ASBESTOS AWARENESS TRAINING

CONTINUING EDUCATION
PROFESSIONAL DEVELOPMENT COURSE

Technical Learning College

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Course Description

Asbestos Awareness CEU Training Course

Review of asbestos awareness information. This course will cover asbestos and its uses, respirator protection and the Federal OSHA Rule and EPA Clean Air Rule. This course is general in nature and not state specific. You will not need any other materials for this course.

Goals

I. Asbestos Familiarization

A. Definitions
B. Physical Description
C. Protective Personnel Equipment
D. Rules

II. Asbestos and Applications

A. Administrative and Engineering Controls

III. OSHA Agency

A. Definitions
B. Rules and Regulations
C. Standard

IV. EPA Agency

D. Definitions
E. Rules and Regulations
F. Standards

V. Standard Program Review

A. References
B. Glossary

VI. Advanced Asbestos application and competency

By the end of the training session, employees should understand and be able to explain:

- ✓ Define asbestos
- ✓ Introduce the regulatory requirement that employees are certified to perform certain tasks
- ✓ Identify where employees can find the applicable standards
- ✓ Explain the types of diseases associated with asbestos exposure and the link with smoking
- ✓ Explain when asbestos is hazardous-friable
- ✓ Identify when and where an employee may be exposed
- ✓ The purpose and application of process safety management, including training and employee participation required by OSHA's and EPA's regulations.
- ✓ The importance of paying greater attention to the risks of the highly hazardous materials covered by the regulations.
- ✓ The importance of being involved in manager programs to reduce the chance of catastrophic releases of hazardous substances.
- ✓ Identify and explain, in writing, different respirator protection terms such as complex figures of speech.
- ✓ Interpret and explain, in writing, denotative and connotative meanings in written selections the different types of asbestos materials and removal techniques.

Prerequisites: None

Course Procedures for Registration and Support:
All of Technical Learning College correspondence courses have complete registration and support services offered. Delivery of services will include, e-mail, web site, telephone, fax and mail support. TLC will attempt immediate and prompt service.

When a student registers for a distance or correspondence course, he/she is assigned a start date and an end date. It is the student's responsibility to note dates for assignments and keep up with the course work. If a student falls behind, he/she must contact TLC and request an end date extension in order to complete the course. It is the prerogative of TLC to decide whether to grant the request.

All students will be tracked by or a unique number assigned to the student.

Instructions for Written Assignments
The Asbestos Awareness Training correspondence course uses a fill-in-the-blank style answer key.

You can write your answers in this manual or type out your own answer key. TLC would prefer that you type out and e-mail each of the chapter examinations to TLC, but it is not required.

Feedback Mechanism (examination procedures)
Each student will receive a feedback form as part of his or her study packet. You will be able to find this form in the rear of the course or lesson.

Security and Integrity
All students are required to do their own work. All lesson sheets and final exams are not returned to the student to discourage sharing of answers. Any fraud or deceit and the student will forfeit all fees and the appropriate agency will be notified.

Grading Criteria
TLC will offer the student either pass/fail or a standard letter grading assignment. If TLC is not notified, you will only receive a pass/fail notice.

Required Texts
The Asbestos Awareness Training course will not require any other materials. This course comes complete. No other materials are needed.

Environmental Terms, Abbreviations, and Acronyms
TLC provides a glossary that defines in non-technical language commonly used environmental terms appearing in publications and materials. It also explains abbreviations and acronyms used throughout OSHA and other agencies. You can find the glossary in the front of the manual.

Recordkeeping and Reporting Practices
TLC will keep all student records for a minimum of seven years. It is your responsibility to give the completion certificate to the appropriate agencies.

ADA Compliance
TLC will make reasonable accommodations for persons with documented disabilities. Students should notify TLC and their instructors of any special needs.

Course content may vary from this outline to meet the needs of this particular group.

Continuing Education Units
You will have 90 days from receipt of this manual to complete in order to receive your Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**). A score of 70 % is necessary to pass this course.

If you should need any assistance, please email all concerns and the final test to :info@tlch2o.com.

There are 100 total points possible for the course: This course will be graded on a "P" (credit) or "Z" (no credit) basis. If you desire a letter grade for this course, you must inform the instructor prior to submitting any of the assignments.

Note to students: Final course grades are based on the total number of possible points. The grading scale is administered equally to all students in the course. Do not expect to receive a grade higher than that merited by your total points. No point adjustments will be made for class participation or other subjective factors.

The final grade options are as follows:
Letter grade (**A**, **B**, **C**, **D**, **F**) - These grades are awarded based on the course grading scale.
Withdrawn (**W** or **Y**) - Students who enroll but do not participate in the class may withdraw themselves by calling Admissions and Records, or their instructor may withdraw them. Either case will result in a grade of "**W**."

Note that participation means the completion of a single homework assignment or an exam. Completion of the pretest and/or syllabus receipt does not imply course participation. If you are a student in this class for any amount of time up to but not including the midway point of the course and then cease to participate, you may withdraw yourself from the course by calling Admissions and Records. You may also request, in writing, that your instructor withdrew you. Either of these cases will result in a grade of "W."

If you participate up to the midway point of the course, and then cease to participate, your instructor will not automatically withdraw you. You must contact your instructor to initiate a withdrawal. This case will result either in a "Y" or a "W". The issuance of a "Y" or a "W" will be at the exclusive decision of your instructor. A "Y" grade is withdrawal failing and counts as an "F" toward your grade point average.

Credit/no credit option (P/Z) - None Available
Your assignments are due on time. Any assignment or mailed-in examination that is one to five days late will be marked down one letter grade. Any assignment or mailed-in examination that is turned in *later* than five days will not be accepted and will be recorded in my grade book as “non-participating” and you can be withdrawn from class. (**See final grade options**.)

Note to students: Keep a copy of everything that you submit. That way if your work is lost you can submit your copy for grading. If you do not receive your graded assignment or quiz results within two or three weeks after submitting it, please contact your instructor.

We expect every student to produce his/her original, independent work. Any student whose work indicates a violation of the Academic Misconduct Policy (cheating, plagiarism) can expect penalties as specified in the Student Handbook, which is available through Student Services; contact them at (928) 468-0665.

A student who registers for a Distance Learning course is assigned a **"start date"** and an **"end date."** It is the student's responsibility to note due dates for assignments and to keep up with the course work.

If a student falls behind, she/he must contact the instructor and request an extension of her/his ***end date*** in order to complete the course.

It is the prerogative of the instructor to decide whether to grant the request.

You will have 90 days from receipt of this manual to complete in order to receive your Continuing Education Units (**CEUs**) or Professional Development Hours (**PDHs**). A score of 70 % is necessary to pass this course.

If you should need any assistance, please email all concerns and the final test to info@tlch2o.com.

Course Objective: To provide an educational awareness in effective and safe asbestos applications, removal techniques and waste methods.

Educational Mission

The educational mission of TLC is:
To provide TLC students with comprehensive and ongoing training in the theory and skills needed for the environmental education field,

To provide TLC students opportunities to apply and understand the theory and skills needed for successful careers,

To provide opportunities for TLC students to learn and practice environmental educational skills with members of the community for the purpose of sharing diverse perspectives and experience,

To provide a forum in which students can exchange experiences and ideas related to environmental education,

To provide a forum for the collection and dissemination of current information related to environmental education, and to maintain an environment that nurtures academic and personal growth.

Important Information about this Manual

This manual has been prepared to educate students and operators in general safety awareness of dealing with Asbestos, removal methods, and disposal applications. This will include personnel protective equipment and the often-complex and various respirator protection devices.

An estimated 1.3 million employees in construction and general industry face significant asbestos exposure on the job. Heaviest exposures occur in the construction industry, particularly during the removal of asbestos during renovation or demolition. Employees are also likely to be exposed during the manufacture of asbestos products (such as textiles, friction products, insulation, and other building materials) and during automotive brake and clutch repair work.

Asbestos is well recognized as a health hazard and is highly regulated. OSHA and EPA asbestos rules are intertwined.

This manual will cover general laws, regulations, required procedures and accepted policies relating to the removal of Asbestos and the use of respirator protection devices, methods, and applications.

It should be noted, however, that the regulation of Asbestos and respirator protection and hazardous materials is an on going process and subject to change over time. For this reason, a list of resources is provided to assist in obtaining the most up-to-date information on various subjects.

This manual is a not a guidance document for applicators or operators who are involved with asbestos. It is not designed to meet the requirements of the United States Environmental Protection Agency **(USEPA)**, Office of Health and Safety Administration (**OSHA**) or your local State environmental protection agency or health department.

This course manual will provide general respirator protection and safety awareness and should not be used as a basis for respirator protection method/device guidance. This document is not a detailed safety manual or a source or remedy for respirator protection or control.

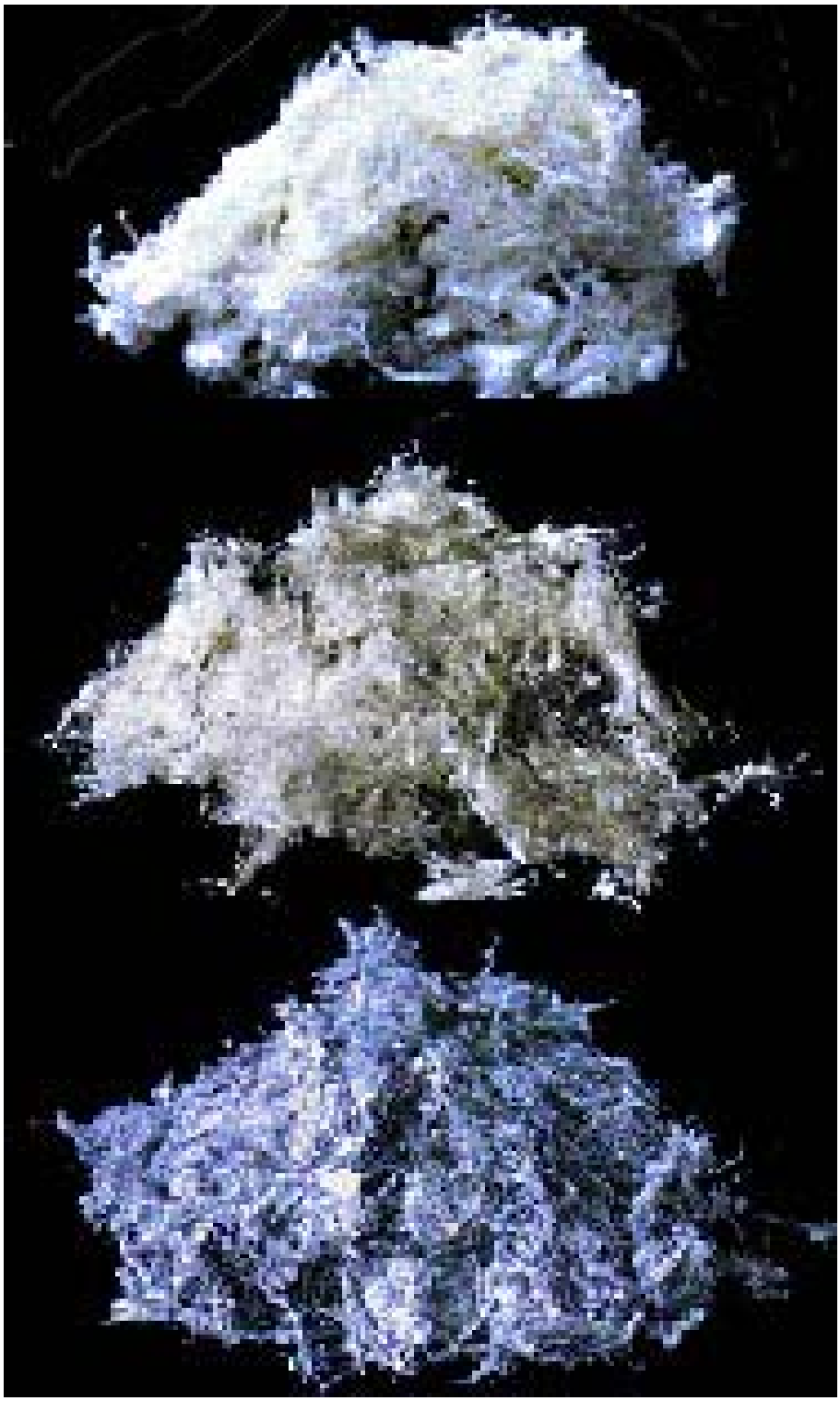
Technical Learning College or Technical Learning Consultants, Inc. make no warranty, guarantee or representation as to the absolute correctness or appropriateness of the information in this manual and assumes no responsibility in connection with the implementation of this information. It cannot be assumed that this manual contains all measures and concepts required for specific conditions or circumstances.

This document should be used for educational purposes only and is not considered a legal document.

Individuals who are responsible for Asbestos Programs and Respirator Protection Programs should obtain and comply with the most recent federal, state, and local regulations relevant to these sites and are urged to consult with OSHA, EPA and other appropriate federal, state and local agencies.

Asbestos Training Requirements

Regulation: 29 CFR 1910.1001 (General industry standard)
29 CFR 1915.1001 (Ship repairing, shipbuilding, and ship breaking)
29 CFR 1926.1101 (Construction work)
40 CFR 763 Subpart E, Appendix C (Model Accreditation Plan)
40 CFR Part 763, Subpart G (Worker Protection Rule)
40 CFR 61 (National Emission Standards for Hazardous Air Pollutant (NESHAP)—Asbestos)



Asbestos minerals which have been used commercially from the top: chrysotile, amosite and crocidolite.

Asbestos Cement Pipe (ACP)

Common water distribution pipe, notice that both pipes have been cut with a powersaw. You are not allowed to cut this type of pipe with a powersaw, because it will spread the Asbestos.

Wetting agents may be applied with garden sprayers or hoses. Garden sprayers are hand-held, portable, and have a one- to five-gallon capacity. Water hoses are usually attached to a faucet tap, fire hydrant or water tank. Generally, the hose has a nozzle attached which spreads the water stream so that a fine mist is created.

Asbestos-Cement Products

Asbestos-cement products (such as transite) are commonly used for duct insulation, pipes, and siding. Being a Category II nonfriable ACM, asbestos-cement products need to be removed prior to demolition if they have a high probability of becoming crumbled, pulverized, or reduced to powder during demolition activities. EPA believes that most demolition activities will subject such Category II nonfriable ACM to the regulation.

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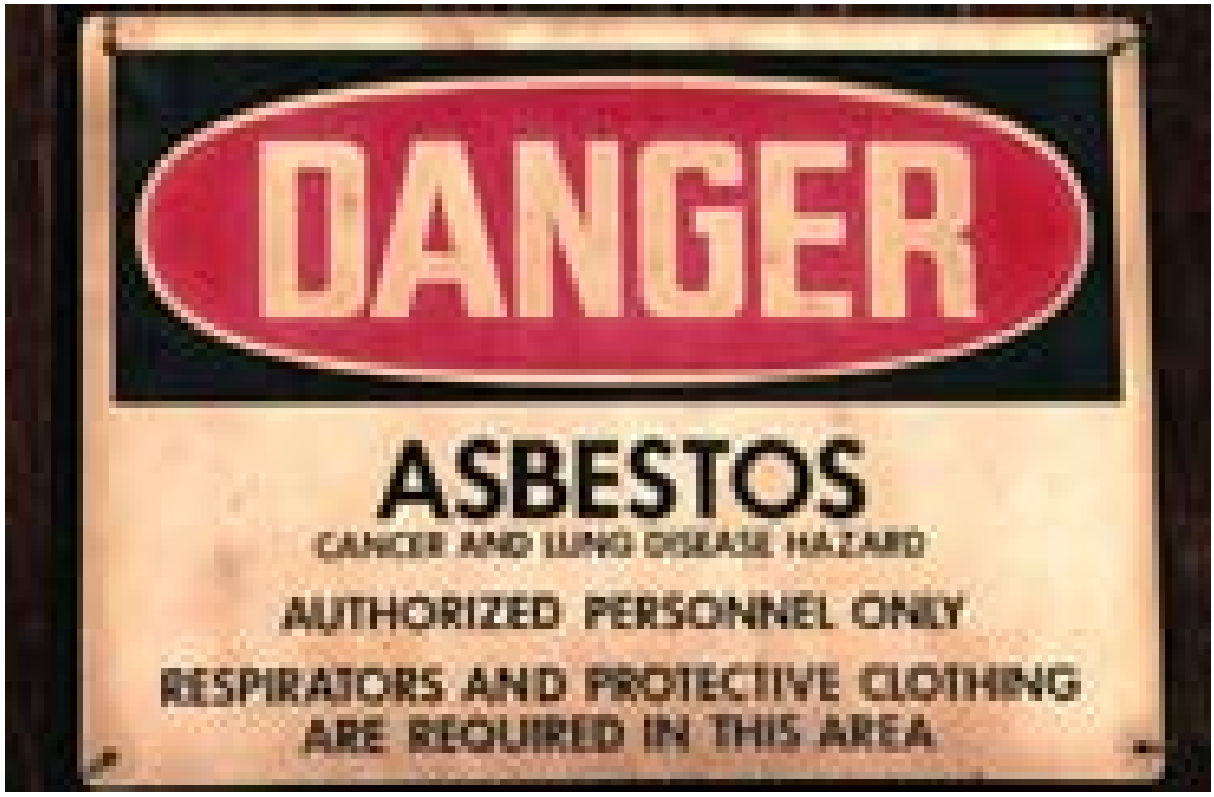


Asbestos Awareness Training Introduction

Employers must provide asbestos awareness training, including training required by local enforcement agencies (**LEA**) where applicable, to all employees who may be exposed to airborne concentrations of asbestos at or above the permissible exposure limit (**PEL**) and/or excursion limit.

The following rules or standards regulate asbestos:

- ✓ 1910.1001 applies to all occupational exposures to asbestos in all industries covered by the Occupational Safety and Health Act.
- ✓ 1915.1001 applies to the shipbuilding industry.
- ✓ 1926.1101 applies to the construction industry. The construction industry includes the alteration, repair, painting, and decorating of a facility that contains asbestos. This regulation also has standards for the housekeeping and custodial duties of asbestos-containing material (ACM).
- ✓ 40 CFR 763, subpart G applies to asbestos-abatement projects by employers of state and local government employees not covered by the OSHA standards. These standards follow the 1910.1001 standards.
- ✓ 40 CFR 61 (**asbestos NESHAP**) applies to facilities that mill, manufacture, or use asbestos. This standard also applies to the demolition of any facility and the renovation of facilities that contain friable asbestos.

Worker's Exposure to Asbestos

OSHA first regulated worker's exposure to asbestos in 1971 under the general workers standard (**29 CFR 1910.1001**). OSHA later followed with specific standards for the construction and shipbuilding industry.

Then, EPA's Worker Protection Rule (40 CFR Part 763, Subpart G) extended the OSHA standards to state and local employees performing asbestos work who are not covered by the OSHA asbestos standards, or by a state OSHA plan.

The rule parallels OSHA requirements and covers medical examinations, air monitoring and reporting, personal protective equipment, work practices, and recordkeeping.

Finally, EPA published the National Emission Standard for Hazardous Air Pollutants (**NESHAP**) for asbestos, which regulates the release of asbestos fibers during activities involving the handling of asbestos.

The basis for these modules is the Environmental Protection Agency's (**EPA**) Model Accreditation Plan (**MAP**), which follows the OSHA training standards. EPA's MAP represents the first comprehensive governmental standard spelling out exactly what a person needs to know to perform a particular task.

Using a chisel and keeping the ACP wet in order to cut the pipe, if possible Duct tape the pipe before cutting it.

Training Requirements

Both EPA and OSHA require workers to be aware of the dangers in being exposed to asbestos, the proper handling of asbestos to reduce exposure, and information on the medical surveillance program requirements. OSHA requires any person that may be exposed to asbestos above the permissible exposure limit, while EPA regulations dictate training based upon the quantity of ACM to be disturbed.

In a successful training program:

- ✓ Employees must be trained when first assigned to a job or an area that meets or exceeds exposure limits or for major fiber releases.
- ✓ Training must be repeated at least once a year.
- ✓ Employees must be able to understand the training.

However, EPA does not require an Operation and Maintenance (**O&M**) plan for asbestos activities of less then three linear or three square feet. The Agency also does not require the work to be done by accredited workers under these circumstances.

Significant Changes in the Asbestos Standard for General Industry, 1910.1001 (through June 29, 1995)

Topic	Change
PEL	The PEL has been reduced to 0.1 fibers/cc from 0.2 fibers/cc as a TWA. The Excursion Limit remains 1.0 fibers/cc averaged over 30 minutes.
PACM	Installed thermal system insulation and sprayed-on and troweled-on surfacing materials found in buildings constructed no later than 1980 are presumed to be asbestos-containing materials (greater than 1% asbestos). Asphalt and vinyl flooring material installed no later than 1980 also must be treated as asbestos-containing. These presumptions may be rebutted by specified inspection and testing.
Asbestos-containing flooring material	Sanding of asbestos-containing flooring material is prohibited. Specific procedures for floor care are mandated.
Brake/clutch repair	Employers must use specific controls and methods specified in Appendix F, unless another method is demonstrated to achieve equivalent results.
Duties of building owners (identification, recordkeeping, notification, signs and labels)	Building and facility owners must determine the presence, location, and quantity of ACM/PACM and keep records of asbestos-containing material and presumed asbestos-containing material. They must inform other employers, and their own employees who will perform housekeeping activities, of the presence and location of such materials. They must post signs at entrances to mechanical rooms/areas that contain ACM/PACM and that employees may enter. Previously installed ACM/PACM must be identified by labels or signs.
Asbestos awareness training	Employers must provide an asbestos awareness training course to employees who will perform housekeeping activities in an area containing ACM or PACM.
Medical surveillance	A pre-employment exam may not be used as a "recent exam" to fulfill any of the standard's medical surveillance requirements, unless the employer paid for the pre-employment exam.

Common Asbestos Acronyms

AHERA - The Asbestos Hazard Emergency Response Act, passed by Congress in 1986

ASHARA - Asbestos School Hazard Abatement Reauthorization Act

CAA - Clean Air Act

CERCLA - The Comprehensive Environmental Response Compensation and Liability Act. Also known as the "**Superfund**."

EPA - The United States Environmental Protection Agency

EHSD - Environmental Health and Safety Division, U.S. EPA

CAA - Clean Air Act

CFR - Code of Federal Regulations

FR - Federal Register

NARS - National Asbestos Registry System

NESHAP - The National Emission Standard for Hazardous Air Pollutants found in Title 40 CFR Part 61 promulgated under Section 112 of the Clean Air Act.

NIOSH - National Institute for Occupational Safety and Health

NIST - National Institute of Standards and Technology

NVLAP - National Voluntary Laboratory Accreditation Program

OSHA - Occupational Safety & Health Administration

PLM - Polarized Light Microscopy

TEM - Transmission Electron Microscopy

TSCA - Toxic Substance Control Act

a. During cutting or disjoining operations when a facility component which is covered or coated with friable ACM is being removed from that facility as units or in sections (Section 61.145 (c)(2)(i)).

During demolitions or renovations a contractor may choose to remove an entire boiler, a section of pipe, or other facility components without first removing the asbestos insulation from these structures. Any ACM which will be disturbed during cutting or disjoining operations must be adequately wet.

b. During stripping operations when a facility component containing RACM remains in place in the facility. (Section 61.145 (c)(3)).

Stripping operations are the most common form of asbestos removal during renovation activities, since most items that are covered with asbestos are facility components or structural members which will not be removed. Stripping off all of the RACM can generate significant asbestos emissions if the ACM is not adequately wet during removal.

Friable spray-on ACM, which includes fire-proofing materials found on decking and support I-beams, is normally easy to wet throughout because of the absorbing property of the cellulose mixing/binding agent. The Asbestos NESHAP requires that these materials be fully penetrated with the wetting agent during demolition/renovation activities.

Asbestos Glossary

Adequately Wet- EPA defines "**adequately wet**" to mean "sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material (**ACM**), then that material has not been adequately wetted. However, the absence of visible emission is not sufficient evidence of being adequately wet (Section 61.141, Definitions). Amended water is often used to wet ACM during repair/removal operations.

Asbestos-Containing Waste Materials (ACWM) -EPA defines ACWM to mean mill tailings or any waste that contains commercial asbestos and is generated by a source subject to the provisions of this subpart. This term includes filters from control devices, friable asbestos waste material, and bags on other similar packaging contaminated with commercial asbestos.

As applied to demolition and renovation operations, this term also includes friable asbestos waste and Category II non-friable ACM waste that becomes crumbled, pulverized, or reduced to powder by forces that acted on the material during the course of demolition and renovation operations regulated by this subpart, and materials contaminated with asbestos including disposal equipment and clothing.

The Asbestos NESHAP defines two categories of non-friable ACM: Category I non-friable ACM (asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products) and Category II non-friable ACM (any non-friable material not designated as Category I).

The Agency requires that, where the Asbestos NESHAP is applicable, friable ACM and Category II and non-friable ACM that is likely to become disturbed or damaged so that the material could be crumbled, pulverized or reduced to powder during a demolition or renovation be removed, from a facility prior to its demolition/ renovation. The fibrous or fluffy spray-applied asbestos materials found in many buildings for fireproofing, insulating, sound-proofing, or decorative purposes are generally considered friable. Pipe and boiler wrap found in numerous buildings is also considered friable.

Non-friable ACM, such as vinyl-asbestos floor tile, generally emits low levels of airborne fibers unless subjected to burning or to sanding, grinding, cutting or abrading operations. Other materials, such as asbestos cement sheet and pipe, can emit asbestos fibers if the materials are crumbled, pulverized or reduced to powder during demolition renovation activities. Whenever non-friable materials are going to be damaged to the extent that they are crumbled, pulverized or reduced to powder, they must be handled in accordance with the Asbestos NESHAP.

Asbestosis- Asbestosis 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.

Category I nonfriable asbestos-containing material (ACM)- means asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy.

Category II nonfriable ACM-means any material, excluding Category I nonfriable ACM, containing more than one percent asbestos as determined using the methods specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Cutting-means to penetrate with a sharp-edged instrument and includes sawing, but does not include shearing, slicing, or punching.

Demolition- means the wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

Facility-means any institutional, commercial, public, industrial, or residential structure, installation, or building (including any structure, installation, or building containing condominiums or individual dwelling units operated as a residential cooperative, but excluding residential buildings having four or fewer dwelling units); any ship; and any active or inactive waste disposal site. For purposes of this definition, any building, structure, or installation that contains a loft used as a dwelling is not considered a residential structure, installation, or building. Any structure, installation or building that was previously subject to this subpart is not excluded, regardless of its current use or function.

Facility component means any part of a facility including equipment.

Friable- Friable means that the material, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. This definition includes previously non-friable material if the non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

Friable asbestos-containing material (**ACM**) is any material containing more than 1 percent asbestos, which when dry, may be crumbled, pulverized, or reduced to powder by hand pressure.

Friable Asbestos Material - Any material containing more than one percent asbestos, as determined using the method specified in Appendix A, subpart F 40 CFR part 763, section 1, Polarized Light Microscopy, that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. If the asbestos content is less than 10 percent as determined by a method other than point counting by polarized light microscopy (PLM), verify the asbestos by point counting using PLM.

Glovebag - A sealed compartment with attached inner gloves used for the handling of asbestos- containing materials.

Grinding-means to reduce to powder or small fragments and includes mechanical chipping or drilling.

Hazard communication- The OSHA general industry standard requires employers to communicate information concerning asbestos hazards in general industry. Asbestos exposure

in general industry occurs in a wide variety of industrial and commercial settings. Employees who manufacture asbestos-containing products may be exposed to asbestos fibers.

Employees who repair and replace automotive brakes and clutches may be exposed to asbestos fibers. In addition, employees engaged in housekeeping activities in industrial facilities with asbestos product manufacturing operations and in public and commercial buildings with installed ACM may be exposed to asbestos fibers.

It should be noted that employees who perform housekeeping activities during and after construction activities are covered by the asbestos construction standard, 29 CFR 1926.1101. However, housekeeping employees, regardless of industry designation, should know whether building components they maintain may expose them to asbestos. The same hazard communication provisions will protect employees who perform housekeeping operations in all three asbestos standards; general industry, construction, and shipyard employment.

In poor condition-means the binding of the material is losing its integrity as indicated by peeling, cracking, or crumbling of the material.

Inactive waste disposal site- means any disposal site or portion of it where additional asbestos-containing waste material has not been deposited within the past year.

Installation- means any building or structure or any group of buildings or structures at a single demolition or renovation site that are under the control of the same owner or operator (or owner or operator under common control).

Nonfriable asbestos-containing material-means any material containing more than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763, section 1, Polarized Light Microscopy that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Owner or operator of a demolition or renovation activity-means any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Planned renovation operations- means a renovation operation, or a number of such operations, in which some RACM will be removed or stripped within a given period of time and that can be predicted. Individual nonscheduled operations are included if a number of such operations can be predicted to occur during a given period of time based on operating experience.

Particulate Asbestos Material - Finely divided particles of asbestos or material containing asbestos.

Permissible exposure limits (PEL)-OSHA has developed permissible exposure limits (**PELs**) to provide a standard for how long a worker may be exposed to an airborne contaminant, such as asbestos, over a specified period of time.

One PEL is the time-weighted average (**TWA**). Employers must ensure that no employee is exposed to concentrations of airborne contaminants above the TWA. For asbestos, the TWA is 0.1 fibers per cubic centimeter (**f/cc**).

Exposure is measured by analyzing eight-hour time-weighted average (**TWA**) air samples from each employee's breathing zone.

PELs also include an "**excursion limit**." An excursion limit is similar to the TWA except that it is measured over a 30-minute period. The excursion limit for asbestos is 1.0 f/cc

PLM - Polarized light microscopy, as defined in Appendix A, subpart F, 40 CFR part 763, section 1

RACM - Regulated Asbestos-Containing Material. RACM means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by the Asbestos NESHAP.

Regulated asbestos-containing material (RACM)-means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations regulated by this subpart. Remove means to take out RACM or facility components that contain or are covered with RACM from any facility.

Renovation-means altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component. Operations in which load-supporting structural members are wrecked or taken out are demolitions.

Resilient floor covering- means asbestos-containing floor tile, including asphalt and vinyl floor tile, and sheet vinyl floor covering containing more than one percent asbestos as determined using polarized light microscopy according to the method specified in appendix A, subpart F, 40 CFR part 763, Section 1, Polarized Light Microscopy.

Strip means to take off RACM from any part of a facility or facility components.

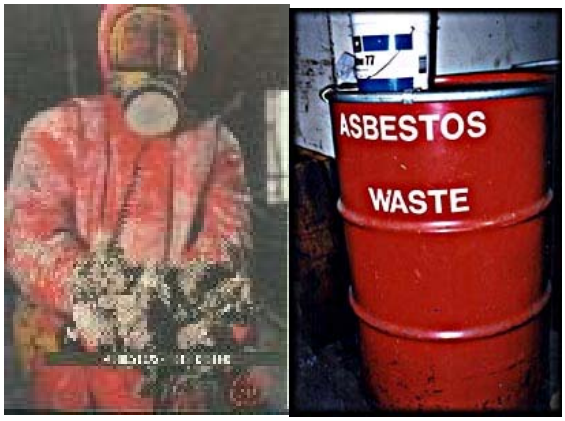
Visible emissions-means any emissions, which are visually detectable without the aid of instruments, coming from RACM or asbestos-containing waste material, or from any asbestos milling, manufacturing, or fabricating operation. This does not include condensed, uncombined water vapor.

Waste generator-means any owner or operator of a source covered by this subpart whose act or process produces asbestos-containing waste material.

Waste shipment record-means the shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

Written compliance program
When the TWA or the excursion limit is exceeded, the employer must develop and implement a written compliance plan to reduce employee exposure to or below the TWA or excursion limit. The employer may use any combination of engineering and work practices to reduce exposure.

This includes respirators where required or permitted under the rules. The compliance plan is an important document for any site-specific work.



ACP Pipe with a bronze service saddle

Where Can Asbestos Be Found?

Asbestos is commonly used as an acoustic insulator, thermal insulation, fire proofing and in other building materials. Asbestos fibers are incredibly strong and have properties that make them resistant to heat. Many products are in use today that contain asbestos. Most of these are materials used in heat and acoustic insulation, fire proofing, and roofing and flooring. Some of the more common products that may contain asbestos include:

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

Asbestos is an Excellent …

Heat Stability
Asbestos will maintain its structural integrity at temperatures well above 800 F. The melting point is at about 2800 F

Thermal Insulation
The fibers have a relatively large surface area, along with numerous pores, and cracks. This allows for a low heat transfer. This makes it useful as an insulator in homes and machinery. The large surface area also absorbs water making it practical as pipe insulator to prevent sweating.

Chemical Resistance
The amphiboles are resistant to aqueous media and chemical attack. They also show high resistance to acids. This makes this class of asbestos useful for battery packing. Chrysotile is significantly less resistant to chemical destruction.

Sound Absorption
Asbestos have a large internal volume, large surface area, and the fibers are flexible. This makes it ideal for the absorption of sound energy. It is often uses to help acoustics.

Serpent

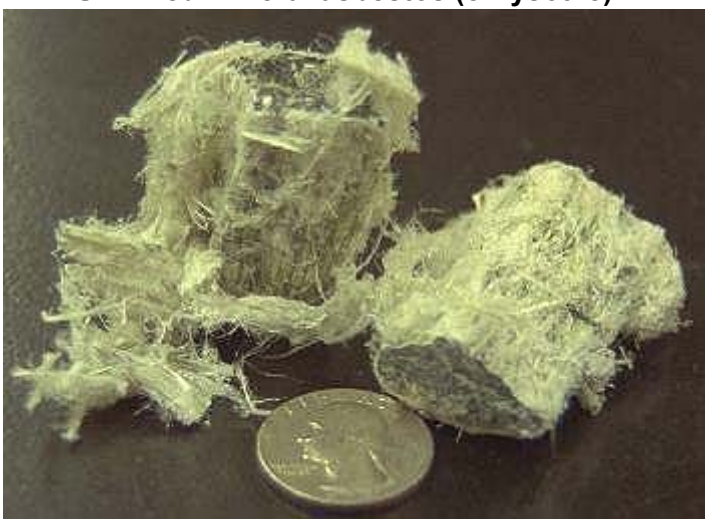
Asbestos

OSHA requires that employees who may be exposed to dangerous levels of asbestos must be made aware of the hazards and how to protect themselves. Employees must be told where in their workplace they can find copies of all applicable asbestos standards. Employers must provide any employee with the opportunity to review the regulations if they so desire. It is an employee's right to have access to the regulations.

What Is Asbestos?

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are: a) chrysotile, b) amosite and c) crocidolite. Chrysotile, also known as white asbestos and a member of the Serpentine mineral group is the commonest. Asbestos can only be identified under a microscope.

Unmilled mineral asbestos (chrysotile).



Asbestos differs from other minerals in its crystal development. The crystal formation of asbestos is in the form of long thin fibers. Asbestos is divided into two mineral groups **Serpentine** and **Amphibole**. The division between the two types of asbestos is based upon the crystalline structure.

Serpentines have a sheet or layered structure where amphiboles have a chain-like structure. As the only member of the serpentine group, Chrysotile (A, B) is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90%-95% of all asbestos contained in buildings in the United States.

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**).

Health Effects of Asbestos Exposure

Asbestos is the largest single cause of fatal disease and ill-health caused by work in Great Britain. Although almost all the deaths and ill health related to asbestos today are due to exposures that happened several decades ago, if you work with asbestos, or come into contact with it as a result of repair and maintenance work, you need to be particularly careful.

Asbestos can be found in most buildings built between 1950 and 1980, as insulation and lagging. It is still used in some brake pads and clutch linings and can be met in vehicle servicing and repair.

Asbestos-Related Health Problems

Some people exposed to asbestos develop asbestos-related health problems; some do not. Once inhaled, asbestos fibers can easily penetrate body tissues. They may be deposited and 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. Asbestos-related diseases may not appear until years after exposure. A medical examination that includes a medical history, breathing capacity test, and chest X ray may detect problems early.

Many substances have a "**safe dose**" or an exposure that is unlikely to cause any harm. Above the safe dose, a health effect is expected. This concept is known as a dose response. As the dose increases, so does the expected severity of the health effect. However, in the case of asbestos, scientists have not determined a "**safe dose**" or threshold level for exposure to airborne asbestos. Still, the less exposure a person receives over a lifetime, the less likely it is that that person will develop an asbestos-related health problem.

In addition to breathing it, ingesting asbestos may also be harmful to you, but the consequences of this type of exposure have not been clearly documented. People who touch asbestos may get a rash similar to the rash caused by fiberglass. While the effects of skin exposure to asbestos have not been scientifically documented, it is best to minimize all contact with asbestos.

Asbestos was used in approximately 3,000 products. Two-thirds of this total (2,000) was used in construction products. Appendix A includes a short list of products where asbestos may be found.

Common Questions

IS ASBESTOS CURRENTLY USED IN ANY NEW PRODUCTS?
Probably not. As you can imagine there has been tremendous liability for any company that manufactured asbestos-containing materials. Manufacturers have found substitutes for asbestos, thus it is not likely that you would encounter new products that contain asbestos. Manufacturers started to phase out the use of asbestos in products during the mid-1970s to early-1980s.

WHAT IS A CARCINOGEN? IS ASBESTOS A CARCINOGEN?
A carcinogen is a substance capable of causing cancer. Asbestos is a recognized carcinogen. If fact, asbestos is one of a few substances recognized as being a "***true***" human carcinogen.

HOW ABOUT DOSE-RESPONSE? WHAT DOES THIS MEAN AND HOW IMPORTANT IS IT?
Understanding the concept of dose-response is extremely important in the role of environmental contaminants. The term "**dose**" applies to a person's exposure to a substance. Dose is a measure of how much of a substance a person's body absorbs. In this case, the number of fibers that are in the air, and how much time is spent breathing these fibers. The term "**response**" refers to a health outcome from the dose and generally refers to disease.

Many people are under the false impression that any exposure to an environmental contaminant can cause harm and should be avoided. However, it is impossible to live in a world without contaminants. We are exposed to pollutant, allergens, contaminants and toxic materials everyday in our lives in the water we drink, the food we eat and the substances we encounter. Generally these contaminants are found in extremely small quantities and do not pose a threat to our health. Even when we are exposed to higher levels there are mechanisms in the body for detoxification of the contaminants.

It is only when we are exposed to high concentrations (**dose**) for long periods of time that health problems (**response**) become likely. The terms "**high**" and "**long**" vary for each particular substance in the environmental. If exposure can't be avoided, an employees' exposure to asbestos should be for a short duration and at very low levels. This will lower their risk of disease.

Even a single exposure to high levels of asbestos most likely would not be a problem.

HOW CAN ASBESTOS HURT ME?
Unless the asbestos is disturbed, it does not present a hazard. Generally it is necessary to inhale the asbestos fibers for a prolonged period of time before any damaged occurs.

WHAT CAN I DO TO PROTECT MYSELF AGAINST ASBESTOS?
First and foremost it is important to recognize asbestos or the many products that may contain asbestos. Asbestos was often used for insulation purposes. It generally appears as small fibers that break lengthwise and generally not in half. If you encounter asbestos, or a material that you think contains asbestos, contact your supervisor. At the present time no UT employees are trained to remove or handle asbestos. Since asbestos is primarily a hazard to the lungs, avoid breathing it. If it is impossible to avoid, or if you feel safer, a respirator equipped with HEPA filters is acceptable. Another method of controlling exposure is to use good dust control procedures. Water is frequently used to control dust.

ARE THERE ANY ACUTE SYMPTOMS OF ASBESTOS EXPOSURE?
Generally there are no short-term (**acute**) symptoms of asbestos exposure, until the exposure level is extremely high. Inhalation of extremely high levels of asbestos can result in shortness of breath, chest or abdominal pain and irritation of the skin and mucous membranes.

HOW IS ASBESTOS MEASURED IN THE AIR?
The number of asbestos fibers in the air can be measured by a process known as air sampling or, as it is sometimes called, air monitoring. Basically it is simple. Air is drawn through a small filter where the fibers are trapped. The volume of air sampled is calculated based on the flow rate of the pump and the how long the pump operates. After the sample is collected the filter is sent to a laboratory where the number of fibers are counted.

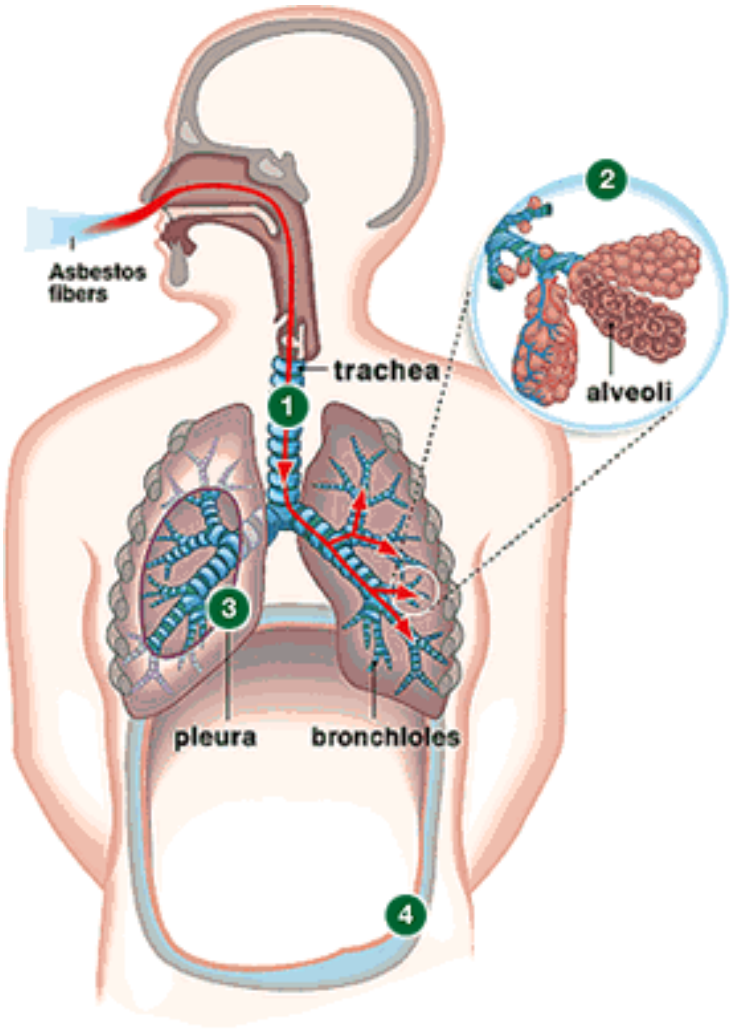
Note that only fibers are counted. There are other airborne fibers, similar to asbestos that can cause the sample to be artificially high. The laboratory reports the results as the number of fibers per volume of air. Generally the volume of air is expressed as cubic centimeters or cc. Thus, the results are expressed at fibers/cc.

There are other lab procedures that can more precisely determine which fibers are asbestos.

Friable spray-on ACM, which includes fire-proofing materials found on decking and support I-beams, is normally easy to wet throughout because of the absorbing property of the cellulose mixing/binding agent. The Asbestos NESHAP requires that these materials be fully penetrated with the wetting agent during demolition/renovation activities.

How Asbestos Affects the Lungs

Most asbestos particles are coughed up or swallowed. Those that are long and thin are not as easily cleared and can cause cancer. The odds of getting cancer increase with the level and duration of exposure.



1. Asbestos fibers are inhaled through successively narrower passages, from the trachea through the bronchial tubes to the bronchioles. Fibers embedded in these airways can cause lung cancer.

2. Fibers can reach the clusters of honeycombed air sacs called alveoli, leaving scar tissue. Excessive scarring restricts breathing. This is asbestosis, a condition resulting mainly from occupational exposure.

3. Fibers can pass through the alveoli and migrate to the pleura, the lining of the chest cavity. There, they may injure the mesothelial cells and promote malignant tumors. This is mesothelioma, a fairly rare cancer that is usually discovered 25 to 40 years after initial exposure. Nearly all victims die within a year of diagnosis.

4. Mesothelioma sometimes occurs in the peritoneum, the lining of the abdominal cavity.

Illnesses Associated with Asbestos Exposure

Asbestosis
Asbestosis 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.

Lung cancer
Lung cancer causes the greatest 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.

Mesothelioma is a rare form of cancer, which most often occurs in the thin membrane lining of the lungs, chest, abdomen, and sometimes the 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.

Other cancers
Evidence suggests that cancers in the esophagus, larynx, oral cavity, stomach, colon, and kidney may be caused by ingesting asbestos.

Increased Risks of Smoking
There are many good reasons to stop smoking, but smoking in addition to asbestos exposure is especially dangerous because both affect the lungs.

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. There is an increased risk of lung cancer for smokers exposed to asbestos.

This deadly combination is so dangerous that the OSHA regulation:

- ✓ Prohibits smoking in work areas where there's a risk of asbestos exposure

Requires employers and doctors who participate in medical surveillance to warn employees about the danger.

WHAT STANDARDS ARE THERE REGARDING ASBESTOS?

Several groups published standards dealing with asbestos. The Occupational Safety and Health Administration (**OSHA**) recently published a standard in August 1994. This new standard lowers the acceptable exposure level to 1/10 of fibers per cubic centimeter of air. This figure is one-half the old standard. The standard has been progressively lowered in the past 25 years. In 1970 the standard was 2 fibers/cc. It dropped to 1 fiber/cc and later to .5 fibers in the 1970s. In 1983 the standard was lowered to .2 fibers and remained at that level until 1994.

Other groups that regulate or publish standards include the National Institute of Occupational Safety and Health (**NIOSH**), the American Conference of Governmental Industrial Hygienist (**ACGIH**) and the Environmental Protection Agency (**EPA**).

WHAT ABOUT THE LATENCY PERIOD ASSOCIATED WITH ASBESTOS? I HAVE HEARD THAT IT MAY TAKE YEARS BEFORE A PERSON ACTUALLY DEVELOPS LUNG CANCER. IS THIS TRUE?
Yes, there is a delay between the exposure to asbestos and the time when the first symptoms of disease appear. The latency period can range from 10-40 years.

DOES EVERYONE EXPOSED TO ASBESTOS DEVELOP CANCER?
No, in fact only a very small percentage of people exposed to asbestos will develop any health effect. This question falls under the area of risk assessment. By using risk assessment it has been calculated that if 1,000 asbestos workers were exposed to the current OSHA limit (.1 fibers/cubic centimeter) eight hours per day, 50 weeks per year for a lifetime, it would result in 4 of these 1,000 employees developing cancer.

IS SMOKING A RISK FACTOR WHEN COMBINED WITH ASBESTOS?
Yes. Let's face it, smoking is just plain bad for your health. Both smoking and asbestos are recognized carcinogens (**cancer-causing agents**). When the two are combined a person's risk of developing a lung disease increases greatly (**more than doubles**).

NESHAP
This regulations restrict the use of spray asbestos, and prohibit the use of wet applied and molded insulation (i.e., pipe lagging). The Asbestos NESHAP also regulates asbestos waste handling and disposal.


NO ADMITTANCE
ASBESTOS REMOVAL
IN PROGRESS

OSHA's Asbestos Standard

Employees must receive asbestos training when they are assigned to work in an area with the risk of exposure to asbestos. The training includes asbestos hazards and how to reduce them. More than one standard may apply to a particular assignment. Employees must be told where in their workplace they can find copies of all the applicable asbestos standards.

Reducing Exposure

Prohibited Activities

Employees should never eat, drink, smoke, chew tobacco or gum, or apply makeup in regulated areas. These activities can greatly increase an employee's exposure to asbestos fibers.

Work Practices

Each employee who will be working with asbestos must be trained in the proper work practices for the job being done. Training must include hands-on experience. OSHA recommends specific procedures to prevent release of asbestos fibers depending on the type of action being done and the class of work. ***General work procedures include:***

- ✓ **Never cut, hammer, or otherwise damage ACM.**
- ✓ **Don't sand flooring materials that contain asbestos.**
- ✓ **Don't burnish or dry-buff floors containing asbestos unless there's enough finish to prevent the pad from contacting the ACM.**
- ✓ **Don't use compressed air to remove asbestos or ACM without using a ventilation system to capture the dust.**
- ✓ **Use enclosures, impermeable sleeves, HEPA vacuums, etc., when working on automotive brakes and clutches.**
- ✓ **Use wet methods, wetting agents, or removal encapsulation to control fiber release during handling, mixing, removal, cutting, or cleanup.**

OSHA also specifies the work practices by the class of work being performed in shipyard and construction. These practices are highly specific, and the proper training is essential to worker health. ***Some of the work procedures include the use of:***

- ✓ **Negative-pressure enclosures**
- ✓ **Glove bag systems**
- ✓ **Glove box systems**
- ✓ **Water spray process systems**
- ✓ **Walk-in or mini-enclosures**

Wetting asbestos keeps fibers out of the air. Handle, mix, apply, remove, cut, and score asbestos while it's wet. Certain asbestos-containing products may not be removed from their shipping containers unless they're wet, enclosed, or ventilated. ***The products include***:

- ✓ **Asbestos cement**
- ✓ **Mortar**
- ✓ **Coating**
- ✓ **Grout**
- ✓ **Plaster**

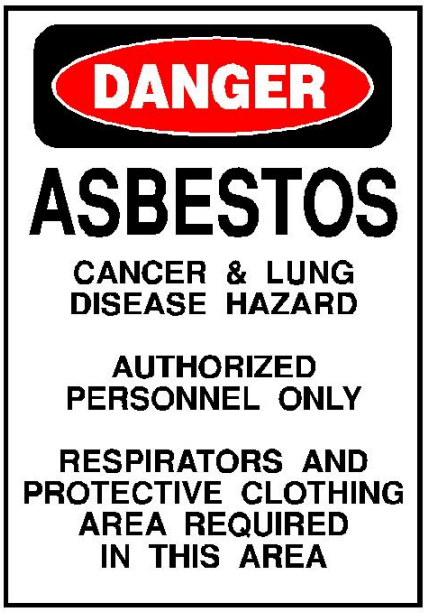
Regulated Areas
A regulated area is an area where the airborne concentration of asbestos exceeds or is likely to exceed the PEL (either the TWA or the excursion limit). The OSHA shipbuilding and construction standards further demarcate a regulated area by what class of asbestos work is being conducted. Class I, II, and III asbestos work must be done in a regulated area by accredited personnel.

EPA determines that an area is regulated by whether the activity constitutes a major or minor fiber release. A major fiber release requires restricted entry into the area and the posting of signs to prevent entry into the area by persons other than those necessary to perform the response action. Whenever possible, restricted areas should get a negative-pressure enclosure before removal or demolition activities commence.
Employers must mark off any regulated areas from the rest of the workplace in a way that employees can recognize and avoid the area or take the appropriate precautions before entering. Only accredited employees are allowed access to regulated areas. Each person entering a regulated area must be supplied with and required to use a respirator.

Eating, drinking, smoking, or chewing tobacco or gum should be prohibited in these areas. No one may apply cosmetics in a regulated area.

Warning Signs
Warning signs must be posted in regulated areas. Signs should include the following cautions:

DANGER-ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA



Respirators (*See Respirator Section in Rear of Manual*)

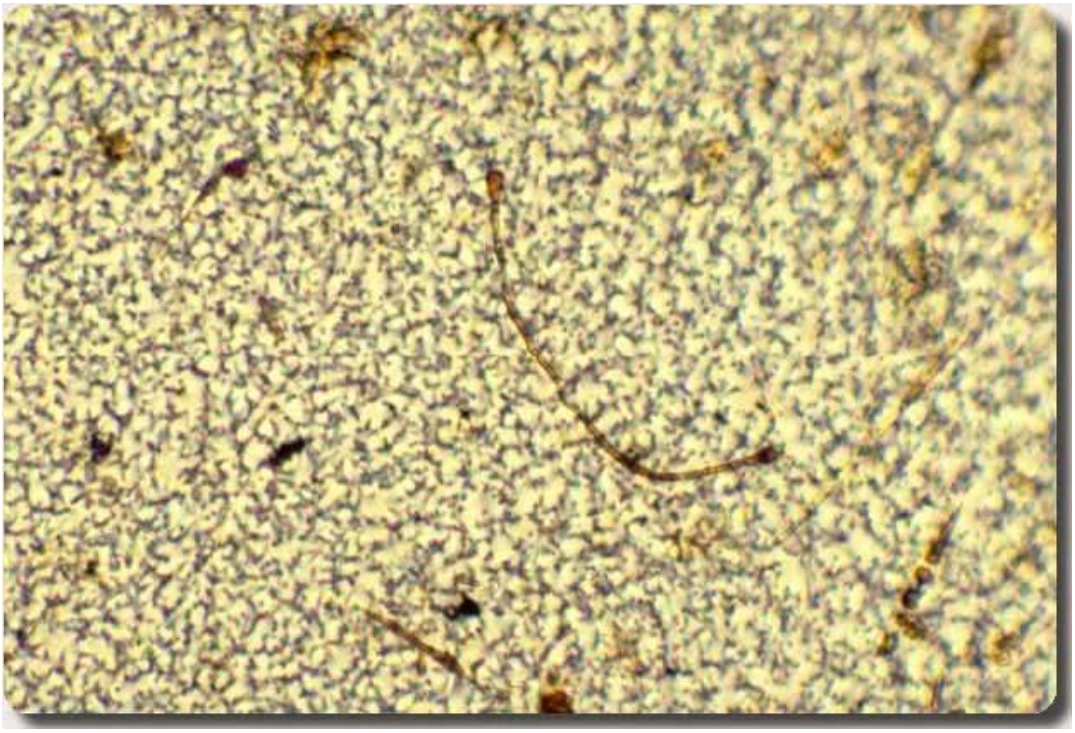
OSHA's respirator standard (29 CFR 1910.134) requires that:

- ✓ The correct respirator be specified for each job
- ✓ The employer have written procedures on the safe use of respirators in "**dangerous atmospheres that might be encountered in normal operations or in emergencies**"
- ✓ Someone stand by a worker using a respirator and stay in communication so that rescue can be provided promptly if needed
- ✓ In some such situations, workers wearing respirators also wear safety harnesses or lines

For certain limited operations, when all feasible engineering and work practices cannot reduce the employee exposure to below the TWA or excursion limits (i.e., 0.1 f/cc and 1.0 f/cc respectively), the employer must reduce exposure to asbestos to 0.5 f/cc over an 8-hour period or 2.5 f/cc for 30 minutes, or less and require employees to use the appropriate respirator.

The operations that will likely require respirator use include: coupling cutoff in primary asbestos cement pipe manufacturing; sanding in primary and secondary asbestos cement sheet manufacturing; grinding in primary and secondary friction product manufacturing; carding and spinning in dry textile processes; and grinding and sanding in primary plastics manufacturing.

Even though the area may be above the TWA, employers must reduce employee exposure to asbestos below the TWA or excursion limit



This is a photo of a lung that was exposed to asbestos and developed cancer

Protective Clothing (*See PPE Section in Rear of Manual*)

Employees exposed to asbestos above the TWA or excursion limit, or where the possibility of eye irritation exists, must use appropriate protective work clothing and equipment. The employer must provide the protection at no cost to the employee. ***Protective clothing includes:***

- ✓ **Coveralls or similar full-body work clothing**
- ✓ **Gloves, head coverings, and foot coverings**
- ✓ **Face shields, vented goggles, or other appropriate PPE that complies with 29 CFR 1910.133**

Change rooms must be provided for the removal of any protective clothing that is contaminated with asbestos. Employees cannot take contaminated work clothing out of the change room, except for laundering, maintenance, or disposal. All contaminated work clothing must be stored in closed containers that prevent dispersion of the asbestos.

Contaminated clothing may only be transported only in sealed impermeable bags or other closed, impermeable containers, with all appropriate labels.

Employers must provide employees who work with asbestos in areas where the airborne exposure to asbestos is above the TWA and/or excursion limit with:

- ✓ **Change rooms equipped with two separate lockers or storage facilities to prevent contamination of the employee's street clothes with fibers from PPE.**
- ✓ **Showers.**
- ✓ **Lunchroom facilities that have a positive pressure, filtered air supply, and are readily accessible. Never enter the lunchroom in protective clothing that may be contaminated with asbestos.**

Anyone working with asbestos should carefully wash his or her hands and face prior to eating, drinking, or smoking.

Engineering Controls

Local exhaust ventilation and dust collection systems are very important, especially when you use tools such as saws, drills, scorers, and abrasive wheels that could release asbestos fibers into the air. ***The following is allowable exposure control equipment:***

- ✓ Automatic bag-opening equipment
- ✓ Exhaust systems to collect air in closed containers
- ✓ Dust collection and cleaning systems
- ✓ Hoods to cover operations that release fibers
- ✓ Tools with exhaust systems or wet sprays
- ✓ Shrouds for tools such as grinders

Whenever the engineering and work practices are insufficient to control asbestos fibers, employees must supplement the controls with respiratory protection.

Decontamination Areas

Decontamination areas are a source of secondary exposure to asbestos. Follow the decontamination procedures for the site to prevent asbestos on protective clothing from becoming airborne. Always enter or exit the regulated area through the decontamination area.

When leaving a regulated area, employees should enter the decontamination area through the equipment room. There, they should remove all asbestos material on the protective clothing by using an HEPA-filtered vacuum. Employees must not remove their respirators while in the equipment room. All protective clothing must be removed and put into labeled clothing bags. Employees then must leave the equipment room, remove their respirator, and shower before entering a clean room.

Housekeeping Requirements
OSHA regulates housekeeping activities under both the general industry standard and the construction standard. The general industry standard applies to routine housekeeping activities in facilities where the asbestos material is whole. If the housekeeping activities are for the cleanup of construction-related activities, the more stringent construction standard must be followed. Generally, both standards require similar precautions:

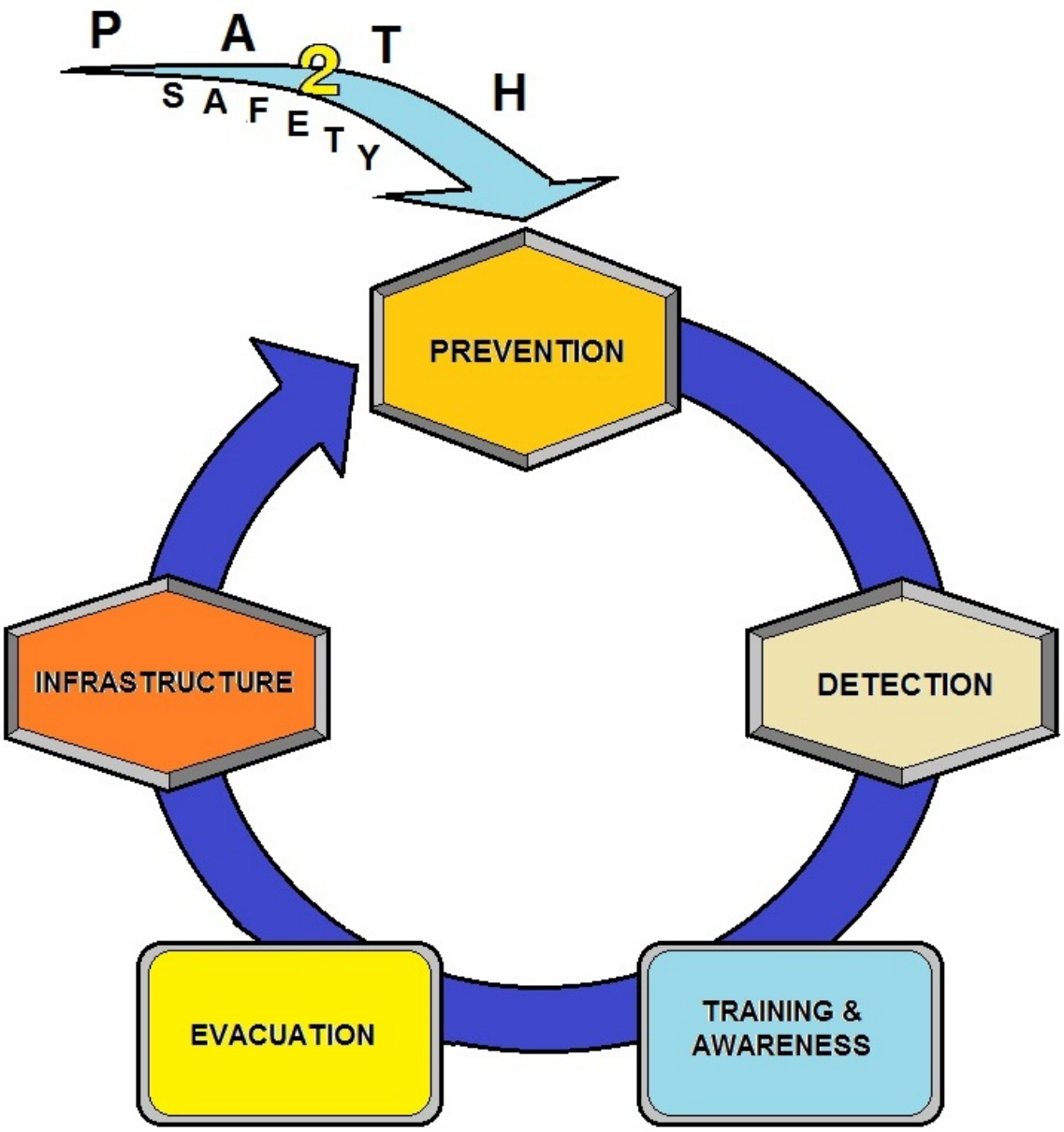
- ✓ Maintain all surfaces as free as possible from ACM waste and dust.
- ✓ Do not clean surfaces using compressed air.
- ✓ Use HEPA-filtered vacuuming equipment.
- ✓ Use wet cleaning or HEPA vacuuming whenever possible. Dry sweeping and shoveling is a last resort.
- ✓ Sanding of asbestos floors is prohibited.
- ✓ Stripping of finish from asbestos flooring may only be done using low-abrasion pads at less than 300 rpm and wet methods.
- ✓ Buffing is allowed only if sufficient finish remains to prevent the pads from contacting the ACM.

The construction standard also requires:

- ✓ All asbestos waste must be collected and disposed of in sealed, labeled, impermeable bags or similar containers.
- ✓ Waste and dust from areas with accessible TSI or surfacing ACM may not be dusted or dry swept except by using an HEPA-filtered vacuum and all material placed in a leak-tight container.

Cleanup Procedures
Keep all surfaces free of asbestos-containing dust and waste. Clean up all asbestos releases as soon as possible. Use HEPA vacuums—not compressed air—to clean up ACM. Shovel, sweep, or use other dry methods only when vacuuming or wet cleaning is impossible.

Avoid activities that might release fibers. For instance, don't cut through pipe insulation or hammer nails or drill holes in ceilings that might contain asbestos.


P A T H
2
SAFETY
PREVENTION
DETECTION
TRAINING & AWARENESS
EVACUATION
INFRASTRUCTURE

Asbestos Wastes (EPA Waste information in next section)

Use the same asbestos safety precautions when handling asbestos waste. It's best to wet these wastes. Place them in labeled, sealed, leakproof containers for careful and proper disposal. ***Examples of asbestos waste include:***

- ✓ **Empty asbestos containers**
- ✓ **Manufacturing cuttings or trimmings**
- ✓ **Materials that are swept or vacuumed up (including vacuum bags or filters)**
- ✓ **Fireproofing**
- ✓ **Insulation**

Any shipment of asbestos waste must conform to the U.S. Department of Transportation (**DOT**) regulations for the transportation of hazardous materials. In general, the material must be placed in a proper poly-lined container that is leakproof and labeled with the correct DOT name for the asbestos waste.

The waste must be transported in a covered vehicle to an EPA-approved landfill. When shipping the waste, the shipping facility must offer the proper placards to the driver of the transport vehicle. The vehicle must have the proper placards on all sides. Once delivered to the landfill, the waste must be covered with at least 6 inches of fill within 24 hours.

For each load of asbestos waste that is regulated under the asbestos NESHAP, the employer must maintain a waste shipment record (**WSR**). The WSR must contain the following information:

- ✓ Name, address, and telephone number of the waste generator
- ✓ Name and address of the local, state, or EPA regional office responsible for administering the asbestos NESHAP program
- ✓ Quantity of waste in cubic meters (or cubic yards)
- ✓ Name and telephone number of the disposal site operator
- ✓ Name and physical site location of the disposal site
- ✓ Date transported
- ✓ Name, address, and telephone number of the transporter(s)
- ✓ Certification that the contents meet all government regulations for transport by highways

Summary

Reducing asbestos exposure is both the employer's and the employee's concern. Do not take shortcuts to save time. Any exposure to asbestos is potentially harmful.

The OSHA standard on asbestos requires that your employer make you aware of the hazards of exposure and how to protect yourself.

- ✓ Use engineering controls, work practices, and procedures that can reduce your exposure.
- ✓ Learn and be able to use emergency and cleanup procedures.
- ✓ Know when to use respirators and protective clothing; learn to use and dispose of them properly.
- ✓ Proper waste disposal has as important a role in reducing exposure as engineering and work practice controls.

Asbestos NESHAP

INTRODUCTION

The Clean Air Act (**CAA**) requires the U. S. Environmental Protection Agency (**EPA**) to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. In accordance with Section 112 of the CAA, EPA established National Emissions Standards for Hazardous Air Pollutants (**NESHAP**) to protect the public.

Asbestos was one of the first hazardous air pollutants regulated under Section 112. On March 31, 1971, EPA identified asbestos as a hazardous pollutant, and on April 6, 1973, EPA first promulgated the Asbestos NESHAP in 40 CFR Part 61.

In 1990, a revised NESHAP regulation was promulgated by EPA. Information contained in this pamphlet is consistent with the amended regulation. This pamphlet answers the most commonly asked questions about the Asbestos NESHAP for demolitions and renovations. Many of the questions included in this pamphlet have been raised by demolition and renovation contractors in recent years. Most questions relate to how a demolition or renovation contractor or building owner can best comply with the regulation.

The responses assume that the questioner has a basic understanding of the Asbestos NESHAP and demolition and renovation practices. A brief glossary of terms is also included at the back of the pamphlet.

The Asbestos NESHAP regulations protect the public by minimizing the release of asbestos fibers during activities involving the processing, handling, and disposal of asbestos-containing material. Accordingly, the Asbestos NESHAP specifies work practices to be followed during demolitions and renovations of all structures, installations, and buildings (excluding residential buildings that have four or fewer dwelling units).

In addition, the regulations require the owner of the building and/or the contractor to notify applicable State and local agencies and/or EPA Regional Offices before all demolitions, or before renovations of buildings that contain a certain threshold amount of asbestos.

For more information about the Asbestos NESHAP or for answers to questions not covered in this pamphlet, contact the delegated State or local agency or the appropriate EPA Regional Office.

REQUIREMENTS FOR ADEQUATELY WETTING ASBESTOS-CONTAINING MATERIALS

The NESHAP regulation requires that RACM be adequately wetted during the following activities:

a. During cutting or disjoining operations when a facility component which is covered or coated with friable ACM is being removed from that facility as units or in sections (Section 61.145 (c)(2)(i)).
During demolitions or renovations a contractor may choose to remove an entire boiler, a section of pipe, or other facility components without first removing the asbestos insulation from these structures. Any ACM which will be disturbed during cutting or disjoining operations must be adequately wet.

b. During stripping operations when a facility component containing RACM remains in place in the facility. (Section 61.145 (c)(3)).

Stripping operations are the most common form of asbestos removal during renovation activities, since most items that are covered with asbestos are facility components or structural members which will not be removed. Stripping off all of the RACM can generate significant asbestos emissions if the ACM is not adequately wet during removal.

Friable spray-on ACM, which includes fire-proofing materials found on decking and support I-beams, is normally easy to wet throughout because of the absorbing property of the cellulose mixing/binding agent. The Asbestos NESHAP requires that these materials be fully penetrated with the wetting agent during demolition/renovation activities.

Other ACM, however, such as "**thermal-block**" insulation used on pipes and boilers, certain ceiling and floor tile applications, etc., which do not absorb water readily may be hard to penetrate by water or a wetting agent. For such materials, adequate wetting consists of coating the surfaces of the materials with water or a wetting agent prior to, during, and, in most cases, after removal activities in order to prevent asbestos emissions. Whenever such materials are broken during the removal process, the exposed, dry surfaces must be wetted immediately to reduce emissions.

If pieces of dry ACM are accidentally disturbed, they should be immediately wetted and kept wet until collected for disposal. Removal personnel are commonly assigned to keep the fallen RACM wet prior to its being collected for disposal.

c. After the RACM has been stripped from a facility component, it must remain adequately wet until it has been collected and contained or treated in preparation for disposal. (Section 61.145 (c)(6)(i)).

After removal, adequately wetted ACWM must be sealed in leak-tight containers or wrapping which must be labeled as specified by the Occupational Health and Safety Administration (OSHA) under 29 CFR 1910.1001(j)(2) or 1926.58(k)(2)(iii). Such waste materials destined for off-site transport must additionally be labeled with the name of the generator and location of the waste generation site (Section 61.150 (a)(1)(iv and v)).

d. In demolitions where the RACM was not removed prior to demolition (Section 61.145 (c)(1)(i)(ii)(iii)(iv)).

- RACM on a facility component encased in concrete or other similarly hard material must be adequately wet whenever exposed during demolitions (Section 61.145 (c)(1)(ii));
- RACM which was not accessible for testing and, due to demolition, cannot be safely removed, must be kept adequately wet at all times until disposed of (Section 61.145 (c)(1)(iii)):
- The portion of a facility ordered demolished that contains RACM must be adequately wet during the wrecking operation (Section 61.145 (c)(9)).

In each of the above situations, ACWM generated must be kept adequately wet during handling and loading for transport to the disposal site. In cases where ACWM can't be segregated from the debris pile it must be disposed of as ACWM. Such ACWM does not have to be sealed in leak-tight containers or wrapping, but may be transported and disposed of in bulk (Section 61.150 (a)(3)).

5. EXCEPTIONS TO ADEQUATELY WETTING ASBESTOS-CONTAINING MATERIALS

The Asbestos NESHAP allows two exceptions to wetting RACM during a demolition or renovation project:

- When the temperature at the point of wetting is below 0C (32F) (Section 61.145 (c)(7)(i)). The owner/operator must remove facility components coated or covered with friable ACM as units or sections to the maximum extent possible and meet subsequent requirements of 61.145, including the wetting requirements. During periods when wetting operations are suspended due to freezing temperatures, the owner/operator must record the temperature in the area containing the facility components at the beginning, middle, and end of each workday and keep daily temperature records available for inspection by the Administrator during normal business hours at the demolition or renovation site. The owner or operator shall retain the temperature records for at least 2 years.
- When the use of water would unavoidably damage equipment or present a safety hazard (Sec. 61.145 (c)(3)(i)(A)). The owner/operator must first obtain written approval from the Administrator for an alternative work practice, prior to renovation activities and utilize a local exhaust ventilation and collection system designed to capture particulate asbestos released during removal operations. (Section 61.145 (c)(3)(i)(B)(1)); or a glove bag system or a leak-tight wrapping which can contain the particulate asbestos materials produced by stripping ACM. (Section 61.145 (c)(3)(i)(B)(2)and (3))

6. TECHNIQUES FOR WETTING ASBESTOS-CONTAINING MATERIALS

General Information

Adequate wetting of ACM is typically accomplished by repeatedly spraying it with a liquid or a wetting agent, usually amended water (water to which surfactant chemicals have been added), until it can absorb no more. However, this does not necessarily mean that the ACM will be soaked throughout. Surfactant chemicals reduce the surface tension of the water, thereby increasing its ability to penetrate the ACM and surround the asbestos fibers.

Although amending agents are not required by the Asbestos NESHAP (the NESHAP only requires the use of a liquid), EPA, in its "Guidance for Controlling Asbestos-Containing Materials in Buildings", EPA-560/5-85-024 (Purple Book), recommends the use of a 50:50 mixture of polyoxyethylene ester and polyoxyethylene ether, or the equivalent, in a 0.16 percent solution (1 ounce to 5 gallons) of water.

Wetting Agents
Wetting agents may be applied with garden sprayers or hoses. Garden sprayers are hand-held, portable, and have a one- to five-gallon capacity. Water hoses are usually attached to a faucet tap, fire hydrant or water tank. Generally, the hose has a nozzle attached which spreads the water stream so that a fine mist is created.

An engineering control often used is a misting unit which can be used to create a high level of humidity within a removal area. It is believed that fibers emitted into a saturated environment will absorb the wetting agent and fall out of the air faster, thus reducing airborne fiber levels.

7. PROCEDURES FOR WETTING ASBESTOS-CONTAINING MATERIALS
The following procedures describe methods of adequately wetting various applications of ACM.
Thermal System Insulation

Molded Pipe Insulation
The recommended wetting procedure for this type of RACM is to saturate the outer surface with amended water, strip off the wet canvas coating and then rewet the surface in order to thoroughly saturate the ACM. The metal bands supporting the RACM should be removed and the half-round sections carefully separated. While this occurs, the interior side and edges of the sections should be saturated with amended water.

If a section breaks during removal, the exposed surfaces should be wetted immediately. A misting sprayer may also be used to keep the air in the removal area or containment area saturated with amended water to attempt to reduce airborne asbestos fiber levels.

Corrugated Paper Pipe Insulation
The outer surface of the corrugated paper **("air-cell")** pipe insulation, usually a canvas wrap, should be saturated with a wetting agent and then removed. Wetting should continue until all the insulation is permeated with amended water. Metal bands holding the insulation in place should be removed and the corrugated RACM insulation stripped.

Any unsaturated surfaces exposed during the stripping operation must be wetted immediately to reduce asbestos emissions. A misting sprayer may also be used to keep the air in the removal area saturated with amended water to attempt to reduce airborne asbestos fiber levels.

Boiler and Water Tank Thermal Block Insulation
Asbestos-containing preformed block insulation has been used as thermal insulation on boilers, hot water tanks and heat exchangers in industrial, commercial, institutional and residential applications. The blocks are commonly chalky in nature and may be held in place by chicken wire or expanded metal lath. A plaster-saturated canvas was often applied as a final covering or wrap.

Due to the number, thickness and varying absorbencies of these layers of materials, adequate wetting may be accomplished only by continually wetting the materials with amended water as the various layers are stripped.

One person may be assigned to spray the materials as they are stripped, and a misting sprayer may be used in an attempt to reduce airborne asbestos fiber levels.

Cementitious Fitting Insulation
Wetting of cementitious fitting insulation is similar to that used when removing asbestos-containing thermal block insulation. The outer surface is saturated with amended water and the outer covering (if applicable) is removed. The fitting insulation is then rewetted and the insulation stripped. To ensure that the fitting remains adequately wet during the removal operation, a person is often assigned to spray the ACM as it is stripped. A misting sprayer may be used to reduce airborne asbestos fiber levels.

Asbestos-Containing Surfacing Materials
"**Surfacing Material**" is a generic term designated by the Asbestos Hazard Emergency Response Act (AHERA; Asbestos Containing Materials in Schools, 40 CFR Part 763, Subpart E) to mean any wall or ceiling material that is sprayed-on or troweled-on, such as acoustical plaster or fireproofing. The recommended wetting method for this type of RACM is to saturate the surfaces, begin the stripping operation and continue to wet the RACM as it is being removed. A misting sprayer may also be used to keep the air saturated while the removal occurs.

Since surfacing materials vary in their ability to absorb a wetting agent, inspectors must consider the type of surfacing material that is being removed in order to determine the required extent of penetration by the amended water. Surfacing materials which easily absorb a wetting agent need to be fully penetrated or permeated to be considered adequately wet, whereas only the exposed surfaces of materials which do not absorb water readily need to be wetted.

The use of high pressure water to remove asbestos-containing surfacing materials, either through a steam-cleaning device or a diesel powered hydroblasting water applicator, should be avoided since such use may unduly disturb RACM and contribute to higher airborne asbestos fiber levels. However, if this removal method is used, contractors must adequately wet the ACM prior to and during the removal.

Miscellaneous Asbestos-Containing Materials
Both friable and non-friable forms of other asbestos-containing building materials exist. Friable materials include asbestos-containing paper (commonly found beneath wooden floors), wallpaper, and joint compound. It has been estimated that 5 to 10 percent of the ceiling tiles currently installed in the U.S. contain asbestos.

Non-friable miscellaneous ACM includes floor tiles, asbestos cement sheet (transite board), siding shingles, asphalt roofing shingles, laboratory benchtops and even chalkboards. These materials may become friable with age, and under harsh conditions. Category I non-friable ACM must be carefully examined to determine if the material is in poor condition, that is, if the binding material is losing its integrity, exhibited by peeling, cracking or crumbling; and is also friable.

When Category I non-friable ACM has become friable it is subject to the NESHAP.
If Category I or II ACM is sanded, ground, cut or abraded it is also covered by the NESHAP. Category II non-friable ACM which is damaged to the extent that it has or will become crumbled, pulverized or reduced to powder due to demolition/ renovation activities, is subject to the Asbestos NESHAP.

Miscellaneous materials are wetted in manners similar to those used to wet other categories of RACM. Coverings are saturated with a wetting agent before removal and the asbestos-containing portions fully penetrated with the agent prior to, during and after their removal, while stored in the removal area, and while being placed into disposal containers.

Miscellaneous materials that don't absorb water readily (e.g., asbestos-concrete products, and floor tiles) are only required to have wetted surfaces. A misting sprayer may be used to diminish airborne asbestos fiber levels.

8. INSPECTION PROCEDURES

The intent of the following guidelines is to provide **GUIDANCE ONLY**, to the regulated community regarding the inspection procedures recommended to Asbestos NESHAP inspectors for determining compliance with the "Adequately Wet" requirements of the Asbestos NESHAP. The purpose of the wetting provisions is to require as much wetting as is necessary to prevent airborne emissions of asbestos fibers. In order to achieve this result, RACM and ACWM must be wetted and maintained wet until collected for disposal. The determination of whether RACM or ACWM has been adequately wetted is generally based on observations made by the inspector at the time of inspection. Observations probative of whether a material is adequately wet include but are not limited to, the following:

- Is there a water supply in place?
- Is water or a wetting agent observed being sprayed onto the RACM or ACWM both during stripping or removal and afterwards while the material awaits proper disposal? If yes, carefully note the method of application used (e.g., misting, fogging, spraying of surface area only or drenching to penetrate the ACM throughout).
- If water or a wetting agent is being used, what equipment is used to apply it (e.g., garden hose, plant mister)?
- If water or a wetting agent is not being used, determine why it is not and document the reason. Possible (although not necessarily valid) reasons include: prior permission obtained from the Administrator (safety hazard, potential equipment damage);
  no water source at the facility;
  temperature at the point of wetting below 32 degrees F;
  portable water supply ran out and contractor continued to work; or
  contractor prepared the area earlier, etc.
- Examine a stripped or removed piece of ACWM or RACM which wets readily. Does it appear to be wetted throughout? If it does not, adequately wet the sample. Describe and photograph how the physical characteristics of the material change upon wetting (e.g., color, weight, texture, etc.). Take samples, as necessary, to document the presence of asbestos in the suspect material.
- When examining materials that do not readily absorb water or a wetting agent (e.g., premolded thermal system insulation, ceiling tiles, floor tiles) inspectors should note whether all exposed surfaces of these materials have been wetted as required.
- Is there visible dust (airborne or settled), or dry ACWM debris in the immediate vicinity of the operation? Inspectors should collect samples of such materials for analysis of their possible asbestos content.
- Examine ACWM in bags or other containers using the procedures that follow, to determine if the material has been adequately wetted?

Randomly select bags (or containers) for inspection.

Lift the bag or container and assess its overall weight. (A bag of dry ACWM can generally be lifted easily with one hand, whereas a bag filled with well-wetted material is substantially heavier.)

If the bag or other container is transparent:
Visually inspect the contents of the unopened bag for evidence of moisture (e.g., water droplets, water in the bottom of the bag, a change in the color of the material due to water).

Without opening the bag, squeeze chunks of debris to ascertain whether moisture droplets are emitted.

If the material appears dry or not penetrated with liquid or a wetting agent, open the bag using the additional steps described in step 9 below a collect a bulk sample of each type of material in the bag noting variations in size, patterns, color and textures.

If the waste material is contained in an opaque bag or other container, or if the material is in a transparent bag which appears to be inadequately wetted:

Carefully open the bag (in the containment area, if possible). If there is no containment area at the site, a glove bag may be used to enclose the container prior to opening it to minimize the risk of any fiber release.

Examine the contents of the bag for evidence of moisture as in 8 above, and if the material appears dry or it is not fully penetrated with water or a wetting agent, collect a bulk sample.

Reseal the bag immediately after evaluating and sampling its contents.

Asbestos NESHAP Regulation Questions

What is the purpose of the Asbestos NESHAP regulation?
The purpose is to protect the public health by minimizing the release of asbestos when facilities which contain asbestos-containing materials (**ACMs**) are demolished or renovated.

How much regulated asbestos-containing material (RACM) is disposed of annually from demolition/renovation operations?
Approximately 5.7 million cubic feet of RACM is disposed of annually. In accordance with the regulation, most RACM is taken to landfills, where it is covered by soil or other debris in order to keep it from releasing asbestos fibers.

What is the difference between demolishing a facility and renovating it?
"**Demolition**" and "**renovation**" are defined in the regulation. You "**demolish**" a facility when you remove or wreck any load-supporting structural member of that facility or perform any related operations; you also "**demolish**" a facility when you burn it. You "renovate" a facility when you alter any part of that facility in any other manner. Renovation includes stripping or removing asbestos from the facility.

What percentage of asbestos related activities involves demolitions?
Demolitions comprise approximately 10% of all reported asbestos-related activities.

Is there a numeric emission limit for the release of asbestos fibers during renovations or demolitions in the asbestos NESHAP regulation?
No, the Asbestos NESHAP relating to demolitions or renovations is a work practice standard. This means that it does not place specific numerical emission limitations for asbestos fibers on asbestos demolitions and removals. Instead, it requires specific actions be taken to control emissions. However, the Asbestos NESHAP does specify zero visible emissions to the outside air from activity relating to the transport and disposal of asbestos waste.

Who is responsible for enforcing the Asbestos NESHAP standards?
Under Section 112 of the Clean Air Act, Congress gave EPA the responsibility for enforcing regulations relating to asbestos renovations and demolitions. The CAA allows EPA to delegate this authority to State and local agencies. Even after EPA delegates responsibility to a State or local agency, EPA retains the authority to oversee agency performance and to enforce NESHA Pregulations as appropriate.

NESHAP Jurisdiction
What is a "facility?"
As defined in the regulation, a "**facility**" is any institutional, commercial, public, industrial or residential structure, installation or building (including any structure, installation or building containing condominiums, or individual dwelling units operated as a residential cooperative, but excluding residential buildings having four or fewer dwelling units); any ship; or any active or inactive waste disposal site.

Any building, structure or installation that contains a loft used as a dwelling is not considered residential. Any structure, installation, or building that was previously subject to the Asbestos NESHAP is not excluded, regardless of its current use or function.

If I renovate several two-family units, are the units defined as a "facility?"
Residential buildings which have four or fewer dwelling units are not considered "**facilities**" unless they are part of a larger installation (for example, an army base, company housing, apartment or housing complex, part of a group of houses subject to condemnation for a highway right-of-way, an apartment which is an integral part of a commercial facility, etc.).

Are mobile homes or mobile structures regulated by the Asbestos NESHAP?
Mobile homes used as single-family dwellings are not subject to Asbestos NESHAP. Mobile structures used for non-residential purposes are subject to NESHAP.

Are Federal facilities regulated by the Asbestos NESHAP?
Yes.

Are single-family private residences regulated by the Asbestos NESHAP?
No.

How much asbestos must be present before the Asbestos NESHAP work practice standards apply to renovation projects?
Asbestos NESHAP regulations must be followed for all renovations of facilities with at least 80 linear meters (260 linear feet) of regulated asbestos-containing materials (**RACM**) on pipes, or 15 square meters (160 square feet) of regulated asbestos-containing materials on other facility components, or at least one cubic meter (35 cubic feet) off facility components where the amount of RACM previously removed from pipes and other facility components could not be measured before stripping. These amounts are known as the "threshold" amounts.

How much asbestos must be present before the Asbestos NESHAP work practice standards apply to demolition projects?
Asbestos NESHAP regulations must be followed for demolitions of facilities with at least 80 linear meters (260 linear feet) of regulated asbestos-containing materials (RACM) on pipes, 15 square meters (160 square feet) of regulated asbestos-containing materials on other facility components, or at least one cubic meter (35 cubic feet) off facility components where the amount of RACM previously removed from pipes and other facility components could not be measured before stripping.

However, all demolitions must notify the appropriate regulatory agency, even if no asbestos is present at the site, and all demolitions and renovations are "subject" to the Asbestos NESHAP insofar as owners and operators must determine if and how much asbestos is present at the site.

Are homes that are demolished or renovated to build non-residential structures regulated by the Asbestos NESHAP?
Yes. For example, homes which are demolished as part of an urban renewal project, a highway construction project, or a project to develop a shopping mall are regulated by the Asbestos NESHAP.

A single home which is converted into a non-residential structure is also regulated by the Asbestos NESHAP. For example, if someone buys a house and converts it into a store, the renovation is subject to the Asbestos NESHAP.

If a renovation site is abandoned, is the site still regulated by the Asbestos NESHAP?
Yes. Even after a renovation site is abandoned, it is still regulated by the Asbestos NESHAP.

What is encapsulation, and is it regulated by the Asbestos NESHAP?
Encapsulation is the application of a material with a sealant to stop it from releasing fibers. Normally, encapsulation is not regulated by the Asbestos NESHAP unless it involves removing or stripping asbestos. However, if encapsulation is done using methods that damage asbestos and release fibers it would be covered. For example, high pressure spraying to apply encapsulant could damage asbestos. Also, if friable RACM is encapsulated, the RACM is still covered by the Asbestos NESHAP if renovation or demolition occurs.

Are offshore oil rigs regulated in terms of asbestos removal and demolition?
Yes. Federal jurisdiction extends to the continental shelf (100 miles). When EPA delegates authority to State or local agencies, the State and local agencies are usually considered to have authority only in territorial waters (12 miles). The Department of the Interior is still evaluating whether States may extend their jurisdiction beyond territorial waters. EPA currently enforces the NESHAP between territorial waters and the continental shelf.

Notifications

What is a notification?
A notification is a written notice of intent to renovate or demolish. Notifications must contain certain specified information, including but not limited to, the scheduled starting and completion date of the work, the location of the site, the names of operators or asbestos removal contractors, methods of removal and the amount of asbestos, and whether the operation is a demolition or renovation. See Section 61.145(b) of the Asbestos NESHAP regulation.

Whom do I notify?
You should notify the delegated State/Local Pollution Control Agency in your area and/or the EPA Regional Office of the demolition or renovation operations subject to NESHAP. Some EPA Regions require that both the EPA Regional Office and the local delegated agency be notified, while some require notice only to the delegated State or local agency. If the program is not delegated, notify the EPA Regional Office.

How do I notify?
Mail or hand-deliver the notification to the appropriate agency.

Are telefaxed or telephone notifications acceptable?
No. Telefaxed notifications are not accepted. Telephone notifications are only acceptable in emergency situations at the discretion of the EPA Regional Office or delegated agency and must be followed with a written copy by the following working day.

Who is responsible for submitting a notification -- the owner of the building which is being demolished or renovated, or the contractor?
The NESHAP regulation states that either the owner of the building or operator of the demolition or renovation operation can submit the notification. Usually, the two parties decide together who will notify. If neither provide adequate notice, EPA can hold either or both parties liable.

When a condominium complex is being renovated, who as owner, is responsible for submitting a notification?
While owners and operators share responsibility for proper notification, the condominium or co-op board is responsible as the owner. The board should ensure that they are told when work takes place on individual units, so that they can comply with notification (and other EPA) requirements, especially if multiple operators are involved.

Is there a form or format for notifications?
Yes, there is a suggested form for notifications. You can obtain a form, and instructions on how to fill it out, from your delegated State or local agency or from your EPA Regional Office.

Do demolitions of facilities in which no asbestos is present require notification?
Yes. All demolitions that meet the definition of facility must notify.

When I notify regarding a renovation, what date do I consider the start date?
For a renovation, the start date is the day that the removal of asbestos-containing material, or any other asbestos-handling activities, including precleaning, construction of containment, or other activities that could disturb the asbestos, will begin.

When I notify regarding a demolition, do I give the start date of the demolition or of the asbestos removal? Which date do I use to determine whether I've met the 10-day waiting period?
For a demolition, the start date is the date that the removal or related activity begins. The date the demolition starts also must be reported. The waiting period should be calculated based on the start date of the removal or the demolition, if no removal is required. The waiting period is necessary to give inspectors time to visit the site before activity begins.

Does the 10-day notification requirement refer to "calendar" days or "working" days?
The Asbestos NESHAP regulation specifies "**working days**." Holidays that fall between Monday and Friday count as "**working days**."

What is a "nonscheduled renovation operation"?
A "nonscheduled renovation operation" is a renovation operation that is caused by the routine failure of equipment which is expected to occur based on past operating experience, but for which an exact date cannot be predicted.

Do I have to notify for non-scheduled operations? When?
Yes, if you can predict based on past experience that renovations will be necessary during the calendar year and the amount of asbestos is likely to exceed the jurisdictional amount, notification is required. This notification must be submitted at least 10 working days before the end of the calendar year preceding the year for which notice is being given.
Note: Single renovation projects which exceed the threshold amount are not covered by this type of notice. A separate notification is required for these projects.

Must I notify the agency again if I know that a specific renovation project involving more than the threshold amount (including the work covered by the calendar year notice for non- scheduled operations) is about to occur at a specific time?
Yes.

What constitutes an emergency renovation?
An emergency renovation is a renovation that was not planned, but results from a sudden, unexpected event that either immediately produces unsafe conditions, or that, if not quickly remedied, could be reasonably foreseen to result in an unsafe or detrimental effect on health or is necessary to protect equipment and avoid unreasonable financial burden. The term includes renovations necessitated by non-routine equipment failures. For example, the explosion of a boiler in a chemical plant might require emergency renovations, since such an explosion would disrupt normal operations. However, renovations involving routine repairs are not emergencies.

Under what conditions must I notify for emergency renovations? When must I notify?
First, inspect the facility and determine the amount of RACM that may have to be removed or disturbed to repair the facility. (If you don't have the time to have samples analyzed, you should assume that all insulation is RACM.) Then, if the amount of RACM is in excess of the threshold amount, you should mail or deliver a notification as soon as possible, but certainly no later than the following workday. A notification which is postmarked more than one working day after the emergency will be considered in violation of the notification requirements. EPA recommends that you send the notice by overnight express mail, and that you phone in a notification as well to the delegated agency and/or EPA Regional Office.

When does a notification need to be revised?
A notification must be revised if information contained in the original notice has changed. For example, you must revise the notification if you change the start date of an operation. If the change relates to the amount of RACM involved, you need only revise the notification if the amount changes by more than 20 percent.

When do I submit a revised notification?
You should telephone EPA as soon as possible after you realize the revision is necessary, and should then mail or hand deliver a written notice. If you delay the start date of a project, EPA must receive the revised notification no later than the original start date. If you plan to begin work before the date specified in the original notice, EPA must receive the revised notice at least 10 working days before the revised start date.

Does the Asbestos NESHAP require a building owner or operator to remove damaged or deteriorating asbestos-containing material?
No. Not unless a renovation of the facility is planned which would disturb the ACM and it exceeds the threshold amount.

What does "adequately wet" mean?
To "**adequately wet**" ACM means to sufficiently mix or penetrate the material with liquid to prevent the release of particulates. If visible emissions are observed coming from ACM, then the material has not been adequately wetted. However, the absence of visible emissions is not evidence of being adequately wet.

If a contractor puts water in the bottom of a bag, then strips the friable asbestos material dry and lets it fall into the water, is this a violation of the Asbestos NESHAP standards?
Yes. The regulation states that friable asbestos-containing material must be "adequately wet" during stripping operations. The material must remain wet until disposal.

Section 61.145(c)(6)(iii) states that the operator must "transport the materials to the ground via dust tight chutes or containers if it has been removed or stripped more than 50 feet above ground level." Can a room sealed with plastic and a negative air system be considered a dust tight chute?
No, the area in which removal is being conducted (the containment area) cannot be considered a dust tight chute in order to comply with 61.145(c)(6)(iii).

Ordered Demolitions

If a facility is being demolished under an order of a State or local government because the facility is structurally unsound, and therefore unsafe, do all the normal regulations covering demolitions apply?

No. The regulations which do apply are specified in 61.145 (a)(3) of the regulation.

If a facility is being demolished under an order of a State or local government, must all the debris be treated as asbestos-contaminated waste?

If, for safety reasons, the RACM in the facility is not removed prior to demolition, the RACM must be kept adequately wet during the wrecking operations. After wrecking, all the contaminated debris must be kept adequately wet until disposal. All contaminated debris which cannot be segregated and cleaned should be disposed of as asbestos waste.

EPA's Advice on Asbestos

EPA's advice on asbestos is neither to rip it all out in a panic nor to ignore the problem under a false presumption that asbestos is "**risk free**." Rather, EPA recommends a practical approach that protects public health by emphasizing that asbestos material in buildings should be located, that it should be appropriately managed, and that those workers who may disturb it should be properly trained and protected. That has been, and continues to be, EPA's position. The following summarizes the five major facts that the Agency has presented in congressional testimony:

FACT ONE: Although asbestos is hazardous, human risk of asbestos disease depends upon exposure.

FACT TWO: Prevailing asbestos levels in buildings -- the levels school children and you and I face as building occupants -- seem to be very low, based upon available data. Accordingly, the health risk we face as building occupants also appears to be very low.

FACT THREE: Removal is often not a school district's or other building owner's best course of action to reduce asbestos exposure. In fact, an improper removal can create a dangerous situation where none previously existed.

FACT FOUR: EPA only requires asbestos removal in order to prevent significant public exposure to asbestos, such as during building renovation or demolition.

FACT FIVE: EPA does recommend in-place management whenever asbestos is discovered. Instead of removal, a conscientious in- place management program will usually control fiber releases, particularly when the materials are not significantly damaged and are not likely to be disturbed.

What are EPA's Regulations Governing Asbestos?

TSCA
In 1979, under the Toxic Substances Control Act (**TSCA**), EPA began an asbestos technical assistance program for building owners, environmental groups, contractors and industry. In May 1982, EPA issued the first regulation intended to control asbestos in schools under the authority of TSCA; this regulation was known as the Asbestos-in-Schools Rule.

Starting in 1985, loans and grants have been given each year to aid Local Education Agencies (**LEAs**) in conducting asbestos abatement projects under the Asbestos School Hazard Abatement Act (**ASHAA**).

AHERA
In 1986, the Asbestos Hazard Emergency Response Act (**AHERA**; Asbestos Containing Materials in Schools, 40 CFR Part 763, Subpart E) was signed into law as Title II of TSCA. AHERA is more inclusive than the May 1982 Asbestos-in-Schools Rule. AHERA requires LEAs to inspect their schools for asbestos containing building materials (**ACBM**) and prepare management plans which recommend the best way to reduce the asbestos hazard.

Options include repairing damaged ACM, spraying it with sealants, enclosing it, removing it, or keeping it in good condition so that it does not release fibers. The plans must be developed by accredited management planners and approved by the State. LEAs must notify parent, teacher and employer organizations of the plans, and then the plans must be implemented. AHERA also requires accreditation of abatement designers, contractor supervisors and workers, building inspectors, and school management plan writers. Those responsible for enforcing AHERA have concentrated on educating LEAs, in an effort to ensure that they comply with the regulations. Contractors that improperly remove asbestos from schools can be liable under both AHERA and NESHAP. For more information on AHERA, request the pamphlet entitled "*The ABC's of Asbestos in Schools*" from the EPA Public Information Center.

ASBESTOS BAN & PHASEOUT RULE
In 1989 EPA published the Asbestos: Manufacture, Importation, Processing, and Distribution in Commerce Prohibitions; Final Rule (40 CFR Part 763, Subpart I). The rule will eventually ban about 94 percent of the asbestos used in the U.S. (based on 1985 estimates). For example, asbestos containing drum brake linings and roof coatings will be banned. The rule will be implemented in three stages between 1990 and 1997.

NESHAP (Summary, see preceding section for more information)
The Clean Air Act (**CAA**) of 1970 requires EPA to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. In accordance with Section 112 of the CAA, EPA established National Emission Standards for Hazardous Air Pollutants (NESHAP). Asbestos was one of the first hazardous air pollutants regulated under Section 112.

On March 31, 1971, EPA identified asbestos as a hazardous pollutant, and on April 6, 1973, EPA promulgated the Asbestos NESHAP in 40 CFR Part 61, Subpart M. The Asbestos NESHAP has been amended several times, most recently in November 1990. For a copy of the Asbestos NESHAP contact the Asbestos NESHAP Coordinators listed in the Appendix.

What are the basic requirements of the Asbestos NESHAP?
The Asbestos NESHAP is intended to minimize the release of asbestos fibers during activities involving the handling of asbestos. Accordingly, it specifies work practices to be followed during renovations of buildings which contain a certain threshold amount of friable asbestos, and during demolitions of all structures, installations, and facilities (except apartment buildings that have no more than four dwelling units).

Most often, the Asbestos NESHAP requires action to be taken by the person who owns, leases, operates, controls, or supervises the facility being demolished or renovated (the "owner"), and by the person who owns, leases, operators, controls or supervises the demolition or renovation (the "operator").

The regulations require owners and operators subject to the Asbestos NESHAP to notify delegated State and local agencies and/or their EPA Regional Offices before demolition or renovation activity begins. The regulations restrict the use of spray asbestos, and prohibit the use of wet applied and molded insulation (i.e., pipe lagging). The Asbestos NESHAP also regulates asbestos waste handling and disposal.

Why was the Asbestos NESHAP recently amended?
The Asbestos NESHAP was amended for several reasons. EPA wanted to clarify existing regulatory policies, and to add regulations which explicitly address monitoring and record keeping at facilities which mill, manufacture, and fabricate asbestos. Also, because of the high risk associated with the transfer and disposal of ACM, EPA also wanted to strengthen the requirements which govern asbestos waste disposal by requiring tracking and record keeping. Furthermore, EPA determined that the Asbestos NESHAP needed to take into account the availability of improved emission controls. EPA also wanted to make the NESHAP consistent with other EPA statutes that regulate asbestos.

What sources are now covered by the asbestos NESHAP?
The following activities and facilities are currently regulated by the Asbestos NESHAP:

- The milling of asbestos.
- Roadways containing ACM.
- The commercial manufacture of products that contain commercial asbestos.
- The demolition of all facilities.
- The renovation of facilities that contain friable ACM.
- The spraying of ACM.
- The processing (fabricating) of any manufactured products that contain asbestos.
- The use of insulating materials that contain commercial asbestos.
- The disposal of asbestos-containing waste generated during milling, manufacturing, demolition, renovation, spraying, and fabricating operation.
- The closure and maintenance of inactive waste disposal sites.
- The operation of and reporting on facilities that convert asbestos containing waste material into non-asbestos material.
- The design and operation of air cleaning devices.
- The reporting of information pertaining to process control equipment, filter devices, asbestos generating processes, etc.
- Active waste disposal sites.

What were the major changes to the Asbestos NESHAP?

Milling, Manufacturing, and Fabricating Sources
Businesses which are involved in asbestos milling, manufacturing, and fabricating now must monitor for visible emissions for at least 15 seconds at least once a day (during daylight hours), and inspect air cleaning devices at least once a week.

The facilities must maintain records of the results, and submit each quarter a copy of the visible emissions monitoring records if visible emissions occurred during the quarter. Facilities that install fabric filters (to control asbestos emissions) after the effective date of the revision must provide for easy inspection of the bags.

Demolition and Renovation
All facilities which are "**demolished**" are subject to the Asbestos NESHAP. The definition of demolition was expanded to include the intentional burning of a facility, in addition to the "**wrecking or taking out . . . any load-supporting structural member of a facility**."

Owners and operators of all facilities which are to be demolished, and of facilities that contain a certain amount of asbestos which are to be renovated, must now provide more detailed information in notifications, including the name of the asbestos waste transporter and the name of the waste disposal site where the ACM will be deposited.

Owners and operators must give a 10-day notice for planned renovations and demolitions. They must renotify EPA in advance of the actual start date if the demolition or renovation will begin on a date other than the one specified in the original notification. Telephone re- notifications are permitted, but must be followed by written notice.

Starting one year after promulgation of the regulation, a person trained in the provisions of the Asbestos NESHAP, and in the methods of complying with them, must supervise operations in which ACM is stripped, removed or otherwise handled. This supervisor is responsible for all on-site activity. Before wetting is suspended, the EPA administrator must approve.

When wetting of asbestos during its removal is suspended due to freezing temperatures, owners or operators must measure the air temperature in the work area three times during the workday, and must keep those records for at least two years.

The revisions also clarify EPA's position regarding the handling and treatment of non- friable asbestos material. The owner and operator must inspect the site for the presence of non-friable ACM, and include in the notification an estimate of how much non-friable ACM is present.

Also, the owner and operator must describe the procedures to be followed if unexpected ACM is found in the course of demolition or renovation, and if non-friable asbestos becomes friable in the course of renovation or demolition.

Waste Transport and Disposal
Vehicles used to transport ACM must be marked according to new guidelines during loading and unloading. Labels indicating the name of the waste generator and the location where the waste was generated must be placed on containers of RACM. When ACM waste is transported off-site, a waste shipment record (**WSR**) must be given to the waste site operator or owner at the time that the waste is delivered to the waste disposal site.

The owner or operator must send a signed copy of the WSR back to the waste generator within 30 days, and attempt to reconcile any discrepancy between the quantity of waste given on the WSR and the actual amount of waste received.

If, within 15 days of receiving the waste, the waste site owner or operator cannot reconcile the discrepancy, he or she must report that problem to the same agency that was notified about the demolition or renovation. New disposal sites must apply for approval to construct, and must notify EPA of the startup date. Existing disposal sites must supply EPA with certain information concerning their operations, such as the name and address of the owner or operator, the location of the site, the average weight per month of the hazardous materials being processed, and a description of the existing emission control equipment.

If a copy of the WSR signed by the waste site owner or operator is not received by the waste generator within 35 days of the date that the waste was accepted by the initial transporter, the waste generator must contact the transporter and/or disposal site owner or operator to determine the status of the waste shipment. If a signed copy of the WSR is not received within 45 days of the date that the waste was accepted by the initial transporter, the waste generator must submit a written report to the same agency that was notified about the demolition or renovation.

Owners of disposal sites must record on the deed to the disposal site that the property has been used for ACM disposal. They must also keep records that show the location, depth, area and volume of the asbestos waste; they must indicate on the deed that these records are available. Owners of inactive disposal sites must obtain written approval before they excavate or otherwise disturb ACM waste that has been deposited on the site.

Where can I get more information?
There are ten EPA Regional Offices around the country. You can obtain more information about the Asbestos NESHAP by contacting your EPA Regional Office's NESHAP coordinator or the appropriate State or local agency. You can obtain more information about AHERA by contacting your EPA Regional Asbestos Coordinator (**RAC**).

You may also call the EPA Toxic Substances Control Act (**TSCA**) Hotline to ask general questions about asbestos, or to request asbestos guidance documents. The Hotline number is (202) 554-1404.

The EPA Public Information Center can send you information on EPA regulations. You can reach the center at (202) 382-2080 or (202) 475-7751. The Office of the Federal Register (202-382- 5475) can send you copies of any regulations published in The Federal Register, including the Asbestos NESHAP. Finally, the EPA has an Asbestos Ombudsman to provide information on the handling and abatement of asbestos in schools, the work place and the home. Also, the EPA Asbestos Ombudsman can help citizens with asbestos-in-school complaints. The Ombudsman can be reached toll-free at (800) 368-5888, direct at (703) 557- 1938 or 557-1939.

Class of Work

Within OSHA's construction and shipbuilding standards, the type of work and likely exposure is broken down by class. Each class has specific work practices that must be followed.

The classes are:

- ✓ Class I asbestos work means activities involving the removal of thermal system insulation (**TSI**) or surfacing asbestos-containing material (**ACM**) or presumed ACM.
- ✓ Class II asbestos work means activities involving the removal of ACM that is neither TSI nor surfacing ACM. This includes the removal of asbestos-containing wallboard; floor tile; sheeting, roofing, and siding shingles; and construction mastics.
- ✓ Class III asbestos work means repair and maintenance operations where ACM, including TSI and surfacing ACM and presumed ACM, is likely to be disturbed.
- ✓ Class IV asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or presumed ACM and activities to clean up dust, waste, and debris resulting from Class I, II, and III activities.

Major vs. Minor Releases

EPA defines fiber releases as either major or minor. A minor fiber release episode is where three square or linear feet or less of friable ACM has fallen or was dislodged. A major fiber release is where more than three square or linear feet has been dislodged.

For a minor release EPA recommends the following actions:

- ✓ Thoroughly saturate the debris using wetting methods.
- ✓ Clean the area, including:
- ✓ HEPA-vacuum or steam-clean all carpets
- ✓ HEPA-vacuum or wet-clean all other floors and all other horizontal surfaces
- ✓ Dispose of all debris, filters, mop heads, cloths in sealed, leak-tight containers.
- ✓ Place the asbestos debris in a sealed, leak-tight container.
- ✓ Repair the area of damaged ACM with asbestos-free spackling, plaster, cement, or insulation; seal with latex paint or an encapsulate; or immediately have the appropriate response action implemented.

For a major release, EPA requires the following actions:

- ✓ Post signs restricting entry into the affected area to those persons necessary to perform the response action. Unauthorized personnel should not be allowed entry.
- ✓ Shut off or temporarily modify the air-handling system to prevent the distribution of fibers to other areas of the building.
- ✓ Make sure the appropriate response action is designed and conducted only by accredited personnel.

Friable and Non-Friable Asbestos

What is friable asbestos-containing material?
Friable ACM is any material containing more than one percent asbestos (as determined by Polarized Light Microscopy) that, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure.

What is non-friable ACM?
Non-friable ACM is any material containing more than one percent asbestos (as determined by Polarized Light Microscopy) that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. Under the Asbestos NESHAP, non-friable ACM is divided into two categories.

Category I non-friable ACM are asbestos-containing resilient floor coverings (commonly known as vinyl asbestos tile (**VAT**)), asphalt roofing products, packings and gaskets. These materials rarely become friable. All other non-friable ACM are considered category II non-friable ACM.

Must I remove category I non-friable material prior to demolition or renovation?
Under normal circumstances, category I non-friable materials need not be removed prior to demolition or renovation, because generally these materials do not release significant amounts of asbestos fibers, even when damaged. This is not, however, a hard and fast rule. If category I materials have become friable or are in poor condition, they must be removed.

Also, if you sand, grind, abrade, drill, cut or chip any non-friable materials, including category I materials, you must treat the material as friable, if more than the jurisdictional amount is involved.

Must I remove category II non-friable materials prior to demolition or renovation?
These materials should be evaluated on a case-by-case basis. If category II non-friable materials are likely to become crushed, pulverized or reduced to powder during demolition or renovation, they should be removed before demolition or renovation begin.

For example, A/C (asbestos cement) siding on a building that is going to be demolished with a wrecking ball should be removed, because it is likely that the siding will be pulverized by the wrecking ball.

Does non-friable waste, if broken, damaged, etc., have to be wetted and contained?
Non-friable ACM that has been damaged during a demolition or renovation operation such that some portions of the material are crumbled, pulverized or reduced to powder is covered by the Asbestos NESHAP if the facility contains more than the threshold amount of RACM.

However, category II non-friable ACM that has a high probability of being damaged by the demolition or renovation forces expected to act on the materials such that it will be crumbled, pulverized, or reduced to powder must be removed prior to the demolition or renovation operation. It is the owner's or operator's responsibility to make these determinations.

Transport and Disposal

How should I handle bulk waste from a facility that contained RACM and that was not found until after demolition began?
The demolition debris must be treated as asbestos-containing waste. Adequately wet the demolition debris until collected for disposal and during loading, transport it in covered vehicles and emit no visible emissions to the outside air as required by 61.150. The waste must be deposited at an acceptable waste disposal site.

Can I transport bulk asbestos waste without placing it in containers as long as I keep the waste pile wet?
No. After wetting, seal all asbestos-containing waste material in leak-tight containers while wet and label with the appropriate signs and labels. If the waste will not fit into containers, it must be placed in leak-tight wrapping.

However, for facilities that are demolished without removing the RACM and for ordered demolitions, the material must be adequately wet after the demolition has occurred and again when loading the material for transport to a disposal site. RACM covered by this paragraph may be transported in bulk without being placed in leak-tight containers or wrapping.

How should I label asbestos-containing waste that is being taken away from the facility?
You should label the containers or wrapped materials with the name of the waste generator and the location at which the waste was generated. An OSHA warning label must also be used.

Does EPA license landfills for asbestos waste?
The EPA does not license asbestos landfills under the Clean Air Act.. However, it has established asbestos disposal requirements for active and inactive disposal sites under the NESHAP, and general requirements for solid waste disposal under the Resource Conservation and Recovery Act (**RCRA**). In addition, State and/or local agencies usually require asbestos landfills to be approved or licensed.

Where can I obtain a list of licensed landfills?
State and local agencies which require handling or licensing procedures can 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.

What should the owner or operator of a waste disposal site do if it is determined that there is a discrepancy between the amount of waste that left the facility and the amount of waste that was delivered to the site?
The waste site owner or operator must contact the demolition/renovation owner or operator, and attempt to reconcile the discrepancy. If they cannot do so within 15 days after the waste was received, the waste site owner or operator must notify both the delegated agency responsible for the facility from which the waste was removed, and the delegated agency responsible for the area in which the waste was disposed.

Can water be considered "six-inch compacted non-asbestos cover"? In other words, could asbestos covered components be dropped in the ocean?
No.

Monitoring and Sampling

Does the NESHAP regulation require air monitoring during renovation or removal?
No.

Does the Asbestos NESHAP regulation require me to inspect my property for asbestos?
No, not unless demolition or renovation is planned. The only Federal regulation which requires general inspections are the AHERA regulations, which mandate that schools must be inspected for asbestos. The NESHAP regulation requires that you inspect for asbestos before demolition or renovation.

What is the acceptable exposure/ambient air standard for asbestos?
EPA does not specify an acceptable exposure/ambient air standard.

What is a bulk sample?
A bulk sample is a solid quantity of insulation, floor tile, building material, etc., that is suspected of containing asbestos fibers that will be analyzed for the presence and quantity of asbestos.

Will EPA test my building for asbestos for me?
No. Owners and operators are responsible for getting their buildings tested.

Does EPA accredit laboratories that test for asbestos?
No. EPA, under 40 CFR Part 763, requires local education agencies to use laboratories accredited by the National Institute of Standards and Technology (NIST) in its National Voluntary Laboratory Accreditation Program (NVLAP). It is recommended for NESHAP related projects that NIST accredited laboratories be used.

How can I find someone to do the testing?
NIST publishes a yearly listing of accredited laboratories enrolled in the NVLAP. Then, on a quarterly basis NIST publishes updates to the master list detailing labs newly accredited, labs which have had their accreditation suspended, etc.

Contact NIST NVLAP for a current listing of accredited labs. The NIST NVLAP number is listed at the end of this pamphlet, along with other contact numbers.

How do laboratories analyze bulk samples?
Laboratories analyze bulk samples a number of ways. Most laboratories use Polarized Light Microscopy (**PLM**). Some laboratories use Transmission Electron Microscopy (**TEM**). However, there is currently no published method for bulk analysis using TEM.

How much does it cost to have a bulk sample analyzed?
The cost varies with the method. The cost of PLM analysis ranges from $20.00 to $100.00. The average cost is $30.00. TEM analysis is more expensive.

Inspections

Does an inspector have the right to enter any facility and the containment area?
Yes. All inspectors have the right under the Clean Air Act to inspect any facility and the containment area. Inspectors are trained and equipped to do this safely.

If I can see ACM dust inside the containment area or inside a glovebag, is this a violation of the Asbestos NESHAP?
The observation of ACM dust will be used as evidence of a violation of the "**adequately wet**" requirement. This is consistent with the definition of adequately wet that requires enough wetting "**to prevent the release of particulates**."

Is visible asbestos-containing debris on the ground outside a removal job considered a "visible emission," and a violation of the NESHAP?
Yes. Dry friable asbestos insulation on the ground violates the "**adequately wet**" requirement, and can be considered evidence of a visible emission.

Is it appropriate for an inspector to open any bags outside the designated contaminated area?
Yes. The inspector may open any bags outside the designated contaminated area to inspect them. The inspector may use a glovebag or other control techniques. The inspector will then properly reseal the bag, or request that the operator do so.

Must an inspector witness improper removal of more than 160 square feet or 260 linear feet of asbestos-containing material to prove a violation of the NESHAP regulation?
No. First, the inspector must gather information about the quantity of asbestos to prove that the project is subject to the NESHAP standards. Second, the inspector must prove that there has been improper removal. The two tasks are distinct from each other.

Are inspectors required to have medical examinations to ensure that they are medically fit to wear respirators?
Yes. Several Federal provisions under OSHA, EHSD, and NIOSH require people to be examined by a doctor and pronounced physically fit before they are permitted to wear respirators.

Must inspectors have personnel monitoring conducted on them during inspections to comply with OSHA requirements for workers?
No. The inspectors do not have to comply with the work practice safety standards required by OSHA for personnel monitoring.

Do inspectors need to follow facility training requirements including fit testing?
No.

Training

Do contractors and employees need to be accredited?
As of November, 1991 the Asbestos NESHAP requires a person trained in the provisions of this rule and the means of complying with them to be on-site when asbestos-containing material is stripped, removed or disturbed. Under AHERA, all contractors and employees involved in the removal and disposal of asbestos-containing material from schools must be accredited. Additionally, many States require that all workers be accredited before they remove asbestos from any facility.

How can I qualify as an asbestos contractor/worker/consultant under AHERA?
You must attend and pass an EPA accredited training course. A list of training courses approved by EPA is published quarterly in the Federal Register, and is available through the TSCA hotline.

The TSCA number is printed at the end of this pamphlet, along with other contact numbers. Contact your State or local agency for more information.

Do supervisors need to be trained?
Beginning on November 20, 1991, the Asbestos NESHAP requires at least one trained supervisor to be present at any site at which RACM is stripped, removed, or otherwise disturbed at any facility which is being demolished or renovated and is regulated by NESHAP. Evidence of the training must be posted and made available for inspection at the demolition or renovation site. Training includes, at a minimum: applicability, notification, material identification, control procedures, waste disposal, reporting and record keeping, asbestos hazards and worker protection.

Completion of an AHERA accredited course constitutes adequate training. Every 2 years the trained individual is required to receive refresher training. Information about both the training and refresher courses is available through EPA or delegated State or local agencies.

Violations and Penalties
What will happen if I violate the Asbestos NESHAP?
Sanctions vary. In some cases, Notices of Deficiency (**NOD**) -- written warnings -- or Notices of Violation (**NOV's**) are issued to owners or operators who violate notification requirements. Or, depending upon the offense, EPA recommends fines up to $25,000 per day per violation.

Violators of the work practice or disposal standards may be subject to either written warnings, administrative orders or civil penalties up to $25,000 per day per violation, depending upon the seriousness of the violation. EPA may also bring criminal charges against violators. Some owners and operators who have knowingly violated the Asbestos NESHAP have been sentenced to prison terms.

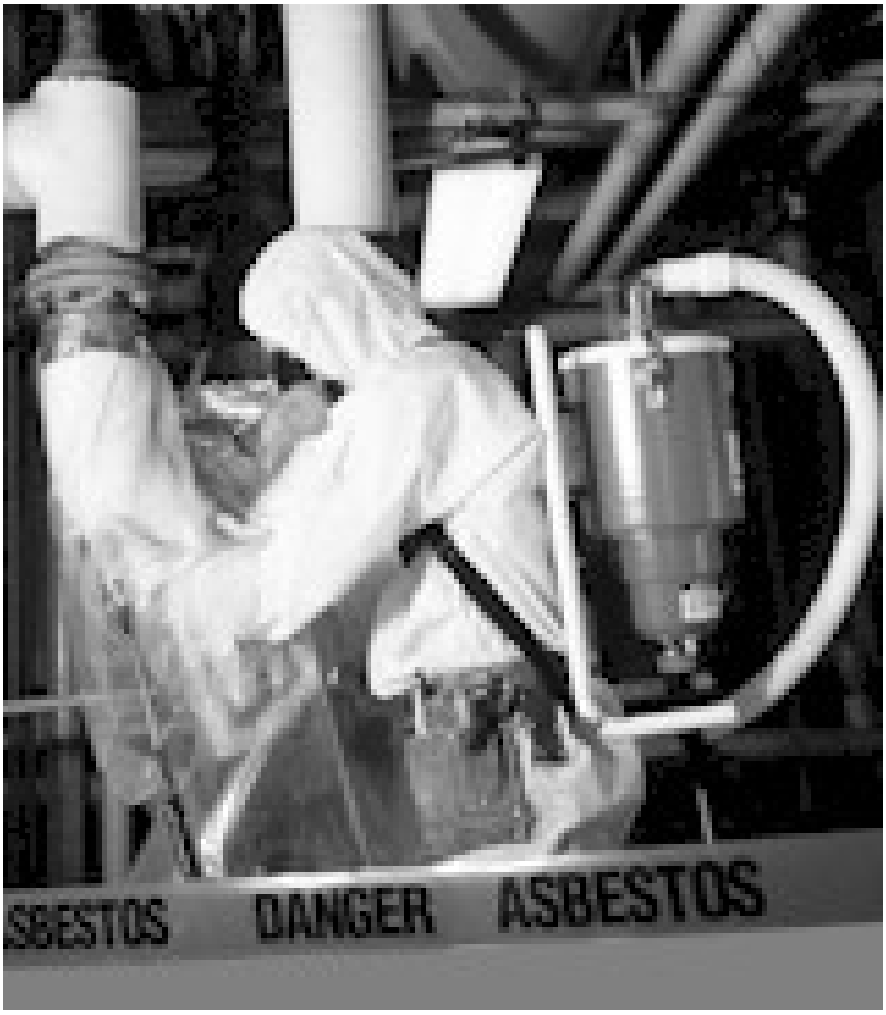
For more information on penalties and enforcement, see the EPA Public Information Document entitled "**Asbestos NESHAP Enforcement**."

What is the maximum penalty which can be assessed for NESHAP violations?
$25,000 per day, per violation, with no absolute maximum. However, some NESHAP violators may also be liable under CERCLA, and if so, the maximum penalty may be much higher.

How are penalties calculated?
Penalties are computed on a case-by-case basis. The amount of asbestos involved, the number of previous violations, the duration of the offense, the economic benefit that accrued to the owner or operator as a result of the violation, and similar considerations are taken into account.

What is "contractor listing?"
Contractors who have shown a pattern of violation, or who have been convicted of a criminal violation, may be placed on a list of violators who are prohibited from contracting for any jobs involving Federal money (grants, contracts, sub-grants, etc.).

Can a corporation that has changed its name, but is owned by an individual who has been listed be subject to contractor listing?
Yes.



NARS

What is NARS?
NARS stands for "**National Asbestos Registry System**." NARS is a computerized database established by EPA in April, 1989. NARS stores data on the compliance history of firms doing demolition or renovation work subject to the Asbestos NESHAP.

What is the purpose of NARS?
NARS is used by EPA Regional Offices as well as State and local agencies to "**target**" inspections of contractors with poor compliance histories, and to monitor activity subject to the NESHAP regulations.

Can I get NARS information?
Yes. NARS information is available through EPA Regional Offices under the provisions of the Freedom of Information Act.

Are there any penalties for being listed in NARS as a violator?
No. NARS is only an information system. Contractors who have violations listed in NARS may, however, be inspected more frequently than contractors who have no violations.

Why does EPA recommend inspection targeting?
Delegated agencies receive over 60,000 notifications of planned renovation or demolition projects each year. Because all projects cannot be inspected, EPA recommends targeting inspections so that agencies can make better use of their inspection resources.

Can firms avoid future inspections based on past good performance?
Past performance is an important criterion for targeting inspections; however, other criteria are also used. As a result of EPA guidance to State and local air pollution agencies, many asbestos removal contractors will be inspected at least once per year.

How many contractors and owners are currently listed in NARS?
As of October 1990, there were approximately 7,000 contractors and owners in NARS.

How does information get into NARS?
Information on the number of notifications, inspections, and violations for each contractor or owner is submitted by delegated State and local air pollution agencies and is reported through the EPA Regional NARS Coordinators to EPA Headquarters where the report is compiled.

Additional Information
You can obtain more information about the Asbestos NESHAP by contacting your EPA Regional Office's NESHAP coordinator. You can obtain more information about AHERA by contacting your Regional Asbestos Coordinator (**RAC**).

You may also call the EPA Toxic Substances Control Act (**TSCA**) Hotline to ask general questions about asbestos, or to request asbestos guidance documents. The Hotline number is (202) 554-1404. The EPA Public Information Center can send you information on EPA regulations. You can reach the Center at (202) 382-2080 or (202) 475-7751.

To obtain a current listing of accredited labs contact NIST NVLAP at (301) 975-4016.

Asbestos Hazard Emergency Response Act (AHERA)

Regulation: 40 CFR 763 Subpart E, Appendix C
Applicability
This session summarizes the training requirements under the U.S. Environmental Protection Agency's (**EPA**) Model Accreditation Plan (**MAP**). Any person who remediates friable asbestos-containing building material (**ACBM**) from schools or public or commercial buildings must be accredited by EPA or an EPA-approved state program.

MAP does not require the accreditation of persons removing ACBM from detached residential single-family homes or residential apartment (including condominiums) buildings of less than 10 units. However, some states require all asbestos removal to be done by accredited personnel.
Note: Only approved training providers, with EPA or state-approved instructors may provide MAP accreditation training.

Worker Training Requirements
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:

- ✓ A response action other than a small-scale short-duration (**SSSD**) activity
- ✓ A maintenance activity that disturbs friable ACBM other than an SSSD activity
- ✓ A response action for a major fiber-release episode

All persons seeking accreditation as asbestos-abatement workers must complete an EPA- or EPA-state approved four-day training course. The four-day worker training course must 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 have actual experience performing tasks associated with asbestos abatement. A person who is otherwise accredited as a contractor/supervisor may perform in the role of a worker without possessing separate accreditation as a worker.

Contractor/Supervisor Training Requirements
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:

- ✓ A response action other than an SSSD activity
- ✓ A maintenance activity that disturbs friable ACBM other than an SSSD activity
- ✓ A response action for a major fiber release-episode.

All persons seeking accreditation as asbestos-abatement contractors/supervisors must complete an EPA or EPA-state approved five-day training course. 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 the lectures where appropriate.

Asbestos abatement supervisors include those persons who provide supervision and direction to workers performing response actions. Supervisors include people who serve as foreman, working foreman, or lead person 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.

Inspector Training Requirements
Any person who inspects schools or public and commercial buildings for ACBM must complete an EPA- or EPA-state approved course for accreditation. An inspector must complete a three-day training course that includes:

- ✓ Background information on asbestos
- ✓ Potential health effects related to asbestos exposure
- ✓ The function and qualifications of an inspector
- ✓ Legal liabilities and defenses
- ✓ Understanding building systems
- ✓ Proper notification to employees, the public, or building occupants of inspections
- ✓ Pre-inspection planning and review of previous inspection records
- ✓ Inspecting for friable and non-friable material
- ✓ Bulk sampling and documentation of asbestos
- ✓ Inspector respirator and personal protective equipment (**PPE**)
- ✓ Recordkeeping and report writing
- ✓ Regulatory review

The training must include at least four hours of hands-on training, individual respirator fit-testing, a course review, a written exam, and a field trip. The field trip must include a simulated building walk-through inspection, on-site discussion about information gathering, proper sampling locations, on-site practice in physical assessment, followed by classroom discussion.

Management Planner Training Requirements
Anyone who prepares management plans for schools must have EPA accreditation as a management planner. Management planners must already possess a current and valid inspector accreditation prior to seeking accreditation as a management planner. The management accreditation course must include:

- ✓ **A course overview**
- ✓ **Evaluation and interpretation of survey results**
- ✓ **Hazard assessment**
- ✓ **Legal implications associated with asbestos removal**
- ✓ **Evaluation and selection of control options**
- ✓ **The role of other professionals, such as industrial hygienist, architects, and engineers**
- ✓ **Developing an operation and maintenance plan**
- ✓ **Regulatory review**
- ✓ **Recordkeeping for management planners**
- ✓ **Submitting management plans**
- ✓ **Financing abatement actions**
- ✓ **Course review**

EPA does not require accreditation of management planners for public or commercial buildings.

Project Designer Training Requirements
A person must be accredited as a project designer to design any of the following activities with respect to friable ACBM in a school or public or commercial building:

- ✓ A response action other than an SSSD activity
- ✓ A maintenance activity that disturbs friable ACBM other than an SSSD activity
- ✓ A response action for a major fiber release episode

To be accredited as a project designer, the person must complete a minimum three-day training course. The training must include demonstrations and lectures on the following material:

- ✓ Background on asbestos
- ✓ Potential health effects related to asbestos exposure
- ✓ An overview of abatement construction projects
- ✓ Safety system design specifications
- ✓ Employee PPE
- ✓ Hazards encountered during abatement activity and how to deal with them
- ✓ Fiber aerodynamics and how to control fibers
- ✓ Design abatement solutions
- ✓ Final clearance process
- ✓ Budget/cost estimating
- ✓ Written abatement specifications
- ✓ Preparing abatement drawings
- ✓ Contract preparation and administration
- ✓ Legal liabilities and defenses
- ✓ Information on asbestos-free replacement products
- ✓ Role of other consultants
- ✓ Special design procedures for occupied buildings
- ✓ All relevant regulatory requirements

The course must also include a field trip to an abatement site or other building site for an on-site discussion of abatement design and building walk-through inspection, a course review, and a written exam.

Examinations
Each state requires a state-approved closed-book examination of anyone seeking accreditation after completion of the initial training course. The state may also include demonstration testing as part of the examination. Anyone seeking initial accreditation in a specific discipline (for example, worker, contractor/supervisor) must pass the examination for that discipline in order to receive accreditation.

Since a state may develop its own examination or have providers of training courses develop examinations, you must check with your state's particular requirements. Each examination must adequately cover the topics included in the training course for that discipline.

Certificate
Each person who completes a training course, passes the required examination, and fulfills whatever other requirements the state imposes must receive an accreditation certificate in a specific discipline. The certificate must include:

- ✓ A unique certification number
- ✓ Name of the accredited person
- ✓ Discipline of the training course completed
- ✓ Dates of the training course
- ✓ Date of the examination
- ✓ Expiration of the accreditation (one year from the date of the examination)
- ✓ The name, address, and telephone number of the training provider that issued the certificate
- ✓ A statement that the person receiving the certificate has completed the requisite training for the asbestos certification under the Toxic Substance Control Act Title II.

Continuing Education
For all disciplines, a state's accreditation program includes annual continuing education as follows:

- ✓ Workers—one full day of refresher training
- ✓ Contractor/supervisors—one full day of refresher training
- ✓ Inspectors—one-half day of refresher training
- ✓ Management planners—one-half day of inspector training and one-half day of training for management planners
- ✓ Project designers—one full day of fresher training
- ✓ Refresher training must address the specifics of each discipline and may not be combined with any other training course. Refresher training extends the accreditation for one year from the date of the refresher course. States may require full re-accreditation after a specific interval (e.g., every five years).

Recordkeeping Requirements for Trainers

All approved trainers of accredited asbestos training courses must comply with the following minimum recordkeeping requirements:

- ✓ **Training course materials.** Trainers must retain copies of all instructional materials used in the delivery of the classroom training, such as student manuals, instructor notebooks, and handouts.
- ✓ **Instructor qualifications.** Trainers must retain copies of all instructors' resumes, and the documentation approving each instructor as issued by either EPA or your state. Either EPA or your state must approve instructors before they may teach courses for accreditation purposes. The trainer must notify EPA or the state in advance whenever course instructors are changed. Records must accurately identify the instructors who taught each particular course for each date that a course was offered.
- ✓ **Examinations.** Trainers must document that each person who receives an accreditation certificate for an initial training course has achieved a passing score on the examination.
- ✓ **Accreditation certificates**. Trainers must 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.
- ✓ **Verification of certificate information**. EPA recommends that trainers of refresher training courses confirm that their students possess valid accreditation before granting course admission.
- ✓ **Records retention and access.** Trainers must maintain all required records for a minimum of three years.

Types of EPA Accreditation

EPA MAP training requires the following persons to be accredited:

- ✓ **Workers**
- ✓ **Supervisors/contractors**
- ✓ **Inspectors**
- ✓ **Management planners**
- ✓ **Project designers**

Each of these requires separate training courses and certifications. Certification is valid for one year before refresher training is required.

Training Session

Asbestos is a durable, fire-retardant, corrosion-resistant mineral compound that breaks up into fine, light fibers invisible to the naked eye.

The term "**friable asbestos**" describes asbestos that is dry and crumbly, capable of being reduced to dust by hand pressure. The use of asbestos ranges from paper products and brake linings to floor tiles and insulation.

Potential Health Effects Related to Exposure
Intact and undisturbed asbestos-containing material (**ACM**) does not pose a health risk. Asbestos becomes a problem when, because of damage, disturbance, or deterioration, fibers are released into the air.

Asbestos fibers can cause serious health problems. If inhaled, these tiny fibers can disrupt normal functions of the lungs. Exposure increases the risk of developing lung cancer, mesothelioma, or asbestosis. It can take anywhere from 20 to 30 years after the first exposure for the first symptoms to occur. Workers who held jobs in industries such as shipbuilding, mining, milling, and fabricating have experienced severe health problems from exposure.

Trainees must receive an explanation of the nature of asbestos-related diseases. Include in your session explanations of:

- ✓ Routes of exposure
- ✓ The dangers of cigarette smoking and asbestos exposure
- ✓ The latency periods for asbestos-related diseases (20 to 30 years)
- ✓ The relationship of asbestos exposure to asbestosis, lung cancer, mesothelioma, and cancers of other organs

Respirators
In general industry and construction, the level of exposure determines what type of respirator is required; the standards specify the respirator to be used. Demonstrate how different respirators work and have workers try them on. In addition, review the following with the trainees:

- ✓ **The components of a proper respiratory protection program**
- ✓ **Selection and use of PPE**
- ✓ **Use, storage, and handling of non-disposable clothing**
- ✓ **Regulations covering PPE**
- ✓ **Classes and characteristics of respirator types**
- ✓ **Limitations of respirators**
- ✓ **Proper selection and inspection**
- ✓ **Storing procedures for respirators**
- ✓ **Methods for field testing of the face piece to face seal (positive- and negative-pressure fit checks)**
- ✓ **Fit testing procedures**

For a more in-depth review, see PPE: Respirator Use, PPE: Protective Clothing and PPE: Eye and Face.

Work Practices

Workers should have actual experience performing tasks associated with asbestos abatement. Be prepared to demonstrate and have workers perform some or all of the following relevant tasks:

- ✓ **Proper work practices for asbestos abatement activities, including descriptions of proper construction**
- ✓ **Maintenance of barriers and decontamination enclosure systems**
- ✓ **Positioning of warning signs**
- ✓ **Lockout 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 high-efficiency particulate air (HEPA) vacuums**
- ✓ **Proper cleanup and disposal procedures**
- ✓ **Work practices for removal, encapsulation, enclosure, and repair of friable ACM**
- ✓ **Emergency procedures for sudden releases**
- ✓ **Potential exposure situations**
- ✓ **Transport and disposal procedures**
- ✓ **Recommended and prohibited work practices**

Personal Hygiene

Following abatement work, employees must wash their hands and face prior to eating, drinking, or smoking. Employees may not enter lunchroom facilities wearing protective work clothing or carrying equipment unless surface fibers have been removed from the clothing or equipment.

Discuss all of the following when explaining personal hygiene:

- ✓ **Entry and exit procedures for the work area**
- ✓ **Use of showers**
- ✓ **Avoidance of eating, drinking, smoking, and chewing (gum or tobacco) in the work area**
- ✓ **Potential for family exposures**

Additional Safety Hazards

In addition to personal hygiene, you should briefly discuss the following possible hazards encountered during abatement activities and how to deal with them:

- ✓ **Electrical hazards**
- ✓ **Heat stress**
- ✓ **Air contaminants other than asbestos**
- ✓ **Fire and explosion hazards**
- ✓ **Scaffold and ladder hazards**
- ✓ **Slips, trips, and falls**
- ✓ **Confined spaces**

For a more in-depth review, see PPE: Respirator Use, PPE: Protective Clothing and PPE: Eye and Face.

Summary

- ✓ The potential health effects related to asbestos exposure include lung cancer, mesothelioma, and cancers of other organs.
- ✓ Although asbestos is hazardous, human risk of asbestos disease depends upon exposure.
- ✓ Removal is often not the best course of action to reduce asbestos exposure. In fact, an improper removal can create a dangerous situation where none previously existed.
- ✓ Respirators have limitations of protection. Make sure your respirator is inspected, stored, and maintained properly.
- ✓ Employees must wash their hands and face prior to eating, drinking, or smoking.
- ✓ Smoking is not allowed in work areas exposed to asbestos.
- ✓ Each employee must enter and exit the asbestos-regulated area through the decontamination area.

DEMOLITION PRACTICES UNDER THE ASBESTOS NESHAP

SECTION 1
DEMOLITION PRACTICES AND NONFRIABLE MATERIALS

INTRODUCTION
EPA revised the asbestos NESHAP regulations on November 20, 1990 (see **40 CFR Part 61 Subpart M)**. Although the NESHAP has not been revised to alter its applicability to friable and nonfriable asbestos-containing materials (**ACM**), nonfriable asbestos materials are now classified as either Category I or Category II material.

Category I material is defined as asbestos-containing resilient floor covering, asphalt roofing products, packings and gaskets. Asbestos-containing mastic is also considered a Category I material (EPA determination - April 9, 1991). Category II material is defined as all remaining types of non-friable ACM not included in Category I that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. Nonfriable asbestos-cement products such as transite are an example of Category II material.

The asbestos NESHAP specifies that Category I materials which are not in poor condition and not friable prior to demolition do not have to be removed, except where demolition will be by intentional burning. However, regulated asbestos-containing materials (**RACM**) and Category II materials that have a high probability of being crumbled, pulverized, or reduced to powder as part of demolition must be removed before demolition begins.

PURPOSE
EPA has identified a need to address how specific demolition practices affect Category I and II nonfriable ACM. The purpose of this manual is to provide asbestos NESHAP inspectors with such information.

This section is intended to apply primarily to demolition and cleanup activities for buildings that contain Category I nonfriable ACM. Although references will be made to Category II nonfriable ACM, for the purposes of this document, it and all other RACM will be assumed to have been removed prior to the start of actual demolition activities. Work practices associated solely with building renovations will not be addressed.

This section is designed to assist the asbestos NESHAP inspector in identifying practices that normally do or do not make Category I nonfriable ACM become regulated asbestos-containing material (**RACM**).

Applicability determinations (both formal and informal) provided by the Regional NESHAP Coordinators have been incorporated into the appropriate sections of this document in an effort to promote nationwide consistency in applying the asbestos NESHAP to these demolition practices.

Activities associated with site cleanup such as segregation, reduction, and on and offsite disposal of ACM are discussed because they may take place during or after the major demolition activities at a site and consequently may influence a demolition contractor's choice of methods.

SECTION 2
PRE-DEMOLITION BUILDING STATUS

This section discusses several factors that can affect the approach to demolition taken by a demolition contractor. It is being included because events that have taken place prior to the start of actual demolition work can influence the methodology(ies) chosen by demolition contractors. These events can be evaluated by an inspector, allowing for prediction of "**hidden**" potential problem areas. Reinforcement and clarification of applicable components of the asbestos NESHAP regulations are also included in this section.

STATE AND LOCAL REGULATIONS

State and local asbestos regulations are sometimes more stringent than the asbestos NESHAP regulations. This does not imply, however, that Category I nonfriable ACM is necessarily removed from a building prior to demolition. Contractors surveyed during research conducted in the preparation of this manual indicated that they typically treated Category I nonfriable ACM as RACM only when the owner or operator of the building being demolished was a state or local government agency or when project specifications explicitly specified that one or more of the Category I nonfriable ACM materials be removed prior to the start of demolition.

UNSAFE BUILDING DECLARATIONS

Several contractors surveyed utilized state or local mechanisms to have buildings declared unsafe as a means to avoid NESHAP requirements during and after demolition activities. However, a State or local agency should not issue a demolition order unless the facility is structurally unsound and in danger of imminent collapse. These conditions should be confirmed independently, and a demolition order should not be based solely on the representation of the contractor or the contractor's agent.

Although issuance of a demolition order may have an effect on notification requirements under the asbestos NESHAP (see 61.145(a)(3)), it has no effect on requirements for disposal procedures for RACM after demolition activities. Also, waste segregation/reduction activities, addressed in Section 5 of this manual, are subject to the asbestos NESHAP provisions whether or not a building has been declared unsafe.

ABATEMENT PRIOR TO DEMOLITION

Demolition contractors typically require that a building owner/operator accept responsibility for the removal of all asbestos-containing materials found during the building inspection prior to the start of demolition activities. Several contractors indicated that if suspect ACM became exposed during demolition activities, and there was no prior knowledge of its existence at the start of demolition activities, that potential asbestos NESHAP requirements would be disregarded unless a change order was immediately processed by the owner/operator requesting the time and materials necessary to achieve compliance with the asbestos NESHAP. Such practices are in direct violation of the asbestos NESHAP.

INTENTIONAL BURNING

As stated in the November 1990 asbestos NESHAP revision (see 61.145(c)(10)): "If a facility is demolished by intentional burning, all RACM, including Category I and Category II nonfriable ACM, must be removed in accordance with the NESHAP before burning." Abandoned buildings utilized by fire departments for practice exercises involving partial burning are subject to this requirement.

For buildings which are still structurally sound but which have previously been subjected to partial or total, intentional or unintentional burning, an inspection for the condition of all ACM should be conducted. Category I ACM should be examined for friability and condition. Friable materials or Category I materials that are friable and in poor condition must be removed prior to any further demolition activity.

SECTION 3
DEMOLITION PRACTICES BY TYPE OF ACM

INTRODUCTION

For many years now the applicability of the asbestos NESHAP to demolitions involving Category I nonfriable ACMs (packings, gaskets, resilient floor coverings and mastic, and asphaltic roofing materials) has been the topic of much debate. Since significant amounts of airborne asbestos fibers are not believed to be produced from such materials during normal demolition activities, however, the asbestos NESHAP, in most cases, does not require their removal prior to demolition.

Category I materials are considered RACM only when they "**will be or have been subjected to sanding, grinding, cutting, or abrading**", they are in "**poor condition**" and "**friable**", or the structure in which they are located will be demolished by burning. (Definitions for these terms and additional information concerning Category I nonfriable ACM can be found in the preamble to the November 1990 revised asbestos NESHAP (**SUPPLEMENTARY INFORMATION**, Section IV - Significant Comments..., Demolition and Renovation, Nonfriable ACM and Broken ACM).

The following information details specific pre-demolition and demolition practices and their impact on Category I nonfriable ACM. The information has been compiled from telephone surveys of demolition contractors, the viewing of activities at a number of demolition sites, and formal and informal EPA applicability determinations. The effects of various demolition practices on asbestos-cement products are also discussed. Since the applicability of the asbestos NESHAP to Category II nonfriable materials is determined on a case-by-case basis, it is hoped that this additional information will help foster nationwide consistency in the application of the regulation to these materials.

As you will see, many of the various demolition techniques described do not, by themselves, cause Category I nonfriable ACM to become RACM. However, in many cases, post-demolition waste consolidation, cleanup, and recycling efforts can cause both Category I nonfriable ACM and Category II nonfriable ACM to become RACM. If that is likely to happen, such materials must be considered RACM and be treated as such. Post-demolition activities which can affect Category I and II materials will be detailed later in this manual.

RESILIENT FLOOR COVERING (TILES)

Depending on the types of activities occurring at a demolition site, floor tiles (and mastic) may or may not become subject to the provisions of the asbestos NESHAP.

Pre-demolition Floor Tile Removal

Although not usually required by the asbestos NESHAP, removal of asbestos-containing resilient floor tiles may occur prior to demolition. Such removal may be required when the substrate to which the floor covering is attached (particle board, wood, concrete) is to be recycled or salvaged.

Since the presence of mastic is not desirable on materials intended for resale or recycling, contractors use a variety of methods to remove this material as well. A wide variety of floor tile removal methods exists, some of which cause the floor tiles and mastic to become RACM and subject to the provisions of the asbestos NESHAP. The following describes various removal methods and the applicability of the asbestos NESHAP to them.

Water/Amended Water/Solvents
Water, amended water, or solvents may be spread onto floor tiles in order to loosen them. After a period of soaking, the tiles may be removed using long-handled scrapers (ice chippers), or gas- or electrically-powered mechanical chisels. In cases where tile breakage is minimal, the floor tiles are not considered RACM.

However, where breakage is extensive, the tiles are RACM and are subject to the provisions of the asbestos NESHAP.

Dry Ice
Although rarely used for this purpose nowadays, dry ice (frozen carbon dioxide) can be used to remove floor tiles. When dry ice is applied to the tiles, the intense cold causes the tiles to contract and detach from the substrate. As long as the tiles are not extensively damaged, they are not considered RACM.

Infrared Machines
Infrared machines may be used in the removal of floor tiles. These machines heat the flooring, thereby softening the tiles and adhesive, and allow for its easy removal. Since most tiles detach intact, they are not friable, and therefore are not considered RACM.

Shot-blasters
Shot-blasters are sometimes used in the removal of floor tiles. These machines direct a barrage of small pellets (shot) against the tiles and continually vacuum up and separate the mixture of pulverized tile and pellets. The pellets are reused immediately and the pulverized materials are segregated for disposal. EPA allows the use of shot-blasters only on wetted floor tiles.

Floor tiles and mastic removed by shot-blasters are considered RACM and are therefore subject to the asbestos NESHAP.

Demolition with Floor Tiles in Place
Since ordinary demolition activities do not include the sanding, grinding, cutting and abrading of floor tiles, floor tiles and associated mastic that are not in poor condition and not friable are not considered RACM and are allowed to remain in place during demolition.

ASPHALT ROOFING PRODUCTS
The pre-demolition terms and conditions (governmental regulations, contract specifications) discussed in Section 2 also influence the handling of asbestos-containing roofing materials.

Pre-demolition Roof Removal
If preliminary assessment has determined that roofing materials contain asbestos, and regulations or contract specifications dictate removal of such material prior to demolition, licensed abatement contractors may be required to do the removal. Alternatively, the demolition contractor may undertake the operation.

Roofs may be removed in a variety of ways. Demolition personnel may use sledge hammers, pry bars, axes, adzes, shovels, ice chippers and roof-cutting saws to remove the roofing materials. They also may use tractor-mounted rotating blade cutters, power plows and power slicers. Use of roof-cutting saws, either hand-or power-driven, or tractor-mounted, are of great concern, since they can generate asbestos-containing dust from roofing materials. The sawing of Category I nonfriable ACM roofing material and the debris created by the sawing are regulated by the asbestos NESHAP. Since power plows and power slicers do not sand, grind, cut or abrade the roofing materials, their use and resultant debris are not subject to the asbestos NESHAP regulation. Category I nonfriable ACM roofing squares that have been decontaminated may be disposed of with other demolition debris or at an asbestos landfill.

Demolition with Roofing Materials in Place
Since demolition activities do not include sanding, grinding, cutting, or abrading, Category I asbestos-containing roofing materials not in poor condition and not friable are not considered RACM and are allowed to remain in place during demolition.

ASBESTOS-CEMENT PRODUCTS
Asbestos-cement products (such as transite) are commonly used for duct insulation, pipes, and siding. Being a Category II nonfriable ACM, asbestos-cement products need to be removed prior to demolition if they have a high probability of becoming crumbled, pulverized, or reduced to powder during demolition activities. EPA believes that most demolition activities will subject such Category II nonfriable ACM to the regulation.

Whether asbestos-cement products are subject to the asbestos NESHAP should be determined by the owner or operator on a case-by-case basis based on the demolition techniques to be used. In general, if contractors carefully remove asbestos-cement materials using tools that do not cause significant damage, the materials are not considered RACM and can be disposed of with other construction debris.

However, if demolition is accomplished through the use of cranes (equipped with wrecking balls, clamshells or buckets), hydraulic excavators, or implosion/explosion techniques, asbestos-cement products will be crumbled, pulverized or reduced to powder, and are subject to the provisions of the asbestos NESHAP.

Some demolition contractors do not treat significantly damaged asbestos-cement products as RACM; they mix it with other demolition debris and dispose of it in direct violation of the waste-disposal provisions of the asbestos NESHAP.

SECTION 4
DEMOLITION PRACTICES BY METHOD

Methods of destruction employed at demolition sites include the use of heavy machines, explosions/implosions, and hand methods. All of these methods cause Category II nonfriable ACM to become RACM; however, Category I nonfriable ACM (packings, gaskets, resilient floor coverings, asphaltic roofing materials, mastic) that is not in poor condition and not friable prior to the demolition operation may be subjected to most of these techniques without becoming RACM.

The following describes various demolition techniques and their effects on nonfriable materials. All Category I nonfriable ACM referenced is presumed not to be in poor condition and not friable prior to the demolition operation.

HEAVY MACHINERY RAZING OPERATIONS
For the purposes of this document heavy machinery (or equipment) includes large motorized vehicles such as bulldozers with rakes, top loaders, backhoes, skid loaders/bobcats, hydraulic excavators, and other similar machinery used for transporting, moving, or dislodging of materials at a demolition site. Cranes equipped with wrecking balls, clamshells, or buckets are also considered heavy machinery.

Heavy machinery is used at demolition sites for both razing operations and post-demolition activities. "**Razing**", the process which reduces a building's structural skeleton to rubble, typically occurs after the building's interior has been gutted by hand.

Use of heavy machinery during the razing process causes Category II nonfriable ACM, but not Category I nonfriable ACM to become RACM. Use of such equipment during subsequent operations, such as waste consolidation, however, is a major concern which will be addressed in Section 5 of this document.

Bulldozers and Similar Machinery
Included in this grouping of heavy machinery are all types of bulldozers, backhoes, top loaders and skid loaders/bobcats commonly used in conjunction with hand methods to raze buildings. Bulldozers move on tracks whereas backhoes, top loaders, and skid loaders operate on rubber tires.

Only if a great deal of working space exists at a site, and a precisely-controlled demolition is not necessary, can bulldozers such as 977 loaders and D-9s be used to demolish a building. These bulldozers are typically equipped with giant rakes designed to ram building walls and move debris.

977's or D-9s may be used to undermine a building, but hydraulic excavators (discussed later in this section) are usually used for this purpose. Backhoes and top loaders are mainly used for moving debris and tearing off sections of walls and other building components.

Skid loaders, machines commonly used to load skids or pallets onto trucks, may be specially equipped with a type of ram for use during demolitions and are usually of the "**bobcat**" type.

The razing of a building using the heavy machinery described above causes Category II nonfriable ACM, but not Category I nonfriable ACM to become RACM.

Hydraulic Excavators
Hydraulic excavators, such as EL-300s, 225s or 215s, resemble a combination bulldozer/backhoe and operate on tracks. They are easier to use and provide greater control during demolition than the bulldozers described above. However, since they too raze buildings by ramming and tearing, like bulldozers, their use in congested areas is limited. Nearby buildings must be protected from the falling debris; plywood may be applied over the windows and rubber tires may be used to cushion and prevent damage to walls of adjacent structures.

On rare occasions, hydraulic excavators may be used to topple one-or two-story buildings by means of an undermining process. The strategy is to undermine the building while controlling the manner and direction in which it falls. The demolition project manager (who in many jurisdictions must be licensed by the city or state) must determine where undermining is necessary so that a building falls in the desired manner and direction. The walls are typically undermined at a building's base, but this is not always the case as building designs may dictate otherwise. Safety and cleanup considerations are also taken into account in determining the methods to be used.

Since the toppling of a building constitutes a safety hazard and generates enormous quantities of dust, many cities and towns will not approve of this method of demolition. Where the practice is allowed, the contractor may be required to keep the structure wet during demolition. Hydrant permits may be required and, because of the wetting restrictions, such demolitions may be impossible to accomplish during the winter.

Hydraulic excavators are also used to conduct cleanup activities such as excavation, fill burial, material reduction, and material load-out. The use of hydraulic excavators during the razing process causes Category II nonfriable ACM, but not Category I nonfriable ACM to become RACM.

Cranes (Wrecking Ball, Clamshell, Bucket)
Although often employed in the past, particularly during demolitions of high-rise structures, cranes are now rarely used. They are expensive to operate and usually not necessary, since renovation has displaced demolition as the method of choice in dealing with many out-of-date structures. Cranes are currently used only in situations where other equipment cannot be employed.

Cranes may be equipped with wrecking balls, clamshells or buckets, which are used in a variety of ways. All three may be dropped or swung against the structure to demolish it. When employed in this manner, clamshells provide the greatest force of the three and result in the fastest, most efficient demolition projects.

Buckets and clamshells allow a greater degree of control than wrecking balls. Buckets may be raised to the level where internal demolition of the building is taking place and be used merely to transport and segregate hand-loaded demolition materials collected from within. Clamshells can take big bites out of the structure and facilitate the segregation of demolition debris.

When demolition is accomplished by crane, the process can begin at the roof and progress continually downward, or alternate up and down. Materials are segregated to the greatest degree possible as the demolition progresses so that the need for post-demolition handling is minimized. In the case of high-rise structures, the interiors are usually gutted by hand prior to razing.

Effect on Category I Materials
The use of cranes during the razing process does not cause Category I nonfriable ACM to become RACM; therefore, Category I materials which are not in poor condition and not friable may remain in the building during such demolition.

Effect on Category II Materials
The use of wrecking balls on asbestos-cement (**A/C**) siding (a Category II nonfriable ACM) on buildings is specifically addressed in the November 1990 asbestos NESHAP revision (see SUPPLEMENTARY INFORMATION, Section IV - Significant Comments...,

Demolition and Renovation, Nonfriable ACM):
"...the A/C siding on a building that is to be demolished using a wrecking ball is very likely to be crumbled, or pulverized with increased potential for the release of significant levels of asbestos fibers. Such material in this instance should be removed prior to demolition."

Therefore, A/C siding, although a nonfriable material, is considered RACM when a wrecking ball is being used to demolish the structure. Whenever buckets and clamshells are to be swung like wrecking balls, A/C materials should also be considered RACM.

EXPLOSIONS/IMPLOSIONS
Building implosions utilizing explosive devices constitute a rarely-used demolition technique. In simplest form, this method is accomplished through the use of explosive charges placed strategically throughout a building so that the building collapses in on itself and debris does not radiate outward to any appreciable distance. Relatively large quantities of dust are created, however, and the direction and magnitude of transport are matters of concern.

Effect on Category I Materials
The asbestos NESHAP does not require the removal of Category I nonfriable ACM that is not in poor condition and not friable prior to building implosions. Normal implosion techniques do not cause nonfriable materials to become RACM. The destruction of buildings during military target practice is considered to be another form of explosive demolition. Category I materials may remain in place during target practice. However, if it can be expected that the building and ACM will burn as a result of explosive demolition, the ACM must be removed prior to demolition.

Recent examination of asbestos-containing floor tiles and roofing materials contained in a large building demolished by implosion revealed that the floor tile was in fair to good condition and had not become friable. Tiles had been broken up into small quantities of large pieces as the individual floors collapsed upon each other. The roofing materials were similarly affected; they too remained nonfriable following demolition by implosion.

EPA does not consider Category I material to be RACM as a result of building implosions.

If, however, Category I materials are to be subjected to sanding, grinding, cutting, or abrading after demolition, they must be treated as RACM and be removed from the building before demolition.

Effect on Category II Materials
Category II materials, such as transite, found in or on buildings scheduled for implosion/explosion destruction must be removed before such demolition. Such materials are considered RACM because they have "**a high probability of becoming crumbled, pulverized or reduced to powder**" during such activities.

HAND METHODS OF DEMOLITION

This section of the manual addresses hand methods employed during demolition and includes segregation activities which take place during demolition (as opposed to cleanup) and their effects on Category I materials. "**Hand methods**", for the purposes of this manual, refer to the use of motorized and non-motorized tools that can be operated by hand and are not used for transportation.

The methods discussed include not only those used in the gutting of building interiors prior to razing, but also those used during razing itself. Unless otherwise noted, **"hand methods**" refers to those methods that do not significantly damage the ACM and therefore do not cause Category I nonfriable ACM to become RACM.

Most buildings of ten floors or less are currently razed at least partially, if not fully, by hand. Hand methods allow much greater control over a building's collapse than other methods and permit easier segregation of demolition materials for resale or recycling than other demolition methods. In addition, hand methods may be required because of workspace limitations.

Depending on the size of the job and demolition schedule, the size of a demolition crew may vary from as few as five individuals to 30 or more. As a general rule, workers use relatively inexpensive tools such as pry bars, hand-held saws, power saws, sledge hammers, axes, bolt cutters, and acetylene torches during gutting and razing operations.

As the gutting/salvage activities progress, demolition debris is typically deposited into a trailer or dumpster strategically placed outside a window of the building being demolished. The window frame is removed and materials are loaded into the storage containers by hand, or, where possible, by bobcats operating within the building. Many jobs require the use of dust-tight chutes for the transport of such debris.

On the rare occasion where onsite burial of demolition debris is allowed, the first activity to take place in the building is the removal of the first story's flooring. This is done so that as waste materials accumulate on upper floors, they can be sent down into the basement through the center of the building, typically through elevator shafts, for disposal.

Chutes may be used if elevator shafts are not available. Such onsite disposal typically is allowed only for noncombustible materials such as cement and brick. Waste consolidation activities which occur in the basement area are of great concern to EPA and are discussed in Section 5 of this manual.

Excess demolition wastes are loaded out for transport to a landfill that accepts construction debris.

If no basement area exists, or if materials cannot be sent into dumpsters or trailers immediately as previously described, debris may be stored in piles scattered around the site. These materials may subsequently be moved by hand or through the use of light or heavy machinery. Section 5 of this manual details such operations.

Floor Removal and Disposition
The techniques used in removing flooring depend upon its ultimate fate. Where it is in poor condition and incapable of being reused or recycled, the flooring is typically ripped out using pry bars and sledge hammers and sent offsite for disposal.

Sometimes wood flooring and other debris is burned to reduce the volume of waste. In this case, the asbestos must be removed prior to burning the wood debris. Since demolition debris disposal costs are so high ($100 - $500 per 60-100 cubic yard load) as much salvage/recycling of materials is done as possible.

Wood or particle board flooring is sometimes segregated and sold to recycling centers where it is chipped up and sold as filler or mulch (composting, gardening, etc.). If resilient asbestos-containing floor covering is attached to such flooring it is considered RACM and must be removed prior to recycling. Tiles are often chipped or scraped off the substrate using the methods described in Section 3.

Large planks and joists, and beams (both wooden and steel) may also be saved if they are in good condition. Wooden planks are usually lifted with pry bars, whereas the larger joists and beams are segregated for reuse following the razing of the structure.

Where demolition debris will be recycled, any asbestos remaining on the debris must be removed prior to any recycling that will sand, grind, cut, or abrade the asbestos or otherwise cause it to become RACM.

Roof Removal and Disposition
On occasion one may find that the roof of a building being demolished is removed before the building is razed. Such removal may be required when buildings are very close to one another, or when the roofing contains asbestos-containing materials.

There are two major types of roofing: "**built-up roofing**" and "**sheet goods**". Built-up roofing contains multiple layers of felt and asphalt. Sheet goods typically consist of a single layer of material.

Roofs are often taken out by hand, typically by using pry bars, sledge hammers, axes, adzes, bolt cutters, ice chippers, shovels and roof-cutting saws. If the roof contains asbestos materials (felt, cork, etc.), an asbestos removal contractor may be employed to remove it.

Some abatement contractors wet the roof with plain or amended water and then use shrouded power saws whose exhaust is HEPA-filtered to cut the roofing into manageable (often 2' x 3') pieces. After the pieces are lifted, the edges may be encapsulated. Other abatement contractors may build a full containment and establish a reduced pressure environment prior to removing the roofing materials.

Depending upon the contractors involved and the condition of the asbestos-containing roof debris, the debris may or may not be segregated from other demolition debris. Abatement contractors may store roof debris in lined dumpsters onsite and dispose of it at an asbestos landfill; if the asbestos-containing roofing material is not in poor condition and is not friable however, it may be disposed of in a landfill which accepts ordinary demolition waste.

Asbestos-containing roofing material may not be ground up for recycling into other products.

Work Progression
Demolition crews typically work downward, floor by floor. Materials such as doors, windows, electrical and other fixtures which can be salvaged are removed first. Interior partitions are then ripped, cut, or knocked out using various hand-held tools including sledge hammers, axes, adzes and pry bars. Brick is generally segregated immediately after being knocked out of walls so it can be examined at the site by potential buyers.

Ceilings are also ripped out using pry bars, axes and sledge hammers. Steel and other metal materials are typically placed in separate debris piles from other materials. Work proceeds in a similar floor/wall, floor/wall pattern until the first floor is once again reached.

Sawing/Cutting Operations
In order to raze a building by hand, load-bearing members must be cut. Based upon the composition, thickness, and condition of the structural member being cut, saws selected range from hand saws to Sawz-alls and gas-driven carbide blade hand saws. Large bolt cutters are also used to cut steel members. Category I materials subjected to sawing or cutting are subject to the provisions of the asbestos NESHAP; however, typical demolition sawing/cutting operations rarely involve such materials.

Grinding Operations
Grinding operations are not common occurrences at most demolition sites. On occasion, however, asbestos-containing mastic and remaining pieces of floor tile may be ground off concrete destined for recycling. Category I material so treated is RACM and is subject to the provisions of the asbestos NESHAP.

Pulverizing Operations
On occasion, asbestos-containing floor tiles are removed from their substrate by hand, using either hand-held ice choppers or electrically- or gas-powered mechanical chippers. If use of such methods pulverizes, crumbles or reduces the floor tiles to powder, the tiles must be considered RACM and must be handled in accordance with the requirements of the asbestos NESHAP.

Summary
On rare occasions Category I nonfriable ACM may be subjected to hand methods involving the uncontrolled drilling, cutting, sawing, grinding or abrading of such materials; under these circumstances Category I materials are considered RACM.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ONSITE WASTE HANDLING PROCEDURES

INTRODUCTION

At the present time it is not demolition operations and ordinary cleanup activities but the post-demolition activities involving waste consolidation and recycling of Category I and II materials which are of greater concern. If such activities subject either Category I or II nonfriable ACM to sanding, grinding, cutting or abrading, the materials become RACM and are then subject to the provisions of the asbestos NESHAP.

In general, since cleanup activities such as loading waste debris onto trucks for disposal do not subject nonfriable materials to sanding, grinding, cutting or abrading, such materials are not considered asbestos-containing waste materials and are not regulated by the asbestos NESHAP.

However, waste consolidation efforts which involve the use of jack hammers or other mechanical devices such as grinders to break up asbestos-containing concrete or other materials covered or coated with Category I nonfriable ACM, are subject to the regulation.

In addition, operations such as waste recycling which sand, grind, cut, or abrade Category I or II nonfriable ACM are subject to the asbestos NESHAP. When these types of activities are performed, Category I and II nonfriable ACM become RACM.

The following details the post-demolition activities of waste consolidation (segregation and reduction), waste load-out and onsite waste disposal and their effects on nonfriable ACM.

WASTE CONSOLIDATION

Waste consolidation operations involve segregation and reduction activities that have as their ultimate goal the resale, recycling, and disposal of demolition debris.

Segregation of Demolition Debris

Demolition contractors segregate demolition debris primarily to maximize their profits. As much material as possible is collected for resale and recycling (e.g., wood, brick, steel and concrete); the remaining debris is most often transported offsite for disposal.

Segregation may involve cutting and grinding operations, the breaking and tearing apart of materials to separate them by material type, and the transport of materials within the demolition site boundaries.

Since segregation activities may be accomplished using hand methods and heavy equipment, nonfriable ACM may or may not become friable in the process. The following text details various segregation activities and describes their effects on nonfriable materials.

Segregation by Hand

Materials such as wood, brick and steel are generally separated from other demolition debris using equipment such as sledgehammers, prybars, adzes and axes. If any hand equipment is used to cut, sand, grind, or abrade Category I or II materials, RACM is thus created and the provisions of the asbestos NESHAP apply.

Material Transport
Since heavy equipment is often used to move and segregate demolition debris, questions have been raised concerning the effect of such transport particularly on

Category I nonfriable ACM.
If Category I nonfriable ACM is transported across a demolition site in the bucket of a top loader, backhoe, hydraulic excavator or other similar vehicle, it is not considered RACM since it is not subjected to sanding, grinding, cutting or abrading during this activity.

Use of bulldozers, on the other hand, is expected to have a greater impact on Category I materials. However, EPA has stated that "...if the bulldozer is moving the debris or picking it up to be put in a vehicle and inadvertently runs over Category I material, then it is not subject to the NESHAP standard" (see Appendix I). Consequently, the moving of debris by bulldozers, whether by carrying it in a bucket or pushing it along the ground does not in itself cause Category I nonfriable ACM to become RACM.

Category II nonfriable ACM subjected to sanding, grinding, cutting or abrading during collection and transport is considered RACM and thus subject to the asbestos NESHAP.

Vehicular Traffic Impact
Rubber-tired Vehicles
If nonfriable ACM is intentionally run over by rubber-tired vehicles as a means of segregation, it does not automatically become RACM but must be examined for damage. If it has become extensively damaged, i.e., it was sanded, ground, cut or abraded during segregation, it becomes RACM and is subject to the NESHAP regulation.

Tracked Vehicles
Although tractor treads present greater risks of causing extensive damage to nonfriable ACM, limiting their use at demolition sites is not considered practical. Intentionally running over nonfriable ACM with tractor treads as a means of segregation is considered grinding; material thus treated becomes RACM.

Intentional segregation in this manner is addressed in the preamble to the revised asbestos **NESHAP (SUPPLEMENTARY INFORMATION**, Section IV, Significant Comments and Changes to the Proposed Revisions, Demolition and Renovation, Nonfriable ACM):
"Examples of practices...included the breaking of nonfriable insulation from steel beams by repeatedly running over the beams with a crawler tractor...these and other similar practices involving nonfriable asbestos material were considered to render nonfriable ACM into dust capable of becoming airborne."

Reduction of Demolition Debris
Reduction activities are of the greatest concern to EPA, since they are most likely to cause both Category I and Category II nonfriable ACM to become RACM.

Category I Reduction

The use of bulldozers to reduce the volume of Category I materials causes them to become RACM as discussed elsewhere in this manual and in the following EPA correspondence:
"If, after a demolition, material left in the facility... is intentionally ground up (such as repeatedly running over the debris with a bulldozer to compact the material), then 61.150(a)(3) applies. The material must be adequately wetted and kept adequately wet during collection and transport to a site or facility operated in accordance with 61.154 or 61.155." (See Appendix I).

Reduction by the use of sledgehammers does not normally cause Category I nonfriable ACM to become RACM. The use of pneumatic hammers, however, whether hand-operated or attached to heavy machinery, does cause these materials to become RACM.

The use of cranes with clamshells or other heavy machinery with rakes or buckets to partially reduce Category I nonfriable ACM is permissible if the material is left recognizable in its original form. Extensively damaged Category I ACM (that which has been sanded, ground, cut, or abraded) becomes RACM. Consolidating waste materials containing Category I nonfriable ACM in the hole (basement) of a building and subsequently grinding or crushing it via bulldozer subjects the operation to the asbestos NESHAP.

For wood/tile debris, demolition crews sometimes use tree chippers to grind the material up. Any Category I nonfriable ACM subjected to this treatment becomes RACM.

Category II Reduction
Reduction of Category II materials such as asbestos-cement pipe and concrete following demolition is also a matter of concern.

Asbestos-Cement Pipe
EPA considers asbestos-cement pipe to be a "**facility component**" (as defined in 40 CFR 61.141) of the facility which owns or utilizes the pipe. In addition, EPA considers asbestos-cement pipe to be Category II nonfriable asbestos containing material. This material becomes "regulated asbestos containing material" (RACM), as defined in 40 CFR 61.141, when it becomes "**friable asbestos material**" or when it "has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the material during the course of demolition or renovation operations regulated by [40 CFR Part 61 Subpart M]."

Consequently, the crushing of asbestos-cement pipe with mechanical equipment will cause this material to become RACM. The demolition and renovation provisions in 40 CFR 61.145 and the waste disposal provisions in 40 CFR 61.150 apply to asbestos-cement pipe where the pipe is considered RACM, and the amount of pipe being removed and crushed is at least 260 linear feet for a single renovation project or during a calendar year for individual nonscheduled operations.

Concrete
At certain demolition sites demolition contractors may rent and operate large concrete-pulverizing machines called PC-400s. Since the asbestos content of concrete is rarely known, use of such machines is a matter of concern to EPA. Under no circumstances should asbestos-containing concrete, or concrete to which asbestos-containing resilient flooring is attached, be subjected to such treatment.

Onsite Waste Disposal
As mentioned in other sections of this manual, using heavy machinery to crush demolition debris containing Category I or II nonfriable ACM in place prior to or during burial, can cause the ACM to become RACM subject to the provisions of sections 61.150 (waste disposal) and 61.151 (inactive waste disposal sites) or 61.154 (active waste disposal sites). If Category I or II materials are not rendered friable, they are not subject to the asbestos NESHAP.

EPA has recently responded to a question regarding the onsite disposal of crushed asbestos-cement pipe, a Category II material. The response is applicable as well to the burying of Category I material which has been sanded, ground, cut or abraded. In its correspondence EPA stated that the practice of backfilling and burying crushed asbestos-cement pipe in place causes these locations to become active waste disposal sites subject to the requirements of 61.154.

Furthermore, if no additional asbestos-containing waste material is buried at that location for a year, the site becomes an inactive waste disposal site subject to the requirements of 61.151(e) and 61.154(h). Consequently, the owner of the land would be required to comply with the requirements for active and inactive waste disposal sites.

In order to avoid the creation of a waste disposal site which is subject to the Asbestos NESHAP, it was suggested that the owners or operators of the pipe consider other options for dealing with it. If the pipe is left in place or removed in such a way that it is not crumbled, pulverized or reduced to power, it would not be subject to the NESHAP. If the pipe must be crushed, the creation of an active waste disposal site can be avoided by removing the pipe from the site and transporting it to a landfill which accepts asbestos waste material.

An alternative method suggested involved the pumping of grout into the buried lines which are no longer in service.

Waste Load Out
As mentioned previously, waste load out activities generally do not cause Category I nonfriable ACM to become RACM. Top loaders are typically used to deposit demolition debris containing Category I nonfriable ACM into trucks for hauling to landfills that accept construction debris.

Recent EPA correspondence discusses the hauling and ultimate disposal of both Category I and Category II ACM as follows:

It is required under 61.150(a)(3) that asbestos-containing waste material be kept adequately wet. Asbestos-containing waste material as applied to demolitions and renovations includes RACM waste and materials contaminated with asbestos including disposable equipment and clothing. Category I or Category II nonfriable ACM that has been contaminated by RACM, and cannot be decontaminated (e.g., building debris in a pile contaminated with RACM) must be treated as asbestos-containing waste material.

Category I or Category II ACM that does not meet the definition of RACM after a demolition or renovation, and is not contaminated with RACM, is not asbestos-containing waste material and is not subject to the wetting requirement of 61.150(a)(3).

Category I or II nonfriable ACM that is not subject to 61.150(a)(3) would still have to be disposed of in a landfill that accepts building debris, in a landfill that operates in accordance with 61.154, or at a facility that operates in accordance with 61.155.

This waste material would not be allowed to go to any facility that would sand, grind, cut or abrade the non-RACM waste or otherwise turn it into RACM waste (such as a cement recycling facility). In addition, if Category I or II nonfriable ACM is sanded, ground, cut or abraded during disposal at a landfill, before it is buried, it is subject to the NESHAP. (See Appendix I).

SECTION 6
OFFSITE WASTE HANDLING PROCEDURES

The issues discussed in this section include landfills, recycling centers, conversion facilities, and renovation activities. Since EPA has taken a "**cradle to grave**" approach regarding the disposition of ACM, responsibility for the ultimate fate of Category I ACM rests with all individuals involved in handling the material.

Landfills

Category I and II ACM that has become RACM must be disposed of in a landfill that operates in accordance with 61.150 and 61.154, or in an EPA-approved conversion facility described in 61.155 of the asbestos NESHAP.

Category I and II nonfriable ACM which has not become RACM during demolition may be disposed of in a landfill that normally accepts construction debris. However, if Category I or II nonfriable ACM is sanded, ground, cut or abraded before it is buried at the landfill, it is subject to the asbestos NESHAP.

Recycling Centers

At the present time, EPA does not allow either Category I or II nonfriable demolition debris to go to any facility (e.g., a cement recycling facility) that will sand, grind, cut or abrade it or otherwise turn it into RACM waste. Recycling facilities which cause non-RACM waste to become RACM waste are subject to the provisions of the asbestos NESHAP (See Appendix I).

Conversion Facilities

Conversion facilities are addressed in Section 61.155 of the November 1990 revised asbestos NESHAP. Owners/operators of such facilities must handle ACWM according to the provisions of the asbestos NESHAP.

REPORTING AND RECORDKEEPING REQUIREMENTS FOR WASTE DISPOSAL

FIELD GUIDE
This is a guide to help you comply with the new reporting and record keeping requirements of the asbestos National Emission Standards for Hazardous Air Pollutants (**NESHAP**). The specific responsibilities of waste generators, transporters and waste disposal site operators are addressed, as well as detailed explanations of how to complete the new forms accurately and efficiently. This field guide is organized into four main sections as follows:
Waste Shipment Record
Reporting Requirements
Record keeping Requirements
Source Reporting Requirements for Disposal Site Operators

I. WASTE SHIPMENT RECORD
After (the effective date of this rule), all shipments of asbestos-containing waste material must be accompanied by a Waste Shipment Record (**WSR**) similar to the sample shown in Figure 1. When it is signed by the generator, the transporter and the waste disposal site operator, the WSR documents the movement and ultimate disposition of asbestos waste. The WSR consists of three parts and requires three signatures, those of the generator, the transporter and the disposal site operator.

A. Waste Generator
Waste generator means any owner or operator of a source covered by this rule whose activities produce asbestos-containing waste materials. Included are asbestos mills, manufacturers, fabricators, demolitions, renovations and spraying operations [40 CFR 61.149 and 150]. Generators are responsible for filling out Items 1-9 of the WSR.

The original should be turned over to the transporter along with the waste shipment, although the generator should retain a copy of the WSR signed by the transporter acknowledging receipt of the waste shipment (Item 10) for his records.

Directions for filling out the WSR form are found in Figure 1. Items 1-4 and 6 provide important reference information. In Item 5, Category I non-friable materials (asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products) should be considered non-friable if they have not been sanded, ground, burned, or abraded; and Category II materials such as asbestos-cement products taken out before demolition may be reported as non-friable also.

tem 7 asks for the quantity of waste in cubic meters or cubic yards. You may report in the units that you are most comfortable using, but you are expected to make a good faith effort to report correctly. Some helpful conversion factor are provided below:

Drums and barrels used as asbestos-waste containers are typically of 35 gallons capacity. Gallons can be converted to cubic yards by multiplying gallons by 0.00379. In our example, 35 gallons x 0.00379 = 0.133 cubic yards for the volume of a drum or barrel.

Plastic bags have a nominal volume of 0.1 cubic yards, but when they contain asbestos waste their volume is assumed to be about 0.075 cubic yards.

Cubic yards can be changed to cubic meters by multiplying cubic yards by 0.765. The drum for which we calculated a volume of 0.133 cubic yards would have a volume of 0.133 x 0.765 = 0.102 cubic meters.

Follow the instructions given in Figure 1 to complete Items 8 and 9. When you turn the waste over to the transporter, require the transporter to acknowledge receipt of the asbestos waste by signing the WSR at Item 10: retain a copy of the WSR signed by the transporter for your files.

B. Transporter
At the time that you take possession of the load of waste, ask the generator for a WSR. Acknowledge receipt of the asbestos waste by signing the WSR at Item 10; return a copy of it to the generator. If you turn the shipment over to a second transporter require him to acknowledge receipt of the shipment by signing the WSR at Item 11. It is recommended that you retain a copy of the signed document for your files when you surrender the WSR to a second transporter.

The transporter who delivers the waste shipment to the waste disposal site should surrender the WSR to the disposal site operator. It is recommended that you keep a copy of the WSR signed by the disposal site operator for your files as a matter of good business practice.

C. Waste Disposal Site Operator
Waste disposal site operators are not expected to open bags or other containers to verify that the material is asbestos: if a WSR accompanies the shipment that is sufficient verification. You must complete Items 12 and 13 of the WSR according to the instructions in Figure 1 and send a copy of the WSR according to the name and address listed in Item 2 of the WSR. The disposal site operator should check to see that the numbers of containers reported in WSR Item 6 and the quantities reported in WSR Item 7 appear to be correct. Any discrepancy should be noted in Item 12.

If the WSR indicates a truckload of asbestos waste, ask the driver if he knows the truck's cargo capacity. If he cannot tell you the capacity, estimate it by multiplying the length by the width by the height of the cargo compartment (all in feet) and divide by 27 cubic feet to obtain cubic yards. If you know the capacity of a truck--say 20 cubic yards--and you judge it to be half-full, estimate the load as 10 cubic yards.

Item 12 is also used to note improperly enclosed or uncovered waste.

II. REPORTING REQUIREMENTS
The revised NESHAP now includes reporting requirements for generators and waste disposal site operators. Generators are required to submit exception reports if they do not receive a copy of the WSR signed by the disposal site owner or operator within 45 days of the date the shipment was accepted by the first transporter.

Disposal site operators must file reports of discrepancies between the quantities of waste indicated on the WSR and the quantities actually received, as well as reports of improperly enclosed or uncovered waste.

A. Exception Report
If you as a generator of a shipment of asbestos waste do not receive a copy of the WSR signed by the disposal site operator within 35 days after you turned the waste over to the first transporter, you must take steps to locate the waste shipment.

First, contact the transporter and verify the fact that the waste was delivered to the waste disposal site specified in Item 3 of the WSR. If the transporter has not delivered the shipment, determine the reason for the delay, and when it will be delivered. If the transporter has delivered the waste to the specified waste disposal site, inquire if a copy of the WSR signed by the disposal site operator can be made available to you. (The transporter is not required to obtain or keep a copy signed by the disposal site operator: however, some may do so as a matter of good business practice.)

Next contact the disposal site operator and determine why you have not received a copy of the WSR signed by him. Request that the disposal site operator send a signed copy of the WSR to you immediately.

If you have not received a signed WSR from the disposal site operator within 45 days after you turned the waste over to the initial transporter, you must submit a written exception report to the responsible NESHAP program agency (see Appendix A for a list of agencies and their jurisdictions). The report should include a copy of the WSR in question as well as a cover letter that explains what you have done to locate the shipment, and the results of your search.

B. Discrepancy Report
As a waste disposal site operator, you will be checking the WSR that accompanies each asbestos waste shipment that arrives at your site to make sure that the information on the WSR accurately describes the waste shipment. If you see that there is a discrepancy between the number of containers shown on the WSR and the number that you count in the truck you should note this in Item 12 of the WSR and contact the generator to determine if there is a reasonable explanation for the discrepancy. If you are able to reconcile the apparent discrepancy, make a note of it on the WSR and forward it to the generator as you would normally do.

If you are unable to resolve the discrepancy within 15 days of accepting the waste, you must send a written discrepancy report immediately to the responsible agency in whose jurisdiction the generator of the waste is located. The discrepancy report should describe the discrepancy in question and the steps you have taken to obtain an explanation for it, such as how and when you attempted to reach the generator. A copy of the shipment's WSR must accompany the discrepancy report.

C. Report of Improperly Enclosed or Uncovered Waste
Disposal site operators will check asbestos waste shipments arriving at their sites and are expected to look for significant amounts of improperly enclosed or uncovered waste before the material is disposed of. If significant amounts of improperly enclosed or uncovered waste are discovered in a shipment (see discussion under WSR), note it in Item 12 of the WSR and send, by the following working day, a written report of the problem to the specific agency responsible for administering the NESHAP program for the jurisdiction where the job site is located (identified on the WSR). If the disposal site is located in a different jurisdiction than the job site, you should also send a copy of the WSR to the agency responsible for the disposal site.

The written report should describe the improperly enclosed or uncovered waste in sufficient detail that the responsible agency can determine the urgency of the situation and what action to take. A copy of the WSR must be submitted along with the written report.

III. RECORD KEEPING REQUIREMENTS

New requirements for record keeping are set for waste generators and waste disposal sites. Generators must keep copies of all WSR's for at least 2 years. In addition to keeping WSR's for at least 2 years, active waste disposal sites must also keep records of the asbestos-containing waste material located within the site.

A. Waste Generator

As a waste generator, you must retain copies of all WSR's, including WSR's signed by the owner or operator of the waste disposal site where the waste was deposited for at least 2 years. The WSR's should be kept in chronological order in a secure, water-tight file. You are expected to provide copies of WSR's upon request of the responsible agency and to make the WSR file available for inspection during normal business hours.

B. Active Waste Disposal Site Operator

You, the waste disposal site operator, are required to keep copies of WSR's that you have received for at least 2 years. The WSR's should be kept in chronological order in a secure, water-tight file. You are expected, further, to provide copies of WSR's upon request of the responsible agency and to make the WSR file available for inspection during normal business hours.

Another new requirement is that you now must maintain up-to-date records that indicate the location, depth and area, and quantity of asbestos containing waste material within the disposal site on a map or diagram of the disposal area.

You have the option of either restricting the asbestos waste to specified areas within the disposal site or depositing it throughout the site. In making this decision you should consider the future use of the property after the disposal site has been closed. By restricting the area where asbestos waste is deposited you will be able to preserve more of the property for future use. However, if you choose to deposit asbestos waste throughout the site, the responsible agency would consider that the entire disposal area contains asbestos.

When you open a new trench (or area) for asbestos waste disposal, place stakes in the ground at the corners of the trench. Take precautions to see that the stakes are kept where they are originally positioned and are not broken during the time that the trench is being filled. When you have filled the trench, call in a land surveyor. The surveyor will use the stakes to determine the location of the asbestos deposit within the disposal site. Ask the surveyor to prepare a map or diagram of the disposal site that shows the location(s) and surface dimensions of the asbestos deposit.

Before beginning to fill a new trench with asbestos waste, measure the maximum depth of the trench, record it, and save it to put on the map provided by the surveyor. Use the data provided in Item 7 of the WSR's to obtain the quantity of asbestos-containing waste material. Add up the cubic yards (**cubic meters**) of waste indicated on the WSR's for all of the asbestos waste shipments that are deposited in the trench up until the time that it is full and is closed.

Also, put the total quantity of asbestos-waste deposited at the site on the map provided by the surveyor. The map should be kept current until the time that the waste disposal site is closed. At closure you must submit a copy of records of asbestos waste disposal locations and quantities to the agency responsible for administering the NESHAP program in your area.

The surveyor's map or diagram of the disposal site with the location and surface dimensions of the asbestos deposit(s), maximum depth of the deposit(s) and asbestos waste quantities fulfills this requirement and should be submitted to the Administrator. Within 60 days of closing your waste disposal site you must record on the deed to the waste disposal site the following information:

- ✓ The land has been used for the disposal of asbestos-containing waste material.
- ✓ The survey plot and record of the location and quantity of asbestos containing waste disposed of within the disposal site have been filed with (name of responsible agency).
- ✓ The site is subject to 40 CFR 61 Subpart M.
- ✓ In some states, a Notation of Deed form can be used to add this information to a deed, while in others it may be easier to prepare a new deed than it is to annotate an existing deed. You should contact the Register of Deeds at the county seat of the county in which your disposal site is located to learn the rules that cover deeds and for instructions on how to proceed.

IV. SOURCE REPORTING REQUIREMENTS FOR DISPOSAL SITE OPERATORS

Another new requirement is that, within 90 days of the effective date of this rule, you are required to report certain information about your asbestos waste disposal operations to the responsible asbestos NESHAP program agency (see Appendix A for a list of agencies). Section 61.153 of the asbestos NESHAP requires that you report the following information:

A brief description of the waste disposal site, which would include such information as the location and size of the disposal facility. A description of the method or methods that will be used to comply with the asbestos NESHAP, or a description of alternative methods that will be used. Methods to be used, such as covering asbestos waste daily with 6 inches of non-asbestos cover or the use of dust suppressants should be reported. Other information that might be reported includes procedures to prevent public access to the asbestos waste disposal area, such as the use of warning signs and fencing. You must report this information using the format in Appendix A of Part 61 of Title 40 of the Code of Federal Regulations (40 CFR).

In addition to the information listed above, you as the waste disposal site operator, must also report the following information required by the source reporting requirements of Section 61.10 of Subpart, Part 61 of 40 CFR.

- ✓ Name and address of the owner or operator.
- ✓ The location of the source.
- ✓ The type of hazardous pollutants emitted by the stationary source.
- ✓ A brief description of the nature, size, design, and method of operation of the stationary source including the operating design capacity of the source. Identify each point of emission for asbestos.
- ✓ The average weight per month of asbestos being processed by the source over the last 12 months preceding the date of the report.
- ✓ If there is a change in any of the information listed above, you must report the changes to the appropriate agency within 30 days after they occur.

Respiratory and Personnel Protection Equipment Section

Workers removing Asbestos wrapped Pipe

SCBA and SCUBA Do's and Don'ts

Do...

- ✓ Do Visually inspect every cylinder at least once each year.
- ✓ Do a formal visual inspection of SCBA wrapped cylinder in heavy use (5 or more fills per week) at least yearly
- ✓ Do visually inspect all cylinders in accordance with the PSI 18 Step Protocol.
- ✓ Do hydrostatically retest SCUBA cylinders every 5 years.
- ✓ Do hydrostatically retest Composite SCBA cylinders every 3 years.
- ✓ Do fill cylinders slowly, at a rate of 300-600 psig per minute.
- ✓ Do rinse cylinders in fresh water after every day of diving giving particular attention to the cylinder valve and under the boot.
- ✓ Do store cylinders for prolonged periods secured in a vertical position with only about 50 psig pressure inside
- ✓ Do transport cylinders so as to best protect the valve from damage.
- ✓ Do keep Evidence of Inspection (**EOI**) stickers in a secure location and away from unauthorized personnel.
- ✓ Do ensure documented training (e.g., PSI training) for all users, handlers and fillers of compressed gas cylinders (OSHA requirement).

Don'ts...

- ✓ Don't connect Titanium regulators to oxygen cylinders. The risk of explosion and fire is great.
  Don't fill cylinders beyond their stamped service pressure.
- ✓ Don't store Cylinders for a prolonged period with more that about 50 psig pressure.
- ✓ Don't charge cylinders cleaned and marked for EANx service with normal SCUBA air.
- ✓ Don't fill any cylinder that is beyond its visual inspection or hydrostatic test/retest period.
- ✓ Don't fill any cylinder that shows signs of excessive damage or mistreatment.
- ✓ Don't fill any cylinder with defects in excess of those established by CGA and/or PSI.
- ✓ Don't subject steel cylinder to temperatures in excess of 600oF
- ✓ Don't subject aluminum cylinders to temperatures in excess of 350oF
- ✓ Don't attempt to put a metrically threaded valve into an NGS threaded cylinder.
- ✓ Don't fill ANY cylinders marked SP6688 or SP6576
- ✓ Don't fill any cylinder that has internal noise or is abnormally heavy.
- ✓ Don't permit any untrained persons to visually inspect cylinders.
- ✓ Don't fill any composite cylinders which are beyond their 15 year service life (or five hydro test/retests + 3 years).
- ✓ Don't fill any cylinders with altered markings.

Respiratory Protection

General
In the Respiratory Protection program, hazard assessment and selection of proper respiratory PPE is conducted in the same manner as for other types of PPE. In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination.

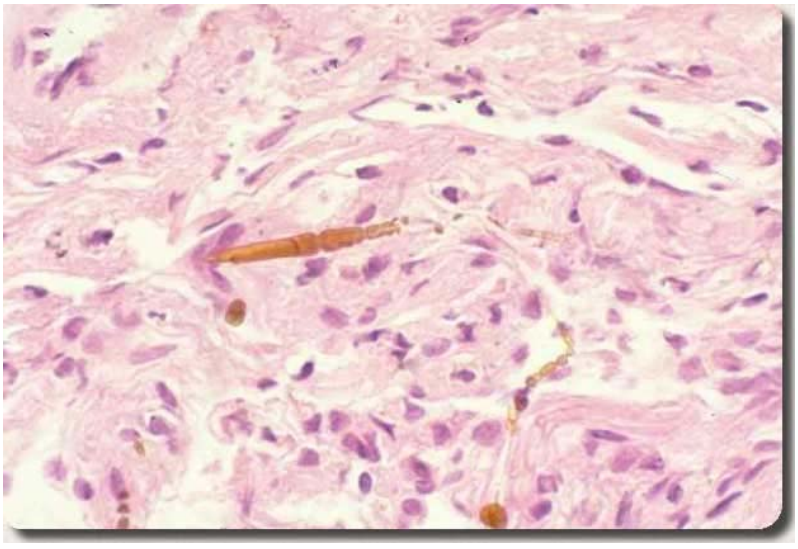
This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used. References: OSHA Standards ***Respiratory Protection*** (**29 CFR 1910.134**)

Why Respirators Are Needed
Respirators protect against the inhalation of dangerous substances (vapors, fumes, dust, gases). They can also provide a separate air supply in a very hazardous situation.

Some of the health hazards that respirators prevent include
- ***Lung damage***
- ***Respiratory diseases***
- ***Cancer and other illnesses.***

Respiratory Protection Responsibilities
The employer is responsible for:

- Providing training in the use and care of respirators
- Ensuring that equipment is adequate, sanitary, and reliable
- Allowing employees to leave area if ill, for breaks, and to obtain parts
- Fit testing
- Providing annual medical evaluation
- Providing a powered air-purifying respirator (**PAPR**) if an employee cannot wear a tight-fitting respirator



Asbestos imbedded in the lung

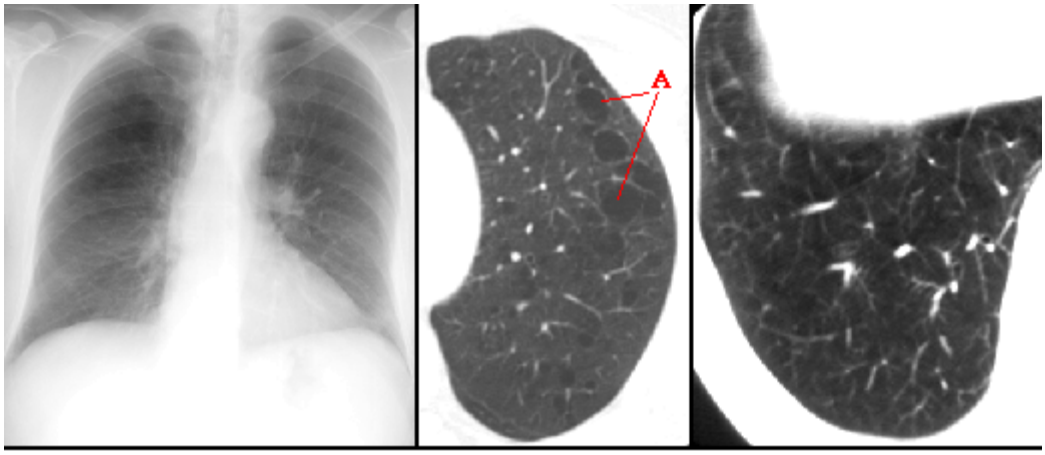
The employee is responsible for:

- Properly using respirators
- Maintaining respirator properly
- Reporting malfunctions
- Reporting medical changes

Selection of Respiratory Protection

When choosing the correct respiratory protection for your work environment, it is important to consider:

- Identification of the substance or substances for which respiratory protection is necessary
- A substance's material safety data sheet (**MSDS**) (it will state which type of respirator is most effective for the substance)
- Activities of the workers
- Hazards of each substance and its properties
- Maximum levels of air contamination expected
- Probability of oxygen deficiency
- Period of time workers will need to use the respiratory protection devices
- Capabilities and physical limitations of the device used



50-year-old male asbestos-exposed cigarette smoker. The chest-x ray was read as possible asbestosis. HRCT scan (middle) through the upper lobes shows changes of emphema without fibrosis (A). The same findings are present in the lower lobes.

Types of Respirators The following is a description of different types of respirators.

Commonly Used Respirators (Air Purifying)

- Disposable Dust masks are worn over the nose and mouth to protect the respiratory system from certain nuisance dusts, mists, etc. They can only provide protection against particular contaminants as specified by the manufacturer (e.g., general dust, fiberglass, etc.). These dust masks cannot be fit tested, and are generally single use. They are not recognized as respiratory protection and may not be worn if a potential for overexposure exists. They are not included in most company's Respiratory Protection Program.

- Half-Face Respirators with interchangeable filter cartridges can protect the respiratory system from hazardous dusts, fumes, mists, etc. They can only provide protection against certain contaminants up to limited concentrations specified by the manufacturer for the particular cartridge type used (e.g., toluene, acetone). These generally operate under negative pressure within the respirator which is created by the wearer's breathing through the filter cartridges. As the protection is only gained if there is a proper seal of the respirator face piece, this type requires fit testing prior to respirator assignment and a fit check prior to each use.

- Full-Face Respirators operate under the same principle and requirements as the half-face type, however, they offer a better facepiece fit and also protect the wearer's eyes from particularly irritating gases or vapors.

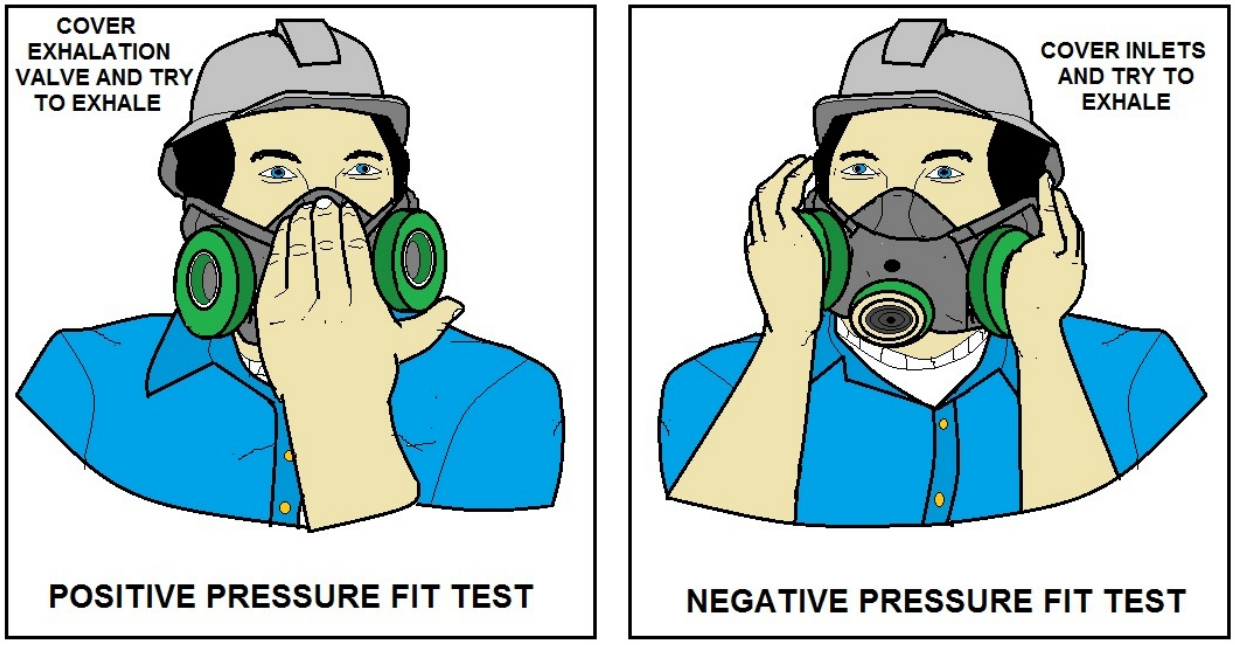
- Full-face, helmet or hood type powered air purifying respirators (**PAPRs**) operate under positive pressure inside the facepiece using a battery operated motor blower assembly to force air through a filter cartridge into the wearer's breathing zone. Use of these respirators is also subject to the manufacturers' guidelines.

Less Commonly Used Types Respirators (Air Supplying)

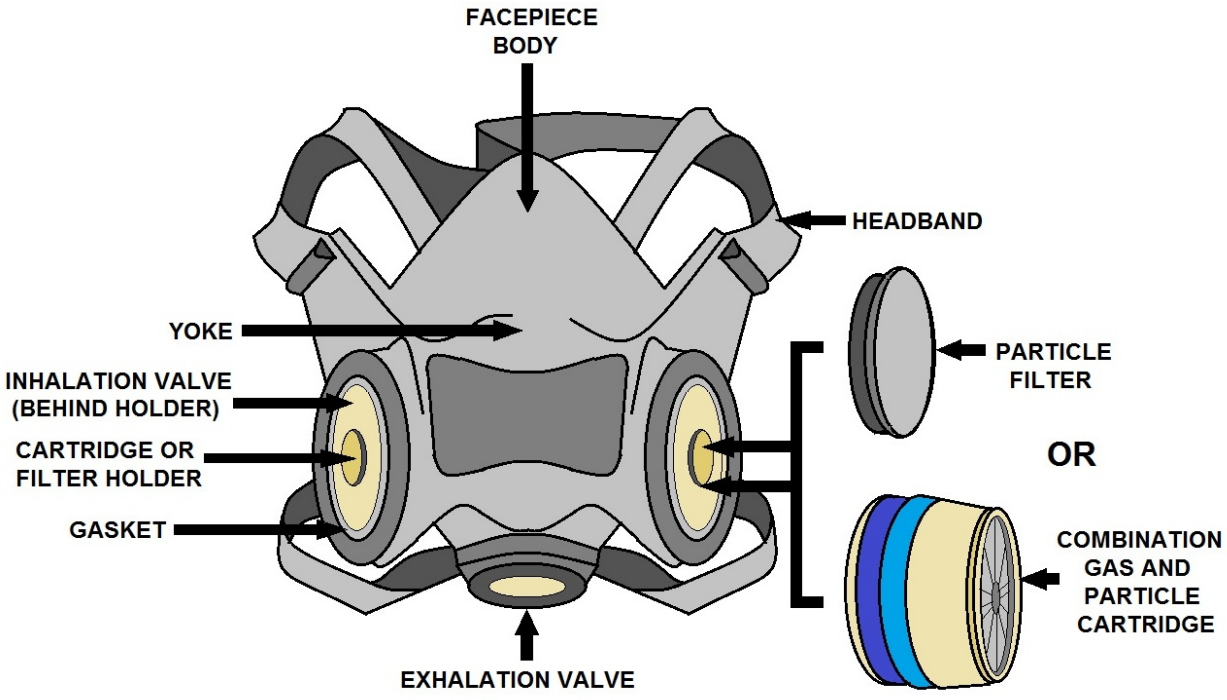
- **Air-Line Respirators** supply clean air through a small diameter hose from a compressor or compressed air cylinders. The wearer must be attached to the hose at all times, which limits mobility. Use of these respirators is subject to the manufacturers' guidelines.

- **Self-Contained Breathing Apparatus** (**SCBA**) respirators supply clean air from a compressed air tank carried on the back of the wearer. These types of respirators are highly mobile and are used primarily for emergency response or rescue work, since only a limited amount of air can be supplied by a single tank, generally 20-60 minutes.

  Units must be thoroughly inspected on a monthly basis and written records must be kept of all inspections, operator training, etc. Use of these respirators is subject to the manufacturer's guidelines



POSITIVE AND NEGATIVE PRESSURE FIT CHECKS



BASIC PARTS OF A HALF-FACEPIECE RESPIRATOR

Basic Types of Respirators

Air-purifying or filtering respirators. Such respirators are used when there is enough oxygen (at least 19.5 percent) and contaminants are present below IDLH level. The respirator filters out or chemically "**scrubs**" contaminants, usually with a replaceable filter. Use color-coded filter cartridges or canisters for different types of contaminants. It's important to select the right filter for the situation.

Air-supplying respirators. These respirators are required when air-purifying respirators aren't effective. Air-purifying respirators are not sufficient in the following settings:

- When there is not enough oxygen
- Confined spaces
- When contaminants cannot be filtered out
- When contaminants are at or above IDLH level.

Different kinds of air-supplying respirators include

- Those connected by hose to stationary air supply (air line)
- Portable tank self-contained breathing apparatus (**SCBA**).

The Importance of Correct Fit

Even a tiny gap between the respirator and the face can allow contaminants to enter. Respirators should be comfortable and properly fitted. Proper fit includes:

- Secure but not too tight
- No slipping or pinching
- Allowance for head movement and speech

An OSHA-accepted qualitative fit test or quantitative fit test must be performed prior to an employee using any tight-fitting respirator.

Tight-fitting respirators must be seal checked before each use by using positive- or negative-pressure check procedures or the manufacturer's instructions.

Respirator Filters/Cartridges
For protection against gases and vapors, the cartridges used for air-purifying respirators must be either equipped with an end-of-service-life indicator (**ESLI**), certified by NIOSH for the contaminant, or a cartridge change schedule has to be established.

For protection against particulates, there are nine classes of filters (three levels of filter efficiency, each with three categories of resistance to filter efficiency degradation). Levels of filter efficiency are 95 percent, 99 percent, and 99.97 percent. Categories of resistance to filter efficiency degradation are labeled N, R, and P.

Protection Factors
The protection factor of a respirator is an expression of performance based on the ratio of two concentrations: The contaminant concentration outside the respirator to the contaminant concentration inside the respirator.

Each class of respirator is also given an assigned protection factor (**APF**). The APF is a measure of the minimum anticipated level of respiratory protection that a properly functioning respirator or class of respirators would provide to a percentage of properly fitted and trained users. When a contaminant concentration is known, the APF can be used to estimate the concentration inside a particular type of respirator worn by a user.

Who Cannot Wear a Respirator?

Respirator fit is essential. Employees must have a medical checkup to make sure they can wear respirators safely. Generally, respirators cannot be worn when a person:

- Wears glasses or personal protective equipment that interferes with the seal of the face piece to the face of the user
- Has facial hair that comes between the sealing surface of the face piece and the face or interferes with valve function
- Has a breathing problem, such as asthma
- Has a heart condition
- Is heat sensitive

Sometimes a person's facial features will not permit a good fit. Check with the supervisor or medical department if the fit is a problem.

Checking for Damage
Before each use, make sure there are no holes, tears, etc., in the respirator. Rubber parts can wear out and should be checked very carefully every time a respirator is used. Replace worn and damaged parts when necessary. Make sure air and oxygen cylinders are fully charged.

Staying Prepared for Respirator Use
Respirators are bulky and awkward, so getting used to them takes practice. Possible problems with wearing respirators may include heat exhaustion or heat stroke. Be alert for symptoms, use the "**buddy system**," and wear a lifeline or harness when necessary. Drink plenty of fluids and take frequent breaks.

Poor maneuverability. Practice with respirators in narrow passages, on ladders, etc., if your use of respirators may be in these types of conditions.

Using up the air supply. When a SCBA is in use, keep checking the gauges and listening for alarms; be ready to leave the area immediately if there is a problem.

Panic. Remember the importance of staying calm in a hot, stressful, or awkward situation.

Cleaning Respirators
Respirators should be cleaned and disinfected after every use. Check the respirator for damage before putting it away; look for holes, cracks, deterioration, dented cartridges, etc. If any damage is found, it should be reported to a supervisor. Respirators stored for emergency use must be inspected monthly when not in use, as well as after each use.

Respirator Storage

Respirators should be stored away from light, heat, cold, chemicals, and dust. Store respirators in a "**normal**" (natural, undistorted) position to hold their shape. Do not allow respirators to get crushed, folded, or twisted.

OSHA RP Overview

OSHA requires that supervisors consult with employees and encourage their participation in the process safety management plan. In fact, managers must have a written plan of action for employee participation in process safety management. Employee participation is critical because

- Employees know a lot about the process they work on
- They play key roles in making sure that process operation is conducted safely.

Operating Procedures

Managers must furnish written operating procedures that clearly explain how to perform each covered process safely. The procedures must be accurate and must be written in language that people can understand. Avoid technical jargon and, if necessary, supply translations.

Operating procedures must include at least the following:

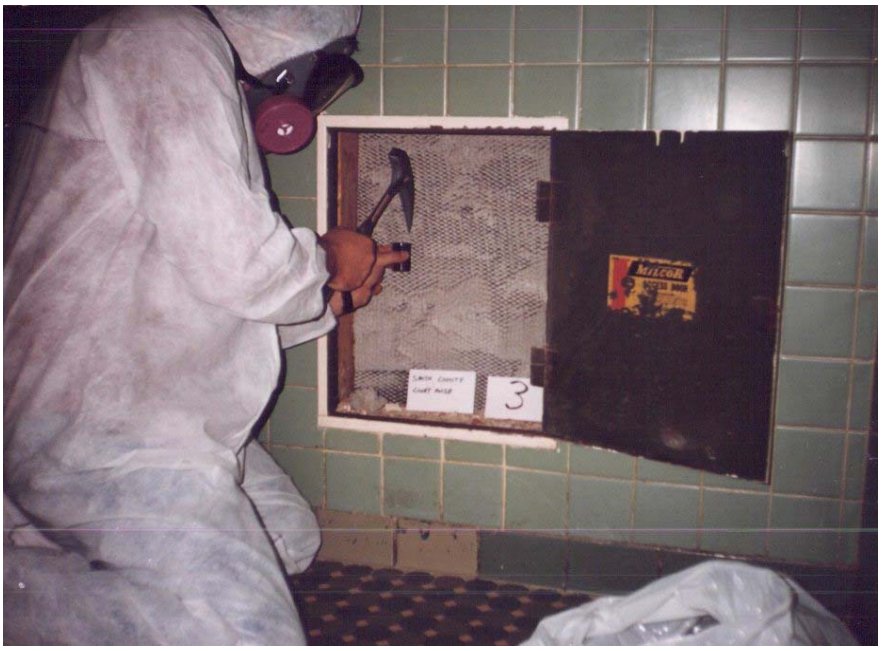
- Operating steps for initial startup, normal and temporary operations, emergency shutdown (including when it's called for and who does it), emergency operations, normal shutdown, and startup after a turnaround or an emergency shutdown
- Operating limits, including what happens if workers don't conform to operating limits and how to avoid or correct such problems
- Safety and health considerations, such as chemical or other hazards, precautions to prevent exposure, quality and inventory control for chemicals, and what to do if an employee is exposed to a hazardous substance
- Safety systems and their functions, including up-to-date operating procedures and safe work practices.

Contractor Employees

Process safety training and safety programs are also required for contractors who work on-site. Managers must check out the safety performance and programs of any contractors being considered for maintenance, repair, turnaround, major renovation, or specialty work on or around a process covered by the regulation.

When a contractor is hired, the manager must provide the contractor with information on the hazards of the process the contractor will work on. To further ensure contractor safety, managers must also

- Provide the contractor with information on safe work practices for the process they're involved with and tell them what to do in an emergency
- Keep a log of contractor employees' injuries or illnesses related to their work in process areas
- Evaluate the contractor's performance to make sure they're living up to their safety obligations under the standard.



The Contractor has Responsibilities, too

- Document that employees are trained to recognize hazards and to follow safe work practices on the job
- Make sure that the contractor's employees understand potential job-related hazards, are trained to work safely, and follow the safety rules of the facility in which they're working.

CONTROL MEASURES

Written Respiratory Protection Program

This paragraph requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. The program must be administered by a suitably trained program administrator. In addition, certain program elements may be required for voluntary use to prevent potential hazards associated with the use of the respirator.

The Small Entity Compliance Guide contains criteria for the selection of a program administrator and a sample program that meets the requirements of this paragraph. Copies of the Small Entity Compliance Guide will be available on or about April 8, 1998 from the Occupational Safety and Health Administration's Office of Publications, Room N 3101, 200 Constitution Avenue, NW, Washington, DC, 20210 (202-219-4667).

(c)(1) In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite-specific procedures. The program shall be updated as necessary to reflect those changes in workplace conditions that affect respirator use. The employer shall include in the program the following provisions of this section, as applicable:

(c)(1)(i) Procedures for selecting respirators for use in the workplace;

(c)(1)(ii) Medical evaluations of employees required to use respirators;

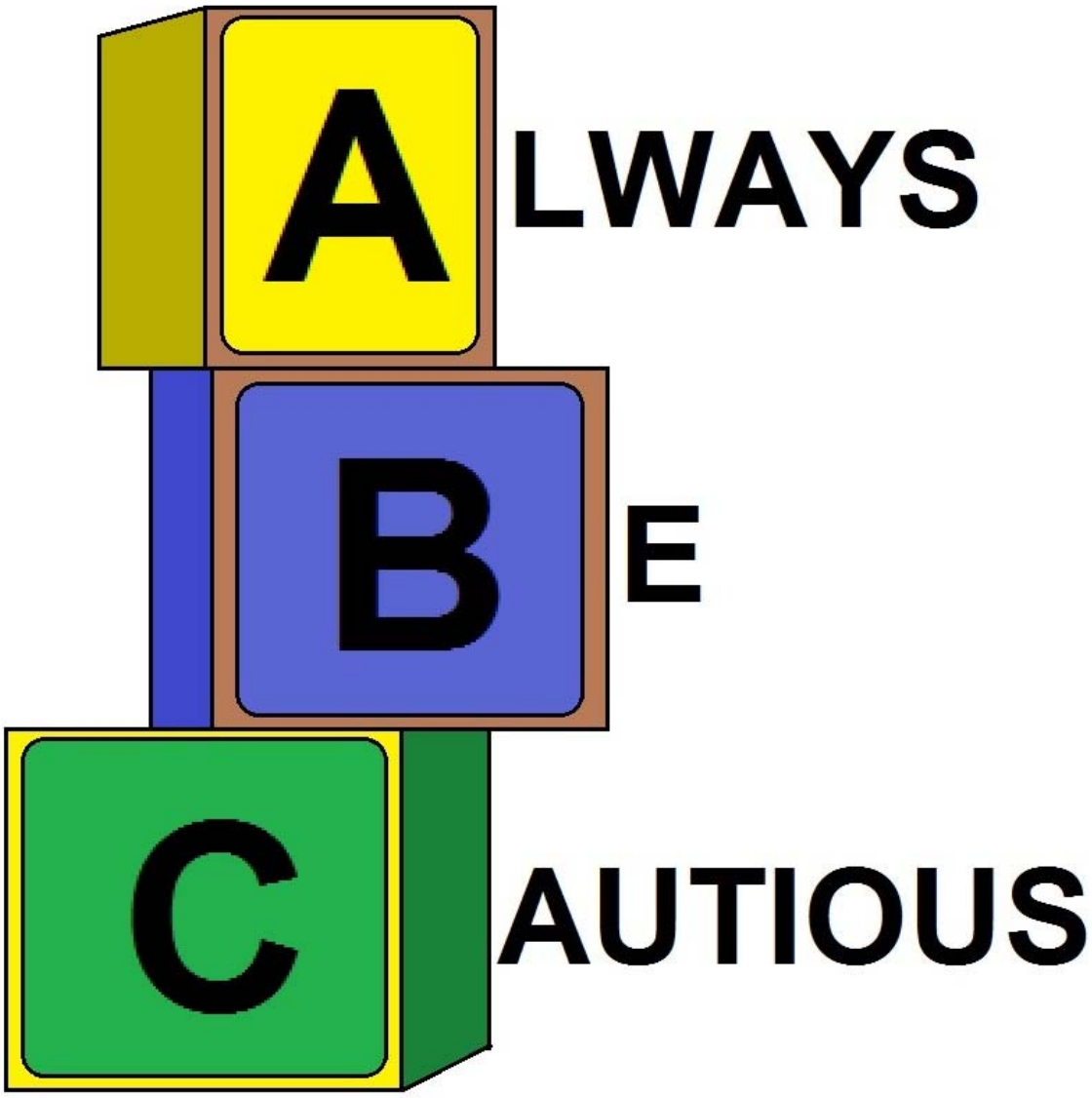
(c)(1)(iii) Fit testing procedures for tight-fitting respirators;

(c)(1)(iv) Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;

(c)(1)(v) Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;

(c)(1)(vi) Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;

(c)(1)(vii) Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;



ABC OF SAFETY

Example of RP Employee Responsibilities

All Employees shall follow the requirements of the Respiratory Protection Program.

Management
- implement the requirements of this program
- provide a selection of respirators as required
- enforce all provisions of this program
- appoint a *Specific Designated* individual to conduct the respiratory protection program

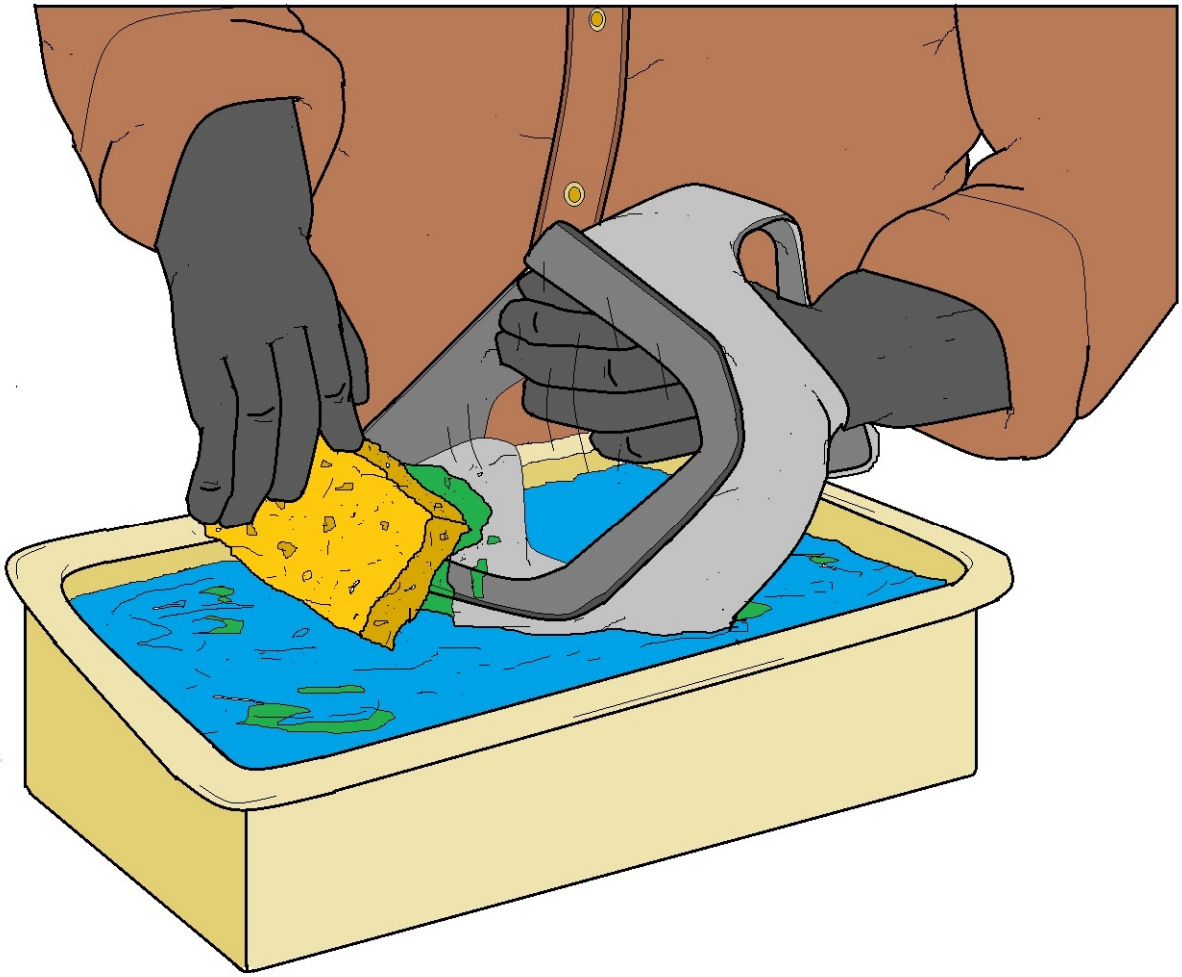
Administrative Department
- Review sanitation/storage procedures.
- ensure respirators are properly, stored, inspected and maintained
- monitor compliance for this program
- provide training for affected Employees
- review compliance and ensure monthly inspection of all respirators
- provide respirator fit testing

Designated Occupational Health Care Provider
- conducts medical aspects of program

Program Administrator
Each Department will designate a program administrator who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness.

Voluntary Use of Respirators is Prohibited
OSHA requires that voluntary use of respirators, when not required by the Employer, must be controlled as strictly as under required circumstances. To prevent violations of the Respiratory Protection Standard Employees are not allowed voluntary use of their own or Employer supplied respirators of any type.

Exception: Employees whose only use of respirators involves the voluntary use of filtering (non-sealing) face pieces (dust masks).



CLEANING AN SCBA MASK

Respiratory Protection Program Statement

Facility _____

Policy Statement

A respiratory protection program is hereby established so as to coordinate the use and maintenance or respiratory protective equipment as determined necessary to:

1. Reduce Personnel exposure to toxic chemical agents, harmful dusts, mist and fumes and
2. Allow trained personnel to work safely in hazardous environments, such as welding, oxygen deficient atmospheres, toxic atmospheres, etc.

Designation of Program Administrator

Management has designated _____

to be responsible for the respiratory protection program at this facility. He/she has been delegated authority by Management to make decisions and implement changes in the respirator program anywhere in this facility.

The following responsibilities apply:

1. Supervision of respirator selection process and procedures

2. Establishment of respiratory protection training sessions

3. Establishment of a continuing program of cleaning and inspections

4. Establishment of medical screening program

5. Establishment of issuing procedures

6. Establishment of periodic inspections

7. Continuing evaluation of all aspects of the respiratory protection program to assure continued effectiveness

8. Establishment of annual fit tests procedures

Any questions or problems concerning respirators or their use should be directed to the

Program Administrator

_____ _____

Facility Manager Date

RP Program Evaluation

Evaluations of the workplace are necessary to ensure that the written respiratory protection program is being properly implemented; this includes consulting with employees to ensure that they are using the respirators properly. Evaluations shall be conducted as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

Program evaluation will include discussions with employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems.

Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- Appropriate respirator selection for the hazards to which the employee is exposed;
- Proper respirator use under the workplace conditions the employee encounters; and
- Proper respirator maintenance.

Full face Respirators **Half face Respirators**

RP Record Keeping

The Employer will retain written information regarding medical evaluations, fit testing, and the respirator program.

This information will facilitate employee involvement in the respirator program, assist the Employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.

Training and Information
Effective training for employees who are required to use respirators is essential. The training must be comprehensive, understandable, and recur annually and more often if necessary. Training will be provided prior to requiring the employee to use a respirator in the workplace.

The training shall ensure that each employee can demonstrate knowledge of at least the following:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator
- Limitations and capabilities of the respirator
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- How to inspect, put on and remove, use, and check the seals of the respirator
- What the procedures are for maintenance and storage of the respirator
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators
- The general requirements of this program

Retraining shall be conducted annually and when:

- changes in the workplace or the type of respirator render previous training obsolete
- inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill
- other situation arises in which retraining appears necessary to ensure safe respirator use

Training is divided into the following sections:

Classroom Instruction

1. Overview of the Employer’s Respiratory Protection Program & OSHA Standard
2. Respiratory Protection Safety Procedures
3. Respirator Selection
4. Respirator Operation and Use
5. Why the respirator is necessary
6. How improper fit, usage, or maintenance can compromise the protective effect.
7. Limitations and capabilities of the respirator.
8. How to use the respirator effectively in emergency situations, including respirator malfunctions
9. How to inspect, put on and remove, use, and check the seals of the respirator.
10. What the procedures are for maintenance and storage of the respirator.
11. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
12. Change out schedule and procedure for air purifying respirators.

Respiratory Protection Program
Training Certificate Example

Name: _____

Department: _____ Date :_____

I have received Training on the Respiratory Protection Program. The Training included the following:

Classroom Training

- ✓ Overview of the Company Respiratory Protection Program
- ✓ Respiratory Protection Safety Procedures
- ✓ Respirator Selection
- ✓ Respirator Operation and Use
- ✓ Why the respirator is necessary
- ✓ How improper fit, usage, or maintenance can compromise the protective effect.
- ✓ Limitations and capabilities of the respirator.
- ✓ How to use the respirator effectively in emergency situations, including respirator malfunctions
- ✓ How to inspect, put on and remove, use, and check the seals of the respirator.
- ✓ What the procedures are for maintenance and storage of the respirator.
- ✓ How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
- ✓ Respirator filter & cartridge change out schedule
- ✓ The general requirements of this program

Hands-on Training

- ✓ Respirator Inspection
- ✓ Respirator cleaning and sanitizing
- ✓ Fit Check
- ✓ Record Keeping
- ✓ Respirator Storage
- ✓ Emergencies

_____

Employees Signature

_____

Trainer's Signature

Fit Testing Hands-on Respirator Training

(see appendix A for more information)

1. Respirator Inspection
2. Respirator cleaning and sanitizing
3. Record Keeping
4. Respirator Storage
5. Respirator Fit Check
6. Emergencies

Basic Respiratory Protection Safety Procedures

1. Only authorized and trained Employees may use Respirators. Those Employees may use only the Respirator that they have been trained on and properly fitted to use.
2. Only Physically Qualified Employees may be trained and authorized to use Respirators. A pre-authorization and annual certification by a qualified physician will be required and maintained. Any changes in an Employees health or physical characteristics will be reported to the Occupational Health Department and will be evaluated by a qualified physician.
3. Only the proper prescribed respirator or SCBA may be used for the job or work environment. Air cleansing respirators may be worn in work environments when oxygen levels are between 19.5 percent to 23.5 percent and when the appropriate air cleansing canister, as determined by the Manufacturer and approved by NIOSH or MESA, for the known hazardous substance is used. SCBAs will be worn in oxygen deficient and oxygen rich environments (below 19.5 percent or above 23.5 percent oxygen).
4. Employees working in environments where a sudden release of a hazardous substance is likely will wear an appropriate respirator for that hazardous substance (example: Employees working in an ammonia compressor room will have an ammonia APR respirator on their person.).
5. Only SCBAs will be used in oxygen deficient environments, environments with an unknown hazardous substance or unknown quantity of a known hazardous substance or any environment that is determined "**Immediately Dangerous to Life or Health**" (IDLH).
6. Employees with respirators loaned on "permanent check out" will be responsible for the sanitation, proper storage and security. Respirators damaged by normal wear will be repaired or replaced by the Employer when returned.
7. The last Employee using a respirator and/or SCBA that are available for general use will be responsible for proper storage and sanitation. Monthly and after each use, all respirators will be inspected with documentation to assure its availability for use.
8. All respirators will be located in a clean, convenient and sanitary location.
9. In the event that Employees must enter a confined space, work in environments with hazardous substances that would be dangerous to life or health should an RPE fail (a SCBA is required in this environment), and/or conduct a HAZMAT entry, a "**buddy system**" detail will be used with a Safety Watchman with constant voice, visual or signal line communication. Employees will follow the established Emergency Response Program and/or Confined Space Entry Program when applicable.
10. Management will establish and maintain surveillance of jobs and work place conditions and degree of Employee exposure or stress to maintain the proper procedures and to provide the necessary RPE.

11. Management will establish and maintain safe operation procedures for the safe use of RPE with strict enforcement and disciplinary action for failure to follow all general and specific safety rules. Standard Operation Procedures for General RPE use will be maintained as an attachment to the Respiratory Protection Program and Standard Operation Procedures for RPE use under emergency response situations will be maintained as an attachment to the Emergency Response Program.

Selection of Respirators
The Employer is responsible and need to have evaluated the respiratory hazard(s) in each workplace, identified relevant workplace and user factors and has based respirator selection on these factors. Also included are estimates of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form.

This selection has included appropriate protective respirators for use in IDLH atmospheres, and has limited the selection and use of air-purifying respirators. All selected respirators are NIOSH-certified.

Filter Classifications - These classifications are marked on the filter or filter package
N-Series: Not Oil Resistant
- Approved for non-oil particulate contaminants
- Examples: dust, fumes, mists not containing oil

R-Series: Oil Resistant
- Approved for all particulate contaminants, including those containing oil
- Examples: dusts, mists, fumes
- Time restriction of 8 hours when oils are present

P-Series: Oil Proof
- Approved for all particulate contaminants including those containing oil
- Examples: dust, fumes, mists
- See Manufacturer's time use restrictions on packaging

Respirators for IDLH atmospheres.
- The following respirators will be used in IDLH atmospheres:
- A full face piece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or
- A combination full face piece pressure demand supplied-air respirator (**SAR**) with auxiliary self-contained air supply.
- Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

Respirators for atmospheres that are not IDLH.

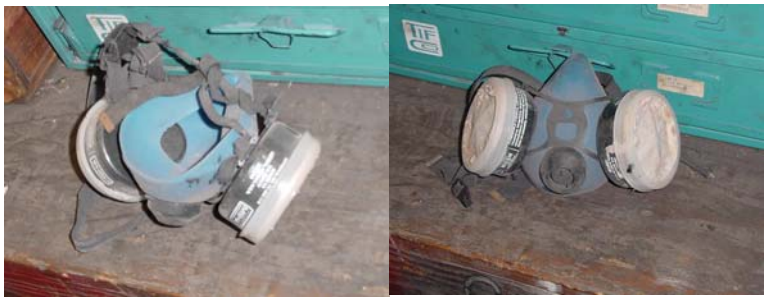
The respirators selected shall be adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations. The respirator selected shall be appropriate for the chemical state and physical form of the contaminant.

Identification of Filters & Cartridges

All filters and cartridges shall be labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible. A change out schedule for filters and canisters has been developed to ensure these elements of the respirators remain effective.

Respirator Filter & Canister Replacement
An important part of the Respiratory Protection Program includes identifying the useful life of canisters and filters used on air-purifying respirators. Each filter and canister shall be equipped with an end-of-service-life indicator (**ESLI**) certified by NIOSH for the contaminant; or

If there is no ESLI appropriate for conditions a change schedule for canisters and cartridges that is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life.



Unacceptable maintenance and storage (OSHA Violation)

Filter & Cartridge Change Schedule
Stock of spare filers and cartridges shall be maintained to allow immediate change when required or desired by the employee.

Cartridges shall be changed based on the most limiting factor below:
- Prior to expiration date
- Manufactures recommendations for the specific use and environment
- After each use
- When requested by employee
- When contaminate odor is detected
- When restriction to air flow has occurred as evidenced by increase effort by user to breathe normally
- Cartridges shall remain in their original sealed packages until needed for immediate use

Filters shall be changed on the most limiting factor below:
- Prior to expiration date
- Manufactures recommendations for the specific use and environment
- When requested by employee
- When contaminate odor is detected
- When restriction to air flow has occurred as evidenced by increase effort by user to breathe normally
- When discoloring of the filter media is evident
- Filters shall remain in their original sealed package until needed for immediate use.

RESPIRATORY PROTECTION PROGRAM CHECKLIST			PAGE 1 OF 2 PAGES		
DIVISION:	**SECTION:**	**SUPERVISOR:**	**DATE:**		
			YES	NO	NA
1	Is respiratory protection (RP) being worn in the section?				
2	Has air sampling been accomplished that mandates using RP?				
3	Where air sampling results greater than Occupational Exposure Limits? (If NO, why are you using a respirator?)				
4	Has a Hazard Assessment been generated concerning the task or process that placed the section on the RP Program?				
5	Have all processes that may warrant the use of RP been evaluated? (If NO, request an assessment from the Department Safety Analyst /Personnel Safety, unless the operation is emergency response).				
6	Have workers received physicals and been found medically qualified to wear RP?				
7	Is there documentation that workers were formally briefed on air sampling results and why RP is required?				
8	Is respiratory protection training and fit-testing documentation available on everyone who wears a respirator?				
9	Are RP wearers being fit-tested at least annually?				
10	Are section employees wearing RP voluntarily when conditions have not mandated their use?				
11	Are employees wearing contacts in hazardous atmospheres or using eye-wear that negates face to face piece seal?				
12	Do RP users have facial hair that negates face to face piece seal?				
13	Has a respirator inventory been compiled that list the type of respirator(s) used in the workplace? (Use Respirator Inventory Worksheet attach to this checklist)				
14	Has the Section Supervisor received formal RP training on OSHA, City Personnel Safety and Respiratory Protection Program requirements and his or her responsibilities?				
15	Does the section have written standard operating instructions governing the selection, fit-testing, use, cleaning, storage and maintenance of respirators?				
16	Is the Fire Department the only source being used to charge SCBA’s with compressed air?				
17	Are SCBA’s being inspected at least every 30 days?				
18	Does the section have on hand, applicable OSHA, CITY, and Section Respiratory Protection Program guidance documents?				

19	Are periodic audits of the section's RP program conducted with discrepancies tracked until closed out?			
20	Have program deficiencies been elevated to the Director and Department Safety Analyst?			

SURVEYED BY:	REVIEWED BY:

Respiratory Protection Schedule by Job and Working Condition

The Employer needs to maintain a Respiratory Protection Schedule by Job and Working Condition. This schedule is provided to each authorized and trained Employee. The Schedule provides the following information:

1. Job/Working Conditions
2. Work Location
3. Hazards Present
4. Type of Respirator or SCBA Required
5. Type of Filter/Canister Required
6. Location of Respirator or SCBA
7. Filter/Cartridge change out schedule

The schedule will be reviewed and updated at least annually and whenever any changes are made in the work environments, machinery, equipment, or processes or if respirator different respirator models are introduced or existing models are removed.

Permanent respirator schedule assignments are:
Each person who engages in welding will have their own Employer provided dust-mist-fume filter APR. This respirator will be worn during all welding operations.

Physical and Medical Qualifications
Records of medical evaluations must be retained and made available in accordance with 29 CFR 1910.1020.

Medical Evaluation Required
Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. The Employer is required to provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace.

Medical Evaluation Procedures
The employee will be provided a medical questionnaire by the designated Occupational Health Care Provider

Follow-up Medical Examination

The Employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions in Part B of the questionnaire or whose initial medical examination demonstrates the need for a follow-up medical examination. The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the Physician deems necessary to make a final determination.
Administration of the medical questionnaire and examinations

The medical questionnaire and examinations shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire shall be administered in a manner that ensures that the employee understands its content. The Employer shall provide the employee with an opportunity to discuss the questionnaire and examination results with the Physician.

Supplemental Information for the Physician
The following information must be provided to the Physician before the Physician makes a recommendation concerning an employee's ability to use a respirator

- The type and weight of the respirator to be used by the employee
- The duration and frequency of respirator use (including use for rescue and escape)
- The expected physical work effort
- Additional protective clothing and equipment to be worn
- Temperature and humidity extremes that may be encountered
- Any supplemental information provided previously to the Physician regarding an employee need not be provided for a subsequent medical evaluation if the information and the Physician remain the same

The Employer has provided the Physician with a copy of the written respiratory protection program and a copy of the OSHA Standard 1910.134

Medical Determination

In determining the employee's ability to use a respirator, the Employer shall

- Obtain a written recommendation regarding the employee's ability to use the respirator from the Physician. The recommendation shall provide only the following information
- Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator
- The need, if any, for follow-up medical evaluations
- A statement that the Physician has provided the employee with a copy of the Physician's written recommendation
- If the respirator is a negative pressure respirator and the Physician finds a medical condition that may place the employee's health at increased risk if the respirator is used, the Employer shall provide a APR if the Physician's medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then the Employer is no longer required to provide a APR

Additional Medical Evaluations

At a minimum, the Employer shall provide additional medical evaluations that comply with the requirements of this section if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator
- A Physician, supervisor, or the respirator program administrator informs the Employer that an employee needs to be reevaluated
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, and temperature) that may result in a substantial increase in the physiological burden placed on an employee.

Respirator Fit Testing (see Appendix A for more information)

Before an employee is required to use any respirator with a negative or positive pressure tight-fitting face piece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. The Employer shall ensure that an employee using a tight-fitting face piece respirator is fit tested prior to initial use of the respirator, whenever a different respirator face piece (size, style, model or make) is used, and at least annually thereafter

The Employer has established a record of the qualitative and quantitative fit tests administered to employees including:

- The name or identification of the employee tested
- Type of fit test performed
- Specific make, model, style, and size of respirator tested
- Date of test
- The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs

Additional fit tests will be conducted whenever the employee reports, or the Employer, Physician, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

If after passing a QLFT or QNFT, the employee notifies the Employer's program administrator, supervisor, or Physician that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator face piece and to be retested.

Types of Fit Tests

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A of OSHA Standard 1910.134.

- QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.
- If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half face pieces, or equal to or greater than 500 for tight-fitting full face pieces, the QNFT has been passed with that respirator.
- Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.
- Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual face piece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator face piece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator face piece.
- Quantitative fit testing of these respirators shall be accomplished by modifying the face piece to allow sampling inside the face piece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate face piece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the face piece.
- Any modifications to the respirator face piece for fit testing shall be completely removed, and the face piece restored to NIOSH approved configuration, before that face piece can be used in the workplace.

Fit test records shall be retained for respirator users until the next fit test is administered. Written materials required to be retained shall be made available upon request to affected employees.

Respirator Operation and Use

Respirators will only be used following the respiratory protection safety procedures established in this program. The Operations and Use Manuals for each type of respirator will be maintained by the Program Administrator and be available to all qualified users.

Surveillance by the direct supervisor shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the Employer shall reevaluate the continued effectiveness of the respirator.

For continued protection of respirator users, the following general use rules apply:

- Users shall not remove respirators while in a hazardous environment
- Respirators are to be stored in sealed containers out of harmful atmospheres
- Store respirators away from heat and moisture
- Store respirators such that the sealing area does not become distorted or warped
- Store respirator such that the face piece is protected
- Face piece seal protection

The Employer does not permit respirators with tight-fitting face pieces to be worn by employees who have:

- Facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function; or
- Any condition that interferes with the face-to-face piece seal or valve function.

If an employee wears corrective glasses or goggles or other personal protective equipment, the Employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face of the user.

Continuing Effectiveness of Respirators

The Employer shall ensure the following that employees leave the respirator use area:

- To wash their faces and respirator face pieces as necessary to prevent eye or skin irritation associated with respirator use
- If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece
- To replace the respirator or the filter, cartridge, or canister elements.

If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece, the Employer will replace or repair the respirator before allowing the employee to return to the work area.

Procedures for IDLH atmospheres

For all IDLH atmospheres, the Employer shall ensure that:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere
- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere
- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue
- The Employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue
- The Employer or designee authorized to do so by the Employer, once notified, provides necessary assistance appropriate to the situation

Employee(s) located outside the IDLH atmospheres will be equipped with:

- Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
- Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or
- Equivalent means for rescue where retrieval equipment is not required.


SAFETY
HARD HAT
EYE
PROTECTION
RESPIRATOR
LONG
SLEEVES
CHEMICAL
RATED GLOVES
CHEMICAL
RESISTANT
APRON
CHEMICAL
RESISTANT
BOOTS

Personal Protective Equipment

Purpose

Your Employer is required to provide all Employees with required PPE to suit the task and known hazards. This Chapter covers the requirements for Personal Protective Equipment with the exception of PPE used for respiratory protection or PPE required for hazardous material response to spills or releases. Applicable OSHA Standards are 1910 Subpart 1 App B and 1910.120 App B, 132, 133, 136, and 138.

General Rules

Design

All personal protective equipment shall be of safe design and construction for the work to be performed.

Hazard Assessment and Equipment Selection

Hazard analysis procedures shall be used to assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the following actions will be taken:

1) Select, and have each affected Employee use, the proper PPE
2) Communicate selection decisions to each affected Employee
3) Select PPE that properly fits each affected employee.

Defective and damaged equipment.

Defective or damaged personal protective equipment shall not be used.

Training

All Employees who are required to use PPE shall be trained to know at least the following:

1) When PPE is necessary;
2) What PPE is necessary;
3) How to properly don, remove, adjust, and wear PPE;
4) The limitations of the PPE
5) The proper care, maintenance, useful life and disposal of the PPE.

Each affected Employee shall demonstrate an understanding of the training and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.

Certification of training for PPE is required by OSHA and shall be accomplished by using the Job Safety Checklist to verify that each affected Employee has received and understood the required PPE training.

Personal Protective Equipment Selection

Controlling Hazards

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

Selection Guidelines

The general procedure for selection of protective equipment is to:

a) become familiar with the potential hazards and the type of protective equipment that is available, and what it can do; i.e., splash protection, impact protection, etc.

b) compare the hazards associated with the environment; i.e., impact velocities, masses, projectile shape, radiation intensities, with the capabilities of the available protective equipment;

c) select the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards

d) fit the user with the protective device and give instructions on care and use of the PPE. It is very important that end users be made aware of all warning labels for and limitations of their PPE.

Fitting the Device

Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

Devices with Adjustable Features

Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases a chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonably low force, however, so as to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

Eye and Face Protection

Each affected employee shall use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Each affected employee shall use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors are acceptable.

Each affected employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.

Each affected employee shall use equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation. The following is a listing of appropriate shade numbers for various operations.

Filter Lenses for Protection Against Radiant Energy			
Operations	**Electrode Size 1/32 in**	**Arc Current**	**Protective Shade**
Shielded metal arc welding	Less than 3	Less than 60	7
	3-5	60-160	8
	5-8	160-250	10
	More than 8	250-550	11
Torch brazing			3
Torch soldering			2
Note: as a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.			

Selection chart guidelines for eye and face protection

The following chart provides general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard "source" operations.

Source	Hazard	Protection
IMPACT - Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, particles, sand, dirt, etc.	Spectacles with side protection, goggles, face shield For severe exposure, use face shield
HEAT-Furnace operation and arc welding	Hot sparks	Face shields, spectacles with side. For severe exposure use faceshield.
CHEMICALS-Acid and chemical handling, degreasing, plating	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield.
DUST - Woodworking, buffing, general, buffing, general dusty conditions.	Nuisance dust	Goggles, eye cup and cover type

Selection Guidelines for Head Protection

All head protection is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn.

When selecting head protection, knowledge of potential electrical hazards is important.

Class A helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof tested to 2,200 volts).

Class B helmets, in addition to impact and penetration resistance; provide electrical protection from high-voltage conductors
(they are proof tested to 20,000 volts).

Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity), and should not be used around electrical hazards.

Where falling object hazards are present, helmets must be worn. Some examples include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall; and working on exposed energized conductors.

Foot Protection

General Requirements

Each affected employee shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where employee's feet are exposed to electrical hazards.

Selection Guidelines for Foot Protection

Safety shoes and boots provide both impact and compression protection. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations electrical conductive or insulating safety shoes would be appropriate.

Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and, for other activities where objects might fall onto the feet.

Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet.

Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees causing a foot injury.

Hand Protection

General Requirements
Hand protection is required when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes.

Selection guidelines for hand protection
Selection of hand PPE shall be based on an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards and potential hazards identified. Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure.

There is no glove that provides protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused. It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; e.g., chemical hazards, cut hazards, flame hazards, etc.

Before purchasing gloves, request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. Other factors to be considered for glove selection in general include:

(A) As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types.

(B) The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

Selection of gloves for protection against chemical hazards:

(A) The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and/or to pass through the skin and cause systemic effects.

(B) Generally, any "**chemical resistant**" glove can be used for dry powders;

(C) For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials.

(D) Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

Protective Clothing Applications

A. The purpose of chemical protective clothing and equipment is to shield or isolate individuals from the chemical, physical, and biological hazards that may be encountered during hazardous materials operations. During chemical operations, it is not always apparent when exposure occurs. Many chemicals pose invisible hazards and offer no warning properties.

B. These guidelines describe the various types of clothing that are appropriate for use in various chemical operations, and provides recommendations in their selection and use. The final paragraph discusses heat stress and other key physiological factors that must be considered in connection with protective clothing use.

C. It is important that protective clothing users realize that no single combination of protective equipment and clothing is capable of protecting you against all hazards. Thus protective clothing should be used in conjunction with other protective methods. For example, engineering or administrative controls to limit chemical contact with personnel should always be considered as an alternative measure for preventing chemical exposure.

The use of protective clothing can itself create significant wearer hazards, such as heat stress, physical and psychological stress, in addition to impaired vision, mobility, and communication. In general, the greater the level of chemical protective clothing, the greater the associated risks. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. Overprotection as well as under-protection can be hazardous and should be avoided.

II. DESCRIPTIONS.
A. PROTECTIVE CLOTHING APPLICATIONS.
1. Protective clothing must be worn whenever the wearer faces potential hazards arising from chemical exposure. Some examples include:

- **Emergency response;**
- **Chemical manufacturing and process industries;**
- **Hazardous waste site cleanup and disposal;**
- **Asbestos removal and other particulate operations; and**
- **Agricultural application of pesticides.**

2. Within each application, there are several operations which require chemical protective clothing. For example, in emergency response, the following activities dictate chemical protective clothing use:

- ✓ **Site Survey**: The initial investigation of a hazardous materials incident; these situations are usually characterized by a large degree of uncertainty and mandate the highest levels of protection.

- ✓ **Rescue**: Entering a hazardous materials area for the purpose of removing an exposure victim; special considerations must be given to how the selected protective clothing may affect the ability of the wearer to carry out rescue and to the contamination of the victim.

- ✓ **Spill Mitigation**: Entering a hazardous materials area to prevent a potential spill or to reduce the hazards from an existing spill (i.e., applying a chlorine kit on railroad tank car). Protective clothing must accommodate the required tasks without sacrificing adequate protection.

- ✓ **Emergency Monitoring**: Outfitting personnel in protective clothing for the primary purpose of observing a hazardous materials incident without entry into the spill site. This may be applied to monitoring contract activity for spill cleanup.

- ✓ **Decontamination**: Applying decontamination procedures to personnel or equipment leaving the site; in general a lower level of protective clothing is used by personnel involved in decontamination.

B. THE CLOTHING ENSEMBLE. The approach in selecting personal protective clothing must encompass an "**ensemble**" of clothing and equipment items which are easily integrated to provide both an appropriate level of protection and still allow one to carry out activities involving chemicals.

In many cases, simple protective clothing by itself may be sufficient to prevent chemical exposure, such as wearing gloves in combination with a splash apron and faceshield (or safety goggles).

1. The following is a checklist of components that may form the chemical protective ensemble:
   - ➢ Protective clothing (suit, coveralls, hoods, gloves, boots);
   - ➢ Respiratory equipment (SCBA, combination SCBA/SAR, air purifying respirators);
   - ➢ Cooling system (ice vest, air circulation, water circulation);
   - ➢ Communications device;
   - ➢ Head protection;
   - ➢ Eye protection;
   - ➢ Ear protection;
   - ➢ Inner garment; and
   - ➢ Outer protection (overgloves, overboots, flashcover).

2. Factors that affect the selection of ensemble components include:

   - ✓ How each item accommodates the integration of other ensemble components. Some ensemble components may be incompatible due to how they are worn (e.g., some SCBA's may not fit within a particular chemical protective suit or allow acceptable mobility when worn).

   - ✓ The ease of interfacing ensemble components without sacrificing required performance (e.g. a poorly fitting overglove that greatly reduces wearer dexterity).

   - ✓ Limiting the number of equipment items to reduce donning time and complexity (e.g. some communications devices are built into SCBA's which as a unit are NIOSH certified).

C. LEVEL OF PROTECTION.

1. Table VIII:1-1 lists ensemble components based on the widely used EPA Levels of Protection: Levels A, B, C, and D. These lists can be used as the starting point for ensemble creation; however, each ensemble must be tailored to the specific situation in order to provide the most appropriate level of protection.

For example, if an emergency response activity involves a highly contaminated area or if the potential of contamination is high, it may be advisable to wear a disposable covering such as Tyvek coveralls or PVC splash suits, over the protective ensemble.

TABLE VIII:1-1. EPA LEVELS OF PROTECTION

LEVEL A:

Vapor protective suit (meets NFPA 1991)
Pressure-demand, full-face SCBA
Inner chemical-resistant gloves, chemical-resistant safety boots, two-way radio communication
OPTIONAL: Cooling system, outer gloves, hard hat
Protection Provided: Highest available level of respiratory, skin, and eye protection from solid, liquid and gaseous chemicals.

Used When: The chemical(s) have been identified and have high level of hazards to respiratory system, skin and eyes. Substances are present with known or suspected skin toxicity or carcinogenity. Operations must be conducted in confined or poorly ventilated areas.
Limitations: Protective clothing must resist permeation by the chemical or mixtures present. Ensemble items must allow integration without loss of performance.

LEVEL B:

Liquid splash-protective suit (meets NFPA 1992)
Pressure-demand, full-facepiece SCBA
Inner chemical-resistant gloves, chemical-resistant safety boots, two-way radio communications
Hard hat.
OPTIONAL: Cooling system, outer gloves
Protection Provided: Provides same level of respiratory protection as Level A, but less skin protection. Liquid splash protection, but no protection against chemical vapors or gases.
Used When: The chemical(s) have been identified but do not require a high level of skin protection. Initial site surveys are required until higher levels of hazards are identified. The primary hazards associated with site entry are from liquid and not vapor contact.
Limitations: Protective clothing items must resist penetration by the chemicals or mixtures present. Ensemble items must allow integration without loss of performance.

LEVEL C:

Support Function Protective Garment (meets NFPA 1993)
Full-facepiece, air-purifying, canister-equipped respirator
Chemical resistant gloves and safety boots
Two-way communications system, hard hat
OPTIONAL: Faceshield, escape SCBA
Protection Provided: The same level of skin protection as Level B, but a lower level of respiratory protection. Liquid splash protection but no protection to chemical vapors or gases.

Used When: Contact with site chemical(s) will not affect the skin. Air contaminants have been identified and concentrations measured. A canister is available which can remove the contaminant. The site and its hazards have been completely characterized.
Limitations: Protective clothing items must resist penetration by the chemical or mixtures present. Chemical airborne concentration must be less than IDLH levels. The atmosphere must contain at least 19.5% oxygen.
Not Acceptable for Chemical Emergency Response

LEVEL D:
Coveralls, safety boots/shoes, safety glasses or chemical splash goggles
OPTIONAL: Gloves, escape SCBA, face-shield
Protection Provided: No respiratory protection, minimal skin protection.
Used When: The atmosphere contains no known hazard. Work functions preclude splashes, immersion, potential for inhalation, or direct contact with hazard chemicals.
Limitations: This level should not be worn in the Hot Zone. The atmosphere must contain at least 19.5% oxygen.
Not Acceptable for Chemical Emergency Response

D.
2. The type of equipment used and the overall level of protection should be reevaluated periodically as the amount of information about the chemical situation or process increases, and when workers are required to perform different tasks. Personnel should upgrade or downgrade their level of protection only with concurrence with the site supervisor, safety officer, or plant industrial hygienist.

3. The recommendations in Table VIII:1-1 serve only as guidelines. It is important for you to realize that selecting items by how they are designed or configured alone is not sufficient to ensure adequate protection. In other words, just having the right components to form an ensemble is not enough. The EPA levels of protection do not define what performance the selected clothing or equipment must offer. Many of these considerations are described in the "limiting criteria" column of Table VIII: 1-1. Additional factors relevant to the various clothing and equipment items are described in subsequent Paragraphs.

E. ENSEMBLE SELECTION FACTORS.
2. Chemical Hazards. Chemicals present a variety of hazards such as toxicity, corrosiveness, flammability, reactivity, and oxygen deficiency. Depending on the chemicals present, any combination of hazards may exist.

3. Physical Environment. Chemical exposure can happen anywhere: in industrial settings, on the highways, or in residential areas. It may occur either indoors or outdoors; the environment may be extremely hot, cold, or moderate; the exposure site may be relatively uncluttered or rugged, presenting a number of physical hazards; chemical handling activities may involve entering confined spaces, heavy lifting, climbing a ladder, or crawling on the ground. The choice of ensemble components must account for these conditions.

4. Duration of Exposure. The protective qualities of ensemble components may be limited to certain exposure levels (e.g. material chemical resistance, air supply). The decision for ensemble use time must be made assuming the worst case exposure so that safety margins can be applied to increase the protection available to the worker.

5. Protective Clothing or Equipment Available. Hopefully, an array of different clothing or equipment is available to workers to meet all intended applications. Reliance on one particular clothing or equipment item may severely limit a facility's ability to handle a broad range of chemical exposures. In its acquisition of equipment and clothing, the safety department or other responsible authority should attempt to provide a high degree of flexibility while choosing protective clothing and equipment that is easily integrated and provides protection against each conceivable hazard.

F. CLASSIFICATION OF PROTECTIVE CLOTHING.

0. Personal protective clothing includes the following:
* Fully encapsulating suits;
* Nonencapsulating suits;
* Gloves, boots, and hoods;
* Firefighter's protective clothing;
* Proximity, or approach clothing;
* Blast or fragmentation suits; and
* Radiation-protective suits.

1. Firefighter turnout clothing, proximity gear, blast suits, and radiation suits by themselves are not acceptable for providing adequate protection from hazardous chemicals.

2. Table VIII:1-2 describes various types of protection clothing available, details the type of protection they offer, and lists factors to consider in their selection and use.

TABLE VIII: 1-2. TYPES OF PROTECTIVE CLOTHING FOR FULL BODY PROTECTION

Description
Type of Protection
Use Considerations
Fully encapsulating suit

- One-piece garment. Boots and gloves may be integral, attached and replaceable, or separate.

- Protects against splashes, dust gases, and vapors.

- Does not allow body heat to escape. May contribute to heat stress in wearer, particularly if worn in conjunction with a closed-circuit SCBA; a cooling garment may be needed. Impairs worker mobility, vision, and communication.
  Nonencapsulating suit
- Jacket, hood, pants or bib overalls, and one-piece coveralls.

- Protects against splashes, dust, and other materials but not against gases and vapors. Does not protect parts of head or neck.

- Do not use where gas-tight or pervasive splashing protection is required. May contribute to heat stress in wearer. Tape-seal connections between pant cuffs and boots and between gloves and sleeves.

Aprons, leggings, and sleeve protectors

- Fully sleeved and gloved apron. Separate coverings for arms and legs. Commonly worn over nonencapsulating suit.

- Provides additional splash protection of chest, forearms, and legs.

Whenever possible, should be used over a nonencapsulating suit to minimize potential heat stress. Useful for sampling, labeling, and analysis operations. Should be used only when there is a low probability of total body contact with contaminants.

Firefighters' Protective Clothing

Gloves, helmet, running or bunker coat, running or bunker pants (NFPA No. 1971, 1972, 1973, and boots (1974).

Protects against heat, hot water, and some particles. Does not protect against gases and vapors, or chemical permeation or degradation. NFPA Standard No. 1971 specifies that a garment consists of an outer shell, an inner liner and a vapor barrier with a minimum water penetration of 25 lb/in2 (1.8 kg/cm2) to prevent passage of hot water.

Decontamination is difficult. Should not be worn in areas where protection against gases, vapors, chemical splashes or permeation is required.
Proximity garment (approach suit)

- ✓ One- or two-piece overgarment with boot covers, gloves, and hood of aluminized nylon or cotton fabric. Normally worn over other protective clothing, firefighters' bunker gear, or flame-retardant coveralls.

- ✓ Protects against splashes, dust, gases, and vapors.

- ✓ Does not allow body heat to escape. May contribute to heat stress in wearer, particularly if worn in conjunction with a closed-circuit SCBA; a cooling garment may be needed. Impairs worker mobility, vision, and communication.

Blast and fragmentation suit

- ✓ Blast and fragmentation vests and clothing, bomb blankets, and bomb carriers.

- ✓ Provides some protection against very small detonations. Bomb blankets and baskets can help redirect a blast.

- ✓ Does not provide for hearing protection.

Radiation-contamination protective suit

- ✓ Various types of protective clothing designed to prevent contamination of the body by radioactive particles.

- ✓ Protects against alpha and beta particles. Does not protect against gamma radiation.

- ✓ Designed to prevent skin contamination. If radiation is detected on site, consult an experienced radiation expert and evacuate personnel until the radiation hazard has been evaluated.

Flame/fire retardant coveralls.

- ✓ Normally worn as an undergarment.

- ✓ Provides protection from flash fires.

- ✓ Adds bulk and may exacerbate heat stress problems and impair mobility

III.

F. CLASSIFICATION OF CHEMICAL PROTECTIVE CLOTHING. Table VIII:1-3 provides a listing of clothing classifications. Clothing can be classified by design, performance, and service life.

TABLE VIII:1-3. CLASSIFICATION OF CHEMICAL PROTECTIVE CLOTHING

By Design

By Performance

By Service Life

gloves
boots
aprons, jackets, coveralls,
full body suits
particulate protection
liquid-splash protection
vapor protection
single use
limited use
reusable

Various PPE

Glossary of Respiratory Protection Terms

The following definitions are important terms used in the respiratory protection standard and terms that will assist in the understanding and the application of the NIOSH decision logic.

Air-Purifying Respirator: A respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element. OSHA Definition

Assigned Protection Factor (APF): See PROTECTION FACTOR. NIOSH Definition

Assigned Protection Factor (APF): [Reserved] OSHA Definition

Atmosphere-Supplying Respirator: A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units. OSHA Definition

Breakthrough: The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing is often referred to as the percentage of the input concentration. NIOSH Definition

Canister or Cartridge: A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container. OSHA Definition

Demand Respirator: An atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation. OSHA Definition

Disposable Respirators: A respirator that is discarded after the end of its recommended period of use, after excessive resistance or physical damage, or when odor breakthrough or other warning indicators render the respirator unsuitable for further use. NIOSH Definition

Dust: A solid, mechanically produced particle with a size ranging from submicroscopic to macroscopic. NIOSH Definition

Emergency Respirator Use Situation: A situation that requires the use of respirators due to the unplanned generation of a hazardous atmosphere (often of unknown composition) caused by an accident, mechanical failure, or other means and that requires evacuation of personnel or immediate entry for rescue or corrective action. NIOSH Definition

Emergency Situation: Any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant. OSHA Definition

Employee Exposure: Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection. OSHA Definition

End-Of-Service-Life Indicator (ESLI): A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective. OSHA Definition

Escape Gas Mask: A gas mask that consists of a half-mask facepiece or mouthpiece, a canister, and associated connections, and that is designed for use during escape-only from hazardous atmospheres. NIOSH Definition

Escape Only Respirator: Respiratory devices that are designed for use only during escape from hazardous atmospheres. NIOSH Definition

Escape-Only Respirator: A respirator intended to be used only for emergency exit. OSHA Definition

Filter or Air-Purifying Element: A component used in respirators to remove solid or liquid aerosols from the inspired air. OSHA Definition

Filtering Facepiece: A particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. (See SINGLE-USE DUST or DUST and MIST RESPIRATORS and DISPOSABLE RESPIRATORS.) NIOSH Definition

Filtering Facepiece (Dust Mask): A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. OSHA Definition

Fit Factor: A quantitative measure of the fit of a specific respirator facepiece to a particular individual. NIOSH Definition

Fit Factor: A quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. OSHA Definition

Fit Test: Means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.) OSHA Definition

Fume: A solid condensation particulate, usually of a vaporized metal. NIOSH Definition

Gas: An aeriform fluid that is in a gaseous state at standard temperature and pressure. NIOSH Definition

Helmet: A rigid respiratory inlet covering that also provides head protection against impact and penetration. OSHA Definition

High-Efficiency Particulate Air (Hepa) Filter: A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters. OSHA Definition

Hood: Means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso. OSHA Definition

Immediately Dangerous to Life or Health (IDLH): Acute respiratory exposure that poses an immediate threat of loss of life, immediate or delayed irreversible adverse effects on health, or acute eye exposure that would prevent escape from a hazardous atmosphere. NIOSH Definition

Immediately Dangerous to Life or Health (IDLH): An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere. OSHA Definition

Interior Structural Firefighting: The physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155) OSHA Definition

Loose-Fitting Facepiece: A respiratory inlet covering that is designed to form a partial seal with the face. OSHA Definition

Maximum Use Concentration (MUC): [Reserved] OSHA Definition

Mist: A liquid condensation particulate. NIOSH Definition

Negative Pressure Respirator (Tight Fitting): A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator. OSHA Definition

Orinasal Respirator: A respirator that covers the nose and mouth and that generally consists of a quarter- or half-facepiece. NIOSH Definition

Oxygen Deficient Atmosphere: An atmosphere with an oxygen content below 19.5% by volume. OSHA Definition

Physician or Other Licensed Health Care Professional (PLHCP): Means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e) of this section. OSHA Definition

Planned or Unplanned Entry into an IDLH Environment, an Environment of Unknown Concentration of Hazardous Contaminant, or an Environment of Unknown Composition: A situation in which respiratory devices are recommended to provide adequate protection to workers entering an area where the contaminant concentration is above the IDLH or is unknown. NIOSH Definition

Positive Pressure Respirator: A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator. OSHA Definition

Potential Occupational Carcinogen: Any substance, or combination or mixture of substances, which causes an increased incidence of benign and/or malignant neoplasms, or a substantial decrease in the latency period between exposure and onset of neoplasms in humans or in one or more experimental mammalian species as the result of any oral, respiratory, or dermal exposure, or any other exposure which results in the induction of tumors at a site other than the site of administration. This definition also includes any substance that is metabolized into one or more potential occupational carcinogens by mammals (29 CFR 1990.103, OSHA Cancer Policy). NIOSH Definition

Powered Air-Purifying Respirator (PAPR): An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering. OSHA Definition

Pressure Demand Respirator: A positive pressure atmosphere- supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation. OSHA Definition

Protection Factors: NIOSH Definition

Assigned Protection Factor (APF): The minimum anticipated protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users.

Simulated Workplace Protection Factor (SWPF): A surrogate measure of the workplace protection provided by a respirator.

Workplace Protection Factor (WPF): A measure of the protection provided in the workplace by a properly functioning respirator when correctly worn and used.

Qualitative Fit Test (QLFT): A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent. OSHA Definition

Quantitative Fit Test (QNFT): Means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator. OSHA Definition

Recommended Exposure Limit (REL): An 8- or 10-hour time-weighted average (TWA) or ceiling (C) exposure concentration recommended by NIOSH that is based on an evaluation of the health effects data. NIOSH Definition

Respiratory Inlet Covering: The portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, a helmet, a hood, a suit, or a mouthpiece respirator with nose clamp. OSHA Definition

Self-Contained Breathing Apparatus (**SCBA**): An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user. OSHA Definition

Service Life: The length of time required for an air-purifying element to reach a specific effluent concentration. Service life is determined by the type of substance being removed, the concentration of the substance, the ambient temperature, the specific element being tested (cartridge or canister), the flow rate resistance, and the selected breakthrough value. The service life for a self-contained breathing apparatus (**SCBA**) is the period of time, as determined by the NIOSH certification tests, in which adequate breathing gas is supplied. **NIOSH Definition**

Service Life: The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer. **OSHA Definition**

Single-Use Dust or Dust and Mist Respirators: Respirators approved for use against dusts or mists that may cause pneumoconiosis and fibrosis. NIOSH Definition

Supplied-Air Respirator (SAR) or Airline Respirator: An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user. OSHA Definition

This Section: This respiratory protection standard. OSHA Definition

Tight-Fitting Facepiece: A respiratory inlet covering that forms a complete seal with the face. OSHA Definition

User Seal Check: An action conducted by the respirator user to determine if the respirator is properly seated to the face. OSHA Definition

Vapor: The gaseous state of a substance that is solid or liquid at temperatures and pressures normally encountered. NIOSH Definition

Appendix A to § 1910.134: Fit Testing Procedures (Mandatory)

Part I. OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures-General Requirements

The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

(a) Position of the mask on the nose

(b) Room for eye protection

(c) Room to talk

(d) Position of mask on face and cheeks

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

(a) Chin properly placed;

(b) Adequate strap tension, not overly tightened;

(c) Fit across nose bridge;

(d) Respirator of proper size to span distance from nose to chin;

(e) Tendency of respirator to slip;

(f) Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection

to the procedures in Appendix B-1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.
9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.
10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.
11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.
12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.
13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.
14. Test Exercises. (a) The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:
(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.
(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).

(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

1. General

(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

(a) Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

(1) Three 1 liter glass jars with metal lids are required.

(2) Odor-free water (e.g., distilled or spring water) at approximately 25 [degrees] C (77 [degrees] F) shall be used for the solutions.

(3) The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.
(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.
(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.
(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."
(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.
(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.
(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.
(b) Isoamyl Acetate Fit Test
(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.
(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.
(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.
(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.
(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.
(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.
(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.
(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.
(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.
3. Saccharin Solution Aerosol Protocol
The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.
(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.
(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.
(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.
(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.
(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.
(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.
(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.
(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.
(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.
(10) The test conductor will take note of the number of squeezes required to solicit a taste response.
(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.
Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.
(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.
(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.
(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.
(b) Saccharin solution aerosol fit test procedure.
(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.
(2) The fit test uses the same enclosure described in 3. (a) above.
(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).
(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.
(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.
(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.
(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.
(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).
(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.
(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).
(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.
4. Bitrex<TM> (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol
The Bitrex<TM> (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.
(a) Taste Threshold Screening.
The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.
(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.
(2) The test enclosure shall have a 3/4 inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.
(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste.
(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This

Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.
(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.
(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.
(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.
(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.
(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.
(10) The test conductor will take note of the number of squeezes required to solicit a taste response.
(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.
(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.
(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.
(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.
(b) Bitrex Solution Aerosol Fit Test Procedure.
(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.
(2) The fit test uses the same enclosure as that described in 4. (a) above.
(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).
(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.
(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.
(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex..

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.
(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.
(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).
(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.
(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).
5. Irritant Smoke (Stannic Chloride) Protocol
This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.
(a) General Requirements and Precautions
(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).
(2) Only stannic chloride smoke tubes shall be used for this protocol.
(3) No form of test enclosure or hood for the test subject shall be used.
(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.
(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.
(b) Sensitivity Screening Check
The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.
(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.
(c) Irritant Smoke Fit Test Procedure
(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
(2) The test subject shall be instructed to keep his/her eyes closed.
(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.
(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.
(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.
(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
(8) If a response is produced during this second sensitivity check, then the fit test is passed.
C. Quantitative Fit Test (QNFT) Protocols
The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.
1. General
(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.
2. Generated Aerosol Quantitative Fit Testing Protocol
(a) Apparatus.
(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.
(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.
(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.
(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.
(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.
(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.
(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.
(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.
(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.
(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.
(13) The limitations of instrument detection shall be taken into account when determining the fit factor.
(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.
(b) Procedural Requirements.
(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.
(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.
(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.
(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.
(5) A stable test agent concentration shall be obtained prior to the actual start of testing.
(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.
(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.
(8) Calculation of fit factors.
(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.
(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:
(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.
(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.
(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.
(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff1+1/ff2+1/ff3+1/ff4+1/ff5+1/ff7+1/ff8}$$

Where ff[1], ff[2], ff[3], etc. are the fit factors for exercises 1, 2, 3, etc.
(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.
(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.
3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.
The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount<TM>) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) Portacount Fit Test Requirements.
(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.
(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.
(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.
(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.
(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.
(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.
(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.
(b) Portacount Test Instrument.
(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.
(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.
(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.
4. Controlled negative pressure (CNP) quantitative fit testing protocol.
The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the

pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer Dynatech Nevada also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

(a) CNP Fit Test Requirements.

(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

(2) The CNP system defaults selected for test pressure shall be set at -15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

(5) The test subject shall be trained to hold his or her breath for at least 20 seconds.

(6) The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

(7) The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.

(b) CNP Test Exercises.

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.
(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.
(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.
(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.
(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.
(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.
(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.
(c) CNP Test Instrument.
(1) The test instrument shall have an effective audio warning device when the test subject fails to hold his or her breath during the test. The test shall be terminated whenever the test subject failed to hold his or her breath. The test subject may be refitted and retested.

(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.

Appendix B-1 to § 1910.134: User Seal Check Procedures (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Facepiece Positive and/or Negative Pressure Checks

A. Positive pressure check. Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

Appendix B-2 to § 1910.134: Respirator Cleaning Procedures (Mandatory)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 [degrees] C [110 [degrees] F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43 [degrees] C [110 [degrees] F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 [degrees] C (110 [degrees] F); or,
2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 [degrees] C (110 [degrees] F); or,
3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
E. Rinse components thoroughly in clean, warm (43 [degrees] C [110 [degrees] F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
F. Components should be hand-dried with a clean lint-free cloth or air-dried.
G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
H. Test the respirator to ensure that all components work properly.

Appendix C to § 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date: ----------
2. Your name: ---------- -
3. Your age (to nearest year): ----------
4. Sex (circle one): Male/Female
5. Your height: ----- ft. ----- in.
6. Your weight: ------ lbs.
7. Your job title: ----------
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): ----------
9. The best time to phone you at this number: --------
10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No
11. Check the type of respirator you will use (you can check more than one category):

a. --- N, R, or P disposable respirator (filter-mask, non-cartridge type only).

b. --- Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s): ----------

---------- ----------

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month: Yes/No
2. Have you ever had any of the following conditions?

a. Seizures (fits): Yes/No

b. Diabetes (sugar disease): Yes/No

c. Allergic reactions that interfere with your breathing: Yes/No

d. Claustrophobia (fear of closed-in places): Yes/No

e. Trouble smelling odors: Yes/No

3. Have you ever had any of the following pulmonary or lung problems?

a. Asbestosis: Yes/No
b. Asthma: Yes/No
c. Chronic bronchitis: Yes/No
d. Emphysema: Yes/No
e. Pneumonia: Yes/No
f. Tuberculosis: Yes/No
g. Silicosis: Yes/No
h. Pneumothorax (collapsed lung): Yes/No
i. Lung cancer: Yes/No
j. Broken ribs: Yes/No
k. Any chest injuries or surgeries: Yes/No
l. Any other lung problem that you've been told about: Yes/No
4. Do you currently have any of the following symptoms of pulmonary or lung illness?
a. Shortness of breath: Yes/No
b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
d. Have to stop for breath when walking at your own pace on level ground: Yes/No
e. Shortness of breath when washing or dressing yourself: Yes/No
f. Shortness of breath that interferes with your job: Yes/No
g. Coughing that produces phlegm (thick sputum): Yes/No
h. Coughing that wakes you early in the morning: Yes/No
i. Coughing that occurs mostly when you are lying down: Yes/No
j. Coughing up blood in the last month: Yes/No
k. Wheezing: Yes/No
l. Wheezing that interferes with your job: Yes/No
m. Chest pain when you breathe deeply: Yes/No
n. Any other symptoms that you think may be related to lung problems: Yes/No
5. Have you ever had any of the following cardiovascular or heart problems?
a. Heart attack: Yes/No
b. Stroke: Yes/No
c. Angina: Yes/No
d. Heart failure: Yes/No
e. Swelling in your legs or feet (not caused by walking): Yes/No
f. Heart arrhythmia (heart beating irregularly): Yes/No
g. High blood pressure: Yes/No
h. Any other heart problem that you've been told about: Yes/No
6. Have you ever had any of the following cardiovascular or heart symptoms?
a. Frequent pain or tightness in your chest: Yes/No
b. Pain or tightness in your chest during physical activity: Yes/No
c. Pain or tightness in your chest that interferes with your job: Yes/No
d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No

e. Heartburn or indigestion that is not related to eating: Yes/No
f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No
7. Do you currently take medication for any of the following problems?
a. Breathing or lung problems: Yes/No
b. Heart trouble: Yes/No
c. Blood pressure: Yes/No
d. Seizures (fits): Yes/No
8. If you've used a respirator, have you ever had any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)
a. Eye irritation: Yes/No
b. Skin allergies or rashes: Yes/No
c. Anxiety: Yes/No
d. General weakness or fatigue: Yes/No
e. Any other problem that interferes with your use of a respirator: Yes/No
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No
Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.
10. Have you ever lost vision in either eye (temporarily or permanently): Yes/No
11. Do you currently have any of the following vision problems?
a. Wear contact lenses: Yes/No
b. Wear glasses: Yes/No
c. Color blind: Yes/No
d. Any other eye or vision problem: Yes/No
12. Have you ever had an injury to your ears, including a broken ear drum: Yes/No
13. Do you currently have any of the following hearing problems?
a. Difficulty hearing: Yes/No
b. Wear a hearing aid: Yes/No
c. Any other hearing or ear problem: Yes/No
14. Have you ever had a back injury: Yes/No
15. Do you currently have any of the following musculoskeletal problems?
a. Weakness in any of your arms, hands, legs, or feet: Yes/No
b. Back pain: Yes/No
c. Difficulty fully moving your arms and legs: Yes/No
d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
e. Difficulty fully moving your head up or down: Yes/No
f. Difficulty fully moving your head side to side: Yes/No
g. Difficulty bending at your knees: Yes/No
h. Difficulty squatting to the ground: Yes/No
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No

j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No
Part B Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.
1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No
If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No
2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No
If "yes," name the chemicals if you know them: ----------
---------- ----------
---------- ----------
3. Have you ever worked with any of the materials, or under any of the conditions, listed below:
a. Asbestos: Yes/No
b. Silica (e.g., in sandblasting): Yes/No
c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No
d. Beryllium: Yes/No
e. Aluminum: Yes/No
f. Coal (for example, mining): Yes/No
g. Iron: Yes/No
h. Tin: Yes/No
i. Dusty environments: Yes/No
j. Any other hazardous exposures: Yes/No
If "yes," describe these exposures: ----------
---------- ----------
---------- ----------
4. List any second jobs or side businesses you have:----------
---------- ----------
5. List your previous occupations:----------
---------- ----------
6. List your current and previous hobbies:----------
---------- ----------
7. Have you been in the military services? Yes/No
If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No
8. Have you ever worked on a HAZMAT team? Yes/No
9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No
If "yes," name the medications if you know them: ----------
10. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes/No
b. Canisters (for example, gas masks): Yes/No
c. Cartridges: Yes/No
11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:
a. Escape only (no rescue): Yes/No
b. Emergency rescue only: Yes/No
c. Less than 5 hours per week: Yes/No
d. Less than 2 hours per day: Yes/No
e. 2 to 4 hours per day: Yes/No
f. Over 4 hours per day: Yes/No
12. During the period you are using the respirator(s), is your work effort:
a. Light (less than 200 kcal per hour): Yes/No
If "yes," how long does this period last during the average shift:------ hrs.------ mins.
Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.
b. Moderate (200 to 350 kcal per hour): Yes/No
If "yes," how long does this period last during the average shift:------ hrs.------ mins.
Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.
c. Heavy (above 350 kcal per hour): Yes/No
If "yes," how long does this period last during the average shift:------ hrs.------ mins.
Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).
13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No
If "yes," describe this protective clothing and/or equipment:----------
---------- ----------
14. Will you be working under hot conditions (temperature exceeding 77 [degrees] F): Yes/No
15. Will you be working under humid conditions: Yes/No
16. Describe the work you'll be doing while you're using your respirator(s):
---------- ----------
---------- ----------

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases):
---------- ----------
---------- ----------
18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):
Name of the first toxic substance: ----------
Estimated maximum exposure level per shift: ----------
Duration of exposure per shift ----------
Name of the second toxic substance: ----------
Estimated maximum exposure level per shift: ----------
Duration of exposure per shift: ----------
Name of the third toxic substance: ----------
Estimated maximum exposure level per shift: ----------
Duration of exposure per shift: ----------
The name of any other toxic substances that you'll be exposed to while using your respirator:
---------- ----------
---------- ----------
---------- ----------
19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, and security):

Appendix D to § 1910.134 (Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, of if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of your respirator so that you do not mistakenly use someone else's respirator

EPA Information Resources

The public may request copies of the following documents from the following sources:

TSCA Hotline - Sponsored by the Office of Pollution Prevention and Toxics, the TSCA Hotline provides technical assistance and information about asbestos programs implemented under TSCA, which include; the Asbestos School Hazard Abatement Act (**ASHAA**), the Asbestos Hazard Emergency Response Act (**AHERA**), and the Asbestos School Hazard Abatement Reauthorization Act (ASHARA).The Hotline provides copies of TSCA information, such as Federal Register notices and support documents, to requesters through its Clearinghouse function.

E-mail address: tsca-hotline@epa.gov
Hours of Service: 8:30 a.m. - 5:00 p.m. (EST) M - F
Telephone: 202-554-1404
TDD: 202-554-0551
Fax: 202-554-5603 (Fax available 24 hours a day)

Asbestos Ombudsman - The Ombudsman focuses on asbestos in schools requirements and handles questions and complaints. The Ombudsman operates a toll-free hotline for the convenience of small businesses, trade associations, and others seeking free, confidential help. A member of the Ombudsman's staff will answer between 8:30 AM and 4:30 PM EST. Message-recording devices for calls during non-business hours and overload periods are provided. All calls are personally handled on a fast turn-around basis. The toll-free hotline number is: (800) 368-5888.

Asbestos Notice (Example Letter/Notice)
Required by Law

Dear Parents, Teachers, Building Occupants, and Employees Organizations: Uncontrolled asbestos contamination in buildings can be a significant environmental and public-health problem. Both the public and private sectors have been dealing with the asbestos issue for many years. In 1986, Congress enacted the Asbestos Hazard Emergency Response Act (AHERA) primarily to require school districts to identify asbestos-containing materials (ACM) in their school buildings and take appropriate actions to control the release of asbestos fibers. In 1987, the U.S. Environmental Protection Agency (EPA) finalized a regulatory program to enforce AHERA. In compliance with AHERA regulations, we had our school facilities inspected by an EPA-accredited building inspector. During the inspection, samples were taken of building materials suspected of containing asbestos. The results of the inspection and laboratory analysis of the samples have confirmed the presence of ACM in portions of the school facilities. It is important to note that these materials are in a form and condition that does not pose an imminent health threat to students, faculty or employees. With confirmation of the presence of ACM, an Asbestos Management Plan was developed for our schools by an EPA-accredited management planner.

The Management Plan includes the inspection and physical assessment reports, the training program for our custodial and maintenance personnel, the plans and procedures to be followed to minimize disturbance of the asbestos-containing materials, and a program for regular surveillance of the ACM. Every three years, a reinspection by an accredited inspector must be conducted on all friable and non-friable known or assumed asbestos containing building materials (ACBM) to determine whether the condition of the ACBM has changed and to make recommendations on managing or removing the ACBM. The following sites contain no asbestos-containing building materials and no operations and maintenance programs or future inspections are required in these buildings: Mount Scott Elementary, Oregon Trail Elementary, Sunrise Middle School, Sunnyside Village Center, Spring Mountain Elementary and Clackamas High School.

During 2001-2002, we conducted periodic surveillance inspections every six months to check the condition of the remaining asbestos and to determine if any action was needed.

During 2002, asbestos-containing building materials (ACBM) have been removed, encapsulated, or encased in various school buildings. An account of these activities is available for review at each site for that campus or at Risk Management Services for all locations.

For further details on the locations of the remaining ACBM or on the asbestos activities, you are welcome to review a copy of the Asbestos Management Plan in the individual school offices or in Risk Management Services by appointment during regular office hours. Gary Walker, Risk Manager, is our designated asbestos-program coordinator; and all inquiries regarding the plan should be directed to him at (508) 653-7843.

Bill Fields
Superintendent

References

Environmental Protection Agency

Office of Safety and Health Administration

Department of Labor

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