

NIOSH SURVEY
GENERAL SERVICES ADMINISTRATION
MARION, OHIO AND FORT WAYNE, INDIANA DEPOTS

SEPTEMBER 12, 1975

STUDY REQUESTED BY:

_____, Chief
Accident and Fire Prevention Branch

STUDY CONDUCTED BY:

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16. Abstract (Limit: 200 words) -Surveys were conducted at the General Services Administration (SIC-4225) depots in Marion, Ohio and Fort Wayne, Indiana, on June 2 and 3, 1975. A total of 27 atmospheric samples were collected to determine the airborne concentrations of asbestos (1332214) fiber in various warehouses and during handling operations. Personal samples were taken to determine employee exposures, and area samples were collected to determine concentrations in warehouses with minimal activity. Samples collected in warehouses with little activity were below the limits of detection for asbestos. Vacuuming and repairing of asbestos filled bags were the most hazardous operations, with values above the proposed OSHA standard of two fibers per cubic centimeter. At the Marion depot, the checker's exposure was close to the proposed standard. Samples collected in the Fort Wayne depot were well below the standard. The authors recommend the use of protective clothing, respirators, and medical surveillance for all workers exposed to asbestos, with chest X-rays and pulmonary function tests to be performed every 2 years. ←				
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SUMMARY

On June 2 and 3, 1975, at the request of Chief of Accident and Fire Prevention Branch, the Industrial Hygiene Services Branch (IHSB) of the National Institute for Occupational Safety and Health (NIOSH) conducted an asbestos survey of the General Services Administration (GSA) Depots located at Marion, Ohio and Fort Wayne, Indiana.

A total of 27 atmospheric samples were collected to determine the airborne concentration of asbestos fiber present in various warehouse locations and during handling operations. Ten personal samples were collected to determine employee exposures associated with handling operations. Seventeen area samples were collected to determine asbestos concentrations in warehouse with minimal activity.

The results of the testing (table 1 and 2) in conjunction with procedural observations, were used as criteria to establish guidelines and prescribe recommendations to help insure a healthful work environment.

INTRODUCTION AND PURPOSE

On June 2 and 3, 1975, at the request of _____ Chief of Accident and Fire Prevention Branch, the Industrial Hygiene Services Branch (IHSB) of the National Institute for Occupational Safety and Health (NIOSH) conducted an asbestos survey of the General Services Administration (GSA) Depots located in Marion, Ohio and Fort Wayne, Indiana. Atmospheric samples were collected to determine the airborne concentration of asbestos fiber present in various warehouse locations. The results of these tests in conjunction with procedural observations, were used as criteria to establish guidelines and prescribe recommendations to help insure a healthful work environment.

METHODOLOGY

Personal and/or fixed location samples were collected in several warehouses where asbestos was stored. In order to assess employee exposure to the contaminant during handling operations, two mock operations were conducted. At the Marion Depot, the potential exposure for the lift-truck operator, checker and inspector were determined for an operation involving the re-location of palletized asbestos packaged in burlap bags. At Fort Wayne (Casad Depot), samples were taken of a cleaning operation involving the patching of torn burlap bags and the vacuuming of the bags,

pallets and general storage area. In each mock operation the sampling procedure entailed the collection of personal and area samples. For all other locations at both Depots, area samples were taken during dormant conditions. Only in section 4, Warehouse T-214 (Casad Depot), was there any activity (lift-truck activity in adjacent section approximately 20-30 feet from asbestos stacks).

Atmospheric samples for asbestos were collected on 0.8 micrometer (μ) pore size mixed cellulose filters with a diameter of 37 millimeters (mm). The filters were incased in a three piece plastic cassette with the face piece removed (open faced) during sampling. Battery powered Mine Safety Appliance (MSA) gravimetric pumps, Type G, equipped with pulsation dampeners were used to draw air through the filters at a rate of 2.0 liters per minute (lpm). Personal samples were collected by having the employee wear the pump with the attached filter positioned within his breathing zone. Area samples, placed in proximity of the asbestos stacks, were taken using the same equipment.

The samples were analyzed at the Salt Lake City Laboratory. The procedure consisted of counting fibers greater than 5 μ in length at 400-450 magnification, using phase contrast illumination, with the sample mounted in a high-viscosity solution of membrane filter material.

TOXICOLOGY

Asbestos is a generic term that applies to a number of naturally occurring silicates of variable composition, but basically are of a form of hydrous magnesium silicate. Their chief characteristic is a structure composed of long, parallel, flexible fibers, capable of repeated longitudinal subdivision. The most widely used form in the United States is chrysotile, a fibrous form of serpentine. Other types include amosite, crocidolite, tremolite, anthophyllite and actinolite.

Prolonged inhalation of asbestos fibers may result in a form of pneumoconiosis known as asbestosis. The fibers, upon deposition in the terminal bronchioles, initiate a tissue response which results in the coating of the fiber with the ultimate production of what is known as the asbestos "body". If large quantities of the fibers are inhaled over a prolonged period, the tissue reaction progresses until a generalized, diffuse fibrosis becomes evident. This fibrosis is first seen in the lower lobes of the lungs but eventually, if exposure continues, appears in the other lobes as well. Respiratory insufficiency and cardiac failure may supervene due to the impaired oxygen transfer across the alveolar membranes. It is of interest that fibers between 20-50

micrometers in length are the most active in the production of fibrosis with fibers less than 2 micrometers being less significant.

Along with asbestosis, recent studies have indicated a relationship between inhalation of asbestos and cancers of the bronchi, pleura and peritoneum. However, data is not conclusive to define the association of each type of asbestos to the formation of the mesothelioma.

FEDERAL STANDARD

The existing standard for asbestos (29 CFR 1910.93a) based on an eight-hour time-weighted average (TWA)* shall not exceed 5 fibers longer than 5 micrometers per cubic centimeter (u/cc) of air, with a ceiling value of 10 fibers longer than 5 u/cc of air. Effective July 1, 1976, the Department of Labor (OSHA) Standard will be 2 fibers/cc.

DISCUSSION OF RESULTS AND RECOMMENDATIONS

At the Marion Depot the checker's exposure to asbestos was close to but below the proposed standard effective July 1, 1976. Samples collected in warehouses with little or no activity yielded results below the analytical limits of detection (Table 1).

*TWA - USDOL employee exposure standards are based on a computed time-weighted average (TWA) exposure during any 8-hour shift of a 40-hour work week. The standard represents conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effects.

Samples collected in the Casad Depot warehouses during dormant conditions yielded results well below the proposed standards. Vacuuming and repairing of asbestos filled bags were the most hazardous operations evidenced during the survey, (Table 2). Personal samples taken on two of the three fork lift operators during asbestos bag vacuuming and repairing were in excess of proposed standard.

In view of the sampling results, the hazardous properties of asbestos, and the effective date of the new standard, it would be advisable to implement the U.S. Department of Labor's proposed standard at this time. Basic guidelines cited herein are from the Occupational Safety and Health Act of 1970 (29 CFR 1910.93a Volume 39, June 27, 1974) and the NIOSH Criteria Document HSM 72-10267. Attention should be given to employee education or awareness programs, improved hygiene and work practices, medical examinations and a respirator program as discussed in the following paragraphs.

Each employee exposed to asbestos should be advised of all hazards and precautions concerning use or exposure. Each exposed worker should be informed of the information applicable to a specific product or material containing 5% or more asbestos.

The information should be kept on file and readily accessible to the worker at all places of employment where asbestos materials are used in unit processes and operations. All pertinent information should be recorded on

U.S. Department of Labor Form OSHA-20, "Material Safety Data Sheet", or a similar form approved by the Occupational Safety and Health Administration, U.S. Department of Labor.

When the limits of exposure to asbestos dust cannot be met by engineering controls or administrative techniques, an employer must utilize a program of respiratory protection and furnish protective clothing to effect the required protection of every worker exposed.

A. Respiratory Protection

For the purpose of determining the class of respirator to be used, the employer must measure the atmospheric concentrations of airborne asbestos in the workplace initially and thereafter whenever process, work-site, climate or control changes occur which are likely to affect the asbestos concentration. The employer shall test for respirator fit and/or make asbestos measurements within the respiratory inlet covering to insure that no worker is being exposed to asbestos in excess of the standard either because of improper respirator selection or fit.

1. Prior to issuance of a respirator for continuous or occasional use, the user shall be examined by a physician. This is to determine

the physical ability of the employee to function normally during the respirator use.

2. The user shall be instructed in the proper use of the respirator and its limitations. Instructions on the adjustment of the equipment and methods of replacement of parts are necessary for the user.

3. Respirators shall be inspected periodically and cleaned after each use. Face pieces shall be cleaned in warm soapy water and disinfected with hypochlorite solution. Replacement of filters may be necessary following excessive breathing resistance, or when worn or deteriorated parts are noticed.

4. Respirators shall be stored in dust proof containers or their own cartons. Rubber parts should not be stored in a crushed position as distortion of the face piece may occur. Equipment for emergency work shall be stored in locations easily accessible.

5. Selection and use of appropriate respiratory protection shall be based on 29 CFR 1910.93a(d)(2), and 29 CFR 1910.134(b).

6. More detailed requirements can be found in 29 CFR 1910.93a(d)(2) (Asbestos) and 29 CFR 1910.134 (respiratory protection).

7. The NIOSH Certified Personal Protective Equipment publication * offers a listing of NIOSH approved respirators for asbestos. These respirators are the only types approved for use.

B. Protective Clothing

1. The employer shall provide each employee subject to exposure with coveralls or similar full body protective clothing and head covering to be worn during the working hours in areas where there is exposure to asbestos dust.

2. The employer shall provide for maintenance and laundering of the soiled protective clothing, which should be stored, transported and disposed of in sealed non-reusable containers marked "Asbestos-Contaminated Clothing" in easy-to-read letters.

*Available by sending a self-addressed mailing label to: Office of Technical Publications, NIOSH, U.S. Post Office Building, Cincinnati, Ohio 45202.

3. Protective clothing shall be vacuumed before removal; clothes should not be cleaned by blowing or shaking.

4. If laundering is to be done by private contractor, the employer must inform the contractor of the potentially harmful effects of exposure to asbestos dust and of safe practices required in the laundering of the asbestos-soiled work clothes.

5. Resin-impregnated paper or similar protective clothing can be substituted for fabric type of clothing.

MEDICAL SURVEILLANCE

Medical surveillance is required for all workers who are exposed to asbestos as part of their work environment. The major objective of such surveillance will be to ensure proper medical management of individuals who show evidence of reaction to past dust exposures, either due to excessive exposures or unusual susceptibility. Medical management may range from recommendations as to job placement, improved work practices, cessation of smoking, to specific therapy for asbestos-related diseases or its complications. Medical surveillance cannot be a guide to adequacy of current controls when environmental data and medical examinations only

cover recent work experience because of the prolonged latent period required for the development of asbestosis and neoplasms.

Required components of a medical surveillance program include periodic measurements of pulmonary function (forced vital capacity (FVC)), and force expiratory volume for one second (FEV), and periodic chest roentgenograms (postero-anterior 14X17 inches). Additional medical requirements include a history to describe smoking habits and details on past exposures to asbestos and other dusts and to determine presence or absence of pulmonary, cardiovascular, and gastrointestinal symptoms, and a physical examination, with special attention to pulmonary rates, clubbing of fingers, and other signs related to cardiopulmonary systems.

Chest roentgenograms and pulmonary function tests should be performed at the employers expense at least every two years on all employees exposed to asbestos. These tests should be made annually to individuals, (1) who have a history of 10 or more years of employment involving exposure to asbestos or, (2) who show roentgenographic findings (such as small opacities, pleural plaques, pleural thickening, pleural calcification) which suggest or indicate pneumoconiosis or other reactions to asbestos, or (3) who have changes in pulmonary function which indicate restrictive or obstructive lung disease.

Preplacement medical examinations and medical examinations on the termination of employment of asbestos exposed workers should be given.

LABELING

A warning label for asbestos as shown in Figure 1 should be used.

Numerical designations indicate the following:

1. 4 = Health Hazard (color code, blue). Inhalation may cause asbestosis, pleural or peritoneal mesothelioma, or lung cancer.
2. 0 = Fire Hazard (color code, red). Asbestos is non-flammable and has negligible vapor pressure, volatility, flash point, and explosive limits.

RECOMMENDATIONS

Due to the sampling results and observations at the Marion and Casad Warehouse the following recommendations are submitted.

1. Employees exposed to asbestos shall wear protective clothing e.g. coveralls, head covering, gloves, foot coverings.

a. Vacuum garments prior to removal and place in designated containers.

b. Store clothing in separate lockers.

2. Provide suitable showering facilities for employees.

3. Eating, drinking, or smoking is not permitted in contaminated areas.

4. Appropriate warning signs must be posted in contaminated areas.

5. Initiate a respirator program as outlined in the text of this report.

6. Provide medical examinations for all employees exposed to asbestos. Medical surveillance shall include all examinations listed in this report.

7. Conduct periodic environmental sampling for operations involving asbestos handling and storage as outlined in 29 CFR 1910.93a.

8. Consolidate asbestos storage into one or two warehouses at each facility.

9. All cleanup of asbestos dust should be performed by vacuum cleaners or wet cleaning methods.

10. All asbestos waste scraps, contaminated clothing, etc., consigned for disposal must be disposed of in sealed impermeable bags.

11. Palletize all "sugar stacked" asbestos. Prior to palletizing bagged asbestos, bags should be sealed using a plastic wrapping or any other suitable type wrapping material. Wrapping should be accomplished with minimum handling, however.

12. Use of electric-powered fork trucks in lieu of gas powered types will help prevent the evolution of fibers into the air. An additional benefit would be the prevention of unwanted emissions from the gas trucks.

13. Avoid unnecessary moving and restacking of unpalletized and unsealed asbestos.

14. Do not hand stack asbestos in railroad shipping cars unless each bag is sealed in a plastic wrapping. Hand stacking of burlap bagged asbestos in the confined space of a railroad car can cause excessive concentrations of asbestos dust.

15. Engineering controls should be installed to reduce asbestos exposure to within safe limits. If engineering controls are not feasible, administrative control and/or personal protection is required.

Submitted by:

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TABLE 1

RESULTS OF ENVIRONMENTAL SAMPLING FOR ASBESTOS
MARION DEPOT
6/2/75

Sample Number & Type	Sample Time (minutes)	Location	Operation	Concentration in fibers per cubic centimeter(cc) of air
4574 - P ¹	15	Warehouse 25 Section 1	Inspector	<0.02
2426 - P	40	Warehouse 25 Section 1	Inspector	VOID
2428 - P	38	Warehouse 25 Section 1	Checker	1.57
4676 - P	15	Warehouse 25 Section 1	Checker	VOID
2429 - P	37	Warehouse 25 Section 1	Lift-Truck Operator	<0.12
4573 - P	15	Warehouse 25 Section 1	Lift-Truck Operator	0.02
2427 - A ²	64	Warehouse 25 Section 1	(area sample adjacent to checker)	<0.21
2430 - A	64	Warehouse 25 Section 1	(area sample in aisle)	0.02
4674 - A	48	Warehouse 22-4	Bay G-6	0.08
4572 - A	90	Warehouse 23-2	Bay D-3	<0.01
4567 - A	94	Warehouse 23-4	Bay C-1	<0.01
4558 - A	86	Warehouse 25-3	Bay F-3	<0.01
4675 - A	84	Warehouse 25-3	Bay C-5	0.04

¹P = personal
²A = area

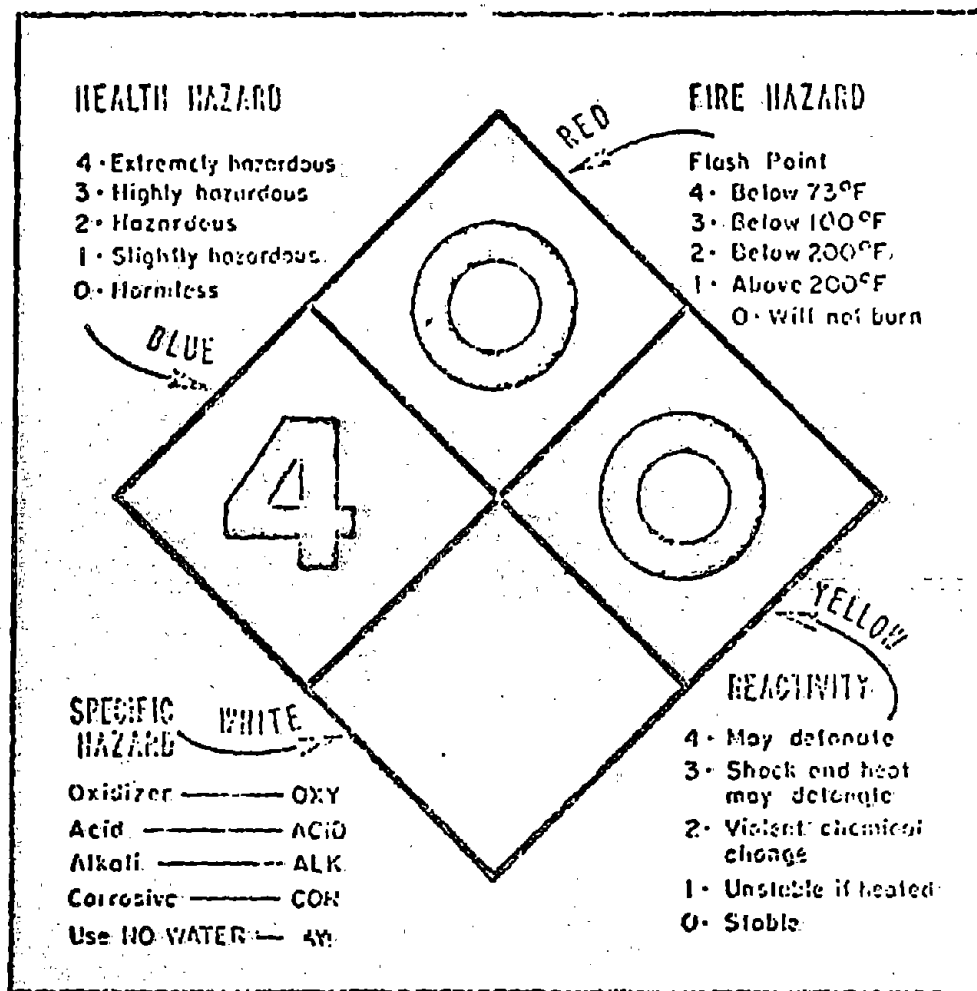
TABLE 2

RESULTS OF ENVIRONMENTAL SAMPLING FOR ASBESTOS
FORT WAYNE (CASAD DEPOT)
6/3/75

Sample Number & Type	Sample Time (minutes)	Location	Operation	Concentration in fibers per cubic centimeter(cc) of air
4678 - P ¹	96	Warehouse T-207 Section 3	Vacuuming and Lift truck Operator	2.31
4687 - P	79	Warehouse T-207 Section 3	Vacuuming and Lift truck Operator	2.52
4686 - P	75	Warehouse T-207 Section 3	Vacuuming and Lift truck Operator	0.39
4682 - P	89	Warehouse T-207 Section 3	Vacuuming	1.66
4679 - P	60	Warehouse T-207 Section 3	(area sample taken within 3 feet of vacuuming operation)	0.89
4689 - A ²	60	Warehouse T-207 Section 3	(Area sample within 15 feet of vacuuming operation)	0.12
4680 - A	191	Warehouse T-200 Section 1		<0.01
4681 - A	177	Warehouse T-200 Section 5		0.02
4684 - A	171	Warehouse T-208 Section 1		0.03
4575 - A	163	Warehouse T-208 Section 3		<0.01
4685 - A	158	Warehouse T-210 Section 1		0.03
4677 - A	147	Warehouse T-213 Section 2		< 0.01
4690 - A	145	Warehouse T-214 Section 2		0.03
4691 - A	136	Warehouse T-214 Section 4		<0.01

¹P = personal
²A = area

16



COLOR AND DIMENSION

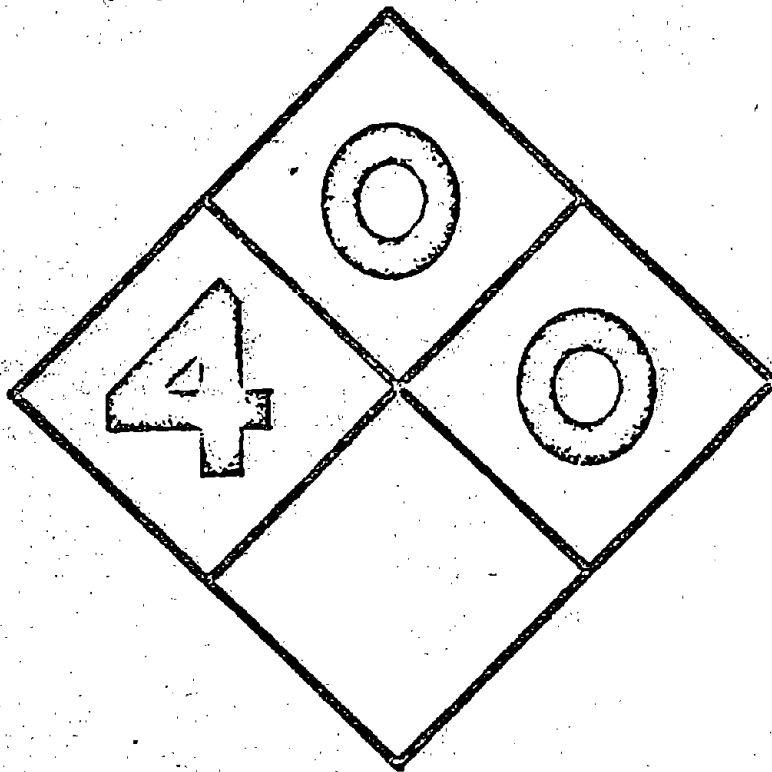
Color format for NEPA No. 704M designations are shown above. The colors indicated shall acceptably match in shade the applicable color of FED-STD-595 as follows:

Color	Class
Black	17038
Red	11105
White	17875
Yellow	13538
Blue	15102

Dimensions of the symbol and LAPI warning combination shall be optional but of such size and location as to be readily visible and legible.

The symbol and warning shall be applied by stenciling, painting, printing, lithographing, with fade-resistant materials.

ASBESTOS



HARMFUL: May Cause Delayed Lung Injury
(Asbestosis, Lung Cancer).

DO NOT BREATHE DUST

Use only with adequate ventilation and
approved respiratory protective devices.

