

## Asbestos Frequently Asked Questions

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### What is asbestos?

Asbestos is the name applied to a group of six different minerals that occur naturally in the earth. They are chrysotile, amosite, crocidolite, tremolite, actinolite, and anthophyllite. Of the asbestos used commercially, over 95% is chrysotile which is white in color and found in serpentine rock. These minerals are made up of fibers that vary in length, and may be straight or curled. They can be so small that they are invisible to the naked eye. Asbestos fibers do not have any detectable odor or taste. Asbestos became a popular commercial product because it is strong, won't burn, resists corrosion, and insulates well. There are two forms of asbestos.

1. **Friable:** A "friable" substance is one that can be crumbled or easily broken to a powder or dust under hand pressure when dry. All friable asbestos-containing materials (ACM), or materials contaminated by friable ACM, are considered hazardous waste. Examples include sprayed acoustical ceilings, paper insulation on furnace ducting, and pipe insulation that is of the soft crumbly type. Friable materials are not a health hazard as long as they remain undamaged and undisturbed.
2. **Non-friable:** A non-friable material is a hard material that is not easily broken, such as floor tile, hard cement-like pipes and panels. Non-friable asbestos-containing wastes are considered to be non-hazardous (regardless of their asbestos content), but are still subject to the labeling requirements of the Cal-OSHA regulations.

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### How is asbestos used?

Because of the properties mentioned above, asbestos has been used in building materials, friction products, and heat-resistant fabrics. The following are examples of products that may contain asbestos:

- Insulation for boilers, tanks, and other vessels
- Pipe insulation
- Textured or sprayed acoustical ceiling
- Structural Steel sprayed or troweled-on fireproofing
- Duct insulation
- Furnace insulating pads
- Sheetrock joint compounds

- Wall and ceiling plaster (non-acoustic)
- Patching plaster
- Asbestos cement (Transite) pipe
- Heater register tape and insulation
- Furnace duct insulation
- Pipe covering
- Roofing felts, shingles, patching tars, etc.
- Acoustic ceiling tiles (glued-on or laid-in)
- Asbestos cement shingles (Transite siding)
- Sheet vinyl flooring, vinyl floor tiles and mastics
- Linoleum sheet flooring
- Sheetrock (only in specialty uses)
- Sealants and coatings
- Ceramic tile grout
- Window glazing
- Fire-doors
- Textured paints and street and concrete paint
- Laboratory tabletops
- Clutch, brake, transmission components
- Fuse box liners
- Fireplace artificial logs or ashes
- Conduits for electrical wire
- Corrosive chemical containers
- Electric motor components
- Heat protective pads
- Paper products
- Textiles (including curtains, stage fire-curtains)
- Fireproof blankets
- Specialized theatrical materials

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#### **How is asbestos detected?**

The toxicity of asbestos appears to be related primarily to fiber number and size, therefore modern analytical methods focus on providing information on these parameters as well as on total amount and mineral type. At present, the number and size distribution of fibers in a sample can only be determined by direct microscopic examination. This may be performed using either light or electron microscopy.

The standard method for measuring airborne asbestos fibers in the workplace is called phase contrast optical microscopy. Fibers are collected on a filter and then transferred to a microscope slide where it is dissolved or treated to make it transparent. The fiber is defined as a length greater than 5 microns and an aspect ratio (length to width ratio) of at least 3 to 1. However, many asbestos fibers are even too small to be seen by this method. Furthermore, this method cannot distinguish other fibers, such as non-hazardous carpet fibers, from asbestos fibers. Consequently, this method is most useful for analysis of samples that are composed mainly of asbestos (as in asbestos materials manufacturing settings), and where a significant fraction of the fibers are large enough to be counted.

Examination of an air sample by transmission electron microscopy (TEM) allows the detection of even the smallest asbestos fibers, many of which are invisible by light microscopy -- reportedly up to 99% of airborne chrysotile fibers. TEM can distinguish asbestos from other fibers as well as measuring their length and diameter. TEM is the preferred method for analysis of all types of asbestos air samples.

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#### **How does asbestos get into the environment?**

Asbestos fibers can enter the air and water from the weathering of natural deposits, and the wearing down or disturbance of man-made asbestos products. Small fibers and fiber-containing particles may be carried long distances by wind or water currents before settling. Larger fibers and particles tend to settle more quickly. Asbestos fibers do not break down to other compounds in the environment. Therefore, they can remain in the environment indefinitely. Asbestos fibers do not build up or “concentrate” in

plants or animals. Products that contain asbestos and are thrown away can also pollute the environment, therefore the law requires proper disposal.

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### **Who is at risk for asbestos exposure?**

In the past, asbestos exposure was mainly confined to workers who mined and milled the raw material or those engaged in product manufacture. Since industrial use of asbestos has decreased over the last 40 years, these occupational exposures have declined. Today, most exposures occur during repair, renovation, removal, and maintenance of asbestos that was installed years ago.

The most heavily exposed people in the U.S. are construction trades people. Carpenters, roofers, utility workers, electricians, pipe-fitters, steel mill workers, sheet metal workers, boilermakers, and laborers are at risk of exposure to asbestos through construction materials, insulation coverings of pipes, boilers, industrial furnaces, and other sources. Mechanics working with brake and transmission products also may be exposed to asbestos. Fortunately, workers are now protected by State and Federal OSHA regulations. However, people who work with asbestos without proper protections are likely to be exposed to much higher levels of asbestos particles in air.

Exposure can also occur when fibers released to the air are inhaled by persons not directly handling asbestos. For example, family members can be exposed from the dust carried home on an exposed worker's clothes. Street dust may contain small quantities of fibers from brake linings or crushed asbestos-containing rock used in road construction. Custodial workers can be exposed by asbestos-containing debris accumulated on floors or improperly thrown out in the regular garbage. On rare occasions, asbestos has been found in small amounts in talc and play sand.

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### **What are the routes of exposure?**

Inhaling asbestos fibers suspended in air is the most important route of exposure. These fibers can come from natural deposits of asbestos in rocks or from the wearing down of man-made products such as insulation, ceiling and floor tiles, roof shingles, cement, automotive brakes and clutches, and many other sources.

Higher outdoor exposure levels may occur if you are near an asbestos mine or factory, a building that is being torn down or renovated, or near a waste site where asbestos is not properly covered up or stored to protect it from wind erosion. Higher indoor exposure can occur if asbestos was previously used for insulation, ceiling or floor tiles, or other purposes, and whether these asbestos-containing materials are in good condition or are deteriorated and easily crumbled.

Exposure to asbestos can also occur by drinking fibers present in water. Fibers can enter water by being eroded from natural deposits or piles of waste asbestos, from asbestos-containing cement pipes used to carry drinking water, or from filtering through asbestos-containing filters. Most drinking water supplies in the U.S. have concentrations less than 1 million fibers per liter (MFL).

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### **What are the health effects of asbestos?**

If you are exposed to a substance such as asbestos, many factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), how often, the route or pathway from which you are

exposed (breathing, eating, drinking, or skin contact), your individual characteristics such as age, gender, nutritional status, family traits, life-style, and state of health, and other chemicals to which you are exposed, such as cigarette smoke. Cigarette smoking works synergistically with asbestos exposure to greatly increase your chance of getting lung cancer. The greater the total exposure to asbestos, the greater the chance you will become ill. Some experts believe that there is no definite safe exposure level for asbestos. The best way to protect yourself is to limit your exposure as much as possible.

The chronic (long-term) health effects after exposure to asbestos take years to develop. There are no known acute (short-term) effects from asbestos. That means that even inhaling high amounts of asbestos would not cause immediate symptoms the way exposure to a toxic gas leak or chemical spill might. Diseases caused by long-term inhalation exposure to asbestos include: asbestosis, pleural plaques, lung cancer, and mesothelioma.

#### *Asbestosis*

Asbestosis is a chronic lung disease whose signs and symptoms result from permanent changes in lung tissue due to asbestos exposure. The earliest and most prominent sign is shortness of breath. Symptoms rarely become apparent until at least ten years after the first exposure. Asbestos fibers become lodged in the lungs, irritating the lung tissues and inflaming the small air tubes and sacs in the lungs. As the inflammation continues, permanent tissue damage, called fibrosis, develops. This damaged tissue does not expand and contract like normal lung tissue, and so breathing becomes difficult. Shortness of breath will increase over time, even after the exposure stops. Asbestosis is a serious disease, and can eventually lead to disability or death in people exposed to high amounts of asbestos. Asbestosis does not usually occur in people exposed to low levels of asbestos.

#### *Pleural Plaques*

Pleural plaques are localized scars, or fibrosis, that form in the lung tissue as a result of exposure to asbestos. Pleural plaques are not associated with any specific symptoms and are benign but many people who exhibit pleural plaques may also develop asbestosis or mesothelioma.

#### *Lung Cancer & Mesothelioma*

Asbestos workers were found to have increased chances of getting cancer of the lung and mesothelioma. Mesothelioma is a cancer of the thin membrane that surrounds the lung and other internal organs. Both lung cancer and mesothelioma are usually fatal. These diseases do not appear immediately, but develop only after a number of years. There is a substantial latency period (10-40 years in humans) between the exposure to asbestos and the occurrence of lung cancer or mesothelioma.

Early symptoms of lung cancer are coughing, chest pains, and coughing up blood. Smoking greatly increases the risk of developing lung cancer from exposure to asbestos. Mesothelioma is a rare and deadly form of cancer that is almost always caused by exposure to asbestos. It is truly an "asbestos cancer" and it may result from relatively light exposure to asbestos. Early symptoms of mesothelioma are shortness of breath or pain in the chest or abdomen. This risk of mesothelioma is not increased by smoking.

#### *Other Types of Exposures*

The health effects from swallowing asbestos are unclear. Some groups of people who have been exposed to asbestos fibers in their drinking water have higher-than-average death rates from cancer of the esophagus, stomach, and intestines. However, it is very difficult to tell whether this is caused by asbestos or by something else and medical science has been inconclusive on this subject.

If you get asbestos fibers on your skin, very few of these fibers, if any, pass through the skin into your body. Asbestos workers often developed “asbestos warts” on their hands, but this is a benign condition. There are no known serious health effects from skin exposure. Additionally, asbestos has not been shown to affect reproduction or cause birth defects.

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### **Are there medical tests to determine exposure?**

Anyone frequently exposed to asbestos on the job should have regular medical exams. The worker should discuss his or her work history with a physician, and the examination should include a complete medical history, physical examination, and possibly a chest x-ray and lung function test. The most common test used to determine if you have been exposed to asbestos is a chest x-ray. The x-ray cannot detect the asbestos fibers themselves, but can detect early signs of lung disease caused by asbestos. However, since lung disease caused by asbestos may take many years to develop, x-rays cannot detect recent asbestos exposure. While other substances besides asbestos can sometimes produce similar changes in the lungs, this test is usually reliable for detecting asbestos-related effects. The examination should also assess for other diseases that may mimic the symptoms of asbestosis, especially other lung and heart conditions. There are no simple blood or urine tests for asbestos.

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### **What are some ways to prevent asbestos exposure?**

Indoor air may become contaminated with fibers released from building materials, especially if they are damaged or crumbling. Common sources in homes are sprayed asbestos (“cottage cheese”) ceilings, furnace duct tape or paper covering (sometimes inside the duct), linoleum flooring, pipe insulation, boiler coverings, wall board joint compound, vinyl flooring and acoustic ceiling tiles. **Home owners should not undertake repairs or removal of asbestos-containing materials without professional guidance or services.**

If the asbestos containing material is in good condition, the best thing to do is to leave it alone. Disturbing it may create a health hazard where none existed before. Undamaged asbestos-containing materials are not thought to release a significant number of fibers and are not a health hazard.

There are three ways for dealing with asbestos: repair/encapsulation, enclosure, and removal.

#### *Repair/Encapsulation*

These terms refer to the use of either a penetrating encapsulant or a bridging encapsulant, or both, to treat limited areas of damage to friable asbestos contaminated material (ACM), such as pipe insulation or acoustical ceiling material. The penetrating encapsulant infiltrates the ACM to bind it together. The bridging encapsulant is used to create a durable surface over the ACM to prevent damage or abrasion from casual contact. The potential problems with this method are that encapsulating undamaged material may cause damage to the material or hide future damage, or that encapsulation may make it more difficult to remove the material later.

A combination of repair/encapsulation is when an encapsulant is sprayed or brushed on the asbestos containing material. The encapsulant is normally a mixture of chemicals that help it penetrate into the materials that forms a water proof seal. The idea is to encapsulate the material to keep fibers from being released and reduce the chance for further damage.

### *Enclosure*

This method is the process of creating physical, air and water tight barriers around the materials. The barrier will protect the asbestos material and prevent the release of asbestos fibers into the air. This should be performed only if the area will not be disturbed.

### *Removal*

There is no simple or “best” way to deal with asbestos flooring removal. In general, it is advisable to leave the material in place. New floors may be laid directly over the old floor. Another option is to build a new plywood floor over the old floor and then the new floor is laid on the plywood. If planning to remove the acoustic ceiling material, the kitchen flooring, or any other suspect asbestos-containing material, contact a certified asbestos removal contractor. Asbestos removal can be dangerous, difficult and expensive. Only a trained and licensed contractor should remove asbestos. It requires proper testing, isolation techniques, protective equipment, and disposal.

Asbestos-containing ceiling material in a home does not necessarily need to be removed, as long as the occupants of the home can avoid disturbing it. Asbestos ceiling material should not be dusted with a feather-duster, for example. Even cobwebs should be removed by gently pressing a wet paper towel against the material to collect the cobweb. Closets that have asbestos material sprayed on the ceiling must be arranged so items on the top shelf do not touch the material. No hooks, nails or screws should be installed into the material as this would likely cause fiber release. The top edges of all the drapes and blinds in the house should be lowered to ensure that the ceiling material does not get rushed when they are drawn.

### *Taking Samples*

Unfortunately, visually inspecting the ceiling cannot determine if asbestos is present, even by an experienced inspector. You must submit small samples of the material to an analytical laboratory where they can be examined under a microscope. Samples should be taken by a qualified individual or a professional asbestos inspector. If you wish to take ceiling material samples yourself, use the protocol outlined below; however, check first with the individual laboratory for their sampling requirements:

1. Wear an individually fit-tested, air-purifying respirator equipped with High Efficiency Particulate Air (HEPA) filters. (Available from safety equipment distributors.)
2. Wet the surface of the material with water from a hand-held spray bottle. Wet material is unlikely to release fibers when disturbed.
3. Carefully scrape a 50 cent piece-sized area of wet material off the substrate and into a zip-lock bag held close to the material and seal immediately. Be sure to take a complete cross-section of material, down to the drywall.
4. Wipe any loose material up with a soaking wet paper towel and flush down the toilet.
5. Ideally, the bare patch should be sealed with an asbestos encapsulant (an asbestos inspector would have some or a hardware store). If an encapsulant is unavailable, latex spray paint can be used to cover the spot where the sample was taken.

Because the asbestos was sometimes mixed into the ceiling material by hand, the material is not uniform in composition; parts of the ceiling may not have any asbestos in them, while other locations may have a relatively high asbestos content. For this reason, material for testing should be taken from several locations. Collect at least three samples of material or at least one sample per room (if it is present in more than one room); whichever is greater. If the laboratory fails to detect asbestos in any of the sample, it is reasonable to consider the material as non-asbestos containing.

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### **How can you properly work with asbestos?**

If you are a contractor who will work with any quantity of asbestos, prior to working with asbestos, by law, you must be trained on its proper handling and storage. There are specific licensing requirements for contractors who disturb greater than 100 square linear feet of asbestos-containing construction material (ACCM) in a year. California regulations generally regulate ACCM which is defined as material that contains greater than 0.1% asbestos, as opposed to the federal regulations that generally regulate ACM (asbestos containing material) which is defined as materials that contain greater than 1% asbestos. Federal and California OSHA regulations regulate work that disturbs materials containing any level of asbestos.

The California contractor licensing requirements are as follows:

- Have four years of experience within the past ten years in the class for which you are applying at the level of journeymen, foreman, supervisor, or contractor. This experience must be verified through certification by a responsible and knowledgeable person.
- Show financial solvency;
- Pass a contractor's examination
- Obtain a contractor's bond or pay the appropriate fee
- Pass an asbestos open-book exam.

The asbestos certification may be granted to an existing license by having the license's qualifying person pass the certification examination. Experience verification is not required. Prior to the granting of the certification to the contractor's license, the licensee must provide to the Licensing Board proof of registration with the Division of Occupational Safety and Health (DOSH). If the certification is to be used only to bid jobs, and the licensee will use subcontractors who hold the asbestos certification to actually perform the work, a certified statement to the effect must be provided to the Board in lieu of registering with DOSH. This certification and registration process is completely separate from the asbestos open-book exam, which has been required in recent years for all contractors when renewing their license, and is presently required for issuance of new licenses. The open-book exam is an awareness exam intended to alert all contractors regarding the potential hazards of asbestos on the job site; the certification process is for licensees who will actually bid and perform asbestos removal work.

Workers whose clothing has been contaminated by asbestos must change into clean clothing before leaving the work site. Do not take contaminated work clothes home, as family members could be exposed. Contaminated work clothes should be laundered by individuals who have been informed of the hazards of asbestos exposure. Wash any areas of the body that may have contacted asbestos. Do not eat, smoke, or drink where asbestos is handled, processed, or stored, since asbestos can be swallowed. Wash hands carefully before eating or smoking. Do not dry sweep for clean-up. Use a special HIGH Efficiency Particulate Absolute vacuum or a wet method to reduce dust during clean-up.

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### **How can you properly dispose of asbestos?**

Cal-EPA is responsible for hazardous waste control. They define asbestos waste as having more than 1% asbestos and being friable. Call them for a ruling if you are disposing of asbestos containing material. Asbestos waste must be placed in landfill sites approved for hazardous waste. The California Water

Resources Control Board licenses hazardous waste sites. The contractor will normally handle the transport and disposal of asbestos waste. If the homeowner is the owner of the waste and if it is over a certain amount, they must sign an EPA form documenting the waste and where it will be deposited. The contractor will help obtain this form but you must sign it. Cal-EPA can give you advice on how to transport and dispose of small amounts of asbestos. They have special policies for homeowners with only small amounts of asbestos waste.

Any hazardous waste that is transported to a disposal site must be accompanied by a properly completed Uniform Hazardous Waste Manifest. To properly complete the manifest, the generator must obtain an EPA Identification number. Permanent ID numbers are issued to generators who routinely generate hazardous waste. Provisional ID numbers and emergency ID numbers are issued for one-time only situations and are valid for 90 days. A special provisional number is issued for asbestos containing wastes generated in the course of residential removals. For further information and to obtain an application, call the Department of Health Services (DHS) at (916) 324-1781.

Asbestos wastes must be contained and transported in one of the following ways:

1. In sealed, leak-tight, and non-returnable containers (e.g. plastic bags of 6mm thickness, cartons, drums, or cans) from which fibers cannot escape. Wastes within the container must be adequately wetted to prevent blowing of fibers in case the container is broken.
2. For bulk wastes that will not fit into containers without additional breaking, place wastes into sealed and leak-tight wrapping after wetting. If the wastes are to be placed directly in trailer or drop-boxes, the trailer or drop-box should be lined with plastic sheeting. The wastes should be wetted to prevent blowing of fibers in case the wrapping is broken. The wrapping should be sealed (e.g. with duct tape), and the trailer or drop-box should be covered with a tarp.

In California, asbestos wastes totaling more than 50 lbs., must be transported by a registered hazardous waste hauler to an approved treatment, storage, or disposal facility. Persons generating and transporting less than 50 lbs. of a hazardous waste to a permitted hazardous waste facility are exempt from this requirement and the requirements concerning possession of the manifest while transporting hazardous waste upon meeting all of the following conditions:

1. The hazardous wastes are transported in closed containers and packed in a manner that prevents the containers from tipping, spilling, or breaking during the transporting.
2. Different hazardous waste materials are not mixed within a container during the transporting.
3. The person transporting the hazardous waste is the producer of that hazardous waste, the person produces no more than 100 kg of hazardous waste in any month, and accumulates no more than 1000 kg at any one time.

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#### **Are there alternatives to asbestos?**

Substitutes for asbestos are constantly being developed. Substitutes include man-made fibers such as:

- Fibrous glass
- Mineral wool



- Ceramic fibers
- Other naturally occurring fibers such as wollastonite
- Non-fibrous minerals such as vermiculite or mica

Non-asbestos friction materials are currently being used in disc brake pads, and substitutes are being developed for drum brake linings. Primary substitutes include:

- Semi-metallic materials for disc brakes
- Non-asbestos organics (e.g., fiberglass, para-aramid, mineral fibers, steel wool and fibers, and resins) for drum brakes.

These and other materials are being developed as substitutes for asbestos in other products. However, some of these man-made fibers may also cause potential health problems. Studies are ongoing to determine what the health effects these fibers may cause.

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### **What is the best way to choose a contractor for remedial work?**

If asbestos is found in your home and remedial work needs to be done, the following are some suggestions to follow:

1. Get bids from a minimum of 3 different qualified and licensed contractors. Make sure the contractor has a valid, current contractor's license and certificate for asbestos abatement work; make certain that the contractor has a current and valid license bond.
2. Clearly define the parameters of the project and your expectations to each bidding contractor so that they know how to bid.
3. Ask each contractor for references that you can contact to learn about the quality of the contractor's previous work.
4. Request a work plan that details procedures and project schedules.
5. Select a contractor who has a comprehensive employee training program.
6. Make sure the contractor has general liability as well as asbestos-specific policies with no exclusion. The contractor should have "occurrence-type" insurance rather than "claims-made" insurance. "Occurrence" coverage begins when the policy is instituted by the contractor and provides that claims may be filed against an asbestos contractor for damages for an indefinite period of time after the exposure occurred. This insurance provides maximum protection long after an individual's exposure to insure against future claims. "Claims-made" coverage is only for claims filed during the period for which the policy is in force. If the contractor changes insurance companies or stops doing business as an asbestos abatement contractor, you may have no grounds to pursue compensation for damages arising out of an exposure to asbestos caused by your contractor.
7. Demand that the contractor provide the following documentation:
  - Copies of required notification materials for the BAAQMD and Cal/OSHA.
  - Job site log-in sheets.
  - Monitoring reports for personal air samples.
  - Accident reports.
  - Hauling and disposal information and permits as required.
  - Obtain a final air monitoring report that is performed by an independent consultant.

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**What has the government done about asbestos?**

The Environmental Protection Agency (EPA) Ban and Phase-Out Rule for asbestos took effect in 1989. Despite the efforts of the EPA to phase out all uses of asbestos, the manufacture of many asbestos-containing products is still allowed in the United States. In the 1970's, the EPA and the Consumer Product Safety Commission (CPSC) banned the production and use of many products that contained asbestos, particularly spray applied materials such as structural fireproofing, acoustical surfacing materials, and patching compounds used by consumers. Additionally, the federal government has taken a number of other steps to protect citizens from exposure to asbestos:

- The EPA established regulations that require school systems to inspect for asbestos, and if damaged asbestos is found, to reduce or eliminate the exposure, either through removal or enclosure so it cannot get into the air. These regulations also establish certification programs to ensure the competency of people involved in identifying, assessing and removing asbestos for school systems as well as in public and commercial buildings. In addition, the EPA publishes guidance documents to assist building owners with implementing asbestos programs.
- The EPA regulates the release of asbestos from factories and during building demolition or renovation to prevent asbestos from getting into the environment. The EPA also regulates the disposal of waste asbestos materials or products, requiring these to be placed only in approved locations.
- The EPA has proposed a limit of 7 MFL (million fibers/liter) on the concentration of long asbestos fibers that may be present in drinking water.
- The Federal Drug Administration regulates the use of asbestos in the preparation of drugs, and restricts the use of asbestos in food-packaging materials.
- OSHA has established Permissible Exposure Limits (PELs) for asbestos of 0.1 f/cc as an 8-hour time-weighted average exposure (TWA), and 1.0 f/cc as a 30-minute short term exposure (excursion limit) that is allowed in air in the workplace.

In California, additional requirements include:

- Licensing of asbestos abatement contractors.
- Certification of asbestos consultants.
- Disposal of asbestos as hazardous waste (with minor exceptions).
- Building owners and employers must notify lessees, contractors and employees of the presence of asbestos in their buildings.
- Building owners shall identify sprayed or troweled-on surfacing materials, thermal systems insulation, and vinyl or asphalt flooring in their buildings and must treat them as asbestos unless they demonstrate that they do not contain asbestos using approved sampling methods.
- Contractors shall identify asbestos in their work areas before they start working and they shall comply with the applicable regulations for asbestos-related work they perform.

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