Region 4
Asbestos/Vermiculite Investigation:

Asbestos Results from Vermiculite Processing Facilities in South Carolina
(June 2001)

October 17, 2001

Science and Ecosystem Support Division
Environmental Investigations Branch
980 College Station Road, Athens, Georgia 30605

10535245

INTRODUCTION

On June 6, 2001 staff from the USEPA Region 4, Science and Ecosystem Support Division (SESD), Enforcement and Investigations Branch (EIB) collected vermiculite ore samples from processing facilities and mines in the Enoree and Woodruff, South Carolina areas. The facilities are primarily vermiculite expansion plants or mines. The focus of the sampling was to determine if current handling and processing activities have resulted in asbestos contamination that would be a threat to on-site or off-site human receptors. The results of these sampling investigations are included in this report.

BACKGROUND

The concern over asbestos contamination arose from the discovery of high concentrations of asbestos in the vermiculite deposits in Libby, Montana. The W.R. Grace Company closed the Libby Mine in 1990, but investigators wanted to determine if vermiculite ore from Libby had been shipped to other processing plants around the country. In May 2000 an evaluation of 22 past and present vermiculite operations in Region 4 was initiated by the Emergency Response and Removal Branch (ERRB) in Atlanta, GA. Site surveys were conducted by a Superfund Technical Assessment and Response Team (START) contractor to determine if sampling was necessary. Of the 22 facilities evaluated it was determined that only 8 would require sampling. This sampling occurred between October 2000 and March 2001. In May 2001, three more facilities were added to the sampling list. These were Carolina Vermiculite, Palmetto Vermiculite and WR Grace in South Carolina.

STUDY OBJECTIVES

The objective was to collect bulk material samples from each facility and analyze them for releasable asbestos using both Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM). The result would be used to determine if the material was "asbestos containing" according to the Toxic Substances Control Act (TSCA) definition of greater than 1% asbestos by weight (U S Code: Title 15, Section 2624).

STUDY AREA

The following facilities in South Carolina were sampled:

Carolina Vermiculite	P O Box 98	Woodruff, SC
Palmetto Vermiculite	P O Box 178	Woodruff, SC
WR Grace	26383 Hwy 221	Enoree, SC

STUDY METHODS

Surface soil samples were collected, when possible, close to where the exfoliation process was

conducted and in the area where the raw ore was stored. Additionally, a sample of the raw ore was collected when available. If the plant had more than one source of vermiculite, a sample was collected from each source. Approximately 1 kg of sample was collected for analysis. All samples were collected in accordance with the US EPA Region 4, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May, 1996. Samples were analyzed in accordance with the **US EPA Superfund Method for the Determination of Releasable Asbestos in Soils and Bulk Materials, Interim Version (Revised MDL).** Laboratory data sheets are Attachment 1.

STUDY RESULTS

Carolina Vermiculite, Woodruff, SC 06/06/01
Project #01-0811

Sample ID	Sample Description	Results
CV-001-VO	Ore from Hanna Mine	None Detected
CV-002-VO	Blend pile	None Detected
CV-003-VO	"Slime" from ditch to settling pond	None Detected
CV-004-VO	Ore concentrate	None Detected
CV-005-VO	Ore from Fanny Young Mine	None Detected

Palmetto Vermiculite, Woodruff, SC 06/06/01
Project #01-0812

Sample ID	Sample Description	Results
PV-123-VO	Composite of African ore grades A2, A3, A4	None Detected
PV-004-VO	Virginia ore	None Detected
PV-005-VO	Carolina ore	None Detected
PV-006-VO	Waste rock	None Detected
PV-007-VO	Finished product	None Detected

WR Grace, Enoree, SC 06/06/01
Project #01-0809

Sample ID	Sample Description	Results
WR-001-VO	Davis Mine ore	<1% Tremolite /Actinolite
WR-002-VO	Ball Mine ore	<1% Tremolite
WR-003-VO	Rim Pile at plant	None Detected
WR-004-VO	#3 ore concentrate	None Detected
WR-005-VO	#4 expanded vermiculite	<1% Tremolite
WR-006-VO	Stoner rock from #4 vermiculite	None Detected
WR-007-VO	Tailings pond	<1% Tremolite /Actinolite

The above results were submitted by EMSL Laboratory, Westmont, NJ and reviewed by Integrated Laboratory Systems, Athens, GA. No data qualifiers were applied to the results.

CONCLUSIONS

From the laboratory results, 13 of the 17 samples submitted for asbestos analysis were "None Detected" and the remaining 4 samples were "<1% Tremolite"or "<1% Tremolite/Actinolite". Therefore, according to the current TSCA definition of >1% being an asbestos containing material, no further action is needed.

LITERATURE CITED

US EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. May 1996.

US EPA Superfund Method for the Determination of Releasable Asbestos in Soils and Bulk Materials, Interim Version, Revised MDL.

Toxic Substances Control Act, US Code: Title 15, Section 2642.

ATTACHMENT 1

ANALYTICAL DATA SHEETS

Submitted by
EMSL Laboratory
Westmont, NJ
and reviewed by
Integrated Laboratory Systems,
Athens, GA

August 8, 2001

Jim Gray
US EPA
College Station Rd
Athens, GA 30613-7799

RE: EMSL Order ID# 040109201

Dear Jim:

Attached please find the results of your soil samples from the above referenced order number. These samples were analyzed for asbestos content via PLM NIOSH 9002 (Issue 2) and for asbestos structure quantification via the Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (EPA-540-R97-028 EPA Superfund). This letter is meant to document all the structure quantities identified by the Elutriator method including those not counted/reported based on the method's requirements. A summary of the results are given in the table below, explanatory notes follow. All results are from the reading of 10 grid openings for each analyzed sample.

Customer Sample ID/ EMSL Sample ID	Total Asbestos Structures[2]	Reported Asbestos Structures[3]		Excluded Asbestos Structures[6]	Mineral Fibers of Concern[7]
		Protocol[4]	Long[5]		
PV-004-VO/040109201-0001	NOT REPORTED[1]	N/A	N/A	N/A	N/A
PV-005-VO/040109201-0002	NOT REPORTED[1]	N/A	N/A	N/A	N/A
PV-006-VO/040109201-0003	0	0	0	0	3
PV-007-VO/040109201-0004	NOT REPORTED[1]	N/A	N/A	N/A	N/A
PV-123-VO/040109201-0005	0	0	0	0	1
CV-001-VO/040109201-0006	0	0	0	0	3
CV-002-VO/040109201-0007	0	0	0	0	0
CV-003-VO/040109201-0008	0	0	0	0	0
CV-004-VO/040109201-0009	0	0	0	0	0
CV-005-VO/040109201-0010	0	0	0	0	5
CV-003-VO (QC) / 040109201-0013	0	0	0	0	5

Notes:

1. These samples of soil/vermiculite did not generate any measurable (by weight) respirable dust for analysis when placed in the elutriator and such the subsequent analysis could not be performed. It is believed that these samples may have been subjected to a preparatory or processing procedure incorporating sieving. This may have resulted in size discrimination in these samples, leaving no particles <10μ.

2. Total asbestos structures represents all asbestos structures (fibers, bundles, cluster, and matrix) found during analysis. This includes six asbestos types-Chrysotile and Amphibole Asbestos (Amosite, Actinolite, Tremolite, Crocidolite, and Anthophyllite).

Notes(Continued)

3. Reported asbestos structures represent all asbestos structures that meet the reporting requirements based on size as stated in the EPA Superfund Method. These structures must be ≤0.5μ in diameter and ≥5μ in length.

4. Protocol asbestos structures represent all asbestos structures that meet the requirements of Notes 1 and 2 and are 5-10μ in length.

5. Long asbestos structures represent all asbestos structures that meet the requirements of Notes 1 and 2 and are >10μ in length.

6. Excluded asbestos structures represent all asbestos structures that meet the requirements of Note 1 but do not meet the size requirements of Notes 2-4.

7. Mineral Fibers of Concern represent a newer class of amphibole categories that has been identified by the USEPA Region 8 in conjunction with the Libby, MT project. These include richterite and winchite. The "Libby Amphiboles" are not currently classified as asbestos but those performing the risk assessment and exposure modeling from the sample results may take this mineral fiber data into consideration.

If you need any calculations based on the Libby Amphiboles identified in these samples, please let me know and I can create additional reports showing this data. If you have any questions or need further information please do not hesitate to contact me at 800-220-3675X 1209.

Sincerely,

Stephen Siegel, CIH
Asbestos Lab Manager

EPA US EPA SESD Athens GA
Generic Chain of Custody

Copy

Reference Case:
Client No:

R

Region: 4	**Date Shipped:** 6/14/2001	**Chain of Custody Record**	**Sampler Signature:**
Project Code: 01-0812	**Carrier Name:** FedEx	**Relinquished By** (Date / Time)	**Received By** (Date / Time)
Account Code: 50102D04ZZQB00	**Airbill:**	1 [illegible] 6/14/01 1500	
CERCLIS ID:	**Shipped to:** EMSL Analytical Inc, 107 Haddon Ave, Westmont NJ 08108, (856) 858-4800	2	
Spill ID:		3	
Site Name/State: Palmetto Vermiculite/SC		4	
Project Leader: Kevin Simmons			
Action:			
Sampling Co: US EPA SESD			

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE	STATION LOCATION	SAMPLE COLLECT DATE/TIME	SAMPLE No.	QC Type
PV-004-VO	Other/ Art Masters	L/G	ASBESTOS (45)	4A-103074 (Not preserved) (1)	PV-004-VO	S: 6/6/2001 13:32		–
PV-005-VO	Other/ Art Masters	L/G	ASBESTOS (45)	4A-103075 (Not preserved) (1)	PV-005-VO	S: 6/6/2001 13:34		–
PV-006-VO	Other/ Art Masters	L/G	ASBESTOS (45)	4A-103076 (Not preserved) (1)	PV-006-VO	S: 6/6/2001 13:35		–
PV-007-VO	Other/ Art Masters	L/G	ASBESTOS (45)	4A-103077 (Not preserved) (1)	PV-007-VO	S: 6/6/2001 13:45		–
PV-123-VO	Other/ Art Masters	L/C	ASBESTOS (45)	4A-103071 (Not preserved) (1)	PV-123-VO	S: 6/6/2001 13:30		–

Shipment for Case Complete? Y	**Sample(s) to be used for laboratory QC:**	**Additional Sampler Signature(s):**	**Chain of Custody Seal Number:**
Analysis Key:	**Concentration:** L = Low, M = Low/Medium, H = High	**Type/Designate:** Composite = C, Grab = G	**Shipment Iced?**_____
ASBESTOS = Asbestos			

TR Number: 4-473322073-061401-0001

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PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Contract Laboratory Analytical Services Support, 2000 Edmund Halley Dr., Reston, VA. 20191-3436 Phone 703/264-9548 Fax 703/264-9222

EPA US EPA SESD Athens GA
Generic Chain of Custody

Copy

Reference Case:
Client No:

R

Region:	4	Date Shipped:	6/14/2001	**Chain of Custody Record**	Sampler Signature:
Project Code:	01-0811	Carrier Name:	FedEx	Relinquished By (Date / Time)	Received By (Date / Time)
Account Code:	50102D04ZZQB00	Airbill:		1 6/14/01 1500	
CERCLIS ID:		Shipped to:	EMSL Analytical Inc 107 Haddon Ave Westmont NJ 08108 (856) 858-4800	2	
Spill ID:				3	
Site Name/State:	Carolina Vermiculite/SC			4	
Project Leader:	Kevin Simmons				
Action:					
Sampling Co:	US EPA SESD				

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE	STATION LOCATION	SAMPLE COLLECT DATE/TIME	SAMPLE No.	QC Type
CV-001-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103065 (Not preserved) (1)	CV-001-VO	S: 6/6/2001 10:52		–
CV-002-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103066 (Not preserved) (1)	CV-002-VO	S: 6/6/2001 11:00		–
CV-003-SS	Surface Soil/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103067 (Not preserved) (1)	CV-003-SS	S: 6/6/2001 11:15		–
CV-004-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103068 (Not preserved) (1)	CV-004-VO	S: 6/6/2001 11:40		–
CV-005-VO	Other/ Kevin Simmons	L/C	ASBESTOS (45)	4A-103069 (Not preserved) (1)	CV-005-VO	S: 6/6/2001 12:10		–

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced?_____
ASBESTOS = Asbestos			

TR Number: 4-473322073-061401-0002

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PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Contract Laboratory Analytical Services Support, 2000 Edmund Halley Dr., Reston, VA. 20191-3436 Phone 703/264-[illegible]348 Fax 703/264-9222

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: sslegel@EMSL.com

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: (706) 355-8744 Phone: 706-355-8613
Project:

Customer ID: USEP50
Customer PO:
Received: 06/15/01 11:38 AM

EMSL Order: 040109201
EMSL Project ID: --
Analysis Date: 7/26/2001

Polarized Light Microscopy (PLM) Performed by NIOSH Method 9002, Issue 2

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
CV-004-VO (DUPLICATE) *040109201-0011*		Brown Non-Fibrous Heterogeneous	Teased		100% Non-fibrous (other)	None Detected
LAB BLANK NIST FIBERGLASS (NBS 1866) *040109201-0012*		Pink Fibrous Homogeneous	Teased	100% Glass		None Detected

Analyst(s)

Linda Price (1)
Scott Combs (11)

Stephen Siegel, CIH
or other approved signatory

Disclaimers: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. EMSL suggests that samples reported as <1% or none detected be tested with either SEM or TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: salegel@EMSL.com

EMSL

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: (706) 355-8744 Phone: 706-355-8613
Project:

Customer ID: USEP50
Customer PO:
Received: 06/15/01 11:38 AM

EMSL Order: 040109201
EMSL Project ID:
Analysis Date: 7/26/2001

Polarized Light Microscopy (PLM) Performed by NIOSH Method 9002, Issue 2

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
PV-004-VO 040109201-0001		Brown/Gray/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
PV-005-VO 040109201-0002		Gray/Brown/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
PV-006-VO 040109201-0003		Various Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
PV-007-VO 040109201-0004		Tan/Gold/Gray Non-Fibrous Heterogeneous	Teased		100% Non-fibrous (other)	None Detected
PV-123-VO 040109201-0005		Gray/Gold/Tan Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
CV-001-VO 040109201-0006		Gray/Brown/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
CV-002-VO 040109201-0007		Tan/Gold/Gray Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
CV-003-VO 040109201-0008		Tan/Gray/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose <1% Fibrous (other)	100% Non-fibrous (other)	None Detected
CV-004-VO 040109201-0009		Gray/Brown/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose <1% Fibrous (other)	100% Non-fibrous (other)	None Detected
CV-005-VO 040109201-0010		Gray/Rust/Gold Non-Fibrous Heterogeneous	Teased Crushed	<1% Cellulose <1% Fibrous (other)	100% Non-fibrous (other)	None Detected

Analyst(s)

Linda Price (1)
Scott Combs (11)

Stephen Siegel, CIH
or other approved signatory

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EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos In Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0005
Field Subsample#	PV-123-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	60.51
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000154

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 4.098E+07	< 8.033E+07
Long Chrysotile Protocol Structures	< 4.098E+07	< 8.033E+07
Total Amphibole Protocol Structures	< 4.098E+07	< 8.033E+07
Long Amphibole Protocol Structures	< 4.098E+07	< 8.033E+07
Long Asbestos Protocol Structures	< 4.098E+07	< 8.033E+07
Total Asbestos Protocol Structures	< 4.098E+07	< 8.033E+07
Estimated Analytical Sensitivity: (s/gPM10)	4.098E+07	8.033E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos In Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0001
Field Subsample#	PV.004-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	0
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	62.6
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< #DIV/0!	< #DIV/0!
Long Chrysotile Protocol Structures	< #DIV/0!	< #DIV/0!
Total Amphibole Protocol Structures	< #DIV/0!	< #DIV/0!
Long Amphibole Protocol Structures	< #DIV/0!	< #DIV/0!
Long Asbestos Protocol Structures	< #DIV/0!	< #DIV/0!
Total Asbestos Protocol Structures	< #DIV/0!	< #DIV/0!
Estimated Analytical Sensitivity: (s/gPM10)	#DIV/0!	#DIV/0!

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Westmont, NJ 08108
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Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0002
Field Subsample#	PV-005-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	0
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile
	Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	58.91
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< #DIV/0!	< #DIV/0!
Long Chrysotile Protocol Structures	< #DIV/0!	< #DIV/0!
Total Amphibole Protocol Structures	< #DIV/0!	< #DIV/0!
Long Amphibole Protocol Structures	< #DIV/0!	< #DIV/0!
Long Asbestos Protocol Structures	< #DIV/0!	< #DIV/0!
Total Asbestos Protocol Structures	< #DIV/0!	< #DIV/0!
Estimated Analytical Sensitivity: (s/gPM10)	#DIV/0!	#DIV/0!

EMSL Analytical Inc.
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Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos In Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0003
Field Subsample#	PV-006-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	62.25
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000163

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.872E+07	< 7.589E+07
Long Chrysotile Protocol Structures	< 3.872E+07	< 7.589E+07
Total Amphibole Protocol Structures	< 3.872E+07	< 7.589E+07
Long Amphibole Protocol Structures	< 3.872E+07	< 7.589E+07
Long Asbestos Protocol Structures	< 3.872E+07	< 7.589E+07
Total Asbestos Protocol Structures	< 3.872E+07	< 7.589E+07
Estimated Analytical Sensitivity: (s/gPM10)	3.872E+07	7.589E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0004
Field Subsample#	PV-007-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	0
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	6.32
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< #DIV/0!	< #DIV/0!
Long Chrysotile Protocol Structures	< #DIV/0!	< #DIV/0!
Total Amphibole Protocol Structures	< #DIV/0!	< #DIV/0!
Long Amphibole Protocol Structures	< #DIV/0!	< #DIV/0!
Long Asbestos Protocol Structures	< #DIV/0!	< #DIV/0!
Total Asbestos Protocol Structures	< #DIV/0!	< #DIV/0!
Estimated Analytical Sensitivity: (s/gPM10)	#DIV/0!	#DIV/0!

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0006
Field Subsample#	CV-001-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	61.13
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000165

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.825E+07	< 7.497E+07
Long Chrysotile Protocol Structures	< 3.825E+07	< 7.497E+07
Total Amphibole Protocol Structures	< 3.825E+07	< 7.497E+07
Long Amphibole Protocol Structures	< 3.825E+07	< 7.497E+07
Long Asbestos Protocol Structures	< 3.825E+07	< 7.497E+07
Total Asbestos Protocol Structures	< 3.825E+07	< 7.497E+07
Estimated Analytical Sensitivity: (s/gPM10)	3.825E+07	7.497E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0007
Field Subsample#	CV-002-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	61.45
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000016

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.945E+08	< 7.732E+08
Long Chrysotile Protocol Structures	< 3.945E+08	< 7.732E+08
Total Amphibole Protocol Structures	< 3.945E+08	< 7.732E+08
Long Amphibole Protocol Structures	< 3.945E+08	< 7.732E+08
Long Asbestos Protocol Structures	< 3.945E+08	< 7.732E+08
Total Asbestos Protocol Structures	< 3.945E+08	< 7.732E+08
Estimated Analytical Sensitivity: (s/gPM10)	3.945E+08	7.732E+08

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0008
Field Subsample#	CV-003-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	61.02
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000031

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 2.036E+08	< 3.990E+08
Long Chrysotile Protocol Structures	< 2.036E+08	< 3.990E+08
Total Amphibole Protocol Structures	< 2.036E+08	< 3.990E+08
Long Amphibole Protocol Structures	< 2.036E+08	< 3.990E+08
Long Asbestos Protocol Structures	< 2.036E+08	< 3.990E+08
Total Asbestos Protocol Structures	< 2.036E+08	< 3.990E+08
Estimated Analytical Sensitivity: (s/gPM10)	2.036E+08	3.990E+08

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Slegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0009
Field Subsample#	CV-004-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	60.71
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000079

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 7.989E+07	< 1.566E+08
Long Chrysotile Protocol Structures	< 7.989E+07	< 1.566E+08
Total Amphibole Protocol Structures	< 7.989E+07	< 1.566E+08
Long Amphibole Protocol Structures	< 7.989E+07	< 1.566E+08
Long Asbestos Protocol Structures	< 7.989E+07	< 1.566E+08
Total Asbestos Protocol Structures	< 7.989E+07	< 1.566E+08
Estimated Analytical Sensitivity: (s/gPM10)	7.989E+07	1.566E+08

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/25/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/24/2001
Analyst	AS
Lab Sample#	040109201-0010
Field Subsample#	CV-005-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	60.64
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000138

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 4.574E+07	< 8.964E+07
Long Chrysotile Protocol Structures	< 4.574E+07	< 8.964E+07
Total Amphibole Protocol Structures	< 4.574E+07	< 8.964E+07
Long Amphibole Protocol Structures	< 4.574E+07	< 8.964E+07
Long Asbestos Protocol Structures	< 4.574E+07	< 8.964E+07
Total Asbestos Protocol Structures	< 4.574E+07	< 8.964E+07
Estimated Analytical Sensitivity: (s/gPM10)	4.574E+07	8.964E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	7/27/2001
Project Name	Region 4 Vermiculite
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040109201

Date Started	6/25/2001
Date Completed	7/25/2001
Analyst	ES
Lab Sample#	040109201-0013
Field Subsample#	CV-003-VO (QC)
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	61.02
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000031

	Number or Protocol Structures	
	Total	Long(>10um)
Asbestos Analysis Results		
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 2.036E+08	< 3.990E+08
Long Chrysotile Protocol Structures	< 2.036E+08	< 3.990E+08
Total Amphibole Protocol Structures	< 2.036E+08	< 3.990E+08
Long Amphibole Protocol Structures	< 2.036E+08	< 3.990E+08
Long Asbestos Protocol Structures	< 2.036E+08	< 3.990E+08
Total Asbestos Protocol Structures	< 2.036E+08	< 3.990E+08
Estimated Analytical Sensitivity: (s/gPM10)	2.036E+08	3.990E+08

US EPA SESD Athens GA
Generic Chain of Custody

USEP50 040112848

Reference Case	
Client No:	L
SDG No:	

Date Shipped:	Chain of Custody Record		Sampler Signature:	
Carrier Name: FedEx	Relinquished By	(Date / Time)	Received By	(Date / Time)
Airbill:	1	8/6/01 1200		
Shipped to:	2			
	3			
	4			

For Lab Use Only

Lab Contract No:

Unit Price:

Transfer To:

Lab Contract No:

Unit Price:

SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	TAG No./ PRESERVATIVE	STATION LOCATION	SAMPLE COLLECT DATE/TIME		FOR LAB USE ONLY SAMPLE No.	Sample Condition On Receipt
WR-001-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103078 (Not preserved) (1)	WR-001-VO	S: 6/6/01	15:10		
WR-002-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103079 (Not preserved) (1)	WR-002-VO	S: 6/6/01	15:40		
WR-003-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103080 (Not preserved) (1)	WR-003-VO	S: 6/6/01	16:10		
WR-004-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103081 (Not preserved) (1)	WR-004-VO	S: 6/6/01	16:25		
WR-005-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103082 (Not preserved) (1)	WR-005-VO	S: 6/6/01	16:35		
WR-006-VO	Other/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103083 (Not preserved) (1)	WR-006-VO	S: 6/6/01	16:40		
WR-007-SS	Surface Soil/ Kevin Simmons	L/G	ASBESTOS (45)	4A-103084 (Not preserved) (1)	WR-007-SS	S: 6/6/01	16:55		

RECEIVED EMSL WESTMONT, NJ 01 AUG -7 AM 11:51

COPY

Shipment for Case Complete?N	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Cooler Temperature Upon Receipt:	Chain of Custody Seal Number:	
Analysis Key:	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G		Custody Seal Intact?__	Shipment Iced?__
ASBESTOS = Asbestos					

TR Number: 4-473322073-061901-0001

LABORATORY COPY

PR provides preliminary results. Requests for preliminary results will increase analytical costs.
Send Copy to: Contract Laboratory Analytical Services Support, 2000 Edmund Halley Dr., Reston, VA. 20191-3436 Phone 703/264-9348 Fax 703/264-9222

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: ssiegel@EMSL.com

EMSL

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: (706) 355-8744 Phone: 706-355-8613
Project:

Customer ID: USEP50
Customer PO:
Received: 06/15/01 11:38 AM

EMSL Order: 040109201
EMSL Project ID:
Analysis Date: 7/26/2001

Polarized Light Microscopy (PLM) Performed by NIOSH Method 9002, Issue 2

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
PV-004-VO *040109201-0001*		Brown/Gray/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
PV-005-VO *040109201-0002*		Gray/Brown/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
PV-006-VO *040109201-0003*		Various Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
PV-007-VO *040109201-0004*		Tan/Gold/Gray Non-Fibrous Heterogeneous	Teased		100% Non-fibrous (other)	None Detected
PV-123-VO *040109201-0005*		Gray/Gold/Tan Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
CV-001-VO *040109201-0006*		Gray/Brown/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
CV-002-VO *040109201-0007*		Tan/Gold/Gray Non-Fibrous Heterogeneous	Teased	<1% Cellulose	100% Non-fibrous (other)	None Detected
CV-003-VO *040109201-0008*		Tan/Gray/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose <1% Fibrous (other)	100% Non-fibrous (other)	None Detected
CV-004-VO *040109201-0009*		Gray/Brown/Gold Non-Fibrous Heterogeneous	Teased	<1% Cellulose <1% Fibrous (other)	100% Non-fibrous (other)	None Detected
CV-005-VO *040109201-0010*		Gray/Rust/Gold Non-Fibrous Heterogeneous	Teased Crushed	<1% Cellulose <1% Fibrous (other)	100% Non-fibrous (other)	None Detected

Analyst(s)

Linda Price (1)
Scott Combs (11)

Stephen Siegel, CIH
or other approved signatory

Disclaimers: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. EMSL suggests that samples reported as <1% or none detected be tested with either SEM or TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: sslegel@EMSL.com

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: (706) 355-8744 Phone: 706-355-8613
Project:

Customer ID: USEP50
Customer PO:
Received: 06/15/01 11:38 AM

EMSL Order: 040109201
EMSL Project ID:
Analysis Date: 7/26/2001

Polarized Light Microscopy (PLM) Performed by NIOSH Method 9002, Issue 2

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
CV-004-VO (DUPLICATE) 040109201-0011		Brown Non-Fibrous Heterogeneous	Teased		100% Non-fibrous (other)	None Detected
LAB BLANK NIST FIBERGLASS (NBS 1866) 040109201-0012		Pink Fibrous Homogeneous	Teased	100% Glass		None Detected

Analyst(s)

Linda Price (1)
Scott Combs (11)

Stephen Siegel, CIH
or other approved signatory

Disclaimers: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. EMSL suggests that samples reported as <1% or none detected be tested with either SEM or TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

September 28, 2001

Jim Gray
US EPA
College Station Rd
Athens, GA 30613-7799

RE: EMSL Order ID# 040112849

Dear Jim:

Attached please find the results of your soil samples from the above referenced order number. These samples were analyzed for asbestos content via PLM NIOSH 9002 (Issue 2) and for asbestos structure quantification via the Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (EPA-540-R97-028 EPA Superfund). This letter is meant to document all the structure quantities identified by the Elutriator method including those not counted/reported based on the method's requirements. A summary of the results are given in the table below, explanatory notes follow.

Customer Sample ID/ EMSL Sample ID	Total Asbestos Structures[1]	Reported Asbestos Structures[2]		Excluded Asbestos Structures[5]	Non-Regulated Amphiboles[6]
		Protocol[3]	Long[4]		
WR-001-VO/040112849-0001	0	0	0	0	12
WR-002-VO/040112849-0002	0	0	0	0	21
WR-003-VO/040112849-0003	0	0	0	0	21
WR-004-VO/040112849-0004	0	0	0	0	2
WR-005-VO/040112849-0005	0	0	0	0	5
WR-006-VO/040112849-0006	0	0	0	0	10
WR-007-SS/040112849-0007	0	0	0	0	6
WR-007-SSQC	0	0	0	0	10
BLANK	0	0	0	0	0

Notes:

1. Total asbestos structures represents all asbestos structures (fibers, bundles, cluster, and matrix) found during analysis. This includes the six regulated asbestos types-Chrysotile and Amphibole Asbestos (Amosite, Actinolite, Tremolite, Crocidolite, and Anthophyllite).

2. Reported asbestos structures represent all asbestos structures that meet the reporting requirements based on size as stated in the EPA Superfund Method. These structures must be ≤0.5μ in diameter and ≥5μ in length.

3. Protocol asbestos structures represent all asbestos structures that meet the requirements of Notes 1 and 2 and are 5-10μ in length.

4. Long asbestos structures represent all asbestos structures that meet the requirements of Notes 1 and 2 and are >10μ in length.

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Notes (Continued)

5. Excluded asbestos structures represent all asbestos structures that meet the requirements of Note 1 but do not meet the size requirements of Notes 2-4.

6. Non-regulated Amphiboles represent a newer class of amphibole categories that have been identified by the USEPA Region 8 in conjunction with the Libby, MT project. These include richterite and winchite. These are also termed "Libby Amphiboles" and are not currently classified as regulated asbestos but those performing the risk assessment and exposure modeling from the sample results may take this mineral fiber data into consideration.

If you need any calculations based on the non-regulated amphiboles identified in these samples, please let me know and I can create additional reports showing this data. If you have any questions or need further information please do not hesitate to contact me at 800-220-3675X 1209.

Sincerely,

Stephen Siegel, CIH
Asbestos Lab Manager

COPY

EMSL Analytical, Inc.
107 Haddon Ave., Westmont, NJ 08108
Phone: (856) 858-4800 Fax: (856) 858-4960 Email: ssiegel@EMSL.com

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: (706) 355-8744 Phone: 706-355-8613
Project: 4-473322073-0619101-0001

Customer ID: USEP50
Customer PO:
Received: 08/07/01 11:51 AM

EMSL Order: 040112849
EMSL Project ID:
Analysis Date: 6/20/2001

Polarized Light Microscopy (PLM) Performed by NIOSH Method 9002, Issue 2

Sample	Location	Appearance	Treatment	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
WR-001-VO 040112849-0001		Brown Non-Fibrous Homogeneous	Teased		100% Non-fibrous (other)	<1% Tremolite/ Actinolite
WR-002-VO 040112849-0002		Brown Non-Fibrous Homogeneous	Teased		100% Non-fibrous (other)	<1% Tremolite
WR-003-VO 040112849-0003		Brown Non-Fibrous Homogeneous	Teased		100% Non-fibrous (other)	None Detected
WR-004-VO 040112849-0004		Brown Non-Fibrous Homogeneous	Teased		100% Non-fibrous (other)	None Detected
WR-005-VO 040112849-0005		Brown Non-Fibrous Homogeneous	Teased 1		100% Non-fibrous (other)	<1% Tremolite
WR-006-VO 040112849-0006		Brown Non-Fibrous Homogeneous	Teased		100% Non-fibrous (other)	None Detected
WR-007-SS 040112849-0007		Brown Non-Fibrous Homogeneous	Teased	1% Cellulose	99% Non-fibrous (other)	<1% Tremolite/ Actinolite

COPY

Analyst(s)

Linda Price (7)

Stephen Siegel, CIH
or other approved signatory

Disclaimers: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. EMSL suggests that samples reported as <1% or none detected be tested with either SEM or TEM. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	9/28/2001
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	040112849-0001
Field Subsample#	WR-001-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	60.42
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000175

Asbestos Analysis Results

	Number of Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.607E+07	< 7.069E+07
Long Chrysotile Protocol Structures	< 3.607E+07	< 7.069E+07
Total Amphibole Protocol Structures	< 3.607E+07	< 7.069E+07
Long Amphibole Protocol Structures	< 3.607E+07	< 7.069E+07
Long Asbestos Protocol Structures	< 3.607E+07	< 7.069E+07
Total Asbestos Protocol Structures	< 3.607E+07	< 7.069E+07
Estimated Analytical Sensitivity: (s/gPM10)	3.607E+07	7.069E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4980

Report Date	9/28/2001
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	040112849-0002
Field Subsample#	WR-002-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	7
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	60.3
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.00023

Asbestos Analysis Results

	Number or Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.920E+07	< 7.684E+07
Long Chrysotile Protocol Structures	< 3.920E+07	< 7.684E+07
Total Amphibole Protocol Structures	< 3.920E+07	< 7.684E+07
Long Amphibole Protocol Structures	< 3.920E+07	< 7.684E+07
Long Asbestos Protocol Structures	< 3.920E+07	< 7.684E+07
Total Asbestos Protocol Structures	< 3.920E+07	< 7.684E+07
Estimated Analytical Sensitivity: (s/gPM10)	3.920E+07	7.684E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4900 Fax:856-858-4960

Report Date	9/28/2001
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	040112849-0003
Field Subsample#	WR-003-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	4
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	60.38
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000271

Asbestos Analysis Results

	Number of Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 5.822E+07	< 1.141E+08
Long Chrysotile Protocol Structures	< 5.822E+07	< 1.141E+08
Total Amphibole Protocol Structures	< 5.822E+07	< 1.141E+08
Long Amphibole Protocol Structures	< 5.822E+07	< 1.141E+08
Long Asbestos Protocol Structures	< 5.822E+07	< 1.141E+08
Total Asbestos Protocol Structures	< 5.822E+07	< 1.141E+08
Estimated Analytical Sensitivity: (s/gPM10)	5.822E+07	1.141E+08

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	9/28/2001
Project Name	4-473322073-0819101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	040112849-0004
Field Subsample#	WR-004-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	44.77
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000183

Asbestos Analysis Results

	Number or Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.449E+07	< 6.760E+07
Long Chrysotile Protocol Structures	< 3.449E+07	< 6.760E+07
Total Amphibole Protocol Structures	< 3.449E+07	< 6.760E+07
Long Amphibole Protocol Structures	< 3.449E+07	< 6.760E+07
Long Asbestos Protocol Structures	< 3.449E+07	< 6.760E+07
Total Asbestos Protocol Structures	< 3.449E+07	< 6.760E+07
Estimated Analytical Sensitivity: (s/gPM10)	3.449E+07	6.760E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	9/28/2001
Project Name	4-473322073-0819101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	040112849-0005
Field Subsample#	WR-005-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	6.35
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000024

Asbestos Analysis Results

	Number or Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 2.630E+08	< 5.154E+08
Long Chrysotile Protocol Structures	< 2.630E+08	< 5.154E+08
Total Amphibole Protocol Structures	< 2.630E+08	< 5.154E+08
Long Amphibole Protocol Structures	< 2.630E+08	< 5.154E+08
Long Asbestos Protocol Structures	< 2.630E+08	< 5.154E+08
Total Asbestos Protocol Structures	< 2.630E+08	< 5.154E+08
Estimated Analytical Sensitivity: (s/gPM10)	2.630E+08	5.154E+08

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4600 Fax:856-858-4980

Report Date	9/28/2001
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	040112849-0006
Field Subsample#	WR-006-VO
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	46.5
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000215

Asbestos Analysis Results

	Number of Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 2.936E+07	< 5.754E+07
Long Chrysotile Protocol Structures	< 2.936E+07	< 5.754E+07
Total Amphibole Protocol Structures	< 2.936E+07	< 5.754E+07
Long Amphibole Protocol Structures	< 2.936E+07	< 5.754E+07
Long Asbestos Protocol Structures	< 2.936E+07	< 5.754E+07
Total Asbestos Protocol Structures	< 2.936E+07	< 5.754E+07
Estimated Analytical Sensitivity: (s/gPM10)	2.936E+07	5.754E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4860

Report Date	9/28/01
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/01
Date Completed	9/26/01
Analyst	AS
Lab Sample#	040112849-0007
Field Subsample#	WR-007-SSQC
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile
	Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	58.45
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.00014

Asbestos Analysis Results

	Number or Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 4.508E+07	< 8.836E+07
Long Chrysotile Protocol Structures	< 4.508E+07	< 8.836E+07
Total Amphibole Protocol Structures	< 4.508E+07	< 8.836E+07
Long Amphibole Protocol Structures	< 4.508E+07	< 8.836E+07
Long Asbestos Protocol Structures	< 4.508E+07	< 8.836E+07
Total Asbestos Protocol Structures	< 4.508E+07	< 8.836E+07
Estimated Analytical Sensitivity: (s/gPM10)	4.508E+07	8.836E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	9/28/01
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112849

Date Started	9/10/01
Date Completed	9/26/01
Analyst	AS
Lab Sample#	040112849-0007
Field Subsample#	WR-007-SS
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A

Tem Analysis

Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter

Dust Generator

Mass of Sample Tumbled(g)	58.45
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502

Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator

Mass of Respirable Dust on Filter(g)	0.000173

Asbestos Analysis Results

	Number of Protocol Structures	
	Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

ESTIMATED ASBESTOS CONCENTRATIONS (s/gPM10)

	Concentrations	
	Mean	95% UCL
Total Chrysotile Protocol Structures	< 3.648E+07	< 7.151E+07
Long Chrysotile Protocol Structures	< 3.648E+07	< 7.151E+07
Total Amphibole Protocol Structures	< 3.648E+07	< 7.151E+07
Long Amphibole Protocol Structures	< 3.648E+07	< 7.151E+07
Long Asbestos Protocol Structures	< 3.648E+07	< 7.151E+07
Total Asbestos Protocol Structures	< 3.648E+07	< 7.151E+07
Estimated Analytical Sensitivity: (s/gPM10)	3.648E+07	7.151E+07

EMSL Analytical Inc.
107 Haddon Avenue
Westmont, NJ 08108
Contacts: Stephen Siegel, CIH, Scott Slavin, Ph.D
Phone:856-858-4800 Fax:856-858-4960

Report Date	9/28/2001
Project Name	4-473322073-0619101-0001
Methods	Draft Modified Elutriator Method for the Determination of Asbestos in Soils and Bulk Material Method (dated May 23, 2000, Revision 1)
EMSL Order ID	040112649

Date Started	9/10/2001
Date Completed	9/26/2001
Analyst	AS
Lab Sample#	LAB BLANK
Field Subsample#	N/A
Field Preparation Technique	N/A
Sample Drying	Yes
Sample Splitting	N/A
Other	N/A
Tem Analysis	
Effective Area of Analytical Filter (sq mm)	385 (ME)
Magnification	19,000 X
Grid Opening Area (sq mm)	0.0061
Number of Grid Openings Scanned	10
Asbestos Structure Size and Type Categories of Interest	Protocol Fiber >5-10u Length <0.5u Diameter Amphiboles/Chrysotile
	Long Fiber >10u Length <0.5u Diameter Amphiboles/Chrysotile
Minimum Acceptable Structure Identification Category	5u Length <0.5u Diameter
Dust Generator	
Mass of Sample Tumbled(g)	
Air Flow Rate Through ME opening of Dust Generator (ml/min)	1430
Air Flow Rate Through IST opening of Dust Generator (ml/min)	72
Estimated Total Air Flow Rate Through Elutriator (ml/min)	1502
Filters from the Isokinetic Sampling Tube(IST) opening of the Elutriator	
Mass of Respirable Dust on Filter(g)	

Asbestos Analysis Results	Number or Protocol Structures Total	Long(>10um)
No.of Chrysotile Asbestos Structures	0	0
No.of Amphibole Asbestos Structures	0	0
Amphibole Mineral Type(s)		

QC Blank

Page 1 of ____

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	385
Secondary Filter Area (mm2)	

EPA Sample Number:	QC Blank
Sample Type (A=Air, D=Dust, O=Other):	
Air volume (L) or dust area (cm2)	
Date received by lab	
Lab Job Number:	0401128849
Lab Sample Number:	
Number of grids prepared	4
Prepared by	BF
Preparation date	

Analyzed by	AVS
Analysis date	9-27-2001
Method (D=Direct, I=Indirect)	D
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C

Row M

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row M 1	G-8	ND													
	E-4														
	L-5														
	M-11														
	F-12														
2	K-7														
	H-8														
	E-12														
	C-9														
	D-4														

COPY

LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile NA = Non-asbestos

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

USEPA REGION 8 SITE INVESTIGATION
TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ	EPA Sample Number:	WR-001-V0 75 mm	Analyzed by	JJ
Instrument	JEOL 100 CX II (2)	Sample Type (A=Air, D=Dust, O=Other):	D	Analysis date	9-18-2001
Voltage	100 KV	Air volume (L) or dust area (cm2)		Method (D=Direct, I=Indirect)	
Magnification	19000 X	Date received by lab	8-7-2001	Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid opening area (mm2)	0.0061	Lab Job Number:	040112849	Grid storage location	2001_C Row J
Scale: 1L =	1	Lab Sample Number:	0001	*Secondary Prep*	
Scale: 1D =	1	Number of grids prepared	4	Fraction of primary filter used:	
Primary filter area (mm2)	385	Prepared by	DS	Total resuspension volume (mL)	
Secondary Filter Area (mm2)		Preparation date	9-10-2001	Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)					1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA	Sketch/Comments	Sketch	Photo	EDS
Row J 1	G-8	MD11 / MF			7.5 / 7.5	0.4 / 0.3		LA							1
	J-4	ND													
	L-8	MD11 / MF			8 / 8.0	1.5 / 0.65		LA							1
		F			3.2	0.25		LA							1
		MD11 / MF			8 / 8.0	1.2 / 0.5		LA							1
	M-13	MD11 / MF			7.5 / 5.0	5 / 0.6		LA							1
		F			5.0	1.1		LA							1
		MD11 / MF			30 / 28.5	5 / 0.5		LA							1
	I-13	ND													
2	H-6														

LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

LAB NAME: EMSL, Westmont, NJ

LAB SAMPLE NO: 0001

EPA SAMPLE NO: WR-001-V0 75 Min

SAMPLE TYPE: D

LAB JOB NUMBER: 0401128449

GRID STORAGE LOC.: 2001_C Row J

Row J

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
2	D-10	MDID			11.5	6									
		MF			3.2	0.7		LA							1
		F			2.8	0.9		LA							1
	C-6	MDIU			10	2.5									
		MF			6	0.9		LA							1
		MDII			5.4	1.2									
		MF			5.1	0.9		LA							1
	G-5	ND													
	L-7	MDIU			10	8									
		MF			2.2	0.8		LA							1

COPY

EMSL Analytical, Westmont, NJ

QDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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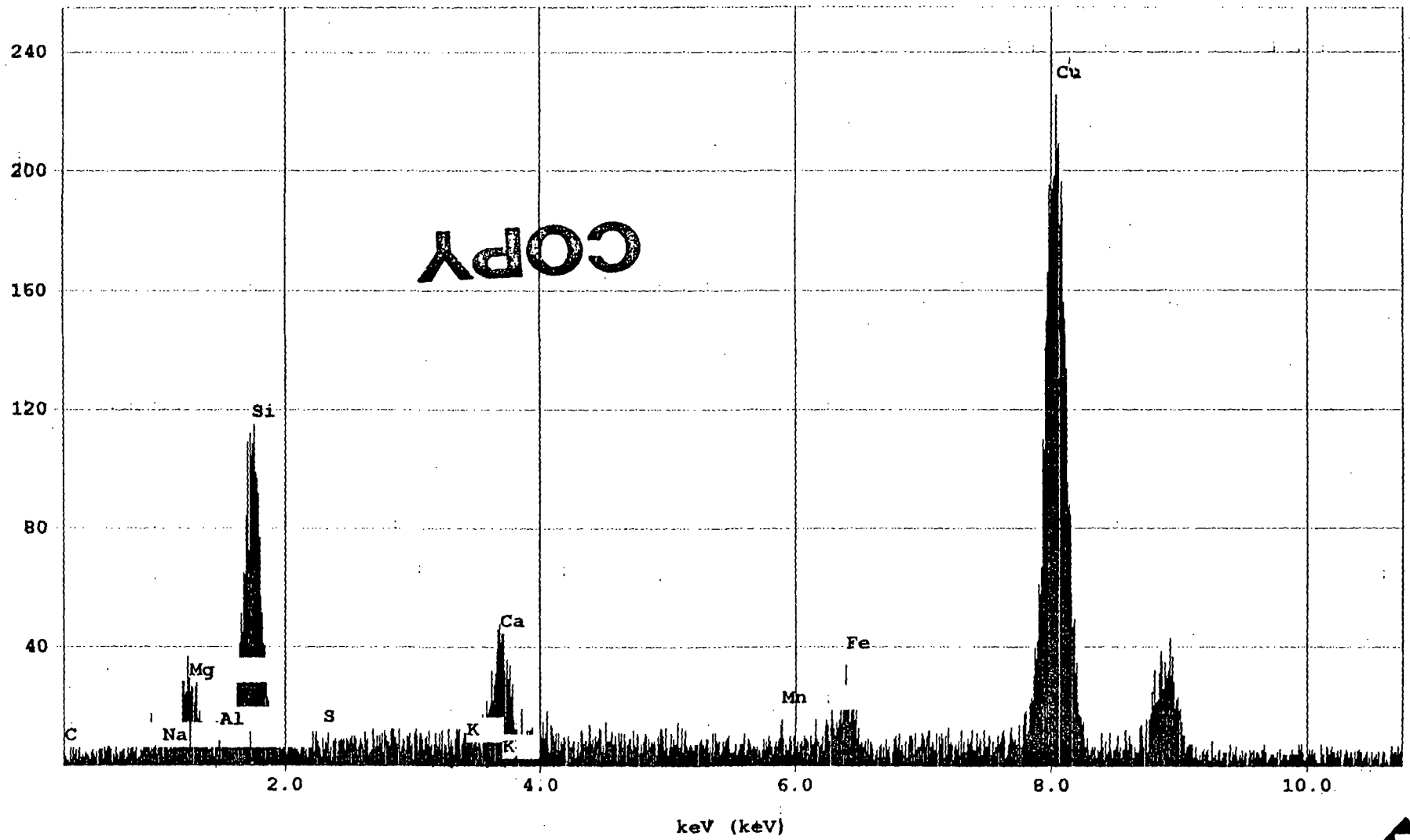

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EMSL Analytical, Westmont, NJ

CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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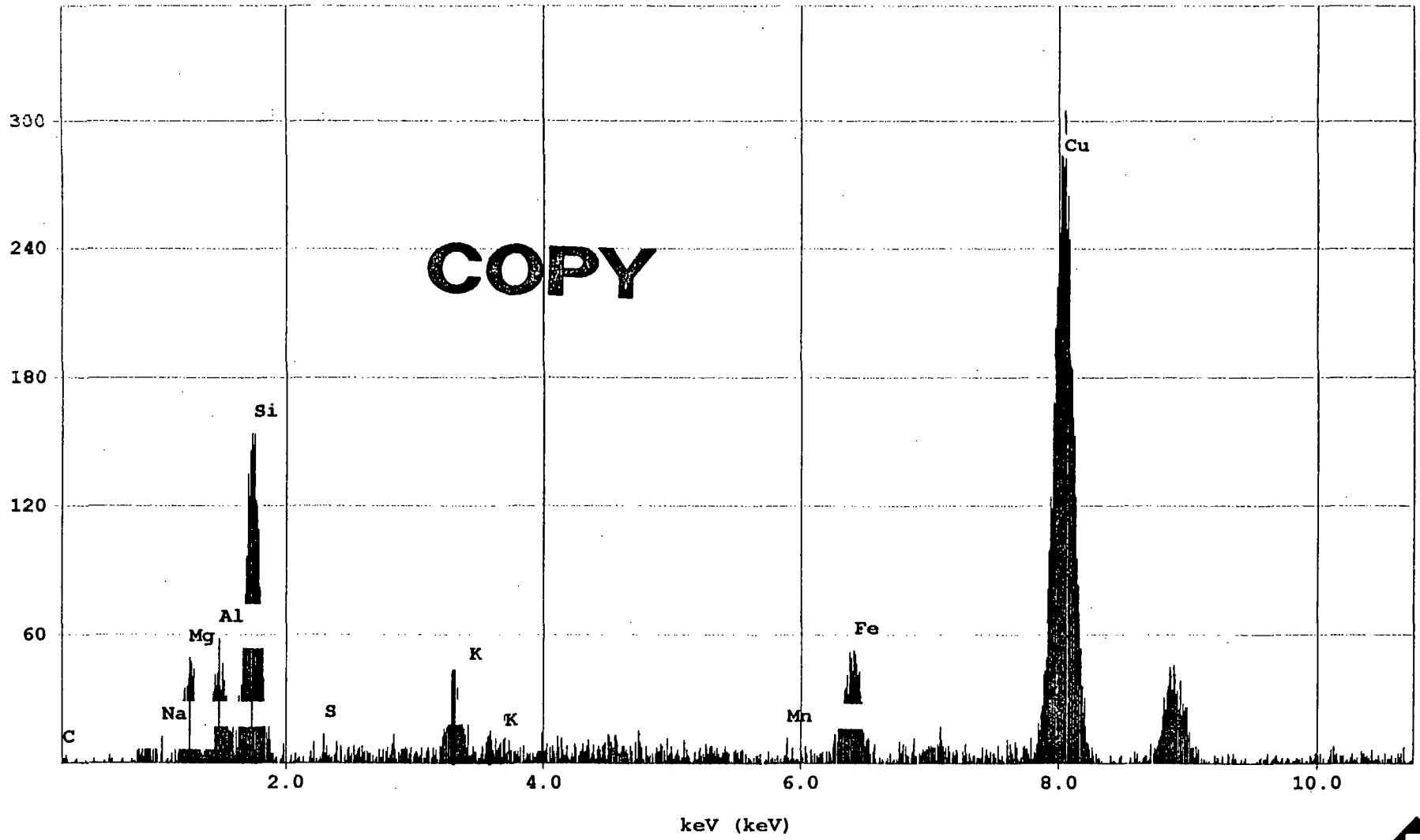

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CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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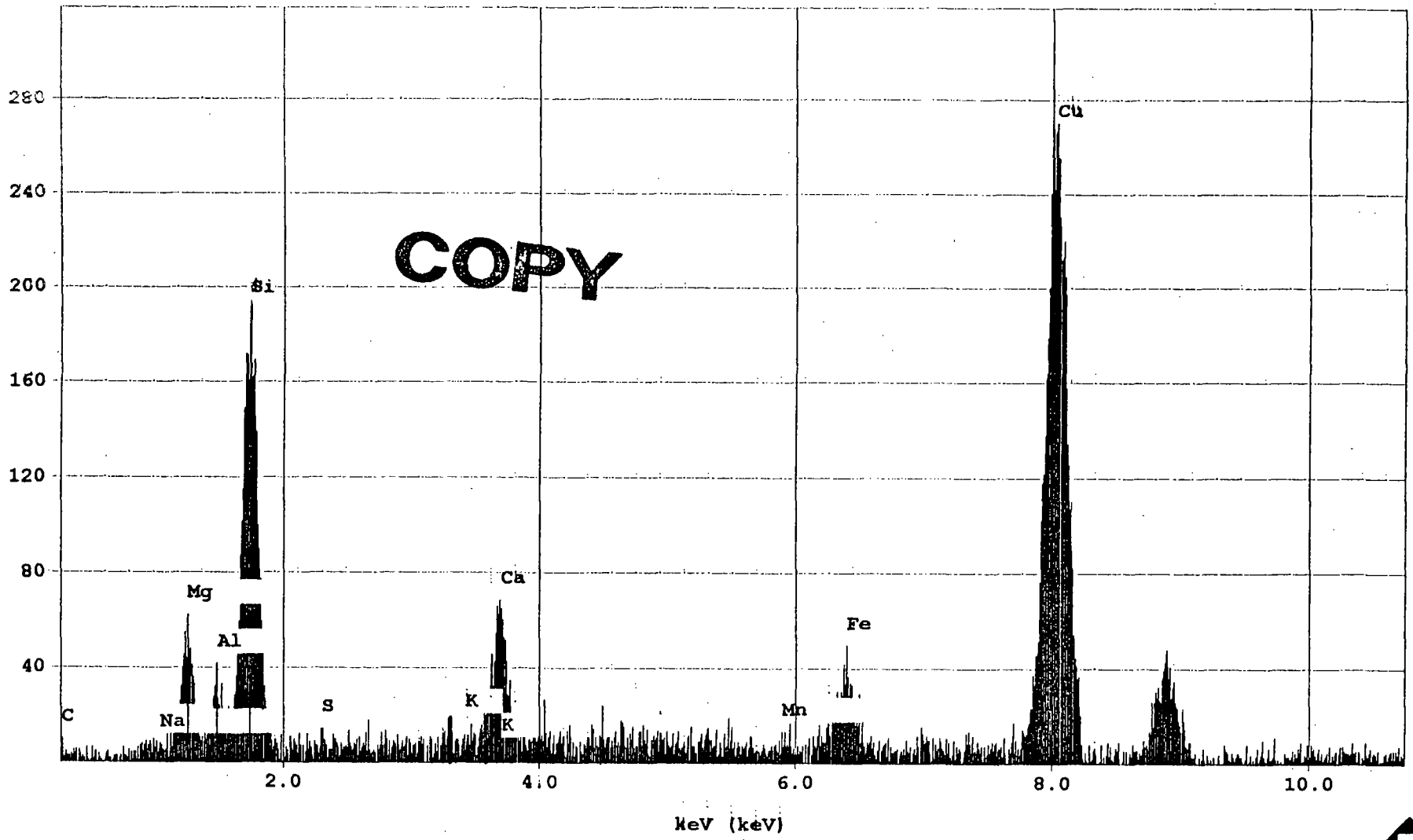

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CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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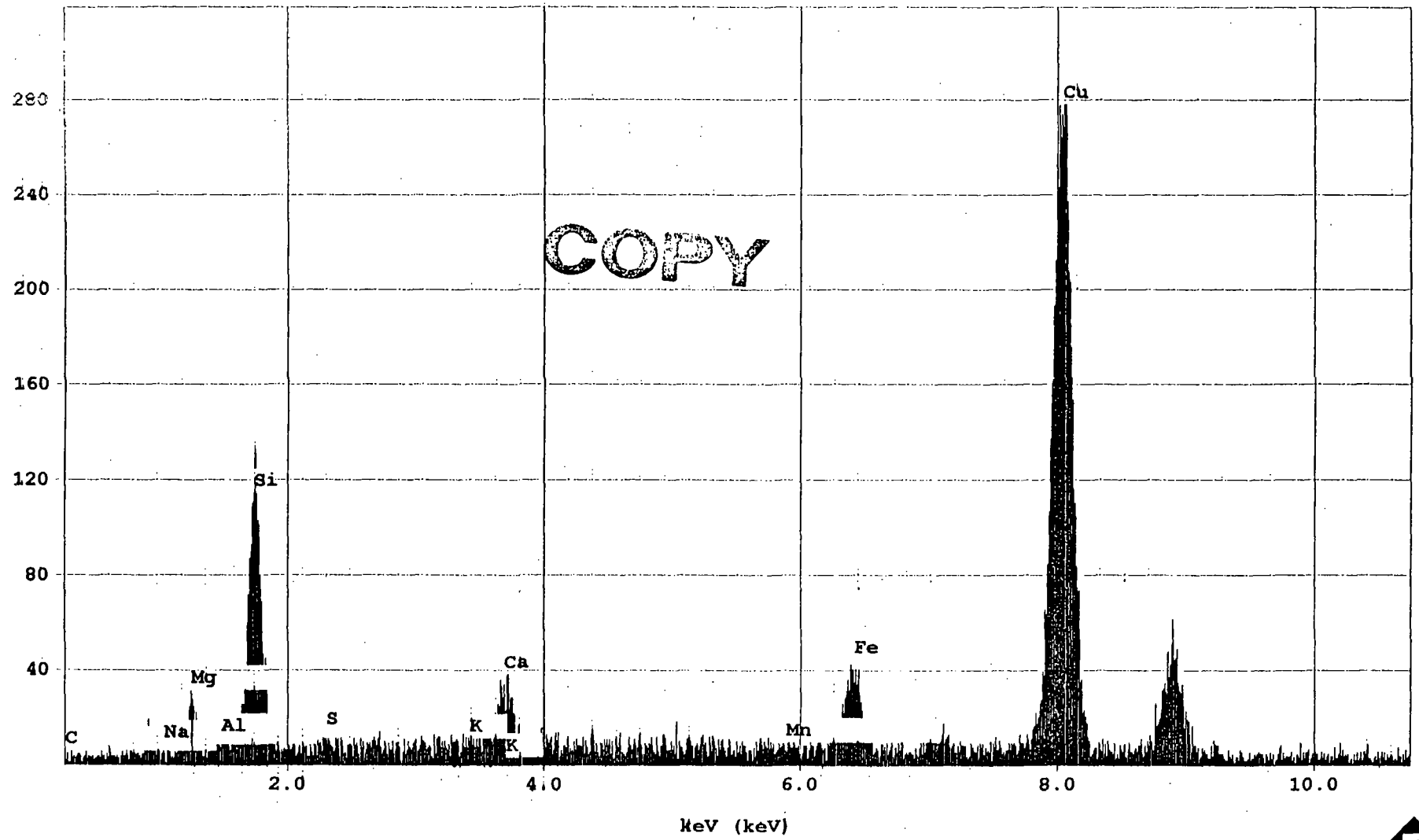

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EMSL Analytical, Westmont, NJ

CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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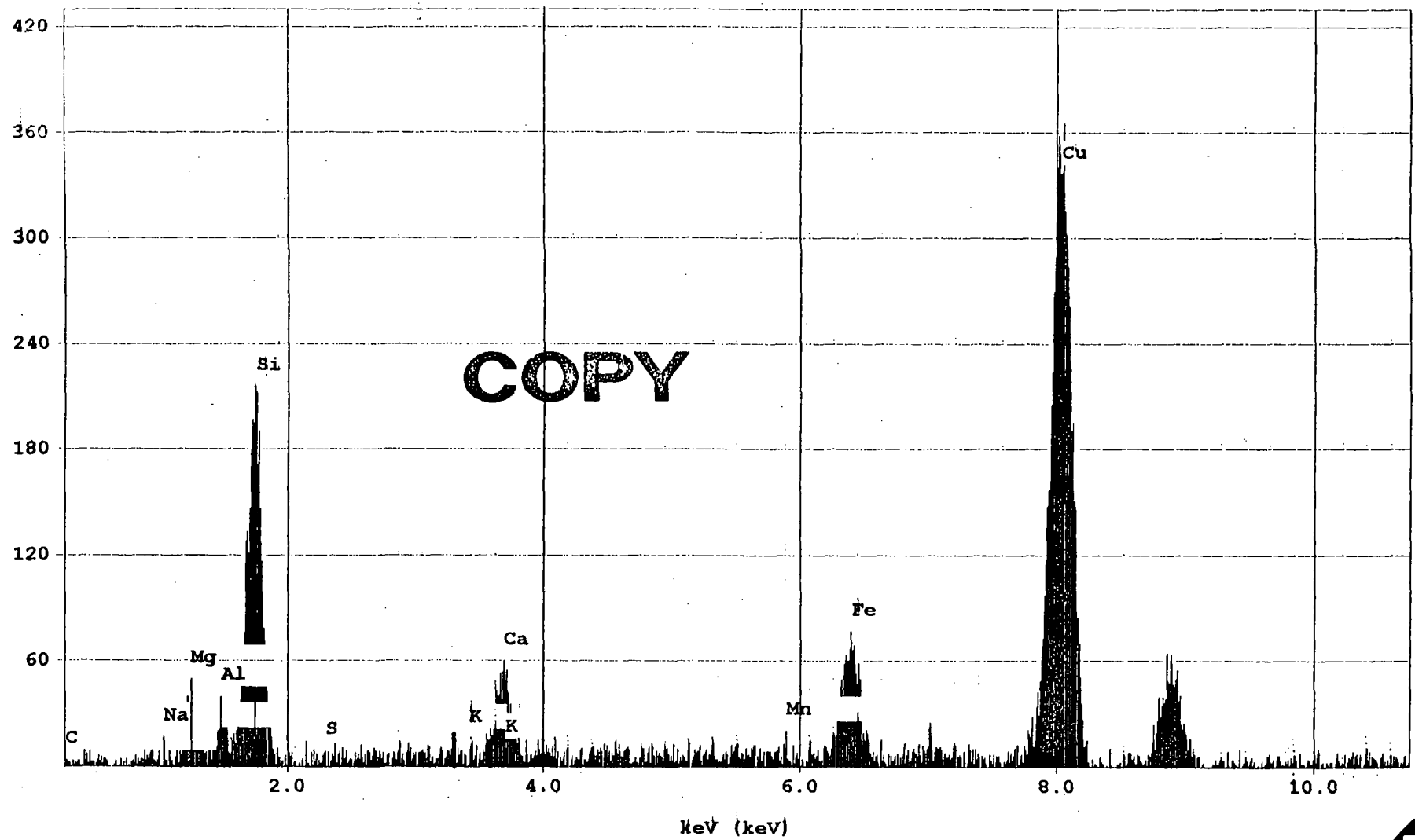

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CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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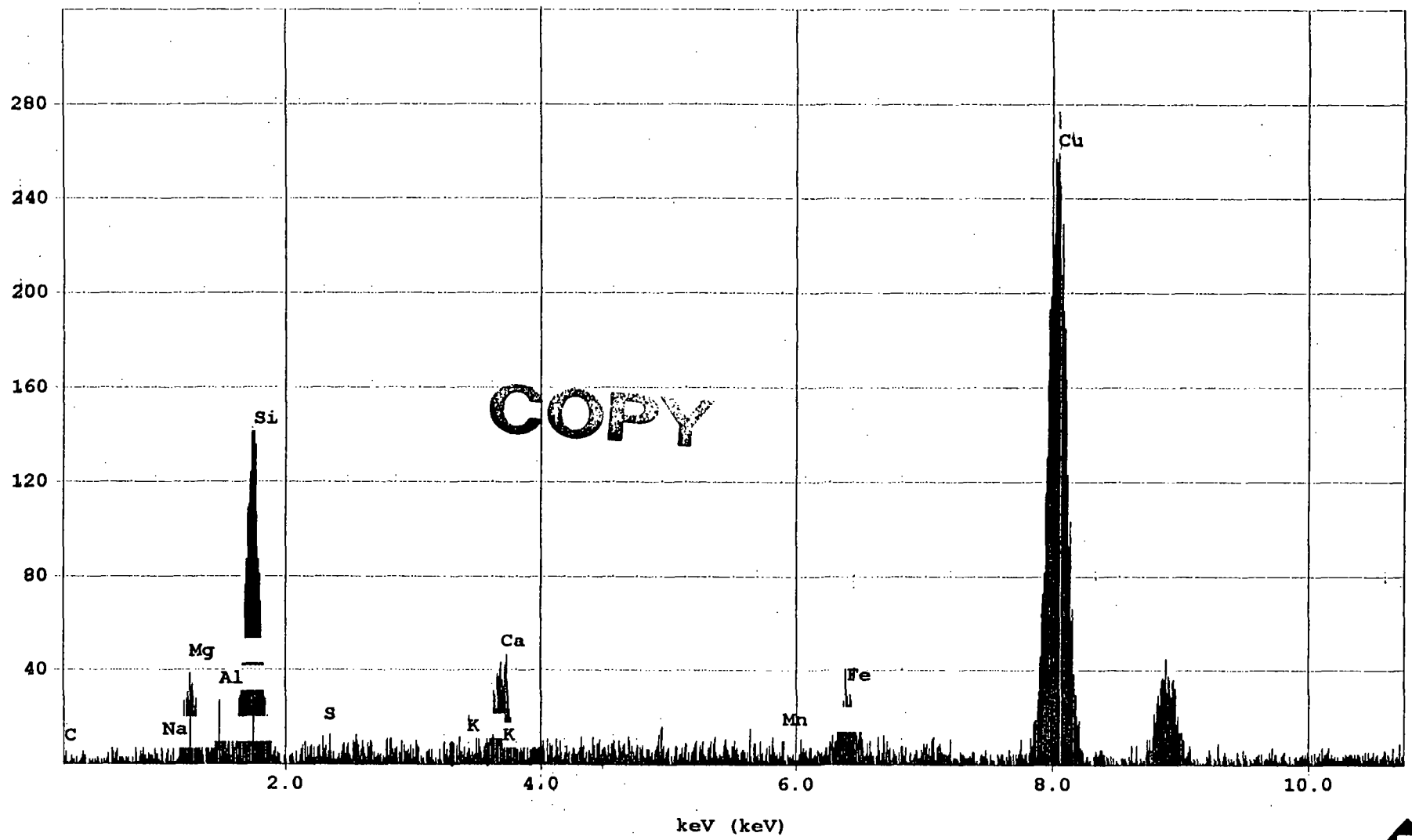

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CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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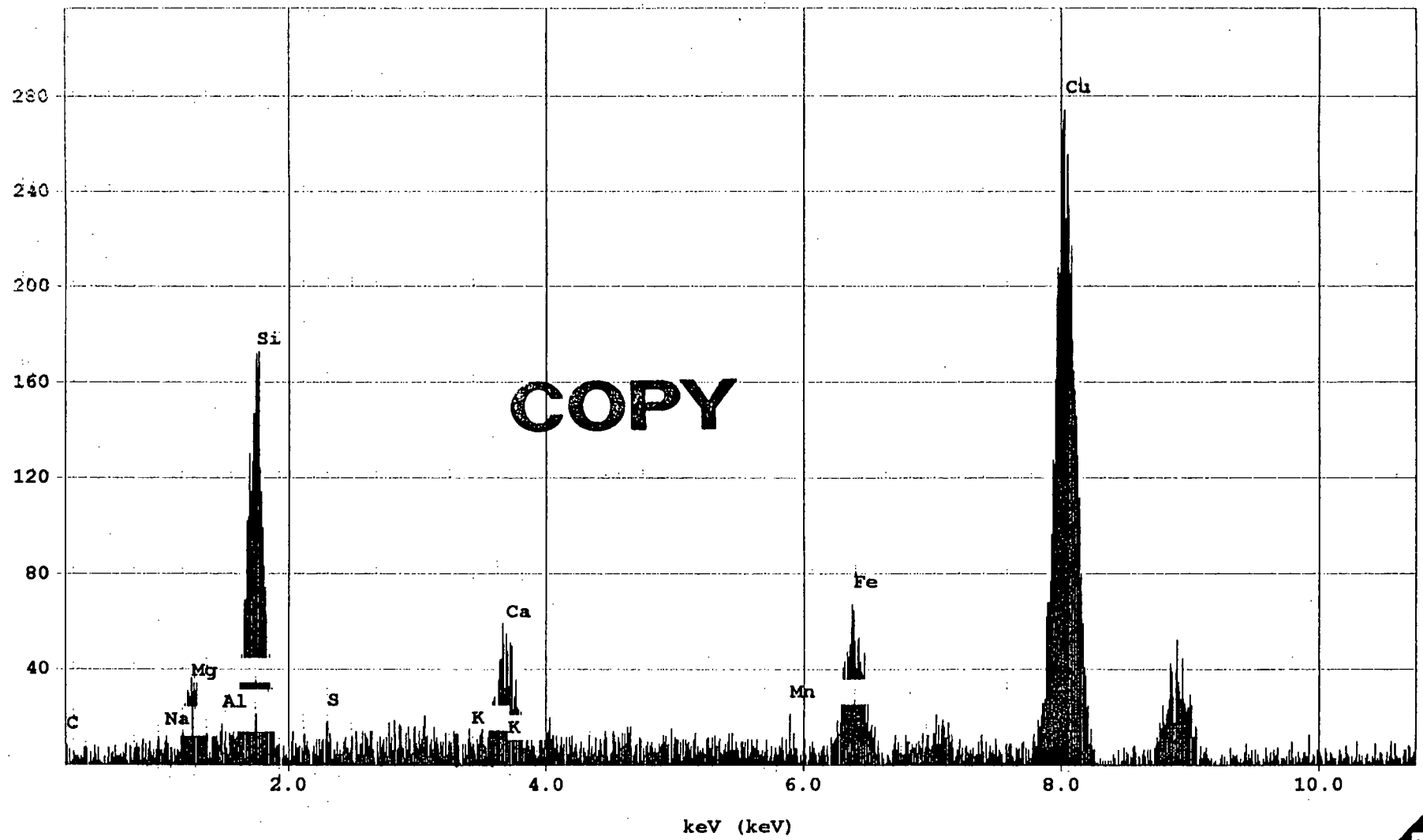

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CDM_112849_WR-001-VO : Libby Amphibole

Wednesday, September 12, 2001

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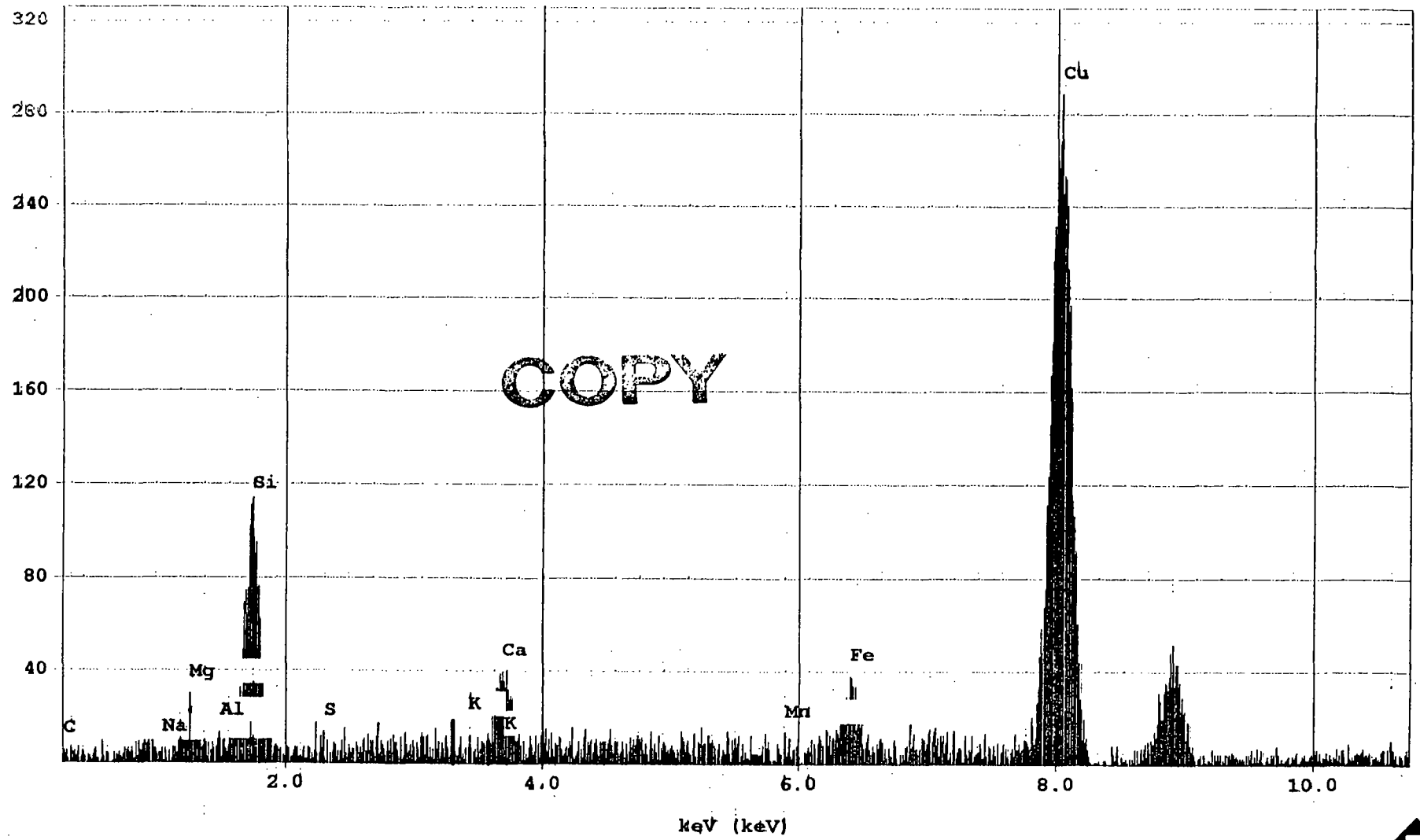

COPY

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

USEPA REGION 8 SITE INVESTIGATION

TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ	EPA Sample Number:	WR-002-V0 10 min.	Analyzed by	[illegible]
Instrument	JEOL 100 CX II (2)	Sample Type (A=Air, D=Dust, O=Other):	D	Analysis date	9-13-2001
Voltage	100 KV	Air volume (L) or dust area (cm2)		Method (D=Direct, I=Indirect)	D
Magnification	19000 X	Date received by lab	8-7-2001	Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid opening area (mm2)	0.0061	Lab Job Number:	040112849	Grid storage location	2001_C Row K
Scale: 1L =	1	Lab Sample Number:	0002	*Secondary Prep*	
Scale: 1D =	1	Number of grids prepared	4	Fraction of primary filter used:	
Primary filter area (mm2)	385	Prepared by	DS	Total resuspension volume (mL)	
Secondary Filter Area (mm2)		Preparation date	9-10-2001	Volume filtered for secondary prep (mL)	

	Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
				Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row K	1	F-8	F			6.0	0.2		LA							1
			MD10 / MF			10 4.8	8 1.0		LA							1
		I-4	MD11 / MF			6.0 6.0	1.2 0.6		LA							1
						15 14	5.5 2.2					NA	Al, Si, Fe			1
			MD14 / MF			10 5.8	7 0.12		LA							1
			F			2.3	0.2		LA							1
		L-5	F			4.7	0.5		LA							1
			F			6.6	0.5		LA							1
						20 170	5.5 2					NA	Al, Si, Fe			1
			MD10 / MF			7 3.0	5 0.9		LA							1

LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile

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E Lutriator

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

LAB NAME: EMSL, Westmont, NJ

LAB SAMPLE NO: 0002

EPA SAMPLE NO: WR-002-V0 10 min.

SAMPLE TYPE: D

LAB JOB NUMBER: 040112849

GRID STORAGE LOC.: 2001_C Row K

Row K

Grid	Grid Opening	Structure Type	No. of Structures Primary	No. of Structures Total	Dimensions Length	Dimensions Width	Identification	Mineral Class LA	Mineral Class OA	Mineral Class C	Mineral Class NA	Sketch/Comments	1 = yes, blank = no Sketch	Photo	EDS
1	D-4	F			7.5	1.5		LA							1
		MD11 / MF			9 / 8.5	2.2 / 2.0		LA							1
		MD11 / MF			20 / 13.0	10.0 / 1.0		LA							1
		MD11 / MF			11 / 11	1.1 / 0.4		LA							1
2	E-10				19 / 7.3	8 / 0.6					NA	Ti only			1
		MD11 / MF			13 / 7.5	6 / 0.5		LA							1
		MD10 / MF			12 / 3.5	10 / 0.7		LA							1
		MD2~~1~~ / MF			10.5 / 5	9 / 0.3		LA							1
		MF			7	0.75		LA							1
		MD11 / MF			12 / 8	2 / 2		LA							1
	I-12	ND													
	L-9	F			4.2	0.7		LA							1
		MD11 / MF			7 / 5	4 / 0.3		LA							1
		MD11 / MF			7.5 / 5	1.1 / 0.4		LA							1
		F			4	0.2		LA							1

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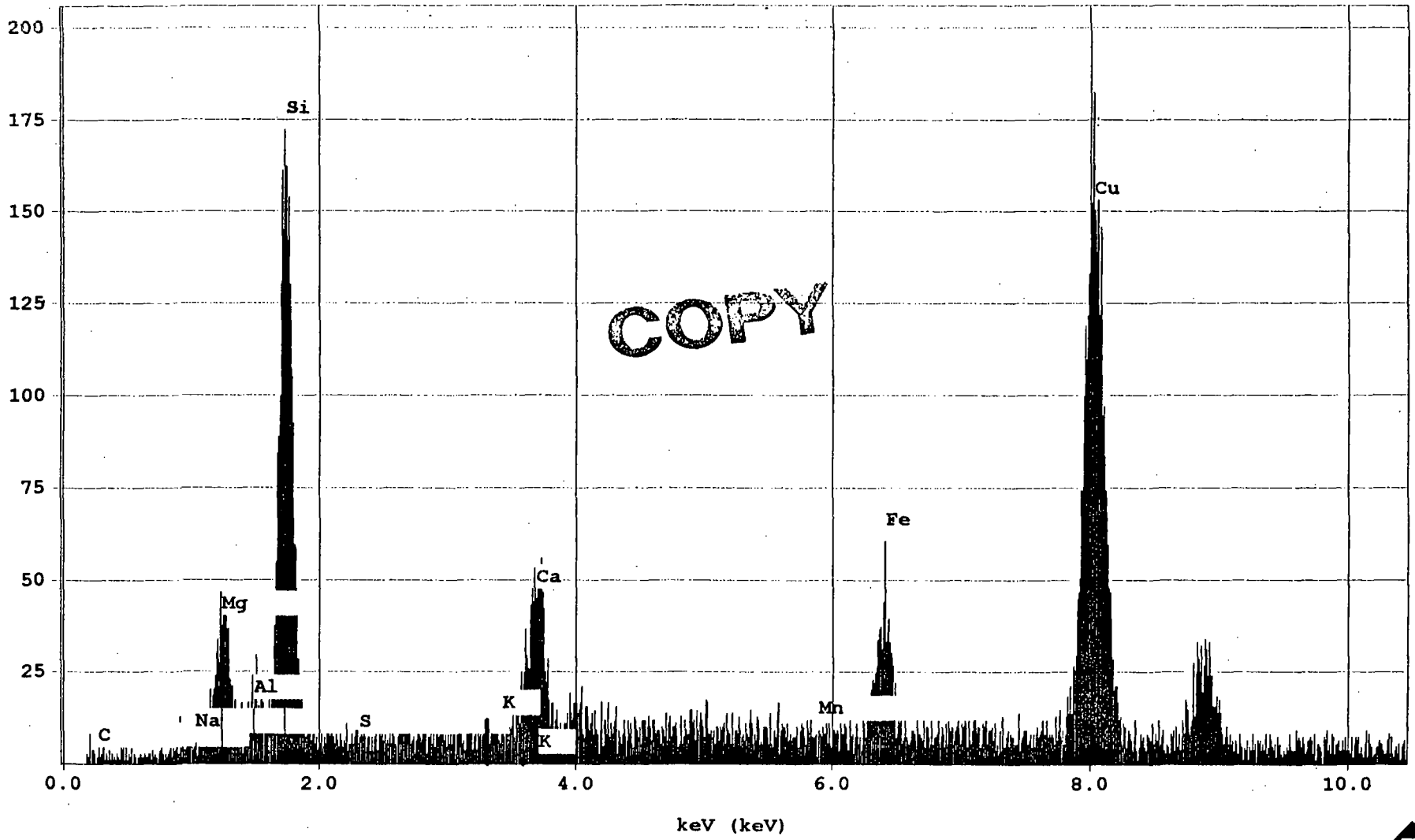
EMSL Analytical, Westmont, NJ

EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 13, 2001



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EMSL Analytical, Westmont, NJ

EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 13, 2001

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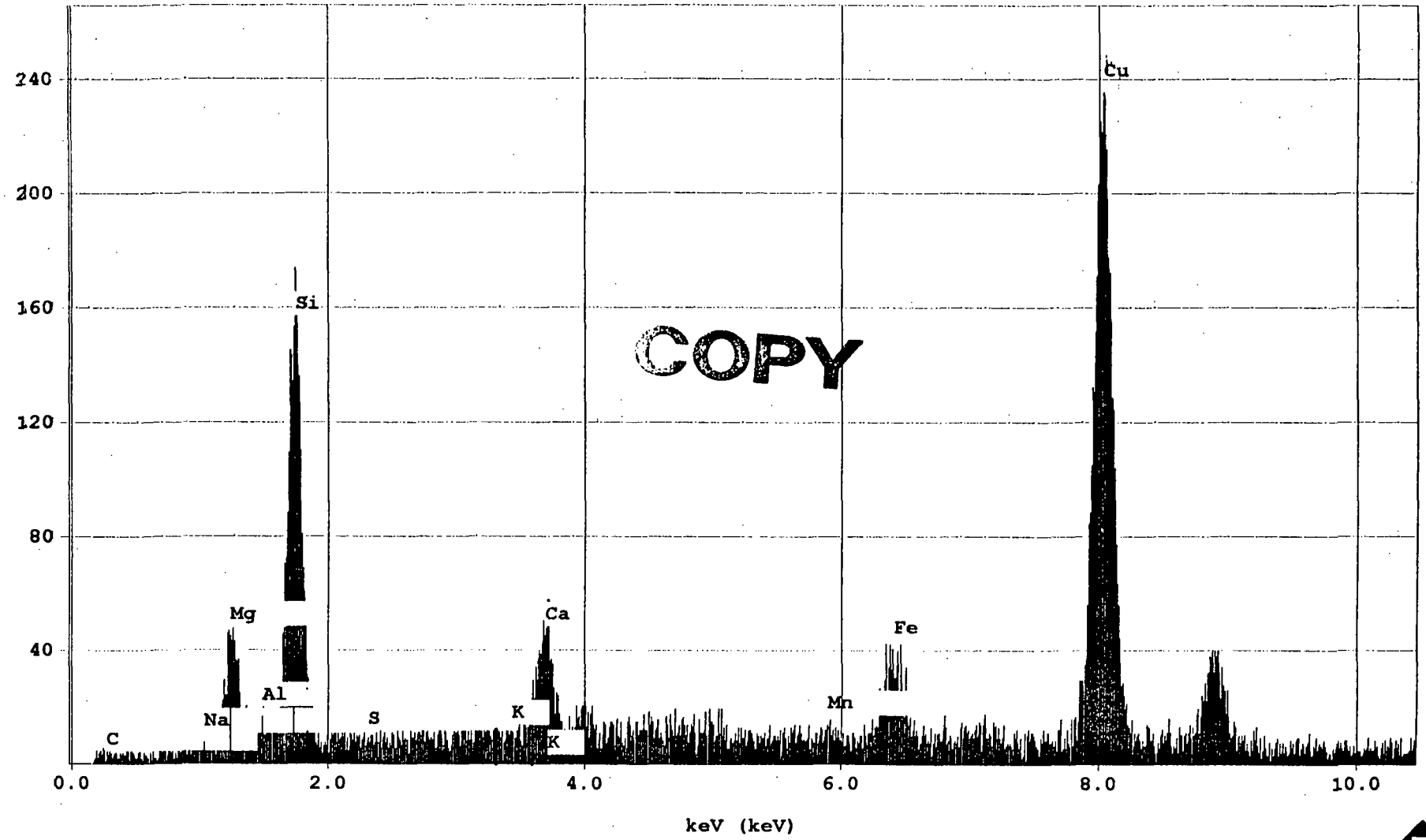

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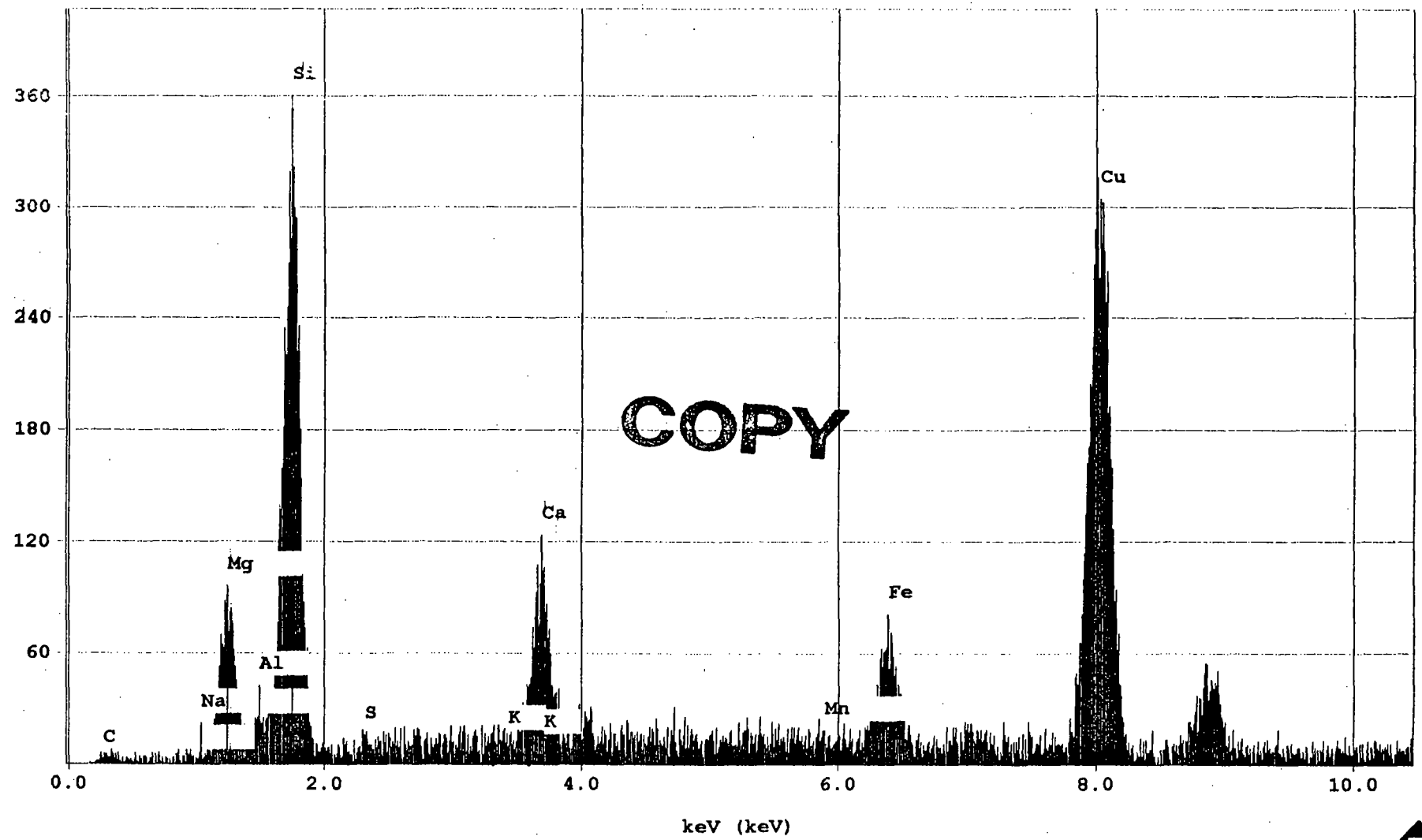
EMSL Analytical, Westmont, NJ

EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 13, 2001



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EMSL Analytical, Westmont, NJ

EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 13, 2001

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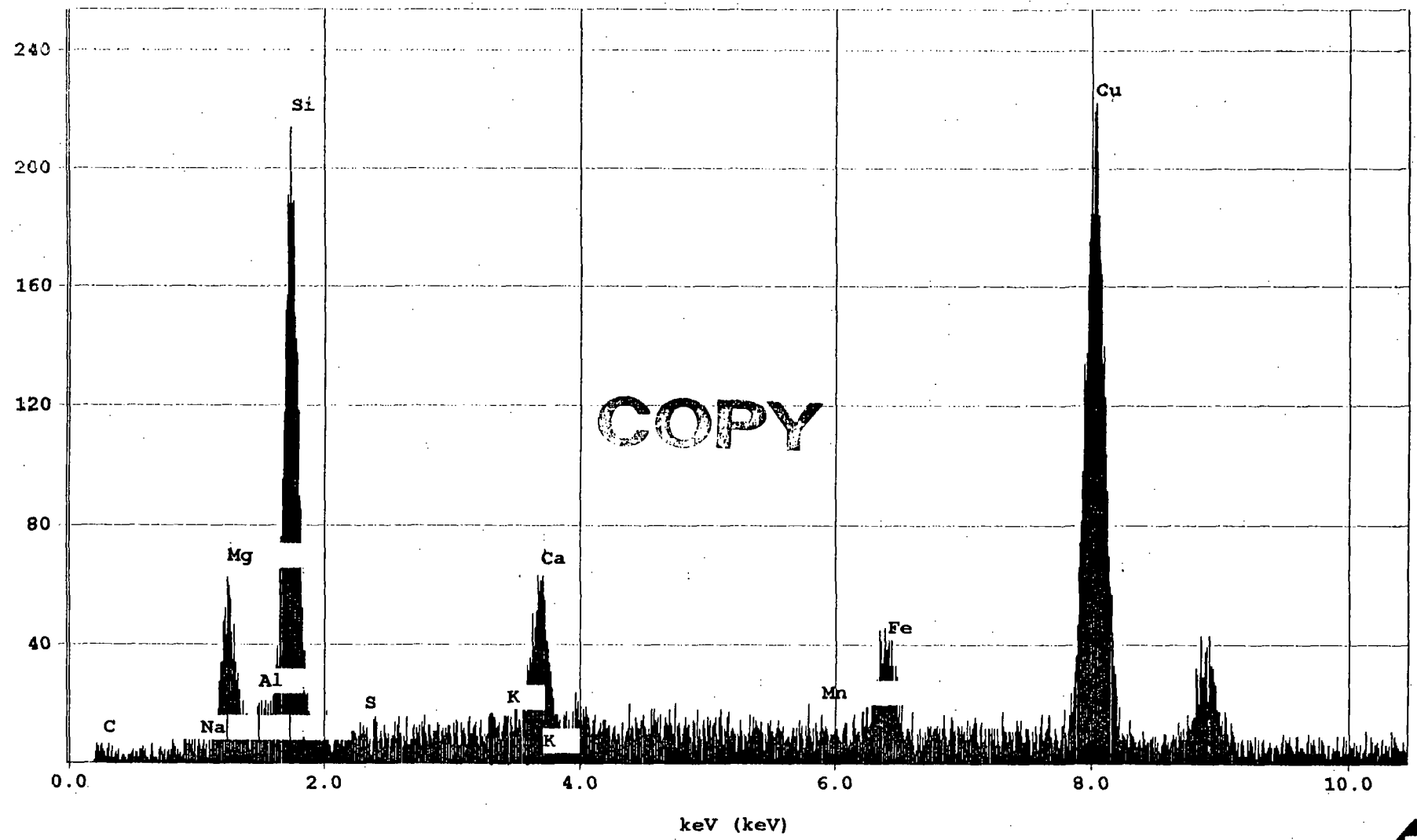

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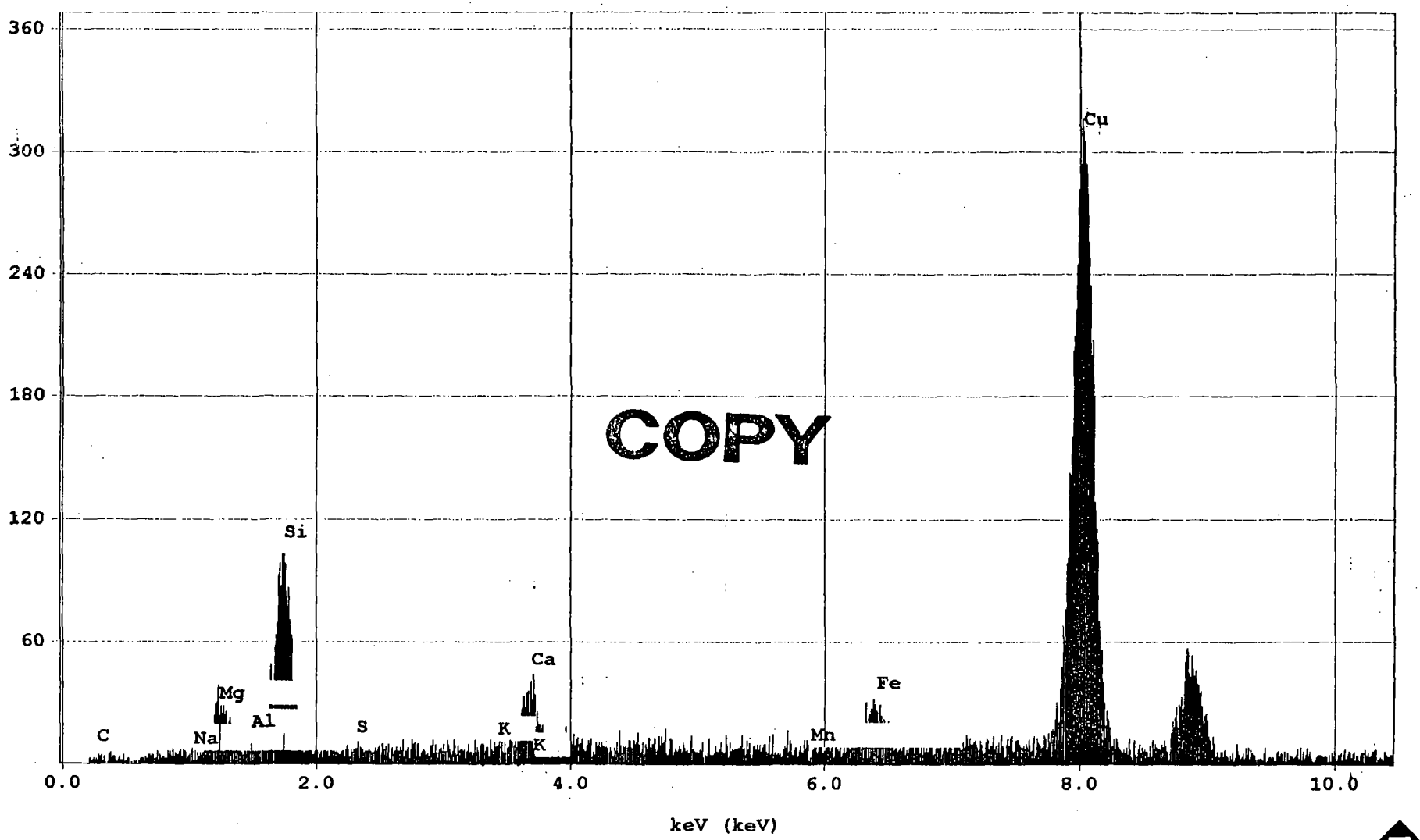
EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 18, 2001



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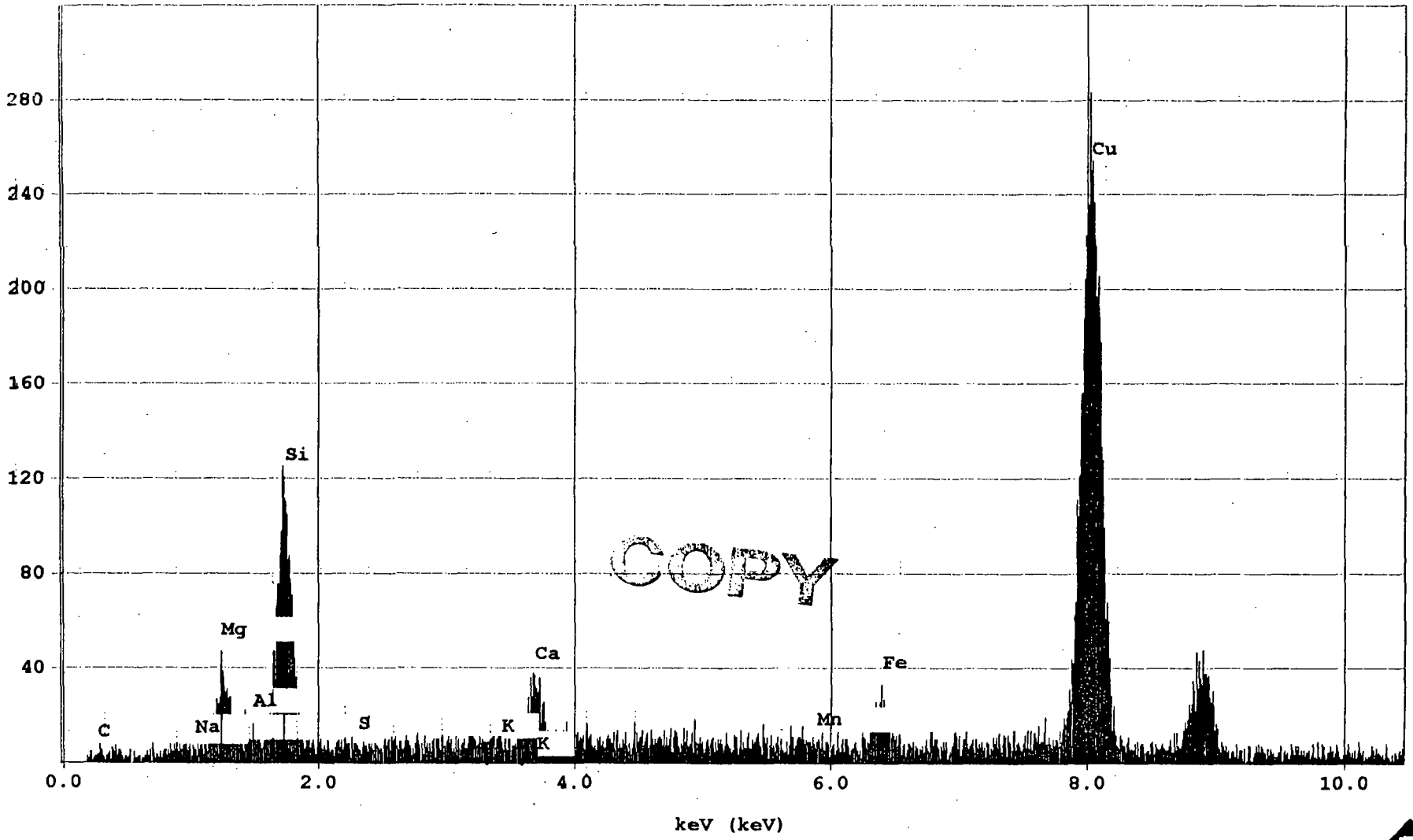
EMSL Analytical, Westmont, NJ

EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 13, 2001



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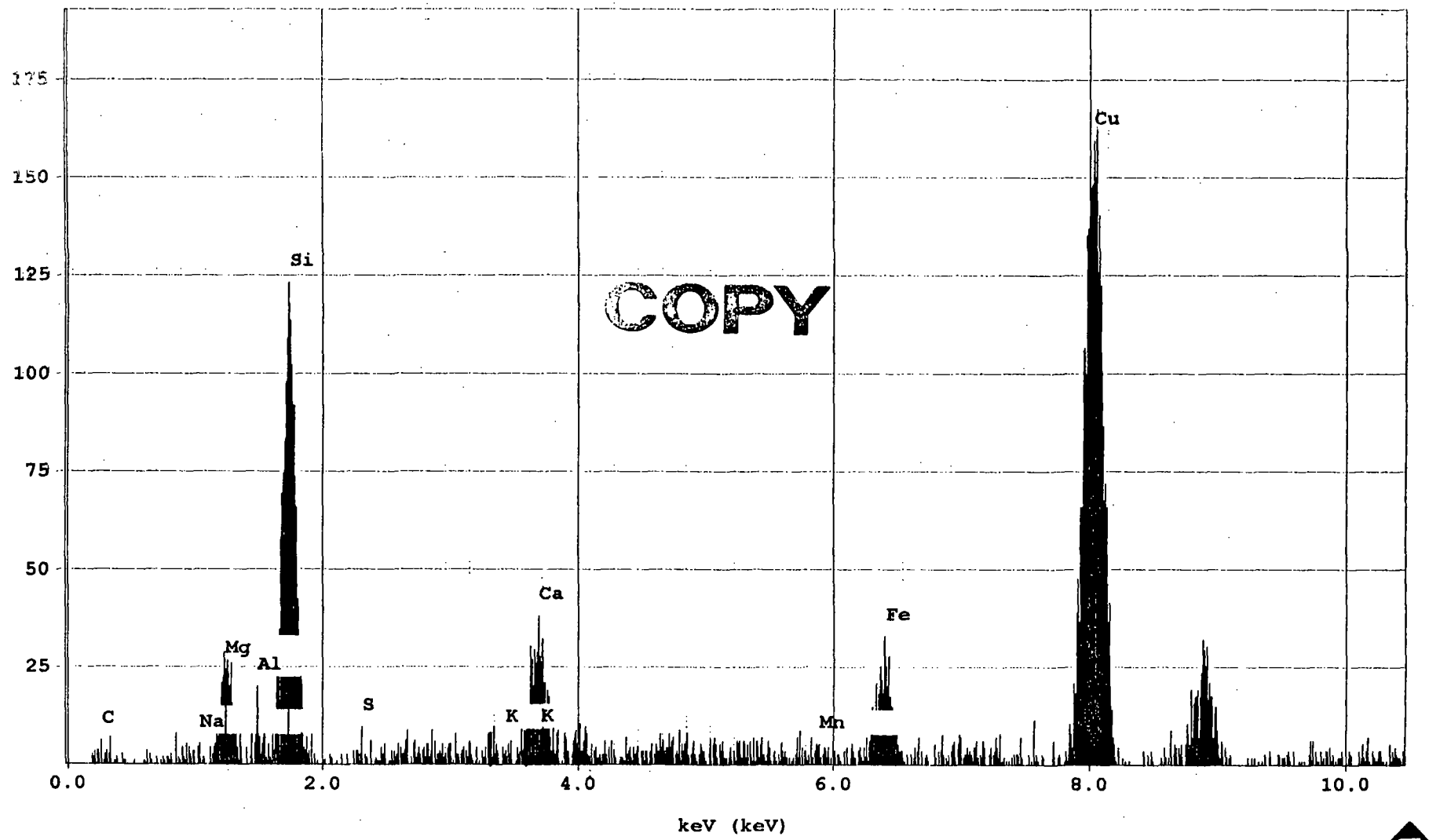
EMSL Analytical, Westmont, NJ

EPA_112849_WR-002-VO : Libby Amphibole

Thursday, September 18, 2001



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EMSL

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

USEPA REGION 8 - SITE INVESTIGATION
TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	385
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-003-V0
Sample Type (A=Air, D=Dust, O=Other):	D
Air volume (L) or dust area (cm2)	
Date received by lab	8-7-2001
Lab Job Number:	040112849
Lab Sample Number:	0003
Number of grids prepared	4
Prepared by	DS
Preparation date	9-10-2001

60 Min

Analyzed by	[illegible]
Analysis date	9-12-2001
Method (D=Direct, I=Indirect)	D
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C

Row H

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

	Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
				Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row H	1	I-6	F			2.5	0.25		LA							1
						8.5	0.35					NA	Si only			1
			MD10 / MF			3 / 3	0.8 / 0.3		LA							1
			MD10 / MF			8 / 4.9	6 / 0.6		LA							1
		F-8	MD21 / MF			8.5 / 6.8	8 / 0.4		LA							1
			MF			3.5	0.15		LA							1
			F			3.5	0.4		LA							1
			MD11 / MF			12 / 5.2	8 / 0.6		LA							1
			F			7.5	0.8		LA							1
			F			1.1	0.12		LA							1

COPY

LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile

ELUTRIATOR

USEPA REGION 8 SITE INVESTIGATION

TEM Asbestos Structure Count

LAB NAME: EMSL, Westmont, NJ

LAB SAMPLE NO: 0003

EPA SAMPLE NO: WR-003-V0 60 min.

SAMPLE TYPE: D

LAB JOB NUMBER: 0401 12849

GRID STORAGE LOC.: 2001 _ C Row H

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
1	F-8	MD21			18	8									
		MF			8.0	0.6		LA							1
		MF			4	0.5		LA							1
		MD20			12	10									
		MF			3	0.15		LA							1
		MF			2.5	0.5		LA							1
		MD22			20	10									
		MF			10	0.6		LA							1
		MF			13.2	1.0		LA							1
		F			16	1.0		LA							1
2	G-7	MD11			20	10									
		MF			7.5	1.0		LA							1
		MD10			4.6	3									
		MF			4	0.5		LA							1
		MD10			20	10									
		MF			4	0.7		LA							1
		MD11			9	0.5									
		MF			9	0.1		LA							1
		MD11			20	4.5									
		MF			19	2		LA							1

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EMSL Analytical, Westmont, NJ

CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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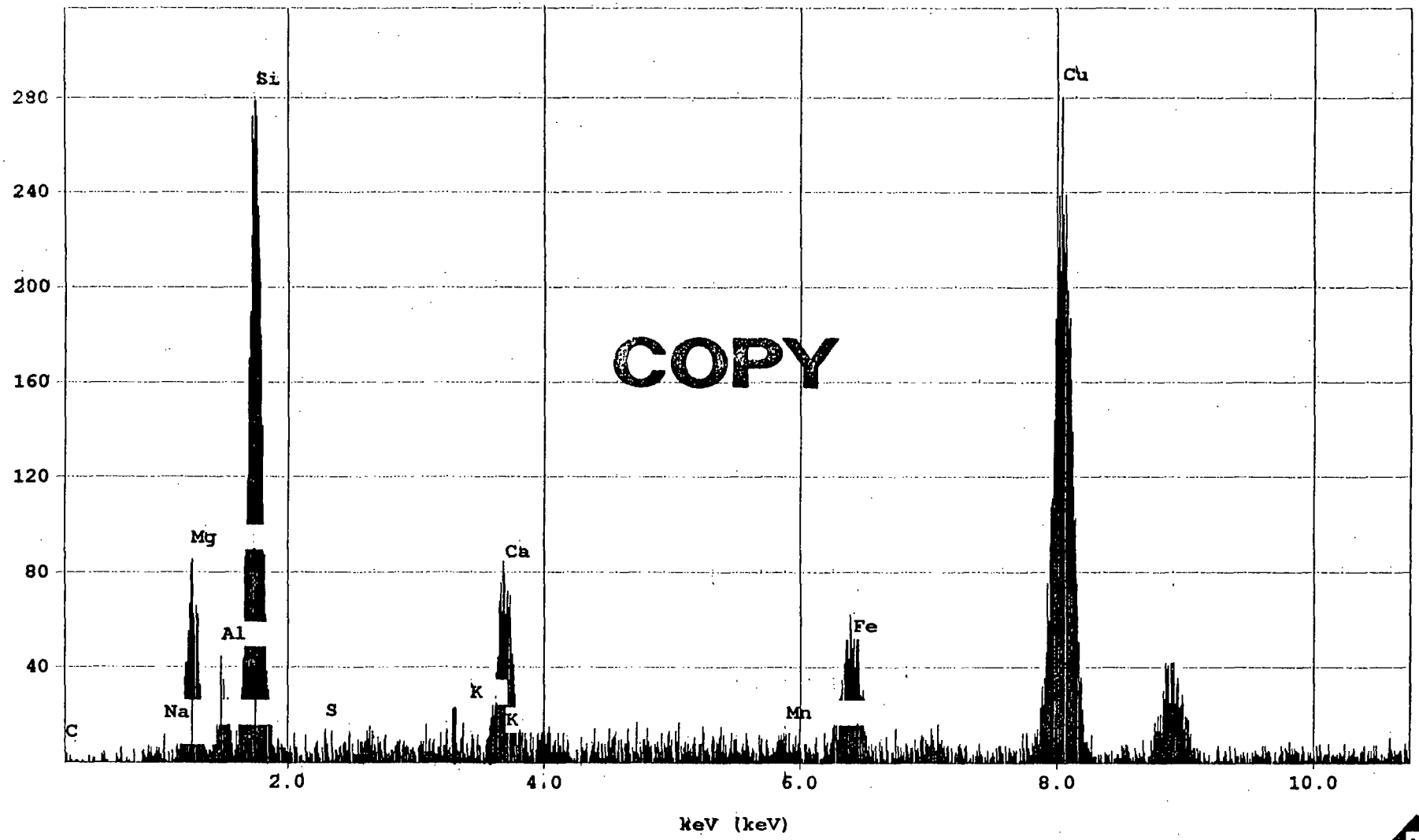

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CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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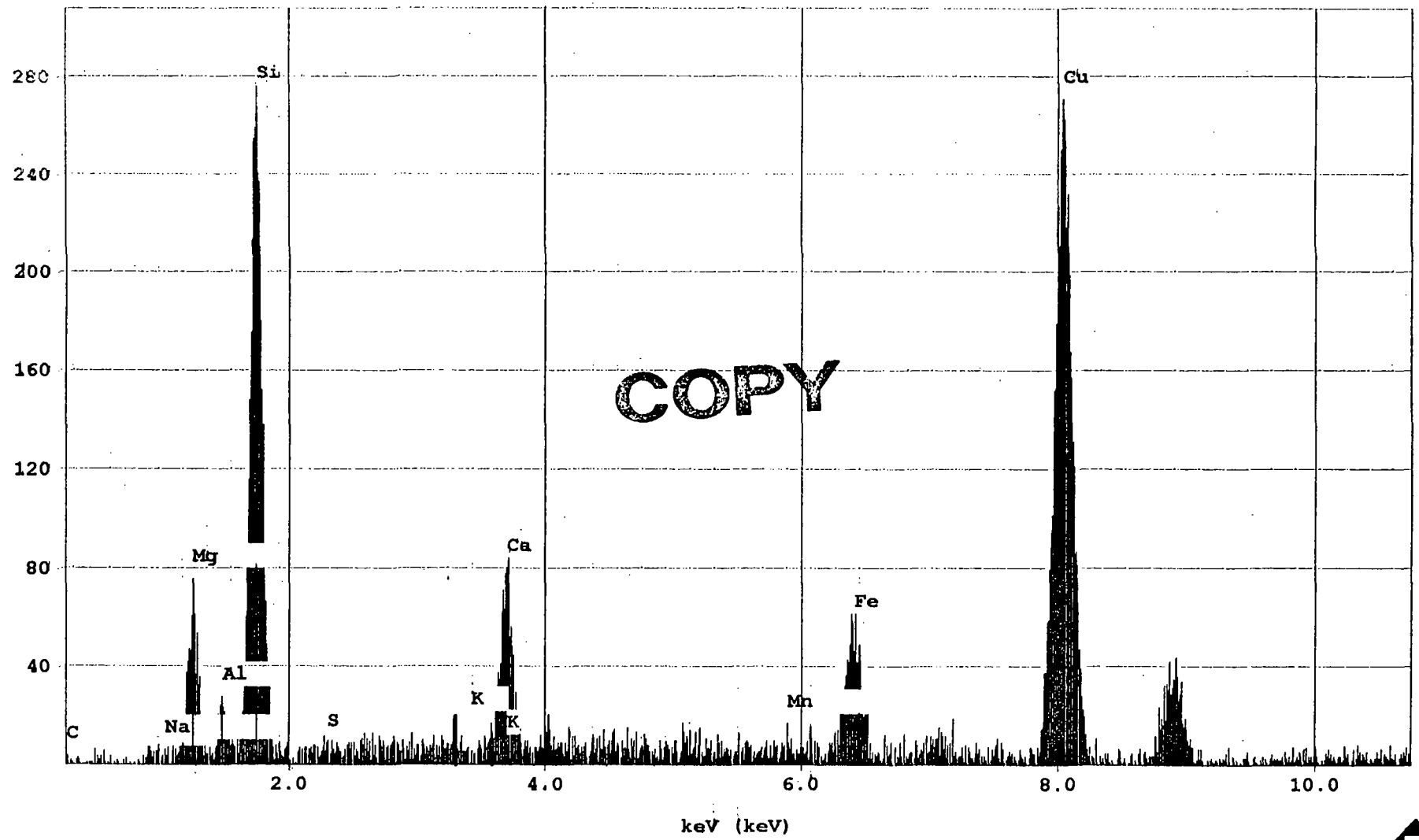

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CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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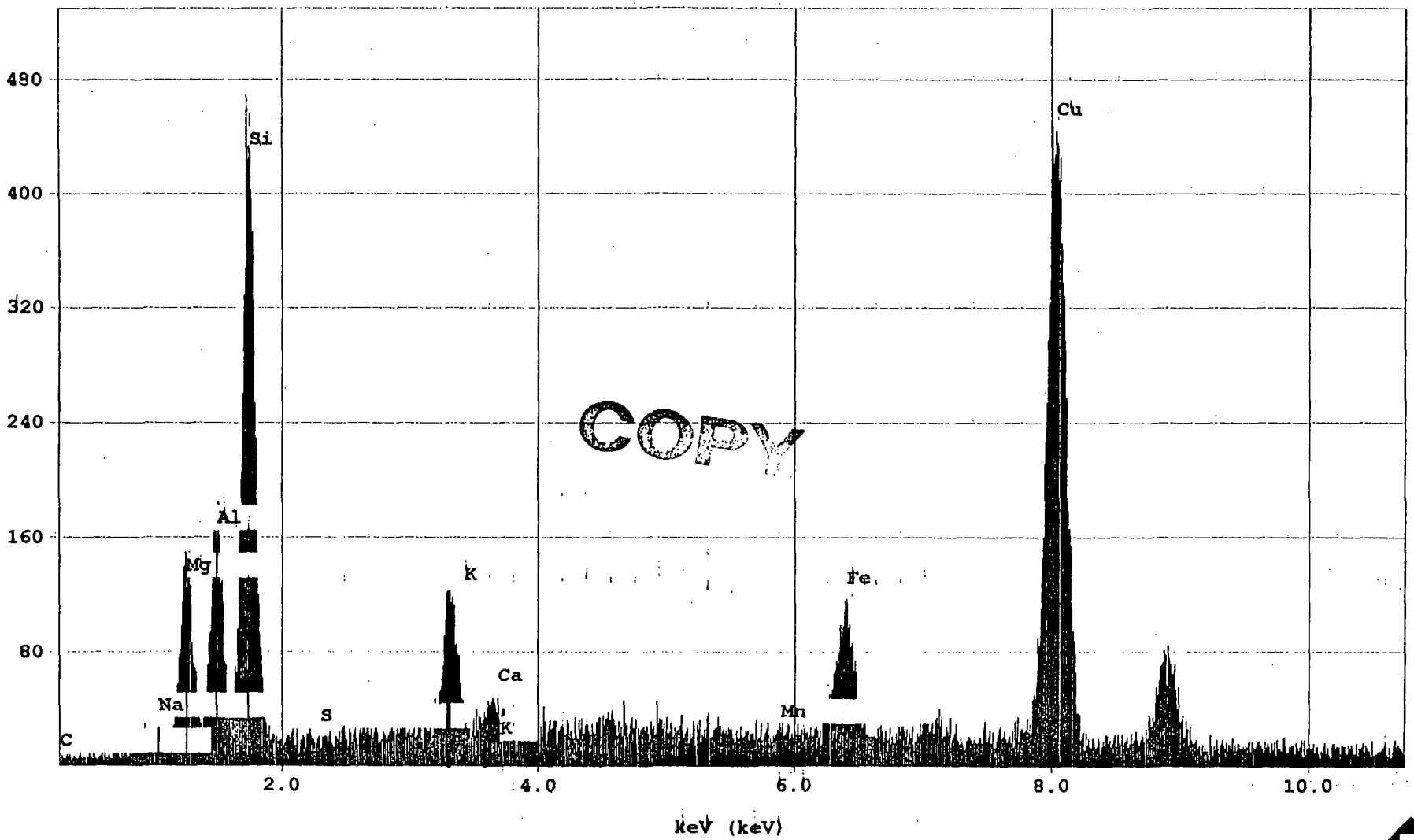

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CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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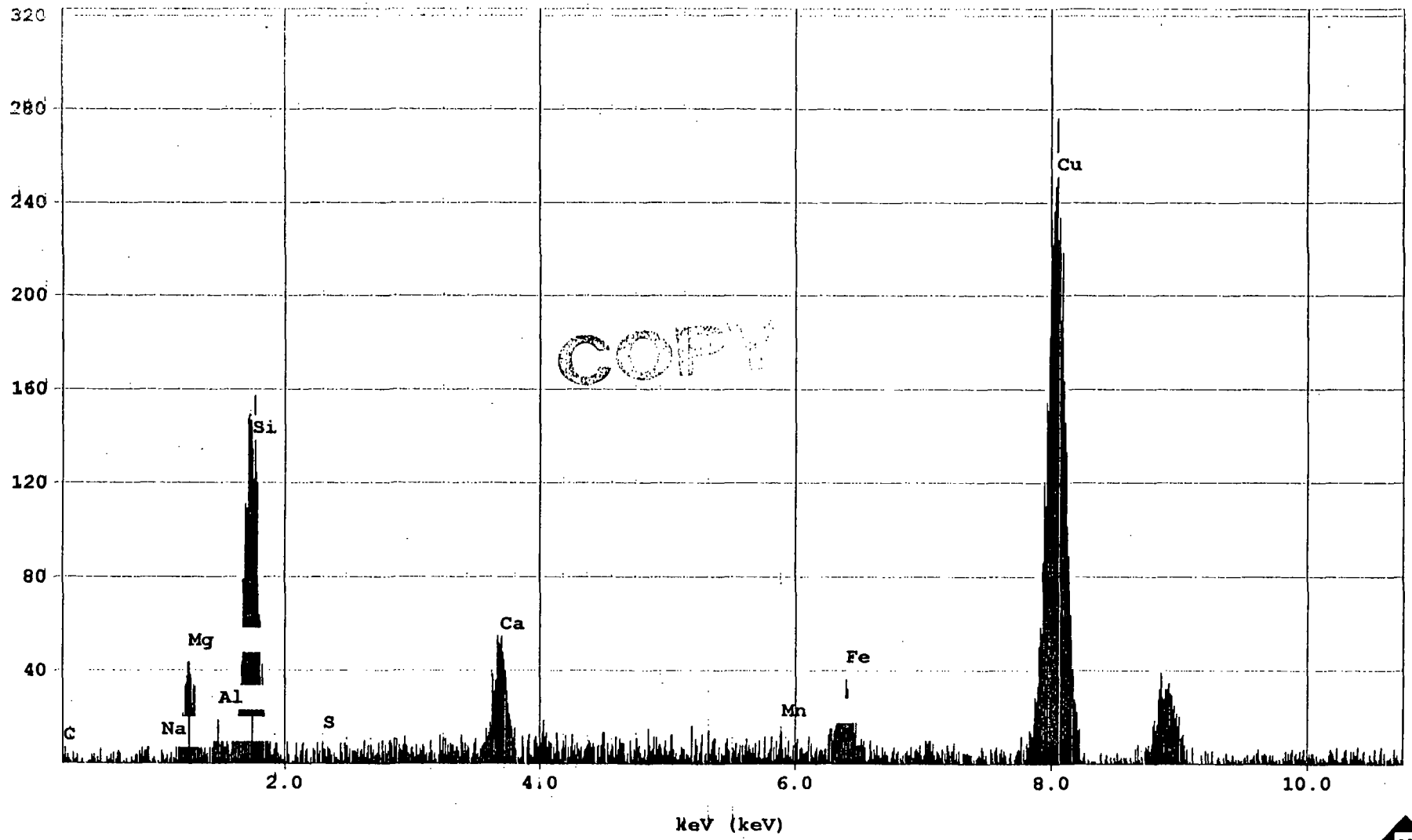

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CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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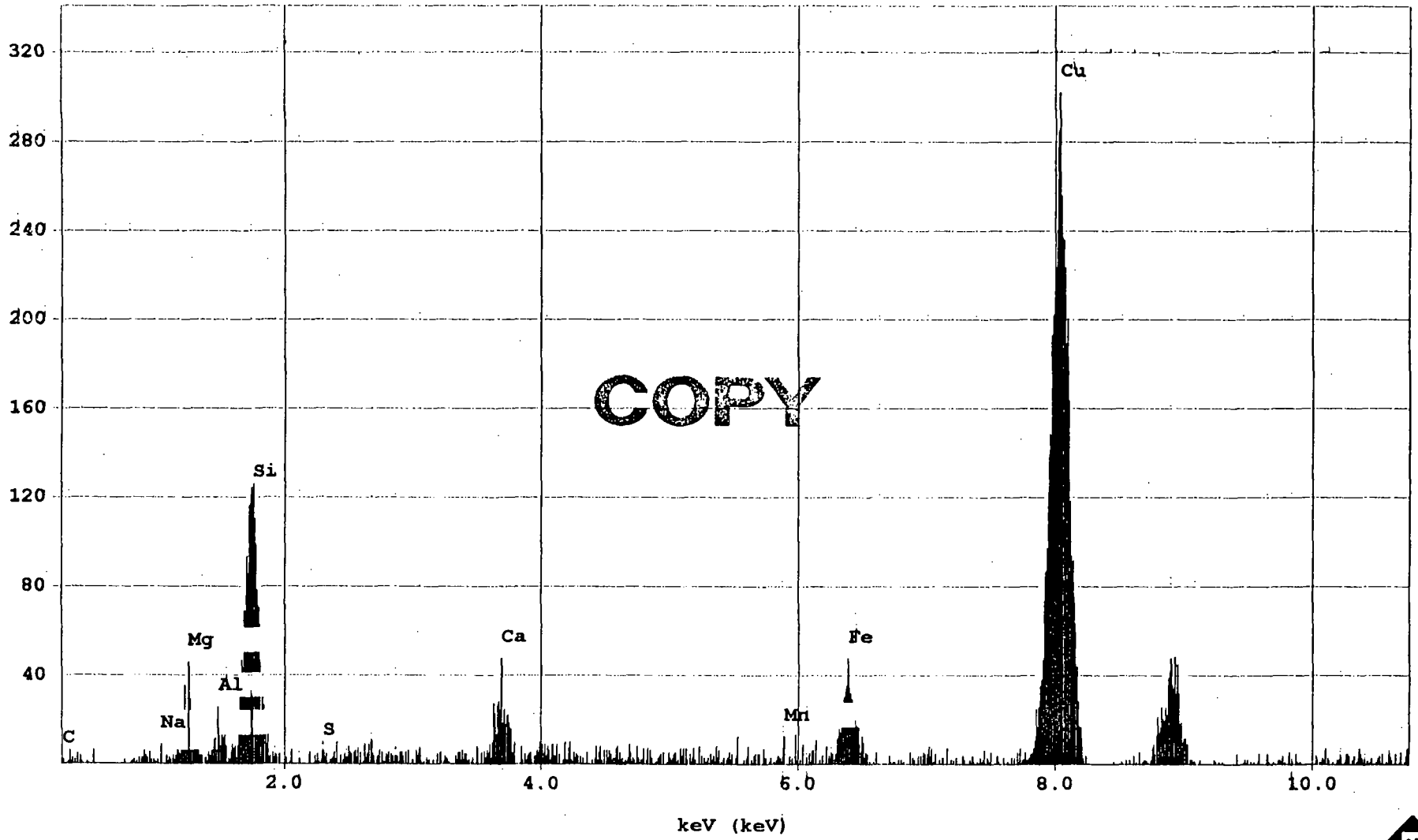

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CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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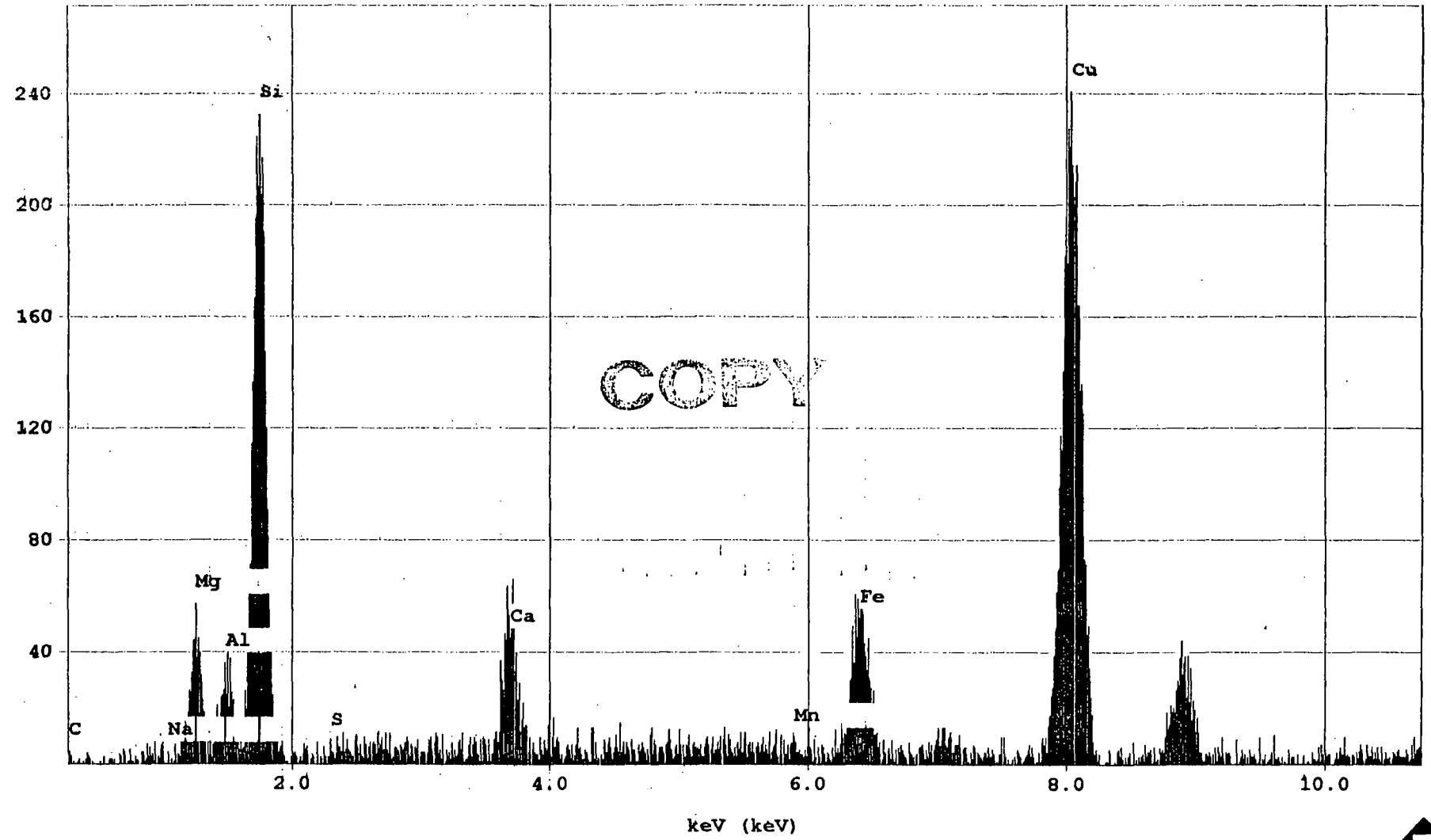

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EMSL Analytical, Westmont, NJ

CDM 112849 WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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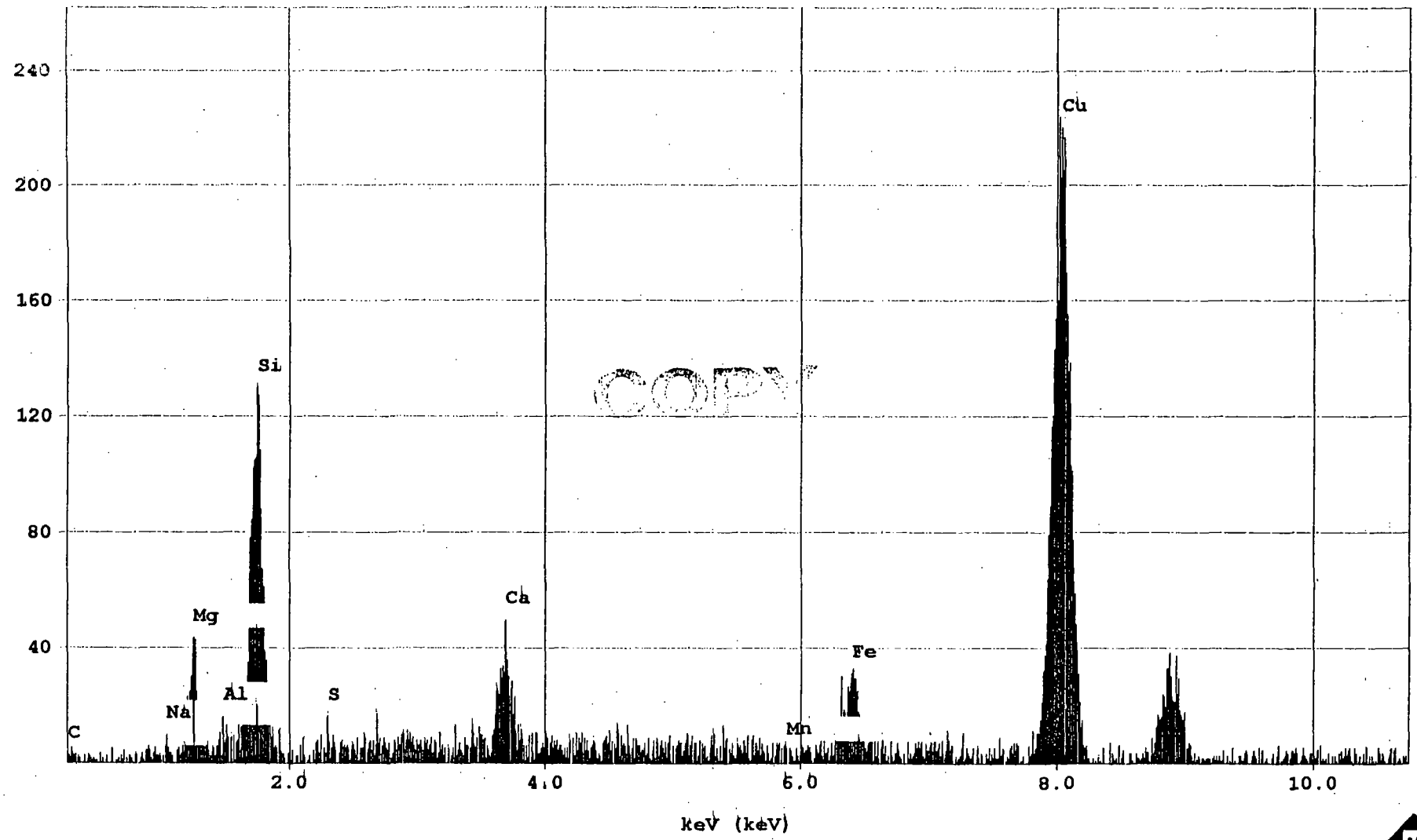

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CDM_112849_WR-003-VO : Libby Amphibole

Wednesday, September 12, 2001

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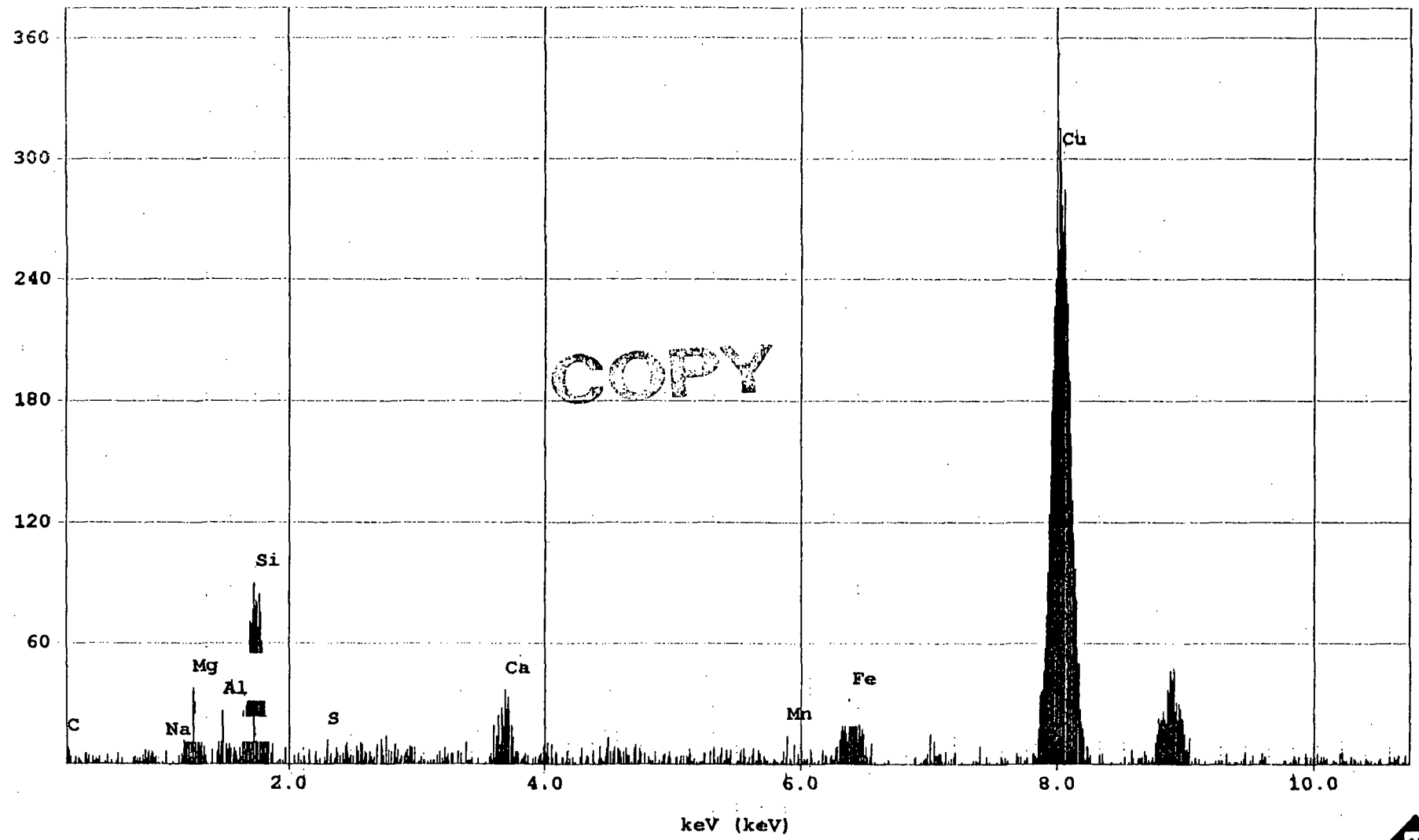

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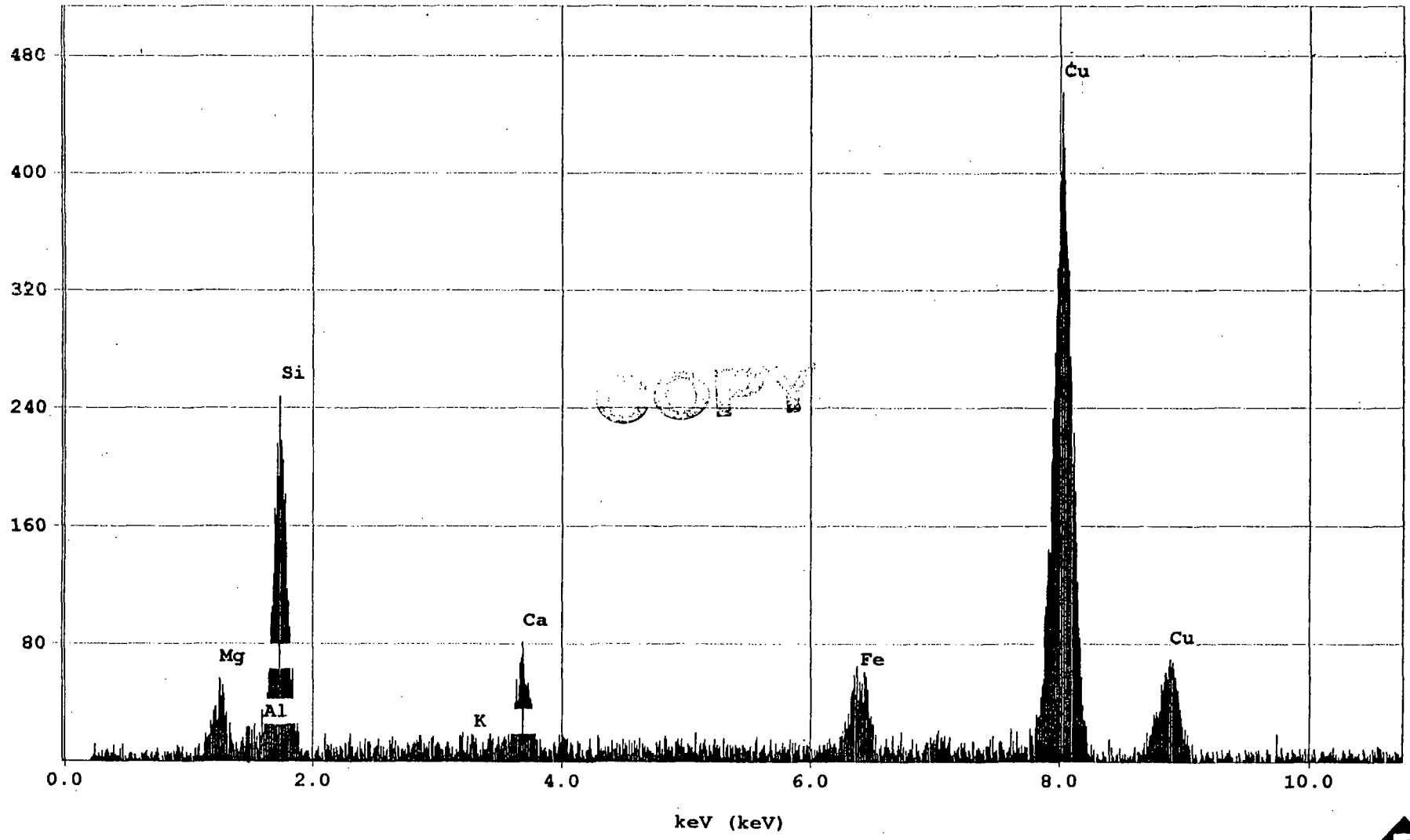
EMSL Analytical, Westmont, NJ

EPA_112849_WR-004-VO: Libby Amphibole

Tuesday, September 18, 2001



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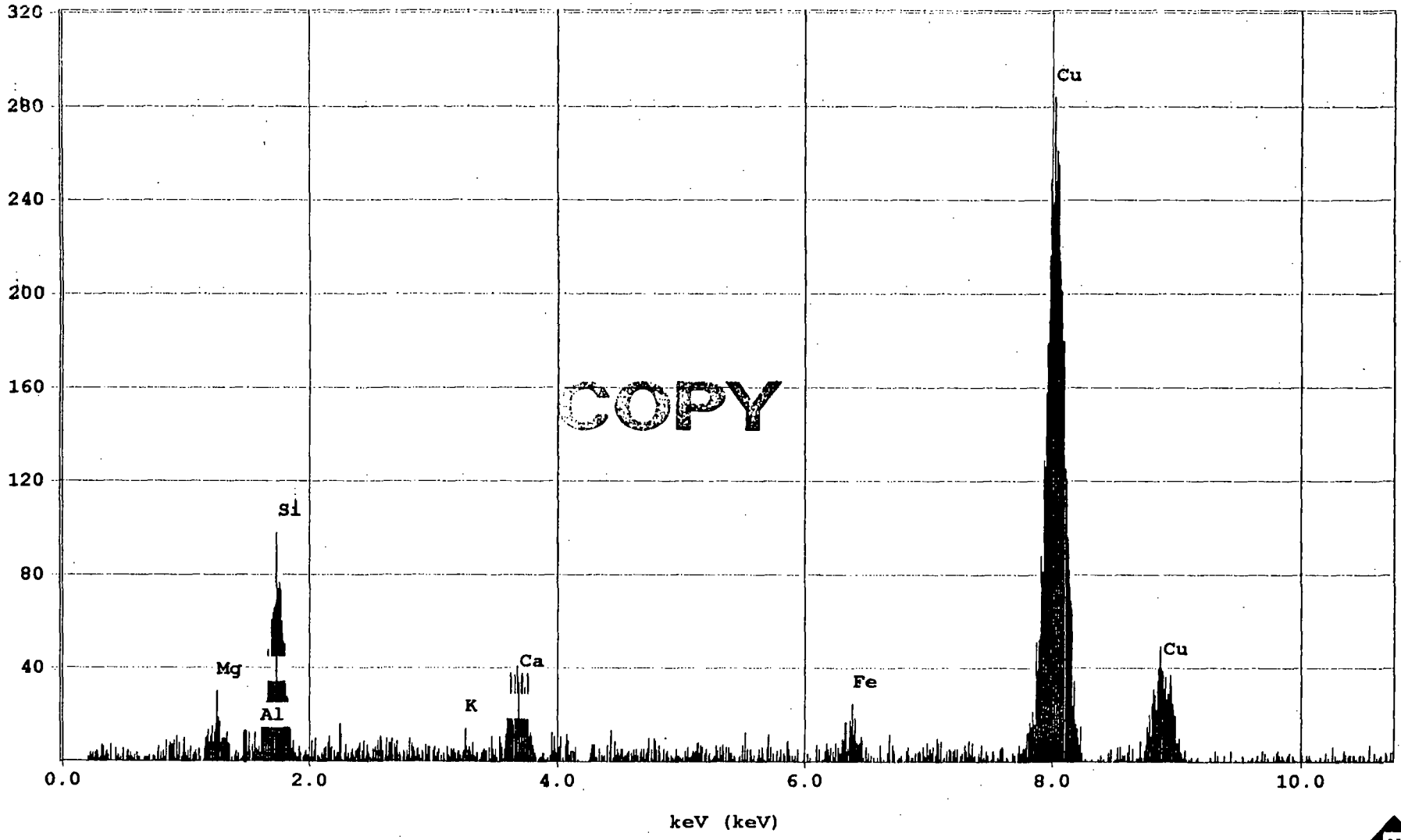
EMSL Analytical, Westmont, NJ

EPA_112849_WR-004-VO: Libby Amphibole

Tuesday, September 18, 2001



COPY

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

USEPA REGION 8 SITE INVESTIGATION
TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-005-V0 66 min
Sample Type (A=Air, D=Dust, O=Other):	D
Air volume (L) or dust area (cm2)	
Date received by lab	8-7-2001
Lab Job Number:	040112849
Lab Sample Number:	000
Number of grids prepared	4
Prepared by	DS
Preparation date	9-10-2001

Analyzed by	
Analysis date	
Method (D=Direct, I=Indirect)	
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C Row Q

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row Q 1															

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LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile

Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

USEPA REGION 8 SITE INVESTIGATION
TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ	EPA Sample Number:	WR-005-V0 10 min	Analyzed by	AJ
Instrument	JEOL 100 CX II (2)	Sample Type (A=Air, D=Dust, O=Other):	D	Analysis date	9-18-2001
Voltage	100 KV	Air volume (L) or dust area (cm2)		Method (D=Direct, I=Indirect)	
Magnification	19000 X	Date received by lab	8-7-2001	Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid opening area (mm2)	0.0061	Lab Job Number:	040112849	Grid storage location	2001_C Row P
Scale: 1L =	1	Lab Sample Number:	0005	*Secondary Prep*	
Scale: 1D =	1	Number of grids prepared	4	Fraction of primary filter used:	
Primary filter area (mm2)	385	Prepared by	DS	Total resuspension volume (mL)	
Secondary Filter Area (mm2)		Preparation date	9-10-2001	Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row F 1	G-6	F			4.0	0.3		LA							
	I-8	ND			7.5	1.0					NA	Al, Si, Fe			1
		F			7.0	0.6		LA							1
	C-8	F			2	0.5		LA							1
	F-12	F			4.25	0.4		LA							1
		F			3.6	0.8		LA							1
					7.0	0.5					NA	Mg, Al, Si, Ca, Fe			1
					8.0	1.0					NA	Mg, Al, Si, Ca, Fe			1
	K-12	ND													
2	L-14	ND													

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LA = Libby-type amphibole OA = Other (non-Libby type) amphibole

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

LAB NAME: EMSL Westmont NJ

LAB SAMPLE NO: 0005

EPA SAMPLE NO: WR-005-V0 10 Min.

SAMPLE TYPE: D

LAB JOB NUMBER: 040112849

GRID STORAGE LOC.: 2001 C Row P

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row P 1	D-5	ND													
	H-3				5.5	1.25					NA	Mg, Al, Si, Ca, Fe			1
	K-6				5.3	0.3					NA	Al, Si, Ti, Fe			1
	J-8	ND													

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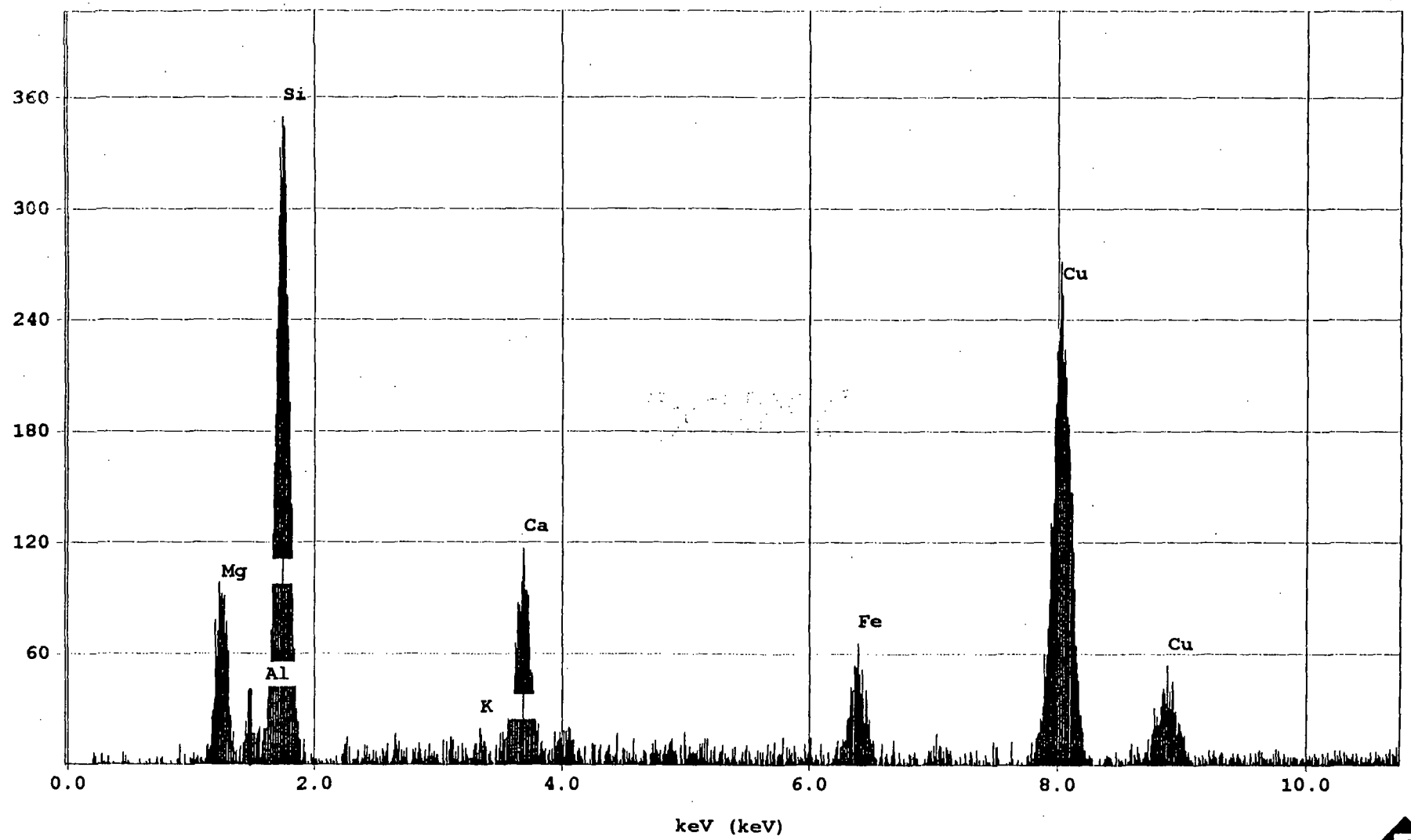
EMSL Analytical, Westmont, NJ

EPA_112849_WR-005-VO: Libby Amphibole

Tuesday, September 18, 2001



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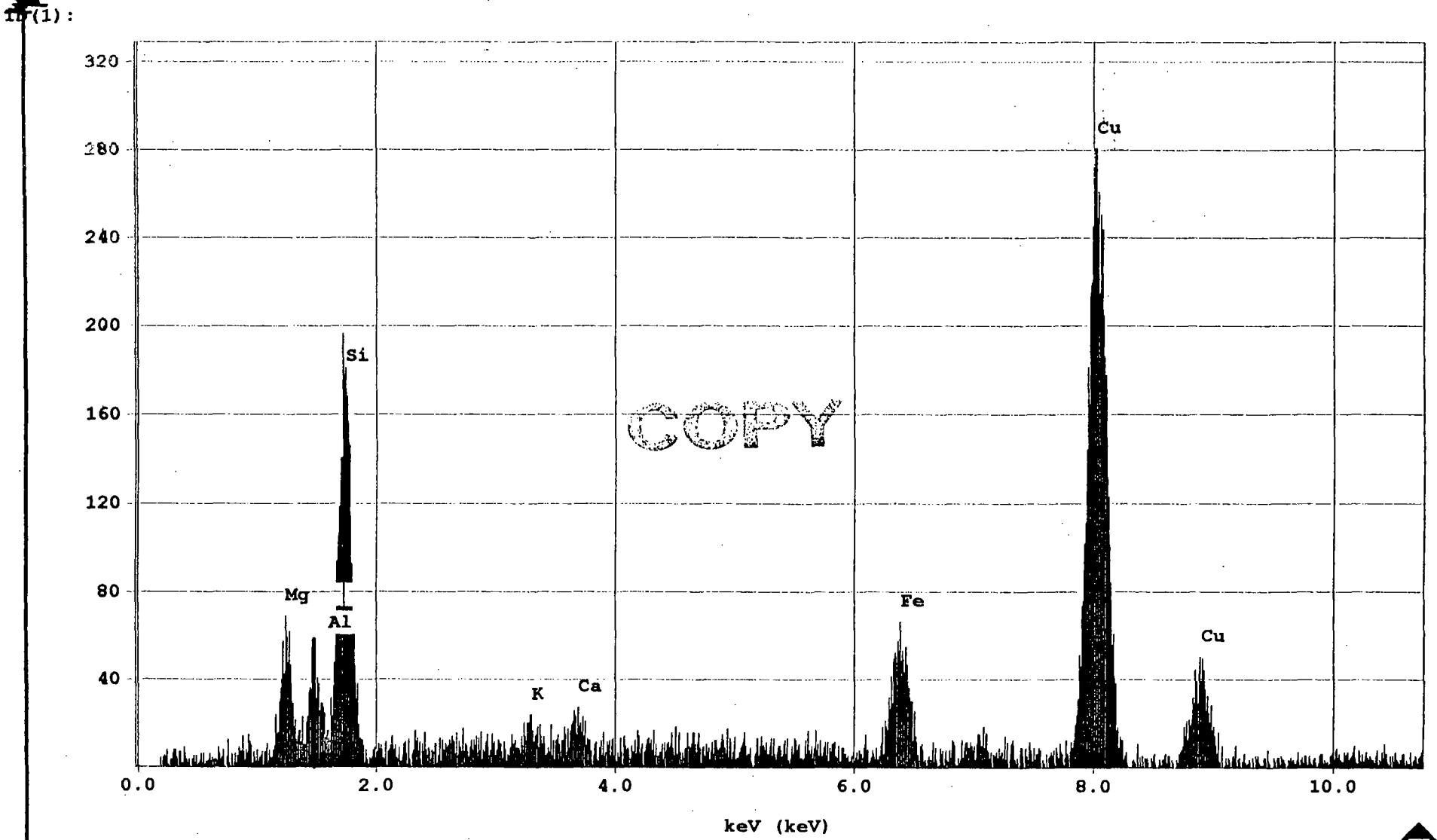
EPA_112849_WR-005-V0: Libby Amphibole

Tuesday, September 18, 2001



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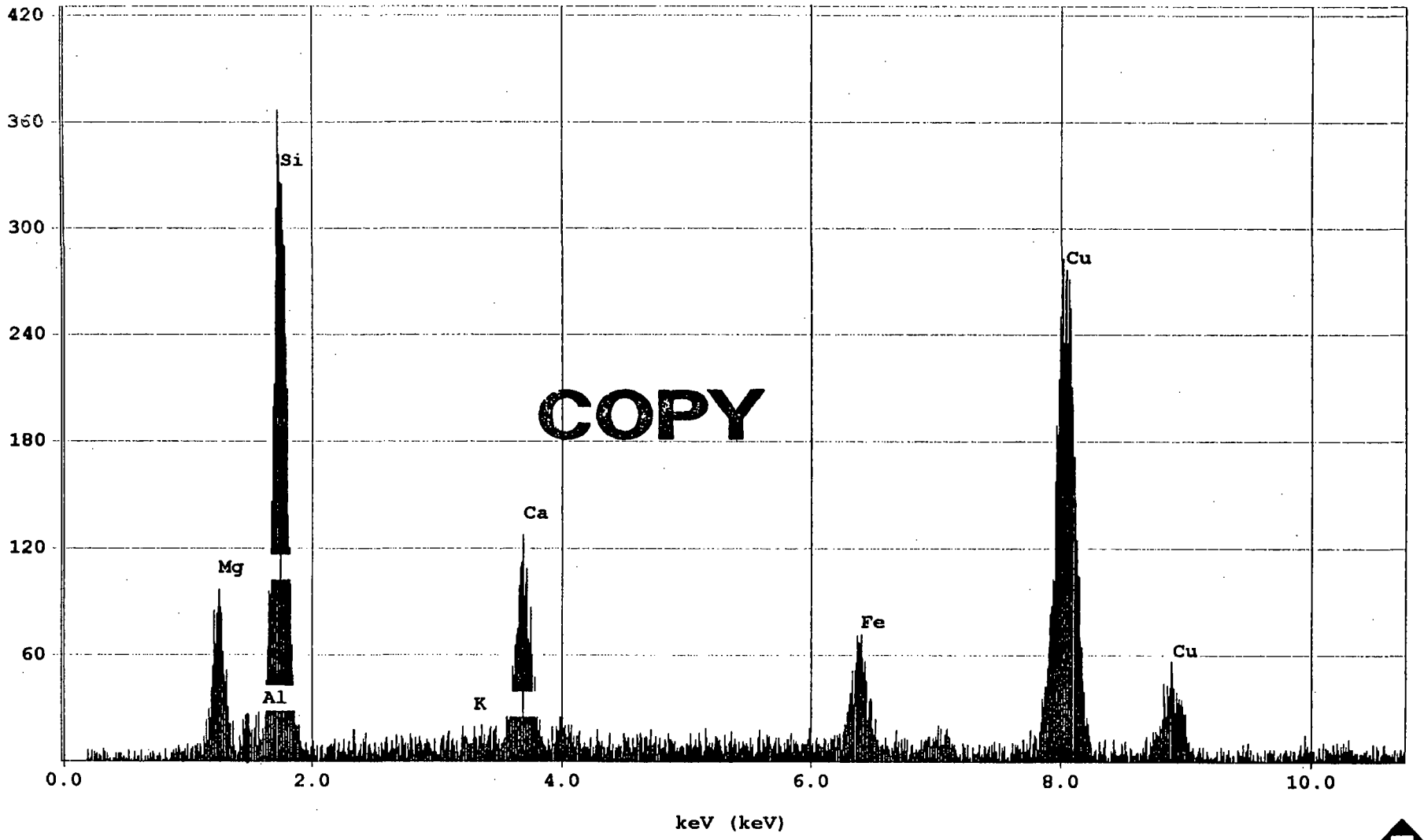
EMSL Analytical, Westmont, NJ

EPA_112849_WR-005-VO: Libby Amphibole

Tuesday, September 18, 2001



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U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

USEPA REGION 8 SITE INVESTIGATION
TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-006-V0 60 min
Sample Type (A=Air, D=Dust, O=Other):	D
Air volume (L) or dust area (cm2)	
Date received by lab	8-7-2001
Lab Job Number:	040112849
Lab Sample Number:	0006
Number of grids prepared	4
Prepared by	DS
Preparation date	9-10-2001

Analyzed by	[illegible]
Analysis date	9-18-2001
Method (D=Direct, I=Indirect)	
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C Row R

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures Primary	No. of Structures Total	Dimensions Length	Dimensions Width	Identification	Mineral Class (see below) LA	OA	C	NA	Sketch/Comments	1 = yes, blank = no Sketch	Photo	EDS
Row R 1	D-8				11	2.5					NA	Mg, Al, Si, K, Ca, Fe			1
		F			5.5	0.5		LA							1
		MD10 / MF			11 / 4.0	8 / 0.3		LA							1
	G-9	MD11 / MF			14 / 7.0	9.5 / 0.6		LA							1
		F			2.5	0.3		LA							1
	I-7				6.0	0.5					NA				
		F			5.5	0.3		LA							1
					7.0	0.35					NA	Mg, Si, Fe			1
	M-6	MD11 / MF			18 / 12.0	7 / 0.4		LA							1
	K-13	ND													

LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

LAB NAME: EMSL, Westmont, NJ

LAB SAMPLE NO: 0006

EPA SAMPLE NO: WR-006-V0 60 min.

SAMPLE TYPE: D

LAB JOB NUMBER: 040112849

GRID STORAGE LOC.: 2001 C Row R

Row R

Grid	Grid Opening	Structure Type	No. of Structures Primary	No. of Structures Total	Dimensions Length	Dimensions Width	Identification	Mineral Class LA	Mineral Class OA	Mineral Class C	Mineral Class NA	Sketch/Comments	1 = yes, blank = no Sketch	Photo	EDS
2	N-5	F			2.8	0.4		LA							1
	~~L-9~~				10	2					NA	Mg, Si, Ca, Fe			1
	J-9				8.0	0.25					NA				1
		MD II			24	5									
		MF			18	0.9		LA							1
					35	3.5					NA	Mg, Al, Si, Ca, Fe			1
	C-9														
	D-6				5.5	0.7		LA							1
		MD II			13.5	4.5									
	F-12	MF			13.0	0.5		LA							1

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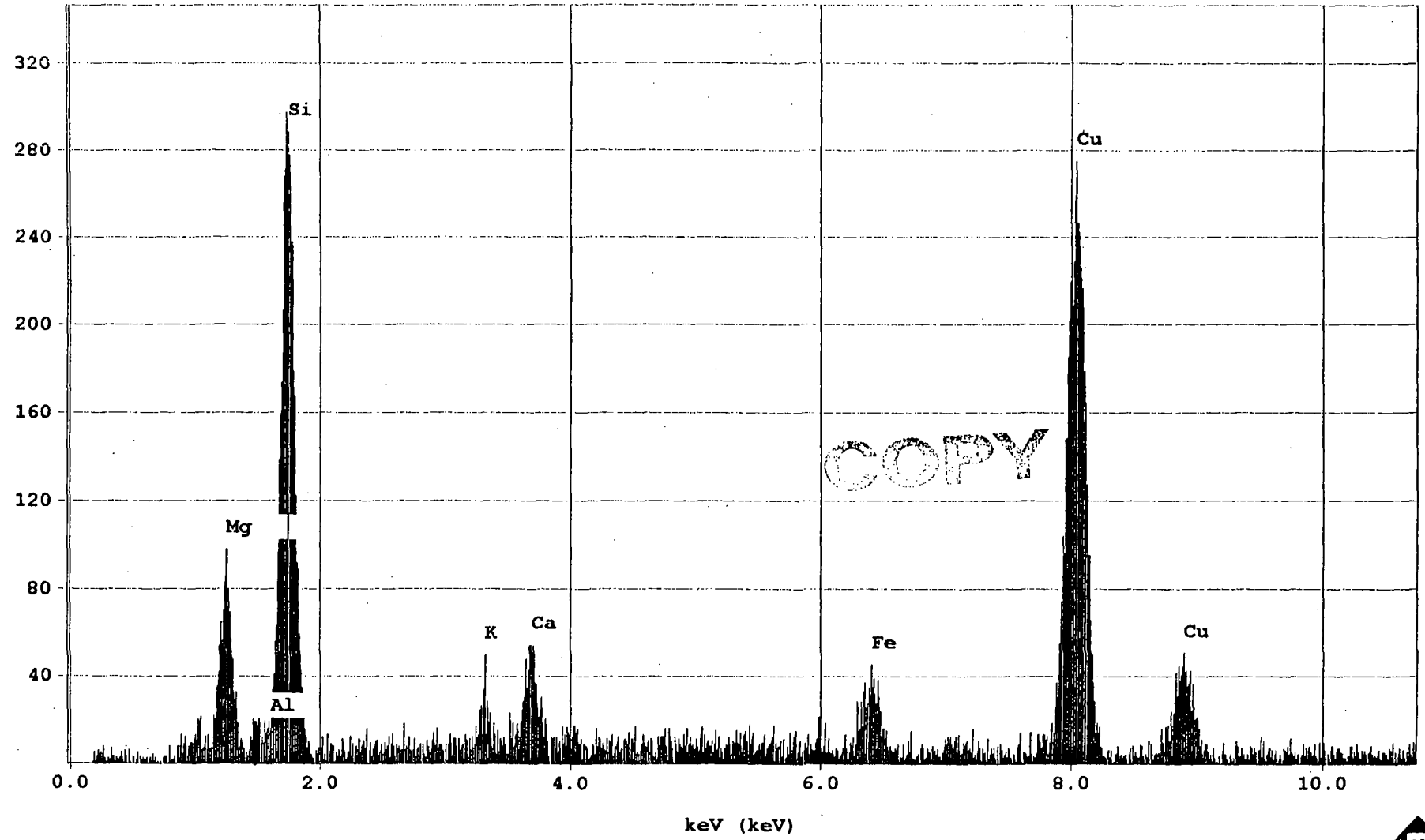
EPA_112849_WR-006-VO: Libby Amphibole

Tuesday, September 18, 2001



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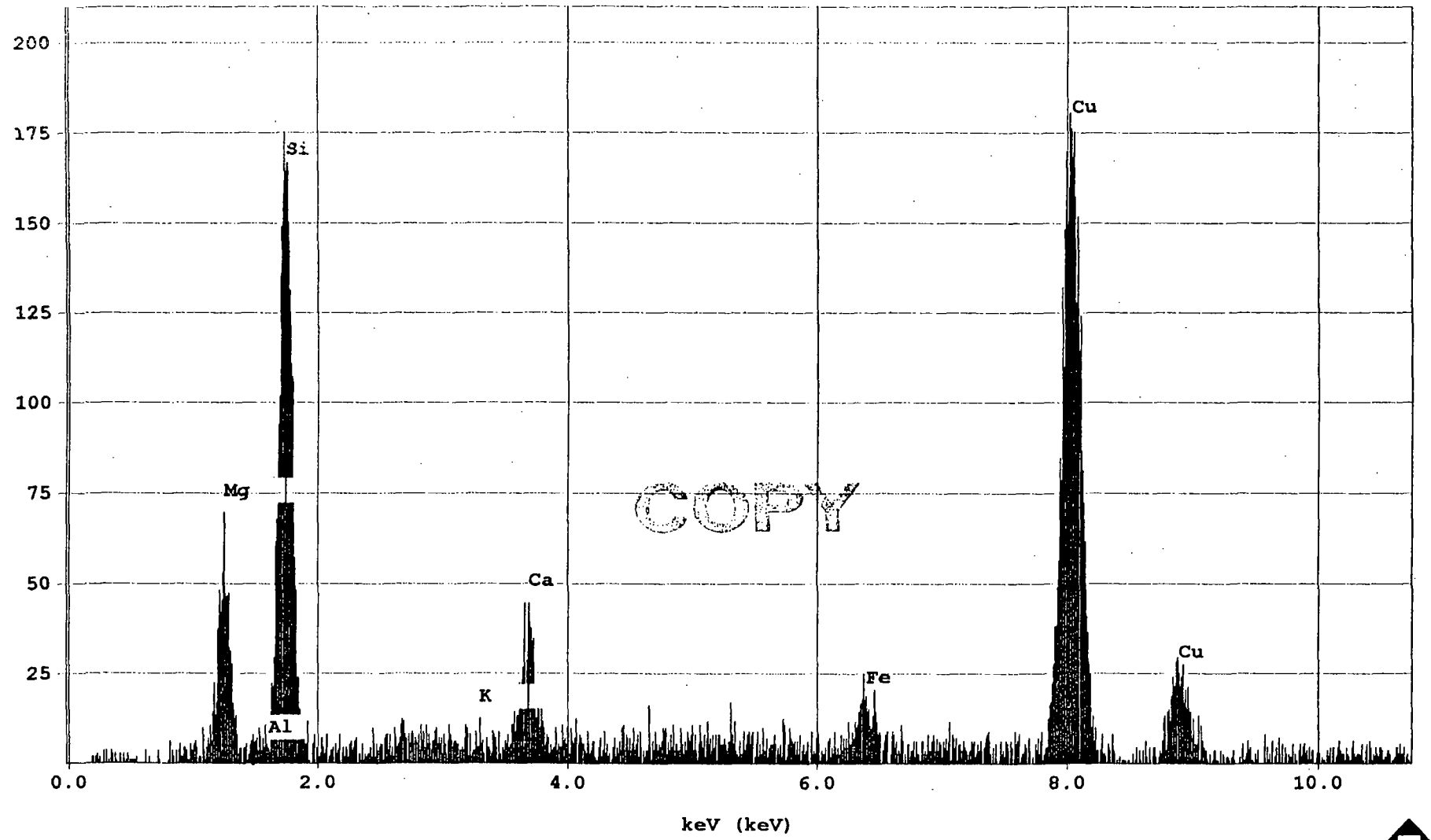
EPA_112849_WR-006-VO: Libby Amphibole

Tuesday, September 18, 2001



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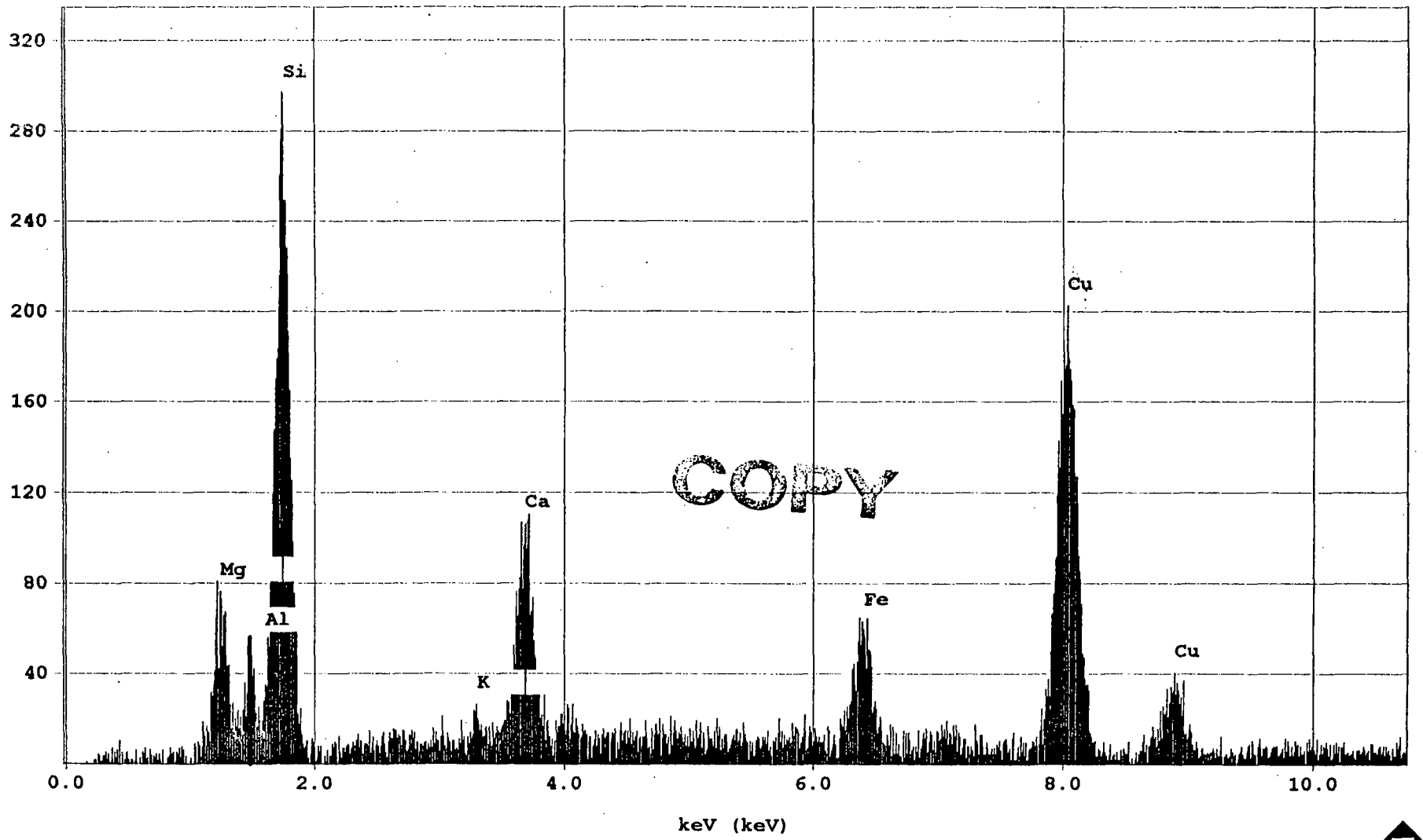
EPA_112849_WR-006-VO: Libby Amphibole

Tuesday, September 18, 2001



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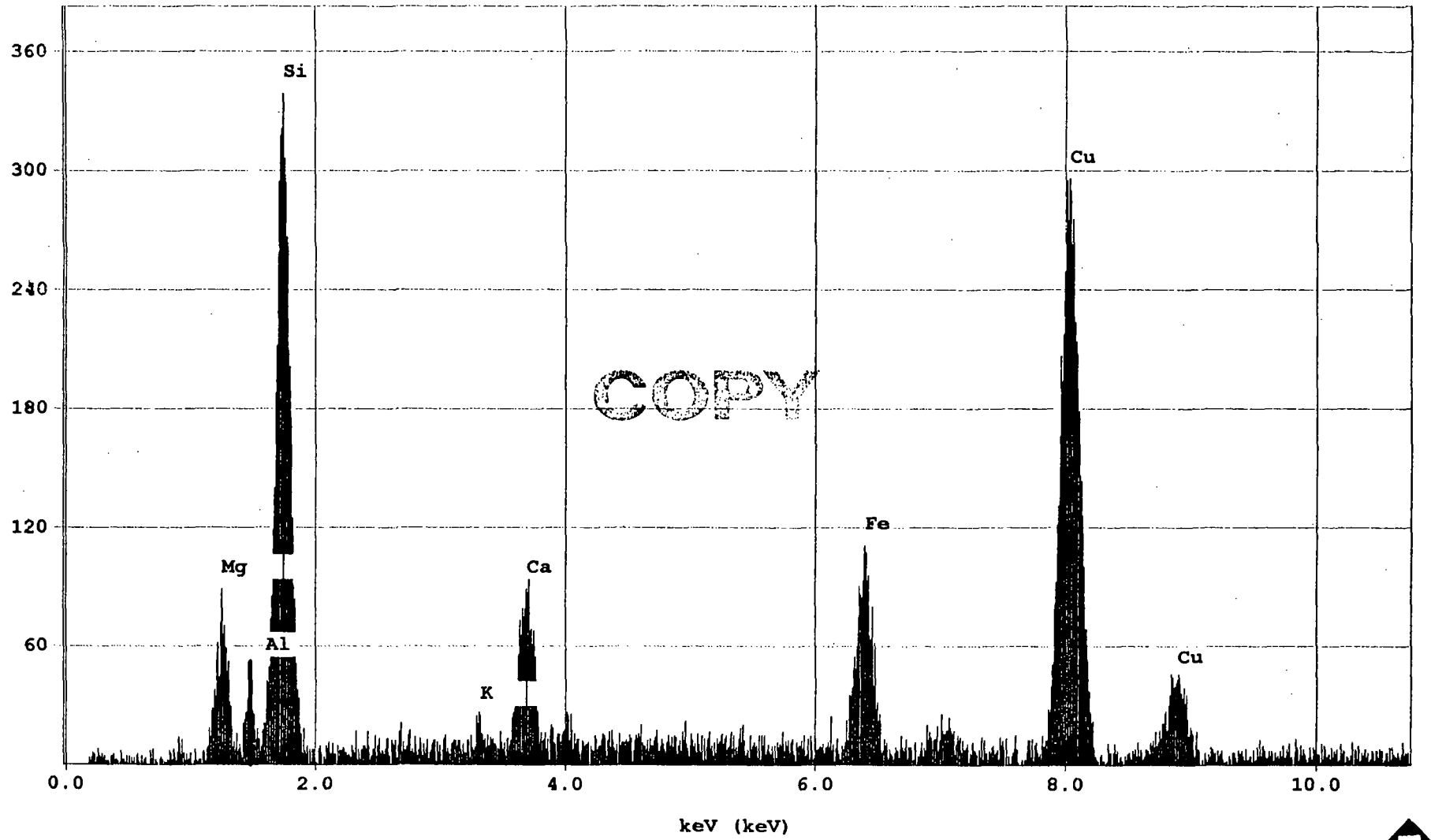
EPA_112849_WR-006-VO: Libby Amphibole

Tuesday, September 18, 2001



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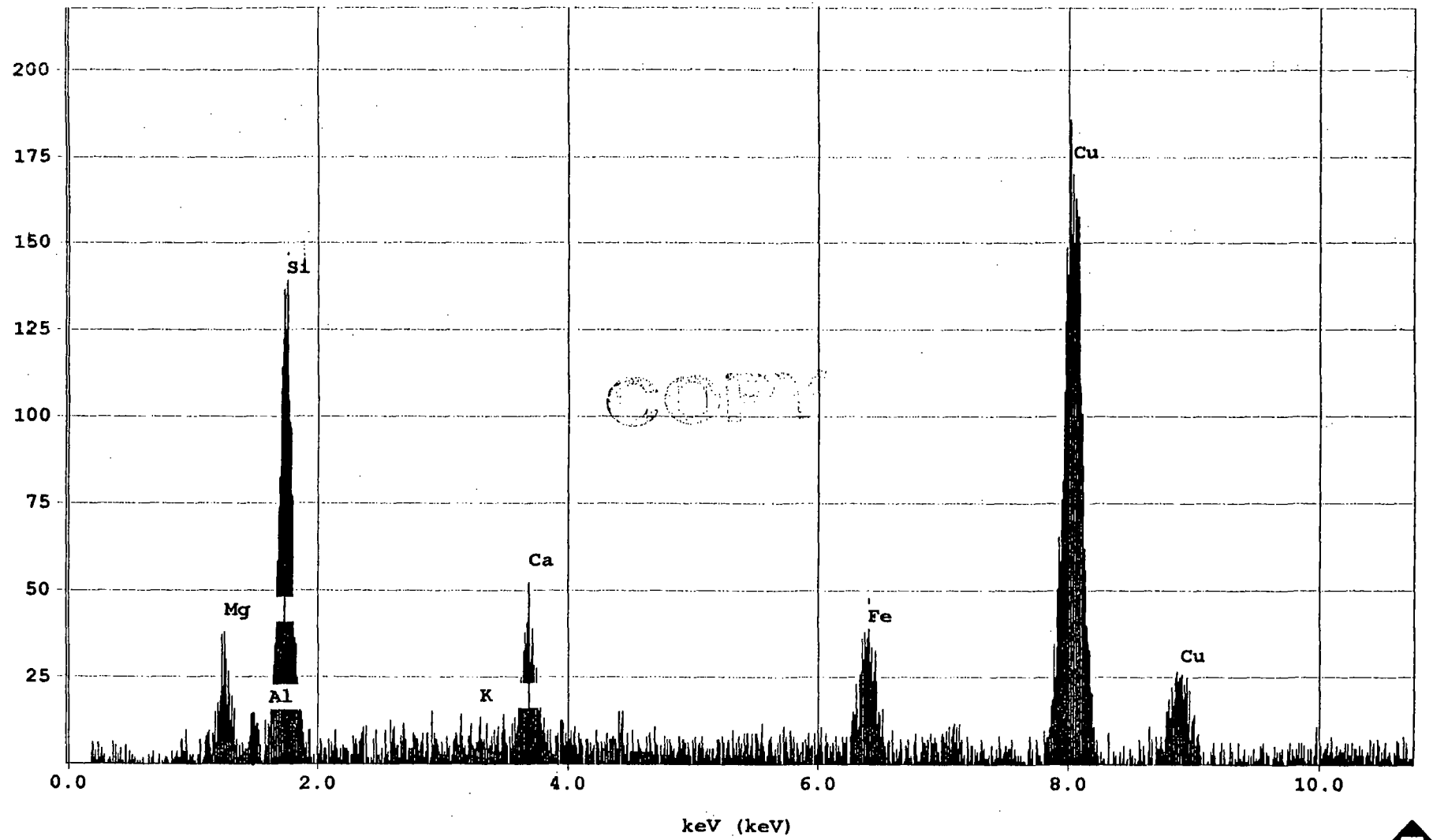
EPA_112849_WR-006-VO: Libby Amphibole

Tuesday, September 18, 2001



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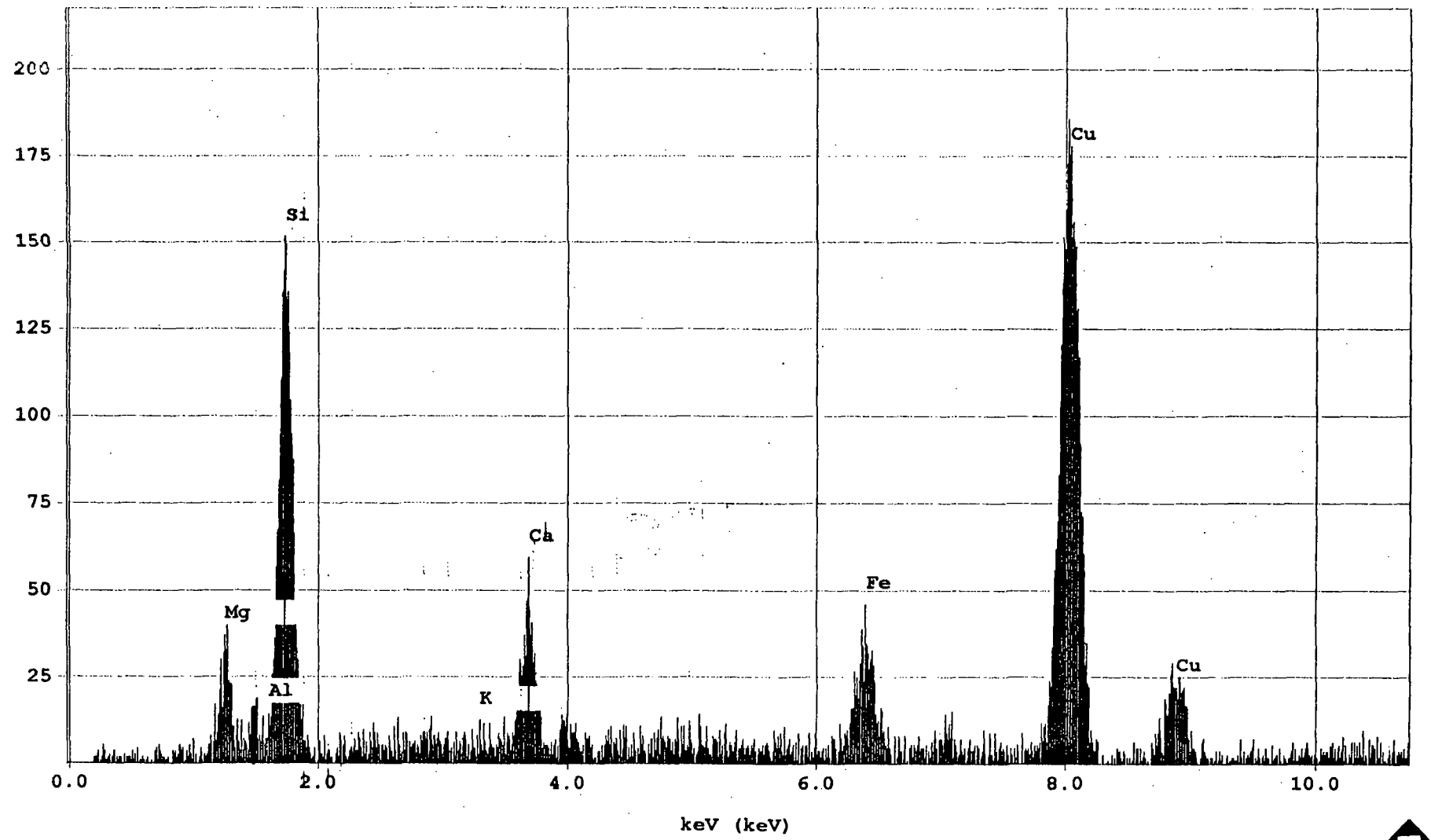
EPA_112849_WR-006-VO: Libby Amphibole

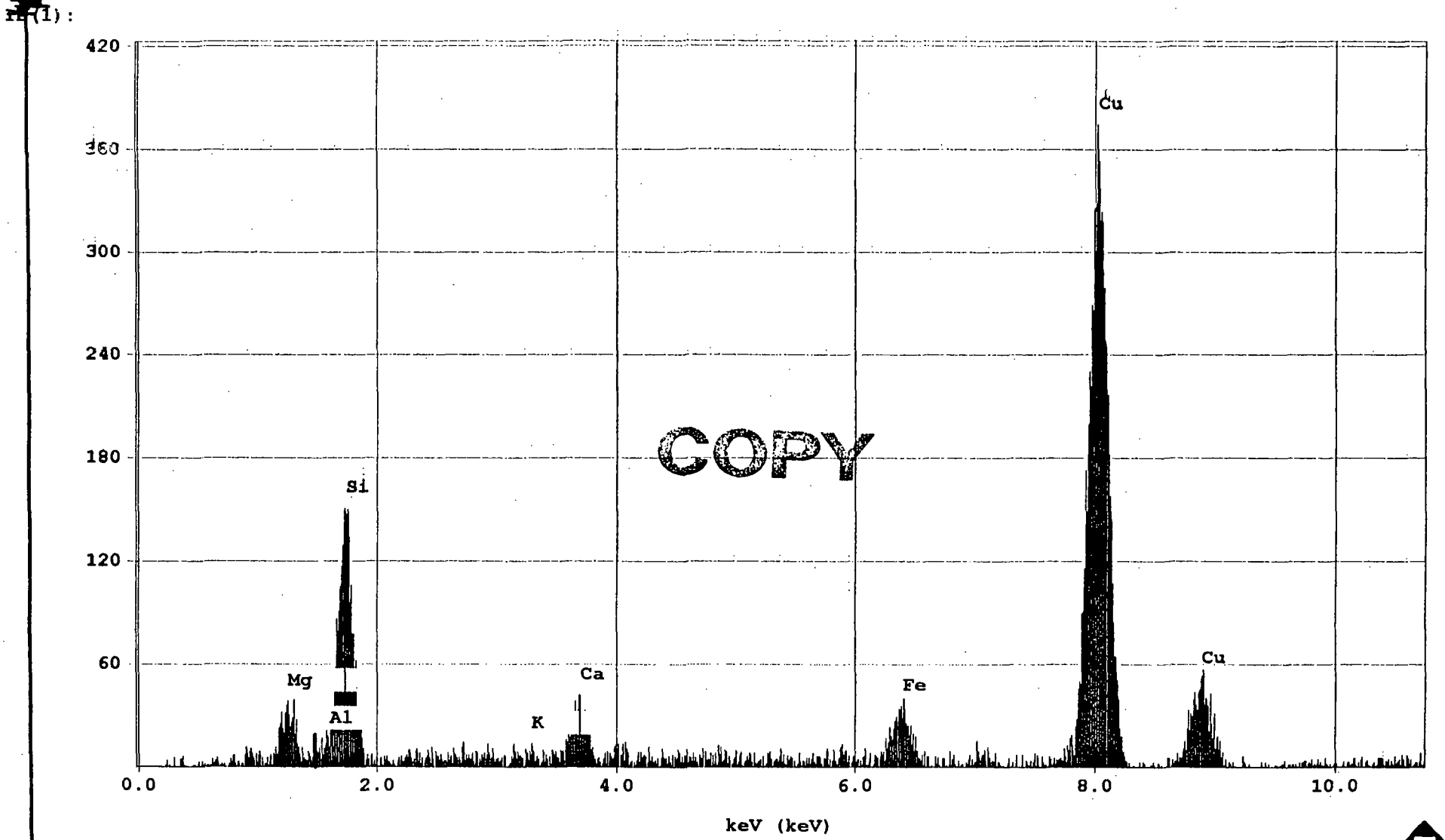
Tuesday, September 18, 2001



EMSL Analytical, Westmont, NJ

EPA_112849_WR-006-V0: Libby Amphibole

Tuesday, September 18, 2001



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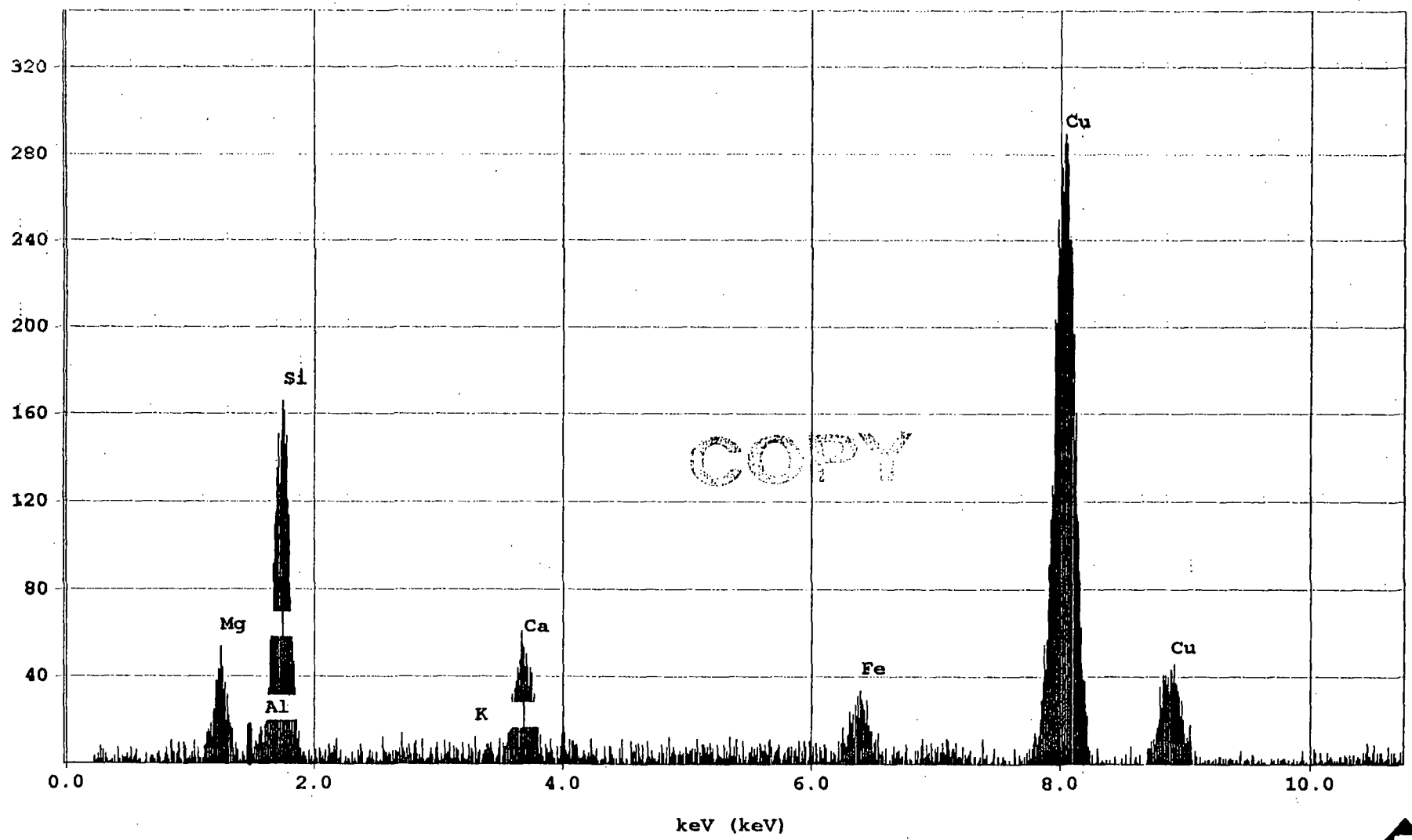
EPA_112849_WR-005-VO: Libby Amphibole

Tuesday, September 18, 2001



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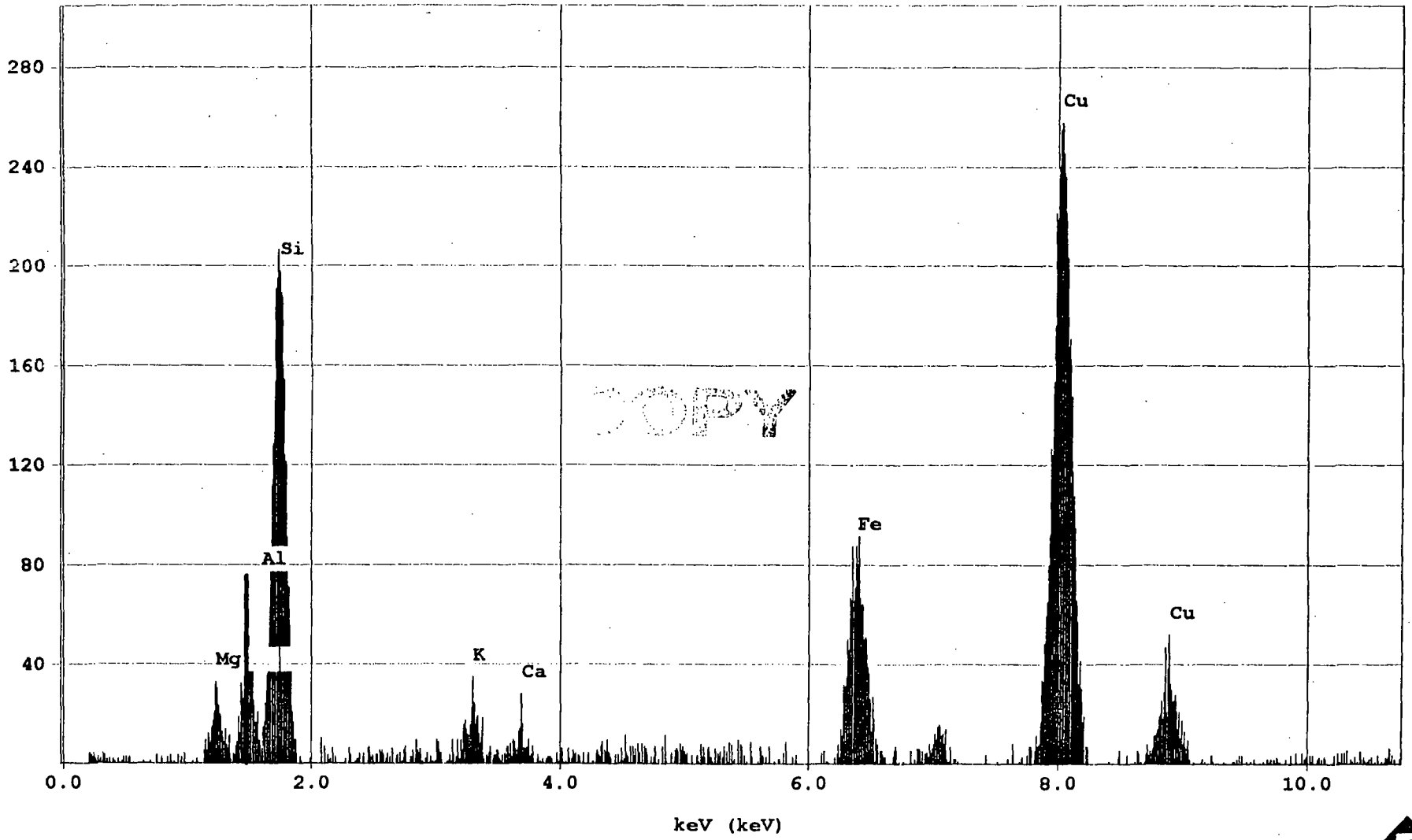
EPA_112849_WR-005-VO: Libby Amphibole

Tuesday, September 18, 2001



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ELUTRIATOR

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	385
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-007-V0 10 min
Sample Type (A=Air, D=Dust, O=Other):	D
Air volume (L) or dust area (cm2)	
Date received by lab	8-7-2001
Lab Job Number:	040112849
Lab Sample Number:	000
Number of grids prepared	4
Prepared by	DS
Preparation date	9-21-2001

Analyzed by	[illegible]
Analysis date	9-21-2001
Method (D=Direct, I=Indirect)	D
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C Row S

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

Row S

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)					1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA	Sketch/Comments	Sketch	Photo	EDS

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LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile NA = Non-asbestos

ELUTRIATOR

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	385
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-007-SS
Sample Type (A=Air, D=Dust, O=Other):	D
Air volume (L) or dust area (cm2)	
Date received by lab	
Lab Job Number:	6401128849
Lab Sample Number:	0007
Number of grids prepared	4
Prepared by	BF
Preparation date	9-24-2001

2 Min.

Analyzed by	ADS
Analysis date	9-25-2001
Method (D=Direct, I=Indirect)	D
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C

Row T

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)					1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA	Sketch/Comments	Sketch	Photo	EDS
Row T 1	H-7	MD11 / MF			16 / 13	13 / 1.2		LA							1
	E-8	MD11 / MF			17 / 9	11 / 1.5		LA							1
	I-11	MD10 / MF			3.3 / 3	0.7 / 0.7		LA							1
	L-10	MD10 / MF			2.5 / 2.5	1 / 0.6		LA							1
	K-5	MD11 / MF			20 / 16	13 / 0.9		LA							1
2	I-10	ND			6	0.9					NA	Si, Ca, Ti, Fe			
	F-8	MD11 / MF			12 / 5.5	6 / 1.4		LA							1
	J-6	ND													
	G-6														
	D-11														

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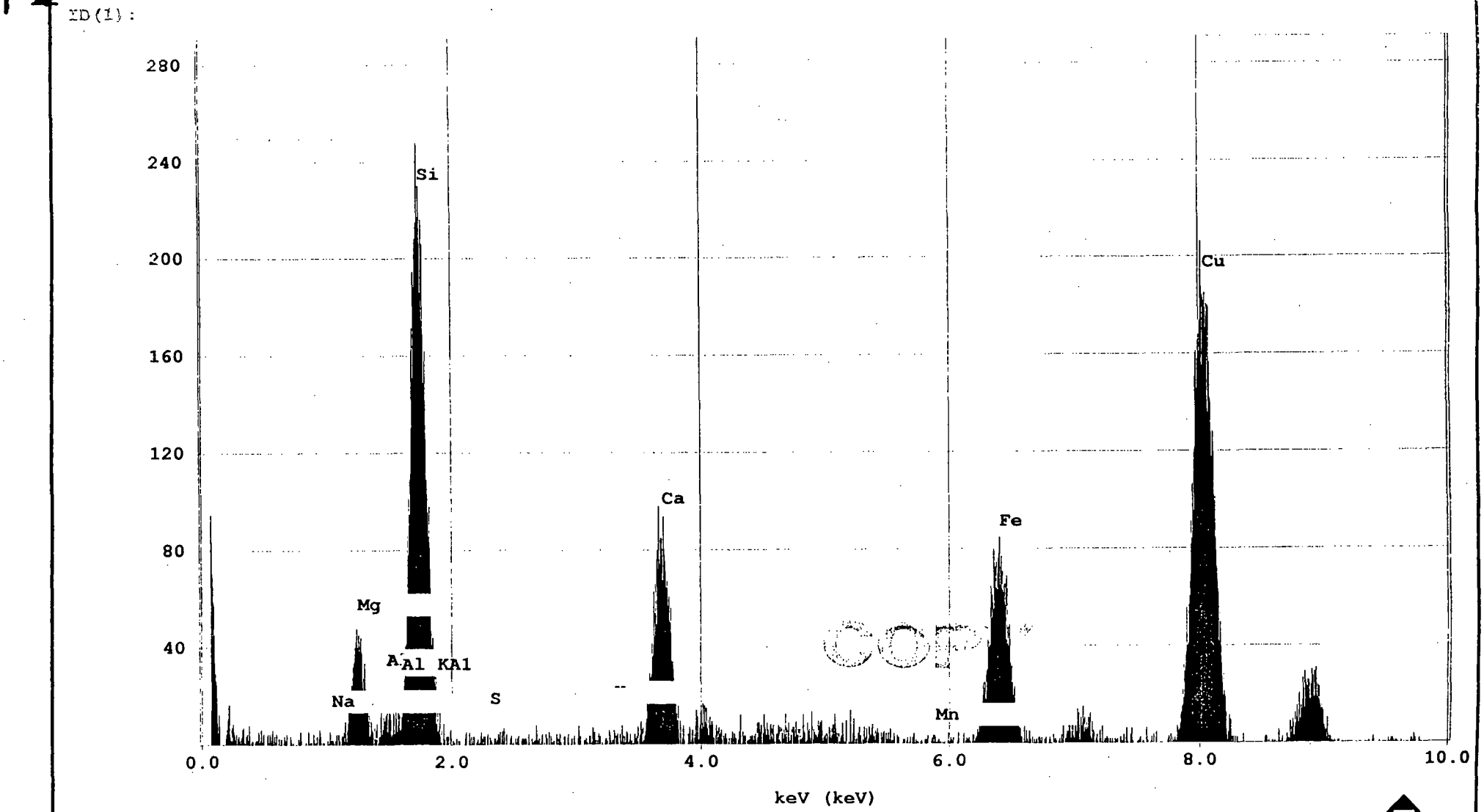
LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile NA = Non-asbestos

EMSL Analytical, Westmont, NJ

EPA Elutriator_112849 Sample WR-007-SS: Libby Amphibole

Tuesday, September 25, 2001



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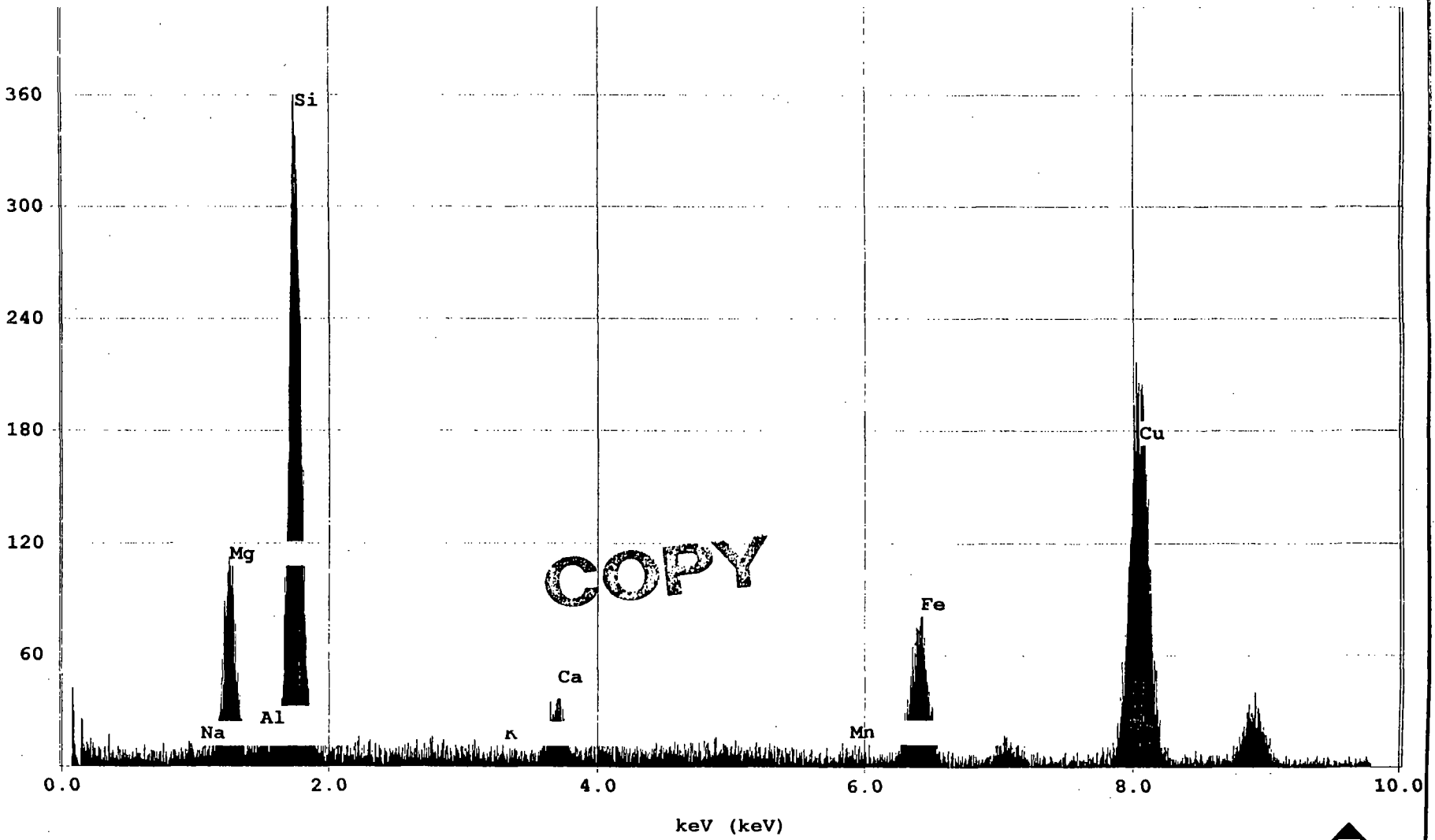
EPA Elutriator_112849 Sample WR-007-SS: Libby Amphibole

Tuesday, September 25, 2001

ID(1):



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EMSL Analytical, Westmont, NJ

EPA Elutriator_112849 Sample WR-007-SS: Libby Amphibole

Tuesday, September 25, 2001

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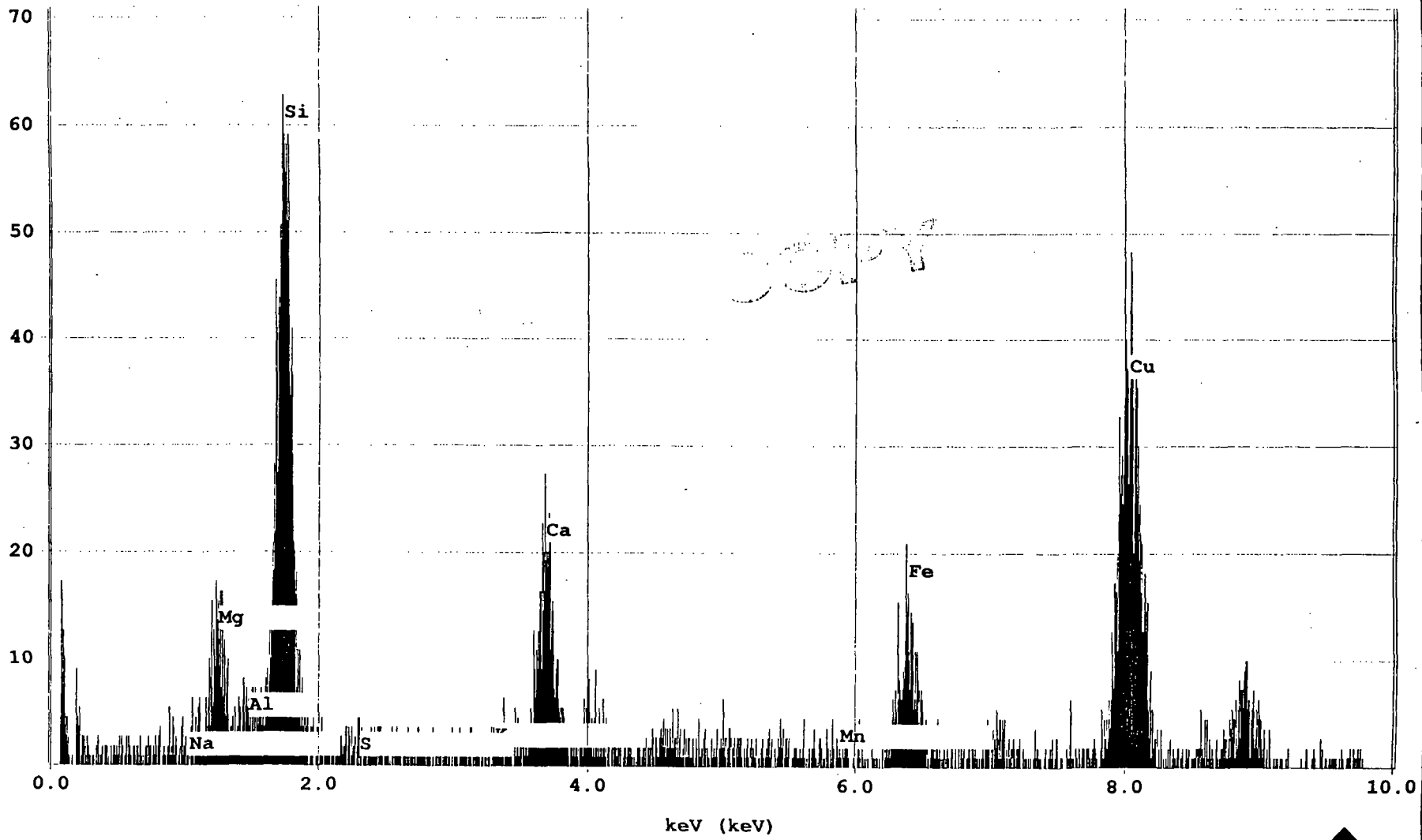

ELUTRIATOR

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	385
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-007-SS 3 Min
Sample Type (A=Air, D=Dust, O=Other):	A
Air volume (L) or dust area (cm2)	D
Date received by lab	
Lab Job Number:	040112849
Lab Sample Number:	000
Number of grids prepared	4
Prepared by	DF
Preparation date	9-24-2001

Analyzed by	[illegible]
Analysis date	9-26-2001
Method (D=Direct, I=Indirect)	D
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001_C Row U

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
			Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row U 1	H-7	MD11 / MF			11 / 10.5	3 / 1.1		LA							1
		F			8	1.4		LA							1
		MD11 / MF			10	2.9		LA							1
	I-5	ND													
	L-7	F			8	0.7		LA							1
		MD11 / MF			11 / 6	5 / 0.9		LA							1
	D-10	ND													
	N-9	F			3.5	0.15		LA							1
2	G-3	ND													
	C-6	ND													

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LA = Libby-type amphibole OA = Other (non-Libby type) amphibole C = Chrysotile NA = Non-asbestos

USEPA REGION 8 LIBBY SITE INVESTIGATION

TEM Asbestos Structure Count

LAB NAME: EMSL, Westmont, NJ

LAB SAMPLE NO: 0007

EPA SAMPLE NO: WR-007-SS 3 Min

SAMPLE TYPE: D

LAB JOB NUMBER: 040112849

GRID STORAGE LOC.: 2001 _ C Row U

	Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class				Sketch/Comments	1 = yes, blank = no		
				Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row U	2	J-8	MD11 / MF			11 / 10	6 / 0.6		LA							1
			F			4.6	0.5		LA							1
			MD11 / MF			6.2 / 6	4 / 0.5		LA							1
		K-13														
		H-13	MD11 / MF			11.5 / 11	5 / 0.15		LA							1

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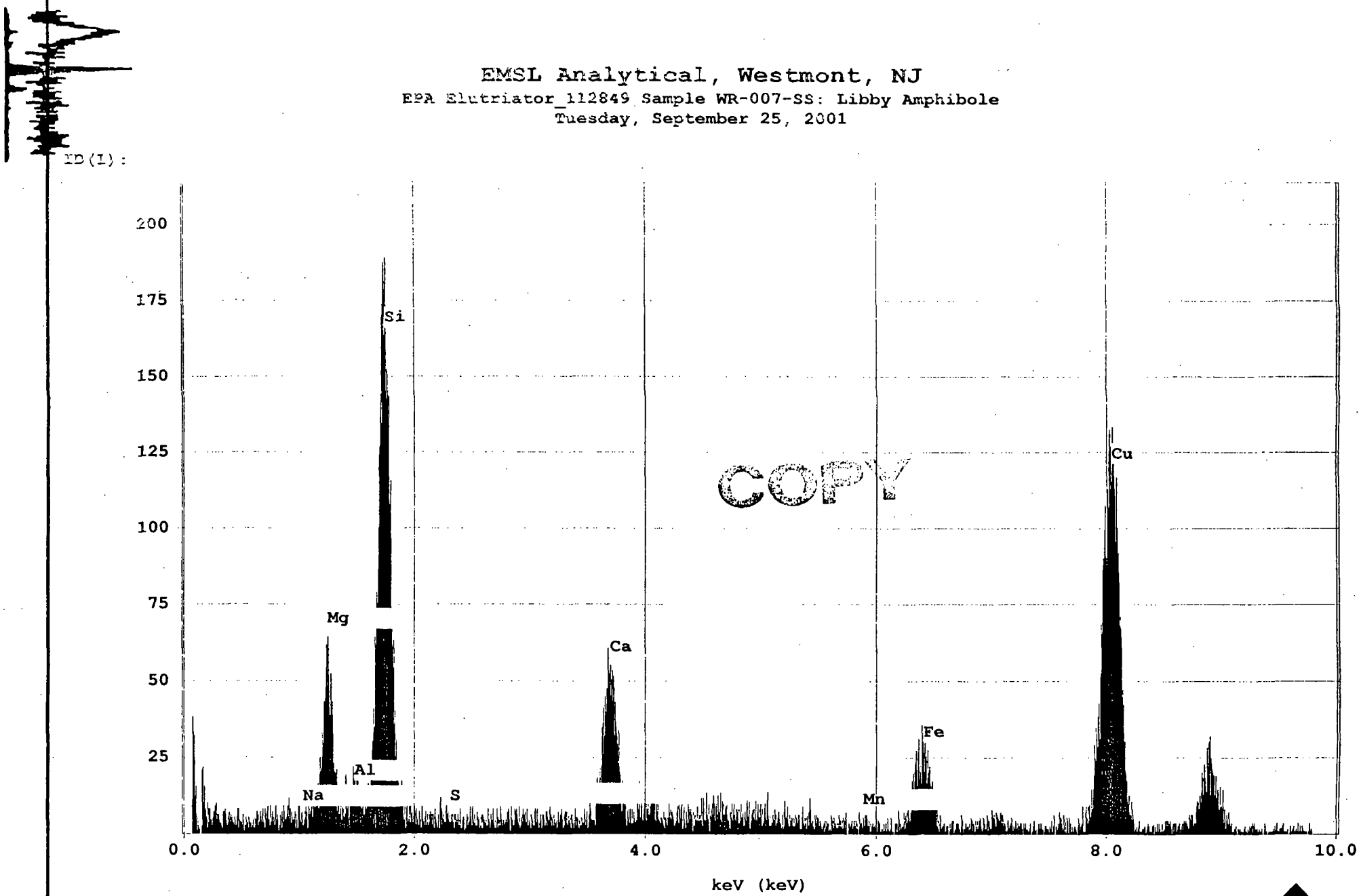
EMSL Analytical, Westmont, NJ

EPA Elutriator_112849 Sample WR-007-SS: Libby Amphibole

Tuesday, September 25, 2001



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EPA Elutriator_112849 Sample WR-007-SS: Libby Amphibole

Tuesday, September 25, 2001

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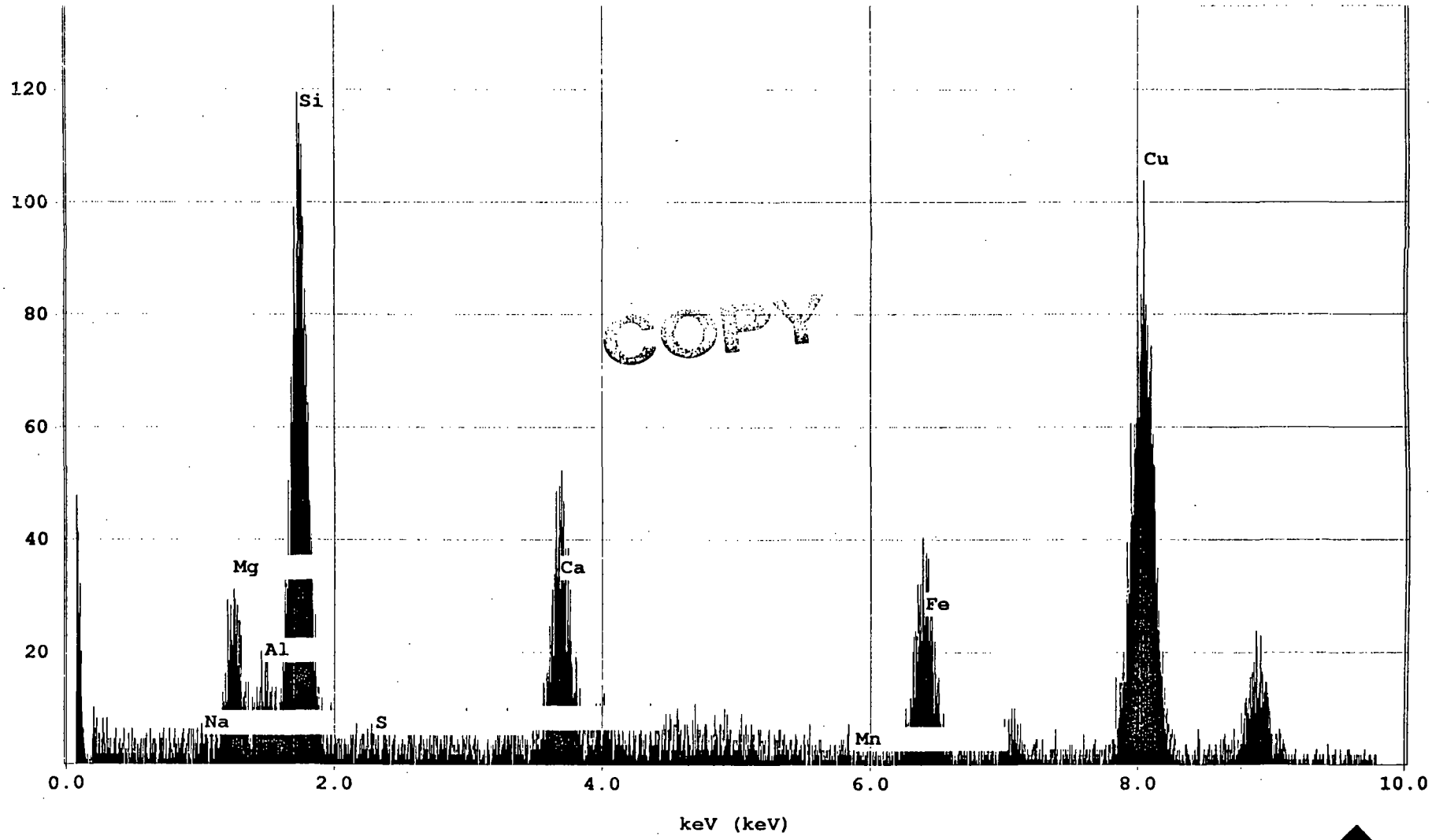

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EMSL Analytical, Westmont, NJ

EPA_112849 Elutriator Sample WR-007-SS: Libby Amphibole

Wednesday, September 26, 2001

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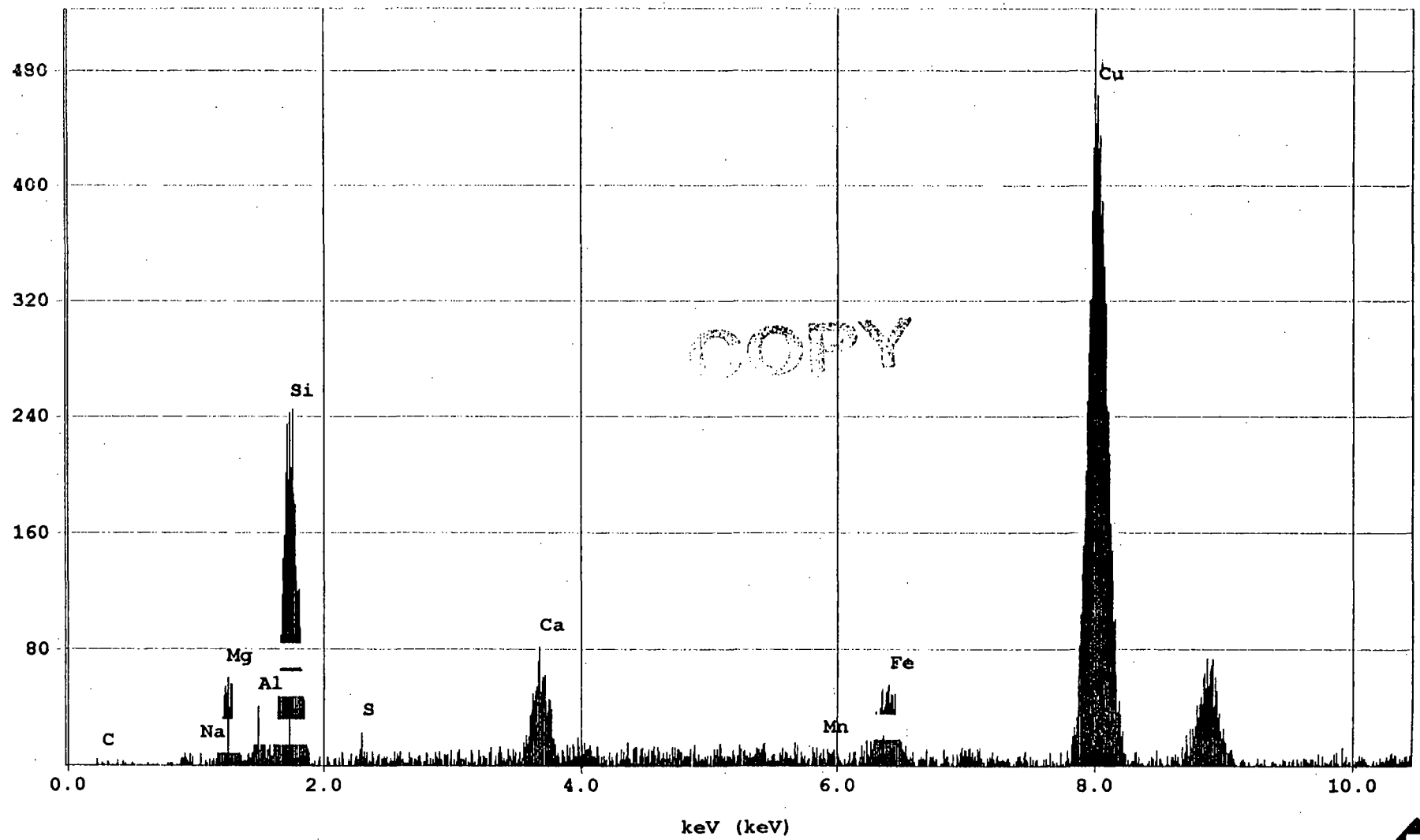

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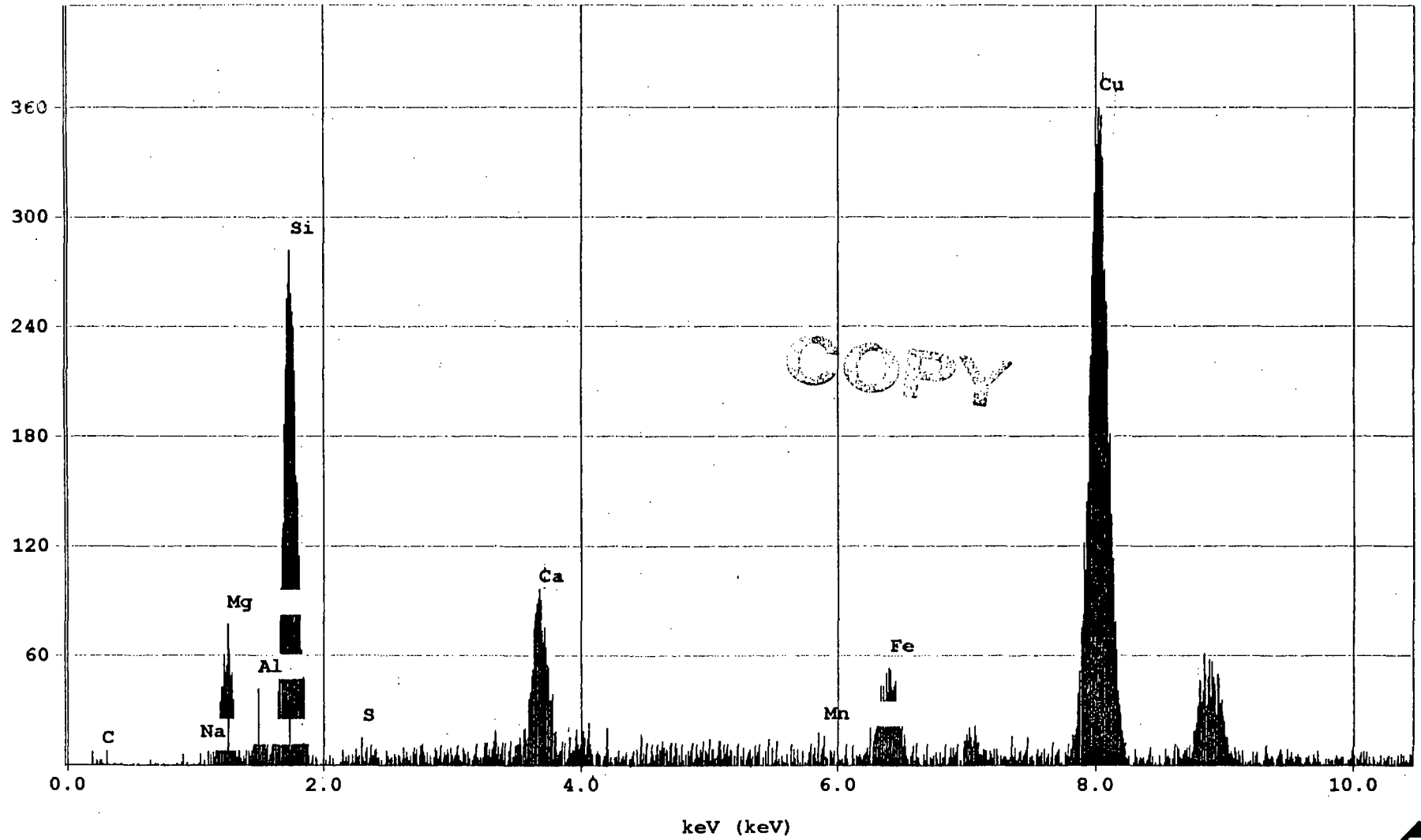
EPA_112849 Elutriator Sample WR-007-SS: Libby Amphibole

Wednesday, September 26, 2001



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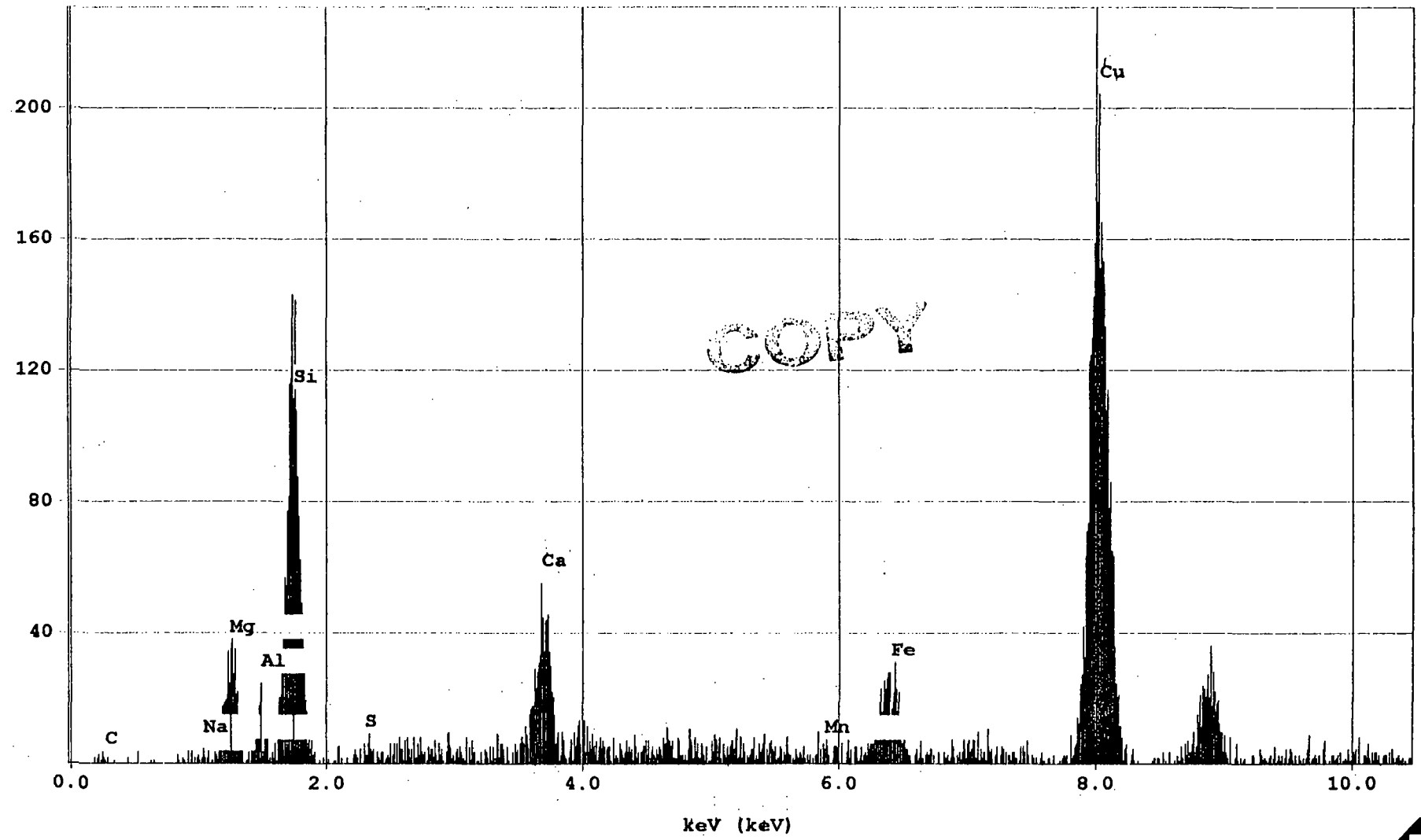
EMSL Analytical, Westmont, NJ

EPA_112849 Elutriator Sample WR-007-SS: Libby Amphibole

Wednesday, September 26, 2001



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EMSL Analytical, Westmont, NJ

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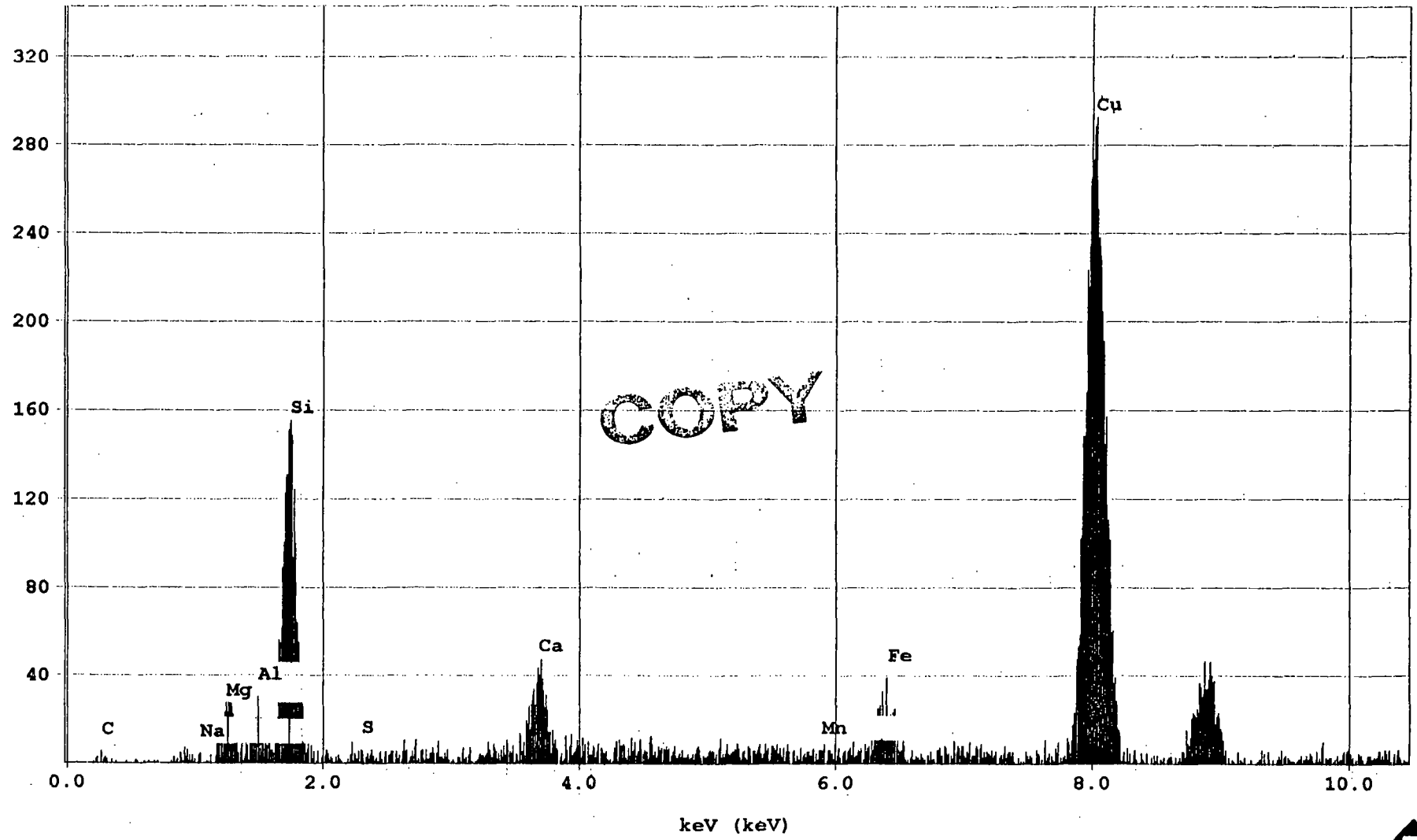

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Attn: Jim Gray
U.S. EPA
Environmental Services Division
College Station Rd
Athens, GA 30613-7799
Fax: 7063558744 Phone: 706-355-8613

ELUTRIATOR

Page 1 of ____

USEPA REGION 8 SITE INVESTIGATION
TEM Asbestos Structure Count

Laboratory name:	EMSL, Westmont, NJ
Instrument	JEOL 100 CX II (2)
Voltage	100 KV
Magnification	19000 X
Grid opening area (mm2)	0.0061
Scale: 1L =	1
Scale: 1D =	1
Primary filter area (mm2)	385
Secondary Filter Area (mm2)	

EPA Sample Number:	WR-004-V0 60 min
Sample Type (A=Air, D=Dust, O=Other):	D
Air volume (L) or dust area (cm2)	
Date received by lab	8-7-2001
Lab Job Number:	040112849
Lab Sample Number:	0004-
Number of grids prepared	4
Prepared by	DS
Preparation date	9-10-2001

Analyzed by	JVS
Analysis date	9-18-2001
Method (D=Direct, I=Indirect)	
Counting rules (I=ISO10312,A=AHERA,O=Other)	I
Grid storage location	2001 _ C

Row 0

Secondary Prep

Fraction of primary filter used:	
Total resuspension volume (mL)	
Volume filtered for secondary prep (mL)	

	Grid	Grid Opening	Structure Type	No. of Structures		Dimensions		Identification	Mineral Class (see below)				Sketch/Comments	1 = yes, blank = no		
				Primary	Total	Length	Width		LA	OA	C	NA		Sketch	Photo	EDS
Row 0	1	H-6	ND													
		K-8														
		I-11														
		L-12														
		D-5														
	2	G-11														
		C-12	F	1	1	4.5	0.5		LA							1
		A-3	ND													
		I-1	F	2	2	9.0	0.55		LA							1
		K-7	ND													

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LA = Libby-type amphibole OA = Other (non-Libby type) amphibole