

FILE NAME: Welding (WELD)

DATE: 1995

DOC#: WELD031

DOCUMENT DESCRIPTION: Excerpt of Consultant Report - Evaluation of Asbestos-Containing Welding Rods for Asbestos Release

DEPOSITION
EXHIBIT

12

EVALUATION OF ASBESTOS-CONTAINING WELDING RODS

FOR ASBESTOS FIBER RELEASE

John M. Demant, Ph.D., CIH

Lori Todd, Ph.D., CIH

Courtney Smith

March 14, 1995

Duke University Medical Center
Department of Community & Family Medicine
Division of Occupational & Environmental Medicine
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Durham, North Carolina 27710

EXHIBIT

436

WELDING ROD ABRASION TEST

Background

A test of asbestos-containing welding rods was performed under controlled conditions to determine if asbestos fibers are released into the air from handling and abrasion. Welding rod samples were first tested for asbestos and non-asbestos fiber content by having a bulk sample of the rod coating analyzed by Transmission Electron Microscopy (TEM) and Polarized Light Microscopy (PLM). Welding rods found to be positive for asbestos content were selected and subjected to the abrasion test. In addition, one set of welding rods found not to contain asbestos was tested as a negative control of the experimental procedure. Testing involved bumping and rubbing two identical welding rods together in a small chamber for approximately 15 minutes while air samples were collected inside the chamber. Background air samples were obtained between each test.

Abrasion Test Design

Asbestos fiber release was tested using a customized Flexiglas glove box fitted with high efficiency particulate air (HEPA) filters. (See Appendix C, Figure 1.) The glove box is air tight except for access ports and filtered air intake and exhaust ports. Prior to each simulation, the glove box was thoroughly washed, and the air inside the glove box purged for 25 minutes using a high volume exhaust system. All air entering and leaving the glove box was HEPA filtered. Purging of the glove box was performed to reduce ambient particulate levels.

For each set of experiments, all necessary materials were placed inside the glove box in sealed plastic bags. This included two sets of air filters (one for the background air sample and one for the test sample), the welding rods to be tested, and clean-up materials. The air sampling pump was calibrated with a "Gillibrator" air flow calibrating device before and after air sampling using an identical calibration filter (marked for calibration only) so as not to contaminate the sampling filter with ambient air. Flow rates of approximately 12 liters per minute were used for all samples. To confirm that the air inside the glove box was free of asbestos fibers, a background air sample was collected for 20 minutes before testing each set of welding rods.

Just prior to the initiation of the welding rod experiment, the air sampling pump was turned on. The two identical welding rods to be tested were then removed from the plastic bag and were bumped and rubbed against each other for approximately 15 minutes. After the rods had been bumped together for 15 minutes a small mixing fan was turned on for 5 minutes and then turned off. The mixing fan was used in order to enhance air mixing within the glove box. Air sampling was performed for a total of 30 minutes. The glove box was cleaned, purged with HEPA filtered air, and re-cleaned before being used for testing the next set of rods.

All air samples were obtained using 25 mm diameter sampling cassettes fitted with mixed cellulose ester filters. Samples were analyzed for asbestos using Transmission Electron Microscopy (TEM), 40 CFR 753 Subpart E, Appendix A, and Phase Contrast Microscopy (PCM), NIOSH 7400.

Welding Rods Tested

The welding rods subjected to the abrasion experiment were two Hobart 6010 (batch 109), two Westinghouse 6011 (batch 107), and two partially burned asbestos containing received from Dr. James Millette of MVA. Analytical data for the rods tested are given in Appendix A. The Westinghouse 6011 (batch 107) rods were found not to contain asbestos and were tested between the tests of rods containing asbestos. This was done as an overall control of the testing, chamber clean-up and analytical procedures.

Sample Preparation and Analysis

Samples were prepared using the above protocol for the abrasion test. The flow rates and total sampling time for each filter cassette are outlined below in Table 1. (Cassettes 1 and 2 were used only for calibration and were not analyzed.)

Table 1: Sample Preparation Data

ID #	Description	Start Flow, Lpm	End Flow, Lpm	Average Flow, Lpm	Sampling time, min	Total air volume, Liters
3	Background	12.29	11.29	11.79	20.0	235.8
4	Hobart 6010 (batch 109)	11.29	10.39	10.84	30.0	325.2
5	Background	12.05	12.51	12.28	20.0	245.6
6	Westinghouse 6011 (batch 107, non-asbestos)	12.63	12.49	12.56	30.0	376.8
7	Background	12.44	12.27	12.36	20.0	247.1
8	Used for calibration only					
9	Partially burned rods (received from Dr. Millette)	12.27	12.84	12.56	30.0	376.7
10	Field blank - ambient air					

The used filter cassettes were covered with duct tape (to prevent their coming apart), numbered, and placed in individual sample bags. They were sent via Federal Express to Materials Analytical Services in Atlanta and were analyzed there by the methods mentioned under "Abrasion Test Design."

Results

Specifics of the laboratory analyses and results are included in Appendix B. For each set of asbestos containing rods tested, the phase contrast data for the test detected fiber concentrations in excess of background. The abrasion test using the non-asbestos rod found no asbestos fibers or structures by TEM thus confirming that the chamber was free of contamination. Highest TEM concentrations were observed for the partially used rods with a concentration of asbestos structures by TEM of 1,231 structures/cc. The partially used welding rods were much more friable than the unused rods and generated significantly more airborne asbestos fibers.

Micro identification by TEM demonstrated that the fibers generated by the abrasion tests were chrysotile. Filter blanks and chamber background samples collected prior to each experiment did not detect the presence of chrysotile nor did the test conducted with non-asbestos containing welding rods. Therefore, the fiber concentrations measured are the result of fibers released from the welding rods. Electron micrographs of typical asbestos structures observed in this sample are shown in Appendix B:

APPENDIX A

WELDING ROD COATING ASBESTOS ANALYSIS RESULTS

MATERIALS ANALYTICAL SERVICES INC.
PRESENCE OR ABSENCE ANALYSIS

CLIENT: UNC
 DATE: 9-28-94

MAS JOB #: M 11811-5
 SAMPLE ID: 006

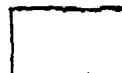


109 Hobart 6010

VERIFICATION OF ASBESTOS IDENTIFICATION			
TYPE OF ASBESTOS	MORPHOLOGY	SELECTED AREA ELECTRON DIFFRACTION	EDS PRINT OUT
CHRYSOCTILE	✓	✓	✓
AMPHIBOL			
TREMOLITE			
ACTINOLITE			
ANTHOPHYLLITE			
CROCIDOLITE			

GRUS # SOLV #	ESTIMATED NUMBER OF STRUCTURES
1	10
2	7
3	5
4	12
5	14
24	9
7	10
3	11
4	10
5	7

NO ASBESTOS DETECTED:



COMMENTS:

**MATERIALS ANALYTICAL SERVICES, INC.
BULK ASBESTOS ANALYSIS**

Object # - Sp. # M17724-03

Date: 1/31/85

Object Name: WELDING ROD COATING SAMPLE

Analyst: Paul Hess

Sample Identification: INC Dept. EEE Sample # T044-0107

#107 Westinghouse 6011

Visual Description: gray cream, fibrous, moderately bound

OPTICAL DATA FOR ASBESTOS IDENTIFICATION

Morphology			
Pleochroism			
Refractive Index <u>// L</u>			
Sign of Elongation			
Extinction			
Birefringence			
Melt			
Fiber Name			

ASBESTOS MINERALS:

Est. Vol %

Pyroxene	NAD
Magnetite/olivine	
Hornblende	

OTHER FIBROUS COMPONENTS:

Wool/Rock wool	
Fibrous glass	
Cellulose	25
Synthetic	
Slit	03

MINERAL FIBROUS COMPONENTS:

Amphibole	
Serpentine	X
General Grains	X
Others:	X

Fibrous mineral aggregate observed

PERVEGENCE: weak to moderate

REMARKS:

SEE No Asbestos Observed. X = Minerals detected. Sample ashed



06 December 1984

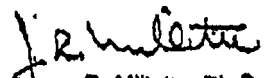
John Dement, Ph.D.
Duke University Medical Center
PO Box 2914
2200 W. Main Suite 700
Durham, NC 27710

Re: Welding Rod
MVA Project No. 1094

Dear John:

Enclosed please find three welding rods which were partially burned in our controlled experiment. They contain approximately two percent of chrysotile asbestos by weight. Please call if you have any questions.

Sincerely,


James R. Millette, Ph.D.
Executive Director

JRM/aw

Enclosure



06 December 1984

John Dement, Ph.D.
Duke University Medical Center
PO Box 2914
2200 W. Main Suite 700
Durham, NC 27710

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Sincerely,


James R. Millette, Ph.D.
Executive Director

JRM/aw

Enclosure

PROJECT 1094 COMMENTS

5500 Oakbrook Parkway #200
Norcross, Ga.

Telephone 404-662-8509

MVA, Inc.
5500 Oakbrook Parkway, Suite 200
Norcross, Georgia 30093
(404) 662-6609

PLM ASBESTOS ANALYSIS

MVA #: 0885

Client: Nass, Motley, Loadholt, Richardson
& Poole

Sample ID #: D2917

Client Sample ID #: 129

Macroscopic Description: White welding rod

Asbestos Minerals:

Chrysotile	- 2%
Amosite	---
Crocidolite	---
Anthophyllite Asbestos	---
Tremolite/Actinolite Asbestos	---

Total Asbestos - 2%

Fillers/Binders/Pigment % - 78%

Fillers/Binders/Pigment Identified:

Mica/Vermiculite	---	Perlite/Pumice	---
Synthetic Foam	---	Carbonate	---
Gypsum	---	Pigment	---
Other	---		

Other Fibers:

Glass Fibers	---
Cellulose	- 20%
Synthetic Fibers	---
Other	---

Comments:

Analyst: Bill Turner

Date: 12/27/93

PROJECT 1040 ELEMENT

APPENDIX B

LABORATORY DATA FOR WELDING ROD ABRASION TESTS



**MATERIALS
ANALYTICAL
SERVICES**

March 8, 1985

Ms. Courtney Smith
Duke University Medical Center
Division of Occupational & Environmental Medicine
cx 2814
Durham, NC 27710

Dear Ms. Smith:

We have completed our analysis for the eight air samples that we received on March 4, 1985.

Our results for the analysis are enclosed. Please do not hesitate to give me a call after you have had a chance to review the data.

Sincerely,

William E. Longo, Ph.D.
President

WEL/mac

High Office
11611 Sunset Road • Suite 101
Raleigh, North Carolina 27606
(919) 211-7011 • FAX (919) 211-5571

Atlanta Office
3337 Peachtree Lane • Suite 250
Norcross, Georgia 30092
(404) 448-3200 • FAX (404) 448-4156



MATERIALS ANALYTICAL SERVICES

Project: Duke University Medical Center

MAS No: M-12582

Date: March 9, 1988

Phase Contrast Microscopy

<u>Client #</u>	<u>Structures/cc</u>
3	0.003
4	0.252
5	< 0.014
6	0.075
7	< 0.014
8	N/A (Blank)
9	0.032
10	N/A (Field Blank)

Transmission Electron Microscopy

<u>Client #</u>	<u>Structures/cc</u>
3	< 0.013
4	0.010
5	< 0.013
6	< 0.008
7	< 0.013
8	N/A (Blank)
8	1.231
10	N/A (Field Blank)

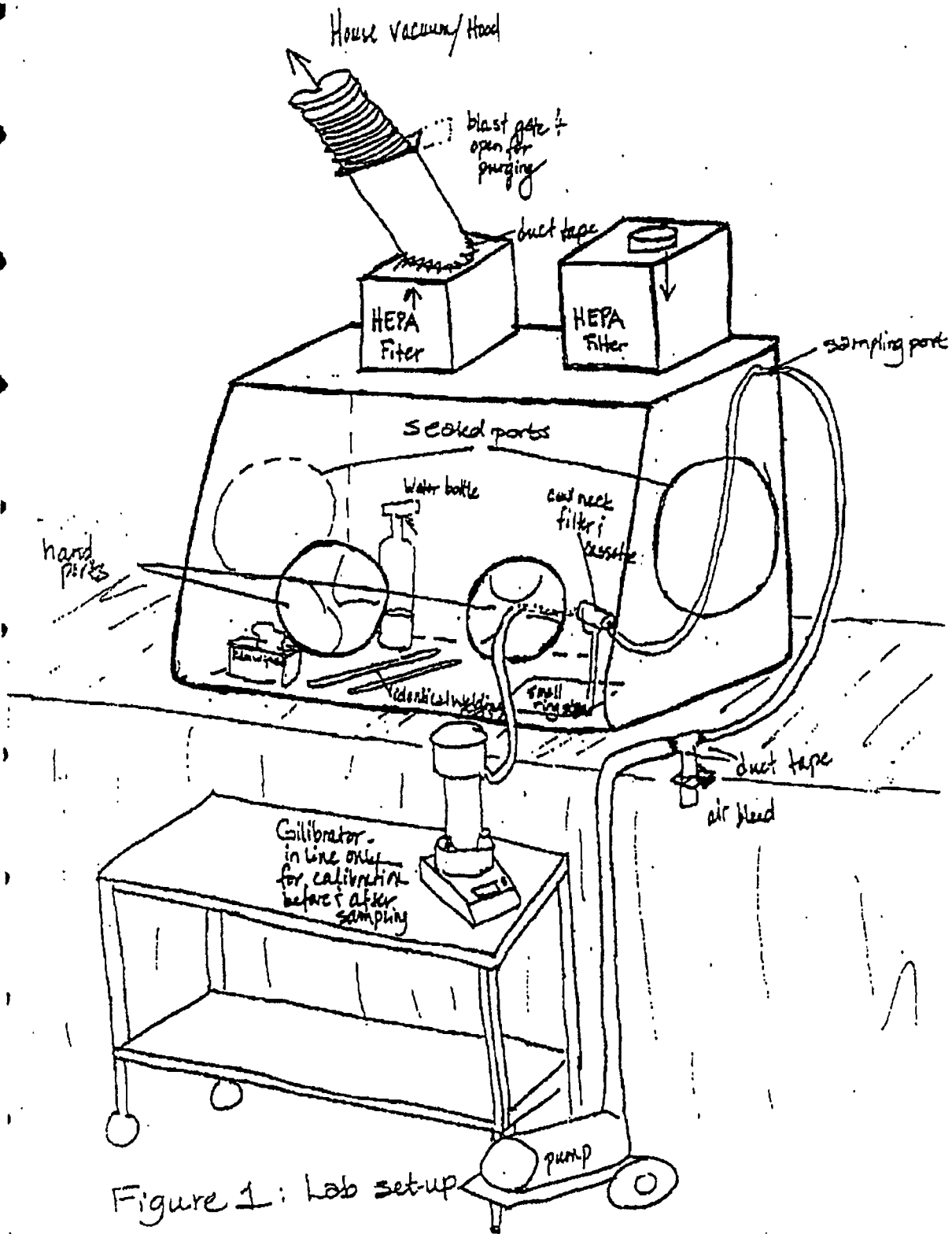


Figure 1: Lab set-up