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**Internal Letter**



**Rockwell International 7**

Date: July 18, 1980

No: .

TO: (Name, Organization, Internal Address)

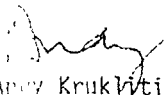
Mike Budd

FROM: (Name, Organization, Internal Address, Phone)

Andy Krukltis

Subject: Handling Of Asbestos Material

Per your request, the following methods and procedures for the handling, monitoring, and disposal of Asbestos materials at the Ashtabula Plant is attached.

  
Andy Krukltis

jas

cc: B. Bertelson  
R. Donnachie  
E. Hoffman

Attachments:

1. OSHA Regulation 1910.1001-Asbestos
2. Clayton Report, 1976
3. Pangborn Dust Collector Procedure
4. Memo, E. Hoffman; June 14, 1979
5. Asbestos Monitoring Milestone Chart
6. Memo, Bill Anderson, October 16, 1979

Form 131-R Rev 3-76



RWI 002425

## ASHTABULA BRAKE

### ASBESTOS HANDLING PROCEDURES

#### A. GENERAL

Airborne asbestos dust presents a potential health hazard. Since brake shoe manufacturing creates a dust problem, enlightened management personnel takes the necessary steps to insure that asbestos dust levels be kept to an absolute minimum in order to safeguard the health and well-being of our employees. Both engineering controls and asbestos dust surveillance are necessary to stay well within the present 8-hour, time-weighted airborne concentration of two fibers, longer than 5 micrometers, per cubic centimeter of air. Management at Ashtabula Brake has a deep concern for maintaining an ongoing stringent asbestos dust control program. This report illustrates the current methods used to minimize health hazards associated with asbestos dust.

While current maximum exposure limits of 2.0 fibers per cubic centimeter exist, the Materials Engineering Lab reported that May to August, 1979 samplings averaged 0.166 fibers per cubic centimeter. (See memo, Bill Anderson, October 16, 1979). Notice that worst case sample (J. Wheelock, July 25, 1979), was 0.44 F/CC. Average asbestos fiber levels have been consistently below the 2 fiber limit at Ashtabula, except for Baghouse shakedown, where levels exceed the 2 fiber limit. Maintenance personnel, consequently, dress in full length coveralls (paper) with hood, gloves, and respirator while performing shakedown operations.

Manufacturing and assembly areas using asbestos materials are shown in figure 1. Starting at the shipping and receiving dock, material is moved to CMA (Conforming Materials Area) where inspection for material conformity takes place. Non-conforming material (NCM) is moved to a Quarantine Area where it is held for vendor review. Conforming material (CM) is taken to the stockroom for storage. Later, the material is moved to departmental in-process storage (IPS) where it is pre-staged for manufacturing process. Actual manufacturing takes place in departments 32, 33, 36, and 38. Finished brake shoes are temporarily stored in IPS (post-stage, in-process storage) prior to being sent to the stockroom. From the stockroom, brake components are transported to assembly departments 50 and 52 for brake assembly. Complete brake assemblies move through packing area, where palletizing and banding occur, to storage in the finished goods area. Pallets, in turn, are loaded on trucks and shipped to our customers.

RWI 002426

7. 1 illustrates areas of the plant where asbestos-containing material is handled, lined, inspected or stored, and the attendant safeguards used; storage modes, environmental controls, and formed procedures for handling the material:

TABLE 1  
ASBESTOS HANDLING AT ASHTABULA BRAKE

| AREA               | OPERATION                  | STORAGE MODE | ENVIRON. CONTROLS | FORMAL PROCEDURES |
|--------------------|----------------------------|--------------|-------------------|-------------------|
| 1. Dock            | Material Handling          | 1            | 1                 | No                |
| 2. CMA             | Inspection                 | 2,3          | 1                 | No                |
| 3. Quarantine Area | Inspection                 | 2,3          | 1                 | No                |
| 4. Stockroom       | Storage                    | 2,3          | 1                 | No                |
| 5. IPS             | Storage                    | 2,3          | 1                 | No                |
| 6. Department      | Riveting                   | 2,3          | 2                 | No                |
|                    | Lining Grind               | 2,3          | 2                 | No                |
| 7. IPS             | Storage                    | 2,3          | 1                 | No                |
| 8. Stockroom       | Storage                    | 2,3          | 1                 | No                |
| 9. Brake Assy.     | Assembly                   | 2,3          | 1                 | No                |
|                    | Palletizing                | 1            | 1                 | No                |
| 10. Finish Goods   | Stretch Wrapping Pallets   | 4            | 1                 | No                |
|                    | Storage                    | 2,3          | 1                 | No                |
| 11. Rework         | Shoe de-riveting           | 2            | 1                 | No                |
|                    | Sort Linings               | 2            | 1                 | No                |
|                    | Shoe re-grinding           | 2            | 2                 | No                |
|                    | Shoe re-riveting           | 2            | 2                 | No                |
|                    | Inspection                 | 2            | 2,5,6             | No                |
| 12. Haz. Waste     | Dust Collection (Indoors)  | 5,6          | 2                 | Yes               |
| 13. Haz. Waste     | Dust Collection (Outdoors) | 5,6          | 2                 | Yes               |
| 14. Haz. Waste     | Solids Collection          | 5            | 5,6               | No                |
| 15. Ind. Engr.     | Asbestos Monitoring        | 7            | 1                 | Yes               |
| 16. Personnel      | Pulmonary Function Exam.   | 7            | 1                 | Yes               |
| 17. Maintenance    | Machine Repair             | 1            | 1,2,3             | No                |
|                    | Dust Collection            | 5,6          | 3,4               | Yes               |
| 18. Housekeeping   | Equipment Cleaning         | 1            | 3                 | No                |
|                    | Facility Cleaning          | 1            | 7                 | No                |

Legend

Storage Mode:

1. No Storage
2. Open items on pallets
3. Closed items on pallets
4. Stretch-wrapped pallets
5. Sealed plastic bags
6. Sealed metal barrels
7. Administrative records

Environmental Controls:

1. Absent
2. Central dust collection system
3. 5-Stage Asbestos Vacuum Cleaner
4. Personnel protective equipment
5. Plastic bags
6. Metal waste container
7. Power floor scrubbing machine

## B. PACKAGING

Lining material packaging is not specified for hazardous material containment by the materials department at Ashtabula. As a result, packaging of this material is discretionary with the vendor. In general, two packaging methods exist: Hermetic and non-Hermetic.

Brake shoe linings received from some vendors (e.g. Abex) are packaged in single wall corrugated boxes with 275 pounds per square inch burst strength. The boxes are sealed with a single strip of cellophane tape across the top flaps of the boxes. Asbestos caution labels are imprinted on each box. Palletized boxes of linings are banded and covered with a heat shrinkable plastic membrane. Such packaging is Hermetic. Asbestos containment is excellent and is the preferred packaging system.

Other vendors, (e.g. Molded Materials) on the other hand, place brake shoe linings in open top, single wall, corrugated boxes. The boxes are not sealed. Asbestos caution labels are imprinted on the side of each box. Palletized boxes of linings are covered with (2) layers of single wall corrugated paper and banded with (7) bands. The packaging is non-Hermetic. Asbestos containment is poor because exposures are not sealed. Asbestos caution labels are not attached to the outside of the palletized assembly. It is questionable whether this method of packaging complies with current regulations. [OSHA 1910.1001 (b) & (g)].

## C. MATERIAL HANDLING

Asbestos containing material is moved, for the most part, from department to department with industrial lift trucks. Some material is moved on roller conveyors in riveting departments and in the brake assembly department. In general, raw materials are moved in an as-received condition (i.e. sealed cartons remain sealed and open cartons remain open during transit). No special precautions are taken to seal cartons or limit asbestos exposure to the atmosphere.

Brake shoes are stacked on pallets or placed in wire baskets ("Palletainer") and moved to in-process storage (IPS), stockroom, or brake assembly areas. Brake assemblies move from the assembly benches to the brake packing area on roller conveyors where the assemblies are placed on pallets and banded for shipment. No special precautions are taken to limit atmosphere exposure.

## D. STORAGE

### 1. Raw Material

Asbestos containing raw material is stored, generally in an as-received condition. Upon reception of random cartons opened for material conformability inspection, linings which arrive in a sealed condition (Hermetic) at this facility are sealed until opened by personnel in the brake shoe riveting departments. Shrink wrap membranes and steel bands are removed from Hermetic packaging for lot shipments in CMA, but remain intact for large lot shipments where they take place in the riveting departments.

1. Material (cont'd)

Non-hermetic packaging, on the other hand, is opened by tearing part of the corrugated p... the top of the package by CMA personnel in order to gain access to the lining m... Banding remains intact, unless preliminary inspection reveals linings of que... ble quality, in which case, subsequent inspection takes place after completely c... ng the package.

As a result of this inspection activity, pallets of lining material may be found in v... hermetic and non-Hermetic states in CMA, quarantine, stockroom, IPS, and r... areas.

2. Finished Goods

L... material in riveted and ground brake shoes is stacked on wooden pallets in the r... departments. Alternately, shoes are placed in wire baskets (palletainers) d temporarily in IPS until they are moved to the stockroom, brake assembly, c... reas for storage, further processing or shipment. Neither pallets nor f... ers of finished brake shoes are wrapped or otherwise sealed before transport e riveting departments.

3. Shed Goods

A... embles are moved on powered roller conveyors in the brake assembly department cking area where brakes are placed on pallets and banded for shipment. Depend- stomer requirements, pallets are either stretch wrapped and stored in the t goods area or sent directly to the finished goods area in an unwrapped condition. S... thus, is mixed in the finished goods area.

E. ENVIRONMENTAL CONTROLS

1. Local Dust Collection Systems

T... ate central dust collection systems are in operation at Ashtabula to capture a... in asbestos dust generated in brake shoe riveting and lining grind operations. C... (Pangborn) is located indoors in department 36. This unit collects dust g... by the #460 shoe grinder (dept. 36) and the #449 shoe grinder (dept. 38). N... equipment is connected to this system.

T... unit (Pangborn, Model 1000 CN) is located outdoors on the South end of the f... adjacent to dept. 32). This unit collects dust generated by the #132 shoe ( dept. 32), #048 shoe grinder (dept. 33), #045, #116, #765 riveters (dept. 32), #154, #155, #158, and #755 riveters (dept. 33). Auxillary flexible hoses c... to this dust collector are used to vacuum empty lining boxes prior to dis- p... 5a

## 2. Sized Dust Collection Systems

Three Hit Dust Collectors, (Model 65H55), are used to collect asbestos dust in riveting operations in dept. 36 on #042, 044, 438, 551, and 761. An Aget Dust Collector is connected to #662 riveter (dept. 36). Two riveting machines have no dust collection systems, #072 (dept. 32) and #595 (dept. 36).

Two Down-Draft Dust Collector/Bench units (Model DDMV-45) have been purchased for installation in dept. 33 for asbestos collection and containment on assembly operation. These units will require modification of the face prior to installation to prevent tools, fasteners, and other small items from falling through the expanded metal screen on the top of the unit.

## 3. General Equipment

Two Can Cleaning Corp., 5-stage asbestos vacuum cleaners are in use (dept. 33 and 36) for salvage and rework operations and for general housekeeping operations following Baghouse shakedown on the indoor central dust collector in

Shop and aisle cleaning throughout the plant is accomplished with a Wayne, power sweeping machine and a Tennant, Model 525, floor scrubbing machine. Power exhaust fans and windows in sawtooth roof area provide ventilation for riveting departments.

## 4. DISPOSAL

### Asbestos Dust

Asbestos dust from central and local dust collectors is contained in sealed plastic lined steel drums (55 gal). An asbestos warning label is affixed to each drum. Maintenance personnel are responsible for Baghouse shakeout and removal of dust (see attachment 3, Pangborn). Drums filled with asbestos dust are taken to the outdoor central dust collector. Ashtabula County Waste, Inc. removes these drums to a licensed hazardous waste landfill in Geneva, Ohio.

### Asbestos Solids

Asbestos containing material is stored in metal trash containers in depts. 32, 33, and 36. Material is placed in plastic bags and the bags, in turn, are placed in the containers. Disposal to landfill site follows the same procedure used for asbestos dust.

### Asbestos Cartons

Asbestos cartons are vacuumed with a hose connected to the central dust collectors in order to remove asbestos dust from the cartons. The vacuumed cartons are placed in hazardous waste containers for subsequent disposal. (See memo, Elona Hoffman, 1979).

Personal Protective Equipment

Gloves, paper coveralls, hoods, and respiratory (single use) masks are placed in plastic bags and placed in 55 gallon steel drums and sealed for waste landfill disposal.

TOS HAZARD SURVEILLANCE

Asbestos Monitoring (Personnel & Environmental)

Asbestos samples of airborne asbestos fibers are collected with a Bendix Air Pump, Model BDx-44, and Millipore Aerosol Field Monitors, (cat. #MAWP). These samples are analyzed for fiber concentration by Rockwell's Industrial Engineering Laboratory in Troy, Michigan. The procedure used to analyze asbestos fibers is described in the Clayton Report, P.6. Refer to the attached milestone chart (FY 80) for the current asbestos monitoring schedule. Records of asbestos monitoring are retained by Supervisor, Safety and by Industrial Engineering Dept.

Medical Examinations

Medical examinations are given to all employees at Ashtabula. These examinations include a chest roentgenogram (Posterior-Anterior 14x17"), Vital Capacity (FVC) and Forced Expiratory Volume at 1 second (FEV 1.0), and a history to elicit symptomatology of respiratory disease.

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value of  $E_m$  shall not exceed unity

Since  $E_m$  is less than unity (1), the exposure combination is within acceptable limits.

To illustrate the formula prescribed in division (i) of this subparagraph, consider the following exposures:

| Material    | Actual concentration of 8-hour exposure | 8-hour time weighted average exposure limit |
|-------------|-----------------------------------------|---------------------------------------------|
| (Table Z-1) | 500 p.p.m.                              | 1,000 p.p.m.                                |
| (Table Z-1) | 45 p.p.m.                               | 200 p.p.m.                                  |
| (Table Z-2) | 40 p.p.m.                               | 200 p.p.m.                                  |

Substituting in the formula, we have:

$$E_m = \frac{500}{1,000} + \frac{45}{200} + \frac{40}{200} = 0.500 + 0.225 + 0.200 = 0.925$$

(e) To achieve compliance with paragraph (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with § 1910.134.

## 1910.1001—ASBESTOS

### (a) Definitions.

(1) **Purpose of this section.**

"Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(3) **Permissible exposure to airborne concentration of asbestos fibers.**

(i) **Effective July 7, 1972.** The 8-hour time-weighted average airborne concentration of asbestos fibers to which any employee may be exposed shall not exceed 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) **Standard effective July 1, 1976.** The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) **Ceiling concentration.** No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

### (c) Methods of compliance.

#### (1) Engineering methods.

(i) **Engineering controls.** Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust

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collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(1) Local exhaust ventilation.

(a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2-1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2-1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) Particular tools. All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, such as, but not limited to, saws, scorers, abrasive wheels, and grinders, shall be provided with local exhaust ventilation systems in accordance with subdivision (i) of this subparagraph.

(2) Work practices.

(a) Work methods. Insofar as practicable, asbestos shall be handled, mixed, applied, moved, cut, scored, or otherwise worked in a wet state sufficient to prevent the release of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the use of the product would be diminished thereby.

(b) Particular products and operations. No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, sealed, closed, or ventilated so as to prevent the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) Spraying, demolition, or removal. Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) Personal protective equipment.

(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) Air purifying respirators. A reusable or single use air purifying respirator, or a

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respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(i) Powered air purifying respirators. A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, the limits.

(ii) "C" supplied-air respirators, continuous flow or pressure-demand. A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times the limits.

(iii) Establishment of a respirator program.

The employer shall establish a respirator program in accordance with the requirements of the American National Standard Practices for Respiratory Protection, ANSI Z88.2-1969, as incorporated by reference.

§ 1910.6 concerning the availability of ANSI Z88.2-1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms:

(i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundrying:

(a) Laundrying of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person

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on for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

**Method of measurement.**

Determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400-450 × (magnification) (4 millimeter objective) with contrast illumination.

**Monitoring.**

**Initial determinations.** Within 6 months of publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

**Personal monitoring.**

Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

**Sampling frequency and patterns.** After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. 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 prescribed by paragraph (b) of this section.

**(3) Environmental monitoring.**

(i) Samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) **Sampling frequency and patterns.** After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

**(4) Employee observation of monitoring.** Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

**(g) Caution signs and labels.**

**(1) Caution signs.**

(i) **Posting.** Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted

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approaches to areas containing excessive concentrations of airborne asbestos fibers.

specifications. The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs required in § 1910.145(d)(4), and to this provision. The signs shall display the following legend in the lower panel, with sizes and styles of a visibility at least equal to that specified in this subdivision.

| Legend                                                 | Notation                                   |
|--------------------------------------------------------|--------------------------------------------|
| Warning                                                | 1" Sans<br>Serif,<br>Gothic<br>or Block.   |
| Hazard                                                 | 3/4" Sans<br>Serif,<br>Gothic<br>or Block. |
| Breathing Dust                                         | 1/4" Gothic.                               |
| Assigned Protective Equipment                          | 1/4" Gothic.                               |
| Do Not Remain In Area Unless Work Requires It.         | 1/4" Gothic.                               |
| Breathing Asbestos Dust May Be Serious To Your Health. | 14 point<br>Gothic.                        |

space between lines shall be at least equal to the height of the upper of any lines.

## (2) Caution labels.

Caution labels shall be affixed to raw materials, mixtures, scrap, debris, and other products containing asbestos fibers, or to their containers, if that no label is required where asbestos fibers have been modified by a binding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section are released.

Label specifications. The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of uniform size and contrast as to be read-

ily visible and legible. The label shall state:

## CAUTION

Contains Asbestos Fibers  
Avoid Creating Dust  
Breathing Asbestos Dust May Cause  
Serious Bodily Harm

## (h) Housekeeping.

(1) **Cleaning.** All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) **Waste disposal.** Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

## (i) Recordkeeping.

(1) **Exposure records.** Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 20 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

[41 F.R. 11504, March 19, 1976.]

(2) **Employee access.** Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) **Employee notification.** Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of

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his section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

**Medical examinations.**

- ( ) **General.** The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

**Preplacement.** The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV<sub>1.0</sub>).

- ( ) **Annual examinations.** On or before January 1, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV<sub>1.0</sub>).

**Termination of employment.** The employer shall provide, or make available, within 30

calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV<sub>1.0</sub>).

- (5) **Recent examinations.** No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) **Medical records.**

(i) **Maintenance.** Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) **Access.** The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

## 10.1002—COAL TAR PITCH VOLATILES; INTERPRETATION OF TERM

used in § 1910.1002 (Table Z-1), coal tar pitch volatiles include the fused polycyclic hydrocarbons that volatilize from the distillation residues of coal, petroleum, wood, and other organic matter.