



GOBIERNO DE PUERTO RICO
Autoridad de Edificios Públicos

Section 02-82-33
(Reference)

GENERAL ASBESTOS REMOVAL SPECIFICATIONS

For:

PBA BUILDING AND SCHOOLS



Autoridad de Edificios Públicos
Gobierno de Puerto Rico

PBA ENVIRONMENTAL DIVISION

Contents

INTRODUCTION5

TERMS AND DEFINITIONS5

SECTION 1.0 GENERAL REQUIREMENTS 10

 1.1 DESCRIPTION OF WORK AND CONTRACTOR RESPONSIBILITIES10

 1.1.1 Description of Work10

 1.1.2 Contractor Responsibilities12

 1.2. SUBMITTALS, NOTICES, RECORDKEEPING, AND REFERENCES 15

 1.2.1 Submittals15

 1.2.2 Notices to Contractor18

 1.2.3 Record keeping20

 1.2.4 Applicable Reference Documents21

 1.2.5 Warning Signs and Labels23

 1.3 EQUIPMENT REMOVAL, SITE SECURITY, AND SITE CONDITIONS24

 1.3.1 Equipment Removal Procedures24

 1.3.2 Site Security24

 1.3.3 Site Conditions25

 1.4 PERSONAL PROTECTION25

 1.4.1 Personal Protection25

SECTION 2.0 LABOR, MATERIALS, AND EQUIPMENT 30

 2.1 Materials30

 2.2 Tools and equipment31

SECTION 3.0 EXECUTION31

 3.1 PREPARATION31

 3.1.1 General32

 3.1.2 Preparation for Friable Materials33

 3.1.3 Preparation for Nonfriable Materials38

 3.2. ASBESTOS REMOVAL 43

 3.2.1 Asbestos Removal. Friable Materials43

 3.2.2 Asbestos Removal, Nonfriable Materials44

 3.2.3 Asbestos Removal, Mastic Materials45

 3.3 CLEANUP I45

 3.3.1 Cleanup45

 3.4 INSPECTIONS AFTER REMOVAL46

 3.4.1 Inspections after Removal (see also SECTION 5.1)46

 3.5 DISPOSAL47

3.5.1	Disposal.....	47
SECTION 4.0 SPECIAL PROCEDURES		48
4.1	EXTERIOR ASBESTOS REMOVAL.....	48
4.1.1	Personal Protection	48
4.1.2	Protection from Heat Stress	48
4.1.3	Decontamination Area.....	49
4.1.4	Respirator Decontamination Facilities (Optional).....	49
4.1.5	Exterior Asbestos Removal	49
4.2	GLOVE BAG PROCEDURE	51
4.2.1	Personal Protection	51
4.2.2	Preparation for Glove Bag Procedure	52
4.2.3	Decontamination Room or Area	52
4.2.4	Separation of Work Areas from Occupied Areas	53
4.2.5	Asbestos Removal	53
4.3.	MINI-CONTAINMENT PROCEDURE.....	54
4.3.1	Personal Protection	54
4.3.2	Preparation for Mini-Containment Procedure.....	54
4.3.3	Decontamination Room or Area	55
4.3.4	Separation of Work Areas from Occupied Areas	56
4.3.5	Asbestos Removal	56
4.3.6	Waste Load-out Procedure	57
4.3.7	Cleanup and Encapsulation	57
4.4	DECONTAMINATION OF CONTAMINATED AREAS.....	57
4.4.1	Personal Protection	57
4.4.2	Preparation	58
4.4.3	Establish Pressure Differential	59
4.4.4	Decontamination of Contaminated Surfaces.....	60
SECTION 5.0 INSPECTIONS, PROJECT MANAGEMENT, AIR MONITORING, AND COMPLETION		60
5.1	INSPECTIONS.....	60
5.1.1	Inspections Prior to and During Work.....	60
5.1.2	Inspection of Non asbestos-Containing Materials.....	61
5.1.3	Final Visual Inspections.....	61
5.2	PROJECT MANAGEMENT	61
5.3	AIR MONITORING.....	62
5.3.1	General.....	62
5.3.2	Background Air Testing	62

5.3.3 Personal Air Sampling62

5.3.4 The Pre-encapsulation Test63

5.3.5 Conditions for Final Air Testing63

5.3.6 Air Clearance Criteria64

5.3.7 Final Air Testing.....64

5.3.8 Final Air Testing: Exterior Areas.....64

5.3.9 Final Air Testing: Glove Bag Procedure65

5.3.10 Failure of Final Air Tests65

5.4 COMPLETION65

5.4.1 Completion.....65

SECTION 6.0 ALTERNATE PROCEDURES AND VIOLATIONS OF SPECIFICATIONS66

6.1 Alternate Procedures66

6.2 Violations of Specifications66

SECTION 7.0 EMERGENCY PLANNING67

SECTION 8.0 FIRE SAFETY AND SAFE EGRESS67

8.1 FIRE PROTECTION AND PREVENTION68

8.1.1 Fire Protection Program68

8.1.2 Fire Extinguishers.....68

8.1.3 Sprinkler Systems.....68

8.1.4 Fire Alarm Devices68

8.2 SAFE EMERGENCY EGRESS68

8.2.1 Application.....68

8.2.2 Fire Alarm Facilities.....69

8.2.3 Protection of Workers and Building Occupants.....69

8.3 MEANS OF EGRESS69

8.3.1 Definitions69

8.3.2 Means of Egress.....70

8.3.3 Emergency Exits.....70

8.3.4 Emergency Lighting.....70

SUPERVISOR DAILY WORK LOG75

AFFIDAVIT.....77

INTRODUCTION

These asbestos removal specifications are necessarily general and are intended only to give a description of what is required to adequately complete an asbestos abatement project in the Puerto Rico Public Building Authority (PR-PBA). The asbestos abatement project is accompanied by a job-specific WORK ORDER, which summarizes the procedures, describes the extent and nature of the asbestos removal or abatement, and details any special conditions at the job site. These specifications are not intended to cover all variations that may occur, however, the WORK ORDER will address anticipated variations. If any discrepancy arises between these general specifications and the WORK ORDER, the procedures and instructions in the WORK ORDER will prevail for specific job requirements.

TERMS AND DEFINITIONS

The following section is a list of terms and definitions that will be used in this specification.

Abatement: Procedures to control fiber release from asbestos-containing materials (ACM). Includes encapsulation, enclosure and removal.

Accredited: A person who holds a current certificate of training or updated certificate of continuing training as required by Federal and State regulations.

AHERA: The Asbestos Hazard Emergency Response Act of 1986, also referred to as the Asbestos-Containing Materials in Schools; Final Rule and Notice, and 40 CFR Part 763

Asbestos-Containing Building Material (ACBM): Surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

Asbestos-Containing Material (ACM): Any material or product that contains more than 1 percent asbestos as determined by Polarized Light Microscopy (PLM) analysis, or assumed to contain greater than 1 percent asbestos.

ASHARA: *Asbestos School Hazard Abatement Reauthorization Act (ASHARA), passed in 1990, required accreditation of personnel working on asbestos activities in schools and public and commercial buildings. Specifically, the Asbestos Model Accreditation Plan (40 CFR Part 763, Appendix C)*

Airlock: A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least 6 feet apart.

Air Monitoring: The process of measuring the fiber content of a specific volume of air in a stated period of time in an appropriate location.

Amended Water: Water to which a surfactant has been added.

Authorized Visitor: Owner, *Owner asbestos inspector*, or representative of any regulatory or other agency having jurisdiction over the project.

Change Order: A written order issued by the Owner, or its duly authorized representative, to the contractor, signed by both parties, covering, additions, deletions, and/or revisions in the Work and/or an adjustment in the Contract Price and/or the Contract time, if any, issued on or after the Effective Date of the Agreement. In unit price Contract, a Change Order can also reflect a change in the number of times, as well as an increase or decrease, contained in the proposal. In Lump Sum Contracts, it reflects an order for additional or less work.

Clean Room: An uncontaminated area or room that is part of the worker decontamination unit, with provisions for storage of uncontaminated clothing and equipment.

Containment: The temporary, polyethylene-lined, enclosure structure erected to control the release of asbestos fibers to the ambient environment.

Contractor: An asbestos abatement contracting company and its employees, which employs a full-time contractor who is certified to provide asbestos abatement services, and whose employees hold current applicable accreditation.

Critical Barrier: A physical barrier that seals openings to the contaminated work area in such a way that airborne contaminants cannot be released to uncontaminated areas.

Curtained Doorway: A device to allow entry or exit from one room to another while permitting minimal air movement between the two rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporary framed doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway.

Decontamination Unit: A series of connected rooms, each room being an airlock, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment.

Demolition: The wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

Encapsulant: A liquid material that can be applied to ACM or surfaces stripped of ACM and that 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). When used, care must be taken that any re-insulation material will adhere to the encapsulant.

Encapsulation: All herein specified procedures necessary to coat surfaces from which ACM has been removed with sealing substance meeting applicable government standards. Encapsulation may also be referred to as "lock-down" encapsulation.

Equipment Decontamination Unit: A decontamination unit for materials and equipment, typically consisting of a designated area of the work area, a washroom, holding area, and an uncontaminated area.

Equipment Room: A contaminated area or room that is part of the worker decontamination unit, with provisions for storage of contaminated clothing and equipment.

Friable ACM: Asbestos-containing material that can be crumbled, or reduced to a powder by ordinary hand pressure or materials assessed as friable by an accredited asbestos abatement inspector.

Fixed Object: A piece of equipment or furniture in the work area that cannot be removed from the work area.

HEPA Filter: A High Efficiency Particulate Air (HEPA) filter that traps and retains at least 99.97% of monodispersed particles 0.3 microns in diameter or larger.

HEPA-Filtered Exhaust Unit: An exhaust fan that draws contaminated air through a HEPA filter and exhausts the filtered air to the outside of the building.

HEPA-Filtered Vacuum: High efficiency particulate air filtered vacuuming equipment with a filter system that collects and retains 99.97% of monodispersed particles 0.3 microns in diameter or larger.

Holding Area: A room between the washroom and an uncontaminated area in the equipment decontamination unit. The holding area has an airlock constructed at its entrance from an uncontaminated area.

Moveable Object: A piece of equipment or furniture in the work area that can be removed from the work area.

Nonfriable ACM: Asbestos-containing material that does not crumble, or become reduced to powder by ordinary hand pressure, or material that has been assessed as nonfriable by an accredited asbestos abatement inspector.

Order to Proceed: A written notice issued by the Owner to the Contractor fixing the date on which the contract Time will commence to run and on which Contractor shall start to perform the work under the contract documents. Such notice to proceed shall identify the persons included in article 5.2.2 of PBA Uniform General Conditions. Unless otherwise agreed by the parties, all permits and/or endorsements to be furnished by the Owner needed to start construction of the Project must be obtained prior to issuance of the Notice to Proceed.

Owner: *Public Buildings Authority and/or employees or authorized personnel.*

Owner asbestos inspector: An asbestos consulting company and its employees who are qualified to perform asbestos consulting services, and whose employees hold current applicable accreditation.

PBA's Environmental Division: An asbestos certified owner's employee who is qualified to perform asbestos consulting services, and who have asbestos requirements trainings and experience.

Pressure Differential: A condition whereby the containment is maintained at a pressure differential of at least minus 0.02 inches of water relative to the adjacent unsealed areas.

Removal: All herein specified procedures necessary to strip all ACM from the designated areas and dispose of these materials at an acceptable site.

Renovation: The modifying of any existing structure, or portion (component) thereof.

Shower Room: A room in the worker decontamination unit that is located between the clean room and equipment room, and is equipped with a functional shower stall and waste water filtering system.

Small-scale, Short Duration: Removal small quantities of friable asbestos-containing insulation on pipes, small quantities of asbestos-containing surfacing materials, or other nonfriable asbestos-containing materials that are less than 25 square feet or 10 linear feet, and can be removed by glove bag or mini-containment procedures contained in this specification.

Surfactant: A non-toxic, non-flammable, chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Supervisor: An employee of Contractor who is accredited as a Supervisor for Asbestos Abatement Projects, qualifies as a competent person on asbestos abatement projects, and holds current applicable accreditation.

Washroom: A room between the work area and the holding area in the equipment decontamination unit. The washroom has an airlock between it and the holding area.

Wet-Clean: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools that have been dampened with amended water, and by afterwards disposing of these cleaning tools as asbestos-containing waste.

Work Area: The area of a building where asbestos-containing materials will be, or are being, removed or abated.

Worker Decontamination Unit: A decontamination enclosure system for workers, typically consisting of a clean room, a shower room, and an equipment room.

Work Order: A written order, signed by the Owner, or its duly authorized representative, which requires performance of a specific contractual issue by the Contractor without negotiation of any sort. If a contractor is not in agreement with the Work Order, he may present a Claim as established in Article 11.5 of PBA Uniform General Conditions.

SECTION 1.0 GENERAL REQUIREMENTS

1.1 DESCRIPTION OF WORK AND CONTRACTOR RESPONSIBILITIES

This specification covers removal and disposal of materials previously identified as Asbestos-Containing Material (ACM) in independently prepared bulk material analysis reports, and removal and disposal of related materials.

1.1.1 Description of Work

- A. The work is, in general terms: Furnish all labor, tools, equipment, material, employee training and testing, permits, waste disposal services, supervision and subcontracting necessary for and reasonably incidental to the completion of removal and disposal of all ACM as specified in the WORK ORDER. This includes all asbestos-containing debris; dust, over spray, or asbestos-contaminated materials. All work shall be performed in accordance with prevailing State and Federal Regulations, including but not limited to the US Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA) the Puerto Rico Occupational Safety and Health Administration (PROSHA) and the Environmental Quality Board (EQB) regulations and any all other regulations.
- B. Special note is given to the combination of interior demolition with removal and disposal of ACM. ACM encountered during demolition shall be left intact and removed and disposed of under controlled conditions as ACM.
- C. This specification covers removal and disposal of ACM and all materials that may have been contaminated during decay or disruption of ACM either prior to or during Contractor's work.
- D. The procedures for removal of the following asbestos-containing materials are contained in this general specification:
 - 1. Friable Asbestos-Containing Materials
 - 2. Nonfriable Asbestos-Containing Materials
 - 3. Asbestos-Containing Mastic Materials
 - 4. Other Asbestos-Containing Materials
 - 5. Exterior, Nonfriable ACM
 - 6. Glove Bag Procedure
 - 7. Mini-Containment Procedure
 - 8. Decontamination of Contaminated Areas

9. When work areas include both friable and non friable types of ACM, Contractor shall prepare work area using procedures for friable asbestos removal.
- E. The following asbestos-containing materials shall be removed and disposed of:
1. All materials identified in the WORK ORDER.
 2. All materials that have accumulated from installation, decay, or disruption of any ACM.
 3. All other materials in removal area must be thoroughly cleaned and sealed in two (2) layers of six (6) mil fire-retardant polyethylene sheeting, or removed prior to disturbance of ACM (see WORK ORDER).
- F. Related Work
1. Related work includes all work necessary for successful completion of removal and disposal of ACM but not directly involving ACM. This work includes but is not limited to:
 - a. Protection of the building and property in the building from work related damage.
 - b. Proper cleaning and/or disposal of contaminated and non-contaminated materials.
 2. Related work includes the maintenance of daily work logs by Contractor on the job site. These work logs shall be supplied by a Contractor and must include:
 - a. The name of each person, and description of the type of respiratory protection worn by each person entering containment or work area.
 - b. Descriptions of meetings or discussions regarding the job, special or unusual events, records of daily containment inspections as required by 1926.1101 (o)(2), records of waste removal from containment, the chart from the recording manometer, and air monitoring results.
 - c. Contractors shall be responsible for a complete daily work log for completeness, and sign each page at the end of each shift.
 - d. A copy of this daily work log, signed by Supervisor must be submitted to **Owner asbestos inspector** and/or to the Public Buildings Authority (PBA) Environmental Division at the end of the project as a condition for completion.
- G. The project shall be termed complete and Contractor released upon satisfaction of all terms and conditions of this specification, including:

1. All required forms, logs, and receipts and satisfactory completion of air testing and site inspection by Contractor and supervised by the owner.
2. A project complete release letter shall be provided to Contractor by the Owner Asbestos Inspector, a copy shall be provided to the Owner (PBA). This release will be based on the final visual inspection and the clearance air samples results as analyzed by Transmission Electron Microscopy (TEM).

H. Work Schedule

Upon receipt of notification to proceed with a specific project by the Owner, Contractor must file all notices to the applicable regulatory agencies, and obtain all required permits to perform the asbestos abatement. **Contractor must submit to Owner a notarized affidavit that notifications have been sent to the applicable regulatory agencies, as well as a copy of the notification of asbestos abatement and permits. Upon commencement of work, Contractor must complete the project within the time specified in the ORDER TO PROCEED.**

1.1.2 Contractor Responsibilities

- A. Contractor and its employees must be experts (more than 3 years of experience) in asbestos removal with full knowledge of, and compliance with, all applicable Federal, State, and Local rules, regulations, and guidelines governing asbestos removal as well as state-of-the-art removal techniques.
- B. Contractor must provide all permits, labor, material, services, insurance, tools, equipment, and notifications in accordance with EPA, OSHA, PR OSHA, EQB, and all other applicable agencies to complete removal of ACM.
- C. Contractor must attend a pre-construction meeting to be held at a mutually agreeable time and date. Attending to this meeting will be the Owner, Contractor, Supervisor, PBA Environmental Division, the Owner Asbestos Inspector and regulatory or related entity representative to the owner discretion.
 1. Abatement Contractor Supervisor assigned to project must attend this meeting.
 2. All pre-construction submittals by Contractor will be reviewed at this meeting. Contractor shall be prepared to discuss and submit plans or documentation for:
 - a. Preparation of work area
 - b. Personal protective equipment

- c. Historical air monitoring data that shows levels of airborne fibers on similar jobs in the past
 - d. Employee training certificates and written statement certifying the employee's year of experience.
 - e. Decontamination procedures
 - f. Abatement methods and procedures
 - g. Handling and disposal procedures for ACM
 - h. Final decontamination and cleanup procedures
 - i. Sequence and schedule of work
 - j. Emergency procedures
 - k. Respiratory Protection Program including evidence of respiratory protection training and current respirator fit tests.
 - a. Owners Safety requirements
 - l. Any site specific owner requirements
 - m. Mitigation materials or products requirements
3. There will be a final walk-through of the building and discussion of plans, anticipated problems, and areas of special concern.
- D. If the Owner permits Contractor to use any of its equipment, tools, utilities, or facilities, such use shall be gratuitous and Contractor shall release and hold harmless Owner from any responsibility arising from claims or personal injuries, including death, arising out of the use of such equipment, tools, or facilities irrespective of the condition thereof or any negligence on the part of the Owner in permitting its use.
- E. Should Contractor fail or be unable to execute the contract and complete the work for any reason, then Contractor shall be penalized in accordance with agreements stated in contract documents.
- F. Owner retains the right to stop work by and/or dismiss Contractor for any breach of specified procedures, including but not limited to airborne fiber levels exceeding 0.01 fibers/cc outside the containment. Dismissal of Contractor may also result in claims against Contractor in accordance with agreements stated in contract documents.
- G. Inspections: Inspections of work area will be made by Owner Asbestos Inspector and Owner (PBA Environmental Division) at scheduled intervals during the course of the project. It is Contractor's responsibility to ensure that:
- 1. Work area is initially cleaned and properly prepared for removal of ACM.
 - 2. Asbestos Containing Materials (ACM) are being properly removed and disposed.
 - 3. Employees of Contractor are properly protected.

4. All ACM have been removed and disposed in accordance with the procedures contained in these specifications and WORK ORDER.
- H. The inspections will merely confirm that these conditions have been met. It is the sole responsibility of Contractor to correct any subsequent discoveries of inadequate initial cleaning, preparation, work procedures, or remaining ACM encountered after an inspection, regardless of the outcome of such inspection.
- I. Supervisory Personnel: Contractor must have an accredited Supervisor (competent person as OSHA definition) at each job site at all times, from mobilization to completion. Failure to have a Supervisor present shall result in termination of all asbestos abatement activities for the remainder of the day, or until an accredited Supervisor is again present. **Contractor shall not begin work until an accredited Supervisor is present, and shall cease all work when Supervisor leaves the work site.**
- J. Security of Containments: Contractor must secure all entrances to containments with a lockable plywood door. The door will be locked with a combination lock. The combination will be given to Owner Asbestos Inspector and Owners Security Representative. When decontamination units are located on the exterior of buildings, Contractor must cover the exterior portion of decontamination unit with 2" plywood, or suitable optional material to be approved by Owner Asbestos Inspector and Owner (PBA environmental Division).
- K. Contractor (including the contractor's employees and sub-contractors) will keep confidential and not divulge or communicate any information related to the assessment work or any other Owner's information without written authorization from the Owner. Any release of information requested by third parties needs a written authorization from Owner. Any release of information without the written consent of the Owner that proves to cause any harm or damages to the Owner will result in a penalty and/or cancelation of the contract.
- L. Suspect Asbestos-Containing Material- For any types of extensive, non incidental asbestos containing material (ACM) which are encountered during removal, and which are not specified above, the Contractor shall remove and dispose of such material according to the methods specified herein by appropriate change order, as directed by the Owner or its representative. All such materials shall be quantified by the Owner or its representative and the cost agreed by the Contractor and the Owner prior to commencing any asbestos abatement work.
- M. Project Conditions-Specific work areas of the building will not be occupied by the owner, general public, or lessees' during the work performed under this contract. If the Contractor hires any subcontractor (Subs) to perform any part of this work, all such Subs shall be notified of the location of asbestos abatement activities and the

schedule of such activities in accordance with these specifications, and as required by OSHA 29 CFR 1926.1101 (K).

1.2. SUBMITTALS, NOTICES, RECORDKEEPING, AND REFERENCES

1.2.1 Submittals

- A. Upon notification of award of contract, Contractor must submit to owner (copy to Owner Asbestos Inspector) the following documents:
1. A copy of Contractor's Licenses.
 - a. A certificate of insurance issued by Contractor's insurance carrier which indicates that Contractor holds an asbestos risk insurance policy on an occurrence basis for an amount not less than \$1,000,000 U.S. dollars. The insurance carrier must be State admitted and rated at least B+ by a nationally recognized insurance rating agency. The certificate of insurance shall name the Owner as additionally insured.
 2. A notarized statement signed by an authorized officer of the company, containing the following information:
 - a. A record of any and all citations issued by Federal, State, or Local regulatory agencies in the United States and its recognized territories relating to asbestos abatement activities. Include projects, dates and resolutions.
 - b. A list of penalties incurred through non-compliance with asbestos abatement project specifications including liquidated damages, overruns in scheduled time limitations, and resolutions.
 - c. Situations in which an asbestos abatement-related contract has been terminated including projects, dates and reasons for termination.
 - d. Copies of any notices of intent to initiate enforcement or settlement agreements such as: Notice of Violation, Notice of Intent to Enforce Violation, or Consent Agreements.
 - e. A list of any asbestos-related legal proceedings/claims in which Contractor (or employees scheduled to participate in this project) have participated or are currently involved.
 3. A copy of Contractor's drug and alcohol abuse policy.
 4. The resumes of the person(s) who are employed by Contractor and are licensed as asbestos abatement contractors in the Commonwealth of Puerto Rico where work will take place, and all accredited Supervisors that will be used in the asbestos abatement projects for the Owner.

5. A copy of the training certificates and Environmental Quality Board (EQB) carnets identification for all personnel to be employed on asbestos abatement projects for the Owner.
6. A copy of Contractor's Respiratory Protection Program that includes:
 - a. A statement of Respiratory Protection Training
 - b. Current copies of qualitative and/or quantitative respirator fit test results for all employees to be used on asbestos abatement projects for the Owner. Respirator fit tests must be performed using respirator brands.
 - c. A copy of the current medical certificates for all employees to be used on asbestos abatement projects for the Owner. The certificates must have the name of the medical center, name of attending physician, and signature of attending physician, and some indication that the individual is physically capable of performing asbestos abatement work.
7. A copy of each type of form used by Contractor in the course of asbestos
 - a. abatement work
8. A copy of Contractor's Worker Protection Procedures.
9. A copy of the following documents:
 - a. Emergency procedures and evidence of employee training in these procedures.
 - b. Contractors Emergency Evacuation Plan for each specific project.
 - c. Contractors Hazard Communication Program and evidence that employees have been trained in the provisions of this program.
10. A copy of the manufacturer's certification that vacuums, ventilation equipment, and other equipment required to contain airborne fibers conform to the American National Standards Institute (ANSI) "Fundamentals Governing the Design and Operation of Local Exhaust Systems", Publication Z9.2-79, and certification that all respirators to be used are NIOSH approved.
11. A copy of the product specifications for all other asbestos abatement supplies and equipment to be used on asbestos abatement projects for Owner. These product specifications include, but are not limited to: protective clothing, head gear, footwear, safety belts, goggles, fire-retardant polyethylene sheeting, pressurized washers, shredders, and all other equipment or supplies that shall require decontamination on the asbestos abatement projects.
12. Contractor should provide a certification that all material to be used for replacement of ACM must be asbestos and lead free.
13. The approval of the landfill(s) to be used by Contractor with a statement that proposed landfill(s) meet all applicable Federal, State, and Local regulations for the

disposal of ACM.

14. A copy of the product specifications and material safety data sheets (MSDS) for all encapsulants to be used on asbestos abatement projects for the Owner.
15. A statement that all royalties and patents have been honored by Contractor or that Contractor holds Owner harmless from any situation arising from negligence of Contractor to honor such fees.

B. Five working days prior to proceeding with a specific asbestos abatement project, Contractor must submit to the Owner Asbestos Inspector the following documents:

1. A copy of the notice of intent (NOI) to demolish or renovate to the appropriate State or Federal Agency, depending on location of the work.
2. A notarized affidavit that notice of intent (NOI) to demolish or renovate was sent by Contractor.
3. An Action Work Plan that outlines specific procedures for construction of decontamination units, isolation of work areas, and performance of initial cleaning in the work areas.
4. A proposed Schedule of Progress for the specific asbestos abatement project.
5. A copy of the Environmental Protection Agency (EPA), Environmental Quality Board (EQB) or appropriate State agencies approval for the proposed disposal site.
6. A copy of all permits require by local and federal agencies.
7. A statement that reserve or auxiliary power for HEPA-filtered exhaust units has been obtained in case of power failure.
8. A statement that initial cleaning before the initiation of any response action in work areas shall be performed in accordance with 40 CFR Part 763.91 (c).

C. Upon completion of a specific asbestos abatement project, Contractor must submit the following documents to the Owner Asbestos Inspector:

1. All disposal receipts for asbestos-containing materials (ACM) acquired during the asbestos abatement project.
2. A copy of all daily logs, sign-in sheets, and daily reports.
3. The original daily chart recordings from manometers for the specific asbestos abatement project.
4. A list of the names and signatures of all persons involved in the asbestos removal on each specific project. Include Environmental Quality Board accreditation and a copy of carnets identification for each person.
5. A certification of compliance statement that all asbestos-containing materials

related to the WORK ORDER have been removed and disposed of in accordance with all applicable Federal, State, and Local regulations for asbestos abatement.

- D. All submittals sent to PBA's Environmental Division, Owner or Owner Asbestos Inspector is expected to be neat, complete, accurate, and readable in English and/or Spanish.

1.2.2 Notices to Contractor

The following section contains general notices applicable to Contractor for all asbestos abatement work for the Owner.

A. Employee Behavior

1. Contractor must provide its employees with a written policy of drug and alcohol abuse. No employee of Contractor shall be allowed to remain on Owner's property who is intoxicated by drugs (substance abuse) and/or alcohol, or who is observed using drugs or alcohol on Owner's property.
2. Contractor is expected to enforce its drug and alcohol abuse policy at all times while conducting business.
3. Weapons and other hazardous, dangerous, or otherwise disruptive items in the possession of Contractor or its employees are not allowed on Owner's property.
4. All contractors' employee shall be freshly shaved on daily basis prior to the commencement of each work shift. The Owner Asbestos Inspector and/or PBA's Environmental Division can direct the shift supervisor to have any and all employees removed from the work site if the Owner Asbestos Inspector and/or PBA's Environmental Division determines that employees facial hair may impede and adequate respiratory seal.
5. Contractor and its employees are required to display good manners to building staff and occupants at all times while on Owner's property. Complaints to PBA's Environmental Division or Owner regarding harassment, threatening behavior, poor personal hygiene, or use of profanity or offensive language by any employee of Contractor may result in the suspension of abatement activities until the behavior problem is corrected or employee is removed from owners property.

B. Performance Standards: Contractor shall perform all asbestos removal using

techniques and procedures recognized by the asbestos removal industry as being safe and effective in the control of fiber release during removal of ACM. Contractor is expected to perform all removal, cleaning, and disposal operations in a manner that would meet final air clearance standards for analysis by Transmission Electron Microscope (TEM).

C. Pay Requests: All requests for payment by Contractor must be submitted to the Owner and Owner Asbestos Inspector.

D. Analytical and Test Results

1. Results of bulk sample analyses of ACM pertaining to the scope of the asbestos abatement projects are available from owner at contractor's request.
2. Results of background and previous air monitoring tests made by the Owner Asbestos Inspector prior to commencement of work will be available from PBA's Environmental Division upon request prior to the beginning of asbestos removal project.
3. Results of final air tests analyzed by Phase Contrast Microscopy (PCM) are responsibility of the Contractor and will be made available to owner within, at least, 24 hours of collection of the sample. Results of final air tests analyzed by Transmission Electron Microscopy (TEM) are responsibility of the Owner and will be made available within, at least, 48 hours of completion of collection of the sample. Owner Asbestos Inspector will make every reasonable effort to obtain these test results in a time and manner suitable to Contractor and owner's work schedule.

E. Condition of Building and Fixtures: Contractor and Owner Asbestos Inspector shall agree in writing on the condition of the building and fixtures, prior to commencement of work. A report on the "Condition of Building and Fixtures" must be signed by both Contractor and Owner Asbestos Inspector prior to commencement of asbestos abatement. Damages incurred by Contractor must be repaired and/or damaged materials replaced at Contractor's expense.

F. Royalties and Patents: All fees, royalties, and claims for any invention, or pretended invention, or patent on any article, material, arrangement, appliance or method that may be used upon or in any manner be connected with the construction of this work

or accessories are hereby included in the prices stipulated in this contract for said work: Contractor hereby expressly binds himself or itself to indemnify and save harmless Owner from all such claims, fees, and from any and all suits and actions of every name and description that may be brought against Owner on account of any such claims, fees, royalties, or costs for any such invention or patent, and from any and all suits or actions that may be brought against Owner for the infringement of any and all patents or patent rights claimed by any person, firm or corporation.

- G. Indemnification: Contractor agrees to indemnify, defend, save and hold harmless Owner from all claims, demands, liabilities, and suits of any nature no matter the extension they arise out of, or are due to the negligent or wrongful act or omission by Contractor or its employees.

1.2.3 Record keeping

- A. For each building where ACM has been removed, air records concerning removal of asbestos-containing materials shall be kept and a copy of these records given to Owner Asbestos Inspector between 24-hour turnaround time after samples collection. Owner Asbestos Inspector and contractor shall submit all documentation to PBA's Environmental Division and to the Owner.
- B. For each specific asbestos removal project, Contractor shall provide to Owner Asbestos Inspector and PBA's Environmental Division with a written description of the asbestos removal measure that shall include:
 - 1. Methods used
 - 2. Location of removal project
 - 3. Start and completion dates
 - 4. Names and addresses of all contractors (and subcontractors) involved in the activity
 - 5. State Asbestos Abatement License and permits
 - 6. The name and location of the disposal site
- C. Provide to Owner Asbestos Inspector and PBA's Environmental Division a copy of training records for each person used by Contractor that shall include:
 - 1. The person's name and job title
 - 2. Date of completion of training

3. Location of the training
 4. Number of hours of training
- D. For each asbestos removal project, the name, signature, State of accreditation, and accreditation number of each person performing the removal shall be recorded and given to Owner Asbestos Inspector and PBA's Environmental Division.
- E. For each asbestos abatement project performed for Owner, Contractor shall certify that all asbestos-containing materials related to the WORK ORDER have been removed and disposed of in accordance with all applicable federal, state, and local regulations for asbestos abatement.

1.2.4 Applicable Reference Documents

The most recent issue of each document is applicable. In case of overlapping jurisdiction of documents or regulations, the most stringent requirements are applicable.

A. Applicable Regulations

Compliance with all applicable regulations is required. These regulations include, but are not limited to:

ERA 40 CFR 61, subpart A: Regulation for Asbestos

ERA 40 CFR 61 Subpart B: General Provisions

ERA 40 CFR part 61, subpart M: National Emission Standard for Asbestos

ERA 40 CFR 241: Guidelines for the Land Disposal of Solid Wastes

ERA 40 CFR 257: Criteria for Classification of Solid Waste Disposal Facilities
& Practices

ERA 40 CFR 262: Standards Applicable to Generators of Hazardous Waste

ERA 40 CFR 263: Standards Applicable to Transporters of Hazardous Waste

ERA 40 CFR 264: Standards for Owners of Hazardous Waste Treatment,
Storage & Disposal Facilities

ERA 40 CFR 265: Interim Status Standards for Owners of Hazardous

Waste Treatment, Storage & Disposal Facilities

ERA 40 CFR 268: Land Disposal Restrictions

ERA 40 CFR 763 subpart E: Asbestos-Containing Materials in Schools: Final Rule and Notice

ERA 40 CFR 763 subpart G: Asbestos Abatement Projects; Worker Protection

OSHA 29 CFR part 1926 subpart F: Fire Protection and Prevention

OSHA 29 CFR part 1910, subpart D: Occupational Exposure to Asbestos: Final Rule

OSHA 29 CFR part 1926.1101: Occupational Exposure to Asbestos; Construction Industry Standard

OSHA 29 CFR part 1926 subpart E: Personal Protective and Life Saving Equipment OSHA 29 CFR part 1910.134: Respiratory Protection

OSHA 29 CFR part 1926.59 and 1910.1200: Hazard Communication

DOT 49 CFR parts 171 and 172: Hazardous Substances Transportation: Asbestos; Final Rule

Environmental Quality Board (EQB): Regulation for the Control of Atmospheric Pollution-Rule 422

Procedures described in the following guidance documents are also applicable to this contract unless specifically stated by Owner inspector or his agent:

EPA 600/4-85-049: Measuring Airborne Asbestos Following an Abatement Action (November)

EPA 560/5-85-005: Evaluation of the EPA Asbestos-in Schools Identification and Notification Rule

EPA 560/5-85-006: Asbestos in Buildings: National Survey of Asbestos-Containing Friable Materials

EPA 560/5-85-024 Guidance for Controlling Asbestos-Containing Materials in Buildings

EPA 530 SW-85-007 Asbestos Waste Management Guidance (May)

NIOSH 7400 Method: NIOSH Manual of Analytical Methods, NIOSH Publication 84-100.

NIOSH 7402 Method: Asbestos Fibers, NIOSH Manual of Analytical Methods, NIOSH Publication 84-100

Among others

1.2.5 Warning Signs and Labels

- A. Each disposal bag or waste container must be labeled with "Asbestos NA2212," the generator's name and location, and a class 9 label. Disposal bags shall be marked as follows:

“DANGER”

**CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER & LUNG DISEASE
HAZARD**

**RQ-ASBESTOS
9-NA2212-PGIII**

The transport container must have a Class 9 label with the asbestos ID number 2212 in an orange rectangular or white square on point display on all four sides of the container.

- B. Warning signs shall be posted at all entrances to the work area and shall be labeled as follows:

**DANGER
ASBESTOS
CANCER & LUNG
DISEASE HAZARD**

**AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA**

- C. Barrier tape shall be placed at all hallways and corridors that lead to the work area and will display the following:

**DANGER DO NOT ENTER
OR:
RESTRICTED AREA – AUTHORIZED
PERSONNEL ONLY**

1.3 EQUIPMENT REMOVAL, SITE SECURITY, AND SITE CONDITIONS

1.3.1 Equipment Removal Procedures

Clean external surfaces of contaminated containers and equipment thoroughly by wet-cleaning with sponges, or use HEPA-filtered vacuum before moving such items into equipment decontamination unit washroom for final cleaning and removal to uncontaminated areas. Ensure that personnel do not leave work areas without going through equipment decontamination unit.

1.3.2 Site Security

- A. Contractor shall provide site security during the hours when Supervisor and workers are on site at no additional cost to the Owner. During the hours when Contractor is not on site, Owner will specify the time period during which security shall be required. Contractor may, at Contractor's option, employ a security service, or use employees of Contractor. Owner may, at Owner's option, provide "off-time" site security.
- B. The Contractor should provide to Owner Asbestos Inspector and Security Office a list of all personnel working on the abatement project and their authorized schedule. As well as the plate number of authorize vehicles.
- C. The entrance to the containment must be locked at all times that an employee of Contractor is not present at the entrance.
- D. When decontamination units are located on the exterior of buildings, Contractor must cover the exterior portion of decontamination unit with 2" plywood, or other suitable material to be approved by PBA's Environmental Division, Owner and/or

Owner Asbestos Inspector.

- E. Contractor is responsible for all damages to the building or its contents or occupants that result from the operation of Contractor's equipment or personnel within the building, except when specified by Owner Asbestos Inspector or PBA's Environmental Division. Damages include, but are not limited to cleanup of any areas contaminated by Contractor during his work and all liquidated damages as stated and agreed to by Owner and Contractor as a result of Contractor's activities.

1.3.3 Site Conditions

- A. Facilities: Domestic power and access to water will be made available for Contractor's use for the duration of each specific abatement project. When these utilities are inadequate, Contractor must supply additional utilities. Arrangement must be made with the Owner for use of bathroom facilities during each specific abatement project.
- B. Extent of initial cleaning: When the Owner Asbestos Inspector or PBA Environmental Division has determined that friable or damaged asbestos-containing materials have contaminated or potentially contaminated equipment and surfaces in the work area, all exposed surfaces in work area that will be protected by fire-retardant polyethylene sheeting shall be thoroughly cleaned with HEPA-filtered vacuums and wet-cleaned prior to installation of fire-retardant polyethylene sheeting over these surfaces.
- C. Equipment storage: Arrangement for equipment storage will be made during pre-construction meeting.
- D. Dumpster location: Arrangements for location of dumpsters to be made at pre-construction meeting. All dumpsters used on asbestos abatement projects for the Owner must be secured with locks and properly labeled. Dumpsters must remain locked at all times while present on Owner's property, except when opened to receive waste.
- E. Contractor parking: Arrangements for Contractor employee parking to be made at the pre-construction meeting.

1.4 PERSONAL PROTECTION

1.4.1 Personal Protection

- A. Prior to commencement of work, the workers must be instructed, knowledgeable,

and accredited by an EPA-approved training facility on the hazards of asbestos exposure, on the use and fitting of respirators, on protective clothing, and on all aspects of work practices and protective measures. This training must comply with all regulations applicable to workers training in Puerto Rico. All workers must have evidence of current accreditation in their possession, or I.D. cards issued by an EPA-approved training agency/Environmental Quality Board (EQB). Workers having expired accreditation certificates **will not be allowed in work area.**

- B. In accordance with 29 CFR 1926.150, Contractor shall supply fire extinguishers for use inside and outside the work area. Contractor shall ensure that all employees have been instructed in the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.
- C. Respiratory Protection
1. Provide workers with personally issued and marked respiratory equipment approved by NIOSH and suitable for asbestos exposure level in work area.
 2. Half-mask, dual cartridge, air purifying respirators must be worn by all personnel during the preparation of work areas having friable ACM. Respiratory protection will not be required for preparation of work areas having only nonfriable ACM (only if a negative exposure assessment for that activity has been determined). Workers may use respiratory protection when not required, if they so desire.
 3. If Contractor personnel intend to use a respirator less efficient than a Powered Air Purifying Respirator (PAPR) for removal of friable ACM, Contractor must make available air testing results that show that fiber levels for similar work performed in the past were less than 0.1 fibers/cc. When fiber counts in excess of 0.1 fibers/cc are anticipated, PAPR or Type C pressure demand respiratory equipment will be the minimum required respiratory equipment.
 4. When respirators with disposable filters are employed, Contractor must provide sufficient replacement filters as required by the worker or applicable regulations.
 5. Contractor shall begin removal of friable surfacing or thermal insulation ACM with all personnel in work area using PAPR or Type C supplied air respirators unless documentation is submitted to Owner Asbestos Inspector and PBA's Environmental Division that shows permissible levels of airborne fibers (1.0 fibers/cc or less) on similar jobs in the past, if any. Owner Asbestos Inspector and PBA's Environmental Division must approve all documentation in writing, before use of PAPR or Type C respirators can be waived.

D. Respirator Selection and Protection Factors: The following table shall be used as guideline for respirator selection criteria for asbestos removal projects:

Table 1. Respirator Selection Criteria		
Respirator Type	Protection Factor	Maximum exposure fibers/cc EPA/NIOSH
Air Purifying:		
Half-mask	10x	0.1
Full-mask	50x	0.5
PAPR	100x	1.0
Air Supplied:		
Continuous	100x	1.0
Pressure Demand	1000x	10.0
Self-Contained	>1000x	>20.0

E. Protective Clothing

1. All employees of Contractor, and authorized visitors are required to wear protective clothing while inside work areas. The protective clothing must be wear properly. No modifications to the clothing may be made that exposes the wearer's skin, other than the hands and face.
2. Contractor must provide workers, Owner Asbestos Inspector and authorized visitors with sufficient sets of protective full body clothing. Such clothing will consist of protective full body coveralls and headgear. Contractor must provide eye protection and hard hats to all employees and authorized visitors, when required by applicable safety regulations.
3. Non-disposable protective clothing and footwear must be left in equipment room until the completion of the asbestos abatement work. At this time, such items must be disposed of as ACM, or must be thoroughly cleaned of all ACM. Disposable protective clothing, headgear, and footwear may be provided.
4. The use of canvas or leather footwear is strictly prohibited in contaminated areas or work areas. All authorized personnel must wear rubber boots, or other approved footwear that is easily decontaminated. Footwear must be approved by Owner

Asbestos Inspector and PBA's Environmental Division.

- F. Provide and post, in equipment room and clean room, the decontamination procedures, work procedures, and personal protection procedures to be followed by workers, as described in **PARAGRAPH H** of this part of these specifications.
- G. Provide and post, in clean room, the a map and clearly marked route of the location of the nearest hospital, telephone, applicable emergency phone numbers, and any other emergency information and procedures for this work.
- H. Worker Protection Procedures
 - 1. Each worker and authorized visitor must, upon entering the job site: remove street clothing in clean room and put on a respirator with functional filters and clean protective clothing before entering equipment room or work area. Workers intending to re-wear contaminated protective clothing stored in equipment room must enter equipment room wearing only respirators (workers will be permitted to wear tight-fitting, nylon swimsuits beneath their protective clothing).
 - 2. Each worker and authorized visitor must, each time he leaves work area:
 - a. Remove gross contamination from clothing with a HEPA-filtered vacuum before leaving work area.
 - b. Proceed to equipment room, remove all clothing except respirators and optional swimsuit, and proceed directly to shower room.
 - c. Wet the outside of the respirator with water while showering.
 - d. Remove the respirator and thoroughly shampoo and wash themselves,
 - e. If worker intends to change filters, remove filters, wet them, and dispose of them in the container provided for this purpose.
 - f. Wash and rinse the inside of the respirator.
 - 3. After showering, each worker and authorized visitor must:
 - a. Proceed directly to clean room, dry off, and dress in uncontaminated street clothes at the end of each day's work, or before eating, smoking, or drinking.
 - b. Before re-entering work area from clean room, each worker and authorized visitor must put on a respirator equipped with functional filters and must dress in clean protective clothing.
 - 4. Workers intending to re-wear contaminated protective clothing stored in equipment room must enter equipment room wearing only respirators and optional swimwear.
 - 5. Workers removing waste containers from equipment decontamination unit must enter holding area from outside wearing a respirator and dressed in

clean protective clothing. No worker shall use this unit as a means to leave or enter washroom or work area.

6. Workers must not eat, drink, smoke, chew gum or tobacco, or apply cosmetics at the worksite except outside the controlled area. Smoking will not be permitted in the Facility at any time.

I. Type C Air Supplied System

When a Type C Supplied Air System is to be used, the following specifications apply:

1. Grade D Air: Compressed air must be at least Grade D quality. Certification of Grade D air quality must be supplied by an independent testing lab after the system has been installed on site.
2. Compression: When supplied air is required, compressors shall be used throughout removal project to generate the air supply. The following specifications apply to compressor procedures:
 - a. Compressor Shut Down: Interconnect monitors, alarms and compressor so that compressor is automatically shut down and the alarms sounded if any of the following occur:
 1. Carbon Monoxide (CO) concentrations exceed 5 ppm/v in the air line between the filter bank and backup air supply,
 2. Compressor temperature exceeds normal operating range.
 - b. Compressor Location: Locate compressor in a location that will not impede access to the building and that will not cause a nuisance by virtue of noise, exhaust gases, or fumes to occupied portions of the building.
 - c. Air Intake: Locate air intake remotely from any source of automobile exhaust or any exhaust from motors or buildings.
3. Purification: Supplied air must be purified using the following system of equipment:
 - a. After cooler
 - b. A coalescing filter
 - c. Two adsorption filters consisting of:
 - a. A molecular sieve to remove water vapor
 - b. An activated charcoal filter
 - d. A mechanical filter capable of removing particles greater than 10 microns in diameter.

- e. A carbon monoxide (CO) monitor equipped with a visual and audible alarm.
 - 4. Storage: Provisions must be made to store a volume of air sufficient for safe exit from work area in the event of compressor failure. Stored air may not be necessary when respirators are equipped with a HEPA egress filter. HEPA egress filters may be used for emergency egress only in asbestos abatement containments.
 - 5. Delivery: The air supply system must deliver air at a pressure sufficient to meet the respirator manufacturer's flow requirements. Any air-line respirators chosen must be of the Positive Pressure, Pressure Demand type, and approved by NIOSH. No unapproved respirators may be used at any time. The maximum air-line length must not exceed 300 feet, and maximum inlet pressure at the mask must not exceed 125 psi.
- J. Protection from Heat Stress: In work areas where heat stress to workers is inevitable, such as roofs and hot mechanical rooms Contractor must provide adequate work breaks in cool areas outside work area, and/or body vests with ice pack inserts, depending on the site conditions.

SECTION 2.0 LABOR, MATERIALS, AND EQUIPMENT

2.1 Materials

- A. Contractor must provide all labor, materials, equipment, and subcontractors necessary for removal and disposal of ACM in a manner consistent with these specifications. These materials include but are not limited to:
 - 1. Fire-retardant polyethylene sheeting (6 mil minimum thickness) for floors
 - 2. Fire-retardant polyethylene sheeting (4 mil minimum thickness) for walls
 - 3. Staples, nails, and tape capable of sealing joints and securing polyethylene to all necessary surfaces
 - 4. Surfactant mixed in recommended proportions
 - 5. Containers to receive and retain ACM with appropriate labels
 - 6. Warning signs and labels
 - 7. Glove bags (when applies)
 - 8. Encapsulants
 - 9. Other Materials: All necessary materials for removal and disposal of asbestos in compliance with all applicable codes and regulations, and these specifications.
- B. Deliver all materials in the original packages, containers, or bundles bearing the

name of the manufacturer and the brand name.

- C. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.
- D. Damaged or deteriorated materials shall not be used and must be removed from the premises. Material that becomes contaminated with asbestos must be disposed of in accordance with the applicable regulations.

2.2 Tools and equipment

- A. Provide suitable tools for asbestos removal, including but not limited to scrapers, brushes, razor knives, wrenches, tools for constructing containment and decontamination units, brooms, carts, and safety equipment.
- B. Provide suitable air moving and exhaust equipment, including but not limited to:
 - 1. A method for maintaining pressure differential of 0.02 inches of water column inside containment than outside.
 - 2. HEPA-filtered vacuums
 - 3. Recording manometers for monitoring the pressure inside containment relative to outside
 - 4. Portable lighting and power supplies as necessary.
- C. No equipment shall cause suspension of ACM within work area or discharge of asbestos fibers outside of work area.

SECTION 3.0 EXECUTION

This section applies to the preparation, removal, cleanup, and disposal of asbestos-containing materials that are friable, nonfriable, and mastic materials. Refer to SECTION 4.0 for SPECIAL PROCEDURES to be used for removal of exterior roofing materials, exterior asbestos cement panels, glove bag removal, mini-containment, and decontamination of contaminated areas.

3.1 PREPARATION

This part is intended to be used as a general specification for preparation of work area for

any particular asbestos abatement project for the Owner. Owner Asbestos Inspector and PBA's Environmental Division complete the WORK ORDER for each individual project for more specific preparation requirements.

3.1.1 General

Proper preparation of the work area prior to asbestos abatement is crucial to the success of asbestos abatement projects. The general aspects of preparation of the work area, as required by the Owner are discussed below:

- A. Critical Barriers: All asbestos abatement work involving friable ACM and nonfriable ACM shall require the installation of critical barriers at all penetrations to the work area.
- B. HVAC and Electrical Shut Down: HVAC systems serving the work area must be either shutdown or temporarily capped on all asbestos abatement projects. Electrical systems serving the work area shall be shut down and secured, or special provisions with Owner must be made to ensure the safety of abatement workers while asbestos abatement is performed. All electrical equipment used by Contractor in the work area must be protected by GFI circuits. The electrical supply to the work area must be located outside the containment.
- C. Pre-cleaning: When Owner Asbestos Inspector and PBA's Environmental Division has determined that friable or damaged asbestos-containing materials have contaminated or potentially contaminated equipment and surfaces in the work area, Contractor must HEPA vacuum and wet-wipe these items before application of protective covering.
- D. Polyethylene Sheeting: In general, all fixed objects and architectural surfaces in the work area must be protected from contamination during asbestos removal or from damage from application of encapsulants after asbestos removal. In certain instances, Owner Inspector and PBA's Environmental Division may not require a covering for walls, floors, or ceilings if the wall, floor, or ceiling material is smooth, non-porous, easily cleaned, and will not be aesthetically affected or damaged by application of encapsulants.
- E. Pressure Differential: All work areas must be placed under a pressure differential of at least minus 0.02 inches of water column, with respect to outside areas, prior to

disturbance of asbestos-containing materials. In instances where mastic materials are the only type of ACM disturbed in the work area, a pressure differential within the work area will not be necessary. Instead, the intake of a HEPA-filtered exhaust unit or HEPA-filtered vacuum may be placed close to the area where asbestos is being disturbed.

3.1.2 Preparation for Friable Materials

Friable ACM includes materials known to contain greater than 1 percent asbestos by the polarized light microscopy (PLM) method of analysis, and can be crumbled or reduced to powder by ordinary hand pressure. These materials include, but are not limited to: spray-applied fireproofing; spray-applied ceilings or walls; plaster walls (during demolition); all thermal system insulation classified as corrugated asbestos paper, asbestos block, plaster mud insulation, or mudded fitting insulation; ceiling tiles; or any other materials identified in the WORK ORDER as being friable ACM.

A. Preparation for Full Containment for Friable Materials

1. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel, approved by Owner Asbestos Inspector and PBA's Environmental Division.
2. Shut down electric power when necessary. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFIC) at all temporary power sources in work area. Locate power source for temporary power panels and electrical equipment outside work area. All modifications to the electrical power systems must be carried out by a licensed electrician.
3. Shut down and isolate cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the structure. During the work, vents within work area must be sealed with, at least, tape and fire-retardant polyethylene sheeting, unless otherwise indicated in the WORK ORDER.
4. Clean supply and return air grilles, remove filters and dispose of filters as

ACM.

5. Clean moveable objects and carpeting within the proposed work areas using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and remove such objects from work area to a suitable temporary location.
6. Clean fixed objects within the proposed work area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and enclose objects with 6 mil fire-retardant polyethylene sheeting sealed with tape.
7. Clean proposed work areas using HEPA-filtered vacuums or wet-cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters must not be used.
8. Seal off all openings, including but not limited to: corridors, doorways, elevators, skylights, ducts, grills, diffusers, and any other penetrations of work areas. Doorways and corridors that will not be used for passage during work must be sealed with critical barriers. These seals must be left in place until final air testing is complete and the results received and approved. Allowances must be made for emergency exits.
9. Cover surfaces in the proposed work area, which do not require asbestos removal, with fire-retardant polyethylene sheeting in the following manner:
 - a. Cover walls or erect temporary walls with 2 layers of (4 mil minimum thickness) fire-retardant polyethylene sheeting sealed with tape. This sheeting must be secured by staples and tension nails as necessary to maintain the integrity of containment throughout removal and testing process. The two layers of fire-retardant polyethylene sheeting must be placed so the upper layer can be removed without damaging the integrity of the lower layer.
 - b. Cover floors with 2 layers of (6 mil minimum thickness) fire-retardant polyethylene sheeting sealed with tape, when appropriate. The floor covering must extend at least 12" up the wall to contain leakage. The wall covering must overlap the floor covering.
 - c. Cover ceilings with 2 layers of (4 mil minimum thickness) fire-retardant polyethylene sheeting, sealed with tape, when appropriate. This sheeting must be secured in a manner that shall maintain the integrity of containment throughout removal and testing.

- d. For work areas that do not have an adequately flat surface, or have extensive mechanical and/or electrical fixtures attached to the ceiling, Contractor shall perform initial cleaning of the exposed surfaces at the ceiling prior to removal, and perform wet-cleaning and HEPA-vacuuming during final cleanup. The ceiling area shall be encapsulated prior to final air testing.
10. Cover, isolate, or remove and clean ceiling-mounted objects, such as lights and other items not previously sealed off, or covered, that interfere with asbestos abatement. Use localized water spraying or HEPA-filtered vacuums during fixture removal to reduce fiber dispersal.
11. Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to the fire code.
12. Seal all unused elevator doors on floors where work is in progress with fire-retardant polyethylene sheeting and plywood.

B. Decontamination Units

1. Use pre-constructed decontamination units or build suitable framing and line with double layer of fire-retardant polyethylene sheeting sealed with tape at all lap joints in the fire-retardant polyethylene sheeting for all containments and decontamination unit rooms.
2. Construct a worker decontamination unit contiguous to work area consisting of three totally enclosed rooms as follows:
 - a. An equipment room with two curtained doorways, one to work area and one to shower room.
 - b. A shower room with two curtained doorways, one to equipment room and one to clean room. Shower room must contain at least one shower with hot and cold water for each 10 persons in the work area. Water must be mixed at point of use (29 CFR 1910.141)
 1. Careful attention must be paid to shower room to insure against leaking of any kind and to insure proper drainage of shower water. There must be no standing water in the shower stall or shower room. Insure a supply of soap at all times in shower room.
 2. Waste water must be filtered through a medium that is capable of

removing suspended particles of a diameter greater than or equal to 5 microns. Filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.

- c. A clean room with one curtained doorway into shower room and one entrance or exit to non-contaminated areas of the building. Clean room must have sufficient space for storage of the workers street clothes, towels, and other non-contaminated items.
3. (Optional) Provide or construct an equipment decontamination unit consisting of two totally enclosed rooms as follows:
- a. A washroom, consisting of an airlock, with a curtained doorway to a designated area of work area and a curtained doorway to holding area.
 - b. A holding area, consisting of an airlock, with a curtained doorway to an uncontaminated area.
 - c. When the uncontaminated area is an elevator, a lockable plywood door must also be constructed and placed in front of the elevator door to restrict access to the contaminated areas.
 - d. Worker decontamination unit may be used as an equipment decontamination unit when deemed appropriate by Owner Asbestos Inspector and PBA's Environmental Division.
5. Where feasible, Owner Asbestos Inspector and PBA's Environmental Division may request that all decontamination units have a Plexiglas window installed to provide a reasonable view of work area. If a reasonable view cannot be obtained from decontamination unit, Contractor may install two or more Plexiglas windows in uncontaminated areas that provide a reasonable view of work area.

C. Establish Pressure Differential and Ventilation

1. Install HEPA-filtered exhaust units in work area to lower concentration of airborne fibers in work area and contain airborne fibers.
2. Install a sufficient amount of HEPA-filtered exhaust units to maintain a complete volume change in work area 4 times per hour, or more, when required by Owner Asbestos Inspector and PBA's Environmental Division and to maintain a pressure

differential between the uncontaminated and contaminated areas of at least 0.02 inches of water column.

3. Locate HEPA-filtered exhaust units so that make-up air enters work area through decontamination unit, or other suitable source of make-up air. Place HEPA-filtered exhaust units as far as possible from the entrance/exit or other make-up air sources.
4. Exhaust ducts shall be attached to metal ducts mounted to 1/2" plywood and placed through opening window, door, or wall, then sealed with tape and vented to outside of building.
5. Start HEPA-filtered exhaust units prior to removal and continue operating until final air clearance of work area has been successfully obtained.
6. Replace the air filters in HEPA-filtered exhaust unit under the following circumstances:
 - a. When the unit's manometer indicates that a pressure drop across the filters exceeds 1.0 inch of water, replace pre-filter first.
 - b. Replace intermediate filter if manometer still exceeds 1.0 inch
 - c. Replace HEPA filter if replacement of pre- and intermediate filters does not reduce manometer reading.
7. HEPA-filtered exhaust units will be inspected daily by Owner Asbestos Inspector to ensure proper maintenance, and correct placement of filters. The inspection results will be noted in the Contractor's daily logs.
8. When pressure differential system is shut down at the end of the project, the filters must be left in HEPA-filtered exhaust unit and HEPA-filtered vacuums, and openings on these items must be sealed with polyethylene sheeting and duct tape. Exhaust tubes and vacuum tubes for the HEPA-filtered must be sealed with duct tape in double bags or 2 layers of fire-retardant polyethylene sheeting. Filters on these pieces of equipment must not be replaced after final cleanup is complete to avoid any risk of re-contaminating the area.

D. Separation of Work Areas from Occupied Areas

1. Maintenance of Containment:
 - a. Ensure that barriers and fire-retardant polyethylene sheeting are effectively sealed and taped. Repair damaged barriers and sheeting, and remedy defects immediately upon discovery. Maintenance is to continue until clearance to dismantle containment is given by Owner Asbestos Inspector.
 - b. Supervisor shall frequently inspect containment during each work shift.

- c. Monitor effectiveness of barriers with recording manometer. A pressure differential must be maintained at all times, prior to the first disturbance of ACM and ending only when final air testing results show that fiber concentrations are acceptable by whichever method has been specified in the WORK ORDER for final air clearance.
 - d. The strip chart from the recording manometer must be marked with the project name, location, date, and time, and submitted to Contractor and PBA's Environmental Division daily.
2. Asbestos abatement work shall not be permitted until:
- a. Arrangements have been made for disposal of waste at the selected and approved landfill, as identified in Contractor submittals.
 - b. Arrangements have been made to contain, filter or properly dispose of contaminated wastewater. No asbestos-contaminated waste water is to be discharged unfiltered into public sanitary sewer systems.
 - 1. Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter of greater than or equal to 5 microns.
 - 2. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.
 - c. Decontamination units are in place and work area is effectively isolated from the remainder of the building
 - d. All other preparatory steps have been taken and applicable notices posted and permits obtained.
 - e. Only when all the above conditions have been met will Contractor be allowed to begin disturbance of ACM. An inspection of each containment by Owner Asbestos Inspector and PBA's Environmental Division will be performed prior to the start of removal. Removal shall not be performed until the condition of each containment is approved by Owner Asbestos Inspector and PBA's Environmental Division.

3.1.3 Preparation for Nonfriable Materials

Nonfriable ACM includes materials known to contain more than 1 percent asbestos by the PLM method of analysis, and cannot be crumbled or reduced to powder by ordinary hand pressure. These materials include, but are not limited to: non-ACM thermal system insulation coated with asbestos-containing mastic; asbestos cement board, panel, or pipe;

vinyl floor tiles and mastic; or any other materials identified in the WORK ORDER as being nonfriable ACM.

A. Prepare Work Areas Having Nonfriable Materials in the Following Manner:

1. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel approved by Contractor, Owner Asbestos Inspector and PBA's Environmental Division
2. Shut down electric power within the work area, if feasible. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFIC) at all temporary power sources in work area. Locate power source for temporary power panels and electrical equipment outside work area. All modifications to the electrical power systems must be carried out by a licensed electrician.
3. Shut down and isolate cooling and ventilating air systems within the proposed work area to prevent contamination and fiber dispersal to other areas of the structure. During the work, vents within work area must be sealed with, at least, tape and fire-retardant polyethylene sheeting.
4. Clean moveable objects and carpeting within the proposed work area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and remove such objects from work area to a suitable temporary location.
5. Clean fixed objects within the proposed work area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and enclose objects with 6 mil (minimum thickness) fire-retardant polyethylene sheeting sealed with tape.
6. Seal off all openings with critical barriers. Critical barriers must be placed on penetrations that include but are not limited to: corridors, doorways, elevators, skylights, ducts, grills, diffusers, and any other penetrations of work areas. Doorways and corridors that will not be used for passage during work must be sealed with barriers. These seals are critical to the integrity of containment and must be left in place until final air testing is complete and the results received and approved. Allowances must be made for emergency exits.
7. Cover surfaces in the proposed work area, which do not require asbestos removal, with fire-retardant polyethylene sheeting in the following manner:
 - a. Cover walls from the floor to the ceiling with 1 layer of (4 mil minimum

thickness) fire-retardant polyethylene sheeting sealed with tape. This sheeting must be secured as necessary to maintain the integrity of the covering throughout removal and testing process.

- b. Cover floors with 2 layers of (6 mil minimum thickness) fire-retardant polyethylene sheeting sealed with tape, when appropriate. The floor covering must extend at least 12" up the wall to contain leakage. The wall covering must overlap the floor covering.
 - c. Cover ceilings with 1 layer of (4 mil minimum thickness) fire-retardant polyethylene sheeting, sealed with tape, when appropriate. This sheeting must be secured in a manner that shall maintain the integrity of the covering throughout removal and testing process.
 - d. In instances where nonfriable ACM mastic is the only substance being removed in the proposed work area, Contractor shall not be required to cover floors, walls, and ceiling with fire-retardant polyethylene sheeting. Instead, Contractor may install splash guards extending at least 12" high along the base of walls affected by floor mastic removal, or install a suitable drop cloth beneath non ACM thermal insulation on pipes or ducts, which is coated with mastic sealant.
8. Cover ceiling-mounted objects, such as lights and other items not previously sealed off, or covered, that interfere with asbestos abatement.
 9. Maintain emergency and fire exits from work areas, or establish alternative exits satisfactory to the fire code.

B. Decontamination Units

1. Build suitable framing and line with double layer of fire-retardant polyethylene sheeting sealed with tape at all lap joints in the fire-retardant polyethylene sheeting for all containments and decontamination unit rooms.
2. Construct a workers entry containment contiguous to work area consisting of two totally enclosed rooms as follows:
 - a. An equipment room with two curtained doorways, one to work area and one to clean room.
 - b. A clean room with one curtained doorway into equipment room and one entrance or exit to non-contaminated areas of the building. Clean room must have sufficient space for storage of the workers street clothes and other non-contaminated items.

C. Establish Pressure Differential and Ventilation

1. For work areas where ACM that is not floor mastic or thermal system mastic is being removed, establish pressure differential and ventilation in the following manner:
 - a. Install HEPA-filtered exhaust units in work area to lower concentration of airborne fibers in work area and contain airborne fibers.
 - b. Install a sufficient amount of HEPA-filtered exhaust units to maintain a complete volume change in work area 4 times per hour, and to maintain a pressure differential between the uncontaminated and contaminated areas of at least 0.02 inches of water column.
 - c. Locate HEPA-filtered exhaust units so that make-up air enters work area through decontamination unit. Place HEPA-filtered exhaust units as far as possible from the entrance/exit or other make-up air sources.
 - d. Exhaust ducts shall be attached to metal ducts mounted to 1/2" plywood and placed through opening window, door, or wall, then sealed with tape and vented to outside of building.
 - e. Start HEPA-filtered exhaust units prior to removal and continue operating until final air clearance of work area has been successfully obtained. If an electric power failure occurs, stop removal immediately.
 - f. When pressure differential system is shut down at the end of the project, the filters must be left in HEPA-filtered exhaust unit and HEPA-filtered vacuums, and openings on these items must be sealed with polyethylene sheeting and duct tape. Exhaust tubes and vacuum tubes for the HEPA-filtered must be sealed with duct tape in double bags or 2 layers of fire-retardant polyethylene sheeting. Filters on these pieces of equipment must not be replaced after final cleanup is complete to avoid any risk of re-contaminating the area.

2. For work areas where only floor mastic or mastic materials on thermal system insulation is being removed:
 - a. Install HEPA-filtered exhaust units in work area, or use HEPA-filtered vacuums to contain airborne fibers.
 - b. A pressure differential is not required for these materials, but Contractor should use HEPA-filtered equipment during cutting, dissolving, and cleaning stages to ensure that airborne fibers, if any, are properly contained in the work area.

D. Separation of Work Areas from Occupied Areas

1. Maintenance of Containment or Restricted Area:

- a. Ensure that barriers and fire-retardant polyethylene sheeting are effectively sealed and taped. Repair damaged barriers and sheeting, and remedy defects immediately upon discovery. Maintenance is to continue until clearance to dismantle containment is given by Owner Asbestos Inspector and PBA's Environmental Division.
- b. Supervisor shall frequently inspect containment or restricted area during each work shift.
- c. Monitor effectiveness of containment with a recording manometer. A pressure differential must be maintained until final air clearance, unless otherwise stated in this section.
- d. The strip chart from the recording manometer must be marked with the project name, location, date, and time, and submitted to Owner Asbestos Inspector daily.

2. Asbestos abatement work shall not be permitted until:

- a. Arrangements have been made for disposal of waste at the selected and approved landfill, as identified in Contractor submittals.
- b. Arrangements have been made to contain, filter, or properly dispose of contaminated wastewater. No asbestos-contaminated waste water is to be discharged unfiltered into public sanitary sewer systems.
 1. Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter of greater than or equal to 5 microns.
 2. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.
- c. Decontamination units are in place and work area is effectively isolated from the remainder of the building
- d. All other preparatory steps have been taken and applicable notices posted and permits obtained.
- e. Only when all the above conditions have been met will Contractor be allowed to begin disturbance of ACM. An inspection of each containment by Owner inspector will be performed prior to the start of removal. Removal shall not be performed until the condition of each containment is approved by Owner inspector and/or PBA's Environmental Division.

3.2. ASBESTOS REMOVAL

This section is intended to be used as a general specification for asbestos removal in work area for any particular asbestos abatement project for the Owner. Owner Asbestos Inspector and PBA's Environmental Division complete the WORK ORDER for each individual project for more specific asbestos removal requirements.

3.2.1 Asbestos Removal. Friable Materials

- A. Prepare site as per section 3.1.1 and 3.1.2. In areas where ACM is greater than 2" thick, wetting would begin the day before removal is to take place.
- B. Spray asbestos material with amended water using spray equipment capable of providing a mist application to reduce the release of fibers. Saturate friable material sufficiently to wet the substrate without causing excessive wetting, dripping, or delamination of the material.
- C. Spray the asbestos material repeatedly during removal process to maintain wet condition and minimize asbestos fiber dispersion. The spraying must not be used as a technique to remove or dislodge ACM.
- D. Remove saturated asbestos material in small sections. As it is removed pack the material in scalable 6 mil polyethylene bags and place in appropriately labeled (29 CFR 1926.1101(k)(8)(iii)) container for transport. Material must be placed in containers in a prompt manner consistent with 29 CFR 1926.1101(g)(1)(iii).
- E. Waste Load-out Procedure
 1. Seal bags or containers. Clean external surfaces of containers thoroughly by wet cleaning in the designated area of work area that is part of (waste load-out unit) equipment decontamination unit.
 2. Move containers to washroom, wet-clean each container thoroughly, and move to clean room area pending removal to uncontaminated areas. The material must be placed in a clean bag or container as it exits the equipment washroom and enters clean room area.
 3. Ensure that containers are removed from clean room areas by workers who have entered from uncontaminated areas, dressed in clean coveralls. Ensure that workers do not enter from uncontaminated areas into washroom or work area. Ensure that contaminated workers do not exit work area through equipment decontamination unit.
 4. When disposal bags are used, the bagged material must be placed within a

second bagging equipment decontamination unit. The second, outer bag must be labeled with all applicable warnings, including D.O.T. labeling.

- a. Double bagged material shall then be passed through clean room to a covered cart for removal from the building.
 - b. When larger pieces of material are to be disposed of, the material must be wrapped in 2 layers of fire-retardant polyethylene sheeting and properly labeled in equipment decontamination unit.
5. All bags, containers, and drums that are to be buried at the disposal site must be tagged with the numbering system provided by Owner inspector and/or environmental area inspector (Owner).

F. Secondary Removal

1. After completion of gross removal work, all surfaces from which asbestos has been removed must be wet-brushed with a wire brush and/or wet-cleaned by an equivalent method to remove all visible material. During this work the surfaces being cleaned must be kept wet.

G. Owner Asbestos Inspector and PBA's Environmental Division will individually approve each area of encapsulation in writing prior to commencement of encapsulation.

1. Encapsulant is to be applied only to surfaces from which ACM has been removed and must not be used as a method for sealing dust on surfaces.

3.2.2 Asbestos Removal, Nonfriable Materials

- A. Prepare site as per section 3.1 .1 and 3.1 .3.
- B. Wet nonfriable material with amended water and remove with appropriate equipment. Dispose of material according to waste load-out procedure.
- C. Spray the asbestos material repeatedly during removal process to maintain wet condition and minimize asbestos fiber dispersion. The spraying must not be used as a technique to remove or dislodge ACM.
- D. Remove material in small sections. As it is removed place the material in scalable 6 mil polyethylene bags and place in appropriately labeled (29 CFR 1 926.1 1 01 (k)(8)(iii)) container for transport. Material must be placed in containers in a prompt manner consistent with 29 CFR 1926.1101(g)(1)(iii).
- E. Waste Load-out Procedure
See SECTION 3.2.1, PARAGRAPH E, WASTE LOAD-OUT PROCEDURE.
- F. Secondary Removal
See SECTION 3.2.1, PARAGRAPH F, SECONDARY REMOVAL.

3.2.3 Asbestos Removal, Mastic Materials

A. Procedure for Removal of Mastic-coated Insulation

1. Place warning signs at entrances to work areas, and use barrier tape to restrict access.
2. Install airlock or curtained doorway at entrance to work area. Install critical barriers on all floor, wall and ceiling penetrations. Place one layer of 6 mil fire-retardant polyethylene sheeting on floor below insulation to be removed.
3. Use HEPA-filtered exhaust units to provide ventilation to work area.
4. Mist insulation with amended water and remove insulation in small sections. Place in bag immediately.
5. Wipe down duct or pipe surfaces with amended water and rags. Apply encapsulant to sheet metal surfaces or metal pipes.
6. Dispose of bagged material as per **SECTION 3.5.1 DISPOSAL.**

B. Procedure for Removal of Floor Tile Mastic

1. Apply solvent to remaining mastic and allow an appropriate period of time for the solvent to dissolve the mastic.
2. Remove mastic material in small sections. As it is removed place the dissolved mastic material in sealable 6 mil polyethylene bags and place in appropriately labeled (29 CFR 1926.1001 (k)(8)(iii)) container for transport. Material must not be placed in containers in a prompt manner consistent with 29 CFR 1926.1101 (g)(1)(iii).
3. Continue with **STEPS 1 -5 from SECTION 3.2.1, PARAGRAPH E, WASTE LOAD-OUT PROCEDURES.**

3.3 CLEANUP I

This part is intended to be used as a general specification for cleanup of work area for any particular asbestos abatement project for the Owner. Owner Asbestos Inspector and/or PBA's Environmental Division prepare the WORK ORDER for each individual project for more specific cleanup requirements.

3.3.1 Cleanup

- A. Remove visible accumulations of asbestos material and debris. Wet-clean all surfaces within work area.
- B. Remove the upper layer of fire-retardant polyethylene sheeting from walls and floors only. The windows, doors, and HVAC vents must remain sealed and any HEPA-filtered exhaust units, air filtration, and decontamination unit must remain in place and in service.
- C. Clean all surfaces in work area and any other contaminated areas with wet-cleaning methods using amended water, and/or using HEPA-filtered vacuums. After cleaning work area, allow for settlement of dust, and again wet-clean or clean with HEPA-filtered vacuums, all surfaces in work area. After completion of the second cleaning operation, perform a complete visual inspection of work area to ensure that work area is free of dust and/or visible asbestos debris.
- D.** Time for settlement of dust between initial cleaning and final cleaning will be determined by Owner Asbestos Inspector. Typical settling times for various types of ACM are: 12-16 hours for friable materials, and 3-4 hours for nonfriable materials. According to the Puerto Rico EQB the settling time for all projects is 24-hour.
- E. Sealed containers and all equipment in use in work area must be included in the cleanup and must be removed from work area via equipment decontamination unit, at an appropriate time in the cleaning sequence.

3.4 INSPECTIONS AFTER REMOVAL

This part is intended to be used as a general specification for inspections of work area for any particular asbestos abatement project for the Owner. Owner Asbestos Inspector and/or PBA's Environmental Division the WORK ORDER for each individual project for more specific inspection requirements.

3.4.1 Inspections after Removal (see also SECTION 5.1)

- A. If Owner Asbestos Inspector and/or PBA's Environmental Division find visible accumulations of asbestos debris in work area after the completion of step 3.3.1 (C), Contractor shall repeat wet-cleaning until work area is in compliance, at Contractor's expense.
- B. When an inspection by Owner Asbestos Inspector and/or PBA's Environmental Division in the presence of Contractor determines that the area is free of accumulations of dust and visible asbestos debris and the final air clearance has been met, decontamination unit shall be removed, the area thoroughly wet-cleaned,

and materials from equipment room and shower room disposed of as contaminated waste.

- C. A final inspection will be carried out by Owner Asbestos Inspector and/or PBA's Environmental Division in the presence of Contractor to ensure that no dust or debris remains on surfaces as a result of dismantling operations.

3.5 DISPOSAL

This part is intended to be used as a general specification for disposal of asbestos-containing materials for any particular asbestos abatement project for the Owner. Owner Asbestos Inspector and/or PBA's Environmental Division prepares the WORK ORDER for each individual project for more specific disposal requirements.

3.5.1 Disposal

A. Preparation and Security of Waste Holding Areas

1. Prepare enclosed transport vehicles and/or enclosed dumpsters with at least 2 layers of 6 mil fire-retardant polyethylene sheeting.
2. Secure transport vehicles and dumpsters with padlocks. Dumpsters and waste transport vehicles must be locked at all times while engaged in asbestos disposal on Owner's property, except when waste materials are being loaded into these items.

B. Storage and Disposal of Containers

1. Containers of ACM shall not be stored in uncontaminated areas, but must be moved directly from work area to an enclosed dumpster in enclosed carts.
2. ACM must be disposed of at the selected and approved disposal site in accordance with requirements of all applicable disposal authorities.
3. Disposal documents and receipts must be submitted to Owner Asbestos Inspector and/or PBA's Environmental Division prior to final clearance of Contractor.

- C. Contractor must tag each container to be buried at the disposal site with a label that displays the numbering system provided by Owner.

D. Discharge of Waste Water

1. All waste water must be filtered through a medium that is capable of removing all

suspended particles of a diameter greater than or equal to 5 microns.

2. All filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.

SECTION 4.0 SPECIAL PROCEDURES

This section is intended to be used as a general specification for special procedures for any particular asbestos abatement project for the Owner. Contractor should consult the WORK ORDER for each individual project for more specific requirements pertaining to this section.

4.1 EXTERIOR ASBESTOS REMOVAL

This part applies only to removal of nonfriable exterior roofing materials, nonfriable asphalt-based exterior mastic materials, or nonfriable exterior asbestos cement panels.

4.1.1 Personal Protection

- A. Exterior work may be performed using half-mask, dual cartridge, air purifying respirators. Organic vapor cartridges placed in tandem with HEPA filters shall be required when solvents are used to remove mastic materials.
- B. All workers engaged in exterior removal must wear protective clothing over disposable underwear, or a tight-fitting, nylon swimsuit. Shoes may be worn for exterior work, provided the shoes are stored in sealed bags at the decontamination area at the end of the day, and properly decontaminated after completion of the work.

4.1.2 Protection from Heat Stress

In exterior areas where heat stress to workers is inevitable, Contractor must provide frequent work breaks in cool areas outside work area, and/or body vests with ice pack inserts, depending on the site conditions.

4.1.3 Decontamination Area

- A. Locate decontamination areas in an exterior or interior area when access from the work area can be accomplished at ground level with exterior access.
- B. Contractor shall establish a decontamination area that is adjacent to the work area for the decontamination of employees and their equipment, which is contaminated with asbestos, that consists of an area covered by a impermeable drop cloth on the ground or horizontal working surface.
- C. The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.
- D. Protective clothing must be cleaned with a HEPA vacuum before it is removed,
- E. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area.
- F. Contractor shall ensure that workers enter and exit the work area through the decontamination area.

4.1.4 Respirator Decontamination Facilities (Optional)

A respirator decontamination facility consisting of a water hose equipped with a spray nozzle, an adequate supply of 6 mil bags, and an adequate supply of disposable towels may be used in a remote section of work area so workers may replenish body fluids with Gatorade, or a similar replenishing drink.

- 1. Each person who uses the respirator decontamination facility shall rinse the exterior of the respirator while holding head over an open 6 mil bag.
- 2. After thoroughly rinsing the respirator each person shall wipe the excess water off the exterior of the respirator with a disposable towel, and dispose of the towel in the bag.
- 3. After removing excess water from the exterior of the respirator, the respirator may be removed.
- 4. Waste water that has accumulated in the rinse bag shall be disposed of as ACM or properly filtered in the decontamination area.

4.1.5 Exterior Asbestos Removal

- A. Provide suitable tools for removal of asbestos cement panels, roof felts, tar, and

- mastics. Roof cutters are permissible only when proper steps are taken to ensure dust-free removal conditions, and local regulatory agencies permit the use of such equipment.
- B. For asbestos cement panels, spray panels with amended water using spray equipment capable of providing a mist application to reduce the release of fibers. Saturate the material sufficiently to wet the material without causing excess dripping.
 - C. Remove wet asbestos cement material in small sections. As it is removed wrap the material in 6 mil fire-retard ant polyethylene sheeting and place in appropriately labeled (29 CFR 1926.1101(k)(8)(iii)) containers lined with 6 mil fire-retardant polyethylene sheeting and enclosed truck or closed dumpster for transport.
 - D. Asbestos cement panels must be removed carefully and in complete sections. Breakage of the panels must be minimized, and must not be used as a method of removal without written approval of Owner Asbestos Inspector and/or PBA's Environmental Division
 - E. For removing roofing material which contains ACM Contractor shall ensure that the following work practices are followed:
 - 1. Roofing material shall be removed in an intact state to the extent feasible.
 - 2. Wet methods shall be used to remove roofing materials that are friable, or that will be rendered friable during removal, unless such wet methods are not feasible or will create safety hazards.
 - 3. Cutting machines shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.
 - 4. When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operation shall be collected with a HEPA-filtered dust collector, or shall be HEPA vacuumed by vacuuming along the cut line.
 - 5. When removing built-up roofs with asbestos-containing roofing felts and a smooth surface using a power roof cutter, the dust resulting from the cutting operation shall be collected either by a HEPA dust collector or HEPA vacuuming along the cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line.
 - F. Asbestos-containing material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist:
 - 1. Any ACM that is not intact shall be lowered to the ground as soon as is

practicable, but in any event no later than the end of the work shift. While the material remains on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.

- G. Intact ACM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.
- H. Roof level heating and ventilation air intake sources shall be isolated or the ventilation system shall be shut down.
- I. After completion of removal work, all surfaces from which asbestos has been removed must be wet-cleaned, and the entire surface must be vacuumed with a HEPA-filtered vacuum.
- J. Any adhesive materials such as mastic, asphalt, or tar must be removed using a suitable (non-toxic) solvent. The residue must be bagged and properly disposed of as ACM. On porous or irregular surfaces where all traces of ACM cannot be removed, encapsulant may be applied. Prior to encapsulation, however, these areas must be inspected and approved by Owner inspector and/or environmental area inspector (Owner).

4.2 GLOVE BAG PROCEDURE

The glove bag is a specialized procedure that shall be utilized only when specified in the WORK ORDER of this specification. Glove bag procedures may only be performed when access and preparation limit possibilities for removal. The procedure shall only be utilized when circumstances dictate this type of removal as determined by Owner Asbestos Inspector and/or PBA's Environmental Division.

4.2.1 Personal Protection

- A. The glove bag procedure may be performed using half-mask, dual cartridge, air purifying respirators, provided Contractor shows previous, similar work has not produced airborne fiber levels in excess of 0.01 fibers/cc during the glove bag removal procedure.
- B. All workers engaged in glove bag removal work must wear protective clothing over disposable underwear, or a tight-fitting, nylon swimsuit. Shoes may be worn for the glove bag procedure, provided the shoes are stored in sealed bags in equipment room of the remote decontamination unit at the end of the day, and properly

decontaminated after completion of the work.

4.2.2 Preparation for Glove Bag Procedure

- A. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel approved by Owner Asbestos Inspector and/or PBA's Environmental Division
- B. Shut down electric power when necessary. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFIC) at power receptacles in work area.
- C. Seal vents within work area with, at least, tape and fire-retardant polyethylene sheeting during the work.
- D. Cover moveable objects within the proposed work areas using 6 mil fire-retardant polyethylene sheeting, as appropriate, or remove such objects from work area to a suitable temporary location.
- E. Cover areas beneath and adjacent to the proposed work using 6 mil fire-retardant polyethylene sheeting, as appropriate. Cover scaffolding with at least one layer of 6 mil fire-retardant polyethylene sheeting, when appropriate.
- F. Prepare curtained doorways at entrances to and exits from work area.

4.2.3 Decontamination Room or Area

- A. Contractor shall establish an equipment room or area that is adjacent to the glove bag work area for the decontamination of workers and equipment contaminated with asbestos. The decontamination area shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface, and be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.
- B. Workers may use double suits, or decontaminate a single suit with a HEPA-filtered vacuum. Before leaving work areas each worker must remove and dispose of the outer suit (if double suits are used) and dispose of this suit in a suitable container (see **SECTION 3.5.1, DISPOSAL**), or thoroughly vacuum the suit using a HEPA-filtered vacuum (if single suits are used) before leaving the glove bag work area to enter decontamination room or area.
- C. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the decontamination room or area.

- D. Contractor shall ensure that employees enter and exit the regulated glove bag work area through the decontamination room or area.

4.2.4 Separation of Work Areas from Occupied Areas

- A. Maintenance of Critical Barriers
- B. Ensure that barriers and fire-retardant polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Maintenance is to continue until clearance to remove critical barriers is given by Owner Asbestos Inspector and/or PBA's Environmental Division
- C. Supervisor shall visually inspect critical barriers continually for the duration of each work shift.
- D. Asbestos abatement work shall not begin until:
 - 1. **See SECTION 3.1.2, PARAGRAPH D, PART 2.**

4.2.5 Asbestos Removal

- A. Install glove bag according to manufacturers recommendations, and in accordance with 29 CFR 1926.1101(g)(5)(ii).
- B. Cut covering on insulation along the top seam to allow wetting of the insulation, and cut cover all around section to be removed.
- C. Remove ACM in small sections. Lower the insulation carefully in the bottom of the glove bag. Do not drop material. One glove bag must be used for each section of ACM to be removed. Sliding or re-use of a single glove bag is strictly prohibited. Use appropriate size bag for the dimensions of the material to be removed to ensure economy of materials.
- D. Prior to removal of the glove bag, ensure that all surfaces from which asbestos has been removed are clean of all visible material, and that the upper portion of the bag is clean of all visible waste. Spray all surfaces and tools in the glove bag with amended water. Wipe all sections of pipe with rag or appropriate material. Wipe upper section of bag as well.
- E. Use appropriate encapsulant on all surfaces inside the bag. Cover exposed insulation remaining on pipe with wettable fiberglass or other suitable material. Duct tape is not suitable for this purpose.
- F. Place tools inside sleeves of glove bag and isolate from interior of glove bag. Collapse bag using HEPA-filtered vacuum. Squeeze and twist bag at mid-level to isolate waste from upper portion of bag. Seal bag with duct tape or locking ties. Vacuum the unsealed upper portion. Keep HEPA-filtered vacuum connected until

the glove bag is removed. Cut the glove bag along the top and sides, then remove from pipe. Cut off isolated sleeves containing any tools or supplies from bag and place in bucket of water. Clean the tools in equipment room of decontamination unit.

- G. Disposal of glove bag, material, and waste water (see **SECTION 3.5.1 DISPOSAL**).

4.3. MINI-CONTAINMENT PROCEDURE

The mini-containment may be specified in certain instances, such as removal of ACM from a small ventilation system or from a short length of duct where a glove bag may not be appropriate to adequately contain the asbestos fibers during removal. The procedure shall only be utilized when circumstances dictate this type of removal, as determined by Owner Asbestos Inspector and/or PBA's Environmental Division.

4.3.1 Personal Protection

- A. The mini-containment procedure may be performed using half-mask, dual cartridge, air purifying respirators, provided Contractor shows previous, similar work has not produced airborne fiber levels in excess of 0.01 fibers/cc during mini-containment removal procedures in the past.
- B. All workers engaged in mini-containment removal work must wear protective clothing over disposable underwear, or a tight-fitting, nylon swimsuit. Shoes may be worn for the mini-containment procedure, provided the shoes are stored in sealed bags in equipment room of the remote decontamination unit at the end of the day, and properly decontaminated after completion of the work.

4.3.2 Preparation for Mini-Containment Procedure

- A. Post warning signs and barrier tape in and around work area as required by all applicable regulatory agencies, and restrict access to work area to personnel approved by Owner Asbestos Inspector and/or PBA's Environmental Division.
- B. Shut down electric power when necessary. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electric code requirements. Use ground-fault interrupter circuits (GFIC) at

- all power receptacles in work area. Locate power source for electrical equipment outside work area.
- C. Seal off all openings, including but not limited to: vents, ducts, grills, diffusers, and any other penetrations of work area within mini-containment with, at least, tape and fire-retardant polyethylene sheeting.
 - D. When appropriate, clean moveable objects within the proposed work areas using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, or remove such objects from work area to a suitable temporary location.
 - E. When appropriate, clean fixed objects within the proposed work area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and cover objects with 6 mil fire-retardant polyethylene sheeting.
 - F. Construct mini-containment using a single layer of fire-retardant polyethylene sheeting placed over a temporary frame constructed with 2"x4" lumber or other suitable material, as determined by Owner Asbestos Inspector and/or PBA's Environmental Division. When permanent walls are present, and will suffice for containment barriers, cover walls and ceilings with a single layer of fire-retardant polyethylene sheeting.
 - G. Construct a decontamination room contiguous to the mini-containment consisting of a single layer of fire-retardant polyethylene sheeting attached to 2"x4" lumber or other suitable material, as determined by Owner Asbestos Inspector and/or PBA's Environmental Division. The decontamination room shall be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment, and shall have curtained doorways at the entrance to work area and exit to uncontaminated areas.
 - H. Place HEPA-filtered vacuum or low-volume HEPA-filtered exhaust unit in such a manner that a pressure differential can be established in the change room.
 - I. Doorways and corridors outside the mini-containment that will not be used for passage during work must be barricaded with barrier tape.

4.3.3 Decontamination Room or Area

- A. Contractor shall establish an equipment room or area that is contiguous with the mini-containment work area for the decontamination of workers and equipment contaminated with asbestos. The decontamination area shall consist of an area

covered by a impermeable drop cloth on the floor or horizontal working surface, and be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

- B. Workers may use double suits, or decontaminate a single suit with a HEPA-filtered vacuum, Before leaving work areas each worker must remove and dispose of the outer suit (if double suits are used) and dispose of this suit in a suitable container (see **SECTION 3.5.1, DISPOSAL**), or thoroughly vacuum the suit using a HEPA-filtered vacuum (if single suits are used) before leaving the decontamination room.
- C. All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the decontamination room or area.
- D. Contractor shall ensure that employees enter and exit the regulated mini-containment work area through the decontamination room or area.

4.3.4 Separation of Work Areas from Occupied Areas

- A. Contractor shall ensure that barriers and fire-retardant polyethylene linings are effectively sealed and taped. Damaged barriers shall be repaired and defects remedied immediately upon discovery. Maintenance is to continue until clearance to remove mini-containment is given by Owner Asbestos Inspector and/or PBA's Environmental Division.
- B. Asbestos abatement work shall not begin until:
 - 1. Arrangements have been made for disposal of waste at the selected and approved landfill, as identified in Contractor submittals.
 - 2. Mini-containment and decontamination unit are in place and work area is effectively isolated from the remainder of the building.
 - 3. All other preparatory steps have been taken and applicable notices posted and permits obtained.
 - 4. Only when all the above conditions have been met will Contractor be allowed to begin disturbance of ACM. An inspection of the mini-containment by Owner Asbestos Inspector and/or PBA's Environmental Division will be performed prior to the start of removal. No removal shall be performed until the condition of the mini-containment is approved by Owner Asbestos Inspector and/or PBA's Environmental Division.

4.3.5 Asbestos Removal

- A. Mist materials with amended water and remove materials in small sections. Place in

bag immediately.

- B. Wipe down exposed surfaces with amended water and rags.
- C. Seal bags or containers. Clean external surfaces of containers thoroughly by wet-cleaning in the mini-containment.

4.3.6 Waste Load-out Procedure

See SECTION 3.2.1, PARAGRAPH E, WASTE LOAD-OUT PROCEDURES, STEPS 1-5.

4.3.7 Cleanup and Encapsulation

- A. After completion of removal work, all surfaces from which asbestos has been removed must be brushed and/or wet-cleaned by an equivalent method to remove all visible material. During this work the surfaces being cleaned must be kept wet with solvent, unless otherwise noted in the WORK ORDER
- B. Owner Asbestos Inspector and/or PBA's Environmental Division will individually approve each area for encapsulation in writing prior to commencement of encapsulation.
- C. Encapsulant is to be applied only to surfaces from which ACM has been removed and shall not be used as a method for sealing dust on surfaces.

4.4 DECONTAMINATION OF CONTAMINATED AREAS

In the event that an area of a building is determined by Owner Asbestos Inspector and/or PBA's Environmental Division as being contaminated with asbestos dust or debris, the area must be decontaminated using the procedures included in this part of the specification.

4.4.1 Personal Protection

- A. All personnel entering an area that is visibly contaminated with assumed, suspected, or known ACM must wear half-mask, dual cartridge, air purifying respirators and protective clothing to install temporary barriers and begin preparation of the contaminated area.
- B. When area or personal air samples indicate a level of airborne fibers to be in excess of 0.1 fibers/cc, all personnel in the contaminated area must use PAPR until fiber concentrations are consistently measured below 0.1 fibers/cc.

- C. When area or personal air samples indicate a level of fiber concentrations to be in excess 1.0 fibers/cc, all personnel in the contaminated area must use a PAPR or Type C, pressure demand respirator until fiber concentrations are measured below 1.0 fibers/cc.
- D. All personnel entering the contaminated area must wear protective clothing and use decontamination units upon leaving the contaminated area.

4.4.2 Preparation

- A. Immediately shut down and isolate heating, cooling and ventilating air systems to prevent contamination and fiber dispersal to other areas of the structure. Adequately wet all visible asbestos debris in the contaminated area. Cover vents within the contaminated area with tape and fire-retardant polyethylene sheeting.
- B. Seal off contaminated area with temporary barriers constructed with 6 mil fire-retardant polyethylene sheeting. Construct curtained doorway for temporary access to contaminated area.
- C. Construct a worker decontamination unit contiguous to the contaminated area consisting of three totally enclosed rooms as follows:
 - 1. An equipment room with two curtained doorways, one to the contaminated area and one to shower room.
 - 2. A shower room with two curtained doorways, one to equipment room and one to clean room. Shower room must contain at least one shower with hot and cold water. Water must be mixed at point of use (29 CFR 1910.141)
 - a. Careful attention must be paid to shower room to insure against leaking of any kind and to insure proper drainage of shower water. There must be no standing water in the shower stall or shower room. Insure a supply of soap at all times in shower room.
 - b. Waste water must be filtered through a medium that is capable of removing suspended particles of a diameter greater than or equal to 5 microns. Filtered waste water must be discharged into public sanitary sewer systems. Discharge of filtered water onto surface soil, asphalt, concrete, or any other porous surface shall not be permitted.
 - 3. A clean room with one curtained doorway into shower room and one

entrance or exit to uncontaminated areas of the building. Clean room must have sufficient space for storage of the workers street clothes, towels, and other uncontaminated items.

- D. Seal off all openings, including but not limited to: corridors, doorways, elevators, skylights, ducts, grills, diffusers, and any other penetrations to the contaminated areas. Doorways and corridors that will not be used for passage during work must be sealed with barriers. These seals are barriers critical to the integrity of containment and must be left in place until final air testing is complete and the results received and approved.

4.4.3 Establish Pressure Differential

- A. Install HEPA-filtered exhaust units in the contaminated area to lower concentration of airborne fibers in the contaminated area, and contain airborne fibers.
- B. Install a sufficient amount of HEPA-filtered exhaust units to maintain a complete volume change in work area 4 times per hour, or more, when required by Owner Asbestos Inspector, and to maintain a pressure differential between the uncontaminated and contaminated areas of at least 0.02 inches of water column.
- C. Locate HEPA-filtered exhaust units so that make-up air enters the contaminated area through decontamination unit, or other suitable source of make-up air. Place HEPA-filtered exhaust units as far as possible from the entrance/exit or other make-up air sources.
- D. Exhaust ducts shall be attached to metal ducts mounted to ½" plywood and placed through opening window, door, or wall, then sealed with tape and vented to outside of building.
- E. Start HEPA-filtered exhaust units before beginning removal. After removal has begun, run units continuously to maintain a constant pressure differential until decontamination of work area is complete. Start removing at a location farthest from the units and work toward them.
- F. When pressure differential system is shut down at the end of the project, the filters must be left in HEPA-filtered exhaust unit and HEPA-filtered vacuums, and openings on these items must be sealed with polyethylene sheeting and duct tape. Exhaust tubes and vacuum tubes for the HEPA-filtered must be sealed with duct tape in double bags or 2 layers of fire-retardant polyethylene sheeting. Filters on these pieces of equipment must not be replaced after final cleanup is complete to avoid any risk of re-contaminating the area.

4.4.4 Decontamination of Contaminated Surfaces

- A. Clean moveable objects and carpeting within the contaminated areas using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate, and remove such objects from the contaminated area to a suitable temporary location. Refer to SECTION 5.4 (B) for Reestablishing object and systems.
- B. Clean fixed objects, including ceiling and wall fixtures, within the contaminated area using HEPA-filtered vacuums and/or wet-cleaning methods as appropriate.
- C. Clean all exposed surfaces in the contaminated area using HEPA-filtered vacuums or wet-cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters shall not be used.

SECTION 5.0 INSPECTIONS, PROJECT MANAGEMENT, AIR MONITORING, AND COMPLETION

5.1 INSPECTIONS

This section is intended to be used as a general specification for inspections, air monitoring, and completion for any particular asbestos abatement project for the Owner. Consult the WORK ORDER for each individual project for more specific requirements pertaining to this section.

5.1.1 Inspections Prior to and During Work

- A. Contractor shall make all work areas available to inspection at all times, although Owner Asbestos Inspector and/or PBA's Environmental Division agrees not to cause undue delay in the progress of Contractor's work.
- B. Each work area will be inspected by Owner Asbestos Inspector and/or PBA's Environmental Division accompanied by Contractor:
 - 1. Immediately after initial cleaning has been completed and prior to the application of fire-retardant polyethylene sheeting to expose surfaces.
 - 2. Immediately prior to the commencement of removal of ACM (after preparation of work area is complete).
 - 3. After removal is complete but prior to the application of any encapsulant to the exposed substrates, and pre-encapsulation air testing.
- C. Regular inspections of the HEPA-filtered ventilation system will be performed by

Owner Asbestos Inspector and/or PBA's Environmental Division to ensure filters are excessively loaded with particulate debris, and are properly seated in HEPA-filtered exhaust units.

5.1.2 Inspection of Non asbestos-Containing Materials

Owner Asbestos inspector may inspect all materials from work area that are being disposed of as Non asbestos-Containing Materials.

5.1.3 Final Visual Inspections

- A. A final visual inspection will be made after all Contractors' materials have been removed from work area and all removal, encapsulation, disposal, and related work is completed.
- B. Work area must be well lighted for inspection by Owner Asbestos Inspector and/or PBA's Environmental Division. Insufficient lighting may result in delay of the final visual inspection.
- C. All fire-retardant polyethylene sheeting must be removed from work area, with the exception of critical barriers, and decontamination unit. HEPA-filtered exhaust units must remain operational, and pressure differential maintained until final clearance by TEM or PCM is obtained.

5.2 PROJECT MANAGEMENT

- A. Owner will employ Owner Asbestos Inspector to conduct on-site Project Management for all phases of the asbestos abatement work.
- B. Owner Asbestos Inspector will be responsible for:
 - 1. Approval of all submittals by Contractor, including pay requests from the environmental and occupational safety standpoint.
 - 2. Conducting all inspections at the job site, as required. Monitoring job site performance and progress.
 - 3. Performing all final air testing of each project.
 - 4. Submitting final report to the Owner that will include all documents, logs, charts, photographs, and test results pertaining to each project.

5.3 AIR MONITORING

5.3.1 General

- A. The Asbestos Contractor is responsible for the personal and abatement ambient air sampling. Final air sampling will be performed by the Contractor using PCM, after this activity the Owner Asbestos Inspector will be doing the final clearance air sample by Transmission Electron Microscopy (TEM). Personal, area, and pre-encapsulation air samples will be analyzed on-site by an accredited analyst (who is been participating in a recognized Proficiency Analytical Testing Program) using NIOSH method 7400 for phase contrast microscopy (PCM). In some cases, OWNER may be used PCM for final air testing.
- B. Final air samples will be analyzed by a laboratory accredited by NVLAP for Transmission Electron Microscopy (TEM), using the AHERA Mandatory Transmission Electron Microscopy Method in Appendix A of 40 CFR 763, subpart E.

5.3.2 Background Air Testing

- A. Background Air Testing will be carried out by Owner Asbestos Inspector prior to initiation of work by Contractor in order to establish air background levels of contamination.
- B. If air monitoring, during work by Contractor, shows an increase in airborne fiber concentrations outside containment system, work shall cease until the source of the contamination is found and remedied to inspector satisfaction. Any areas that have been contaminated as a result of Contractor's work shall be cleaned by Contractor.
- C. Background air samples will be analyzed by PCM. TEM analysis of questionable samples will be made available at the expense of Contractor should he request it.

5.3.3 Personal Air Sampling

- A. The personal air monitoring will consist of:
 - 1. An 8 hour Time Weighted Average (TWA) for samples collected on 25% of the work force during each eight hour shift for the duration of the project.
 - 2. Continuous personal monitoring to be conducted during preparation,

removal, and final cleanup, unless Type C pressure demand respiratory protection is used.

3. Excursion Limit or Short Term Exposure Limit (STEL) sampling shall be performed during all phases of the asbestos abatement project to establish the STEL for each job function.

5.3.4 The Pre-encapsulation Test

- A. After successful completion of the pre-encapsulation inspection, but prior to removal of the wall and floor coverings, critical barriers, decontamination unit, and use of any encapsulant, ~~Owner Asbestos Inspector~~ Contractor's air project hygienist will conduct pre-encapsulation air testing.
- B. This will consist of filtered air samples of sufficient volume to yield a detection limit of less than 0.01 fibers/cc.
 1. The sampling will not begin until work area is dry.
 2. Sampling will utilize aggressive techniques (a 1 HP leaf blower and electric fans) to re-suspend any dust or material that has settled in work area.
 3. The pre-encapsulation air testing will be analyzed by PCM (NIOSH 7400) with a concentration of 0.01 fibers/cc being acceptable (see SECTION 5.3.6 for discussion of confidence limits). The EQB clearance is 0.005 fibers/cc for final clearance samples; this project will comply with the TEM clearance benchmark which is a more stringent method. **See SECTION 5.3.6, PARAGRAPH C and SECTION 5.3.7.**

5.3.5 Conditions for Final Air Testing

- A. Contractor should notify the Owner Asbestos Inspector with at least 24 hours advance of the time proposed to conduct the pre-encapsulation air testing.
- B. Final air testing shall take place when removal is complete, the fire-retardant polyethylene sheeting not necessary to the integrity of containment removed, and a visual inspection of work area shows that work area is clean and dry.
- C. Contractor should expect a delay of at least 24 hours from the time the samples reach the laboratory to the time the results are known for all PCM analyses.
- D. Contractor should expect at least a 48 hour delay from the time the samples reach the laboratory to the time the results are known for samples analyzed by TEM. Owner Asbestos Inspector will make every reasonable effort to obtain these results in a time period suitable to Contractor's work schedule.

5.3.6 Air Clearance Criteria

- A. Owner Asbestos Inspector and owner recognize the samples taken for all PCM clearance or pre-encapsulation samples must meet a standard that allows inspector 95% certainty that the sample does not in fact meet the 0.01 fibers/cc final air standard. Ninety-five percent certainty is defined by the equation:

$$MC + 1.645 (CV) (FAS) = 95\% \text{ confidence level}$$

where: MC = measured concentration of fibers

CV = coefficient of variation FAS = final air standard

- B. The results of this equation must be less than the final air standard for any sampled area to pass the test.
- C. For samples analyzed by the Transmission Electron Microscope Method (TEM), the arithmetic mean of the measured airborne asbestos concentration for the five inside samples must be less than or equal to 70 structures/mm², or the average airborne asbestos concentration measured inside work area is not statistically higher than the average airborne asbestos concentration measured outside work area as determined by the statistical Z-test.

5.3.7 Final Air Testing

- A. After work area has met the 0.01 fibers/cc standard for the pre-encapsulation test, final air testing will be conducted and analyzed by Transmission Electron Microscopy (TEM), when the amount of ACM removed in work area is greater than 160 square feet, or 260 linear feet. Final air testing will consist of five TEM samples inside work area and five TEM samples outside work area. The sampling procedures and guidelines in EPA 40 CFR 763 part III will be followed.
- B. When the amount of ACM removed in work area is less than 160 square feet or 260 linear feet, the results of the pre encapsulation (PCM) air test will be considered as the criteria for Contractor compliance, unless TEM analysis is required by the Owner.

5.3.8 Final Air Testing: Exterior Areas

Final air testing will not be required for exterior, open work areas. Instead, a thorough

and meticulous inspection will be performed by Owner Asbestos Inspector to determine Contractor compliance.

5.3.9 Final Air Testing: Glove Bag Procedure

- A. Each work area in which glove bag removal has occurred will be visually inspected by Owner Asbestos Inspector prior to final air testing.
- B. Aggressive sampling procedures will not be used unless work areas are fully contained by critical barriers.
- C. Each work area will be tested and analyzed by the PCM method, using static sampling procedures, unless conditions allow aggressive testing (see B. above),
- D. A TEM final air test of the general areas of glove bag removal maybe performed at Owner's discretion upon failure of a PCM final.

5.3.10 Failure of Final Air Tests

- A. When the results of the final air test show values of airborne asbestos in excess of the final air standard, Contractor must re-clean work area.
- B. The final air testing procedure shall then be repeated at **Contractor's expense**.

5.4 COMPLETION

5.4.1 Completion

A. Completion Criteria

- 1. After final inspections and final air testing are complete and the results known, Owner Asbestos Inspector will advise Contractor and the owner of the test results.
- 2. When a work area fails either the inspection or the final air testing, the area must be re-cleaned, re-inspected and re-tested. The sequence of re-cleaning and re-testing shall continue until the area passes the inspection and the final air test at **Contractor's expense**.
- 3. When work area has passed final air test, Contractor will be informed immediately.

B. Re-establishment of Objects and Systems

When the project is complete:

1. Relocate all objects moved to temporary locations in the course of the work to their former positions.
2. Where HVAC, mechanical, and electrical systems have been shut down or disconnected, restore these systems to proper working order

SECTION 6.0 ALTERNATE PROCEDURES AND VIOLATIONS OF SPECIFICATIONS

This section is intended to be used as a general specification for alternate procedures for any particular asbestos abatement project for the Owner. Owner Asbestos Inspector and PBA Environmental Division must develop the WORK ORDER for each individual project for more specific requirements pertaining to this section.

6.1 Alternate Procedures

- A. Procedures described in this specification must be utilized at all times.
- B. When specific procedures cannot be utilized, a request must be made in writing to Owner Asbestos Inspector and/or PBA's Environmental Division providing details of the problem encountered and recommended alternatives.
- C. Alternative procedures must provide equivalent or greater protection than procedures that they replace.
- D. Any alternative procedure must be approved in writing by Owner Asbestos Inspector and/or PBA's Environmental Division prior to implementation.

6.2 Violations of Specifications

- A. Owner will enforce these specifications through Owner Asbestos Inspector and/or PBA's Environmental Division
- B. Upon Owner Asbestos Inspector and/or PBA's Environmental Division recommendation, Owner shall issue cease work orders upon discovery of any violation of these specifications.
- C. Minor infractions of the specifications may result in cessation of work until the infraction is corrected.
- D. Major violations of this specification may result in the dismissal of the contractor from all asbestos abatement work, and application of liquidated damages as stated and agreed to by Contractor in contract documents.

SECTION 7.0 EMERGENCY PLANNING

- A. Emergency planning must be developed by Contractor and approved by the Owner.
- B. Emergency procedures must be in written form and prominently posted in clean room and equipment room of worker decontamination unit. Prior to entering work area everyone must read and sign these procedures to acknowledge receipt and understanding of work site layout, location of emergency exits, and emergency procedures.
- C. Emergency planning must include:
 - 1. Written notification of police, fire and emergency medical personnel of planned abatement activities, work schedule, and layout of work area.
 - 2. An employee safety meeting must be conducted by Contractor prior to the commencement of each work shift. The meeting shall be attended by all Contractor employees on site, and Owner Asbestos Inspector and/or PBA's Environmental Division. All aspects of emergency planning shall be covered in the meeting.
 - 3. Access to fire extinguishers both inside and outside the work area.
- D. Emergency planning must include:
 - 1. Considerations of fire, explosion, toxic atmospheres, electrical hazards, slips, falls and trips, confined spaces and heat related injury.
 - 2. A copy of the emergency procedures and evidence employee training in these procedures shall be provided to the Owner.
- E. Evacuation and Emergency Decontamination Procedures
 - 1. Employees must be trained in evacuation procedures in the event of workplace emergency.
 - 2. For non-life threatening situations, employees injured or otherwise incapacitated must decontaminate following normal procedures, with assistance from fellow workers if necessary, before exiting the workplace to obtain proper treatment.
 - 3. For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove him from the workplace and secure proper medical treatment.
- F. Telephone numbers of all emergency response personnel must be prominently posted in clean room and equipment room, along with the a map of, and clearly marked route to, the location of the nearest hospital emergency room.

SECTION 8.0 FIRE SAFETY AND SAFE EGRESS

8.1 FIRE PROTECTION AND PREVENTION

8.1.1 Fire Protection Program

- A. Contractor shall be responsible for the development of a fire protection program to be followed throughout all phases of demolition and abatement work, and shall provide firefighting equipment as specified in this section.
- B. As fire hazards occur, there shall be no delay in providing the necessary equipment.

8.1.2 Fire Extinguishers

- A. Contractor shall provide a fire extinguisher, rated not less than 2A, for each 3,000 square feet of demolition/abatement work area.
- B. Travel distance from any point of the protected area to the nearest extinguisher shall not exceed 100 linear feet. This distance shall decrease in areas of limited mobility.
- C. A fire extinguisher may be substituted with a 1/2" diameter garden hose not exceeding 100 linear feet in length.

8.1.3 Sprinkler Systems

- A. During renovation, abatement, or alterations, the existing fire sprinkler system shall be maintained in service at all times.
- B. If building is scheduled for complete demolition, existing sprinkler system shall be retained in service as long as reasonable.

8.1.4 Fire Alarm Devices

An Alarm System consisting of an active telephone system and warning alarm (e.g. siren) shall be established by Contractor to alert workers and fire department in case of fire emergency.

8.2 SAFE EMERGENCY EGRESS

8.2.1 Application

This part contains general fundamental requirements essential to providing a safe means

of egress from fire and similar emergencies. Nothing in this part shall be construed to prohibit a better type of containment construction, more exits, or otherwise safer conditions than the minimum requirements specified in this part.

8.2.2 Fire Alarm Facilities

- A. In each work area, provide fire alarm facilities to workers and other building occupants so they may escape.
- B. These fire alarm facilities shall be provided where necessary to warn worker and building occupants of the existence of fire, as a fire itself may not provide adequate warning.

8.2.3 Protection of Workers and Building Occupants

- A. No existing building shall be occupied during demolition/abatement unless all existing exits and any existing fire protection are continuously maintained, or in lieu thereof, other measures are taken to provide equivalent safety.
- B. No flammable or explosive substances or equipment for demolition/abatement shall be introduced in a building of normally low or ordinary hazard classification while building is occupied, provided the condition of use and safeguards do not create any additional danger or handicap to egress beyond the normally permissible conditions in the building or work area.
- C. Each exit, way of approach, and way of travel from an exit to the street or open space shall be continuously maintained free of all obstruction or impediments to instant use in the case of fire or other emergency.

8.3 MEANS OF EGRESS

8.3.1 Definitions

- A. Exit Access: That portion of a means of egress that leads to an entrance to an exit.
- B. An Exit: That portion of a means of egress that is separated from all other spaces of demolition/abatement or equipment as a way of travel to the street or open area.
- C. High Hazard Contents: High hazard contents shall be classified as those materials, substances, or equipment that are able to rapidly burn or from which toxic gases, fumes, or explosions may occur in the event of fire.

8.3.2 Means of Egress

- A. If a door is present at the exit to the decontamination unit, from a work area to an exit, or to a way of exit access, it shall be of the side-hinged, swinging type. It shall swing in the direction of exit travel.
- B. The minimum width of any way of exit access shall in no case be less than 28 inches. Where a single way of exit access leads to an exit, its capacity in terms of width shall be at least equal to the required capacity of the exit to which it leads. Where more than one way of exit access leads to an exit, each shall have a width adequate for the number of persons it must accommodate.

8.3.3 Emergency Exits

- A. For each work area, Contractor shall provide an alternate emergency exit.
- B. The alternate emergency exit shall consist of a door that leads to a way of exit access. The door shall be covered and sealed with fire-retardant polyethylene sheeting.
- C. Fire-retardant polyethylene sheeting covering the emergency exit shall be clearly outlined and attached in a manner that allows "tear away" in case of emergency and marked as an emergency exit. A utility knife shall be permanently attached to the fire-retardant polyethylene sheeting to provide access to the emergency exit.
- D. Contractor shall install arrows throughout the work area at 2 feet and 5 feet above the floor indicating the direction to the nearest exit.

8.3.4 Emergency Lighting

- A. In case of electrical failure during fire, Contractor shall provide battery-operated lights or lamps in the work area.
- B. There shall be at least one battery-operated light or lamp every five workers present in the work area.

CERTIFICATE OF WORKER TRAINING

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

CONTRACTOR'S NAME: _____

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER. IF YOU SMOKE AND INHALE ASBESTOS FIBERS THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PERSON.

Your employer's contract with the Owner for the above project requires that: You will be supplied with the proper respirator and be trained in its use. You will be trained in safe work practices and in the use of the equipment found on the job. You will receive a medical examination. These things are to have been done at no cost to you. By signing this certification you are assuring the Owner that your employer has met these obligations to you.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. I have a copy of, or access to, the written respiratory protection manual issued by my employer. I have been equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: I have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. The topics covered in the course included the following:

- Physical characteristics of asbestos
- Health hazards associated with asbestos
- Respiratory protection
- Use of protective equipment
- Negative air/pressure differential Systems
- Work practices including hands on or on-job training
- Personal decontamination procedures
- Air monitoring, personal and area

This training meets all requirements of the Asbestos Hazard Emergency Response Act.

Print Name: _____ Worker's Signature: _____

CERTIFICACION DE ADIESTRAMIENTO A LOS TRABAJADORES

NOMBRE DEL PROYECTO: _____ FECHA: _____

DIRECCION DEL PROYECTO: _____

NOMBRE DEL CONTRATISTA: _____

TRABAJAR CON MATERIALES CON CONTENIDO DE ASBESTO PUEDE SER PELIGROSO. INHALAR LAS FIBRAS DE ASBESTO SE HA RELACIONADO A DISTINTOS TIPOS DE CANCER. SI FUMA E INHALA FIBRAS DE ASBESTO AUMENTA EL POTENCIAL A DESARROLLAR CANCER DEL PULMON CONTRARIO A UNA PERSONA QUE NO FUME.

El contrato del contratista con el dueño del proyecto requiere que: Que le suplan un respirador apropiado y para el cual usted este adiestrado. Usted fue adiestrado para realizar los trabajos de manera segura y en el uso correcto de los equipos a utilizar. Recibirá exámenes médicos según establecen las reglamentaciones estatales y federales y estas serán libre de costo para usted. Al firmar esta certificación usted le esta afirmando al dueño del proyecto que el contratista (patrono) ha cumplido con cada una de estas obligaciones.

PROTECCION RESPIRATORIA: He sido adiestrado en el uso apropiado de respiradores y fui informado sobre el tipo de respirador a utilizarse en este proyecto. Se me ha hecho entrega o tengo accesible una copia del manual escrito de protección respiratoria utilizado por mi patrono. Se me ha provisto, sin costo, el equipo de protección respiratoria necesario para llevar a cabo los trabajos en el proyecto de referencia.

CURSOS DE ADIESTRAMIENTO*: He sido adiestrado sobre los peligros inherentes al manejar y respirar fibras de asbestos. Además he sido adiestrado en los procedimientos adecuados para manejar los materiales con contenido de asbestos y las medidas de protección requeridas. Los temas cubiertos dentro de los cursos son los siguientes:

- Características físicas del asbestos
- Peligros a la salud asociados a la exposición del asbestos
- Protección respiratoria
- Uso del equipo de protección respiratoria
- Sistema de presión negativa
- Prácticas seguras de trabajo
- Procedimiento de descontaminación personal
- Monitoreo de Aire personales y en las áreas

*Los adiestramientos ofrecidos deben cumplir con los requisitos establecidos por las diversas agencias reguladores tanto a nivel estatal como federal.

Nombre: _____ Firma: _____

SUPERVISOR DAILY WORK LOG

DATE: _____

DESCRIPTION OF WORK TO BE PERFORMED:

WORKERS ON-SITE:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____

CONTAINMENT INSPECTIONS:

TIME: _____

COMMENTS: _____

ADDITIONAL COMMENTS

SUPERVISOR DAILY WORK LOG

DATE: _____

COMMENTS:

WASTE REMOVAL:

ATTACHED RECEIPTS:

- Chart recording from manometer
- Air monitoring results from Owner inspector
- Dump receipts from landfill

Name of Supervisor:

Signature:

Name of Owner inspector Representative:

Signature:

**SUPERVISOR DAILY WORK LOG
CONTAINMENT ENTRY LOG**

Page _____ of _____

Date: _____

Name	Respirator type	Time In -Time Out
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Name of Supervisor:

Signature:

Contractor Certification of Compliance with 40 CFR 763.100 et seq.

Pursuant to the written agreement by and between the OWNER and the U.S. ENVIRONMENTAL PROTECTION AGENCY, CONTRACTOR specified hereon is required to certify within five (5) work days of completion of the project that CONTRACTOR has conducted the asbestos removal in accordance with 40 CFR S763.100 *et seq.*

Further, that CONTRACTOR has complied with, and enforced, all applicable federal, regional, state, and local regulations for asbestos abatement, worker protection, and disposal of asbestos-containing materials.

Further, CONTRACTOR certifies that all asbestos-containing material, related to the scope of the project, has been removed.

CONTRACTOR NAME:

REMOVAL PROJECT:

The undersigned, a principal of CONTRACTOR, attests to the foregoing:

CONTRACTOR:

Title: _____

Date: _____

WITNESS: _____

Date: _____

Contact: _____

AFFIDAVIT

I, _____ representing hereinafter known as CONTRACTOR attest that the attached is a true and accurate copy of the notice of intent (NOI) to renovate or demolish to the Environmental Protection Agency (EPA) and other related agency for asbestos abatement activity described below:

[Enter name of facility and a description of the materials to be abated, including location]

This notice was made on _____
I am authorized to act in behalf of CONTRACTOR to issue such notices.

Signature: _____

Title: _____

Received by: _____

Title: _____

Date: _____ Time: _____