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ADMINISTRATIVE RECORD

W.R. GRACE VERMICULITE MINE CLOSURE WATER QUALITY DATA REPORT NO. 5 OCTOBER, 1993

Submitted to:

Montana Department of State Lands
Hard Rock Mining Bureau
Helena, Montana

Submitted by:

Schafer and Associates
Bozeman, Montana

January 27, 1994

Schafer

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1.0 BACKGROUND

The W.R. Grace vermiculite mine near Libby, Montana was closed in the fall of 1990. As part of the reclamation and closure, particularly as it applies to areas around the tailings impoundment, W.R. Grace submitted to the Water Quality Bureau a proposed Water Quality Monitoring Plan in September, 1991 (Schafer and Associates, 1991). The purpose of the Plan was to establish post-closure water quality data as a means of monitoring the performance of facility reclamation measures.

The plan calls for water sampling at several locations in the Rainy Creek drainage as shown on Figure 1.1. Contingent sampling on the Kootenai was proposed if initial data on Rainy Creek indicated any potential health concerns. Four sampling campaigns were proposed for the first year to characterize re-reclamation water quality conditions and assess seasonal variations in water quality. Additional annual sampling campaigns for a minimum of three years following closure were also proposed. The first sampling event took place in mid-November, 1991, the second in late March, 1992, the third in early July, 1992 and the fourth in late October, 1992. Results from these sampling events were reported in Water Quality Data Report No.1, No. 2, No.3 and No. 4, respectively. Data from these sampling events indicated that fluoride was slightly above drinking water standards in Lower Rainy Creek due to drainage of process water from the tailings impoundment. Asbestiform fibers were also above drinking water standards in Lower Rainy Creek. Although Carney Creek carried fibers potentially attributable to mine waste dumps and Fleetwood Creek carried fibers which appear to be of natural origin, neither tributary could account for the quantity of fibers found in Lower Rainy Creek. It was concluded that the Lower Rainy Creek streambed was the source of the high asbestiform fiber count and that this was probably the result of old mining practices which discharged tailings directly into the drainage without settlement.

Facility demolition and reclamation activities were completed in 1992 and early 1993. This report is the first of the post-closure water quality reports summarizing data from water samples collected October 21, 1993.

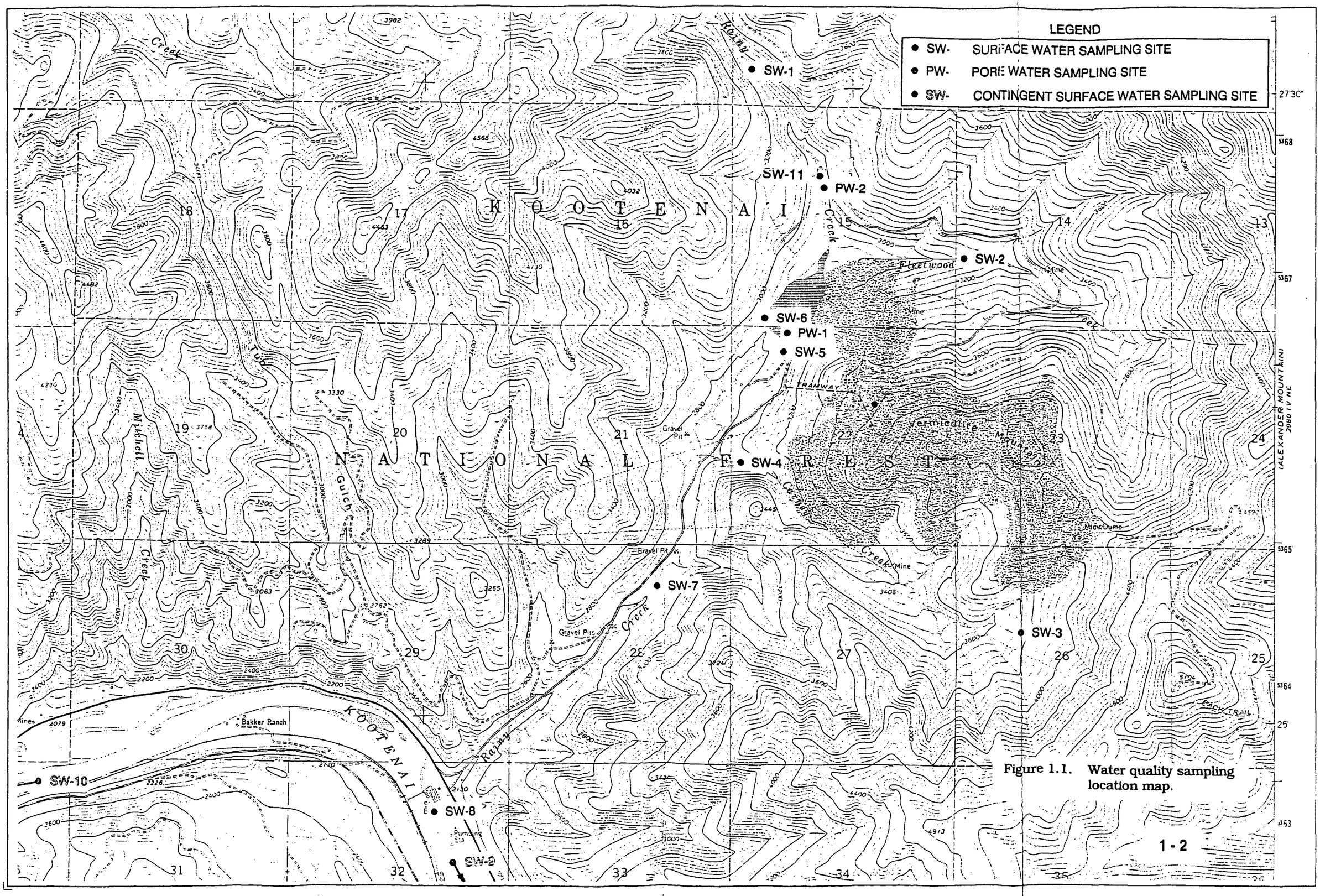

Figure 1.1. Water quality sampling location map.

2.0 METHODS

Conditions at the time of sampling were partly cloudy with morning fog but no rain. Temperatures ranged from 38° F to 50° F. The Rainy Creek diversion pipeline was removed as part of reclamation and Rainy Creek was flowing in its natural drainage into the tailings pond. The tailing pond surface water was restricted to the upper end of the impoundment but appeared to be slightly larger than the previous year. This is probably the result of a cool, wet summer. There was no surface water discharge from the impoundment through the new concrete spillway which was built in the spring of 1993.

Sampling methods were outlined in the Water Quality Monitoring Plan (Schafer and Associates, 1991) submitted in September, 1991 and modified slightly in the field as described in Water Quality Data Report No. 1 (Schafer and Associates, 1992). For the post-closure sampling, modifications were made to the initial plan to reduce the number of samples and the analyses performed on them based on the results of baseline sampling. These changes were outlined in a letter to DSL dated January 13, 1992 accompanying Water Quality Data Report No. 4. The revised sampling plan concentrated on the fluoride and asbestiform fibers in Lower Carney Creek, toe drains and surface discharge from the tailings impoundment, and Lower Rainy Creek. Since elevated metal concentrations were not detected in baseline sampling, metal analyses were removed from the analytical list. DSL agreed to the suggested changes and recommended that annual post-closure sampling take place each year in the fall of the year during base flow.

The preservation techniques and analytical methods used are summarized in Table 2.1. All samples were stored and shipped on ice.

Table 2.1. Summary of sampling and analytical methods for water samples.

Unpreserved Samples		Field Parameters	
Component	Analytical Method[1]	Parameter	Method
TDS	EPA 160.1	Flow	Pygmy current meter/ Baski flume
TSS	EPA 160.2	pH	Field pH meter
Asbestiform Fibers	EPA-600/4-83-043	EC	Field EC meter
Hardness	EPA 130.2	Temperature	Field meter
Alkalinity	EPA 310.1		
NO_3^{-1}	EPA 353.2		
SO_4^{-2}	EPA 375.3		
Cl^{-1}	EPA 325.3		
F^{-1}	EPA 340.2		
Ca	EPA 215.1/200.7		
Mg	EPA 242.1/200.7		
Na	EPA 273.1/200.7		
K	EPA 258.1/200.7		
CO_3^{-2}/HCO_3^{-1}	EPA 310.1		

[1] EPA procedures are described in 40 CFR Part 136, Table B. Procedures for asbestiform fibers are described in "Analytical Procedures for Determination of Asbestos Fibers in Water" (EPA-600/4-83-043).

3.0 PRESENTATION OF DATA

Results of the October 21, 1993 sampling are summarized in tabular form as follows:

- Table 3.1 is a summary of field parameters including pH, electric conductivity (EC), temperature and flow.
- Table 3.2 is a summary of major cation and anion analyses.
- Table 3.3 is a summary of miscellaneous analyses for various components, alkalinity, hardness, etc.
- Table 3.4 is a summary of asbestiform fiber analyses.

Raw analytical data from Energy Laboratories and EMS Laboratories used to prepare Tables 3.2, 3.3 and 3.4, are included in Appendix A and B, respectively.

Table 3.1. Field data summary.

SITE NO.	DESCRIPTION	pH (su)	EC (mmhos/cm)	TEMP (°C)	FLOW (cfs)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled			
SW-2	Fleetwood Creek above coarse tails	8.14	0.46	6.2	0.14[1]
SW-3	Upper Carney Creek at Zook's Dump	Not Sampled			
SW-4	Lower Carney Creek above Rainy Creek	8.25	0.56	6.0	0.14[2]
SW-5	Tailings dam toe drains	7.15	0.56	9.7	0.68[1]
SW-6	Tailings pond outfall[5]	Not Sampled			
SW-7	Lower Rainy Creek leaving mine property	Not Sampled			
SW-8	Lower Rainy Creek above Kootenai River	8.55	0.46	6.3	1.04[1]
SW-9	Kootenai River above Rainy Creek	Not Sampled[3]			
SW-10	Kootenai River below Rainy Creek	Not Sampled[3]			
SW-11[4]	Rainy Creek flow into tailings pond	8.24	0.33	5.1	0.11[1]
PW-1	Tailings Pond pore water	Not Sampled			
PW-2	Groundwater near SW-11	Not Sampled			

1 Flow measurement was made with a Pygmy current meter.
2 Flow measurement was made with a Baski flume.
3 Samples of the Kootenai River were not taken as discussed in the Water Quality Monitoring Plan.
4 The original Water Quality Monitoring Plan did not include this site.
5 There was no surface flow from the impoundment.

Table 3.2. Laboratory data summary for major cations and anions.

SITE NO.	DESCRIPTION	K (mg/l)	Na (mg/l)	Ca (mg/l)	Mg (mg/l)	SO_4^{-2} (mg/l)	Cl^{-1} (mg/l)	CO_3^{-2} (mg/l)	HCO_3^{-1} (mg/l)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled							
SW-2	Fleetwood Creek above coarse tails	Not Sampled							
SW-3	Upper Carney Creek at Zook's Dump	Not Sampled							
SW-4	Lower Carney Creek above Rainy Creek	13	9	94	27	22	1	0	430
SW-5	Tailings dam toe drains	12	6	90	24	9	3	0	396
SW-6	Tailings pond surface water	Not Sampled							
SW-7	Lower Rainy Creek leaving mine property	Not Sampled							
SW-8	Lower Rainy Creek above Kootenai River	10	7	84	21	13	4	2	343
SW-0	Blind Control (Replicate of SW-4)	10	7	84	21	14	4	0	349
SW-9	Kootenai River above Rainy Creek	Not Sampled							
SW-10	Kootenai River below Rainy Creek	Not Sampled							
SW-11	Rainy Creek flow into tailings pond	Not Sampled							
PW-1	Pore water from tailings	Not Sampled							
PW-2	Groundwater near SW-11	Not Sampled							

Table 3.3. Laboratory data summary for miscellaneous constituents.

SITE NO.	DESCRIPTION	TDS (mg/l)	TSS (mg/l)	Hardness (mg/l)	Alkalinity (mg/l)	NO_3^{-1} (mg/l)	F^{-1} (mg/l)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled					
SW-2	Fleetwood Creek above coarse tails	Not Sampled					
SW-3	Upper Carney Creek at Zook's Dump	Not Sampled					
SW-4	Lower Carney Creek above Rainy Creek	424	<1	347	352	0.22	0.38
SW-5	Tailings dam toe drains	379	2	324	324	<0.05	1.5
SW-6	Tailings pond surface water	Not Sampled					
SW-7	Lower Rainy Creek leaving mine property	Not Sampled					
SW-8	Lower Rainy Creek above Kootenai River	357	<1	296	285	<0.05	1.7
SW-0	Blind Control (Replicate of SW-8)	360	2	295	286	<0.05	1.6
SW-9	Kootenai River above Rainy Creek	Not Sampled					
SW-10	Kootenai River below Rainy Creek	Not Sampled					
SW-11	Rainy Creek flow into tailings pond	Not Sampled					
PW-1	Pore water from tailings	Not Sampled					
PW-2	Groundwater near SW-11	Not Sampled					

Table 3.4. Laboratory data summary for asbestiform fibers.

SITE NO.	DESCRIPTION	DETECTION LIMIT (MFL)*	FIBERS <5µm (MFL)*	FIBERS >5µm (MFL)*	FIBERS >10µm (MFL)*	FIBER MASS (µg/l)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled				
SW-2	Fleetwood Creek above coarse tails	Not Sampled				
SW-3	Upper Carney Creek at Zook's Dump	Not Sampled				
SW-4	Lower Carney Creek above Rainy Creek	0.15	7.1	4.6	1.5	23
SW-5	Tailings dam toe drains	0.16	1.5	ND	ND	0.1
SW-6	Tailings pond surface water	Not Sampled				
SW-7	Lower Rainy Creek leaving mine property	Not Sampled				
SW-8	Lower Rainy Creek above Kootenai River	0.07	3.7	1.3	0.9	24
SW-0	Blind Control (Replicate of SW-8)	0.16	12.1	3.8	1.9	18
SW-9	Kootenai River above Rainy Creek	Not Sampled				
SW-10	Kootenai River below Rainy Creek	Not Sampled				
SW-11	Rainy Creek flow into tailings pond	Not Sampled				

* MFL = Million fibers per liter

4.0 DATA ANALYSIS

Data for streamflow, fluoride and asbestiform fibers collected during the last three base flow periods is compared in Table 4.1.

Stream flow data indicate that the toe drains contributed about an additional 0.6 cfs to the overall flow in Lower Rainy Creek on the first sample date following plant closure (11/15/91). This additional flow has subsided as the tailings pond has drained and now appears to be near an equilibrium flow condition.

Asbestiform fiber data in Lower Rainy Creek may have improved somewhat since mine operation was ceased. Fiber counts in the last two base flow periods are substantially less than the initial sampling done in November, 1991. Both samples are within the federal drinking water standard of 7.0 MFL. The reduced fiber counts may be influenced by the lower base flows in Rainy Creek. Fiber counts in Lower Rainy Creek during other seasons with higher measured streamflows and during the initial period when the tailings impoundment was draining down, were between 10 and 20 MFL (> 10 microns long with aspect ratio > 3:1) and 200 to 400 µg/l (all fibers with aspect ratio > 3:1).

Fluoride has steadily declined in the toe drain samples and now analyzes 1.5 mg/l F, slightly below the drinking water standard of 2.0 mg/l F. Fluoride in Lower Rainy Creek has not decreased with time and is averaging 1.6 mg/l F. The levels now being measured in Lower Rainy Creek are only about four times higher than background concentrations in natural streams in the area. These fluoride concentrations are near the saturation value for CaF_2 reported by Lindsay and as predicted by MINTAQA2 modelling. This may be an indication that fluoride previously discharged from the toe drains (greater than 3.0 mg/l F) was slightly oversaturated with respect to CaF_2. Equilibrium may have been achieved in Lower Rainy Creek through dilution and possibly precipitation of CaF_2. The latest data indicates that additional fluoride is resolubilizing in Lower Rainy Creek (higher flow than the toe drains at the same fluoride concentration). The source of this additional fluoride may be precipitated CaF_2. If this is the case, it may be some time before the fluoride levels decline any further in Lower Rainy Creek since the fluoride concentration may be determined by the availability of previously precipitated CaF_2.

Table 4.1. A comparison of critical water quality parameters in the last three base flow periods.

Date	LOWER RAINY CREEK (Site SW-8)				LOWER CARNEY CREEK (Site SW-4)				TAILINGS DAM TOE DRAINS (Site SW-5)			
	Flow	Asbestiform Fibers		Fluoride	Flow	Asbestiform Fibers		Fluoride	Flow	Asbestiform Fibers		Fluoride
	(cfs)	(MFL)[1]	(µg/l)[2]	(mg/l)	(cfs)	(MFL)[1]	(µg/l)[2]	(mg/l)	(cfs)	(MFL)[1]	(µg/l)[2]	(mg/l)
11/15/91	2.03	17.	240	1.6	0.24	0.1	6.4	0.28	1.22	0.3	8.8	3.1
10/29/92	1.46	0.4	24	1.5	NM	1.2	23	0.20	0.69	ND	0.1	2.6
10/21/93	1.04	0.9	9.9	1.7	0.14	1.5	22	0.38	0.68	ND	0.8	1.5

ND = Not Detected
NM = Not Measured
[1] Includes only fibers longer than 10 microns with aspect ratio greater than 3:1.
[2] Includes all fibers with aspect ratio greater than 3:1, regardless of size.

REFERENCES

American Public Health Association, 1985. Standard Methods for the Examination of Water and Wastewater, Part 300: Determination of Metals.

Lindsay, W. L. 1979. Chemical Equilibria in Soils, p 95.

Schafer and Associates, 1991. W.R. Grace Vermiculite Mine Closure Water Quality Monitoring Plan, submitted to Montana Department of Health and Environmental Sciences, Water Quality Bureau.

Schafer and Associates, 1992(a). W.R. Grace Vermiculite Mine Closure Water Quality Data Report No. 1, November 1991, submitted to Montana Department of State Lands, Hard Rock Mining Bureau.

Schafer and Associates, 1992(b). W.R. Grace Vermiculite Mine Closure Water Quality Data Report No. 2, March 1992, submitted to Montana Department of State Lands, Hard Rock Mining Bureau.

Schafer and Associates, 1992(c). W.R. Grace Vermiculite Mine Closure Water Quality Data Report No. 3, July 1992, submitted to Montana Department of State Lands, Hard Rock Mining Bureau.

Schafer and Associates, 1993. W.R. Grace Vermiculite Mine Closure Water Quality Data Report No. 4, October 1992, submitted to Montana Department of State Lands, Hard Rock Mining Bureau.

APPENDIX A

ENERGY LABORATORIES DATA REPORTS

ENERGY LABORATORIES

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
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Tom Hudson
Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

WATER ANALYSIS
W.R. Grace Mine Near Libby, MT

Lab No.	93-51903
Sample Identification	SW0
Date & Time Sampled	10/21/93 @ 1430
Date Submitted	10/26/93
Date Reported	11/19/93 crp

Constituent	mg/l (ppm)	Date Analyzed
Potassium	10	11/04/93
Sodium	7	11/04/93
Calcium	84	11/04/93
Magnesium	21	11/04/93
Sulfate	14	11/08/93
Chloride	4	11/08/93
Carbonate	0	11/01/93
Bicarbonate	349	11/01/93
Total Dissolved Solids @ 180°C	360	11/09/93
Total Suspended Solids	2	10/26/93
Total Hardness as CaCO3	295	11/04/93
Total Alkalinity as CaCO3	286	11/01/93
Nitrate plus Nitrite as N	<0.05	11/03/93
Fluoride	1.6	11/08/93
Total Acidity as CaCO3	<1	11/01/93
Total Recoverable Iron	<0.03	10/28/93

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WATER ANALYSIS
W.R. Grace Mine Near Libby, MT

Lab No.	93-51904
Sample Identification	SW4
Date & Time Sampled	10/21/93 @ 1300
Date Submitted	10/26/93
Date Reported	11/19/93 crp

Constituent	mg/l (ppm)	Date Analyzed
Potassium	13	11/04/93
Sodium	9	11/04/93
Calcium	94	11/04/93
Magnesium	27	11/04/93
Sulfate	22	11/08/93
Chloride	1	11/08/93
Carbonate	0	11/01/93
Bicarbonate	430	11/01/93
Total Dissolved Solids @ 180°C	424	11/09/93
Total Suspended Solids	<1	10/26/93
Total Hardness as CaCO3	347	11/04/93
Total Alkalinity as CaCO3	352	11/01/93
Nitrate plus Nitrite as N	0.22	11/03/93
Fluoride	0.38	11/08/93
Total Acidity as CaCO3	<1	11/01/93
Total Recoverable Iron	0.06	10/28/93

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WATER ANALYSIS
W.R. Grace Mine Near Libby, MT

Lab No.	93-51905
Sample Identification	SW5
Date & Time Sampled	10/21/93 @ 1030
Date Submitted	10/26/93
Date Reported	11/19/93 crp

Constituent	mg/l (ppm)	Date Analyzed
Potassium	12	11/04/93
Sodium	6	11/04/93
Calcium	90	11/04/93
Magnesium	24	11/04/93
Sulfate	9	11/08/93
Chloride	3	11/08/93
Carbonate	0	11/01/93
Bicarbonate	396	11/01/93
Total Dissolved Solids @ 180°C	379	11/09/93
Total Suspended Solids	2	10/26/93
Total Hardness as CaCO3	324	11/04/93
Total Alkalinity as CaCO3	324	11/01/93
Nitrate plus Nitrite as N	<0.05	11/03/93
Fluoride	1.5	11/08/93
Total Acidity as CaCO3	<1	11/01/93
Total Recoverable Iron	<0.03	10/28/93

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WATER ANALYSIS
W.R. Grace Mine Near Libby, MT

Lab No.	93-51906
Sample Identification	SW8
Date & Time Sampled	10/21/93 @ 1430
Date Submitted	10/26/93
Date Reported	11/19/93 crp

Constituent	mg/l (ppm)	Date Analyzed
Potassium	10	11/04/93
Sodium	7	11/04/93
Calcium	84	11/04/93
Magnesium	21	11/04/93
Sulfate	13	11/07/93
Chloride	4	11/07/93
Carbonate	2	11/01/93
Bicarbonate	343	11/01/93
Total Dissolved Solids @ 180°C	357	11/09/93
Total Suspended Solids	<1	10/26/93
Total Hardness as CaCO3	296	11/04/93
Total Alkalinity as CaCO3	285	11/01/93
Nitrate plus Nitrite as N	<0.05	11/03/93
Fluoride	1.7	11/08/93
Total Acidity as CaCO3	<1	11/01/93
Total Recoverable Iron	<0.03	10/28/93

APPENDIX B

EMS LABORATORIES DATA REPORTS

RECEIVED JAN 1 4 1994

DATE:	January 3, 1994
CLIENT:	SCHAFER & ASSOCIATES P. O. Box 6186 Bozeman, MT 59715
ATTENTION:	Thomas Hudson
REFERENCE:	Letter Dated October 25, 1993
REPORT NO:	29180
SUBJECT:	ASBESTOS ANALYSIS OF WATER SAMPLES BY TRANSMISSION ELECTRON MICROSCOPY
ACCREDITED:	National Institute of Standards and Technology through NVLAP (Laboratory No. 1218) California Department of Health Services for Asbestos by TEM (Certification No. 1119)

Four surface water samples were submitted for quantitative asbestos TEM analysis. The samples came from the W. R. Grace mine near Libby, Montana.

The sample were analyzed according to the U.S. EPA method (EPA-600/4-83-043).

The asbestiform which was present in the water samples was from the tremolite/actinolite group of amphiboles.

For Sample SW-5-4, only 5 ml could be filtered through a 0.1µm pore size *polycarbonate filter as required by the method because of the heavy* particulates in the water. Additional grid openings were analyzed for >10µm fibers in length to increase the analytical sensitivity and to address the new Federal drinking water regulations where the MCL is 7.1 MFL for fibers >10µm in length.

The results are as follows:

ASBESTOS FIBER LENGTH DISTRIBUTION (MFL)

Sample No.	<2.5 µm	2.5 to 4.9 µm	5.0 to 9.9 µm	>10 µm	D. L. µm
SW-0-4	7.6	4.5	3.1	1.5	0.16
SW-4-4	3.8	3.3	2.9	1.9	0.15

ASBESTOS FIBER LENGTH DISTRIBUTION (MFL)

Sample No.	<2.5 µm	2.5 to 4.9 µm	5.0 to 9.9 µm	>10 µm	D. L. µm
SW-5-4	ND	1.5	ND	ND	1.5 (21 GO)
				ND	0.16 (181 GO)
SW-8-4	2.0	1.7	0.4	0.9	0.07

MFL = Millions of Fibers per Liter
D. L. = Detection Limit

Respectfully submitted,

EMS LABORATORIES, INC.

B M Kolk

B. M. Kolk
Laboratory Director

A U.S. Dept. of Commerce, Nat'l Institute of Standards and Technology accredited lab.
Airborne Asbestos
Asbestos Bulk Sample
Analyses
NVLAP
EMS Laboratories, Inc.
Lab Code: 1218

This report, from a NIST accredited laboratory through NVLAP, must not be used by the client to claim product endorsement by NVLAP or any agency of the Government.

ANALYSIS OF WATER BY TEM (EPA-600/4-83-043)

LAB NO: 29180
CLIENT: SCHAFFER & ASSOC.

Laboratory I.D.	Client I.D.	FILTER MEDIA DATA Type	Diameter mm	Effective Area mm^2	No. of G.O.	Analyzed Area, mm^2	Sample Volume (ml)
29180-0-4	SW 0-4	PC	47	1017	9	0.063	100
29180-4-4	SW 4-4	PC	47	1017	20	0.14	50
29180-5-4	SW 5-4	PC	47	1017	21	0.147	5
29180-5-4*	SW 5-4*	PC	47	1017	182	1.274	5
29180-8-4	SW 8-4	PC	47	1017	20	0.14	100

INDIVIDUAL ANALYTICAL RESULTS

Laboratory I.D.	Client I.D.	No. of Asbestos Str	>5	>10	Detection Limit (MFL)	CONCENTRATION (MFL) Str	Str >5um	Str >10um
29180-0-4	SW 0-4	104	28	9	0.2	17	4.5	1.5
29180-4-4	SW 4-4	82	32	13	0.1	12	4.6	1.9
29180-5-4	SW 5-4	1	N.D.	N.D.	1.4	1.4	N.D.	N.D.
29180-5-4*	SW 5-4*	N.D.	N.D.	N.D.	0.2	N.D.	N.D.	N.D.
29180-8-4	SW 8-4	68	17	12	0.07	4.9	1.2	0.9

* For Fibers > 10um only.

The analysis was carried out to the approved TEM method. This laboratory is in compliance with the quality specified by the method.

B M Koll

Authorized Signature

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 29180 **Client** SCHAFFER &ASSOC.

Sample No. SW 0-4*

Date Analyzed 12/13/93

Fibers (asbestos)	17	MFL
Fibers > 5 µm in length (asbestos)	4.5	MFL
Fibers > 10 µm in length (asbestos)	1.5	MFL
Mass (asbestos)	37	ug/L
More/Less than 5 Fibers in Sample (asbestos)	MORE	
Poisson 95% Confidence Interval	14 to 20	MFL
Detection Limit	0.2	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Asbestos)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	7	16	13	11	29	19	9

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	3	11	13	18	45	11	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
46	32	10	4	4	7	1	0

* This sample contains Amphiboles : Tremolite.

ASBESTOS ANALYSIS

Sample No. SW0-4 Page 1 of 2

RECEIVING

TYPE OF SAMPLE
Air ☐ Water ☑
Soil ☐ Bulk ☐
Other _____

METHOD OF ANALYSIS
EPA 600/4-83-043 ☑ ISO ☐

LEVEL OF ANALYSIS
Chrysotile CD-CDQ
Amphibole AD-ADQ

ASPECT RATIO
3:1 ☒ 5:1 ☐

Approved By BKoll Date 12-28

LENGTHS
All Sizes (EPA) ☐
(μm) ≥0.5 ☒
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width ≥5.0 μm length)

FILTER TYPE / AREA (mm±)
MCE ☐ 385 ☐
PC ☑ 314 ☐
MCN ☐ 1017 ☑
Other _____

PORE SIZE
0.45 μm ☐ 0.8 μm ☐
0.1 μm ☐ 0.22 μm ☐
Other _____

G.O. Area (mm²) 0.0070
No. of G.O. to Analyze 20
Filter Lot No. _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 100 ml
Weight _____ grams
Ashed Area _____ %

Prepared By B.P/F.M
Date 10-28-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address 1-A
Screen Magnification 19,200 X
Camera Constant 28.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst FM Date 10-28-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	01	F	5	70													✓				3	10	2	1	EDS Tremolite
	02	F	5	55													✓				3	10	2	2	EDS — " —
	03	F	2.5	30													✓		✓		3	10	3	1	SAED #4904, EDS
	04	F	3	32													✓				3	10	2		EDS Trem ~~Actinol~~
	05	F	4	30													✓				3	10	2	1	EDS Tremolite
	06	F	3	55												✓	✓								— " —
	07	F	2.5	22	✓																				— " —
	08	F	8	125												✓									— " —
	09	F X	2.5	30												✓									— " — Trem-Act
	10	F	2.5	45												✓					2	10	1	2	EDS, SAED #4905
	11	F	2.5	145												✓									— " —
	12	F	4	23												✓									— " —
	13	F	4	38												✓									— " —
	14	F	5	100												✓									— " —
2	15	F	2.5	27													✓								— " —

OBSERVATIONS:
Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client [illegible] Sample No. 2

EMS Lab No [illegible] Page 2 of 2

Analyst _____ Date _____

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
2	16	F	6	38	✓																				Tremolite
	17	F	5	50												✓									"
	18	F	5	80												✓									"
	19	F	3	70												✓									"
	20	F	5	45												✓									"
3	21	F	2.5	70												✓									"
	22	F	4	47												✓									"
	23	F	5	45												✓									"
	24	F	10	150												✓									"
	25	F	5	53													✓								"
	26	F	4	175													✓		✓		3	10	1	1	EDS, SAED #4910
	27	F X	5	280													✓								Tremolite
	28	F	4	57													✓								"
	29	F X	6	440													✓								"
	30	F	2.5	30	✓																				
	31	F	8	160													✓								"

OBSERVATIONS: Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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28-Oct-1993 20:10:03

29180,0-4,A,0$,FM,/>.5MKM/ Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 15 secs

Energy	Counts	X-Ray Lines
1.27	1265.	Mg K , Mg K , Mg K , As L , As L , As L
1.76	4351.	Si K , Si K
3.32	172.	K K , K K
3.71	981.	Ca K , Ca K
4.01	93.	Ca K , Ca K
6.42	227.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 16067

28-Oct-1993 20:13:05

29180,0-4,A,02,FM,/).5MKM/ Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.26	619.	Mg K , Mg K , Mg K , As L , As L
1.75	2404.	Si K , Si K
2.65	98.	Cl K , Cl K
3.71	424.	Ca K , Ca K
6.42	439.	Fe K , Fe K
7.08	63.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 11051

28-Oct-1993 20:21:05

29180,0-4,A,03,FM,/).5MKM/ Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 28 secs

Energy	Counts	X-Ray Lines
1.28	318.	Mg K , Mg K , Mg K , As L , As L , As L
1.75	1139.	Si K , Si K
2.66	53.	Cl K , Cl K
3.72	294.	Ca K , Ca K
6.42	168.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 10598

28-Oct-1993 20:23:53

29180,0-4,A,04,FM,/).5MKM/ Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 15 secs

Energy	Counts	X-Ray Lines
1.26	451.	Mg K , Mg K , Mg K , As L , As L
1.75	1503.	Si K , Si K
2.61	42.	Cl K , Cl K
3.71	350.	Ca K , Ca K
4.03	63.	Ca K , Ca K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 8741

28-Oct-1993 20:26:47

29180,0-4,A,05,FM,/).5MKM/ Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
1.25	216.	Mg K , Mg K , Mg K , As L , As L
1.75	755.	Si K , Si K
3.72	146.	Ca K , Ca K
6.41	61.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 4530

28-Oct-1993 20:44:43

29180,0-4,A,10,FM,/).5MKM/ Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 38 secs

Energy	Counts	X-Ray Lines
1.26	448.	Mg K , Mg K , Mg K , As L , As L
1.75	1908.	Si K , Si K
3.71	139.	Ca K , Ca K
6.41	457.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 12218

31-Oct-1993 13:42:20

29180,SWO-4,A,26,FM Preset= 100 secs
Vert= 1000 counts Disp= 1 Elapsed= 99 secs

Energy	Counts	X-Ray Lines
1.25	2502.	Mg K , Mg K , Mg K , As L , As L
1.75	8701.	Si K , Si K
3.32	417.	K K , K K
3.70	1268.	Ca K , Ca K
6.42	1042.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 1175

TEM ASBESTOS ANALYSIS

Client [illegible] EMS Lab No. [illegible]
Sample No. SW-C-1 Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address 1B
Screen Magnification 19200 X
Camera Constant 138.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 17
Analyst S. Ahmad Date 12-13-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
1	1	F	10	50	✓																				EDS #1 100% Mg
	2	F	5	30													✓				3	10	1	1	EDS #2 Tremolite
	3	F	10	70													✓				3	10	3	1	EDS #3 "
	4	F	2.5	50													✓				3	10	2	1	EDS #4 "
	5	F	8	185													✓				3	10	2	1	EDS #5 "
	6	F	7	40												✓									"
	7	F	3	25												✓									"
	8	MD	22	160												✓									"
	9	F	8	90												✓									"
	10	F	5	40												✓									"
	11	F	8	82												✓									"
	12	F	2.5	42												✓									"
2	13	MD	12	95												✓									"
	14	F	6	25												✓									"
	15	F	5	30												✓			✓	✓	3	10	1	1	EDS #15 Tremolite

OBSERVATIONS: Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☐ Heavy ☑ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. SW-0-4

EMS Job No. [illegible]
Page 2 of

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address 1B
Screen Magnification 19200 X
Camera Constant 28.3
Accelerating Voltage 100 KV
Beam Current 10 µm
K-Factor 1.7
Analyst S. Ahmed Date 12-13-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
2	16	F	3	260												✓	✓								Tremolite
	17	F	9	60												✓	✓								"
	18	F	2	32												✓	✓								"
	19	F	20	190												✓	✓								"
	20	F	15	45												✓	✓								"
	21	F	5	160												✓	✓								"
	22	F	2	20												✓	✓								"
3	23	F	15	480												✓	✓								"
	24	F	5	85												✓	✓								"
	25	F	8	65													✓				1	10	2		EDS #25 Tremolite
	26	F	5	40												✓									Tremolite
	27	F	8	64												✓									"
	28	F	6	55												✓									"
	29	F	4	48												✓									"
	30	F	5	100												✓									"

OBSERVATIONS:

Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☐ Heavy ☑ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. SW-024

EMS No. [illegible]
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RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address B
Screen Magnification 19200 X
Camera Constant 28.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7
Analyst S. Ahmed Date 12-13-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
3	31	F	5	480 X												✓	✓								
	32	F	4	35												✓									
	33	F	4	74												✓	✓								
	34	F	6	40												✓	✓								
	35	F	4	400 X												✓	✓				3	10	2	2	EDS #35

OBSERVATIONS: Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☐ Heavy ☑ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

13-Dec-1993 11:35:24

29180-SW-0-4,B,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
1.28	497.	Mg K , Mg K , Mg K , As L , As L , As L
1.76	1258.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 169

13-Dec-1993 11:37:18

29180-SW-0-4,B,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.26	204.	Mg K , Mg K , Mg K , As L , As L
1.75	769.	Si K , Si K
3.70	103.	Ca K , Ca K
6.41	152.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 120

13-Dec-1993 11:41:32

29180-SW-0-4,B,#03,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 16 secs

Energy	Counts	X-Ray Lines
1.26	241.	Mg K , Mg K , Mg K , As L , As L
1.75	754.	Si K , Si K
3.71	202.	Ca K , Ca K
4.05	44.	Sc K , Sc K , Ca K , Ca K
6.41	77.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 174

13-Dec-1993 11:42:18

29180-SW-0-4,B,#04,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
1.25	213.	Mg K , Mg K , Mg K , As L , As L
1.75	790.	Si K , Si K
3.71	184.	Ca K , Ca K
6.41	80.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 125

13-Dec-1993 11:44:49

29180-SW-0-4,B,#05,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.25	144.	Mg K , Mg K , Mg K , As L , As L
1.75	556.	Si K , Si K
3.69	110.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 80

13-Dec-1993 12:01:09

29180-SW-0-4,B,#15,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 35 secs

Energy	Counts	X-Ray Lines
1.27	278.	Mg K , Mg K , Mg K , As L , As L , As L
1.74	1017.	Si K , Si K
3.33	90.	K K , K K
3.71	107.	Ca K , Ca K
6.41	145.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 185

13-Dec-1993 12:05:16

29180-SW-0-4,B,#25,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.26	235.	Mg K , Mg K , Mg K , As L , As L
1.75	751.	Si K , Si K
3.71	298.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 141

13-Dec-1993 12:30:49

29180-SW-0-4,B,#35,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.24	228.	Mg K , Mg K , As L , As L
1.75	811.	Si K , Si K
3.70	144.	Ca K , Ca K
6.42	140.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 127

TEM ASBESTOS ANALYSIS

nt _ na _ MS No. _ _

Sample No. 29180-3004 Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address 1-C
Screen Magnification 19,300 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radle Date 12-13-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	1	F	5	30											✓		✓				5	10	1	1	EDS Tremolite
	2	F	5	38											✓		✓				3	10	1	1	EDS "
	3	F	5	18											✓		✓				2	10	1	2	EDS "
	4	F	4	25													✓				3	10	2	1	EDS "
	5	F	4	28													✓				3	10	2	1	EDS "
	6	F	5	16													✓				3	10	2	1	EDS "
	7	MD	5	30													✓				2	10	1	3	EDS "
	8	F	3	18													✓				2	10	1	1	EDS "
	9	F	4	25													✓				3	10	1	1	EDS "
	10	F	25	78													✓				1	10	5	3	EDS "
	11	MD	2	90												✓									
	12	F	5	16												✓									
2	13	F	10	165												✓									
	14	F	10	95												✓									
	15	F	1.5	100												✓									

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client [illegible] EMS Lab No. [illegible]
Sample No. 29180 Scopy Page 2 of

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address 1-C
Screen Magnification 19300 X
Camera Constant 36.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst [illegible] Date 12-11-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
16	16	F	5	25												✓									
	17	F	1	15	✓																				
	18	F	3	20												✓									
	19	F	14	165												✓									
	20	F	4	22												✓	✓				3	10	2	1	EDS Tremolite
	21	F	3	44												✓									
	22	F	4	140												✓									this Sample Contains
	23	F	5	50												✓									only Tremolite
	24	F	5	58												✓									fine.
	25	F	3	22												✓									
	26	F	8	42												✓									
3	27	AD	4	55												✓									
3	28	AD	5	225												✓									
	29	B	1.6	330												✓									
	30	F	3	120												✓	✓				3	10	2	1	EDS Tremolite

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client _ Schafer
Sample No. SWT 4

EMS Lab No. 2[illegible]80
Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

Grid Address C
Screen Magnification 19300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst Radle Date 12-12

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
3	31	F	8	125												✓									
	32	F	5	35												✓									
	33	F	3	16												✓									
	34	F	4	25												✓									
	35	B	15	360												✓									
	36	F	5	25												✓									
	37	F	15	180												✓									
	38	F	3	15												✓									
	39	F	3	15												✓									
	40	F	4	68												✓	✓	✓			2	10	1	1	
	41	F	4	28												✓									
	42	MD	4	25												✓									
			5	120X												✓									

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

13-Dec-1993 12:57:59

29180-SW-O-4,C,#01,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
0.51	1332.	O K , O K , V L , V L , V L , V L
1.25	878.	Mg K , Mg K , Mg K , As L , As L
1.74	1600.	Si K , Si K
2.61	83.	Cl K , Cl K
3.69	109.	Ca K , Ca K
6.40	206.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 383

13-Dec-1993 13:04:17

29180-SW-0-4,C,#02,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
0.51	944.	O K , O K , V L , V L , V L , V L
1.25	418.	Mg K , Mg K , Mg K , As L , As L
1.74	1649.	Si K , Si K
3.70	197.	Ca K , Ca K
6.40	160.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 281

13-Dec-1993 13:05:41

29180-SW-0-4,C,#03,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
0.51	759.	O K , O K , V L , V L , V L , V L
1.25	237.	Mg K , Mg K , Mg K , As L , As L
1.74	1068.	Si K , Si K
3.30	59.	K K , K K
3.67	105.	Ca K , Ca K
6.39	219.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 273

13-Dec-1993 13:07:13

29180-SW-0-4,C,#04,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
0.52	1350.	O K , O K , V L , V L , V L , V L
1.25	554.	Mg K , Mg K , Mg K , As L , As L
1.74	2105.	Si K , Si K
3.69	458.	Ca K , Ca K
6.39	200.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 425

13-Dec-1993 13:12:23

29180-SW-0-4,C,#05,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 38 secs

Energy	Counts	X-Ray Lines
0.51	802.	O K , O K , V L , V L , V L , V L
1.25	287.	Mg K , Mg K , Mg K , As L , As L
1.74	882.	Si K , Si K
3.69	217.	Ca K , Ca K
6.37	140.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 214

13-Dec-1993 13:13:52

29180-SW-0-4, C, #06, RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
0.51	1786.	O K , O K , V L , V L , V L , V L
1.25	772.	Mg K , Mg K , Mg K , As L , As L
1.74	2519.	Si K , Si K
3.69	522.	Ca K , Ca K
6.39	306.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 475

13-Dec-1993 13:15:24

29180-SW-0-4, C, #07, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 37 secs

Energy	Counts	X-Ray Lines
0.51	884.	O K , O K , V L , V L , V L , V L
1.25	202.	Mg K , Mg K , Mg K , As L , As L
1.74	1163.	Si K , Si K
3.69	102.	Ca K , Ca K
6.39	367.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 303

13-Dec-1993 13:17:47

29180-SW-0-4, C, #08, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 14 secs

Energy	Counts	X-Ray Lines
0.52	385.	O K , O K , V L , V L , V L , V L
0.98	42.	Zn L , Zn L

13-Dec-1993 13:18:02

29180-SW-0-4,C,#08,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 14 secs

Energy	Counts	X-Ray Lines
0.52	385.	O K , O K , V L , V L , V L , V L
0.98	42.	Zn L , Zn L
1.25	129.	Mg K , Mg K , Mg K , As L , As L
1.74	619.	Si K , Si K
3.71	77.	Ca K , Ca K
6.38	68.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 125

13-Dec-1993 13:21:37

29180-SW-0-4,C,#09,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
0.52	512.	O K , O K , V L , V L , V L , V L
1.25	197.	Mg K , Mg K , Mg K , As L , As L
1.74	742.	Si K , Si K
2.62	53.	Cl K , Cl K
3.68	86.	Ca K , Ca K
6.40	124.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 207

13-Dec-1993 13:23:03 29180-SW-0-4,C,#10,R

ENERGY	COUNTS	X-RAY LINES
0.51	1611.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	206.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	414.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	3527.	Si KA1, Si KA2
3.69	1650.	Ca KA1, Ca KA2
4.02	166.	Ca KB1, Ca KB3
4.51	19.	Ti KA1, Ti KA2
5.41	111.	Cr KA1, Cr KA2
5.98	30.	Cr KB1, Cr KB3
6.40	1044.	Fe KA1, Fe KA2
7.03	141.	Fe KB1, Fe KB3

- background

13-Dec-1993 13:47:01

29180, SWD-4, C, #20, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 20 secs

Energy	Counts	X-Ray Lines
0.51	814.	O K , O K , V L , V L , V L , O V L
1.26	502.	Mg K , Mg K , Mg K , As L , As L
1.74	1478.	Si K , Si K
3.69	351.	Ca K , Ca K
6.39	158.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 277

13-Dec-1993 13:50:27 29180,SWD-4,C,#30,RS

ENERGY	COUNTS	X-RAY LINES
0.52	1172.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.00	32.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	597.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	2146.	Si KA1, Si KA2
2.62	33.	Cl KA1, Cl KA2
3.33	37.	K KA1, K KA2
3.69	475.	Ca KA1, Ca KA2
4.02	38.	Ca KB1, Ca KB3
6.40	251.	Fe KA1, Fe KA2
7.05	30.	Fe KB1, Fe KB3

13-Dec-1993 13:54:35 LN Testng

29180,SWD-4,C,#40,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 77 secs

Energy	Counts	X-Ray Lines
0.52	520.	O K , O K , V L , V L , V L , V L
1.25	169.	Mg K , Mg K , Mg K , As L , As L
1.74	729.	Si K , Si K
3.70	101.	Ca K , Ca K
6.39	119.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 239

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 29180 **Client** SCHAFFER &ASSOC.

Sample No. SW 4-4*

Date Analyzed 11/29/93

Fibers (asbestos)	12	MFL
Fibers > 5 µm in length (asbestos)	4.6	MFL
Fibers > 10 µm in length (asbestos)	1.9	MFL
Mass (asbestos)	22	ug/L
More/Less than 5 Fibers in Sample (asbestos)	MORE	
Poisson 95% Confidence Interval	9.4 to 15	MFL
Detection Limit	0.1	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Asbestos)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	0	8	10	8	24	19	13

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	4	14	18	6	26	14	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
17	30	16	7	6	5	1	0

* This sample contains Amphiboles : Tremolite and Actinolite.

TEM ASBESTOS ANALYSIS

Client SIMA FED LAB
Sample No. SW4-4

EMS Lab No. [illegible]
Page _____ of _____

RECEIVING

TYPE OF SAMPLE
Air ☐ Water ☒
Soil ☐ Bulk ☐
Other _____

METHOD OF ANALYSIS
EPA 600/4-83-043 ☒ ISO ☐

LEVEL OF ANALYSIS
Chrysotile CD-CDQ
Amphibole ADQ

ASPECT RATIO
3:1 ☒ 5:1 ☐

LENGTHS
All Sizes (EPA) ☐
(μm) ≥0.5 ☒
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width ≥5.0 μm length)

FILTER TYPE / AREA (mm±)
MCE ☐ 385 ☐
PC ☒ 314 ☐
MCN ☐ 1017 ☒
Other _____

PORE SIZE
0.45 μm ☐ 0.8 μm ☐
0.1 μm ☒ 0.22 μm ☐
Other _____

G.O. Area (mm²) 0.0 070
No. of G.O. to Analyze 20
Filter Lot No. _____

Approved By B Kolb Date 10-27

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume _____ liters
Working Volume 50 ml
Weight _____ grams
Ashed Area _____ %

Prepared By BP / FM
Date 10-27-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address 1-A
Screen Magnification 19,300 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor _____

Analyst G-D Date 11-16-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	01	F	2.5	110																	3	10	1	2	tremolite
	02	F	3	220																					
	03	F	3	25																					
	04	F	2	70																					
	05	F	8	115																					
2	06	F	4	75																					
	07	F	2	25																					
3	08	F	8	230																					
	09	F	3	55																					
	10	F	1	40																	3	10	1	2	tremolite
	11	F	3	40																					
	12	F	3	75																					
	13	F	10	240																					
	14	F	3	25																					
	15	F	3	25																					

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

nt [illegible] MS No. [illegible]
Sample No. 4 Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address 1-A
Screen Magnification 19,300 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor _____

Analyst [illegible] Date 11-16-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
(8)	16	F X	8	230																					
	17	F	10	80																					
	18	F	3	33																					
	19	F X	8	230																					
	20	F	5	85																	2	10	1	1	tremolite
	21	F	5	130																					
(5)	22	F	3	30																					
(6)	23	F	10	80																					
	24	F	2	30																					
	25	F	3	30																					
	26	F	2	46																					
(7)	27	F x	3	100																					
	28	F	5	110																					
	29	F	7	45																	3	10	1	2	tremolite

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

16-Nov-1993 18:28:25

29180,#4,1A,01,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.26	636.	Mg K , Mg K , Mg K , As L , As L
1.75	2110.	Si K , Si K
3.34	145.	K K , K K
3.70	241.	Ca K , Ca K
6.42	356.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11309

16-Nov-1993 18:30:04

29180,#4,1A,10,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 38 secs

Energy	Counts	X-Ray Lines
1.26	697.	Mg K , Mg K , Mg K , As L , As L
1.75	2404.	Si K , Si K
3.31	153.	K K , K K
3.71	305.	Ca K , Ca K
6.41	409.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 10376

16-Nov-1993 18:31:28

29180,#4,1A,20,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 39 secs

Energy	Counts	X-Ray Lines
1.25	515.	Mg K , Mg K , Mg K , As L , As L
1.75	2371.	Si K , Si K
3.34	150.	K K , K K
3.71	278.	Ca K , Ca K
6.41	347.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 10037

16-Nov-1993 18:33:17

29180, #4, 1A, 1Q, GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.25	755.	Mg K , Mg K , Mg K , As L , As L
1.74	2479.	Si K , Si K
3.34	158.	K K , K K
3.70	284.	Ca K , Ca K
6.42	409.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 10922

TEM ASBESTOS ANALYSIS

Client _____ Sample No. SW4-4

EMS Job No. _____ Page 1 of 3

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address 1-13
Screen Magnification 19300 X
Camera Constant 50.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radlg Date 11-29-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
1	1	F	4	25													✓				2	10	2	2	EDS Tremolite
	2	F	10	130													✓				3	10	2	2	EDS
	3	F	8	65								✓					✓				3	10	2	1	EDS
	4	F	4	40													✓				3	10	4	4	EDS
	5	F	6	180													✓				3	10	2	2	EDS
	6	MD	5	55																					all amphiboles
	7	F	8	90											✓										are Tremolite.
	8	F	10	275											✓										
	9	F	15	60								✓													
	10	F	10	90											✓										
	11	MD	5	98								✓													
2	12	F	18	110											✓										
	13	MD	6	68											✓										
	14	MP	6	75											✓										
	15	F	3	50											✓										

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

...nt [illegible] MS No. [illegible]
Sample No. SW4-4 Page 2 of 3

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address 1B
Screen Magnification 19500 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radu Date 11-29

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
	16	MD	1	38								✓													
3	17	F	5	195									✓		✓										
	18	F	3	30								✓													
	19	F	15	140											✓										
	20	F	14	225											✓										
	21	F	1	170											✓										
	22	F	3	38											✓										
	23	F	2	95											✓										
	24	MD	3	28											✓										
	25	F	2	11	✓																				
4	26	MD	2	42	✓																				
	27	F	15	75											✓										
	28	B	6	35	✓																				
	29	MD	6	65											✓										
	30	MD	10	200											✓										

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Sample No. SW4-4

MS No. [illegible]

Page 3 of 3

RECEIVING

ANALYSIS

MICROSCOPE

50 ml Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address 1-B
Screen Magnification 19300 X
Camera Constant 36.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radha Date 11-29

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
	31	MD	6	65								✓													
	32	F	7	38											✓										
	33	F	5	85	✓																				
	34	F	4	25	✓																				
5	35	F	3	16	✓																				
6	36	F	15	90											✓										
	37	MD	2	30											✓										
	38	F	10	130	✓																				
7	39	F	15	75											✓										
	40	F	6	30											✓										
	41	F	6	25	✓																				
	42	F	15	250											✓										
	43	F	2	35											✓										
	[illegible]																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

29-Nov-1993 15:43:38

29180,SW4-4,B,#01,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 89 secs

Energy	Counts	X-Ray Lines
0.52	675.	O K , O K , V L , V L , V L , V L
1.26	174.	Mg K , Mg K , Mg K , As L , As L
1.74	735.	Si K , Si K
2.62	183.	Cl K , Cl K
3.69	179.	Ca K , Ca K
5.90	170.	Mn K , Mn K
6.41	131.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 12412

29-Nov-1993 15:47:51 29180,SW4-4,B,#02,RS

ENERGY	COUNTS	X-RAY LINES
0.52	728.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
0.97	27.	Zn LA1, Zn LA2
1.25	343.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	1223.	Si KA1, Si KA2
3.33	56.	K KA1, K KA2
3.70	203.	Ca KA1, Ca KA2
6.40	212.	Fe KA1, Fe KA2
7.06	49.	Fe KB1, Fe KB3

29-Nov-1993 15:50:35 29180,SW4-4,B,#03,RS

ENERGY	COUNTS	X-RAY LINES
0.52	1063.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.01	67.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	497.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	1566.	Si KA1, Si KA2
3.32	103.	K KA1, K KA2
3.69	340.	Ca KA1, Ca KA2
4.02	43.	Ca KB1, Ca KB3
5.84	35.	Mn KA2
6.41	114.	Fe KA1, Fe KA2

29-Nov-1993 15:53:40 29180,SW4-4,B,#08,RS

ENERGY	COUNTS	X-RAY LINES
0.52	480.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.25	120.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	485.	Si KA1, Si KA2
2.62	122.	Cl KA1, Cl KA2
3.32	91.	K KA1, K KA2
3.69	225.	Ca KA1, Ca KA2
5.88	117.	Mn KA1, Mn KA2
6.39	192.	Fe KA1, Fe KA2

29-Nov-1993 15:57:07

29180,SW4-4,B,#05,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
0.52	632.	O K , O K , V L , V L , V L , V L
1.26	277.	Mg K , Mg K , Mg K , As L , As L
1.74	905.	Si K , Si K
3.69	198.	Ca K , Ca K
6.41	146.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral O = 7199

TEM ASBESTOS ANALYSIS

Client: Sch[illegible] A[illegible]
Sample No. SW4-4

EMS [illegible] No [illegible]
Page 1 of 3

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☑

Grid Address 1C
Screen Magnification 19,200 X
Camera Constant 28.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst Kyeong Date 11/29/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	1	F	5	80	✓							✓													EDS
	2	F	5	58													✓				3	10	3		Tremolite; EDS
2	3	B	13	82													✓				3	10	2	3	Actinolite; EDS
	4	mD	3	100													✓				2	10	3		Tremolite; EDS
	5	~~mD~~ F	4	110													✓				3	10	3	1	Tremolite; EDS
	6	mD	7	240	✓																				
	7	F	2	22											✓										Tremolite
	8	F	4	78	✓																				
3	9	F	6	135											✓										Actinolite
	10	~~F~~	3	110	✓																				
	11	mD	6	245											✓										Actinolite
	12	F	2	42											✓										Tremolite
	13	F	2.5	35											✓										"
	14	F	4	54											✓										"
	15	F	3	43								✓													

OBSERVATIONS: Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client: [illegible]
Sample No. SW4-4

EMS Lab No [illegible]
Page 2 of 3

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address
Screen Magnification X
Camera Constant
Accelerating Voltage 100 KV
Beam Current μm
K-Factor

Analyst Kyeong Date 11/29/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
3	16	F	2	90											✓										Tremolite
	17	F	7	110											✓										"
	18	F	4	43											✓										Actinolite
	19	F	3	110											✓										Tremolite
	20	F	1.5	57								✓													
	21	F	7	71	✓																				
4	22	B	14	290													✓				3	10	2		Tremolite
	23	F	7.5	44											✓										"
	24	B	8	168											✓										Actinolite
	25	F	6	396											✓										"
	26	F	2.5	187											✓										"
	27	B	11	95	✓																				
	28	F	3	120											✓										Actinolite
	29	F	2	72								✓													
5	30	F	6	74											✓										Actinolite

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client: Schnitzer
Sample No. SW 4-4

EMS Lab No. [illegible]
Page 3 of 3

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address
Screen Magnification X
Camera Constant
Accelerating Voltage 100 KV
Beam Current μm
K-Factor

Analyst Kyeong Date 11/29/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
6	31	F	3	110											✓										Tremolite
	32	F	2	22											✓										"

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

29-Nov-1993 16:07:56

29180,SW4-4,C,#01,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 53 secs

Energy	Counts	X-Ray Lines
1.26	421.	Mg K , Mg K , Mg K , As L , As L
1.75	1989.	Si K , Si K
3.70	170.	Ca K , Ca K
6.41	540.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral O = 10195

29-Nov-1993 16:12:15

29180,SW4-4,C,#02,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.25	380.	Mg K , Mg K , Mg K , As L , As L
1.75	1289.	Si K , Si K
3.71	414.	Ca K , Ca K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral O = 6007

29-Nov-1993 16:17:24

29180,SW4-4,C,#03,KC Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.26	1712.	Mg K , Mg K , Mg K , As L , As L
1.75	5966.	Si K , Si K
3.33	145.	K K , K K
3.71	1166.	Ca K , Ca K
4.03	178.	Ca K , Ca K
6.42	879.	Fe K , Fe K
7.07	121.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 23132

29-Nov-1993 16:19:19

29180,SW4-4,C,#04,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
1.25	150.	Mg K , Mg K , Mg K , As L , As L
1.75	614.	Si K , Si K
2.63	73.	Cl K , Cl K
3.70	215.	Ca K , Ca K
6.42	96.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 5210

29-Nov-1993 16:21:23

29180,SW4-4,C,#05,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.26	364.	Mg K , Mg K , Mg K , As L , As L
1.74	1313.	Si K , Si K
2.63	111.	Cl K , Cl K
3.70	327.	Ca K , Ca K
6.41	181.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 6761

29-Nov-1993 16:23:50

29180,SW4-4,C,#06,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 45 secs

Energy	Counts	X-Ray Lines
1.25	538.	Mg K , Mg K , Mg K , As L , As L
1.75	2233.	Si K , Si K
3.69	245.	Ca K , Ca K
6.42	549.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 12176

29-Nov-1993 16:52:54

29180,SW4-4,C,#22,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
1.25	447.	Mg K , Mg K , Mg K , As L , As L
1.75	1368.	Si K , Si K
3.70	338.	Ca K , Ca K
4.03	70.	Ca K , Ca K
6.41	94.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 5561

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 29180 **Client** SCHAFFER &ASSOC.

Sample No. SW 5-4*

Date Analyzed 12/21/93

Fibers (asbestos)	1.4	MFL
Fibers > 5 µm in length (asbestos)	BDL*	MFL
Fibers > 10 µm in length (asbestos)	BDL*	MFL
Mass (asbestos)	0.8	ug/L
More/Less than 5 Fibers in Sample (asbestos)	LESS	
Poisson 95% Confidence Interval	0.1 to 7.7	MFL
Detection Limit	1.4	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Asbestos)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	0	0	0	0	1	0	0

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	0	0	0	0	1	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
0	1	0	0	0	0	0	0

* This sample contains Amphibole : Tremolite.

TEM ASBESTOS ANALYSIS

nt [illegible] MS No. [illegible]
Sample No. SW5-4 Page _____ of _____

RECEIVING

TYPE OF SAMPLE
Air ☐ Water ☒
Soil ☐ Bulk ☐
Other _____

METHOD OF ANALYSIS
EPA 600/4-83-043 ☒ ISO ☐

LEVEL OF ANALYSIS
Chrysotile CD-CDQ
Amphibole ADQ

ASPECT RATIO
3:1 ☒ 5:1 ☐

Approved By BJoek Date 10-27

LENGTHS
All Sizes (EPA) ☐
(μm) ≥0.5 ☒
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width ≥5.0 μm length)

FILTER TYPE / AREA (mm±)
MCE ☐ 385 ☐
PC ☒ 314 ☐
MCN ☐ 1017 ☒
Other _____

PORE SIZE
0.45 μm ☐ 0.8 μm ☐
0.1 μm ☒ 0.22 μm ☐
Other _____

G.O. Area (mm²) 0.0 070
No. of G.O. to Analyze 20/160
Filter Lot No. _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

All Sizes

Volume _____ liters
Working Volume 5 ml
Weight _____ grams
Ashed Area _____ %

Prepared By BP/FM
Date 10-27-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

Grid Address 1A
Screen Magnification 19300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S.Ahmad Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								

OBSERVATIONS:

Clean ☐ Other _____
Debris ☒ Very Light ☐ Light ☐ Moderate ☒ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. SWS-4

EMS I[illegible] No. [illegible]
Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address 1B
Screen Magnification 19300 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst S. Ahmed Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	1	F	5	80 X													✓				3	10	2	2	EDS #1; Tremolite
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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21-Dec-1993 07:49:12

29180-SW5-4,B,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
0.52	596.	O K , O K , V L , V L , V L , V L
1.26	409.	Mg K , Mg K , Mg K , As L , As L
1.74	1266.	Si K , Si K
2.64	86.	Cl K , Cl K
3.69	237.	Ca K , Ca K
6.41	179.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 8 = 299

TEM ASBESTOS ANALYSIS

nt [illegible]
Sample No. SWS-4

EMS [illegible] No. [illegible]
Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address G
Screen Magnification 19,300 X
Camera Constant 304
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radle Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☒ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No.	29180	Client	SCHAFFER & ASSOC.
Sample No.	SW 5-4*	Date Analyzed	12/21/93

Fibers > 10 µm in length (chrysotile)	BDL*	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Poisson 95% Confidence Interval	0 to 0.6	MFL
Detection Limit	0.2	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	0	0	0	0	0	0	0

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	0	0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
0	0	0	0	0	0	0	0

* For Fibers > 10 um only.

TEM ASBESTOS ANALYSIS

Client [illegible] EMS I No. [illegible]
Sample No. SW5-4 Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

≥ 10um

Grid Address 1A
Screen Magnification 9300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst S. Ahmed Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								
11	NSD																								
12	NSD																								
13	NSD																								
14	NSD																								
15	NSD																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client [illegible] EMS Lab No. [illegible]
Sample No. SWS-4 Page 2 of

Analyst S.A. Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
16	NSD																								
17	NSD																								
18	NSD																								
19	NSD																								
20	NSD																								
21	NSD																								
22	NSD																								
23	NSD																								
24	NSD																								
25	NSD																								
26	NSD																								
27	NSD																								
28	NSD																								
29	NSD																								
30	NSD																								
31	NSD																								
32	NSD																								
33	NSD																								
34	NSD																								
35	NSD																								

OBSERVATIONS: Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client Schaefer, EMS Lab No. [illegible]
Sample No. SW-5-4 Page 3 of

7/10um

Analyst SA Date 12-21

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
36	NSD																								
37																									
38																									
39																									
40																									
41																									
42																									
43																									
44																									
45																									
46																									
47																									
48																									
49																									
50																									
51																									
52																									
53																									
54																									
55																									

OBSERVATIONS: Clean ☐ Other _____

Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. SW 5-4

EMS Lab No. [illegible]
Page 4 of

Analyst SA Date 12-21

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
56	NSD																								
57																									
58																									
59																									
60																									
61																									
62																									
63																									
64																									
65																									

OBSERVATIONS:

Clean ☐ Other _____

Debris ☑ Very Light ☐ Light ☑ Moderate ☑ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client [illegible] MS No. [illegible]
Sample No. SW 5-4 Page 1 of

RECEIVING

>10um

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address 1B
Screen Magnification 9300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 µm
K-Factor 1.7
Analyst S. Ahmed Date 12-7-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								
11	NSD																								
12	NSD																								
13	NSD																								
14	NSD																								
15	NSD																								

OBSERVATIONS: Clean ☐ Other _____

Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client Schaefer
Sample No. SWS-4

EMS Lab No. [illegible]
Page 2 of

Analyst S. A Date 12-20

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
16	NSD																								
17	NSD																								
18	NSD																								
19																									
20																									
21																									
22																									
23																									
24																									
25																									
26																									
27																									
28																									
29																									
30																									
31																									
32																									
33																									
34																									
35																									

OBSERVATIONS: Clean ☐ Other _____

Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client [illegible] EMS Lab No. [illegible]
Sample No. SWS-4 Page 3 of

≥ 10um

Analyst S.A Date 12-21-9[illegible]

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
36	NSD																								
37	NSD																								
38	↓																								
39																									
40																									
41																									
42																									
43																									
44																									
45	↓																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☑ Very Light ☐ Light ☐ Moderate ☑ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

C[illegible] Sample No. SWS-14

[illegible] No. [illegible]

Page 1 of 4

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

7/10 µm

Grid Address 10
Screen Magnification 9300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 µm
K-Factor 1.6

Analyst Rado Date 12-21-[illegible]

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								
11	NSD																								
12	NSD																								
13	NSD																								
14	NSD																								
15	NSD																								

OBSERVATIONS: Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☒ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client [illegible] Sample No. S105-4

EMS Lab No. [illegible]

Page 2 of [illegible]

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

7.10 μm

Grid Address 1-C
Screen Magnification 9300 X
Camera Constant 130.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst [illegible] Date 12-21-95

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
16	NSD																								
17	NSD																								
18	NSD																								
19	NSD																								
20	NSD																								
21	NSD																								
22	NSD																								
23	NSD																								
24	NSD																								
25	NSD																								
26	NSD																								
27	NSD																								
28	NSD																								
29	NSD																								
30	NSD																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client [illegible] EMS [illegible] No. [illegible]
Sample No. SW5-4 Page 3 of 4

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

Grid Address C
Screen Magnification 9,300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst Rada Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm)		Fiber Classification															EDS Analysis					Comments
			Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	
31	NSD																								
32	NSD																								
33	NSD																								
34	NSD																								
35	NSD																								
36	NSD																								
37	NSD																								
38	NSD																								
39	NSD																								
40	NSD																								
41	NSD																								
42	NSD																								
43	NSD																								
44	NSD																								
45	NSD																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

...ent 3C... EMS No 2...
Sample No. SW5-4 Page 4 of 4

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address 1C
Screen Magnification 9300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst Radke Date 12-21-93

Grid Opening	Structure Number	Structure	Dimensions (mm)		Fiber Classification															EDS Analysis					Comments
			Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	
46	NSD																								
47	NSD																								
48	NSD																								
49	NSD																								
50	NSD																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-406

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 29180 **Client** SCHAFFER &ASSOC.

Sample No. SW 8-4*

Date Analyzed 12/20/93

Fibers (asbestos)	4.9	MFL
Fibers > 5 µm in length (asbestos)	1.2	MFL
Fibers > 10 µm in length (asbestos)	0.9	MFL
Mass (asbestos)	9.9	ug/L
More/Less than 5 Fibers in Sample (asbestos)	MORE	
Poisson 95% Confidence Interval	3.9 to 6.2	MFL
Detection Limit	0.07	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Asbestos)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	7	11	8	2	23	5	12

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	2	5	11	11	26	12	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
32	20	7	4	0	4	1	0

* This sample contains Amphiboles : Tremolite and Actinolite.

TEM ASBESTOS ANALYSIS

Client [illegible] ASS. EMS Lab No. [illegible]
Sample No. SW 8-4 Page _____ of _____

RECEIVING

TYPE OF SAMPLE
Air ☐ Water ☐
Soil ☐ Bulk ☐
Other _____

METHOD OF ANALYSIS
EPA 600/4-83-043 ☒ ISO ☐

LEVEL OF ANALYSIS
Chrysotile CQ-CDQ
Amphibole ADQ

ASPECT RATIO
3:1 ☒ 5:1 ☐

Approved By BKoll Date 10-27

LENGTHS
All Sizes (EPA) ☐
(μm) ≥0.5 ☐
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width ≥5.0 μm length)

FILTER TYPE / AREA (mm²)
MCE ☐ 385 ☐
PC ☒ 314 ☐
MCN ☐ 1017 ☒
Other _____

PORE SIZE
0.45 μm ☐ 0.8 μm ☐
0.1 μm ☐ 0.22 μm ☐
Other _____

G.O. Area (mm²) 0.0 670
No. of G.O. to Analyze 20
Filter Lot No. _____

PREP

DIRECT PREP ☐
INDIRECT PREP ☐

Volume _____ liters
Working Volume 100 ml
Weight _____ grams
Ashed Area _____ %

Prepared By BP/AM
Date 10-27-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address 1A
Screen Magnification 19300 X
Camera Constant 36.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radla Date 12-14

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
1	1	F	5	25													✓				3	10	2	1	EDS Tremolite
	2	F	1.5	18	✓																				EDS FC
	3	F	4	48	✓																3	10	0	1	has Al. EDS, NoCa
	4	F	4	40	✓																				EDS
	5	MD	2	58	✓																				EDS
2	6	F	3	50	✓																				EDS
	7	F	12	100													✓				3	10	3	1	EDS Tremolite
	8	MD	4	200	✓																				EDS
	9	F	5	22													✓				3	10	2	0	EDS Tremolite
	10	F	5	32													✓				3	10	3	1	EDS Tremolite
	11	F	2	11											✓										
	12	F	4	320											✓										
	13	MD	6	150											✓										
	14	F	3	45	✓																				
	15	F	3	15	✓																				

OBSERVATIONS:

Clean ☐	Other _____				
Debris ☐	Very Light ☐	Light ☐	Moderate ☒	Heavy ☒	Very Heavy ☐
Gypsum ☐	Very Light ☐	Light ☐	Moderate ☐	Heavy ☐	Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. SW3-4

EMS Lab No. [illegible]
Page 2 of

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

Grid Address 1A
Screen Magnification 19,300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radle Date 12-14

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
3	16	F	1.5	32											✓										
	17	F	5	22	✓																				
	18	F	4	24	✓																				
	19	MD	12	95											✓										
	20	F	5	25													✓				4	10	3	.5	EDS
	21	F	5	116											✓										
	22	MD	5	25	✓																				
	23	F	3	24											✓										
	24	F	3	16											✓										
4	25	F	10	190											✓										
	26	F	12	75	✓																				
	27	MD	8	50											✓										
	28	MD	8	55											✓										
	29	MD	1.5	35											✓										
	30	F	2	15													✓				3	10	2	2	EDS

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

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TEM ASBESTOS ANALYSIS

Client: Schaffer
Sample No. SW8-4

EMS Lab No. [illegible]
Page 3 of

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☒
Serial No. 542-05-13 H600B ☐

Grid Address 1A
Screen Magnification 19,300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radk Date 12.14

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
	31	MD	4	40											✓										
	32	F	2	38	✓																				
5	33	F	3	18											✓										
	34	F	4	25											✓										
	35	F	5	25											✓										
	36	F	5	56											✓										
	37	F	4	25											✓										
	38	F	4	22																					

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

14-Dec-1993 18:09:41

29180,SW8-4,A,#01,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 9 secs

Energy	Counts	X-Ray Lines
0.51	700.	O K , O K , V L , V L , V L , V L
1.26	374.	Mg K , Mg K , Mg K , As L , As L
1.74	1311.	Si K , Si K
3.69	323.	Ca K , Ca K
4.02	35.	Ca K , Ca K
6.38	118.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 8 = 217

14-Dec-1993 18:12:20

29180, SW8-4, A, #02, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
0.51	380.	O K , O K , V L , V L , V L , V L
6.39	1090.	Fe K , Fe K
7.05	139.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 135

14-Dec-1993 18:14:24

29180, SW8-4, A, #03, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 28 secs

Energy	Counts	X-Ray Lines
0.52	289.	O K , O K , V L , V L , V L , V L
1.25	125.3	Mg K , Mg K , Mg K , As L , As L
1.49	79.	Al K , Al K -backgrnd.
1.73	363.	Si K , Si K
3.31	101.	K K , K K
6.39	66.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 143

14-Dec-1993 18:22:09

29180, SW8-4, A, #04, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
0.51	271.	O K , O K , V L , V L , V L , V L
1.24	69.	Mg K , Mg K , As L , As L
1.73	192.	Si K , Si K
2.62	236.	Cl K , Cl K
3.68	194.	Ca K , Ca K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 124

14-Dec-1993 18:23:36

29180, SW8-4, A, #05, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
0.52	464.	O K , O K , V L , V L , V L , V L
1.25	231.	Mg K , Mg K , Mg K , As L , As L
1.74	742.	Si K , Si K
3.70	167.	Ca K , Ca K
6.41	83.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 148

14-Dec-1993 18:28:09

29180,SW8-4,A,#07,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 17 secs

Energy	Counts	X-Ray Lines
0.52	621.	O K , O K , V L , V L , V L , V L
1.25	281.	Mg K , Mg K , Mg K , As L , As L
1.74	545.	Si K , Si K
2.62	145.	Cl K , Cl K
3.69	331.	Ca K , Ca K
6.38	120.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 235

14-Dec-1993 18:29:35

29180,SW8-4,A,#08,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 18 secs

Energy	Counts	X-Ray Lines
0.51	512.	O K , O K , V L , V L , V L , V L
1.25	229.	Mg K , Mg K , Mg K , As L , As L
1.74	844.	Si K , Si K
2.62	90.	Cl K , Cl K
3.70	107.	Ca K , Ca K
6.40	139.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 208

14-Dec-1993 18:32:14

29180, SW8-4, A, #09, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
0.51	911.	O K , O K , V L , V L , V L , V L
1.24	439.	Mg K , Mg K , As L , As L
1.74	1576.	Si K , Si K
3.69	266.	Ca K , Ca K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 266

14-Dec-1993 18:33:22

29180, SW8-4, A, #10, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 13 secs

Energy	Counts	X-Ray Lines
0.52	1057.	O K , O K , V L , V L , V L , V L
1.25	598.	Mg K , Mg K , Mg K , As L , As L
1.74	1772.	Si K , Si K
3.32	44.	K K , K K
3.69	501.	Ca K , Ca K
4.01	42.	Ca K , Ca K
6.38	140.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 324

14-Dec-1993 19:13:33

29180,SW8-4,A,#20,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 16 secs

Energy	Counts	X-Ray Lines
0.51	1020.	O K , O K , V L , V L , V L , V L
1.25	625.	Mg K , Mg K , Mg K , As L , As L
1.74	1686.	Si K , Si K
2.63	46.	Cl K , Cl K
3.68	463.	Ca K , Ca K
4.03	51.	Ca K , Ca K
6.39	99.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 311

14-Dec-1993 19:25:50

29180,SW8-4,A,#30,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
0.52	467.	O K , O K , V L , V L , V L , V L
1.25	213.	Mg K , Mg K , Mg K , As L , As L
1.74	734.	Si K , Si K
3.69	146.	Ca K , Ca K
6.40	104.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 189

14-Dec-1993 19:40:37

29180, SW8-4, A, #38, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 47 secs

Energy	Counts	X-Ray Lines
0.52	552.	O K , O K , V L , V L , V L , V L
1.26	254.	Mg K , Mg K , Mg K , As L , As L
1.74	967.	Si K , Si K
3.68	216.	Ca K , Ca K
6.40	140.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 8 = 189

TEM ASBESTOS ANALYSIS

Client _ Sample No. SW-8-4

EMS Lab No. _ Page 1 of 2

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address B
Screen Magnification 19,200 X
Camera Constant 28.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst Kylong Date 12/20/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	1	F	1.5	25	✓																				
	2	F	3	27	✓																				
	3	F	5	92													✓				3	10	3	1	Tremolite
	4	F	4	50	✓																				
2	5	F	2.5	22	✓																				
	6	F	9	33													✓				2	10	3	2	Actinolite
3	7	B	12	400X													✓				3	10	2	1	Tremolite
4	8	F	5	92													✓				2	10	2	1	Tremolite
5	9	F	5	72													✓				3	10	2	2	Actinolite
	10	F	5	76													✓				3	10	3	1	Tremolite
	11	B	10	80											✓		✓								Actinolite
	12	F	5	18													✓				3	10	2	1	Tremolite
6	13	F	6	32											✓										Actinolite
	14	F	5	75											✓		✓				3	10	2	1	Tremolite
	15	F	4.5	89											✓										"

OBSERVATIONS: Clean ☐ Other _____

Debris ☑ Very Light ☐ Light ☐ Moderate ☒ Heavy ☒ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. SW 8-4

EMS Lab No. [illegible]18
Page 2 of 2

Analyst Kyong Date 12/20/93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
	16	F	7	205													✓				3	10	3	1	Tremolite
	17	F	4	40	✓																				
	18	F	4	61											✓										Actinolite
	19	F	2	13											✓										Tremolite
	20	B	5	25											✓										"
	21	F	2.5	90											✓										"
	22	F	3	320											✓										Actinolite
	23	F	10	60											✓										Tremolite
7	24	F	3	35											✓										"
	25	B	17	90											✓										Actinolite
	26	F	1	110	✓																				
	27	F	2	30	✓																				
	28	F	4	50													✓				3	10	3	1	Tremolite
	29	F	3	45											✓										"

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

20-Dec-1993 14:28:55

29180,SW6-4,B,03,KC Preset= 100 secs
Vert= 200 counts Disc= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.24	282.	Mg K , Mg K . As L , As L
1.75	881.	Si K , Si K
2.63	101.	Cl K , Cl K
3.71	316.	Ca K , Ca K
6.42	111.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 7358

20-Dec-1993 14:45:04

[illegible].SW8-4,2,06.KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
1.25	300.	Mg K , Mg K , Mg K , As L , As L
1.75	2112.	Si K , Si K
2.64	250.	Cl K , Cl K
3.70	593.	Ca K , Ca K
3.41	333.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 12181

20-Dec-1993 14:51:53

29180, SW8-4, 5.07, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
1.26	423.	Mg K , Mg K , Mg K , As L , As L
1.75	1356.	Si K , Si K
3.70	248.	Ca K , Ca K
6.43	172.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 7917

20-Dec-1993 15:02:03

29160.SW8-4.B.06.KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.25	387.	Mg K . Mg K , Mg K , As L . As L
1.74	1695.	Si K . Si K
3.33	62.	K K . K K
3.69	369.	Ca K . Ca K
6.36	218.	Fe K . Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 8499

20-Dec-1993 15:06:41

29180,SW8-4,5,09,KC Preset= 100 secs
vert= 200 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.23	506.	Mg K , Mg K , Mg K , As L , As L
1.75	1747.	Si K , Si K
3.33	60.	K K , K K
3.70	365.	Ca K , Ca K
6.40	352.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 9996

20-Dec-1993 15:10:47

29180,SW8-4,5,10,KC Preset= 100 secs
vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.23	426.	Mg K , Mg K , Mg K , As L , As L
1.75	1406.	Si K , Si K
2.63	111.	Cl K , Cl K
3.70	365.	Ca K , Ca K
6.40	165.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 7316

20-Dec-1993 15:31:45

29160,SW6-4.B,12,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.22	468.	Mg K , Mg K , Mg K , As L , As L
1.75	1566.	Si K , Si K
3.31	49.	K K , K K
3.70	324.	Ca K , Ca K
6.41	104.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 6606

20-Dec-1993 15:34:22

29160,SW6-4,B,14,KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 35 secs

Energy	Counts	X-Ray Lines
1.36	341.	Mg K , Mg K , Mg K , As L , As L
1.75	1213.	Si K , Si K
3.71	223.	Ca K , Ca K
6.41	167.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 7541

20-Dec-1993 15:36:16

29160, SW8-4, B, 16, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
1.26	694.	Mg K , Mg K , Mg K , As L , As L
1.74	2133.	Si K , Si K
3.71	575.	Ca K , Ca K
6.41	240.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 10290

20-Dec-1993 15:47:44

29180, SW6-4, B, 28, KC Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
1.23	239.	Mg K , Mg K , Mg K , As L , As L
1.74	1011.	Si K , Si K
2.63	107.	Cl K , Cl K
3.70	356.	Ca K , Ca K
4.05	64.	Sc K , Sc K , Ca K , Ca K
5.41	127.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 5699

TEM ASBESTOS ANALYSIS

Client: [illegible] Asi.
Sample No. SWC-4

1S I No. [illegible]
Page ____ of ____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☑
Serial No. 542-05-13 H600B ☐

Grid Address: 1C
Screen Magnification: 19300 X
Camera Constant: 36.41
Accelerating Voltage: 100 KV
Beam Current: 18 µm
K-Factor: 1.6

Analyst: Radha Date: 12-20-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
1	1	F	3	25	✓																				
	2	F	5	30	✓																				Al, Si
	3	F	15	220		✓											✓				3	10	2	2	EDS Transl.
2	4	F	12	140	✓																				
3	5	F	4	55	✓																				
	6	F	5	52													✓				3	10	3	1	Transl.
4	7	F	5	50													✓				3	10	2	2	EDS Transl.
	8	F	3	22													✓								
	9	F	1.5	16	✓																				
	10	F	10	175	✓																3	10	1	2	EDS
	11	F	5	35	✓																				
5	12	MD	6	220													✓				3	10	3	1	EDS
	13	F	10	98											✓										
	14	MD	2	55											✓										
	15	B	6	225											✓										

OBSERVATIONS: Clean ☐ Other ____
Debris ☐ Very Light ☐ Light ☐ Moderate ☑ Heavy ☒ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Client [illegible] Sample No. SW8-4

IS L No. [illegible]

Page _____ of _____

C

Analyst Rada Date 12-20-93

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
6	16	F	5	60											✓										
	17	MD	4	35											✓										
	18	F	3	15											✓										
	19	F	4	28											✓										
	20	MD	5	350											✓										
7	21	MD	10	290											✓										
	22	F	3	55											✓										
	23	F	10	60											✓										
	24	F	20	330											✓										
	25	F	10	60													✓				3	10	2	2	EDS
8	26	F	3	30											✓										
	27	F	3	290											✓										
	28	MD	4	100	✓																				
	29	MD	3	35	✓																				
	30	MD	4	280											✓										

OBSERVATIONS: Clean ☐ Other _____

Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065

20-Dec-1993 14:37:53 29180,SW8-4,C,03,RS

ENERGY	COUNTS	X-RAY LINES
0.52	888.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	40.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	456.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	1442.	Si KA1, Si KA2
2.62	74.	Cl KA1, Cl KA2
3.29	58.	K KA1, K KA2
3.70	250.	Ca KA1, Ca KA2
6.40	223.	Fe KA1, Fe KA2
7.02	36.	Fe KB1, Fe KB3

20-Dec-1993 14:53:07 29180,SW8-4,C,06,RS

ENERGY	COUNTS	X-RAY LINES
0.51	1701.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.25	987.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	3007.	Si KA1, Si KA2
2.60	145.	Cl KA1, Cl KA2
3.32	83.	K KA1, K KA2
3.69	1058.	Ca KA1, Ca KA2
4.01	174.	Ca KB1, Ca KB3
6.39	210.	Fe KA1, Fe KA2

20-Dec-1993 14:57:29

29180, SW8-4, C, 07, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 21 secs

Energy	Counts	X-Ray Lines
0.52	1002.	O K , O K , V L , V L , V L , V L
1.25	386.	Mg K , Mg K , Mg K , As L , As L
1.74	1324.	Si K , Si K
3.70	248.	Ca K , Ca K
6.40	233.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 6892

20-Dec-1993 15:00:55

29180, SW8-4, C, 08, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
0.51	799.	O K , O K , V L , V L , V L , V L
1.25	330.	Mg K , Mg K , Mg K , As L , As L
1.73	1211.	Si K , Si K
2.61	199.	Cl K , Cl K
3.69	333.	Ca K , Ca K
6.38	126.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 8684

20-Dec-1993 15:05:35 29180,SW8-4,C,10,RS

ENERGY	COUNTS	X-RAY LINES
0.51	1549.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	96.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	751.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	2572.	Si KA1, Si KA2
2.61	52.	Cl KA1, Cl KA2
3.30	80.	K KA1, K KA2
3.69	269.	Ca KA1, Ca KA2
6.39	526.	Fe KA1, Fe KA2
7.04	62.	Fe KB1, Fe KB3

20-Dec-1993 18:16:36

29180, SW8-4, C, 12, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
0.51	1371.	O K , O K , V L , V L , V L , V L
1.25	764.	Mg K , Mg K , Mg K , As L , As L
1.74	2350.	Si K , Si K
2.61	167.	Cl K , Cl K
3.69	643.	Ca K , Ca K
4.01	86.	Ca K , Ca K
6.40	223.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 10612

20-Dec-1993 15:58:15 29160,SW8-4,C,25,RS

ENERGY	COUNTS	X-RAY LINES
0.52	1073.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	100.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	506.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	1737.	Si KA1, Si KA2
2.61	53.	Cl KA1, Cl KA2
3.34	92.	K KA1, K KA2
3.70	301.	Ca KA1, Ca KA2
5.37	41.	Cr KA1, Cr KA2
6.40	261.	Fe KA1, Fe KA2
7.01	52.	Fe KB1, Fe KB3

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No. 29180 **Date Analyzed** 12/21/93

Client SCHAFFER & ASSOC.

Sample No. EMS BLANK

Fibers (chrysotile)	ND	MFL
> 5 Micron length (chrysotile)	ND	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Sensitivity Level	0.07	MFL

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	0	0	0	0	0

TEM ASBESTOS ANALYSIS

Client [illegible]
Sample No. 10-27-93

EMS Lab No. [illegible]
Page _____ of _____

RECEIVING

TYPE OF SAMPLE
Air ☐ Water ☒
Soil ☐ Bulk ☐
Other _____

METHOD OF ANALYSIS
EPA 600/4-83-043 ☒ ISO ☐

LEVEL OF ANALYSIS
Chrysotile _____
Amphibole _____

ASPECT RATIO
3:1 ☐ 5:1 ☐

LENGTHS
All Sizes (EPA) ☐
(μm) ≥0.5 ☒
≥1.0 ☐
≥5.0 ☐
≥10.0 ☐
PCM Range* ☐
*(≥0.25 μm width ≥5.0 μm length)

FILTER TYPE / AREA (mm²)
MCE ☐ 385 ☐
PC ☒ 314 ☐
MCN ☐ 1017 ☒
Other _____

PORE SIZE
0.45 μm ☐ 0.8 μm ☐
0.1 μm ☒ 0.22 μm ☐
Other _____

G.O. Area (mm²) 0.0 070
No. of G.O. to Analyze 20
Filter Lot No. _____

Approved By _____ Date _____

PREP

DIRECT PREP ☐
INDIRECT PREP ☐

Volume _____ liters
Working Volume 100 ml
Weight _____ grams
Ashed Area _____ %

Prepared By BP/FM
Date 10-27-93

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address A
Screen Magnification 19,500 X
Camera Constant 30.5
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Radla Date 1-6-94

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								

OBSERVATIONS:

Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

TEM ASBESTOS ANALYSIS

Sample No. 10-07-[illegible] Page _____ of _____

RECEIVING

ANALYSIS

MICROSCOPE
Serial No. 542-05-06 H600A ☐
Serial No. 542-05-13 H600B ☐

Grid Address B
Screen Magnification 19300 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst Rade Date 1.6.94

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Dimensions (mm) Length	Fiber Classification NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	NSD																								
2	NSD																								
3	NSD																								
4	NSD																								
5	NSD																								
6	NSD																								
7	NSD																								
8	NSD																								
9	NSD																								
10	NSD																								

OBSERVATIONS: Clean ☐ Other _____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

EMS LABORATORIES 117 West Bellevue Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-4065