



**T R A I N I N G**  
SERVICES INTERNATIONAL



**ASBESTOS  
CONTRACTOR/  
SUPERVISOR  
REFRESHER  
TRAINING COURSE**

*Federal Edition*

Material prepared by

**T R A I N I N G**  
SERVICES INTERNATIONAL

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**Welcome to:**  
**ASBESTOS**  
**CONTRACTOR/ SUPERVISOR**  
**REFRESHER TRAINING COURSE**

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# **Training Services International, Inc**

## **Asbestos Contractor/ Supervisor Refresher Training Course**

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This manual has been developed to meet the OSHA and EPA requirements for personnel performing asbestos abatement activities. It serves as a guide for supervisors to complete these projects at industry standards. This manual contains current industry standards and references to EPA and OSHA regulations.

Due to the constantly changing nature of government regulations, interpretations, and standards, the publisher and editors do not assume any responsibility and shall not be held liable in any degree for any loss or injury caused during the performance of the work practices addressed herein.

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## Asbestos Contractor/ Supervisor Refresher Training Course Outline

Topic	Materials
<b>0.25 Hrs – Introduction</b> Sign-In, Introductions and Overview of Course	Sign-in Sheet
<b>0.75 Hrs. – Background &amp; Current Issues</b> Characteristics, health effects, current events	Manual Section 1
<b>0.75 Hrs. – Legal Issues &amp; Pre-Work Activities</b> Regulations, responsibilities, personal documentation	Manual Sections 2 & 3
<b>0.25 Hrs - Break</b>	
<b>1.5 Hrs – Sampling, Medical Surveillance &amp; PPE</b> Material & air sampling, medical exams, respirators, clothing, other safety equipment	Manual Sections 4, 5 & 6
<b>1.0 Hrs - Lunch</b>	
<b>1.5 Hrs –Setting Up the Work Area &amp; Work Practices</b> Set up, work practices, engineering controls, disposal	Manual Sections 7 & 8
<b>0.25 Hrs - Break</b>	
<b>1.0 Hrs. – Waste Disposal &amp; Safety Concerns</b> Safety attitudes & concerns	Manual Section 9 & 10
<b>0.75 Hrs. - Exam</b>	

## SECTION 1 – BACKGROUND & CURRENT EVENTS

### SOME FACTS ABOUT ASBESTOS





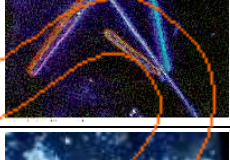
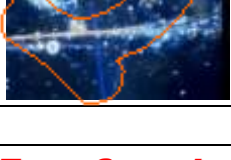
Asbestos is a generic name given to the fibrous variety of six naturally occurring minerals with the following properties:

- Extremely long, thin flexible fibers that can be woven
- Resistance to chemical and thermal degradation
- High tensile strength
- High electrical resistance
- Fire resistant
- Good insulator
- Used in over 3000 commercial products



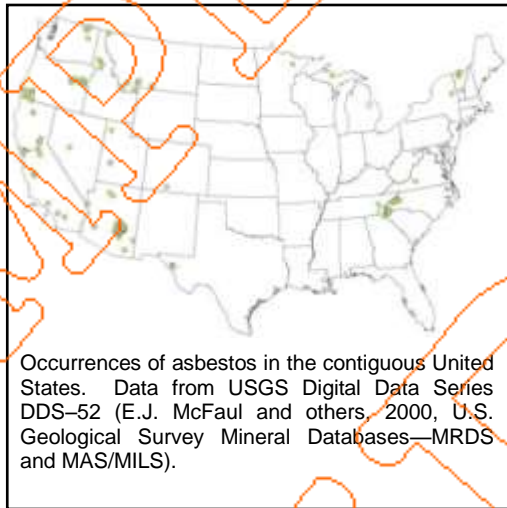
USGS Photo

The minerals that can crystallize as asbestos belong to two groups: serpentine (chrysotile) and amphibole (crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos). Serpentine and amphibole minerals can have fibrous or nonfibrous structures; the fibrous type is called asbestos. Asbestiform varieties of several other amphiboles have been identified. Other minerals are similar to asbestos in their particle shape, but they do not possess the characteristics required to classify them as asbestos.

Mineral	Family	Comments
	Chrysotile Serpentine (long-wavy structure)	White asbestos Most common found in 90-95% ACMs.
	Amosite Amphibole (short, rigid structure; most hazardous)	Brown asbestos Most common amphibole found in 5-10% ACMs. No current production
	Crocidolite Amphibole (short, rigid structure; most hazardous)	Blue asbestos Found in 1-5% ACMs. No current production
	Actinolite Amphibole (short, rigid structure; most hazardous)	Can be in vermiculite Often associated with tremolite. No current production
	Tremolite Amphibole (short, rigid structure; most hazardous)	Can be in vermiculite Some current production in India,
	Anthophyllite Amphibole (short, rigid structure; most hazardous)	Rare, no current production

**Asbestos in the U.S.**

The USGS reports asbestos has been identified in 20 states and mined in 17 States over the past 100 years. It is found in many common rocks. The type of rock expected to contain asbestos occurs predominantly along the eastern seaboard from Alabama to Vermont, along the western seaboard from California to Washington, and in the upper Midwest in Minnesota and Michigan. Small occurrences of asbestos are in other areas, such as Arizona, Idaho, and Montana.



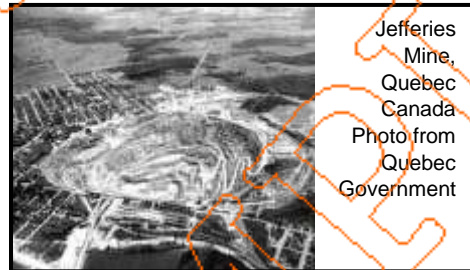
The USGS has been studying the locations of naturally occurring asbestos and updating previous locations. The USGS published asbestos location reports of the Eastern United States on July 1, 2005, the Central United States on August 8, 2006, and of the Rocky Mountain States on July 12, 2007. These reports contain maps and associated databases of asbestos and amphibole locations including:

- o 324 locations identified in the Eastern United States, and
- o 36 locations identified in the Central United States
- o 48 locations in the Rocky Mountain States (Colorado, Idaho, Montana, New Mexico and Wyoming)

There could be many more deposits of naturally occurring asbestos in the Western United States. USGS surveys have identified asbestos primarily in mountainous areas.

**Worldwide Asbestos**

World production of asbestos was estimated to be 2.2 Mt in 2007. Russia continued to be the leading producer of asbestos, followed by China, Kazakhstan, Canada, Brazil, and Zimbabwe. These countries accounted for 95% of the world production.



**ESTIMATED ASBESTOS WORLD PRODUCTION**

(Numbers estimated in thousands of metric tons, information provided by USGS publications)

Country	2001	2002	2003	2004	2005	2006	2007
Brazil	170	209	231	252	236	227	230
Canada	340	272	201	220	185	185	185
China	360	360	500	400	400	360	380
Kazakhstan	235	291	355	347	300	300	300
Russia	750	750	878	923	925	925	925
Zimbabwe	120	130	147	104	122	100	100
Other Countries	75	123	88	84	82	83	80
<b>Total</b>	<b>2,050</b>	<b>2,130</b>	<b>2,400</b>	<b>2,330</b>	<b>2,250</b>	<b>2,180</b>	<b>2,200</b>

## Uses of Asbestos

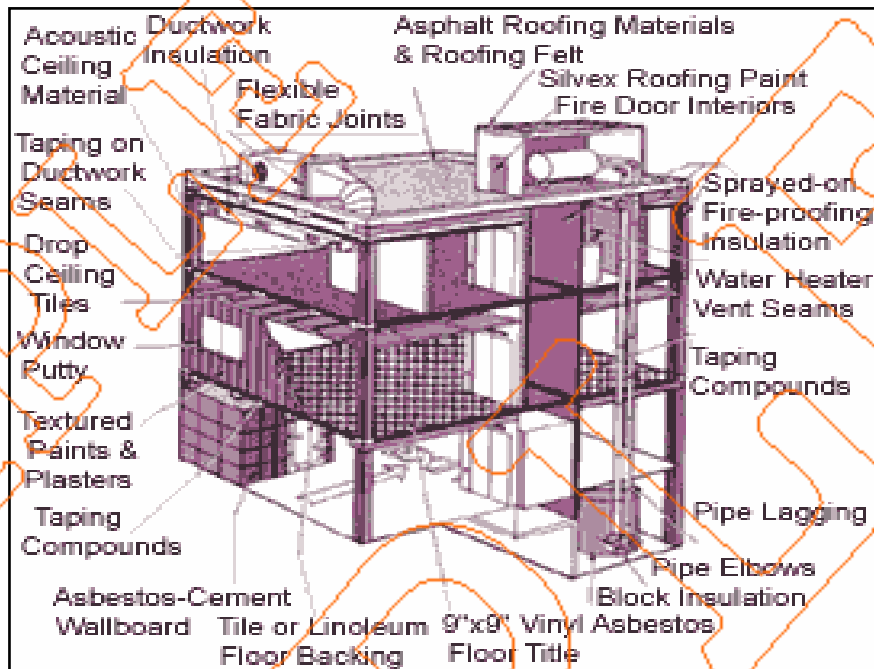
Asbestos has been used in literally thousands of products. Asbestos gained widespread use because it is plentiful, readily available, and low in cost. Because of its unique properties asbestos proved well suited for many uses in the construction trades. The following diagrams and tables provided by the list some asbestos uses.

**USEPA Sample List of Suspect Asbestos - Containing Materials**

Cement Pipes	Elevator Brake Shoes
Cement Wallboard	HVAC Duct Insulation
Cement Siding	Boiler Insulation
Asphalt Floor Tile	Breeching Insulation
Vinyl Floor Tile	Ductwork Flexible Fabric Connections
Vinyl Sheet Flooring	Cooling Towers
Flooring Backing	Pipe Insulation (corrugated air-cell, block, etc.)
Construction Mastics (floor tile, carpet, ceiling tile, etc.)	Heating and Electrical Ducts
Acoustical Plaster	Electrical Panel Partitions
Decorative Plaster	Electrical Cloth
Textured Paints/Coatings	Electric Wiring Insulation
Ceiling Tiles and Lay-in Panels	Chalkboards
Spray-Applied Insulation	Roofing Shingles
Blown-in Insulation	Roofing Felt
Fireproofing Materials	Base Flashing
Taping Compounds (thermal)	Thermal Paper Products
Packing Materials (for wall/floor penetrations)	Fire Doors
Gaskets	Caulking/Putties
Laboratory Hoods/Table Tops	Adhesives
Laboratory Gloves	Wallboard
Fire Blankets	Joint Compounds
Fire Curtains	Vinyl Wall Coverings
Elevator Equipment Panels	Spackling Compounds

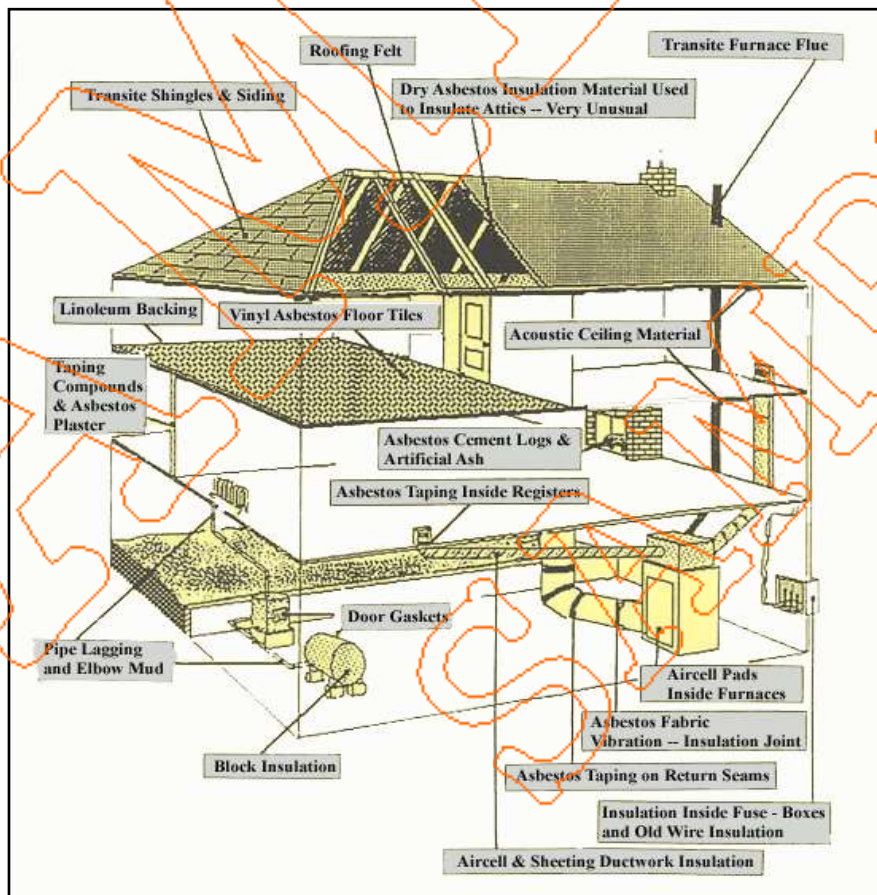
**Asbestos Materials in Commercial & School Buildings**

USEPA Diagram



**Asbestos Materials in Residential Buildings**

USEPA Diagram





### Asbestos Bans

EPA bans for asbestos started in the 1970's. Bans were implemented under the National Emission Standard for Hazardous Air Pollutants (NESHAP) The EPA Ban and Phase out Rule of 1989. In 1991 much of the Ban and Phase out Rule was vacated and remanded by U.S. Fifth Circuit Court of Appeals. A summary of United States asbestos bans is listed below:

US Asbestos Bans	
<b>NESHAP Bans</b>	
<ul style="list-style-type: none"> <li>Spray-applied fireproofing - 1973</li> <li>Preformed block pipe, boiler, tank, duct insulation - 1975</li> </ul>	<ul style="list-style-type: none"> <li>Spray-applied decorative uses - 1978</li> <li>Other decorative uses - 1990</li> </ul>
<b>EPA Ban and Phase Out Rule 1989-91</b>	
<ul style="list-style-type: none"> <li>Corrugated paper</li> <li>Roll board</li> <li>Commercial paper</li> </ul>	<ul style="list-style-type: none"> <li>Specialty paper</li> <li>Flooring felt</li> <li>New uses of asbestos</li> </ul>
<b>Examples of Products Not Banned</b>	
<ul style="list-style-type: none"> <li>Asbestos cement (transite)</li> <li>Asphalt roofing products</li> <li>Ceiling Tile</li> <li>Resilient flooring (tile &amp; sheeting)</li> <li>Mastics</li> <li>Gaskets</li> <li>Wallboard &amp; joint compound</li> </ul>	<ul style="list-style-type: none"> <li>Friction products (disc brakes, brake drums, transmission parts &amp; clutch facings)</li> <li>Clothing &amp; cloth products</li> <li>Caulking &amp; glazings</li> <li>Light concrete</li> <li>All other uses not mentioned in bans</li> </ul>

### Enforcing the Bans

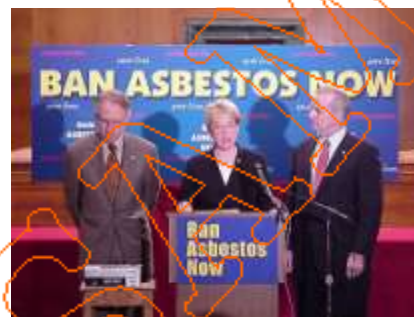


USEPA

The EPA or OSHA currently bans no other materials. Also EPA does not track the manufacture, processing, and distribution in commerce of asbestos-containing products. It would be prudent for consumers to use due diligence and inquire about the presence of asbestos in the products they purchase. Possible sources for this information include the product's Material Safety Data Sheet (MSDS) and cut sheets. However, sample and analysis reports of the material may still be required by regulatory agencies.

### Active Ban Legislation

The US Senate passed the Ban Asbestos in America Act (S. 742) on October 4, 2007. This act bans nearly all production, distribution, and installation of asbestos containing materials. Products exempt from this ban would include diaphragm electrolysis installations (chlorine Industry) and products DOD and NASA deemed necessary for their uses. Concerns have been expressed regarding materials with contaminant asbestos concentrations not being banned.

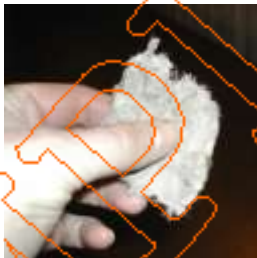


US Senate Photo

A similar version of this bill (H.R. 3285) has been introduced to the House of Representatives and is currently in committee. Exemptions including contaminant asbestos have not been finalized in this bill.

## Key Terms

**Asbestos-containing material (ACM)** is defined as material containing more than 1% asbestos. If at least one sample taken from a material is analyzed to **contain over 1% asbestos**, the material is considered ACM.



TSI Photo

**Friable ACM** can be “crumbled, pulverized, or reduced to powder by hand pressure when dry.” Disturbed or damaged friable ACM readily releases asbestos fibers into the air.

**Non-Friable ACM** cannot be “crumbled, pulverized, or reduced to powder by hand pressure when dry.”

### Intact vs. Non-Intact

If the material has become crumbled, pulverized, or otherwise deteriorated so that the asbestos is no longer bound in the material’s matrix it is considered by OSHA as non-intact. If the asbestos remains in the material’s matrix it is generally considered intact.



EPA Photo

### Three Categories of ACM Used in Buildings.


- **Surfacing Materials** – Friable ACM sprayed or troweled on surfaces (walls, ceilings, structural members) for acoustical, decorative, or fireproofing purposes. This includes plaster and fireproofing insulation. OSHA has further defined surfacing materials in a letter of interpretation (dated June 18, 1999) as materials with fibers “loosely bound” in the matrix.



- **Thermal System Insulation** – Insulation used to inhibit heat transfer or prevent condensation on pipes, boilers, tanks, ducts, and various other components of hot and cold water systems and heating, ventilation, and air conditioning (HVAC) systems. This includes pipe lagging; pipe wrap; block, batt, and blanket insulation; and cements and “muds”.

- **Miscellaneous Materials** – Other materials not surfacing or TS. Friable examples include ceiling tile, drywall & joint compound, and fabrics. Non-friable examples include floor tile, gaskets, roofing felt, concrete pipe, outdoor siding, and fabrics.

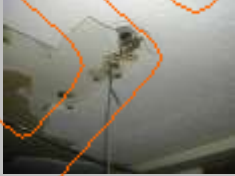


<b>Drywall/ Joint Compound Removals/ Repairs (OSHA Class II, NESHAP RACM)</b>	
Scope	Any removal activity
Notification	NESHAP: Removal over 160 SF of RACM, any demolition (load-bearing wall) ODH: Removal or repair over 50 SF of friable material OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>Establish regulated area (demarcate &amp; secure area) for all jobs</li> <li>Critical barriers due to non-intact removal</li> <li>Drop cloths below removal activity, recommend poly entire floor</li> <li>Decon consisting of drop cloth if no NEA, recommend 3 stage decon</li> </ul>
Work Practices	<ul style="list-style-type: none"> <li>Usually recommend NPE</li> <li>Thoroughly wet material with amended water prior to and during removal</li> <li>Remove intact unless not possible</li> <li>No cutting, abrading or breaking unless other methods are not feasible.</li> <li>Immediately bag or wrap material, unless material is kept wet until transferred to a closed receptacle</li> <li>Prompt clean-up with wet methods &amp; HEPA vacs</li> </ul> 
Air Sampling	<ul style="list-style-type: none"> <li>Personals: Required by OSHA if NEA does not exist. Not required if using supplied air.</li> <li>Finals: Required in schools per AHERA. Some states require finals. ODH requires at least 3 if owner or contractor chooses to run finals. Recommended if space will be re-occupied</li> <li>Backgrounds and Environmental samples are not required. Recommended on jobs in occupied buildings or with other trades.</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required due to non-intact removal</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. 3-stage decon recommended. Some states require 5-stage decon w/ lockable door.
Waste Disposal	All waste to be disposed of in sealed, labeled, leak-tight containers. Two 6-mil plastic bags, one 6-mil bag and a sealed drum, or equivalent. Send to an EPA approved asbestos landfill for disposal.
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)

**Key:**

- LF – Linear Feet
- SF – Square Feet
- f/cc – fibers per cubic centimeter
- NPE-Negative Pressure Enclosure

- NEA – Negative Exposure Assessment
- PEL – Permissible Exposure Assessment
- APR – Air Purifying Respirator
- SCBA-Self-Contained Breathing Apparatus

<b>Ceiling Tile Removal</b> (OSHA Class II, NESHAP RACM)	
Scope	Any removal activity
Notification	NESHAP: Removal over 160 SF of RACM, any demolition ODH: Removal or repair over 50 SF of friable material OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>Establish regulated area (demarcate &amp; secure area) for all jobs</li> <li>Critical barriers due required for non-intact removal, recommended for all jobs</li> <li>Drop cloths below removal activity</li> <li>Recommend floor &amp; wall poly</li> <li>Decon consisting of drop cloth if no NEA, recommend 3 stage decon</li> <li>Usually recommend NPE</li> </ul>
Work Practices	<ul style="list-style-type: none"> <li>Thoroughly wet material with amended water prior to and during removal</li> <li>Remove intact unless not possible</li> <li>No cutting, abrading or breaking unless other methods are not feasible.</li> <li>Immediately bag or wrap material, unless material is kept wet until transferred to a closed receptacle</li> <li>Prompt clean-up with wet methods &amp; HEPA vacs</li> </ul> 
Air Sampling	<ul style="list-style-type: none"> <li>Personals: Required by OSHA if NEA does not exist. Not required if using supplied air.</li> <li>Finals: Required in schools per AHERA. Some states require finals. ODH requires at least 3 if owner or contractor chooses to run finals. Recommended if space will be re-occupied</li> <li>Backgrounds and Environmental samples are not required. Recommended on jobs in occupied buildings or with other trades.</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required due to non-intact removal</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. 3-stage decon recommended. Some states require 5-stage decon w/ lockable door.
Waste Disposal	All waste to be disposed of in sealed, labeled, leak-tight containers. Two 6-mil plastic bags, one 6-mil bag and a sealed drum, or equivalent. Send to an EPA approved asbestos landfill for disposal.
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)

## Key:

LF – Linear Feet

SF – Square Feet

f/cc – fibers per cubic centimeter

NPE-Negative Pressure Enclosure

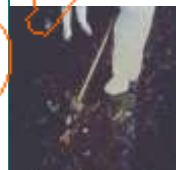
NEA – Negative Exposure Assessment

PEL – Permissible Exposure Assessment

APR – Air Purifying Respirator

SCBA-Self-Contained Breathing Apparatus

<b>Floor Tile &amp; Resilient Flooring Removals (OSHA Class II)</b>	
Scope	Removals over 25 SF (OSHA)
Notification	NESHAP: Removal generates 160 SF of RACM, any demolition ODH: Removal generates 50 SF of friable material OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – 8- Hour flooring removal-only course, annual refresher or Worker – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>Establish regulated area (demarcate &amp; secure area) for all jobs</li> <li>Critical barriers if material is removed non-intact or no NEA</li> <li>Negative Pressure Enclosure (NPE) with mechanical chipping removal</li> <li>Decon consisting of drop cloth if no NEA</li> <li>Options include splashguards, criticals, and NPE for additional protection in occupied bldgs or when finals air clearance samples will be run.</li> <li>Consider optional 3 stage decon in occupied buildings</li> </ul>
Air Sampling	<ul style="list-style-type: none"> <li>Personals: Required by OSHA if NEA does not exist.</li> <li>Final clearance air samples are optional if material remains intact &amp; non-friable. Required in schools and some states for any friable projects over small scale-short duration.</li> <li>Backgrounds &amp; environmental samples a consideration, especially friable jobs</li> </ul>
Work Practices	<ul style="list-style-type: none"> <li>Remove tiles intact, unless not possible.</li> <li>Clean floors with HEPA vacs filter and metal floor tool (no brush).</li> <li>Resilient sheeting: Wet snip point before cutting.</li> <li>Mastic: Scraping is to be done using wet methods.</li> <li>No wetting for heated, intact removal.</li> <li>Do not sand flooring or its backing, rip-up resilient sheeting, dry sweep.</li> </ul> <p><b>Removal Options</b></p> <ul style="list-style-type: none"> <li>Resilient Floor Covering Institute (RFCI) removal practices (short-handled hand tools)</li> <li>Heat (radiant, flame, infrared), dry ice, flooding</li> <li>Long-handled hand tools (light spud bars, shovels)</li> <li>Metal-handled spud bars (may be considered mechanical chipping)</li> <li>Powered blades (may be considered mechanical chipping)</li> <li>Oscillating machines (mechanical chipping)</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required if no NEA, dry removal, non-intact removal</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. Access to at least hand washing facilities recommended
Waste Disposal	Friable ACM/ RACM sent to EPA-approved asbestos landfill. Non-friable/ Category I NF can be sent to CD&D landfill.
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)



**Key:**

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NPE-Negative Pressure Enclosure

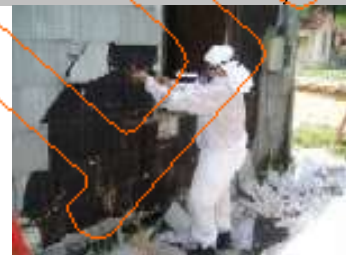
NEA – Negative Exposure Assessment

PEL – Permissible Exposure Assessment

APR – Air Purifying Respirator

SCBA-Self-Contained Breathing Apparatus

<b>Transite Siding Removals (OSHA Class II)</b>	
Scope	Removals over 25 SF (OSHA)
Notification	NESHAP: Removal generates 160 SF of RACM, any demolition ODH: Removal generates 50 SF of friable material OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – 8- Hour transite removal course, annual refresher or Worker – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>Establish regulated area (demarcate &amp; secure area) for all jobs</li> <li>Critical barriers for indoor projects if material is removed non-intact or no NEA</li> <li>Options include tenting outside removals if friable material is generated.</li> <li>Drop cloths recommended if feasible</li> </ul>
Air Sampling	Personals: Required by OSHA if NEA does not exist. <ul style="list-style-type: none"> <li>Environmental &amp; final clearance air samples not recommended for outdoor jobs.</li> </ul>
Work Practices	<ul style="list-style-type: none"> <li>Cutting, abrading or breaking siding, shingles, or transite panels, prohibited unless other methods cannot be used.</li> <li>Spray each panel or shingle with amended water prior to removal.</li> <li>Place panels in impervious waste bags or plastic wrapping</li> <li>Lowered wrapped panels to the ground no later than the end of the work shift.</li> <li>Immediately lower wrapped or unbagged panels or shingles to the ground via covered dust-tight chute, crane or hoist.</li> <li>Pull nails or cut them with flat, sharp instruments.</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required if no NEA, dry removal, non-intact removal</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. Access to at least hand washing facilities recommended
Waste Disposal	Friable ACM/ RACM sent to EPA-approved asbestos landfill. Non-friable/ Category II NF recommended to asbestos landfill
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)



City of San Antonio, TX Photo

**Key:**

LF – Linear Feet

SF – Square Feet

f/cc – fibers per cubic centimeter

NPE-Negative Pressure Enclosure

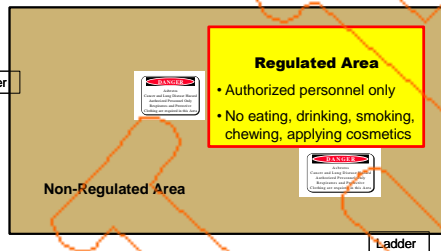
NEA – Negative Exposure Assessment

PEL – Permissible Exposure Assessment

APR – Air Purifying Respirator

SCBA-Self-Contained Breathing Apparatus

<b>Roofing Removals (OSHA Class II)</b>	
Scope	Removals over 25 SF (OSHA)
Notification	NESHAP: 5580 SF using wet cutting, 160 SF dry cut, any demolition OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – 8- Hour roofing removal-only course, annual refresher or Worker – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>All work to be supervised by a competent person</li> <li>Establish a regulated area (signs, demarcation, limit access, prohibitions) around removal area.</li> <li>Isolate, shutdown, or re-direct roof-level heating and ventilating air intake sources.</li> </ul>
Air Sampling	Personals: Required by OSHA if NEA does not exist. Environmental & final clearance air samples not recommended
Work Practices	<ul style="list-style-type: none"> <li>All work to be supervised by a competent person</li> <li>Remove material intact to the extent feasible.</li> <li>Use HEPA vacs or gentle wet sweeping to collect dust during all roof cutting operations.</li> <li>Wetting required if material is non-intact or cutting machines will be used as long as safety hazard is not created.</li> <li>Repairs &lt; 25 SF: Wet methods and HEPA vacuuming not required using manual, intact methods.</li> <li>Place non-intact removed material into disposal bag, lower ASAP.</li> <li>Lower intact roofing material by end of shift.</li> <li>Lower material in chute, by crane or hoist. Store in closed receptacle.</li> <li>Removal options include: roof cutter, roof plow, roof slicer, axes &amp; hatches</li> <li>Prohibitions: Dry sweeping, throwing material to ground</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required if no NEA or during roof cutter operations</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. Access to at least hand washing facilities recommended
Waste Disposal	All asbestos waste off roof at end of shift by crane, hoist, dust-tight chute. Tailings wet, containerized as soon as practical. Sent to EPA-approved asbestos landfill. Roof sections & shingles can be sent to CD&D landfill
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)



**Key:**

LF – Linear Feet

SF – Square Feet

f/cc – fibers per cubic centimeter

NPE – Negative Pressure Enclosure

NEA – Negative Exposure Assessment

PEL – Permissible Exposure Assessment

APR – Air Purifying Respirator

SCBA – Self-Contained Breathing Apparatus

<b>Galbestos Exterior Panels Removals (OSHA Class II)</b>	
Scope	Removals over 25 SF (OSHA)
Notification	NESHAP: Removal generates 160 SF of RACM, any demolition ODH: Removal generates 50 SF of friable material OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – 8- Hour transite removal course (intact, nonfriable), annual refresher or Worker – 32-hour AHERA MAP course (non-intact, friable), annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>Establish regulated area (demarcate &amp; secure area) for all jobs</li> <li>Options include tenting outside removals if friable material is generated.</li> <li>Drop cloths recommended if feasible</li> </ul>
Air Sampling	<ul style="list-style-type: none"> <li>Personals: Required by OSHA if NEA does not exist.</li> <li>Environmental &amp; final clearance air samples not recommended for outdoor jobs.</li> </ul>
Work Practices	<ul style="list-style-type: none"> <li>Remove panels intact to the extent feasible, limit disturbing material or generating flaking as much as possible.</li> <li>Spray each panel with amended water prior to removal.</li> <li>Place panels in impervious plastic wrapping</li> <li>Lowered wrapped panels to the ground no later than the end of the work shift.</li> <li>Immediately lower wrapped or unbagged panels or shingles to the ground via covered dust-tight chute, crane or hoist.</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required if no NEA, dry removal, non-intact removal</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. Access to at least hand washing facilities recommended
Waste Disposal	Friable ACM/ RACM sent to EPA-approved asbestos landfill. Non-friable/ Category II NF recommended to asbestos landfill Non-friable/ Category I NF can be disposed in non-asbestos landfill
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)

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SF – Square Feet

f/cc – fibers per cubic centimeter

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NEA – Negative Exposure Assessment

PEL – Permissible Exposure Assessment

APR – Air Purifying Respirator

SCBA-Self-Contained Breathing Apparatus



<b>Gasket Removals (OSHA Class II)</b>	
Scope	Any removals/ repairs
Notification	NESHAP: 160 SF of friable any demolition (rare for gasket projects) ODH: Removal of over 50 SF of friable material (rare for gasket projects) OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker – Specialized gasket removal course, annual refresher or Worker – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up Work Area	<ul style="list-style-type: none"> <li>Establish regulated area (demarcate &amp; secure area)</li> <li>Non-intact or deteriorated gasket: Enclose area around gasket with glovebag</li> <li>Drop cloths for non-intact removals</li> <li>Decon consisting of drop cloth if no NEA</li> </ul>
Air Sampling	Personals: Required by OSHA if NEA does not exist. Environmental & final clearance air samples usually not recommended
Work Practices	<ul style="list-style-type: none"> <li>All work to be supervised by a competent person</li> <li>Intact removed gaskets removed w/ putty knife and immediately placed in leak-tight container.</li> <li>Remove visibly deteriorated gaskets unlikely to be removed intact, within a glovebag.</li> <li>Scrap off residue wet.</li> </ul>
	 <p>TSI Photo</p>
Respirator use	<ul style="list-style-type: none"> <li>Respirator required if no NEA, during non-intact or dry removal</li> <li>½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. Access to at least hand washing facilities recommended
Waste Disposal	Friable gasket materials to be containerized as soon as practical. Sent to EPA-approved asbestos landfill. Non-friable gaskets containerized & labeled per OSHA, not required to go to asbestos landfill
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)

Key:

LF – Linear Feet

SF – Square Feet

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NEA – Negative Exposure Assessment

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SCBA-Self-Contained Breathing Apparatus

<b>Clean-ups/ Fiber Release Episodes (OSHA Class IV)</b>	
Scope	Clean-ups involving recognizable pieces of asbestos building materials Major fiber release episodes (AHERA- over 3 LF/ 3 SF dislodged material)
Notification	NESHAP: Friable ACM covering over 160 SF ODH: 50 SF of friable ACM OSHA: Building owners notify occupants. Asbestos contractor notify other trades
Training	Worker (non-schools and no notification) – 2- Hour awareness & asbestos cleaning course, annual refresher or Worker (schools & notified projects) – 32-hour AHERA MAP course, annual refresher Competent Person – 40-hour AHERA MAP course, annual refresher
Isolate and Set-up	Regulated areas are recommended in all facilities. They are required in schools and all facilities without an NEA. Regulated areas include:
Work Area	<ul style="list-style-type: none"> <li>• Demarcate with OSHA Danger signs, barrier tape recommended</li> <li>• Limit access to authorized persons</li> <li>• Seal or shut down HVAC in regulated area.</li> <li>• If no NEA exists place at least a drop cloth at the entrance to act as a decontamination area to hold workers, waste, and equipment. Not required for jobs with NEA</li> </ul>
Work Practices	<ul style="list-style-type: none"> <li>• Assume debris near ACM is asbestos</li> <li>• Wet methods, HEPA vacs, prompt clean-up</li> </ul> 
Air Sampling	<ul style="list-style-type: none"> <li>• Personals: Required by OSHA if NEA does not exist. Not required if using supplied air.</li> <li>• Finals: Required in schools per AHERA. Some states require finals. ODH requires at least 3 if owner or contractor chooses to run finals. Recommended if space will be re-occupied</li> <li>• Backgrounds and Environmental samples are not required. Recommended on jobs in occupied buildings or with other trades.</li> </ul>
Respirator use	<ul style="list-style-type: none"> <li>• Respirator required if no NEA &amp; non-intact material</li> <li>• ½ mask APR allowed up to 1.0 f/cc, recommended up to 0.1 f/cc</li> <li>• Full mask APR is allowed up to 5.0 f/cc, recommended up to 0.5 f/cc</li> <li>• PAPR is allowed for all jobs up to 100.0 f/cc, recommended up to 1.0 f/cc</li> </ul>
Protective Clothing	Whole-body covering required above PEL. Disposable suits recommended in most situations.
Hygiene Facilities	Drop cloth outside the regulated area when no NEA exists. Access to at least hand washing facilities recommended. 3-stage decons required for major clean-ups
Waste Disposal	All waste to be disposed of in sealed, labeled, leak-tight containers. Two 6-mil plastic bags, one 6-mil bag and a sealed drum, or equivalent. Send to an EPA approved asbestos landfill for disposal.
Medical Exams	Medical exam required through licensed physician for respirator clearance. Medical surveillance program required after 30 days work or 30 days at or above the PEL 30 within a year (1 day counted after 1 hour of work)

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**SECTION 9- WASTE DISPOSAL**

**ACM CLASSIFICATIONS FOR WASTE DISPOSAL**

Waste disposal procedures include containerizing the waste and taking it to the proper landfill. Both of these activities depend on the type and condition of the material. OSHA, NESHAP and DOT have regulations governing these activities. This section reviews the requirements for friable or regulated ACM and non-friable ACM.



EPA Photo

OSHA regulates all materials the same except for intact roofing. NESHAP has separate requirements for RACM, Category I Non-Friable, and Category II Non-Friable materials.

**FRIABLE ACM DISPOSAL REQUIREMENTS**

<p><b>OSHA Packaging Requirements</b></p>	<p>Wet, collect and dispose of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers</p>	
<p><b>NESHAP Packaging Requirements for RACM</b></p>	<ul style="list-style-type: none"> <li>• Adequately Wet Material</li> <li>• 2 – 6 mil layers or 12 mils of plastic wrapping or 1 – 6mil layer of plastic with sealed drum</li> <li>• OSHA label</li> <li>• Generator label (owner)</li> </ul>	
<p><b>US DOT Label Requirements</b></p>	<p>For <b>non-bulk containers</b> (i.e. plastic bags and drums), the labeling required by DOT includes the Class 9 label with white backing and the following description:</p>	<p><b>RQ, ASBESTOS, NA2212</b></p>
	<p>Commercial highway vehicles carrying these containers do not need a Class 9 placard.</p> <p><b>Bulk containers</b> (i.e. roll-offs w/ bladder bags) need proper I.D. on an orange placard or white square-on- point display. If placard is used I.D. can be put on placard.</p>	
<p><b>NESHAP Disposal Requirements</b></p>	<ul style="list-style-type: none"> <li>• Signage displayed during loading</li> <li>• EPA-Licensed Asbestos Landfill</li> </ul>	

**NON-FRIABLE ACM DISPOSAL REQUIREMENTS**

	<b>Roofing</b> Category I NF	<b>Flooring, Gaskets, Packings</b> Category I NF	<b>All Other Non-Friable Materials</b> Category II NF
<b>OSHA Packaging Requirements</b>	Keep intact if feasible, wet non-intact roofing.	Wet, collect and dispose of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers	Wet, collect and dispose of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers
<b>NESHAP Packaging Requirements</b>	None	None	None
<b>NESHAP Disposal Requirements</b>	None	None	<ul style="list-style-type: none"> <li>• Signage during loading</li> <li>• EPA-Licensed Asbestos Landfill</li> </ul>

**NESHAP RECORDKEEPING REQUIREMENTS**

Waste shipment forms are required for waste leaving the project site. Requirements for completed waste shipment records include:

- If owner does not receive the completed form(s) within 35 days, the owner is required to contact the transporter and/or the disposal site attempting to locate it.
- If owner does not receive the completed form(s) within 45 days, the owner is required to contact the local EPA representative explaining the situation.
- Waste shipment forms are required to be held onto for at least 2 years. It is recommended that the owner keep them indefinitely.

**DOT SHIPPING PAPER REQUIREMENTS**

Dot requires each person who offers a hazardous material for transportation to describe the hazardous material on shipping papers and kept for three (3) years. This documentation must include:

- DOT Shipping description\*
- Emergency contact number\*
- Shippers certification & signature
- Total quantity
- Shipper's name & address\*
- Page number & total pages

Some of this information (denoted with\*) will be additional to the information entered on the NESHAP Waste Shipment Record. It is the shipper's responsibility to include information with shipment.

## NESHAP REQUIREMENTS FOR ACTIVE LANDFILLS

### Site Requirements

1. No visible emissions to outside air
2. Warning signs and fencing requirements
  - Not required if natural barriers are present
  - Display signs every 330 feet or less along perimeter.
  - Easily read & contain following:



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Legend	Notation
Asbestos Waste Disposal Site	2.5 cm (1 inch) Sans Serif Gothic or Block
Do Not Create Dust	1.9 cm (3/4 inch) Sans Serif Gothic or Block
Breathing Asbestos is Hazardous to Your Health.	14 Point Gothic

3. Fencing must deter access by the general public.
4. Instead of no visible emissions, the landfill must:



EPA Photo

- Be covered with at least 15 centimeters (6 inches) of compacted nonasbestos-containing material, or
- Be covered with a resinous or petroleum-based dust suppression agent that effectively binds dust and controls wind erosion.

### Waste Shipment Requirements

1. Record open or improperly sealed containers received & report to EPA authority.
2. Send original to generator within 30 days.
3. Resolve quantity discrepancies with generator within 15 days or report to EPA.
4. Retain a copy of all records and reports for at least 2 years.
5. Maintain, until closure, records of the location, depth and area, and quantity in cubic meters (cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area.
6. Furnish upon request, and make available during normal business hours for inspection by the Administrator, all records required under this section.
7. Notify the Administrator in writing at least 45 days prior to excavating.

## SECTION 10- SAFETY CONCERNS

### OVERVIEW

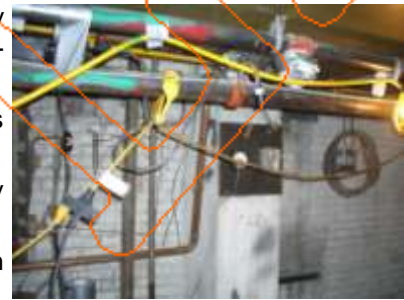
- All job sites have safety concerns
- Asbestos abatement activities often make job sites less safe



TSI Photo

### ELECTRICAL SAFETY

- Use proper lock-out/ tag-out procedures
- Use caution with wet methods
- De-energize as much equipment as possible
- Consider using dry removal in areas immediately adjacent to energized electrical equipment if de-energizing is not feasible.
- Use non-conductive scrapers and vacuum attachments (plastic, rubber).
- Ensure that all electrical equipment in use is properly grounded, properly use GFCI's
- Use care not to violate insulated coverings with scrapers, scaffolding wheels, etc
- Elevate wiring
- Do not allow water to accumulate on floors.
- Ensure that electrical outlets are tightly sealed and taped to avoid water spray.
- Perform a pre-work walkthrough to identify potential sources of electrical hazards.



TSI Photo

### LADDERS

The following items should be checked on a regular basis:

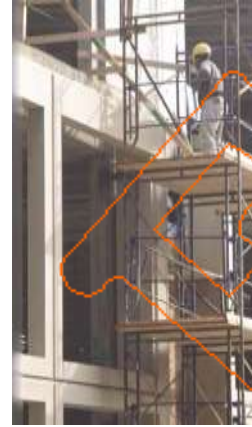
- Extension type ladders should be used with a 1-4 lean ratio (1 foot out for every 4 feet of elevation).
- Ladders are always maintained in good condition.
- Complete inspections are done periodically.
- No improvised repairs are made.
- Defective ladders are not used.
- Safety feet spreaders and other components of ladders are in good condition.
- Movable parts operate freely without binding or undue play.
- Rungs are kept free of grease or oil
- Ladders are not used for other than their intended purpose
- Step ladders should only be used when fully opened.
- The user faces the ladder while going up and down.
- Tops are not used as steps. If needed, get a longer ladder.
- Bracing on the back legs is not used for climbing.
- Portable ladders are used by one person at a time.
- Fiberglass ladders are recommended.



TSI Photo

## SCAFFOLDING

- Ensure proper setup, regular inspection, and basic maintenance
- For free-standing mobile scaffolding, the height shall not exceed four times the minimum base dimension
- When workers will be riding mobile scaffolding the base dimension should be at least one half of the height.
- Use guardrails when scaffolding is 4- 10 feet tall and less than 45 inches wide. Scaffolding 10 feet or higher must have guardrails.
- Planking used on a scaffold should not extend farther than 12" over the edges secured to the frame with cleats on both ends.

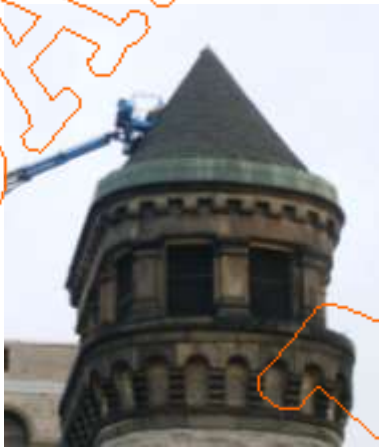


OSHA Photo

## AERIAL LIFTS

Aerial lifts include boom-supported aerial platforms, such as cherry pickers or bucket trucks. The major causes of fatalities are falls, electrocutions, and collapses or tip overs.

- Ensure that workers who operate aerial lifts are properly trained in the safe use of the equipment.



TSI Photos



- Maintain and operate elevating work platforms in accordance with the manufacturer's instructions.
- Never override hydraulic, mechanical, or electrical safety devices.
- Never move the equipment with workers in an elevated platform unless this is permitted by the manufacturer.
- Do not allow workers to position themselves between overhead hazards, such as joists and beams, and the rails of the basket. Movement of the lift could crush the worker(s).
- Maintain a minimum clearance of at least 10 feet, or 3 meters, away from the nearest overhead lines.
- Always treat powerlines, wires and other conductors as energized, even if they are down or appear to be insulated.
- Use a body harness or restraining belt with a lanyard attached to the boom or basket to prevent the worker(s) from being ejected or pulled from the basket.
- Set the brakes, and use wheel chocks when on an incline.
- Use outriggers, if provided.
- Do not exceed the load limits of the equipment.
- Allow for the combined weight of the worker, tools, and materials.

## SLIPS, TRIPS, AND FALLS



OSHA Photo

- Use slip-resistant rubber soled boots
- Minimize water on floors. Wet polyethylene is very slick and water increases the risk of electrical shock.
- Use care around air lines and electrical cords.
- Suspend electrical lines and cords, when possible, using tape.
- No running, jumping, or horseplay in work areas should ever be allowed.
- Minimize debris on floors.
- Pick up tools, scrapers, etc.
- Use proper harnesses when needed or required. Make sure life lines are properly anchored to support weight of workers.

## HAZ-COM

Failure to recognize the hazards associated with chemicals can cause chemical burns, respiratory problems, fires and explosions.

- Maintain a Material Safety Data Sheet (MSDS) for each chemical in the facility.
- Make this information accessible to employees at all times in a language or formats that are clearly understood by all affected personnel.
- Train employees on how to read and use the MSDS.
- Follow manufacturer's MSDS instructions for handling hazardous chemicals.
- Train employees about the risks of each hazardous chemical being used.
- Provide spill clean-up kits in areas where chemicals are stored.
- Have a written spill control plan.
- Train employees to clean up spills, protect themselves and properly dispose of used materials.
- Provide proper personal protective equipment and enforce its use.
- Store chemicals safely and securely.



## FIRE SAFETY



- Mark exit routes at floor level
- Mark emergency exits
- Keep flammables away from ignition sources
- Utilize flammable storage cabinets
- Know your chemical properties
- Do not block fire extinguishers with equipment
- Do not overload outlets - use a track plug
- Practice good housekeeping techniques in the lab/office/work area
- Inspect wires for possible damage and replace as needed



**EMERGENCY PROCEDURES**

- Develop emergency plan
- Post emergency phone number(s)
- Notify emergency responders
- Have certified first aid & CPR personnel on-site
- Inform personnel on emergency plan/procedures



**HEAT-RELATED DISORDERS**

Heat Stress	
<b>Symptoms:</b> <ul style="list-style-type: none"> <li>• Fatigue</li> <li>• Weakness</li> <li>• Profuse sweating</li> <li>• Normal temperature</li> <li>• Pale clammy skin</li> <li>• Headache</li> <li>• Cramps</li> <li>• Vomiting</li> <li>• Fainting</li> </ul>	<b>Treatment:</b> <ul style="list-style-type: none"> <li>• MEDICAL ALERT</li> <li>• Remove worker from hot area.</li> <li>• Have worker lie down and raise feet</li> <li>• Apply cool wet cloths</li> <li>• Loosen or remove clothing</li> <li>• Allow small sips of water or Gatorade™ if victim is not vomiting</li> </ul>

Heat Stroke	
<b>Symptoms:</b> <ul style="list-style-type: none"> <li>• Dizziness</li> <li>• Nausea</li> <li>• Severe headache</li> <li>• Hot dry skin</li> <li>• Confusion</li> <li>• Collapse</li> <li>• Delirium</li> <li>• Coma</li> <li>• Death</li> </ul>	<b>Treatment:</b> <ul style="list-style-type: none"> <li>• MEDICAL EMERGENCY</li> <li>• Remove worker from hot area</li> <li>• Remove clothing</li> <li>• Have them lie down</li> <li>• COOL THE BODY (SHOWER, COOL WET CLOTHS)</li> <li>• Do Not give stimulants</li> </ul>

## SECTION 11- GLOSSARY

<b>Acoustical Insulation</b>	The general application or use of asbestos for the control of sound due to its lack of reverberent surfaces.
<b>Acoustical Tile</b>	A finishing material in a building usually found in the ceiling or walls for the purpose of noise control.
<b>Actinolite</b>	One of six naturally occurring asbestos minerals. It is not normally used commercially.
<b>Addenda</b>	Changes made to working drawings and specifications for a building before the work is bid.
<b>AHERA</b>	Asbestos Hazard Emergency Response Act
<b>Algorithm</b>	A formal numerical procedure for assessing suspect material; results are given a numerical score.
<b>Alveoli</b>	Located in clusters around the respiratory bronchioles of the lungs, this is the area in which true respiration takes place.
<b>Amosite</b>	An asbestiform mineral of the amphibole group. It is the second most commonly used form of asbestos in the U.S. Also known as brown asbestos.
<b>Amphibole</b>	One of the two major groups of minerals from which the asbestiform minerals are derived - distinguished by their chain-like crystal structure and chemical composition. Amosite and crocidolite are examples of amphibole minerals.
<b>Anthophyllite</b>	One of six naturally occurring asbestos minerals. It is of limited commercial value.
<b>Asbestos</b>	A generic name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure, are incombustible in air, and separate into fibers. Asbestos includes the asbestiform varieties of chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); anthophyllite; tremolite, and actinolite.
<b>Asbestos Bodies</b>	Coated asbestos fibers often seen in the lungs of asbestos-exposure victims.
<b>Asbestos-Containing Building Material (ACBM)</b>	Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building (AHERA definition).
<b>Asbestos-Containing Material</b>	Any material or product which contains more than 1 percent asbestos (AHERA, OSHA definition).
<b>Asbestosis</b>	A non-malignant, progressive, irreversible lung disease caused by the inhalation of asbestos dust and characterized by diffuse fibrosis.
<b>ASHARA</b>	Asbestos School Hazard Abatement Reauthorization Act. U.S. EPA regulation enacted November 28, 1992 which extended accreditation requirements for inspectors, contractor/supervisors, designers, and workers to public and commercial buildings.
<b>Breeching</b>	A duct which transports combustion gases from a boiler or heater to a chimney or stack. Also called a flue.

<b>Building Inspector</b>	A person who conducts a survey of a building for the presence of asbestos-containing materials. Must be accredited under AHERA and ASHARA regulations.
<b>Bulk Sample</b>	Sample of bulk material; in the case of asbestos, suspect material.
<b>Category I Non-friable ACM</b>	Asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products containing more than 1% asbestos.
<b>Category II Non-friable ACM</b>	Any material, excluding Category I non-friable ACM, containing more than 1% asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. Example: asbestos cement products
<b>Cementitious ACM</b>	Asbestos-containing materials that are densely packed, granular and are generally non-friable.
<b>Chain-of custody</b>	Formal procedures for tracking samples and insuring their integrity.
<b>Change Order</b>	A change to construction documents after a contract for construction has been signed.
<b>Chrysotile</b>	The only asbestiform mineral of the serpentine group. It is the most common form of asbestos used in buildings. Also known as white asbestos.
<b>Certified Industrial Hygienist (CIH)</b>	An industrial hygienist who has been granted certification by the American Board of Industrial Hygiene.
<b>Cilia</b>	Tiny hair-like structures in the windpipe and bronchi of the lung passages which beat upward and that help force undesirable particles, fibers and liquids up and out of the lungs.
<b>Claims-Made Insurance</b>	A form of insurance in which a claim is allowed only if the insurance is in effect when the claim is made, that is, when the injury or effect is observed.
<b>Contract Documents</b>	Legally binding building drawings and specifications. Also called construction documents.
<b>Crocidolite</b>	The strongest of the asbestos minerals. An asbestiform mineral of the amphibole group. It is of minor commercial value in the U.S. Blue asbestos.
<b>Damaged Friable Surfacing (Miscellaneous) Material</b>	Friable surfacing (miscellaneous) ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or, if applicable, which has delaminated such that the bond to the substrate (adhesion) is inadequate or which for any other reason lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of ACM surface; water damage; significant or repeated water stains, ~ gauges, mrrs or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage (AHERA definition).
<b>Damaged or Significantly Damaged or Damaged Thermal System Insulation</b>	Thermal system insulation on pipes, boilers, tanks, ducts, and other thermal system insulation equipment which has lost its structural integrity, or whose covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges, or other signs of physical injury to ACM, occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris, originating from the ACBM in question may also indicate damage (AHERA definition).

<b>Dose-Response Effect</b>	The relationship between the amount of pollutant a person is exposed to (dose) and the increase risk of disease (effect). Usually the greater the dose, the greater the effect.
<b>Electrical Systems</b>	The system of wires, lights, power generation equipment, and related facilities to produce, convey, and utilize electrical power in a building.
<b>Encapsulation</b>	The use of an agent to seal the surface (bridging encapsulant) or penetrate the bulk (penetrating encapsulant) of ACM.
<b>Enclosure</b>	A resilient structure, built (or sprayed) around ACM designed to prevent disturbance and contain released fibers.
<b>Epidemiology</b>	The study of causes, occurrence and distribution of disease throughout a population.
<b>Errors and Omissions Insurance</b>	A type of insurance, which protects professionals for mistakes they may make in contracted plans and recommendations.
<b>Excursion Limit (EL)</b>	A level of airborne fibers specified by OSHA as a short term excursion level. It is currently 1.0 fibers per cubic centimeter (f/cc) of air, 30-minute time-weighted average, as measured by phase contrast microscopy.
<b>f/cc</b>	Fibers per cubic centimeters of air.
<b>Fireproofing</b>	Spray or trowel applied fire resistant materials.
<b>Friable</b>	Any materials that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
<b>Functional Spaces</b>	Spatially distinct units within a building, which contain identifiable populations of building occupants.
<b>General Liability Insurance</b>	A type of insurance which covers the insured for damage to property and person caused by his or her own negligence.
<b>Hazard Assessment</b>	The interpretation and evaluation of physical assessment data in order to set abatement priorities and rank areas for response actions. These priorities and rankings are based on anticipated exposure to asbestos fibers.
<b>Heating, Ventilating, &amp; Air Conditioning (HVAC) System</b>	The system of pipes, ducts, and equipment (air conditioners, chillers, heaters, boilers, pumps, fans) used to heat, cool, move, and filter air in a building. HVAC systems are also known as mechanical systems.
<b>High Efficiency Particulate Air (HEPA)</b>	A type of filter which is 99.97% efficient at filtering particles of 0.3 micrometers in diameter.
<b>Homogeneous Sampling Area</b>	An area of ACM or suspect ACM which appears similar throughout in terms of color, texture, and date of material application.
<b>Indemnify</b>	To pay for or pay back. Indemnification clauses in contracts are intended to cover the cost of judgements and/or legal defenses in the event of litigation.
<b>Industrial Hygienist</b>	A professional qualified by education, training, and experience to recognize, evaluate, and develop controls for occupational health hazards.
<b>Latency Period</b>	The time between first exposure to a disease causing agent and the appearance of the disease.
<b>Liability</b>	Being subject to legal action for one's behavior.

<b>Local Education Agency (LEA)</b>	Authority responsible for complying with AHERA. As defined in Section 198 of the Elementary and Secondary Education Act of 1965.
<b>Lung Cancer</b>	A malignant growth of abnormal cells in the lungs, specifically of the bronchi covering.
<b>Macrophage</b>	White blood cells, which attack foreign substances in the body. The release of enzymes from these cells as they attack undigestible particles, such as asbestos, contributes to the creation of scar tissue in the lung.
<b>Management Plan</b>	A plan for each LEA to control and manage ACBM (AHERA definition). Must be prepared by an EPA or state accredited Management Planner.
<b>Management Planner</b>	An individual that has completed an EPA or State approved course and passed an examination covering the development of management plans.
<b>Mechanical Systems</b>	See HVAC systems
<b>Mesothelioma</b>	A relatively rare form of cancer, which develops in the lining of the pleura or peritoneum with no known cure. It is almost always caused by exposure to asbestos.
<b>Micrometer</b>	One millionth of one meter
<b>Miscellaneous Material</b>	Interior building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and does not include surfacing material or thermal system insulation (AHERA definition).
<b>Negative Exposure Assessment</b>	Data demonstrated by the employer and acceptable to OSHA verifying that employee exposure is below the Permissible Exposure Limit (PEL).
<b>Negative Pressure Respirators</b>	Respirators which function by the wearer breathing in air through a filter.
<b>NESHAP</b>	National Emission Standards for Hazardous Air Pollutants - EPA Regulation 40 CFR subpart M, Part 61.
<b>NIOSH</b>	The National Institute for Occupational Safety and Health which was established by the occupational Safety and Health Act of 1970.
<b>Occurrence Insurance</b>	A form of insurance in which a claim is allowed regardless of when the claim is filed. For asbestos insurance, the "occurrence" could be the time of first exposure.
<b>Operations and Maintenance Plan (O&amp;M)</b>	Specific procedures and practices developed for the interim control of asbestos-containing materials in buildings until it is removed.
<b>OSHA</b>	The Occupational Safety and Health Administration which was created by the Occupational Safety and Health Act of 1970; serves as the enforcement agency for safety and health in the workplace environment.
<b>Permissible Exposure Limit (PEL)</b>	A level of airborne fibers specified by OSHA as an occupational exposure standard for asbestos. It is currently 0.1 fibers per cubic centimeter of air, 8-hour time-weighted average, as measured by phase contrast microscopy.
<b>Phase Contrast Microscopy (PCM)</b>	An optical microscopic technique used for the counting of fibers in air samples, but which does not distinguish fiber types.
<b>Physical Assessment</b>	Assessing suspect material to determine the current condition of the material and the potential for future disturbance.

<b>Plenum</b>	A horizontal space designed to transport air in a building. Plenums are commonly the space between a dropped ceiling and the floor above.
<b>Pleura</b>	The thin membrane surrounding the lungs, and which lines the internal surface of the chest cavity.
<b>Pleural Plaque</b>	A fibrous thickening of the lining of the chest cavity. Associated with asbestos exposure.
<b>Plumbing System</b>	The system of pipes, valves, fittings and related components designed to convey liquid or gas fluids throughout a building. Some piping may also be part of the HVAC system.
<b>Point Counting</b>	A method of analyzing bulk samples whereby the sample is homogenized, placed on microscope slides and examined under a polarized light microscope. A point counting stage (or mechanical stage) and cross hair reticle are used for counting with only the particle(s) directly under the cross being counted (void space is not counted). A minimum of 400 counts should be made for each slide (several slides are examined).
<b>Polarized Light Microscopy (PLM)</b>	An optical microscopy technique for analyzing bulk samples for asbestos in which the sample is illuminated with polarized light (light which vibrates in only one plane) to distinguish between different types of asbestos fibers by their shape and unique optical properties.
<b>Positive Pressure Respirators</b>	Respirators which function by blowing air or providing pressured air to the wearer.
<b>Protection Factor (PF)</b>	A number, which reflects the degree of protection provided by a respirator. It is calculated by dividing the concentration of contaminant outside the mask by the concentration inside the mask.
<b>Presumed ACM</b>	Asbestos-containing thermal system insulation and surfacing materials found in a building constructed no later than 1980. (OSHA regulations)
<b>Qualitative Fit Test</b>	A method of testing a respirator's face-to-facepiece seal by covering the inhalation or exhalation valves and either breathing in or out to determine the presence of any leaks.
<b>Quality Assurance</b>	A program for collecting and analyzing additional samples of suspect material to check on the reliability of procedures.
<b>Quantitative Fit Testing</b>	Testing the fit of a respirator by calculating concentrations of contaminants inside and outside the mask. This requires the use of instruments.
<b>Rales</b>	Cracking sounds in the lower half of the lung; symptomatic of progressing asbestosis.
<b>Random Sample</b>	A sample drawn in such a way that there is no set pattern and is designed to give a true representation of the entire population or area.
<b>Record Documents</b>	Drawings and specifications, which should reflect the way a building was actually constructed (sometimes referred to as "as-built drawings").

<b>Regulated Asbestos (RACM) Containing Material</b>	<ul style="list-style-type: none"> <li>a) friable asbestos material,</li> <li>b) Category I non-friable ACM that has become friable,</li> <li>c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or</li> <li>d) Category II non-friable ACM that 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 regulated by subpart §61.141 of 40 CFR Part 61 (NESHAP Revision; Final Rule)</li> </ul>
<b>Respiration</b>	The exchange of gases in the lungs.
<b>Respiratory Protection Program</b>	A set of procedures and equipment required by OSHA to be established by an employer, which provides for the safe use of respirators on their job sites.
<b>Respiratory Tract</b>	The organs of the body, which convey air to the blood, allow exchange of gases, and remove carbon dioxide.
<b>Serpentine</b>	One of the two major groups of minerals from which the asbestiform minerals are derived; distinguished by their tubular structure and chemical composition. Chrysotile is a serpentine mineral.
<b>Shop Drawings</b>	Detailed drawings of selected items used in the construction of a building that are drawn by the contractor, but reviewed by the architect/engineer responsible for designing the project.
<b>Significantly Damaged Friable Surfacing (Miscellaneous) Materials</b>	Friable surfacing (miscellaneous) ACM in a functional space where damage is extensive and severe (AHERA definition).
<b>Specifications</b>	A written set of standards, procedures, and materials for the construction of a building.
<b>Structural Member</b>	Any load-supporting member such as beams and load supporting walls of a facility.
<b>Submittals</b>	Drawings or descriptive literature such as operating manuals transmitted to the building owner upon construction completion.
<b>Substrate</b>	The material or existing surface located under or behind the asbestos-containing material.
<b>Surfacing Material</b>	Material that is sprayed-on, troweled-on or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes (AHERA definition).
<b>Synergistic</b>	The combination of two effects which is greater than the sum of the two independent effects.
<b>Thermal System Insulation</b>	Material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.
<b>Tort</b>	A legal wrong, sometimes referred to as negligence.

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<b>Trachea</b>	The main air tube into the lungs. Made up of cartilage and supported by cartilage rings, the trachea divides into two bronchi which lead into the lungs.
<b>Transite™</b>	A trade name for asbestos cement wallboard and sheeting
<b>Transmission Electron Microscopy (TEM)</b>	A method of microscopic analysis which utilizes an electron beam that is focused onto a thin sample. As the beam penetrates (transmits) through the sample, the difference in densities produces an image on a fluorescent screen from which samples can be identified and counted. Used for analyzing air samples for asbestos.
<b>Tremolite</b>	One of six naturally occurring asbestos minerals, Tremolite has few commercial uses.
<b>Working drawings</b>	A set of drawings, which reflect the intended construction and appearance of the building. Also known as building plans.
<b>U.S. EPA</b>	United States Environmental Protection Agency. Created in 1970, the U.S. EPA is the federal promulgator and enforcement agency for environmental regulations.
<b>User Seal Check</b>	Procedure for ensuring the seal of a negative pressure, air-purifying respirator by covering the filters and inhaling, then the exhalation valve and exhaling to check for leaks around the face seal.

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