

**THE PENNSYLVANIA STATE UNIVERSITY**

**OFFICE OF PHYSICAL PLANT**

**DEPARTMENT OF ENVIRONMENTAL HEALTH AND SAFETY**

**ASBESTOS CONTAINING MATERIALS**

**REMOVAL PERFORMANCE SPECIFICATION:**

**University Park Campus**

**Building (###)**

**Project Name**

**Project #**

PREPARED BY:

Steven Z. Rohrbach & Brett Eddinger

Hazardous Building Materials Program Manager

301 Steam Services Building

University Park, PA 16802

(814) 865-6391

Fax: (814) 863-7427

szr15@psu.edu bae5082@psu.edu

Created:

September 23, 2022

*REPRODUCTION OF THIS DOCUMENT IS STRICTLY PROHIBITED WITHOUT THE EXPRESSED WRITTEN PERMISSION OF THE AUTHOR AND THE PENN STATE UNIVERSITY DEPARTMENT OF ENVIRONMENTAL HEALTH AND SAFETY*

**Table of Contents**

I. General Requirements 3

Regulations and Guidelines 3

Definitions 3

Submittals and Notifications (Pre-Bid to Post-Job) 5

Personal Protection and Decontamination 8

II. Materials and Equipment 9

III. Execution of Work 9

Preparation and Set-up 9

Preparation for Gross Removal 13

Preparation for Glovebag Removal of Pipe Insulation 13

Asbestos Removal 14

Glovebag Removal of Pipe Insulation 14

Gross Asbestos Removal 14

Asbestos Containing Built-up Roofing Removal 16

Transite Roofing and Siding Removal 17

Final Cleanup of Containment/Work Areas 18

IV. Air Monitoring and Inspection Firm Qualifications and Requirements 19

Appendices

Appendix A Asbestos Removal Scope of Work

Appendix B Unit Price Quotation Sheet

Appendix C Work Phasing / Schedule / Manpower / Working Hours

Appendix D Approved Asbestos Contractors and Site Visit Requirements

Appendix E Approved Air Monitoring and Inspection Firms

**I.** U**General Requirements**

A. This specification covers the removal and disposal of materials specified in Appendix A and any additional materials deemed to within the Scope of Work of this project by Penn State Environmental Health & Safety Department.

B. The Contractor shall furnish all labor, materials, services, insurances and equipment necessary to carry out the removal and disposal operations.

**NOTE: Asbestos contractors must be on the Penn State Office of Physical Plant’s Prequalified Bidders List prior to bidding.**

C. The current issue of each of the following documents shall govern. Where conflicts between these specifications and the following regulations exist, the more stringent shall apply.

1. Regulations. Contractor(s) shall comply with the most recent, applicable Federal, State and Local regulations.

Title 29, Code of Federal Regulations, Section 1910.1001, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor.

Title 29, Code of Federal Regulations, Section 1926.1101, Occupational Safety and Health Administration (OSHA), U.S. Department of Labor.

Title 40, Code of Federal Regulations, Part 61 Subparts A and B, National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos, U.S. Environmental Protection Agency (EPA).

Title 25, Part I, Subpart C, Article III, Chapters 123, 133, 137, Pennsylvania Department of Environmental Protection (DEP).

Pennsylvania Act 194-1990 - The Asbestos Occupations Accreditation Act. Pennsylvania Department of Labor and Industry.

Clean Water Act - U.S. Environmental Protection Agency.

Federal and Pennsylvania Departments of Transportation.

2. Guidelines. Asbestos-Containing Materials in School Buildings; Guidance Documents, Part I and II, U.S. Environmental Protection Agency.

Guidance for Controlling Asbestos Containing Materials in Buildings, latest copies, U.S. Environmental Protection Agency.

D. Definitions

UHEPA VacuumU - High Efficiency Particulate Air (HEPA) vacuum equipment capable of collecting and retaining asbestos fibers, at a minimum efficiency of 99.97% for fibers 0.3 microns or larger.

USurfactantU - a chemical wetting agent added to water to improve penetration into asbestos containing materials.

UCritical Seal or Critical BarrierU - a barrier, consisting of two layers of 6-mil plastic sheeting sealed with tape and/or spray glue, used to prevent air entry or escape into or from the work area for the duration of the project. Critical seals shall be used to cover items such as doorways, windows, electrical fixtures, heating and ventilation louvers, immovable objects or any other object deemed necessary by the University.

U AirlockU - a system permitting passage to and from an asbestos work area preventing air movement from a contaminated area to an uncontaminated area, consisting of curtained doorways at least (3) feet apart.

UCurtained doorwayU - a device to allow passage from one room to another while permitting minimal air movement between the rooms, constructed in one of the two manners:

1. Two or three overlapping sheets of 6-mil plastic over an existing or temporarily framed doorway; securing each along the top and one vertical edge of each sheet. Each sheet shall be secured along the opposite vertical side of the other.

2. Three overlapping sheets of plastic the outermost sheet attached on the top; the middle sheet attached on all sides with a vertical slit cut vertically down the center; and the innermost sheet attached on top and weighted on the bottom to fall against the middle sheet in the event of a loss of negative pressure.

The Contractor may select either of the above options; however, the Contractor must demonstrate to the satisfaction of Environmental Health and Safety that adequate directional air flow is provided with the option selected.

UWorker Decontamination Enclosure SystemU - a series of connected rooms, with curtained doorways to adjacent rooms, consisting of a clean room, a shower room and an equipment room. The system shall be constructed with two layers of 6-mil plastic and shall be water tight. Tape and/or glue seams shall NOT be placed on the bottom of the system.

UEquipment Decontamination Enclosure SystemU - a series of connected rooms with curtained doorways between adjacent rooms, consisting of a designated area in the work area, a washroom, a holding area and an uncontaminated area. The system shall be constructed with two layers of 6-mil plastic and shall be water tight. Tape and/or glue seams shall NOT be placed on the bottom of the system.

UClean RoomU - an uncontaminated area or room within worker decontamination enclosure system; with provisions, when possible, for the storage of workers clothing and protective equipment.

UShower RoomU - a room between the clean room and the equipment room in the worker decontamination enclosure system. The shower room shall have supplies such as soap and shampoo for proper employee decontamination when exiting the work area.

UEquipment RoomU - a contaminated area or room in the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.

UWashroomU - a room between the work area and the holding area in the equipment decontamination enclosure system. The washroom shall have provisions (water, rags, clean disposal bags) to decontaminate waste, equipment, etc., as it exits the work area.

UEnvironmental Health and SafetyU (EHS) – 301 Steam Services Building, The Pennsylvania State University, University Park, PA 16802. Phone: (814) 865-6391, Fax: (814) 863-7427.

UOffice of Physical PlantU (OPP) – Physical Plant Building, The Pennsylvania State University, University Park, PA 16802. Phone: Contact the Project Manager or Coordinator for the project.

UPenetrating EncapsulantU - liquid sealant designed to be applied to materials to penetrate the material, bind its components together, and prevent fiber release. The encapsulant shall be approved by the University prior to use.

UBridging EncapsulantU - a sealant material which surrounds or embeds asbestos fibers in an adhesive matrix, creates a membrane over the surface and prevents fiber release. This encapsulant shall be approved by the University prior to use.

UWork AreaU - a room, a section of a room or other designated space in which asbestos abatement is being conducted or as defined by Environmental Health and Safety.

UWork PlanU – a written plan prepared by the contractor which details the scope-of-work as understood by the contractor, proposed containment and worker decontamination enclosure unit design, work phasing, scheduling, etc.

U Ladders and ScaffoldingU - metal and wooden ladders shall be prohibited in the work area during asbestos abatement. Wooden planked scaffolding will also be prohibited.

U Airless SprayerU - an electrical or hand pressurized liquid spray applicator used to apply amended water and encapsulant. Airless sprayers shall NOT be used for "Power Washing" or "Power Stripping" asbestos containing materials from the work area.

E. Submittals and Notifications

1. Contractor Information To Be Submitted With Bid Proposal

**NOTE: Asbestos contractors must be on the Penn State Office of Physical Plant’s Prequalified Bidders List prior to bidding.**

a. The Contractor shall submit a workplan to EHS that includes a draft manifest that selects a disposal site and waste hauler. The workplan must include EHS-provided blockplans that illustrate the planned containment area(s), location and quantity of negative air machines, negative air exhaust location, and decontamination unit. Anticipated number of shifts and shift times must be stated. Any other notable project details should also be included.

b. The Contractor shall submit a draft notification to EHS for approval prior to submitting to PADEP.

c. Submit a notarized statement describing all citations and/or violations issued by UanyU regulatory agency or consultant concerning performance on previous abatement contracts. Briefly describe the circumstances, citing job, involved persons and agencies.

The term "violation" includes all activities which have resulted in issuance of a Notice of Violation, administrative order, civil penalty, other monetary settlement (settlement agreement, settlement letter, letter agreement, or consent assessment), permit or license suspension or revocation, bond forfeiture, summary misdemeanor or felony conviction, pleas of guilty or no contest, or any consent agreement, consent order, consent adjunction, consent or settlement decree, or any court actions whether pending or settled.

Provide a written discussion of the outcome of any citations or violations, answer the question, "has your firm or its agents been issued a Stop Work Order on any project due to negligence within the last twenty-four months?" If "Yes," provide details as discussed above.

Answer the question: "are you now, or have been in the past, a party to any litigation or arbitration arising out of your performance on asbestos abatement contracts?" If "Yes" provide details as discussed above.

Describe any liquidated damages assessed within the last twenty-four months.

Failure to properly or truthfully report any of the required information in this section shall be considered grounds for rejection of bids or termination of contract, and removal from the University's approved bidders list.

2. Information To Be Submitted By Contractor Prior To Commencement Of Work

a. Notify the PADEP of the proposed asbestos abatement before any work commences (10 work days or 5 work days depending on if the project meets Asbestos NESHAP notification requirements). The Contractor is also responsible with all fees associated with notification submittal.

**An email (PDF) is to be submitted to PSU Environmental Health and Safety. Email is to be provided on the same day the notification is submitted.**

**Proof of Mailing or Submission: The contractor shall provide proof of mailing or submission of these notifications. This can be in the form of a registered letter receipt, copy of the postmarked envelope, or PADEP Greenport printout. A copy of an envelope with a postage stamp is not acceptable.**

Emergency notifications and/or project notifications less than 5 or 10 working days shall be scheduled and/or approved by Environmental Health and Safety only. These notifications, after approval from Environmental Health and Safety, shall be emailed to all aforementioned regulatory agencies and Environmental Health and Safety, followed by hard copy.

Additions, deletions, or corrections to notifications shall be the responsibility of the Contractor or Environmental Health and Safety, depending on the circumstances.

b. Notifications to Allegheny and Philadelphia Counties shall be in accordance to that county's respective regulations.

c. Submit to Environmental Health and Safety any required Allegheny or Philadelphia County Project Permit, if the work is to be conducted in either county. This shall be emailed to Environmental Health and Safety, followed by hard copy.

d. Submit to Environmental Health & Safety a Work Plan, which details the scope of work as understood by the contractor, containment(s), placement of negative air machines, location of exhausts, worker decontamination unit(s), work phasing, anticipated shifts, and any project-specific unique features or difficult conditions.

 3. Documentation and Signage Required During and After Abatement Project

a. **The contractor shall provide Environmental Health and Safety, a Waste Shipment Record or manifest for** U**all**U **types of asbestos waste. This shall be in a format similar to that shown in EPA’s NESHAP regulations and show the total number of asbestos disposal bags, drums, tons, etc. transported from the University to the approved disposal site or contractor temporary storage area or warehouse. This shall be provided to EHS when the waste leaves Penn State property.**

Then, again when applicable, the contractor shall provide Environmental Health and Safety the same waste shipment record showing that the asbestos waste was properly transported and delivered to the approved disposal site. This shall be accompanied by a written receipt from an authorized agent of the disposal site reflecting the actual number of bags, drums, etc. received for disposal.

The waste shipment record and receipt shall be submitted to Environmental Health and Safety no later than 45 calendar days from pick-up by the initial transporter.

b. Signs and barriers as required by EPA and OSHA standards shall be provided and displayed at each location where asbestos abatement is conducted. Signs shall be posted at the perimeter of the work area(s), the entry and exit, and at any barriers separating work areas from occupied areas. The aforementioned signs shall also be placed on any “asbestos waste” disposal or storage vehicles during loading and unloading of asbestos waste.

Depending on the waste, transport vehicles may also need to be posted with "Municipal" or "Residual Waste" signs and "UN Class 9" placards as required by PA DEP Municipal or Residual Waste and DOT Regulations.

c. The Contractor shall, upon request, provide the results of all personal exposure monitoring air sample results to Environmental Health and Safety.

d. When working in “containment areas”, the Contractor shall maintain project worker logs.

F. Personnel Protection and Decontamination

1. The contractor shall provide workers with sufficient sets of protective equipment. This shall consist of full body coveralls (including attached hood and booties), headgear, eye protection, respiratory protection, gloves, etc. Non-disposable protective clothing, footwear, and eye protection shall be left in the equipment room until the end of the project, at which time such items shall be disposed of as asbestos waste, or shall be thoroughly cleaned of all visible dirt and debris.

Used disposable protective clothing shall be disposed of as asbestos containing waste.

2. Respiratory protection should consist of a Powered Air Purifying Respirators (PAPR's) for OSHA Class 1 work where no negative exposure assessment has been conducted.

3. Worker Protection Procedures:

a. Each worker shall, upon entering the decontamination system or work area: remove street clothes in the clean room, put on a respirator and clean protective clothing, before entering the shower, equipment room or the work area.

b. Each worker shall, upon leaving the work area: remove gross contamination from clothing, etc. before leaving the work area; proceed to the equipment room and remove all clothing except respirator; still wearing the respirator, proceed to the shower, clean the face, head and outside of the respirator with soap and water; remove respirator dispose of filters as asbestos waste (If filters are to be re-used, they must be sealed at the intakes.). Following showering and drying, each worker shall proceed directly to the clean room and dress in street clothes.

c. Contaminated footwear shall be stored in the equipment room when not in use in the work area. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water.

Store contaminated protective clothing in the equipment room for re-use or place in receptacles for disposal with other asbestos contaminated materials.

d. Workers shall not eat or drink in the work area, except in the established clean room, after proper decontamination.

TOBACCO IS PROHIBITED ON ALL UNIVERSITY PROPERTY.

e. Workers shall be fully protected with respirators and protective clothing immediately prior to the first disturbance of asbestos-containing materials and until "Final Air" testing is completed and acceptable. Precautions may be required during preparations, depending on the condition of the material to be abated.

 G. Equipment Removal and Decontamination Procedures

1. Clean contaminated containers and equipment thoroughly by wet wiping and/or using a HEPA-filtered vacuum before moving into the washroom for final cleaning and removal to uncontaminated areas.

**II.** U**Materials and Equipment**

 A. Materials

 1. Plastic Sheeting shall be of 6-mil minimum thickness.

2. Tape shall be capable of sealing joints of adjacent sheets of plastic sheeting to finished or unfinished surfaces of dissimilar materials and capable of adhering under dry, wet, hot or cold conditions, including use of amended water.

3. Surfactant (wetting agent) shall be mixed with water in a concentration sufficient to enhance the penetration of water into the materials to be removed.

4. Impermeable asbestos disposal containers shall consist of two, 6-mil plastic bags; if needed, capable of fitting in or lining drums which are capable of being sealed (metal or fiber drums) with tightly fitting lids.

The containers (bags or drums) shall be labeled in accordance with OSHA Standard 29 CFR 1910.1001 and 1926.58, as wells as, EPA NESHAPS, and DOT regulations.

5. Glovebags shall be a minimum of 6-mil thickness with attached gloves, tool pouch, proper labeling, etc and individually smoke-tested prior to use.

Modification of glovebags shall be prohibited unless specified by Environmental Health and Safety.

**III.** U**Execution of Work**U

 A. Preparation and Set-up

 1. Work Area:

a. The contractor shall isolate heating, cooling and ventilating air systems with critical seals to prevent contamination to other areas. Critical seals shall remain in place for the duration of the work, and until the "Final Air" samples are approved by Environmental Health and Safety or it's representative.

Any portion of an operating ventilation system which distributes air into any part of a building, including but not limited to duct work, shall be isolated so as not to be part of the containment area unless approval is granted by Environmental Health and Safety.

Heating, cooling and ventilating air system shutdown will be the responsibility of the University.

b. The contractor shall seal all openings, including but not limited to corridors, windows, doorways, sky-lights, ducts, grills, diffusers, pipe chases, electrical outlets, non-removable light fixtures and any other penetrations of the work areas, with critical seals, as directed by Environmental Health and Safety or it's representative.

Doorways and corridors which will not be used for passage during work must be sealed with barriers as described below. These openings shall be sealed prior to any disturbance of asbestos-containing materials (e.g. prior to the removal of ceiling fixtures, tiles, etc.).

c. Separation of Work Areas from Occupied Areas

The contractor shall separate parts of the building required to remain in use from parts of the building that will undergo asbestos removal by means of airtight barriers, constructed as follows:

(a) Build suitable wood or metal framing and apply 12 mil minimum thickness plastic sheeting on both sides and / or hardwall barriers if noted in Appendix A.

Black plastic may be required by EH&S or it's representative.

(b) Seal the plastic sheeting with tape as specified on the work area side.

d. Pre-cleaning

In the event of prior asbestos contamination, Environmental Health and Safety or it's representative may require pre-cleaning of the area(s) to be covered with critical seals or barriers. HEPA filtered negative air machine installation, personal protective equipment use and curtained doorway installation over the entrance(s) to the work area may also be requested prior to precleaning.

The contractor shall preclean all objects within the work area. This will be conducted using HEPA-filtered vacuums and/or wet cleaning methods. Removable objects shall be moved from the work area to a designated location only after they are precleaned.

e. The contractor shall cover floor and wall surfaces with a minimum of two layers of 6-mil plastic on both floors and walls, sealed with tape (and glue if needed).

The first layer of floor plastic shall extend at least 12 inches up on walls, then cover walls with one layer of plastic sheeting to the floor level, thus overlapping the floor plastic by a minimum of 12 inches.

Install the second layers of plastic in the same manner as the first layer, thus causing an overlapping to prevent water leakage. The first and second layers shall be installed so as to allow them to be separated or removed independently of each other.

The floor plastic shall be installed with as few seams as possible.

f. The contractor shall install a HEPA filtered negative air pressure system(s) at all work areas to ensure a minimum negative pressure differential of 0.02 inches of water column relative to all adjacent areas. The direction of air movement shall be towards the work area from adjacent areas. This negative differential pressure shall be maintained under all conditions.

The HEPA system(s) shall run 24 hours a day for the duration of the project, until acceptable "Final Air" sample results are achieved from the 3rd party air monitoring and inspection firm and containment tear down is complete. Any exceptions to this must be explicitly approved by EHS.

Requirements for the installation and operation of the system are as follows:

(1) Exhaust from HEPA-filtered air systems shall be ducted to the outdoors.

New exhaust duct shall be used for each project; previously used duct shall be rejected on-site.

 (2) HEPA filter(s) shall be tightly sealed around their edges/gaskets.

(3) The system shall be visually inspected and approved by Environmental Health and Safety or it's representative prior to use.

(4) The procedures for use of HEPA negative-pressure systems shall conform to Appendix J of the EPA Guidance Document, "Guidance for Controlling Asbestos Containing Materials in Buildings (June 1985)."

(5) The contractor shall maintain "spare" Negative Air Filtration unit(s), of sufficient air movement capacity, on site for use in the event of unit failure. These may need to be stored in the work area depending on the configuration of the containment and decontamination enclosure system(s). Environmental Health and Safety or it's representative shall determine whether the unit(s) must be stored in the work area.

If the HEPA filtration system fails, the Contractor shall immediately seal all entrances to the work area. These entrances shall remain sealed until the HEPA system is again operational.

In the event of an emergency the University may need to penetrate prepared areas to resolve the emergency. Any repairs required by these penetrations will be conducted by the Contractor at no charge to the University.

g. The contractor shall build decontamination enclosure systems at work area entrances and exits.

h. The contractor shall remove and clean ceiling mounted objects, such as lights and other items not previously sealed that interfere with the asbestos removal. Use localized water spraying and/or HEPA-filtered vacuum during fixture removal to reduce fiber dispersal.

i. The contractor shall maintain easily visible emergency and fire exits from the work area.

j. All areas where asbestos-containing materials are disturbed shall be completely isolated from adjacent areas using wood framed, sealed barriers with 2 layers of 6-mil plastic sheeting on both sides of the frame.

k. The contractor shall seal elevators that may open into work areas with critical seals until "Final Air" samples have been approved by Environmental Health and Safety.

Elevator shutdowns shall be the responsibility of the University.

 2. Decontamination Enclosure Systems

a. The contractor shall build suitable framing or use existing rooms connected with framed-in tunnels, and line with two layers of plastic, sealed with tape at all plastic joints, for all enclosures and decontamination enclosure system rooms. The plastic shall be placed towards the contaminated area(s) so that the framing material does not become contaminated. Tape and/or glue seams shall NOT be placed on the bottom of the system.

b. In all cases, access between contaminated and uncontaminated rooms or areas shall be through an airlock. Access between any two rooms within the decontamination enclosure systems shall be through a curtained doorway.

c. UWorker Decontamination Enclosure System

The contractor shall construct a worker decontamination enclosure system contiguous to the work area consisting of at least three totally enclosed chambers (airlocks) as follows:

(1) An equipment room with two curtained doorways, one to the work area and one to the shower room.

(2) A shower/washroom with two curtained doorways, one to the equipment room and one to the clean room. The shower room shall contain at least one shower head for each ten (10) employees, as well as, body soap or other appropriate cleansing agents convenient to the showers.

The University shall provide both hot and cold water whenever possible. However, in the event that hot water is not available, the contractor shall supply a portable source of hot water. This unit shall be electrically powered and use 110 AC as it's power source.

Water from the shower shall be collected and filtered, using a 3 to 5 micron filter, prior to disposal into any waste water system. Water shall not be bagged as waste.

(3) A clean room with one curtained doorway into the shower and one curtained entrance to uncontaminated areas of the building. When possible, the clean room shall have sufficient space for storage of street clothes, towels, and other uncontaminated items.

 d. UEquipment Decontamination Enclosure System:

When required, the contractor shall construct an equipment decontamination enclosure system consisting of two totally enclosed chambers as follows:

(1) A washroom, with a curtained doorway to a designated area of the work area and a curtained doorway to the holding area.

(2) A holding area, with a curtained doorway to an uncontaminated area.

 3. Preparation for Gross Removal

a. For all gross removal asbestos removal projects, the work area shall be prepared and air monitored in accordance with all sections of this specification, unless otherwise specified in Appendix A.

 4. Preparation for Glove Bag Removal of Pipe Insulation

a. If the amount of asbestos-containing pipe insulation to be removed by the glove bag method, **is less than or equal to twenty five (25) linear feet,** the work area shall be prepared and air monitored in accordance with all sections of this specification, with the following exceptions:

1. A UsingleU layer of 6-mil plastic shall be used to construct the enclosure system. Plastic shall be installed on all walls, floors and surfaces in the work area.

2. The plastic enclosure system shall be connected to at least two airlocks serving as a decontamination enclosure system.

If any personal or area air sample collected inside the work area exceeds the current OSHA PEL for airborne asbestos, a shower shall be installed for proper worker decontamination.

3. “Final Air” samples shall be collected in accordance with this specification. Additional air samples collected outside of the work area shall be collected at the discretion of Environmental Health and Safety or their representative.

b. If the amount of asbestos-containing pipe insulation to be removed by the glove bag method, **is greater than twenty five (25) linear feet,** all requirements of this specification will apply.

c. After the removal has been completed and approved by Environmental Health and Safety, a representative number of "Final Air" samples shall be collected and analyzed in accordance with Section IV of this specification. The number and location of samples shall be at the discretion of Environmental Health and Safety. These samples may encompass locations inside and outside of the work area.

d. The HEPA-filtration system(s) shall continue running and the enclosure shall remain intact until all "Final Air" sample results are achieved by the 3rd party air monitoring consultant and containment tear down is complete.

 B. Asbestos Removal

1. **Glove Bag Removal of Pipe Insulation**

 a. Prepare site (see Section III.A)

b. The Contractor shall use glove bags in the manner described in the most recent EPA or OSHA standards and/or guidelines. Glove bags shall have a minimum thickness of 6-mil.

c. Penetrating encapsulant shall be applied to all surfaces of pipe where asbestos has been removed.

d. Glove bags shall not be reused or slid along adjacent lengths of pipe insulation, unless specified otherwise within Appendix A.

e. Before leaving the work area, glove bags shall be placed into 6-mil labeled polyethylene bags and sealed, for disposal.

f. Removal shall not take place on thermal systems greater than 150°F.

 2. **Gross Asbestos Removal**

a. Prepare site (see Section III.A)

b. Spray asbestos material with amended water before and during removal, using spray equipment capable of providing a "mist" application. Saturate the material sufficiently without causing excess dripping or delamination of the material. Spray the asbestos material repeatedly during the work process to maintain a wet condition and to minimize fiber dispersion.

c. Remove the saturated asbestos material in small sections. As it is removed, pack the material into labeled plastic bags of 6-mil minimum thickness. Material shall not be allowed to dry prior to insertion into the bags.

All removal shall be conducted so as to minimize breakage as much as possible and shall not be allowed to drop to the floor during removal.

Waste shall either be placed in labeled, plastic lined drums or double wrapped in labeled plastic for disposal. The option of which shall be at the discretion of Environmental Health and Safety or it's representative.

d. All mechanical equipment used for removal, such as grinders or shot blasters, must be equipped with attached HEPA filtration systems.

e. All plastic sheeting, tape, cleaning materials, clothing and other disposable material or items used in the removal shall be packed into two plastic bags of 6-mil minimum thickness each for disposal.

 ALL MATERIALS SHALL BE WETTED PRIOR TO DISPOSAL, INCLUDING PLASTIC, DISPOSABLE COVERALLS, ETC.

f. Seal filled bags using tape and the "goose necking" technique. "Goose necking" meaning sealing waste bags by first twisting the bags, taping, folding the twisted area over and taping again. This shall be conducted on both bags.

Ensure that bags are labeled in accordance with OSHA, EPA NESHAPS and DOT. Clean external surfaces of the bags by wet cleaning in the work area, or equipment room of the worker or equipment Decontamination Enclosure System. Move bags to the shower or washroom, wet clean the exterior of each thoroughly. After cleaning, pass the bag out of the shower or washroom and place into a second "clean" bag before moving to uncontaminated areas. Ensure that the bags are removed from the clean room by workers who entered from uncontaminated areas dressed in clean clothing. If drums are used, ensure that the exterior of each drum is labeled in accordance with the regulations mentioned above.

g. The Contractor shall transport the sealed bags and drums, if used, to the approved waste disposal site or storage facility at regular intervals without allowing asbestos waste to accumulate inside or outside of the building.

Any asbestos waste transported through a building, elevator or stair tower must be contained in two (2) sealed 6-mil plastic bags inside of a sealable drum or cart.

h. After completion of gross removal, all surfaces from which asbestos has been removed shall be wire brushed and/or wet sponged, or cleaned by an equivalent method.

Additionally, clean all surfaces in the work area using wet methods and/or a HEPA-filtered vacuum.

This cleanup includes removal of all visible accumulations of material, dust and debris.

i. Upon acceptable visual inspection by the contractor's supervisor via flashlights, Environmental Health and Safety or it's representative shall be asked to inspect the area. Environmental Health and Safety or it's representative shall then conduct a visual inspection as soon as possible upon request from the supervisor. After approval from Environmental Health and Safety or it's representative, all surfaces and the inner layer of plastic shall be sprayed with a penetrating encapsulant.

j. All liquid waste produced within the work area or decontamination enclosure system shall be passed through a 3 to 5 micron filter prior to disposal into any waste water system.

3. **Asbestos Containing Built-up Roofing Removal**

a. Shut down HVAC intake systems and cover and seal roof-mounted HVAC intake vents with plastic and duct tape.

b. Spray asbestos material with amended water before and during removal, using spray equipment capable of providing a "mist" application. Saturate the material sufficiently without causing excess dripping or delamination of the material. Spray the asbestos material repeatedly during the work process to maintain a wet condition and to minimize fiber and dust dispersion.

c. Remove the saturated asbestos roofing material in small sections. As it is removed, immediately transfer the material to the disposal container.

Material **SHALL NOT** be allowed to dry out prior to insertion the disposal container.

Chutes are not permitted to be utilized.

Due to the nature and content of some roofing materials and the logistics of removing materials from the roof area, disposal containers may need to be more substantial than labeled plastic bags which may tear. In this case, disposal may require metal or fiber drums or simply cardboard or burlap liners for labeled plastic bags. This shall be the choice of the contractor, the final required result being that no asbestos waste containers shall be allowed to leak.

Also, in some cases, a lined dumpster may be substituted for smaller containers. This will be at the discretion of Environmental Health and Safety on a case-by-case basis.

d. All plastic sheeting, tape, cleaning materials, clothing and other disposable material or items used in roofing removal shall be packed into two plastic bags of 6-mil minimum thickness each for disposal.

 ALL MATERIALS SHALL BE WETTED PRIOR TO DISPOSAL, INCLUDING PLASTIC, DISPOSABLE COVERALLS, ETC.

 e. Seal filled bags using tape and the "goose necking" technique.

Clean external surfaces of the containers by wet cleaning in the work area, or equipment room of the worker or equipment Decontamination Enclosure System if used.

f. The Contractor shall transport the sealed containers to the approved waste disposal site or storage facility at regular intervals without allowing waste to accumulate.

Any waste transported through a building, elevator or stair tower must be contained in two (2) sealed 6-mil plastic bags inside of a sealable drum or cart. Bags of waste may be taken out of the drums or carts and placed in an appropriate vehicle once the drums have been transported outside of the building.

g. After completion of removal, all surfaces from which asbestos roofing has been removed shall be cleaned using wet methods and/or a HEPA-filtered vacuum.

This cleanup includes removal of all visible accumulations of material, dust and debris.

h. Upon acceptable visual inspection by the contractor's supervisor, Environmental Health and Safety or OPP or their representative shall be asked to inspect the area. Environmental Health and Safety or their representative shall then conduct a visual inspection, as soon as possible upon request from the supervisor.

 4. **Transite Roofing and Siding Removal**

a. Transite roofing and siding removal shall be conducted so as to minimize breakage of the material as much as possible.

Transite roofing or siding **SHALL NOT** be allowed to drop to the ground during removal.

b. All plastic sheeting, tape, cleaning materials, clothing and other disposable material or items used for Transite removal shall be packed into two plastic bags of 6-mil minimum thickness each for disposal.

 ALL MATERIALS SHALL BE WETTED PRIOR TO DISPOSAL, INCLUDING PLASTIC, DISPOSABLE COVERALLS, ETC.

 c. Seal filled bags using tape and the "goose necking" technique.

Ensure that bags, drums, etc. are labeled in accordance with OSHA, EPA NESHAPS and DOT. Clean external surfaces of the containers by wet cleaning in the work area, or equipment room of the worker or equipment Decontamination Enclosure System.

d. The Contractor shall transport the sealed containers to the approved waste disposal site or storage facility at regular intervals without allowing waste to accumulate.

Any waste transported through a building, elevator or stair tower must be contained in two (2) sealed 6-mil plastic bags inside of a sealable drum or cart. Bags of waste may be taken out of the drums or carts and placed in an appropriate vehicle once the drums have been transported outside of the building.

e. After completion of removal, all surfaces from which the Transite has been removed shall be cleaned using wet methods and/or a HEPA-filtered vacuum.

This cleanup includes removal of all visible accumulations of material, dust and debris.

f. Upon acceptable visual inspection by the contractor's supervisor, Environmental Health and Safety or OPP or their representative shall be asked to inspect the area. Environmental Health and Safety, OPP or their representative shall then conduct a visual inspection, as soon as possible upon request from the supervisor.

g. All liquid waste produced within the Transite removal work area shall be passed through a 3 to 5 micron filter prior to disposal into any waste water system.

 C. Final Cleanup of Containment/Work Areas

1. After the encapsulant is dry or tacky, remove the inner layer of plastic sheeting from the walls and floors. The outer layer of plastic and critical seals on windows, doors, and HVAC vents, etc. shall remain in place, and the HEPA-filtered negative air pressure systems shall remain in service.

2. Again, clean all surfaces in the work area, including the decontamination enclosure systems and all other areas used during the asbestos removal process by wet wiping and/or HEPA vacuuming.

This cleanup shall again include removal of all visible accumulations of material, dust and debris.

3. Remove the remaining layer of plastic sheeting from the walls and floors. The windows, doors, and HVAC vents shall remain critically sealed and the HEPA-filtered negative air pressure systems shall remain in service.

4. After cleaning the work area and all other areas included above, the Contractor shall have the option to wait 24 hours to allow dust to settle or be filtered and then wet clean or HEPA-vacuum all surfaces again.

This waiting period will also allow any residual water or encapsulant to dry.

5. After the area has been cleaned as specified above, the contractor's supervisor shall again inspect all areas, via a flashlight, to determine whether all visible dust has been satisfactorily removed. If the asbestos has been satisfactorily removed, and the area satisfactorily cleaned, the supervisor shall request a visual inspection by Environmental Health and Safety or it's representative.

If Environmental Health and Safety, or their representative, finds visible accumulations of debris in any of the areas, the Contractor shall repeat the wet cleaning or HEPA-vacuuming until the work area is satisfactory. Once the work area is deemed satisfactorily cleaned "Final Air" sampling can be conducted.

a. If the results of the "Final Air" sampling are satisfactory, all remaining plastic sheeting shall be removed, placed into two plastic bags of 6-mil minimum thickness each and transported in accordance with this specification.

(1) Satisfactory "Final Air" sample results shall be concentrations that are less than or equal to 0.005 fibers/cc using Phase Contrast Microscopy (PCM).

(2) No activities within the project area, such as replacement procedures, may commence until the area is found satisfactory by visual inspection and "Final Air" sampling.

b. If the results of the "Final Air" sampling are not satisfactory, the area shall be wet cleaned or HEPA-vacuumed and inspected until the air samples are satisfactory.

The entire work area must also be dry or “tacky” to the touch before final air sampling is to be conducted (i.e. no visible puddles or droplets of water or encapsulant).

**IV.** U**Air Monitoring and Inspection Firm Qualifications and Requirements**

A. Air monitoring and visual inspections shall be conducted during indoor asbestos abatement (and outside as determined on a case-by-case basis by Environmental Health and Safety) by an independent firm, hired by the University in accordance with the University’s Asbestos Containing Material Removal Performance Specification, applicable NIOSH air sampling methods, and the following protocol:

Air monitoring and inspection firms **CANNOT** be hired by the asbestos contractor.

**NOTE: Asbestos air monitoring and inspection firms must be approved by EHS and OPP.**

1. Qualifications of personnel conducting on-site air monitoring and visual inspections:

Air monitoring and inspection firm on-site personnel shall have at least (6) month’s experience in asbestos abatement project inspection, air sampling and analysis. Penn State reserves the right to review, approve and/or reject these on-site personnel.

 2. All air samples shall be immediately analyzed "on-site" by:

a. An analyst whose name appears in the most recent copy of the Asbestos Analysts Registry developed by the American Industrial Hygiene Association (AIHA); or

b. An analyst who has successfully completed the NIOSH 582 course or an equivalent, and successfully participates in the Proficiency Analytical Testing (PAT) Program, and is employed by an AIHA accredited laboratory.

3. Air monitoring specified below represents the UminimumU numbers of samples to be collected each day; this may be increased at the discretion of EHS.

 Minimum # Minimum Sample

 ULocationU USamples/DayU UVolume(liters)

 Inside decontamination unit 2 1200

 "clean" room

 Outside work area (at 2 1200

 discretion of EHS)

 Downstream of each HEPA filter 1 1200

exhaust

Ten (10) percent of all samples shall be re-analyzed and their concentrations confirmed at an AIHA accredited laboratory. These samples shall be randomly selected and may require approval by Environmental Health and Safety.

B. A representative number of "Final Air" samples shall also be collected, as designated by Environmental Health and Safety.

1. “Final Air” testing will be conducted under aggressive conditions whenever feasible, as directed by EHS. Agitation of the air during sampling will be by either a (1) horsepower leaf blower or stationary fans.

If visible dust is disturbed at any time while using leaf blowers or fans, air sampling shall be terminated. The contractor will then reclean the area until no visible dust is seen.

2. All "Final Air" samples shall have a minimum volume of 1200 liters of air and shall show airborne fiber concentrations that are less than or equal 0.005 fibers/cc using PCM.

3. Additional "Final Air" samples may be requested in each work area, and immediately submitted to Environmental Health and Safety. These samples shall be collected on polycarbonate filters (25-mm) with a pore size of 0.45 micrometers or less (AHERA TEM air sample filters).

These samples shall not be analyzed on-site but shall be collected at the same time as the other "Final Air" samples. EHS will become the owner of these samples, which will serve as archive "Final Air" samples.

C. All area and "Final Air" samples shall be collected and analyzed by the independent air monitoring and inspection firm. The Contractor Ushall notU collect or analyze any air samples for the University.

D. All air sampling shall be conducted in accordance with the method prescribed in applicable EPA and OSHA guidelines.

1. Air sampling pumps shall be calibrated before and after each use and record of this calibration shall be furnished to EHS.

E. Daily air samples collected outside of the work area, from the beginning of removal activities until satisfactory "Final Air" samples are attained (less than or equal to 0.005 fibers/cc).

The Contractor or the University may choose to collect background samples in proximity to the work area, prior to the start of any preparation or removal activities. A minimum sample volume of 1200 liters shall be collected for the background samples. The samples may be analyzed using PCM (NIOSH 7400A) or Transmission Electron Microscopy (TEM).

If a sample reading above 0.005 fibers/cc is obtained outside of the work area, the Contractor shall take immediate, corrective action under the supervision of EHS or it's representative. Corrective action includes but is not limited to: collection of additional air samples, HEPA vacuuming or wet wiping of contaminated areas, and construction of additional airtight barriers.

Corrective actions shall be conducted until all samples outside the work area are once again below 0.005 fibers/cc or background concentration.

F. A written report and invoice shall be submitted to Environmental Health and Safety within 45 days of the satisfactory completion of the project. Additional copies shall not be sent to other departments within the University. EHS will distribute as needed after review and approval.

The report shall include:

a. Report/Cover Letter describing the general details of the project (i.e. scope of work, contractor representative, EHS contact, start and end dates, etc. This report should preferably be written by the person(s) on-site at the time of the work.

b. Diagram of containment area showing daily and final air test locations, containment boundary, decontamination unit and negative air machine layout, etc. Building floorplans for this purpose will be provided by PSU when possible.

c. Project monitor's daily log sheets, both hand written, and if needed for legibility, typed.

Log entries will be expected to be concise, but detailed enough so that the unfamiliar can follow job progress, conversations, decisions, etc. Entries will be made every half-hour at the minimum and must show the time of day. Logs sheets will also have the project monitor's printed name, signature and date. This information will be on all pages, which will be numbered.

d. Daily checklists for projects that require the project monitor to record number of negative air machines, manometer readings, proper glovebag use, containment integrity, etc. "No" or "unchecked" responses shall be corrected and explained fully either on the checklist or in daily logs.

e. Field sampling data sheets that contain sample number, sample date, air pump pre- and post-calibration data, sample time-on and time-off, total sampling time, average sample flow rate, sample description, location, results, etc. These shall also show project monitor's printed name, signature and date.

Typed sample data sheets may be required for legibility and ease of cataloging.

f. Air sample fiber count sheets that show the number of fibers counted in each sample and which grid the fibers were seen. These shall also show sample number, collection date, sampler's printed name/signature, date of analysis, analyst's printed name, signature and date, etc.

g. Asbestos Worker Daily Sign-In Sheet with printed names, signatures and PA Department of Labor and Industry license Number.

**Those without valid photo-ID or a receipt from the PA Department of Labor and Industry shall not be allowed to conduct asbestos removal activities (Preparation activities or assistant activities outside the work are allowable).**

Anything typed or duplicated (i.e. daily logs, sample data, computer generated drawings, etc.) shall include the corresponding handwritten notes/information, data, drawing, etc. that it was transcribed from.

G. Although not required by this specification, it is highly recommended that the Contractor conduct air sampling inside the work area during preparation and removal in accordance with all applicable OSHA standards.

Created By: Steven Z. Rohrbach, PADL&I Project Designer #036320

 Brett Eddinger, PADL&I Project Designer #055025

**Appendix A – Scope of Work**

**Pre-Bid Meeting:**

**Start Date:**

**Project Duration:** Asbestos Contractor to provide, in days, with quote.

**Bid Format:** Electronic bid must be Adobe PDF documents, on company letterhead.

**Work Plan:** Attach to bid documents. Plan must be PDF format and show planned work area layouts, decon and negative air placement, phasing, etc. Draft manifest MUST be included in work plan.

Work Plan must be dated and on company letterhead.

 **Work Hours:**

 **Work Days:**

 **Prevailing Wages:**

**Asbestos Containing Materials:**

**Project-Specific Scope of work** – See attached plan for locations.

**Notes**:

PSU OPP Project Leader: Name, email, cell

Negative air exhaust to be vented to the exterior of the building.

ALL Asbestos waste generated is required to be sent to Wayne Township Landfill (DEP Permit # 100955) in Clinton County, PA.

Waste to be segregated per instructions above.

Asbestos contractor to provide friable and non-friable asbestos rolloffs, as needed.

Rolloffs to be fully enclosed and secured. Open top or loose tarp is **NOT** allowed.

OSHA signage to be placed on containers during loading and unloading only.

Rolloff(s) to be on-site before ACM removal starts.

Rolloff location to be coordinated with PSU.

Blank blockplan attached for Work Plan.

**Asbestos Notification Information**

**(Asbestos contractor to submit draft for review before submitting.)**

**Date of Initial Notification:** Enter date that Initial Notification is submitted.

**Type of Operation:** Renovation

**Address:** The Pennsylvania State University

Building (###)

Curtin Road, University Park, PA 16802

**Municipality:**  State College Borough

**Facility Information:** **Present / Prior Use:**

**Occupied:**

**Facility Size (SF):** **Floors:** **Built:**

**Facility Owner:** The Pennsylvania State University – EHS Dept.

6 Eisenhower Parking Deck

University Park, PA 16802

Contact: Brett Eddinger – Phone: 814-865-6391.

**Facility Inspection:** **Inspectors:** Brett Eddinger  **PA #** 055025

**Date:**

**Procedures/Analytical Method:** Visual inspection, bulk sampling, PLM analysis.

**Type of ACM, Description, Locations:** List materials quantities and specific room number(s)

**Regulated by NESHAPS:** Depends on amount of friable ACM removed.

**Air Monitoring Firm:** TBD

**Sections 25, 26:** Either enter or circle “Operator” after printed name or signature.

**Asbestos Waste Manifest Information**

**(Asbestos contractor to submit draft for review before submitting.)**

**Generating Address:** The Pennsylvania State University

Building (###)

Curtin Road, University Park, PA 16802

**Generator/Owner Information:** The Pennsylvania State University – EHS Dept.

 6 Eisenhower Parking Deck

University Park, PA 16802

Contact: Brett Eddinger – Phone: 814-865-6391.

**Appendix B**

U**Unit Price Quotation Request**

In the event that unexpected Asbestos Containing Materials are discovered, in addition to the Scope of Work in Appendix A, the University also requests that a quotation be submitted for the following Unit Price Items:

**Prices to include set-up and removal as per this specification or as noted below.**

**Appendix C**

**Work Phasing / Schedule / Manpower / Working Hours**

**Work Phasing / Scheduling**

The Asbestos Contractor will coordinate all work with Penn State OPP and EHS.

Penn State OPP, EHS and the chosen air monitoring firm will be kept appraised of all schedules and phasing in advance of start of work.

**NOTE:** The air monitoring firm will not be expected to work extra hours for air sampling to “clear” work areas due to inadequate contractor planning or manpower.

**Temporary labor must be directly employed by the contractor, under contractor’s payroll, Workers Comp insurance, etc.**

**Subcontractors conducting asbestos-related work, or work in containment, must be identified during bidding and prequalified before use (e.g. shot blasting, boiler demolition).**

**Manpower**

The Asbestos Contractor is expected to supply the appropriate manpower to complete the project in the allotted schedule.

If temporary labor is employed and workers’ native language is not English, the Asbestos Contractor must ensure there are an adequate number of supervisors who are fluent in the appropriate native language(s) of the workers.

**Working Hours**

Due to regulatory requirements, emergency egress and occupant safety issues, asbestos-related work often requires special scheduling and planning considerations.

**Publicly Accessible Areas - Lobbies, Corridors, Open Rooms or Stairs**

All asbestos handling in these areas must be conducted during non-occupied hours such as nights, weekends or breaks.

Corridors and / or stairs cannot be blocked during normal occupancy or class use hours, unless there are adequate alternate emergency egress pathways.

**Non-Publicly Accessible Areas – Closed Rooms, Corridors, Stairs, Renovation or Construction Areas**

Removal where decontamination units or other equipment must be placed in publicly accessible areas must be conducted during non-occupied hours such as nights, weekends or breaks (Example: decon entrance opens into occupied corridor or negative air exhaust must run through the corridor or an adjacent room).

**Appendix D**

**Approved Asbestos and Structural Demolition Contractors and Site Visit Requirements**

A mandatory pre-bid meeting / walk-through shall be conducted.

The most up-to-date listing of prequalified asbestos and structural demolition contractors is located on the OPP Prequalified Contractors Search webpage at:

<http://apps.opp.psu.edu/BiddersList/search.cfm>

**Appendix E**

U**Approved Air Monitoring and Inspection Firms**

Air monitoring and inspection services are to be contracted separately by Penn State.

However, the chosen General and Asbestos Contractors will be expected to work closely and coordinate all work and scheduling with the chosen consultant, PSU OPP and EHS.

File Name: