

ASBESTOS WORKER RECERTIFICATION MANUAL



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ASBESTOS BASICS

Characteristics and Uses of Asbestos

Asbestos is a **naturally occurring** fibrous mineral. Two major commercial sources of this mineral are from mines in South Africa and Canada. Because it is a rock, asbestos has many properties that make it a useful component of many building systems. Its **properties** include: **high tensile strength, high heat resistance, and chemical resistance**. It is extremely aerodynamic and the **fibers may float in the air several days** after they are released.

There are six types of asbestos. The **three major types** of asbestos are **chrysotile (white asbestos), amosite (brown asbestos), and crocidolite (blue asbestos)**, with chrysotile being the one most commonly used. AHERA has divided asbestos containing building materials (ACBM) into three categories. These categories are: **Surfacing** (sprayed on or troweled on fire proofing, acoustical plaster, sound proofing, etc.) **Thermal** (pipe coverings, duct coverings, boiler coverings, etc.) **Miscellaneous** (fire doors, floor tile and mastic, ceiling tile, Transite panels or cement pipes, etc.).

Definitions:

Friable - The ability of a material to be crumbled to a powder by hand pressure when dry.

Asbestos Containing Material (ACM) - Any material, according to the EPA and OSHA, that contains > 1% asbestos by weight. **NOTE:** The State Employees Asbestos Program treats all materials that have asbestos in them as asbestos containing regardless of the amount, because even material with a trace amount of asbestos could present an inhalation hazard when the material is disturbed.

Remember: Asbestos is a health hazard when it is released as a dust!

ASBESTOS RELATED DISEASES

Factors Affecting Disease

There are several factors that may affect a person's getting an asbestos related disease. These include:

Smoking (Asbestos workers who smoke are 50 to 90 times more likely to get lung cancer than non smoking non asbestos working persons)

Individual Susceptibility (Individual response to asbestos fibers cannot be predicted.)

Group Susceptibility (Maintenance workers who fail to follow safe work practices are more likely to get an asbestos related disease than office workers, primarily because maintenance workers are more likely to come into direct contact with asbestos than office workers.)

Age (The older you are when you start working with asbestos, the less likely you are to get an asbestos related disease)

Amount of Exposure to Asbestos (In general the more asbestos you are exposed to the greater your chance of getting an asbestos related disease)

Length of Time Exposed to Asbestos (Same as above)

General Health (The better health you are in, the more resistance to disease you have) **Note:** There is **no safe level of asbestos exposure**. Any exposure poses some risk. The more exposure you have, the greater your risk. Thus, it is important to take appropriate safety measures whenever working with or around friable asbestos containing materials.

Asbestos enters the body in two main ways: **Inhalation** (breathing it in) and **Ingestion** (swallowing it such as when it is brought up in mucus from the respiratory tract.)

Defense Mechanisms Against Asbestos

The body has defensive mechanisms against asbestos which include: **nose hairs, the mucociliary escalator, and white blood cells (Phagocytes)**. While these help, they are not entirely effective against asbestos). The first two mechanisms handle large sized fibers. However very small fibers can enter the lungs and create adverse health effects.

Non - Harmful Symptoms of Asbestos Exposure

Non - harmful symptoms of asbestos exposure include: **asbestos warts, asbestos bodies, pleural plaques, pleural effusion, and pleural thickening.**

Major Asbestos Related Diseases

Asbestosis

This disease is a scarring of the lungs caused by the body's response to the asbestos fibers lodged there. It is generally associated with exposure to large amounts of asbestos and takes 10-20 years to develop. Chest X-rays and Pulmonary Function Tests are how it is diagnosed.

Lung Cancer

This disease is one or more malignant tumors of the lungs caused by the body's response to the asbestos fibers lodged there. In general the more asbestos you are exposed to, the greater your chances of getting lung cancer. **Smoking increases your risk of getting lung cancer when you work with asbestos by over 50 to 90 times that of non-smoking non-asbestos workers.** Lung cancer takes 20-30 years to develop and is diagnosed by chest X-rays and biopsy.

Mesothelioma

This disease is a malignancy of the lining of chest and/or abdominal cavity caused by asbestos fibers that have migrated from the lungs to this area. This disease has been associated with lower levels of exposure to asbestos. Mesothelioma takes from 30-50 years to develop and is diagnosed by chest X-rays and biopsies.

Other Cancers

Asbestos exposure has been linked with an increase in other cancers, particularly of the digestive system.

LAWS AND REGULATIONS

The law is one tool for a safer and healthier job. However, the protection furnished by occupational and environmental safety laws depend extensively on how well people comply with these provisions.

When it comes to asbestos and other hazardous materials, substantial compliance is not enough. Everyone must do their part. For example, if just one individual fails to comply with the requirements, he/she could create conditions that endanger the entire work crew or could contaminate the environment. Thus, it is extremely important for everyone working with asbestos to know the safety and health requirements. Each person must follow them to the letter and should insist that fellow workers also follow the requirements.

Asbestos project workers and supervisors have an ethical and legal responsibility to ensure that work proceeds in a safe manner. The minimum standards for safe asbestos work are prescribed in regulations set forth by OSHA (the Occupational Safety and Health Administration) and EPA (the Environmental Protection Agency). These regulations were promulgated on statutes enacted by Congress, and carry enforcement penalties for non-compliance. There are also State of Maryland Regulations based on laws enacted by the Maryland General Assembly, which both complement and supplement Federal Regulations.

As stated before, these regulations set the **minimum** requirements to protect workers and the environment from asbestos hazards. They also serve as a competency standard for supervisors. For example, OSHA's asbestos regulations specifically requires supervisors to be a Competent Person by definition, a Competent Person is a knowledgeable person able to identify asbestos and associated safety hazards, prescribe control measures to protect workers and the environment. In addition, to be a competent person, the individual must also have the authority to take prompt corrective actions to eliminate hazards that may arise during the project. The supervisor has the responsibility to ensure that workers are complying with safety procedures and to initiate disciplinary action against individuals who fail to comply with safety procedures. It is important to note that the supervisor, as a competent person, may be judged by how well he/she protected workers and the environment, not necessarily on the question did he/she just follow the regulations. These competency issues are likely to be decided by a jury during a tort liability trial sometime in the future, with the consequences much more severe than any penalty levied by regulatory enforcement officials.

It is also important for workers to realize that there are several serious safety hazards at the worksite besides asbestos. These could include heat stress, electrical hazards, fall hazards, confined spaces, lifting and material handling hazards, among others. The supervisor on the job needs to be competent in addressing these other safety concerns. Before any work commences on an asbestos project, they should assess all the potential safety hazards on the job site, and be sure that appropriate control measures are implemented according to established safety practices in the industry. It is recommended that a copy of the OSHA regulation 29 CFR1926 be checked as part of the project planning process.

Construction Standards

29 CFR 1926.1101

ASBESTOS

Replaced 1926.58 on August 10, 1994 with MOSH adoption Jan. 30, 1995.

Applies to:

[(a)]

- (1) removal or encapsulation of materials containing asbestos;
- (2) construction, alteration, repair, maintenance, or renovation of structures, substrates, or portions thereof, that contain asbestos;
- (3) asbestos spill/emergency cleanup;
- (4) transportation, disposal, storage, containment of, and housekeeping activities involving asbestos or products containing asbestos on the site or location at which construction activities are performed.

New Definitions:

[(b)]

- * **Building/facility owner:** legal entity, including lessee, which exercises control over management and record keeping functions related to the building or facility.
- * **Disturbance:** a Class III operation where contact with ACM or PACM (either accidental or intentional) is or could be released but amount is no more than what will fill a standard size glove bag or waste bag (60 united inches).
{NOTE: If amount above is exceeded, the operation becomes a Class I or II job, depending on the type of asbestos disturbed (TSI/Surfacing or Misc.)}.
- * **PACM:** Presumed Asbestos Containing Material.
- * **Competent person training:**

If Class I or II work: Supervisor training (5 day);
If Class III or IV must have O & M course training (2 day).
[Class IV work not allowed in MD as OSHA defines it]

Permissible Exposure Limits (PELs) of:

[(c)]

- * 0.1 f/cc, for an 8-hour Time-Weighted Average (TWA); and
1.0 f/cc over a 30-minute sampling period called Excursion Limit (EL).
No more action limit (AL).

Regulated Area:

[(e)]

- * an area established and demarcated by the employer where Class I, II, III work is being conducted and any adjoining areas where debris and waste accumulate,
- * where airborne concentrations are or may exceed the PELs,
- * only authorized persons allowed,
- * must wear an appropriate respirator,
- * have appropriate sign and demarcation tape,
- * no eating, drinking, smoking, chewing tobacco or gum, or applying of cosmetics.

NOTE: standard does not address Class IV operations as regulated areas but would be if above PELs.

Competent Person:

[(o)]

- * Employer must designate such a person and must have the qualifications and authority to ensure worker safety and health under 1926.20 (b)(2) through 1926.32, which includes:
 - accident prevention program, which includes frequent and regular on-site inspections;
 - education and training program in the recognition and avoidance of unsafe conditions and the regulations applicable to the work environment; safe handling, personal hygiene, and personal protective practices;
 - confined space entry procedures;
 - housekeeping;
 - illumination;
 - fire protection and prevention;
 - first aid procedures; and
- * from the ASBESTOS standard:
 - inspect Class I site at least once per shift or at employee's request,
 - inspect Class II, III, IV at sufficient enough intervals to assess whether conditions have changed and at an employee's request,
 - set up regulated area, enclosure, or other containment,
 - supervise employee exposure monitoring and ensure it is conducted correctly,
 - ensure employees in containment or using glove bags are wearing respirators and protective clothing,
 - ensure through on-site inspections that engineering controls are working properly and employees are using proper work practices,
 - ensure that employees are using the hygiene facilities and decontamination procedures, and
 - ensure notification requirements are met.

Need for Initial Exposure Assessment (IEA) (personal sampling): [(f)(2)]
Must be conducted by a "competent person" immediately before [(b)]
or at the initiation of the operation.

***Exception-** Class I jobs must assume > TWA or EL until exposure monitoring conducted and shows < TWA/EL.

Negative Exposure Assessment (NEA) [(f)(2)(iii)]

For any one specific job, the employer may demonstrate exposures below PELs from data which is ...

- A. Objective data demonstrating that product/material or activity cannot release fibers exceeding PELs; or
- B. Previous monitoring (below PELs) within last 12 months and the data obtained closely resembles the process, type of material, control methods, work practices, environmental conditions, and training and experience of employees. From this data, there must be a high degree of certainty that exposures will be under the TWA and EL; or
- C. Results of initial breathing zone monitoring of current job are under the PELs and are representative of entire job.

CLASSES OF WORK:

Class I: activities involving removal of Thermal System Insulation and surfacing ACM or PACM (Presumed Asbestos Containing Material); [(g)(4)]

*** respirator must be provided and required to be used *** [(h)]

...if no negative exposure assessment must provide a full face, supplied-air respirator operated in the pressure demand mode and equipped with an auxiliary, positive-pressure, self-contained breathing apparatus;

***but if exposures are under 1.0 f/cc for an 8-hour TWA, a tight-fitting, full-face piece, powered-air purifying respirator (PAPR) may be used.

DECON unit: > 10 ft² or 25 linear feet of TSI or surfacing is being removed, a 3-stage unit (connected equipment, shower, & clean rooms) is required; When < 10/25, or where exposures > PEL or no negative exposure assessment shall establish an equipment room or area adjacent to regulated area.

Protective coveralls and gloves if over TWA/EL or over 10 SF or 25 LF.

NOTE: If the removal is a glove bag operation, there must be two employees present to perform this activity.

Class II: activities involving removal of ACM other than TSI or surfacing material if not done in an intact state. [(g)(7)]

**Examples- removal of wall board, floor tile and sheeting, roofing, siding shingles, mastics, cutting into fire doors or privy doors.
-respirator must be provided and required usage if asbestos is not removed in a substantially intact state, or not using wet methods, or no negative exposure assessment. [(h)(1)]**

Vinyl and asphalt flooring - no sanding, must use HEPA vac, resilient sheeting cutting with wetting at the snip point and wetting during delamination. Rip-ups prohibited. Scraping of adhesive residue and/or backing using wet methods.

Removal of intact tiles only unless can show not possible. If can be removed intact by heating, wet method can be omitted. [(g)(8)(i)]

Care of asbestos-containing flooring material: (1910 - General Industry)

Stripping conducted using low abrasive pad, < 300 rpm buffer, and wet methods.

Burnishing or dry buffing performed only when enough finish so pad does not contact flooring material.

Siding shingles or panels - no breaking, cutting, or abrading unless can demonstrate other methods cannot be used. Wetting with amended water. Immediately wrapped or bagged. Disposed at end of each workday. [(g)(8)(iii)]

Gaskets - Removed within glovebag if visibly deteriorated or unlikely to be removed intact. Thoroughly wetted with amended water including residue. Immediately placed in disposal container. [(g)(8)(iv)]

Class III: repair and maintenance operations where ACM including TSI or surfacing is likely to be disturbed (either accidentally or intentionally) and contact can release fibers. [(g)(9)]

-disturbance is an amount that does not exceed amount contained in one standard-sized glove bag or waste bag (1/3 to 1/2 full) and in no event shall exceed 60 inches in length and width.

-required to use wet methods and to extent feasible, local exhaust ventilation.

-if no sampling data or over PEL' s or no negative exposure assessment, must use impermeable dropcloths and plastic barriers or equivalent and isolate by using mini-enclosures or glovebags.

Class IV: Housekeeping (not cleanup) that takes place in an area after a Class I, II, or III job has been completed. Does not include picking up and bagging of asbestos debris/dust during Class I, II, or III operations.

[(g)(10)]

NOTE: Class IV work is not allowed in MD as OSHA defines it.

"Competent person" must evaluate work before being done to assure the work is not another class of work.

-mandated to use wet methods, HEPA vacs, and promptly clean up debris containing ACM or PACM.

-if TSI or surfacing is accessible during housekeeping operations, other waste and debris is to be considered asbestos containing (contaminated).

Requirements when exposures over the PEL or EL or without a Negative Exposure Assessment:

-regulated area with appropriate sign and demarcation.

-respiratory protection with specific Class and emergency use requirements.

-protective clothing with immediate repairs to rips and tears, and competent person to examine once per work shift.

-training, medical surveillance, record keeping.

-competent person: designated by employer with qualifications and authority to ensure worker safety and health and perform inspections of the site.

NOTE: If specific control measures not given, then must use ...

- A. Use of HEPA vacuums,**
- B. Wet methods unless infeasible due to hazards of electricity or slips, or equipment malfunction,**
- C. Prompt clean-up and disposal of debris in leak-tight containers,**
- D. Local exhaust systems with HEPA filtration,**
- E. Enclosure or isolation.**

Labels:

affixed to all products containing asbestos and to containers containing asbestos. If feasible, installed asbestos products shall contain a visible label unless has been modified by a bonding agent, coating, binder, or other material and manufacturer can demonstrate that thru use, handling, storage, processing, or disposal no release at PEL or EL will occur or < 1%. [(k)(7)]

Previously installed PACM/ACM shall be clearly labeled or signs to notify employees of what materials containing PACM/ACM there are in their building and to entrances of mechanical rooms containing ACM/PACM.

Signs may be used in lieu of labels if contain required label information.

Training: Variable amounts according to Class of work. [(k)(9)]

Class I & II training equivalent to EPA' s 4day asbestos abatement worker or 5-day for asbestos supervisor and both include 16 hours of "hands-on".
Class III training equivalent to 16-hour Operations and Maintenance course for EPA.
Class IV training equivalent to 2-hour awareness training course for EPA.

NOTE: Every employee who works with a category of ACM material (roofing, flooring, siding, or transite) containing asbestos shall receive additional training.

Housekeeping: [(1)]

If using a vacuum, must be HEPA filtered. NO compressed air blow downs of area or tools.

Medical Surveillance: [(m)]

Program for employees for 30 or more days per year engaged in Class I, II, III work (Does NOT apply to Level II workers) or exposed at or above TWA or EL and wear negative-pressure respirators.

Initial examination conducted prior to assignment and at least annually thereafter.

Building and Facility Owners must before work subject to this standard is begun: [(k)]

- * identify presence, location, and quantity of ACM or PACM at site.
- * notify in writing or personal communication:
 - (A) prospective employers,
 - (B) employees of employers,
 - (C) tenants who occupy areas containing such materials.
- * post signs on mechanical room doors which identify type, location, and appropriate work practices to ensure will not disturb ACM/PACM.
- * affix labels or signs to notify employees of what materials contain ACM/PACM.

29 CFR 1910.134

RESPIRATORY PROTECTION

Employer' s primary obligation is to control atmospheric contamination by feasible and accepted engineering control methods (for example, enclosure or confinement of the operation, general and local ventilation, or substitution of less toxic contaminants).

When not feasible or while engineering controls are being implemented, appropriate respirators shall be used under the following requirements:

- 1) when necessary to protect the health of the employee,
- 2) applicable and suitable for the purpose intended, and
- 3) responsible for the establishment and maintenance of a respiratory protection program.

Requirements for a minimal acceptable program:

The elements of the respiratory protection standard include:

- Respirators shall be provided by the employer when necessary to protect the health of the employee
- The employer shall develop and implement a written respiratory protection program that is administered by a suitably trained person *[usually the ASHS in MD]* who will do the required evaluations of program effectiveness.
- The employer shall evaluate respiratory hazards in the workplace and identify user and workplace factors and base the respirator selection on them.
- The employer shall provide a medical evaluation on an employee's fitness to wear a respirator
- The employer shall ensure that each employee receives and passes a fit test.
- The employer shall establish and implement procedures for the proper use of respirators.
- The employer shall provide for the cleaning, disinfection, storage, inspection, and repair of respirators.
- The employer shall provide grade D or better breathing quality air for those employees using supplied air respirators
- All labels must comply with NIOSH and be readable
- The employer must provide training to employees who need to wear respirators on at least an annual basis.
- The employer shall evaluate the workplace to ensure the program is working and that employees are using respirators properly.

- **The employer shall establish and retain written information regarding medical exams, fit tests, and the respirator program.**

These requirements were to be implemented by no later than October 5, 1998

Environmental Protection Agency (EPA)

NATIONAL EMISSIONS STANDARD FOR HAZARDOUS AIR POLLUTANTS

NESHAP

(CAA) (40 CFR 61 Part M) (1990)
(revised from 1984)

- Banned asbestos spray-applied insulation, pre-molded insulation (if friable), spray-applied decorative material.
- No visible emissions to the outside.
- Required notification 10 days prior to any removals, demolition, renovations when asbestos amounts larger than 160 square feet or 260 linear feet or 35 cubic feet.
- Removal and stripping of asbestos made adequately wet and no dropping, throwing, sliding, or otherwise disturbing.
- Use of local exhaust and collection systems (negative air machines).
- Only approved variances for nonwetted renovations and removals when there are safety and equipment damage concerns.
- Defined Category I and II nonfriable RACM (regulated asbestos-containing material) in relation to demolition and renovation operations.

Category I nonfriable ACM includes asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products.

Category II nonfriable ACM includes any asbestos-containing material, not included in Category I nonfriable ACM, that when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure but mechanical forces during the course of demolition or renovation make them friable. Examples are: cement siding shingles and Transite products.

- Established standards for waste disposal for manufacturing, fabricating, demolition, renovation, and spraying operations.
- Training requirements for onsite representatives.

ASBESTOS HAZARD EMERGENCY RESPONSE ACT

AHERA

**(40 CFR Part 763, TSCA-- published October 30, 1987;
effective December 14, 1987; implementation of MP- May 1989)**

- **Applicable to private and public non profit schools through 12th grade (including non-profit nurseries and pre-schools) required to inspect buildings for asbestos presence and condition.**
- **Local Education Agency (LEA) - Designates a person to ensure implementation of the management plan for the school.**
- **Must develop and implement updated asbestos management plans.**
- **Operations/Maintenance Plan and implementation.**
- **Abatement project planning/supervision. Abatement work done by certified persons who have attended 3-5 day training courses with EPA approval.**
- **Annual notification to parents and occupants.**
- **Specific training requirements for accredited persons.**
- **Required periodic surveillance (every 6 months) and re-inspection (every 3 years) to monitor ACM left in schools.**
- **EPA was to recommend to Congress to extend this regulation to public buildings.**

ASBESTOS MANUFACTURING, PROCESSING, IMPORTATION AND DISTRIBUTION PROHIBITIONS

**(TSCA) November 5, 1993
40 CFR Part 763**

EPA issued a final rule under section 6 of the Toxic Substances Control Act (TSCA) prohibiting, at staged intervals, the future manufacture, importation, processing, and distribution in commerce of almost all asbestos-containing products, and required labeling of such products in the interim.

On October 18, 1991, the United States Court of Appeals vacated and remanded most of the rule but left intact the portion that regulates products that were not being manufactured, produced, or imported when the rule was published on July 12, 1989.

The six asbestos-containing product categories that are still subject to the prohibition are corrugated paper, rollboard, commercial paper, specialty paper, flooring felt, and new uses of asbestos.

The asbestos-containing product categories that are no longer subject to the rule are: asbestos-cement corrugated sheet, asbestos-cement flat sheet, asbestos clothing, pipeline wrap, roofing felt, vinyl-asbestos floor tile, asbestos-cement shingle, millboard, asbestos-cement pipe, automatic transmission components, clutch facings, friction materials, disc brake pads, drum brake linings, brake blocks, gaskets, non-roofing coatings, and roof coatings. (Thus, it is possible that these products could contain asbestos, even today. Work involving these materials should proceed with caution. The supervisor should either have samples taken by an accredited asbestos building inspector or obtain reliable information on the content of these materials before performing work activities.)

ASBESTOS SCHOOL HAZARD ABATEMENT REAUTHORIZATION ACT

ASHARA

Passed by Congress as an interim final rule and amended AHERA' s Model Accreditation Plan
(Effective 10-3-94)

- Clarifies the types of persons who must be accredited to work with asbestos in schools and expanded coverage to public and commercial buildings, i.e., individuals working in public and commercial buildings, must have AHERA accredited training as either a worker, supervisor, project designer, or building inspector, as applicable.
- Increased the minimum number of hours of training, including additional hours of hands-on health & safety training for abatement workers and contractor/supervisors.
- Congress expanded accreditation for inspectors, project designers, workers, contractors/supervisors working in schools, public and private building but did not enact accreditation requirements to management planners working in public and commercial buildings.
- Exempted residential properties and dwellings with <10 units.
- Defined "small-scale, short-duration activities," where under 3 square or linear feet did not have to use accredited workers and over 3 square or linear feet would have to use accredited workers.
- Certificates for accreditation required issuing provider' s name, address, and telephone number.
- Civil penalty of \$5000 per day per violation provisions.

State of Maryland

EXECUTIVE ORDER 01.01.1987.22 - ASBESTOS OVERSIGHT COMMITTEE (AOC)

(Rescinded Executive Order 01.01.1983.09)

- established the AOC and its responsibilities. Re-affirmed the State Employees Asbestos Program and addressed each agency' s/facility' s requirements for identifying LEVEL I & II State employees¹ and maintaining programs of medical monitoring and training for these employees.

AOC: assigned to "define the status of the asbestos situation in the State with respect to its employees and facilities and to develop and implement an asbestos management plan (AMP) and appropriate policies to effectively address and resolve any asbestos related issues." Established members from several Departments with at least quarterly meetings.

Asbestos Management Plan (AMP): develop and update annually and consist of a safety, health, and equipment program, a training and medical monitoring program, and a statewide operations and maintenance program.

Asbestos Abatement Plan: develop a prioritized schedule of abatement activities.

Safety and Health Program: State employees required to work with asbestos only when incidental to their work and less than 160 square feet or 260 linear feet or 35 cubic feet of ACM per building per year. Exceeding shall be contracted out. Each department/agency shall implement and shall appoint a S&H Coordinator who appoints a S&H Committee. Each facility shall have a S&H Specialist be responsible for their program.

Level II State employees can volunteer to remove ACM if requirements of training, medical monitoring, and PPE usage are in order but only if it is under the 160/260/35 limits for the building. Incentive pay for working with asbestos.

¹ Level I employees are those workers employed in positions with the potential for asbestos exposure because of work-related activities or location, but who are not required to break, cut into, tear out or otherwise disturb asbestos or asbestos-containing materials.

Level II employees are those workers employed in positions whose job activities may cause them to break, cut into, tear out, or otherwise disturb asbestos-containing materials, or who must work in areas where this activity takes place.

Equipment: provide employees with appropriate respiratory protection [(1/2 face for automotive workers) (PAPR, or Type C, pressure-demand, supplied-air for other designations)] and protective clothing while performing Level II-type activities.

Medical Monitoring and Training: Employees agreeing to work in positions which involve incidental exposure to asbestos shall participate in this monitoring program after successfully completing a formal asbestos training program.

Operations and Maintenance Program: (within the AMP) contains a procedure to locate and identify asbestos in State buildings, and to assess its condition and type; a statewide project schedule for abatement projects; a procedure for performing recurrent surveys and inspections to update existing conditions, and guidelines for preparation and prioritization of contract removals with outside contractors.

COMAR 26.11.21

CONTROL OF ASBESTOS **Updated in (1998)**

- Applies to all business entities and local governments.
- State agencies/facilities are exempt from its requirements as per Executive Order however, asbestos work practices performed by State Facilities must be equal to or better than the State regulations.
- Defines "Operations and maintenance" as removal, encapsulation or disturbance of friable ACM of less than 10 ft² or 20 linear feet and associated with small repairs or maintenance.
- Licensed remover must notify MDE Air & Radiation Management Admin. (ARMA) in writing for project > O & M.
- Requires licensing for entity engaging in an asbestos project.
- Workers within preceding year must be medically examined to determine ability to wear a respirator.
- Specific sign requirements for > NESHAP with posting for 3 days prior to starting and placement outside of all entrances and exits. Must display startup and anticipated completion dates, posting date, and complaint information and phone number to ARMA.
- Specific air monitoring requirements of 1 per room and 1 per room size/volume.
- After cleaning and with barriers still up, send final written results to ARMA within 24 hours after receiving.
- Use of negative-pressure systems with at least 4 air changes per hour.
- Bag labeling to show license number, date of sealing, & where generated.
- Copy of disposal receipt or record of disposal to MDE within 10 days showing appropriate facility and date.

- **Maintain records concerning each project for 6 years.**
- **Licensing application, fee, and revocation/suspension requirements.**
- **Safety & Health training course requirements.**

COMAR 26.11.23

SCHOOL ASBESTOS ACCREDITATION OF INDIVIDUALS AND APPROVAL OF TRAINING COURSES **updated in 1998**

- **Applies to individuals performing asbestos projects in Maryland schools and public and commercial buildings and to persons applying for approval of training for asbestos occupations.**
- **Establishes training requirements for accreditation of specific types of disciplines for individuals working-with-asbestos.**
- **Establishes fees for training providers' application.**
- **Requires a MD Photo ID card to work in MD.**
- **Establishes means to suspend or revoke a training course; and to decertify accredited persons.**

RESPIRATORS AND PROTECTIVE CLOTHING

Respirators

The purpose of respiratory protection is to provide clean, breathable air to the user. There is not a one size fits all, good for every hazard respirator. Some respirators cannot be used in atmospheres which are **Immediately Dangerous to Life or Health (IDLH)**. Such conditions may exist when there is less than 19.5% oxygen in the air or when the level of toxic contaminants is too high or where a flammable or explosive atmosphere exists. Some respirators only provide protection up to a certain level or for a certain contaminant depending on the type of filter or cartridge used.

Respirators must be **approved by NIOSH** (National Institute for Occupational Safety & Health) and selected based on the hazard to which the employee will be exposed. There are two categories or types of respirators. They are **Air Supplied** and **Air Purifying**. Level II building maintenance employees are required to use either a **POWERED AIR PURIFYING RESPIRATOR** or a **TYPE C PRESSURE DEMAND AIRLINE RESPIRATOR**. Both of these must have tight fitting full-face pieces.

NOTE: You cannot use a respirator until you have been medically cleared to do so by medical monitoring.

Respirators must be fit tested every year. The two accepted methods are **qualitative** and **quantitative**. Qualitative fit testing is a simple pass/fail test that determines whether a person can smell, taste or be irritated by a test agent while wearing a respirator. Quantitative fit testing measures the difference in contaminant or pressure inside and outside the respirator while it is worn to determine an actual fit factor number. NIOSH approves respirators under laboratory conditions that may vary from actual field conditions.

There are several factors that can affect the fit of a respirator. These include: **facial hair, eyeglasses, dentures, facial scars or deformities, and a loss or gain of weight (generally 10 to 20 pounds or more)**. The presence of such factors may necessitate more frequent fit testing.

The powered air purifying respirator (PAPR) will afford protection against asbestos when it is equipped with HEPA filters, up to 100x the P.E.L. of 0.1 f/cc as long as the motor is providing 4 cfm or more of air to the face-piece when the motor is on. This respirator **cannot be used in an IDLH atmosphere**. Fit testing for this respirator must be done every year in the negative pressure mode (i.e., blower off) using either qualitative or quantitative methods.

The airline respirator will afford protection up to 1000x the P.E.L. It supplies clean pressurized air to the user rather than purifying the air in the room. It must supply what is called Grade D breathing air. The air source for this respirator can either be bottled air

tanks or a compressor. These must be rated for use with respiratory equipment. You can't just use any compressor because it may not have the proper filters and alarms to deal with carbon monoxide and particulates. This respirator can be used to escape from, (but not enter), IDLH atmospheres **provided** that it has a 5 to 15 min. escape bottle of air attached directly to it. Airlines cannot use more than 300 feet of hose from the air source to the regulator. It also must be fit tested every year using quantitative methods.

Each time either respirator is used, the following must be done:

- (a) Inspecting of the respirator before every use to make sure the valves, straps, mask, and hoses are all in working order.
- (b) Using a flow check meter with PAPR's to insure fully charged batteries and to check to see if the filters or motors need replacing before each use. **NOTE:** PAPR's need to provide air flow into the face piece greater than 4 cfm in order to achieve the upper range of protection from the unit.
- (c) Checking of the fit every time you put on the respirator using both positive (cover the exhalation valve(s) and breathe out gently-- the mask should puff out slightly) and negative pressure (cover the inhalation valves/filters and breathe in-- the mask should collapse slightly) user seal checks.

Respirators also require proper care and maintenance. They must be cleaned after every use in a mild detergent in water not exceeding 120F. If they are not individually assigned they must also be disinfected with an **EPA registered disinfectant** as recommended by the manufacturer of the respirator. In general alcohol wipes should be avoided since the alcohol could degrade the rubber face-piece. Consult the manufacturer for recommendations on selection of an appropriate disinfectant.

Respirators should be air dried away from direct sunlight and heat exceeding 120F. They should be stored in a clean and sanitary area where they will not get crushed or broken.

Any respirator that is found to be defective shall not be used. It must be tagged as defective and returned to the Safety & Health Specialist and a new one obtained or defective parts replaced.

Anytime respirators are used, there must be a written respiratory protection program in place at the facility.

The elements of a respiratory protection program include the following:

- Procedures for selecting respirators for use in the workplace
- Medical evaluations of employees required to use respirators
- Fit testing procedures for tight fitting facepieces
- Procedures for proper use of respirators in routine and reasonably foreseeable

- emergency situations
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for air supplied respirators
- Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
- Procedures for regularly evaluating the effectiveness of the program
- Having someone responsible for the program with suitable training and experience
- Evaluations as necessary (at least annually) to ensure the effectiveness of the current program
- Proper record-keeping procedures

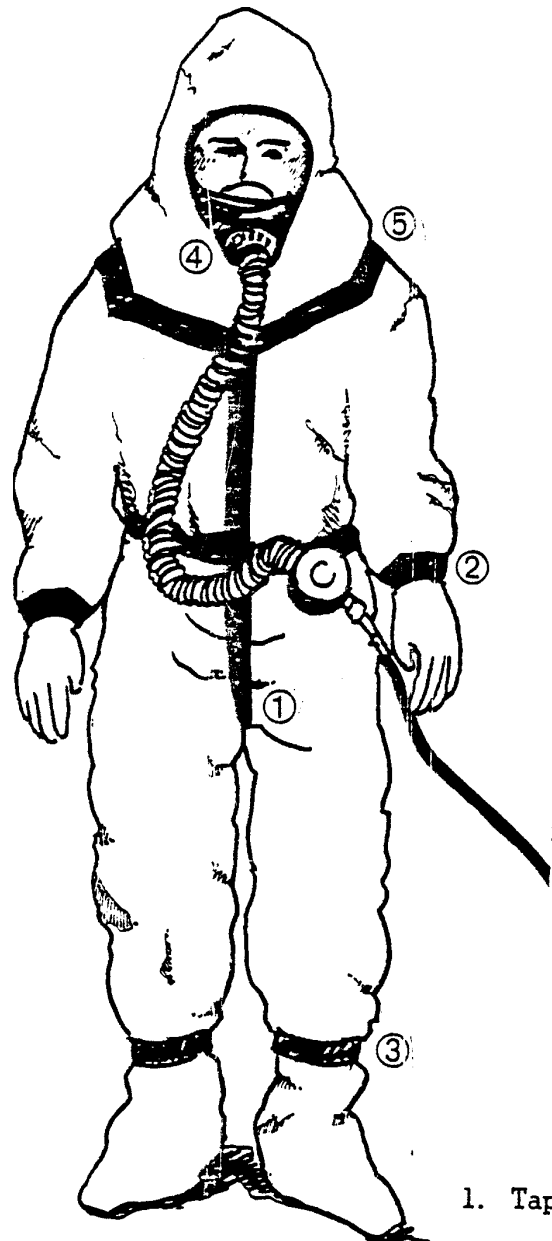
Protective Clothing

The purpose of protective clothing is to minimize contamination of regular work clothing with asbestos fibers that can then be carried out of the worksite and into the workplace or home.

Disposable protective clothing of the **Tyvek** or **Kleen Guard** variety or equivalent must be used whenever the worker is performing Level II work or in a restricted area. Disposable clothing must be decontaminated, placed in sealed bags, and disposed of as asbestos waste after being used. The disposable suits can only be worn once, and then they must be discarded with the asbestos waste. It is illegal in Maryland to use launderable protective clothing for asbestos work.

Any other protective equipment must be decontaminated before it is taken from the work area or placed in sealed bags which are not to be opened until the employee is in the next asbestos work area.

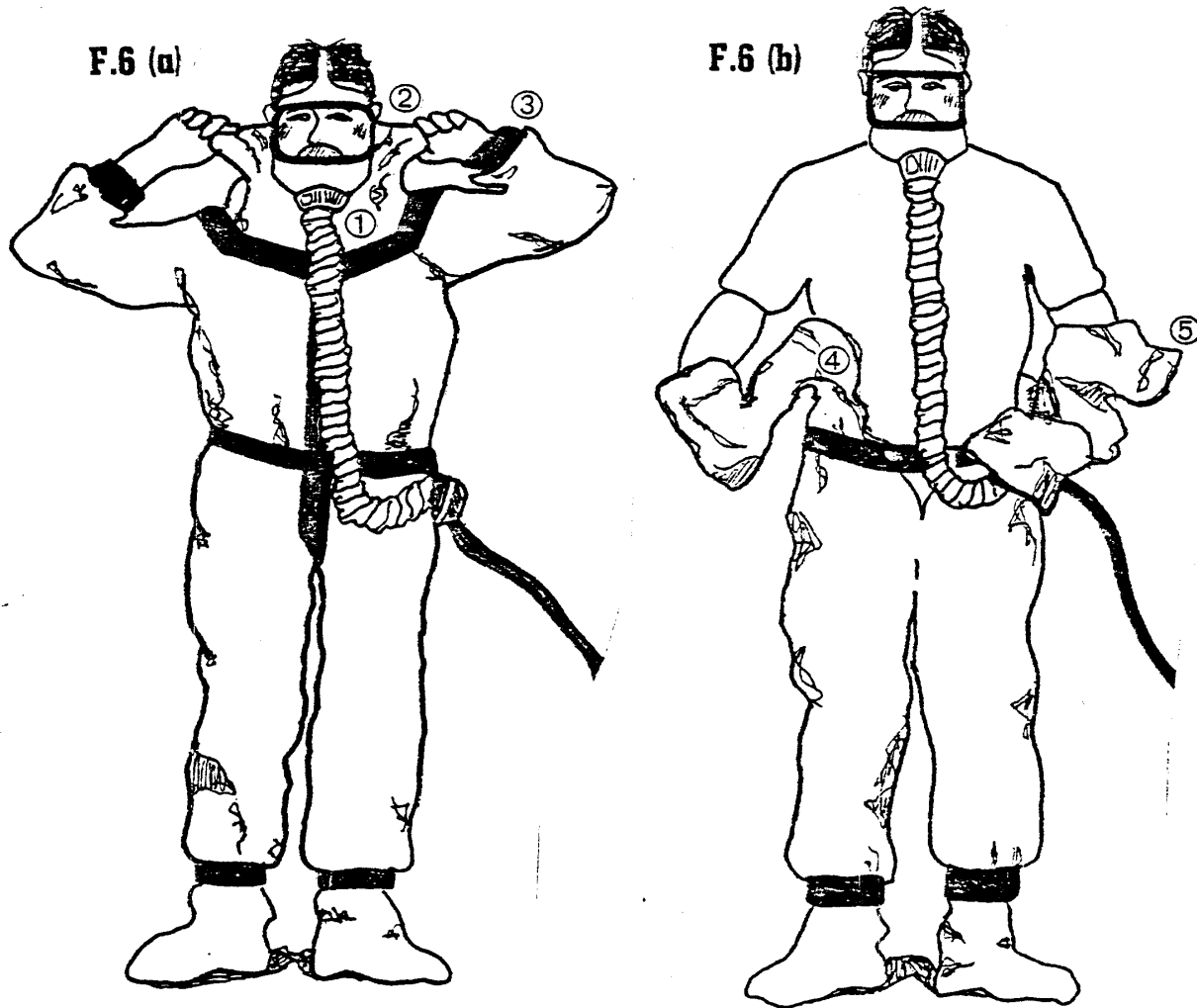
TAPING PROCEDURE FOR PROTECTIVE CLOTHING



1. Tape zipper & crotch area.
2. Tape cuffs snugly at sleeve.
3. Tape shoe covers securely to suit with pants legs tucked inside.*
4. Respirator face piece must be in place before donning hood.
5. Seal hood securely with tape to suit.

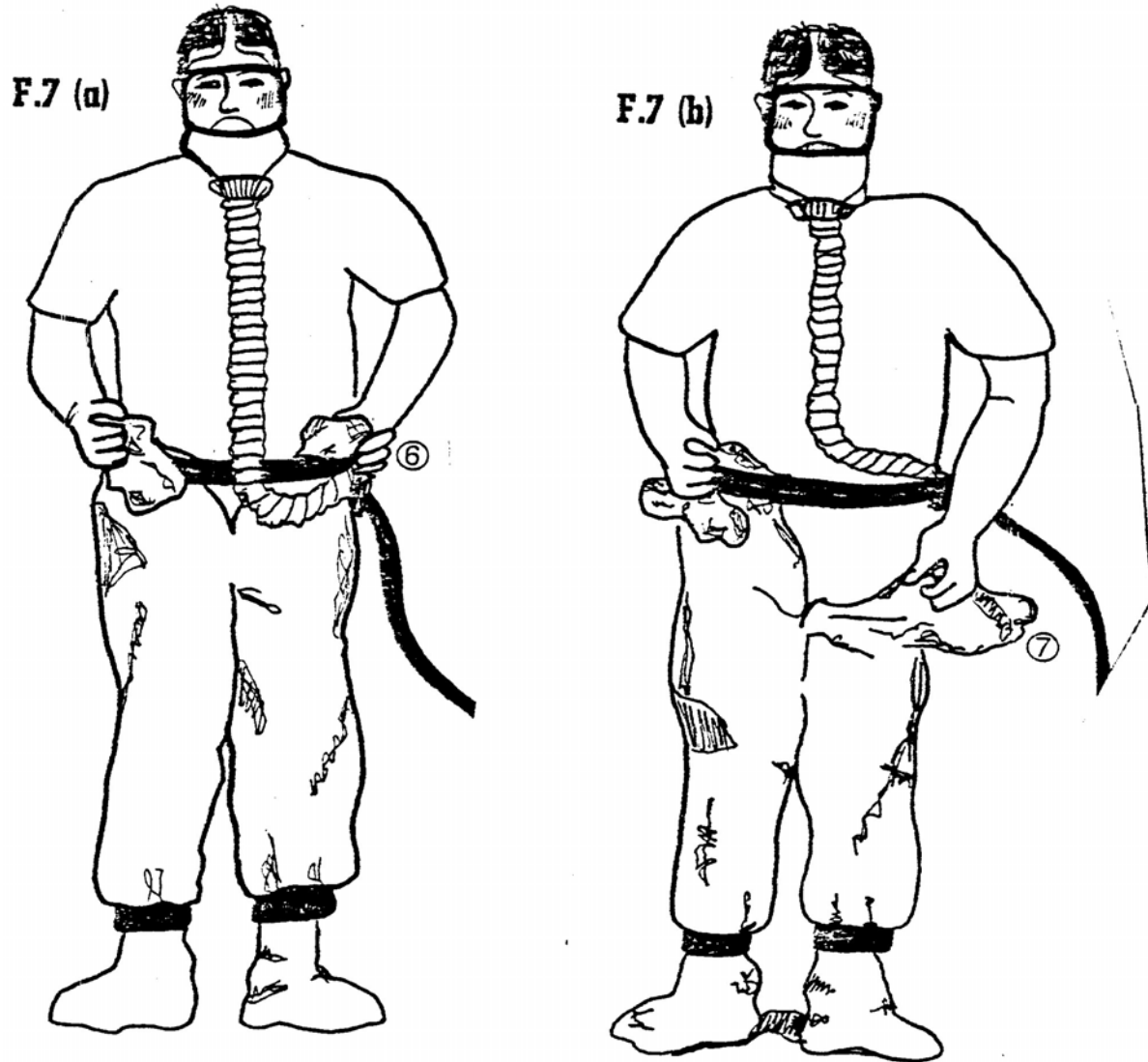
* If not secured/bought with hood and booties attached.

REMOVAL PROCEDURE FOR PROTECTIVE CLOTHING



1. Remove tape hood under chin.
2. Roll hood down (inside out).
3. Loosen tape from sleeve.
4. Remove tape from zipper, unzip, and continue to roll suit firmly inside out.
5. Pull sleeves inside-out.

REMOVAL PROCEDURE FOR PROTECTIVE CLOTHING



6. Tuck tightly rolled suit under respirator belt.
7. Continue to roll suit firmly inside out. Respirator should remain in place until suit is completely removed and disposed of as asbestos waste.

ASBESTOS MEDICAL MONITORING PROGRAM FOR STATE EMPLOYEES

INTRODUCTION

The State of Maryland is concerned with safe guarding the occupational safety & health of its employees. It was this concern that prompted the signing by the Governor of an Executive Order putting the State Employees Asbestos Program into effect.

The prevention of work related illness depends on awareness of risk, control of the work environment and the promotion of healthful & safe work practices. The State Employees asbestos Program is working towards providing a safer work environment by providing mandatory training to all employees who may be potentially exposed to asbestos in the performance of normal work activities. Any employee whose job activity may require cutting into, breaking, or otherwise disturbing asbestos or asbestos containing materials has been designated as a Level II employee and is required to participate in the Medical Monitoring Program.

WHAT IS MEDICAL MONITORING

Medical monitoring is a screening of the health of a Level II and former Level II employees by means of periodic medical examinations. The purpose of medical monitoring is to both detect and prevent possible adverse health effects of occupational exposure to asbestos dust as early as possible and to evaluate an employee' s fitness to wear a respirator. For State employees in Level II job categories that have duties that may involve potential asbestos exposure, medical monitoring can provide the following.

- . Early recognition of pre-existing lung disease or other conditions that may affect an employee' s ability to wear a respirator or work with asbestos.
- . Prompt referral for follow-up of abnormal findings.
- . Indication of the effectiveness of respirator use & safe work practices taken to reduce asbestos exposure. (By looking at the rate of asbestos-related diseases among Level II employees since the program began).
- . Identification of health factors that may increase an individual' s risk of developing asbestos related disease.
- . Determination of appropriate follow-up and counseling for early asbestos related conditions or smoking.
- . Periodic evaluation of fitness for respirator use and work with asbestos.

The examination provided is specific for the detection of asbestos related illness or respiratory abnormalities. The purpose of this examination is not to take the place of your regular physical exams or routine medical care.

WHO IS ELIGIBLE FOR MONITORING?

The Medical Monitoring Program provides medical examinations for all Level II State employees whose work may involve exposure to asbestos. Under the provisions of the State Employees Asbestos Program it is mandatory that any employee who works with asbestos must participate in medical screening hence the exam is mandatory for all Level II employees

If an employee can document previous Level II exposure as a State employee but no longer works with asbestos, he or she may also participate in the Medical Monitoring Program.

If an employee refuses to work with asbestos, he or she will not be eligible for medical monitoring unless previous Level II exposure to asbestos as a State employee can be documented.

CONTENT OF THE EXAMS:

The exams will consist of:

- . Questions about medical, work history, exposure, & respirator usage
- . Measurement of the blood pressure
- . Examination of the heart & lungs
- . Chest x-ray (initially and then at the discretion of the physician)
- . Pulmonary function test (to evaluate lung function)

CONFIDENTIALITY:

Confidentiality of medical records will be assured with access limited strictly to medical personnel. Records will be subject to release pursuant to the Federal (OSHA) Regulation of Access to Employee Exposure and Medical Records CFR 1910.1020. Supervisory personnel will only receive information that workers have been examined & approved/disapproved for respirator use.

Employees who want a copy of their medical records or who want the records to go directly to a third party must request the Medical Release Authorization and fill it out. The form can be obtained from the State Employees Asbestos Program.

RESULTS OF THE EXAMS:

Employees will be individually notified of their fitness for duty. Information will be sent directly to the employee's home address from the clinic. The physician's recommendations for follow-up screening and referral will be included if appropriate.

SIGNIFICANCE OF ABNORMAL TEST RESULTS:

Many of the abnormalities found in people who work with asbestos may also be found in the general population, and may or may not be a result of exposure to asbestos on the job. Questions concerning abnormal test results should be discussed with the Medical Monitoring Physician at the clinic.

ANNUAL FOLLOW-UP EXAMS:

Employees will return for follow-up exams annually.

SAMPLING AND ANALYTICAL METHODS

TYPES OF SAMPLING

PERSONAL

-Sampling pump worn on person with filter in breathing zone

-Pump air flow 1 to 4 liters per min (LPM)

-Only way for OSHA exposure determination levels

-Airborne fiber concentrations (fibers per cubic centimeter)

AREA

- 2 Types: high volume (10-12lpm) low volume (1-4lpm)

- Pump placed on objects in and out of regulated area

-Airborne fiber concentration (f/cc)

BULK

-Only small quantity of ACM/PACM needed (1 tsp)

-Will need multiple number of samples for proper results

- Obtain glass/plastic vials or zip lock baggies, (No paper envelopes etc.)

-Results in percent (%)

SAMPLE ANALYSIS

PHASE CONTRAST MICROSCOPY

(PCM)

*COST: \$10-25

TURN- 2 HOURS
AROUND:

SPECIFICITY: IDENTIFIES ALL FIBERS

SENSITIVITY: 0.25 micron
(thinnest fiber visible)

REPORTED F/CC
IN:

TRANSMISSION ELECTRON MICROSCOPY

(TEM)

\$50

24 HOURS

ONLY ASBESTOS

0.20 micron

STRUCTURES/
MILLIMETER
SQUARED (S/MM²)

POLARIZED LIGHT MICROSCOPY

(PLM)

\$10-25

48 HOURS

ALL FIBERS

0.0025 microns

PERCENT
ASBESTOS

CLEARANCE SAMPLING: done for private and State contracts. Uses a 1 HP Leaf Blower and 20 inch box fans to blow down the area. Conducted when wall and floor layers of plastic are taken down after visual clearances but before critical barriers around doors, windows, electrical etc. are removed.

AIRBORNE CLEARANCE LEVELS: <0.01 F/CC (PCM) or ≤ 70 S/MM² (TEM) or Background (Pre-abatement levels.)

COSTS: prices are average approximate price ranges.

WORK PRACTICES REVIEW

There are six asbestos abatement control options and one or a combination of them can be used on the same job. These control options are: **removal, repair, restriction, encapsulation, enclosure, and operations & maintenance (O&M)**

When performing asbestos abatement work there are 6 principles to be emphasized

- (1) Containment
- (2) Air Filtration with HEPA Filters
- (3) Negative Air pressure
- (4) Wet Methods
- (5) Good Housekeeping
- (6) Proper Cleanup & Waste Disposal

AREA PREPARATION

- Put up warning Signs
- Shut off ventilation system, seal the vents, and lock out controls
- Shut off electrical system and lock out controls
- Bring in extension cords
- Bring in scaffolds and tools
- Build the decon
- Hook-up and start the negative air machine
- Clean everything in the room
- Throw out what can't be cleaned
- Take out anything that can be moved
- Wrap anything that can't be moved in 6 mil poly
- Cover **all** openings (**Critical Barriers**) in the room with 2 layers of 6 mil poly
- Put a layer of 6 mil plastic on the floor and wall (seams overlap 12" run 12" up the wall)
- Put a second layer of 6 mil plastic on the floor and wall

MINIMIZE FIBER RELEASE

- Keep asbestos Wet
- Scrap/Cut asbestos while wet into a bag
- "Gooseneck" all bags and double them
- Work Area Under "Negative Air Pressure";
- No eating, drinking, smoking, chewing, or applying cosmetics in work area
- Powered Hand tools Locally Exhausted Through HEPA Filter;
- Use wooden or plastic tools
- Proper use of scrapers/cutting implements
- Good Housekeeping Procedures To Be Used (no dropping or throwing asbestos, clean up as you go)

- Prohibited Work Practices: dry, no HEPA, etc.
- Clean up as you go

CLEANUP & DISPOSAL

- Means to Decontaminate Workers and Equipment Available: plastic on floor, single chamber decon, three stage decon w/shower; Must use every time you enter/exit work area
- Means to Decontaminate Waste Containers Before Removal from Regulated Area;
- Proper Storage and removal of Waste
- Procedures to Account for and Track Asbestos Waste;
- Filtration Devices in Place to Remove Asbestos from Waste Water; Remove gross debris from the work area
- Everything must be cleaned or disposed of from the job.
- Use a lockdown encapsulant
- Take down first layer of poly (Wet wiping/HEPA vacuuming first)
- Take down second layer of poly (Wet wiping/HEPA vacuuming first)
- Remove poly from non-moveable objects/ clean critical barrier poly
- Have air samples taken, if passed, shut of negative air machine
- Take poly off critical barriers
- Disassemble the Decon
- Put procedures in place to Verify Completion of Cleanup -Clean tools
- Apply sprayback

OSHA WARNING SIGNS AND LABELS

Danger - Asbestos Cancer & Lung Disease Hazard Authorized Personnel Only Respirators & Protective Clothing Are Required In This Area	Asbestos Danger Cancer & Lung Disease Hazard Authorized Personnel Only
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Fig. 1 Sign, Asbestos Danger

Fig 2 Sign, Asbestos Danger

Danger Contains Asbestos Fibers Avoid Creating Dust Cancer & Lung Disease Hazard	Asbestos Free
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Fig 3 Danger Warning Label, Asbestos
Waste Bags

Fig 4 Asbestos Free Label

Use sign shown in Fig 1 for demarcating regulated areas where respiratory protection and clothing are required.

Use sign shown in Fig 2 for demarcating regulated areas.

Use the label in Fig 3 for asbestos waste bags and drums.

Use the label in Fig. 4 for marking asbestos free materials.

The following signs may be used in addition to required OSHA signs to keep people away from a regulated area or to restrict access to an area which is awaiting abatement.

WARNING!
Restricted Access
For Access Call:

NO ACCESS!
Respirators Required
in this area.

Asbestos Hazard!
Area Restricted
Protective equipment Required

DANGER!
Area Restricted
Authorized Entry Only!

Signs or Notices

Signal Words

E.G., Danger, Warning, Hazard, Do Not Enter

Statement of Hazard

Precautionary Statement

Effects of Exposure

MODIFICATIONS TO FIRE DOORS

It may sometimes be necessary to modify asbestos core fire doors by changing locks, inserting windows, etc. The State Employees Asbestos Program, strongly recommends replacing the door with a non-asbestos substitute rather than undertaking an operation which will involve disturbing large quantities of ACM. If modification operations are unavoidable, extensive preparation is necessary to perform the work in an environmentally safe manner.

To inset a lock or window, the cutting drilling operation required will likely disturb the inner asbestos core. Exterior door panels limit the amount of water which could be sprayed onto the ACM for dust control. Thus, elevated levels of airborne asbestos fibers are probable.

For this reason, doors requiring modification must be removed from the site and taken to a fabricated plastic enclosure in a "remote" area. Close (by taping) lock set holes, screw holes, etc. to avoid spread of contamination during transport. All drills, saws, etc., must be equipped with local exhaust ventilation such as a HEPA vacuum attachment.

Obviously, Level II workers engaged in this operation are required to observe all requirements and procedures pertaining to safe work, personal and environmental protection, cleanup, and disposal as prescribed by the State Asbestos Program and other relevant regulations (i.e. OSHA). And, given the complexity of activities involved in proper modification of asbestos core doors it may be more cost efficient to plan several jobs at one time.

SAFETY AND HEALTH CONSIDERATIONS (OTHER THAN ASBESTOS)

Electrical Safety Considerations

The Hazard

One of the most common hazards and one that gives the least warning, is electrical current. Incorrect wiring, improper grounding, and lack of proper shielding results in approximately 1,000 people per year being electrocuted.

Three factors determine the severity of electric shock. These are:

- The amount of current flowing through the body
- The path of the current flowing through the body
- The time the current is allowed to follow this path

Electrical Safety Review

- The use of wet methods increases the potential for electric shock when working around electrical components.
- De-energize equipment, then perform tests to verify that the circuit has been de-activated. Once this has been confirmed, lock-out the controls to ensure that the circuit can not be accidentally re-activated.
- Use non conductive scrapers and vacuum attachments (wood, plastic, rubber)
- **In cases where equipment/power cannot be de-energized, the job MUST be contracted out. Level II employees are prohibited from doing such jobs.**
- Ensure all electrical equipment is properly grounded before the job begins and connected to GFCI (ground fault circuit interrupter) devices.
- Use care not to damage insulated coverings with scrapers, scaffolding wheels, etc.
- Avoid stringing electrical wiring across floors. Elevate wiring off the floor to keep it away from water on the floor and damage from foot traffic and rolling scaffolds.
- Do not allow water to accumulate in puddles on work area floors.
- Ensure electrical outlets are tightly sealed and taped to avoid being sprayed with water.
- Use stable wooden or fiberglass ladders - not metal.

- De-energize and lock out equipment.
- Electrical equipment and lines should be considered energized unless tested and determined to be otherwise and then locked out
- Energized parts must be insulated or guarded from employee contact and with any other conductive object.
- Extension cords used with portable electrical tools and appliances must be the three wire grounded type and connected to a GFCI (Ground Fault Circuit Interrupter).
- Extension cords shall be protected from accidental damage and should not be fastened with staples, hung from nails, or suspended from wire.
- Portable electric hand tools shall be equipped with a 3 wire cord having a ground wire permanently fixed to the tool frame; or should be double insulated.
- All circuits and electrical disconnect switches shall be locked out.

Ladders/Scaffolding/Walking - Working Surfaces (Inspections and Proper Use)

Ladders and Scaffolds

Asbestos abatement projects always present risks to workers from falls, slips, or trips. The nature of the tasks necessitate the use of scaffolding and ladders.

Ladders

The following items shall always be checked on a regular basis:

- Ladders are always maintained in good condition.
- Complete inspections are done periodically
- No improvised ladder repairs are made.
- Defective ladders are not used. When they are found, the defective ladder must be removed from the job site, and must be destroyed.
- Safety feet spreaders and other components of ladders are in good condition.
- Movable parts operate freely without binding or undue play.
- Rungs are kept free of grease or oil.

- Ladders are not used for other than their intended purpose.
- Extension type ladders shall be used with a 1:4 lean ratio (1 foot out for every 4 feet of elevation).
- Step ladders shall only be used when fully open.
- The user faces the ladder when going up or down.
- Tops of step ladders are not to be used as steps.
- Bracing on the back legs is not used for climbing.
- Portable ladders are used by one person at a time.
- Ladders are secured to prevent displacement when in use.
- All ladders have well designed safety shoes.
- Hook or other type ladders used in structures are positively secured.
- Wood or fiberglass ladders must be selected to reduce electrical hazards.

Scaffolding

Some asbestos abatement projects will involve the use of scaffolding. Proper set up, regular inspections, and basic maintenance should not be overlooked. **OSHA standards require that when free standing mobile scaffolding is used, the height shall not exceed four times the minimum base dimension.** This is because scaffolding can be easily turned over. Mobile scaffolds shall be in good repair and move freely. Rented scaffolding must be checked carefully. When using a mobile scaffold the floor space must be kept clear. Workers shall not ride the scaffold while it is in motion.

Guardrails shall be used. OSHA requires that guardrails be used when scaffolding is from 4 to 10 feet tall and less than 45 inches wide. Scaffolding over 10 feet tall must have guardrails regardless of width. Midrails and toe boards are also necessary.

Planking used on a scaffold shall not extend farther than 12" over the edges and shall always be secured to the frame.

Slips, Trips, and Falls

Areas sealed with polyethylene and kept damp with amended water (water containing a surfactant) to reduce airborne fibers become very slick. Disposable booties worn on these wet surfaces can be a potential slip hazard. The supervisor needs to assess this risk, and modify the foot protection as necessary to decrease the risk of slipping on the job. Airline hoses and electrical lines can create trip hazards. When asbestos and other debris are removed, they must be bagged as soon as possible.

- Consider the height of the work, equipment in use, and the numerous trip hazards. Take a look at your walking surfaces.
- Seamless rubber boots, slip on shoes, or safety shoes with non-skid soles may help reduce slip hazards.
- Minimize the amount of water that accumulates on the floor.
- Suspend electrical lines and cords where possible using non conductive materials.
- No horseplay should be allowed in the work area.
- Minimize debris on the floor.
- Pick up tools, scrapers, etc.

Fire Considerations

Fires can create immediate life threatening conditions. A few of the fire safety features to be concerned with are the location of exits, travel distances to exits, emergency lighting, availability of fire suppression devices and alarm systems.

Emergency plans should be developed to include alternative exits to the main one, which will be used only during emergencies. All personnel entering the work area must be familiar with these exits.

Polyethylene sheeting, glove bags, and protective clothing can melt and burn as well as produce toxic gases. Avoid contact with transformers, steam pipes, boilers, etc. that will be hot during the removal process. Any job which may pose a fire danger will require the use of fire rated polyethylene and other procedures as directed by the Agency Safety & Health Specialist

To Avoid Fire Problems In Asbestos Control Areas

- Ensure that all sources of ignition are removed from the work area and that controls are locked out.
- Cut off supply to steam lines, electric and steam heaters, and radiators. Do not allow the polyethylene to lay against hot surfaces.
- Do not allow lighters, matches, or smoking inside the work area or decontamination unit.
- Post a fire watch when using cutting torches, welding equipment, or other hot processes.
- When using a cutting torch, know what is on the other side of the wall and below the floor.

- Reduce the amount of flammable/combustible materials inside a space to a minimum, prior to hanging poly.
- Mark exits from the work area and post directional arrows.
- Keep trash and debris to a minimum.
- Lighting of exits and exit routes should be provided.
- In case of fire, the fire hazard becomes an immediate threat and plastic barriers may have to be violated.
- Be alert for flammable vapors at the work site.
- A telephone or other effective means of communication shall be available for notifications of authorities in an emergency.
- Post local rescue and fire department numbers.
- Make available at the worksite and provide training in the use of Class ABC fire extinguishers.

Emergency Procedures

OSHA requires a written emergency action and fire prevention plan (29 CFR 1910.38) Briefly the essential items of the plan should include:

- The manner in which emergencies are announced.
- Emergency escape procedures and routes.
- Procedures for employees who must remain to operate critical plant operations which take time to shut down.
- Procedures to account for all employees after evacuation.
- Rescue and medical duties.
- Names and/or job titles of people to be contacted for additional information.
- A list of major workplace fire hazards.
- Names and/or job titles of people responsible for the building maintenance of fire prevention equipment.

- Names and/or job titles of people responsible for the building control of fuel source hazards.

Establish a system for alerting workers of an emergency or other problem requiring evacuation. All persons entering the work area must be familiar with this system. A floor plan drawing should also be posted to familiarize persons in the work area with the location of the exits.

Written emergency procedures shall cover events such as fires, power failures, compressor failure (with air supplied respirators), accident, or employee injury.

Medical Services and First Aid

Asbestos work during warm months, in steam tunnels, etc. may lead to heat cramps, heat exhaustion or heat stroke. Under the right circumstances, these can lead to death within a few minutes of exposure.

Heat Related Disorders

It is important for employees to recognize the symptoms of heat related disorders.

Heat Cramps

Symptoms:

- Cramping of the large muscles usually appearing after heavy work in a hot environment, often after the end of a break or work day.

Treatment:

- Replace lost fluids
- Rest

Prevention:

- Frequent breaks away from heat
- Regular replacement of lost body fluids
- Take time to get use to the heat

Causes:

- Loss of fluids and electrolytes supplying working muscles

Heat Exhaustion

Symptoms:

- Fatigue, weakness, profuse sweating, normal temperature, pale clammy skin, headache, cramps, vomiting, and fainting.

Treatment:

- MEDICAL ALERT
- Remove worker from hot area
- Have worker lay down with feet up
- Apply cool, wet cloths

- Loosen or remove clothing
- Allow small sips of water if person is conscious

Prevention:

- Frequent breaks away from heat
- Increase fluid intake
- Become acclimatized to the heat
- External cooling

Causes:

- High air temperature
- High humidity
- Low air movement
- Hard Work
- Not enough breaks from the heat
- Insufficient fluid intake
- Full body clothing
- Not acclimatized to heat

Heat Stroke

Symptoms:

- Dizziness, nausea, severe headache, hot dry skin, confusion, collapse, delirium, **coma and death**

Treatment:

- **MEDICAL EMERGENCY**
- Remove worker from area
- Remove clothing
- Have them lay down
- COOL the body (Wet Cloths)
- Do not give stimulants
- Immediately call for an ambulance

Causes:

- Same as for heat exhaustion

Prevention:

- Same as for heat exhaustion

Carbon Monoxide Poisoning

Symptoms:

- Dizziness, nausea, headache, drowsiness, vomiting, collapse, coma, and death

Sources:

- Oil lubricated compressors, particularly those used with airline respirators
- Internal combustion engines
- Open flame & fire
- Unvented gas appliances
- Kerosene heaters

Description of CO:	Colorless, Odorless, and Tasteless
Limits:	50 ppm (Time weighted average over 8 hrs.)
	500ppm (Short term exposure limit - 15 minutes)
	20ppm (Grade D breathing air for airline respirators) (Maximum allowable concentration)

If these symptoms are observed, those persons should immediately be brought into fresh air and medical attention provided. Symptoms for both carbon monoxide poisoning and heat stroke are very similar. **Both are medical emergencies!**

Telephone numbers of physicians, hospitals, and ambulances should be conspicuously posted. **Someone on the project should be trained in first aid.**

Body Protection

The following guidance should be used when whole body protection is needed.

- Use special single-use whole body disposable clothing including shoes, for any job involving exposure to airborne concentrations of asbestos.
- Use work gloves
- Always cut away from body when using knives, wire cutters, etc.
- Use care when removing metal lathe or cutting duct work.
- Wear hardhats on job sites where there is exposure to falling objects, electrical shocks, or burns.
- Make sure protective equipment (hard hats, goggles, safety shoes etc.) is in sanitary and good working condition.
- Full face respirators help prevent eye injuries.
- Use a non - irritating surfactant when possible.
- Get close to the work so you don' t have to overreach.
- Lift properly (see initial course manual for guidance)

- Use the buddy system for lifting
- Use hand carts or rolling pallets to avoid manual material handling.

Blood borne Pathogen Requirements

- Utilize universal precautions (such as wearing gloves and impermeable body coverings) when dealing with exposure to blood resulting from cuts, lacerations, etc. on the job.