770-866-3259

COMPANY NAME: Dept 14
ADDRESS:
PHONE:
FAX:

PROJECT NUMBER:
PROJECT NAME: Gasket Fabrication II
WORK AREA DESCRIPTION: ECL
PROJECT REPRESENTATIVE: M. Mount
SAMPLING DATE: 9/18/06

TURNAROUND TIMES: _____ 1 DAY _____ 3 DAYS _____ STANDARD 5 –7 DAYS

DATE	SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE MEDIA	ANALYSIS DESIRED	START TIME	STOP TIME	TOTAL TIME MINUTES	AVERAGE FLOW RATE LPM	AIR VOLUME (LITERS)
9/18/06	P-2-A	Reactor, Right, During Fabrication	MCE	7400, 7402	2:33	2:51	18	2.6	46.8
	B	Left,		7402				2.48	44.6
	C	Right,						3.52	63.4
	D	Left						3.54	63.7
	FB-1	Field Blank		7402	—	—	—	—	0
	FB-2				—	—	—	—	0
M40549	FB-3				—	—	—	—	0
					—				
	FAB-1	Shirt Before		EPA Fabric Method	—	—	—	—	
	FAB-2	Shirt After			—	—	—	—	
									CM²
	MV-1	Dust from side of pipe	.45 MCE	ASTM 5557	—	—	—	—	100
M40550	MV-2	Flange face			—	—	—	—	400

CHAIN OF CUSTODY	NAME	COMPANY	MODE OF TRANSFER	LOG IN DATE	RECEIVED BY	COMPANY
First Transfer by:	Michael D Mount	MAS 9/18/06	Hand	9/19/06	Nancy Sears	MAS
Second Transfer by:						
Third Transfer by:						

TEM DUST ANALYSIS M40550 000

Materials Analytical Services Atlanta
ECL Gasket Fabrication II

Client Sample ID: lab blank

Sample Area/ Volume:	0 cm2	**Date Analyzed:**	12/14/2006
Filter Type:	MCE 47mm	**Analyst:**	Mehrdad Motamedi
Pore size:	0.45	**Scope Number:**	4
Effective Filter Area:	1297	**Accelerating Voltage:**	100 KV
Sample type:	Dust	**Indicated Mag:**	25 KX
Analysis type:	Dust	**Screen Mag:**	20 KX
Grid Acceptance	YES 2 %	**Grid_box:**	7178

Str < 5um:	0	**Number of grids:**	2	#1: 101	#3: 101	**Average Grid Size:**	0.010302
Str ≥5um:	0	**Number of openings:**	10	#2: 101	#4: 103	**Total Area Analyzed:**	0.103
Total Str:	0						

Volume Filtered 50 ml
Dilution Factor 2

Str / sqr ft	#Error	**Str / cm2**	#Error
Str / sqr ft >=5	0.000E+00	**Str / cm2 >=5**	0.000E+00

Str#	Grid ID	Serp	Other	Structure	Length	Width	Morph	SAED	EDS	Photo	Sketch
	A5-F8			NSD					☐	☐	☐
	E7			NSD					☐	☐	☐
	D6			NSD					☐	☐	☐
	D5			NSD					☐	☐	☐
	C5			NSD					☐	☐	☐
	A4-B9			NSD					☐	☐	☐
	E9			NSD					☐	☐	☐
	H10			NSD					☐	☐	☐
	E3			NSD					☐	☐	☐
	B3			NSD					☐	☐	☐

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

TEM DUST ANALYSIS M40550 001

Materials Analytical Services Atlanta
ECL Gasket Fabrication II

Client Sample ID: MV-1

Sample Area/ Volume:	100 cm2	**Date Analyzed:**	12/14/2006
Filter Type:	MCE 47mm	**Analyst:**	Mehrdad Motamedi
Pore size:	0.45	**Scope Number:**	4
Effective Filter Area:	1297	**Accelerating Voltage:**	100 KV
Sample type:	Dust	**Indicated Mag:**	25 KX
Analysis type:	Dust	**Screen Mag:**	20 KX
Grid Acceptance	YES 3 %	**Grid_box:**	7178

Str < 5um:	0	**Number of grids:**	2	#1: 100	#3: 101	**Average Grid Size:**	0.010251
Str ≥5um:	0	**Number of openings:**	10	#2: 102	#4: 102	**Total Area Analyzed:**	0.103
Total Str:	0						

Volume Filtered 50 ml
Dilution Factor 2

Str / sqr ft	2.351E+05	**Str / cm2**	2.351E+03
Str / sqr ft >=5	0.000E+00	**Str / cm2 >=5**	0.000E+00

Str#	Grid ID	Serp	Other	Structure	Length	Width	Morph	SAED	EDS	Photo	Sketch
	E5-B9			NSD					☐	☐	☐
	C10			NSD					☐	☐	☐
	D8			NSD					☐	☐	☐
	F9			NSD					☐	☐	☐
	G3			NSD					☐	☐	☐
	E4-B6			NSD					☐	☐	☐
	E8			NSD					☐	☐	☐
	G6			NSD					☐	☐	☐
	H7			NSD					☐	☐	☐
	I8			NSD					☐	☐	☐

M40550 001

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

TEM DUST ANALYSIS M40550 002

Materials Analytical Services Atlanta
ECL Gasket Fabrication II

Client Sample ID: MV-2

Sample Area/ Volume:	400 cm2	Date Analyzed:	12/14/2006
Filter Type:	MCE 47mm	Analyst:	MDMOUNT
Pore size:	0.45	Scope Number:	4
Effective Filter Area:	1297	Accelerating Voltage:	100 KV
Sample type:	Dust	Indicated Mag:	25 KX
Analysis type:	Dust	Screen Mag:	20 KX
Grid Acceptance	YES 2 %	Grid_box:	7178

Str <5um:	0	Number of grids:	2	#1: 103	#3: 103	Average Grid Size:	0.010455
Str ≥5um:	0	Number of openings:	10	#2: 102	#4: 101	Total Area Analyzed:	0.105
Total Str:	0						

Volume Filtered	50 ml	Str / sqr ft	5.763E+04
Dilution Factor	2	Str / sqr ft >=5	0.000E+00
		Str / cm2	6.203E+01
		Str / cm2 >=5	0.000E+00

Str#	Grid ID	Serp	Other	Structure	Length	Width	Morph	SAED	EDS	Photo	Sketch
1	B4-C3			NSD					☐	☐	☐
	D4			NSD					☐	☐	☐
	D8			NSD					☐	☐	☐
	E7			NSD					☐	☐	☐
2	B5-D4			NSD					☐	☐	☐
	D7			NSD					☐	☐	☐
	G7			NSD					☐	☐	☐
	G3			NSD					☐	☐	☐

C - Chrysotile
TR - Tremolite
CR - Crocidolite
AN - Anthophyllite
AC - Actinolite

NSD - No Structure Detected
F - Fiber
B - Bundle
M - Matrix
C - Cluster

SECTION 10

Gasket Fabrication:
A Work Practice Study

March 16, 2006

William E. Longo, Ph.D., Richard Hatfield, and Mike Mount, CIH

Protocol

I. ECL SET-UP

A. Study is to be performed in the exposure characterization lab (ECL) constructed using negative airflow asbestos abatement technology. The size of the ECL is approximately 15' x 20' x 8'. The ECL will be decontaminated before the study.

B. Air exchange inside the ECL will be approximately 200 cubic feet per minute as measured at 10' (in middle of 12' ID duct) from the air exhaust of the HEPA filter negative air machine.

C. Tyndall lighting setup in general accordance with the methods described in D.T. Chambers, "Asbestos", John Wiley & Sons, 6, 193, 1983 and the Environmental Protection Agency SOP, EPA-Libby-02, Revision #1, March 2001. The lighting source consisted of three high intensity light (750 watts ellipsoidal pyrex lens, 219K candle power, 8 degree beam angle) located on each side of the worktable at a height of approximately 5.5 feet from the floor and 7 feet from the work activity.

D. Two video cameras (Sony Handcam, Model TRV99) will be used in this study.

II. BACKGROUND AIR SAMPLES

A. Adjust and calibrate high volume area pumps to approximately 10.0 liters per minute.
B. Setup five area air samples inside the ECL. Use 25mm air cassettes containing 0.8 micron pore size mixed cellulose ester (MCE) filters with a 5.0 micron backing pad.

C. Locate the background air samples in each quadrant of the ECL at a height of 5.5 feet from the floor and a distance of approximately six feet from the work activity.

III. WORK PRACTICE STUDY

One 11" flange with eight bolt holes will be utilized in this study. The investigator will use a ball peen hammer to fabricate six gaskets from approximately one foot square sheets. After the first four gaskets are fabricated, the investigator will exchange both the area and personal air samples. The investigator will then fabricate two additional gaskets. After the fabrication of the last gasket, the investigator will use a hand file to smooth out the inside surfaces.

A. During this study, the four area samples located in each quadrant will be calibrated and run at a rate of approximately ten liters /minute.

B. The investigator will be fitted with four personal air pumps and air cassettes located in their breathing zone and calibrated at a flow rate of approximately 2.5 to 3.5 liters/minute.

C. The investigator will wear appropriate protective clothing, work apparel and appropriate respiratory protection equipment.

D. The work practice will be performed under both ambient and Tyndall lighting.

E. The entire procedure will be videotaped with two separate cameras. During filming, the Tyndall lighting will be turned off and overhead lights turned on several times during the study.

F. Both area and personal air samples will be exchanged after the first four gaskets are fabricated.

G. The field blanks will be opened inside the ECL for 30 seconds after the study has been completed.

IV. LABORATORY ANALYSIS

A. The air sample cassettes will be analyzed by the NIOSH 7400 PCM method using A counting rules and selected air samples will be analyzed by the NIOSH 7402 TEM method.

B. Additionally, two selected air samples will be analyzed by the indirect TEM method.

C. Fabric samples from the work clothing will be analyzed by the recommended EPA method.

Gasket Fabrication

Background Air Samples

Sample No.	Sample Description	PCM Fibers/cc
A-0-A	IWA Background	0.004
A-0-B	IWA Background	0.003
A-0-C	IWA Background	0.003
A-0-D	IWA Background	0.005

Fabrication No Hand Filing

Personal Air Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
P-1-A	Personal	1.2	85%	1.0
P-1-B	Personal	1.6	91%	1.5
P-1-C	Personal	1.8	---	---
P-1-D	Personal	1.6	---	---

Area Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
A-1-A	Area	0.47	98%	0.46
A-1-B	Area	0.74	92%	0.68
A-1-C	Area	0.43	---	---
A-1-D	Area	0.65	---	---

Fabrication and Hand Filing

Personal Air Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
P-2-A	Personal	3.1	98%	3.0
P-2-B	Personal	3.1	---	---
P-2-C	Personal	4.0	---	---
P-2-D	Personal	2.7	99%	2.7

Area Samples

Sample No.	Sample Description	PCM Fibers/cc	NIOSH 7402	PCME Fibers/cc
A-2-A	Area	1.2	---	---
A-2-B	Area	1.1	98%	1.1
A-2-C	Area	1.1	98%	1.1
A-2-D	Area	0.9	---	---

Field Blanks

Sample No.	Sample Description	PCM Fibers/mm^2	NIOSH 7402
FB-1	Area	< 7	0%
FB-2	Area	< 7	0%

Fabric Samples

Sample No.	Type	Asbestos Structures/ft^2	Asbestos Structures/cm^2
FAB – 1	Blank	NSD	
FAB – 2	After	75.3 million	81.1 thousand

Report of Results: MVA6662

Fiber Release Testing During Gasket Making

Prepared for:
Patten, Wornom, Hatten & Diamonstein
12350 Jefferson Ave, Suite 300
Newport News, VA 23602

Focused on the Science of Small Things

MVA SCIENTIFIC CONSULTANTS

3300 Breckinridge Boulevard • Suite 400 • Duluth, GA 30096
770-662-8509 • FAX 770-662-8532 • www.mvainc.com

Report of Results: MVA6662

Fiber Release Testing During Gasket Making

Prepared for:
Patten, Wornom, Hatten & Diamonstein
12350 Jefferson Ave, Suite 300
Newport News, VA 23602

Respectfully Submitted by:

James R. Millette, Ph.D.
Executive Director

MVA Scientific Consultants
3300 Breckinridge Boulevard
Suite 400
Duluth, GA 30096

22 May 2006

MVA SCIENTIFIC CONSULTANTS

Report of Results -- MVA Project No. 6662

Fiber Release Testing During Gasket Making

INTRODUCTION

A large roll of sheet gasket material was delivered to MVA Scientific Consultants on 27 April 2006. According to the information provided, the roll was a portion of a 5-foot sheet that had been found by John Comerford of Lipsitz & Ponterio, LLC at the Spaulding Fibre plant in Buffalo, New York. The sheet had labeling on one side that repeated "John Crane, Crane Packing Company 2150". At the laboratory, the sample was assigned the MVA Number R0668. MVA Scientific Consultants was requested to test the sample for asbestos fiber release. Initial analysis of the gasket material for composition was done on 3 May 2006. The fiber release test was conducted on 11 May 2006. Analyses of the air samples were conducted during the period 11 May to 19 May 2006.

METHODS AND EQUIPMENT

The basic composition of the gasket sample was determined following the analytical procedures described in the U.S. Environmental Protection Agency "Test Method EPA/600/R-93/116 -- Method for the Determination of Asbestos in Bulk Building Materials."

Because the standard polarized light microscopy analysis procedure is only sensitive to asbestos levels of approximately 1%, additional work was done to test for possible low levels of amphibole asbestos. In order to concentrate possible amphibole material for analysis, the Addison and Davies acid/base digestion procedure was used to eliminate the chrysotile. A known amount of the test material was weighed accurately into a porcelain crucible and heated overnight at 600°C in a muffle oven, allowed to cool, and re-weighed. After it had cooled, the material was transferred to a 100 ml round-bottom flask containing 80 ml of acid (2 N H_2SO_4) fitted with a reflux condenser and the suspension was boiled for 1 h. During boiling, the suspension was stirred with a stir bar to prevent the asbestos from fusing to the base of the flask preventing it from overheating and fracturing. The residue was collected in 12 ml centrifuge tubes by centrifuge (2800 rpm for 10 min) and the reflux procedure was repeated with sodium hydroxide (4N). The final residues were collected by centrifugation and washed by further repeated centrifuge processing with distilled water. The final residue was deposited onto pre-weighed 0.2 µm pore size polycarbonate filters, dried and weighed. The residue was suspended in water. A known aliquot was extracted and re-filtered through a 0.2 µm pore size polycarbonate filter. The filter was dried and TEM grids prepared following the standard direct preparation procedures (AHERA/ISO10312). A laboratory blank sample following all the procedures except the addition of test material was prepared in a similar way.

Sample grids were analyzed by transmission electron microscopy. Particles were identified as tremolite/actinolite fibers based on morphology, electron diffraction and elemental composition. The mass of tremolite/actinolite fibers was determined by summing the masses of individual fibers found. The mass of an individual fiber was calculated using the formula: length times width times height (the width was used as an approximate value for the height) times density. A value of 3,000 kg/M3 (3.00 gram/cc) was used as the density of tremolite/actinolite.

The fiber release testing was done on 11 May 2006 in a containment chamber that was approximately 11 feet long, 9 1/2 feet wide and 9 feet high. During part of the testing, a bright light was directed into the room from one side to enhance the ability to see particles in the air. The test was performed in two parts. In the first part, 4 gaskets were fabricated without any filing of edges. In the second part, 2 gaskets were fabricated with filing of edges.

The released particles were collected with standard air filter cassettes. The filters were analyzed for fibers using optical microscopy (phase contrast microscopy - NIOSH 7400/OSHA ID-160 procedure) and transmission electron microscopy (NIOSH 7402 for study samples and AHERA method for the 'before' sample). The TEM analyses were performed with a Philips 420 TEM or Philips 120 TEM each equipped with an Oxford x-ray analysis system. The data are reported in terms of fibers per cubic centimeter (F/cc) for PCM, percent asbestos for NIOSH 7402.

SPECIFIC STUDY ACTIVITIES

Prior to fiber release testing, the containment chamber was cleaned. A sample of the air in the room was collected for 1 hour at 5 liters per minute.

Prior to the testing, six one-foot squares of gasket material were cut from Sample R0668.

A certified industrial hygienist (C. DePasquale, Compass Environmental, Kennesaw, GA) performed the test in the chamber. He wore two air cassettes (one on each shoulder) with airflow rates of approximately 2.5 liters/minute (lpm) (air samples R0724-R0727). He also wore protective clothing and a respirator while in the chamber. Area air samples, R0722 and R0723, were collected at a flow rate of approximately 5 lpm. They were collected from a position approximately 6 feet from the activity. The investigator fabricated 6 gaskets from 6 approximately one-foot square gasket sheets using a ball-peen hammer on an eleven (11') inch flange with eight bolt holes. After the first four gaskets were fashioned, the investigator replaced both the area and personal air samplers with new cassettes. The investigator then fabricated two additional gaskets and used hand files to smooth out the edges. The samples were collected for periods of approximately 20 minutes for each part of the test. A HEPA filter exhaust system was running during the testing.

The test was videotaped using two video cameras. During part of the test, the lighting approximated Tyndall lighting and was used to improve the visibility of suspended particles in the air in the containment chamber. The light was placed outside the room, approximately 1 foot away from the window.

RESULTS

Sample R0668 (John Crane Sheet Gasket 2150) contained approximately 72% chrysotile asbestos by PLM (Figure 1) and approximately 0.15% tremolite/actinolite asbestos by TEM (Figures 2 through 5).

During the fiber release testing, particles could be seen being released during gasket making with a ball-peen hammer and during filing (Figures 6 through 9). Analysis of the air samples collected while the gasket was being made showed that asbestos fibers were released into the air (Figures 10 through 12). Table 1 shows the concentrations of fibers released into the breathing zone of the worker and in the vicinity.

Sample R0721 collected of the air in the chamber before the testing showed no asbestos detected by TEM analysis. The blank samples also showed no asbestos by TEM analysis.

CONCLUSIONS

Fabricating gaskets on a pipe flange using a ball-peen hammer causes dust to be released into the breathing zone of the worker and into the air around the activity. The dust contains significant levels of asbestos fibers (~2 F/cc in the breathing zone and 0.8 F/cc in the vicinity) as determined by the NIOSH methods 7400 and 7402.

Fabricating gaskets on a pipe flange using a ball peen hammer and hand filing the edges causes dust to be released into the breathing zone of the worker and into the air around the activity. The dust contains significant levels of asbestos fibers (1.5 - 2 F/cc in the breathing zone and 1 F/cc in the vicinity) as determined by the NIOSH methods 7400 and 7402.

REFERENCES

Addison, J. and L.S.T. Davies. Analysis of Amphibole Asbestos in Chrysotile and Other Minerals Ann. Occupational Hygiene 34,2,159-175, 1990.

"AHERA" - Appendix A to Subpart E - Interim Transmission Electron Microscopy Analytical Methods, U.S. EPA, 40 CFR Part 763. Asbestos-Containing Materials in Schools, Final Rule and Notice. Fed. Reg. 52(210), 41857-41894, 1987.

National Institute of Occupational Safety and Health, NIOSH 7400, "Asbestos and Other Fibers by Phase Contrast Microscopy (PCM)" - Method 7400 - NIOSH Manual of Analytical Methods, 4th Ed., U.S. Department of HHS, NIOSH Publ. 94-113, 1994.

National Institute of Occupational Safety and Health, NIOSH 7402, "Asbestos Fibers by Transmission Electron Microscopy (TEM)" - Method 7402 - NIOSH Manual of Analytical Methods, 4th Ed., U.S. Department of HHS, NIOSH Publ. 94-126, 1994.

Occupational Safety and Health Administration, OSHA ID-160 "Asbestos in Air", D. Crane, July 1997.

TABLE 1
Air Samples

MVA Sample #	Description	Time (Min)	Pump Rate (lpm)	Air Volume (L)	PCM NIOSH 7400 F/cc	TEM NIOSH 7402 %Asbestos	Asbestos Fibers/cc
R0721	Before	60	5.0	300	NA	0%	<0.01
Activity 1	Making 4 Gaskets No Filing						
R0724	Personal During	20	2.45	49.0	2.3	97%	2.2
R0725	Personal During	20	2.49	49.8	2.2	99%	2.2
R0722	Area During	20	5.0	100	0.8	92%	0.7
Activity 2	Making 2 Gaskets With Filing						
R0726	Personal During	20	2.45	49.0	2.4	90%	2.2
R0727	Personal During	20	2.49	49.8	1.6	96%	1.5
R0723	Area During	20	5.0	100	1.0	100%	1.0

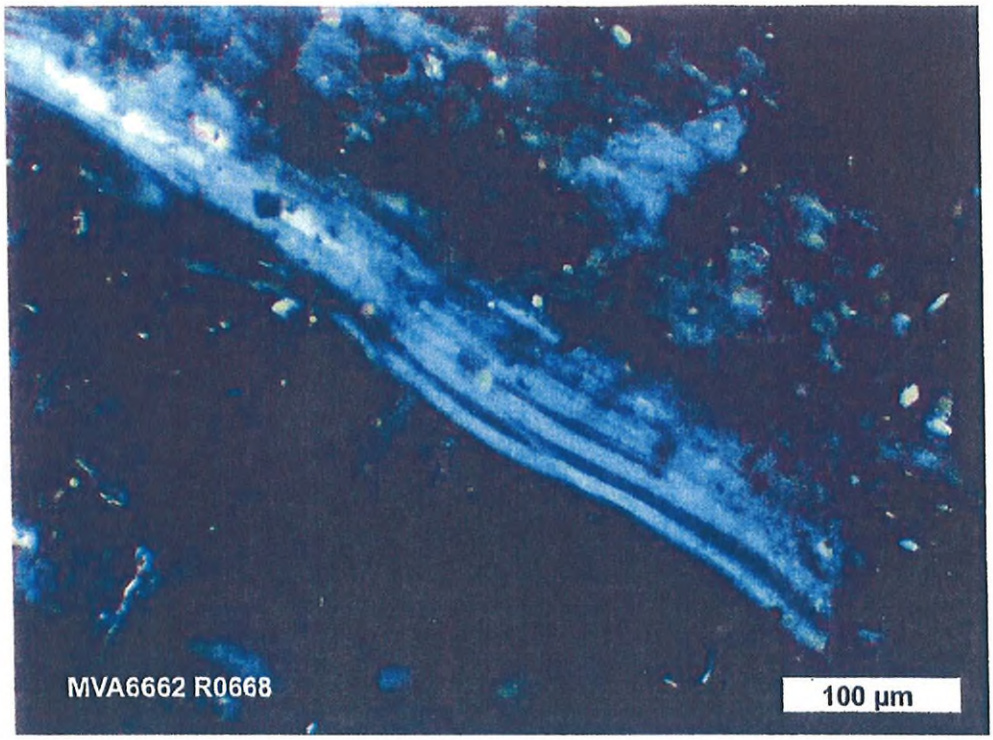

Figure 1. PLM image of chrysotile asbestos found in John Crane Sheet Gasket 2150 (Sample R0668).

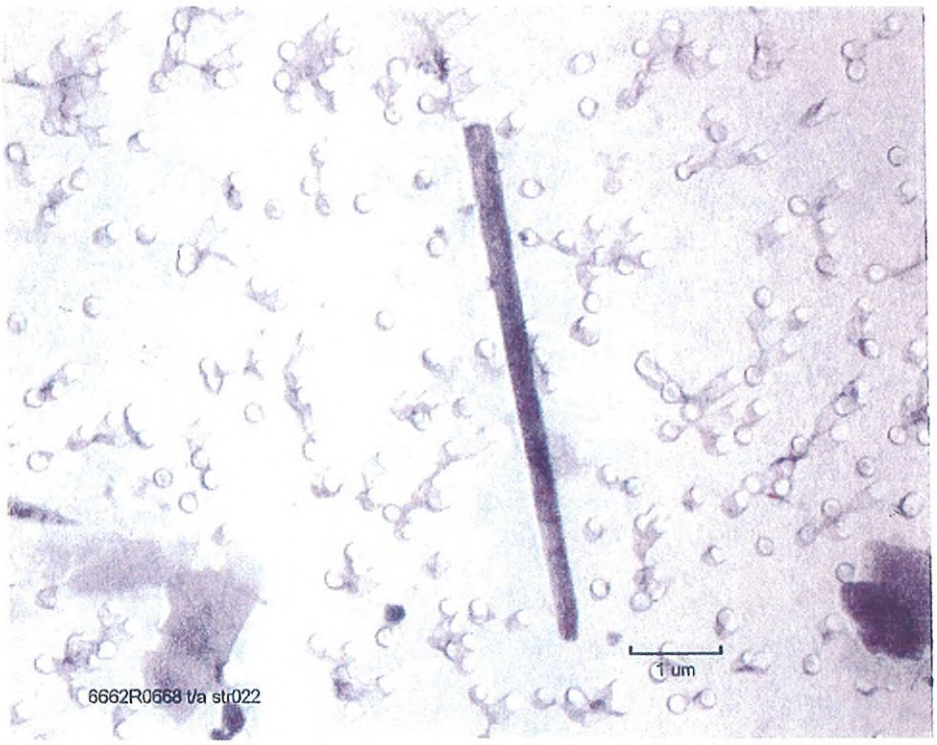

Figure 2. TEM image of tremolite/actinolite asbestos found in John Crane Sheet Gasket 2150 (Sample R0668).

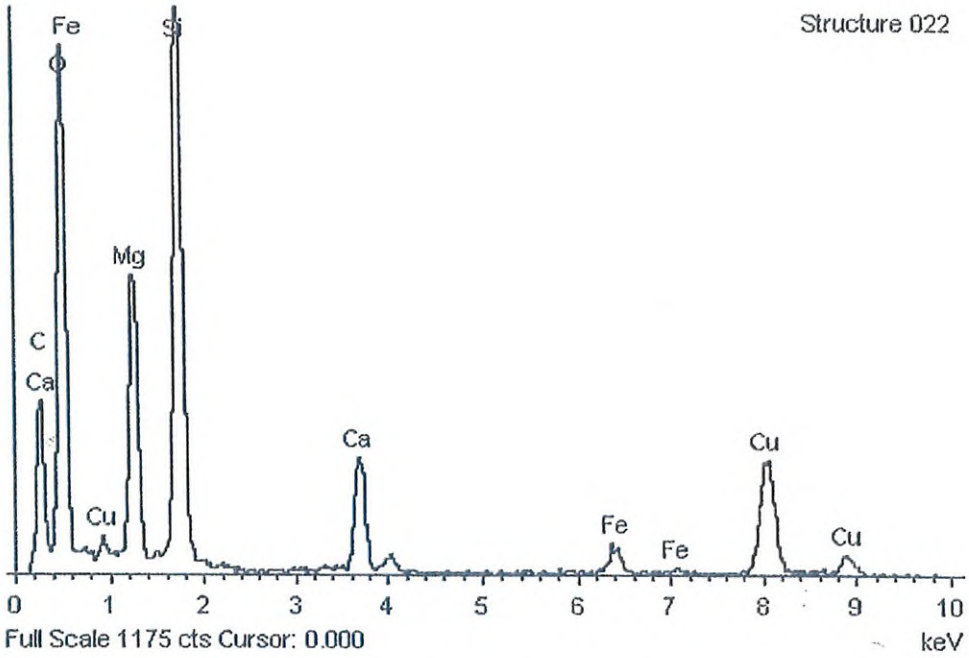

Figure 3. X-ray spectrum of tremolite/actinolite asbestos found in John Crane Sheet Gasket 2150 (Sample R0668).

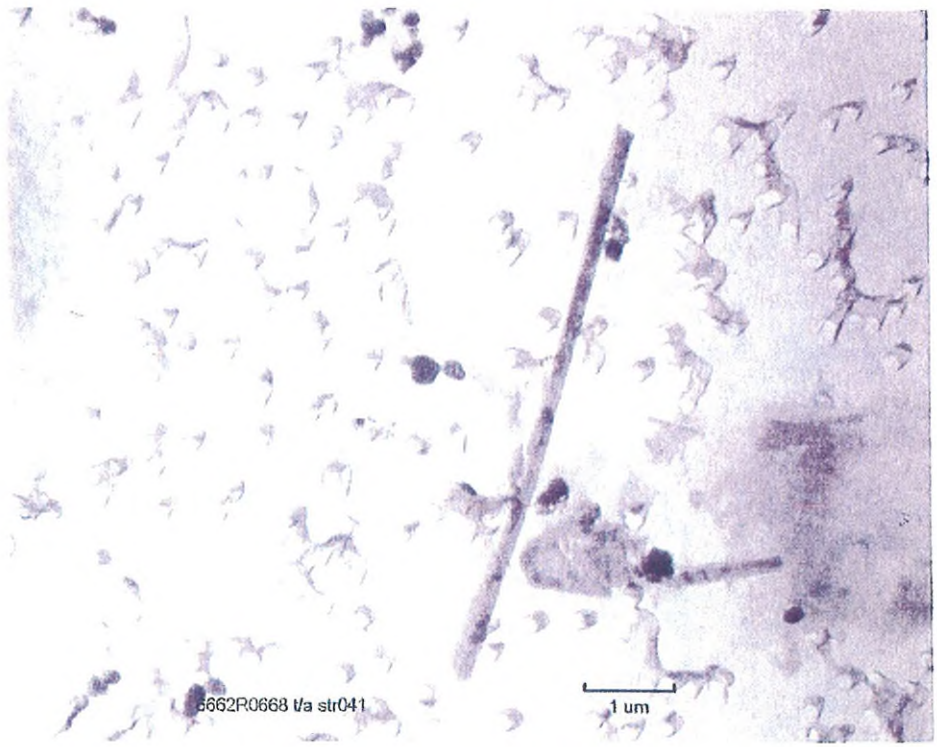

Figure 4. TEM image of tremolite/actinolite asbestos found in John Crane Sheet Gasket 2150 (Sample R0668).

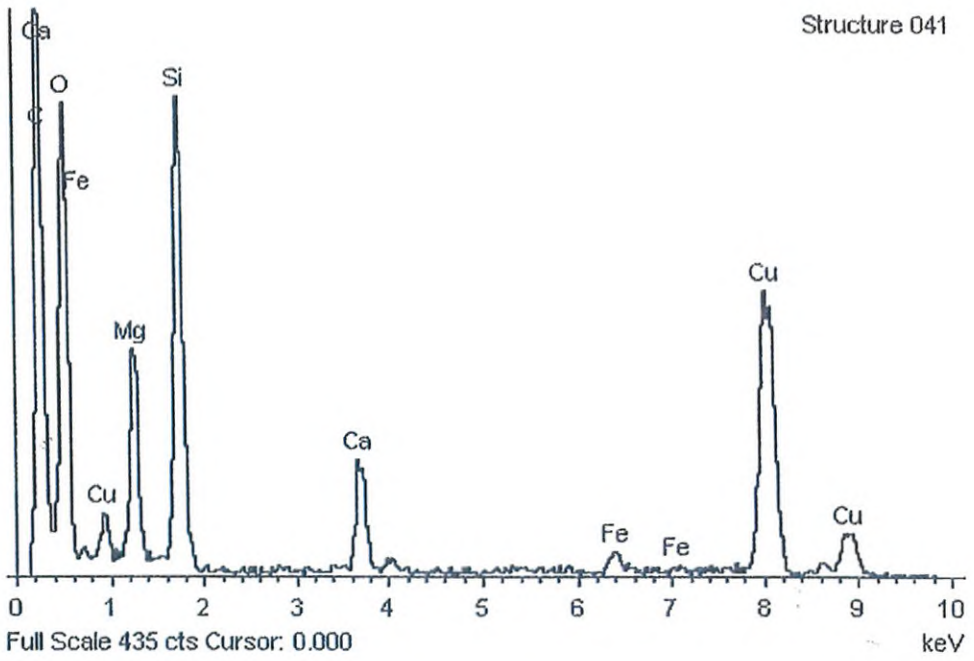

Figure 5. X-ray spectrum of tremolite/actinolite asbestos found in John Crane Sheet Gasket 2150 (Sample R0668).

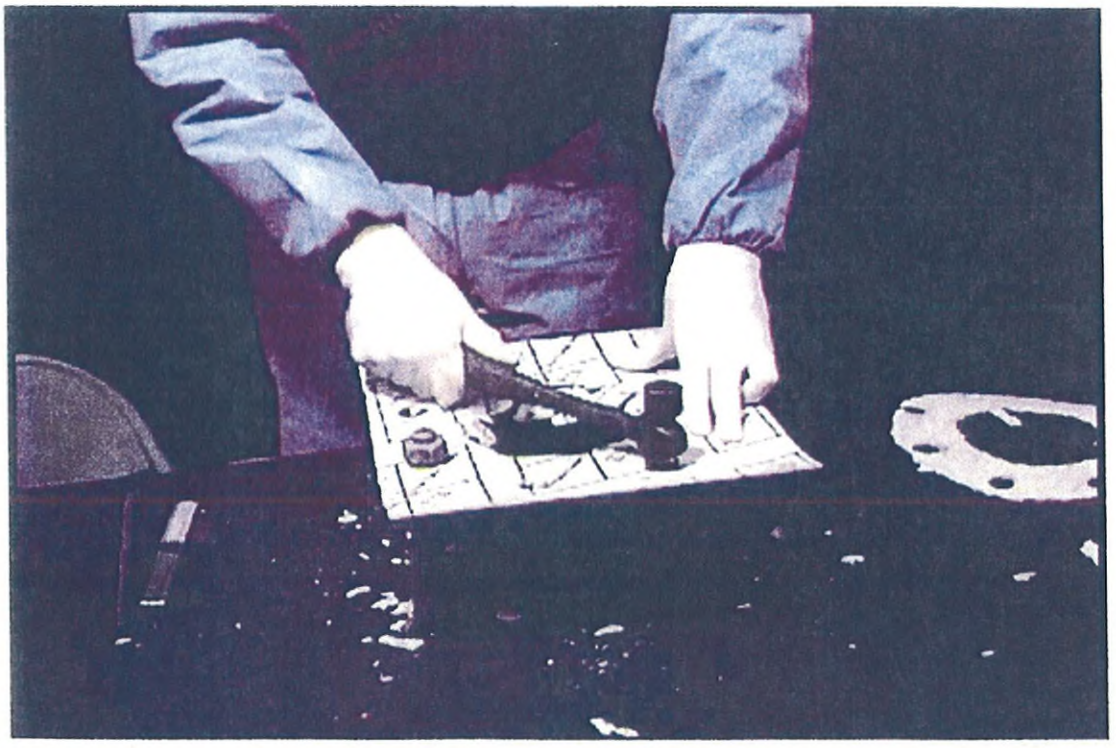

Figure 6. Fabricating a gasket with John Crane Sheet 2150 (Sample R0668).

Figure 7. Particles being released into the air during gasket fabrication.

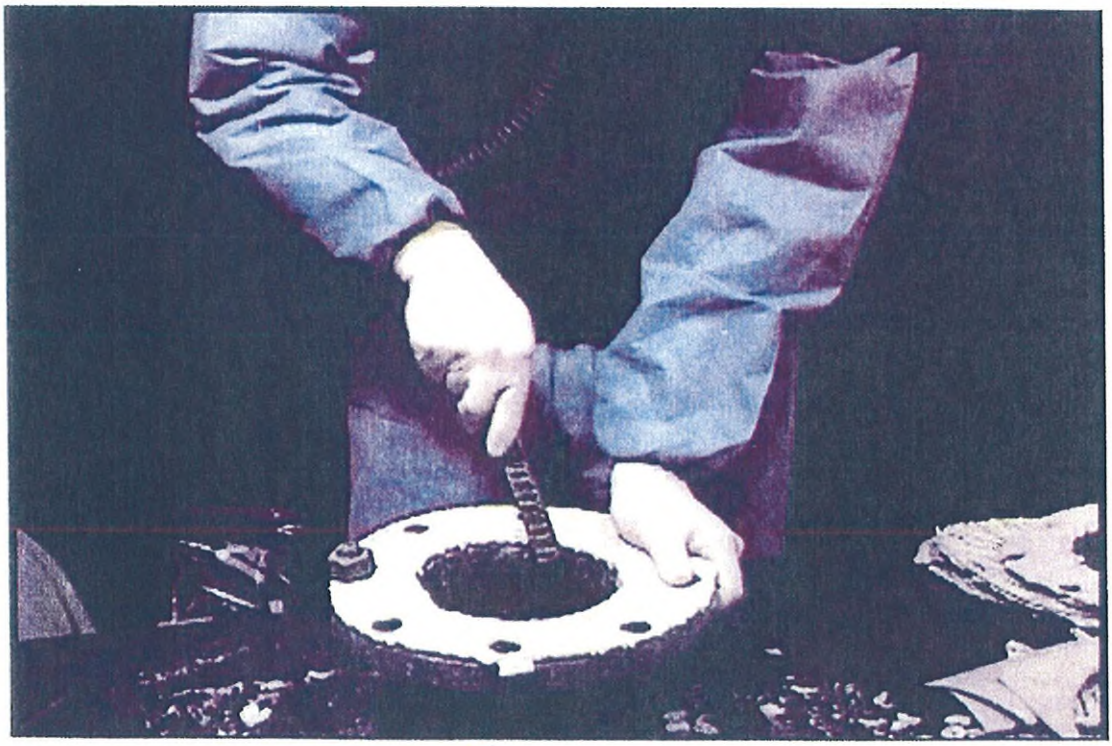

Figure 8. Filing a gasket edge with John Crane Sheet 2150 (Sample R0668).

Figure 9. Particles being released into the air during gasket filing.

Figure 10. TEM image of a chrysotile bundle released into the air during gasket fabrication.

Figure 11. TEM image of a chrysotile bundle released into the air during gasket fabrication.

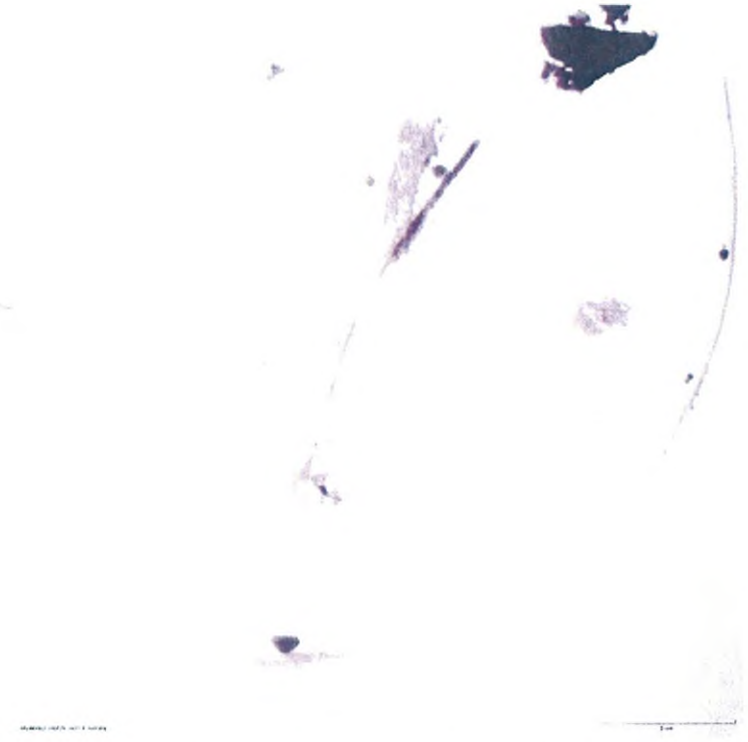

Figure 12. TEM image of a chrysotile bundle released into the air during gasket fabrication.