

ADVISORY NO. 3.2: ASBESTOS ABATEMENT

TERMINOLOGY AND DEFINITIONS

Abatement:

Procedures to control fiber release from asbestos-containing materials, i.e., removal, encapsulation, or enclosure.

Air Lock:

A system for permitting ingress and egress without permitting air movement between a contaminated area or an uncontaminated area, typically consisting of two contained doorways at least 6 feet (2 meters) apart.

Air Monitoring:

The process of measuring the fiber content of a specific volume of air in a stated period of time. Phase-contrast microscopy in accordance with NIOSH method No. 7400 is the prescribed method of sampling and analysis.

Air Sampling Technician:

A person trained and experienced in air sampling techniques and schemes who performs air sampling under the direction of the asbestos project manager or certified industrial hygienist.

Amended Water:

Water to which a surfactant has been added.

Asbestos Project Manager:

An individual qualified by virtue of experience and education, designated, as the Owner's representative and responsible for supervising the air sampling technician and helping to ensure compliance with the job specifications.

Authorized Visitor:

The building owner or his representatives, air sampling technician, asbestos project manager, consultant, or a representative of any regulatory or other agency having jurisdiction over the project.

Barrier:

Plastic sheeting and/or other materials used along with the floors, ceilings, and walls of a structure to form an isolated work environment that separates the contaminated work area from the uncontaminated area.

Bridging Encapsulant:

A liquid designed to form a tough membrane over the surface of asbestos-containing materials.

Building Owner:

The owner or his authorized representative

Clean Room:

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

Competent Person:

A contractor's employee by virtue of his education and experience who is capable of operating an asbestos hazard abatement project in accordance with current EPA, OSHA, and NIOSH regulations, and standard work practices established for asbestos removal. Duties of the competent person are as defined in OSHA Regulations 29 CFR 1926.58(b) (www.osha.gov/comp-links.html).

Consultant:

A certified industrial hygienist (C.I.H.), the designated asbestos project manager, or an industrial

hygiene technician under the supervision of the C.I.H. or the asbestos project manager.

Contaminated:

Containing or coated with asbestos.

Curtained Doorway:

A device to permit ingress or egress from one room to another while minimizing air movement between the rooms, typically constructed by placing two overlapping sheets of plastic over an existing or temporarily formed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. Two curtained doorways spaced a minimum of 6 feet apart form the airlock.

Decontamination Enclosure System:

A series of connected rooms, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment. A decontamination enclosure system always contains at least one airlock.

Demolition:

The wrecking or taking out of any structural materials of a facility together with any related handling operations.

Encapsulant:

A liquid material that can be applied to asbestos containing materials or cleaned substrates following the removal of asbestos containing materials to control the possible release of residual asbestos fibers from the material by creating a membrane over the surface or by penetrating into the material and binding its components together.

Encapsulation:

The application of an encapsulant to asbestos-containing materials to control the release of asbestos fibers into the air.

Enclosure:

The construction of an airtight impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

EPA:

United States Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

Equipment Decontamination Enclosure System:

That portion of a decontamination enclosure system designed for controlled transfer of materials and equipment into or out of the work area, typically consisting of a washroom and holding area.

Equipment Room:

A contaminated area or room that is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.

Facility:

Any institutional, commercial, or industrial structure, installation or building.

Facility Component:

Any pipe, duct, boiler, tank, fan, engines, or furnace at or in a facility, or any structural member of a facility.

Fixed Object:

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

Glove-bag Technique:

A method with limited applications for removing small amounts of asbestos containing material from HVAC ducts, piping runs, valves, joints, elbows, and other non-planar surfaces in an uncontaminated (plasticized) work area. The glove-bag assembly is a manufactured or fabricated

device consisting of a glove-bag (typically constructed of 6-mil transparent plastic), two inward-projecting, long sleeves, rubber gloves; one inward-projecting waterwand sleeve; an internal tool pouch; and an attached-labeled receptacle for asbestos waste. The glove-bag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and contains all asbestos fibers released during the removal process. All workers, who are permitted to use the glove-bag technique, must be highly trained, experienced, and skilled in this method.

HVAC:

Heating, ventilation, and air conditioning systems.

HEPA Filter:

A high efficiency particulate air filter capable of removing particles greater than 0.3 microns in diameter with 99.97% efficiency.

HEPA Vacuum:

A vacuum system equipped with HEPA filtration.

Holding Area:

A chamber between the washroom and an uncontaminated area in the equipment decontamination enclosure system. The holding area comprises an air lock.

Movable Object:

A piece of equipment or furniture in the work area which can be removed from the work area.

Negative-Pressure Ventilation System:

A local exhaust system capable of maintaining a detectable pressure differential across containment barriers relative to adjacent unsealed areas.

NESHAPS:

The National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61) (www.epa.gov/opptintr/asbestos/htm).

NIOSH:

The National Institute for Occupational Safety and Health.

OSHA:

Occupational Safety and Health Administration.

Outside Air:

The air outside buildings and structures.

Penetrating Encapsulant:

A liquid designed to saturate the material, thereby binding asbestos fibers to one another and to substances in the material.

Plasticize:

To cover floors, walls, etc., with plastic sheets as herein specified.

Removal:

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

Shower Room:

A room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and suitably arranged for complete showering during decontamination. The shower room comprises an airlock between contaminated and clean areas.

Staging Area:

Either the holding area or an area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

Stripping:

All herein specified procedures necessary to remove asbestos containing materials or asbestos-contaminated materials from their substrate or from any component of the facility.

Substrate:

The underlying surface or material to which asbestos-containing material has been applied.

Surfactant:

A chemical wetting agent added to water to improve penetration.

Thermal Insulation:

Insulation used to prevent heat loss from pipes, boilers, tanks, breaching, heat exchangers, etc.

Visible Emissions:

Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments.

Washroom:

A room between the work area and the holding area in the equipment decontamination enclosure system. A washroom comprises an air lock.

Wet Cleaning:

The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools that have been dampened with water and the disposing of these cleaning tools as asbestos contaminated waste.

Work Area:

Designated rooms, spaces, or areas of the project in which asbestos abatement actions to be undertaken or which may be contaminated as a result of such abatement actions. A contained work area is one that has been sealed, plasticized and equipped with a decontamination enclosure system. An isolated work area is a controlled-access work area that has been isolated by plastic curtains and in which the openings to the outside are sealed with plastic sheeting. An isolated work area is not an airtight containment area and is not equipped with a decontamination enclosure system.

Worker Decontamination Enclosure System:

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

PREPARATION

Work Area Preparation - Prepare each work area in the order in which they are presented below:

Shut down and lock out electric power to all work areas where applicable. Provide temporary power and lighting and ensure safe installation of temporary power services and equipment, as specified in applicable electrical code requirements. Provide temporary lighting and ground fault interrupt circuits as a power source for electrical equipment. All modifications to the building's electrical system shall be performed by a certified electrician at the consent of the Building Owner.

Shut down and isolate heating, cooling, and ventilating air systems such as, but not limited to, ductwork, registers, grills, diffusers, fans, air handlers, unit ventilators, and supply air and return air systems to prevent contamination of the units and fiber dispersal to other areas of the structure. The asbestos abatement contractor shall be responsible for dismantling any existing ductwork that is necessary to access the removal of asbestos containing fireproofing. Whatever ductwork is dismantled, the contractor shall seal the openings with sheet metal or wood, plastic sheeting and duct tape. The Building Owner or his designated HVAC engineer shall assist the contractor in identifying areas of ductwork that need to be sealed off and isolated from the HVAC system to prevent airborne asbestos fiber dispersal to other occupied areas of the building. All ductwork that is dismantled by the asbestos abatement contractor shall be reinstalled at the appropriate time in the reconstruction sequence of

work.

The building owner is responsible for removing all movable objects from the work area, except where the movable objects are contaminated with asbestos containing material. The contractor shall be responsible for the removal and decontamination of any movable equipment that may be contaminated.

Install HEPA-filtered air movement equipment in the work area and vent exhaust ducts through a roof hatch to the outside of the building. Seal openings around exhaust ducts. No exhaust from the negative-air-movement equipment shall be allowed to be released within the building. All HEPA-filtered air-movement-equipment shall be maintained as described in the Section on Negative Air Pressure Systems.

Introduce scaffolding, ladders, and other large equipment into the work area and install the worker and equipment decontamination enclosure system. Once the decontamination enclosure system is in place, they shall be used, as specified, for the entrance and exit of all personnel and equipment.

Seal off all openings (including, but not limited to, corridors, doorways, windows, elevators, skylight, ducts, grills, diffusers, and any other penetrations of the work area) with plastic sheeting sealed with tape. Doorways and corridors that will not be used for passage into occupied areas during the removal work must be sealed with barriers. Fireproofing which is not accessible for removal shall be thoroughly sealed with a fire rated expandable foam insulation material such as Fire Stop 2000 Foam manufactured by Dow Corning, Inc.

Pre-clean contaminated movable objects within the work area by using HEPA-filtered vacuums and wet cleaning methods. Remove the decontaminated equipment from the work area and store in an uncontaminated part of the building.

Pre-clean fixed objects within the proposed work area by using HEPA-filtered vacuums and/or wet cleaning methods as appropriate, and enclose with 6 mil (minimum) plastic sheeting sealed with tape.

Remove and clean ceiling mounted objects, such as lights, that interfere with asbestos abatement work.

Cover floor with plastic sealed with tape. Use a minimum of two layers of 6-mil plastic on concrete floors. Cover floors so that plastic extends at least 12 inches up the wall. Cover all walls with 4 mil plastic sheeting and overlap floor sheeting by at least two feet. Seal all joints with tape and/or spray adhesive. Locations and methods of attachment of plastic sheeting to finished surfaces shall be approved by the Owner in advance.

Build air locks at entrance to the work area.

DECONTAMINATION ENCLOSURE SYSTEMS

General - Build suitable framing and/or use existing rooms connected with framed-in tunnels, and line with plastic sealed with tape at all joints for all enclosures and decontamination enclosure systems rooms. Either existing rooms outside of the work area or specially framed and sealed temporary areas may be used for the decontamination enclosure system. Convenience and proximity to the work area shall be the determining factors. In all cases, access between contaminated and uncontaminated rooms or areas shall be through an airlock.

Worker Decontamination Enclosure System:

Construct a worker decontamination enclosure system connected to the work area that consists of three totally enclosed chambers as follows:

- An equipment room with two curtained doorways: one to the work area and one to the shower room.
- A shower room with two curtained doorways: one to the equipment room and one to the clean

room. The shower shall contain at least one showerhead. Careful attention shall be paid to the shower enclosure to ensure against leaking of any kind. Ensure soap is available at all times in the shower room. Both hot and cold water must be available. The shower wastewater shall be drained, collected, and filtered through a system with at least 5 to 10 micron particle size collection capability. All used filters shall be discarded as contaminated waste. Filtered water may be discharged to a sanitary or storm sewer drain.

- A clean room with one curtained doorway into the shower and one entrance or exit to uncontaminated areas of the building. The clean room shall have sufficient space for storage of workers' street clothes, towels, and other uncontaminated items.
- Use black or opaque plastic for the walls of the worker decontamination enclosure system to ensure the privacy of the workers.

Separation of Work Areas

The contractor shall use airtight barriers to separate the parts of the building required to remain free of contamination from the parts of the building that will undergo abatement. The barriers shall be constructed as follows:

- Build suitable wood or metal frame.
- Cover the inside and outside of the frame with 6-mil plastic sheet, sealed with tape as specified.

Maintenance of Enclosure Systems

- Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.
- Visually inspect enclosures at the beginning of each work period.
- Use smoke methods to determine the effectiveness of barriers when directed by Building Owner or consultant.

Negative-Air-Pressure System

A negative-air-pressure system shall be maintained in the work area at all times while abatement activity is in progress. The Contractor shall not allow any airflow out of the work area except through HEPA-filtered negative-air-pressure devices.

One complete air change in the work area is required every ten minutes.

Negative pressure shall be maintained so that the movement of tools, equipment, employees, and waste containers through the decontamination enclosure systems do not result in airflow out of the work area.

Air circulation in the work area shall be maintained by the negative pressure device to reduce dead air spaces in the work area, and to provide appropriate ventilation in the work area.

The Air Sampling Technician will be collecting air samples outdoors where the negative-pressure devices discharge air. If the air sample analyses indicate that the negative pressure device is discharging asbestos fibers outside the building in concentrations higher than typical outdoor ambient concentrations, the Contractor shall immediately repair or replace the defective unit or the defective components to eliminate the discharge of fibers from the work area.

No negative pressure devices shall discharge air outside the building near pedestrian ways or crossings.

ASBESTOS - REMOVAL PROCEDURES

Prepare Site - Prepare site as specified in each work area.

Fireproofing Removal:

After isolation of the work area is completed as specified, remove all suspended ceiling systems in the manner specified. Lightly mist the exposed finished surfaces with amended water to saturate the ceiling panels. When this has been done, select one or more ceiling panels for immediate removal to gain access in the plenum space above the suspended ceiling system. When access has been gained, thoroughly saturate all adjacent ceiling panels with amended water. When all adjacent ceiling panels have been thoroughly saturated with amended water, remove them and immediately place them in an approved waste disposal container. The ceiling panels shall be handled carefully and shall not be allowed to drop on the floor below. Progressively continue to saturate adjacent ceiling panels with amended water, remove them, and place them in appropriate waste disposal containers until all ceiling panels have been completely removed and the asbestos containing fireproofing is exposed. All gridwork, clips, hangers, and other materials associated with the suspended ceiling system shall be removed and discarded as asbestos waste. In some areas of the building, the fireproofing is above hard plaster ceilings. After the work area has been properly prepared, these ceilings shall be demolished to allow access to and facilitate the removal of the spray-applied fireproofing. All ductwork that is to be dismantled shall be removed before the spray-applied asbestos containing materials are removed.

When the suspended ceiling system or hard plaster ceilings have been completely removed and the asbestos-containing fireproofing is exposed, spray the asbestos material with amended water by using low pressure spray equipment capable of providing a mist application to reduce the release of fibers.

Fogmaster misting units may also be installed in designated areas to provide additional misting of asbestos materials as they are removed. The fireproofing must be sprayed repeatedly during the work process to maintain a wet condition and to minimize asbestos fiber dispersion (**Note:** Fiberglass insulation which is on any ductwork or piping shall be removed and disposed of as asbestos contaminated waste). All the main trunk line ductwork shall remain in place unless there is no alternative to access the fireproofing. Contractor will be responsible for dropping all take-offs from the main trunk line. If ductwork is to be dropped, it must first be isolated from the system from outside the containment area. Once this has occurred, the duct can be dropped and sealed off inside the containment. Any ductwork which is dropped shall be wet cleaned, double wrapped with poly sheeting, and stored inside the containment unless otherwise authorized by the Building Owner and Asbestos Consultant.

Remove the saturated asbestos material in small sections. As it is removed, pack the material in sealable plastic bags of 6-mil minimum thickness or in other suitable sealable containers labeled for transport. The asbestos-containing material shall not be allowed to dry out prior to insertion into the container. All waste on the floor shall be placed and sealed in disposal containers prior to the completion of each work shift. After completion of stripping work, all surfaces from which asbestos has been removed shall be brushed, wet wiped with rags or cleaned by an equivalent method to remove all visible material. During this work, the surfaces being cleaned shall be kept wet.

Acoustical Plaster Ceiling Removal:

After isolation of the work area is completed as specified, the asbestos-containing layer on acoustical plaster ceilings shall be sprayed with amended water, using spray equipment capable of providing a "mist" application. Saturate the material sufficiently to wet the substrate without causing excess dripping or delamination of the material. Continue to spray the ceiling material repeatedly during the work process to maintain wet conditions and to minimize airborne asbestos fiber levels.

Remove the saturated asbestos ceiling material and substrate in small sections. As the material is removed and falls to the floor below, immediately place it in appropriate containers for disposal. The ceiling material shall not be allowed to dry out prior to insertion into the disposal container. Insure all metal wastes are inserted into air and watertight drums and not plastic disposal bags.

After removal of the asbestos contaminated ceiling system, all surfaces not contained in polyethylene shall be wire-brushed and/or wetsprayed or cleaned by an equivalent method to remove all visible material. The surfaces being cleaned shall be kept wet during this work.

Pipe Insulation Removal:

This article applies to the removal of pipe insulation in conventional containment environments. The asbestos material around pipes shall be removed in small sections. The cloth jacketing on the pipe insulation shall be cut along the top seam to allow the wetting of the insulation with amended water. At the top seam, the insulation shall be sprayed thoroughly with amended water prepared in accordance with manufacturer's specifications. The sections shall be parted and the inside of the insulation thoroughly wetted. The cloth cover shall be cut around the circumference of the section being removed. The insulation material shall be lowered carefully and not allowed to drop. The material shall be wetted again before placing inside appropriate sealable containers. All pipe surfaces (including elbows, support rods, and valves) shall be cleaned thoroughly with damp sponges or cloths until they are visibly clean. The next section of pipe insulation shall be removed following the same procedures. Containers that become full shall be sealed and readied for transportation to an approved disposal site.

Glove-bag Technique:

After the required hand tools and equipment are assembled, a polyethylene glove-bag shall be installed according to the manufacturer's instructions on a small section of asbestos containing pipe insulation to be removed. The required hand tools shall be placed in the bag before sealing the bag to the pipe. The cloth cover on the pipe insulation shall be cut and opened to allow thorough wetting of the insulation with amended water. After the insulation has been opened and thoroughly wetted, the cloth cover shall be cut around the circumference of the section being removed. After removal of the insulation material, the material shall be contained in the lower compartment of the bag and thoroughly saturated. The inside of the glove-bag, plastic extensions, and pipe shall be washed down with amended water by inserting the nozzle of the portable sprayer into the bag. The glove-bag may be evacuated with a portable HEPA-filtered vacuum. While the bag is collapsed, it shall be squeezed below the tool pouch and then twisted. The bag shall be sealed with tape or locking ties to separate the waste from the removal compartment. The glove-bag and plastic extensions shall be cut along the top and sides to then remove the bag from the pipe. All tools shall be thoroughly cleaned before they are removed from the bag. The glove-bag and plastic extensions shall be placed in an appropriate disposal container with OSHA required label.

After the substrate is sufficiently clean (as determined by the Building Owner or the Consultant) and prepared to accept sealant, apply the sealant (per the manufacturer's printed instructions) to the cleaned underside of the roof and/or floor deck and to all beams, columns, or structural members, to adjacent masonry walls; and to areas where over spray could have occurred and from which the asbestos material has been removed. This is the bond to the substrate any residual fibers that may remain on the surface and to prevent subsequent dispersion or re-entrainment. Apply the sealant with airless spray equipment. A thin, visible, contiguous film must cover the entire underside of the roof and or floor deck and any other surfaces from which asbestos has been stripped or on which residual material may be present (masonry, metal panels, etc.). Colored dyes shall be used in the sealant to help ensure adequate coverage of the substrate. **NOTE:** The sealant must be compatible with replacement fireproofing.

Workers applying the sealant shall wear appropriate respirators and full protective clothing. All partitions, enclosure systems, and plastic sheeting shall remain in place during application of the sealant.

If the airborne fiber concentration outside the work area is found to be greater than or equal to 0.05 fibers per cubic centimeter, the abatement contractor shall be required to HEPA-vacuum and/or wet clean these areas to the satisfaction of the Building Owner and/or Consultant. The abatement Contractor shall bear the full expense associated with episodic fiber release.

CLEANUP AND DECONTAMINATION OF THE WORK AREA

Asbestos Cleanup:

Remove visible accumulations of asbestos material and debris. Wet clean all surfaces within the work area.

Remove the plastic sheets from walls and floors only. The windows, doors, HVAC vents, and other equipment and penetrations shall remain sealed and any HEPA-filtered negative-air-pressure systems, air filtration and decontamination enclosure systems shall remain in service.

Clean all surfaces in the work area and any other contaminated areas with water and/or with HEPA-filtered vacuum equipment. After cleaning the work area, wait 24 hours to allow dust to settle, and wet clean or clean with HEPA filtered vacuum equipment all surfaces in the work area a second time. After completion of the second cleaning operation, visually inspect the entire work area to ensure that it is free of visible asbestos debris.

If a negative-air-pressure system is used, the 24-hour settling period and second wet-cleaning may be waived. The results of the visual inspection and air monitoring by the building owner's representative and consultant conducted after the first wet cleaning shall determine the need for additional wet cleaning and settling periods.

Sealed containers and all equipment used in the work area shall be included in the cleanup and shall be removed from the work area via the equipment decontamination enclosure system, at an appropriate time in the cleaning sequence.

If the Building Owner or Consultant finds visible accumulations of asbestos debris in the work area after cleaning, the contractor shall repeat the wet cleaning at his own expense until the work area is in compliance.

When a final inspection and air monitoring determines that the area is free of accumulation of visible asbestos debris and airborne fibers, the decontamination enclosure system shall be removed, all areas shall be thoroughly wet cleaned, and materials from the equipment room and shower shall be disposed of as contaminated waste. A final check shall be carried out by the Building Owner and/or Consultant to ensure that no dust or debris remains on surfaces as a result of dismantling operations.

To prevent exceeding available storage capacity on site as the work progresses, sealed and labeled containers of contaminated waste shall be removed and disposed of as contaminated waste.

DETERMINING ABATEMENT COMPLETION

Visual Inspection:

The Building Owner and/or the Consultant shall conduct a thorough first visual inspection of each work area after the Contractor has indicated that all asbestos-containing material has been completely removed. The first inspection will be conducted before the plastic sheets have been cleaned with damp mops and cloths, but after all gross debris has been cleaned up and prior to the spray application of sealant to exposed surfaces.

Items to be checked during the first visual inspection include, but are not limited to, the following:

- The adequacy of the removal of asbestos containing material from the substrates.
- The presence of adhering material or accumulated material on exposed surfaces.
- The Building Owner or Consultant may (at their discretion) use an electric leaf blower during the inspection to dislodge or discover any hidden debris that should have been removed. It is recommended that the contractor perform this procedure himself in each work area before notifying the Building Owner/Consultant that the area is clean and ready for inspection. If visible dust or debris is discovered during the inspection, the Contractor shall wet clean the entire work area again until the Building Owner or Consultant is satisfied that all-visible dust or debris has been removed.

Only after the work area has passed the first visual inspection will the Contractor be permitted to apply sealant materials.

After the work area has passed the first visual inspection, the Contractor will apply a sealant to exposed surfaces and clean all surfaces in the work area and any other contaminated areas with water and/or with HEPA filtered vacuum equipment. The plastic sheets on the walls and floor may be sprayed with the sealant provided that all loose asbestos debris has been removed from the plastic prior to spraying and that the plastic sheets are sufficiently clean to allow the sealant to effectively bond any residual material to the plastic. The Contractor will wait 24 hours to allow the sealant to dry and dust to settle.

The Building Owner and/or the consultant will conduct a second visual inspection of the work area after application of the sealant. Items to be checked during the second visual inspection include, but are not limited to, the following:

- Cleanliness of the work area and decontamination areas; accumulation of loose dust or debris on plastic sheets covering surfaces, walls, and floors.
- Complete coverage of the exposed surfaces by the sealant.

If any accumulation of dust or debris is observed, the Contractor will be required to wet-clean and/or HEPA vacuum the work area again and pass another inspection.

After the work has passed the second visual inspection, the Contractor will remove the plastic sheets from walls and floors only. The windows, doors, and HVAC vents will remain sealed. All HEPA-filtered negative-air-pressure systems, air filtration, and decontamination enclosure systems will remain in service. After an adequate settling period of 12-24 hours, the Contractor will wet-clean or HEPA vacuum all objects and surfaces in the work area.

The Building Owner or consultant shall conduct a third thorough visual inspection of the work site to ensure that it is free of visible dust after completion of the final cleaning operation. After the work site has passed the third visual inspection and the walls, floors, and all exposed surfaces are dust free, final air monitoring will be performed by the Consultant. Only after the work site meets the air testing criteria will the Contractor be permitted to proceed to the next phase of work.

FINAL AIR MONITORING

Final air tests will be performed to determine and document air quality upon completion of abatement activities. The consultant shall perform the final air tests after the work site has passed the final visual inspection. Fans or blowers will be used to circulate air in the work area during the final air tests to simulate building use conditions (aggressive sampling). Air samples will be collected by use of high volume electric sampling pumps calibrated to a maximum flow rate of 10 liters/minute. Filter samples will be analyzed by phase-contrast microscopy, (PCM).

Acceptable final air concentrations by PCM - Final air samples will be collected from several locations in the work areas and in the adjacent equipment and worker decontamination areas. At least five area samples will be analyzed by PCM using NIOSH Method No. 7400. Total airborne fiber levels in all locations in the work area (as determined by phase contrast microscopy) must be less than 0.01 fibers per cubic centimeter of air. If any air sample concentration in the work area is equal to or greater than 0.01 fibers/cubic centimeter, then the Contractor shall wait 24 hours (from the end of the air sampling period) and re-clean the work site with HEPA-filtered vacuum equipment and damp cloths and mops.

A new set of air samples for the entire work site will be collected and analyzed by the consultant at the Contractor's expense. If the fiber levels in the work area still exceed 0.01 fibers/cubic centimeter, then the contractor shall be required to wet-clean again and pay for the additional air monitoring.

SEALANT APPLICATION FOR LOCKDOWN

In all areas from where asbestos-containing materials were removed, an approved sealant shall be used to lock down any residual airborne asbestos fibers to the substrate and to prevent subsequent dispersion or re-entrainment.

The sealant shall be applied to unfinished walls, floor deck, plastic sheeting and other applicable areas. No sealant shall be applied to dirt floors, mechanical and electrical equipment or finished surfaces.

The sealant shall be applied with low-pressure airless spray equipment.

The sealant shall be used and applied in strict accordance to manufacturer's specifications.

The Contractor shall apply a thin visible, continuous film of sealant to all areas specified. Additional applications shall be required if the first application does not adequately cover the substrates or lockdown residual airborne asbestos fibers.

REESTABLISHMENT OF OBJECTS AND SYSTEMS

The Contractor shall ensure that all plumbing, HVAC and remaining electrical systems, equipment, and fixed objects are returned to their original condition and in working order upon completion of the project.

Any damages to the finishes, floor, walls, or any other item or fixture resulting from the actions of Contractor personnel shall be repaired to their original condition without any additional cost to the Building Owner. A comparison of the pre-construction inspection report shall be the basis for the assessment of damages to be addressed.

The Contractor shall not be responsible for returning equipment previously moved by the building owner back to their original location.

The Contractor shall refer to the electrical demolition drawing to show those lights that are to be decontaminated and salvaged for reuse by the Building Owner.