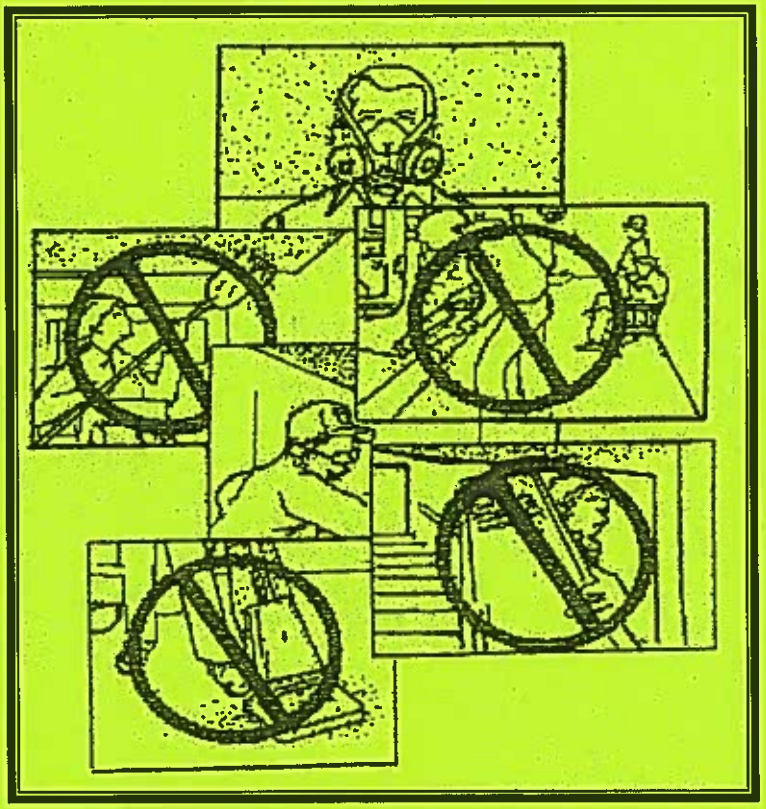
ASBESTOS

2-HR Awareness Training

EPA 40 CR 763 and OSHA 29 CFR 1910 and 1926



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HANDOUTS

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Asbestos Awareness

AHERA 40 CFR 763 and OSHA 29 CFR 1910.1001 & 1926.1101

BACKGOUND INFORMATION

What is Asbestos?

Asbestos is a mineral. It is mined in much the same way that other minerals, such as iron, lead, and copper, are mined. Asbestos is composed predominately of magnesium silicate. There are six recognized asbestiform minerals classified into one of two groups based upon crystal structure as well as the presence of contaminating metals in the mineral matrix (Fe, Ca, and Na).

- **AMPHIBOLE GROUP**: Amosite, Crocidolite, Anthophylite, Tremolite, and Actinolite
- **SERPENTINE GROUP**: Chrysotile

The three most common are ***chrysotile, amosite,*** and ***crocidolite.*** **Chrysotile** fibers are pliable and cylindrical, and often arranged in bundles. Amosite and crocidolite fibers are like tiny needles. The first commercial asbestos mine -- a chrysotile – opened in Quebec, Canada, in the 1870's. **Crocidolite** asbestos was first mined in South Africa during the 1980's. **Amosite** asbestos also comes from Africa and was first mined in 1916; its name is derived from "Asbestos Mines of South Africa—AMOSite.

Most Common Asbestos

Chrysotile
Amosite
Crocidolite

Unlike most minerals, which turn into dust particles when crushed, asbestos breaks up into fine fibers that are too small to be seen by the human eye. Often individual fibers are mixed with a material that binds them together, producing asbestos containing material (ACM). The Environmental Protection Agency (EPA) defines ACM as those materials that contain greater than one percent (1%) asbestos when analyzed using a polarized light microscope.

How long has asbestos been in use?

Asbestos was first used in the United States in the early 1900's, to insulate steam engines. It was not until after World War II, that asbestos was used extensively in the U.S. For the next thirty years, people who constructed and renovated public and commercial buildings used asbestos and ACM extensively. They used ACM primarily to fireproof, insulate, soundproof, and decorate. EPA estimates that there are asbestos containing materials in most of the nation's approximately 107,000 primary and secondary schools and 733,000 public and commercial buildings.

Asbestos Characteristics

- ✓ Readily Available
- ✓ Tensile Strength
- ✓ Fire Resistant
- ✓ Resists Corrosion
- ✓ Chemical Resistant
- ✓ Great Insulator
- ✓ Absorbent
- ✓ Poor Conductor of Electricity

Why has asbestos been so widely used?

Asbestos appealed to manufacturers and builders for a variety of reasons. It is strong yet flexible, and it will not burn. It conducts electricity poorly, but insulates effectively. It also resists corrosion. Asbestos may have been so widely used because few other available substances combine the same qualities.

How many products contain asbestos?

One study estimated that 3,000 different types of commercial products contained asbestos. The amount of asbestos in each product varied from as little as one percent to as much as 100 percent. Many older plastics, paper products, brake linings, floor tiles and textile products contain asbestos, as do many heavy industrial products such as sealants, cement pipe, cement sheets, and insulation.

Asbestos Awareness Training

Asbestos awareness training, as mandated in the OSHA rule, refers to the level of training required for building maintenance and housekeeping ***employees who work near, but who do not disturb*** asbestos containing materials (ACM) and presumed asbestos containing materials (PACM).

Any employee who performs any building ***maintenance, repair, or housekeeping activities who may come into contact with, but not disturb, ACM or PACM*** must receive annual asbestos awareness training - including employees of outside service and trade companies.

The determination of which employees must receive awareness training is based upon the duties actually performed - not their job title. Examples of common activities that may trigger awareness training requirements are identified in the chart.

Presumed Asbestos-Containing Materials (PACM)

PACM are very common building materials. OSHA defines them as thermal system insulation and spray or trowel applied surfacing materials found in buildings built prior to 1980. PACM must be treated the same as materials known to contain asbestos, unless tested and proven to be asbestos-free. In addition, asphalt and vinyl flooring materials installed no later than 1980 must be treated as if they contain asbestos for floor-care maintenance purposes. Examples of common forms of PACM are identified in the chart.

OSHA ASBESTOS STANDARDS

The OSHA Asbestos Standards have far-reaching implications for building owners and employers. ***Buildings constructed prior to 1980*** are "presumed" to contain asbestos unless tested and proven otherwise. ***Owners and managers*** of pre-1980 buildings must determine the presence, location, quantity, and condition of asbestos-containing materials (ACM) and presumed asbestos-containing materials (PACM) in their buildings, inform building occupants of its presence, post warning signs, and affix labels accordingly.

Activities that Trigger Asbestos Awareness Training

- Routine housekeeping activities in areas where suspect materials are accessible.
- Sweeping
- Mopping
- Vacuuming
- Dusting
- Building maintenance and repair activities where suspect materials may be contacted but not disturbed.
- Changing filters, light bulbs & gaskets
- Removing or installing fixtures, ceiling tiles, fire detection devices, etc.
- Painting, sanding, refinishing, remodeling and demolition activities.

PACM

- Surfacing Materials
- Thermal System Insulation
- Acoustical Materials on Walls & Ceiling
- Decorative Materials on Walls & Ceilings
- Fireproofing
- Pipe Insulation
- Boiler Insulation
- Air-Duct Insulation
- Sheet Rock & Joint Compound

OSHA ASBESTOS STANDARDS

29 CFR 1910.1001 General Industry
29 CFR 1915.1001 Shipyard
29 CFR 1926.1001 Construction

Employers, regardless of building ownership, must notify employees of the ACM and PACM in their work areas and provide asbestos awareness training to employees who work near or may come into contact with ACM or PACM.

BUILDING OWNERS must:

- identify potential asbestos hazards within their buildings;
- inform building occupants of their presence;
- post warning signs and affix labels

EMPLOYERS must:

- inform employees of potential hazards in their workplace;
- provide annual training to employees who may come into "contact" with or "disturb" ACM/PACM

For More Information about Asbestos in the Work Place,
Contact the Asbestos Program Manager.

Specific Awareness Training Requirements

29 CFR 1926.1101 construction-related activities include any form of maintenance, repair, renovation or alteration of structures, substrates and portions thereof.

Specific training requirements depend upon which OSHA asbestos industry standard(s) is in effect. To determine the applicable OSHA asbestos standard one must examine the types of tasks actually performed by the employee.

Employees performing building ***"maintenance"*** work generally fall under the **Construction Standard,** while **housekeeping** workers normally fall under the **General Industry Standard.** Employees who perform both types of duties are covered by both standards. To be in compliance, asbestos awareness training:

- Must be provided at the time of initial job assignment (within 60 days for Class IV workers) and annually thereafter.
- Must be provided at no cost and in a manner they can understand.
- Must include information about the ACM and PACM present in the workplace
- Must contain course materials and meet requirements of the asbestos industry standard(s) in effect. which is determined by the duties actually performed by the employee.
- Employers must make training materials and proof of training available to OSHA upon request

The Construction Standard is in effect when employees perform construction-related duties where ACM or PACM are present or may be affected. Example activities include:

- Removing or installing light fixtures
- Hanging pictures or fixtures where drilling, pounding or screwing is involved
- Painting, sanding or refinishing
- Running wire or cable
- Plumbing and HVAC work
- Demolition and renovation
- Moving or replacing ceiling tiles
- Replacing light bulbs and changing batteries in fire detection devices
- Housekeeping activities performed as a result of construction activities

The Construction Standard defines four classes of asbestos work, each requiring a specific level of training. Building maintenance activities where ACM or PACM are not disturbed are considered Class IV work, requiring two-hour asbestos awareness training. Class III work involves similar activities, except small amounts of ACM or PACM are disturbed and 16-hour training is required. The distinction between Class III and Class IV work is important and sometimes blurry.

OSHA CLASSIFICATIONS OF WORK
Based Upon "Exposure Assessment"

Class I: Means activities involving the removal of Thermal System Insulation (TSI) and surfacing ACM/PACM.

Class II: Means activities involving the removal of ACM that is not TSI or surfacing material (miscellaneous materials). Examples are removal of floor or ceiling tiles. siding, roofing and transite panels.

Class III: Means repair and maintenance operations where ACM including TSI and surfacing materials is likely to be disturbed. It includes repair and maintenance activities involving intentional disturbance of ACM or PACM. It is limited to ACM/PACM

Class IV: Means maintenance and custodial work including clean-up, during which employees contact ACM or PACM.

[NOTE: Class I, II, III work shall be conducted in a "regulated area". See 29 CFR 1926 (b) Definition of "Regulated Area" and (e)]

Regulated Areas
ALL
CLASS I, II & III
WORK
Post Signs
Put Up Barricade Tape
Control Access
Competent Person On-site

The General Industry Standard [29 CFR 1910.1001] applies to employers of employees who perform routine, non-construction-related housekeeping duties in areas where accessible ACM or PACM are present. It should be noted that ***under the General Industry Standard, "maintenance" work refers only to floor care activities involving presumed asbestos- containing flooring material.*** Examples of duties triggering the General Industry Standard include:

- Routine dusting, sweeping, vacuuming and mopping
- Waxing and buffing presumed asbestos-containing floor covering

Notification of Hazards. Employers must inform affected employees of the locations of ACM & PACM in their work areas, including vinyl and asphalt floor coverings installed prior to 1981.

Awareness Training

General Requirements Training must be consistent with requirements for training for local education agency maintenance and custodial staff as set forth in 40 CFR 763.92

- Initial Training 2-Hours minimum training time. Length not specified.
- Refresher Training annually. Length not specified.
- Must make training materials readily available to affected employees, including a copy of the regulation.
- Must inform employees of the availability of self-help smoking cessation information and make it available upon request
- Must make training materials and training records available to OSHA upon request.

Course Content Requirements

- ✓ Information regarding asbestos and its various uses and forms
- ✓ Recognition of damaged & deteriorated asbestos-containing building materials
- ✓ Information about the health effects associated with asbestos exposure
- ✓ Relationship between smoking and asbestos exposure to lung Cancer
- ✓ Non-construction housekeeping procedures.
- ✓ Proper response to fiber release episodes.
- ✓ Care and maintenance o f ACM flooring
- ✓ Provide name and telephone number of person designated to carry out asbestos-related responsibilities

IDENTIFYING ACM/PACM AND RECOGNIZING DAMAGE

How can asbestos be identified?

While it is often possible to "suspect" that a material or product is /or contains asbestos by visual determination, actual determinations can only be made by instrumental analysis. Until a product is tested, it is best to assume that the product contains asbestos, unless the label or the manufacturer verifies that it does not.

OSHA requires that property owners identify the presence. location, quantity and condition of all materials presumed to be asbestos containing. Only EPA AHERA accredited inspectors determine whether the suspect material is asbestos containing following specific protocols.

EPA requires that the asbestos content of suspect materials be determined by collecting bulk samples and analyzing them by polarized light microscopy (PLM). The PLM technique determines both the percent and type of asbestos in the bulk material. EPA can provide information about laboratories that test for asbestos. Only accredited laboratories may perform the analysis.

EPA AHERA CATEGORIES

Materials are considered asbestos containing (ACM) if the material contains greater than 1% asbestos as determined by a NVLAP accredited laboratory using polarized light microscopy (PLM). EPA established three categories based upon how they are installed into the building.

SURFACING – ACM sprayed or troweled on surfaces (walls. ceiling. structural members) for acoustical. decorative, or fireproofing purposes. This includes: Acoustical Plaster. Decorative Plaster, Fireproofing, and Hard Plasters

THERMAL SYSTEM INSULATION (TSI) – Insulation used to inhibit heat transfer or prevent condensation on pipes. boilers, tanks, ducts, and other components of and hot and cold water systems and heating, ventilation and air conditioning (HVAC) systems. This includes: Pipe insulation [Calcium/ Magnesium Silicate ("Mag" block). Corrugated ("Air Cell"), Wrapped Cardboard. Mudded cementitious fittings (tees, elbows, valves], Tank insulation, Breeching insulation, Duct insulation (interior and exterior)

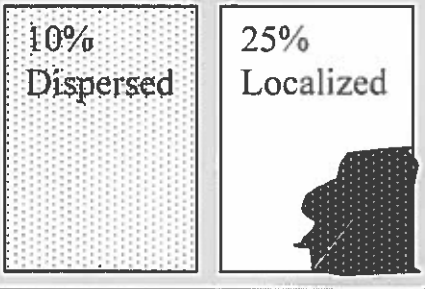
MISCELLANEOUS MATERIALS – Asbestos containing material that is not surfacing or TSI. mostly non-friable products and materials. Examples of miscellaneous materials Include: Ceiling tile, Transite board, Transite pipe, ACM filters, Floor tiles (VAT) & Adhesives ("Mastic"), Fire brick. Vibration joint cloth, Electrical wire covering, Brake Shoes, Asbestos papers (numerous uses), Asbestos cloth (numerous uses).

*Fire door. *Fire blanket, and **Shingles (roofing or siding)

**Not ACBM* ***Not AHERA*

Follow the EPA 10-25 Rule to Determine Damage

FAIR	<10% Dispersed = Damaged >25% Localized = Damaged
POOR	>10% Dispersed = Significantly Damaged >25% Localized = Significantly Damaged
GOOD	No visible damage



RECOGNIZING DAMAGED ACM

Source: "Model EPA Curriculum for Training Inspectors

SURFACING & MISCELLANEOUS MATERIAL

SIGNFICANTLY DAMAGED. Material with one or more of the following characteristics:

- Crumbling or blistered over at least one tenth of the surface if the damage is evenly distributed (one quarter if the damage is localized).
- One tenth (one quarter, if localized) of material hanging from the surface, deterioration, or showing adhesive failure.
- Water stains, gouges, or mars over at least one tenth of The surface if the damage is evenly distributed (one quarter if the damage is localized).

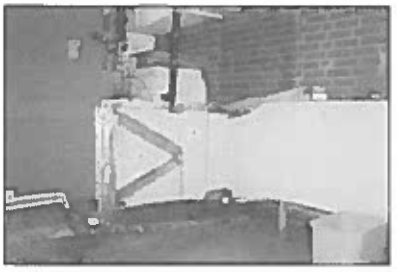
Accumulation of powder, dust, or debris similar in appearance to the suspect material on surfaces beneath the material can be used as confirmatory evidence.

DAMAGED. Material with the following characteristics:

- The surface crumbling, blistered, water-stained, gouged, marred or otherwise abraded over less than one tenth of the surface if the damage is evenly distributed (less than one quarter if the damage is localized).

Accumulation of powder, dust, or debris similar in appearance to the suspect material on surfaces beneath the material can be used as confirmatory evidence.

GOOD CONDITION. Material with no visible damage or deterioration, or showing only very little damage or deterioration.



THERMAL SYSTEM INSULATION

SIGNFICANTLY DAMAGED. Material with one or more of the following characteristics:

1) Missing jackets on at least one tenth of the piping or equipment.
2) Crushed or heavily gouged or punctured insulation on at least one tenth of pipe runs/risers, boiler, tank, duct, etc., if the damage is evenly distributed (one quarter if the damage is localized).

Accumulation of powder, dust, or debris similar in appearance to the suspect material on surfaces beneath the pipe/boiler/tank/duct, etc. can be used as confirmatory evidence.

DAMAGED. Material with the following characteristics:

1) A few water stains or less than one tenth of insulation with missing jackets.
2) Crushed insulation or water stains, gouge, punctures, or mars on up to one tenth of the insulation if the damage is evenly distributed (or up to one quarter if the damage is localized).

Accumulation of powder, dust, or debris similar in appearance to the suspect material on surfaces beneath the pipe/boiler/tank/duct, etc. can be used as confirmatory evidence.

GOOD CONDITION. Material with no visible damage or deterioration, or showing only very limited damage or deterioration.

EPA AHERA Definitions

Significantly Damaged Friable Surfacing and Miscellaneous ACM

Friable surfacing or miscellaneous ACM in a functional space where damage is "extensive and severe." [***NOTE:*** the preamble to the AHERA rule makes reference to 10 and 25 percent damage as a means of distinguishing significantly damaged from damaged ACBM.]

Damaged Friable Surfacing or Miscellaneous ACM

Friable miscellaneous or surfacing ACM which has

1) deteriorated or sustained physical injury such that the internal structure (cohesion of the material is inadequate) OR, if applicable,
2) which has delaminated such that the bond to the substrate (adhesion) is inadequate, OR
3) which for any other reason lacks fiber cohesion or adhesion qualities.

Such damage or deterioration may be illustrated by,

- the separation of ACM into layers;
- separation of ACM from the substrate;
- flaking, blistering, or crumbling of ACM surface;
- water damage;
- significant or repeated water stains;
- scrapes, gouges, mars, or other signs of physical injury on the ACM.

Asbestos debris originating from the ACBM in question may also indicate damage.

Damaged or Significantly Damaged TSI

TSI on pipes, boiler, tanks, ducts, and other thermal system insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges, or other signs of physical injury to ACM; occasional water damage on the protective coverings/ jackets; or exposed ACM ends or joints. Asbestos debris, origination from the ACBM in question may also indicate damage.

NOTE: The AHERA Rule has only one TSI category of damage. (damaged or significantly damaged).

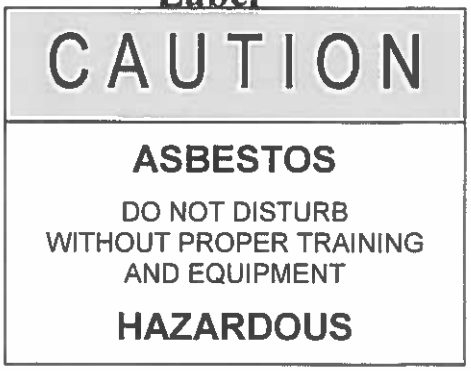
POTENTIAL FOR DISTURBANCE

Potential for CONTACT
HIGH Service workers work in the vicinity if the material more than once per week, or
MODERATE Service workers work in the vicinity of the material once per month to once per week, or the material is in a room or office and accessible to the occupants
LOW Service workers work in the vicinity of the material less than once per month, or the material is visible but not within reach of building occupants.

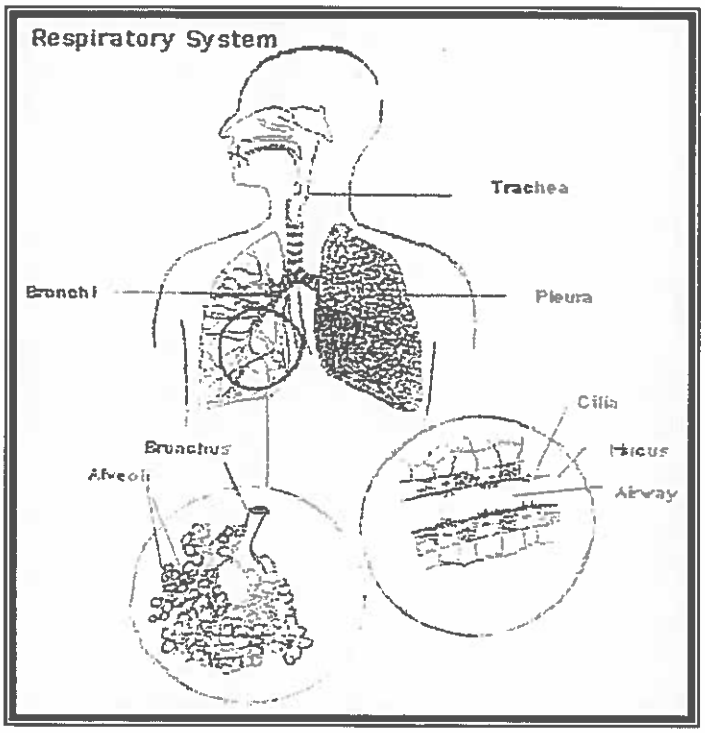
Influence of VIBRATION
HIGH Loud motors or engines present (e.g., some fan rooms), or Intrusive noises or easily sensed vibrations (e.g., ducts vibrating but no fan in the area) or
MODERATE Motors or engines present but not obtrusive (e.g., ducts vibrating but no fan in the area) or, Occasional loud sounds (e.g., equipment operating).
LOW/NONE. None of the above.

Potential for AIR EROSION
HIGH High velocity air (e.g., elevator shaft, fan room).
MODERATE Noticeable movement of air (e.g., air shaft, ventilator air stream)
LOW/NONE None of the above.

AHERA Asbestos Caution Label



HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO ASBESTOS



Asbestos is a ***known carcinogen.*** Some people exposed to asbestos develop asbestos-related health problems; some do not. Asbestos enters the body through ***inhalation or ingestion.***

Once inhaled, asbestos fibers can easily penetrate body tissues. They may be deposited into the tiny air sacs in the lungs called the ***alveoli*** or retained in the airways and lung tissue. Because asbestos fibers remain in the body, each exposure increases the likelihood of developing an asbestos-related disease. The increased risk that may come with repeated exposure is referred to as the ***dose response relationship.***

Asbestos related diseases may not appear until years after exposure. This delay in symptoms is called the ***latency period***. The latency period for asbestos related diseases vary and may be as much as 10 to 40 years. Ingesting asbestos may be harmful, but the consequences of this type of exposure are not as clearly documented. Nor have the effects of skin exposure to asbestos been well documented. Insulators who have worked many years with asbestos have been known to develop asbestos warts on their hands; however, today with the use of protective clothing and equipment this is less likely to occur. People who touch asbestos may get a rash similar to the rash caused by fiberglass.

Today we are seeing results of exposure among asbestos workers during World War II. A medical examination that includes a medical history, breathing capacity test and chest x-ray may detect problems early. Scientists have not been able to develop a "safe" or threshold level for exposure to airborne asbestos. ***There is no known safe level of exposure.***

The body has ***natural defenses***: ***cilia, mucus, and white blood cells.*** Because smoking destroys some of the body's natural defenses, smokers are at greater risk. It is well established that people who smoke and work with asbestos are at 80-90 times higher risk for developing some asbestos related diseases including cancer. This result is known as a ***synergistic effect*** – the multiplied effect of two carcinogens (tobacco smoke and asbestos) coming together.

DISEASES ASSOCIATED WITH ASBESTOS EXPOSURE

The most common asbestos-related diseases include asbestosis, lung cancer, mesothelioma and other cancer of the gastrointestinal tract. These are described briefly below.

- **Asbestosis.** It is a serious, chronic, non-cancerous respiratory disease. Inhaled asbestos fibers aggravate lung tissues, which causes them to scar. Symptoms of asbestosis include shortness of breath and a dry crackling sound in the lungs while inhaling. In its advanced stages, the disease may cause cardiac failure.

There is no effective treatment for asbestosis; the disease is usually disabling or fatal. The risk of asbestosis is minimal for those who do not work with asbestos; the disease is rarely caused by neighborhood or family exposure. Those who renovate or demolish buildings that contain asbestos may be at significant risk, depending on the nature of the exposure and precautions taken. Scar tissue builds up in the "alveoli" (the tiny air sacs n the lung) where the exchange of oxygen with blood occurs. The ability of the respiratory tract to transfer oxygen from the inhaled air to the blood is reduced.

- **Lung Cancer** causes the largest number of deaths related to asbestos exposure. The incidence of lung cancer in people who are directly involved in the mining, milling, manufacturing and use of asbestos and its products is much higher than in the general population. The most common symptoms of lung cancer are coughing and a change in breathing. Other symptoms include shortness of breath, persistent chest pains. hoarseness, and anemia.

  People who have been exposed to asbestos and are also exposed to some other carcinogen—such as cigarette smoke—have a significantly greater risk of developing lung cancer than people who have only been exposed to asbestos. This is known as the ***synergistic effect.*** One study found that asbestos **workers who smoke are about 90 times more likely to develop lung cancer** than people who neither smoke nor have been exposed to asbestos.

- **Mesothelioma** is a rare form of cancer which most often occurs in the thin membrane lining of the lungs. chest. abdomen. and (rarely) heart. About 200 cases are diagnosed each year in the United States. Virtually all cases of mesothelioma are linked with asbestos exposure. Approximately 2 percent of all miners and textile workers who work with asbestos, and 10 percent of all workers who were involved in the manufacture of asbestos-containing gas masks, contract mesothelioma.

  People who work in asbestos mines, asbestos mills and factories, and shipyards that use asbestos, as well as people who manufacture and install asbestos insulation, have an increased risk of mesothelioma. So do people who live with asbestos workers, near asbestos mining areas, near asbestos product factories or near shipyards where use of asbestos has produced large quantities of airborne asbestos fibers.

  The younger people are when they inhale asbestos, the more likely they are to develop mesothelioma. This is why enormous efforts have been made to prevent school children from being exposed.

- **Other Cancer.** Several digestive system cancers have been linked to asbestos exposure. In the majority of studies conducted, those individuals who were exposed to asbestos fibers showed a greater frequency of cancer of the esophagus, larynx, oral cavity, stomach, colon and kidney.

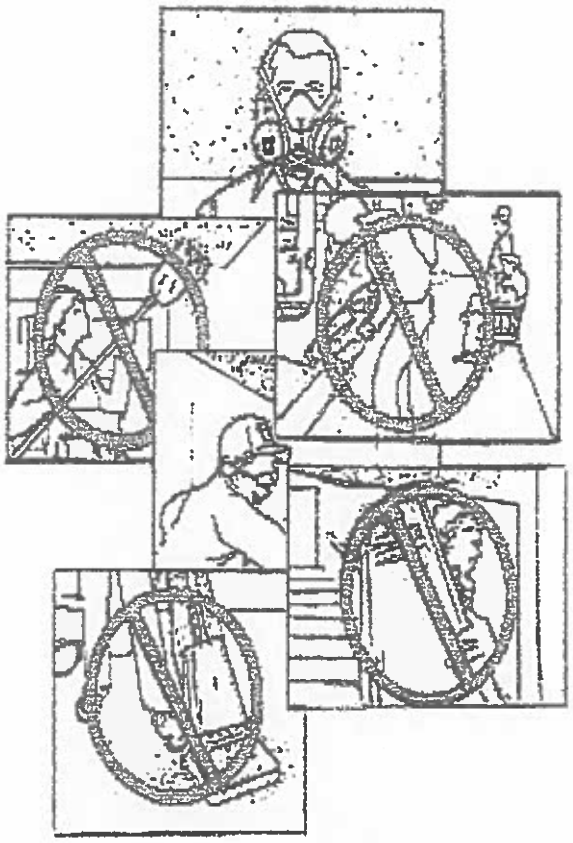
Health Terms to Remember

Routes of Exposure: Asbestos enters the body through inhalation & ingestion.
Dose Response Relationship: The more one is exposed the greater the risk. But remember, there is NO known safe level of exposure.
Synergistic Effect: The multiplied effect of 2 known carcinogens, smoking and asbestos exposure. The risk not only adds up; it multiplies up.
Latency Period: The length of time between exposure and onset of symptoms of disease. The latency period for the various diseases ranges from 10 – 40 years

EXPOSURE: How is one exposed to asbestos?

When asbestos fibers are in the air, people may ***inhale*** or ***ingest*** them. Because asbestos fibers are small and light, they can stay in the air for a long time --for as long as there is air movement, for days or weeks.

People whose work brings them into contact with ACM – workers who repair, renovate, or maintain buildings with ACM in them, for example—may inhale fibers that are in the air; this is called occupational exposure. OSHA has defined occupational exposure as any exposure to asbestos at an employee's work site. Workers' families may inhale asbestos fibers released by clothes that have been in contact with ACM: this is called secondary exposure.



The amount of asbestos a worker is exposed to Will vary according to :

1) The **concentration of fibers** in the air
2) **Duration of exposure**
3) The worker's **breathing rate** workers doing manual labor breath faster)
4) **Weather** conditions
5) The **protective devices** the worker wears

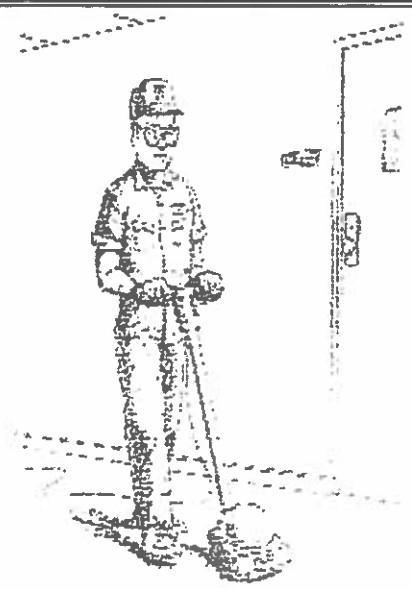
Safe Housekeeping procedures

Damaged ACM is more likely to release fibers than non-damaged ACM. In a 1984 survey, EPA found that approximately 66 percent of those buildings that contained asbestos, contained damaged ACM. If ACM, when dry, can be crumbled by hand pressure – a condition known as "***friable***" – it is more likely to release fibers than if it is "non-friable."

Fluffy, spray-applied asbestos fireproofing material, often found above suspended ceilings, is considered friable. Some materials that are considered "***non-friable***", such as vinyl-asbestos floor tile, can also release fibers when sanded, sawed or otherwise aggressively disturbed. Materials such as asbestos cement pipe can release asbestos fibers if broken or crushed when buildings are demolished, renovated or repaired. ACM which is in a heavy traffic area, and which is therefore often disturbed, is more likely to release fibers than ACM in relatively undisturbed areas.

To minimize fiber release when performing housekeeping tasks, certain activities are prohibited. Prohibited activities are identified in the chart below.

P	**A**	DO NOT drill holes in ACM/PACM.
R	**C**	DO NOT hang plants or pictures on structures covered with ACM/PACM.
O	**T**	DO NOT sand asbestos containing floor tile.
H	**I**	DO NOT damage ACM/PACM while moving furniture or other objects.
I	**V**	DO NOT install curtains, drapes, or dividers so that they damage ACM/PACM.
B	**I**	DO NOT dust floor, ceilings, moldings or other surfaces with a dry brush.
I	**T**	DO NOT sweep with a dry broom.
T	**I**	DO NOT use an ordinary vacuum to clean up asbestos containing debris.
E	**E**	DO NOT remove ventilation system filters dry.
D	**S**	DO NOT shake ventilation system filters.



Maintaining Asbestos Containing Floors

- Sanding of asbestos containing floor material is prohibited
- Stripping of finishes shall be conducted using low abrasion pads at speeds lower than 300 rpm and wet methods
- Burnishing or dry buffing may be performed only on asbestos containing flooring that has sufficient finish so that the pad cannot contact the asbestos containing material.
- Waste and debris and accompanying dust in an area containing accessible ACM and/ or PACM or visibly deteriorated ACM, must not be dusted or swept dry, or vacuumed without using a HEPA filter.
- HEPA Vacuums must be used and emptied in such a manner as to minimize the re-entry of asbestos

Disturbance v Removal – [OSHA 29 CFR 1926.1101(b)]

- **Disturbance** means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove-bag or waste bag which shall no exceed 60 inches in length and width.
- **Removal** means operations where ACM and /or PACM is taken out or stripped from structures or substrates and includes demolition operations. EPA defines removal as: the taking out or stripping of substantially all asbestos containing building material from a damaged area, a functional space, or a homogeneous area.

NOTE: *Exposure to concentrations of asbestos fibers at or above the permissible exposure level (PEL) or the excursion limit (EL) requires participation in medical surveillance and respiratory protection.*

Major Fiber Release v Minor Fiber Release

Fiber Release Episode means any uncontrolled or unintentional disturbance of asbestos containing building material resulting in visible emissions. Releases involving the disturbance of greater than 3 linear feet or greater than 3 square feet are a ***"major fiber release"*** and if the quantity disturbed is less than 3 linear feet or less *than 3 square feet it is a* ***"minor fiber release".***

For minor fiber release episodes, basic cleaning and containment practices by O&M staff may be followed. Thoroughly saturate the debris using wet methods. Clean the area using wet methods and HEPA vacuum. Place asbestos debris in sealed, leak-tight container. Repair the area of damage with asbestos free materials.

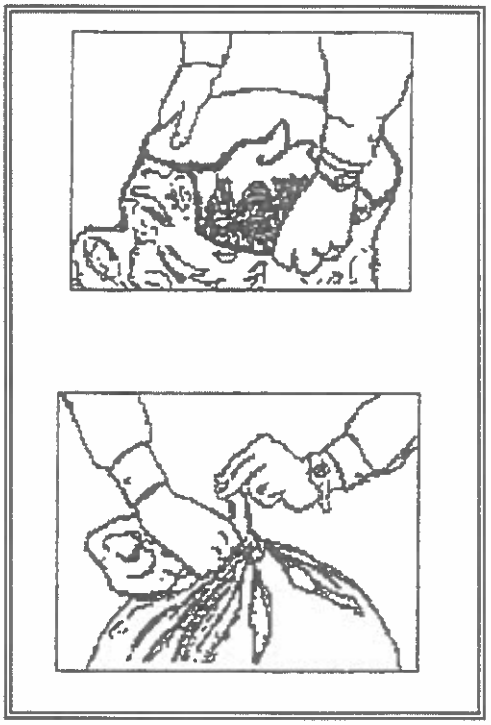
For major fiber release episodes, immediately post signs and restrict the area to those necessary for the response action. Shut off or temporarily modify the air-handling systems to prevent the distribution of fibers to other areas in the building. Response actions must be designed by an accredited Project Designer and conducted by persons accredited to conduct the response action.

You can reduce the risk of exposure to asbestos by taking the right action.

- Become familiar with the types of materials that could contain asbestos.
- Avoid touching or disturbing asbestos materials on walls, ceilings, pipes or boilers.
- Improper cleaning can disturb asbestos fibers. Use wet cleaning methods & HEPA vacuums.
- Mist filters from HVAC systems before removing and never shake the filters.
- Dispose of waste generated during cleaning as ACM.
- Avoid disturbance of ACM when doing routine maintenance jobs.
- Take special care when working in mechanical rooms. Follow the specific work practices designed to minimize fiber release. IF issued PPE, be certain to wear it as instructed. Always decontaminate yourself and your equipment before leaving the work area.
- IF you discover previously unidentified suspect ACM, notify your Supervisor or APM.

WASTE DISPOSAL

Waste generated during Class I, II, III or IV activities or from Any asbestos abatement project must be properly packaged and disposed of at an EPA approved landfill. The procedures for handling and packaging of ACM/PACM waste are defined by EPA in the Asbestos National Emissions Standard for Hazardous Air Pollutants (NESHAP) found in 40 CFR 61M. The shipping of ACM/PACM waste from the site where the waste was created to the EPA approved landfill is governed by the Department of Transportation (DOT); these rules are found in 49 CFR 173.



- Wetted
- Double bagged or wrapped in 2 layers of 6 mil poly
- Labels are affixed:
  - EPA Generator Label
  - OSHA Danger Label
  - DOT ORM-9 (Other Regulated Materials)
  - Vehicles must be enclosed and poly lined.
- Placarding is required during loading and unloading of waste.
- Waste Shipment Record must accompany the waste to the landfill where the accuracy of the shipment is verified and confirmation is sent to the generator. Generators who do not receive verification must notify EPA.
- Landfill buries the waste with six inches of dirt within 24 hrs.
- Generators are liable "cradle to the grave"

YOU MAY NEED ADDITIONAL TRAINING

Regulations provide for different levels of training based upon the likelihood of exposure and the nature of the tasks being performed. To help you know whether you need additional training or not ask yourself:

1) Do I come into ***contact*** with ACM/PACM when performing my tasks? YES NO
2) Do I ***disturb*** ACM/PACM when performing my tasks? YES NO
3) Do I ***remove*** ACM/PACM when performing my tasks? YES NO

IF you answered YES to Question #1, then the 2-HR Awareness Training is sufficient. IF you answered YES to Question #2, then you will need the 16-HR Operations and Maintenance Training.

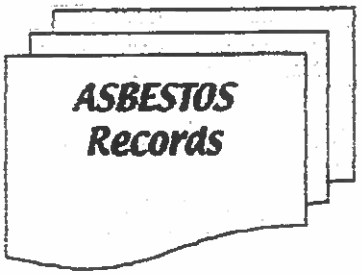
The 2-HR Awareness Training will count toward that course so that an additional 14 hours of training is required. Finally, IF you answered YES to Question #3, you must be an EPA AHERA accredited Worker (4-days of training). In addition, work at this level must be designed by an AHERA Accredited Project Designer and performed under the supervision of an AHERA Accredited Supervisor.

ASBESTOS PROGRAM MANAGER (APM) or DESIGNATED PERSON

Building Owners are ultimately responsible for asbestos-related problems in their buildings. The owner should appoint an asbestos program manager to direct all asbestos-related activities. The APM should be on-site and familiar with operations and intricacies of the facility and with the applicable regulations. The APM will oversee the development of the asbestos compliance program as set forth by the OSHA Asbestos Standards. He should be familiar with the how ACM is used at the facility, where ACM is located, the condition of the ACM, the potential for disturbance, the health risks to building occupants, and the options for controlling ACM.

The APM is responsible for the day to day compliance with the Facility Asbestos Compliance Plan and all applicable local state and federal regulations. The APM is responsible for maintaining records. Documentation associated with an asbestos compliance program include but are not limited to the following:

- Notification either personally or in writing (building occupants, tenants, employees, etc.)
- Labels and Signage (OSHA Danger Labels affixed to products containing ACM/PACM, OSHA Danger Sign entrance to mechanical rooms where ACM/PACM is located, at regulated areas where O&M activities are taking place, etc.)
- Work Permits
- Training
- Exposure Assessment Data
- Medical Surveillance Program
- Respiratory Protection Program
- Fiber Release Episodes
- Response Actions
- Sampling and Analytical Tests [air monitoring (personal & clearance) and bulk samples
- Waste Disposal and
- Other Records specifically identified in the various regulations.



IMPORTANT! Asbestos Records are to be maintained for the life of the facility and are transferred with ownership. The APM responsibilities are tremendous and the liability is great.

QUESTIONS? Contact your Asbestos Program Manager (APM)

If you believe that you did not receive appropriate level of training
Contact the Asbestos Program Manager at your Facility.

Asbestos Program Manager (APM) at my facility is _____.

The telephone number of the APM is _____.

USEPA
ASBESTOS-CONTAINING MATERIALS IN SCHOOLS

40 CFR 763 Subpart-E

RainCrow Environmental, LLC 752 Myrick Rd., Deatsville, AL 36022 (334) 315-2892

SUBPART E -- ASBESTOS-CONTAINING MATERIALS IN SCHOOLS

§ 763.80 Scope and purpose.

Text

(a) This rule requires local education agencies to identify friable and nonfriable asbestos-containing material (ACM) in public and private elementary and secondary schools by visually inspecting school buildings for such materials, sampling such materials if they are not assumed to be ACM, and having samples analyzed by appropriate techniques referred to in this rule. The rule requires local education agencies to submit management plans to the Governor of their State by October 12, 1988, begin to implement the plans by July 9, 1989, and complete implementation of the plans in a timely fashion. In addition, local education agencies are required to use persons who have been accredited to conduct inspections, reinspections, develop management plans, or perform response actions. The rule also includes recordkeeping requirements. Local education agencies may contractually delegate their duties under this rule, but they remain responsible for the proper performance of those duties. Local education agencies are encouraged to consult with EPA Regional Asbestos Coordinators, or if applicable, a State's lead agency designated by the State Governor, for assistance in complying with this rule.

separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

Damaged or significantly damaged thermal system insulation ACM means thermal system insulation ACM on pipes, boilers, tanks, ducts, and other thermal system insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris originating from the ACBM in question may also indicate damage.

Encapsulation means the treatment of ACBM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).

Enclosure means an airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air.

Fiber release episode means any uncontrolled or unintentional disturbance of ACBM resulting in visible emission.

Friable when referring to material in a school building means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously nonfriable material after such previously nonfriable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

Functional space means a room, group of rooms, or homogeneous area (including crawl spaces or the space between a dropped ceiling and the floor or roof deck above), such as classroom(s), a cafeteria, gymnasium, hallway(s), designated by a person accredited to prepare management plans, design abatement projects, or conduct response actions.

High-efficiency particulate air (HEPA) refers to a filtering system capable of trapping and retaining at least 99.97 percent of all monodispersed particles 0.3 mu m in diameter or larger.

Homogeneous area means an area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture.

Local education agency means:

(1) Any local educational agency as defined in section 198 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 3381).

(2) The owner of any nonpublic, nonprofit elementary, or secondary school building.

(3) The governing authority of any school operated under the defense dependents' education system provided for under the Defense Dependents' Education Act of 1978 (20 U.S.C. 921, et seq.).

Miscellaneous ACM means miscellaneous material that is ACM in a school building.

Miscellaneous material means interior building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and does not include surfacing material or thermal system insulation.

(4) Any maintenance, storage, or utility facility, including any hallway, essential to the operation of any facility described in this definition of "school building" under paragraphs (1), (2), or (3).
(5) Any portico or covered exterior hallway or walkway.
(6) Any exterior portion of a mechanical system used to condition interior space.
Significantly damaged friable miscellaneous ACM means damaged friable miscellaneous ACM where the damage is extensive and severe.
Significantly damaged friable surfacing ACM means damaged friable surfacing ACM in a functional space where the damage is extensive and severe.
State means a State, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the Northern Marianas, the Trust Territory of the Pacific Islands, and the Virgin Islands.
Surfacing ACM means surfacing material that is ACM.
Surfacing material means material in a school building that is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.
Thermal system insulation means material in a school building applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.
Thermal system insulation ACM means thermal system insulation that is ACM.
Vibration means the periodic motion of friable ACBM which may result in the release of asbestos fibers.
Source
[52 FR 41846, Oct. 30, 1987]

§ 763.84 General local education agency responsibilities.

Text
Each local education agency shall:
(a) Ensure that the activities of any persons who perform inspections, reinspections, and periodic surveillance, develop and update management plans, and develop and implement response actions, including operations and maintenance, are carried out in accordance with subpart E of this part.
(b) Ensure that all custodial and maintenance employees are properly trained as required by this subpart E and other applicable Federal and/or State regulations (e.g., the Occupational Safety and Health Administration asbestos standard for construction, the EPA worker protection rule, or applicable State regulations).
(c) Ensure that workers and building occupants, or their legal guardians, are informed at least once each school year about inspections, response actions, and post-response action activities, including periodic reinspection and surveillance activities that are planned or in progress.
(d) Ensure that short-term workers (e.g., telephone repair workers, utility workers, or exterminators) who may come in contact with asbestos in a school are provided information regarding the locations of ACBM and suspected ACBM assumed to be ACM.
(e) Ensure that warning labels are posted in accordance with § 763.95.

(vi) Record the following and submit to the person designated under § 763.84 a copy of such record for inclusion in the management plan within 30 days of the inspection:
(A) An inspection report with the date of the inspection signed by each accredited person making the inspection, State of accreditation, and if applicable, his or her accreditation number.
(B) An inventory of the locations of the homogeneous areas where samples are collected, exact location where each bulk sample is collected, dates that samples are collected, homogeneous areas where friable suspected ACBM is assumed to be ACM, and homogeneous areas where nonfriable suspected ACBM is assumed to be ACM.
(C) A description of the manner used to determine sampling locations, the name and signature of each accredited inspector who collected the samples, State of accreditation, and, if applicable, his or her accreditation number.
(D) A list of whether the homogeneous areas identified under paragraph (a)(4)(vi)(B) of this section, are surfacing material, thermal system insulation, or miscellaneous material.
(E) Assessments made of friable material, the name and signature of each accredited inspector making the assessment, State of accreditation, and if applicable, his or her accreditation number.
(b) Reinspection. (1) At least once every 3 years after a management plan is in effect, each local education agency shall conduct a reinspection of all friable and nonfriable known or assumed ACBM in each school building that they lease, own, or otherwise use as a school building.
(2) Each inspection shall be made by an accredited inspector.
(3) For each area of a school building, each person performing a reinspection shall:
(i) Visually reinspect, and reassess, under § 763.88, the condition of all friable known or assumed ACBM.
(ii) Visually inspect material that was previously considered nonfriable ACBM and touch the material to determine whether it has become friable since the last inspection or reinspection.
(iii) Identify any homogeneous areas with material that has become friable since the last inspection or reinspection.
(iv) For each homogeneous area of newly friable material that is already assumed to be ACBM, bulk samples may be collected and submitted for analysis in accordance with §§ 763.86 and 763.87.
(v) Assess, under § 763.88, the condition of the newly friable material in areas where samples are collected, and newly friable materials in areas that are assumed to be ACBM.
(vi) Reassess, under § 763.88, the condition of friable known or assumed ACBM previously identified.
(vii) Record the following and submit to the person designated under § 763.84 a copy of such record for inclusion in the management plan within 30 days of the reinspection:
(A) The date of the reinspection, the name and signature of the person making the reinspection, State of accreditation, and if applicable, his or her accreditation number, and any changes in the condition of known or assumed ACBM.
(B) The exact locations where samples are collected during the reinspection, a description of the manner used to determine sampling locations, the name and signature of each accredited inspector who collected the samples, State of accreditation, and, if applicable, his or her accreditation number.

§ 763.87 Analysis.

(a) Local education agencies shall have bulk samples, collected under § 763.86 and submitted for analysis, analyzed for asbestos using laboratories accredited by the National Bureau of Standards (NBS). Local education agencies shall use laboratories which have received interim accreditation for polarized light microscopy (PLM) analysis under the EPA Interim Asbestos Bulk Sample Analysis Quality Assurance Program until the NBS PLM laboratory accreditation program for PLM is operational.

(b) Bulk samples shall not be composited for analysis and shall be analyzed for asbestos content by PLM, using the "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" found at appendix E to subpart E of this part.

(c)(1) A homogeneous area is considered not to contain ACM only if the results of all samples required to be collected from the area show asbestos in amounts of 1 percent or less.

(2) A homogeneous area shall be determined to contain ACM based on a finding that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent.

(d) The name and address of each laboratory performing an analysis, the date of analysis, and the name and signature of the person performing the analysis shall be submitted to the person designated under § 763.84 for inclusion into the management plan within 30 days of the analysis.

Source

[52 FR 41846, Oct. 30, 1987; 60 FR 31922, June 19, 1995]

§ 763.88 Assessment.

(a)(1) For each inspection and reinspection conducted under § 763.85 (a) and (c) and previous inspections specified under § 763.99, the local education agency shall have an accredited inspector provide a written assessment of all friable known or assumed ACBM in the school building.

(2) Each accredited inspector providing a written assessment shall sign and date the assessment, provide his or her State of accreditation, and if applicable, accreditation number, and submit a copy of the assessment to the person designated under § 763.84 for inclusion in the management plan within 30 days of the assessment.

(b) The inspector shall classify and give reasons in the written assessment for classifying the ACBM and suspected ACBM assumed to be ACM in the school building into one of the following categories:

(1) Damaged or significantly damaged thermal system insulation ACM.

(2) Damaged friable surfacing ACM.

(3) Significantly damaged friable surfacing ACM.

(4) Damaged or significantly damaged friable miscellaneous ACM.

(5) ACBM with potential for damage.

(6) ACBM with potential for significant damage.

(7) Any remaining friable ACBM or friable suspected ACBM.

(c) Assessment may include the following considerations:

(1) Location and the amount of the material, both in total quantity and as a percentage of the functional space.

actions protects human health and the environment. For purposes of determining which of these response actions are the least burdensome, the local education agency may then consider local circumstances, including occupancy and use patterns within the school building, and its economic concerns, including short- and long-term costs.
(d) If significantly damaged friable surfacing ACM or significantly damaged friable miscellaneous ACM is present in a building the local education agency shall:
(1) Immediately isolate the functional space and restrict access, unless isolation is not necessary to protect human health and the environment.
(2) Remove the material in the functional space or, depending upon whether enclosure or encapsulation would be sufficient to protect human health and the environment, enclose or encapsulate.
(e) If any friable surfacing ACM, thermal system insulation ACM, or friable miscellaneous ACM that has potential for damage is present in a building, the local education agency shall at least implement an operations and maintenance (O&M) program, as described under § 763.91.
(f) If any friable surfacing ACM, thermal system insulation ACM, or friable miscellaneous ACM that has potential for significant damage is present in a building, the local education agency shall:
(1) Implement an O&M program, as described under § 763.91.
(2) Institute preventive measures appropriate to eliminate the reasonable likelihood that the ACM or its covering will become significantly damaged, deteriorated, or delaminated.
(3) Remove the material as soon as possible if appropriate preventive measures cannot be effectively implemented, or unless other response actions are determined to protect human health and the environment. Immediately isolate the area and restrict access if necessary to avoid an imminent and substantial endangerment to human health or the environment.
(g) Response actions including removal, encapsulation, enclosure, or repair, other than small-scale, short-duration repairs, shall be designed and conducted by persons accredited to design and conduct response actions.
(h) The requirements of this subpart E in no way supersede the worker protection and work practice requirements under 29 CFR 1926.58 (Occupational Safety and Health Administration (OSHA) asbestos worker protection standards for construction), 40 CFR Part 763, subpart G (EPA asbestos worker protection standards for public employees), and 40 CFR Part 61, subpart M (National Emission Standards for Hazardous Air Pollutants -- Asbestos).
(i) Completion of response actions. (1) At the conclusion of any action to remove, encapsulate, or enclose ACBM or material assumed to be ACBM, a person designated by the local education agency shall visually inspect each functional space where such action was conducted to determine whether the action has been properly completed.
(2)(i) A person designated by the local education agency shall collect air samples using aggressive sampling as described in Appendix A to this subpart E to monitor air for clearance after each removal, encapsulation, and enclosure project involving ACBM, except for projects that are of small-scale, short-duration.
(ii) Local education agencies shall have air samples collected under this section analyzed for asbestos using laboratories accredited by the National Bureau of Standards to conduct

exists on the effective date of this rule, and a notice of any change to the method will be published in the FEDERAL REGISTER.
(6) To determine the amount of ACBM affected under paragraph (i)(5) of this section, the local education agency shall add the total square or linear footage of ACBM within the containment barriers used to isolate the functional space for the action to remove, encapsulate, or enclose the ACBM. Contiguous portions of material subject to such action conducted concurrently or at approximately the same time within the same school building shall not be separated to qualify under paragraph (i)(5) of this section.
Source
[52 FR 41846, Oct. 30, 1987, as amended at 53 FR 12525, Apr. 15, 1988; 60 FR 31922, June 19, 1995; 60 FR 34465, July 3, 1995]

§ 763.91 Operations and maintenance.
(a) Applicability. The local education agency shall implement an operations, maintenance, and repair (O&M) program under this section whenever any friable ACBM is present or assumed to be present in a building that it leases, owns, or otherwise uses as a school building. Any material identified as nonfriable ACBM or nonfriable assumed ACBM must be treated as friable ACBM for purposes of this section when the material is about to become friable as a result of activities performed in the school building.
(b) Worker protection. Local education agencies must comply with either the OSHA Asbestos Construction Standard at 29 CFR 1926.1101, or the Asbestos Worker Protection Rule at 40 CFR 763.120, whichever is applicable.
(c) Cleaning -- (1) Initial cleaning. Unless the building has been cleaned using equivalent methods within the previous 6 months, all areas of a school building where friable ACBM, damaged or significantly damaged thermal system insulation ACM, or friable suspected ACBM assumed to be ACM are present shall be cleaned at least once after the completion of the inspection required by § 763.85(a) and before the initiation of any response action, other than O&M activities or repair, according to the following procedures:
(i) HEPA-vacuum or steam-clean all carpets.
(ii) HEPA-vacuum or wet-clean all other floors and all other horizontal surfaces.
(iii) Dispose of all debris, filters, mopheads, and cloths in sealed, leak-tight containers.
(2) Additional cleaning. The accredited management planner shall make a written recommendation to the local education agency whether additional cleaning is needed, and if so, the methods and frequency of such cleaning.
(d) Operations and maintenance activities. The local education agency shall ensure that the procedures described below to protect building occupants shall be followed for any operations and maintenance activities disturbing friable ACBM:
(1) Restrict entry into the area by persons other than those necessary to perform the maintenance project, either by physically isolating the area or by scheduling.
(2) Post signs to prevent entry by unauthorized persons.
(3) Shut off or temporarily modify the air-handling system and restrict other sources of air movement.
(4) Use work practices or other controls, such as, wet methods, protective clothing, HEPA-vacuums, mini-enclosures, glove bags, as necessary to inhibit the spread of any released fibers.

(v) Name and telephone number of the person designated to carry out general local education agency responsibilities under § 763.84 and the availability and location of the management plan.
(2) The local education agency shall ensure that all members of its maintenance and custodial staff who conduct any activities that will result in the disturbance of ACBM shall receive training described in paragraph (a)(1) of this section and 14 hours of additional training. Additional training shall include, but not be limited to:
(i) Descriptions of the proper methods of handling ACBM.
(ii) Information on the use of respiratory protection as contained in the EPA/NIOSH Guide to Respiratory Protection for the Asbestos Abatement Industry, September 1986 (EPA 560/OPPTS-86-001), available from the Director, Environmental Assistance Division (7408), Office of Pollution Prevention and Toxics, U.S. Environmental Protection Agency, Room E-543B, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Telephone: (202) 554-1404, TDD: (202) 544-0551 and other personal protection measures.
(iii) The provisions of this section and § 763.91, Appendices A, C, and D of this subpart E of this part, EPA regulations contained in 40 CFR Part 763, subpart G, and in 40 CFR Part 61, subpart M, and OSHA regulations contained in 29 CFR 1926.58.
(iv) Hands-on training in the use of respiratory protection, other personal protection measures, and good work practices.
(3) Local education agency maintenance and custodial staff who have attended EPA-approved asbestos training or received equivalent training for O&M and periodic surveillance activities involving asbestos shall be considered trained for the purposes of this section.
(b) Periodic surveillance. (1) At least once every 6 months after a management plan is in effect, each local education agency shall conduct periodic surveillance in each building that it leases, owns, or otherwise uses as a school building that contains ACBM or is assumed to contain ACBM.
(2) Each person performing periodic surveillance shall:
(i) Visually inspect all areas that are identified in the management plan as ACBM or assumed ACBM.
(ii) Record the date of the surveillance, his or her name, and any changes in the condition of the materials.
(iii) Submit to the person designated to carry out general local education agency responsibilities under § 763.84 a copy of such record for inclusion in the management plan.
Source
[52 FR 41846, Oct. 30, 1987; 60 FR 34465, July 3, 1995; 65 FR 69210, 69216, Nov. 15, 2000]

Notes
[EFFECTIVE DATE NOTE: 65 FR 69210, 69216, Nov. 15, 2000, substituted "Appendices A, C, and D of this subpart E of this part" for "Appendices A, B, C, D of this subpart E of this part," effective Dec. 15, 2000.]

assumed to be ACM, and the name and signature, State of accreditation, and if applicable, accreditation number of each accredited person making the assessments.
(3) For each inspection and reinspection conducted under § 763.85:
(i) The date of the inspection or reinspection and the name and signature, State of accreditation and, if applicable, the accreditation number of each accredited inspector performing the inspection or reinspection.
(ii) A blueprint, diagram, or written description of each school building that identifies clearly each location and approximate square or linear footage of homogeneous areas where material was sampled for ACM, the exact location where each bulk sample was collected, date of collection, homogeneous areas where friable suspected ACBM is assumed to be ACM, and where nonfriable suspected ACBM is assumed to be ACM.
(iii) A description of the manner used to determine sampling locations, and the name and signature of each accredited inspector collecting samples, the State of accreditation, and if applicable, his or her accreditation number.
(iv) A copy of the analyses of any bulk samples collected and analyzed, the name and address of any laboratory that analyzed bulk samples, a statement that the laboratory meets the applicable requirements of § 763.87(a) the date of analysis, and the name and signature of the person performing the analysis.
(v) A description of assessments, required to be made under § 763.88, of all ACBM and suspected ACBM assumed to be ACM, and the name, signature, State of accreditation, and if applicable, accreditation number of each accredited person making the assessments.
(4) The name, address, and telephone number of the person designated under § 763.84 to ensure that the duties of the local education agency are carried out, and the course name, and dates and hours of training taken by that person to carry out the duties.
(5) The recommendations made to the local education agency regarding response actions, under § 763.88(d), the name, signature, State of accreditation of each person making the recommendations, and if applicable, his or her accreditation number.
(6) A detailed description of preventive measures and response actions to be taken, including methods to be used, for any friable ACBM, the locations where such measures and action will be taken, reasons for selecting the response action or preventive measure, and a schedule for beginning and completing each preventive measure and response action.
(7) With respect to the person or persons who inspected for ACBM and who will design or carry out response actions, except for operations and maintenance, with respect to the ACBM, one of the following statements:
(i) If the State has adopted a contractor accreditation program under section 206(b) of Title II of the Act, a statement that the person(s) is accredited under such plan.
(ii) A statement that the local education agency used (or will use) persons who have been accredited by another State which has adopted a contractor accreditation plan under section 206(b) of Title II of the Act or is accredited by an EPA-approved course under section 206(c) of Title II of the Act.
(8) A detailed description in the form of a blueprint, diagram, or in writing of any ACBM or suspected ACBM assumed to be ACM which remains in the school once response actions are undertaken pursuant to § 763.90. This description shall be updated as response actions are completed.

(4) Upon submission of its management plan to the Governor and at least once each school year, the local education agency shall notify in writing parent, teacher, and employee organizations of the availability of management plans and shall include in the management plan a description of the steps taken to notify such organizations, and a dated copy of the notification. In the absence of any such organizations for parents, teachers, or employees, the local education agency shall provide written notice to that relevant group of the availability of management plans and shall include in the management plan a description of the steps taken to notify such groups, and a dated copy of the notification.
(h) Records required under § 763.94 shall be made by local education agencies and maintained as part of the management plan.
(i) Each management plan must contain a true and correct statement, signed by the individual designated by the local education agency under § 763.84, which certifies that the general, local education agency responsibilities, as stipulated by § 763.84, have been met or will be met.
Source
[52 FR 41846, Oct. 30, 1987]

§ 763.94 Recordkeeping.
(a) Records required under this section shall be maintained in a centralized location in the administrative office of both the school and the local education agency as part of the management plan. For each homogeneous area where all ACBM has been removed, the local education agency shall ensure that such records are retained for 3 years after the next reinspection required under § 763.85(b)(1), or for an equivalent period.
(b) For each preventive measure and response action taken for friable and nonfriable ACBM and friable and nonfriable suspected ACBM assumed to be ACM, the local education agency shall provide:
(1) A detailed written description of the measure or action, including methods used, the location where the measure or action was taken, reasons for selecting the measure or action, start and completion dates of the work, names and addresses of all contractors involved, and if applicable, their State of accreditation, and accreditation numbers, and if ACBM is removed, the name and location of storage or disposal site of the ACM.
(2) The name and signature of any person collecting any air sample required to be collected at the completion of certain response actions specified by § 763.90(i), the locations where samples were collected, date of collection, the name and address of the laboratory analyzing the samples, the date of analysis, the results of the analysis, the method of analysis, the name and signature of the person performing the analysis, and a statement that the laboratory meets the applicable requirements of § 763.90(i)(2)(ii).
(c) For each person required to be trained under § 763.92(a) (1) and (2), the local education agency shall provide the person's name and job title, the date that training was completed by that person, the location of the training, and the number of hours completed in such training.
(d) For each time that periodic surveillance under § 763.92(b) is performed, the local education agency shall record the name of each person performing the surveillance, the date of the surveillance, and any changes in the conditions of the materials.

(iii) Fail to develop a management plan pursuant to regulations under section 203(i) of Title II of the Act.
(2) Section 207(a) of Title II of the Act (15 U.S.C. 2647) also provides that any local education agency which violates any provision of section 207 shall be liable for a civil penalty of not more than $ 5,000 for each day during which the violation continues. For the purposes of this subpart, a "violation" means a failure to comply with respect to a single school building.
(b) Compliance with Title I of the Act. (1) Section 15(1)(D) of Title I of the Act (15 U.S.C. 2614) makes it unlawful for any person to fail or refuse to comply with any requirement of Title II or any rule promulgated or order issued under Title II. Therefore, any person who violates any requirement of this subpart is in violation of section 15 of Title I of the Act.
(2) Section 15(3) of Title I of the Act (15 U.S.C. 2614) makes it unlawful for any person to fail or refuse to establish or maintain records, submit reports, notices or other information, or permit access to or copying of records, as required by this Act or a rule thereunder.
(3) Section 15(4) (15 U.S.C. 2614) of Title I of the Act makes it unlawful for any person to fail or refuse to permit entry or inspection as required by section 11 of Title I of the Act.
(4) Section 16(a) of Title I of the Act (15 U.S.C. 2615) provides that any person who violates any provision of section 15 of Title I of the Act shall be liable to the United States for a civil penalty in an amount not to exceed $ 25,000 for each such violation. Each day such a violation continues shall, for purposes of this paragraph, constitute a separate violation of section 15. A local education agency is not liable for any civil penalty under Title I of the Act for failing or refusing to comply with any rule promulgated or order issued under Title II of the Act.
(c) Criminal penalties. If any violation committed by any person (including a local education agency) is knowing or willful, criminal penalties may be assessed under section 16(b) of Title I of the Act.
(d) Injunctive relief. The Agency may obtain injunctive relief under section 208(b) of Title II of the Act to respond to a hazard which poses an imminent and substantial endangerment to human health or the environment or section 17 (15 U.S.C. 2616) of Title I of the Act to restrain any violation of section 15 of Title I of the Act or to compel the taking of any action required by or under Title I of the Act.
(e) Citizen complaints. Any citizen who wishes to file a complaint pursuant to section 207(d) of Title II of the Act should direct the complaint to the Governor of the State or the EPA Asbestos Ombudsman, 1200 Pennsylvania Ave., NW., Washington, DC 20460. The citizen complaint should be in writing and identified as a citizen complaint pursuant to section 207(d) of Title II of TSCA. The EPA Asbestos Ombudsman or the Governor shall investigate and respond to the complaint within a reasonable period of time if the allegations provide a reasonable basis to believe that a violation of the Act has occurred.
(f) Inspections. EPA may conduct inspections and review management plans under section 11 of Title I of the Act (15 U.S.C. 2610) to ensure compliance.
Source
[52 FR 41846, Oct. 30, 1987]

describes the information submitted under paragraph (b) of this section, and solicits written comment from interested members of the public. Comments must be submitted within 60 days.
(3) If, during the comment period, EPA receives a written objection to a Governor's request and a request for a public hearing detailing specific objections to the granting of a waiver, EPA will schedule a public hearing to be held in the affected State after the close of the comment period and will announce the public hearing date in the Federal Register before the date of the hearing. Each comment shall include the name and address of the person submitting the comment.
(d) Criteria. EPA may waive some or all of the requirements of subpart E of this part if:
(1) The State's lead agency and other cooperating agencies have the legal authority necessary to carry out the provisions of asbestos inspection and management in schools relating to the waiver request.
(2) The State's program of asbestos inspection and management in schools relating to the waiver request and implementation of the program are or will be at least as stringent as the requirements of this subpart E.
(3) The State has an enforcement mechanism to allow it to implement the program described in the waiver request.
(4) The lead agency and any cooperating agencies have or will have qualified personnel to carry out the provisions relating to the waiver request.
(5) The State will devote adequate resources to the administration and enforcement of the asbestos inspection and management provisions relating to the waiver request.
(6) When specified by EPA, the State gives satisfactory assurances that necessary steps, including specific actions it proposes to take and a time schedule for their accomplishment, will be taken within a reasonable time to conform with applicable criteria under paragraphs (d) (2) through (4) of this section.
(e) Decision. EPA will issue for publication in the Federal Register a notice announcing its decision to grant or deny, in whole or in part, a Governor's request for a waiver from some or all of the requirements of this subpart E within 30 days after the close of the comment period or within 30 days following a public hearing, whichever is applicable. The notice will include the Agency's reasons and rationale for granting or denying the Governor's request. The 30-day period may be extended if mutually agreed upon by EPA and the State.
(f) Modifications. When any substantial change is made in the administration or enforcement of a State program for which a waiver was granted under this section, a responsible official in the lead agency shall submit such changes to EPA.
(g) Reports. The lead agency in each State that has been granted a waiver by EPA from any requirement of subpart E of this part shall submit a report to the Regional Administrator for the Region in which the State is located at least once every 12 months to include the following information:
(1) A summary of the State's implementation and enforcement activities during the last reporting period relating to provisions waived under this section, including enforcement actions taken.
(2) Any changes in the administration or enforcement of the State program implemented during the last reporting period.

(2) An accredited inspector has determined that, based on sampling records, nonfriable ACBM was identified in that homogeneous or sampling area during an inspection conducted before December 14, 1987. The inspector shall sign and date a statement to that effect with his or her State of accreditation and if applicable, accreditation number and, within 30 days after such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall identify whether material that was nonfriable has become friable since that previous inspection and shall assess the newly-friable ACBM under § 763.88.
(3) Based on sampling records and inspection records, an accredited inspector has determined that no ACBM is present in the homogeneous or sampling area and the records show that the area was sampled, before December 14, 1987 in substantial compliance with § 763.85(a), which for purposes of this section means in a random manner and with a sufficient number of samples to reasonably ensure that the area is not ACBM.
(i) The accredited inspector shall sign and date a statement, with his or her State of accreditation and if applicable, accreditation number that the homogeneous or sampling area determined not to be ACBM was sampled in substantial compliance with § 763.85(a).
(ii) Within 30 days after the inspector's determination, the local education agency shall submit a copy of the inspector's statement to the EPA Regional Office and shall include the statement in the management plan for that school.
(4) The lead agency responsible for asbestos inspection in a State that has been granted a waiver from § 763.85(a) has determined that, based on sampling records and inspection records, no ACBM is present in the homogeneous or sampling area and the records show that the area was sampled before December 14, 1987, in substantial compliance with § 763.85(a). Such determination shall be included in the management plan for that school.
(5) An accredited inspector has determined that, based on records of an inspection conducted before December 14, 1987, suspected ACBM identified in that homogeneous or sampling area is assumed to be ACM. The inspector shall sign and date a statement to that effect, with his or her State of accreditation and if applicable, accreditation number and, within 30 days of such determination, submit a copy of the statement to the person designated under § 763.84 for inclusion in the management plan. However, an accredited inspector shall identify whether material that was nonfriable suspected ACBM assumed to be ACM has become friable since the previous inspection and shall assess the newly friable material and previously identified friable suspected ACBM assumed to be ACM under § 763.88.
(6) Based on inspection records and contractor and clearance records, an accredited inspector has determined that no ACBM is present in the homogeneous or sampling area where asbestos removal operations have been conducted before December 14, 1987, and shall sign and date a statement to that effect and include his or her State of accreditation and, if applicable, accreditation number. The local education agency shall submit a copy of the statement to the EPA Regional Office and shall include the statement in the management plan for that school.
(7) An architect or project engineer responsible for the construction of a new school building built after October 12, 1988, or an accredited inspector signs a statement that no ACBM was specified as a building material in any construction document for the

20. Ensure that the sampler is turned upright before interrupting the pump flow.
21. Check that all samples are clearly labeled and that all pertinent information has been enclosed before transfer of the samples to the laboratory.
22. Ensure that the samples are stored in a secure and representative location.
23. Do not change containers if portions of these filters are taken for other purposes.
24. A summary of Sample Data Quality Objectives is shown in the following Table II:
TABLE II -- SUMMARY OF SAMPLING AGENCY DATA QUALITY OBJECTIVES
This table summarizes the data quality objectives from the performance of this method in terms of precision, accuracy, completeness, representativeness, and comparability. These objectives are assured by the periodic control checks and reference checks listed here and described in the text of the method.

Unit Operation	QC Check	Conformance Frequency	Expectation
Sampling materials	Sealed blank	1 per I/O site	95%
Sample procedures	Field blanks	2 per I/O site	95%
	Pump calibration	Before and after each field series	90%
Sample custody	Review of chain-of-custody record	Each sample	95% complete
Sample shipment	Review of sending report	Each sample	95% complete

C. Sample Shipment
Ship bulk samples to the analytical laboratory in a separate container from air samples.
D. Sample Receiving
1. Designate one individual as sample coordinator at the laboratory. While that individual will normally be available to receive samples, the coordinator may train and supervise others in receiving procedures for those times when he/she is not available.
2. Bulk samples and air samples delivered to the analytical laboratory in the same container shall be rejected.
E. Sample Preparation
1. All sample preparation and analysis shall be performed by a laboratory independent of the abatement contractor.
2. Wet-wipe the exterior of the cassettes to minimize contamination possibilities before taking them into the clean room facility.
3. Perform sample preparation in a well-equipped clean facility.
NOTE: The clean area is required to have the following minimum characteristics. The area or hood must be capable of maintaining a positive pressure with make-up air being HEPA-filtered. The cumulative analytical blank concentration must average less than 18 s/mm<2> in an area of 0.057 mm<2> (nominally 10 200-mesh grid openings) and a single preparation with a maximum of 53 s/mm<2> for that same area.

film so that only one or two sharp rings are obtained on the superimposed ED pattern. Thicker gold film would normally give multiple gold rings, but it will tend to mask weaker diffraction spots from the unknown fibrous particulate. Since the unknown fibrous particulate. Since the unknown d-spacings of most interest in asbestos analysis are those which lie closest to the transmitted beam, multiple gold rings are unnecessary on zone-axis ED patterns. An average camera constant using multiple gold rings can be determined. The camera constant is one-half the diameter of the rings times the interplanar spacing of the ring being measured.

3. Magnification Calibration. The magnification calibration must be done at the fluorescent screen. The TEM must be calibrated at the grid opening magnification (if used) and also at the magnification used for fiber counting. This is performed with a cross grating replica (e.g., one containing 2,160 lines/mm). Define a field of view on the fluorescent screen either by markings or physical boundaries. The field of view must be measurable or previously inscribed with a scale or concentric circles (all scales should be metric). A logbook must be maintained, and the dates of calibration and the values obtained must be recorded. The frequency of calibration depends on the past history of the particular microscope. After any maintenance of the microscope that involved adjustment of the power supplied to the lenses or the high-voltage system or the mechanical disassembly of the electron optical column apart from filament exchange, the magnification must be recalibrated. Before the TEM calibration is performed, the analyst must ensure that the cross grating replica is placed at the same distance from the objective lens as the specimens are. For instruments that incorporate an eucentric tilting specimen stage, all specimens and the cross grating replica must be placed at the eucentric position.

4. While not required on every microscope in the laboratory, the laboratory must have either one microscope equipped with energy dispersive X-ray analysis or access to an equivalent system on a TEM in another laboratory.

5. Microscope settings: 80-120 kV, grid assessment 250-1,000X, then 15,000-20,000X screen magnification for analysis.

6. Approximately one-half (0.5) of the pre-determined sample area to be analyzed shall be performed on one sample grid preparation and the remaining half on a second sample grid preparation.

7. Individual grid openings with greater than 5 percent openings (holes) or covered with greater than 25 percent particulate matter or obviously having nonuniform loading must not be analyzed.

8. Reject the grid if:

a. Less than 50 percent of the grid openings covered by the replica are intact.

b. The replica is doubled or folded.

c. The replica is too dark because of incomplete dissoulution of the filter.

9. Recording Rules.

a. Any continuous grouping of particles in which an asbestos fiber with an aspect ration greater than or equal to 5:1 and a length greater than or equal to 0.5 pm is detected shall be recorded on the count sheet. These will be designated asbestos structures and will be classified as fibers, bundles, clusters, or matrices. Record as individual fibers any contiguous grouping having 0, 1, or 2 definable intersections. Groupings having more than 2 intersections are to be described as cluster or matrix. An intersection is a non-

a. Fiber. A structure having a minimum length greater than or equal to 0.5 pm and an aspect ratio (length to width) of 5:1 or greater and substantially parallel sides. Note the appearance of the end of the fiber, i.e., whether it is flat, rounded or dovetailed.
b. Bundle. A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.
c. Cluster. A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.
d. Matrix. Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.
11. After finishing with a grid, remove it from the microscope, and replace it in the appropriate grid holder. Sample grids must be stored for a minimum of 1 year from the date of the analysis; the sample cassette must be retained for a minimum of 30 days by the laboratory or returned at the client's request.
G. Sample Analytical Sequence
1. Under the present sampling requirements a minimum of 13 samples is to be collected for the clearance testing of an abatement site. These include five abatement area samples, five ambient samples, two field blanks, and one sealed blank.
2. Carry out visual inspection of work site prior to air monitoring.
3. Collect a minimum of 5 air samples inside the work site and 5 samples outside the work site. The indoor and outdoor samples shall be taken during the same time period.
4. Remaining steps in the analytical sequence are contained in Unit IV of this Appendix.
H. Reporting
1. The following information must be reported to the client for each sample analyzed:
a. Concentration in structures per square millimeter and structures per cubic centimeter.
b. Analytical sensitivity used for the analysis.
c. Number of asbestos structures.
d. Area analyzed.
e. Volume of air sampled (which must be initially supplied to lab by client).
f. Copy of the count sheet must be included with the report.
g. Signature of laboratory official to indicate that the laboratory met specifications of the method.
h. Report form must contain official laboratory identification (e.g., letterhead).
i. Type of asbestos.
I. Quality Control/Quality Assurance Procedures (Data Quality Indicators)
Monitoring the environment for airborne asbestos requires the use of sensitive sampling and analysis procedures. Because the test is sensitive, it may be influenced by a variety of factors. These include the supplies used in the sampling operation, the performance of the sampling, the preparation of the grid from the filter and the actual examination of this grid in the microscope. Each of these unit operations must produce a product of defined quality if the analytical result is to be a reliable and meaningful test result. Accordingly, a series of control checks and reference standards are to be performed along with the sample analysis as indicators that the materials used are adequate and the operations are within acceptable limits. In this way, the quality of the data is defined and the results are of known value. These checks and tests also provide timely and specific warning of any problems which might develop within the sampling and analysis operations. A

typical materials (working standards)	comparisons with unknowns	
Analysis of NBS SRM 1876 and/r RM 8410 (measure of accuracy and comparability)	1 per analyst per year	1.5 x Poisson Std. Dev.
Data entry review (data validation and measure of completeness)	Each sample	95%
Record and verify ID electron diffr action pattern of structure	1 per 5 samples	80% accuracy
Calculations and data reduction	Hand calculation of automated data reduction procedure or independent recal culation of hand-calculated data	1 per 100 samples 85%

1. When the samples arrive at the laboratory, check the samples and documentation for completeness and requirements before initiating the analysis.
2. Check all laboratory reagents and supplies for acceptable asbestos background levels.
3. Conduct all sample preparation in a clean room environment monitored by laboratory blanks. Testing with blanks must also be done after cleaning or servicing the room.
4. Prepare multiple grids of each sample.
5. Provide laboratory blanks with each sample batch. Maintain a cumulative average of these results. If there are more than 53 fibers/mm<2> per 10 200-mesh grid openings, the system must be checked for possible sources of contamination.
6. Perform a system check on the transmission electron microscope daily.
7. Make periodic performance checks of magnification, electron diffraction and energy dispersive X-ray systems as set forth in Table III and under Unit II.I.
8. Ensure qualified operator performance by evaluation of replicate analysis and standard sample comparisons as set forth in Table III under Unit II.I.
9. Validate all data entries.
10. Recalculate a percentage of all computations and automatic data reduction steps as specified in Table III under Unit II.I.
11. Record an electron diffraction pattern of one asbestos structure from every five samples that contain asbestos. Verify the identification of the pattern by measurement or comparison of the pattern with patterns collected from standards under the same conditions. The records must also demonstrate that the identification of the pattern has been verified by a qualified individual and that the operator who made the identification

operation with an open laboratory blank which on subsequent analysis has an average of less than 18 structures/mm<2> in an area of 0.057 mm<2> (nominally 10 200 mesh grid openings) and a maximum of 53 structures/mm<2> for no more than one single preparation for that same area.
6. Cluster -- A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.
7. ED -- Electron diffraction.
8. EDXA -- Energy dispersive X-ray analysis.
9. Fiber -- A structure greater than or equal to 0.5 pm in length with an aspect ratio (length to width) of 5:1 or greater and having substantially parallel sides.
10. Grid -- An open structure for mounting on the sample to aid in its examination in the TEM. The term is used here to denote a 200-mesh copper lattice approximately 3 mm in diameter.
11. Intersection -- Nonparallel touching or crossing of fibers, with the projection having an aspect ratio of 5:1 or greater.
12. Laboratory sample coordinator -- That person responsible for the conduct of sample handling and the certification of the testing procedures.
13. Filter background level -- The concentration of structures per square millimeter of filter that is considered indistinguishable from the concentration measured on blanks (filters through which no air has been drawn). For this method the filter background level is defined as 70 structures/mm<2>.
14. Matrix -- Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.
15. NSD -- No structure detected.
16. Operator -- A person responsible for the TEM instrumental analysis of the sample.
17. PCM -- Phase contrast microscopy.
18. SAED -- Selected area electron diffraction.
19. SEM -- Scanning transmission electron microscope.
20. STEM -- Scanning transmission electron microscope.
21. Structure -- a microscopic bundle, cluster, fiber, or matrix which may contain asbestos.
22. S Ö<3> -- Structures per cubic centimeter.
23. S/mm<2> -- Structures per square millimeter.
24. TEM -- Transmission electron microscope.
B. Sampling
1. Sampling operations must be performed by qualified individuals completely independent of the abatement contractor to avoid possible conflict of interest (See References 1, 2, and 5 of Unit III.L.) Special precautions should be taken to avoid contamination of the sample. For example, materials that have not been prescreened for their asbestos background content should not be used; also, sample handling procedures which do not take cross contamination possibilities into account should not be used.
2. Material and supply checks for asbestos contamination should be made on all critical supplies, reagents, and procedures before their use in a monitoring study.
3. Quality control and quality assurance steps are needed to identify problem areas and isolate the cause of the contamination (see Reference 5 of Unit III.L.). Control checks

e. Select an appropriate flow rate equal to or greater than 1 L/min or less than 10 L/min for 25 mm cassettes. Larger filters may be operated at proportionally higher flow rates.
f. Orient the cassette downward at approximately 45 degrees from the horizontal.
g. Maintain a log of all pertinent sampling information, such as pump identification number, calibration data, sample location, date, sample identification number, flow rates at the beginning, middle, and end, start and stop times, and other useful information or comments. Use of a sampling log form is recommended. See the following Figure 2:
=gmls cfr3829.pdf =ghead =gmle
h. Initiate a chain of custody procedure at the start of each sampling, if this is requested by the client.
i. Maintain a close check of all aspects of the sampling operation on a regular basis.
j. Continue sampling until at least the minimum volume is collected, as specified in the following Table I:
=gmls cfr3830.pdf =ghead =gmle
k. At the conclusion of sampling, turn the cassette upward before stopping the flow to minimize possible particle loss. If the sampling is resumed, restart the flow before reorienting the cassette downward. Note the condition of the filter at the conclusion of sampling.
l. Double check to see that all information has been recorded on the data collection forms and that the cassette is securely closed and appropriately identified using a waterproof label. Protect cassettes in individual clean resealed polyesthylene bags. Bags are to be used for storing cassette caps when they are removed for sampling purposes. Caps and plugs should only be removed or replaced using clean hands or clean disposable plastic gloves.
m. Do not change containers if portions of these filters are taken for other purposes.
6. Minimum sample number per site. A minimum of 13 samples are to be collected for each testing consisting of the following:
a. A minimum of five samples per abatement area.
b. A minimum of five samples per ambient area positioned at locations representative of the air entering the abatement site.
c. Two field blanks are to be taken by removing the cap for not more than 30 sec and replacing it at the time of sampling before sampling is initiated at the following places:
i. Near the entrance to each ambient area.
ii. At one of the ambient sites.
(NOTE: Do not leave the blank open during the sampling period.)
d. A sealed blank is to be carried with each sample set. This representative cassette is not to be opened in the field.
7. Abatement area sampling.
a. Conduct final clearance sampling only after the primary containment barriers have been removed; the abatement area has been thoroughly dried; and, it has passed visual inspection tests by qualified personnel. (See Reference 1 of Unit III.L.)
b. Containment barriers over windows, doors, and air passageways must remain in place until the TEM clearance sampling and analysis is completed and results meet clearance test criteria. The final plastic barrier remains in place for the sampling period.
c. Select sampling sites in the abatement area on a random basis to provide unbiased and representative samples.

2. Select a rigid shipping container and pack the cassettes upright in a noncontaminating nonfibrous medium such as a bubble pack. The use of resealable polyethylene bags may help to prevent jostling of individual cassettes.
3. Avoid using expanded polystyrene because of its static charge potential. Also avoid using particle-based packaging materials because of possible contamination.
4. Include a shipping bill and a detailed listing of samples shipped, their descriptions and all identifying numbers or marks, sampling data, shipper's name, and contact information. For each sample set, designate which are the ambient samples, which are the abatement area samples, which are the field blanks, and which is the sealed blank if sequential analysis is to be performed.
5. Hand-carry samples to the laboratory in an upright position if possible; otherwise choose that mode of transportation least likely to jar the samples in transit.
6. Address the package to the laboratory sample coordinator by name when known and alert him or her of the package description, shipment mode, and anticipated arrival as part of the chain of custody and sample tracking procedures. This will also help the laboratory schedule timely analysis for the samples when they are received.
D. Quality Control/Quality Assurance Procedures (Data Quality Indicators)
Monitoring the environment for airborne asbestos requires the use of sensitive sampling and analysis procedures. Because the test is sensitive, it may be influenced by a variety of factors. These include the supplies used in the sampling operation, the performance of the sampling, the preparation of the grid from the filter and the actual examination of this grid in the microscope. Each of these unit operations must produce a product of defined quality if the analytical result is to be a reliable and meaningful test result. Accordingly, a series of control checks and reference standards is performed along with the sample analysis as indicators that the materials used are adequate and the operations are within acceptable limits. In this way, the quality of the data is defined and the results are of known value. These checks and tests also provide timely and specific warning of any problems which might develop within the sampling and analysis operations. A description of these quality control/quality assurance procedures is summarized in the text below.
1. Prescreen the loaded cassette collection filters to assure that they do not contain concentrations of asbestos which may interfere with the analysis of the sample. A filter blank average of less than 18 s/mm<2> in an area of 0.057 mm<2> (nominally 10 200-mesh grid openings) and a maximum of 53 s/mm<2> for that same area for any single preparation is acceptable for this method.
2. Calibrate sampling pumps and their flow indicators over the range of their intended use with a recognized standard. Assemble the sampling system with a representative filter -- not the filter which will be used in sampling -- before and after the sampling operation.
3. Record all calibration information with the data to be used on a standard sampling form.
4. Ensure that the samples are stored in a secure and representative location.
5. Ensure that mechanical calibrations from the pump will be minimized to prevent transferral of vibration to the cassette.
6. Ensure that a continuous smooth flow of negative pressure is delivered by the pump by installing a damping chamber if necessary.

3. Preparation areas for air samples must be separated from preparation areas for bulk samples. Personnel must not prepare air samples if they have previously been preparing bulk samples without performing appropriate personal hygiene procedures, i.e., clothing change, showering, etc.
4. Preparation. Direct preparation techniques are required. The objective is to produce an intact carbon film containing the particulates from the filter surface which is sufficiently clear for TEM analysis. Currently recommended direct preparation procedures for polycarbonate (PC) and mixed cellulose ester (MCE) filters are described in Unit III.F.7. and 8. Sample preparation is a subject requiring additional research. Variation on those steps which do not substantively change the procedure, which improve filter clearing or which reduce contamination problems in a laboratory are permitted.
a. Use only TEM grids that have had grid opening areas measured according to directions in Unit III.J.
b. Remove the inlet and outlet plugs prior to opening the cassette to minimize any pressure differential that may be present.
c. Examples of techniques used to prepare polycarbonate filters are described in Unit III.F.7.
d. Examples of techniques used to prepare mixed cellulose ester filters are described in Unit III.F.8.
e. Prepare multiple grids for each sample.
f. Store the three grids to be measured in appropriately labeled grid holders or polyethylene capsules.
5. Equipment.
a. Clean area.
b. Tweezers. Fine-point tweezers for handling of filters and TEM grids.
c. Scalpel Holder and Curved No. 10 Surgical Blades.
d. Microscope slides.
e. Double-coated adhesive tape.
f. Gummed page reinforcements.
g. Micro-pipet with disposal tips 10 to 100 mu L variable volume.
h. Vacuum coating unit with facilities for evaporation of carbon. Use of a liquid nitrogen cold trap above the diffusion pump will minimize the possibility of contamination of the filter surface by oil from the pumping system. The vacuum-coating unit can also be used for deposition of a thin film of gold.
i. Carbon rod electrodes. Spectrochemically pure carbon rods are required for use in the vacuum evaporator for carbon coating of filters.
j. Carbon rod sharpener. This is used to sharpen carbon rods to a neck. The use of necked carbon rods (or equivalent) allows the carbon to be applied to the filters with a minimum of heating.
k. Low-temperature plasma asher. This is used to etch the surface of collapsed mixed cellulose ester (MCE) filters. The asher should be supplied with oxygen, and should be modified as necessary to provide a throttle or bleed valve to control the speed of the vacuum to minimize disturbance of the filter. Some early models of ashers admit air too rapidly, which may disturb particulates on the surface of the filter during the etching step.
1. Glass petri dishes, 10 cm in diameter, 1 cm high. For prevention of excessive evaporation of solvent when these are in use, a good seal must be provided between the

carefully placed so that it bridges the gap between the adhesive tape strips on the microscope slide. The filter strip can be held with fine-point tweezers and supported underneath by the scalpel blade during placement on the microscope slide. The analyst can place several such strips on the same microscope slide, taking care to rinse and wet-wipe the scalpel blade and tweezers before handling a new sample. The filter strips should be identified by etching the glass slide or marking the slide using a marker insoluble in water and solvents. After the filter strip has been cut from each filter, the residual parts of the filter must be returned to the cassette and held in position by reassembly of the cassette. The cassette will then be archived for a period of 30 days or returned to the client upon request.

e. Carbon coating of filter strips. The glass slide holding the filter strips is placed on the rotation-tilting device, and the evaporator chamber is evacuated. The evaporation must be performed in very short bursts, separated by some seconds to allow the electrodes to cool. If evaporation is too rapid, the strips of polycarbonate filter will begin to curl, which will lead to cross-linking of the surface material and make it relatively insoluble in chloroform. An experienced analyst can judge the thickness of carbon film to be applied, and some test should be made first on unused filters. If the film is too thin, large particles will be lost from the TEM specimen, and there will be few complete and undamaged grid openings on the specimen. If the coating is too thick, the filter will tend to curl when exposed to chloroform vapor and the carbon film may not adhere to the support mesh. Too thick a carbon film will also lead to a TEM image that is lacking in contrast, and the ability to obtain ED patterns will be compromised. The carbon film should be as thin as possible and remain intact on most of the grid openings of the TEM specimen intact.

f. Preparation of the Jaffe washer. The precise design of the Jaffe washer is not considered important, so any one of the published designs may be used. A washer consisting of a simple stainless steel bridge is recommended. Several pieces of lens tissue approximately 1.0 cm x 0.5 cm are placed on the stainless steel bridge, and the washer is filled with chloroform to a level where the meniscus contacts the underside of the mesh, which results in saturation of the lens tissue. See References 8 and 10 of Unit III.L.

g. Placing of specimens into the Jaffe washer. The TEM grids are first placed on a piece of lens tissue so that individual grids can be picked up with tweezers. Using a curved scalpel blade, the analyst excises three 3 mm square pieces of the carbon-coated polycarbonate filter from the filter strip. The three squares are selected from the center of the strip and from two points between the outer periphery of the active surface and the center. The piece of filter is placed on a TEM specimen grid with the shiny side of the TEM grid facing upwards, and the whole assembly is placed boldly onto the saturated lens tissue in the Jaffe washer. If carbon-coated grids are used, the filter should be placed carbon-coated side down. The three excised squares of filters are placed on the same piece of lens tissue. Any number of separate pieces of lens tissue may be placed in the same Jaffe washer. The lid is then placed on the Jaffe washer, and the system is allowed to stand for several hours, preferably overnight.

h. Condensation washing. It has been found that many polycarbonate filters will not dissolve completely in the Jaffe washer, even after being exposed to chloroform for as long as 3 days. This problem becomes more serious if the surface of the filter was overheated during the carbon evaporation. The presence of undissolved filter medium on the TEM preparation leads to partial or complete obscuration of areas of the sample, and

with acetone until the wicking substrate is saturated. The level of acetone should be just high enough to saturate the filter paper without creating puddles.
j. Remove about a quarter section of the carbon-coated filter samples from the glass slides using a surgical knife and tweezers. Carefully place the section of the filter, carbon side down, on the appropriately labeled grid in the acetone-saturated petri dish. When all filter sections have been transferred, slowly add more solvent to the wedge-shaped trough to bring the acetone level up to the highest possible level without disturbing the sample preparations. Cover the petri dish. Elevate one side of the petri dish by placing a slide under it. This allows drops of condensed solvent vapors to form near the edge rather than in the center where they would drip onto the grid preparation.
G. TEM Method
1. Instrumentation.
a. Use an 80-120 kV TEM capable of performing electron diffraction with a fluorescent screen inscribed with calibrated gradations. If the TEM is equipped with EDXA it must either have a STEM attachment or be capable of producing a spot less than 250 nm in diameter at crossover. The microscope shall be calibrated routinely (see Unit III.J.) for magnification and camera constant.
b. While not required on every microscope in the laboratory, the laboratory must have either one microscope equipped with energy dispersive X-ray analysis or access to an equivalent system on a TEM in another laboratory. This must be an Energy Dispersive X-ray Detector mounted on TEM column and associated hardware/software to collect, save, and read out spectral information. Calibration of Multi-Channel Analyzer shall be checked regularly for A1 at 1.48 KeV and Cu at 8.04 KeV, as well as the manufacturer's procedures.
i. Standard replica grating may be used to determine magnification (e.g., 2160 lines/mm).
ii. Gold standard may be used to determine camera constant.
c. Use a specimen holder with single tilt and/or double tilt capabilities.
2. Procedure.
a. Start a new Count Sheet for each sample to be analyzed. Record on count sheet: analyst's initials and date; lab sample number; client sample number microscope identification; magnification for analysis; number of predetermined grid openings to be analyzed; and grid identification. See the following Figure 4:
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b. Check that the microscope is properly aligned and calibrated according to the manufacturer's specifications and instructions.
c. Microscope settings: 80-120 kV, grid assessment 250-1000X, then 15,000-20,000X screen magnification for analysis.
d. Approximately one-half (0.5) of the predetermined sample area to be analyzed shall be performed on one sample grid preparation and the remaining half on a second sample grid preparation.
e. Determine the suitability of the grid.
i. Individual grid openings with greater than 5 percent openings (holes) or covered with greater than 25 percent particulate matter or obviously having nonuniform loading shall not be analyzed.
ii. Examine the grid at low magnification (<1000X) to determine its suitability for detailed study at higher magnifications.

(3) Cluster. A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group; groupings must have more than 2 intersections.
(4) Matrix. Fiber or fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.
(5) NSD. Record NSD when no structures are detected in the field.
(6) Intersection. Non-parallel touching or crossing of fibers, with the projection having an aspect ratio 5:1 or greater.
ii. Structure Measurement.
(1) Recognize the structure that is to be sized.
(2) Memorize its location in the "window" relative to the sides, inscribed square and to other particulates in the field so this exact location can be found again when scanning is resumed.
(3) Measure the structure using the scale on the screen.
(4) Record the length category and structure type classification on the count sheet after the field number and fiber number.
(5) Return the fiber to its original location in the window and scan the rest of the field for other fibers; if the direction of travel is not remembered, return to the right side of the field and begin the traverse again.
i. Visual identification of Electron Diffraction (ED) patterns is required for each asbestos structure counted which would cause the analysis to exceed the 70 s/mm<2> concentration. (Generally this means the first four fibers identified as asbestos must exhibit an identifiable diffraction pattern for chrysotile or amphibole.)
i. Center the structure, focus, and obtain an ED pattern. (See Microscope Instruction Manual for more detailed instructions.)
ii. From a visual examination of the ED pattern, obtained with a short camera length, classify the observed structure as belonging to one of the following classifications: chrysotile, amphibole, or nonasbestos.
(1) Chrysotile: The chrysotile asbestos pattern has characteristic streaks on the layer lines other than the central line and some streaking also on the central line. There will be spots of normal sharpness on the central layer line and on alternate lines (2nd, 4th, etc.). The repeat distance between layer lines is 0.53 nm and the center doublet is at 0.73 nm. The pattern should display (002), (110), (130) diffraction maxima; distances and geometry should match a chrysotile pattern and be measured semiquantitatively.
(2) Amphibole Group [includes grunerite (amosite), crocidolite, anthophyllite, tremolite, and actinolite]: Amphibole asbestos fiber patterns show layer lines formed by very closely spaced dots, and the repeat distance between layer lines is also about 0.53 nm. Streaking in layer lines is occasionally present due to crystal structure defects.
(3) Nonasbestos: Incomplete or unobtainable ED patterns, a nonasbestos EDXA, or a nonasbestos morphology.
iii. The micrograph number of the recorded diffraction patterns must be reported to the client and maintained in the laboratory's quality assurance records. The records must also demonstrate that the identification of the pattern has been verified by a qualified individual and that the operator who made the identification is maintaining at least an 80 percent correct visual identification based on his measured patterns. In the event that examination of the pattern by the qualified individual indicates that the pattern had been

identification only after 70s/mm<2> have been exceeded for a particular sample.)

(6) If a diffraction pattern was recorded on film, the micrograph number must be indicated on the count sheet.
(7) If an electron diffraction was attempted and an appropriate spectra is not observed, N should be recorded on the count sheet.
(8) If an X-ray analysis is attempted but not observed, N should be recorded on the count sheet.
(9) If an X-ray analysis spectrum is stored, the file and disk number must be recorded on the count sheet.
m. Classification Rules.
i. Fiber. A structure having a minimum length greater than or equal to 0.5 mum and an aspect ratio (length to width) of 5:1 or greater and substantially parallel sides. Note the appearance of the end of the fiber, i.e., whether it is flat, rounded or dovetailed.
ii. Bundle. A structure composed of three or more fibers in a parallel arrangement with each fiber closer than one fiber diameter.
iii. Cluster. A structure with fibers in a random arrangement such that all fibers are intermixed and no single fiber is isolated from the group. Groupings must have more than two intersections.
iv. Matrix. Fiber of fibers with one end free and the other end embedded in or hidden by a particulate. The exposed fiber must meet the fiber definition.
v. NSD. Record NSD when no structures are detected in the field.
n. After all necessary analyses of a particle structure have been completed, return the goniometer stage to 0 degrees, and return the structure to its original location by recall of the original location.
o. Continue scanning until all the structures are identified, classified and sized in the field.
p. Select additional fields (grid openings) at low magnification; scan at a chosen magnification (15,000 to 20,000X screen magnification); and analyze until the stopping rule becomes applicable.
q. Carefully record all data as they are being collected, and check for accuracy.
r. After finishing with a grid, remove it from the microscope, and replace it in the appropriate grid hold. Sample grids must be stored for a minimum of 1 year from the date of the analysis; the sample cassette must be retained for a minimum of 30 days by the laboratory or returned at the client's request.
H. Sample Analytical Sequence
1. Carry out visual inspection of work site prior to air monitoring.
2. Collect a minimum of five air samples inside the work site and five samples outside the work site. The indoor and outdoor samples shall be taken during the same time period.
3. Analyze the abatement area samples according to this protocol. The analysis must meet the 0.005 s Ö<3> analytical sensitivity.
4. Remaining steps in the analytical sequence are contained in Unit IV. of this Appendix.
I. Reporting
The following information must be reported to the client. See the following Table II:
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NOTE: The more spaces included in the measurement, the more accurate the final calculation. On most microscopes, however, the magnification is substantially constant only within the central 8-10 cm diameter region of the fluorescent screen.
iv. Calculate the true magnification (M) on the fluorescent screen:
M=XG/Y
where:
X=total distance (mm) between the designated grating lines;
G
****
libration constant of the grating replica (lines/mm):
Y=number of grating replica spaces counted along X.
c. Calibration of the EDXA System. Initially, the EDXA system must be calibrated by using two reference elements to calibrate the energy scale of the instrument. When this has been completed in accordance with the manufacturer's instructions, calibration in terms of the different types of asbestos can proceed. The EDXA detectors vary in both solid angle of detection and in window thickness. Therefore, at a particular accelerating voltage in use on the TEM, the count rate obtained from specific dimensions of fiber will vary both in absolute X-ray count rate and in the relative X-ray peak heights for different elements. Only a few minerals are relevant for asbestos abatement work, and in this procedure the calibration is specified in terms of a "fingerprint" technique. The EDXA spectra must be recorded from individual fibers of the relevant minerals, and identifications are made on the basis of semiquantitative comparisons with these reference spectra.
d. Calibration of Grid Openings.
i. Measure 20 grid openings on each of 20 random 200-mesh copper grids by placing a grid on a glass slide and examining it under the PCM. Use a calibrated graticule to measure the average field diameter and use this number to calculate the field area for an average grid opening. Grids are to be randomly selected from batches up to 1,000.
NOTE: A grid opening is considered as one field.
ii. The mean grid opening area must be measured for the type of specimen grids in use. This can be accomplished on the TEM at a properly calibrated low magnification or on an optical microscope at a magnification of approximately 400X by using an eye-piece fitted with a scale that has been calibrated against a stage micrometer. Optical microscopy utilizing manual or automated procedures may be used providing instrument calibration can be verified.
e. Determination of Camera Constant and ED Pattern Analysis.
i. The camera length of the TEM in ED operating mode must be calibrated before ED patterns on unknown samples are observed. This can be achieved by using a carbon-coated grid on which a thin film of gold has been sputtered or evaporated. A thin film of gold is evaporated on the specimen TEM grid to obtain zone-axis ED patterns superimposed with a ring pattern from superimposed with a ring pattern from the polycrystalline gold film.
ii. In practice, it is desirable to optimize the thickness of the gold film so that only one or two sharp rings are obtained on the superimposed ED pattern. Thicker gold film would normally give multiple gold rings, but it will tend to mask weaker diffraction spots from the unknown fibrous particulates. Since the unknown d-spacings of most interest in

	high standards		
	ED calibration by gold standard	Weekly	95%
	EDS calibration by copper line	Daily	95%
Performance check (measure of cleanliness)	Laboratory blank read 1 per 25 samples	Prep 1 per series or 10%	Meet specs or reanalyze series
	Replicate counting (measure of precision)	1 per 100 samples	1.5 x Poisson Std. Dev.
	Duplicate analysis (measure of reproducibility)	1 per 100 samples	2 x Poisson Std. Dev.
	Known samples of typical materials (working standards)	Training and for comparison with unknowns	100%
	Analysis of NBS SRM 1876 and/r RM 8410 (measure of accuracy and comparability)	1 per analysis per year	1.5 x Poisson Std. Dev.
	Data entry review (data validation and measure of completeness)	Each sample	95%
	Record and verify ID electron diffraction pattern of structure	1 per 5 samples	80% accuracy
Calculations and data reduction	Hand calculation of automated data reduction procedure or independent recalculation of hand-calculated data	1 per 100 samples	85%

1. When the samples arrive at the laboratory, check the samples and documentation for completeness and requirements before initiating the analysis.
2. Check all laboratory reagents and supplies for acceptable asbestos background levels.
3. Conduct all sample preparation in a clean room environment monitored by laboratory blanks and special testing after cleaning or servicing the room.
4. Prepare multiple grids of each sample.

10. Yamate, G., S.C. Agarwall, R.D. Gibbons, IIT Research Insititute, "Methodology for the Measurement of Airborne Asbestos by Electron Microscopy." Draft report, USEPA Contract 68-02-3266, July 1984.
11. Guidance to the Preparation of Quality Assurance Project Plans. USEPA, Office of Toxic Substances, 1984.
IV. Mandatory Interpretation of Transmission Electron Microscopy Results to Determine Completion of Response Actions
A. Introduction
A response action is determined to be completed by TEM when the abatement area has been cleaned and the airborne asbestos concentration inside the abatement area is no higher than concentrations at locations outside the abatement area. "Outside" means outside the abatement area, but not necessarily outside the building. EPA reasons that an asbestos removal contractor cannot be expected to clean an abatement area to an airborne asbestos concentration that is lower than the concentration of air entering the abatement area from outdoors or from other parts of the building. After the abatement area has passed a thorough visual inspection, and before the outer containment barrier is removed, a minimum of five air samples inside the abatement area and a minimum of five air samples outside the abatement area must be collected. Hence, the response action is determined to be completed when the average airborne asbestos concentration measured inside the abatement area is not statistically different from the average airborne asbestos concentration measured outside the abatement area.
The inside and outside concentrations are compared by the Z-test, a statistical test that takes into account the variability in the measurement process. A minimum of five samples inside the abatement area and five samples inside the abatement area and five samples outside the abatement area are required to control the false negative error rate, i.e., the probability of declaring the removal complete when, in fact, the air concentration inside the abatement area is significantly higher than outside the abatement area. Additional quality control is provided by requiring three blanks (filters through which no air has been drawn) to be analyzed to check for unusually high filter contamination that would distort the test results.
When volumes greater than or equal to 1,199 L for a 25 mm filter and 2,799 L for a 37 mm filter have been collected and the average number of asbestos structures on samples inside the abatement area is no greater than 70 s/mm<2> of filter, the response action may be considered complete without comparing the inside samples to the outside samples. EPA is permitting this initial screening test to save analysis costs in situations where the airborne asbestos concentration is sufficiently low so that it cannot be distinguished from the filter contamination/background level (fibers deposited on the filter that are unrelated to the air being sampled). The screening test cannot be used when volumes of less than 1,199 L for 25 mm filter or 2,799 L for a 37 mm filter are collected because the ability to distinguish levels significantly different from filter background is reduced at low volumes.
The initial screening test is expressed in structures per square millimeter of filter because filter background levels come from sources other than the air being sampled and cannot be meaningfully expressed as a concentration per cubic centimeter of air. The value of 70 s/mm (2) is based on the experience of the panel of microscopists who consider one structure in 10 grid openings (each grid opening with an area of 0.0057 mm (2) to be

3. If less than 1,199 L of air for a 25 mm filter or 2,799 L of air for a 37 mm filter is collected for any of the inside samples, or the arithmetic mean concentration of structures per square millimeter of filter is greater than 70 s/mm<2>, analyze the three blanks.
4. If the arithmetic mean concentration of structures per square millimeter on the blank filters is greater than 70 s/mm<2>, terminate the analysis, identify and correct the source of blank contamination, and collect a new set of samples.
5. If the arithmetic mean concentration of structures per square millimeter on the blank filters is less than or equal to 70 s/mm<2>, analyze the outside samples and perform the Z-test.
6. If the Z-statistic is less than or equal to 1.65, the response action is complete. If the Z-statistic is greater than 1.65, reclean the abatement site and collect a new set of samples.
Source
[52 FR 41857, Oct. 30, 1987]

APPENDIX B TO SUBPART E [This section was removed and reserved. See 65 FR 69210, 69216, Nov. 15, 2000.]
APPENDIX C TO SUBPART E - ASBESTOS MODEL ACCREDITATION PLAN
Text
[PUBLISHER'S NOTE: For a clarification regarding the training course self-certification requirements of the Asbestos Model Accreditation Plan (MAP) Interim Final Rule, see 60 FR 27697, May 25, 1995.]
I. Asbestos Model Accreditation Plan for States
The Asbestos Model Accreditation Plan (MAP) for States has eight components:
(A) Definitions
(B) Initial Training
(C) Examinations
(D) Continuing Education
(E) Qualifications
(F) Recordkeeping Requirements for Training Providers
(G) Deaccreditation
(H) Reciprocity
A. Definitions
For purposes of Appendix C:
1. "Friable asbestos-containing material (ACM)" means any material containing more than one percent asbestos which has been applied on ceilings, walls, structural members, piping, duct work, or any other part of a building, which when dry, may be crumbled, pulverized, or reduced to powder by hand pressure. The term includes non-friable asbestos-containing material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.
2. "Friable asbestos-containing building material (ACBM)" means any friable ACM that is in or on interior structural members or other parts of a school or public and commercial building.
3. "Inspection" means an activity undertaken in a school building, or a public and commercial building, to determine the presence or location, or to assess the condition of, friable or non-friable asbestos-containing building material (ACBM) or suspected

an enclosure shall conform spatially and geometrically to the localized work area, in order to perform its intended containment function.

B. Initial Training

Training requirements for purposes of accreditation are specified both in terms of required subjects of instruction and in terms of length of training. Each initial training course has a prescribed curriculum and number of days of training. One day of training equals 8 hours, including breaks and lunch. Course instruction must be provided by EPA or State-approved instructors. EPA or State instructor approval shall be based upon a review of the instructor's academic credentials and/or field experience in asbestos abatement.

Beyond the initial training requirements, individual States may wish to consider requiring additional days of training for purposes of supplementing hands-on activities or for reviewing relevant state regulations. States also may wish to consider the relative merits of a worker apprenticeship program. Further, they might consider more stringent minimum qualification standards for the approval of training instructors. EPA recommends that the enrollment in any given course be limited to 25 students so that adequate opportunities exist for individual hands-on experience.

States have the option to provide initial training directly or approve other entities to offer training. The following requirements are for the initial training of persons required to have accreditation under TSCA Title II.

Training requirements for each of the five accredited disciplines are outlined below. Persons in each discipline perform a different job function and distinct role. Inspectors identify and assess the condition of ACBM, or suspect ACBM. Management planners use data gathered by inspectors to assess the degree of hazard posed by ACBM in schools to determine the scope and timing of appropriate response actions needed for schools. Project designers determine how asbestos abatement work should be conducted. Lastly, workers and contractor/supervisors carry out and oversee abatement work. In addition, a recommended training curriculum is also presented for a sixth discipline, which is not federally-accredited, that of "Project Monitor." Each accredited discipline and training curriculum is separate and distinct from the others. A person seeking accreditation in any of the five accredited MAP disciplines cannot attend two or more courses concurrently, but may attend such courses sequentially.

In several instances, initial training courses for a specific discipline (e.g., workers, inspectors) require hands-on training. For asbestos abatement contractor/supervisors and workers, hands-on training should include working with asbestos-substitute materials, fitting and using respirators, use of glovebags, donning protective clothing, and constructing a decontamination unit as well as other abatement work activities.

1. WORKERS

A person must be accredited as a worker to carry out any of the following activities with respect to friable ACBM in a school or public and commercial building: (1) A response action other than a SSSD activity, (2) a maintenance activity that disturbs friable ACBM other than a SSSD activity, or (3) a response action for a major fiber release episode. All persons seeking accreditation as asbestos abatement workers shall complete at least a 4-day training course as outlined below. The 4-day worker training course shall include lectures, demonstrations, at least 14 hours of hands-on training, individual respirator fit testing, course review, and an examination. Hands-on training must permit workers to

(i) Relevant Federal, State, and local regulatory requirements, procedures, and standards. With particular attention directed at relevant EPA, OSHA, and State regulations concerning asbestos abatement workers.
(j) Establishment of respiratory protection programs.
(k) Course review. A review of key aspects of the training course.
2. CONTRACTOR/SUPERVISORS
A person must be accredited as a contractor/supervisor to supervise any of the following activities with respect to friable ACBM in a school or public and commercial building: (1) A response action other than a SSSD activity, (2) a maintenance activity that disturbs friable ACBM other than a SSSD activity, or (3) a response action for a major fiber release episode. All persons seeking accreditation as asbestos abatement contractor/supervisors shall complete at least a 5-day training course as outlined below. The training course must include lectures, demonstrations, at least 14 hours of hands-on training, individual respirator fit testing, course review, and a written examination. Hands-on training must permit supervisors to have actual experience performing tasks associated with asbestos abatement.
EPA recommends the use of audiovisual materials to complement lectures, where appropriate.
Asbestos abatement supervisors include those persons who provide supervision and direction to workers performing response actions. Supervisors may include those individuals with the position title of foreman, working foreman, or leadman pursuant to collective bargaining agreements. At least one supervisor is required to be at the worksite at all times while response actions are being conducted. Asbestos workers must have access to accredited supervisors throughout the duration of the project.
The contractor/supervisor training course shall adequately address the following topics:
(a) The physical characteristics of asbestos and asbestos-containing materials. Identification of asbestos, aerodynamic characteristics, typical uses, physical appearance, a review of hazard assessment considerations, and a summary of abatement control options.
(b) Potential health effects related to asbestos exposure. The nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; synergism between cigarette smoking and asbestos exposure; and latency period for diseases.
(c) Employee personal protective equipment. Classes and characteristics of respirator types; limitations of respirators; proper selection, inspection, donning, use, maintenance, and storage procedures for respirators; methods for field testing of the facepiece-to-face seal (positive and negative-pressure fit checks); qualitative and quantitative fit testing procedures; variability between field and laboratory protection factors that alter respiratory fit (e.g., facial hair); the components of a proper respiratory protection program; selection and use of personal protective clothing; and use, storage, and handling of non-disposable clothing; and regulations covering personal protective equipment.
(d) State-of-the-art work practices. Proper work practices for asbestos abatement activities, including descriptions of proper construction and maintenance of barriers and decontamination enclosure systems; positioning of warning signs; lock-out of electrical and ventilation systems; proper working techniques for minimizing fiber release; use of wet methods; use of negative pressure exhaust ventilation equipment; use of HEPA

demonstrations, 4 hours of hands-on training, individual respirator fit-testing, course review, and a written examination.
EPA recommends the use of audiovisual materials to complement lectures, where appropriate. Hands-on training should include conducting a simulated building walk-through inspection and respirator fit testing. The inspector training course shall adequately address the following topics:
(a) Background information on asbestos. Identification of asbestos, and examples and discussion of the uses and locations of asbestos in buildings; physical appearance of asbestos.
(b) Potential health effects related to asbestos exposure. The nature of asbestos-related diseases; routes of exposure; dose-response relationships and the lack of a safe exposure level; the synergistic effect between cigarette smoking and asbestos exposure; the latency periods for asbestos-related diseases; a discussion of the relationship of asbestos exposure to asbestosis, lung cancer, mesothelioma, and cancers of other organs.
(c) Functions/qualifications and role of inspectors. Discussions of prior experience and qualifications for inspectors and management planners; discussions of the functions of an accredited inspector as compared to those of an accredited management planner; discussion of inspection process including inventory of ACM and physical assessment.
(d) Legal liabilities and defenses. Responsibilities of the inspector and management planner; a discussion of comprehensive general liability policies, claims-made, and occurrence policies, environmental and pollution liability policy clauses; state liability insurance requirements; bonding and the relationship of insurance availability to bond availability.
(e) Understanding building systems. The interrelationship between building systems, including: an overview of common building physical plan layout; heat, ventilation, and air conditioning (HVAC) system types, physical organization, and where asbestos is found on HVAC components; building mechanical systems, their types and organization, and where to look for asbestos on such systems; inspecting electrical systems, including appropriate safety precautions; reading blueprints and as-built drawings.
(f) Public/employee/building occupant relations. Notifying employee organizations about the inspection; signs to warn building occupants; tact in dealing with occupants and the press; scheduling of inspections to minimize disruptions; and education of building occupants about actions being taken.
(g) Pre-inspection planning and review of previous inspection records. Scheduling the inspection and obtaining access; building record review; identification of probable homogeneous areas from blueprints or as-built drawings; consultation with maintenance or building personnel; review of previous inspection, sampling, and abatement records of a building; the role of the inspector in exclusions for previously performed inspections.
(h) Inspecting for friable and non-friable ACM and assessing the condition of friable ACM. Procedures to follow in conducting visual inspections for friable and non-friable ACM; types of building materials that may contain asbestos; touching materials to determine friability; open return air plenums and their importance in HVAC systems; assessing damage, significant damage, potential damage, and potential significant damage; amount of suspected ACM, both in total quantity and as a percentage of the total area; type of damage; accessibility; material's potential for disturbance; known or

EPA recommends the use of audiovisual materials to complement lectures, where appropriate.

TSCA Title II does not require accreditation for persons performing the management planner role in public and commercial buildings. Nevertheless, such persons may find this training and accreditation helpful in preparing them to design or administer asbestos operations and maintenance programs for public and commercial buildings.

The management planner training course shall adequately address the following topics:

(a) Course overview. The role and responsibilities of the management planner; operations and maintenance programs; setting work priorities; protection of building occupants.

(b) Evaluation/interpretation of survey results. Review of TSCA Title II requirements for inspection and management plans for school buildings as given in section 203(i)(1) of TSCA Title II; interpretation of field data and laboratory results; comparison of field inspector's data sheet with laboratory results and site survey.

(c) Hazard assessment. Amplification of the difference between physical assessment and hazard assessment; the role of the management planner in hazard assessment; explanation of significant damage, damage, potential damage, and potential significant damage; use of a description (or decision tree) code for assessment of ACM; assessment of friable ACM; relationship of accessibility, vibration sources, use of adjoining space, and air plenums and other factors to hazard assessment.

(d) Legal implications. Liability; insurance issues specific to planners; liabilities associated with interim control measures, in-house maintenance, repair, and removal; use of results from previously performed inspections.

(e) Evaluation and selection of control options. Overview of encapsulation, enclosure, interim operations and maintenance, and removal; advantages and disadvantages of each method; response actions described via a decision tree or other appropriate method; work practices for each response action; staging and prioritizing of work in both vacant and occupied buildings; the need for containment barriers and decontamination in response actions.

(f) Role of other professionals. Use of industrial hygienists, engineers, and architects in developing technical specifications for response actions; any requirements that may exist for architect sign-off of plans; team approach to design of high-quality job specifications.

(g) Developing an operations and maintenance (O&M) plan. Purpose of the plan; discussion of applicable EPA guidance documents; what actions should be taken by custodial staff; proper cleaning procedures; steam cleaning and HEPA vacuuming; reducing disturbance of ACM; scheduling O&M for off-hours; rescheduling or canceling renovation in areas with ACM; boiler room maintenance; disposal of ACM; in-house procedures for ACM -- bridging and penetrating encapsulants; pipe fittings; metal sleeves; polyvinyl chloride (PVC), canvas, and wet wraps; muslin with straps, fiber mesh cloth; mineral wool, and insulating cement; discussion of employee protection programs and staff training; case study in developing an O&M plan (development, implementation process, and problems that have been experienced).

(h) Regulatory review. Focusing on the OSHA Asbestos Construction Standard found at 29 CFR 1926.58; the National Emission Standard for Hazardous Air Pollutants (NESHAP) found at 40 CFR part 61, Subparts A (General Provisions) and M (National Emission Standard for Asbestos); EPA Worker Protection Rule found at 40 CFR part 763, Subpart G; TSCA Title II; applicable State regulations.

(f) Employee personal protective equipment. Classes and characteristics of respirator types; limitations of respirators; proper selection, inspection; donning, use, maintenance, and storage procedures for respirators; methods for field testing of the facepiece-to-face seal (positive and negative-pressure fit checks); qualitative and quantitative fit testing procedures; variability between field and laboratory protection factors that alter respiratory fit (e.g., facial hair); the components of a proper respiratory protection program; selection and use of personal protective clothing; use, storage, and handling of non-disposable clothing.
(g) Additional safety hazards. Hazards encountered during abatement activities and how to deal with them, including electrical hazards, heat stress, air contaminants other than asbestos, fire, and explosion hazards.
(h) Fiber aerodynamics and control. Aerodynamic characteristics of asbestos fibers; importance of proper containment barriers; settling time for asbestos fibers; wet methods in abatement; aggressive air monitoring following abatement; aggressive air movement and negative-pressure exhaust ventilation as a clean-up method.
(i) Designing abatement solutions. Discussions of removal, enclosure, and encapsulation methods; asbestos waste disposal.
(j) Final clearance process. Discussion of the need for a written sampling rationale for aggressive final air clearance; requirements of a complete visual inspection; and the relationship of the visual inspection to final air clearance.
EPA recommends the use of TEM for analysis of final air clearance samples. These samples should be analyzed by laboratories accredited under the NIST NVLAP.
(k) Budgeting/cost estimating. Development of cost estimates; present costs of abatement versus future operation and maintenance costs; setting priorities for abatement jobs to reduce costs.
(l) Writing abatement specifications. Preparation of and need for a written project design; means and methods specifications versus performance specifications; design of abatement in occupied buildings; modification of guide specifications for a particular building; worker and building occupant health/medical considerations; replacement of ACM with non-asbestos substitutes.
(m) Preparing abatement drawings. Significance and need for drawings, use of as-built drawings as base drawings; use of inspection photographs and on-site reports; methods of preparing abatement drawings; diagramming containment barriers; relationship of drawings to design specifications; particular problems related to abatement drawings.
(n) Contract preparation and administration.
(o) Legal/liabilities/defenses. Insurance considerations; bonding; hold-harmless clauses; use of abatement contractor's liability insurance; claims made versus occurrence policies.
(p) Replacement. Replacement of asbestos with asbestos-free substitutes.
(q) Role of other consultants. Development of technical specification sections by industrial hygienists or engineers; the multi-disciplinary team approach to abatement design.
(r) Occupied buildings. Special design procedures required in occupied buildings; education of occupants; extra monitoring recommendations; staging of work to minimize occupant exposure; scheduling of renovation to minimize exposure.
(s) Relevant Federal, State, and local regulatory requirements, procedures and standards, including, but not limited to:

nonproprietary; reading and interpreting records and abatement drawings; discussion of change orders; common enforcement responsibilities and authority of project monitor.
(f) Response actions and abatement practices. Pre-work inspections; pre-work considerations, precleaning of the work area, removal of furniture, fixtures, and equipment; shutdown/modification of building systems; construction and maintenance of containment barriers, proper demarcation of work areas; work area entry/exit, hygiene practices; determining the effectiveness of air filtration equipment; techniques for minimizing fiber release, wet methods, continuous cleaning; abatement methods other than removal; abatement area clean-up procedures; waste transport and disposal procedures; contingency planning for emergency response.
(g) Asbestos abatement equipment. Typical equipment found on an abatement project; air filtration devices, vacuum systems, negative pressure differential monitoring; HEPA filtration units, theory of filtration, design/construction of HEPA filtration units, qualitative and quantitative performance of HEPA filtration units, sizing the ventilation requirements, location of HEPA filtration units, qualitative and quantitative tests of containment barrier integrity; best available technology.
(h) Personal protective equipment. Proper selection of respiratory protection; classes and characteristics of respirator types, limitations of respirators; proper use of other safety equipment, protective clothing selection, use, and proper handling, hard/bump hats, safety shoes; breathing air systems, high pressure v. low pressure, testing for Grade D air, determining proper backup air volumes.
(i) Air monitoring strategies. Sampling equipment, sampling pumps (low v. high volume), flow regulating devices (critical and limiting orifices), use of fibrous aerosol monitors on abatement projects; sampling media, types of filters, types of cassettes, filter orientation, storage and shipment of filters; calibration techniques, primary calibration standards, secondary calibration standards, temperature/pressure effects, frequency of calibration, recordkeeping and field work documentation, calculations; air sample analysis, techniques available and limitations of AHERA on their use, transmission electron microscopy (background to sample preparation and analysis, air sample conditions which prohibit analysis, EPA's recommended technique for analysis of final air clearance samples), phase contrast microscopy (background to sample preparation, and AHERA's limits on the use of phase contrast microscopy), what each technique measures; analytical methodologies, AHERA TEM protocol, NIOSH 7400, OSHA reference method (non clearance), EPA recommendation for clearance (TEM); sampling strategies for clearance monitoring, types of air samples (personal breathing zone v. fixed-station area) sampling location and objectives (pre-abatement, during abatement, and clearance monitoring), number of samples to be collected, minimum and maximum air volumes, clearance monitoring (post-visual-inspection) (number of samples required, selection of sampling locations, period of sampling, aggressive sampling, interpretations of sampling results, calculations), quality assurance; special sampling problems, crawl spaces, acceptable samples for laboratory analysis, sampling in occupied buildings (barrier monitoring).
(j) Safety and health issues other than asbestos. Confined-space entry, electrical hazards, fire and explosion concerns, ladders and scaffolding, heat stress, air contaminants other than asbestos, fall hazards, hazardous materials on abatement projects.

accreditation certificate in a specific discipline. Whether a State directly issues accreditation certificates, or authorizes training providers to issue accreditation certificates, each certificate issued to an accredited person must contain the following minimum information:
a. A unique certificate number
b. Name of accredited person
c. Discipline of the training course completed.
d. Dates of the training course.
e. Date of the examination.
f. An expiration date of 1 year after the date upon which the person successfully completed the course and examination.
g. The name, address, and telephone number of the training provider that issued the certificate.
h. A statement that the person receiving the certificate has completed the requisite training for asbestos accreditation under TSCA Title II.
States or training providers who reaccredit persons based upon completion of required refresher training must also provide accreditation certificates with all of the above information, except the examination date may be omitted if a State does not require a refresher examination for reaccreditation.
Where a State licenses accredited persons but has authorized training providers to issue accreditation certificates, the State may issue licenses in the form of photo-identification cards. Where this applies, EPA recommends that the State licenses should include all of the same information required for the accreditation certificates. A State may also choose to issue photo-identification cards in addition to the required accreditation certificates.
Accredited persons must have their initial and current accreditation certificates at the location where they are conducting work.
2. The following are the requirements for examination in each discipline:
a. Worker:
i. 50 multiple-choice questions
ii. Passing score: 70 percent correct
b. Contractor/Supervisor:
i. 100 multiple-choice questions
ii. Passing score: 70 percent correct
c. Inspector:
i. 50 Multiple-choice questions
ii. Passing score: 70 percent correct
d. Management Planner:
i. 50 Multiple-choice questions
ii. Passing score: 70 percent correct
e. Project Designer:
i. 100 multiple-choice questions
ii. Passing score: 70 percent correct
D. Continuing Education
For all disciplines, a State's accreditation program shall include annual refresher training as a requirement for reaccreditation as indicated below:
1. Workers: One full day of refresher training.

Instructors must be approved by either EPA or a State before teaching courses for accreditation purposes. A training provider must notify EPA or the State, as appropriate, in advance whenever it changes course instructors. Records must accurately identify the instructors that taught each particular course for each date that a course is offered.
3. Examinations. A training provider must document that each person who receives an accreditation certificate for an initial training course has achieved a passing score on the examination. These records must clearly indicate the date upon which the exam was administered, the training course and discipline for which the exam was given, the name of the person who proctored the exam, a copy of the exam, and the name and test score of each person taking the exam. The topic and dates of the training course must correspond to those listed on that person's accreditation certificate. States may choose to apply these same requirements to examinations for refresher training courses.
4. Accreditation certificates. The training providers or States, whichever issues the accreditation certificate, shall maintain records that document the names of all persons who have been awarded certificates, their certificate numbers, the disciplines for which accreditation was conferred, training and expiration dates, and the training location. The training provider or State shall maintain the records in a manner that allows verification by telephone of the required information.
5. Verification of certificate information. EPA recommends that training providers of refresher training courses confirm that their students possess valid accreditation before granting course admission. EPA further recommends that training providers offering the initial management planner training course verify that students have met the prerequisite of possessing valid inspector accreditation at the time of course admission.
6. Records retention and access. (a) The training provider shall maintain all required records for a minimum of 3 years. The training provider, however, may find it advantageous to retain these records for a longer period of time.
(b) The training provider must allow reasonable access to all of the records required by the MAP, and to any other records which may be required by States for the approval of asbestos training providers or the accreditation of asbestos training courses, to both EPA and to State Agencies, on request. EPA encourages training providers to make this information equally accessible to the general public.
(c) If a training provider ceases to conduct training, the training provider shall notify the approving government body (EPA or the State) and give it the opportunity to take possession of that providers asbestos training records.
G. Deaccreditation
1. States must establish criteria and procedures for deaccrediting persons accredited as workers, contractor/supervisors, inspectors, management planners, and project designers. States must follow their own administrative procedures in pursuing deaccreditation actions. At a minimum, the criteria shall include:
(a) Performing work requiring accreditation at a job site without being in physical possession of initial and current accreditation certificates;
(b) Permitting the duplication or use of one's own accreditation certificate by another;
(c) Performing work for which accreditation has not been received; or
(d) Obtaining accreditation from a training provider that does not have approval to offer training for the particular discipline from either EPA or from a State that has a contractor accreditation plan at least as stringent as the EPA MAP.

C. States seeking EPA approval or reapproval of accreditation programs shall submit the following information to the Regional Asbestos Coordinator at their EPA Regional office:
1. A copy of the legislation establishing or upgrading the State's accreditation program (if applicable).
2. A copy of the State's accreditation regulations or revised regulations.
3. A letter to the Regional Asbestos Coordinator that clearly indicates how the State meets the program requirements of this MAP. Addresses for each of the Regional Asbestos Coordinators are shown below:
EPA, Region I, (ATC-111) Asbestos Coordinator, JFK Federal Bldg., Boston, MA 02203-2211, (617) 565-3836.
EPA, Region II, (MS-500), Asbestos Coordinator, 2890 Woodbridge Ave., Edison, NJ 08837-3679, (908) 321-6671.
EPA, Region III, (3AT-33), Asbestos Coordinator, 841 Chestnut Bldg., Philadelphia, PA 19107, (215) 597-3160.
EPA, Region IV, Asbestos Coordinator, 345 Courtland St., N.E., Atlanta, GA 30365, (404) 347-5014.
EPA, Region V, (SP-14J), Asbestos Coordinator, 77 W. Jackson Blvd., Chicago, IL 60604-3590, (312) 886-6003.
EPA, Region VI, (6T-PT), Asbestos Coordinator, 1445 Ross Ave. Dallas, TX 75202-2744, (214) 655-7244.
EPA, Region VII, (ARTX/ASBS), Asbestos Coordinator, 726 Minnesota Ave., Kansas City, KS 66101, (913) 551-7020.
EPA, Region VIII, (8AT-TS), Asbestos Coordinator, 1 Denver Place, Suite 500 999 - 18th St., Denver, CO 80202-2405, (303) 293-1442.
EPA, Region IX, (A-4-4), Asbestos Coordinator, 75 Hawthorne St., San Francisco, CA94105, (415) 744-1128.
EPA, Region X, (AT-083), Asbestos Coordinator, 1200 Sixth Ave., Seattle, WA 98101, (206) 553-4762.
EPA maintains a listing of all those States that have applied for and received EPA approval for having accreditation requirements that are at least as stringent as the MAP for one or more disciplines. Any training courses approved by an EPA-approved State Program are considered to be EPA-approved for purposes of accreditation.
III. Approval of Training Courses
Individuals or groups wishing to sponsor training courses for disciplines required to be accredited under section 206(b)(1)(A) of TSCA, 15 U.S.C. 2646(b)(1)(A), may apply for approval from States that have accreditation program requirements that are at least as stringent as this MAP. For a course to receive approval, it must meet the requirements for the course as outlined in this MAP, and any other requirements imposed by the State from which approval is being sought. Courses that have been approved by a State with an accreditation program at least as stringent as this MAP are approved under section 206(a) of TSCA, 15 U.S.C. 2646(a), for that particular State, and also for any other State that does not have an accreditation program as stringent as this MAP.
A. Initial Training Course Approval
A training provider must submit the following minimum information to a State as part of its application for the approval of each training course:

has submitted false information as a part of the self-certification required under Unit V.B. of the revised MAP.

Training course providers shall permit representatives of EPA or the State which approved their training courses to attend, evaluate, and monitor any training course without charge. EPA or State compliance inspection staff are not required to give advance notice of their inspections. EPA may suspend or withdraw State or EPA approval of a training course based upon the criteria specified in this Unit III.C.

IV. EPA Procedures for Suspension or Revocation of Accreditation or Training Course Approval.

A. If the Administrator decides to suspend or revoke the accreditation of any person or suspend or withdraw the approval of a training course, the Administrator will notify the affected entity of the following:

1. The grounds upon which the suspension, revocation, or withdrawal is based.

2. The time period during which the suspension, revocation, or withdrawal is effective, whether permanent or otherwise.

3. The conditions, if any, under which the affected entity may receive accreditation or approval in the future.

4. Any additional conditions which the Administrator may impose.

5. The opportunity to request a hearing prior to final Agency action to suspend or revoke accreditation or suspend or withdraw approval.

B. If a hearing is requested by the accredited person or training course provider pursuant to the preceding paragraph, the Administrator will:

1. Notify the affected entity of those assertions of law and fact upon which the action to suspend, revoke, or withdraw is based.

2. Provide the affected entity an opportunity to offer written statements of facts, explanations, comments, and arguments relevant to the proposed action.

3. Provide the affected entity such other procedural opportunities as the Administrator may deem appropriate to ensure a fair and impartial hearing.

4. Appoint an EPA attorney as Presiding Officer to conduct the hearing. No person shall serve as Presiding Officer if he or she has had any prior connection with the specific case.

C. The Presiding Officer appointed pursuant to the preceding paragraph shall:

1. Conduct a fair, orderly, and impartial hearing, without unnecessary delay.

2. Consider all relevant evidence, explanation, comment, and argument submitted pursuant to the preceding paragraph.

3. Promptly notify the affected entity of his or her decision and order. Such an order is a final Agency action.

D. If the Administrator determines that the public health, interest, or welfare warrants immediate action to suspend the accreditation of any person or the approval of any training course provider, the Administrator will:

1. Notify the affected entity of the grounds upon which the emergency suspension is based;

2. Notify the affected entity of the time period during which the emergency suspension is effective.

3. Notify the affected entity of the Administrator's intent to suspend or revoke accreditation or suspend or withdraw training course approval, as appropriate, in accordance with Unit IV.A. above. If such suspension, revocation, or withdrawal notice

i. Conduct training for accreditation purposes under section 206 of TSCA, 15 U.S.C. 2646.
ii. Approve training course providers to conduct training or issue accreditation that satisfies the requirements for TSCA accreditation; or
iii. Issue accreditation that satisfies the requirement for TSCA accreditation.
EPA will extend EPA-approval to any training course provider that loses State approval because the State does not comply with the deadline, so long as the provider is in compliance with Unit V.B. of this MAP, and the provider is approved by a State that had complied with an earlier version of the MAP as of the day before the State loses its EPA approval.
5. A State that does not have an accreditation program that satisfies the requirements for TSCA accreditation under either an earlier version of the MAP or this MAP, may not:
a. Conduct training for accreditation purposes under section 206 of TSCA, 15 U.S.C. 2646;
b. Approve training course providers to conduct training or issue accreditation that satisfies the requirements for TSCA accreditation; or
c. Issue accreditation that satisfies the requirement for TSCA accreditation.
B. Requirements applicable to Training Courses and Providers
As of October 4, 1994, an approved training provider must certify to EPA and to any State that has approved the provider for TSCA accreditation, that each of the provider's training courses complies with the requirements of this MAP. The written submission must document in specific detail the changes made to each training course in order to comply with the requirements of this MAP and clearly state that the provider is also in compliance with all other requirements of this MAP, including the new recordkeeping and certificate provisions. Each submission must include the following statement signed by an authorized representative of the training provider: "Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the training described in this submission complies with all applicable requirements of Title II of TSCA, 40 CFR part 763, Appendix C to Subpart E, as revised, and any other applicable Federal, state, or local requirements." A consolidated self-certification submission from each training provider that addresses all of its approved training courses is permissible and encouraged. The self-certification must be sent via registered mail, to EPA Headquarters at the following address: Attn. Self-Certification Program, Field Programs Branch, Chemical Management Division (7404), Office of Pollution Prevention and Toxics, Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460. A duplicate copy of the complete submission must also be sent to any States from which approval had been obtained.
The timely receipt of a complete self-certification by EPA and all approving States shall have the effect of extending approval under this MAP to the training courses offered by the submitting provider. If a self-certification is not received by the approving government bodies on or before the due date, the affected training course is not approved under this MAP. Such training providers must then reapply for approval of these training courses pursuant to the procedures outlined in Unit III.
C. Requirements applicable to Accredited Persons.

prevent breaking of the containers. Similarly, at the disposal site, the asbestos waste containers should be transferred carefully to avoid fiber release.

Waste transport. Although there are no regulatory specifications regarding the transport vehicle, it is recommended that vehicles used for transport of containerized asbestos waste have an enclosed carrying compartment or utilize a canvas covering sufficient to contain the transported waste, prevent damage to containers, and prevent fiber release. Transport of large quantities of asbestos waste is commonly conducted in a 20-cubic-yard "roll off" box, which should also be covered. Vehicles that use compactors to reduce waste volume should not be used because these will cause the waste containers to rupture. Vacuum trucks used to transport waste slurry must be inspected to ensure that water is not leaking from the truck.

Disposal involves the isolation of asbestos waste material in order to prevent fiber release to air or water. Landfilling is recommended as an environmentally sound isolation method because asbestos fibers are virtually immobile in soil. Other disposal techniques such as incineration or chemical treatment are not feasible due to the unique properties of asbestos. EPA has established asbestos disposal requirements for active and inactive disposal sites under NESHAPs (40 CFR Part 61, subpart M) and specifies general requirements for solid waste disposal under RCRA (40 CFR Part 257). Advance EPA notification of the intended disposal site is required by NESHAPs.

Selecting a disposal facility. An acceptable disposal facility for asbestos wastes must adhere to EPA's requirements of no visible emissions to the air during disposal, or minimizing emissions by covering the waste within 24 hours. The minimum required cover is 6 inches of nonasbestos material, normally soil, or a dust-suppressing chemical. In addition to these Federal requirements, many state or local government agencies require more stringent handling procedures. These agencies usually supply a list of "approved" or licensed asbestos disposal sites upon request. Solid waste control agencies are listed in local telephone directories under state, county, or city headings. A list of state solid waste agencies may be obtained by calling the RCRA hotline: 1-800-424-9346 (382-3000 in Washington, DC). Some landfill owners or operators place special requirements on asbestos waste, such as placing all bagged waste into 55-gallon metal drums. Therefore, asbestos removal contractors should contact the intended landfill before arriving with the waste.

Receiving asbestos waste. A landfill approved for receipt of asbestos waste should require notification by the waste hauler that the load contains asbestos. The landfill operator should inspect the loads to verify that asbestos waste is properly contained in leak-tight containers and labeled appropriately. The appropriate EPA Regional Asbestos NESHAPs Contact should be notified if the landfill operator believes that the asbestos waste is in a condition that may cause significant fiber release during disposal. In situations when the wastes are not properly containerized, the landfill operator should thoroughly soak the asbestos with a water spray prior to unloading, rinse out the truck, and immediately cover the wastes with nonasbestos material prior to compacting the waste in the landfill.

Waste deposition and covering. Recognizing the health dangers associated with asbestos exposure, the following procedures are recommended to augment current federal requirements:

documentation of the specific location and quantity of the buried asbestos wastes. In addition, the estimated depth of the waste below the surface should be recorded whenever a landfill section is closed. As mentioned previously, such information should be recorded in the land deed or other record along with a notice warning against excavation of the area.
Source
[52 FR 41897, Oct. 30, 1987; 62 FR 1832, 1834, Jan. 14, 1997]

Notes
[EFFECTIVE DATE NOTE: 62 FR 1832, 1834, Jan. 14, 1997, substituted "77 West Jackson Boulevard" for "230 S. Dearborn Street" under the Region V heading, effective Jan. 14, 1997.]

APPENDIX E TO SUBPART E -- INTERIM METHOD OF THE DETERMINATION OF ASBESTOS IN BULK INSULATION SAMPLES
Text
1.3 Interferences
Fibrous organic and inorganic constitutents of bulk samples may interfere with the identification and quantitation of the asbestos mineral content. Spray-on binder materials may coat fibers and affect color or obscure optical characteristics to the extent of masking fiber identity. Fine particles of other materials may also adhere to fibers to an extent sufficient to cause confusion in identification. Procedures that may be used for the removal of interferences are presented in Section 1.7.2.2.
1.4 Precision and Accuracy
Adequate data for measuring the accuracy and precision of the method for samples with various matrices are not currently available. Data obtained for samples containing a single asbestos type in a simple matrix are available in the EPA report Bulk Sample Analysis for Asbestos Content: Evaluation of the Tentative Method. 4
1.5 Apparatus
1.5.1 Sample Analysis
A low-power binocular microscope, preferably stereoscopic, is used to examine the bulk insulation sample as received.
-- Microscope: binocular, 10-45X (approximate).
-- Light Source: incandescent or fluorescent.
-- Forceps, Dissecting Needles, and Probes
-- Glassine Paper or Clean Glass Plate
Compound microscope requirements: A polarized light microscope complete with polarizer, analyzer, port for wave retardation plate, 360 degrees graduated rotating stage, substage condenser, lamp, and lamp iris.
-- Polarized Light Microscope: described above.
-- Objective Lenses: 10X, 20X, and 40X or near equivalent.
-- Dispersion Staining Objective Lens (optional)
-- Ocular Lens: 10X minimum.
-- Eyepiece Reticle: cross hair or 25 point Chalkley Point Array.
-- Compensator Plate: 550 millimicron retardation.
1.5.2 Sample Preparation

treated as a separate material so that fibers are first identified and quantified in that layer only, and then the results for each layer are combined to yield an estimate of asbestos content for the whole sample.

1.7.2.2 Sample Preparation

Bulk materials submitted for asbestos analysis involve a wide variety of matrix materials. Representative subsamples may not be readily obtainable by simple means in heterogeneous materials, and various steps may be required to alleviate the difficulties encountered. In most cases, however, the best preparation is made by using forceps to sample at several places from the bulk material. Forcep samples are immersed in a refractive index liquid on a microscope slide, teased apart, covered with a cover glass, and observed with the polarized ligth microscope.

Alternatively, attempts may be made to homogenize the sample or eliminate interferences before further characterization. The selection of appropriate procedures is dependent upon the samples encountered and personal preference. The following are presented as possible sample preparation steps.

A mortar and pestle can sometimes be used in the size reduction of soft or loosely bound materials though this may cause matting of some samples. Such samples may be reduced in a Wylie mill. Apparatus should be clean and extreme care exercised to avoid cross-contamination of samples. Periodic checks of the particle sizes should be made during the grinding operation so as to preserve any fiber bundles present in an identifiable form. These procedures are not recommended for samples that contain amphibole minerals or vermiculite. Grinding of amphiboles may result in the separation of fiber bundles or the production of cleavage fragments with aspect ratios greater than 3:1. Grinding of vermiculite may also produce fragments with aspect ratios greater than 3:1.

Acid treatment may occasionally be required to eliminate interferences. Calcium carbonate, gypsum, and bassanite (plaster) are frequently present in sprayed or trowelled insulations. These materials may be removed by treatment with warm dilute acetic acid. Warm dilute hydrochloric acid may also be used to remove the above materials. If acid treatment is required, wash the sample at least twice with distilled water, being careful not to lose the particulates during decanting steps. Centrifugation or filtration of the suspension will prevent significant fiber loss. The pore size of the filter should be 0.45 micron or less. Caution: prolonged acid contact with the sample may alter the optical characteristics of chrysotile fibers and should be avoided.

Coatings and binding materials adhering to fiber surfaces may also be removed by treatment with sodium metaphosphate. 7 Add 10 mL of 10gœ sodium metaphosphate solution to a small (0.1 to 0.5 mL) sample of bulk material in a 15-mL glass centrifuge tube. For approximately 15 seconds each, stir the mixture on a vortex mixer, place in an ultrasonic bath and then shake by hand. Repeat the series. Collect the dispersed solids by centrifugation at 1000 rpm for 5 minutes. Wash the sample three times by suspending in 10 mL distilled water and recentrifuging. After washing, resuspend the pellet in 5 mL distilled water, place a drop of the suspension on a microscope slide, and dry the slide at 110 [degrees] C.

In samples with a large portion of cellulosic or other organic fibers, it may be useful to ash part of the sample and view the residue. Ashing should be performed in a low temperature asher. Ashing may also be performed in a muffle furnace at temperatures of 500 [degrees] C or lower. Temperatures of 550 [degrees] C or higher will cause

Mineral	Birefringence	Extinction	Sign of elonation
Chrysotile (asbestiform serpentine).	.008	[parallel] to fiber length (length slow)	+
Amosite (asbestiform grunerite).	.020-.033	[parallel] to fiber length (length slow)	+

Mineral	Morphology, color n a	Refractive indices n b [alpha]	[gamma]
Crocidolite (asbestiform Riebeckite).	Straight, rigid fibers. Thick fibers and bundles common, blue to purple-blue in color. Pleochroic. Birefringence is generally masked by blue color.	1.654-1.701	1.668-1.717[sup]3 n e (normally close to 1.700).
Anthophyllite-asbestos.	Straight fibers and acicular cleavage fragments. d Some composite fibers. Aspect ratio <10:1. Colorless to light brown.	1.596-1.652	1.615-1.676 n f.
Tremolite-actinolite-asbestos.	Normally present as acicular or prismatic cleavage fragments d Single crystals predominate, aspect ratio <10:1. Colorless to pale green.	1.599-1.668	1.622-1.688 n f.

Mineral	Birefringence	Extinction	Sign of elonation
Crocidolite (asbestiform Riebeck-	.014-.016	[parallel] to fiber length (length fast)	--

a From reference 9.

b Blue absorption color.

c Oblique extinction view.

Text
1.7.2.4 Quantitation of Asbestos Content
Asbestos quantitation is performed by a point-counting procedure or an equivalent estimation method. An ocular reticle (cross-hair or point array) is used to visually superimpose a point or points on the microscope field of view. Record the number of points positioned directly above each kind of particle of fiber of interest. Score only points directly over asbestos fibers or nonasbestos matrix material. Do not score empty points for the closest particle. If an asbestos fiber and a matrix particle overlap so that a point is superimposed on their visual intersection, a point is scored for both categories. Point counting provides a determination of the area percent asbestos. Reliable conversion of area percent to percent of dry weight is not currently feasible unless the specific gravities and relative volumes of the materials are known.
For the purpose of this method, "asbestos fibers" are defined as having an aspect ratio greater than 3:1 and being positively identified as one of the minerals in Table 1-1.
A total of 400 points superimposed on either asbestos fibers or nonasbestos matrix material must be counted over at least eight different preparations of representative subsamples. Take eight forcep samples and mount each separately with the appropriate refractive index liquid. The preparation should not be heavily loaded. The sample should be uniformly dispersed to avoid overlapping particles and allow 25-50 percent empty area within the fields of view. Count 50 nonempty points on each preparation, using either.
-- A cross-hair reticle and mechanical stage; or
-- A reticle with 25 points (Chalkley Point Array) and counting at least 2 randomly selected fields.
For samples with mixtures of isotropic and anisotropic materials present, viewing the sample with slightly uncrossed polars or the addition of the compensator plate to the polarized light path will allow simultaneous discrimination of both particle types.
Quantitation should be performed at 100X or at the lowest magnification of the polarized light microscope that can effectively distinguish the sample components. Confirmation of the quantitation result by a second analyst on some percentage of analyzed samples should be used as standard quality control procedure.
The percent asbestos is calculated as follows:
% asbestos=(a/n) 100%
where
a=number of asbestos counts,
n=number of nonempty points counted (400).
If a=0, report "No asbestos detected." If 0<a </=3, report "< 1% as asbestos".
The value reported should be rounded to the nearest percent.
1.8 References
1. Paul F. Kerr, Optical Mineralogy, 4th ed., New York, McGraw-Hill, 1977.

preparation and step-scanning analysis. All samples that exhibit diffraction peaks in the diagnostic regions for asbestiform minerals are submitted to a full (5 [degrees] -60 [degrees] 2 [theta] 1 [degrees] 2 [theta]/min) qualitative XRD scan, and their diffraction patterns are compared with standard reference powder diffraction patterns[sup]3 to verify initial peak assignments and to identify possible matrix interferences when subsequent quantitative analysis will be performed.

Table 2-1 -- The Asbestos Minerals and Their Nonasbestiform Analogs

Asbestiform	Nonasbestiform
SERPENTINE	
Chrysotile	Antigorite, lizardite
AMPHIBOLE	
Anthophyllite asbestos	Anthophyllite
Cummingtonite-grunerite asbestos ("Amosite")	Cummingtonite-grunerite
Crocidolite	Riebeckite
Tremolite asbestos	Tremolite
Actinolite asbestos	Actinolite

Table 2-2 -- Principal Lattice Spacings of Asbestiform Minerals a

Minerals	Principal d-spacings [*] and relative intensities	JCPDS Powder diffrac-tion file n 3 number
Chrysotile	7.37[100] 3.65[70] 4.57[50]	21-543 n b
	7.36[100] 3.66[80] 2.45[65]	25-645
	7.10[100] 2.33[80] 3.55[70]	22-1162 (theoretical)
"Amosite"	8.33[100] 3.06[70] 2.756[70]	17-745 (nonfibrous)
	8.22[100] 3.060[85] 3.25[70]	27-1170 (UICC)
Anthophyllite	3.05[100] 3.24[60] 8.26[55]	9-455
	3.06[100] 8.33[70] 3.23[50]	16-401 (synthetic)
Anthophyllite	2.72[100] 2.54[100] 3.480[80]	25-157
Crocidolite	8.35[100] 3.10[55] 2.720[35]	27-1415 (UICC)
Tremolite	8.38[100] 3.12[100] 2.705[90]	13-437 n b
	2.706[100] 3.14[95] 8.43[40]	20-1310 n b (synthetic)
	3.13[100] 2.706[60] 8.44[40]	23-666 (synthetic mixture with richterite)

Notes

a This information is intended as a guide, only. Complete powder diffraction data, including mineral type and source, should be referred to, to ensure comparability of sample and reference materials where possible. Additional precision XRD data on

to give good quantitative results may be possible when a step-scanning mode of operation is employed.
-- Halloysite has a peak at 3.63 [*] that interferes with the secondary (3.66 [*]) peak for chrysotile.
-- Kaolinite has a major peak at 7.15 [*] that may interfere with the primary peak of chrysotile at 7.36 [*] when present at concentrations of >10 percent. However, the secondary chrysotile peak at 3.66 [*] may be used for quantitation.
-- Gypsum has a major peak at 7.5 [*] that overlaps the 7.36 [*] peak of chrysotile when present as a major sample constituent. This may be removed by careful washing with distilled water, or be heating to 300 deg. C to convert gypsum to plaster of paris.
-- Cellulose has a broad peak that partially overlaps the secondary (3.66 [*]) Chrysotile peak. 8
-- Overlap of major diagnostic peaks of the amphibole asbestos minerals, amosite, anthophyllite, crocidolite, and tremolite, at approximately 8.3 [*] and 3.1 [*] causes mutual interference when these minerals occur in the presence of one another. In some instances, adequate resolution may be attained by using step-scanning methods and/or by decreasing the collimator slit width at the X-ray port.
Table 2-3 -- Common Constituents in Insulation and Wall Materials
A. Insulation materials
Chrysotile
"Amosite"
Crocidolite
* Rock wool
* Slag wool
* Fiber glass
Gypsum (CaSO[sub]4.2H[sub]2O)
Vermiculite (micas)
* Perlite
Clays (kaolin)
* Wood pulp
* Paper fibers (talc, clay, carbonate fillers)
Calcium silicates (synthetic)
Opaques (chromite, magnetite inclusions in serpentine)
Hematite (inclusions in "amosite")
Magnesite
* Diatomaceous earth
B. Spray finishes or paints
Bassanite
Carbonate minerals (calcite, dolomite, vaterite)
Talc
Tremolite
Anthophyllite
Serpentine (including chrysotile)
Amosite
Crocidolite
* Mineral wool

-- Carbonates may also interfere with quantitative analysis of the amphibole asbestos minerals, amosite, anthophyllite, crocidolite, and tremolite. Calcium carbonate (CaCO[sub]3) has a peak at 3.035 [*] that overlaps major amphibole peaks at approximately 3.1 [*] when present in concentrations of >5 percent. Removal of carbonates with a dilute acid wash is possible; however, if present, chrysotile may be partially dissolved by this treatment. 11

-- A major talc peak at 3.12 [*] interferes with the primary tremolite peak at this same position and with secondary peaks of crocidolite (3.10 [*]), amosite (3.06 [*]), and anthophyllite (3.05 [*]). In the presence of talc, the major diagnostic peak at approximately 8.3 [*] should be used for quantitation of these asbestiform minerals.

The problem of intraspecies and matrix interferences is further aggravated by the variability of the silicate mineral powder diffraction patterns themselves, which often makes definitive identification of the asbestos minerals by comparison with standard reference diffraction patterns difficult. This variability results from alterations in the crystal lattice associated with differences in isomorphous substitution and degree of crystallinity. This is especially true for the amphiboles. These minerals exhibit a wide variety of very similar chemical compositions, with the result being that their diffraction patterns are characterized by having major (110) reflections of the monoclinic amphiboles and (210) reflections of the orthorhombic anthophyllite separated by less than 0.2 [*] 12

2.3.2 Matrix Effects

If a copper X-ray source is used, the presence of iron at high concentrations in a sample will result in significant X-ray fluorescence, leading to loss of peak intensity along with increased background intensity and an overall decrease in sensitivity. This situation may be corrected by choosing an X-ray source other than copper; however, this is often accompanied both by loss of intensity and by decreased resolution of closely spaced reflections. Alternatively, use of a diffracted beam monochromator will reduce background fluorescent radiation, enabling weaker diffraction peaks to be detected.

X-ray absorption by the sample matrix will result in overall attenuation of the diffracted beam and may seriously interfere with quantitative analysis. Absorption effects may be minimized by using sufficiently "thin" samples for analysis. 5 13 14 However, unless absorption effects are known to be the same for both samples and standards, appropriate corrections should be made by referencing diagnostic peak areas to an internal standard 7 8 or filter substrate (Ag) peak. 5 6

2.3.3 Particle Size Dependence

Because the intensity of diffracted X-radiation is particle-size dependent, it is essential for accurate quantitative analysis that both sample and standard reference materials have similar particle size distributions. The optimum particle size range for quantitative analysis of asbestos by XRD has been reported to be 1 to 10 mum. 15. Comparability of sample and standard reference material particle size distributions should be verified by optical microscopy (or another suitable method) prior to analysis.

2.3.4 Preferred Orientation Effects

Preferred orientation of asbestiform minerals during sample preparation often poses a serious problem in quantitative analysis by XRD. A number of techniques have been developed for reducing preferred orientation effects in "thick layer" samples. 7 8 15 However, for "thin" samples on membrane filters, the preferred orientation effects seem

-- Magnetic Stirring Plate and Bars
-- Porcelain Crucibles
-- Muffle Furnace of Low Temperature Asher
2.5.2 Sample Analysis
Sample analysis requirements include an X-ray diffraction unit, equipped with:
-- Constant Potential Generator; Voltage and mA Stabilizers
-- Automated Diffractometer with Step-Scanning Mode
-- Copper Target X-Ray Tube: High intensity, fine focus, preferably.
-- X-Ray Pulse Height Selector
-- X-Ray Detector (with high voltage power supply): Scintillation or proportional counter.
-- Focusing Graphite Crystal Monochromator; or Nickel Filter (if copper source is used, and iron fluorescence is not a serious problem).
-- Data Output Accessories:
-- Strip Chart Recorder
-- Decade Scaler/Timer
-- Digital Printer
-- Sample Spinner (optional).
-- Instrument Calibration Reference Speciment: alpha quartz reference crystal (Arkansas quartz standard, #180-147-00, Philips Electronics Instruments, Inc., 85 McKee Drive, Mahwah, NJ 07430) or equivalent.
2.6 Reagents
2.6.1 Standard Reference Materials
The reference materials listed below are intended to serve as a guide. Every attempt should be made to acquire pure reference materials that are comparable to sample materials being analyzed.
-- Chrysotile: UICC Canadian, or NIEHS Plastibest. (UICC reference materials available from: UICC, MRC Pneumoconiosis Unit, Llandough Hospital, Penarth, Glamorgan, CF61XW, UK).
-- Crocidolite: UICC
-- Amosite: UICC
-- Anthophyllite: UICC
-- Tremolite Asbestos: Wards Natural Science Establishment, Rochester, N.Y.; Cyprus Research Standard, Cyprus Research, 2435 Military Ave., Los Angeles, CA90064 (washed with dilute HCl to remove small amount of calcite impurity); India tremolite, Rajasthan State, India.
-- Actinolite Asbestos
2.6.2 Adhesive
Tape, petroleum jelly, etc. (for attaching silver membrane filters to sample holders).
2.6.3 Surfactant
1 percent aerosol OT aqueous solution or equivalent.
2.6.4 Isopropanol
ACS Reagent Grade.
2.7 Procedure
2.7.1 Sampling

samples prior to analysis to reduce background radiation or matrix interference. Since chrysotile undergoes dehydroxylation at temperatures between 550 [degrees] C and and 650 [degrees] C, with subsequent transformation to forsterite, 23 24 ashing temperatures should be kept below 500 [degrees] C. Use of a low temperature asher is recommended. In all cases, calibration of the oven is essential to ensure that a maximum ashing temperature of 500 [degrees] C is not exceeded.

2.7.2.1.3 Acid leaching -- Because of the interference caused by gypsum and some carbonates in the detection of asbestiform minerals by XRD (see Section 2.3.1), it may be necessary to remove these interferents by a simple acid leaching procedure prior to analysis (see Section 1.7.2.2).

2.7.2.2 Qualitative Analysis

2.7.2.2.1 Initial screening of bulk material-- Qualitative analysis should be performed on a representative, homogeneous portion of the sample with a minimum of sample treatment.

1. Grind and mix the sample with a mortar and pestle (or equivalent method, see Section 2.7.2.1.1.) to a final particle size sufficiently small (approx. 100 mum) to allow adequate packing into the sample holder.
2. Pack the sample into a standard bulk sample holder. Care should be taken to ensure that a representative portion of the milled sample is selected for analysis. Paticular care should be taken to avoid possible size segregation of the sample. (Note: Use of a back-packing method 25 of bulk sample preparation may reduce preferred orientation effects.)
3. Mount the sample on the diffractometer and scan over the diagnostic peak regions for the serpentine (approx. 67.4 [*]) and amphibole (8.2-8.5 [*] minerals (see Table 2-2). The X-ray diffraction equipment should be optimized for intensity. A slow scanning speed of 1 deg. 2theta/min is recommended for adequate resolution. Use a sample spinner is recommended.
4. Submit all samples that exhibit diffraction peaks in the diagnostic regions for asbestiform minerals to a full qualitative XRD scan) 5 [degrees] -60 [degrees] 2 [theta]/min) to verify initial peak assignments and to identify potential matrix interferences when subsequent quantitative analysis is to be perform.
5. Compare the sample XRD pattern with standard reference powder diffraction patterns (i.e., JCPDS power diffraction data 3 or those of other well-characterized reference materials). Principal lattice spacings of asbestiform minerals are given in Table 2-2; common constituents of bulk insulation and wall materials are listed in Table 2-3.

2.7.2.2.2 Detection of minor or trace constituents -- Routine screening of bulk materials by XRD may fail to detect small concentrations (<5 percent) of asbestos. The limits of detection will, in general, be improved if matrix absorption effects are minimized, and if the sample particle size is reduced to the optimal 1 to 10 [mu]m range, provided that the crystal lattice is not degraded in the milling process. Therefore, in those instances where confirmation of the presence of an asbestiform mineral at very low levels is required, or where a negative result from initial screening of the bulk material by XRD (see Section 2.7.2.2.1) is in conflict with previous PLM results, it may be desirable to prepare the sample as described for quantitative analysis (see Section 2.7.2.3) and step-scan over appropriate 2theta ranges of selected diagnostic peaks (Table 2-2). Accurate transfer of the sample to the silver membrane filter is not necessary unless subsequent quantitative analysis is to be performed.

count scan may be used alternatively; however, the method chosen should be used consistently for all samples and standards.) An appropriate scanning interval should be selected for each peak, and background corrections made. For a fixed time scan, measure the background on each side of the peak for one-half the peak-scanning time. The net intensity, I[sub]a, is the difference between the peak integrated count and the total background count.

13. Determine the net count, I[sub]Ag, of the filter 2.36 A silver peak following the procedure in step 12. Remove the filter from the holder, reverse it, and reattach it to the holder. Determine the net count for the unattenuated silver peak, I degrees [Ag]. Scan times may be less for measurement of silver peaks than for sample peaks; however, they should be constant throughout the analysis.

14. Normalize all raw, net intensities (to correct for instrument instabilities) by referencing them to an external standard (e.g., the 3.34 [*] peak of an alpha-quartz reference crystal). After each unknown is scanned, determine the net count, I degrees [sub]r, of the reference specimen following the procedure in step 12. Determine the normalized intensities by dividing the peak intensities by I degrees [sub]r:

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2.8 Calibration

2.8.1 Preparation of Calibration Standards

1. Mill and size standard asbestos materials according to the procedure outlined in Section 2.7.2.1.1. Equivalent, standardized matrix reduction and sizing techniques should be used for both standard and sample materials.

2. Dry at 100 [degrees] C for 2 hr; cool in a desiccator.

3. Prepare two suspensions of each standard in isopropanol by weighing approximately 10 and 50 mg of the dry material to the nearest 0.01 mg. Quantitatively transfer each to a 1-L volumetric flask with approximately 200 mL isopropanol to which a few drops of surfactant have been added.

4. Ultrasonicate for 10 min at a power density of approximately 0.1 W/mL, to disperse the asbestos material.

5. Dilute to volume with isopropanol.

6. Place the flask on a magnetic stirring plate. Stir.

7. Prepare, in triplicate, a series of at least five standard filters to cover the desired analytical range, using appropriate aliquots of the 10 and 50 mgœ suspensions and the following procedure.

Mount a silver membrane filter on the filtration apparatus. Place a few milliliters of isopropanol in the reservoir. Vigorously hand shake the asbestos suspension and immediately withdraw an aliquot from the center of the suspension. Do not adjust the volume in the pipet by expelling part of the suspension; if more than the desired aliquot is withdrawn, discard the aliquot and resume the procedure with a clean pipet. Transfer the aliquot to the reservoir. Keep the tip of the pipet near the surface of the isopropanol. Filter rapidly under vacuum. Do not wash the sides of the reservoir. Leave the vacuum on for a time sufficient to dry the filter. Release the vacuum and remove the filter with forceps.

2.8.2 Analysis of Calibration Standards

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Notes
[EFFECTIVE DATE NOTE: 65 FR 69210, 69216, Nov. 15, 2000, revised Subpart G, effective Dec. 15, 2000.]
§ 763.121 Does this subpart apply to me?
Text
If you are a State or local government employer and you are not subject to a State asbestos standard that OSHA has approved under section 18 of the Occupational Safety and Health Act or a State asbestos plan that EPA has exempted from the requirements of this subpart under § 763.123, you must follow the requirements of this subpart to protect your employees from occupational exposure to asbestos.
Source
[52 FR 5623, Feb. 25, 1987; 52 FR 10817, Mar. 30, 1987; 53 FR 1022, Jan. 15, 1988; 65 FR 69210, 69217, Nov. 15, 2000]

Notes
[EFFECTIVE DATE NOTE: 65 FR 69210, 69217, Nov. 15, 2000, revised Subpart G, effective Dec. 15, 2000.]
§ 763.122 What does this subpart require me to do?
Text
If you are a State or local government employer whose employees perform:
(a) Construction activities identified in 29 CFR 1926.1101(a), you must:
(1) Comply with the OSHA standards in 29 CFR 1926.1101.
(2) Submit notifications required for alternative control methods to the Director, National Program Chemicals Division (7404), Office of Pollution Prevention and Toxics, Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

(b) Custodial activities not associated with the construction activities identified in 29 CFR 1926.1101(a), you must comply with the OSHA standards in 29 CFR 1910.1001.
(c) Repair, cleaning, or replacement of asbestos-containing clutch plates and brake pads, shoes, and linings, or removal of asbestos-containing residue from brake drums or clutch housings, you must comply with the OSHA standards in 29 CFR 1910.1001.
Source
[52 FR 5623, Feb. 25, 1987; 65 FR 69210, 69217, Nov. 15, 2000]

Notes
[EFFECTIVE DATE NOTE: 65 FR 69210, 69217, Nov. 15, 2000, revised Subpart G, effective Dec. 15, 2000.]
§ 763.123 May a State implement its own asbestos worker protection plan?
Text
This section describes the process under which a State may be exempted from the requirements of this subpart.
(a) States seeking an exemption. If your State wishes to implement its own asbestos worker protection plan, rather than complying with the requirements of this subpart, your State must apply for and receive an exemption from EPA.

[EFFECTIVE DATE NOTE: 65 FR 69210, 69217, Nov. 15, 2000, added this section as part of the revision of Subpart G, effective Dec. 15, 2000.]
§ 763.124 [This section was removed. See 65 FR 69210, 69216, Nov. 15, 2000.]
§ 763.125 [This section was removed. See 65 FR 69210, 69216, Nov. 15, 2000.]
§ 763.126 [This section was removed. See 65 FR 69210, 69216, Nov. 15, 2000.]

Subpart I -- Prohibition of the Manufacture, Importation, Processing, and Distribution in Commerce of Certain ASbestos-Containing Products; Labeling Requirements

§ 763.160 Scope.

Text

This subpart prohibits the manufacture, importation, processing, and distribution in commerce of the asbestos-containing products identified and at the dates indicated in §§ 763.165, 763.167, and 763.169. This subpart requires that products subject to this rule's bans, but not yet subject to a ban on distribution in commerce, be labeled. This subpart also includes general exemptions and procedures for requesting exemptions from the provisions of this subpart.

Source

[4 FR 29507, July 12, 1989]

§ 763.163 Definitions.

Text

For purposes of this subpart:

Act means the Toxic Substances Control Act, 15 U.S.C. 2601 et seq.

Agency means the United States Environmental Protection Agency.

Asbestos means the asbestiform varieties of: chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonite-grunerite); tremolite; anthophyllite; and actinolite.

Asbestos-containing product means any product to which asbestos is deliberately added in any concentration or which contains more than 1.0 percent asbestos by weight or area.

Chemical substance, has the same meaning as in section 3 of the Act.

Commerce has the same meaning as in section 3 of the Act.

Commercial paper means an asbestos-containing product which is made of paper intended for use as general insulation paper or muffler paper. Major applications of commercial papers are insulation against fire, heat transfer, and corrosion in circumstances that require a thin, but durable, barrier.

Rollboard means an asbestos-containing product made of paper that is produced in a continuous sheet, is flexible, and is rolled to achieve a desired thickness. Asbestos rollboard consists of two sheets of asbestos paper laminated together. Major applications of this product include: office partitioning; garage paneling; linings for stoves and electric switch boxes; and fire-proofing agent for security boxes, safes, and files.
Specialty paper means an asbestos-containing product that is made of paper intended for use as filters for beverages or other fluids or as paper fill for cooling towers. Cooling tower fill consists of asbestos paper that is used as a cooling agent for liquids from industrial processes and air conditioning systems.
State has the same meaning as in section 3 of the Act.
Stock-on-hand means the products which are in the possession, direction, or control of a person and are intended for distribution in commerce.
United States has the same meaning as in section 3 of the Act.
Source
[54 FR 29507, July 12, 1989, as amended at 54 FR 46897, Nov. 8, 1989; 59 FR 33208, June 28, 1994]

§ 763.165 Manufacture and importation prohibitions.
Text
(a) After August 27, 1990, no person shall manufacture or import the following asbestos-containing products, either for use in the United States or for export: flooring felt and new uses of asbestos.
(b) After August 26, 1996, no person shall manufacture or import the following asbestos-containing products, either for use in the United States or for export: commercial paper, corrugated paper, rollboard, and specialty paper.
(c) The import prohibitions of this subpart do not prohibit:
(1) The import into the customs territory of the United States of products imported solely for shipment outside the customs territory of the United States, unless further repackaging or processing of the product is performed in the United States; or
(2) Activities involving purchases or acquisitions of small quantities of products made outside the customs territory of the United States for personal use in the United States.
Source
[54 FR 29507, July 12, 1989; 59 FR 33209, June 28, 1994]

§ 763.167 Processing prohibitions.
Text
(a) After August 27, 1990, no person shall process for any use, either in the United States or for export, any of the asbestos-containing products listed at § 763.165(a).
(b) After August 26, 1996, no person shall process for any use, either in the United States or for export, any of the asbestos-containing products listed at § 763.165(b).
Source
[54 FR 29507, July 12, 1989; 59 FR 33209, June 28, 1994]

§ 763.169 Distribution in commerce prohibitions.
Text

size of the product packaging or wrapping down to a minimum 2.5 cm (1 inch) on each side if the product wrapping or packaging has a visible exterior surface larger than 5 square inches.
(2) Products subject to this subpart shall be labeled in English as follows:
NOTICE
This product contains ASBESTOS. The U.S. Environmental Protection Agency has banned the distribution in U.S. commerce of this product under section 6 of the Toxic Substances Control Act (15 U.S.C. 2605) as of (insert effective date of ban on distribution in commerce). Distribution of this product in commerce after this date and intentionally removing or tampering with this label are violations of Federal law.
(e) No one may intentionally remove, deface, cover, or otherwise obscure or tamper with a label or sticker that has been applied in compliance with this section, except when the product is used or disposed of.
Source
[54 FR 29507, July 12, 1989; 59 FR 33209, June 28, 1994]

§ 763.173 Exemptions.
Text
(a) Persons who are subject to the prohibitions imposed by §§ 763.165, 763.167, or 763.169 may file an application for an exemption. Persons whose exemption applications are approved by the Agency may manufacture, import, process, or distribute in commerce the banned product as specified in the Agency's approval of the application. No applicant for an exemption may continue the banned activity that is the subject of an exemption application after the effective date of the ban unless the Agency has granted the exemption or the applicant receives an extension under paragraph (b)(4) or (5) of this section.
(b) Application filing dates. (1) Applications for products affected by the prohibitions under §§ 763.165(a) and 763.167(a) may be submitted at any time and will be either granted or denied by EPA as soon as is feasible.
(2) Applications for products affected by the ban under § 763.169(a) may be submitted at any time and will be either granted or denied by EPA as soon as is feasible.
(3) Applications for products affected by the ban under §§ 763.165(b) and 763.167(b) may not be submitted prior to February 27, 1995. Complete applications received after that date, but before August 25, 1995, will be either granted or denied by the Agency prior to the effective date of the ban for the product. Applications received after August 25, 1995, will be either granted or denied by EPA as soon as is feasible.
(4) Applications for products affected by the ban under § 763.169(b) may not be submitted prior to February 26, 1996. Complete applications received after that date, but before August 26, 1996, will be either granted or denied by the Agency prior to the effective date of the ban for the product. Applications received after August 26, 1996, will be either granted or denied by EPA as soon as is feasible.
(5) The Agency will consider an application for an exemption from a ban under § 763.169 for a product at the same time the applicant submits an application for an exemption from a ban under § 763.165 or § 763.167 for that product. EPA will grant an exemption at that time from a ban under § 763.169 if the Agency determines it appropriate to do so.

(ix) Evidence, in addition to that provided in the other information required with the application, showing that the continued manufacture, importation, processing, distribution in commerce, and use, as applicable, of the product will not present an unreasonable risk of injury to human health.
(2) Criteria for decision (existing products). After considering all the information provided by an applicant under paragraphs (d)(1) and (e) of this section, and any other information available to EPA, EPA will grant an exemption from the prohibitions in §§ 763.165, 763.167, or 763.169 for an applicant's asbestos-containing product only if EPA determines both of the following:
(i) The applicant has made good faith attempts to develop and use a non-asbestos substance or product which may be substituted for the asbestos-containing product or the asbestos in the product or use, and those attempts have failed to produce a substitute or a substitute that results in a product that can be economically produced.
(ii) Continued manufacturing, processing, distribution in commerce, and use, as applicable, of the product will not present an unreasonable risk of injury to human health.
(3) Criteria for decision (new products). Requests to develop and use an asbestos substance or product will be treated as a petition pursuant to Section 21 of TSCA.
(e) The Agency reserves the right to request further information from an exemption applicant if necessary to complete the Agency's evaluation of an application.
(f) Upon receipt of a complete application, the Agency will issue a notice in the Federal Register announcing its receipt and invite public comments on the merits of the application.
(g) If the application does not include all of the information required in paragraph (d) of this section, the Agency will return it to the applicant as incomplete and any resubmission of the application will be considered a new application for purposes of the availability of any extension period. If the application is substantially inadequate to allow the Agency to make a reasoned judgment on any of the information required in paragraph (d) of this section and the Agency chooses to request additional information from the applicant, the Agency may also determine that an extension period provided for in paragraph (b)(5) of this section is unavailable to the applicant.
(h) When denying an application, the Agency will notify the applicant by registered mail of its decision and rationale. Whenever possible, the Agency will send this letter prior to the appropriate ban. This letter will be considered a final Agency action for purposes of judicial review. A notice announcing the Agency's denial of the application will be published in the FEDERAL REGISTER.
(i) If the Agency proposes to approve an exemption, it will issue a notice in the Federal Register announcing this intent and invite public comments. If, after considering any timely comments received, the Agency approves an exemption, its decision will be published in the Federal Register. This notice will be considered a final Agency action for purposes of judicial review.
(j) The length of an exemption period will be specified by the agency when it approves the exemption. To extend an exemption period beyond the period stipulated by EPA, applicants must submit a new application to the Agency, following the application procedures described in this section. Applications may not be submitted prior to 15 months before the expiration of the exemption period, unless stated otherwise in the notice granting the exemption. Applications received between 15 months and 1 year

(b) Records. (1) Each person whose activities are subject to the bans imposed by §§ 763.165, 763.167, and 763.169 for a product must, between the effective date of the § 763.165 or § 763.167 ban on the product and the § 763.169 ban on the product, keep records of all commercial transactions regarding the product, including the dates of purchases and sales and the quantities purchased or sold. These records must be maintained for 3 years after the effective date of the § 763.169 ban for the product.
(2) Each person who is subject to the requirements of § 763.171 must, for each product required to be labeled, maintain a copy of the label used in compliance with § 763.171. These records must be maintained for 3 years after the effective date of the ban on distribution in commerce for the product for which the § 763.171 requirements apply.
(Approved by the Office of Management and Budget under control number 2070-0082)
Source
[54 FR 29507, July 12, 1989, as amended by 54 FR 46898, Nov. 8, 1989]

§ 763.179 Confidential business information claims.
Text
(a) Applicants for exemptions under § 763.173 may assert a Confidential Business Information (CBI) claim for information in an exemption application or supplement submitted to the Agency under this subpart only if the claim is asserted in accordance with this section, and release of the information would reveal trade secrets or confidential commercial or financial information, as provided in section 14(a) of the Act. Information covered by a CBI claim will be treated in accordance with the procedures set forth in 40 CFR Part 2, subpart B. The Agency will place all information not claimed as CBI in the manner described in this section in a public file without further notice to the applicant.
(b) Applicants may assert CBI claims only at the time they submit a completed exemption application and only in the specified manner. If no such claim accompanies the information when it is received by the Agency, the information may be made available to the public without further notice to the applicant. Submitters that claim information as business confidential must do so by writing the word "Confidential" at the top of the page on which the information appears and by underlining, circling, or placing brackets ([ ]) around the information claimed CBI.
(c) Applicants who assert a CBI claim for submitted information must provide the Agency with two copies of their exemption application. The first copy must be complete and contain all information being claimed as CBI. The second copy must contain only information not claimed as CBI. The Agency will place the second copy of the submission in a public file. Failure to furnish a second copy of the submission when information is claimed as CBI in the first copy will be considered a presumptive waiver of the claim of confidentiality. The Agency will notify the applicant by certified mail that a finding of a presumptive waiver of the claim of confidentiality has been made. The applicant has 30 days from the date of receipt of notification to submit the required second copy. Failure to submit the second copy will cause the Agency to place the first copy in a public file.
(d) Applicants must substantiate all claims of CBI at the time the applicant asserts the claim, i.e., when the exemption application or supplement is submitted, by responding to the questions in paragraph (e) of this section. Failure to provide substantiation of a claim