
ASBESTOS OPERATIONS MANUAL

SEPTEMBER 2000



**WEST VIRGINIA UNIVERSITY
ENVIRONMENTAL HEALTH AND SAFETY**

WVU ASBESTOS OPERATIONS MANUAL

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I. INTRODUCTION

A. Purpose of WVU Asbestos Operations Manual

All questions and/or concerns related to this Manual or asbestos in West Virginia University (WVU) buildings should be directed to Environmental Health and Safety at 293-3792.

The purpose of WVU's Asbestos Management Program is to reasonably protect employees and building users from potential health hazards associated with asbestos exposures. This Asbestos Operations Manual sets forth the procedures and work practices employed at WVU to manage asbestos containing materials in place until such time as WVU possesses the financial resources to remove all asbestos containing materials through alterations, demolition, renovations, and/or repairs.

B. Asbestos

A group of natural fibrous minerals with potential health affects to those who inhale or ingest these microscopic minerals.

Asbestos has been used in various materials on WVU campuses as fire-retardant material; acoustical insulation on ceilings and walls; floor and ceiling tiles; electrical equipment; and brake and clutch pads. WVU has discontinued the use of most products with asbestos containing materials. Many forms of asbestos containing materials have a tendency to deteriorate or become damaged and break into a dust of tiny fibers which can float in the air and be inhaled. Asbestos exposure has been shown to increase the risk of developing lung cancer, cancer of the chest and abdomen lining (mesothelioma), and chronic lung disease (asbestosis). Exposure occurs by breathing the asbestos containing materials that have become friable as a result of deterioration or damage. Inhalation of even small quantities of asbestos fibers can lead to serious health impairment. Detection of asbestos-related diseases is difficult since the latency period between exposure and appearance of the disease is sometimes as much as 20 to 40 years. It should be noted that persons who are exposed to asbestos and smoke are more than 50 times more susceptible to lung cancer than persons who do not smoke.

C. WVU Asbestos Policy

It is the policy of WVU to protect all faculty, staff, students, and visitors from hazardous conditions, including exposures to asbestos fibers. It is the goal of WVU to eliminate asbestos on its campuses. Elimination of asbestos products will be accomplished through abatement and removal at the time of alteration, demolition, renovation, and/or repair. Until that goal is achieved, asbestos will be managed in accordance with this WVU Asbestos Operations Manual and building specific Operations and Maintenance Plans when available.

Acting as a representative of the President of WVU, the Assistant Vice President for Facilities and Services is the overall coordinator of the University's program. A designated representative of Environmental Health and Safety will act as program manager.

Engineering controls will be used to comply with State and Federal permissible exposure limits for asbestos to the extent such controls are feasible. When these controls are not feasible or in case of an emergency, personal protective equipment shall be provided and worn, including respiratory protection.

II. IDENTIFICATION OF ASBESTOS CONTAINING MATERIALS

All buildings owned or operated by WVU will be inspected for the presence of asbestos containing materials. Environmental Health and Safety is responsible for the inspection of WVU buildings for the presence and condition of asbestos containing materials. Maintenance and custodial staffs shall be informed as to the presence of asbestos containing materials in each building where they have assigned responsibilities and shall report any and all observed changes in the condition of asbestos containing materials to Environmental Health and Safety.

A. Facility Evaluation

Facility evaluations are a means of determining probable locations of asbestos containing materials. The evaluation is accomplished through the review of architectural plans, as built specifications, renovation specifications, mechanical systems drawings, electrical systems drawings, contract documents, structural drawings, and other related materials that are available. Prior survey and testing records should be reviewed if available and included in the facility evaluation.

B. Physical Inspection

1. Physical inspections will include the touring of all areas of a building to (a) identify functional spaces and homogeneous areas; (b) perform physical assessments; and (c) conduct bulk sampling as necessary.
2. Asbestos Survey and Assessment Plan
 - a. Visual Inspection
 - (1) A visual inspection of every building or structure for the presence of asbestos containing materials shall be conducted.
 - (a) "Asbestos containing materials" shall include, but not be limited to, pipe insulation, insulating tapes, duct boots, sprayed or troweled material for fireproofing, acoustical or architectural purposes. Asbestos containing surfacing material and thermal insulation shall be labeled in accordance with 29CFR-1926.1101.
 - (b) Non-friable materials such as floor tiles, asbestos cement pipe or board, and similar materials shall be listed in the final inspection report. Asphalt and vinyl flooring installed prior to 1980 shall be presumed to contain asbestos unless tested for asbestos content.
 - (c) Other materials used for pipe insulation, boiler insulation, ceiling tile, etc., which are obviously not asbestos but fibrous glass, synthetic fibers and similar mixtures are not to be sampled as part of the survey plan without specific authorization from Environmental Health and Safety.

- (2) The report of the visual inspection shall include the following information on each asbestos containing material encountered during the inspection:
- (a) Description of the type of asbestos containing material.
 - (b) Approximate linear or square footage of the material.
 - (i) Pipes and boilers: length and diameter.
 - (ii) Sprayed or troweled applications:
 - Directly sprayed area;
 - Over spray as percent of the area affected.
 - (c) Characteristics of the material.
 - (i) Estimated average thickness of sprayed or troweled materials.
 - (ii) Friability.
 - (iii) Adhesion to underlying materials.
 - (d) Assessment of existing damage.
 - (i) Description of the types of damage.
 - (A) Mechanical damage.
 - Intentional removal during maintenance or renovations and alterations.
 - Accidental.
 - Vibration.
 - Abrasion by installed fixtures.
 - (B) Water damage.
 - (C) Delamination due to deterioration.
 - (ii) Description of the extent of damage as a percentage of the applied material.
 - (iii) Description of the severity of damage.

- (iv) Description of the presence, extent, and location of debris.
- (e) Exposure and Accessibility
 - (i) Description of the activities in the area.
 - (ii) Approximate ranges of reasonably foreseeable numbers of employees, students, visitors, etc. exposed to the asbestos containing materials.
 - (iii) Description of the reasonable foreseeable frequency of employee presence in the area.
 - (iv) Description of the reasonable foreseeable range of possibilities of employee disturbing asbestos containing material while present in the area.
- (f) Relationship to other installations, fixtures, equipment, or materials, movement of vehicles and other factors which may result in disturbing or damaging the material.

b. Bulk Sampling

- (1) Identification of the areas and materials to be sampled are to be based on the results of the visual inspection and review of building specifications and shall include:
 - (a) Friable materials (easily crumbled with light hand pressure).
 - (b) Exposed and deteriorating non-friable materials.
 - (c) Any materials which might reasonably be expected to contain asbestos which are/will be subject to a disruptive activity.
- (2) Intact insulation on pipes, boilers and similar equipment shall not be penetrated solely to take samples unless specifically authorized by Environmental Health and Safety.
- (3) Number of Samples
 - (a) A minimum of 3 samples shall be taken for each homogeneous sampling area less than 1000 square feet, 5 samples for areas between 1000 and 5000 square feet, and 7 samples for areas greater than 5000 square feet.
 - (b) For purposes of this survey plan, "homogeneous" shall indicate, as a minimum:
 - (i) Lateral runs of pipe insulation unless color, quality or other characteristics indicate separate applications.
 - (ii) Hand or trowel applied insulation on elbows, unions, clean-outs, strainers and other special shapes on one connected system, unless color, quality, or other characteristics indicate separate applications.

- (iii) Boiler insulation.
- (iv) Duct insulation.
- (v) For sprayed or troweled materials on beams, pans, ceilings and walls:
 - (A) Each distinct usage (fireproofing, acoustical, or architectural);
 - (B) Each distinct floor;
 - (C) Each area of a floor with characteristics which indicate a possible difference of material, insulation, spray, etc.

(4) Sample Identification

The following information shall be recorded on a sample data sheet for each bulk sample obtained during the survey:

- (a) Code or sample number.
- (b) Source material type (ex. pipe insulation, over spray, etc.).
- (c) Date sample was taken.
- (d) Location.
 - (i) Building number.
 - (ii) Building name.
 - (iii) Room or area name.

(5) Sampling Methodology

- (a) Samples shall be taken in such a way that possibility of fiber release is minimized.
 - (i) The sample area shall be wetted with water or a wetting agent before sampling.
 - (ii) If the material cannot be wetted, a plastic bag or other containment device shall be placed around the sampler.
 - (iii) If i and ii above cannot be instituted, a high efficiency filtered respirator must be worn and a means to contain/clean debris must be utilized during sampling.
 - (iv) Obtain a representative sample by slowly pushing the sampler into the material with a twisting motion until the entire thickness of the material has been penetrated.
 - (v) Place the sample into a clean vial or similar container. Wet wipe the exterior of the container before capping.

- (vi) Label the sample container with a sample or code number which can be cross-referenced to date, location, etc. on the sample data sheet.
 - (vii) The sample area shall be wetted after the sample is taken. Wet paper towels can be used to clean debris and are to be discarded in plastic bags.
 - (viii) Repair damage to sampled area with latex paint or other encapsulant, plaster, duct tape, etc.
- (b) Bulk samples shall be taken when no other employees except those involved in the survey are present.
 - (c) Sampling instruments shall be thoroughly cleaned after each sample is taken.
 - (d) Dust and debris samples may be collected as appropriate.
 - (e) After sampling is completed, all bulk samples and sampling data sheets shall be turned over to Environmental Health and Safety.
 - (f) Environmental Health and Safety will cause all negative samples collected to be submitted to National Voluntary Laboratory Accredited Program (NVLAP) laboratory for analysis.

c. Reinspection Procedures

Reinspections will be conducted by Environmental Health and Safety to determine if during the time interval since the previous inspection, the asbestos containing material has become more deteriorated, more water damaged, whether the occupancy rate or status has changed in the area, or whether other changes may have occurred which would change the exposure potential of the material.

- (1) A reinspection of all asbestos containing materials identified during the previous visual inspection and bulk sampling shall be conducted at least annually after completion of the Operations and Maintenance Plan.
- (2) The reinspection shall be conducted in the same manner as the visual inspection.
- (3) Bulk samples shall only be taken of previously unsampled materials. Dust and debris samples are to be taken in areas where the asbestos containing materials show obvious signs of damage.
- (4) If upon reinspection the status of the asbestos containing material or building use has changed, Environmental Health and Safety shall be informed.
- (5) Environmental Health and Safety will evaluate all reinspection findings and sampling reports and will initiate any and all corrective actions deemed necessary which may include, but not be limited to:
 - (a) Removal
 - (b) Encapsulation

- (c) Enclosure
- (d) Repair
- (e) Engineering controls
- (f) Use of personal protective equipment
- (g) Increased inspection frequency

d. Inspection reports

Inspection reports shall document hazard assessments according to the following system.

1. RANKING

Condition	Rank	Category	Environmental Health and Safety Recommendation	Unit Response
Poor	5	significant damage		
Poor	4	Less than 25% damage or Potential for significant damage		
Poor	3	25% or less localized damage or Potential for significant damage		
Fair	2	Potential for damage		
Good	1	All remaining ACBM		

Recommendations from Environmental Health and Safety may include, but not be limited to one or more of the following: remove, encapsulate, repair, enclose, operations and maintenance.

2. SAMPLING SCHEME

When sampling is required, the following scheme should be employed.

a. Miscellaneous/Surface Material

(1) Suspect nonfriable materials will:

- (a) Be assumed to be asbestos containing material and not be sampled or
- (b) Be sampled for ID purposes only at the discretion of the inspector and his/her supervisor.

(2) Suspect friable materials will be sampled in the following manner:

- (a) Representative samples of each homogeneous area shall be collected in a random manner.
- (b) A minimum of three samples shall be collected for each suspect friable homogeneous material.

b. Thermal System Insulation

(1) Suspect nonfriable materials will:

- (a) Be assumed to be asbestos containing material and not be sampled or
- (b) Be sampled for ID purposes only at the discretion of the inspector.

(2) Friable thermal system insulation will be sampled in a random manner with a minimum of:

- (a) Three bulk samples per homogeneous area.
- (b) One bulk sample from each homogeneous patch material shall be collected.
- (c) Samples shall also be collected from joint material that is determined to be friable.
- (d) Thermal system insulation that is jacketed or encased and in good repair shall either be assumed to contain asbestos containing materials or may be sampled at the discretion of the inspector or his/her supervisor for sampling purposes.

C. Record keeping

Environmental Health and Safety will maintain records regarding sampling and assessment of all building inspections for a minimum of thirty (30) years.

III. NOTIFICATION/TRAINING AND CLASSIFICATIONS OF ASBESTOS WORK

A. Notices

1. Notice to Students, Faculty, Administrators, and Support Staff

In its capacity as property owners and managers of the State's buildings, WVU at times has need to communicate with you regarding important matters concerning health and safety. In that regard, you should be aware that many of the State's public buildings at WVU were constructed at a time when, as a standard construction practice, asbestos containing products were used.

WVU has adopted an Asbestos Management Program. Under that Program, WVU has surveyed and analyzed its buildings to identify the type and location of asbestos containing products. WVU has developed and implemented special operations and maintenance programs to avoid unnecessary disturbance or damage to the asbestos containing products found in the buildings.

According to the surveys conducted to date, the primary asbestos containing products in WVU buildings include fireproofing which has been sprayed onto the structural steel beams and columns of many buildings. In most areas of the buildings, the steel beams and columns are accessible only by removal of ceiling panels. Other asbestos containing products in the buildings include acoustical plaster and insulation on certain mechanical equipment and vinyl asbestos floor tile, among others. These products are not generally accessible to occupants or visitors to the buildings.

Environmental experts retained by the State of West Virginia have advised WVU that it is important to avoid unnecessary disturbance or damage to these asbestos-containing products, because such disturbance or damage could result in a release of asbestos fibers into the air. According to our experts, the health risks associated with asbestos are related to airborne asbestos fibers which can be inhaled. When inhaled, asbestos fibers can cause certain diseases, including lung cancer. Furthermore, health risks are considerably enhanced for smokers who are also exposed to asbestos fibers.

WVU has established special maintenance programs in its buildings to deal with asbestos containing materials. An integral part of the WVU Asbestos Management Program includes the continued monitoring, inspection, and maintenance of all areas of the buildings which have asbestos containing products. Signs shall be posted in some of the buildings indicating the locations of asbestos containing materials that are accessible and capable of being disturbed or damaged. Questions relating to asbestos in buildings should be referred to Environmental Health and Safety at 293-3792.

In order to ensure compliance with the WVU Asbestos Management Program, building occupants and visitors should not attempt any access to the areas where the asbestos containing products are located without first contacting Environmental Health and Safety or the Maintenance Supervisor for that particular building. In particular, any work that may involve disturbance of asbestos containing materials such as removing ceiling tiles; telephone repair work and/or computer cable installation; changing ceiling light fixtures; or going above the ceiling must not be performed without prior consultation with Environmental Health and Safety and the maintenance supervisor. In addition, any incidents involving significant changes in

the condition of the asbestos containing products, including water leaks, should be reported immediately to the Maintenance Supervisor for that building. Care should be taken not to scrape, scratch, or otherwise disturb those asbestos containing materials.

Your cooperation is necessary for the successful implementation of this program. Faculty and administrators should post this notice on bulletin boards where it can be read by employees and others who are working in or visiting your office.

Your cooperation in this effort is appreciated. With your assistance, WVU can continue to successfully address the safety of all occupants and visitors to the State's buildings at WVU.

Sincerely,

Roger L. Pugh
Director, Environmental Health and Safety

2. Notice to Contractors, and Equipment Installation and Maintenance Personnel.

Concerning Asbestos Containing Products From the State of West Virginia

Based on the recommendations from experts retained by the State of West Virginia, special maintenance policies and procedures are implemented in the State of West Virginia's public buildings to ensure that the asbestos containing products in the buildings are not unnecessarily disturbed or damaged. The WVU Asbestos Management Program generally involves:

- a. Use of special procedures for abatement, maintenance, repair or cleaning activities involving potential disturbances of asbestos containing products in the State's public buildings.
 - b. Use of specific responses if asbestos containing products are disturbed.
 - c. The training of personnel who will be responsible for the abatement, maintenance, repair or cleaning activities involving access to asbestos containing products.
 - d. The use of special equipment in certain circumstances to protect personnel from excessive exposure to asbestos fibers, and a medical surveillance program for personnel who may be required to work with asbestos containing materials.
3. According to a survey conducted in the State's Public Buildings, the asbestos containing products in the buildings which may release asbestos fibers are spray-on fireproofing insulation located on the structural steel beams and columns in the building, acoustical plasters sprayed on ceilings, steam pipe insulation, insulation on certain mechanical equipment and vinyl asbestos floor tile, among others. As part of WVU's Asbestos Management Program, signs should be posted in buildings indicating the locations of asbestos containing materials that are capable of being disturbed or damaged during abatement, maintenance, repair or cleaning by the contractor. The contractor should notify the designated Asbestos Maintenance Supervisor for the building who has been given the responsibility of overseeing the Asbestos Management Program for that particular building, in which abatement, maintenance, repair or cleaning by the contractor is being conducted.

Under WVU's Asbestos Management Program, contractors and other outside personnel are required to comply with the following rules:

- a. Any abatement, maintenance, renovation, or cleaning activity which has the potential of disturbing asbestos containing products must be approved by Environmental Health and Safety, and performed by personnel who are currently licensed by the State of West Virginia to perform such work.
- b. Any incidents involving damage to, or significant changes in the condition of asbestos containing products are to be reported immediately to Environmental Health and Safety, the designated Asbestos Maintenance Supervisor for the building and/or the appropriate Planning, Design and Construction representative. Asbestos containing material should be handled only by licensed personnel, according to approved procedures.

- c. If asbestos containing material has been damaged or disturbed, do not try to sweep it up or otherwise disturb it. Disturbing the material in this fashion may have the effect of further spreading the asbestos fibers and/or making them airborne. The disturbed asbestos containing material should be handled only by licensed personnel, according to approved procedures. The area should be secured to prevent further potential contamination.

The WVU Asbestos Operations Manual has been prepared to provide more detailed guidance for personnel and outside contractors who will be working in areas where the asbestos containing products are accessible. If you are going to be involved in work where asbestos containing products may be disturbed, and you have not been provided with guidance from the Manual, contact Environmental Health and Safety, the building's Asbestos Maintenance Supervisor, or Planning, Design, and Construction representative so that appropriate approved guidance can be obtained prior to beginning any work.

If you have any questions regarding this notice, or about any problem that may arise concerning this issue, please contact Environmental Health and Safety at 293-3792.

Sincerely,

Roger L. Pugh
Director, Environmental Health and Safety

I have read and understand this Notice and agree to follow the procedures and requirements outlined above.

NAME

COMPANY

DATE

B. Components of Asbestos Training Programs

Environmental Health and Safety shall inaugurate and maintain a training program designed to instruct appropriate employees in the handling and control of asbestos. Specific instructions with respect to hazards unique to this work shall be given to all appropriate personnel prior to being assigned to any work involving asbestos. Such training shall be documented to certify that the employee has satisfactorily completed the training program.

Departments shall maintain documentation of asbestos training and training renewals conducted for employees. This documentation (which includes type of training, date, trainer, and employee) shall be submitted to Human Resources and Environmental Health and Safety upon successful completion of the training program.

Departments shall assure that employees do not work with asbestos unless they have been appropriately trained or have received necessary renewal training as described herein.

Each asbestos training program shall include the following information:

1. The nature of all health hazards directly attributable to asbestos exposure including carcinogenic hazards;
2. The increased risk of lung cancer associated with smoking cigarettes and asbestos exposure;
3. The specific nature of the operations and specific information to aid the employee in recognizing when and where asbestos exposure may result;
4. The purpose for and a description of the exposure monitoring program;
5. The purpose for and a description of the medical monitoring program;
6. The necessary protective steps to prevent exposure, including engineering controls and safe work practices;
7. Where the employee is required to wear a respirator, the purpose for, proper use and limitation of the respiratory devices;
8. Where protective clothing is required, the purpose for, proper use and limitations of protective clothing;
9. The purpose for and application of housekeeping and personal hygiene practices and procedures to prevent asbestos exposure to others;
10. The purpose for, significance of and familiarization with emergency procedures;
11. Review of the Asbestos Management Program.

Annual refresher safety training is required for all workers who are assigned duties which may require them to come into contact with asbestos containing material.

C. Levels of Training

1. Level 1: Training is to be offered to all employees who work in areas determined by WVU Environmental Health and Safety to contain asbestos containing building materials. It is designed to provide awareness training and a general orientation to the subject of asbestos in buildings. Training should focus on the uses and applications of asbestos material in buildings, the locations of such materials, and what steps employees can take to minimize their exposure to asbestos, and to reduce their risk of incurring asbestos related diseases.
2. Level 2: Training is targeted at those personnel who perform work in which there is significant potential for exposure to asbestos. This group would include maintenance and other employees who perform services that may bring them in contact with asbestos containing materials. This training should be at a minimum EPA certified worker level.
 - a. These employees would require, in addition to Level 1 training, instruction in the practical aspects of performing maintenance or repair on asbestos containing materials.
 - b. Service personnel should be taught practical precautions to be followed in removing suspended ceiling panels, installing light or plumbing fixtures, repairing air handling systems or engaging in any activity that might damage asbestos containing materials.
 - c. They should be given instruction and training in wet cleaning methods and the use of special equipment (i.e., high efficiency particulate air [HEPA] filtered vacuums).
 - d. They should receive training on removal and disposal procedures; the proper use of personal protective equipment and personal hygiene techniques, and information in reporting procedures and compliance with relevant regulations.
 - e. Training should provide workers with "hands-on" experiences.
3. Level 3: Level 3 training is advanced training and is designed for those staff and management personnel who have abatement, supervisory, design, inspection or operations and maintenance responsibilities. They are to receive the equivalent of level 2 training (minimum 40 hour EPA certified supervisor level training) in addition to the requirements outlined in Section D, Specific Asbestos Training Programs.

D. Specific Asbestos Training Programs

1. Asbestos Awareness Training Requirements

An essential part of the Asbestos Management Program is employee training and education. The purpose of the training program is to transmit information to employee and management personnel, and to increase their level of knowledge and awareness in several key areas including:

- a. Diseases that may result from exposure to airborne asbestos, and how these diseases manifest themselves;

- b. The concepts of risk and of dose-response relationships, and the role of related factors in the production of diseases, such as smoking;
 - c. The physical characteristics of asbestos--its recognition, mechanisms of dispersion and potential for inhalation;
 - d. The potential for fiber emissions from work processes and how fiber releases from these processes can be minimized;
 - e. The purpose and function of engineering and work control practices.
2. Asbestos Worker Training

Requirements are the successful completion of an EPA model asbestos worker course of 4 days duration. The employee must pass the accompanying examination and obtain certification. Additionally the employee must attend an annual refresher course to maintain certification and acquire West Virginia licensing.

3. Asbestos Supervisor Training

Requirements are the successful completion of an EPA model asbestos worker course prior to being certified as an Asbestos Supervisor. Asbestos Supervisor training requires the successful completion of 5 days of training in an EPA model asbestos Supervisor course, passing of the accompanying examination and obtaining of certification. Additionally the supervisor must attend an annual refresher course so as to maintain certification and acquire West Virginia licensing.

4. Asbestos Inspector Training

Requirements are the successful completion of an EPA model Asbestos Inspector course of a minimum of 21 hours, passing of the accompanying examination and obtaining of certification. Additionally, a 2 day annual refresher is required to maintain certification and acquire West Virginia licensing.

5. Asbestos Management Planner

Requirements are the prior completion and certification as an Asbestos Building Inspector (see above), the successful completion of an EPA model course of instruction with a minimum of 14 hours training as an asbestos management planner, passing of the accompanying examination and obtaining of certification. Additionally an annual refresher course is required to maintain certification and acquire West Virginia licensing.

6. Asbestos Project Designer

Requirements are the successful completion of an EPA model Asbestos Project Designer Course, passing of the accompanying examination and obtaining of certification. Additionally, an annual refresher course is required to maintain certification and acquire West Virginia licensing.

7. Asbestos Final Clearance Monitor

Requirements are the successful completion of an EPA/State of WV Model Air Monitoring course, passing of the accompanying exam, and obtaining of certification.

Additionally, an annual refresher course is required to maintain certification and acquire West Virginia licensing.

8. Asbestos Laboratory Requirements

Laboratories providing service to the WVU Asbestos Management Program must be National Voluntary Laboratory Accreditation Program (NVLAP) or American Industrial Hygiene Association (AIHA) certified. Laboratories providing such service must also be licensed by the State of WV Department of Health.

E. Asbestos Work Classifications

1. Class I AAsbestos work@ means work activities including the removal of thermal system insulation and surfacing materials. A regulated area is required, as well as EPA training and direct on site supervision at all times.
2. Class II AAsbestos work@ means work activities involving the removal of asbestos containing materials which are neither thermal system insulation nor surfacing asbestos containing material. This includes but is not limited to the removal of asbestos containing material wallboard, floor tile and sheeting, roofing and siding shingles and mastics. Supervision at regular and frequent intervals. EPA approved training required.
3. Class III AAsbestos work@ means repair and maintenance operation where asbestos containing material or presumed asbestos containing material may be disturbed. EPA training with supervision at regular and frequent intervals.
4. Class IV AAsbestos work@ means maintenance, clean-up, and custodial activities during which employees contact asbestos containing material or presumed asbestos containing material and activities to clean up waste and debris containing asbestos containing material and presumed asbestos containing material. Supervision at regular and frequent intervals.

All Class I, II, and III projects shall utilize negative pressure systems in their implementation and design procedure with the exception of glovebag operations.

F. OSHA Notification Requirement

advance notification required when performing Class I work when using unlisted compliance methods (e.g. not utilizing negative pressure enclosures). Otherwise, OSHA will accept the current notification system and requirement set forth in 40 CFR 61 subpart m: National Emissions Standard for Hazardous Air Pollutants. A hazard communication provision exists that requires the building owner to communicate Aavailable® information concerning the presence and location of asbestos containing material, unless the building was built or renovated after 1979 or is rebutted by laboratory analysis. See pages 12 - 15 and facility operations and maintenance programs.

IV. CLEANING OF ASBESTOS CONTAINING MATERIAL

A. Work Practices for Cleaning Activities

1. Special cleaning practices should be employed for any buildings with surfacing asbestos containing material (particularly if the material is friable) or asbestos containing thermal system insulation. If the building contains only miscellaneous (usually non-friable) asbestos containing material, if all the asbestos containing material is isolated behind air-tight barriers, or if thermal system insulation is completely enclosed by protective jackets in good repair, special cleaning practices are not needed unless asbestos containing material is disturbed. Where asbestos containing material is confined to a single room or area, special cleaning practices just for that area may be sufficient. Where the asbestos containing material is more wide-spread and where fibers can be transported in the ventilation system, special cleaning practices may be extended to the entire building. Periodic air monitoring and other testing may be conducted to evaluate the effectiveness of various cleaning procedures.
2. Custodians should be instructed to avoid bumping asbestos containing material on pipes and walls or other surfaces with brooms, mops, vacuum cleaners and other cleaning equipment. These disturbances may cause the release of asbestos fibers, even when the asbestos containing material has been encapsulated. Dry broom, mops, and dust cloths and standard vacuum machines will simply resuspend fibers. All dusting and mopping of floors with asbestos containing material should be conducted using wet cleaning techniques (mops or cloths dampened with water or a dust suppressant) or with vacuum cleaners equipped with HEPA filters:
 - a. All curtains, books, upholstered furniture, carpets, and other irregular surfaces should be vacuumed with a HEPA vacuum cleaner. (Floors should be buffed with the least abrasive pad available.) Sanding and stripping of floors at speed greater than 300 rpm is prohibited.
 - b. All uncarpeted floors should be wet-mopped, and all other horizontal surfaces such as the tops of light fixtures and file cabinets should be wiped with damp cloths on a regular basis. Alternatively, these surfaces can be HEPA vacuumed.
 - c. Spray (mist) bottles of water should be used to keep the mops and cloths damp. Alternatively a dust suppressant can be used on mops.
 - d. Cleaning materials (mop heads, cloths) should be washed after each cleaning, and HEPA filters changed regularly.
 - (1) All asbestos containing material should be (a) discarded as asbestos waste -- the materials should be placed in 6 mil plastic bags, the bags sealed and labeled: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD", and (b) bagged asbestos deposited in a landfill approved by the State of WV.
 - (2) Small amounts of waste may be stored in labeled 55-gallon drums (or other durable containers) in secure areas on-site. Federal, State, and local regulations apply.

- e. HEPA filters and vacuum bags should be removed from vacuum cleaners with great care. Consult manufacturer's instructions on filter removal. Workers should wear at least air-purifying respirators and should mist the filters and material inside vacuum bags with water as they are removed.
- f. Ladders, mops, buckets, vacuum cleaners, and all cleaning equipment should be washed or wiped with damp cloths when the cleaning is finished. Debris should be disposed of as asbestos waste.

B. Work Practices For Maintenance Activities

- 1. Normal maintenance activities that disturb asbestos containing material may raise levels of airborne asbestos. Maintenance workers should be cautioned against conducting any maintenance work in a manner that may disturb asbestos containing material. If a maintenance worker is concerned about work practices relating to asbestos, an Asbestos Abatement Supervisor or Environmental Health and Safety should be consulted to ensure that proper procedures are employed whenever there is a possibility of disturbing asbestos containing material or asbestos fibers.
- 2. The nature and extent of special work practices should be tailored to the appropriate asbestos work classification as prescribed in OSHA 29CFR 1926.1102 (see page 22).

C. Specific Work Practices

The following sections on surfacing materials, thermal system insulation, and other types of asbestos containing material describe example work practices in detail.

- 1. Surfacing Materials
 - a. Contact with asbestos containing material unlikely, however accidental disturbance of asbestos containing material possible.
 - (1) Routine maintenance and repair includes work on light fixtures, plumbing fixtures and pipes, air registers, HVAC ducts, and other accessible parts of building utility systems. Where these fixtures or system parts are near friable asbestos containing material, maintenance work may unintentionally disturb the asbestos containing material and release asbestos fibers.
 - (2) For example, maintenance work on ventilation ducts in an air-handling room where asbestos fireproofing is present only on structural beams could be conducted without contacting the asbestos containing material. However, the fireproofing could be disturbed accidentally during the course of the work, or asbestos dust and debris on surfaces resuspended.
 - (3) The following precautions are examples and should be used if accidental disturbance of asbestos containing material (or dust and debris containing asbestos fibers) is likely to occur:
 - (a) Approval must be obtained from Environmental Health and Safety or designee before beginning work.

- (b) The work should be scheduled after normal working hours (nights or weekends), if possible, or access to the work area should be controlled: doors should be locked from the inside and signs posted to prevent unauthorized persons from entering the work area (e.g., "DANGER - ASBESTOS; CANCER AND LUNG DISEASE HAZARD; AUTHORIZED PERSONNEL ONLY; RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA")
Note, emergency exits must remain in operation.
- (c) The air-handling system must be shut off or temporarily modified to prevent the distribution of any released fibers to areas outside the work site.
- (d) A 6-mil polyethylene plastic dropcloth should be placed beneath the location of the maintenance work, extending at least 10 feet beyond all sides of the work site. Alternatively, a rectangular enclosure constructed of 6-mil plastic on a frame can be positioned underneath the maintenance area to inhibit the spread of fibers from fallen asbestos containing material. (Mobile enclosures of this type are available commercially.) The need for an enclosure will be determined on a case-by-case basis.
- (e) Workers must wear at least air-purifying respirators with HEPA filters (see discussion in Section 11 on respiratory protection) and disposable protective clothing including a body suit and hood.
- (f) The asbestos containing material in the vicinity of the maintenance work should be misted lightly with amended water -- a combination of a surfactant and water. Use a mister that produces a very fine spray. SHUT OFF the electrical system before spraying around any electrical conduits or fixtures. Follow lock-out/tag-out procedures.
- (g) After the maintenance work is completed, the fixture, register, or other component, and all tools, ladders and other equipment should be HEPA vacuumed or wiped with a damp cloth.
- (h) If any debris is apparent on the drop cloth, floor or elsewhere, it should be HEPA vacuumed.
- (i) The plastic dropcloth (or enclosure) should be wiped with a damp cloth, carefully folded, and discarded as asbestos waste.
- (j) All cloths, vacuum bags/filters, and other disposable materials should be discarded in sealed and labeled plastic bags as asbestos waste.
- (k) Workers should HEPA vacuum respirators and protective clothing at the work site. The clothing should then be discarded as asbestos waste. If the asbestos containing material was disturbed during the course of the work, the workers should leave their respirators on, proceed to a shower room, shower with respirators on, and clean their respirators while in the shower.

b. Disturbance of Asbestos Containing Material Intended or Likely.

Some maintenance and repair activities will unavoidably disturb the asbestos containing material. For example, installing new sprinkler or piping systems will necessitate hanging pipes from structural members of ceilings. If the beams or ceilings are covered with asbestos containing material, the asbestos containing material will be scraped away to install hangers. Likewise, pulling cables or wires through spaces with asbestos containing material or asbestos containing material debris is likely to dislodge pieces of the asbestos containing material or disturb asbestos containing material debris. Furthermore, any time tiles are moved to enter the space above a suspended ceiling, settled dust on top of the tiles will be resuspended. If the beams or decking above the ceiling are covered with asbestos containing material, the dust is likely to contain asbestos fibers. All of these examples involve disturbance of asbestos containing material or asbestos dust or debris, and will likely result in elevated levels of airborne asbestos fibers.

c. Class III Asbestos Work

The following procedures are appropriate for maintenance activities which involve Class III removal of surfacing asbestos containing material or when disturbance of asbestos containing material dust and debris of unintentional contact with the asbestos containing material is likely.

- (1) Approval should be obtained from Environmental Health and Safety before beginning work.
- (2) The work should be supervised by OSHA certified supervisor/competent person.
- (3) The work should be scheduled after normal working hours (nights or weekends) if possible, or access to the work area should be controlled: doors should be locked from the inside and signs posted to prevent unauthorized persons from entering the work area (e.g., "DANGER - ASBESTOS; CANCER AND LUNG DISEASE HAZARD; AUTHORIZED PERSONNEL ONLY; RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA").
- (4) Emergency exits must remain in operation.
- (5) The air-handling system should be shut off or temporarily modified to prevent the distribution of any released fibers to areas outside the work site.
- (6) Workers should wear at a minimum, air purifying respirators with HEPA filters and protective clothing including a body suit, hood, boots, and gloves.
- (7) A rectangular enclosure constructed of 6-mil plastic on a frame should be positioned underneath the maintenance area to inhibit the spread of fibers from fallen asbestos containing material (mobile enclosures of this type are available commercially).

- (8) If entry to the space above a suspended ceiling is necessary, the entry tiles should be removed carefully with as little jarring as possible. The area should be misted with amended water to minimize dust.
- (9) Workers identified by Environmental Health and Safety must wear personal monitors as required by OSHA.
- (10) During the course of the work, any asbestos containing material which is removed should be collected by the HEPA-vacuum. This may be accomplished by placing the vacuum hose just below the asbestos containing material being removed or in some other manner deemed appropriate by a certified asbestos supervisor or Environmental Health and Safety.
- (11) Upon completion of the work, any visible debris on the top of the suspended ceiling, on the drop cloth or the floor, or anywhere else should be collected by cleaning with a HEPA- vacuum.
- (12) All equipment and tools should be wiped with damp cloths or HEPA-vacuumed.
- (13) The plastic sheet should be wiped with a damp cloth, carefully folded, and discarded as asbestos waste.
- (14) All debris, cloths, and vacuum bags/filters should be discarded in sealed and labeled plastic bags as asbestos waste.
- (15) Workers should vacuum their disposable suits before leaving the work site (or remove and discard them as asbestos waste and put on a clean disposable suit), proceed to a shower room, shower with their respirators on, and clean their respirators while in the shower.

d. Large Disturbances

Any maintenance work which involved removal of 3 or more square feet of surfacing material (or 3 linear feet of thermal system insulation) should be considered a Class I, II, or III disturbance of asbestos containing material. Moreover, if the maintenance work is part of general building renovation, NESHAPs regulations requires prior notice of removal of asbestos containing material when the disturbance encompasses more than 160 square feet of friable surfacing asbestos containing material (or 260 linear feet of thermal system insulation) or 35 cubic feet of asbestos containing material would be broken up or if the renovation made such asbestos containing material inaccessible for subsequent removal (40 CFR 61, subpart m).

2. Thermal System Insulation

Maintenance activities affecting asbestos containing thermal system insulation generally involve plumbing-type repairs, or repairs to the heating, ventilation and air conditioning (HVAC) system. Frequently, the Asbestos containing material must be removed to provide access to the valve, flange, duct, or related system part needing maintenance.

a. Contact With Asbestos Containing Material Unlikely, but Accidental Disturbance of Asbestos Containing Material Possible

Maintenance activities or repairs which can be performed without contacting or disturbing the asbestos containing material require little more than normal care and good workmanship. However, respirators and a HEPA vacuum cleaner should be available if needed. For example, valves which are either uncovered or covered with nonasbestos insulation can be repacked or repaired without disturbing asbestos lagging on nearby pipes. As with surfacing asbestos containing material, the only precautions necessary are to make sure that a HEPA vacuum cleaner and air-purifying respirators are available if needed.

Even maintenance tasks that involve no direct contact with asbestos containing material may cause accidental disturbance. For example, vibrations created by maintenance in one part of piping network will be transmitted to other parts. Vibrations could then cause fiber release from insulation which is exposed (not covered with a protective jacket) or not in good condition. If in doubt about the possibility of fiber release, thoroughly inspect the thermal system insulation before undertaking the maintenance or repair work. Then, either correct the problem before starting, or assume that the maintenance work may cause accidental disturbance and fiber release. In this case, the following procedures should be used:

- (1) Work approval and site preparation procedures as described under Surfacing Material, section IV. C. 1.
- (2) Plastic sheets (6-mil polyethylene) should be cut and taped around any insulation which might be accidentally disturbed. The plastic should be misted with amended water before taping it shut. If the locations where insulation could be disturbed are too numerous for isolation with plastic, workers should perform the maintenance work wearing air-purifying respirators at a minimum and protective clothing, including disposable suits and hoods.
- (3) Cleanup procedures as described under Surfacing material should be followed. Special care should be taken when removing the plastic from the insulation to minimize disturbance of any asbestos containing material dust or debris that may have fallen from the insulation.

b. Disturbance of Asbestos Containing Material Intended or Likely

Where asbestos containing insulation must be removed to maintain or repair the thermal system, the asbestos containing material will obviously be disturbed. As with surfacing asbestos containing material, the amount to be removed or manipulated will determine the procedures to be used.

c. Small Disturbances

The amount to be removed is 3 linear feet or less or 3 square feet of thermal system insulation, the project should be considered a Class III disturbance. The following procedures should be followed:

- (1) Work approval and site preparation procedures as described for surfacing asbestos containing material should be followed.

- (2) Maintenance workers should wear at least air-purifying respirators with HEPA filters and protective clothing (suit, hood, and boots) in case of a fiber release accident.
- (3) The asbestos containing insulation should be removed as necessary for repairs, and the repairs should be made using standard glove bag techniques where possible. Glovebags are fastened around the part to be repaired, the insulation is removed with knives and saws to make the part accessible, and the repairs are made using tools contained in the glovebag tool pouch. The open faces of the remaining asbestos containing insulation are then sealed with an encapsulate or sealer, all surfaces are wet-wiped or HEPA-vacuumed, and all debris is sealed in the glovebag and removed together with the bag.
- (4) If a glovebag is ruptured during the course of the repairs, work should stop, the area should be sealed off, and all procedures recommended for large-scale asbestos removal should be followed. Sealing tape applied quickly to a small puncture could prevent significant release of fibers to the room provided the Asbestos containing material inside the bag was thoroughly wetted as it was removed. Thorough clean-up of the work site followed by air testing should be employed under most circumstances to assure that fibers which may have escaped have been removed.
- (5) At the conclusion of the work, maintenance workers should clean their clothing if fibers escaped from the glovebag, shower with their respirators on, and clean their respirators while in the shower in accordance with WVU's Respiratory Protection Program.
- (6) All glovebags and any other used materials (including disposable clothing) should be bagged and discarded as asbestos waste.
- (7) Non-asbestos insulating material can be installed as necessary to replace insulation which is necessary to remove.

d. Large Disturbances

Maintenance activities which involve removal of 3 linear feet or more of asbestos containing material should be considered a Class I, II or III disturbance. In some situations glovebag techniques may be appropriate and the procedures described above under "small disturbances" should be followed. When glovebags are not feasible the maintenance activities should be conducted using all the procedures recommended for large-scale asbestos removal.

3. Miscellaneous Asbestos Containing Material

Other miscellaneous types of asbestos containing material should also be addressed. They include vinyl composition asbestos floor tiles and mastic, asbestos ceiling tiles, transited wall board and counter tops, asbestos roof tiles, and various textile products such as stage curtains. Disturbance of these materials should be avoided. Where this is not possible, procedures should be used as described above for large-scale removal of asbestos containing material. Cutting, drilling, grinding, or sanding of asbestos containing material must be performed with tools equipped with HEPA-filtered vacuum systems (OSHA requirement). This is Class II asbestos work.

4. Changing Filters in HVAC Systems

Whenever friable asbestos containing material is present in an area of a building serviced by a HVAC system, special procedures should be followed when changing filters in that HVAC system. The filters should be misted with water or amended water as they are waste. Workers changing filters should wear at least an air-purifying respirator.

D. Renovation and Remodeling

1. Building renovation or building system replacement can cause major disturbance of asbestos containing material. Moving walls, adding wings, and replacing heating or air conditioning systems involve breaking, cutting, or otherwise disturbing asbestos containing material that may be present. Prior removal of asbestos containing material is highly recommended in these situations, and may be required by NESHAPs if the amount of asbestos containing material likely to be disturbed is greater than the threshold amounts (160 square feet of surfacing material or 260 linear feet of thermal system insulation or 35 cubic feet of asbestos containing material). If prior removal is not undertaken, the renovation project should be considered equivalent to an asbestos removal project which requires certain criteria to be considered throughout the project. A key step in considering a renovation project is checking on the location and type of asbestos containing material that may be affected. Clearance should be obtained before serious project planning is begun.
2. Remodeling or redecorating implies less dramatic structural alteration. However, disturbance of asbestos containing material or materials contaminated with asbestos fibers is still possible. Where the remodeling involves direct contact with asbestos containing material (e.g., painting or wall papering over asbestos containing material), all of the procedures and precautions recommended by EPA and required by OSHA for asbestos removal should be followed.

E. Procedures for Fiber Release Episodes

A fiber release episode may be defined as "any uncontrolled or unintentional disturbance of asbestos containing material." Examples of fiber release episodes include a roof leak that results in complete delamination of asbestos containing material, thermal system insulation that is destroyed when a steam pipe bursts, or non-friable wallboard that is cut with non-HEPA equipment and made friable. As long as asbestos containing material remains in the building, a fiber release episode could occur. Custodial and maintenance workers should report to their supervisor and Environmental Health and Safety the presence of debris on the floor, water or physical damage to the asbestos containing material, or any other evidence of possible fiber release. Fiber release episodes can also occur during maintenance or renovation projects. A suitably trained and certified in-house team should be assigned to clean up debris and make repairs as soon as possible.

1. Minor Episodes/Class III or IV
 - a. Minor episodes can be treated with standard wet cleaning and/or HEPA vacuum techniques.

- b. Examples include, but are not limited to small sections of insulation (less than 3 linear feet) falling from a pipe as a result of a careless worker bumping into a beam and dislodging a small amount of fireproofing asbestos containing material (less than 3 square feet).
- c. Standard wet cleaning and HEPA-vacuum techniques include:
 - (1) Workers should wear air-purifying respirators with HEPA filters at a minimum.
 - (2) Workers should thoroughly saturate the debris with water or amended water using a very fine spray. The debris should then be placed in a labeled, 6-mil plastic bag for disposal, and the floor should be cleaned with damp cloths or a mop. Alternatively, the debris can be collected with a HEPA vacuum cleaner.
 - (3) All debris and materials used in the cleanup should be discarded as asbestos waste.
 - (4) Workers should vacuum their disposable suits before leaving the work site (or remove and discard them as asbestos waste and put on a clean disposable suit), proceed to a shower room, shower with their respirators on, and clean their respirators while in the shower.
 - (5) The damaged asbestos containing material should be repaired with asbestos-free spackling, plaster, cement, or insulation, or sealed with latex paint or an encapsulant.
 - (6) Carpeting should be tested to ensure it is decontaminated.
 - (7) Air monitoring should be conducted prior to re-occupancy of the area.

2. Major Episodes

- a. Major fiber release episodes are serious events. Large amounts of asbestos containing material falling from heights of several feet may contaminate an entire building with asbestos fibers.
- b. If 3 square feet or more of surfacing asbestos containing material or 3 linear feet or more of thermal system insulation delaminates or is dislodged from its substrate, the episode should be considered Class I or III. A large breach in a containment barrier for a maintenance or abatement project should also be considered a major episode. The following response procedures should be employed:
 - (1) The area should be isolated as soon as possible after the asbestos containing material debris is discovered. Where the area can be sealed by doors, they should be locked from the inside (escape corridors must remain in operation) and signs posted to prevent unauthorized personnel from entering the work area ("DANGER - ASBESTOS; CANCER AND LUNG DISEASE HAZARD: AUTHORIZED PERSONNEL ONLY: RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA").

- (2) The air-handling system should be shut off or temporarily modified to prevent the distribution of fibers from the work site to other areas of the building. If possible, doors, windows, and air registers should be sealed with 6-mil plastic sheets and tape.
- (3) All the procedures recommended by EPA and required by OSHA for large-scale removal of asbestos containing material should be considered. These include containment barriers, negative pressure ventilation, personal respiratory protection and protective clothing, decontamination facilities, and air testing.
- (4) Workers should wear an appropriate respirator and protective clothing including a body suit, hood, boots, and gloves, if required. Personal air monitoring may be conducted on representative workers, but is not required by OSHA when SCBA or "type C" respirators are used.
- (5) Fallen debris should be sprayed with amended water and placed in plastic bags for disposal. Shovels are useful for collecting the debris. The floor should be thoroughly cleaned with a HEPA vacuum cleaner.
- (6) Walls, ceilings, pipes, boilers or other surfaces where asbestos containing material was damaged or delaminated should be repaired temporarily. This might involve replastering with asbestos-free material, spraying with an encapsulant, or taping with duct tape. In some cases, asbestos containing material beyond the immediate area of damage may need to be removed to prevent additional episodes.
- (7) The air should be tested for asbestos fibers before the plastic barriers are removed and the area reoccupied. Air may be sampled at a specified number of locations and analyzed by either phase contrast microscopy or transmission electron microscopy. However, sampling should NOT be done aggressively since the use of blowers and fans may dislodge fibers from the remaining asbestos containing material.
- (8) After the barriers have been taken down, decontamination of the entire building or a portion of it should be considered. The need for this will depend on how rapidly the response team reacted to the episode, and in particular, how quickly the HVAC system was turned off. A thorough decontamination includes HEPA-vacuuming all carpets. Furniture, and other surfaces (nonfabric surfaces) could be wet-cleaned as described previously. These surfaces need to be tested to be sure asbestos fibers have been removed. If asbestos fibers remain, disposal of certain fixtures or recleaning may be necessary.

- (9) All equipment used in the cleanup operation should be washed or wiped with damp cloths. All disposable materials (e.g., cloths, mop heads, filters, coveralls) should be discarded as asbestos waste.

3. Documentation

Each fiber release episode, whether minor or major, should be documented by the unit in charge of the building. Documentation should be submitted to and retained by Environmental Health and Safety.

FIBER RELEASE EPISODE REPORT

1. Address, building and room number(s) (or description of area where episode

occurred): _____

2. The release episode was reported by _____

on _____
(DATE)

3. Describe the episode _____

4. The asbestos containing material was _____/was not _____ cleaned up according to approved procedures. Describe the cleanup: _____

SIGNED: _____ DATE: _____

V. ABATEMENT GUIDELINES

A. General Procedures

1. Notification shall be given to West Virginia University's Environmental Health and Safety Department a minimum of forty-five (45) days in advance of any scheduled abatement activity (304-293-3792). (This is to allow Environmental Health and Safety to forward proper notification to various regulatory agencies.)
2. A pre-construction briefing will be conducted by the University department and Environmental Health and Safety during the forty-five (45) day notification period that will specifically address any proposed Asbestos Abatement Activity. A representative from the contractor and a member of the Environmental Health and Safety staff will review this manual, at the pre-bid meeting, to ensure compliance with its contents. Contractor licensing will be verified at this time.
3. Two weeks prior to abatement, the contractor or appropriate WVU department will finalize the methods and procedures to be implemented during the Abatement Activity. Applicable Regulatory Compliance will be reviewed at this point. Environmental Health and Safety will conduct a review of the proposed abatement activities to ensure that the proper equipment and materials will be employed. The contractor will provide Environmental Health and Safety with all Abatement Activity and disposal documentation upon request. Records and Abatement Activities will be subject to review throughout the course of the abatement process. Copies of all final records are to be submitted to Environmental Health and Safety prior to substantial completion of the project.
4. The work site will be examined by Environmental Health and Safety for ancillary hazards and potential effects to West Virginia University employees, students, and visitors. Areas of concern will be identified and addressed by the contractor.
5. Environmental Health and Safety may conduct inspection of the job site periodically during the Abatement Activity. Environmental Health and Safety may also do independent clearance monitoring of the job site. Environmental Health and Safety reserves the right to have a representative on site as deemed necessary to ensure contractual and regulatory compliance and to provide for the safety and well being of West Virginia University employees, students, and visitors.
6. Environmental Health and Safety reserves the right to suspend projects that are found to be in non-compliance with applicable federal, state, and local regulations or the West Virginia University Asbestos Management Program or pose a hazard to employees, students, and visitors.

B. Pre-Job Briefing

Although asbestos abatement projects are basically similar, every job will have different problems and each one will require different solutions. Before beginning each new project, workers should receive a briefing from their supervisors detailing any special conditions they may encounter. Items workers should be made aware of include the following:

1. The type of material workers will be removing.

2. The containment procedures to be employed, specifically how and where plastic and/or other materials will be applied.
3. The protective clothing workers will need to wear, especially in conditions where there may be hazards other than asbestos, such as heat, cold, chemicals, a need for hard hats, etc.
4. The type of respiratory protection needed.
5. The location of the decontamination area, if applicable; which passageways workers are permitted to use; emergency routes; and escape procedures.
6. The location of specific hazards, such as hot pipes, sharp edges, dangerous steps, electrical hazards, etc., should be pointed out and marked.
7. Awareness of the usual hazards, of limited vision, hearing, and movement restrictions due to protective clothing and respirators, and uncertain footing in wet materials on plastic sheeting, should be reinforced.

C. Equipment and Materials

Like many other types of work, asbestos abatement requires a wide variety of tools and specialized equipment in its performance. It is important that all equipment be kept clean to ensure its continued good operation and to prevent its becoming contaminated with asbestos fibers. The need for any repairs or replacement of tools or equipment should be reported to a supervisor as soon as possible.

The following is a list of materials and equipment necessary to perform an abatement procedure. Since each asbestos removal or encapsulation project is different in terms of size or complexity, this list is offered as a sample of materials and equipment available at WVU which may be used for asbestos activities as appropriate:

1. Respiratory Protection -- Refer to WVU Respiratory Protection Program and 29 CFR 1910.134, Respiratory Protection Standard.
 - a. Dual cartridge half-face air purifying respirator with high efficiency cartridges and protective goggles.
 - b. Dual cartridge full-face air purifying respirator with high efficiency cartridges.
 - c. Powered full-face air purifying respirator with high efficiency cartridges.
2. Air movement and filtering equipment with HEPA filters rated at 99.97% removal efficiency down to 0.3 microns, and of sufficient capacity to provide:
 - a. minimum of four air changes per hour for each active work area to ensure proper air filtering, and
 - b. an air pressure differential (ΔP) between the active work area and the outside environment (i.e., 0.02 inches water).
3. Airless Spray Equipment for saturating, mist fiber control, and the application of the encapsulant. A garden sprayer may be used on small projects. Powered spray equipment may be preferred on large projects.

4. Vacuum or Vacuum Systems with HEPA filters for surface cleaning and general housekeeping.
5. Hand tools, including plastic shovels, scrapers, snips, brushes, staplers, etc., in sufficient quantity to ensure proper progression of the work and the appropriate level of housekeeping during abatement activities.
6. Disposable clothing, consisting of coverall, headcover, and foot covering. At least four complete changes per worker per day and additional outfits for inspectors should be kept on-site.
7. Polyethylene sheeting. A minimum of six (6) mil for protection of all surfaces, field equipment, HVAC supply and return openings. A minimum of two layers are required for protection of the floor and walls.
8. Leak-tight polyethylene bags (with preprinted danger labels and required disposal information) six (6) mil minimum for disposal of asbestos waste. Also, 30-gallon fiber drums provide added protection and may be required on projects involving the removal of asbestos contaminated objects with sharp edges (eg. lighting fixtures, metal lath, etc.).
9. Glovebags, six mil preprinted polyethylene bags with build-in gloves, are to be used in the removal of pipe insulation. **CAUTION:** Never perform glove bag removal on hot pipes (e.g., over 150^o F)!
10. Duct tape, three-inch width recommended, which is resistant to amended water or encapsulant. Paper masking tape is **not** permitted.
11. Wet cleaning tools, sponges, mops, buckets, cloths, etc.
12. Temporary lighting and power source (ground fault protected) as conditions warrant.
13. Scaffolds, ladders, wood, etc. as necessary for removal of asbestos and construction of barriers.
14. Encapsulants as needed to bind any residual fibers to the substrate. It may also be used during final cleaning procedures to bind fibers to the plastic barriers.
15. Wetting Agents. Wetting agents are sprayed onto the friable material to reduce the incidence of airborne asbestos fibers during the abatement procedures and to compact the material being worked on.
16. Project Signs - Project and danger signs should be provided and displayed at all entrances to the work area. Signs should comply with OSHA Regulation 29 CFR 1926.1101.
17. Danger Labels - Danger labels should be affixed to all bags and containers which are to be filled with asbestos waste material and removed from site. Information on waste containers should also include: name and address of generator and location of removal site.
18. Shower and contaminated water containment or filtering system must be installed within the decontamination chamber on all projects. Glove bag removal operations will not require a shower system on-site. However, the worker must wash his/her face and hands after removal of the asbestos and then shower before leaving work.

D. Personnel Protection

Protective equipment for all workers and inspectors should be kept at the abatement work site. Each day and for the duration of the project, workers should be supplied a minimum of four (4) complete sets of disposable clothing and respirator filter changes for use as needed. For abatement conducted by WVU employees, the following will be provided:

1. Protective Clothing

- a. Protective clothing consists of full-body coveralls, disposable head covers, gloves, footwear, and eye protection. Protective clothing must be worn by all workers and inspectors during all phases of work--layout, removal, or encapsulation, and post clean-up operations.

All footwear must be covered with disposable booties or with booties attached to the disposable coveralls. Rubber boots may be used during abatement work provided they remain in the work area and are thoroughly cleaned at the end of the project.

- b. Eye protection on abatement projects should be used. Respiratory protection that incorporates full face shields may be the most practical solution. Half-mask respirators make comfortable fitting of protective eyewear difficult. The high heat and humidity conditions commonly found inside a removal work area make the use of spectacles difficult and uncomfortable. Goggles or face shields are the recommended options. Whichever form of eye protection is used, it must meet the standard set forth in the American National Standards Institute (ANSI) standard Z87.1-1979. Eyewear and face shields which meet the guidelines set forth in the ANSI standard will bear a Z87 marking near the logo.
- c. Protective hardhats must be worn by employees on any asbestos abatement job site where there is exposure to falling objects. Removing suspended ceilings and light fixtures are examples.
- d. Prior to the worker entering the shower, all contaminated disposable clothing worn within the abatement work area must be disposed of in the equipment room of the decontamination chamber. **THIS CLOTHING IS CONSIDERED CONTAMINATED WASTE AND IS TO BE DISPOSED OF WITH OTHER ASBESTOS WASTE MATERIAL.** Nondisposable protective gear must be thoroughly cleaned before removing these items from the work area.

2. Respirators (Refer to WVU Respiratory Protection Program and 29 CFR 1910.134 Respiratory Protection Standard)

The purpose of the respirator is to provide clean air to its user. The respirator and cartridges selected for use in asbestos abatement work must be approved by the Mine Safety and Health Administration (MSHA) and the National Institution for Occupational Safety and Health (NIOSH).

The type of respiratory protection needed is based on the individual work assignments and the atmosphere or concentration of airborne asbestos fibers which may be encountered. The following are types of respiratory protection which may be used for asbestos abatement:

- a. Air purifying respirators are the minimum type required for all personnel at the job-site.
 - (1) Half-face type with high efficiency cartridges rated for asbestos may be used during inspection and containment erection and by secondary support personnel in conditions of low asbestos fiber concentration.
 - (2) Full-face type with high efficiency cartridges rated for asbestos may be used by all personnel in active work areas where atmospheres are not expected to exceed 0.5 fibers per cubic centimeter. Personnel in areas of lower concentrations may continue to use full-face respirators for a more secure fit during strenuous work.
 - (3) Powered air purifying respirators should be used where concentrations are expected to exceed 0.5 fibers per cubic centimeter.

b. Inspections of Respirators

Each half or full-face respirator consists of the facepiece, headbands, gasket, inhalation and exhalation valves, and filter cartridges. Each respirator must be thoroughly inspected before and after each use. This inspection must consist of at least the following:

- (1) Check for deterioration or distortion of the rubber facepiece cushion.
- (2) Check the elasticity and/or deterioration of the headbands to ensure all slips, hooks, and adjusters are in place and functional.
- (3) Inspect the inhalation and exhalation valve for deterioration, distortion and dirt. It may be necessary to remove an exhalation valve cover in order to properly inspect the valve. Be sure to replace the cover after inspection.
- (4) Powered air purifying respirators should be checked for damage and assurance that all connections are secure.
- (5) Batteries for powered air units should be fully charged and their power cord connections checked for dirt or corrosion and a tight fit.
- (6) Inspect the filter holder on cartridge receptacles to make sure that they are clean, their gaskets are in place and in good condition, and the threads are not stripped.
- (7) Check the cartridges to be sure that only MSHA/NIOSH approved HEPA filters are being used for asbestos abatement work.

c. Donning of Respirator

When donning the respirator, place the mask over the chin and swing the top in so that it rests over the bridge of the nose. The longest headband is placed over the crown of the head and the shortest headband around the neck. The headbands are adjusted by moving the slides until the facial seal is tight but comfortable. Tighten head straps from bottom to top.

All workers should check respirator fit every time the respirator is worn by placing hands over the cartridges and inhaling. The respirator should collapse

slightly on the face with no detectable leaks at the face seal. If a good fit is not achieved, the worker should try to reposition the respirator on his/her face. A smaller size or different type of respirator may be needed.

E. Air Testing

1. Air monitoring during asbestos abatement projects serves a multiple purpose:
 - a. Monitors the fiber level in the work area and at the breathing zone of the worker.
 - b. Monitors the non-asbestos portion of the building.
 - c. Monitoring detects whether negative air pressure equipment and barriers are functioning properly and that contaminants are not leaking from the work area into other areas of the building.
 - d. Determines the background fiber levels prior to abatement activities.
 - e. Determines when the work area is ready for re-occupancy. This is sometimes referred to as "final clearance testing".
2. Air testing and analysis will be conducted in accordance with EPA recommendations and OSHA regulations.
 - a. All equipment and personnel necessary for air sampling will be provided by the Office of Environmental Health and Safety, for in-house projects.
 - b. A third-party monitoring laboratory must be used for larger projects involving outside contractors.
 - c. All personnel involved in the sampling will be permitted continuous access to the work area.
3. Air sampling should be conducted in each work area prior to the start of abatement activities in that area unless a negative exposure assessment is utilized. A minimum of three monitors per worksite and at least one per room should be set up in the following locations: active work area, decontamination chamber (clean side), and at the HEPA air filtration unit exhaust.
4. Final clearance testing should begin as soon as all surfaces within the work area have been thoroughly cleaned and dried. The work area environment will be stirred up with a fan, broom, etc. to create a "worst case" condition during sampling (i.e., aggressive sampling). Final clearance testing will comply with WV Department of Health Title 64 Series 63.
5. The final clearance levels shall not exceed 0.01 f/cc PCM, .02 s/cc (WV Title 64 Series 63), or 70 s/mm² TEM and/or the background level established by pre-job monitoring. If any monitor shows a total fiber count higher than the specified levels, the entire worksite should be recleaned with a HEPA filtered vacuum cleaner and damp cloths or mops, and a new set of air samples for the entire worksite should be collected and analyzed.
6. The measurement of airborne fibers at the worksite following project completion serves only to indicate that the elevated levels of total fibers observed during abatement action have been reduced. The sampling method required by OSHA

regulations does not distinguish asbestos fibers from other naturally occurring or man-made fibers such as fiberglass, paper fibers, mineral wool, etc. which may be in the air.

F. Sampling

1. Introduction

- a. Sampling and analytical methods are important tools for assessing and monitoring asbestos materials. The applications of sampling and analyses may range from bulk sampling of suspect materials to estimating airborne fiber levels before, during, and after an abatement project. Collection of reliable data requires a thorough knowledge of the various sampling and analytical techniques which are available and when a particular technique should be used.
- b. This section is an introduction to the types of sampling methods and various analytical techniques used for asbestos containing materials. After these methods have been described, the applications of these methods to an asbestos abatement project will be discussed.

2. Sampling Methods

a. Air Sampling

- (1) Air sampling is conducted to determine airborne fiber concentrations before, during and after abatement activities. Sampling is conducted with battery powered pumps, which are used to pull low volumes of air (0.5 - 4 liters per minute) and electric pumps which pull high air volumes (4-30 liters per minute). Pumps are calibrated before and after use. A 25mm cassette which holds a filter with very small pore openings is attached to the pump with flexible tubing. With the front cover of the cassette removed, air is drawn through the filter and particles in the air are collected on the filter surface. The type of filter used for sampling depends on the technique which will be used for analysis.
- (2) The two basic types of air sampling are area and personal monitoring. Area air samples are taken with a pump that is placed at breathing zone height at some stationary location. The top cover of sample cassette is removed and the filter holder is pointed downward to prevent material from falling onto the filter. The pump is turned on and the start time and sample description are recorded. The pump should be checked periodically (every 30 minutes) to make sure it is functioning properly. Also, the filter should be visibly inspected for overloading. At the end of the sampling period, the pump is turned off and the cover of the filter holder is replaced and secured with tape. The stop time and any other comments about sampling conditions are then recorded. Personal samples are collected from within the breathing zone of an individual, but outside the respirator. Personal samples are collected in the same manner as area samples except the pump is hung from a disposable tape belt around the worker and the filter holder is attached, pointing downward, to the worker's lapel or collar.
- (3) Area air samples can be collected using static or aggressive sampling techniques.
 - (a) Static sampling implies monitoring an area as it is without creating

any additional disturbance in the air. This method is typically used during the removal phase of the abatement project. An obvious criticism of this technique for clearance sampling when no one is in the area is that the fibers that have settled out of the air are not detected.

- (b) An alternative sampling technique which addresses this concern is to create an artificial disturbance in the air during sampling. Aggressive sampling can be accomplished by using electric fans or blowers. For additional information see EPA 560/5-89-001 May 1989.

b. Bulk Sampling

- (1) Bulk sampling is the technique used to collect samples of suspect materials such as fireproofing, pipe lagging, boiler insulation, and acoustical spray. Bulk sampling is usually conducted during the building survey/hazard assessment and provides data for decisions on control measures. If bulk sampling data is not available to the contractor during his walk through survey, arrangements should be made for the contractor to collect some bulk samples.
- (2) With the approval of Environmental Health and Safety a small sample of suspect material may be collected and placed in a container or a small jar. Anyone taking bulk samples should wear a cartridge respirator and protective clothing if a large number of samples are going to be collected. Bulk samples are analyzed by an analytical laboratory, typically using polarized light microscopy, to determine if asbestos is present and the type and percentage of asbestos in the sample. Bulk samples may alternatively be analyzed by transmission electron microscopy.

c. Settled Dust

Settled dust sampling can be accomplished by scraping an area containing accumulated dust and placing the material in a small container. Alternatively, settled dust sampling can be conducted by vacuuming a measured area with a filter in a cassette which is attached to an air pump. Debris may be treated like a bulk sample with analysis by polarized light and dust samples by transmission electron microscopy.

3. Sampling Strategies and Procedures for an Abatement Project

a. Air Sampling Before Abatement Begins

- (1) Area air sampling may be conducted before abatement activities begin to estimate the existing airborne fiber concentrations inside and outside the building. Such sampling is termed "prevalent level sampling." These results can be used as control data for comparing sample concentrations detected during and after the abatement project. Prevalent level sampling provide good data for documentation purposes. It is particularly useful when an abatement project is conducted in a portion of the building, with other areas of the building remaining occupied. Airborne fiber levels monitored in these occupied areas during the abatement project should never exceed the indicated prevalent level in these areas before the project began. Also, the airborne fiber

concentrations inside the abatement area after cleanup is completed can not be expected to be lower than the airborne fiber levels outside the containment area.

- (2) Because low airborne fiber concentrations are typically found prior to abatement activities, a large volume of air should be sampled to obtain a low detection limit. Simply stated, detection limit is the lowest value that can be reliably reported for the sampling and analytical methods used. The volume of air measured to obtain a 0.01 fiber per cubic centimeter of air (fiber/cc) detection limit should range between 1000 to 2500 liters, depending on the filter size and counting method used. Samples can be collected at a flowrate of .5-10 liters per minute.
- (3) Prevalent samples should be collected throughout the building as well as in the area where abatement will take place. As a rule of thumb, one sample should be taken for every 50,000 cubic feet (5,000 sq. feet with 10 ft. ceilings) of building space (minimum of 3 samples). At least two samples should be collected from outside the building.
- (4) Because results of prevalent level sampling are used as baseline data, the same sampling and analytical techniques should be used for prevalent samples including samples taken outside the work area during and after the removal project.

b. Air Sampling During and After the Asbestos Abatement Project

(1) Personal Sampling

- (a) Personal sampling is conducted during a renovation or abatement project to determine employees' exposure (outside any respirator) to airborne fibers. Personal monitoring during an abatement project is required by the OSHA Asbestos Standard (29 CFR 1926.1101 and 29 CFR 1910.1001). Under OSHA hazard communication laws (29 CFR 1910.1200), employees have the right to know the asbestos concentrations to which they are exposed and what measures are being taken to protect them.
- (b) Personal samples should be taken during the first full day of removal activity. Additional personal samples should be taken when the type of materials being removed or the location (i.e. building) changes. OSHA requires initial monitoring and monitoring every six months thereafter. Personal samples should be collected daily during an abatement project.
- (c) Personal samples should be collected at a flow-rate of 1-2 liters per minute from at least 25% of the workers during a particular job. Samples for asbestos exposure should be taken to determine the 8-hour, time weighted concentration. Over an 8-hour period, filters may have to be changed several times to prevent overloading.

(2) Area Air Sampling Inside the Work Area

In addition to personal samples, area air samples are collected inside the work area daily to determine the concentrations of airborne asbestos fibers. Usually, 2 to 3 samples of 600 to 1200 liters of air are usually adequate to index the airborne fiber concentrations inside the work area. The data from these samples can be used on a relative basis to monitor

work conditions from one day to the next. A radical increase in area concentrations would signal that work practices need to be adjusted.

(3) Area Air Sampling Outside the Work Area/Inside the Building

- (a) During an abatement project, samples are collected from locations outside the work area, and inside the contained worksite. These samples are especially important in situations where unprotected people are occupying other areas of the building. Potential leakage points where sampling should be conducted include the clean side of the containment barriers separating the work area from occupied parts of the building and inside the shower and clean rooms of the decontamination unit. If the abatement project is being conducted in a multistory building, area air samples should be collected from floors above and below an abatement activity.
- (b) A large air volume of 1000 to 3000 liters is necessary to obtain the desired detection limit of 0.01 fibers per cubic centimeter for these samples. High volume pumps can be used to shorten the sampling time so that problems which develop can be detected relatively quickly. Phase contrast microscopy is generally the analytical method used for these air samples.

(4) Area Air Sampling Outside the Building

Area air samples are placed in locations outside of the building during an abatement project to detect leakage of fibers from the worksite. Typically, pumps may be placed at some of the following locations: entrance of the decontamination unit, at doors or windows, near the exhaust of negative air filtration units, and/or at the waste load-out area. Generally, high volume samples are collected and analyzed by phase contrast microscopy.

(5) Air Sampling After Final Clearance of the Work Area

Area air sampling is conducted upon conclusion of an asbestos abatement project to estimate the airborne fiber concentrations of residual fibers. The area should undergo a thorough visual inspection for remaining material before final clearance sampling is initiated. Samples should be placed inside the work area at approximately one sample for every 50,000 cubic feet (5,000 sq. feet with 10 foot ceilings), with a minimum of three in the work area. It may be appropriate to take outdoor air samples for comparison.

4. The enclosed Chain of Custody Form should accompany all Asbestos Sampling.

ASBESTOS SAMPLE
CHAIN OF CUSTODY FORM

SAMPLE ID # _____ DATE _____

TAKEN FROM: FACILITY _____
BUILDING _____
ROOM _____
AREA _____
TYPE OF MATERIAL SAMPLED (i.e. Ceiling, Floor, Tile, etc.)

AMOUNT SAMPLED (i.e., 6" x 6" of Plaster or 12" of Pipe Insulation, etc.)

REASON SAMPLED:
_____ Abatement
_____ Survey
_____ Defendant Split Sample
_____ Other _____

REMOVED BY _____ DATE & TIME _____

SIGNATURE _____

1. RECEIVING PARTY _____ DATE & TIME _____

SIGNATURE _____

HOW TRANSPORTED OR STORED _____

2. RECEIVING PARTY _____ DATE & TIME _____

SIGNATURE _____

HOW TRANSPORTED OR STORED _____

3. RECEIVING PARTY _____ DATE & TIME _____

SIGNATURE _____

HOW TRANSPORTED OR STORED _____

4. RECEIVING PARTY _____ DATE & TIME _____

SIGNATURE _____

HOW TRANSPORTED OR STORED _____

RECEIVED BY _____ AT STORAGE LOCATION _____

SIGNATURE _____ DATE AND TIME _____

DESCRIBE FULLY HOW SAMPLE WILL BE STORED AND UNDER WHAT CONDITIONS (e.g., locked room or drawer, safe, etc.).

PLACED INTO STORAGE AT _____ a.m.
p.m. DATE _____

BY _____ SIGNATURE _____

ONCE PLACED IN SAMPLE STORAGE FACILITY, ANYONE WHO ACCESSES SAMPLE MUST FILL IN PART BELOW:

1. NAME OF PARTY _____ DATE & TIME _____
SIGNATURE _____

REASON REMOVED FROM AREA _____

RETURNED DATE & TIME _____

2. NAME OF PARTY _____ DATE & TIME _____
SIGNATURE _____

REASON REMOVED FROM AREA _____

RETURNED DATE & TIME _____

3. NAME OF PARTY _____ DATE & TIME _____
SIGNATURE _____

REASON REMOVED FROM AREA _____

RETURNED DATE & TIME _____

4. NAME OF PARTY _____ DATE & TIME _____
SIGNATURE _____

REASON REMOVED FROM AREA _____

RETURNED DATE & TIME _____

G. Work Procedures

Proper preparation for the actual asbestos abatement involves several procedures outlined in this section. These procedures should be implemented with care and diligence to insure the safety of the worker and the protection of the environment.

1. Preparation

- a. Any work which can be performed without touching the asbestos containing material, disturbing the suspended ceiling, or any other barrier system, should be performed first. Caution signs should be posted at all approaches to the asbestos abatement work area as required by OSHA. Barricades must be erected to prevent entry of unauthorized persons into the work area.
- b. The first step in preparing a **contained** abatement work area should be to construct a decontamination chamber. This should be done to prevent the transport of asbestos fibers outside the work area and to protect against asbestos fiber inhalation by workers. Three rooms are needed for this chamber:
 - (1) Clean Room -- This is an area where workers enter and leave the abatement work area. Workers should be provided with space or shelves so that clean protective equipment, work tools, and supplies can be stored in an accessible location.
 - (2) Shower Room -- All contaminated clothing worn in the work area must be removed by this point. The worker keeps his respirator on and showers to remove fibers from his body and the respirator before entering the clean room.
 - (3) Equipment Room -- Contaminated equipment is stored here and workers will remove contaminated clothing in this area prior to showering. Benches for workers and shelves or space for equipment should be provided.
- c. Curtained doorways must be constructed between each room and the work area. These doorways must consist of two sheets of 6 mil plastic, suspended from the ceiling or containment structure as close together as possible. The curtains must be anchored with tape at the ceiling and along one side only, in an alternating pattern, to the floor, to produce an alternating flap effect. Two curtained doorways at least six feet apart constitute an air lock. An air lock is constructed on either side of the shower room.
- d. Prior to sealing off the work area, clean all furniture and fixtures with damp cloths or HEPA vacuum cleaner to remove any settled visible dust. All movable furniture and light fixtures should be moved and stored outside the abatement work area. Immovable items and water sensitive items should be completely wrapped in plastic and sealed with duct tape.
- e. The air handling system supply air and exhaust in the work area should be shut off prior to start of work. Cover all heating and ventilation ducts with plastic and/or duct tape.

- f. Remove, clean, store, or dispose of all dressings from window openings (ex. drapes, blinds, etc.). Seal all window openings with plastic and duct tape.
 - g. All electrical power inside the work area must be de-energized, tagged out, and locked out. Temporary moisture proof lighting connected to an external power source and equipped with ground fault interrupters should be used. Seal off all electrical outlets and openings within work area with duct tape.
 - h. After all of the above mentioned work procedures have been completed, the plastic barriers can be constructed.
 - (1) The first area that must be covered is the floor. A minimum of two layers of 6 mil plastic should be used. Plastic should be placed tightly onto the floor and extend at least 12 inches up onto the walls. If the floor covering is carpet which cannot be removed prior to asbestos abatement, place one layer of plastic over the carpeting, then one layer of plywood followed by two layers of 6 mil plastic. When securing the floor plastic, work along a wall, toward the corner, taping the plastic in place using vertical strips four feet to five feet apart, and then seal with horizontal strips of duct tape. All edges of the floor plastic should be taped in the same manner, forming a "pocket" in each corner. Each "pocket" must be folded flat against one wall and secured with tape. This is necessary to avoid creating places where debris can accumulate. Attach plastic around and over projections and irregularities in floor and secure with tape.
 - (2) All wall surfaces must be covered with a minimum of two layers of 6 mil plastic. The plastic must be anchored with tape or other means of support that will not damage finished or decorated surfaces. Seams must be overlapped at least 6 inches and completely sealed with duct tape to prevent dust or water from penetrating the seams of the barrier. Wall plastic should normally be started at a corner with at least two feet of overlap around the corner. Methods of fastening plastic to walls will vary from job to job; however, the following is generally successful.
 - (a) Use of spray glue on concrete or cinder block walls prior to attaching plastic is useful to assist in distributing weight load and holding plastic while taping.
 - (b) Tape plastic approximately two inches from ceiling. This allows space for using a double horizontal tape line. Corners should be taped first with vertical strips and then with horizontal strips. Vertical strips of tape must be placed every four to five feet prior to securing the continuous horizontal tape lines.
- For a double wall covering of plastic, the first layer must be hung approximately six inches below the ceiling, then the second layer can be hung as described above.
- i. Prior to erecting door barriers and attachment of the decontamination chamber, move large equipment into the work area. This would include scaffolding, HEPA vacuum cleaners, ladders, etc.

- j. At this point, HEPA exhaust units should be installed inside the work area. Outside air entering through baffles is pulled through the decontamination chamber by the unit and exhausted outside again. The reduced pressure created will cause the plastic to bow inward while the HEPA unit(s) is in operation.
- k. Using HEPA filtration equipment specifically designed for asbestos abatement in the decontamination area and active work area should ensure proper fiber control and prevent escape of airborne fibers from the work area.
- l. Extra protection and precaution in setting up the system can mean the success or failure of an asbestos abatement project.
- m. Upon completion of the preceding procedures, the work area should be inspected by Environmental Health and Safety to insure conformity to all pertinent regulations. The actual contained work may not begin until after a satisfactory inspection by Environmental Health and Safety

2. Removal

Removal of asbestos containing materials will begin only after the material has been thoroughly wetted with a solution of water and a wetting agent. This serves to reduce fiber release and to compact the material being worked on. Wetting agents should be tested on a small area of the material to check for absorption.

- a. Using a fine spray, thoroughly saturate the material to be removed. Absorb any excess water from the floor with disposable towels or mops. The dampened asbestos material should be removed using flat blocked scrapers. Different width blades are helpful for varying ceiling configurations. Wetted asbestos which has been removed from the ceiling must be immediately accumulated and bagged to prevent the material from drying out.
- b. Bags must only be filled approximately half full due to weight restrictions. Bags of asbestos debris must be sealed with duct tape and moved to a staging area for wet wiping, rebagging, and removal from the work area.
- c. When all asbestos has been removed, the ceiling must be brushed, wet wiped, and/or HEPA vacuumed to remove any visible residuals. Ceilings may be sealed with an asbestos encapsulant mixture after cleaning to lock down any asbestos fibers which still may be present.

3. Post Abatement Cleanup

At the completion of the abatement process, the work area is ready to be cleaned in preparation for its restoration to normal use. A thorough cleaning of the abatement work site should ensure that post abatement levels of airborne fibers are at or below those levels monitored before the work began. The cleanup operation should proceed as follows:

- a. Remove visible accumulations of asbestos material and debris. Wet clean all surfaces within the work area including all equipment used in the work area.

- b. Wait 24 hours and wet clean or clean all surfaces with a HEPA filtered vacuum. All plastic remains in place during this time. An encapsulant should then be sprayed on all plastic, floors, and walls to bind all residual asbestos fibers.
 - c. The area is inspected by Environmental Health and Safety to ensure that all visible accumulation of material has been removed. Air sampling will be conducted at this time.
 - d. Remove the plastic sheets from walls and floors only using the following procedures:
 - (1) Cut wall plastic at a point approximately six inches above floor level around perimeter of the work area.
 - (2) Make vertical cuts in wall plastic at convenient places to facilitate removal in sections. Lay plastic flat onto floor plastic with the inside of the wall plastic face down on the floor plastic. Cut plastic into manageable sections, fold up the plastic, and place into 6 mil disposal bags.
 - (3) When taking up floor plastic, remove one layer at a time. Fold the plastic from the outer edges toward the middle so that the clean side of floor plastic is on top.
 - e. The windows, doors, and all heating and air conditioning vents should remain sealed. HEPA filtered exhaust systems should continue to be used and the decontamination chamber must remain in service.
 - f. Clean all surfaces in the work area with water and/or HEPA filtered vacuum equipment. After cleaning the work area, wait until all surfaces are dry and again wet clean or vacuum the entire area. After completion of the second cleaning operation, perform a complete visual inspection of the work area to ensure that it is free of visible asbestos debris.
 - g. Sealed bags and all equipment used in the work area must be included in the cleanup and shall be removed from work area, via the decontamination chamber, at an appropriate time in the cleaning sequence.
4. Final Decontamination of the Work Area
- a. Visual Inspection

A thorough visual inspection of the work site will be made by Environmental Health and Safety after completion of all abatement procedures. The purpose of this inspection is to detect incomplete work, damage caused by the abatement activity, and incomplete cleanup of the work site.

The inspection will be conducted before the containment barriers have been taken down but after the work surfaces have been cleaned. The inspector will first check on the completeness of the job. If asbestos containing material has been removed, all substrate surfaces will be inspected for proper application of sealant. All surfaces will be checked for dust and debris, especially overhead surfaces such as tops of suspended light fixtures.

b. Air Monitoring

Environmental Health and Safety will conduct air sampling after completion of all contained work. Should these tests register a fiber count greater than the acceptable pre-determined level the work area should be recleaned until additional air tests indicate an acceptable fiber level. After the work area is found to be in compliance, all windows, doors, louvers, and air circulating equipment may be unsealed and the subsequent waste material disposed of as contaminated waste. The final inspection should leave the area free from all waste.

5. Disposal of Asbestos Waste

The asbestos contaminated waste resulting from the abatement procedures must be disposed of according to EPA regulations (40 CFR 61 Subpart m). The material must be dealt with while still on the job site and later at the disposal site. This is accomplished as follows:

- a. Load 6 mil plastic bags with waste asbestos material while the material is damp or wet.
- b. Load the bags from 1/3 to 2 full. Seal the top of each bag with duct tape. The bag can then be moved to the equipment room where the exterior of the bag must be wet-cleaned. Place the first bag into another bag, seal the second bag, and attach an asbestos danger label (if the bag is not already pre-labeled). The waste may then be moved to a secure storage area outside the work area. Exercise care not to break the bags. The waste generator and abatement location must be indicated on the waste container.
- c. Fiber or rigid drums may be required for transport and disposal of asbestos waste. Check with the landfill prior to disposal of the waste.
- d. All bags of asbestos waste must be inspected at the landfill for holes or tears which may have occurred during transport. If a bag is found to be torn open, it must be placed in another bag or fiber drum immediately and sealed.

6. Asbestos Manifest

- a. Upon disposal, a manifest signed by the clerk must be obtained indicating:
 - (1) that the waste material is asbestos,
 - (2) the site where the asbestos originated, and
 - (3) the amount of asbestos waste disposed.
- b. The manifest is retained for Record keeping purposes by the West Virginia University unit who has served as contractor during the abatement. A copy shall be forwarded to Environmental Health and Safety for record keeping purposes.
- c. Contractors are required to turn over a copy of the waste manifest within 30 (thirty) days of disposal to WVU Environmental Health and Safety.
- d. Please refer to 40 CFR 63 Subpart m for additional responsibilities required of landfill operators.

H. Glovebag Removal of Asbestos Containing Material

1. A glovebag consists of a 6 mil clear poly bag with a preprinted asbestos hazard warning. Each bag has special arm inserts attached to latex gloves, a vacuum port and tool pouch.
2. The use of a glovebag allows asbestos containing pipe insulation to be removed in an enclosure. However, dual cartridge high efficiency filter respirators and disposable protective suits should/will be used as a precaution.
3. The following are designed to act as general guidelines in the proper use of the glovebag. It may be necessary to modify the recommended procedures due to differing site conditions. When alteration is required due to unusual or extreme conditions such as heat, location, size, etc.; a back-up emergency procedure should be in force to prevent accidental fiber release. Do not use a standard glovebag or any other standard poly product in areas of extreme heat (greater than 150⁰ F).
 - a. Remove glovebag from carton and inspect the bag thoroughly for possible damage in shipment prior to use. Measure diameter of pipe insulation to be removed and add 50% to measurement. This formula ensures side cuts to be adequate to fit around pipe plus excess to allow fold at top seal. Place all necessary tools in pouch.
 - b. Place open end of glovebag around pipe and pull bag up tight to end of side cut. Fold excess top edges over and staple. Seal top edge and side cuts securely with tape to ensure against air leaks, smoke test and add overall support.
 - c. Make final visual inspection to check that all edges have been properly sealed. Insert sprayer wand into the vacuum port by making a small "X" incision. Thoroughly mist asbestos pipe insulation to be removed to deter fiber activity and ease in removal. Remove wand and insert hose of HEPA filtered vacuum. Seal around the hole and vacuum tube.
 - d. Place arms into the inserts until hands are securely in gloves. Begin removing asbestos pipe insulation. Take care not to damage integrity of the glovebag or any sealed edges. When the asbestos has been removed and the pipe is thoroughly cleaned, place the tools back into the tool pouch and carefully remove arms from the inserts.
 - e. Turn on the HEPA vacuum and begin to remove air from the glovebag. As the bag begins to collapse, carefully squeeze the bag just below the tool pouch and twist. Seal twisted area securely to prevent any possible fiber release from the asbestos debris in the bottom of the glovebag. Remove the vacuum hose and insert sprayer wand using an EPA approved sealant to lightly seal all remaining residual fibers in the upper section of the bag and on the pipe surfaces and exposed edges of insulation. Remove spray wand and seal the access hole with tape.
 - f. Carefully remove the glovebag from the pipe. Remove tools from the pouch. Place the glovebag into a 6 mil plastic bag for disposal. Seal the outer bag securely with duct tape. Make a final check to insure a clean job and HEPA vacuum all work surfaces.

I. Encapsulation of Asbestos Containing Material

1. There are times when asbestos containing material cannot or should not be removed. This may be due to inaccessibility of the asbestos containing material, condition of the material, etc. If the decision to encapsulate has been made, the work area must be enclosed and prepared in the same manner as if the asbestos containing material were to be removed. All loose or hanging insulation material must be hand removed, bagged, and properly disposed of before the actual encapsulation process begins.
2. Encapsulants must be applied by airless spray equipment. A powered sprayer is recommended for large removal or encapsulation projects.
 - a. It is usually good practice to first apply a light mist coat of the encapsulant to the asbestos containing material. The purpose of this preliminary coat is to moisten and seal loose fibers and to keep them from breaking away from the surface. This mist coat should be applied in three or four quick passes with the sprayer wand held 18 to 24 inches from the asbestos material.
 - b. Most encapsulants should be applied in two or three separate coats, with time allowed after each coat for the encapsulant to cure. Drying times vary from encapsulant to encapsulant. Manufacturer's recommendations should be followed. Do not apply too much encapsulant in each coat. A penetrating encapsulant, if applied too thickly, can block the surface of the material as it cures, preventing any subsequent coats from penetrating into the asbestos containing material. Furthermore, over application of a penetrating encapsulant can cause the asbestos containing material to become too wet and to break loose from the substrate. This second problem is also applicable for bridging encapsulants.
 - c. Dilution plays an important role in application of an encapsulant since it may improve the penetrating quality of the encapsulant. Some encapsulants must be diluted with water. Most manufacturers give recommendations concerning dilution on the labels of their encapsulants. Some experimentation may also help determine when dilution is useful.
 - d. The coverage rate of a penetrating encapsulant is dependent primarily on the thickness of the material to be encapsulated and the ability of the encapsulant to wet the material. The thicker the material, the more encapsulant will be required to cover it completely and penetrate to the substrate.
 - e. Not all asbestos containing materials can be encapsulated. If the ability of the base material to support the sealant is in doubt, contact the Department of Environmental Health and Safety before proceeding with the application of the encapsulant. If failure should occur during the encapsulation process, stop work and notify Environmental Health and Safety immediately.
 - f. All barriers should remain intact and the HEPA filtered exhaust operating during encapsulation procedures

J. Worker Decontamination

1. It is imperative to the worker's safety that he/she strictly adhere to the following decontamination procedure. These precautions cannot be overemphasized. Any damage to protective clothing, to protective barriers, or to equipment must be remedied immediately to avoid possible contamination and a subsequent health hazard.

The decontamination process should proceed as follows:

- a. Remove Gross Contamination -- Before the worker enters the contaminated equipment room from the active work area he/she should remove any gross contamination from his/her disposable clothing, including head and foot covers. This is normally accomplished by one worker assisting another using a HEPA filtered vacuum.
 - b. Remove Contaminated Clothing -- In the equipment room, the worker should remove all clothing, including shoes, underwear, etc. Workers must leave their respirators on. If protective clothing is disposable, place it in a contaminated waste drum or plastic container provided for the collection of asbestos waste materials. If wearing regular clothing, store in a closable bag until laundering.
 - c. Shower -- After removing his/her clothing, the worker should then proceed to the shower room and wash thoroughly with soap and water. After he/she is completely wetted, the worker should wet his/her respirator and clean it thoroughly. After wet cleaning, the respirator is the last item of protective equipment to be removed.
 - d. Clean Respirator -- Each worker will maintain his/her own respirator. Disposable filters or cartridges should be disposed of as contaminated waste. The facepiece should be wiped out with a cloth soaked in alcohol or cleaned with a disinfectant. Finally, the respirator should be dried and placed in a clean plastic bag and stored in the clean room.
 - e. Leave Job Site -- The worker proceeds to the clean room to dry, dress, and leave the job site.
2. Two important rules will be strictly enforced:
 - a. Workers will not be permitted to eat, drink, or smoke while within the contaminated work area. To eat, drink or smoke, workers must pass through the **ENTIRE** decontamination sequence.
 - b. Workers must not remove their respirators for any reason while in the work area.
 - c. Violation of either of these stipulations may result in disciplinary action.

K. Ancillary Hazards

A great deal of attention has been given to protecting workers from exposure to asbestos and to preventing release of asbestos fibers. However, basic and immediate safety hazards have often been overlooked. The methods used in a typical abatement project (for example, sealing the work area, using wet methods, working at heights on ladders and

scaffolding, and shutting down normal building systems) add new dimensions to the task of providing a safe working environment.

1. Electrical Safety

- a. Electrical safety is one of the most potentially serious problems faced during an abatement project. Three factors determine the severity of electrical shock. They are:
 - (1) The amount of current flowing through the body.
 - (2) The path of the current flowing through the body.
 - (3) The time the current is allowed to follow this path.
- b. The path of current depends on the points of contact. Most often the path is from the hands, through the body, and out the feet. The amount of electrical resistance determines, in part, the amount of current flow. Moist skin or damp conditions greatly reduce electrical resistance and significantly increase with a current source. In addition to the obvious shock potential, deaths have resulted from falls after nonfatal electrical shocks.
- c. During the pre-job briefing and the preparation of the worksite prior to abatement, potential electrical hazards should be identified and eliminated. Each asbestos abatement project is different and electrical hazards may not exist on particular projects. The following guidelines should be followed to reduce the risk of injury to workers from electrical shock.
 - (1) The use of wet methods increase the potential for electrical shock when working around electrical panels, conduits, light fixtures, alarm systems, junction boxes, computers, transformers, etc. De-energize as much equipment as possible. Use portable light systems and regularly check the system and wiring for damage.
 - (2) Avoid stringing electrical wiring across floors. Elevate wiring if possible to keep it away from water on the floor and from damage caused by foot traffic and equipment.
 - (3) Do not allow water puddles on work area floors. Damp floors are okay but deep water should be avoided.
 - (4) Electrical outlets should be tightly sealed and taped to avoid water spray.
 - (5) Electrical equipment and lines should be considered energized unless tested and determined otherwise.
 - (6) Extension cords used with portable electrical tools and appliances should be three-wired cords connected to a Ground Fault Interrupter (GFI) circuit. Extension cords should be protected from accidental damage, must not be fastened with staples, hung from nails or suspended by wire (tape is an acceptable alternative).

- (7) Portable electrical hand tools should be equipped with a three-wired cord having a ground wire permanently fixed to the tool frame, or be a double-insulated type and labeled as such.

2. Scaffolding

- a. Some asbestos abatement projects need scaffolding. Proper setup, regular inspection and basic maintenance should not be overlooked. Manually propelled mobile scaffolding provides a convenient and efficient work platform.
- b. OSHA standards require that when free standing mobile scaffolding is used, the height shall not exceed four times the minimum base dimension.
 - (1) This requirement is based on the fact that scaffolding is easily turned over. Relatively little force is required to tip a scaffold and, therefore, it is important that the wheels on mobile scaffolds move freely and are in good repair.
 - (2) The use of guardrails on scaffolds is a must on abatement projects since workers usually are looking up while working and can easily step off the edge of an unprotected scaffold. OSHA requires that guardrails be used when scaffolding is greater than 6" and less than 12".
 - (3) Planking used on scaffolds must not extend farther than 12 inches over the edges and must be secured to the frame, and be scaffold grade lumber.

3. Ladders

- a. Falls from minor heights can result in crippling injury or death. A fall is an unplanned event that does not allow the person to anticipate and prepare for the force of impact.
- b. In order to prevent injuries during abatement projects, check these items on the ladder before use:
 - (1) Ladder is in good condition. A ladder found to be in need of repair or which has improvised repairs must not be used.
 - (2) Safety feet spreaders and other components should be in good condition. Missing safety feet create sharp edges that will cut plastic floor covering.
 - (3) Check that all movable parts operate freely without binding or undue play.
 - (4) Rungs should be free of grease or oil.
 - (5) Extension ladders should be used with a 1:4 lean ratio (one foot out for every four feet of elevation).
 - (6) Step ladders should be fully opened when in use.

- (7) Bracing on the back legs of a step ladder should not be used for climbing.
 - (8) Ladders should be secured to prevent displacement during use.
 - (9) To avoid the electrical hazards of metal ladders, wood or fiberglass ladders should be used.
4. Slips, Trips, and Falls
- a. Abatement work sites can become very slippery places in which to work since the area must be sealed in polyethylene and the entire area kept damp to reduce airborne fibers. Disposable boots are a potential trip hazard, and equipment and electrical lines create tripping hazards. These conditions create potential worker hazards even before removal begins.
 - b. To prevent slips, trips, and falls:
 - (1) Consider the height of the work, equipment in use, and numerous tripping hazards. Take a look at the "walking surfaces".
 - (2) The use of disposable boots may be impractical in many removal situations. They may come apart and create a serious tripping hazard. Seamless rubber boots may be an alternative.
 - (3) Inspect ladders and scaffolding before use. Make sure railings are adequate on scaffolds.
 - (4) Minimize water on floors. Wet polyethylene is slick and water increases the risk of electrical shock.
 - (5) Use care around electrical lines. Suspend electrical lines and cords, when possible, using tape.
 - (6) No running, jumping, or horseplay in work area should occur.
 - (7) Minimize debris on walking surfaces.
 - (8) Pick up all tools.

L. Automotive Operations

These safety work practices cover operations consisting of brake assembly and relining, drum turning, and clutch assembly and rebuilding.

- 1. Dust is to be cleaned from brake drums, brake backing plates, brake assemblies, and clutch assemblies with an industrial type vacuum cleaner equipped with a high efficiency (HEPA) filter (99.97% efficiency for 0.3 micron particles) or with a rag soaked in water and wrung until nearly dry. Under no circumstances shall compressed air or dry brushing be used for cleaning.
- 2. A respirator must be worn by employees engaged in brake or clutch work, if asbestos is present.

3. Rags used for wiping brake and clutch assemblies and contaminated vacuum cleaner bags are to be sealed in properly labeled plastic bags and disposed of as asbestos waste.

VI. PROCEDURES FOR HANDLING ASBESTOS EMERGENCIES

Immediate area of spill should be sealed off to prevent bystanders from walking through the contaminated area and thereby spreading the contamination. All workers who may be involved in asbestos abatement work including spills or other emergency repairs, must be familiar with ALL asbestos abatement equipment and personal protective equipment.

A. Clean up Operations

1. Asbestos containing material should be wetted from the start of clean up operations and wetting agents should be used continually throughout the clean up to ensure that any asbestos containing material exposed in the course of work is wet and remains wet until final disposal.
 - a. Use only enough water to keep the material wet. Do not use excessive amounts of water.
 - b. Dry methods such as shoveling, blowing, and sweeping are prohibited in and around the spill area.
2. Special vacuum cleaners equipped with HEPA filters are available for extensive clean ups. Wet/dry or shop vacuums are not permitted to be used to clean up asbestos debris.
3. All asbestos waste materials are to be placed in heavy plastic bags (preferably 6 mil) and securely sealed. This includes spilled wastes, discarded protective clothing, and any other contaminated material. Wastes must be sealed in containers before they dry out to minimize the release of asbestos.
4. After all asbestos bulk debris has been removed, all loose edges of ceiling material or pipe insulation must be removed and the area encapsulated. All surfaces in the immediate spill area are to be wet wiped with clean cloths. This will include floors, walls, windows, bookshelves, etc. The cloths are then to be disposed of as asbestos contaminated material.
5. If asbestos contaminated material has spilled on carpeting, a HEPA filtered vacuum must be used. A household type vacuum/shop vacuum is prohibited.
6. All workers are required to thoroughly wash their faces and hands immediately after leaving the contaminated area for any reason. This should be done in the closest washroom facility.
7. Protective clothing must not be worn outside the contaminated area so as not to further spread the contamination.
8. At a minimum, a half mask air purifying respirator equipped with high efficiency filters must be worn when cleaning the spilled material. Depending upon the extent and immediacy of the emergency, additional protective equipment may be needed (i.e., protective clothing, goggles, boots, etc.).

B. Spill Scenario

1. Evaluate extent of spill. Gather clean up supplies and equipment.
2. If the spill occurs in a heavily used or public area, cordon off the contaminated area. If the spill is confined to an area where no workers or bystanders are present (i.e., equipment room), this step is not necessary.
3. Depending on the extent and location of the spill, it may be appropriate to turn off the ventilation system. Change the system's filters and vacuum around the supply and exhaust vents near the contaminated area as appropriate.
4. Don protective equipment and begin to wet clean asbestos debris from floors, ledges, etc.
5. If the spill involves asbestos materials from overhead structures (such as ceilings, pipes, etc.), a sheet of plastic should be placed on the floor beneath the disturbed area.
6. Clean the edges of the disturbed ceiling and/or pipes, removing all loose material.
7. Encapsulate exposed areas that remain.
8. Wet the plastic and wet clean all tools that have been used in the contaminated area. After a thorough cleaning, all equipment may be removed from this area. The plastic sheeting should be folded in such a way that the contaminated side is not exposed.
9. Place the contaminated plastic, cleaning cloths, protective clothing, etc., into a 6 mil plastic bag and seal securely.
10. The waste material is to be taken to a pre-designated area for later disposal.
11. Inform appropriate personnel of the spill so that follow up action may be taken.

VII. PROCEDURES FOR HANDLING ASBESTOS MATERIALS

A. Cement Asbestos Board Materials

Cement asbestos board and ducting materials that contain asbestos do not normally pose unreasonable health hazards so long as the materials are maintained in their original manufactured state. These materials may become hazardous when they are handled, cut or disposed of. To preclude the inadvertent generation of airborne asbestos particles from cement asbestos board materials, the following procedures shall be followed for the handling, cutting or tooling and disposal of cement asbestos board materials.

1. Handling

- a. Care should be exercised when handling cement asbestos board to avoid unnecessary breakage.
- b. Never store materials where they can be damaged or accessed by unauthorized personnel.
- c. Never use cement asbestos board in an application where it is subjected to abrasion that would generate airborne dust.
- d. Work gloves should be worn when handling cement asbestos board to avoid unnecessary cuts and skin abrasions.

2. Cutting, Drilling, and Grinding

Cement asbestos board shall not be cut, drilled or ground unless the tools are equipped with local exhaust systems filtered through a HEPA filter(s).

3. Disposal

- a. Cement asbestos board debris (solid pieces) can be disposed of at any landfill that accepts "construction debris". Recommendation concerning this should be made by Environmental Health and Safety.
- b. Cement asbestos board dust must be handled and disposed of as asbestos containing debris.

4. Renovation/Demolition

- a. Removal of cement asbestos board materials during renovation and demolition jobs must be accomplished so as to avoid breakage or crumbling of the cement asbestos board.
- b. Cement asbestos board materials that are damaged or in such a condition that dust is generated by simple handling must be handled and disposed of as asbestos containing debris.

B. Asbestos Containing Floor Tile

Floor tile and its adhesive materials that contain asbestos do not normally pose unreasonable health hazards so long as the materials are maintained in their original manufactured state. These materials may become hazardous when they are handled or removed. The Environmental Protection Agency considers these types of materials to be non-friable if in good condition. They cannot, under normal circumstances, be reduced to a powder by hand pressure. To preclude the inadvertent generation of airborne asbestos particles from asbestos containing floor tile and its adhesives, the following procedures shall be followed for the handling, removal, cutting, or disposal of asbestos containing floor tile and adhesives.

1. Handling

- a. Care should be exercised when handling asbestos containing floor tile to avoid unnecessary breakage.
- b. Never store asbestos containing floor tile where it is subject to abrasion that would generate airborne dust.
- c. Work gloves should be worn when handling asbestos containing floor tile to avoid unnecessary skin cuts and abrasions.
- d. Any dust or debris found on the furniture, floor, or surrounding materials or equipment should be cleaned by using a wet cloth, mop or HEPA vacuum. Never dry sweep or use a regular vacuum cleaner on this debris.

2. Maintenance of Floor Tile

- a. Maintain the integrity of the floor surface on a day to day basis by replacing loose (non-broken) floor tile. If floor tile is broken or cracked it should be removed by a certified worker and treated as a hazardous material.
- b. The floor tile should be cleaned, sealed and waxed periodically. Abrasive scrubbing and stripping methods are not to be used at anytime, nor are scraping tools.

3. Cutting, Drilling, Removal

Asbestos containing floor tile or adhesives shall not be cut, drilled or ground unless the tools are equipped with local exhaust systems filtered through a HEPA filter.

4. Disposal

- a. Asbestos containing floor tile (solid pieces) can be disposed of at any landfill that accepts "construction debris". Contact the landfill for packaging instructions. Recommendations will be made by Environmental Health and Safety.
- b. Dust from asbestos containing floor tile or its adhesives must be handled and disposed of as asbestos containing waste.

5. Renovation/Demolition

- a. Removal of asbestos containing floor tile or adhesive materials during renovation and demolition projects should be accomplished so as to avoid breakage or crumbling of the materials.
- b. Asbestos containing floor tile or adhesive materials that are damaged or in such condition that dust is generated by simple handling should be handled and disposed of as asbestos containing waste.

c. Renovation/Demolition Procedures

(1) Supplies and Tools Needed

- (a) stiff blade wall or floor scraper
- (b) utility or hook knife
- (c) HEPA vacuum
- (d) soap and water
- (e) large 6 mil polyethylene bag
- (f) asbestos warning labels
- (g) heavy duty scraper

(2) Procedures

- (a) Floor tiles usually adhere the tightest in those areas exposed to heavy foot traffic. As a matter of good practice in starting the tile removal, select those sections which receive the least traffic. Since tiles are normally in a 9"x9" or 12"x12" dimension, try to remove individual tiles as a complete unit.
- (b) Establish critical barriers, splashguard, and 6 mil poly minicube for disposable clothing change and equipment transfer. Start the removal by thoroughly cleaning the floor to be removed. This will serve to remove any accumulated dust. Water, if left to soak, will aid in the removal of the tile.
- (c) Remove the first tile by carefully wedging the scraper in the seam of two adjoining tiles and gradually forcing the edge of one of the tiles up and away from the floor. Do not break off pieces of the tile, but continue to force the balance of the tile up by working the scraper beneath the tile and exerting both a forward pressure and a twisting action on the blade to release the tile from the adhesive and the floor.
- (d) When the first tile is removed, place it, without breaking it into smaller pieces into the heavy duty impermeable trash bag which will be used for disposal.
- (e) With removal of the first tile, accessibility of the other tiles is improved. Force the scraper under the exposed edge of another

tile, and continue to exert a prying, twisting force to the scraper as it is moved under the tile until the tile is released from the floor. Again, dispose of the tile and succeeding tiles by placing in the heavy duty bag without additional breaking.

- (f) Some tiles will release quite easily, while others require varying degrees of force. Where the adhesive is spread heavily or is quite hard, it may prove easier to force the scraper through the tightly adhered areas by striking with a hammer, using moderate blows of force while maintaining the scraper at a 25 to 30 degree angle to the floor.
- (g) If you encounter areas where even the above methods will not remove the tiles, the removal procedure can be simplified by thoroughly heating the tiles with a hot air blower until the heat softens the adhesive. Use caution not to burn or char the tile. Use adequate ventilation.
- (h) Floor tile adhesives are best removed using a solvent to dissolve the adhesive. Use adequate ventilation and proper respiratory protection when using a solvent.

C. Assumed Asbestos Fire Doors

Fire doors that are assumed to contain asbestos do not normally pose unreasonable health hazards if the integrity of the factory seal is maintained. These materials may become dangerous when the surface of the door is broken and the fire proofing material located between the two surfaces of the door is released into the air. To prevent the inadvertent generation of airborne fire proofing particles the following procedures should be followed when drilling, cutting, and disposing of fire doors, etc.

1. Handling

- a. Care should be exercised when handling assumed asbestos containing fire doors to avoid damage to the factory seal of all the door's surfaces.
- b. Never store assumed asbestos containing fire doors where they are subject to physical contact that would penetrate the surface of the door.
- c. Proper personal protective equipment should be worn when handling damaged asbestos containing fire doors.

2. Maintenance of Fire Doors

Maintain the integrity of the door by preventing the use of procedures that may cause the factory seal to be broken or damaged.

3. Cutting, Drilling, Tacks, and etc.

Fire doors assumed to contain asbestos should not be cut, drilled or otherwise punctured unless the work is being done in an approved enclosure with proper protective gear and air filtering equipment.

4. Disposal
 - a. Assumed or asbestos filled fire doors should be transported to and disposed of at a certified landfill in accordance with EPA regulations.
 - b. All protective clothing, filters, dust, etc., should be disposed of as asbestos containing waste.
5. Renovation/Demolition
 - a. Removal of assumed asbestos fire doors during renovation and demolition projects should be accomplished without breaking the integrity of the door.
 - b. Fire doors assumed to contain asbestos that are damaged and are in such condition that the integrity of the door is broken and can not be reasonably repaired should be secured and disposed of as asbestos waste.
 - c. Renovation/Demolition Procedures
 - (1) Supplies and Tools Needed
 - (a) screwdriver
 - (b) wrenches
 - (c) hammer/pry bar
 - (d) duct tape
 - (e) HEPA vacuum
 - (f) air tight containers
 - (g) protective clothing and respirators
 - (2) Procedures
 - (a) Remove the screws that mount the door to the door jamb. Remove the hinge pins so that the door can be laid down. If the hardware or door accessories are to be removed from the surface which might expose the asbestos lining, licensed or certified workers should be used. The HEPA vacuum should be activated to remove the debris caused by removing the hardware or accessories and duct tape placed over the hole to seal the door and prevent further fiber release.
 - (b) Upon removal of all screws/bolts and taping of all holes place an air tight seal on the door, prepare the door for transportation to an approved disposal site.
 - (c) Clean the work area where doors are prepared for transportation to the disposal site. Use the wet method and the HEPA vacuum for cleaning the area.

D. Thermal System Insulation

Thermal system asbestos insulation (pipe lagging, boiler wrap, duct insulation, etc.) does not pose an immediate hazard if the seal is maintained. These materials become a potential hazard when the surface of the insulation jacketing is damaged or the joints and ends are exposed to release fibers into the air. To prevent the inadvertent generation of airborne fiber particles these procedures shall be followed when drilling, cutting, removing, and disposing of all thermal system insulation materials.

1. Handling

- a. Care should be exercised when handling asbestos thermal system insulation to avoid damage that would result in a fiber release.
- b. Do not store asbestos containing thermal system insulation where it is subject to physical contact that would cause a fiber release.
- c. Proper personal protective equipment should be worn when handling asbestos thermal system insulation.
- d. Any dust or debris found on the furniture, floor, or surrounding materials or equipment should be cleaned by using a wet cloth or mop or use of the HEPA vacuum. Never dry sweep or use a regular vacuum cleaner on this debris.

2. Maintenance of Thermal System Insulation

- a. Maintain the integrity of the thermal system insulation by using a penetrating encapsulant, a coat of latex paint or enclosing the thermal system insulation with jacketing and taping the seams to insure an air tight enclosure. Painting of the thermal insulation system will be performed on the same schedule as the facility. Proper personal protective equipment shall be worn.
- b. Punctures, small cuts or tears can be repaired by using an approved tape such as duct tape.

3. Cutting, Drilling, Removal

Asbestos thermal system insulation shall not be cut, drilled or otherwise punctured unless the work is being done in an approved enclosure with proper protective gear and air filtering equipment.

4. Disposal

- a. Asbestos thermal system insulation should be transported to and disposed of at a certified landfill in accordance with EPA and State of West Virginia Regulations.
- b. All protective clothing, filters, dust, etc., must be disposed of as asbestos containing waste.

5. Renovation/Demolition

- a. Removal of asbestos thermal system insulation during renovation and demolition projects should be accomplished without breaking the integrity of the jacketing and disposed of as asbestos waste.
- b. Asbestos thermal system insulation that is damaged and is in such condition that the integrity of the jacket is broken, must be secured and disposed of as asbestos waste.
- c. Renovation/Demolition Procedures
 - (1) Supplies and Tools which may be needed
 - (a) glove bags
 - (b) utility knife
 - (c) protective clothing and equipment
 - (d) duct tape
 - (e) HEPA vacuum
 - (f) air tight containers
 - (g) amended water and airless spray
 - (h) pliers
 - (i) smoke test kit
 - (2) Procedures
 - (a) Certified personnel should be used if the renovation or demolition of the asbestos containing material is likely to cause a fiber release.
 - (b) Upon removal of all thermal system insulation, the affected areas should be cleaned using wet methods and the HEPA vacuum.
 - (c) The glove bag and its contents sealed inside should be disposed of at an approved hazardous waste dump site.

E. Asbestos Containing Surfacing Material

Surfacing materials are materials that have been troweled or sprayed onto the surface of a building for purposes such as sound proofing, fire-proofing, or wall and ceiling plasters. These materials may present health hazards if they have been damaged and made friable. Friable means that the material can be crumbled, pulverized, or reduced to powder (when dry) by hand pressure. Asbestos containing building material should be handled by certified personnel. The procedures listed below should be followed when drilling, cutting, and disposing of asbestos containing surfacing materials.

1. Handling

- a. Care should be exercised when handling asbestos containing surfacing materials to avoid excessive damage to the integrity of the surfaces.
- b. Never store equipment, furniture, or other materials near surfacing materials where they are subject to physical contact that would penetrate the surface and cause a fiber release.
- c. Personal protective equipment should be worn when handling asbestos containing surfacing materials.

2. Maintenance of Surfacing Materials

Maintain the integrity of the surfacing materials and prevent the use of procedures that may cause the integrity of the surface to be broken or damaged.

3. Cutting, Drilling, Patching, etc.

Asbestos containing surfacing materials should not be cut, drilled, or otherwise punctured unless the work is being done in an approved enclosure with proper protective gear and air filtering equipment.

4. Disposal

- a. Asbestos containing surfacing materials should be transported to and disposed of at an approved landfill in accordance with EPA Regulations.
- b. All protective clothing, filters, dust, etc., must be disposed of as asbestos containing waste.

5. Renovation/Demolition

- a. Removal of asbestos containing surfacing materials during renovation and demolition projects should be accomplished using the proper procedures as outlined in the EPA regulations without releasing fibers into the air and disposed of as asbestos waste.
- b. Asbestos containing surfacing materials that are damaged and are in such condition that the integrity of the surface is broken or damaged should be secured by patching with a non-asbestos compound and the procedures listed below. The debris will be disposed of as asbestos waste.

c. Renovation/Repair Procedures

(1) Supplies and Tools Needed

- (a) scraper
- (b) airless sprayer
- (c) amended water
- (d) duct tape
- (e) HEPA vacuum

- (f) air tight containment (4 mil and 6 mil plastic)
 - (g) disposable protective clothing, respirators, gloves, and goggles.
 - (h) hammers/pry bars
 - (i) disposal bags
 - (j) HEPA fresh air supply
 - (k) portable shower system
- (2) Procedures
- (a) When working in single functional spaces or rooms, seal off the windows, doors, heat supply (if present), and any area where air is likely to cause the friable materials to become airborne using, at minimum, 4 mil plastic for the walls and 6 mil plastic for the floors. Seal the seams in the plastic with duct tape.
 - (b) Protective clothing, respirator, gloves, and goggles are required.
 - (c) Using the airless sprayer filled with amended water, spray the friable area to prevent the powder from becoming airborne. Once the material has been wetted, you may begin your repairs.
 - (d) Clean the work area where the debris has caused contamination using a HEPA vacuum. Be sure your HEPA vacuum is a wet/dry vacuum before trying to vacuum up water. Treat the materials, including your protective clothing, as described in the Disposal Procedures and prepare for transportation to the disposal site.
 - (e) Air monitoring should be required prior to, during, and after the project. Contact Environmental Health and Safety for more details.

F. Ceiling Tile

Ceiling tile and its adhesive materials that contain asbestos do not normally pose health hazards if maintained in their original manufactured state. These materials may become hazardous when they are handled or removed improperly. The Environmental Protection Agency considers these types of materials to be friable. They can, under normal circumstances, be reduced to a powder by hand pressure. To preclude the inadvertent generation of airborne asbestos particles from asbestos containing ceiling tile and its adhesives, the following procedures should be followed for the handling, removal, cutting, or disposal of asbestos containing ceiling tile and adhesives.

1. Handling
 - a. Care should be exercised when handling asbestos containing ceiling tile to avoid unnecessary breakage.
 - b. Never store asbestos containing ceiling tile where it is subject to abrasion that would generate airborne dust.

- c. Work gloves should be worn when handling asbestos containing ceiling tile to avoid unnecessary cuts and skin abrasions.
 - d. Any dust or debris found on the furniture, floor, or surrounding materials or equipment should be cleaned by using a wet cloth, mop or HEPA Vacuum. Never dry sweep or use a regular vacuum cleaner on this debris.
2. Maintenance of Ceiling Tile
- a. Maintain the integrity of the ceiling surface on a day to day basis by replacing all loose (non-broken) ceiling tile. If the ceiling tile is broken or cracked it should be removed by a certified person and treated as a hazardous material.
 - b. The ceiling tile should be sealed with a coat of latex paint or a penetrating encapsulant to maintain the integrity of the materials as scheduled on the regular interior painting of facilities.
3. Cutting, Drilling, Removal
- Asbestos containing ceiling tile or adhesives should not be cut, drilled or ground unless the tools are equipped with local exhaust systems filtered through a HEPA filter.
4. Disposal
- a. Asbestos containing ceiling tile should be disposed of at any approved landfill that accepts asbestos waste material. Contact the landfill for packaging instructions.
 - b. Dust from asbestos containing ceiling tile or its adhesives must be handled and disposed of as asbestos containing waste.
5. Renovation/Demolition
- a. Removal of asbestos containing ceiling tile or adhesive materials during renovation and demolition projects should be accomplished so as to avoid breakage or crumbling of the materials.
 - b. Asbestos containing ceiling tile or adhesive materials that are damaged or in such condition that dust is generated by simple handling should be handled and disposed of as asbestos containing waste.
 - c. Renovation/Demolition Procedures
 - (1) Supplies and Tools Needed
 - (a) stiff blade wall or floor scraper
 - (b) utility or hook knife
 - (c) HEPA vacuum
 - (d) soap and water
 - (e) large 6-mil polyethylene bag

- (f) asbestos warning labels
 - (g) heavy duty scraper
 - (h) hammer/pry bar
 - (i) wire cutters/pliers
 - (j) screwdrivers
- (2) Procedures
- (a) Start the removal by thoroughly cleaning the area to be removed. This will serve to remove any accumulated dust that may contain asbestos fibers.
 - (b) Remove the first stapled or glued on tile by determining which side of the room the tile job was finished on (this makes it possible to expose the stapling flange of the tile) and carefully cutting the tile in the seam of two adjoining tiles and gradually forcing the edge of the cut tiles down and away from the ceiling (to remove drop-in panels, carefully raise the tile out of the grid structure, to remove tile from a "Z" type channel system, start in a corner and remove the pieces one at a time). Do not break off pieces of the tile, but continue to remove the balance of the tile by using the instruction listed above.
 - (c) When the first tile is removed, place it, without breaking it into smaller pieces, into the heavy duty impermeable trash bag which will be used for disposal.
 - (d) With removal of the first tile, accessibility of the other tiles is improved. If the tile is stapled or glued, continue removal by working from the stapling flange and pulling staples out or pushing a scraper under the edge to force the tile free from the adhesive. If the ceiling is a drop of "Z" channel, continue lifting out the panels and remove the metal frame work, if it is not to be cleaned and re-used, in approved 6-mil plastic bags and prepare for shipment to an approved landfill.
 - (e) Some glued on ceiling tiles may release quite easily, while others require varying degrees of force, where the adhesive is spread heavily or is quite hard. It may prove easier to force the scraper through the tightly adhered areas by striking with a hammer, using moderate blows of force while maintaining the scraper at a 25 to 30 degree angle to the ceiling. If a hammer is used be careful not to strike the edge or surface of the tile causing a release of fibers.
 - (f) Ceiling tile adhesives may be removed from surfaces which are to remain in the building by applying an approved chemical solvent to the area in question. Use adequate ventilation and proper respiratory protection when using a solvent.

G. Fuse Block Holders/Liners

These asbestos containing building materials are materials that have been woven or molded into products used as liners and fuse block holders because of their ability to prevent the conduction of heat. The liners are easily made friable while the fuse blocks are non-friable. These materials are potentially hazardous if they have been damaged and made friable. Friable means that the material can be reduced to a powder form by mere hand pressure. Asbestos containing building materials should be handled by certified personnel. The procedures listed below should be followed when drilling, cutting, and disposing of asbestos containing building materials.

1. Handling

- a. Care should be exercised when handling asbestos containing building materials to avoid damage to the integrity of the surfaces.
- b. Never store equipment, furniture, or other materials near asbestos containing building materials where they are subject to physical contact that would penetrate the surface and cause a fiber release.
- c. Proper protective clothing and respirators should be worn when handling asbestos containing building materials.

2. Maintenance of Fuse Block Holders/Liners

Maintain the integrity of the asbestos containing building materials and prevent the use of procedures that may cause the integrity of the surface to be broken or damaged.

3. Cutting, Drilling, Patching, etc.

Asbestos containing building materials should not be cut, drilled, or otherwise punctured unless the work is being done in an approved enclosure with proper protective gear and air filtering equipment.

4. Disposal

- a. Asbestos containing building materials must be transported to and disposed of at a certified landfill in accordance with EPA regulations.
- b. All protective clothing, filters, dust, etc. must be disposed of as asbestos containing waste.

5. Renovation/Demolition

- a. Removal of asbestos containing building materials during renovation and demolition projects should be accomplished using proper procedures as outlined in the EPA regulations without releasing fibers into the air and disposed of as asbestos waste.
- b. Asbestos containing building materials that are damaged and are in such condition that the integrity of the surface is broken or damaged should be secured by patching with a non-asbestos compound in accordance with the procedures listed below.

c. Renovation/Repair Procedures

(1) Supplies and Tools Needed

- (a) scrapers
- (b) airless sprayer
- (c) amended water
- (d) duct tape
- (e) HEPA vacuum
- (f) air tight containment (4 mil and 6 mil plastic)
- (g) protective clothing, respirators, gloves, and goggles
- (h) screwdrivers
- (i) hazardous waste disposal bags
- (j) mop bucket and wet mop

(2) Procedures

- (a) When working with electrical equipment, seal off the area and perform a glove bag type operation or use a mini enclosure depending on the size of the project. When spraying the materials with any liquid, always make certain that the electric has been disconnected, locked and tagged out by a certified electrician to prevent electrocution.
- (b) Protective clothing, respirator, gloves and goggles are required.
- (c) Using the airless sprayer filled with amended water, spray the friable area to prevent the fibers from becoming airborne. Once the materials have been wetted you may begin your repairs.
- (d) Clean the work area where the debris has caused contamination using a HEPA vacuum. Be sure your HEPA vacuum is a wet/dry vacuum before trying to vacuum up water.

H. Roofing Materials

Asbestos containing roofing materials may become hazardous when they are handled or removed or if they have become friable due to weathering of the material. The following procedures shall be followed for the removal and disposal of asbestos containing roofing products.

1. Handling and Disposal

The material classification will be determined in accordance with 40 CFR 61 Subpart m.

- a. If the material is determined to be category I under NESHAPS it will be handled as a non-regulated material. Contact Environmental Health and Safety for recommendations.
- b. If it is determined to be a category II material, it will be handled as friable asbestos material, subject to all applicable Federal and State regulations.

2. Renovation/Demolition

- a. Removal of asbestos containing roofing materials during renovation and demolition jobs should be accomplished so as to avoid breakage or crumbling of the material. This material should be removed in an adequately wet condition.
- b. Asbestos containing roofing materials that are damaged, or in such a condition that dust is generated by handling of the material should be disposed of and handled as asbestos containing debris.

WEST VIRGINIA



NOTIFICATION OF ABATEMENT, DEMOLITION, OR RENOVATION

Date ___/___/___

Operator Project No. _____

OFFICE USE ONLY	
Date Rec=d ___/___/___	Check # _____
Postmark ___/___/___	Paid by _____
Notif #. _____	Amount \$ _____

Type of Notification	
Original _____	Revision (highlight changes) _____ Cancellation _____
Type of Operation	
Demolition _____	Ordered Demolition _____ Renovation _____ Emergency Renovation _____
Facility Owner	
Name _____	
Address _____	
City _____	State _____ Zip Code _____
Contact _____	Phone (____) _____
Facility Description	
Name _____	
Address _____	City _____
County _____	Location w/in Facility _____
Building Size (sq ft) _____	No. of Floors _____ Age (yrs.) _____
Present Use _____	Prior Use _____
Asbestos Contractor	
Name _____	Asb. Cont. License No. _____
Address _____	
City _____	State _____ Zip Code _____
Contact _____	Phone (____) _____
Other Contractor	
Name _____	Cont. License No. _____
Address _____	
City _____	State _____ Zip Code _____
Contact _____	Phone (____) _____
Building Inspection	
Asbestos Inspection by _____	Inspection Date ___/___/___ WV License No. _____
Lab _____	Analysis by _____
Procedure used to detect the presence of asbestos _____	
Is asbestos present at 1% or greater? _____ Yes _____ No	
Project Designer _____	WV License No. _____
Air Monitor _____	WV License No. _____
Schedule	
Asbestos Removal	Start Date ___/___/___ Completion Date ___/___/___
Demo/Renovation	Start Date ___/___/___ Completion Date ___/___/___
Project Work Hours _____	Work days: M Tu W Th F Sa Su (Circle)

Emergency Renovation

Date & hour of sudden unexpected event ___/___/___ ___:___ AM PM

Attach a description of the sudden, unexpected event, and how this results in an unsafe condition, would cause equipment damage, or an unreasonable financial burden.

Demolition Ordered by Government Agency

Agency _____

Name _____ Title _____

Date of Order ___/___/___ Date Ordered to Begin ___/___/___

(Copy of order must be attached)

Type(s) of ACM

Asbestos Containing Material to be Removed
Type(s) _____

Cat. I & II Nonfriable ACM Not to be Removed
Type(s) _____

Pipes _____ Ln Ft _____ % Asbestos

Pipes _____ Ln Ft _____ % Asbestos

Area _____ Sq Ft _____ % Asbestos

Area _____ Sq Ft _____ % Asbestos

Other _____ Cu Ft _____ % Asbestos

Other _____ Cu Ft _____ % Asbestos

Description of planned demolition or renovation work and method(s) to be used:

Description of procedures to be used to comply with NESHAP (40 CFR 61 Subpart M):

Description of procedures to be followed in the event that unexpected asbestos is found or previously nonfriable ACM becomes crumbled, pulverized or reduced to powder:

Waste Transporter

Name _____

Address _____

City _____ State _____ Zip Code _____

Contact _____ Phone (____) _____

Waste Disposal Site

Name _____ ID # _____

Address _____

City _____ State _____ Zip Code _____

Contact _____ Phone (____) _____

Certification

I certify that an individual trained in the provisions of 40 CFR Part 61, Subpart M will be on site during the demolition or renovation and evidence that the required training has been accomplished by the person will be available for inspection during normal business hours. I further certify that the information contained in this notification is correct.

Signature of Owner/Operator _____ Date ___/___/___

Name and title (print or type) _____

Revised 5/94

Environmental Health and Safety
WEST VIRGINIA UNIVERSITY
Asbestos Pre-Abatement Checklist

Building: _____ Date: _____

Location: _____

Project Description: _____

Company Performing Abatement: _____

Supervisor on Job: _____ Title: _____

Work-Site Preparation	Problems	Acceptable	Applicable	Encountered/Comments
A. Area non-accessible to general public		_____	_____	_____
B. Signage				
1. Proper caution signs at entrances and exits		_____	_____	_____
2. Dumpster Labeled		_____	_____	_____
C. Airlock-Decontamination Area				
1. Clean Room - 1st Stage				
a. Lockers/clothing storage		_____	_____	_____
b. Double Plastic flaps at entrance and exit		_____	_____	_____
2. Shower Area - 2nd Stage				
a. Showers operating		_____	_____	_____
b. Shower waste water properly filtered		_____	_____	_____
c. Double Plastic flaps at entrance and exit		_____	_____	_____
d. Clean towels available		_____	_____	_____
3. Equipment Room - 3rd Stage				
a. Double Plastic flaps at entrance and exit		_____	_____	_____
b. Asbestos bag for disposal of used suits		_____	_____	_____
D. Perimeter Barrier Preparation				
1. 6 ml plastic used		_____	_____	_____
2. Floor plastic (2 layers)		_____	_____	_____
3. Wall plastic		_____	_____	_____
4. Proper sealing of:				
a. Doors		_____	_____	_____
b. Windows		_____	_____	_____
c. Ventilation Systems				
1. Vents		_____	_____	_____
2. Ducts		_____	_____	_____
3. Grilles		_____	_____	_____
4. System turned off		_____	_____	_____
d. Pipes and conduit		_____	_____	_____
e. Light fixtures		_____	_____	_____
f. Sprinkler heads		_____	_____	_____
g. Any other openings into work area		_____	_____	_____
5. Penetrations through ceiling properly sealed		_____	_____	_____

ASBESTOS PRE-ABATEMENT CHECKLIST

DATE _____

E. Asbestos Removal Equipment

1. HEPA Filtered Vacuums

a. Number of Units _____

b. Type _____

2. HEPA Ventilation Units

a. Number of Units _____

b. Type _____

c. Operating YES NO

d. HEPA filters present YES NO

e. Exhausted out of work area YES NO

f. Negative pressure inside work area:

Measurements	Inches H ₂ O	Location
1.	_____	_____
2.	_____	_____
3.	_____	_____

3. Water hoses present YES NO

4. Amended water sprayers present YES NO

5. Surfactant present YES NO

6. Type of encapsulant to be used _____

7. Any other equipment to be used _____

F. Worker Protection

1. Respirator Protection

a. Type of respirators to be used _____

b. Are respirators NIOSH/MSHA approved YES NO

2. If jurisdiction requires licensing, do all workers have proper identification to perform asbestos removal? YES NO

3. Proper Protective Clothing

Full body coveralls Hard Hats
 Head covers Eye Protection
 Foot covers

G. Verification of Waste Disposal Site YES NO

Name and Location _____

H. Authorization to Proceed:

Date _____ Time _____

Inspector _____ Signature _____

Title _____

Authorization given to _____

Witness(es) _____

Environmental Health and Safety
WEST VIRGINIA UNIVERSITY
Daily Asbestos Abatement Checklist

Building: _____ Date: _____

Location: _____

Project Description: _____

Company Performing Abatement: _____

Supervisor on Job: _____ Title: _____

Number of Workers at site: _____

Inspector: _____ Signature: _____

Title: _____

Work-Site Preparation	Acceptable	Not Applicable	Problems Encountered/Comments
A. Airlock Decontamination Area			
1. Clean Room - 1st Stage			
a. Floors Clean	_____	_____	_____
b. No asbestos or asbestos contaminated material present	_____	_____	_____
2. Shower Area - 2nd Stage			
a. Shower operating	_____	_____	_____
b. Shower waste water properly filtered	_____	_____	_____
3. Equipment Area - 3rd Stage			
a. No excess asbestos debris present	_____	_____	_____
b. Contaminated suites and material placed in asbestos bag	_____	_____	_____
4. Airlock perimeter plastic/plastic flaps intact	_____	_____	_____
5. Proper signage at entrance	_____	_____	_____
B. Perimeter Barriers			
1. Perimeter plastic intact	_____	_____	_____
2. Windows and doors sealed	_____	_____	_____
3. Ducts, ventilation systems, pipes sealed	_____	_____	_____
4. All other vertical and horizontal openings into area sealed	_____	_____	_____
C. Work Area Practices			
1. Hammers, saws, brooms not in use	_____	_____	_____
2. Material kept wet	_____	_____	_____
3. Material bagged promptly	_____	_____	_____
4. Workers protective equipment:			
a. Full body disposable clothing intact	_____	_____	_____
b. Proper foot protection	_____	_____	_____
c. Proper NIOSH respirators			
TYPE: _____	_____	_____	_____
d. Hard Hats	_____	_____	_____
e. Eye protection	_____	_____	_____
5. Adequate lighting	_____	_____	_____

DAI LY ASBESTOS CHECKLI ST

Date _____

- D. Worker Decontami nation and Work Hab its
1. Workers shower upon leaving work area _____
 2. Contami nated full body sui ts bagged in dirty room _____
 3. Disposable sui ts used once _____
 4. No smoking in work area or ai rlock _____
 5. No eating or drinking in work area or ai rlock _____

- E. HEPA Ventilation Uni ts
1. Number in use _____
 2. Pre-fi lters changed periodically YES NO
 3. Negative Pressure Inside Work Area:
 - a. Measured wi th:
 1. Magnahelic gauge _____
 2. Transducer _____
 - b. Locati on(s) and Negati ve Pressure Reading:

LOCATI ON	INCHES H ₂ O
1. _____	_____
2. _____	_____
3. _____	_____

4. Is microtrap exhaust properly vented? YES NO
5. Is microtrap exhaust hose intact? YES NO

	Acceptabl e	Not Appl i cabl e	Probl ems Encountered/Comments
F. End of Work Day Procedures			
1. Material on floors bagged before leaving area	_____	_____	_____
2. Bags of asbestos sealed	_____	_____	_____
3. If bags are removed			
a. Properly decontami nated	_____	_____	_____
b. Tightl y sealed	_____	_____	_____
c. Placed in drums	_____	_____	_____
4. Are microtraps left runni ng overnight	_____	_____	_____
5. Work area properl y sealed off	_____	_____	_____

- G. Air Sampl ing
- | | | |
|--|-------|----------|
| | AREA | PERSONAL |
| 1. Number of Air Samples taken | _____ | _____ |
| 2. Number of Air Samples taken by Contractor | _____ | _____ |

H. What is the dai ly job progress?

Environmental Health and Safety
WEST VIRGINIA UNIVERSITY
Final Asbestos Abatement Checklist

Building: _____ Date: _____

Location: _____

Project Description: _____

Company Performing Abatement: _____

Inspector: _____ Signature: _____

Title: _____

Accompanied by: _____ Title: _____

A. Visual Inspection of Work Area
The following areas have been wet cleaned and/or HEPA vacuumed and found to contain no visible asbestos residue:

Work Site Inspection	Acceptable	Not Applicable	Problems Encountered/Comments
1. Floors	_____	_____	_____
2. Walls	_____	_____	_____
3. Window ledges	_____	_____	_____
4. Pipes			
a. Vertical	_____	_____	_____
b. Horizontal	_____	_____	_____
c. Pipe hangers	_____	_____	_____
5. Ventilation Equipment	_____	_____	_____
6. Ducts	_____	_____	_____
7. Registers	_____	_____	_____
8. Lights	_____	_____	_____
9. Conduit and wires	_____	_____	_____
10. Sprinkler heads	_____	_____	_____
11. Fire alarms	_____	_____	_____
12. Electrical panels and boxes	_____	_____	_____
13. All other horizontal surfaces	_____	_____	_____
14. All other vertical surfaces	_____	_____	_____
15. Removal equipment remaining in work area	_____	_____	_____

B. Encapsulation
1. Has encapsulant been used? YES NO
2. Name of encapsulant used _____

C. Have all bags of asbestos material been removed from work area? YES NO

FINAL ASBESTOS ABATEMENT CHECKLIST

Date_____

D. Final Air Sampling

- 1. Sample I.D. number(s)_____
 - 2. Were samples analyzed on site? YES NO
 - 3. If yes, person performing analysis?_____Title_____
 - 4. Was a blank submitted? YES NO Color of quality control dot_____
 - 5. Is electronmicroscopy required? YES NO
 - 6. Sample(s) sent to the following laboratory for EM:_____
 - 7. What is the specified final clearance level? (f/cc)?_____
 - 8. Were HEPA filtered exhausts run during the taking of final air samples? YES NO
 - 9. Were any other aggressive sampling techniques used? YES NO
- Describe_____

E. Results of Visual Inspection

The work area was found to be acceptably free of residual asbestos and debris YES NO

Inspector_____Signature_____

Date_____Time_____

F. Results of Air Test(s)

The results of final air tests:

Sample I.D.	Results (f/cc)
_____	_____
_____	_____
_____	_____
_____	_____

Are these results below the final clearance level? YES NO

Notification given to:_____Title_____

Date and time of notification_____

Microscopist_____Signature_____

G. Has the contractor been informed to clean all contamination left behind barriers? YES NO

ASBESTOS PROJECT LOG
WEST VIRGINIA UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL HEALTH AND SAFETY

PLEASE RETURN TO:
ENVIRONMENTAL HEALTH AND SAFETY
ATTENTION ASBESTOS PROJECT LOG FILE

Project Superintendent _____ TIME IN TIME OUT

DATE: _____

Include/attach the following information:

- A. Copies of inspection reports
- B. Air sampling analysis results
- C. Project minutes and additional notations
- D. Disposal forms and copies of receipts
- E. Any other routine or pertinent documentations
- F. Copies of notifications

DATE: _____

VISITORS LOG

Name: _____

Company: _____

Reason for entry: _____

Time In: _____

Time Out: _____

Work performed _____

Personal protection worn: _____

DATE: _____

VISITORS LOG

Name: _____

Company: _____

Reason for entry: _____

Time In: _____

Time Out: _____

Work performed _____

Personal protection worn: _____

DATE: _____

VISITORS LOG

Name: _____

Company: _____

Reason for entry: _____

Time In: _____

Time Out: _____

Work performed _____

Personal protection worn: _____

DATE: _____

VISITORS LOG

Name: _____

Company: _____

Reason for entry: _____

Time In: _____

Time Out: _____

Work performed _____

Personal protection worn: _____

NOTES

NOTES

NOTES

NOTES

SAMPLING ANALYSIS RECORD

COLLECTION DATE _____ BY _____ SAMPLE NO. _____

COMPANY _____

PLANT _____

SAMPLING SITE _____

INDUSTRIAL PROCESS _____

WORKER _____

SAMPLE RATE _____ VOLUME _____

TEMP. _____ HUMIDITY _____ PRESSURE _____

EQUIPMENT _____

CHEMICALS OF INTEREST _____

DATE OF SAMPLE SHIPMENT _____

OBJECTIVE _____

COMMENTS _____

=====

ANALYTICAL RESULTS

DATE _____ BY _____

METHOD _____ CONDITIONS _____

GC COLUMN _____ TEMP _____

CARRIER _____

RESULTS

SAMPLE NUMBER	LAB NUMBER	SAMPLE TYPE	CHEMICAL	CONCENTRATION

COMMENTS: _____

WASTE SHIPMENT RECORD

GENERATOR

1. Work site name and mailing address	Owners Name	Owner's Telephone No.
2. Operator's name and address		Operators Telephone No.
3. Waste disposal site (WDS) name, mailing address, and physical site location		WDS Telephone No.
4. Name and address of responsible agency		
5. Description of materials	6. Containers No. Type	7. Total quantity m ³ (yd ³)
8. Special handling instructions and additional information		
9. OPERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and government regulations.		
Printed/typed name and title	Signature	Month Day Year

TRANSPORTER

10. Transporter 1 (Acknowledgment of receipt of materials)		
Printed/typed name and title	Signature	Month Day Year
Address and telephone no.		
11. Transporter 2 (Acknowledgment of receipt of materials)		
Printed/typed name and title	Signature	Month Day Year
Address and telephone no.		

DISPOSAL SITE

12. Discrepancy indication space		
13. Waste disposal site owner or operator: Certification of receipt of asbestos materials covered by this manifest except as noted in item 12.		
Printed/typed name and title	Signature	Month Day Year

INSTRUCTIONS

WASTE GENERATOR SECTION (Items 1-9)

1. Enter the name of the facility at which asbestos waste is generated and the address where the facility is located. In the appropriate spaces, also enter the name of the owner of the facility and the owner's telephone number.
2. If a demolition or renovation, enter the name and address of the company and authorized agent responsible for performing the asbestos removal. In the appropriate spaces, also enter the telephone number of the operator.
3. Enter the name, address, and physical site location of the waste disposal site (WDS) that will be receiving the asbestos materials. In the appropriate spaces, also enter the telephone number of the WDS. Enter "on-site" if the waste will be disposed of on the generator's property.
4. Provide the name and address of the local, State, or EPA Regional office responsible for administering the asbestos NESHAP Program.
5. Indicate the types of asbestos waste materials generated. If from a demolition or renovation, indicate the amount of asbestos that is:
 - * Friable asbestos material
 - * Non-friable asbestos material
6. Enter the number of containers used to transport the asbestos materials listed in Item 5. Also enter one of the following container codes used in transporting each type of asbestos material (specify any other type of container used if not listed below):
 - DM - Metal drums, barrels
 - DP - Plastic drums, barrels
 - BA - 6 mil plastic bags or wrapping
7. Enter the quantities of each type of asbestos material removed in units of cubic meters (cubic yards).
8. Use this space to indicate special transportation, treatment, storage or disposal or Bill of Lading information. If an alternate waste disposal site is designated, note it here. Emergency response telephone numbers or similar information may be included here.
9. The authorized agent of the waste generator must read and then sign and date this certification. The date is the date of receipt by transporter.

NOTE: The waste generator must retain a copy of this form.

TRANSPORTER SECTION (Items 10 & 11)

10. & 11. Enter name, address, and telephone number of each transporter used, if applicable.
 - Print or type the full name and title of person accepting responsibility and acknowledging receipt of materials as listed on this waste shipment record for transport. Enter date of receipt and signature.

NOTE: The transporter must retain a copy of this form.

DISPOSAL SITE SECTION (Items 12 & 13)

12. The authorized representative of the WDS must note in this space any discrepancy between waste described on this manifest and waste actually received as well as any improperly enclosed or contained waste. Any rejected materials should be listed and destination of those materials provided. A site that converts asbestos containing waste material to nonasbestos material is considered a WDS.
13. The signature (by hand) of the authorized WDS agent indicates acceptance and agreement with statements on this manifest except as noted in item 12. The date is the date of signature and receipt of shipment.

NOTE: The WDS must retain a completed copy of this form. The WDS must also send a completed copy to the operator listed in item 2.

IX. GLOSSARY

Abatement

Procedures to control fiber release from asbestos containing materials. Includes removal, encapsulation, repair and renovation activities.

Action Level (OSHA)

An air borne concentration of asbestos of 0.1 fiber (longer than 5 micrometers) per cubic centimeter as an 8-hour time weighted average.

Aggressive Sampling

An air sampling technique typically used for final clearance wherein the area and surfaces around the air sample are agitated, brushed, blown with air jets or mechanical fans, or otherwise disturbed in an effort to resuspend any settled dust and detect the presence of residual asbestos fibers.

Airlock

A system for permitting ingress and egress without permitting air movement between a contaminated and an uncontaminated area, typically consisting of two curtained doorways at least 3 feet apart.

Air Monitoring

The process of measuring the fiber content of a specific volume of air in a stated period of time.

Amended Water

Water to which a surfactant has been added.

Asbestos

A class of magnesium-silicate minerals that occur in fibrous form. Minerals that are included in this group are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.

Asbestos Containing Material (ACM)

Material composed of asbestos of any type and in an amount greater than 1 percent, either alone or mixed with other fibrous or nonfibrous materials.

Asbestos Contaminated Material

Any materials, substances or item impregnated or coated (no matter how lightly) with asbestos fibers.

Asbestos Filtration Device (HEPA Air Filtration System)

Filtered exhaust ventilation equipment used for drawing air from inside containment/regulated work areas. Such equipment must have at least three filter stages, including readily accessible pre- and secondary filters, and a final filter which must be a High Efficiency Particulate Air (HEPA) filter rated 99.97% effective in capturing particles having diameters of 0.3 micrometers or greater.

Asbestos Hazard Abatement Contractor

A Contractor with a valid license, certification, or registration issued by a governmental authority of the State in which the work is to be performed, to perform directly or indirectly in any asbestos hazard abatement activity.

Asbestos Permissible Exposure Limit (OSHA)

0.1 fibers (longer than 5 micrometers) per cubic centimeter as an 8-hour time weighted average.

Barrier

Polyethylene sheeting and/or other materials which, when used in conjunction with the existing floors, ceilings, and walls of the structure, form the containment/ regulated area. The barrier separates the contaminated work environment from the uncontaminated environment.

Class I

Removal of high risk material which requires a regulated area, EPA approval training and direct supervision on site at all times.

Class II

Removal of non high risk material which has the same requirements as Class I except that supervision is provided at regular and frequent intervals.

Class III

Repair or maintenance activities that disturb asbestos that are not more than one glove bag and can be contained by plastic barriers in a regulated area by employees with EPA approved training under supervision at frequent and regular intervals.

Class IV

Repair, maintenance, or cleaning activities that have contact with asbestos such as dusting or mopping. Proper training with regular and frequent supervision is required.

Clean Room

An uncontaminated area or room which is part of the work decontamination enclosure system, with provisions for storage of worker's street clothes and protective equipment.

Curtained Doorway

A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing two overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along one vertical side of doorway and securing the vertical edge of the other sheet along the opposite vertical side of the doorway.

Decontamination Chamber

A series of connected rooms, typically consisting of a clean room, a shower room, and an equipment room, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment.

Disposal

All specified procedures necessary to transport and deposit the asbestos containing material or asbestos-contaminated waste materials removed from a building to an approved waste disposal site in compliance with existing sections 61.152 and .156 of the EPA Regulations (40 CFR 61), and Sections 172.101 and 173.1090 of the DOT Regulations (40 CFR) or such other or additional regulations as may be in force.

Encapsulant

A liquid material which can be applied to asbestos containing material which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

Encapsulate

The process whereby an encapsulant is applied to asbestos containing material to control the release of asbestos fibers into the air.

Enclosed Regulated Area

A regulated area which has been isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris. A local exhaust system is required.

EPA (USEPA)

United States Environmental Protection Agency.

Equipment Room (Change Room)

A room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

Fibers

All fibers regardless of composition as counted in the NIOSH 7400 procedure, or asbestos fibers of any size as counted using transmission electron microscopy.

Friable Asbestos Material

Material that contains more than 1 percent asbestos which can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

Glovebag Technique

A method with limited applications for removing small sections of asbestos containing material from HVAC ducts, short piping runs, valves, joints, elbows, and other nonplanar surfaces in an uncontained regulated area. The glovebag assembly is a manufactured or fabricated device consisting of a glovebag (typically constructed of 6 mil transparent polyethylene or polyvinyl chloride plastic), two inward projecting long sleeve gloves, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the removal process. All workers who are permitted to use the glovebag technique must be highly trained, experienced and skilled in this method.

HEPA Filter

A high efficiency particulate absolute (HEPA) air filter capable of removing particles 0.3 microns in diameter with 99.97% efficiency.

HEPA Air Filtration System

High efficiency particulate air (HEPA) filtered exhausting equipment with a UL 586 filter system capable of collecting and retaining asbestos fibers. Filters shall be of 99.97 percent efficiency for retaining 0.3 micrometer diameter particles. (This system also applies to HEPA vacuuming equipment).

HEPA Vacuum

A vacuum system equipped with HEPA filtration.

HVAC

Heating, Ventilation, and Air Conditioning; all building mechanical equipment including supply and return ductwork, unit ventilators, fan-coil units, blower cabinets and fans, control devices, damper assemblies and other similar mechanical equipment.

Independent Testing Laboratory

A qualified organization capable of performing air sampling analysis (PLM) and bulk sampling analysis (PCM) with no affiliation with Contractor or Owner and in possession of an accreditation as an NVLAP lab.

Lagging

Thermal insulation used to prevent heat loss or condensation from pipes, boilers and similar mechanical equipment.

Negative Pressure Ventilation System

A portable exhaust system equipped with HEPA filtration and capable of maintaining a constant low velocity air flow into contaminated areas from adjacent uncontaminated areas.

NIOSH

National Institute for Occupational Safety and Health.

Non-friable Asbestos Material

Material that contains asbestos in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and may not release fibers in excess of the action level during any appropriate use, handling, storage, transportation, or processing. Non-friable asbestos material is considered hazardous during removal and disposal procedures.

OSHA (USOSHA)

United States Department of Labor, Occupational Safety and Health Administration.

PACM

Presumed asbestos containing material.

Personal Monitoring

Sampling of asbestos fiber concentrations within the breathing zone of an employee.

Prior Experience

Experience required of the Contractor/Subcontractor on asbestos projects of similar nature and scope to insure capability of performing the asbestos removal in a satisfactory manner. Similarities shall be in areas related to material composition, project size, number of employees, and engineering work practice and personal protection controls required.

Regulated/Containment Area

Established work areas where airborne concentrations of asbestos, exceed or can reasonably be expected to exceed the asbestos permissible limit.

Removal

All specified procedures necessary to strip asbestos containing materials from designated areas and to dispose of these materials at an acceptable site.

Shower Room

A room between the clean room and the equipment room in the worker decontamination enclosure with hot and cold or warm running water controllable at the tap and suitably arranged for complete showering during decontamination.

Surfactant

A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Time Weighed Average (TWA)

The TWA is an 8-hour time weighted average of airborne concentration of fibers (5 micrometers or longer) per cubic centimeter of air.

Wet Cleaning

The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water and afterwards thoroughly decontaminated or disposed of as asbestos contaminated.

X. REGULATIONS:

EPA Asbestos "Final Rule" 40 CFR 763

NESHAPS 40 CFR 61 Subpart M (November 20, 1990)

OSHA 1926.1101

OSHA Respirator Standard 29 CFR 1910.134

OSHA Hazard Communication 29CFR 1910.1200

State of West Virginia House Bill #4647

State of WV Title 64 SER 63

West Virginia Board of Trustees Asbestos Policy

Environmental Health and Safety and the Law Library house these regulations. If you need information or a copy of a specific page(s) contact Environmental Health and Safety at 293-3792.