

WORKER INSTRUCTION

Before the project begins, Air Duct Services shall instruct workers on using appropriate procedures for personal protection when performing remedial and cleaning techniques including:

- A. Use and fitting of respirators
- B. Use of protective clothing
- C. Entry and exit from work areas
- D. Aspects of work procedures
- E. Protective measures
- F. Safety and emergency egress procedures

RESPIRATORY PROTECTION

Air Duct Services shall provide workers with individually issued and marked respiratory protection equipment approved by the National Institute for Occupational Safety and Health (NIOSH) and Mine Safety and Health Administration (MSHA). At a minimum, respiratory protection for remediation workers working within full containments (Remediation Levels 2-4) shall consist of full-face negative pressure P100 respirators. Full-faced powered air purifying (PAPR) respirators shall be used in crawlspace containments. These respirators shall be equipped with a high efficiency particulate air (HEPA) filter and organic vapor cartridge/cartridges. Air Duct Services shall provide sufficient replacement respirators or cartridges for negative pressure respirators and PAPRs as necessary or as required by applicable regulations. Cartridges and filters for respirators shall not be used any longer than one workday. New respirator cartridges and respirators shall be stored at the job site in a clean storage cabinet. Disposable respirators must be discarded after every worker moves to a different work area according to the direction of the Environmental Consultant.

Air Duct Services shall ensure that workers do not remove respirators to eat, drink, smoke, chew gum or tobacco, or apply cosmetics during mold remediation work activities.

PROTECTIVE CLOTHING

Air Duct Services shall provide workers with sufficient sets of protective disposable clothing, consisting of full-body coveralls, head covers, gloves, and 18-inch high boot type covers in sizes to properly fit individual workers. Integral boot/head cover/coveralls are acceptable so long as the shoe covering fits well and does not cause a trip hazard. All persons entering containments under Remediation Levels 3 & 4 shall don two layers of disposable clothing over street clothes or undergarments before entering the work area (one layer is acceptable for containments under Remediation Level 2). Protective clothing shall be secured at the wrists (for example, taped) to ensure that skin is not exposed. Skin protection is essential to prevent contact with spores that may be present on microbial-contaminated materials. Removal, cutting, rolling up, or alteration of the full-length arm and leg portions of the coveralls is strictly prohibited, as is the removal of the integral head covering.

Air Duct Services shall provide hard hats, as required by job conditions or by applicable safety regulations.

Only the Environmental Consultant and the Owner/Engineer and remediation workers possessing

the appropriate certification and training may enter the remediation containment areas. Air Duct Services shall not under any circumstances permit any person to enter the containment areas without the appropriate protective clothing, respirators, equipment, certification, and training.

DECONTAMINATION PROCEDURES

Containment Entry Procedures

For entry into the containments, the following entry procedure shall be used. Air Duct Services shall ensure that each worker and authorized visitor follows these entry procedures.

A. Don respiratory protective equipment and protective clothing (one or two sets of disposable protective clothing with integral full-body protection and headgear, gloves, and footwear) over street clothes or undergarments before entering the contained work area. Air Duct Services shall provide protective clothing and appropriate respirators to authorized visitors. Protective clothing and respirators must be accessible to the Environmental Consultant for inspection of work areas after normal work hours.

B Pass through the decontamination unit before entering into the contained or enclosed work area.

Containment Exit Procedures

Air Duct Services shall ensure that each worker and authorized visitor follows these decontamination exit procedures.

A. When an individual leaves the containment work area (e.g., for breaks, lunch, end of work shift), HEPA-vacuum the outer layer of protective clothing before exiting the containment work area.

B. Pass through the airlock into the equipment room. Remove outer layer of protective clothing and deposit this outer layer into a contaminated material disposal bag that is dedicated to the equipment room only, for the purpose of disposal of the outer protective clothing layer.

C. Step into the clean room, HEPA-vacuum the inner layer of protective clothing with a separate HEPA vacuum that is dedicated to the clean room only for the purpose of vacuuming the inner layer of protective clothing. Remove the inner layer of protective clothing while still in the clean room area and deposit into a materials disposal bag. Exit the clean room. Air Duct Services shall have an extra HEPA vacuum available for use immediately outside the decontamination unit in the event the vacuum serving the clean room fails.

D. Upon exiting the containment, remove respirator.

HEAT STRESS / COLD STRESS

At all times, Air Duct Services shall ensure that the thermal environment within containments comply with the guidelines provided by the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) for physical agents in the work environment, as well as any and all applicable state and federal occupational health and safety regulations. Appropriate thermal

environmental conditions include the protection against heat stress and cold stress.

SECURITY

At all times throughout any remedial action, Air Duct Services shall provide adequate security measures to prevent any unauthorized entry into active containments. The work areas shall never, at any time, be left unattended unless access can be positively blocked (for example, locked doors).

SAFETY COMPLIANCE

Air Duct Services shall comply with all local fire safety rules regarding egress from buildings.

WARNING SIGNS

Air Duct Services shall post warning signs at all entrances or openings to containments. Warning signs must contain characters of such size, clearly marked, in English (at a minimum), and in any other language necessary (e.g., Spanish) such that comprehension by all passers-by is ensured. Warning signs shall state the following:

WARNING - DO NOT ENTER

Remediation and/or Cleaning Work in Progress

Alternate wording for the warning signs must be approved in advance by the Owner/Architect and/or the Environmental Consultant.

AUTHORIZED VISITORS

Visitors who enter the containment areas must have full authorization from the Owner/Architect and the Environmental Consultant. Additionally, all visitors must have the following certifications:

- A. Current (within 12 months) physician's approval to enter work areas where fungal aerosols are being generated, including the ability to wear a negatively pressurized respirator (see Section 2.0). If the physician's written approval to enter work areas where fungal aerosols are being generated is not feasible to obtain, it is Air Duct Services' responsibility to effectively communicate to all authorized visitors the hazards and risks associated with occupational exposure to fungal aerosols. Risks can include allergic respiratory disease (for example, asthma and hypersensitivity pneumonitis), infection for individuals with pre-existing chronic disease (for example, those with compromised immune systems), and mycotoxicosis (mycotoxins can cause adverse health effects). No substitution may be made for the physical examination and other requirements as specified under the Respiratory Protection Standard (OSHA 29 CFR 1910.134).
- B. Current (within six months) respirator fit test documentation.
- C. Release form to the Owner/Architect stating knowledge by the visitor of the potential hazards involved in entering the containment areas.

Air Duct Services shall instruct all visitors in safety and proper use of protective clothing and respiratory protection before the visitor shall enter the work area. Refer to applicable sections of

these specifications.

GENERAL

Before the removal of contaminated materials begins, Air Duct Services shall inspect for prior damage all items located in the remediation areas and give the Owner/Architect a written list including photographs if necessary, noting all such preexisting damaged items.

TEMPORARY POWER, LIGHTING, AND HVAC

The General Contractor shall provide temporary electrical power, equipped with grounded circuit interrupters, for Air Duct Services's equipment. The temporary power will be sufficient in number of outlets and circuit breakers in order to handle the amount of AFDs, lighting and other equipment that is required. Air Duct Services shall be responsible for extending this power to his/her equipment, using grounded extension cords. Air Duct Services will implement, if necessary, proper power lock-out/tag-out procedures for any building equipment or other applicable power sources in the work areas. The necessity for such a power lock-out/tag-out procedure will be the sole responsibility of Air Duct Services.

Air Duct Services shall provide sufficient stand-alone light fixtures to illuminate areas not adequately illuminated by existing lighting (e.g. in level 2-4 containments). This lighting must be available to the Environmental Consultant for after-hours work inspections.

FIRE PROTECTION

Air Duct Services shall provide portable fire extinguishers within the full containment areas, and outside the decontamination units. Fire extinguishers shall be rated for Class A, B, and C fire hazards and shall be sized for coverage of the areas within the containment.

Air Duct Services shall consult with the local Fire Marshall, if Air Duct Services is not familiar with or has questions pertaining to, selection, sizing, required number, and placement of the fire extinguishers. If fire sprinklers, smoke detectors, or fire detection equipment are present and operable, they must be protected during remediation.

CONTAINMENT BARRIERS

General

- A. Two containment barriers are necessary for full containments (crawlspaces and Remediation Levels 3 & 4), including a ceiling constructed of the same material (6-mil flame retardant polyethylene sheeting) used for containment walls.
- B. One or two containment barriers (as determined by the Environmental Consultant) are necessary for Remediation Level 2 containments.
- C. Supports such as wooden 2 x 4's, PVC pipes, or other framing materials shall be used to support the ceilings of full containments including decontamination units. These support frames may be constructed in such a way that they are transportable/reusable between work areas.

D. 6-mil flame retardant polyethylene sheeting shall be secured to existing structures using duct tape (2-inch minimum width), spray adhesives, staples or any other combination thereof to insure the integrity of the barrier for the duration of the work. Additional supports in the form of plywood panels (to be used in occupied areas), 2 x 3 or 4-inch wood studs, polyvinyl chloride (PVC) piping, or other equivalent framing material shall be used as determined by Air Duct Services and the Environmental Consultant.

E. The Owner/Architect and/or the Environmental Consultant will determine the appropriate type, size, location, and construction of all containments utilized in the remediation process.

Full Containment Protective Barriers (crawlspaces, Remediation Levels 3 & 4)

A. Two layers of 6-mil flame retardant polyethylene sheeting on all openings, including the heating, ventilation, and air conditioning system openings. Floors, walls, and stationary non-colonized objects in the enclosed containment work area shall be covered by 2 layers (minimum) of polyethylene sheeting according to the professional judgment of the Environmental Consultant.

Containment (Remediation Level 2)

A. One or two layers of 6-mil flame retardant polyethylene sheeting on all openings, including HVAC duct openings such as supply air diffusers and return air grilles.

B. Floors, walls, and stationary non-colonized objects in the enclosed work area may be covered by polyethylene sheeting according to the professional judgment of the Environmental Consultant. A protective barrier is required to keep demolition dusts out of wall cavities and other hidden interior spaces associated with work area mold remediation.

CONTAINMENT WORK AREA PRESSURIZATION

Air Filtration Devices (AFDs)

For Full Containments, Air Duct Services shall install and use ventilation equipment consisting of AFDs equipped with high-efficiency particulate air (HEPA) and pre-filters, to develop and maintain a negative air pressure differential inside contained work areas relative to outside areas. Air Duct Services shall be responsible for acquiring and paying for any licenses needed for use of any equipment, including but not limited to, air pressure differential systems and air filtration systems.

All vacuum collection equipment, exhausted within the building envelope during the course of this remediation project shall utilize HEPA final filtration with a 99.97% collection efficiency at 0.3 microns.

All HEPA filters must carry a manufacturer's label of DOP efficiency certification.

All vacuum collection equipment exhausted within a building envelope must pass on site HEPA filtration efficiency certification DOP test that may be conducted by the Environmental Consultant

prior to initial use on the job site. Additional filtration re-certifications are required whenever:
A new HEPA final filter is installed in the vacuum collection device during the course of the project.

A vacuum collection device has been visibly damaged to an extent, in the opinion of the Environmental Consultant, may have compromised the integrity of the HEPA final filter.

A HEPA filtered air scrubber or other vacuum collection device is relocated from a highly contaminated work zone to one of lesser contamination.

HEPA filters and pre-filters for AFDs shall be replaced to maintain pressurization performance requirements during demolition and cleaning, and at the completion of work in a containment work area. Filters shall not be reused. Used filters shall be double-bagged in 6-mil polyethylene bags within the containment and disposed as contaminated waste as specified in Section 6.0.

All exhaust and intake openings in AFDs shall be sealed with one layer of 6-mil polyethylene when not in use, including transporting such AFDs into and out of the work areas during containment construction and containment removal work.

All AFD equipment is subject to performance checks by the Environmental Consultant and if found deficient, must be repaired or replaced.

Full Containment Work Areas

Air Duct Services shall establish a negative air pressure differential inside the containment work areas relative to adjacent areas, before full containment removal work activities begin. No air from inside contained work areas may flow out of the containment work area without passing through a HEPA filter.

The exhaust ventilation system should be (according to professional judgment of the Environmental Consultant) capable of maintaining a differential pressure of not less than -0.02 inches w.c. for containments of Remediation Levels 2, 3 & 4.

An air pressure differential shall be continuously maintained in all containment work areas from the start of work until all remediation activities (including fine dust removal) has been completed.

If the containment work area isolation structure fails to prevent air from flowing out of the enclosed work areas during personnel or equipment movement through the containment structure, additional air locks and/or AFD(s) shall be installed.

Air Duct Services shall continuously monitor the air pressure differential across work area enclosures by using a pressure differential meter or manometer. The monitoring system must be in place before the start of remedial activities and shall be visible (the gauge) from areas outside (external to the containment).

Exhaust Air Discharge

All exhaust air from containment work areas, unless otherwise specified, shall be discharged to the outdoors, so as to prevent re-entrainment. Air Duct Services shall coordinate the location of discharge openings with the Owner/Engineer and the Environmental Consultant. Any window

sashes or doors removed for installation of exhaust air discharge equipment shall be reinstalled after completion of the work. Openings used for discharge of exhaust air shall be sealed tight with duct tape and plywood. Exhaust discharge openings may be cut into plywood. HEPA filters must be used on all air exhausted from containments.

Limiting Equipment Cross Contamination

When working outside of negatively pressurized containments, Air Duct Services shall keep exposed service tools and equipment free of debris and contamination. Tools and equipment include (but are not limited to): Vacuum Collection Equipment, vacuum hoses and attachments, air lines and hoses, brushes, ladders, power tools, hand tools, zoning devices, and inspection equipment.

Contaminated hand tools and equipment shall be kept sealed in plastic bags until cleaned in the designated outdoor decontamination area at the work site.

Hoses, cables, and other tools shall be cleaned free of visible debris with suitable sanitary damp wipes prior to removal from containment areas.

The Environmental Consultant may require ATP swab tests to verify the cleanliness of the Contractor's equipment prior to its initial deployment on site, and throughout the course of the project.

The Environmental Consultant may direct Air Duct Services to provide additional cleaning to any equipment that the Environmental Consultant deems as a potential source of cross contamination on the job site.

DECONTAMINATION AREAS

General

For Full Containment work, Air Duct Services shall establish a decontamination unit adjacent and connected to the containment work areas. Air Duct Services shall ensure that employees and authorized visitors enter and exit the containment work areas through the decontamination area.

Refer to Section 2.4 regarding personnel entry and exit procedures through the decontamination units.

Decontamination Unit Description: Full Containment (Remediation Levels 2 - 4)

The three chambers (rooms) are described in order of outermost chamber to innermost chamber, and shall be as follows:

A. Clean Room. This chamber shall be equipped with a bin lined with impermeable labeled bags for the containment and disposal of the inner layer of protective clothing. A double-layered contaminated materials disposal bag can suffice for the bin. Separate and distinct HEPA-filtered vacuums shall be dedicated to this room to clean the protective clothing. Double-flap doorways

(minimum) shall separate the clean room from the building interior area outside the work area and from the equipment room chamber.

B. Equipment Room. This chamber shall be equipped with a bin lined with impermeable labeled bags for the containment and disposal of the outer layer of protective clothing. The equipment room shall be of sufficient size to allow one worker to remove the outer layer of protective clothing without permitting air movement between decontamination areas.

C. Airlock. This chamber shall be of sufficient size to isolate at least one worker without permitting air movement between the decontamination areas and the containment work areas. A minimum of 10 square feet of floor area is required. Triple-flap doorways shall separate the airlock from the equipment room and from the containment work area.

The airlock, equipment room, and clean room shall be high enough (minimum 7 feet) to easily accommodate entry and egress of workers and materials.

Decontamination Unit Construction (Full Containment; Remediation Levels 2-4)

Materials used to construct a typical decontamination unit include 2 x 3 or 4-inch lumber, or other equivalent framing materials, for the frame, 3-inch to 2-inch plywood or 6-mil fire resistant polyethylene for the walls, duct tape, staples, and nails. The floor should be covered with two layers of 6-mil fire resistant polyethylene.

Equipment/Bagged Material Decontamination

The outer surfaces of bags or wrappings containing gypsum board and other demolished materials shall be thoroughly vacuumed with a HEPA-vacuum cleaner in the contained work (full containment) area, squeezed to remove excess air, sealed, and then transported to the clean room (full containment only) where the wrappings or bags will again be HEPA-vacuumed before transport to the interior area outside the work area containment.

A decontamination unit consisting of a single airlock (with dedicated HEPA vacuum cleaner) may, at the discretion of the Environmental Consultant, be acceptable for Remediation Level 2 work.

When working outside containment in general building areas, Air Duct Services shall keep exposed service tools and equipment free of debris and contamination. Tools and equipment include (but are not limited to): vacuum collection equipment, vacuum hoses and attachments, air lines and hoses, brushes, ladders, power tools, hand tools, zoning devices, and inspection equipment.

Contaminated hand tools and equipment shall be kept sealed in plastic bags until cleaned in the designated outdoor decontamination area at the work site.

The Environmental Consultant may direct Air Duct Services to provide additional cleaning to any equipment that he/she deems as a potential source of cross contamination on the job site.

HEPA-FILTERED VACUUM CLEANERS

Air Duct Services shall provide an adequate quantity of HEPA-filtered vacuum cleaners (with DOP

efficiency certification labels), designed for continuous operation, to perform the work in a timely and efficient manner.

Nozzle attachments shall include those as required by Air Duct Services to adequately remove all dust. As a minimum, nozzle attachments shall include crevice and extended bristle brush nozzles.

All HEPA-filtered vacuum cleaners are subject to performance checks by the Environmental Consultant and if found deficient, must be repaired or replaced.

All vacuum collection equipment, exhausted within the building envelope during the course of this remediation project shall utilize HEPA final filtration with a 99.97% collection efficiency at 0.3 microns.

All HEPA filters must carry a manufacturer's label of DOP efficiency certification.

All vacuum collection equipment exhausted within a building envelope must be capable of passing on site HEPA filtration efficiency certification DOP tests that the Environmental Consultant may conduct prior to initial use on the job site. Additional filtration re-certifications are required whenever:

A new HEPA final filter is installed in the vacuum collection device during the course of the project.

A vacuum collection device has been visibly damaged to an extent, in the opinion of the Environmental Consultant, that may have compromised the integrity of the HEPA final filter.

A HEPA filtered air scrubber or other vacuum collection device is relocated from a highly contaminated work zone to one of lesser contamination.