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Asbestos/NESHAP Adequately Wet Guidance



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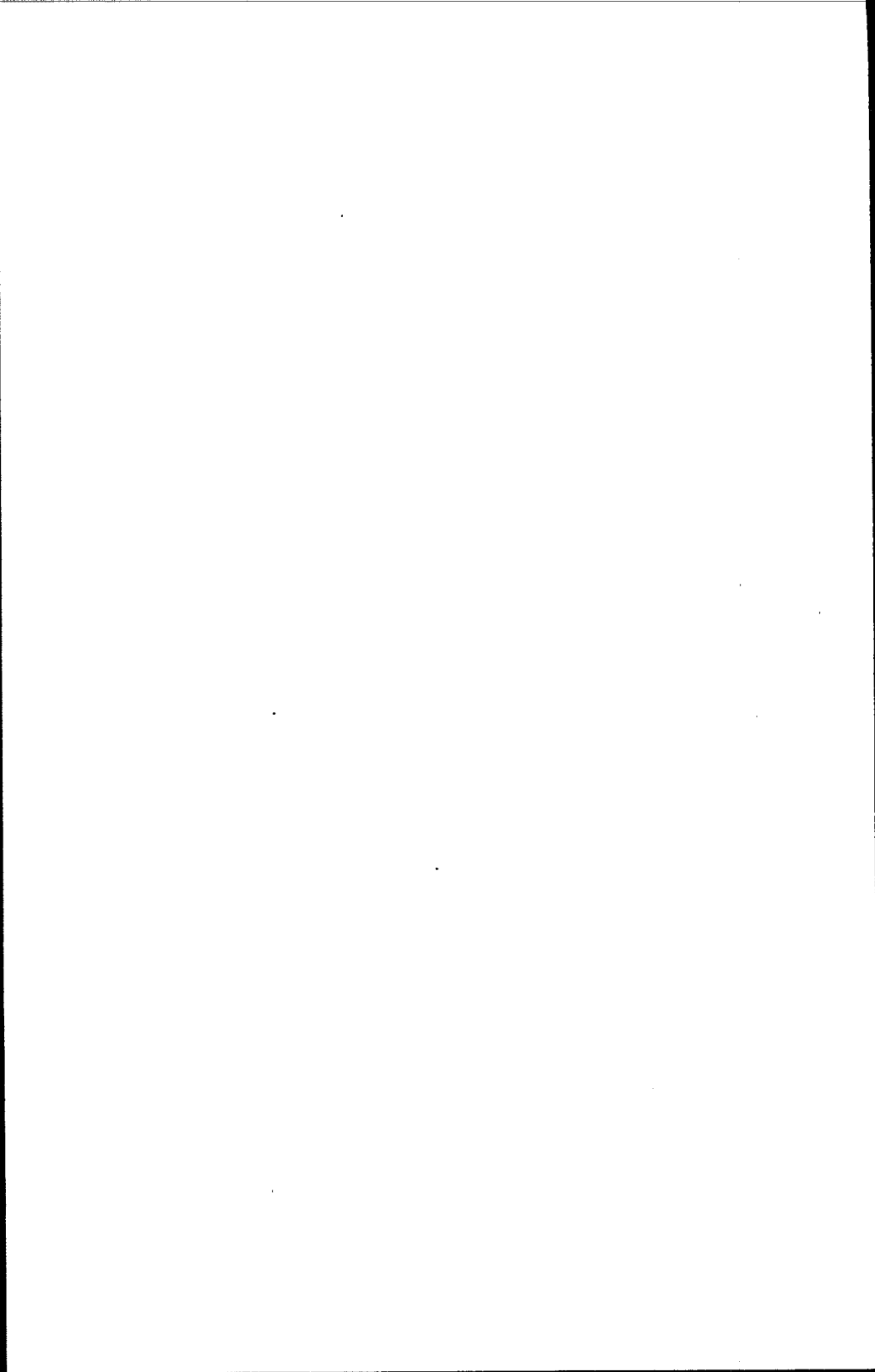
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EPA340/1-90-019

**ASBESTOS NESHAP
ADEQUATELY WET GUIDANCE**

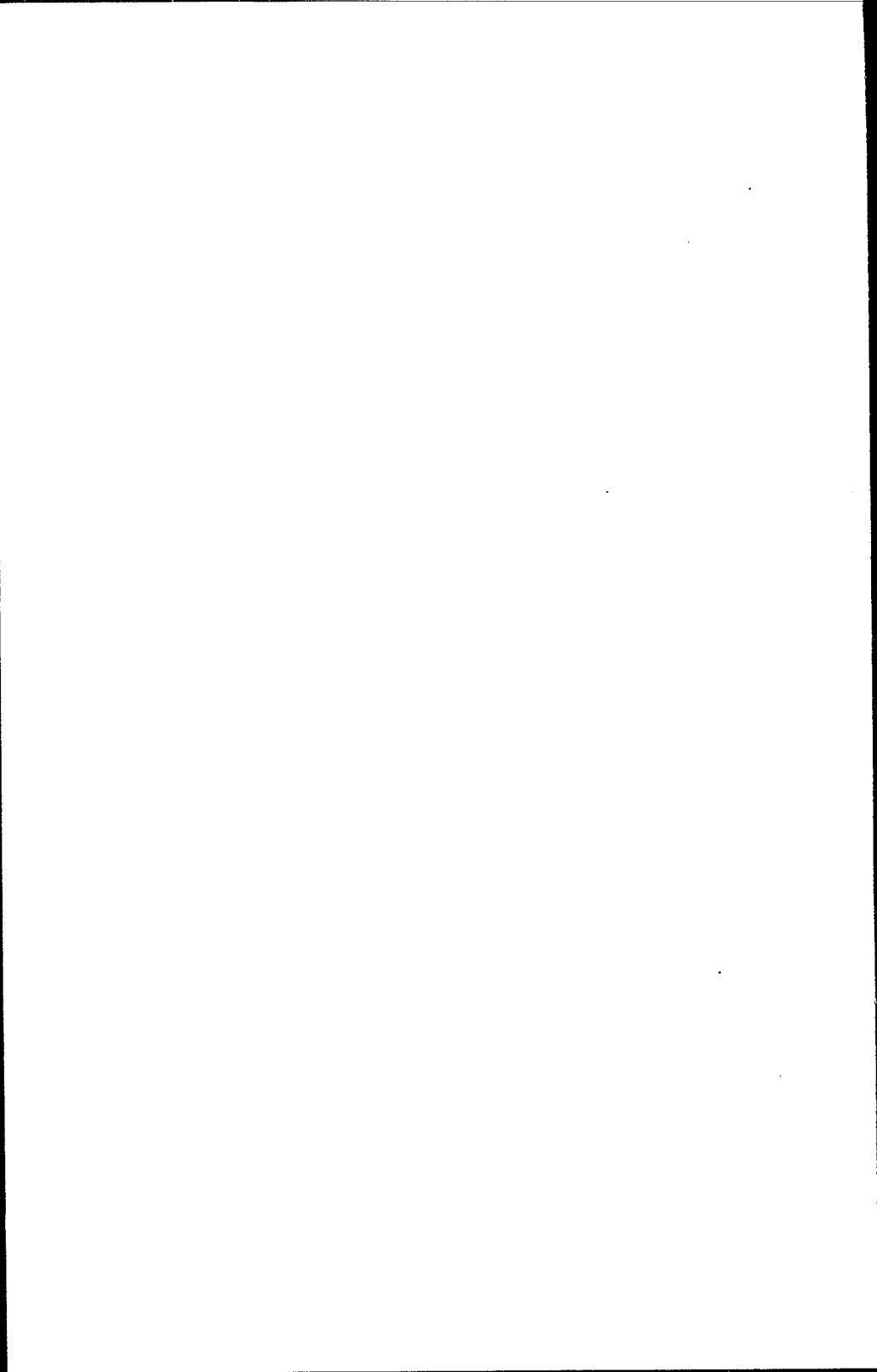
U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and
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Stationary Source Compliance Division
Washington, DC 20460

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1. INTRODUCTION

The Clean Air Act (CAA) of 1970 requires the U.S. Environmental Protection Agency (EPA) to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. In accordance with Section 112 of the CAA, EPA established National Emissions Standards for Hazardous Air Pollutants (NESHAP) to protect the public. Asbestos was one of the first hazardous air pollutants regulated under Section 112. The Asbestos NESHAP (40 CFR 61, Subpart M) addresses milling, manufacturing and fabricating operations, demolition and renovation activities, waste disposal issues, active and inactive waste disposal sites and asbestos conversion processes.

The Asbestos NESHAP requires facility owners and/or operators involved in demolition and renovation activities to control emissions of particulate asbestos to the outside air because no safe concentration of airborne asbestos has ever been established. The primary method used to control asbestos emissions is to adequately wet the Asbestos Containing Material (ACM) with a wetting agent prior to, during and after demolition/renovation activities.

The purpose of this document is to provide guidance to asbestos inspectors and the regulated community on how to determine if friable ACM is adequately wet as required by the Asbestos NESHAP.

The recommendations made in this guidance are solely recommendations. They are not the exclusive means of complying with the Asbestos NESHAP requirements. Following these recommendations is not a guarantee against findings of violation. Determinations of whether asbestos materials are adequately wetted are made by EPA inspectors on site.

2. IMPORTANT TERMS

Adequately Wet

EPA defines "adequately wet" to mean "sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material (ACM), then that material has not been adequately wetted. However, the absence of visible emission is not sufficient evidence of being adequately wet (Section 61.141, Definitions). Amended water is often used to wet ACM during repair/removal operations.

Friable Asbestos Material

Friable asbestos material is any material containing more than 1 percent asbestos as determined using Polarized Light Microscopy (PLM), that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Asbestos-Containing Waste Materials (ACWM)

EPA defines ACWM to mean mill tailings or any waste that contains commercial asbestos and is generated by a source subject to the provisions of this subpart. This term includes filters from control devices, friable asbestos waste material, and bags on other similar packaging contaminated with commercial asbestos. As applied to demolition and renovation operations, this term also includes friable asbestos waste and Category II nonfriable ACM waste that becomes crumbled, pulverized, or reduced to powder by forces that acted on the material during the course of demolition and renovation operations regulated by this subpart, and materials contaminated with asbestos including disposal equipment and clothing.

Nonfriable Asbestos-containing Materials

Nonfriable asbestos-containing material is any material containing more than 1 percent asbestos as determined using Polarized Light Microscopy (PLM) that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Regulated Asbestos-Containing Material (RACM)

Is (a) friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the force expected to act on the material in the course of demolition or renovation operations.

3. FRIABLE AND NONFRIABLE ASBESTOS-CONTAINING MATERIALS

The Asbestos NESHAP defines two categories of nonfriable ACM: Category I nonfriable ACM (asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products) and Category II nonfriable ACM (any nonfriable material not designated as Category I).

The Agency requires that, where the Asbestos NESHAP is applicable, friable ACM and Category II and nonfriable ACM that is likely to become disturbed or damaged so that the material could be

crumbled, pulverized or reduced to powder during a demolition or renovation be removed, from a facility prior to its demolition/renovation. The fibrous or fluffy spray-applied asbestos materials found in many buildings for fireproofing, insulating, sound-proofing, or decorative purposes are generally considered friable. Pipe and boiler wrap found in numerous buildings is also considered friable.

Nonfriable ACM, such as vinyl-asbestos floor tile, generally emits low levels of airborne fibers unless subjected to burning or to sanding, grinding, cutting or abrading operations. Other materials, such as asbestos cement sheet and pipe, can emit asbestos fibers if the materials are crumbled, pulverized or reduced to powder during demolition/renovation activities. Whenever nonfriable materials are going to be damaged to the extent that they are crumbled, pulverized or reduced to powder, they must be handled in accordance with the Asbestos NESHAP.

4. REQUIREMENTS FOR ADEQUATELY WETTING ASBESTOS-CONTAINING MATERIALS

The NESHAP regulation requires that RACM be adequately wetted during the following activities:

- a. **During cutting or disjoining operations when a facility component which is covered or coated with friable ACM is being removed from that facility as units or in sections (Section 61.145 (c)(2)(i)).**

During demolitions or renovations a contractor may choose to remove an entire boiler, a section of pipe, or other facility components without first removing the asbestos insulation from these structures. Any ACM which will be disturbed during cutting or disjoining operations must be adequately wet.

- b. **During stripping operations when a facility component containing RACM remains in place in the facility. (Section 61.145 (c)(3)).**

Stripping operations are the most common form of asbestos removal during renovation activities, since most items that are covered with asbestos are facility components or structural members which will not be removed. Stripping off all of the RACM can generate significant asbestos emissions if the ACM is not adequately wet during removal.

Friable spray-on ACM, which includes fire-proofing materials found on decking and support I-beams, is normally easy to wet throughout because of the absorbing property of the cellulose mixing/binding

agent. The Asbestos NESHAP requires that these materials be fully penetrated with the wetting agent during demolition/renovation activities.

Other ACM, however, such as "thermal-block" insulation used on pipes and boilers, certain ceiling and floor tile applications, etc., which do not absorb water readily may be hard to penetrate by water or a wetting agent. For such materials, adequate wetting consists of coating the surfaces of the materials with water or a wetting agent prior to, during, and, in most cases, after removal activities in order to prevent asbestos emissions. Whenever such materials are broken during the removal process, the exposed, dry surfaces must be wetted immediately to reduce emissions.

If pieces of dry ACM are accidentally disturbed, they should be immediately wetted and kept wet until collected for disposal. Removal personnel are commonly assigned to keep the fallen RACM wet prior to its being collected for disposal.

- c. After the RACM has been stripped from a facility component, it must remain adequately wet until it has been collected and contained or treated in preparation for disposal. (Section 61.145 (c)(6)(i))

After removal, adequately wetted ACWM must be sealed in leak-tight containers or wrapping which must be labeled as specified by the Occupational Health and Safety Administration (OSHA) under 29 CFR 1910.1001(j)(2) or 1926.58(k)(2)(iii). Such waste materials destined for off-site transport must additionally be labeled with the name of the generator and location of the waste generation site (Section 61.150 (a)(1)(iv and v)).

- d. In demolitions where the RACM was not removed prior to demolition (Section 61.145 (c)(1)(i)(ii)(iii)(iv))
- RACM on a facility component encased in concrete or other similarly hard material must be adequately wet whenever exposed during demolitions (Section 61.145 (c)(1)(ii));
 - RACM which was not accessible for testing and, due to demolition, cannot be safely removed, must be kept adequately wet at all times until disposed of (Section 61.145 (c)(1)(iii));
 - The portion of a facility ordered demolished that contains RACM must be adequately wet during the wrecking operation (Section 61.145 (c)(9)).

In each of the above situations, ACWM generated must be kept adequately wet during handling and loading for transport to the disposal site. In cases where ACWM can't be segregated from the debris pile it must be disposed of as ACWM. Such ACWM does not have to be sealed in leak-tight containers or wrapping, but may be transported and disposed of in bulk (Section 61.150 (a)(3)).

5. EXCEPTIONS TO ADEQUATELY WETTING ASBESTOS-CONTAINING MATERIALS

The Asbestos NESHAP allows two exceptions to wetting RACM during a demolition or renovation project:

- **When the temperature at the point of wetting is below 0°C (32°F) (Section 61.145 (c)(7)(i)).**

The owner/operator must remove facility components coated or covered with friable ACM as units or sections to the maximum extent possible and meet subsequent requirements of 61.145, including the wetting requirements.

During periods when wetting operations are suspended due to freezing temperatures, the owner/operator must record the temperature in the area containing the facility components at the beginning, middle, and end of each workday and keep daily temperature records available for inspection by the Administrator during normal business hours at the demolition or renovation site. The owner or operator shall retain the temperature records for at least 2 years.

- **When the use of water would unavoidably damage equipment or present a safety hazard (Sec. 61.145 (c)(3)(i)(A)).**

The owner/operator must first obtain written approval from the Administrator for an alternative work practice, prior to renovation activities and utilize a local exhaust ventilation and collection system designed to capture particulate asbestos released during removal operations. (Section 61.145 (c)(3)(i)(B)(1)); or a glove bag system or a leak-tight wrapping which can contain the particulate asbestos materials produced by stripping ACM. (Section 61.145 (c)(3)(i)(B)(2) and (3))

6. TECHNIQUES FOR WETTING ASBESTOS-CONTAINING MATERIALS

General Information

Adequate wetting of ACM is typically accomplished by repeatedly spraying it with a liquid or a wetting agent, usually amended water (water to which surfactant chemicals have been added), until it can absorb no more. However, this does not necessarily mean that the ACM will be soaked throughout. Surfactant chemicals reduce the surface tension of the water, thereby increasing its ability to penetrate the ACM and surround the asbestos fibers. Although amending agents are not required by the Asbestos NESHAP (the NESHAP only requires the use of a liquid), EPA, in its "Guidance for Controlling Asbestos-Containing Materials in Buildings", EPA-560/5-85-024 (Purple Book), recommends the use of a 50:50 mixture of polyoxyethylene ester and polyoxyethylene ether, or the equivalent, in a 0.16 percent solution (1 ounce to 5 gallons) of water.

Wetting agents may be applied with garden sprayers or hoses. Garden sprayers are hand-held, portable, and have a one- to five-gallon capacity. Water hoses are usually attached to a faucet tap, fire hydrant or water tank. Generally, the hose has a nozzle attached which spreads the water stream so that a fine mist is created.

An engineering control often used is a misting unit which can be used to create a high level of humidity within a removal area. It is believed that fibers emitted into a saturated environment will absorb the wetting agent and fall out of the air faster, thus reducing airborne fiber levels.

7. PROCEDURES FOR WETTING ASBESTOS-CONTAINING MATERIALS

The following procedures describe methods of adequately wetting various applications of ACM.

Thermal System Insulation

Molded Pipe Insulation

The recommended wetting procedure for this type of RACM is to saturate the outer surface with amended water, strip off the wet canvas coating and then rewet the surface in order to thoroughly saturate the ACM. The metal bands supporting the RACM should be removed and the half-round sections carefully separated. While this occurs, the interior side and edges of the sections should be saturated with amended water. If a section breaks during removal, the exposed surfaces should be wetted immediately. A misting

sprayer may also be used to keep the air in the removal area or containment area saturated with amended water to attempt to reduce airborne asbestos fiber levels.

Corrugated Paper Pipe Insulation

The outer surface of the corrugated paper ("air-cell") pipe insulation, usually a canvas wrap, should be saturated with a wetting agent and then removed. Wetting should continue until all the insulation is permeated with amended water. Metal bands holding the insulation in place should be removed and the corrugated RACM insulation stripped. Any unsaturated surfaces exposed during the stripping operation must be wetted immediately to reduce asbestos emissions. A misting sprayer may also be used to keep the air in the removal area saturated with amended water to attempt to reduce airborne asbestos fiber levels. Inadequately wetted and adequately wetted corrugated paper pipe insulation can be seen in Figures 1 and 2.



**Figure 1. Inadequately wetted corrugated paper, pipe insulation.
(Note the fibrous material adjacent to the lagging clamp.)**

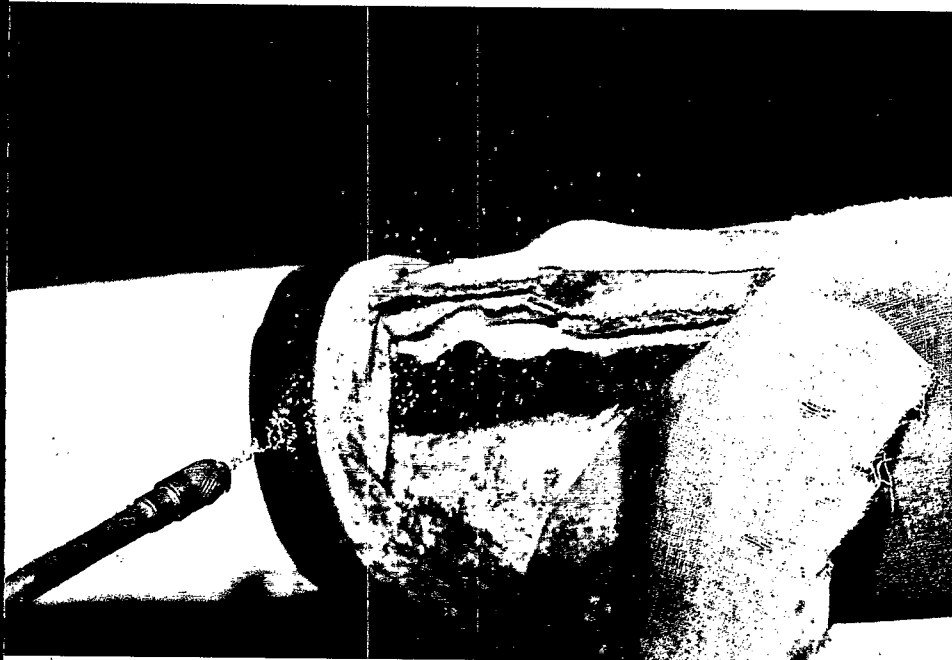


Figure 2. Adequately wetted corrugated paper, pipe insulation.
(Note the saturated material adjacent to the lagging clamp.)

Boiler and Water Tank Thermal Block Insulation

Asbestos-containing preformed block insulation has been used as thermal insulation on boilers, hot water tanks and heat exchangers in industrial, commercial, institutional and residential applications. The blocks are commonly chalky in nature and may be held in place by chicken wire or expanded metal lath. A plaster-saturated canvas was often applied as a final covering or wrap.

Due to the number, thickness and varying absorbencies of these layers of materials, adequate wetting may be accomplished only by continually wetting the materials with amended water as the various layers are stripped.

One person may be assigned to spray the materials as they are stripped, and a misting sprayer may be used in an attempt to reduce airborne asbestos fiber levels.

Cementitious Fitting Insulation

Wetting of cementitious fitting insulation is similar to that used when removing asbestos-containing thermal block insulation. The outer surface is saturated with amended water and the outer covering (if applicable) is removed. The fitting insulation is then rewetted and the insulation stripped. To ensure that the fitting remains adequately wet during the removal operation, a person is often assigned to spray the ACM as it is stripped. A misting sprayer may be used to reduce airborne asbestos fiber levels. Inadequately wetted cementitious fitting insulation can be seen in Figure 3.

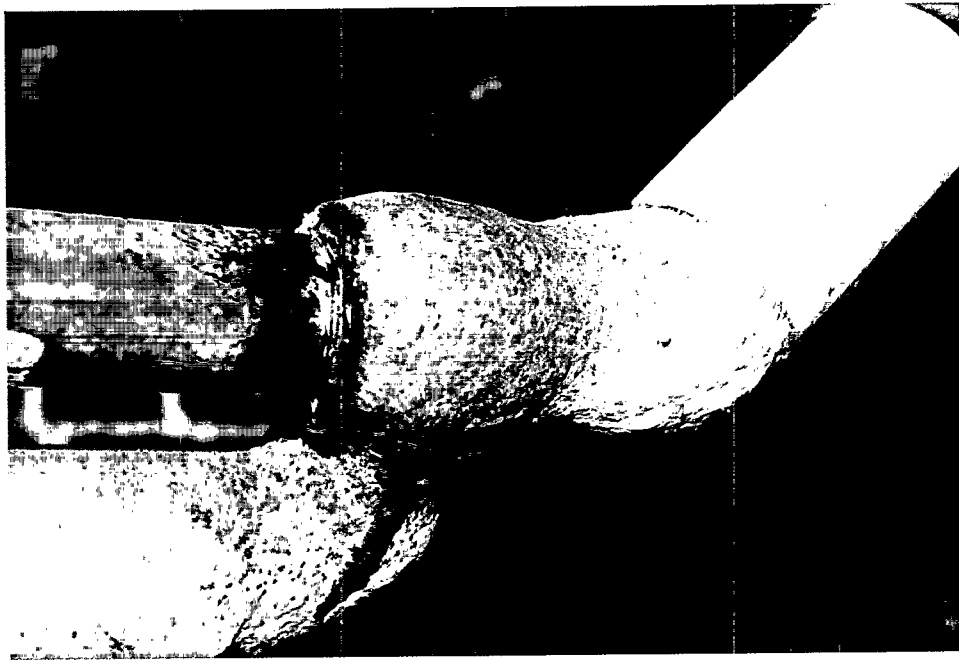


Figure 3. Inadequately wetted cementitious fitting insulation. (Note that the part of the insulation which has been wetted is dark grey in color, whereas the dry section remains white.)

Asbestos-Containing Surfacing Materials

"Surfacing Material" is a generic term designated by the Asbestos Hazard Emergency Response Act (AHERA; Asbestos Containing Materials in Schools, 40 CFR Part 763, Subpart E) to mean any wall or ceiling material that is sprayed-on or troweled-on, such as acoustical plaster or fireproofing. The recommended wetting method

for this type of RACM is to saturate the surfaces, begin the stripping operation and continue to wet the RACM as it is being removed. A misting sprayer may also be used to keep the air saturated while the removal occurs. Since surfacing materials vary in their ability to absorb a wetting agent, inspectors must consider the type of surfacing material that is being removed in order to determine the required extent of penetration by the amended water. Surfacing materials which easily absorb a wetting agent need to be fully penetrated or permeated to be considered adequately wet, whereas only the exposed surfaces of materials which do not absorb water readily need to be wetted.

The use of high pressure water to remove asbestos-containing surfacing materials, either through a steam-cleaning device or a diesel powered hydroblasting water applicator, should be avoided since such use may unduly disturb RACM and contribute to higher airborne asbestos fiber levels. However, if this removal method is used, contractors must adequately wet the ACM prior to and during the removal.

Miscellaneous Asbestos-Containing Materials

Both friable and nonfriable forms of other asbestos-containing building materials exist. Friable materials include asbestos-containing paper (commonly found beneath wooden floors), wallpaper, and joint compound. It has been estimated that 5 to 10 percent of the ceiling tiles currently installed in the U.S. contain asbestos.

Nonfriable miscellaneous ACM includes floor tiles, asbestos cement sheet (transite board), siding shingles, asphalt roofing shingles, laboratory benchtops and even chalkboards. These materials may become friable with age, and under harsh conditions. Category I nonfriable ACM must be carefully examined to determine if the material is in poor condition, that is, if the binding material is losing its integrity, exhibited by peeling, cracking or crumbling; and is also friable. When Category I nonfriable ACM has become friable it is subject to the NESHAP.

If Category I or II ACM is sanded, ground, cut or abraded it is also covered by the NESHAP. Category II nonfriable ACM which is damaged to the extent that it has or will become crumbled, pulverized or reduced to powder due to demolition/ renovation activities, is subject to the Asbestos NESHAP.

Miscellaneous materials are wetted in manners similar to those used to wet other categories of RACM. Coverings are saturated with a wetting agent before removal and the asbestos-containing portions fully penetrated with the agent prior to, during and after their

removal, while stored in the removal area, and while being placed into disposal containers. Miscellaneous materials that don't absorb water readily (e.g., asbestos-concrete products, and floor tiles) are only required to have wetted surfaces. A misting sprayer may be used to diminish airborne asbestos fiber levels.

8. INSPECTION PROCEDURES

The intent of the following guidelines is to provide GUIDANCE ONLY, to the regulated community regarding the inspection procedures recommended to Asbestos NESHAP inspectors for determining compliance with the "Adequately Wet" requirements of the Asbestos NESHAP. The purpose of the wetting provisions is to require as much wetting as is necessary to prevent airborne emissions of asbestos fibers. In order to achieve this result, RACM and ACWM must be wetted and maintained wet until collected for disposal. The determination of whether RACM or ACWM has been adequately wetted is generally based on observations made by the inspector at the time of inspection. Observations probative of whether a material is adequately wet include but are not limited to, the following:

1. Is there a water supply in place?
2. Is water or a wetting agent observed being sprayed onto the RACM or ACWM both during stripping or removal and afterwards while the material awaits proper disposal? If yes, carefully note the method of application used (e.g., misting, fogging, spraying of surface area only or drenching to penetrate the ACM throughout).
3. If water or a wetting agent is being used, what equipment is used to apply it (e.g., garden hose, plant mister)?
4. If water or a wetting agent is not being used, determine why it is not and document the reason. Possible (although not necessarily valid) reasons include:
 - prior permission obtained from the Administrator (safety hazard, potential equipment damage);
 - no water source at the facility;
 - temperature at the point of wetting below 32 degrees F;
 - portable water supply ran out and contractor continued to work; or
 - contractor prepared the area earlier, etc.

5. Examine a stripped or removed piece of ACWM or RACM which wets readily. Does it appear to be wetted throughout? If it does not, adequately wet the sample. Describe and photograph how the physical characteristics of the material change upon wetting (e.g., color, weight, texture, etc.). Take samples, as necessary, to document the presence of asbestos in the suspect material.
6. When examining materials that do not readily absorb water or a wetting agent (e.g., premolded thermal system insulation, ceiling tiles, floor tiles) inspectors should note whether all exposed surfaces of these materials have been wetted as required.
7. Is there visible dust (airborne or settled), or dry ACWM debris in the immediate vicinity of the operation? Inspectors should collect samples of such materials for analysis of their possible asbestos content.
8. Examine ACWM in bags or other containers using the procedures that follow, to determine if the material has been adequately wetted?
 1. Randomly select bags or the containers for inspection.
 2. Lift the bag and assess its overall weight. (A bag of dry ACWM can generally be lifted easily by one hand. A bag filled with well-wetted material would be substantially heavier.)
 3. If the bag or other container is transparent:
 - Visually inspect the contents of the unopened bag for evidence of moisture (e.g., water droplets, water in the bottom of the bag, a change in the color of the material due to water).
 - Without opening the bag, squeeze chunks of debris to ascertain whether moisture droplets are emitted.
 - If the material appears dry or not penetrated with liquid or a wetting agent, open the bag using the additional steps described in step 9 below, and collect a bulk sample of each type of material in the bag ascertaining

variations in size, patterns, color and textures.

9. If the waste material is contained in an opaque bag or other container, or if the material is in a transparent bag which appears to be inadequately wetted:
- Carefully open the bag (in the containment area, if possible). If there is no containment area at the site, a glove bag may be used to enclose the container prior to opening it to minimize the risk of any fiber release.
 - Examine the contents of the bag for evidence of moisture as in 8 above, and if the material appears dry or it is not fully penetrated with water or a wetting agent, collect a bulk sample.
 - Reseal the bag immediately after evaluating and sampling its contents.

APPENDIX A

ASBESTOS NESHAP COORDINATORS (FOR DEMOLITION/RENOVATION ACTIVITIES)

Asbestos NESHAP Coordinator
Air Management Division
U.S. EPA Region I
JFK Federal Building
Boston, MA 02203
(617) 565-3265
CT, MA, ME, NH, RI, VT

Asbestos NESHAP Coordinator
Air & Waste Management Division
U.S. EPA Region II
26 Federal Plaza
New York, NY 10278
(212) 264-6770
NJ, NY PR, VI

Asbestos NESHAP Coordinator
Air Management Division
U.S. EPA Region III
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-6550
DC, DE, MD, PA, VA, WV

Asbestos NESHAP Coordinator
Air Management Division
U.S. EPA Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365
(404) 347-5014
AL, FL, GA, KY, MS, NC, SC, TN

Asbestos NESHAP Coordinator
Air Management Division
U.S. EPA Region V
230 South Dearborn Street
Chicago, IL 60604
(312) 886-6793
IL, IN, MI, MN, OH, WI

Asbestos NESHAP Coordinator
Air, Pesticide & Toxics Division
U.S. EPA Region VI
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 655-7223
AR, LA, NM, OK, TX

Asbestos NESHAP Coordinator
Air & Toxics Management Division
U.S. EPA Region VII
726 Minnesota Avenue
Kansas City, KS 66101
(913) 551-7618
IA, KS, MO, NE

Asbestos NESHAP Coordinator
Air & Toxics Division
U.S. EPA Region VIII
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Denver, CO 80202-2405
(303) 293-1767
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Air Management Division (A-3-3)
U.S. EPA Region IX
75 Hawthorne Street
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AS, AZ, CA, GU, HI, NV,
Northern Marianas, TT

Asbestos NESHAP Coordinator
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U.S. EPA Region X
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APPENDIX B

REGIONAL ASBESTOS COORDINATORS (FOR SCHOOLS)

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Regional Asbestos Coordinator
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Regional Asbestos Coordinator
EPA Region VI
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AR, LA, NM, OK, TX

Regional Asbestos Coordinator
EPA Region VII
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