

FILE NAME: Ceiling Tiles (CT)

DATE: 2001 Sept

DOC#: CT001

DOCUMENT DESCRIPTION: Unpublished Internal Report

CONWED CEILING TILES

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INSTALLING CEILING TILES

Work Practice Study

September, 2001

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Revision #0

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RESULTS

Ceiling Tile Installation

During the installation of the ceiling tiles, Worker 1 (William Longo) was exposed to levels of airborne asbestos fibers of between 0.23 to 0.70 fibers/cc as measured by PCM. Worker II (Richard Hatfield) had an exposure level that ranged from 0.34 to 0.92 fibers/cc when also measured by PCM.

The PLM analysis of the 10 ceiling tiles used in this confirmed that each of the tiles used in the work practice contained either chrysotile or amosite asbestos. In some cases, both types of asbestos were found. A summary of the results are shown in the following table.

BULK ASBESTOS ANALYSIS CEILING TILES

Sample Number	Type of Asbestos	Concentration
Tile 1	Chrysotile	2%
Tile 2	Chrysotile Amosite	1% 4%
Tile 3	Chrysotile	2%
Tile 4	Chrysotile Amosite	1% 4%
Tile 5	Chrysotile Amosite	2% <1%
Tile 6	Chrysotile Amosite	2% <1%
Tile 7	Chrysotile	2%
Tile 8	Chrysotile	2%
Tile 9	Chrysotile Amosite	2% 1%
Tile 10	Chrysotile	2%



The clothing worn by the two workers performing the installation procedure were found to be contaminated with respirable asbestos fibers. The two fabric samples tested showed a range of 185.4 million asbestos structures to 240.3 million asbestos per square foot.

Cleanup

During the cleanup phase of this study, the worker performing the activity was exposed to levels of airborne asbestos fibers of between 0.90 to 3.20 fibers/cc as measured by PCM.

QUALITY CONTROL

Phase Contrast Microscopy

MAS is a participant in AIHA's asbestos Proficiency Analytical Testing (PAT) program for asbestos fiber analysis for the last 12 years and has passed each and every round during that time. Additionally, MAS exchanges air samples with outside laboratories and has developed intra and inter-counter precision for the laboratory.

For the PCM air samples analyzed in this study, 10% blind recounts were performed and the results were within the confidence limits as specified by NIOSH.

Transmission Electron Microscopy

MAS is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) to analyze asbestos air samples by transmission electron microscopy.

For the TEM air samples analyzed in this project, 10% blind recounts were performed.

Rate of Error

The rate of error for this study is based on the PCM analysis and is determined as follows:

	<u>Ceiling Tile Installation</u>	<u>Average f/cc</u>	<u>Average f/mm²</u>
1)	Area Samples	0.46	132.33
2)	Personnel Samples	0.48	28.73

The coefficient of variation determined at this laboratory for this range of fiber counts are 0.1676 for the area samples and 0.1722 for the personnel samples. Therefore, the area air samples' upper and lower limits are 0.38 f/cc and 0.54 f/cc, for the personnel samples, the upper and lower limits are 0.40 and 0.56 f/cc on average.



	<u>Ceiling Tile Cleanup</u>	<u>Average f/cc</u>	<u>Average f/mm²</u>
1)	Area Samples	1.00	128.0
2)	Personnel Samples	1.75	45.3

The coefficient of variation determined at this laboratory for this range of fiber counts are 0.1676 for the area samples and 0.1722 for the personnel samples. Therefore, the area air samples upper and lower limits are 0.925 f/cc and 1.08 f/cc, for the personnel samples, the upper and lower limits are 1.67 f/cc and 1.83 f/cc on average.

For the TEM analysis, all blind recounts (installation and cleanup) were within the required 95% confident limit as prescribed by the National Institute of Science and Technology (NIST).

CONCLUSION

MAS conducted a study to determine the release and potential human exposure to airborne asbestos fibers during the installation of asbestos containing ceiling tiles; this study was then followed by a cleanup work practice. The installation phase of the study shows that even when a small number of ceiling tiles were installed, significant amounts of asbestos fibers were released into the breathing zone of the two workers who were performing this activity. Additionally, during the cleanup work practice it was found that the worker exposure level was in excess of OSHA's excursion limit of 1.0 fiber/cc.

The ceiling installation portion of this work study was 45 minutes in length and only involved the installation of 10 tiles. Under normal circumstances on a construction project, one would expect much larger areas to be tiled and therefore, much higher asbestos exposures to the individuals than demonstrated in this study.

The clothing worn by the workers were found to be contaminated with asbestos dust. This contamination is yet another potential source of exposure through re-entrainment of the asbestos dust from such activities as the brushing of the clothing or during typical laundry activities.

INSTALLING CEILING TILES

Asbestos Air Analysis Results



INSTALLATION

I. BACKGROUND AIR SAMPLES

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/cc</u>	<u>TEM Str/cc (All)</u>	<u>TEM Fibers $\geq 5 \mu\text{m/cc}$</u>
A-0-A (NE)	IWA Background	< 0.002	< 0.007	N/A
A-0-B (SE)	IWA Background	< 0.002	< 0.007	N/A
A-0-C (SW)	IWA Background	< 0.002	< 0.007	N/A
A-0-D (NW)	IWA Background	< 0.002	< 0.007	N/A

II. PERSONNEL AIR SAMPLES

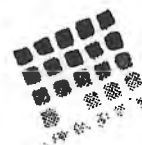
<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/cc</u>	<u>TEM Str/cc (All)</u>	<u>TEM Fibers $\geq 5 \mu\text{m/cc}$</u>
P-1-A	Personnel WLR	0.23	11.46	< 0.60
P-1-B	Personnel WLL	0.35	16.14	1.80
P-1-C	Personnel RHR	0.36	6.63	< 0.60
P-1-D	Personnel RHL	0.34	6.60	< 0.60
P-2-A	Personnel WLR	0.70	4.78	0.48
P-2-B	Personnel WLL	0.41	6.17	0.95
P-2-C	Personnel RHR	0.49	7.24	< 0.48
P-2-D	Personnel RHL	0.92	4.85	0.97

III. AREA AIR SAMPLES

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/cc</u>	<u>TEM Str/cc (All)</u>	<u>TEM Fibers $\geq 5 \mu\text{m/cc}$</u>
A-1-A (NE)	IWA Area	0.13	1.55	0.24
A-1-B (SE)	IWA Area	0.05	1.08	< 0.12
A-1-C (SW)	IWA Area	0.12	1.96	0.12
A-1-D (NW)	IWA Area	0.12	1.30	< 0.12
A-2-A	IWA Area	0.62	1.63	< 0.10
A-2-B	IWA Area	0.52	2.18	0.28
A-2-C	IWA Area	0.46	2.68	0.37
A-2-D	IWA Area	0.58	2.03	0.68
A-3-A	IWA Area	0.72	1.32	0.12
A-3-B	IWA Area	0.81	2.65	0.48
A-3-C	IWA Area	0.63	1.83	0.11
A-3-D	IWA Area	0.77	1.30	0.12

INSTALLING CEILING TILES

Asbestos Air Analysis Results Continued



IV. FIELD BLANKS

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/mm²</u>	<u>TEM Str/mm² (All)</u>	<u>TEM Fibers ≥ 5 μm/cc</u>
FB-1	IWA Area	< 7	0.0	N/A
FB-2	IWA Area	< 7	0.0	N/A
FB-2	IWA Area	< 7	0.0	N/A

V. FABRIC ANALYSIS

<u>Sample No.</u>	<u>Sample Description</u>	<u>Asbestos Structures/ft²</u>	<u>Asbestos Structures/ft²</u>
FWL-2	Fabric Control	0.00	0.00
FRH-2	Fabric Control	0.00	0.00
FWL-2	Fabric	185.4 million	200 thousand
FRH-2	Fabric	240.3 million	259 thousand

CEILING TILE CLEANUP

Asbestos Air Analysis Results



CLEANUP

I. BACKGROUND AIR SAMPLES

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/cc</u>	<u>TEM Str/cc (All)</u>	<u>TEM Fibers ≥ 5 µm/cc</u>
A-0-A (NE)	IWA Background	< 0.001	< 0.005	N/A
A-0-B (SE)	IWA Background	< 0.001	< 0.005	N/A
A-0-C (SW)	IWA Background	< 0.002	< 0.005	N/A
A-0-D (NW)	IWA Background	< 0.001	< 0.005	N/A

II. PERSONNEL AIR SAMPLES

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/cc</u>	<u>TEM Str/cc (All)</u>	<u>TEM Fibers ≥ 5 µm/cc</u>
P-1-A	Personnel RHR	1.05	6.86	< 0.86
P-1-B	Personnel RHL	0.90	7.61	1.69
P-1-C	Personnel RHR	3.20	11.25	3.46
P-1-D	Personnel RHL	1.83	6.80	0.85

III. AREA AIR SAMPLES

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/cc</u>	<u>TEM Str/cc (All)</u>	<u>TEM Fibers ≥ 5 µm/cc</u>
A-1-A	IWA Area	0.93	3.59	0.51
A-1-B	IWA Area	0.74	2.23	0.34
A-1-C	IWA Area	0.90	2.05	0.17
A-1-D	IWA Area	1.37	3.25	0.68

IV. FIELD BLANKS

<u>Sample No.</u>	<u>Sample Description</u>	<u>PCM Fibers/mm²</u>	<u>TEM Str/mm² (All)</u>	<u>TEM Fibers ≥ 5 µm/cc</u>
FB-1	IWA Area	< 7	0.0	N/A
FB-2	IWA Area	< 7	0.0	N/A