



The
UNIVERSITY
of **VERMONT**

**Standard Specification for
Abatement of Vinyl Asbestos Floor Tile and Mastic Tile
Adhesive
2010**

Prepared for and by

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PART 1 General Information

1.1 Applicable Standards and Guidelines

1.1 (A) General Requirements

1.1 (A) i All work under this contract shall be done in strict accordance with all applicable Federal, State and Local regulations, standards and codes governing asbestos abatement and any other trade work done in conjunction with the abatement.

1.1 (A) ii The most recent edition of any relevant regulation, standard, document or code shall be in effect. Where conflicts among the requirements or with these specifications exist the most stringent requirements shall be utilized.

1.1 (A) iii Copies of all standards, regulations, codes and other applicable documents, including this specification and those listed in Section 1.1(b) shall be available at the worksite in the clean change area of the worker decontamination system.

1.1 (B) Specific Requirements

1.1 (B) i *Occupational Safety and Health Administration (OSHA)*

1.1 (B) i a Title 29 Code of Federal Regulations Section 1910.134 - General Industry Standard For Respiratory Protection

1.1 (B) i b Title 29 Code of Federal Regulations Section 1926.1101 - Construction Industry

1.1 (B) i c Title 29 Code of Federal Regulations Section 1910.2 - Access to Employee Exposure and Medical Records

1.1 (B) i d Title 29 Code of Federal Regulations Section 1910.1200 - Hazard Communication

1.1 (B) ii *Environmental Protection Agency - (EPA)*

1.1 (B) ii a Title 40 Code of Federal Regulation Part 61 Subparts A and M (Revised Subpart B) - National Emission Standard for Asbestos

1.1 (B) ii b Title 40 Code of Federal Regulation Part 763 - Model Accreditation Plan for Asbestos

1.1 (B) iii *Vermont Department of Health - (VDOH)*

1.1 (B) iii V.S.A. Title 18, Chapter 26, Effective February 1987; Amended November 1995

1.2 Submittals and Notices

1.2 (A) The Contractor shall:

1.2 (A) i Prior To Commencement of Work:

1.2 (A) i a Should abatement projects involving greater than 160 linear feet of pipe insulation or 260 square feet of sprayed, trowelled or otherwise applied material or covering, building structures or components, send written notification in accordance with 40 CFR Part 61.146 of subpart M, to the appropriate Federal air pollution control agency responsible for the enforcement of the National Emission Standard for Asbestos at least ten (10) working days prior to the commencement of any on-site project activity. Provide the University with a copy of the notice.

1.2 (A) i b Submit proof satisfactory to the University that required permits have been obtained.

1.2 (A) i c Submit documentation satisfactory to the University that the Contractor's employees, including foreman, supervisors and any other company personnel or agents who may be

exposed to airborne asbestos fibers or who may be responsible for any aspects of abatement activities, have received adequate training.

1.2 (A) i d Submit documentation from a physician that all employees or agents who may be exposed to airborne asbestos in excess of background level have been provided with an opportunity to be medically monitored to determine whether they are physically capable of working while wearing a respirator required without suffering adverse health effects. In addition, document that personnel have received medical monitoring as required in OSHA 29 CFR 1926.1101 (m). The Contractor must be aware of and provide information to the examining physician about unusual conditions in the workplace environment (e.g. high temperatures, humidity, and chemical contaminants) that may impact on the employee's ability to perform work activities.

1.2 (A) i e With the University, inspect the premises wherein all abatement and abatement related activities will occur and submit a statement signed by both, agreeing on building and fixture condition prior to the commencement of work.

1.2 (A) i f Submit documentation of respirator fit-testing for all Contractor employees and agents who must enter the work area. The fit-testing shall be in accordance with quantitative fit-testing procedures as detailed in OSHA 29 CFR 1910.134.

1.2 (A) i g Submit documentation of current certification by the Vermont Department of Health for all Contractor employees and agents who must enter the work area

1.2 (A) ii During Abatement Activities

1.2 (A) ii a Progress meetings will be scheduled at the pre-construction meeting so that job progress reports can be given detailing abatement activities. Reports shall include review of progress with respect to previously established milestones and schedules, major problems and action taken, injury reports, equipment breakdown and bulk material and air sampling results conducted by Contractor's Air Sampling Professional.

1.2 (A) ii b Post in the clean change area of the worker decontamination enclosure a list containing the names of emergency personnel who may be required to assist during abatement activities.

1.2 (B) The University shall:

1.2 (B) i Prior to Commencement of Work:

1.2 (B) i a Notify occupants of work areas that may be disrupted by the abatement of project dates and requirements for relocation. Arrangements must be made prior to start, for relocation of desks, files, equipment and personal possessions to avoid unauthorized access into work area.

1.2 (B) i b Submit to Contractor, results of pre-abatement air sampling (if conducted) including location of samples, names of the Air Sampling Professional, equipment utilized and method of analysis.

1.2 (B) i c Document that University's employees who will be required to enter the work area during abatement have received all proper training.

1.2 (B) i d Provide to the Contractor information concerning access, shutdown and protection requirements of certain equipment and systems in the work area.

1.2 (B) i d Provide to Contractor a copy of campus map with work site location for emergency planning.

1.2 (B) ii During Abatement:

1.2 (B) ii a Submit to the Contractor, results of bulk material analysis and air sampling data collected during the course of the abatement. These sample results are for information only. They serve only to monitor Contractor performance during the project and shall not release the Contractor from any responsibility to sample for OSHA compliance.

1.3 Site Security

1.3 (A) The work area is to be restricted only to authorized, trained, and protected personnel. These may include the Contractor's employees, employees of Subcontractors, University employees and representative, State and local inspectors and any other designated individuals. A list of authorized personnel shall be established prior to job start and posted in the clean change room of the worker decontamination system.

1.3 (B) Entry into the work area by unauthorized individuals shall be reported immediately to the University by the Contractor.

1.3 (C) Two separate logs shall be maintained in the clean change room of the worker decontamination system. One for anyone who enters the containment area and the other for anyone who visits the job site. Each person must record name, affiliation, time in and time out for each entry.

1.3 (D) Access to the work area shall be through a single worker 3-stage decontamination system. All other means of access (doors, windows, hallways, etc.) shall be blocked or locked so as to prevent entry to or exit from the work area. The only exceptions for this rule are the waste pass-out airlock which shall be sealed except during the removal of containerized asbestos waste from the work area, and emergency exits in case of fire or accident. Emergency exits shall not be locked from the inside, however, they shall be sealed with 2 layers of 6 mil polyethylene sheeting and duct tape until needed.

1.3 (E) Contractor should have control of site security during abatement operations whenever possible, in order to protect work efforts and equipment. If site is secured with lock and key, The University shall have a copy of the key and/or instant access.

1.3 (F) Contractor will have University's assistance in notifying building occupants of impending activity and enforcement of restricted access by University's employees.

1.3 (G) Contractor will comply with the University's badge identification policy. See Appendix C for details.

1.4 Emergency Planning

1.4 (A) Emergency planning shall be developed prior to abatement initiation and agreed to by Contractor and University.

1.4 (B) Emergency procedures shall be in written form and prominently posted in the clean change room and equipment room of the worker decontamination system. Everyone prior to entering the work area must read and sign these procedures to acknowledge receipt and understanding of the work site layout, location of emergency exits and emergency procedures.

1.4 (C) Emergency planning shall include but is not limited to, written notification of police, fire and emergency medical personnel of planned abatement activities, work schedule and layout of the work area, particularly barriers that may affect response capabilities.

1.4 (D) Emergency planning shall include considerations of fire, explosion, toxic atmospheres, electrical hazards, slips, trips and falls, confined spaces and heat related injury. Written procedures shall be developed by the Contractor and training in procedures shall be provided to employees.

1.4 (E) Employee shall be trained in evacuation procedures in the event of workplace emergencies.

1.4 (E) i For non-life-threatening situations - employees injured or otherwise incapacitated shall decontaminate following normal procedures with assistance from fellow workers if necessary, before exiting the workplace to obtain proper medical treatment.

1.4 (E) ii For life-threatening injury or illness, worker decontamination shall take least priority after measures to stabilize the injured worker, remove them from the workplace and secure proper medical treatment.

1.4 (F) An adequate number of fire extinguishers and first aid kits shall be available both inside and outside containment.

1.4 (G) Telephone numbers of all emergency response personnel shall be prominently posted in the clean change area and equipment room and at the location of the nearest telephone.

1.5 Joint Scope Meeting

1.5 (A) The Contractor shall attend a joint scope meeting with representatives of the University at the Training and Compliance Office.

1.5 (B) The Contractor and supervisory personnel who will provide on-site direction of the abatement activities must attend.

1.5 (C) Upon notice to proceed and prior to commencement of work, the Contractor shall provide all submittals as required in Section 1.2 (Submittals and Notices) for the project. In addition the Contractor shall be prepared to provide detailed information concerning:

1.5 (C) i Preparation of the work area.

1.5 (C) ii Personal protective equipment including respiratory protection and protective clothing.

1.5 (C) iii Employees who will participate in the project, including delineation of experience, training, and assigned responsibilities during the project.

1.5 (C) iv Decontamination procedures for personnel, work area and equipment.

1.5 (C) v Abatement methods and procedures to be utilized.

1.5 (C) vi Required air monitoring procedures.

1.5 (C) vii Procedures for handling waste materials.

1.5 (C) viii Procedures for final decontamination and cleanup.

1.5 (C) ix A timeline of work and performance schedule.

1.5 (C) x Emergency procedures.

1.5 (C) xi Parking arrangements shall be compliant with the most current University of Vermont parking policy.

PART 2 Materials and Equipment

2.1 Materials

2.1 (A) General (all abatement projects)

2.1 (A) i Deliver all materials in the original packages, containers or bundles bearing the name of the manufacturer and the brand name (where applicable).

2.1 (A) ii Store all materials subject to damage off the ground, away from wet or damp surfaces and under cover sufficient enough to prevent damage or contamination. Replacement materials shall be stored outside of the work area until abatement is completed.

2.1 (A) iii Damaged, deteriorating or previously used materials shall not be used and shall be removed from the work site and disposed of properly. The University representative has the authority to reject any unacceptable materials and equipment.

2.1 (A) iv Polyethylene sheeting for floor, walls, stationary objects and all other uses shall be a minimum of 6-mil thick.

2.1 (A) v Duct tape or other waterproof tape, spray glue, staples, screws or other effective procedures capable of sealing adjacent sheets of polyethylene and capable of sealing polyethylene to dissimilar finished or unfinished surfaces under both wet and dry conditions shall be utilized.

2.1 (A) vi Polyethylene sheeting utilized for worker decontamination enclosure shall be opaque white or black in color.

2.1 (A) vii Disposal bags shall be 6-mil polyethylene, pre-printed with labels as required by EPA regulation 40 CFR 61.150 (a) (1) (iv), OSHA requirement 29 CFR 1910.1001 (J) (4) (ii), 29 CFR 1910.1200 (f) and Transportation 49 CFR 172.301, 172.400.

2.1 (A) viii Disposal drums shall be metal or fiberboard with locking ring tops.

2.1 (A) ix Stick-on labels as per EPA and OSHA requirements (see 2.1 (a) viii) for disposal drums.

2.1 (A) x Danger signs as required by OSHA 29 CFR 1910.1001 (J) (2) (ii) and 29 CFR 1926.1101.

2.1 (B) Removal

2.1 (B) i When removing mastic that is asphalt based the contractor will use Sentinel® #909™ Low Odor Mastic Remover.

2.1 (B) ii When removing mastic that is associated with carpet the contractor will use Sentinel ® #626 Carpet Adhesive Remover.

2.1 (B) iii For neutralizing the floor after mastic has been removed the contractor will use Sentinel ® #805™ TSP Final Wash.

2.1 (B) iv If the contractor chooses products other than what is listed above, section 2.2 (D) Substitutions must be followed.

2.1 (C) Enclosure Materials

2.1 (C) i Enclosure material shall conform with the following characteristics.

2.1 (C) i a The enclosures shall be constructed of materials such that when the enclosure is completed there is limited potential for impact damage to the enclosure and no potential for fiber release.

2.1 (C) i b Other [*Please refer to Bidding and Contract Documents for specific requirements*]

2.1 (C) ii Additional materials as necessary for removal, as specified in 2.1 (A).

2.2 Equipment

2.2 (A) General (all abatement projects)

2.2 (A) i A sufficient quantity of negative pressure ventilation units equipped with HEPA filtration and operated in accordance with ANSI 29.2-79 (local exhaust ventilation requirements) and EPA 560/5-83-002 Guidance for Controlling Friable Asbestos-Containing Materials in Buildings Appendix F: Recommended Specifications and Operating Procedures For the Use of Negative Pressure Systems for Asbestos Abatement shall be utilized so as to provide one workplace air change every 15 minutes.

To calculate total air flow requirement:

$$\text{Total ft}^3 / \text{min} = \frac{\text{Vol. of work area (in ft}^3 \text{)}}{15 \text{ minutes}}$$

To Calculate the number of units needed for the abatement:

$$\text{Number of units needed} = \frac{[\text{Total ft}^3 / \text{min.}]}{[\text{Capacity of unit in ft}^3 / \text{min.}]}$$

If air-supplied respirators are utilized estimate the volume of supplied air and add to workplace air volume when calculating ventilation requirements. For small enclosures and glove bags, a HEPA filtered vacuum system may be utilized to provide negative air pressure.

2.2 (A) ii Type “C” air supplied respirators in positive mode with full facepieces and HEPA filtered disconnect protection are recommended by the US EPA for all full shift abatement work until the successful completion of final clearance air monitoring. Powered air purifying respirators equipped with HEPA filters and full facepieces or respirators with a higher NIOSH assigned protection factor may be used for inspection or repair work of less than 1 hour duration per day. A sufficient supply of charged replacement batteries and filters and a flow test meter shall be available in the clean change area for use with powered air purifying respirators. Air purifying respirators with dual high-efficiency (HEPA) filters may be utilized during work area preparation activities. (See Section 3.3 (b) iii). Air purifying respirators with dual high-efficiency (HEPA) filters may be utilized during work area preparation activities. Respirators shall be provided that have been tested and approved by the National Institute of Occupational Safety and Health for use in asbestos contaminated atmospheres.

2.2 (A) iii Compressed air systems shall be designed to provide air volumes and pressures to accommodate respirator manufacturer’s specifications. The compressed air systems shall have a receiver of adequate capacity to allow escape of all respirator users from contaminated areas in the event of compressor failure. Compressors must meet the requirements of OSHA 29 CFR 1910.134 (i). Compressors must have an in-line carbon monoxide monitor and periodic inspection of the carbon monoxide monitor must be evidenced. Documentation of adequacy of compressed air systems/respiratory protection system must be retained on site. This documentation will include a list of compatible components with the maximum number and type of respirators that may be used with the system. Periodic testing of compressed air shall insure

that systems provide air of sufficient quality (Grade D breathing air as described in Compressed Gas Association Commodity Specifications G-7.1)

2.2 (A) iv Full body protective clothing, including head, body and foot covering (unless using footwear as described in 2.2 (a) vi consisting of material impenetrable by asbestos fibers (Tyvek® or equivalent) shall be provided to all workers and authorized visitors in sizes adequate to accommodate movement tearing.

2.2 (A) v Additional safety equipment (e.g. hard hats meeting the requirements of ANSI Standard Z89.1-1981, eye protection meeting the requirements of ANSI Standard Z87.1-1979, safety shoes meeting the requirements of ANSI Standard Z41.1-1967, disposable PVC gloves), as necessary, shall be provided to all workers and authorized visitors.

2.2 (A) vi Non-skid footwear shall be provided to all abatement workers. Disposable clothing shall be adequately sealed to the footwear to prevent body contamination.

2.2 (B) Removal Equipment

2.2 (B) i A sufficient supply of scaffolds, ladders, lifts and hand tools (e.g. scrapers, wire cutters, brushes, utility knives, wire saws, etc.) shall be provided as needed.

2.2 (B) ii Sprayers with pumps capable of providing 500 pounds per square inch (psi) at the nozzle tip at a flow rate of 2 gallons per minute for spraying amended water.

2.2 (B) iii Rubber dustpans and rubber squeegees shall be provided for cleanup. Use of bristled brooms/brushes may only be used inside containment and in conjunction with wet methods.

2.2 (B) iv Brushes utilized for removing loose asbestos containing material shall have nylon or fiber bristles. Metal may be used if an adequate exposure assessment for this task is conducted.

2.2 (B) v A sufficient supply of HEPA filtered wet/dry vacuum systems shall be available during cleanup. **No vacuums without HEPA filters will be allowed on site.**

2.2 (C) Substitutions

2.2 (C) i Approval Required:

2.2 (C) i a The Contract is based on the materials, equipment and methods specified in the Bidding Requirements and Contract Documents.

2.2 (C) i b The University will consider proposals for substitutions of specified materials, equipment and methods only when such proposals are accompanied by complete technical data and all relevant information required by the University to evaluate the proposed substitution.

2.2 (C) i c Substituted materials, equipment or methods shall not be used unless such substitutions have been specifically approved by the University.

2.2 (C) ii “Or Equal”

2.2 (C) ii a Where the phrases “or equal” or “or equal as approved by the University” occur in the Bidding Requirements and Contract Documents, substituted materials, equipment or methods must be approved by the University.

2.2 (C) ii b The decision of the University shall be final.

2.2 (C) iii Separate Substitute Bids:

Bidders may, if they wish, submit completely separate bids using materials and methods other than those described in the Bidding Requirements and Contract Documents, provided that all substitutions are clearly identified and described, and that the bid in all other respects is in accordance with the provisions of the Bidding Requirements and Contract Documents.

2.2 (C) iv Availability of Specified Items:

2.2 (C) iv a Verify prior to bidding that all specified items will be available in time for installation during orderly and timely progress of the work.

2.2 (C) iv b In the event that specified items will not be available for use during the timely progress of the work, notify the University at the earliest opportunity prior to the submittal of bids.

2.2 (C) iv c Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back-charged as necessary and shall not be borne by the University.

PART 3 Execution

3.1 Preparation

3.1 (A) Work Areas

3.1 (A) i The Contractor shall post danger signs which meet the specifications of OSHA 29 CFR 1926.1101 and VRAC, V.S.A. Title 18, Chapter 26 as amended November 1995, Section 2.4.2 (h) at any location and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted at a distance sufficiently far enough away from the work area to permit an employee to read the sign and take the necessary protective measures to avoid exposure. Additional signs may need to be posted following construction of workplace enclosure barriers. The Contractor is responsible for providing signage in any language other than English which may be the employees' primary language.

3.1 (A) ii Shut down and lock out of all heating, cooling and air conditioning system (HVAC) components that are in, supply or pass through the work area must be completed. (Note: Interiors of exiting duct work may require operations before the ductwork is sealed off or during the final cleaning phase prior to reengagement of the system. Appropriate equipment and control measures shall be utilized to prevent contamination of building spaces during this operation. Adequate cleaning of ductwork may sometimes be accomplished by drawing high volumes of air through the system using HEPA negative air filtration units.) Investigate the work area and agree on pre-abatement conditions with the University. Seal all intake and exhaust vents in the work area with duct tape and 6-mil polyethylene. Also, seal any seams in the system components that pass through the work area. Remove all HVAC system components that pass through the work area. Remove all HVAC system filters and place in labeled 6-mil polyethylene bags for preparation and eventual disposal as asbestos contaminated waste.

3.1 (A) iii The University will shut down and lock out electric power to all work areas. The Contractor will provide temporary power panel and lighting equivalent to a minimum of 20 foot candles/square foot. Safe installation (including ground faulting) of temporary power sources and equipment by compliance with all applicable electrical code requirements and OSHA requirements for temporary electrical systems shall be insured. University in-house electricians will perform all hook-ups; coordination of this will be through the Asbestos & Lead Management Program. Use of other power sources is prohibited.

3.1 (A) iv The University shall designate sanitary facilities for abatement personnel outside of the enclosed work area.

3.1 (A) v The University will provide water and hose bibb connection(s) for construction purposes. It shall be the responsibility of the Contractor to connect to the existing University system, and to disconnect water on a daily basis at the end of each work day.

3.1 (A) vi The Contractor shall pre-clean all movable objects within the work area using a HEPA filtered vacuum and/or wet cleaning methods as appropriate. After cleaning, these objects shall be removed from the work area and carefully stored in an uncontaminated location designated by the University. (Carpeting, drapes, clothing, upholstered furniture and other fabric items may be disposed of as asbestos contaminated waste or cleaned as asbestos contaminated items utilizing HEPA vacuum techniques and off-premises steam cleaning. Since adequate cleaning of severely contaminated fabric is difficult, the University will carefully consider this option on a case by case basis.)

3.1 (A) vii The Contractor shall pre-clean all fixed objects in the work area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Careful attention must be paid to machinery behind grills or gratings where access may be difficult but contamination significant. Also pay particular attention to wall, floor and ceiling penetrations behind fixed items. After pre-cleaning, the Contractor and the University will inspect the area. The University must agree that pre-cleaning is complete. Fixed objects must be enclosed in 6-mil polyethylene sheeting and sealed securely in place with duct tape.

3.1 (A) viii The Contractor shall pre-clean all surfaces in the work area using HEPA filtered vacuums and/or wet cleaning methods as appropriate. Do not use methods or equipment that would raise dust such as dry sweeping or vacuums unequipped with HEPA filters. Do not disturb asbestos containing materials during the pre-cleaning phase.

3.1 (A) ix The Contractor shall seal off all windows, doorways, elevator openings, corridor entrances, drains, ducts, grills, grates, diffusers, electrical boxes, electrical connectors and any other openings between the work area and uncontaminated areas outside of the work area, including the outside of the building, tunnels and crawl spaces, with 6-mil polyethylene sheeting and duct tape. Hard barriers may be required as specified in Section 3.1 (D) - Isolating Work Area from Occupied Areas *infra*.

3.1 (A) x The contractor will not have to seal the ceiling or anything that maybe on the ceiling unless dust generating activities are used.

3.1.(A) xi The contractor shall install a splash barrier made of 6 mil polyethylene sheeting 3 to 5 feet up the wall by spot taping. Tape shall be used so as to minimize tape damage. Masking tape can be used on surfaces where material can be damaged. (ie: sheetrock)

3.1 (B) Worker Decontamination Enclosure Systems

3.1 (B) i Worker decontamination enclosure systems shall be provided at each location where workers will enter or exit the contained work area. This system may be constructed in additional space outside the work area and accessible from it; if the layout is appropriate. The space may be enclosed in polyethylene sheeting and be used for the storage of equipment or as office space. If layout is not appropriate, enclosure systems may be housed in a structure constructed out of metal, wood or plastic support as appropriate.

3.1 (B) ii Plans for construction, including materials and layout, shall be submitted as drawings and approved in writing by the University prior to the commencement of work. Worker decontamination enclosure systems constructed at the worksite shall utilize opaque white, black polyethylene sheeting or other acceptable materials which maintain privacy. If a portable, pre-fabricated unit is to be used, a detailed description of it must be submitted for the University's approval. Plans must include a floor plan in accordance with Section 3.1 (B) iii *infra*, displaying dimensions, material, size, thickness, plumbing and electrical utilities.

3.1 (B) iii The worker decontamination enclosure system shall consist of, at a minimum, a clean room, a shower, and an equipment (dirty) room.

3.1 (B) iv Entry to and exit from all airlocks and decontamination enclosure system chambers shall be through curtained doorways consisting of two sheets of overlapping polyethylene sheeting. One sheet shall be secured at the top and left side, the other sheet at the top and right side. Both sheets shall have weights attached to the bottom to insure that they hang straight and maintain a seal over the doorway when not in use. Doorway designs, which provide equivalent protection and are acceptable to the University, may be utilized.

3.1 (B) v The clean room shall be large enough to accommodate the work crew. The clean room shall be a minimum of six (6) feet in height. A minimum of thirty-two (32) square feet of floor space shall be provided for every six (6) full shift abatement workers. As the work crew is increased, an additional 3 feet of floor space shall be added for each additional full shift worker. Hooks for hanging clothes shall be provided. The University will not be held responsible for lost or stolen property. Lockers may be provided for valuables; however, workers may be requested to secure their property off the worksite. Storage space for respirators shall also be provided in this area. Clean work clothes, clean disposable clothing, replacement filters for respirators, towels and other necessary items shall be provided in adequate supply at this area. A door which can be locked shall be used to permit access into the clean room from outside the work area. Heat, electricity and lights shall be provided, as necessary for comfort. This space shall be kept clean and orderly.

3.1 (B) vi The shower room shall contain one shower per every six abatement workers. Each showerhead shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. An adequate supply of soap, shampoo and towels shall be supplied by the Contractor and made available at all times. Shower water shall be drained, collected and filtered through a system with at least 5 micron particle size collection capability. (Note: A system containing a series of several filters with progressively smaller pore sizes is recommended to avoid rapid clogging of the filtration system by large particles.)

3.1 (B) vii The equipment (dirty) room shall be used for storage of equipment and tools at the end of a shift after they have been decontaminated using a HEPA filtered vacuum and/or wet cleaning techniques as appropriate. Replacement filters (in sealed containers until used) for HEPA vacuums, negative air filtration units (NAFU), extra tools, containers of surfactant and other materials and equipment that may be required during the abatement may also be stored here as needed. A labeled 6-mil polyethylene bag for collection of disposable clothing shall be located in this room. Contaminated footwear (e.g. rubber boots, other reusable footwear) shall be stored in this area. Workers shall wear rubber boots with steel shank and toe.

3.1 (C) Waste Container Pass-Out Air-Lock and Emergency Exits

3.1 (C) i The waste container pass-out air-lock shall be constructed at a location away from the worker decontamination enclosure system. Whenever possible, it shall be located where there is direct access from the work area to the outside of the building.

3.1 (C) ii This air-lock system shall consist of an air-lock, a container staging area, and another air-lock which leads outside the work area.

3.1 (C) iii The waste container pass-out air-lock shall be constructed in equivalent fashion to the worker decontamination enclosure system using equivalent materials and air-lock and curtain doorway designs.

3.1 (C) iv This air-lock system shall not be used to enter or exit the work area.

3.1 (C) v Emergency exits shall be established and clearly marked with duct tape arrows or other effective designations to permit them to be easily seen from anywhere within the work area. Exits shall be secured to prevent access from uncontaminated areas and still permit use in an emergency. These exits shall be properly sealed with polyethylene sheeting, which can be cut to permit egress if necessary. These exits may be the worker decontamination enclosure, the waste pass-out air-lock and/or other alternative exits satisfactory to fire officials and the University.

3.1 (D) Isolation of the Work Area from Occupied Areas of the Building

3.1 (D) i The contaminated work area shall be separated from uncontaminated, occupied areas of the building by the construction of air tight barriers.

3.1 (D) ii Walls shall be constructed of metal framing to support barriers in all openings larger than 4' x 8'.

3.1 (D) iii A sheathing material shall be drywall of at least 5/8" thickness. The drywall shall be applied to the building occupant side of the barrier.

3.1 (D) iv Metal framing on the containment side will have 1"x 4" lumber attached horizontally to allow for stapling and taping

3.1 (D) v The inside of the partition shall be covered with a double layer of 6-mil polyethylene sheeting with staggered joints and sealed in place.

3.1 (D) vi Mask all seams of partition at floor, ceiling, walls and fixtures to form an air tight seal.

3.1 (E) Maintenance of Workplace Barriers and Worker Decontamination Enclosure Systems

3.1 (E) i All polyethylene barriers inside the workplace, in the worker decontamination enclosure system, in the waste container pass-out air-lock and at partitions constructed to isolate the work area from occupied areas shall be inspected at least twice daily, prior to the start of each day's abatement activities and following the completion of the day's abatement activities. Document inspections and observations in the daily project log.

3.1 (E) ii Damage and defects in the enclosure system are to be repaired immediately upon discovery.

3.1 (E) iii Smoke tubes shall be used to test the effectiveness of the barrier system when directed by the University.

3.1 (E) iv At any time during the abatement activities, after barriers have been erected, if visible material is observed outside of the work area or if damage occurs to the barriers, work shall immediately stop. Repairs are to be made to the barriers, and debris/residue cleaned up using appropriate HEPA vacuuming and wet methods.

3.1 (E) v If air samples collected outside of the work area during abatement activities indicate airborne fiber concentrations greater than 0.01 f/cc or pre-measured background levels (whichever is lower), work shall immediately stop for inspection and repair of barriers. Cleanup of surfaces outside of the work area using HEPA vacuums or wet cleaning techniques may be necessary.

3.1 (E) vi Install and initiate operation of Negative Air Filtration Units (NAFU) as needed to provide one air change in the work area every 15 minutes. (See Section 2.2 (A) i *supra*) Openings shall be made airtight with duct tape and/or caulking. If more than one unit is installed, they should be turned on one at a time, checking the integrity of wall barriers for secure attachment and need for additional reinforcement. Insure that adequate power supply is available to satisfy the requirements of the ventilating units. NAFUs shall be exhausted to the outside of the building. They shall not be exhausted into occupied areas of the building. Twelve inch extension ducts shall be used to reach from the work area to the outside when required. Careful installation and daily inspections shall be done to insure that the ducts do not release fibers into uncontaminated building areas.

3.1 (E) vii Once constructed and reinforced as necessary, with negative air filtration units in operation as required, test enclosure for leakage utilizing smoke tubes. Repair or reconstruct as needed.

3.1 (E) viii Clearly identify and maintain emergency and fire exits from the work area.

3.1 (E) ix Remove, clean and enclose in polyethylene ceiling-mounted objects such as lights and other items that interfere with the abatement process and were not previously cleaned and sealed off. Utilize localized spraying of amended water and/or HEPA vacuums to reduce fiber dispersal during the removal of these fixtures.

3.1 (F) Prior to the Commencement of Work

Commencement of work shall not occur until:

3.1 (F) i Enclosure systems have been constructed and tested.

3.1 (F) ii Negative Air Filtration Units (NAFU) and enclosure systems are functioning adequately.

3.1 (F) iii All pre-abatement submissions, notification, posting and permits have been provided and are satisfactory to the University (See Section 1.2 *supra*).

3.1 (F) iv All equipment for abatement, clean-up and disposal are available.

3.1 (F) v All worker training, medical and fit test certificates are on site.

3.1 (F) vi Contractor receives written permission from the University to commence abatement.

3.1 (G) Alternative Procedures

3.1 (H) i Procedures described in this specification are to be utilized at all times.

3.1 (H) ii If specified procedures cannot be utilized, a request must be made in writing to the University providing details of the problem encountered and recommended alternatives.

3.1 (H) iii Alternative procedures shall provide equivalent or greater protection than procedures which they replace.

3.1 (H) iv Alternative procedures must be approved in writing by the University prior to implementation.

3.2 Workplace Entry and Exit Procedures

3.2 (A) Personnel entry and exit

3.2 (A) i All workers and authorized personnel shall enter the work area through the worker decontamination enclosure system.

3.2 (A) ii All personnel who enter the work area must sign the entry log, located in the clean room, upon entry and exit.

3.2 (A) iii All personnel, before entering the work area, shall read and be familiar with all posted regulations, personal protection requirements (including workplace entry and exit procedures) and emergency procedures. A sign-off sheet shall be used to acknowledge that these have been reviewed and understood by all personnel prior to entry.

3.2 (A) iv All personnel shall proceed first to the clean room, remove street clothing and don respiratory protection deemed adequate for the job conditions disposable coveralls, and head and foot coverings. Hard hats, eye protection and gloves shall also be utilized if required. Clean respirators and protective clothing shall be provided and utilized by each person for each separate entry into the work area.

3.2 (A) v Personnel wearing designated personal protective equipment shall proceed from the clean room through the shower and equipment room to the main work area.

3.2 (A) vi Before leaving the work area all personnel shall remove gross contamination from the outside of respirators and protective clothing by brushing and /or wet wiping procedures. Small HEPA vacuums with brushing attachments may be used for this purpose; larger machines may tear the suits. Each person shall clean the soles of protective footwear (a small children's wading pool next to the equipment room works well) prior to entering the equipment (dirty) room.

3.2 (A) vii Protective equipment except respirators is to be removed in the equipment (dirty) room. Deposit disposable clothing into appropriately labeled containers for disposal.

3.2 (A) viii Reuseable contaminated footwear shall be stored in the equipment room when not in use in the work area, and disposed of as contaminated waste upon completion of abatement. Rubber boots may be decontaminated at the completion of the abatement for reuse.

3.2 (A) ix Prior to the removal of respirators, personnel shall proceed to the shower area, clean the outside of the respirators and the exposed face area under running water, then shower and shampoo to remove residual asbestos contamination. Various types of respirators will require slight modifications to these procedures. An airline respirator with HEPA filtered disconnect protection may be disconnected in the equipment room and worn into the shower. A powered air-purifying respirator facepiece will have to be disconnected from the filter/power pack assembly, which is not waterproof, upon entering the shower. A dual cartridge negative pressure respirator may be worn into the shower. Cartridges must be replaced for each new entry into the work area.

3.2 (A) x After showering and drying off, proceed to the clean room.

3.2 (A) xi These procedures shall be posted in the clean room along with the Utilization of a Decontamination Unit in accordance with V.S.A. Title 18, Chapter 26, Effective February 1987; Amended November 1995.

3.2 (B) Waste Container Pass-out Procedures

3.2 (B) i Asbestos contaminated waste that has been containerized shall be transported out of the work area through the waste container pass-out airlock or through the worker decontamination enclosure if a separate airlock has not been constructed.

3.2 (B) ii Waste pass-out procedures shall utilize two teams of workers, an “inside” team and an “outside” team.

3.2 (B) iii The inside team wearing appropriate protective clothing and respirators for inside the work area shall clean the outside, including bottoms, of properly labeled containers (bags, drums, or wrapped components) using HEPA vacuums and wet wiping techniques. No worker from the inside team shall leave the contaminated area through this airlock.

3.2 (B) iv Add water to bags until there is approximately 1 quart of free standing water. Disposal bags should be collapsed by evacuating the air from the bag with a HEPA vacuum in the work area or enclosure. Once collapsed, twist the bag to form a neck and wrap it tight with duct tape. Fold neck of bag over to form a loop, then again wrap duct tape around neck and loop (Gooseneck Tie).

3.2 (B) v The outside team, wearing disposable clothing over their street clothing and appropriately assigned respirators, shall enter the air-lock from outside the work area, enclose the drums or bags in clean, labeled, 6-mil polyethylene bags; the bags shall then be vacuumed and sealed as described in Section 3.2 (B) iv *supra*. No worker from the outside team shall enter the contaminated work area through this air-lock.

3.2 (B) vi The exit from this airlock shall be secured to prevent unauthorized entry.

3.2 (B) vii All waste shall be tagged with tags issued by the University and placed in a permitted University vehicle for transportation to the temporary storage facility at Centennial Field. All waste should be labeled as required by federal, state and local regulations. Federal regulations requiring labeling of waste include OSHA regulations 29 CFR 1910.1200, 1910.1001 and 1926.1101, EPA's NESHAP regulation 40 CFR 61.150, and the Department of Transportation's Hazardous Materials Regulations 49 CFR 171 and 180. ACM packaging, with some exceptions, must meet general DOT and EPA requirements and be protective, marked and labeled. An adequate number of Contractor's personnel shall accompany University personnel to the temporary storage facility for unloading of waste.

3.2 (B) viii The on-site supervisor will sign the Waste Shipment Record.

3.3 Personal Protective Equipment (PPE)

3.3 (A) Training

3.3 (A) i Prior to commencement of abatement activities, all personnel who will be required to enter the work area or handle containerized asbestos containing materials must have received adequate training in accordance with Title 40 Code of Federal Regulation Part 763 - Model Accreditation Plan for Asbestos and V.S.A. Title 18, Chapter 26, Effective February 1987; Amended November 1995.

3.3 (A) ii Special on-site training on equipment and procedures unique to this job site shall be performed as required.

3.3 (A) iii Training in emergency response and evacuation procedures shall be provided and documented.

3.3 (B) Respiratory Protection

3.3 (B) i All respiratory protection shall be provided to workers in accordance with the submitted written respiratory protection program, which includes all items in OSHA 29 CFR 1910.134 (c) (1-9). This program shall be posted in the clean room of the worker decontamination enclosure system.

3.3 (B) ii Each worker shall be provided with a respirator which is marked with a waterproof personal name label.

3.3 (B) iii Respirators shall be selected that meet the following level of protection requirements in accordance with OSHA 29 CFR 1926.1101:

Implementation Suggestions:

The use of engineering controls such as negative pressure ventilation units and HEPA vacuums, and good work practices such as the wetting of asbestos containing material prior to abatement, misting the work area to help the fibers settle, removal in small sections, and the use of glovebags and proper clean-up and containerization, all help to reduce airborne fiber levels in the work area. A properly designed air monitoring program, implemented by a qualified air sampling professional (Asbestos Project Monitor or Supervisor) and certified analytical laboratory, may support the use of respiratory protective devices that provide a lower factor of protection to the workers than air supplied respirators for abatement activities. Safety problems associated with the use of airline systems and time and financial constraints may be reduced through the use of alternative types of respiratory protection. It is imperative, however, that adequate air monitoring of fiber levels and a well designed respiratory protection program in accordance with 29 CFR 1910.134 be implemented. Key points of the respirator program include proper selection of respirator type and size, training of personnel in the proper inspection, donning, use, cleaning, and maintenance procedures for the respirator selected including their use limitations, and a good fitting and fit testing program to provide proper protection. **Single-use disposable respirators are not acceptable for the use of handling asbestos at the University.**

3.3 (B) iv Fit testing.

3.3 (b) iv a Workers must perform positive and negative air pressure fit checks each time a respirator is put on. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.

3.3 (B) iv b Workers shall be given a quantitative fit test in accordance with procedures detailed in the OSHA 29 CFR 1910.134, Appendix A, Fit Test Procedures.

3.3 (B) iv c Documentation of respirator fit test must be provided to the University.

3.3 (B) v Bearded workers shall not be permitted to enter the work area wearing a tight fitting respirator.

3.3 (B) vi Hooded or loose fitting respirators may be used as long as the respirator is adequate for the fiber concentrations of exposure.

3.3 (B) vii Additional respirators (minimum of 2 of each type) must be available at the work site for authorized visitors who may be required to enter the work area. Training on the donning and use of these respirators shall be provided. Visitors must meet all OSHA 1926.1101 requirements.

3.3 (C) Protective Clothing

3.3 (C) i Disposable clothing including head, foot and full body protection shall be provided in sufficient quantities and adequate sizes for all workers and authorized visitors.

3.3 (C) ii Hard hats, protective eye-wear, gloves, rubber boots and/or other footwear shall be provided as required for workers and authorized visitors.

3.4 Removal Procedures

3.4 (A) Clean and isolate the work area in accordance with Section 3.1 *supra*.

3.4 (B) When the asbestos containing material is disturbed, wet with an amended water solution using equipment capable of providing a fine spray mist in order to reduce airborne fiber concentrations. Saturate the material to the substrate, however, do not allow excessive water to accumulate in the work area. Keep all removed material wet enough to prevent fiber release until it can be containerized for disposal. If work area temperatures are below 32°F/0°C and amended water is subject to freezing, procedures in Section 3.1(b) i *supra* must be utilized. Maintain a high humidity in the work area by misting or spraying to assist in fiber settling and to reduce airborne concentrations. Wetting procedures are not equally effective on all types of asbestos containing material but shall be used in all cases.

3.4 (C) Saturated asbestos containing material shall be removed in manageable sections. Removed material should be containerized before moving on to work in a new location. Surrounding areas shall be periodically sprayed and maintained in a wet condition until visible material is cleaned.

3.4 (C) i Remove carpet first. If tile adheres to carpet, cut those sections of carpet and discard as contaminated waste.

3.4 (C) ii Carpet with no tile attached to it shall be removed as non-contaminated waste.

3.4 (C) iii All non-contaminated carpet shall be removed prior to the removal of VAT/MTA.

3.4 (D) Containers (e.g. 6-mil polyethylene bags or drums) shall be sealed when full. Double bag process will occur as outlined in Section 3.2 (b) *supra*. If drums are used, they may need to be enclosed with a 6-mil polyethylene bag.

3.4 (E) Large components removed intact may be wrapped in 2 layers of 6-mil polyethylene sheeting, secured with tape and properly labeled for transportation.

3.4 (F) Asbestos containing waste with sharp-edged components (e.g. nails, screw, metal lath, tin sheeting) will tear the polyethylene bags and sheeting and shall be placed into grain bags, drums, fiber barrels or cardboard boxes before wrapping or bagging.

3.4 (G) After completion of all stripping work, surfaces from which asbestos containing materials have been removed shall be wet brushed and sponged or cleaned by some equivalent method to remove all visible residue. The contractor shall use Sentinel ® 747™ or Sentinel ® 626™ Removers at this point to achieve the smooth clean surface.

3.4 (H) Clean-up shall proceed in accordance with Section 3.5 *infra*.

3.5 Clean-up Procedures

3.5 (A) Remove and containerize all visible accumulations of asbestos containing material and asbestos contaminated debris utilizing hand tools made of rubber or plastic. Do not use metal shovels to pick up or move accumulated waste. Special care shall be taken to minimize damage to floor sheeting.

3.5 (B) Starting from the opposite end of the decontamination enclosure in the work area, working from high to low, far to near, wet clean all surfaces in the work area using Sentinel® 805™ TSP, rags, mops and sponges.

3.5 (C) The on-site supervisor and the University representative will carry out the first visual inspection of the work area. All surfaces shall be free from any visual debris. The University representative and the on-site supervisor must agree that the area is deemed visually clean.

3.5 (D) Remove the splash barrier layer of polyethylene sheeting from walls. Windows, doors, HVAC system vents, and all other critical barriers shall remain sealed. The negative air filtration units shall remain in place and running.

3.5 (E) Starting from the opposite end of the decontamination enclosure system, working from high to low, far to near, wet clean all surfaces in the work area using rags, mops and sponges.

3.5 (F) The on-site supervisor and the University representative will carry out the final visual inspection of the work area. All surfaces shall be free from any visual debris. After the area has been deemed visually clean, the University representative and the on-site supervisor shall sign off on the area. However, if any accumulation of residue is observed, it will be assumed to be asbestos and the cleaning cycle will be repeated.

3.5 (G) The work area shall be cleaned until it is in compliance with the Vermont Regulations for Asbestos Control, V.S.A. Title 18, Chapter 26 effective February 1987; Amended November 1995 Section 2.3.2 (s) and with any other criteria agreed upon by the Contractor and the University prior to initiation of abatement activities. Additional cleaning cycles shall be provided, as necessary, at no cost to the University until these have been met.

3.5 (H) Following the satisfactory completion of clearance air monitoring and encapsulation, remaining barriers may be removed and properly disposed of. A final visual inspection by the University shall insure that no contamination remains in the work area. Unsatisfactory conditions may require additional cleaning and air monitoring. (See section 3.10 *infra* - Re-establishment of the Work Area).

3.6 Clearance Air Monitoring

3.6 (A) Following the completion of clean-up operations, the Contractor shall notify the University that areas are ready for clearance air monitoring.

3.6 (B) The University shall then arrange for an Asbestos Project Monitor to sample the air in the work area for airborne fiber concentrations.

3.6 (B) i Passive air sampling shall be conducted.

3.6 (C) The air sampling shall be conducted using sampling pumps calibrated at a flow rate of at least two and not more than twelve liters per minute using collection media and procedures in accordance with NIOSH Standard Analytical Method P&CAM 239 or 7400, as available. Air volumes shall be sufficient to provide reliable results down to a concentration of 0.010 fibers per cubic centimeter (f/cc) of air or lower. A minimum of one thousand liters will be collected.

3.6 (D) Sufficient number of samples will be taken to clear the abatement area unless otherwise noted in the Bidding and Contract Documents.

3.7 Disposal Procedures

3.7 (A) General

As work progresses, to prevent exceeding available storage capacity on site, sealed and labeled containers of asbestos containing waste shall be removed and transported to the University's temporary storage facility at Centennial Field.

3.7 (B) Transportation to Temporary Facility

3.7 (B) i Once drums, bags and wrapped components have been removed from the work area, they shall be tagged, with tags and labels supplied by the University, and loaded into the University's permitted truck for transportation.

3.7 (B) ii An adequate number of Contractor's personnel shall accompany University personnel to the temporary storage facility for unloading of waste.

3.7 (B) iii When moving containers, utilize hand trucks, carts and proper lifting techniques to avoid bodily injuries.

3.7 (B) iv Containers shall be placed in the University vehicle with care. Large components shall be secured to prevent shifting and tipping. Do not throw containers into the truck cargo area.

3.7 (B) v University will have the truck properly labeled for loading and unloading.

3.7 (B) vi Site Supervisor for the Contractor will sign the Waste Shipment Record as the generator.

3.8 Re-establishment of Work Area and Systems

3.8 (A) Re-establishment of the work area shall only occur following the completion of clean-up procedures and after clearance air monitoring has been performed and documented to the satisfaction of the University.

3.8 (B) At the discretion of the Contractor, mandatory requirements for personal protective equipment may be waived for the removal of all barriers.

3.8 (C) Polyethylene barriers shall be removed from all critical areas at this time and disposed of as asbestos contaminated waste.

3.8 (D) Relocate objects that were removed to temporary locations back to their original positions.

3.8 (E) Repair all areas of damage that occurred as a result of abatement activities.

PART 4 Payment and Recording

4.1 Payment

The University and the Contractor will agree upon a payment schedule at the Pre-construction meeting. Ten percent of the contract price (10%) will be retained until Project Closure records are received.

4.2 Project Closure Records

In order for the University to complete its files and release the retainer, the Contractor shall submit the following information as the project's closure records within 30 days of final clearance.

4.2 (A) All notifications, permits, licenses and other documentation related to all phases of the project.

4.2 (B) All qualification certificates, licenses, accreditation documents, medical monitoring documents, and fit test forms of Contractor and Contractor's employees who participated in the project.

4.2 (C) Written respiratory protection program.

4.2 (D) Material Safety Data sheets of all hazardous materials/ substances used during the project.

4.2 (E) Strip chart recordings of the negative pressure differential maintained throughout the duration of the project.

4.2 (F) Sign-in/Sign-out logs for entrance to/exit from the abatement work area.

4.2 (G) Correspondence relating to any site visits by the Vermont Department of Health (if any occurred).

4.2 (H) Daily written supervisor logs.

4.2 (I) Personal air monitoring data, analytical lab and analyst certificates.