United States
Environmental Protection
Agency

Air And Radiation
(6306W)

EPA 340-B-94-001
August 1994

EPA

Applicability Of The Asbestos NESHAP To Asbestos Roofing Removal Operations

Guidance Manual

GUIDANCE ON THE APPLICABILITY OF THE ASBESTOS NESHAP TO ASBESTOS ROOFING REMOVAL OPERATIONS

EPA Contract No. 68-D1-0118
EPA Project No. 80/41C
(RTI Project No. 5538-085)

September 1994

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1.0 INTRODUCTION

1.1 BACKGROUND

The asbestos national emission standards for hazardous air pollutants (NESHAP) were initially promulgated in 1973 in accordance with Section 112 of the Clean Air Act (CAA) of 1970. Revised several times to expand coverage and increase stringency, the asbestos NESHAP was revised on November 20, 1990, (55 FR 48406) for the purpose of enhancing enforcement and promoting compliance without altering the stringency of controls or expanding coverage.

Because of the complexities of the asbestos NESHAP and as a result of discussions with representatives of the roofing industry, it became evident that clarification was needed as to the applicability of the asbestos NESHAP to the removal of asbestos-containing roofing material (ACRM), as well as how compliance with the regulation could be achieved. The U.S. Environmental Protection Agency (EPA) decided (1) to develop guidance that documents roof removal practices including those that comply with the asbestos NESHAP and those that are not subject to the NESHAP and (2) to develop an Interpretive Rule that specifies how and when the asbestos NESHAP applies to the removal of ACRM. The Interpretive Rule, published as Appendix A to the Asbestos NESHAP (40 CFR part 61 subpart M), and this guidance document are intended to clarify for industry and enforcement agencies how and under what circumstances the NESHAP applies to the removal of ACRM and how compliance can be achieved.

2.0 ROOFING INDUSTRY

2.1 NUMBER AND SIZE OF ESTABLISHMENTS

Roofing contractors are classified in SIC 1761, Roofing, Siding, and Sheet Metal Work. Based on information from the Census of Construction Industries,[1] and the National Roofing Contractors Association (NRCA)[2] there are about 15,000 firms that do primarily roofing work and between 132,000 and 150,000 workers employed by firms that do roofing primarily.

2.2 TYPE OF PROJECTS: REROOFING VS. RE-COVERING

The NRCA estimates that about 70,000 roof removal jobs are done annually (excluding four-unit or less residential structures).[2] Based on data collected from its membership,[3] the NRCA estimates the percentages of all roofing projects that are reroofing (with roof removal), re-covering (without removal), and new construction. The results of their survey are presented in Table 2-1.

TABLE 2-1. TYPE OF PROJECT

Type	Percent of all projects
New construction	21
Reroofing with roof removal	48
Re-covering without roof removal	31

Source: National Roofing Contractors Association, Annual Market Survey, 1992-93.

3.0 ROOF ASSEMBLIES AND MATERIALS

This section provides a brief review of roof assemblies and materials, including decks, vapor retarders, insulation, membranes and membrane surfacing.

3.1 DECKS

The deck is the structural surface to which the roofing system (including insulation) is applied.[4] In addition to serving as the structural base for the roof system, decks must meet other design requirements regarding deflection, component-anchorage, dimensional stability, fire resistance and surface character.[5] Deck materials include: wood plank; wood panel (including plywood, oriented strand board, and waferboard) meeting minimum industry standards; poured gypsum concrete; lightweight insulating concrete; precast concrete or cementitious wood fiber plank; precast-prestressed concrete; reinforced concrete; and steel.[4] Metal, concrete and wood decks compose the majority of the market.[3]

Deck design must take into account strength, deflection, drainage or slope, and component anchorage or attachments. Two critical deck design parameters are slope and component anchorage or attachments.

3.1.1 Slope

To provide drainage and prevent the accumulation of rainwater, roofs are sloped. Slope is often provided by the deck, although in some situations it is provided by tapered insulation and sloped insulating fills. Even so-called "flat" roofs should be slightly sloped to promote positive drainage. Suggested slopes for three types of roof are given in Table 3-1.[4]

A variety of materials are used as vapor retarders, including one or two plies of asphalt-saturated felt adhered with bitumen; vinyl or polyethylene film; polyvinyl chloride (PVC) sheets; aluminum foil; and laminated kraft paper sheets with a bitumen-sandwiched or bitumen-coated kraft paper.

In temperate humid climates during much of the year, water vapor flows in the opposite direction, i.e., down through the roof to the interior.[5] In these climates, the roof membrane acts as the vapor retarder.

3.3 THERMAL INSULATION

Four categories of insulation are used in low-slope roof systems:

- Rigid board insulation
- Dual-purpose deck and insulating panels
- Poured-in-place insulating concrete fills
- Sprayed-in-place polyurethane foam

In addition, blanket or loose-filled insulation maybe used in joist cavities under the roof deck.

Rigid board insulation includes wood and vegetable fiber boards, foamed plastics, rigid glass fibers, perlite, cellular glass, mineral fiberboard, and poured lightweight insulating concretes. Preformed structural wood-fiber decks made of cement-coated wood fibers (e.g., Tectum®) also serve as insulation. Lightweight insulating concretes contain perlite (siliceous volcanic glass), or vermiculite (expanded mica) aggregate and Portland cement. Polyurethane foam is the principal sprayed-in-place plastic foam.

Insulation for steep-sloped roofs is often applied under the deck. Insulation used in nonresidential, low-sloped roofs is summarized in Table 3-2.[6]

TABLE 3-3. MEMBRANES USED IN NONRESIDENTIAL ROOFING PROJECTS

Membrane	Percent of projects
Built-up roofing	30.4
Ethylene propylene diene monomer (EPDM)	27.3
Modified bitumen-APP	11.1
Modified bitumen-SBS	9.5
Asphalt shingles	5.6
Polyvinyl chloride (PVC)	3.4
Clorosulfonated polyethylene (CSPE) (e.g. Hypalon)	2.3
Tile	1.8
Other single-ply	1.7
Metal-architectural	1.7
Metal-structural	0.4
Polyurethane foam	0.9
Liquid-applied	0.4
Other	3.5

Source: National Roofing Contractors Association, 1991/1992 NRCA Market Survey.

- Good internal cohesion and adhesion
- Thermoplasticity[5]

The bitumen is used as an adhesive as well as a waterproofing layer.[4] The roofing felts stabilize and reinforce the system. The aggregate protects the membrane from the effects of sunlight and weathering. Between the plies of roofing felt, bitumen is mopped, typically at 20 to 35 lb/square (a square is 100 ft^2).[4] The top layer, or flood coat, of bitumen is applied at 60 lb/square, allowing about half of the aggregate to become imbedded in it.

The primary advantage of asphalt is that it comes in a wide range of viscosities; hence, high viscosity (high resistance to flow) asphalts are available for slopes up to 6 in./ft. In contrast, coal tar bitumen has viscosities about the same as dead-level (Type I) asphalt and, thus, is generally only appropriate for slopes of 1/4 in./ft or less.[4]

The predominant reinforcing material used in roofing felts is glass fiber. Asbestos was manufactured and used as a reinforcing material in roofing felts until about the early 1980s, after which its use and manufacture for that purpose were discontinued.

3.4.2 Single Ply Membrane

Synthetic, single-ply membranes can be classified by application technique and design. They may be sheet- or fluid-applied and designed as fully or partially adhered, mechanically attached or loose-laid and ballasted membranes. They may also be classified as thermosetting, e.g., EPDM; thermoplastic, e.g., PVC, chlorinated polyethylene (CPE), and polyisobutylene membranes (PIB); and modified bitumen.

3.4.3 Shingles

A shingle is defined as a small unit of prepared roofing material designed for installation with similar units in overlapping rows on inclines normally exceeding 25 percent.[4]

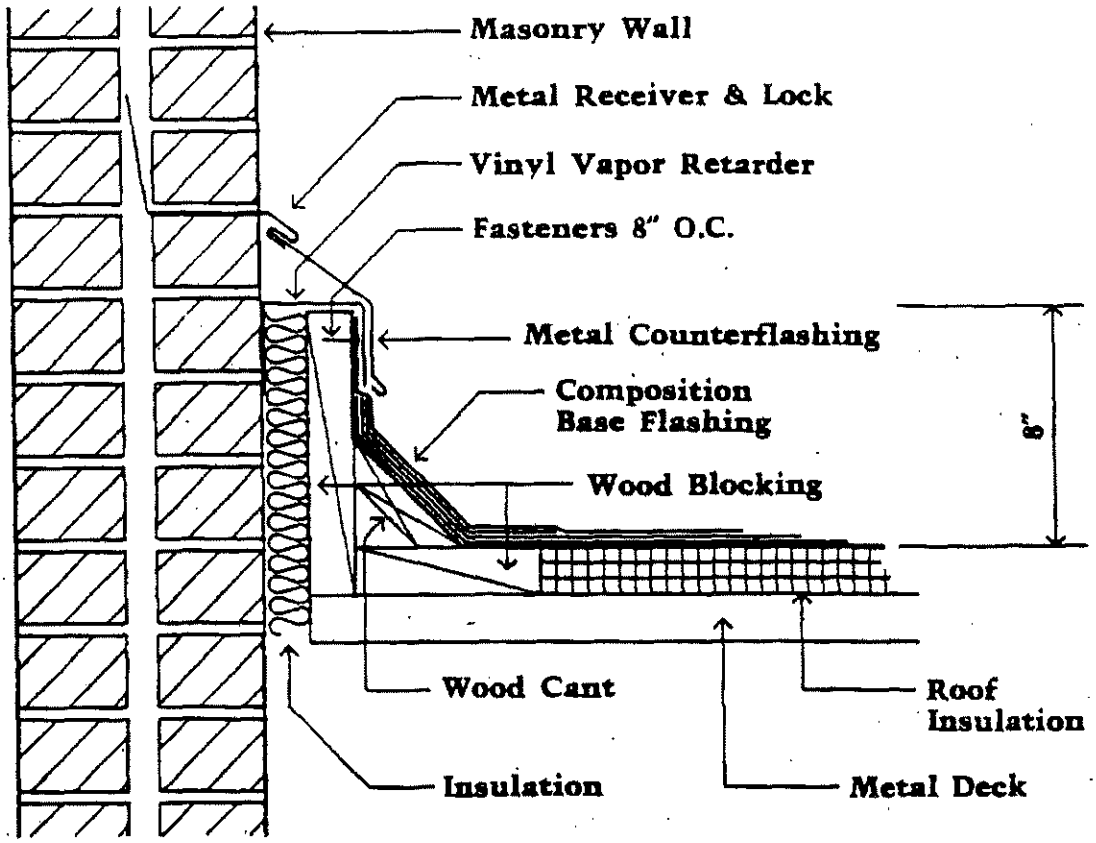

Figure 3-2. Base flashing.

3.5.3 Mineral

Mineral-surfaced roll roofing is made of felts often coated with granules of slate, ceramic, or mineral embedded in the weathering grade asphalt on the surface to be exposed.[5]

4.0 ASBESTOS ROOFING PRODUCTS

This section describes various roofing products and their uses with particular emphasis on those that contain (or contained) asbestos. Information on the time periods in which asbestos-containing products were used is provided where available.

4.1 FELTS[5]

Asbestos roofing felts were nonwoven fabrics of organic and/or inorganic composition. Organic felts are made of cellulose fibers--pulped wood and felted papers--saturated and coated with coal tar bitumen or asphalt. Asbestos-reinforced felts were saturated and coated with asphalt and were relatively low in cost and widely used.

Asbestos felts conforming to the specifications of ASTM-D250 were made of 85 percent chrysotile and 15 percent organic fibers saturated with asphalt though the ASTM standard was changed frequently over the years. The addition of other organic fibers allowed the felt to absorb more of the asphalt saturant, which asbestos fibers do not absorb. Asbestos felts, like others, are quite thin. For example, dry asbestos felts (before bitumen is added) weighed approximately 9 and 18 lb/square and were 0.023 and 0.047 in. thick, respectively.[8] Glass fiber mats saturated with asphalt were also used as roofing felts.

The typical use, asbestos content, and time period sold for asbestos felts are given in Table 4-1.[10] Virtually all

U.S. production of asbestos roofing felts was discontinued, however, by the early 1980s, in part because of performance-related problems with the product.

4.2 CEMENTS, COATINGS, AND ADHESIVES

Cements, coatings, and adhesives are typically made of asphalt cutback, i.e., solvent-thinned bitumens, and include cold-process roof primers, adhesives, roof and flashing cements, and roof coatings. Typical uses, asbestos contents, and time periods sold for asbestos-containing cements, coatings, and adhesives are shown in Table 4-2.[10]

4.3 SINGLE-PLY PRODUCTS

Asbestos was used as a neoprene latex bonded asbestos backing material in a few of the early single-ply roofing systems such as TNA-200 (Tedlar-neoprene-asbestos), PIB membranes, and Hypalon sheets. The PIB membranes were sold between 1960 and 1966.[10] Other single-ply products (e.g. EPDM, PVC, modified bitumen, and CPE) are not and have not in the past been made with asbestos.

4.4 SHINGLES

A/C roofing shingles and asphalt-asbestos roofing shingles have been in use in this country for more than 80 years. Asphalt-asbestos roofing shingles were sold until 1979, but were not used widely; A/C shingles were sold until 1992.

4.5 DECKING

Since the 1930s, corrugated A/C sheets and flat A/C sheets (Transite) have been used as wall cladding, and occasionally as roofing panels; flexible and utility A/C products have been used as decking.[11] However, unless damaged, decks are not repaired or removed even if other parts of the roof system are being replaced.[4]

4.6 INSULATION

Asbestos is not and has not been employed in thermal insulation used in roof systems.

4.7 OTHER ROOF COMPONENTS

Roofing materials not covered in previous sections of Chapter 4 (e.g., vapor retarders, thermal insulation, modified bitumen membranes) are not and have not in the past been made with asbestos. Roofing felts and single-ply membranes presently manufactured and used also do not contain asbestos.

5.0 ROOF REMOVAL PRACTICES

5.1 BUILT-UP ROOFS

Whenever roofs become damaged or deteriorate to the point that leaks are likely, a decision must be made on how to restore the roof to its intended integrity. Usually the course of action requires, at a minimum, the repair of the damaged or deteriorated areas and, in some cases, replacement of the entire roof may be necessary. Even when the decision is to re-cover the existing roof, repairs are occasionally made to the existing roof. Complete roof removal typically involves removal of the membrane, flashing, insulation, and vapor retarder (if present) in the affected area. In some instances, the roof deck may need repair or replacement.

The aspects of roof removal practices discussed here are limited to the methods and equipment used in the removal of the roof membrane and flashing, the components of a roof system where asbestos is most likely to be found. As discussed above, other components of roof systems do not contain asbestos or are not repaired or replaced using methods that trigger coverage under the asbestos NESHAP. Several methods of cutting the roof membrane are available and the method chosen often depends on the nature of the job as well as State and local asbestos regulations. Power roof cutters are used predominantly to cut roof membranes into manageable sections that can be lifted and removed by workers. Manual methods are sometimes used. Other mechanical methods may be used successfully to cut and slice roof membranes, although their use is not yet as well known or as widespread.

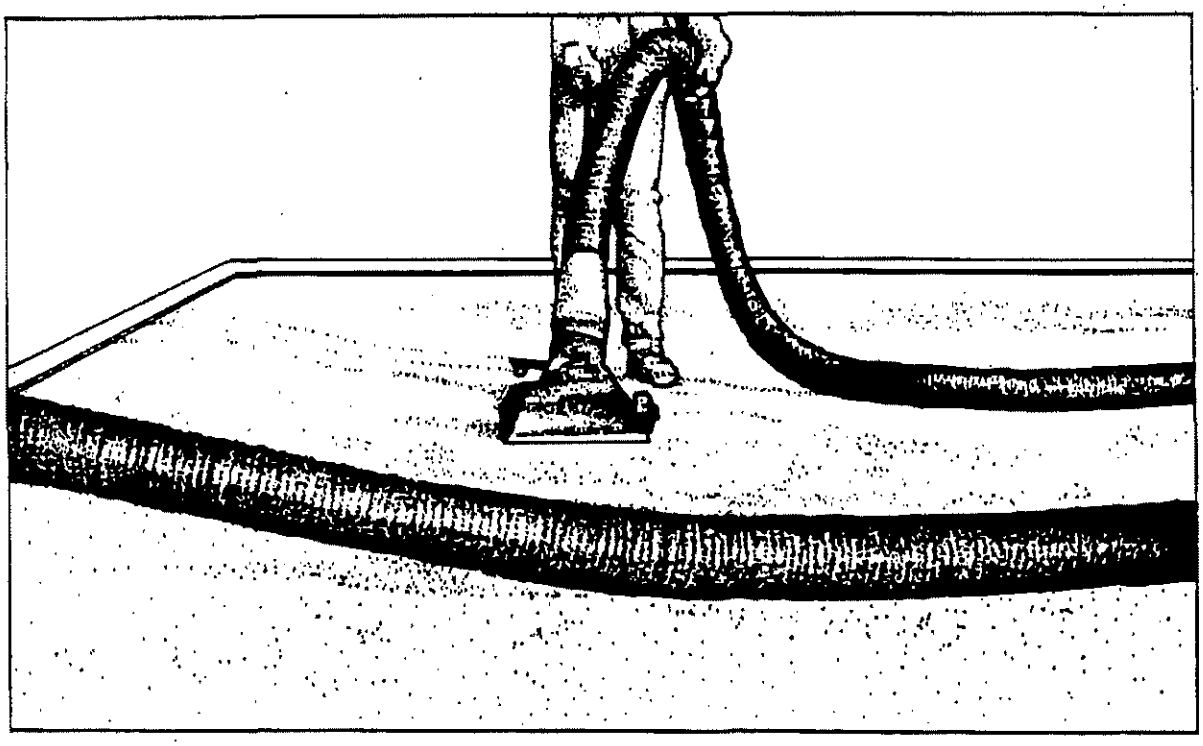

Figure 5-1. Gravel removal by vacuuming.

remove roof membranes on larger removal jobs. On large, manual roof removal jobs, labor requirements usually increase for the removal phase because it takes considerably more workers to chop or slice the same amount of membrane that can be cut using powered cutting equipment in the same time. Manual removal was estimated by one roofing contractor to increase labor requirements by about one and one-half times.[13]

5.1.3 Rotating Blade (RB) Roof Cutter

RB roof cutters, like the one in Figure 5-3, are used extensively by roofing contractors to cut roof membranes for removal. A gasoline-powered engine mounted on a three- or four-wheeled deck turns a blade mounted near or toward the front of the machine. Standard engines range in size from 5 hp for cutters used for patch work and cutting around roof fixtures such as vents and heating, ventilation, and air conditioning (HVAC) components to 14 hp for cutters equipped with double blades, with 8- and 9-hp engines being typical for the RB roof cutters that do the bulk of the cutting. RB roof cutter blades typically have two cutting edges and are about 12 in. long. The cutting edge of the blade is blunt with about a 1/4-in. kerf as opposed to a tapered, sharp edge. The blades are often carbide tipped to extend blade life. On gravel-surfaced roofs, at a removal rate of about 4,000 ft^2 per day, a standard blade lasts for 3 to 4 days.[13] The blade design allows the cutter to be used on gravel-covered roofs, which would dull sharp blades and blades made of softer material. The blade rotates so that the cutting action is from the underside of the membrane when the cutter is moving forward. The cutting can be adjusted to the desired depth depending on the thickness of the membrane, the number of layers present, and the presence or absence of insulation between the membrane and the deck. Because cutting depth is adjustable, RB roof cutters can be used to cut membranes with no underlying insulation if care is taken not to cut completely through the membrane. Because roof systems are not completely uniform in thickness, occasional gouging of the

roof deck may occur when using RB power cutters. The blade rotates in a plane perpendicular to the roof surface and is usually housed in a metal blade guard that confines the dust and minimizes the throwing of gravel. Blade guard designs vary. One design completely encloses the blade to within about an inch or less of the roof surface, and another suspends 2-in. length chains from the sides of the shroud to deflect thrown gravel. RB roof cutters are used on both smooth- and gravel-surfaced roofs and are manually propelled. Cutters are commercially available from several manufacturers of roofing equipment.

5.1.4 "Slicer"

A self-propelled, two-wheeled tractor equipped with a blade can be used to slice through smooth roof membranes.[14] Modified by attaching a heavy metal plate to the tractor at the rear, weight is placed on the blade while the plate slides along the roof membrane surface. The blade extends down through a slot cut into the center, near the rear of the metal plate. The lower, slicing portion of the blade is triangular so that, as the blade is pulled through the membrane, the slicing edge is angled back, much like the slicing motion made when using a utility knife. The slicing depth is adjustable. The blade can slice through the membrane and insulation without producing visible emissions or dust or debris. A "slicer" is shown in Figure 5-4. This device may not be suitable for use on aggregate-surfaced roofs because the aggregate would quickly dull the blade. Although this device is not presently available commercially, the slicer can be fabricated using commercially available components. Other similarly adapted roofing equipment has been used to slice roofs by installing a roof cutter blade, perpendicular to the roof surface on the front of a power remover.[15]

5.1.5 "Roof Plow"

The "roof plow" operates on a principle similar to that of the "slicer," except that it slices the membrane from below.[16] Because it slices from below, it is not dulled by

roof aggregate and may, therefore, be suitable for aggregate-surfaced roofs. The "plow" shown in Figure 5-5 is attached to the rear of a self-propelled garden tractor much like the slicer and is pulled along through the membrane. To start, the tip of the "plow" blade is inserted under the roof membrane. Because the plow slices the membrane, no dust or debris is created during its use. "Plows" are also not presently available commercially, but, like the slicer, can be fabricated using commercially available materials.

5.1.6 Concrete/Asphalt Planer

A planer is a machine used to remove concrete or asphalt from surfaces at controlled depths and profiles.[17] It uses a series of hardened steel or tungsten carbide cutters that are aligned on four parallel shafts across a definite width of cut and revolve on a drum. The cutters can be spaced to produce various finishes and have a standard penetration depth of 1/4 in. to 3/4 in. Deeper cuts may be achieved on some substrates by modifying the cutters. Some models of planers come equipped with a misting device over the cutter assembly and can be used with a vacuum system designed for the planer. For roof removal purposes, all of the cutters except one set are removed to obtain a single cut. One manufacturer is also considering additional design changes that would permit a cutting depth of up to 2 in. An important feature of the planer is that it can be used in combination with a well designed HEPA-filtered vacuum system. Both the concrete planer and vacuum unit are commercially available. The planer, however, has rarely been used in roof removal projects, because the cutters are easily clogged with bituminous material, and the short cutting depth requires several passes. Figure 5-6 shows a planer with a vacuum system.

5.1.7 Power Remover (Power Tear-off Machine)

Following the separation of roof membrane into sections, workers using shovels and pry bars may manually pry

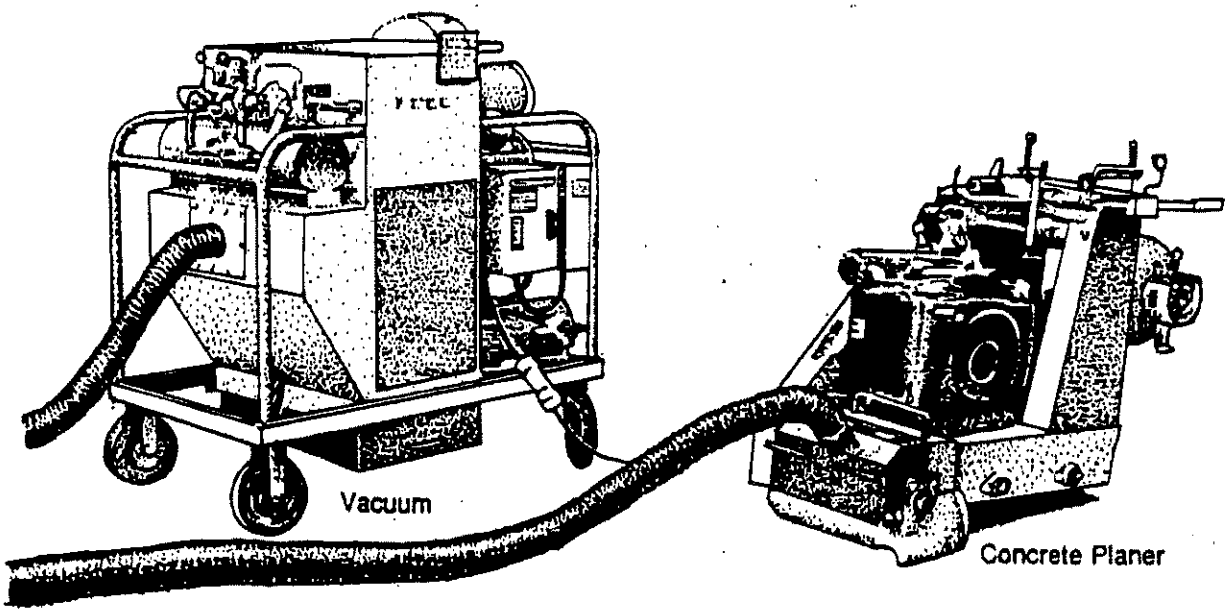

Figure 5-6. Concrete planer and vacuum.

6.0 DUST CONTROL METHODS

Various methods are available for minimizing dust emissions from the removal of asbestos-containing roofing materials. Dust control methods include modifying the way in which the asbestos material is removed as well as add-on dust control devices. The control methods discussed here are intended for use in the removal of asbestos-containing BUR membranes.

6.1 REMOVAL METHODS

The method used to separate the BUR membrane into sections can affect the amount of dust generated. As described in Section 5, the standard RB roof cutter, long used by the roofing industry, uses a blade with a flat 1/4- to 3/8-in.-wide cutting edge. As this blunt edge passes rapidly through the roof system components, i.e., insulation, membrane, and surface aggregate, visible emissions of dust are typically generated.[13,19] Dust created during the use of the RB roof cutter on an asbestos-containing membrane has been shown to contain asbestos.[20] Various methods devised to reduce the amount of dust generated include modification of the standard roof cutting blade and the use of methods that minimize the degree of damage to the roofing materials. For example, it has been demonstrated that by adjusting the cutting depth to cut only the membrane, it is possible to reduce visible emissions.[20] In a test where a membrane and insulation were being cut, most of the dust generated came from the insulation materials (only 1 to 3 percent of the sampled material was asbestos.)[20]

set of cutters, this machine has been used to separate BUR membranes into sections for removal. Various models of concrete planers are equipped with a misting device over the cutter assembly to aid in dust control. In addition, a vacuum system has been designed for use with the concrete planers to control dust.[17] These vacuum units are available with large (150-ft^2) paper-pleated filters and are also available with HEPA filters.[17] A 2 hp centrifugal blower generates 150 cfm of suction and a 1 hp air compressor automatically purges the primary filter into a collection tray under the machine. During a demonstration of the concrete planer (set up for roof cutting, i.e., all but one set of cutters removed) and the vacuum unit, dust was effectively controlled and the planer was operated without producing visible emissions.[21] Planers, however, are not typically used in roof removal operations, and may not be suitable under some conditions.

6.2 WETTING

Wetting has been done in various ways to attempt to control dust emissions from roof removals involving RB roof cutters. Although asphalt materials do not absorb water, the water helps to control dust by adhering to the particles, causing them to settle out faster. One approach is to apply water to the roof surface prior to cutting. This primarily reduces emissions from dust that has collected on the roof. In a test where a local exhaust system had been installed on a RB roof cutter and a skirt added to extend the blade guard to the roof surface, the added precaution of a general wetting of the roof surface further reduced visible emissions. (The roof had been swept and washed prior to cutting).[20] Water may also be sprayed during cutting at the point where the roof is being cut by a worker walking beside the cutter. A hand-held, garden-type sprayer or water hose with a spray nozzle is often used to apply water at the point of cutting. (This method is not always appropriate, however, for instance if the insulation is being re-used.)

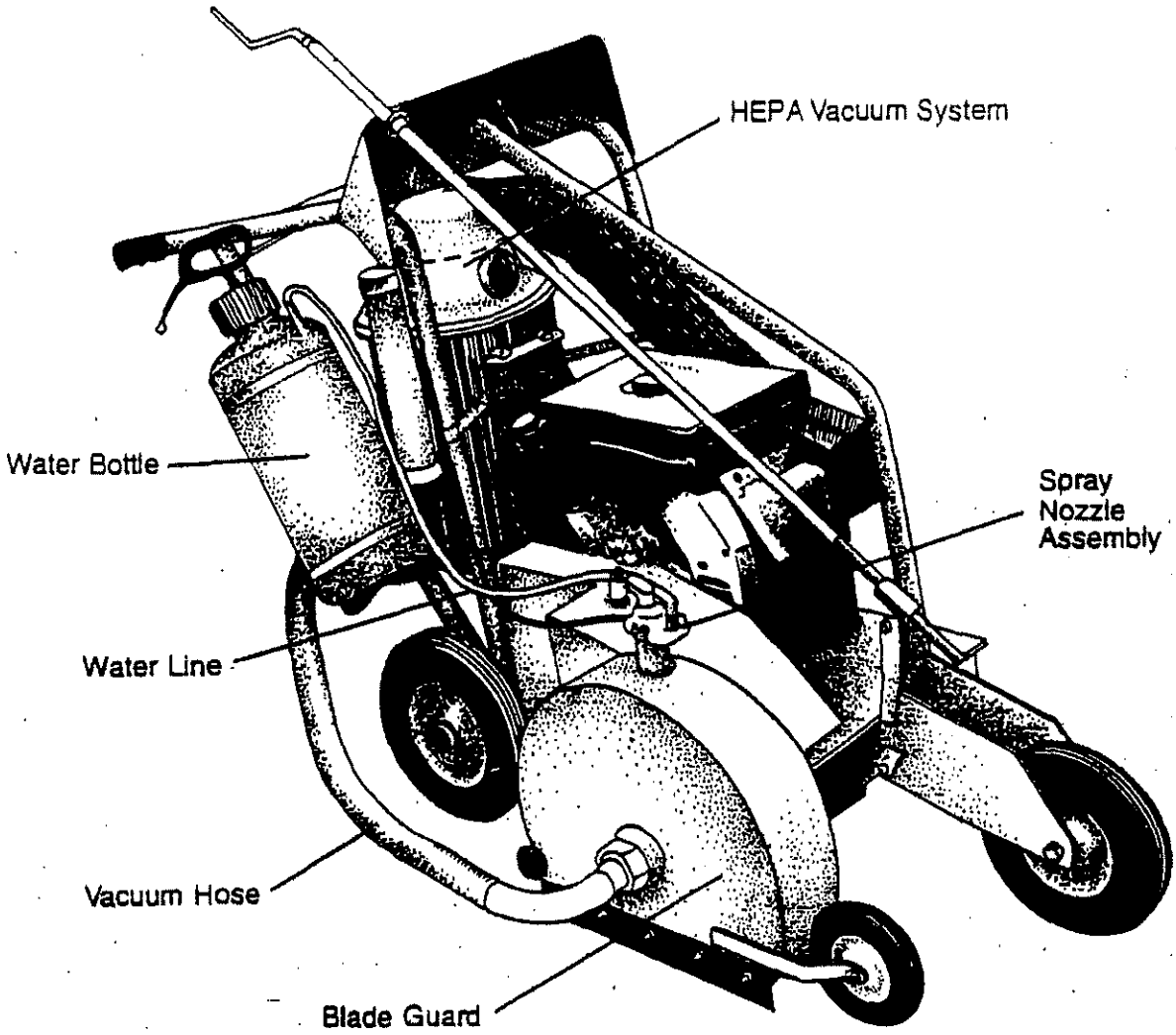

Figure 6-1. Rotating Blade Roof Cutter Equipped with a Spray Nozzle and Vacuum System

the extent of damage to the existing roof and the structure's load-bearing capacity.

6.5 WASTE HANDLING AND DISPOSAL

The asbestos-containing waste generated during a roof removal job generally includes the asbestos-containing membrane and flashing. The dust created by the use of the RB roof cutter has also been shown to contain asbestos.[20] If the dust from cutting is not controlled at the source, it may be blown away from the cutting area and contaminate other parts of the roof. Where controls are implemented, e.g., wetting inside the blade guard, use of local exhaust ventilation with the blade guard, and extending the blade guard down close to the roof surface, most of the dust can be confined to the surface immediately adjacent to the cut. Vacuuming along the cut while still wet is one method for collecting the dust for disposal. When manual or slicing methods are used on roof membranes that are not badly deteriorated, there is no asbestos dust or debris formed. Nonasbestos waste and nonRACM-contaminated waste can be disposed of in landfills separately from RACM waste.

7.0 SAFETY HAZARDS AND PROPERTY DAMAGE

This section reviews the safety and health hazards that normally accompany roof removals, as well as the potential for additional safety hazards and property damage if the asbestos NESHAP is applied to roof removals. This section has relevance to NESHAP inspectors since they will be exposed to many of the same safety and health hazards as roofing workers. It is noted that the responsibility for occupational safety and health problems associated with roof removals lies with OSHA and its state-level counterparts.

7.1 GENERAL

The primary safety and health problems of roof removals include dust inhalation and skin and eye irritation during removal, falls from ladders and roofs and through roof openings, strains, sprains and hazards associated with lifting heavy objects, and the effects of extreme heat.[22,23] These and other problems may be exacerbated when jobs are rushed.[22]

7.1.1 Dust

Use of power brooms to sweep loose aggregate and other deposits from roofs and roof cutters to cut built-up membranes can produce copious amounts of airborne dust. The dust from power brooming is primarily a nuisance dust, although NIOSH suggests that dust from some slags may be a health problem requiring worker protection.[22] On the other hand, the dust produced by roof cutting may contain asbestos, and dust from coal tar pitch causes skin and eye irritation similar to that resulting from exposure to volatile pitch emissions.[22]

The NIOSH has identified the following controls for dust exposures. Engineering controls for dust problems include

Preventing heat illness involves reducing the time spent in the heat, using tools to reduce the metabolic demands of roof removals, having supervisors trained to recognize early signs of heat illness, and drinking adequate amounts of cool potable water.[25]

7.1.4 Rushed Jobs

Rushing roof removal work to take advantage of favorable weather and/or to increase worker productivity can contribute to roofing injuries. For example, in the rush to complete a removal, protective equipment may not be cleaned or may not be used, perimeter protection and guarding of roof holes may be inadequate or overlooked, ladders may not be tied off, the risk of heat stress under unfavorable temperature, humidity, and wind conditions may be increased, and inexperienced and untrained workers pressed into service may behave in an unsafe manner.[22]

7.2 NESHAP RELATED

The asbestos NESHAP may require wetting when RB roof cutters are used to cut roofs.

7.2.1 Safety Hazards

Under certain circumstances, wetting, as may be required by the NESHAP, could create a safety hazard. Water on a roof membrane may cause it to become slick, increasing the potential for falls and, if the water freezes during cold weather work, an even greater slippage problem is created.[26]

The wetting required by the NESHAP can be accomplished through use of a blade guard fitted with a nozzle which applies a fine water spray on an area approximately 2 in. on either side of the cut. Thus, only a very small portion of the entire roof is wetted. On an aggregate surfaced roof, any reduction in traction due to a wet surface would be minimal, since the aggregate provides additional traction. The NESHAP does provide for exceptions from the wetting requirement where the Administrator has determined that wetting would present a safety hazard or when the temperature is below freezing at the point of removal (40 CFR 61.145(c)).

8.0 NESHAP REQUIREMENTS: INTERPRETIVE RULE GOVERNING ROOF REMOVAL OPERATIONS

The EPA has published, as a new Appendix A to Subpart M of 40 C.F.R. Part 61, an interpretive rule, which is presented in its entirety below. The purpose of the interpretive rule is to clarify the Asbestos NESHAP as it affects roof removal operations by: (i) specifying which roof removal operations EPA construes the NESHAP to cover; and (ii) specifying roof removal work practices that EPA deems to be in compliance with the NESHAP in roofing operations where the NESHAP applies.

The interpretive rule does not supersede, alter or replace the Asbestos NESHAP; nor does it change the scope or stringency of the NESHAP. Rather the interpretive rule interprets the NESHAP as it applies to roof removal operations, in order to provide particularized guidance which, if followed, would promote compliance with, and more effective and consistent enforcement of, the NESHAP in such operations.

In addition to EPA's asbestos NESHAP, other Federal regulations (e.g., OSHA) and State and local environmental and occupational safety and health regulations may apply to roofing operations. These regulations often are more stringent than EPA's asbestos NESHAP. Roofing contractors, abatement contractors, and consultants on roofing jobs involving the removal of roofing should be familiar with all applicable Federal, State, and local regulations in addition to the NESHAP.

which the material will be subjected, (3) the amount of ACM involved.

1.3. Asbestos-containing material regulated under the NESHAP is referred to as "regulated asbestos-containing material" (RACM). RACM is defined in § 61.141 of the NESHAP and includes: (1) friable asbestos-containing material; (2) Category I nonfriable ACM that has become friable; (3) Category I nonfriable ACM that has been or will be sanded, ground, cut, or abraded; or (4) Category II nonfriable ACM that has already been or is likely to become crumbled, pulverized, or reduced to powder. If the coverage threshold for RACM is met or exceeded in a renovation or demolition operation, then all friable ACM in the operation, and in certain situations, nonfriable ACM in the operation, are subject to the NESHAP.

A. Threshold Amounts of Asbestos-Containing Roofing Material

1.A.1. The NESHAP does not cover roofing projects on single family homes or on residential buildings containing four or fewer dwelling units. 40 C.F.R. § 61.141. For other roofing renovation projects, if the total asbestos-containing roof area undergoing renovation is less than 160 ft^2, the NESHAP does not apply, regardless of the removal method to be used, the type of material (Category I or II), or its condition (friable versus nonfriable). 40 C.F.R. §61.145(a)(4). However, EPA would recommend the use of methods that damage asbestos-containing roofing material as little as possible. EPA has determined that where a rotating blade (RB) roof cutter or equipment that similarly damages the roofing material is used to remove Category I nonfriable asbestos-containing roofing material, the removal of 5580 ft^2 of that material will create 160 ft^2 of RACM. For the purposes of this interpretive rule, "RB roof cutter" means an engine-powered roof cutting machine with one or more rotating cutting blades the edges of which are blunt. (Equipment with

RACM (from other ACM that has been crumbled, pulverized or reduced to powder), the operation is not subject to the NESHAP, even where the total area of the roofing material to be removed exceeds 160 ft^2; provided, however, that if the renovation includes other operations involving RACM, the roof removal operation is covered if the total area of RACM from all renovation activities exceeds 160ft^2. See the definition of regulated asbestos-containing material (RACM), 40 C.F.R. § 61.141.

1.A.3. Only roofing material that meets the definition of ACM can qualify as RACM subject to the NESHAP. Therefore, to determine if a removal operation that meets or exceeds the coverage threshold is subject to the NESHAP, any suspect roofing material (i.e. roofing material that may be ACM) should be tested for asbestos. If any such roofing material contains more than one percent asbestos and if the removal operation is covered by the NESHAP, then EPA must be notified and the work practices in § 61.145(c) must be followed. In EPA's view, if a removal operation involves at least the threshold level of suspect material, a roofing contractor may choose not to test for asbestos if the contractor follows the notification and work practice requirements of the NESHAP.

B. A/C Shingle Removal (Category II ACM Removal)

1.B.1. A/C shingles, which are Category II nonfriable ACM, become regulated ACM if the material has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations. 40 C.F.R. § 61.141. However, merely breaking an A/C shingle (or any other category II ACM) that is not friable may not necessarily cause the material to become RACM. A/C shingles are typically nailed to buildings on which they are attached. EPA believes that the extent of breakage that will normally

1.C.2. Power removers or power tear-off machines are typically used to pry the roofing material up from the deck after the roof membrane has been cut. It is EPA's interpretation that when these machines are used to pry roofing material up, their use is not regulated by the NESHAP.

1.C.3. As noted previously, the NESHAP only applies to the removal of asbestos-containing roofing materials. Thus, the NESHAP does not apply to the use of RB cutters to remove non-asbestos built up roofing (BUR). On roofs containing some asbestos-containing and some non-asbestos containing materials, coverage under the NESHAP depends on the methods used to remove each type of material in addition to other coverage thresholds specified above. For example, it is not uncommon for existing roofs to be made of non-asbestos BUR and base flashings that do contain asbestos. In that situation, EPA construes the NESHAP to be inapplicable to the removal of the non-asbestos BUR using an RB cutter so long as the RB cutter is not used to cut 5580 ft^2 or more of the asbestos-containing base flashing or other asbestos-containing material into sections. In addition, the use of methods that slice, shear, punch or pry could then be used to remove the asbestos flashings and not trigger coverage under the NESHAP.

II. Notification

2.1. Notification for a demolition is always required under the NESHAP. However, EPA believes that few roof removal jobs constitute "demolitions" as defined in the NESHAP (§ 61.141). In particular, it is EPA's view that the removal of roofing systems (i.e., the roof membrane, insulation, surfacing, coatings, flashings, mastic, shingles, and felt underlayment), when such removal is not a part of a demolition project, constitutes a "renovation" under the NESHAP. If the operation is a renovation, and Category I roofing material is

III. Emission Control Practices

A. Requirements to Adequately Wet and Discharge No Visible Emission

3.A.1. The principal controls contained in the NESHAP for removal operations include requirements that the affected material be adequately wetted, and that asbestos waste be handled, collected, and disposed of properly. The requirements for disposal of waste materials are discussed separately in section IV below. The emission control requirements discussed in this section III apply only to roof removal operations that are covered by the NESHAP as set forth in Section I above.

3.A.2. For any operation subject to the NESHAP, the regulation (§§ 61.145(c)(2)(i), (3), (6)(i)) requires that RACM be adequately wet (as defined in § 61.141) during the operation that damages or disturbs the asbestos material until collected for disposal.

3.A.3. When using an RB roof cutter (or any other method that sands, grinds, cuts or abrades the roofing material) to remove Category I asbestos-containing roofing material, the emission control requirements of § 61.145(c) apply as discussed in Section I above. EPA will consider a roof removal project to be in compliance with the "adequately wet" and "discharge no visible emission" requirements of the NESHAP if the RB roof cutter is equipped and operated with the following: (1) a blade guard that completely encloses the blade and extends down close to the roof surface; and (2) a device for spraying a fine mist of water inside the blade guard, and which device is in operation during the cutting of the roof.

temperatures are indicated as the reason for not wetting, records must be kept of the temperature at the beginning, middle and end of the day on which wetting is not performed and the records of temperature must be retained for at least 2 years. 42 C.F.R. § 61.145(c)(7)(iii). It is EPA's interpretation that in such cases, no written application to, or written approval by the Administrator is needed for using emission control methods listed in § 61.145(c)(3)(i)(B), or alternative emission control methods that have been previously approved by the Administrator. However, such written application or approval is required for alternative emission control methods that have not been previously approved. Any dust and debris collected from cutting must still be kept wet and placed in containers. All of the other requirements for notification and waste disposal would continue to apply as described elsewhere in this notice and the Asbestos NESHAP.

C. Waste Collection and Handling

3.C.1. It is EPA's interpretation that waste resulting from slicing and other methods that do not cut, grind, sand or abrade Category I nonfriable asbestos-containing roofing material is not subject to the NESHAP and can be disposed of as nonasbestos waste. EPA further construes the NESHAP to provide that if Category II roofing material (such as A/C shingles) is removed and disposed of without crumbling, pulverizing, or reducing it to powder, the waste from the removal is not subject to the NESHAP waste disposal requirements. EPA also interprets the NESHAP to be inapplicable to waste resulting from roof removal operations that do not meet or exceed the coverage thresholds described in section I above. Of course, other State, local, or Federal regulations may apply.

3.C.2. It is EPA's interpretation that when an RB roof cutter, or other method that similarly damages the roofing

using a filtered vacuum cleaner or debris collector that meets the requirements of 40 C.F.R. § 61.152 to clean up as much of the debris as possible, or to gently sweep up the bulk of the debris, and then use a filtered vacuum cleaner that meets the requirements of 40 C.F.R. § 61.152 to clean up as much of the remainder of the debris as possible. On smooth surfaced roofs (nonaggregate roofs), sweeping up the debris and then wet wiping the surface may be done in place of using a filtered vacuum cleaner. It is EPA's view that if these decontamination procedures are followed, the remaining roofing material does not have to be collected and disposed of as asbestos waste. Additionally, it is EPA's view that where such decontamination procedures are followed, if the remaining portions of the roof are non-asbestos or Category I nonfriable asbestos material, and if the remaining portions are removed using removal methods that slice, shear, punch or pry, as discussed in section 1.C above, then the remaining portions do not have to be collected and disposed of as asbestos waste and the NESHAP's no visible emissions and adequately wet requirements are not applicable to the removal of the remaining portions. In EPA's interpretation, the failure of a filtered vacuum cleaner or debris collector to collect larger chunks or pieces of damaged roofing material created by the RB roof cutter does not require the remaining roofing material to be handled and disposed of as asbestos waste; provided that such visible chunks or pieces of roofing material are collected (e.g. by gentle sweeping) and disposed of as asbestos waste. Other methods of decontamination may not be adequate, and should be approved by the local delegated agency.

3.C.4. In EPA's interpretation, if the debris from the cutting is not collected immediately, it will be necessary to lightly mist the dust or debris, until it is collected, as discussed above, and placed in containers. The dust or debris should be lightly misted frequently enough to prevent the

paragraph is followed in operations where roofing material near the cutline has been rendered friable by the use of an RB roof cutter, and if the decontamination procedures set forth in paragraph 3.C.3 have been followed, the NESHAP's no visible emissions and adequately wet requirements would be met for the removal, handling and disposal of the remaining roofing material.

3.C.6. As one way to comply with the NESHAP, the dust and debris from cutting can be placed in leak-tight containers, such as plastic bags, and the containers labeled using warning labels required by OSHA (29 CFR 1926.58). In addition, the containers must have labels that identify the waste generator (such as the name of the roofing contractor, abatement contractor, and/or building owner or operator) and the location of the site at which the waste was generated.

IV. Waste Disposal

A. Disposal Requirements

4.A.1. Section 61.150(b) requires that, as soon as is practical, all collected dust and debris from cutting as well as any contaminated roofing squares, must be taken to a landfill that is operated in accordance with § 61.154 or to an EPA-approved site that converts asbestos waste to nonasbestos material in accordance with § 61.155. During the loading and unloading of affected waste, asbestos warning signs must be affixed to the vehicles.

B. Waste Shipment Record

4.B.1. For each load of asbestos waste that is regulated under the NESHAP, a waste shipment record (WSR) must be maintained in accordance with § 61.150(d). Information that must be maintained for each waste load includes the following:

contractor responsible for the removal. In addition to the initial training requirement, a refresher training course is required every 2 years. The NESHAP training requirements became effective on November 20, 1991.

5.2. Asbestos training courses developed specifically to address compliance with the NESHAP in roofing work, as well as courses developed for other purposes can satisfy this requirement of the NESHAP, as long as the course covers the areas specified in the regulation. EPA believes that Asbestos Hazard Emergency Response Act (AHERA) training courses will, for example, satisfy the NESHAP training requirements. However, nothing in this interpretive rule or in the NESHAP shall be deemed to require that roofing contractors or roofing workers performing operations covered by the NESHAP must be trained or accredited under AHERA, as amended by the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). Likewise, state or local authorities may independently impose additional training, licensing, or accreditation requirements on roofing contractors performing operations covered by the NESHAP, but such additional training, licensing or accreditation is not called for by this interpretive rule or the federal NESHAP.

5.3. For removal of Category I asbestos containing roofing material where RB roof cutters or equipment that similarly damages the asbestos-containing roofing material are used, the NESHAP training requirements (§ 61.145(c)(8)) apply as discussed in Section I above. It is EPA's intention that removal of Category I asbestos-containing roofing material using hatchets, axes, knives, and/or the use of spud bars, pry bars and shovels to lift the roofing material, or similar removal methods that slice, punch, or shear the roof membrane are not subject to the training requirements, since these methods do not cause the roof removal to be subject to the NESHAP. Likewise, it is EPA's intention that roof removal

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APPENDIX A
GLOSSARY

Aggregate: Crushed stone, crushed slag, or water-worn gravel used for surfacing a built-up roof; any granular mineral material.

Alligatoring: The cracking of the surfacing bitumen on a built-up roof, producing a pattern of cracks similar to a alligator's hide; the cracks may or may not extend through the surfacing bitumen.

Asphalt: A dark brown to black cementitious material in which the predominating constituents are bitumens, which occur in nature or are obtained in petroleum processing.

Asphalt, Air Blown: An asphalt produced by blowing air through molten asphalt at an elevated temperature to raise its softening point and modify other properties.

Asphalt Felt: An asphalt-saturated felt.

Base Ply: The base ply is the first ply when it is a separate ply and not part of a shingled system.

Base Sheet: A saturated or coated felt placed as the first ply in some multiply, built-up membranes.

Bitumen: The generic term for an amorphous, semi-solid mixture of complex hydrocarbons derived from any organic source. Asphalt and coal tar are the two bitumens used in the roofing industry.

Blind Nailing: The practice of nailing the back portion of a ply.

Blister: A spongy raised portion of a roof membrane, ranging in area from one inch in diameter and of barely detectable height upwards. Blisters result from the pressure build-up of gases entrapped in the membrane system. The gases most commonly are air/or water vapor. Blisters usually involve delamination of the underlying membrane plies.

Brooming: Embedding a ply of roofing material by using a broom to smooth out the ply and ensure contact with the adhesive under the ply.

Deck: The structural surface to which the roofing or waterproofing system (including insulation) is applied.

EPDM: Ethylene Propylene Diene Monomer.

Felt: A fabric manufactured by the interlocking of fibers through a combination of mechanical work, moisture, and heat without spinning, weaving or knitting. Roofing felts are manufactured from vegetable fibers, asbestos fibers or glass fibers.

Fishmouth: An opening formed by an edge wrinkle in a felt where it overlaps another felt in a built-up roofing membrane.

Flashing: The system used to seal the edges of a membrane at walls, expansion joints, drains, gravel stops, and other areas where the membrane is interrupted or terminated. Base flashing covers the edges of the membrane. Cap flashing or counter-flashing shields the upper edges of the base flashing.

Flat Asphalt: A roofing asphalt that has a softening point of approximately 170°F. (77°C) and that conforms to the requirements of ASTM Standard D 312, Type II.

Flood Coat: The top layer of bitumen in an aggregate surface, built-up roofing membrane. Correctly applied, it is poured, not mopped, to a weight of 60 pounds per square for asphalt, 75 pounds per square for coal-tar pitch.

Fluid Applied Elastomer: An elastomeric material, which is fluid at ambient temperatures, that dries or cures after application to form a continuous membrane.

Glass Fiber Felt: A felt sheet in which glass fibers are bonded into the felt sheet with resin. They are suitable for impregnation and coating. They are used in the manufacture and coating of bituminous waterproofing materials, roof membranes and shingles.

Hypalon: A synthetic rubber (chemically chlorosulfonated polyethylene), often used in conjunction with neoprene in elastomeric roof coverings.

Inorganic: Being or composed of matter other than hydrocarbons and their derivatives, or matter that is not of plant or animal origin.

Insulation: A material applied to reduce the flow of heat.

Ply: A layer of felt in a built-up roof membrane system. A four-ply membrane system has four plies of felt.

PVC: Polyvinyl-chloride single-ply membrane (as applied to roofing).

Re-covering: The addition of a new membrane over a major portion of a roof surface. This may or may not involve removal of the old membrane and may not include installation of additional insulation.

Reinforced Membrane: A roofing or waterproofing membrane reinforced with felts, mats, fabrics or chopped fiber.

Reroofing: The removal of all roof system components down to the structural deck followed by installation of completely new roofing system.

Resaturant: Cold applied viscous tar or asphalt bitumen for coating roofs.

Roll Roofing: The term applied to smooth-surfaced or mineral-surfaced coated felts.

Roof System: A system of interacting roof components designed to weatherproof and normally, to insulate a building's top surface.

Saturated Felt: A felt that has been impregnated with bitumen of low softening point from 100°F to 160°F.

Shingle: (1) A small unit of prepared roofing material designed to be installed with similar units in overlapping rows on inclines normally exceeding 25%; (2) To cover with shingles; (3) To apply any sheet material in overlapping rows like shingles.

Slag: A grayish, porous aggregate left as a residue from blast furnaces and used as surfacing aggregate.

Slope: The tangent of the angle between the roof surface and the horizontal. It is measured in inches per foot.
Level slope - up to 1/2 inch per foot.
Low slope - 1/2 inch per foot to 1 1/2 inches per foot.
Steep slope - over 1 1/2 inches per foot.

Smooth Surfaced Roof: A built-up roofing membrane surfaced with a layer of hot mopped asphalt, cold-applied asphalt-clay emulsion, cold-applied asphalt cutback, or sometimes with an unmopped inorganic felt.