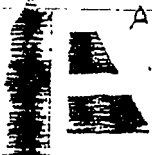


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INVESTIGATION OF ASBESTOS EXPOSURE

DURING

VALVE PACKING REPLACEMENT

PERFORMED BY:

ATLANTIC ENVIRONMENTAL, INC
2 E. BLACKWELL ST.
DOVER, NJ

INVESTIGATION PERFORMED AT:

THE TURBOFANE MATERIALS EXPOSURE
CHAMBER (AMEC)
83 BASSETT HIGHWAY
DOVER, NJ

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Investigation of Asbestos Exposure during Packing Replacement

August 28, 2000

1.0 INTRODUCTION

A steam valve packing replacement was performed at the Atlantic Environmental, Inc. AMEC (Airborne Materials Exposure Chamber), located at 83 Bassett Highway, Dover, NJ, on August 28, 2000. The evaluation involved monitoring for potential exposure to asbestos fibers during the replacement of packing in a 1 1/4 inch steam valve.

2.0 TEST PROTOCOL

2.1 Background Clearance Samples

Background clearance samples inside the chamber were obtained using uniform clearance criteria developed by Atlantic Environmental, Inc. The results of the five clearance air samples utilizing TEM analysis indicate levels of less than 0.005 fibers of asbestos fibers of 5 micron or greater in length.

2.2 Participants

The following individuals were directly involved in this study:

- Tom Merz, Steamfitter
- Robert Sheriff, Acting as Steamfitter Assistant
- Dr. Frederick M. Toca, Observer and Coordinator of Activities (outside the chamber)
- Asbestos Specialist (to prepare chamber, coordinate sampling, and filming activities)
- Environmental Technician (to perform duties outside the chamber, as required)

2.3 Valve History

A steam valve was received via Federal Express from Mr. Robert Lee, General Manager, ADI Technologies, Inc., 121 Queens Street, Honolulu, Hawaii. In a statement from Mr. Lee dated 8/23/00 the 1 1/4 inch steam valve came from a Honolulu machine shop and was rated for 900 PSI at 775° Fahrenheit. Mr. Lee confirmed that it was from an ocean going vessel, but could not identify the vessel or origin. This valve was designated as valve # HON002. The valve packing from HON002 was removed as part of a study performed on August 23, 2000.

On August 28, 2000 this same valve was repacked with John Crane Style No. 815 1/4 inch packing.

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2.4 Steam Fitter Operator

Mr. Thomas C. Merz, a journeyman plumber/pipefitter with 25 years experience, performed the valve packing replacement. During his 25 years, Mr. Merz has performed valve packing removals and replacements on water, hot water, steam, foam CO², Halon, and sprinkler systems.

2.5 Packing Replacement

The packing replacement by Mr. Tom Merz began at approximately 11:25 a.m. Eastern Daylight Time on August 28, 2000. Four pieces of John Crane Valve Packing Material Style # 815 1/4 inch of the appropriate diameter to correctly fit the valve stem opening were measured and cut with a knife. Each piece was the length of 1 diameter around the valve shaft. The packing was installed so that the ends were staggered around the shaft. The entire replacement was completed at approximately 11:38 a.m. During the project Mr. Merz used his own tools, which he brought with him and used procedures that he normally would utilize in his profession.

3.0 Test Results

All material and air samples were analyzed by Scientific Laboratories, Inc., New York. New York. Scientific Laboratories is a certified laboratory.

3.1 Sample Analysis

- 3.1.1 Air samples were analyzed by PCM (Phase Contrast Microscopy) using NIOSH 7400 and TEM (Transmission Electron Microscopy) using NIOSH 7402 Analytical Methods.

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3.2 Sample Results

3.2.1 Air Sample Results

- Three area samples inside the test chamber were analyzed by PCM and all samples indicated actual concentrations of less than 0.023 fibers/cc 5 microns or longer.
- One area sample inside the chamber was analyzed by TEM and indicated no asbestos fibers detected at the lower detection limit of 0.0093 f/cc.
- Two personnel samplers (using battery powered sampling devices) on the steamfitter both indicated exposure levels of less than the detection limit of 0.096 f/cc, during the sampling period. This translates to an 8-hour time weighted average of less than 0.0026 f/cc.
- Two personnel samples, using battery powered personnel samplers attached to the assistant indicated exposure levels of less than the detection limit of 0.093 fibers/cc and 0.090 fibers/cc, respectively, during the sampling period. This translates to 8 hour time weighted average levels of less than 0.0025 f/cc and 0.0024 f/cc, respectively.
- The two personnel samples (1 on the steamfitter, and the other on the assistant) using high flow samplers (at 10 liters per minute) indicated levels of 0.040 f/cc and 0.024 f/cc, respectively, during the sampling period. This translates to an 8-hour time-weighted average of 0.001 f/cc and 0.00065 f/cc, respectively.

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4.0 CONCLUSION

Air sampling test results during replacement of asbestos containing packing into the steam valve indicate exposure to the operator and assistant that is significantly below the current OSHA allowable limits. Calculating the exposure limits for a time-weighted average over an 8-hour day (based upon the high flow samplers) indicates exposure levels of approximately 121 times lower than the current OSHA limit of 0.1 f/cc.

In conclusion this evaluation of employee exposure during the replacement of asbestos containing packing materials indicates that the overall exposure of individuals performing packing replacement in conditions and circumstances involved in this test, does not pose a significant health risk.

Report prepared by:

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President

8/30/00
Date