

FILE NAME: Flooring (FLR)

DATE: 1989 Nov 6

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Tile Study Routine Buffing and Stripping Operations

BC Note (attached to
next page)

Buffing + Stripping
data w/ R.T. Lee
Group actually -
finding fibers
You probably have
this

A. F. MEYER AND ASSOCIATES, INC.

**VINYL ASBESTOS FLOOR TILE STUDY
ROUTINE BUFFING AND STRIPPING OPERATIONS
FOR
WRC-TV WASHINGTON
NOVEMBER 6, 1989**

ACKNOWLEDGEMENT

THIS REPORT WAS PREPARED BY JOHN B. LOVE.

CONTRIBUTORS TO THE REPORT INCLUDED:

REYNOLDS RENSHAW (AFMA)

TOM DAGENHART AND MONICA M. MCCLOY (R. J. LEE GROUP).

THE COOPERATION AND ASSISTANCE OF WRC-TV WASHINGTON, SOUTHERN INSULATION, AND THE MONTGOMERY COUNTY PUBLIC SCHOOLS IN THE STUDY COVERED BY THIS REPORT IS MUCH APPRECIATED.

A. F. MEYER AND ASSOCIATES, INC.

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1. TABLES OF RESULTS
2. HARD COPIES OF LABORATORY ANALYSIS REPORTS

A. F. MEYER AND ASSOCIATES, INC.

1. INTRODUCTION:

Per your request, on October 19, 1989 A. F. Meyer and Associates, Inc. (AFMA) performed a limited study to determine asbestos fiber release, if any, from routine buffing and stripping of vinyl asbestos floor tiles. The study was performed by John B. Love and Reynolds B. Renshaw in classroom 18 at the Silgo Middle School in Montgomery County, Maryland. Southern Insulation, a licensed asbestos abatement firm performed the buffing and stripping operations. Samples of the 9" x 9" vinyl floor tiles indicated they contained 5% chrysotile asbestos in the tiles themselves and 10% chrysotile asbestos in the mastic used to adhere the tiles to the concrete floor of the school.

This study is very limited and must not be construed as being all inclusive as to asbestos exposures encountered by custodial and maintenance staff, students, teachers, and the general public in schools generated from routine buffing and stripping of asbestos-containing floor tiles. It was intended to provide an indication of whether or not there is a potential to release asbestos fibers from the tiles during buffing or stripping. It was also intended to provide a foundation for further investigation if warranted based on its outcome.

2. PROCEDURES USED:

The approximate size of classroom 18 was 30 feet by 28 feet (840 square feet). This part of the school was unoccupied at the time of the study. Prior to the buffing and stripping operations, the classroom was totally isolated from the rest of the school by constructing a containment consisting of two layers of 6 mil plastic sheeting on the walls and a three-stage decontamination facility connected to the area. A high efficiency particulate air (HEPA) exhaust unit was placed inside the classroom. The exhaust unit was operated at a low setting so as not to provide rapid air exchange and filtration. The purpose of the unit was to create a slight negative pressure differential relative to adjacent areas of the school so fiber release would not occur outside the contained classroom.

After total isolation of the area and prior to performing the floor maintenance, all surfaces within the classroom were pre-cleaned via wet methods using amended water. All floor maintenance supplies (i.e. buffing/stripper solutions and pads) were provided by Channel 4 and Montgomery County janitorial staff. Buffing and stripping procedures were discussed at length with maintenance staff prior to conducting the study. For the purposes of this study the following buffing and stripping methods were employed:

METHOD 1 - BUFFING

Buff with standard red buffing pad and standard buffing solution. (Duration - approximately 45 minutes).

METHOD 2 - STRIPPING

Strip floor using standard stripping mixture mopped on and standard black stripping pad. Mop with clean water twice afterwards. (Duration - approximately 70 minutes).

METHOD 3 - STRIPPING

Strip floor using a fine mist spray of stripper solution and standard black stripping pad. Mop with clean water twice afterwards. (Duration - approximately 70 minutes).

During all floor maintenance operations, persons performing the work wore full-body protective (Tyvek) suits and full-face respirators equipped with filters designed for protection against airborne asbestos dust/fibers. Workers and survey persons, using appropriate procedures, entered and exited the work area through the decontamination facility. Once all buffing and stripping operations were complete and the study concluded, the floor was mopped and waxed to ensure any remaining dust or fibers would not become airborne once the containment was dismantled and the area re-occupied.

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3. SAMPLING PROTOCOL AND ANALYTICAL METHODS:

Bulk samples were collected from the water used during pre-cleaning, the water and stripper mix mopped up after the final stripping method, the buffing (red) and stripping (black) pads used, and from the residual dust remaining on the tiles after the final stripping and mopping method. General area air samples were collected in the classroom prior to the buffing and stripping work, during each method used, and under aggressive sampling conditions using a leaf blower after the final stripping and mopping method and before re-waxing the floor. Two samples were collected during each sampling period, one located approximately two feet from the floor and the other approximating breathing zone level, or five feet above the floor. One eight-hour air sample was collected from the workers' breathing zone. Two general area air samples were collected outside the contained classroom at the entrance to the decontamination facility. General air samples were collected with high volume line operated sampling pumps at a flow rate of 8.5 - 8.7 liters per minute (lpm). The worker breathing zone air sample was collected using a battery operated personal sampling pump at a flow rate of 2.4 lpm. All sampling pumps were calibrated before and after each sampling period.

Bulk samples were analyzed using Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM). Air samples obtained from inside the classroom prior to, during, and after the buffing and stripping operations were collected on 0.45 micron pore size mixed cellulose ester membrane filters with 50 mm non-conductive extension cowl. These samples were analyzed using Transmission Electron Microscopy (TEM). The outside general area and worker breathing zone air samples were collected on 0.8 micron pore size mixed cellulose ester membrane filters with 50 mm non-conductive extension cowl. These samples were analyzed using Phase Contrast Microscopy (PCM). The general area samples outside the contained classroom were also analyzed by TEM. (For specific methods of analyses used please see the attached tables).

4. LIMITS FOR AIRBORNE ASBESTOS:

a. Except for abatement activities, there are no exposure standards for non-occupational settings.

b. There are standards for general air quality after completion of an abatement or response action and before re-occupation of the areas involved. These standards are based on the analysis of a minimum of five samples collected within the work area after abatement is complete. Samples analyzed using phase contrast microscopy must all demonstrate concentrations less than 0.01 fibers per cubic centimeter (f/cc). Samples analyzed using Transmission Electron Microscopy (TEM) must have an average of less than 70 structures per square millimeter or not be statistically significantly different (higher) than 5 samples collected from outside the contained work area.

c. The EPA's Worker Protection Rule 40 CFR Part 76 3.121 has been extended to employees of local education agencies who perform operations, maintenance, and repair (O & M) activities involving asbestos-containing material. Under the rule, the permissible exposure limit for asbestos based on an eight-hour time weighted average is 0.2 fibers per cubic centimeter (f/cc) with an action level of 0.1 f/cc.

5. RESULTS OF SAMPLING:

a. Analysis results of the sample collected from the water used during pre-cleaning indicated asbestos was present. Results of the sample collected from the stripper and water mix after the stripping operations showed close to two times that of the water used during pre-cleaning. In both instances, asbestos structures detected were all less than 10 micrometers in length. Consequently, the reported concentration of structures greater than 10 micrometers in both samples was less than 122.7 million structures per liter (MILL STR/L).

b. Analysis results of the bulk sample collected from the residue on the buffing (red) pad indicated a trace of chrysotile asbestos.

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- c. Analysis results of the bulk sample collected from the residue on the stripping (black) pad indicated 1% chrysotile asbestos.
- d. Analysis results of the bulk sample collected from the remaining residue on the floors after the final stripping method indicated a trace of chrysotile asbestos.
- e. Results of the air sample collected from the workers breathing zone yielded a concentration of 0.013 fibers per cubic centimeter as an eight-hour time weighted average.
- f. General area air samples collected inside the contained classroom before any buffing or stripping operations were performed (background) indicated airborne fiber densities of 30.5 and 45.8 structures per mm^2 (0.01 and 0.015 structures per cc).
- g. General area air samples collected inside the work area during buffing operations performed showed airborne fiber densities of 15.3 and 45.8 structures per mm^2 (<0.01 and 0.015 structures per cc).
- h. General area air samples collected within the contained classroom during the first stripping operation (Method #2) showed airborne fiber densities of 91.6 and 229.0 structures per mm^2 (0.029 and 0.072 structures per cc).
- i. General area air samples collected within the contained classroom during the second stripping operation (Method #3) yielded airborne fiber densities of 236,167.6 and 276,316.1 structures per mm^2 (77.5 and 89.2 structures per cc). It should be noted that these samples could not be analyzed by standard TEM analysis because of excessive loading on the filters. The samples were prepared by low-temperature plasma ashing and aqueous redeposition due to overloading of the filters. Complex asbestos structures consisting of multiple fibers may have disaggregated during sample preparation. Consequently, asbestos structure counts may be biased high.
- j. General area air samples collected using aggressive sampling techniques after the final stripping operation indicated airborne fiber densities of 137.4 and 183.2 structures per mm^2 (0.045 and 0.06 structures per cc).
- k. All asbestos sample analysis results are outlined in the attached Tables 1 and 2.

6. CONCLUSIONS:

- a. Again, this study has limitations and cannot be used to definitively quantify general occupant and maintenance staff exposure levels to asbestos from floor tile maintenance activities in all situations. It applies only to conditions encountered and techniques used at the time of sampling.
- b. Concentrations found in the workers breathing zone during this study did not exceed the existing permissible exposure limit nor the action level outlined in the EPA's Worker Protection Rule. The sampling and analytical method required for worker exposure monitoring detects all fibers with characteristics of asbestos fibers and which are greater than 5 microns in length. Levels found however, do warrant consideration when assessing overall asbestos exposures to employees involved in routine operations, maintenance and repair activities.
- c. Airborne asbestos fiber densities or concentrations found in the general air within classroom 18 prior to the buffing and stripping operations did not exceed filter background levels (70 s/mm^2) when analyzed using TEM.
- d. General area air samples collected during buffing operations did not exceed filter background levels when analyzed using TEM.

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e. General area air samples collected during stripping operations and under aggressive sampling techniques after all stripping was done did significantly exceed filter background levels when analyzed using TEM. It appears that airborne asbestos structure densities started to increase during the first stripping method (stripping mixture mopped on and using standard black stripping pad) and elevated tremendously during the second stripping method (fine mist spray of stripper solution and using standard black stripping pad). Aggressive sampling conducted after the second or final stripping method and after the floor was mopped showed that airborne asbestos structure densities returned to levels near those experienced during the first stripping method. This leads us to believe that stripping asbestos-containing floor tiles using semi-wet techniques has a far greater potential for releasing airborne asbestos than stripping methods employing wet or very wet methods. It should be noted that of the general area air samples collected inside the classroom during these operations, nearly all asbestos structures found were less than 5 microns in length.

f. Based on the air sampling, it is the opinion of this study that asbestos fibers or structures were released from the floor tiles and became airborne during the stripping operations performed. The levels found were above levels considered acceptable for determining the completion of a response or abatement action and before re-occupancy of such affected areas.

g. The degree of health risk associated with the levels of airborne asbestos found cannot be accurately ascertained without further investigation and exposure monitoring.

7. RECOMMENDATIONS:

a. Consistent with EPA's guidance document 560/5-85-024 Guidance for Controlling Asbestos-Containing Materials in Buildings ("Purple Book") paragraph 3.3.3, avoid removing, sanding or stripping floor tiles containing asbestos. If tiles are removed, do not sand asbestos backing material remaining on the floor.

b. Implement interim policies in regards to the above until such time that further investigation is performed and more scientific data becomes available or until specific guidance is issued by the appropriate regulatory agencies.

c. If asbestos-containing floor tiles must be stripped, use only wet stripping methods. Institute appropriate engineering controls, work practices, air monitoring, and employee protection programs. Assess exposures to workers during stripping and consider these exposures in overall exposure assessments of employees involved in routine operations, maintenance, and repair activities.

d. Considerable attention should be lent to the potential for fiber release during asbestos-containing floor tile maintenance operations. EPA's involvement and participation is imperative in affording an adequate assessment of exposure potentials. Appropriate regulatory guidance for local education agencies must be disseminated at the earliest possible date.

ATTACHMENT 1
TABLES OF RESULTS

Asbestos Air Sampling Results
Sligo Middle School, Montgomery County, Maryland
WRC-TV Washington

TABLE #1

TRANSMISSION ELECTRON MICROSCOPY (TEM)

SAMPLE #	SAMPLE DATE	SAMPLE LOCATION	SAMPLE VOLUME IN LITERS	TEM ANALYSIS OF AIR FIBER DENSITY IN S/1
JLC410198901	10/19/89	Pre-sample - background classroom 18	1199.8	45.8
JLC410198902	10/19/89	Pre-sample - background classroom 18	1218.0	30.5
JLC410198904	10/19/89	Work area - Method #1 @ 5'	1199.8	45.8
JLC410198905	10/19/89	Work area - Method #1 @ 5'	1218.0	15.3
JLC410198906	10/19/89	Work area - Method #2 @ 2'	1199.8	91.6
JLC410198907	10/19/89	Work area - Method #2 @ 5'	1218.0	229.0
JLC410198908	10/19/89	Clean area - outside decon entrance	1479.0	122.1
JLC410198909	10/19/89	Work area - Method #3 @ 2'	1174.0	236,167.6
JLC410198910	10/19/89	Work area - Method #3 @ 5'	1192.0	276,316.1
JLC410198912	10/19/89	Clean area - outside decon entrance	1662.0	30.5
JLC410198913	10/19/89	Post-strip - pre-wax aggressive @ 2'	1166.0	183.2
JLC410198914	10/19/89	Post-strip - pre-wax aggressive @ 5'	1183.0	137.4

PHASE CONTRAST MICROSCOPY (PCM)

SAMPLE #	SAMPLE DATE	SAMPLE LOCATION	SAMPLE VOLUME IN LITERS	PCM ANALYSIS OF AIR FIBER DENSITY IN F/M
JLC410198908	10/19/89	Clean area - outside decon entrance	1479.0	17.8
JLC410198911	10/19/89	Personel - workers breathing zone	1152.0	39.5
JLC410198912	10/19/89	Clean area - outside decon entrance	1662.0	22.5
JLC410198919	10/19/89	Blank		NFO

< = Less than NFO = No Fibers Observed S/MM2 = Structures per square millimeter S/CC = Structures per cubic centimeter
 F/MM2 = Fibers per square millimeter F/CC = Fibers per cubic centimeter

ANALYSIS: Air samples were analyzed using Transmission Electron Microscopy (TEM) EPA level II (YAMATE, Microscopy (PCM) NIOSH 7400 A (as modified by OSHA/EPA counting rules). Samples were analyzed at an accredited laboratory.

* These samples were prepared by low-temperature plasma ashing and aqueous redeposition due to overloading of original structures consisting of multiple fibers may have disaggregated during sample preparation. Consequently, asbestos levels may be high.

**Asbestos Bulk and Water Sampling Results
Sligo Middle School, Montgomery County, Maryland
WRC-TV Washington**

TABLE #2

BULK SAMPLES

SAMPLE #	SAMPLE DATE	SAMPLE LOCATION	PCM ANALYSIS OF BULK SAMPLES EXPRESSED IN PERCENT ASBESTOS	ANALYTICAL DESCRIPTION
JLC410188901	10/18/89	Red floor tile - classroom 18	5.0	Chrysotile
JLC410188901	10/18/89	Red floor tile mastic	10.0	Chrysotile
JLC410188902	10/18/89	Tan floor tile - classroom 18	5.0	Chrysotile
JLC410188902	10/18/89	Tan floor tile mastic	5.0	Chrysotile

SAMPLE #	SAMPLE DATE	SAMPLE LOCATION	TEM ANALYSIS OF BULK SAMPLES EXPRESSED IN PERCENT ASBESTOS	ANALYTICAL DESCRIPTION
JLC410198915	10/19/89	Black pad used during Method #2	1	Chrysotile
JLC410198916	10/19/89	Red pad used during Method #1	Trace	Chrysotile
JLC410198918	10/19/89	Residual dust on floor after Method #3	Trace	Chrysotile

WATER SAMPLES

SAMPLE #	SAMPLE DATE	SAMPLE LOCATION	TOTAL STRUCTURE CONCENTRATION (MILL STR/L)	<10UM STRUK (MILL
JLC410198903	10/19/89	Water used during pre-cleaning	9666.4	<122.
JLC410198917	10/19/89	Water used during floor cleaning after final stripping Method #3	14491.6	<122.

< = Less Than > = Greater Than NFO = No Fibers Observed MILL STR/L = Million Structures per Liter

ANALYSIS:

Water samples were analyzed using Transmission Electron Microscopy (TEM) EPA method 600/4-83 using Polarized Light/Dispersion Staining (PLM) 40 CFR Part 763 App.A to Subpart F, and Trar EPA Level II, a semi-quantative adaptation. Samples were analyzed by R. J. Lee Group, and A

ATTACHMENT 2

HARD COPIES OF LABORATORY ANALYSIS REPORTS

RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT



A. F. MEYER AND ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VIRGINIA 22101
ATTN: JOHN LOVE

REPORT DATE: OCTOBER 19, 1989
SAMPLES RECEIVED: OCTOBER 18, 1989
RJ LEE JOB NO: AOW910016
PURCHASE ORDER NO: WRC-TV (WRITTEN AUTHORITY)

ANALYSIS: ASBESTOS IN BULK SAMPLES

METHOD: PLM (POLARIZED LIGHT MICROSCOPY/DISPERSION STAINING) 40 CFR PART 763 APP. A TO SUBPART F

SAMPLE					PHYSICAL DESCRIPTION OF SAMPLE
IDENTIFICATION		CHRYSTILE	AMPHIBOLE	NON-ASBESTOS	
-----		ASBESTOS	ASBESTOS	FIBERS	
CLIENT	RJ LEE	(VOLUME %)	(VOLUME %)	(VOLUME %)	
JLC4 10188901	54986	5	ND1		RED-BROWN SOLID (TILE?)
TILE					
JLC4 10188901	54987	10	ND1		BLACK MASTIC
MASTIC					
JLC4 10188902	54988	5	ND1		TAN TILE
TILE					
JLC4 10188902	54989	5	ND1		BLACK MASTIC
MASTIC					

Tom Dagenhart
LABORATORY ANALYST

Oct. 18, 1989
DATE:

Tom Dagenhart
TOM DAGENHART, M.S.
LABORATORY MANAGER, NVLAP SIGNATORY

EPA Accreditation Number 3410; MIST NVLAP Participant Number 1208-3
PLEASE SEE ESSENTIAL NOTES ON REVERSE SIDE OF REPORT

RJ Lee Group

The Materials Characterization Specialists

Invoice Number: DCO368

350 Hochberg Road
Monroeville, PA 15146
(412) 325-1775 Fax (412) 733-1799

2424 6th Street
Berkeley, CA 94710
(415) 486-8319 Fax (415) 486-0927

Bill to: URC-TV 4001 NEBRASKA AVE., N.W. WASHINGTON, D.C. 20016 ATTN: RICK NELSON	Ship to: A. F. MEYER AND ASSOCIATES, INC. 6849 OLD DOMINION DRIVE MCLEAN, VIRGINIA 22101 ATTN: JOHN LOVE TELEPHONE: 703-734-9093
--	--

Date	Date Report Sent	Project #	Terms	Client PO#	Vendor#
OCT. 19, 1989	OCT. 19, 1989	ACW910016	NET 30 DAYS	URC-TV	

Item	Description	Unit Price	Amount
4	ASBESTOS ANALYSIS OF BULK SAMPLES BY PLM RUSH SERVICE SAMPLE ID NUMBERS: JLC4 10188901 TILE JLC4 10188901 MASTIC JLC4 10188902 TILE JLC4 10188902 MASTIC	\$36.00	\$144.00

Please Pay This Amount

\$144.00

Remit To:

RJ Lee Group, Inc. P.O. Box 278, Monroeville, PA 15146
Please return one (1) copy of this invoice with payment to ensure proper credit

F00988

RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT

A.F. MEYER & ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VIRGINIA 22101
703-670-2131
JOHN LOVE

RJ LEE GROUP JOB NUMBER: ATW-910020A
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER:
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: OCTOBER 28, 1989

ANALYSIS: ASBESTOS IN WATER

METHOD: TRANSMISSION ELECTRON MICROSCOPY, EPA METHOD 600/4-83-043

SAMPLE INFORMATION

RJ LEE GR.	CLIENT		FILTER	FILTERED	
SAMPLE #	SAMPLE #	SAMPLE DESCRIPTION	AREA	VOLUME	WATER
			(SQ MM)	(ML)	CLARITY
55013	JLC4101989-03	NONE GIVEN	201	0.1	CLOUDY
55016	JLC4101989-17	NONE GIVEN	201	0.1	CLOUDY
NOT APPL.	NOT APPLICABLE	FILTER BLANK	201	0	NOT APPLICABLE

Monica M. McCloy
SAMPLE PREPARATOR

Monica M. McCloy
TEM OPERATOR-ANALYST

Tom O'Connell
LABORATORY MANAGER

10-28-89
DATE

RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT

A.F. MEYER & ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VIRGINIA 22101
703-670-2131
JOHN LOVE

RJ LEE GR. JOB NUMBER: ATW-910020A
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER:
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: OCTOBER 28, 1989

ANALYSIS: ASBESTOS IN WATER

METHOD: TRANSMISSION ELECTRON MICROSCOPY, EPA METHOD 600/4-83-043

ANALYTICAL INFORMATION

AREA OF GRID OPENING : 0.00655 SQ MM
DETECTION LIMIT : 4
(STRUCTURES PER TEN GRID OPENINGS)

TEM ACCELERATING POTENTIAL: 100 KV

TEM: PHILIPS CM12

ENERGY DISPERSIVE X-RAY ANALYZER: EDAX 9800 PLUS

		ASBESTOS STRUCTURES DETECTED					TOTAL	> 10 UM	
RJ LEE GR.	CLIENT	GRID	FILTER AREA	WITH ASPECT RATIO > 3 : 1			STRUCTURE	STRUCTURE	TYPE
SAMPLE #	SAMPLE #	OPENINGS	ANALYZED	-----			CONCENTRATION	CONCENTRATION	OF
		SCANNED	(SQ MM)	< 10.0 UM	>= 10.0 UM	TOTAL	(MILL STR/L)	(MILL STR/L)	ASBESTOS
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
55013	JLC4101989-03	2	0.0131	63	0	63	9666.4	< 122.7	CHRYSTILE
55016	JLC4101989-17	1	0.0066	57	0	57	17491.6	< 122.7	CHRYSTILE
NOT APPL.	NOT APPLICABLE	10	0.0655	0	0	0	NOT APPL.	NOT APPL.	NONE DETECTED

RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT

A.F. MEYER & ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VIRGINIA 22101
703-670-2131
JOHN LOVE

RJ LEE GR. JOB NUMBER: ATW-910020A
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER:
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: OCTOBER 28, 1989

ANALYSIS: ASBESTOS IN WATER

METHOD: TRANSMISSION ELECTRON MICROSCOPY, EPA METHOD 600/4-83-043

ESSENTIAL NOTES AND DISCLAIMERS

1. TEM ANALYTICAL DATA GENERALLY VALID TO ONLY ONE SIGNIFICANT FIGURE.
2. THE ASBESTOS MINERALS SOUGHT IN EACH SAMPLE INCLUDE CHRYSOTILE (CLINOCHRYSOTILE, ORTHOCHRYSOTILE AND PARACHRYSOTILE), AMOSITE (GRUNERITE AND CUMINGTONITE), CROCIDOLITE (RIEBECKITE), ANTHOPHYLLITE (ANTHOPHYLLITE AND MAGNESIO-ANTHOPHYLLITE), TREMOLITE AND ACTINOLITE. NAMES GIVEN IN PARENTHESES INDICATE THE PROPER MINERALOGICAL TERM FOR ASBESTOS VARIETIES KNOWN BY AN IMPRECISE NAME. DEFINITIONS USED FOR THE AMPHIBOLES ARE THOSE OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION (1978).
3. ASBESTOS STRUCTURES INCLUDED IN THE STRUCTURE CONCENTRATION INCLUDE FIBERS, BUNDLES, CLUMPS AND MATRICES. SEE DEFINITIONS IN AHERA REGULATIONS.
4. THE NUMBER OF STRUCTURES USED IN CALCULATING DETECTION LIMITS MAY VARY DEPENDING UPON THE CLEANLINESS OF FIELD AND SEALED BLANKS AND THE CLEANLINESS OF LABORATORY BLANKS CONTEMPORANEOUS WITH THESE SAMPLES.
5. ASBESTOS STRUCTURES GREATER THAN TEN MICROMETERS (UM) IN LENGTH ARE REPORTED SEPARATELY BECAUSE THESE ARE THE IMPORTANT STRUCTURES IN THE EPA GUIDELINES.

RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT

A. F. MEYER AND ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VIRGINIA 22101
ATTN: JOHN LOVE

REPORT DATE: OCTOBER 24, 1989
SAMPLES RECEIVED: OCTOBER 20, 1989
RJ LEE JOB NO: ATW910020C
PURCHASE ORDER NO: WRC-TV (WRITTEN AUTHORITY)

ANALYSIS: ASBESTOS IN BULK SAMPLES

METHOD: PLM (POLARIZED LIGHT MICROSCOPY/DISPERSION STAINING) 40 CFR PART 763 APP. A TO SUBPART F

SAMPLE					PHYSICAL DESCRIPTION OF SAMPLE
IDENTIFICATION		CHRYSTILE	AMPHIBOLE	NON-ASBESTOS	
-----		ASBESTOS	ASBESTOS	FIBERS	
CLIENT	RJ LEE	(VOLUME %)	(VOLUME %)	(VOLUME %)	
JLC4 10198915	55014	ND1	ND1	90 SYNTHETIC FIBERS	RED FIBROUS MATERIAL
JLC4 10198916	55015	ND1	ND1	90 SYNTHETIC FIBERS	BLACK FIBROUS MATERIAL; GRAY CEMENT
JLC4 10198918	55017	ND1	ND1	20 CELLULOSE 10 SYNTHETIC FIBERS	GRAY DUST WITH FIBERS

William Brown
LABORATORY ANALYST

Oct 24, 1989
DATE:

Tom Dagenhart
TOM DAGENHART, M.S.
LABORATORY MANAGER, NVLAP SIGNATORY

RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT

A. F. MEYER AND ASSOCIATES, INC.
6849 OLD DOMINION DR.
MCLEAN, VIRGINIA 22101
ATTN: JOHN LOVE

REPORT DATE: OCTOBER 24, 1989
SAMPLES RECEIVED: OCTOBER 20, 1989
RJ LEE JOB NO: ATW9100208
PURCHASE ORDER NO: WRC-TV (WRITTEN AUTHORITY)

ANALYSIS: FIBERS (>5 MICROMETERS LONG) ON MIXED CELLULOSE ESTER FILTERS

METHOD: PHASE CONTRAST MICROSCOPY (PCM)
NIOSH 7400 A AS MODIFIED BY OSHA/EPA COUNTING RULES

FILTER DIAMETER (MM): 25 FIELD AREA (MM²): 0.00785

SAMPLE IDENTIFICATION		SAMPLE VOLUME (LITERS)	FIELDS COUNTED	TOTAL FIBERS	UNCORRECTED FIBER DENSITY (FIBERS/MM ²)	AIRBORNE FIBER CONCENTRATION (FIBERS/CM ³)	NOTES
-----	-----						
CLIENT	RJ LEE						
JLC410198908	55009	1479	100	14	17.8	0.005	
JLC410198911	55010	1152	100	31	39.5	0.013	
JLC410198912	55011	1662	100	22.5	28.7	0.007	
JLC410198919	55012	0	100	0	0.0	-----	

B. Clemente
LABORATORY ANALYST

Oct 24, 1989
DATE

Tom Dagenhart
TOM DAGENHART, M.S.
LABORATORY MANAGER

NOTES:

FIBERS SMALLER THAN 0.3 MICROMETERS IN DIAMETER ARE NOT DETECTED BY PCM.
PCM RELATIVE STANDARD DEVIATIONS RANGE FROM 40% AT LOW FIBER DENSITY TO 10% AT HIGH FIBER DENSITY.
PCM DATA ARE NOT RELIABLE TO MORE THAN ONE SIGNIFICANT FIGURE.
" < " MEANS BELOW RELIABLE DETECTION LIMIT.

RJ Lee Group

The Materials Characterization Specialists

ANALYSIS OF AIRBORNE ASBESTOS ON MIXED CELLULOSE ESTER FILTERS BY TRANSMISSION ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)

A.F. MEYER & ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VIRGINIA 22101
703-670-2131
JOHN LOVE

RJ LEE GR. JOB NUMBER: ATW-910020A
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER:
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: OCTOBER 27, 1989

SAMPLE INFORMATION

RJ LEE GR. SAMPLE #	CLIENT SAMPLE #	SAMPLE DESCRIPTION	AIR VOLUME (LITERS)	CASSETTE DIAMETER (MM)	COIL LENGTH (MM)	CONDUCTIVE COIL
54998	JLC4101989-01	NONE GIVEN	1199.8	25	50	YES
54999	JLC4101989-02	NONE GIVEN	1218	25	50	YES
55000	JLC4101989-04	NONE GIVEN	1199.8	25	50	YES
55001	JLC4101989-05	NONE GIVEN	1218	25	50	YES
55002	JLC4101989-06	NONE GIVEN	1199.8	25	50	YES
55003	JLC4101989-07	NONE GIVEN	1218	25	50	YES
55004	JLC4101989-09	NONE GIVEN	1174	25	50	YES
55005	JLC4101989-10	NONE GIVEN	1192	25	50	YES
55006	JLC4101989-13	NONE GIVEN	1166	25	50	YES
55007	JLC4101989-14	NONE GIVEN	1183	25	50	YES
55008	JLC4101989-20	BLANK	0	25	50	YES

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CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER:
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: OCTOBER 27, 1989

ANALYTICAL INFORMATION

AREA OF GRID OPENING: 0.00655 SQ MM TEM ACCELERATING POTENTIAL: 100 KV TEM: PHILIPS CM12
DETECTION LIMIT (FIBERS PER TEN GRID OPENINGS): 2 ENERGY DISPERSIVE X-RAY ANALYZER: EDAX 9800 PLUS

RJ LEE GR. SAMPLE #	ANALYTICAL SENSITIVITY (STRUCT/CC)	GRID OPENINGS SCANNED	AREA ANALYZED (SQ MM)	ASBESTOS STRUCTURES DETECTED WITH ASPECT RATIO > 3 : 1			STRUCTURE DENSITY (STR/SQ MM)	STRUCTURE CONCENTRATION (STR/CC)	TYPE OF ASBESTOS
				< 5.0 UM	>= 5.0 UM	TOTAL			
54998	0.0049	10	0.0655	3	0	3	45.8	0.015	CHRYSL./AMOSITE
54999	0.0048	10	0.0655	1	1	2	30.5	0.010	CHRYSTILE
55000	0.0049	10	0.0655	3	0	3	45.8	0.015	CHRYSL./AMOSITE
55001	0.0048	10	0.0655	0	1	1	15.3	0.010	AMOSITE
55002	0.0049	10	0.0655	6	0	6	91.6	0.029	CHRYSL./TREMOLI
55003	0.0048	10	0.0655	14	1	15	229.0	0.072	CHRYSTILE
55004	NOT ANALYZED	0	0.0000	0	0	0	NOT ANAL.	NOT ANAL.	NOT ANALYZED
55005	NOT ANALYZED	0	0.0000	0	0	0	NOT ANAL.	NOT ANAL.	NOT ANALYZED
55006	0.0050	10	0.0655	11	1	12	183.2	0.060	CHRYSL./TREMOLI
55007	0.0050	10	0.0655	8	1	9	137.4	0.045	CHRYSTILE
55008	NOT APPLICABLE	10	0.0655	0	0	0	0.0	NOT APPL.	NONE DETECTED

* SEE PAGE 3, COMMENT 6

Monica M. McClellan
SAMPLE PREPARATOR

Monica M. McClellan
TEM OPERATOR-ANALYST

Tom Dugan 10-27-89
LABORATORY MANAGER, DATE

RJ Lee Group

The Materials Characterization Specialists

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PURCHASE ORDER NUMBER:
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: OCTOBER 27, 1989

***** ESSENTIAL NOTES AND DISCLAIMERS *****

1. TEM ANALYTICAL DATA GENERALLY VALID TO ONLY ONE SIGNIFICANT FIGURE.
2. THE ASBESTOS MINERALS SOUGHT IN EACH SAMPLE INCLUDE CHRYSOTILE (CLINOCHRYSOTILE, ORTHOCHRYSOTILE AND PARACHRYSOTILE), AMOSITE (GRUNERITE AND CUMMINGTONITE), CROCIDOLITE (RIEBECKITE), ANTHOPHYLLITE (ANTHOPHYLLITE AND MAGNESIO-ANTHOPHYLLITE), TREMOLITE AND ACTINOLITE. NAMES GIVEN IN PARENTHESES INDICATE THE PROPER MINERALOGICAL TERM FOR ASBESTOS VARIETIES KNOWN BY AN IMPRECISE NAME. DEFINITIONS USED FOR THE AMPHIBOLES ARE THOSE OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION (1978).
3. ASBESTOS STRUCTURES INCLUDED IN THE STRUCTURE CONCENTRATION AND STRUCTURE DENSITY INCLUDE FIBERS, BUNDLES, CLUMPS AND MATRICES. SEE DEFINITIONS IN AHERA REGULATIONS.
4. THE NUMBER OF FIBERS USED IN CALCULATING DETECTION LIMITS MAY VARY DEPENDING UPON THE CLEANLINESS OF FIELD AND SEALED BLANKS AND THE CLEANLINESS OF LABORATORY BLANKS CONTEMPORANEOUS WITH THESE SAMPLES.
5. AIRBORNE MASS CONCENTRATIONS OF ASBESTOS IN NANOGRAMS PER CUBIC METER CAN BE PROVIDED AS NEEDED FOR THESE SAMPLES. THIS STREAMLINED REPORT ONLY INCLUDES STRUCTURE CONCENTRATIONS.
6. SAMPLES JLC4101989-09 AND 10, WERE NOT ANALYZED DUE TO HEAVY PARTICULATE LOADING AND THE RESULTING UNSTABLE NATURE OF THE CARBON FILM IN THE ELECTRON BEAM.

The Materials Characterization Specialists

ANALYSIS OF AIRBORNE ASBESTOS ON POLYCARBONATE FILTERS BY TRANSMISSION ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)

A.F. MEYER & ASSOCIATES, INC.
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JOHN LOVE

RJ LEE GR. JOB NUMBER: ATW-910020F
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER: WRITTEN AUTHORIZATION
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: NOVEMBER 3, 1989

SAMPLE INFORMATION

RJ LEE GR. SAMPLE #	CLIENT SAMPLE #	SAMPLE DESCRIPTION	AIR VOLUME (LITERS)	CASSETTE DIAMETER (MM)	COWL LENGTH (MM)	CONDUCTIVE COWL
55004	JLC4101989-09	NONE GIVEN	1174	25	50	YES
55005	JLC4101989-10	NONE GIVEN	1192	25	50	YES
		FILTER BLANK	0	25	50	YES

The Materials Characterization Specialists

ANALYSIS OF AIRBORNE ASBESTOS ON POLYCARBONATE FILTERS BY TRANSMISSION ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)

A.F. MEYER & ASSOCIATES, INC.
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703-734-9093
JOHN LOVE

RJ LEE GR. JOB NUMBER: ATW-910020F
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER: WRITTEN AUTHORIZATION
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: NOVEMBER 3, 1989

ANALYTICAL INFORMATION

AREA OF GRID OPENING: 0.00655 SQ MM TEM ACCELERATING POTENTIAL: 80 KV TEM: PHILIPS CM12
DETECTION LIMIT (FIBERS PER TEN GRID OPENINGS): 2 ENERGY DISPERSIVE X-RAY ANALYZER: EDAX 9800 PLUS

				ASBESTOS STRUCTURES DETECTED						
RJ LEE GR.	ANALYTICAL SENSITIVITY	GRID OPENINGS	AREA DILU. ANALYZED	WITH ASPECT RATIO > 3 : 1			STRUCTURE DENSITY	STRUCTURE CONCENTRATION	TYPE OF	
SAMPLE #	(STRUCT/CC)	SCANNED	FACT. (SQ MM)	< 5.0 UM	>= 5.0 UM	TOTAL	(STR/SQ MM)	(STR/CC)	ASBESTOS	
55004	0.7745	0.9	13.9	0.0004	99	1	100	236167.6	77.448	CHRYSTILE
55005	1.3730	0.5	13.9	0.0002	65	0	65	276316.1	89.246	CHRYSTILE
LAB BLANK NOT APPLICABLE		10	NA	0.0655	0	0	0	0.0	NOT APPL.	NONE DETECTED

Monica McElroy
SAMPLE PREPARATOR

Monica McElroy
TEM OPERATOR-ANALYST

Tom Sargent 11-3-89
LABORATORY MANAGER, DATE

1

The Materials Characterization Specialists

ANALYSIS OF AIRBORNE ASBESTOS ON POLYCARBONATE FILTERS BY TRANSMISSION
ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)

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RJ LEE GR. JOB NUMBER: ATW-910020F
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER: WRITTEN AUTHORIZATION
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REPORT DATE: NOVEMBER 3, 1989

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ESSENTIAL NOTES AND DISCLAIMERS

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1. TEM ANALYTICAL DATA GENERALLY VALID TO ONLY ONE SIGNIFICANT FIGURE.
2. THE ASBESTOS MINERALS SOUGHT IN EACH SAMPLE INCLUDE CHRYSOTILE (CLINOCHRYSOTILE, ORTHOCHRYSOTILE AND PARACHRYSOTILE), AMOSITE (GRUNERITE AND CUMINGTONITE), CROCIDOLITE (RIEBECKITE), ANTHOPHYLLITE (ANTHOPHYLLITE AND MAGNESIO-ANTHOPHYLLITE) TREMOLITE AND ACTINOLITE. NAMES GIVEN IN PARENTHESES INDICATE THE PROPER MINERALOGICAL TERM FOR ASBESTOS VARIETIES KNOWN BY AN IMPRECISE NAME. DEFINITIONS USED FOR THE AMPHIBOLES ARE THOSE OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION (1973).
3. ASBESTOS STRUCTURES INCLUDED IN THE STRUCTURE CONCENTRATION AND STRUCTURE DENSITY INCLUDE FIBERS, BUNDLES, CLUMPS AND MATRICES. SEE DEFINITIONS IN AHERA REGULATIONS.
4. THE NUMBER OF FIBERS USED IN CALCULATING DETECTION LIMITS MAY VARY DEPENDING UPON THE CLEANLINESS OF FIELD AND SEALED BLANKS AND THE CLEANLINESS OF LABORATORY BLANKS CONTEMPORANEOUS WITH THESE SAMPLES.
5. AIRBORNE MASS CONCENTRATIONS OF ASBESTOS IN NANOGRAMS PER CUBIC METER CAN BE PROVIDED AS NEEDED FOR THESE SAMPLES. THIS STREAMLINED REPORT ONLY INCLUDES STRUCTURE CONCENTRATIONS.
6. THESE SAMPLES WERE PREPARED BY LOW-TEMPERATURE PLASMA ASHING AND AQUEOUS REDEPOSITION DUE TO OVERLOADING OF ORIGINAL AIR FILTERS.
7. COMPLEX ASBESTOS STRUCTURES CONSISTING OF MULTIPLE FIBERS MAY HAVE DISAGGREGATED DURING SAMPLE PREPARATION. CONSEQUENTLY, ASBESTOS STRUCTURE COUNTS MAY BE BIASED HIGH.

The Materials Characterization Specialists

**ANALYSIS OF AIRBORNE ASBESTOS ON MIXED CELLULOSE ESTER FILTERS BY TRANSMISSION
ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)**

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RJ LEE GR. JOB NUMBER: ATW-910C20E
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER: WRITTEN AUTHORIZATION
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: NOVEMBER 3, 1989

SAMPLE INFORMATION

RJ LEE GR. SAMPLE #	CLIENT SAMPLE #	SAMPLE DESCRIPTION	AIR VOLUME (LITERS)	CASSETTE DIAMETER (MM)	COWL LENGTH (MM)	CONDUCTIVE COWL
55009	JLC4101989-08	NONE GIVEN	1479	25	50	YES
55011	JLC4101989-12	NONE GIVEN	1662	25	50	YES

**VINYL ASBESTOS FLOOR TILE STUDY
ROUTINE BUFFING AND STRIPPING OPERATIONS
FOR
WRC-TV WASHINGTON
NOVEMBER 6, 1989**

**NEWS EMBARGO UNTIL
December 1, 1989**

The Materials Characterization Specialists

ANALYSIS OF AIRBORNE ASBESTOS ON MIXED CELLULOSE ESTER FILTERS BY TRANSMISSION ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)

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SAMPLE RECEIPT DATE: OCTOBER 20, 1989
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RJ LEE GR.	ANALYTICAL SENSITIVITY (STRUCT/CC)	GRID OPENINGS SCANNED	AREA ANALYZED (SQ MM)	ASBESTOS STRUCTURES DETECTED WITH ASPECT RATIO > 3 : 1			STRUCTURE DENSITY (STR/SQ MM)	STRUCTURE CONCENTRATION (STR/CC)	TYPE OF ASBESTOS
				< 5.0 UM	>= 5.0 UM	TOTAL			
55009	0.0040	10	0.0655	7	1	8	122.1	0.032	CHRYSL./ACTIN.
55011	0.0035	10	0.0655	0	2	2	30.5	0.007	CHRYSTILE

Monica McClellan
SAMPLE PREPARATOR

Monica McClellan
TEM OPERATOR-ANALYST

Tom S. Gierhart 1.1
LABORATORY MANAGER, DATE

The Materials Characterization Specialists

**ANALYSIS OF AIRBORNE ASBESTOS ON MIXED CELLULOSE ESTER FILTERS BY TRANSMISSION
ELECTRON MICROSCOPY, EPA LEVEL II METHOD (YAMATE, ET AL., 1984)**

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RJ LEE GR. JOB NUMBER: ATW-910020E
CLIENT JOB NUMBER: VAT STUDY SLIGO ELEM.
PURCHASE ORDER NUMBER: WRITTEN AUTHORIZATION
SAMPLE RECEIPT DATE: OCTOBER 20, 1989
REPORT DATE: NOVEMBER 3, 1989

ESSENTIAL NOTES AND DISCLAIMERS

1. TEN ANALYTICAL DATA GENERALLY VALID TO ONLY ONE SIGNIFICANT FIGURE.
2. THE ASBESTOS MINERALS SOUGHT IN EACH SAMPLE INCLUDE CHRYSOTILE (CLINOCHRYSOTILE, ORTHOCHRYSOTILE AND PARACHRYSOTILE), AMOSITE (GRUNERITE AND CUMMINGTOWITE), CROCIDOLITE (RIEBECKITE), ANTHOPHYLLITE (ANTHOPHYLLITE AND MAGNESIO-ANTHOPHYLLITE), TREMOLITE AND ACTINOLITE. NAMES GIVEN IN PARENTHESES INDICATE THE PROPER MINERALOGICAL TERM FOR ASBESTOS VARIETIES KNOWN BY AN IMPRECISE NAME. DEFINITIONS USED FOR THE AMPHIBOLES ARE THOSE OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION (1970).
3. ASBESTOS STRUCTURES INCLUDED IN THE STRUCTURE CONCENTRATION AND STRUCTURE DENSITY INCLUDE FIBERS, BUNDLES, CLUMPS AND MATRICES. SEE DEFINITIONS IN AHERA REGULATIONS.
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RJ Lee Group

The Materials Characterization Specialists

LABORATORY REPORT

A. F. MEYER ASSOCIATES, INC.
6849 OLD DOMINION DRIVE
MCLEAN, VA 22101
ATTN: JOHN LOVE

REPORT DATE: NOVEMBER 3, 1989
SAMPLES RECEIVED: OCTOBER 20, 1989
RJ LEE JOB NO: ATL910020
PURCHASE ORDER NO: WRC-TV WRITTEN AUTHORITY

ANALYSIS: ASBESTOS IN BULK SAMPLES

METHOD: TRANSMISSION ELECTRON MICROSCOPY (TEM), SEMIQUANTITATIVE ADAPTATION OF EPA LEVEL II METHOD, FIBER IDENTIFICATION BY MORPHOLOGY, ENERGY DISPERSIVE X-RAY ANALYSIS (EDXA) AND SELECTED AREA ELECTRON DIFFRACTION (SAED).

SAMPLE IDENTIFICATION		CHRYSTILE	AMPHIBOLE	NON-ASBESTOS	PHYSICAL DESCRIPTION OF SAMPLE
-----	-----	ASBESTOS	ASBESTOS	FIBERS	
CLIENT	RJ LEE	(VOLUME %)	(VOLUME %)	(VOLUME %)	
JLC4101989-15	55014	1	ND1		BROWN DUST (INCLUDED CALCITE AND SILICA PARTICLES & ORGANIC MATERIAL)
JLC4101989-16	55015	TRACE	ND1		BROWN DUST (INCLUDED ORGANIC MATERIAL)
JLC4101989-18	55017	TRACE	ND1		BROWN DUST (INCLUDED GYPSUM, ORGANIC MAT & TITANIUM PIGMENT)

Monica M. McCleary
LABORATORY ANALYST

Nov 3, 1989
DATE:

Tom Dagenhart
TOM DAGENHART, M.S.
LABORATORY MANAGER, NVLAP SIGNATORY