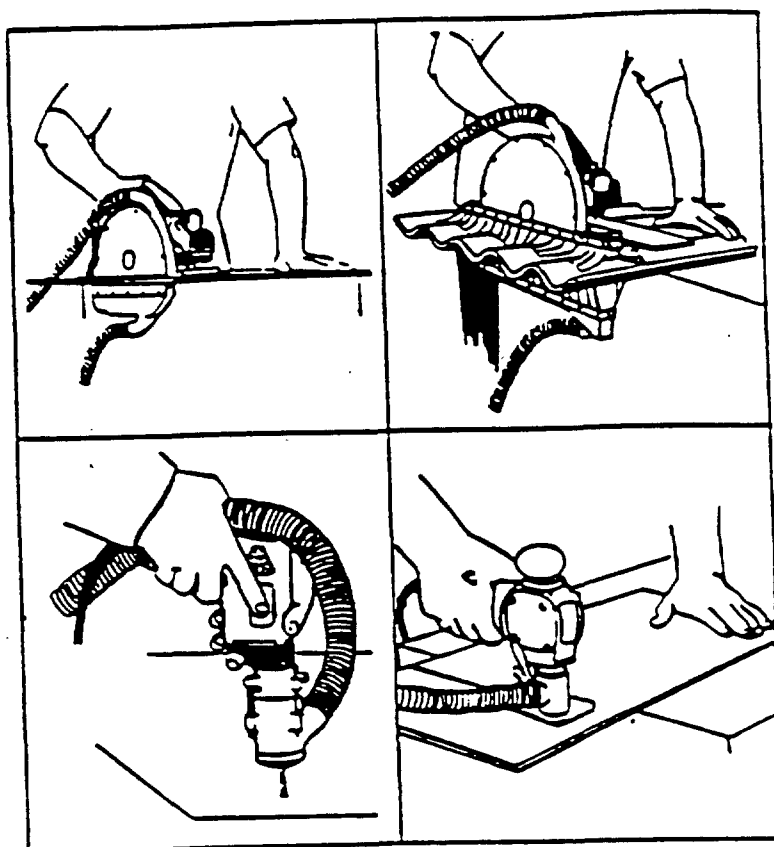




Recommended Work Practices for Field Fabrication of Asbestos- Cement Sheet

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Introduction

The Occupational Safety and Health Act in the United States and similar laws in Canada and other countries were enacted to ensure every worker, as far as possible, a safe and healthy work place. This legislation is far-reaching. It covers millions of employees and nearly every employer.

To assist in assuring compliance with these laws, the asbestos-cement industry is disseminating information regarding the hazards of exposure to airborne asbestos. One means of reducing hazards of exposure is to reduce the exposure through good work practices.

Good work practices is what this booklet is about. The recommendations that appear on the following pages were developed through study and field testing. They are designed to achieve safer and more healthful job site conditions when working with asbestos-cement (A/C) sheet products. Since field conditions will vary, adherence to these work practices will not necessarily guarantee compliance with national, state or local regulations. Questions relating to compliance should be directed to appropriate regulatory agencies.

The Asbestos Information Association/North America believes this booklet will help engineers, superintendents, contractors, foremen and crews to understand procedures for the safer handling and fabrication of A/C sheet products.

This booklet supersedes AIA/NA recommended work practices for field fabrication of asbestos sheet products previously distributed in 1975.

January 25, 1980

Asbestos and Health

Airborne asbestos fiber has been identified as a possible health hazard. Inhalation of these fibers in excessive quantities may cause pulmonary disease. But like the automobile, electricity and x-rays, there are non-harmful ways to use potentially harmful things.

Asbestos-cement (A/C) sheet products contain 15% to 40% asbestos. The asbestos fibers are not free, but "locked-in" the cement binder, like reinforcing rods in concrete. The distinction between "free" and "bound" asbestos is extremely important. First of all, it determines the probability of fiber release, which in turn, directly relates to the probability of risk. More importantly, it explains clearly and simply why A/C sheet is a proper use of asbestos.

The present state of scientific learning on asbestos shows that minimizing exposure to airborne asbestos dust reduces the hazards of asbestos-related disease. During the use and handling of A/C sheet, the only time that fibers may be released in significant quantities from a health standpoint, is during fabrication operations when sufficient mechanical energy is applied to the product to literally "tear" the fibers from the cement binder. One means of reducing airborne fiber generation is through good work practices.

Summary of OSHA Asbestos Standard

Under the current OSHA standard for occupational exposures to asbestos, it is the employer's responsibility to assure that exposure of employees to airborne concentrations of asbestos fibers does not exceed the following "permissible exposure levels":

- a. Eight-hour time-weighted average: Two fibers, longer than 5 micrometers, per cubic centimeter.
- b. Ceiling concentrations: Ten fibers, longer than 5 micrometers, per cubic centimeter.

In October 1975, OSHA proposed a revision to the current standard which would reduce the eight-hour time-weighted average exposure to 0.5 fibers per cubic centimeter of air and ceiling concentrations to 5.0 fibers per cubic centimeter. OSHA specifically excluded the construction industry from coverage within that proposal. In their notice, OSHA stated that a separate standard would be proposed to cover workers who handle asbestos-containing products in the construction industry.

The work practices recommended in this booklet are based on data for "peak dust concentrations" representing short time periods of maximum exposure. Field fabricating operations involving the cutting of A/C sheet are normally infrequent and of short duration. Using these recommended work practices, which will maintain fiber levels below OSHA allowable ceiling concentrations, it is improbable that field personnel would be exposed in a typical working day to levels exceeding the current OSHA eight-hour time-weighted average permissible exposure limit.

For full text of OSHA standard for occupational exposure to asbestos dust (29 CFR 1910.1001) refer to Appendix B.

Products and Operations

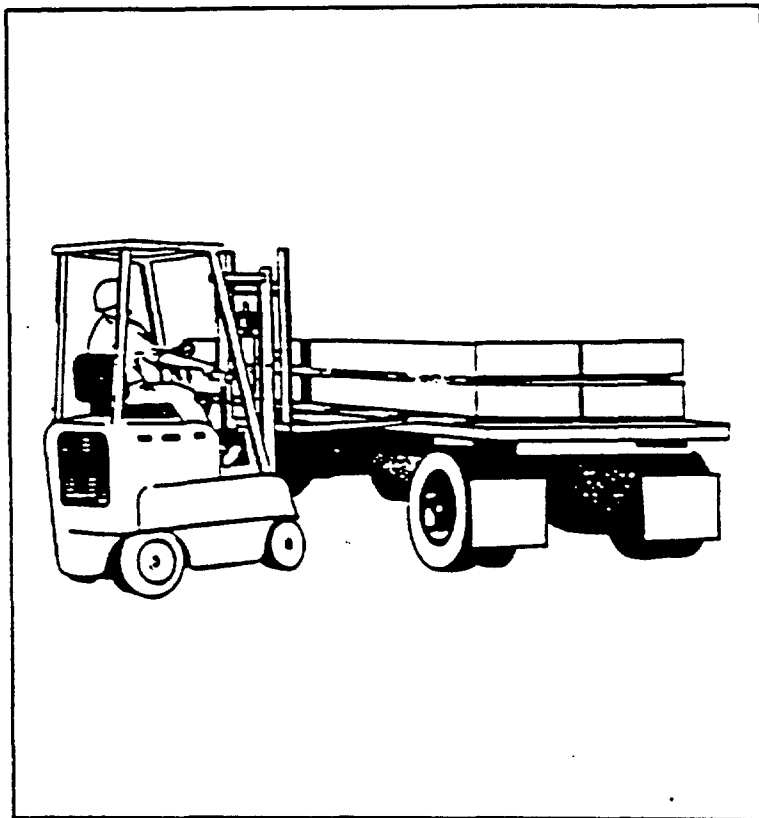
The following work practices are applicable to flat and corrugated A/C sheet products:

Operations to which these work practices apply include:

- Shipping, Receiving and Handling
- Cutting
- Drilling
- Hole Cutting and Cutouts
- Housekeeping and Waste Disposal

Equipment used with these work practices is available from the sources shown in the equipment list (page 17).

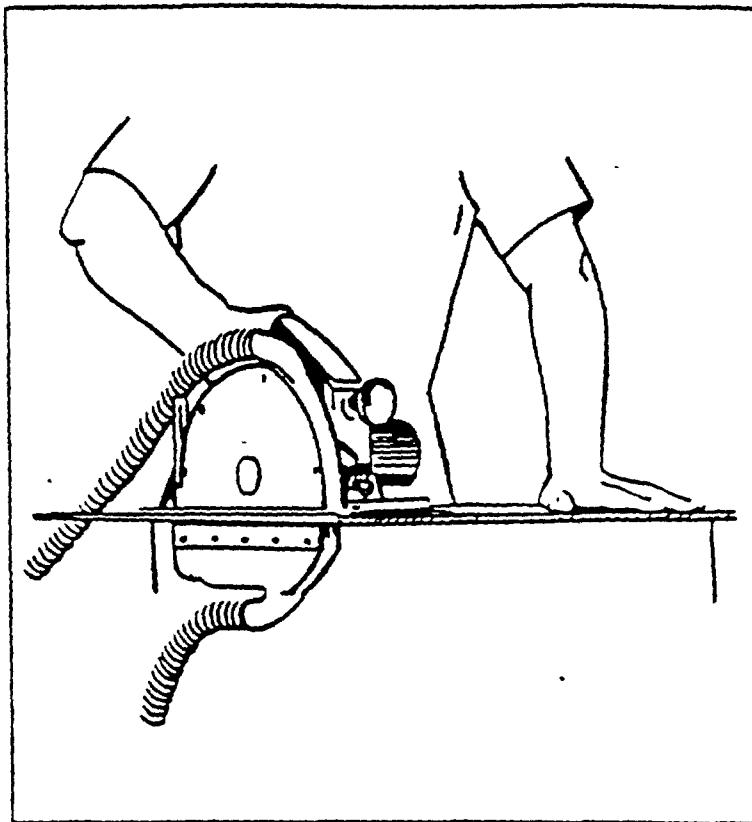
Shipping, Receiving and Handling



A/C sheet is shipped from the factory with clean surfaces, generally in pallet loads, using shipping methods acceptable to the producer and the customer.

All unloading operations should be carefully performed to avoid sheet damage. Pallet loads are normally unloaded by fork truck. Small shipments may require manual unloading.

Cutting — Flat Sheets Circular Saw



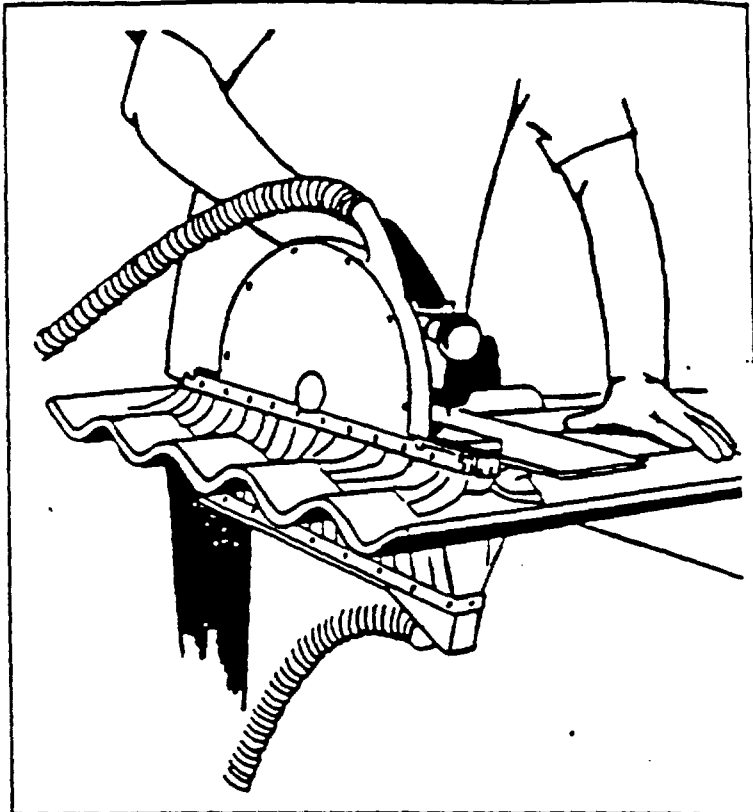
Circular Saw With Dust Collection Hood

Circular saws for cutting flat sheets should be used *only* when equipped with the specific dust collection hoods pictured above. Exhaust ventilation and dust collection is provided by a vacuum cleaner as described in the specifications (page 15).

A circular saw cuts by a "pulverizing" action which releases asbestos fibers and fine particulate. The combination of hood and vacuum source is highly effective in capturing and collecting these particles and fibers. Saw operating techniques are those normally employed. No special procedures are required except adjustment of the lower hood section to suit thickness of sheet being cut. Saw design requires the use of blades recommended by the tool supplier (abrasive disc or diamond).

For additional information on saw operation, refer to the supplier's instructions in Appendix A.

Cutting — Corrugated Sheets Circular Saw



Circular Saw With Dust Collection Hood

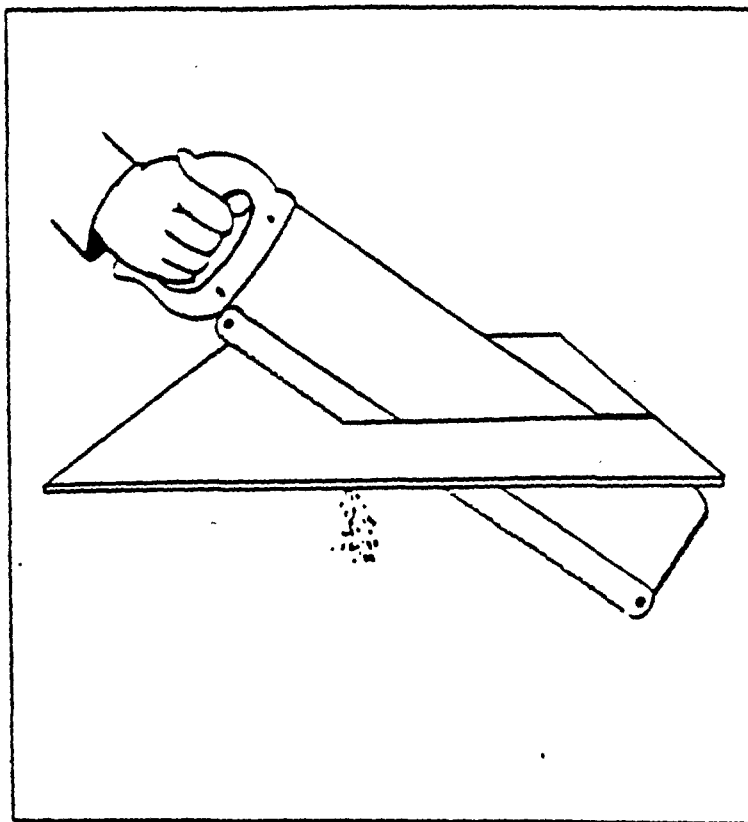
Circular saws for cutting corrugated sheets should be used *only* when equipped with the specific dust collection hood pictured above. Exhaust ventilation and dust collection is provided by a vacuum cleaner as described in the specifications (page 15).

A circular saw cuts by a "pulverizing" action which releases asbestos fibers and fine particulate. The combination of hood and vacuum source is highly effective in capturing and collecting these particles and fibers. Saw operating techniques are those normally employed. Saw design requires the use of blades recommended by the tool supplier (abrasive disc or diamond).

This tool depends on pliable "fingers" to seal the cutting zone and is designed for use on sheets with 1½" deep corrugations. For cutting sheets with deeper or irregular corrugations, consult the tool supplier.

For additional information on saw operation, refer to the supplier's instructions in Appendix A.

Cutting Handsaw

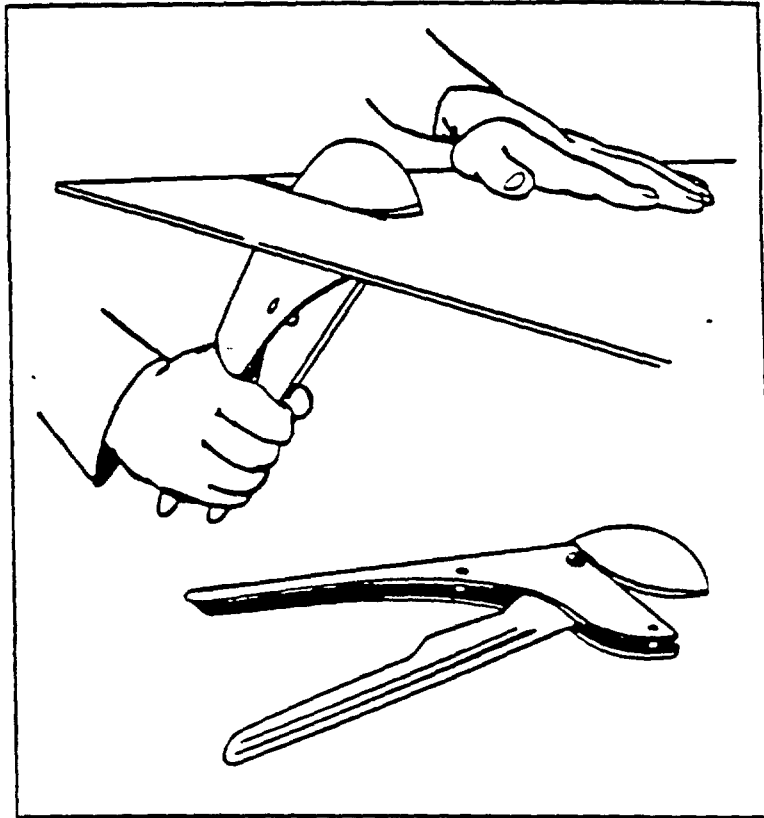


Handtools — Handsaw

This is a handsaw equipped with a carbide blade designed for cutting asbestos-cement sheet. Practical use of this saw is limited by its slow cutting speed. It is most useful in operations where cutting is infrequent and of short duration.

Because of the slow cutting speed, saw operation generates coarse particles of asbestos-cement with few airborne fibers. Its use does not require dust collection equipment for compliance with present exposure limits.

Cutting — Flat Sheets Hand Clippers

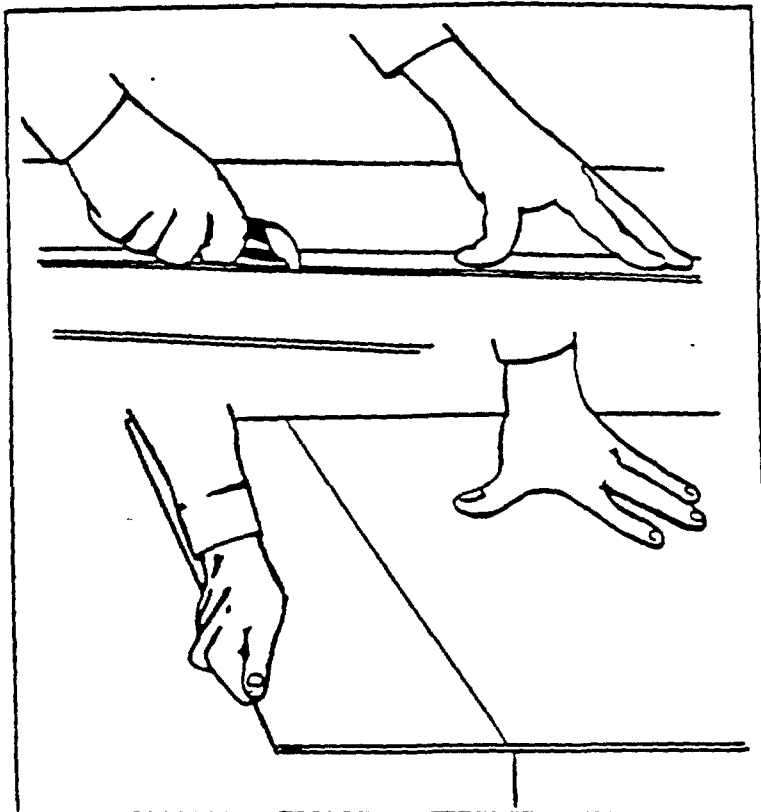


Handtools — Hand Clippers

These hand clippers are designed for cutting sheet material up to $\frac{1}{4}$ " in thickness. Practical use is limited by slow cutting speed. It is most useful in operations where cutting is infrequent and of short duration.

The clipper cutting action generates coarse particles of asbestos-cement with few air-borne fibers. Its use does not require dust collection equipment for compliance with present exposure limits.

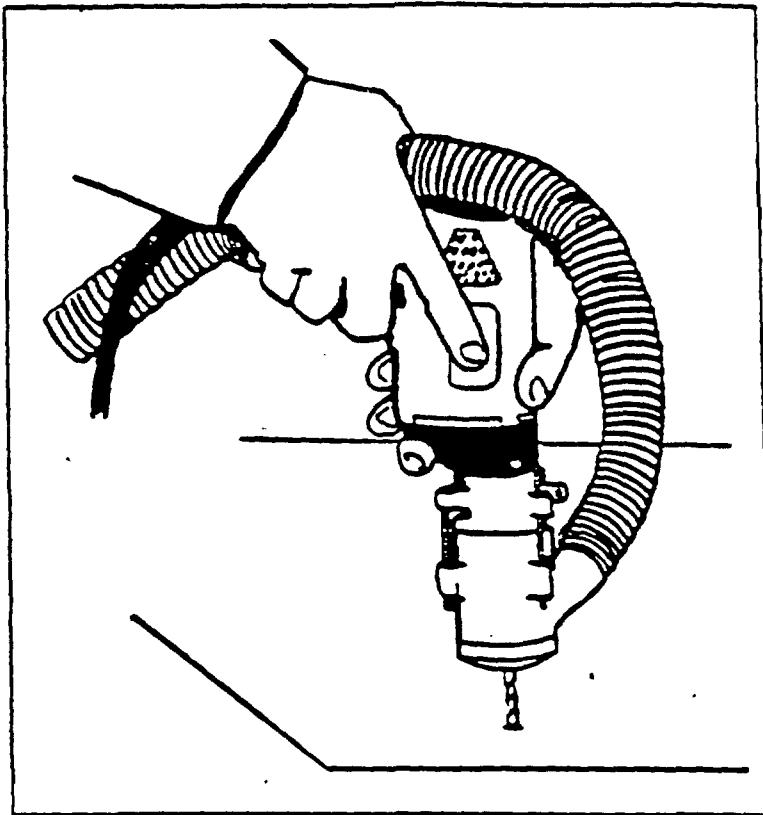
Cutting — Flat Sheets Score & Snap Knife



Handbook — Scoring Knife

The scoring knife can be used with sheets up to $\frac{1}{4}$ " in thickness. However, it performs best with sheets $\frac{1}{8}$ " and $\frac{3}{16}$ " thick. The sheet is placed on a worktable or saw horses. A suitable guide bar is placed or clamped along the cut line and the sheet scored repeatedly. After scoring, the sheet is hand snapped along the score line. This cutting procedure generates little dust and few airborne fibers. Its use does not require dust collection equipment for compliance with present exposure limits.

Drilling Power Drill



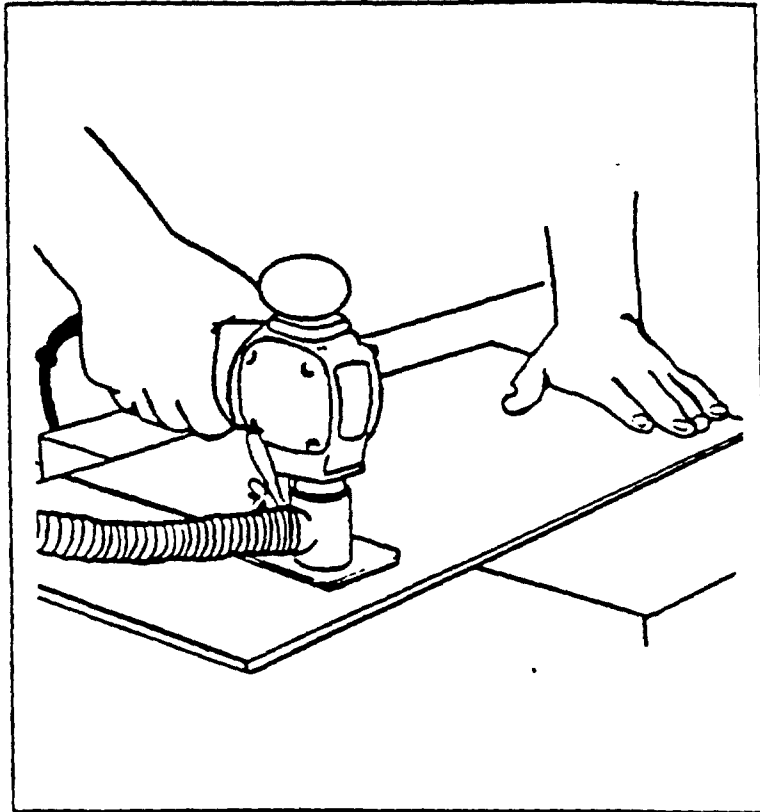
Drill With Dust Collection Hood

Drilling of small holes ($\frac{1}{8}$ " or less) on vertical surfaces, or downward usually can be done without dust collection equipment and in compliance with present exposure limits.

Drilling of larger holes, and drilling overhead, requires dust collection equipment on the drill in order to achieve compliance. Equipment includes a hood (Cape Universal Building Products, Ltd.) and vacuum cleaner to provide exhaust ventilation and dust collection. Vacuum cleaner should be as described in specifications (page 15).

Drilling techniques are those normally employed. No special procedures are required.

Hole Cutting and Cutouts Flat Sheets — Sabre Saw



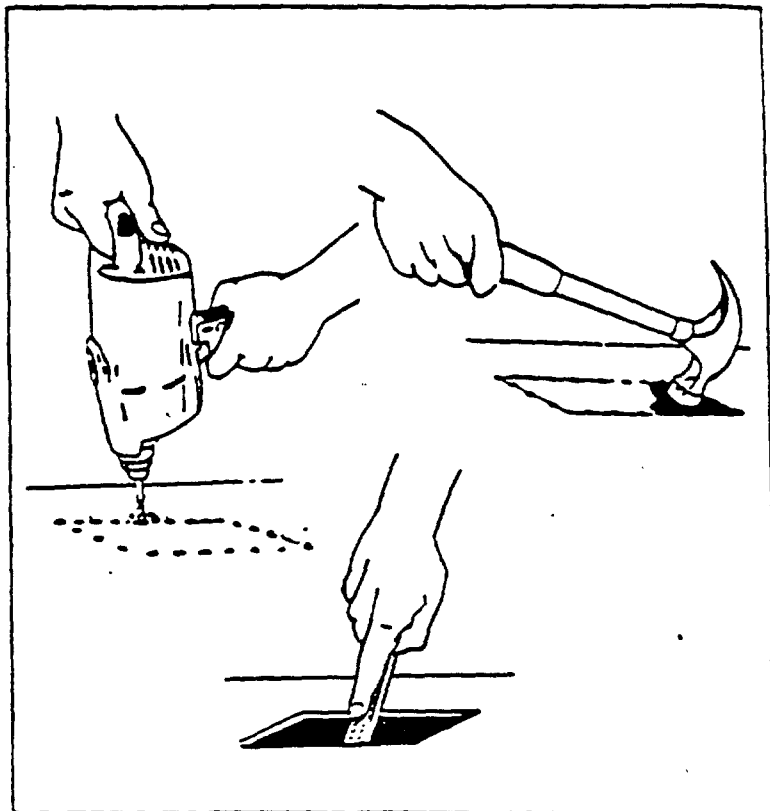
Sabre Saw With Dust Collection Hood

Sabre saws should be used only when equipped with the specific dust collection hood pictured above. Exhaust ventilation and dust collection is provided by a vacuum cleaner as described in the specifications (page 15).

Saw operating techniques are those normally employed. No special procedures are required.

For additional information on saw operation, refer to supplier's instructions in Appendix A.

Hole Cutting and Cutouts Drill and Rasp



A simple method of making cutouts is to drill small holes around the edge of the opening to be cut and knocking out the material to be removed with a hammer. A rasp is used to dress or bevel edges of the cut.

This procedure does not require dust collection equipment for compliance with present exposure limits.

Housekeeping and Waste Disposal

Housekeeping is an essential part of any safe construction operation. It is even more essential when airborne dust created by the lack of good housekeeping has the potential for harm to employees and others.

EQUIPMENT: All external surfaces of equipment should be maintained free of dust accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure limits.

WASTE DISPOSAL: Asbestos-cement dust chips and cuttings from the field operations described in this booklet must be collected in a manner that will not contribute airborne asbestos dust to the atmosphere. *Loose material should never be dry swept.* When vacuum equipment is available, it should be used. Water or other dust suppressants should be applied in those circumstances where sweeping is unavoidable. **DO NOT BLOW WASTE MATERIAL WITH COMPRESSED AIR.**

No visible emissions to the atmosphere are permitted from the collection, processing, packaging, transporting or deposition of any asbestos-containing material. Wastes must be collected and disposed in accordance with the requirements of the U.S. Environmental Protection Agency. For full text of EPA waste disposal requirements (40 CFR, Chapter 1, Part 61) refer to Appendix C.

Vacuum Cleaner Specifications

(Values shown below are minimum recommended)

Circular Saw — Flat and Corrugated Sheet Cutting

Vacuum (lift):	59" W.G. (water gage)
Airflow:	175 SCFM (standard cubic feet per minute)
Filtration System:	Multi-stage, designed for use with asbestos-containing dusts.
Dust Collection:	Unit must be provided with, or capable of using, a disposable plastic or paper bag for collecting and removing dust.

Sabre Saw and Drill

Vacuum (lift):	59" W.G.
Airflow:	65 SCFM
Filtration System:	See Above
Dust Collection:	See Above

Equipment Suppliers

Tools shown in this pamphlet are available from:

Wheeler-Pilot International
P. O. Box 3128
20433 Earl Street
Torrance, CA 90510
(213) 371-1238

Niisk of America, Inc.
201 King Manor Drive
King of Prussia, PA 19406
(215) 277-3900

Suppliers claiming to have vacuum cleaning units suitable for use with asbestos-containing dusts are:

American Cleaning Equipment Corp., 111 South Route 53, Addison, IL 60101

Beamco, Inc., 707 Stierlin Road, Mountain View, CA 94040

Breuer Electric Manufacturing Co., 5100 No. Ravenswood Ave., Chicago, IL 60640

Hild Floor Machine Co., Inc., 5339 West Lake St., Chicago, IL 60644

Kari-Vac Inc., 4360 W. 127th St., Alsip, IL 60658

Niisk of America, 201 King Manor Drive, King of Prussia, PA 19466

Pullman/Holt Products, 10702 46th Street, Tampa, FL 33617

Vac-U-Max, 227 Main St., Belleville, NJ 07109

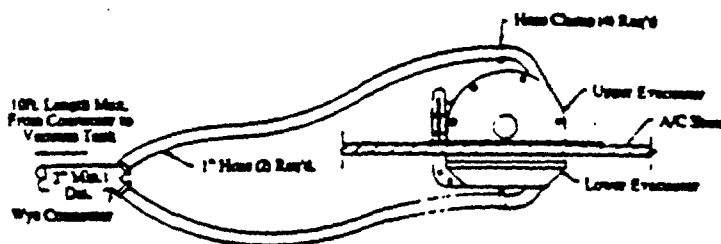
Wheeler-Pilot International, 20433 Earl Street, Torrance, CA 90510

NOTE:

It is recognized that equipment suppliers other than those listed above may be available. Mention of any company is not to be considered an endorsement by AIA/NA.

Appendix A

Operating Instructions Wheeler-Pilot Flat Sheet Circular Saw Model 888



1. The WPI Model 888 uses the Black & Decker Model 3037 Circular Saw. Black & Decker operating instructions for Model 3037 must be read and understood prior to operation.
2. Only vacuum cleaners certified by the manufacturer for use with asbestos dust and having a capability of 175 CFM minimum are to be used with this tool. A vacuum hose of not less than 2 inches in diameter and not more than 10 feet long is to be used between the Wye Connector and vacuum tank. The vacuum manufacturer's operating instructions must be read and understood before operation.
3. Inspect all system elements for cracks, punctures or openings, i.e. hood, vacuum hose and connectors. Repair or replace any faulty item or part.
4. Connect the vacuum hoses as shown, insuring all connections and clamps are tight.
5. Turn on vacuum and check for any stoppages or air leaks in the vacuum line or hood and insure adequate air flow in the open area of the saw.
6. If any leaks or stoppages are located, change or repair faulty items.
7. Adjust lower evacuator so that the rubber skirt contacts the underside of the sheet to be cut.
8. Connect circular saw to electrical outlet and feed into work. There should be virtually no visible dust or debris. If excess dust is visible, (a) check vacuum cleaner bag for overload-per manufacturer's instructions, (b) check lines for air leaks and (c) check proper adjustment of lower evacuator.
9. Avoid using excessive force feeding saw into work. If great force is required, stop and check tool for proper operation.

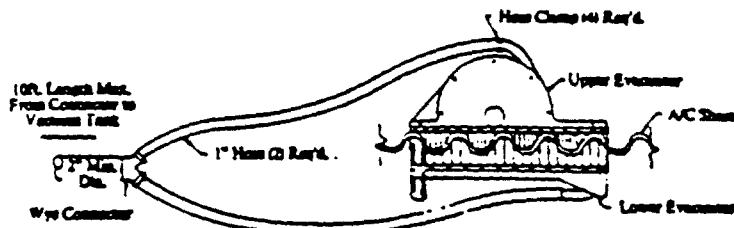
BLADE REPLACEMENT

(In addition to Black & Decker operating instructions)

1. Disconnect unit from electrical outlet.
2. Lower or remove lower evacuating hood.
3. Remove (4) screws and cover to expose blade.
4. Grasp the exposed lower portion of the blade and remove hub screw with wrench.
5. Blade can be removed or replaced (caution: silicon carbide blades must be mounted with appropriate side out, the blades are marked accordingly).

A-1

Operating Instructions Wheeler-Pilot Corrugated Sheet Circular Saw — Model 898



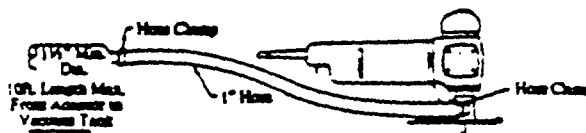
1. The WPT Model 898 uses the Black & Decker Model 3037 Circular Saw. Black & Decker operating instructions for Model 3037 Must be read and understood prior to operation.
2. Only vacuum cleaners certified by the manufacturer for use with asbestos dust and having a capability of 175 CFM minimum are to be used with this tool. A vacuum hose of not less than 2 inches in diameter and not more than 10 feet long is to be used between the Wye Connector and vacuum tank. The vacuum manufacturer's operating instructions must be read and understood before operation.
3. Inspect all system elements for cracks, punctures or openings, i.e., hood, vacuum hose and connectors. Repair or replace any faulty item or part.
4. Connect the vacuum hoses as shown, insuring all connections and clamps are tight.
5. Turn on vacuum and check for any stoppages or air leaks in the vacuum line or hood and insure adequate air flow in the open area of the saw.
6. If any leaks or stoppage are located, change or repair faulty item.
7. Adjust lower evacuator so that the runners on the inside of the skirt fingers are approximately 1/4 inch from the bottom of the sheet.
8. Connect circular saw to electrical outlet and feed into work. There should be virtually no visible dust or debris. If excess dust is visible, (a) check vacuum cleaner bag for overload-per manufacturer's instructions, (b) check lines for air leaks and (c) check proper adjustment of lower evacuator.
9. Avoid using excessive force feeding saw into work. If great force is required, stop and check tool for proper operation.

BLADE REPLACEMENT

(In addition to Black & Decker operating instructions)

1. Disconnect unit from electrical outlet.
2. Lower or remove lower evacuating hood.
3. Remove (8) screws and cover to expose blade.
4. Grasp the exposed lower portion of the blade and remove hub screw with wrench.
5. Blade can be removed or replaced (caution: Silicon carbide blades must be mounted with appropriate side out, the blades are marked accordingly).

Operating Instructions Wheeler-Pilot Saber Saw Model 878



1. The WPI Model 878 uses the Black & Decker Model 3155 Saber (JIG) Saw. Black & Decker operating instructions for Model 3155 must be read and understood prior to operating this unit.
2. Only vacuum cleaners certified by the manufacturers for use with asbestos dust and having a capability of 65 CFM minimum are to be used with this tool. A vacuum hose of not less than 1 1/4 inches in diameter and not more than 10 feet long is to be used. The vacuum manufacturer's operating instructions must be read and understood before operation.
3. Inspect all system elements for cracks, punctures or openings, i.e., hood, vacuum hose and connectors. Repair or replace any faulty item.
4. Assemble vacuum hose as shown above, insuring all connections and clamps are tight.
5. Turn on vacuum and check for any stoppages or air leaks in the vacuum line or hood and insure adequate air flow in the open area of the saw.
6. If any leaks or stoppages are located, change or repair faulty item.
7. Connect saber saw to electrical outlet and feed into work. There should be no visible dust or debris. If excess dust is visible, (a) check vacuum cleaner bag for over-load-per manufacturer's instructions, (b) check lines for air leaks.

TO INSTALL OR REMOVE BLADE

(In addition to Black & Decker operating instructions)

1. Disconnect unit from electrical outlet.
2. Remove the two screws which retain the shield.
3. Pull shield straight down (shield fits firmly in position. A soft tap may be necessary).
4. Remove blade (see Black & Decker operating instructions).
5. Reassemble.

Appendix B OSHA Standard For Occupational Exposure to Asbestos

NOTE: Federal Register, Vol. 40, No. 133, May 21, 1975, announced that the OSHA standard for exposure to asbestos dust was reclassified from 1910.101a to 1910.1001. This change simplifies the reference system for toxic substance standards in Subpart I, Part 1910, Occupational Safety & Health Standards.

§ 1910.101a Asbestos.

(a) Definitions. For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

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

(b) Permissible exposure to airborne concentrations of asbestos fibers—(1) Standard effective July 1, 1972. The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (c) 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 (c) 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 (c) of this section.

(c) Methods of compliance—(1) Engineering controls. (i) Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) Local exhaust ventilation. (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standards Fundamentals Covering the Design and Operation of Local Exhaust Systems, ANSI Z9.3-1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.3-1971, and the maintenance of a historic file in compliance therewith. The address of the American National Standards Institute is given in § 1910.106.

(iii) 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, scores, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(7) Work practices—(1) Wet methods. Dusts or particulate matter shall be limited, mixed, loaded, removed, cut, moved, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the feasibility of the practice would be diminished thereby.

(2) Particular products and operations. No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from such surfaces, or other operations in which they are added, without being either wetted, or enclosed, or ventilated so as to prevent or remove 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 pipe, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or covering shall be provided with respiratory protection in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(4) 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 maintain 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 personal rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personal rotation shall be preferred and used.

(2) Where a respirator is required 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 (27 F.R. 6344, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(1) **Air purifying respirators.** A respirator or respirators described in subdivisions (ii) or (iii) of this subpart 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 10 times these limits.

(2) **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 subpart, 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, these limits.

(3) **Type "C" supplied-air respirators, continuous flow or pressure-demand type.** 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 these limits.

(iv) **Establishment of a respirator program.** (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practice for Respiratory Protection, ANSI Z95.1-1968, which is incorporated by reference herein.

(b) See § 1010.6 concerning the availability of ANSI Z95.1-1968 and the maintenance of an asbestos file in accordance therewith. The address of the American National Standards Institute is given in § 1010.100.

(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 referred to another job or given the opportunity to transfer to a different position where duties he is able to perform with the same employer. In the same geographical area and with the same security, 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 overalls 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) **Clothing lockers.** The employer shall provide two secure lockers or containers for each employee, or equivalent, or installed so to prevent contamination of the employee's street clothes from his work clothes.

(5) **Laundering.** (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of asbestos 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 for laundering shall inform such person, of the requirements in (a) of this section to effectively prevent the release of asbestos asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

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

(d) **Method of measurement.** All determinations of airborne concentrations of asbestos shall be made by the method after method of test-add X (micrometers) (4 micrometer objective) with phase contrast illumination.

(7) **Monitoring.** (i) **Fixed determinations.** Within 6 months of the publication of this section, every employer shall assess 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.

(2) **Personal monitoring.** (i) Samples shall be collected from within the breathing zone of the employee, on membrane filters of 0.2 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 pattern.** After the initial determinations required by paragraph (1) of this subpart, samples shall be of such frequency and pattern as to prevent with reasonable accuracy the level of exposure of employees. In no case shall the sampling be done at intervals greater than 4 months for employees whose exposure to asbestos may reasonably be forecast to exceed the limits prescribed by paragraph (b) of this section.

(1) Sho. appendages. The various
sides required by subcategory (1) of the
subcategories shall conform to the
subcategories of 20" x 10" vertical form
sides specified in § 1918.144(d)(1).
to this subcategory. The same shall de-
pict the following listed in the top
panel, with letter sizes and colors of
visibility of least equal to that specified
in this subcategory.

(3) Employee consent. Every employee and former employee shall have received this notice in any record referred to or mentioned by paragraph (1) of the

1) Medical examinations—1) General. The doctor shall provide a complete physical and mental examination relative to capacity to conduct the duties of this position.

Spacing between lines shall be at least equal to the length of the upper of 0.7 mm line.

(3) **Preemployment.** The employer shall provide or make available to each of his employees, within 16 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 16 x 17 inches), a history to elicit symptomatology of respiratory distress, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁).

(3) **Annual examinations.** On or before January 31, 1972, and at least annually thereafter, every employer shall provide or make available comprehensive medical examinations to each of his employees exposed in occupations exposed to airborne concentrations of asbestos fibers. Such annual examinations shall include, as a minimum, a chest roentgenogram (posterior-anterior 16 x 17 inches), a history to elicit symptomatology of respiratory distress, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁).

(4) **Termination of employment.** The employer shall provide or make available, within 16 calendar days before or after the termination of employment of any employee exposed 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 16 x 17 inches), a history to elicit symptomatology of respiratory distress, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁).

(5) **Record 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—(7) Maintenance.** Records of employees examined pursuant to this paragraph shall continue to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 30 years.

(8) **Access.** The contents of the records of the medical examinations covered 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 or other of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination covered 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.

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§ 1910.19 Asbestos dust.

Section 1910.20 shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard or exposure to asbestos dust which would otherwise be applicable by virtue of any of these sections.

NOTE: Following defines additional occupational areas affected by section 1910.19 above:

1910.12	- Construction work (construction, alteration, and/or repair, including painting and decorating)
1910.13	- Ship repairing
1910.14	- Shipbuilding
1910.15	- Shiprepairing
1910.16	- Longshoring

Appendix C

U.S. Environmental Protection Agency

Regulations for Disposal of Asbestos-Containing Wastes

shall be labeled with a warning label
that reads:

Caution

Contents Asbestos
Avoid Contact or Breathing Caution
Breathing Asbestos is Dangerous
to Your Health

Alternatively, warning labels approved
by Occupational Safety and Health
Standards of the Department of Labor,
Occupational Safety and Health Admin-
istrations (OSHA) under 29 CFR 1910-
120(e)(3)(ii) may be used.

(4) Processing of asbestos-containing
waste material into non-fragile forms:
(A) All asbestos-containing waste
material shall be formed into non-fragile
blocks or other shapes and processed at
waste disposal sites which are operated in
accordance with the provisions of § 61.23.

(B) There shall be no visible emis-
sions to the outside air from the collec-
tion and processing of asbestos-
containing waste material except as
specified in paragraph (1) of this section.
(C) For the purposes of this para-
graph (2), the term all asbestos-con-
taining waste material as applied to
collection and processing operations
covered by paragraph (4) of this sec-
tion includes only fragile asbestos waste
and certain other asbestos waste.

(5) Waste disposal for asbestos waste:
The owner or operator of any source
covered under the provisions of para-
graph (4) of this section shall meet the
following standards:

(1) There shall be no visible emis-
sions to the outside air, except as pro-
vided in paragraph (2)(3) of this section,
during the collection, processing, pack-
aging, transporting or disposal of
any asbestos-containing waste mate-
rial which is generated by such source.

(2) All asbestos-containing waste ma-
terial shall be covered at waste
disposal sites which are operated in ac-
cordance with the provisions of § 61.23.

(3) Rather than meet the requirements
of paragraph (2)(1) of this section, an
owner or operator may elect to meet
the following requirements in para-
graphs (2)(2)(i) and (ii), or the an
alternative disposal method which has
received prior approval by the Admin-
istrator:

(i) There shall be no visible emis-
sions to the outside air from the transfer of
asbestos waste material from the
waste disposal site, except as provided in
paragraph (2) of this section. Such waste
shall be subsequently processed either
as specified in paragraph (2)(2)(i) of
this section or as specified in paragraph
(2)(3) of this section.

(ii) All asbestos-containing waste
material shall be adequately mixed, with
a wetting agent recommended by the
manufacturer of the agent to effectively
wet dust and tailings, prior to processing
at a waste disposal site. Such agent shall
be used as recommended for the particu-
lar dust by the manufacturer of the
agent. There shall be no discharge of
visible emissions to the outside air from
the wetting operation except as specified
in paragraph (2) of this section. Wetting
shall be suspended when the asbestos

(1) Waste disposal for manufactured,
fabricated, construction, repair and
removal operations: The owner or op-
erator of any source covered under the
provisions of paragraphs (4), (5), (6),
or (7) of this section shall meet the fol-
lowing standards:

(1) There shall be no visible emis-
sions to the outside air, except as provided in
paragraph (2)(3) of this section, dur-
ing the collection, processing, packaging,
transporting, or disposal of
asbestos-containing waste material;
or emissions of any asbestos-containing
waste material which is generated by
such source.

(2) All asbestos-containing waste ma-
terial shall be disposed at waste dis-
posal sites which are operated in accor-
dance with the provisions of § 61.23.

(3) Rather than meet the requirements
of paragraph (2)(1) of this section, an
owner or operator may elect to use
one of the disposal methods specified
under (2)(2)(i) and (ii) of this section,
or an alternative disposal method which
has received prior approval by the Ad-
ministrator:

(i) Transfer of asbestos-containing
waste material with water:

(A) Control device asbestos waste shall
be thoroughly mixed with water into a
slurry and other asbestos-containing
waste material shall be thoroughly
washed. There shall be no visible emis-
sions to the outside air from the collec-
tion, mixing and washing operations, ex-
cept as provided in paragraph (2) of this
section.

(B) After wetting, all asbestos-con-
taining waste material shall be mixed
into non-fragile secondary waste and
such material shall be disposed at
waste disposal sites which are operated in
accordance with the provisions of
§ 61.23.

(C) The standards specified under
paragraphs (2)(2)(i) and (ii) of this section

temperature at the waste disposal site is less than -2.2°C (ca. 28°F). The ambient air temperature shall be determined by an appropriate thermometer buried with an accuracy of $\pm 1^{\circ}\text{C}$ ($\pm 1^{\circ}\text{F}$) and recorded at least at hourly intervals during the period that the operation of the cooling system is suspended. Records of such temperature measurements shall be retained at the source for a minimum of two years and made available for inspection by the Administrator.

(1) The cover of any inactive waste disposal site, which was operated by sources covered under § 61.22 (a), (c) or (d) and where asbestos-containing waste material emissions of such source was controlled, shall meet the following standards:

(i) There shall be no visible emissions to the outside air from an inactive waste disposal site subject to this subsection, except as provided in paragraph (i)(3) of this section.

(ii) Warning signs shall be displayed at all entrances and along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material was deposited, at intervals of 100 m (ca. 328 ft) or less, except as specified in paragraph (i)(4) of this section. Signs shall be posted in such a manner and location that a person may easily read the legend. The warning signs required by this subsection shall conform to the requirements of 29 CFR 1910.145(d)(4) and this paragraph. The signs shall display the following legend in the lower panel, with letter size and style of a minimum of 12 point, in the type of a minimum of 12 point, in the type of a minimum of 12 point, in the type of a minimum of 12 point.

Legend
Asbestos Waste Disposal Site
Do Not Cross Fence
Breaching Access to Restricted
Area Results
Penalties
1. See Sign, Color or Size
2. See Sign, Color or Size
3. See Sign

Spacing between lines shall be at least equal to the height of the upper of the two lines.

(3) The perimeter of the site shall be fenced in a manner adequate to deny access by the general public, except as specified in paragraph (i)(4) of this section.

(4) Warning signs and fencing are not required where the requirements of paragraphs (i)(3) (i) or (ii) of this section are met, or where a natural barrier adequately denies access by the general public. Upon request and supply of appropriate information, the Administrator will determine whether a fence or a natural barrier adequately denies access to the general public.

(5) Rather than meet the requirement of paragraph (i)(1) of this section, an owner may elect to meet the requirements of this paragraph or may use an alternative control method for emissions from inactive waste disposal sites which

has received prior approval by the Administrator.

(i) The asbestos-containing waste material shall be covered with at least 15 centimeters (ca. 6 inches) of compacted non-asbestos-containing material, and a cover of vegetation shall be grown and maintained on the area adequate to prevent exposure of the asbestos-containing waste material; or

(ii) The asbestos-containing waste material shall be covered with at least 30 centimeters (ca. 12 inches) of compacted non-asbestos-containing material and maintained to prevent exposure of the asbestos-containing waste; or

(iii) For inactive waste disposal sites for asbestos tailings, a raincoat or water-tight dust suppression agent which effectively binds dust and controls wind erosion shall be applied. Such agent shall be used as recommended for the particular asbestos tailings by the dust suppression agent manufacturer. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, waste crochets are not considered a dust suppression agent.

7. The first sentence in § 61.23 is revised as follows:

§ 61.23 Air-Cleaning.

If air-cleaning is elected, as permitted by § 61.22 (c) and § 61.22 (d) (i) (iv), the requirements of this section must be met:

8. The first sentence in § 61.24 is revised and redesignated as paragraph (a) and new paragraphs (c) and (d) are added as follows:

§ 61.24 Reporting.

(a) For sources subject to § 61.22 (c) and § 61.22 (d):

(1) A brief description of each process that produces asbestos-containing waste material.

(2) The average weight of asbestos-containing waste material disposed of, measured in lb/day.

(3) The collection control methods used in all stages of waste disposal.

(4) The type of disposal site or incineration site used for ultimate disposal, the name of the site operator, and the name and location of the disposal site.

(c) For sources subject to § 61.22 (c):

(1) A brief description of the site.

(2) The method or methods used to comply with the standard, or alternative procedures to be used.

(c) Such information shall accompany the information required by § 61.16. The information described in this section shall be reported using the format of Appendix A of this part.

9. A new section 61.25 is added to subpart B as follows:

§ 61.25 Waste disposal sites.

In order to be an acceptable site for disposal of asbestos-containing waste material under § 61.22 (c) and (d), an active waste disposal site shall meet the requirements of this section.

(a) There shall be no visible emissions to the outside air from any active waste

disposal site where asbestos-containing waste material has been deposited, except as provided in paragraph (d) of this section.

(b) Warning signs shall be displayed at all entrances and along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material is deposited, at intervals of 100 m (ca. 328 ft) or less except as specified in paragraph (d) of this section. Signs shall be posted in such a manner and location that a person may easily read the legend. The warning signs required by this paragraph shall conform to the requirements of 29" x 14" standard format signs specified in 29 CFR 1910.143(d)(4) and this paragraph. The signs shall display the following legend in the lower panel, with letter case and style of a visibility at least equal to those specified in this paragraph.

LEGEND

Asbestos Waste Disposal Site

Do Not Cross Fence

Breaking Accesses
to Entrances or Ties Starts

Warning

1" Sans Serif, Uppercase or Bold

1/2" Sans Serif, Uppercase or Bold

14 Point Gothic

Spacing between lines shall be at least equal to the height of the upper of the two lines.

(c) The perimeter of the disposal site shall be fenced in order to adequately deter access to the general public except as provided in paragraph (d) of this section.

(d) Warning signs and fencing are not required where the requirements of paragraph (c)(1) of this section are met, or where a natural barrier adequately deters access to the general public. Upon request and supply of appropriate information, the Administrator will determine whether a fence or a natural barrier adequately deters access to the general public.

(e) Rather than meet the requirements of paragraph (a) of this section, an owner or operator may elect to meet the requirements of paragraph (a)(1) or (a)(2) of this section -- may use an alternative control method for asbestos from active waste disposal sites which has received prior approval by the Administrator.

(1) At the end of each operating day, or at least once every 14-hour period while the site is in continuous operation, the asbestos-containing waste material which was deposited at the site during the operating day or previous 14-hour period shall be covered with at least 15 centimeters (ca. 6 inches) of compacted non-asbestos-containing material.

(2) At the end of each operating day, or at least once every 14-hour period while the disposal site is in continuous operation, the asbestos-containing waste material which was deposited at the site during the operating day or previous 14-hour period shall be covered with a resinous or petroleum-based dust suppression agent which effectively blocks dust

and controls wind erosion. Such agent shall be used as recommended for the particular dust by the dust suppression agent manufacturer. Other equally effective dust suppression agents may be used upon prior approval by the Administrator. For purposes of this paragraph, waste cradles on is not considered a dust suppression agent.

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ASBESTOS INFORMATION ASSOCIATION
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