

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The Contractor shall supply all labor, materials, services, insurance, special permits and equipment necessary to remove and dispose of biologically-contaminated materials and the clean-up, sanitization, or disinfection of all areas of interior surfaces within the area described on the Work Order and in accordance with these specifications.
- B. Biological (microbial) contaminants include but are not limited to:
 - 1. Fungi
 - 2. Bacteria
 - 3. Viruses
 - 4. Allergens
 - 5. Pathogens
- C. General Requirements
 - 1. Contractor is responsible to take appropriate measures ensuring that the project site will be safeguarded from contamination due to work activities during the biological remediation (bio-remediation) project period.
 - 2. Building materials in the project area shall be treated as biologically-contaminated unless otherwise noted.
 - 3. All work is to be performed in accordance with applicable codes, standards, and accepted industry practices. This includes compliance with regulatory requirements applicable at the time the work is performed and is not limited to requirements at the time of bid. All work, including work practices, is to be craftsman-like and is subject to inspection by the Owner.
 - 4. The work described in this section is a general description and is not intended as a complete listing of the work to be accomplished. The work associated with each Work Order may be expanded or deleted above and beyond the specified scope by the Owner to include other biologically contaminated materials that may be encountered during the course of the Work Order.
- D. Damages caused during the performance of remediation activities shall be repaired by the Contractor (including, but not limited to, paint peeled off by barrier tape, nail holes, water damage, broken glass) at no additional cost to the Owner.
- E. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which Work is indicated are not to be disturbed.
- F. Contractor's Use of the Existing Building: Maintain existing building in a safe and weather tight condition throughout the construction period. Repair damage caused by remediation operations. Take all precautions necessary to protect the building and its occupants during the Work period.
- G. Keep public areas such as hallways, stairs, elevator lobbies, and toilet rooms free of accumulation of waste, rubbish, and construction debris.
- H. Smoking or open fires will not be permitted within the building enclosure or on the premises.

1.2 RELATED WORK

- A. Section 02 80 00 – Facilities Remediation
- B. Section 02 82 00 – Asbestos Removal
- C. Section 02 83 00 – Heavy Metal-Related Activities
- D. Section 02 84 00 – PCB and Mercury Lamp Removal
- E. Section 02 85 00 – Silica and Fugitive Dust Controls
- F. Section 02 86 00 – PCB-Containing Bulk Material Removal
- G. Section 02 87 00 – Water Loss Response

1.3 QUALITY CRITERIA

- A. Qualifications for Performance of Work: The following qualifications are required for the Contractor's personnel involved in microbial remediation.
 - 1. Remediation contractor will carry current business licenses and certifications applicable to the remediation of biological contamination and the application of biocides.
 - 2. The Contractor's Supervisor shall:
 - a. Hold current certification as an Applied Microbial Remediation Technician or Specialist (AMRT or AMRS) by the Institute of Inspection, Cleaning, and Restoration Certification (IICRC), or a current certification as a Council-certified Microbial Remediator (CMR) or Remediation Supervisor (CMRS) by the American Council for Accreditation Certification (ACAC), or equivalent.
 - b. Have documentation of successful completion of an OSHA 10 Hour General Industry Health and Safety course.
 - c. Be able to demonstrate and document competence and experience in responding to a wide variety of water loss episodes including high-rise commercial buildings, health care facilities, research laboratories, classroom settings, and special use buildings.
 - d. Have documented experience implementing control measures to prevent building occupant exposures to Work Area contaminants. Strong experience and understanding of Sheet Metal and Air-conditioning Contractors' National Association (SMACNA) Standard 1995, *IAQ Guidelines for Occupied Buildings Under Construction*.
 - e. Have documented experience and deference working with industrial hygienists and environmental consultants to provide a high-level of indoor environmental quality (IEQ) during and following water loss response events. This includes carefully following work plans and protocols prepared for remediation work.
 - f. Experience using low-VOC and low-odor products, non-toxic chemicals, green methods, and discretion in discussing environmental hazards with occupants is required.
 - 3. The Contractor's Employees shall:
 - a. Have completed biohazard remediation awareness training, including but not limited to information on health effects of exposure to biohazards, safe work practices to prevent exposure to biohazards, and the use and limitation of personal protective equipment.

PART 2 - PRODUCTS

2.1 ANTI-MICROBIALS, BIOCIDES, CLEANING AGENTS, DEODORIZERS

- A. Antimicrobials, biocides, cleaning agents, or deodorizers may be used to treat affected areas.
 - 1. Such products shall be approved in advance of their use by the Owner.
 - 2. Biocides and cleaning agents shall be applied as directed by the manufacturer. Biocides shall hold a current registration with the Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
 - 3. Cleaning, deodorizing, and disinfecting agents shall be free of added scents or perfumes that may persist and interfere with the post remediation clearance evaluation.
 - 4. Contractor shall seek to utilize low-VOC, low-odor products, non-toxic chemicals, and green methods when possible.

PART 3 - EXECUTION

3.1 COORDINATION AND COMMUNICATION

- A. The Owner shall have overall control of the site and primary responsibility to communicate with Owner, occupants, and facilities personnel.
- B. The Owner shall be responsible for requesting the Contractor to respond to a remediation.
- C. The Contractor's Supervisor shall be responsible for coordinating the remediation with all involved parties including the Owner.
- D. Coordinating access to Work Area shall be the responsibility of the Contractor's Supervisor.

3.2 REMEDIATION WORK PLAN

- A. Prior to the start of each Work Order, the Contractor shall submit a detailed Remediation Work Plan to the Environmental Consultant. The Remediation Work Plan shall include the following elements:
 - 1. Summary of Scope of Work
 - a. Description of affected areas
 - b. Description of biological contaminants
 - c. Quantities and description of affected materials
 - 2. Special Precautions
 - a. Detail special circumstances, conditions, or considerations associated with the Work Order
 - 3. Products
 - a. List any products that are to be used for cleaning, disinfection, deodorizing, etc.
 - b. Provide an SDS for each product
 - c. Provide the EPA FIFRA registration number for biocides, if used
 - 4. Work Area Regulation, Preparation, and Security
 - a. Detail specifics regarding containment barrier set up.

- b. Specify number and locations of negative pressure system fans
 - c. Detail set up and location of decontamination facility
- 5. Personal Protective Equipment
 - a. Specify PPE to be used
- 6. Pre-Cleaning Procedures
 - a. List methods, procedures, and materials and locations to be pre-cleaned
- 7. Demolition Procedures
 - a. Specify procedures and tools to be used
- 8. Drying Procedures
 - a. Include number and placement of fans and dehumidifiers
 - b. Include calculations for estimated number of dehumidifiers to be utilized
- 9. Cleaning and Disinfecting Procedures
 - a. Specify cleaning and disinfecting procedures (i.e. pressure washer will be used with biocide to disinfect under wooden base plates, etc.)
 - b. Specify treatment of non-porous building materials to be left in place (i.e. HEPA vacuum, antimicrobial encapsulation, etc.)
- 10. Waste Handling and Disposal Procedures
 - a. Note restriction in times of day that the waste can be transported from Work Area
 - b. Present route of waste haul out from Work Area to on site temporary storage
 - c. Specify procedures to prevent contamination during transport (i.e. sealed bags, covered loads, closed containers, etc.)
- 11. Emergency Contingency Procedures
 - a. Specify emergency contacts and procedures to be utilized
- B. The Contractor's Remediation Work Plan shall follow the recommendations of the ANSI/IICRC S500 and the ANSI/IICRC S520 most current editions.
- C. Site specific procedures have been established for certain facilities associated with the University of Washington, such as the University of Washington Medical Center. A Site Specific Remediation Protocol may be drafted by the Contractor at the request of the Owner. If such a document has been issued, then the Contractor's Supervisor shall execute the remediation in accordance with the remediation protocol and the remediation protocol will have precedence over the Contractor's Remediation Work Plan and the recommendations of the ANSI/IICRC S200 and the ANSI/IICRC S520 most current editions.

3.3 INSPECTIONS

- A. Pre-remediation (the remediation work shall not begin until):
 - 1. A Work Order is issued and signed by the Owner.
 - 2. The Owner has reviewed and approved the Contractor's Remediation Work Plan.

3. The Contractor and the Environmental Consultant have inspected the site to ensure that work can begin.
 4. The Work Area enclosure system has been inspected and approved by the Contractor and the Owner. When enclosure systems are in use, the Contractor's Supervisor shall inspect the enclosure on a daily basis as it is being constructed and approve the completed enclosure, controls, and decontamination and waste load-out facilities when completed. Enclosure systems shall be smoke tested or otherwise tested prior to remediation to verify negative pressure has been obtained.
 5. The negative pressure ventilation and supplied air systems, if used, are functioning adequately. Contractor must test all systems.
 6. All equipment and products for remediation, cleaning, and disposal are on hand.
 7. All worker and supervisor training, certification and medical monitoring are current and documentation is available on the job site.
- B. Throughout the Project: The Contractor's Supervisor shall perform daily inspections of the project site.
- C. Post-remediation: The Owner or Environmental Consultant will perform a post-remediation inspection of the Work Area prior to removal of enclosure systems, if used.
1. If, during this inspection, any suspect biological contamination is observed, the Contractor shall adequately clean or remove the contaminated surfaces.
 2. If any visible dust or debris is observed, using the criteria for completeness of cleanup as defined by ASTM Standard E1368-11 ("No dust, dirt, or debris should be visually detectable on the final inspection of the Work Area."), the Contractor shall re-clean the Work Area.
 3. Air, swab, or bulk sampling may be performed at the discretion of the Owner to further evaluate the efficacy of the remediation.

3.4 SITE SECURITY

- A. The Work Area is to be restricted only to authorized, trained, and protected personnel. These may include the Contractor's employees; Owner employees and representatives; federal, state and local inspectors and other authorized or designated individuals.
- B. Secure the Work Area from access by occupants, staff, or users of the building. Accomplish this where possible by locking doors, windows, or other means of access to the Work Area, or by constructing temporary framing with plywood or gypsum board barriers. All emergency exits/corridors must be kept open. Fire suppression systems must remain functional or additional systems put in place at the discretion of the Owner.
- C. For projects requiring the use of a negative pressure enclosure, a logbook shall be maintained in the clean room area of the worker decontamination system. Everyone who enters the Work Area must sign in, recording; name, affiliation (Contractor, Owner, regulatory agency, etc.), work phone number, purpose of entry, acknowledge existence, review and understanding of the project's emergency contingency plan and time in and time out for each entry.
- D. Contractor shall be responsible for site security during remediation operations.

3.5 PERSONNEL PROTECTION REQUIREMENTS

A. Training

1. All personnel involved with biological remediation shall receive training consistent with their duties as described in 1.3 – Quality Criteria. Employees will receive training in order to acquire the understanding, knowledge and skills necessary for the safe performance of the duties assigned to them.
2. Training shall be provided to each affected employee:
 - a. Before the employee is first assigned duties.
 - b. Whenever the employer has reason to believe that there are deviations from the remediation procedures or that there are inadequacies in the employee's knowledge or use of these procedures.
 - c. The training shall establish employee proficiency in the duties required and shall introduce new or revised procedures, as necessary, for compliance.
 - d. Training shall include:
 - 1) Occupational risk for health effects associated with microbes.
 - 2) OSHA Hazard Communication Standard (29 CFR 1910.1200).
 - 3) Methods and Procedures for microbial remediation to include:
 - a) Proper selection and application of biocides;
 - b) Work practices to ensure proper cleaning;
 - c) Final cleaning of remediation area;
 - d) Personal Protective Equipment (PPE); and
 - e) Bloodborne Pathogens.

- #### B. Safety Meeting:
- The Contractor shall conduct a safety meeting at the beginning of the project and weekly thereafter. Topics to be discussed include, but are not limited to: emergency exit routes and procedures, location of telephone and emergency numbers, fire extinguisher, and first aid kit, special precautions for toxic or hazardous materials (SDS information), protective equipment, scaffolding procedures, proper use of ladders, electrical safety, previous week's air sample results, etc. Minutes of these meetings shall be recorded with copies provided to the Owner. All attendees shall sign an acknowledgment of attendance.

C. During remediation, the following minimal PPE is required:

1. Full-bodied disposable coveralls, clean cotton coveralls, or the equivalent over their normal work clothing and shoes;
 - a. Protective clothing shall be provided to all workers in the Work Area including impermeable gloves. Protective clothing shall be secured (for example, taped) to ensure that skin is not exposed. Skin protection is essential to prevent contact with cleaning agents, biocides, and biological pathogens.
2. Leather, canvas gloves, or equivalent work gloves over rubber or nitrile gloves as appropriate to prevent cuts;
3. Goggles, full-face respirators, or face shields to protect their eyes and prevent contact with cleaning agents, biocides, and microbial pathogens; and
4. Half-mask or full-face air purifying respirators equipped with HEPA/Organic vapor (or acid gas) cartridges.

- D. Eating, drinking, chewing gum or tobacco, smoking, and applying cosmetics are prohibited in the work location. Workers shall wash their hands and faces at break, lunch, and at the end of the day prior to engaging in these activities.
- E. Persons suffering cuts, abrasions, or puncture wounds during remediation must leave the contaminated environment immediately and seek medical treatment.
- F. Disposable coveralls and footwear shall be provided by the Contractor to the Owner, or other authorized visitors inspecting the jobsite.

3.6 REMEDIATION

- A. Biological contamination remediation typically involves the following:
 - 1. Demolition and disposal of materials that cannot be salvaged.
 - 2. Cleaning and disinfection of contaminated surfaces.
 - 3. Drying of materials that can be salvaged.
 - 4. Application of and antimicrobial encapsulant to limit future growth.
- B. Remediation of the biological contaminants shall be executed under the direction of the Contractor's Supervisor in accordance with the recommendations of the ANSI/IICRC S500 and the ANSI/IICRC S520 most current editions or a Site Specific Remediation Protocol.
- C. Remediation of biological contaminants may be conducted as a Local Removal or within a Mini-Enclosure. Large-scale remediation will be conducted within a Negative Pressure Enclosure.
 - 1. Local Removal
 - a. Local Removal methods may be employed when the area of contamination is no greater than ten square feet and only upon approval of the Owner.
 - 2. Mini-Enclosure
 - a. A Mini-Enclosure may be used when the area of contamination is no greater than one hundred square feet, can be enclosed by the Mini-Enclosure without moving the Mini-Enclosure, and only upon approval of the Owner.
 - 3. Negative Pressure Enclosure
 - a. A Negative Pressure Enclosure is required for all remediation where the area of contamination is greater than 100 square feet.

3.7 PREPARATION OF THE WORK AREA

- A. The Contractor shall post warning signs at all entrances or openings to the enclosed Work Areas. Warning signs may be in the form of continuous plastic tape. The warning signs shall have black characters on a yellow background as follows:

WARNING - DO NOT ENTER Remediation Work in Progress
- B. Alternate wording for the warning signs shall require approval by the Owner. Warning signs shall be posted every 10 feet of perimeter barrier.
- C. Pre-clean using HEPA filtered vacuums or wet cleaning methods, remove furnishings and install drop cloths, as appropriate. Do not use methods that would raise dust such as dry sweeping or vacuuming with equipment not equipped with HEPA filters. Do not disturb biologically-contaminated materials during the pre-cleaning phase.

- D. Following pre-cleaning, remove from the Work Area all dry, uncontaminated objects that are movable to protect them from potential microbial contamination.
- E. Work Area preparation for Local Removal shall be performed as follows:
 - 1. The Contractor shall place a layer of polyethylene sheeting on the floor of the Work Area, and also over an area slightly larger than the contamination in all directions and secure with duct tape.
 - 2. If a greater area of contamination on the hidden side of the removed materials is discovered during local removal, then work shall stop for assessment and direction by the Owner.
- F. Work Area preparation for mini-enclosure shall be performed as follows:
 - 1. Work Area walls, ceiling and floors (hard surfaces) shall be covered with one layer of 6-mil polyethylene sheeting. Depending on the remediation project this can be installed as a lean-to, tent or full-height containment. Walls and ceilings that are not covered will have to be cleaned following remediation.
 - 2. Establish airlock at entrance to mini-enclosure.
 - 3. Incorporate a HEPA filtered exhaust system into the critical barrier enclosure to establish a negative pressure within the enclosure. Vent the exhaust to the outside of the building when practical.
 - a. The Contractor's Supervisor shall document that a negative pressure differential has been established. The negative pressure differential may be confirmed with a manometer, a magnehelic gauge, smoke tubes, or visual observations.
 - 4. If a greater area of contamination on the hidden side of the removed materials is discovered during the remediation work, then work shall stop for assessment and direction by the Owner.

3.8 NEGATIVE PRESSURE ENCLOSURE

- A. Prepare Work Area as indicated in Article 3.7, of this section.
- B. Verify shut down and lock out all heating, cooling and air conditioning system (HVAC) components that are in, supply, or pass through the containment area, if possible. Seal all ducts and smoke test the containment before beginning abatement work within the enclosure.
- C. Pre-clean all fixed objects in the containment area using HEPA filtered vacuums and/or wet cleaning techniques as appropriate. Careful attention must be paid to machinery grills or gratings where access may be difficult, but contamination significant. Pay particular attention to wall, floor, and ceiling penetrations behind fixed items. After pre-cleaning, enclose fixed objects in 6-mil polyethylene sheeting and seal securely in place with tape.
- D. Seal off all windows, doorways, elevator openings, corridor entrances, drains, ducts, grills, grates, diffusers and all other openings between the containment area and uncontaminated areas outside of the containment area including the outside of the building, tunnels and crawl spaces with 6-mil polyethylene sheeting and tape.
- E. Cover floors in the containment area with polyethylene sheeting as follows:
 - 1. Seal all floor drains and other floor openings in area with 6-mil sheeting and duct tape.
 - 2. Floors shall be covered with two (2) individual layers of 6-mil (minimum) sheeting. The Owner shall approve each layer of sheeting prior to installation of next layer. Protect layers of sheeting as necessary against rips and tears. Install one (1) additional layer 6-mil poly sheeting as drop clothes to aid in cleanup of bulk materials.

3. Plastic shall be sized to minimize seams. If the floor area necessitates seams, those on successive layers of sheeting shall be staggered. A distance of at least 6 feet between seams is required. Do not locate seams at wall/floor joints or cracks in the concrete flooring. Pre-seal all cracks in floors before placing any plastic to the satisfaction of the Owner.
4. Floor sheeting shall extend to at least 12" up the sidewalls of the containment area.
5. Sheeting shall be installed in a fashion so as to prevent slippage between successive layers of material. (Vinyl sheeting may be used for improved traction of floors.)
- F. Provide sufficient lighting throughout the Work Area to maintain a minimum lighting level of 50-foot candles at any surface where biologically-contaminated material is to be removed. Hand held lights, such as flashlights, are not acceptable except for augmentation beyond 50-foot candle minimum illumination.
- G. Clearly identify and maintain emergency and fire exits from the Work Area.
- H. Cover walls in the containment area with polyethylene sheeting as follows:
 1. Seal all openings in walls with critical barriers with 6-mil polyethylene sheeting and duct tape. Insure airtight seal.
 2. Each wall surface shall be covered with two (2) layers of 6-mil polyethylene sheeting.
 3. Plastic shall be sized to minimize seams. Seams shall be staggered and separated by a distance of at least 6 feet.
 4. Wall sheeting shall overlap floor sheeting by at least 12 inches beyond the wall/floor joint to provide a better seal against water damage and for negative pressure.
 5. Wall sheeting shall be secured adequately to prevent it from falling away from the walls. This will require additional support/attachment when negative pressure ventilation systems are utilized. Wall sheeting shall not be taped to asbestos materials or biologically-contaminated materials.
 6. Install two or more transparent plastic viewing ports in the walls of the enclosure in such a manner to allow unobstructed viewing of all components within the enclosure, which are involved in the project. Existing windows shall be utilized for viewing ports when possible. Movable curtains on the outside shall cover viewing ports. The Owner shall approve location of view ports.
- I. Worker Decontamination Facility:
 1. Worker decontamination enclosure systems shall be provided for workers entering or exiting the containment area. The worker decontamination shall consist of a clean change room and an equipment room, each separated from each other and from the containment area by curtained doorways. The decontamination unit shall be constructed of metal, wood or plastic framing systems.
 2. The worker decontamination enclosure systems constructed at the work site shall utilize 6-mil opaque black or white polyethylene sheeting or other acceptable materials for privacy.
 3. The worker decontamination facility should be constructed contiguous to the Work Area for negative pressure enclosures. Where construction contiguous to Work Area is not feasible, the decontamination facility shall be constructed with a polyethylene lined tunnel connecting the decontamination facility to the Work Area.
 4. Entry to and exit from all material decontamination chambers and decontamination enclosure systems shall be through curtained doorways consisting of two (2) sheets of overlapping polyethylene sheeting. One sheet shall be secured at the top and left side, the other sheet at the

top and right side. Both sheets shall have weights attached to the bottom to insure that they hang straight and maintain a seal over the doorway when not in use. Inverted T double sheet doorway with a flap door shall be used.

5. Access between any two rooms in the decontamination enclosure system shall be through a curtained doorway. Pathways in from clean to contaminated, and out from contaminated to clean in the containment area shall be clearly designated.
 6. Clean room shall be sized to adequately accommodate the work crew. Benches shall be provided as well as storage for employees' street clothes. Shelves for storing respirators shall also be provided in this area. Clean work clothes (if required under disposables); clean disposable clothing, replacement filters for respirators, and other necessary items shall be provided in adequate supply at the clean room. A location for postings shall be provided in this area. Lighting, heat, and electricity shall be provided as necessary for comfort.
 7. The equipment room shall be used for storage of equipment and tools at the end of a shift after they have been decontaminated. A walk-off pad, just inside the equipment room for workers to clean off foot coverings after leaving the containment area and prevent excessive contamination of the worker decontamination enclosure system shall be used. A 6-mil polyethylene bag for collection of disposable clothing shall be located in this room. Contaminated foot wear (e.g., rubber boots, other reusable footwear) shall be stored in this area for reuse the following workday.
- J. Emergency exits shall be established and clearly marked with duct tape arrows or other effective designations to permit easy location from anywhere within the containment area. They shall be secured to prevent access from uncontaminated areas and permit emergency exiting. These exits shall be properly sealed with polyethylene sheeting, which can be cut to permit egress if needed. These exits may be the worker decontamination facility and/or other alternative exits satisfactory to Fire officials.
- K. Air Pressure Differential:
1. Provide a fully operational negative air system (HEPA filtered) within the Work Area and continuously maintain a pressure differential across Work Area enclosures of negative 0.02 inches column of water. Demonstrate to the Owner the pressure differential by use of a pressure differential meter or a manometer recording with strip chart, or similar digital equipment with alarm before disturbance of any microbially-contaminated materials.
 2. Provide fully operational negative pressure systems supplying a minimum of one air change every 15 minutes. Determine the volume in cubic feet of the Work Area by multiplying floor area by ceiling height. Determine total ventilation requirement in cubic feet per minute (cfm) for the Work Area by dividing this volume by the air change rate.
 3. Vent to outside of building, in locations approved by the Owner.
 4. Provide supplemental makeup air inlets where required for proper airflow through the workspace in location approved by the Owner.
 5. Test negative pressure system for a 1 hour time period before any microbial remediation begins. After the Work Area has been prepared, the decontamination facility set up, and the exhaust unit(s) installed, start the unit(s) (one at a time). Demonstrate operation and testing of negative pressure system to the Owner. Indications of correct negative air system shall include the following:
 - a. Plastic barriers and sheeting move lightly in toward Work Area.
 - b. Curtain of decontamination units moves lightly in toward Work Area.

- c. There is a noticeable movement of air through the decontamination unit. Use smoke tube to demonstrate air movement from the Clean Room to Equipment Room, and from Equipment Room to Work Area.
- d. Use smoke tubes to demonstrate a positive motion of air across all area in which work is performed.
- e. Use a differential pressure meter or manometer to demonstrate a pressure difference of at least 0.02 inches column of water across every barrier separating the Work Area from the balance of the building or outside.
- f. Modify the Negative Pressure System as necessary to successfully demonstrate the above.
- g. Contractor's Supervisor shall smoke test the negative pressure enclosure at least once every shift and document testing in daily log.
 - 1) Provide a minimum of one back-up negative air for every four primary negative air units used. A minimum of one back-up negative air unit will be required if less than four primary units are used. The back-up negative air unit(s) shall be of equal capacity to primary unit(s).
 - 2) Openings made in the enclosure system to accommodate these units shall be made airtight. If more than one unit is installed, they should be turned on one at a time, checking the integrity of wall barriers for secure attachment and need for additional reinforcement. Insure that adequate power supply is available to satisfy the requirements of the ventilating units. Twelve inch diameter extension ducting shall be used to reach from the containment area to the outside when required.

L. Maintenance of Containment Barriers and Worker Decontamination Facility:

- 1. Following completion of the construction of all polyethylene barriers and decontamination system enclosure, the negative air machines shall be turned on. The Contractor shall continuously maintain a pressure differential across Work Area enclosures a minimum of negative 0.02 inches column of water for a 1-hour settling time to insure that barriers will remain intact and secured to walls and fixtures before beginning actual remediation activities.
- 2. All polyethylene barriers inside the containment, in the worker decontamination enclosure system, in the waste container pass-out airlock and at partitions constructed to isolate the area from occupied areas, shall be inspected by the Contractor's Supervisor at least twice daily including prior to the start of each day's remediation activities. Document inspections and observations into the daily project log.
- 3. Damage and defects in the enclosure system are to be repaired immediately upon discovery. Use smoke tubes to test the effectiveness of the barrier system when directed by the Owner.
- 4. At any time during the remediation activities after barriers have been erected, if visible material is observed outside of the containment area or if damage occurs to barriers, the work shall immediately stop, repairs made to the barriers, and debris/residue cleaned up using appropriate HEPA vacuuming and wet mopping procedures.
- 5. Careful installation and daily inspections shall be done to ensure that the negative pressure ventilation exhaust does not release microbially-contaminated materials into uncontaminated building areas.

3.9 PROCEDURES FOR EMERGENCY SPILLS AND UNCONTROLLED RELEASES OF BIOLOGICALLY-CONTAMINATED MATERIALS

- A. This procedure shall be used in any situation involving an uncontrolled release such as but not limited to, a rupture in a containment, unscheduled removal of wall material that opens the Work Area from an uncontained side of a wall, or similar event where biologically-contaminated materials may be or has the potential to be introduced into the air in an uncontrolled manner.
- B. Specific Work Procedure:
 - 1. Evacuate the immediate area of all unprotected personnel.
 - 2. Establish a regulated area. The Work Area shall be identified and access restricted in any manner that minimizes the number of persons within the Work Area and protects persons outside the Work Area from exposure. Seal all openings into Work Area including drains.
 - 3. Use caution to assure personnel are not tracking debris to areas outside the regulated area and spreading the contamination.
 - 4. Contact the Owner as soon as possible.
 - 5. Clean the entire area using wet methods, a HEPA equipped vacuum, or other appropriate procedure.
 - 6. The clean-up procedures shall include the entire affected area.

3.10 CONTAINMENT ENTRY AND EXIT PROCEDURES

- A. Personnel Entry and Exit:
 - 1. All workers and authorized personnel shall enter the containment area through the worker decontamination enclosure system or airlock.
 - 2. All personnel who enter the containment area must sign the entry log located in the clean room or airlock upon entry and exit.
 - 3. All personnel before entering the containment area shall read and be familiar with all posted regulations, personnel protection requirements (including work place entry and exit procedures), and emergency procedures. A sign-off sheet shall be used to acknowledge that these have been reviewed and understood by all personnel prior to entry.
 - 4. When entering a containment all personnel shall proceed to the clean room or airlock don appropriate respiratory protection and disposable coveralls, head covering and foot covering. Hard hats and gloves shall also be utilized as required. Clean respirators and protective clothing shall be provided and utilized by each person for each separate entry into the containment area.
 - 5. Personnel wearing designated personal protective equipment shall proceed from the clean room through equipment room or airlock to the main containment area.
 - 6. Before leaving the containment area all personnel shall remove gross contamination from the outside of respirators and protective clothing. Each person shall clean bottoms of protective footwear just prior to entering the equipment room or airlock.
 - 7. Personnel shall proceed to equipment room where they remove all protective equipment except respirators. Deposit disposable clothing into appropriately labeled containers for disposal.

8. Reusable contaminated footwear shall be stored in the equipment room or in case of mini-enclosure in the Work Area when not in use in the containment area.
9. Proceed to the clean room or airlock, remove respirator, and don clean disposable clothing if there will be later re-entry into the containment area or street clothes if they are at the end of the work shift.

3.11 DEMOLITION PROCEDURES

1. Remove all specified materials using hand tools where appropriate.
2. The limited use of water for dust control is allowed provided its use is controlled and doesn't damage finishes or furnishing.
3. In the case of wallboard and plaster, the Contractor shall remove the wall or ceiling material in manageable pieces by cutting into large sections to reduce the amount of dust released during demolition activities or by removing screws. All wallboard screws shall be removed with care without damaging metal studs or lumber.
4. To facilitate restoration, the following procedures shall be followed for drywall demolition unless otherwise specified by the Work Order, Scope of Work, or the Site Specific Remediation Protocol:
 - a. When the damaged drywall is limited to an elevation of less than twelve inches above the floor level, then remove the drywall to an elevation of twelve and three eighths inches.
 - b. When the damaged drywall is limited to an elevation of more than twelve inches but less than twenty four inches above the floor level, then remove the drywall to an elevation of twenty four and three eighths inches.
 - c. When the damaged drywall is limited to an elevation of more than twenty four inches but less than forty eight inches above the floor level, then remove the drywall to an elevation of forty eight and three eighths inches.
 - d. When the damaged drywall is limited to an elevation of more than forty eight inches, then remove the entire sheet of drywall.
5. Remove batting insulation and other porous debris within wall cavities, as applicable.
6. Removed material shall not be dropped or thrown. Remove material intact or as components whenever possible and carefully lower to the floor. If this cannot be feasibly accomplished, a dust-tight chute shall be constructed to transport the material to containers on the floor, or the material may be containerized at elevated levels (e.g., on scaffolds) and carefully lowered to the ground by mechanical means.
7. Single bag all waste material prior to removal from the Work Area or immediately upon removal of the barrier. Disposal bags shall not be overfilled.
8. Handcarts or equivalent shall be used to transport waste containers or materials. Waste containers or materials shall be raised and securely transported, and shall not be dropped or slid.
9. Disposal containers shall be securely sealed to prevent accidental opening and leakage. Bags may be placed in drums for staging and transportation to the landfill.
10. Large components removed intact may be wrapped in a layer of 6-mil polyethylene sheeting secured with tape for transport to the landfill.

11. The Work Area shall be cleaned of all visible dust and debris prior to the visual inspection by the Owner. Re-cleaning may be required, at no additional cost to the Owner, until all suspect material is removed. Re-cleaning and inspection will continue until no visible suspect material remains.

3.12 DISINFECTION

- A. Disinfection of biologically contaminated surfaces will be performed in accordance with all Federal, State, Local, and Facility rules and regulations.
- B. Disinfection of biologically contaminated surfaces will be performed in accordance with the Contractor's Remediation Work Plan and/or the Site Specific Remediation Protocol.
- C. Biocides and cleaning agents shall be applied as directed by the manufacturer. Biocides shall hold a current registration with the Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
- D. Application of biocides in Healthcare Facilities shall be in accordance with the recommendation provided by the Department of Health and Human Service Center for Disease Control (CDC) Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008.

3.13 DRYING REQUIREMENTS

- A. Dry building materials, finishes, or furnishing (i.e. wall systems, floor covering, office supplies, etc.) as specified in the Work Order, Scope of Work, or Site Specific Remediation Protocol.
- B. Set up drying equipment including dehumidifiers and fans in accordance with the recommendations presented in the ANSI/IICRC S500 most current edition or the Site Specific Remediation Protocol.
- C. The Contractor's Supervisor shall establish a daily schedule to monitor condensate collection vessels and empty as necessary. The daily schedule will be documented and submitted to the Owner on a daily basis.
- D. The Contractor's Supervisor shall conduct psychrometric readings at the intake and exhaust of each dehumidifier and in surrounding areas adjacent to the Work Area. The readings shall be collected and recorded at least daily at the beginning and at the end of the shift, and submitted to the Owner by the start of the next shift. Measurements shall include, at a minimum the following:
 1. Percent Relative Humidity
 2. Temperature
 3. Dew Point or Specific Humidity
- E. The Contractor's Supervisor shall conduct moisture measurements of materials that are being dried. The readings will be collected and recorded at least daily at the beginning and at the end of the shift, and submitted to the Owner by the start of the next shift.
- F. The Contractor's Supervisor shall monitor the drying for indications of abnormal microbial ecology (i.e. suspect visible fungal growth, musty odors, etc.). If abnormal microbial ecology is suspected, the Contractor's Supervisor shall immediately notify the Owner.

3.14 DISPOSAL REQUIREMENTS

- A. Spent cleaning agents, biocides, and supplies shall be packaged, labeled, transported, and disposed of in accordance with all federal, state, and local regulations and requirements.

- B. Demolition debris shall be packaged, labeled, transported, and disposed of in accordance with all federal, state, and local regulations and requirements.
- C. Contaminated waste shall be packaged, labeled, transported, and disposed of in accordance with all federal, state, and local regulations and requirements.
- D. Remove waste containers from the areas during agreed upon hours via the agreed upon route.

3.15 POST REMEDIATION CLEARANCE EVALUATION

- A. The Contractor will conduct a final visual inspection of the Work Area for completeness of work and the presence of any visible debris following all remediation in using the criteria for completeness of cleanup as defined by ASTM Standard E1368-11 ("No dust, dirt, or debris should be visually detectable on the final inspection of the Work Area."), The Contractor will notify the Owner when the Work Area has successfully passed this criteria.
- B. Upon notification of successful completion of the Contractor's final visual inspection, the Owner will conduct a Post Remediation Clearance Evaluation. The Post Remediation Clearance Evaluation will consist of a visual inspection and biological testing.
 - 1. A physical inspection will be performed to assess the remediation efforts with regard to completeness of the demolition and cleaning procedures. The inspector will rely on sensorial observations (visual, olfactory, and tactile) to evaluate the efficacy of the remediation.
 - 2. The Owner will conduct a final visual inspection of the Work Area for completeness of work and the presence of any visible debris following all remediation using the criteria for completeness of cleanup as defined by ASTM Standard E1368-11 ("No dust, dirt, or debris should be visually detectable on the final inspection of the Work Area.").
 - 3. Representative areas may be further evaluated using sterile swabs, spore traps, Anderson samples, tape lifts, Adenosine triphosphate (ATP) test kits, etc. to collect surface, bulk, or air samples. The samples will be submitted to a qualified laboratory on a twenty-four hour turnaround time and analyzed for fungi or fecal indicators, as appropriate.
- C. The standard for clearance of an area shall include all of the following.
 - 1. The Owner's confirmation of the successful completion of the Scope of Work specified on the Work Order and/or in a Site Specific Remediation Protocol;
 - 2. The absence of physically detectable contamination or residues;
 - 3. The absence of interfering antimicrobial, biocide, or cleaning agent odors; and,
 - 4. Laboratory results confirming a successful decontamination.
- D. Examples of clearance testing criteria are presented below. Project specific test methods may be employed as determined by the Owner and/or the Site Specific Remediation Protocol.
 - 1. Fungal.
 - a. Nonviable fungal tape lifts shall confirm the absence of fungal spores or fungal fragments above "trace" levels.
 - b. Nonviable fungal air samples shall indicate fungal spores and fungal fragments inside of the Work Area are not significantly more numerous with regard to genera and concentration to those in surrounding or outdoor areas.

2. Bacterial
 - a. Sterile Swab confirming the absence of fecal indicators (i.e. Total coliform, Fecal coliforms *E. coli*, *Enterococcus*).
- E. Upon receipt of clearance, the Contractor may dismantle the Work Area containment.

END OF SECTION