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GRINDING ASBESTOS CEMENT PIPE

WORK PRACTICE SIMULATION DEMONSTRATION

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Protocol for Work-practice Simulation of Grinding Asbestos Cement Pipe

This study was designed and conducted by Richard Hatfield, William Longo and Sherman Lee Phillips

Study Design and Methodology

The study was performed in an isolation chamber constructed using typical asbestos abatement protocols. The size of the chamber is approximately 15'x 20'x 8'. The chamber is constructed with two viewing windows for video taping purposes and has an air exchange rate of appoximatily100 cubic feet per minute with two primary inlet sources and a negative air machine that produces a constant flow during the workplace study. After the study, the inside of the chamber was decontaminated by standard asbestos decontamination methods including HEPA vacuuming of all dust and debris and wet wiping of all surfaces.

During video taping of the work practice study, lighting is utilized inside the chamber to enhance the possible observations of dust release during the work practice. Previous studies have shown that the use of, what is commonly referred to, as the "Tyndall light phenomena" is an effective method of displaying respirable airborne dust generated from workplace actives.

Materials Analytical Services (MAS) were provided with some Capco manufactured asbestos cement pipe by Mr. Sherman Phillips. A sample of the pipe was analyzed by Polarized Light Microscopy (PLM) and confirmed Chrysotile and Crocidolite asbestos was present in the pipe.

During the study, air samples were collected using 25mm air cassettes containing 0.8 micron pore mixed cellulose ester (MCE) filters and a 5.0 micron backing pad. The air sampling pumps were calibrated both before and after the sample collection. High volume pumps were used for area or bystander air samples during the simulation. The pumps were located outside the chamber and connected to the air sample cassettes by Tygon tubing through the walls of the chamber. The two area air samples were located on opposite ends of the chamber. The air sampling cassettes were located approximately five feet from the floor and 6 to 8 feet from the work activity. The high volume pumps were calibrated to a flow rate of 10 liters per minute. The two investigators performing the work place simulation were each fitted with two personnel air samplers attached to the left and right shoulder area to sample in the breathing zone the asbestos exposures during the work place simulations. The personnel air samples were collected with battery operated Gillian pumps, calibrated to a flow rate of 2 liters per minute. Before each work place simulation, background samples were run both inside and outside the chamber. The air samples were collected in general accordance with methods outlined in NIOSH's 582 "Sampling and Evaluating Airborne Asbestos Dust".

The individuals working inside the chamber wore Tyvek suits under cotton/polyester work cloths and were protected with Self-Contained Breathing Apparatus (SCBA). The chamber design included decontamination areas for clothing removal and for a shower to remove any residual asbestos contamination before the workers left the chamber area.

The work practice used in this study was the grinding of imperfections from the inside ends of an asbestos cement pipe. For this study a former employee of Capco, Mr. Sherman Phillips, was asked to perform the work activities just as he did on the job. Mr. Phillips also provided some information about his on the job experiences grinding these pipes. During this discussions Mr. Phillips stated the following:

- Worked at Capco Plant located in Ragland, Alabama for 7 years as a lath operator on the finishing side.
- He was trained by Capco and worked there from 1968 to 1975.
- Mr. Phillips estimates that he ground thousands of pipe ends.
- Mr. Phillips stated he ground pipes, which were stacked in groups of 15 to 40 pipes per pallet depending on their diameter. Approximately one out of three required grinding. Daily production of pipe was approximately 100 to 600 per shift per day. He stated that while he was grinding at one end of the pipes, another worker was grinding at the other ends.

To simulate the grinding activity, Mr. Phillips, utilized an Ingersoll-Rand Series 61H horizontal air grinder (model 61H120L6), which has a free speed of 12,000 rpm. The grinder was powered by 90 psi. compressed air at a maximum flow rate of 10 cu. ft. per minute. The sampling and work time for the study was approximately 12 minutes in length. After the completion of the work place simulation, swatch samples of the work clothing were taken and analyzed by the Chatfield method to determine the level of asbestos contamination in the clothing.

The filters were analyzed by the NIOSH 7400 method for PCM using A counting rules. For TEM analysis, a modified Yamate EPA level II indirect air sample analysis was performed. The samples for TEM analysis were prepared using a redeposit method as detailed in the ASTM method D-5595. The dust collected on the filter is washed from the cassette and filter using a 50-50 mixture of de-ionized water and alcohol. The suspension is mixed using an ultra-sound water bath to produce a homogeneous suspension. An aliquot of the suspension is redeposit onto a new filter.

Upon completion of the workplace simulation study, the chamber was completely decontaminated to remove the asbestos containing dust. The black cloth sheeting on the inside surfaces of the chamber was removed and disposed. All surfaces were HEPA vacuumed and wet wiped according to standard asbestos abatement technology.

GRINDING OF ASBESTOS CEMENT PIPE
ASBESTOS AIR AND FABRIC ANALYSIS RESULTS

Sample #	Sample Description	PCM Fibers/cc	TEM (All) Str/cc	TEM Fibers > 5µm/cc
I-I-A	IWA Background	0.10	< 0.02	N/A
I-I-B	IWA Background	0.05	< 0.02	N/A
II-I-A	IWA Area Sample	294.00	3188	1175
II-I-B	IWA Area Sample	207.00	3244	1663
III-I-A	IWA SLPR Personnel	254	5925	423
III-I-B	IWA SLPL Personnel	200	1802	277
III-I-C	IWA RLHR Personnel	227	7618	1270
III-I-D	IWA RLHL Personnel	293	3133	975

		Structures/sq ft.	Structures/cm^2
IV-I-A-SLP	Clothing Fabric	9.4 billion	10.1 million
IV-I-B-RLH	Clothing Fabric	17.2 billion	18.5 million

SLP - Sherman Lee Phillips

MATERIALS ANALYTICAL SERVICES, INC.
PLM ANALYSIS

Proj#-Spl#: M20774 - 001 Analyst: W.B. Egeland Date: 12/21/98

ClientName: Environmental Litigation Group ClientSpl: #1

Location:

Type_Mat: 8" Cement Asbestos Pipe

Gross Visual: Light gray. Cementitious with abundant blue and white fiber bundles throughout. Six inch diameter pipe with 5/8th inch thickness.

OPTICAL DATA FOR ASBESTOS IDENTIFICATION

Morphology	Wavy	Straight	
Pleochroism	None	Blue/Gray	
Refract Index	1.555/1.548	1.695/1.705	
Sign	+	-	
Extinction	Parallel	Parallel	
Birefringence	Low	Mod.	
Melt	No	No	
Fiber Name	Chrysotile	Crocidolite	

ASBESTOS MINERALS	EST. VOL. %
Chrysotile	18
Amosite	
Crocidolite	7
Tremolite/Actinolite	
Anthophyllite	

OTHER FIBROUS COMPONENTS

NON FIBROUS COMPONENTS

Cement	75

Effervescence: Strong.

Binder Description: Carbonate and fine-grained aggregate

Comments: No starch observed