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ADMINISTRATIVE RECORD

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
Helena, Montana

Submitted by:

Schafer and Associates
Bozeman, Montana

January 13, 1993

Schafer

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January 13, 1991

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Mr. Pat Plantenberg
Department of State Lands
Hardrock Mining Bureau
1625 Eleventh Avenue
Helena, Montana 59620

Dear Pat:

Enclosed are two copies of Water Quality Data Report No. 4 summarizing the results of the fourth and final round of water sampling for background data at the W.R. Grace vermiculite mine near Libby. Data for this report was collected October 29, 1992. Please forward one copy to Tom Reid at the Water Quality Bureau.

Streamflows for the entire drainage were noticeably lower than on previous sampling events which would be expected at this time of year. For the first time we were able to record significantly lower flow from the tailings dam toe drains suggesting that drainage from impounded materials may be beginning to subside. We also measured much lower levels of asbestiform fibers in Lower Rainy Creek than on the previous sampling events. This may be a direct result of lower stream flows although it is difficult to imagine such a large change in fiber count with such a small change in flow.

As I suggested in the letter submitted with Water Quality Data Report No. 3, based on the data we have from the background sampling program, we would like to implement changes in the annual water quality sampling program which will now be done for a period of at least three years. We would suggest that annual sampling take place in late March or early April when streamflow is the highest. This will ensure that the data regarding asbestiform fibers is most meaningful. The most significant movement of fibers appears to occur with high stream flows. Also, if the Rainy Creek channel reconstruction project ever produces discharge from the tailings impoundment it will most likely be at this time of year.

We would like to limit the number of samples and the analyses done on them in order to reduce costs. Samples would be limited to Site SW-5 (tailings dam toe drain), Site SW-6 (tailings pond outfall from the new box culvert outlet when completed), Site SW-4 (Lower Carney Creek) and Site SW-8 (Lower Rainy Creek). We would propose to limit analyses as shown on the marked-up data summary sheets attached to this letter. For the purpose of maintaining complete data for water balance we would continue to provide field data parameters on Upper Rainy Creek (Site SW-11) and on Fleetwood Creek (Site SW-2).

Please advise whether these changes in the sampling and analysis plan are acceptable. If you have questions or comments please call.

Sincerely,

Tom Hudson

Tom Hudson
Project Manager

Table 3.1. Field data summary.

SITE NO.	DESCRIPTION	pH[6] (su)	EC (mmhos/cm)	TEMP (°C)	FLOW (cfs)	D.O.[3] (ppm)
SW-1	Upper Rainy Creek above diversion dam	[redacted]				
SW-2	Fleetwood Creek above coarse tails	8.10	0.51	6.9	0.14[1]	[redacted]
SW-3	Upper Carney Creek at Zook's Dump	[redacted]				
SW-4	Lower Carney Creek above Rainy Creek	8.20	0.66	6.5	0.00[2]	[redacted]
SW-5	Tailings dam toe drains	6.95	0.73	9.6	0.69[1]	[redacted]
SW-6	Tailings pond outfall (surface water sample, only)[6]	8.27	0.31	6.5	0.00	[redacted]
SW-7	Lower Rainy Creek leaving mine property	[redacted]				
SW-8	Lower Rainy Creek above Kootenai River	8.05	0.61	7.2	1.46[1]	[redacted]
SW-9	Kootenai River above Rainy Creek	[redacted]				
SW-10	Kootenai River below Rainy Creek	[redacted]				
SW-11[5]	Rainy Creek flow into tailings pond	7.63	0.45	6.3	0.24[1]	[redacted]
PW-1	Tailings Pond pore water	[redacted]				
PW-2	Groundwater near SW-11	[redacted]				

1 Flow measurement was made with a Pygmy current meter.

2 Flow measurement was not made. Carney Creek was flowing upstream of the settlement basin in which the Baski flume has normally been installed. However, there was no discharge from the settlement basin; significant percolation losses may be occurring here.

3 Dissolved oxygen was not measured.

4 Samples of the Kootenai River were not taken as discussed in the Water Quality Monitoring Plan.

5 The original Water Quality Monitoring Plan did not include this site. Rainy Creek reestablishes itself between the diversion dam and the tailings impoundment.

6 Standing water was no longer present at the original sample point near the decant tower. Water was collected nearby but at a slightly different location in the pond and this may have had an impact on measured water quality parameters.

Table 3.2. Laboratory data summary for metals.

SITE NO.	DESCRIPTION	As (mg/l)	Cd (mg/l)	Cr (mg/l)	Cu (mg/l)	Fe (mg/l)	Pb (mg/l)	Hg (mg/l)	Ni (mg/l)	Zn (mg/l)	K (mg/l)	Na (mg/l)	Ca (mg/l)	Mg (mg/l)
SW-1	Upper Rainy Creek above diversion dam	[redacted]												
SW-2	Fleetwood Creek above coarse tails	[redacted]												[redacted]
SW-3	Upper Carney Creek at Zook's Dump	[redacted]												
SW-4	Lower Carney Creek above Rainy Creek	[redacted]				0.03	[redacted]				15	9	99	29
SW-0	Blind Control (Replicate of SW-4)	[redacted]												
SW-5	Tailings dam toe drains	[redacted]				0.07	[redacted]				12	7	91	26
SW-6	Tailings pond surface water	[redacted]				0.39	[redacted]				7	5	31	12
SW-7	Lower Rainy Creek leaving mine property	[redacted]												
SW-8	Lower Rainy Creek above Kootenai River	[redacted]				<0.03	[redacted]				11	7	91	22
SW-9	Kootenai River above Rainy Creek	[redacted]												
SW-10	Kootenai River below Rainy Creek	[redacted]												
SW-11	Rainy Creek flow into tailings pond	[redacted]												
PW-1	Pore water from tailings	[redacted]												
PW-2	Groundwater near SW-11	[redacted]												

Table 3.3. Laboratory data summary for miscellaneous constituents.

SITE NO.	DESCRIPTION	SO_4^{-2} (mg/l)	Cl (mg/l)	CO_3^{-2} (mg/l)	HCO_3^{-1} (mg/l)	TDS (mg/l)	TSS (mg/l)	Hardness (mg/l)	Alkalinity (mg/l)	NO_3 (mg/l)	F (mg/l)	TPH (mg/l)
SW-1	Upper Rainy Creek above diversion dam	[redacted]										
SW-2	Fleetwood Creek above coarse tails	[redacted]										
SW-3	Upper Carney Creek at Zook's Dump	[redacted]										
SW-4	Lower Carney Creek above Rainy Creek	21	2	10	433	402	3	367	371	0.36	0.20	[redacted]
SW-0	Blind Control (Replicate of SW-4)	[redacted]										
SW-5	Tailings dam toe drains	8	7	0	445	416	1	333	365	<0.05	2.6	[redacted]
SW-6	Tailings pond surface water	21	4	1	158	162	21	127	131	0.08	0.43	[redacted]
SW-7	Lower Rainy Creek leaving mine property	[redacted]										
SW-8	Lower Rainy Creek above Kootenai River	11	9	8	357	366	2	318	305	<0.05	1.5	[redacted]
SW-9	Kootenai River above Rainy Creek	[redacted]										
SW-10	Kootenai River below Rainy Creek	[redacted]										
SW-11	Rainy Creek flow into tailings pond	[redacted]										
PW-1	Pore water from tailings	[redacted]										
PW-2	Groundwater near SW-11	[redacted]										

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	[redacted]				
SW-2	Fleetwood Creek above coarse tails	[redacted]				
SW-3	Upper Carney Creek at Zook's Dump	[redacted]				
SW-4	Lower Carney Creek above Rainy Creek	0.2	10.3	3.2	1.2	23
SW-0	Blind Control (Replicate of SW-4)	[redacted]				
SW-5	Tailings dam toe drains	0.3	0.6	0.0	0.0	0.1
SW-6	Tailings pond surface water	25.3	1821	304	202	2900
SW-7	Lower Rainy Creek leaving mine property	[redacted]				
SW-8	Lower Rainy Creek above Kootenai River	0.2	13.5	3.7	0.4	24
SW-9	Kootenai River above Rainy Creek	[redacted]				
SW-10	Kootenai River below Rainy Creek	[redacted]				
SW-11	Rainy Creek flow into tailings pond	[redacted]				

* MFL = Million fibers per liter

Table of Contents

Section	Description	Page
1.0	BACKGROUND	1 - 1
2.0	METHODS	2 - 1
3.0	PRESENTATION OF DATA	3 - 1
4.0	DATA ANALYSIS	4 - 1
4.1	Analysis of Current Data	4 - 1
4.2	Comparison of All Background Sampling Events	4 - 1

List of Tables

Number	Description	Page
Table 2.1.	Summary of sampling and analytical methods for water samples.	2 - 2
Table 3.1.	Field data summary.	3 - 2
Table 3.2.	Laboratory data summary for metals	3 - 3
Table 3.3.	Laboratory data summary for miscellaneous constituents	3 - 4
Table 3.4.	Laboratory data summary for asbestiform fibers	3 - 5
Table 4.1.	A comparison of measured water quality data with drinking water standards.	4 - 3
Table 4.2.	A comparison of critical water quality parameters over the background sampling period.	4 - 5

List of Figures

Number	Description	Page
Figure 1.1.	Water quality sampling location map.	1 - 2
Figure 4.1.	Schematic flow diagram of the Rainy Creek drainage with mass flow measurements for selected components.	4 - 2

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 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, and the third in early July, 1992. Results from these sampling events were reported in Water Quality Data Report No.1, No. 2, and No. 3, respectively. This report presents the data from the fourth sampling event performed on October 29, 1992.

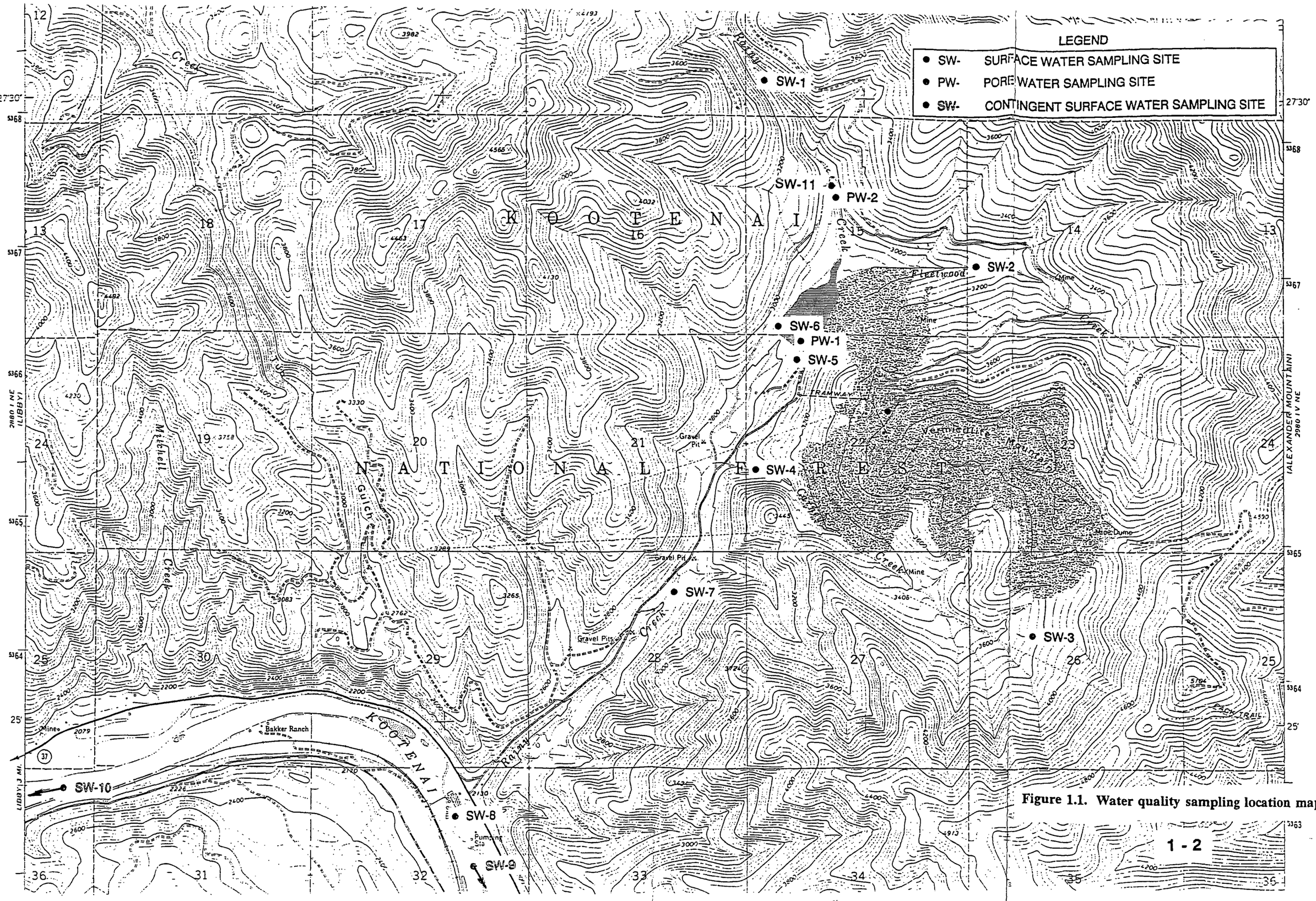

Figure 1.1. Water quality sampling location map.

2.0 METHODS

Conditions at the time of sampling were generally cloudy and a light rain or mist fell most of the day. Temperatures ranged from 45° F to 50° F. The Rainy Creek diversion was not in use; all of Rainy Creek flowed in the natural drainage into the tailings pond. The tailing pond surface water was restricted to a small area at the upper end of the impoundment.

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). Once again Site SW-1, Upper Rainy Creek above the diversion dam, was not sampled because the entire Upper Rainy Creek flow could be sampled more effectively at SW-11.

The preservation techniques and analytical methods used are summarized in Table 2.1. All samples were stored and shipped on ice. Metals were analyzed as the "total recoverable" form according to procedures outlined in Standard Methods for Examination of Water and Wastewater (APHA, 1985).

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

Unpreserved Samples		Preserved Samples			Field Parameters	
Component	Analytical Method[1]	Component	Preservation/ Container[2]	Analytical Method[1]	Param.	Method
TDS	EPA 160.1	TPH	H_2SO_4/Glass	EPA 418.1	Flow	Pygmy current meter/ Baski
TSS	EPA 160.2	Cu	HNO_3/PE	EPA 220.1/200.7	pH	Field pH meter
Asbest. Fibers	EPA-600/4-83-043	Zn	HNO_3/PE	EPA 289.1/200.7	EC	Field EC meter
Hardness	EPA 130.2	Cd	HNO_3/PE	EPA 213.1/200.7	DO	Field D.O. meter
Alkalinity	EPA 310.1	Pb	HNO_3/PE	EPA 239.2/200.7	Temp.	Field meter
NO_3^-	EPA 353.2	Hg	HNO_3/PE	EPA 245.2		
SO_4^{-2}	EPA 375.3	Fe	HNO_3/PE	EPA 236.1/200.7		
Cl^-	EPA 325.3	As	HNO_3/PE	EPA 206.3		
F^-	EPA 340.2	Ni	HNO_3/PE	EPA 249.1/200.7		
Ca	EPA 215.1/200.7	Cr	HNO_3/PE	EPA 218.1/200.7		
Mg	EPA 242.1/200.7					
Na	EPA 273.1/200.7					
K	EPA 258.1/200.7					
CO_3^{-2}/HCO_3^-	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).

2 Samples were acidified to a value less than 2.0. The TPH sample was collected in a 1 L glass bottle; metals were collected in 500 ml polyethylene (PE) bottles.

3.0 PRESENTATION OF DATA

Results of the October 29, 1992 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 metal analyses including selected heavy metals and major cations.
- Table 3.3 is a summary of miscellaneous analyses for various anions, petroleum hydrocarbons, 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[6] (su)	EC (mmhos/cm)	TEMP (°C)	FLOW (cfs)	D.O.[3] (ppm)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled				
SW-2	Fleetwood Creek above coarse tails	8.10	0.51	6.9	0.14[1]	
SW-3	Upper Carney Creek at Zook's Dump	8.07	0.75	5.8	0.0002	
SW-4	Lower Carney Creek above Rainy Creek	8.20	0.66	6.5	0.00[2]	
SW-5	Tailings dam toe drains	6.95	0.73	9.6	0.69[1]	
SW-6	Tailings pond outfall (surface water sample, only)[6]	8.27	0.31	6.5	0.00	
SW-7	Lower Rainy Creek leaving mine property	7.70	0.63	7.1	0.98[1]	
SW-8	Lower Rainy Creek above Kootenai River	8.05	0.61	7.2	1.46[1]	
SW-9	Kootenai River above Rainy Creek	Not Sampled[4]				
SW-10	Kootenai River below Rainy Creek	Not Sampled[4]				
SW-11[5]	Rainy Creek flow into tailings pond	7.63	0.45	6.3	0.24[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 not made. Carney Creek was flowing upstream of the settlement basin in which the Baski flume has normally been installed. However, there was no discharge from the settlement basin; significant percolation losses may be occurring here.

3 Dissolved oxygen was not measured.

4 Samples of the Kootenai River were not taken as discussed in the Water Quality Monitoring Plan.

5 The original Water Quality Monitoring Plan did not include this site. Rainy Creek reestablishes itself between the diversion dam and the tailings impoundment.

6 Standing water was no longer present at the original sample point near the decant tower. Water was collected nearby but at a slightly different location in the pond and this may have had an impact on measured water quality parameters.

Table 3.2. Laboratory data summary for metals.

SITE NO.	DESCRIPTION	As (mg/l)	Cd (mg/l)	Cr (mg/l)	Cu (mg/l)	Fe (mg/l)	Pb (mg/l)	Hg (mg/l)	Ni (mg/l)	Zn (mg/l)	K (mg/l)	Na (mg/l)	Ca (mg/l)	Mg (mg/l)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled												
SW-2	Fleetwood Creek above coarse tails	<0.005	<0.001	<0.01	<0.01	<0.03	<0.01	<0.001	<0.03	<0.01	8	5	78	15
SW-3	Upper Carney Creek at Zook's Dump	<0.005	<0.001	<0.01	<0.01	0.51	<0.01	<0.001	<0.03	0.02	11	7	102	27
SW-4	Lower Carney Creek above Rainy Creek	<0.005	<0.001	<0.01	<0.01	0.03	<0.01	<0.001	<0.03	0.02	15	9	99	29
SW-0	Blind Control (Replicate of SW-4)	<0.005	<0.001	<0.01	<0.01	0.03	<0.01	<0.001	<0.03	0.02	14	10	99	29
SW-5	Tailings dam toe drains	0.006	<0.001	<0.01	<0.01	0.07	<0.01	<0.001	<0.03	<0.01	12	7	91	26
SW-6	Tailings pond surface water	<0.005	<0.001	<0.01	<0.01	0.39	<0.01	<0.001	<0.03	<0.01	7	5	31	12
SW-7	Lower Rainy Creek leaving mine property	<0.005	<0.001	<0.01	<0.01	<0.03	<0.01	<0.001	<0.03	0.01	13	8	93	25
SW-8	Lower Rainy Creek above Kootenai River	<0.005	<0.001	<0.01	<0.01	<0.03	<0.01	<0.001	<0.03	<0.01	11	7	91	22
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	<0.005	<0.001	<0.01	<0.01	<0.03	<0.01	<0.001	<0.03	<0.01	5	4	69	11
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	SO_4^{-2} (mg/l)	Cl^- (mg/l)	CO_3^{-2} (mg/l)	HCO_3^{-1} (mg/l)	TDS (mg/l)	TSS (mg/l)	Hardness (mg/l)	Alkalinity (mg/l)	NO_3^- (mg/l)	F^- (mg/l)	TPH (mg/l)
SW-1	Upper Rainy Creek above diversion dam	Not Sampled										
SW-2	Fleetwood Creek above coarse tails	16	5	0	333	322	3	255	273	<0.05	0.20	<0.1
SW-3	Upper Carney Creek at Zook's Dump	10	2	0	486	457	12	366	398	0.26	0.20	<0.1
SW-4	Lower Carney Creek above Rainy Creek	21	2	10	433	402	3	367	371	0.36	0.20	<0.1
SW-0	Blind Control (Replicate of SW-4)	22	2	11	435	410	3	367	374	0.34	0.20	<0.1
SW-5	Tailings dam toe drains	8	7	0	445	416	1	333	365	<0.05	2.6	<0.1
SW-6	Tailings pond surface water	21	4	1	158	162	21	127	131	0.08	0.43	<0.1
SW-7	Lower Rainy Creek leaving mine property	11	10	5	387	376	4	334	325	0.06	2.1	<0.1
SW-8	Lower Rainy Creek above Kootenai River	11	9	8	357	366	2	318	305	<0.05	1.5	<0.1
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	6	<1	0	275	221	4	220	225	<0.05	0.18	<0.1
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	0.1	3.7	1.0	0.9	23
SW-3	Upper Carney Creek at Zook's Dump	2.5	162.1	43.0	20.2	1600
SW-4	Lower Carney Creek above Rainy Creek	0.2	10.3	3.2	1.2	23
SW-0	Blind Control (Replicate of SW-4)	0.2	13.8	2.6	1.5	18
SW-5	Tailings dam toe drains	0.3	0.6	0.0	0.0	0.1
SW-6	Tailings pond surface water	25.3	1821	304	202	2900
SW-7	Lower Rainy Creek leaving mine property	0.2	9.7	1.7	1.5	22
SW-8	Lower Rainy Creek above Kootenai River	0.2	13.5	3.7	0.4	24
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	0.1	1.7	0.6	0.0	6.7

* MFL = Million fibers per liter

4.0 DATA ANALYSIS

4.1 ANALYSIS OF CURRENT DATA

The significant findings of this sampling event are as follows:

- Streamflow was significantly less than in the spring and summer. For the first time, flows from the toe drains were noticeably smaller indicating that drainage of tailings pore water may be subsiding and gradually approaching an equilibrium flow.

- Asbestiform fiber counts in Lower Rainy Creek were much lower than those measured during earlier sampling events. We have observed large variations in fiber counts in Carney Creek but not in Rainy Creek until now. The sampling may be very sensitive to stream flows. However, statistically, there is not sufficient data to make correlations here.

- A mass flow schematic diagram for the sampling area is presented in Figure 4.1 for selected parameters.

- Table 4.1 compares measured water quality values to existing standards. These data show the same trends which have been noted in earlier reports.

4.2 COMPARISON OF ALL BACKGROUND SAMPLING EVENTS

The past year, during which background data was collected, must be considered unusual in that the winter was exceptionally mild. There was essentially no significant snow accumulation and spring runoff was not much greater than base flow. Future data in periods of high flow may show asbestiform fiber counts which are substantially different than reported here because of this.

At no time during sampling was there any indication of the formation of acid or the mobilization of heavy metals. Acid-base accounting has been done on both fine tailings and coarse tailings. Samples showed little or no acid potential (AP) and as much as 30 lbs $CaCO_3$ per ton neutralization potential (NP). These data together with the long operating history of the property without a problem related to acid production gives us confidence that heavy metal contamination of surface waters will not occur at this mine.

The only potential areas of concern are which have been identified are with respect to fluoride and asbestiform fibers. The fluoride concentration in water discharged from the

tailings dam toe drains is slighlty above drinking water standards. However, the concentration has been shown to be decreasing and we expect it to drop below the standard for drinking water within a year or two as water drains from the tailings materials and is displaced by stream water and rainfall.

Asbestiform fibers in Lower Rainy Creek, Carney Creek and in tailings pond water have all been measured at levels higher than recently promulgated standards for drinking water. Measured values in streams have been quite variable and could be dependent on the volume of flow at the time of sampling. Lower Rainy Creek has been the apparent source of most fibers discharged into the Kootenai River. This is probably the result of old mining practices in which tailings were discharged directly into the drainage rather than contained in an impoundment. However, as shown in Water Quality Data Report No. 1, geologic formations containing asbestiform fibers are naturally exposed in the Fleetwood Creek drainage. These formations have almost certainly contributed to asbestiform fiber counts in downstream sediments including those in the Lower Rainy Creek channel.

The tailings dam toe drains have consistently produced water with little or no measurable asbestiform fiber counts. The tailings impoundment has not discharged surface water for a period of two years now because percolation rates have exceeded recharge rates from Upper Rainy Creek and Fleetwood Creek. It is expected that discharge from the box culvert and spillway to be constructed this year will be a relatively rare event. Consequently, contributions to total asbestiform fiber counts in Lower Rainy Creek from the tailings impoundment are anticipated to be low.

Table 4.2 compares some of these more critical and significant parameters over the entire period of background monitoring. These data show the variability of asbestiform fiber counts and the slow decline in fluoride content of the toe drains which we expect to continue for several years until approaching the concentration measured in natural surface waters in the area.

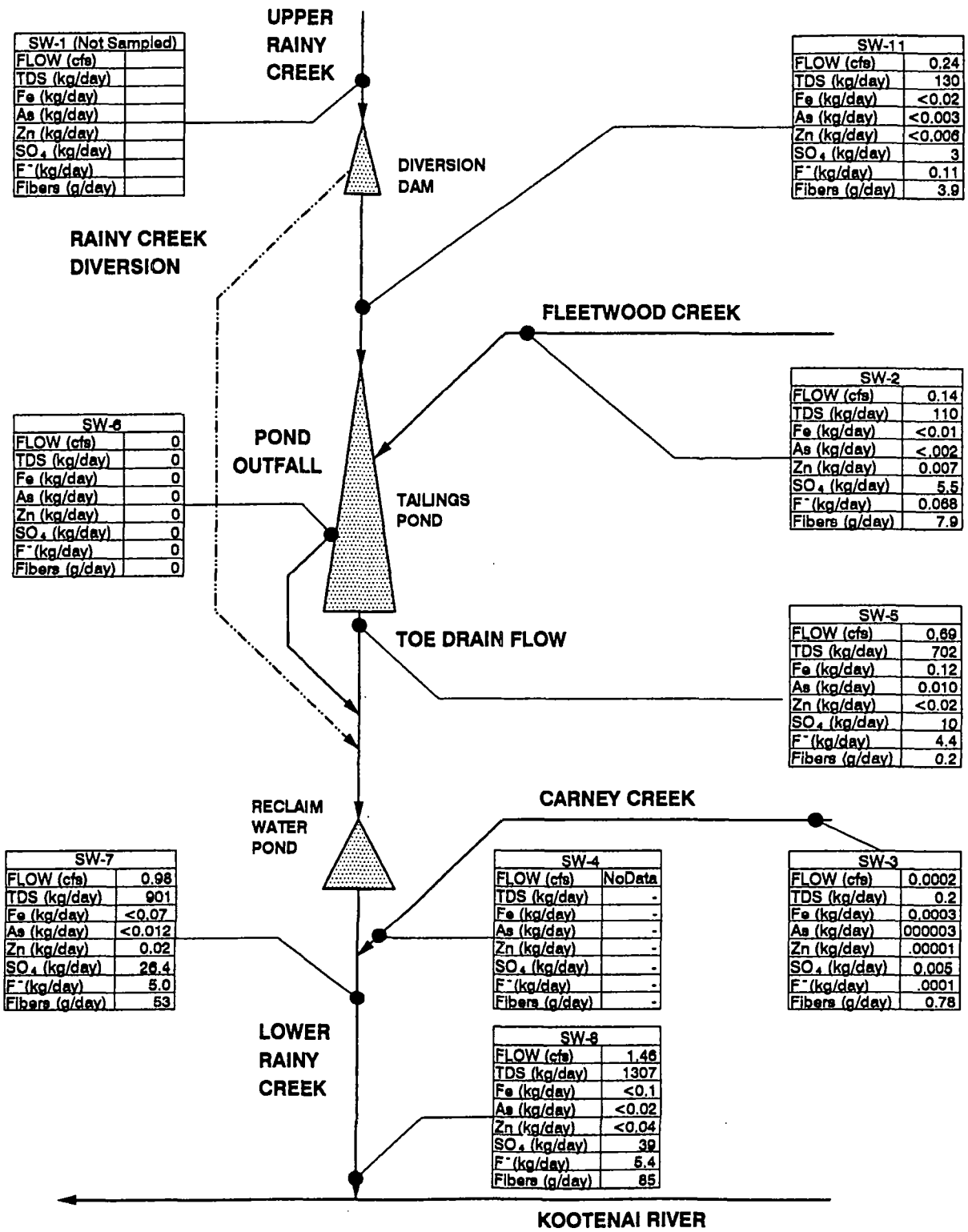

Figure 4.1 Schematic flow diagram of the Rainy Creek drainage with mass flow measurements for selected components.

Table 4.1 A comparison of measured water quality data with drinking water standards.

Constituent	Measured Concentration Range	Primary Drinking Water Standard	Secondary Drinking Water Standard	Location of Sample with Maximum Concentration
	(mg/l except as noted)			
As	<0.005 to 0.006	0.05		SW-5
Cd	<0.001	0.005[1]		All
Cr	<0.01	0.1[1]		All
Cu	<0.01		1.0	All
Fe	<0.03 to 0.51		0.3	SW-3
Pb	<0.01	0.05		All
Hg	<0.001	0.005		All
Ni	<0.03			All
Zn	<0.01 to 0.02	5.0		SW-2
Asbestos (MFL)	<0.1 to 202	7.0[1,2]		SW-6
SO_4^{-2}	6 to 22		250.	SW-4
Cl^-	<1 to 10		250.	SW-7
NO_3^-	<0.05 to 0.36	10.0		SW-4
F^-	0.18 to 2.6		2.0	SW-5
pH (su)	6.95 to 8.27		6.5 to 8.5	SW-5(min); SW-6(max)
TDS	163 to 398		500.	SW-3

1 These standards were added or revised effective July 1992.

2 Fiber counts are based on fibers greater than 10 microns in length with an aspect ratio greater than 3:1.

Table 4.2 A comparison of critical water quality parameters over the background sampling period.

Date	Lower Rainy Creek Streamflow (Site SW-8) (cfs)	Lower Rainy Creek Asbestiform Fibers (Site SW-8) (MFL)[1]	Lower Rainy Creek Asbestiform Fibers (Site SW-8) (μg/l)[2]	Carney Creek Streamflow (Site SW-4) (cfs)	Carney Creek Asbestiform Fibers (Site SW-4) (MFL)[1]	Carney Creek Asbestiform Fibers (Site SW-4) (μg/l)[2]	Toe Drain Fluoride Concentration (Site SW-5) (mg/l)
November 15, 1991	2.03	17.	240	0.24	0.1	6.4	3.1
March 25, 1992	2.92	9.	270	0.51	19.	950	3.1
July 2, 1992	2.29	18.	340	0.11	1.1	24	2.9
October 29, 1992	1.46	0.4	24	??	1.2	23	2.6

[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.

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, November 1991, submitted to Montana Department of State Lands, Hard Rock Mining Bureau.

APPENDIX A

ENERGY LABORATORIES DATA REPORTS

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-735-4489

COPY

LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45463
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SWO
Sampled 10/29/92
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	14
Sodium	10
Calcium	99
Magnesium	29
Sulfate	22
Chloride	2
Carbonate	11
Bicarbonate	435
Total Dissolved Solids @ 180°C	410
Total Suspended Solids	3
Total Hardness as $CaCO_3$	367
Total Alkalinity as $CaCO_3$	374
Nitrate plus Nitrite as N	0.34
Fluoride	0.20
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	0.02

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45464
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW2
Sampled 10/29/92 @ 1030
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	8
Sodium	5
Calcium	78
Magnesium	15
Sulfate	16
Chloride	5
Carbonate	0
Bicarbonate	333
Total Dissolved Solids @ 180°C	322
Total Suspended Solids	3
Total Hardness as $CaCO_3$	255
Total Alkalinity as $CaCO_3$	273
Nitrate plus Nitrite as N	<0.05
Fluoride	0.20
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	<0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	<0.01

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45465
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW3
Sampled 10/29/92 @ 0915
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	11
Sodium	7
Calcium	102
Magnesium	27
Sulfate	10
Chloride	2
Carbonate	0
Bicarbonate	486
Total Dissolved Solids @ 180°C	457
Total Suspended Solids	12
Total Hardness as $CaCO_3$	366
Total Alkalinity as $CaCO_3$	398
Nitrate plus Nitrite as N	0.26
Fluoride	0.20
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	0.51
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	0.02

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45466
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW4
Sampled 10/29/92 @ 1400
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	15
Sodium	9
Calcium	99
Magnesium	29
Sulfate	21
Chloride	2
Carbonate	10
Bicarbonate	433
Total Dissolved Solids @ 180°C	402
Total Suspended Solids	3
Total Hardness as $CaCO_3$	367
Total Alkalinity as $CaCO_3$	371
Nitrate plus Nitrite as N	0.36
Fluoride	0.20
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	0.02

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45467
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW5
Sampled 10/29/92 @ 1315
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	12
Sodium	7
Calcium	91
Magnesium	26
Sulfate	8
Chloride	7
Carbonate	0
Bicarbonate	445
Total Dissolved Solids @ 180°C	416
Total Suspended Solids	1
Total Hardness as $CaCO_3$	333
Total Alkalinity as $CaCO_3$	365
Nitrate plus Nitrite as N	<0.05
Fluoride	2.6
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1
Total Recoverable Metals	
Arsenic	0.006
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	0.07
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	<0.01

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45468
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW6
Sampled 10/29/92 @ 1245
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	7
Sodium	5
Calcium	31
Magnesium	12
Sulfate	21
Chloride	4
Carbonate	1
Bicarbonate	158
Total Dissolved Solids @ 180°C	162
Total Suspended Solids	21
Total Hardness as $CaCO_3$	127
Total Alkalinity as $CaCO_3$	131
Nitrate plus Nitrite as N	0.08
Fluoride	0.43
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	0.39
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	<0.01

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45469
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW7
Sampled 10/29/92 @ 1455
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	13
Sodium	8
Calcium	93
Magnesium	25
Sulfate	11
Chloride	10
Carbonate	5
Bicarbonate	387
Total Dissolved Solids @ 180°C	376
Total Suspended Solids	4
Total Hardness as $CaCO_3$	334
Total Alkalinity as $CaCO_3$	325
Nitrate plus Nitrite as N	0.06
Fluoride	2.1
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	<0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	0.01

* Analysis done by EPA method 418.1.

ENERGY LABORATORIES

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45470
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW8
Sampled 10/29/92 @ 1600
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	11
Sodium	7
Calcium	91
Magnesium	22
Sulfate	11
Chloride	9
Carbonate	8
Bicarbonate	357
Total Dissolved Solids @ 180°C	366
Total Suspended Solids	2
Total Hardness as $CaCO_3$	318
Total Alkalinity as $CaCO_3$	305
Nitrate plus Nitrite as N	<0.05
Fluoride	1.5
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1
Total Recoverable Metals	
Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	<0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	<0.01

* Analysis done by EPA method 418.1.

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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45470 dup
DATE: 11/20/92 ag

QUALITY ASSURANCE - DUPLICATE ANALYSIS

WR Grace Mine Near Libby, MT, SW8
Sampled 10/29/92 @ 1600
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	11
Sodium	7
Calcium	91
Magnesium	22
Sulfate	12
Chloride	9
Carbonate	7
Bicarbonate	363
Total Dissolved Solids @ 180°C	344
Total Suspended Solids	2
Total Hardness as $CaCO_3$	318
Total Alkalinity as $CaCO_3$	309
Nitrate plus Nitrite as N	<0.05
Fluoride	1.6
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons	N/A

Total Recoverable Metals

Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	<0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	<0.01

ENERGY LABORATORIES, INC.
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LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45471
DATE: 11/20/92 ag

WATER ANALYSIS

WR Grace Mine Near Libby, MT, SW11
Sampled 10/29/92 @ 1135
Submitted 11/03/92

Constituent	mg/l (ppm)
Potassium	5
Sodium	4
Calcium	69
Magnesium	11
Sulfate	6
Chloride	<1
Carbonate	0
Bicarbonate	275
Total Dissolved Solids @ 180°C	221
Total Suspended Solids	4
Total Hardness as $CaCO_3$	220
Total Alkalinity as $CaCO_3$	225
Nitrate plus Nitrite as N	<0.05
Fluoride	0.18
Total Acidity as $CaCO_3$	0
Total Petroleum Hydrocarbons*	<0.1
Total Recoverable Metals	
Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.01
Copper	<0.01
Iron	<0.03
Lead	<0.01
Mercury	<0.001
Nickel	<0.03
Zinc	<0.01

* Analysis done by EPA method 418.1.

ENERGY LABORATORIES, INC.
P.O. BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS, MT 59107-0916 • PHONE (406) 252-6325
FAX (406) 252-6069 • 1-800-735-4489

LABORATORY REPORT

TO: Tom Hudson
ADDRESS: Schafer & Associates
P.O. Box 6186
Bozeman, MT 59715

LAB NO: 92-45471 spi
DATE: 11/20/92 ag

QUALITY ASSURANCE- SPIKED ANALYSIS

WR Grace Mine Near Libby, MT, SW11
Sampled 10/29/92 @ 1135
Submitted 11/03/92

Constituent	% Recovery
Potassium	93
Sodium	98
Calcium	99
Magnesium	100
Sulfate	97
Chloride	97
Carbonate	N/A
Bicarbonate	N/A
Total Dissolved Solids @ 180°C	N/A
Total Suspended Solids	N/A
Total Hardness as $CaCO_3$	N/A
Total Alkalinity as $CaCO_3$	N/A
Nitrate plus Nitrite as N	106
Fluoride	100
Total Acidity as $CaCO_3$	N/A
Total Petroleum Hydrocarbons	N/A
Total Recoverable Metals	
Arsenic	101
Cadmium	96
Chromium	96
Copper	88
Iron	97
Lead	102
Mercury	90
Nickel	92
Zinc	105

APPENDIX B

EMS LABORATORIES DATA REPORTS

COPY

DATE:	November 20, 1992
CLIENT:	Schafer & Associates 865 Technology Blvd. P.O. Box 6186 Bozeman, MT 59715
ATTENTION:	Tom Hudson
REFERENCE:	Letter from Mr. Hudson dated 11-2-92.
REPORT NO.:	25877
SUBJECT:	ANALYSIS OF WATER SAMPLES BY TRANSMISSION ELECTRON MICROSCOPY
ACCREDITED:	National Institute of Standards and Technology through NVLAP (Laboratory No. 1218)
CERTIFIED:	California Dept. of Health Services for Asbestos by TEM (ELAP E1119)

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

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

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	6.9	6.9	2.6	1.5	0.289
SW-2-4	1.8	1.9	1.0	0.9	0.113
SW-3-4	96.1	66.0	43.0	20.2	2.53
SW-4-4	5.9	4.4	3.2	1.2	0.168
SW-5-4	0.0	0.6	0.0	0.0	0.289
SW-6-4	784	1037	304	202	25.3
SW-7-4	5.0	2.7	1.7	1.5	0.168
SW-8-4	7.4	6.1	3.7	0.4	0.217
SW-11-4	1.1	0.6	0.6	N.D.	0.144

*The computer rounds off to one significant figure on the summary sheets.

Schafer & Associates

Report No. 25877

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

The test reports are enclosed.

Respectfully submitted,

EMS LABORATORIES, INC.

B M Kolk

B.M. Kolk
Laboratory Director

BMK/kat

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: 25877
CLIENT: SCHAFER & 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)
25877-0-4	SW-0-4	MCE	47	1017	21	0.1407	25
25877-2-4	SW-2-4	MCE	47	1017	21	0.1407	50
25877-3-4	SW-3-4	MCE	47	1017	6	0.0402	10
25877-4-4	SW-4-4	MCE	47	1017	18	0.1206	50
25877-5-4	SW-5-4	MCE	47	1017	21	0.1407	25
25877-6-4	SW-6-4	MCE	47	1017	3	0.0201	2
25877-7-4	SW-7-4	MCE	47	1017	18	0.1206	50
25877-8-4	SW-8-4	MCE	47	1017	14	0.0938	50
25877-11-4	SW-11-4	MCE	47	1017	21	0.1407	50

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
25877-0-4	SW-0-4	62	15	5	0.3	18	4	1.4
25877-2-4	SW-2-4	51	17	8	0.1	5.8	1.9	0.9
25877-3-4	SW-3-4	89	26	8	2.5	230	63	20
25877-4-4	SW-4-4	87	27	7	0.2	15	4.4	1.2
25877-5-4	SW-5-4	2	-	-	0.3	0.6	-	-
25877-6-4	SW-6-4	92	23	8	2.5	2300	510	200
25877-7-4	SW-7-4	66	20	9	0.2	11	3.2	1.5
25877-8-4	SW-8-4	81	19	2	0.2	18	4.3	0.4
25877-11-4	SW-11-4	16	4	-	0.1	2.3	0.6	-

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

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-0-4	Reference	W.R GRACE
Date	11/11/92		

Total Asbestos Fibers	18	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	18	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	4	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	15	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	14 to 23	MFL
Detection Limit	0.3	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	2	9	8	5	38

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	5	11	15	4	27

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
18	20	10	8	4	2

TEM ASBESTOS ANALYSIS

Client: SCI-modev
Sample No. SW-0-4
EMS Job No. 29 x 44
Page 1 of 1

RECEIVING

TYPE OF SAMPLE: Air ☐ Water ☒ Soil ☐ Bulk ☐ Other ____

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

LEVEL OF ANALYSIS: Chrysotile CD-0 CD6; 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEMq0194A

Approved By [illegible] Date 11-10

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume ____ liters
Working Volume 25 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address I-A
Screen Magnification 19100 X
Camera Constant 27-7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst S. Ahmed Date 11-11-92

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	2	18													✓				3	10	3		EDS#1; Tremolite
	2	MD	3	25	✓																				EDS#2; Al, Si, Fe
	3	MD	2.5	25													✓				3	10	1	1	EDS#3; Tremolite
2	4	F	15	50	✓																				
	5	F	8	58								✓									3	10	.6	3	EDS#4; low Ca
	6	F	2	20	✓																				
	7	B	5	55	✓																				
3	8	F	8	50													✓				3	10	2	1	EDS#8; Tremolite
	9	MD	5	20													✓				2	10	2	1	EDS#9; Tremolite
	10	MD	5	50													✓								
	11	F	2.5	82													✓				3	10	2	1	EDS#11; Tremolite
	12	F	2.5	18											✓										Tremolite
4	13	F	2	40											✓										Tremolite
	14	F	3	115											✓										Tremolite
	15	MD	3	45	✓																				

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

TEM ASBESTOS ANALYSIS

Client 3C - Jer
Sample No. SW-0-4

EMS No. 25077
Page 2 of 2

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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume _____ liters
Working Volume 25 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1A
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst S. Ahmed Date 11/11/92

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
4	16	F	8	50											✓	✓	✓	✓			3	10	2	1	EDS #16; Tremolite
	17	F	1.5	70											✓	✓									Tremolite
	18	F	2.5	30											✓	✓									"
	19	F	10	40	✓																				
	20	MD	6	100											✓	✓									Tremolite
	21	MD	5	40											✓	✓									"
	22	MD	5	38											✓	✓									"
5	23	F	8	102											✓	✓									"
	24	MD	1	35											✓	✓									"
6	25	MD	5	30											✓	✓	✓	✓			3	10	3	1	EDS #25; Tremolite
	26	F	10	200											✓	✓									Tremolite
7	27	F	2.5	27											✓	✓									"
	28	F	8	55											✓	✓									"
	29	F	2	58											✓	✓									"
	30	F	1.5	38											✓	✓									"

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

11-Nov-1992#13:32:22

25877-0-4,A,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 41 secs

Energy	Counts	X-Ray Lines
1.26	243.	Mg K , Mg K , Mg K , As L , As L
1.74	958.	Si K , Si K
3.71	238.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 8221

11-Nov-1992#13:35:03

25877-0-4,A,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 18 secs

Energy	Counts	X-Ray Lines
1.49	236.	Al K , Al K
1.74	392.	Si K , Si K
3.32	130.	K K , K K
6.40	49.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 4103

11-Nov-1992#14:56:06

25877-0-4,A,#03,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 60 secs

Energy	Counts	X-Ray Lines
0.51	2153.	O K , O K , V L , V L , V L , V L
1.26	1671.	Mg K , Mg K , Mg K , As L , As L
1.74	5122.	Si K , Si K
3.71	514.	Ca K , Ca K
6.42	606.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 30451

11-Nov-1992#13:39:09

25877-0-4,A,#04,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.02	31.	Na K , Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.26	372.	Mg K , Mg K , Mg K , As L , As L
1.75	1419.	Si K , Si K
3.71	81.	Ca K , Ca K
6.40	318.	Fe K , Fe K
7.08	58.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 13806

11-Nov-1992#13:54:16

25877-0-4,A,#08,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 17 secs

Energy	Counts	X-Ray Lines
1.25	643.	Mg K , Mg K , Mg K , As L , As L
1.75	2507.	Si K , Si K
2.34	33.	S K , S K
3.69	452.	Ca K , Ca K
4.01	65.	Ca K , Ca K
6.42	289.	Fe K , Fe K
7.07	50.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 15931

11-Nov-1992 13:56:56 25877-0-4,A,#09,SA

ENERGY	COUNTS	X-RAY LINES
1.26	2696.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	12372.	Si KA1, Si KA2
2.30	113.	S KA1, S KA2
3.32	254.	K KA1, K KA2
3.70	2171.	Ca KA1, Ca KA2
4.06	337.	Sc KA1, Sc KA2
5.91	203.	Mn KA1, Mn KA2
6.42	734.	Fe KA1, Fe KA2
7.09	88.	Fe KB1, Fe KB3
9.87	64.	Ge KA1, Ge KA2

11-Nov-1992#13:59:09

25877-0-4,A,#11,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 25 secs

Energy	Counts	X-Ray Lines
1.25	854.	Mg K , Mg K , Mg K , As L , As L
1.74	2937.	Si K , Si K
3.31	120.	K K , K K
3.69	607.	Ca K , Ca K
4.03	82.	Ca K , Ca K
6.41	255.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 12022

11-Nov-1992#14:10:00

25877-0-4,A,#16,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.26	291.	Mg K , Mg K , Mg K , As L , As L
1.75	1088.	Si K , Si K
3.69	178.	Ca K , Ca K
6.39	160.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 8886

11-Nov-1992#14:40:57

25877-0-4,A,#25,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.26	405.	Mg K , Mg K , Mg K , As L , As L
1.74	1327.	Si K , Si K
3.70	345.	Ca K , Ca K
6.38	75.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 10374

TEM ASBESTOS ANALYSIS

Client: 3Cl - Fe
Sample No.: SW-0-4
EMS No.: 25877
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 (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: 067
No. of G.O. to Analyze: 20
Filter Lot No.: HoEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume ____ liters
Working Volume 25 ml
Weight ____ grams
Ashed Area ____ %

Prepared By: FG
Date: 11-10-92

ANALYSIS

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

Grid Address: 1-B
Screen Magnification: 19,300 X
Camera Constant: 30.3
Accelerating Voltage: 100 KV
Beam Current: 1.0 μm
K-Factor: 1.55

Analyst: Radla E.M. Date: 11-11-92

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	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	4	22																	3	10	1	1	EDS Tremolite
	2	F	7	50																	3	10	1	1	EDS Tremolite
	3	F	3	40								✓									3	10	8	1	EDS
	4	F	15	68											✓										Tremolite
	5	F	5	50								✓													
	6	F	10	30								✓													EDS Al Si K Fe
2	7	F	8	280											✓										Tremolite
	8	F	5	60								✓													
	9	MD	5	60											✓										
	10	F	8	45											✓						3	10	1	1	Tremolite EDS
	11	MD	1.5	18								✓													
	12	F	10	150											✓										Tremolite
3	13	F	5	85											✓										Tremolite
	14	F	6	85														✓			3	10	1	1	EDS, SAED #4234
	15	F	3	35											✓										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.: SW-0-4
EMS Lab No.: -87-
Page 2 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 (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: 067
No. of G.O. to Analyze: 20
Filter Lot No.: HoEM90194A

Approved By ___ Date ___

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume ___ liters
Working Volume 25 ml
Weight ___ grams
Ashed Area ___ %

Prepared By: FG
Date: 11-10-92

ANALYSIS

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

Grid Address: 1-B
Screen Magnification: 1930 X
Camera Constant: 30.3
Accelerating Voltage: 100 KV
Beam Current: 10 μm
K-Factor: 1.55

Analyst: Radla Filie Date: 11-11-92

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
4	16	F	6	22											✓										Tremolite
	17	F	7	115											✓										— " —
	18	F	7	75											✓										— " —
	19	F	2	25	✓																				
	20	F	5	110											✓										Tremolite
	21	F X	18	300								✓													
5	22	F/D	2	20								✓													
	23	F/D	3	80											✓										Tremolite
	24	F	2.5	20	✓																				
	25	F	10	90											✓										Tremolite
6	26	F	5	230											✓										— " —
	27	F	5	23											✓										— " —
	28	F	3	50											✓										— " —
	29	F	2.5	105											✓	✓					3	10	2	1	EDS Tremolite
7	30	F X	3	440											✓										

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

TEM ASBESTOS ANALYSIS

Client _____ EMS Lab No. 258.7
Sample No. _____ Page 3 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 (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 _____
No. of G.O. to Analyze _____
Filter Lot No. _____

Approved By _____ Date _____

PREP

DIRECT PREP ☐
INDIRECT PREP ☐

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

Prepared By _____
Date _____

ANALYSIS

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

Grid Address 1-B
Screen Magnification _____ X
Camera Constant _____
Accelerating Voltage 100 KV
Beam Current _____ μm
K-Factor _____

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
7	31	F	5	65											✓										Tremolite
	32	F	3	20								✓													
	33	F	3	35											✓										Tremolite
	34	F	3	67											✓										tremolite

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

11-Nov-1992#13:49:15

25877-0-4,B,#01,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
0.51	1206.	O K , O K , V L , V L , V L , V L
1.25	707.	Mg K , Mg K , Mg K , As L , As L
1.75	2384.	Si K , Si K
3.33	103.	K K , K K
3.71	451.	Ca K , Ca K
6.42	407.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13974

11-Nov-1992#13:50:42

25877-0-4,B,#02,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
0.51	1223.	O K , O K , V L , V L , V L , V L
1.01	89.	Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.25	757.	Mg K , Mg K , Mg K , As L , As L
1.75	2535.	Si K , Si K
3.31	104.	K K , K K
3.71	410.	Ca K , Ca K
6.42	256.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13929

11-Nov-1992 13:55:43 25877-0-4,B,#04,RS

ENERGY	COUNTS	X-RAY LINES
0.51	893.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.25	752.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	2978.	Si KA1, Si KA2
2.32	19.	S KA1, S KA2
2.64	19.	Cl KA1, Cl KA2
3.70	2287.	Ca KA1, Ca KA2
4.04	214.	Sc KA2, Ca KB1, Ca KB3
4.53	18.	Ti KA1, Ti KA2
5.44	37.	Cr KA1, Cr KA2
6.42	364.	Fe KA1, Fe KA2
6.96	61.	Co KA1
8.57	15.	Zn KA2
9.88	24.	Ge KA1, Ge KA2

11-Nov-1992 14:00:32 25877-0-4,B,#06,RS

ENERGY	COUNTS	X-RAY LINES
0.51	1901.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.48	1672.	Al KA1, Al KA2
1.75	2964.	Si KA1, Si KA2
3.33	1193.	K KA1, K KA2
3.64	99.	Ca KA2
4.54	61.	Ti KA1, Ti KA2
6.43	361.	Fe KA1, Fe KA2
7.05	65.	Fe KB1, Fe KB3

11-Nov-1992 14:06:59 25877-0-4,B,#10,RS

ENERGY	COUNTS	X-RAY LINES
0.51	852.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.01	45.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	621.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	1908.	Si KA1, Si KA2
3.32	45.	K KA1, K KA2
3.71	395.	Ca KA1, Ca KA2
4.02	76.	Ca KB1, Ca KB3
6.43	239.	Fe KA1, Fe KA2

11-Nov-1992#14:53:46

25877-0-4,B,#14,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 60 secs

Energy	Counts	X-Ray Lines
0.51	2153.	O K , O K , V L , V L , V L , O V L
1.26	1671.	Mg K , Mg K , Mg K , As L , As L
1.74	5122.	Si K , Si K
3.71	514.	Ca K , Ca K
6.42	606.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 30451

11-Nov-1992#15:45:04

25877-0-4,B,#29,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 60 secs

Energy	Counts	X-Ray Lines
0.51	941.	O K , O K , V L , V L , V L , V L
1.26	584.	Mg K , Mg K , Mg K , As L , As L
1.75	1980.	Si K , Si K
3.71	369.	Ca K , Ca K
6.40	171.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 9784

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No. SW-0-4

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 _____
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume _____ liters
Working Volume 25 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-G
Screen Magnification 19,300 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.55

Analyst [illegible] Date 11-11-92

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	40																					
	02	F/mD	1.5	28																					
	03	F/mD	3	60																	3	10	3	1	EDS #1 tremolite
	04	F	3	110																	3	10	2	2	EDS #2 "
	05	F	2	20																					
2	06	F	3	95																	3	10	2	1	EDS #3 tremolit
	07	F	3	75																	3	10	2	1	EDS #4 "
	08	F	2	45																	2	10	1	2	EDS #5 "
3	09	F	2	20																					
4	10	F	4	65																					
	11	F	1	40																					
	12	F	3	130																					
5	13	F	4	75																					
	14	F	2	22																					
6	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

Client: SCIntegr
Sample No. SW-0-4
EMS Lab No. 4101
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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEMq0194A

Approved By ____ Date ____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume ____ liters
Working Volume 25 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 19,303 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.55

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	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
6	16	F/MA	1.5	50																					
	17	F/MA	3	45																					
	18	F	1	35																					
7	19	F	4	335																					
	20	F	3	20																	3	10	1	1	EDS #6 tremolit

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

11-Nov-1992#15:07:15

25877-0-4,C,#03,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
0.51	1223.	O K , O K , V L , V L , V L , V L
1.26	846.	Mg K , Mg K , Mg K , As L , As L
1.74	2869.	Si K , Si K
3.72	735.	Ca K , Ca K
4.01	99.	Ca K , Ca K
6.41	249.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13891

11-Nov-1992#15:11:31

25877-0-4, C, #04, GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.26	877.	Mg K , Mg K , Mg K , As L , As L
1.74	2951.	Si K , Si K
3.70	534.	Ca K , Ca K
6.41	394.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11930

11-Nov-1992#15:22:43

25877-0-4,C,#06,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 41 secs

Energy	Counts	X-Ray Lines
1.26	609.	Mg K , Mg K , Mg K , As L , As L
1.74	2454.	Si K , Si K
3.33	169.	K K , K K
3.70	412.	Ca K , Ca K
6.42	191.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 13901

11-Nov-1992#15:34:25

25877-0-4,C,#07,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 50 secs

Energy	Counts	X-Ray Lines
0.51	1274.	O K , O K , V L , V L , V L , V L
1.26	1183.	Mg K , Mg K , Mg K , As L , As L
1.75	3689.	Si K , Si K
3.71	881.	Ca K , Ca K
6.41	237.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 16236

11-Nov-1992#15:42:04

25877-0-4,C,#08,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.26	486.	Mg K , Mg K , Mg K , As L , As L
1.74	2224.	Si K , Si K
3.71	317.	Ca K , Ca K
6.40	365.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13126

11-Nov-1992#16:20:45

25877-0-4,C,#20,GA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
1.26	1024.	Mg K , Mg K , Mg K , As L , As L
1.75	3910.	Si K , Si K
3.33	99.	K K , K K
3.70	509.	Ca K , Ca K
4.03	114.	Ca K , Ca K
6.41	553.	Fe K , Fe K
7.08	81.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 14170

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-2-4	Reference	W.R.GRACE
Date	11/11/92		

Total Asbestos Fibers	5.8	MFL
Chrysotile Fibers	0.1	MFL
Amphibole Fibers	5.7	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	1.9	MFL
Mass (Chrysotile)	0.0004	µg/L
Mass (amphibole)	23	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	4.3 to 7.6	MFL
Detection Limit	0.1	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	3	6	3	4	35

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	3	6	6	2	34

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
18	15	8	1	4	5

TEM ASBESTOS ANALYSIS

Client 3cl-rev
Sample No. SW-2-4

EMS Job No. 25844
Page 1 of

RECEIVING

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

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

LEVEL OF ANALYSIS
Chrysotile CD → aDQ
Amphibole ADX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By B Koll Date 11-10

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 50 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19100 -X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7
Analyst S. Ahmed Date 11/11/92

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	1	MD	2.5	65													✓				3	10	1	1	EDS #1 Tremolite
	2	F	8	90													✓				3	10	1	1	EDS #2 Tremolite
	3	F	3	49	✓																				
2	4	F	16	240													✓				3	10	2	1	EDS #4 Tremolite
	5	F	10	83													✓				3	10	2	1	EDS #5 "
3	NSD																								
4	6	MD	8	85													✓				3	10	2	1	EDS #6 Tremolite
	7	F	2.5	65											✓										Tremolite
5	8	F	5	100x											✓										"
	9	F	12	68											✓										"
	10	F	2	35											✓										"
	11	F	8	300														✓			3	10	2	1	SA EDS #527, EDS #10 Tremolite
6	12	F	30	180											✓										Tremolite
7	13	F	5	108											✓										Tremolite
	14	F	6	350											✓						3	10	2	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: Sel. n fev
Sample No. SW-2-4

EMS Lab No. 27077
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1A
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7
Analyst S. Ahmed Date 11/11/92

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
7	15	F	12	2115													✓								EDS#15 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) 568-406

11-Nov-1992#10:21:46

25877-2-4,A,#01,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 39 secs

Energy	Counts	X-Ray Lines
1.25	453.	Mg K , Mg K , Mg K , As L , As L
1.74	1480.	Si K , Si K
3.69	183.	Ca K , Ca K
6.42	180.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11073

11-Nov-1992#10:22:16

25877-2-4,A,#02,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 53 secs

Energy	Counts	X-Ray Lines
1.25	621.	Mg K , Mg K , Mg K , As L , As L
1.74	2015.	Si K , Si K
3.70	253.	Ca K , Ca K
6.42	239.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11413

11-Nov-1992#10:42:00

25877-2-4,A,#04,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 15 secs

Energy	Counts	X-Ray Lines
1.25	1119.	Mg K , Mg K , Mg K , As L , As L
1.74	3561.	Si K , Si K
3.34	88.	K K , K K
3.70	810.	Ca K , Ca K
4.03	102.	Ca K , Ca K
5.92	57.	Mn K , Mn K
6.40	461.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 31477

11-Nov-1992#10:44:11

25877-2-4,A,#05,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.25	912.	Mg K , Mg K , Mg K , As L , As L
1.74	2774.	Si K , Si K
3.70	706.	Ca K , Ca K
4.04	87.	Sc K , Ca K , Ca K
6.41	114.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13674

11-Nov-1992#10:50:08

25877-2-4,A,#06,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.26	383.	Mg K , Mg K , Mg K , As L , As L
1.74	1294.	Si K , Si K
3.70	228.	Ca K , Ca K
6.41	114.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11458

11-Nov-1992#11:05:35

25877-2-4,A,#1D,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 18 secs

Energy	Counts	X-Ray Lines
1.25	833.	Mg K , Mg K , Mg K , As L , As L
1.74	2755.	Si K , Si K
2.29	47.	S K , S K
3.30	42.	K K , K K
3.71	756.	Ca K , Ca K
4.01	71.	Ca K , Ca K
6.40	334.	Fe K , Fe K
Quantex)	47.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 15000

11-Nov-1992#11:21:09

25877-2-4,A,#15,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
1.25	729.	Mg K , Mg K , Mg K , As L , As L
1.74	2392.	Si K , Si K
3.34	72.	K K , K K
3.70	418.	Ca K , Ca K
6.42	163.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13439

TEM ASBESTOS ANALYSIS

Client: 3cl-rev
Sample No.: SW-2-4
EMS Job No.: 25844
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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HAEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-B
Screen Magnification 14300 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.55

Analyst Radka Date 11-11-92

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	45													✓				3	10	2	1	Tremolite EDS
	2	MD	2	18													✓				2	10	1	1	Tremolite EDS
2	3	F	3	12													✓								
	4	F	5	25													✓				3	10	1	1	Tremolite EDS
	5	F	3	72													✓								EDS
	6	F	1	11				✓													8	10			EDS (chrysotile)
	7	F	5	70													✓				2	10	1	1	EDS Tremolite
3	8	F	10	40													✓								NA, Mg, Si, K, Ca, Fe EDS
	9	F	11	480													✓								" EDX
	10	F	15	70													✓								
	11	F	6	85											✓										
4	12	F	3	58													✓				4	10			
	13	F	3.5	195													✓				4	10	1	1	Tremolite EDS
5	14	MD	10	48													✓								
6	F	F	10	70													✓								

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

TEM ASBESTOS ANALYSIS

...ent 3cl ~ Lev
Sample No. SW-2-4

EMS ...b No. 27877
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-10-92

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 Radha Date 11.11.92

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
6	16	F	5	240													✓				3	10	2	1	Tremolite EDS
	17	F	5	30											✓		✓								"
	18	IND	1.5	60											✓										"
7	19	F	6	25											✓										"
	20	IND	3	150											✓										"
	21	F	4	24											✓										"
	22	F	14	100											✓										"

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

11-Nov-1992#10:57:42

25877-2-4,B,#01,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 38 secs

Energy	Counts	X-Ray Lines
0.51	808.	O K , O K , V L , V L , V L , V L
1.26	511.	Mg K , Mg K , Mg K , As L , As L
1.74	1570.	Si K , Si K
3.71	252.	Ca K , Ca K
6.41	191.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 7540

11-Nov-1992#10:59:49

25877-2-4,B,#02,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
0.51	479.	O K , O K , V L , V L , V L , V L
1.26	237.	Mg K , Mg K , Mg K , As L , As L
1.75	1144.	Si K , Si K
3.69	117.	Ca K , Ca K
6.41	170.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 6229

11-Nov-1992#11:07:50

25877-2-4, B, #04, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
0.51	762.	O K , O K , V L , V L , V L , V L
1.25	561.	Mg K , Mg K , Mg K , As L , As L
1.75	1818.	Si K , Si K
3.70	256.	Ca K , Ca K
6.43	184.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 7390

11-Nov-1992#11:09:57

25877-2-4, B, #05, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
0.50	283.	O K , O K , V L , V L , V L , V L
1.26	208.	Mg K , Mg K , Mg K , As L , As L
1.48	81.	Al K , Al K
1.74	500.	Si K , Si K
3.32	83.	K K , K K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 3167

11-Nov-1992#11:13:15

25877-2-4,B,#06,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 61 secs

Energy	Counts	X-Ray Lines
0.50	163.	O K , O K , V L , V L , V L , V L
1.25	159.	Mg K , Mg K , Mg K , As L , As L
1.75	202.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 3023

11-Nov-1992#11:19:54

25877-2-4,B,#07,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
0.50	349.	O K , O K , V L , V L , V L , V L
1.25	190.	Mg K , Mg K , Mg K , As L , As L
1.75	780.	Si K , Si K
3.71	103.	Ca K , Ca K
6.42	113.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 4677

11-Nov-1992 11:29:06 25877-2-4,B,#08,RS

ENERGY	COUNTS	X-RAY LINES
0.51	2083.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	246.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	1240.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	4806.	Si KA1, Si KA2
3.32	192.	K KA1, K KA2
3.70	410.	Ca KA1, Ca KA2
6.42	1111.	Fe KA1, Fe KA2
7.08	133.	Fe KB1, Fe KB3

11-Nov-1992 11:31:31 25877-2-4,B,#09,RS

ENERGY	COUNTS	X-RAY LINES
0.51	2993.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	359.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	1754.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	7650.	Si KA1, Si KA2
3.33	194.	K KA1, K KA2
3.70	496.	Ca KA1, Ca KA2
6.42	1661.	Fe KA1, Fe KA2
7.07	199.	Fe KB1, Fe KB3

11-Nov-1992#11:50:59

25877-2-4,B,#13,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 28 secs

Energy	Counts	X-Ray Lines
0.51	3355.	O K , O K , V L , V L , V L , V L
1.26	3089.	Mg K , Mg K , Mg K , As L , As L
1.74	7024.	Si K , Si K
3.31	118.	K K , K K
3.72	74.	Ca K , Ca K
6.41	415.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 23532

11-Nov-1992#12:52:34

25877-2-4,B,#16,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
0.51	1178.	O K , O K , V L , V L , V L , V L
1.25	793.	Mg K , Mg K , Mg K , As L , As L
1.75	2519.	Si K , Si K
3.34	108.	K K , K K
3.72	416.	Ca K , Ca K
4.05	75.	Sc K , Sc K , Ca K , Ca K
6.42	260.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 12902

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No.: SW-2-4
EMS Lab No.: 27077
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst S. Ahmed Date 11/11/92

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	1	MD	2	30													✓				2	10	2	1	EDS #1 Tremolite
	2	F	5	15	✓																				EDS #2 Si, Ca.
2	3	F	5	100													✓				2	10	2	1	EDS #3 Tremolite
3	4	F	5	22													✓				3	10	2	1	EDS #4 Tremolite
	5	F	2.5	41													✓				3	10	3	1	EDS #5 Tremolite
	6	F	3	27													✓								
4	7	F	5	49											✓										Tremolite
	8	F	9	480											✓										"
	9	F	6	70											✓										EDS #9 Na, Mg, Si, Ca, Fe
5	10	F	15	55											✓										EDS #10 Na, Mg, Si, Ca, Fe
	11	MD	5	100											✓										Tremolite
	12	F	6	78											✓										"
	13	F	5	50											✓										"
	14	MD	7	25											✓										"
6	15	MD	10	160											✓										EDS #15 Na, Mg, Si, Ca, Fe

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

TEM ASBESTOS ANALYSIS

ent Schnitzer
Sample No. SW-2-4

EMS No 27877
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst S. Ahmed Date 11/11/92

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
6	16	F	10	30x											✓										Tremolite
7	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

11-Nov-1992#11:33:11

25877-2-4,C,#01,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.27	149.	Mg K , Mg K , Mg K , As L , As L , As L
1.76	611.	Si K , Si K
3.72	132.	Ca K , Ca K
6.42	109.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 6893

11-Nov-1992#11:34:14

25877-2-4,C,#02,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 21 secs

Energy	Counts	X-Ray Lines
1.75	1088.	Si K , Si K
3.69	43.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 5850

11-Nov-1992#11:43:51

25877-2-4,C,#03,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
0.99	49.	Zn L , Zn L , Zn L
1.25	406.	Mg K , Mg K , Mg K , As L , As L
1.74	1981.	Si K , Si K
3.72	390.	Ca K , Ca K
4.05	60.	Sc K , Sc K , Ca K , Ca K
6.43	319.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11190

11-Nov-1992#11:51:52

25877-2-4,C,#04,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 25 secs

Energy	Counts	X-Ray Lines
1.26	208.	Mg K , Mg K , Mg K , As L , As L
1.74	686.	Si K , Si K
3.70	176.	Ca K , Ca K
6.39	75.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 5379

11-Nov-1992#11:53:21

25877-2-4,C,#05,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 64 secs

Energy	Counts	X-Ray Lines
1.25	468.	Mg K , Mg K , Mg K , As L , As L
1.75	1767.	Si K , Si K
3.70	407.	Ca K , Ca K
6.40	157.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13470

11-Nov-1992#11:58:48

25877-2-4,C,#09,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.02	136.	Na K , Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.25	658.	Mg K , Mg K , Mg K , As L , As L
1.74	4677.	Si K , Si K
3.70	154.	Ca K , Ca K
5.88	76.	Mn K , Mn K
6.42	1655.	Fe K , Fe K
7.08	223.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral O = 22404

11-Nov-1992#12:49:03

25877-2-4,C,#10,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.03	146.	Na K , Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.26	230.	Mg K , Mg K , Mg K , As L , As L
1.74	2936.	Si K , Si K
3.71	499.	Ca K , Ca K
6.42	1249.	Fe K , Fe K
7.07	148.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral O = 21973

11-Nov-1992#12:52:16

25877-2-4,B,#16,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
0.51	1178.	O K , O K , V L , V L , V L , V L
1.25	793.	Mg K , Mg K , Mg K , As L , As L
1.75	3519	Si K , Si K

11-Nov-1992 12:53:47 25877-2-4,C,#15,SA

ENERGY	COUNTS	X-RAY LINES
1.00	137.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	1374.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	5254.	Si KA1, Si KA2
3.32	271.	K KA1, K KA2
3.71	809.	Ca KA1, Ca KA2
4.06	108.	Sc KA1, Sc KA2
6.41	1359.	Fe KA1, Fe KA2
7.07	240.	Fe KB1, Fe KB3

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-3-4	Reference	W.R. GRACE
Date	11/18/92		

Total Asbestos Fibers	230	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	230	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	63	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	500	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	180 to 280	MFL
Detection Limit	2.5	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	4	13	16	5	51

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	8	13	20	13	35

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
26	28	15	9	5	6

TEM ASBESTOS ANALYSIS

Client: Schr Lev
Sample No. SW-3-4
EMS Job No. 25844
Page 1 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 ADX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By R Kolk Date 11-10

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 10 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19,100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst R.M. Date 11-11-92

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	01	F X	4	130												✓				1	2	10		4	EDS Crocidolite
	02	F	3	45								✓									2	10	1	3	EDS
	03	F	2.5	35												✓					3	10	2	2	EDS Tremolite
	04	F	3	20	✓																				
	05	F	4	20												✓									EDS Tremolite
	06	F	4	30												✓					3	10	2	1	EDS Tremolite
	07	F	2.5	27												✓					3	10	2	2	EDS Tremolite
	08	F	10	260											✓										Tremolite
	09	F	12	95												✓		✓		.4	1	10		4	Crocidolite*
	10	F	3	45												✓									— " —
	11	F	3	60												✓									Tremolite
	12	F	6	40												✓									— " —
	13	F	4	155												✓					3	10	2	1	EDS — " —
	14	F/D	5	100												✓									— " —
	15	F	3	290									✓			✓					3	10	2	1	SAED# 4528

Tr.

OBSERVATIONS:
* EDS, SAED 4528

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

ient Schalev
Sample No. SW-3-4

EM[illegible]b N 25877
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By Date

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 10 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-10-92

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 Date

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	16	F	5	65												✓									Crocidolite
	17	F	2	85												✓									— " —
2	18	F X	3	60												✓									Tremolite
	19	F	2	30												✓									Tremolite
	20	F	10	115												✓					3	10	2	1	EDS Trem.
	21	F	1	31	✓																				
	22	F	2.5	80												✓									Tremolite
	23	F	2	70												✓									— " —
	24	F	10	100												✓									— " —
	25	F	7	135								✓													
	26	F X	5	110												✓									Tremolite
	27	F	5	140												✓									— " —
	28	F	3	125												✓				.4	2	10		4	EDS Crocidolite
	29	F	3	70												✓									Tremolite
	30	F	6	48								✓													

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

11-Nov-1992#16:53:26

25877-3-4,A,#01,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.02	151.	Na K , Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.26	564.	Mg K , Mg K , Mg K , As L , As L
1.75	2941.	Si K , Si K
3.33	92.	K K , K K
6.41	1122.	Fe K , Fe K
7.07	136.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 16332

11-Nov-1992#17:03:19

25877-3-4,A,#02,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 53 secs

Energy	Counts	X-Ray Lines
1.26	776.	Mg K , Mg K , Mg K , As L , As L
1.74	3448.	Si K , Si K
3.69	251.	Ca K , Ca K
5.43	148.	Cr K , Cr K
6.41	907.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 18849

11-Nov-1992#17:05:17

25877-3-4,A,#03,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 39 secs

Energy	Counts	X-Ray Lines
1.26	828.	Mg K , Mg K , Mg K , As L , As L
1.75	3005.	Si K , Si K
3.32	160.	K K , K K
3.70	515.	Ca K , Ca K
6.42	456.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 14037

11-Nov-1992#17:10:10

25877-3-4,A,#05,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.25	620.	Mg K , Mg K , Mg K , As L , As L
1.74	2042.	Si K , Si K
3.32	104.	K K , K K
3.71	310.	Ca K , Ca K
6.40	217.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 12798

11-Nov-1992#17:16:10

25877-3-4,A,#07,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.25	715.	Mg K , Mg K , Mg K , As L , As L
1.74	2725.	Si K , Si K
3.70	519.	Ca K , Ca K
6.41	528.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 16105

11-Nov-1992 17:30:51 25877-3-4,A,#09,FM

ENERGY	COUNTS	X-RAY LINES
0.69	91.	F KA1, F KA2, Fe LA1, Fe LA2, Fe LB1, Fe LG1
1.02	548.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	2187.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	14628.	Si KA1, Si KA2
3.32	187.	K KA1, K KA2
3.73	108.	Ca KA1
5.91	141.	Mn KA1, Mn KA2
6.41	5532.	Fe KA1, Fe KA2
7.07	710.	Fe KB1, Fe KB3

11-Nov-1992#17:48:57

25877-3-4,A,#13,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.26	606.	Mg K , Mg K , Mg K , As L , As L
1.75	2194.	Si K , Si K
3.70	460.	Ca K , Ca K
6.40	278.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 12710

11-Nov-1992#18:14:52

25877-3-4,A,#20,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.26	746.	Mg K , Mg K , Mg K , As L , As L
1.74	2533.	Si K , Si K
3.33	78.	K K , K K
3.70	468.	Ca K , Ca K
6.41	283.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 15033

11-Nov-1992#18:33:02

25877-3-4,A,#28,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 46 secs

Energy	Counts	X-Ray Lines
1.02	143.	Na K , Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.25	606.	Mg K , Mg K , Mg K , As L , As L
1.75	3299.	Si K , Si K
6.41	1167.	Fe K , Fe K
7.06	155.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 18096

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No. SW-3-4

EMS Lab No. 21077
Page 1 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 10 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-B
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10.1 μm
K-Factor 1.6

Analyst S. Ahmed Date 11/17/92

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	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	8	50													✓				3	10	2	1	EDSA1; Tremolite
	2	F	2	25													✓				3	10	2	1	EDSA2; "
	3	F	8	50	✓																				
	4	F	2	35													✓				3	10	2	1	EDSA4; Tremolite
	5	F	5	220								✓									1	10		5	EDSA5; low Fe
	6	F	6	35													✓				3	10	3	2	EDSA6; Tremolite
	7	F	4	30											✓										Tremolite
	8	F	4	65											✓										Tremolite
	9	F	3	140											✓										"
	10	F	15	1100											✓										Tremolite
	11	F	10	200											✓										
	12	F	15	62											✓										Tremolite
	13	F	3	60	✓																				
	14	F	5	180											✓										Tremolite
	15	MD	2	40											✓		✓				3	10	3	3	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: Schatev
Sample No.: SW-3-4
EMS Lab No.: 27077
Page 2 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* ☐
*1≥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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM901 94A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 10 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 19100 X
Camera Constant 27.17
Accelerating Voltage 100 KV
Beam Current 1 μm
K-Factor 1.6

Analyst S. Ahmed Date 11/17/92

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	16	F	6	190x											✓	✓									Tremolite
2	17	F	7	222											✓	✓									Tremolite
	18	F	7	55											✓	✓									"
	19	F	2.5	210											✓	✓									Tremolite
	20	F	1	25											✓	✓									"
	21	F	3	62											✓	✓									Tremolite
	22	F	8	32											✓	✓									Tremolite
	23	F	4	50											✓	✓									Tremolite
	24	F	1	16											✓	✓									"
	25	F	8	63											✓	✓									Tremolite
	26	F	3	103											✓	✓	✓				3	10	3	1	EDS #26 Tremolite
	27	F	2.5	28											✓	✓									Tremolite
	28	MD	7	65											✓	✓									"
	29	F	1	31											✓	✓									"
	30	MD	2	30								✓	✓								14	10		1	EDS #30

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

TEM ASBESTOS ANALYSIS

Client Schn Lev
Sample No. SW-3-4

EMS Lab No. 25877
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 10 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10.1 μm
K-Factor 1.6

Analyst S. Ahmed Date 11/17/92

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
2	31	F	1.5	32											✓	✓									Tremolite
	32	MD	3	50											✓	✓									"
	33	F	3	162											✓	✓									"
	34	MD	8	45	✓																				

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

17-Nov-1992 12:47:57

25877,SW-3-4,B,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 21 secs

Energy	Counts	X-Ray Lines
1.25	355.	Mg K , Mg K , Mg K , As L , As L
1.73	1409.	Si K , Si K
3.69	271.	Ca K , Ca K
6.43	136.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 11088

17-Nov-1992 12:48:19

25877,SW-3-4,B,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 37 secs

Energy	Counts	X-Ray Lines
1.25	783.	Mg K , Mg K , Mg K , As L , As L
1.74	2857.	Si K , Si K
3.70	603.	Ca K , Ca K
6.42	296.	Fe K , Fe K
7.05	84.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 19633

17-Nov-1992 10:37:40

25877,SW-3-4,B,#04,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.27	149.	Mg K , Mg K , Mg K , As L , As L , As L
1.74	435.	Si K , Si K
3.70	101.	Ca K , Ca K
6.41	68.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 7596

17-Nov-1992 10:46:35

25877,SW-3-4,B,#05,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 72 secs

Energy	Counts	X-Ray Lines
1.25	600.	Mg K , Mg K , Mg K , As L , As L
1.74	4423.	Si K , Si K
6.40	2098.	Fe K , Fe K
7.06	258.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 36076

17-Nov-1992 10:47:50

25877,SW-3-4,B,#06,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 20 secs

Energy	Counts	X-Ray Lines
1.25	467.	Mg K , Mg K , Mg K , As L , As L
1.74	1694.	Si K , Si K
3.69	454.	Ca K , Ca K
4.02	48.	Ca K , Ca K
5.89	40.	Mn K , Mn K
6.40	194.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 14940

17-Nov-1992 11:21:07 25877,SW-3-4,B,#15,S

ENERGY	COUNTS	X-RAY LINES
1.25	873.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	3042.	Si KA1, Si KA2
2.05	41.	P KA1, P KA2
3.31	43.	K KA1, K KA2
3.69	816.	Ca KA1, Ca KA2
4.00	74.	Ca KB1, Ca KB3
5.89	54.	Mn KA1, Mn KA2
6.41	609.	Fe KA1, Fe KA2
7.08	75.	Fe KB1, Fe KB3

17-Nov-1992 11:33:34

25877,SW-3-4,B,#26,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.25	1485.	Mg K , Mg K , Mg K , As L , As L
1.74	4775.	Si K , Si K
3.34	109.	K K , K K
3.69	1209.	Ca K , Ca K
4.04	113.	Sc K , Ca K , Ca K
6.40	477.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 23890

17-Nov-1992 11:45:44

25877,SW-3-4,B,#30,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 47 secs

Energy	Counts	X-Ray Lines
1.24	574.	Mg K , Mg K , As L , As L
1.74	1504.	Si K , Si K
6.41	126.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 11942

TEM ASBESTOS ANALYSIS

ient Schalev
Sample No. SW-3-4

EMS Lab No. 27877
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 10 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 1930 X
Camera Constant 30.4
Accelerating Voltage 1 100 KV
Beam Current 10 μm
K-Factor 1.5

Analyst Radha Date 11-18-92 +19

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	1	F	9	90													✓				3	10	2	1	Tremolite
	2	F	3	68													✓				3	10	1	1	"
	3	MD	3	20													✓				3	10	1	1	"
	4	MD	2	190													✓				3	10	2	1	"
	5	F	1.5	24													✓				3	10	2	1	
	6	F	6	42	✓																				
	7	F	1.5	25											✓										Tremolite
	8	MD	1.5	38											✓										Tremolite
	9	F	6	55																					
	10	MD	3	38	✓																				
	11	MD	2	18													✓				2	10	4	4	Tremolite
	12	F	5	290											✓										Tremolite
	13	F	4	25	✓																				
	14	F	3	44											✓										Tremolite
	15	F	4	24											✓										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 Schatev
Sample No. SW-3-4
EMS Lab No. [illegible]
Page 2 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* ☐
*1 ≥ 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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM901 94A

Approved By Date

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 10 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 19300 X
Camera Constant 304
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1-5

Analyst Radha Date 11-18-92

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	16	F	3	20	✓																				
	17	MD	6	80											✓										Tremolite
	18	F	6	35											✓										Tremolite
	19	MD	3	26											✓										Tremolite
	20	F	5	16											✓										Tremolite
	21	F	6	72											✓										Tremolite
	22	F	3	15											✓										Tremolite
	23	MD	5	78											✓										Tremolite
	24	MD	3	35											✓										Tremolite
	25	F	15	16								✓													
	26	F	5	28											✓										Tremolite
	27	F	16	165											✓										Tremolite
2	28	MD	3	25									✓		✓										Tremolite
	29	F	3	15								✓													
	30	F	4	35											✓										Tremolite

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

TEM ASBESTOS ANALYSIS

Client: Schat V
Sample No. SW-3-4
MS No 27844
Page 3 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* ☐
*1 ≥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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 10 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-10-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 1930 X
Camera Constant 3dy
Accelerating Voltage 1 100 KV
Beam Current 10 μm
K-Factor 1.5

Analyst Radha Date 11-18-92

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	31	F	6	38											✓										Tremolite
	32	MD	4	12								✓													
	33	F	6	145													✓				4	10	2	1	EDS Tremolite
	34	F	4	60											✓										Tremolite
	35	MD	3	25											✓										Tremolite
	36	F	28	90											✓										Tremolite
	37	F	3	32											✓										Tremolite
	38	F	4	70											✓										Tremolite
	39	F	5	240											✓										Tremolite
	40	F	18	60								✓													
	41	F	4	40											✓										Tremolite
	42	F	12	195											✓										Tremolite
	43	F	4	30											✓										Tremolite

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

[illegible] Drive ☐ Pasadena, California 91105-2503 ☐ (818) 568-[illegible]

18-Nov-1992 13:27:39 25877-3-4,C,#01,RS

ENERGY	COUNTS	X-RAY LINES
0.51	1560.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.01	84.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	1092.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	3606.	Si KA1, Si KA2
3.29	121.	K KA1, K KA2
3.70	594.	Ca KA1, Ca KA2
4.03	87.	Ca KB1, Ca KB3
6.42	447.	Fe KA1, Fe KA2

18-Nov-1992 13:29:20 25877-3-4,C,#02,RS

ENERGY	COUNTS	X-RAY LINES
0.51	1602.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.00	115.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	1053.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	3618.	Si KA1, Si KA2
3.30	157.	K KA1, K KA2
3.70	546.	Ca KA1, Ca KA2
4.01	76.	Ca KB1, Ca KB3
4.55	59.	Ti KA1
6.42	474.	Fe KA1, Fe KA2
7.03	64.	Fe KB1, Fe KB3

18-Nov-1992 13:30:25

25877-3-4,C,#03,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
0.51	1726.	O K , O K , V L , V L , V L , V L
1.25	1242.	Mg K , Mg K , Mg K , As L , As L
1.74	3713.	Si K , Si K
3.70	431.	Ca K , Ca K
6.41	555.	Fe K , Fe K
7.04	65.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 645

18-Nov-1992 13:39:16

25877-3-4, C, #04, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 16 secs

Energy	Counts	X-Ray Lines
0.51	1138.	O K , O K , V L , V L , V L , V L
0.99	56.	Zn L , Zn L , Zn L
1.25	789.	Mg K , Mg K , Mg K , As L , As L
1.74	2639.	Si K , Si K
3.31	145.	K K , K K
3.70	451.	Ca K , Ca K
6.40	282.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 495

18-Nov-1992 13:43:19

25877-4-4, C, #05, RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 16 secs

Energy	Counts	X-Ray Lines
0.51	552.	O K , O K , V L , V L , V L , V L
1.25	448.	Mg K , Mg K , Mg K , As L , As L
1.74	1334.	Si K , Si K
3.68	266.	Ca K , Ca K
6.41	162.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 238

18-Nov-1992 13:46:35

25877-3-4,C,#11,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
0.52	467.	O K , O K , V L , V L , V L , V L
1.26	156.	Mg K , Mg K , Mg K , As L , As L
1.74	899.	Si K , Si K
3.72	65.	Ca K , Ca K
6.40	332.	Fe K , Fe K
7.07	66.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 205

19-Nov-1992 08:59:01

25877,3-4,C,#33,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
0.51	538.	O K , O K , V L , V L , V L , V L
1.25	354.	Mg K , Mg K , Mg K , As L , As L
1.74	964.	Si K , Si K
3.68	182.	Ca K , Ca K
6.39	108.	Fe K , Fe K
8.04	388.	Cu K , Cu K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 5118

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-4-4	Reference	W.R. GRACE
Date	11/13/92		

Total Asbestos Fibers	15	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	15	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	4.4	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	39	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	12 to 18	MFL
Detection Limit	0.2	MFL

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

Size Distribution (Chrysotile and Amphibole)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	6	10	10	9	52

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	8	13	16	10	40

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
27	28	16	7	5	4

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No.: SW-4-4
EMS No.: 25 x 7 7
Page 1 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 ADX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By BKolh Date 11-11-92

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 50 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19,100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.7

Analyst F.M. Date 11-14-92

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 X	2.5	64														✓			3	10	2	1	EDS Tremolite
	02	F	2	90														✓			3	10	2	1	EDS — " —
	03	F	4	22														✓			3	10	2	1	EDS — " —
	04	F	12	60														✓			3	10	2	1	EDS — " —
	05	F	5	35														✓			3	10	2	1	EDS
	06	F X	20	440														✓			3	10	1	2	EDS, SAED #4530
	07	F X	5	180												✓									Tremolite
	08	F	2.5	70												✓									— " —
	09	F X	5	140												✓									— " —
	10	F X	4	100												✓									— " —
2	11	F	5	220												✓									— " —
	12	F	5	66												✓									— " —
	13	F X	3	160												✓									— " —
	14	F	4	50	✓																				
	15	F	5	95												✓									Tremolite

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

TEM ASBESTOS ANALYSIS

Client: SCI-JPV
Sample No.: SW-4-4
EM Lab No.: 25544
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM9019 4A

Approved By ____ Date ____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 ____ 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	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
3	16	F	4	23														✓			3	10	2	1	EDS Tremolite
	17	F	6	70												✓									— " —
	18	F	2.5	27												✓									— " —
	19	F	3	115												✓									— " —
4	20	F X	5	160														✓			3	10	1	2	EDS, SAED #4531
5	21	F	4	38												✓									Tremolite
	22	F	2.5	30												✓									— " —
	23	F	4	38	✓																				
6	24	F X	14	110												✓									Tremolite
	25	F/D	2.5	60												✓									— " —
	26	F X	6	70												✓									— " —
	27	F	4	50												✓									— " —
	28	F	15	165												✓									— " —
	29	F	1.5	15												✓									— " —
7	30	F	5	70								✓									2	10	1	1	EDS

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

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No.: SW-4-4
EMS Lab No.: 2077
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 _____ Date _____

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
7	31	F/D	3	100												✓									Tremolite
	32	F	7.5	110												✓									— " —
	33	F	2.5	17												✓									— " —
	34	F	5	48								✓													
	35	F	7	30													✓			.3	2	10		3	EAS Crocidolite

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

11-Nov-1992#19:22:16

25877-4-4,A,#01,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.26	573.	Mg K , Mg K , Mg K , As L , As L
1.75	2012.	Si K , Si K
3.71	379.	Ca K , Ca K
6.43	236.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13363

11-Nov-1992#19:25:33

25877-4-4,A,#02,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.25	524.	Mg K , Mg K , Mg K , As L , As L
1.75	1818.	Si K , Si K
3.71	391.	Ca K , Ca K
6.42	126.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11416

11-Nov-1992#19:27:39

25877-4-4,A,#03,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.26	1507.	Mg K , Mg K , Mg K , As L , As L
1.74	5275.	Si K , Si K
3.32	88.	K K , K K
3.70	1109.	Ca K , Ca K
4.04	154.	Sc K , Ca K , Ca K
6.41	553.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 23203

11-Nov-1992#19:31:37

25877-4-4,A,#04,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
1.26	1745.	Mg K , Mg K , Mg K , As L , As L
1.75	6292.	Si K , Si K
2.26	62.	S K , S K
3.31	95.	K K , K K
3.70	1218.	Ca K , Ca K
4.02	153.	Ca K , Ca K
6.42	769.	Fe K , Fe K
Quantex>	108.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 29528

11-Nov-1992 19:34:29 25877-4-4,A,#05,FM

ENERGY	COUNTS	X-RAY LINES
1.00	133.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	2330.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	8240.	Si KA1, Si KA2
3.32	310.	K KA1, K KA2
3.70	1420.	Ca KA1, Ca KA2
4.04	162.	Sc KA2, Ca KB1, Ca KB3
6.42	981.	Fe KA1, Fe KA2
7.07	111.	Fe KB1, Fe KB3

11-Nov-1992 19:38:08 25877-4-4, A, #06, FM

ENERGY	COUNTS	X-RAY LINES
1.01	160.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.26	3561.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.75	13845.	Si KA1, Si KA2
2.32	83.	S KA1, S KA2
3.33	408.	K KA1, K KA2
3.70	1661.	Ca KA1, Ca KA2
4.02	125.	Ca KB1, Ca KB3
5.91	154.	Mn KA1, Mn KA2
6.41	2117.	Fe KA1, Fe KA2
7.06	337.	Fe KB1, Fe KB3

11-Nov-1992#20:02:26

25877-4-4, A, #16, FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 38 secs

Energy	Counts	X-Ray Lines
1.26	748.	Mg K , Mg K , Mg K , As L , As L
1.75	2956.	Si K , Si K
3.34	98.	K K , K K
3.70	582.	Ca K , Ca K
6.42	337.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral .0 = 17290

11-Nov-1992#20:17:39

25877-4-4,A,#20,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.27	1039.	Mg K , Mg K , Mg K , As L , As L , As L
1.75	3722.	Si K , Si K
3.34	160.	K K , K K
3.70	488.	Ca K , Ca K
6.43	562.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 18598

11-Nov-1992#20:40:07

25877-4-4,A,#35,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.02	286.	Na K , Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.26	2053.	Mg K , Mg K , Mg K , As L , As L
1.75	10054.	Si K , Si K
3.69	233.	Ca K , Ca K
6.41	2758.	Fe K , Fe K
7.07	405.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 37128

11-Nov-1992#20:43:42

25877-4-4,A,#30,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.25	814.	Mg K , Mg K , Mg K , As L , As L
1.74	3421.	Si K , Si K
3.32	134.	K K , K K
3.70	313.	Ca K , Ca K
6.41	444.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 16281

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No.: SW-4-4
EMS Lab No.: 2077
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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-8
Screen Magnification 19300 X
Camera Constant 20.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.5

Analyst Radla Date 11.12.92

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	MD	3	68													✓				3	10	2	2	EDS Tremolite
	2	~~E~~	25	110													✓				3	10	2	1	EDS "
	3	~~MD~~	6	55	✓																				EDS
	4	E	8	42	✓																				EDS
	5	F	6	89													✓				3	10	2	1	EDS Tremolite
	6	MD	1	35											✓		✓				3	10	3	2	EDS "
	7	MD	2	15													✓								
	8	MD	3	20											✓										Tremolite
	9	F	12	80											✓										Tremolite
	10	F	6	70													✓				3	10	2	1	EDS Tremolite
	11	MD	3	65											✓										"
2	12	~~E~~	1	42	✓																				
	13	F	3	40											✓										Tremolite
	14	E	2	30											✓										"
	15	F	12	165											✓										"

OBSERVATIONS:

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

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No. SW-4-4
EMS Lab No. 2077
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 _____ Date _____

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
2	16	MD	3	30	✓																				Tremolite
	17	~~F~~	1.5	17													✓								↓
	18	MD	4	65													✓								Tremolite
3	19	MD	3	24											✓										Tremolite
	20	F	6	80											✓		✓				4	10	2	1	Tremolite
4	21	F	8	65													✓								
	22	MD	10	265													✓								
	23	MD	3	30											✓										Tremolite
	24	MD	8	72											✓										Tremolite
	25	F	4	220											✓										Tremolite
	26	F	6	80											✓										Tremolite
	27	F	2	20								✓													
5	28	F	1.5	20								✓													
	29	F	3	18											✓										Tremolite
	30	F	18	80											✓										"

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-4-1

EMS Lab No. [illegible]
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM9019 4A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 _____ 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
5	30	F	3	45											✓										Tremolite
	31	F	1	11								✓													
6	32	F	4	42											✓										Tremolite
	33	MD	1	12	✓												✓								
	34	F	23	115												✓					4	10	3	1	Tremolite
	35	MD	8	40											✓										Tremolite
	36	MD	4	115											✓										Tremolite
	37	MD	9	45											✓										Tremolite
	38	F	3	68											✓										Tremolite

OBSERVATIONS:

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

12-Nov-1992 13:11:31

25877,4=4,B,#01,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 51 secs

Energy	Counts	X-Ray Lines
0.51	642.	O K , O K , V L , V L , V L , V L
1.25	469.	Mg K , Mg K , Mg K , As L , As L
1.74	1418.	Si K , Si K
3.69	293.	Ca K , Ca K
6.42	218.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 7724

12-Nov-1992 13:13:19 25877,4=4,B,#01,RS

ENERGY	COUNTS	X-RAY LINES
0.51	3643.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.01	186.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	3151.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	10301.	Si KA1, Si KA2
3.32	392.	K KA1, K KA2
3.70	1711.	Ca KA1, Ca KA2
4.02	234.	Ca KB1, Ca KB3
4.55	53.	Ti KA1
6.41	852.	Fe KA1, Fe KA2
7.09	147.	Fe KB1, Fe KB3

12-Nov-1992 13:15:02

25877,4=4,B,#03,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 24 secs

Energy	Counts	X-Ray Lines
0.51	398.	O K , O K , V L , V L , V L , V L
1.24	89.	Mg K , Mg K , As L , As L
1.48	135.	Al K , Al K
1.74	708.	Si K , Si K
3.30	65.	K K , K K
3.69	103.	Ca K , Ca K
6.43	113.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 4315

12-Nov-1992 13:17:14

25877,4=4,B,#04,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 54 secs

Energy	Counts	X-Ray Lines
0.51	433.	O K , O K , V L , V L , V L , V L
1.74	1257.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral O = 5450

12-Nov-1992 13:23:16 LN Low !

25877,4-4,#5,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
0.50	1579.	O K , O K , V L , V L , V L , V L
1.25	1158.	Mg K , Mg K , Mg K , As L , As L
1.74	3730.	Si K , Si K
3.69	894.	Ca K , Ca K
6.41	237.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 15974

12-Nov-1992 13:27:10

25877,4-4,B,#06,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
0.51	932.	O K , O K , V L , V L , V L , V L
1.24	497.	Mg K , Mg K , As L , As L
1.74	1860.	Si K , Si K
3.70	574.	Ca K , Ca K
6.41	405.	Fe K , Fe K
7.05	90.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 9798

12-Nov-1992 13:31:58

25877,4-4,B,#10,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
0.51	966.	O K , O K , V L , V L , V L , V L
1.25	719.	Mg K , Mg K , Mg K , As L , As L
1.74	2183.	Si K , Si K
3.69	476.	Ca K , Ca K
6.41	203.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 9082

13-Nov-1992 07:21:57

25877,4,B,#20,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 57 secs

Energy	Counts	X-Ray Lines
0.50	2270.	O K , O K , V L , V L , V L , V L
1.25	1839.	Mg K , Mg K , Mg K , As L , As L
1.74	4802.	Si K , Si K
3.69	840.	Ca K , Ca K
6.40	591.	Fe K , Fe K
8.05	1080.	Cu K , Cu K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 19487

13-Nov-1992 07:37:03

25877-4-4,B,#34,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 20 secs

Energy	Counts	X-Ray Lines
0.50	1484.	O K , O K , V L , V L , V L , V L
1.24	1261.	Mg K , Mg K , As L , As L
1.74	3495.	Si K , Si K
3.70	1000.	Ca K , Ca K
4.02	109.	Ca K , Ca K
6.39	168.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 15140

TEM ASBESTOS ANALYSIS

lien Schafer
Sample No. SW-4-4

EMS Lab No. 27077
Page 1 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S. Ahmed Date 11-13-92

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	1	F	1.5	30													✓				2	10	2	1	EDS#1; Tremolite
	2	MD	4	20													✓				2	10	2	1	EDS#2; Tremolite
	3	MD	2	60													✓				3	10	2	2	EDS#3; Tremolite
	4	F	3	42													✓				3	10	1	1	EDS#4; Tremolite
	5	F	20	160													✓				2	10	1	1	EDS#5, Tremolite
	6	MD	7	55	✓																				
	7	MD	1.5	25											✓										Tremolite
2	8	F	2.5	50											✓										"
	9	F	5	60											✓										"
	10	F	8	191											✓										"
	11	F	10	210											✓										"
	12	F	5	42											✓										"
	13	MD	7	278											✓										"
	14	MD	3	35											✓										"
3	15	F	1.5	100											✓		✓				3	10	2	2	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: SC' .J'
Sample No. SW-4-4

EMS Lab No. [illegible]
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By Date

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume liters
Working Volume 50 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 µ
K-Factor 1.6

Analyst S. Ahmed Date 11/13/92

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	16	F	3	145												✓									Tremolite
	17	F	5	100												✓									"
4	18	F	5	39	✓																				
	19	F	7	47												✓									Tremolite
	20	F	5	20	✓																				
	21	MD	5	50												✓									Tremolite
	22	MD	5	32												✓									Tremolite
5	23	F	7	39												✓									"
	24	MD	3	22												✓									"
	25	MD	3	18	✓																				
	26	F	1.5	27												✓			✓		2	10	1	1	Tremolite EDS Analysis
	27	F	10	970												✓									"
	28	MD	5	25												✓									"
	29	F	1.5	18												✓									"

OBSERVATIONS:

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

13-Nov-1992 07:57:06

25877-4-4,C,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
1.25	154.	Mg K , Mg K , Mg K , As L , As L
1.74	688.	Si K , Si K
3.67	152.	Ca K , Ca K
6.40	84.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 8061

13-Nov-1992 07:57:41

25877-4-4,C,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.25	239.	Mg K , Mg K , Mg K , As L , As L
1.74	1060.	Si K , Si K
3.68	234.	Ca K , Ca K
6.41	109.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 11465

13-Nov-1992 07:59:06

25877-4-4,C,#03,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 15 secs

Energy	Counts	X-Ray Lines
1.25	526.	Mg K , Mg K , Mg K , As L , As L
1.74	1997.	Si K , Si K
3.30	89.	K K , K K
3.70	298.	Ca K , Ca K
4.00	32.	Ca K , Ca K
5.90	49.	Mn K , Mn K
6.42	272.	Fe K , Fe K
Quantex)	54.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 18605

13-Nov-1992 07:59:37 25877-4-4,C,#04,SA

ENERGY	COUNTS	X-RAY LINES
1.25	943.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	3559.	Si KA1, Si KA2
2.28	63.	S KA1, S KA2
3.33	139.	K KA1, K KA2
3.71	513.	Ca KA1, Ca KA2
4.05	94.	Sc KA1, Sc KA2, Ca KB1, Ca KB3
6.41	462.	Fe KA1, Fe KA2
7.03	72.	Fe KB1, Fe KB3

13-Nov-1992 08:00:50 25877-4-4,C,#05,SA

ENERGY	COUNTS	X-RAY LINES
1.25	1479.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	5925.	Si KA1, Si KA2
3.33	273.	K KA1, K KA2
3.70	827.	Ca KA1, Ca KA2
4.02	82.	Ca KB1, Ca KB3
4.49	64.	Ti KA1, Ti KA2
5.88	77.	Mn KA1, Mn KA2
6.40	716.	Fe KA1, Fe KA2
7.06	63.	Fe KB1, Fe KB3

13-Nov-1992 08:28:24

25877-4-4,C,#15,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.25	425.	Mg K , Mg K , Mg K , As L , As L
1.74	1638.	Si K , Si K
3.30	60.	K K , K K
3.68	232.	Ca K , Ca K
6.38	249.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 19835

13-Nov-1992 08:40:16

25877-4-4,C,#26,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 54 secs
Quantex> ID/AU/TY
13-Nov-1992 08:40:34

25877-4-4,C,#26,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 54 secs

Energy	Counts	X-Ray Lines
1.25	958.	Mg K , Mg K , Mg K , As L , As L
1.74	3957.	Si K , Si K
3.31	181.	K K , K K
3.69	400.	Ca K , Ca K

0.000 Range= 10.230 keV 10.110
Integral 0 = 25167

6.39	893.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 25167

13-Nov-1992 08:42:49

25877-4-4,C,#26,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.25	329.	Mg K , Mg K , Mg K , As L , As L
1.74	1163.	Si K , Si K
3.69	189.	Ca K , Ca K
6.43	114.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 11087

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-5-4	Reference	W.R. GRACE
Date	11/13/92		

Total Asbestos Fibers	0.6	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	0.6	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	*BDL	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	0.1	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	LESS	
Poisson 95% Confidence Interval	0.06 to 2.1	MFL
Detection Limit	0.3	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	2

Particle Width - Microns

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

TEM ASBESTOS ANALYSIS

Client 3Ch. Rev
Sample No. SW-5-4

EMS Lab No. 25077
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 ADX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By B Koch Date 11-11-92

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume _____ liters
Working Volume 25 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19,400 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.5

Analyst F.M. Date 11-12-92

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	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 ☐

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

TEM ASBESTOS ANALYSIS

Client: 30' - Fev
Sample No.: SW-5-4
EMS Job No.: 25477
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume ____ liters
Working Volume 25 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address I-B
Screen Magnification 19100 X
Camera Constant 27-7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S. Ahmed Date 11/13/92

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 ☐

TEM ASBESTOS ANALYSIS

Client: Schaefer
Sample No. SW-5-4
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 ____
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. 40EM9019 4A

Approved By ____ Date ____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume ____ liters
Working Volume 25 ml
Weight ____ grams
Ashed Area ____ %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst S. Ahmed Date 11-13-92

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	1	F	2.5	62													✓				3	10	3	3	EDS Al Tremolite
	2	F	3	68													✓				3	10	3	2	EDS Al; Tremolite
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 ☐

13-Nov-1992 07:28:23

25877-5-4,C,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.26	169.	Mg K , Mg K , Mg K , As L , As L
1.74	662.	Si K , Si K
3.70	172.	Ca K , Ca K
6.42	155.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 12436

13-Nov-1992 07:30:47

25877-5-4,C,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 35 secs

Energy	Counts	X-Ray Lines
1.24	485.	Mg K , Mg K , As L , As L
1.74	1883.	Si K , Si K
3.70	415.	Ca K , Ca K
6.41	220.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 14545

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-6-4	Reference	W.R.GRACE
Date	11/19/92		

Total Asbestos Fibers	2300	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	2300	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	510	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	2900	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	1900 to 2900	MFL
Detection Limit	25	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	2	10	13	6	61

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	3	21	22	11	35

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
20	33	23	5	4	7

TEM ASBESTOS ANALYSIS

Client: Sc' [illegible]
Sample No.: SW-6-4
EM[illegible]b N: 29277
Page 1 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: ADX

ASPECT RATIO
3:1 ☑ 5:1 ☐

Approved By: B Kolk Date: 11-11

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: 067
No. of G.O. to Analyze: 20
Filter Lot No.: H0EM90194A

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume ___ liters
Working Volume 2 ml
Weight ___ grams
Ashed Area ___ %

Prepared By: FG
Date: 11-11-92

ANALYSIS

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

Grid Address: 1-A
Screen Magnification: 19,100 X
Camera Constant: 77.7
Accelerating Voltage: 100 KV
Beam Current: 10 μm
K-Factor: 1.6

Analyst: F.M. Date: 11-12-92

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
1	01	F	7	140														✓			3	10	2	1	EDS Tremolite
	02	F	2	25														✓			3	10	2	1	EDS — " —
	03	F	4	70														✓			3	10	2	1	EDS — " —
	04	F	6	100														✓			3	10	1	1	EDS — " —
	05	F X	10	95														✓			3	10	2	1	EDS — " —
	06	F/D	3	60												✓									— " —
	07	F	2.5	40										✓											— " —
	08	F	10	40								?								.2	2	10	.3	3	EDS
	09	F X	10	400												✓									Tremolite
	10	F/D	3	67												✓									— " —
	11	F	2	20												✓									— " —
	12	F	2	18											✓										— " —
	13	F	7	95												✓									— " —
	14	F	2	185												✓									— " —
	15	F	3	75												✓									— " —

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

TEM ASBESTOS ANALYSIS

ient Schaefer
Sample No. SW-6-4

EMS Lab No. 29 A T +
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By Date

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 2 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-11-92

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 Date

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	16	F	8	110												✓									Tremolite
	17	F	2	55												✓									— " —
	18	F	3	80												✓	✓				3	10	3	1	EDS Tremolite
	19	F	2	75										✓											— " —
	20	F	2	200								✓													
	21	F	2	45										✓											Tremolite
	22	F	2	80												✓									— " —
	23	F	1	52								✓													
	24	F	3	70												✓									Tremolite
	25	F	1	65								✓													
	26	F	3	56													✓				3	10	3	1	EDS Tremolite
	27	F	6	84												✓		✓							SAED 4532, 4533
	28	F	5	38												✓									— " —
	29	F	5	42												✓									— " —
	30	F	2.5	50												✓									— " —

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

TEM ASBESTOS ANALYSIS

Client Sinaf-1
Sample No. SW-6-4
EMS Lab No. 25977
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 2 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-11-92

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 _____ 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
1	31	F	1.5	62												✓									Tremolite
	32	F	2.5	130												✓									— " —
	33	F	5	28												✓									— " —
	34	F	3	40												✓									— " —
	35	F X	4	380														✓			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 ☐

12-Nov-1992 15:40:31

25877,SW-6-4,1A,01,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 38 secs

Energy	Counts	X-Ray Lines
1.25	2359.	Mg K , Mg K , Mg K , As L , As L
1.74	8414.	Si K , Si K
3.32	160.	K K , K K
3.70	1865.	Ca K , Ca K
4.03	143.	Ca K , Ca K
5.90	114.	Mn K , Mn K
6.41	920.	Fe K , Fe K
Quantex>	115.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 44694

12-Nov-1992 15:45:02

25877,SW-6-4,1A,02,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.25	2015.	Mg K , Mg K , Mg K , As L , As L
1.74	7763.	Si K , Si K
3.31	167.	K K , K K
3.70	1832.	Ca K , Ca K
4.04	124.	Sc K , Ca K , Ca K
6.41	802.	Fe K , Fe K
7.04	113.	Fe K , Fe K
Quantex>		

0.160 Range= 10.230 keV 10.230
Integral 0 = 35947

12-Nov-1992 15:46:39

25877,SW-6-4,1A,03,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 39 secs

Energy	Counts	X-Ray Lines
1.24	833.	Mg K , Mg K , As L , As L
1.74	3262.	Si K , Si K
3.69	588.	Ca K , Ca K
6.40	338.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 18298

12-Nov-1992 15:49:07

25877,SW-6-4,1A,04,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.25	2138.	Mg K , Mg K , Mg K , As L , As L
1.74	8393.	Si K , Si K
3.32	309.	K K , K K
3.70	1020.	Ca K , Ca K
4.03	103.	Ca K , Ca K
5.90	112.	Mn K , Mn K
6.40	1370.	Fe K , Fe K
	183.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 43737

12-Nov-1992 15:50:26

25877,SW-6-4,1A,05,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.25	2799.	Mg K , Mg K , Mg K , As L , As L
1.74	10261.	Si K , Si K
3.30	199.	K K , K K
3.70	2459.	Ca K , Ca K
4.03	213.	Ca K , Ca K
5.92	131.	Mn K , Mn K
6.41	1036.	Fe K , Fe K
Quantex)	180.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 51767

12-Nov-1992 16:02:24

25877,SW-6-4,1A,08,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.00	154.	Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.25	1522.	Mg K , Mg K , Mg K , As L , As L
1.74	7607.	Si K , Si K
3.71	278.	Ca K , Ca K
6.40	2329.	Fe K , Fe K
7.06	303.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 37541

12-Nov-1992 16:31:02

25877,SW-6-4,1A,18,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.25	610.	Mg K , Mg K , Mg K , As L , As L
1.74	2330.	Si K , Si K
3.70	617.	Ca K , Ca K
6.38	232.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 12627

12-Nov-1992 16:42:10

25877,SW-6-4,1A,26,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.25	2354.	Mg K , Mg K , Mg K , As L , As L
1.74	8106.	Si K , Si K
3.29	151.	K K , K K
3.69	2141.	Ca K , Ca K
4.06	141.	Sc K , Sc K
5.90	155.	Mn K , Mn K
6.41	742.	Fe K , Fe K
Quantex>	116.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 43583

12-Nov-1992 17:11:28

25877, SW-6-4, 1A, 35, FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.25	643.	Mg K , Mg K , Mg K , As L , As L
1.73	2483.	Si K , Si K
3.69	460.	Ca K , Ca K
6.41	311.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 16314

TEM ASBESTOS ANALYSIS

Client: SCh[illegible] EMS Lab No. [illegible]
Sample No. SW-6-4
Page 1 of 3

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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. 110EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

Volume _____ liters
Working Volume 2 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-B
Screen Magnification 19300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.5

Analyst S. Ahmed Date 11-19-92

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	1	F	2	32													✓				3	10	2	2	EDS #1 Tremolite
	2	F	3	25													✓				3	10	2	2	EDS #2 "
	3	F	5	70	✓																				F
	4	F	5	55													✓				4	10	3	1	EDS #4 Tremolite
	5	F	5	18													✓				3	10	2	1	EDS #5 "
	6	F	10	60													✓				3	10	2	1	EDS #6 "
	7	F	4	22											✓										Tremolite
	8	F	2.5	74											✓										"
	9	F	9	225											✓										"
	10	F	3	36											✓										Tremolite
	11	F	15	110	✓																				
	12	F	6	56											✓										Tremolite
	13	F	5	85											✓										"
	14	F	3	32											✓										"
	15	MD	7	65													✓				4	10	2		EDS #15; 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: SCI-Rsov
Sample No.: SW-6-4
EMSL Lab No.: 29844
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HAEM96144A

Approved By: Date:

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 2 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 19300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.15

Analyst S. Ahmed Date 11-19-92

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 Analysis Na	Mg	Si	Ca	Fe	Comments
1	16	F	10	1100											✓	✓									Tremolite
	17	F	5	230											✓	✓									"
	18	F	1.5	30											✓	✓									"
	19	F	5	68											✓	✓									"
	20	F	8	55																					
	21	F	2	42											✓										Tremolite
	22	F	3	35											✓	✓									"
	23	MD	10	55											✓	✓									"
	24	MD	2	50											✓	✓									"
	25	F	8	165											✓	✓	✓				4	10	2	1	EDS #25 Tremolite
	26	F	2.5	65											✓	✓									"
	27	F	4	280											✓	✓									"
	28	F	2	67											✓	✓									"
	29	MD	5	90											✓	✓									"
	30	F	3	205											✓	✓									"

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

TEM ASBESTOS ANALYSIS

Client: Sc[illegible]
Sample No.: SW-6-4
EMS Lab No.: 25377
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM96144A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 2 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 19300 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.5
Analyst S. Ahmed Date 11/19/92

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	31	F	3	50											✓	✓	✓								Tremolite
	32	MD	10	85											✓	✓									"
	33	F	5	22											✓	✓	✓								"
	34	F	5	68											✓	✓									"
	35	F	6	160													✓	✓			3	10	2	1	EDS #35 Tremolite
	36	MD	8	55	✓																				
	37	F	3	55											✓	✓									Tremolite
	38	F	8	54	✓																				
	39	F	2	30	✓																				
	40	F	4	80											✓	✓									Tremolite
	41	F	10	130								✓													
	42	F	14	140											✓	✓									Tremolite
	43	F	5	70											✓	✓									"
	44	F	1	35											✓	✓									"

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

19-Nov-1992 10:28:49

25877-6-4,B,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 47 secs

Energy	Counts	X-Ray Lines
0.51	334.	O K , O K , V L , V L , V L , V L
1.25	262.	Mg K , Mg K , Mg K , As L , As L
1.74	915.	Si K , Si K
3.70	112.	Ca K , Ca K
6.39	125.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 6369

19-Nov-1992 10:33:52

25877-6-4,B,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
0.51	673.	O K , O K , V L , V L , V L , V L
1.25	389.	Mg K , Mg K , Mg K , As L , As L
1.74	1388.	Si K , Si K
3.71	207.	Ca K , Ca K
6.41	206.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 9486

19-Nov-1992 10:34:41

25877-6-4,B,#04,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
0.51	424.	O K , O K , V L , V L , V L , V L
1.25	357.	Mg K , Mg K , Mg K , As L , As L
1.74	921.	Si K , Si K
3.69	221.	Ca K , Ca K
4.04	44.	Sc K , Ca K , Ca K
6.41	102.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 7922

19-Nov-1992 10:35:20

25877-6-4,B,#05,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
0.51	885.	O K , O K , V L , V L , V L , V L
1.26	603.	Mg K , Mg K , Mg K , As L , As L
1.73	1939.	Si K , Si K
3.70	485.	Ca K , Ca K
4.00	64.	Ca K , Ca K
6.42	215.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 12395

19-Nov-1992 10:36:29

25877-6-4,B,#06,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
0.50	506.	O K , O K , V L , V L , V L , V L
1.25	327.	Mg K , Mg K , Mg K , As L , As L
1.74	1045.	Si K , Si K
3.69	240.	Ca K , Ca K
6.41	81.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 8050

19-Nov-1992 10:43:49

25877-6-4,B,#15,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 64 secs

Energy	Counts	X-Ray Lines
0.51	379.	O K , O K , V L , V L , V L , V L
1.25	294.	Mg K , Mg K , Mg K , As L , As L
1.74	745.	Si K , Si K
3.70	216.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 5545

19-Nov-1992 11:24:42

25877-6-4,B,#25,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
0.50	547.	O K , O K , V L , V L , V L , V L
1.25	446.	Mg K , Mg K , Mg K , As L , As L
1.74	1250.	Si K , Si K
3.69	198.	Ca K , Ca K
6.40	111.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 8546

19-Nov-1992 11:25:34

25877-6-4,B,#35,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
0.50	438.	O K , O K , V L , V L , V L , V L
1.25	335.	Mg K , Mg K , Mg K , As L , As L
1.74	1012.	Si K , Si K
3.70	240.	Ca K , Ca K
3.97	42.	Ca K , Ca K
6.40	104.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 8451

TEM ASBESTOS ANALYSIS

Client: Sol. ajov
Sample No. SW-6-4
EMS Lab No. 27877
Page 1 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. 40EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 2 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 19,400 X
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor _____

Analyst F.M. Date 11-19-92

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	10	110												✓					3	10	2	1	EDS Tremolite
	02	F	3	30												✓					3	10	2	1	EDS — " —
	03	F	5	30												✓					3	10	2	1	EDS — " —
	04	F	5	115												✓					4	10	2	1	EDS — " —
	05	F	2	40												✓					3	10	2		EDS — " —
	06	F	2.5	25												✓									— " —
	07	F/D	4	80												✓									— " —
	08	F	3	38												✓									— " —
	09	F/D	4	35												✓									— " —
	10	F	3	25												✓									— " —
	11	F/D	8	55												✓									— " —
	12	F	3.5	65												✓									— " —
	13	F/D	3	30												✓									— " —
	14	F	3	90												✓					3	10	2		EDS Tremolite
	15	F	17	150	✓																				

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

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No. SW-6-4
EMS Lab No. [illegible]
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. 40EM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 2 ml
Weight _____ grams
Ashed Area _____ %

Prepared By FG
Date 11-11-92

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 _____ Date _____

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	16	F	4	20												✓									Tremolite
	17	F/D	4	65												✓									— " —
	18	F/D	5	40	✓																				
	19	F/D	2	200												✓									Tremolite
	20	F	3	95												✓									— " —
	21	F	5	90												✓									— " —
	22	F	2	30												✓									— " —
	23	F	4	22	✓																				
	24	F	4	115												✓									Tremolite
	25	F	6	90								✓													
	26	F	5	65												✓					4	10	2		EDS Tremolite
	27	F	3	45								✓													
	28	F	4	110												✓									Tremolite
	29	F	3	27												✓									Tremolite
	30	F	5	60								✓													

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

19-Nov-1992 12:13:54

25877-6-4,c,#01,fm Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 43 secs

Energy	Counts	X-Ray Lines
0.50	2985.	O K , O K , V L , V L , V L , V L
1.25	2362.	Mg K , Mg K , Mg K , As L , As L
1.74	7595.	Si K , Si K
3.31	143.	K K , K K
3.69	1624.	Ca K , Ca K
4.03	216.	Ca K , Ca K
6.41	826.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 30049

19-Nov-1992 12:18:40

25877-6-4,c,#02,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
0.51	1146.	O K , O K , V L , V L , V L , V L
1.25	812.	Mg K , Mg K , Mg K , As L , As L
1.74	2474.	Si K , Si K
3.70	560.	Ca K , Ca K
4.04	90.	Sc K , Ca K , Ca K
6.40	229.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 13177

19-Nov-1992 12:19:54

25877-6-4,c,#03,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
0.51	1375.	O K , O K , V L , V L , V L , V L
1.25	1084.	Mg K , Mg K , Mg K , As L , As L
1.74	3103.	Si K , Si K
3.70	580.	Ca K , Ca K
4.03	91.	Ca K , Ca K
6.41	308.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 15365

19-Nov-1992 12:21:16

25877-6-4,c,#04,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 39 secs

Energy	Counts	X-Ray Lines
0.51	1589.	O K , O K , V L , V L , V L , V L
1.25	1283.	Mg K , Mg K , Mg K , As L , As L
1.74	3555.	Si K , Si K
3.69	791.	Ca K , Ca K
6.41	371.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 17790

19-Nov-1992 12:23:33

25877-6-4,c,#05,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 65 secs

Energy	Counts	X-Ray Lines
0.51	510.	O K , O K , V L , V L , V L , V L
1.25	412.	Mg K , Mg K , Mg K , As L , As L
1.74	1192.	Si K , Si K
3.68	265.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 7445

19-Nov-1992 12:33:50

25877-6-4,c,#14,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 45 secs

Energy	Counts	X-Ray Lines
0.51	498.	O K , O K , V L , V L , V L , V L
1.26	321.	Mg K , Mg K , Mg K , As L , As L
1.74	951.	Si K , Si K
3.68	199.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 5815

19-Nov-1992 12:48:23

25877-6-4,c,#26,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 62 secs

Energy	Counts	X-Ray Lines
0.51	656.	O K , O K , V L , V L , V L , V L
1.25	538.	Mg K , Mg K , Mg K , As L , As L
1.73	1493.	Si K , Si K
3.69	346.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 7120

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-7-4	Reference	W.R.GRACE
Date	11/18/92		

Total Asbestos Fibers	11	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	11	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	3.2	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	22	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	8.6 to 14	MFL
Detection Limit	0.2	MFL

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

Size Distribution (Chrysotile and Amphibole)

Particle Length - Microns

0 -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	3	13	9	5	36

Particle Width - Microns

0 - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	3	15	10	6	32

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
26	14	16	2	1	7

TEM ASBESTOS ANALYSIS

nt Schafer
Sample No. SW-7-4

EMS No [illegible]
Page 1 of

RECEIVING

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

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

LEVEL OF ANALYSIS
Chrysotile CP/CDQ
Amphibole ADX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM901944A

Approved By B Kolk Date 11-11

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19,100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst FM Date 11-12-92

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 X	8	160	✓																				EDS Silicate
	02	F	2.5	30														✓			2	10	1	1	EDS Tremolite
	03	F	2	120								✓									2	10		2	EDS SAED 4534
	04	F	5	57														✓			3	10	2	1	EDS Tremolite
	05	F/D	2	40										✓											
	06	F	2.5	110												✓					3	10	2	1	EDS SAED 4535
2	07	F	6	90								✓									2	10		3	EDS
3	08	F X	2	180												✓									Tremolite
	09	F	4	105												✓									— " —
	10	F	2	22												✓									— " —
	11	F	2.5	27												✓									— " —
	12	F X	6	50												✓									— " —
4	13	F	4	20												✓									— " —
	14	F	3	40												✓									— " —
	15	F	10	30														✓			3	10	1	1	EDS — " —

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.: SW-7-4
EMS Lab No.: 25841
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEM901944A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 ____ 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	EDS Na	EDS Mg	EDS Si	EDS Ca	EDS Fe	Comments
4	16	F	12	90												✓									Tremolite
	17		4	45								✓									2	10		2	EDS
5	18	F	2.5	18												✓									Tremolite
	19	F	3	38												✓									
	20	F	2	37								✓													
6	21	F	1	27								✓													
	22	F	1	15								✓													
	23	F/D	7	54													✓			.2	2	10		3	EDS Crocidolite
7	24	F	10	130												✓									Tremolite

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

12-Nov-1992 17:58:06

25877,SW-7-4,1A,01,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 25 secs

Energy	Counts	X-Ray Lines
1.74	3419.	Si K , Si K
3.69	70.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 12005

12-Nov-1992 18:01:31

25877,SW-7-4,1A,02,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 45 secs

Energy	Counts	X-Ray Lines
1.26	861.	Mg K , Mg K , Mg K , As L , As L
1.74	3456.	Si K , Si K
3.31	152.	K K , K K
3.70	437.	Ca K , Ca K
6.41	506.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 18866

12-Nov-1992 18:06:01

25877,SW-7-4,1A,03,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 50 secs

Energy	Counts	X-Ray Lines
1.25	428.	Mg K , Mg K , Mg K , As L , As L
1.73	2270.	Si K , Si K
6.41	487.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 14737

12-Nov-1992 18:16:30 LN Testng

25877,SW-7-4,1A,04,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.25	1771.	Mg K , Mg K , Mg K , As L , As L
1.74	6426.	Si K , Si K
3.69	1496.	Ca K , Ca K
4.02	196.	Ca K , Ca K
6.40	499.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 30325

12-Nov-1992 18:21:26

25877,SW-7-4,1A,06,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.25	378.	Mg K , Mg K , Mg K , As L , As L
1.74	1503.	Si K , Si K
3.69	275.	Ca K , Ca K
6.40	180.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral O = 11734

12-Nov-1992 18:32:12

25877,SW-7-4,1A,07,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.25	649.	Mg K , Mg K , Mg K , As L , As L
1.74	3867.	Si K , Si K
4.49	152.	Ti K , Ti K
6.40	1134.	Fe K , Fe K
7.07	189.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 23151

12-Nov-1992 18:49:36

25877,SW-7-4,1A,15,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.25	1202.	Mg K , Mg K , Mg K , As L , As L
1.74	4546.	Si K , Si K
3.32	191.	K K , K K
3.69	620.	Ca K , Ca K
6.42	301.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 22880

12-Nov-1992 18:53:45

25877,SW-7-4,1A,17,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.25	752.	Mg K , Mg K , Mg K , As L , As L
1.74	3120.	Si K , Si K
6.40	686.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 19401

13-Nov-1992 16:31:05

25877,SW7-4,A,23,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 86 secs

Energy	Counts	X-Ray Lines
1.01	152.	Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.25	1073.	Mg K , Mg K , Mg K , As L , As L
1.74	6612.	Si K , Si K
3.33	99.	K K , K K
3.67	135.	Ca K , Ca K
6.40	2035.	Fe K , Fe K
7.05	278.	Fe K , Fe K

Quantex>
0.000 Range= 10.230 keV 10.110
Integral 0 = 39487

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No.: SW-7-4
EMS Lab No.: [illegible]
Page 1 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEM901944A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-B
Screen Magnification 19,300 X
Camera Constant 30.3
Accelerating Voltage 40 100 KV
Beam Current 10 μm
K-Factor 1.5

Analyst Radla Date 11-13-92

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	3	155													✓				3	10	2		Tremolite EDS
	2	F	6	82								✓													EDS
	3	F	4	68								✓													EDS
	4	F	5	25								✓													EDS
	5	F	3	95								✓													
	6	F	3	20								✓													
	7	F	3	120								✓													
	8	F	10	55													✓				3	10	2	1	EDS Tremolite
	9	F	2	55													✓				3	10	1	1	EDS Tremolite
	10	F	6	45																					
	11	F	3	28								✓													
	12	F	6	80								✓													
2	13	F	4	35								✓													
	14	F	4	60											✓										Tremolite
	15	F	4	38											✓										Tremolite

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

not all has [illegible] are [illegible]

TEM ASBESTOS ANALYSIS

Client: Schnfer
Sample No. SW-7-4
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 ____
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 ____ Date ____

Grid Opening	Structure Number	Structure	Dimensions (mm) Width	Length	NAM	TM	CM	CD	CQ	CMQ	CDQ	UF	AD	AX	ADX	AQ	ADQ	AZQ	AZZ	EDS Analysis Na	Mg	Si	Ca	Fe	Comments
2	16	~~F~~	6	50								✓													
	17	F	1.5	40								✓													
	18	F	5	35								✓													
	19	F	12	245													✓				3	10	2	1	EDS Tremolite
	~~20~~	MD	3	20											✓										Tremolite
	~~21~~	~~F~~ MD	1.5	22								✓													
(3)	22	MD	16	95													✓				3	10	3	1	Tremolite
	23	MD	3	80											✓										Tremolite
	24	MD	3	30								✓													
	25	F	5	285											✓										Tremolite
	26	F	6	24											✓										"
	27	F	10	55											✓										"
	28	F	3	24											✓										"
	29	F	3	70											✓										"
	30	F	6	22											✓										"

OBSERVATIONS:
Clean ☐ Other ____
Debris ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Gypsum ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
Silicate fibers

TEM ASBESTOS ANALYSIS

...ent Schafer
Sample No. SW-7-4
EM... b N
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HoEM901944A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 _____ 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
3	31	F	12	125											✓										Tremolite
4	32	F	4	32											✓										"
	33	F	2	45											✓										"
	34	F	1	25											✓										"
	35	MD	1.5	30											✓										"
	36	F	4	18											✓										"
	37	F	6	570													✓				3	10	2	1	EDS Tremolite
	38	F	2	260											✓										"
	39	F	15	530									✓		✓										"
	40	F	3	100								✓													
	41	F	5	130											✓										Tremolite

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

13-Nov-1992 08:11:53

25877-7-4,B,#01,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 65 secs

Energy	Counts	X-Ray Lines
0.50	557.	O K , O K , V L , V L , V L , V L
1.24	332.	Mg K , Mg K , As L , As L
1.74	1189.	Si K , Si K
3.70	291.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 10537

13-Nov-1992 08:13:22

25877-7-4,B,#02,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
0.51	442.	O K , O K , V L , V L , V L , V L
1.73	1189.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 5126

13-Nov-1992 08:14:31

25877-7-4,B,#03,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
0.51	253.	O K , O K , V L , V L , V L , V L
1.74	620.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral O = 3456

13-Nov-1992 08:15:47

25877-7-4,B,#04,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
0.50	203.	O K , O K , V L , V L , V L , V L
1.73	608.	Si K , Si K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral O = 4165

13-Nov-1992 08:20:05 25877-7-4,B,#08,RS

ENERGY	COUNTS	X-RAY LINES
0.50	1044.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
0.99	60.	Zn LA1, Zn LA2, Zn LB1
1.25	912.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	2690.	Si KA1, Si KA2
3.35	68.	K KA1, K KA2
3.70	618.	Ca KA1, Ca KA2
4.02	76.	Ca KB1, Ca KB3
5.90	53.	Mn KA1, Mn KA2
6.43	185.	Fe KA1, Fe KA2
7.04	44.	Fe KB1, Fe KB3

13-Nov-1992 08:21:33

25877-7-4,B,#09,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 37 secs

Energy	Counts	X-Ray Lines
0.51	295.	O K , O K , V L , V L , V L , V L
1.25	186.	Mg K , Mg K , Mg K , As L , As L
1.73	652.	Si K , Si K
3.71	95.	Ca K , Ca K
6.39	91.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 5175

13-Nov-1992 08:48:38

25877-7-4,B,#19,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 26 secs

Energy	Counts	X-Ray Lines
0.51	1258.	O K , O K , V L , V L , V L , V L
1.25	855.	Mg K , Mg K , Mg K , As L , As L
1.74	2602.	Si K , Si K
3.31	100.	K K , K K
3.70	581.	Ca K , Ca K
6.40	245.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral O = 12013

13-Nov-1992 08:54:51 25877-7-4,B,#22,RS

ENERGY	COUNTS	X-RAY LINES
0.50	1987.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.25	1624.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.73	4728.	Si KA1, Si KA2
3.32	82.	K KA1, K KA2
3.69	1237.	Ca KA1, Ca KA2
4.02	169.	Ca KB1, Ca KB3
6.41	304.	Fe KA1, Fe KA2

13-Nov-1992 09:16:18

25877-7-4,B,#37,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 18 secs

Energy	Counts	X-Ray Lines
0.50	592.	O K , O K , V L , V L , V L , V L
1.00	53.	Na K , Na K , Zn L , Zn L , Zn L , Zn L
1.25	394.	Mg K , Mg K , Mg K , As L , As L
1.74	1296.	Si K , Si K
3.68	254.	Ca K , Ca K
6.41	128.	Fe K , Fe K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 5238

TEM ASBESTOS ANALYSIS

Client: Schafe.
Sample No.: SW-7-4
EMS Lab No.: 25077
Page: 1 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HaEM901944A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address KC
Screen Magnification 19100 X
Camera Constant 27-7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S. Ahmed Date 11/18/92

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	360													✓				2	10	2	2	EDS#1; Actinol
	2	F	5	30													✓				3	10	1	2	EDS#2; Actino
	3	F	7	55													✓				2	10	2	1	EDS#3; Tremol
	4	F	5	130													✓				2	10	2	1	EDS#4; Tremol
	5	F	8	62													✓				2	10	1	1	EDS#5; Tremolite
	6	F	10	200											✓										Tremolite
2	7	F	2	32											✓										Actinolite
	8	F	5	27											✓										Tremolite
	9	F	7	48											✓										"
	10	F	3	12											✓										"
	11	F	2	51								✓													
	12	F	3	91								✓													
	13	F	5	60								✓									7	10		7	EDS# 13;
3	14	F	2	35											✓										
	15	F	3	27											✓										

OBSERVATIONS:

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

TEM ASBESTOS ANALYSIS

Client: Schafer
Sample No. SW-7-4
EMS Job No. [illegible]
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM901944A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6
Analyst S. Ahmad Date 11-18-9[illegible]

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	16	F	8	450											✓										Tremolite
	17	F	4	40	✓																				
	18	F	4	20	✓																				
4	19	F	2	25											✓										Tremolite
	20	MD	5	40											✓										Tremolite
	21	F	5	20											✓										Tremolite
5	22	F	2	20	✓																				
	23	F	2	27											✓										Tremolite
	24	F	8	68											✓										"
	25	F	20	75	✓																				
6	26	F	3	25	✓																				
	27	F	6	200x											✓										Tremolite
7	28	F	2.5	74											✓										"
	29	F	10	140											✓										"
	30	F	8	180											✓		✓				2	10	1	2	EDS H30 Actinol

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

TEM ASBESTOS ANALYSIS

ent Schafer
Sample No. SW-7-4

EMS Lab No. [illegible]
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1C
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S. Ahmed Date 11-18-92

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
7	31	F	3	82											✓	✓									Tremolite
	32	F	2	56	✓																				
	33	F	1.5	40											✓	✓									Tremolite

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

18-Nov-1992 13:23:34

25877-7-4,C,#01,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.26	1011.	Mg K , Mg K , Mg K , As L , As L
1.74	4154.	Si K , Si K
3.31	114.	K K , K K
3.69	390.	Ca K , Ca K
6.40	948.	Fe K , Fe K
7.08	138.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 741

18-Nov-1992 13:24:23

25877-7-4,C,#02,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.25	992.	Mg K , Mg K , Mg K , As L , As L
1.73	3823.	Si K , Si K
3.31	96.	K K , K K
3.70	291.	Ca K , Ca K
6.40	929.	Fe K , Fe K
7.06	133.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 613

18-Nov-1992 13:25:26

25877-7-4,C,#03,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
1.25	467.	Mg K , Mg K , Mg K , As L , As L
1.73	1900.	Si K , Si K
3.31	43.	K K , K K
3.69	360.	Ca K , Ca K
4.06	69.	Sc K , Sc K
6.40	268.	Fe K , Fe K
7.03	48.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 655

18-Nov-1992 13:25:49

25877-7-4,C,#04,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 37 secs

Energy	Counts	X-Ray Lines
1.25	1303.	Mg K , Mg K , Mg K , As L , As L
1.74	5286.	Si K , Si K
3.32	113.	K K , K K
3.69	923.	Ca K , Ca K
4.05	156.	Sc K , Sc K , Ca K , Ca K
6.40	749.	Fe K , Fe K
7.02	106.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 886

18-Nov-1992 13:26:30

25877-7-4,C,#05,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 30 secs

Energy	Counts	X-Ray Lines
1.24	639.	Mg K , Mg K , As L , As L
1.74	3254.	Si K , Si K
3.34	103.	K K , K K
3.69	568.	Ca K , Ca K
4.02	68.	Ca K , Ca K
6.40	448.	Fe K , Fe K
7.05	60.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 611

18-Nov-1992 13:37:35

25877-7-4,C,#13,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 50 secs

Energy	Counts	X-Ray Lines
1.25	2915.	Mg K , Mg K , Mg K , As L , As L
1.74	3948.	Si K , Si K
6.41	264.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 595

19-Nov-1992 09:09:54

25877,7-4,C,#30,SA Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 35 secs

Energy	Counts	X-Ray Lines
1.25	1364.	Mg K , Mg K , Mg K , As L , As L
1.74	5680.	Si K , Si K
3.31	225.	K K , K K
3.69	596.	Ca K , Ca K
4.04	95.	Sc K , Ca K , Ca K
5.87	97.	Mn K , Mn K
6.40	1012.	Fe K , Fe K
Quantex>	139.	Fe K , Fe K

0.160 Range= 10.230 keV 10.230
Integral 0 = 29990

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-8-4	Reference	W.R.GRACE
Date	11/17/92		

Total Asbestos Fibers	18	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	18	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	4.3	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	24	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	14 to 22	MFL
Detection Limit	0.2	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	3	10	15	6	47

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	5	13	23	7	33

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
25	31	12	4	4	5

BF

TEM ASBESTOS ANALYSIS

Client: Solafor
Sample No. SW-8-4
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 4DX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By B Kolh Date 11-12

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19,100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst F.M. Date 11-14-92 11-15-9

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	3	80												✓					2	10	2	1	Tremolite
	02	F	15	110												✓					3	10	3		— " —
	03	F	5	32												✓					3	10	2	1	— " —
	04	F	4	100												✓					3	10	3	1	— " —
	05	F	3	50												✓					3	10	1	2	
	06	F	17	125	✓																				
	07	F	2.5	52												✓									Tremolite
	08	F	2.5	165												✓									SAED #4537, Tr
2	09	F	3	55												✓									— " —
	10	F/D	3	22								✓													
	11	F	4	100								✓													
	12	F X	2	34												✓									Tremolite
	13	F	3	140												✓									— " —
3	14	F	1.5	35												✓									— " —
	15	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

lien [illegible]
Sample No. SW-8-4

EMS Lab No. [illegible]
Page 2 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 ____ Date ____

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
3	16	F/D	2	35	✓																				
	17	F	1.5	50	✓																				
	18	F X	5	170												✓					3	10	2	1	EDS Tremolite
	19	F	3	30								✓													
4	20	F X	3	180												✓									Tremolite
	21	F	8	140												✓									— " —
	22	F	5	35												✓									— " —
	23	F/D	2	220												✓									— " —
	24	F/D	2.5	30												✓									— " —
	25	F/D	2.5	25												✓									— " —
	26	F/D	2	120												✓									— " —
	27	F X	6	60								✓													
	28	F	5	38												✓									Tremolite
	29	F	3	30												✓									— " —
5	30	F	6	105												✓					3	10	3		— " —

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

TEM ASBESTOS ANALYSIS

Clie... [illegible]
Sample No. SW-8-4

E... Lab ... [illegible]
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

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 ____ 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
5	31	F/D	4	80												✓									Tremolite
	32	F	3	85												✓									— " —
6	33	F/D	3	40												✓									— " —
	34	F/D	4	45												✓									— " —
	35	F	3	35												✓									— " —
	36	F	6	48												✓									— " —
	37	F	30	200												✓				.3	2	10		3	EDS Crocidol
	38	F	3	30								✓													
	39	F	5	45	✓																				
	40	F	5	40												✓									Tremolite
	41	F	3	35												✓									— " —
7	42	F	4	38												✓									— " —
	43	F	10	80	✓																				
	44	F	2.5	30												✓									Tremolite
	45	F	6	100												✓					3	10	2	1	EDS Tremolit

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

TEM ASBESTOS ANALYSIS

Clie Schafer
Sample No. SW-8-4

EMS Lab No. [illegible]
Page 4 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By Date

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume liters
Working Volume 50 ml
Weight grams
Ashed Area %

Prepared By FG
Date 11-11-92

ANALYSIS

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

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

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
7	46	F	8	76												✓									Tremolite
	47	F	5	85								✓													

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

15-Nov-1992 09:00:17

25877,SW-8-4,A,01,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 37 secs

Energy	Counts	X-Ray Lines
1.25	332.	Mg K , Mg K , Mg K , As L , As L
1.74	1511.	Si K , Si K
3.69	236.	Ca K , Ca K
6.40	158.	Fe K , Fe K
8.04	1775.	Cu K , Cu K
8.91	254.	Cu K , Cu K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 10780

15-Nov-1992 09:04:25

25877,SW-8-4,A,02,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 40 secs

Energy	Counts	X-Ray Lines
1.24	396.	Mg K , Mg K , As L , As L
1.74	1264.	Si K , Si K
3.69	414.	Ca K , Ca K
8.05	1740.	Cu K , Cu K
8.90	204.	Cu K , Cu K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 12086

15-Nov-1992 09:11:29

25877,SW-8-4,A,03,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.25	826.	Mg K , Mg K , Mg K , As L , As L
1.74	2704.	Si K , Si K
3.32	77.	K K , K K
3.70	567.	Ca K , Ca K
4.03	80.	Ca K , Ca K
6.41	325.	Fe K , Fe K
8.04	1547.	Cu K , Cu K
Quantex)	256.	Cu K , Cu K

0.000 Range= 10.230 keV 10.110
Integral 0 = 16901

15-Nov-1992 09:19:35

25877,SW-8-4,A,04,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.25	470.	Mg K , Mg K , Mg K , As L , As L
1.74	1732.	Si K , Si K
3.68	436.	Ca K , Ca K
4.04	74.	Sc K , Ca K , Ca K
6.40	207.	Fe K , Fe K
8.05	1194.	Cu K , Cu K
8.91	145.	Cu K , Cu K
Quantex)		

0.000 Range= 10.230 keV 10.110
Integral 0 = 11992

15-Nov-1992 09:27:08

25877,SW-8-4,A,05,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.25	1223.	Mg K , Mg K , Mg K , As L , As L
1.74	4049.	Si K , Si K
3.70	438.	Ca K , Ca K
6.41	650.	Fe K , Fe K
7.07	96.	Fe K , Fe K
8.05	1547.	Cu K , Cu K
8.92	188.	Cu K , Cu K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 20732

15-Nov-1992 09:43:31

25877,SW-8-4,A,13,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.25	1176.	Mg K , Mg K , Mg K , As L , As L
1.74	4631.	Si K , Si K
3.31	144.	K K , K K
3.68	819.	Ca K , Ca K
4.03	101.	Ca K , Ca K
6.40	489.	Fe K , Fe K
8.05	2007.	Cu K , Cu K
Quantex)	289.	Cu K , Cu K

0.000 Range= 10.230 keV 10.110
Integral 0 = 23287

15-Nov-1992 09:54:05

25877,SW-8-4,A,30,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 48 secs

Energy	Counts	X-Ray Lines
1.25	809.	Mg K , Mg K , Mg K , As L , As L
1.73	2565.	Si K , Si K
3.68	668.	Ca K , Ca K
8.04	1622.	Cu K , Cu K
8.91	233.	Cu K , Cu K

Quantex)
0.000 Range= 10.230 keV 10.110
Integral 0 = 13121

15-Nov-1992 10:00:51 25877,SW-8-4,A,37,FM

ENERGY	COUNTS	X-RAY LINES
1.01	390.	Na KA1, Na KA2, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	2165.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	10448.	Si KA1, Si KA2
3.32	312.	K KA1, K KA2
6.41	3051.	Fe KA1, Fe KA2
7.05	410.	Fe KB1, Fe KB3
8.04	2788.	Cu KA1, Cu KA2
8.89	350.	Cu KB1, Cu KB3

15-Nov-1992 10:13:03

25877,SW-8-4,A,45,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.25	1030.	Mg K , Mg K , Mg K , As L , As L
1.74	3760.	Si K , Si K
3.69	802.	Ca K , Ca K
4.04	60.	Sc K , Ca K , Ca K
6.41	443.	Fe K , Fe K
7.01	50.	Fe K , Fe K
8.06	1139.	Cu K , Cu K
Quantex)	130.	Cu K , Cu K

0.000 Range= 10.230 keV 10.110
Integral 0 = 22977

TEM ASBESTOS ANALYSIS

Client Schaffer
Sample No. SW-8-4

EMS Lab No. [illegible]
Page 1 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 10100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S. Ahmed Date 11-16-92

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	MD	3	48													✓	✓			3	10	2	1	EDS #1; Tremolite
	2	MD	4	58													✓	✓			2	10	2	1	EDS #2; Tremolite
	3	F	4	25													✓	✓			3	10	2	2	EDS #3; Tremolite
	4	F	5	92													✓	✓			3	10	2	1	EDS #4; Tremolite
	5	F	1.5	60													✓	✓			3	10	2	1	EDS #4; Tremolite
2	6	MD	5	40											✓	✓									Tremolite
	7	F	5	27											✓	✓									"
	8	F	1.5	59											✓	✓									"
	9	F	3	160											✓	✓									"
	10	MD	3	25											✓	✓									"
	11	F	5	45											✓	✓									"
3	12	BAD	3	25											✓	✓									"
	13	F	3	65											✓	✓									"
	14	F	5	85											✓	✓									"
	15	F	3	15											✓	✓					3	10	2	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 Schafer
Sample No. SW-8-4
EMS Lab No. [illegible]
Page [illegible] 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 9100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1-6

Analyst S. Ahmed Date 11-16-92

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	16	F	5	27											✓										Tremolite
	17	F	10	108											✓										Tremolite
	18	F	1.5	18											✓										Tremolite
	19	F	5	50											✓										Tremolite
	20	F	2.5	110											✓										"
4	21	F	3	50											✓										"
	22	F	3	40											✓										"
	23	F	2	22											✓										"
	24	MD	4	80											✓										"
	25	F	2	60											✓						3	10	2	1	EDS 172.5 Tre
	26	F	2	18											✓										Tremolite
5	27	F	5	108											✓										"
	28	MD	3	32											✓										"
	29	F	5	52											✓										"
	30	F	6	51											✓										"

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

TEM ASBESTOS ANALYSIS

lien [illegible]
Sample No. SW-8-4

EMS Lab No. [illegible]
Page 3 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1B
Screen Magnification 19100 X
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst S. Ahmed Date 11/26/92

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
5	31	F	3	62											✓										Tremolite
	32	F	8	130											✓										"
	33	F	1	62											✓										"
	34	F	3	40	✓																				

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

16-Nov-1992 13:52:53

25877-8-4,B,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.25	510.	Mg K , Mg K , Mg K , As L , As L
1.74	1856.	Si K , Si K
3.69	348.	Ca K , Ca K
6.41	251.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 13894

16-Nov-1992 13:53:35

25877-8-4,B,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 28 secs

Energy	Counts	X-Ray Lines
1.25	266.	Mg K , Mg K , Mg K , As L , As L
1.74	1065.	Si K , Si K
3.70	189.	Ca K , Ca K
6.40	123.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 10336

16-Nov-1992 13:54:02

25877-8-4,B,#03,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 42 secs

Energy	Counts	X-Ray Lines
1.25	470.	Mg K , Mg K , Mg K , As L , As L
1.74	1685.	Si K , Si K
3.70	326.	Ca K , Ca K
6.40	227.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 13324

16-Nov-1992 13:55:18

25877-8-4,B,#04,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 19 secs

Energy	Counts	X-Ray Lines
1.25	293.	Mg K , Mg K , Mg K , As L , As L
1.73	968.	Si K , Si K
3.28	41.	K K , K K
3.68	202.	Ca K , Ca K
6.41	134.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 9763

16-Nov-1992 13:55:46

25877-8-4, B, #05, SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 39 secs

Energy	Counts	X-Ray Lines
1.26	621.	Mg K , Mg K , Mg K , As L , As L
1.74	2221.	Si K , Si K
3.68	467.	Ca K , Ca K
6.41	329.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 16126

16-Nov-1992 14:09:17

25877-8-4,B,#15,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 31 secs

Energy	Counts	X-Ray Lines
1.25	548.	Mg K , Mg K , Mg K , As L , As L
1.74	1881.	Si K , Si K
3.28	66.	K K , K K
3.69	429.	Ca K , Ca K
6.40	225.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 16244

16-Nov-1992 14:09:41

25877-8-4,B,#25,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 44 secs

Energy	Counts	X-Ray Lines
1.24	1301.	Mg K , Mg K , As L , As L
1.74	4582.	Si K , Si K
3.30	152.	K K , K K
3.69	1091.	Ca K , Ca K
6.40	461.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 24766

TEM ASBESTOS ANALYSIS

Cli[illegible] Sample No. SW-8-4

[illegible] 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 (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) 0.0 067

No. of G.O. to Analyze 20

Filter Lot No. HOEM90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑ INDIRECT PREP ☐

Volume _____ liters

Working Volume 50 ml

Weight _____ grams

Ashed Area _____ %

Prepared By FG

Date 11-11-92

ANALYSIS

MICROSCO

Serial No. 542-05-06 H600A [illegible]

Serial No. 542-05-13 H600B [illegible]

Grid Address 16

Screen Magnification 19(050)

Camera Constant 27.7

Accelerating Voltage 100 KV

Beam Current 100

K-Factor 1.6

Analyst S. Ahmed Date 11-17-9[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	Na	Mg	Si	Ca	Fe	Comments
1	1	MD	5	32													✓	✓			2	10	1	1	EDS#1 Trem
	2	F	8	48													✓				3	10	2	1	EDS#2 [illegible]
	3	F	7	84													✓				2	10	1	2	EDS#3 Actin
	4	F	2	22													✓				3	10	2	1	EDS#4 Trem
	5	F	2.5	32	✓																				
	6	MD	3	70													✓				2	10	1	2	EDS#6 Trem
	7	MD	7	35											✓										Tremolite
	8	F	2	30								✓													
	9	F	5	25											✓										Tremolite
	10	F	7	160											✓										"
	11	F	15	115	✓																				
2	12	F	8	115											✓										Tremolite
	13	F	2	32											✓										"
	14	F	3	99											✓										"
	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

Clie [illegible]
Sample No. SW-8-4

E[illegible] 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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM 90194A

Approved By _____ Date _____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address [illegible]
Screen Magnification 19650
Camera Constant 27.7
Accelerating Voltage 100 KV
Beam Current 100 µ
K-Factor 1.6
Analyst S. Ahmad Date 11-17-92

Grid Opening	Structure Number	Structure	Dimensions (µm) Width	Dimensions (µm) 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	1	15		✓						✓													
	17	F	10	65	✓																				
	18	F	8	50			✓								✓										Tremolite.
	19	F	1	15	✓																				

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

17-Nov-1992 13:21:44

25877,SW-8-4,C,#01,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
1.25	344.	Mg K , Mg K , Mg K , As L , As L
1.74	1756.	Si K , Si K
3.68	217.	Ca K , Ca K
6.42	188.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 11353

17-Nov-1992 13:23:00

25877,SW-8-4,C,#02,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 18 secs

Energy	Counts	X-Ray Lines
1.25	680.	Mg K , Mg K , Mg K , As L , As L
1.74	2279.	Si K , Si K
3.69	428.	Ca K , Ca K
6.40	282.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 13079

17-Nov-1992 13:31:08

25877,SW-8-4,C,#06,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.26	197.	Mg K , Mg K , Mg K , As L , As L
1.73	1058.	Si K , Si K
3.71	86.	Ca K , Ca K
6.40	184.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 10058

TEM ASBESTOS ANALYSIS

Client SC[illegible]
Sample No. SW-11-4
EMS [illegible] 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 ADX

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By [illegible] Date 11-11-92

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-A
Screen Magnification 19100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst [illegible] Date 11-18-92

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	C	6	30	✓																				
	02	F	3	38								✓													
2	NSD																								
3	03	F	2.5	50												✓					3	10	2		EDS Tremolite
4	04	F X	2.5	44	✓																				
5	NSD																								
6	05	F	6	93												✓					3	10	3	1	EDS Tremolite
	06	F	3	38	✓							✓													
	07	F	5	115												✓					3	10	2	1	EDS Tremolite
7	08	F	2	10												✓					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 ☐

18-Nov-1992 18:24:06

25877,SW-11-4,1-A,03,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 33 secs

Energy	Counts	X-Ray Lines
1.24	233.	Mg K , Mg K , As L , As L
1.74	756.	Si K , Si K
3.69	177.	Ca K , Ca K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 112

18-Nov-1992 18:35:38

25877,SW-11-4,1-A,05,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
1.24	957.	Mg K , Mg K , As L , As L
1.74	2920.	Si K , Si K
3.69	947.	Ca K , Ca K
4.02	83.	Ca K , Ca K
6.39	232.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 571

18-Nov-1992 18:42:24

25877,SW-11-4,1-A,07,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 37 secs

Energy	Counts	X-Ray Lines
1.25	819.	Mg K , Mg K , Mg K , As L , As L
1.73	2862.	Si K , Si K
3.30	86.	K K , K K
3.70	693.	Ca K , Ca K
6.40	397.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 517

18-Nov-1992 18:50:49

25877,SW-11-4,1-A,08,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.25	447.	Mg K , Mg K , Mg K , As L , As L
1.74	1484.	Si K , Si K
3.70	263.	Ca K , Ca K
6.41	140.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 227

TEM ASBESTOS ANALYSIS

Client: 3C'rugler
Sample No.: SW-11-4
EMS Lab No.: 25244
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 (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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. H0EM90194A

Approved By ____ Date ____

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-B
Screen Magnification 19,100 X
Camera Constant 28.4
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.6

Analyst F.M. Date 11-18-92

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	01	F	3.5	40												✓					3	10	2	1	EDS Tremolit
2	02	F	12	45												✓					3	10	3	1	EDS Tremolit
3	03	F X	3	25	✓																				
4	04	F	25	150												✓					3	10	3	1	EDS Tremoli
5	05	F/D	6	50												✓					2	10	1	2	EDS Tremolit
6	06	F/D	5	58												✓					3	10	2	1	EDS — " —
7	07	F	4	22												✓									— " —

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

18-Nov-1992 19:16:15

25877,SW-11-4,1-B,01,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 34 secs

Energy	Counts	X-Ray Lines
1.24	631.	Mg K , Mg K , As L , As L
1.74	2223.	Si K , Si K
3.70	526.	Ca K , Ca K
6.41	288.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 411

18-Nov-1992 19:19:52

25877,SW-11-4,1-B,02,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 29 secs

Energy	Counts	X-Ray Lines
1.25	1797.	Mg K , Mg K , Mg K , As L , As L
1.74	6169.	Si K , Si K
3.69	1948.	Ca K , Ca K
4.04	207.	Sc K , Ca K , Ca K
6.42	514.	Fe K , Fe K
7.04	90.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 8 = 1168

17-Nov-1992 13:25:30

25877,SW-8-4,C,#03,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 28 secs

Energy	Counts	X-Ray Lines
1.25	123.	Mg K , Mg K , Mg K , As L , As L
1.72	557.	Si K , Si K
3.72	62.	Ca K , Ca K
6.41	108.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 6642

17-Nov-1992 13:27:34

25877,SW-8-4,C,#04,SA Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 27 secs

Energy	Counts	X-Ray Lines
1.24	187.	Mg K , Mg K , As L , As L
1.74	665.	Si K , Si K
3.72	108.	Ca K , Ca K
6.43	77.	Fe K , Fe K

Quantex>
0.320 Range= 10.230 keV 10.230
Integral 0 = 6784

COPY

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

EMS No.	25877	Client	SCHAFER & ASSOC.
Sample No.	SW-11-4	Reference	W.R.GRACE
Date	11/18/92		

Total Asbestos Fibers	2.3	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	2.3	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	0.6	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	6.7	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	1.4 to 3.8	MFL
Detection Limit	0.1	MFL

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

Size Distribution (Chrysotile and Amphibole)

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	1	4	0	3	8

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	2	1	3	10

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
8	5	3	0	0	0

18-Nov-1992 19:28:34 25877,SW-11-4,1-B,04

ENERGY	COUNTS	X-RAY LINES
1.25	4796.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	16776.	Si KA1, Si KA2
2.26	108.	S KA1, S KA2
3.30	121.	K KA1, K KA2
3.69	4612.	Ca KA1, Ca KA2
4.04	485.	Sc KA2, Ca KB1, Ca KB3
4.93	102.	V KA1, V KA2
5.92	244.	Mn KA1, Mn KA2
6.40	1163.	Fe KA1, Fe KA2
7.06	209.	Fe KB1, Fe KB3

18-Nov-1992 19:32:46

25877,SW-11-4,1-B,05,FM Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 36 secs

Energy	Counts	X-Ray Lines
1.24	1140.	Mg K , Mg K , As L , As L
1.74	5542.	Si K , Si K
3.30	130.	K K , K K
3.69	570.	Ca K , Ca K
5.89	107.	Mn K , Mn K
6.40	1076.	Fe K , Fe K
7.07	172.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 941

18-Nov-1992 19:36:17

25877,SW-11-4,1-B,06,FM Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 32 secs

Energy	Counts	X-Ray Lines
1.25	547.	Mg K , Mg K , Mg K , As L , As L
1.74	2119.	Si K , Si K
3.70	429.	Ca K , Ca K
6.41	247.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 8 = 372

TEM ASBESTOS ANALYSIS

Client Schuster
Sample No. SW-11-4

EMS Lab No. 25x+1
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 ☐

Approved By _____ Date _____

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) 0.0 067
No. of G.O. to Analyze 20
Filter Lot No. HOEM90194A

PREP

DIRECT PREP ☒
INDIRECT PREP ☐

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

Prepared By FG
Date 11-11-92

ANALYSIS

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

Grid Address 1-C
Screen Magnification 19,800 X
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 μm
K-Factor 1.5
Analyst Radh Date 11-19-9

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	1	F	5	25													✓				3	10	2	1	Tremolite
	2	F	12	145													✓				3	10	1	2	Tremolite
2	NSD																								
3	3	F	4	100													✓				3	10	2	1	Tremolite
4	NSD																								
5	4	F	4	22								✓													no diffraction.
6	5	F	8	25													✓				3	10	2	1	Tremolite.
	6	F	6	28													✓								Tremolite
7	7	F	4	42													✓								Tremolite

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

19-Nov-1992 07:01:34

25877,4,A,#01,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 54 secs

Energy	Counts	X-Ray Lines
0.51	1801.	O K , O K , V L , V L , V L , V L
1.25	1195.	Mg K , Mg K , Mg K , As L , As L
1.74	3638.	Si K , Si K
3.70	803.	Ca K , Ca K
6.40	439.	Fe K , Fe K

Quantex>
0.160 Range= 10.230 keV 10.230
Integral 0 = 20109

19-Nov-1992 07:03:06 25877,4,A,#02,RS

ENERGY	COUNTS	X-RAY LINES
0.51	1017.	O KA1, O KA2, V LA1, V LA2, V LB1, V LG1
1.02	91.	Na KA1, Na KA2, Na KB1, Zn LA1, Zn LA2, Zn LB1, Zn LG1
1.25	773.	Mg KA1, Mg KA2, Mg KB1, As LA1, As LA2
1.74	2463.	Si KA1, Si KA2
3.31	70.	K KA1, K KA2
3.70	259.	Ca KA1, Ca KA2
4.10	42.	Sc KA1, Sc KA2
6.41	415.	Fe KA1, Fe KA2

19-Nov-1992 07:05:37

25877,4,A,#03,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 18 secs

Energy	Counts	X-Ray Lines
0.51	580.	O K , O K , V L , V L , V L , V L
1.24	290.	Mg K , Mg K , As L , As L
1.74	1126.	Si K , Si K
3.70	179.	Ca K , Ca K
6.42	162.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 7212

19-Nov-1992 07:15:02

25877,4,A,#04,RS Preset= 100 secs
Vert= 200 counts Disp= 1 Elapsed= 22 secs

Energy	Counts	X-Ray Lines
0.51	906.	O K , O K , V L , V L , V L , V L
1.25	1261.	Mg K , Mg K , Mg K , As L , As L
1.73	1416.	Si K , Si K
6.41	84.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 6598

19-Nov-1992 07:17:56

25877,4,A,#05,RS Preset= 100 secs
Vert= 500 counts Disp= 1 Elapsed= 23 secs

Energy	Counts	X-Ray Lines
0.51	1440.	O K , O K , V L , V L , V L , V L
1.26	916.	Mg K , Mg K , Mg K , As L , As L
1.74	3253.	Si K , Si K
3.32	133.	K K , K K
3.69	490.	Ca K , Ca K
6.39	430.	Fe K , Fe K

Quantex)
0.160 Range= 10.230 keV 10.230
Integral 0 = 12401

COPY

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

EMS No.	25877	Date Analyzed	11/18/92
Client	SCHAFER & 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	0.004	MFL

Particle Size Distribution (Chrysotile)

Particle Length - Microns

C -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

0 - .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

EMS Lab No. 25877
Client EMS Blank
Sample No. 11-3-92

RECEIVING

METHOD OF ANALYSIS
EPA Yamate Level I ☐
Level II ☑
Level III ☐
AHERA ☐

ASPECT RATIO 3:1 ☑ 5:1 ☐

Approved By BK Date 11-3

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 ☐
MCE/314 ☐
MCE/1017 ☑
Other ☐

TYPE OF SAMPLE
Air ☐ Water ☑
Soil ☐ Wipe ☐
Bulk ☐ Other ☐
Dust/Microvac ☐

PORE SIZE
0.45 µm ☐
0.8 µm ☐
.1 µm ☑
.22 µm ☐
Other ☐

G.O. Area (mm²) 0.067
No. of G.O. to Analyze 20
Filter Lot No.

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume ____ liters
Working Volume 500 ml
Weight ____ grams
Ashed Area ____ %
Date 11-10-92
Prepared By FG

ANALYSIS

GRID
1 ☒ 3 ☐
2 ☐ 4 ☐

MICROSCOPE
600A ☒
600B ☐
HU11E ☐
HU125E ☐

Grid Address 1A
Screen Magnification 19300
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 µa

A

Analyst Radla Date 11-18

Grid Opening	Structure Number	Structure	Dimension (mm) Width	Length ≥5µm	Thickness	SAED Observation Chrysotile	Amphibole	Ambiguous	Non Asbestos	No Pattern	EDS Analysis Na	Mg	Si	Ca	Fe	Id	Comments
1	NSD																
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																
8	NSD																
9	NSD																
10	NSD																

15 lines

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

TEM ASBESTOS ANALYSIS

EMS Lab No. 25877
Client EMS Blank
Sample No. 11-3-92

Page 1 of 1

MICROSCOPE
600A ☑
600B ☐
HU11E ☐
HU125E ☐

B

RECEIVING

ANALYSIS

GRID
1 ☐ 3 ☐
2 ☑ 4 ☐

Grid Address LB
Screen Magnification 19300 x
Camera Constant 30.4
Accelerating Voltage 100 KV
Beam Current 10 µa

Analyst Radka
Date 11-4

Grid Opening	Structure Number	Structure	Dimension(mm) Width	Length ≥5µm	Thickness	SAED Observation Chrysotile	Amphibole	Ambiguous	Non Asbestos	No Pattern	EDS Analysis Na	Mg	Si	Ca	Fe	Id	Comments
1	NSD																
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																
8	NSD																
9	NSD																
10	NSD																

15 lines

OBSERVATIONS:

Clean ☐
Debris: ☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐
☐ Very Light ☐ Light ☐ Moderate ☐ Heavy ☐ Very Heavy ☐

COPY

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

EMS No. 25877 Date Analyzed 11/17/92

Client SCHAFER & 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	0.004	MFL

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 & UP
0	0	0	0	0	0

Particle Width - Microns

0 - .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

EMS Lab No. 25877
Client EMS Blank
Sample No. 11-4-92

RECEIVING

METHOD OF ANALYSIS
EPA Yamate Level I ☐
Level II ☑
Level III ☐
AHERA ☐

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)

Approved By BK Date 11-4

FILTER TYPE/AREA (mm²)
MCE/385 ☐
MCE/314 ☐
MCE/1017 ☑
Other ☐

TYPE OF SAMPLE
Air ☐ Water ☑
Soil ☐ Wipe ☐
Bulk ☐ Other ☐
Dust/Microvac ☐

PORE SIZE
0.45 µm ☐
0.8 µm ☐
.1 µm ☑
.22 µm ☐
Other ☐

G.O. Area (mm²) 0.0067
No. of G.O. to Analyze 20
Filter Lot No. HoEM90194A

PREP

DIRECT PREP ☑
INDIRECT PREP ☐

Volume _____ liters
Working Volume 500 ml
Weight _____ grams
Ashed Area _____ %
Date 11-11-92
Prepared By FG

ANALYSIS

GRID
1 ☒ 3 ☐
2 ☐ 4 ☐

MICROSCOPE
600A ☑
600B ☐
HU11E ☐
HU125E ☐

Grid Address 1A
Screen Magnification 19390 x
Camera Constant 36.4
Accelerating Voltage 100 KV
Beam Current 10 µa

Analyst Radla Date 11-

A

Grid Opening	Structure Number	Structure	Dimension(mm) Width	Length ≥5µm	Thickness	SAED Observation Chrysotile	Amphibole	Ambiguous	Non Asbestos	No Pattern	EDS Analysis Na	Mg	Si	Ca	Fe	Id	Comments
1	NSD																
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																
8	NSD																
9	NSD																
10	NSD																

15 lines

OBSERVATIONS:

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

TEM ASBESTOS ANALYSIS

EMS Lab No. 25877
Client EMS Blank
Sample No. 11-4-92

RECEIVING

ANALYSIS

MICROSCOPE
600A ☐
600B ☐
HU11E ☐
HU125E ☐

GRID
1 ☐ 3 ☐
2 ☐ 4 ☐

Grid Address 1-B
Screen Magnification 1930 x
Camera Constant 30.3
Accelerating Voltage 100 KV
Beam Current 10 µa

B

Analyst Radhe
Date 11-17

Grid Opening	Structure Number	Structure	Dimension (mm) Width	Length ≥5µm	Thickness	SAED Observation Chrysotile	Amphibole	Ambiguous	Non Asbestos	No Pattern	EDS Analysis Na	Mg	Si	Ca	Fe	Al	Comments
1	NSD																
2	NSD																
3	NSD																
4	NSD																
5	NSD																
6	NSD																
7	NSD																
8	NSD																
9	NSD																
10	NSD																

15 lines

OBSERVATIONS:

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