FORM CHE-7350

THE HARTFORD

A.W. CHESTERTON
30 INDUSTRIAL WAY
WOBURN, MA 01801

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PLAINTIFF'S EXHIBIT
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CH-77

AN EVALUATION OF SIMULATED FIELD USE OF VARIOUS ASBESTOS-CONTAINING PACKING MATERIALS

STEPHEN W. CAMPBELL, CSP, CIH
MAY 11, 1983

INTRODUCTION

On May 11, 1983 a series of environmental tests were made at the A.W. Chesterton Research Facility at 30 Industrial Way, Woburn, MA 01801. The purpose of the evaluation was to monitor a simulation of the cutting, installation, and removal of asbestos-containing packing materials. Packings for both valves and pumps were utilized during the simulation.

The study was requested by David Lasnier, General Manager, A.W. Chesterton, and the evaluation were conducted by Stephen W. Campbell, Certified Industrial Hygienist, Hartford Insurance Group, Boston. Special thanks to Jack Santolucito and Bob Leduc for their time and courtesy.

This report represents the conclusions, recommendations, test methods and test results of the data obtained on May 11, 1983.

CONCLUSIONS

1. Airborne levels of asbestos measured during the simulation were all well below those limits generally regarded as safe. The sample that was obtained for the entire monitoring period of all six types of packing indicates levels of only 0.03 fibers per cc of asbestos. OSHA's legal limit for an 8-hour exposure to asbestos is 2.0 fibers per cc.
2. The simulation is deemed appropriate for the monitoring of the cutting and installation of asbestos containing packing materials. It should be noted that the removal of these packings from pumps and valves in field use may well pose a somewhat higher risk than that monitored.

The reason for the increased risk is associated with the deteriorated condition of the packings often experienced under normal wear and tear. The packing removed during the simulation was relatively new and intact; thus, the likelihood of generating airborne fibers of asbestos was substantially reduced.

RECOMMENDATIONS

Normal field operations involving the removal, cutting and installation of asbestos packing typically takes between 10-30 minutes. The variability is reportedly largely dependent upon the difficulty in removing the worn asbestos containing packing from valves or pumps. For test data to be truly meaningful, it is necessary to approximate field conditions as closely as possible. What is necessary, then is to obtain samples during removal of asbestos containing packing that has been "abused" under actual conditions of use.

As mentioned previously, the evaluation serves as a useful measure of employee exposure to asbestos during the cutting and installation of asbestos containing packings. Those values listed in the test results section of this report may well understate the actual amount of asbestos experienced by a field person during the removal of worn packing from valves and pumps. Accordingly, the following recommendation is being submitted.

83-A In order to approximate more closely a real field situation, monitoring of asbestos exposure to the removal of worn packing materials should be simulated. If it is possible to provide for several types of packing materials to be tested at one time, The Hartford's Loss Control Department would very much like to conduct this type of testing again.

TEST METHODS

The purpose of the study was to approximate employee exposure to asbestos during typical field operations for the removal, cutting and installation of various packing materials. A member of A.W. Chesterton's research staff at the Woburn facility assisted by simulating these operations utilizing 3 types of valve packings and 3 types of pump packings. Each of these packing materials was cut to length, installed in the appropriate equipment, momentarily brought up to normal operating conditions, and then removed. The total time for this procedure involved approximately 10-18 minutes.

One sample was taken during the entire procedure involving all 6 types of packing materials. In addition another sample was collected for each of the individual packing materials to measure the exposure created by that one substance.

The entire sampling period involved 97 minutes comprised of 6 separate sampling periods ranging from 14-18 minutes each. All samples were collected on millipore type AA0.8 micron cellulose acetate filters mounted in 3 piece open faced cassettes attached to the lapel of the operator. Air was drawn through these filters with the use of Mine Safety Appliance Model G Vacuum Pumps set at flow rates approximating 2.0 litres per minute. Analysis of samples was conducted by phase contrast microscopy. This technique measures all fibrous material present on the filter and may tend to overstate the actual presence of asbestos material.

Periodic calibration of all equipment and analysis of all samples takes place at The Hartford's AIHA Accredited Laboratory in Hartford, Connecticut.

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TEST RESULTS

All samples were collected on Jack Santolucito as he simulated the cutting, installation and removal of asbestos-containing packing. Sample #30 remained on his left lapel for the entire sampling period, whereas samples #31-37 were changed with each style of packing. The results obtained are all quite low and indicate exposures well below those levels generally regarded as safe.

SAMPLE #	TOTAL TIME (HRS:MIN)	TOTAL VOLUME(L)	TOTAL FIBERS	FIBERS/cc	STYLE PACKING
30	1:37	189	6,000	0.03	All listed below
31	0:16	32	$<$3,000	$<$ 0.09	Valve 1000
32	0:15	30	$<$3,000	$<$ 0.09	Valve 1500
33	0:14	29	$<$3,000	$<$ 0.09	Valve 5010
34	0:14	28	7,000	0.25	Pump 1722 Whitelon
35	0:18	36	3,000	0.08	Pump 320 Blueon*
36	0:18	36	3,000	0.08	Pump 330

OSHA's 8-hour legal limit	2.0
ACGIH TLV - Chrysotile	2.0
ACGIH TLV - Amosite	0.5
ACGIH TLV - Crocidolite	0.2

* Most likely contains crocidolite, whereas all others most likely contain chrysotile asbestos.

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Hopefully this report has been of assistance to you in your attempt to assess the exposure to airborne asbestos contamination.

Respectfully submitted,

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Certified Industrial Hygienist

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Dick Hoyle

EVALUATION OF AIRBORNE ASBESTOS DURING CUTTING, REMOVAL, AND PACKING OF PUMPS

STEPHEN W. CAMPBELL, CSP, CIH
JUNE 23, 1983
JUNE 28, 1983

INTRODUCTION

As a result of a previous study and recommendations made at that time, another evaluation of the simulated use of asbestos containing packing materials was conducted at the A. W. Chesterton plant in Woburn, MA. This latest study involved two sets of samples collected on June 23, 1983 and June 28, 1983. The first set involved strictly cutting of four types of asbestos containing packing material for a total of 65 pieces during a period lasting approximately one hour. The second sampling occurred several days later when a pump containing asbestos packing was dismantled, the packing removed, new packing cut, and installed. This procedure lasted only 17 minutes. The survey was conducted by Stephen W. Campbell, Certified Industrial Hygienist, The Hartford Insurance Group, Boston, MA. Special thanks to Jack Santoluccito, Bob LeDuc, and Victor DiDonato for their time and courtesy.

This report represents the conclusions, discussion of findings, test methods and test results of the data obtained on June 23 and 28, 1983.

CONCLUSIONS

All samples collected during the cutting, removal, and repacking of asbestos containing packing materials demonstrate airborne levels of fiber well below those levels generally regarded as safe. In fact, levels were so low that no measurable amount of fiber was able to be detected during the sampling period.

To provide an even more realistic assessment of this simulated exposure, additional tests should be performed during the removal of asbestos containing packing materials from pumps that have run for an extended period of time. Necessarily, such an approach will be ongoing by its nature, and will undoubtedly encompass a period involving several months.

DISCUSSION OF FINDINGS

Testing conducted on June 23, 1983 involved essentially a blind test. Simply this means that the material cut was known only to the operator and the tester by the code letters A, B, C, and D. In an attempt to obtain as long a sample as possible, and to approximate the absolute "worst case condition", the operator cut packing rings from each of these materials for periods of approximately 14-15 minutes. Depending upon the type of material, the amount available, and the ease of use, between 13-20 rings were cut from each of the unknown samples.

On June 28, 1983 a very brief sampling period was chosen since the operator merely had to remove the packing from a pump that had been run for a period of 14 hours. The removal procedure lasted approximately 10 minutes, following which the operator cut new rings and installed them back into the pump again. This procedure approximates a more realistic assessment of the typical conditions faced in the field. Since the pump was only run for a period of 14 hours, the deterioration of the gaskets was not significant. Consequently, additional testing in the future will hopefully measure exposures found under more severe conditions of use.

TEST METHODS

As in the past asbestos samples were collected by placing a three piece open face cassette onto the lapel of the operator during the processes described. Samples were collected in the three piece open face cassette on a millipore type AA, pore size 0.8 micron, 37 millimeter filter. Air was drawn through this apparatus with the use of a Mine Safety Appliance Model G Vacuum Pump operating at a flow rate of 2.0 liters per minute for the times indicated in the test results section.

In one instance the sampler was placed in an area extremely close to the stuffing box of the pump during the removal of asbestos containing packing material.

Analysis of all samples and the periodic calibration of the vacuum pumps takes place at The Hartford's AIHA Accredited Laboratory in Hartford, Connecticut. Analysis involved the counting of fibers via a phase contrast microscopy technique.

TEST RESULTS - ASBESTOS

All samples were collected on Jack Santoluccito during cutting of 5/16 inch or 10mm packing while cutting on a 50mm shaft on June 23, 1983. To simulate worst case conditions numerous cuts of each type of packing were made and the entire procedure lasted 57 minutes and involved 65 cuts of various packing.

SAMPLE #	TYPE PACKING	TOTAL TIME (HRS:MIN)	VOLUME(L)	FIBERS	FIBERS/CC	TOTAL CUTS
1	A, B, C & D	0:53	106	<3000	<0.03	65
2	A	0:15	30	<3000	<0.10	20
3	B	0:14	28	<3000	<0.11	13
4	C	0:14	28	<3000	<0.11	14
5	D	0:14	28	<3000	<0.11	18

OSHA - 8 Hour Time-Weighted Average Permissible Exposure Limit 2.0 Fibers/cc

The next series of samples were taken during the removal of A. W. Chesterton Model 2022 3/8 inch packing with a model 1722 end ring from a pump that had run for 14 hours. following removal of the six rings and the end ring another series of rings were cut and the pump was again packed for a future test.

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This activity took place on June 28, 1983 and the entire procedure lasted 17 minutes. Samples were taken on Jack Santoluccito and to the left side of the drive end of the pump stuffing box.

LOCATION	SAMPLE	TOTAL TIME (HRS:MIN)	VOLUME(L)	FIBERS	FIBERS/CC
Jack	6	0:17	34	<3000	<0.09
Area	7	0:17	34	<3000	<0.09

Hopefully this information has been of assistance to you in your attempt to evaluate field exposures to asbestos containing packing material.

Respectfully submitted,

Stephen W. Campbell, CSP, CIH
Certified Industrial Hygienist

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