

INDUSTRIAL HYGIENE STUDY

FOR

CUTLER HAMMER

POWER DISTRIBUTION AND CONTROL DIVISION

BOWLING GREEN, KENTUCKY

INTRODUCTION

This report covers the Industrial Hygiene study conducted in this plant on April 29, 1976. The purpose of the study was to evaluate employees' exposures to asbestos fiber in the thermo-plastic molding department.

SUMMARY OF RESULTS

Detailed results of this study may be found in the attached tables at the end of this report.

Employees' exposures to asbestos fibers were less than the current, the July 1, 1976 effective and the proposed OSHA allowable limits at all locations sampled. As will be seen from sample T-147, the break shoe assembly operator's exposure exhibited an asbestos fiber level of 1.0 fiber per cc. However this elevation of the atmospheric level as compared to subsequent samples on this operator is due to the fact that the down draft ventilation table was not in operation until 0930 hours.

Suggestions are made below to more effectively exhaust the contaminant generated at the slug press. This suggestion is made in the interest of good industrial hygiene practice since the employees' exposure doesn't necessarily justify further ventilation improvements due to the low atmospheric concentration. It is the opinion of industrial hygienists however, that the atmospheric level will be higher when the operator is required to pre-form more than one batch (250 pounds) of the thermo-plastic resin containing asbestos fibers.

A recent Occupational Safety and Health Review Commission decision, states that periodic medical monitoring of the exposed employees is necessary regardless of the airborne concentration of asbestos fiber. This decision will be discussed below.

PLAINTIFF EXHIBIT

CUT 5033

DEPOSITION
EXHIBIT

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Additional material is attached which will aid in the start up of an in-house atmospheric monitoring program by Cutler Hammer personnel.

RECOMMENDATIONS

1. The ventilation serving slug press M-3608 used for pre-forming of the plastic resin containing asbestos fiber, should be upgraded to completely enclose the mold die and feed spout. See Discussion for details.
2. At the end of each day the settled dust on the slug press and adjacent area should be removed with a vacuum cleaner which is presently available.
3. The break shoe assembly operator should be instructed to open the blast gate or damper on the duct serving the down draft ventilated table prior to assembly activities.
4. The open end flexible ducts serving various grinders and the multiple spindle drill presses should be equipped with hoods to more effectively capture the contaminant generated at the point of operation.

EQUIPMENT AND STUDY PROCEDURES

Employee exposure to asbestos fibers was evaluated by equipping various operators with MSA Model G pumps and Millipore cellulose acetate membrane filters, attached to the employee's lapel. The top cap of the filter cassette was removed to expose the entire filter face to the atmosphere. The flow rate was adjusted to 2.0 liters per minute with the use of a calibrated Brooks Precision Rotometer, checked periodically (at least every 30 minutes) throughout the sampling period and readjusted if necessary. The samples were worn for the time noted on the attached data sheet subsequently analyzed using a phase contrast microscopic technique, at a magnification of 450x.

Where more than one sample was acquired to determine the operator's exposure, a time-weighted average exposure was determined from the formula:

$$TWAE = \frac{C_a T_a + C_b T_b + \dots + C_n T_n}{\sum T}$$

where: C_a = the concentration acquired over the sampling period T_a .

$\sum T$ = the total time sampling.

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Ventilation measurements were made with an Alnor velometer equipped with various probes, which enables the industrial hygienist to measure a wide range of air velocities. The readings on Table 2 marked as averages, indicate that a 9 point velocity traverse was made of the hood face. The 9 points were then averaged to determine the face velocity.

DISCUSSION

Asbestos is a term applied to a number of mineral silicates, most common being chrysotile, the other types known as amosite, crocidolite and anthophyllite. Prolonged, repeated exposure to asbestos can cause a fibrotic condition of the lung known as asbestosis. Symptomatic of this disease is difficulty in breathing, coughing, chest pains, decreased chest expansion, loss of weight and weakness. There is also evidence to suggest that exposure to asbestos fibers can cause a type of lung cancer. The present threshold limit value or OSHA allowable limit is 5 fibers per cc of air greater than 5 microns in length. This limit however will be dropped 2 fibers per cc of air greater than 5 microns in length in July of 1976.

Ventilation on the Defiance slug press M-3608 could be improved to more effectively capture the dust generated here. The point between the mold die and the feed sleeve or chute appears to be the source of greatest dust exposure. To a lesser degree the raw material holding hopper was also observed to dust, especially near the end of the batch. An enclosure of this previously mentioned point with a design as displayed in the lower right hand corner of the attached ventilation sketch VS-303, could be adapted here. A 45 degree branch from the hood could be attached to a flexible duct to the main, thereby allowing the hood to move with the slide arm. Not only would this further reduce the employees' exposure to asbestos containing dust since it would collect the contaminant directly at the point of operation, but also it would partially alleviate the build-up of dust on the machinery and floor, which eventually becomes airborne again with personnel and vehicular traffic in the area.

The open end ducts on the grinding operations in the adjacent department do not effectively direct the air flow past the point of operation. A more effective means would be to install small conical hoods to the ends of the flexible ducts. The hoods could also be equipped with small magnets to keep them in place during grinding, buffing and drilling operations. On the present operating conditions due to the lack of a means of support these open end ducts are often left to the side of the operation providing no exhaust whatever for the contaminant.

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A decision by the Occupational Safety and Health Review Commission in the latter part of 1975 stated that employees exposed to asbestos fiber regardless of the concentration must be offered pre-employment and periodic medical exams, which include a 14 x 17 inch chest X-ray and lung function tests and a history of respiratory diseases. For the company's benefit, it would be advisable to initiate these medical programs especially on a pre-employment basis. Since the pre-employment physical will indicate any employee who may be entering the plant with a past respiratory illness which could be aggravated by additional exposure. Naturally, any plans of this nature should be approved by a physician who is familiar with the practice of occupational health medicine.

The company has indicated that it plans to initiate an in-house monitoring program for asbestos fiber as well as other contaminants. The particular method of sampling for asbestos was discussed with the plant contact on the day of the study and is also covered in the attached "Fundamentals of Industrial Hygiene" manual.

Briefly stated, the sampling must be indicative of the employees' actual exposure. Therefore breathing zone samples must be acquired. Since asbestos is given an 8-hour time-weighted average and a ceiling limit, sampling must be designed to measure both these limits. The ceiling sample is acquired during periods of expected highest exposure, such as during dumping of the asbestos containing resin into the feed hoppers.

It is essential when acquiring air samples to measure the air flow through the filter accurately, keep a record of the duration of the individual samples and handle the filter cassettes with care so as not to introduce additional fibers onto the filter from your hands or employee's clothing.

The question then arises, how often should samples be acquired after the initial determination? The NIOSH criteria document on asbestos (HSM72-10267) states annual determinations are necessary on those employees with an exposure less than the allowable limit and on a quarterly basis for those employees who have exposures in excess of the allowable limit. The present federal standard on asbestos states in OSHA Section 1910.1001 (s)(2)(ii) that "in no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits....".

Respectfully submitted,

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