Lab/Cor, Inc.

A Professional Service Corporation in the Northwest

December 18, 2004

Lisa M. Johnson
Ecology & Environment, Inc.
San Francisco, CA

Dear Lisa,

Enclosed is the additional requested QC Data from Lab/Cor, Inc. Below is a checklist of all that is included.

- NVLAP On-Site Assesment Approval
- Our latest NYDOH Proficiency Test Report for Air, Bulk and Water samples
- The latest Interlab results – our raw data for this series of analyses was submitted to Batta Labs for result compilation.
- 1st Packet – Jeol 1200EX QC Data – (October – December)
- 2nd Packet – Philips 410LS QC Data – October
- 3rd Packet – Philips 410LS QC Data – November
- 4th Packet – Philips 410LS QC Data – December

If any further data is necessary, please do not hesitate to call us.

Sincerely,

Kate March
Lab/Cor, Inc.
Seattle WA, 98117

(206)781-0155
kmarch@labcor.net

Johnson, Lisa

From: Johnson, Lisa
Sent: Wednesday, December 15, 2004 4:12 PM
To: 'mail@labcor.net'
Cc: Edwards, Howard
Subject: A few items needed for the El Dorado Hills Data Packages

Hello John,

I am coordinating validation services for Howard Edwards with a third party data service. There are a few more items needed to complete your data packages submitted to E&E on Dec. 7, 2004. Below is the list of items:

-Any TEM equipment maintenance and/or calibration logs, forms or other information for the contract period

-Results and raw data of any recent analysis of in-house standard reference materials or inter-laboratory performance verification

-Most recent copy of your NVLAP and proficiency test results

If you have any questions, please contact me at the number below.

Thank You,

Lisa M. Johnson
START Member
Ecology and Environment, Inc.
(415) 981-2811
(415) 981-0801 fax
ljohnson@ene.com

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899

May 10, 2004

Mr. John Harris
Lab/Cor, Inc.
7619 Sixth Avenue, NW
Seattle, WA 98117

NVLAP Lab Code: 101920-0

Dear Mr. Harris:

On November 7, 2003, your laboratory was visited by an assessor representing the National Voluntary Laboratory Accreditation Program (NVLAP). The purpose of the visit was to assess your laboratory's compliance with NVLAP criteria for accreditation in the Airborne Asbestos Fiber Analysis (TEM) program.

I am pleased to inform you that the On-Site Assessment Review, which was completed on May 7, 2004, has found that your laboratory meets the on-site assessment requirements. No further action is required on your part, at this time, with regard to the on-site assessment phase of the evaluation of your laboratory.

If you have any questions, please call Thomas R. Davis at (301) 975-6499, or Hazel M. Richmond at (301) 975-3024.

Sincerely,

Warren R. Merkel, NVLAP Chief
Laboratory Accreditation Program

NIST

WADSWORTH CENTER
NEW YORK STATE DEPARTMENT OF HEALTH
ENVIRONMENTAL LABORATORY APPROVAL PROGRAM

Proficiency Test Report

Lab Id: 11747
EPA Lab Code: Not on File

LABCOR INC
7619 SIXTH AVENUE NW
SEATTLE, WA-98117-4037
(206) 781-0155
Director: MR. JOHN HARRIS

Shipment Date : 07-Sep-2004
Closing Date : 22-Oct-2004
Score Date : 09-Nov-2004

This report may contain data that are not covered by the NVLAP accreditation.
** Indicates NVLAP accredited analyte evaluated using the USEPA's National Standards for Water Proficiency Testing Studies Criteria Document.
NVLAP Lab Code 200387-0. ELAP is an A2LA accredited Proficiency Testing Provider. Certificate Number 1785.01

Shipment: 276 Asbestos in Air, Water, and NonFriable Samples by Electron Microscopy

Analyte Name	Units	Sample ID	Method	Result	Mean/ Target *	Warning Limits	Acceptance Limits	Score
Sample: Air and Emissions Asbestos in Air by TEM								
Asbestos in Air by TEM EPA Code: N/A	Struct/	1728	40 CFR APX A No. III	41.4	88.4		D.L. - 196 *28 passed out of 29 reported results.*	Satisfactory
Dominant Asbestos Type EPA Code: N/A		1728	40 CFR APX A No. III	Act	Act		*16 passed out of 29 reported results.*	Satisfactory
Dominant Asbestos Type EPA Code: N/A		1987	40 CFR APX A No. III	Amosite	Amosite		*27 passed out of 29 reported results.*	Satisfactory
Asbestos in Air by TEM EPA Code: N/A	Struct/	1987	40 CFR APX A No. III	10741	8040		660 - 15400 *29 passed out of 29 reported results.*	Satisfactory
Sample: Solid and Hazardous Waste Asbestos in Non-Friable Material								
Percent Asbestos in Residue EPA Code: N/A	%	1785	ITEM 198.4 OF MANUAL	60	47.7		D.L. - 98.7 *29 passed out of 29 reported results.*	Satisfactory
Percent Residue EPA Code: N/A	%	1785	ITEM 198.4 OF MANUAL	54.51	63.3		28.8 - 97.8 *28 passed out of 29 reported results.*	Satisfactory
Percent Residue EPA Code: N/A	%	5706	ITEM 198.4 OF MANUAL	17.71	18.0		13.2 - 22.8 *28 passed out of 29 reported results.*	Satisfactory
Percent Asbestos in Residue EPA Code: N/A	%	5706	ITEM 198.4 OF MANUAL	55	38.7		D.L. - 93.9 *29 passed out of 29 reported results.*	Satisfactory
Sample: Potable Water Asbestos in Water by TEM								
Asbestos in Water by TEM ** EPA Code: 0253	MF/L	4233	EPA 100.2	8.179	3.00 *		D.L. - 19.8 *22 passed out of 23 reported results.*	Satisfactory

BATTA

Date Report Prepared: November 21, 2004
Prepared By: R. Shumate

NISTIR 5351 - Analyst Summary

	Verifying Analyst rgs *	Analyst #1 bl	Analyst #2 drw	Analyst #3 mq	Analyst #4 km	Analyst #5 mp **	Analyst #5 yz **
Cumulative TP/TNS (should be >0.85)		0.980	0.980	1.000	0.980	0.918	0.926
Cumulative FP/TNS (should be <0.05)		0.020	0.000	0.041	0.000	0.000	0.000
Cumulative FN/TNS (should be <0.10)		0.020	0.020	0.000	0.020	0.082	0.074

** Since RGS was verifying analyst, values will not be calculated.*

*** MP and YZ each analyzed only 2 of the four grid openings.*

Summary of Grid Openings Analyzed

Grid Opening H-2: Seven structures were verified. This opening yielded good duplication. There were no FN recorded. Only two occurrences (causing FP) were in question. Nearly one-third of the way through the opening, a matrix with a fibril of Chrysotile attached was found. The fibril protruding from the matix was <5:1 aspect and was about 4μm in length. One analyst (MQ) counted it as a matrix structure. The second occurence was similar to the first. A martix having a Chrysotile "fibril" protuding was found halfway through the opening. In this case, the fibril was protruding less than 3μm from the matrix. The aspect ratio of the protrusion was less than 3:1. One analyst (MQ) counted this as a matrix structure.

Grid Opening E-2: Fifteen structures were verified. This opening also yielded good duplication. No FP were recorded. Only one occurrence (causing FN) was in question. Near the start of the opening, a bundle (avg L: 3.5μm, W: 1.2μm) consisting of Chrysotile fibers was found. At the onset of the round, I (RGS) had originally listed the occurence as a non-structure, feeling that the overall aspect of approximately 3:1 would disqualify it. Upon closer examination, I agree that the fibers within the matrix are discernable and the aspect ratios of the individual fibers within the bundle qualify it as a bundle structure. Only one other analyst (MP) did not list the occurence as a structure. Although I listed it as a FNA (feeling that MP saw the structure as I first did), it is uncertain whether his omission should be listed as a FNA or FNB. MP also did not list TPM9, and was listed as FNB.

Grid Opening D-9: Twenty-one structures were verified. This opening also yielded good duplication. A few structures were in question, yielding FN. Near the start of the opening, along the left grid bar, a Chrysotile fiber (approximately 1.5μm long, 0.1μm wide) was found. Only one analyst (BL) did not list the occurence as a structure. Structure TPM9 is a bundle of Chrysotile (approximately 4.5μm long and 0.6μm wide). This occurence was listed as ambiguous by DRW and was not listed by KM. Structures TPM12 and TPM20 were not listed by YZ. Both of these occurences are thin, single fibrils (about 1.0μm long and 0.07μm wide) of Chrysotile and it is assumed that the analyst simply missed the fiber.

Grid Opening E-20: Six structures were verified. This opening also yielded perfect duplication. All analysts listed six Chrysotile structures on their countsheet.

Overall Notes

As can be seen above, all analysts participating had "TP/FN/FP values" within the acceptable limits listed by NVLAP and in the NISTIR-5351. In addition to these values, I statistically tracked the reproducibility of fiber-sizing. I also wanted to track the accurate classification of structures (fiber, bundle, cluster and matrix) but not all analysts indicated structure class on the countsheets.

Problems noted during the verification process: Lack of fiber classification (see note above), fiber sizing not consistently precise (significant figures), lack of sketch detail causing the verification process to be more time-consuming. It helps to include any objects close in proximity to the structure and to include the grid bar in the sketch when it is nearby. The most significant problem noted was the counter-clockwise deviation of two grid openings by two analysts. Please be sure to follow grid orientation instructions to help cut-down the time taken in the verification process. It was also noted that two of the participating analysts only analyzed two grid openings apiece. To offer the best statistical value to the round, please have all TEM analysts read all the grid openings submitted for that round. Thanks to everyone for their timely submission of results. If anyone has any questions regarding these results, please feel free to contact me by phone or e-mail.

BATTA

Sample Type: 01-1-3
Sample Archive Location: E-5
Grid Opening ID: H-2

Verified Asbestos Analysis

Analytical Values	Verifying Analyst**	Analysis 1	Analysis 2	Analysis 3	Analysis 4	Analysis 5	Analysis 6	Analysis 7	Analysis 8	Analysis 9	Analysis 10	Analysis 11	Analysis 12	Analysis 13	Analysis 14	Analysis 15	Analysis 16	Analysis 17	Analysis 18	Analysis 19	Analysis 20
Date of Analysis	07/28/04	07/28/04	08/19/04	08/20/04	08/25/04	09/20/04															
TEM Operator	rgs	bl	drw	mq	km	mp															
Structures Reported (SR)	7	7	7	9	7	7															
True Positives (TP)	7	7	7	7	7	7															
TPM	7	7	7	7	7	7															
TPU	0	0	0	0	0	0															
*TPV (TP found by verifying analyst, but NOT found by any analyst)	0																				
*Total Number of Structures (TNS) (all analysts)	7																				
*Total Number of Structures (TNS) (one analyst)	7	7	7	7	7	7															
False Positives (FP)				2																	
False Negatives (FN)		0	0	0	0	0															
FNA																					
FNB																					
Not Located (NL)																					
Ambiguous (AMB)																					
TP/TNS		1.000	1.000	1.000	1.000	1.000															
FP/TNS		0.000	0.000	0.286	0.000	0.000															
FN/TNS		0.000	0.000	0.000	0.000	0.000															
[(TP/TNS) + (FN/TNS)] (must equal 1.00)		1.000	1.000	1.000	1.000	1.000															

*Value for these items will be the same for all analysts.

**Verifying analyst should not be one of the TEM Operators.

Refer to NISTIR 5351 for guidance.

BATTA

Statistical Review of Structure Assignment From Verified Asbestos Analysis

Only structures verified as "TPM" are recorded.

	Structure Length							Str Width							Structure Type							Stats for Structure Length					Stats for Structure Width					Str Type / Classification ID	
	H-2							H-2							f=1, b=2, m=3, c=4																		
Str #	rgs	bl	drw	mq	km	mp		rgs	bl	drw	mq	km	mp		rgs	bl	drw	mq	km	mp		Average	Std Dev	CV or %RSD	LCL	UCL	Average	Std Dev	CV or %RSD	LCL	UCL	Type Pass or Fail	Correct Ruling on Structure (if close to 0.5µm) Pass or Fail
1	7.50	7.55	7.50	8.00	6.50	7.00		0.250	0.250	0.500	0.500	0.400	0.400		2	2						7.3	0.52	7.08	6.320	8.363	0.38	0.11	29.36	0.1622	0.6045	Pass	Pass
2	4.00	4.00	4.00	3.00	3.80	4.20		0.250	0.200	0.350	0.250	0.250	0.380		1	1						3.8	0.43	11.15	2.994	4.673	0.28	0.07	24.74	0.1439	0.4161	Pass	Pass
3	2.70	2.75	2.50	2.50	2.50	2.50		0.050	0.050	0.100	0.050	0.050	0.030		1	1						2.6	0.12	4.55	2.345	2.805	0.06	0.02	42.64	0.0089	0.1011	Pass	Pass
4	1.50	1.75	1.30	2.00	1.50	1.60		0.080	0.090	0.100	0.100	0.100	0.100		1	1						1.6	0.24	15.03	1.133	2.083	0.10	0.01	8.81	0.0786	0.1114	Pass	Pass
5	1.80	1.90	1.50	2.00	1.50	1.70		0.060	0.060	0.100	0.100	0.100	0.050		2	2						1.7	0.21	11.92	1.327	2.139	0.08	0.02	30.66	0.0311	0.1255	Pass	Pass
6	3.20	3.25	2.75	2.50	3.00	3.00		0.070	0.080	0.100	0.100	0.080	0.100		1	1						3.0	0.28	9.59	2.394	3.506	0.09	0.01	15.05	0.0622	0.1145	Pass	Pass
7	2.80	2.90	3.00	2.50	3.20	2.60		0.060	0.050	0.050	0.050	0.050	0.050		2	1						2.8	0.26	9.11	2.326	3.341	0.05	0.00	7.90	0.0436	0.0597	Fail	Pass
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BATTA

Sample Type: 01-1-3
Sample Archive Location: E-5
Grid Opening ID: E-2

Verified Asbestos Analysis

Analytical Values	Verifying Analyst**	Analysis 1	Analysis 2	Analysis 3	Analysis 4	Analysis 5	Analysis 6	Analysis 7	Analysis 8	Analysis 9	Analysis 10	Analysis 11	Analysis 12	Analysis 13	Analysis 14	Analysis 15	Analysis 16	Analysis 17	Analysis 18	Analysis 19	Analysis 20
Date of Analysis	07/28/04	07/28/04	08/19/04	08/26/04	08/25/04	09/20/04															
TEM Operator	rgs	bl	drw	mq	km	mp															
Structures Reported (SR)	15	15	15	15	15	15															
True Positives (TP)	15	15	15	15	15	15															
*TPM	15	15	15	15	15	13															
TPU	0	0	0	0	0	2															
*TPV (TP found by verifying analyst, but NOT found by any analyst)	0																				
*Total Number of Structures (TNS) (all analysts)	15																				
*Total Number of Structures (TNS) (one analyst)	15	15	15	15	15	15															
False Positives (FP)																					
False Negatives (FN)		0	0	0	0	2															
FNA						1															
FNB						1															
Not Located (NL)																					
Ambiguous (AMB)																					
TP/TNS		1.000	1.000	1.000	1.000	0.867															
FP/TNS		0.000	0.000	0.000	0.000	0.000															
FN/TNS		0.000	0.000	0.000	0.000	0.133															
[(TP/TNS) + (FN/TNS)] (must equal 1.00)		1.000	1.000	1.000	1.000	1.000															

*Value for these items will be the same for all analysts.

**Verifying analyst should not be one of the TEM Operators.

Refer to NISTIR 5351 for guidance.

BATTA

Statistical Review of Structure Assignment From Verified Asbestos Analysis

Only structures verified as "TPM" are recorded.

	Structure Length							Str Width							Structure Type							Stats for Structure Length					Stats for Structure Width					Str Type / Classification ID	
	E-2							E-2							f=1, b=2, m=3, c=4																		
Str #	rgs	bl	drw	mq	km	mp		rgs	bl	drw	mq	km	mp		rgs	bl	drw	mq	km	mp		Average	Std Dev	CV or %RSD	LCL	UCL	Average	Std Dev	CV or %RSD	LCL	UCL	Type Pass or Fail	Correct Ruling on Structure (if close to 0.5µm) Pass or Fail
1	5.50	5.50	5.00	5.00	5.00	5.20		0.250	0.250	0.400	0.500	0.400	0.600		2	2						5.2	0.24	4.71	4.719	5.681	0.40	0.14	34.46	0.1291	0.6709	Pass	Pass
2	1.70	2.00	1.50	2.00	1.50	1.80		0.080	0.050	0.100	0.100	0.100	0.100		1	1						1.8	0.23	12.90	1.306	2.194	0.09	0.02	23.11	0.0482	0.1284	Pass	Pass
3	3.20	3.60	4.00	3.00	3.50	3.20		0.080	0.100	0.100	0.100	0.100	0.150		1	1						3.4	0.36	10.54	2.709	4.124	0.11	0.02	22.34	0.0589	0.1511	Pass	Pass
4	5.50	5.60	5.00	5.00	4.80	5.20		0.100	0.100	0.200	0.200	0.120	0.180		1	1						5.2	0.31	6.03	4.569	5.797	0.15	0.05	32.39	0.0545	0.2455	Pass	Pass
5	2.90	3.10	2.75	2.50	2.70	2.60		0.250	0.300	0.350	0.400	0.350	0.300		2	2						2.8	0.22	7.81	2.335	3.182	0.33	0.05	16.14	0.2220	0.4280	Pass	Pass
6	1.10	1.10	1.00	1.00	1.20	1.10		0.070	0.050	0.100	0.100	0.080	0.040		1	1						1.1	0.08	6.95	0.935	1.231	0.07	0.03	34.14	0.0241	0.1225	Pass	Pass
7	5.70	6.00	5.00	6.00	5.20	5.70		0.100	0.110	0.150	0.200	0.120	0.200		2	1						5.6	0.41	7.41	4.785	6.415	0.15	0.04	30.39	0.0591	0.2343	Fail	Pass
8	7.50	7.65	6.00	7.00	7.50	7.00		0.250	0.250	0.400	0.400	0.350	0.400		2	2						7.1	0.61	8.56	5.912	8.304	0.34	0.07	21.54	0.1970	0.4863	Pass	Pass
9	3.70	3.75	4.00	3.00	3.60			0.300	0.350	0.500	0.400	0.350			2	2						3.6	0.37	10.29	2.880	4.340	0.38	0.08	19.95	0.2310	0.5290	Pass	Pass
10	3.50	3.75	3.00	3.00	3.40	3.50		0.200	0.180	0.300	0.250	0.250	0.300		2	2						3.4	0.30	8.95	2.767	3.949	0.25	0.05	20.13	0.1491	0.3443	Pass	Pass
11	5.90	6.10	5.50	6.00	5.30	6.00		0.350	0.380	0.750	0.500	0.450	0.600		2	2						5.8	0.32	5.56	5.166	6.434	0.51	0.15	29.60	0.2112	0.7988	Pass	Pass
12	1.80	2.00	1.50	2.00	1.50	1.80		0.050	0.090	0.010	0.050	0.080	0.030		1	1						1.8	0.23	12.74	1.324	2.209	0.05	0.03	57.96	-0.0072	0.1105	Pass	Pass
13	2.30	2.25	2.50	3.00	1.80	2.00		0.080	0.080	0.100	0.100	0.100	0.100		1	1						2.3	0.42	18.09	1.488	3.129	0.09	0.01	11.07	0.0730	0.1136	Pass	Pass
14	5.20	5.25	5.00	4.50	4.60	5.10		0.100	0.100	0.150	0.200	0.110	0.150		1	1						4.9	0.32	6.41	4.319	5.564	0.14	0.04	29.16	0.0576	0.2124	Pass	Pass
15	3.60	3.50	4.00	3.00	3.50			1.200	1.000	1.500	1.000	1.200										3.5	0.36	10.12	2.820	4.220	1.18	0.20	17.37	0.7773	1.5827		Pass
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BATTA

Sample Type: 01-1-3
Sample Archive Location: N-5
Grid Opening ID: D-9

Verified Asbestos Analysis

Analytical Values	Verifying Analyst**	Analysis 1	Analysis 2	Analysis 3	Analysis 4	Analysis 5	Analysis 6	Analysis 7	Analysis 8	Analysis 9	Analysis 10	Analysis 11	Analysis 12	Analysis 13	Analysis 14	Analysis 15	Analysis 16	Analysis 17	Analysis 18	Analysis 19	Analysis 20
Date of Analysis	07/28/04	07/28/04	08/25/04	08/30/04	08/11/04	09/20/04															
TEM Operator	rgs	bl	drw	mq	km	yz															
Structures Reported (SR)	21	22	21	21	21	21															
True Positives (TP)	21	21	21	21	21	21															
*TPM	21	20	20	21	20	19															
TPU	0	1	1	0	1	2															
*TPV (TP found by verifying analyst, but NOT found by any analyst)	0																				
*Total Number of Structures (TNS) (all analysts)	21																				
*Total Number of Structures (TNS) (one analyst)	21	21	21	21	21	21															
False Positives (FP)		1																			
False Negatives (FN)		1	1	0	1	2															
FNA			1																		
FNB		1			1	2															
Not Located (NL)																					
Ambiguous (AMB)																					
TP/TNS		0.952	0.952	1.000	0.952	0.905															
FP/TNS		0.048	0.000	0.000	0.000	0.000															
FN/TNS		0.048	0.048	0.000	0.048	0.095															
[(TP/TNS) + (FN/TNS)] (must equal 1.00)		1.000	1.000	1.000	1.000	1.000															

*Value for these items will be the same for all analysts.

**Verifying analyst should not be one of the TEM Operators.

Refer to NISTIR 5351 for guidance.

BATTA

Statistical Review of Structure Assignment From Verified Asbestos Analysis

Only structures verified as "TPM" are recorded.

	Structure Length							Str Width							Structure Type							Stats for Structure Length					Stats for Structure Width					Str Type / Classification ID	
	D-9							D-9							f=1, b=2, m=3, c=4																		
Str #	rgs	bl	drw	mq	km	yz		rgs	bl	drw	mq	km	yz		rgs	bl	drw	mq	km	yz		Average	Std Dev	CV or %RSD	LCL	UCL	Average	Std Dev	CV or %RSD	LCL	UCL	Type Pass or Fail	Correct Ruling on Structure (if close to 0.5µm) Pass or Fail
1	1.50		1.00	1.50	1.50	1.20		0.060		0.100	0.100	0.100	0.060		1							1.3	0.23	17.18	0.888	1.792	0.08	0.02	26.08	0.0409	0.1271	Pass	
2	0.70	0.75	0.75	0.75	0.80	0.70		0.070	0.070	0.100	0.100	0.100	0.060		1	1						0.7	0.04	5.07	0.668	0.816	0.08	0.02	22.34	0.0467	0.1199	Pass	Pass
3	1.50	1.50	1.20	1.50	1.50	1.20		0.060	0.050	0.100	0.100	0.080	0.100		1	1						1.4	0.15	11.07	1.096	1.704	0.08	0.02	27.29	0.0379	0.1255	Pass	Pass
4	3.10	3.05	2.75	2.50	3.00	3.10		0.120	0.100	0.150	0.100	0.100	0.120		1	1						2.9	0.24	8.30	2.441	3.393	0.12	0.02	17.17	0.0762	0.1538	Pass	Pass
5	10.20	10.10	10.00	8.00	8.00	8.60		0.300	0.280	0.400	0.350	0.400	0.270		2	2						9.2	1.07	11.64	7.057	11.243	0.33	0.06	17.56	0.2183	0.4484	Pass	Pass
6	2.40	2.40	2.00	2.00	2.00	2.10		0.080	0.050	0.100	0.100	0.100	0.100		1	1						2.2	0.20	9.19	1.762	2.538	0.09	0.02	23.11	0.0482	0.1284	Pass	Pass
7	8.70	8.60	7.50	9.00	8.00	7.80		0.150	0.150	0.250	0.200	0.150	0.180		2	2						8.3	0.59	7.08	7.116	9.417	0.18	0.04	22.22	0.1014	0.2586	Pass	Pass
8	1.30	1.50	1.20	1.50	1.30	1.20		0.060	0.080	0.100	0.100	0.080	0.120		1	1						1.3	0.14	10.25	1.065	1.602	0.09	0.02	23.31	0.0488	0.1312	Pass	Pass
9	4.70	4.80		4.50		4.10		0.500	0.500		1.000		0.450		2	2						4.5	0.31	6.84	3.917	5.133	0.61	0.26	42.35	0.1028	1.1222	Pass	Pass
10	5.20	5.20	4.80	4.50	4.50	4.20		0.250	0.250	0.350	0.400	0.350	0.250		2	2						4.7	0.41	8.62	3.931	5.536	0.31	0.07	21.55	0.1777	0.4389	Pass	Pass
11	2.40	2.50	2.50	2.50	2.00	2.20		0.060	0.080	0.100	0.050	0.100	0.060		1	1						2.4	0.21	8.82	1.943	2.757	0.08	0.02	28.91	0.0324	0.1176	Pass	Pass
12	1.20	1.20	1.20	1.50	1.20			0.070	0.080	0.100	0.050	0.100			1	1						1.3	0.13	10.65	0.996	1.524	0.08	0.02	26.52	0.0383	0.1217	Pass	Pass
13	5.50	5.50	5.00	5.00	5.00	5.00		0.060	0.070	0.100	0.100	0.100	0.070		1	1						5.2	0.26	5.00	4.659	5.674	0.08	0.02	22.34	0.0467	0.1199	Pass	Pass
14	1.10	1.15	1.20	1.50	1.00	1.20		0.060	0.060	0.100	0.050	0.100	0.060		1	1						1.2	0.17	14.15	0.860	1.523	0.07	0.02	31.10	0.0279	0.1155	Pass	Pass
15	5.00	5.20	5.00	4.50	4.30	4.50		1.500	1.420	1.200	1.500	1.500	0.800		2	2						4.8	0.36	7.62	4.039	5.461	1.32	0.28	21.21	0.7698	1.8702	Pass	Pass
16	4.80	3.00	4.00	4.00	4.00	4.10		0.300	0.250	0.400	0.250	0.400	0.210		2	2						4.0	0.57	14.41	2.855	5.112	0.30	0.08	26.96	0.1418	0.4615	Pass	Pass
17	7.50	7.85	6.00	7.50	6.50	6.30		0.250	0.250	0.300	0.350	0.350	0.250		2	2						6.9	0.77	11.05	5.434	8.449	0.29	0.05	16.85	0.1951	0.3883	Pass	Pass
18	1.20	1.30	1.20	1.00	1.20	1.20		0.060	0.050	0.100	0.200	0.100	0.070		1	1						1.2	0.10	8.31	0.990	1.377	0.10	0.05	56.53	-0.0107	0.2041	Pass	Pass
19	7.80	8.05	7.50	8.00	7.00	6.80		0.700	0.700	1.200	1.500	1.000	0.720		2	2						7.5	0.53	6.98	6.493	8.557	0.97	0.33	33.97	0.3224	1.6176	Pass	Pass
20	1.00	1.25	1.00	1.00	1.00			0.050	0.050	0.100	0.050	0.100			1	1						1.1	0.11	10.65	0.830	1.270	0.07	0.03	39.12	0.0162	0.1238	Pass	Pass
21	3.50	3.50	2.75	3.50	3.00	3.70		0.200	0.200	0.300	0.250	0.220	0.180		2	2						3.3	0.37	11.00	2.606	4.044	0.23	0.04	19.42	0.1391	0.3109	Pass	Pass
22																																	
23																																	
24																																	
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BATTA

Sample Type: 01-1-3
Sample Archive Location: N-5
Grid Opening ID: E-20

Verified Asbestos Analysis

Analytical Values	Verifying Analyst**	Analysis 1	Analysis 2	Analysis 3	Analysis 4	Analysis 5	Analysis 6	Analysis 7	Analysis 8	Analysis 9	Analysis 10	Analysis 11	Analysis 12	Analysis 13	Analysis 14	Analysis 15	Analysis 16	Analysis 17	Analysis 18	Analysis 19	Analysis 20
Date of Analysis	07/28/04	07/28/04	08/25/04	08/30/04	08/11/04	09/20/04															
TEM Operator	rgs	bl	drw	mq	km	yz															
Structures Reported (SR)	6	6	6	6	6	6															
True Positives (TP)	6	6	6	6	6	6															
*TPM	6	6	6	6	6	6															
TPU	0	0	0	0	0	0															
*TPV (TP found by verifying analyst, but NOT found by any analyst)	0																				
*Total Number of Structures (TNS) (all analysts)	6																				
*Total Number of Structures (TNS) (one analyst)	6	6	6	6	6	6															
False Positives (FP)																					
False Negatives (FN)		0	0	0	0	0															
FNA																					
FNB																					
Not Located (NL)																					
Ambiguous (AMB)																					
TP/TNS		1.000	1.000	1.000	1.000	1.000															
FP/TNS		0.000	0.000	0.000	0.000	0.000															
FN/TNS		0.000	0.000	0.000	0.000	0.000															
[(TP/TNS) + (FN/TNS)] (must equal 1.00)		1.000	1.000	1.000	1.000	1.000															

*Value for these items will be the same for all analysts.

**Verifying analyst should not be one of the TEM Operators.

Refer to NISTIR 5351 for guidance.

BATTA

Statistical Review of Structure Assignment From Verified Asbestos Analysis

Only structures verified as "TPM" are recorded.

	Structure Length							Str Width							Structure Type							Stats for Structure Length					Stats for Structure Width					Str Type / Classification ID	
	E-20							E-20							f=1, b=2, m=3, c=4																		
Str #	rgs	bl	drw	mq	km	yz		rgs	bl	drw	mq	km	yz		rgs	bl	drw	mq	km	yz		Average	Std Dev	CV or %RSD	LCL	UCL	Average	Std Dev	CV or %RSD	LCL	UCL	Type Pass or Fail	Correct Ruling on Structure (If close to 0.5µm) Pass or Fail
1	3.10	3.10	2.75	2.50	2.50	2.90		0.080	0.080	0.100	0.100	0.100	0.100		1	1						2.8	0.27	9.71	2.272	3.344	0.09	0.01	11.07	0.0730	0.1136	Pass	Pass
2	5.30	5.40	5.00	5.00	4.70	5.00		0.150	0.150	0.300	0.200	0.200	0.180		2	2						5.1	0.25	4.94	4.575	5.559	0.20	0.06	28.16	0.0878	0.3055	Pass	Pass
3	2.10	2.10	2.00	2.00	2.00	1.60		0.050	0.070	0.100	0.050	0.080	0.070		1	1						2.0	0.19	9.47	1.601	2.333	0.07	0.02	27.11	0.0327	0.1073	Pass	Pass
4	5.20	5.30	5.00	5.00	4.90	4.70		0.120	0.150	0.250	0.150	0.150	0.130		2	2						5.0	0.21	4.26	4.597	5.437	0.16	0.05	29.47	0.0667	0.2500	Pass	Pass
5	4.70	4.70	4.50	4.00	4.00	3.70		0.100	0.090	0.200	0.100	0.110	0.120		1	1						4.3	0.42	9.91	3.436	5.097	0.12	0.04	33.75	0.0404	0.1996	Pass	Pass
6	1.10	1.05	1.00	1.00	1.00	1.00		0.050	0.050	0.100	0.050	0.100	0.060		1	1						1.0	0.04	4.08	0.943	1.107	0.07	0.02	36.34	0.0195	0.1171	Pass	Pass
7																																	
8																																	
9																																	
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Screen and Camera Magnification Calibration

Date of Measurement: 11/1/2004 **Analyst:** JH

Setting: 20,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/1/2004	973					

	SM1	SM2	SM3	SM4	SM5	Screen/Camera Ratio
Screen	22.3	22.2	22.3	22.3	22.1	#VALUE!

Date	# Spaces	Magnification
11/1/2004	22.24	15540

Setting: 15,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/1/2004	ND *					

		SM2	SM3	SM4	SM5	Screen/Camera Ratio
Screen	29.2	29.2	29.1	29.3	29.1	#VALUE!

Date	# Spaces	Magnification
11/1/2004	29.18	11844

Setting: 10,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/1/2004	974					

	SM1	SM2	SM3	SM4	SM5	Screen/Camera Ratio
Screen	43.7	43.7	43.7	43.6	43.8	#VALUE!

Date		# Spaces		Magnification
11/1/2004		43.7		7908

Setting: 5,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/1/2004	975					

Setting: 1,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/1/2004	ND					

D1 = The smaller measurement of the Supper Device in mm.

D2 = The larger measurement of the Supper Device in mm.

D = D2 - D1

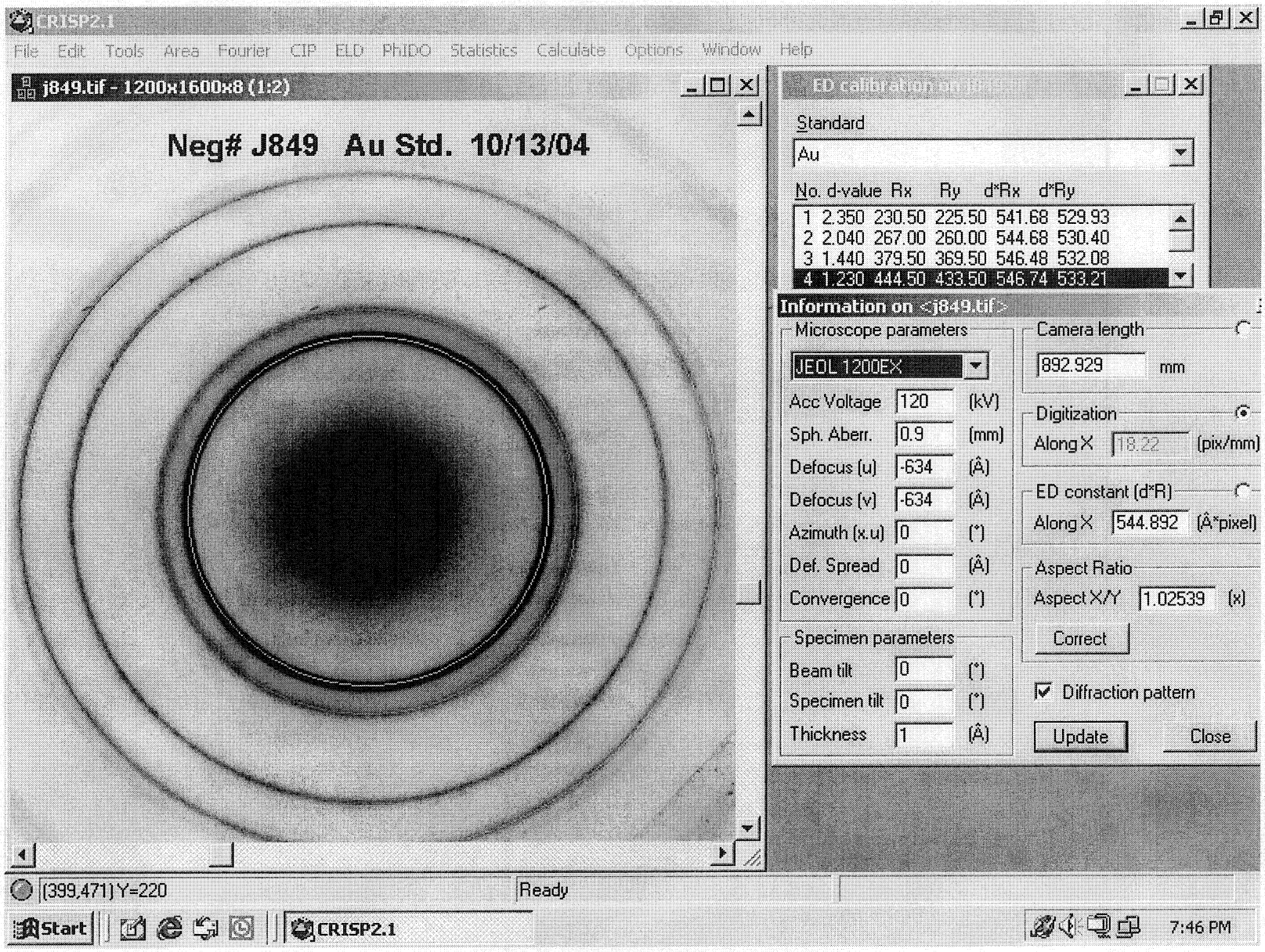
Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Camera Magnification = (D/# spaces) * 2160

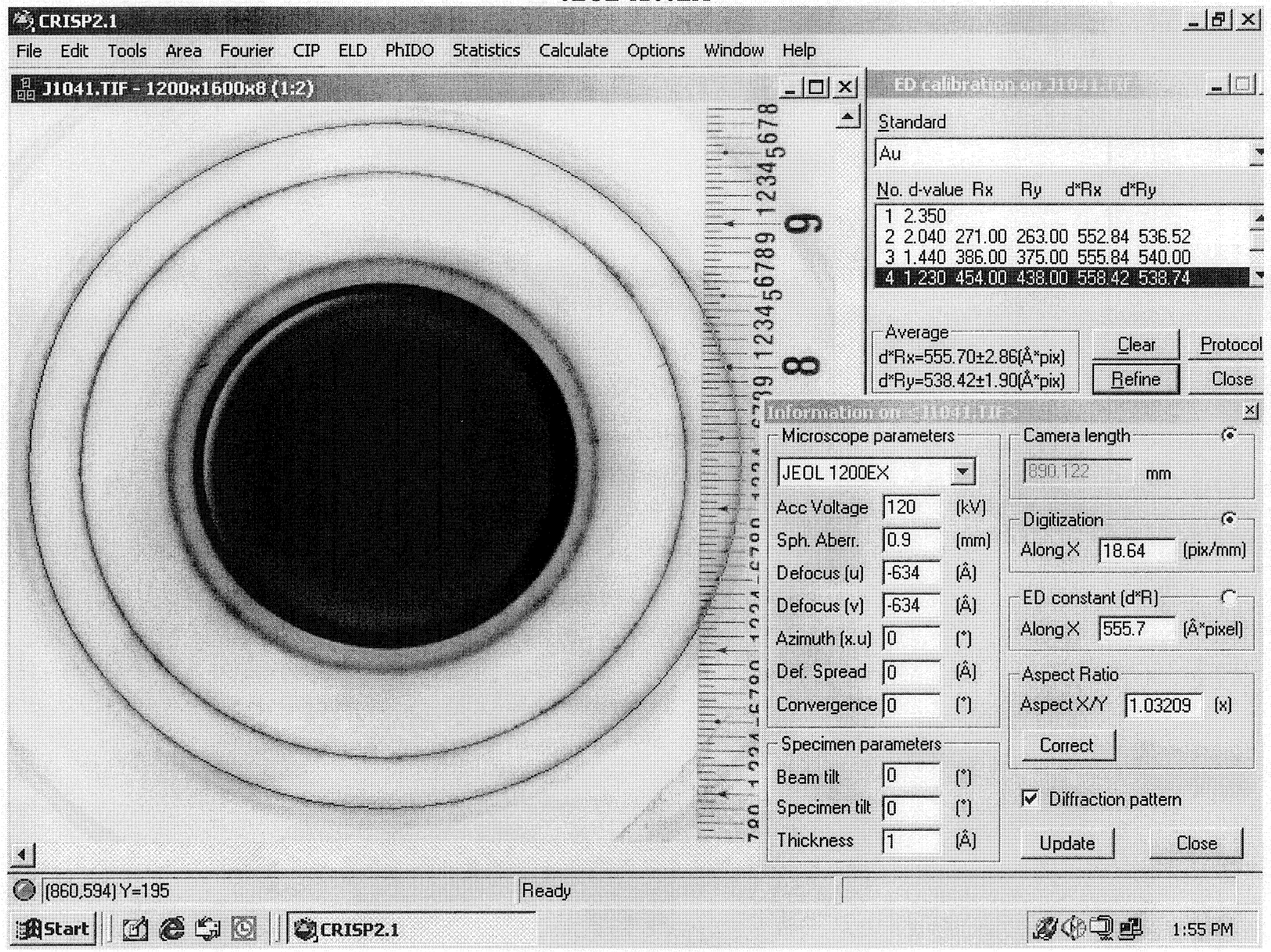
Screen Magnification = (155/# spaces) * 2160

* ND - Not Done

Au Std.
Jeol
10/13/04



Au Std. 11/18/04
JEOL 1200EX



Screen and Camera Magnification Calibration

Date of Measurement: 12/16/2004 **Analyst:** JH

Setting: **20,000**

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
12/16/2004	1178					

	SM1	SM2	SM3	SM4	SM5	Screen/Camera Ratio
Screen	22.2	22.1	22.3	22.3	22.1	#VALUE!

Date	# Spaces	Magnification
12/16/2004	22.2	15568

Setting: **10,000**

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
12/16/2004	1179					

	SM1	SM2	SM3	SM4	SM5	Screen/Camera Ratio
Screen	43.6	43.9	43.6	43.8	43.7	#VALUE!

Date	# Spaces	Magnification
12/16/2004	43.72	7905

Setting: **5,000**

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
12/16/2004	1180					

D1 = The smaller measurement of the Supper Device in mm.

D2 = The larger measurement of the Supper Device in mm.

D = D2 - D1

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Camera Magnification = (D/# spaces) * 2160

Screen Magnification = (155/# spaces) * 2160

* ND - Not Done

k-factor Calibration

KFACTOR SUMMARY

Date:	12/16/2004
Analyst:	JH
Microscope:	JEOL 1200EX

Spectra Number	Mg	Si	Ca	Fe
1	1.08	1.00	1.35	2.02
2	1.07	1.00	1.32	2.01
3	1.08	1.00	1.32	1.82
4	1.08	1.00	1.36	2.04
5	1.08	1.00	1.37	2.01
Average	1.08	1.00	1.34	1.98
Standard Deviation	0.00	0.00	0.02	0.09
2s	0.01	0.00	0.04	0.18
STDEV Pass/Fail	Pass	Pass	Pass	Pass
Sensitivity (Mg:Fe)	0.54			
Pass/Fail	**PASS**			

Sensitivity (Mg:Fe) values greater than 1.5 are failed. Instrument must be taken out of operation, serviced and k-factor calibrations redone before instrument may be place back into service.

Relative kfactor values	Rounded value	Limits	Pass/Fail
Na			
Mg			
Al			
Ca			
Fe			

SRM 2063a Raw data

Spectra Number		Mg	Si	Ca	Fe
1	Background	0	0	0	0
	Net Area Counts	24742	84619	29201	18246
	Counts - Background	24742	84619	29201	18246
	Isi/Ia	3.42005497	1	2.897811719	4.63767401
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.08	1.00	1.35	2.02
2	Background	0	0	0	0
	Net Area Counts	24546	83655	29487	18124
	Counts - Background	24546	83655	29487	18124
	Isi/Ia	3.40809093	1	2.837012921	4.61570294
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.07	1.00	1.32	2.01
3	Background	0	0	0	0
	Net Area Counts	29488	101272	35702	24262
	Counts - Background	29488	101272	35702	24262
	Isi/Ia	3.43434617	1	2.836591788	4.17409941
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.08	1.00	1.32	1.82
4	Background	0	0	0	0
	Net Area Counts	25022	85746	29481	18338
	Counts - Background	25022	85746	29481	18338
	Isi/Ia	3.42682439	1	2.90851735	4.67586433
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.08	1.00	1.36	2.04
5	Background	0	0	0	0
	Net Area Counts	24843	85039	29000	18461
	Counts - Background	24843	85039	29000	18461
	Isi/Ia	3.4230568	1	2.93237931	4.60641352
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.08	1.00	1.37	2.01

Albite Standard Calibration

SRM 99a (Version#1)

Date:	12-16-04				
Analyst:	JH				
Spectra Number	**Na**	**Al**	**Si**		
1	3.88	2.72	1.00		
2	1.07	0.53	1.00		
Average	2.48	1.63	1.00		
Standard Deviation	1.99	1.55	0.00		
Na Limits	**2.48**	**PASS**			
Al Limits	**1.63**	**PASS**			

SRM 99a Raw Data

Spectra Number		Na	Al	Si
1	Background	0	0	0
	Gross Area	858	4609	28138
	Net Area Counts	858	4609	28138
	Cx/Csi	0.11838624	0.4457672	1
	Isi/Ix	32.7948718	6.10501193	1
	k-factor	3.88	2.72	1.00
2	Background	0	0	0
	Gross Counts	192	1460	1737
	Net Counts	192	1460	1737
	Cx/Csi	0.11838624	0.4457672	1
	Isi/Ix	9.046875	1.18972603	1
	k-factor	1.07	0.53	1.00

Albite Standard Calibration

SRM 99a

Date: 12/16/2004
Analyst: jh

Spectra Number	Na	Al	Si
1	0.90	1.43	1.00
2	1.91	1.76	1.00
3	1.41	1.62	1.00
4	0.94	1.82	1.00
5	0.89	1.33	1.00
Average	1.21	1.59	1.00
Standard Deviation	0.45	0.21	0.00
2s	0.90	0.42	0.00
Na Limits	**1.21**	**PASS**	
Al Limits	**1.59**	**PASS**	

SRM 99a Raw Data

Spectra Number		Na	Al	Si
1	**Background**			
	Area Counts	9419	22320	71365
	Net Counts	9419	22320	71365
	Cx/Csi	0.118386243	0.4457672	1
	Isi/Ix	7.576706657	3.1973566	1
	k-factor	0.90	1.43	1.00
2	**Background**			
	Area Counts	3370	13800	54377
	Net Counts	3370	13800	54377
	Cx/Csi	0.118386243	0.4457672	1
	Isi/Ix	16.13560831	3.9403623	1
	k-factor	1.91	1.76	1.00

3	Background			
	Area Counts	4692	15360	55914
	Net Counts	4692	15360	55914
	Cx/Csi	0.118386243	0.4457672	1
	Isi/Ix	11.9168798	3.6402344	1
	k-factor	1.41	1.62	1.00
4	Background			
	Area Counts	8496	16427	67125
	Net Counts	8496	16427	67125
	Cx/Csi	0.118386243	0.4457672	1
	Isi/Ix	7.900776836	4.0862604	1
	k-factor	0.94	1.82	1.00
5	Background			
	Area Counts	8414	21097	63127
	Net Counts	8414	21097	63127
	Cx/Csi	0.118386243	0.4457672	1
	Isi/Ix	7.50261469	2.9922264	1
	k-factor	0.89	1.33	1.00

BEAM DOSE CALIBRATION

(Version#1)

Date:	12/16/2004				
Analyst:	JH				
Microscope:	JEOL 1200EX				
Fiber Length used in analysis (um):					
Time (sec)	**Visual**	**Neg #**	**Recordable Diffraction**	**EDS**	**Photo**
0	Y		ND*		
30	Y		ND*		
60	Y	1181	Y		
90	Y	1182	Y		
120	Y	1183	Y		
150	Y	1184	Y	865	1185
PASS/FAIL	**PASS**		**PASS**		

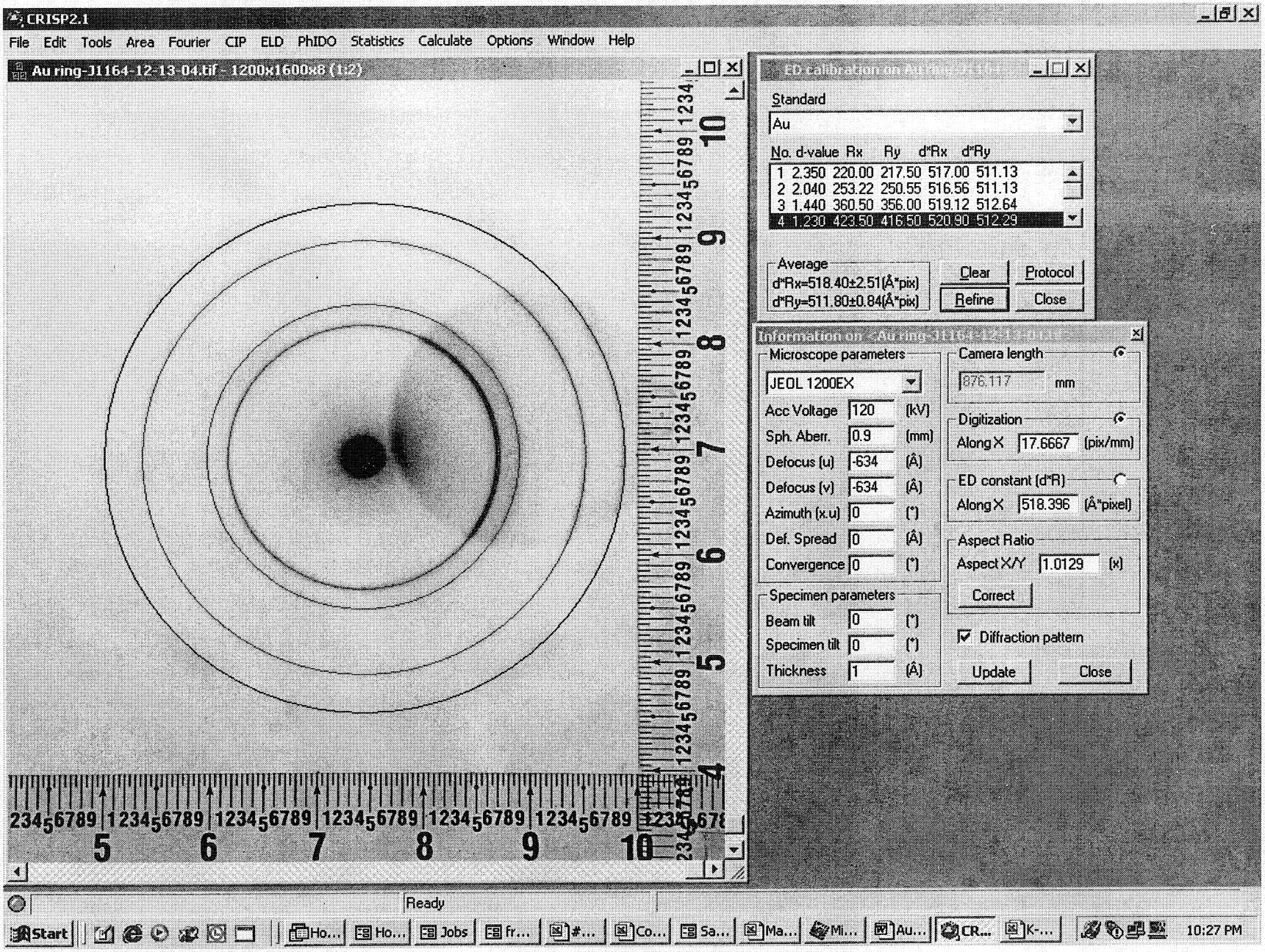
*ND - Not Done

Visual - Mark "Y" if diffraction pattern is seen on screen, mark "N" if pattern is not seen on screen

Recordable Diffraction - Mark "Y" if diffraction pattern is seen on negative, mark "N" if pattern is not seen on negative

Chrysotile Fiber Specs.: Single fibril, >= 1.0 micron in length

Au Std. 12/13/04
JEOL 1200EX
Neg J1164



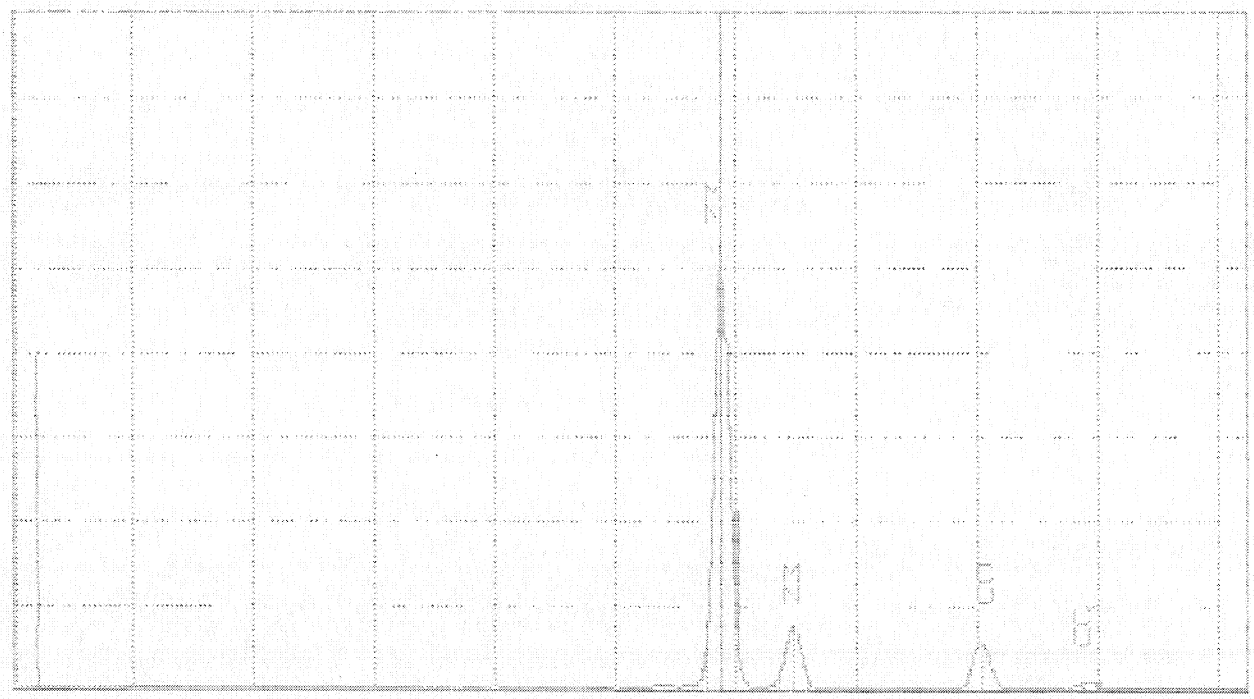
1,50
*

MN RESOL 12-16-04 HP 16ASBCN

CENTR.	AREA	FWHM
245	216	25 N
601	708	151
929	649	117
4142	671	135
5406	918	120
6000	168451	141
6429	241125	150
7409	321	147
8028	19145	159
10090	2924	179

RESOLVMAN = 141

TN-5400 University of Washington / JEOL HXI 17-DEC-04 00:01
Current: 5.890keV = 10/25



0.000 B- 5 VPS = 16384 1M 24M
165 MN RESOL 12-16-04 SPSB4

*
SDMTF: QUANTIFY
Standardless Analysis
*X 'SDMTF'

Chi-sqrd = 0.95

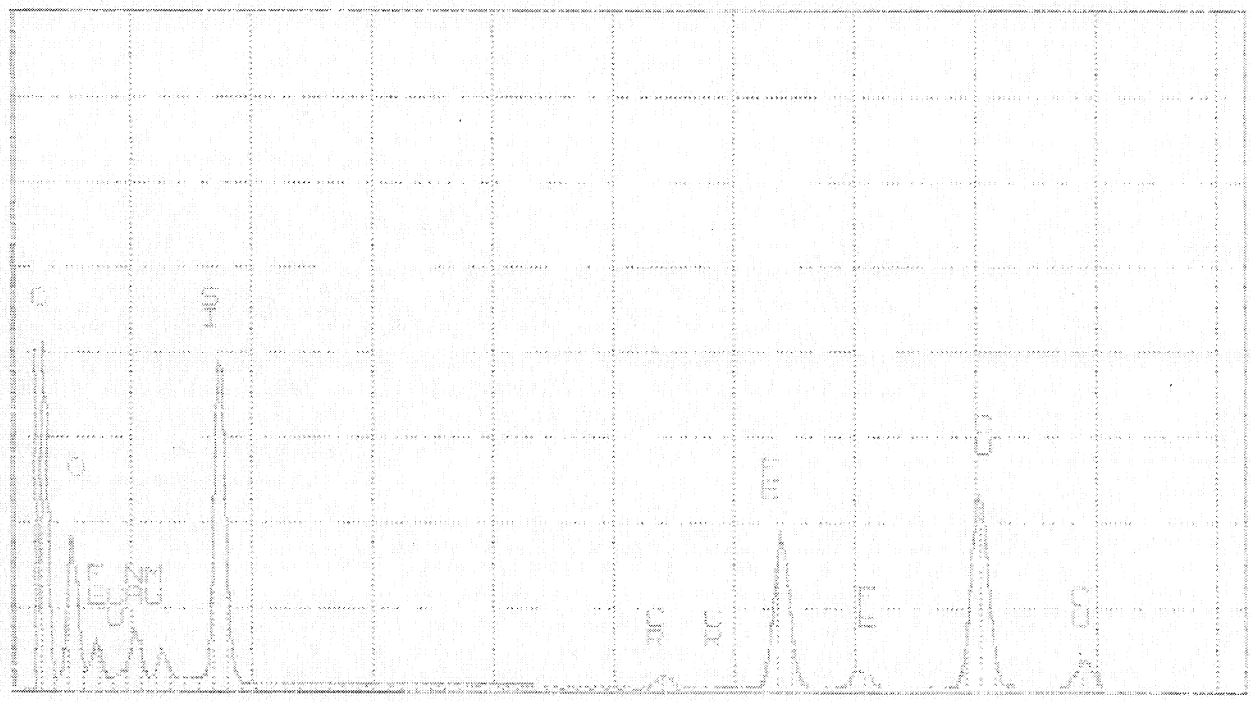
Element	Net Counts
Si-K	23333 +/- 284
Mg-K	2640 +/- 256
Al-K	1275 +/- 308
Ca-K	179 +/- 106
Fe-K	16594 +/- 241
Na-K	4302 +/- 168
K -K	270 +/- 101

IBEAM	EDS:SIK	EDS:MGK	EDS:ALK	EDS:CAK	EDS:FEK	EDS:NAK	EDS:

CROC STD 12-16-04 SPG63

EL-LINE	PEAK	K-FACTOR	CHI/LNBF	ATOM%	EL WT%	WT%	FORMULA
SI-K	23333	1.000	1.000	20.22	24.61	52.74	SIO2
MG-K	2640	1.000	0.111	2.44	2.77	4.62	MGO
AL-K	1275	0.750	0.041	0.84	1.01	1.91	AL2O3
CA-K	179	0.949	0.007	0.10	0.18	0.25	CAO
FE-K	16594	1.399	0.994	10.07	24.51	35.01	FE2O3
NA-K	4302	0.549	0.101	2.50	2.50	5.10	NA2O
K-K	270	1.059	0.012	0.18	0.30	0.36	K2O
O			1.792	63.42	44.12		

TN-SHAO University of Washington / JEOL THU 16-DEC-04 23:31
Current: 0.000keV = 0



0.0MM R- 5 VFs = 4096 10.240
162 CROC STD 12-16-04 SPG63

✓ b. **for spot size measurement**, see:
- D. B. Williams, *Practical Analytical Electron Microscopy in Materials Science*, Philips Electronics Instruments, Inc., Mahwah, New Jersey, 1984, pp. 34-35 (for TEM or STEM mode);
- D. B. Williams, *Standardized Definitions of X-ray Analysis Performance Criteria in the AEM*, in A. D. Romig Jr. and W. F. Chambers, (ed.), *Microbeam Analysis 1986*, San Francisco Press, San Francisco, 1986, pp. 443-448 (for TEM mode); and
- J. I. Goldstein, et al., *Scanning Electron Microscopy and X-ray Microanalysis*, Plenum Press, New York, 1981, p. 48 (for STEM mode);

✓ c. **for k-factor measurement**, see:
- D. C. Joy, A. D. Romig, J. I. Goldstein, *Introduction to Analytical Electron Microscopy*, Plenum Press, New York, 1986; or
- D. B. Williams, *Practical Analytical Electron Microscopy in Materials Science*, Philips Electronics Instruments, Inc., Mahwah, New Jersey, 1984;

✓ d. **for quality assurance**, see J. K. Taylor, *Quality Assurance of Chemical Measurements*, Lewis Publishers, Chelsea, Michigan, 1987;

✓ e. **for statistical analysis**, see M. G. Natrella, *Experimental Statistics*, John Wiley & Sons, New York, 1966;

✓ f. **for control charts**, see *Manual on Presentation of Data and Control Chart Analysis*, ASTM, Philadelphia, 1991; and

✓ g. reference data on the crystallography and chemical composition of minerals that analytically interfere with the regulated asbestos minerals.

3 Personnel

✓ 3.1 Staff members are aware of both the extent and limitation of their area of responsibility.

✓ 3.2 The laboratory has a written description of its training program which includes training with standards and blind testing to determine competency and criteria for successful completion.

✓ 3.3 Analysts and technical supervisors participate in an appropriate form of continuing education, such as formal coursework, in-house education, and scientific or technical meetings, and have access to journals that describe advances in the field of electron microscopy and/or asbestos analysis.

✓ 3.4 The technical supervisor(s) shall be qualified to conduct AEM studies, apply AEM to crystalline materials and is knowledgeable in the field of asbestos analysis including procedures for sample handling, preparation, analysis, storage, disposal, and contamination monitoring.

3.5 AEM analysts are trained and are proficient in:

✓ a. AEM use, calibration, alignment, electron micrography (or functional equivalent);

should be from the low end (0.7 keV to 2 keV) and the other peak from the high end (7 keV to 10 keV) of this range. The calibration of the x-ray energy is checked prior to each analysis of samples and recalibrated if out of the specified range.

6.11 The relative sensitivity (k-factors) factors relative to Si for elements found in asbestos (Na, Mg, Al, Si, Ca, Fe) are determined so that:

a. the k-factors are determined to a precision (2 *s*) within 10% relative to the mean value obtained for Mg, Al, Si, Fe, and within 20% relative to the mean value obtained for Na;

b. the k-factor relative to Si for Na is between 1.0 and 4.0, for Mg and Fe is between 1.0 and 2.0, and for Al and Ca is between 1.0 and 1.75; and

c. the k-factor for Mg relative to Fe on SRM 2063(a) or other standard traceable to NIST is 1.5 or less.

NOTE: *SRM 2063 or SRM 2063a can be used for the determination of k-factors for Mg, Si, Ca and Fe. The laboratory must obtain its own chemically characterized materials for determining the Na and Al k-factors. Examples include albite for Na k-factor determination and biotite or albite for Al k-factor determination. Na k-factors are sensitive to electron beam dose (current and time). It is suggested that small particles (≤ 0.1 µm in size) be used for Na k-factor determination to minimize the effect of Na migration.*

6.12 The portions of a grid in a specimen holder for which abnormal x-ray spectra are generated under routine asbestos analysis conditions are determined and these areas are avoided in asbestos analysis.

NOTE: *X-rays can be absorbed due to the relative position of the area of interest, the grid bars, specimen holder and x-ray detector and give an abnormal spectra (for an example of an abnormal spectra see S. Turner, E. B. Steel, S. S. Doorn, and S. B. Burris, "Proficiency Tests for the NIST Airborne Asbestos Program - 1991," NISTIR 5432). The laboratory should use a standard material (SRM 2063 is recommended) to map out the spectra obtained over the grid area and to thereby determine the regions that should be avoided in routine analysis.*

6.13 The low temperature asher is calibrated by determining a calibration curve for the weight vs. ashing time of collapsed mixed-cellulose-ester (mce) filters.

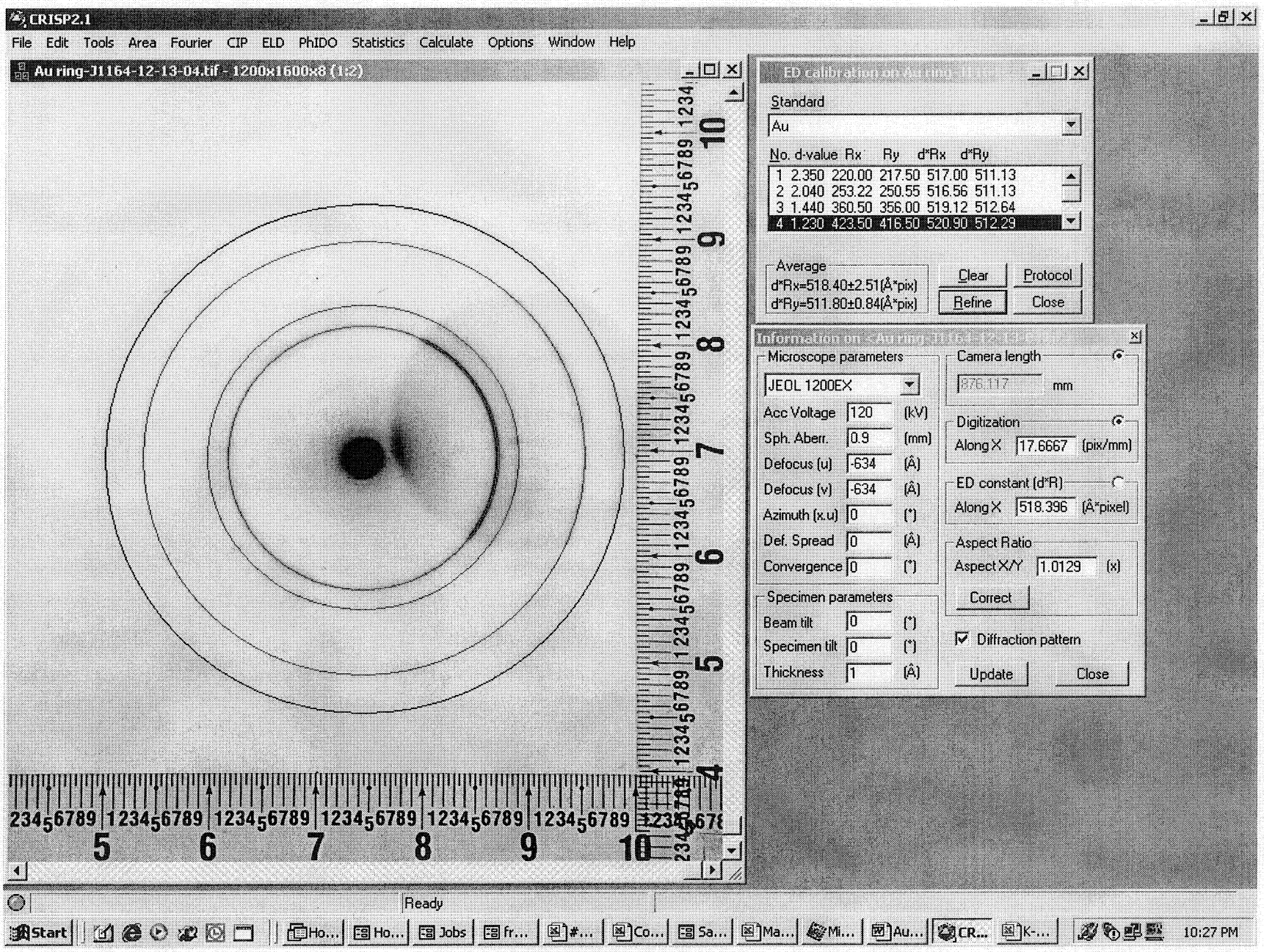
NOTE: *The AHERA method specifies that a mixed-cellulose-ester filter is to be ashed by 10%. However, if ashing by this amount generates a texture in the replica that affects structure counting, it is permissible to etch by less than this amount.*

6.14 The determination of the quality of sample preparations is calibrated or the laboratory has the following documentation available:

a. images and samples showing good preparations and examples of the types of problems that occur in poor preparations (readily available to analysts); and

b. a record of repeat evaluations of images and samples by the same and different analysts. (This data may be derived in part from sample preparation evaluations done in the course of verified analysis.)

Au Std. 12/13/04
JEOL 1200EX
Neg J1164



Screen and Camera Magnification Calibration

Version#1

Date of Measurement: 12/17/2004 **Analyst:** DW

Average:

Screen Magnification at 18,000:	17347
Screen Magnification at 10,000:	10024

Camera Magnification at 18,000:	18133
Camera Magnification at 10,000:	10527
Camera Magnification at 550:	562

Setting 18,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
10/25/2004	5340	30.2	114.15	83.95	10	18133

H.ST
18100

Screen

Date	# Spaces	Magnification
10/25/2004	19.3	17347

Setting 10,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
10/25/2004	5341	29.6	112.45	82.85	17	10527

H.ST
10511

Screen

Date	# Spaces	Magnification
10/25/2004	33.4	10024

Setting 550

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
10/25/2004	5342	48.25	61.25	13	50	562

H.ST
570

D1 = The smaller measurement of the Supper Device in mm.

D2 = The larger measurement of the Supper Device in mm.

D = D2 - D1

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Camera Magnification = (D/# spaces) * 2160

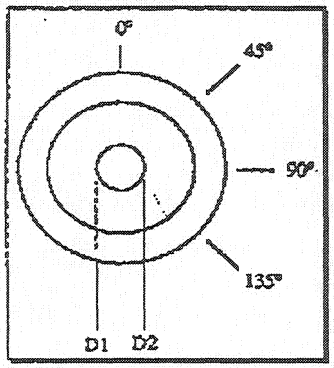
Screen Magnification = (155/# spaces) * 2160

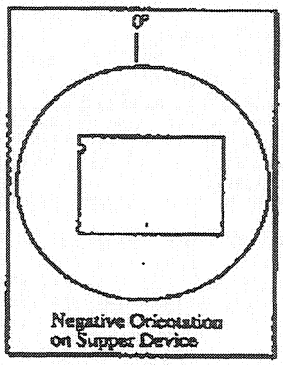
Camera Length and Camera Constant Calibration (Version#1)

Date of Measurement:	12/17/2004	**Average Camera Constant:**	26.951 **mmA**
Negative Number:	5343	(All 12 Measurements)	
Date Negative was Taken:	10/25/2004	**Average Camera Length:**	728.42 **mm**
Analyst:	DW	(All 12 Measurements)	

Ring #	**0 degrees**						**45 degrees**					
	D_1	D_2	D	R	CC	CL	D_1	D_2	D	R	CC	CL
1	55.60	78.45	22.85	11.43	26.91	727.19	64.50	87.35	22.85	11.43	26.91	727.19
2	53.70	80.25	26.55	13.28	27.07	731.56	62.60	89.00	26.40	13.20	26.91	727.43
3	48.25	85.70	37.45	18.73	27.00	729.77	57.20	94.40	37.20	18.60	26.82	724.90

Ring #	**90 degrees**						**135 degrees**					
	D_1	D_2	D	R	CC	CL	D_1	D_2	D	R	CC	CL
1	76.65	99.55	22.90	11.45	26.96	728.78	85.15	108.05	22.90	11.45	26.96	728.78
2	74.85	101.35	26.50	13.25	27.02	730.18	83.25	109.80	26.55	13.28	27.07	731.56
3	69.55	106.80	37.25	18.63	26.86	725.87	77.80	115.15	37.35	18.68	26.93	727.82





Measure the first three rings moving outward from the central spot of the diffraction pattern.

D_1 = The smaller measurement on the Supper device (mm).

D_2 = The larger measurement on the Supper device (mm).

$D = D_2 - D_1$

$R = D/2$

CC = Camera Constant

For Ring 1 [111], CC = R*2.355

For Ring 2 [200], CC = R*2.039

For Ring 3 [220], CC = R*1.442

CL = Camera Length = CC/0.037

k-factor Calibration

SRM 2063a (Revision# 4)

Date:	12/17/2004			
Analyst:	JH			
Spectra Number	**Mg**	**Si**	**Ca**	**Fe**
1	1.88	1.00	1.00	1.27
2	1.93	1.00	1.00	1.29
3	1.88	1.00	0.99	1.28
4	1.89	1.00	0.99	1.28
5	1.88	1.00	0.99	1.28
Average	1.89	1.00	0.99	1.28
Standard Deviation	0.02	0.00	0.01	0.01
2s	0.05	0.00	0.01	0.01
STDEV Pass/Fail	Pass	Pass	Pass	Pass
Sensitivity (Mg:Fe)	1.48			
Pass/Fail	**PASS**			
Relative Limits	Mg		Ca	Fe
	Pass		Fail	Pass

Sensitivity (Mg:Fe) values greater than 1.5 are failed. Instrument must be taken out of operation, serviced and k-factor calibrations redone before instrument may be place back into service.

SRM 2063a Raw data

Spectra Number		Mg	Si	Ca	Fe
1	Background				
	Net Area Counts	62.338	371.714	173.369	127.314
	Counts - Background	62.338	371.714	173.369	127.314
	Isi/Ia	5.96287978	1	2.144062664	2.91966319
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.88	1.00	1.00	1.27
2	Background	0	0	0	0
	Net Area Counts	40.504	248.989	116.193	84.248
	Counts - Background	40.504	248.989	116.193	84.248
	Isi/Ia	6.14726941	1	2.142891568	2.95542921
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.93	1.00	1.00	1.29
3	Background	0	0	0	0
	Net Area Counts	66.158	395.402	186.626	135.05
	Counts - Background	66.158	395.402	186.626	135.05
	Isi/Ia	5.9766317	1	2.118686571	2.92781933
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.88	1.00	0.99	1.28
4	Background	0	0	0	0
	Net Area Counts	59.319	357.172	167.774	121.903
	Counts - Background	59.319	357.172	167.774	121.903
	Isi/Ia	6.02120737	1	2.12888767	2.92996891
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.89	1.00	0.99	1.28
5	Background	0	0	0	0
	Net Area Counts	60.147	358.695	169.604	122.608
	Counts - Background	60.147	358.695	169.604	122.608
	Isi/Ia	5.96363908	1	2.114897054	2.92554319
	Ca/Csi	0.31452249	1	0.466456196	0.43646409
	k-factor	1.88	1.00	0.9865	1.28

Albite Standard Calibration

SRM 99a (Revision# 3)

Date:	12/17/2004		
Analyst:	TM		
Spectra Number	**Na**	**Al**	**Si**
1	2.04	1.53	1.00
2	2.05	1.45	1.00
3	2.14	1.37	1.00
4	2.45	1.46	1.00
5	2.18	1.49	1.00
Average	2.17	1.46	1.00
Standard Deviation	0.16	0.06	0.00
2s	0.33	0.11	0.00
STDEV Pass/Fail	Pass	Pass	Pass
Relative Limits	Na	Al	
	Pass	Pass	

SRM 99a Raw Data

Spectra Number		Na	Al	Si
1	Background	15	49	158
15598	Gross Counts	151	734	2503
	Net Counts	136	685	2345
	Cx/Csi	0.118386243	0.445767196	1
	Isi/Ix	17.24264706	3.423357664	1
	k-factor	2.04	1.53	1.00
2	Background	49	119	529
15599	Gross Counts	483	2433	8043
	Net Counts	434	2314	7514
	Cx/Csi	0.118386243	0.445767196	1
	Isi/Ix	17.31336406	3.247191011	1
	k-factor	2.05	1.45	1.00
3	Background	25	46	237
15600	Gross Counts	165	867	2763
	Net Counts	140	821	2526
	Cx/Csi	0.118386243	0.445767196	1
	Isi/Ix	18.04285714	3.076735688	1
	k-factor	2.14	1.37	1.00
4	Background	42	98	534
15601	Gross Counts	405	2382	8033
	Net Counts	363	2284	7499
	Cx/Csi	0.118386243	0.445767196	1
	Isi/Ix	20.6584022	3.283274956	1
	k-factor	2.45	1.46	1.00
5	Background	36	89	348
15602	Gross Counts	289	1488	5012
	Net Counts	253	1399	4664
	Cx/Csi	0.118386243	0.445767196	1
	Isi/Ix	18.43478261	3.333809864	1
	k-factor	2.18	1.49	1.00

Screen Magnification Calibration (Philips 410)

(Version#1)

Date of Measurement: 12/17/04

Analyst: DW

Average:

Screen Magnification at 18,000:	17347
Screen Magnification at 10,000:	10024

Setting 18,000

Screen

Date	# Spaces	Magnification
10/25/2004	19.3	17347

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
10/25/2004	5.26	5.07

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
10/25/2004	0.53	0.51

Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
10/25/2004	4.61	4.44	0.058	0.576

Setting 10,000

Screen

Date	# Spaces	Magnification
10/25/2004	33.4	10024

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
10/25/2004	9.11	9.13

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
10/25/2004	0.91	0.913

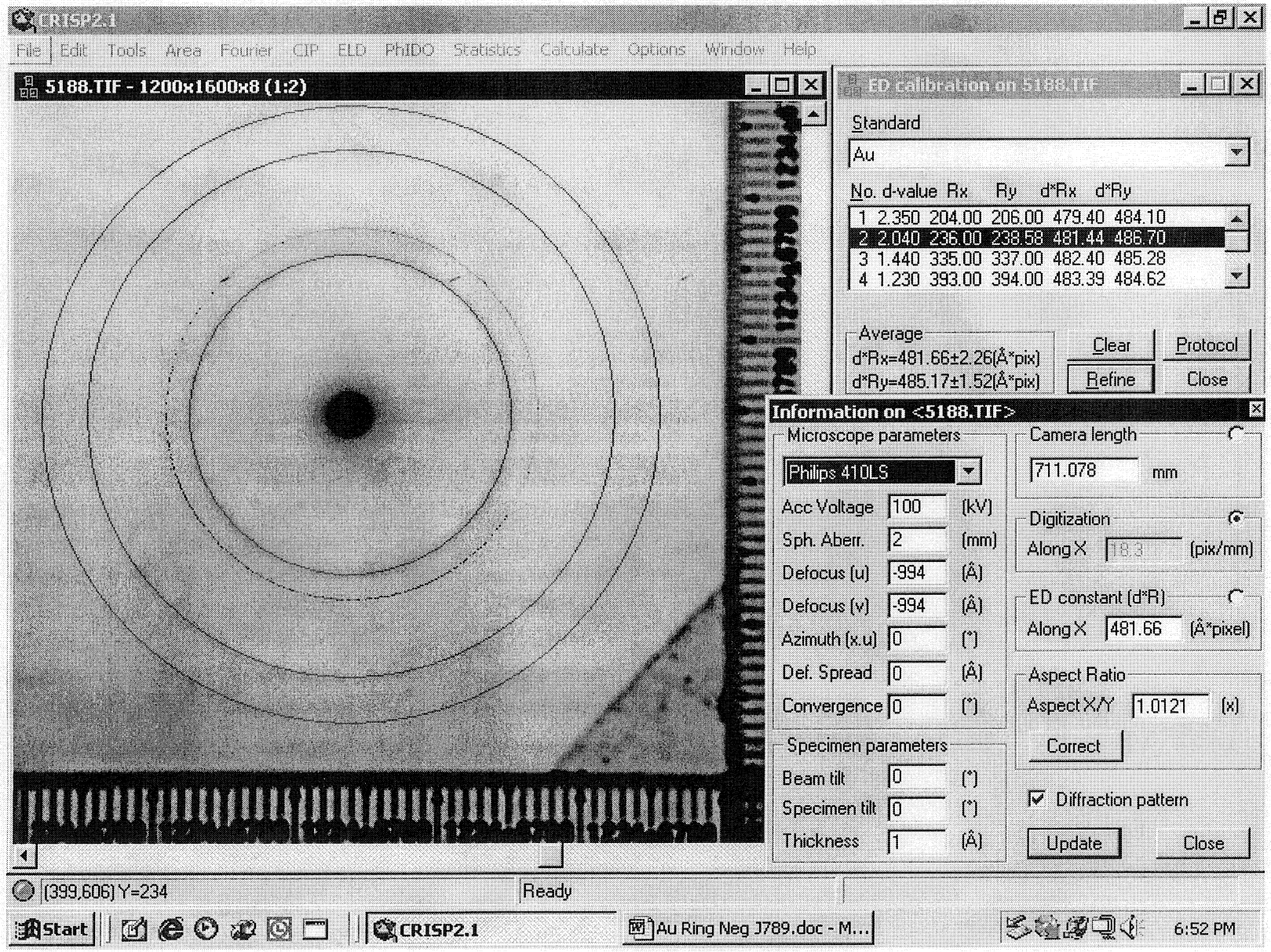
Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
10/25/2004	7.98	8.00	0.100	0.998

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Screen Magnification = (155/# spaces) * 2160

Au Std 9/28/04
Philips 410
Neg 5188



Montl Claibration Log — Lab/Cor, Inc. — Date: OCT 04

Analyst											KM	KM	VH			
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18K Mag. Calib. SC1																
SC2																
SC3																
SC4																
SC5																
10K Mag. Calibration																
EDS																
EDS Na																
EDS Al											1.485					
Gain Inc.											-12					
New Gain											5					
Cu											8.044					
Zero Inc.											19					
New Zero											-794					
Resolution											167.8					
# of Iterations											4					
Alignment -- FCA											✓	✓	✓			
DA											✓					
Gold Rings Negative													✓			
Camera Constant																

Analyst			[illegible]	[illegible]					[illegible]		[illegible]			TM	TM	
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
18K Mag. Calib. SC1									19.3							
SC2									19.3							
SC3									19.2							
SC4									19.3							
SC5									19.3							
10K Mag. Calibration									33.4							
EDS																
EDS Na				1.485					1.485		1.485			1.485	1.485	
EDS Al																
Gain Inc.				-5					-4		-31			5	8	
New Gain				193					122		149			118	96	
Cu				8.044					8.044		8.044			8.044	8.044	
Zero Inc.				25					23		38			-3	-14	
New Zero				-282					-497		-793			-419	-54	
Resolution				156.0					165.8		168			156.5	162.7	
# of Iterations				4					3					3	2	
Alignment -- FCA			[illegible]						[illegible]		[illegible]				KM	
DA			[illegible]	[illegible]					[illegible]		[illegible]				KM	
Gold Rings Negative									✓						✓	
Camera Constant																

Screen and Camera Magnification Calibration

Version#1

Date of Measurement: 12/17/2004 **Analyst:** KM

Average:

Screen Magnification at 18,000:	17187
Screen Magnification at 10,000:	9847

Camera Magnification at 18,000:	18036
Camera Magnification at 10,000:	10487
Camera Magnification at 550:	566

Setting 18,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/9/2004	5629	24	107.5	83.5	10	18036

Hist 18100

Screen

Date	# Spaces	Magnification
11/1/2004	19.48	17187

Setting 10,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/9/2004	5630	16.85	109.1	92.25	19	10487

Hist 10511

Screen

Date	# Spaces	Magnification
11/1/2004	34	9847

Setting 550

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
11/9/2004	5631	52.45	65.55	13.1	50	566

Hist 570

D1 = The smaller measurement of the Supper Device in mm.

D2 = The larger measurement of the Supper Device in mm.

D = D2 - D1

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Camera Magnification = (D/# spaces) * 2160

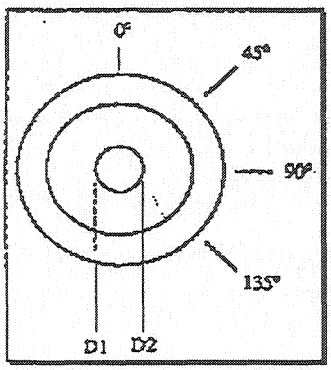
Screen Magnification = (155/# spaces) * 2160

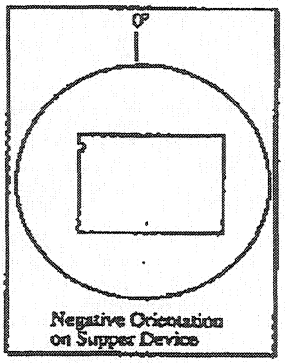
Camera Length and Camera Constant Calibration (Version#1)

Date of Measurement:	12/17/2004	**Average Camera Constant:**	26.934 **mmA**
Negative Number:	5503	(All 12 Measurements)	
Date Negative was Taken:	11/16/2004	**Average Camera Length:**	727.95 **mm**
Analyst:	KM	(All 12 Measurements)	

Ring #	**0 degrees**						**45 degrees**					
	D_1	D_2	D	R	CC	CL	D_1	D_2	D	R	CC	CL
1	56.90	79.90	23.00	11.50	27.08	731.96	64.30	87.25	22.95	11.48	27.02	730.37
2	55.20	81.70	26.50	13.25	27.02	730.18	62.65	88.95	26.30	13.15	26.81	724.67
3	49.75	87.10	37.35	18.68	26.93	727.82	57.20	94.50	37.30	18.65	26.89	726.85

Ring #	**90 degrees**						**135 degrees**					
	D_1	D_2	D	R	CC	CL	D_1	D_2	D	R	CC	CL
1	75.30	98.20	22.90	11.45	26.96	728.78	83.15	106.00	22.85	11.43	26.91	727.19
2	73.45	99.80	26.35	13.18	26.86	726.05	81.35	107.80	26.45	13.23	26.97	728.80
3	68.05	105.30	37.25	18.63	26.86	725.87	75.75	113.05	37.30	18.65	26.89	726.85





Measure the first three rings moving outward from the central spot of the diffraction pattern.

D_1 = The smaller measurement on the Supper device (mm).

D_2 = The larger measurement on the Supper device (mm).

$D = D_2 - D_1$

$R = D/2$

CC = Camera Constant

For Ring 1 [111], CC = R*2.355

For Ring 2 [200], CC = R*2.039

For Ring 3 [220], CC = R*1.442

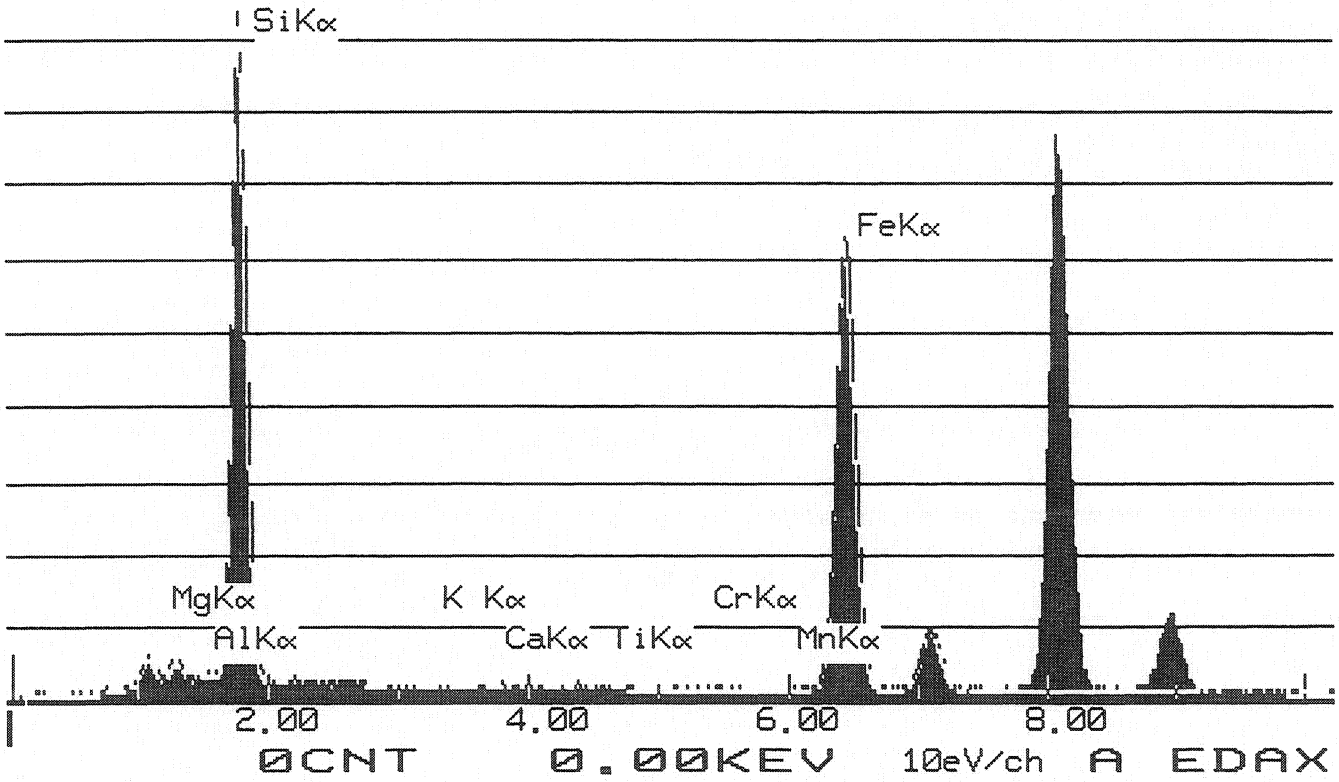
CL = Camera Length = CC/0.037

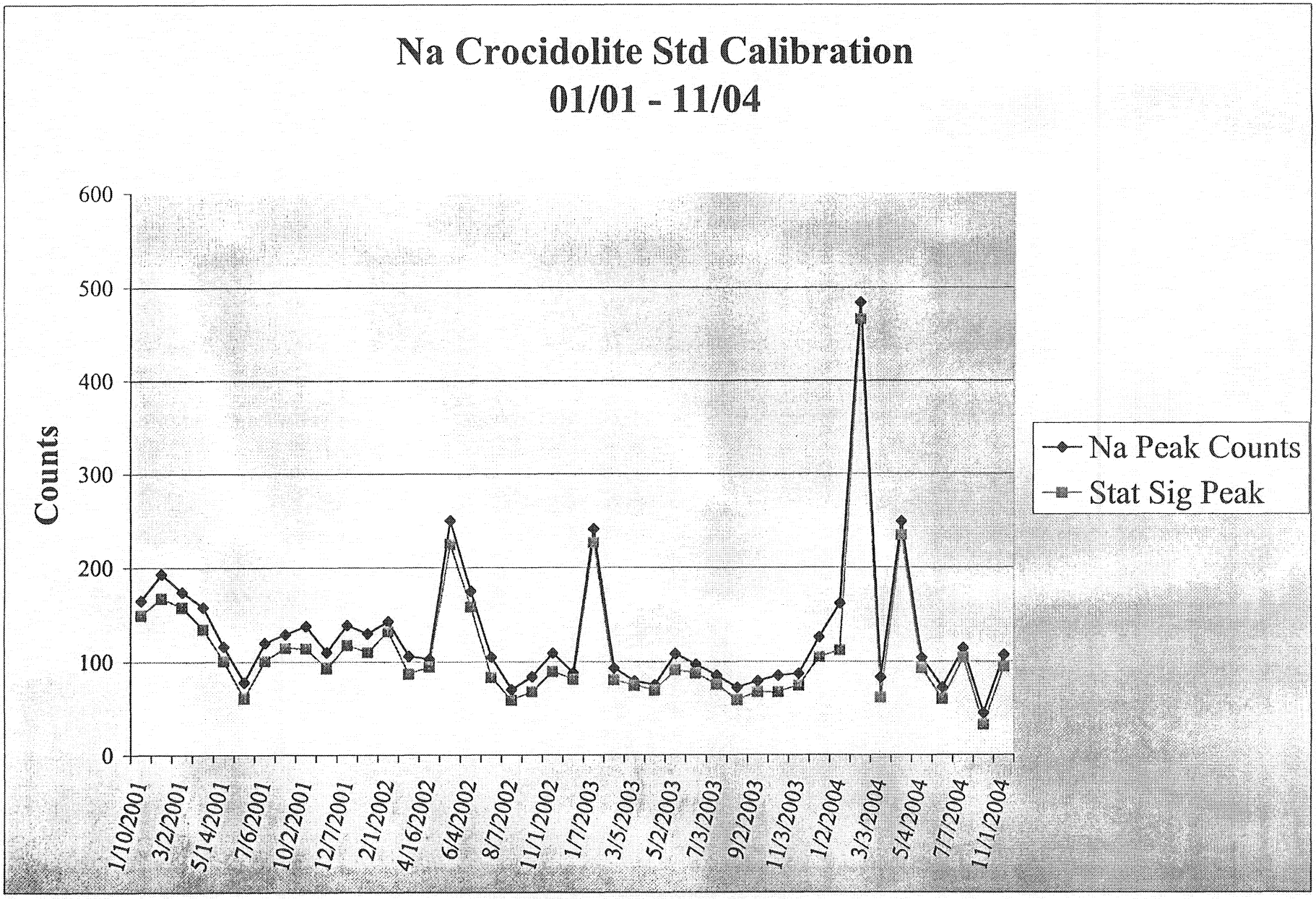
INTE-% :
I^BEL = CROC STD 11/1/04 15277
\ JAN-73 19:53:55
91.138 LIVE SECONDS

ELEM	CPS	WT % ELEM	WT % OXIDE
NAK	7.867	3.622	4.883
MGK	5.914	1.286	2.132
ALK	1.119	0.146	0.276
SIK	198.578	24.278	51.939
CRK	0.285	0.046	0.068
FEK	183.853	28.469	40.703
TOTAL			100.000

USED PEIF: USER

08-JAN-05 19:54:20 SUPER QUANT
RATE=21852CPS TIME= 91LSEC
FS= 1962/ 1962 PRST= 200LSEC
A =CROC STD 11/1/04 15277




Na Crocidolite Std Calibration
01/01 - 11/04
Counts
600
500
400
300
200
100
0
1/10/2001
3/2/2001
5/14/2001
7/6/2001
10/2/2001
12/7/2001
2/1/2002
4/16/2002
6/4/2002
8/7/2002
11/1/2002
1/7/2003
3/5/2003
5/2/2003
7/3/2003
9/2/2003
11/3/2003
1/2/2004
3/3/2004
5/4/2004
7/7/2004
11/1/2004
Na Peak Counts
Stat Sig Peak

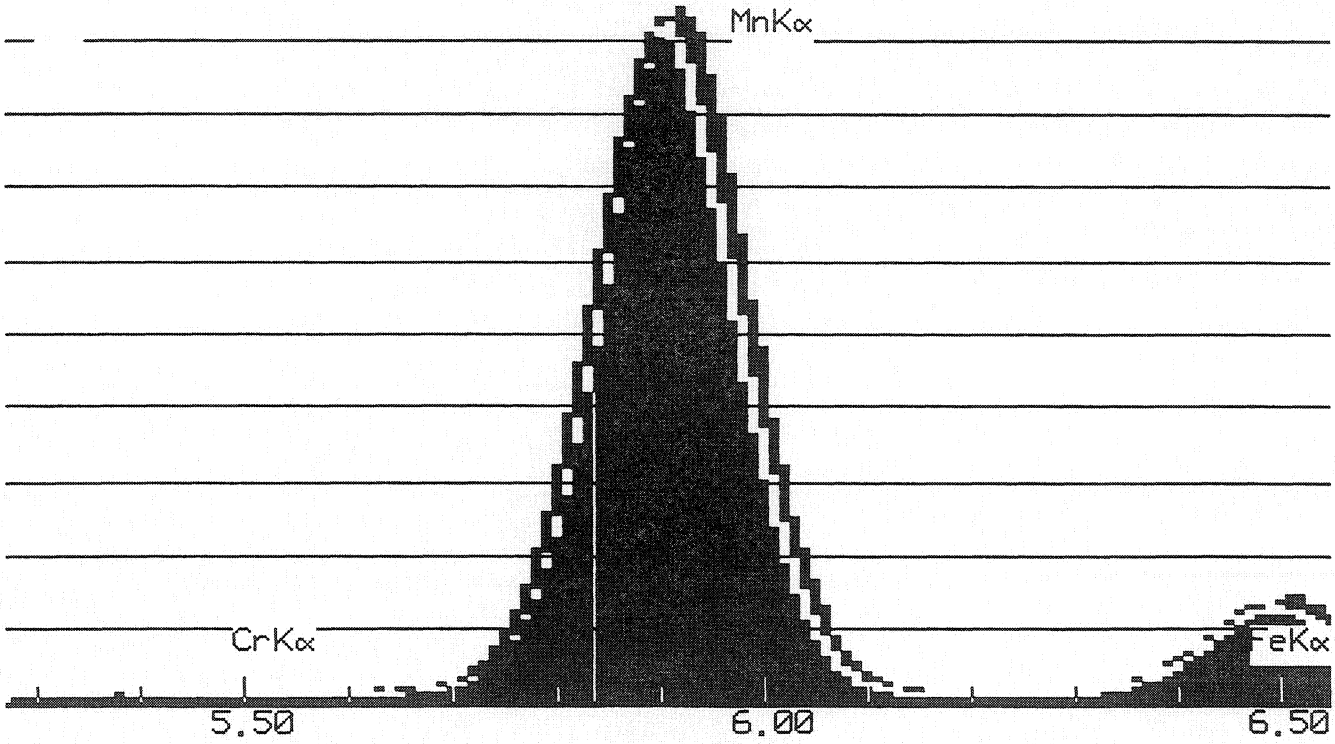
INTE-% :
I^BEL = MN STD 11/1/04 15278
(JAN-73 20:02:27
69.299 LIVE SECONDS

ELEM	CPS	WT % ELEM	WT % OXIDE
NAK	0.534	0.056	0.076
ALK	0.866	0.026	0.049
SIK	0.303	0.008	0.018
MNK	2018.071	77.335	99.858

TOTAL			100.000

USED PEIF: USER

08-JAN-05 20:02:52 SUPER QUANT
RATE=36068CPS TIME= 69LSEC
FS= 10892/ 10892 PRST= 200LSEC
A =MN STD 11/1/04 15278



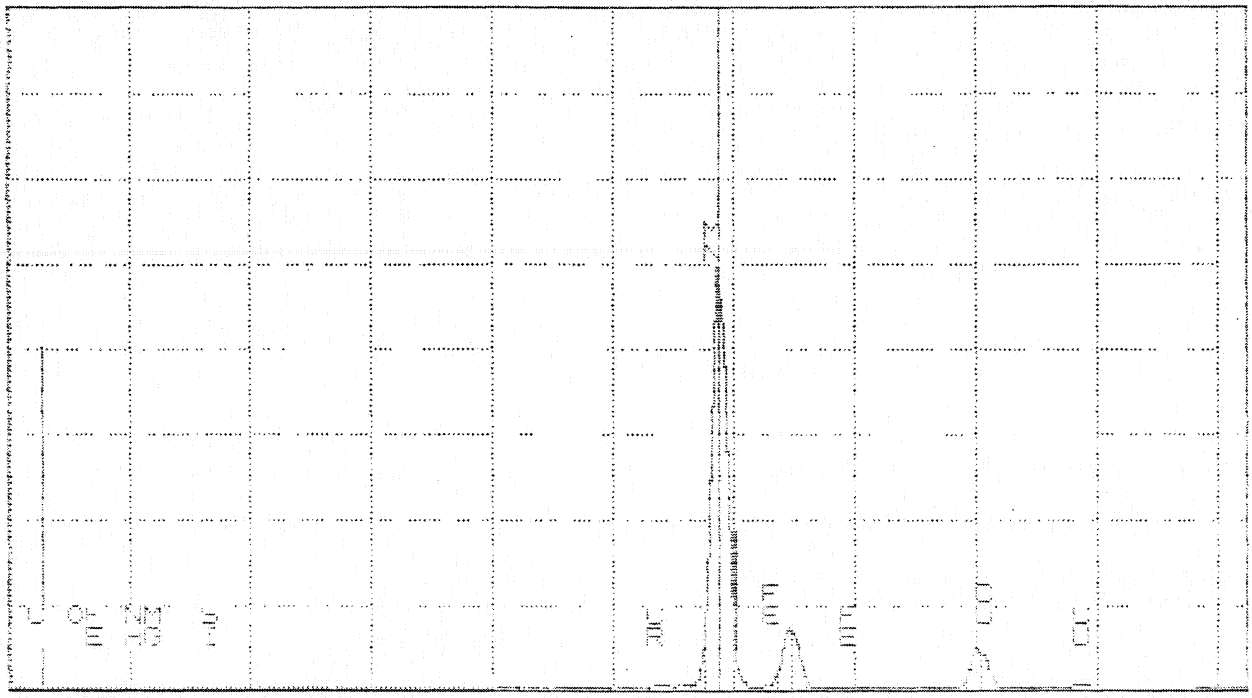
5244CNT 5.83KEV 10eV/ch A EDAX

PHILIPS MnKa Peak Resolution Calibration

Date	Analyst	EDS	Mn Peak (cnts)	FWHM High (cnts)	FWHM Low (cnts)	FWHM (cnts)	# Channels	Resolution (eV)	Std Dev	Std Dev (2s)	Pass/Fail
2/5/02	DW		14255	7466	6369	6918	17	170			Pass
2/13/02	DW		10830	5441	4460	4951	17	170			Pass
2/26/02	DW		10070	5734	4772	5253	16	160			Pass
3/1/02	DW		10243	5177	4378	4778	15	150			Pass
3/20/02	DW		7684	3964	3290	3627	16	160			Pass
4/16/02	DW		10042	5693	4729	5211	16	160			Pass
5/2/02	DW	11466	10022	5310	4438	4874	17	170			Pass
6/4/02	DW	11531	10252	5421	4480	4951	16	160			Pass
7/1/02	DW	11800	10300	5749	4799	5274	16	160			Pass
8/7/02	DW	12318	10640	5905	4825	5365	17	170			Pass
10/1/02	DW	12634	15662	8414	7183	7799	17	170			Pass
11/1/02	DW	12667	20000	10797	9338	10068	17	170			Pass
12/2/02	DW	12778	10303	5421	4410	4916	16	160			Pass
1/7/03	DW	13007	10303	5569	4559	5064	14	140			Pass
2/7/03	KM	13089	10427	5960	4156	5058	17	170			Pass
3/5/2003	KM	13165	2348	1046	1279	1163	17	170			Pass
4/3/2003	KM	13226	10313	5676	4731	5204	16	160			Pass
5/5/2003	KM	13341	11454	5815	4977	5396	17	170			Pass
6/1/2003	KM	13437	9806	5385	4577	4981	17	170			Pass
7/3/2003	KM	13580	10335	5440	4620	5030	17	170			Pass
8/5/2003	KM	13713	10233	5686	4710	5198	17	170			Pass
9/2/2003	KM	13828	12311	6552	5661	6107	17	170			Pass
10/1/2003	KM	13981	10934	6341	5440	5891	17	170			Pass
11/3/2003	KM	14047	12783	7599	6376	6988	17	170	3.162	6.325	Pass
12/3/2003	KM	14131	10314	5258	4476	4867	17	170	3.162	6.325	Pass
1/2/2004	KM	14175	9901	5102	4166	4634	17	170	3.162	6.325	Pass
2/2/2004	KM	14240	10370	4747	5732	5240	17	170	0.000	0.000	Pass
3/3/2004	KM	14285	10232	5374	4428	4901	16	160	3.162	6.325	Pass
4/1/2004	KM	14371	9603	5532	4718	5125	17	170	3.162	6.325	Pass
5/4/2004	KM	14542	10344	4743	4017	4380	17	170	3.162	6.325	Pass
6/8/2004	KM	14819	10084	5420	4601	5011	17	170	3.162	6.325	Pass
7/7/2004	DW	14868	12292	5971	5843	5907	16	160	4.216	8.433	Pass
9/8/2004	KM	15032	6799	4180	3197	3689	16	160	4.830	9.661	Pass
11/1/2004	KM	15278	10251	6145	5244	5695	16	160	5.164	10.328	Pass

* Data is historical for the most recent 12 months

TN-5500 University of Washington / JEOL MON 01-NOV-04 17:29
Cursor: 5.440keV = 101:49



0.000 C- 6 VFS = 15.94 10.240
8z 1024chans 51%DT RT= 0sec 0.010keV

CENTR.	AREA	FWHM	
288	184	63345	N
590	365	144	
929	449	114	
4177	778	145	
[illegible]	[illegible]	72	N
[illegible]	[illegible]	142	-- MN RESOLUTION
6471	20514	119	
6924	11741	102	
6841	2549	174	

JEOL Mn STD
11/1/04

SUMIF -38/80

SQMTF: QUANTIFY
Standardless Analysis

Refit _K K' _K K" _CAK' _CAK"
Refit _MGK' _ALK' _K K _FEK"
Chi-sqrd = 4.99

JEOL CROCIDOLITE STD

11/1/04

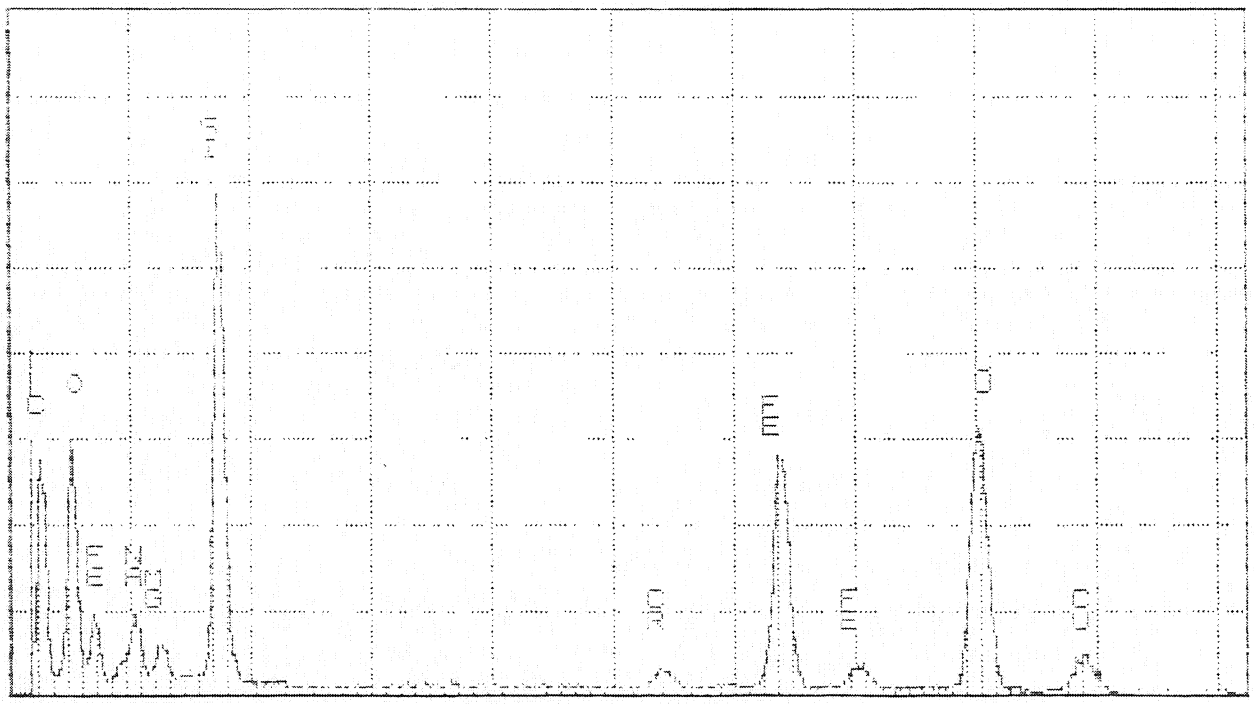
Element	Net Counts
Si-K	8144 +/- 140
Mg-K	741 +/- 131
Al-K	360 +/- 164
K -K	0 +/- 0
Ca-K	122 +/- 30
Fe-K	6254 +/- 106
Na-K	1470 +/- 107

REF.S EDS:SiK EDS:MgK EDS:ALK EDS:K K EDS:CAK EDS:FEK
EDS:NAK

CROC STD 11/1/04 SP704

EL-LINE	PEAK	K-FACTOR	CPS/CWEF	ATOM%	EL WT%	WT%	FORMULA
SI-K	8144	1.000	1.000	20.16	24.31	52.09	SIO2
MG-K	741	1.000	0.041	2.14	2.71	1.69	MgO
AL-K	360	0.750	0.020	0.69	0.81	1.52	AL2O3
K -K	0	1.060	0.000	0.00	0.00	0.00	K2O
CA-K	122	0.949	0.014	0.20	0.35	0.43	CAO
FE-K	6254	1.399	1.073	10.84	26.13	37.34	FE2O3
NA-K	1470	0.549	0.098	2.41	2.39	4.88	NA2O3
.1			1.802	40.54	44.40		

TN-5500 University of Washington / JEOL MON 01-NOV-04 1:16
Cursor: 0.000keV = 0



0.000 8- 5 VFS = 1024 10.240
0 CROC STD 11/1/04 SP704

Lab/C , Inc.

A Professional Service Corporation in the Northwest

Report Number: 041373

Report Date: December 17, 2004

Client Information	
Project Name:	Test water bottles in Water Kit Supplies for asbestos
Project No.:	Not Available
P. O. No.:	Not Available
Sample Type:	Water

Tracking Information			
Login:	Nov 19, 2004	*By:*	JS
Prep:	Nov 19, 2004	*By:*	MH
Verified:	Nov 19, 2004	*By:*	MH
Reviewed:	Dec 17, 2004	*By:*	JH

Analysis Information	
Analysis Type:	EPA-Water
Reference No.:	100.2
Min. Aspect Ratio:	3:1
Min. Length:	10 µm
Min. Width:	Other µm

PRELIMINARY TABLE

Transmission Electron Microscopy – EPA-Water – Water Sample Analysis

Lab/Cor Sample No.	Client Sample No.	Description	Fiber Type	Concentration (MFL > 10 µm)**	95% Confidence Interval (MFL > 10 µm)	Struc. Count	Analytical Sens. (MFL > 10 µm)	Volume (ml)	Number of Grid Openings	Filter Area (mm²)	Area Analyzed (mm²)	Analyst	Analysis Date
041373-01	01	Water bottle certified as asbestos-free for Water Kit Supplies	AMPHIBOLE	<0.083	0 - 0.307	0	0.083	40.0	4	193	0.0580	MQ	12/17/04
			CHRYSOTILE	<0.083	0 - 0.307	0							
			TOTAL	<0.083	0 - 0.307	0							

**MFL > 10µm – Million Fibers per Liter Greater Than 10 µm in Length. Samples with values higher than seven(7) MFL are above the EPA maximum contaminant level (MCL) and must be reported to the appropriate state agency for an assessment of vulnerability.

04137300.tem

Screen Magnification Calibration (Philips 410)

(Version#1)

Date of Measurement: 12/17/04

Analyst: DW

Average:

Screen Magnification at 18,000:	17187
Screen Magnification at 10,000:	9847

Setting 18,000

Screen

Date	# Spaces	Magnification
11/1/2004	19.48	17187

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
11/1/2004	5.31	5.07

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
11/1/2004	0.53	0.51

Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
11/1/2004	4.65	4.44	0.058	0.582

Setting 10,000

Screen

Date	# Spaces	Magnification
11/1/2004	34	9847

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
11/1/2004	9.27	9.13

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
11/1/2004	0.93	0.913

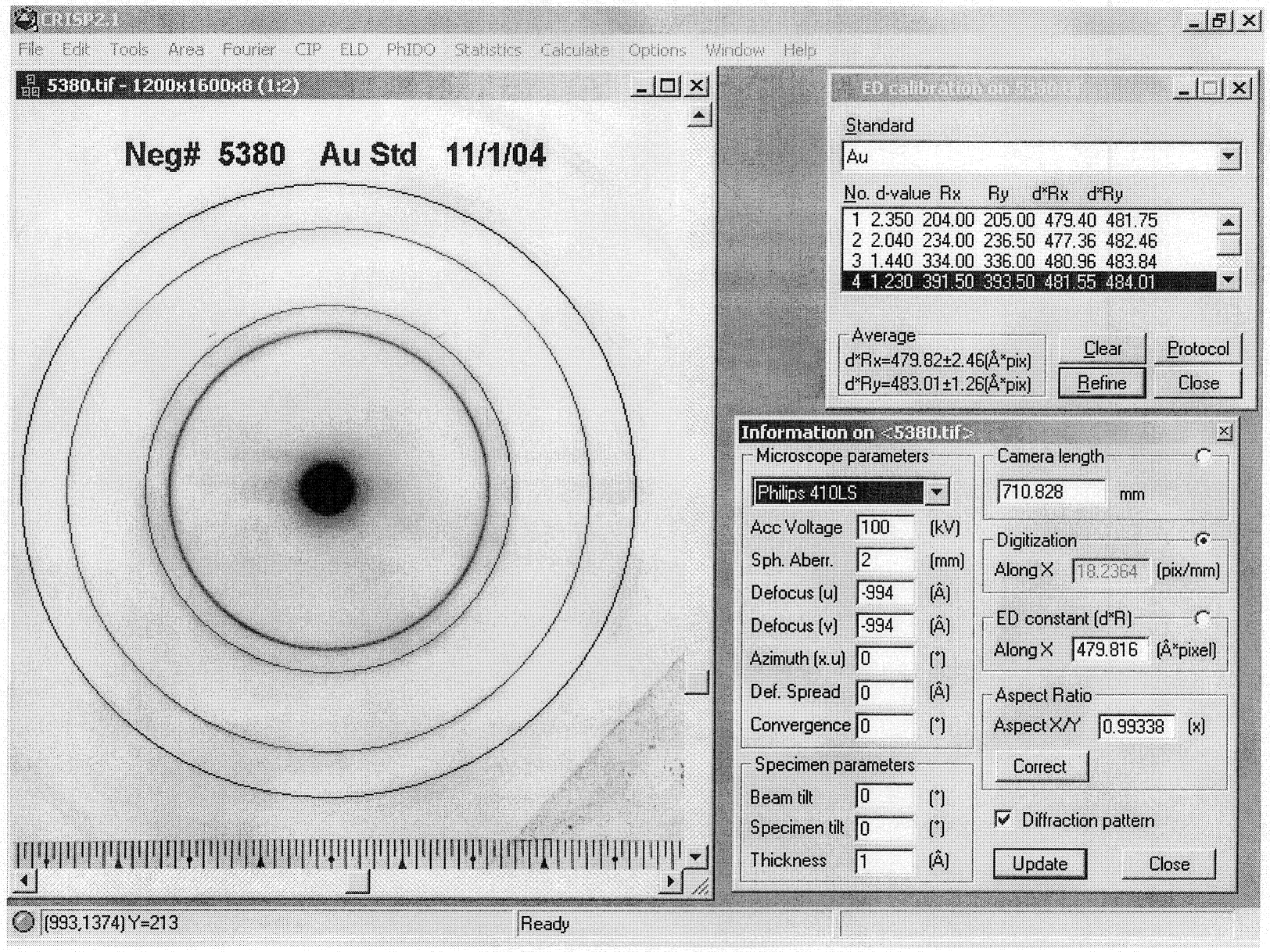
Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
11/1/2004	8.12	8.00	0.102	1.016

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Screen Magnification = (155/# spaces) * 2160

Au Std 11/1/04
Phillips 410



Monti Claibration Log — Lab/Cor, Inc. — Date: Nov. 04

Analyst	KM			MQ												KM
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18K Mag. Calib. SC1	19.4															
SC2	19.5															
SC3	19.5															
SC4	19.6															
SC5	19.4															
10K Mag. Calibration	34.0															
EDS				✓												
EDS Na	1.845	1.845		1.845												
EDS Al																
Gain Inc.	14	13		1												
New Gain	79	87		74												
Cu	8.044	8.044		8.044												
Zero Inc.	-18	-23		-4												
New Zero	-510	-580		-427												
Resolution	164.8	164.3														
# of Iterations	4	5		3												
Alignment -- FCA	✓			✓												✓
DA	✓	✓		✓												✓
Gold Rings Negative	KM															KM
Camera Constant																

Analyst								DW		DW		TM	DW	KM		
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
18K Mag. Calib. SC1																
SC2																
SC3																
SC4																
SC5																
10K Mag. Calibration																
EDS				✓												
EDS Na																
EDS Al				1.485												
Gain Inc.				1												
New Gain				55												
Cu				8.044												
Zero Inc.				23												
New Zero				-473												
Resolution				161.6												
# of Iterations				3												
Alignment -- FCA				✓				✓		✓		✓	✓	✓		
DA				✓				✓		✓				✓		
Gold Rings Negative								DW		DW		TM	DW	KM		
Camera Constant																

Screen and Camera Magnification Calibration

Version#1

Date of Measurement: 12/17/2004 **Analyst:** DW

Average:

Screen Magnification at 18,000:	17392
Screen Magnification at 10,000:	9648

Camera Magnification at 18,000:	18014
Camera Magnification at 10,000:	10482
Camera Magnification at 550:	557

Setting 18,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
12/15/2004	5718	26.6	110	83.4	10	18014

HIST 18096

Screen

Date	# Spaces	Magnification
12/15/2004	19.25	17392

Setting 10,000

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
12/15/2004	5719	23	105.5	82.5	17	10482

HIST 10511

Screen

Date	# Spaces	Magnification
12/15/2004	34.7	9648

Setting 550

Camera

Date	Negative #	D_1	D_2	D	# Spaces	Magnification
12/15/2004	5720	51	63.9	12.9	50	557

HIST 568

D1 = The smaller measurement of the Supper Device in mm.

D2 = The larger measurement of the Supper Device in mm.

D = D2 - D1

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Camera Magnification = (D/# spaces) * 2160

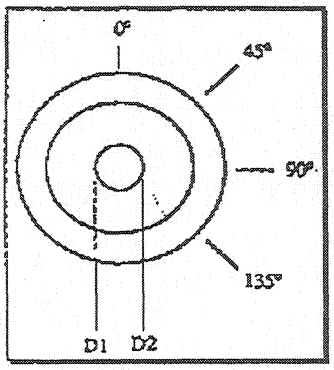
Screen Magnification = (155/# spaces) * 2160

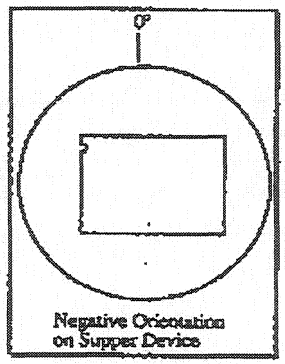
Camera Length and Camera Constant Calibration (Version#1)

Date of Measurement:	12/17/2004	**Average Camera Constant:**	27.078 mmA
Negative Number:	5721	(All 12 Measurements)	
Date Negative was Taken:	12/15/2004	**Average Camera Length:**	731.83 mm
Analyst:	DW	(All 12 Measurements)	

Ring #	0 degrees						45 degrees					
	D_1	D_2	D	R	CC	CL	D_1	D_2	D	R	CC	CL
1	61.50	84.45	22.95	11.48	27.02	730.37	67.90	90.95	23.05	11.53	27.14	733.55
2	59.65	86.25	26.60	13.30	27.12	732.94	66.15	92.85	26.70	13.35	27.22	735.69
3	54.10	91.75	37.65	18.83	27.15	733.67	60.80	98.25	37.45	18.73	27.00	729.77

Ring #	90 degrees						135 degrees					
	D_1	D_2	D	R	CC	CL	D_1	D_2	D	R	CC	CL
1	75.80	98.80	23.00	11.50	27.08	731.96	80.25	103.25	23.00	11.50	27.08	731.96
2	73.90	100.50	26.60	13.30	27.12	732.94	78.45	105.00	26.55	13.28	27.07	731.56
3	68.60	106.00	37.40	18.70	26.97	728.79	73.00	110.40	37.40	18.70	26.97	728.79





Measure the first three rings moving outward from the central spot of the diffraction pattern.

D_1 = The smaller measurement on the Supper device (mm).

D_2 = The larger measurement on the Supper device (mm).

$D = D_2 - D_1$

$R = D/2$

CC = Camera Constant

For Ring 1 [111], CC = R*2.355

For Ring 2 [200], CC = R*2.039

For Ring 3 [220], CC = R*1.442

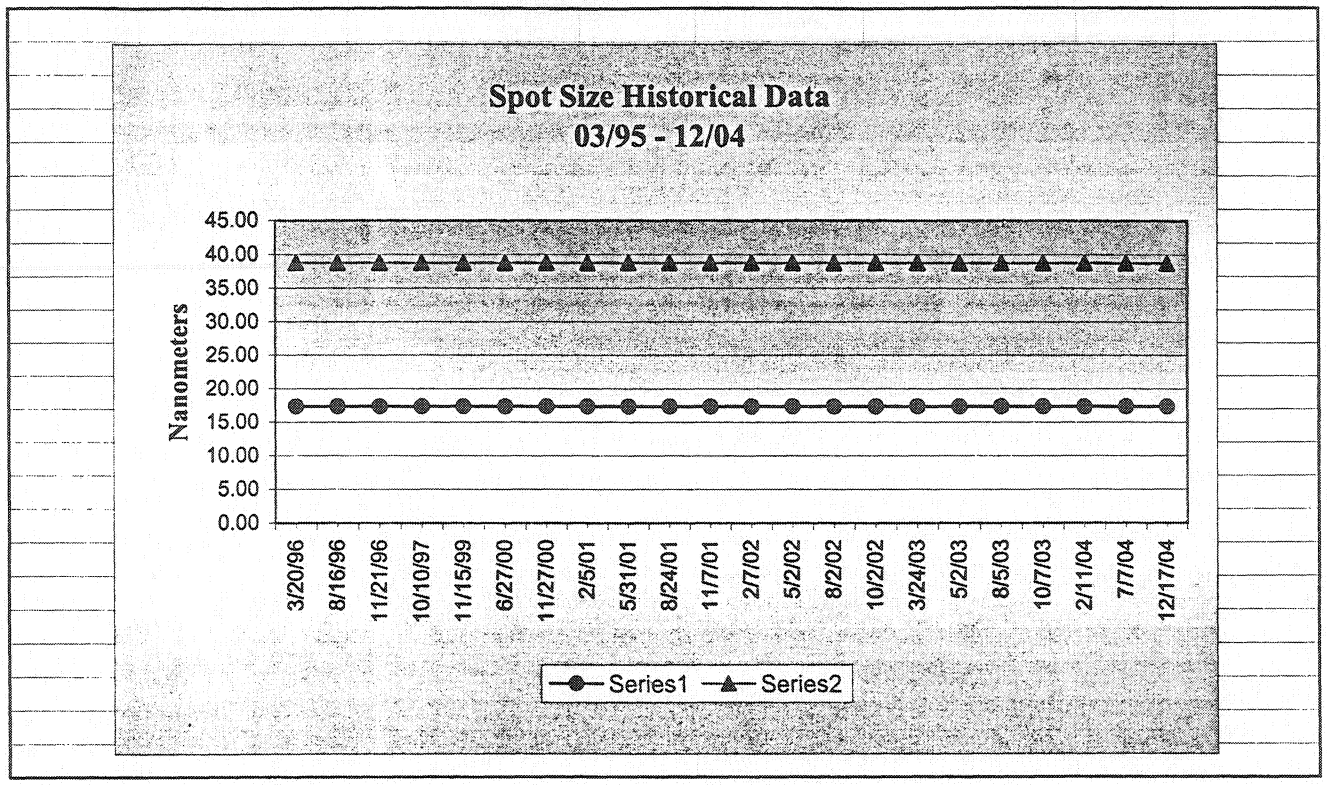
CL = Camera Length = CC/0.037

Spot Size Calibration

Spot Size Calculation

Run #	Spot Size (mm)	Avg.SpotSize mm	CamMag	SpotSize nm	Historical Avg
1	3.1	3.1	17392	176.3	155.1
2	3.1				
3	3				

Date	Spot size (nm)	UpperLimit (nm)	Analyst	Negative #	STD Spot Size	2S	25% Mean
9/8/95	117	250	JH		154.88	17.36	38.72
3/20/95	150	250	JH		154.88	17.36	38.72
9/8/95	117	250	JH		154.88	17.36	38.72
3/20/96	150.36	250	JH		154.88	17.36	38.72
8/16/96	122.3	250	JH		154.88	17.36	38.72
11/21/96	122.37	250	JH		154.88	17.36	38.72
10/10/97	122.58	250	JH		154.88	17.36	38.72
11/15/99	102.2	250	GG		154.88	17.36	38.72
6/27/00	124.1	250	DW		154.88	17.36	38.72
11/27/00	153.3	250	DW		154.88	17.36	38.72
2/5/01	166.1	250	DW		154.88	17.36	38.72
5/31/01	129	250	DW	1149	154.88	17.36	38.72
8/24/01	173.9	250	DW	1481	154.88	17.36	38.72
11/7/01	167.4	250	DW	1725	154.88	17.36	38.72
2/7/02	138	250	DW	1991	154.88	17.36	38.72
5/2/02	168.8	250	DW	2213	154.88	17.36	38.72
8/2/02	155.6	250	DW	2247	154.88	17.36	38.72
10/2/02	155.6	250	DW	2561	154.88	17.36	38.72
3/24/03	139.7	250	DW	3009	154.88	17.36	38.72
5/2/03	122.4	250	DW	3160	154.88	17.36	38.72
8/5/03	135.9	250	KM	3590	154.88	17.36	38.72
10/7/03	165.7	250	DW	3881	154.88	17.36	38.72
2/11/04	171.7	250	KM	4241	154.88	17.36	38.72
7/7/04	161.4	250	KM	4965	154.88	17.36	38.72
12/17/04	176.3	250	MQ	5723	154.88	17.36	38.72


Spot Size Historical Data
03/95 - 12/04
Nanometers
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
3/20/96
8/16/96
11/21/96
10/10/97
11/15/99
6/27/00
11/27/00
2/5/01
5/31/01
8/24/01
11/7/01
2/7/02
5/2/02
8/2/02
10/2/02
3/24/03
5/2/03
8/5/03
10/7/03
2/11/04
7/7/04
12/17/04
Series1
Series2

INTE-% :
ABEL = MN STD 15566 12/15/04
6-DEC-72 04:03:57
81.354 LIVE SECONDS

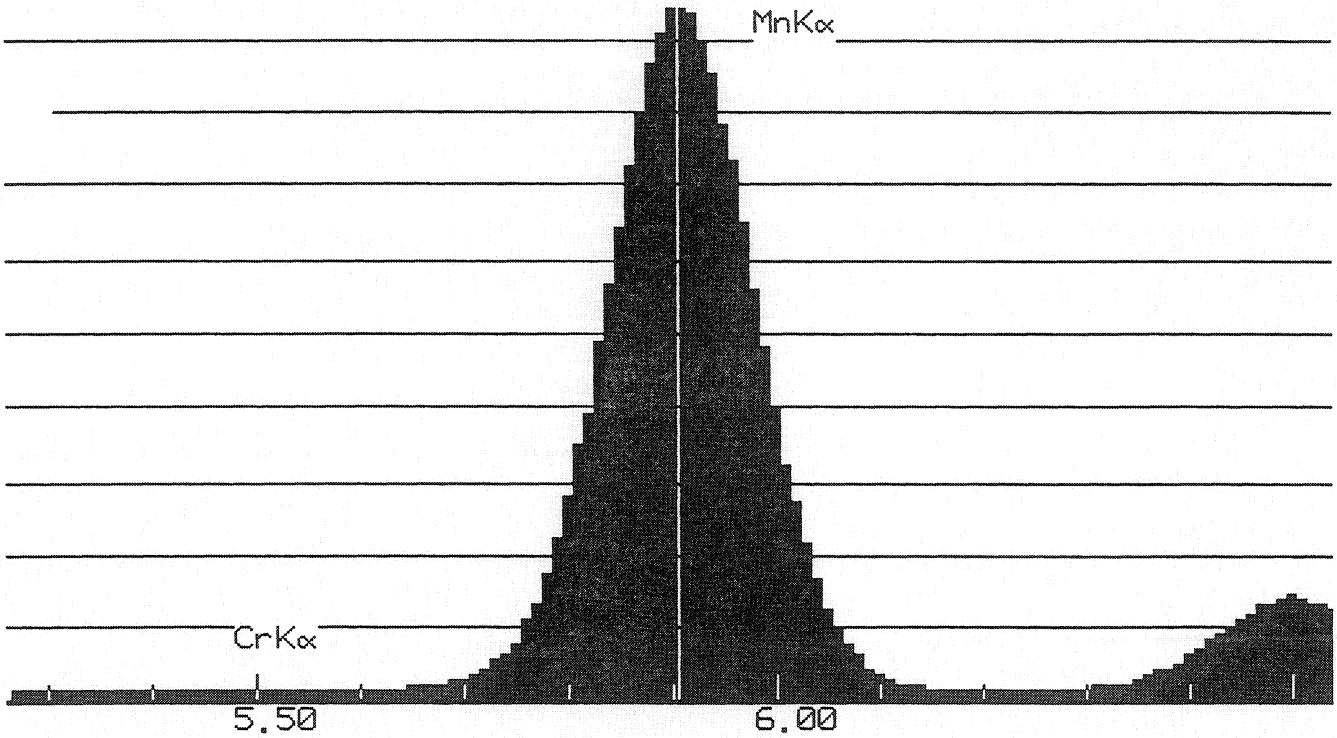
MN STD 12/15/04

17 channels @ 10 eV/channel

ELEM	CPS	WT % ELEM	WT % OXIDE
K K	0.393	0.022	0.026
MNK	1695.504	77.425	99.974
TOTAL			100.000

USED PEIF: USER

15-DEC-04 04:04:15 SUPER QUANT
RATE=24143CPS TIME= 81LSEC
FS= 10903/ 10903 PRST= 200LSEC
A =MN STD 15566 12/15/04



10227CNT 5.90KEV 10eV/ch A EDAX

PHILIPS MnKa Peak Resolution Calibration

Date	Analyst	EDS	Mn Peak (cnts)	FWHM High (cnts)	FWHM Low (cnts)	FWHM (cnts)	# Channels	Resolution (eV)	Std Dev	Std Dev (2s)	Pass/Fail
2/5/02	DW		14255	7466	6369	6918	17	170			Pass
2/13/02	DW		10830	5441	4460	4951	17	170			Pass
2/26/02	DW		10070	5734	4772	5253	16	160			Pass
3/1/02	DW		10243	5177	4378	4778	15	150			Pass
3/20/02	DW		7684	3964	3290	3627	16	160			Pass
4/16/02	DW		10042	5693	4729	5211	16	160			Pass
5/2/02	DW	11466	10022	5310	4438	4874	17	170			Pass
6/4/02	DW	11531	10252	5421	4480	4951	16	160			Pass
7/1/02	DW	11800	10300	5749	4799	5274	16	160			Pass
8/7/02	DW	12318	10640	5905	4825	5365	17	170			Pass
10/1/02	DW	12634	15662	8414	7183	7799	17	170			Pass
11/1/02	DW	12667	20000	10797	9338	10068	17	170			Pass
12/2/02	DW	12778	10303	5421	4410	4916	16	160			Pass
1/7/03	DW	13007	10303	5569	4559	5064	14	140			Pass
2/7/03	KM	13089	10427	5960	4156	5058	17	170			Pass
3/5/2003	KM	13165	2348	1046	1279	1163	17	170			Pass
4/3/2003	KM	13226	10313	5676	4731	5204	16	160			Pass
5/5/2003	KM	13341	11454	5815	4977	5396	17	170			Pass
6/1/2003	KM	13437	9806	5385	4577	4981	17	170			Pass
7/3/2003	KM	13580	10335	5440	4620	5030	17	170			Pass
8/5/2003	KM	13713	10233	5686	4710	5198	17	170			Pass
9/2/2003	KM	13828	12311	6552	5661	6107	17	170			Pass
10/1/2003	KM	13981	10934	6341	5440	5891	17	170			Pass
11/3/2003	KM	14047	12783	7599	6376	6988	17	170	3.162	6.325	Pass
12/3/2003	KM	14131	10314	5258	4476	4867	17	170	3.162	6.325	Pass
1/2/2004	KM	14175	9901	5102	4166	4634	17	170	3.162	6.325	Pass
2/2/2004	KM	14240	10370	4747	5732	5240	17	170	0.000	0.000	Pass
3/3/2004	KM	14285	10232	5374	4428	4901	16	160	3.162	6.325	Pass
4/1/2004	KM	14371	9603	5532	4718	5125	17	170	3.162	6.325	Pass
5/4/2004	KM	14542	10344	4743	4017	4380	17	170	3.162	6.325	Pass
6/8/2004	KM	14819	10084	5420	4601	5011	17	170	3.162	6.325	Pass
7/7/2004	DW	14868	12292	5971	5843	5907	16	160	4.216	8.433	Pass
9/8/2004	KM	15032	6799	4180	3197	3689	16	160	4.830	9.661	Pass
11/1/2004	KM	15278	10251	6145	5244	5695	16	160	4.924	9.847	Pass
12/15/2004	DW	15566	10227	5288	4330	4809	17	170	4.924	9.847	Pass

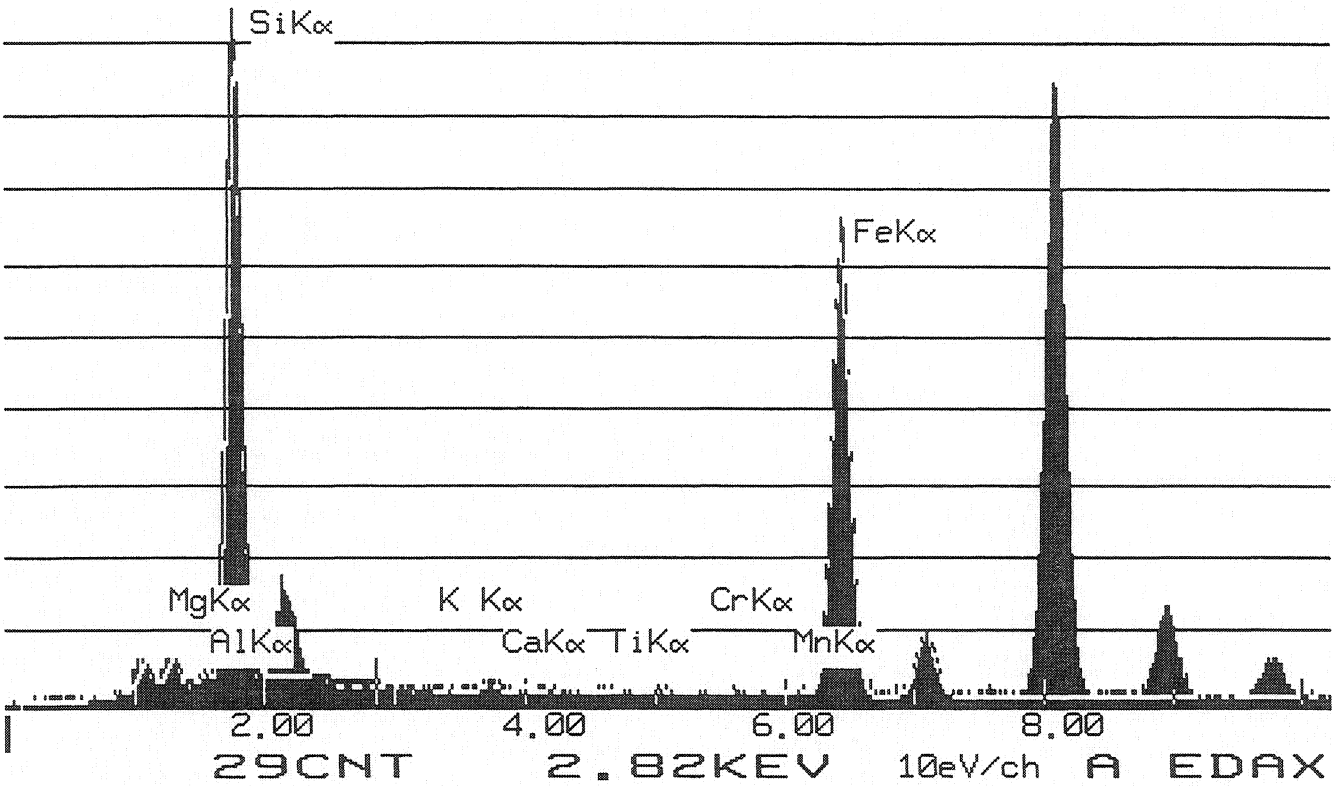
INTE-% :
LABEL = CROC STD 15568 12/15/04
1 DEC-72 05:10:28
64.025 LIVE SECONDS

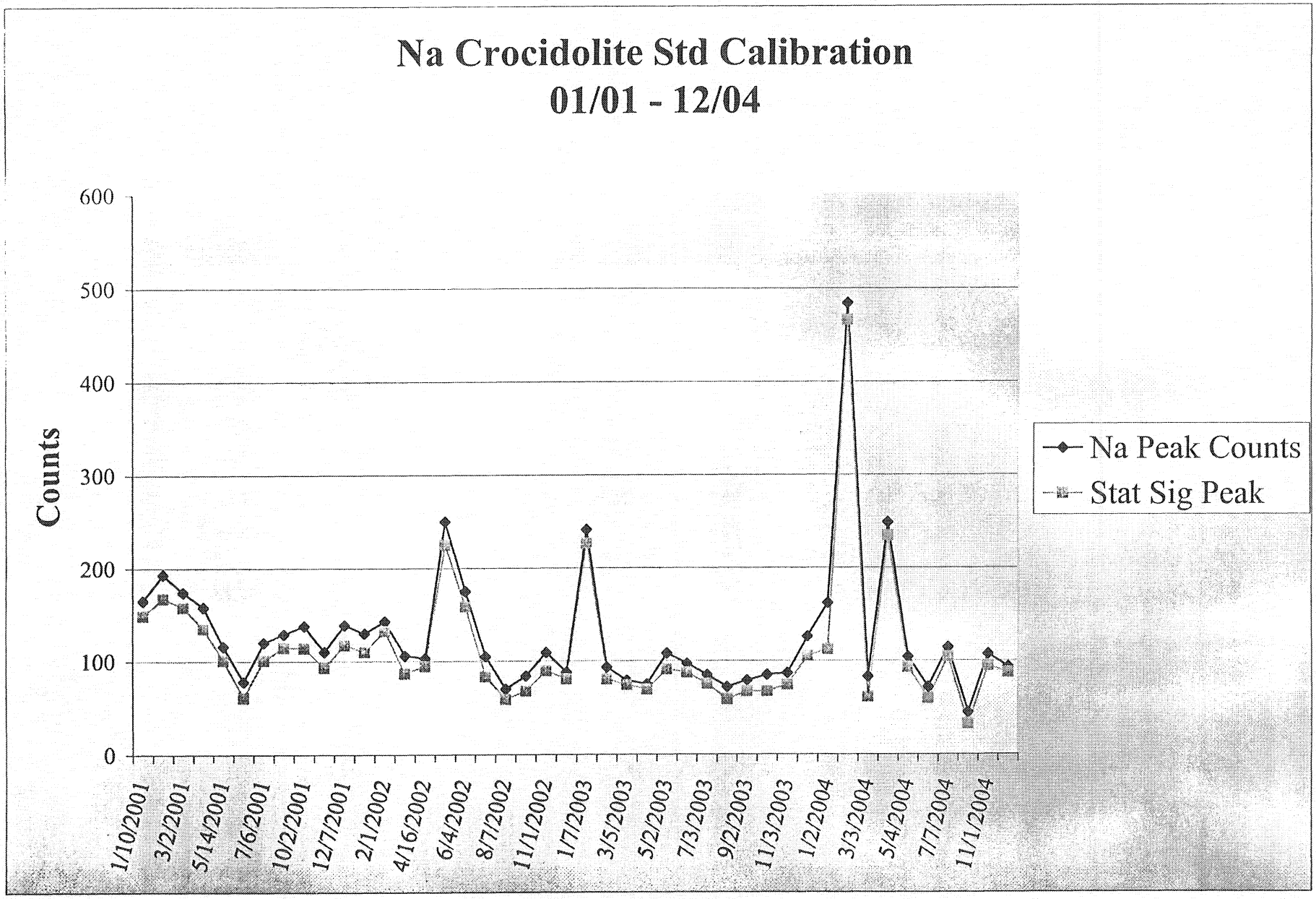
ELEM	CPS	WT % ELEM	WT % OXIDE
NAK	7.291	2.885	3.888
MGK	9.512	1.777	2.946
ALK	2.421	0.272	0.513
SIK	230.814	24.248	51.875
CAK	3.983	0.399	0.558
MNK	0.734	0.106	0.137
FEK	210.697	28.035	40.082

TOTAL			100.000

USED PEIF: USER

15-DEC-04 05:10:50 SUPER QUANT
RATE= 599CPS TIME= 64LSEC
FS= 1546/ 1546 PRST= 200LSEC
A =CROC STD 15568 12/15/04




Na Crocidolite Std Calibration
01/01 - 12/04
Counts
600
500
400
300
200
100
0
1/10/2001
3/2/2001
5/14/2001
7/6/2001
10/2/2001
12/7/2001
2/1/2002
4/16/2002
6/4/2002
8/7/2002
11/1/2002
1/7/2003
3/5/2003
5/2/2003
7/3/2003
9/2/2003
11/3/2003
1/2/2004
3/3/2004
5/4/2004
7/7/2004
11/1/2004
Na Peak Counts
Stat Sig Peak

BEAM DOSE CALIBRATION

(Version#1)

Date:	12/15/04		
Analyst:	MQ		
Fiber Length used in analysis:			5 MICRONS
Time (sec)	**Visual**	**Neg #**	**Recordable Diffraction**	**EDS**
0	Y	ND*	ND*	
30	Y	ND*	ND*	
60	Y	5725	Y	
90	Y	5726	Y	
120	Y	5727	Y	15567
PASS/FAIL	**PASS**		**PASS**	

*ND - Not Done

Visual - Mark "Y" if diffraction pattern is seen on screen, mark "N" if pattern is not seen on screen

Recordable Diffraction - Mark "Y" if diffraction pattern is seen on negative, mark "N" if pattern is not seen on negative

Chrysotile Fiber Specs.: Single fibril, >= 1.0 micron in length

Screen Magnification Calibration (Philips 410)
(Version#1)

Date of Measurement: 12/17/04

Analyst: DW

Average:

Screen Magnification at 18,000:	17258
Screen Magnification at 10,000:	9789

Setting 18,000

Screen

Date	# Spaces	Magnification
8/3/2004	19.4	17258

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
8/3/2004	5.29	5.07

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
8/3/2004	0.53	0.51

Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
8/3/2004	4.64	4.44	0.058	0.579

Setting 10,000

Screen

Date	# Spaces	Magnification
8/3/2004	34.2	9789

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
8/3/2004	9.33	9.13

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
8/3/2004	0.93	0.913

Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
8/3/2004	8.17	8.00	0.102	1.022

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Screen Magnification = (155/# spaces) * 2160

Screen Magnification Calibration (Philips 410)

(Version#1)

Date of Measurement: 12/15/04

Analyst: KM

Average:

Screen Magnification at 18,000:	17392
Screen Magnification at 10,000:	9648

Setting 18,000

Screen

Date	# Spaces	Magnification
1/12/1900	19.25	17392

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
1/12/1900	5.25	5.07

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
1/12/1900	0.52	0.51

Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
1/12/1900	4.60	4.44	0.057	0.575

Setting 10,000

Screen

Date	# Spaces	Magnification
2/2/2004	34.7	9648

Large Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
2/2/2004	9.46	9.13

Small Circle Diameter

Date	Actual Diameter (um)	Theoretical Dia. (um)
2/2/2004	0.95	0.913

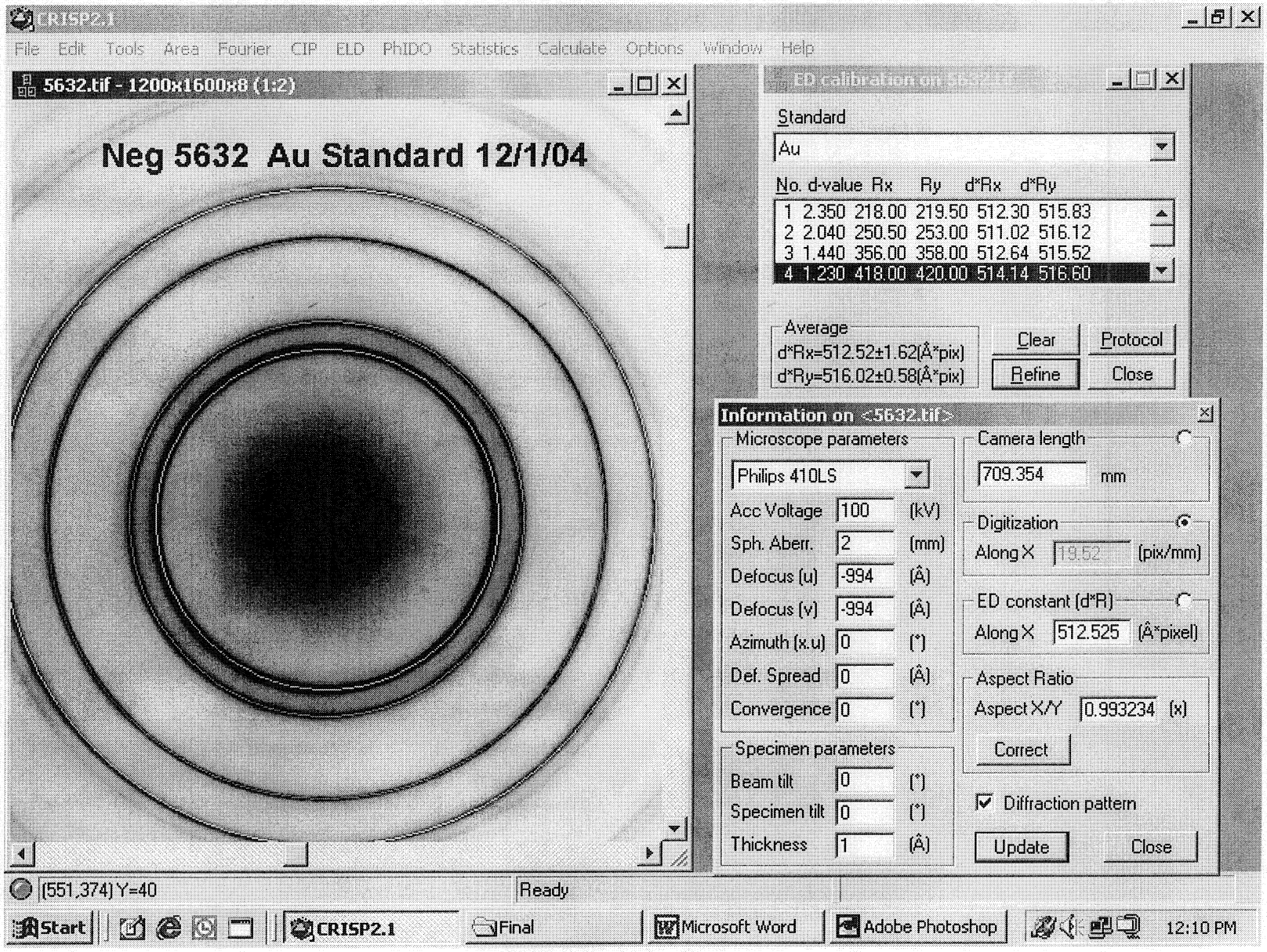
Rule

Date	Actual Length (um)	Theoretical Length (um)	Single Unit (um)	Ten Units (um)
2/2/2004	8.29	8.00	0.104	1.036

Spaces = The number of spaces spanned by the measurement or reported on calibration sheet. For the 18,000x screen mag., take the avg. of the five measurements recorded on the monthly calibration log. For the 10,000x screen mag., only one measurement is recorded on the monthly calibration log.

Screen Magnification = (155/# spaces) * 2160

Au Standard
Phillips 410LS
12/1/04



Montl Claibration Log Lab/Cor, Inc. Date: DEC 2004

Analyst	KM									TM					DW	
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18K Mag. Calib. SC1	19.3														19.2	
SC2	19.2														19.2	
SC3	19.1														19.2	
SC4	19.4														19.3	
SC5	19.3														19.3	
10K Mag. Calibration	33.4														33.7	
EDS																
EDS Na																
EDS Al	1.0485									1.485					1.485	
Gain Inc.	-5									1					1	
New Gain	52									59					447	
Cu	8.044									8.044					8.044	
Zero Inc.	27									2					-15	
New Zero	-626									-456					-1451	
Resolution	164.3									158.4					168.9	
# of Iterations	6									2					3	
Alignment -- FCA	✓									✓					DW	
DA										✓						
Gold Rings Negative	KM									KM					DW	
Camera Constant																

Analyst	KM															
Day	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
18K Mag. Calib. SC1																
SC2																
SC3																
SC4																
SC5																
10K Mag. Calibration																
EDS																
EDS Na																
EDS Al																
Gain Inc.																
New Gain																
Cu																
Zero Inc.																
New Zero																
Resolution																
# of Iterations																
Alignment -- FCA	✓															
DA	✓															
Gold Rings Negative																
Camera Constant																