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ASBESTOS AWARENESS TRAINING

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TERMS

ASBESTOS

- Chrysotile
- Amosite
- Crocidolite
- Tremolite
- Anthophyllite
- Actinolite

ACM - *Asbestos Containing Material*

Any material containing > 1% asbestos

PACM - *Presumed Asbestos Containing Material*

Any material presumed to contain > 1% asbestos

TERMS

SURFACING MATERIAL

- Sprayed
- Troweled, or
- Applied to surfaces

THERMAL SYSTEM INSULATION

Also Known as TSI. It's an ACM applied to:

- Pipes
- Fittings
- Boilers
- Tanks
- Ducts, or
- Other structural components to prevent heat loss or gain

What is Asbestos?

- Asbestos is a naturally occurring mineral.
- The crystal formation of asbestos is in the form of long thin fibers.
- Asbestos is divided into two mineral groups Serpentine and Amphibole.
- Serpentines have a sheet or layered structure where amphiboles have a chain like structure.

What is Asbestos?

Asbestos minerals have the following characteristics in common:

01 Separates

Asbestos bundles separate into smaller and smaller fiber bundles when disturbed or handled

02 Resilient

Asbestos is resistant to heat, bacteria and chemicals

03 Durable

Asbestos has abundant tensile strength and stiffness

04 Padding

Asbestos is an excellent electrical and thermal insulator

05 Sound Barrier

Asbestos makes a very good noise insulator

06 Long Standing

Asbestos is resistant to the effects of friction and wear

Mining Asbestos

Asbestos is found throughout the world, primarily Canada, the former Soviet Union and South Africa. Canada was the largest provider to the United States.

Three common types of asbestos are chrysotile, amosite and crocidolite.

Chrysotile

- Most common type of asbestos
- 90% of the asbestos in buildings in the USA
- Mined in Canada and the Soviet Union

Amosite

- Second most common type of Asbestos
- Mined primarily in South Africa.

Crocidolite

- Third most common type of asbestos
- Strongest asbestos fiber
- Mined in South Africa and Australia.

Chrysotile

Most Common

Amosite

Second Most Common

Crocidolite

Third Most Common

What Does Asbestos Look Like?

Chrysotile

White

Fine silky fibers

The only member of the serpentine group

Amosite

Brown

Heat insulation materials

Member of the amphibole group.

Crocidolite

Blue

High heat applications

Member of the amphibole group.

What is the History Of Asbestos Use?

Dirty Secrets

Ancient Greeks named asbestos, which means inextinguishable. Strabo, a Greek geographer and Pliny the Elder mentioned a sickness of the lungs in slaves who wove asbestos into cloth. But they were awestruck of the magical properties of asbestos… so they ignored the dangers.

Household

Asbestos, used for wicks of the eternal flames of the vestal virgins and dresses in the cremation of kings. Romans used it to make napkins, which they'd clean with fire. Amazed how the napkins came out so white, they called asbestos amiantus, meaning unpolluted.

Construction

Asbestos is strong & durable with long, thin fibers once woven into cloth. Used in thousands of products, 30M tons of asbestos was used in industrial sites, homes, schools, shipyards and commercial buildings in the USA in the 20th Century

Module 2: Where to find Asbestos

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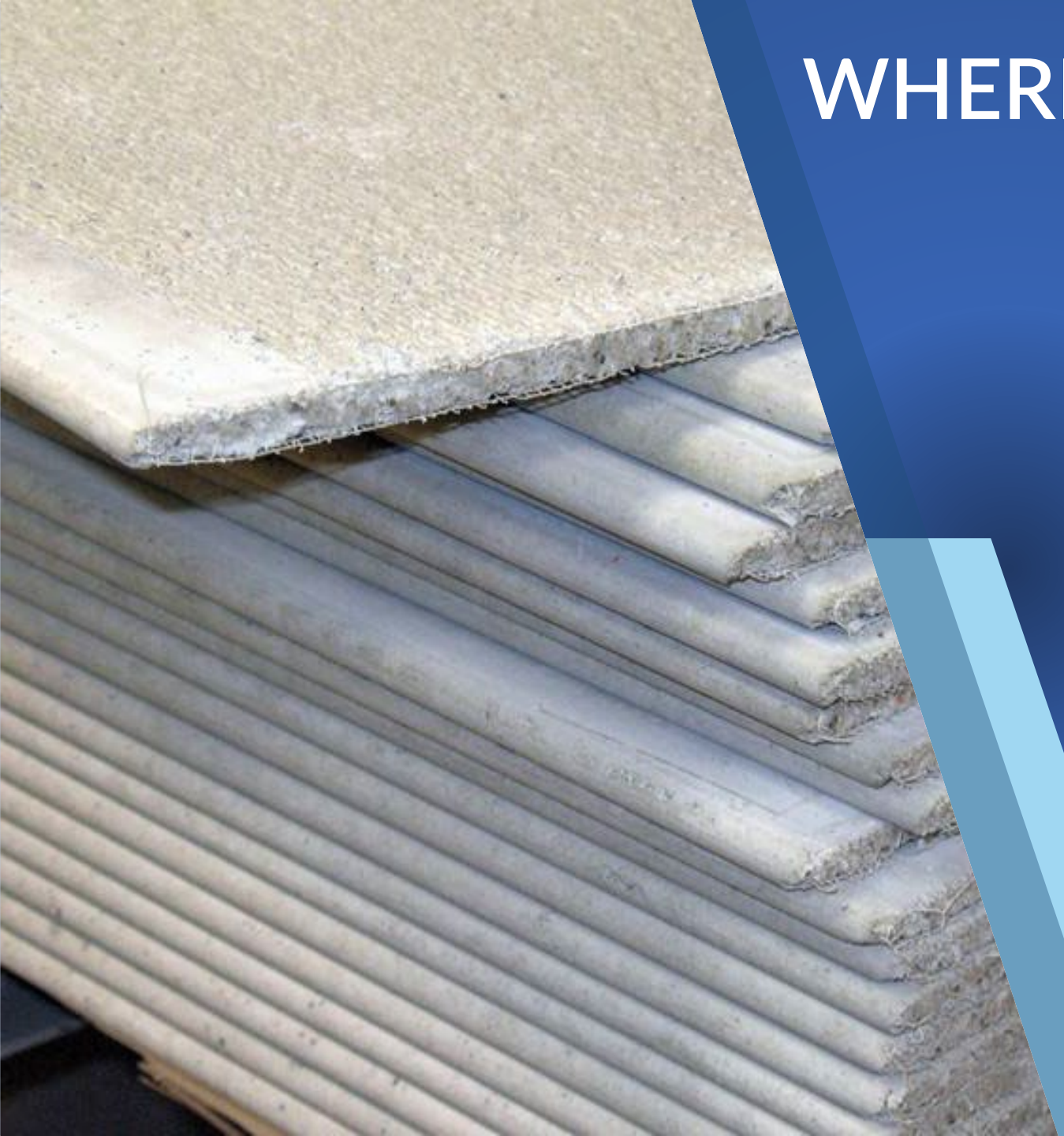
WHERE IS ASBESTOS FOUND?

Asbestos was very inexpensive and effective component of many products.

The construction industry utilized asbestos most frequently as it was added to building materials to give them strength, fire retardancy, color and, in some cases, as filler.

Fireproofing...

So much buzz was created by the asbestos industry for the fire proofing or enhanced safety properties of asbestos that the 1970 Fire Precautions Act encouraged heavy use of asbestos insulation board.



WHERE IS ASBESTOS FOUND?

Reinforcing Cement

- 70% used to reinforce asbestos cement in construction
- Cement mixed with 15% asbestos fiber makes a rigid sheet less than 5 millimeters thick.
- If iron was used instead, the sheet would have to be 3 centimeters thick to have the same strength.

Cement Pipes

- Rigid cement pipes need to be 3cm thick and 1 meter
- With asbestos, pipes can be one centimeter thick.
- Asbestos saves on the cost of cement and transportation.
- Its light, and easy to handle

WHERE IS ASBESTOS FOUND?

Sprayed Coatings

- Sprayed coatings are the most lethal uses for asbestos.
- Many sprayed asbestos products contained up to 85% asbestos
- Between 1935 and 1971, it was used extensively in public buildings for acoustic and thermal insulation and fire protection of structural steel work.
- It was common in system-built council housing; in boiler houses and ceilings to balconies and walkways.
- This material is usually found to be soft, friable and therefore extremely dangerous.

WHERE IS ASBESTOS FOUND?

Lagging

- Lagging is insulation for pipework, boilers and ducts.
- Heating pipes and boilers in factories, hospitals, and public buildings.
- High dust levels in ducts where it’s disturbed during maintenance activities.

WHERE IS ASBESTOS FOUND?

Insulation Boards

Such as partitions, fire doors, and ceiling tiles.

- Amosite 1950s, 1960s, and 1970s in insulation boards.
- Insulation boards in stairways, curtain walling, partitions, and fire-proof panels.
- Found in system-built council housing, hotels & schools
- Heating ducts
- Linings to doors and meter cupboards
- Heating units
- Insulation boards typically contained 25% asbestos.

WHERE IS ASBESTOS FOUND?

Asbestos Cement

- Sheeting on wall and roofs, tiles, water tanks, gutters, pipes, and paster finishes
- Chrysotile, found in concentrations of about 10%
- Asbestos slates, tiles and linings behind fires walls
- Fibers released from materials with age
- When material is damaged
- During routine maintenance
- Drilling, sanding, wire brushing, and machine sawing
- Dangerous concentrations of asbestos dust.

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WHY ARE ASBESTOS PRODUCTS DANGEROUS?

Friability

What makes an asbestos product dangerous is its friability. Products containing asbestos, that when dry, can easily be crumbled or powdered by hand are considered friable.

EXAMPLES OF FRIABLE PRODUCTS

- Mechanical insulation
- Sprayed insulation

Sprayed insulation includes fire resistant, acoustic, thermal, condensation control, decorative millboards.

WHY ARE ASBESTOS PRODUCTS DANGEROUS?

Non-Friable

Products where asbestos is bound tightly and doesn't easily shed asbestos fibers under normal use are called non friable.

EXAMPLES OF NON-FRIABLE PRODUCTS

- Roof shingles
- Asbestos cement pipes
- Caulking compounds
- Floor tiles
- Joint cements, and
- Welding rods

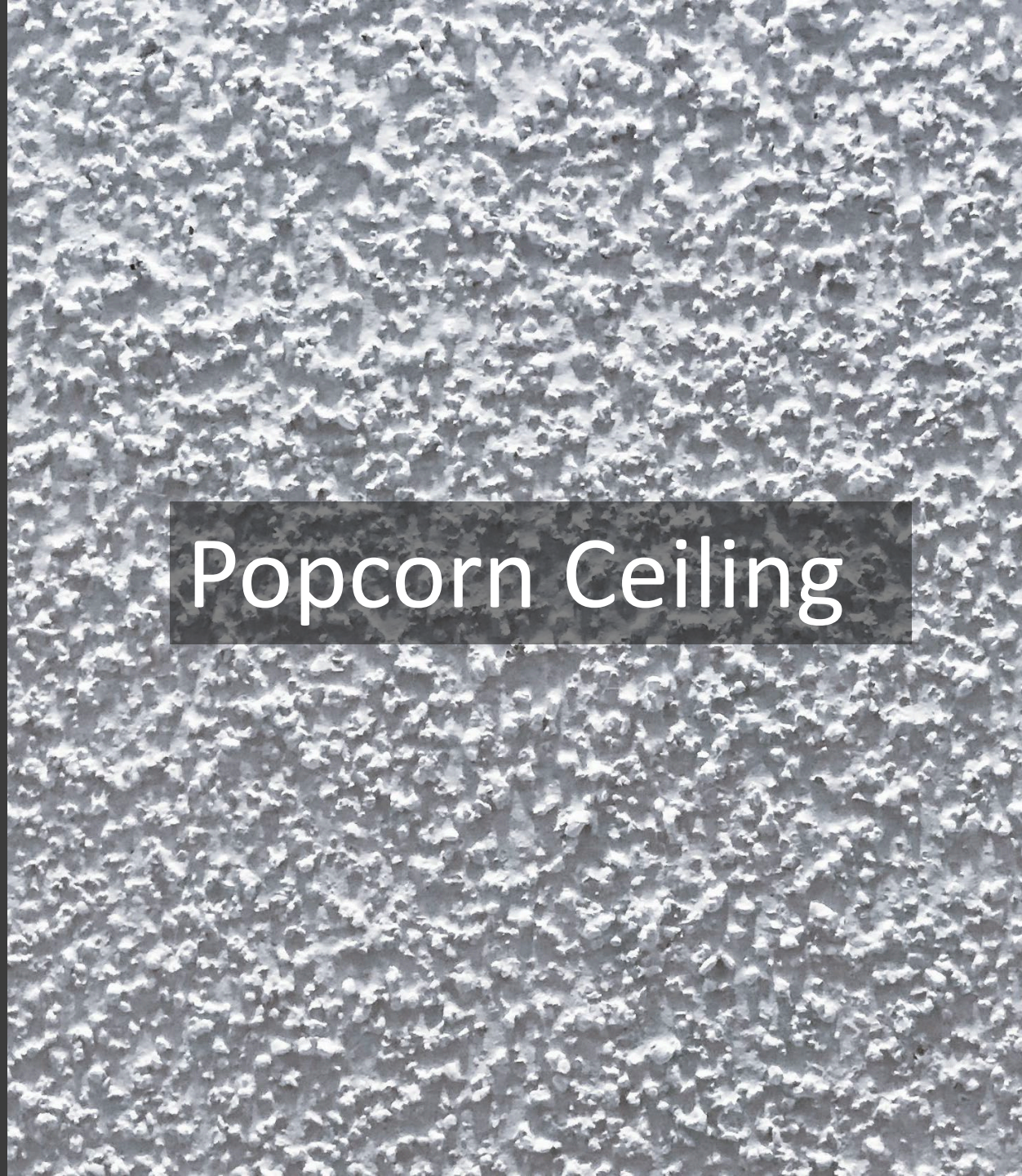
Either Category

Other products that may fall in either category, depending on their condition are textiles and papers.

Friable sprayed or troweled asbestos insulating formulations applied for fire protection, thermal or acoustic insulation were used until 1974.

Mechanical insulation was applied to pipes, boilers, etc. until the late 1970's. Acoustic or decorative finishes which were sprayed or troweled in place were also applied until the late 1970's.

The next screen will show common asbestos products, how easily they are friable, and their dates of use. This information can also be found in the downloadable course materials.



Asbestos Product Friability

Building Product	Friability	Dates of Use
Roofing Materials	Low	1920-Mid 1970's
Textiles and Gaskets	Low to moderate	1920-Mid 1970's
Duct Wrap	Moderate to high	1920-Mid 1970's
Mechanical Insulation	High	1926-Mid 1970's
Cement Board	Low	1930-Present
Spray Insulation	High	1935-1974
Cement Pipe	Low	1935-Present
Brake Linings	Low	1940-Present
Texture Coat	Moderate to high	1950-Mid 1970's
Floor Tile	Low	1950-Mid 1970's
Drywall Taping Compound	Low to moderate	1950-Mid 1970's
Ceiling Tiles	Low to moderate	1950-1970's

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Asbestos Exposure

Small Fibers

The most dangerous asbestos fibers are too small to be visible.

Airborne

They can become airborne when asbestos containing materials are disturbed or during improper removal.

Aerodynamic Fibers

Asbestos is only dangerous if it becomes airborne; however, asbestos fibers are extremely aerodynamic.

Suspension

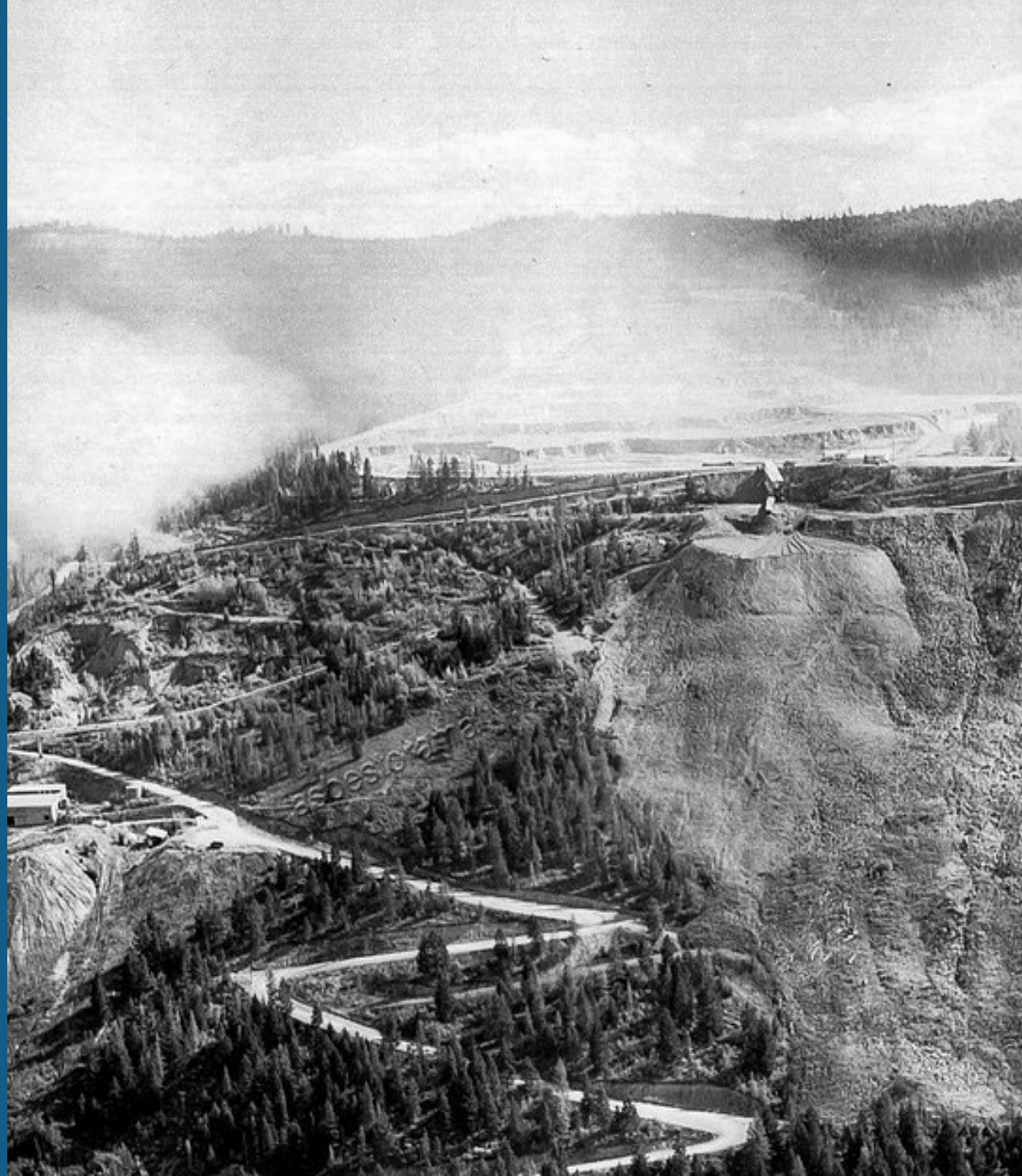
Small diameter fibers and particles may remain suspended in the air for a long time and be carried long distances by wind or water before settling down.

Risk of Exposure

Asbestos fibers can't move through soil and because the fibers are not broken down to other compounds, they remain unchanged for long periods of time.

Because of this, asbestos dust generated from the disturbance of ACM poses a risk of exposure to the following people:

- Workers in the area during disturbance
- Occupants of the building in the area during the disturbance, *and*
- If asbestos dust is not cleaned up and is re-disturbed, anyone in the area may be exposed until the dust settles, which can take several hours.



How Does Asbestos Get Into The Body?

If asbestos were to stay in the environment and not get into our body, we wouldn't have to worry. It is when the asbestos gains entry to our body that it can create a problem for our health.

- Swallowed
- Absorbed through the skin
- Inhaled
- Injection under the skin

Virtually Invisible

While asbestos fibers can enter the body through ingestion, inhalation is by far the major route.

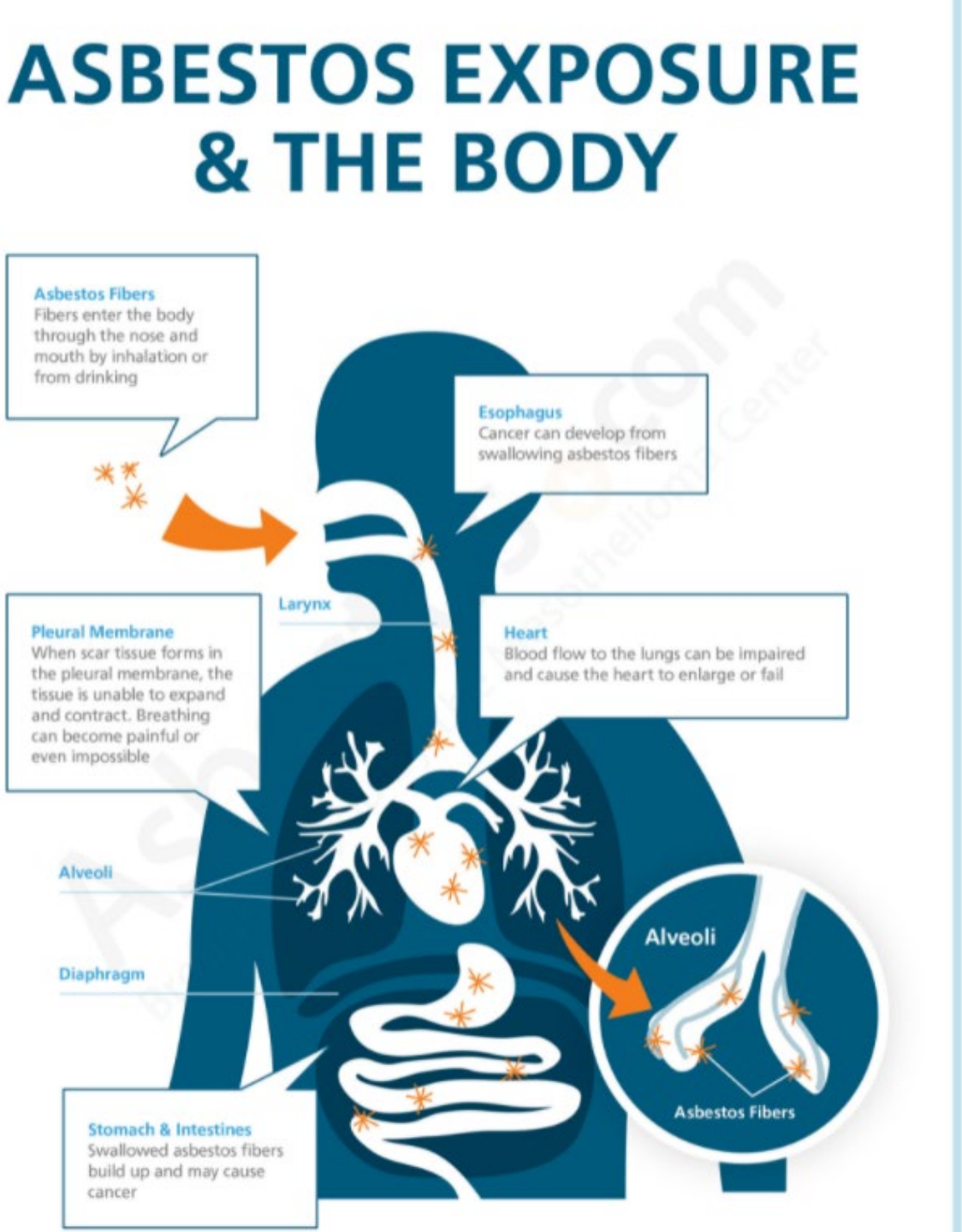
Asbestos fibers have no odor, and those that you may inhale cannot be seen by the naked eye.

Respiratory System

Your respiratory system includes the mouth, nose, windpipe (trachea), bronchi and lungs.

The lungs are located within the pleural cavity. Lying within the cavity and covering the lungs is a lining called the pleural mesothelium.

The lungs contain air sacks called alveoli. The alveoli are the sites where oxygen is absorbed into the blood and carbon dioxide is removed from the blood.



Your Body's Defenses

Our body's respiratory system has defense mechanisms that keep foreign particles form causing damage. Amazingly, estimates indicate that these mechanisms are 95 to 98 % effective.

Defense Mechanisms

- The mouth and nose filter out very large particles
- Coated bronchi filter out smaller particles
- Cilia, which are hair like protrusions on cells lining the airways (bronchial tree), move particles up to the back of the mouth where they are swallowed or expelled.
- The smallest non-trapped particles, may travel to the alveoli in the lower respiratory system where they may be attacked by large cells (macrophages), which try to digest them. Because asbestos is a mineral fiber, the macrophages are often not successful.
- Coughing is also defense mechanism for our body.

How Asbestos Hurts Us

Most of the information about asbestos diseases comes from studying workers in various asbestos industries.

The bulk of the data comes from World War II shipbuilding activities and the asbestos industries in the United States and England.

Exposure to very high levels of airborne asbestos typical of the asbestos workplace prior to 1972 has been linked with the diseases on the following screens.

Asbestosis

Asbestosis is a chronic disease in which lungs become scarred (fibrosis) as a result of a biological reaction to the inhalation of asbestos fibers.

Scarring of the Lungs

Scarring causes thickening of the walls of the lungs and a reduction in the capacity for transfer of oxygen to the bloodstream.

Victims usually die from heart failure, as the heart overworks to deliver the required oxygen to the body.

Asbestosis usually results after exposure to high concentrations of fibers over a long period of time. Symptoms usually occur 15 to 35 years after the first exposure.

Mesothelioma

Mesothelioma is a cancer of the covering of the lung or lining of the chest or abdominal cavities. It is the rarest form of the asbestos related diseases. This disease is always rapidly fatal, usually within a year after diagnosis. The latency period is usually 25 to 30 years for Mesothelioma.

Lung Cancer

Lung Cancer is responsible for one half of the deaths that occur from past asbestos exposures.

Lung cancer usually begins as a tumor in the lower lungs. Symptoms begin with a persistent cough or change in chronic cough. Later symptoms include loss of appetite, weight loss, pain and general weakness. Other cancers have been noted in a small number of people occupationally exposed to asbestos. These tumors are usually cancers of the gastrointestinal tract.

Make it Better or Make it Worse?

Smoking is a major risk factor. When coupled with asbestos exposure, smoking can greatly increase the risk of developing asbestos related diseases. It is not a risk factor for mesothelioma.

Smoking weakens the lungs, contributing to the negative health effects of asbestos exposure. Individually, Smoking or Asbestos exposure can cause lung cancer. Together, asbestos and smoking multiply the risk of lung cancer significantly.

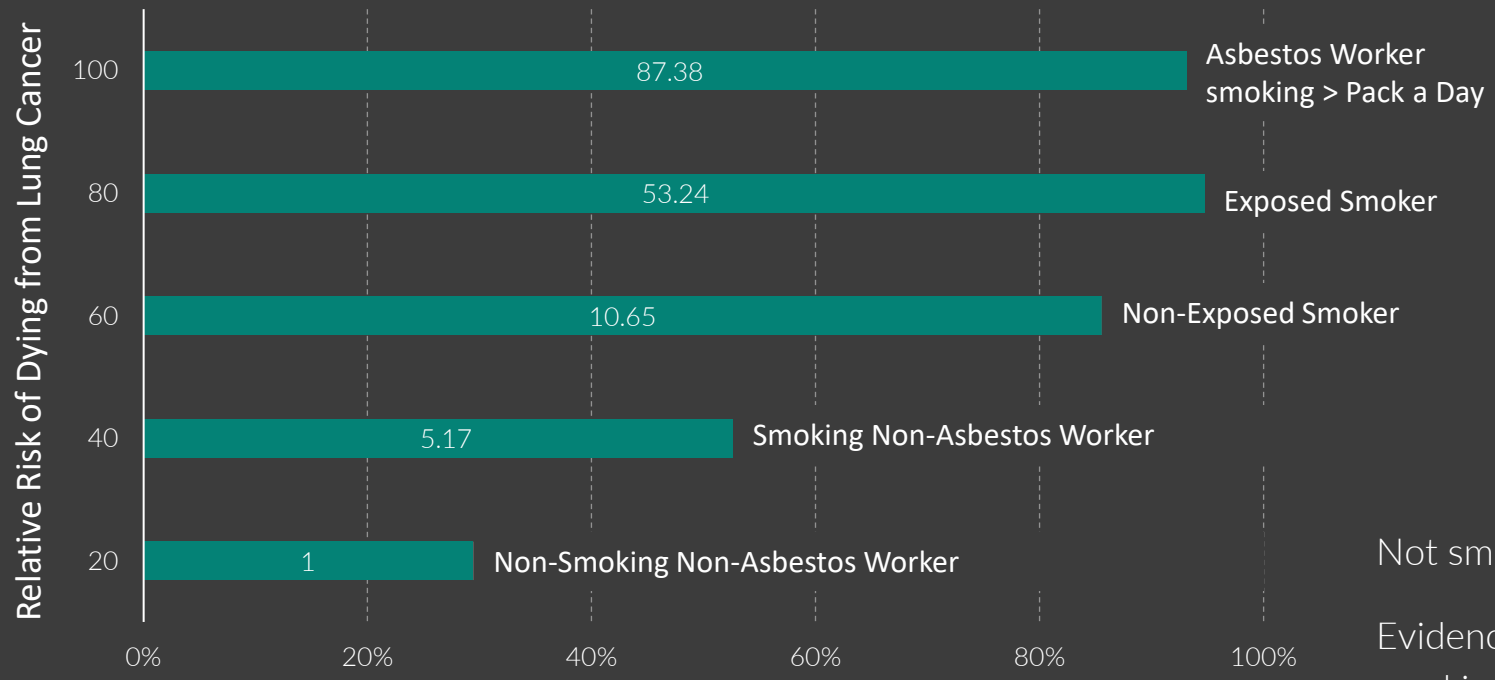
Asbestos workers are five times more likely to develop lung cancer than the general population.

Smokers are ten times more likely to develop lung cancer than the general population.

A person who works with asbestos and smokes is likely to have a 90 times greater risk of contracting lung cancer.

Relative Risk

Dying from Lung Cancer for Smoking and Non-Smoking Asbestos Workers



Source

Report of the Surgeon General in 1985

Not smoking is an important aspect of preventing disease.

Evidence suggests that asbestos exposed workers who quit smoking can reduce their risk of developing lung cancer by as much as 50% within five years of quitting.

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Work Safe

For many years, asbestos was considered a "miracle mineral." It was used because it is fireproof, and resistant to acid and corrosion.

Microscopic

Asbestos fibers are so tiny you need a microscope to see them. You can breathe them in easily without knowing it, whether they are in the air or on your clothes.

As we've seen in this course, asbestos can cause serious lung and breathing diseases which can take as long as 15 to 35 years to show up.

Smokers exposed to asbestos up to 90 times more likely to get certain lung diseases than nonsmokers.

Today, a great deal is known about the health hazards that result from overexposure to asbestos. It is very important for your health to work safely with asbestos. Let's start by understanding the most common terms and what they mean to your health.

What is an ACM?

ACM is the acronym for "asbestos containing materials".

EPA Definition

The Environmental Protection Agency defines ACM as any material containing more than one percent (1%) asbestos as determined using the method specified in:

- Appendix A, Subpart F
- 40 CFR Part 763, Section 1, Polarized Light Microscopy (PLM).

Friable

Friable ACM is any material containing more than one percent (1%) asbestos that, when dry, can be crumbled, pulverized or reduced to powder by hand pressure.

Non-Friable

Non friable ACM is any material containing more than one percent (1%) asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

EPA also defines two categories of non friable ACM: Category I and Category II.

Category 1 Non-Friable ACM

Asbestos containing packing, gasket, resilient floor covering or asphalt roofing product which contains more than one percent (1%) asbestos.

Category I non friable ACM must be inspected and tested for friability if it is in poor condition.

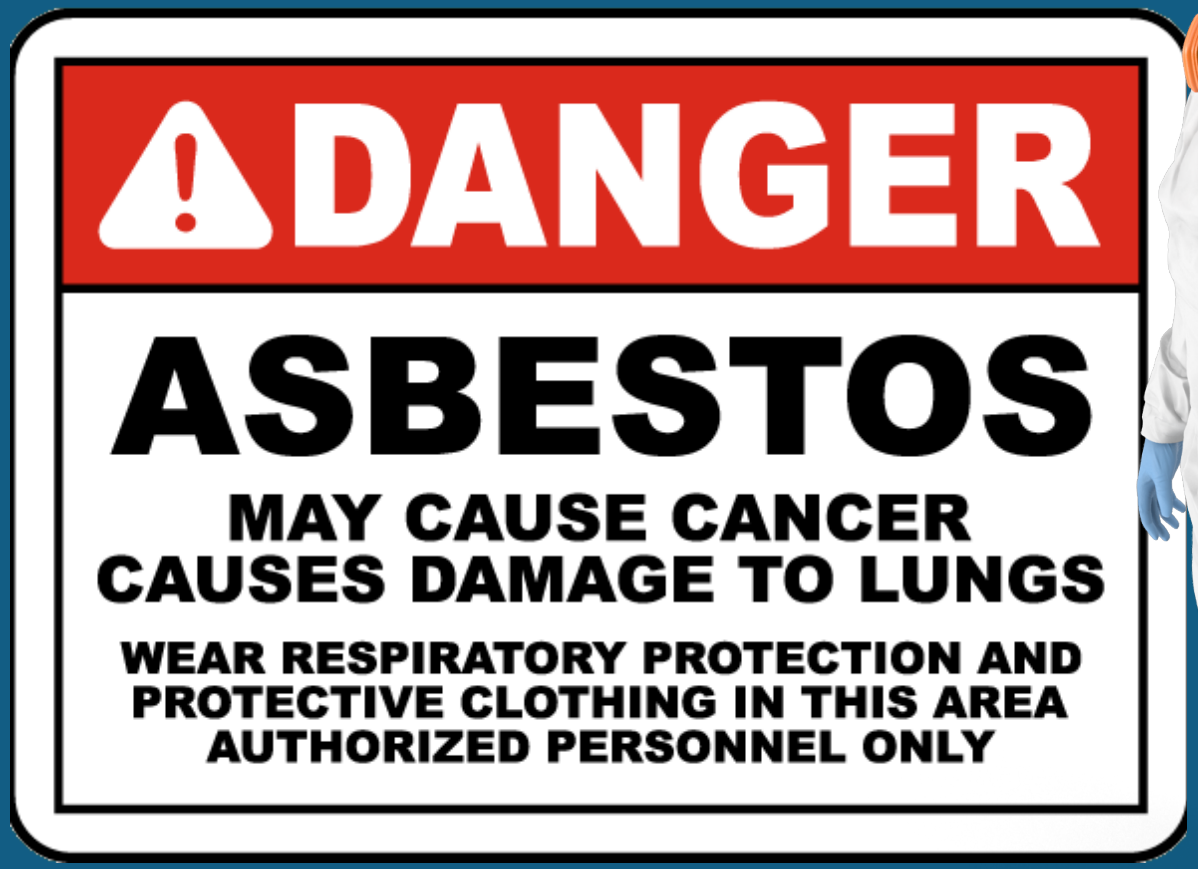
Asbestos containing packing, gaskets, resilient floor coverings and asphalt roofing materials must be removed before demolition only if they are in poor condition and are friable.

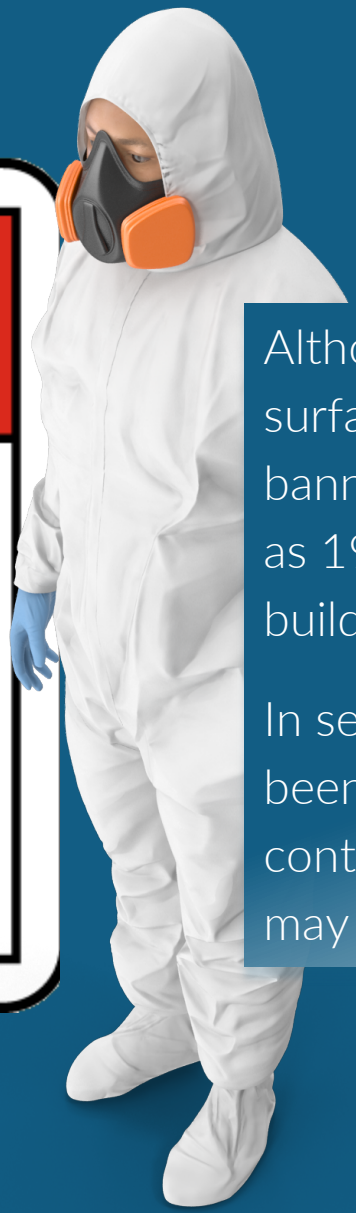
Regulated Asbestos Containing Material (RACM)

Any material, excluding Category I non-friable ACM, containing more than one percent (1%) asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category II non friable ACMs such as cement siding, Transite board, and shingles, that are subjected to intense weather conditions (thunderstorms, high winds or prolonged exposure to high heat and humidity) may become "weathered" to a point where they become friable.

Recognizing Asbestos

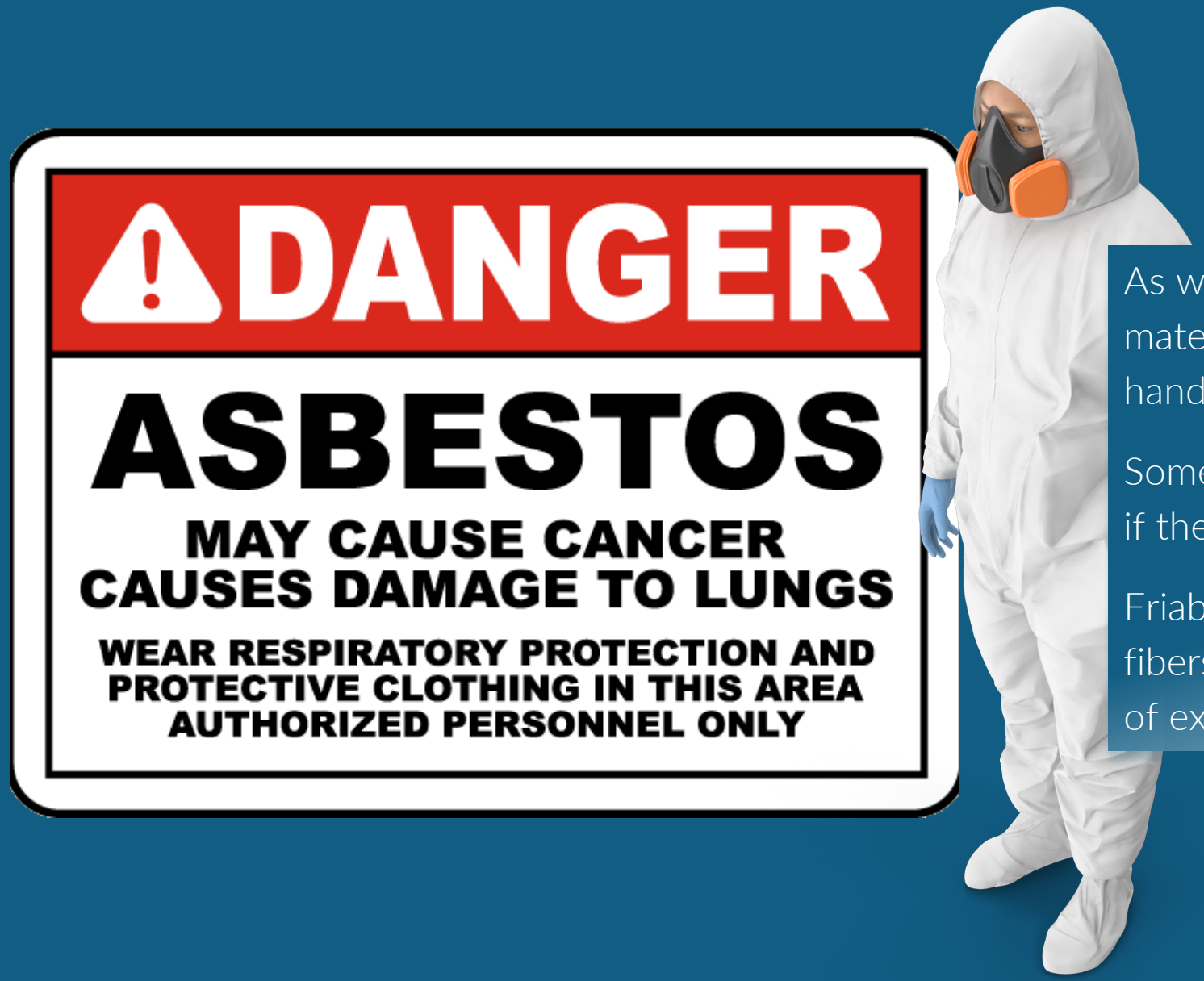




Although the use of asbestos in thermal, surfacing and fire proofing materials was banned in 1973, buildings constructed as late as 1980 have been found to contain asbestos building materials.

In several old buildings it may have already been determined that materials, indeed, contain asbestos. In these cases, the materials may be labeled to warn workers.

When Do ACM's Become Dangerous

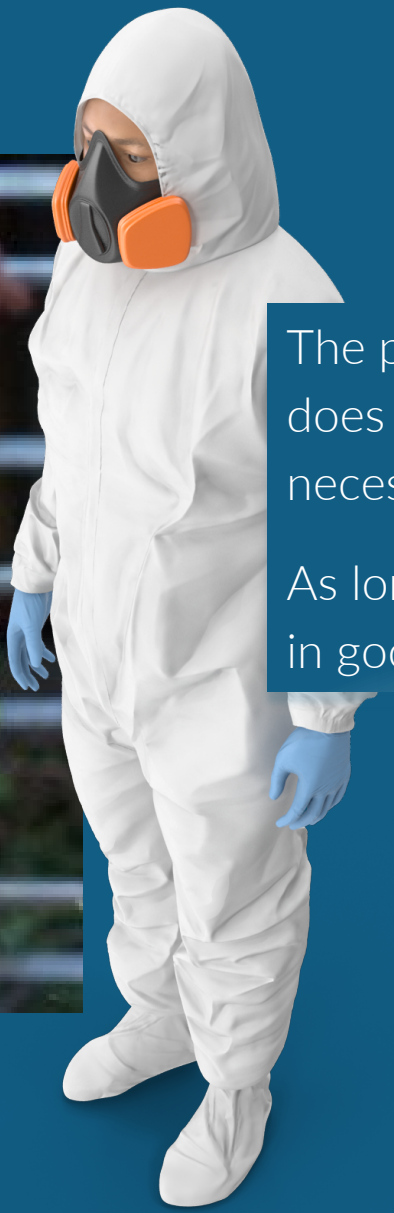


As was stated earlier, asbestos containing materials that can be reduced to powder by hand pressure are considered friable.

Some non friable materials may become friable if they are cut, drilled or damaged by water.

Friable materials are more likely to release fibers into the air where they can be a source of exposure to you.

When Do ACM's Become Dangerous



The presence of asbestos alone in a building does not mean that the building occupants are necessarily endangered.

As long as asbestos containing materials remain in good condition, exposure is unlikely.

Fallout

Old and/or deteriorated asbestos fibers may become airborne due to damage or destruction of the bonding agents used to hold the asbestos product together. Fallout may result in fibers being deposited on horizontal surfaces over time due to humidity, vibration or aging.

Contact

Striking, cutting, drilling, etc. may release fibers into the environment.

Air erosion is also a form of contact and may release fibers to the environment from damaged or exposed material.

Re-entrainment

Sweeping, dusting or unfiltered vacuuming of settled dust may result in asbestos fibers being re suspended into the atmosphere.

How Can You Help?

When ACM degrades or is damaged, it may release asbestos into the air. Here are some things you can do to keep this from happening:

Avoid touching or disturbing ACM on ceilings, pipes or boilers.

Do not drill, sand or scrape materials that contain ACM.

Do not attempt to clean any material that appears to contain asbestos.

Contact your supervisor immediately to arrange proper cleaning of any material suspected of containing may contain asbestos.

How Can You Help?

To minimize the potential for exposure to asbestos during floor care, the following practices are recommended:

- Never sand or scrape asphalt or vinyl flooring that contains asbestos.
- Always strip floor finishes using wet methods and the lowest abrasion pads possible.
- Always use speeds less than 300 revolutions per minute.
- Burnish or dry buff asbestos containing flooring only if it has enough finish, that the pad cannot contact the asbestos containing material.
- Do not dust, dry sweep or vacuum dirt or debris in an area that contains damaged thermal asbestos insulation, surfacing or deteriorated ACM. Use only wet methods or HEPA filtered vacuums.

Module 6: Required Training & EPA Banning of Asbestos

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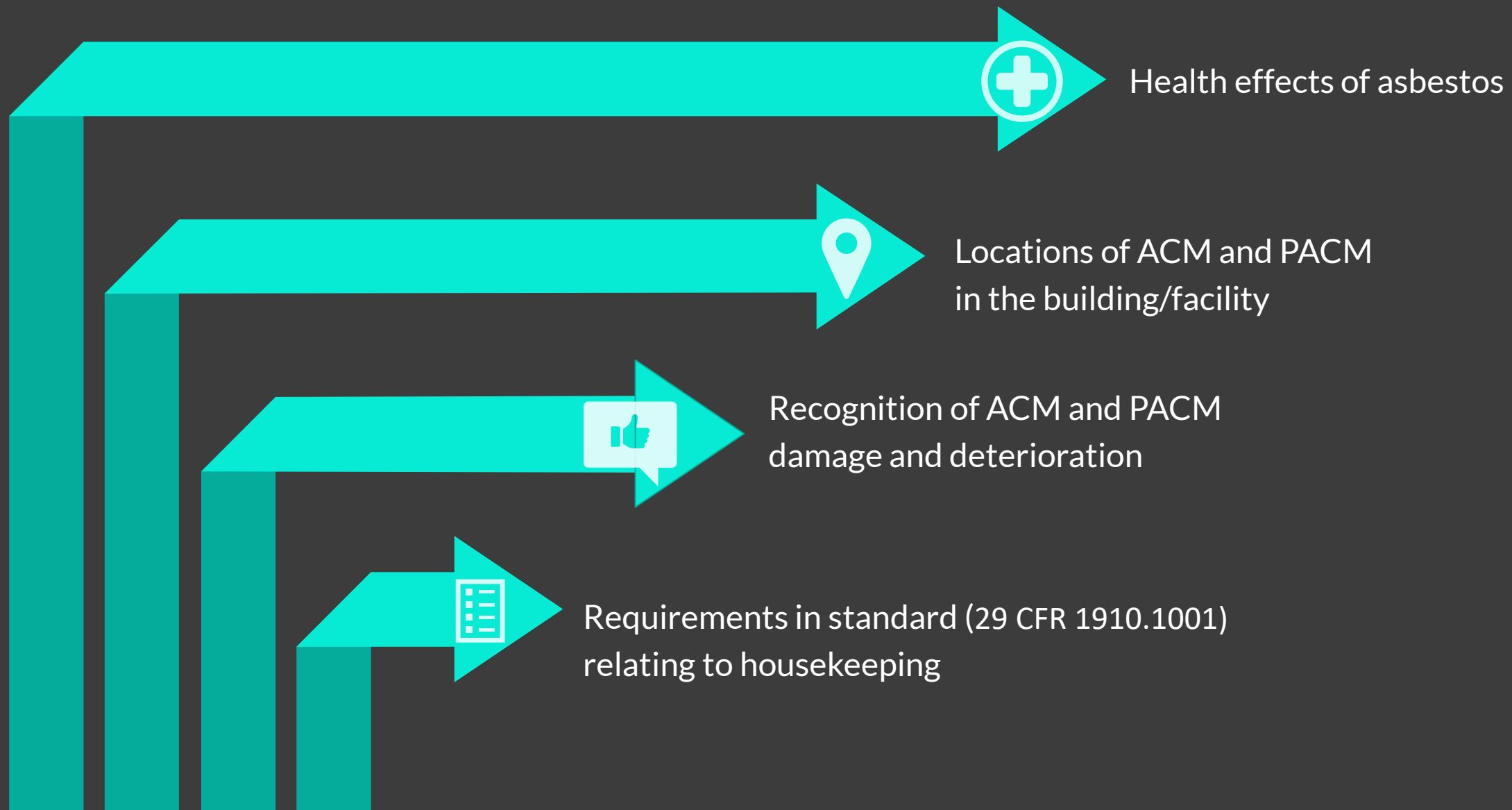
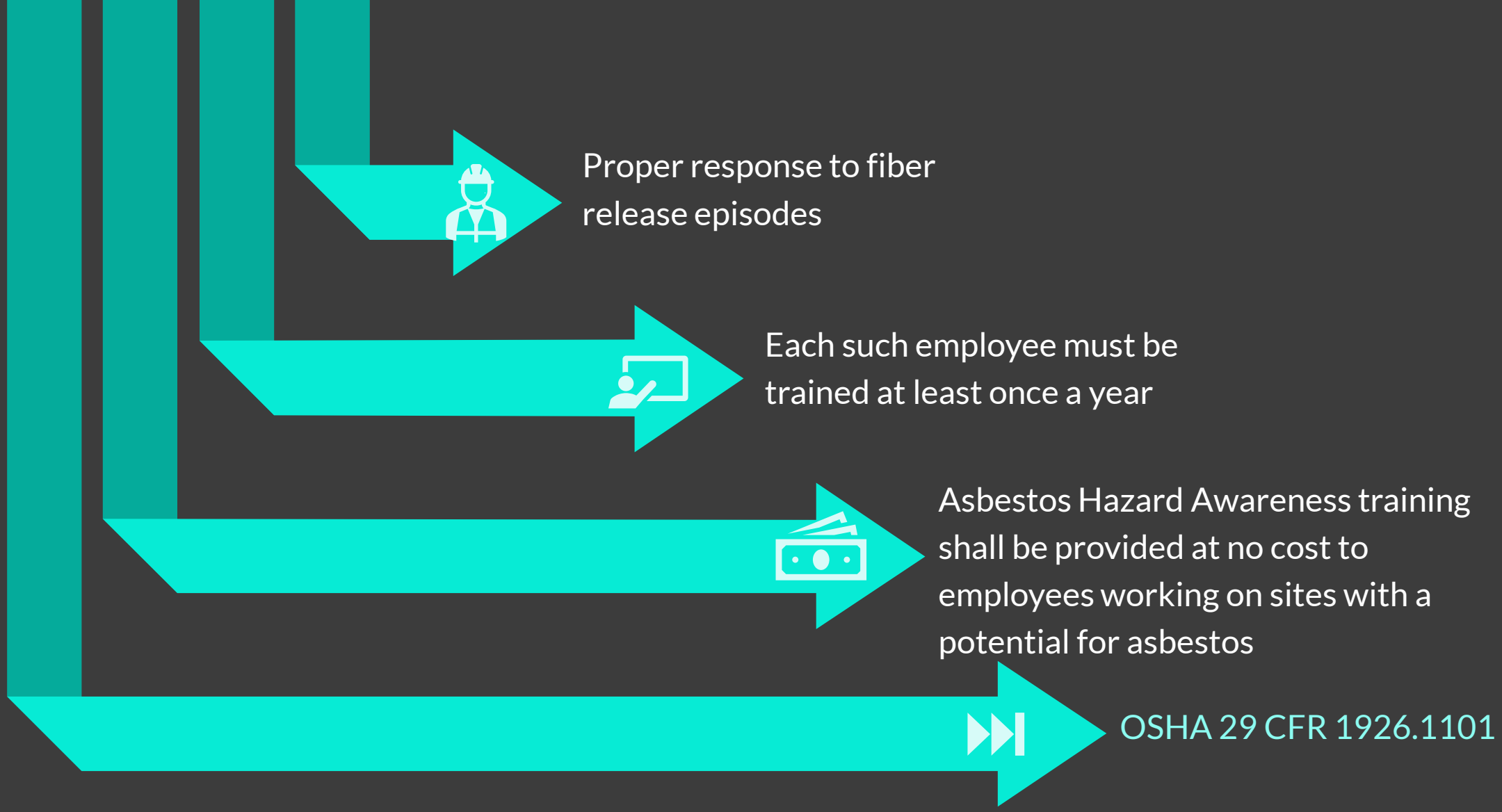
OSHA 29 CFR 1910.1001

When working in an area containing ACM or PACM, the employer must provide, an Asbestos Awareness Training Course which must include training on:



- Health effects of asbestos
- Locations of ACM and PACM in the building/facility
- Recognition of ACM and PACM damage and deterioration
- Requirements in standard (29 CFR 1910.1001) relating to housekeeping


Proper response to fiber release episodes
Each such employee must be trained at least once a year
Asbestos Hazard Awareness training shall be provided at no cost to employees working on sites with a potential for asbestos
OSHA 29 CFR 1926.1101

Asbestos Work Classifications

All asbestos work is not the same. Each “Class” has its own purpose, risk, and requirements. These “Classes” range from Class I through Class IV.

Class I

Class I asbestos work is the most dangerous. This Class involves work activities such as removal of Thermal System Insulation and surfacing, Asbestos Containing Materials, and Presumed Asbestos Containing Materials.

Class II

Class II asbestos work activities involve the removal of ACM, that's not TSI or surfacing material.

This includes but is not limited to, the removal of asbestos wall board, floor tile, sheet rock, shingles, and mastics.

Class III

Class III asbestos work activities involve maintenance and custodial work where ACM, including TSI, is likely to be disturbed.

Class IV

Class IV asbestos work activities involve maintenance and custodial activities to clean up waste and debris containing ACM and PACM