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These Mold Response Standard Operating Procedures (SOP’s) are provided to Penn State University work units, supporting the safe preparation, handling and disposal of mold-contaminated materials, and specifically, the safe cleaning, removal and disposal of limited quantities, i.e. approximately less than 100 square feet of mold-contaminated articles or surfaces. This guideline is intended to protect both workers and the affected built environment, and is not a fine line or regulatory threshold, defining safe or unsafe levels of mold contamination.

Mold contamination that is more significant or wide-spread in a building, requires special isolation techniques, and additional training by personnel performing the work. For these larger projects, mold clean-up or removal work should be performed by qualified contractors, and may include separate monitoring by 3rd party experts, familiar with the evaluation and control of mold-related hazards.

Please contact your work unit supervisor and your safety officer to determine the best strategy for clean-up or removal of a particular mold hazard. Please contact the EHS office (865 – 6391), Hans Derr, Manager, Health & Environmental Programs at (3-3834), or Curt Speaker, Biosafety Officer (3-3905) for further assistance in evaluating mold hazards.

1. **General Guidelines – Safe Handling and Removal of Mold-Contaminated Building Materials**

The following guidelines are provided to support an effective response by Penn State personnel to ***limited quantities of mold-contaminated articles or building materials***. When considering the surface area of relative impact, the following guideline should be applied:

* Surface contamination may be contiguous (in one, continuous area), or diffuse (nearby, disconnected smaller groups of contamination), but localized within a room, hallway or part of a room.
* Where surface impact is contiguous, estimate square feet of visible contamination, and any additional hidden or non-visible contamination which may be located behind walls or building surfaces. This non-visible contamination may be present by unknown sources of odor, or deformed, delaminated or softened wall structure, bubbling or delaminating paint, material discoloration, or other factors which indicate symptoms of water/mold impact,
* Where surface impact is diffuse, estimate the relative surface area by mentally condensing the diffuse spots into one contiguous area; further estimate potential hidden, or non-visible mold, as above indicated.
* Surface inspections for hidden mold should be conducted while donning all appropriate PPE, to prevent exposure to spores or moldy debris by inhalation, or contact with skin, eyes, and mucous membranes.

**Estimates are not intended to be fine lines for determining response action.** Response actions should accommodate the capability and job focus of Penn State personnel, range of controls, available manpower requirements, and other factors, which may complicate a response action.

1. **Incidental Surface Mold Growth (estimated less than 3 square feet impacted materials or area)**

Preliminary

Verify worker/employee orientation and training to perform incidental mold cleaning tasks. Pre-notify EHS in event alleged occupant health symptoms have been reported.

Work Area Preparation/ Isolation

As needed, isolate the work area from general occupancy, and lock-out ventilation sources as necessary to prevent dispersal of spores during work.

1. Obtain needed equipment and materials for conducting incidental cleaning, and donn appropriate personal protective equipment (PPE). Typical PPE will include protective gloves and eyewear. In cases involving dry spores or heavily contaminated surfaces, a NIOSH/MSHA-approved N95 dust mask is also advised.

Work Procedures

For Cleaning Solid Surfaces: Mist-spray residues, and damp wipe/clean solid surfaces with a Betco QuatStat or other disinfecting solution. If loose spores are noticeable, HEPA vacuuming may be additionally used for control. Refer to Section II. *Specific Guidelines – Safe Handling and Removal of Mold-Contaminated Building Materials, by Material Type* for removal of contaminated substrates such as drywall.

For Fabric/ Non-Impervious Surfaces: For light, surface contamination, mist-spray surface with compatible disinfecting solution, then HEPA vacuum surface to remove visible debris or contaminants. *Consult specialized services for fabric cleaning and stain removal*. Carefully mist, collect in sealable plastic bags, and discard heavily impacted fabric or textile materials. Contact qualified outside servicers for support.

1. **Incidental Surface Mold Growth (cont.)**

Personal Protective Equipment (PPE) List

* NIOSH/MSHA-Approved N95 filtering face piece (dust mask), or ½-face respirator with N95 filter cartridges (minimum)
* Glove protection – minimum durable nitrile exam gloves,
* Eye protection – Safety glasses and/ or chemical splash goggles with vented covers,

Control Equipment & Materials List

* Hand pump sprayer, as necessary.
* Betco Quat-Stat solution mixed according to directions, OR sodium hypochlorite (chlorox) bleach solution of 1 part water: 10 parts standard bleach. If used, ensure proper chemical protective or nitrile gloves used.
* Disposable or waste cleaning rags, brushes and cleaning supplies,

Optional Additional Supplies, as needed:

* High Efficiency Particulate Absolute (HEPA)-filtered portable vacuum cleaner system with hose and attachments (if necessary for loose spores or dust).
* Polyethylene sheet, 6- or 4-mil, for covering floors beneath work.

NOTE: Arrange for shut down of area HVAC service, as necessary.

* Wire brushes, for cleaning structural or rough surfaces, only as necessary

Reference Guides – *Refer to Section III References.*

1. **Removal or Cleaning of Estimated Greater than 3 – 10 Square Feet of Mold-Impacted Materials**

Preliminary

Verify worker/employee orientation and training. Pre-notify EHS in event alleged occupant health symptoms have been reported.

Work Area Preparation/ Isolation

1. Isolate work area from general occupancy.
2. Stop/ lock-out ventilation sources to the immediate work area and/or close off ventilation vents.
3. Pre-notify building/ adjacent occupants of planned mold removal/cleaning activities including project contact information.
4. Isolate or demarcate work areas.

NOTE: Adjacent occupancy (adjacent rooms) is permissible; however, persons with weakened immune systems or allergy should NOT occupy areas during response activity.

1. Pre-clean solid surface floor (as required).
2. Place down plastic drop cloth to protect nearby floors or surfaces.
3. Remove unfixed (removable) articles from work area before work. Note any items which may require specialized cleaning.

Work Procedures

1. Mist mold-damaged or contaminated surfaces with cleaning/disinfecting solution,
2. Use HEPA vacuums to remove loose spores or surface mold, and to periodically clean up dusts and debris.
3. Carefully clean and/or remove mold-contaminated articles and place in plastic disposal bags; seal bags with duct tape.
4. Conduct specific removal or cleaning according to specific guidelines listed at Section II.
5. Post wipe-clean and/or HEPA vacuum all area surfaces.
6. Clean wipe all solid surfaces.
7. Conduct a visual inspection of all areas and surfaces following work and cleaning.

Personal Protective Equipment (PPE) List

* NIOSH/MSHA-Approved N95 filtering face piece (dust mask), or ½-face respirator with N95 filter cartridges (minimum)
* Glove protection – minimum durable nitrile exam gloves,
* Eye protection – Chemical splash goggles with vented covers, and/or safety glasses,
* Work/body clothing protection – Disposable Tyvek or Kleenguard (coveralls) with minimum elastic sleeves and legs (or include Tyvek or durable, disposal boot covers).
* Foot protection – Boot covers or Tyvek or other disposable boot/shoe covers.

Control Equipment & Materials List

* High Efficiency Particulate Absolute (HEPA)-filtered portable vacuum cleaner system with hose and attachments.
* Polyethylene sheet, 6- or 4-mil, for isolating/ covering nearby work area surfaces.
* NOTE: Arrange for shut down of area HVAC service.
* Hand pump sprayer
* Betco Quat-Stat solution mixed according to directions, or sodium hypochlorite (chlorox) bleach solution of 1 part water: 10 parts standard bleach. If used, ensure proper chemical protective or nitrile gloves used.
* Disposable or waste cleaning rags, brushes and cleaning supplies,
* Wire brushes (for cleaning structural lumber or rough surfaces)
* Auxiliary lighting, connected safely through GFCI-protected circuit (as necessary)

Reference Guides – *Refer to Section III References.*

1. **Removal or Cleaning of an Estimated 10 – 100 Square Feet of Mold-Impacted Materials**

Preliminary

Verify worker/employee orientation and training. Pre-notify EHS in event alleged occupant health symptoms have been reported. Consult EHS during project planning for any additional project requirements, such as for any needed environmental sampling and analysis or contract support services.

Work Area Preparation/ Isolation

1. Isolate work area from general occupancy.
2. Stop/ lock-out ventilation sources to the immediate work area and/or close off ventilation vents.
3. Adjacent occupancy (adjacent rooms) is NOT permissible.
4. Pre-clean solid surface floor (as required).
5. Place down plastic drop cloth and/or cover tabletops to protect work area floors and surfaces.
6. Remove unfixed (removable) articles from work area before performing work. Note any items which may require specialized cleaning.
7. Install portable HEPA air filtration unit for use in recirculation or exhaust mode to contain air movement and to prevent dispersal of airborne mold spores and construction dusts. Exhaust air stream should NOT disturb mold-impacted surfaces, and where feasible, exhaust to exterior area. Circulate dry air within area/zone for a period following removal and cleaning work.
8. Donn and remove Tyvek coverall before entering, and upon leaving work area.

NOTE: Additional air drying equipment may be required where significant wetting of materials has occurred.

Personal Protective Equipment (PPE) List

* NIOSH/MSHA-Approved N95 filtering face piece (dust mask), or minimum ½-face respirator with N95 filter cartridges (minimum) is recommended. Comply with Penn State Respiratory Protection Program requirements where respirators are required.
* Glove protection – minimum durable nitrile exam gloves,
* Eye protection – Chemical splash goggles with vented covers, and/or safety glasses,
* Work/body clothing protection – Disposable Tyvek or Kleenguard (coveralls) with minimum elastic sleeves and legs (or include Tyvek or durable, disposal boot covers),
* Foot protection – Boot covers or Tyvek or other disposable boot/shoe covers.

Control Equipment & Materials List

* High Efficiency Particulate Absolute (HEPA)-filtered portable vacuum cleaner system with hose and attachments,
* Polyethylene sheet, 6- or 4-mil, for isolating/ covering nearby work area surfaces,
* Duct tape
* NOTE: Arrange for shut down of area HVAC service.
* Hand pump sprayer
* Betco Quat-Stat solution mixed according to directions or sodium hypochlorite (chlorox) bleach solution of 1 part water: 10 parts standard bleach.

**NOTE**: All appropriate product precautions should be observed when working with cleaning-disinfecting solutions.

* Disposable or waste cleaning rags, brushes and cleaning supplies,
* Wire brushes (for cleaning structural lumber or rough surfaces)
* Auxiliary lighting, connected safely through GFCI-protected circuit (as necessary)
* HEPA air filtration unit with associated flexible exhaust duct.
* Carpet steam cleaner or other specialized equipment

Work Procedures

1. Mist mold-damaged or contaminated surfaces with cleaning/disinfecting solution,
2. Use HEPA vacuums to remove loose spores or surface mold, and to periodically clean up dusts and debris.
3. Carefully clean and/or remove mold-contaminated articles and place in plastic disposal bags; seal bags with duct tape.
4. Minimize dust generation by using hand tools vs. power saws or tools.
5. Conduct specific removal or cleaning according to specific guidelines listed at Section II.
6. Post wipe-clean and/or HEPA vacuum all area surfaces.
7. Perform final wipe-cleaning/ disinfection of all area solid surfaces.
8. Mist or wipe drop cloths,
9. Carefully place waste materials in minimum 4 mil polyethylene bags. Remove from building to residual waste containers. No special waste requirements.
10. Carefully clean/remove vent covers; final clean work area; restore area services.
11. Conduct a final visual inspection of all areas and surfaces following work and cleaning.
12. Where planned, arrange for any needed environmental sampling and analysis.

Reference Guides – *Refer to Section III References.*

1. **Specific Guidelines – Safe Handling and Removal of Mold-Contaminated Building Materials, by Material Type**

In addition to the general procedures and controls presented at Section I, please refer to the additional material-specific guidelines. Please consult your supervisor or EHS where needed to determine extent of mold impact or response action.

1. DRYWALL - Cut in a manner to minimize dust using hand tools. Mist before and/or during cutting. Do not saturate. Utilize HEPA vacuums to collect airborne dust during cutting, as feasible. Place directly into waste bags (i.e. minimum 4-mil polyethylene) and seal with duct tape. Waste should be carefully removed from the facility, and may be disposed as general residual waste.
2. INSULATION - Verify NON-ASBESTOS, OR treat as ASBESTOS. Refer to the EHS website, and Asbestos web page for detailed guidance. Use glovebags for pipe insulation removal, if feasible. Use wet misting practices during all cutting and removal activities.
3. CARPETS, Water Incursion –
* If ‘black water’ (chemical or biological contaminated, sewage) – Discard. Use proper care in handling sewage-contaminated debris. *Refer to Penn State’s Water Incursion Procedures*, (last revised September 2012). Disinfect concrete or base solid surfaces.
* If ‘gray water’ (outdoor rainwater, non-potable, or potable mixture) -
* Hot-water disinfecting extract with EFFECTIVE drying (lift, ventilate),
* Extract and dry-chemical clean, with EFFECTIVE drying (lift, ventilate), OR
* Steam extract (disinfecting solution), with EFFECTIVE drying (lift, ventilate)

NOTES: If area is damp-prone, dry chemical extraction, or steam extraction are preferred. Ensure material safety data sheets (MSDS) or safety data sheets (SDS) are reviewed and precautions taken during use.

1. CARPETS, Other (mold on surface) –
* HEPA vacuum clean carpet, followed by effective extraction and drying.
* Wet mist with disinfecting solution if dry spores visible on surface.
1. TEXTILES – Use same practices as for carpets. Control release of spores whether discarding or containing for possible deep disinfection/ cleaning. Contact specialized laundering facilities, as required.
2. WOOD – HEPA vacuum, mist disinfecting clean, wire brush surface contaminants.

 Consult EHS with questions or need for assistance.

1. **References**
2. **EHS Internal Reference**

Penn State Water Incursion Standard Operating Procedure, September 2012

1. **External Agency/ Organization References**

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| **Agency/ Organization** | **Resource(s) provided** | **URL - Website** |
| Carpet & Rug Institute (CRI) | Carpet maintenance, restoration guides | [www.carpet-rug.org](http://www.carpet-rug.org/)(706) 278-3176 |
| International Institute of Cleaning, & Restoration Certification (IICRC) | Information, standards for inspection, cleaning and restoration of buildings/ materials | [www.iicrc.org](http://www.iicrc.org/)360-693-5675 |
| IICRC | Certification courses | http://www.iicrc.org/education-certification/course-schedule/ |

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| **Agency/ Organization** | **Resource(s) provided** | **URL - Website** |
| National Institute of Building Sciences (NIBS) | Building regulations, science, technology guidance | [www.nibs.org](http://www.nibs.org/)(202) 289-7800 |
| National Air Duct Cleaners Association (NADCA) | Duct cleaning information, standards and guidance | [www.nadca.org](http://www.nadca.org/)(202) 737-2926 |
| New York City Dept. of Health & Mental Hygiene (NYCDOH) | Guidelines on Assessment and Remediation of Fungi in Indoor Environments (Nov. 2008) | http://www.nyc.gov/html/doh/downloads/pdf/epi/epi-mold-guidelines.pdf |
| Public Health Agency of Canada | Guidelines and standards, including assessment of mold | www.phac-aspc.gc.ca/hp-ps/index-eng-php |
| USDOL/ OSHA | Safety & Health Information Bulletin- “Mold in the Workplace” (SHIB-03-10-10) | https://www.osha.gov/dts/shib/shib101003.html |
| USDOL/ OSHA | OSHA Mold webpage | www.osha.gov/SLTC/molds/ |
| USEPA | Moisture Control Guidance for Building Design, Construction and Maintenance (EPA 402-F-13053)  | http://www.epa.gov/iaq/pdfs/moisture-control.pdf |
| USEPA | Mold Course - "Introduction to Mold and Mold Remediation for Environmental and Public Health Professionals" | http://www.epa.gov/mold/moldcourse/index.html |
| USEPA | Mold Resources webpage | http://www.epa.gov/mold/moldresources.html |
| USEPA | Mold Remediation in Schools and Commercial Buildings EPA 402-K-01-001 (Sept. 2008) | http://www.epa.gov/mold/pdfs/moldremediation.pdf |