

SECTION 02 82 13
ASBESTOS REMEDIATION

PART 1 - GENERAL

A.

1.1 SECTION INCLUDES

A. Equipment.

B. Work Procedure.

C. Clean-up and disposal.

1.2 REFERENCES

A. ANSI

1. Z9.2 - Fundamentals Governing the Design and Operation of Local Exhaust Systems

2. Z88.2 - Respiratory Protection

B. ASTM

1. ASTM C 732 - Aging Effects of Artificial Weathering on Latex Sealants

2. ASTM D 522 - Mandrel Bend Test of Attached Organic Coatings

3. ASTM D1331 - Surface and Interfacial Tension of Solutions of Surface-Active Agents

4. ASTM D2794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

5. ASTM E84 - Surface Burning Characteristics of Building Materials

6. ASTM E96 - Water Vapor Transmission of Materials

7. ASTM E119 - Fire Tests of Building Construction and Materials

8. ASTM E736 - Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members

C. CFR

1. 29 CFR 1910.134 - Respiratory Protection
2. 29 CFR 1910.141 - Sanitation
3. 29 CFR 1910.145 - Accident Prevention Signs and Tags
4. 29 CFR 1910.1200 - Hazard Communication
5. 29 CFR 1926.58 - Asbestos, Tremolite, Anthophyllite, and Actinolite
6. 40 CFR 61-SUBPART A - General Provisions
7. 40 CFR 61-SUBPART M - National Emission Standard for Asbestos
8. 40 CFR 763-SUBPART F - Friable Asbestos-Containing Materials in Schools

D. EPA

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

E. UL

1. UL 586 - High-Efficiency, Particulate, Air Filter Units

F. Report

- ~~1. Section 00-31-21 - Existing Condition Information.~~
2. Zimmetry Environmental Management Corp.: Asbestos Containing Building Materials Inspection Report for Puerto Rico Department of Health Sampling Conducted at Ramón Ruiz Arnau University Hospital 2nd level, Ward B & Delivery Rooms Bayamón, PR. June 2022

1.3 DEFINITIONS

- A. Action Level: An airborne concentration of asbestos fibers, in the breathing zone of a worker equaling 0.1 fibers per cubic centimeter of air calculated as an 8-hour time weighted average.
- B. Amended Water: Water containing a wetting agent or surfactant with a surface tension of 29 dynes per square centimeter when tested in accordance with ASTM D1331.
- C. Area Sampling: Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.
- D. Asbestos: The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content is at least one percent of the material by area.
- E. Asbestos Control Area: That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris. Two examples of an asbestos control area are: a full containment and a "glovebag."
- F. Asbestos Fibers: Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.
- G. Asbestos Permissible Exposure Limit: 0.2 fibers per cubic centimeter of air as an 8-hour time weighted average as defined by 29 CFR 1926.58 or other federal legislation having legal jurisdiction for the

protection of workers health.

- H. Background: Normal airborne asbestos concentration in an area similar to the asbestos abatement area but in an uncontaminated (with asbestos) state.
- I. Contractor: The Contractor is that individual, or entity under contract to the Navy to perform the herein listed work.
- J. Encapsulants: Specific materials in various forms used to chemically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.
 - 1. Removal Encapsulant (can be used as a wetting agent).
 - 2. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)
 - 3. Penetrating Encapsulant (used to penetrate the asbestos containing material down to substrate, encapsulating all asbestos fibers)
 - 4. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed)
- K. Friable Asbestos Material: Material that contains more than one percent asbestos by area and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
- L. Glovebag Technique: Those asbestos removal and control techniques put forth in 29 CFR 1926.58 Appendix G, III-A, B, C, D and Figure G-1.
- M. HEPA Filter Equipment: High efficiency particulate air (HEPA) filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.
- N. Nonfriable Asbestos Material: Material that contains asbestos in which the fibers have been temporarily locked in by a bonding agent, coating, binder, or other material so that the asbestos is well bound and may not release fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers will be released under other conditions such as demolition or removal.
- O. Personal Sampling: Air sampling to determine asbestos fiber concentrations within the breathing zone of a specific employee, performed in accordance with 29 CFR 1926.58.
- P. Private Industrial Hygienist (PIH): That industrial hygienist hired by the Contractor to perform the herein listed industrial hygiene tasks. In some instances, the PIH can perform this role vicariously through a trained subordinate, but only with the specific consent of the Contracting Officer.
- Q. TEM: Refers to Transmission Electron Microscopy
- R. Time Weighted Average (TWA): The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers. At least three full shift samples per person are required to establish that person's TWA exposure.
- S. Wetting Agent: That specific agent used to reduce airborne asbestos levels by physically bonding

asbestos fibers to material to be removed. An equivalent wetting agent must have a surface tension of at least 29 dynes per square centimeter as tested in accordance with ASTM D1331.

1.4 REQUIREMENTS

- A. Description of Work: The work covered by this section includes the handling of asbestos containing materials which are encountered during repair, construction, and demolition projects and describes some of the resultant procedures and equipment required to protect workers and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of the generated asbestos containing materials. More specific operational procedures will be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. Provide full containment, glovebag or outdoor techniques as outlined in this specification.
- B. Medical Requirements: 29 CFR 1926.58.
 - 1. Medical Examinations: Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.58 or other pertinent state or local directives. This requirement must have been satisfied within the past year. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the work "ASBESTOS".
 - 2. Medical Records: Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.
- C. Training: Within one year prior to assignment to asbestos work, each employee shall be instructed by the PIH about the hazards of asbestos, safety and health precautions, the use and requirements for protective clothing, equipment, and respirators, and the association of cigarette smoking and asbestos-related disease, and all additional requirements of 29 CFR 1926.58. Furnish each employee with a respirator fit test administered by the PIH as required by 29 CFR 1926.58. Fully cover engineering and other hazard control techniques and procedures. In addition, train all personnel involved in the asbestos removal in accordance with United States Environmental protection Agency (USEPA) or state criteria whichever is more stringent. The Contractor shall document the training by providing dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer or Owner Representative.
- D. Permits, Licenses, and Notifications: Obtain necessary permits and licenses in conjunction with asbestos removal, hauling, and disposition, and furnish timely notification of such actions required by Federal, state, regional, and local authorities. Notify the Environmental Quality Board (EQB) in writing 10 days prior to the commencement of work in accordance with 40 CFR 61, SUBPART M.
- E. Safety and Health Compliance: In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of federal, state, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.58, 40 CFR 61, SUBPART A and 40 CFR 61, SUBPART M. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of

this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Contracting Officer shall apply.

- F. Respiratory Protection Program: Establish and implement a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134.
- G. Industrial Hygienist (IH): Conduct personal and area/environmental ~~air sampling~~ and training under the direction of an Industrial Hygienist currently certified for comprehensive practice by the American Board of Industrial Hygiene. For the purpose of this contract, the Contractor shall retain the services of an industrial hygienist (PIH) to perform all sampling. Company responsible of sampling equipment placement, sampling collection, and analysis must be performed by an independent third party, as described in bid document.
- H. Hazard Communication: Adhere to all parts of 29 CFR 1910.1200 and provide the Contracting Officer with a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.

- B. Manufacturer's Catalog Data:

1. Local exhaust equipment
2. Vacuums
3. Respirators
4. Pressure differential automatic recording instrument
5. Amended water

- C. Statements:

1. Asbestos Hazard Abatement Plan: Submit a detailed plan of the safety precautions and work procedures to be used in the removal and demolition of materials containing asbestos. The plan shall be prepared, signed, and sealed, including certification number and date, by the PIH. Such plan shall include but not be limited to the precise personal protective equipment to be used, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control pollution. The plan shall also include (both fire and medical emergency) response plans. This plan must be approved in writing prior to the start of any asbestos work. The Contractor and PIH shall meet with the Contracting Officer prior to beginning work, to discuss in detail the asbestos plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan shall be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to the start of work.

2. Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with certification that persons counting the samples have been judged proficient by

INTERIOR DEMOLITION OF EXISTING DELIVERY ROOMS SECOND FLOOR
HOSPITAL UNIVERSITARIO DR. RAMÓN RUIZ ARNAU
PUERTO RICO DEPARTMENT OF HEALTH
028213-5

successful participation within the last year in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis.

3. Industrial Hygienist Certification: Submit the name, address, and telephone number of the Industrial Hygienist (PIH) selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the Industrial Hygienist is currently certified in comprehensive practice by the American Board of Industrial Hygiene, including certification number and date. Personnel performing any industrial hygiene function under the direction of the PIH shall be employed by the PIH's company.
4. Landfill Approval: Submit written evidence that the landfill for disposal is approved for asbestos disposal by the USEPA and the Environmental Quality Board (EQB). Submit detailed delivery tickets, prepared, signed and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill, within 3 days after delivery. A hazardous waste manifest shall be submitted, within 3 days, to the Owner's On Site Representative.
5. Employee Training: Submit certificates signed by each employee indicating that the employee has received training in the proper handling of materials that contain asbestos; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.58 on an initial and annual basis.
6. Medical Certification: Provide a written certification signed by a licensed physician that all workers and supervisors have met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.58 and 29 CFR 1910.134.

D. Field Test Reports

1. Air Sampling Results: Complete fiber counting and provide results to the PIH for review within 16 hours. Notify the Owner's on Site Representative immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees within 3 working days, signed by the testing laboratory employee performing air sampling, the employee that analyzed the sample, and the PIH.
2. Pressure Differential Recordings for Local Exhaust System: Provide a local exhaust system that creates a negative pressure of at least 0.02 inches of water relative to the pressure external of the enclosure and operate it continuously, 24 hours a day, until the enclosure of the asbestos control area is removed. Submit pressure differential recordings for each work day to the PIH for review and to the Contracting Officer or Owner Representative within 24 hours from the end of each work day. Notify the Contractor and the Contracting Officer or Owner Representative immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance shall levels exceed 0.1 fibers per cubic centimeter.

E. Certificates

1. Vacuums

2. Water filtration equipment
3. Ventilation systems
4. Other equipment required to contain airborne asbestos fibers
5. Chemical encapsulants / sealers
6. Show compliance with ANSI Z9.2 by providing manufacturers' certifications.

F. Records

1. Notifications: Notify the Owner's On Site Representative in writing 10 working days prior to the start of asbestos work.
2. Rental Equipment: Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.
3. Respirator Program Records: Submit records of the respirator program as required by ANSI Z88.2, 29 CFR 1910.134, 29 CFR 1926.58.

PART 2 - PRODUCTS

2.1 ENCAPSULANTS

- A. General: Shall conform to current USEPA requirements, shall contain no toxic or hazardous substances, no solvents and shall conform to the following performance requirements.
- B. Removal Encapsulants

Requirement

Flame Spread - 25, Smoke Emission - 50
 Combustion Toxicity Zero Mortality
 Protocol Life Expectancy – 20 years
 Permeability - Minimum 0.4 Terms

Test Standard

ASTM E 84
 University of Pittsburgh
 ASTM E 96

C. Bridging Encapsulant

Requirement

Flame Spread - 25, Smoke Emission - 50
Combustion Toxicity Zero Mortality
Life Expectancy - 20 years

Permeability - Minimum 0.4 perms

Cohesion/Adhesion Test - 50 pounds of force/foot
E736

Fire Resistance - Negligible affect on fire resistance
rating over 3 hour test (Classified by UL for use over
fibrous and cementitious sprayed fireproofing)

Impact Resistance - Minimum 43 in/lb

Flexibility - no rupture or cracking

Test Standard

ASTM E 84
University of Pittsburgh Protocol
ASTM C 732
Accelerated Aging Test
ASTM E 96

ASTM

ASTM E 119

ASTM D 2794
Gardner Impact Test
ASTM D 522
Mandrel Bend Test

D. Penetrating Encapsulant

Requirement

Flame Spread - 25, Smoke
Emission - 50
Combustion Toxicity
Zero Mortality
Life Expectancy - 20 years

Permeability - Minimum 0.4 perms

Cohesion/Adhesion Test - 50 pounds of force/foot

Fire Resistance - Negligible affect on fire resistance
rating over 3 hour test (Classified by UL for use over
fibrous and cementitious sprayed fireproofing)

Impact Resistance - Minimum 43 in/lb

Flexibility - no rupture or cracking

Test Standard

ASTM E 84

University of Pittsburgh Protocol

ASTM C 732
Accelerated Aging Test
ASTM E 96

ASTM E736

ASTM 119

ASTM D 2794
Gardner Impact Test
ASTM D 522
Mandrel Bend Test

E. Lock-down Encapsulant

Requirement

Flame Spread - 25, Smoke Emission - 50
Combustion Toxicity Zero Mortality
Life Expectancy - 20 years

Permeability - Minimum 0.4 perms

Test Standard

ASTM E 84

University of Pittsburgh Protocol

ASTM C 732
Accelerated Aging Test
ASTM E 96

Requirement**Test Standard**

Fire Resistance – Negligible affect on fire resistance rating over 3 hour test (Tested with fireproofing over encapsulant applied directly to steel member)

ASTM E 119

Bond Strength - 100 pounds of force foot (Tests compatibility with cementitious and fibrous fire- proofing)

ASTM E 736

PART 3 - EXECUTION**3.1 EQUIPMENT**

- A. General: Make available to the Owner's On-Site Representative two complete sets of personal protective equipment as required herein, for entry to the asbestos control area at all times for inspection of the asbestos control area. Provide equivalent training to the Owner's On-Site Representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment required to contain airborne asbestos fibers.
- B. Respirators: Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.
 - 1. Respirators for Handling Asbestos: Provide personnel engaged in the removal and demolition of asbestos materials with Type C supplied-air respirators, in the pressure/demand mode with an auxiliary self-contained breathing apparatus. The use of any other type of respiratory protection must be requested in writing by the PIH. The request shall identify the specific type of respiratory protection requested and the reasoning behind the choice. Forward the request to the Owner's On-Site Representative. A different request shall be filled for each type of operation. All respiratory protection shall comply with the spirit and letter of 29 CFR 1926.58 and 29 CFR 1910.134. Use of other than Type C supplied-air respirators, in the pressure/demand mode with an auxiliary self-contained breathing apparatus is prohibited unless approved by the Owner's on-Site Representative.
- C. Exterior Whole-Body Protection
 - 1. Protective Clothing: Provide personnel exposed to asbestos with disposable protective whole body clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck using tape.
 - 2. Work Clothing: Provide cloth work clothes for wear under the disposable protective coveralls and foot coverings and either dispose of or properly launder them as recommended by the PIH after use.

3. Decontamination Unit: Provide a temporary, negative pressure unit with a separate decontamination locker room and a clean locker room with a shower that complies with 29 CFR 1910.141 (d)(3) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter to remove asbestos contamination with an approved water filtration equipment. Dispose of filters and residue as asbestos contaminated work clothing as asbestos contaminated waste. Decontamination units shall be physically attached to the asbestos control area. Build both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.
 4. Eye Protection: Provide goggles to personnel engaged in asbestos operations when the use of a full-face respirator is not required.
- D. Warning Signs and Labels: Provide bilingual warning signs printed in English and Spanish at all approaches to asbestos control areas containing concentrations of airborne asbestos fibers. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.
1. Warning Sign: Provide vertical format conforming to 29 CFR 1910.145 (d)(4), and 29 CFR 1926.58 (k) minimum 20 by 14 inches displaying the following legend in the lower panel:

<u>Legend</u>	<u>Notation</u>
Danger	1-inch Sans Serif Gothic or Block
Asbestos	1-inch Sans Serif Gothic or Block
Cancer and Lung Disease Hazard	1/4-inch Sans Serif Gothic or Block
Authorized Personnel Only	1/4-inch Gothic
Respirators and Protective Clothing Are Required this Area	1/4-inch Gothic

Spacing between lines shall be at least equal to the height of the upper of any two lines.

2. Warning Labels: Provide labels conforming to 29 CFR 1926.58 (K) of sufficient size to be clearly legible, displaying the following legend:

DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING
DUST CANCER AND LUNG DISEASE HAZARD
BREATHING ASBESTOS DUST MAY
CAUSE SERIOUS BODILY HARM

INTERIOR DEMOLITION OF EXISTING DELIVERY ROOMS SECOND FLOOR
HOSPITAL UNIVERSITARIO DR. RAMÓN RUIZ ARNAU
PUERTO RICO DEPARTMENT OF HEALTH
028213-10

- E. Local Exhaust System: Provide a local exhaust system in the asbestos control area in accordance with ANSI Z9.2 and 29 CFR 1926.58 that will provide at least four air changes per hour inside of the containment. Local exhaust shall be operated 24 hours per day, until the asbestos control area is removed and shall be leak proof to the filter and equipped with HEPA filters. Local exhaust equipment shall be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. Provide continuous 24-hour per day monitoring of the pressure differential with a pressure differential automatic recording instrument. In no case shall the building ventilation system be used as the local exhaust system for the asbestos control area. Filters on exhaust equipment shall conform to ANSI Z9.2 and UL 586. The local exhaust system shall terminate out of doors.
- F. Tools: Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.
- G. Rental Equipment: If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.2 WORK PROCEDURE

- A. Perform asbestos related work in accordance with 29 CFR 1926.58 and as specified herein. Use wet or if given prior EPA approval, dry removal procedures and full containment, or outdoor techniques. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, or applying cosmetics shall not be permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos shall not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection provisions of this specification are complied with by the trade personnel. Shut down the building ventilating, and air conditioning system, cap the openings to the system, and provide temporary ventilation, and air conditioning prior to the commencement of asbestos work. Disconnect electrical service when wet removal is performed and provide temporary electrical service prior to the use of any water. If an asbestos spill occurs outside of the asbestos control area, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.
- B. Protection of Existing Work to Remain: Perform demolition work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Owner Representative using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the Owner as deemed appropriate by the Owner Representative. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PIH work may proceed.
- C. Precleaning: Wet wipe and HEPA vacuum all surfaces with asbestos debris prior to establishment of a containment.
- D. Asbestos Control Area Requirements:

1. Full Containment: Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos containment with the use of curtains, portable partitions, or other enclosures to prevent the escape of asbestos fibers from the contaminated asbestos work area. Containment development shall include protective covering of walls, and ceilings with a continuous membrane of two layers of minimum 4-mil plastic sheet sealed with tape to prevent water or other damage. Provide two layers of 6-mil plastic sheet over floors and extend a minimum of 12 inches up walls. Seal all joints with tape. Provide local exhaust system in the asbestos control area. Openings will be allowed in enclosures of asbestos control areas for the supply and exhaust of air for the local exhaust system. Replace filters as required to maintain the efficiency of the system.
2. Outdoor: Establish designated limits for the asbestos work area with the use of rope or other continuous barriers and maintain all other requirements for asbestos control areas except for local exhaust. Also, where an enclosure is not provided, conduct area monitoring of airborne asbestos fibers during the work shift at the designated limits downwind of the asbestos area at such frequency as recommended by the PIH and conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work). If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter whichever is lesser, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Owner's On Site Representative.

E. Asbestos Handling Procedures

1. General Procedures: Wet asbestos material with a fine spray of amended water or specific wetting agent during removal, cutting, or other handling to reduce the emission of airborne fibers. Remove material and immediately place in 6 mil plastic disposal bags. Where unusual circumstances prohibit the use of 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Owner's on Site Representative for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation and wrap the pipes and insulation in plastic and remove the pipe by sections.
2. Sealing Contaminated Items Designated for Disposal: Remove contaminated architectural, mechanical, and electrical appurtenances such as blinds, full-height partitions, carpeting, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lockdown encapsulant at the demolition site before removing the items from the asbestos control area. These items need not be vacuumed. The asbestos lockdown encapsulant shall be tinted a contrasting color. It shall be spray-applied by airless method. Thoroughness of sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces. Lockdown encapsulants shall comply with the performance requirements specified herein.
3. Exposed Pipe Insulation Edges: Contain edges of asbestos insulation to remain that exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 1/4-inch-thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non- asbestos lagging cloth, overlapping the existing ends by 4 inches. When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

F. Air Sampling: Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.58 and as specified herein. Sampling performed in accordance with 29 CFR 1926.58 shall be performed by the PIH. Sampling performed for environmental and quality control reasons shall be performed by the PIH. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis.

1. Sampling Prior to Asbestos Work: Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each demolition and removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.
2. Sampling During Asbestos Work: The PIH shall provide personal and area sampling as indicated in 29 CFR 1926.58 and governing environmental regulations. Thereafter, provided the same type of work is being performed, provide area sampling at least once every work shifts close to the work inside the containment, outside the clean room entrance to the containment, and at the exhaust opening of the local exhaust system. If sampling outside the containment shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. In areas where the construction of a containment is not required, after initial TWAs are established and provided the same type of work is being performed, provide sampling at the designated limits of the asbestos work area at such frequency as recommended by the PIH. Where glovebag methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels.

The PIH shall provide personal sampling as indicated in 29 CFR 1926.58. At the same time the PIH will provide area sampling close to the work inside the containment, outside the clean room entrance to the containment, and at the exhaust opening of the local exhaust system. Thereafter, provided the same type of work is being performed, the PIH will provide area sampling once every work shifts close to the work inside the containment, outside the clean room entrance to the containment, and at the exhaust opening of the local exhaust system. If sampling outside the containment shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the conditions(s) causing the increase, and notify the Contracting Officer immediately. Where glovebag methods are used, perform personal and area air sampling at locations and frequencies that will accurately characterize the evolving airborne asbestos levels.

3. Sampling After Final Clean-Up (Clearance Sampling): Provide area sampling of asbestos fibers using aggressive air sampling techniques as defined in the EPA 560/5-85-024 and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the containment or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PIH shall perform a visual inspection to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. Use transmission electron microscopy (TEM) to analyze clearance samples and report the results in accordance with current NIOSH criteria. The asbestos fiber counts from these samples shall be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. Should any of the final samples indicate a higher value, the Contractor shall take appropriate actions to re-clean the area and shall repeat the sampling and TEM analysis at the Contractor's expense.

- G. Lock Down: Prior to removal of plastic barriers and after pre-clearance cleanup of gross contamination, a visual inspection by the PIH, of all areas affected by the removal of the asbestos contaminated materials for any visible fibers, shall be conducted and approved by the PIH. A post removal (lock down) encapsulant shall then be spray applied to ceiling, walls, floors and other areas exposed in the removal area. The exposed area shall include but not be limited to plastic barriers, furnishings and articles to be discarded as well as dirty change room, air locks for bag removal and decontamination chambers.
- H. Site Inspection: Prior to removal of plastic barriers and after pre-clearance cleanup of gross contamination, a visual inspection by the PIH, of all areas affected by the removal of the asbestos contaminated materials for any visible fibers, shall be conducted and approved by the PIH. A post removal (lock down) encapsulant shall then be spray applied to ceiling, walls, floors and other areas exposed in the removal area. The exposed area shall include but not be limited to plastic barriers, furnishings and articles to be discarded as well as dirty change room, air locks for bag removal and decontamination chambers.

3.3 CLEAN-UP AND DISPOSAL

- A. Housekeeping: While parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. Do not blow down the space with compressed air. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will certify the area as safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the containment removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos-contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the containment for residual material or accumulated dust or debris. The Contractor shall re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos concentrations after re-cleaning. The Contracting officer will certify that the area is safe in writing before unrestricted entry is permitted. The Government shall have the option to perform monitoring to certify the areas are safe before entry is permitted.
- B. Title to Materials: All materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified in applicable local, state, and Federal regulations and herein.
- C. Disposal of Asbestos
 - 1. Procedure for Disposal: Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiberproof, waterproof, non- returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be wetted to insure the security of the material in case of container breaching. Affix a warning and Department of Transportation (DOT) label to each bag or use at least 6 mil thick bags with the approved warnings and DOT labeling preprinted on the bag. Dispose of

waste asbestos material at an Environmental Protection Agency (EPA) or state- approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Procedure for hauling and disposal shall comply with 40 CFR 61, SUBPART M, state, regional, and local standards. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags shall remain in the drum and the entire contaminated drum shall be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

2. Asbestos Disposal Quantity Report: Direct the PIH to record and report, to the Owner's On Site Representative, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for asbestos containing material released for disposal.

END OF SECTION