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COMPANY CONFIDENTIAL

John H. Field Dept. 1501 - Bldg. 276-B

John W. Born Dept. 0020 - Bldg. 5-H 3/2/73

Surveys of Asbestos Fiber Concentrations in Building 276-B

Summary:

On December 18 and 28, 1972, I measured atmospheric concentrations of asbestos fibers in Bldg. 276-B. The measurements occurred during each customary cyclic operation. The basic operations were loading, hand-trucking, and unloading the bags of asbestos and then emptying the bags into the churns. The Occupational Safety and Health Act (OSHA) has set concentration limits of 5 fibers (longer than 5 micrometers) per milliliter until July 1, 1976 and 2 fibers/ml thereafter. The majority of operations involving asbestos in Bldg. 276-B are in serious violation of the OSHA limit. Prompt engineering and administrative steps must be taken to correct the hazardous conditions.

Recommendations

1. Install a local exhaust ventilation system at each chute through which asbestos fibers enter the churns:

   a. Fit each local exhaust system with a disposable filter.

   b. Dispose of the filters regularly in an approved manner.

   c. Have Dept. 0020 remeasure the atmospheric concentrations of asbestos as soon as the exhaust systems are installed.

2. Use a portable vacuum cleaner to remove residual amounts and spills of asbestos fibers promptly:

   a. Make sure that the vacuum cleaner has a bag or filter which is approved for collecting asbestos fibers.

   b. Dispose of the filters regularly in an approved manner.

   c. Make the vacuum cleaner permanently available in the churn and storage areas.

   d. Have the compounder remove the asbestos fibers from the churn and floor surfaces and from his clothing and person as soon as the batch is mixed.

   e. Have the supply man remove the asbestos fibers from his clothing and person and from the hand-truck as soon as the bags have been delivered.

f. Have the supply man remove the asbestos fibers from the floor, skid, and bag surfaces in the asbestos storage areas whenever necessary.

3. Obtain and use a waste container for empty asbestos bags which will minimize the dispersal of fibers during the disposal of the bags.

4. Reseal the open bags of dried asbestos before removing them from the hot room.

5. Until the local exhaust systems and the vacuum cleaner are in satisfactory regular use:

   a. Have all workers who are exposed to asbestos fibers wear dust respirators which are approved by the U. S. Bureau of Mines for asbestos fibers.

   b. Have all such workers remove the asbestos fibers carefully from their clothing and persons promptly to avoid breathing or swallowing the fibers afterward.

   c. Have all such workers remove the asbestos fibers from the work surfaces as soon as the operation is finished.

6. Notify Dept. 0020 when the local exhaust systems and the portable vacuum cleaner are first put into use.

7. Notify Dept. 0020 whenever there is a new job classification which requires exposure to asbestos fibers.

Results and Discussion:

The surveys of the operations in Building 276-B indicate that the present excessive asbestos concentrations are correctable. However, it appears that extensive engineering improvements are necessary.

Measurements of atmospheric concentrations of asbestos fibers were made during complete work cycles. These cycles are summarized in the accompanying table. There were two basic types of work. One type involved loading the asbestos bags fromthe supply area onto a hand truck, taking the bags to the churn area, and unloading and restacking the bags. The second type involved emptying the asbestos from the bags into the churns through the chutes. There are two types of churn chutes. One type has a hood over its waist-high opening. The other type has a hinged lid at its opening about 18 inches above the floor. The asbestos fibers were used both in the as-received condition and after being dried in a hot room.

The table states the atmospheric concentrations of asbestos fibers during the various types of work. These concentrations were measured in the breathing zones of the workers. The workers included the supply man who delivered the bags to the churn area and the compounder who

fed the asbestos into the churn. In two of the four cases the same man did both jobs. The table gives the exposure times for the several types of work. It then gives the corresponding asbestos concentration in the air. The four concentrations must be compared with the threshold limit value (TLV). This value is the 8-hour time-weighted limit for the average atmospheric concentration of asbestos fibers longer than five micrometers. At present this limit is five fibers per milliliter (ml). As of July 1, 1976, the limit will become two fibers per ml. In both cases concentrations from 5 to 10 fibers per ml are permitted for 15 minute periods each hour up to five times daily. The time-weighted average concentration still must not exceed the threshold limit value.

Studies of the information in the accompanying table permit several conclusions. Each average asbestos concentration per single cycle exceeded the threshold limit value. The TLV is a time-weighted value which is averaged over an 8-hour workday. Whether the measured concentration actually exceeds the TLV depends upon the nature and number of the cycles of exposure per day. However, in all four operations the concentration exceeded even the short-time limit. Therefore, in each case the exposure to asbestos fibers was in violation of the OSHA standard. Loading, transporting, and unloading the bags of asbestos expose a worker to a higher concentration of asbestos fibers than does emptying the same number of bags into a churn. The atmospheric concentration during the addition of asbestos to the churns was higher for Churn 313 than for Churn 108.

The higher value in the case of Churn 313 may be due to two features. First, the opening of its chute is closer to the worker's breathing zone. Second, the shape of the chute tends to direct the escaping fibers toward the worker's face. Furthermore, the asbestos fibers blew out of both chutes after addition of the asbestos when the mixing started. These clouds of asbestos fibers undoubtedly added significantly to the average concentrations.

One likely cause of the higher exposure to the supply man is the dust collection on the stacks of non-dried asbestos bags. Some asbestos escapes from the bags during stacking. When the bags are taken off the stacks and put on the hand truck and then onto the floor, this dust rises into the worker's breathing zone. Removal of the dust with the vacuum cleaner before handling would minimize this source of exposure. Also, prior to drying the asbestos in the hot room, the supply man cuts off the tops of the bags. These openings allow the asbestos fibers to rise into his breathing zone when the bags are placed on the hand truck. Resealing the bags after drying would eliminate this source of exposure to asbestos fibers.

Until July 1, 1976, the required local exhaust ventilation system must capture all but five fibers per ml of asbestos in the air around each chute. After that date it must capture all but two fibers per ml. This capture might be accomplished by either one exhaust duct on each of two sides of the chute or a full exhaust ring. In addition to the

local exhaust system some method of preventing blow-back of the asbestos through the chute will be necessary. In the case of the chute with a hinged lid, a gasket seal and tight closure may be sufficient. Also the local exhaust system must avoid the release of hazardous concentrations of asbestos fibers to the atmosphere outside the plant. The local exhaust system therefore may require a filter. A disposable type of filter is recommended. The workers must either clean or dispose of the filters regularly in an approved manner.

Another source of exposure is a dispersal of asbestos fibers into the air during the sweeping after adding the asbestos to the churn. Therefore, I recommend the use of a vacuum cleaner to remove residual amounts and spills of asbestos fibers promptly. The vacuum cleaner must have a filter with the right pore size to retain asbestos fibers longer than five micrometers. The filters must permit safe and easy disposal. Use of the vacuum cleaner should make little or no sweeping necessary. Since both the supply men and the churn operators must use the vacuum cleaner at widely separated locations, it must be portable and readily available. It is important to remove the asbestos fibers from each worker's clothing and person as soon as he has finished handling the asbestos. This removal also can best be done with the vacuum cleaner.

Asbestos fibers from "empty" bags are a potential hazard during disposal. A different type of waste control for the empty bags is necessary to minimize the dispersal of the asbestos fibers during the disposal. It is obvious from the accompanying table that the workers who are exposed to asbestos must have temporary respiratory protection. They will be required to wear dust respirators which are approved by the U. S. Bureau of Mines throughout such exposures. These workers also must remove the asbestos fibers from their clothing and persons promptly to avoid breathing or swallowing the fibers afterwards.

OSHA requires two safeguards for workers exposed to asbestos fibers. It requires a comprehensive annual pulmonary examination for each worker exposed to asbestos fibers. It also requires measurements of the atmospheric concentrations of asbestos fibers longer than five micrometers in each area where asbestos is used. Department 0020 therefore would appreciate prompt notice of any new asbestos process and any new job classification involving such asbestos exposures.

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cc: John H. Codrea
Kenneth G. Kemp

Asbestos Exposures During the Compounding and Mixing of Adhesives

Description of Work during Atmospheric Sampling	Exposure Time (min.)	Avg. Asbestos Concentration* (fibers/ml)
Emptying of fifteen 50-lb. bags of Code 164 asbestos (non-dried) into Churn No. 108	8.5	11.
Transporting of fifteen 50-lb. bags of non-dried Code 164 asbestos to the Churn 108 storage space	3.0	24.
Transporting of twenty-six 50-lb. bags of dried Code 164 asbestos to Churn 108 and emptying of the asbestos into the churn	25.5	7.4
Transporting of fifteen 50-lb. bags of non-dried Code 164 asbestos to Churn 313 and emptying of the asbestos into the churn	12.5	24.

* The present 8-hour time-weighted limit (TLV) for the average atmospheric concentration of asbestos fibers longer than 5 micrometers is 5 fibers per ml. As of July 1, 1976, the limit will become 2 fibers per ml. In both cases the concentration must never exceed the ceiling limit value of 10 fibers per ml.