O&M

EPA MODEL ASBESTOS OPERATIONS AND MAINTENANCE TRAINING COURSE

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OPERATIONS AND MAINTENANCE
EPA MODEL MANUAL
TABLE OF CONTENTS

WHAT IS AN O&M PROGRAM?

1

Asbestos containing building materials (ACBM) can be found in **hundreds of thousands** of buildings. While many building owners have already removed, or plan to remove asbestos from their buildings, in many cases they cannot do it immediately. ACBM which is damaged or can be easily disturbed must be either contained or removed, since it is likely to release fibers into the air. But if the material is in good condition and is unlikely to be disturbed, it can be left in place and removed later, if required. An Operations and Maintenance program is necessary to prevent the possible disturbances of ACBM, and ensure that any asbestos releases are dealt with properly.

The purpose of an O&M program is to reduce the chance of exposing building workers and occupants to asbestos dust. An Operations and Maintenance (O&M) program is a combination of training, cleaning, work practice, surveillance, notification, recordkeeping, worker protection, and emergency response procedures to be followed in a building wherever ACBM might be disturbed. As you will learn in the next chapter, asbestos can cause diseases that can hurt or even kill you. It is very important to know how to control the release of asbestos fibers that could occur on your job.

The principal objectives of an O&M program are:

1. **Maintain ACBM in good condition**
2. **Provide procedures for the proper handling of fiber release episodes.**

O&M

WHAT IS O & M?

An O&M program is not a quick solution to an asbestos problem where you work. It is a **long-term process** that requires a **long-term commitment** if it is to be successful. There are many different parts of an Operations and Maintenance program, and all are equally important.

Asbestos containing building materials (ACBM) are grouped into one of three categories. The first group is called **surfacing materials (SM).** Examples of asbestos SM are sprayed-on insulation, or acoustical plaster. The second group is called **thermal system insulation (TSI).** Pipe, boiler, and duct insulation are examples of TSI. The final category is called **miscellaneous ACBM.** Some types of Miscellaneous ACBM are floor tiles, wall board, vinyl sheet flooring, and ceiling panels. (*See Chapters 7 and 8 for more information.*)

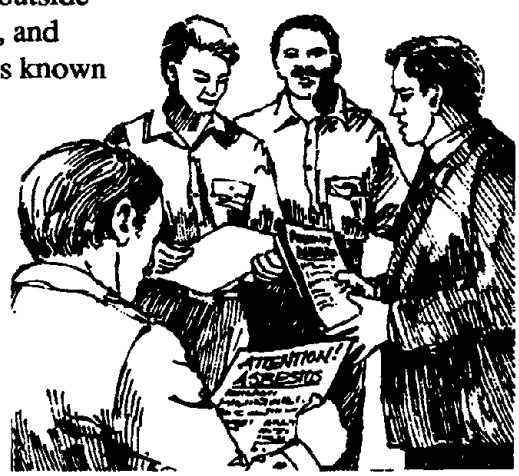
Parts of an O&M Program

An Operations and Maintenance program has seven parts that are very important to its overall effectiveness: 1-notification, 2-surveillance, 3-controls, 4-work practices, 5-recordkeeping, 6-worker protection, and 7-training. Not every O&M program will address each of these parts equally, but they should all be included.

1. Notification

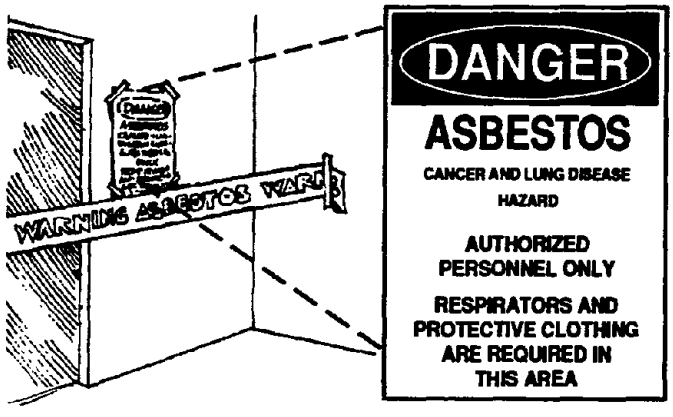
Notification informs everyone of asbestos.

Telling building workers, tenants, outside contractors, parents of school children, and others about asbestos and its location is known as "notification." It can be done in several different ways. Three of the best ways to notify building occupants of the presence and location of asbestos are:



A. HANDING OUT WRITTEN NOTICES.

B. POSTING SIGNS WARNING OF ACBM IN THE AREA.



C. TRAINING PEOPLE TO BE AWARE OF ACBM IN THE BUILDING.

The method of notification can depend on the type and location of the ACBM, and on the number of people affected. Whatever type of notification is used, it should tell people several different things:

- *where the asbestos is*
- *what condition it is in*
- *the dangers of asbestos when it becomes airborne*
- *who should be notified if ACBM becomes damaged*

2. Surveillance

Walking through a building to **visually** inspect the condition of ACBM is known as **surveillance**. This is **required** in school buildings every 6 months, and is also done regularly in many other buildings.

Accredited inspectors must check for ACBM.

School districts must have each building inspected for ACBM by an **accredited asbestos inspector** every 3 years. (An inspector must attend a 3 day inspector training course). Each school must then also *check for changes in the ACBM at least every six months.* **This may be done by a school custodian or maintenance worker who is familiar with the building and has been trained in what to look for.** If **surveillance** is one of your responsibilities at work, you should be trained in the following: the building's asbestos management plan, where ACBM is found, how to recognize ACBM in poor condition, and how to respond to emergency asbestos disturbances. You should also be familiar with good recordkeeping techniques.

Any changes in the condition of the ACBM should be written down and reported to whoever is in charge of the asbestos program in your building. Sometimes this individual is called the **Designated Person or Asbestos Coordinator.**

By keeping track of the condition of the asbestos in your building you can avoid releasing asbestos fibers in the future, which will help protect your health and the health of others.

3. Controlling Work on ACBM

Know where asbestos is before you start working.

A good O&M program will include a system to prevent employees and contractors from unknowingly performing maintenance work on asbestos containing materials.

Some building owners have had success using a **work permit system,** which requires the maintenance or custodial person and contractors to get permission before beginning any or all maintenance work. A form is used which gives the **time** and the **location** of the requested work, the **type of maintenance** needed, and any information about **suspect ACBM** nearby.

The person in charge of the program can then use building records and inspection results to determine if ACBM is in the area. If ACBM is in the work area, the Designated Person or Asbestos Coordinator can make sure trained people perform the work using all the necessary equipment and taking all the necessary precautions.

It is extremely important that these work practices should also be followed by outside contractors working in the building, such as electricians, plumbers, or phone company representatives.

4. O&M Work Practices

Working with or around ACBM requires special work practices. The safe management of asbestos is what an O&M program is all about. In order to work safely with asbestos, you must know how to protect yourself, how to work safely around ACBM without damaging it, and how to properly clean it up. The National Institute of Building Sciences (NIBS) publishes a guidance manual which addresses O&M work practices in detail. It can be very useful for people performing O&M tasks.

Chapter 4 emphasizes the importance of protecting yourself. It is very important to understand how respirators, protective clothing, air sampling, engineering controls, and medical surveillance are incorporated into an overall "worker protection program", designed to keep you safe.

It is important for you to know how to avoid damaging ACBM. Your routine custodial and maintenance tasks may involve coming in contact with ACBM. Along with knowing how to protect yourself, it's also very important to know how to prevent ACBM damage. Chapter 5 deals with how to recognize ACBM in your building so you can work safely around it.

Chapter 7 describes the right way to respond to fiber release episodes. It is very important to know the right way to clean up asbestos dust and debris. If you do it the wrong way, you could be creating an even bigger asbestos hazard for yourself and others.

When working with asbestos:

1. **Wear a protective suit and a respirator.**
2. **Use special cleaning methods.**

5. Recordkeeping

A very important part of a successful O&M program is keeping good records. Whether you assist in recordkeeping or not, it is important to know what records are kept in case you need to review them.

A written asbestos program is required for every school building, which identifies where ACBM can be found and what is being done about it. (This "plan" to manage ACBM is referred to as the **Management Plan.**) School districts are required by the Environmental Protection Agency (EPA) to

Your supervisor will keep most of the records.

maintain the following records as a part of a school's **Management Plan.**

- inspection/reinspection of ACBM
- surveillance of ACBM
- inspection and assessment reports
- annual notifications
- fiber release reports
- respirator use procedures
- O&M program plan
- small-scale, short-duration activities
- a plan for removal, encapsulation, enclosure, and repair
- work practices and procedures
- application for maintenance work
- evaluations of work affecting ACBM
- response actions (asbestos abatement actions)

Many other building owners keep records such as these, not just school building representatives. The Asbestos Coordinator will keep the records which are generated at your place of work. Depending on how much asbestos you're exposed to, the Occupational Safety and Health Administration (OSHA) may require the following records to be kept:

- personal air sampling records
- initial monitoring exemption
- employee training records
- medical records data

Chapter 9 (Regulations) covers recordkeeping requirements in more detail. Additionally, your state is likely to have its own list of required records.

6. Worker Protection

One of the most important parts of an O&M program is worker protection. A good worker protection program will address these four areas:

1. Respirators and Protective Clothing
2. Medical Surveillance
3. Personal Air Sampling
4. Engineering Controls

If O&M workers are required to wear a respirator, a written "respiratory protection program" must be in place (Chapter 4, part II). Protective Clothing (such as disposable suits and gloves) is also necessary to prevent

contaminating yourself with asbestos fibers, and bringing asbestos fibers home with you (Chapter 4, part III).

The Occupational Safety and Health Administration (OSHA) and EPA Worker Protection Rule require medical monitoring of people who use certain respirators or who work with asbestos at certain levels. Workers exposed to certain amounts of asbestos fibers or who wear respirators with filters *(See "Action Level" page 22)* will need to have an annual medical examination. It is possible that O&M workers may require medical surveillance.

Personal air sampling may also be required by OSHA or EPA, depending on what type of O&M task you will be performing. This involves wearing a sampling pump which draws air through a filter as you work with ACBM. The filter is then analyzed for asbestos fibers using a microscope. Air sampling results let a person know how many fibers they are being exposed to.

Equipment and methods that minimize the release of asbestos dust during an asbestos operation are called engineering controls. These are important "tools" which need to be used when working with ACBM. Examples include HEPA vacuums and HEPA equipped power tools *(Chapter 8)*.

7. Training

Properly training workers to perform special procedures and work practices is the key to a successful O&M program. AHERA, OSHA, and the EPA Worker Protection Rule all require similar training programs.

The EPA Asbestos School Hazard Emergency Response Act (AHERA) regulations require that all school maintenance and custodial personnel who work in a building that contains ACBM receive at least 2 hours of asbestos awareness training. If their work activities could disturb ACBM, an additional 14 hours of more specific training is required. Some states have more stringent training requirements than the EPA regulations. If workers disturb large amounts of asbestos, a 32-hour training course is required. *(See Chapter 9, Regulations, which covers the training requirements for O&M workers in more detail.)*

O&M vs. Removal

It's important to know that an O&M program is not always the solution for a building containing ACBM. If ACBM in a building is badly damaged in

areas accessible to children or the public, or will be disturbed by renovation, (or other activity) it may need to be removed.

The building owner must decide how to best protect the health of the tenants, employees, the public, or others. Sometimes removal is necessary to do this. Whenever ACBM remain, an O&M program should be started until removal is done at a later date.

WHAT IS AN O&M PROGRAM?

Key Facts

A well planned O&M program is an economical long-term solution to the problem of ACBM in a building. A good O&M program is made up of seven parts:

1. Notification of employees
2. Surveillance of all ACBM
3. Controls
4. Work practices
5. Recordkeeping of actions taken/documents
6. Worker protection
7. Training to work safely around ACBM

If an O&M program is working well, it will accomplish two basic objectives:

1. Maintain ACBM in good condition
2. Provide procedures for the proper handling of fiber release episodes.

Asbestos that is left in a building does not always pose a health threat. By starting a good O&M program you can work safely with and around ACBM.

IDENTIFYING ASBESTOS

2

In this chapter you will learn:

- **What asbestos is.**
- **That asbestos can be dangerous.**
- **When asbestos is dangerous.**
- **How asbestos gets in the air.**
- **Where you may find asbestos.**
- **How asbestos is identified.**
- **About the different kinds of asbestos fibers.**

Scenario:

Recognizing Asbestos

Will: The asbestos is behind these wall tiles. Let's tear out the tiles before we set up. It will save us some time, and we're behind schedule.

Chris: What's in the tiles?

Will: It's just tile, there's no asbestos in that.

Chris: How do you know?

Will: It doesn't look like it has asbestos. And besides, the owner of the building said the asbestos was **behind** the tiles.

Chris: How does he know where all the asbestos is?

Will: Listen Chris, he **owns** the building. He should know where all the asbestos is, right? Besides, I know what asbestos looks like. There's nothing in these tiles that can hurt you. Come on, we have a lot of work to do today. Grab a hammer and let's get going.

Chris: Well, ... OK.

IDENTIFYING ASBESTOS

Discussion Questions

(Choose 1 or 2 of the following questions to discuss)

1. How can you tell if something has asbestos in it?
2. How can Will and Chris find out where the asbestos is in the building?
3. Why do you think Will wanted to tear the tiles out before setting up?
4. Why do you think Chris went along with Will?
5. What could Chris have done to find out about the tiles?
6. How could Chris have gotten the information without getting Will angry? (Without risking getting fired or disciplined?)

What is asbestos?

Asbestos is a mineral. It is a natural rock mined from the ground in places like Vermont, Canada, and South Africa. Asbestos is not a man-made fiber. (Fiberglass is a man-made fiber.) Asbestos has been used since Roman times. Most recently, it has been used in a variety of building materials.

When asbestos is crushed, it does not make ordinary dust, like other rocks. Asbestos breaks into tiny, sharp fibers, many of which are too small to see. You cannot see, feel, or taste individual asbestos fibers.

All asbestos fibers are dangerous.

Are there different kinds of asbestos?

There are six kinds of asbestos fibers. They are all dangerous.
The three most common kinds of asbestos fibers are:

- **Chrysotile (CRY-so-tile)**
- **Amosite (AM-o-site)**
- **Crocidolite (crow-SID-o-lite)**

Chrysotile asbestos makes up about 95% of all asbestos found in buildings.

Amosite is less than 5% of all asbestos found in buildings.
Amosite does not soak up water easily. This is important to remember. Asbestos must be wet before you handle it. Wetting asbestos helps to keep the fibers out of the air. Therefore, amosite is harder to work with.

Crocidolite is less than 5% of all asbestos.

There are three other kinds of asbestos fibers. They are rarely used in buildings:

- **Anthophyllite (an-THAW-fill-ite)**
- **Tremolite (TREH-mo-lite)**
- **Actinolite (ack-TIN-o-lite)**

All asbestos fibers are dangerous. Some people say that some kinds of asbestos fibers are less dangerous. Many, including the government, disagree. You must treat **all** asbestos as dangerous.

When is asbestos dangerous?

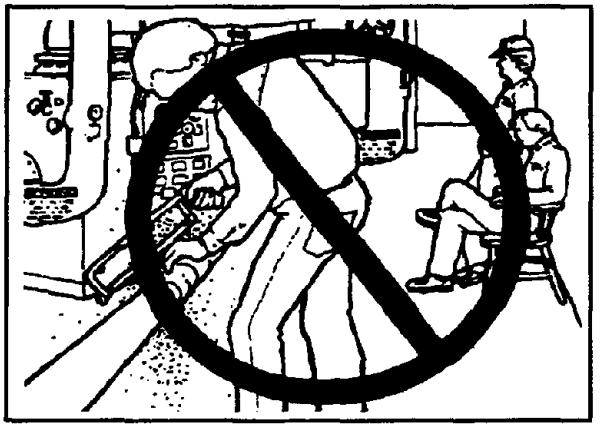
Asbestos is dangerous when you breathe it. Asbestos fibers are so small they can easily get deep into your lungs. Asbestos can make you very sick years after you breathe it. Small amounts of asbestos will not make you cough or sneeze or itch while you breathe it, but if enough asbestos gets into your lungs it can kill you years later.

When asbestos gets in the air, you can breathe it. Sometimes plaster has asbestos in it. If the plaster stays on the wall, the asbestos will not hurt you. If you tear down the wall, the asbestos may get in the air. When asbestos is in the air, it is dangerous.

Asbestos is dangerous when you breathe it.

It is easy to get asbestos in the air. If you handle asbestos at all, it can become airborne. If you:

- saw
- nail
- bump
- sand
- abrade
- drill
- cut
- or tear

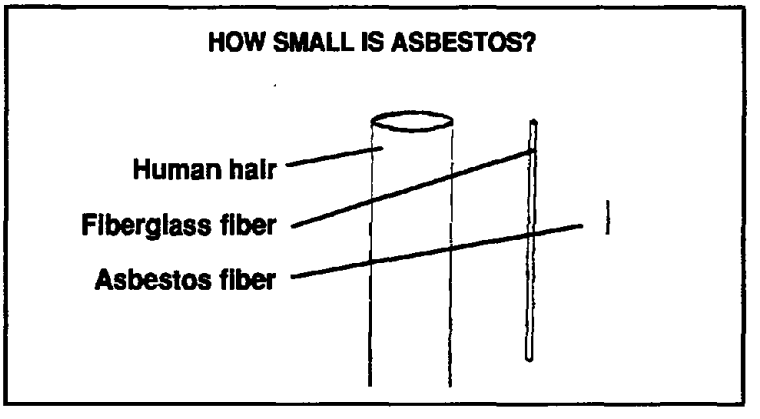


asbestos, it can become airborne. Once asbestos is in the air, it can get in your lungs and make you sick.

Asbestos fibers are very small.

Asbestos fibers are so light, they go wherever air goes. If asbestos is in the air in a mechanical room, it can travel through the building. It can go through air ducts, under doors, and down halls and stairs. Asbestos is so light it can hang in the air for days. If you step in asbestos dust on the floor, you can stir fibers back into the air.

Many fibers are so small that we can't see them.



How much asbestos is in the air?

There are ways to measure how much asbestos is in the air. Air pumps pull the air through a small filter. The asbestos fibers stick to this filter. The fibers are then counted with the use of a microscope. The amount of air that

passes through the pump is also measured. The units of measure used are cubic centimeters, which are about the size of a sugar cube. **Asbestos is measured in fibers per cubic centimeter (f/cc) of air.** This is called **air sampling.** Even though you cannot see asbestos in the air, it can be measured by using this method. Remember, asbestos can be dangerous when it is in the air.

If asbestos is so dangerous, why is there so much of it?

Asbestos is a very good fire, heat, and sound insulator. It is also very strong. Pound for pound, asbestos is stronger than steel. For example, asbestos can still be in brake shoes and clutches which need to be strong and resist heat.

Asbestos is in more than 3,000 different products. It is in many building materials. Older buildings contain large amounts of asbestos. Asbestos is common in boiler rooms, on ceilings or above ceilings, and wherever pipes are found. Spray-applied asbestos such as fireproofing was banned in 1973, so newer buildings have much less asbestos in them.

Asbestos was used in <u>many</u> building and construction materials.

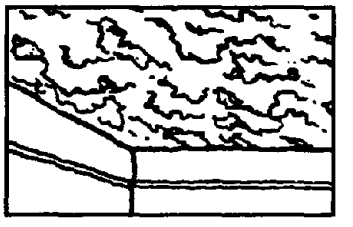
EXAMPLES OF ASBESTOS-CONTAINING BUILDING MATERIALS (ACBM)

acoustical (sound) plaster	mastic
adhesive backing for floor coverings	paper products
acoustical (sound) tiles	paints and coatings
boiler insulation	pipe gaskets
caulking, putties	pipe insulation
ceiling insulation	plaster/stucco
chemical tanks	roofing felts
decorative plaster	roofing asphalt
dropped ceiling tiles	siding
duct insulation	spackling
electrical insulation	Transite™ counter tops/lab hoods
fire blankets	Transite™ (cement) sheets
fire curtains	Transite™ (cement) pipes
fire doors	valves
fireproofing on beams and columns	vinyl-asbestos floor tiles

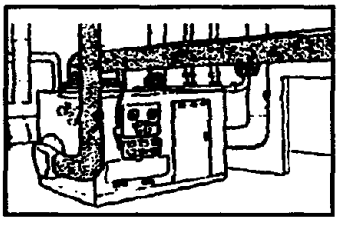
IDENTIFYING ASBESTOS

You are likely to find asbestos in:

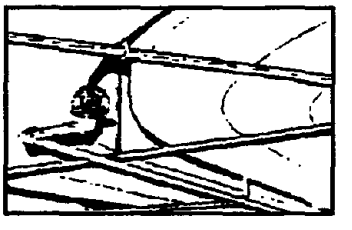
1. **Sprayed-on ceiling insulation and fireproofing**
2. **Pipe and boiler insulation**
3. **Duct insulation**
4. **Floor and ceiling tiles**



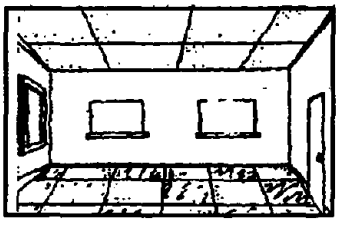
1. Sprayed-on asbestos insulation is usually fluffy material found on ceilings or steel beams. Sometimes you can see the insulation from the floor. Sometimes it has been covered by ceiling tiles.



2. Asbestos pipe and boiler insulation may be covered with paper, cloth, or metal. The insulation may be cardboard-like pipe wrap or cement on pipe elbows. It may also be troweled-on insulation on boilers or boiler wrap.



3. Asbestos duct insulation is usually a thin layer of insulation. It may be painted to match the room. It may be covered with paper, cloth, or metal.



4. Asbestos floor and ceiling tile look exactly like non-asbestos containing tile. Asbestos floor tile is usually vinyl asbestos tile (VAT). Most 9" x 9" floor tiles are asbestos containing, and some 12" x 12" are as well. Asbestos ceiling tile was sometimes used for dropped ceilings.

Friable (crumbly) asbestos

Asbestos that can be crumbled in your hand is called "friable" (FRY-able) asbestos. A friable (crumbly) piece of ACBM is more dangerous than a non-friable piece of ACBM, because the fibers are more likely to get in the air.

An example of friable asbestos is sprayed-on ceiling insulation. The insulation may fall off the ceiling and get in the air without even being touched. When someone touches the ceiling, or when air blows across the ceiling, asbestos may get in the air.

An example of non-friable asbestos is vinyl-asbestos floor tile (VAT). If it is in good condition, the asbestos fibers will probably stay in the tiles. But if you saw, drill, or sand the tile, asbestos may become friable and get into the air.

FRIABLE (CRUMBLY) ASBESTOS

If you can crumble ACBM, it is friable.

Friable asbestos can get in the air. It can easily get in your lungs.

Identifying asbestos

You can't tell if a product contains asbestos just by looking at it.

If your job involves disturbing asbestos, your supervisor must tell you where the asbestos is when you get on the job. A lot of maintenance workers handle asbestos. They may not know where all the asbestos is in their building. **If you think something might be asbestos, assume that it is asbestos and treat it carefully. Then ask your supervisor to find out for sure by having the material sampled.** Your supervisor will check by looking at a lab report.

If you work in a school, you can look at your school's Management Plan. The Plan has lab reports in it on all identified ACBM. They tell you whether or not the material contains asbestos.

Many things look the same, whether they have asbestos in them or not.

IDENTIFYING ASBESTOS

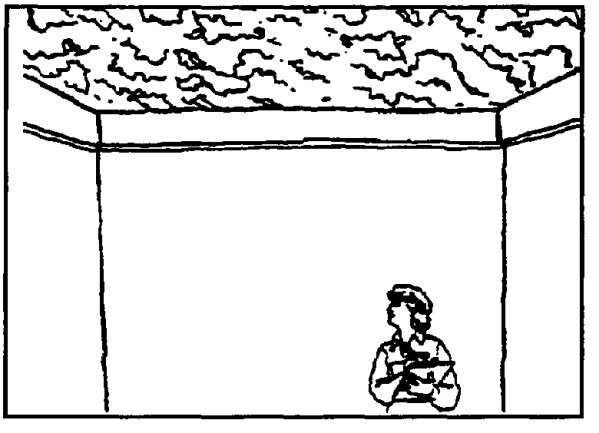
Ceiling tiles made by different companies are made to look the same so they can be replaced. A ceiling tile with 10% asbestos may look exactly the same as a ceiling tile with 30% asbestos, or one with no asbestos.

Asbestos can take many forms and colors. Sometimes asbestos looks white and fluffy. Sometimes it is colored and looks like brown mud. Sometimes, as with pipe insulation, it is covered with a fabric or paper jacket of any color.

The only way to know if a product is asbestos is:

1. **Send a piece of it (a bulk sample) to a lab.**
2. **Have the lab look at it with a microscope.**

Some people say they can tell if something is asbestos just by looking at it. This is not true. No one can tell for sure if something is asbestos by looking, feeling, or smelling it. **The only way to tell for sure is to have an inspector send a piece of the material to a lab.** This is called a **"bulk sample."** At the lab, a trained analyst looks at the sample under a microscope.



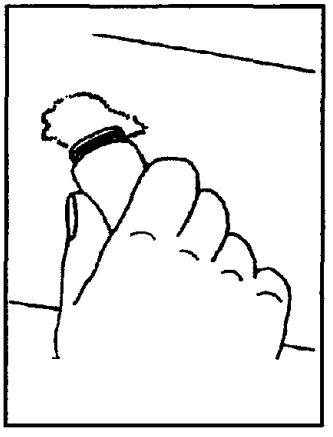
IS IT ASBESTOS?

A few building materials have a standard look. Some contain asbestos, some don't. Papery, grey-looking, pipe covering almost always has asbestos in it. Fiberglass, black polyurethane foam, and cork never have asbestos in them, but could be contaminated with asbestos dust, or coated with a thin asbestos "mud" on the outside or underneath.

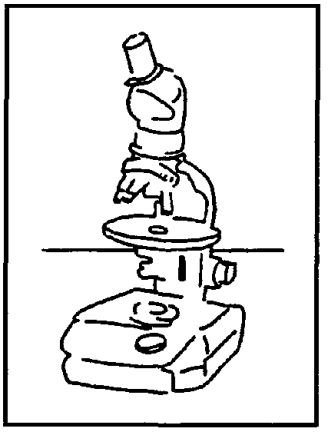
As you can see, asbestos can be in many building materials. You need to work carefully around insulation and other building materials that might contain asbestos. Remember that **not everything has asbestos in it.** Glass, fiberglass, polyurethane foam, cork, and ceramic tiles rarely have asbestos in them.

What is sent to a lab?

To tell whether something is asbestos, a trained and accredited asbestos inspector takes **a solid piece of the material** to have it analyzed. The inspector seals up the hole where the sample was taken and sends the piece of material to a lab. A sample taken from a school must go to an approved lab. The lab grinds up the **bulk sample** and stains it with dye, then looks at it under a special microscope. It is called a **Polarized Light Microscope (PLM).** The lab sends back a report based on the PLM readings.



BULK SAMPLE



POLARIZED LIGHT MICROSCOPE

An example

A building owner sent a piece of pipe insulation to a lab. Technicians at the lab analyzed the sample for asbestos content with a PLM. The lab found that the pipe insulation had asbestos in it and sent the building owner the report on the top of the next page. **According to the report, what percent of the insulation was asbestos?**

IDENTIFYING ASBESTOS

Received: 5/15/90
SAMPLE ID: AH-023

ABC ANALYTICAL LAB, INC. REPORT

NAME: Asbestos Bulk Sample Analysis

DATE ANALYZED: 5/16/90 ANALYST: Sletten VERIFIED BY: KMD

Fiber Type	Result	Other Materials	Result
CHRYSOTILE	Trace	CELLULOSE FIBER	Trace
AMOSITE	30-35%	FIBROUS GLASS	45-50%
CROCIDOLITE	0%	NANF	10-15%
TREMOLITE	0%		

Definitions:
NANF = Non-Asbestos, Non-Fibrous
Trace = Trace Amounts Noted

BULK SAMPLE REPORT FROM LAB

According to the lab report, the pipe insulation was 30 to 35% amosite asbestos. It also had a trace of chrysotile asbestos in it. It was 45 to 50% fiberglass. Any building material with more than 1% asbestos is considered ACBM.

Protecting yourself

Protect yourself and others.

Asbestos is dangerous, but you can protect yourself and those around you from breathing asbestos fibers. To work safely with asbestos, you have to **keep it out of the air.** There are lots of ways to do this. You will learn about them in this class.

Keep asbestos out of the air.

You also have to **take asbestos out of the air with special (HEPA) filters.** Most important, you have to filter the air that you breathe with a **respirator**—a mask that filters the air. You can also wear a respirator that pumps in clean air from outside the work room. You **must** wear a special disposable suit when you perform work that will disturb asbestos. You **must not** take asbestos home with you on your clothes or body.

The air that leaves the work room also has to be filtered. This protects people outside of the work room.

You cannot tell when asbestos is in the air or is hurting your lungs. **But you can use your knowledge to work more safely and protect yourself.**

IDENTIFYING ASBESTOS

Key Facts

Asbestos is a mineral that comes apart into fibers that can become airborne.

Asbestos is dangerous when it is in the air and you breathe it.
It is very easy to get asbestos in the air.
Wherever air goes, asbestos can go.

Asbestos can kill you, but you can protect yourself.

To work safely with asbestos, you have to keep it out of the air.

When asbestos gets in the air, you have to filter the air with special filters.

You must also protect yourself with respirators and clothing.

Asbestos is in more than 3,000 different products.

In buildings, you may find asbestos in:

- Sprayed-on ceiling insulation
- Duct insulation
- Walls
- Pipe and boiler insulation
- Floor and ceiling tiles
- Fireproofing

Friable (crumbly) asbestos is more dangerous than non-friable (hard) asbestos.

You cannot tell if something contains asbestos just by looking at it.
A lab can test a piece of material, called a bulk sample.
The lab looks at the bulk sample under a Polarized Light Microscope (PLM).

If you do not know whether something is asbestos, assume that it is asbestos until a bulk sample proves it is not.

There are three common kinds of asbestos fibers:

- Chrysotile (CRY-so-tile) (95% of asbestos in buildings)
- Amosite (AM-o-site) (hard to wet)
- Crocidolite (crow-SID-o-lite)

Discussion questions

1. Is asbestos dangerous if it gets on your clothes?
2. Sometimes air ducts are insulated with asbestos on the inside. Why is this so bad?
3. Is asbestos floor tile friable? Is this always true?
4. You can't tell whether a product contains asbestos by just looking at it. Why does this make asbestos more dangerous than other workplace problems?
5. Why is it harder to work safely with amosite asbestos than with other kinds of asbestos?

For more information

List of asbestos-containing materials, Appendix A to EPA, "Guidance For Controlling Asbestos-Containing Materials in Buildings," (the "Purple Book") EPA Publication No. EPA 560/5-85- 024.

EPA, "Managing Asbestos In Place" (the "Green Book"), EPA Publication No.20T-2003.

OSHA Asbestos Standard, 29 CFR 1926.1101, Appendix H, "Substance Technical Information for Asbestos."

Georgia Tech Research Institute, "Bulk Sampling," Section I in "Model EPA Curriculum for Training Building Inspectors," available from National Technical Information Service, (703) 487-4650.

FACT SHEET

TRAINING FACT SHEET

There are a lot of facts that you need to know about asbestos. This fact sheet has been made to help you. It has information you **must remember.** All of the information will be covered in the class. These facts may not make sense when you first start reading them. It will get easier. If you read this every day, it will help you to remember the information.

I. Government agencies involved with asbestos:

There are three main federal government agencies that deal with asbestos. You will hear about these agencies throughout this training. Here is a list of the agencies and a brief description of each.

Federal Government agencies that deal with asbestos:

1. EPA
2. OSHA
3. NIOSH

1. EPA.

The Environmental Protection Agency.
A federal government agency that protects against pollution. The EPA makes and enforces regulations to protect the community and the environment from pollution. *(See page 164 for more information about the EPA.)*

WPR—Worker Protection Rule. The EPA regulation that protects state and local government employees doing abatement.

AHERA—Asbestos Hazard Emergency Response Act. The EPA's "asbestos in schools" regulation. *(See page 166 for more information.)*

NESHAP—National Emission Standards for Hazardous Air Pollutants. The EPA regulation that covers asbestos as an air pollution problem. *(See page 164 for more information.)*

OSHA limits the amount of asbestos you are allowed to breathe.

2. **OSHA.**
   The Occupational Safety and Health Administration.
   A federal government agency that covers worker safety and health. OSHA makes and enforces regulations (standards) to protect workers. OSHA has regulations about: asbestos, lead, chemical safety, electrical safety, ladders, respirators, scaffolds, and many other workplace hazards.

3. **NIOSH.**
   The National Institute for Occupational Safety and Health.
   A federal government agency that researches worker safety and health, and reports its findings to the Occupational Safety and Health Administration (OSHA). NIOSH makes recommendations to OSHA for Health and Safety standards. NIOSH also certifies respirators.

II. Measurement of asbestos in the air

Airborne asbestos is measured in fibers per cubic centimeter (f/cc) of air. A cubic centimeter is about the size of a sugar cube. The air is checked for asbestos fibers through air sampling methods.

OSHA sets limits on the amount of asbestos fibers you can be exposed to in your work. There are three limits that you will need to know. They are the Permissible Exposure Limit (PEL) and the Excursion Limit (EL).

The Permissible Exposure Limit (PEL) is 0.1 f/cc. It is an 8 hour Time Weighted Average.

Permissible Exposure Limit (PEL) = 0.1 f/cc

The Permissible Exposure Limit is the average number (0.1 f/cc) of fibers in the air over an **8 hour** period of time. The PEL is the highest number of fibers in the air (allowed by law) for a worker to be exposed to. The Permissible Exposure Limit is like a **red light**—it means **stop and get a respirator and other protection before doing any work in that area.**

When you are working in an area that reaches the Permissible Exposure Limit, the OSHA standard states that you must stop until you have:

1. Trained workers.
2. Medically cleared workers.
3. Respirators.
4. Protective suits.
5. Contained the work.
6. Negative air pressure.

Excursion Limit (EL) = 1.0 f/cc

The Excursion Limit (EL) is 1.0 f/cc. It is a 1/2 hour Time Weighted Average.

The Excursion Limit is the average number (1.0 f/cc) of fibers in the air over a **30-minute** period of time. It is the highest number of fibers a worker can be exposed to in any **thirty minute time period.** It is like a **red light**—it means **stop.** The Excursion Limit protects you from large amounts of asbestos exposure in a short time period.

When you are working in an area that reaches the Excursion Limit the OSHA standard states that you **stop work. Immediate steps must be taken to limit the amount of asbestos dust in the air:**

1. Use more amended water.
2. Bag up the asbestos waste more quickly.

III. Respirators

Respirators help protect you from breathing asbestos.

In most cases, your supervisor will select the proper respirator for you. However, it is still important for you to understand how well a respirator will protect you. The following terms are used to describe a respirator's ability to protect you from asbestos fibers:

1. **Maximum Use Level (MUL)** = the largest amount of asbestos a respirator can handle under the OSHA law.
2. **Protection Factor (PF)** = the degree of protection a respirator gives you over wearing no respirator at all.
3. **Permissible Exposure Limit (PEL)** = the amount of asbestos where respirators become required. The PEL for asbestos is 0.1 fiber per cubic centimeter (f/cc).

These three terms combine to give you a **formula** that you can use:

Maximum Use Level = Protection Factor x Permissible Exposure Limit
MUL = PF x PEL

Example on how to use this formula:
A half-mask, air-purifying respirator has a Protection Factor of 10. For every 10 fibers outside, 1 fiber leaks in. What is the MUL for this respirator?

MUL = PF x PEL
so
MUL = 10 x 0.1 f/cc
MUL = 1.0 f/cc

The Maximum Use Level is 1 f/cc, so:

1. **Below 1.0 f/cc** in the air, a half-mask, air-purifying respirator is **legal.**
2. **Above 1.0 f/cc** the respirator is **not allowed.** You need at least a full-face, air-purifying respirator.

ASBESTOS DISEASES

PART 1

3

In this chapter you will learn:

- **About the diseases caused by asbestos.**
- **How asbestos gets into your body.**
- **When asbestos is dangerous.**
- **How much asbestos it takes to make you sick.**
- **How long it takes you to get sick from asbestos.**
- **How your respiratory (breathing) system works.**
- **The connections between asbestos, smoking, and disease.**

Asbestos Diseases

Pat: The waste bag broke open. Help me clean up the asbestos that spilled on the floor.

Jesse: OK, let's get our suits and respirators on.

Pat: Don't worry about that. Let's just sweep it up real quick.

Jesse: We shouldn't handle it without some protection. It's dangerous.

Pat: Crossing the street is dangerous, too! Come on. That little bit of asbestos isn't going to hurt you. Let's get it done fast so I can take a cigarette break.

ASBESTOS DISEASES

Discussion questions:

(Choose 1 or 2 of the following questions to discuss)

1. Do you agree or disagree with the following statements? Why or why not?
   If you only breathe asbestos at levels below the legal limit you cannot get an asbestos disease. (Yes/No) ____
   Jesse worries too much. (Yes/No) ____
   Jesse is a better worker than Pat. (Yes/No) ____
   If you worry about every bit of asbestos, you will never get any work done. (Yes/No) ____
   Pat is going to get cancer from smoking anyway, so it doesn't matter how careful Pat is with asbestos. (Yes/No) ____
2. Who would you rather work with, Jesse or Pat?
3. Do you think Jesse decided to help Pat sweep up without a suit and respirator? Why or why not?
4. What could Jesse say or do to get Pat to be more careful?

Asbestos causes:

1. **Asbestosis**
2. **Lung cancer**
3. **Meso-thelioma,**
4. **Other cancers**

ASBESTOS DISEASES

When you work with asbestos, you must work carefully. You are in this class to learn how to protect yourself and others from asbestos fibers. Asbestos exposure means breathing asbestos fibers. If you are in an area where asbestos is in the air and you are not protected, then you are exposed. This is called asbestos exposure.

Asbestos exposure may cause:

- Asbestosis: **"white lung," scarring of the lungs**
- Lung cancer: **cancer of the lungs**
- Mesothelioma: **cancer of the lining of the chest or the abdomen**
- Other cancers: **cancers of the digestive system**

How do we know that asbestos can make you sick?

We know that asbestos causes asbestosis, mesothelioma, lung cancer, and other cancers because of many studies. One of the most important studies looked at the death certificates of union insulation workers who worked with asbestos. All the men had worked with dangerous amounts of asbestos for at least 20 years.

These workers did not know how dangerous their work with asbestos was. No one told them that they needed to keep asbestos out of the air. No one told them that they had to protect themselves with respirators and disposable suits. There were no regulations to protect them. Many of these workers died from asbestos diseases.

Working with asbestos is a big responsibility.

You are in this O&M class to learn about asbestos. You will learn that asbestos can be dangerous. Asbestos causes diseases that kill. You will learn when asbestos is most dangerous and how to keep the danger level as low as possible. You will learn how to protect yourself and others as you work with asbestos. Use the information from this class when you work. Demand and use the right equipment and protective gear. You can then help reduce your risk of asbestos disease. (Preamble to the OSHA Standard, 29 CFR 1910 and 1926, 51 FR 22708.)

When is asbestos dangerous?

You cannot tell when you are breathing asbestos

Asbestos is dangerous when it is in the air. When asbestos is in the air, you cannot see it, but you breathe it. Asbestos is dangerous when it gets into your body. Asbestos gets in your body when you breathe or swallow it. Asbestos enters your body through your nose and mouth. Remember that asbestos fibers are so small you can't see them. You cannot see, feel, or taste asbestos fibers. Asbestos will not make you cough or sneeze. It will not make your throat or skin itch. Asbestos does not let you know it is there.

Asbestos is dangerous when you breathe it.

How much asbestos is dangerous?

There is no amount of asbestos that has been proven to be safe

There is no safe level of asbestos exposure.

The more asbestos you are exposed to, the more asbestos collects in your body, and the more likely you are to get an asbestos-related disease. All of the asbestos diseases except one are **dose-related.** Dose-related means the more asbestos you breathe, the more likely you are to get sick. The bigger the dose of asbestos, the more likely you are to get an asbestos-related disease. You may not get sick until years after you breathe the asbestos.

The more asbestos you breathe, the more likely you are to get asbestosis. The same holds true for lung cancer. The more asbestos you are exposed to, the more likely you are to get a digestive system cancer. **Asbestosis, lung cancer, and digestive system cancers are dose-related.**

The one asbestos disease that is different is mesothelioma. Very small amounts of asbestos can give you mesothelioma. Asbestos workers' families have gotten mesothelioma from the dust the workers brought home on their clothes. Fortunately, this is a rare disease, but like other things that cause cancer, **there is no amount of asbestos that has been proven to be safe.**

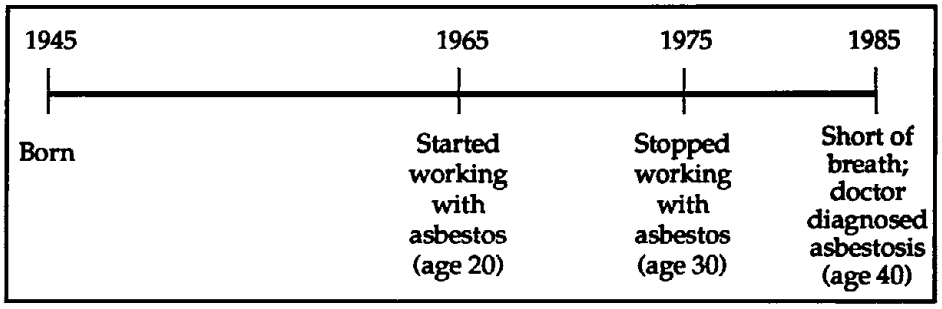
How long does it take to get sick from asbestos?

*Asbestos can make you sick **10 to 40 years after you breathe it***

Asbestos gives no warning.

All of the asbestos diseases have a **latency period.** The **latency period** is the gap between the time you breathe asbestos and the time you start to feel sick. The latency period for asbestos diseases is between **ten and forty years** long. Even if you only worked with asbestos for a year and then stopped, you still might get sick ten to forty years later.

If you breathe tear gas, it will make you feel ill right away. It will make your eyes water and throat hurt as soon as you are exposed to it. **If you breathe asbestos, you probably won't even know you are breathing it.** Asbestos does not irritate you while you are being exposed to it. It gives no warning.



SAMPLE LATENCY PERIOD

Asbestos can make you sick 10 to 40 years after you breathe it.

You may not feel sick during the latency period of ten to forty years. If you get an asbestos-related disease, you will begin to feel sick after the latency period.

Not everyone who is exposed to asbestos gets an asbestos-related disease. But anyone who is exposed to asbestos has a higher risk of getting an asbestos disease. All of the asbestos diseases are difficult to treat, and some cannot be cured.

Avoid getting asbestos diseases. Stop breathing in asbestos fibers.

Prevention is the only cure.

Except for colon cancer, asbestos diseases—asbestosis, lung cancer, mesothelioma (a cancer)—are very difficult or impossible to treat. Once you get sick, your doctor may not be able to stop your disease from getting worse. The best way to avoid getting sick is to not breathe in asbestos fibers.

When you breathe in asbestos, many fibers are caught in your throat before they get to your lungs. But many smaller fibers get deep into your lungs, and some stay there for the rest of your life. It is important to stop these fibers from ever entering your lungs. You can keep many of the fibers out of your lungs by using safer work methods and using personal protective equipment.

How your lungs work

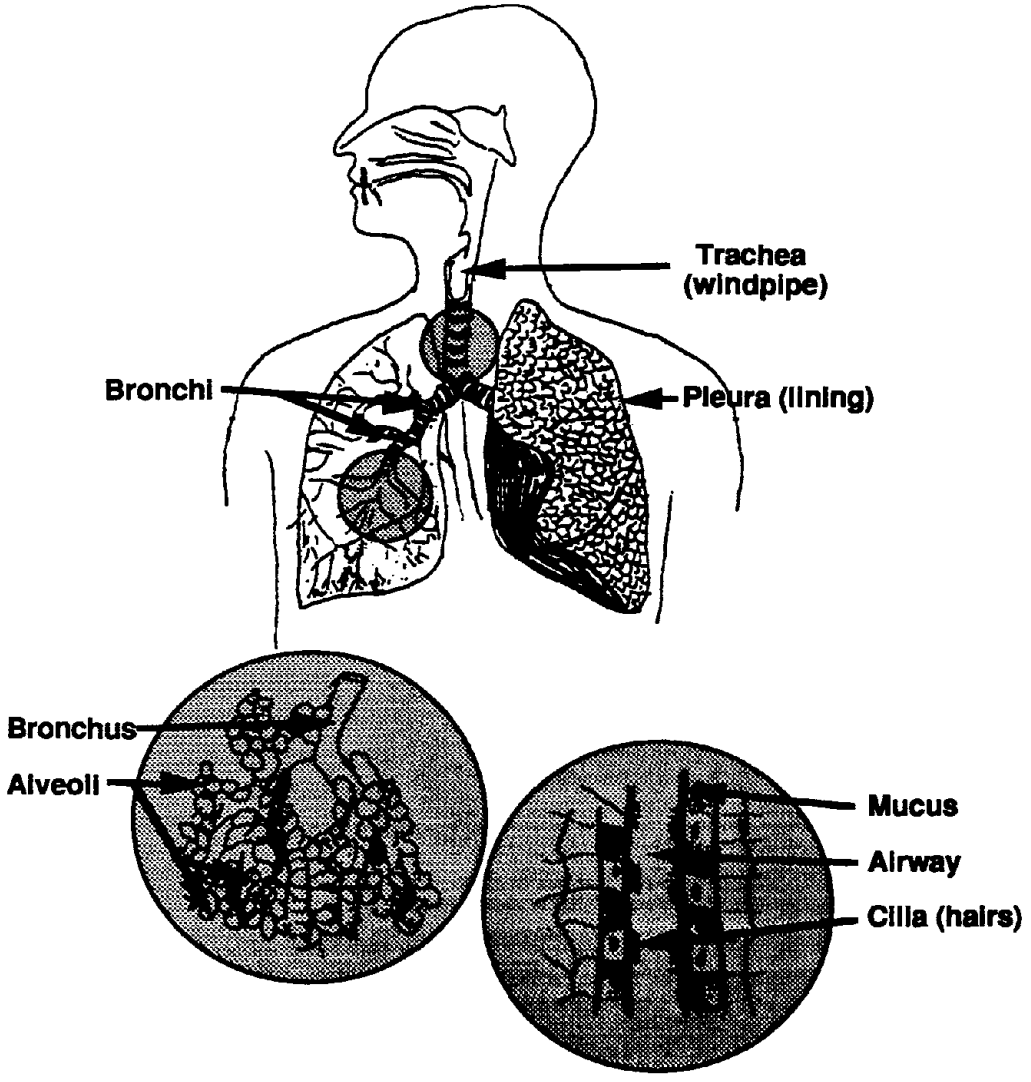
To understand how asbestos makes you sick, you need to know how your respiratory (breathing) system works.

Your respiratory system brings oxygen (a gas in the air) into your body. You cannot live without oxygen for more than a couple of minutes. When you breathe in, air goes into your lungs. Your lungs are like a giant sponge with a huge surface area for taking in oxygen. **Your lungs take oxygen from the air, place it in your blood, and get rid of carbon dioxide** (a waste gas in your blood). Then your heart pumps the oxygen-rich blood through your body. Every cell in your body needs the oxygen that comes through your lungs.

Take a deep breath. When you breathe in, air goes through your nose and mouth into your windpipe. The windpipe divides into smaller and smaller tubes and finally ends in **tiny sacs called alveoli (al-VE-o-lie).** In the alveoli, oxygen from the air goes into your blood, and carbon dioxide from your blood goes through your lungs and out of your body when you breathe out. The alveoli are like the leaves on a tree. A tree leaf takes in carbon dioxide and gives off oxygen. In the alveoli, oxygen passes into the blood and carbon dioxide waste goes out. The walls of your alveoli have to be very thin so that oxygen and carbon dioxide can move through them. When you breathe, your chest moves in and out. It widens or expands when you breathe in, so that more air can come into your lungs.

When you breathe out your chest narrows or contracts, as your lungs "push out" the carbon dioxide. There is a two-layered lining called the **pleura.** It lines your lungs and your rib cage. This lining lubricates your chest. It reduces the friction caused by breathing.

All of the parts of your respiratory system work together so that you can breathe and live.


Trachea
(windpipe)
Bronchi
Pleura (lining)
Bronchus
Alveoli
Mucus
Airway
Cilia (hairs)

Your body's defenses against asbestos

Your breathing system has some good defenses against breathing in dusts that can hurt you. But the small asbestos fibers can overcome your body's natural defenses and make you sick years later.

Here are some of your body's defenses against asbestos:

nose—dust gets stuck in hairs and mucus in your nose. You sneeze to get rid of it. You can blow out the large asbestos fibers. The smaller fibers travel on to your throat.

throat—smaller dust also gets stuck in hairs and mucus in your throat. You cough to get rid of it. The smaller fibers travel down your windpipe.

The tiny asbestos fibers pass through your body's defenses.

windpipe— the cells in your windpipe are covered with tiny hairs called cilia (SILLY-uh). These tiny hairs quickly beat back and forth. There are other cells in your windpipe that make mucus, a sticky gum-like substance. Some of the asbestos fibers stick to the mucus. The cilia wave back and forth, slowly pushing dust and mucus up your throat. Then you cough up the mucus and get rid of some of the asbestos fibers. You swallow about a quart of this mucus a day. If the mucus you swallow has asbestos fibers in it, fibers may lodge in your digestive system, although this is less dangerous than having them in your lungs.

Cigarette smoke paralyzes the cilia. It destroys one of your body's important defenses against asbestos. Smoking and working with asbestos can be a deadly combination, greatly increasing the chance of developing an asbestos related disease.

Some of the smaller asbestos fibers travel into the branches of your breathing system. They then lodge in your lungs or the lining of your lungs. They may even enter your blood stream.

white blood cells and scar formation—this part of your immune system tries to eat up asbestos, just like it would eat up a germ. But the asbestos fiber kills the white blood cells. The dead cells wrap around the asbestos fiber and your body forms a scar. This scar tissue on your alveoli (air sacs) is called **fibrosis.** The scarring thickens the walls of the alveoli and makes it difficult for oxygen to reach the blood. This scarring can become asbestosis.

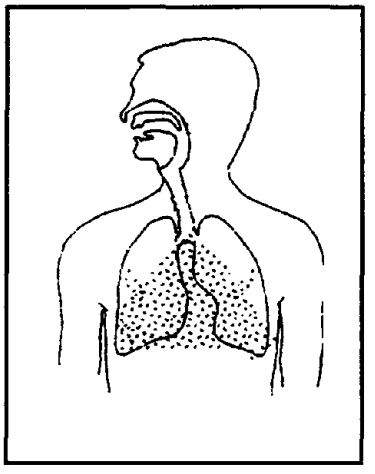
Diseases caused by asbestos

Disease	Signs & symptoms	Treatment of symptoms
Asbestosis	• Severely short of breath • Dry cough • Feeling very tired • Clubbed fingers	• Treatment, but no cure. • Stop working with asbestos. • Stop smoking. • Get flu shots. • Treat all chest colds quickly with antibiotics.
Lung cancer	• Short of breath • Constant cough • Feeling tired and weak • Deep chest pain • Cough up blood • Weight loss	• Surgery, radiation and chemotherapy. • 9-13% live for 5+ years • Poor cure rate. • **Smoking multiplies your chances of getting lung cancer. Stop smoking!**
Mesothelioma	**Pleural Mesothelioma** • Short of breath • Dull chest pain under ribs • Swelling in chest **Peritoneal Mesothelioma** • Swollen stomach • Belly pain • Weight loss	• No treatment, some medical procedures for pain reduction. • Will kill you in 6 months to 2 years after it is discovered. (A few people have died 5 years after their mesothelioma was discovered.)
Digestive system cancer	• Change in bowel patterns • Blood in bowel movement • Feeling tired • Weight loss	• Surgery, radiation and chemotherapy. • Chances of living are <u>good</u> if colon cancer found early. 80% to 90% live for 5+ years.

ASBESTOS DISEASES

Asbestosis is a scarring of the lungs.

Asbestosis (as-bes-TO-sis)



ASBESTOSIS

Asbestosis is a scarring of the lungs that can weaken and destroy your lungs ("white lung"). Asbestosis is not a cancer. It is a progressive disease. This means that scars keep forming in your lungs even after you stop asbestos exposure. Asbestosis is a **marker disease**. This means that if someone has asbestosis, you know that they have been exposed to asbestos.

When you breathe in asbestos fibers, they go deep into your lungs. Asbestos fibers are thin, sharp and jagged. They dig into your lungs like tiny needles. **Your body forms scars around the fibers.** The scarred lungs cannot get oxygen into your blood any more. The scarred areas of your lungs become useless. You have to breathe more often to get the oxygen you need. You become short of breath. (*See the chart on page 35 for other symptoms.*)

When you have asbestosis, your heart (your body's pump) has to work much harder to get blood with enough oxygen to all your body cells. Many people with asbestosis die from heart attacks or heart failure because their heart is overworked. Other people with asbestosis die of pneumonia, other infections, and respiratory failure because asbestosis weakens their defenses.

Asbestosis is dose-related. The more asbestos you breathe, the more likely you are to get asbestosis. The more asbestos you breathe, the more severe the asbestosis may be.

What is cancer?

Many cancers are linked to asbestos exposure. Cancer is a name used for a large group of diseases which affect many different parts of the body.

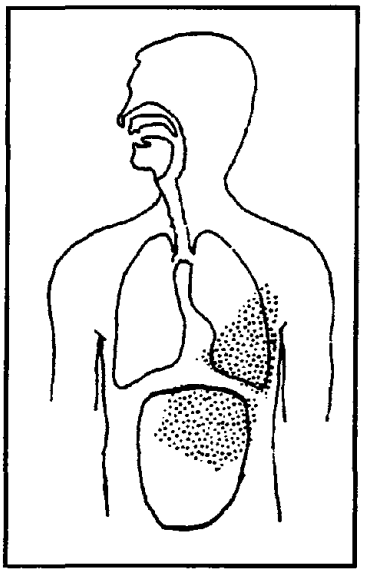
All cancers are made up of cells which are not normal. These abnormal cancer cells grow rapidly and out of control. They either remain in one area of the body and form a tumor or they spread to other areas of the body.

Mesothelioma (mes-o-thee-lee-O-ma)

A rare but deadly cancer, mesothelioma is a difficult disease to identify or diagnose. It is often not identified and is mislabeled. It is difficult to know how rare this disease really is.

There are two kinds of mesothelioma. **Pleural mesothelioma** is a cancer that attacks the two-layered pleura lining of the chest. **Peritoneal mesothelioma** is a cancer that attacks the lining of the abdomen (stomach).

Mesothelioma is caused by asbestos. Because mesothelioma is only caused by asbestos, it is a marker disease. Mesothelioma has been directly linked to asbestos exposure in at least 96% of the documented cases. There is no cure or treatment for mesothelioma. It kills most people 6 months to 2 years after it is detected. Some people have lived as long as 5 years after their mesothelioma was discovered.



MESOTHELIOMA

Low levels of asbestos exposure can cause mesothelioma.

Mesothelioma has the longest latency period of all the asbestos diseases. The latency period for mesothelioma is between 30-40 years for adults. Children are the exception to the long latency period rule. Because children's bodies grow at a rapid pace, the latency period for a child is much shorter than that of an adult.

It may only take a very small amount of asbestos to give you mesothelioma. Mesothelioma has killed asbestos workers' wives, children, and even pet dogs by asbestos dust taken home on worker's clothing. This is why you must not take asbestos home with you on your clothes. We say that mesothelioma is NOT **dose-related** because low levels of asbestos exposure can cause this disease.

There is no amount of asbestos that has been proven to be safe.

ASBESTOS DISEASES

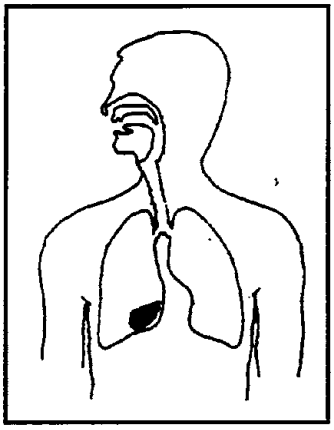
Lung cancer

Smoking multiplies your chances of getting lung cancer

Lung cancer is the biggest killer of all the asbestos diseases.

Asbestos is a strong cancer-causing substance. Lung cancer is the biggest killer of all the asbestos diseases. Between 20% and 25% of asbestos worker deaths are caused by lung cancer. Lung cancer is cancer that lodges in the lung. It is dose-related.

Asbestos and smoking together are a deadly mix. The risk of getting lung cancer is not just the risk from smoking plus the risk from asbestos. It is almost the risk from smoking times the risk from asbestos.



LUNG CANCER

Quit smoking and avoid asbestos exposure.

Prevent lung cancer: quit smoking and avoid exposure

What does all this mean?

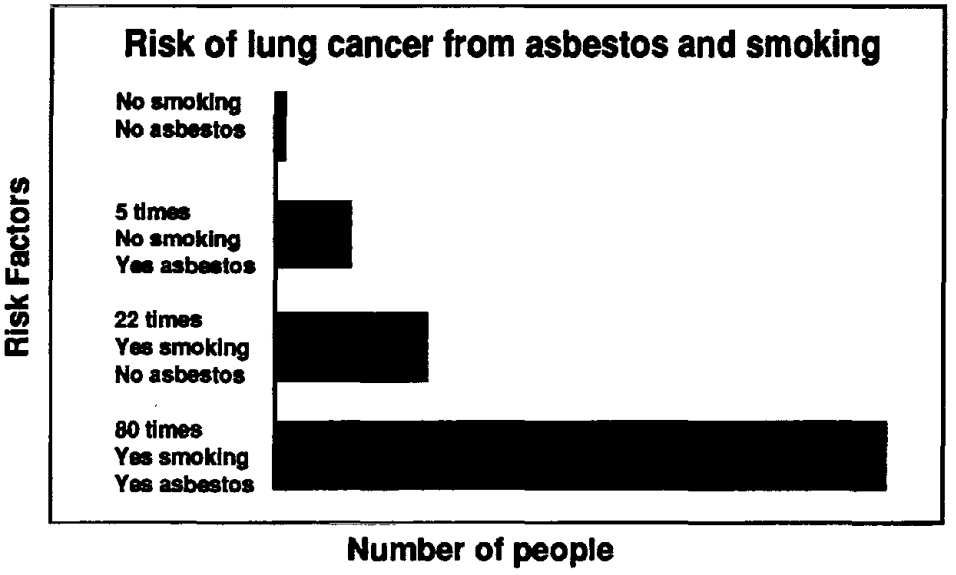
More people die from lung cancer than from any other asbestos related disease.

An asbestos worker who does not smoke, but breathes asbestos is about 5 times more likely to get lung cancer than someone who does not work with asbestos.

A smoker who does not work with asbestos is about 22 times more likely than a non-smoker to get lung cancer. So if all you did was smoke and never worked with asbestos, your risk of lung cancer would be 4 times more then that of an asbestos worker who never smoked.

Asbestos and smoking together are a deadly mix.

But, when you combine smoking and asbestos exposure, the combination is deadly. **Asbestos exposed workers who smoke are about 80 times more likely to get lung cancer.** Your possibility of a cure is only 11%. The best thing you can do to prevent this disease is **quit smoking and avoid asbestos exposure.**



If you are a smoker, get help to quit

Nicotine addiction and the pleasures of smoking make smoking a very difficult habit to break. How difficult a habit (or addiction) is to break can be measured. It is measured by the percent of relapse. **Relapse** means that you tried to stop using the substance, but started using it again. Let's say you stopped smoking for 30 days. Then on day 31, you picked up a cigarette and by day 40, you were smoking a pack a day again. You just had a **relapse.**

About 70% of smokers who quit, relapse in the first three months. The rate of relapse is about the same for those who are addicted to heroin and those who are alcoholics.

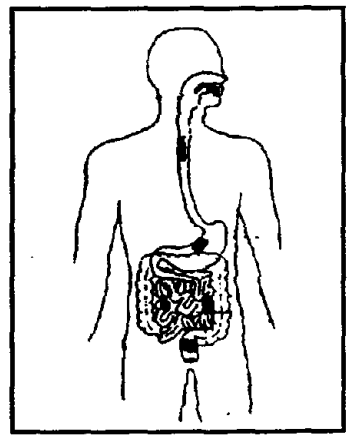
There is hope. Surveys show that most people who keep trying to quit finally succeed. There are many programs that can help you stop smoking. Please get help. Your local chapter of the American Lung Association can give you a list of where you can go to get help.

ASBESTOS DISEASES

Other cancers

Many other cancers are more often found in asbestos workers who worked without personal protective equipment than in people who don't work with asbestos at all. These cancers include cancers of the digestive system; cancer in the mouth, the esophagus (the tube from your mouth to your stomach), the stomach, and the lower intestine (colon and rectum).

A doctor may be able to successfully treat colon and rectum cancer if the doctor finds it early. Digestive system cancers are **dose-related.**



DIGESTIVE SYSTEM CANCER

Other diseases

Pleural plaques are found in asbestos workers. They are lesions that grow slowly. They are made of fibrous tissue that can harden. They are found in the lining of the lungs. You may not even know you have pleural plaques until you get an x-ray. If you have these plaques, your risk of lung cancer doubles. You may also develop pleural asbestosis, which is a scarring of the lining of the lungs.

Pleural plaques are not caused by smoking, only by asbestos exposure.

If you protect yourself and keep asbestos out of the air, you lower your odds of getting sick

ASBESTOS DISEASES

Key Facts

Asbestos can kill you or make you sick. Protect yourself.

Asbestos is silent and deadly. You do not know it is there. You cannot see, hear, feel, taste, smell, or touch the small asbestos fibers that enter your body. When asbestos is in the air, it gets into your body when you breathe and when you swallow.

Diseases

Asbestos causes four types of diseases:

1. Asbestosis, a "marker disease", is also known as "white lung"—a scarring of the lungs which makes it hard to breathe.
2. Mesothelioma, also "marker disease"—a cancer of the lining of the lungs or the lining of the stomach. It is rare but it always kills. It is not dose-related. (See below)
3. Lung Cancer (also caused by smoking) is the biggest killer of all the asbestos diseases. **Asbestos workers who smoke are 80 times more likely to get lung cancer then those who do not smoke and are not exposed to asbestos.**
4. Other Cancers—cancers of the stomach or colon.

Dose-related

The more asbestos fibers you breathe or swallow, the more likely you are to get sick. This is called a dose relationship. The higher the amount of asbestos, the greater your chances of getting an asbestos disease. Most asbestos diseases are dose related. Mesothelioma is the exception.

Latency period

All of the asbestos diseases have a latency period. The latency period is the time gap between when you take the asbestos into your body and when you become sick. For asbestos diseases the latency period is between 10 and 40 years long.

Discussion questions

1. Why is it important to know about the health hazards of asbestos?
2. When is asbestos dangerous?
3. Is there a safe level of asbestos exposure?
4. How do we know that asbestos causes diseases that can kill?

For more information

OSHA Asbestos standard, 29 CFR 1926.1101, Appendix I, "Medical Surveillance Guidelines."

Source book on Asbestos Diseases, George A. Peters and Barbara J. Peters, Garland STPM Press, 1980.

Asbestos Disease Update, George A. Peters and Barbara J. Peters, Garland Publishing, 1989.

NIOSH-OSHA Asbestos Work Group, "Workplace Exposure to Asbestos," DHHS (NIOSH) Publication No. 81-103.

Asbestiform Fibers: Nonoccupational Health Risks, National Research Council, National Academy Press, 1984.

Asbestos diseases exercise

This is not a test. It is an exercise. Use it to see for yourself how well you understand the material in the chapter.

1. How do asbestos fibers enter your body?

2. What is a latency period?

3. What does dose-related mean?

4. What are the diseases that asbestos causes?

5. How do asbestos exposure and smoking cigarettes mix?

NOTES

ASBESTOS DISEASES

PART 2: MEDICAL EXAMS

3

In this chapter you will learn:

What happens during a medical exam.
Why you need a medical exam.
When to have a medical exam.
About the medical records your employer has to keep.

Medical Exams

Billy: Do you want to ride with me to the Medical Center to get your asbestos check-up?

Lee: No, I'm not going to get a check-up.

Billy: Why not? You need to get checked to make sure you don't have an asbestos disease.

Lee: I feel fine. Besides, if I am sick, I don't want to know it. I mean, you've got to die from something, right?

Billy: Some diseases can be treated if they find them early enough.

Lee: Yeah. But even if it can be cured, I'd lose my job. I've got a family and a mortgage on the house. What do you think would happen to them if I lost my job?

Billy: What would happen to them if you die?

Discussion questions:

(Choose one or two of the following questions to discuss)

1. Why doesn't Lee want to get a check-up?
2. Do you think Lee would really lose the job if the doctor found an asbestos disease, or is that just an excuse?
3. If Lee doesn't get a check-up and then gets sick later, do you think Lee will be able to get Workers' Compensation?
4. If you were Lee's family, what would you want Lee to do?
5. If you were Lee's employer, what could you do to make Lee less afraid of losing the job?

MEDICAL EXAMS

MEDICAL EXAMS

A doctor can help you find medical problems early

Asbestos medical exams are required by the OSHA law.

If you work with asbestos, you must have a special kind of medical exam called **medical surveillance.** You have to have a medical exam before you start work and then once a year. The doctor who gives you medical surveillance is a doctor whose specialty is **occupational diseases.** Occupational diseases are caused by your occupation or job. Asbestos causes occupational disease. Medical exams are required by law.

You must have a **baseline** exam before you start to work. The baseline exam documents your health prior to working with asbestos. It is the first medical exam that you get with the job. It is a long and complete exam that usually takes 2-3 hours. You may need the records of this exam for legal purposes if you get an asbestos disease.

Your employer must pay for your exam each year.

Each year after that, the medical exam will be a shorter version of the baseline exam. The doctor looks for any changes in your health since your first exam. With the yearly exam, a disease can be found early. The earlier an asbestos disease is found, the better your chances for treatment. Be sure to get these exams. They can save your life. By law, your employer must pay for all of these exams.

Asbestos medical exams must have at least three parts:

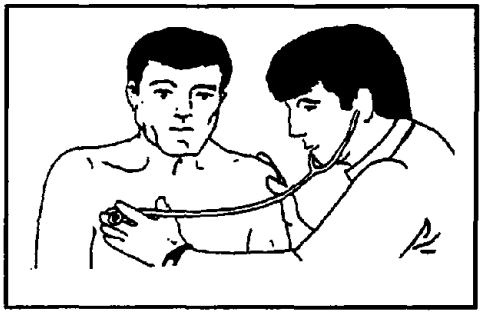
1. A **work history,** to see if you've ever worked with materials that might have damaged your lungs. These include coal dust, cotton fibers, silica, or asbestos. This is a long questionnaire. It asks you about your smoking habits. It asks you about any lung diseases you have had. This questionnaire is required by OSHA.

DOCTOR TAKING WORK HISTORY

The doctor must use the official questionnaire. It is 9-12 pages long. The doctor may not use one the employer writes. (The questionnaire is Appendix D of the OSHA Asbestos Standard.)

MEDICAL EXAMS

2. **A general physical exam** that concentrates on your lungs, heart, and stomach. This is to see if your lungs, heart, and stomach are normal and in good shape. In your baseline exam, the doctor will document your health **and state how healthy you are before you work with asbestos.** It is also to make sure that you don't have any medical problems that asbestos would make worse. After checking your lungs and heart, the doctor will tell you if you can wear a respirator (a mask that protects you from asbestos), and if you can work with asbestos.



GENERAL PHYSICAL EXAM

In the yearly exam, the doctor looks for any signs (symptoms) of asbestosis, lung cancer, or other asbestos diseases. For example, the doctor will listen for "rales" or crackling sounds in your lungs, which may be a sign that you have asbestosis.

3. A breathing test, called a **Pulmonary Function Test (PFT).** A breathing test makes sure that your lungs are not damaged before you begin work. It is used as a comparison for later tests. You blow in and out of a tube using your mouth. Your nose is held tight so you cannot breathe from it. All the air that your lungs take in and push out is measured. A meter reads how much air your lungs can hold and how much air you can blow out in one second. The breathing test is a very simple, safe test. This test often gives the first clue that your lungs are being hurt by asbestos.

PULMONARY FUNCTION TEST

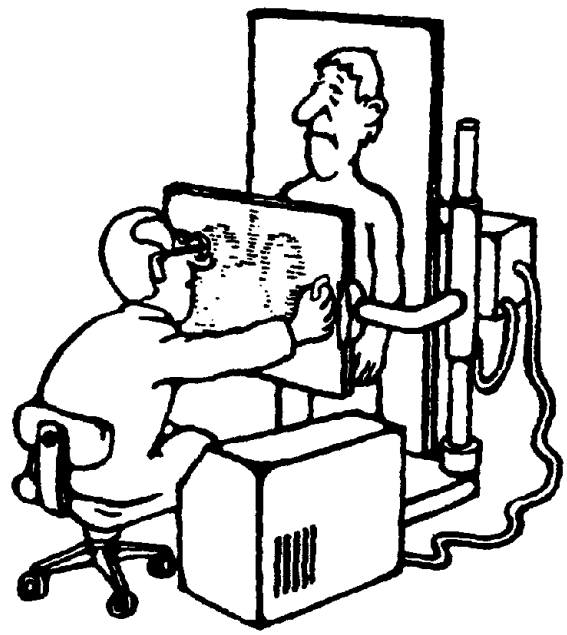
An asbestos medical exam must include:

1. **The OSHA questionnaire**
2. **A physical exam**
3. **A Pulmonary Function Test**

MEDICAL EXAMS

Remember, it is important to find asbestos diseases early. Smokers may also have a poor pulmonary function test result. Your pulmonary function test may also be poor if you have a bad cold.

There are four additional parts to the medical exam. These are not required, but they are recommended.



CHEST X-RAY

1. A **chest x-ray** to make sure that your lungs are not damaged before you begin to work. It is compared to future x-rays to find any changes that take place in your lungs as you work with asbestos over the years. The need for a chest x-ray is your doctor's decision. It is usually a part of the baseline exam.

   The x-ray must be checked by a doctor with experience in reading x-rays of work-related lung diseases. Doctors who are trained and certified to read x-rays for asbestos workers are called **"B readers."**

2. An **EKG** (electrocardiogram) to make sure that your heart is working well. It measures the electrical workings of your heart. If you are 40 years old or over, this test should be included in your exam.

3. A **sputum cytology** to find abnormal cells that warn of cancer. You cough up some of that mucus into a cup and it is examined.

4. A **Hemoccult slide** to check for blood in your digestive system.

MEDICAL EXAMS

When must workers have medical exams?

You must have a medical exam before you start work and then once a year.

OSHA regulations say your employer must provide medical exams.

Medical exams are required whenever you are issued a negative-pressure respirator. You will learn about negative-pressure respirators in the next section. You must be medically cleared by a doctor before you can wear a respirator. This is to make sure that your heart and lungs can handle the strain of wearing a respirator.

Why are medical exams required?

Medical exams help to find asbestos diseases early.

Yearly medical exams are the quickest way to tell if asbestos is making you sick. The exams are for finding asbestos diseases early. Remember that most asbestos diseases get worse, the more asbestos you breathe. It's important to find these diseases as early as possible.

Medical exams are used as evidence for workers' compensation. Workers' compensation is a no-fault insurance system. You must prove that you got your disease or injury on the job. You will then be financially compensated, to some extent, for your disability. Medical exams also help doctors do research on asbestos diseases, so they can prevent them in the future.

The first exam shows a baseline— how healthy you were when you started work. **Yearly exams can catch a problem when it first starts.** The yearly exam is a little shorter than the first one. It includes:

1. A short (3 page) questionnaire every year. Like the baseline exam, this is also an official OSHA questionnaire. It asks about your work experience, smoking habits, and lung diseases over the last year.

2. A general physical exam each year, just like the first year.

3. Pulmonary Function Tests (PFTs) each year, just like the first year.

MEDICAL EXAMS

Your yearly exam also includes:

4. A chest x-ray every 5 years; (more often if you're older and/or have worked with asbestos for many years, less often if your doctor says). You do not need to have a chest x-ray every year. The schedule below is recommended by OSHA - it is not required.

RECOMMENDED SCHEDULE FOR CHEST X-RAYS

YEARS SINCE FIRST WORKED WITH ASBESTOS	AGE NOW 18-35	AGE NOW 36-45	AGE NOW OVER 45
0- TO 10 YRS	EVERY 5 YRS	EVERY 5 YRS	EVERY 5 YRS
MORE THAN 10 YRS	EVERY 5 YRS	EVERY 2 YRS	ONCE A YEAR

Employers are required by OSHA regulations to provide these tests for their workers. The tests are not to punish you for getting sick on the job. They are to keep you from getting sicker if asbestos begins to make you sick. The earlier most asbestos diseases are found, the better your chances for treatment. Medical exams are also very important if you ever have to file for workers' compensation or disability.

The earlier most asbestos diseases are found, the better your chances for a treatment.

After these medical exams, the doctor writes a report and gives a copy to your employer. The doctor tells your employer whether you have any medical problems that would make it more dangerous for you to work with asbestos. The doctor writes down any medical limitations on your work. The doctor might say that you have to wear a powered air-purifying respirator instead of a negative-pressure respirator.

Your employer pays for the doctor. OSHA regulations require the employer to inform the doctor of the **required** and recommended tests for the medical exam. A urine test should not be requested. It is not a part of this

exam. The employer must also inform the doctor not to report any finding that does not prevent you from working with asbestos. You are the doctor's patient. By law, the doctor must not tell your employer anything about your health, unless it will keep you from doing asbestos work. **Your employer must give you a copy of the doctor's report within 30 days after getting it from the doctor.**

Records

Your employer must keep your medical records for 30 years after you leave the job. If your employer goes out of business, your employer has to give your medical records to the person who takes over the business. If the business folds, the records are to be sent to the Director of the National Institute for Occupational Safety and Health (NIOSH) (*see the Training Fact Sheet on pages 21-22*). You cannot count on your employer to be in business when you need your medical records.

Your employer must keep your medical records for 30 years.

Even in the best business offices, records can get lost or ruined. The longer the records have to be kept, the more chances that they get lost or misplaced. You have the right to get copies of your medical records from the doctor. You and your family are the people who will care the most about your health. You may need the information from your medical records 20-30 years from now. **YOU SHOULD GET COPIES OF ALL YOUR MEDICAL RECORDS AND KEEP THEM IN A SAFE PLACE.** A safe deposit box is a good place to keep them. Thirty years from now, you may need these records, and they need to be in a place where you can find them.

MEDICAL EXAMS

Beyond medical exams

There are some things you can do to lower your risk of getting cancer from working with asbestos:

1. **Always remember how dangerous asbestos can be.** OSHA regulations require your employer to give you the right equipment and protective gear you need to do the work safely. A safe job protects you and everyone around you. Keep asbestos out of the air. Demand the right equipment. Work safely. Protect yourself with the right respirator and disposable suit.

2. **Quit smoking.** There are many places you can go for help to quit smoking (see end of this chapter for more information). Encourage your family, friends, and co-workers to quit smoking.

3. **Inform any doctor you visit that you have worked with asbestos.** Tell the doctor the year when you started working with asbestos. Tell the doctor how long you worked with it. Asbestos diseases have a latency period of ten to forty years. Tell the doctor about all the diseases that asbestos causes and ask the doctor to look for those diseases.

The latency period for asbestos diseases is 10 to 40 years.

4. **Even after you stop working with asbestos, you should have a yearly physical** with a rectal exam. This is even more important if you worked with asbestos ten years ago or more.

5. **You have the right to know what hazards you are working with** and what hazards and pollutants are in your community. Work with your co-workers, union, and community to identify these hazards and take the proper precautions.

MEDICAL EXAMS

Key Facts

People who work with asbestos may have to have medical surveillance, a special kind of doctor's check-up:

1. before they start work, and
2. once a year after that

Medical exams are the quickest way to tell if asbestos is making you sick.

A medical exam includes:

First exam

- Long questionnaire
- General physical (lungs, heart, stomach)
- Lung tests (Pulmonary Function Tests (PFT))

Every year

- Short questionnaire
- General physical (lungs, heart, stomach)
- Lung tests (Pulmonary Function Tests (PFT))

Your employer must give you a copy of the doctor's written opinion within 30 days after she or he gets it.

Your employer must keep your medical records for 30 years.

You should keep your own copies of your medical records.

MEDICAL EXAMS

Discussion questions

1. What good is medical surveillance?
2. Why is it important to find asbestos diseases early?
3. Why is it important to have an asbestos medical exam before doing any asbestos work?
4. When are medical exams required by OSHA?
5. List the required parts of an asbestos medical exam.
6. What is the baseline exam?
7. How long must the employer keep the medical records?
8. Why keep copies of your medical records?
9. What do I do when I am no longer working with asbestos and do not get yearly medical surveillance?

For more information

OSHA Asbestos Standard, 29 CFR 1926.1101 (m)(2), "Medical Examinations and Consultations."

OSHA Asbestos Standard, 29 CFR 1926.1101, Appendix I, "Medical Surveillance Guidelines."

Stop smoking information:

Call your local chapter of the American Lung Association. (1-800-LUNG-USA)

Call your local chapter of the American Cancer Society.

Look in the yellow pages under "Smoking."

RESPIRATOR TYPES

PERSONAL PROTECTIVE EQUIPMENT

PART 1: RESPIRATOR TYPES

4

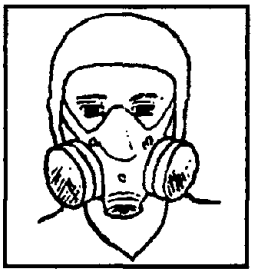
In this chapter you will learn:

- **What respirators are.**
- **You must wear a respirator when you work with asbestos.**
- **How respirators work.**
- **Respirators are not perfect.**
- **Respirators have to fit.**
- **Not everyone can wear a respirator.**
- **What kinds of respirators are allowed on an asbestos job.**
- **What kinds of respirators are not allowed on an asbestos job.**
- **How to figure out if you have the right respirator for the job.**

What is a respirator?

Respirators are your last line of defense against asbestos

NO.



YES!

You need to keep asbestos out of your lungs when you work with it. One way to do this is to keep asbestos out of the air. But no matter what you do, some asbestos will still be in the air. This is why you have to wear a respirator. A respirator is a mask that filters the air in the work room or supplies clean air from outside the work room.

A respirator is a mask that protects you from asbestos.

Paper dust masks will not protect anyone from airborne asbestos fibers. These masks **are illegal on asbestos jobs.**

RESPIRATOR TYPES

The last line of defense

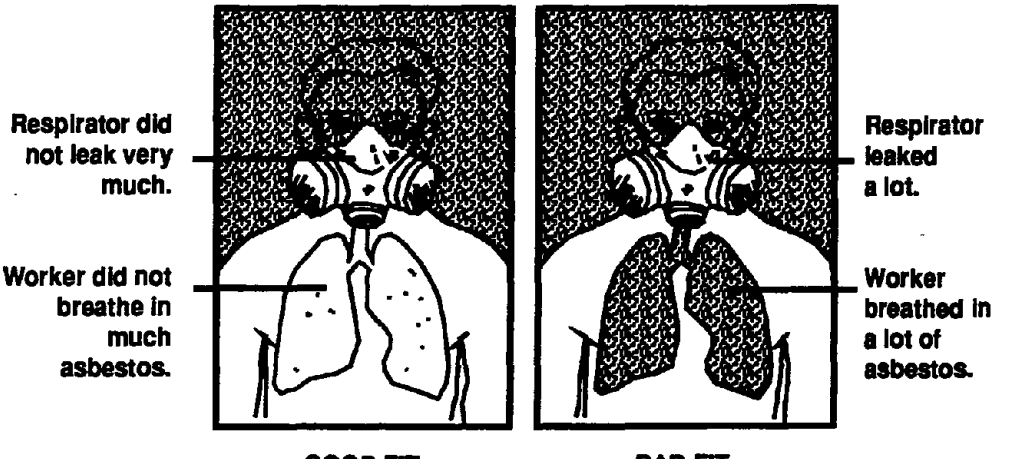
Respirators block asbestos fibers from entering your body. They are absolutely necessary to prevent you from breathing in asbestos fibers. Workers don't like respirators because they are usually uncomfortable, hot, and heavy. They block your sight, and sometimes they make it harder to breathe. It is important to remember why you have to wear them. **You are protecting yourself from asbestos diseases by wearing a respirator.**

Respirators are also not a quick fix, though many people think they are. The OSHA standard says that before workers can wear a respirator, they have to have a doctor's permission, a fitting session (called a fit test), and training. Respirators must be maintained and kept in perfect shape all the time. Employers must also have a written respirator program. They must do regular inspections to be sure that respirators actually protect workers.

A respirator is only as good as its fit

A respirator that does not fit will not protect you.

A respirator that fits properly will minimize the number of asbestos fibers that get into your lungs. If you wear a respirator that doesn't fit, air and asbestos will leak in around the sides of the mask. Instead of being caught in the filters, asbestos will go into your lungs. This is why OSHA regulations say you must have a fit test. The test tells you whether the respirator seals around your face. A respirator that does not fit looks the same as one that does. There is no way to tell if a respirator protects you well enough just by looking at it.

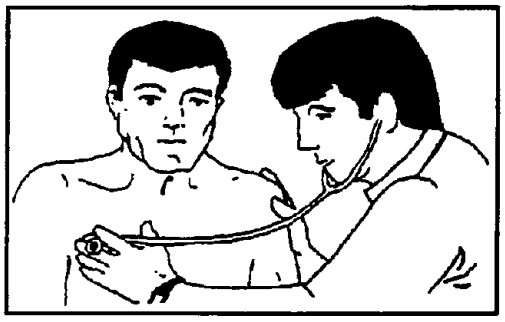


Not everyone can wear a respirator

Some people cannot find a respirator that will fit their face. If you have a beard, you cannot wear a respirator that requires a tight face seal. If you have any hair on your face where the respirator seals, the respirator will not protect you. Even a large mustache can break the seal of your respirator.

If your nose has been broken you may not be able to wear a respirator. If you have missing teeth, large scars, a very narrow or broad face, or a face with an unusual shape, you may not be able to wear a respirator. If you wear glasses, you may have to get special frames that will not break the seal of your respirator.

If you feel very anxious, a little faint, and shaky whenever you put on a respirator, you may not be able to wear one. You may have claustrophobia, a fear of confined spaces.



GET A CHECKUP

A doctor must examine you to see if you can wear a respirator.

Respirators also make it harder to breathe. Although most workers can wear one without a problem, you must have a medical checkup to be sure that your lungs and heart are strong enough to take the strain of working with a respirator. You must have permission from a doctor before you can wear a respirator on the job.

When do you wear a respirator?

You <u>should</u> wear a respirator whenever you work with asbestos

Asbestos is measured in fibers per cubic centimeter (f/cc) of air. A cubic centimeter is about the size of a sugar cube. You breathe at least one million cubic centimeters of air every hour when you are working.

OSHA regulations say that you have to wear a respirator when asbestos in the air reaches 0.1 ("point one") fibers per cubic centimeter of air (f/cc) in an 8-hour day. This level, 0.1 f/cc, is the average amount of fibers in the air during an 8-hour day. You can think of this as the "speed limit" for asbestos. Your employer has to test the air to see how much asbestos is in it. The legal limit of 0.1 f/cc is called the Permissible Exposure Limit or PEL.

RESPIRATOR TYPES

You must wear a respirator when asbestos in the air reaches 0.1 f/cc

How much is 0.1 f/cc??

The legal limit of 0.1 f/cc doesn't mean literally "one-tenth of a fiber." It is an average. At the legal limit, there are **on the average** 0.1 asbestos fibers in every cubic centimeter of air. It means that **on the average** there is one fiber in every 10 cubic centimeters of air.

There are 1 million cubic centimeters in every cubic meter. If the level is 0.1 f/cc, on the average there are 100,000 fibers in every cubic meter of air. If you breathe about 8 cubic meters of air in an 8-hour shift, you breathe about **800,000 asbestos fibers in an 8-hour day** at the legal limit.

No respirator is perfect

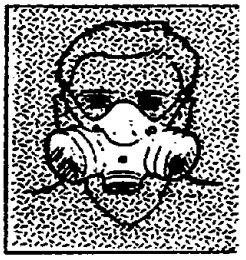
Every respirator leaks.

Every kind of respirator has its good and bad points. Every respirator leaks. Some respirators protect you more than others. Every respirator has a Protection Factor (PF). This number tells you how much the respirator protects you.

The more asbestos in the air, the better the respirator you need.

The Protection Factor tells you how much a respirator protects you.

There are five kinds of respirators allowed on asbestos jobs. Which respirator you wear depends on the amount of asbestos in the air. Your employer must test workers' breathing air every day. Then he or she determines what kind of respirator is needed, based on how much asbestos is in the air.



RESPIRATOR TYPES

Air-purifying respirators use a filter to clean (purify) the air that's in the workplace.

O & M workers usually wear air-purifying respirators when disturbing ACBM.

Air-purifying respirators clean the air in the work room before you breathe it in.

Here are the three kinds of respirators that are used in asbestos maintenance work, starting with the one that protects you LEAST and going to the one that protects you MOST:

1. Half-mask air-purifying respirator

2. Full-face air-purifying respirator

3. Powered air-purifying respirator

RESPIRATOR TYPES

#1 Half-mask, air-purifying respirator

This is the simplest respirator you may use on an asbestos job. It is a half-mask, air-purifying respirator. The bottom of the respirator facepiece (the wide part) goes under your chin. The top of the facepiece (the narrow part) goes over your nose. .

Air-purifying respirators always have filters.

It is the least protective respirator the law allows. The two **HEPA (High Efficiency Particulate Air) filters** catch the asbestos and filter it out of the air. This is an air-purifying respirator. It filters, or purifies, the air as you breathe it. You must not use it if there is not enough oxygen to breathe. It will not work unless the filters are made for asbestos. An asbestos respirator must have filters that say they protect against asbestos dust.

HEPA = High Efficiency Particulate Air

When you breathe in, your lungs pull air through the filters. This takes a lot of effort. This type of respirator is also called a negative-pressure respirator. When you breathe in, a suction, or negative pressure, is produced inside the mask. The facepiece has to fit perfectly on your nose, cheeks and chin. If the respirator does not form an airtight seal, air and asbestos will leak in around the edges of the mask. Air will not be filtered through the HEPA filters. Negative-pressure respirators can leak. Remember, a respirator is only as good as its fit.

O&M workers will sometimes disturb asbestos. Usually a half-face negative-pressure respirator will be enough protection for you. If it isn't, you'll need a different respirator.

#1

HALF-MASK AIR-PURIFYING RESPIRATOR

Protection Factor = 10
legal up to 1 f/cc

Protection Factor = 10; Means: for every ten fibers outside the mask, one fiber will leak in.

RESPIRATOR TYPES

#2 Full-face, air-purifying respirator

A full-face air-purifying respirator is better than a half-mask.

This respirator is legal for five times as much asbestos as respirator #1. It is the same as respirator #1, except the top of the facepiece goes all the way around your face and across your forehead. This gives a better seal. It is called a full-face air-purifying respirator.

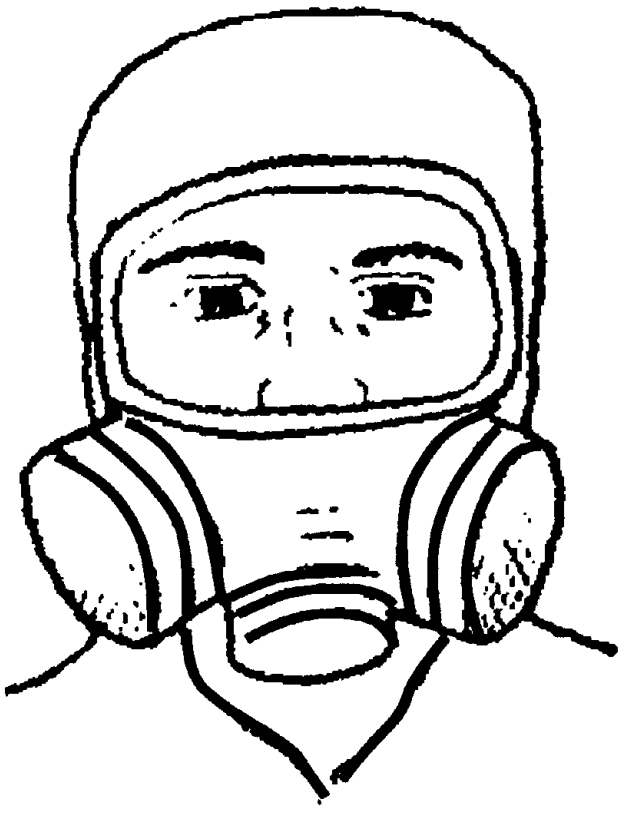
Because it is also an air-purifying respirator, you must not use it if there is not enough oxygen in the workplace air. It is also a negative-pressure respirator. When you breathe in, a suction, or negative pressure, is produced inside the facepiece. The facepiece has to fit perfectly on your forehead, the sides of your face, and your chin. If the facepiece does not form an airtight seal, air and asbestos will leak in around the edges of the mask. Air will not be filtered through the filters.

You must not wear a full-face respirator if you wear regular glasses. The side bars of the glasses break the seal of the mask. The mask will not fit tightly on your face. If you wear glasses, your employer should provide special glasses and a frame that holds your lenses in place inside the full face respirator.

#2

FULL-FACE AIR-PURIFYING RESPIRATOR

Protection Factor = 50
legal up to 5 f/cc



Protection Factor = 50; Means: for every 50 fibers outside the mask, one fiber leaks in.

RESPIRATOR TYPES

#3 Powered air-purifying respirator (PAPR)

A PAPR is a positive pressure air-purifying respirator.

This respirator is legal for ten times as much asbestos as respirator #1. It looks like respirator #2, but it has an air pump. It has HEPA filters or cartridges. The air pump and the filters are usually on a belt or on the face piece. The pump pulls the air through the filters. It blows the air through a hose into the mask.

This respirator only filters the air that's already in the room. It is an air-purifying respirator. Because it has an air pump, this respirator is called a powered air-purifying respirator or PAPR. The OSHA asbestos regulations state that you have the right to get a PAPR whenever a negative-pressure respirator is required on the job.

You have the right to get a PAPR instead of a negative-pressure respirator.

The air coming through the hose pushes air and asbestos away from the sides of the mask. This is a positive-pressure respirator. The air pump makes a positive pressure inside the mask. One good thing about a positive-pressure respirator is that if it leaks, it leaks out. Asbestos is not supposed to leak in.

Another good thing about a powered air-purifying respirator (PAPR) is that your lungs do not have to work so hard to pull the air through the filters. The air pump does some of the work. But if the batteries are low, this PAPR is no better than a full-face respirator without an air pump.

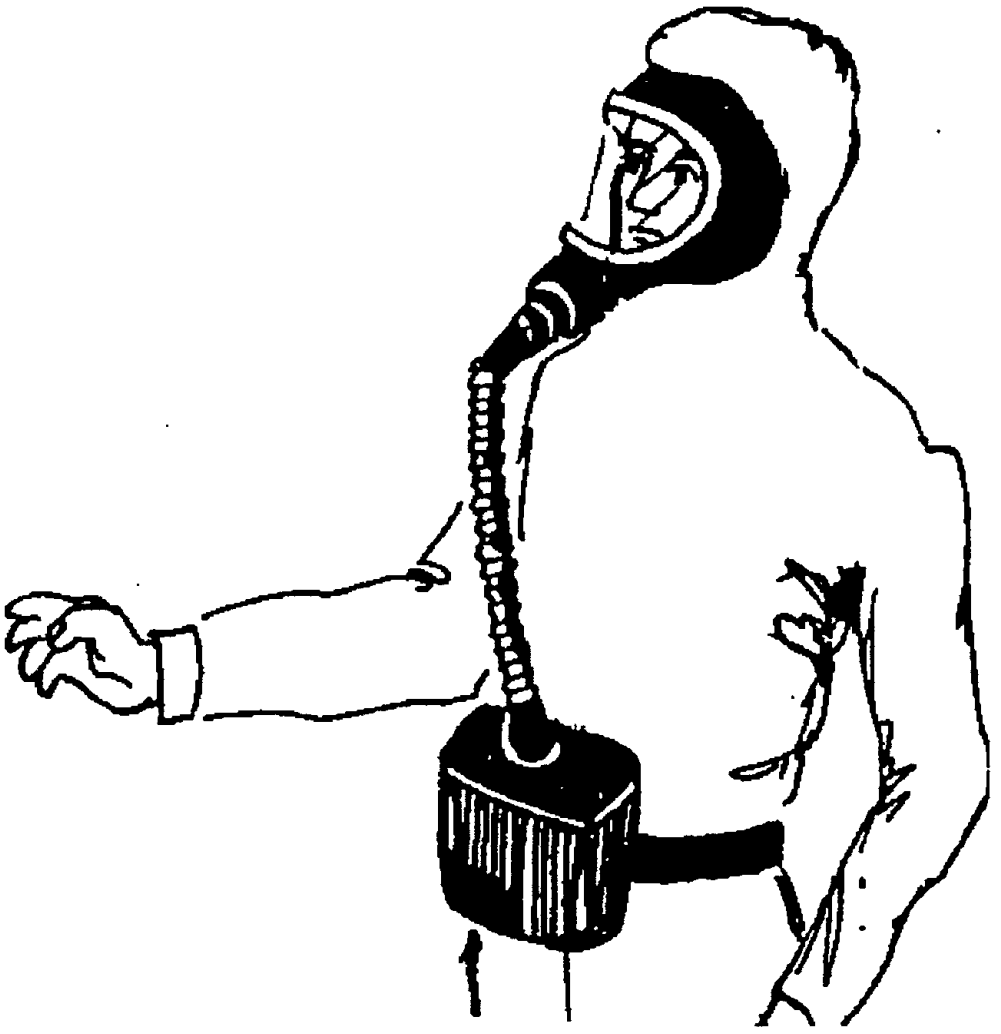
Another problem with a PAPR is that it only filters the dirty air in the room. It is just like any other air-purifying respirator. If the batteries in the air pump are run down, air and asbestos can leak in around the sides of the mask. This can also happen if the filters are clogged with dust or if you are breathing very hard.

The air pump on a PAPR blows air at the same rate, no matter how hard you breathe. If you breathe in very hard, it makes a suction, or negative pressure inside the facepiece. This is called overbreathing the respirator. The facepiece has to fit perfectly on your forehead, the sides of your face, and your chin. If it does not form an airtight seal, air and asbestos will leak in around the edges of the facepiece.

#3

POWERED AIR-PURIFYING RESPIRATOR

Protection Factor = 100
legal up to 10 f/cc



Protection Factor = 100; Means: for every 100 fibers outside the mask, one fiber will leak in.

RESPIRATOR TYPES

Other respirators

Another type of respirator that is rarely used in O&M work is the **supplied-air respirator.** A legal respirator for an asbestos job may look different from the three shown on pages 60 through 65. This type of respirator uses an air hose to deliver clean air to the worker. The air comes from either a tank or a compressor. Supplied-air respirators are normally used if there is a lot of asbestos in the air, if there is not enough oxygen in the air, if dangerous gases or vapors are in the air, or if there is not enough oxygen concentration in the air.

HALF-MASK SUPPLIED-AIR RESPIRATOR

A powered air-purifying respirator (PAPR) or supplied-air respirator may have:

- a loose-fitting hood or helmet instead of a full-face mask.
- a half-mask instead of a full-face.
- a backup filter, in case the air supply is cut off.

HALF-MASK POWERED AIR-PURIFYING RESPIRATOR

A supplied-air respirator may be a respirator that does not use compressed air. These respirators are legal, but they are not recommended.

Not all respirators are legal for asbestos work.

A respirator with a loose-fitting hood does not protect you as well as a respirator with a tight-fitting mask. If you breathe more air than the motor pumps, air will leak in around the sides of the hood. Check the protection factor on these respirators. Be sure that they protect you against the amount of asbestos in the air. There are many legal respirators for asbestos work.

RESPIRATOR TYPES

These respirators are illegal for asbestos work: "Disposable" or "one use" respirators are not allowed for asbestos work. "Dust masks" are not respirators and are not allowed for asbestos work. "Gas masks" with chin canister filters are not allowed for asbestos work.

PAPER DUST MASKS

DISPOSABLE (ONE USE) RESPIRATORS

GAS MASK RESPIRATORS WITH ONE FILTER

RESPIRATOR TYPES

Protection Factor

How much asbestos can a respirator handle? Some respirators are better than others at keeping asbestos out of your lungs. A respirator's Protection Factor (PF) is a measure of how well it should protect you from asbestos. Protection Factors go from 10 to 1,000. Protection Factors are based on respirators that fit properly.

A half-mask air-purifying respirator has a Protection Factor of 10 (For every 10 fibers in the air, 1 fiber leaks into the mask. For every 1,000 fibers in the air, 100 fibers leak in).

A full-face air-purifying respirator has a Protection Factor of 50 (For every 50 fibers in the air, 1 fiber leaks into the mask. For every 1,000 fibers in the air, 20 fibers leak in).

A PAPR and a continuous-flow air supplied respirator have a Protection Factor of 100 (For every 100 fibers in the air, 1 fiber leaks into the mask. For every 1,000 fibers in the air, 10 fibers leak in).

RESPIRATOR TYPES

How do you know you have the right respirator?

When you see your air sampling results, how can you tell which respirator will protect you enough? Your supervisor will be selecting the proper respirator for you in most cases. However, it is still important for you to understand how well a respirator will protect you. You need to know the respirator's limit or **Maximum Use Level (MUL)**. This is how much asbestos the respirator can protect you from.

To figure out the Maximum Use Level for a respirator, **take the legal limit (the PEL = 0.1) and multiply it by the Protection Factor.** *(See page 23 for more about the PEL.)* The Protection Factor (PF) tells you how many fibers leak in, compared to the number of fibers outside. You need to keep the number of fibers inside below 0.1 f/cc (the legal limit).

0.1 f/cc (legal limit) x Protection Factor = Maximum Use Level
0.1 x PF = MUL

A half-mask, air-purifying respirator has a Protection Factor of 10.
0.1 x 10 = 1 f/cc
The **Maximum Use Level is 1 f/cc.**

A full-face, air-purifying respirator has a Protection Factor of 50.
0.1 x 50 = 5 f/cc
The **Maximum Use Level is 5 f/cc.**

A Powered Air Purifying Respirator (PAPR) has a Protection Factor of 100.
0.1 x 100 = 10 f/cc
The **Maximum Use Level is 10 f/cc.**

RESPIRATOR TYPES

Math review for your own information

Number line
The numbers get bigger as you go down

0
0.1 = 1/10
0.2 = 2/10 = 1/5
0.3 = 3/10
0.4 = 4/10
0.5 = 5/10 = 1/2
0.6 = 6/10
0.7 = 7/10
0.8 = 8/10
0.9 = 9/10
1 = 10/10
1.1 = 1 1/10
1.2 = 1 2/10

Decimals
1 is more than .5 ("point five")
.5 ("point five") is more than .2 ("point two")
.2 ("point two") is more than .1 ("point one")
.1 ("point one") is more than .01 ("point oh one")

Decimals and fractions
.1 ("point one") = 1/10 ("one tenth")
.2 ("point two") = 2/10 ("two tenths") = 1/5 ("one fifth")
.01 ("point oh one") = 1/100 ("one one-hundredth")

RESPIRATOR TYPES

Respirators legal for working with asbestos—OSHA Rule

Name	+/- Pressure	PF	Maximum Use Level Legal Up To
Half-Mask, Air-Purifying	Always Negative-Pressure	10	1 f/cc
Full Face, Air-Purifying	Always Negative-Pressure	50	5 f/cc
Powered Air-Purifying Respirator (PAPR)	Usually Positive-Pressure (but can be overbreathed)	100	10 f/cc

The OSHA rule is a minimum.

How does OSHA determine the Maximum Use Level?

Remember the math equation

PEL x PF = MUL

For a half-mask, air-purifying respirator 0.1 x 10 = 1 f/cc

What does this mean?

The Permissible Exposure Limit means the largest amount of asbestos fibers OSHA says that a worker can breathe. This means that the rule says you can breathe 1 asbestos fiber for every 10 cubic centimeters of air that you breathe. It means that when you wear a respirator at its Maximum Use Level, you breathe in 0.1 asbestos fiber for every cubic centimeter of air that you breathe.

RESPIRATOR TYPES

NIOSH Respirator Recommendations

Respirators recommended for working with asbestos—NIOSH

Name	+/- Pressure	Recommended PF	Recommended MUL Up To
Half-Mask, Air-Purifying	Always Negative-Pressure	10	0.01 f/cc to 0.1 f/cc
Full Face, Air-Purifying	Always Negative-Pressure	50	0.5 f/cc
Powered Air-Purifying Respirator (PAPR)	Usually Positive-Pressure (but can be overbreathed)	50	0.5 f/cc

How does NIOSH determine the Maximum Use Level?

Use an equation.

CL x PF = MUL

For a half-mask, air-purifying respirator 0.01 x 10 = 0.1 f/cc

CL stands for Clearance Level.

What is a Clearance Level?

CL stands for Clearance Level. 0.01 f/cc is one of the Clearance Levels used in the AHERA rule for small O&M projects. The area is clean when the Clearance Level is reached. The Clearance Level is an acceptable level of exposure. The area can then be opened for the public to use.

NIOSH says that the acceptable level of asbestos exposure for workers should be the same as for the general public. When you use a respirator at the NIOSH recommended MUL, you breathe in 1 asbestos fiber for each 100 cubic centimeters of air that you breathe.*

* NIOSH recommendations are not required by law.

RESPIRATOR TYPES

Key Facts

You should wear a respirator when you work with asbestos.

You must have a doctor's permission before you can wear a respirator on the job.

Not everyone can wear a respirator.

Respirators don't work unless they fit perfectly.

Paper dust masks are not approved for asbestos work.

Positive pressure (a motor pushes air into the mask and pushes fibers away from the edges of the mask) **is better than negative-pressure** (your lungs do all the work to move the air).

Full-face is better than half-mask.

Powered Air-Purifying Respirator (PAPR) (a motor does some of the work) **is more protective than non-powered, negative pressure** (your lungs do all the work).

Tight-fitting (an airtight seal) **is more protective than loose-fitting** (no seal).

Your employer chooses your type of respirator by looking at the air samples and using the table on page 69.

Your employer must give you a PAPR instead of a negative-pressure respirator if you request one.

RESPIRATOR TYPES

This respirator is an
air-purifying negative-pressure
half-mask
respirator which has a Protection Factor of 10.
It is legal up to 1 f/cc.
It is recommended up to 0 .1 f/cc.

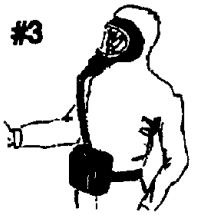
#1

This respirator is an
air-purifying negative-pressure
full-face
respirator which has a Protection Factor of 50.
It is legal up to 5 f/cc.
It is recommended up to 0.5 f/cc.

#2

This respirator is a
powered air-purifying (PAPR)
positive-pressure full-face
respirator which has a Protection Factor of 100.
It is legal up to 10 f/cc.
It is recommended up to 0.5 f/cc.

#3



For more information

OSHA Asbestos Standard, 29 CFR 1926.1101, paragraph (h), "Respiratory Protection."

EPA Worker Protection Rule, 40 CFR 763, subpart G.

American Lung Association, "What You Should Know About On-The-Job Respiratory Protection," ALA Item No. 0683. Call (800) LUNG-USA

"Model Curriculum for Training Asbestos Abatement Contractors and Supervisors," Chapter VIII., "Establishing a Type C Supplied-Air System," Georgia Tech Research Institute, available from National Technical Information Services, (703) 487-4650

EPA/NIOSH, "A Guide to Respiratory Protection for the Asbestos Abatement Industry," Publication No. EPA-560-0PTS-86-001.3.

NIOSH, "Respiratory Protection, A Guide for the Employee," DHHS (NIOSH) Publication No. 78-1 93B.

NIOSH "Guide to Industrial Respiratory Protection," DHHS (NIOSH) Publication No. 87-116.

RESPIRATOR TYPES

RESPIRATOR CARE

PERSONAL PROTECTIVE EQUIPMENT

4

PART 2: CARING FOR YOUR RESPIRATOR

In this chapter you will learn:

What your employer has to do before giving you a respirator.
How to make sure your respirator fits.
How to take care of your respirator.
How to:
- **clean,**
- **inspect,**
- **maintain, and**
- **store your respirator.**

A respirator program

A respirator can't protect you unless it fits.

When OSHA inspects a job for health problems, more than one-third of the problems are in the company's respirator program. The OSHA regulations say your employer has to have a very strong respirator program. You can think of this as the "workers respirator bill of rights."

RESPIRATOR CARE

What your employer has to do

Before your employer gives you a respirator, he or she must make sure a written **respirator protection program** is in place. The following 10 points outline the different parts of a respirator protection program. It is very important to know what **your rights** are when you put on a respirator, and the requirements that your employer must follow. What your employer must do could be called the "Respirator Bill of Rights." (OSHA 1910.134)

THE RESPIRATOR "BILL OF RIGHTS"

Your employer must have a written respirator program.

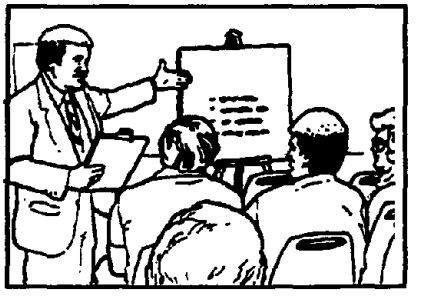
1. **Your employer must assign one person to be in charge of the respirator program.**
   Find out who this person is. He or she can help you if you have a problem with your respirator.

2. **Your employer must have written procedures for choosing and using respirators.**
   Get a copy of this program from the person in charge of the program.

3. **Your employer must check the whole respirator program regularly.**
   Is it as good in reality as it is on paper?

4. **Your employer must offer medical exams to everyone who wears a negative pressure respirator.**
   No one is allowed to wear this type of respirator without a doctor's clearance.

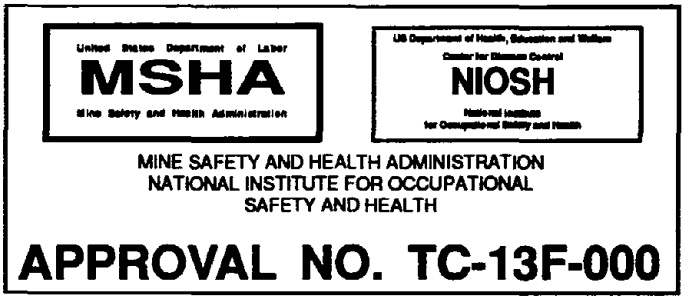
5. **Your employer must give you training about respirators.**
   Before you put on a respirator, you have to be trained. You need training on each respirator you work with. You have to learn about all the parts of your respirator. You have to learn how your respirator works. You need to know what a respirator can do for you. You



TRAINING

need to know what a respirator can't do for you. You have to be trained in how to clean, inspect, store, and make sure your respirator is fitting properly (*see below*).

6. **Your employer must use approved respirators.**
Respirators have to be approved by two agencies: the Mine Safety and Health Administration (MSHA) and the National Institute for



APPROVAL STICKERS

Occupational Safety and Health (NIOSH).

Use the right filter for the hazard.

7. **Your employer must choose a respirator based on the hazard.**
A gas filter won't protect you from dust. A dust filter won't protect you from a gas. A filter respirator won't protect if there isn't enough oxygen in the air.

Your employer has to sample the air for asbestos. He or she will choose the proper type of respirator by looking at the air sample results.

You must have a fit test when you get a new or different respirator.

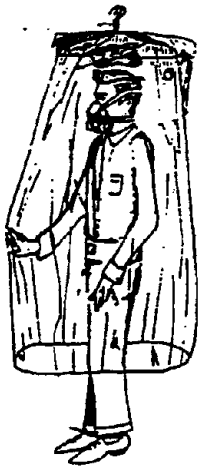
8. **Your employer must be sure your respirator fits you.**

With negative-pressure respirators, you must have a fit test every 6 months.

You must also have a fit test every 6 months.

When you first get a respirator, and every six months after that, the fit must be tested. Remember that a respirator is only as good as its fit. The

RESPIRATOR CARE



QUALITATIVE FIT TEST

fit tests are called a **qualitative fit test** or a **quantitative fit test**. The tests take from one-half hour to an hour.

In a qualitative fit test, you stand in a bag or booth and the tester blows irritating smoke around the edges of the respirator. (Sometimes banana oil or saccharine is used.) The tester will then have you move your head and face in ways that will test the respirator's fit. If the material leaks into the mask, you will smell it or taste it. If you can smell or taste the test material, the mask does not fit well enough to keep asbestos out of your lungs.

A qualitative fit test tests the quality of the respirator's seal. You use your senses in the qualitative fit test. Whenever you have a qualitative fit test, it should be done in a well ventilated area.

QUANTITATIVE FIT TEST

In a **quantitative fit test**, you go into a booth. The tester puts a probe inside your respirator. The tester will then have you move your head and face in ways that will test the respirator's fit. If the mist leaks inside your respirator, it does not fit well enough to keep asbestos out of your lungs. A computer measures how much mist leaks in.

One of these fit tests will be offered during an EPA-approved Asbestos Worker Training Class. You must have a fit test on every negative-pressure respirator you are given for protection. You must have another fit test every six months if you have a negative-pressure respirator. You must also have a fit test if the shape of your face changes. This could happen if you:

- gain or lose more than 10 pounds
- break your nose

RESPIRATOR CARE

- lose teeth or get new dentures
- get pregnant
- have surgery on your face

9. Your employer must inspect respirators and fix them.
If there is anything wrong with your respirator, your employer has to fix it before you can wear it. Your employer has to check the respirators to make sure they are in perfect shape. Your employer has to have trained people fix your respirator.

10. Your employer must give you a safe place to store your respirator.
Your employer has to give you a clean, dry place to keep your respirator.

What you have to do

After your employer gives you the respirator, you have to use it safely. Do you have the right one? Did you get a fit test on your respirator? Does the respirator work? Is it clean?

You are the one who cares the most about whether your respirator works. If it is not in perfect shape, you could breathe asbestos. Learn how to use your respirator and take care of it.

1. Do you have the right respirator?
Does your respirator fit you? You must get a fit test for your respirator.

Do you have an approved respirator and the proper filters? Look for the MSHA/NIOSH seals on your respirator box and on the filters.

You need to have the right respirator for the job. Look at the air samples. Figure out which respirator you need. Is your respirator protective enough? According to OSHA regulations, you can ask for a Powered Air-Purifying Respirator (PAPR) and your employer must give you one unless it is not protective enough for the work area. You would then get a supplied-air respirator.

Even if you have an approved respirator, it might not protect you enough

RESPIRATOR CARE

from the amount of asbestos in the air. Respirator Protection Factors (*see page 68*) come from tests in labs. The respirator maker tests an average-size person. The tests are done in a clean, cool lab. Only new respirators are used. But you don't work in a lab. You may not have an average face. You sweat when you work. The respirator may slide on your face. Maybe your respirator isn't as perfect as when it was new. There are many reasons why the respirator may not work as well for you as it did in the lab.

Learn how your respirator works.

2. Know how to use your respirator.

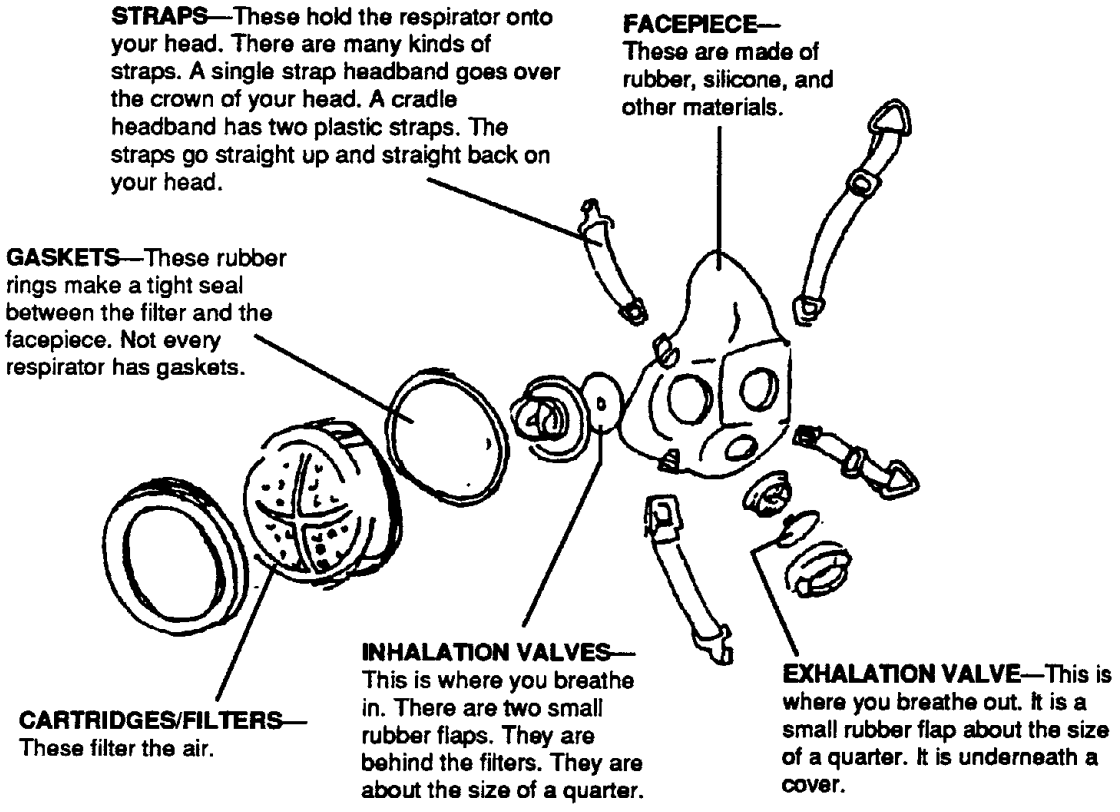
If you don't know how to use your respirator, it will not protect you. If you don't have a clean shaven face, a tight fitting respirator will not protect you. If you don't maintain it, it will not protect you. Get to know your respirator. Get training on the respirator you use. Inspect your respirator. Are all the parts where they belong? Always inspect your respirator before you put it on.

Make sure it has all of its parts.

3. Inspect your respirator every time you use it.

A respirator can't help you unless it's in perfect shape. You need to inspect your respirator before you put it on. Make sure all the parts are there. Make sure all the parts are in good shape. Make sure all the parts are in the right place. **If you find anything wrong with your respirator, do not wear it until it is fixed.**

THE PARTS OF A HALF-MASK RESPIRATOR



A PAPR (powered air-purifying respirator) has all of these parts and some more:

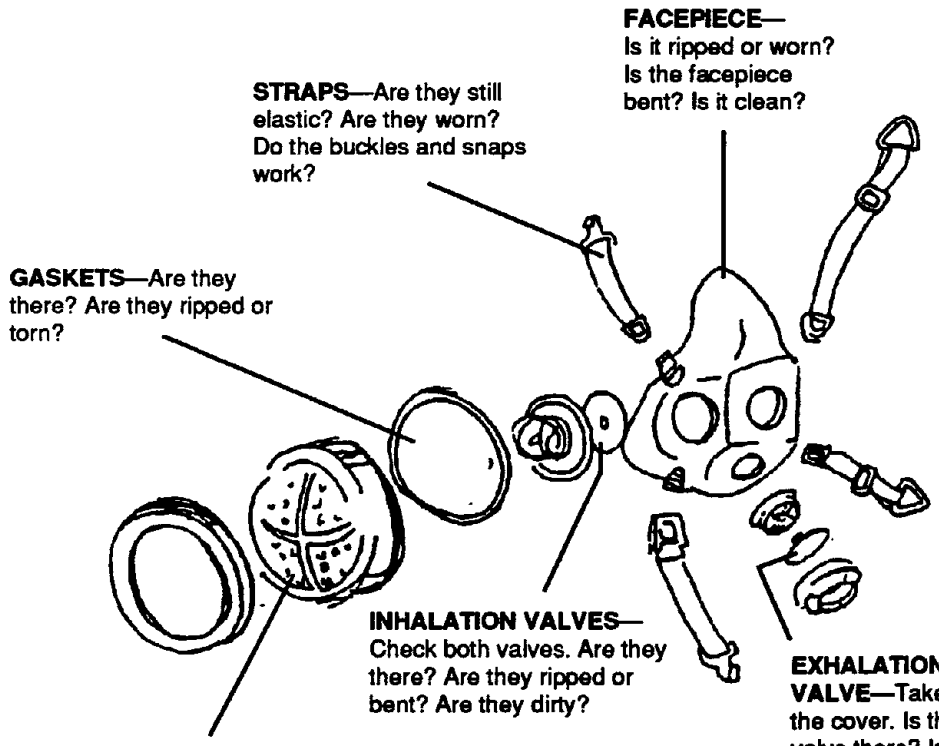
HOSE—If the fan is on your belt, this carries air up to your face.

CORD—If the fan is on your facepiece, this carries electricity up to the fan.

BATTERY—Every PAPR has a battery to run the fan.

RESPIRATOR CARE

HOW TO INSPECT YOUR RESPIRATOR



CARTRIDGES/FILTERS—
Do you have the right filter for the job? When you work with asbestos, you need purple (magenta) or orange filters. When you use methylene chloride (in many spray glues), you need yellow or black filters and purple or orange filters. A few combination filters are grey.

Change the filters when it becomes harder to breathe. The filters may be filled with asbestos. They may be wet. You may have to shower in order to change the filters.

If you wear a PAPR you need to check all of the above and more:

hose—Is it bent or cut?

battery—Is it charged?

flow—Use a tube called a flow meter to see how much air the fan is blowing.

If you wear a supplied-air respirator, you need to check all of the above and more:

escape cartridge —Is there a HEPA filter? Is it clean?

escape air bottle— Is the bottle full?

4. Putting on a respirator.

When you put on a respirator for the first time, put the mask up to your face first. Smile and frown and move your face around. Be sure the edges of the mask fit your face. Next, fasten the bottom strap (the one that goes around the back of your neck). Tighten the bottom strap. Pull the top strap over your head. Tighten the top strap. Pull both sides at the same time. The straps need to hold the respirator on your face. Do not make them too tight. The mask will dig into your skin and it will not be comfortable. Then do the two fit checks (next page).

RESPIRATOR CARE

Do fit checks every time you put a respirator on.

5. Do fit checks every time you put a respirator on.

Fit tests every six months make sure that you have the right respirator. **You also have to check the fit yourself every time you put a respirator on.** The fit checks you do yourself are called a **negative-pressure fit check** and a **positive-pressure fit check**. You must do both of these fit checks every time you put on the respirator. Do the two fit checks every time you go into an area where there's asbestos in the air. You can only do these fit checks on a tight-fitting respirator. (A tight-fitting respirator makes an air-tight seal around your face.)

The **negative-pressure fit check.** Cover the two filters or the air hose with your hands and suck in gently. Hold for a count of ten. You will feel the respirator pull against your face. You can feel the area of the seal tightening to your face. If there is a leak, air will rush in through the leak instead of pulling the mask against your face. You will feel air move against your cheeks. It may feel like a feather brushing across your face. The air will move toward your mouth. You may hear the air flow. If someone is watching you, they should see the respirator suck in a little at your nose.

NEGATIVE PRESSURE FIT CHECK

POSITIVE PRESSURE FIT CHECK

The **positive-pressure fit check.** Take the cover off the valve on your chin. Cover the rubber flap with one hand and puff out gently. You should feel the force of your breath balloon the respirator out a tiny bit. This is like the feeling when you first blow up a balloon. You have to blow harder to get over the resistance of the balloon. As the mask moves out, you will feel the seal of the respirator tighten on your face. If there is a leak in the mask, air will rush out

of the leak instead of making the mask balloon out. If there is a leak, you will feel air rush out against your cheeks. You will not feel the seal tightening to your face. Don't blow too hard, or you can blow out your intake valves and break a good seal.

6. Keep your respirator clean

Keep your respirator clean.

Though respirators are never comfortable, they can become very uncomfortable if you do not clean and disinfect them regularly. It is very easy to clean your respirator. You must clean it before and after every use.

Take off the filters and wash the respirator in warm water with a mild soap. You may want to use a mild disinfectant. Wash the inside and outside of the facepiece with a soft bristle brush or a clean rag. Rinse the respirator in clean water, and let it dry in the air.

CLEAN YOUR RESPIRATOR

If you have a PAPR, do not drop the battery, motor, or power cord in the water. Wipe these off with a damp cloth.

7. Store your respirator in a safe place

Don't hang your respirator by its straps to dry. This can stretch out the straps. Keep your respirator in clean, dry place. It is easy to damage a respirator or get asbestos on it.

8. Repairs

Respirator parts have to come from the same manufacturer that made the respirator. In other words, you may not use MSA brand filters on a Cesco brand respirator. You may not use 3M brand valves on an AO brand respirator. No one should fix your respirator unless he or she knows how to fix it.

RESPIRATOR CARE

CARING FOR YOUR RESPIRATOR

Key Facts

A respirator will not protect you unless it fits.

You must have a fit test before you can wear a negative-pressure respirator at work.

- **Qualitative fit-testing** uses your sense of smell. It doesn't use machines.
- **Quantitative fit-testing** uses a machine. It measures how much air leaks around the edges of your respirator.

You must have another fit test every 6 months for negative-pressure respirators.

You must inspect your respirator before you put it on.

You must do fit checks **every time** you enter an area with asbestos in it.

- **Negative-pressure fit check:** suck in, cover the purple filters.
- **Positive-pressure fit check:** blow out, cover the valve on your chin.

Clean your respirator with soap and water every time after you wear it.

Store your respirator in a clean, safe place.

Use HEPA filters for asbestos only.

Change the respirator filters whenever breathing resistance increases.

Discussion questions

1. OSHA regulations give you the right to go through decontamination and wash your face if asbestos or your respirator irritates it. Why do you have this right?
2. When you first pick up your respirator, what are you going to do?
3. How often do you need a fit test?
4. Why is it important to learn how to do the positive-pressure and negative-pressure fit checks?

For more information

OSHA Respirator Standard, 29 CFR 1910.134.

American Lung Association, "What You Should Know About On-The-Job Respiratory Protection," ALA Item No. 0683.

NIOSH, "Respiratory Protection, A Guide for the Employee," DHHS (NIOSH) Publication No. 78-1 93B.

EPA/NIOSH, "A Guide to Respiratory Protection for the Asbestos Abatement Industry," Publication No. EPA-560-0PTS-86-001.

OSHA Asbestos Standard, 29 CFR 1926.58, Appendix H, "Substance Technical Information for Asbestos, Non-mandatory."

RESPIRATOR CARE

Respirator exercise

This is not a test. It is an exercise. Use it to see for yourself how well you understand the material in the chapter.

1. What is the difference between a negative-pressure respirator and a positive-pressure respirator?

2. Which one protects you more? Why?

3. If you are working on an abatement project and air samples show 2.5 fibers/cc, which respirator do you have to wear?

4. Can you request a respirator that will protect you more? If so, what type?

RESPIRATOR CARE

5. What is the difference between a qualitative fit test and a quantitative fit test?

6. Some people have a harder time getting a good fit on a respirator. Who are they? Why do they have a hard time? What should they do?

7. Name three limits of respirators—that is, reasons why they protect you less than they are supposed to.

8. Are there times when you can't wear a negative-pressure respirator because it won't protect you enough?

9. Name two parts of the "worker's respirator bill of rights."

RESPIRATOR
CARE

PERSONAL PROTECTIVE EQUIPMENT

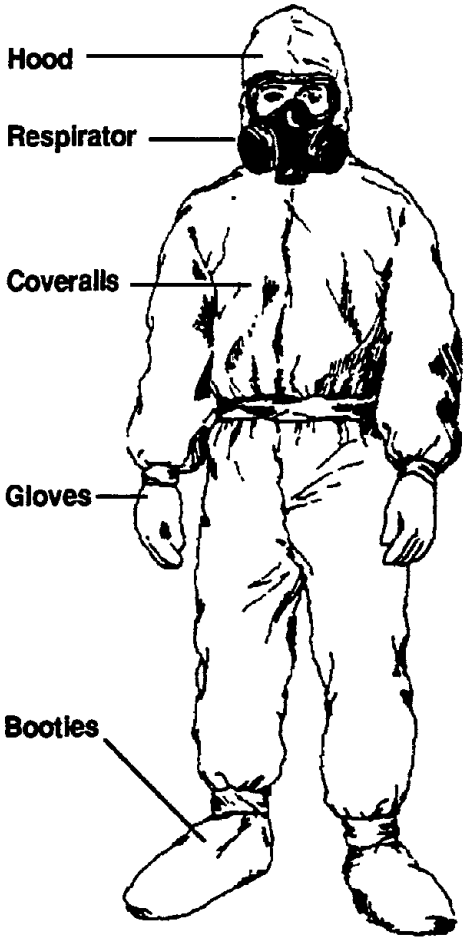
PART 3: OTHER SAFETY EQUIPMENT

4

In this chapter you will learn:

About disposable suits.

About hard hats, boots, and other equipment.



Wear a respirator and a disposable suit.

Protective clothing and other safety equipment

A respirator is the most important piece of equipment for protecting you from asbestos. However, you also may have to wear protective clothing.

Workers should always wear disposable suits and gloves when dealing with asbestos. The suit includes coveralls, booties, and a hood. Sometimes suits are made in one piece, sometimes in two or three. They are usually made of a papery material such as Tyvek™ or KleenGuard™. Suits come in several sizes. You can shorten a one-piece suit by putting duct tape around the waist, wrists, and ankles. Everyone in the work room may be required to wear a suit. You should also wear gloves to keep asbestos off your hands. For small-scale work two suits are often worn. This way the outer suit can be disposed of and the inner suit can be worn to a shower or washroom.

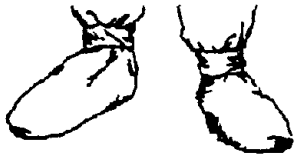
OTHER SAFETY EQUIPMENT

Footwear

Booties are very slippery, especially on the wet plastic in asbestos work rooms. You may wear canvas or rubber shoes outside the booties. You may wear boots or steel-toed safety shoes. These keep you from slipping or being hurt by falling objects.

Leave unclean safety equipment on the job.

You can't take these shoes off the job unless they are clean. Sometimes you can clean all the asbestos off them. (Leather and fabric shoes can not be cleaned; rubber shoes without seams can be cleaned.) **If you can't clean them, you have to throw them out or tie them up in a bag.** By sealing them up in a bag, you can save them until your next asbestos task.



BOOTIES CAN BE SLIPPERY!

YOU MAY NEED TO WEAR BOOTS OR SAFETY SHOES

Leave work clothes at work

You should not wear street clothes on an asbestos job. If for some reason you have to wear street clothes, seal them in a plastic bag with a warning label. Do not take them home.

If you use any non-disposable clothing or equipment (such as work boots or a hard hat) on an asbestos job, you must clean it. Do not take it off the job unless it is clean. You can save these clothes in a sealed plastic bag until they are needed for another asbestos task.

Wear a disposable suit. Leave your work clothes at work.

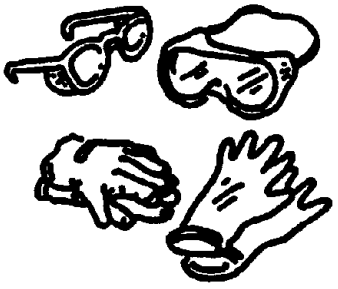
It is possible to wash clothing with asbestos on it. But disposable suits are much better. If you work in cold weather, you will probably wear long underwear. It should not leave the job. The person who washes the long underwear must be trained about the dangers of asbestos.

If you take asbestos home on your skin or street clothes, dust can come off in your home. Your family could get asbestosis, mesothelioma, or other asbestos diseases if they breathe or swallow asbestos. **It is very important to wear a suit and not take your work clothes home.**

Gloves, goggles, and hard hats

Asbestos work has many of the same dangers as ordinary demolition work.

You need to wear goggles or a full face respirator if you do work overhead. You need to wear latex, cotton, or leather gloves if you work with sharp metal lath or around hot pipes. You need to wear steel-toed safety boots and hard hats if building materials might fall. You must wear rubber gloves, rubber safety boots, and hard hats if you work around live electrical wires.



Asbestos work can be as dangerous as demolition work.

You should have some training about how to use safety equipment.

For example, hard hats are made to protect you if something falls straight down on your head. But they **will not protect you if something hits you from the side.** Your employer should train you about hard hats. OSHA has rules about protective equipment like hard hats, goggles, and boots. **Many of the rules for respirators also apply to other equipment.** For example, goggles will not protect you unless they are in perfect shape. They have to be cleaned, stored and maintained.

You need training in how to use safety equipment.

OTHER SAFETY EQUIPMENT

OTHER PROTECTIVE EQUIPMENT

Key Facts

You must wear protective clothing on an asbestos job.

Asbestos work is just as dangerous as other demolition work.

You may need to wear a hard hat, goggles, or steel-toed boots outside your disposable suit.

You must wear rubber gloves and boots if you are working around live electrical wires.

You need training in how to use safety equipment.

Leave unclean safety equipment on the job site.

Don't bring asbestos home. Leave work clothes at work!

For more information

OSHA Personal Protective Equipment Standards, 1910.132, 1910.133, 1910.135, 1910.136.

OSHA, "Personal Protective Equipment," Publication No. OSHA 3077.

OSHA Asbestos Standard, 29 CFR 1926.1101, Section (i).

EPA Worker Protection Rule, 40 CFR 763, subpart G.

RECOGNIZING ACBM IN POOR CONDITION

5

In this chapter you will learn:

How to identify ACBM in poor condition.
Why it is important to recognize ACBM in poor condition.

When Asbestos Containing Building Materials (ACBM) are in bad condition it is much more likely to be dangerous. Examples of ACBM in poor condition might be ripped pipe insulation, a ceiling tile damaged by a water leak, or damaged asbestos floor tile.

It's important for you to be able to recognize ACBM in your building, **especially** when it is in poor condition. You could be walking by asbestos material every day and not know it. This chapter will help you to recognize possible ACBM in your building. If you are not sure whether a material contains ACBM, it is called **"suspect ACBM"** and should be assumed to contain asbestos. It is also important to identify suspect ACBM in poor condition. If you identify suspect ACBM, or damaged suspect ACBM, let your supervisor know.

Although O&M workers will not be required to perform formal building inspections for ACBM, you should know what is involved in this procedure. A trained and experienced person who has been accredited by taking and passing a special 3-day EPA course must conduct an inspection to locate ACBM, and classify its condition. **Bulk samples** are necessary to positively identify material as asbestos-containing. Bulk samples will be taken by the inspector.

Once all of the ACBM has been identified, the findings are given to the building owner (in a report) and he or she is responsible for having a **Management Plan** developed for that building. The management plan will outline how the ACBM will be dealt with until it is removed.

Asbestos in "poor condition" can have a lot of different meanings. Here we will discuss three different conditions:

- **Damaged ACBM**

- **Deteriorating ACBM**
- **Delaminated ACBM**

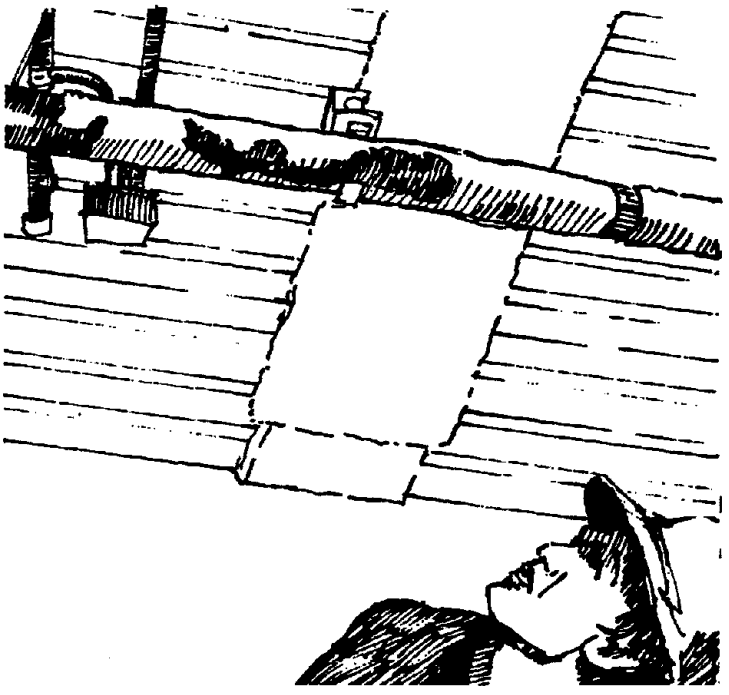
Be on the lookout for damaged ACBM.

Damaged ACBM

Accidental or intentional contact with ACBM that can result in the release of asbestos fibers is known as **damage.** Ripped pipe insulation, broken ceiling tiles, scrape marks on walls from moving equipment, or broken plaster could all be examples of damaged ACBM. Be aware!

Dust or debris underneath any type of ACBM is usually a sign of damage. You must be able to recognize ACBM damage in your building to keep you and your coworkers safe.

If you are **not sure** whether some damaged material contains asbestos,



YOU NEED TO KNOW HOW TO RECOGNIZE DAMAGED ACBM

assume that it does until you can find out for sure. Asbestos is a dangerous material. It's better to be safe than sorry.

Deteriorating ACBM

Asbestos that has cracked, flaked, or peeled away from its surface (or "substrate") is called **deteriorated ACBM.**

ACBM deterioration is caused by many things. Some causes could be old age, poor quality material, poor installation, heat, humidity, wind, water damage, vandalism, or disruption from previous maintenance work. ACBM deterioration is common, especially in older buildings.

It is just as important to stop the **cause of the deterioration** (or damage) as it is to control the release of asbestos fibers. If an ACBM ceiling tile repeatedly gets damaged by water leaks, you must **stop the water leaks.** This will prevent further asbestos damage.

Asbestos **dust or debris** is a clear sign of **ACBM deterioration** when you find it directly under insulation or surfacing material.

Delamination

When asbestos material separates or breaks away in pieces or chunks from where it was originally intended to be, it is known as **delamination.** An example of delamination would be asbestos plaster in a boiler room that has **blistered** over the years due to the high humidity in the area and fallen on the floor.

Delamination occurs over time.

Areas in a building which could be affected by delamination are usually **high-humidity areas.** Rooms near pools (like pool filter rooms), boiler rooms, locker rooms or bathrooms all are affected by humidity. This is where **delamination** is most likely to occur.

Blistering, peeling, or flaking ACBM is a sure sign of delamination. Humidity causes the binders or glue in the ACBM to fail. The material breaks away and releases asbestos fibers.

Surveillance

Being able to identify asbestos problems in your building is an important responsibility. Keeping a lookout for changes in the condition of the ACBM is called **surveillance.** Occasional or "*periodic*" surveillance is required in

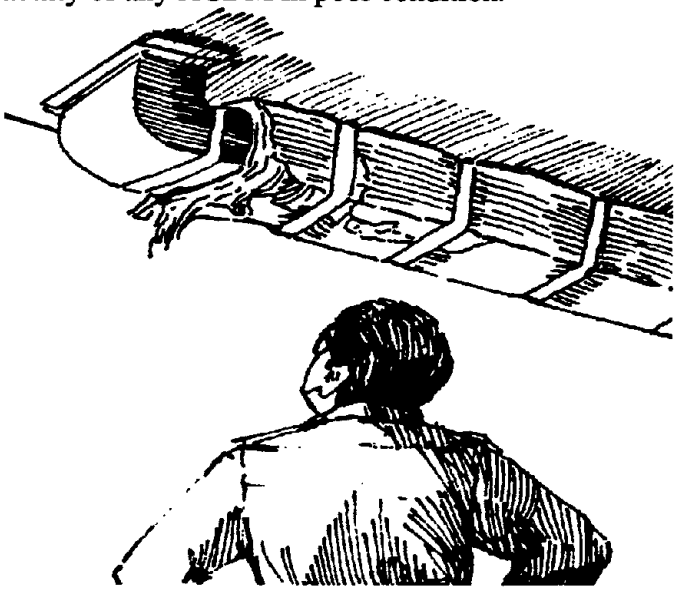
school buildings under the **AHERA** rule every 6 months. It is **strongly recommended in all other buildings.**

After taking this **O&M Course** you will be more familiar with what ACBM is and where it can be found in your building. It will be up to you to monitor the condition of all ACBM, and respond to any problems that might arise due to damage, deterioration, or delamination.

Keep a written log of ACBM damage.

Every **3 years** school buildings must be **reinspected** to assess the current condition of the ACBM. Although **this** reinspection must be done by an accredited building inspector, trained O&M workers can perform the routine surveillance that must be done at least **every 6 months.** Records must be kept on this updated information. This is the responsibility of the **Designated Person** (the person in charge of the asbestos program). He or she will record the surveillance/reinspection information, and include it in the management plan.

Asbestos damage, deterioration and delamination can be spotted easily. You need to keep your eyes open and know what to look for. Keep a **written log** of your findings, and notify the designated person or asbestos coordinator for your facility of any ACBM in poor condition.



YOU CAN EASILY SPOT DAMAGE, DETERIORATION AND DELAMINATION OF ACBM.

Recognizing ACBM in Poor Condition

Key Facts

It's important to be able to spot what could be asbestos in your building – especially if it's in bad condition.

Asbestos that is in bad condition can usually be put into one of these 3 categories:

1. Damaged ACBM
2. Deteriorating ACBM
3. Delaminating ACBM

The only way to be sure if a material contains asbestos is to take a bulk sample and have it tested by a laboratory.

If you're not sure if a material is or isn't asbestos containing – **ASSUME THAT IT IS**, until you can find out for sure.

RECOGNIZING
ACBM

CONTROL METHODS

6

In this chapter you will learn:
How asbestos can be controlled.
About the kind of asbestos work you may do.

Control Methods

When asbestos materials are found in a building, the owner of the building must make a decision about what to do with them. The danger from asbestos materials depends on how likely they are to release fibers into the air. Products which are in good shape and are unlikely to be damaged are not usually a problem. These products can stay in the building and might not be removed until the building is renovated or demolished.

Products which are in bad condition need to have something done to them to prevent fibers from getting into the building air. There are a number of different ways to do this. These are called **control methods.** Most large scale control methods should be performed under containment, however, minor repairs and removals as done in an O&M plan, may sometimes be done without containment. They include:

There are several ways to control asbestos in buildings.

1. **Encapsulation**
2. **Enclosure**
3. **Repair**
4. **Removal**
5. **In-Place Management**

These control methods are sometimes used together on one project. Repairing damaged pipe insulation and encapsulating asbestos mud on a pipe elbow would be an example of this. With respect to encapsulation, enclosure, and removal, **O&M workers only carry out small-scale operations.** Choosing the appropriate control method is important to prevent the release of asbestos fibers.

Usually, O&M workers will not decide which method to use. That decision is made by the **Designated Person or Asbestos Coordinator.** It is then included in the management plan.

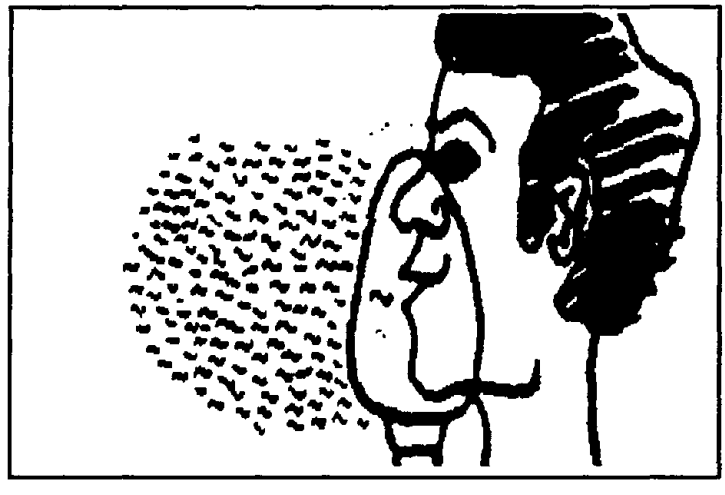
CONTROL METHODS

1. Encapsulation

Encapsulation means spraying a paint-like material on the asbestos.

Encapsulation is the spraying of a paint-like coating over the material. The coating is put on using a low-pressure spray system. When material is encapsulated, the coating prevents release of fibers into the air. The coating may also prevent some damage to the material from contact.

When you work on an encapsulation job you can still be exposed to asbestos fibers. In fact, when the spray of encapsulant hits the material, a small amount of dust is sometimes blown into the air. The material cannot be wetted first, because the encapsulant will not stick. Because of this, an encapsulation job is set up just like a removal job. Workers will also wear respirators and protective clothing while doing encapsulation.



ENCAPSULATION

Two kinds of encapsulants are used. One kind is called a **bridging encapsulant.** This kind covers the material with a "tough skin" on the outside. The other kind is called a **penetrating encapsulant.** This kind soaks into the material and binds the material together and to its substrate. The material then becomes hard like a plaster cast.

When doing encapsulation, workers usually make two passes at the material with the sprayer. This is done to make sure that the asbestos is completely covered. The encapsulant takes some time to dry. Materials

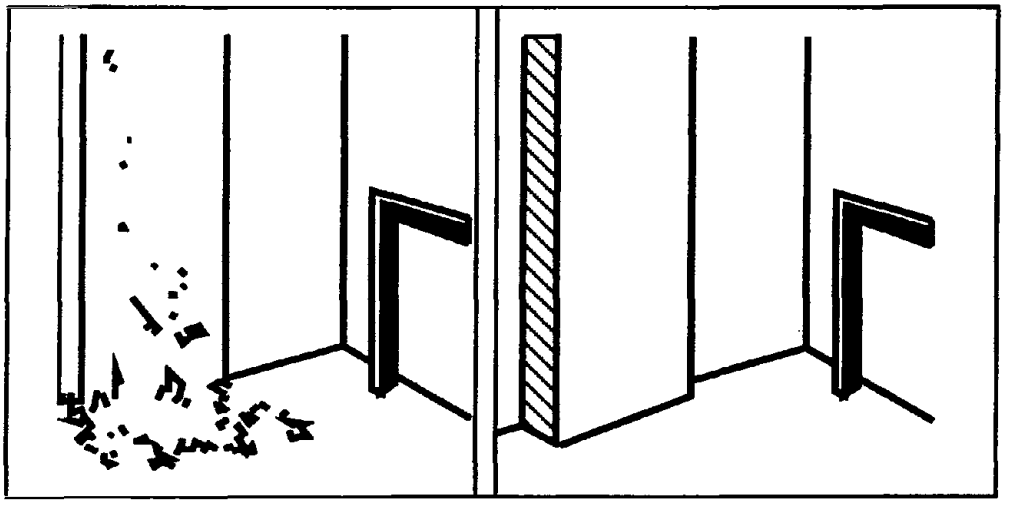
contaminated with dust during the job are disposed of as asbestos waste. This includes plastic barriers, suits and other items. Remember that the encapsulation is only as good as its substrate. (The **"substrate"** is the surface being covered by the ACBM). If the ACBM is badly damaged and falling away, the encapsulation will not last. This is known as **delamination.** Here are advantages and disadvantages associated with encapsulation:

Advantages	**Disadvantages**
Release of fibers reduced	Asbestos remains
Lower *initial* cost	Sealant may cause delamination
Quick	Reinspections and surveillance needed (schools)
	Encapsulated ACBM harder to remove

2. Enclosure

Enclosure means building an air-tight barrier around the asbestos.

Enclosure means building an air-tight barrier around the asbestos material. The enclosure is built with non-asbestos building materials. Examples are sheet rock, wood with spline joints, caulked sheet metal and other materials. **If the barrier is not air-tight, it is not considered an enclosure.** For example, putting in a drop ceiling to control asbestos fireproofing material is not an enclosure.



ENCLOSURE

An enclosure job also requires that a containment be built. Building the enclosure often requires disturbing the material. Workers will also have to wear respirators and protective clothing. If drills or nail guns are used to attach the enclosure, asbestos dust can be released.

Another type of enclosure is sometimes referred to as **encasement.** Encasement means spraying a foam directly on an asbestos material or onto a lattice hung below the material, or pouring concrete on to a dirt floor in a crawl space.

During an enclosure job, disturb the material as little as possible. It is best to use power tools such as drills only if they are attached to a HEPA vacuum. Items from the work area (like plastic sheeting and suits) that get dust on them have to be disposed of as asbestos waste. Other things like power tools must be cleaned before they leave the containment.

Like encapsulation, there are advantages and disadvantages to building an enclosure around damaged ACBM. Here are a few:

Advantages	**Disadvantages**
Exposure outside enclosure reduced	Asbestos source remains
	Fiber release possible during construction
Lower *initial* cost	Inspections and periodic reinspections
Quick	Work around asbestos requires extra care

3. Repair

Repair is a control method which can be used if there are small amounts of damage to asbestos materials. For example, asbestos pipe insulation might have a canvas covering which is torn. The tear exposes the asbestos fibers, which may be released into the air. By simply wrapping new canvas around the tear and repainting with mastic, the area is repaired. Repairing damaged ACBM is a **temporary** solution to an asbestos problem - it still must be dealt with at a later date.

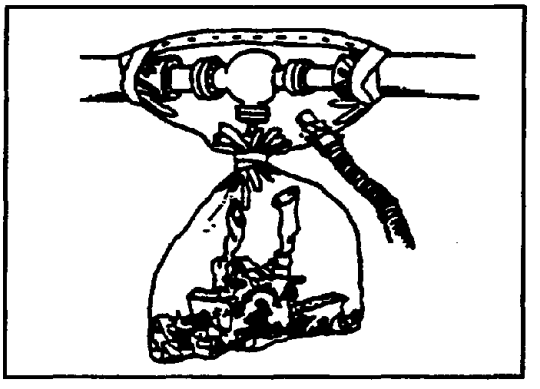
Advantages	**Disadvantages**
Release of fibers reduced	Asbestos source remains
Lower *initial* cost	Fiber release possible during repair
Quick	Inspections and periodic reinspections

4. Removal

Removal is the method used to permanently control fiber release from asbestos materials in buildings. Removal means taking the asbestos off of whatever it is on. It is then bagged and sealed and taken to a landfill that accepts asbestos waste.

Removal means taking the asbestos off and properly disposing of it.

Large scale asbestos removal jobs must be done by workers with **more training** than you are receiving here (4 days of training for asbestos abatement workers). O&M workers should only remove ACBM when there are small amounts of it posing an immediate health threat to building occupants. An example of this would be a damaged asbestos-containing ceiling panel. O&M workers, wearing the proper personal protective equipment, could remove the damaged tile and replace it with a non-asbestos containing tile. *(See Chapter 7-Work Practices)*



GLOVEBAG (SMALL-SCALE) REMOVAL

Advantages	Disadvantages
Eliminates ACBM	Improper removal may increase fiber level
Eliminates need for O & M Program	Initial cost usually highest
Life cycle cost may be lowest	Refireproofing & reinsulating may be needed
	Technically difficult
	Building operations may have to be shut down temporarily

5. In-Place Management

An O&M program is used to manage asbestos in place.

In-place management is the control method where an O&M program is put into effect to manage the ACBM in a building. The purpose is to maintain ACBM in good condition. As you have already learned in Chapter 1, the O&M program has a number of different parts. Here is a summary:

CONTROL METHODS

1. **Inventory:** A list of all asbestos materials in the building is made. The inventory includes the types and quantities of materials, their location, and their condition.
2. **Labeling:** ACBM in the building can be labeled to alert workers that the materials contain asbestos.
3. **Surveillance:** The materials are inspected at least every six months to see if they are in good shape.
4. **Training** for maintenance employees, (like this course), is required for people who work in the buildings that may contain ACBM or whose jobs will include disturbing ACBM. It is one of the most important aspects of implementing a good in-place management program.
5. **Work procedures** are developed for maintenance work. For example, how to safely remove and dispose of a small amount of pipe insulation so that a leaking pipe valve may be repaired.
6. **Equipment:** Proper equipment is provided to maintenance workers so that they can do the work safely.
7. **Damage Response:** Procedures are developed for dealing with accidental damage to asbestos materials (fiber release episodes).

The point of the In-Place Management program is to prevent the asbestos materials from releasing fibers into the building. This protects maintenance and service workers, outside contractors (plumbers, electricians, etc.) and other people in the building. All of the parts of the program are important. If some parts are done but others are not, the program won't be effective. A good In-Place Management program also requires that the building owner have a knowledgeable person on staff to deal with asbestos. The building engineer or someone else should be trained to know about asbestos hazards and how to run the owner's program.

Any building containing asbestos should have an O&M program.

Advantages	Disadvantages
Reduces release of fibers	Asbestos source remains
Lower *initial* cost	Cost of training and maintaining O&M program is significant
Allows removal to occur over a period of time	

CONTROL METHODS

Key Facts

Asbestos in buildings can be controlled in a number of different ways. The different ways are:

1. Encapsulation
2. Enclosure
3. Repair
4. Removal
5. In-Place Management Program

Encapsulation means spraying a paint-like coating over the material. This binds the material together. It can also be a liquid that penetrates the ACBM and binds it together from within.

Enclosure means building an airtight barrier around the asbestos material.

Repair means fixing small areas of damaged asbestos material.

Removal means taking the asbestos material off of whatever it is on, cleaning the material up and properly disposing of it.

An **In-Place Management Program** is a written Operations and Maintenance program. It is needed when asbestos will remain in a building. The program states what training a worker must have. In order to work with asbestos, O&M workers should receive a two-day operations and maintenance training.

The written In-Place Management program includes:

1. Where asbestos is found. Many asbestos materials should be labeled.
2. Worker training requirements.
3. Ways to work with asbestos safely. This includes equipment, worker protection, and medical exams.
4. Permits which are required before beginning work.
5. How to check the condition of asbestos materials and record any changes.

Discussion questions

1. What kind of material do you think would not be good to encapsulate?
2. Can you see a situation in which more than one control method might be used in an area?

For more information

Guidance for Controlling Asbestos Containing Materials in Buildings (The Purple Book), U.S. Environmental Protection Agency, June, 1985.

Managing Asbestos In Place, A Building Owner's Guide to Operations and Maintenance Programs for Asbestos-Containing Materials, U.S. Environmental Protection Agency, July, 1990.

EPA "Managing Asbestos in Place", (The "Green Book"), EPA Publication No. 20T-2003.

O&M WORK PRACTICES

7

In this chapter, you will learn:

- **Why different cleaning procedures are needed for ACBM.**
- **When special cleaning is required.**
- **Different tools and equipment needed for asbestos cleaning.**
- **What to do before starting an O&M cleaning task.**
- **The safest way to disturb ACBM if your job requires it.**
- **The proper way to clean yourself and the work area when the task is completed.**

Why can't normal cleaning methods be used for ACBM?

ACBM requires special cleaning methods.

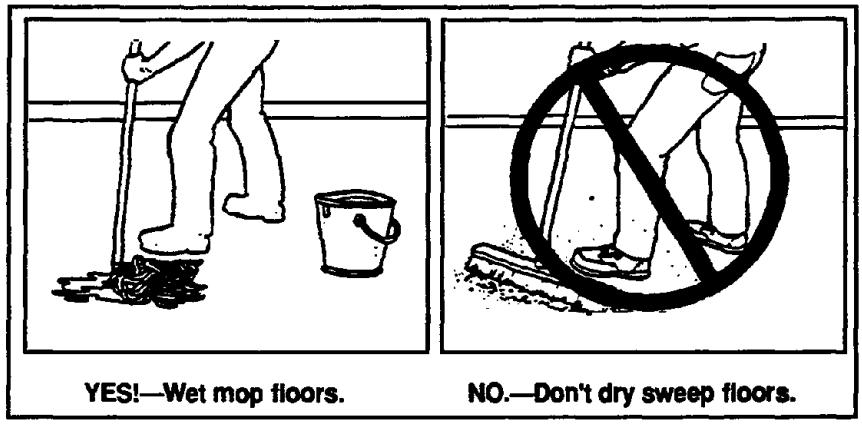
As you have already learned, special care must be taken to keep asbestos fibers out of the air. Normal cleaning methods, such as sweeping, dusting and vacuuming will only stir up asbestos fibers and create a more hazardous situation. Special methods and tools are used to keep fiber levels down.

Remember your main goal when dealing with asbestos is to **keep dust out of the air**. The following is a list of asbestos specific cleaning techniques to keep in mind when dealing with ACBM.

Wet mopping v. dry sweeping

When asbestos dust or debris has fallen to the floor, it must be picked up immediately. If you sweep up the dust, you will miss a lot of asbestos fibers and they will be stirred up into the air. **DO NOT DRY SWEEP ASBESTOS DUST!**

Wet mopping the floor with amended water (water with a soap solution added to it) will keep fiber levels down. Remember, too, that the mophead and water are contaminated and must be disposed of as asbestos waste.



USE WATER TO CLEAN UP

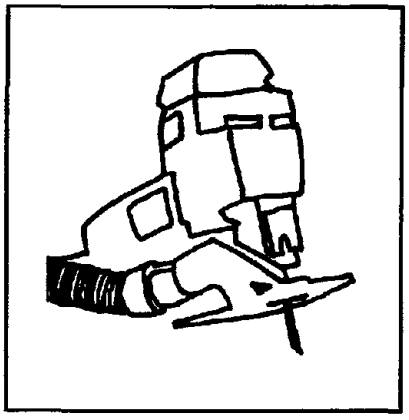
HEPA-equipped tools will capture asbestos dust.

Regular vacuuming v. HEPA vacuuming

A regular vacuum cleaner may look like it's picking up all of the asbestos dust, but remember most asbestos dust cannot be seen. Most asbestos fibers are very tiny and an ordinary vacuum will miss a lot of fibers. The fibers it does pick up will be blown out through the bag or through the exhaust. **Ordinary vacuum cleaners will do more harm than good!**

A HEPA (**H**igh **E**fficiency **P**articulate **A**ir) vacuum is very much like an ordinary vacuum cleaner but with one big difference. It has a HEPA filter built in to trap the asbestos fibers as they are collected. (A HEPA filter will trap 99.97% of the fibers that it picks up.) **A HEPA vacuum cleaner is a very important piece of equipment for you to have when doing asbestos cleaning work.**

HEPA VACUUM



HEPA-EQUIPPED JIGSAW

HEPA-equipped power tools v. regular power tools

Sometimes power tools are needed to remove ACBM. This will always result in a stirring up of fibers. Because of this, power tools like drills or jigsaws are used only when absolutely necessary, and then only with some important modifications.

Attaching a HEPA vacuum to the power tool will greatly reduce the amount of dust that is created. This is called "local ventilation" or "local exhaust ventilation." This will allow any fibers that were released to be immediately captured. Power tools should also be double insulated and grounded, so they won't shock you even if they get wet.

When is special cleaning needed?

Special cleaning is necessary wherever asbestos dust or debris is found. Special methods and equipment are needed to clean these areas. Cleaning asbestos is very different from picking up normal dust or dirt. Asbestos fibers are dangerous to your health; you must take extra care when dealing with ACBM.

If you are not sure if a material is ACBM, **assume that it is.** It is always better to be safe when working around asbestos. The following section will give you an idea of when special cleaning is necessary.

Initial cleaning

After your building has been checked for ACBM, special cleaning should be done wherever friable or damaged ACBM was found. This is called **initial cleaning**. It is important that you thoroughly clean everywhere asbestos fibers may have settled. Here are some common surfaces where asbestos dust might be found, and some cleaning methods.

Asbestos dust usually can't be seen.

As a general rule, hard surfaces should be wiped down with a wet cloth or mop. Surfaces that cannot be wiped should be HEPA-vacuumed.

WORK PRACTICES

When cleaning, follow the cleaning methods below

Surfaces	Possible cleaning method
floors	wet-mopping with amended water
walls	wet-wiping with rags, using amended water
curtains	HEPA-vacuuming
carpeting	steam cleaning or HEPA-vacuuming
books	HEPA-vacuuming
furniture	wet-wiping with amended water, or HEPA-vacuuming
desks	wet-wiping with amended water, or HEPA-vacuuming

Special cleaning will pick up a lot of dust you can't see.

It is important to remember when doing your initial cleaning most of the fibers you pick up are too small to be seen. Don't let this fool you. You are doing a very important task that may save lives. Asbestos cleaning jobs must be done slowly and thoroughly.

Periodic cleaning

Air movement, vibration, and contact will cause asbestos containing materials to create dust. Although you can't see this, it is happening. This is why scheduled special cleanings or **periodic cleanings** using wet methods are needed.

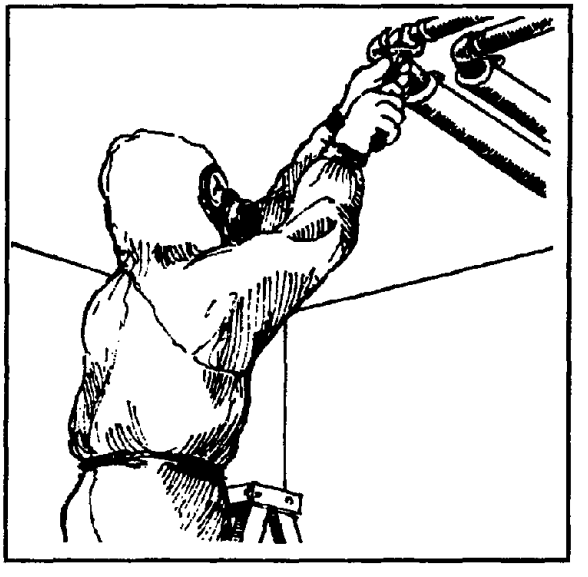
Your asbestos supervisor should let you know how often this periodic cleaning should be done. The decision is made based on the age of the building, how much ACBM is there, and how likely it is that fibers are being released. A common periodic cleaning schedule is every 6 months, although in your building it may be more or less often.

When ACBM is disturbed by accident

Sometimes asbestos is disturbed by accident. A water leak might cause an asbestos ceiling tile to become soaked and fall. Or the vibration of a furnace might cause some ACBM on a duct to come loose. When something like this happens, you know that asbestos fibers have gotten into the air. Special cleaning will be necessary to pick up asbestos fibers that have been released.

When ACBM is disturbed on purpose

Special cleaning is also needed when ACBM is disturbed on purpose. Working on a plumbing fixture, replacing some floor tiles, or working on a light fixture can create asbestos dust. Once the task has been completed, special cleaning is needed around the work area.



Take precautions when you'll be disturbing ACBM.

Sometimes this type of cleaning is easier because it is for a **planned asbestos disturbance.** Steps can be taken **before** the work is started to make cleanup easier. Here are some examples:

1. Laying down poly sheeting will keep asbestos fibers off the floor.
2. Sealing air vents in the work area will keep fibers from leaving the immediate area.
3. Wetting the ACBM with amended water before disturbing it will keep fiber levels very low.

Special cleaning will still be needed after the job is done, but it should be much easier if these steps are taken.

WORK PRACTICES

Tools and equipment needed to perform asbestos O&M work

Special cleaning means you will need special tools and equipment. You may not be familiar with all of the tools or equipment listed below, but you will receive training in this course on how to use all of them.

A very important thing to remember when working with asbestos is that your tools and equipment will become **contaminated.** Does this mean they must be thrown away? No. Some tools can be **decontaminated.** Tools that cannot be cleaned will simply be marked as contaminated and only used for asbestos maintenance operations. A good rule of thumb is that smooth metal and plastic tools can be decontaminated. Leather or wood tools usually can't be decontaminated.

Keep your asbestos tools separate from your regular tools.

When storing contaminated tools, be sure to wipe them down first with amended water. Then seal them in a 6-mil plastic bag, making sure the bag is properly labeled and sealed with duct tape.

ASBESTOS TOOLS AND EQUIPMENT

- Utility knife
- Ground fault circuit interrupters
- Extension cords/adapters
- Lockout tags
- Temporary work lights
- Ladder/scaffold for elevated work
- Wet wipes or bucket
- Smoke test bulb and tubes
- Bone saw
- Wire cutters
- Tin snips
- Safety glasses
- Scrapers
- 6-mil sheet plastic
- Duct tape
- Disposal bags with labels
- HEPA vacuum
- Respirators
- Disposable coveralls
- Disposable towels or wet wipes
- Asbestos barrier tape
- Asbestos warning signs
- Low-pressure sprayer
- Aerosol encapsulant cans
- Air monitoring pumps
- Frame for mini-enclosure
- Negative pressure machine
- Glovebags

If you will be doing a lot of asbestos maintenance work it might be helpful to choose a certain broom closet or work room to house all of your asbestos equipment. Be sure to label all the equipment, and keep it separate from non-contaminated equipment.

Cleaning and decontaminating HEPA vacuums

Cleaning a HEPA vacuum is very much like doing an asbestos cleanup job. You must be careful not to contaminate yourself or the work area when it is being cleaned.

Before cleaning your HEPA vacuum, you should read and follow any specific instructions included by the manufacturer. It is helpful to have a second HEPA vacuum to help clean the first one. Follow these steps when cleaning or changing filters and bags in your HEPA vacuum.

Keep your asbestos tools separate from your regular tools.

- The vacuum should only be opened and cleaned in an asbestos work area.

- You must wear a respirator and protective clothing when changing vacuum cleaner bags or filters, or when cleaning the unit.

- Cover the floor with a plastic drop cloth. When opening the vacuum, mist the air. Remove the full bag and dispose of it in a properly labeled asbestos waste bag.

- Wet wipe the inside of the HEPA vacuum, and clean it with the second HEPA vacuum, if you have one.

- Replace the bag.

- Wipe down the vacuum and plastic drop cloth. Dispose of the drop cloth as asbestos waste.

- Decontaminate yourself with the HEPA vacuum and by wet-wiping your suit.

- Dispose of the protective suit and HEPA cartridges in the asbestos waste bag. Seal the bag and clean your respirator.

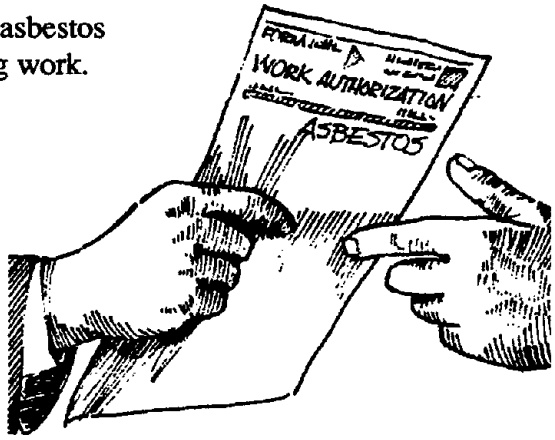
WORK PRACTICES

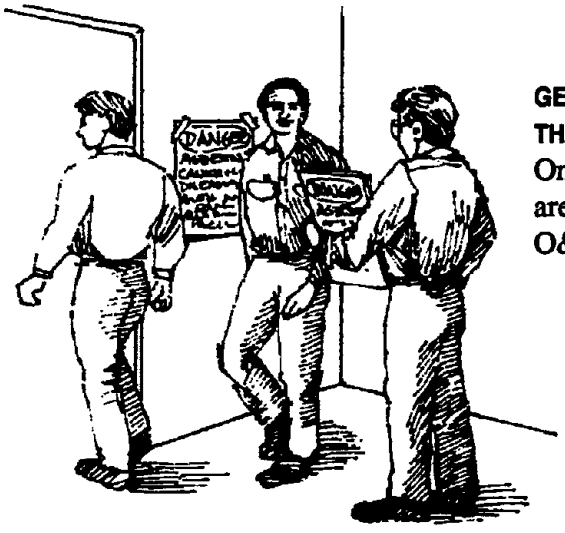
Before cleaning asbestos

Several steps must be taken before beginning an O&M clean-up task where a small amount of asbestos has been disturbed. You must take the proper precautions to keep yourself safe. Every building will have its own procedures for cleaning ACBM dust and debris. The following steps are basic rules that should be followed.

Follow some basic rules before starting an O&M cleaning.

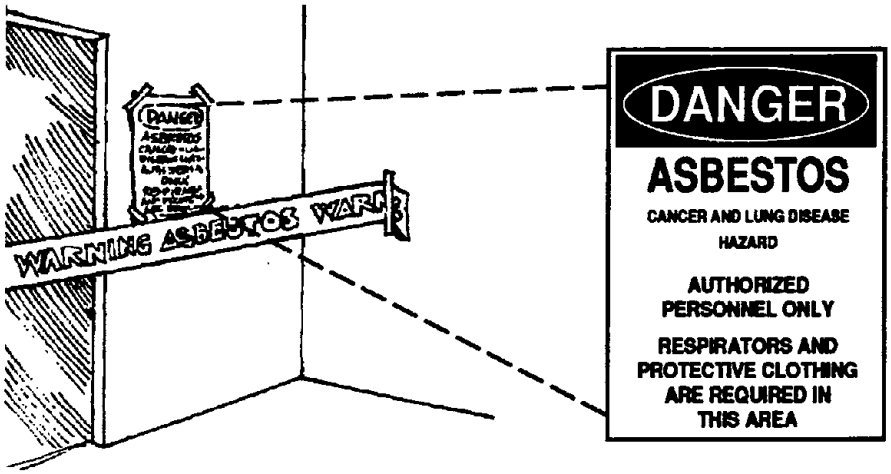
GET PERMISSION from your asbestos supervisor before beginning work.



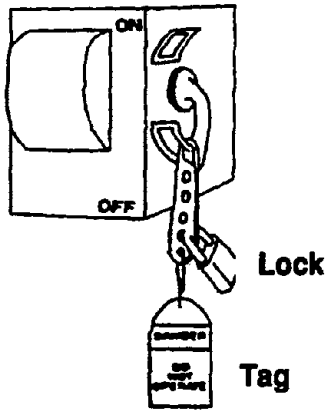


GET OTHER PEOPLE OUT OF THE WORK AREA.
Only O&M trained workers are allowed to be around an O&M cleanup task.

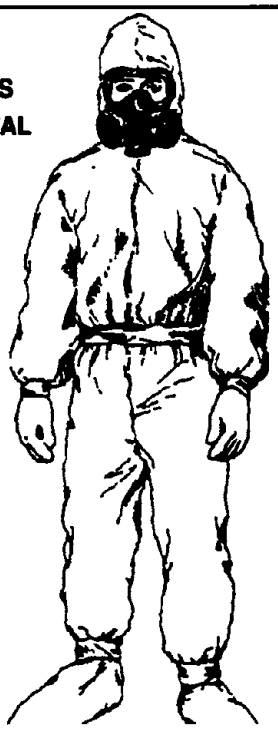
PUT UP WARNING SIGNS to keep people away from the work area.



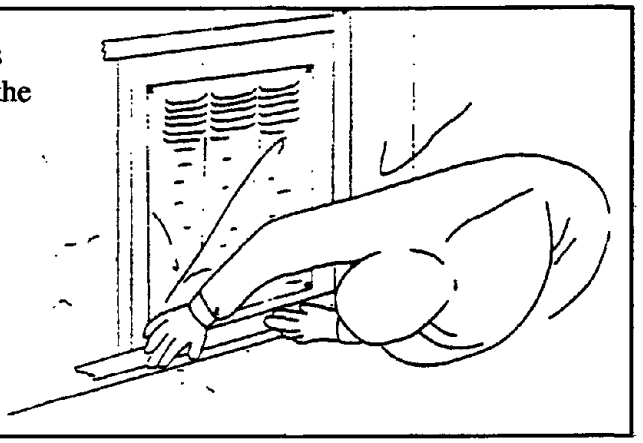
SHUT OFF HVAC AND LOCKOUT ELECTRICAL SYSTEMS,
so no one gets electrocuted and asbestos is not being carried through the building.



PUT ON RESPIRATORS AND PERSONAL PROTECTIVE EQUIPMENT.



SEAL AIR VENTS so asbestos fibers won't float through the building.



BRING IN SPECIAL TOOLS AND EQUIPMENT that are only used for asbestos removal and cleanup work.

Cleaning up damaged asbestos material

You must be careful when cleaning up even a small amount of ACBM. Damaged pipe insulation, ripped duct insulation, or damaged asbestos drywall are examples of "small scale" O&M tasks. (Small scale jobs includes less than 3 square feet or 3 linear feet of ACBM.)

Here is a checklist of steps that should be taken. Every job will be different of course, but these basic steps will be necessary for every job.

Damaged asbestos must be repaired immediately.

- Job setup must be done as explained in the last section. This includes putting up warning signs, sealing off air vents, wearing a respirator, etc.

- Your asbestos supervisor will let you know if air sampling will be needed.

- Wet the asbestos debris using a low pressure sprayer. Amended water is always used.

- Pick up large pieces of debris and place them in a waste disposal bag.

- Hepa vacuum the entire area, and then wet-wipe the area with amended water. Throw the rags into the disposal bag when the job is done.

- Repair the damaged insulation. Your asbestos supervisor will let you know how this should be done.

- Clean up all asbestos contaminated materials and dispose of all waste properly.

If asbestos cleanup jobs are not done right, the rest of the building can become contaminated. You must follow each step carefully and not take any shortcuts. It's **your** health that is at risk as well as other building occupants.

Repairing the damaged ACBM in the right way is also very important. Your asbestos supervisor will decide how the ACBM should be repaired. That decision is based on the location of the material, its chances of being disturbed again, and what replacement material will last the longest. You will probably be able to make decisions like this once you become more familiar with asbestos replacement materials.

Be sure to check on **repaired** ACBM. If it was damaged before, it can become damaged again. It is also important to keep good records of where all ACBM repairs were done. Your asbestos supervisor will probably keep all the official repair records. Keeping your own personal records is a good idea, too.

WORK PRACTICES

Waste Disposal

"Asbestos waste" includes any type of asbestos containing material (ACM) and contaminated materials that are removed during an O&M task. Disposable supplies are also considered asbestos waste. Used poly sheet plastic, duct tape, rags, disposable suits, and used HEPA filters, are some examples of asbestos waste.

Asbestos waste must be sealed in airtight containers. The containers must be labeled. An OSHA warning label and an EPA NESHAP label must be on every waste package. The OSHA label warns people that the package contains asbestos. The EPA NESHAP label lists the name of the asbestos generator and the location of the job.

Asbestos waste storage and disposal requires special procedures.

Waste containers must be **airtight.** Most often 6 mil plastic bags or barrels are used. When using plastic bags, suck the excess air out of the bag using a HEPA vacuum. Bags must then be sealed with duct tape and **"goosenecked."** This means the neck of the bag is taped closed, folded over, and taped again. Asbestos barrels must include an airtight liner and have sealable tops.

If asbestos waste cannot be disposed of right away, it must be stored in a safe place (such as a lockable closet) with warning signs. All asbestos waste must then be hauled to an EPA-approved waste disposal site by a permitted waste hauler. **Asbestos waste cannot be thrown out as normal garbage.**

Sealing and Refinishing Floors

Many buildings have asbestos-containing floor coverings. The only way to be sure which floors in your building contain asbestos is to have them tested. Once you know which floors contain asbestos, they must be treated differently.

Asbestos floors must be treated with care.

Asbestos containing floor coverings must never be dry stripped, sanded, or dry leveled. These methods will stir up a lot of fibers. Wet-stripping is required to minimize the release of asbestos fibers.

Here are some basic procedures to follow when dealing with asbestos floor coverings:

- Wet mop the area in front of the floor stripping machine using a solution of all-purpose cleaner or wax stripper, whichever is needed for the job.

- Leave the solution on the floor for less than a minute.

- Use a putty knife to remove gum or other material. Be careful not to damage the floor covering.

- Don't use the most abrasive pads. (Scrub with moderately abrasive pads, depending on the condition of the floor.) Don't **reuse** pads. Don't use steel wool.

- Pick up excess water with a wet-dry HEPA vacuum if needed.

- Rinse the floor with clean water. Mop up the clean water.

- Remove the water immediately from soft floors. Don't let the water flow under furniture or appliances.

Floors should be stripped of **all** finishes only rarely. Check with your asbestos supervisor before this is done. (Normally, floors are stripped only if there is a change in products to be used or if the floor has been neglected.)

WORK PRACTICES

Sealing the floor (if needed)

Avoid frequent floor stripping.

- Apply the sealant to a clean, dry floor. (Follow the manufacturer's directions.)

- Use the floor machine or mop the sealant into the floor. (Again following the manufacturer's directions.)

- Let the first coat dry. Apply second coat if necessary.

- The next day, use a floor machine with fiber or polish brush to buff the sealant. (If necessary.)

- Allow the sealant to dry before applying the finish

- Follow the manufacturer's directions for applying finish. Use a long strand mophead, or whatever tool the manufacturer supplied.

- Use the standard figure 8 mopping motion. Avoid streaking. Use a thin coat of finish.

Very often one coat of sealant will be enough. Don't apply the finish coat closer than 12 inches from the wall (unless the floor was stripped). Fans may be necessary in humid weather. If two coats are needed, apply the second coat up to the baseboards. Clean any splattered baseboard or furniture. Buff only if absolutely necessary.

O&M WORK PRACTICES

Key Facts

Normal cleaning methods such as sweeping and vacuuming cannot be used when working with ACBM. SPECIAL CLEANING methods must be used.

Your main goal is to keep asbestos dust out of the air. This can be done by following these rules.

1. Don't dry sweep – use a wet mop or wet-wipe the floor
2. Never use a normal vacuum cleaner. You must use a HEPA vacuum cleaner.
3. If you use power tools on ACBM surfaces, be sure they are HEPA-equipped.

Once you discover where ACBM is in your building, those areas will need SPECIAL cleaning methods and in some cases, containment barriers. Once that is done, periodic special cleanings should be scheduled for those areas.

It's a good idea to gather a set of tools/equipment which will only be used for asbestos work. Be sure to label those tools: **"USE ONLY FOR ASBESTOS JOBS."**

Remember you must take several important steps before you work with ACBM:

1. Get permission from your asbestos supervisor.
2. Get other people out of the work area.
3. Put up warning signs and barrier tape.
4. Shut off HVAC and lockout electrical systems.
5. Put on respirators and other personal protective equipment.
6. Seal air vents.
7. Bring in your special tools and equipment.

ASBESTOS SHOULD ALWAYS BE WETTED WITH AMENDED WATER BEFORE IT IS DISTURBED. (Amended water is water with a soap solution added to it).

A lot of floor coverings contain asbestos. They should never be dry stripped, sanded, or dry leveled. When working on an asbestos floor, make sure it is wet. Follow the procedures in this chapter very closely.

Work Practice Exercise

This is not a test. Use it to see for yourself how well you understand the material in this chapter.

1. Why can't you dry sweep or use a ordinary vacuum cleaner in asbestos work areas?

2. What is amended water? Why is it used on asbestos jobs?

3. What is the difference between initial cleaning and periodic cleaning?

4. List 3 steps that need to be taken when preparing a work area to do an asbestos cleanup job.

5. Where should asbestos tools be kept? How should they be labeled?

6. List 3 basic precautions that need to be taken when refinishing an asbestos floor.

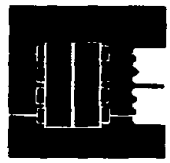
WORK
PRACTICES

For more information

OSHA Asbestos Construction Standard, 29 CFR 1926.58
Publication No. OSHA 3096.

EPA "Managing Asbestos in Place", (The "Green Book"), EPA Publication No. 20T-2003.

"Guidance Manual - Asbestos Operations and Maintenance Work Practices"
National Institute of Building Sciences, NIBS Document No. 5076-7.
(202) 789-7800



MAINTENANCE-RELATED REMOVAL

8

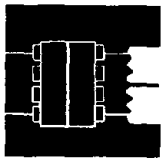
In this chapter you will learn:

How to use a glovebag
How to build a mini-enclosure
How to plan a small-scale O&M repair job

Mini-enclosures and glovebags are two methods used by O&M workers to remove asbestos. A mini-enclosure looks like a plastic closet. It is built around damaged ACBM to contain the asbestos fibers when an asbestos repair job is necessary. A glovebag looks like a plastic bag with gloves attached to it. Glovebags are used to remove small amounts of asbestos pipe insulation. You should only use a mini-enclosure or a glovebag on a "small scale" job.

Before you do maintenance work with ACBM you need to:

- Get supervisor's permission.
- Evacuate the area.
- Place asbestos warning signs at any entrance to the work area and barrier tape around the work area.
- Shut off HVAC and electrical systems.
- Put on protective clothing and a respirator when working around ACBM. When you use a mini-enclosure or a glovebag, you should wear 2 disposable suits.
- Pre-clean area with damp rags and HEPA vacuum.



MAINTENANCE-RELATED REMOVAL

When using a mini-enclosure or a glovebag, you need to follow safe asbestos work practices:

- Contain the work area. When using a mini-enclosure or glovebag, it is necessary to seal the immediate work area so asbestos fibers won't spread.
- Wet the asbestos with amended water.
- Use a HEPA vacuum to filter the air and create negative pressure.

Negative pressure means the air pressure inside the work area is lower than the air pressure outside the work area. Negative pressure ensures that asbestos fibers stay in the work area and do not contaminate the rest of the area. A HEPA vacuum is often used to create negative pressure in a mini-enclosure or glovebag. *(See next page.)*

Air monitoring is sometimes necessary when doing a glovebag job or when using a mini-enclosure. An air sampling pump may be worn by the worker to determine how many asbestos fibers are in the air. Your supervisor will decide if an air monitoring device is needed on your job.

TOOLS AND MATERIALS

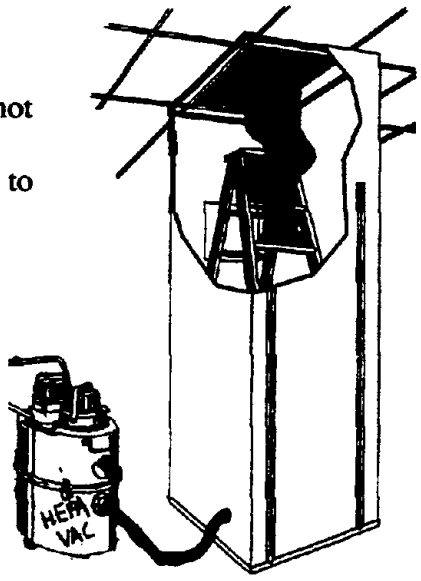
Here is a list of equipment commonly used when doing a mini-enclosure repair job or a glovebag operation:

Duct tape	HEPA vacuum	Garden sprayer
Surfactant	6-mil disposal bags	Smoke test kit
Bone saw	Spray adhesive	Wire cutters
Utility knives	Nylon-bristle brush	Wipe rags
6-mil poly	Barrier tape	Warning signs, labels
Staplers	Putty knife	Scraper

Mini-enclosures

Mini-enclosures are used for work such as:

- removing or working on ACBM that is not pipe insulation.
- in areas where there is too much ACBM to use a glovebag.
- removal or repair of ACBM around hot steam pipes (glovebags will melt on hot steam pipes)



Setup

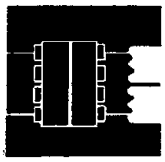
There are several ways to build a mini-enclosure. One way is to line a wood or PVC frame with two layers of poly. Depending on the area you are working in you should have an airtight chamber with two layers of plastic for the floor and two layers of plastic for the walls. If you have a part of the ceiling that is not covered with asbestos you can attach the poly to that. It is also possible to buy a pre-made mini-enclosure from an asbestos equipment distributor. The smallest a mini-enclosure should be is 3 feet wide or 3 feet deep.

Some mini-enclosures have two rooms. The first room is used as a change room where you keep your tools and protective gear. The second room is the work area. These two rooms should be connected. They should be separated by two layers of poly that act as door flaps.

A HEPA vacuum hose should be inserted into the mini-enclosure. This will create negative air pressure in the work area, and will collect fibers that may be released during the job.

In a mini-enclosure you must:

1. **Use amended water.**
2. **Use a HEPA vacuum.**
3. **Wear a suit and respirator.**



MAINTENANCE-RELATED REMOVAL

Removal

When removing asbestos, keep it wet using a low pressure sprayer with amended water. Bag up the asbestos material as it is removed. After removing the asbestos clean the entire surface with a wet nylon brush or rag. After you have removed all visible ACBM, clean the area again, and then apply a thin coat of sealant. This procedure is known as "lockdown."

Cleanup

After you have finished removing the asbestos, you need to take time to clean up the work area. Follow these important steps:

- Wipe down the floor and walls of the mini-enclosure with amended water. Use a mop and HEPA vacuum to pick up any remaining ACBM. Leave the HEPA vacuum running to filter the air inside the mini-enclosure.
- Whenever possible, wait one day and reclean the area. This allows remaining dust to settle so it can be cleaned up a second time.
- Decontaminate all tools by washing them thoroughly in amended water. Do this before you bring them out of the work area.

Clean up must be done right away.

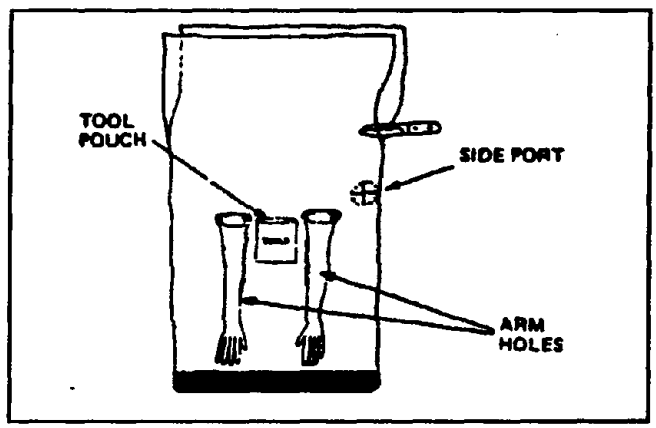
- Once the area is clean, take down the mini-enclosure and warning signs. Start from the top of the mini-enclosure and fold downward. Bag the plastic as asbestos waste and dispose of it properly.
- If you are wearing two suits, clean your outer suit with damp rags and a HEPA vacuum. Wipe off the respirator with a clean wet towel or rag. Throw away the outer suit with the mini-enclosure. Go to a shower or washroom wearing your inner suit and respirator. Remove the filters and clean out your respirator in the shower or washroom. Bag your suit and the used filter and throw them away with the rest of the asbestos waste.
- If you only have on one suit, clean it using the above methods and throw it away with the mini-enclosure. Be sure to leave your respirator on until you can properly wash it in the shower or washroom.

Glovebags

Glovebags are used when removing pipe insulation.

A glovebag is a plastic bag with sleeves and gloves attached. There are different size glovebags made to fit different types of pipes. Some glovebags are made for horizontal pipes and others are made for vertical pipes. A glovebag seals around the asbestos insulation on the pipe. The seal must be airtight. ACBM is then removed inside the glovebag so no fibers will be released to the outside air.

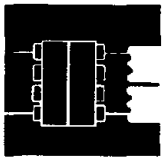
Always wear a respirator and suit when using a glovebag.



Setup

Before you hang your glovebag you need to make sure you have prepared the area (posted asbestos warning signs, put up barrier tape, shut off electrical and HVAC systems, etc.). Wearing respirators and personal protective equipment is always necessary when doing this type of asbestos task, as well. The following steps explain how to do a proper glovebag:

1. If there is friable insulation near the area you are going to work on, wrap the insulation with poly and duct tape. This will ensure the remaining insulation won't be disturbed.



MAINTENANCE-RELATED REMOVAL

2. Place a layer of poly underneath the area where you are working. This will protect the floor from contamination if your glovebag leaks or breaks.

A glovebag may only be used once.

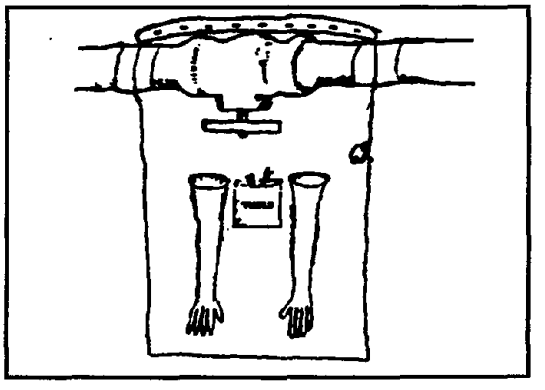
3. Duct tape each end of the pipe where the glovebag will be attached so you will be taping to tape and not to ACBM.

4. Duct tape the bottom of the glovebag (the closed end) to prevent the bag from splitting.

5. Cut the sides of the bag from the top to fit the pipe. Cut each side about twice the width of the pipe.

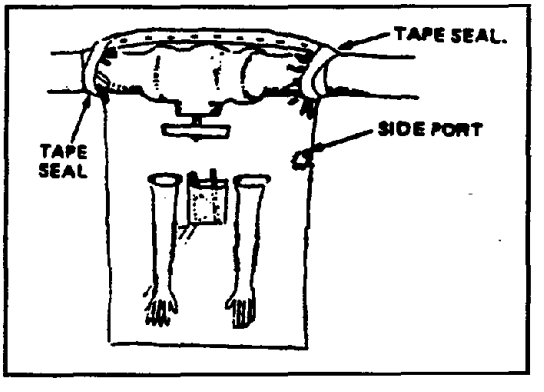
6. Place the tools you need inside the glovebag. Tools you normally use inside a glovebag are a utility knife, bone saw, wire cutters, rags, nylon brush and encapsulant.

7. Place the glovebag around the pipe. Seal the top with duct tape or staples. If you staple the bag you must cover the staples with duct tape. Asbestos fibers can leak out of a bag that is only stapled shut.

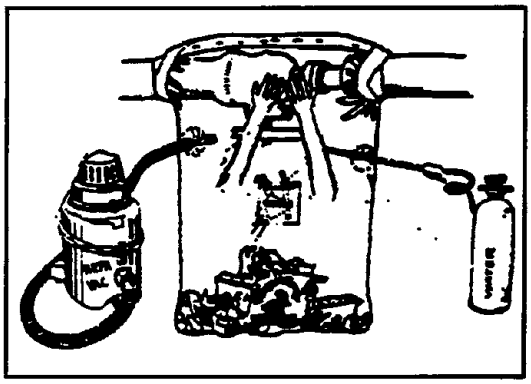


Glovebags must be sealed airtight.

8. Duct tape the sides of the bag. Leave enough room at the top of the glovebag so you can move your arm around the pipe easily. Make sure the bag is airtight.



9. Cut two small holes in the bag below the pipe. Place the tip of the garden sprayer in one hole and the nozzle of the HEPA vacuum in the other. Duct tape both of these so that no air can get out of the glovebag.



10. Smoke test the bag. Use a smoke tube and an aspirator bulb. Pump smoke into the bag through a small hole and squeeze. If you see smoke escaping from the bag your bag is not well sealed. Make the necessary repairs and retest with the smoke tube. Once your bag is airtight you can begin to remove the ACBM from the pipe.

Removal

1. One worker should place his/her hands inside the gloves and pick up the tools needed to remove the ACBM. Another worker should spray the material with amended water from the garden sprayer. The material should be wetted constantly; before, during and after removal.

Wear a suit and respirator when using a glovebag.

2. The insulation should be cut lengthwise and taken off the pipe. Remove the section of insulation in one piece, if possible. Rinse the tools after each use and store them in the tool pouch. Lower the insulation slowly to the bottom of the bag. Again, the asbestos material should be sprayed with amended water.

3. Clean the pipe to remove all asbestos fibers. Even if you do not see any remaining ACBM, clean the pipe again. Many asbestos fibers are too small to be seen. Use a damp rag and nylon brush to clean the pipe.

4. Paint the pipe and the ends of the insulation with sealant. This procedure is known as 'lockdown'.

Cleanup

1. After the ACBM is removed, spray the inside of the bag a final time to rinse down any dust or debris left on the bag.

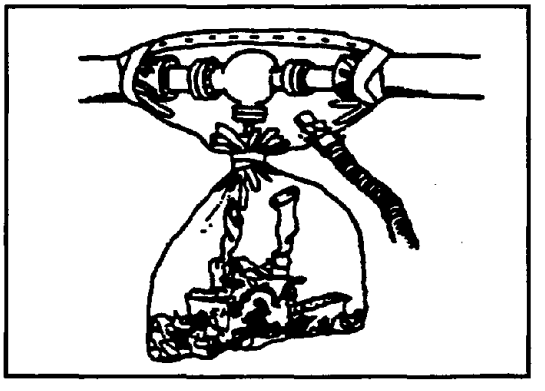
2. Take the tools out of the pouch and with tools in hand pull one of the gloves out of the bag so it is hanging inside out. The tools will be in the glove, and the sleeve should now be hanging outside of the body of the bag.

3. Twist the sleeve of the glove and duct tape the twisted section of the sleeve. Cut the sleeve at the twist. Place the glove in a bucket of amended water.

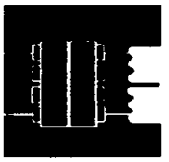
4. Turn on the HEPA vacuum to remove the air inside the bag.

5. Remove the sprayer nozzle and seal the hole with duct tape.

6. Twist the bag in the middle (above the sleeves but below the pipe) so that the ACBM is in the bottom of the bag. Duct tape the bag around the twist. Place the bottom part of the bag in a labeled asbestos disposal bag.



7. Turn on the HEPA vacuum again and remove the top of the bag from the pipe. The HEPA vacuum will catch any stray fibers. Carefully remove the HEPA vacuum from the glovebag while it is resting inside the disposal bag. Fold the glove bag down into the disposal bag.



8. Twist the disposal bag shut with the HEPA vacuum running until all the air is pulled out of the disposal bag. Twist 6 inches from the top of the glovebag shut and duct tape the twist. Fold the top of the bag over and duct tape this so that it makes a knot at the top of the bag. This is known as "goosenecking." Goosenecking prevents the bag from leaking.

9. HEPA vacuum the work area. Remove the plastic from the floor and dispose of it as asbestos waste. Take down barriers and warning signs.

10. Clean your outer suit with damp rags and a HEPA vacuum. Wipe off the respirator with a clean wet towel or rag while you are still wearing it. Dispose of the outer suit as asbestos waste. Go to a shower or washroom wearing your inner suit and respirator. While in the shower, remove the filters and clean your respirator. Bag your suit and the used filter and throw them away with the rest of the asbestos waste.

Dry Decontamination

On O&M jobs only a small amount of ACBM will be disturbed. Usually a decontamination unit (with a shower) won't be built. If you do not have access to a shower, you must still decontaminate yourself. Here is the procedure for a dry decontamination:

1. Put a piece of poly on the floor to catch any dust.

2. Clean off the outside of the outer suit with a damp rag or a HEPA vacuum. A buddy is helpful, since you can't see asbestos on your back, etc.

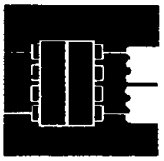
3. Take the suit off carefully, rolling it inside out and placing it on the poly.

4. Roll up the poly and the suit and seal them in an asbestos waste bag.

5. Repeat steps 2 and 3 for the inner suit and seal it up in an asbestos waste bag. (If you are only wearing one suit, skip this step.)

6. Remove the filters and clean your respirator.

7. Wash your hands thoroughly.



MAINTENANCE-RELATED REMOVAL

Asbestos work situations

A good O&M program will include work practices for each type of ACBM in a building. There are three types of ACBM that you will have to deal with:

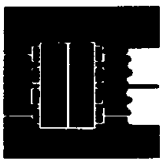
TYPES OF ACBM	EXAMPLES
Thermal System Insulation (TSI)	- Pipe insulation - Duct insulation - Boiler insulation
Surfacing Materials (SM)	- Spray on insulation - Acoustical plaster
Miscellaneous Materials	- Floor tiles - Vinyl sheet flooring - Drywall, plaster, or drywall compound - Ceiling panels/tiles

It is important to understand that there are different types of asbestos materials. Depending on the type of ACBM damage, different work practices will be used to control each asbestos problem. You and your asbestos supervisor must decide how to handle each situation.

In the next section you will be asked to use what you've learned. Five different asbestos problems or *situations* will be explained. Think about the problems one at a time and figure out how the asbestos O&M task should be carried out.

Remember your main goals: protect yourself, and keep asbestos dust out of the air. Feel free to go back through the manual to help you remember all the important steps that were covered.

The National Institute of Building Sciences (NIBS) has developed a set of work practice specifications for asbestos O&M work. *(See page 175 for more details)*



Situation One

A ceiling in a classroom is covered with acoustical plaster. There is a 2" to 4" gouge mark in the ceiling. White dust has settled on the floor directly below the damaged ACBM. What should be done?

Set-up

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Removal

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Clean up

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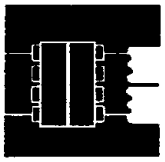


MAINTENANCE-RELATED REMOVAL

Situation One

A ceiling in a classroom is covered with acoustical plaster. There is a 2" to 4" gouge mark in the ceiling. White dust has settled on the floor directly below the damaged plaster. What should be done?

Set-up

1. Tell your asbestos supervisor. By looking at the inspection report, it should be easy to tell if the plaster contains asbestos.

2. Assuming it is ACBM, a work authorization form might need to be filled out. Recordkeeping is very important.

3. Don't let anyone into that work area.

4. Shut off and seal up HVAC openings.

5. Put up asbestos warning signs and barrier tape.

6. Put on your respirator and protective clothing.

7. Bring in asbestos tools/equipment that will be needed.

Removal

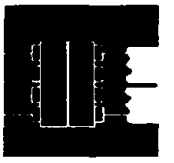
8. Mist the dust on the floor using amended water. HEPA-vacuum the dust using a wet/dry HEPA vacuum.

9. HEPA-vacuum surfaces in the area of the disturbance.

10. Put poly drop cloth beneath the damaged ceiling.

11. Mist the damaged ceiling area with amended water.

12. With HEPA vacuum several inches away, remove loose ACBM with a hand scraper. (Keep scraping until you find material that is not loose, flaking, or damaged.)



13. Collect debris in a labeled disposal bag.

14. Repair damaged area using a non-asbestos plaster or similar material.

15. Apply a lockdown encapsulant where the ACBM was disturbed. This is a type of sealant used to bind down any leftover fibers.

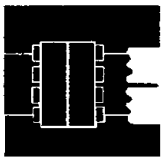
Clean up

16. Clean tools, equipment, and work area by wet-wiping and HEPA vacuuming as needed. Leave the HEPA vacuum running to filter any airborne fibers from the air.

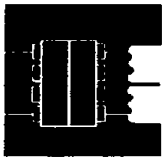
17. Put rags and drop cloth into the waste bag and seal.

18. Properly clean and remove your respirator and protective clothing.

19. Take down plastic barriers over the vents, remove warning signs, etc.



MAINTENANCE-
RELATED
REMOVAL



Situation Two

A maintenance worker is carrying an extension ladder. When turning a corner he bangs the ladder into an air duct. The damaged insulation is about 1 inch deep and 3 to 4 inches wide. What should be done?

Set-up

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Removal

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Clean up

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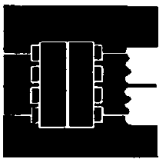


Situation Two

A maintenance worker is carrying an extension ladder. When turning a corner he bangs the ladder into an air duct. The damaged insulation is about 1 inch deep and 3 to 4 inches wide. What should be done?

Set up

1. By checking with your asbestos supervisor you can find out if that insulation contains asbestos. If you're not sure, **treat it as if it were asbestos.**

2. If your building has a work authorization form, it will have to be filled out by your supervisor.

3. Shut off and seal up HVAC openings.

4. Use warning signs and barrier tape to keep people away from the work area.

5. Close all doors, if possible.

6. Put on a respirator and personal protective equipment.

7. Bring in asbestos tools or equipment.

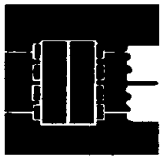
Removal

8. Preclean the work area.

   - HEPA vacuum the floor beneath the damaged insulation.
   - Mist the damaged insulation with amended water.
   - HEPA vacuum the area around the damaged duct insulation.
   - Place a poly drop cloth beneath the work area.

9. Wet the damaged area with amended water again.

10. Fill in the area to be repaired with non-asbestos patching material.



11. Dip lag cloth into water and squeeze out excess water. Apply lag cloth to the area being repaired and smooth out using a wet sponge.

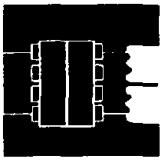
Clean up

12. Clean tools, equipment, and work area by wet-wiping and HEPA vacuuming as needed. Leave the HEPA vacuum running to filter any airborne fibers from the air. Store asbestos tools separately from regular tools.

13. Put rags and drop cloth into the asbestos waste bag and seal.

14. Properly clean and remove your respirator and protective clothing.

15. Take down plastic barriers over the vents, remove warning signs, etc.



MAINTENANCE-
RELATED
REMOVAL

Situation Three

A leaking pipe has damaged an asbestos ceiling tile. (The tile is 2 feet by 4 feet.) The ceiling tile has since dried out and is decaying badly. Asbestos debris has fallen to the floor. What should be done?

Set-up

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Removal

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Clean up

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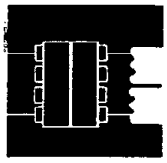


Situation Three

A leaking pipe has damaged an asbestos ceiling tile. (The tile is 2 feet by 4 feet.) The ceiling tile has since dried out and is decaying badly. Asbestos debris has fallen to the floor. What should be done?

Set up

1. Check with your asbestos supervisor to confirm that the tile contains asbestos. Remind your supervisor to check the inspection report for areas **above** the tile for ACBM. Pipe insulation, duct insulation, or sprayed-on deck insulation above the ceiling may contain ACBM, too.

2. Fill out the right work order forms if your building uses that type of system.

3. Shut off and seal up any HVAC openings around the work area.

4. Lockout/tagout the power to the work area. You don't want to be working in a ceiling space with live wires around you.

5. Put up asbestos warning signs and barrier tape to keep people away from the asbestos work area.

6. Your asbestos supervisor will decide if a personal air sampling monitor is necessary for this task.

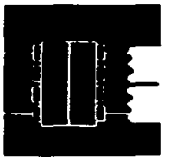
7. Put on a respirator and personal protective equipment.

8. Bring the necessary tools and equipment to the work area.

Removal

9. Mist the damaged tile with amended water. Don't use so much water that it will cause more debris to fall away.

10. Using 2-by-4's and 6-mil poly sheeting, construct a mini-enclosure extending from floor to ceiling. Prefabricated mini-enclosures are also available.



11. Attach a HEPA vacuum to the mini-containment to filter the air inside the work area (creating negative air pressure).

12. Mist the asbestos ceiling tile again with amended water. Carefully remove it and place it in a waste disposal bag.

13. Wipe any suspension system components with amended water. Use a nylon brush to remove any ACBM debris that was not removed by wiping. Place any debris and rags into the disposal bags.

14. Replace the ceiling tile with a non-asbestos tile. HEPA vacuum the adjacent ceiling tiles again.

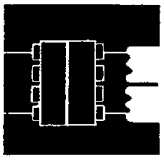
Clean up

15. Clean tools, equipment, and mini-containment by wet-wiping and HEPA vacuuming as needed. Leave the HEPA vacuum running to filter any airborne fibers from the air. Store asbestos tools separately from regular tools.

16. Take down the mini-containment. Properly dispose of all asbestos and asbestos contaminated materials.

17. Properly clean and remove your respirator and protective clothing.

18. Take down plastic barriers over the vents, remove warning signs, etc.



MAINTENANCE-
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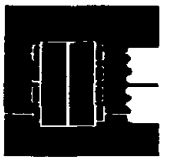
REMOVAL



Situation Four

A fire inspection was just completed in your building. You've been told to install an ABC rated fire extinguisher on a wall in a hallway. To do this, you must drill through what could be asbestos-containing plaster. What should you do?

Set-up

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Clean up

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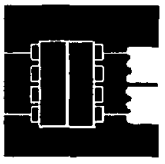


Situation Four

A fire inspection was just completed in your building. You've been told to install an ABC rated fire extinguisher on a wall in a hallway. To do this, you must drill through what could be asbestos-containing plaster. What should you do?

Set up

1. Check the building inspection report with your supervisor to determine if the wall plaster contains asbestos. If no building inspection was done, assume the wall is ACBM.

2. Get an asbestos work order form, if needed.

3. Shut off and seal up any HVAC openings near the work area.

4. Lockout and tagout the electricity around the work area.

5. Put up asbestos warning signs and barrier tape.

6. Put on a respirator and protective clothing

7. Bring asbestos tools and equipment to the work area.

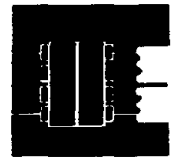
Removal

8. Place a poly sheeting dropcloth under the work area. If accessible, do this on both sides of the wall.

9. Mark the areas on the wall to be drilled.

10. Wet the area to be drilled with amended water. (Both sides of the wall, if possible.)

11. Using a HEPA equipped drill, make the necessary holes in the wall. As an additional safeguard, some people have drilled through wet sponges or shaving cream to keep fiber levels even lower.



12. HEPA vacuum the area again after the drilling is done.

13. If a sponge or shaving cream was used, dispose of it as asbestos containing waste.

14. Hang the brackets for the fire extinguisher. HEPA vacuum the area again.

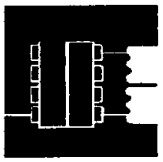
Clean up

15. Clean tools, equipment, and wall by wet-wiping and HEPA vacuuming as needed. Leave the HEPA vacuum running to filter any airborne fibers from the air.

16. Properly dispose of all asbestos and asbestos contaminated materials.

17. Properly clean and remove your respirator and protective clothing.

18. Take down plastic barriers over the vents, remove warning signs, etc.



MAINTENANCE-
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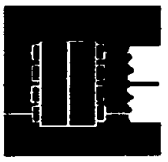
REMOVAL



Situation Five

When moving furniture, some maintenance workers dropped a heavy desk which badly damaged several floor tiles. The tiles measured 9 inches by 9 inches and were in the middle of a busy hallway. What should be done?

Set-up

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Work Practices

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Clean up and Disposal

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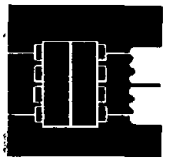


MAINTENANCE-RELATED REMOVAL

Situation Five

When moving furniture, some maintenance workers dropped a heavy desk which badly damaged several floor tiles. The tiles measured 9 inches by 9 inches and were in the middle of a busy hallway. What should be done?

Set-Up

1. You can be fairly sure that 9" by 9" tiles are ACBM, but until someone checks the building inspection report you cannot be certain. Your asbestos supervisor should have this report. If not, treat them as ACBM.

2. Fill out an asbestos work form if your building uses that type of system.

3. Shut off and seal up any HVAC openings in the work area.

4. Put up barrier tape and warning signs to keep people away from the damaged tiles. Reroute foot traffic.

5. Bring asbestos tools and equipment into the work area.

6. Put on your respirator and protective clothing.

Work Practices

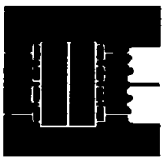
7. Use a HEPA vacuum cleaner to clean the area of the damage.

8. Mist the work area with amended water.

9. Carefully pick up any damaged tiles that can be easily removed. Place them in a waste disposal bag.

10. Using a scraper, pry the rest of the damaged tile away from the floor. A hammer might be needed to strike the scraper handle, wedging the tile away from the floor.

11. A heat gun can also be used to loosen the mastic, making tile removal much easier. *Caution: Heating resilient tile or mastic might produce toxic vapors. Organic vapor cartridges might be needed.*



12. Dispose of all floor tile pieces as asbestos waste. Placing the tiles in a box within the bag will prevent the bag from ripping.

13. To remove the mastic (it too may be ACBM), wet the area with amended water, or a citric acid or other solvent.

14. Scrape the adhesive with a stiff-bladed wall or floor scraper.

Clean-Up and Disposal

15. Dispose of the mastic as asbestos waste.

16. HEPA vacuum the floor with a wet/dry vacuum.

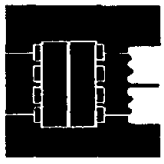
17. Wet-wipe the floor area again. Dry the floor area and apply the new floor adhesive.

18. Install new non-ACBM floor tiles.

19. Clean tools and store them safely away from non-asbestos tools.

20. Properly clean and remove your respirator and protective clothing.

21. Reopen HVAC, take down warning signs, etc.



MAINTENANCE-
RELATED
REMOVAL

Rules
Regulations

REGULATIONS

In this chapter you will learn about:

- **The federal agencies that make asbestos regulations.**
- **The difference between federal and state asbestos regulations.**
- **How laws or regulations can protect custodial and maintenance workers.**
- **What laws or regulations you must follow to protect the environment.**

9

Regulations

Regulations are one tool for a safer and healthier job.

The asbestos regulations apply to everyone who comes in contact with ACBM during the course of their work, not just those who remove it. The regulations do differ slightly for O&M workers, so this chapter will explain the differences.

Congress passes laws, and EPA and OSHA enforce regulations or standards based on those laws. OSHA and EPA can give your employer a fine for violating their regulations. Regulations are just as strong as laws.

Some states have their own asbestos regulations which must be followed when you're working in that state. State regulations must be **at least as tough as federal regulations**—think of federal regulations as minimum guidelines which everyone must follow.

Rules
Regulations

Federal asbestos rules that affect your building

Two types of federal regulations cover asbestos work. One is intended to protect the worker from exposure to asbestos and the other is meant to protect the environment. Regulations developed by the **Occupational Safety and Health Administration (OSHA)** provide worker protection in the private sector. The **Environmental Protection Agency (EPA)** created the Worker Protection Rule to protect public employees (i.e., state and local governments) involved in asbestos work, however, the primary intent is to protect the environment.

Employees of privately owned companies or organizations must comply with both the EPA and OSHA regulations. Employees of publicly owned agencies must comply with EPA standards, however, this is not true in all states. Check with your state OSHA office to find out if public employees are exempt from OSHA standards. If you work in a state with its own asbestos regulations, you will be required to comply with those standards as well.

OSHA

In 1972, **OSHA** began making regulations for work involving asbestos. The regulation has been updated during the past 20 years, most recently on August 10, 1994.

OSHA has many standards that protect people in various professions. For example, a construction industry standard was developed, which is where OSHA first addressed asbestos regulations. The asbestos standard (29 CFR 1926.1101) protects people who work with asbestos in the following areas:

Renovation	Repair
Demolition	Maintenance
Removal	Insulation
Encapsulation	Emergency cleanup
Alteration	Transportation/Disposal

These regulations were developed to keep you safe at work. **You have the right to a safe and healthy workplace.**

Rules
Regulations

OSHA Asbestos Construction Standard—29 CFR 1926.1101

The OSHA asbestos standard is a work-practice regulation designed to keep asbestos workers safe on the job. The revised asbestos construction standard not only applies to large asbestos jobs, but also **contains requirements for maintenance activities.** Some maintenance activities, which are not considered construction activities (such as floor maintenance involving asbestos-containing floor covering), are covered under the OSHA General Industry Standard (29 CFR 1910.1001).

Under the asbestos construction standard, asbestos-related activities are divided into **four classes.** The classification of work depends on the type of activity, the type of asbestos-containing material (ACM), and the level at which the ACM will be disturbed.

Work classification

Employers are required to provide a certain amount of protection depending on the class of work. The following is a description of the four classes. **The type of protection required for each class is described elsewhere in this manual.**

CLASS I —Any work that involves the **removal** of Thermal System Insulation (TSI), surfacing ACM, and presumed ACM (PACM). PACM includes TSI and surfacing material found in buildings constructed before 1981.

CLASS II—Involves the **removal** of ACM that is not TSI or surfacing material. This includes the removal of asbestos-containing wallboard, floor tile, sheeting, transite panels, construction mastics, and roofing and siding shingles.

CLASS III—Involves **repair and maintenance operations** where ACM or PACM is **likely to be disturbed.**

CLASS IV—Involves **maintenance and custodial construction activities** during which employees **contact but do not disturb** ACM or PACM. This also includes activities performed to clean up dust, waste, and debris resulting from Class I, II, and III activities.

Rules
Regulations

Persons being trained with this manual are most likely to be involved with Class II, III, and IV activities and occasionally with Class I. Persons performing Class I jobs involving **large amounts of PACM** and some Class II activities involving **large amounts of friable ACM** require more training than can be obtained through this manual.

Activities performed to clean up dust, waste, and debris resulting from Class I and II work involving friable ACM are considered by EPA to be associated with "activities to conduct a response action." Persons "conducting" response actions involving friable ACM must receive training as required by EPA's Model Accreditation Plan Rule, Appendix C to 40 CFR 763 subpart E.

Competent person

Your employer is required to choose a **"competent person"** for every job covered by this standard. The competent person is responsible for ensuring that the rules are followed during the job by making **frequent and regular inspections of the job site, material, equipment, and work practices.** For Class I jobs, inspections are required at least once during each work shift and when requested by an employee. Class II and III work requires on-site inspections at regular intervals to determine whether work conditions have changed, or when requested by the employee. A competent person is required to have training appropriate to the job class he or she is supervising.

Permissible exposure limit (PEL)

Your employer is not allowed to let you breathe in more than 0.2 fibers of asbestos per cubic centimeter (f/cc) of air. **This limit is the average amount of asbestos in the air throughout an 8-hour day.** If you work in an area with more asbestos in the air than the PEL, your employer must find ways to reduce exposure. These are called engineering controls and work practices.

Excursion limit (EL)

Your employer is not allowed to let you breathe in more than 1 fiber per cubic centimeter (f/cc) of air. **This limit is the average amount of asbestos in the air during a 30-minute period.**

Rules
Regulations

Exposure assessments

A competent person must perform an **exposure assessment** to determine how much asbestos is in the air. An exposure assessment can include **air monitoring of the job** or **interpretation of air monitoring results from similar jobs** or **objective data.** Objective data is information that shows that the ACM or the activity performed on the ACM releases asbestos fibers in amounts greater than the PEL or EL. When **any** conditions of the job change, an employer cannot rely on objective data or monitoring results from a similar job. In this case, the employer must conduct additional air monitoring.

Air sampling

The competent person must **sample the air** every day if Class I or II work is being performed, unless he or she has shown that exposure is never at or above the PEL or EL. An exposure assessment below the PEL or EL is called a **negative exposure assessment (NEA).**

For Class I and II work where **initial air monitoring** has been done and exposure levels are below the PEL and EL, **daily (periodic) air monitoring** is not needed. The competent person must, however, start air monitoring again any time work conditions change including work practices, equipment, workers, or the work environment. For Class III and IV jobs where exposures are expected to exceed the PEL, the competent person must perform air monitoring at intervals sufficient to show that the exposure "prediction" is correct. The collection of the air samples must be done within the workers' breathing zone. Workers or their representatives have the right to watch the employee exposure monitoring and see the exposure monitoring records.

Regulated areas

Class I, II, and III work must be conducted in **regulated areas,** except Class II and III work where an NEA has been produced. All workers must be properly trained and informed. No other workers may have access to the work area. Whenever the airborne asbestos exceeds the PEL, all other work must be conducted in a regulated area. **Regulated areas are areas that have been "marked off" so that other people are kept away from the work.**

Depending on the class of work, signs, yellow caution tape, critical barriers, or negative-pressure enclosures may be used to mark off the

Rules
Regulations

regulated area. Only authorized, training persons may be allowed in a regulated area, which must be supervised by a competent person. No one may eat, drink, smoke, chew tobacco or gum, or apply makeup in regulated areas.

Methods of compliance

Different types of engineering controls and work practices are required during the job depending on the class of work and the exposure assessment. For all classes of work regardless of exposure level, workers are required to use a HEPA (high efficiency purifying air) filtered vacuum, keep all ACM wet, and dispose of all waste in leakproof containers. In addition, the following **control methods** should be used when necessary to ensure that the PEL or EL is not exceeded:

- use HEPA-equipped local exhaust ventilation,
- enclose the work area,
- ventilate the work area, and
- implement other work practices and engineering controls that reduce exposure.

The employer must use these control methods to reduce employee exposure to the lowest possible level and use respiratory protection only if he or she is unable to reduce the exposure level below the PEL or EL.

The following work practices may **not** be used on any asbestos-containing materials:

- high-speed abrasive disc saws (unless they are HEPA-equipped),
- compressed air (unless it is used with a ventilation system to capture created dust), and
- dry clean-up methods including dry sweeping and shoveling.

Employees may not be rotated to reduce their exposure.

1. Compliance methods for Class I work

Persons performing Class I work are required to have training beyond that provided in this manual.

For all **Class I** work, the following are required:

- a competent person must supervise the work,
- the heating ventilation and air-conditioning (HVAC) system must be isolated in regulated areas,
- impermeable dropcloths must be placed on surfaces below removal activity, and
- all objects in the regulated area must be covered with impermeable dropcloths.

For all **Class I** work:

- involving **more than 25 linear feet or 10 square feet,** or
- where no negative exposure assessment has been produced, or
- where employees are working in areas adjacent to the regulated area, the employer must use one of the following methods:

  1) critical barriers, or
  2) other barriers or isolation methods.

For all **Class I** jobs where a negative exposure assessment has not been produced or where the PEL has been exceeded, the regulated area must be ventilated. In addition, Class I work shall be performed using one of the following specific **control methods:**

- negative pressure enclosure/glove bag
- mini-enclosure
- glove bag/box system
- alternate control methods

2. Compliance Methods for Class II Work

For all **Class II** work, the following are required:

- a competent person must supervise the work, and
- impermeable dropcloths must be placed on surfaces below removal activity.

Rules
Regulations

For all **Class II** work where:

- a negative exposure assessment has not been produced, or
- work conditions have changed, or
- the ACM is not removed in a substantially **intact** condition, the employer must use one of the following control methods:
  1) critical barriers, or
  2) other barriers or isolation methods.

Additional controls for Class II work by ACM type

Type of control	Requirements
Vinyl/asphalt flooring materials	• Do not sand flooring or backing. • Use HEPA-filtered vacuum, disposable dust bag, and metal tool (no brush). • Floor sheeting shall be removed by wetting the cut and wetting during delamination. Dry ripping is prohibited. • All scraping of adhesives and backing must be done wet. • Dry sweeping is prohibited. • Mechanical chipping is prohibited, unless under negative pressure enclosures. • Tiles shall be removed intact. • When tiles are heated and removed intact, wetting may be omitted. • Resilient flooring, associated adhesives, and backing shall be assumed to contain asbestos unless analysis shows otherwise.
Roofing materials	• To the extent feasible, remove materials intact. • If not intact or if the materials will become non-intact or unless unsafe, use wet methods during removal. • Unless unsafe, cutting machines shall be continuously misted. • When using a power roof cutter, collect dust with a HEPA dust collector or vacuum along cut line for aggregate or smooth built-up roof. For smooth built-up

Rules
Regulations

Roofing materials continued	roof, cleanup using wet methods may also be used. • Do not drop or throw roofing material to ground. • Hand carry, pass, or lower via covered, dust-proof chute or crane, or hoist all material to ground as soon as possible but no later than the end of the work shift. • Non-intact material must be kept wet, placed in impermeable waste bags, or wrapped in plastic until lowered to ground. • On the ground, unwrapped material shall be kept in a closed receptacle. • Roof level HVAC air intake sources shall be isolated or shut down. • Removal or repair of less than 25 sq. ft./day does not require wet methods or HEPA vacuum if the material remains intact and there is no visible emission.
Exterior cementitious siding, shingles, or transite panels (other than roofs)	• Cutting, abrading, or breaking is prohibited. • Wet with amended water before removal. • Lower to the ground via covered, dust-tight chute or crane, or hoist or place in impermeable bag or plastic sheeting and lower to ground no later than the end of the work shift. • Cut nail heads with flat, sharp instruments.
Gaskets	• If deteriorated or not intact, remove with glove bag. • Wet thoroughly with amended water. • While wet, place in disposal container. • Any scraping of residue must be done while wet.
Other Class II work	• Wet with amended water before and during removal. • If possible, remove in an intact condition. • Do not cut, abrade, or break the material. • ACM shall be kept wet until placed in container for disposal.

In accordance with specific conditions set by the rule, the rule provides for alternate work practices for Class II.

Rules
Regulations

3. Compliance methods for Class III work

For all **Class III** work:

- perform using wet methods and, to the extent possible, use local exhaust ventilation, and
- if drilling, cutting, abrading, sanding, chipping, breaking, or sawing TSI or surfacing ACM, use impermeable dropcloths and isolate using mini-enclosures, glove bags, or another isolation method.

For all **Class III** work where:

- a negative exposure evaluation has not been produced, or
- the PEL has been exceeded

    1) contain the area with impermeable dropcloths or plastic barriers.

In addition to the above, where **Class III** work involves the disturbance of TSI or surfacing ACM, respirators are required.

4. Compliance methods for Class IV work

For all **Class IV** work:

- use wet methods,
- use HEPA-filtered vacuum,
- promptly clean up ACM debris, and
- use respirators when cleanup of debris and waste is in regulated areas that require respirators.

Respiratory protection

Respirators shall be fit from those that have been approved and shall be provided at no cost to the employee. Respirators are required for:

- all Class I work,
- Class II work where the ACM is not removed in an intact condition or it becomes non-intact during removal,
- Class II and III work performed without using wet methods,
- Class II and III work where no negative exposure assessment has been produced,
- Class III work where TSI or surfacing ACM or PACM is disturbed,
- Class IV work performed in regulated areas where respirators are required,
- when employees are exposed above the PEL or EL, and
- in emergencies.

Protective clothing

Protective clothing is required when:

- the exposure amount is higher than the PEL or EL,
- no negative exposure assessment has been produced, or
- Class I work being performed involves more than 25 ln.ft./10 sq.ft.

Hygiene facilities

Requirements for **Class I** work involving **more than 25 ln.ft./10 sq.ft.**, and **Class I, II, and III** work involving less than 25 ln.ft./10 sq.ft. **but where the PEL is exceeded or no negative exposure assessment is produced:**

- Decontamination areas (e.g., equipment room, shower area, and clean room) must be established adjacent to regulated areas for decontamination of employees and equipment.

Rules
Regulations

Training

Training shall be provided, at no cost, before the initial assignment and annually after that.

Class	Training Requirement
Class I	Equivalent to EPA Model Accreditation Plan.
Class II	Equivalent to EPA Model Accreditation Plan, or as described in the rule, at least 8 hours of training is required for the removal or disturbance of "one generic" category of ACM.
Class III	Equivalent to EPA's 16-hour O&M training.
Class IV	Equivalent to EPA's 2-hour awareness training.

Housekeeping

- Where vacuuming is selected, use HEPA-filtered vacuums.
- Dispose all waste, debris, and contaminated clothes and equipment in sealed, labeled, impermeable containers.
- Do not dry dust, sweep, or use vacuums without HEPA-filters in areas with TSI or surfacing ACM.

Care of ACM flooring material

- Sanding of floors is prohibited.
- Use low abrasion pads at speeds below 300 rpm and wet methods for stripping finishes.
- Burnishing or dry buffing may be conducted on floors with sufficient finish.

Rules
Regulations

ASBESTOS HAZARD EMERGENCY RESPONSE ACT (AHERA)

In 1986, Congress passed the **Asbestos Hazard Emergency Response Act (AHERA)**. In response to this Act, EPA wrote the regulation which required **schools** to inspect for asbestos and manage any ACBM that was found in the building.

AHERA **did not** require schools to remove ACBM. It **did** require schools to choose a response action to deal with the asbestos that was found. The possible response actions were encapsulation, enclosure, removal, repair, or **operations and maintenance (O&M).**

Schools were required to develop an O&M program if:

- **friable ACBM** was present in the building, or
- **non-friable ACBM that could become friable** was present.

Under the AHERA O&M provisions, schools must carry out specific O&M procedures which provide for the clean-up of any ACBM releases and help ensure the general safety of school students and employees.

Work Practice requirements under AHERA

The "asbestos-in-schools rule" (AHERA) also governs how small-scale O&M jobs must be done in school buildings. These guidelines were set up to keep **maintenance and custodial personnel safe** when their jobs required them to work around ACBM.

The guidelines are simple and make sense, so employees in buildings (other than schools) often follow AHERA standards.

Initial Cleaning

The building must be cleaned after an asbestos inspection, **wherever ACBM or suspect ACBM was found.** Cleaning must involve using HEPA-vacuuming, wet cleaning all floors or other horizontal surfaces, and then disposing of all mopheads, debris, filters, etc. Leak-tight containers must be used for disposal. Additional cleaning must be done if needed.

Rules
Regulations

O&M activities

1. **Limit access**—only people involved with the asbestos work are allowed to be around the project.
2. **Warning signs** must be put up around the asbestos work area.
3. **Air-handling system** must be shut off or modified as to not pump asbestos fibers through the building.
4. **Proper work practices** must be used to decrease fiber release and ensure personnel safety. Some examples would be
    - using wet methods,
    - wearing disposable suits and respirators,
    - employing the use of HEPA-vacuums, glovebags, and
    - building mini-enclosures.
5. **Clean up** any other fixtures in the work area once the project is complete.
6. Place the asbestos debris and any other cleaning materials in a **sealed, leak-tight, labeled container.**

Minor fiber release episodes

A **"minor"** fiber release episode is defined as the falling or dislodging of 3 square or 3 linear feet (or less) of ACBM. If **more** than this amount is damaged, accredited asbestos workers with 4 days of asbestos training must handle the situation.

Occasionally O&M workers will have to deal with building damage or deterioration which releases asbestos into the air. If you work in a **school building** you **must** follow these four steps. If you work in any other type of building then these guidelines are strongly **recommended.**

1. **Wet** the ACBM thoroughly.
2. **Clean** the area, being sure to use proper personal protective equipment and the right equipment.
3. Place the ACBM in a **sealed, leak-tight container.**
4. **Repair** the area of damaged ACBM with asbestos-free spackling, plaster, cement, insulation, or whatever may be necessary to seal up the work area.

Rules
Regulations

Training requirements under AHERA

The following training requirements apply to **school maintenance or custodial workers.**

1. **Any maintenance or custodial person** working in a building which contains ACBM must have **at least a 2-hour asbestos awareness course.**

2. For persons working in the same type of building whose **job responsibilities may include disturbing ACBM,** the regulation says **16 hours** of asbestos training is required.

3. For those people whose job responsibilities involve **large scale removal of ACBM, 32 hours** of asbestos worker training is required.

Once again, remember that states may have their own training requirements. Know your state regulations - if they are stricter than the federal regulations you must obey the state regulations.

ASBESTOS SCHOOL HAZARD ABATEMENT REAUTHORIZATION ACT (ASHARA)

As part of EPA's 1987 AHERA Regulations, the Model Accreditation Plan (MAP) set up guidelines for training asbestos workers, supervisors, inspectors, management planners, and project designers. The ASHARA rule revised the MAP. Training requirements for asbestos workers and supervisors have been extended by one additional day.

As of November 28th, 1992, the ASHARA rule required anyone designing or performing a response action or inspecting for asbestos in a public or commercial building to be accredited. A "public or commercial building" is any building other than schools or apartment buildings with fewer than 10 units.

Rules
Regulations

BAN AND PHASE OUT RULE

The EPA came out with a regulation in 1989 that was supposed to **stop** the making and selling of most asbestos products in the United States. Called the "Ban and Phase Out" rule, it was originally scheduled to be a 7 year plan (1990-1996).

Several businesses involved in the asbestos industry, as well as the governments of Quebec and Canada, banded together to try and have this new EPA regulation **overturned.**

In October of 1991 a U.S. Court of Appeals in Louisiana agreed with the asbestos industry and ruled to have the Ban and Phase Out rule overturned.

The court did rule, however, that any asbestos product that was completely out of production must **stay out of production.** But the products that the ban had **not yet** reached could still be made, so care needs to be taken when choosing replacement materials. Spray-on ACM and pipe and boiler ACM are still banned.

Keep in mind that a lot of manufacturers know that asbestos is a very dangerous product, and have stopped using it anyway.

EPA WORKER PROTECTION RULE

The OSHA regulations which protect people who work with asbestos **do not** cover everybody. The regulation was written by Congress so that federal, state and local government employees in some states were **excluded**. EPA saw this as a problem and developed a regulation to cover these people as well. This is what the EPA **Worker Protection Rule** is all about.

But another problem still exists. This EPA regulation only covers state and local government employees who work on asbestos abatement jobs. The people who work on smaller O&M type jobs are still not covered. EPA has proposed to extend this regulation so that everyone who works with asbestos will be covered.

Rules
Regulations

REGULATIONS

Key Facts

The different federal agencies that regulate asbestos are:

OSHA - the Occupational Safety and Health Administration
EPA - the Environmental Protection Agency

OSHA develops regulations which protect workers. The rules OSHA makes deal with exposure levels, medical surveillance, work practices, and recordkeeping.

OSHA makes some exceptions from the rule for small asbestos jobs, such as O&M jobs.

EPA regulations protect the environment.

"NESHAP" covers asbestos as an air pollutant.
"AHERA" regulates how to deal with asbestos in schools.
"ASHARA" revises AHERA
"Ban and Phase Out Rule" was meant to stop production and sales of asbestos products. It was overturned.
"Worker Protection Rule" protects government employees not covered by the OSHA asbestos regulations

Many states have regulations which define "small-scale" asbestos jobs. You may need an asbestos license to do O&M work in those states.

Some states take OSHA and EPA recommendations and write them into their own regulations.

If a state and the federal government both have a regulation, the one that protects you the most applies.

Rules
Regulations

Regulations Exercise

This is not a test. Use it to see for yourself how well you understand the material in the chapter.

1. What does OSHA stand for? Who does OSHA protect?

2. What does OSHA say you must do before you can wear a respirator?

3. What types of jobs does OSHA consider to be Class III?

4. What does EPA stand for? The regulations made by EPA are designed to protect what?

5. Which labels must be on asbestos waste disposal bags?

Rules Regulations

6. The EPA AHERA regulation was written to protect whom?

7. List at least 4 steps that you must take when asbestos is released in a building.

8. How much training does EPA require for a maintenance worker in a school building whose job involves disturbing ACBM?

9. When does a respirator have to be worn?

10. The EPA AHERA regulation requires schools to _____ buildings for ACBM and develop a _____ for buildings where asbestos is found.

Rules
Regulations

For more information

OSHA Asbestos Construction Standard, 29 CFR 1926.1101
Publication No. OSHA 3096

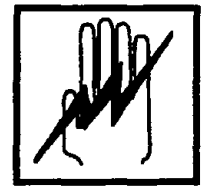
EPA "Managing Asbestos in Place", (The "Green Book"), EPA Publication No. 20T-2003

"Guidance Manual - Asbestos Operations and Maintenance Work Practices" National Institute of Building Sciences, NIBS Document No. 5076-7

EPA National Emissions Standards for Hazardous Air Pollutants, 40 CFR 61 Subpart M, pp. 140-152.

EPA Worker Protection Rule, 40 CFR 763, Subpart G, pp. 120-125.

EPA Asbestos Containing Materials in Buildings Final Rule, 40 CFR 763.



OTHER HEALTH AND SAFETY PROBLEMS

10

In this chapter you will learn about these dangers on asbestos jobs:

- **Problems with heat.**
- **Chemicals.**
- **Electrical shocks.**
- **Fires.**
- **Tight spaces.**
- **Dangers from scaffolds and ladders.**
- **Slips and trips.**

Safety

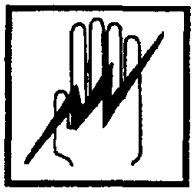
Foreman: Why are you taking your mask off? You know you're supposed to keep it on while you're in the work area.

Brian: I'm too hot. And I've got a real bad itch right under my face piece.

Foreman: You're the third person who's done that today. I'm going to write up the next person who takes their mask off in here!

Brian: It's not our fault! These half-mask respirators are just too uncomfortable to wear in the summer. We asked the company for PAPR's last month, but they won't give them to us.

Foreman: Listen, you've just got to be more careful. It's for your own good.



OTHER HEALTH AND SAFETY PROBLEMS

Discussion questions:

(Choose one or two of the following questions to discuss)

1. Who is right, the foreman or Brian?
2. Why did Brian take his mask off?
3. Is it OK to take your mask off in a contaminated area?
4. What should the workers do if they have to take their masks off?
5. What could the company do to make it easier for workers to keep their masks on?
6. What could the foreman do?
7. What would you do if you were Brian?
8. What would you do if you were the foreman?

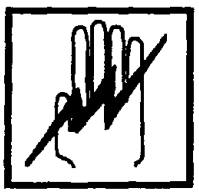
Other health and safety problems

Heat, electricity, and fire will harm you much faster than asbestos can.

Heat, electricity, and chemicals are dangerous on asbestos jobs

Working with asbestos is a long-term danger. But short-term hazards, such as electrocution and fires, can hurt you immediately. Here are some of the short-term dangers on asbestos jobs:

1. Heat stroke and heat stress
2. Chemicals
3. Electrical shocks
4. Fires and explosions
5. Confined spaces
6. Dangers from scaffolds and ladders
7. Slips, trips, and falls



Heat

Heat stroke is a medical emergency

Your body tries to cool itself by sweating. On the job, you work in a suit that doesn't let your body heat escape. Your lungs have to work harder to pull air through a respirator. The air conditioning must be shut off. You work very hard. If your body overheats, you can get very sick. Overheating can cause heat stroke (a medical emergency) or heat stress.

Heat stroke happens when your body can't control its temperature. You stop sweating. Sweating is your body's way of cooling itself. Your body overheats. Heat stroke can kill you or cause brain damage. Here are some signs of heat stroke:

- hot skin
- dry skin
- flushed skin
- confused
- headache
- dizziness
- nausea (feel sick to stomach)
- fainting

A worker with heat stroke has hot, dry skin.

If a worker shows signs of heat stroke, get the person to the hospital right away. Unless the victim is treated quickly, he or she could die. Call an ambulance. Until the ambulance comes, you need to cool off the body. The body can't do this by itself.

Heat stroke can kill—call an ambulance!

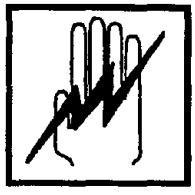
Get the worker to a safe location. Take off the suit and respirator. Be sure the person is still breathing. Cool the body off with water as soon as possible. You can hold the worker in the shower for a minute. Be sure you don't get water in the nose or mouth. You can wet the skin and fan it. **Don't give water to a person who has fainted. You could make the person choke.**

Heat stress is less serious than heat stroke.

A worker with heat stress has cool, sweaty skin.

Heat stress happens when you lose a lot of water from sweating. Sometimes you lose a lot of salt, too. Here are some signs of heat stress:

- cool skin
- sweaty skin
- pale skin
- headache
- dizziness
- nausea (feel sick to stomach)

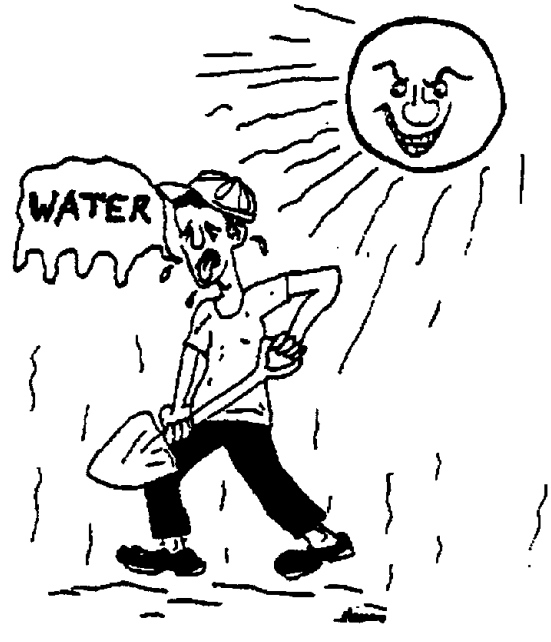


Do these sound familiar? The last three signs of heat stress: headache, dizziness, and nausea are also signs of heat stroke. If a worker has hot, dry, flushed skin, he or she probably has heat stroke—get the person to the hospital. If the person has cool, clammy, pale skin, he or she probably has heat stress—cool the body down.

Get the worker to a safe area. Take off the suit and respirator and give the person cool water to drink. If the worker faints, call an ambulance. He or she may have heat stroke. **Don't give water to a person who has fainted. You could make the person choke.**

Watch out for these warning signs of a person being overcome by heat:

- less alert
- less coordinated
- gets a headache
- feels sick to stomach

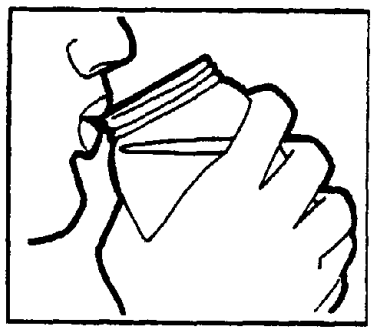


This could be the beginning of heat stroke or heat stress. Get the person out of the work area and have him or her drink cool water.

Heat can make you less coordinated, and this can cause other accidents. Heat can also cause muscle cramps or heat rash. These are uncomfortable, but they are not serious. Heat can also make a worker faint. Take the worker out of the work area. Be sure that a person who has fainted does not have a more serious problem.

Preventing heat problems

Take breaks and drink water to prevent problems with heat



DRINK WATER

Here are some ways to prevent heat problems:

Drink lots of water—Your body loses lots of water when you sweat. It is best to drink every half hour. Drink 8 to 16 ounces of water at every break.

Drink some orange juice and eat bananas—or eat potato chips or one salty food once a day. Your body may need a little extra salt. But most Americans already eat too much salt. If you are on a low-salt diet for your heart do not eat extra salt. Salt tablets are very dangerous. Do not take them. You may want to drink a thirst quencher like Gatorade™.

Take breaks—Your body will handle heat better if it can cool down sometimes. At least two breaks a day and a lunch break will help your body handle heat better.

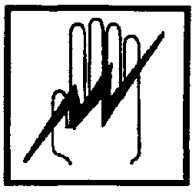
Get used to heat gradually—It takes about two weeks for your body to get used to working in the heat. Your body can get unused to heat in about four days. New workers should only work a half day in the heat for the first few days. They should not work a full shift until the end of their first week.

Use cooling vests—There is some equipment that can help keep you cool. Cooling vests have ice packs in them. However, the ice melts, and they can be uncomfortable. When you are working in very hot areas, cool vests can prevent heat problems.

Cut down on alcohol—Alcohol dries out your body. Even if you only have two beers the night before work, you are more likely to have problems with heat. Never drink alcohol when you have to work the next morning. Drink lots of water before going to work.

To prevent heat problems:

1. **Take breaks**
2. **Drink water**
3. **Get used to heat gradually**



OTHER HEALTH AND SAFETY PROBLEMS

Chemicals on the job site

An asbestos filter on your respirator will not protect you from other chemicals

Many chemicals are used on asbestos jobs.

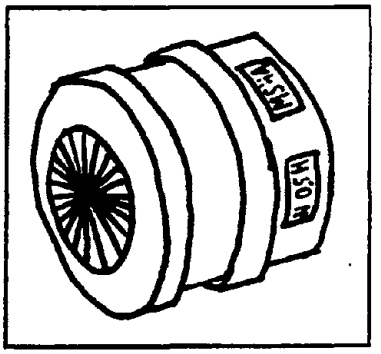
You may have learned about some dangerous chemicals used at work:

- methylene chloride (in spray glue)
- ammonia (in spray poly)
- isocyanates (in polyurethane foam)
- surfactant (in amended water)
- fiberglass (for replacing)
- solvents (for taking off floor tile glue)
- lockdown
- encapsulants
- carbon monoxide (from motors)

An asbestos filter will not protect you from chemicals.

Use a combination filter.

An asbestos filter on your respirator will not protect you from other chemicals. For example, you might need both a **black** filter (for methylene chloride) **and a purple or orange** filter (for asbestos). You might need both a **green** filter (for ammonia) **and a purple or orange** filter (for asbestos). These dual purpose filters are called **combination filters**. Some of these combination filters are gray.



COMBINATION FILTER

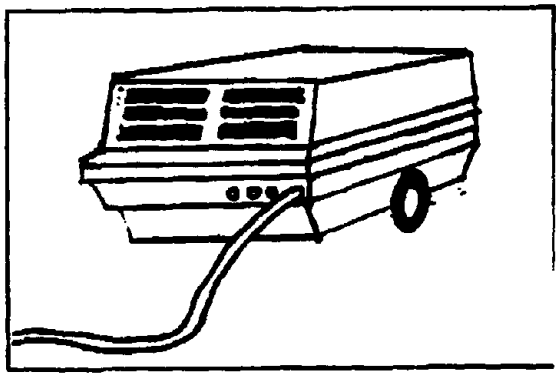
You may also disturb asbestos in a chemical plant, lab, or some place where other chemicals are used. You need to know what you are working with. Your employer must have you trained about the chemicals you work with. This is called **Hazard Communication** training, or "Right To Know" training. It is required by OSHA. (29 CFR 1910.1200 or 1926.59)

Carbon monoxide

Carbon monoxide is a poisonous gas you can't see or smell.

Carbon monoxide is a deadly gas that comes from some motors.

Carbon monoxide is a dangerous gas. It can poison you. It can cause permanent brain damage and can even kill you. It has no smell, taste, or color. It comes from engines, such as air compressors and generators. It can be a real problem if you are using Type C respirators. Type C respirators are supplied-air respirators which sometimes use a compressor to deliver the air. Here are some signs of carbon monoxide poisoning:



COMPRESSOR

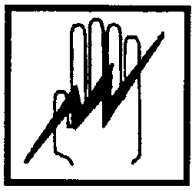
Do not use compressors in the work area.

Suddenly you begin to feel drunk and dizzy and you may start swaying back and forth. Your thinking gets foggy. You may even begin to act crazy and can fall unconscious. You may:

- feel faint
- have a headache
- throw up
- feel nauseous (sick to stomach)
- feel sleepy
- feel dizzy

At least one person on the crew should know CPR.

Does this sound familiar? Three signs of carbon monoxide poisoning (headache, nausea, and dizziness) are also signs of heat stroke and heat stress. If a worker has these signs, get him out of the work room and take off his respirator. If he or she faints, call an ambulance. If the person does not respond to you when you call his name and shake his shoulder, that person is unconscious. If a worker becomes unconscious because of carbon monoxide, be prepared to give CPR (cardio-pulmonary resuscitation). CPR is a procedure to get someone's heart and lungs working again. There should always be someone on your crew who has CPR certification. You can get certified by taking CPR classes at your local American Red Cross.



If you begin to have signs of carbon monoxide poisoning and you are wearing a Type C respirator, turn on your escape gear and disconnect your air line. Alert your co-workers and get everyone out of the work area. Help your co-workers to get out and have the air purification system checked.

Preventing electrical shocks

An electrical shock can stop your heart.

An electric shock can stop your heart.

Electricity is measured in **amps.** **Even a few amps can kill you if the electricity goes through your heart.** Electricity follows the easiest path to the earth. It is very easy for electricity to travel through water. If you are wet and you touch electricity, it may travel through your body. Remember – low amperage doesn't mean low hazard!

A wire with electricity going through it is called a "live" wire. If a tool or an extension cord is broken, it may have a **short.** This means that the electricity doesn't flow through the right wires. It may flow through the tool and into your body. **Electricity is a problem on asbestos jobs for many reasons:**

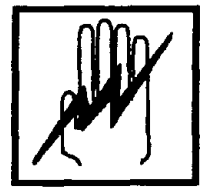
- a lot of water is used
- power may not be shut off
- power tools are used
- extension cords are used
- metal tools may be used
- wires are exposed when the asbestos is removed

Electricity and water are a deadly combination.

Preventing electrical shocks

Shut off the power—Lock the electrical box and tag it. Your employer should have an electrician test the wires. You might think that all the power is shut off, but it may not be.

Cover electrical outlets—Be sure that electrical outlets and boxes are covered water-tight.



Water—Don't use too much water. Don't use so much water that it pools on the floor. Clean up small amounts of water with a wet/dry HEPA vacuum. **Never use water around live wires.**

Tools must be grounded or double insulated.

Use safe power tools—Power tools should be **double insulated.** This means the outside of the tool doesn't touch the wires in the cord. Tools should also be **grounded.** This means there is an extra wire in the cord. If there is a **short,** electricity will travel through the extra wire. Electricity should not go into your body. A **grounded** tool has three prongs on the plug (instead of two). **Never cut the third prong off a grounded plug.** Use an adapter. Attach the wire on the adapter to the plate on the outlet.

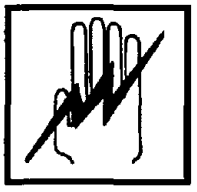
Keep power tools in perfect shape—It is much easier to get a shock from a broken tool. Broken tools should be taken off the job. They should have a DO NOT USE tag on them. Do not try to fix a broken tool unless you have been trained. Always unplug a tool before trying to fix it. Some companies cut the cord of a broken tool so no one can use it.

Here are some ways to keep tools in perfect shape:

- inspect the tool before you use it
- give broken tools to your supervisor
- be sure the tool is sharp—the motor has to work harder if it is dull
- don't carry a tool by its cord
- don't unplug a tool by pulling on the cord
- store tools where they won't be damaged

Use safe extension cords—Heavy-duty wire is **not meant** for temporary wiring. Your employer must give you extension cords with plugs for power tools. Your employer should give you grounded extension cords.

Keep extension cords in perfect shape—There may be a lot of extension cords on the job. Power tools need them, so do HEPA vacuums and temporary lighting. Extension cords need to be taped up off the floor. If a scaffold runs over the cords, it could cut them. **Never hang extension cords with wire.** This could cause a shock. When you attach a tool to an extension cord, put electrical tape around the joint. Also do this when you attach two extension cords together.



OTHER HEALTH AND SAFETY PROBLEMS

Never use metal hand tools or ladders—Electricity travels through metal. If you touch a live wire with a metal shovel, you could get a bad shock. Your employer should give you plastic or wood tools. Metal tools with plastic handles are safer. Metal ladders are also dangerous. Your employer should give you wood or fiberglass ladders.

Wires in walls and ceilings—When disturbing ACBM on a ceiling, you may uncover wires. It is very important to shut off the electricity and have an electrician test it.

If a worker has been shocked, do not touch him. You might get a shock yourself. Shut off the power first. Then use a dry wood pole to move him away from anything metal. **Someone on the job should be trained to do CPR.** (CPR stands for Cardio-Pulmonary Resuscitation. A person trained in CPR can keep someone breathing and keep his heart going until an ambulance comes. Do not try CPR unless you have been trained.)

Ground Fault Interrupters

Use Ground Fault Interrupters to prevent shocks.

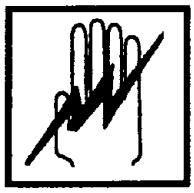
A Ground Fault Interrupter will shut off the power before you get shocked.

Always use GFIs.

The best way to protect workers from shocks is to **prevent** shocks. OSHA says your employer has to prevent shocks. Your employer can use a sensitive **circuit breaker or a written program.**

A Ground Fault Interrupter (GFI) is a very sensitive circuit breaker. If there is a short, the GFI will shut off the power before it can hurt your heart. A Ground Fault Interrupter is a very good way to prevent shocks. Each extension cord should have its own GFI.

Your employer can also use a **written program.** With a written program, you count on a person (and equipment) to keep you safe. Written programs are not a good way to protect workers from shocks.



Protective equipment

Preventing shocks is the best way to protect workers. But if you must work around live wires, you need to protect yourself.

You may need:

- rubber gloves
- a hard hat (nonmetalic)
- rubber boots

The equipment must be made for working with electricity. Only some hard hats are made for working with electricity.

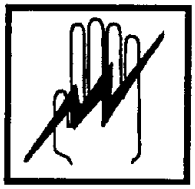
Fires and explosions

Prevent fires: keep flames out of the work room.

Poly, tape and suits will all burn.

The best way to deal with fires is to prevent them. Any fire needs three things: fuel (something that burns), heat (the heat, flame or spark that starts the fire), and oxygen (in the air). Poly, duct tape, and disposable suits burn fast. **Preventing fires means keeping fuel, heat and oxygen from coming together.**

FUEL	HEAT	OXYGEN
• poly	• welding	• air
• duct tape	• cutting torches	• Grade D air tanks
• spray glue	• electrical wires	
• encapsulant	• lights	
• disposable suits	• broken tools	
• wood	• operating machines	
	• cigarettes	



OTHER HEALTH AND SAFETY PROBLEMS

Welding and cutting—These are often used in demolition. A worker must stand by with a fire extinguisher in case any sparks fly.

Electrical wires and lights—An ordinary lamp on the floor can start a fire. Never wrap lights in poly. Heat will build up and can set the poly on fire. Your employer must use safety lights. The lights have cages that keep the hot bulb from starting a fire. They are also safe in water.

Tools—If tools are kept in perfect shape, they are not likely to start a fire.

Operating machines—These need extra protection during setup. They must be protected from moisture.

Do not smoke on the job.

Smoking cigarettes is illegal on asbestos jobs.

Cigarettes—These are not allowed on asbestos jobs. Do not smoke during setup. Poly and spray glue both catch fire very easily.

There are some new products which can help prevent fires. Fire-resistant poly doesn't burn as easily. New spray glues use chemicals that don't burn as easily.

NO SMOKING

There are a few rare cases where you work around chemicals that can explode. You need to know what you are working around. If there are gases which can explode, you must wear a firefighter's respirator. This is called a **Self-Contained Breathing Apparatus (SCBA)** and it requires special training to use. You carry a tank of air with you on your back. Methane (a sewer gas) and acetylene (used in torches) are two gases that can explode.

SELF-CONTAINING BREATHING APPARATUS (SCBA)

In case of fire

Look at the escape plan when you start the job.

Look at the escape plan before you go in the work room.

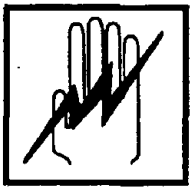
If there is a fire where you are working, GET OUT. The fire will spread very quickly. Your employer must have **fire extinguishers** and an **escape plan.** Fire extinguishers need to be able to put out wood, chemical, and electrical fires. These are called **ABC-rated fire extinguishers.** If there are sprinklers, your employer should try to leave them in service as long as possible.

The escape plan includes a map and emergency phone numbers. The plan should be hung nearby. When you start a job, look at the map. Figure out how you would get out in an emergency. Do you have to dial "9" to make a phone call outside of the building? Is there an emergency exit from the work area? Are there signs on the walls to show you how to get out? Where is the fire extinguisher? Do you know how to use it?

Confined spaces

Sometimes you will be asked to perform O & M work in a small area that is hard to get out of. This might happen if you are disturbing asbestos inside of a steam tunnel, a factory oven, or a storage tank. It is hard to get out of these **confined spaces.** A confined space is defined as any work area that has any one of the following characteristics; one entry/exit, poor natural ventilation, not designed for continuous worker occupation. You can use up all the oxygen in the space very quickly. **Many people have died in confined spaces.**

If you work inside a confined space, you should wear a **Self-Contained Breathing Apparatus (SCBA).** You should wear a rescue harness. There needs to be another worker outside who checks on you at least every few minutes. He or she can pull you out if something happens to you. No one should go into a confined space to rescue a worker, unless he is protected. People have died trying to rescue workers in confined spaces.



OTHER HEALTH AND SAFETY PROBLEMS

Ladders

Inspect ladders before you use them.

You already know not to use metal ladders. Electricity passes through them, and it can shock you. Also be sure that ladders are in perfect shape.

Every time you use a ladder, check for these things:

- broken steps
- broken hinges
- broken feet
- wobbly ladder
- no rubber safety feet
- water on the ladder (slippery)
- tools left on ladder (knife, hammer, nails)

Here are some ways to use ladders safely:

Don't lean a step ladder against a wall. Use a ladder that's made to lean against a wall.

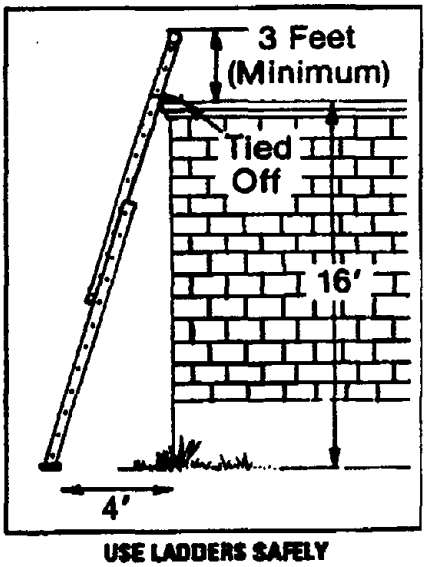
If you lean a ladder against a wall, set it up so that the top of the ladder is four times higher than the distance from the wall to the base of the ladder.

Only use one side of a step ladder. The other side isn't made to hold a person.

Face the ladder. Don't stand on it backwards.

Don't stand higher than two steps from the top of a step ladder. Get a taller ladder.

Don't use a ladder as a platform. Use a piece of wood.



USE LADDERS SAFELY

Scaffolds

All scaffolds should have guard rails.

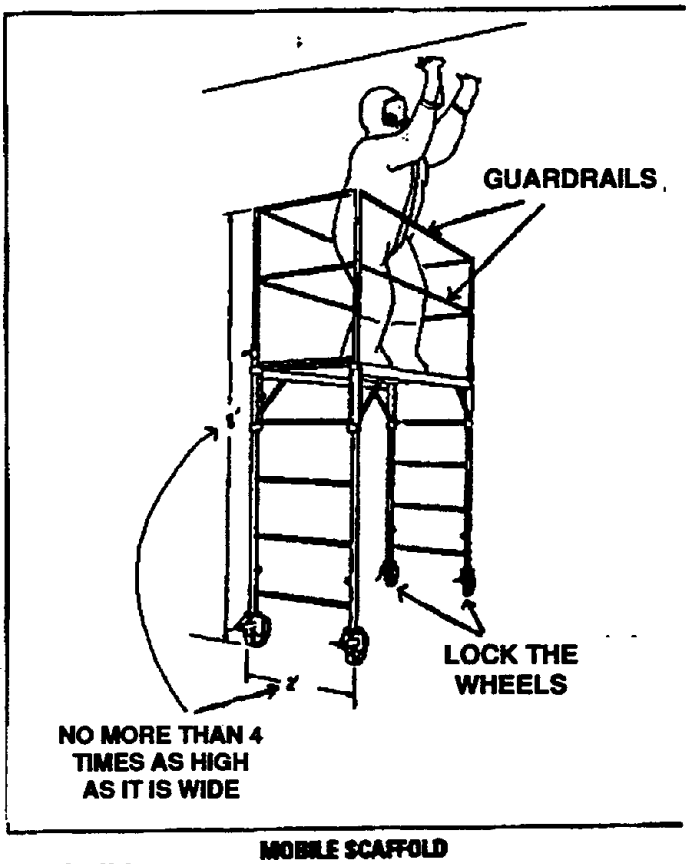
Scaffolds on wheels are common on asbestos-related jobs. Metal scaffolds may not be safe! Electricity travels through metal. If you touch a live wire with a metal scaffold, you can get a bad shock.

All scaffolds should have guard rails

You can't tell whether a scaffold is safe by looking at it. Scaffolds must be put together by someone with experience. All the parts must fit perfectly. They should be inspected by someone other than the person who built them.

Here are some rules about scaffolds on wheels:

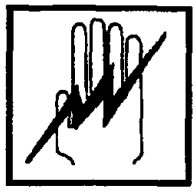
- **All scaffolds should have railings.** These keep you from falling over the side.
- **Scaffolds more than 10 feet high must have railings and toe boards.**
- **The scaffold parts must be locked together with pins.**
- **The wheels must be locked when people are on the scaffold.**
- **Mobile scaffolds may not be more than 4 times higher than they are wide.** For example, a 6-foot-wide scaffold may not be more than 24 feet high.
- **Boards may not overlap the ends of the scaffold more than 1 foot.** If you step on the end of the board, the board could tip over and you would fall.



MOBILE SCAFFOLD

Do not build scaffolds more than 4 times higher than they are wide.

Do not build



It is safer to use scrapers with long handles than to work on a scaffold.

If you are using air-supplied respirators, it is easy for the hose to be caught on the scaffold. Be sure that there is enough hose for you to move around. It is even more important not to fall off scaffolding. If you fall, you may be trapped by the hose. It can pull the respirator off your face. The hose could pull other people off the scaffold.

Slips, trips and falls

When you work, you wear slippery booties on your feet. The floor should have plastic on it. There may be water on the floor. It is easy to fall down. You could trip on the hose or it could get tangled. You could fall and seriously injure yourself.

Keep the floor dry to prevent slips.

Here are some ways to prevent falls on the job:

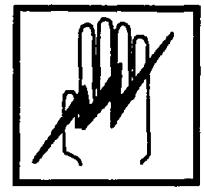
- Keep the floor dry. Don't use too much water. Use a wet/dry HEPA vacuum to pick up small amounts of water.
- Wear boots outside of your booties. You cannot wear these boots outside an asbestos job.
- Tape extension cords up on the walls.
- Keep boxes, bags, and other junk out of the way.
- Keep air lines from getting tangled.

Back injuries

Don't fill bags more than one-third full.

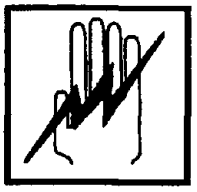
Don't fill bags more than one-third full.

Back injuries are very common and very painful. They are hard to treat. It is much easier to prevent back problems than to treat them.



Here are some ways to prevent back problems:

- Don't fill bags more than 1/3 full.
- Figure out how much you can lift comfortably.
- Figure out a way to lift that's comfortable for you.
- Try to keep your back straight when you lift, use your legs to lift.
- Keep the bag close to your body when lifting.
- Don't lift, twist, and turn at the same time.
- Get help to lift heavy bags.



OTHER SAFETY AND HEALTH PROBLEMS

Key Facts

Short-term dangers on an O&M job can be as dangerous as asbestos.

Heat stroke
a medical emergency: call an ambulance
hot skin, dry skin, flushed skin

Get the person out of the work area. Take off the suit and respirator. Get the skin wet to cool off the body.

Heat stress
a medical alert
cold skin, clammy skin, pale skin

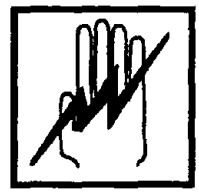
Get the person out of the work room. Take off the suit and respirator. Give the victim a cool drink.

To prevent heat problems:
Drink lots of water. Get used to heat gradually over 2 weeks. Take breaks.

Chemicals
An asbestos filter on your respirator will not protect you from chemicals. Use a combination filter or an air-supplied respirator.

Carbon monoxide is a dangerous gas. Signs of carbon monoxide poisoning: headache, nausea, dizziness, sleepiness, faint. Get the worker out of the work area and take off the respirator.

Key Facts continued on next page



Key Facts (continued)

Electrical hazards
An electric shock can stop your heart. If you are wet and you touch electricity, it will travel through your body.

To prevent electric shocks:
Never use water around live wires.
Shut off the power and lock the electrical box.
Use tools that are double-insulated and grounded.

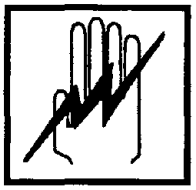
Never use metal hand tools or ladders.
Use Ground Fault Interrupters (GFI) on all wires.
Wear rubber gloves, a hard hat, and rubber boots if you work with live wires.

If a worker has been shocked, shut off the power and use a dry wood pole to move the worker.

To prevent fires:
Have a worker stand by with a fire extinguisher when welding or cutting torches are used. Have an ABC-rated fire extinguisher on the job.

To prevent falls:
Inspect ladders every time you use them.

Make sure all scaffolds have railings. Lock the wheels when people are on the scaffold. Mobile scaffolds may not be more than four times higher than they are wide.



OTHER HEALTH AND SAFETY PROBLEMS

Safety and health exercise

This is not a test. It is an exercise. Use it to see for yourself how well you understand the material in the chapter.

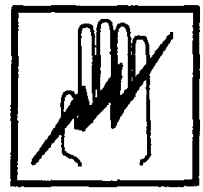
1. Why is electricity a hazard on O&M jobs?

2. Why do you need Ground Fault Interrupters (GFIs) for extension cords?

3. How do GFIs protect against electrical shocks?

4. What other protection can you use against electrical shocks?

5. Why shouldn't you use metal ladders?



6. Why are scaffolds on wheels dangerous?

7. How do you protect yourself from these dangers?

8. Name two common tripping hazards on O&M jobs.

9. Why is heat stress a problem on O&M jobs?

10. What are the symptoms of heat stress?

Discussion questions

1. Some employers want workers to work for 6 hours without a break. Do you think this causes more heat problems than working for 8 hours and taking breaks? Why do employers do it?
2. Is it necessary to drink Gatorade™ when you are working in the heat?
3. Which do you think is safer for workers—using Ground Fault Interrupters (sensitive circuit breakers) or a written Grounding Program? Why?
4. Why should a scaffold be inspected by a different person than the one who put it together?
5. What would you look for if you were inspecting a scaffold?

For more information

USDOL, "Protecting Workers in Hot Environments," USDOL Fact Sheet #84-16.

NIOSH, "Work in Hot Environments," Publication No. DHHS (NIOSH) 86-11 2.

OSHA Electrical Standards, 29 CFR 1926.400 to .449.

OSHA, "Controlling Electrical Hazards," Publication No. OSHA 3075 .

OSHA, "Ground Fault Protection on Construction Sites," Publication No. OSHA 3007.

OSHA Ladder Standard, 29 CFR 1926.450.

OSHA Scaffold Standard, 29 CFR 1926.451.

NIOSH, "General Safety Considerations," Appendix E to EPA/NIOSH, "A Guide To Respiratory Protection in the Asbestos Abatement Industry," Publication No. EPA-560-0PTS-86-001.

FOR MORE INFORMATION

GLOSSARY

Terms in CAPITALS are defined in the glossary.

ABATEMENT	Lessening the HAZARD of ASBESTOS. Methods include ENCAPSULATION, ENCLOSURE, REPAIR and REMOVAL of ASBESTOS.
ACBM	Asbestos-Containing Building Material.
ACTION LEVEL	See AL.
ADEQUATELY WET	ASBESTOS is "adequately wet" when it is wet enough so that no particles are released. One indication of this (but not the only one) is no visible emissions.
AGGRESSIVE SAMPLING	A way of taking AIR SAMPLES where the air is stirred up using fans and leaf blowers. Aggressive sampling is used for CLEARANCE AIR SAMPLES.
AHERA	The Asbestos Hazard Emergency Response Act—The statute that mandated EPA "Asbestos in Schools Rule" requiring the inspection of school buildings for ACBM, followed by implementing the appropriate response action.
ASBESTOS SCHOOL HAZARD ABATEMENT REAUTHORIZATION ACT (ASHARA)	The statute that mandated EPA to revise the Model Accreditation Plan (MAP) to extend training requirements to public and commercial buildings and lengthen training course requirements for asbestos abatement workers.
AIRLOCK	Empty spaces sometimes placed between DECON chambers in order to limit the flow of air.
AIR-PURIFYING RESPIRATOR	Protective equipment. A face mask with filters that you wear. It filters or purifies the air in the work area before you breathe it.
AIR SAMPLES	A measurement of the amount of ASBESTOS in the air using a sampling pump.
AIR-SUPPLIED RESPIRATOR	A face mask with a hose. It supplies clean air to the respirator from outside the work area.

FOR MORE INFORMATION

ALVEOLI	Tiny air sacs in the lungs where oxygen enters the body.
AMENDED WATER	Water plus a chemical called SURFACTANT. Amended water soaks into ASBESTOS faster than plain water.
AREA AIR SAMPLE	An AIR SAMPLE taken from a stationary location. A sampling pump is set either inside or outside an asbestos work area to determine airborne fiber levels.
ASBESTOS	A natural mineral used for insulation, soundproofing, or decoration in many buildings. Asbestos breaks into FIBERs. It causes lung cancer and other diseases. Materials with more than 1% asbestos content are considered asbestos under AHERA.
ASBESTOSIS	A disease caused by ASBESTOS. It is the scarring of the lungs, also known as "white lung".
B-READER	A doctor who has had special training and has been certified to identify signs of occupational diseases on X-rays.
BRONCHUS(I)	A branch off the windpipe where air travels to your lungs.
BULK SAMPLE	A chunk of material which is sent to a lab to test for ASBESTOS.
CANCER	A large group of diseases where cells grow abnormally, rapidly and out of control.
CARBON MONOXIDE	A colorless, odorless, tasteless poisonous gas.
CARTRIDGE	A filter used on an AIR-PURIFYING RESPIRATOR.
CATEGORY I NONFRIABLE ACBM	ASBESTOS-containing gaskets, resilient floor covering, and asphalt roofing products that cannot be crushed by hand pressure. Must also contain more than one percent of asbestos as determined by using a PLM.
CATEGORY II NONFRIABLE ACBM	All NONFRIABLE materials that are not Category I nonfriable ACBM.
CILIA	Very tiny hairs that line the walls of your windpipe and BRONCHI. They beat rapidly and move mucus up your windpipe to remove dust and particles, including asbestos fibers, from your respiratory system.

FOR MORE INFORMATION

CLEAN ROOM	The first room in the DECON UNIT (going in). Clean suits and respirators and street clothes are stored here.
CLEARANCE AIR SAMPLE	An AREA AIR SAMPLE taken at the end of the job. It tells the building owner whether the room is clean enough to be reoccupied.
COMPETENT PERSON	In the OSHA regulations, a trained supervisor who makes sure that rules are followed and equipment works on the job.
CONFINED SPACE	A space that has the following characteristics: 1) limited openings for entry and exit, 2) inadequate natural ventilation, and 3) not designed for continuous worker occupancy.
CONTAINMENT	Isolating the work area from the rest of the building. Usually done by putting POLY on the walls and floors and using a NEGATIVE AIR MACHINE. This keeps ASBESTOS FIBERs inside the work area.
CONTINUOUS-FLOW AIR-SUPPLIED RESPIRATOR	An AIR-SUPPLIED RESPIRATOR that has a constant amount of air which is supplied to you. It will not give you more air if you need it.
CONTRACT SPECIFICATIONS	See SPECS.
CONTROL METHODS	Ways of controlling ASBESTOS. Includes: ENCAPSULATE, ENCLOSE, REPAIR, REMOVE, and O&M.
COSH	Committee on Occupational Safety and Health—A community-based group which helps workers with health and safety problems.
CUBIC CENTIMETER	A volume about the size of a sugar cube. Asbestos in the air is measured in FIBERs per cubic centimeter.
DECON	Decontamination unit or area—A shower unit. The decon has three rooms: DIRTY ROOM, SHOWER and CLEAN ROOM. Everyone must enter and leave the work room through the decon.
DEMAND-ONLY RESPIRATOR	AIR-SUPPLIED RESPIRATOR which always goes into a NEGATIVE-PRESSURE state before it supplies you the air that you need. This is not a respirator used for ASBESTOS ABATEMENT work.

FOR MORE INFORMATION

DEMOLITION	The wrecking or taking out of a load-supporting building part and any related handling operations or the intentional burning of a facility.
DIRTY ROOM	The first room in the DECON (going out). Workers take their suits off in the dirty room on their way to the shower. Dirty hard hats and tools are also stored here.
DOSE	The amount of a substance that you take, or are exposed to, at a specific time.
DOSE-RELATED	A relationship between the amount of a substance you are exposed to and the reaction you have to that exposure.
DUCT TAPE	Sticky, often silver tape. Used to attach POLY.
DUST MASK	A face mask that has no seal to your face. It is not legal for ASBESTOS work. It does not protect you.
ELECTRON MICROSCOPE	A microscope which beams electrons (instead of light) at a sample. Electron microscopes can blow up images much larger than LIGHT MICROSCOPEs.
ENCAPSULANT	A sticky paint used to lock down ASBESTOS.
ENCAPSULATE	To cover ASBESTOS with a sticky paint. (A way to control ASBESTOS without removing it). Can also be a liquid that soaks into the ACBM and binds it together from within.
ENCLOSE	To build an **air-tight** box around ASBESTOS. A way to control ASBESTOS without removing it.
ENGINEERING CONTROLS	Ways of controlling workplace hazards by building barriers, ventilation, etc. Must be done before RESPIRATORs may be used.
ENVIRONMENTAL PROTECTION AGENCY (EPA)	Environmental Protection Agency—A U.S. government agency that writes and enforces regulations to protect land, air, water, and public health.
EQUIPMENT ROOM	See DIRTY ROOM.
EXPOSURE	Not protected. If you are in a work area with ASBESTOS fibers in the air and you do not have on the right RESPIRATOR, you are exposed to ASBESTOS.

FOR MORE INFORMATION

F/CC	FIBERs per CUBIC CENTIMETER of air—ASBESTOS is measured this way. Air is pumped through a filter. The number of FIBERs are counted. The amount of air is measured in CUBIC CENTIMETERS.
FIBER	A single strand of ASBESTOS. ASBESTOS fibers are so small they are invisible.
FIBROSIS	A disease where scar tissue is formed in the connective tissue of the lungs.
FRIABLE	"Crumbly"— Asbestos containing materials that, when dry can be crumbled or pulverized by hand pressure.
FULL-FACE RESPIRATOR	A face mask that covers the full area of your face, from the hair line of your forehead to your chin.
GLOVEBAG	A 3-foot by 4-foot plastic bag with gloves built into it. The top of the bag is sealed around a pipe. The work is done inside the bag. Used for removing small sections of asbestos pipe insulation.
GRADE D AIR	Air for an AIR-SUPPLIED RESPIRATOR. Grade D air has chemicals, oil and water filtered out so that it is safe to breathe.
GFI	Ground Fault Interrupter—A sensitive circuit breaker for tools and extension cords. A GFI will stop a current before it can stop a worker's heart.
HALF-MASK RESPIRATOR	A face mask that covers half of your face. It covers your nose and mouth from the bridge of your nose to your chin. Must be worn with the proper filters.
HAZARD	A danger or a risk.
HEAT STRESS	An illness caused by working in a hot area. A medical alert.
HEAT STROKE	An illness caused by working in a hot area. A medical emergency —the worker's body cannot cool itself.
HEPA FILTER	High Efficiency Particulate Air filter—A filter that is fine enough to trap ASBESTOS FIBERS in the air. HEPA filters are used in RESPIRATORS, HEPA VACUUMS, and NEGATIVE AIR MACHINES.

FOR MORE INFORMATION

HEPA VACUUM	HEPA-equipped vacuum cleaner—A vacuum cleaner which filters air through a HEPA FILTER and will not redistribute asbestos fibers into the air.
HVAC SYSTEM	Heating, Ventilating, and Air Conditioning system—The system that heats or cools a building. Usually a central heating and cooling system that blows air through ducts.
INDUSTRIAL HYGIENIST (IH)	A scientist who is trained to control workplace health and safety HAZARDs. An industrial hygienist (IH) usually takes air samples and inspects ASBESTOS jobs.
LATENCY PERIOD	A time gap between when you were exposed to a toxic material and when you have signs and symptoms of disease. For example, if you breathe ASBESTOS today, you may get ASBESTOSIS in 20 years. The latency period for most asbestos diseases is 10-40 years long.
LEAK-TIGHT	Sealed so that solids or liquids cannot escape or spill out. It also means dust-tight. Six-mil poly waste bags or sealed drums are examples of items that could be considered leak tight.
LIGHT MICROSCOPE	A microscope which shines light on or through a sample. Light microscopes cannot blow up images as large as ELECTRON MICROSCOPEs. POLARIZED LIGHT MICROSCOPEs (PLMs) and PHASE CONTRAST MICROSCOPEs (PCMs) are light microscopes.
LOCAL EXHAUST VENTILATION	Hooking up a vacuum or air duct **right at the place where work is being done** (for example, on a power tool). This is different from general ventilation—bringing fresh air into a room.
LOCKDOWN	A sticky sealant which is sprayed on beams, decks, ceilings, etc. **after** ASBESTOS is cleaned off. Lockdown seals in any invisible FIBERs that weren't cleaned up.
LOCKOUT/TAGOUT	LOCKOUT is putting a lock on the electrical box during ASBESTOS work or CONFINED SPACE work so that power sources will not be turned on by accident. TAGOUT is putting up a warning sign explaining why the power box is locked.
LUNG CANCER	A disease of abnormal growth of lung cells or lung tissue.

FOR MORE INFORMATION

MATERIAL SAFETY DATA SHEET (MSDS)	A chemical fact sheet. Your employer must train you how to use Material Safety Data Sheets.
MAXIMUM USE LEVEL	The highest amount of asbestos a respirator can protect you against.
MEDICAL EXAM	An exam given by a doctor to check your health.
MESOTHELIOMA	A disease caused by ASBESTOS. It is a CANCER of the lining of the lungs or the lining of the stomach and digestive system.
MSHA	The Mine Safety and Health Administration—A U.S. government agency which, aside from creating and enforcing safety rules for miners, approves respirators.
NEGATIVE AIR MACHINE	A heavy-duty fan with HEPA filters in it. All the air that leaves the work room is pulled through the negative air machine.
NEGATIVE AIR PRESSURE	When a NEGATIVE AIR MACHINE is running, the air pressure inside the work room is less than the air pressure outside the work room. ASBESTOS cannot leak out of the work room.
NEGATIVE-PRESSURE FIT CHECK	A test to check the seal of your RESPIRATOR to make sure that it is fitted to your face so that there are no leaks for fibers to get in. You use NEGATIVE-PRESSURE for this check. It is a check you must do each and every time that you put on your RESPIRATOR.
NEGATIVE-PRESSURE RESPIRATOR	A face mask, (RESPIRATOR) that works by using NEGATIVE-PRESSURE to seal the face piece to the face. NEGATIVE-PRESSURE means that there is less air pressure inside the face mask than outside the face piece.
NESHAP	The National Emission Standards for Hazardous Air Pollutants—An EPA regulation for ASBESTOS. These rules are designed to keep asbestos out of the air.
NIOSH	The National Institute for Occupational Safety and Health—A U.S. government agency that researches worker safety and health. NIOSH recommends changes in the regulations to OSHA. NIOSH also approves respirators.
NONFRIABLE	ASBESTOS that **cannot** be crumbled by hand pressure.

FOR MORE INFORMATION

O&M PLAN	Operations and Maintenance Plan—A plan for controlling the ASBESTOS that remains in a building. This plan includes: 1) Where the asbestos is found in the building. Many asbestos materials should be labeled. 2) The amount of training that workers must receive to work with the material. 3) The permits which must be obtained before working with asbestos. 4) Accepted ways to work with asbestos safely. This includes equipment, worker protection, and medical exams. 5) When and how to check the condition of asbestos materials and record any changes.
OBSERVER/ ATTENDANT	A worker stationed outside a CONFINED SPACE to monitor what's going on inside.
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)	The Occupational Safety and Health Administration—A U.S. government agency that covers worker safety and health on the job.
OSHA STANDARD	An OSHA regulation, for example, the OSHA Asbestos Standard.
OXYGEN-DEFICIENT ATMOSPHERE	An atmosphere containing an oxygen level less than 19.5 percent.
PAPR	Powered Air Purifying Respirator—An AIR-PURIFYING RESPIRATOR (a face mask with a filter) that has a pump. This pumps air through the filter to the face piece. It is a POSITIVE-PRESSURE RESPIRATOR. You can request a PAPR whenever a NEGATIVE- PRESSURE RESPIRATOR is required by law.
PCM	Phase Contrast Microscope—The microscope used to count ASBESTOS FIBERS from PERSONAL AIR SAMPLES. PCM is sometimes used for AREA AIR SAMPLES.
PERMISSIBLE EXPOSURE LIMIT (PEL)	Permissible Exposure Limit—The PEL is 0.1 fibers per cubic centimeter over an 8-hour day. This is OSHA's legal limit on how much ASBESTOS a worker may be exposed to.
PERSONAL AIR SAMPLE	An AIR SAMPLE taken in a worker's breathing area. This is an accurate measure of how much asbestos the worker was EXPOSED to.

FOR MORE INFORMATION

PFT	See PULMONARY FUNCTION TEST.
PHASE CONTRAST MICROSCOPE	See PCM.
PLEURA	A two-layered lining of the chest area. It wraps around the lungs and the inside of the rib cage.
PLM	Polarized Light Microscope—The microscope used to look at BULK SAMPLES of suspect ACM.
POLARIZED LIGHT MICROSCOPE	See PLM.
POLY	Polyethylene sheet plastic—Sheet plastic that is taped to walls and floors to protect them from ASBESTOS while work is going on.
POSITIVE-PRESSURE FIT CHECK	A test to check the seal of your RESPIRATOR to your face. You check for leaks by testing the fit with POSITIVE-PRESSURE. You make the positive-pressure by blowing into the mask.
POSITIVE-PRESSURE RESPIRATOR	A face mask that has more air pressure inside the mask then outside the mask. These RESPIRATORs are more protective then the NEGATIVE-PRESSURE RESPIRATORs. With POSITIVE-PRESSURE the air leaks from the inside to the outside.
POWERED AIR-PURIFYING RESPIRATOR	See PAPR.
PRESSURE-DEMAND AIR-SUPPLIED RESPIRATOR	A face mask with air supplied to the mask through a hose. The amount of air that is supplied to you is enough to meet what you "demand." There is a regulator that senses the amount of air that you need to breathe.
PROTECTION FACTOR	PF—The degree of protection of a RESPIRATOR. The Protection Factor is determined in a laboratory.
PULMONARY FUNCTION TEST	A breathing test to see how well your lungs are working. It measures how much air you can breathe in and out. It can tell you if there is a problem with your lungs.

FOR MORE INFORMATION

QUALITATIVE FIT TEST	A test that tells you if you have any leaks in your RESPIRATOR. You are tested by someone who follows the OSHA procedure. The test uses irritant smoke, banana oil, or saccharine. If you smell or taste the testing substance, you have a leak and the respirator does not fit. You must have a qualitative fit test for any NEGATIVE-PRESSURE RESPIRATOR that is issued to you.
QUANTITATIVE FIT TEST	A test that tells you if you have any leaks in your RESPIRATOR. It is a very accurate test. It uses a probe to determine the amount of testing agent outside the mask and the amount inside the mask. It gives you the personal PROTECTION FACTOR which that mask has for you.
REGULATED ASBESTOS-CONTAINING MATERIAL (RACM)	Materials covered by the NESHAP regulations 1) FRIABLE ASBESTOS material, 2) CATEGORY I NONFRIABLE ACBM that will or has become FRIABLE, or 3) CATEGORY II NONFRIABLE ACBM that has a high probability of becoming or has become FRIABLE during demolition or renovation.
RENOVATION	Changing a building or one or more building parts in any way, including the stripping or removal of RACM. (Operations whereby load-supporting building parts are wrecked or taken out are DEMOLITIONS.)
REPAIR	A way to control ASBESTOS without removing it. An example would be putting a patch on asbestos pipe insulation.
RESPIRATOR	A face mask used to protect you from breathing asbestos fibers or other contaminants. It either filters your breathing air or supplies you with clean breathing air.
SMALL-SCALE, SHORT-DURATION	Asbestos tasks which involve disturbing a small amount of asbestos in order to get the primary task done.
SCBA	Self Contained Breathing Apparatus—An AIR-SUPPLIED RESPIRATOR for which you carry the air supply in a tank.
SPECS	Contract specifications—A written plan for the job that the building owner writes. The contractor must follow the specs.
SPRAYBACK	New non-asbestos insulation put up **after** ASBESTOS is removed and the job passes the CLEARANCE AIR SAMPLE.

FOR MORE INFORMATION

SURFACTANT	A chemical added to water to make it soak into ASBESTOS faster. Surfactant makes water wetter.
TEM	Transmission Electron Microscope—The microscope used to count ASBESTOS from CLEARANCE AIR SAMPLES.
TRANSMISSION ELECTRON MICROSCOPE	See TEM.
TIME WEIGHTED AVERAGE (TWA)	A method of determining fiber counts by averaging exposure over a set time limit.
TYPE C RESPIRATOR	An AIR-SUPPLIED RESPIRATOR.
VISIBLE EMISSIONS	Asbestos dust given off by RACM, asbestos-containing waste material, or any asbestos milling, manufacturing, or production which can be seen without the aid of instruments.
WHITE BLOOD CELLS	A part of the body's defense system against outside substances. They attack foreign objects like bacteria or ASBESTOS.
WORK HISTORY	A part of the worker's medical exam. It includes a list of the type of work a person has done and the type of chemical or hazards a person might have been exposed to. This helps the doctor look for job-related diseases that a worker might have or develop.
WORK PRACTICES	Ways of doing work that affect safety on the job. For example, keeping ASBESTOS wet is a good work practice. It keeps ASBESTOS out of the air.